

MOUNTING AND OPERATING INSTRUCTIONS



EB 8395 EN

Translation of original instructions



Type 3724 Positioner (cover removed)

Type 3724 Electropneumatic Positioner

Firmware version 1.01



Edition October 2018

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.

- 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 (aftersaleservice@samsongroup.com).



The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is 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	Safety instructions and measures	5
1.1	Notes on possible personal injury	7
1.2	Notes on possible property damage	7
2	Markings on the device	9
2.1	Nameplate	9
2.2	Article code	9
3	Design and principle of operation	10
3.1	Technical data	12
3.2	Dimensions in mm	14
4	Measures for preparation	15
4.1	Unpacking	15
4.2	Transporting	15
4.3	Storage	15
5	Mounting and start-up	16
5.1	Pneumatic connections	16
5.1.1	Supply pressure	16
5.2	Electrical connections	18
5.2.1	Accessories	18
5.2.2	Selecting cables and wires	19
5.2.3	Cable entry	19
6	Operation	20
6.1	Operating controls	20
7	Operating the positioner	22
7.1	Adapting the display	23
7.2	Enabling configuration to change parameters	23
7.3	Adjusting the volume restriction Q	24
7.4	Entering the opening direction/direction of action	25
7.5	Entering the direction of action	25
7.6	Limiting the signal pressure	25
7.7	Adjusting the limit contacts	26
7.8	Setting other parameters	26
7.9	Initialization	27
7.10	Zero calibration	28
7.11	Manual mode	29
7.12	Reset	30

Contents

8	Servicing.....	31
8.1	Preparation for return shipment.....	31
8.2	Firmware update.....	31
9	Malfunction.....	32
9.1	Error codes.....	33
9.2	Emergency action	34
10	Decommissioning and removal	35
10.1	Decommissioning.....	35
10.2	Removing the positioner	35
10.3	Disposal.....	35
11	Annex.....	36
11.1	After-sales service.....	36
11.2	Code list.....	37

1 Safety instructions and measures

Intended use

The Type 3724 Positioner is delivered as a ready-mounted unit on Type 3379 Pneumatic Piston Actuators. It is used to assign the valve position to the control signal. The device is designed to operate under exactly defined conditions (e.g. operating pressure, temperature). Therefore, operators must ensure that the positioner is only used in applications where the operating conditions correspond to the technical data. In case operators intend to use the positioner in other applications or conditions than specified, contact SAMSON.

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

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

Reasonably foreseeable misuse

The Type 3724 Positioner is **not** suitable for the following applications:

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

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

- Use of non-original spare parts

- Performing maintenance activities not specified by SAMSON

Qualifications of operating personnel

The positioner must be mounted, started up and serviced by fully trained and qualified personnel only; the accepted industry codes and practices are to be observed. According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible hazards due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.

Personal protective equipment

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

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

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

Safety instructions and measures

Revisions and other modifications

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

Safety features

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

Warning against residual hazards

The positioner has direct influence on the control valve. To avoid personal injury or property damage, plant operators and operating personnel must prevent hazards that could be caused in the control valve by the process medium, the operating pressure, the signal pressure or by moving parts by taking appropriate precautions. They must observe all hazard statements, warning and caution notes in these mounting and operating instructions, especially for installation, start-up and service work.

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

Responsibilities of the operator

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

Responsibilities of operating personnel

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

Referenced standards and regulations

The device with a CE marking fulfills the requirements of the Directive 2014/30/EU and the Directive 2014/35/EU. The Declaration of Conformity is available on request.

Referenced documentation

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

- The mounting and operating instructions of the components on which the positioner is mounted (valve, actuator, valve accessories etc.).

1.1 Notes on possible personal injury

WARNING

Risk of personal injury due to moving parts on the valve.

During initialization of the positioner and during operation, the actuator stem moves through its entire travel range. Injury to hands or fingers is possible if they are inserted into the valve.

- During initialization, do not touch any moving valve parts.

1.2 Notes on possible property damage

NOTICE

Risk of malfunction due to incorrect sequence during start-up.

The positioner can only work properly if the mounting and start-up are performed in the prescribed sequence.

- Perform mounting and start-up as described in section 1.6 in page 5.

Unauthorized manual adjustments to the positioner will damage it!

- Do not move the pick-up rod manually.

Dirty supply air will cause the positioner to malfunction!

- Only use supply air that is dry and free of oil and dust.
- Blow through all air pipes and hoses thoroughly before connecting them.

An incorrect electric signal will damage the positioner.

A current source must be used to provide the electrical power for the positioner.

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

Incorrect assignment of the terminals will damage the positioner and will lead to malfunction.

For the positioner to function properly, the prescribed terminal assignment must be observed.

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

A reference variable above or below the static destruction limit will damage the positioner.

- Keep the reference variable within the static destruction limit of ± 32 V.

Malfunction due to initialization not yet completed.

The initialization causes the positioner to be adapted to the mounting situation. After initialization is completed, the positioner is ready to use.

- Initialize the positioner on the first start-up.
- Re-initialize positioner after changing any parameters.

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

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

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

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

2 Markings on the device

2.1 Nameplate

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

SAMSON 3724 Positioner		
Model 3724-	1	
Serial no.	2	Firmware 3
Var-ID	4	
SAMSON AG D-60314 Frankfurt		Made in Germany

Input	5
Supply max.	6

 See technical data for ambient temperature

- 1 Model number
- 2 Serial number
- 3 Firmware version
- 4 Configuration ID
- 5 Reference variable
- 6 Supply

2.2 Article code

Positioner	Type 3724-	0	0	0	0	0	0	0	x	0	0	0	0	0
Housing material														
Housing: 1.4409 · Cover: 1.4404								0						
Surface finish														
Micro-bead blasted									1					
Polished ($R_a \leq 0.6 \mu\text{m}$)									2					
Permissible ambient temperature														
-20 to +80 °C										0				
Degree of protection														
IP 65 ¹⁾ (only applies in combination with Type 3379 Pneumatic Actuator)													0	

¹⁾ Pending

3 Design and principle of operation

The Type 3724 Positioner is delivered as a ready-mounted unit on Type 3379 Pneumatic Piston Actuators.

The positioner is used to assign the valve position (controlled variable x) to the control signal (reference variable w). The positioner compares the electric control signal of a control system to the travel of the control valve (1) and issues a signal pressure (output variable y) for the pneumatic actuator.

The positioner mainly consists of the following components (see Fig. 1):

- Magneto-resistive sensor (2)
- Analog i/p converter (6) with a downstream air capacity booster (7)
- Electronics unit with microcontroller (4)
- Software limit contacts (12)

The travel is measured by an internal pick-up rod, which is connected to a magnet, as well as a non-contact magneto-resistive sensor and the downstream electronics.

The motion of the pick-up rod causes the direction of the magnetic field to change. This change is sensed by the sensor (2). The electronics unit determines the current valve position from this information.

The position of the valve is transmitted to the microcontroller (4) over its A/D converter (3). The microcontroller contains a modified PID controller which compares the actual valve position with the 4 to 20 mA control signal. The resulting output value is passed on to the D/A converter. In case of a system deviation, the activation of the i/p module

(6) is changed so that the actuator (1) is pressurized or vented accordingly over the downstream air capacity booster (7). The supply air is supplied to the booster (7) and the pressure regulator (8).

NOTICE

Unauthorized manual adjustments to the positioner will damage it!

Do not move the pick-up rod manually.

The output signal pressure supplied by the booster can be limited to 2.3 bar by software.

The volume restriction Q (10) is used to optimize the positioner by adapting it to the actuator.

Tight-closing function

The pneumatic actuator is completely filled with air or vented as soon as the reference variable falls below 1 % or exceeds 99 % (see set point cutoff in P10 and P11 parameter codes).

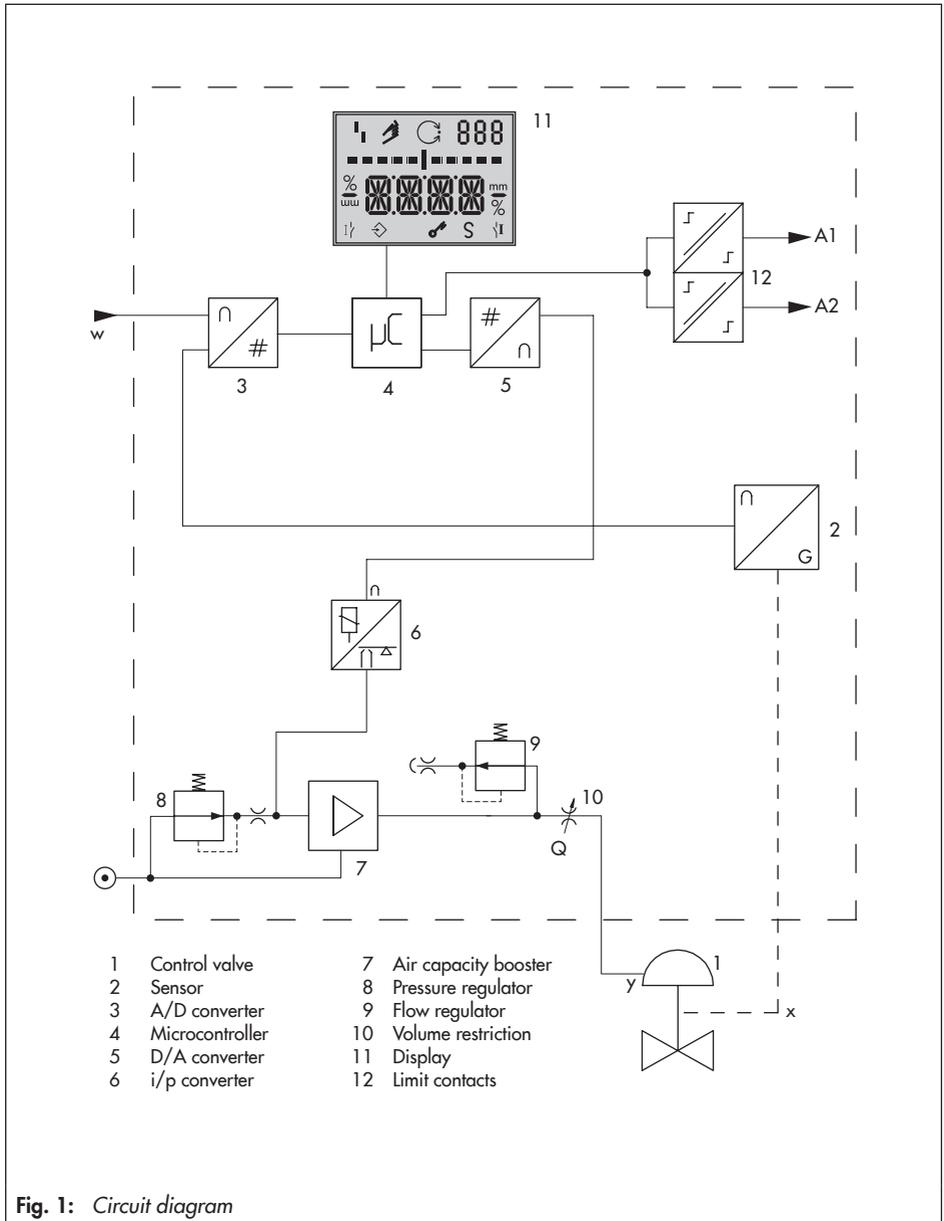


Fig. 1: Circuit diagram

3.1 Technical data

Table 1: *General technical data*

Positioner	
Attachment	Type 3379 piston Ø: 63 mm · Effective area: 31 cm ² Type 3379 piston Ø: 90 mm · Effective area: 63 cm ²
Travel	4 to 16 mm, adjustable in steps of 0.5 mm
Reference variable w (reverse polarity protection)	4 to 20 mA signal range · Two-wire device Split-range operation 4 to 11.9 mA and 12.1 to 20 mA
Static destruction limit	±32 V
Minimum current	3.8 mA
Load impedance	Max. 6.3 V
Supply air Air quality acc. to ISO 8573-1	Supply air: 1.4 to 7 bar (20 to 105 psi) 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
Air consumption, steady state	Independent of supply air approx. 110 l _n /h
Signal pressure (output)	0 bar up to the supply pressure minus 0.4 bar Can be limited to approx. 2.3 bar by software
Characteristic	Three selectable characteristics: Linear · Equal percentage · Reverse equal percentage
Transit time	Only for actuators with initialization time > 0.4 s ¹⁾
Direction of action	w/x reversible
Perm. ambient temperature	-20 to +80 °C
Electromagnetic compatibility	Complying with EN 61000-6-2, EN 61000-6-3 and NAMUR Recommendation NE 21
Degree of protection	IP 65 ²⁾ (only applies in combination with Type 3379 Pneumatic Actuator)
Compliance	CE

Materials	
Housing	1.4409
Cover	1.4404
Dome (visual indicator)	Polycarbonate
Weight (without actuator)	Approx. 1.2 kg

- 1) For faster actuators, a volume restriction must be used. Otherwise, the initialization cannot be performed successfully.
- 2) Pending

Table 2: *Limit contacts*

Binary contacts		Two software limit contacts (min., max.)
Version		Reverse polarity protection, galvanic isolation
Adjustment range		0 to 100 % (see section 7.7 on page 26)
Step size		0.5 %
Static destruction limit		± 32 V
Signal state	No response	Non-conducting (highly resistive), $I < 100 \mu\text{A}$
	Response	Conducting ($R = 330 \Omega$)
For connection to		– Binary input of a PLC acc. to IEC 61131-2, $P_{\text{max}} = 400 \text{ mW}$

3.2 Dimensions in mm

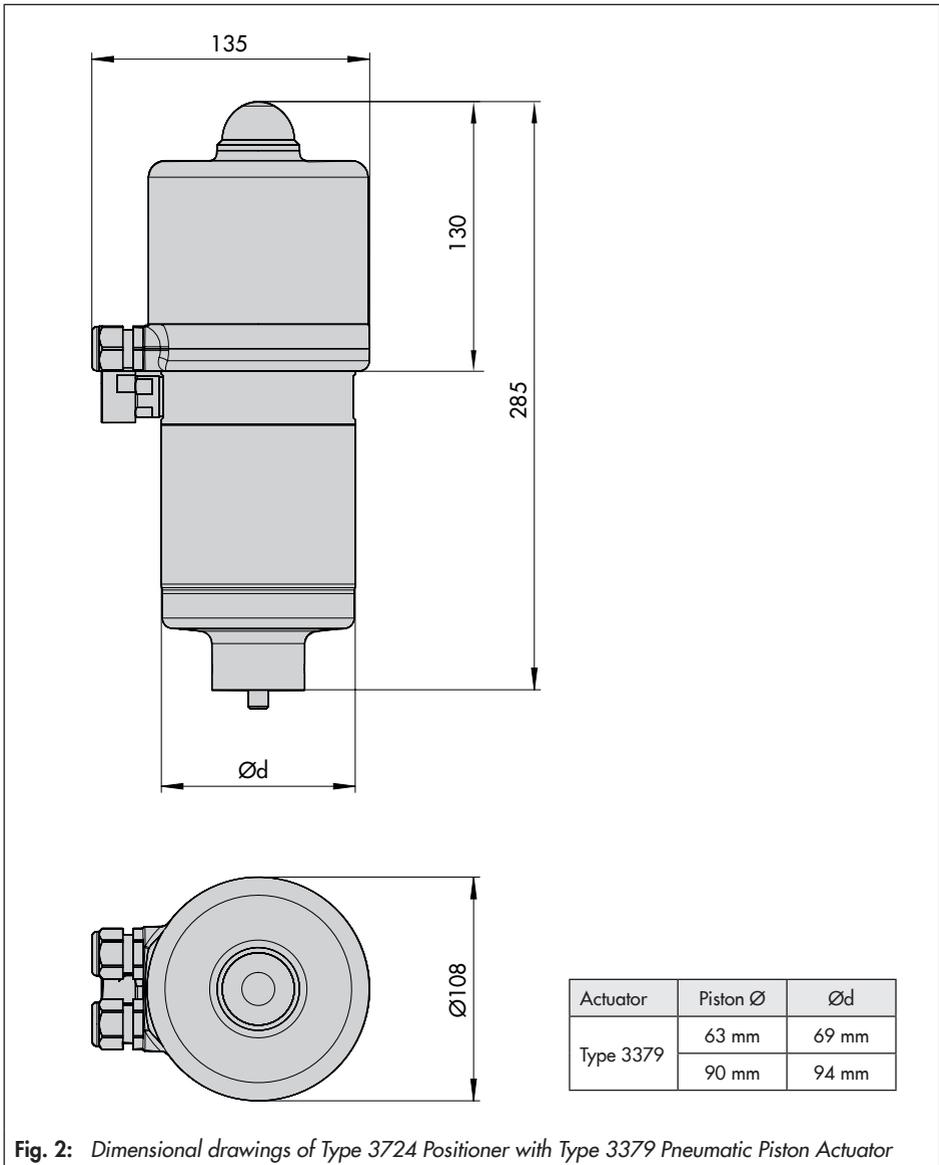


Fig. 2: Dimensional drawings of Type 3724 Positioner with Type 3379 Pneumatic Piston Actuator

4 Measures for preparation

After receiving the shipment, proceed as follows:

1. Check the scope of delivery. Compare the shipment received with the delivery note.
2. Check the shipment for transportation damage. Report any transportation damage.

4.1 Unpacking

! NOTICE

Risk of positioner damage due to foreign particles entering it.

Do not remove the packaging and protective film/protective caps until immediately before mounting and start-up.

1. Remove the packaging from the positioner.
2. Dispose of the packaging in accordance with the valid regulations.

4.2 Transporting

- Protect the positioner against external influences (e.g. impact).
- Protect the positioner against moisture and dirt.
- Observe transport temperature depending on the permissible ambient temperature (see technical data in section 3.1).

4.3 Storage

! NOTICE

Risk of positioner damage due to improper storage.

- Observe storage instructions.
- Avoid long storage times.
- Contact SAMSON in case of different storage conditions or long storage periods.

Storage instructions

- Protect the positioner against external influences (e.g. impact, shocks, vibration).
- Do not damage the corrosion protection (coating).
- Protect the positioner against moisture and dirt. In damp spaces, prevent condensation. If necessary, use a drying agent or heating.
- Observe storage temperature depending on the permissible ambient temperature (see technical data in section 3.1).
- Store positioner with closed cover.
- Seal pneumatic and electrical connections.

5 Mounting and start-up

! NOTICE

Risk of malfunction due to incorrect sequence of mounting, installation and start-up. Observe the prescribed sequence.

i Note

The unit consisting of the Type 3724 Positioner, Type 3379 Actuator and valve is ready assembled on delivery.

In special cases, the valve and actuator are delivered separately and must be assembled on site. In this case, read the associated valve documentation.

→ Sequence to be kept on installing and starting up the positioner:

1. Remove the protective caps from the pneumatic connections.

2. Perform pneumatic installation.

→ Section 5.1 onwards

3. Perform electrical installation.

→ Section 5.2 onwards

4. Perform settings.

→ Section 7 onward

5.1 Pneumatic connections

The Type 3724 Positioner is delivered ready mounted on the Type 3379 Pneumatic Piston Actuator. The pneumatic connections of the positioner are connected internally to the connections of the actuator.

The pneumatic connections of the actuator are used (see Mounting and Operating Instructions of the Type 3379 Pneumatic Piston Actuator ► EB 8315) for start-up (see section 7 on page 22).

! NOTICE

Dirty supply air will cause the positioner to malfunction!

Only use supply air that is dry and free of oil and dust.

Blow through all air pipes and hoses thoroughly before connecting them.

5.1.1 Supply pressure

The required supply air pressure depends on the bench range and the actuator's operating direction (fail-safe action). The bench range is written on the nameplate either as the bench range or signal pressure range. The operating direction is marked **FA** or **FE** or by a symbol.

FA: actuator stem extends (air to open/ATO)

Fail-close (for globe and angle valves):
Required supply pressure = Upper bench range value + 0.4 bar, minimum 1.4 bar.

FE: actuator stem retracts (air to close/ATC)

Fail-open (for globe and angle valves):
For tight-closing valves, the maximum signal pressure $p_{st_{max}}$ is roughly estimated as follows:

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

d = Seat diameter [cm]

Δp = Differential pressure across the valve [bar]

A = Actuator area [cm²]

F = Upper bench range value [bar]

If there are no specifications, calculate as follows:

Recommended supply pressure =
Upper bench range value + 1 bar

i Note

The signal pressure at the output (38) of the positioner can be restricted to approx. 2.3 bar by setting P9 parameter code to ON.

5.2 Electrical connections

NOTICE

An incorrect electric signal will damage the positioner.
Only use a current source and never a voltage source.

- ➔ Connect the wiring as shown in Fig. 3.
- ➔ Select cables and wires as described in section 5.2.2.
- ➔ Insert cables as described in section 5.2.3.

NOTICE

Incorrect assignment of the terminals will damage the positioner and will lead to malfunction.

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

5.2.1 Accessories

Description	Order no.
Cable gland: Black plastic, M16x1.5	8808-1010

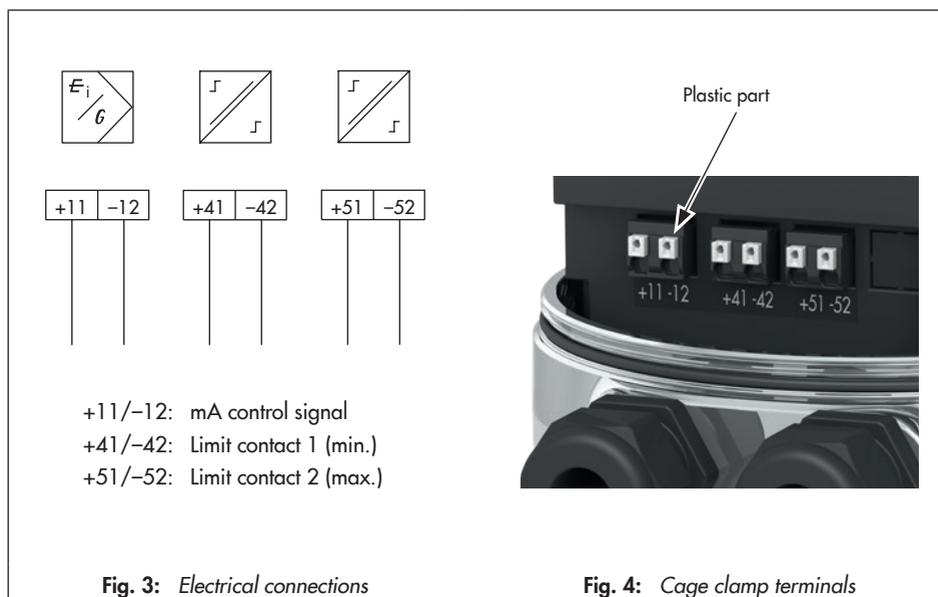


Fig. 3: Electrical connections



Fig. 4: Cage clamp terminals

5.2.2 Selecting cables and wires

The minimum radial thickness of the conductor insulation must be suitable for the conductor diameter and type of insulation. It must be at least 0.2 mm.

The diameter of an individual wire in a fine-stranded conductor must not be smaller than 0.1 mm.

Protect the conductor ends against splicing, e.g. by using wire-end ferrules.

5.2.3 Cable entry

The M16x1.5 cable gland is designed for a clamping range of 6 to 12 mm.

The cage clamp terminals hold wire cross-sections of 0.2 to 1.5 mm².

- Unscrew the cover and remove it.
- To unlock the cage clamp terminals: place a slotted screwdriver on the plastic part (Fig. 4) and lightly push it into the terminal block.
- Insert or remove the wire **without force**.
- Guide wires for the reference variable to the terminals +11 and -12 located on the housing.

⚠ NOTICE

A reference variable above or below the static destruction limit will damage the positioner.

Keep the reference variable within the static destruction limit of ± 32 V.

Mounting the cover

- Mount the cover, briefly turn it counter-clockwise to center it. Turn it clockwise to firmly close it.

6 Operation

The positioner is operated by three pushbuttons for menu navigation on the display (see Fig. 5):

△: Up

*: Confirm

▽: Down

→ To adapt the air capacity, adjust the volume restriction (see section 7.3).

6.1 Operating controls

Press △ or ▽ button to select a parameter code (P0 to P20). Then press * button to confirm the selected code.

To save changes to parameters in a non-volatile memory, proceed as follows:

- After changing parameters, press △ or ▽ button to change to Code P0 or
- wait three minutes until the display returns automatically to P0.

i Note

- The  icon on the display indicates that the changed parameter settings have not yet been saved in the non-volatile memory.
- The selected parameter code remains active until you change the setting or exit the parameter code.
- After changing settings in P2, P4 and P8 parameter codes, the positioner must be re-initialized.

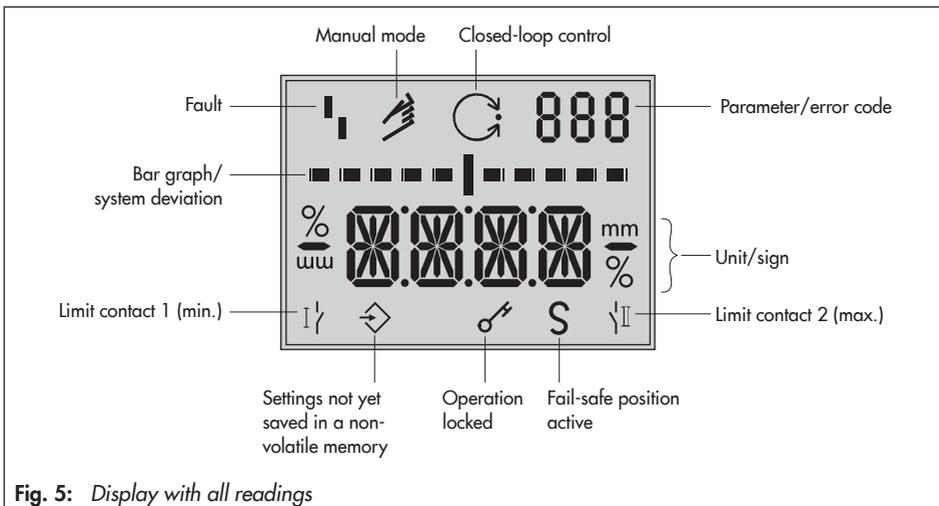
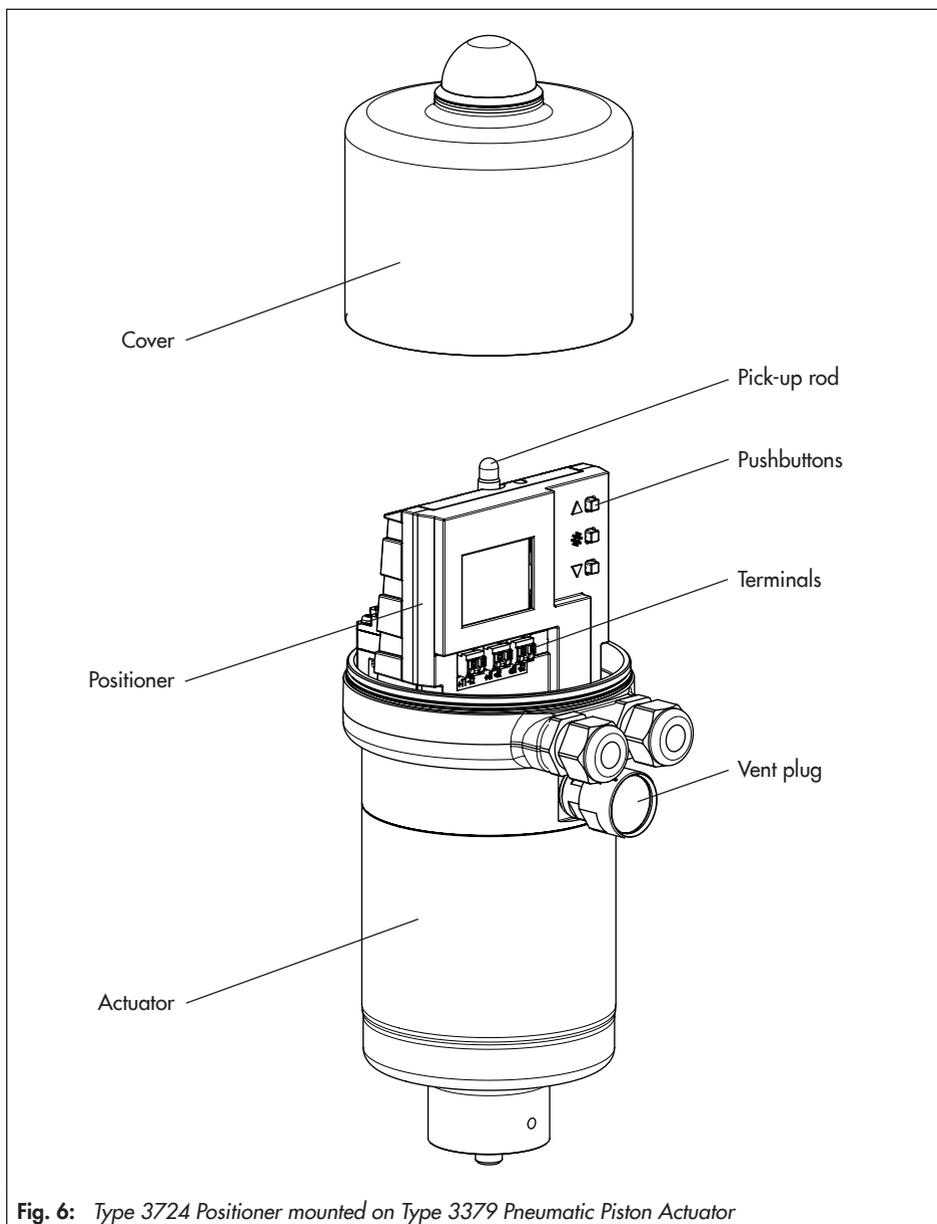


Fig. 5: Display with all readings



Volume restriction Q

The volume restriction serves to adapt the air output capacity to the size of the actuator. Two fixed settings are possible (refer to section 7.3).

Reading

Display	Meaning
ESC	Stop
Err	Faults
LOW	w too low
MAN	Manual mode
MAX	Maximum range
RST	Reset
INIT	Initialization
ON/OFF	Activated/deactivated
ZERO	Zero calibration

Icons which are assigned to certain codes and functions are indicated on the display. The bar elements indicate the system deviation that depends on the sign (+/-) and the value.

One bar element appears per 1 % set point deviation.

If the positioner has not yet been initialized, the position of the pick-up rod is indicated in the operating range of ± 10 mm.

If the fault indication icon  is displayed, press Δ or ∇ until **ERR** is displayed to view the relevant **E0** to **E15** error code(s) (see code list in section 33 on page 9.1).

7 Operating the positioner

NOTICE

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

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

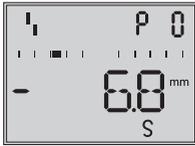
- Perform pneumatic connections on the actuator as described in ► EB 8315.
- Connect the supply air to signal pressure connection.
- Check whether a vent plug or silencer is screwed into the exhaust port.
- Connect the 4 to 20 mA signal.
 - Terminals +11/-12
- Connect software limit contacts, if applicable.
 - Terminals +41/-42: (limit contact 1, min.)
 - Terminals +51/-52: (limit contact 2, max.)

Note

- **LOW** on the display indicates that the reference variable is lower than 3.8 mA.
- The positioner is ready for operation with its default settings for most applications.

Reading after connecting the electrical signal

Code **P0** is displayed. The  fault indication icon and **S** (fail-safe position) appear on the display when the positioner has not yet been initialized. The reading indicates the position of the pick-up rod in the operating range of ± 10 mm.



Reading when the positioner has not yet been initialized

Code **P0** and the valve position in % appear on the display after connecting the electrical signal to an initialized positioner.



Initialization successfully completed, positioner runs in closed-loop operation

i Note

The positioner has a function to monitor the working range. If the pick-up rod moves too close to the mechanical stops (risk of mechanical damage), the positioner vents the actuator and the valve moves to its fail-safe position (**S** displayed together with **E8** error code).

7.1 Adapting the display

The display reading direction can be rotated by 180°. If the displayed data appear upside down, proceed as follows:

Press **Δ** or **∇** until Code **P1** appears.



Code **P1**: Reading direction

Press ***** to confirm the selected code. **P1** blinks.

Press **Δ** or **∇** until the display is set in the desired direction.

Press ***** to confirm display direction.

7.2 Enabling configuration to change parameters

Before changing parameter settings in an initialized positioner, configuration must be enabled first by selecting Code **P19**.



LOCK and the key icon indicate that the configuration is locked.

Press **Δ** or **∇** until Code **P19** appears.

Press ***** to confirm the selected code. **P19** blinks.

Press **Δ** until OPEN is displayed.

Touch ***** to unlock operation.

Operating the positioner

If no settings are entered within three minutes, the enabled configuration function becomes invalid.

7.3 Adjusting the volume restriction Q

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

- Actuators with a **transit time < 0.4 s** require a restricted air flow rate.

Setting to MIN

- Actuators with a **transit time ≥ 0.4 s** do not require the air flow rate to be restricted.

Setting to MAX

Intermediate settings are not permitted.

NOTICE

Malfunction due to changing the volume restriction setting!

Re-initialize positioner after changing the volume restriction setting.

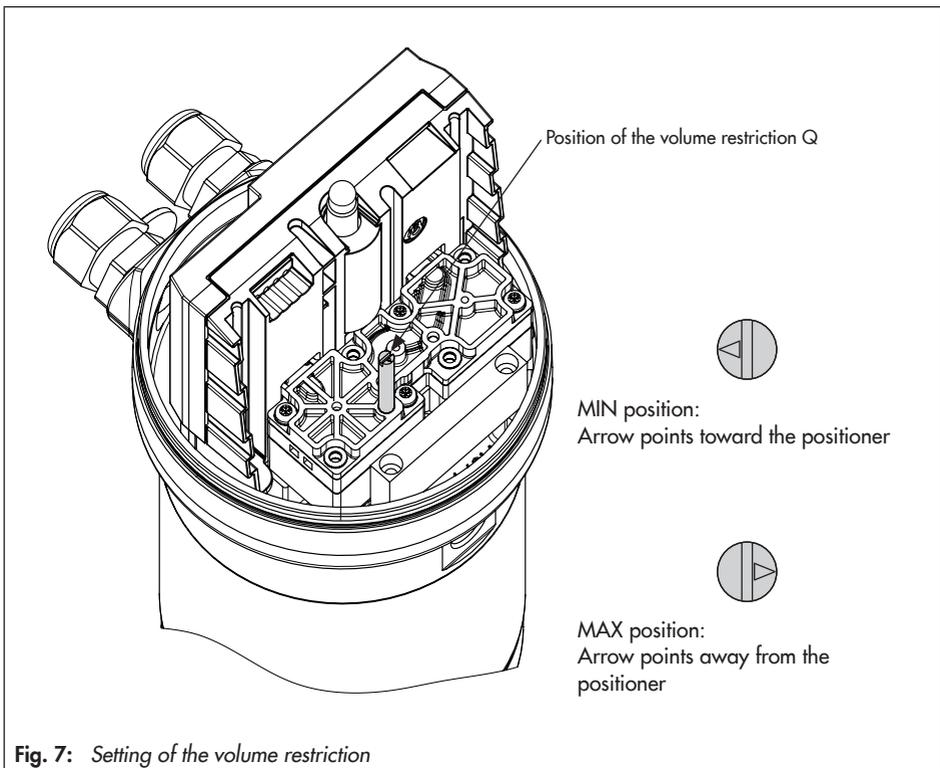


Fig. 7: Setting of the volume restriction

7.4 Entering the opening direction/direction of action

- AIR TO OPEN (ATO) applies to a valve opening as the signal pressure increases.
- AIR TO CLOSE (ATC) applies to a valve closing as the signal pressure increases.

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

Enable configuration (section 7.2).



Default ATO

Press Δ or ∇ until Code **P2** appears.

Press \ast to confirm selected code. **P2** blinks.

Press Δ or ∇ until the required fail-safe position appears.

Press \ast to confirm setting.

i Note

The changed opening direction/direction of action first becomes effective after the positioner has been re-initialized.

7.5 Entering the direction of action

The direction of action (**P7**) is set to increasing/increasing by default.

For checking purposes: After successfully completing initialization, the positioner display should read 0 % when the valve is closed and 100 % when the valve is open.

If necessary, the direction of action can be changed either before or after initialization.

The following correlation applies:

Valve	CLOSED	OPEN
Reading	0 %	100 %
>>	4 mA	20 mA
<<	20 mA	4 mA

>>: increasing/increasing

<<: increasing/decreasing

7.6 Limiting the signal pressure

If the maximum actuator force may cause damage to the valve, the signal pressure must be limited. Set Code **P9** to ON. This limits the signal pressure to approx. 2.3 bar.

Make sure the configuration is enable (section 7.2) before changing this setting.

7.7 Adjusting the limit contacts

The electronic limit contact can be triggered by the position of pick-up rod exceeding or falling below an adjustable switching point.

Limit contact 1, min. (Code P12):

The limit contact is activated when the pick-up rod moves below the adjusted switching value. The limit contact is deactivated when the pick-up rod moves above the adjusted switching value by 1 % again.

→  indicates it is active

Limit contact 2 (max., Code P13): Limit contact 2, max. (Code P13):

The limit contact is activated when the pick-up rod moves above the adjusted switching value. The limit contact is deactivated when the pick-up rod moves below the adjusted switching value by 1 % again.

→  indicates it is active

Press  or  to select Code **P12** for limit contact 1 or **P13** for limit contact 2.

Press , **P12** or **P13** blinks.

Press  or  to adjust the required switching value in steps of 0.5 % and press  to confirm the value.

Note

*The switching values for **P12** and **P13** must be adjusted at least 5 % from one another. It is not possible to enter switching values that are less than 5 % from one another.*

7.8 Setting other parameters

The following table lists all the parameter codes and their default settings. If you want to change the default setting of a parameter, proceed as described previously.

More details concerning the parameter codes can be found in section 11.2.

Parameter codes [Default setting] Codes marked with * indicate that the positioner needs to be re-initialized afterwards	
P0	Status reading
P1	Reading direction
P2*	ATO/ATC [ATO]
P4*	Nominal range [MAX]
P5	Characteristic [0]
P6	Reference variable [4 to 20 mA]
P7	w/x direction of action [>>]
P8*	Gain Kp [50]
P9	Pressure limitation 2.3 bar [OFF]
P10	Set point cutoff decrease (end position w <) [ON]
P11	Set point cutoff increase (end position w >) [OFF]
P12	Limit A1, min. [2 %]
P13	Limit A2, max. [98 %]
P14	Display of reference variable w
P15	INIT Start initialization
P16	ZERO Start zero calibration
P17	MAN Manual mode
P18	RST Reset
P19	Enable configuration

Parameter codes [Default setting] Codes marked with * indicate that the positioner needs to be re-initialized afterwards	
P20	Firmware version

7.9 Initialization

During initialization the positioner adapts itself optimally to the friction conditions and the signal pressure required by the control valve.

NOTICE

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

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

The type and extent of self-adaptation depends on the preset parameters.

MAX is the default setting for the nominal range (Code P4).

During the initialization process, the positioner determines the travel range of the valve (from the CLOSED position to the opposite end position).

Alternatively, a different travel can be selected in Code P4 (see code list in section 11.2).

Note

The travel set in Code P4 is only limited during initialization. However, it might be exceeded in closed-loop control when the control signal is higher than 20 mA.

Start initialization by activating Code P15 as follows:



Press Δ or ∇ to select Code P15.

Press \ast and hold for six seconds. 6-5-4-3-2-1- is counted down on the display.

Initialization starts. INIT blinks on the display!

Note

The time required for the initialization procedure depends on the actuator transit time and can take a few minutes.



Initialization successfully completed, positioner runs in closed-loop operation

After a successful initialization, the positioner changes to closed-loop operation indicated by the \odot closed-loop operation icon and control position in % predetermined by the reference variable on the display. Configuration is locked.

A malfunction leads to the process being interrupted and the positioner moving to the fail-safe position. The fault indication icon is displayed (see section 9).

Operating the positioner

Canceling initialization

The initialization can be canceled by pressing ✱.

- ESC blinks on the display.
- Press ✱ to confirm.

i Note

This code must be confirmed by touching ✱. Otherwise, the code remains active.

Initial state 1:

*Positioner has **not** been initialized*

The positioner goes to the fail-safe position after the initialization process has been canceled.

Initial state 2:

Positioner is initialized

On canceling a new initialization process, the positioner returns to closed-loop operation. The settings of the previous initialization are used.

A new initialization can be started directly afterwards.

7.10 Zero calibration

In case of inconsistencies in the closed position of the valve (e.g. with soft-seated plugs), it might be necessary to recalibrate zero. Enable configuration as described in section 7.2.

Start the zero calibration by activating Code P16 as follows:



Press Δ or ∇ until Code **P16** appears.

Press ✱ and hold for six seconds. **6-5-4-3-2-1-** is counted down on the display.

Zero calibration starts, the display blinks!

The positioner moves the control valve to the CLOSED position and recalibrates the internal electric zero point.

When the zero calibration has been successfully completed, the positioner returns to closed-loop operation (display with status indication).

Canceling zero calibration

The zero calibration can be canceled by pressing *****.

- ESC blinks on the display.
- Press ***** to confirm.

i Note

*This code must be confirmed by touching *****. Otherwise, the code remains active.*

The positioner returns to closed-loop operation without performing a zero calibration.

A new zero calibration can be started directly afterwards.

7.11 Manual mode

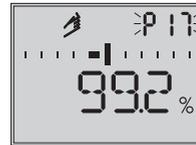
The valve position can be moved as follows using the **Manual mode** function:
Enable configuration as described in section 7.2.

Press **Δ** or **∇** until Code **P17** appears.

Press ***** and hold for six seconds. **6-5-4-3-2-1-** is counted down on the display.

P17 blinks.

The manual set point is indicated on the display of an initialized positioner.



If the positioner has not yet been initialized, the position of the pick-up rod is indicated in the operating range of ± 10 mm.

Press **Δ** or **∇** to change the manual set point.

Initialized positioner

The manual mode starts using the last set point used in closed-loop operation, ensuring a bumpless changeover.

The bar elements on the display indicate the system deviation between the manual set control and set point used for closed-loop control while manually moving the valve in Code P17.

The manual set point is adjusted in steps of 0.1 %. You can move the valve controlled within its range.

Positioner that has not been initialized

Press Δ or ∇ for a long time to move the valve manually.

The valve is only moved in one direction uncontrolled. The bar elements on the display indicate the change in direction.

Press \ast to deactivate manual mode.

i Note

The Manual mode function can only be exited as described or by interrupting the electrical supply (cold start). The positioner does **not** automatically exit this function and return to the display showing the status indication.

7.12 Reset

A reset causes an initialization to be undone and all parameters settings are reset to the default settings (see code list in section 11.2).

Enable configuration (section 7.2).

Press Δ or ∇ until Code **P18** appears.



Press \ast and hold for six seconds. **6-5-4-3-2-1-** is counted down on the display.

RST blinks while \ast is pressed. As soon as the key is released, the reset process is completed and the display returns to status indication (**P0**).

i Note

The **I** fault indication icon is displayed after a reset since the positioner needs to be re-initialized. The error code **E2** is also activated (see section 9.1).

8 Servicing

i Note

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

- *The product warranty becomes void if service or repair work not described in these instructions is performed without prior agreement by SAMSON's After-sales Service department.*
- *Only use original spare parts by SAMSON, which comply with the original specifications.*

The Type 3724 Positioner requires no maintenance.

- Observe the maintenance instructions of any upstream supply air pressure reducing stations.

8.1 Preparation for return shipment

Defective positioners can be returned to SAMSON for repair.

Proceed as follows to return devices to SAMSON:

1. Put the control valve out of operation.
See associated valve documentation.
2. Remove the positioner (see section 10).
3. Continue as described on our website at
▶ www.samsongroup.com > Service & Support > After-sales Service > Returning goods

8.2 Firmware update

Contact your local SAMSON engineering and sales office or subsidiary (www.samsongroup.com > About SAMSON > Sales offices) to request a firmware update.

Required specifications

Please submit the following details on requesting a firmware update:

- Type
- Serial number
- Configuration ID
- Current firmware version
- Required firmware version

9 Malfunction

In case of a fault, the fault indication icon  is displayed.

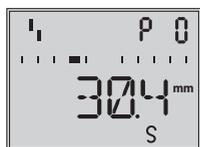
If the fault indication icon appears after a parameter code setting has been changed, this indicates that this setting does not match the values determined during initialization. See Code **E1** (see code list in section 9.1).

Press buttons past Code **P0** or **P20**. The respective error code **E0** to **E15** together with **ERR** appear on the display.

Refer to the code list for the cause of the errors and the recommended action.

Example:

If, for instance, a travel has been entered in Code **P4** (nominal range) which is larger than the maximum valve travel possible, the initialization process would be interrupted (**E2** error code) because the rated travel would not have been reached (**E6** error code). The valve moves to the fail-safe position (**S** indicated on the display).



Display of the fault indication



The nominal range (Code P4) must be changed and the positioner re-initialized to remedy this problem.

Reset error codes

The E0 and E8 error codes can be reset as follows:

Press  or  to select the error code.



Press  to confirm the error code. **ESC** is displayed. **E8** blinks.



Press  or  until **RST** appears.



Press  to reset the error.

The reset procedure can be canceled by pressing  when **ESC** appears.

9.1 Error codes

In case of a fault, the fault indication icon  is displayed.

The errors listed in the following table are assigned to error classes:

Error class 1: No operation possible

Error class 2: Manual operation only possible

Error class 3: Manual operation and closed-loop control possible

Code	Description		Class
E0	Zero error (operational error)	Only with tight-closing function P10 (set point cutoff decrease set to ON). The zero point has shifted by more than 5 % compared to initialization. The error may arise when the valve seat trim is worn.	3
	Recommended action	Check valve and positioner attachment. If OK, perform a zero calibration over Code P16 (see section 7.10). Error code can be reset (see section 9).	
E1	Displayed and INIT values are not identical (operational error)	Adjusted and displayed valves are not identical to the INIT values as the parameters were changed after initialization.	3
	Recommended action	Reset parameters or perform initialization.	
E2	Positioner has not been initialized	Malfunction or parameter change requiring the positioner to be re-initialized.	2
	Recommended action	Set parameters and initialize the positioner over Code P15 .	
E3	K_p setting (initialization error)	Positioner hunts. Volume restriction set incorrectly, too much gain.	2
	Recommended action	Check the volume restriction setting as described in section 7.3. Limit gain K _p in Code P8 . Re-initialize the positioner.	
E4	Transit time too short (initialization error)	The transit times of the actuator determined during initialization are so short (below 0.4 second) that optimal positioner tuning is not possible.	2
	Recommended action	Check the volume restriction setting as described in section 7.3. Re-initialize the positioner.	

Malfunction

E5	Standstill detection is not possible (initialization error)	Supply pressure varies. Mounting incorrect.	2
	Recommended action	Check supply air and positioner mounting. Re-initialize the positioner.	
E6	Travel is not achieved during initialization (initialization error)	Supply pressure is too low, actuator leaks, incorrect travel adjusted or pressure limit function activated.	2
	Recommended action	Check supply air, positioner mounting and setting. Re-initialize the positioner.	
E7	Actuator does not move (initialization error)	No supply air, mounting blocked.	2
	Recommended action	Check supply air, positioner mounting and mA input signal. Re-initialize the positioner.	
E8	x > range	Pick-up rod in range of the end stops	1
	Recommended action	Check positioner mounting and re-initialize the positioner. Error code can be reset (see section 9).	
E9 to E15	Device error (internal)	Return positioner to SAMSON AG for repair.	1/3

9.2 Emergency action

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

The plant operator is responsible for emergency action to be taken in the plant.



Tip

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

10 Decommissioning and removal

NOTICE

The process is disturbed by interrupting closed-loop control.

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

10.1 Decommissioning

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

1. Disconnect and lock the air supply and signal pressure.
2. Open the positioner cover and disconnect the wires for the control signal.

10.2 Removing the positioner

1. Disconnect the wires for the control signal from the positioner.
2. Disconnect the lines for air supply and signal pressure.
3. Disassemble as described in the associated actuator or valve documentation.

10.3 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.

Note

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

Tip

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

11 Annex

11.1 After-sales service

Contact SAMSON's After-sales Service for support concerning service or repair work or when malfunctions or defects arise.

E-mail address

You can reach our after-sales service at aftersalesservice@samsongroup.com.

Addresses of SAMSON AG and its subsidiaries

The addresses of SAMSON AG, its subsidiaries, representatives and service facilities worldwide can be found on our website (www.samsongroup.com) or in all SAMSON product catalogs.

Required specifications

Please submit the following details:

- Type designation
- Configuration ID
- Serial number
- Firmware version

11.2 Code list

Code	Display, values [default setting]	Description
<p>Note: Codes marked by an asterisk (*) indicate that the positioner needs to be re-initialized afterwards</p>		
P0	Status reading with basic information	The reading indicates the valve position in % when the positioner is initialized. Press * to display the actual valve position when the positioner is initialized.
P1	Reading direction	The reading direction of the display is turned by 180°.
P2*	ATO/ATC [ATO]	Parameter to adapt the positioner to how the control valve functions: ATO – Air to open (valve CLOSED in fail-safe position) ATC: Air to close (valve OPEN in fail-safe position)
P4*	Nominal range [MAX]	The travel is adjustable from 4 to 16 mm in steps of 0.5 mm. MAX: Maximum possible travel
P5	Characteristic 0 to 2 [0]	Three different characteristics can be selected to define the relationship between the input variable and the position of the actuator stem: 0 → Linear 1 → Equal percentage 2 → Reverse equal percentage
P6	Reference variable [4 to 20 mA] SRLO/SRHI	For split-range operation: SRLO: low range 4 to 11.9 mA SRHI: high range 12.1 to 20 mA
P7	w/x [>>]/<<	Direction of action of the reference variable w to the travel/rotational angle x (increasing/increasing or increasing/decreasing)
P8*	Gain K _p 30/[50]	On initializing the positioner, the gain is set to the selected value. If the positioner hunts, the K _p value can be reduced.
P9	Pressure limitation ON/[OFF]	The signal pressure can take on the same pressure as the supply air at the maximum [OFF] or, in the case that the maximum actuator force can damage the valve, the pressure is limited to approx. 2.3 bar.
P10	Set point cutoff decrease (end position w <) [ON]/OFF	Lower tight-closing function: If w reaches up to 1 % towards the final value that causes the valve to close, the actuator is immediately completely vented (with ATO - air to open) or filled with air (with ATC - air to close).

Code	Display, values [default setting]	Description
P11	Set point cutoff increase (end position w >) ON/[OFF]	Upper tight-closing function: If w reaches up to 99 % towards the final value that causes the valve to open, the actuator is immediately completely filled with air (with ATO - air to open) or vented (with ATC - air to close).
P12	Limit A1, min. [2 %]	The lower switching point can be adjusted in steps of 0.5 %. Note: Keep a distance of 5 % to the switching value adjusted in P13 .
P13	Limit A2, max. [98 %]	The upper switching point can be adjusted in steps of 0.5 %. Note: Keep a distance of 5 % to the switching value adjusted in P12 .
P14	Info w Initialized	Indicates the internally adjusted set point in the positioner (adjusted set point in 0 to 100 % according to the settings in P6 and P7). Press * to display external set point (applied set point in 0 to 100 % according to the 4-20 mA signal).
	Not initialized	Displays external set point in 0 to 100 % according to the 4-20 mA signal.
P15	Start initialization	Press * button to cancel the initialization process. As a result, the valve moves to the fail-safe position. After a power supply failure during initialization, the positioner starts with the values of the last initialization (if available).
P16	Start zero calibration	The zero calibration process can be interrupted by pressing *. The control valve returns to closed-loop operation. Note: A zero calibration cannot be started when E1 error code exists. After a power supply failure during zero calibration, the positioner starts with the settings from the last zero calibration.
P17	Manual mode ¹⁾	Press Δ or ▽ to enter the set point.
P18	Reset	Parameters are reset to their default setting. The positioner can only return to closed-loop operation after it has been re-initialized.
P19	Enable configuration [LOCK]/OPEN	Enable configuration to change parameter settings. This function is automatically canceled when none of the keys are touched within three minutes.
P20	Firmware version	Installed firmware version is displayed. Press * to display the last four digits of the serial number.

¹⁾ Also not available when the positioner has not been initialized



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

**e/p-Stellungsregler / e/p-Positioner / Positionneur e/p
Typ/Type/Type 3724**

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.

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

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

ex_3724-0_de_en_fr_m07.pdf

EB 8395 EN



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