




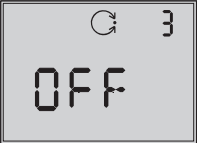

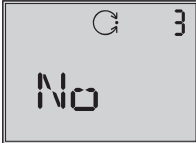
Addendum for Mounting and Operating Instructions EB 8384-2 EN and EB 8384-3 EN

Edition August 2007
for new firmware version 1.5x

Readings for activated/deactivated functions

The readings on the positioner display has changed in firmware 1.5x and higher as follows (see code list):

- ▶ Function activated: **ON → YES**
- ▶ Function deactivated: **OFF → No**

Example Code 3 (enable configuration):			
Positioner with firmware 1.49 and lower		Positioner with firmware 1.50 and higher	
			

Reset to default values

In firmware 1.5x and higher, two different reset functions can be selected in **Code 36** (reset):

36*	Reset [No] Std · diAG ESC	Std: Resets all parameters to default values (factory setting) as well as the diagnosis data. After resetting the parameters, the positioner must be re-initialized. diAG: Resets only the diagnosis data. Plotted reference graphs and logs remain unaffected. The positioner does not need to be re-initialized.
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Article code for firmware 1.5x and higher

The article code has been altered because the following functions have been added:

- ▶ The positioner additionally has an optional binary input (see section on optional binary input).

- ▶ All **EXPERT+** diagnostic functions are available in the positioner without activation (see section on additions to the code list).

Refer to EB 8389 EN for a detailed description of the diagnostic functions (also available in Internet at www.samson.de).

Article code		Type 3730-2/-3	x	x	x	x	x	0	x	x	0	x	0	0	x	0	x	x
Explosion protection																		
None			0															
⊕ II 2 G EEx ia IIC T6/II 2 D IP 65 T 80 °C acc. to ATEX			1															
CSA/FM intrinsically safe/non incandive			3															
⊕ II 3 G EEx na II T6 acc. to ATEX			8															
Additional equipment																		
Inductive limit switch	Without		0															
	With Type SJ 2-SN		1		0													
Solenoid valve SIL 4	Without		0															
	24 V DC		4															
Analog position transmitter	Without				0													
	With				1		0											
External position sensor	Without					0												
	With		0			1												
Binary input	Without							0										
	With					0		2										
Diagnostics	EXPERT plus								4									
Housing material	Aluminum									0								
	Stainless steel 1.4581					0				1								
Device for special applications	Without														0			
	Free of substances that impair paint adhesion														1			
	Exhaust air with ¼ NPT connection														2			
Special versions	Without															0	0	
	IECEX		1													1	2	

Application type (new)

In firmware 1.5x and higher, two types of valves are now available: **Control valve** and **Open/Close (on/off) valve**.

Note: Select the application type and perform the settings for the open/close valve in Code 49. See section on additions to code list.

The manual operating mode \rightarrow (MAN) and the automatic operating mode \odot (AUTO) can be selected with both application types.

Depending on the type of valve that has been selected, the positioner behaves differently in the automatic mode (AUTO) \odot :

	Control valve	Open/Close valve
AUTO \odot	The positioner follows continuously the reference variable. The valve position (current position) appears in % on the display.	Discrete analysis of the reference variable. The valve position (current position) in % and O/C (Open/Close) appear in alternating sequence on the display.
MAN \rightarrow	The positioner follows the reference variable given over local operation.	

Open/close (on/off) valve

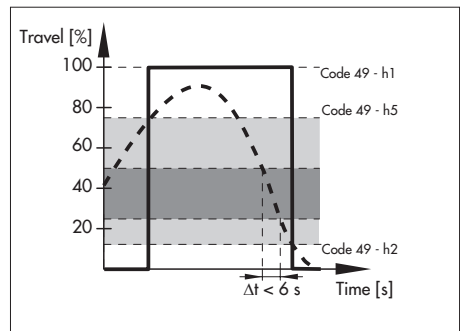
Note: The travel range of open/close valves is defined using the fail-safe position and the given Operating point. As a result, the following parameters to define the operating range and the range of the reference variable cannot be changed or analyzed:
 Travel/angle range start (Code 8)
 Travel/angle range end (Code 9)
 Travel/angle lower limit (Code 10)
 Travel/angle upper limit (Code 11)

Reference variable range start (Code 12)
 Reference variable range end (Code 13)

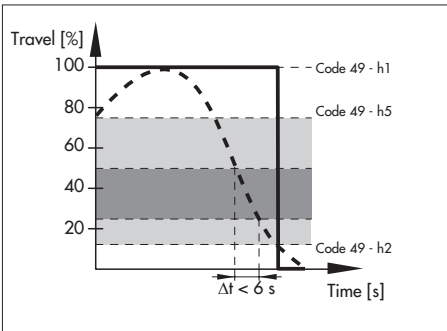
If the valve is to be operated with the open/close application type, enter the operating point, test limits and limits for the discrete analysis.

Discrete analysis

If the reference variable (— — —) is below *Limit operating point* (Code 49 - h5) at the start of automatic operation, the valve (—) moves to the fail-safe position. If the reference variable increases and exceeds the *Limit operating point*, the valve moves to the *Operating point* (Code 49 - h1). The valve moves back to the fail-safe position if later the reference variable falls below the *Limit fail-safe position* (Code 49 - h2).

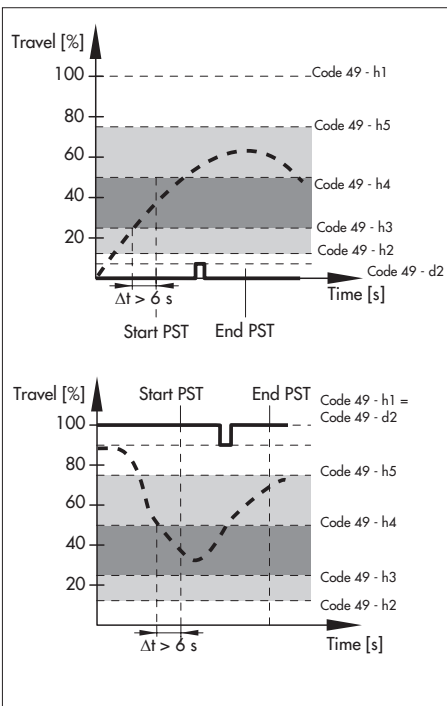


If the reference variable (— — —) is above *Limit operating point* (Code 49 - h5) at the start of automatic operation, the valve (—) moves to the *Operating point* (Code 49 - h1). If later the reference variable drops below the *Limit fail-safe position* (Code 49 - h2), the valve moves to the fail-safe position.



Starting the partial stroke test (PST)

A partial stroke test is started when the reference variable (— — —) moves from a defined position (fail-safe position or *Operating point*) into the range between *Lower limit test start* (Code 49 - h3) and *Upper limit test start* (Code 49 - h4) and remains there for longer than six seconds. The valve (—) moves from the last defined position to *Step start* (Code 49 - d2).



After the partial stroke test is completed, the valve moves back to its previous position (fail-safe position or *Operating point*).

Note: The partial stroke test (PST) is performed according to the settings in Code 49 - d2 to 49 - d9. Refer to EB 8389 EN on EXPERT® valve diagnostics.

Cancellation of the partial stroke test (PST)

The partial stroke test is cancelled whenever the reference variable leaves the range between *Limit fail-safe position* and *Limit operating point*.

After the test has been cancelled, the valve moves back to its previous position (fail-safe position or *Operating point*).

Performing settings

Enable configuration:

Turn \otimes → Code 3, display: **No**

Press \otimes , Code 3 blinks.

Turn \otimes → **YES**

Press \otimes , display: \diamond

Select Open/Close as application type:

Turn \otimes → Code 49

Press \otimes , Code 49 blinks.

Turn \otimes → Code h0

Press \otimes , Code h0 blinks.

Turn \otimes → **YES**

Press \otimes

Enter the operating point, test limits and limits for discrete analysis:

Turn \otimes → Code h1/h2/h3/h4/h5

Press \otimes , Code h1/h2/h3/h4/h5 blinks.

Turn \otimes and set selected parameter.

Press \otimes to confirm setting.

Optional binary input

The positioner has an optional binary input. The following actions can be performed over the binary input:

- ▶ **Transfer switching state** [default]
The switching state of the binary input is logged.
- ▶ **Set local operation write protection**
Settings cannot be changed at the positioner while the binary input is active. The configuration enabled function in Code 3 is not active.
- ▶ **Start partial stroke test (PST)**
The positioner starts a single partial stroke test. The test is performed according to the settings in Code 49 - d2 to Code 49 - d9 (refer to EB 8389 EN on EXPERT+ valve diagnostics).
- ▶ **Go to fail-safe reference value**
An open/close valve moves to the entered fail-safe reference value when the positioner is in automatic mode \odot (AUTO). No action is started when the positioner is in manual mode ✎ (MAN) or fail-safe position (SAFE).
- ▶ **Switch between AUTO/MAN**
The positioner changes from automatic mode \odot (AUTO) mode into manual mode ✎ (MAN) and vice versa.

No action is started if the positioner is in the fail-safe position.

- ▶ **Start data logger**
The data logger is started when the binary input is active (refer to EB 8389 EN on EXPERT+ valve diagnostics).
- ▶ **Reset diagnosis**
Any active diagnostic functions in *Statistical information* (in-service monitoring) and *Tests* (out-of-service diagnostics) are cancelled and the diagnosis data are reset once.
- ▶ **External solenoid valve connected**
The triggering of an external solenoid valve is recognized.
- ▶ **Leakage sensor**
The "External leakage soon to be expected" error is set. The error is reset when the edge control is set to OFF. The alarm remains saved in the logging.

Note:

The optional binary output can only be configured using the TROVIS-VIEW software and over the DD parameters (refer to EB 8389 EN on EXPERT+ valve diagnostics). The switching state is transferred when the switch is open in the default setting.

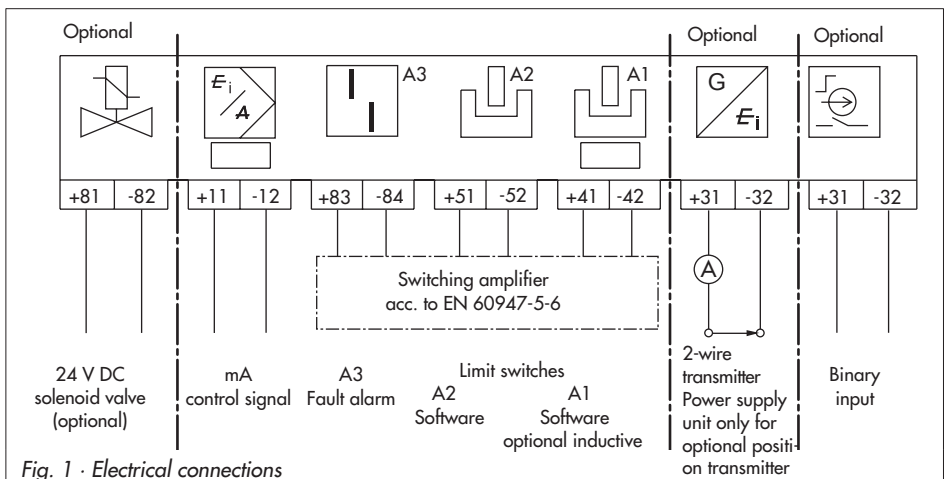


Fig. 1 · Electrical connections

Additions to the code list

Code no.	Parameter – Display, values [default setting]	Description
Note: Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.		
48*	Diagnostic parameters d	
	d0 Temperature -55 to 125 °C	Current operating temperature [°C] inside the positioner (accuracy ± 3 %) Display only
	d1 Minimum temperature [20]	The lowest temperature below 20 °C that has ever occurred. Display only
	d2 Maximum temperature [20]	The highest temperature above 20 °C that has ever occurred. Display only
	d3 Number of zero calibrations [0]	The number of zero calibrations since the last initialization. Display only
	d4 Number of initializations [0]	The number of initializations that have been performed since the last reset. Display only
	d5 Zero point limit [5.0 %] 0.0 to 100.0 % of the nominal range	User-defined zero point monitoring Used for error monitoring of the zero point shift.
	d6 Condensed state	Condensed state, made up from the individual states · Display only · Display only OK Okay C Maintenance required CR Maintenance demanded b Maintenance alarm S Out of specification
	d7 Start reference test [No] ON · ESC	Reference test for Drive signal y steady-state (d1) and drive signal y hysteresis (d2) (Tests). The reference test can only be activated in manual mode (MAN) as the valve moves through its entire working range. If EXPERT* is activated in older positioners at later point in time, the reference graphs must be plotted in order to activate the diagnostic functions.
	d8 - Unassigned	Firmware version 1.4x and lower: Enter the activation code for EXPERT*.

Code no.	Parameter – Display, values [default setting]	Description
Note: Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.		
48*	Diagnosis parameters h	
h0	Initialization with reference test [No] · YES ESC	The reference graphs for Drive signal y steady-state (d1) and drive signal y hysteresis (d2) (Tests) are plotted during the reference test.
h1	Reference test result [No] · YES	Display only No No reference test has been performed. YES The reference graphs for Drive signal y steady-state (d1) and drive signal y hysteresis (d2) (Tests) have been plotted successfully.
h2	– Unassigned	
h3	Auto reset diAG 0 to 365 days; [0 days]	After an adjustable time period, the diagnosis data are reset automatically according to the settings in Code 36 - diAG. Example: A start-up behavior of the plant which is untypical for the process is not to be included in the total diagnosis.
h4	Rest time for auto reset diAG	Display only Remaining time until the diagnosis data are reset automatically according to the settings in Code 48 - h3
49*	Partial stroke test (PST)/Full stroke test (FST) · Application type	
A Partial stroke test (PST)		
A0	Start Partial Stroke Test [No] · YES · ESC	Set operating mode and test mode PST to MAN.
A1	Time until the next automatic PST test takes place	Display only Remaining time [d_h] until the next partial stroke test is performed. Only applies to PST Auto mode.
A2	Desired PST testing mode Auto · [Man] · ESC	Activates (PST Auto) or deactivates (PST Man) the scheduled automatic partial stroke test.
A3	Auto test time	Time [h] between for partial stroke tests (PST)
A4	Classification report PST status [C] · OK · CR · b · S ESC	C Maintenance required OK No message CR Maintenance demanded b Maintenance alarm S Out of specification
A5	Min. recommended scan time	Display only Scan time [s] required to plot the complete step response test.
A6	– Unassigned	

Code no.	Parameter – Display, values [default setting]	Description
Note: Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.		
49*	A7 y-monitoring reference value	<p>Display only</p> <p>The valve moves to the valve position <i>Step start</i> (Code 49 - d2) and <i>Step end</i> (Code 49 - d3) with certain control pulses. The difference between these control pulses creates the delta y value [1/s].</p> <p>The y-monitoring reference value applies to the adjusted step values (Code 49 - d2 and Code 49 - d3) and for the selected ramp times (Code 49 - d5 and Code 49 - d6). The y-monitoring reference value must be determined again if any of the above mentioned values change.</p>
A8	Activation delta y-monitoring [No] · YES · ESC	Activates/deactivates delta y-monitoring
A9	delta y-monitoring value 0 to 100 %; [10 %]	<p>The percentage [%] of the entire range of the control pulse between 1 and 10000 1/s (Example: 10 % = 10000 1/s)</p> <p>The partial stroke test is cancelled if the change in control signal (delta y) varies from the y-monitoring reference value by this amount.</p>
d Step parameters for the partial stroke test (PST)		
d1 – Unassigned		
d2	Step start 0.0 to 100.0 %; [95.0 %]	Start value to perform the step response test
d3	Step end 0.0 to 100.0 %; [90.0 %]	End value to perform the step response test
d4	Activation of the ramp function [No] · YES	Activates/deactivates the ramp function.
d5	Ramp time (rising) 0 to 9999 s; [15 s]	Ramp time for 0 to 100 % travel (rising) of the ramp function. Do not enter a ramp time which is lower than the value automatically given during initialization.
d6	Ramp time (falling) 0 to 9999 s; [15 s]	Ramp time for 0 to 100 % travel (falling) of the ramp function. Do not enter a ramp time which is lower than the value automatically given during initialization.
d7	Settling time before test start 1.0 to 240.0 s; [10.0 s]	Waiting time before the test starts to allow the valve to safely reach the step start value.

Code no.	Parameter – Display, values [default setting]	Description
Note: Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.		
49*	d8 Delay time after step 1.0 to 240.0 s; [2.0 s]	Time after the first step until the second step starts.
	d9 Scan time 0.2 to 250.0 s; [0.2 s]	Scan time of the step response test
	E Cancellation conditions of the partial stroke test (PST)	
	E0 Activation x control [No] · YES	Activates/deactivates x control.
	E1 x control value -10.0 to 110.0 % of total travel; [0.0 %]	The test is automatically cancelled as soon as the valve position falls below this value.
	E2 – Unassigned	
	E3 – Unassigned	
	E4 – Unassigned	
	E5 Activation tolerance band control [No] · YES	Activates/deactivate tolerance band control.
	E6 PST Tolerance band 0.1 to 100.0 %; [5.0 %]	The test is automatically cancelled as soon as the <i>Step end</i> (Code 49 - d3) exceeds this value.
	E7 Max. test duration 30 to 25000 s; [30 s]	Maximum time within which a test can be completed before the test is cancelled automatically.
	F Partial stroke test (PST) information · Display only	
	F0 No test available	No test exists or the test has been cancelled manually.
	F1 Test OK	
	F2 x cancellation	The test was cancelled by the x cancellation function.
	F3 y cancellation	The test was cancelled by the y cancellation function.
	F4 Tolerance band exceeded	The test was cancelled. The x-values exceeded the tolerance band.
	F5 Max. test time exceeded	The test was not completed within the maximum test time and was cancelled.
	F6 Test man. cancelled	The test has been manually cancelled by the user.
F7 Measured data storage out of memory	The maximum capacity of the memory for measured data has been reached. After 100 measured data per measured variable have been recorded, the logging stops. However, the test is continued.	

Code no.	Parameter – Display, values [default setting]	Description
Note: Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.		
49*	F8 Aborted by int. solenoid valve	The test was cancelled by the activation of the solenoid valve.
	F9 Supply pressure/friction	An insufficient supply pressure or excessive friction occurred during the test.
h Application type of valve		
	h0 Application type [No] · YES · ESC	No Control valve YES Open/close (on/off) valve Depending on the application type of valve that has been selected, the positioner has different diagnostic functions and behaves differently in the automatic mode (AUTO).
	h1 Operating point 0.0 to 100.0 % valve position; [100.0 %]	The valve moves to this position as soon as the reference variable exceeds the <i>Limit operating point</i> (Code 49 - h5).
	h2 Limit fail-safe position 0.0 to 20.0 % reference variable; [12.5 %]	The valves moves to the fail-safe position (SAFE) when the reference variable falls below this limit.
	h3 Lower limit test start [25.0 % reference variable]	Display only The valve remains in its last valid position when the reference variable is between the <i>Limit fail-safe position</i> and <i>Lower limit test</i> . A partial stroke test is started when the reference variable moves to the range between <i>Lower limit test</i> and <i>Upper limit test</i> and remains there longer than six seconds.
	h4 Upper limit test start [50.0 % reference variable]	Display only The valve remains in its last valid position when the reference variable is between the <i>Upper limit test</i> and <i>Limit operating point</i> .
	h5 Limit operating point 55.0 to 100.0 % reference variable; [75.0 %]	The valve moves to the <i>Operating point</i> when the reference variable exceeds the <i>Limit operating point</i> .
	h6 – Unassigned	
	h7 Limit value time analysis 0.6 to 30.0 s; [0.6 s]	Time limit for the difference between the reference value and the latest recorded value. It determines at which difference value an alarm is to be generated.
	h8 Limit value travel analysis 0.1 to 100.0 % valve position; [0.3 %]	Travel limit for the difference between the reference value and the latest recorded value. It determines at which difference value an alarm is to be generated.

Code no.	Parameter – Display, values [default setting]	Description	
Note: Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.			
49*	h9 Classification report Close/open [C] · OK · CR · b · S ESC	C OK CR b S	Maintenance required No message Maintenance demanded Maintenance alarm Out of specification



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