MOUNTING AND OPERATING INSTRUCTIONS

EB 8384-3 EN

Translation of original instructions



Old design



New design

HART® COMMUNICATION PROTOCOL

Series 3730
Type 3730-3 Electropneumatic Positioner

Communication: HART®

Firmware version 1.61

CE EAC Ex certified

TÜVRheinland CERTIFIED SIL/PL Capability www.tuv.com ID 0600000000

Edition April 2022

Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices. The images shown in these instructions are for illustration purposes only. The actual product may vary.

➔ For the safe and proper use of these instructions, read them carefully and keep them for later reference.

➔ If you have any questions about these instructions, contact SAMSON's After-sales Service (aftersalesservice@samsongroup.com).

Documents relating to the device, such as the mounting and operating instructions, are available on our website at ***www.samsongroup.com > Downloads > Documentation***.

Definition of signal words

⚠ DANGER

Hazardous situations which, if not avoided, will result in death or serious injury

⚠ WARNING

Hazardous situations which, if not avoided, could result in death or serious injury

NOTICE

Property damage message or malfunction

Note

Additional information

Tip

Recommended action

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1 Safety instructions and measures

Intended use

The SAMSON Type 3730-3 Positioner is mounted on pneumatic control valves and used to assign the valve position to the control signal. The device is designed to operate under exactly defined conditions (e.g. operating pressure, temperature). Therefore, operators must ensure that the positioner is only used in applications where the operating conditions correspond to the technical data. In case operators intend to use the positioner in applications or conditions other than those specified, contact SAMSON.

SAMSON does not assume any liability for damage resulting from the failure to use the device for its intended purpose or for damage caused by external forces or any other external factors.

➔ Refer to the technical data for limits and fields of application as well as possible uses.

Reasonably foreseeable misuse

The Type 3730-3 Positioner is ***not*** suitable for the following applications:

– Use outside the limits defined during sizing and by the technical data

Furthermore, the following activities do not comply with the intended use:

– Use of non-original spare parts
– Performing maintenance activities not described in these instructions

Qualifications of operating personnel

The positioner must be mounted, started up or operated only by trained and experienced personnel familiar with the product. According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible hazards due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.

Explosion-protected versions of this device must be operated only by personnel who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.

Personal protective equipment

No personal protective equipment is required for the direct handling of the positioner. Work on the control valve may be necessary when mounting or removing the device.

➔ Observe the requirements for personal protective equipment specified in the valve documentation.

➔ Check with the plant operator for details on further protective equipment.

Revisions and other modifications

Revisions, conversions or other modifications of the product are not authorized by SAMSON. They are performed at the user's own risk and may lead to safety hazards, for example. Furthermore, the product may no longer meet the requirements for its intended use.

Safety features

Upon failure of the air supply or electric signal, the positioner vents the actuator, causing the valve to move to the fail-safe position determined by the actuator.

Warning against residual hazards

The positioner has direct influence on the control valve. Any hazards that could be caused in the valve by the process medium, the signal pressure or by moving parts are to be prevented by taking appropriate precautions. Plant operators and operating personnel must observe all hazard statements, warning and caution notes in these mounting and operating instructions, especially for installation, start-up and service work.

If inadmissible motions or forces are produced in the pneumatic actuator as a result of the supply pressure, it must be restricted using a suitable supply pressure reducing station.

Responsibilities of the operator

Operators are responsible for proper use and compliance with the safety regulations. Operators are obliged to provide these mounting and operating instructions to the operating personnel and to instruct them in proper operation. Furthermore, operators must ensure that operating personnel or third parties are not exposed to any danger.

Responsibilities of operating personnel

Operating personnel must read and understand these mounting and operating instructions as well as the specified hazard statements, warning and caution notes. Furthermore, the operating personnel must be familiar with the applicable health, safety and accident prevention regulations and comply with them.

Referenced standards, directives and regulations

Devices with a CE marking fulfill the following requirements of the Directives:

– Type 3730-3: 2014/30/EU, 2011/65/EU
– Type 3730-31/-35/-38/-39: 2014/30/EU, 2014/34/EU, 2011/65/EU

Devices with an EAC marking fulfill the following requirements of the Regulations:

– Type 3730-3: TR CU 020/2011

See the 'Certificates' chapter for the declarations of conformity and EAC certificates.

Referenced documentation

The following documents apply in addition to these mounting and operating instructions:

– Operating instructions for valve diagnostics: ▶ EB 8389
– Safety manual: ▶ SH 8384-3
– The mounting and operating instructions of the components on which the positioner is mounted (valve, actuator, valve accessories etc.).

1.1 Notes on possible severe personal injury

⚠ DANGER

Risk of fatal injury due to the ignition of an explosive atmosphere.

Incorrect installation, operation or maintenance of the positioner in potentially explosive atmospheres may lead to ignition of the atmosphere and ultimately to death.

➔ The following regulations apply to installation in hazardous areas: EN 60079-14 (VDE 0165, Part 1).

➔ Installation, operation or maintenance of the positioner must only be performed by personnel who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.

➔ Read the special instructions concerning explosion protection (see Chapter 1.4).

1.2 Notes on possible personal injury

⚠ WARNING

Crush hazard arising from moving parts on the valve.

Control valves contain moving parts (actuator and plug stem), which can injure hands or fingers if inserted into the valve.

➔ Do not touch any moving valve parts while the control valve is in operation.

➔ Before performing any mounting or installation work on the positioner, put the control valve out of operation by disconnecting and locking the supply air and control signal.

➔ Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.

Incorrect electrical connection will render the explosion protection unsafe.

➔ Adhere to the terminal assignment.

➔ Do not undo the enameled screws in or on the housing.

Intrinsic safety rendered ineffective in intrinsically safe devices.

Every time the positioner is operated, even not within the plant (e.g. during maintenance, calibration and work on equipment), it must be ensured that the conditions for intrinsically safe circuits are observed.

➔ Only connect intrinsically safe devices intended for use in intrinsically safe circuits to certified intrinsically safe input-connected units.

➔ Do not place intrinsically safe devices back into operation that were connected to intrinsically safe input-connected units without certification.

➔ Do not exceed the maximum permissible electric values specified in the EC type examination certificates when interconnecting intrinsically safe electrical equipment (U_i or U_0, I_i or I_0, P_i or P_0, C_i or C_0 and L_i or L_0).

1.3 Notes on possible property damage

NOTICE

Risk of damage to the positioner due to incorrect mounting position.

➔ Do not mount the positioner with the back of the device facing upward.

➔ Do not seal or restrict the vent opening when the device is installed on site.

Incorrect installation of the lever in positioner versions without a sliding clutch will damage the travel sensor.

➔ Hold the lever in position while removing or mounting it to prevent it from moving to the end stops.

An incorrect electric signal will damage the positioner.

For the positioner to function properly, a current source and compliance with the prescribed terminal assignment are necessary.

➔ Only use a current source and never a voltage source.

➔ Connect the electrical wiring to the positioner according to the prescribed terminal assignment.

Malfunction due to initialization not yet completed.

The initialization causes the positioner to be calibrated to adapt it to the mounting situation. After initialization is completed, the positioner is ready for use.

➔ Initialize the positioner on first start-up.

➔ Re-initialize positioner after changing the mounting position.

Risk of positioner damage due to incorrect grounding of the electric welding equipment.

➔ Do not ground electric welding equipment near to the positioner.

Incorrect cleaning will damage the window.

The window is made of Makrolon® and will be damaged when cleaned with abrasive cleaning agents or agents containing solvents.

➔ Do not rub the window dry.

➔ Do not use any cleaning agents containing chlorine or alcohol or abrasive cleaning agents.

➔ Use a non-abrasive, soft cloth for cleaning.

1.4 Special instructions concerning explosion protection

Explosive dust atmospheres of zone 21 or zone 22

➔ The following applies to type of protection Ex i in combustible dust atmospheres:
- If intrinsic safety is impaired by the influence of dust, an enclosure complying with Clause 6.1.3 of EN 60079-11 with at least degree of protection IP 5X must be used. The requirements according to Clause 6.1.3 apply to the cable entries and conduit systems accordingly.
- The degree of ingress protection is verified by a test according to IEC 60529 and EN 60079-0 (e.g. performed by VDE).

➔ For use in the presence of combustible dust in compliance with type of protection Ex tb IIIC (protection by enclosure), observe clause 5.6.3 of EN 60079-14.

Equipment for use in zone 2/zone 22

➔ In equipment operated according to type of protection Ex nA (non-sparking equipment) according to EN 60079-15, circuits may be connected, interrupted or switched while energized only during installation, maintenance or repair.

➔ Observe the special conditions of use mentioned in the statement of conformity for the rated values and the installation of the series-connected fuse for interconnection of Ex nA circuits.

➔ Positioners with type of protection Ex nA or Ex tc can be used with a cover with or without window.

➔ The Types 3730-31, 3730-35 and 3730-38 Positioners are 100 % identical in design, except for the marking and the housing cover.

➔ For type of protection Ex nA, connect the VCC connection in the program interface adapter in series with a fuse according to IEC 60127, 250 V F or T with a fuse rating of max. $I_N \leq 40$ mA.

➔ Connect the signal current circuit in series with a fuse according to IEC 60127-2/VI, 250 V T with a fuse rating of $I_N \leq 63$ mA.

➔ Connect the transmitter current circuit in series with a fuse according to IEC 60127-2/VI, 250 V T with a fuse rating of $I_N \leq 40$ mA.

➔ Install the fuses outside the hazardous area.

Servicing explosion-protected devices

➔ Observe the following for servicing equipment in a section relevant for explosion protection:

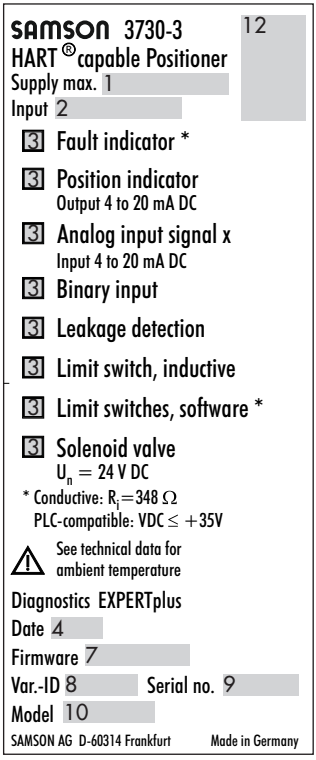
- It must not be put back into operation until a qualified inspector has assessed the equipment according to explosion protection requirements, has issued an inspection certificate or given the device a mark of conformity. Inspection by a qualified inspector is not required if the manufacturer performed a routine test on the device before putting it back into operation. Document the passing of the routine test by attaching a mark of conformity to the device.
- Replace explosion-protected components only with original, routine-tested components by the manufacturer.
- Devices that have already been used outside hazardous areas and are intended for future use inside hazardous areas must comply with the safety requirements placed on serviced devices. They must be subjected to testing according to the specifications in EN 60079-19.
- EN 60079-19 applies to servicing explosion-protected devices.
- Use the protective cable designed by SAMSON when interconnecting non-intrinsically safe set point calibrators with intrinsically safe equipment for repair, calibration etc. to ensure that components relevant to explosion protection are not damaged.

2 Markings on the device

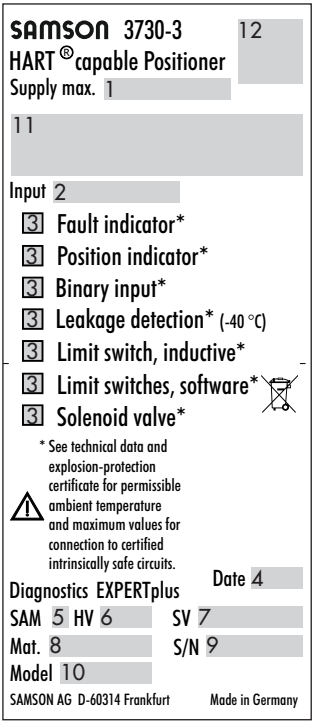
2.1 Nameplate

The nameplate shown was up to date at the time of publication of this document. The nameplate on the device may differ from the one shown.

Version without explosion protection



Explosion-protected version



1 Supply pressure
2 Input signal (4 to 20 mA DC)
3 Features: ☒ Yes/☐ No
  – Fault indicator
  – Position indicator 4 to 20 mA DC output
  – Analog input signal x 4 to 20 mA DC
  – Binary input
  – Leakage detection
  – Limit switch, inductive
  – Limit switches, software
  – Solenoid valve
4 Date of manufacture
5 Code for NAMUR Recommendation NE 53 (internal specification)
6 Hardware version
7 Software/firmware version
8 Configuration ID, material number
9 Serial number
10 Model number
11 Explosion protection marking
12 Approvals (CE, EAC, UKCA etc.)

2.2 Article code

Positioner	Typ 3730-3	x	x	x	x	x	x	x	0	x	0	0	x	0	x	x
With display and autotune, HART® communication, 4 to 20 mA set point, two software limit contacts, one fault alarm contact																
Explosion protection																
Without	0															
ATEX II 2 G Ex ia IIC Gb; II 2 D Ex ia IIIC T80°C Db; II 2 D Ex tb IIIC T80°C Db	1															
CSA 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	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, III. Div. 2, Groups F, G																
ATEX II 2 D Ex tb IIIC T80°C Db	5															
ATEX II 3G Ex nA II T6 Gc, II 3D Ex tc IIIC T80°C Db	8															
ATEX II 2G Ex d[ia] IIC T6 Gb	9															
Option (additional equipment)																
Inductive limit switch																
Without		0														
SJ2-SN (NC contact)		1														
Solenoid valve																
Without			0													
With, 24 V DC			4													
Position transmitter																
Without				0												
With				1	0	0	0									
External position sensor																
Without					0											
With		0			1					0						
Prepared connection		0			2											
Analog input x	0	0		0	3	0	0									
Leakage sensor																
Without						0										
With				0	0	1	0									
Binary input																
Without							0									
With				0	0	0	2									
Diagnostics																
EXPERTplus								4								
Housing material																
Aluminum (standard)										0						
Stainless steel 1.4408				0						1						

Positioner		Typ 3730-3	x	x	x	x	x	x	x	x	0	x	0	0	x	0	x	x
Special applications																		
Without															0			
Device completely free of paint-impairing substances															1			
Exhaust air with ¼ NPT connection, back of housing sealed															2			
With additional vent hole and VDI/VDE 3847 adapter; without travel pick-off parts															6			
With additional vent hole															7			
Special version																		
Without																0	0	
CCC Ex	Ex ia IIC T4...T6 Gb; Ex ia IIIC T80°C Db	1														0	9	
	Ex tb IIIC T80°C Db	5																
	Ex ec IIC T4...T6 Gc; Ex tc IIIC T80°C Dc	8														1	0	
CCoE	Ex ia IIC T6..T4 Gb; Ex nA IIC T6 Gc	1																
IECEx	Ex ia IIC T6...T4 Gb; Ex ia IIIC T80°C Db	1														1	2	
	Ex tb IIIC T80°C Db	5														3	4	
	Ex nA IIC T6 Gc, Ex tc IIIC T80°C Dc	8														1	3	
INMETRO	Ex ia IIC T6/T5/T4 Gb, Ex ia IIIC T80 °C Db	1														3	1	
	Ex tb IIIC T80 °C Db	5														4	2	
	Ex ec IIC T6 Gc, Ex tc IIIC T80 °C Dc	8																
KCS	Ex ia IIC T6/T5/T4	1														2	9	
NEPSI	Ex ia IIC T4~T6 Gb; Ex ia IIIC T80°C Db	1														0	9	
	Ex tb IIIC T80°C Db	5																
	Ex nA IIC T4~T6 Gc; Ex tD A22 IP66 T80°C	8														1	0	
TR CMU 1055	II 2G Ex ia IIC T6...T4 Gb; II 2D Ex ia IIIC T80 °C Db	1														4	3	
	II 2D Ex tb IIIC T80 °C Db	3																
	II 3G Ex ic nA IIC T6 Gc; II 3D Ex tc IIIC T80 °C Dc IP66	8																

2.3 Firmware versions

Firmware revisions	
Old	**New**
1.01	**1.10**
	The HART® protocol as per HART® specification revision 5 is supported by default. The HART® protocol can be changed to revision 6 in TROVIS-VIEW.
	The following status messages have been added: • Code 76 – No emergency mode • Code 77 – Program load error Reading indicates the number of zero calibrations performed since the last initialization.
	For initialization of "AIR TO CLOSE" actuators, the direction of action (Code 7) is automatically set to increasing/decreasing.
	Code 3, the activation period of the enabled configuration function has been extended to 120 s.
1.10	**1.20**
	Electronics changed, no new functions added.
1.20	**1.30**
	New EXPERTplus diagnostics functions (Code 48) added. Positioner in EXPERTplus version with extended diagnostics features.
	An initialization procedure in progress can be canceled by pressing the rotary pushbutton.
	The **position transmitter** (Code 37) and **solenoid valve** (Code 45) options are automatically detected.
1.30	**1.40**
	All EXPERTplus functions can be used over HART® communication in this firmware version and higher.
	The fault alarm contact is triggered by the condensed state of the positioner. It is always active with 'Maintenance alarm' condensed state. • When Code 32 = YES: also active with 'Function check' condensed state • When Code 33 = YES: also active with 'Maintenance required/Maintenance demanded' condensed state
	The "Function check" condensed state is additionally set for Test A1, A2, fault alarm output and position transmitter.
	The min./max. values of the temperature monitoring can be reset.
1.40	**1.41**
	Internal revisions

Firmware revisions	
Old	**New**
1.41	**1.42**
	Internal revisions
1.42	**1.51**
	All EXPERTplus diagnostic functions are available without having to activate them in the positioner (▶ EB 8389 on EXPERTplus Valve Diagnostics).
	Optional binary input with following actions: • Transmit switching state • Activate local write protection • Switch between automatic and manual modes • Various diagnostic functions ▶ EB 8389 (EXPERTplus valve diagnostics)
	The pressure limit (Code 16) is no longer automatically set during initialization.
1.51	**1.54**
	Internal revisions
1.54	**1.55**
	Analog input x option to connect commercially available position sensors with a 4 to 20 mA signal
	Code 4: the setting for **300 mm** has been added to the pin position
1.55	**1.56**
	Internal revisions
1.56	**1.61**
	Additional function: the step response test can be started by a rising edge at the binary input (▶ EB 8389 on EXPERTplus valve diagnostics).

3 Design and principle of operation

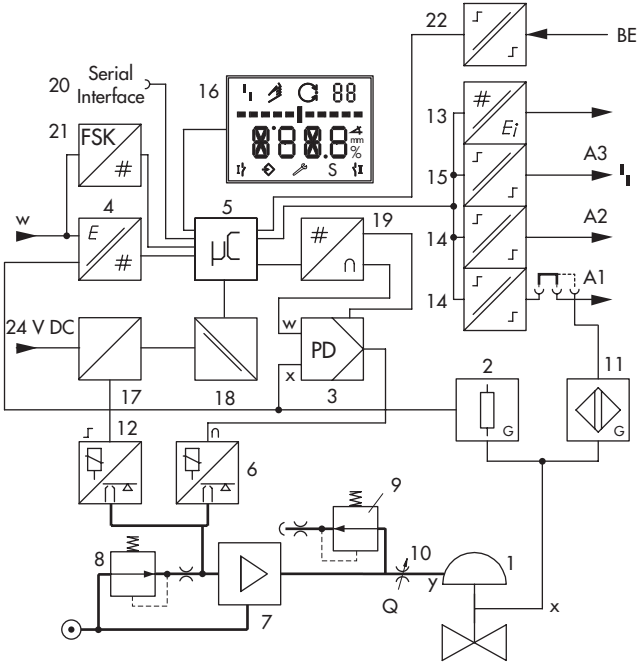
➔ See Fig. 3-1

The electropneumatic positioner is mounted on pneumatic control valves and used to assign the valve position (controlled variable x) to the control signal (set point w). The electric signal from a controlling system is compared to the travel or the rotational angle of the control valve and a signal pressure (output variable y) is produced for the actuator.

The positioner consists of a travel sensor system (2) proportional to resistance, an analog i/p converter with a downstream air booster (7) and the electronics with microcontroller (5).

The positioner is fitted with three binary contacts as standard: A fault alarm output indicates a fault to the control room and two configurable software limit switches are used to indicate the end positions of the valve.

The valve position is transmitted as a either an angle of rotation or travel to the pick-up



1 Control valve
2 Travel sensor
3 PD controller
4 A/D converter
5 Microcontroller
6 i/p converter
7 Air booster
8 Pressure regulator
9 Flow regulator
10 Volume restriction
11* Inductive limit switch
12* Solenoid valve
13* Analog position transmitter
14 Software limit switch, alarm 1/2
15 Fault alarm output, alarm 3
16 Display
17* Actuation of solenoid valve
18* Galvanic isolation
19 D/A converter
20 Communication interface
21 HART® connection
22 Binary input BE*
* Option

Fig. 3-1: *Block diagram*

lever and to the travel sensor (2) and supplied to an analog PD controller. An A/D converter (4) transmits the position of the valve to the microcontroller (5). The PD controller compares this actual position to the 4 to 20 mA DC control signal (reference variable) after it has been converted by the A/D converter (4). In case of a set point 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). As a result, the closure member of the valve (e.g. plug) is moved to the position determined by the set point.

The supply air is supplied to the booster (7) 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 software.

The volume restriction Q (10) is used to optimize the positioner.

The extended EXPERTplus diagnostics are integrated into the positioner. They provide information on the positioner and generate diagnostic and status messages, which allow faults to be pinpointed quickly.

3.1 Mounting versions

The positioner is suitable for the following types of attachment using the corresponding accessories:

– Direct attachment to SAMSON Type 3277 Actuator
– Attachment to actuators according to IEC 60534-6
– Attachment according to VDI/VDE 3847-1/-2
– Attachment to Type 3510 Micro-flow Valve
– Attachment to rotary actuators according to VDI/VDE 3845

3.2 Additional equipment

Solenoid valve

If the operating voltage for the solenoid valve (12) fails, the signal pressure for the booster is vented to the atmosphere. As a result, the actuator is vented and the valve moves to its fail-safe position.

NOTICE

The manual set point is automatically reset to 0 % after the solenoid valve is activated. A different manual set point must be entered again (Code 1).

Position transmitter

The position transmitter (13) is a two-wire transmitter and issues the travel sensor signal as a 4 to 20 mA signal processed by the microcontroller.
Since this signal is issued independent of the positioner's input signal (minimum current 3.8 mA), the momentary travel/angle of rotation is controlled in real-time.
Additionally, the position transmitter allows positioner faults to be indicated over a signal current of <2.4 mA or >21.6 mA.

Inductive limit switch

In this version, the rotary shaft of the positioner carries an adjustable tag which actuates the built-in proximity switch. The optional inductive switch (11) is connected to A1, while the remaining software limit switch is connected to A2.

External position sensor

In this version, only the sensor is mounted to the control valve. The positioner is located separately from the valve. The connection of x and y signals to the valve is established by cable and piping for air (only without inductive limit switch).

Analog input x

The **analog input x** option allows commercially available external linear or angle position sensors that use a 4 to 20 mA signal to be connected to the positioner. The analog input x is protected against reverse polarity and overload up to 24 V AC/DC. The positioner switches to open-loop operation (no closed-loop operation) as soon as the input signal falls below 2.5 mA.

Leakage sensor

By upgrading the positioner with a leakage sensor, it is possible to detect seat leakage when the valve is in the closed position.

Binary input

Positioners can be optionally fitted with a binary input. The following actions can be triggered by changing the edge state:

– **Transmit switching state** [default]
  The switching state of the binary input is logged.
– **Set on-site operation write protection**
  While the binary input is active, no settings can be changed at the positioner. Enabling configuration over Code 3 is not active.
– **Switch between AUTO/MAN**
  The positioner changes from the automatic mode ↻ (AUTO) to the manual mode ✋ (MAN) or vice versa.

  This function is not performed if the positioner is in the fail-safe position mode (SAFE).
– Various diagnostic functions ▶ EB 8389 (EXPERTplus valve diagnostics)

i ***Note***

– The optional binary input can only be configured using the TROVIS-VIEW software and using the DD parameters (▶ EB 8389 on EXPERTplus valve diagnostics).
– The default switching state is with an open switch.

3.3 Communication

The positioner is equipped with an interface for HART® protocol (Highway Addressable Remote Transducer) for communication purposes. Data are transmitted in a superimposed frequency (FSK = Frequency Shift Keying) on the existing signal loop for the 4 to 20 mA set point.

Either a HART® capable handheld communicator or a computer with FSK modem can be used to establish communication and operate the positioner.

Note

The HART® device revision as well as the indicating and operating modules supported by the Type 3730-3 Positioner can be found on the SAMSON website (▶ www.samsongroup.com > SERVICE > Downloads > Device integration > 3730-3 > 'Device Revision' to 'Firmware' assignment).

3.4 Configuration using the TROVIS-VIEW software

The positioner can be configured with SAMSON's TROVIS-VIEW Software.

The positioner has for this purpose a **serial interface** to allow the RS-232 or USB port of a computer to be connected to it using an adapter cable.

The TROVIS-VIEW software enables the user to easily configure the positioner as well as view process parameters online.

Note

TROVIS-VIEW provides a uniform user interface that allows users to configure and parameterize various SAMSON devices using device-specific database modules. The device module 3730-3 can be downloaded free of charge from our website at ▶ www.samsongroup.com > SERVICE > Downloads > TROVIS-VIEW.
Further information on TROVIS-VIEW (e.g. system requirements) is available on our website and in the Data Sheet ▶ T 6661.

3.5 Technical data

Table 3-1: *Type 3730-3 Electropneumatic Positioner*

Type 3730-3 Positioner		**The technical data for the explosion-protected devices may be restricted by the limits specified in the test certificates.**
Valve travel	Adjustable	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.
Set point 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 (corresponds to 410 Ω at 20 mA)
Supply	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 below the lowest ambient temperature to be expected
Signal pressure (output)		0 bar up to the supply pressure · Can be limited to 1.4 bar/2.4 bar/3.7 bar ± 0.2 bar by software
Charac-teristic	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		Exhaust and supply adjustable separately up to 240 s by software
Direction of action		Reversible
Air consumption, steady state		Independent of supply air, approx. 110 l_n/h
Air output capacity	Actuator (supply)	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 (exhaust)	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 –55 to +80 °C Special version for low temperatures with metal cable gland (Type 3730-3xxxxxxxx0x02x0xx) **The temperature limits for the explosion-protected devices may be restricted by the limits specified in the test certificates.**

Type 3730-3 Positioner		**The technical data for the explosion-protected devices may be restricted by the limits specified in the test certificates.**	
Influences	Temperature	≤0.15 %/10 K	
	Supply air	None	
	Effect of vibration	≤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 mm² wire cross-section	
Degree of protection		IP66/NEMA 4X	
Use in safety-instrumented systems (SIL) Emergency venting at 0 mA set point and using optional solenoid valve		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.	
		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).	
Explosion protection		Refer to Table 3-3	
Communication (local)		SAMSON SSP interface and serial interface adapter	
Software requirements (SSP)		TROVIS-VIEW with database module 3730-3	
Communication (HART®)		HART® Revision 5 (can be switched to Revision 6) Impedance in HART® frequency range: Receiving 350 to 450 Ω · Sending approx. 115 Ω	
Software requirements	For handheld communicator	Device description for Type 3730-3	
	For computer	DTM file according to specification 1.2, suitable for integrating the device into frame applications that support the use of FDT/DTM (e.g. PACTware); other integrations (e.g. AMS, PDM) available	
Binary contacts			
For connection to		For connection to the binary input of the PLC acc. to IEC 61131-2, P_{max} = 400 mW or for connection to NAMUR switching amplifier acc. to EN 60947-5-6	NAMUR switching amplifier acc. to EN 60947-5-6
Two software limit switches, reverse polarity protection, floating, configurable switching characteristics (default settings in table)			
Signal state	**Version**	**No explosion protection**	**Ex**
	No response	Non-conducting	≤1.0 mA
	Response	Conductive (R = 348 Ω)	≥2.2 mA

Type 3730-3 Positioner		**The technical data for the explosion-protected devices may be restricted by the limits specified in the test certificates.**	
One fault alarm contact, floating			
Signal state	**Version**	**No explosion protection**	**Ex**
	No fault alarm	Conductive (R = 348 Ω)	≥2.2 mA
	Fault alarm	Non-conducting	≤1.0 mA
Materials			
Housing		Die-cast aluminum EN AC-AlSi12(Fe) (EN AC-44300) acc. to DIN EN 1706, chromate and powder coating · Special version: stainless steel 1.4408	
External parts		Stainless steel 1.4404/316L	
Cable gland		M20x1.5, black polyamide	
Weight		Die-cast aluminum housing: approx. 1.0 kg Stainless steel housing: approx. 2.2 kg	
Conformity		CE · EAC	

Table 3-2: *Optional additional functions*

Options for Type 3730-3 Positioner	
Solenoid valve · Approval acc. to IEC 61508/SIL	
Input	24 V DC · Reverse polarity protection · Static destruction limit 40 V Current consumption $I = \frac{U - 5.7\ V}{3840\ \Omega}$ (corresponding to 4.8 mA at 24 V/114 mW)
Signal '0' (no response)	<12 V (emergency shutdown at 0 V)
Signal '1' (response)	> 19 V
Service life	> 5 x 10^6 switching cycles
K_V coefficient	0.15
Analog position transmitter	Two-wire transmitter
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

Options for Type 3730-3 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
Inductive limit switch by Pepperl+Fuchs For connection to switching amplifier according to EN 60947-5-6. Can be used in combination with a software limit switch.		
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		–40 to +90 °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 to 2000 Hz
Degree of protection		IP 67
Leakage sensor · Suitable for operation in hazardous areas		
Temperature range		–40 to +130 °C
Tightening torque		20 ±5 Nm
Binary input · Galvanically isolated · Switching behavior configured by software (e.g. TROVIS-VIEW, DTM)		
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 · 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)
Analog input x · Electrical isolation · Input for externally measured valve position		
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 Ω · Overload capacity: 24 V AC/DC

Table 3-3: *Summary of explosion protection approvals*

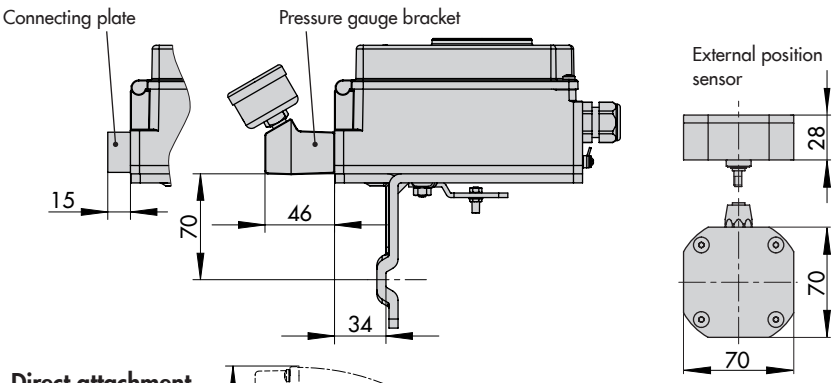
Type		Certification			Type of protection/comments
3730	-31	 1)	Number Date	PTB 02 ATEX 2174 2017-02-14	II 2 G Ex ia IIC Gb II 2 D Ex ia IIIC T80°C Db II 2 D Ex tb IIIC T80°C Db
		CCC Ex	Number Date Valid until	2020322307001016 2022-11-11 2025-09-03	Ex ia IIC T4...T6 Gb Ex ia IIIC T80°C Db
		CCoE	Number Date Valid until	A/P/HQ/MH/104/6864 2021-08-30 2025-12-31	Ex ia IIC T6..T4 Gb Ex nA IIC T6 Gc
		IECEx	Number Date	IECEx PTB 05.0008X 2016-11-30	Ex ia IIC T6...T4 Gb Ex ia IIIC T80°C Db
		INMETRO	No. Date Valid until	IEx 13.0161X 2022-08-28 2027-08-27	Ex ia IIC T6/T5/T4 Gb Ex ia IIIC T80 °C Db
		KCS	Number Date Valid until	11-KB4BO-0224 2011-11-10 2024-11-10	Ex ia IIC T6/T5/T4
		NEPSI	Number Date Valid until	GYJ22.3549X 2022-11-21 2027-11-20	Ex ia IIC T4~T6 Gb Ex ia IIIC T80°C Db
		TR CMU 1055	Number Date Valid until	ZETC/35/2021 2021-07-26 2024-07-25	II 2G Ex ia IIC T6...T4 Gb II 2D Ex ia IIIC T80 °C Db
	-33	**CSA**	Number Date	1330129 2021-10-11	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
		FM	Number Date	3012394 2011-08-11	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, III. Div. 2, Groups F, G
	-35	 1)	Number Date	PTB 02 ATEX 2174 2017-02-14	II 2 D Ex tb IIIC T80°C Db

Type		Certification		Type of protection/comments
3730	-35	**CCC Ex**	Number 2020322307001016 Date 2022-11-11 Valid until 2025-09-03	Ex tb IIIC T80°C Db
		IECEx	Number IECEx PTB 05.0008X Date 2016-11-30	Ex tb IIIC T80°C Db
		INMETRO	No. IEx 13.0161X Date 2022-08-28 Valid until 2027-08-27	Ex tb IIIC T80 °C Db
		NEPSI	Number GYJ22.3550X Date 2022-11-21 Valid until 2027-11-20	Ex tb IIIC T80°C Db
		TR CMU 1055	Number ZETC/35/2021 Date 2021-07-26 Valid until 2024-07-25	II 2D Ex tb IIIC T80 °C Db
	-38	(Ex) 2)	Number PTB 03 ATEX 2180 X Date 2016-06-30	II 3G Ex nA II T6 Gc II 3D Ex tc IIIC T80°C Db
		CCC Ex	Number 2020322307001016 Date 2022-11-11 Valid until 2025-09-03	Ex ec IIC T4...T6 Gc Ex tc IIIC T80 °C Dc
		IECEx	Number IECEx PTB 05.0008X Date 2016-11-30	Ex nA IIC T6 Gc, Ex tc IIIC T80°C Dc
		INMETRO	No. IEx 13.0161X Date 2022-08-28 Valid until 2027-08-27	Ex ec IIC T6 Gc Ex tc IIIC T80 °C Dc
		NEPSI	Number GYJ22.3550X Date 2022-11-21 Valid until 2027-11-20	Ex nA IIC T4~T6 Gc Ex tD A22 IP66 T80°C
		TR CMU 1055	Number ZETC/35/2021 Date 2021-07-26 Valid until 2024-07-25	II 3G Ex ic nA IIC T6 Gc II 3D Ex tc IIIC T80 °C Dc IP66
	-39	(Ex) 1)	Number PTB 03 ATEX 2211 X Date 2003-10-22	II 2G Ex d[ia] IIC T6 Gb

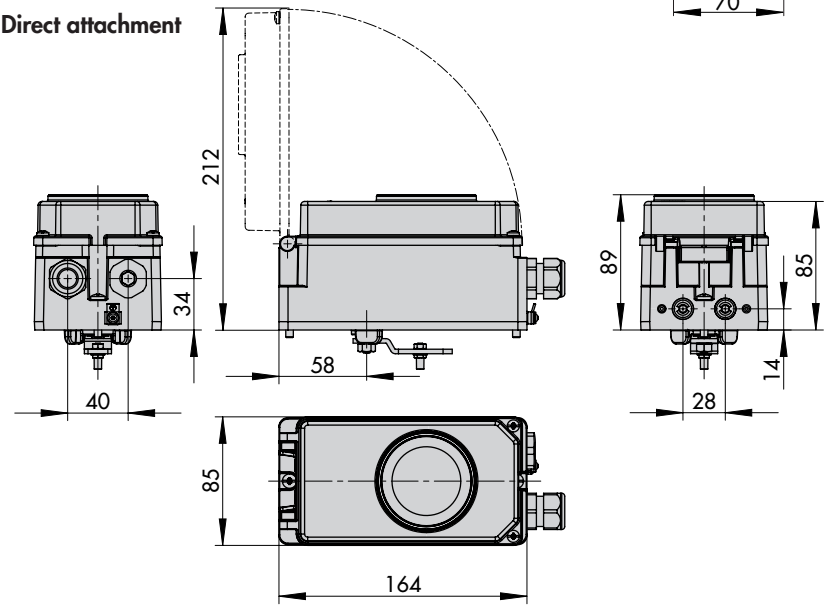
1) EC type examination certificate
2) Statement of conformity

3.6 Dimensions in mm

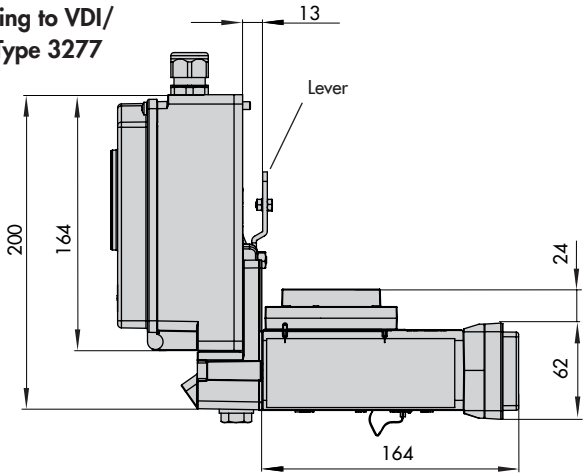
Attachment according to IEC 60534-6



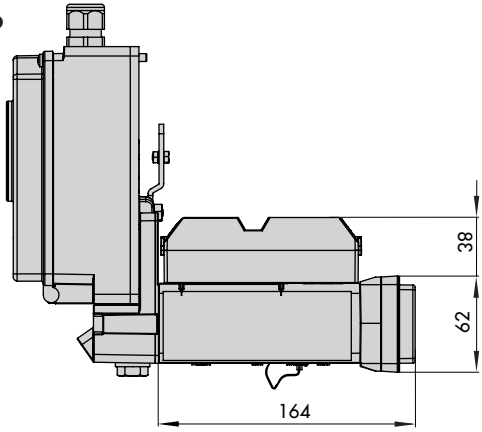
Direct attachment



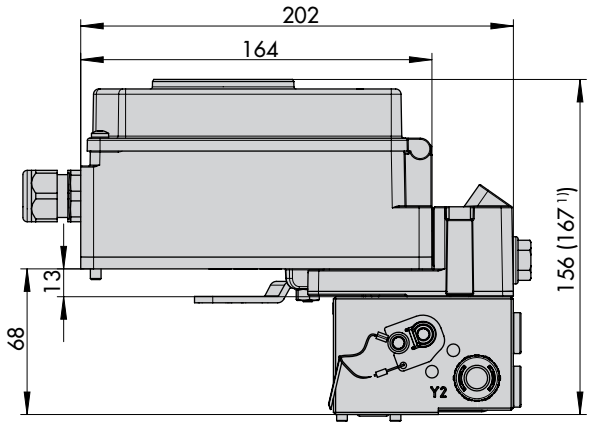
Attachment according to VDI/ VDE 3847-1 onto Type 3277 Actuator



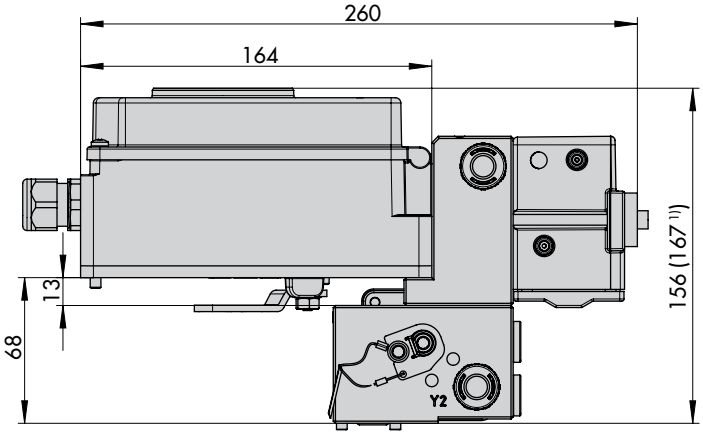
Attachment according to VDI/ VDE 3847-1 to a NAMUR rib



Attachment according to VDI/VDE 3847-2 with single-acting actuator

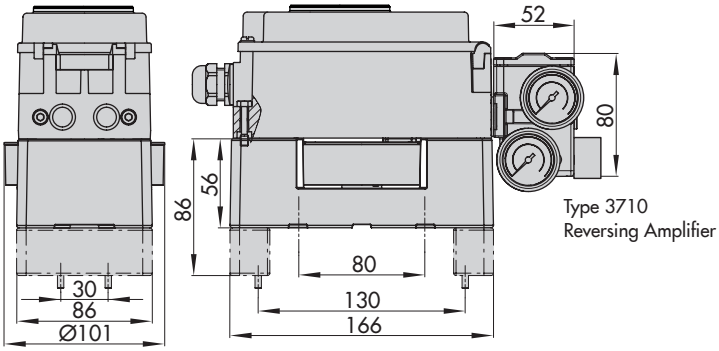


Attachment according to VDI/VDE 3847-2 with double-acting actuator

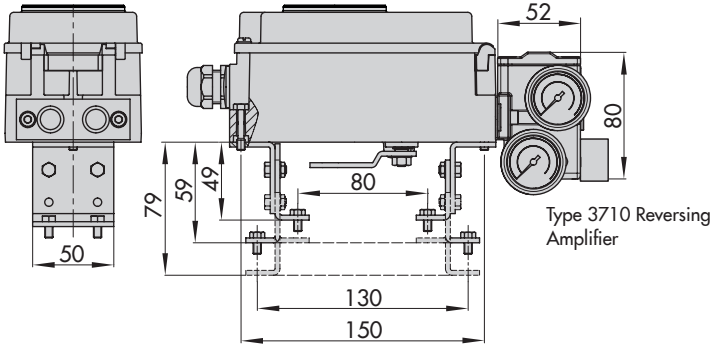


Attachment to rotary actuators according to VDI/VDE 3845

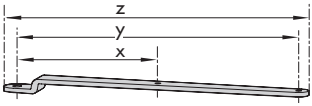
Heavy-duty version

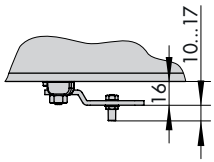


Light version



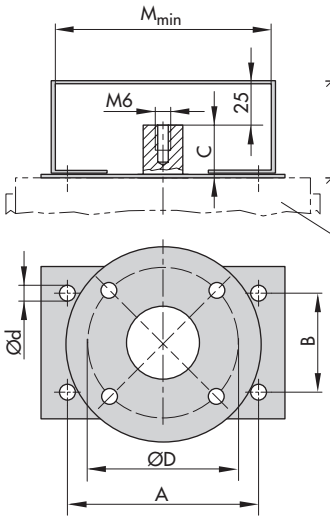
Lever





Lever	x	y	z
S	17 mm	25 mm	33 mm
M	25 mm	50 mm	66 mm
L	70 mm	100 mm	116 mm
XL	100 mm	200 mm	216 mm
XXL	200 mm	300 mm	316 mm

3.6.1 Fixing levels according to VDI/VDE 3845 (September 2010)



Dimensions in mm						
Size	A	B	C	Ød	M_{min}	D[1)]
AA0	50	25	15	5.5 for M5	66	50
AA1	80	30	20	5.5 for M5	96	50
AA2	80	30	30	5.5 for M5	96	50
AA3	130	30	30	5.5 for M5	146	50
AA4	130	30	50	5.5 for M5	146	50
AA5	200	50	80	6.5 for M6	220	50

[1)] Flange type F05 acc. to DIN EN ISO 5211

4 Shipment and on-site transport

The work described in this chapter is only to be performed by personnel appropriately qualified to carry out such tasks.

4.1 Accepting the delivered goods

After receiving the shipment, proceed as follows:

1. Check the scope of delivery. Check that the specifications on the nameplate of the positioner match the specifications in the delivery note. See the 'Markings on the device' chapter for nameplate details.
2. Check the shipment for transportation damage. Report any damage to SAMSON and the forwarding agent (refer to delivery note).

4.2 Removing the packaging from the positioner

Observe the following sequence:

➔ Do not remove the packaging and the protective caps on the pneumatic ports until immediately before installation.

➔ Dispose and recycle the packaging in accordance with the local regulations.

4.3 Transporting the positioner

➔ Pack the positioner properly to comply with terms of transportation.

Transport instructions

– Protect the positioner against external influences (e.g. impact).

– Protect the positioner against moisture and dirt.

– Observe transport temperature depending on the permissible ambient temperature (see the 'Design and principle of operation' chapter).

4.4 Storing the positioner

NOTICE

Risk of device damage due to improper storage.

➔ *Observe the storage instructions.*

➔ *Avoid long storage times.*

➔ *Contact SAMSON in case of different storage conditions.*

Note

We recommend regularly checking the control valve and the prevailing storage conditions during long storage periods.

Storage instructions

– Protect the positioner against external influences (e.g. impact, shocks, vibration).

- Do not damage the corrosion protection (coating).
- Protect the positioner against moisture and dirt. In damp spaces, prevent condensation. If necessary, use a drying agent or heating.
- Make sure that the ambient air is free of acids or other corrosive media.
- Observe storage temperature depending on the permissible ambient temperature (see the 'Design and principle of operation' chapter).
- Store the positioner with the cover closed.
- Seal the pneumatic and electrical connections.
- Do not place any objects on the positioner.

5 Installation

The work described in this chapter is only to be performed by personnel appropriately qualified to carry out such tasks.

⚠ DANGER

Risk of fatal injury due to the ignition of an explosive atmosphere.

➔ *Observe EN 60079-14 (VDE 0165, Part 1) for work on the positioner in potentially explosive atmospheres.*

➔ *Work in potentially explosive atmospheres must only be performed by personnel who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.*

⚠ WARNING

Crush hazard arising from moving parts on the valve.

➔ *Do not touch any moving valve parts while the control valve is in operation.*

➔ *Before performing any mounting or installation work on the positioner, put the control valve out of operation by disconnecting and locking the supply air and control signal.*

➔ *Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.*

NOTICE

Risk of malfunction due to incorrect mounting parts/accessories.

➔ *Only use the mounting parts and accessories listed in these mounting and operating instructions to mount and install the positioner. Pay special attention to the type of attachment.*

5.1 Installation conditions

Work position

The work position for the positioner is the front view onto the operating controls on the positioner seen from the position of operating personnel.

Operators must ensure that, after installation of the positioner, the operating personnel can perform all necessary work safely and easily access the device from the work position.

Mounting orientation

➔ Observe mounting position (see Fig. 5-2).

➔ Do not seal or restrict the vent opening (see Fig. 5-1) when the device is installed on site.

5.2 Preparation for installation

Before mounting, make sure the following conditions are met:

– The positioner is not damaged.
– The air supply is not yet connected to the positioner.
– The current is not yet connected to the positioner.

Proceed as follows:

➔ Lay out the necessary material and tools to have them ready during mounting.
➔ Adjust correct lever and pin position (see Chapter 5.3).
➔ Seal the signal pressure output at the back of the positioner with the screw plug (4, order no. 0180-1436) and the associated O-ring (order no. 0520-0412) if the screw plug is not yet in place.
➔ Remove the protective caps from the pneumatic connections.

5.3 Adjusting the lever and pin position

i ***Note***

*The **M** lever is included in the scope of delivery.*
***S**, **L** and **XL** levers are available as accessories (see Chapter 5.13).*
*The **XXL** lever is available on request.*

The positioner is adapted to the actuator and to the rated travel by the lever on the back of the positioner and the pin inserted into the lever.

The travel tables on page 5-5 show the maximum adjustment range at the positioner. The travel that can be implemented at the valve is additionally restricted by the selected fail-safe position and the required compression of the actuator springs.

The positioner is equipped with the M lever (pin position 35) as standard (see Fig. 5-3). If a pin position other than position 35 with the standard M lever is required or an L or XL lever size is required, proceed as follows (see Fig. 5-4):

1. Unthread the nut (1.1) to unfasten the mounted lever.
   ➔ Make sure that the lever does not rest on the end stops.
2. Fasten the follower pin (2) in the assigned lever hole (pin position as specified in the travel tables on page 5-5). Only use the longer follower pin included in the mounting kit.
3. Place the lever (1) on the shaft of the positioner and fasten it tight using the disk spring (1.2) and nut (1.1).
   ➔ Make sure that the lever does not rest on the end stops.

5.4 Exchanging the lever

The procedure to exchange the lever depends on whether the standard version of the positioner has been ordered with a sliding clutch or the special version without a sliding clutch.

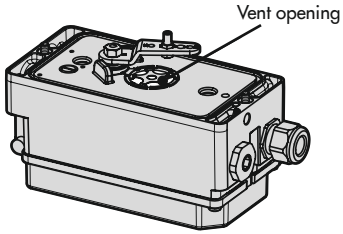


Fig. 5-1: *Vent opening (back of the positioner)*

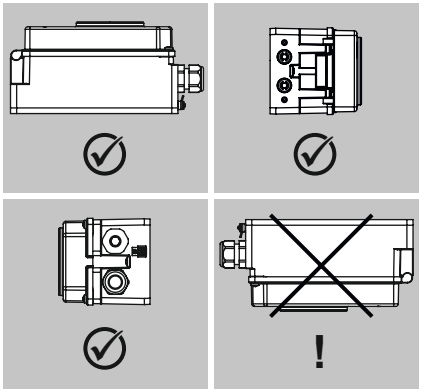
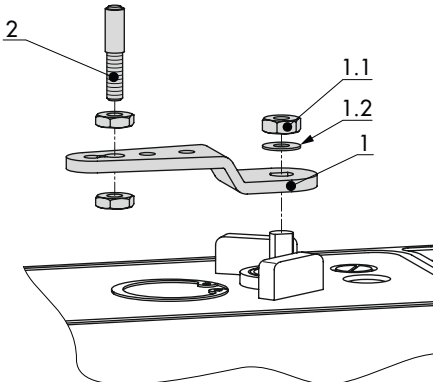


Fig. 5-2: *Permissible mounting positions*



1 Lever
1.1 Nut
1.2 Disk spring
2 Follower pin

Fig. 5-4: *Mounting the lever and follower pin*

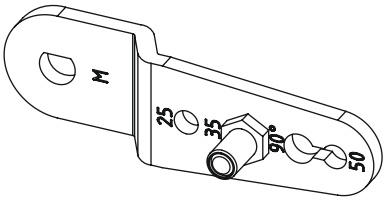


Fig. 5-3: *M lever with pin position 35*

Special version of the positioner without sliding clutch can be identified by their article code. The article code is printed on the nameplate as "Model". Special versions of the positioner without sliding clutch are:

– Type 3730-3xxxxxxxxxxxx**002**
– Type 3730-3xxxxxxxxxxxx**018**
– Type 3730-3xxxxxxxxxxxx**028**
– Type 3730-3xxxxxxxxxxxx**036**
– Type 3730-3xxxxxxxxxxxx**039**
– Type 3730-3xxxxxxxxxxxx**048**

Lever exchange in standard version with sliding clutch

If a pin position other than position 35 with the standard M lever is required or an L or XL lever size is required, proceed as follows (see Fig. 5-4):

1. Unthread the nut (1.1) to unfasten the mounted lever.
2. Fasten the follower pin (2) in the assigned lever hole (pin position as specified in the travel tables on page 5-5). Only use the longer follower pin included in the mounting kit.
3. Place the lever (1) on the shaft of the positioner and fasten it tight using the disk spring (1.2) and nut (1.1).
4. Move the newly mounted lever once all the way as far as it will go in both directions to adapt it to the internal measuring lever.

Lever exchange in standard version without sliding clutch

NOTICE

Incorrect installation of the lever in positioner versions without a sliding clutch will damage the travel sensor.

➔ *Hold the lever in position while removing or mounting it to prevent it from moving to the end stops.*

If a pin position other than position 35 with the standard M lever is required or an L or XL lever size is required, proceed as follows (see Fig. 5-4):

1. Unthread the nut (1.1) to unfasten the mounted lever. While doing so, hold the lever in the middle to ensure that it does not rest at the end stops.
2. Fasten the follower pin (2) in the assigned lever hole (pin position as specified in the travel tables on page 5-5). Only use the longer follower pin included in the mounting kit.
3. Place the lever (1) on the shaft of the positioner and fasten it tight using the disk spring (1.2) and nut (1.1). While doing so, hold the lever in the middle to ensure that it does not rest at the end stops.

5.4.1 Travel tables

Table 5-1: *Direct attachment to Type 3277-5 and Type 3277 Actuator*

Actuator size [cm²]	Rated travel [mm]	Adjustment range at positioner [1] Travel [mm]	Required lever	Assigned pin position
120	7.5	5.0 to 25.0	M	25
120/175/240/350	15	7.0 to 35.0	M	35
355/700/750	30	10.0 to 50.0	M	50

1) The min./max. adjustment range is based on the NOM (nominal range) initialization mode

Table 5-2: *Attachment according to IEC 60534-6 (NAMUR)*

SAMSON valves with Type 3271 Actuator		Adjustment range at positioner Other control valves [1]		Required lever	Assigned pin position
Actuator size [cm²]	Rated travel [mm]	Min. travel [mm]	Max. travel [mm]		
60 and 120 with Type 3510 Valve	7.5	3.6	18.0	S	17
120	7.5	5.0	25.0	M	25
120/175/240/350	15	7.0	35.0	M	35
355/700/750	7.5	7.0	35.0	M	35
355/700/750	15 and 30	10.0	50.0	M	50
1000/1400/2800	30	14.0	70.0	L	70
	60	20.0	100.0	L	100
1400/2800	120	40.0	200.0	XL	200
See manufacturer's specifications	200	See manufacturer's specifications			300

1) The min./max. adjustment range is based on the NOM (nominal range) initialization mode

Table 5-3: *Attachment to rotary actuators*

Opening angle	Required lever	Assigned pin position
24 to 100°	M	90°

5.5 Positioner attachment

5.5.1 Direct attachment

a) Type 3277-5 Actuator

➔ Required mounting parts and accessories: Table 5-5

➔ Observe the travel table on page 5-5.

Actuator with 120 cm² (see Fig. 5-5)

Depending on the type of positioner attachment, the signal pressure is routed either left or right of the yoke through a hole to the actuator diaphragm. Depending on the failsafe action of the actuator "actuator stem extends" or "actuator stem retracts" (valve closes or opens upon supply air failure), the switchover plate (9) must first be attached to the actuator yoke. Align the switchover plate with the corresponding symbol for left or right attachment according to the marking (view looking onto the switchover plate).

1. Mount connecting plate (6) or pressure gauge bracket (7) with pressure gauges on the positioner. Make sure that the two seals (6.1) are seated properly.
2. Remove screw plug (4) on the back of the positioner and seal the signal pressure output (38) on the connecting plate (6) or on the pressure gauge bracket (7) with the stopper (5) included in the accessories.
3. Place follower clamp (3) on the actuator stem, align it and screw tight so that the mounting screw is located in the groove of the actuator stem.
4. Mount cover plate (10) with narrow side of the cut-out (Fig. 5-5, on the left) pointing towards the signal pressure connection. Make sure that the gasket (14) points towards the actuator yoke.
5. **15 mm travel:** Keep the follower pin (2) on the M lever (1) on the back of the positioner in the pin position 35 (delivered state).
   7.5 mm travel: Remove the follower pin (2) from the pin position 35, reposition it in the hole for pin position 25 and screw tight.

   While doing so, hold the lever in the middle to ensure that it does not rest at the end stops.
6. Insert molded seal (15) into the groove of the positioner housing and insert the seal (10.1) on the back of the housing.
7. Seal the signal pressure output at the back with the screw plug (4, order no. 0180-1436) and the associated O-ring (order no. 0520-0412).
8. Place positioner on the cover plate (10) in such a manner that the follower pin (2) rests on the top of the follower clamp (3). Adjust the lever (1) correspondingly and open the positioner cover to hold the positioner shaft in position at the cap or rotary pushbutton. The lever (1) must rest on the follower clamp with spring force. Fasten the positioner on the cover plate (10) using the two fastening screws.
9. Mount cover (11) on the other side.

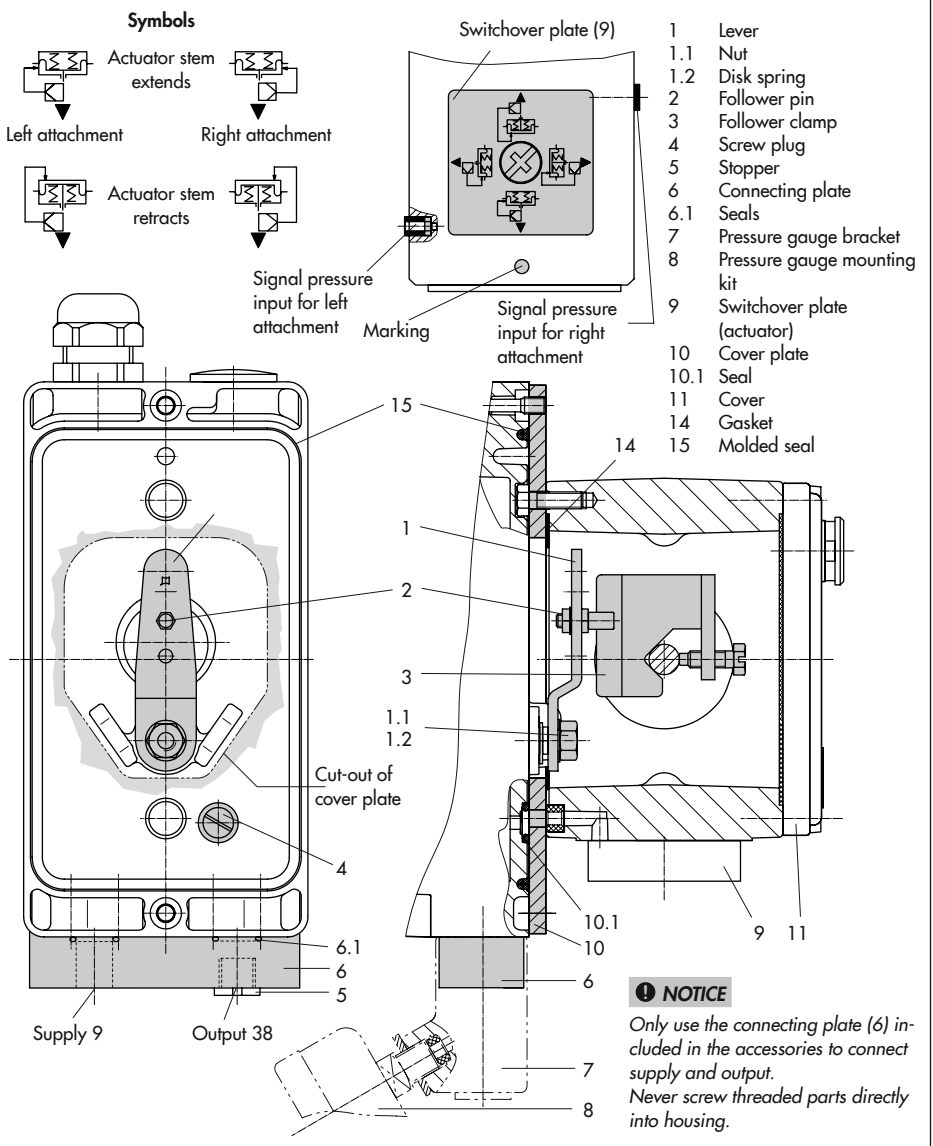


Fig. 5-5: *Direct attachment – Signal pressure connection for Type 3277-5 Actuator with 120 cm²*

➔ Make sure that the vent plug is located at the bottom when the control valve is installed to allow any condensed water that collects to drain off.

b) Type 3277 Actuator

➔ Required mounting parts and accessories: Table 5-6

➔ Observe the travel table on page 5-5.

Actuators with 175 to 750 cm² effective areas (see Fig. 5-6)

Mount the positioner on the yoke. The signal pressure is routed to the actuator over the connection block (12), for actuators with fail-safe action "actuator stem extends" internally through a hole in the valve yoke and for "actuator stem retracts" through an external pipe.

1. Place follower clamp (3) on the actuator stem, align it and screw tight so that the mounting screw is located in the groove of the actuator stem.
2. Mount cover plate (10) with narrow side of the cut-out (Fig. 5-6, on the left) pointing towards the signal pressure connection. Make sure that the gasket (14) points towards the actuator yoke.
3. For actuators with 355, 700 or 750 cm², remove the follower pin (2) on the M lever (1) on the back of the positioner from pin position 35, reposition it in the hole for pin position 50 and screw tight. While doing so, hold the lever in the middle to ensure that it does not rest at the end stops.

   For actuators 175, 240 and 350 cm² with 15 mm travel, keep the follower pin (2) in pin position 35.
4. Insert molded seal (15) into the groove of the positioner housing.
5. Place positioner on the cover plate in such a manner that the follower pin (2) rests on the top of the follower clamp (3). Adjust the lever (1) correspondingly and open the positioner cover to hold the positioner shaft in position at the cap or rotary pushbutton. The lever (1) must rest on the follower clamp with spring force. Fasten the positioner on the cover plate (10) using the two fastening screws.
6. Make sure that the tip of the gasket (16) projecting from the side of the connection block is positioned to match the actuator symbol for the actuator's fail-safe action "actuator stem extends" or "actuator stem retracts". If this is not the case, unscrew the three fastening screws and lift off the cover. Turn the gasket (16) by 180° and re-insert it.
   The old connection block version (Fig. 5-6, bottom) requires the switch plate (13) to be turned to align the actuator symbol with the arrow marking.
7. Place the connection block (12) with the associated seals against the positioner and the actuator yoke and fasten using the screw (12.1). For actuators with fail-safe action "actuator stem retracts", additionally remove the stopper (12.2) and mount the external signal pressure pipe.
8. Mount cover (11) on the other side.

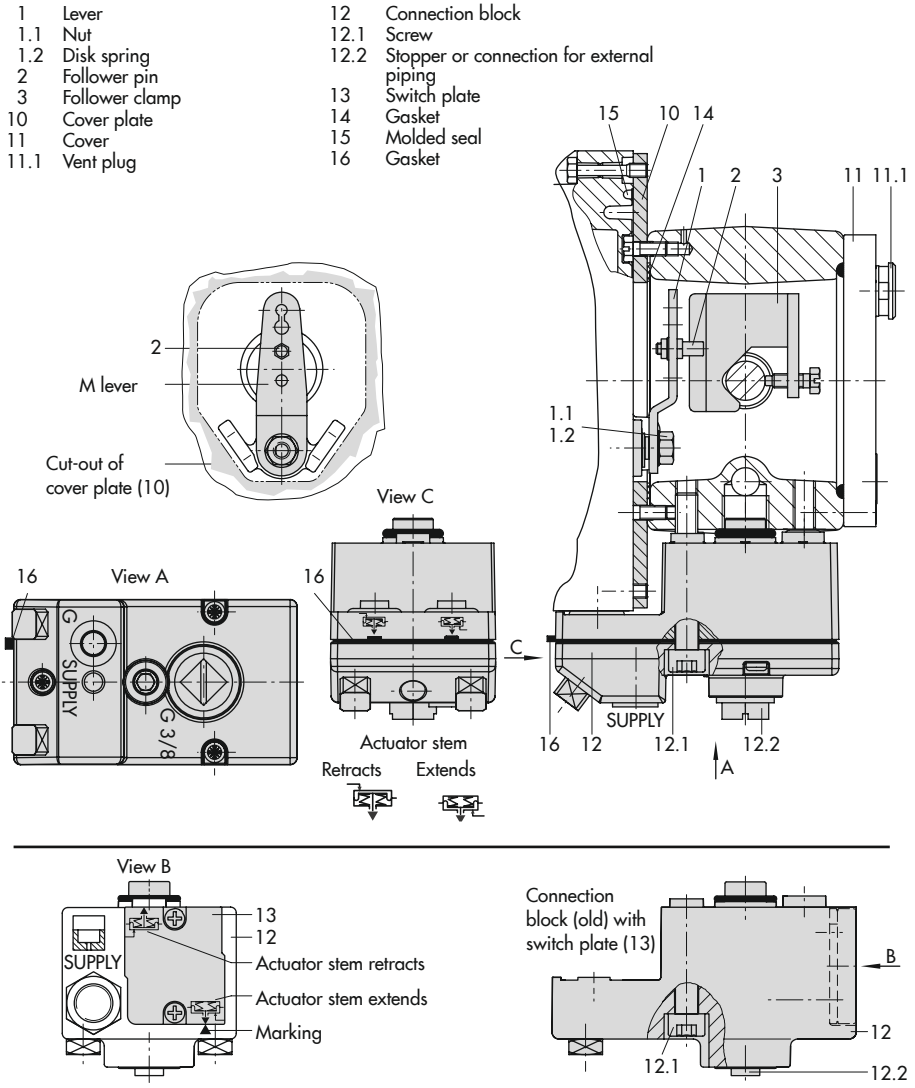


Fig. 5-6: *Direct attachment – Signal pressure connection for Type 3277 Actuator with 175 to 750 cm²*

➔ Make sure that the vent plug is located at the bottom when the control valve is installed to allow any condensed water that collects to drain off.

5.5.2 Attachment according to IEC 60534-6

➔ See Fig. 5-7

➔ Required mounting parts and accessories: Table 5-7

➔ Observe the travel table on page 5-5.

The positioner is attached to the control valve using a NAMUR bracket (10).

1. Screw the two bolts (14) to the bracket (9.1) of the stem connector (9), place the follower plate (3) on top and use the screws (14.1) for fastening.

   Actuator sizes 2800 cm² and 1400 cm² with 120 mm travel:
   - For a travel of 60 mm or smaller, screw the longer follower plate (3.1) directly to the stem connector (9).
   - For a travel exceeding 60 mm, mount the bracket (16) first and then the follower plate (3) to the bracket together with the bolts (14) and screws (14.1).
2. Mount NAMUR bracket (10) to the control valve as follows:
   - For **attachment to the NAMUR rib**, use an M8 screw (11) and toothed lock washer directly in the yoke hole.
   - For attachment to **valves with rod-type yokes**, use two U-bolts (15) around the yoke. Align the NAMUR bracket (10) according to the embossed scale so that the follower plate (3) is shifted by half the angle range to the NAMUR bracket (the slot of the follower plate is centrally aligned with the NAMUR bracket at mid valve travel).
3. Mount connecting plate (6) or pressure gauge bracket (7) with pressure gauges (8) on the positioner. Make sure that the two seals (6.1) are seated properly.
4. Select required lever size (1) M, L or XL and pin position according to the actuator size and valve travel listed in the travel table on page 5-5.

If a pin position other than position **35** with the standard **M** lever is required or an **L** or **XL** lever size is required. Proceed as described in Chapter 5.4.

5. Place positioner on the NAMUR bracket in such a manner that the follower pin (2) rests in the slot of the follower plate (3, 3.1). Adjust the lever (1) correspondingly.
   Screw the positioner to the NAMUR bracket using its two fastening screws.

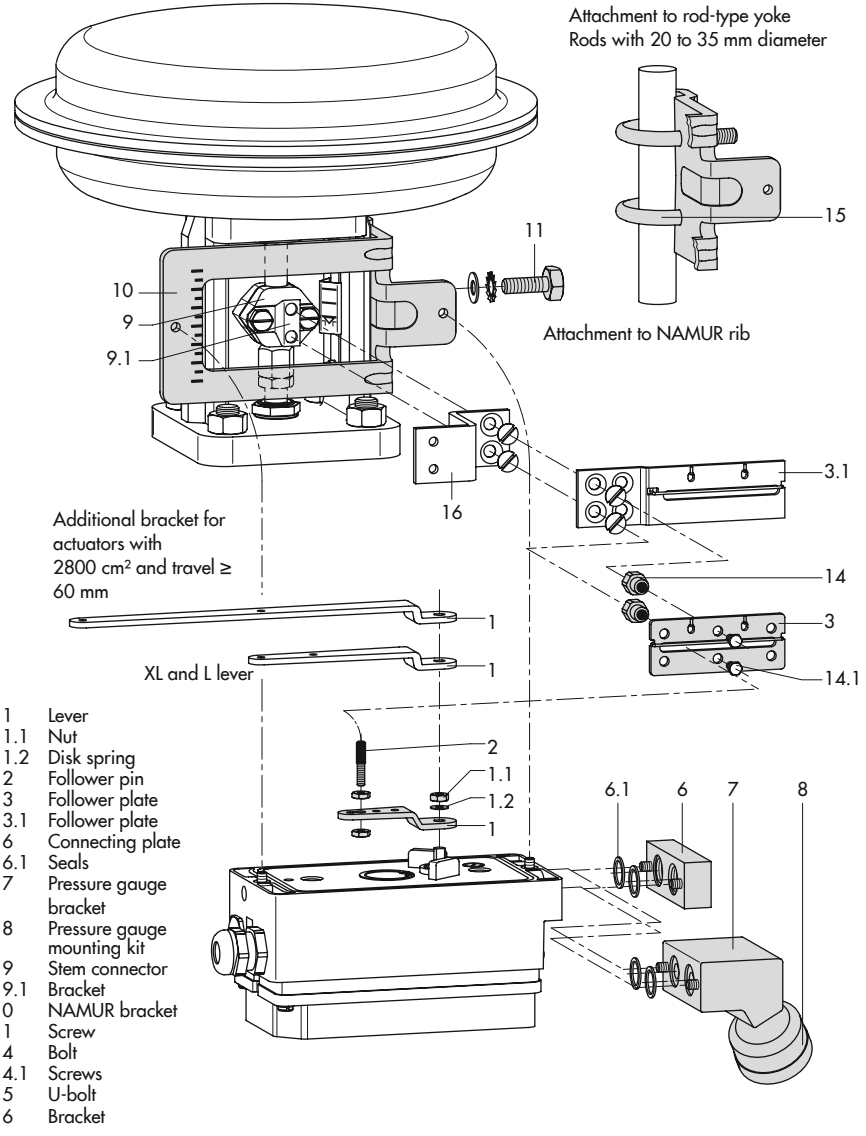


Fig. 5-7: *Attachment according to IEC 60534-6 (NAMUR)*

5.5.3 Attachment according to VDI/VDE 3847-1

The 3730-3-xxx0xxxx0x0060xx and 3730-3-xxx0xxxx0x007000 Positioners with air purging of the actuator's spring chamber can be attached according to VDI/ VDE 3847-1.

The 3730-3-xxx0xxxx0x0000xx Positioner without air purging of the actuator's spring chamber can 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 signal pressure can be blocked in the actuator by unscrewing the red retaining screw (20) and turning the air blocker (19) on the bottom of the adapter block.

Attachment to Type 3277 Actuator (see Fig. 5-8)

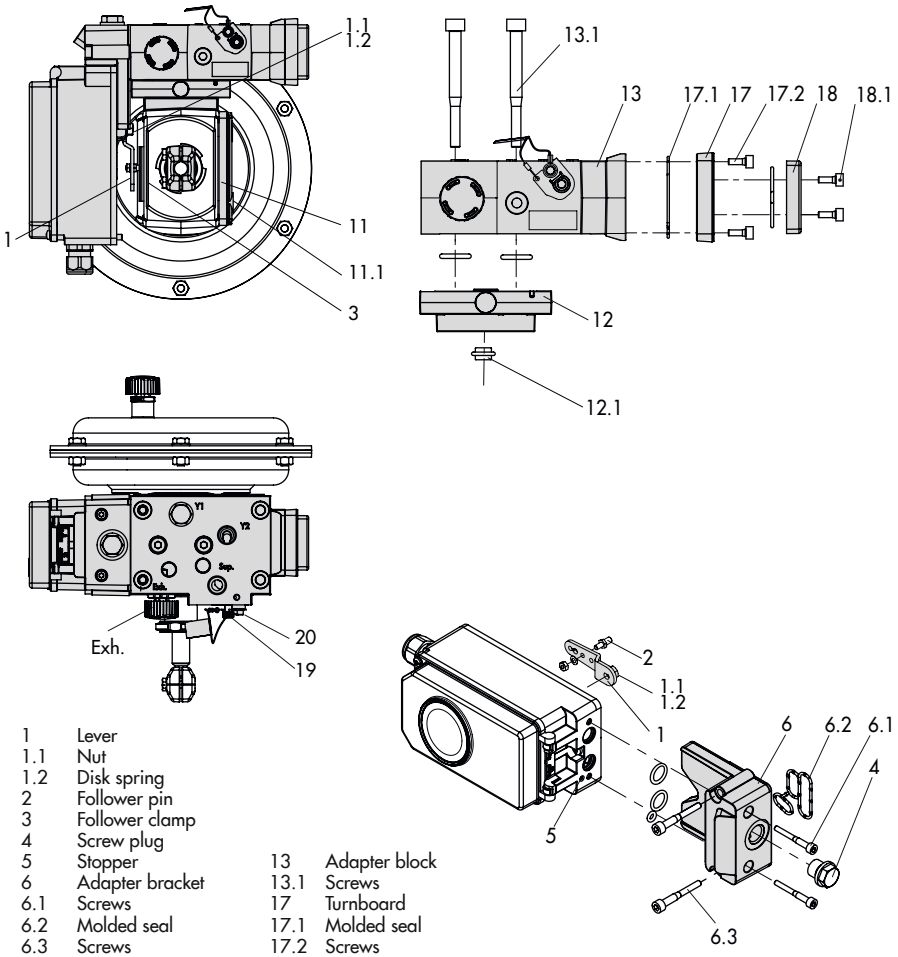
➔ Required mounting parts and accessories: see Table 5-8

Mount the positioner on the yoke as shown in Fig. 5-8. The signal pressure is routed to the actuator over the connecting plate (12), for actuators with fail-safe action "actuator stem extends" internally through a bore in the valve yoke and for "actuator stem retracts" through external piping.

Only the Y1 port is required for positioner attachment. The Y2 port can be used for air purging of the spring chamber.

1. Place follower clamp (3) on the actuator stem, align it and screw tight so that the mounting screw is located in the groove of the actuator stem.
2. Place the adapter bracket (6) on the positioner and mount using the screws (6.1). Make sure that the seals are correctly seated. For positioners **with air purging**, remove the stopper (5) before mounting the positioner. For positioners **without air purging**, replace the screw plug (4) with a vent plug.
3. For actuators with 355, 700 or 750 cm², remove the follower pin (2) on the M lever (1) on the back of the positioner from pin position 35, reposition it in the hole for pin position 50 and screw tight. While doing so, hold the lever in the middle to ensure that it does not rest at the end stops.

   For actuators 175, 240 and 350 cm² with 15 mm travel, keep the follower pin (2) in pin position 35.
4. Insert the molded seal (6.2) in the groove of the adapter bracket (6).
5. Insert the molded seal (17.1) into the turnboard (17) and mount the turnboard to the adapter block (13) using the screws (17.2).
6. Mount the dummy plate (18) to the turnboard (17) using the screws (18.1). Make sure that the seals are correctly seated.



1	Lever	13	Adapter block
1.1	Nut	13.1	Screws
1.2	Disk spring	17	Turnboard
2	Follower pin	17.1	Molded seal
3	Follower clamp	17.2	Screws
4	Screw plug	18	Dummy plate
5	Stopper	18.1	Screws
6	Adapter bracket	19	Air blocker
6.1	Screws	20	Retaining screw
6.2	Molded seal		
6.3	Screws		
11	Cover		
11.1	Vent plug		
12	Connecting plate		
12.1	Seal		

Fig. 5-8: *Attachment according to VDI/VDE 3847 onto Type 3277 Actuator*

i ***Note***

A solenoid valve can also be mounted in place of the dummy plate (18). The orientation of the turnboard (17) determines the mounting position of the solenoid valve. Alternatively, a restrictor plate can be mounted (▶ AB 11).

7. Insert the screws (13.1) through the middle holes of the adapter block (13).
8. Place the connecting plate (12) together with the seal (12.1) onto the screws (13.1) corresponding to the fail-safe action "actuator stem extends" or "actuator stem retracts". The fail-safe action that applies is determined by aligning the groove of the adapter block (13) with the groove of the connecting plate (12) (Fig. 5-9).

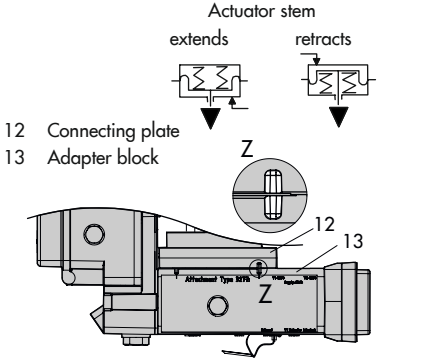


Fig. 5-9: *Fail-safe action*

9. Mount the adapter block (13) together with the connecting plate (12) to the actuator using the screws (13.1).
10. Insert the vent plug (11.1) into the **Exh.** connection.
11. For fail-safe action "actuator stem extends", seal the Y1 port with a blanking plug.

    For fail-safe action "actuator stem retracts", connect the Y1 port to the signal pressure connection of the actuator.

    Place positioner on the adapter block (13) in such a manner that the follower pin (2) rests on the top of the follower clamp (3). Adjust the lever (1) correspondingly and open the positioner cover to hold the positioner shaft in position at the cap or rotary pushbutton.

    The lever (1) must rest on the follower clamp with spring force.

    Fasten the positioner to the adapter block (13) using the two fastening screws (6.3). Make sure the molded seal (6.2) is properly seated.
12. Mount cover (11) on the other side to the yoke.
    ➔ Make sure that the vent plug is located at the bottom when the control valve is installed to allow any condensed water that collects to drain off.

Attachment to NAMUR rib (see Fig. 5-10)

– Required mounting parts and accessories: see Table 5-8

– Observe the travel table on page 5-5.

1. **Series 240 Valves, actuator size up to 1400-60 cm²:** Screw the two bolts (14) to the bracket of the stem connector or directly to the stem connector (depending on the version), place the follower plate (3) on top and use the screws (14.1) to fasten it.

   Type 3251 Valve, 350 to 2800 cm²: Screw the longer follower plate (3.1) to the bracket of the stem connector or directly to the stem connector (depending on the version).

   Type 3254 Valve, 1400-120 to 2800 cm²: Screw the two bolts (14) to the bracket (16). Fasten the bracket (16) onto the stem connector, place the follower plate (3) on top and use the screws (14.1) to fasten it.

   Mount the positioner on the NAMUR rib as shown in Fig. 5-10.

2. For **attachment to the NAMUR rib**, fasten the NAMUR connection block (10) directly into the existing yoke bore using the screw and toothed lock washer (11). Align the marking on the NAMUR valve connection (on the side marked '1') to 50 % travel.

   For attachment to **valves with rod-type yokes** using the formed plate (15), which is placed around the yoke: screw the four studs into the NAMUR connection block (10). Place the NAMUR connection block on the rod and position the formed plate (15) on the opposite side. Use the nuts and toothed lock washers to fasten the formed plate onto the studs. Align the marking on the NAMUR valve connection (on the side marked '1') to 50 % travel.

3. Place the adapter bracket (6) on the positioner and mount using the screws (6.1). Make sure that the seals are correctly seated. For positioners **with air purging**, remove the stopper (5) before mounting the positioner. For positioners **without air purging**, replace the screw plug (4) with a vent plug.

4. Select required lever size (1) M, L or XL and pin position according to the actuator size and valve travel listed in the travel table on page 5-5.

If a pin position other than position 35 with the standard M lever is required or an L or XL lever size is required. Proceed as described in Chapter 5.4.

5. Insert the molded seal (6.2) in the groove of the adapter bracket.

6. Insert the molded seal (17.1) into the turnboard (17) and mount the turnboard to the adapter block (13) using the screws (17.2).

7. Mount the dummy plate (18) to the turnboard using the screws (18.1). Make sure that the seals are correctly seated.

Note

A solenoid valve can also be mounted in place of the dummy plate (18). The orientation of the turnboard (17) determines the mounting position of the solenoid valve. Alternatively, a restrictor plate can be mounted (▶ AB 11).

8. Fasten the adapter block (13) to the NAMUR connection block using the screws (13.1).
9. Insert the vent plug into the Exh. connection.
10. Place the positioner on the adapter block (13) in such a manner that the follower pin (2) rests on the top of the follower plate (3, 3.1). Adjust the lever (1) correspondingly.

    Fasten the positioner to the adapter block (13) using the two fastening screws (6.3). Make sure the molded seal (6.2) is properly seated.
11. For **single-acting actuators without air purging**, connect the Y1 port of the adapter block to the signal pressure connection of the actuator. Seal the Y2 port with a blanking plug.

    For **double-acting actuators and actuators with air purging**, connect the Y2 port of the adapter block to the signal pressure connection of the second actuator chamber or spring chamber of the actuator.

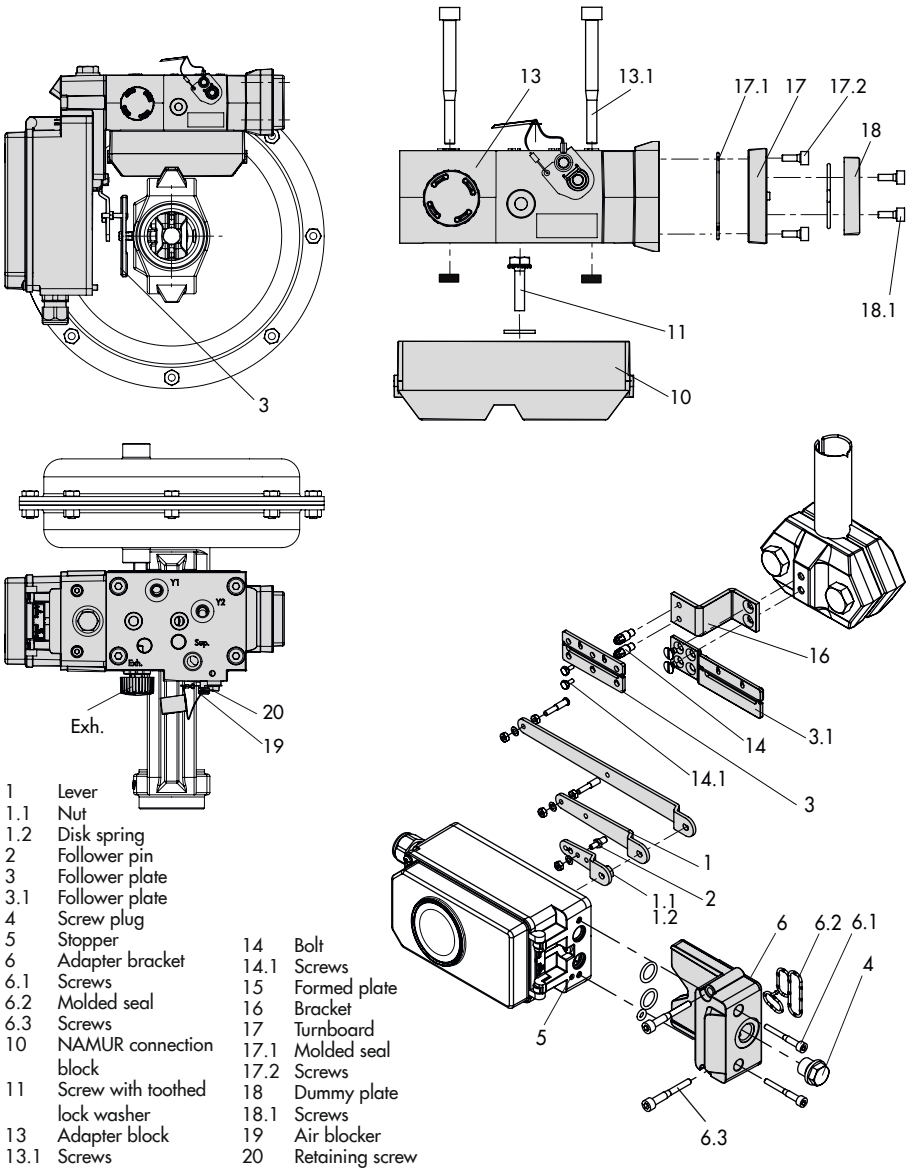
5.5.4 Attachment according to VDI/VDE 3847-2

Attachment according to VDI/VDE 3847-2 for PFEIFFER SRP (single-acting) and DAP (double-acting) rotary actuators in sizes 60 to 1200 with NAMUR interface and air purging of the actuator's spring chamber allows the direct attachment of the positioner without additional piping.

Additionally, the positioner can be replaced quickly while the process is running by blocking the air in single-acting actuators.

Procedure to block the actuator in place (see Fig. 5-11):

1. Unscrew the red retaining screw (1).
2. Turn the air blocker (2) on the bottom of the adapter block according to the inscription.



1	Lever	14	Bolt
1.1	Nut	14.1	Screws
1.2	Disk spring	15	Formed plate
2	Follower pin	16	Bracket
3	Follower plate	17	Turnboard
3.1	Follower plate	17.1	Molded seal
4	Screw plug	17.2	Screws
5	Stopper	18	Dummy plate
6	Adapter bracket	18.1	Screws
6.1	Screws	19	Air blocker
6.2	Molded seal	20	Retaining screw
6.3	Screws		
10	NAMUR connection block		
11	Screw with toothed lock washer		
13	Adapter block		
13.1	Screws		

Fig. 5-10: *Attachment according to VDI/VDE 3847 to a NAMUR rib*

a) Version for single-acting actuator

Mounting onto a PFEIFFER Type 31a (edition 2020+) SRP Rotary Actuator

➔ See Fig. 5-13

1. Fasten the adapter block (1) to the actuator's NAMUR interface using the four fastening screws (2).
   ➔ Make sure that the seals are correctly seated.
2. Mount the follower wheel (3) onto the actuator shaft. Use the matching shaft adapter (see Table 5-9).
3. Place the adapter bracket (4) onto the adapter block (1) and fasten it using the fastening screws (5).
   ➔ Make sure that the seals are correctly seated.
4. Insert and fasten the follower pin in the 90° position on the positioner's lever (see Fig. 5-12).
   ➔ Only use the longer follower pin included in the mounting kit.
5. Align the positioner on the adapter bracket (1) in such a way that the follower pin engages into the actuator's follower wheel (3).
6. Fasten the positioner onto the adapter bracket (4) using the fastening screws (6).
   ➔ Make sure that the seals are correctly seated.

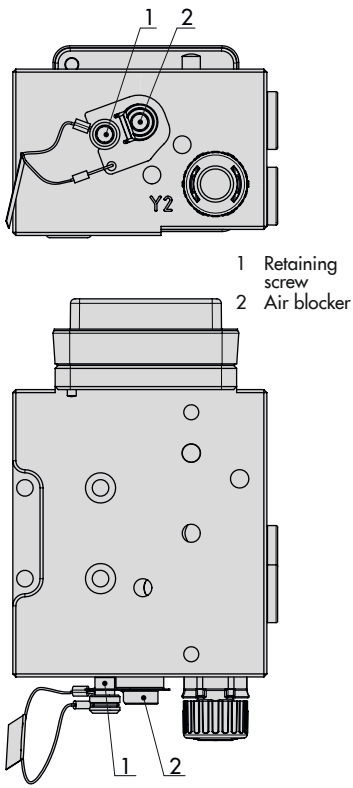


Fig. 5-11: *Adapter block for attachment according to VDI/VDE 3847-2*

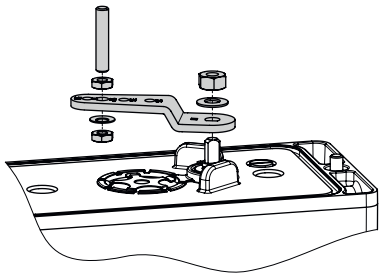


Fig. 5-12: *Follower pin in 90° position*

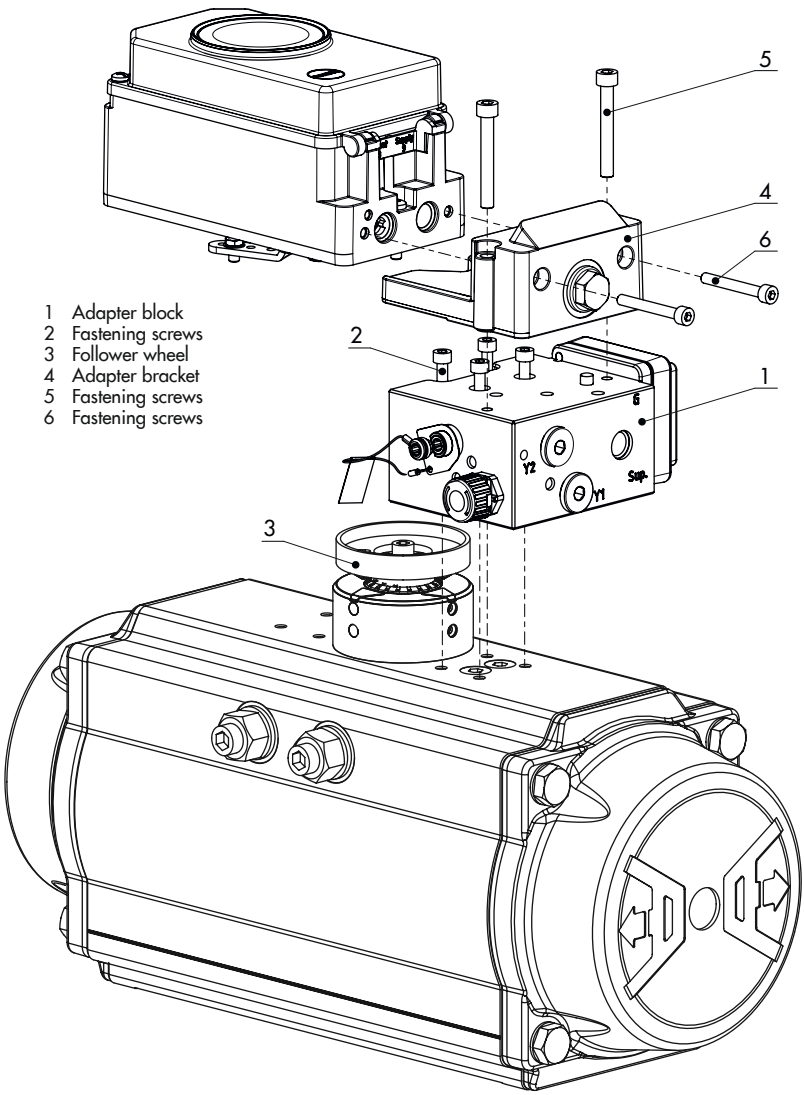


Fig. 5-13: *Mounting on a single-acting actuator*

b) Version for double-acting actuator

A reversing amplifier must be additionally mounted for applications with double-acting (DAP) actuators or applications with single-acting (SAP) actuators that include partial stroke testing.

In this case, a special adapter bracket (4) is required for mounting.

➔ See Fig. 5-15

1. Fasten the adapter block (1) to the actuator's NAMUR interface using the four fastening screws (2).
   ➔ Make sure that the seals are correctly seated.
2. Mount the follower wheel (3) onto the actuator shaft. Use the matching adapter (see Table 5-9).
3. Place the adapter bracket (4) onto the adapter block (1) and fasten it using the fastening screws (5).
   ➔ Make sure that the seals are correctly seated.
4. Insert and fasten the follower pin in the 90° position on the positioner's lever (see Fig. 5-12).
5. Align the positioner on the adapter bracket (1) in such a way that the follower pin engages into the actuator's follower wheel (3).
6. Fasten the positioner onto the adapter bracket (4) using the fastening screws (6).
7. Mount the Type 3710 Reversing Amplifier (7) together with the two guide bushings (8) and terminal plate (9) onto the adapter bracket using the associated fastening screws (10).
   ➔ Make sure that the seals are correctly seated.
8. Remove the vent plug at the adapter block and seal the opening with the G ¼ screw plug.
9. Mount the turnboard marked '***Doppel***' for double-acting actuators or the turnboard marked '***PST***' for single-acting actuators with partial stroke testing. See Fig. 5-14.
   ➔ Make sure that the seals are correctly seated.

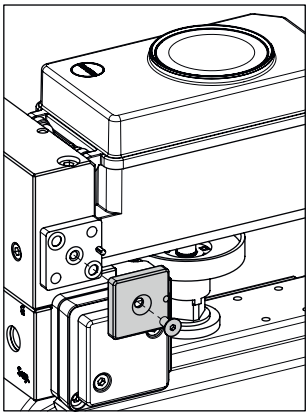


Fig. 5-14: *Mounting the turnboard*

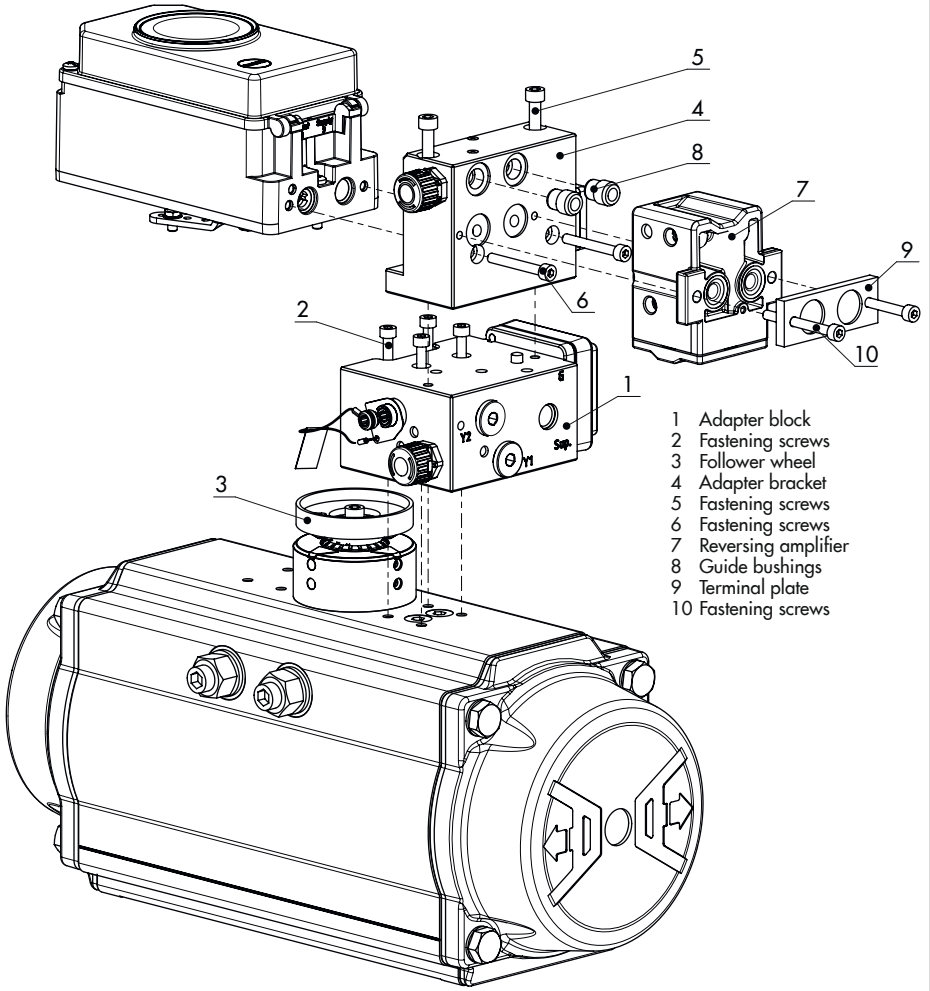


Fig. 5-15: *Mounting on a double-acting actuator or single-acting actuator with partial stroke testing*

Intermediate plate for AA4 interface

➔ See Fig. 5-16

An intermediate plate (1) must be mounted between the adapter block and adapter bracket for PFEIFFER SRP and DAP rotary actuators in sizes 900 and 1200 with AA4 interface. This plate is included in the accessories for the shaft adapter AA4 (see Table 5-9).

Mounting a solenoid valve

➔ See Fig. 5-17

A solenoid valve (12) can also be mounted in place of the dummy plate (12). The orientation of the turnboard (14) determines the mounting position of the solenoid valve. Alternatively, a restrictor plate can be mounted. Further information can be found in the document ▶ AB 11 (Accessories for Solenoid Valves).

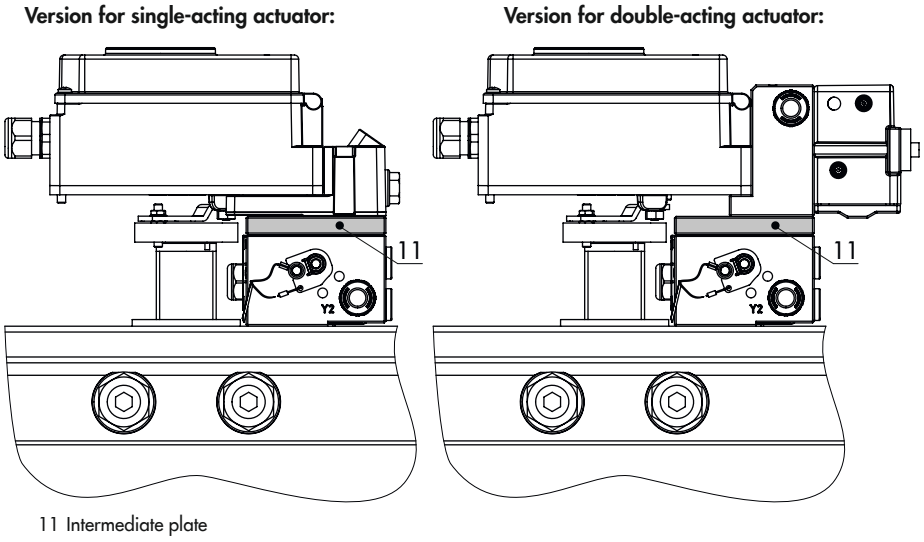


Fig. 5-16: *Intermediate plate for actuators in sizes 900 and 1200 for AA4 interface*

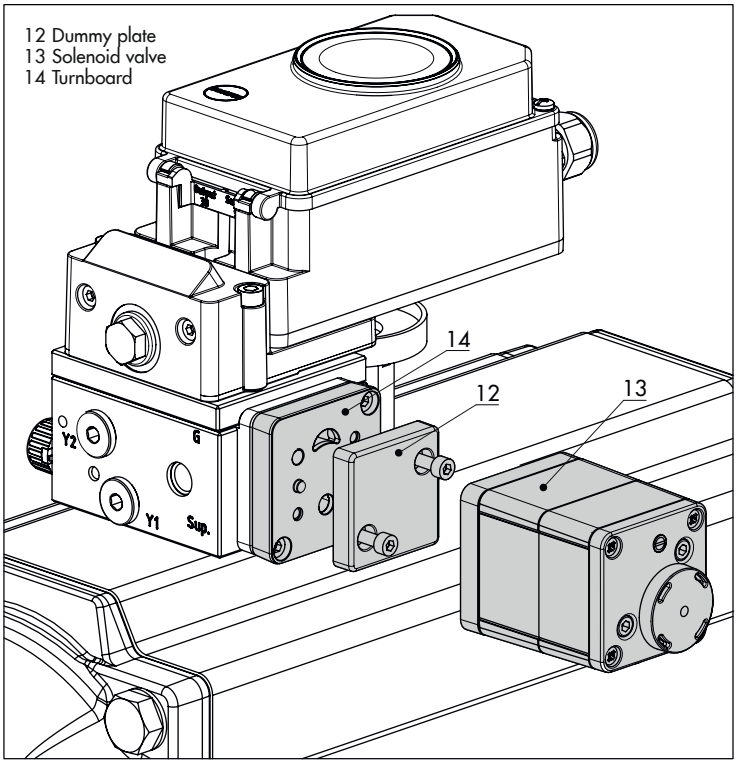


Fig. 5-17: *Mounting a solenoid valve*

5.5.5 Attachment to Type 3510 Micro-flow Valve

➔ See Fig. 5-18

➔ Required mounting parts and accessories: Table 5-7

➔ Observe the travel table on page 5-5.

The positioner is attached to the valve yoke using a bracket.

1. Fasten the bracket (9.1) to the stem connector.
2. Screw the two bolts (9.2) to the bracket (9.1) of the stem connector (9), place the follower plate (3) on top and use the screws (9.3) for fastening.
3. Mount the travel indication scale (accessories) to the outer side of the yoke using the hex screws (12.1), ensuring that the scale is aligned with the stem connector.
4. Fasten the hex bar (11) onto the outer side of yoke by screwing the M8 screws (11.1) directly into the holes on the yoke.
5. Fasten the bracket (10) to the hex bar (11) using the hex screw (10.1), shim and tooth lock washer.
6. Mount connecting plate (6) or pressure gauge bracket (7) with pressure gauges on the positioner. Make sure that the two seals (6.1) are seated properly.
7. Unscrew the standard M lever (1) including follower pin (2) from the positioner shaft.
8. Take the S lever (1) and screw the follower pin (2) in the hole for pin position 17. Proceed as described as in Chapter 5.4.
9. Place positioner on the bracket (10) in such a manner that the follower pin slides into the groove of the follower pin (3). Adjust the lever (1) correspondingly. Screw the positioner to the bracket (10) using both its screws.

5.5.6 Attachment to rotary actuators

➔ See Fig. 5-20

➔ Required mounting parts and accessories: Table 5-10

➔ Observe the travel table on page 5-5.

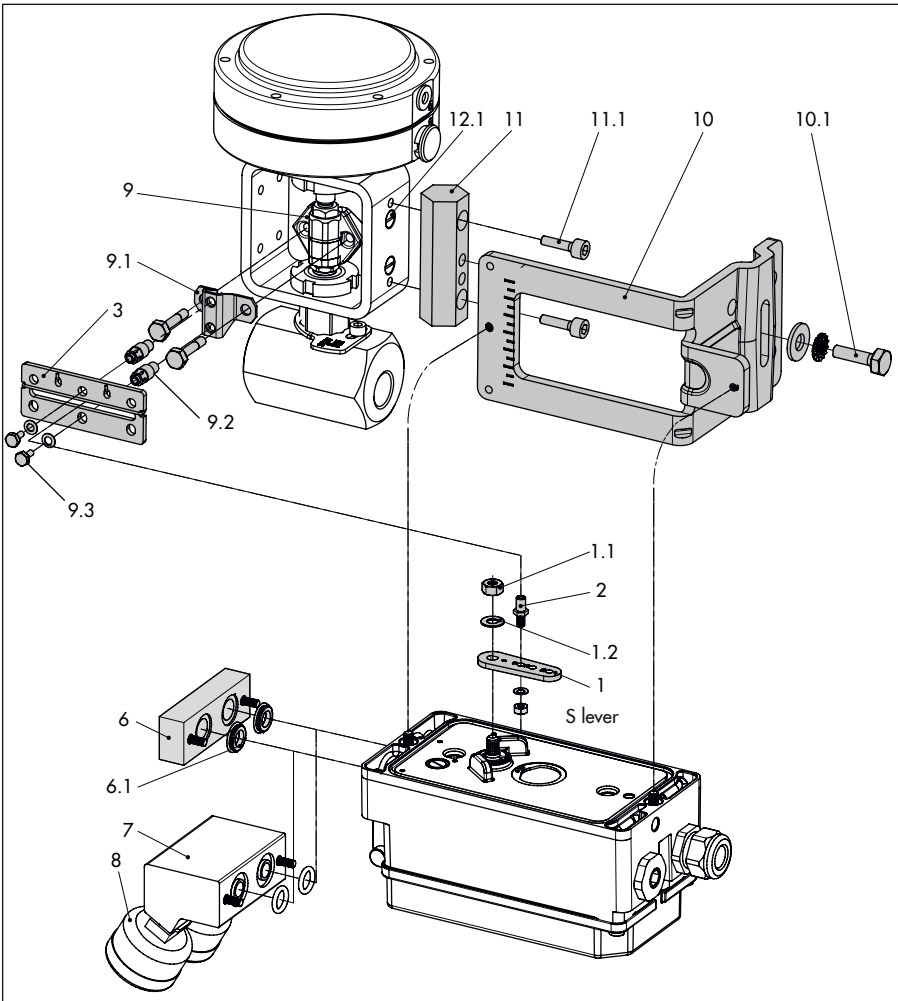
The positioner is mounted to the rotary actuator using two pairs of brackets.

Prior to attaching the positioner to the SAMSON Type 3278 Rotary Actuator, mount the associated adapter (5) to the free end of the rotary actuator shaft.

i ***Note***

On mounting the positioner as described below, it is important to observe the actuator's direction of rotation.

1. Place follower clamp (3) on the slotted actuator shaft or adapter (5).



1	Lever	6.1	Seals	9.1	Bracket	11.1	Screws
1.1	Nut	7	Pressure gauge bracket	9.2	Bolt	12.1	Screws
1.2	Disk spring			9.3	Screws		
2	Follower pin	8	Pressure gauge mounting kit	10	Bracket		
3	Follower plate			10.1	Screw		
6	Connecting plate	9	Stem connector	11	Hex bar		

Fig. 5-18: *Attachment to Type 3510 Micro-flow Valve*

2. Place coupling wheel (4) with flat side facing the actuator on the follower clamp (3). Align slot so that it matches the direction of rotation when the valve is in its closed position (see Fig. 5-20).
3. Fasten the coupling wheel (4) and follower clamp (3) tightly onto the actuator shaft using screw (4.1) and disk spring (4.2).
4. Fasten the bottom pair of brackets (10.1) with the bends pointing either facing to the inside or to the outside (depending on the actuator size) onto the actuator housing. Position the top pair of brackets (10) and fasten.
5. Mount connecting plate (6) or pressure gauge bracket (7) with pressure gauges on the positioner. Make sure that the two seals (6.1) are seated properly. Double-acting springless rotary actuators require the use of a reversing amplifier on the connection side of the positioner housing (see Chapter 5.5.7).
6. Unscrew the standard follower pin (2) from the positioner's M lever (1). Use the metal follower pin (Ø 5 mm) included in the mounting kit and screw tight into the hole for pin position 90°.
7. Place positioner on the top bracket (10) and fasten tight. Taking the actuator's direction of rotation into account, adjust lever (1) so that it engages in the slot of the coupling wheel (4) with its follower pin (Fig. 5-20). It must be guaranteed that the lever (1) is parallel to the long side of the positioner when the actuator is at half its angle of rotation.
8. Stick the scale plate (4.3) on the coupling wheel so that the arrow tip indicates the closed position and it can be easily read when the valve is installed.

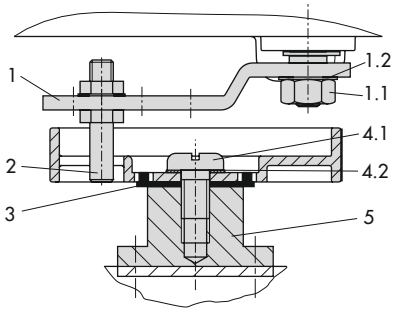
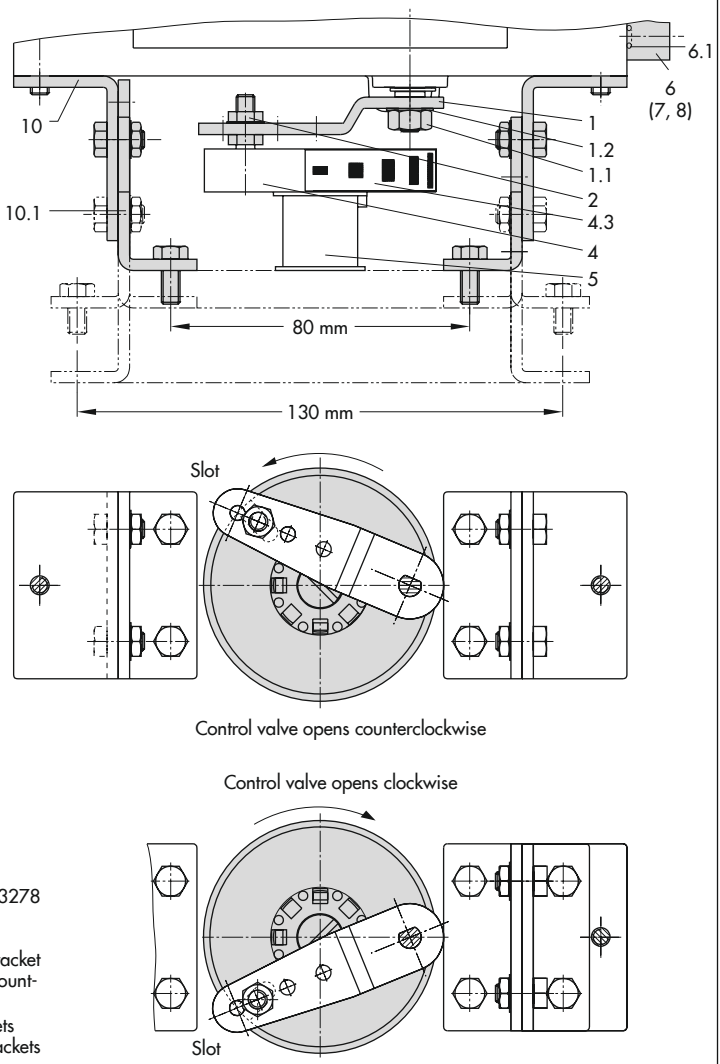


Fig. 5-19: *Mounting the coupling wheel on Type 3278*



Legend for Fig. 5-19 and Fig. 5-20

1	Lever
1.1	Nut
1.2	Disk spring
2	Follower pin
3	Follower clamp (Fig. 5-19)
4	Coupling wheel
4.1	Screw
4.2	Disk spring
4.3	Scale plate
5	Actuator shaft Adapter for Type 3278
6	Connecting plate
6.1	Seals
7	Pressure gauge bracket
8	Pressure gauge mounting kit
10	Top pair of brackets
10.1	Bottom pair of brackets

Fig. 5-20: *Attachment to rotary actuators*

a) Heavy-duty version

➔ See Fig. 5-22

➔ Required mounting parts and accessories: Table 5-10

Both mounting kits contain all the necessary mounting parts. The parts for the actuator size used must be selected from the mounting kit.

Prepare actuator and mount possibly required adapter supplied by the actuator manufacturer.

1. Mount the housing (10) onto the rotary actuator. In case of VDI/VDE attachment, place spacers (11) underneath, if necessary.
2. For **SAMSON Type 3278 and VETEC S160 Rotary Actuators**, fasten the adapter (5) onto the free end of the shaft and for **VETEC R Actuator**, place on the adapter (5.1). For **Type 3278, VETEC S160** and **VETEC R Actuators**, place on the adapter (3). For **Type 3278, VETEC S160** and **VETEC R** Actuators, place on the adapter (3). For VDI/VDE version, this step depends on the actuator size.
3. Stick adhesive label (4.3) onto the coupling in such a manner that the yellow part of the sticker is visible in the window of the housing when the valve is OPEN. Adhesive labels with explanatory symbols are enclosed and can be stuck on the housing, if required.
4. Fasten coupling wheel (4) on the slotted actuator shaft or adapter (3) using screw (4.1) and disk spring (4.2).
5. Unscrew the standard follower pin (2) from the positioner's M lever (1). Attach the follower pin (Ø5 mm) included in the mounting kit to pin position 90°. Proceed as described in Chapter 5.3.
6. Mount connecting plate (6) for required G ¼ connecting thread or pressure gauge bracket (7) with pressure gauges on the positioner. Make sure that the two seals (6.1) are seated properly. Double-acting springless rotary actuators require the use of a reversing amplifier on the connection side of the positioner housing (see Chapter 5.5.7).
7. For actuators with a volume of less than 300 cm³, screw the screw restriction (order no. 1400-6964) into the signal pressure output of the positioner (or the output of the pressure gauge bracket or connecting plate).

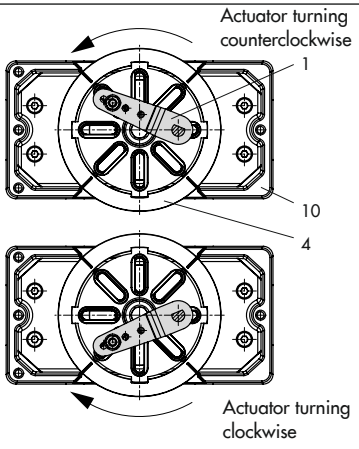


Fig. 5-21: *Direction of rotation*

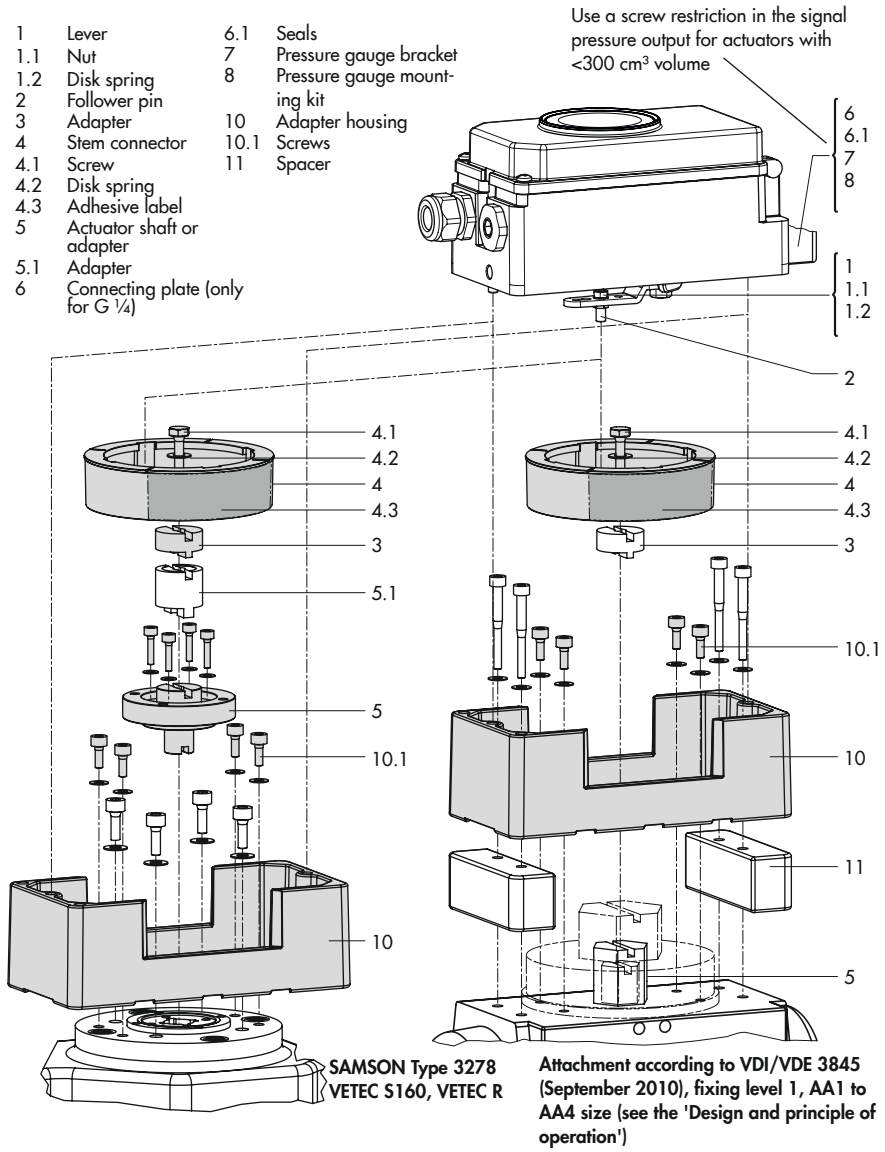


Fig. 5-22: *Attachment to rotary actuators (heavy-duty version)*

8. Place positioner on housing (10) and screw it tight. Taking the actuator's direction of rotation into account, adjust lever (1) so that it engages in the correct slot with its follower pin (Fig. 5-21).

5.5.7 Reversing amplifier for double-acting actuators

For the use with double-acting actuators, the positioner must be fitted with a reversing amplifier, e.g. the SAMSON Type 3710 Reversing Amplifier (see Mounting and Operating Instructions ▶ EB 8392).

The following applies to all reversing amplifiers:

The signal pressure of the positioner is supplied at the output 1 of the reversing amplifier. An opposing pressure, which equals the required supply pressure (Z) when added to the pressure at output 1, is applied at output 2.
The following relationship applies:
output 1 + output 2 = Supply pressure (Z).

Connect output 1 to the signal pressure connection on the actuator that causes the valve to open when the pressure rises.

Connect output 2 to the signal pressure connection on the actuator that causes the valve to close when the pressure rises.

➔ Set slide switch on positioner to AIR TO OPEN.

i Note

*How the outputs are marked depends on the reversing amplifier used. **Type 3710**: Output 1/2 = Y_1/Y_2*

5.6 Attachment of external position sensor



Fig. 5-23: *Positioner unit with sensor mounted on a micro-flow valve*

➔ Required mounting parts and accessories: Table 5-11

In the positioner version with an external position sensor, the sensor located in a separate housing is attached over a plate or bracket to the control valve. The travel pick-off corresponds to that of a standard device.
The positioner can be mounted as required to a wall or a pipe.

For the pneumatic connection either a connecting plate (6) or a pressure gauge bracket (7) must be fixed to the housing, depending on the accessory chosen. Make sure the seals (6.1) are correctly inserted (see Fig. 5-7, bottom right).

For the electrical connection a 10 meter connecting lead with M12x1 connectors is included in the scope of delivery.

i Note

– In addition, the instructions in Chapters 5.12 and 5.11 apply for the pneumatic and electrical connection.

Operation and setting are described in the 'Start-up and configuration' chapter.
– *Since 2009, the back of the position sensor (20) is fitted with two pins acting as mechanical stops for the lever (1). If this position sensor is mounted using old mounting parts, two corresponding Ø 8 mm holes must be drilled into the mounting plate/bracket (21). A template is available for this purpose. See Table 5-11.*

5.6.1 Mounting the position sensor with direct attachment

Type 3277-5 Actuator with 120 cm² (Fig. 5-24)

The signal pressure from the positioner is routed over the signal pressure connection of the connecting plate (9, Fig. 5-24 left) to the actuator diaphragm chamber. To proceed, first screw the connecting plate (9) included in the accessories onto the actuator yoke.

– Turn the connecting plate (9) so that the correct symbol for the fail-safe action "actuator stem extends" or "actuator stem retracts" is aligned with the marking (see Fig. 5-24, bottom).
  ➔ Make sure that the gasket for the connecting plate (9) is correctly inserted.
– The connecting plate has threaded holes with NPT and G threads. Seal the threaded connection that is not used with the rubber seal and square plug.

Type 3277 Actuator with 175 to 750 cm²:

The signal pressure is routed to the connection at the side of the actuator yoke for the version with fail-safe action "actuator stem extends". For the fail-safe action "actuator stem retracts" the connection on the top diaphragm case is used. The connection at the side of the yoke must be fitted with a venting plug (accessories).

Mounting the position sensor

1. Place the lever (1) on the sensor in mid-position and hold it in place. Unthread the nut (1.1) and remove the lever together with the disk spring (1.2) from the sensor shaft.
2. Screw the position sensor (20) onto the mounting plate (21).
3. Depending on the actuator size and rated valve travel, determine which lever and position of the follower pin (2) is to be used from the travel table on page 5-5. The positioner is delivered with the **M** lever in pin position 35 on the sensor. If necessary, remove the follower pin (2) from its pin position and move it to the hole for the recommended pin position and screw tight.
4. Place the lever (1) and disk spring (1.2) on the sensor shaft. Place the lever **in mid-position** and **hold it in place**. Screw on the nut (1.1).
5. Place follower clamp (3) on the actuator stem, align it and screw tight so that the mounting screw is located in the groove of the actuator stem.

6. Place the mounting plate together with the sensor onto the actuator yoke so that the follower pin (2) rests on the top of the follower clamp (3). It must rest on it with spring force. Fasten the mounting plate (21) onto the actuator yoke using both fixing screws.
7. Mount cover (11) on the other side.
   ➔ Make sure that the vent plug is located at the bottom when the control valve is installed to allow any condensed water that collects to drain off.

5.6.2 Mounting the position sensor with attachment according to IEC 60534-6

➔ See Fig. 5-25

➔ Required mounting parts and accessories: Table 5-11

1. Place the lever (1) on the position sensor in **mid-position** and **hold it in place**. Unthread the nut (1.1) and remove the lever together with the disk spring (1.2) from the sensor shaft.

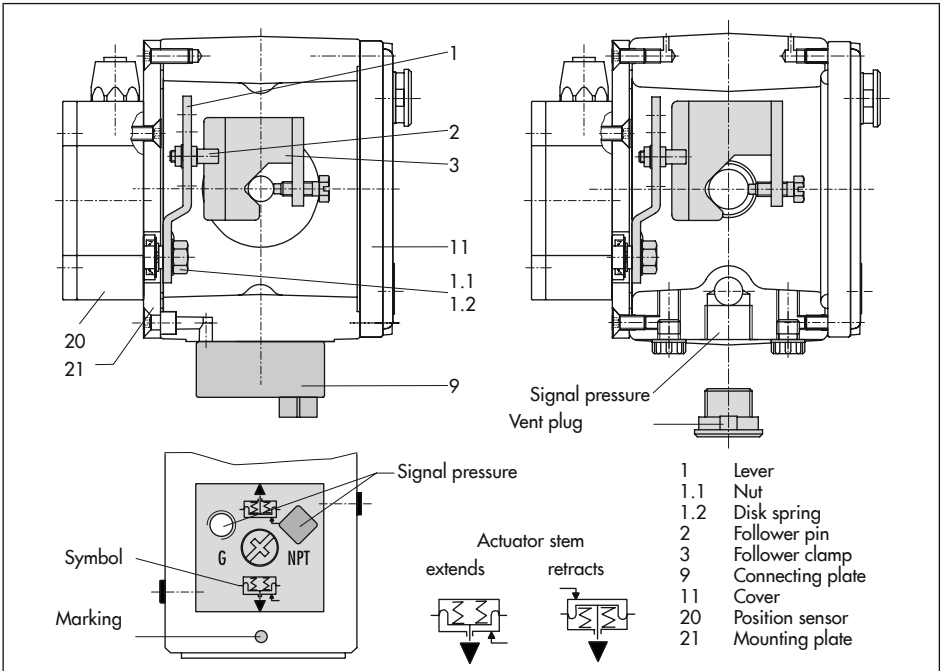
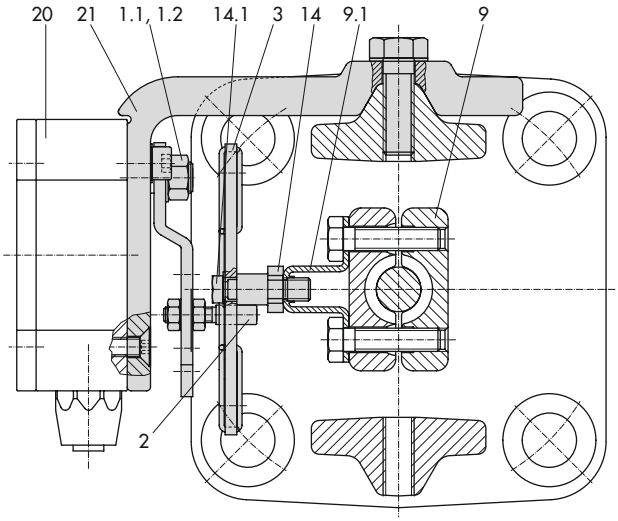


Fig. 5-24: *Mounting for Type 3277-5 Actuator (left) and Type 3277 Actuator (right)*

2. Screw the position sensor (20) onto the bracket (21).

The standard attached M lever with the follower pin (2) at position 35 is designed for 120 to 350 cm² actuators with 15 mm rated travel. For other actuator sizes or travels, select the lever and pin position from the travel table on page 5-5. L and XL levers are included in the mounting kit.

3. Place the lever (1) and disk spring (1.2) on the sensor shaft. Place the lever **in mid-position** and **hold it in place**. Screw on the nut (1.1).
4. Screw the two bolts (14) to the bracket (9.1) of the stem connector (9), place the follower plate (3) on top and use the screws (14.1) for fastening.
5. Place the bracket with the sensor at the NAMUR rib in such a manner that the follower pin (2) rests in the slot of the follower plate (3), then screw the bracket using its fixing screws onto the valve.



1	Lever
1.1	Nut
1.2	Disk spring
2	Follower pin
3	Follower plate
9	Stem connector
9.1	Bracket
14	Bolt
14.1	Screws
20	Position sensor
21	Bracket

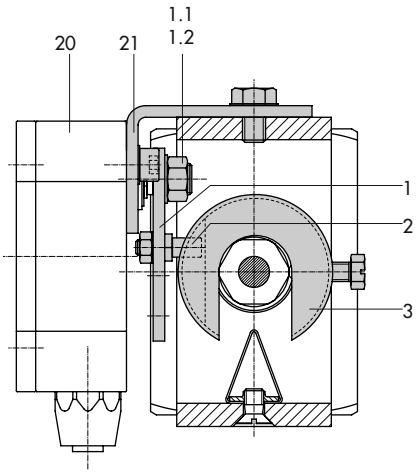
Fig. 5-25: *Mounting according to IEC 60534-6 (NAMUR)*

5.6.3 Mounting the position sensor to Type 3510 Micro-flow Valve

➔ See Fig. 5-26

➔ Required mounting parts and accessories: Table 5-11

1. Place the lever (1) on the position sensor in **mid-position** and **hold it in place**. Unscrew the nut (1.1) and remove the standard attached M lever (1) together with the disk spring (1.2) from the sensor shaft.
2. Screw the position sensor (20) onto the bracket (21).
3. Select the S lever (1) from the accessories and screw the follower pin (2) into the hole for pin position 17. Place the lever (1) and disk spring (1.2) on the sensor shaft. Place the lever in mid-position and hold it in place. Screw on the nut (1.1).
4. Place follower clamp (3) on the valve stem connector, align at a right angle and screw tight.
5. Position the bracket (21) with the position sensor on the valve yoke and screw tight, making sure the follower pin (2) slides into the groove of the follower clamp (3).



1	Lever
1.1	Nut
1.2	Disk spring
2	Follower pin
3	Follower clamp
20	Position sensor
21	Bracket

Fig. 5-26: *Mounting on a micro-flow valve*

5.6.4 Mounting on rotary actuators

➔ See Fig. 5-27

➔ Required mounting parts and accessories: Table 5-11

1. Place the lever (1) on the position sensor in **mid-position** and **hold it in place**. Unthread the nut (1.1) and remove the lever together with the disk spring (1.2) from the sensor shaft.
2. Screw the position sensor (20) onto the mounting plate (21).
3. Replace the follower pin (2) normally attached to the lever (1) with the metal follower pin (Ø 5 mm) from the accessories and screw it into the hole for pin position 90°.
4. Place the lever (1) and disk spring (1.2) on the sensor shaft. Place the lever **in mid-position** and **hold it in place**. Screw on the nut (1.1).

Follow the instructions describing attachment to the standard positioner in Chapter 5.5.6.

Instead of the positioner, attach the position sensor (20) with its mounting plate (21).

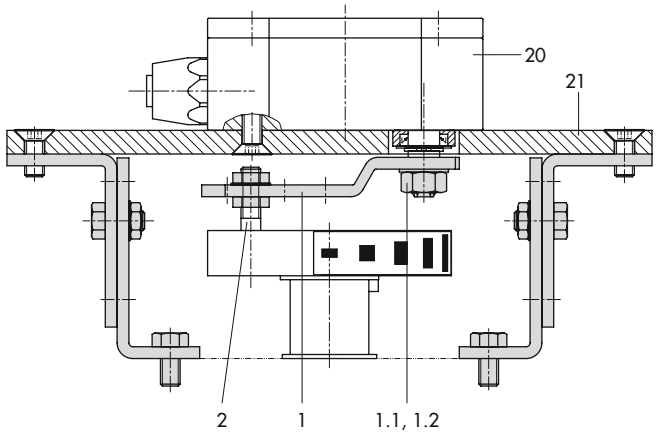


Fig. 5-27: *Mounting on rotary actuators*

5.7 Mounting the leakage sensor

➔ See Fig. 5-28

Normally, the control valve is delivered with positioner and leakage sensor already mounted.
If the leakage sensor is mounted after the valve has been installed or it is mounted on another control valve, proceed as described in the following.

NOTICE

Risk of malfunction due to incorrect fastening!

Fasten the leakage sensor using a torque of 20 ±5 Nm.

The M8 threaded connection on the NAMUR rib should preferably be used to mount the sensor (Fig. 5-28).

Tip

If the positioner was mounted directly onto the actuator (integral attachment), the NAMUR interfaces on either side of the valve yoke can be used to mount the leakage sensor.

The start-up of the leakage sensor is described in detail in the Operating Instructions for EXPERTplus Valve Diagnostics.

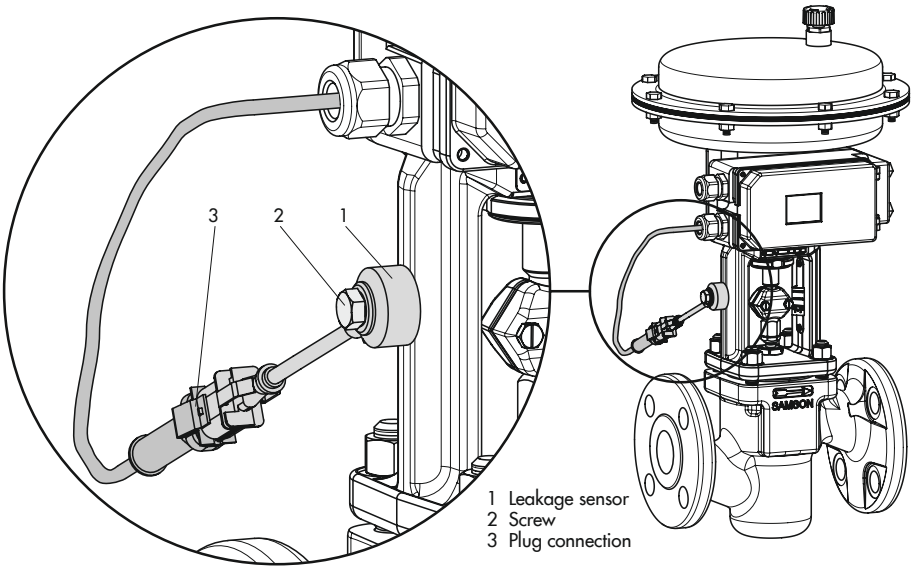


Fig. 5-28: *Mounting the leakage sensor*

5.8 Retrofitting inductive limit switch

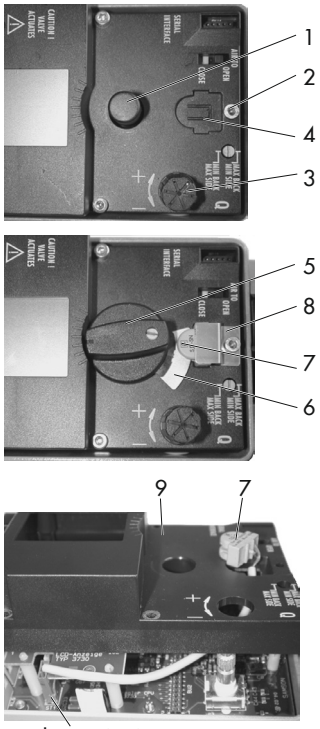
Required retrofit kit:

Limit switch Order no. 1402-1770

i ***Note***

The same requirements apply to retrofitting a unit as to servicing the positioner. For explosion-protected positioners, the requirements specified under 'Servicing explosion-protected devices' in the 'Safety instructions and measures' chapter must be observed. Check the "Limit switch, inductive" box on the nameplate after installing the limit switch.

1. Remove rotary pushbutton (3) and cap (1), unthread the five fastening screws (2) and lift off plastic cover (9) together with the display, taking care not to damage the ribbon cable (between PCB and display).
2. Use a knife to cut an opening at the marked location (4).
3. Push the connector (11) with cable through the opening and secure the proximity switch (7) on the cover with a dot of glue.
4. If necessary, remove the jumper at the socket X7 and push the cable connector (11) on the socket.
5. Guide the cable in such a manner that the plastic cover can be placed back onto the positioner. Insert the fixing screws (2) and screw tight. Attach the clamping plate (8) onto the proximity switch.
6. Attach the rotary switch (5). Make sure the flattened side of the positioner shaft is turned so that the rotary switch (5) can be attached with the metal tag next to the proximity switch.
7. On start-up of the positioner, set the option inductive alarm under Code 38 from *No* to *YES*.



1	Cap	6	Metal tag
2	Screw	7	Proximity switch
3	Rotary pushbutton	8	Clamping plate
4	Marking	9	Plastic cover
5	Rotary switch	11	Connector

Fig. 5-29: *Retrofitting an inductive limit switch*

5.9 Mounting positioners with stainless steel housings

Positioners with stainless steel housings require mounting parts that are completely made of stainless steel or free of aluminum.

i ***Note***

The pneumatic connecting plate and pressure gauge bracket are available in stainless steel (order numbers listed below). The Type 3710 Pneumatic Reversing Amplifier is also available in stainless steel.

Connecting plate (stainless steel)	G ¼ ¼ NPT	1400-7476 1400-7477
Pressure gauge bracket (stainless steel)	G ¼ ¼ NPT	1402-0265 1400-7108

Table 5-4 to Table 5-10 apply for attaching positioners with stainless steel housings with the following restrictions:

Direct attachment

All mounting kits from Table 5-6 can be used. The connection block is not required. The stainless steel version of the pneumatic connecting plate routes the air internally to the actuator.

Attachment according to IEC 60534-6 (NAMUR rib or attachment to rod-type yokes)

All mounting kits from Table 5-7 can be used. Connecting plate in stainless steel.

Attachment to rotary actuators

All mounting kits from Table 5-10 can be used except for the heavy-duty version. Connecting plate in stainless steel.

5.10 Air purging function for single-acting actuators

The instrument air leaving the positioner is diverted to the actuator spring chamber to provide corrosion protection inside the actuator. Observe the following:

Direct attachment to Type 3277-5 (stem extends FA/stem retracts FE)

The air purging function is automatically provided.

Direct attachment to Type 3277, 175 to 750 cm²

FA: Remove the stopper (12.2, Fig. 5-6) at the black connection block and make a pneumatic connection to the spring chamber on the vented side.

! ***NOTICE***

Mounting possibly incorrect when old powder-paint-coated aluminum connection blocks are used.

Mount old powder-paint-coated aluminum connection blocks as described in 'Attachment according to IEC 60534-6 (NAMUR rib or attachment to rod-type yokes)' and 'Attachment to rotary actuators'.

FE: The air purging function is automatically provided.

Attachment according to IEC 60534-6 (NAMUR rib or attachment to rod-type yokes) and to rotary actuators

The positioner requires an additional port for the exhaust air that can be connected over piping. An adapter available as an accessory is used for this purpose:

Threaded bushing (M20x1.5)	G ¼	0310-2619
	¼ NPT	0310-2550

i ***Note***

The adapter uses one of the M20x1.5 connections in the housing which means only one cable gland can be installed.

Should other valve accessories be used which vent the actuator (e.g. solenoid valve, volume booster, quick exhaust valve), this exhaust air must also be included in the purging function. The connection over the adapter at the positioner must be protected with a check valve (e.g. check valve G ¼, order no. 8502-0597) mounted in the piping. Otherwise the pressure in the positioner housing would rise above the ambient pressure and damage the positioner when the exhausting components respond suddenly.

5.11 Pneumatic connection

⚠ WARNING

Risk of injury by possible movement of exposed parts (positioner, actuator or valve) after connecting the signal pressure.

➔ *Do not touch or block exposed moving parts.*

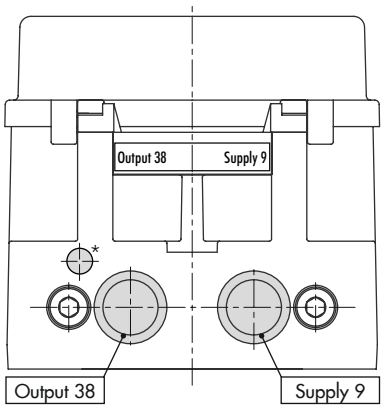
NOTICE

Incorrect connection of the supply air will damage the positioner and will lead to malfunction.

➔ *Screw the screw fittings (Supply and Output) into the connecting plate, pressure gauge mounting block or connection block from the accessories.*

➔ *Never screw threaded parts directly into housing!*

The pneumatic ports are located on the back of the positioner (see Fig. 5-30).



* Additional vent hole only in
Type 3730-3xxxxxxxx**6**0xx and
Type 3730-3xxxxxxxx**7**0xx

Fig. 5-30: *Pneumatic connections*

Connecting the supply air

Before performing the pneumatic connection, make sure the following conditions are met:

– The positioner is properly mounted onto the control valve.

If this is the case:

➔ Connect the pneumatic connections in the connecting plate, pressure gauge mounting block and connection block (optionally designed as a bore with ¼ NPT or G ¼ thread). Customary fittings for metal or copper tubing or plastic hoses can be used.

5.11.1 Signal pressure connection

The signal pressure connection depends on how the positioner is mounted onto the actuator:

Type 3277 Actuator

– The signal pressure connection is fixed.

Attachment according to IEC 60534-6 (NAMUR)

– For "actuator stem retracts" fail-safe action: connect the signal pressure to the connection on top of the actuator.
– For "actuator stem extends" fail-safe action: connect the signal pressure to the connection on bottom of the actuator.

Rotary actuators

– For rotary actuators, the manufacturer's specifications for connection apply.

5.11.2 Signal pressure reading

Tip

To monitor the supply air and signal pressure, we recommend mounting pressure gauges (see accessories in Chapter 5.13).

Mounting the pressure gauges:

➔ See Chapter 5.2 and Fig. 5-7

5.11.3 Supply pressure

The required supply air pressure depends on the bench range and the actuator's direction of action (fail-safe action).

The bench range is written on the nameplate either as the bench range or signal pressure range depending on the actuator. The direction of action is marked FA or FE or by a symbol.

Actuator stem extends FA (AIR TO OPEN)

Fail-close (for globe and angle valves):

➔ Required supply pressure = Upper bench range value + 0.2 bar, at least 1.4 bar.

Actuator stem retracts FE (AIR TO CLOSE)

Fail-open (for globe and angle valves):

For tight-closing valves, the maximum signal pressure pst_{max} is roughly estimated as follows:

$$pst_{max} = F + \frac{d^2 \cdot \pi \cdot \Delta p}{4 \cdot A} \text{ [bar]}$$

d = Seat diameter [cm]
Δp = Differential pressure across the valve [bar]
A = Actuator area [cm²]
F = Upper bench range value of the actuator [bar]

If there are no specifications, calculate as follows:

➔ Required supply pressure = Upper bench range value + 1 bar

5.11.4 Signal pressure (output)

The signal pressure at the output (38) of the positioner can be restricted to 1.4 bar, 2.4 bar or 3.7 bar in Code 16.
The limitation is not activated by default [No].

5.12 Electrical connection

For electrical installation, observe the relevant electrotechnical regulations and the accident prevention regulations that apply in the country of use. In Germany, these are the VDE regulations and the accident prevention regulations of the employers' liability insurance.

⚠ WARNING

Incorrect electrical connection will render the explosion protection unsafe.

➔ *Adhere to the terminal assignment.*

➔ *Do not undo the enameled screws in or on the enclosure.*

⚠ WARNING

Intrinsic safety rendered ineffective in intrinsically safe devices.

➔ *Only connect intrinsically safe devices intended for use in intrinsically safe circuits to certified intrinsically safe input-connected units.*

➔ *Do not place intrinsically safe devices back into operation that were connected to intrinsically safe input-connected units without certification.*

➔ *Do not exceed the maximum permissible electric values specified in the EC type examination certificates when interconnecting intrinsically safe electrical equipment (U_i or U_0, I_i or I_0, P_i or P_0, C_i or C_0 and L_i or L_0).*

The ambient temperature ranges of the tables in the EC type examination certificate apply for the assignment between the permissible ambient temperature, temperature class, maximum short-circuit currents and maximum power P_i and P_0.

The following additionally applies: For positioners in type of protection Ex tb (3730-3 5) and type of protection Ex nA (3730-3 8), the cable glands and blanking plugs must be certified according to EN 60079-7 (Ex e).

Selecting cables and wires

➔ Observe **Clause 12 of EN 60079-14** for installation of the intrinsically safe circuits.

Clause 12.2.2.7 applies when running multicore cables or wires with more than one intrinsically safe circuit.

The radial thickness of the insulation of a conductor for common insulating materials (e.g. polyethylene) must not be smaller than 0.2 mm. The diameter of an individual wire in a fine-stranded conductor must not be smaller than 0.1 mm. Protect the conductor ends against splicing, e.g. by using wire-end ferrules.

When two separate cables or wires are used for connection, an additional cable gland can be installed. Seal cable entries left unused with plugs. Fit equipment used in ambient temperatures below –20 °C with metal cable entries

Equipment for use in zone 2/zone 22

In equipment operated according to type of protection Ex nA (non-sparking equipment)

according to EN 60079-15, circuits may be connected, interrupted or switched while energized only during installation, maintenance or repair.

The special conditions of use mentioned in the statement of conformity must be observed for the rated values and the installation of the series-connected fuse for interconnection of Ex nA circuits.

For Ex nA equipment (non-sparking equipment), circuits may be connected, interrupted or switched while energized only during installation, maintenance or repair.

- Positioners with type of protection Ex nA or Ex tc can be used with a cover with or without window.
- The Type 3730-31, Type 3730-35 and Type 3730-38 Positioners are 100 % identical in design, except for the marking and the housing cover.
- For type of protection Ex nA, the VCC connection in the interface adapter must be connected in series with a fuse according to IEC 60127, 250 V F or T with a fuse rating of I_N ≤40 mA.
- The signal current circuit must be connected in series with a fuse according to IEC 60127-2/VI, 250 V T with a fuse rating of I_N ≤63 mA.
- The transmitter current circuit must be connected in series with a fuse according to IEC 60127-2/VI, 250 V T with a fuse rating of I_N ≤40 mA.

The fuses must be installed outside the hazardous area.

Cable entry

Cable entry with M20x1.5 cable gland, 6 to 12 mm clamping range (see accessories in Table 5-4).

There is a second M20x1.5 threaded hole in the housing that can be used for additional connection, when required. The screw terminals are designed for wire cross-sections of 0.2 to 2.5 mm². Tighten the screws by 0.5 to 0.6 Nm.

The wires for the set point must be connected to the terminals 11 and 12 located in the housing.

Only use a **current source**. OVERLOAD appears on the display when the set point exceeds 22 mA.

NOTICE

The connection of a voltage source (U ≥ 7 V or U ≥ 2 V when connected to the wrong pole) at terminals 11 and 12 will damage the positioner.

➔ *Only connect a current source and never a voltage source.*

In general, it is not necessary to connect the device to a bonding conductor. However, if it is to be connected, it can be connected either to the terminal for equipotential bonding inside or outside the device.

Depending on the version, the positioner is equipped with inductive limit switches and/or a solenoid valve.

The position transmitter is operated on a two-wire circuit. The usual supply voltage to terminals 31 and 32 is 24 V DC. Taking the

resistance of the supply leads into account, the voltage at the position transmitter terminals can be between 12 and 30 V DC.

Refer to Fig. 5-31 or to the label on the terminal block.

NOTICE

Malfunction due to the current falling below minimum current.

➔ *Do not allow the set point to fall below 3.8 mA.*

Note

In positioners for attachment according to VDI/VDE 3847-1, the terminal designation of the limit switches 41/42 and 51/52 as well as the OPEN and CLOSED wording can be changed by turning the terminal label which is printed on both sides.

Connecting the electrical power

Before performing the electrical connection, make sure the following conditions are met:

– The positioner is properly mounted onto the control valve.
– The air supply is properly connected.

If this is the case:

➔ Connect the electrical power (mA signal) as shown in Fig. 5-31.

5.12.1 Switching amplifier according to EN 60947-5-6

For operation of the limit switches, switching amplifiers must be connected in the output circuit. To ensure the operating reliability of the positioner, the amplifiers should comply with the limit values of the output circuits conforming to EN 60947-5-6.

Observe the relevant regulations for installation in hazardous areas.

For applications in safe areas (non-hazardous areas), limit switches can be directly interconnected to the binary input of the PLC in accordance with IEC 61131. This applies to the standard operating range for digital inputs according to Clause 5.2.1.2 of IEC 61131-2 with the rated voltage of 24 V DC.

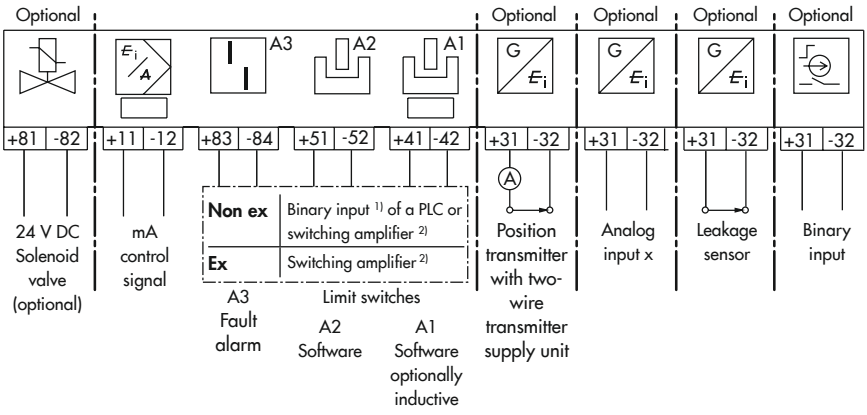
5.12.2 Establishing communication

Communication between computer and positioner using an FSK modem or handheld communicator (if necessary, using an isolation amplifier) is based on the HART® protocol.

Viator FSK modem

– RS-232	Non ex	Order no. 8812-0130
– PCMCIA	Non ex	Order no. 8812-0131
– USB	Non ex	Order no. 8812-0132

If the load impedance of the controller or control station is too low, an isolation amplifier must be connected between controller



1) Binary input acc. to IEC 61131-2 (Pmax = 400 mW)
2) Switching amplifier according to EN 60947-5-6

Fig. 5-31: *Electrical connections*

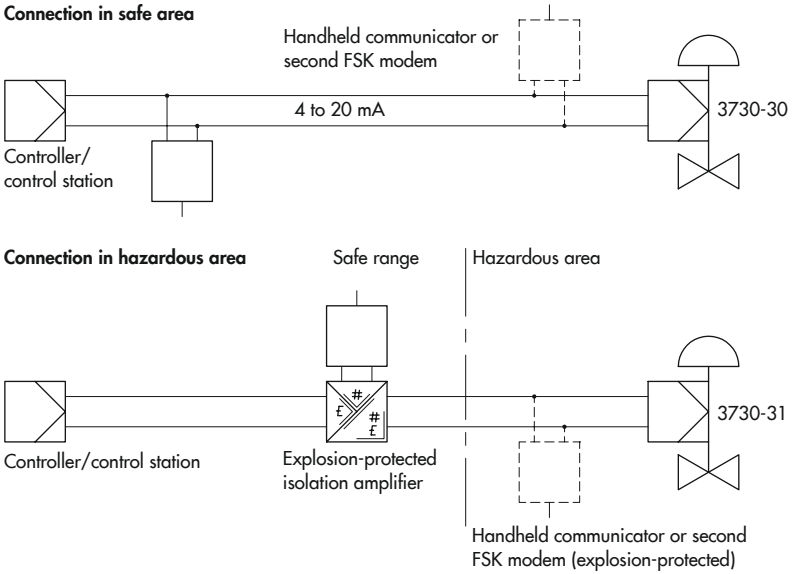


Fig. 5-32: *Connection with FSK modem*

and positioner (interfacing as for positioner connected in hazardous areas). See Fig. 5-32.

If the positioner is used in hazardous areas, an explosion-protected isolation amplifier must to be used.

Using the HART® protocol, all connected control room and field units can be addressed individually using a point-to-point connection or the standard (multidrop) bus.

Point-to-point:

The bus address/polling address must always be set to zero (0).

Standard bus (multidrop):

In the standard bus (multidrop) mode, the positioner follows the analog current signal (set point) in the same way as for point-to-point communication. This operating mode is, for example suitable for split-range operation of positioners (series connection). The bus address/polling address has to be within a range of 1 to 15.

---

i ***Note***

Communication errors may occur when the process controller/control station output is not HART®-compatible.
Alternatively, a 250 Ω resistor can be connected in series and a 22 µF capacitor can be connected in parallel to the analog output. The load for the controller output will increase as a result.

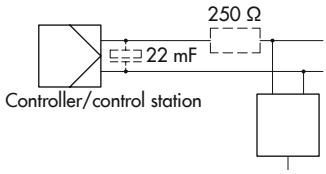


Fig. 5-33: *Adapting the output signal*

5.13 Mounting accessories

Table 5-4: *General accessories*

Designation		Order no.
Reversing amplifier for double-acting actuators		Type 3710
M20x1.5 cable gland	Black plastic (6 to 12 mm clamping range)	8808-1011
	Blue plastic (6 to 12 mm clamping range)	8808-1012
	Nickel-plated brass (6 to 12 mm clamping range)	1890-4875
	Nickel-plated brass (10 to 14 mm clamping range)	1992-8395
	Stainless steel 1.4305 (8 to 14.5 mm clamping range)	8808-0160
Adapter M20x1.5 to ½ NPT	Powder-coated aluminum	0310-2149
	Stainless steel	1400-7114
Lever	S	0510-0522
	M	0510-0510
	L	0510-0511
	XL	0510-0512
	XXL	0510-0525
Retrofit kit for inductive limit switch 1 x SJ2-SN		1402-1770
Isolated USB interface adapter (SSP interface to USB port on a computer) including TROVIS-VIEW CD-ROM		1400-9740
TROVIS-VIEW 6661 (▶ www.samsongroup.com > SERVICE & SUPPORT > Downloads > TROVIS-VIEW)		

Table 5-5: *Direct attachment to Type 3277-5 Actuator*

Designation			Order no.
Mounting parts	Standard version for actuators 120 cm² or smaller		1400-7452
	Version compatible with paint for actuators 120 cm² or smaller		1402-0940
Accessories for actuator	Old switchover plate for Type 3277-5xxxxxx.**00** Actuator (old)		1400-6819
	New switchover plate for Type 3277-5xxxxxx.**01** Actuator (new) [1]		1400-6822
	New connecting plate for Type 3277-5xxxxxx.**01** Actuator (new) [1], G ⅛ and ⅛ NPT		1400-6823
	Old connecting plate for Type 3277-5xxxxxx.**00** Actuator (old): G ⅛		1400-6820
	Old connecting plate for Type 3277-5xxxxxx.**00** (old): ⅛ NPT		1400-6821
Accessories for positioner	Connecting plate (6)	G ¼	1400-7461
		¼ NPT	1400-7462
	Pressure gauge bracket (7)	G ¼	1400-7458
		¼ NPT	1400-7459
	Pressure gauge mounting kit (8) up to max. 6 bar (output/supply)	Stainless steel/brass	1402-0938
		Stainless steel/stainless steel	1402-0939
	Pressure gauge mounting kit (8) up to max. 6 bar (without inscription)	Stainless steel/brass	1402-1637
		Stainless steel/stainless steel	1402-1638

[1] Only new switchover and connecting plates can be used with new actuators (Index 01). Old and new plates are not interchangeable.

Table 5-6: *Direct attachment to Type 3277 Actuator*

Mounting parts/accessories		**Order no.**
Standard version for actuators 175, 240, 350, 355, 700, 750 cm²		1400-7453
Version compatible with paint for actuators 175, 240, 350, 355, 700, 750 cm²		1402-0941
Connection block with seals and screw	G ¼	1400-8819
	¼ NPT	1402-0901
Pressure gauge mounting kit up to max. 6 bar (output/supply)	Stainless steel/brass	1402-0938
	Stainless steel/stainless steel	1402-0939
Piping with screw fittings [1]		**Order no.**
Actuator (175 cm²), steel	G ¼/G ⅜	1402-0970
	¼ NPT/⅜ NPT	1402-0976
Actuator (175 cm²), stainless steel	G ¼/G ⅜	1402-0971
	¼ NPT/⅜ NPT	1402-0978
Actuator (240 cm²), steel	G ¼/G ⅜	1400-6444
	¼ NPT/⅜ NPT	1402-0911
Actuator (240 cm²), stainless steel	G ¼/G ⅜	1400-6445
	¼ NPT/⅜ NPT	1402-0912
Actuator (350 cm²), steel	G ¼/G ⅜	1400-6446
	¼ NPT/⅜ NPT	1402-0913
Actuator (350 cm²), stainless steel	G ¼/G ⅜	1400-6447
	¼ NPT/⅜ NPT	1402-0914
Actuator (355 cm²), steel	G ¼/G ⅜	1402-0972
	¼ NPT/⅜ NPT	1402-0979
Actuator (355 cm²), stainless steel	G ¼/G ⅜	1402-0973
	¼ NPT/⅜ NPT	1402-0980
Actuator (700 cm²), steel	G ¼/G ⅜	1400-6448
	¼ NPT/⅜ NPT	1402-0915
Actuator (700 cm²), stainless steel	G ¼/G ⅜	1400-6449
	¼ NPT/⅜ NPT	1402-0916
Actuator (750 cm²), steel	G ¼/G ⅜	1402-0974
	¼ NPT/⅜ NPT	1402-0981
Actuator (750 cm²), stainless steel	G ¼/G ⅜	1402-0975
	¼ NPT/⅜ NPT	1402-0982

[1] for "actuator stem retracts" fail-safe action
with air purging of the top diaphragm chamber

Table 5-7: *Attachment to NAMUR rib or attachment to rod-type yokes [1] according to IEC 60534-6*

Travel in mm	Lever	For actuator	Order no.
7.5	S	Type 3271-5 with 60/120 cm² on Type 3510 Micro-flow Valve	1402-0478
5 to 50	M[2]	Actuators from other manufacturers and Type 3271 with 120 to 750 cm² effective areas	1400-7454
14 to 100	L	Actuators from other manufacturers and Type 3271 with 1000 and 1400-60 cm²	1400-7455
30 or 60	L	Type 3271, 1400-120 and 2800 cm² versions with 30/60 mm travel [3]	1400-7466
		Mounting brackets for Emerson and Masoneilan linear actuators (in addition, a mounting kit according to IEC 60534-6 is required depending on the travel). See rows above.	1400-6771
		Valtek Type 25/50	1400-9554
40 to 200	XL	Actuators from other manufacturers and Type 3271 with 1400-120 and 2800 cm² and with 120 mm travel	1400-7456

Accessories		Order no.
Connecting plate	G ¼	1400-7461
	¼ NPT	1400-7462
Pressure gauge bracket	G ¼	1400-7458
	¼ NPT	1400-7459
Pressure gauge mounting kit up to max. 6 bar	Stainless steel/brass	1402-1637
	Stainless steel/stainless steel	1402-1638

1) 20 to 35 mm rod diameter
2) M lever is mounted on basic device (included in the scope of delivery)
3) In conjunction with Type 3273 Side-mounted Handwheel with 120 mm rated travel, additionally one bracket (0300-1162) and two countersunk screws (8330-0919) are required.

Table 5-8: *Attachment according to VDI/VDE 3847-1*

Mounting parts			Order no.
VDI/VDE 3847 interface adapter			1402-0257
Connecting plate, including connection for air purging of actuator spring chamber	Aluminum	ISO 228/1-G ¼	1402-0268
		¼–18 NPT	1402-0269
	Stainless steel	ISO 228/1-G ¼	1402-0270
		¼–18 NPT	1402-0271
Mounting kit for attachment to SAMSON Type 3277 Actuator with 175 to 750 cm²			1402-0868
Mounting kit for attachment to SAMSON Type 3271 Actuator or third-party actuators			1402-0869
Travel pick-off for valve travel up to 100 mm			1402-0177
Travel pick-off for 100 to 200 mm valve travel (SAMSON Type 3271 Actuator only)			1402-0178

Table 5-9: *Attachment according to VDI/VDE 3847-2*

Designation		Order no.
Mounting parts	Mounting block for PFEIFFER Type 31a (edition 2020+) Rotary Actuators with blank plate for solenoid valve interface	1402-1645
	Dummy plate for solenoid valve interface (sold individually)	1402-1290
	Adapter bracket for Type 3730 (VDI/VDE 3847)	1402-0257
	Adapter bracket for Type 3730 and Type 3710 (DAP/PST)	1402-1590
Accessories for actuator	Shaft adapter AA1	1402-1617
	Shaft adapter AA2	1402-1616
	Shaft adapter AA4	1402-1888

Table 5-10: *Attachment to rotary actuators*

Mounting parts/accessories			Order no.
Attachment according to VDI/VDE 3845 (September 2010), actuator surface corresponds to fixing level 1			
	Size AA1 to AA4, version with CrNiMo steel bracket		1400-7448
	Size AA1 to AA4, heavy-duty version		1400-9244
	Size AA5, heavy-duty version (e.g. Air Torque 10 000)		1400-9542
	Bracket surface corresponds to fixing level 2, heavy-duty version		1400-9526
	Attachment for rotary actuators with max. 180° opening angle, fixing level 2		1400-8815 and 1400-9837
Attachment to SAMSON Type 3278 with 160/320 cm², CrNiMo steel bracket			1400-7614
Attachment to SAMSON Type 3278 with 160 cm² and to VETEC Type S160, Type R and Type M, heavy-duty version			1400-9245
Attachment to SAMSON Type 3278 with 320 cm² and to VETEC Type S320, heavy-duty version			1400-5891 and 1400-9526
Attachment to Camflex II			1400-9120
Accessories	Connecting plate	G ¼	1400-7461
		¼ NPT	1400-7462
	Pressure gauge bracket	G ¼	1400-7458
		¼ NPT	1400-7459
	Pressure gauge mounting kit up to max. 6 bar	Stainless steel/brass	1402-1637
		Stainless steel/stainless steel	1402-1638

Table 5-11: *Attachment of external position sensor*

Mounting parts/accessories			Order no.
Template for mounting position sensor on older mounting parts			1060-0784
Direct attachment	Mounting parts for actuator with 120 cm²		1400-7472
	Connecting plate (9, old) with Type 3277-5xxxxxx.00 Actuator	G ⅛	1400-6820
		⅛ NPT	1400-6821
	Connecting plate (new) with Type 3277-5xxxxxx.**01** Actuator (new) [1]		1400-6823
	Mounting parts for actuators with 175, 240, 350, 355 and 750 cm²		1400-7471
NAMUR attachment	Mounting parts for attachment to NAMUR rib using L or XL lever		1400-7468
Attachment to Type 3510 Micro-flow Valve	Mounting parts for Type 3271 Actuator with 60 cm²		1400-7469
Attachment to rotary actuators	VDI/VDE 3845 (September 2010), see the 'Design and principle of operation' chapter for details.		
	Actuator surface corresponds to fixing level 1		
	Size AA1 to AA4 with follower clamp and coupling wheel, version with CrNiMo steel bracket		1400-7473
	Size AA1 to AA4, heavy-duty version		1400-9384
	Size AA5, heavy-duty version (e.g. Air Torque 10 000)		1400-9992
	Bracket surface corresponds to fixing level 2, heavy-duty version		1400-9974
	SAMSON Type 3278 with 160 cm² and VETEC Type S160 and Type R, heavy-duty version		1400-9385
	SAMSON Type 3278 with 320 cm² and VETEC Type S320, heavy-duty version		1400-5891 and 1400-9974
Accessories for positioner	Connecting plate (6)	G ¼	1400-7461
		¼ NPT	1400-7462
	Pressure gauge bracket (7)	G ¼	1400-7458
		¼ NPT	1400-7459
	Pressure gauge mounting kit up to max. 6 bar	Stainless steel/brass	1402-1637
		Stainless steel/stainless steel	1402-1638
	Bracket to mount the positioner on a wall (**Note:** The other fastening parts are to be provided at the site of installation as wall foundations vary from site to site).		0309-0184

[1] Only new connecting plates can be used with new actuators (Index 01). Old and new plates are not interchangeable.

6 Operation

⊛ Rotary pushbutton

The rotary pushbutton is located underneath the front protective cover. The positioner is operated on site using the rotary pushbutton:

Turn ⊛: Select codes and values

Press ⊛: confirm setting.

AIR TO OPEN/AIR TO CLOSE slide switch

– AIR TO OPEN applies to a valve opening as the signal pressure increases.

– AIR TO CLOSE applies to a valve closing as the signal pressure increases.

The signal pressure is the pneumatic pressure at the output of the positioner applied to the actuator.

Volume restriction Q

The volume restriction serves to adapt the air output capacity to the size of the actuator. Depending on the air passage at the actuator, two fixed settings are available.

– For actuators smaller than 240 cm² and with a signal pressure connection at the side (Type 3271-5), set restriction to MIN SIDE.

– For a connection at the back (Type 3277-5), set restriction to MIN BACK.

– For actuators 240 cm² and larger, set to MAX SIDE for a side connection and to MAX BACK for a connection at the back.

Readings

Icons assigned to certain codes, parameters and functions are indicated on the display.

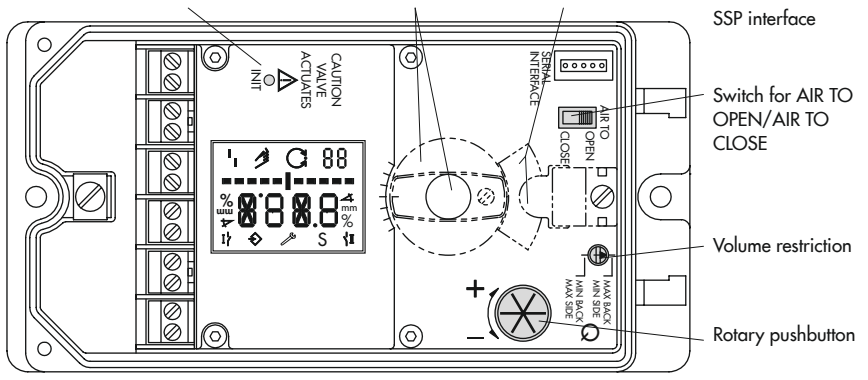


Fig. 6-1: *Operating controls*

Operating modes

– **(manual mode)**
The positioner follows the manual set point (Code 1) instead of the mA signal.
blinks: The positioner is not initialized. Operation only possible over manual set point (Code 1).

– **(automatic mode)**
The positioner is in closed-loop operation and follows the mA signal.

– ***S* SAFE**
The positioner vents the output. The valve moves to the mechanical fail-safe position.

Bar graph

In manual and automatic modes, the bars indicate the set point deviation that depends on the sign (+/–) and the value. One bar element appears per 1 % set point deviation.

If the positioner has not been initialized, (blinks on the display), the bar graph indicates the lever position in degrees in relation to the mid-axis. One bar element corresponds to approximately a 5° angle of rotation. The fifth bar element blinks (reading > 30°) if the permissible angle of rotation has been exceeded. Lever and pin position must be checked.

Status messages

– Maintenance alarm
– Maintenance demanded/Maintenance required
– blinks: Out of specification

These icons indicate that an error has occurred.

A classified status can be assigned to each error. Classifications include “No message”, “Maintenance required”, “Maintenance demanded” and “Maintenance alarm” (see ▶ EB 8389 on EXPERTplus valve diagnostics).

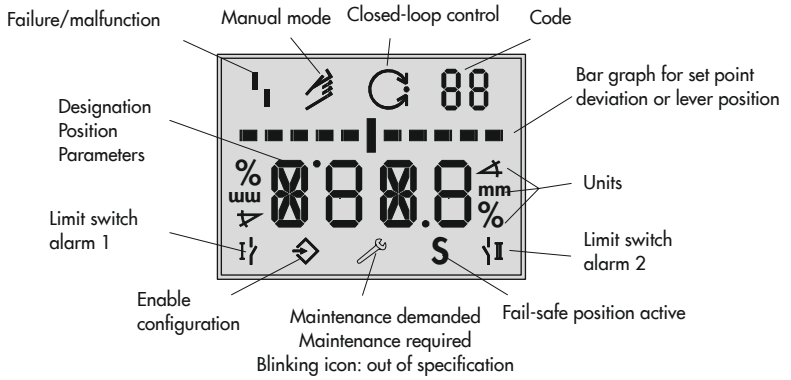
Enable configuration

This indicates that the codes marked with an asterisk (*) in the code list are enabled for configuration (see the 'Start-up and configuration' chapter).

6.1 Serial interface

The positioner must be supplied with at least 4 mA.

The positioner can be connected directly to the computer over the local serial interface and the serial interface adapter. The operator software is TROVIS-VIEW (version 4) with installed device module 3730-3.



AUtO	Automatic
CL	Clockwise
CCL	Counterclockwise
Err	Error
ESC	Cancel
HI	ix higher than 21.6 mA
LO	ix lower than 2.4 mA
LOW	w too low
MAN	Manual setting
MAX	Maximum range
No	Not available/not active
NOM	Rated travel
O/C	Type of application: On/off valve ▶ EB 8389
OVERLOAD	x > 22 mA
RES	Reset
RUN	Start
SAFE	Fail-safe position
SUb	Substitute calibration
tEStinG	Test function active
TunE	Initialization in progress
YES	Available/active
ZP	Zero calibration
↗↗	Increasing/increasing
↗↘	Increasing/decreasing
↻ blinks	Emergency mode (see error code 62)
↗ blinks	Initialization missing
S	Valve in mechanical fail-safe position

Fig. 6-2: *Display*

6.2 HART® communication

The positioner must be supplied with at least 3.6 mA. The FSK modem must be connected in parallel to the current loop.

A DTM file (Device Type Manager) conforming to the Specification 1.2 is available for communication. This allows the device, for example to be run with the PACTware user interface. All the positioner's parameters are accessible over the DTM and the user interface.

For start-up and settings, proceed as described in the 'Start-up and configuration' chapter. Refer to the code list in Appendix A for the parameters necessary for the user interface.

---

i ***Note***

If complex functions are started in the positioner, which require a long calculation time or lead to a large quantity of data being saved in the volatile memory of the positioner, the alert 'busy' is issued by the DTM file. This alert is ***not an error message*** *and can be simply confirmed.*

Locking HART® communication

The write access for HART® communication can be disabled over Code 47. This function can only be enabled or disabled locally at the positioner.

Write access is enabled by default.

Locking on-site operation

The on-site operation including the INIT key can be locked over HART® communication. The word 'HART' then blinks on the display when Code 3 is selected. This locking function can only be disabled over HART® communication. On-site operation is enabled by default.

6.2.1 Dynamic HART® variables

The HART® specification defines four dynamic variables consisting of a value and an engineering unit. These variables can be assigned to device parameters as required. The universal HART® command 3 reads the dynamic variables out of the device. This allows manufacturer-specific parameters to also be transferred using a universal command.

In the Type 3730-3 Positioner, the dynamic variables can be assigned by the DD or in TROVIS-VIEW [Settings > Operation unit] as shown in Table 6-1.

Table 6-1: *Dynamic HART® variables assignment*

Variable	Meaning	Unit
Reference variable	Set point	%
Valve set point	Set point depending on direction of action	%
Target position	Set point after transit time specification	%
Valve position	Valve position	%
Set point deviation e	Set point deviation e	%
Absolute total valve travel	Absolute total valve travel	–
Binary input status	0 = Not active 1 = Active 255 = –/–	–
Status of internal solenoid valve/forced venting	0 = De-energized 1 = Energized 2 = Not installed	–
Condensed state	0 = No message 1 = Maintenance required 2 = Maintenance demanded 3 = Maintenance alarm 4 = Out of specification 7 = Function check	
Temperature	Temperature	°C
Leakage	Sound pressure level (leakage detection)	dB

7 Start-up and configuration

The work described in this chapter is to be performed only by personnel appropriately qualified to carry out such tasks.

⚠ DANGER

Risk of fatal injury due to the ignition of an explosive atmosphere.

➔ *Observe EN 60079-14 (VDE 0165, Part 1) for work on the positioner in potentially explosive atmospheres.*

➔ *Installation, operation or maintenance of the positioner is to be performed only by personnel who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.*

⚠ WARNING

Crush hazard arising from moving parts on the valve.

➔ *Do not touch any moving valve parts while the control valve is in operation.*

➔ *Before performing any mounting or installation work on the positioner, put the control valve out of operation by disconnecting and locking the supply air and control signal.*

➔ *Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.*

Before start-up, make sure the following conditions are met:

– The positioner is properly mounted according to the instructions.

– The pneumatic and electrical connections have been performed according to the instructions.

Reading after connecting the electrical power supply:



After *tEStinG* runs across the display, the fault alarm icon appears and the hand icon blinks on the display when the **positioner has not been initialized**. The reading indicates the lever position in degrees in relation to the mid-axis.

Code 0 is displayed when a **positioner has been initialized**. The positioner is in the last active operating mode.

The positioner performs a test in the start-up phase while following its automation task at the same time.

During the start-up phase, operation on site is unrestricted, yet write access is limited.

Sequence for start-up:

Action	Chapter
1. Determine the fail-safe position.	7.1
2. Adjust the volume restriction Q.	7.2
3. Limit the signal pressure.	7.3
4. Check the operating range of the positioner.	7.4
5. Initialize the positioner.	7.5
6. Configure the positioner by setting further parameters.	7.6
7. Positioners with inductive limit switches: Adjust the inductive limit switch.	7.7

7.1 Determining the fail-safe position

Define the fail-safe position of the valve taking the valve type and the actuator's direction of action into account. Position the AIR TO OPEN/AIR TO CLOSE slide switch accordingly:

– **AIR TO OPEN** setting
  Signal pressure opens the valve, e.g. for a fail-close valve
  The AIR TO OPEN setting always applies to double-acting actuators.

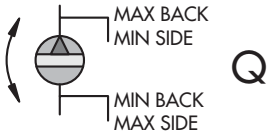
– **AIR TO CLOSE** setting
  Signal pressure closes the valve, e.g. for a fail-open valve

For checking purposes: After successfully completing initialization, the positioner display must read 0 % when the valve is closed and 100 % when the valve is open. If this is not the case, change the slide switch position and re-initialize the positioner.

i ***Note***

The switch position is prompted prior to an initialization. After an initialization has been completed, changing the switch position does not have any effect on the operation of the positioner.

7.2 Adjusting the volume restriction Q



Signal pressure \ Transit time	<1 s	≥1 s
Connection at the side	MIN SIDE	MAX SIDE
Connection at the back	MIN BACK	MAX BACK

* Intermediate settings are not permitted.

Fig. 7-1: *Volume restriction Q*

The volume restriction Q serves to adapt the air output capacity to the size of the actuator:

8. Actuators with a **transit time <1 s**, e.g. linear actuators with an effective area smaller than 240 cm², require a restricted air flow rate (MIN).
9. Actuators with a **transit time ≥1 s** do not require the air flow rate to be restricted (MAX).

The position of volume restriction Q also depends on how the signal pressure is routed at the actuator in **SAMSON actuators**:

'SIDE' inscription

- For actuators with a signal pressure connection at the side, e.g. Type 3271-5
- For actuators from other manufacturers

'BACK' inscription

10. For actuators with a signal pressure connection at the back, e.g. Type 3277-5

The following applies to positioners with optional analog input x: the MIN SIDE setting must always be used for actuators with an air volume of less than one liter.

NOTICE

Malfunction due to changed start-up settings.

➔ *Initialize an initialized positioner again after the position of the volume restriction has been changed.*

7.3 Limiting the signal pressure

If the maximum actuator force may cause damage to the valve, the signal pressure must be limited.

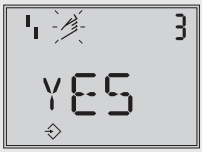
➔ Do not activate pressure limitation for double-acting actuators (AIR TO OPEN (AtO) fail-safe position). Default setting is '**No**'.

Enable configuration at the positioner before limiting the signal pressure.

Enable configuration:

Configuration is locked again if no settings are entered within 120 seconds.

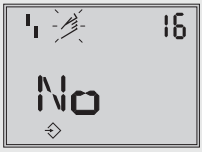
1. Turn ⊛ until Code 3 appears (reading: *No*).
2. Press ⊛, the code number 3 blinks.
3. Turn ⊛ until *YES* appears.
4. Press ⊛ to confirm (reading: ⇨).



Enable configuration
Default: No

Limit the signal pressure:

1. Turn ⊛ until Code 16 appears.
2. Press ⊛, the code number 16 blinks.
3. Turn ⊛ until the required pressure limit (1.4/2.4/3.7 bar) appears.
4. Press ⊛ to confirm.



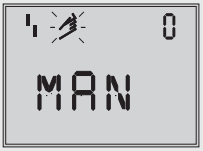
Pressure limit
Default: No

7.4 Checking the operating range of the positioner

To check the mechanical attachment and the proper functioning, the valve should be moved through the operating range of the positioner in the ✋ manual mode with the manual set point.

Select manual mode (✋):

1. Turn ⊛ until Code 0 appears.
2. Press ⊛, the code number 0 blinks.
3. Turn ⊛ until *MAN* appears.
4. Press ⊛. The positioner changes to the manual mode (✋).



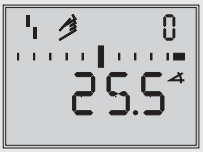
Operating mode
Default: MAN

Check the operating range:

1. Turn ⊛ until Code 1 appears.
2. Press ⊛, the code number 1 and ✋ icon blink.
3. Turn ⊛ until the pressure in the positioner builds up and the control valve moves to its final positions so that the travel/angle can be checked.

   The angle of rotation of the lever on the back of the positioner is indicated.

   A horizontal lever (mid position) is equal to 0°.



Manual set point w (current angle of rotation is indicated)

To ensure the positioner is working properly, the outer bar elements must not blink while the valve is moving through the operating range.

Exit Code 1 by pressing the rotary pushbutton (⊛).

The permissible range has been exceeded when the displayed angle is more than 30° and the outer right or left bar element blinks. The positioner goes to the fail-safe position (SAFE). After canceling the fail-safe position (SAFE) (see the 'Operation' chapter) it is **absolutely essential** that you check the lever and pin position as described in the 'Installation' chapter.

⚠ WARNING

Risk of injury due to the actuator stem extending or retracting.

➔ *Before exchanging the lever or changing the pin position, disconnect the supply air and electrical auxiliary power.*

7.5 Initializing the positioner

⚠ WARNING

Risk of injury by exposed moving parts on the positioner, actuator or valve.

➔ *Do not touch or block exposed moving parts.*

NOTICE

The process is disturbed by the movement of the actuator or valve.

➔ *Do not perform the initialization while the process is running. First isolate the plant by closing the shut-off valves.*

➔ Check the max. permissible signal pressure of the valve before starting initialization. During initialization, the positioner issues an output signal pressure up to the maximum supply pressure supplied. If necessary, limit the signal pressure by connecting an upstream pressure reducing valve.

Note

Reset positioner to its default settings (see the 'Operation' chapter) before mounting it on a different actuator or changing its mounting position.

During initialization, the positioner adapts itself optimally to the friction conditions and the signal pressure required by the control valve. The type and extent of auto tuning depends on the initialization mode selected:

– **Maximum range (MAX)** (standard range)
  Initialization mode for simple start-up of valves with two clearly defined mechanical end positions, e.g. three-way valves (see Chapter 7.5.1)
– **Nominal range (NOM)**
  Initialization mode for all globe valves (see Chapter 7.5.2)
– **Manually selected OPEN position (MAN)**
  Initialization mode for globe valves requiring OPEN position to be entered manually (see Chapter 7.5.3)
– **Substitute calibration (SUb)**
  This mode allows a positioner to be replaced while the plant is running, with the least amount of disruption to the plant (see Chapter 7.5.4).

For normal operation, simply start initialization by pressing the INIT key after mounting the positioner on the valve and defining the fail-safe position and setting the volume restriction. The positioner only needs to work with its default settings. If necessary, perform a reset (see the 'Operation' chapter).

i Note

An initialization procedure in progress can be canceled by pressing the rotary pushbutton. STOP is displayed for three seconds and the positioner changes to the fail-safe position (SAFE). Clear the fail-safe position again over Code 0 (see the 'Operation' chapter).

The time required for the initialization procedure depends on the actuator transit time, which means that initialization can take a few minutes.

After a successful initialization, the positioner runs in closed-loop operation indicated by the ↻ closed-loop operation icon.

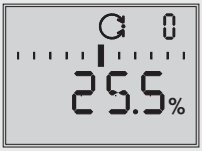
A malfunction leads to the process being canceled. The initialization error is displayed according to how it has been classified by the condensed state (see the 'Malfunction' chapter).



Alternating readings
Initialization in progress
Icon depending on initialization mode selected



Bar graph display indicating the progress of the initialization



Initialization successfully completed. Positioner in automatic mode (↻)

i Note

When Code 48 - h0 = YES, the diagnostics automatically start to plot the reference graphs (drive signal steady-state d1 and hysteresis d2) after initialization has been completed. This is indicated by tESt and d1 or d2 appearing on the display in alternating sequence.
An error during the plotting of the reference graphs is indicated on the display over Code 48 - h1 and Code 81. The reference graphs do not have any effect on closed-loop operation.

Fail-safe action AIR TO CLOSE

If the slide switch is set to AIR TO CLOSE, the positioner automatically switches to the direction of action increasing/decreasing (↗↘) after initialization has been completed. This results in the assignment (right) between set point and valve position.

The tight-closing function is activated.

Set Code 15 (set point cutoff increase) to 99 % **for three-way valves.**

Fail-safe position	Direction of action	Set point Valve CLOSED at	Set point Valve OPEN at
Actuator stem extends (FA) AIR TO OPEN	↗↗	0 %	100 %
Actuator stem retracts (FE) AIR TO CLOSE	↗↘	100 %	0 %

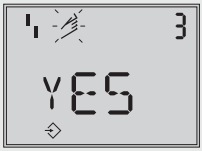
7.5.1 MAX – Initialization based on maximum range

The positioner determines travel/angle of rotation of the closing member from the CLOSED position to the opposite travel stop and adopts this travel/angle of rotation as the operating range from 0 to 100 %.

Enable configuration:

Configuration is locked again if no settings are entered within 120 seconds.

1. Turn ⊛ until Code 3 appears (reading: *No*).
2. Press ⊛, the code number 3 blinks.
3. Turn ⊛ until *YES* appears.
4. Press ⊛ to confirm (reading: ⇨).



Enable configuration
Default: No

Select the initialization mode:

1. Turn ⊛ until Code 6 appears.
2. Press ⊛, the code number 6 blinks.
3. Turn ⊛ until *MAX* appears.
4. Press ⊛ to confirm the MAX initialization mode.



Default: MAX

Start initialization:

➔ Press INIT key.

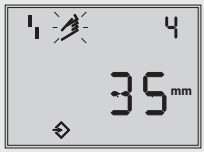
The rated travel/angle of rotation is indicated in % after initialization. Code 5 (nominal range) remains locked. The parameters for travel/angle range start (Code 8) and travel/angle range end (Code 9) can also only be displayed and modified in %.

For a reading in mm/°, enter the pin position (Code 4).

Enter the pin position:

1. Turn ⊛ until Code 4 appears.
2. Press ⊛, the code number 4 blinks.
3. Turn ⊛ to select pin position on lever to match the attachment.
4. Press ⊛ to confirm.

   The nominal range is displayed in mm/°.



Pin position
Default: No

7.5.2 NOM – Initialization based on nominal range

The calibrated sensor allows the exact valve travel to be measured very accurately. During initialization, the positioner checks whether the control valve can move through the indicated nominal range (travel or angle) without collision. If this is the case, the indicated nominal range is adopted with the limits of travel/angle range start (Code 8) and travel/angle range end (Code 9) as the operating range.

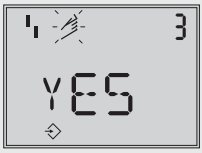
i ***Note***

The maximum possible travel must always be greater than the rated travel entered. If this is not the case, initialization is automatically canceled (error message Code 52) because the rated travel could not be achieved.

Enable configuration:

Configuration is locked again if no settings are entered within 120 seconds.

1. Turn ⊛ until Code 3 appears (reading: *No*).
2. Press ⊛, the code number 3 blinks.
3. Turn ⊛ until *YES* appears.
4. Press ⊛ to confirm (reading: ⇨).



Enable configuration
Default: No

Enter the pin position and nominal range:

1. Turn ⊛ until Code 4 appears.
2. Press ⊛, the code number 4 blinks.
3. Turn ⊛ to select pin position on lever to match the attachment.
4. Press ⊛ to confirm.



Pin position
Default: No

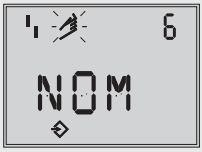
5. Turn ⊛ until Code 5 appears.
6. Press ⊛, the code number 5 blinks.
7. Turn ⊛ and set rated travel of the valve.
8. Press ⊛ to confirm.



Nominal range
(locked when Code 4 = No)

Select the initialization mode:

1. Turn ⊛ until Code 6 appears.
2. Press ⊛, the code number 6 blinks.
3. Turn ⊛ until *NOM* appears.
4. Press ⊛ to confirm the NOM initialization mode.



Init mode
Default: MAX

Start initialization:

➔ Press INIT key.
➔ After the initialization has been successfully completed:
Check the direction of action (Code 7) and, if necessary, change it.

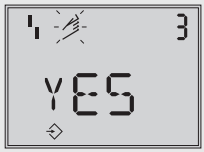
7.5.3 MAN – Initialization based on a manually selected OPEN position

Before starting initialization, move the control valve manually to the OPEN position. Turn the rotary pushbutton (⊛) clockwise in small steps. The valve must be moved with a monotonically increasing signal pressure. The positioner calculates the differential travel/angle from the OPEN and CLOSED positions and adopts it as the operating range with limits of lower travel/angle range value (Code 8) and upper travel/angle range value (Code 9).

Enable configuration:

Configuration is locked again if no settings are entered within 120 seconds.

1. Turn ⊛ until Code 3 appears (reading: *No*).
2. Press ⊛, the code number 3 blinks.
3. Turn ⊛ until *YES* appears.
4. Press ⊛ to confirm (reading: ⇨).



Enable configuration
Default: No

Enter the pin position:

1. Turn ⊛ until Code 4 appears.
2. Press ⊛, the code number 4 blinks.
3. Turn ⊛ to select pin position on lever to match the attachment.
4. Press ⊛ to confirm.



Pin position
Default: No

Select the initialization mode:

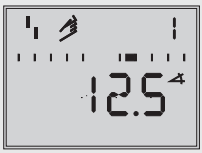
1. Turn ⊛ until Code 6 appears.
2. Press ⊛, the code number 6 blinks.
3. Turn ⊛ until *MAN* appears.
4. Press ⊛ to confirm the MAN initialization mode.



Init mode
Default: MAX

Enter OPEN position:

1. Turn ⊛ until Code 0 appears.
2. Press ⊛, the code number 0 blinks.
3. Turn ⊛ until *MAN* appears.
4. Press ⊛ to confirm.
5. Turn ⊛ until Code 1 appears.
6. Press ⊛, the code number 1 blinks.
7. Turn ⊛ until the required valve position is reached.
8. Press ⊛ to confirm the OPEN position.



Manual set point (current angle of rotation is indicated)

Start initialization:

➔ Press INIT key.

7.5.4 SUb – Substitute calibration

A complete initialization procedure takes several minutes and requires the valve to move through its entire travel range several times. In the SUb initialization mode, the control parameters are estimated and not determined by an initialization procedure. As a result, a high level of accuracy cannot be expected. A different initialization mode should be selected if the plant allows it.

The substitute calibration is used to replace a positioner while the process is running. For this purpose, the control valve is usually fixed mechanically in a certain position or pneumatically by means of a pressure signal which is routed to the actuator externally. The blocking position ensures that the plant continues to operate with this valve position.

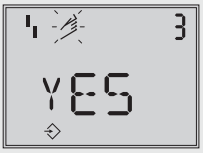
By entering the blocking position (Code 35), closing direction (Code 34), pin position (Code 4), nominal range (Code 5) and direction of action (Code 7), the positioner can calculate the positioner configuration.

➔ Perform a reset before re-initializing the positioner if the substitute positioner has already been initialized (see the 'Operation' chapter).

Enable configuration:

Configuration is locked again if no settings are entered within 120 seconds.

1. Turn ⊛ until Code 3 appears (reading: *No*).
2. Press ⊛, the code number 3 blinks.
3. Turn ⊛ until *YES* appears.
4. Press ⊛ to confirm (reading: ⇨).



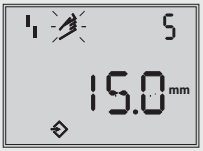
Enable configuration
Default: No

Enter the pin position and nominal range:

1. Turn ⊛ until Code 4 appears.
2. Press ⊛, the code number 4 blinks.
3. Turn ⊛ to select pin position on lever to match the attachment.
4. Press ⊛ to confirm.
5. Turn ⊛ until Code 5 appears.
6. Press ⊛, the code number 5 blinks.
7. Turn ⊛ and set rated travel of the valve.
8. Press ⊛ to confirm.



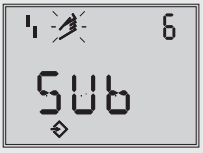
Pin position
Default: No



Nominal range
(locked when Code 4 = No)

Select the initialization mode:

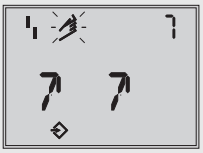
1. Turn ⊛ until Code 6 appears.
2. Press ⊛, the code number 6 blinks.
3. Turn ⊛ until *SUb* appears.
4. Press ⊛ to confirm the SUb initialization mode.



Init mode
Default: MAX

Enter the direction of action:

1. Turn ⊛ until Code 7 appears.
2. Press ⊛, the code number 7 blinks.
3. Turn ⊛ to select the direction of action (↗↗/↗↘).
4. Press ⊛ to confirm.



Direction of action
Default: ↗↗

Deactivate travel limit:

1. Turn ⊛ until Code 11 appears.
2. Press ⊛, the code number 11 blinks.
3. Turn ⊛ until *No* appears.
4. Press ⊛ to deactivate the travel limit function.



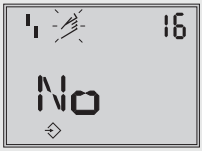
Travel limitation
Default: No

Change pressure limit and control parameters:

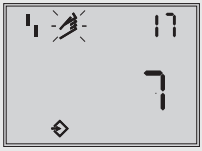
i ***Note***

Do not change the pressure limit (Code 16). Only change the control parameters K_P (Code 17) and T_V (Code 18) if the settings of the replaced positioner are known.

1. Turn ⊛ until the required Code 16/17/18 appears.
2. Press ⊛, the code number 16/17/18 blinks.
3. Turn ⊛ to set the control parameter selected.
4. Press ⊛ to confirm.



Pressure limit
Default: No



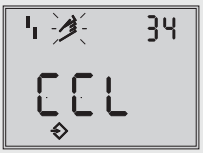
K_P level
Default: 7



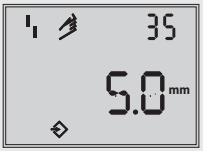
T_V level
Default: 2

Enter closing direction and blocking position:

1. Turn ⊛ until Code 34 appears.
2. Press ⊛, the code number 34 blinks.
3. Turn ⊛ and set the closing direction (CCL = counterclockwise/CL = clockwise).
4. Press ⊛ to confirm.
5. Turn ⊛ until Code 35 appears.
6. Press ⊛, the code number 35 blinks.
7. Turn ⊛ to set the blocking position, e.g. 5 mm (read off at travel indicator scale of the blocked valve or measure with a ruler).
8. Set switch for fail-safe position AIR TO OPEN or AIR TO CLOSE according to Chapter 7.1.
9. Adjust volume restriction as described in Chapter 7.2.



Closing direction (direction of rotation causing the valve to move to the CLOSED position (view onto positioner display); standard CCL



Blocking position
Default: 0

Start initialization:

➔ Press INIT key.
The positioner switches to MAN mode.
The blocking position is indicated.

Since initialization has not been completed, the error code 76 (no emergency mode) and possibly also error code 57 (control loop) may appear on the display. These alarms do not influence the positioner's readiness for operation.

Cancel the blocking position and change to automatic mode (AUTO):

For the positioner to follow its set point again, the blocking position must be canceled and the positioner must be set to automatic mode as follows:

1. Turn ⊛ until Code 1 appears.
2. Press ⊛, the code number 1 and ⚒ icon blink.
3. Turn ⊛ to build up pressure in the positioner to move the valve slightly past the blocking position.
4. Press ⊛ to cancel the mechanical blocking.
5. Turn ⊛ until Code 0 appears.
6. Press ⊛, the code number 0 blinks.
7. Turn ⊛ until *AUtO* appears.
8. Press ⊛ to confirm. The positioner switches to automatic mode. The current valve position is indicated in %.

➔ If the positioner shows a tendency to oscillate in automatic mode, the parameters K_P and T_V must be slightly corrected. Proceed as follows:

- Set T_V (Code 18) to 4.
- If the positioner still oscillates, the gain K_P (Code 17) must be decreased until the positioner shows a stable behavior.

Zero point calibration

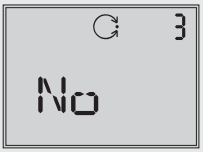
➔ Finally, if process operations allow it, the zero point must be calibrated according to the 'Operation' chapter.

7.6 Setting other parameters

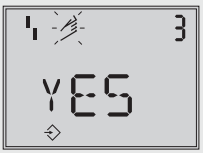
All codes and their meaning and default settings are listed in the code list in Appendix A.

Codes which are marked with an asterisk must be enabled with Code 3 before the associated parameters can be configured as described below.

Turn ⊛ until Code 3 appears (reading: *No*).
Press ⊛, the code number 3 blinks.
Change the setting in Code 3.
Turn ⊛ until *YES* appears.
Press ⊛, reading: ⇨
Configuration is enabled.
You can now configure codes one after the other:
Turn ⊛ to select the required code.
Press ⊛ to activate the selected code. The code number starts to blink.
Turn ⊛ to select the setting.
Press ⊛ to confirm the selected setting.



Code 3
Configuration not enabled



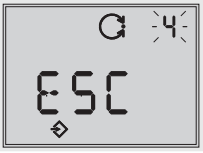
Configuration enabled

If no settings are entered within 120 seconds, the enabled configuration function becomes invalid and the display returns to Code 0.

Cancel the setting:

To cancel a value before it is confirmed (by pressing ⊛) proceed as follows:

Turn ⊛ until *ESC* appears.
Press ⊛ to confirm.
The entered value is not adopted.



Canceling the reading

7.7 Adjusting inductive limit switch

The positioner version with an inductive limit switch has an adjustable tag (1) mounted on the axis of rotation, which operates the proximity switch (3).

For operation of the inductive limit switch, the corresponding switching amplifier (see the 'Installation' chapter) must be connected to the output circuit.

When the tag (1) is located in the inductive field of the switch, the switch assumes a high resistance. When it moves outside the field, the switch assumes a low resistance.

Normally, the limit switch is adjusted in such a way that it will provide a signal in both end positions of the valve. The switch, however, can also be adjusted to indicate intermediate valve positions.

The required switching function, i.e. whether the output relay is to be picked up or released when the tag enters the field, must be selected at the switching amplifier, if required.

---

i ***Note***

The inductive limit switch replaces the software limit switch A1 with terminal assignment +41/–42.
Each switching position can optionally be set to indicate when the tag has entered the field or when it has left the field.
The second software limit switch remains effective, the function of the software limit switch A1 is disabled.

Software adaptation

– Code 38 (inductive alarm is set to YES).
– The inductive limit switch is connected to the terminals +41/–42 (see the 'Installation' chapter).
– The device is set up accordingly in the delivered state.

Adjusting the switching point

---

i ***Note***

During adjustment or testing, the switching point must always be approached from mid-position (50 %).

To guarantee the switching under all ambient conditions, adjust the switching point approx. 5 % before the mechanical stop (OPEN – CLOSED).

For CLOSED position:

1. Initialize the positioner.
2. Move the valve to 5 % in the MAN mode (see display).
3. Adjust the tag at the yellow adjustment screw (2) until the tag enters or leaves the field and the switching amplifier responds.
   You can measure the switching voltage as an indicator.

Contact function:

– Tag leaving the field > contact is closed.
– Tag entering the field > contact is opened.

For OPEN position:

1. Initialize the positioner.
2. Move the valve to 95 % in the MAN mode (see display).
3. Adjust the tag (1) at the yellow adjustment screw (2) until the tag enters or leaves the field of the proximity switch (3).
   You can measure the switching voltage as an indicator.

Contact function:

– Tag leaving the field > contact is closed.
– Tag entering the field > contact is opened.

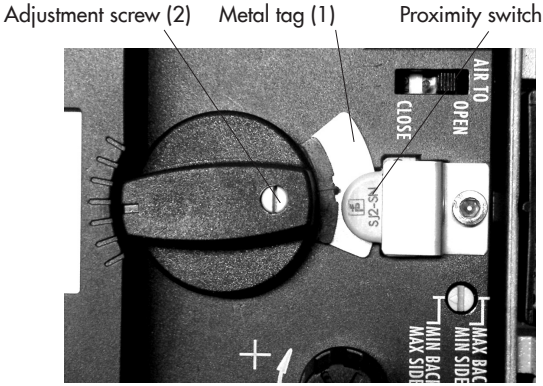


Fig. 7-2: *Adjusting the limit switch*

8 Operation

The work described in this chapter is only to be performed by personnel appropriately qualified to carry out such tasks.

⚠ DANGER

Risk of fatal injury due to the ignition of an explosive atmosphere.

➔ *Installation, operation or maintenance of the positioner must only be performed by personnel who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.*

⚠ WARNING

Crush hazard arising from moving parts on the valve.

➔ *Do not touch any moving valve parts while the control valve is in operation.*

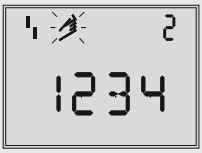
➔ *Before performing any mounting or installation work on the positioner, put the control valve out of operation by disconnecting and locking the supply air and control signal.*

➔ *Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.*

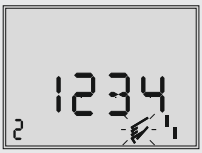
8.1 Adapting the display direction

The display contents can be turned by 180° to adapt the display reading to the actuator's mounting situation. If the displayed data appear upside down, proceed as follows:

1. Turn ⊛ until Code 2 appears.
2. Press ⊛, the code number 2 blinks.
3. Turn ⊛ and select the desired reading direction.
4. Press ⊛ to confirm.



Reading direction for right attachment of pneumatic connections

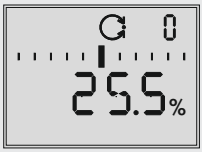


Reading direction for left attachment of pneumatic connections

8.2 Changing the operating mode

8.2.1 Closed-loop operation (automatic mode)

After initialization has been completed successfully, the positioner is in ↻ automatic mode (AUtO).



Automatic mode

8.2.2 Manual mode

Switching to ✋ manual mode (MAN):

1. Turn ⊛ until Code 0 appears.
2. Press ⊛, reading: *AUtO*, the code number 0 blinks.
3. Turn ⊛ until *MAN* appears.
4. Press ⊛. The positioner changes to the manual mode (✋).

   The manual mode starts using the last set point used in automatic mode, ensuring a bumpless changeover. The current position is displayed in %.



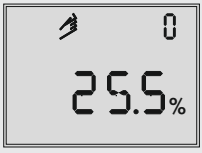
Automatic mode

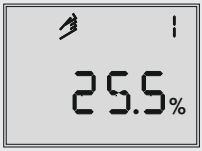


Manual mode

Adjusting the manual set point:

1. Turn ⊛ until Code 1 appears.
2. Press ⊛, the code number 1 blinks.
3. Turn ⊛ until sufficient pressure has been built up in the positioner and the control valve moves to the required position.





The positioner automatically returns to Code 0 if no settings are made within 120 seconds, but remains in the manual mode.

Switch to ↻ automatic mode (AUtO)

1. Turn ⊛ until Code 0 appears.
2. Press ⊛, the code number 0 blinks.
3. Turn ⊛ until *AUtO* appears.
4. Press ⊛. The positioner switches to automatic mode.

8.2.3 Fail-safe position (SAFE)

If you want to move the valve to the fail-safe position determined during start-up (see the 'Start-up and configuration' chapter), proceed as follows:

1. Turn ⊛ until Code 0 appears.
2. Press ⊛, reading: current operating mode (AUtO or MAN), the code number 0 blinks.
3. Turn ⊛ until *SAFE* appears.
4. Press ⊛, reading: *S*

   The valve moves to the fail-safe position. If the positioner has been initialized, the current valve position in % is indicated on the display.



Exiting the fail-safe position:

1. Turn ⊛ until Code 0 appears.
2. Press ⊛, the code number 0 blinks.
3. Turn ⊛ and select the required operating mode (AUtO or MAN).
4. Press ⊛ to confirm.
5. The positioner switches to the operating mode selected.

8.3 Performing zero calibration

In case of inconsistencies in the closed position of the valve, e.g. with soft-seated plugs, it might be necessary to recalibrate zero.

⚠ WARNING

Risk of injury due to the actuator stem extending or retracting.

➔ *Do not touch or block the actuator stem.*

❗ *NOTICE*

The process is disturbed by the movement of the actuator stem.

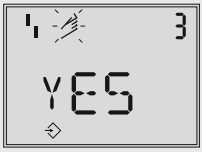
➔ *Do not perform zero calibration while the process is running. First isolate the plant by closing the shut-off valves.*

The positioner must be connected to the supply air to perform the zero calibration.

Enable configuration:

Configuration is locked again if no settings are entered within 120 seconds.

1. Turn ⊛ until Code 3 appears (reading: *No*).
2. Press ⊛, the code number 3 blinks.
3. Turn ⊛ until *YES* appears.
4. Press ⊛ to confirm (reading: ⇨).

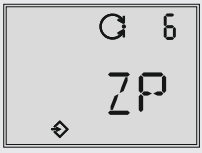


Enable configuration
Default: No

Perform zero calibration:

1. Turn ⊛ until Code 6 appears.
2. Press ⊛, the code number 6 blinks.
3. Turn ⊛ until *ZP* appears.

➔ Press INIT key.
Zero calibration starts. The positioner moves the valve to the CLOSED position and recalibrates the internal electrical zero point.



Init mode
Default: MAX

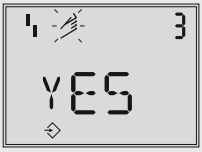
8.4 Resetting the positioner

This function resets all start-up and setting parameters as well as the diagnosis to the factory default settings (see code list in Appendix).

Enable configuration:

Configuration is locked again if no settings are entered within 120 seconds.

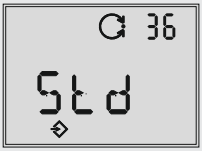
1. Turn ⊛ until Code 3 appears (reading: *No*).
2. Press ⊛, the code number 3 blinks.
3. Turn ⊛ until *YES* appears.
4. Press ⊛ to confirm (reading: ⇨).



Enable configuration
Default: No

Reset start-up parameters:

1. Turn ⊛ until Code 36 appears (reading: ••–••–).
2. Press ⊛, the code number 36 blinks.
3. Turn ⊛ until *Std* appears.
4. Press ⊛ to confirm.
   All start-up parameters as well as the diagnosis are reset to their default values.



Reset
Default: No

i ***Note***

Code 36 - diAG allows just the diagnosis data (EXPERTplus) to be reset. Refer to the Operating Instructions for EXPERTplus valve diagnostics ▶ EB 8389 .

9 Malfunctions

Malfunctions are indicated on the display by error codes. Appendix A lists possible error messages and recommended action.

The error codes appear on the display corresponding to their status classification set over the condensed state (Maintenance required/ Maintenance demanded: , Out of specification: blinking, Maintenance alarm:). If 'No message' is assigned to the error code as the status classification, the error is not included in the condensed state.

A status classification is assigned to every error code in the default setting. The assignment of the status classification can be changed in TROVIS-VIEW and over the parameters of the DD. Refer to the Operating Instructions for the valve diagnostics ▶ EB 8389 for more details.

To provide a better overview, the classified messages are summarized in a condensed state for the positioner according to the NAMUR Recommendation NE 107. The status messages are divided into the following categories:

– **Maintenance alarm**
  The positioner cannot perform its control task due to a malfunction in the positioner itself or in one of its peripherals or the positioner has not yet been successfully initialized.
– **Maintenance required**
  The positioner still performs its control task (with restrictions). A maintenance demand or above average wear has been determined. The wear tolerance will soon be exhausted or is reducing at a faster rate than expected. Maintenance is necessary in the medium term.
– **Maintenance demanded**
  The positioner still performs its control task (with restrictions). A maintenance demand or above average wear has been determined. The wear tolerance will soon be exhausted or is reducing at a faster rate than expected. Maintenance is necessary in the short term.
– **Out of specification**
  The device is running outside the specified operating conditions..

If an event is classified as "No message", this event does not have any affect on the condensed state.

Table 9-1: *Condensed state reading*

Condensed state	Positioner display
Maintenance alarm	
Function check	Text e.g. *TUNE* or *TEST*
Maintenance required/ maintenance demanded	
Out of specification	blinking

The message with the highest priority determines the condensed state in the positioner.

9.1 Troubleshooting

⚠ DANGER

Risk of fatal injury due to the ignition of an explosive atmosphere.

➔ *Installation, operation or maintenance of the positioner must only be performed by personnel who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.*

⚠ WARNING

Crush hazard arising from moving parts on the valve.

➔ *Do not touch any moving valve parts while the control valve is in operation.*

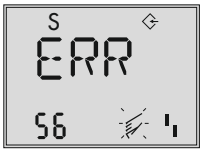
➔ *Before performing any mounting or installation work on the positioner, put the control valve out of operation by disconnecting and locking the supply air and control signal.*

➔ *Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.*

Table 9-1 lists general errors.

If the positioner detects an error, the possible source of error is displayed in Code 49 onwards. In this case, *ERR* is displayed.

Example:



Example:
Error caused by pin position

➔ Refer to the code list (Appendix A) for possible causes and the recommended action.

Fault alarm output

'Maintenance alarm' as the condensed state causes the optional fault alarm output to be switched.

– The 'Function check' condensed state can also activate the fault alarm output (Code 32).

– The 'Maintenance required/Maintenance demanded' condensed state and 'Out of specification' can also activate the fault alarm output (Code 33).

Confirming error messages

1. Turn ⊛ until Code 3 appears (reading: No).
2. Press ⊛, the code number 3 blinks.
3. Turn ⊛ until *YES* appears.
4. Press ⊛ to confirm (reading: ⇨).
5. Turn ⊛ until the the error code that you want appears.
6. Press ⊛ to confirm the error message.

i ***Note***

Contact SAMSON's After-sales Service for malfunctions that cannot be remedied as described in Table 9-2 and the code list in Appendix A.

Table 9-2: *Further troubleshooting*

Description of fault	Measures
No reading on the display	➔ Check electrical connection and electrical power. ➔ Check the ambient temperature (the display's operating range is from –30 to +65 °C).
Actuator moves too slowly	➔ Check the supply pressure. ➔ Deactivate software restriction. ➔ Check the cross-section of the piping and screw fittings. ➔ Check the configuration of the mounting parts.
Actuator moves in the wrong direction.	➔ Check the characteristic setting. ➔ Check the piping. ➔ Check the configuration of the mounting parts.
Air leaks from the positioner.	➔ Check attachment. ➔ Check the seals in the connecting plate.

9.2 Emergency action

Fail-safe action is triggered by the i/p converter or solenoid valve and upon supply air failure. The positioner fully discharges its pneumatic output to the atmosphere, causing the pneumatic actuator to be vented. As a result, the valve moves to the fail-safe position. The fail-safe position depends on how the springs are arranged in the pneumatic actuator (air-to-close or air-to-open).

When the supply air fails, the optional solenoid valve or forced venting is triggered and after reaching the shutdown signal, all positioner functions, except open/closed loop control, remain active (including diagnostics as well as position and status feedback).

Tip

Emergency action in the event of valve or actuator failure is described in the associated valve and actuator documentation.

➔ Plant operators are responsible for emergency action to be taken in the plant.

10 Servicing

The work described in this chapter is only to be performed by personnel appropriately qualified to carry out such tasks.

⚠ DANGER

Risk of fatal injury due to the ignition of an explosive atmosphere.

➔ *Installation, operation or maintenance of the positioner must only be performed by personnel who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.*

⚠ WARNING

Crush hazard arising from actuator and plug stem moving.

➔ *Do not touch any moving valve parts while the control valve is in operation.*

➔ *Before performing any mounting or installation work on the positioner, put the control valve out of operation by disconnecting and locking the supply air and control signal.*

➔ *Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.*

⚠ WARNING

Intrinsic safety rendered ineffective in intrinsically safe devices.

➔ *Only connect intrinsically safe devices intended for use in intrinsically safe circuits to certified intrinsically safe input-connected units.*

➔ *Do not place intrinsically safe devices back into operation that were connected to intrinsically safe input-connected units without certification.*

➔ *Do not exceed the maximum permissible electric values specified in the EC type examination certificates when interconnecting intrinsically safe electrical equipment (U_i or U_0, I_i or I_0, P_i or P_0, C_i or C_0 and L_i or L_0).*

The positioner was checked by SAMSON before it left the factory.

– The product warranty becomes void if service or repair work not described in these instructions is performed without prior agreement by SAMSON's After-sales Service.

– Only use original spare parts by SAMSON, which comply with the original specifications.

The positioner does not require any maintenance.

10.1 Cleaning the cover window

Occasionally, the window in the cover may need to be cleaned.

NOTICE

Incorrect cleaning will damage the window.

The window is made of Makrolon® (new design) and will be damaged when cleaned with abrasive cleaning agents or agents containing solvents.

- ➔ *Do not rub the window dry.*
- ➔ *Do not use any cleaning agents containing chlorine or alcohol or abrasive cleaning agents.*
- ➔ *Use a non-abrasive, soft cloth for cleaning.*

10.2 Cleaning the filters

There are filters with a 100 µm mesh size in the pneumatic connections for supply and output which can be removed and cleaned, if required.

10.3 Maintenance of the supply air pressure reducing stations

The maintenance instructions of any upstream supply air pressure reducing stations must be observed.

10.4 Firmware updates

Firmware updates on positioners currently in operation can be performed as described below. Only individuals with a written approval may perform updates. Approved individuals are named by SAMSON's Quality Assurance and assigned a test mark.

Laptops and computers connected to the power supply must only be interconnected with intrinsically safe equipment if the SAMSON isolated USB interface adapter (order no. 1400-9740) is connected in-between for software programming or test routines.

Updates outside the hazardous area:

- ➔ Remove the positioner and perform the update outside the hazardous area.

Updates on site:

- ➔ Updates on site are only permitted after the plant operator presented a signed hot work permit.
- ➔ After updating has been completed, add the current firmware to the nameplate (e.g. using a label).
- ➔ The individual approved by SAMSON confirms the update by attaching the assigned test mark (stamp).

10.5 Periodic inspection and testing of the positioner

We recommend inspection and testing according to Table 10-1 at the minimum.

Table 10-1: *Recommended inspection and testing*

Inspection and testing	Action to be taken in the event of a negative result
Check the markings, labels and nameplates on the positioner for their readability and completeness.	Immediately renew damaged, missing or incorrect nameplates or labels.
	Clean any inscriptions that are covered with dirt and are illegible.
Check the positioner and leakage sensor (if installed) to ensure they are mounted firmly.	Tighten the any loose mounting screws.
Check the pneumatic connections.	Tighten any loose male connectors of the screw fittings.
	Renew any air pipes or hoses that leak.
Check the power supply wires.	Tighten any loose cable glands.
	Make sure that the stranded wires are pushed into the terminals and tighten any loose screws on the the terminals.
	Renew damaged lines.
Check error messages on the display (indicated by the and icons).	Troubleshooting (see the 'Malfunctions' chapter).

11 Decommissioning

The work described in this chapter is only to be performed by personnel appropriately qualified to carry out such tasks.

⚠ DANGER

Risk of fatal injury due to ineffective explosion protection.

The explosion protection becomes ineffective when the positioner cover is opened.

➔ *The following regulations apply to installation in hazardous areas: EN 60079-14 (VDE 0165, Part 1).*

❗ *NOTICE*

The process is disturbed by interrupting closed-loop control.

➔ *Do not mount or service the positioner while the process is running and only after isolating the plant by closing the shut-off valves.*

To decommission the positioner before removing it, proceed as follows:

➔ Put the control valve out of operation. See associated valve documentation.

➔ Shut off and lock the supply air line to the positioner.

➔ Disconnect and lock the electrical power supply.

12 Removal

The work described in this chapter is only to be performed by personnel appropriately qualified to carry out such tasks.

⚠ DANGER

Risk of fatal injury due to the ignition of an explosive atmosphere.

➔ *The following regulations apply to installation in hazardous areas: EN 60079-14 (VDE 0165, Part 1).*

➔ *Installation, operation or maintenance of the positioner must only be performed by personnel who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.*

➔ Put the positioner out of operation (see the 'Decommissioning' chapter).

➔ Disconnect the wires for electrical input and remove them from the positioner.

➔ Unscrew the screw fittings at the Output 38 and Supply 9 ports of the positioner.

➔ To remove the positioner, loosen the three fastening screws on the positioner.

13 Repairs

A defective positioner must be repaired or replaced.

NOTICE

Risk of positioner damage due to incorrect service or repair work.

➔ *Do not perform any repair work on your own.*

➔ *Contact SAMSON's After-sales Service for service and repair work.*

13.1 Servicing explosion-protected devices

If a part of the device on which the explosion protection is based needs to be serviced, the device must not be put back into operation until a qualified inspector has assessed it according to explosion protection requirements, has issued an inspection certificate, or given the device a mark of conformity. Inspection by a qualified inspector is not required if the manufacturer performed a routine test on the device before putting it back into operation. Document the passing of the routine test by attaching a mark of conformity to the device.

Replace explosion-protected components only with original, routine-tested components by the manufacturer.

Devices that have already been used outside hazardous areas and are intended for future use inside hazardous areas must comply with the safety requirements placed on serviced devices. Before being operated inside hazardous areas, test the devices according to the specifications for servicing explosion-protected devices.

EN 60079-19 applies to servicing explosion-protected devices.

13.2 Returning devices to SAMSON

Defective devices can be returned to SAMSON for repair.

Proceed as follows to return devices to SAMSON:

1. Put the positioner out of operation (see the 'Decommissioning' chapter).
2. Remove the positioner (see the 'Removal' chapter).
3. Proceed as described on the Returning goods page of our website
   ▶ www.samsongroup.com > Service > After-sales Service > Returning goods

14 Disposal



We are registered with the German national register for waste electric equipment (stiftung ear) as a producer of electrical and electronic equipment, WEEE reg. no.: DE 62194439

➔ Observe local, national and international refuse regulations.

➔ Do not dispose of components, lubricants and hazardous substances together with your other household waste.

Tip

On request, we can appoint a service provider to dismantle and recycle the product.

15 Certificates

The following certificates are shown on the next pages:

- EU declaration of conformity for Type 3730-3
- EU declaration of conformity for Type 3730-31
- EU declaration of conformity for Type 3730-35
- EU declaration of conformity for Type 3730-38
- EAC certificate for Type 3730-3
- ATEX: EC type examination certificate for Type 3730-31 and Type 3730-35
- ATEX: Statement of conformity for Type 3730-38
- ATEX: EC type examination certificate for Type 3730-39
- IECEx: IECEx Certificate of Conformity for Type 3730-31, Type 3730-35 and Type 3730-38
- CSA certificate
- FM certificate
- EAC (GOST): Certificate for Type 3730-38

The certificates shown were up to date at the time of publishing. The latest certificates can be found on our website:
▶ www.samsongroup.com > Products > Valve accessories > 3730-3

SMART IN FLOW CONTROL

SAMSON

EU Konformitätserklärung / EU Declaration of Conformity / Déclaration UE de conformité

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller/
This declaration of conformity is issued under the sole responsibility of the manufacturer/
La présente déclaration de conformité est établie sous la seule responsabilité du fabricant.

Für das folgende Produkt / For the following product / Nous certifions que le produit

Elektropneumatischer Stellungsregler mit HART-Kommunikation /
Electropneumatic Positioner with HART communication /
Positionneur électropneumatique avec communication HART
Typ/Type/Type 3730-3...

wird die Konformität mit den einschlägigen Harmonisierungsrechtsvorschriften der Union bestätigt /
the conformity with the relevant Union harmonisation legislation is declared with/
est conforme à la législation d'harmonisation de l'Union applicable selon les normes:

EMC 2014/30/EU	EN 61000-6-2:2005, EN 61000-6-3:2007 +A1:2011, EN 61326-1:2013
RoHS 2011/65/EU	EN 50581:2012

Hersteller / Manufacturer / Fabricant:

SAMSON AKTIENGESELLSCHAFT
Weismüllerstraße 3
D-60314 Frankfurt am Main
Deutschland/Germany/Allemagne

Frankfurt / Francfort, 2017-07-29
Im Namen des Herstellers/ On behalf of the Manufacturer/ Au nom du fabricant.

i v. H. Zager

Hanno Zager
Leiter Qualitätssicherung/Head of Quality Managment/
Responsable de l'assurance de la qualité

i.V. Dirk Hoffmann

Dirk Hoffmann
Zentralabteilungsleiter/Head of Department/Chef du département
Entwicklungsorganisation/Development Organization

SAMSON AKTIENGESELLSCHAFT
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E-Mail: samson@samson.de
Revison 07

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SMART IN FLOW CONTROL

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Typ/Type/Type 3730-31..

entsprechend der EU-Baumusterprüfbescheingung PTB 02 ATEX 2174 ausgestellt von der/
according to the EU Type Examination PTB 02 ATEX 2174 issued by/
établi selon le certificat CE d'essais sur échantillons PTB 02 ATEX 2174 émis par:

Physikalisch Technische Bundesanstalt
Bundesallee 100
D-38116 Braunschweig
Benannte Stelle/Notified Body/Organisme notifié 0102

wird die Konformität mit den einschlägigen Harmonisierungsrechtsvorschriften der Union bestätigt /
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RoHS 2011/65/EU	EN 50581:2012

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Electropneumatic Positioner with HART communication /
Positionneur électropneumatique avec communication HART
Typ / Type / Type 3730-38..

entsprechend der EU-Baumusterprüfbescheingung PTB 03 ATEX 2180 X ausgestellt von der/
according to the EU Type Examination PTB 03 ATEX 2180 X issued by/
établi selon le certificat CE d'essais sur échantillons PTB 03 ATEX 2180 X émis par:

Physikalisch Technische Bundesanstalt
Bundesallee 100
D-38116 Braunschweig
Benannte Stelle/Notified Body/Organisme notifié 0102

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EMC 2014/30/EU	EN 61000-6-2:2005, EN 61000-6-3:2007 +A1:2011, EN 61326-1:2013
Explosion Protection 94/9/EC (to 2016-04-19)	EN 60079-0:2009, EN 60079-15:2010, EN 60079-31:2009
Explosion Protection 2014/34/EU (from 2016-04-20)	EN 60079-0:2012/A11:2013, EN 60079-15:2010, EN 60079-31:2014

Hersteller / Manufacturer / Fabricant:

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Positionneur électropneumatique avec communication HART
Typ/Type/Type 3730-39..

entsprechend der EU-Baumusterprüfbescheingung PTB 03 ATEX 2211 X ausgestellt von der/
according to the EU Type Examination PTB 03 ATEX 2211 X issued by/
établi selon le certificat CE d'essais sur échantillons PTB 03 ATEX 2211 X émis par:

Physikalisch Technische Bundesanstalt
Bundesallee 100
D-38116 Braunschweig
Benannte Stelle/Notified Body/Organisme notifié 0102

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ЕВРАЗИЙСКИЙ ЭКОНОМИЧЕСКИЙ СОЮЗ

СЕРТИФИКАТ СООТВЕТСТВИЯ

EAC

№ ЕАЭС RU C-DE.ЭА11.В.00045/19

Серия RU № 0197354

ОРГАН ПО СЕРТИФИКАЦИИ Общества с ограниченной ответственностью «ТМС РУС». Место нахождения (адрес юридического лица): Российская Федерация, 127083, город Москва, улица Верхняя Масловка, дом 20, строение 2; адрес места осуществления деятельности: Российская Федерация, 127083, город Москва, улица Верхняя Масловка, дом 20, строение 2, помещения № 18, 28. Аттестат аккредитации № РОСС RU.0001.11ЭА11 от 02.07.2015. Номер телефона: +7 (495) 221-18-04; адрес электронной почты: info@tms-cs.ru.

ЗАЯВИТЕЛЬ Общество с ограниченной ответственностью «Самсон Контролс».
Место нахождения (адрес юридического лица) и адрес места осуществления деятельности: Российская Федерация, 109544, город Москва, бульвар Энтузиастов, дом 2, этаж 5, комната 11. ОГРН 1037700041026. Номер телефона: +7 (495) 777-45-45; адрес электронной почты: samson@samson.ru.

ИЗГОТОВИТЕЛЬ «SAMSON AG Mess- und Regeltechnik».
Место нахождения (адрес юридического лица) и адрес места осуществления деятельности по изготовлению продукции: Weismullerstrasse 3, D-60314 Frankfurt am Main, Германия.

ПРОДУКЦИЯ Позиционеры, типы 3724, 3725, 3730-0, 3730-1, 3730-2, 3730-3, 3730-4, 3730-5, 3730-6, 3731-3, 3731-5, 4763, 4765. Изготовление в соответствии со стандартами, указанными в приложении к сертификату соответствия на бланке № 0676628.
Серийный выпуск.

КОД ТН ВЭД ЕАЭС 9032 81 000 0

СООТВЕТСТВУЕТ ТРЕБОВАНИЯМ технического регламента Таможенного союза «Электромагнитная совместимость технических средств» (ТР ТС 020/2011)

СЕРТИФИКАТ СООТВЕТСТВИЯ ВЫДАН НА ОСНОВАНИИ протокола сертификационных испытаний № 190919-013-016-02/ИР от 22.10.2019, выданного испытательной лабораторией Общества с ограниченной ответственностью «Инновационные решения», аттестат аккредитации РОСС RU.0001.21АВ90; акта о результатах анализа состояния производства № 00062-А от 04.07.2019 органа по сертификации Общества с ограниченной ответственностью «ТМС РУС»; руководств по эксплуатации 4218-3725-3724-2018.РЭ, 4218-3730-4763-2018.РЭ, 4218-3731-2018.РЭ.
Схема сертификации – 1с.

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ Стандарт, в результате применения которого на добровольной основе обеспечивается соблюдение требований технического регламента: подразделы 6.2 и 7.2 ГОСТ Р 51522.1-2011 (МЭК 61326-1:2005) «Электрическое оборудование для измерения, управления и лабораторного применения. Часть 1. Общие требования и методы испытаний». Назначенный срок службы – 15 лет. Назначенный срок хранения – 2 года. Условия хранения указаны в руководствах по эксплуатации 4218-3725-3724-2018.РЭ, 4218-3730-4763-2018.РЭ, 4218-3731-2018.РЭ.

СРОК ДЕЙСТВИЯ С 05.11.2019 **ПО** 04.11.2024 **ВКЛЮЧИТЕЛЬНО**

Руководитель (уполномоченное лицо) органа по сертификации (подпись) Назарова Лилия Юрьевна (Ф.И.О.)

М.П.

Эксперт (эксперт-аудитор) (эксперты (эксперты-аудиторы)) (подпись) Ходоров Владимир Игоревич (Ф.И.О.)

АО «Опцион», Москва, 2019 г., «Б». Лицензия № 05-05-09/003 ФНС РФ. ТЗ № 369. Тел.: (495) 726-47-42, www.opcion.ru

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
Nationales Metrologieinstitut

(1) EU-TYPE-EXAMINATION CERTIFICATE

(Translation)

(2) Equipment or Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 2014/34/EU**

(3) EU-Type Examination Certificate Number:

PTB 02 ATEX 2174 **Issue: 2**

(4) Product: HART capable positioner Typ 3730-31..., 3730-35...

(5) Manufacturer: SAMSON AG Mess- und Regeltechnik

(6) Address: Weismüllerstraße 3, 60314 Frankfurt, Germany

(7) This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential Test Report PTB Ex 16-26233.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0:2012/A11:2013 EN 60079-11:2012 EN 60079-31:2014

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design and construction of the specified product in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

(12) The marking of the product shall include the following:

II 2 G Ex ia IIC T6...T4 Gb resp. Ex ia IIIC T80 °C Db or
II 2 D Ex tb IIIC T80 °C Db

Konformitätsbewertungsstelle Sektor Explosionsschutz Braunschweig, February 14, 2017
On behalf of PTB:

Dr.-Ing. F. Lienesch
Regierungsdirektor

ZSEx001e c

sheet 1/7

EU-Type Examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt.
In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig • GERMANY

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
Nationales Metrologieinstitut

(13) **SCHEDULE**

(14) **EU-Type Examination Certificate Number PTB 02 ATEX 2174, Issue: 2**

(15) Description of Product

The HART capable positioner type 3730-31.. and 3730-35.. is a communication capable, single respectively double operating postitioner for the attachment to all common lift or slewing-motion actuators. It is intended to assign the valve position to an actuating signal. The communication is carried out by using SSP and HART protcols. As a pneumatic auxiliary power non-combustible media are used.
The operation takes place inside or outside hazardous areas.

In the future the HART capable positioner type 3730-31.. and 3730-35.. may also be manufactured and operated according to the test documents listed in the test report.

Thermal and electrical maximum values:

Type 3730-31...:

For relationship between temperature class and permissible ranges of the ambient temperature, reference is made to the following table:

Gas- or dust group	Temperature class	Permissible range of the ambient temperature
IIC	T6	-55 °C ... 60 °C
	T5	-55 °C ... 70 °C
	T4	-55 °C ... 80 °C
IIIC	Not applicable	-55 °C ... 80 °C

For relationship between temperature class, permissible ranges of the ambient temperature, maximum short-circuit currents and maximum power for analyzing units with limit contacts (terminals 41/42), reference is made to the following table:

Temperature class	Permissible range of the ambient temperature	I_o / P_o
T6	-55 °C ... 45 °C	52 mA / 169 mW
T5	-55 °C ... 60 °C	
T4	-55 °C .. 75 °C	
T6	-55 °C ... 60 °C	25 mA / 64 mW
T5	-55 °C ... 80 °C	
T4	-55 °C ... 80 °C	

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SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 02 ATEX 2174, Issue: 2

Depending on the variant of the positioner type 3730-31... the different connection possibilities lead to the following electrical values.

Signal circuit ..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(terminals 11/12) only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 28 V
I_i = 115 mA
P_i = 1 W

L_i negligibly low
C_i = 35 nF

Position indicator ..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(terminals 31/32) only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 28 V
I_i = 115 mA
P_i = 1 W

L_i negligibly low
C_i = 5.3 nF

Structure-borne sound sensor..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(terminals 31/32) only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 30 V
I_i = 100 mA

L_i negligibly low
C_i = 5.3 nF

Binary sensor..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(terminals 31/32) only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 30 V
I_i = 100 mA
P_i = 250 mW

L_i negligibly low
C_i = 56.3 nF

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SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 02 ATEX 2174, Issue: 2

Limit contacts, software ..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(terminals 41/42, 51/52) only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 20 V
I_i = 60 mA
P_i = 250 mW

L_i negligibly low
C_i = 5.3 nF

Limit contact, inductive ..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(terminals 41/42) only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 16 V
I_i = 52 mA
P_i = 169 mW

L_i = 100 µH
C_i = 60 nF

resp.

U_i = 16 V
I_i = 25 mA
P_i = 64 mW

L_i = 100 µH
C_i = 60 nF

Forced venting..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(terminals 81/82) only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 28 V
I_i = 115 mA
P_i = 1 W

L_i negligibly low
C_i = 5.3 nF

EU-Type Examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt.
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SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 02 ATEX 2174, Issue: 2

Fault signal output ..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(terminals 83/84) only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 20 V
I_i = 60 mA
P_i = 250 mW

L_i negligibly low
C_i = 5.3 nF

Serial Interface ..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(Programming socket)

Maximum values:

U_o = 7.88 V
I_o = 61.8 mA
P_o = 120 mW
linear characteristic

L_o = 10 mH
C_o = 0.65 µF

resp.

only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 16 V
I_i = 25 mA
P_i = 64 mW

L_i negligibly low
C_i negligibly low

External position sensor ..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(Analog-PCB, pins p9, p10, p11)

Maximum values:

U_o = 7.88 V
I_o = 61 mA
P_o = 120 mW
linear characteristic

L_o = 10 mH
C_o = 0.66 µF

L_i = 370 µH
C_i = 730 nF

resp.

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SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 02 ATEX 2174, Issue: 2

External position sensor with type 3712..type of protection Intrinsic Safety Ex ia IIC/IIIC (terminals VREF, WIPER, GND, GND)

Maximum values:

U_o = 7.88 V
I_o = 61 mA
P_o = 120 mW
linear characteristic

L_o = 10 mH
C_o = 0.66 µF

L_i = 370 µH
C_i = 730 nF

When intrinsically safe circuits are interconnected the rules for the interconnection of intrinsically safe circuits shall be observed.

Type 3730-35...:

The permissible range of the ambient temperature for dust group IIIC is between -55 °C ... 80 °C.

Signal circuit	Rated Voltage:	28 V
(Terminals 11/12)	Nominal signal:	4 ... 20 mA
Position indicator	Rated Voltage:	28 V
(Terminals 31/32)	Output signal:	4 ... 20 mA
Sensor connection (Leakage-Sensor)	Rated Voltage:	30 V
(Terminals 31/32)	inner capacitance	1,4 nF
Binary input	Rated Voltage:	30 V
(Terminals 31/32)	Nominal signal:	6 ... 30 V DC
Limit contact, inductive	Rated Voltage:	16 V
(Terminals 41/42)	Nominal signal:	8 V DC, 8 mA
Limit contacts, software	Rated Voltage:	20 V
(Terminals 41/42)	Nominal signal:	8 V DC, 8 mA
Forced venting	Rated Voltage:	28 V
(Terminals 81/82)	Nominal signal:	6 ... 24 V DC
Fault signal output	Rated Voltage:	20 V
(Terminals 83/84)	Nominal signal:	8 V DC, 8 mA

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SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 02 ATEX 2174, Issue: 2

Changes against previous issue:

The changes concern the electrical data and the extension of the HART capable positioner for the external position sensor type 3712.

(16) Test Report PTB Ex16-26233

(17) Specific conditions of use

None.

(18) Essential health and safety requirements

Met by compliance with the aforementioned standards.

Konformitätsbewertungsstelle, Sektor Explosionsschutz
On behalf of PTB:

Dr.-Ing. F. Lienesch
Regierungsdirektor

Braunschweig, February 14, 2017

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Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
Nationales Metrologieinstitut

(1) # CONFORMITY STATEMENT

(Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 2014/34/EU**

(3) Test Certificate Number:

PTB 03 ATEX 2180 X **Issue: 01**

(4) Product: HART capable positioner Typ 3730-38..

(5) Manufacturer: SAMSON AG Mess- und Regeltechnik

(6) Address: Weismüllerstraße 3, 60314 Frankfurt, Deutschland

(7) This product and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential test report PTB Ex 16-25138.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0:2012/A11:2013 EN 60079-15:2010 EN 60079-31:2014

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This Conformity Statement relates only to the design and construction of the specified product in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this product.

(12) The marking of the product shall include the following:

II 3 G Ex nA IIC T6 Gc und
II 3 D Ex tc IIIC T80 °C Dc

Konformitätsbewertungsstelle Sektor Explosionsschutz
On behalf of PTB:

Dr.-Ing. U. Gerlach
Regierungsdirektor

Braunschweig, June 30, 2016

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT

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(13) # SCHEDULE

(14) ## CONFORMITY STATEMENT PTB 03 ATEX 2180 X, Ausgabe: 01

(15) Description of the product

The HART capable positioner type 3730-38.. is a communication capable, single respectively double operating postitioner for the attachment to all common lift or slewing-motion actuators. It is intended to assign the valve position to an actuating signal. The communication is carried out by using SSP and HART protcols. As a pneumatic auxiliary power non-combustible media are used.
The operation takes place inside or outside hazardous areas.

In the future the HART capable positioner type 3730-38.. may also be manufactured and operated according to the test documents listed in the test report.

The thermal and electrical maximum values are presented in summary.

For relationship between temperature class and permissible ranges of the ambient temperature, reference is made to the following table:

Gas or dust group	Temperature class	Permissible range of the ambient temperature
IIC	T6	-55 °C ... 60 °C
	T5	-55 °C ... 70 °C
	T4	-55 °C ... 80 °C
IIIC	-	-55 °C ... 80 °C

Electrical data

Signal circuit .....
(Terminals 11/12).....Nominal signal: 4 ... 20 mA
.....Rated voltage: 32 V DC ... 85 V DC

Position indicator .....
(Terminals 31/32).....Outputsignal: 4 ... 20 mA
.....Rated voltage: 32 V DC ... 85 V DC

Sensor connection.....
(Terminals 31/32).....inner capacitance 1,4 nF

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SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 03 ATEX 2180 X, Issue: 01

Binary input.....		
(Terminals 31/32).....	Nominal signal:	6 ... 30 V DC
.....	Rated voltage:	32 V DC ... 85 V DC
Limit contact, inductive		
(Terminals 41/42).....	Nominal signal:	8 V DC, 8 mA
Limit contacts, software		
(Terminals 41/42).....	Nominal signal:	8 V DC, 8 mA
Forced venting.....		
(Terminals 81/82).....	Nominal signal:	6 ... 24 V DC
.....	Rated voltage:	32 V DC ... 85 V DC
Fault signal output		
(Terminals 83/84).....	Nominal signal:	8 V DC, 8 mA
External position sensor.....		
(Analog board Pins p9, p10, p11)	Nominal signal: potentiometer	

Changes

The changes concern the update of the applied standards, the adding of another type notation for dust ignition protection by enclosure, the discontinue of the intrinsically safe variant and the application of alternative gasket material of the enclosure.

(16) Test report PTB Ex 16-25138

(17) Specific conditions of use

A fuse according to IEC 60127-2/II, 250 V F respectively IEC 60127-2/VI, 250 V T with a maximum nominal fuse current of $I_N \leq 63$ mA shall be connected in series to the signal circuit (terminals 11/12).

If the position indicator circuit is connected to a circuit of type of protection Ex nA IIC/IIIC a fuse according to IEC 60127-2/VI, 250 V T with a maximum nominal fuse current of $I_N \leq 40$ mA shall be connected in series. This fuse shall be arranged outside of the hazardous area.

A fuse according to IEC 60127-2/II, 250 V F respectively IEC 60127-2/VI, 250 V T with a maximum nominal fuse current of $I_N \leq 40$ mA shall be connected in series to the program interface adapter in the connection of Vcc.
The program interface adapter shall be arranged outside the hazardous area.

The connection of the wires has to be made in a way that the connection is free of tensile and torsional stress.

Connection, disconnection and switching of energized circuits is only permitted during installation, maintenance or repair.

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SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 03 ATEX 2180 X, Issue: 01

(18) Essential health and safety requirements

Met by compliance with the aforementioned standards.

According to Article 41 of Directive 2014/34/EU, Conformity Statements which have been issued according to Directive 94/9/EC prior to the date of coming into force of Directive 2014/34/EU (April 20, 2016) may be considered as if they were issued already in compliance with Directive 2014/34/EU. By permission of the European Commission supplements to such Conformity Statements and new issues of such certificates may continue to hold the original certificate number issued before April 20, 2016.

Konformitätsbewertungsstelle, Sektor Explosionsschutz
On behalf of PTB:

Braunschweig, June30,2016

Dr.-Ing. U. Gerlach
Regierungsdirektor

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT

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Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB

TRANSLATION

(1) **EX TYPE EXAMINATION CERTIFICATE**

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres – **Directive 94/9/EC**

(3) EC Type Examination Certificate Number

PTB 03 ATEX 2211 X

(4) Equipment: Model 3730-39.. HART capable Positioner

(5) Manufacturer: SAMSON AG Mess- und Regeltechnik

(6) Address: Weismüllerstr. 3, 60314 Frankfurt am Main, Germany

(7) The equipment and any acceptable variation thereof are specified in the schedule to this certificate.

(8) The Physikalisch-Technische Bundesanstalt, notified body number 0102 according to Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the essential health and safety requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres specified in Annex II to the Directive.

The examination and test results are recorded in confidential report.

PTB Ex 03-23428

(9) The essential health and safety requirements are satisfied by compliance with

EN 50014:1997 + A1 + A2 **EN 50018:2000** **EN 50020:2002**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use as specified in the schedule to this certificate.

(11) According to the Directive 94/9/EC, this EC Type Examination Certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the Manufacture and apply to is equipment.

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Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB

(12) The marking of the equipment shall include the following:

 **II 2G EEx d ia IIC T6**

Zertifizierungsstelle Explosionsschutz
By order

Braunschweig, 22. Oktober 2003

(Signature) (Seal)

Dr.-Ing. U. Gerlach

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Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB

(13) **S c h e d u l e**

(14) **EC Type Examination Certificate No. PTB 03 ATEX 2211 X**

(15) **Description of Equipment**

The Model 3730-39.. HART capable Positioner is a positioner with communication capability and serves for adjusting valve stem positions to a control signal. The equipment consists of the Model 3730-21.. HART capable Positioner certified under PTB 02 ATEX 2174 interconnected to the Model 3770-1.. Field Barrier certified under PTB 98 ATEX 1025 X.

For instrument air non-combustible media are used.

The equipment is intended for use inside and outside of hazardous locations.

The correlation between temperature classification and permissible ambient temperature ranges is shown in the table below:

Temperature class	Permissible ambient temperature range
T6	-40 °C ...60 °C
T5	-40 °C ...70 °C
T4	-40 °C ... 80 °C

Electrical data

Signal circuit (terminals Ch 2+/- and Ch 3+/-) Rating	(0)4 to 20 mA or UN up to 10 V resp. or NAMUR proximity switches
Input Nominal fuse current	Um = 250 V I_N = 80 mA
Signal circuit channel 1 (terminals Ch 1+/-)Rating	(0)4 to 20 mA
Input Nominal fuse current	Um = 250 V I_N = 80 mA

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Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB

(16) Test report **PTB Ex 03-23428**

(17) **Special conditions for safe use**

The Model 3770-1.. Field Barrier shall be connected via cable entries or conduit system suitable for the purpose and which satisfy the requirements of EN 50018 Clauses 13.1 and 13.2 and for which a separate certificate has been issued.

Cable entries (Pg cable glands) and closing plugs of the simple type shall not be used. Where the field barrier is connected via a conduit entry approved for this purpose the associated sealing device shall be applied directly on the enclosure.

Apertures not used shall be closed in compliance with En 50018 Clause 11.9.

An equipotential bonding conductor shall be provided along the intrinsically safe output circuits.

(18) **Special health and safety requirements**

In compliance with the standards specified above.

Zertifizierungsstelle Explosionsschutz
By order

Braunschweig, 22. Oktober 2003

(Signature) (seal)

Dr. Ing. U. Gerlach

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IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEx PTB 05.0008X	Issue No: 1	Certificate history: Issue No. 1 (2016-11-30)
Status:	**Current**	Page 1 of 5	Issue No. 0 (2005-02-21)
Date of Issue:	**2016-11-30**		
Applicant:	**SAMSON AG Mess- und Regeltechnik** Weismuellerstrasse 3 D-60314 Frankfurt am Main **Germany**		
Equipment: *Optional accessory:*	**HART capable positioner type 3730-31.., 3730-35.. and 3730-38..**		
Type of Protection:	**General Requirements, Intrinsic Safety, Type of Protection "n", Dust Ignition Protection by Enclosure**		
Marking:	Ex ia IIC T6...T4 Gb and Ex ia IIIC T80°C Db or Ex tb IIIC T80°C Db or Ex nA IIC T6 Gc and Ex tc IIIC T80°C Dc		

Approved for issue on behalf of the IECEx Certification Body: Dr.-Ing. Frank Lienesch

Position: Department Head "Explosion Protection in Sensor Technology and Instrumentation"

Signature: (for printed version)

Date: 14.12.16

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

Physikalisch-Technische Bundesanstalt (PTB)
Bundesallee 100
38116 Braunschweig
Germany

Physikalisch-Technische Bundesanstalt Braunschweig und Berlin

IECEx Certificate of Conformity

Certificate No:	IECEx PTB 05.0008X	Issue No: 1
Date of Issue:	**2016-11-30**	Page 2 of 5
Manufacturer:	**SAMSON AG Mess- und Regeltechnik** Weismuellerstrasse 3 D-60314 Frankfurt am Main **Germany**	

Additional Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:

The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2011 Edition:6.0	Explosive atmospheres - Part 0: General requirements
IEC 60079-11 : 2011 Edition:6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-15 : 2010 Edition:4	Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
IEC 60079-31 : 2013 Edition:2	Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:

DE/PTB/ExTR16.0043/00

Quality Assessment Report:

DE/TUN/QAR06.0011/07

IECEx Certificate of Conformity

Certificate No: IECEx PTB 05.0008X Issue No: 1

Date of Issue: **2016-11-30** Page 3 of 5

Schedule

EQUIPMENT:

Equipment and systems covered by this certificate are as follows:

General description
The Model 3730-3... HART® capable positioner is a single- or double-acting positioner with communication capability intended for the attachment to pneumatic control valves or rotary actuators. The positioner is of a self-balancing type and adapts itself automatically to the attached valve or actuator respectively. The positioner server matches valve stem positions with the control signal in the 4-20mA range. Nominal travels of 3.6 to 200 mm are possible with linear actuators, or angles of rotation of 24 ° to 100 ° with rotary actuators.

Options:
Position indicator, software proximity switch, inductive proximity switch, forced routing function, fault alarm output, external displacement transducer and serial interface.

CONDITIONS OF CERTIFICATION: YES as shown below:

For specific conditions of use reference is made to the attachment.

IECEx Certificate of Conformity

Certificate No: IECEx PTB 05.0008X Issue No: 1

Date of Issue: **2016-11-30** Page 4 of 5

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

The changes concern the
- update of the applied Standards
- application of alternative gasket material of the enclosure
- adding of an enclosure with windows
- increase of the internal capacitance of the inductive limit contact (terminals 41/42) to C_i = 60 nF (type 3730-31)
- adding of a type notation for dust ignition protection by enclosure for EPL Db (type 3730-35)
- implementation of dust ignition protection by Intrinsic Safety for EPL Db (type 3730-31)
- implementation of dust ignition protection by enclosure for EPL Dc (type 3730-38)
- implementation of type of protection "nA" for EPL Gc (type 3730-38)
- adding of specific conditions of use for type of protection "nA" (type 3730-38).

IECEx Certificate of Conformity

Certificate No: IECEx PTB 05.0008X Issue No: 1

Date of Issue: **2016-11-30** Page 5 of 5

Additional Information:

For thermal and electrical specifications reference is made to the attachment.

Annex:

Attachment IECEx PTB 05.0008-01_v3-2.pdf

Applicant: **SAMSON AG Mess- und Regeltechnik**
Weismuellerstrasse 3
60314 Frankfurt am Main
Germany

Electrical Apparatus: HART capable positioner
Type 3730-31.., 3730-35.. and 3730-38..

Electrical and thermal data for type 3730-31:

For relationship between temperature class and permissible ranges of the ambient temperature, reference is made to the following table:

Gas- or dust group	Temperature class	Permissible range of the ambient temperature
IIC	T6	-55 °C ... 60 °C
	T5	-55 °C ... 70 °C
	T4	-55 °C ... 80 °C
IIIC	Not applicable	-55 °C ... 80 °C

The relationship between temperature class, the permissible range of the ambient temperature and the maximum short circuit currents for analyzing units with limit contact (terminals 41/42) applies according to the following table:

Temperature class	Permissible range of the ambient temperature	I_o / P_o
T6	-55 °C ... 45 °C	52 mA / 169 mW
T5	-55 °C ... 60 °C	
T4	-55 °C .. 75 °C	
T6	-55 °C ... 60 °C	25 mA / 64 mW
T5	-55 °C ... 80 °C	
T4	-55 °C ... 80 °C	

Electrical data

Signal circuit..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(terminals 11/12) only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 28 V
I_i = 115 mA

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Bundesallee 100, 38116 Braunschweig, Germany
Postfach 33 45, 38023 Braunschweig, Germany
Telephone +49 531 592-0, Telefax +49 531 592-3605

P_i = 1 W
L_i negligibly low
C_i = 35 nF

Position indicator ..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(terminals 31/32) only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 28 V
I_i = 115 mA
P_i = 1 W

L_i negligibly low
C_i = 5.3 nF

Type 3730-31....1. ..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(Structure-borne sound sensor) only for connection to a certified intrinsically safe circuit

Sensor connection

(terminals 31/32)

Maximum values:

U_i = 30 V
I_i = 100 mA

L_i negligibly low
C_i = 5.3 nF

Type 3730-31.....1 ..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(Binary sensor) only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 30 V
I_i = 100 mA
P_i = 250 mW

L_i negligibly low
C_i = 56.3 nF

Limit contacts, software ..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(terminals 41/42, 51/52) only for connection to a certified intrinsically safe circuit

Maximum values:

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Postfach 33 45, 38023 Braunschweig, Germany
Telephone +49 531 592-0, Telefax +49 531 592-3605

U_i = 20 V
I_i = 60 mA
P_i = 250 mW

L_i negligibly low
C_i = 5.3 nF

Limit contact, inductive ..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(terminals 41/42) only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 16 V
I_i = 52 mA
P_i = 169 mW

L_i = 100 µH
C_i = 60 nF

or

U_i = 16 V
I_i = 25 mA
P_i = 64 mW

L_i = 100 µH
C_i = 60 nF

Forced venting ..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(terminals 81/82) only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 28 V
I_i = 115 mA

L_i negligibly low
C_i = 5.3 nF

Fault signal output ..... type of protection Intrinsic Safety Ex ia IIC/IIIC
(terminals 83/84) only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 20 V
I_i = 60 mA
P_i = 250 mW

L_i negligibly low
C_i = 5.3 nF

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Serial Interface (Programming socket) ..... type of protection Intrinsic Safety Ex ia IIC/IIIC

Maximum values:

U_o = 7.88 V
I_o = 61.8 mA
P_o = 120 mW
linear characteristic

L_o = 10 mH
C_o = 0.65 µF

or

only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 16 V
I_i = 25 mA
P_i = 64 mW

L_i negligibly low
C_i negligibly low

External position sensor (Analog-PCB, pins p9, p10, p11) ..... type of protection Intrinsic Safety Ex ia IIC/IIIC

Maximum values:

U_o = 7.88 V
I_o = 61 mA
P_o = 120 mW
linear characteristic

L_o = 10 mH
C_o = 0.66 µF

L_i = 370 µH
C_i = 730 nF

When intrinsically safe circuits are interconnected the rules for the interconnection of intrinsically safe circuits shall be observed.

Electrical and thermal data for type 3730-35 and 3730-38:

For relationship between temperature class and permissible ranges of the ambient temperature, reference is made to the following table:

Physikalisch-Technische Bundesanstalt (PTB)
Bundesallee 100, 38116 Braunschweig, Germany
Postfach 33 45, 38023 Braunschweig, Germany
Telephone +49 531 592-0, Telefax +49 531 592-3605

Gas- or dust group	Temperature class	Permissible range of the ambient temperature
IIC	T6	-55 °C ... 60 °C
	T5	-55 °C ... 70 °C
	T4	-55 °C ... 80 °C
IIIC	Not applicable	-55 °C ... 80 °C

Electrical data

Signal circuit	Rated Voltage:	28 V
(Terminals 11/12)	Nominal signal:	4 ... 20 mA
Position indicator	Rated Voltage:	28 V
(Terminals 31/32)	Output signal:	4 ... 20 mA
Sensor connection (Leakage-Sensor)	Rated Voltage:	30 V
(Terminals 31/32)	inner capacitance	1,4 nF
Binary input	Rated Voltage:	30 V
(Terminals 31/32)	Nominal signal:	6 ... 30 V DC
Limit contact, inductive	Rated Voltage:	16 V
(Terminals 41/42)	Nominal signal:	8 V DC, 8 mA
Limit contacts, software	Rated Voltage:	20 V
(Terminals 41/42)	Nominal signal:	8 V DC, 8 mA
Forced venting	Rated Voltage:	28 V
(Terminals 81/82)	Nominal signal:	6 ... 24 V DC
Fault signal output	Rated Voltage:	20 V
(Terminals 83/84)	Nominal signal:	8 V DC, 8 mA

Specific condtions of use:

For the HART capable positioner **type 3730-38** in type of protection "nA" the following applies:

1. A fuse according to IEC 60127-2/II, 250 V F respectively IEC 60127-2/VI, 250 V T with a maximum nominal fuse current of $I_N \leq 63$ mA shall be connected in series to the signal circuit (terminals 11/12).
2. The position indicator circuit shall be connected to a fuse according to IEC 60127-2/VI, 250 V T with a maximum nominal fuse current of $I_N \leq 40$ mA in series. This fuse shall be arranged outside of the hazardous area.

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Telephone +49 531 592-0, Telefax +49 531 592-3605

3. A fuse according to IEC 60127-2/II, 250 V F respectively IEC 60127-2/VI, 250 V T with a maximum nominal fuse current of $I_N \leq 40$ mA shall be connected in series to the program interface adapter in the connection of Vcc.
4. The program interface adapter shall be arranged outside the hazardous area.
5. The connection of the wires has to be made in a way that the connection is free of tensile and torsional stress.

Physikalisch-Technische Bundesanstalt (PTB)
Bundesallee 100, 38116 Braunschweig, Germany
Postfach 33 45, 38023 Braunschweig, Germany
Telephone +49 531 592-0, Telefax +49 531 592-3605

Installation Manual for apparatus certified by CSA for use in hazardous locations.

Electrical rating of intrinsically safe apparatus and apparatus for installation in hazardous locations.

Table 1: Maximum values

	Control signal	Position Indicator *or* (Binary Input) *or* [Leakage detection]	Forced venting function Solenoid valve	Limit switches		Fault signal
				inductive	software	
Circuit No.	**1**	**2**	**5**	**3 and 4**	**3 and 4**	**6**
Terminal No.	**11 / 12**	**31 / 32**	**81 / 82**	**41 / 42 and 51 / 52**	**41 / 42 and 51 / 52**	**83 / 84**
U_i or V_{max}	**28 V**	**28 V**	**28 V**	**16 V**	**20 V**	**20 V**
I_i or I_{max}	**115 mA**	**115 mA (100 mA) [100 mA]**	**115 mA**	**25/52 mA**	**60 mA**	**60 mA**
P_i or P_{max}	**1 W**	**1 W**	**500 mW**	**64/169 mW**	**250 mW**	**250 mW**
C_i	**35 nF**	**5.3 nF (56.3 nF) [5.3 nF]**	**5.3 nF**	**60 nF**	**13.4 nF**	**13.4 nF**
L_i	**0 µH**	**0 µH**	**0 µH**	**100 µH**	**0 µH**	**0 µH**

Circuit	**Serial interface BU**			**External position sensor**		
Terminal	**Connector**			**Analog pcb. pin p9, p10, p11**		
U_i or V_{max}	**16 V**	**U_0 or V_{0C}**	**7.88 V**	**U_0 or V_{0C}**	**7.88 V**	
I_i or I_{max}	**25 mA**	**I_0 or I_{SC}**	**61.8 mA**	**I_0 or I_{SC}**	**61 mA**	
P_i or P_{max}	**64 mW**	**P_0**	**120 mW**	**P_0**	**120 mW**	
C_i	**0 nF**	**C_0**	**0.65 µF**	**C_0**	**0.66 µF**	**C_i=730 nF**
L_i	**0 µH**	**L_0**	**10 mH**	**L_0**	**10 mH**	**L_i=370 µH**

Notes: Entity parameters must meet the following requirements:

U_0 or V_{0C} or $V_t \leq U_i$ or V_{max} / I_0 or I_{SC} or $I_t \leq I_i$ or I_{max} / P_0 or $P_{max} \leq P_i$ or P_{max}
$C_a \geq C_i + C_{cable}$ and $L_a \geq L_i + L_{cable}$

Table 2: CSA/FM – certified barrier parameters of circuit 2 and 5

Barrier	Supply barrier				Evaluation barrier		
	V_{0C}	R_{min}	I_{SC}	P_{max}	V_{0C}	R_{min}	I_{SC}
circuit 2	≤ 28 V	≥ 300 Ω	≤ 115 mA	≤ 1 W	≤ 28 V	#	0 mA
circuit 5	≤ 28 V	≥ 392 Ω	≤ 115 mA	≤ 500 mW	≤ 28 V	#	0 mA

Table 3: The correlation between temperature classification and permissible ambient temperature ranges is shown in the table below:

Temperature class	Permissible ambient temperature range
T6	- 40 °C ... 60° C
T5	- 40 °C ... 70 °C
T4	- 40 °C ... 80 °C

Table 4: For the Model 3730 – 331 . . . Positioner the correlation between temperature classification, permissible ambient temperature ranges and maximum short-circuit current is shown in the table below:

Temperature class	Permissible ambient temperature range	Maximum short-circuit current
T6	- 40 °C ... 45 °C	52 mA
T5	- 40 °C ... 60 °C	
T4	- 40 °C ... 75 °C	
T6	- 40 °C ... 60 °C	25 mA
T5	- 40 °C ... 80 °C	
T4	- 40 °C ... 80 °C	

Intrinsically safe if installed as specified in manufacturer's installation manual.

CSA- certified for hazardous locations

Ex ia IIC T6: Class I, Zone 0
Class I, Div. 1, Groups A, B, C, D.
Class II Div. 1, Groups E, F + G; Class III. **Type 4 Enclosure**

Notes:

1.) The apparatus may be installed in intrinsically safe circuits only when used in conjunction with CSA certified apparatus. For maximum values of U_i or V_{max}; I_i or I_{max}; P_i or P_{max} ; C_i and L_i of the various apparatus see Table 1 on page 1.

2.) For barrier selection see Table 2 on page 2.

3.) The installation must be in accordance with the C. E. C. Part 1.

4.) Use only supply wires suitable for 5 °C above surrounding temperature.

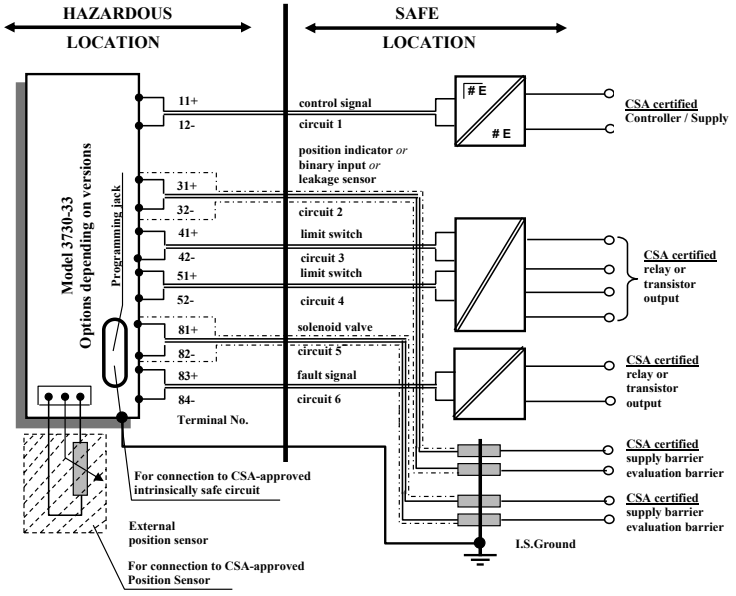
5.) For CSA Certification, Safety Barrier must be CSA Certified and installed in accordance with C.E.C. Part. 1. Each pair of I.S. wires must be protected by a shield that is grounded at the I.S. Ground. The shield must extend as close to the terminals as possible.

6.) Substitution of components may impair intrinsic safety.

7.) For the permissible maximum values for the intrinsically safe circuits 1, 3, 4 and 6 see Table 1

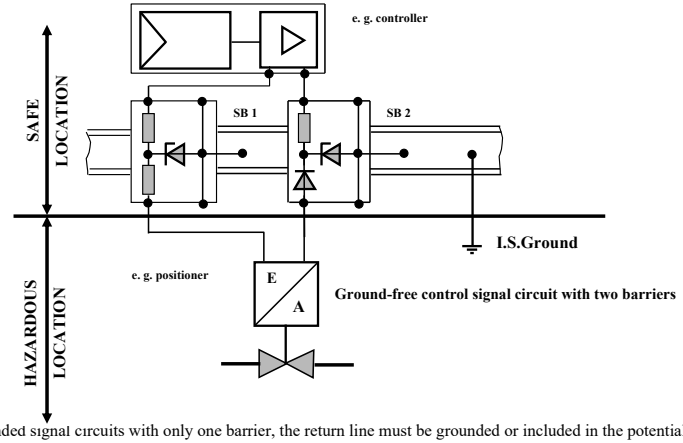
8.) For the permissible barrier parameters for the circuits 2 and 5 see Table 2

9.) Cable entry M 20 x 1.5 or metal conduit according to drawing No. 1050 – 0539 T or 1050 – 0540 T



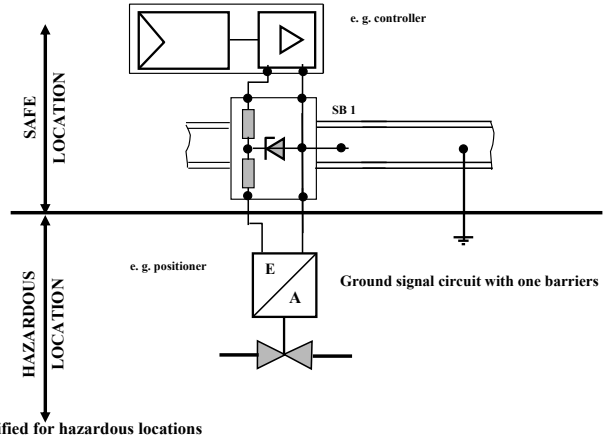
On interconnection to form ground- free signal circuits, only evaluation barriers must be installed in the return line. Correct polarity must be ensured.

Circuit diagram of a ground- free signal circuit.
(position indicator and forced venting function)



In grounded signal circuits with only one barrier, the return line must be grounded or included in the potential equalization network of the system.

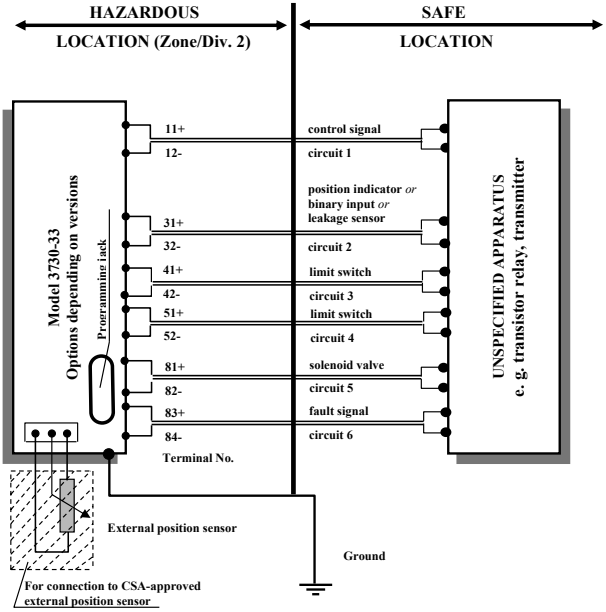
Circuit diagram of a grounded signal circuit
(position indicator and forced venting function)



CSA- certified for hazardous locations

Class I, Zone 2
Class I, Division 2, Groups A, B, C, D,
Class II, Groups E, F + G; Class III. **Type 4 Enclosure**

HART-capable positioner with position indicator, forced venting function (solenoid valve), fault signal and limit switches.



Notes:

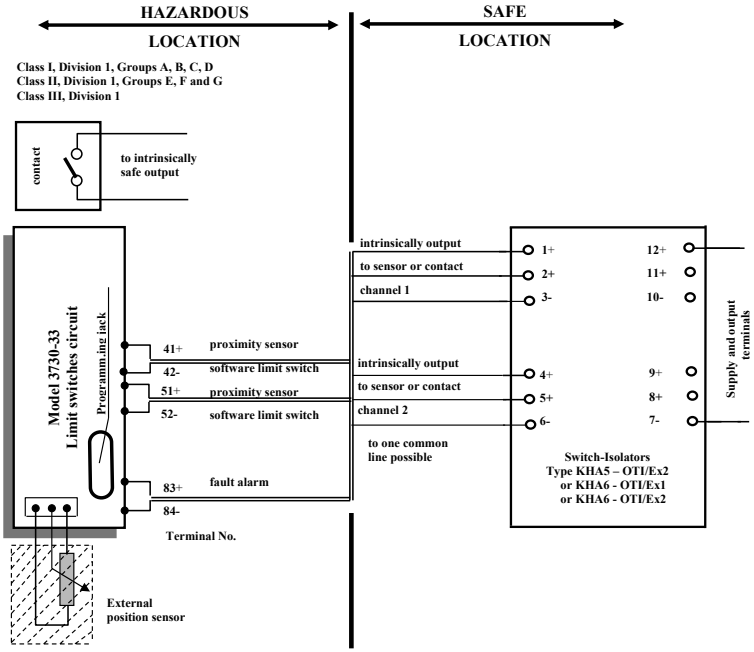
1.) The installation must be in accordance with the Canadian Electrical Code, Part 1

2.) For the maximum values for the individual circuits see Table 1 and 2.

3.) Cable entry only rigid metal conduit according to drawing No. 1050-0539 T and 1050-0540 T

4.) Substitution of components may impair intrinsic safety.

Installation drawing Control Relay KHA5-OTI/Ex2, KHA6-OTI/Ex1 or KHA6-OTI/Ex2 with Model SJ-b-N Proximity Sensors



maximum capacitance of each inductive sensor 60 nF
maximum inductance of each inductive sensor 200 µH

The total series inductance and shunt capacitance of shield wiring shall be restricted to the following maximum values

Control Relay Terminal No.	Groups	L [mH]	C [µF]	V0C [V]	ISC [mA]
1-3; 2-3 4-6; 5-6	A + B	84.8	1.27	12.9	19.8
	C	299	3.82		
	D	744	10.2		

Each pair of I.S. wires must be protected by a shield that is grounded at the I.S. Ground. The shield must extend as close to the terminals as possible Install per C.E.C. Part 1.

Installation Manual for apparatus approved by FM for use in hazardous locations.

Electrical rating of intrinsically safe apparatus and apparatus for installation in hazardous locations.

Table 1: Maximum values

	Control signal	Position Indicator *or* (Binary Input) *or* [Leakage detection]	Forced venting function Solenoid valve	Limit switches		Fault signal
				inductive	software	
Circuit No.	1	2	5	3 and 4	3 and 4	6
Terminal No.	11 / 12	31 / 32	81 / 82	41 / 42 and 51 / 52	41 / 42 and 51 / 52	83 / 84
U_i or V_{max}	28 V	28 V	28 V	16 V	20 V	20 V
I_i or I_{max}	115 mA	115 mA (100 mA) [100 mA]	115 mA	25/52 mA	60 mA	60 mA
P_i or P_{max}	1 W	1 W	500 mW	64/169 mW	250 mW	250 mW
C_i	35 nF	5.3 nF (56.3 nF) [5.3 nF]	5.3 nF	60 nF	13.4 nF	13.4 nF
L_i	0 µH	0 µH	0 µH	100 µH	0 µH	0 µH

Circuit	Serial interface BU			External position sensor		
Terminal	Connector			Analog pcb. pin p9, p10, p11		
U_i or V_{max}	16 V	U_0 or V_{0C}	7.88 V	U_0 or V_{0C}	7.88 V	
I_i or I_{max}	25 mA	I_0 or I_{SC}	61.8 mA	I_0 or I_{SC}	61 mA	
P_i or P_{max}	64 mW	P_0	120 mW	P_0	120 mW	
C_i	0 nF	C_0	0.65 µF	C_0	0.66 µF	C_i=730 nF
L_i	0 µH	L_0	10 mH	L_0	10 mH	L_i=370 µH

Notes: Entity parameters shall meet the following requirements:

U_0 or V_{0C} or $V_t \leq U_i$ or V_{max} / I_0 or I_{SC} or $I_t \leq I_i$ or I_{max} / P_0 or $P_{max} \leq P_i$ or P_{max}
$C_a \geq C_i + C_{cable}$ and $L_a \geq L_i + L_{cable}$

Table 2: FM / CSA – approved barrier parameters of circuit 2 and 5

Barrier	Supply barrier				Evaluation barrier		
	V_{0C}	R_{min}	I_{SC}	P_{max}	V_{0C}	R_{min}	I_{SC}
circuit 2	≤ 28 V	≥ 196 Ω	≤ 115 mA	≤ 1 W	≤ 28 V	#	0 mA
circuit 5	≤ 28 V	≥ 392 Ω	≤ 115 mA	≤ 500 mW	≤ 28 V	#	0 mA

Table 3: The correlation between temperature classification and permissible ambient temperature ranges is shown in the table below:

Temperature class	Permissible ambient temperature range
T6	60 °C
T5	- 40 °C ≤ ta ≤ 70 °C
T4	80 °C

Table 4: For the Model 3730 – 331 . . . Positioner the correlation between temperature classification, permissible ambient temperature ranges and maximum short- circuit current is shown in the table below:

Temperature class	Permissible ambient temperature range	Maximum short-circuit current
T6	45 °C	52 mA
T5	- 40 °C ≤ ta ≤ 60 °C	
T4	75 °C	
T6	60 °C	25 mA
T5	- 40 °C ≤ ta ≤ 80 °C	
T4	80 °C	

Intrinsically safe if installed as specified in manufacturer's installation manual EB 8384-3 EN.
FM- approved for hazardous locations: HART-capable positioner with position indicator or binary input or leakage detection, forced venting function (solenoid valve), fault signal and limit switches

Class I, Zone 0 AEx ia IIC T6:
Class I, II, III, Div. 1, Groups A, B, C, D, E, F + G; NEMA 4X

Notes:

1.) The apparatus may be installed in intrinsically safe circuits only when used in conjunction with FM/CSA approved apparatus. For maximum values of U_i or V_{max}; I_i or I_{max}; P_i or P_{max} ; C_i and L_i of the various apparatus see Table 1 on page 1.

2.) For barrier selection see Table 2 on page 2.

3.) The installation shall be in accordance with the National Electrical Code ANSI/NFPA 70 and ANSI/ISA RP 12.06.01.

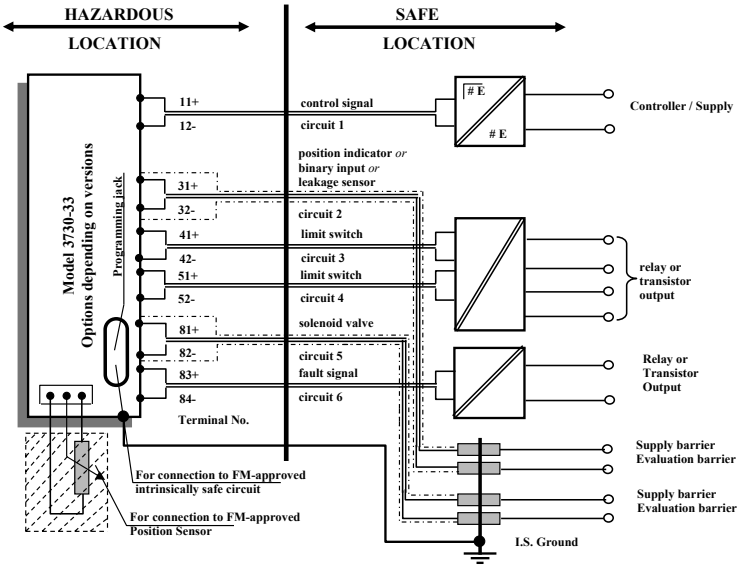
4.) Use only supply wires suitable for 5 °C above surrounding temperature.

5.) Substitution of components may impair intrinsic safety.

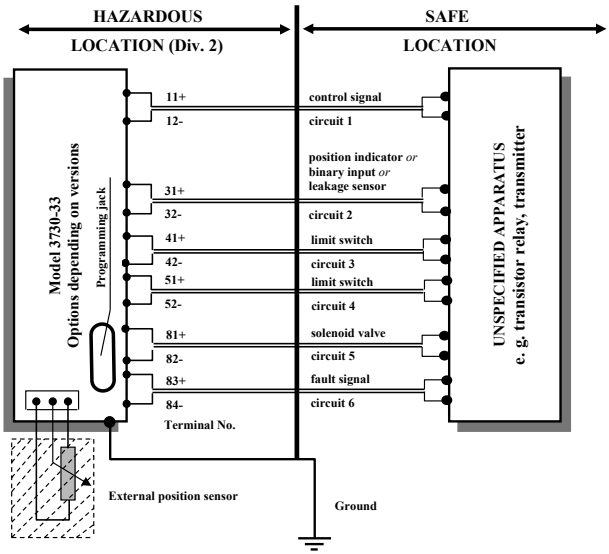
6.) For the permissible maximum values for the intrinsically safe circuits 1, 3, 4 and 6 see Table 1

7.) For the permissible barrier parameters for the circuits 2 and 5 see Table 2

8.) Cable entry M 20 x 1.5 or metal conduit according to drawing No. 1050 – 0539 T or 1050 – 0540 T



Class I, Division 2, Groups A, B, C, D,
Class II, Division 2 Groups F + G. **NEMA 4X.**



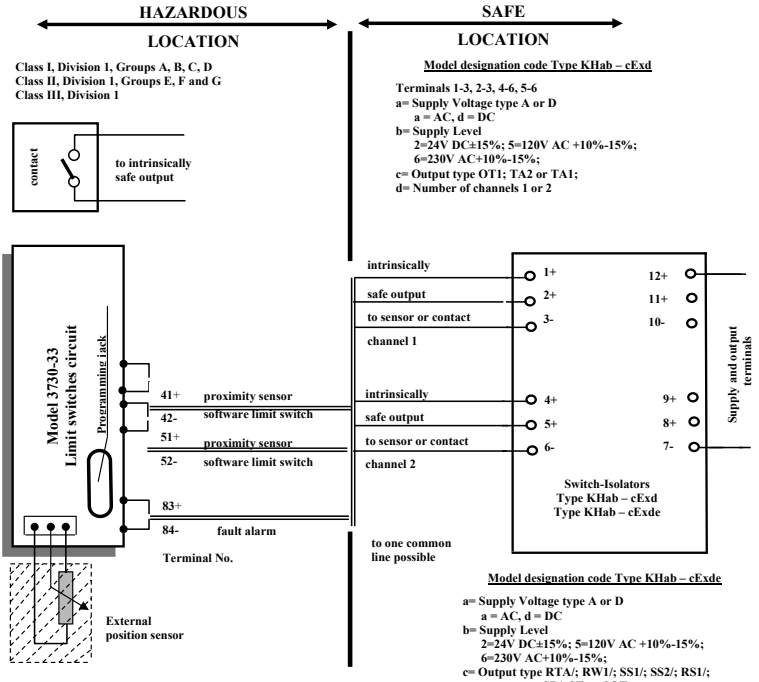
Notes:

1.) The installation shall be in accordance with the National Electrical Code ANSI/NFPA 70

2.) For the maximum values for the individual circuits see Table 1
Cable entry only rigid metal conduit

3.) Substitution of components may impair intrinsic safety.

Installation drawing Control Relay KHab-cEx de Model SJ-b-N Proximity Sensors



Model designation code Type KHab – cExde

a= Supply Voltage type A or D
a = AC, d = DC
b= Supply Level
2=24V DC±15%; 5=120V AC +10%-15%;
6=230V AC+10%-15%;
c= Output type RTA/; RW1/; SS1/; SS2/; RS1/; SR/; ST-or SOT
d= Number of channels 1 or 2
e= Power rail designation, P, 2S.P or GS.P (includes Model KHD2-EB-PB Power Feed Module) or Blank

maximum capacitance of each inductive sensor 30 nF
maximum inductance of each inductive sensor 100 µH

The total series inductance and shunt capacitance of shield wiring shall be restricted to the following maximum values

Control Relay Terminal No.	Groups	L [mH]	C [µF]	V0C [V]	ISC [mA]
1-3; 2-3 4-6; 5-6	A + B	84.8	1.27	12.9	19.8
	C	299	3.82		
	D	744	10.2		

ТАМОЖЕННЫЙ СОЮЗ

СЕРТИФИКАТ СООТВЕТСТВИЯ

EAC

№ ТС RU C-DE.AA87.B.01278

Серия RU № 0743927

ОРГАН ПО СЕРТИФИКАЦИИ Орган по сертификации взрывозащищенного и рудничного оборудования (ОС ЦСВЭ) Общества с ограниченной ответственностью «Центр по сертификации взрывозащищенного и рудничного оборудования» (ООО «НАНИО ЦСВЭ»). Адрес места нахождения юридического лица: Россия, 140004, Московская область, Люберецкий район, город Люберцы, поселок ВУГИ, АО «Завод «ЭКОМАШ», литера В, Объект 6, этаж 3, офис 26. Адрес места осуществления деятельности в области аккредитации: Россия, 140004, Московская область, Люберецкий район, город Люберцы, поселок ВУГИ, АО «Завод «ЭКОМАШ», Литера В, Объект 6, этаж 3, офисы 26/3, 26/4, 26/5, 27/6, 30/1, 32. Аттестат № RA.RU.11AA87 от 20.07.2015 г.
Телефон: +7 (495) 558-83-53, +7 (495) 558-82-44. Адрес электронной почты: ccve@ccve.ru

ЗАЯВИТЕЛЬ Общество с ограниченной ответственностью «Самсон Контролс»,
Россия, 109147, Москва, ул. Марксистская, д. 16. ОГРН: 1037700041026.
Телефон: +7 (495) 7774545. Адрес электронной почты: samson@samson.ru

ИЗГОТОВИТЕЛЬ SAMSON AG Mess- und Regeltechnik,
Weismüllerstrasse 3, 60314 Frankfurt am Main, Германия.

ПРОДУКЦИЯ Позиционеры типов 3730-01, 3730-11, 3730-31, 3730-6-113, 3730-08, 3730-18, 3730-38, 3730-6-813, 3730-6-213 с электропреобразователем (барьером) типа 3770-1 (выпускаются в соответствии с технической документацией SAMSON AG Mess- und Regeltechnik на позиционеры типов 3730-01, 3730-11, 3730-31, 3730-6-113, 3730-08, 3730-18, 3730-38, 3730-6-813, 3730-6-213 с электропреобразователем (барьером) типа 3770-1) с Ex-маркировками согласно приложению (см. бланки №№ 0550180, 0550181, 0550182, 0550183). Серийный выпуск.

КОД ТН ВЭД ТС 9032 810000

СООТВЕТСТВУЕТ ТРЕБОВАНИЯМ ТР ТС 012/2011 «О безопасности оборудования для работы во взрывоопасных средах».

СЕРТИФИКАТ ВЫДАН НА ОСНОВАНИИ Протокола оценки и испытаний № 227.2018-Т от 29.11.2018 Испытательной лаборатории взрывозащищенного и рудничного оборудования (ИЛ ЦСВЭ) Общества с ограниченной ответственностью «Центр по сертификации взрывозащищенного и рудничного оборудования (ООО «НАНИО ЦСВЭ») (аттестат № RA.RU.21АК06 от 19.01.2016); Акта о результатах анализа состояния производства сертифицируемой продукции № 151-А/18 от 10.10.2018 Органа по сертификации взрывозащищенного и рудничного оборудования (ОС ЦСВЭ) Общества с ограниченной ответственностью «Центр по сертификации взрывозащищенного и рудничного оборудования» (ООО «НАНИО ЦСВЭ») (аттестат № RA.RU.11AA87 выдан 20.07.2015). Схема сертификации – 1с.

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ
Перечень стандартов – см. приложение, бланк № 0550183.
Условия и срок хранения указаны в технической документации.
Назначенный срок службы – 15 лет.

СРОК ДЕЙСТВИЯ С 30.11.2018 ПО 29.11.2023 ВКЛЮЧИТЕЛЬНО

М.П.

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Эксперт (эксперт-аудитор) (эксперты (эксперты-аудиторы)) (подпись) Мозеров Валентин Алексеевич (инициалы, фамилия)

Бланк изготовлен ЗАО "ОПЦИОН" www.opcion.ru (лицензия № 05-05-09/003 ФНС РФ) тел. (495) 726-4742, Москва, 2013

ТАМОЖЕННЫЙ СОЮЗ

ПРИЛОЖЕНИЕ

К СЕРТИФИКАТУ СООТВЕТСТВИЯ № ТС **RU C-DE.AA87.B.01278 Лист 1**

Серия RU № 0550180

1. НАЗНАЧЕНИЕ И ОБЛАСТЬ ПРИМЕНЕНИЯ

Позиционеры типов 3730-01, 3730-11, 3730-31, 3730-6-113, 3730-08, 3730-18, 3730-38, 3730-6-813, 3730-6-213 с электропреобразователем (барьером) типа 3770-1 (далее – позиционеры) предназначены для преобразования электрического входного сигнала в пропорциональный пневматический выходной сигнал и выдачи токового или цифрового сигнала положения клапана.

Область применения – взрывоопасные зоны помещений и наружных установок, а также зоны, опасные по воспламенению горючей пыли, согласно Ex-маркировке, ГОСТ IEC 60079-14-2013, регламентирующим применение электрооборудования во взрывоопасных средах.

2. ОСНОВНЫЕ ТЕХНИЧЕСКИЕ ДАННЫЕ

2.1. Ex-маркировка:	
- позиционеры типов 3730-01	1Ex ia IIC T6…T4 Gb Ex ia IIIC T80°C Db или Ex tb IIIC T80°C Db
- позиционеры типов 3730-08	2Ex nA II T6…T4 Gc X Ex tc IIIC T80°C Dc X
- позиционеры типов 3730-11	1Ex ia IIC T6…T4 Gb Ex ia IIIC T80°C Db или Ex tb IIIC T80°C Db
- позиционеры типов 3730-18	2Ex nA IIC T6…T4 Gc X Ex tc IIIC T80°C Dc X
- позиционеры типов 3730-31	1Ex ia IIC T6…T4 Gb Ex ia IIIC T80°C Db или Ex tb IIIC T80°C Db
- позиционеры типов 3730-38	2Ex ic IIC T6…T4 Gc или 2Ex nA IIC T6…T4 Gc X Ex tc IIIC T80°C Dc X
- позиционеры типов 3730-6-113	1Ex ia IIC T6…T4 Gb Ex ia IIIC T80°C Db или Ex tb IIIC T80°C Db
3730-6-213 с электропреобразователем (барьером) типа 3770-1	1Ex d [ia] IIC T6…T4 Gb X Ex tb IIIC T80°C Db X
- позиционеры типов 3730-6-813	2Ex nA IIC T6…T4 Gc X 2Ex ic IIC T6…T4 Gc или Ex tc IIIC T80°C Dc
2.2. Диапазон температур окружающей среды, °C: - позиционеры типов 3730-6-113, 3730-6-213:	
для Ii = 52мА	от минус 55 до +45(T6)/+60(T5)/+75(T4)
для Ii = 25мА	от минус 55 до +60(T6)/+80(T5)/+80(T4)
- позиционеры типов 3730-1	от минус 40 до +50(T6)/+70(T5)/+80(T4)
- позиционеры типов 3730-11:	
для I_i = 52мА	от минус 40 до +45(T6)/+60(T5)/+75(T4)
для I_i = 25мА	от минус 40 до +60(T6)/+80(T5)/+80(T4)
- позиционеры типов 3730-31:	
для Ii = 52мА	от минус 55 до +45(T6)/+60(T5)/+75(T4)
для Ii = 25мА	от минус 55 до +60(T6)/+80(T5)/+80(T4)
- позиционеры типов 3730-08	от минус 40 до +50(T6)/+70(T5)/+80(T4)
- позиционеры типов 3730-18	от минус 40 до +60(T6)/+70(T5)/+80(T4)
- позиционеры типов 3730-38	от минус 55 до +60(T6)/+70(T5)/+80(T4)
- позиционеры типов 3730-6-813:	
для Ii = 52мА	от минус 55 до +45(T6)/+60(T5)/+75(T4)
для Ii = 25мА	от минус 55 до +60(T6)/+80(T5)/+80(T4)
- электропреобразователь типа 3770-1	от минус 45 до +60
2.3. Степень защиты от внешних воздействий: - позиционеры с Ex-маркировкой 2Ex nA II T6…T4 Gc X - все остальные позиционеры	не ниже IP54 IP65, IP66

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ТАМОЖЕННЫЙ СОЮЗ

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2.4. Входные и выходные искробезопасные параметры позиционеров с Ex-маркировкой 1Ex ia IIC T6…T4 Gb, Ex ia IIIC T80°C Db:

Типы позиционеров	Клеммы	Входные искробезопасные параметры					Выходные искробезопасные параметры				
		U_i* В	I_i* мА	P_i* Вт	L_i, мкГн	C_i, нФ	U_o, В	I_o, мА	P_o, мВт	L_o, мГн	C_o, нФ
3730-6-113,	11/12	28/32	115/87	1	0	5,3	-	-	-	-	-
3730-6-213	31/32	28/32	115/87,5	1	0	5,3	-	-	-	-	-
		30	100	-	0	56,3	-	-	-	-	-
		30	100	1	0	5,3	-	-	-	-	-
	41/42	16	52/25	0,169/0,064	100	30	-	-	-	-	-
	41/42 и 51/52	20	60	0,25	0	5,3	-	-	-	-	-
	81/82	28/32	115/87,5	-	0	5,3	-	-	-	-	-
	83/84	20	60	0,25	0	5,3	-	-	-	-	-
	Интерфейс SSP	20	60	0,2	0	0	7,88	69,2	137	10	650
	Датчик положения	-	-	-	370	66	7,88	13,2	27	10	1000
3730-01	11/12	28	115	1	0	5,3	-	-	-	-	-
3730-11	11/12	28	115	1	0	6	-	-	-	-	-
	44/45	16	52/25	0,169/0,064	100	30	-	-	-	-	-
	41/42 и 51/52	20	60	0,25	0	16	-	-	-	-	-
3730-31	11/12	28	115	1	0	35	-	-	-	-	-
	31/32	28	115	1	0	5,3	-	-	-	-	-
		30	100	0,25	0	56,3	-	-	-	-	-
		30	100	-	0	5,3	-	-	-	-	-
	41/42	16	52/25	0,169/0,064	100	30	-	-	-	-	-
	41/42 и 51/52	20	60	0,25	0	5,3	-	-	-	-	-
	81/82	28	115	-	0	5,3	-	-	-	-	-
	83/84	20	60	0,25	0	5,3	-	-	-	-	-
	Интерфейс BU	16	25	0,064	0	0	7,88	61,8	120	10	650
	Датчик положения	-	-	-	370	730	7,88	61	120	10	660

2.5. Входные и выходные искробезопасные параметры позиционеров с Ex-маркировкой 2Ex ic IIC T6…T4 Gc X, Ex ic IIIC T80°C Dc X

Типы позиционеров	Клеммы	Входные искробезопасные параметры					Выходные искробезопасные параметры				
		U_i* В	I_i* мА	P_i* Вт	L_i, мкГн	C_i, нФ	U_o, В	I_o, мА	P_o, мВт	L_o, мГн	C_o, нФ
3730-08	11/12	28	115	1	0	5,3	-	-	-	-	-
		28	115	1	0	5,3	-	-	-	-	-
3730-18	11/12	28	115	1	0	6	-	-	-	-	-
	44/45	20	52/25	0,169/0,064	100	30	-	-	-	-	-
	41/42 и 51/52	20	60	0,25	0	16	-	-	-	-	-
3730-38	11/12	30	100	1	0	35	-	-	-	-	-
	31/32	28/30	115/100	1	0	5,3	-	-	-	-	-
		30	100	0,25	0	56,3	-	-	-	-	-
		-	-	-	0	5,3	-	-	-	-	-
	41/42	20	52/25	0,169/0,064	100	30	-	-	-	-	-
	41/42 и 51/52	20	60	0,4	0	5,3	-	-	-	-	-
	81/82	30	100	-	0	5,3	-	-	-	-	-
	83/84	20	60	0,4	0	5,3	-	-	-	-	-
	Интерфейс BU	20	25	0,064	0	0	7,88	62	120	10	650
	Датчик положения	-	-	-	370	730	7,88	61	120	10	660
3730-6-813	11/12	32	132	1,2	0	5,3	-	-	-	-	-
	31/32	32	132	1	0	56,3	-	-	-	-	-
	41/42	20	52/25	0,169/0,064	100	30	-	-	-	-	-
	41/42 и 51/52	20	60	0,4	0	5,3	-	-	-	-	-
	81/82	32	132	-	0	5,3	-	-	-	-	-
	83/84	20	60	0,4	0	5,3	-	-	-	-	-
	Интерфейс SSP	20	60	0,2	0	5,3	-	-	-	-	-
	Датчик положения	7,88	61	0,12	10000	1000	-	-	-	-	-

* конкретные значения U_i*, I_i* определяются из максимально допустимой входной мощности P_i* и не могут воздействовать на вход позиционеров одновременно.

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ТАМОЖЕННЫЙ СОЮЗ

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2.6. Электрические параметры позиционеров с Ex-маркировкой 2Ex nA IIC T6…T4 Gc X

Цепь	Клеммы	Номинальное напряжение постоянного тока U_N, В	Ток, мА
	11/12	-	4…20
Датчик положения	31/32	-	4…20
Концевой датчик	41/42	8	8
Программное обеспечение	41/42 и 51/52	8	8
Магнитный клапан	81/82	6…24	-
Индикация ошибок	83/84	8	8
Датчик положения (оммический)	-	6…30	-

2.7. Электрические параметры позиционеров 3730-6-213 с электропреобразователем (барьером) типа 3770-1 с Ex-маркировкой 1Ex d [ia] IIC/IIB T6 Gb X, Ex tb IIIC T80°C Db X:	
- максимальное напряжение переменного тока U_m, В	250
- номинальный ток, мА	80
- выходной сигнал	4-20 мА

2.8. Выходные искробезопасные параметры электропреобразователя типа 3770-1:

Цепь	Клеммы	U_o, В	I_o, мА	P_o, мВт	L_o, мГн	C_o, мкФ
Канал 1	+/-	17,2	110	473	3	360
Канал 2, 3	+/-	12,6	49	154	15	1,15

3. ОПИСАНИЕ КОНСТРУКЦИИ И ОБЕСПЕЧЕНИЯ ВЗРЫВОЗАЩИЩЕННОСТИ ИЗДЕЛИЙ

Позиционеры типов 3730-6-113, 3730-6-213, 3730-6-813 выполнены в прямоугольном корпусе, изготовленного из нержавеющей стали или из алюминиевого сплава с содержанием магния, цинка и циркония менее 7,5%. На одной боковой стороне поверхности корпуса имеются отверстия под кабельные вводы, на другой – фитинги пневматической системы. Внутри корпусов позиционеров размещены электронные платы схем управления. На корпусе имеется заземляющий зажим и маркировочная табличка.

Позиционеры типов 3730-01, 3730-11, 3730-31, 3730-08, 3730-18, 3730-38 выполнены в виде единого блока, состоящего из корпуса и крышки. Внутри корпуса расположена электронная плата I/P преобразователя, элементы для подключения электрических и пневматических линий. На корпусе имеются отверстия под кабельные вводы.

Электропреобразователь типа 3770-1 представляет собой электронную схему многоканального барьера искрозащиты, помещенную в цилиндрический корпус из алюминиевого сплава с содержанием магния, цинка и циркония менее 7,5%. На корпусе имеются отверстия под кабельные вводы, наружный и внутренний заземляющие зажимы.

Взрывозащищенность позиционеров обеспечивается выполнением требований стандартов: ГОСТ 31610.11-2014 (IEC 60079-11:2011). Взрывоопасные среды. Часть 11. Оборудование с видом взрывозащиты искробезопасная электрическая цепь «i», ГОСТ 31610.15-2012/МЭК 60079-15:2005. Электрооборудование для взрывоопасных газовых сред. Часть 15. Конструкция, испытания и маркировка электрооборудования с видом защиты «n». ГОСТ 31610.0-2014 (IEC 60079-0:2011). Взрывоопасные среды. Часть 0. Оборудование. Общие требования. ГОСТ IEC 60079-1-2011 Взрывоопасные среды. Часть 1. Оборудование с видом взрывозащиты «взрывонепроницаемые оболочки «d», ГОСТ IEC 60079-31-2010 Взрывоопасные среды. Часть 31. Оборудование с защитой от воспламенения пыли оболочками «t» согласно Ex-маркировке, приведенной в п.2.1.

4. МАРКИРОВКА

Ex-маркировка, наносимая на позиционеры, должна включать следующие данные:

- товарный знак или наименование предприятия - изготовителя;
- тип изделия;
- заводской номер;
- Ex-маркировку;
- специальный знак взрывобезопасности;
- предупредительные надписи;
- наименование или знак центра по сертификации и номер сертификата соответствия;

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ТАМОЖЕННЫЙ СОЮЗ

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5. СПЕЦИАЛЬНЫЕ УСЛОВИЯ ПРИМЕНЕНИЯ

Знак X, стоящий после Ex-маркировки, означает, что при эксплуатации позиционеров необходимо соблюдать следующие специальные" условия:

5.1. Позиционеры типа 3730-38 с Ex-маркировкой 2Ex nA IIC T6…T4 Gc X подключаются к цепи питания датчика положения через предохранитель с номинальным током $I_N \leq 40$ мА.

5.2. Позиционеры типов 3730-08, 3730-18 с Ex-маркировкой 2Ex nA IIC T6…T4 Gc X подключаются к сигнальным цепям через предохранитель с номинальным током $I_N \leq 80$ мА.

5.3. Позиционеры типа 3730-6-813 с Ex-маркировкой 2Ex nA IIC T6…T4 Gc X подключаются к сигнальным цепям и цепям питания датчика положения через предохранитель с номинальным током $I_N \leq 80$ мА, а цепь программного интерфейсного адаптера через предохранитель с номинальным током $I_N \leq 40$ мА.

5.4. Предохранители, указанные в п. 5.1, 5.2, 5.3, устанавливаются вне взрывоопасной зоны.

5.5. Подсоединение внешних электрических цепей к позиционерам с Ex-маркировкой 1Ex d [ia] IIC T6 Gb X, Ex tb IIIC T80°C Db X необходимо осуществлять через кабельные вводы, имеющие сертификат соответствия требованиям ТР ТС012/2011 на электрооборудование с видом взрывозащиты "d" для взрывоопасной газовой смеси категории IIC.

5.6. Не используемые отверстия под кабельные вводы позиционеров с Ex-маркировкой 1Ex d [ia] IIC T6 Gb X, Ex tb IIIC T80°C Db X закрываются заглушками, имеющими сертификат соответствия требованиям ТР ТС012/2011.

Специальные условия применения, обозначенные знаком X, должны быть отражены в сопроводительной документации, подлежащей обязательной поставке с каждым позиционером.

Внесение изменений в конструкцию позиционером возможно только по согласованию с НАНИО ЦСВЭ в соответствии с требованиями ТР ТС 012/2011.

Инспекционный контроль – 2019 г., 2020 г., 2021 г., 2022 г.

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16 Appendix A (configuration instructions)

16.1 Parameters and functions

<table>
<tr><th>Code no.</th><th>Parameter – Readings/ values [default setting]</th><th>Description</th></tr>
<tr><td colspan="3">Codes marked with an asterisk (*) must be enabled with Code 3 prior to configuration.</td></tr>
<tr><td>0</td><td>Operating mode
[MAN] Manual mode
AUtO Automatic mode
SAFE Fail-safe position
ESC Cancel</td><td>Switchover from automatic to manual mode is bumpless.
In fail-safe position, the S icon is displayed.
In MAN and AUtO mode, the system deviation is represented by the bar graph elements.
The reading indicates the valve position or angle of rotation in % when the positioner is initialized. If the positioner is not initialized, the position of the lever in relation to the longitudinal axis is displayed in degrees (°).</td></tr>
<tr><td>1</td><td>Manual w
[0] to 100 % of the nominal range</td><td>Adjust the manual set point with the rotary pushbutton. The current travel/angle is displayed in % when the positioner is initialized. If the positioner is not initialized, the position of the lever in relation to the longitudinal axis is indicated in degrees (°).
It can only be selected when Code 0 = MAN</td></tr>
<tr><td>2</td><td>Reading direction
1234, ɈƐƮ1 , ESC</td><td>The reading direction of the display is turned by 180°.</td></tr>
<tr><td>3</td><td>Enable configuration
[No], YES, ESC</td><td>Enables changing of data (automatically deactivated when the rotary pushbutton has not been operated for 120 s). HART blinks on the display when the on-site operation is locked over HART® communication. Codes marked with an asterisk (*) can only be read and not overwritten. Similarly, codes can only read over the SSP interface.</td></tr>
<tr><td>4*</td><td>Pin position
[No], 17, 25, 35, 50, 70, 100, 200, 300 mm, 90° with rotary actuators, ESC
If you select a pin position in Code 4 that is too small, the positioner switches to SAFE mode for reasons of safety.</td><td>Follower pin must be mounted in the proper position depending on the valve travel/opening angle.
Pin position must be entered for nominal (NOM) or substitute (SUb) initialization.
<table>
<tr><th>Pin position Code 4</th><th>Standard Code 5</th><th>Adjustment range Code 5</th></tr>
<tr><td>17</td><td>7.5</td><td>3.6 to 17.7</td></tr>
<tr><td>25</td><td>7.5</td><td>5.0 to 25.0</td></tr>
<tr><td>35</td><td>15.0</td><td>7.0 to 35.4</td></tr>
<tr><td>50</td><td>30.0</td><td>10.0 to 50.0</td></tr>
<tr><td>70</td><td>40.0</td><td>14.0 to 70.7</td></tr>
<tr><td>100</td><td>60.0</td><td>20.0 to 100.0</td></tr>
<tr><td>200</td><td>120.0</td><td>40.0 to 200.0</td></tr>
<tr><td>90°</td><td>90.0</td><td>24.0 to 100.0</td></tr>
</table></td></tr>
</table>

Code no.	**Parameter** – Readings/ values [default setting]	Description
5*	**Nominal range** mm or angle °, ESC	Nominal valve travel or opening angle must be entered for nominal (NOM) or substitute (SUb) initialization. The possible adjustment range depends on the pin position from the table for Code 4. Indicates maximum travel/angle reached during initialization after initialization has been successfully completed.
6*	**Init mode** [MAX] Maximum range NOM Nominal range MAN Manual setting SUb Emergency mode ZP Zero calibration ESC Cancel	Select the initialization mode MAX: Travel/angle of the closure member from the CLOSED position to the opposite stop in the actuator. NOM: Travel/angle of the closure member measured from the CLOSED position to the indicated OPEN position. MAN: Manually selected range SUb: Substitute calibration (without initialization)
7*	**w/x** [↗↗] Increasing/ increasing ↗↘ Increasing/ decreasing ESC	Direction of action of the set point w in relation to the travel/angle x Automatic adaptation: AIR TO OPEN: On completing initialization, the direction of action remains increasing/increasing (↗↗). A globe valve opens as the set point increases. AIR TO CLOSE: On completing initialization, the direction of action changes to increasing/decreasing (↗↘). A globe valve closes as the set point increases.
8*	**Travel/angle range start (lower x-range value)** [0.0] to 80.0 % of the nominal range, ESC *Specified in mm or angle ° provided Code 4 is activated.*	Lower range value for travel/angle in nominal or operating range The **operating range** is the actual travel/angle of the valve and is limited by the lower travel/angle range value (Code 8) and the upper travel/angle range value (Code 9). Usually, the operating range and the nominal range are identical. The nominal range can be limited to the operating range by the lower and upper x-range values. The value is displayed or must be entered. The characteristic is adapted. See also the example in Code 9.

Code no.	**Parameter** – Readings/ values [default setting]	Description
9*	**Travel/angle range end (upper x-range value)** 20.0 to [100.0 %] of the nominal range, ESC *Specified in mm or angle ° provided Code 4 is activated.*	Upper range value for travel/angle in nominal or operating range The value is displayed or must be entered. The characteristic is adapted. **Example:** The operating range is modified, for example to limit the range of a control valve which has been sized too large. For this function, the entire resolution range of the set point is converted to the new limits. 0 % on the display corresponds to the adjusted lower limit and 100 % to the adjusted upper limit.
10*	**Travel/angle lower limit (lower x-limit)** 0.0 to 49.9 % of the operating range, [No], ESC	Limits travel/opening angle to the entered value (lower limit). The characteristic is not adapted. The characteristic is not adapted to the reduced range. See also the example in Code 11.
11*	**Travel/angle upper limit (upper x-limit)** 50.0 to 120.0 %, [100.0 %] of the operating range, No, ESC	Limits travel/angle to the entered value (upper limit). The characteristic is not adapted. **Example:** In some applications, it is better to limit the valve travel, e.g. if a certain minimum medium flow is required or a maximum flow must not be reached. The lower limit must be adjusted with Code 10 and the upper limit with Code 11. If a tight-closing function has been set up, it has priority over the travel limitation. When set to No, the valve can be opened past the rated travel with a set point outside of the 0 to 100 % range.
12*	**w-start** [0.0] to 75.0 % of the set point range, ESC	The lower set point range value must be lower than upper range value (w-end), 0 % = 4 mA. The set point range is the difference between w-end and w-start and must be $\Delta w \geq 25$ % = 4 mA. When the set point range of 0 to 100 % = 4 to 20 mA, the valve must move through its entire operating range from 0 to 100 % travel/angle of rotation. In split-range operation, the valves operate with smaller set points. The control signal of the control unit to control two valves is divided such, for instance, that the valves move through their full travel/angle of rotation at only half the input signal (first valve set to 0 to 50 % = 4 to 12 mA and second valve set to 50 to 100 % =12 to 20 mA).

Code no.	**Parameter** – Readings/ values [default setting]	Description
13*	**w-end** 25.0 to [100.0 %] of the set point range, ESC	The upper range value of the set point range must be greater than lower range value (w-start). 100.0 % = 20 mA
14*	**Set point cutoff decrease** 0.0 to 49.9 %, [1.0 %] of the span adjusted in Code 12/13, No, ESC	If the set point w reaches up to the entered percentage at the final value that causes the valve to close, the actuator is immediately completely vented (with AIR TO OPEN) or filled with air (with AIR TO CLOSE). This action always lead to maximum tight-closing of the valve. Codes 14/15 have priority over Codes 8/9/10/11. Codes 21/22 have priority over Codes 14/15.
15*	**Set point cutoff increase** 50.0 to 100.0 % of the span adjusted in Code 12/13, [No], ESC	If the set point w reaches up to the entered percentage at the final value that causes the valve to open, the actuator is immediately filled with air (with AIR TO OPEN) or completely vented (with AIR TO CLOSE). This action always leads to the valve being completely opened. Codes 14/15 have priority over Codes 8/9/10/11. Codes 21/22 have priority over Codes 14/15. **Example:** set the cutoff to 99 % for three-way valves.
16*	**Pressure limit** 1.4 bar, 2.4 bar, 3.7 bar, [No], ESC	The signal pressure to the actuator can be limited in stages. After changing a pressure limit already set, the actuator must be vented once (e.g. by selecting the fail-safe position (SAFE) over Code 0). **Do not activate pressure limitation for double-acting actuators (with fail-safe position AIR TO OPEN).**
17*	**Proportional-action coefficient K_P (level)** 0 to 17, [7], ESC	Read or change K_P **Note concerning changing the K_P and T_V levels:** During positioner initialization, the values for K_P and T_V are optimally set. If the positioner tends to overshoot impermissibly due to other disturbances, the K_P and T_V levels can be adapted accordingly after initialization. Increment T_V level until desired behavior is reached or when the maximum value of 4 is reached, the K_P level can be decreased in increments. **K_P level changes affect the set point deviation.**
18*	**Derivative-action time T_V (level)** 1, [2], 3, 4, No, ESC	Read or change T_V (see K_P level) A change of the T_V level has no effect on the system deviation.

Code no.	**Parameter** – Readings/ values [default setting]	Description
19*	**Tolerance band** 0.1 to 10.0 %, [5.0 %] of the operating range, ESC	Used for error monitoring. Determination of the tolerance band in relation to the operating range. Associated lag time (30 s) is a reset criterion. If a transit time is determined during initialization which is six times longer than 30 s, the six-fold transit time is accepted as the lag time.
20*	**Characteristic** [0] to 9, ESC	Valve characteristic selection 0 Linear 1 Equal percentage 2 Reverse equal percentage 3 SAMSON butterfly valve, linear 4 SAMSON butterfly valve, equal percentage 5 VETEC rotary plug valve, linear 6 VETEC rotary plug valve, equal percentage 7 Segmented ball valve, linear 8 Segmented ball valve, equal percentage 9 User-defined (defined over operator software) The various characteristics are listed in the Appendix.
21*	**Required transit time OPEN (w ramp open)** [0] to 240 s, ESC	Time required to move through the operating range when the valve opens. Limitation of the transit time (Code 21 and 22): For some applications it is recommendable to limit the transit time of the actuator to prevent it from engaging too fast in the running process. Code 21 has priority over Code 15. **The function is not activated when the fail-safe function or solenoid valve is triggered nor upon failure of the auxiliary power.**
22*	**Required transit time CLOSED (w ramp closed)** [0] to 240 s, ESC	Time required to move through the operating range when the valve closes. Code 22 has priority over Code 14. **The function is not activated when the fail-safe function or solenoid valve is triggered nor upon failure of the auxiliary power.**
23*	**Total valve travel** [0] to 99 · 10^7, RES, ESC Exponential reading from 9999 travel cycles onwards	Totaled full valve travel cycle Can be reset to 0 by selecting ESC. The total valve travel is saved in a non-volatile memory after every 1000 full valve travel cycle.

Code no.	**Parameter** – Readings/ values [default setting]	Description
24*	**LV total valve travel** 1000 to 99 · 10^7 [1.000000], ESC Exponential reading from 9999 travel cycles onwards	Limit value of total valve travel. If the limit is exceeded, the and icons are indicated.
25*	**Alarm mode** 0 to 3, [2], ESC	Switching mode of software limit switch alarms A1 and A2 when activated (when the positioner is initialized). 1) Explosion-protected version according to EN 60947-5-6 0: A1 ≥ 2.2 mA A2 ≤ 1.0 mA 1: A1 ≤ 1.0 mA A2 ≤ 1.0 mA 2: A1 ≥ 2.2 mA A2 ≥ 2.2 mA 3: A1 ≤ 1.0 mA A2 ≥ 2.2 mA 2) Version without explosion protection 0: A1 R = 348 Ω A2 Non-conducting 1: A1 Non-conducting A2 Non-conducting 2: A1 R = 348 Ω A2 R = 348 Ω 3: A1 Non-conducting A2 R = 348 Ω When a positioner has not been initialized, the software limit switches always register the signal as in the state of no response. If there is no mA signal at the terminals 11/12, the software limit switches both switch to ≤ 1.0 mA (Ex) or non-conducting (without explosion protection). **Note: The fault alarm output always switches to ≤1.0 mA/ non-conducting in case of a fault; it has ≥2.2 mA/R = 348 Ω when there is no fault.**
26*	**Limit A1** 0.0 to 100.0 %, [2.0 %] of the operating range, No, ESC	Alarm A1 responds when the value falls below the limit. Software limit value A1 is displayed or can be changed in relation to the operating range. The setting has no effect when an inductive limit switch is installed.
27*	**Limit A2** 0.0 to 100.0 %, [98.0 %] of the operating range, No, ESC	Alarm A2 responds when the value exceeds the limit. Software limit value A2 is displayed or can be changed in relation to the operating range.

Code no.	**Parameter** – Readings/ values [default setting]	Description
28*	**Alarm test** Reading direction: Standard / Turned [No] / [No] RUN 1 / 1 RUN RUN 2 / 2 RUN RUN 3 / 3 RUN ESC / ESC	Test of software limit switch alarms A1 and A2 as well as of fault alarm contact A3. If the test is activated, the contact is switched five times. RUN 1/1 RUN: software limit switch A1 to ≥2.2 mA RUN 2/2 RUN: software limit switch A2 to ≥2.2 mA RUN 3/3 RUN: fault alarm contact A3 to ≤1.0 mA
29*	**Position transmitter x/ix** [3] [↗↗], ↗↘, ESC	Operating direction of the position transmitter: it indicates assignment between travel/angle position and output signal i based on CLOSED position. The operating range (see Code 8) of the valve is represented by the 4 to 20 mA signal. Values exceeding or falling below the limits 2.4 and 21.6 mA can be indicated. When the positioner has not been mounted (set point smaller than 3.6 mA), the signal is 0.9 mA and 3.8 mA the positioner has not been initialized. When YES is set in Code 32, the position transmitter issues the value as per Code 30 during initialization or zero calibration. When No is set in Code 32, 4 mA is issued during a running calibration.
30*	**Fault alarm ix** [3] HI, LO, [No], ESC	Select if and how alarms that cause the fault alarm contact to be switched are also indicated by the position transmitter. HI ix =21.6 ±0.1 mA or LO ix =2.4 ±0.1 mA
31*	**Position transmitter test** [3] –10.0 to 110.0 % of the operating range, [default value is last indicated value of the position transmitter], ESC	Testing the position transmitter. Values can be entered in relation to the operating range. The momentary valve position is used in initialized positioners locally as the start value (bumpless changeover to the test mode). When testing by software, the entered simulation value is issued as the position feedback signal for 30 seconds.
	[3] Analog position transmitter: Code 29/30/31 can only be selected if the position transmitter (optional) is installed.	

Code no.	**Parameter** – Readings/ values [default setting]	Description
32*	**Error message in case of 'Function check' condensed state** [YES], No, ESC	YES: Error message also in case of 'Function check' condensed state No: 'Function check' condensed state does not cause an error message to be issued Regardless of the condensed state, the fault alarm output always switches when the error codes 57, 58, 60, 62 and 64 to 70, 76 are issued.
33*	**Error message in case of condensed state 'Maintenance required'** [YES], No, ESC	YES: Error message only in case of condensed state 'Maintenance alarm' and 'Maintenance required' No: Error message only in case of condensed state 'Maintenance alarm' Regardless of the condensed state, the fault alarm output always switches when the error codes 57, 58, 60, 62 and 64 to 70, 76 are issued.
34*	**Closing direction** CL, [CCL], ESC	CL: Clockwise CCL: Counterclockwise Direction of rotation to reach the valve's CLOSED position (view onto rotary switch with positioner cover open). Needs only be entered in SUb initialization mode (Code 6).
35*	**Blocking position** [0.0] mm/° /%, ESC	Enter the blocking position (distance to CLOSED position) Only necessary with SUb initialization mode.
36*	**Reset** [No], Std, diAG, ESC	Std: Resets all parameters and diagnosis data to their default settings. After a reset, the positioner must be re-initialized. diAG: Resets diagnosis data only. Plotted reference graphs and logs remain saved. The positioner does not need to be re-initialized.
37*	**Position transmitter** No, YES	Read only Indicates whether an optional position transmitter is installed.
38*	**Inductive alarm** [No], YES, ESC	Indicates whether the inductive limit switch option is installed or not.

Code no.	**Parameter** – Readings/ values [default setting]	Description
39	**Set point deviation e info** –99.9 to 99.9 %	Read only Indicates the deviation from the target position (e = w – x).
40	**Transit time Open info** [0] to 240 s	Read only Minimum opening time determined during initialization.
41	**Transit time Closed info** [0] to 240 s	Read only Minimum closing time determined during initialization.
42	**Auto-w info** 0.0 to 100.0 % of the span	Read only Indicates the applied automatic set point with corresponding 4 to 20 mA signal.
43	**Firmware info**	Read only Indicates the positioner type and current firmware version in alternating sequence.
44	**y info** [0] to 100 %, 0P, MAX, – – –	Read only Indicates the control signal y in % in relation to the travel range determined during initialization. MAX: The positioner builds up its maximum output pressure, see description in Code 14 and 15. 0P: The positioner vents completely, see description in Code 14 and 15. – – –: The positioner is not initialized.
45	**Solenoid valve info** YES, HIGH/LOW, No	Read only Indicates whether a solenoid valve is installed or not. If a voltage supply is connected at the terminals of the installed solenoid valve, YES and HIGH appear on the display in alternating sequence. If a voltage supply is not connected (actuator vented, fail-safe position indicated on the display by the S icon), YES and LOW appear on the display in alternating sequence.
46*	**Polling address** [0] to 63, ESC	Select bus address
47*	**Write protection HART®** YES, [No], ESC	When write protection is active, device data can be read, but not overwritten over HART® communication.
48* **49***	**Diagnostic parameters ▶ EB 8389**	

16.1.1 Error codes

Initialization errors

Error codes – Recommended action		Condensed state message active, when prompted, *Err* appears. When fault alarms exist, they are displayed here.
50	**x > permissible range**	Value of measuring signal too high or too low; the lever operates near its mechanical stops. • Pin not mounted properly • Bracket slipped in case of NAMUR attachment or positioner is off center. • Follower plate not mounted properly.
	Status classification	[Maintenance required]
	Recommended action	Check attachment and pin position, set operating mode from SAFE to MAN and re-initialize the positioner.
51	**Δx < permissible range**	Insufficient measuring span of the lever. • Pin not mounted properly • Wrong lever An angle of rotation smaller than 16° at the positioner shaft only generates an alarm. An angle below 9° leads to the initialization being canceled.
	Status classification	[Maintenance required]
	Recommended action	Check attachment and re-initialize the positioner.
52	**Attachment**	• Invalid positioner attachment • Rated travel/angle (Code 5) could not be achieved during NOM initialization (no tolerance downwards permissible). • Mechanical or pneumatic fault, e.g. wrong lever selected or supply pressure too low to move to the required position.
	Status classification	[Maintenance required]
	Recommended action	Check attachment and supply pressure. Re-initialize the positioner. Under certain circumstances, it may be possible to check the maximum travel/ angle by entering the actual pin position and then performing a MAX initialization. After initialization has been completed, the Code 5 indicates the maximum achieved travel or angle.

Error codes – Recommended action		Condensed state message active, when prompted, *Err* appears. When fault alarms exist, they are displayed here.
53	**Initialization time exceeded (Init time >)**	Initialization takes too long. The positioner returns to the previous operating mode. • No pressure in supply line or pneumatic leakage • Supply air failure during initialization
	Status classification	[Maintenance required]
	Recommended action	Check attachment and supply air line. Re-initialize the positioner.
54	**Initialization – solenoid valve**	1) A solenoid valve is installed (Code 45 = YES) and has not been connected or not properly. As a result, actuator pressure cannot build up. The alarm is generated when you attempt to initialize the positioner. 2) If you attempt to initialize the positioner from the fail-safe position (SAFE).
	Status classification	[Maintenance required]
	Recommended action	1) Check connection and supply voltage of the solenoid valve (Code 45 High/Low). 2) Set the MAN mode in Code 0. Re-initialize the positioner.
55	**Transit time too short (transit time <)**	Actuator transit times detected during initialization are so short that optimal positioner tuning is impossible.
	Status classification	[Maintenance required]
	Recommended action	Check the volume restriction setting as described in the 'Start-up and configuration' chapter. Re-initialize the positioner.
56	**Pin position**	Initialization canceled because selected NOM and SUB initialization modes require the pin position to be entered.
	Status classification	[Maintenance required]
	Recommended action	Enter pin position over Code 4 and rated travel/angle over Code 5. Re-initialize the positioner.

Operational errors

Error codes – Recommended action		Condensed state message active, when prompted, ***Err*** appears. When fault alarms exist, they are displayed here.
57	**Control loop** Additional indication at the fault alarm contact	Control loop error, the valve no longer follows the controlled variable within tolerable times (tolerance band alarm Code 19). • Actuator is blocked. • Positioner attachment has shifted subsequently. • Insufficient supply pressure
	Status classification	[Maintenance required]
	Recommended action	• Check attachment. • Check supply pressure.
58	**Zero point**	• Mounting arrangement or linkage has slipped. • Valve trim, particularly with soft seat, is worn.
	Status classification	[Maintenance required]
	Recommended action	• Check valve and positioner attachment. • Calibrate zero. We recommend to re-initialize the positioner if zero deviates by more than 5 %.
59	**Inconsistent data memory**	The error is detected by automatic monitoring and corrected automatically.
	Status classification	Maintenance alarm (cannot be classified)
60	**Internal device error** Additional indication at the fault alarm contact	The positioner goes to the fail-safe position (SAFE).
	Status classification	Maintenance alarm (cannot be classified)
	Recommended action	Return positioner to SAMSON for repair.

Error codes – Recommended action		Condensed state message active, when prompted, ***Err*** appears. When fault alarms exist, they are displayed here.
61	**KP too low**	Proportional-action coefficient Kp level lower than 3 was detected during initialization. ***Note:*** *A Kp level < 3 does not cause the initialization process to be canceled.*
	Status classification	[Maintenance required]
	Recommended action	• Activate volume restriction in positioner output. • Increase the bypass restriction setting of booster (if installed).

Hardware errors

Error codes – Recommended action		Condensed state message active, when prompted, *Err* appears. When fault alarms exist, they are displayed here.
62	**x signal**	Actuator's measured value recording failed. The conductive plastic element is defective. The device continues functioning in emergency mode but it must be replaced as quickly as possible. The emergency mode on the display is indicated by a blinking closed-loop operation icon and 4 dashes instead of the position reading. ***Note on the open-loop operation:*** *If the measuring system has failed, the positioner is still in a reliable state. The positioner switches to emergency mode where the position cannot be accurately controlled anymore. However, the positioner continues operation according to its set point so that the process remains in a safe state.*
	Status classification	[Maintenance demanded]
	Recommended action	Return device to SAMSON for repair.
63	**w too low**	The set point is considerably smaller than 4 mA (0 %). This happens when the positioner's power supply does not meet the standard requirements. This state is indicated on the positioner display by *LOW* blinking.
	Status classification	[No message]
	Recommended action	Check set point. If necessary, adjust the current source's lower limit so that no values lower than 4 mA can be applied.

Error codes – Recommended action		Condensed state message active, when prompted, *Err* appears. When fault alarms exist, they are displayed here.
64	**i/p converter (y)**	Current circuit of i/p converter interrupted.
	Status classification	Maintenance alarm (cannot be classified)
	Recommended action	Cannot be remedied. Return device to SAMSON for repair.

Error appendix

Error codes – Recommended action		Condensed state message active, when prompted, *Err* appears. When fault alarms exist, they are displayed here.
65	**Hardware** Additional indication at the fault alarm contact	Initialization key jammed (firmware version R 1.51 and higher) A hardware error has occurred. The positioner changes to the fail-safe position (SAFE).
	Status classification	[Maintenance alarm]
	Recommended action	Confirm error and return to automatic mode or perform a reset and re-initialize the positioner. In the problem still persists, return device to SAMSON for repair.
66	**Data memory** Additional indication at the fault alarm contact	No more data can be written to the memory, e.g. because written data deviate from read data. The valve moves to the fail-safe position.
	Status classification	Maintenance alarm (cannot be classified)
	Recommended action	Return device to SAMSON for repair.
67	**Check calculation** Additional indication at the fault alarm contact	Hardware controller monitored by test calculation.
	Status classification	[Maintenance alarm]
	Recommended action	Confirm error. If this is not possible, return the device to SAMSON for repair.

Data errors

Error codes – Recommended action		Condensed state message active, when prompted, *Err* appears. When fault alarms exist, they are displayed here.
68	**Control parameters** Additional indication at the fault alarm contact	Error in control parameters.
	Status classification	[Maintenance required]
	Recommended action	Confirm error, perform a reset and re-initialize the positioner.

Error codes – Recommended action		Condensed state message active, when prompted, *Err* appears. When fault alarms exist, they are displayed here.
69	**Potentiometer parameters** Additional indication at the fault alarm contact	Error in digital potentiometer parameters
	Status classification	[Maintenance required]
	Recommended action	Confirm error, perform a reset and re-initialize the positioner.
70	**Calibration** Additional indication at the fault alarm contact	Error in data from production calibration. The positioner continues operation with cold start values.
	Status classification	[Maintenance required]
	Recommended action	Return device to SAMSON for repair.
71	**General parameters**	Error in parameters not critical to control operation.
	Status classification	[Maintenance required]
	Recommended action	Confirm error. Check and, if necessary, change the settings of the required parameters.
73	**Internal device error 1**	Internal device error
	Status classification	[Maintenance required]
	Recommended action	Return device to SAMSON for repair.
74	**HART® parameters**	Error in parameters not critical to control operation.
	Status classification	[Maintenance required]
	Recommended action	Confirm error. Check and, if necessary, change the settings of the required parameters.

Error codes – Recommended action		Condensed state message active, when prompted, *Err* appears. When fault alarms exist, they are displayed here.
76	**No emergency mode**	The travel measuring system of the positioner has a self-monitoring function (see Code 62). An emergency mode (open-loop control) is not available for certain actuators, such as double-acting actuators. In case of a travel sensing error, the positioner vents the output (Output 38) or A1 in double-acting actuators. During the initialization, the positioner automatically checks whether the actuator has such a function or not.
	Status classification	[No message]
	Recommended action	Merely information, confirm, if necessary. No further action required.
77	**Software loading error**	When the positioner starts operation for the first time after the PA signal has been applied, it carries out a self-test (*tEStinG* runs across the display). If the positioner loads the wrong software, the valve moves to the fail-safe position. It is not possible to make the valve leave this fail-safe position again.
	Status classification	Maintenance alarm (cannot be classified)
	Recommended action	Interrupt current signal and restart the positioner. If not successful, return device to SAMSON for repair.
78	**Option parameters**	Error in option parameters.
	Status classification	[Maintenance required]
	Recommended action	Return device to SAMSON for repair.

Diagnosis errors

Error codes – Recommended action		Condensed state message active, when prompted, *Err* appears. When fault alarms exist, they are displayed here.
79	**Diagnostic messages**	Messages generated by the extended diagnostics
	Status classification	Maintenance required (cannot be classified)
80	**Diagnostic parameters**	Error in parameters not critical to control operation.
	Status classification	Maintenance required (cannot be classified)
	Recommended action	Confirm error. Check and, if necessary, perform a new reference test.

Error codes – Recommended action		Condensed state message active, when prompted, *Err* appears. When fault alarms exist, they are displayed here.
81	**Reference graphs**	Error occurred during plotting the reference graphs for drive signal y steady-state or drive signal y hysteresis. • Reference test canceled • Reference line for drive signal y steady-state or drive signal y hysteresis was not adopted. Error messages are not yet saved in a non-volatile memory. They cannot be reset.
	Status classification	[No message]
	Recommended action	Check and, if necessary, perform a new reference test.

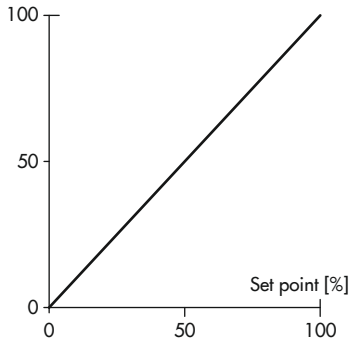
16.2 Valve characteristic selection

The characteristics that can be selected in Code 20 are shown in the following in graph form.

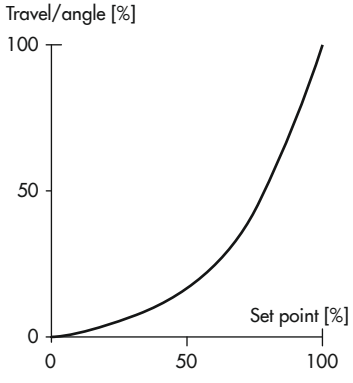
i ***Note***

A characteristic can only be defined (user-defined characteristic) using a workstation/operating software (e.g. TROVIS-VIEW).

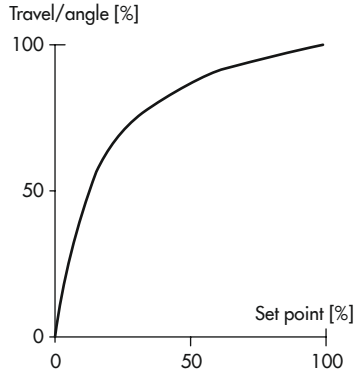
Linear (select characteristic: 0)



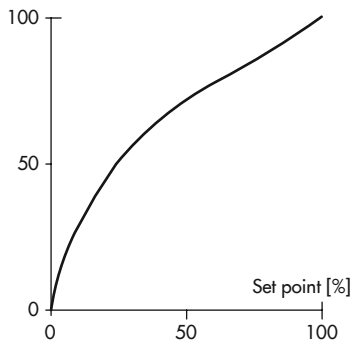
Equal percentage (select characteristic: 1)



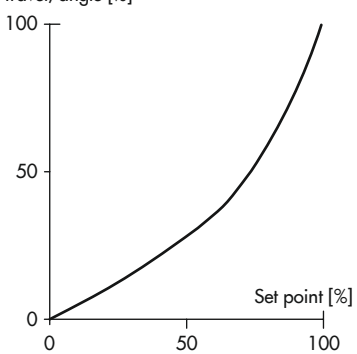
Reverse equal percentage (select characteristic: 2)



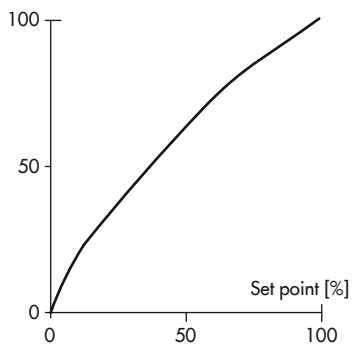
SAMSON butterfly valve linear (select characteristic: 3)



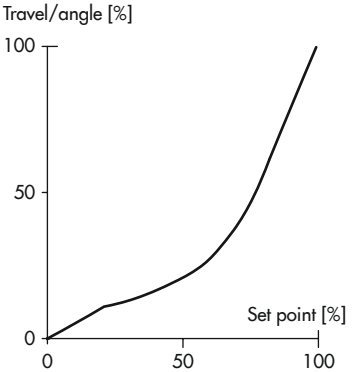
SAMSON butterfly valve equal percentage (select characteristic: 4)



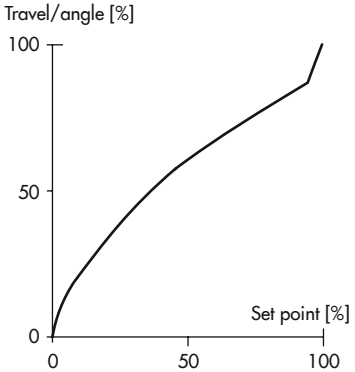
VETEC rotary plug valve linear (select characteristic: 5)



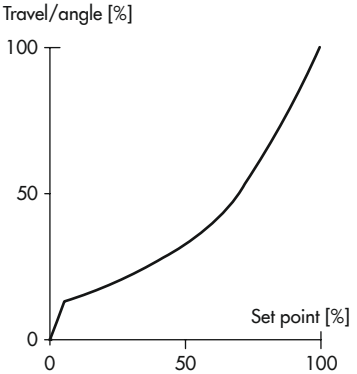
VETEC rotary plug valve equal percentage (select characteristic: 6)



Segmented valve ball linear (select characteristic: 7)



Segmented valve ball equal percentage (select characteristic: 8)



17 Appendix B

17.1 Accessories

Table 17-1: *General accessories*

Designation		Order no.
Reversing amplifier for double-acting actuators		Type 3710
M20x1.5 cable gland	Black plastic (6 to 12 mm clamping range)	8808-1011
	Blue plastic (6 to 12 mm clamping range)	8808-1012
	Nickel-plated brass (6 to 12 mm clamping range)	1890-4875
	Nickel-plated brass (10 to 14 mm clamping range)	1992-8395
	Stainless steel 1.4305 (8 to 14.5 mm clamping range)	8808-0160
Adapter M20x1.5 to ½ NPT	Powder-coated aluminum	0310-2149
	Stainless steel	1400-7114
Lever	S	0510-0522
	M	0510-0510
	L	0510-0511
	XL	0510-0512
	XXL	0510-0525
Retrofit kit for inductive limit switch 1 x SJ2-SN		1402-1770
Isolated USB interface adapter (SSP interface to USB port on a computer) including TROVIS-VIEW CD-ROM		1400-9740
TROVIS-VIEW 6661 (▶ www.samsongroup.com > SERVICE & SUPPORT > Downloads > TROVIS-VIEW)		

Table 17-2: *Direct attachment to Type 3277-5 Actuator*

Designation			Order no.
Mounting parts	Standard version for actuators 120 cm² or smaller		1400-7452
	Version compatible with paint for actuators 120 cm² or smaller		1402-0940
Accessories for actuator	Old switchover plate for Type 3277-5xxxxxx.**00** Actuator (old)		1400-6819
	New switchover plate for Type 3277-5xxxxxx.**01** Actuator (new) [1]		1400-6822
	New connecting plate for Type 3277-5xxxxxx.**01** Actuator (new) [1], G ⅛ and ⅛ NPT		1400-6823
	Old connecting plate for Type 3277-5xxxxxx.**00** Actuator (old): G ⅛		1400-6820
	Old connecting plate for Type 3277-5xxxxxx.**00** (old): ⅛ NPT		1400-6821
Accessories for positioner	Connecting plate (6)	G ¼	1400-7461
		¼ NPT	1400-7462
	Pressure gauge bracket (7)	G ¼	1400-7458
		¼ NPT	1400-7459

Designation			Order no.
Accessories for positioner	Pressure gauge mounting kit (8) up to max. 6 bar (output/supply)	Stainless steel/ brass	1402-1637
		Stainless steel/ stainless steel	1402-1638
	Pressure gauge mounting kit (8) up to max. 6 bar (without inscription)	Stainless steel/ brass	1402-1637
		Stainless steel/ stainless steel	1402-1638

1) Only new switchover and connecting plates can be used with new actuators (Index 01). Old and new plates are not interchangeable.

Table 17-3: *Direct attachment to Type 3277 Actuator*

Mounting parts/accessories		Order no.
Standard version for actuators 175, 240, 350, 355, 700, 750 cm²		1400-7453
Version compatible with paint for actuators 175, 240, 350, 355, 700, 750 cm²		1402-0941
Connection block with seals and screw	G ¼	1400-8819
	¼ NPT	1402-0901
Pressure gauge mounting kit up to max. 6 bar	Stainless steel/brass	1402-1637
	Stainless steel/stainless steel	1402-1638
Piping with screw fittings 1)		**Order no.**
Actuator (175 cm²), steel	G ¼/G ⅜	1402-0970
	¼ NPT/⅜ NPT	1402-0976
Actuator (175 cm²), stainless steel	G ¼/G ⅜	1402-0971
	¼ NPT/⅜ NPT	1402-0978
Actuator (240 cm²), steel	G ¼/G ⅜	1400-6444
	¼ NPT/⅜ NPT	1402-0911
Actuator (240 cm²), stainless steel	G ¼/G ⅜	1400-6445
	¼ NPT/⅜ NPT	1402-0912
Actuator (350 cm²), steel	G ¼/G ⅜	1400-6446
	¼ NPT/⅜ NPT	1402-0913
Actuator (350 cm²), stainless steel	G ¼/G ⅜	1400-6447
	¼ NPT/⅜ NPT	1402-0914
Actuator (355 cm²), steel	G ¼/G ⅜	1402-0972
	¼ NPT/⅜ NPT	1402-0979
Actuator (355 cm²), stainless steel	G ¼/G ⅜	1402-0973
	¼ NPT/⅜ NPT	1402-0980
Actuator (700 cm²), steel	G ¼/G ⅜	1400-6448
	¼ NPT/⅜ NPT	1402-0915
Actuator (700 cm²), stainless steel	G ¼/G ⅜	1400-6449
	¼ NPT/⅜ NPT	1402-0916

Mounting parts/accessories		Order no.
Actuator (750 cm²), steel	G ¼/G ⅜	1402-0974
	¼ NPT/⅜ NPT	1402-0981
Actuator (750 cm²), stainless steel	G ¼/G ⅜	1402-0975
	¼ NPT/⅜ NPT	1402-0982

1) for "actuator stem retracts" fail-safe action
with air purging of the top diaphragm chamber

Table 17-4: *Attachment to NAMUR rib or attachment to rod-type yokes [1] according to IEC 60534-6*

Travel in mm	Lever	For actuator	Order no.
7.5	S	Type 3271-5 with 60/120 cm² on Type 3510 Micro-flow Valve	1402-0478
5 to 50	M[2]	Actuators from other manufacturers and Type 3271 with 120 to 750 cm² effective areas	1400-7454
14 to 100	L	Actuators from other manufacturers and Type 3271 with 1000 and 1400-60 cm²	1400-7455
30 or 60	L	Type 3271, 1400-120 and 2800 cm² versions with 30/60 mm travel [3]	1400-7466
		Mounting brackets for Emerson and Masoneilan linear actuators (in addition, a mounting kit according to IEC 60534-6 is required depending on the travel). See rows above.	1400-6771
		Valtek Type 25/50	1400-9554
40 to 200	XL	Actuators from other manufacturers and Type 3271 with 1400-120 and 2800 cm² and with 120 mm travel	1400-7456
Accessories			**Order no.**
Connecting plate		G ¼	1400-7461
		¼ NPT	1400-7462
Pressure gauge bracket		G ¼	1400-7458
		¼ NPT	1400-7459
Pressure gauge mounting kit up to max. 6 bar		Stainless steel/brass	1402-1637
		Stainless steel/stainless steel	1402-1638

1) 20 to 35 mm rod diameter
2) M lever is mounted on basic device (included in the scope of delivery)
3) In conjunction with Type 3273 Side-mounted Handwheel with 120 mm rated travel, additionally one bracket (0300-1162) and two countersunk screws (8330-0919) are required.

Table 17-5: *Attachment according to VDI/VDE 3847-1*

Mounting parts	Order no.
VDI/VDE 3847 interface adapter	1402-0257

Mounting parts			Order no.
Connecting plate, including connection for air purging of actuator spring chamber	Aluminum	ISO 228/1-G ¼	1402-0268
		¼–18 NPT	1402-0269
	Stainless steel	ISO 228/1-G ¼	1402-0270
		¼–18 NPT	1402-0271
Mounting kit for attachment to SAMSON Type 3277 Actuator with 175 to 750 cm²			1402-0868
Mounting kit for attachment to SAMSON Type 3271 Actuator or third-party actuators			1402-0869
Travel pick-off for valve travel up to 100 mm			1402-0177
Travel pick-off for 100 to 200 mm valve travel (SAMSON Type 3271 Actuator only)			1402-0178

Table 17-6: *Attachment according to VDI/VDE 3847-2*

Designation		Order no.
Mounting parts	Mounting block for PFEIFFER Type 31a (edition 2020+) Rotary Actuators with blank plate for solenoid valve interface	1402-1645
	Dummy plate for solenoid valve interface (sold individually)	1402-1290
	Adapter bracket for Type 3730 (VDI/VDE 3847)	1402-0257
	Adapter bracket for Type 3730 and Type 3710 (DAP/PST)	1402-1590
Accessories for actuator	Shaft adapter AA1	1402-1617
	Shaft adapter AA2	1402-1616
	Shaft adapter AA4	1402-1888

Table 17-7: *Attachment to rotary actuators*

Mounting parts/accessories	Order no.
Attachment according to VDI/VDE 3845 (September 2010), actuator surface corresponds to fixing level 1	
Size AA1 to AA4, version with CrNiMo steel bracket	1400-7448
Size AA1 to AA4, heavy-duty version	1400-9244
Size AA5, heavy-duty version (e.g. Air Torque 10 000)	1400-9542
Bracket surface corresponds to fixing level 2, heavy-duty version	1400-9526
Attachment for rotary actuators with max. 180° opening angle, fixing level 2	1400-8815 and 1400-9837
Attachment to SAMSON Type 3278 with 160/320 cm², CrNiMo steel bracket	1400-7614
Attachment to SAMSON Type 3278 with 160 cm² and to VETEC Type S160, Type R and Type M, heavy-duty version	1400-9245
Attachment to SAMSON Type 3278 with 320 cm² and to VETEC Type S320, heavy-duty version	1400-5891 and 1400-9526
Attachment to Camflex II	1400-9120

Mounting parts/accessories			Order no.
Accessories	Connecting plate	G ¼	1400-7461
		¼ NPT	1400-7462
	Pressure gauge bracket	G ¼	1400-7458
		¼ NPT	1400-7459
	Pressure gauge mounting kit up to max. 6 bar	Stainless steel/brass	1402-1637
		Stainless steel/stainless steel	1402-1638

Table 17-8: *Attachment of external position sensor*

Mounting parts/accessories			Order no.
Template for mounting position sensor on older mounting parts			1060-0784
Direct attachment	Mounting parts for actuator with 120 cm²		1400-7472
	Connecting plate (9, old) with Type 3277-5xxxxxx.00 Actuator	G ⅛	1400-6820
		⅛ NPT	1400-6821
	Connecting plate (new) with Type 3277-5xxxxxx.**01** Actuator (new) [1]		1400-6823
	Mounting parts for actuators with 175, 240, 350, 355 and 750 cm²		1400-7471
NAMUR attachment	Mounting parts for attachment to NAMUR rib using L or XL lever		1400-7468
Attachment to Type 3510 Micro-flow Valve	Mounting parts for Type 3271 Actuator with 60 cm²		1400-7469
Attachment to rotary actuators	VDI/VDE 3845 (September 2010), see the 'Design and principle of operation' chapter for details.		
		Actuator surface corresponds to fixing level 1	
		Size AA1 to AA4 with follower clamp and coupling wheel, version with CrNiMo steel bracket	1400-7473
		Size AA1 to AA4, heavy-duty version	1400-9384
		Size AA5, heavy-duty version (e.g. Air Torque 10 000)	1400-9992
		Bracket surface corresponds to fixing level 2, heavy-duty version	1400-9974
	SAMSON Type 3278 with 160 cm² and VETEC Type S160 and Type R, heavy-duty version		1400-9385
	SAMSON Type 3278 with 320 cm² and VETEC Type S320, heavy-duty version		1400-5891 and 1400-9974

Mounting parts/accessories			Order no.
Accessories for positioner	Connecting plate (6)	G ¼	1400-7461
		¼ NPT	1400-7462
	Pressure gauge bracket (7)	G ¼	1400-7458
		¼ NPT	1400-7459
	Pressure gauge mounting kit up to max. 6 bar	Stainless steel/brass	1402-1637
		Stainless steel/stainless steel	1402-1638
	Bracket to mount the positioner on a wall (**Note:** The other fastening parts are to be provided at the site of installation as wall foundations vary from site to site).		0309-0184

1) Only new connecting plates can be used with new actuators (Index 01). Old and new plates are not interchangeable.

17.2 After-sales service

Contact our after-sales service for support concerning service or repair work or when malfunctions or defects arise.

E-mail contact

You can reach our after-sales service at aftersalesservice@samsongroup.com.

Addresses of SAMSON AG and its subsidiaries

The addresses of SAMSON AG, its subsidiaries, representatives and service facilities worldwide can be found on our website (www.samsongroup.com) or in all SAMSON product catalogs.

Required specifications

Please submit the following details:

- Order number and position number in the order
- Specifications on the nameplate:
  - Supply pressure
  - Explosion protection marking
  - Date of manufacture
  - Firmware version
  - Configuration ID
  - Serial number
  - Model number

EB 8384-3 EN

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