MOUNTING AND OPERATING INSTRUCTIONS

EB 8390-5 EN

Translation of original instructions



Type 3738-50 Electronic Limit Switch

with optional integrated solenoid valve for on/off valves
Communication: FOUNDATION™ fieldbus

Firmware version A 1.01 / K 1.01

CE Ex certified

Edition August 2021

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 > Service & Support > 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

1 Important safety instructions 6
1.1 Special conditions according to PTB 08 ATEX 2039 X 6
2 Article code 7
3 Design and principle of operation 8
3.1 Versions 8
3.2 Communication using TROVIS-VIEW 10
3.3 FOUNDATION™ fieldbus communication 10
3.3.1 FOUNDATION™ fieldbus block model 10
4 Technical data 12
4.1 Electronic limit switch 12
4.2 Solenoid valve 14
4.3 Optional forced venting 14
5 Attachment 15
5.1 Accessories 16
5.2 Attachment to linear actuators 17
5.2.1 Preparations 17
5.2.2 Attachment 18
5.3 Attachment to rotary actuators 20
5.3.1 Preparations 21
5.3.2 Attachment 22
6 Connections 26
6.1 Pneumatic connections 26
6.2 Supply pressure 26
6.3 Electrical connection 27
7 Operating controls and readings 30
7.1 Rotary pushbutton 30
7.2 SAMSON SSP interface 30
7.3 On-site operation 30
8 Start-up 33
8.1 Adapting the display direction 33
8.2 Verifying readings on display 33
8.3 Determining the actuator type 34
8.4 Determining the direction of action 35
8.5 Adjusting the end positions 35
8.6 Initialization 36
8.6.1 Starting automatic initialization 37

8.6.2 Starting manual initialization 37
8.7 Replacing an electronic limit switch 39
8.8 Zero/end position calibration 39
8.9 Reset to default settings 40
9 Operation 40
9.1 Lock operation 40
9.1.1 Locking operation over FOUNDATION™ fieldbus 40
9.1.2 Lock on-site operation 41
9.2 Partial stroke test (PST) 41
9.2.1 Defining the PST target range 43
9.2.2 Starting the partial stroke test 43
9.2.3 Configuration example based on PTO direction of action 44
9.3 Testing the solenoid valve 47
9.4 Malfunction 47
9.4.1 Status messages 47
9.4.2 Error messages 48
9.4.3 Confirming status and error messages 48
10 Maintenance, calibration and work on equipment 48
10.1 Servicing 48
11 Servicing explosion-protected devices 49
12 Firmware update (serial interface) 49
13 Disposal 50
14 Parameter list 51
14.1 Status messages 55
14.2 Error messages 57
15 Dimensions in mm 59
Assignment based on the direction of action 75

1 Important safety instructions

For your own safety, follow these instructions concerning the mounting, start up and operation of the limit switch:

– The device is to 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 is referred to as individuals who are able to judge the work they are assigned to and recognize possible dangers 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.
– Any hazards that could be caused by moving parts are to be prevented by taking appropriate precautions.
– For use within hazardous areas, the Special Conditions mentioned in the EC type examination certificate and its addenda must be observed.
– 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.

To avoid damage to any equipment, the following also applies:

– Proper shipping and storage are assumed.
– Do not ground electric welding equipment near to the electronic limit switch.

1.1 Special conditions according to PTB 08 ATEX 2039 X

An appropriate warning is to be attached to the plastic part of the enclosure to prevent the risk of electrostatic charging.

Where it is necessary to protect the apparatus against mechanical influences the installation instructions in the mounting instructions document must be observed.

2 Article code

Electronic Limit Switch	**Type 3738-50-**	x	x	x	x	x	0	0	x	1	x	0	0	x	0
With display															
Explosion protection															
Without		0	0	0											
II 2G Ex ia IIC T6; II 2D Ex ia IIIC T80°C IP66		1	1	0											
II 2G Ex eb[ia] IIC T4; II 2D Ex tb IIIC T80°C IP66		3	1	0											
II 3G Ex ic IIC T4; II 3G Ex nA II T4 Gc; II 3D Ex tc IIIC T80°C IP66		8	1	0											
Solenoid valve															
External, bus powered					0										
Integrated, bus powered					4										
Options															
Without						0									
Forced venting						1									
Company version															
SAMSON							0								
AIR TORQUE [1]							1								
Cover															
Gray beige							0	0							
Black [1]							0	1							
Silver gray [1]							1	3							
Special applications															
Without														0	
Device compatible with paint														1	
Special version															
Without															0

[1] No longer available after January 2018

3 Design and principle of operation

The Type 3738-50 Electronic Limit Switch allows on/off valves to be actuated by an integrated or external solenoid valve as well as their discrete end positions to be read out by a FOUNDATION™ fieldbus network according to IEC 61158-2.

Major features of the electronic limit switch include:

– Power supplied by a FOUNDATION™ fieldbus network (solenoid valve with low energy consumption of 6 V DC)
– Simple discrete control of on/off valves over a FOUNDATION™ fieldbus network
– Integrated diagnostics with partial stroke testing (PST)
– Non-contact sensing of the rotation angle by a magnetoresistive sensor system
– Version with integrated solenoid valve or for external solenoid valve

Fig. 1

The electronic limit switch is designed for attachment to pneumatic actuators. The current valve position is measured without contact using a magnet (on a screw) positioned centrically on the actuator shaft. The screw with magnet does not need to be adjusted. The AMR (anisotropic magnetoresistive) sensor located in the device together with the measuring electronics (1) can detect the directional change of the applied magnetic field and, as a result, sense the movement of the actuator.

The pneumatic actuator is operated by a solenoid valve (6, 8) which converts the signal issued by the process control system into a binary pressure signal.

3.1 Versions

Version with integrated solenoid valve (Type 3738-50-xxx4x00x1x00x0)

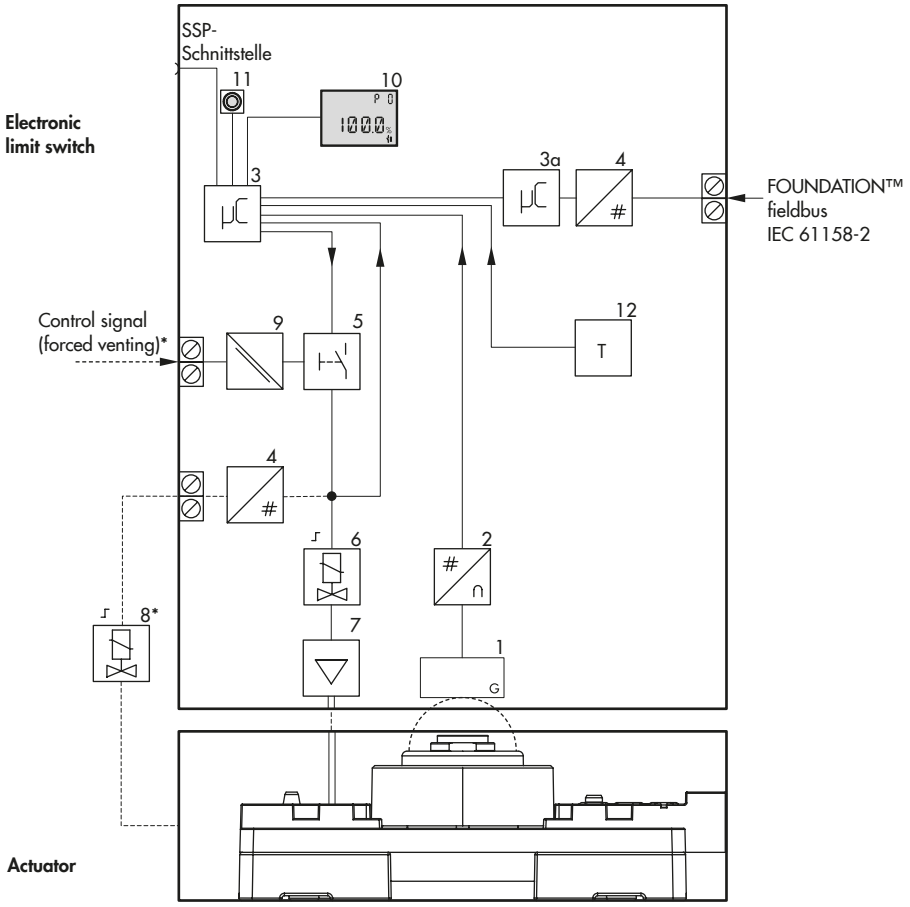
The solenoid valve is integrated into the housing of the electronic limit switch. The electronic limit switch and the solenoid valve are powered by the connected FOUNDATION™ fieldbus two-wire cable according to IEC 61158-2.

The electronic limit switch can optionally be fitted with a **forced venting** function. This function is activated when the solenoid valve is de-energized after the power supply is interrupted, causing the actuator to move the control valve to its fail-safe position.

Version for external solenoid valve (Type 3738-50-xxx0x00x1x00x0)

The electronic limit switch and the external solenoid valve are powered by the connected FOUNDATION™ fieldbus two-wire cable according to IEC 61158-2.

The electronic limit switch can optionally be fitted with a **forced venting** function. This function is activated when the solenoid valve is de-energized after the power supply is interrupted, causing the actuator to move the control valve to its fail-safe position.



1 AMR sensor with electronics
2 A/D converter
3 Microcontroller
4 Interface module (IEC 61158-2)
5 Actuation of forced venting
6 Solenoid valve
(Type 3738-50-xxx4x00x1x00x0)
7 Air capacity booster (Type 3738-50-xxx4x00x1x00x0)
8* External solenoid valve
(Type 3738-50-xxx0x00x1x00x0)
9 Galvanic isolation
10 Display
11 Rotary pushbutton
12 Temperature sensor
* Option

Fig. 1: *Schematic diagram: Type 3738-50 Electronic Limit Switch*

3.2 Communication using TROVIS-VIEW

See Table 2 for order numbers.

The electronic limit switch can be configured with SAMSON's TROVIS-VIEW Software. The electronic limit switch has for this purpose a SAMSON SSP interface to allow the RS-232 or USB port of a computer to be connected to it using a serial interface adapter cable.

The TROVIS-VIEW software enables the user to easily configure the electronic limit switch as well as view and document process parameters on a computer. See Data Sheet ▶ T 6661.

3.3 FOUNDATION™ fieldbus communication

The electronic limit switch is controlled completely by digital signal transmission according to FOUNDATION™ fieldbus specification.

Data are transmitted over the bus using digital, bit-synchronous Manchester coding at a Baud rate of 31.25 kbit/s over twisted-pair wires according to IEC 61158-2.

i Note

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

3.3.1 FOUNDATION™ fieldbus block model

All the functions and data of the device are assigned to various block types in FOUNDATION™ fieldbus. Each block type covers a different range of tasks. In the SAMSON Type 3738-50 Electronic Limit Switch, the following block types are implemented:

Resource Block (RES)

The Resource Block (RES) describes characteristics of the fieldbus device, such as the device name, manufacturer number and serial number. There is only one Resource Block in a device.

Function Blocks (FB)

Function Blocks are responsible for the way a FOUNDATION™ fieldbus device works. A fieldbus application can be configured by linking the input and output parameters of Function Blocks. The Type 3738-50 Positioner includes the following Function Blocks:

5x Discrete Input Function Blocks (DI FB)
Execution time 20 ms

5x Discrete Output Function Blocks (DO FB)
Execution time 30 ms

1x Analog Input Function Block (AI FB)
Analog position feedback
Execution time 20 ms

Transducer Blocks (TRD)

Each AI or AO Function Block has a Transducer Block which contains all data and device-specific parameters to link the device to the process value (sensor or final control element).

The following Transducer Blocks (corresponding to the Function Blocks) are implemented:

5x Discrete Input Transducer Blocks (DI TRD)

5x Discrete Output Transducer Blocks (DO TRD)

1x Analog Input Transducer Block (AI TRD)

i ***Note***

The parameter of the individual function blocks are described in the Configuration Manual ▶ KH 8390-5.

4 Technical data

4.1 Electronic limit switch

Type		3738-50-xxx**4**x00x1x00x0	3738-50-xxx**0**x00x1x00x0
Version		With integrated solenoid valve	For external solenoid valve
Permissible range of rotation		Min.: 0 to 30° Max.: 0 to 170°	
Communication	Local	SAMSON SSP interface with serial interface adapter with TROVIS-VIEW with database module 3738-50	
	Over bus	FOUNDATION™ fieldbus	
Supply air	Supply air	2.4 to 8 bar	Same as specifications of the solenoid valve manufacturer
	Air quality	Acc. to ISO 8573-1 edition 2004 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	Same as specifications of the solenoid valve manufacturer
	Air consumption	In idle position <60 l/h In switching position <30 l/h	
Electric power supply		Powered by FOUNDATION™ fieldbus	
Maximum operating current		14 mA	
Permissible ambient temperature		–25 to 80 °C	–40 to 80 °C
		Metal cable glands must be used for ambient temperatures below –20 °C. The limits specified in the examination certificate additionally apply.	
Influences	Temperature	0.7 %/90° angle above the permissible temperature range	
	Effect of vibration	0.25 % up to 2500 Hz and 4 g according to IEC 770	
Service life		15 years	
Maximum storage period		24 months	
Electromagnetic compatibility		Complying with EN 61000-6-2, EN 61000-6-3, EN 61326-1 and NAMUR Recommendation NE 21	

Type		3738-50-xxx**4**x00x1x00x0	3738-50-xxx**0**x00x1x00x0
Version		With integrated solenoid valve	For external solenoid valve
Electrical connections		M20x1.5 cable gland(s) for 6 to 12 mm clamping range, screw terminals for 0.2 to 2.5 mm² wire cross-sections	
	*Without forced venting	One cable gland	Two cable glands
	*With forced venting	Two cable glands	Three cable glands
Degree of protection		IP 66	
Materials	Housing	Die-cast aluminum EN AC-AlSi12(Fe) (EN AC-44300) acc. to DIN EN 1706, powder coating	
	Housing cover	Computer	
	Cover gasket	PU	
	Indicator wheel	Computer	
	Magnet material	Hard ferrite	
Weight		Approx. 1.2 kg	Approx. 1.0 kg

Table 1: *Explosion protection certificates for Type 3738-20 Electronic Limit Switch*

Type		Certification		Type of protection/comments
3738-50 -110		Number	PTB 08 ATEx 2039 X	II 2G Ex ia IIC T6; II 2D Ex ia IIIC T80°C IP66
		Date	2012-07-19	
3738-50 -310		Number	PTB 08 ATEx 2039 X	II 2G Ex eb[ia] IIC T4; II 2D Ex tb IIIC T80°C IP66
		Date	2012-07-19	
3738-50 -810		Number	PTB 08 ATEx 2039 X	II 3G Ex ic IIC T4; II 3G Ex nA II T4 Gc; II 3D Ex tc IIIC T80°C IP66
		Date	2012-07-19	

4.2 Solenoid valve

Integrated solenoid valve (Type 3738-50-xxx4x00x1x00x0)	
Version	3/2-way or 5/2-way function Function determined by the position of the molded seal
K_{VS} coefficient	0.32
Service life	1,000,000 switching cycles
Temperature range (operation)	–25 to +80 °C

External solenoid valve (Type 3738-50-xxx0x00x1x00x0)
Read manufacturer's specifications.
6 V DC, max. 18 mW

4.3 Optional forced venting

Input	0 to 30 V DC · Reverse polarity protection · Static destruction limit 40 V Current consumption 3.5 mA at 24 V, galvanic isolation
Signal	Signal '1' at U_e > 5 V · Signal '0' at U_e < 3 V

5 Attachment

⚠ DANGER

– ***Electrostatic charging***
Due to the high surface resistance of the enclosure cover ($R_{Isol.} \geq 10^9$ Ω), installation and maintenance on the equipment must be performed in such a way as to prevent electrostatic charging.

– ***Mechanical effects***
In areas where damage to the housing can be expected due to mechanical influences, the housing must be protected by an additional cover.

– ***Combustible dust atmospheres***
The electronic limit switch complies with the requirements for type of protection Ex tb as the enclosure (housing) is designed according to EN 60079-31. The enclosure complies with degree of protection IP 66 according to IEC 60529.

⚠ WARNING

Mount the electronic limit switch, keeping the following sequence:
– *Mount the electronic limit switch on the actuator. See sections 5.2 and 5.3.*
– *Connect the supply air. See sections 6.1 and 6.2.*
– *Connect the electrical power. See section 6.3.*
– *Perform the start-up settings. See section 8.*

! *NOTICE*

Observe the following instructions to avoid damaging the electronic limit switch:
– *Use only the accessories listed in the Table 1 to mount the electronic limit switch!*
– *Observe the shaft height of the actuator on mounting the electronic limit switch on rotary actuators!*

Mounting position

Any mounting position may be used, however, the electronic limit switch must not be installed in a suspended position.

5.1 Accessories

Table 2: *Accessories*

			Order no.
Attachment to linear actuators (NAMUR attachment)	Version with integrated solenoid valve	G ¼	1402-0540
	Version with integrated solenoid valve	¼ NPT	1402-0541
	Version for external solenoid valve	G ¼	1402-0542
	Version for external solenoid valve	¼ NPT	1402-0543
	Plus mounting parts for Type 3271 Actuator		
	Version up to 700 cm²		–
	1400-60 and 2800-120 versions		1402-0544
	2800-30 and 2800-60 versions		1402-0545
Attachment to rotary actuators acc. to VDI/ VDE 3845, fixing level 1 (2010)	Attachment (20 mm shaft height)		1400-9859
	Attachment (30 mm shaft height)		1400-9860
	Attachment (50 mm shaft height)		1400-9861
	Attachment (50 mm shaft height, 88 mm shaft diameter), e.g. AIR TORQUE Type SC 3000 and Pfeiffer Type 31b, 2000 size		1402-0332
	Attachment (80 mm shaft height)		1402-0586
	VDI/VDE 3845 mounting platform for freely configurable hook-up	G ¼	1380-1738
	VDI/VDE 3845 mounting platform for freely configurable hook-up	¼ NPT	1380-1739
	Mounting platform for Type 31a Edition 2020+ (black)	G ¼	1380-1266
	Mounting platform for Type 31a Edition 2020+ (black)	¼ NPT	1380-1268
SAMSON TROVIS-VIEW software	TROVIS-VIEW with device module 3738-50 (free download from www.samsongroup.com)		
	Serial interface adapter (SAMSON SSP interface to RS-232 port on a computer)		1400-7700
	Isolated USB interface adapter (SAMSON SSP interface to USB port on a computer)		1400-9740

5.2 Attachment to linear actuators

The electronic limit switch is mounted to linear actuators according to IEC 60534-6 (NAMUR attachment).

Required accessories: see Table 2

5.2.1 Preparations

Version with integrated solenoid valve (Type 3738-50-xxx4x00x1x00x0) (Fig. 2)

1. Insert the molded seal (3) into the support element (2) depending on the type of actuator (single-acting or double-acting).
2. Slide the O-ring (3.1) onto the air duct of the molded seal (3).
3. Fasten the electronic limit switch (1) to the support element (2) using the two screws mounted on the electronic limit switch as shown in Fig. 2.
4. Remove the blanking plug on the supply air port (SUPPLY, 2.1) of the support element (2).

Version with external solenoid valve (Type 3738-50-xxx0x00x1x00x0)

1. Fasten the electronic limit switch (1) to the support element (2) using the two screws mounted on the electronic limit switch as shown in Fig. 2.

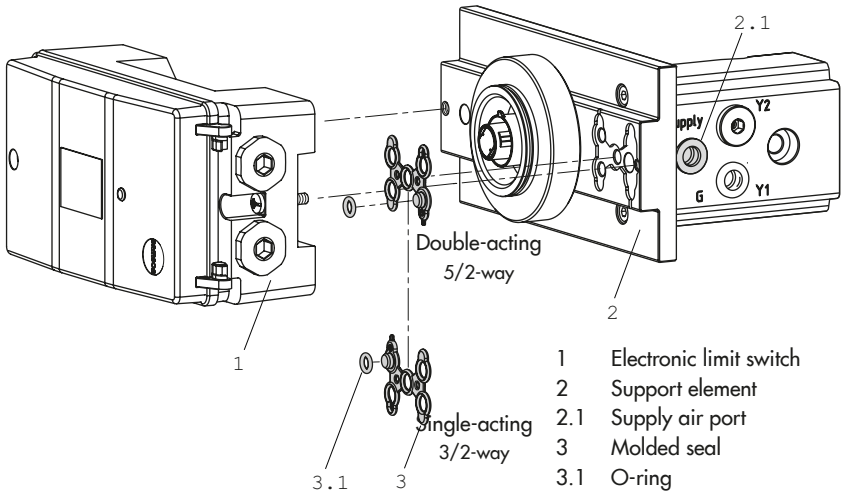


Fig. 2: *Preparations for mounting the electronic limit switch with integrated solenoid valve*

5.2.2 Attachment

Use the lever (5) underneath the support element (2) and the pin (6) on the lever to adapt the electronic limit switch to the linear actuator.

Table 3: *Travel table*

Actuator size [cm²]	Rated travel [mm]	Lever	Recommended pin position
120 to 350	15	M	35
700	15/30	M	50
1400	60	L	100
2800	120	XL	200
2800	30	M	50
2800	60	L/XL	100/200

The electronic limit switch is equipped with the lever M (pin position 35) as standard.

Levers L and XL are included in the mounting parts 1402-0544 or 1402-0545.

1. Select lever (5) according to Table 3.
2. Insert the follower pin (6) in the pin position according to Table 3 of the lever (5). Fasten tight using shim and nuts (Fig. 3).
3. Place the lever (5) on the shaft of the support element (2) and fasten it tight using the disk spring (5.1) and nut (5.2).
4. **Mounting on actuators with 120 to 700 cm² actuator areas (Fig. 4 1):**
   Fasten the follower plate (7.1) at the middle holes to the stem connector (9) of the actuator using the washers (7.2) and screws (7.3).

   Mounting on Type 3271 Actuators with 1400 and 2800 cm² actuator areas and with 200 mm rated travel (Fig. 4 2)
   Fasten the follower plate (7.4) at the outer holes to the stem connector (9) of the actuator using the screws (7.5).

   Mounting to Type 3271 Actuators with 2800 cm² actuator area and with 50, 100 or 200 mm rated travel (Fig. 4 3)
   Screw the bracket (8) to the stem connector (9) of the actuator using the screws (8.2).
   Fasten the follower plate (7.1) together with pins (8.1) located in the middle holes to the bracket (8) using the washers (7.2) and screws (7.3).
5. Fasten the support element (2) to the actuator using the screw (4), ensuring that the follower pin (6) comes to rest in the slot of the follower plate (7.1/7.4).
6. Electronic limit switch with integrated solenoid valve: connect supply air to supply air port (SUPPLY, 2.1).

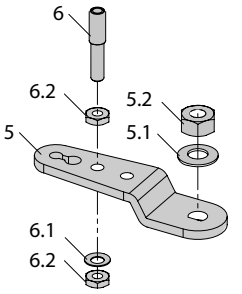


Fig. 3: *Fastening the follower pin on the lever*

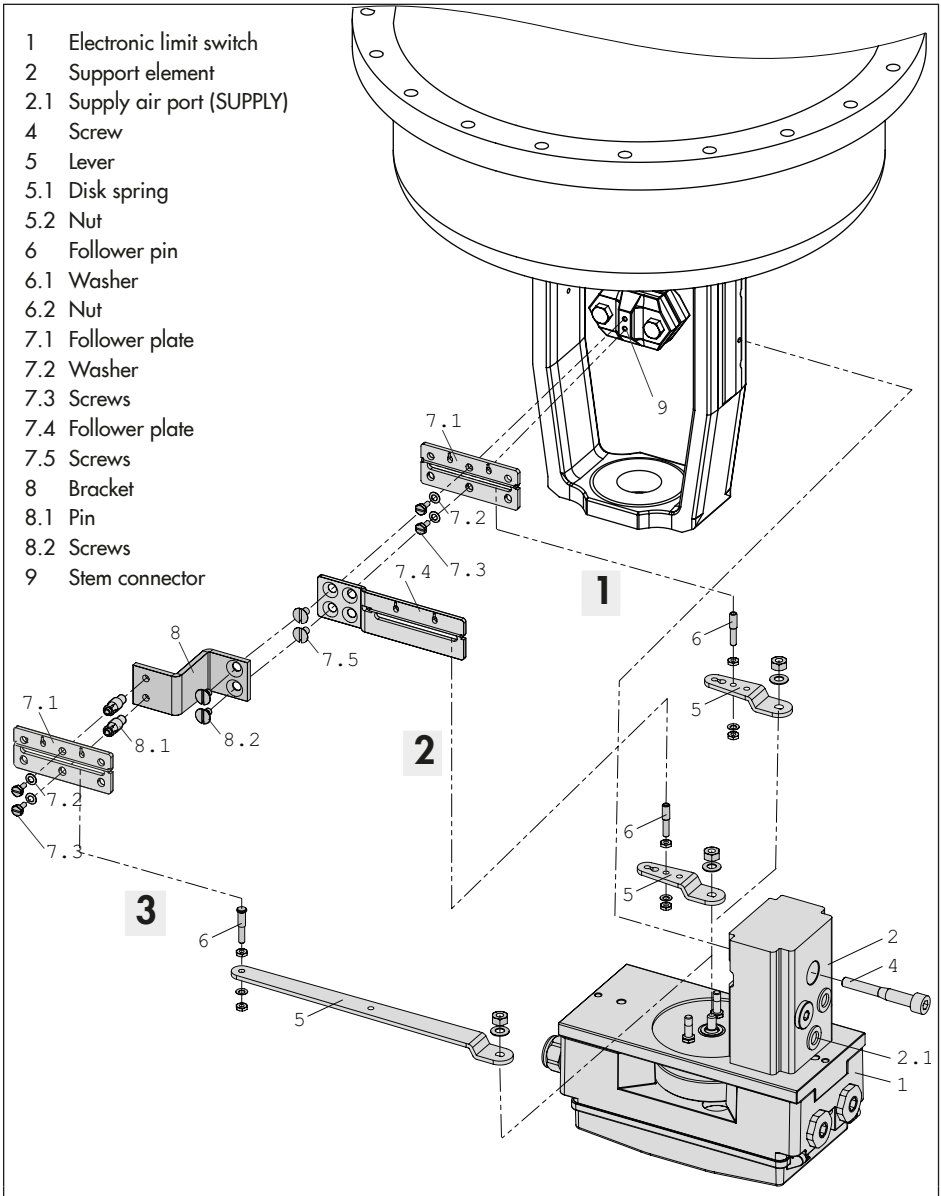


Fig. 4: *Mounting the electronic limit switch on linear actuators*

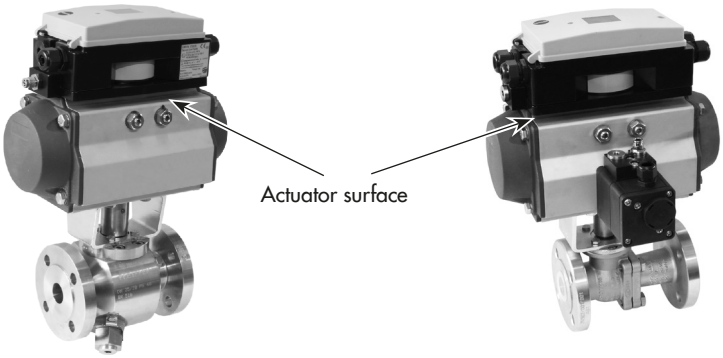
5.3 Attachment to rotary actuators

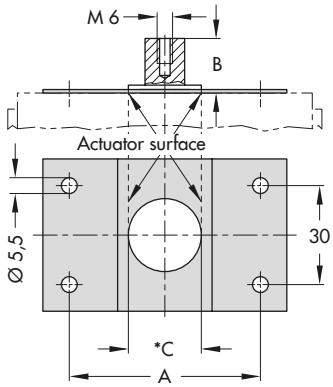
The electronic limit switch is mounted on rotary actuators according to VDI/VDE 3845, level 1 (2010). The version with integrated solenoid valve can also be directly (without hook-up) mounted to a Pfeiffer Type 31a Rotary Actuator (Edition 2020+).

Required accessories: see Table 2

Versions with integrated solenoid valve (Type 3738-20xxx14xxxxx2xx)

Version with external solenoid valve (Type 3738-20-xxx1000xxx200)





Shaft height B [mm]	20	30	50
Distance between holes A [mm]	80	80/130	130

Fig. 5: *Mounting to rotary actuators according to VDI/VDE 3845, level 1 (2010)*

5.3.1 Preparations

Version with integrated solenoid valve (Type 3738-20xxx14xxxxx2xx)

Two mounting platforms are available for the attachment (Fig. 6):

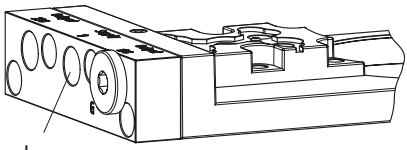
– Mounting platform for mounting onto the special version of the Pfeiffer Type 31a Rotary Actuator with integrated air holes
– Mounting platform for freely configurable hook-up for mounting to standard actuators according to VDI/VDE 3845

The supply air is connected at the side of both mounting platforms. The blanking plug needs to be removed from the air connection (Fig. 6).

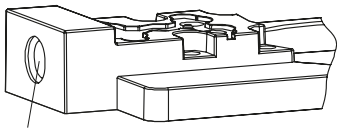
1. Insert the molded seal (3) into the mounting platform (2) depending on the type of actuator (single-acting or double-acting).
2. Slide the O-ring (3.1) onto the air duct of the molded seal (3).
3. Press the molded seal (4) onto the air ducts underneath the mounting platform (2).
4. **For attachment to rotary actuators with a 50 mm shaft height:** press the second molded seal (4) onto the air ducts underneath one of the distance pieces (5).
5. Remove the blanking plug on the supply air port (SUPPLY) of the mounting platform (2).
6. Connect the connections (depending on the mounting platform):

   Mounting platform for freely configurable hook-up, single-acting actuator

   ➔ Connect port 138 to the pneumatic actuator
   – Without air purging of the actuator's spring chamber:
     seal port 238 with the blanking plug
   – With air purging of the actuator's spring chamber:
     connect port 238 to the actuator's spring chamber



Mounting platform for freely configurable hook-up (1380-1738 or 1380-1739)



Mounting platform for the special version of the Pfeiffer Type 31a Rotary Actuator (Edition 2020+) with integrated air holes (1380-1266 or 1380-1268)

Fig. 6: *Mounting platform*

Mounting platform for freely configurable hook-up, double-acting actuator

➔ Connect port 138 to the chamber of the pneumatic actuator, that opens the valve when loaded with air

➔ Connect port 238 to the other chamber of the actuator

Mounting platform for Pfeiffer Type 31a Rotary Actuator (Edition 2020+) with integrated air holes

➔ Connect internally using the molded seal (4)

Version with external solenoid valve (Type 3738-20xxx1000xxx200)

No preparation is necessary.

5.3.2 Attachment

The attachment depends on the shaft height of the rotary actuator upon which the electronic limit switch is to be mounted (Fig. 8).

	Screw with magnet (6)	Cap screws (10)
20 mm shaft height	SW 24, 30 mm	M5x16
30 mm shaft height	SW 24, 20 mm	M5x16
50 mm shaft height	SW 24, 20 mm	M5x40
80 mm shaft height	SW 24, 20 mm	M5x40

1. **Attachment to rotary actuators with 20 or 30 mm shaft height:**
   Place the spacers (11) on the inner holes of the actuator.

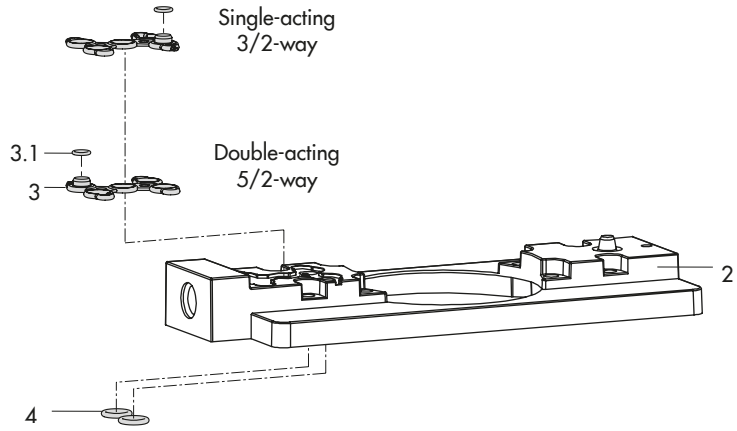
   Attachment to rotary actuators with 50 mm shaft height:
   Place the distance pieces (5) on the rotary actuator.

   Attachment to rotary actuators with 80 mm shaft height:
   a. Screw pins (16) into the actuator.
   b. Fasten adapter (14) with anti-rotation fixture (25) in the groove of the actuator shaft.
   c. Bend the flap on the anti-rotation fixture (15) upward.
   d. Fasten intermediate plate (13) to the pins (16) using the screws (12).

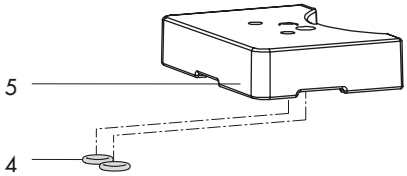
i ***Note***

Electronic limit switch with integrated solenoid valve: place the distance piece including inserted molded seal (4) over the air ducts of the actuator.

2. Fasten the mounting platform (2) on the rotary actuator:
   – **Version with integrated solenoid valve:** screws 10a and 10b
   – **Version for external solenoid valve:** screws 10a



Distance piece for attachment to rotary actuators with 50 mm shaft height



1 Electronic limit switch
2 Mounting platform
3 Molded seal
3.1 O-ring
4 Molded seal
5 Distance piece

Fig. 7: *Preparations for mounting the electronic limit switch with integrated solenoid valve*

i ***Note***

Electronic limit switch with integrated solenoid valve: fasten the mounting platform (2), making sure that the air ducts located on the rotary actuator and the mounting platform are properly aligned over each other.

3. **Attachment to rotary actuators with 20 mm shaft height:**
   Place the adapter (7) and indicator wheel (8) one after the other onto the actuator shaft.

   Attachment to rotary actuators with 30, 50 or 80 mm shaft height:
   Place the indicator wheel (8) onto the actuator shaft.
4. Insert plate (9) into the indicator wheel (8).

! ***NOTICE***

Do not exceed the maximum torque of 8 Nm when fastening the screw with magnet (6).

5. Fasten the screw with magnet (6) onto the actuator shaft.
6. Bend the two flaps on the plate (9) towards the width flats of the screw with magnet (6).
7. Place the electronic limit switch on the mounting platform (2) as shown in Fig. 8 and fasten it using the two screws mounted on the device.
8. Electronic limit switch with integrated solenoid valve: connect supply air to supply air port (SUPPLY, 2.1).

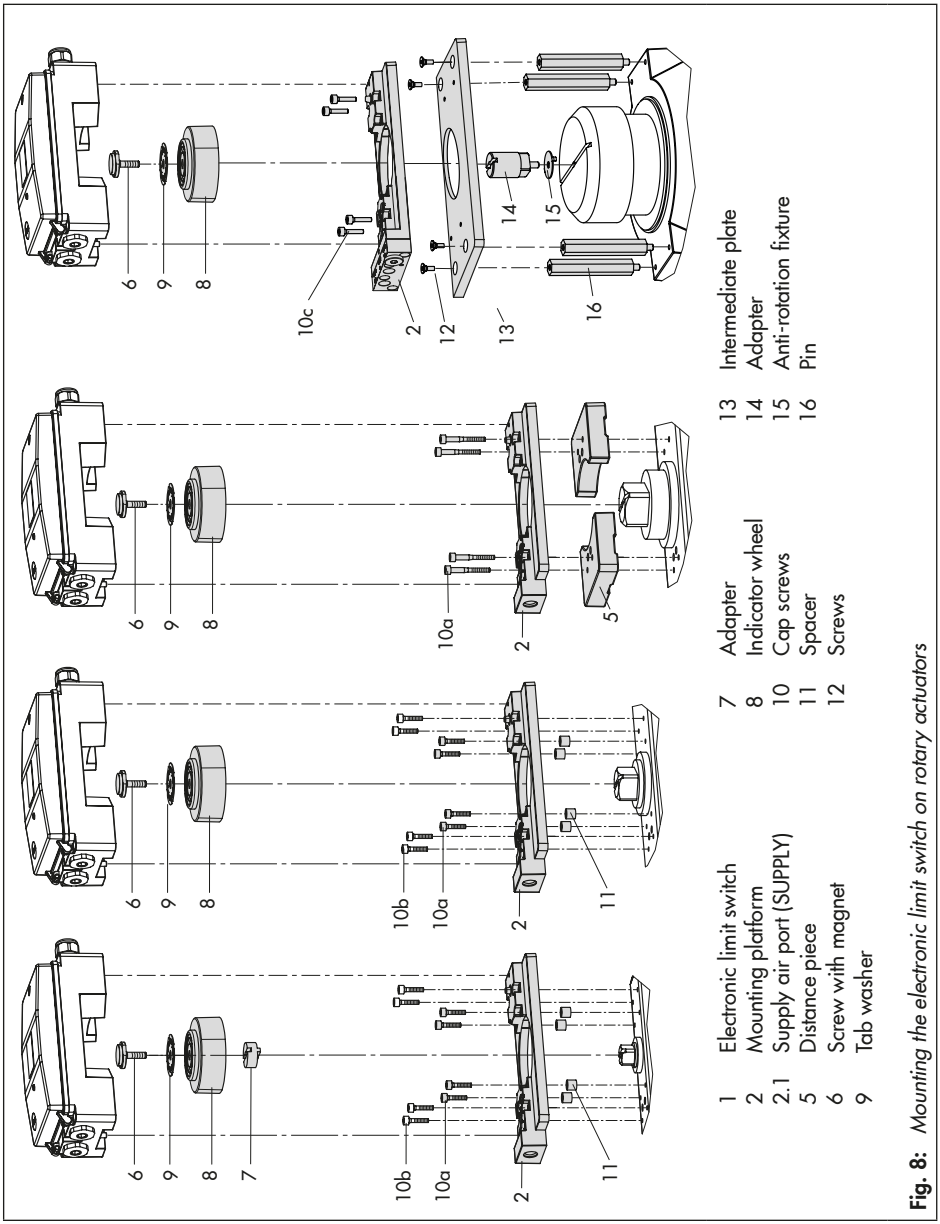


Fig. 8: *Mounting the electronic limit switch on rotary actuators*

6 Connections

⚠ WARNING

Mount the electronic limit switch, keeping the following sequence:

– Mount the electronic limit switch on the actuator. See sections 5.2 and 5.3.
– Connect the supply air. See sections 6.1 and 6.2.
– Connect the electrical power. See section 6.3.
– Perform the start-up settings. See section 8.

The connection of the power may cause the actuator shaft/stem to move, depending on the operating mode.

Do not touch the actuator shaft/stem or obstruct it to avoid risk of injury to hands or fingers.

6.1 Pneumatic connections

! *NOTICE*

Observe the following instructions to avoid damaging the electronic limit switch and/or solenoid valve:

– Run and attach the connecting lines and screw joints according to good professional practice. Check them for leakage and damage at regular intervals and repair them, if necessary. Before starting any repair work, depressurize any open connecting lines.
– The air connections are designed as threaded holes with G ¼ or ¼ NPT thread depending on the device version. Protect the exhaust air connections or vent plugs by installing a filter or taking other appropriate precautions to prevent water or dirt from entering them.
*– **Operation using a pressure reducing valve:** The K_{VS} coefficient of an upstream pressure reducing valve must be at least 1.6 times larger than the K_{VS} coefficient of the device.*
*– **Air pipe:** The minimum nominal size of the air pipe must be a pipe with an inside diameter of ≥ 4 mm. A larger nominal size is needed when the connection length exceeds 2 m.*
*– **Operation with external solenoid valve (Type 3738-50-xxx0x00x1x00x0)***
The input pressure must not exceed the maximum supply pressure of the external solenoid valve (refer to the specifications given by the solenoid valve manufacturer). Do not remove the blanking plug on the air port of the mounting platform (3).
– The supply air must be dry and free from oil and dust. The maintenance instructions for upstream pressure reducing stations must be observed.
– Blow through all air pipes and hoses thoroughly before connecting them.

6.2 Supply pressure

Version with integrated solenoid valve (Type 3738-50-xxx4x00x1x00x0)

Depending on the mounting platform used (ISO 228/1–G ¼ or ¼–18 NPT), customary fittings for metal or copper tubing or plastic hoses can be used.

The supply is connected at the side of the support element or mounting platform.

Operation with external solenoid valve (Type 3738-50-xxx0x00x1x00x0)

Connect the supply air to the external solenoid valve following the instructions given by the solenoid valve manufacturer.

6.3 Electrical connection

⚠ DANGER

Risk of fatal injury due to electric shock and/or the formation of an explosive atmosphere.

For electrical installation, observe the relevant electrotechnical regulations and the accident prevention regulations that apply in the country of use.

The following regulations apply to installation in hazardous areas: EN 60079-14 (VDE 0165, Part 1) Explosive Atmospheres – Electrical Installations Design, Selection and Erection.

The maximum permissible values specified in the EC type examination certificate apply when connecting the intrinsically safe circuits.

Adhere to the terminal assignment specified in the certificate. Switching the assignment of the electrical terminals may cause the explosion protection to become ineffective.

Version: electronic limit switch with intrinsically safe external solenoid valve

The operating voltage and external solenoid valve are connected according to EN 60079-11, type of protection Ex i.

– ***Ex i terminals: color: blue or black***

Version: electronic limit switch with non-intrinsically safe external solenoid valve

The operating voltage and external solenoid valve are connected according to EN 60079-7, type of protection Ex e.

The following applies to external connection:

– ***Ex i terminals:*** *color: blue*
– ***Ex e terminals: color: black***
– ***Cable entry:*** *Ex e cable entry: black; Ex i cable entry: blue*

The cable entries of the electronic limit switch with external ***non-intrinsically safe*** *solenoid valve must be certified according to type of protection Ex e according to ATEX.*

The degree of protection (IP grade) of the cable entries and the blanking plug must be the same as that of the limit switch.

Do not loosen enameled screws in or on the housing.

Note on the selection of cables and wires:

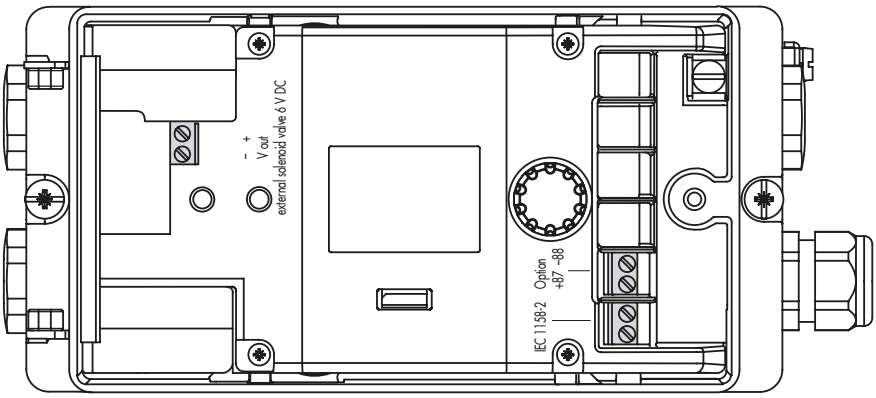
– *Observe* ***clause 11.2*** *for installation of the* ***non-intrinsically safe*** *circuits and* ***clause 12 of EN 60079-14 (VDE 0165, Part 1)*** *for installation of the intrinsically safe circuits. Clause 12.2.2.7 of EN 60079-14 applies when running*

multi-core cables and 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 individual wires 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 are used for connection, an additional cable gland can be installed.*
- *Seal cable entries left unused with certified Ex e blanking plugs.*

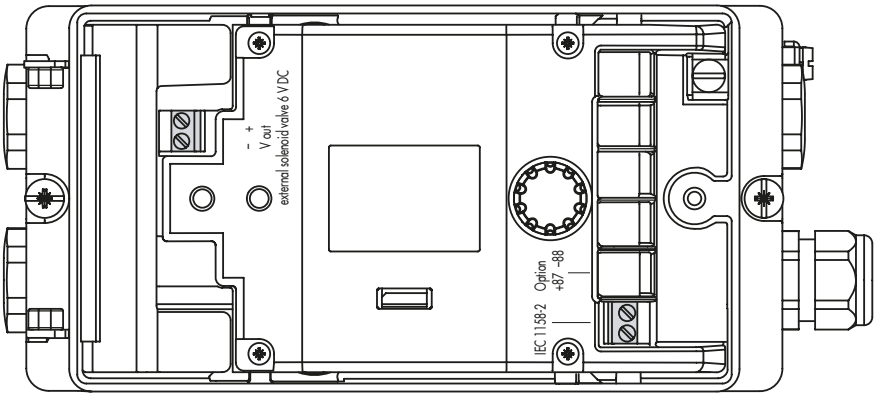
Cable entry

The threaded connection for the terminal compartment is designed with an M20x1.5 thread.

The screw terminals are designed for wire cross-sections of 0.2 to 1.5 mm². Tighten by at least 0.5 Nm.



Version with integrated solenoid valve (Type 3738-50-xxx4x00x1x00x0)



Version for external solenoid valve (Type 3738-50-xxx0x00x1x00x0)

Fig. 9: *Electrical connection*

7 Operating controls and readings

7.1 Rotary pushbutton

The rotary pushbutton (◎) is located underneath the housing cover.

The device is operated on site using the rotary pushbutton:

Turn ◎: Select parameters and values

Press ◎: Confirm setting/exit parameter

7.2 SAMSON SSP interface

The SAMSON SSP interface is located underneath the housing cover.

The local SAMSON SSP interface of the electronic limit switch needs to be connected over a serial interface adapter cable (see Table 2) to the RS-232 or USB port of the computer before the TROVIS-VIEW software can be used.

7.3 On-site operation

The P2 parameter allows the user to switch between the **RUN** operating mode and **SET** configuration mode. In the **SET** configuration mode, the parameters marked with an asterisk (*) (see parameter lists from page 51 onwards) can be changed and the device can be initialized.

To switch over modes, the key number must be entered first. The key code can be found on 75. To avoid unauthorized use of the key number, remove the page or make the key number unreadable.

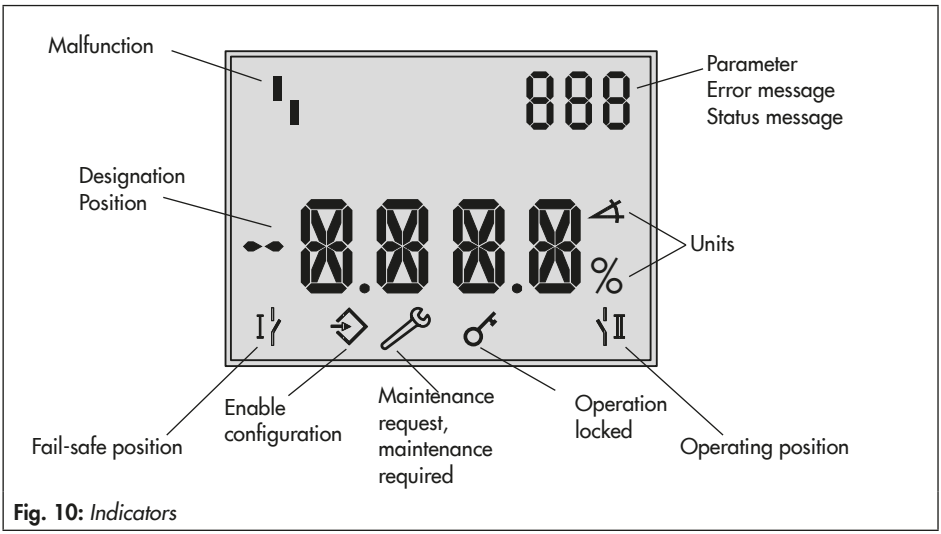
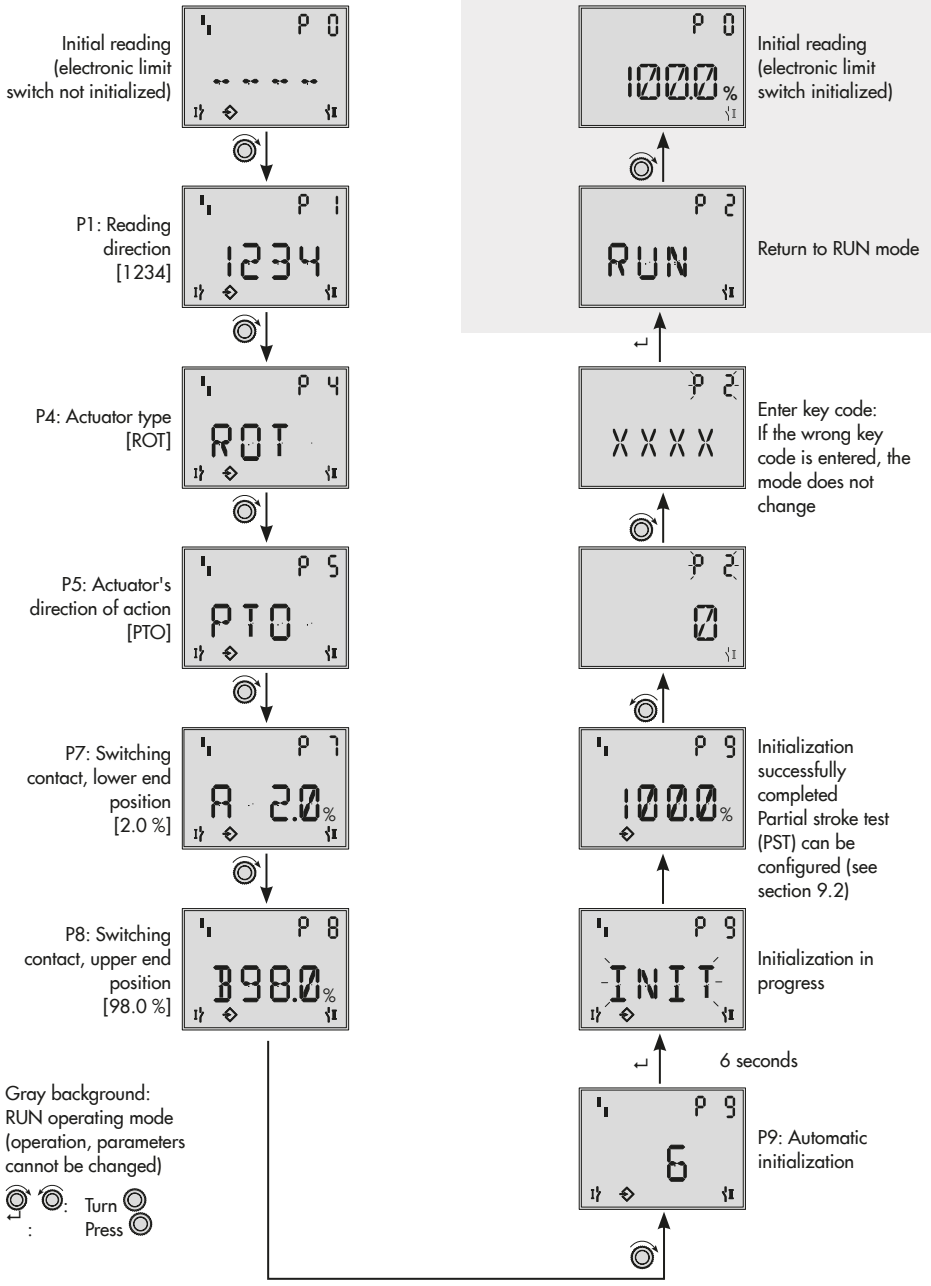
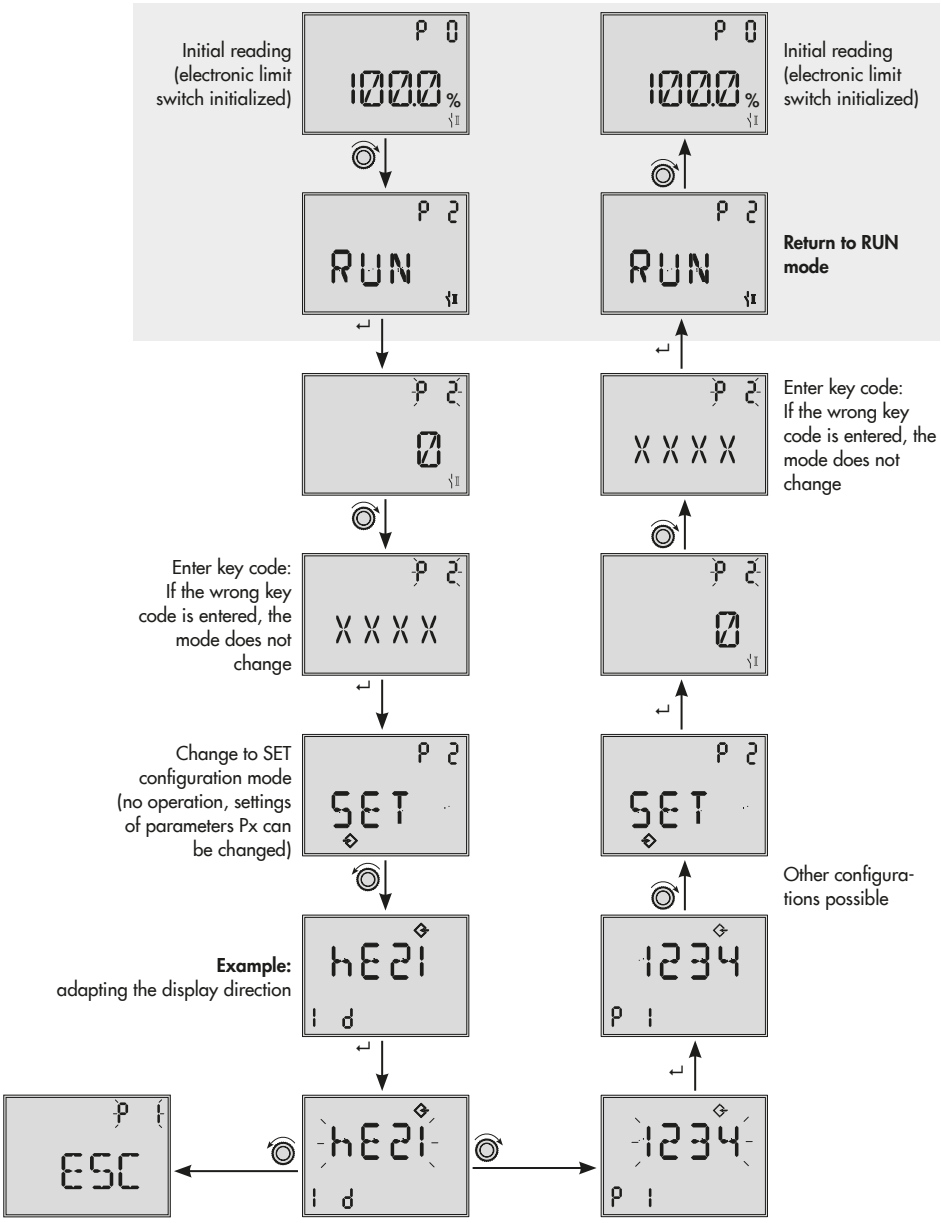


Fig. 10: *Indicators*

Placing the electronic limit switch into operation using its default settings



Changing the operating mode and parameter settings



8 Start-up

⚠ WARNING

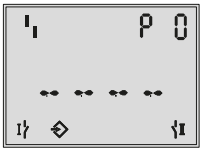
Mount the electronic limit switch, keeping the following sequence:

- *Mount the electronic limit switch on the actuator. See sections 5.2 and 5.3.*
- *Connect the supply air. See sections 6.1 and 6.2.*
- *Connect the electrical power. See section 6.3.*
- *Perform the start-up settings. See section 8.*

NOTICE

Perform the start-up settings in the same sequence as described (sections 8.1 to 8.5).

Reading after connecting the electrical power supply:



P0: Display when the electronic limit switch has not yet been initialized

- The ⁞ fault alarm icon and – – – – appear on the display **when the electronic limit switch has not yet been initialized**. The electronic limit switch is not in service. Parameter settings can be changed (**P2** = **SET**). See page 32.

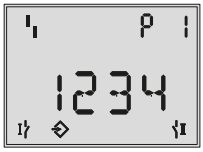
i Note

The current angle of rotation is set to 0° by pressing the rotary pushbutton (◎).

- The current angle of rotation is displayed in % **when the electronic limit switch has been initialized**. To change parameter settings, the configuration mode (**SET**) must be activated. See page 32.

8.1 Adapting the display direction

The reading on the electronic limit switch display can be turned by 180° to adapt it to the electronic limit switch's mounting situation.



P1: Reading direction

If the displayed data appear upside down, proceed as follows:

Turn ◎ → **P1**

Press ◎, **P1** blinks

Turn ◎ 1234/1234

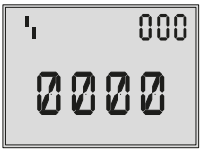
Press ◎ to confirm the reading direction and to exit the parameter.

8.2 Verifying readings on display

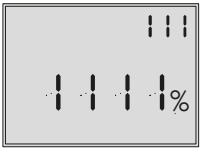
NOTICE

For safety-instrumented systems, the display's functioning must be tested.

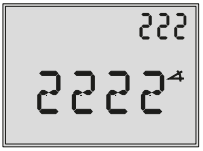
The display's functioning is checked using the P3 parameter.



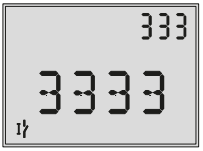
P3: Display reading 1



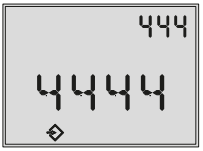
P3: Display reading 2



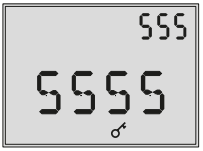
P3: Display reading 3



P3: Display reading 4



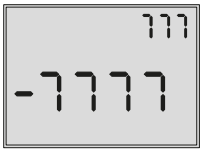
P3: Display reading 5



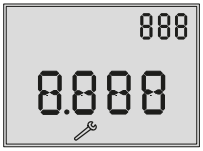
P3: Display reading 6



P3: Display reading 7



P3: Display reading 8



P3: Display reading 9



P3: Display reading 10

Turn ◎ → **P3**

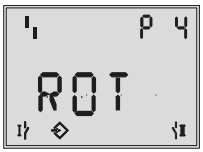
Press ◎, reading 1

Turn ◎, reading 2 to 10

Press ◎ to confirm testing. The last test of the display readings is saved in the electronic limit switch. The time stamp can be read over FOUNDATION™ fieldbus and in TROVIS-VIEW.

8.3 Determining the actuator type

The setting of the actuator type (rotary or linear actuator) is made using P4 parameter.



P4: Actuator type
Default: ROT

Turn ◎ → **P4**

Press ◎, **P4** blinks

Turn ◎ → ROT (rotary actuator)/LIN (linear actuator)

Press ◎ to confirm the actuator type and to exit the parameter.

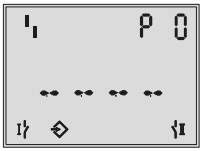
i ***Note***

After initialization, this parameter is locked and can first be changed after performing a reset of the start-up data to default settings (P21).

8.4 Determining the direction of action

Observe the assignment of the end position depending on the direction of action (see page 75).

The setting is made using P5 parameter.



P5: Direction of action
Default: PTO

Turn ◎ → **P5**

Press ◎, **P5** blinks

Turn ◎ → **PTC** (power to close)/**PTO** (power to open)

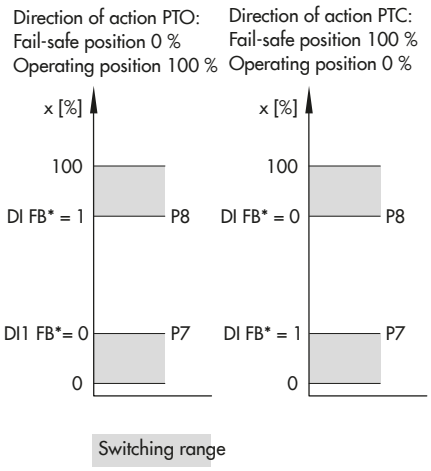
Press ◎ to confirm direction of action and to exit the parameter.

i ***Note***

*After initialization, this parameter is locked and can first be changed after performing a reset of the start-up data to default settings (**P21**).*

8.5 Adjusting the end positions

The end positions can be adjusted within the travel range. The end positions are set in the **P7** (Switching contact, lower end position) and **P8** (Switching contact, upper end position) parameters.



* **DI FB:** the Discrete Input Function Block (DI1 FB to DI5 FB) over which the valve position is communicated can be configured over FOUNDATION™ fieldbus and TROVIS-VIEW. DI1 FB is default, u KH 8390-5.

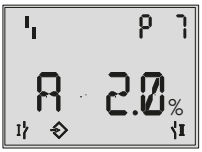
Fig. 11: *Switching range of end positions*

i ***Note***

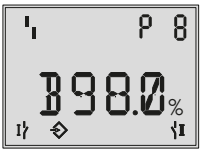
The following correlations apply to the setting ranges of the switching ranges for lower end position (P7) and the upper end position (P8):

*– **P7**: 0.5 % to (**P8** – 2.0 %)*
*– **P8**: (**P7** + 2.0 %) to 99.5 %*

Observe the assignment of the end position depending on the direction of action (see page 75).



P7: Switching contact, lower end position
Default: 2.0 %
Example: Fail-safe position for PTO direction of action



P8: Switching contact, upper end position
Default: 98.0 %
Example: Operating position for PTO direction of action

Turn ◎ → **P7/P8**

Press ◎, **P7/P8** blinks

Turn ◎ → Required switching value

Press ◎ to confirm the switching value and to exit the parameter.

8.6 Initialization

⚠ WARNING

Check the control valve's max. permissible signal pressure before starting initialization. The actuator is moved through its entire travel range during initialization. Therefore, do not start initialization while a process is running, but only during start-up, when all shut-off valves are closed.

! NOTICE

After the electronic limit switch has been mounted onto another actuator or its mounting location has been changed and before re-initializing, the electronic limit switch needs to be reset to its default setting (Code P21). Refer to section 8.9).

i Note

If an electronic limit switch is replaced with another electronic limit switch of the same type, the replaced electronic limit switch may not need to be re-initialized, provided certain conditions are met (see section 8.7).

After the electronic limit switch has been initialized, the current valve position appears in % on selecting **P0**. Keep the rotary pushbutton (◎) pressed to display the reading as an angle (°).

Two types of initialization are available:

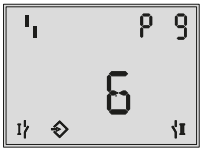
– Automatic initialization with **P9** parameter
– Manual initialization with **P10** parameter by manually confirming the end positions (POS1 and POS2)

8.6.1 Starting automatic initialization

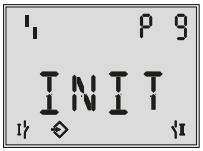
i ***Note***

The automatic initialization can be canceled by pressing the rotary pushbutton (◎). ESC appears on the display.

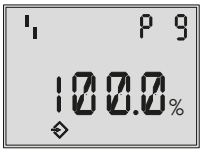
Data saved in the electronic limit switch before the initialization can be restored by pressing the rotary pushbutton (◎) again.



P9: Initialization is being prepared



P9: Initialization in progress



P9: Initialization successfully completed

Turn ◎ → **P9**

Press ◎ and hold for six seconds. The seconds remaining until the initialization starts appear on the display.

Initialization starts (display: INIT): The valve moves twice from the operating position to the fail-safe position and back again to the operating position. It measures the travel between the end stops as well as the dead time and transit times for opening and closing the valve.

After the initialization has been successfully completed, the current valve position in % is indicated.

The electronic limit switch is in the configuration mode (SET).

To start operation, exit the configuration mode (see page 32).

The automatic initialization is automatically canceled if a fault occurs (**ERR** on the display).

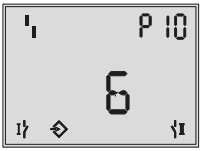
The initialization error can be read in the **ERR** parameter level:

- **E0**: No initialization
- **E1**: Actuator does not move
- **E2**: Min. travel not reached
- **E3**: Max. travel exceeded
- **E4**: Actuator travels too fast
- **E5**: No switching voltage applied
- **E6**: Time-out

8.6.2 Starting manual initialization

i ***Note***

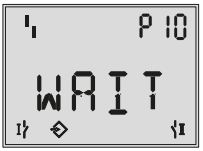
- *Select ESC on the display and press the rotary pushbutton to cancel the manual initialization. Data saved in the electronic limit switch before the initialization can be restored by pressing the rotary pushbutton (◎) again.*
- *If the electronic limit switch was initialized manually, the partial stroke test cannot be started (see section 9.2).*



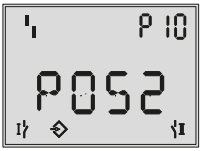
P10: Initialization is being prepared



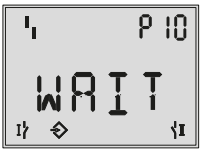
P10: Confirmation of fail-safe position (solenoid valve de-energized)



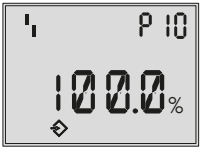
P10: Fail-safe position found



P10: Confirmation of operating position (solenoid valve energized)



P10: Operating position found



P10: Initialization successfully completed

Turn ◎ → **P10**

Press ◎ and hold for six seconds. The seconds remaining until the position check starts appear on the display.

Display: **POS1**

➔ Move the valve to the fail-safe position manually (de-energize the solenoid valve).

Press ◎ to confirm the fail-safe position → **WAIT**

The electronic limit switch saves the fail-safe position.

Display: **POS2**

➔ Move the valve to the operating position manually (energize the solenoid valve).

Press ◎ to confirm the operating position → **WAIT**

The electronic limit switch saves the operating position.

After the initialization has been successfully completed, the current valve position in % is indicated.

The electronic limit switch is in the configuration mode (**SET**).

To start operation, exit the configuration mode (see page 32).

The manual initialization is automatically canceled if a fault occurs (**ERR** on the display).

The initialization error can be read in the ERR parameter level:

– **E0**: No initialization
– **E2**: Min. travel not reached
– **E3**: Max. travel exceeded
– **E6**: Time-out

8.7 Replacing an electronic limit switch

An (old) electronic limit switch can be replaced by another (new) electronic limit switch of the same type by performing an end position calibration in the operating or fail-safe position, but without having to initialize the new one, provided the following conditions are met:

- **Data from the electronic limit switch being replaced are downloaded and saved in TROVIS-VIEW.**
- **The screw with magnet must not be unfastened while the electronic limit switch is being replaced.**
- **The end stops of the valve must not be changed while the electronic limit switch is being replaced.**

Replacing an electronic limit switch

➔ Download and save data from the electronic limit switch being replaced to the DTM or to TROVIS-VIEW.

➔ Replace electronic limit switch.

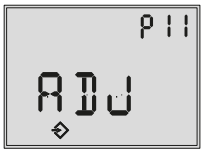
➔ Load data from TROVIS-VIEW onto the new electronic limit switch.

➔ Perform an end position calibration as described in section 8.8.

8.8 Zero/end position calibration

When the zero point or end positions are incorrect, it may be necessary to recalibrate them. Always perform an end position calibration for the fail-safe position and for the operating position.

*The electronic limit switch must be in the configuration mode (**SET**). See page 32.*



P11: Zero/end position calibration in progress

Turn ◎ → **P11**

Press ◎ and hold for six seconds. The seconds remaining until the end position calibration starts appear on the display.

The current valve position is set to the travel stop (0 % or 100 %).

The electronic limit switch is in the configuration mode (**SET**).

To start operation, exit the configuration mode (see page 32).

The end position calibration is automatically canceled if an error occurs (**ERR** on the display).

The error can be read in the **ERR** parameter level:

- **E6**: Time-out
- **E8:** Unable to calibrate end positions

8.9 Reset to default settings

This function resets all parameters to the factory default settings (see parameter list from page 51 onwards).

All error and status messages are also reset.

NOTICE

After performing a reset, the electronic limit switch needs to be re-initialized (see section 36).

*The electronic limit switch must be in the configuration mode (**SET**). See page 32.*



P21: Reset start-up data

Turn ◎ → **P21**

Press ◎, **P21** blinks

Turn ◎ → **RST**

Press ◎.

The initialization values are reset to the default settings.

➔ Re-initialize the electronic limit switch (see section 8.6).

➔ Set PST parameters (see section 41).

9 Operation

⚠ WARNING

The actuator shaft/stem moves while the electronic limit switch is operating.
Do not touch the actuator shaft/stem or obstruct it to avoid risk of injury to hands or fingers.

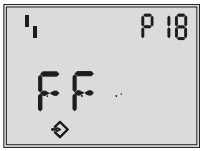
9.1 Lock operation

The on-site operation including operation over TROVIS-VIEW and the operation of the electronic limit switch over FOUNDATION™ fieldbus can be locked.

9.1.1 Locking operation over FOUNDATION™ fieldbus

When write protection is active, device data can only be read over the FOUNDATION™ fieldbus network, but not overwritten in the device. Operation is locked in the **P18** parameter.

*The electronic limit switch must be in the configuration mode (**SET**). See page 32.*



P18: FOUNDATION™ fieldbus write protection: NO

Turn ◎ → **P18**, display: NO

Press ◎, **P18** blinks

Turn ◎ → **FF**

Press ◎.

Operation over FOUNDATION™ fieldbus is locked.

Deactivate locking

Turn ◎ → **P18**, display: **FF**

Press ◎, **P18** blinks

Turn ◎ → **NO**

Press ◎.
The locking of the operation over FOUNDATION™ fieldbus is canceled.

9.1.2 Lock on-site operation

When the locking function is active, the electronic limit switch can only be operated over FOUNDATION™ fieldbus. The locked on-site operation of the electronic limit switch is indicated on the display by the ⚷ icon.

On-site operation is locked over FOUNDATION™ fieldbus. See KH 8390-5.

9.2 Partial stroke test (PST)

⚠ WARNING

Wear protection if the test is performed on the version with integrated solenoid valve while the housing cover is open.

The probability of failure on demand (PFD) can be reduced and maintenance intervals can be extended by the partial stroke test (PST).

This helps prevent the valve from seizing up in its operating position.

Partial stroke testing (PST) can only be performed on an automatically initialized device (P9). Refer to section 8.6.1.

Test procedure (Fig. 12)

The electronic limit switch issues pulses of various lengths to the solenoid valve (briefly de-energizing it) during the partial stroke test (PST), moving the valve further towards the fail-safe position.

The test has been completed successfully when the valve has reached the target range ('PST step end' ± ½ 'PST tolerance band') by one pulse, but not exceeded it. When this position is reached, DI1 = 2.

The analysis of a successfully completed test provides the following data:

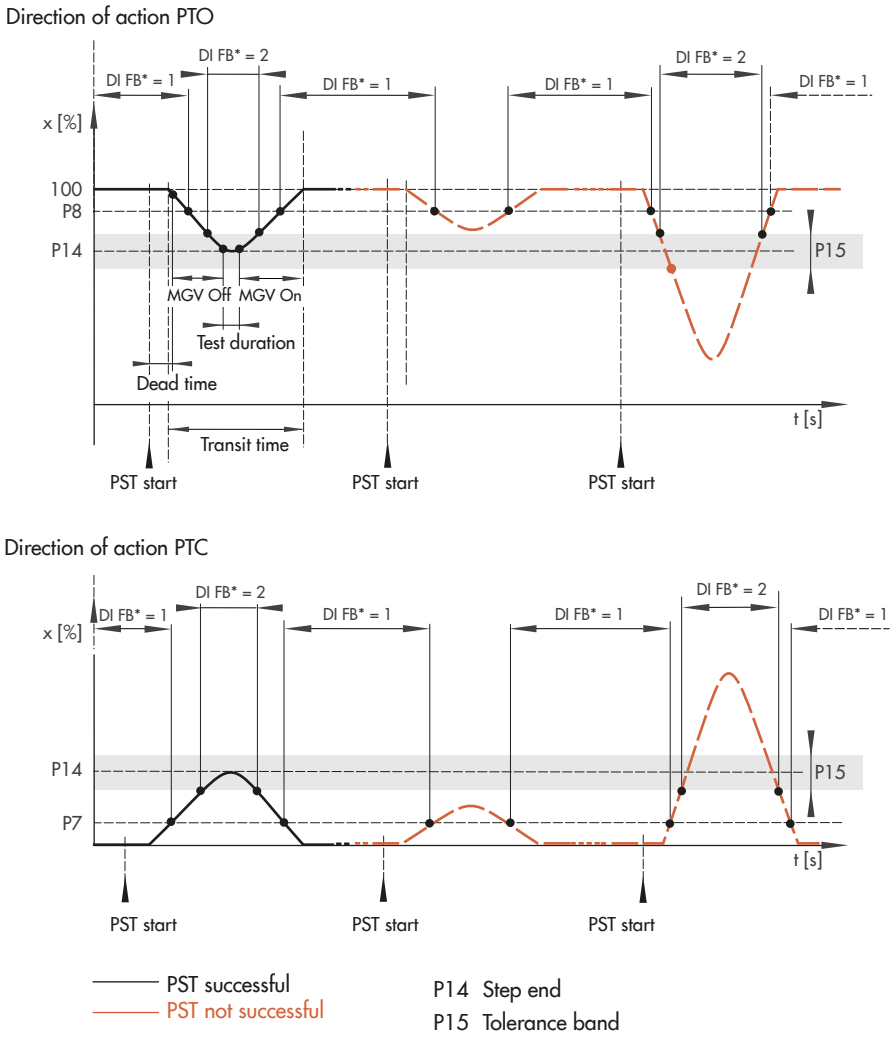
– PST pulse length
– PST dead time
– PST transit time SV de-energized
– PST hold time
– PST transit time SV energized
– PST travel
– PST status

If the test could not be completed, the corresponding F8 or F9 status message is generated:

– F8: PST: solenoid valve not energized/ forced venting active
– F9: PST: time-out

i *Note*

– If the travel of the PST is monitored and, if necessary, the status messages F6 ('PST: tolerance band not reached') and F7 ('PST: tolerance band exceeded') are to be

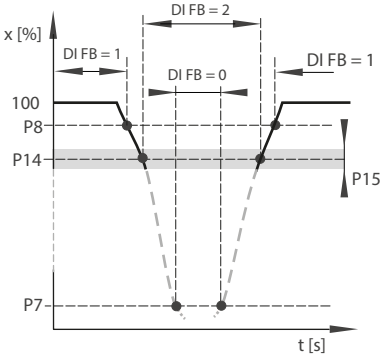


* **DI FB:** the Discrete Input Function Block (DI1 FB to DI5 FB) over which the valve position is communicated can be configured over FOUNDATION™ fieldbus and TROVIS-VIEW. DI1 FB is default, ▶ KH 8390-5.

Fig. 12: *Partial stroke test (PST)*

generated, the P12 parameter must be set to YES.

– *A refresh rate in the process control system short enough to record short transitions allows an intermediate position to be indicated with a DI FB. See ▶ KH 8390-5.*



9.2.1 Defining the PST target range

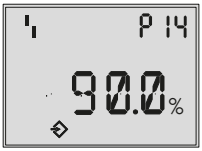
Define the target range by configuring P14 and P15 parameters.

PST target range = 'PST step end' (P14) ± ½ 'PST tolerance band' (P15)

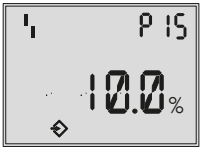
NOTICE

It is important to take the process conditions (e.g. pressure, medium, dead time, breakaway torque and torque of the valve) into account on defining the PST target range. A valve that opens (PTC) and closes (PTO) too far may affect the process.

*The electronic limit switch must be in the configuration mode (**SET**). See page 32.*



P14: PST step end
Default: 90.0 %



P15: PST tolerance band
Default: 10.0 %

Turn ◎ → **P14/P15**

Press ◎, **P14/P15** blinks

Turn ◎ → PST step end/PST tolerance band

Press ◎ to confirm the value and to exit the parameter.

9.2.2 Starting the partial stroke test

A single PST test can be started manually or a regular PST test can be started automatically at defined time intervals.

Start PST automatically at defined intervals (RUN mode)

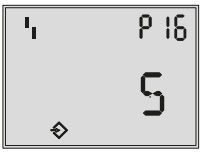
The test is performed automatically after a time interval (days) entered in P16 ('Interval for PST).

NOTICE

The automatic test causes the valve to leave its operating position without a switching demand.

Note

The default setting OFF causes the automatic test to be deactivated.



P16: Interval for PST

Turn ◎ → **P16**

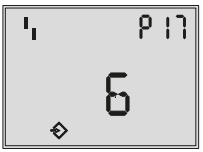
Press ◎, **P16** blinks

Turn ◎ → Required time period [days]

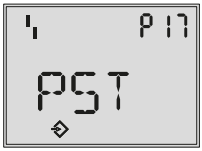
Press ◎ to confirm the entry and to exit the parameter.

Start PST manually (SET or RUN configuration mode)

A single test is started by the P17 parameter.



P17: Start of PST is being prepared



P17: Test in progress

Turn ◎ → **P17** (travel range in %)

Press ◎ and hold for six seconds.
The seconds remaining until the test starts appear on the display.

The test starts (display: PST).

Note

- *A test in progress can be canceled by pressing the rotary pushbutton (◎). ESC appears on the display.*
- *The partial stroke test can also be started over FOUNDATION™ fieldbus (▶ KH 8390-5).*

9.2.3 Configuration example based on PTO direction of action

The valve is normally open (operating position = 100 %). In the event of emergency, the valve is to close (fail-safe position = 0 %). The actuator's direction of action is therefore PTO (power to open), configured in the P5 parameter.

The upper end position (P8) is set at 98 %. This value is the same as the default setting. If the valve position exceeds this value, then DI1 = 1.

To prevent the valve seizing in the open position, a partial stroke test is to be performed on a weekly basis. During the partial stroke

test, the valve is moved from the operating position towards the fail-safe position to a step end of 90 % by briefly de-energizing the solenoid valve. During the test, the valve must not move beyond a position of 85 % and a status message is activated for monitoring purposes if the PST target range is not reached or exceeded.

The following settings are made to the initialized electronic limit switch in the example while taking the process conditions into consideration:

1. **Select configuration mode SET (P2)**

   The parameters required to configure the partial stroke test can only be set in the SET configuration mode (P2 = SET).

2. **Define PST target range (P14, P15)**

   The PST target range is made up of the 'PST step end' (P14) and the 'PST tolerance band' (P15). The test has been successfully completed when the valve reached the position of the step end ± half the tolerance band, but not moved beyond it.

   P14 ('PST step end') = 90 %

   P15 ('PST tolerance band') = 10 %

   → PST target range = 90 % ± 5 %
   = 85 to 95 %

3. **Activate the monitoring of the PST target range (P12)**

   The monitoring of the target range as well as the status readout F6 'PST: tolerance band not reached' and F7 'PST: tolerance band exceeded' are activated by the P12 parameter = YES.

   When the status message F6 or F7 is generated, check the attachment, supply air lines and the valve. The setting for the target range might need to be adapted in the P14 and P15 parameters. See "Define PST target range (P14, P15)" in point 2.

4. **Start automatic PST (P16)**

   P16 = 7 days

   The test starts automatically once a week after switching to RUN operating mode. The valve leaves the operating position (100 %) without a switching demand.

5. **Select RUN operating mode (P2)**

   The countdown starts after the electronic limit switch has been switched to the RUN operating mode (P2 = RUN).

6. **Evaluate PST (Fig. 13)**

   A partial stroke test is successfully completed when the valve reaches the defined PST target range, but has not moved beyond it. Entry into the PST range and a further three seconds after its exits causes DI1 = 2. Afterwards, this partial stroke test is reevaluated.

   The evaluation of the performed test provides the following data:

   – PST pulse length
   – PST dead time
   – PST transit time SV de-energized
   – PST hold time
   – PST transit time SV energized
   – PST travel
   – PST status

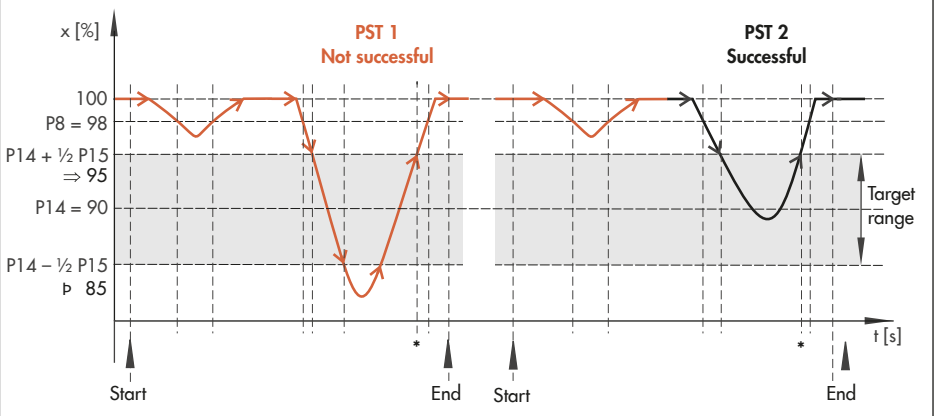
Check the voltage supply and solenoid valve wiring when the status message F8 ('PST: solenoid valve de-energized/ forced venting active') is generated.

Check the attachment and supply air line when the status message F9 ('PST: time-out') is generated.

The last ten evaluations are saved in a non-volatile memory in the electronic limit switch and can be read in the TROVIS-VIEW software.

The solenoid valve is briefly de-energized by pulses issued by the electronic limit switch to close the valve.

In this example, the valve does not reach the PST target range during the first partial stroke test and moves beyond it. The test was not successfully completed. In the second automatic test, the valve initially does not reach the PST target range. The next step though ends in the PST target range, meaning the test has been successfully completed.



* After leaving the PST target range again, DI1 = 2 applies for a further three seconds.

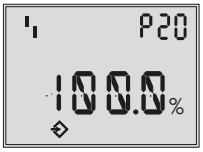
Fig. 13: *Example: course of the first of two partial stroke test (PST)*

9.3 Testing the solenoid valve

You can de-energize the solenoid valve while the voltage is still applied using the P20 parameter. In this case, the valve moves to the fail-safe position.

Observe the assignment of the end position depending on the direction of action (see page 75).

The electronic limit switch must be in the configuration mode (SET). See page 32.



P20: Testing the solenoid valve
Example: PTO

Turn ◎ → **P20**

Press ◎, **P20** blinks and ESC is displayed.

Turn ◎ → Operating position

Turn ◎ to de-energize the solenoid valve (the valve moves to the fail-safe position) while the rotary pushbutton is pressed.

Turn ◎ → **ESC**

Press ◎ to exit the parameter.

9.4 Malfunction

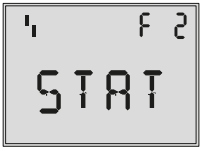
9.4.1 Status messages

When a status message is generated, the fault icon is displayed in the RUN operating mode.

The possible cause of the fault is indicated by the STAT parameter reading under F0 to F10.

i ***Note***

– *The status message F4 ('Transit time when required to move exceeded') is only generated when a fault occurs and when P13 ≠ OFF.*
– *The status messages F6 ('PST: tolerance band not reached') and F7 ('PST: tolerance band exceeded') are only generated when a fault occurs and when P12 = YES.*
– *The status message **F10** indicates that one of the error messages **E0** to **E10** has been generated.*



Example:
F2: Limit for movement counter (P26) exceeded

Refer to the parameter list (section 13.1) for possible causes and the recommended action.

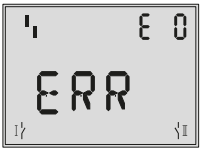
9.4.2 Error messages

When an error message is generated, the ' fault icon is displayed in the **RUN** operating mode.

The possible cause of the error is indicated by the **ERR** parameter reading under **E0** to **E10**.

Error **E9** (device error 1) causes the condensed state to be set to 'Failure'.

Error **E10** (device error 2) causes the switching position to be displayed unchanged.



Example:
E0: No initialization

Refer to the parameter list (section 13.1 and section 13.2) for possible causes and the recommended action.

9.4.3 Confirming status and error messages

i ***Note***

The status messages F0, F1, F3 and F10 as well as the error message E0 cannot be confirmed.

*The electronic limit switch must be in the configuration mode (**SET**). See page 32.*

Turn ◎ → **F0**/…/**F10**, **STAT** or **E0**/…/**E10**, **ERR**

Press ◎, **F0**/…/**F10**, **E1**/…/**E10** blinks

Turn ◎ → **RST**

Press ◎ to confirm status/error message.

10 Maintenance, calibration and work on equipment

Interconnection with intrinsically safe circuits to check or calibrate the equipment inside or outside hazardous areas must be performed only with intrinsically safe current/voltage calibrators and measuring instruments to rule out any damage to components relevant to explosion protection.

Observe the maximum permissible values specified in the certificates for intrinsically safe circuits.

10.1 Servicing

The electronic limit switch does not require any maintenance when used for its intended purpose.

⚠ DANGER

Risk of electrostatic charging
Due to the high surface resistance of the enclosure cover ($R_{Isol.} \geq 10^9$ Ω), installation and maintenance on the equipment must be performed in such a way as to prevent electrostatic charging.

Version with integrated solenoid valve (Type 3738-50-xxx4x00x1x00x0)

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.

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

11 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 performs a routine test on the device before putting it back into operation and the passing of the routine test is documented 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.

12 Firmware update (serial interface)

Firmware updates on electronic limit switches currently in operation can be performed as follows:

When updates are performed by a service employee appointed by SAMSON, the update is confirmed on the device by the test mark assigned by SAMSON's Quality Assurance.

In all other cases, only plant operator personnel with written approval may perform updates. Updates are to be confirmed on the device by approved personnel.

Laptops and computers connected to the power supply must not be used without an additional protective circuit.

This does not apply to laptop computers in battery operation. In this case, it is assumed that a battery-powered laptop computer runs briefly for software programming or testing purposes.

a) **Updates outside the hazardous area:**

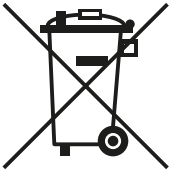
   The electronic limit switches must be removed from the actuator. Update them outside the hazardous area.

b) **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; this can be done using labels.

13 Disposal



SAMSON is a producer registered at the following European institution ▶ https://www.ewrn.org/national-registers/national-registers. WEEE reg. no.: DE 62194439/FR 025665

➔ Observe local, national and international refuse regulations.

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

i Note

We can provide you with a recycling passport according to PAS 1049 on request. Simply e-mail us at aftersalesservice@samsongroup.com giving details of your company address.

Tip

On request, we can appoint a service provider to dismantle and recycle the product as part of a distributor take-back scheme.

14 Parameter list

No.	Parameter – Readings, values [default setting]	Description	
Parameters marked with an asterisk (*) can only be changed when the electronic limit switch is in the SET configuration mode (set in P2).			
P0	Info: actual value	**After initialization:** current valve position in % Keep ◎ pressed down → current valve position in ° (angle) **Before initialization: Travel in °**	See section 8.
P1	Reading direction 1234 · ⁴32l · ESC	The reading direction of the display is turned by 180°.	See section 8.1.
Start-up			
P2	Configuration RUN · [SET] · ESC	**RUN:** Operation mode, parameter settings cannot be changed **SET:** Configuration mode (device not in service), parameter settings can be changed, ⇨ icon	See page 32
P3	Verify LCD segments 0000 to 9999	Read only	See section 8.2.
P4*	Actuator type [ROT] · LIN · ESC	**ROT:** Rotary actuator **LIN:** Linear actuator	See section 8.3.
	Note: After initialization, this parameter is locked and can first be selected and changed after performing a reset of the start-up data (P21).		
P5*	Actuator's direction of action [PTO] · PTC · ESC	**PTO (power to open):** Fail-safe position = Valve CLOSED, 0 % of travel range Operating position = Valve OPEN, 100 % of travel range **PTC (power to close):** Fail-safe position = Valve OPEN, 100 % of travel range Operating position = Valve CLOSED, 0 % of travel range	See section 8.4.
	Note: Observe the assignment depending on the direction of action (see page 75). After initialization, this parameter is locked and can first be selected and changed after performing a reset of the start-up data (P21).		
P6	Info: Forced venting	Shows whether the forced venting option exists or not (YES/NO)	–

No.	Parameter – Readings, values [default setting]	Description	
P7*	Switching contact, lower end position 0.5 % to (P8 – 2.0 %) · ESC [2.0 %]	The following applies: PTO → Switching contact for fail-safe position PTC → Switching contact for operating position	See section 8.5.
	Note: Observe the assignment depending on the direction of action (see page 75).		
P8*	Switching contact, upper end position (P7 + 2.0 %) to 99.5 % · ESC [98.0 %]	The following applies: PTO → Switching contact for operating position PTC → Switching contact for fail-safe position	See section 8.5.
	Note: Observe the assignment depending on the direction of action (see page 75).		
P9*	Automatic initialization (INIT)	Starts initialization	See section 8.6.1.
P10*	Manual initialization (INIT)	Initialization after manual confirmation of fail-safe position (POS1) and operating position (POS2)	See section 8.6.2.
P11*	End position calibration	A calibration at the current position is performed.	See section 8.8.
Status readout			
P12*	Issue status PST target range YES · [NO] · ESC	Issue status message F6/F7 if the valve moves to a position outside the PST target range ('PST step end' ± ½ 'PST tolerance band').	See section 9.2.
P13*	Actuator transit time limit [OFF] · 0.5 to 180.0 s · ESC	Issue status message F4 when the control valve exceeded the adjusted actuator transit time.	See section 9.4.1.
Partial stroke test (PST) The PST step range is limited between 2 and 98 % ('PST step end' ± ½ 'PST tolerance band')			
P14*	PST step end 4.0 to 96.0 % · ESC [90.0 %]	Step end position that the valve is to be moved to during the PST.	See section 9.2.
P15*	PST tolerance band 4.0 to 96.0 % · ESC [10.0 %]	Tolerance added to the PST step end position. The partial stroke test has been completed successfully when the valve has reached the target range ('PST step end' ± ½ 'PST tolerance band') by one pulse, but not exceeded it.	See section 9.2.

No.	Parameter – Readings, values [default setting]	Description	
P16*	Interval for PST [OFF] · 1 to 999 days · ESC	Interval between automatic partial stroke tests	See section 9.2.
P17	Start manual PST	A single automatic partial stroke test is started.	See section 9.2.
Locking function			
P18*	FOUNDATION™ fieldbus write protection [NO] · FF · HMI · ESC	**HMI:** Locking of on-site operation and operation using TROVIS-VIEW (icon: ⚷) Only over FOUNDATION™ fieldbus. **FF:** Locking of operation over the FOUNDATION™ fieldbus network Only on-site operation possible.	See section 9.1.
Test functions			
P19*	Enable simulation		
P20*	Solenoid valve testing	De-energize solenoid valve (fail-safe position)	See section 9.3.
Reset function			
P21*	Reset start-up data RST · ESC	Resets all settings of electronic limit switch to the factory default settings.	See section 8.9.
Display functions · Read only			
P22	Info: Actuator transit time while the solenoid valve is de-energized	Time [s] required by the actuator to move to the fail-safe position (dead time + transit time) Values determined during automatic initialization (P9)	–
P23	Info: Actuator transit time while the solenoid valve is energized	Time [s] required by the actuator to move to the operating position (dead time + transit time) Values determined during automatic initialization (P9)	–
P24	Info: temperature	Current operating temperature [°C] inside the electronic limit switch Keep ◎ pressed down –> reading in °F	–
P25	Info: operating hours	Number of operating hours	–

No.	Parameter – Readings, values [default setting]	Description	
Rotary motion			
P26*	Limit for movement counter OFF · 100 to 9.9E7 · ESC [1.0E4]	Status message F2 is generated when the max. number of rotary motions has been reached.	–
	Note: The monitoring of the rotary motions is deactivated by P26 = OFF.		
P27*	Reset movement counter RST · ESC	The unopened parameter indicates the number of rotary motions from one end position to the other. To reset the counter, open the parameter, select RST and confirm.	–
Bus address			
P28	Bus address		–
Firmware version			
P29	Info: firmware version (application)	Current firmware version	–
P30	Info: firmware version (communication)	Firmware version of the FOUNDATION™ fieldbus communication	–

14.1 Status messages

No.	Status message	Possible causes
Status messages marked with an asterisk (*) can be confirmed in SET configuration mode. See section 9.4.1.		
TROVIS-VIEW: Current status messages are saved with a time stamp in [Diagnostics – Status messages].		
F0	Stationary outside required/desired end positions	• Mechanical blockage • Supply pressure too low • External leakage **Recommended action** • Check attachment and supply air line.
F1	Left end position without being required to move	• Supply pressure too low • External leakage **Recommended action** • Check supply air line.
F2	Limit for movement counter (P26) exceeded	The value entered in P26 for the maximum rotary motion has been exceeded. **Recommended action** • Deactivate function or enter higher value.
F3	Temperature limits exceeded	The temperature in the electronic limit switch is too low/too high. **Recommended action** • Check the operating conditions.
F4*	Transit time when required to move exceeded ***Note:*** *The status message is only generated when P13 ≠ OFF.*	The actuator transit time has exceeded the limit entered in P13. **Recommended action** • Check attachment. • Enter a higher limit.
F5*	Actuator stationary when required to move ***Note:*** *If the valve moves after a delay, F5 remains active until the next successful switching demand.*	• Mechanical blockage • Supply pressure too low • External leakage **Recommended action** • Check attachment and supply air line.

No.	Status message	Possible causes
Partial stroke test (PST)		
F6* **F7***	PST: tolerance band not reached PST: tolerance band exceeded ***Note:*** *The status messages are only generated when P12 = YES.*	• Mechanical blockage • Friction too high • Supply pressure too low **Recommended action** • Check attachment and supply air line. • Check valve.
F8*	PST: solenoid valve not energized/forced venting active ***Note:*** *It is only evaluated when the partial stroke test is started manually (P17).*	• Breakage of wire to external solenoid valve
F9*	PST: time-out	• Mechanical blockage • Supply pressure too low • External leakage **Recommended action** • Check attachment and supply air line.
Error messages		
F10	Error E0 to E10 exists	See section 13.2
Forced venting		
F11	Forced venting active	

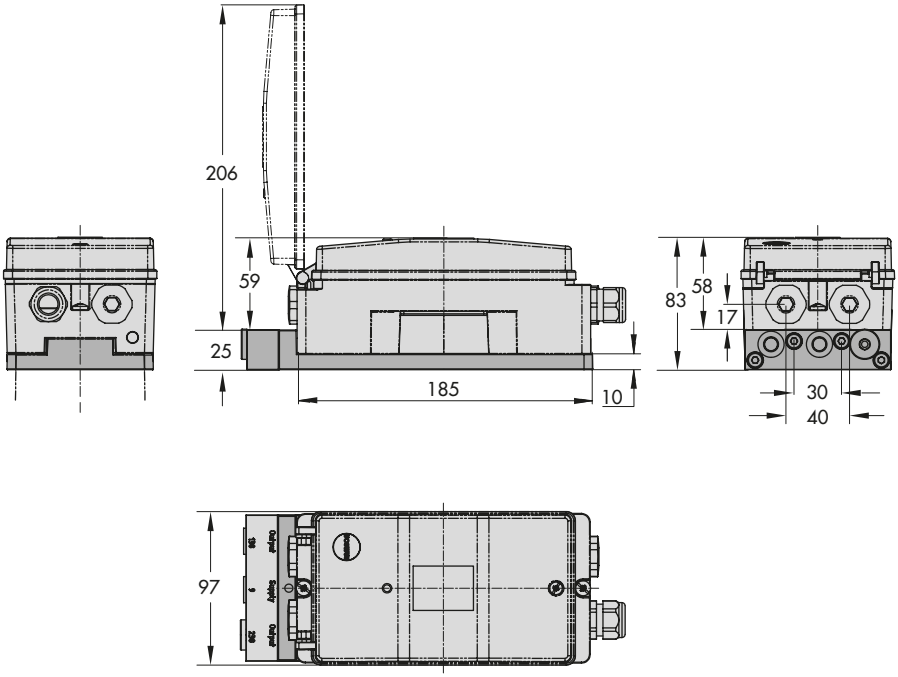
14.2 Error messages

No.	Error message	Possible causes
Error messages marked with an asterisk (*) can be confirmed in SET configuration mode. See section 9.4.2.		
TROVIS-VIEW: The last 32 error messages are displayed with a time stamp in [Diagnostics – Logging of device errors].		
E0	No initialization	• The electronic limit switch has not yet been initialized. **Recommended action** • Start initialization with P9 or P10 parameter.
E1*	INIT: actuator does not move	• Mechanical blockage • Supply pressure too low • External leakage **Recommended action** • Check attachment and supply air line.
E2*	INIT: min. travel not reached	• Mechanical blockage • Supply pressure too low • External leakage **Recommended action** • Check attachment and supply air line. • Increase angle of rotation at the actuator.
E3*	INIT: max. travel exceeded	• Maximum angle exceeds 170°. **Recommended action** • Reduce angle of rotation at the actuator.
E4*	INIT: actuator travels too fast	• K_V coefficient of solenoid valve too high **Recommended action** • Install a restriction. • Version for external solenoid valve: Reduce K_V coefficient at solenoid valve.
E5*	INIT: no switching voltage applied	• Incorrect voltage supplied to the solenoid valve • Forced venting active during initialization **Recommended action** • Check switching voltage to integrated/external solenoid valve. • Check forced venting input.

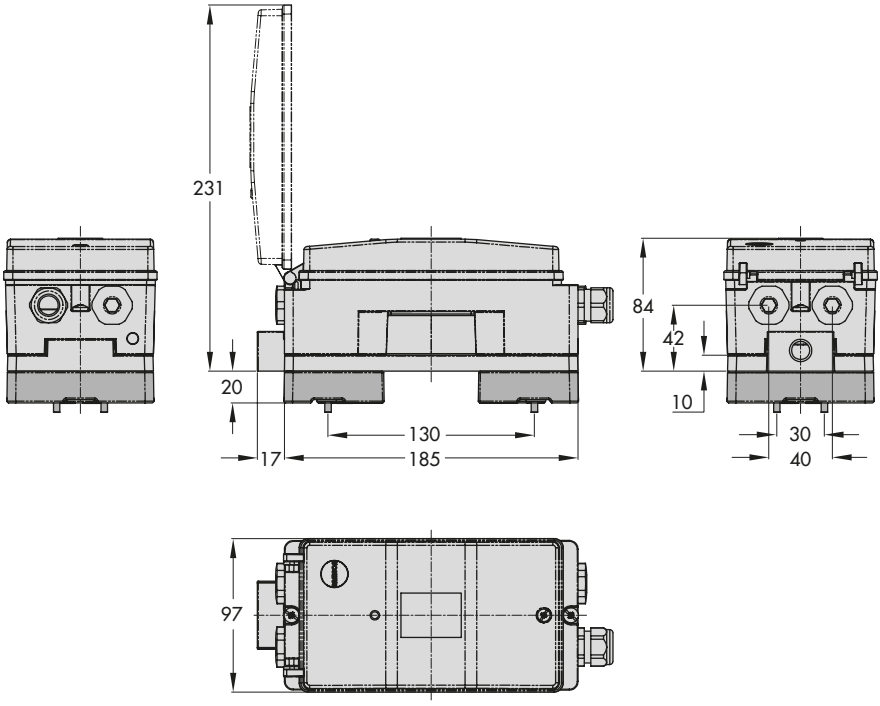
No.	Error message	Possible causes
E6*	INIT: time-out	• Supply pressure too low • Friction too high • K_V coefficient of solenoid valve too low **Recommended action** • Check attachment and supply air line. • Version for external solenoid valve: Use a different solenoid valve with a higher K_V coefficient.
E7*	Internal error	
E8*	Unable to calibrate end positions	• The end stops have shifted by 10° at the minimum. **Recommended action** • Re-initialize the electronic limit switch.
Device error		
E9*	Device error 1	• The screw with magnet is missing or not fastened properly to the actuator shaft. **Recommended action** • Check the screw with magnet to ensure it is fastened properly. Restart the device. If the malfunction still exists even though the screw with magnet is fastened properly, the electronic limit switch should be replaced soon. The device still functions. or • Internal error **Recommended action** • Restart the electronic limit switch (return it to SAMSON if error repeatedly occurs).
E10*	Device error 2	• Internal error **Recommended action** • Restart the electronic limit switch (return it to SAMSON if error repeatedly occurs).

15 Dimensions in mm

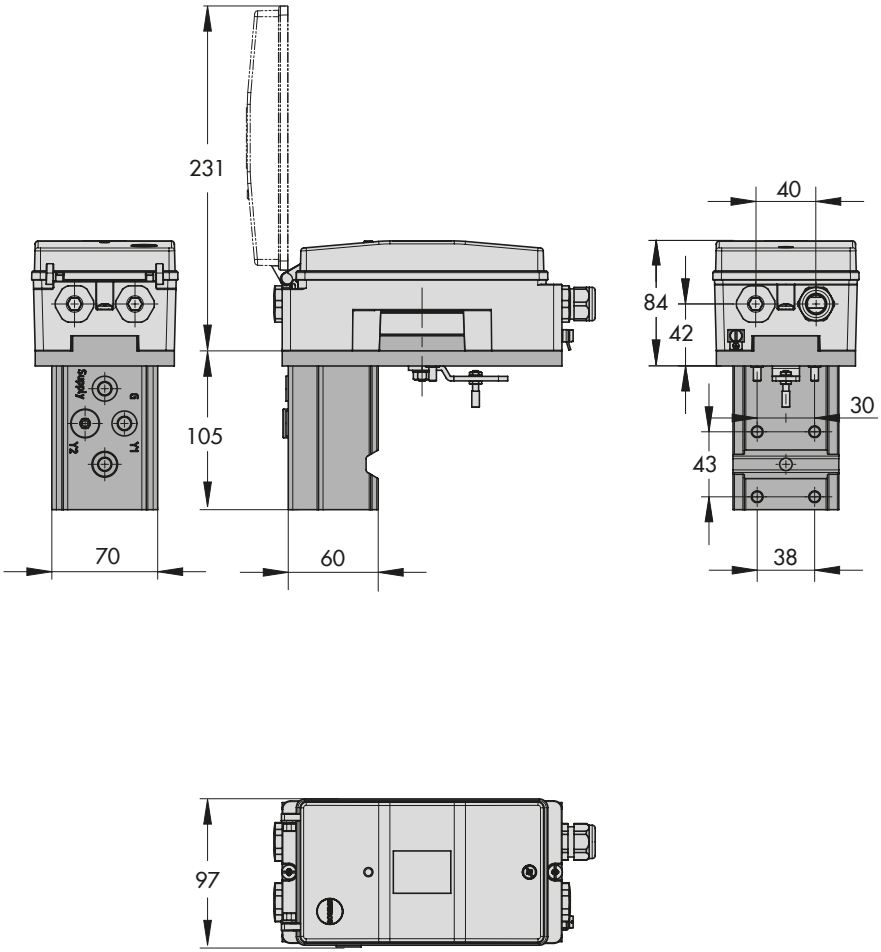
Dimensions for attachment to rotary actuators according to VDI/VDE 3845 using a mounting platform



Attachment to PFEIFFER Type 31a Actuator (Edition 2020+)



Attachment to linear actuators according to IEC 60534-6 (NAMUR)



[Translation of German original]

Physikalisch- Technische Bundesanstalt
Braunschweig and Berlin

(1) **EC 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 08 ATEX 2039 X

(4) Equipment: Type 3738-..-110.. Electronic Valve Position Monitor

(5) Manufacturer: SAMSON AG Mess- und Regeltechnik

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

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

(8) Physikalisch-Technische Bundesanstalt, notified body no. 0102 in accordance with 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, given in Annex II to the Directive.
The examination and test results are recorded in the confidential Assessment and Test Report **PTB Ex 09-28163**.

(9) Compliance with the essential health and safety requirements has been assured by compliance with:

EN 60079-0:2006 **EN 61241-0:2006**
EN 60079-11:2007 **EN 61241-11:2006**

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

(11) This EC type examination certificate relates only to the design and construction of the specified equipment or protective system in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment. These requirements are not covered by this certificate.

EC type examination certificates without signature nor seal are invalid.
This EC type examination certificates may only be reproduced without changes.
Excerpts or modifications are to be approved by Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt · Bundesallee 100 · 38116 Braunschweig · Germany

[Translation of German original]

Physikalisch- Technische Bundesanstalt
Braunschweig and Berlin

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

II 2G Ex ia IIC T6 or II 2D Ex iaD A21 IP66 T80 °C

Certification Sector for Explosion Protection Braunschweig, 16 March 2009
O/o

[Signature Johannsmeyer, stamp: Physikalisch-Technische Bundesanstalt 56]

Dr.-Ing. U. Johannsmeyer
Director and Professor

EC type examination certificates without signature nor seal are invalid.
This EC type examination certificates may only be reproduced without changes.
Excerpts or modifications are to be approved by Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt · Bundesallee 100 · 38116 Braunschweig · Germany

Ptb54-3738.doc

[Translation of German original]

Physikalisch-Technische Bundesanstalt
Braunschweig and Berlin

(13) **Enclosure**

(14) **EC Type Examination Certificate PTB 08 ATEX 2039 X**

(15) **Description of the equipment or protective system:**

The Type 3738-..-110.. Electronic Valve Position Monitor is designed to safely indicate the end positions of on/off control valves and includes different diagnostic functions for safe valve operation. The valve monitor in type of protection Ex ia IIC T6 is used for connection to intrinsically safe NAMUR contacts with intrinsically safe internal or external solenoid valves.

The valve monitor is intended for use in hazardous areas.

The following table lists the relation between equipment type, type of protection, temperature class and permissible ambient temperature range:

Type	Type of protection	Temperature class	Permissible ambient temperature range
3738-..110..	Ex ia IIC	T6	–40 °C to 55 °C
		T5	–40 °C to 70 °C
		T4	–40 °C to 80 °C

Electric data

Supply current circuit
using limit switch (A) NAMUR contact ..... in type of protection Ex ia IIC
(terminals 41/42) For connection to a certified intrinsically safe current circuit only

Max. values:

U_i = 20 V
I_i = 60 mA
P_i = 400 mW
L_i negligibly small
C_i = 5 nF

Limit switches (B/C) NAMUR contact ..... in type of protection Ex ia IIC
(terminals 51/52 or 61/62) For connection to a certified intrinsically safe current circuit only

Max. values:

U_i = 20 V
I_i = 60 mA
P_i = 400 mW
L_i negligibly small
C_i = 15 nF

EC type examination certificates without signature nor seal are invalid.
This EC type examination certificates may only be reproduced without changes.
Excerpts or modifications are to be approved by Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt · Bundesallee 100 · 38116 Braunschweig · Germany

[Translation of German original]

Physikalisch-Technische Bundesanstalt
Braunschweig and Berlin

Schedule to the EC Type Examination Certificate PTB 08 ATEX 2039 X

Limit switch (status) ..... in type of protection Ex ia IIC
(terminals 83/84) For connection to a certified intrinsically safe current circuit only

Max. values:

U_i = 20 V
I_i = 60 mA
P_i = 400 mW
L_i negligibly small
C_i = 15 nF

Version 3738-..-110.4..
Internal solenoid valve ..... in type of protection Ex ia IIC
(terminals 81/82 external operating voltage) For connection to a certified intrinsically safe current circuit only

Max. values:

U_i = 28 V
I_i = 115 mA
or
U_i = 32 V
I_i = 87.6 mA
L_i negligibly small
C_i = 5 nF

Version 3738-..-110.0..
External solenoid valve ..... in type of protection Ex ia IIC
(terminals 81/82 external operating voltage) For connection to a certified intrinsically safe current circuit only

Max. values:

U_i = 28 V
I_i = 115 mA
or
U_i = 32 V
I_i = 87.6 mA
L_i negligibly small
C_i = 5 nF
or

EC type examination certificates without signature nor seal are invalid.
This EC type examination certificates may only be reproduced without changes.
Excerpts or modifications are to be approved by Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt · Bundesallee 100 · 38116 Braunschweig · Germany

Ptb54-3738.doc

[Translation of German original]

Physikalisch-Technische Bundesanstalt
Braunschweig and Berlin

Schedule to the EC Type Examination Certificate PTB 08 ATEX 2039 X

(terminals 281/282 external solenoid valve) .... in type of protection Ex ia IIC

U_o = 28 V
I_o = 115 mA

or

U_o = 32 V
I_o = 87.6 mA
P_o = 1 W

Linear characteristic

L_i negligible small
C_i = 5 nF
L_o = 3 mH
C_o = 56 nF

Observe the rules governing the interconnection of intrinsically safe current circuits (if applicable) and ensure that the application range is observed.

SSP interface (connector) ..... in type of protection Ex ia IIC
For connection to a certified intrinsically safe current circuit only

Max. values:

U_i = 20 V
I_i = 60 mA
P_i = 200 mW
L_i negligibly small
C_i negligibly small

or
in type of protection Ex ia IIC

U_o = 9.55 V
I_o = 32 mA
P_o = 147 mW

Linear characteristic

L_i negligibly small
C_i negligibly small
L_o = 10 mH
C_o = 640 nF

Observe the rules governing the interconnection of intrinsically safe current circuits (if applicable) and ensure that the application range is observed.

EC type examination certificates without signature nor seal are invalid.
This EC type examination certificates may only be reproduced without changes.
Excerpts or modifications are to be approved by Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt · Bundesallee 100 · 38116 Braunschweig · Germany

[Translation of German original]

Physikalisch-Technische Bundesanstalt
Braunschweig and Berlin

Schedule to the EC Type Examination Certificate PTB 08 ATEX 2039 X

(16) **Assessment and Test Report PTB Ex 09-28163**

(17) **Special conditions for safe use**
To prevent the risk of electrostatic charging, mark the plastic part of the enclosure with appropriate warning instructions.
Observe the mounting instructions wherever it is necessary to protect the equipment against mechanical influences.

(18) **Essential health and safety requirements**
Compliance with the essential health and safety requirements has been assured by compliance with the standards mentioned above.

Certification Sector for Explosion Protection — Braunschweig, 16 March 2009
O/o

[Signature Johannsmeyer, stamp: Physikalisch-Technische Bundesanstalt 56]

Dr.-Ing. U. Johannsmeyer
Director and Professor

EC type examination certificates without signature nor seal are invalid.
This EC type examination certificates may only be reproduced without changes.
Excerpts or modifications are to be approved by Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt · Bundesallee 100 · 38116 Braunschweig · Germany

Ptb54-3738.doc

[Translation of German original]
Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

1st ADDENDUM
according to Directive 94/9/EC, Annex III, Clause 6
to EC Type Examination Certificate PTB 08 ATEX 2039 X

Equipment: Type 3738-..-310.. Electronic Limit Switch

Marking: Ex **II 2G Ex e [ia] IIC T4 or II 2D Ex tD A21 IP 66 T80 °C**

Manufacturer: SAMSON AG Mess- und Regeltechnik

Address: Weismüllerstr. 3, D-60314 Frankfurt, Germany

Description of additions and modifications

The Type 3738-..-110.. Electronic Limit Switch is expanded by the Type 3738-..-310..
The Type 3738-..-310.. is used for connection to external, intrinsically safe NAMUR contacts and to non-intrinsically safe solenoid valves in types of protection Ex d e, Ex e or Ex e mb.

The limit switch is intended for use in hazardous areas.

The following table lists the relation between equipment type, type of protection, temperature class and permissible ambient temperature range:

Type	Type of protection	Temperature class	Permissible ambient temperature range
3738-..-110..	Ex ia IIC	T6	–40 °C to 55 °C
		T5	–40 °C to 70 °C
		T4	–40 °C to 80 °C
3738-..-310..	Ex e [ia] IIC	T4	–40 °C to 80 °C

Electric data

Voltage supply ..... Max. values:
(terminals 81/82)
U = 24V DC
Um = 60V
P = 18W

External solenoid valve ..... Max. values:
(terminals 281/282)
U = 24V DC
Um = 60V
P = 18W

Supply current circuit
using limit switch (A) NAMUR contact ..... in type of protection Ex ia IIC
(terminals 41/42) For connection to a certified intrinsically safe current circuit only

EC Type examination Certificates without signature and seal are invalid.
This EC Type Examination Certificate may only be reproduced in its entirety and without any change, schedule included. Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

[Translation of German original]
Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

1st Addendum to EC Type Examination Certificate PTB 08 ATEX 2039 X

Max. values:
Ui = 20V
Ii = 60mA
Pi = 400mW
Li negligibly small
Ci = 5nF

Limit switches (B/C) NAMUR contact ....in type of protection Ex ia IIC
(terminals 51/52 or 61/62) ....For connection to a certified intrinsically safe current circuit only

....Max. values:
.....Ui = 20V
.....Ii = 60mA
.....Pi = 400mW
.....Li negligibly small
....Ci = 15nF

Limit switch (status)..... in type of protection Ex ia IIC
(terminals 83/84) For connection to a certified intrinsically safe current circuit only

Max. values:
.....Ui = 20V
.....Ii = 60mA
.....Pi = 400mW
.....Li negligibly small
....Ci = 15nF

Applied standards

EN 60079-0:2006 EN 60079-7:2007 EN 61241-0:2006
EN 60079-11:2007 EN 61241-1:2004

Assessment and Test Report PTB Ex 09-29233

Certification Sector for Explosion Protection Braunschweig, 20 October 2009
O/o
[Signature Gerlach, stamp: Physikalisch-Technische Bundesanstalt 56]
Dr.-Ing. U. Gerlach
Oberregierungsrat [senior government official]

EC Type examination Certificates without signature and seal are invalid.
This EC Type Examination Certificate may only be reproduced in its entirety and without any change, schedule included. Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

[Translation of German original]
Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

2nd ADDENDUM
according to Directive 94/9/EC, Annex III, Clause 6
to EC Type Examination Certificate PTB 08 ATEX 2039 X

Equipment: Type 3738-..-110.., Type 3738-..-310.. and Type 3738-..-810..
Electronic Limit Switch

Marking: **II 2 G Ex ia IIC T6 and II 2 D Ex ia IIIC T80 °C IP 66 or**
II 2 G Ex eb [ia] IIC T4 and II 2 D Ex tb IIIC T80 °C IP 66 or
II 3 G Ex ic IIC T4 and II 3 G Ex nA II T4 Gc and
II 3 D Ex tc IIIC T80 °C IP 66

Manufacturer: SAMSON AG, Mess- und Regeltechnik

Address: Weismüllerstraße 3, 60314 Frankfurt, Germany

Description of additions and modifications

The Type 3738-..-110.. and Type 3738-..-310.. Electronic Limit Switches are expanded by the Type 3738-..-810..
The Type 3738-..-810.. in type of protection Ex ic or Ex nA is used to energize external solenoid valves. The limit switch is intended for use in hazardous areas of zone 2 or 22.

The following table lists the relation between equipment type, type of protection, temperature class and permissible ambient temperature range:

Type	Type of protection	Temperature class	Permissible ambient temperature range
3738-..-110..	Ex ia IIC	T6	–40 °C to 55 °C
		T5	–40 °C to 70 °C
		T4	–40 °C to 80 °C
3738-..-310..	Ex eb [ia] IIC	T4	–40 °C to 80 °C
3738-..-810..	Ex ic IIC or Ex nA II	T4	–40 °C to 80 °C

EC type examination certificates without signature nor seal are invalid.
This EC type examination certificates may only be reproduced without changes.
Excerpts or modifications are to be approved by Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt · Bundesallee 100 · 38116 Braunschweig · Germany

[Translation of German original]
Physikalisch-Technische Bundesanstalt
Braunschweig and Berlin

2nd Addendum to EC Type Examination Certificate PTB 08 ATEX 2039 X

Electric data

Voltage supply ..... in type of protection Ex ic IIC
(terminals 81/82)

Max. values:

U_i = 32 V DC
I_i = 100 mA
C_i = 5 nF
L_i negligibly small

or
in type of protection Ex nA II
Operating values:

U_B = 24 V
U_m = 60 V

Supply current circuit ..... in type of protection Ex ic IIC
using limit switch (A) NAMUR contact
(terminals 41/42)

Max. values:

U_i = 32 V DC
I_i = 100 mA
C_i = 5 nF
L_i negligibly small

or
in type of protection Ex nA II
Operating values:

U_B = 8 V
R_i = 1 kΩ (EN 60947-5-6)

Limit switches (B/C) NAMUR contacts ..... in type of protection Ex ic IIC
(terminals 51/52 or 61/62)

Max. values per limit switch:

U_i = 20 V DC
I_i = 60 mA
C_i = 15 nF
L_i negligibly small

or
in type of protection Ex nA II
Operating values:

U_B = 8 V
R_i = 1 kΩ (EN 60947-5-6)

EC type examination certificates without signature nor seal are invalid.
This EC type examination certificates may only be reproduced without changes.
Excerpts or modifications are to be approved by Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt · Bundesallee 100 · 38116 Braunschweig · Germany

Ptb54 Add-2.doc

[Translation of German original]

Physikalisch-Technische Bundesanstalt
Braunschweig and Berlin

2nd Addendum to EC Type Examination Certificate PTB 08 ATEX 2039 X

Limit switches (status) ..... in type of protection Ex ic IIC
(terminals 83/84)

Max. values:

U_i = 20 V DC
I_i = 60 mA
C_i = 15 nF
L_i negligibly small

or
in type of protection Ex nA II
Operating values:

U_B = 8 V
R_i = 1 kΩ (EN 60947-5-6)

External solenoid valve..... in type of protection Ex ic IIC
(terminals 281/282)

Max. values:

U_o = 32 V DC
I_o = 100 mA
Linear characteristic
C_o = 56 nF
L_o = 3 mH
C_i = 5 nF
L_i negligibly small

or
in type of protection Ex nA II
Operating values:

U_B = 24 V
U_m = 60 V

Observe the rules governing the interconnection of intrinsically safe current circuits (if applicable) and ensure that the application range is observed.

SSP interface ..... in type of protection Ex ic IIC
(connector)

Max. values:

U_i = 20 V DC
I_i = 60 mA
C_i negligibly small
L_i negligibly small

EC type examination certificates without signature nor seal are invalid.
This EC type examination certificates may only be reproduced without changes.
Excerpts or modifications are to be approved by Physikalisch-Technische Bundesanstalt.

[Translation of German original]

Physikalisch-Technische Bundesanstalt
Braunschweig and Berlin

2nd Addendum to EC Type Examination Certificate PTB 08 ATEX 2039 X

or

U_o = 9.55 V DC
I_o = 32 mA
P_o = 147 mW
Linear characteristic
C_o = 640 nF
L_o = 10 mH
C_i = 5 nF
L_i negligibly small

or
in type of protection Ex nA II
Operating values:

U_B = 8 V
I_B = 20 mA

Observe the rules governing the interconnection of intrinsically safe current circuits (if applicable) and ensure that the application range is observed.

The special conditions and all specifications of the EC type examination certificate remain valid without changes.

Applied standards

EN 60079-0:2009 EN 60079-7:2007 EN 60079-11:2007 EN 60079-31:2009

Assessment and Test Report PTB Ex 12-21067

Certification Sector for Explosion Protection Braunschweig, 2 February 2012
O/o

[Signature Johannsmeyer, stamp: Physikalisch-Technische Bundesanstalt 24]

Dr.-Ing. U. Johannsmeyer
Director and Professor

EC type examination certificates without signature nor seal are invalid.
This EC type examination certificates may only be reproduced without changes.
Excerpts or modifications are to be approved by Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt · Bundesallee 100 · 38116 Braunschweig · Germany

Ptb54 Add-2.doc

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

3. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 08 ATEX 2039 X

(Translation)

Equipment: Electronic limit signal transducer, types 3738-40-.10 and 3738-50-.10

Marking: Ⓔx **I 2 G Ex ia IIC T6** and **II 2 D Ex ia IIIC T80 °C IP66** or
II 2 G Ex eb [ia] IIC T4 and **II 2 D Ex tb IIIC T80 °C IP66** or
II 3 G Ex ic IIC T4 and **II 3 G Ex nA II T4** and
II 3 D Ex tc IIIC T80 °C IP66

Manufacturer: SAMSON AG Mess- und Regeltechnik

Address: Weismüllerstr. 3, 60314 Frankfurt, Germany

Description of supplements and modifications

The electronic limit signal transducers of type series 3738-..-.10 are supplemented by types 3738-40-.10 and 3738-50-.10. Communication is carried out alternatively according to PROFIBUS PA (type 3738-40) or FOUNDATION Fieldbus specification (type 3738-50).

Type 3738-40-810.. and type 3738-50-810.. which are designed to Ex ic or Ex nA type of protection are intended for the application in hazardous areas of zone 2 or 22 respectively.

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

Type	Type of protection	Temperature class	Permissible range of the ambient temperature
3738-40-110.. 3738-50-110..	Ex ia IIC	T6 T5 T4	-40 °C ... 55 °C -40 °C ... 70 °C -40 °C ... 80 °C
3738-40-310.. 3738-40-310..	Ex eb [ia] IIC	T4	-40 °C ... 80 °C
3738-40-810.. 3738-50-810..	Ex ic IIC bzw. Ex nA II	T6 T5 T4	-40 °C ... 55 °C -40 °C ... 70 °C -40 °C ... 80 °C

EC-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

Normal.dotm

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

3. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 08 ATEX 2039 X

Electrical data

Note:
The electrical data for the types of protection Ex ia, Ex ic and Ex nA are represented below. The special conditions, the electrical data for type 3738-20-.10 and all other specifications of the EC-type examination certificate and its supplements apply without changes.

BUS-terminal, signal circuit.....type of protection Ex ia IIC/IIB

For relationship between type of protection and permissible electrical data, reference is made to the following tables:

Type 3738-40

PROFIBUS PA
Ex ia IIC/IIB
U_i = 17.5 V DC
I_i = 380 mA
P_i = 5.32 W

or

Type 3738-50

Foundation™ Fieldbus	
Ex ia IIC	Ex ia IIB
U_i = 24 V DC	U_i = 24 V DC
I_i = 380 mA	I_i = 380 mA
P_i = 1.04 W	P_i = 2.58 W
	C_i = 5 nF
	L_i = 10 µH

or

BUS-terminal, signal circuit.....type of protection Ex ic IIC/IIB

Type of protection	U_i [VDC]	I_i [mA]	P_i [W]
Ex ic IIC	20 24 32	464 261 132	2.32 1.56 1.04
Ex ic IIB	20 24 32	1170 650 324	5.88 3.89 2.77

EC-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

3. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 08 ATEX 2039 X

C_i = 5 nF
L_i = 10 µH

or

type of protection Ex nA II

U_B = 9 ... 24 VDC
I_B = 15 mA

Solenoid, internal ..... internal circuit without external connection facilities
(plug connector ASR/X2)

type of protection Ex ia IIC/IIB

Maximum values: Bus-interfacing

Note: Only one of the following options will be applied in each case.

Option External Solenoid U_N = 6 V DC ..... type of protection Ex ia IIC/IIB

Maximum values: Bus-interfacing
L_i negligibly low
C_i = 5 nF

Voltage supply BUS-connection ..... type of protection Ex ic IIC/IIB
(terminal V_{out})

Maximum values: Bus-interfacing
L_i negligibly low
C_i = 5 nF

or

type of protection Ex nA II

Maximum values: Bus-interfacing

Option External Solenoid U_N = 24 V DC

Signal input/output ..... type of protection Ex eb II
(terminals 81+/82-, 281+/282-)

Operating values:

U_B = 24 V DC
U_m = 60 V DC
P = 18 W

EC-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

3. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 08 ATEX 2039 X

Option External Solenoid U_N = 24 V DC

Signal input ..... type of protection Ex ia IIC/IIB
(terminals 81+/82-)

Maximum values:
U_i = 28 V DC
I_i = 115 mA
P_i = 1 W

or

U_i = 32 V DC
I_i = 87.8 mA
P_i = 1 W

L_i negligibly low
C_i = 5 nF

Signal output ..... type of protection Ex ia IIC/IIB
(terminals 281+/281-)

Maximum values:
U_i = 28 V DC
I_i = 115 mA
P_i = 1 W

or

U_o = 32 V DC
I_o = 87.8 mA
P_o = 1 W
linear characteristic

L_o = 10 mH
C_o = 150 nF

L_i negligibly low
C_i = 5 nF

Serial interface SSP ..... type of protection Ex ia IIC/IIB
(plug connector)

Maximum values (passive):
U_i = 20 V DC
I_i = 60 mA
P_i = 200 mW

L_i negligibly low
C_i negligibly low

EC-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

or

Maximum values (active):

U_o = 5.35 V DC
I_o = 35 mA
P_o = 50 mW
linear characteristic

For relationship between type of protection, explosion group and permissible external reactances, reference is made to the table:

Ex ia	L_o	C_o
IIC	10 mH	1.7 µF
IIB	10 mH	12 µF

or

type of protection Ex ic IIC/IIB

Maximum values (passive):

U_i = 20 V DC
I_i = 60 mA
P_i = 200 mW

L_i negligibly low
C_i negligibly low

or

Maximum values (active):

U_o = 5.35 V DC
I_o = 35 mA
P_o = 50 mW
linear characteritic

For relationship between type of protection, explosion group and permissible external reactances, reference is made to the table:

Ex ic	L_o	C_o
IIC	10 mH	3.1 µF
IIB	10 mH	19 µF

EC-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

3. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 08 ATEX 2039 X

L_i negligibly low
C_i = 5 nF

or

type of protection Ex nA II

Operating values:

U_B = 8 V
I_B = 20 mA

The rules for the interconnection of intrinsically safe circuits shall be observed where applicable and the adherence to the field of application shall be safeguarded.

Binary input, active (terminals 85+/86-) ..... type of protection Ex ia IIC/IIB

Maximum values:

U_i = 20 V
I_i = 60 mA
P_i = 200 mW

L_i negligibly low
C_i negligibly low

or

type of protection Ex nA II

Operating value:

U_B = 30 V

Binary input, passive (terminals 87+/88-) ..... type of protection Ex ia IIC/IIB

Maximum values:

U_i = 30 V
I_i = 100 mA

L_i negligibly low
C_i = 110 nF

or

Binary input, active (terminals 85+/86-) ..... type of protection Ex ic IIC/IIB

Maximum values:

U_i = 30 V
I_i = 152 mA

EC-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

3. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 08 ATEX 2039 X

L_i negligibly low
C_i negligibly low

or

type of protection Ex nA II

Operating value:

U_B = 30 V

Binary input, passive ..... type of protection Ex ic IIC/IIB
(terminals 87+/88-)

Maximum values:

U_i = 32 V
I_i = 132 mA

L_i negligibly low
C_i = 110 nF

or

type of protection Ex nA II

Operating value:

U_B = 32 V

Applied standards

EN 60079-0:2009 EN 60079-7:2007 EN 60079-11:2012 EN 60079-27:2008 EN 60079-31:2009

Test report: PTB Ex 12-21143

Zertifizierungsdirektor Explosionsschutz
On behalf of PTB:

Dr.-Ing. U. Johannsmeier
Direktor und Professor

Braunschweig, July 19, 2012

EC-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

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

Grenzsignalgeber / Limit Switch / Contacts de position
Typ / Type / Type 3738-..-000

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

ce_3738-_000_de_en_fra_rev07.pdf

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

Grenzsignalgeber / Limit Switch / Contacts de position
Typ/Type/Type 3738-20-110, -20-310, -20-810

entsprechend der EU-Baumusterprüfbescheingung PTB 08 ATEX 2039 X ausgestellt von der/
according to the EU Type Examination PTB 08 ATEX 2039 X issued by/
établi selon le certificat CE d'essais sur échantillons PTB 08 ATEX 2039 X 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 /
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
Explosion Protection 2014/34/EU	EN 60079-0:2012/A11:2013, EN 60079-7:2015, EN 60079-11:2012, EN 60079-15:2010, EN 60079-31:2014
RoHS 2011/65/EU	EN 50581:2012

Hersteller / Manufacturer / Fabricant:

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

Frankfurt / Francfort, 2018-12-17

Im Namen des Herstellers/ On behalf of the Manufacturer/ Au nom du fabricant.

i.V. Dr. Fuchs

Dr. Julian Fuchs
Zentralabteilungsleiter/Head of Department/Chef du département
Entwicklung Ventilanbaugeräte und Messtechnik
Development Valve Attachments and Measurement Technologies

i.V. S. Schäfer

Dipl.-Ing. Silke Bianca Schäfer
Total Quality Management/
Management par la qualité totale

ce_3738-..110_de_en_fra_rev08.pdf

Assignment based on the direction of action

PTO (power to open)

DI1 state	Position	Switching contact for end position
DI1 = 0	Fail-safe position (0 %) · Valve CLOSED	P7 (0.5 % to P8 – 2.0 % [2.0 %])
DI1 = 1	Operating position (100 %) · Valve OPEN	P8 (P7 + 2.0 % to 99.5 %, [98.0 %])

PTC (power to close)

DI1 state	Position	Switching contact for end position
DI1 = 0	Fail-safe position (100 %) · Valve OPEN	P8 (P7 + 2.0 % to 99.5 %, [98.0 %])
DI1 = 1	Operating position (0 %) · Valve CLOSED	P7 (0.5 % to P8 – 2.0 % [2.0 %])

Key number 42

SAMSON AKTIENGESELLSCHAFT
Weismüllerstraße 3 · 60314 Frankfurt am Main, Germany
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507
samson@samsongroup.com · www.samsongroup.com