

Series V2001 Valves

Type 3323 Three-way Valve with pneumatic or electric actuator

DIN version

SAMSON

Application

Mixing and diverting valve designed for use in industrial plants

Valve size	DN 15 to 100
Nominal pressure	PN 16 and 40
Temperature range	-10 to +300 °C



The Type 3323 Three-way Valve (mixing or diverting valve) can be combined with either electric or pneumatic actuators:

- Electropneumatic actuators with integrated i/p positioner for Type 3323-IP
- Pneumatic actuators for Type 3323-PP
- Electric actuators for Type 3323-E1 or Type 3323-E3

Valve body made of

- Cast iron for PN 16
- Spheroidal graphite iron for PN 25
- Cast steel for PN 40 (up to DN 50) and PN 16 and 40 (DN 65 and larger)
- Stainless steel for PN 40 (up to DN 50) and PN 16 (DN 65 and larger)

Metal-seated valve plug

Mixing valves in DN 15 to 25 can also be used for diverting service.

Versions

- **Type 3323-IP Electropneumatic Valve (mixing or diverting valve)** (Fig. 1) · With Type 3372 Electropneumatic Actuator, optionally with integrated positioner (120 cm² only, with plug connector) or Type 3725 Positioner (Fig. 3), tight-closing function to completely vent or fill the actuator with air, reference variable 4 to 20 mA, max. 6 bar supply air, fail-safe position stem extends or retracts, optionally with Type 4744-2 Limit Switch (Fig. 4) and Type 3730 Positioner
- **Type 3323-PP Pneumatic Valve (mixing or diverting valve)** (Fig. 2) · With Type 3371 Pneumatic Actuator, 120 cm² (DN 15 to 100, 15 mm travel) or Type 3371 Pneumatic Actuator, 350 cm² (DN 65 to 100), fail-safe position actuator stem extends or retracts, optionally with Type 4744-2 Limit Switch
- **Type 3323-E1 Electric Valve (mixing or diverting valve)** (Fig. 5) · With Type 5824-30 Electric Actuator for 230 V/50 Hz or 24 V/50 Hz, optionally with limit contacts, resistance transmitters, positioner
- **Type 3323-E3 Electric Valve (mixing and diverting valve)** (Fig. 6) · With Type 3374 Electric Actuator for 230 V/50 Hz, 230 V/60 Hz, 24 V/50 Hz or



Fig. 1: Type 3323-IP



Fig. 2: Type 3323-PP



Fig. 3: Type 3323-IP with Type 3725 Positioner, 120 cm²



Fig. 4: Type 3323-IP with limit switch



Fig. 5: Type 3323-E1



Fig. 6: Type 3323-E3

24 V/60 Hz, optionally with fail-safe action (tested according to DIN EN 14597 with actuator stem extends), limit contacts, resistance transmitters, positioner

Further versions

- **Explosion-protected version** with electric actuators on request
- **Type 3323 according to ANSI standards** · See Data Sheet T 8114

Principle of operation

Depending on the version, the three-way valve can be used either as a mixing or diverting valve.

In mixing valves, the process media to be mixed enter at valve ports A and B. The combined flow exits the valve at port AB (Fig. 7). The flow rate from ports A or B to AB depends on the cross-sectional area of flow between the seats and plugs.

In diverting valves, the process medium enters at the valve port AB and the partial flows exit at ports A and B (Fig. 8).

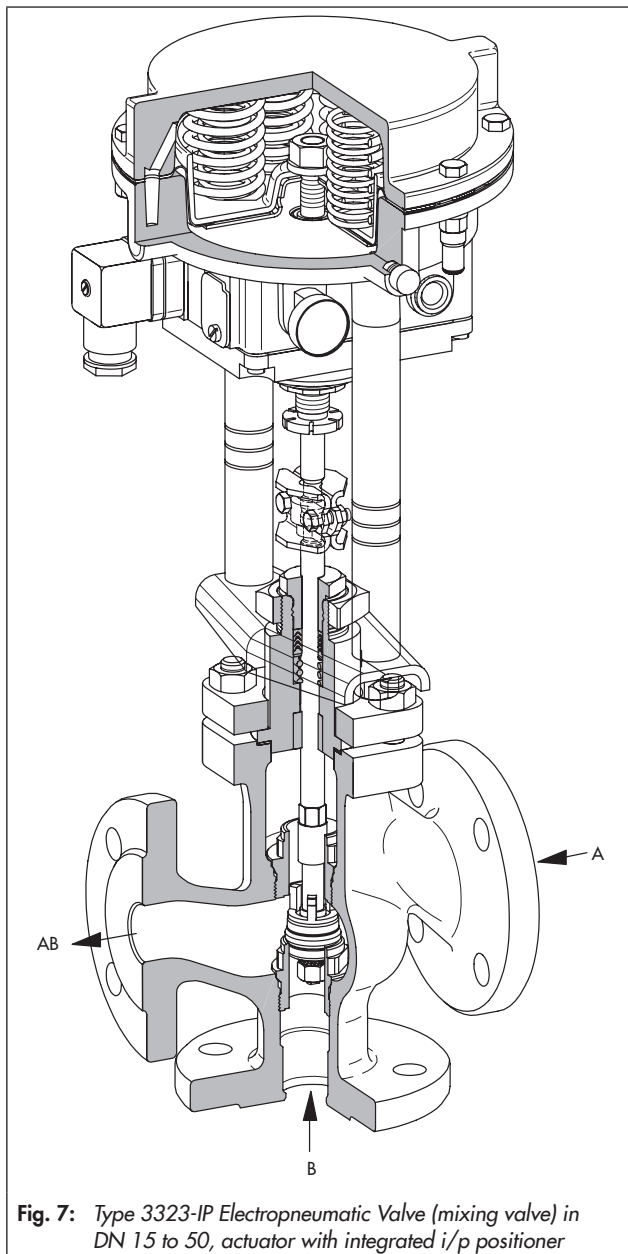


Fig. 7: Type 3323-IP Electropneumatic Valve (mixing valve) in DN 15 to 50, actuator with integrated i/p positioner

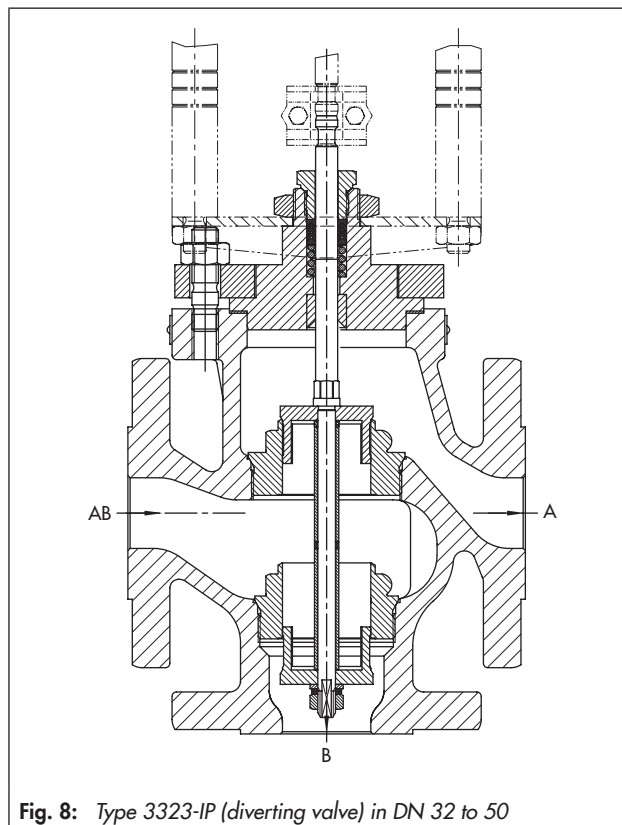


Fig. 8: Type 3323-IP (diverting valve) in DN 32 to 50

Fail-safe position

The control valve has two different fail-safe positions that become effective when the supply air fails:

- **Actuator stem extends:** when the supply air fails, port B is closed in mixing valves and port A is closed in diverting valves.
- **Actuator stem retracts:** when the supply air fails, port A is closed in mixing valves and port B is closed in diverting valves.

Associated documentation

Valve and actuator are delivered separately. Instructions on how to mount the valve on the actuator can be found in the mounting and operating instructions delivered with the product:

- ▶ EB 8113 Type 3323 Three-way Valve
- ▶ EB 8313-1 Electropneumatic actuator for Type 3331-IP (with integrated positioner)
- ▶ EB 8313-3 Electropneumatic actuator for Type 3323-IP (with Type 3725 Positioner)
- ▶ EB 5824-1 Electric actuator for Type 3323-E1
- ▶ EB 5824-2 Electric actuator for Type 3323-E1
- ▶ EB 8331-3 Electric actuator for Type 3323-E3
- ▶ EB 8331-4 Electric actuator for Type 3323-E3
- ▶ EB 8317 Pneumatic actuator for Type 3323-PP

Table 1: Type 3323 Three-way Valve**Table 1.1: Technical data**

Material		Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel - 1.0619		Stainless steel 1.4408	
Valve size	DN	15 to 100	15 to 100	15 to 50	65 to 100	15 to 50	65 to 100
Nominal pressure	PN	16	25	40	16 and 40	40	16
Seat-plug seal		Metal seal					
Characteristic		Linear					
Rangeability		30:1 up to DN 25 · 50:1 for DN 40 and larger					
Temperature range		-10 to +220 °C					
With insulating section ¹⁾		-10 to +300 °C					
Leakage class according to IEC 60534-4		Metal seal: I (0.05 % of K _{VS})					
Compliance		CE · ENEC					

¹⁾ Not for stainless steel with DN 65 to 100

Table 1.2: Materials

Valve body	Cast iron · EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel · 1.0619	Stainless steel 1.4408
Valve bonnet	Up to DN 50: 1.0460 DN 65 and larger: EN-GJL-250	Up to DN 50: 1.0460 DN 65 and larger: EN-GJL-250	Up to DN 50: 1.0460 DN 65 and larger: 1.0619	Up to DN 50: 1.4404 DN 65 and larger: 1.4408
Valve flange ¹⁾	1.0460			
Seat	DN 15 to 25: 1.4104 ²⁾ DN 32 to 50: 1.4104 DN 65 and larger: 1.4006			DN 15 to 25: 1.4104 ²⁾ DN 32 and larger: 1.4401/1.4404
Plug	Up to DN 50: 1.4305 DN 65 and larger: 1.4006			1.4404
Guide bushing	1.4104			
Packing	PTFE			
Body gasket	Graphite on metal core			

¹⁾ No contact with process medium; only up to DN 50. For DN 65 and larger: one-pieced (see valve bonnet for material)

²⁾ Top seat material: 1.4305

Table 2: Nominal sizes, K_{VS} coefficients and seat diameters**Table 2.1: Type 3323 as mixing valve**

Valve size	DN	15	20	25	32	40	50	65	80	100
K _{VS} coefficient		4	6.3	8	16	20	32	60	80	160
Seat Ø	mm	24	24	24	40	40	40	63	75	100
Rated travel	mm	15	15	15	15	15	15	15	15	30

Table 2.2: Type 3323 as diverting valve

Valve size	DN	15	20	25	32	40	50	65	80	100
K _{VS} coefficient		–	–	–	16	20	32	60/40	80/60	160/100
Seat Ø	mm	–	–	–	40	40	40	63/48	75/63	100/80
Rated travel	mm	–	–	–	15	15	15	15	15	30

Table 3: *Pneumatic actuators***Table 3.1:** *Technical data*

Valve/actuator		Type 3323-IP with Type 3372 Actuator		Type 3323-PP with Type 3371 Actuator	
Actuator area		120 cm²	350 cm²	120 cm²	350 cm²
Attachment to Type 3323 DN		15 to 50	65 to 100	15 to 50	65 to 100
Fail-safe position		Actuator stem extends (FA) or actuator stem retracts (FE)			
Reference variable		4 to 20 mA		–	
Bench range/ rated travel	Stem extends	1.4 to 2.3 bar/15 mm	2.2 to 3.8 bar/30 mm	1.4 to 2.3 bar/15 mm	2.2 to 3.8 bar/30 mm
	Stem retracts	1.4 to 2.3 bar/15 mm	1.5 to 2.7 bar/30 mm	1.4 to 2.3 bar/15 mm	1.5 to 2.7 bar/30 mm
Characteristic		Linear, deviation from terminal-based linearity ≤ 2 %		–	
Hysteresis		≤ 1 %		–	
Variable position		≤ 7 %		–	
Degree of protection		IP 54 with integrated positioner (for 120 cm² only) IP 66 with Type 3725		–	
Permissible ambient temperature		Standard: –20 to +80 °C		–35 to +90 °C	
		With metal cable gland: –30 to +80 °C			

Table 3.2: *Materials*

Actuator	Type 3372		Type 3371	
Actuator area	120 cm²	350 cm²	120 cm²	350 cm²
Actuator housing	GD-ALSi12	1.0330	GD-ALSi12	1.0330
Diaphragm	NBR		NBR	
Actuator stem	1.4305	1.4571	1.4305	1.4571
Positioner housing				
Integrated version	POM-GF	–	–	
Type 3725	Polyphthalamide (PPA)		–	
Yoke				
Stem	9SMn28K	1.0715+C	9SMn28K	1.0715+C
Bracket	1.4301	–	1.4301	–
Mounting bracket for Type 3725	Aluminum		–	

Table 3.3: *Permissible differential pressures for metal-seated plug*

Fail-safe action	Actuator stem extends		Actuator stem retracts	
Actuator area	120 cm ²	350 cm ²	120 cm ²	350 cm ²
Bench range in bar Travel (in parentheses)	1.4 to 2.3	2.2 to 3.8 (30 mm) 2.1 to 2.7 (15 mm)	1.4 to 2.3	1.5 to 2.7 (30 mm) 1.5 to 2.1 (15 mm)
K _{VS} coefficients	Δp when p ₂ = 0 bar		Δp when p ₂ = 0 bar	
4.0 to 8	16	–	16	–
16 to 32	10	–	10	–
60	–	10	–	10
80	–	10	–	10
160	–	10	–	10

Table 4: *Electric actuators* · Permissible differential pressures for metal-seated plug

Three-way valve		Type	Type 3323-E1	Type 3323-E3	
Actuator		Type	5824-30	3374-21/-31	3374-10/-11
Thrust	Stem retracts		0.7 kN	0.5 kN	2.5 kN
	Stem extends		0.7 kN	2.0 kN	2.5 kN
K_{VS} coefficients			Δp when $p_2 = 0$ bar		
4 to 8			10	18	25
16 to 32			3.5	6	10
60			–	2	5.5
80			–	–	3.2
160			–	–	3.1
Actuator data		See Data Sheet	► T 5824	► T 8331	

Table 5: *Type of attachment and required adapter*

Type 3323 Valve			DN 15 to 50	DN 65 to 100
Type 3372 Actuator with connector	Version:	IP	Mounting with crossbeam (form B)	–
Type 3372 Actuator with Type 3725 Positioner		IP	Mounting with crossbeam (form B)	Attachment without crossbeam (form C)
Type 5824-30 Actuator		E1	With adapter (1400-7414)	–
Type 3374-11/-21/-31 Actuator		E3	Mounting with crossbeam (form B)	With adapter (1400-9515)
Type 3374-10 Actuator		E3	–	With adapter (1400-9515)
Type 3371 Actuator		PP	Mounting with crossbeam (form B)	Attachment without crossbeam (form C)

Table 6: Dimensions and weights for Type 3323 Three-way Valve

Table 6.1: Valve with standard bonnet

Valve size	DN	15	20	25	32	40	50	65	80	100
Face-to-face dimension L	mm	130	150	160	180	200	230	290	310	350
Height H	mm	110			115			135		157
Height H2	mm	70	80	85	100	105	120	130	140	150
Weight	kg (approx.)	5	6	7	11	12	15	31	37	49

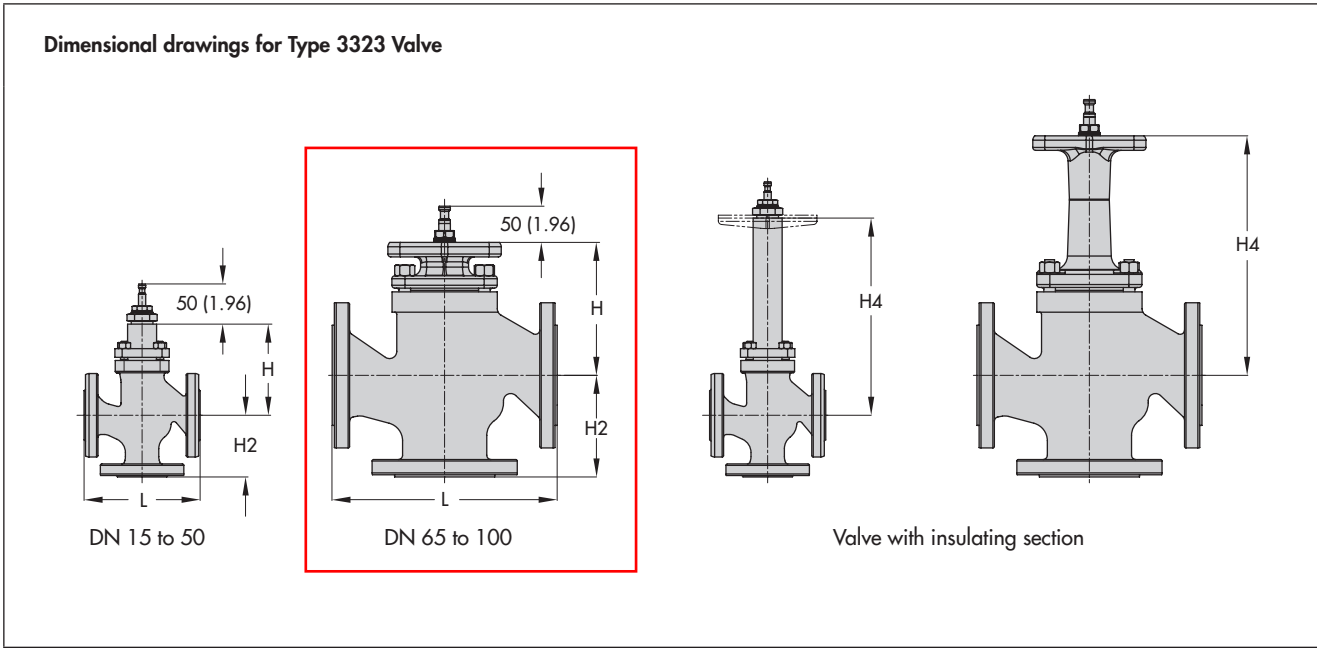
Table 6.2: Valve with insulating section

Valve size	DN	15	20	25	32	40	50	65	80	100
Face-to-face dimension L	mm	130	150	160	180	200	230	290	310	350
Height H4	mm	369			374			402		408
Weight	kg (approx.)	8	9	10	17	18	21	40	45	68

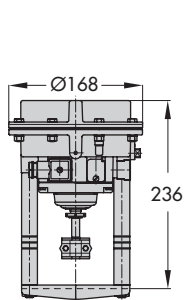
Table 6.3: Weights of Type 3371, Type 3372, Type 5824 and Type 3374 Actuators

Actuator type		Pneumatic		Electropneumatic			Electric	
Type		3371/120	3371/350	3372/120	3372/120	3372/350	E1/5824	E3/3374
Positioner		–		Integrated	Type 3725		Optional, integrated	
Weight	kg (approx.)	4	13	6	7	16	1.25	Max. 4

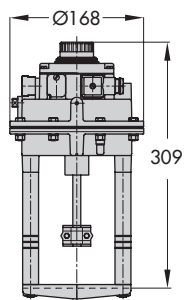
Dimensional drawings for Type 3323 Valve



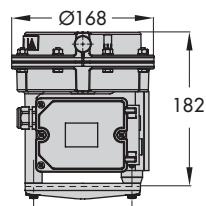
Dimensional drawings for actuators



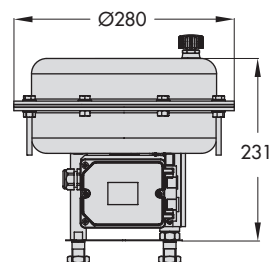
Type 3372/120 cm²
Integrated, stem extends



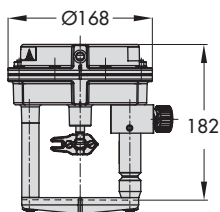
Type 3372/120 cm²
Integrated, stem retracts



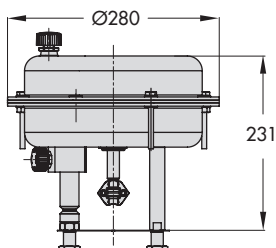
Type 3372/120 cm²
With Type 3725
Actuator stem extends/retracts



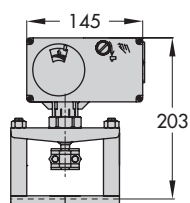
Type 3372/350 cm²
With Type 3725
Actuator stem extends/retracts



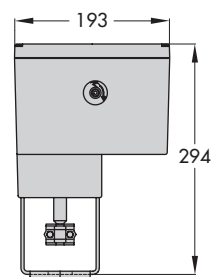
Type 3371/120 cm²



Type 3371/350 cm²



Actuator E1
Type 5824



Actuator E3
Type 3374

Ordering text

The following specifications are required on ordering:

Valve	
Type 3323 Three-way Valve	
Version as	Mixing valve or diverting valve
Valve size	DN ...
Pressure rating	PN ...
Flow coefficient	K _{VS} ...
Body material	Cast iron, spheroidal graphite iron, cast steel, or stainless steel
Seat-plug seal	Metal seal
Actuators	
For Type 3323-IP : Type 3372 Electropneumatic Actuator	
With integrated positioner	4 to 20 mA
With positioner	Type 3725, Type 3730-x
Optional	Intrinsically safe Ex ia
Additional equipment	1 or 2 limit switches
For Type 3323-PP : Type 3371 Pneumatic Actuator	
Fail-safe position	Actuator stem extends or retracts
Signal pressure range	1.4 to 2.3 bar
Additional equipment	1 or 2 limit switches
For Type 3323-E1 : Type 5824-30 Electric Actuator	
Power supply	<ul style="list-style-type: none"> – 230 V/50 Hz – 24 V/50 Hz
Additional equipment	<ul style="list-style-type: none"> – Two limit contacts – Resistance transmitter 0 to 1000 Ω – Digital positioner <ul style="list-style-type: none"> – Input: 0/4 to 20 mA or 0/2 to 10 V – Output: 0/2 to 10 V
For Type 3323-E3 : Type 3374 Electric Actuator	
Fail-safe action	With fail-safe action: Actuator stem extends or retracts
Thrust	
Without fail-safe action	1.25 kN; 2.5 kN
With fail-safe action	2 kN (actuator stem extends) 500 N (actuator stem retracts)
Power supply	<ul style="list-style-type: none"> – 230 V/50 Hz – 230 V/60 Hz – 24 V/50 Hz – 24 V/60 Hz
Additional equipment	<ul style="list-style-type: none"> – Two limit contacts – Resistance transmitter 0 to 1000 Ω – Digital positioner with input and output 0/4 to 20 mA or 0/2 to 10 V

Specifications subject to change without notice

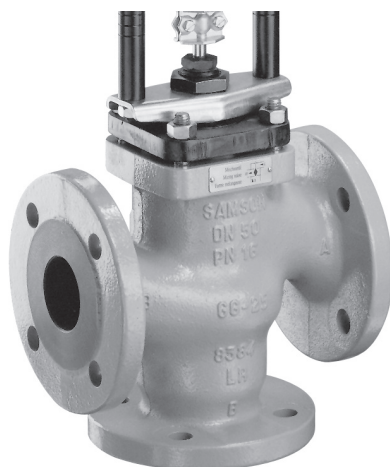


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Series V2001
Type 3323 Three-way Valve



**Mounting and
Operating Instructions**

EB 8113/8114 EN

Edition August 2013

Definition of signal words



DANGER!

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



NOTICE

Property damage message or malfunction



WARNING!

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



Note:

Additional information



Tip:

Recommended action

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1 General safety instructions



- The control valve must be mounted, started up or serviced by fully trained and qualified personnel only; the accepted industry codes and practices are to be observed. Make sure employees or third persons are not exposed to any danger.

All safety instructions and warnings given in these mounting and operating instructions, particularly those concerning installation, start-up and maintenance, must be strictly observed.

- The control valves comply with the requirements of the European Pressure Equipment Directive 97/23/EC. Valves with a CE marking have a declaration of conformity which includes information about the applied conformity assessment procedure. The declaration of conformity is available on request.
- To ensure appropriate use, only use the control valve in applications where the operating pressure and temperatures do not exceed the specifications used for sizing the valve at the ordering stage. The manufacturer does not assume any responsibility for damage caused by external forces or any other external factors.
Any hazards that could be caused in the valve by the process medium, the operating pressure, the signal pressure or by moving parts are to be prevented by taking appropriate precautions.
- Proper shipping and storage are assumed.

WARNING!

- For installation and maintenance, make sure the relevant section of the pipeline is depressurized and, depending on the process medium, drained as well. Depending on the field of application, allow the valve to cool down or heat up to reach ambient temperature before starting any work on it.
- When working on the valve, make sure that the pneumatic air supply or power supply as well as the control signal are disconnected to prevent any hazards due to moving parts.
- Be particularly careful if the actuator springs of pneumatic control valves are preloaded. Such actuators are labeled correspondingly and can also be identified by three long bolts protruding from the bottom of the actuator. Before starting any work on the valve, relieve the compression from the preloaded springs.

2 Design and principle of operation

Fig. 1

The Type 3323 Three-way Valve has a modular design and can be combined with pneumatic or electric actuators (as described in the next section).

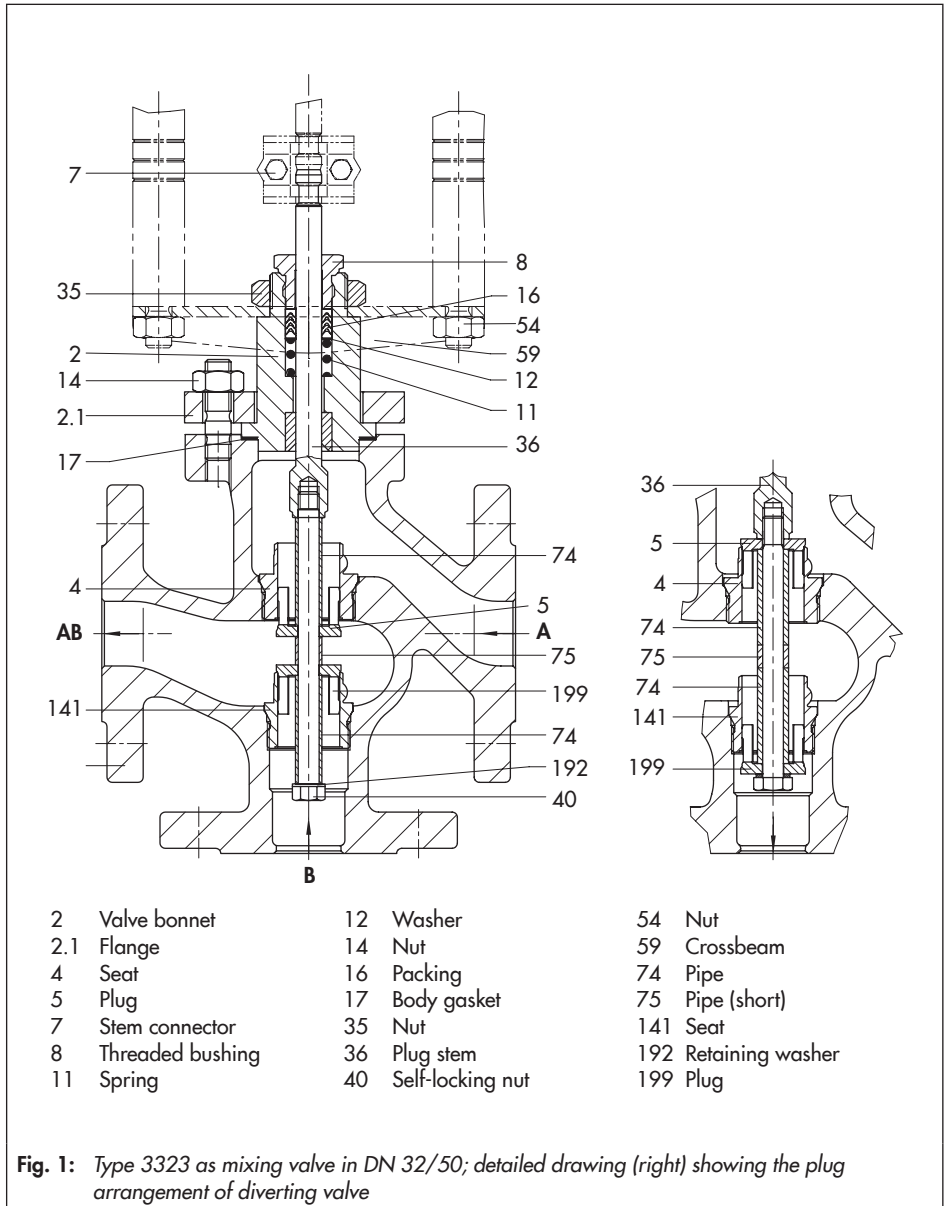
Depending on the plug arrangement, the three-way valve can be used for either mixing or diverting service.

In mixing valves, the process media to be mixed enter at valve ports **A** and **B**. The combined flow exits the valve at port **AB**.

In diverting valves, in contrast, the process medium enters at the valve port **AB** and the partial flows exit at ports **A** and **B**.

The flow rate from ports A or B to AB and vice versa depends on the cross-sectional area of flow between the seats and plugs.

The plug (5, 199) is moved by changing the control signal applied to the actuator. The plug stem (36) is sealed by a spring-loaded PTFE V-ring packing (16) and is connected to the actuator stem by the stem connector.



3 Installation

3.1 Assembling valve and actuator

The valve and actuator are delivered separately and must be assembled on site.

There are different ways to assemble the valve and actuator depending on the actuator model and the nominal size.

The following tables show the actuators that can be used and the associated instructions.

Types 3371, 3372, 5824 and 3374 Actuators on Type 3323 Valve up to DN 50 (NPS 2), Fig. 3

Form B attachment (mounting using a central nut) is performed according to the associated Mounting and Operating Instructions.

Actuator	For control valve	Associated instructions
Type 3371	Type 3323-PP	► EB 8317 EN
Type 3372	Type 3323-IP	► EB 8313-1 EN ► EB 8313-3 EN ¹⁾
Type 5824	Type 3323-E1	► EB 5824-1 EN ► EB 5824-2 EN ²⁾
Type 3374	Type 3323-E3	► EB 8331-3 EN ► EB 8331-4 EN ²⁾

¹⁾ Version with Type 3725 Positioner

²⁾ Version with integrated positioner

Types 3371 and 3372 Actuators on Type 3323 Valve in DN 65 (NPS 2½) and larger, Fig. 3

Form C attachment (mounting using rods) is performed according to the associated Mounting and Operating Instructions.

Actuator	For control valve	Associated instructions
Type 3371	Type 3323-PP	► EB 8317 EN
Type 3372	Type 3323-IP	► EB 8313-1 EN ► EB 8313-3 EN ¹⁾

¹⁾ Version with Type 3725 Positioner

Type 3374 Actuator on Type 3323 Valve in DN 65 (NPS 2½) and larger, Fig. 2

1. Place the actuator yoke on the valve bonnet and fasten using two M8 hexagon socket screws.
2. Extend the actuator stem using the manual override until the actuator stem touches the plug stem.
3. Position the clamps of the stem connector and fasten with screws.

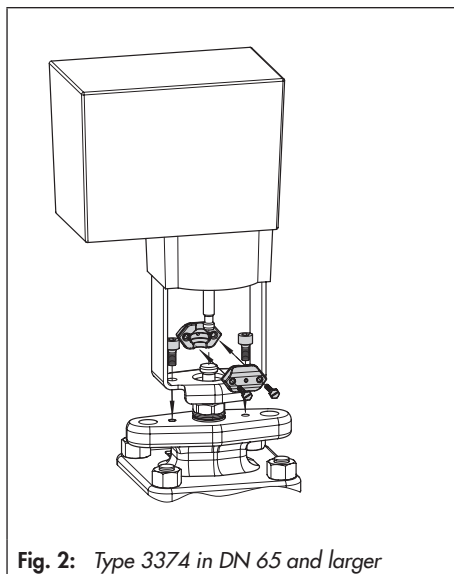
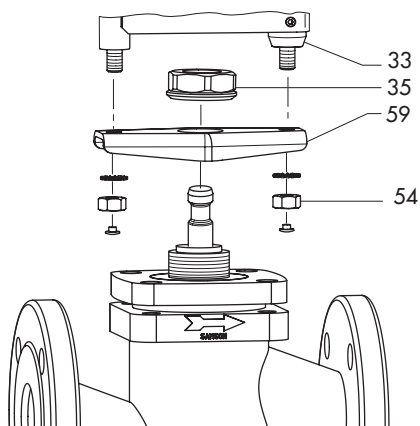
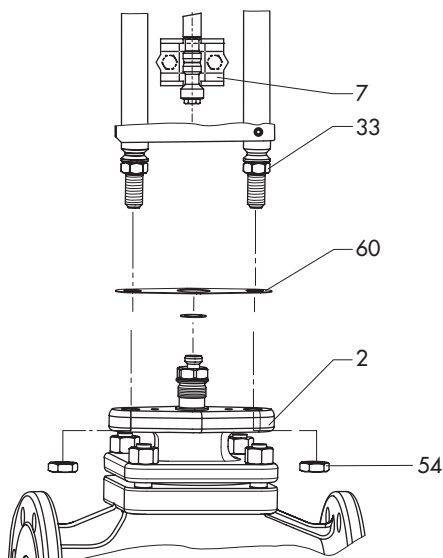


Fig. 2: Type 3374 in DN 65 and larger

Form B attachment (mounting using a central nut)



Form C attachment (mounting using rods)



- 2 Valve bonnet
- 7 Stem connector
- 33 Rods
- 35 Nut
- 54 Nut
- 59 Crossbeam
- 60 Plate

Fig. 3: Form B attachment (mounting using a central nut) and Form C attachment (mounting using rods)

3.2 Mounting position

The valve can be mounted in any desired position. However, the restrictions for the actuator used must be strictly observed.



NOTICE

Install the valve free of stress and with the least amount of vibrations as possible.

If necessary, support the pipelines near the connections.

Since sealing parts, weld spatter and other impurities carried along by the medium may impair the tight shut-off of the seat and plug, flush out the pipeline thoroughly before installing the valve in the pipeline.

Pipeline routing

To ensure that the control valve functions properly, the pipeline must be straight and without any manifolds or disturbances for a distance of at least 6 times the valve size (DN) upstream and downstream of the valve. Contact SAMSON if this distance cannot be observed.

3.3 Strainer, bypass

We recommend to install a SAMSON Type 2 Strainer upstream of the valve, and upstream of both inlet ports in mixing valves.

We recommend installing a shut-off valve both upstream of the strainer and downstream of the valve to ensure that the plant does not need to be shut down for maintenance. In addition, install a bypass line.

3.4 Arrangement of the valve

Install the valve as shown in Fig. 4 depending on whether it is to be used for mixing or diverting service.

Fail-safe action: the valve shuts off the flow of the heating medium or opens the flow of the cooling medium.

The plug arrangement (i.e. either mixing or diverting valve) is indicated on a label attached to the valve body.

4 Operation

The operating instructions only apply in conjunction with the actuator. Refer to the corresponding Mounting and Operating Instructions.

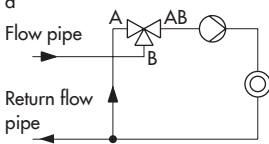
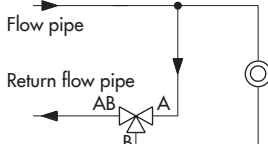
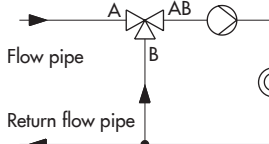
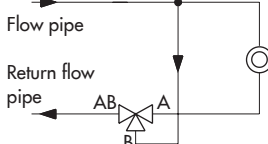
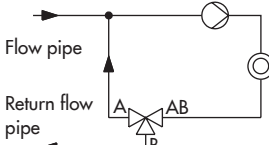
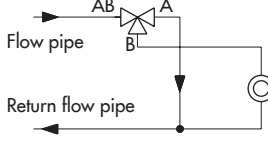
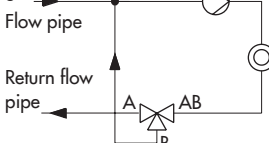
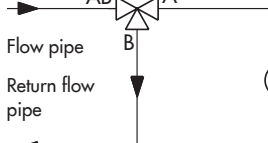
Mixing service - Temperature control $Q = \text{constant}$	Diverting service - Flow control $Q = 0 \text{ to } 100 \%$	Actuator stem extends (FA) Actuator stem retracts (FE)
<p>a</p>  <p>Flow pipe</p> <p>Return flow pipe</p>	<p>b</p>  <p>Flow pipe</p> <p>Return flow pipe</p>	<p>Heating with mixing valve FA Cooling with mixing valve FE</p> <p>a) Installation in flow pipe b) Installation in return flow pipe</p>
<p>c</p>  <p>Flow pipe</p> <p>Return flow pipe</p>	<p>d</p>  <p>Flow pipe</p> <p>Return flow pipe</p>	<p>Heating with mixing valve FA Cooling with mixing valve FE</p> <p>c) Installation in flow pipe d) Installation in return flow pipe</p>
<p>e</p>  <p>Flow pipe</p> <p>Return flow pipe</p>	<p>f</p>  <p>Flow pipe</p> <p>Return flow pipe</p>	<p>Heating with diverting valve FA Cooling with diverting valve FE</p> <p>e) Installation in return flow pipe f) Installation in flow pipe</p>
<p>g</p>  <p>Flow pipe</p> <p>Return flow pipe</p>	<p>h</p>  <p>Flow pipe</p> <p>Return flow pipe</p>	<p>Heating with diverting valve FA Cooling with diverting valve FE</p> <p>g) Installation in return flow pipe h) Installation in flow pipe</p>

Fig. 4: Typical installations

5 Maintenance – Replacing parts

The control valve is subject to normal wear, especially at the seat, plug and packing. Depending on the operating conditions, check the valve at regular intervals to prevent possible failure before it can occur.

External leakage can indicate that the packing is defective.

If the valve does not close tightly, tight shut-off may be impaired by dirt stuck between the seat and plug or by damaged facings.



WARNING!

Before performing any work on the control valve, make sure the relevant plant section has been depressurized and, depending on the process medium, drained as well. When used at high temperatures, allow the plant section to cool down to ambient temperature. Make sure the electrical or pneumatic control signal for the actuator is switched off. Remove the signal pressure line of a pneumatic actuator. As valves are not free of cavities, remember that residual process medium might still be contained in the valve. We recommend removing the valve from the pipeline.

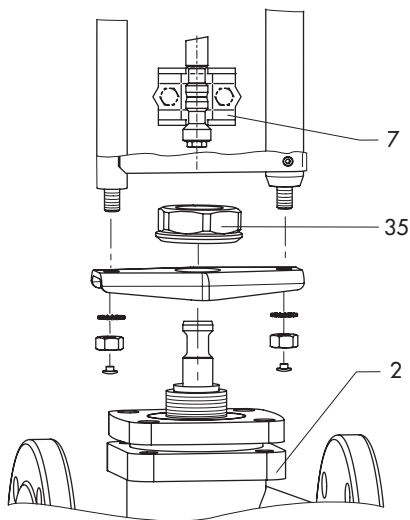
We recommend removing the parts, cleaning them, and, if necessary, replacing them with new ones.

5.1 Removing the actuator

Before performing any repair work on the valve, remove the actuator from the valve.

Valve up to DN 50 (NPS 2) – Form B attachment (mounting using a central nut), Fig. 5

- ➔ Undo the screws on the stem connector (7) and remove the stem connector.
- ➔ Unscrew the nut (35) and lift the actuator off the valve bonnet (2).

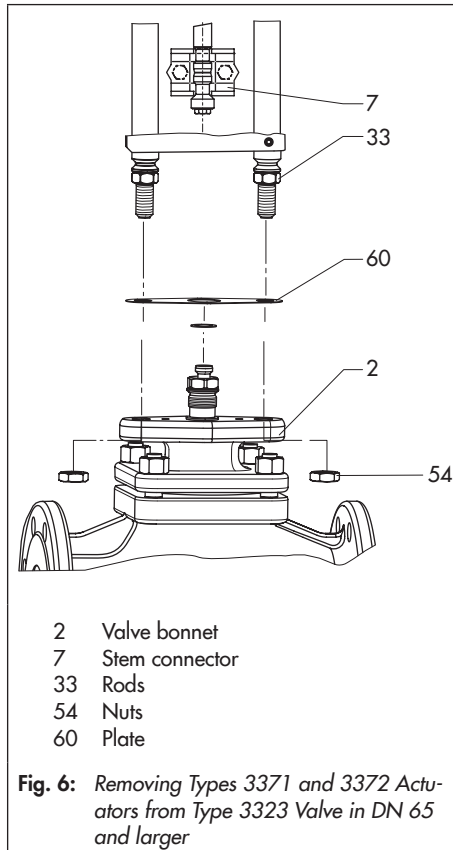


- | | |
|----|----------------|
| 2 | Valve bonnet |
| 7 | Stem connector |
| 35 | Nut |

Fig. 5: Removing actuators from Type 3323 Valve up to DN 50

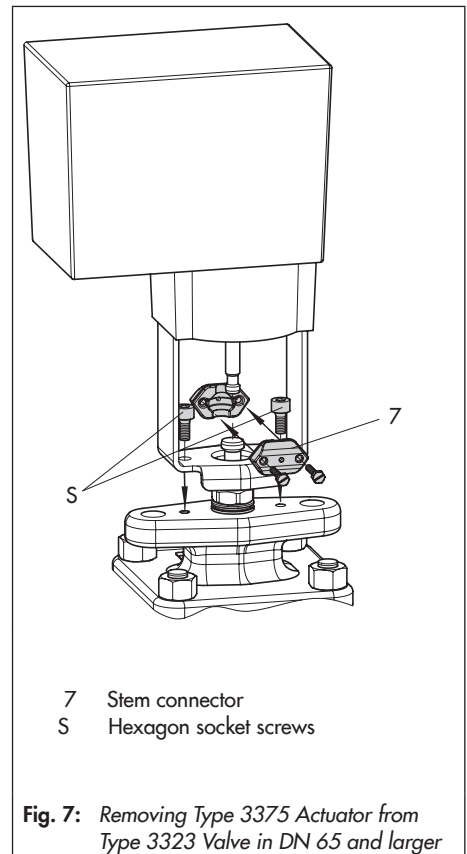
**Valve in DN 65 (NPS 2½) and larger –
Form C attachment (mounting using rods),
Fig. 6**

- ➔ Undo the screws on the stem connector (7) and remove the stem connector.
- ➔ Undo nuts (54) while holding the rods (33) stationary with an open-end wrench (SW 22) to prevent them from turning.
- ➔ Lift the actuator including the plate (60) off the valve bonnet (2).



**Valve in DN 65 (NPS 2½) and larger –
mounting on yoke, Fig. 7**

- ➔ Undo the screws on the stem connector (7) and remove the stem connector.
- ➔ Unscrew the two hexagon socket screws (S) and lift actuator together with the yoke off the valve bonnet.



5.2 Replacing the packing



Note:

Contact your nearest SAMSON subsidiary or the SAMSON After-sales Service department for information on suitable lubricants.

5.2.1 Standard valve bonnet

In case of leakage at the packing, the packing (16) must be renewed.

Removing the valve bonnet, Fig. 8

Valve up to DN 50

1. Unscrew the threaded bushing (8).
2. Unscrew nuts (14) and lift off flange (2.1).

Valve in DN 65 and larger

1. Unscrew the threaded bushing (8).
2. Unscrew nuts (14) and lift the valve bonnet (2) off the valve body over the plug stem.
3. Check the body gasket (17) located in the valve body for damage. We recommend renewing the body gasket.

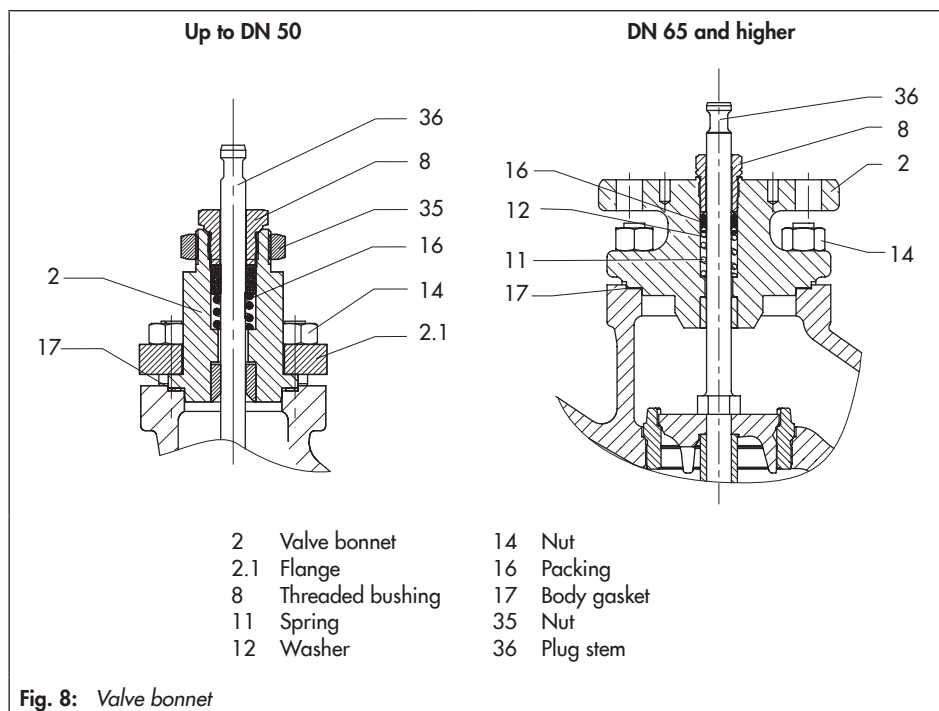


Fig. 8: Valve bonnet

4. Use a suitable tool to pull the damaged packing (16) out of the valve bonnet. Remove washer (12) and spring (11) and clean the packing chamber.

Installing the packing, Fig. 9

5. Apply a suitable lubricant to each part of the new packing as well as to the plug stem.
6. Insert the spring (11) and then the washer (12) into the packing chamber.
7. Carefully slide the parts of the new packing (16) into the packing chamber.
8. Apply a suitable lubricant to the thread of the threaded bushing (8). Lightly screw in the threaded bushing, but do not tighten it yet.

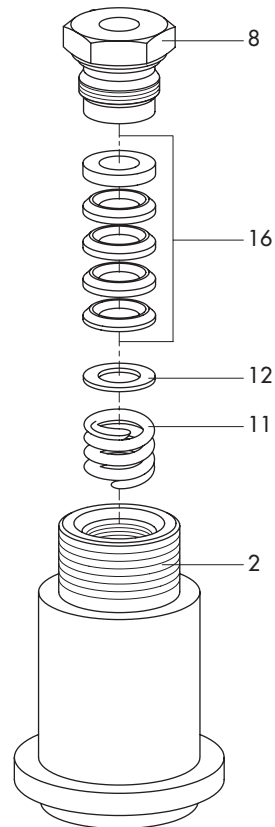
Mounting the valve bonnet

Valve up to DN 50

9. Place the valve bonnet (2), while turning it, over the plug stem (36) onto the valve body. Make sure that the body gasket (17) is seated properly.
10. Place the flange (2.1) on the bonnet and fasten it with the nuts (14) (observe tightening torque listed in Table 1). Tighten the threaded bushing.

Valve in DN 65 and larger

9. Place the valve bonnet (2), while turning it, over the plug stem (36) onto the valve body. Make sure that the body gasket (17) is seated properly.
10. Fasten the bonnet with the nuts (14) (observe tightening torque listed in Table 1). Tighten the threaded bushing.



- | | |
|----|------------------|
| 2 | Valve bonnet |
| 8 | Threaded bushing |
| 11 | Spring |
| 12 | Washer |
| 16 | Packing |

Fig. 9: Packing parts

5.2.2 Insulating section

Fig. 10

The insulating section is used to extend the distance between the packing and the valve as well as the process medium. This results in a wider temperature range.

The arrangement of the packing in the insulating section is the same as in the standard bonnet. Proceed as described in section 5.2.1 to replace the packing.

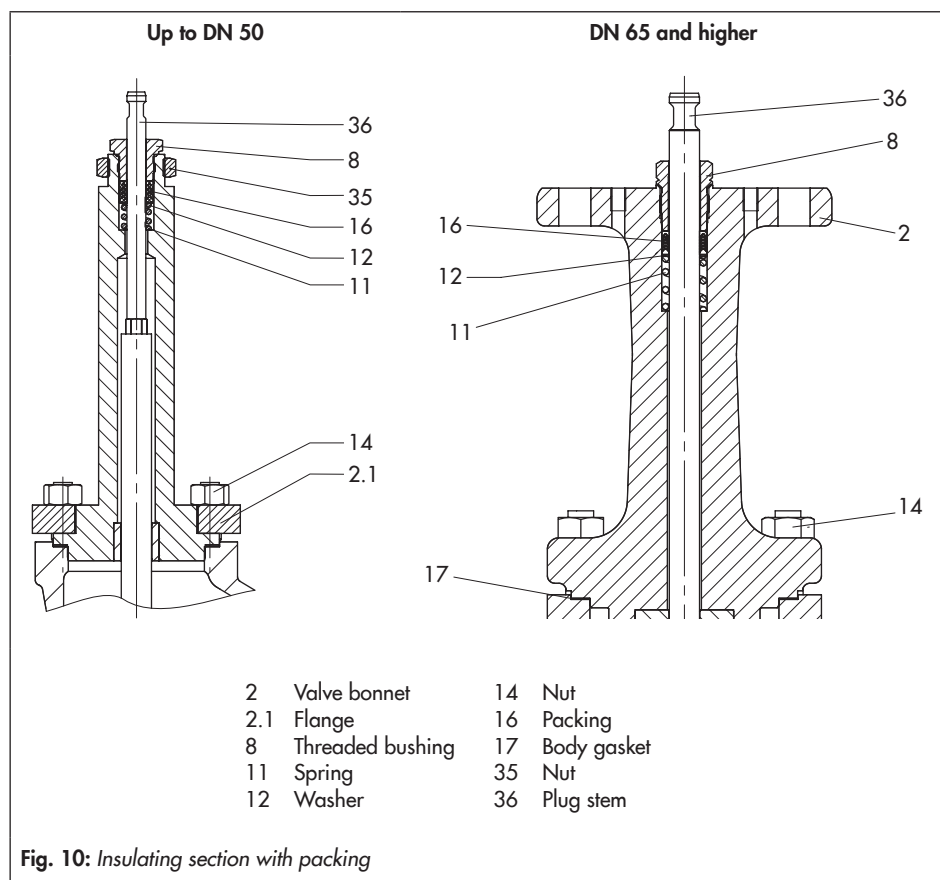


Fig. 10: *Insulating section with packing*

5.3 Replacing the seat and/or plug

Valves in DN 15 and 25 can be used both as mixing or diverting valves. The direction of flow is the only factor in this case that determines the application. Therefore, it is not necessary to rearrange the valve. The valve construction only has one plug.

Valves in DN 32 and larger have two plugs. Their arrangement differs depending on whether the valve is to be used as mixing or diverting valve.

When checking or replacing the seat or plug, we also recommend replacing the packing (16) and the body gasket (17).

When disassembling the valve, it is important to lay out the parts in the exact order they were disassembled in to facilitate assembly later.

Refer to Table 1 for the required tightening torques for seats (4, 141) and nuts (14, 40) on the body and plug stem.

5.3.1 Valves in DN 15 and 25

Disassembly, Fig. 11

1. Unscrew threaded bushing (8), remove nuts (14) and lift off flange (2.1).
2. Lift the valve bonnet (2) off the valve body over the plug stem.
3. Check the body gasket (17) located in the valve body for damage. We recommend renewing the body gasket.
4. Hold the plug stem (36) stationary from above at the hexagonal part with a suit-

- able tool and undo the nut (40) from below.
5. Remove the retaining washer (192) from below.
6. Carefully pull the plug stem out of the body from above.
7. Unscrew the top seat (4) using a seat wrench.

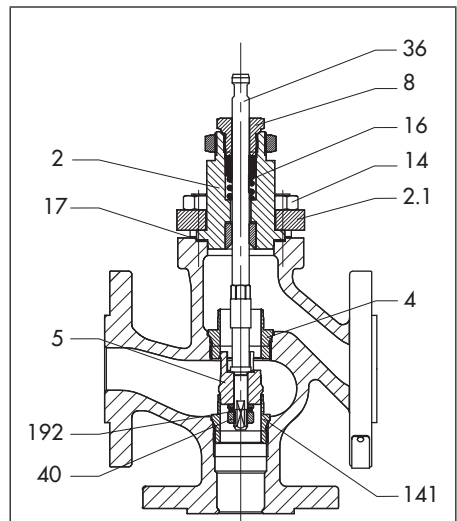


Fig. 11: Seats and plug for DN 15 and 25

8. Once the plug (5) has been removed, the bottom seat (141) can also be removed using the seat wrench.
9. Carefully clean all the parts and renew them, if necessary.

Assembly

Proceed in the reverse order to assemble the parts:

1. Mount bottom seat (141).
2. Insert the plug (5) with the three skirt projections facing upwards.
3. Mount top seat (4).
4. Guide the plug stem (36) from above through the plug (5).
5. Place the retaining washer (192) on the plug stem and mount the nut (40).
6. Apply a suitable lubricant to the plug stem in the area where the packing is located.
7. Carefully place the valve bonnet (2) over the plug stem (36) onto the valve body.
8. Place on flange and fasten with nuts (14).
9. Apply a suitable lubricant to the thread of the threaded bushing (8). Mount bushing.

5.3.2 Valves in DN 32 to 100

Disassembly, Fig. 8 and Fig. 12

Valve bonnet (DN 32 and 50)

1. Unscrew the threaded bushing (8).
2. Remove nuts (14) and lift off flange (2.1).

Valve bonnet (DN 65 and larger)

1. Unscrew the threaded bushing (8).
2. Remove nuts (14) and lift the valve bonnet (2) off the valve body over the plug stem. Check the body gasket (17) located in the valve body for damage. We recommend renewing the body gasket.

Mixing valve

3. Hold the plug stem (36) stationary from above at the hexagonal part with a suitable tool and undo the nut (40) from below.
4. Remove the retaining washer (192) and pipe (74) from below.
5. Carefully pull the plug stem (36) out of the body from above, while removing the short pipe (75) sideways.
6. Unscrew the top seat (4) using seat wrench (see Table 1).
7. Remove the top plug (5) and bottom plug (199) from the valve body.
8. Unscrew the bottom seat (141) using seat wrench.
9. Carefully clean all the parts and renew them, if necessary.

Diverting valve

3. Hold the plug stem (36) stationary from above at the hexagonal part with a suitable tool and undo the nut (40) from below.

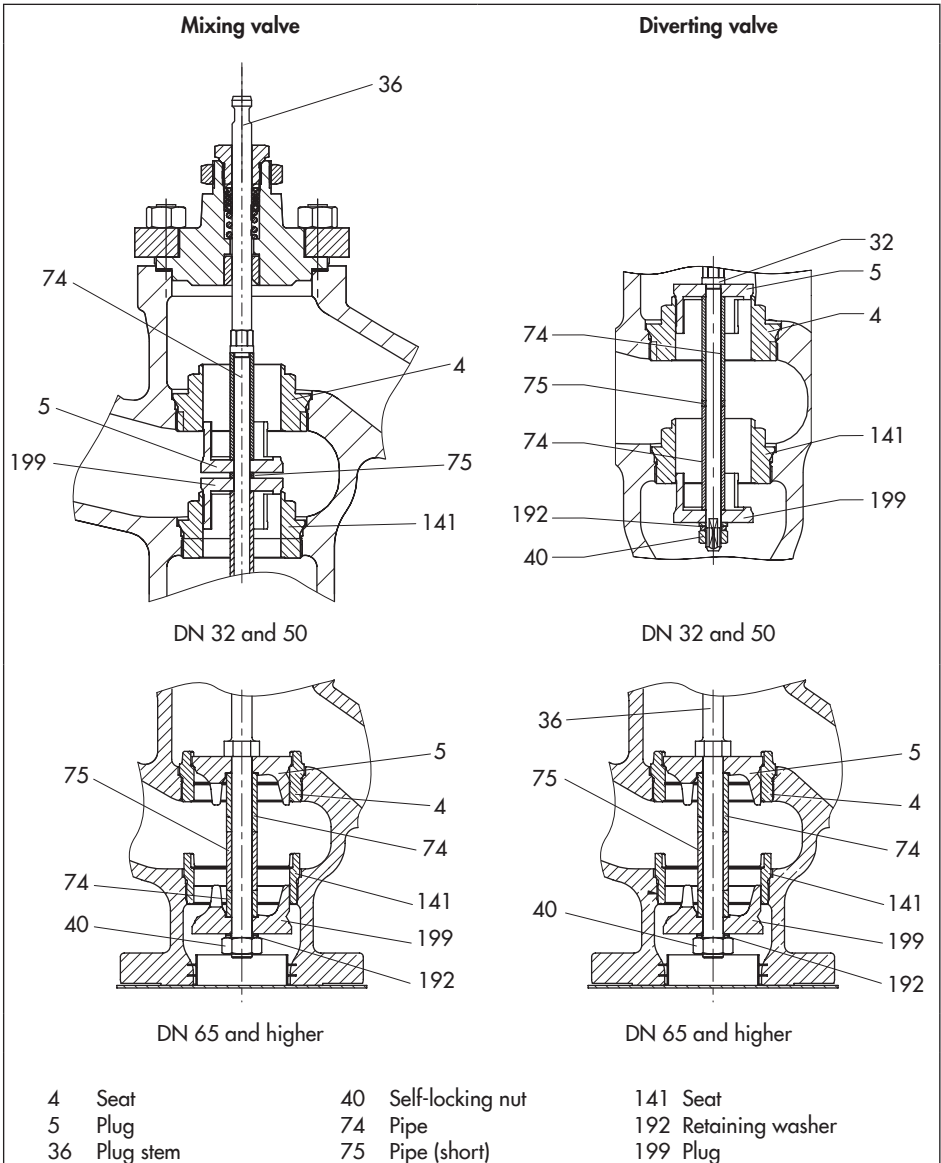


Fig. 12: Plug arrangement for valves in DN 32 to 100

4. Remove the retaining washer (192) and pipe (74) from below. Carefully pull the plug stem out of the body from above. The pipes (74, 75) for fixing the plug in place will now fall off the plug stem.
5. Remove the top plug (5) from the valve body.
6. Unscrew the top seat (4) and then the bottom seat (141) using a suitable seat wrench (see Table 1).
7. Remove the bottom plug (199) from the valve body.
8. Carefully clean all the parts and renew them, if necessary.

Mounting the seat/plug

Apply a suitable lubricant to the thread and the sealing cone of the new or remachined seats as well as to the nuts (40) and the threaded end of the plug stem.

On mounting the spacer pipes and plug, use a rod or long screw to hold them in position.

Mixing valve

1. Screw in the bottom seat (141) using seat wrench. Observe the tightening torque in Table 1.
2. Insert the bottom plug (199) into the seat (141) and hold the pipe (74) and the top plug (5) from below using a rod.
3. Mount top seat (4) with the seat tool.
4. Slide the pipe (74) on the plug stem and push the plug stem from above through the top plug (5), pipe (75) and bottom plug (199), while removing the rod (used as a tool) from below out of the valve.

5. Slide the bottom pipe (74) and retaining washer (192) from below onto the plug stem and tighten the nut (40), while holding the plug stem stationary. Observe the tightening torque in Table 1.

Diverting valve

1. Place the bottom plug (199) in the valve body as shown and mount the bottom seat (141) using a seat wrench, observing the tightening torques in Table 1.
2. Capture the bottom plug (199) and pieces of pipe (74, 75) using the rod as a tool.
3. Mount the top seat (4) using the seat wrench and applying the tightening torque in Table 1.
4. Place the top plug (5) in the top seat (4).
5. Guide the plug stem (36) from above through the plug (5), spacer pipes (74, 75) and bottom plug (199).
6. Place the retaining washer (192) from below on the plug stem and mount the nut (40), while holding the plug stem stationary. Observe tightening torque in Table 1.

Mounting the valve bonnet

1. Apply a suitable lubricant to the plug stem (36) in the area where the packing is located.
2. Carefully place the valve bonnet (2) over the plug stem onto the valve body.

Valve up to DN 50

3. Place flange (2.1) on the bonnet and fasten with the nuts (14) (observe tightening torque in Table 1).
4. Apply a suitable lubricant to the thread of the threaded bushing (8). Screw in the threaded bushing and tighten it.

Valve in DN 65 and larger

3. Fasten the bonnet with the nuts (14).
4. Apply a suitable lubricant to the thread of the threaded bushing (8). Screw in the threaded bushing and tighten it.

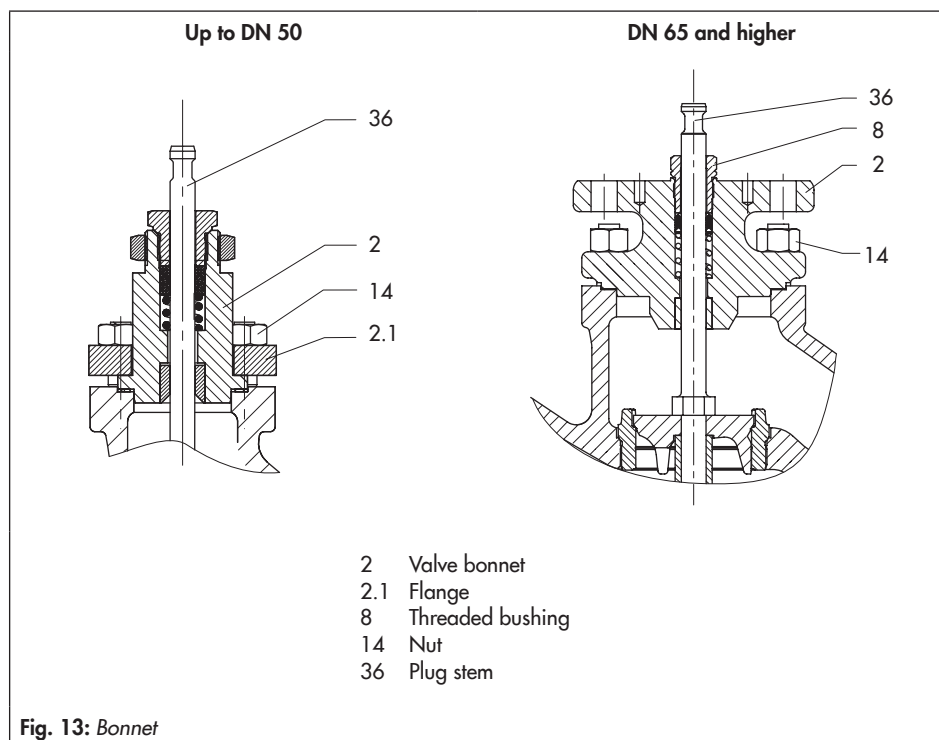


Fig. 13: Bonnet

5.4 SAMSON seat wrench and tightening torques

Contact the SAMSON After-sales Service for more details on mounting.

Table 1: SAMSON seat wrench and tightening torques

Nominal size		DN 15 to 25 NPS ½ to 2	DN 32 to 50 NPS 1½ to 2	DN 65 to 80 NPS 2½ to 3	DN 100 NPS 4
Seat wrench Order no.		1280-3010	1280-3011	1280-0305	1280-0405
Additionally required		9932-3814	9932-3808 9932-3812	9932-3808 9932-3814	9932-3808 9932-3814
Seat thread tightening torque ±10 %	Top	120 Nm	M62 x 1.5 500 Nm	950 Nm	880 Nm
	Bottom	120 Nm	M68 x 1.5 500 Nm	1400 Nm	1320 Nm
Body nuts (14) tightening torque ±10 %		30 Nm	50 Nm	100 Nm	150 Nm

6 Description of the nameplate

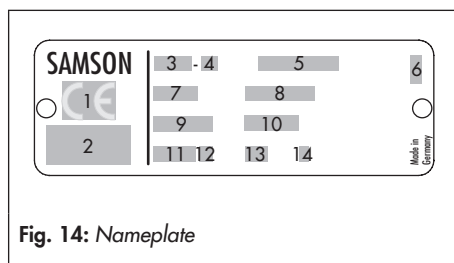


Fig. 14: Nameplate

- 1 CE marking or "Art. 3, Abs. 3", where applicable
- 2 ID of the notified body, fluid group and category, where applicable
- 3 Type designation
- 4 Device modification index
- 5 Material
- 6 Year of manufacture
- 7 Valve size: DIN: DN, ANSI: NPS
- 8 Perm. operating gauge pressure at room temperature, DIN: PN, ANSI: CL
- 9 Order no. with modification index
- 10 Item in order
- 11 Flow coefficient:
DIN: K_{VS} , ANSI: C_v
- 12 Characteristic: % equal percentage, Lin linear, DIN: A/Z, ANSI: O/C for on/off
- 13 Seal:
ME metal, **ST** Stellite coated,
Ni nickel plated,
PT soft PTFE seal,
PK soft PEEK seal
- 14 Version:
M mixing valve, **V** diverting valve

7 Dimensions

The dimensions for the DIN and ANSI versions of the Type 3323 Valve can be found in the associated Data Sheets ► T 8113 EN and ► T 8114 EN

8 Customer inquiries

Submit the following details when making inquiries:

- Order number and item in the order (written on the nameplate)
- Type, nominal size and nominal pressure of the valve
- Pressure and temperature of the process medium
- Flow rate in m^3/h
- Bench range of the mounted actuator (e.g. 1.4 to 2.3 bar)
- Strainer used
- Installation drawing



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EB 8113/8114 EN

2014-07-11



Application

Electric actuator for plant engineering and HVAC

The actuator is a linear actuator with or without fail-safe action available either in a version with a three-step signal or a version with digital positioner. It can be combined with SAMSON Series V2001 and Series 240 Valves as well as Type 3260 and Type 3214 Valves.

Special features

- Actuator optionally available with either integrated yoke (Fig. 1) or using an M30x1.5 ring nut (Fig. 2) including the necessary stem connecting parts
- Actuator with fail-action "actuator stem extends" tested by the German Technical Inspectorate (TÜV) according to DIN EN 14597 in combination with various SAMSON valves
- Motor switched off by torque-dependent limit contacts
- Mechanical override ¹⁾
- Thrust up to 2.5 kN
- No maintenance required

¹⁾ Not in versions with positioner and fail-safe action

Three-step version

- Power supply:
 - 230 V/24 V with 50/60 Hz or
 - 120 V/60 Hz
- Synchronous motor with maintenance-free planetary gear
- Additional electrical equipment:
 - Mechanical limit contacts
 - Resistance transmitters

Version with digital positioner

- Power supply:
 - 24 V with 47 to 63 Hz and DC
 - 85 to 264 V with 47 to 63 Hz
- Stepper motor with maintenance-free planetary gear
- All function settings performed using a rotary pushbutton on the actuator
- Backlit LCD
- Additional electrical equipment:
 - Mechanical/electronic limit contacts
 - RS-485 module for Modbus-RTU communication

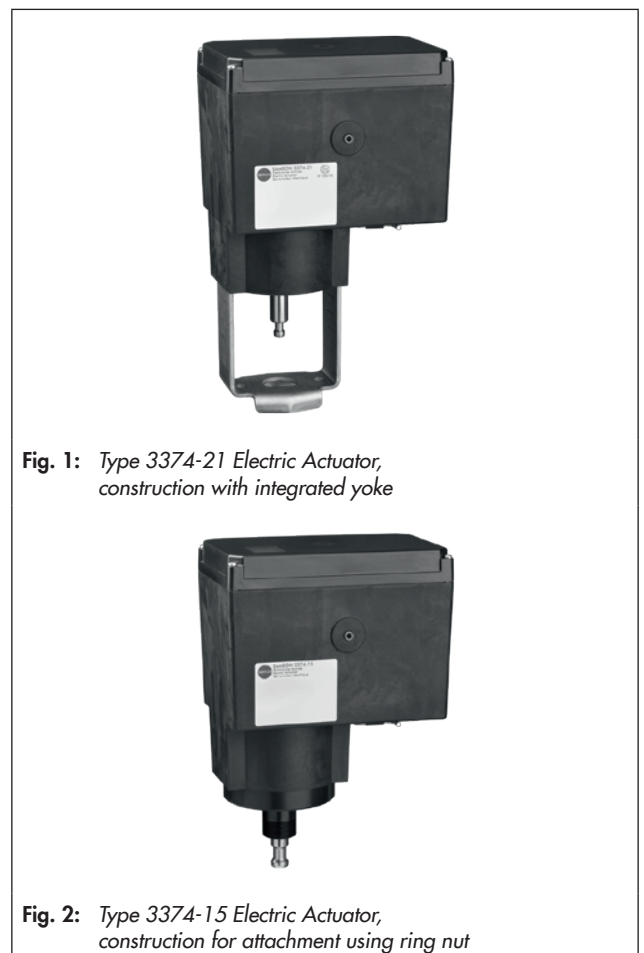


Fig. 1: Type 3374-21 Electric Actuator, construction with integrated yoke

Fig. 2: Type 3374-15 Electric Actuator, construction for attachment using ring nut

- Settings performed in TROVIS-VIEW

Special version with three-key operation

- The actuator is not operated using the rotary pushbutton. Instead, keys on the cover are used for operation.
- This actuator version can be operated without having to remove the housing cover.

Principle of operation

The electric actuator consists of a reversible motor and a maintenance-free planetary gear with ball screw drive. The motor is switched off by torque-dependent limit contacts or in case of overload.

Actuators with an integrated yoke (Fig. 5a) are primarily combined with the following valves:

- V2001
- Type 3260 in DN 65 to 150
- Type 3214 in DN 65 to 100
- Type 3214 balanced by a diaphragm, DN 125 to 250



Fig. 3: Type 3374-21 Electric Actuator, mounted on a V2001 Globe Valve

Actuators with central attachment are primarily combined with valves that have their own yoke:

Series 240 (Fig. 5b)

- Type 3214 balanced by a bellows, DN 125 to 250 (Fig. 5c)

Fail-safe action

The Type 3374 Electric Actuator is available optionally with fail-safe action:

Actuator stem extends: Upon power supply failure, the actuator stem extends

Actuator stem retracts: Upon power supply failure, the actuator stem retracts

Additional electrical equipment

Mechanical limit contacts

The mechanical limit contacts can be adjusted independently from one another. They are actuated by continuously adjustable cam disks.

Electronic limit contacts

The electronic limit contacts consist of relays with change-over contacts. In contrast to the mechanical limit contacts, the electronic limit contacts no longer function after a power supply failure. The relays are de-energized and the contacts change to the idle state.

Resistance transmitters

The resistance transmitter is linked to the gear and produces a resistance signal between approx. 0 and 1000 Ω (usable range 0 to 800 Ω) proportional to the valve travel.

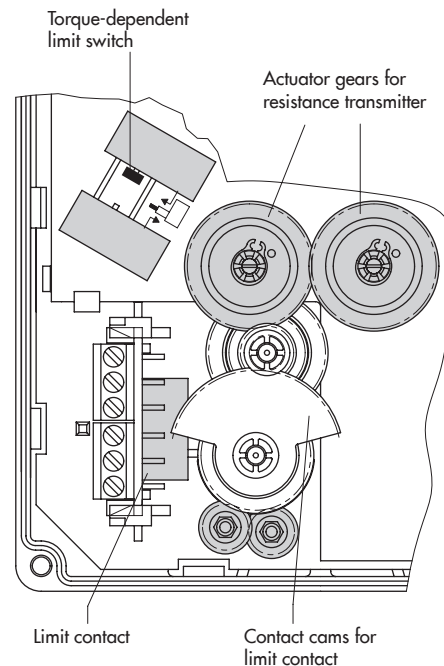


Fig. 4: Partial view with opened cover

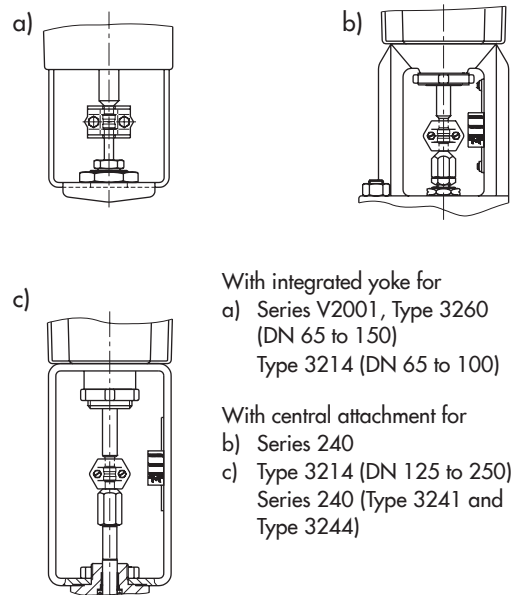


Fig. 5: Attachment to various valves

1. Three-step version

Table 1: *Technical data*

Type 3374		-10	-11	-15	-21	-26	-31	-36
Version with		Yoke		Ring nut	Yoke	Ring nut	Yoke	Ring nut
Fail-safe action		Without			Extends		Retracts	
Rated travel	mm	30	15	30	15			
Transit time for rated travel								
Standard	s	240	120	240	120			
Fast	s	120	60	120	60			
In the event of fail-safe action	s	–			12			
Stroking speed								
Standard	mm/s	0.125						
Fast	mm/s	0.25						
In the event of fail-safe action	mm/s	–			1.25			
Thrust	Retracts	2.5 kN			0.5 kN			
	Extends	2.5 kN			2 kN			
Power supply		230 V (+10/–15 %), 50 Hz 230 V (+10/–15 %), 60 Hz 24 V (+10/–15 %), 50 Hz 24 V (+10/–15 %), 60 Hz 120 V (90 to 132 V), 60 Hz						
Duty type		S1 - 100 % according to EN 60034-1						
Power consumption	VA	7.5/13 ²⁾			10.5/16 ²⁾			
Motor switch-off		Torque dependent						
Degree of protection		IP 54 according to EN 60529, IP 65 with cable glands (can be retrofitted) ¹⁾ Suspended mounting not permitted						
Overvoltage category		II according to EN 60664						
Design and testing		According to EN 61010						
Class of protection		II according to EN 61140						
Noise immunity		According to EN 61000-6-2, EN 61326						
Noise emission		According to EN 61000-6-3, EN 61326						
Manual override		Hex wrench · Adjustment not possible after fail-safe action has been triggered.						
Weight	kg (approx.)	3.2		3.3	3.9	4.0	3.5	3.6
Materials		Housing and cover: Plastic (glass-fiber reinforced PPO)						
Additional electrical equipment								
Limit contacts		Two travel-dependent, adjustable changeover switches, max. 250 V AC, 1 A						
Resistance transmitters		0 to 1000 Ω, (0 to 900 Ω at rated travel) max. permissible current 1 mA						

¹⁾ Cable glands M20x1.5 with metal nut SW 23/24 (order no. 1400-8828)

²⁾ Actuator with faster motor

2. Version with digital positioner



Table 2: Technical data · Without fail-safe action

Type 3374	-10	-11	-15	
Type of connection	With yoke		With ring nut	
Travel mm	30	15	30	
Travel limitation	Between 10 and 100 % of the rated travel			
Manual override	4 mm hex wrench			
Electrical connection				
Power supply	24 V (±15 %), 47 to 63 Hz and 24 V DC (±15 %) 85 to 264 V, 47 to 63 Hz			
Duty type	S1 - 100 % according to EN 60034-1			
Power consumption	Speed level: Normal · Fast			
24 V	AC	12.5 VA · 16.5 VA		
	DC	7.5 W · 11 W		
85 to 264 V	AC	13.8 to 20 VA		
Transit time in s · Stroking speed in mm/s				
Standard version	Standard	120 · 0.25	60 · 0.25	120 · 0.25
	Fast	60 · 0.5	30 · 0.5	60 · 0.5
Actuator with faster motor	Standard	60 · 0.5	30 · 0.5	60 · 0.5
	Fast	30 · 1.0	15 · 1.0	30 · 1.0
Thrust in kN (standard version · Version with faster motor)				
Extends	2.5 · 1.25	2.5 · 1.25	2.5 · 1.25	
Retracts	2.5 · 1.25	2.5 · 1.25	2.5 · 1.25	
Weight				
kg (approx.)	3.5	3.5	3.6	

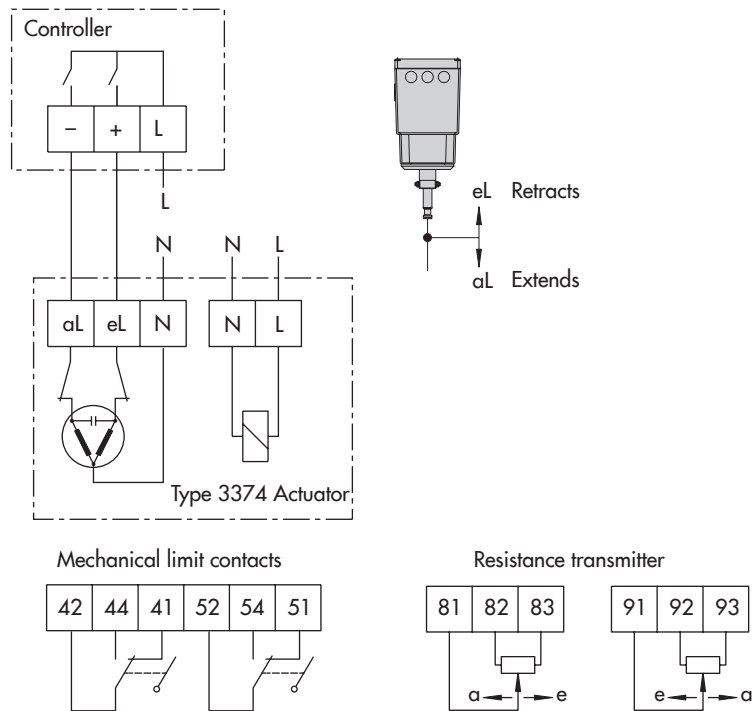
Table 3: Technical data · With fail-safe action

Actuator	Type 3374	-21	-26	-31	-36
Type of connection		With yoke	With ring nut	With yoke	With ring nut
Fail-safe action		Extends		Retracts	
Travel	mm	15		15	
Travel limitation		Between 10 and 100 % of the rated travel			
Manual override		-			
Electrical connection					
Power supply		24 V (±15 %), 47 to 63 Hz and 24 V DC (±15 %) 85 to 264 V, 47 to 63 Hz			
Duty type		S1 - 100 % according to EN 60034-1			
Power consumption		Speed level: Normal · Fast			
24 V	AC	18 VA · 23 VA			
	DC	11.5 W · 15 W			
85 to 264 V	AC	19.8 to 26 VA			
Transit time in s · Stroking speed in mm/s					
Standard		60 · 0.25	60 · 0.25	60 · 0.25	60 · 0.25
Fast		30 · 0.5	30 · 0.5	30 · 0.5	30 · 0.5
Upon fail-safe action		12 · 1.25	12 · 1.25	12 · 1.25	12 · 1.25
Forces in kN					
Thrust (stem extends)		2	2	2	2
Thrust (stem retracts)		0.5	0.5	0.5	0.5
Nominal thrust of safety spring		2	2	0.5	0.5
Weight					
kg (approx.)		4.2	4.3	3.8	3.9

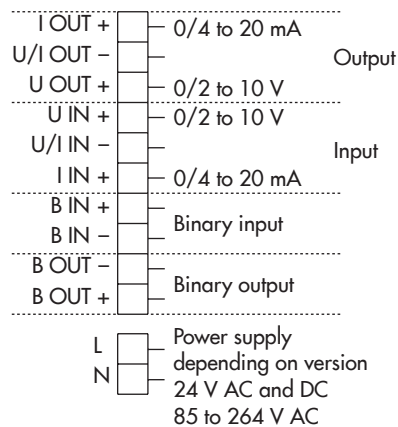
Table 4: Common technical data

Type 3374-xx		
Input signal	Current input	0/4 to 20 mA, adjustable · $R_i = 50\ \Omega$
	Voltage input	0/2 to 10 V, adjustable · $R_i = 20\ k\Omega$
	Pt 1000 input	Measuring range: -50 to 150 °C, 300 μ A
	Binary input	By jumpering the terminals, not galvanically isolated
Position feedback	Current	0/4 to 20 mA, adjustable · Error message 24 mA
		Resolution
	Load	Max. 200 Ω
	Voltage	0/2 to 10 V, adjustable · Error message 12 V
		Resolution
	Load	Minimum 5 k Ω
Binary input		Open-circuit voltage: 10 V; short-circuit current: 5 mA By jumpering the terminals, not galvanically isolated
Binary output (floating)	Revision 2	Galvanically isolated · Max. 24 V DC/50 mA · No short-circuit protection · Reversible polarity
	Revision 3	Max. 230 V AC/1 A
Applications	Positioner	The travel follows the input signal
	PID controller	Fixed set point control
	Two-step mode	Two-step behavior, control over binary input
	Three-step mode ¹⁾	Three-step behavior, control over binary input
	Temperature closed-loop control upon input signal failure ¹⁾	The integrated PID controller uses a fixed set point for closed-loop control when the input signal is missing.
Display		Icons for functions, codes and text field with backlight
Rotary pushbutton		Operating control for on-site operation to select and confirm codes and values
Interface	Standard	RS-232 · For point-to-point connection to communication participants or for memory pen · Permanently installed · Connection: RJ-12 connector socket
Motor switch-off		By torque-dependent limit contacts
Degree of protection acc. to EN 60529		IP 54 with cable entries, IP 65 with cable glands (can be retrofitted) ²⁾ Suspended mounting not permitted according to EN 60664
Overvoltage category		II according to EN 61010
Design and testing		According to EN 61010
Class of protection		II according to EN 61140
EMC		According to EN 61000-6-2, EN 61000-6-3 and EN 61326
Degree of contamination		2 according to EN 61010
Noise immunity		According to EN 61000-6-2
Noise emission		According to EN 61000-6-3
Mechanical environmental conditions		Class 1M2 according to EN 60721-3-1:1998
		Class 2M1 according to EN 60721-3-2:1998
		Class 3M4 according to EN 60721-3-3:1998
		Class 4M4 according to EN 60721-3-4:1998
Permissible temperatures ³⁾	Ambient	5 to 60 °C
	Storage	-25 to +70 °C
Humidity		5 to 95 % relative humidity, no dew formation
Compliance		 
Additional electrical equipment		
Limit contacts	Mechanical	Two adjustable limit contacts with changeover switches; 230 V AC/1 A · Without contact protection
	Electronic	Two adjustable limit contacts with relay and changeover switches; 230 V AC/1 A · Without contact protection
RS-485 module (order no. 1402-1522)		Module for Modbus-RTU communication

¹⁾ Application only available in Type 3374, revision 3²⁾ Cable glands M20x1.5 with metal nut SW 23/24 (order no. 1400-8828)³⁾ The permissible medium temperature depends on the valve on which the electric actuator is mounted. The limits in the valve documentation apply.

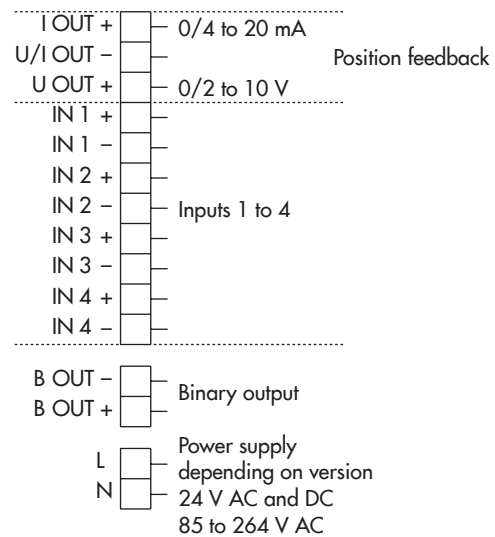
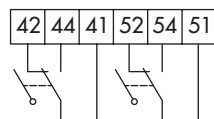


For actuators with firmware version 2.xx (revision 2)



Options:

Mechanical limit contacts



Electronic limit contacts

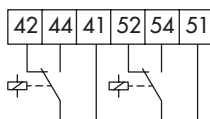
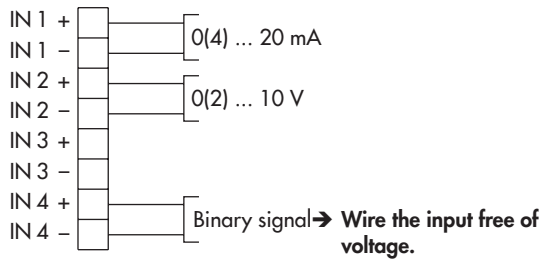
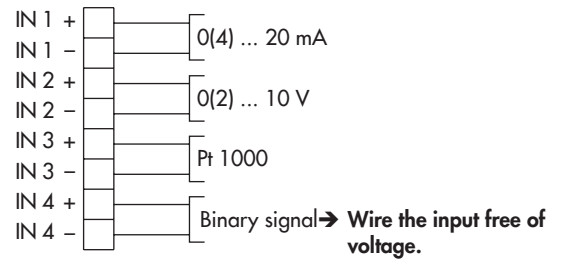


Fig. 7: *Electrical connection · Version with digital positioner*

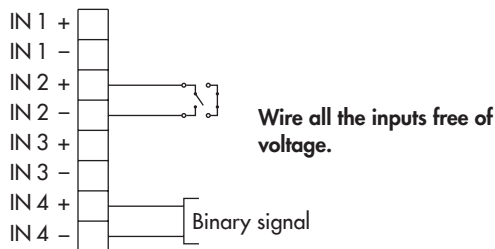
Application: Positioner (POS)



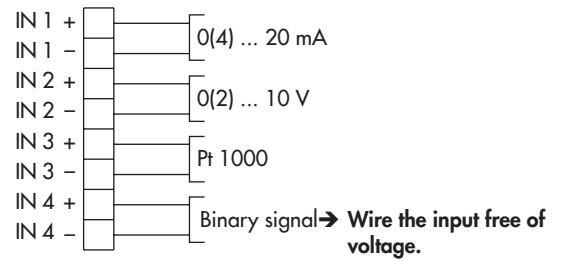
Application: PID controller (PID)



Application: Two-step mode (2STP)

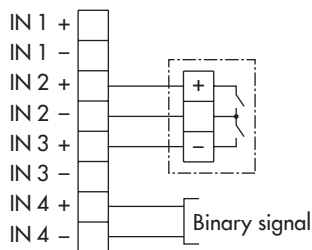


Application: Temperature closed-loop control upon input signal failure (POSF)

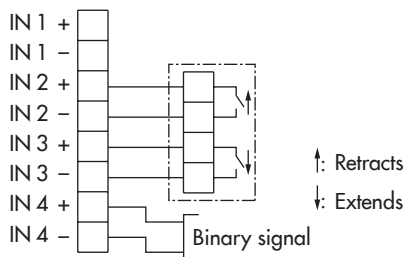


Application: Three-step mode (3STP)

Three-wire connection:



Four-wire connection:

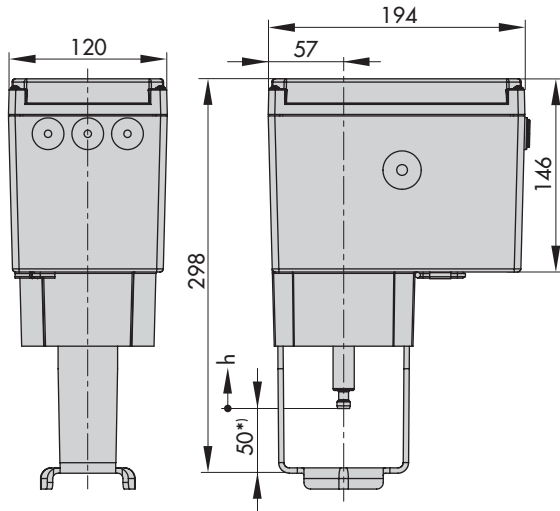


Wire all the inputs free of voltage.

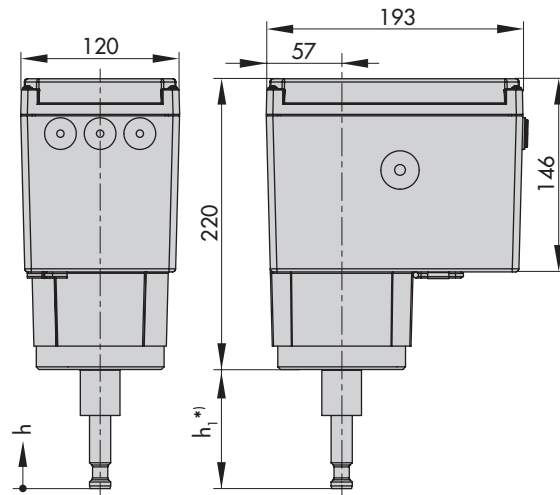
Fig. 8: Terminal assignment depending on the application selected

Dimensions in mm

Type 3374-10/-11/-21/-31



Types 3374-15/-26/-36



*) When actuator stem is fully extended

Type 3374	Dimension h	Dimension h ₁
-10	30	–
-11	15	–
-21	15	–
-31	15	–
-15	30	90
-26	15	75
-36	15	75

Ordering text · Three-step version

Electric actuator	Type 3374- ...
Rated travel	15/30 mm
Version with fail-safe action	Actuator stem extends or retracts only with 15 mm travel
Power supply	230 V/50 or 60 Hz, 24 V/50 or 60 Hz or 120 V/60 Hz
Additional electrical equipment	
Two mechanical limit contacts	
Two resistance transmitters	0 to 1000 Ω

Ordering text · Version with digital positioner

Electric actuator	Type 3374- ...
Rated travel	15/30 mm
Version with fail-safe action	With/without
Gear version	Standard or actuator with faster motor
Power supply	24 V, 50/60 Hz and DC 85 to 264 V, 50/60 Hz
Additional electrical equipment	
Two limit contacts	Mechanical/electronic

List of documentation

Mounting and operating instructions

- for Type 3374, revision 2: ► EB 8331-4 (rev. 2)
- for Type 3374, revision 3: ► EB 8331-4 (rev. 3)

MOUNTING AND OPERATING INSTRUCTIONS



EB 8331-4 EN

Translation of original instructions



Type 3374 Electric Actuator

Version with positioner, revision 3

Firmware version 3.11



Edition August 2016

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 Department (aftersaleservice@samson.de).



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.samson.de > **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

Firmware revisions	
Old	New
3.10	3.11 (internal revisions)

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1 Safety instructions and measures

The Type 3374 Electric Actuator is designed to operate a mounted globe valve used in industrial applications as well as in heating, ventilation and air-conditioning systems. The digital positioner ensures a predetermined assignment of the valve position to the input signal. The actuator is designed to operate under exactly defined conditions (e.g. thrust, travel). Therefore, operators must ensure that the actuator is only used in operating conditions that meet the specifications used for sizing the actuator at the ordering stage. In case operators intend to use the actuator 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. See section 3.7.

Reasonably foreseeable misuse

The actuator 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 service and repair work not described in these instructions

Qualifications of operating personnel

The actuator must be mounted, started up, serviced and repaired 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 electric actuator. Work on the control valve may be necessary when mounting or removing the device.

- ➔ Observe the requirements for personal protective equipment specified in the valve documentation.
- ➔ Check with the plant operator for details on further protective equipment.

Revisions and other modifications

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

Safety features

Upon power supply failure, the **Type 3374** Electric Actuator causes the valve to move to a certain fail-safe position. The fail-safe action of SAMSON actuators is specified on the actuator nameplate.

Warning against residual hazards

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.

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 Type 3374 Electric Actuator fulfills the requirements of the Directives 2014/30/EU and 2014/35/EU. The declaration of conformity includes information about the applied conformity assessment procedure. This declaration of conformity is included in the appendix of these instructions.

The Type 3374 Electric Actuator is designed for use in low voltage installations.

➔ For wiring, maintenance and repair, observe the relevant safety regulations.

Referenced documentation

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

- Mounting and operating instructions of the valve on which the electric actuator is mounted, e.g. for SAMSON valves:
 - ▶ EB 5861 for Type 3260 Three-way Valve
 - ▶ EB 5868 for Type 3213 and Type 3214 Globe Valves
 - ▶ EB 8113 for Type 3323 Three-way Valve
 - ▶ EB 8131 for Type 3531 Globe Valve for Heat Transfer Oil
 - ▶ EB 8135 for Type 3535 Three-way Valve for Heat Transfer Oil

1.1 Notes on possible severe personal injury

DANGER

Risk of electric shock.

- ➔ Before connecting wiring, performing any work on the device or opening the device, disconnect the power supply and protect it against unintentional reconnection.
- ➔ Only use power interruption devices that are protected against unintentional reconnection of the power supply.
- ➔ Do not remove any covers to perform adjustment work on live parts.

Risk of bursting in pressure equipment.

Valves and pipelines are pressure equipment. Improper opening can lead to valve components bursting.

- ➔ Before starting any work on the valve, depressurize all plant sections concerned as well as the valve.
- ➔ Drain the process medium from all the plant sections concerned and from the valve.
- ➔ Wear recommended personal protective equipment. See associated valve documentation.

1.2 Notes on possible personal injury

WARNING

Crush hazard arising from moving parts.

The electric actuator contains moving parts (actuator and plug stems), which can injure hands or fingers if inserted into the actuator.

- ➔ Do not insert hands or fingers into the yoke while the valve is in operation.
- ➔ Disconnect the power supply before performing any work on the control valve.
- ➔ Do not impede the movement of the actuator or plug stem by inserting objects into their path.

1.3 Notes on possible property damage

NOTICE

Risk of damage to the electric actuator due to the power supply exceeding the permissible tolerances.

The Type 3374 Electric Actuator is designed for use according to regulations for low-voltage installations.

→ Observe the permissible tolerances of the power supply.

Risk of actuator damage due to excessively high tightening torques.

Observe the specified torques on tightening the mounting parts of Type 3374 Electric Actuators. Excessively tightened torques lead to parts wearing out quicker.

→ Observe the specified tightening torques.

Risk of damage to the electric actuator due to incorrect operation of the manual override.

The actuator stem of the electric actuator can be adjusted manually.





→ Do not operate the manual override while the actuator is running and only when the power supply is disconnected.





Risk of actuator damage due to incorrect wiring of the binary inputs.

→ Always wire the binary inputs free of voltage.

2 Markings on the device

2.1 Nameplate

	SAMSON 3374- 1		
	Electric Actuator		
	Var.-ID 2		
	Serial no. 3		
U: 4	F↓ 8		10
P _{max} : 5	F↑ 9		
s: 6	v: 7		
Digital Positioner			
Firmware: 11		12	
0(4) ... 20 mA DC; R _i = 50 Ω			
0(2) ... 10 V DC; R _i = 20 kΩ			
		13	 14 0062
SAMSON AG, Germany		Made in Germany	

1	Type designation
2	Configuration ID
3	Serial number
4	Power supply; power line frequency
5	Power consumption
6	Nominal transit time
7	Stroking speed
8	Thrust (stem retracts)
9	Thrust (stem extends)
10	Fail-safe action  Retracts or Extends 
11	Firmware version
12	Limit contacts  Mechanical limit contacts  Electronic limit contacts
13	Testing according to DIN EN 14597
14	Year

3 Design and principle of operation

The Type 3374 Electric Actuator is used in industrial plants as well as in heating, ventilation and air-conditioning systems.

The actuator is suitable for form-fit attachment to various SAMSON valve series, depending on the version **with or without fail-safe action**.

The stepper motor is switched off by torque-dependent switches in the end positions or in case of overload. The force of the motor is transmitted to the actuator stem via gearing and ball screw.

The Type 3374 Actuator is optionally available with either integrated yoke (Fig. 1) or using an M30x1.5 ring nut (Fig. 2) including the necessary stem connecting parts.

Testing according to DIN EN 14597

The Types 3374 Electric Actuator with fail-safe action "actuator stem extends" is tested by the German technical surveillance association (TÜV) according to DIN EN 14597 in combination with various SAMSON valves. The register number is available on request.

3.1 Versions

The Type 3374 Electric Actuator is available with or without fail-safe action.

Version with fail-safe action

Type 3374-2x and Type 3374-3x Actuators are able to perform a fail-safe action and contain a spring assembly and an electromagnet. The actuator moves to the fail-safe position when the electromagnet is de-energized.

→ Do not use the fail-safe action to control the valve position!



Fig. 1: Construction with integrated yoke



Fig. 2: Construction for mounting with ring nut

3.2 Limit contacts

The actuator can be equipped with **either mechanical or electronic limit contacts** to influence the tasks of control equipment.

3.2.1 Mechanical limit contacts

The two mechanical limit contacts can be adjusted independently from one another. They are operated by mechanical pins. The installation and adjustment of the mechanical limit contacts is described in section 6.1.

3.2.2 Electronic limit contacts

The two electronic limit contacts consist of relays with changeover contacts. In contrast to the mechanical limit contacts, the electronic limit contacts no longer function after a power supply failure. The relays are de-energized and the contacts change to the idle state. The retrofitting and adjustment of the electronic limit contacts is described in section 9.8.

3.3 Manual override

There are two ways to manually move the actuator stem:

- Manual override with 4 mm hex wrench
- MAN operating mode to move the actuator stem manually

3.3.1 Mechanical override

The mechanical manual override is only possible for actuators **without** fail-safe action. It is performed by placing a 4 mm hex wrench on the red actuator shaft located at the side of the housing. The hex wrench is included in the scope of delivery. It is attached to the bottom of the housing.

- ➔ Do not operate the manual override while the actuator is running and only when the power supply is disconnected.

3.3.2 Moving the actuator stem manually

First place the actuator into MAN mode to move the actuator stem manually. The operation and selection of the operating mode are described in section 8.1 on page 47.

3.4 Communication

The Type 3374 Electric Actuator has two communication interfaces:

- Internal serial RS-232 interface for SSP protocol for configuration using TROVIS-VIEW.

→ See section 7.4

- RS-485 interface (RS-485 module required) for Modbus-RTU protocol and SSP protocol for configuration using TROVIS-VIEW.

→ See section 6.3

3.5 Device overview and operating controls

The operating controls are located underneath the housing cover.

i Note

To undo the screws on the housing cover, use a Pozidriv PZ2 screwdriver to get enough hold on the screw heads.

3.6 Special version with three-key operation

In the special version of the Type 3374 with three-key operation, the actuator is not operated using the rotary pushbutton. Instead, three keys on the cover are used for operation.

This actuator version can be operated without having to remove the housing cover.

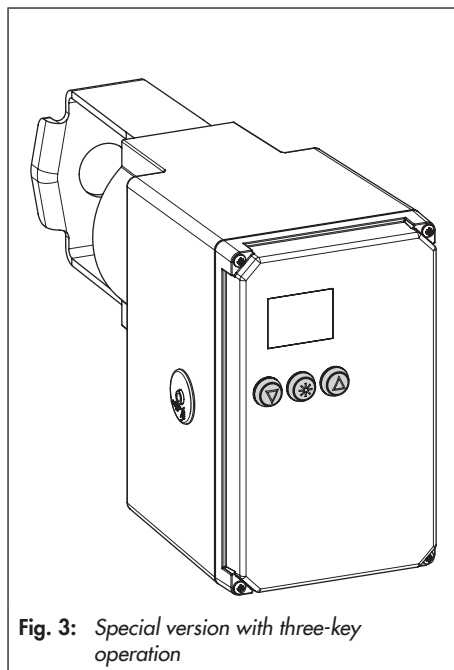
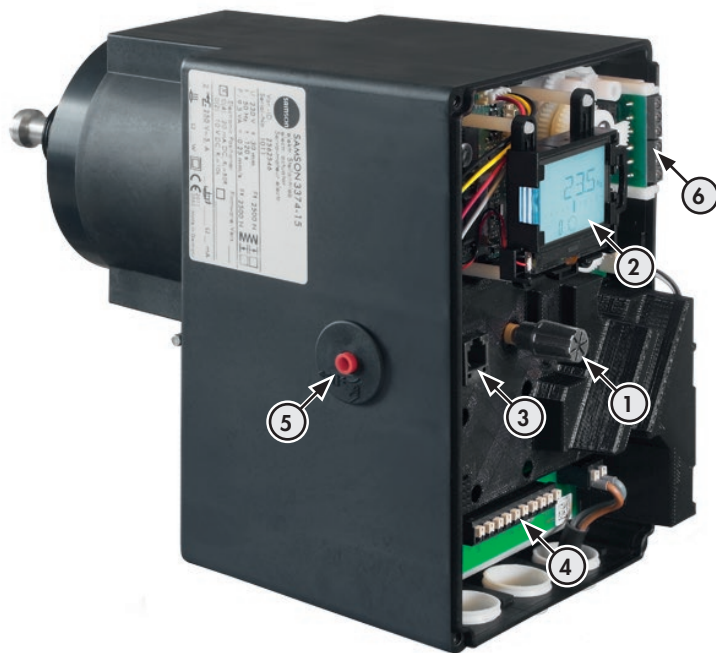


Fig. 3: Special version with three-key operation



- 1 Rotary pushbutton
- 2 Display
- 3 Serial interface
- 4 Terminals
- 5 Actuating shaft for mechanical manual override
- 6 Terminal board for limit contacts

Fig. 4: Operating controls (with housing cover removed)

3.7 Technical data

Table 1: *Version without fail-safe action*

Type 3374		-10	-11	-15
Type of connection		With yoke ¹⁾		With ring nut ²⁾
Travel	mm	30	15	30
Travel limitation		Between 10 and 100 % of the rated travel		
Manual override		4 mm hex wrench		
Electrical connection				
Power supply		24 V (±15 %), 47 to 63 Hz and 24 V DC (±15 %) 85 to 264 V, 47 to 63 Hz		
Duty type		S1 - 100 % according to EN 60034-1		
Power consumption		Speed level: Normal · Fast		
24 V	AC	12.5 VA · 16.5 VA		
	DC	7.5 W · 11 W		
85 to 264 V	AC	13.8 to 20 VA		
Transit time in s · Stroking speed in mm/s				
Standard version	Normal ³⁾	120 · 0.25	60 · 0.25	120 · 0.25
	Fast ⁴⁾	60 · 0.5	30 · 0.5	60 · 0.5
Actuator with faster motor	Normal ³⁾	60 · 0.5	30 · 0.5	60 · 0.5
	Fast ⁴⁾	30 · 1.0	15 · 1.0	30 · 1.0
Thrust in kN (standard version · Version with faster motor)				
Extends		2.5 · 1.25	2.5 · 1.25	2.5 · 1.25
Retracts		2.5 · 1.25	2.5 · 1.25	2.5 · 1.25
Weight				
kg (approx.)		3.5	3.5	3.6

¹⁾ For attachment to SAMSON Series V2001 Valves (DN 15 to 80) and to SAMSON Type 3260 (DN 65 to 150) and Type 3214 Valves (DN 65 to 100)

²⁾ For attachment to SAMSON Series 240 Valves and to SAMSON Type 3214 Valve (DN 125 to 250)

³⁾ Normal speed level (Code c64 = NORM)

⁴⁾ Fast speed level (Code c64 = FAST)

Table 2: *Version with fail-safe action*

Type 3374	-21	-26	-31	-36
Type of connection	With yoke ¹⁾	With ring nut ²⁾	With yoke ¹⁾	With ring nut ²⁾
Fail-safe action	Extends		Retracts	
Travel mm	15		15	
Travel limitation	Between 10 and 100 % of the rated travel			
Manual override	–			
Electrical connection				
Power supply	24 V (±15 %), 47 to 63 Hz and 24 V DC (±15 %) 85 to 264 V, 47 to 63 Hz			
Duty type	S1 - 100 % according to EN 60034-1			
Power consumption	Speed level: Normal · Fast			
24 V	AC	18 VA · 23 VA		
	DC	11.5 W · 15 W		
85 to 264 V	AC	19.8 to 26 VA		
Transit time in s · Stroking speed in mm/s				
Normal ³⁾	60 · 0.25	60 · 0.25	60 · 0.25	60 · 0.25
Fast ⁴⁾	30 · 0.5	30 · 0.5	30 · 0.5	30 · 0.5
Upon fail-safe action	12 · 1.25	12 · 1.25	12 · 1.25	12 · 1.25
Forces in kN				
Thrust (stem extends)	2	2	2	2
Thrust (stem retracts)	0.5	0.5	0.5	0.5
Nominal thrust of safety spring	2	2	0.5	0.5
Weight				
kg (approx.)	4.2	4.3	3.8	3.9

¹⁾ For attachment to SAMSON Series V2001 Valves (DN 15 to 80) and to SAMSON Type 3260 (DN 65 to 150) and Type 3214 Valves (DN 65 to 100)

²⁾ For attachment to SAMSON Series 240 Valves and to SAMSON Type 3214 Valve (DN 125 to 250)

³⁾ Normal speed level (Code c64 = NORM)


⁴⁾ Fast speed level (Code c64 = FAST)

Table 3: *Common data*

Digital positioner		
Input signal	Current input	0/4 to 20 mA, adjustable · $R_i = 50 \Omega$
	Voltage input	0/2 to 10 V, adjustable · $R_i = 20 k\Omega$
	Pt 1000 input ¹⁾	Measuring range: -50 to 150 °C, 300 μ A
	Binary input ²⁾	By jumpering the terminals, not galvanically isolated
Position feedback	Current	0/4 to 20 mA, adjustable · Error message 24 mA
		Resolution 1000 steps or 0.02 mA
	Load	Max. 200 Ω
	Voltage	0/2 to 10 V, adjustable · Error message 12 V
		Resolution 1000 steps or 0.01 V
	Load	Minimum 5 k Ω
Binary input		Open-circuit voltage: 10 V; short-circuit current: 5 mA By jumpering the terminals, not galvanically isolated
Binary output		Floating, max. 230 V AC/1 A
Applications	Positioner	The travel follows the input signal
	PID controller	Fixed set point control
	Two-step mode	Two-step behavior, control over binary input
	Three-step mode	Three-step behavior, control over binary input
	Temperature closed-loop control upon input signal failure	The integrated PID controller uses a fixed set point for closed-loop control when the input signal is missing.
Display		Icons for functions, codes and text field with backlight
Rotary pushbutton		Operating control for on-site operation to select and confirm codes and values
Interface	Standard	RS-232 · For point-to-point connection to communication participants or for memory pen · Permanently installed Connection: RJ-12 connector socket

¹⁾ For PID Controller (PID) and Temperature closed-loop control upon input signal failure (POSF) applications only

²⁾ For two-step mode (2STP) and three-step mode (3STP) applications

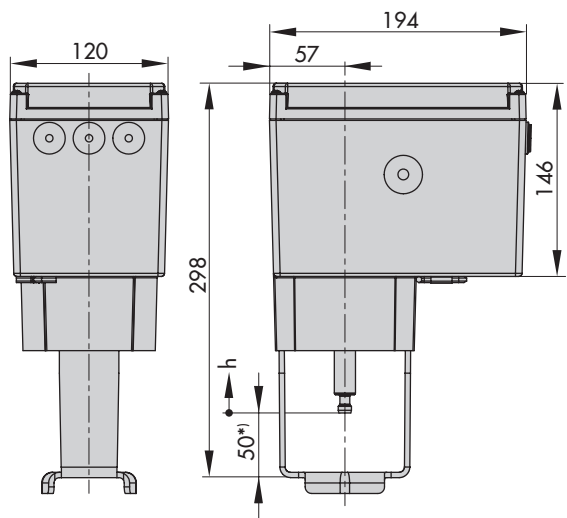
Safety		
Motor switch-off	By torque-dependent limit contacts	
Degree of protection acc. to EN 60529	IP 54 with cable ducts IP 65 with cable glands (can be retrofitted) ¹⁾ Suspended mounting not permitted according to EN 60664	
Overvoltage category	II according to EN 61010	
Design and testing	According to EN 61010	
Class of protection	II according to EN 61140	
EMC	According to EN 61000-6-2, EN 61000-6-3 and EN 61326	
Degree of contamination	2 according to EN 61010	
Noise immunity	According to EN 61000-6-2	
Noise emission	According to EN 61000-6-3	
Environmental conditions		
Mechanical environmental conditions	Class 1M2 according to EN 60721-3-1:1998	
	Class 2M1 according to EN 60721-3-2:1998	
	Class 3M4 according to EN 60721-3-3:1998	
	Class 4M4 according to EN 60721-3-4:1998	
Permissible temperatures ²⁾		
Ambient	5 to 60 °C	
Storage	-25 to +70 °C	
Ambient conditions		
Humidity	5 to 95 % relative humidity, no dew formation	
Compliance		
		
Additional electrical equipment		
Limit contacts	Mechanical	Two adjustable limit contacts with changeover switches; 230 V AC/1 A · Without contact protection
	Electronic	Two adjustable limit contacts with relay and changeover switches; 230 V AC/1 A · Without contact protection
RS-485 module (order no. 1402-1522)	Module for Modbus-RTU communication	

¹⁾ Cable glands M20x1.5 with metal nut SW 23/24 (order no. 1400-8828)

²⁾ The permissible medium temperature depends on the valve on which the electric actuator is mounted. The limits in the valve documentation apply.

3.8 Dimensions in mm

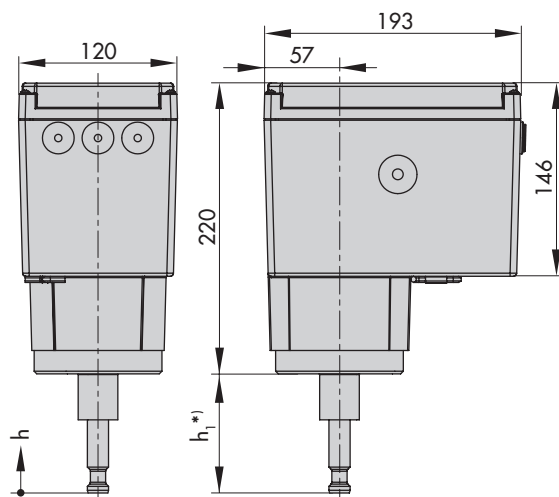
Type 3374-10/-11/-21/-31



*) When actuator stem is fully extended

Type 3374	Dimension h
-10	30
-11	15
-21	15
-31	15
-15	30
-26	15
-36	15

Types 3374-15/-26/-36



**) When actuator stem is fully extended*

Type 3374	Dimension h	Dimension h_1
-10	30	–
-11	15	–
-21	15	–
-31	15	–
-15	30	90
-26	15	75
-36	15	75

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 damage to SAMSON and the forwarding agent (refer to delivery note).

4.1 Unpacking

i Note

Do not remove the packaging until immediately before mounting and start-up.

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

4.2 Transporting and lifting

4.2.1 Transporting

- Protect the electric actuator against external influences (e.g. impact).
- Protect the electric actuator against moisture and dirt.
- Observe the permissible transportation temperature of -25 to $+70$ °C.

4.2.2 Lifting

Due to the low service weight, lifting equipment is not required to lift the electric actuator.

4.3 Storage

i NOTICE

Risk of electric actuator damage due to improper storage.

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

i Note

We recommend regularly checking the electric actuator and the prevailing storage conditions during long storage periods.

Storage instructions

- Protect the electric actuator against external influences (e.g. impact).
- Protect the electric actuator against moisture and dirt.
- Make sure that the ambient air is free of acids or other corrosive media.
- Observe the permissible storage temperature from -25 to $+70$ °C.
- Do not place any objects on the electric actuator.

5 Mounting and start-up

❗ NOTICE

*Risk of malfunction due to incorrectly performed start-up.
Perform start-up following the described sequence.*

1. Mount the actuator onto the valve.
→ See section 5.1.
2. Connect power supply.
→ See section 5.2.
3. Initialize the actuator.
→ See section 8.3.

5.1 Mounting the actuator onto the valve

5.1.1 Mounting position

The control valve can be installed in the pipeline in any desired position. However, a suspended mounting position of the actuator is not permissible (see Fig. 5).

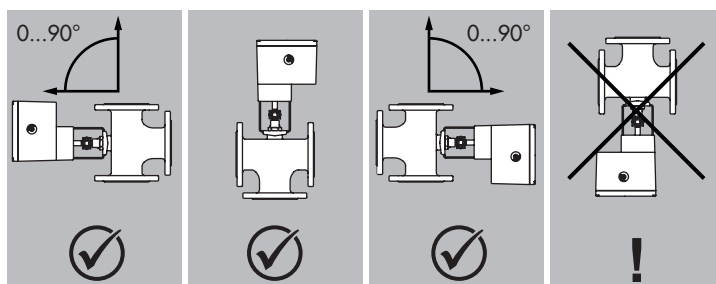


Fig. 5: Mounting position

5.1.2 Construction with integrated yoke

Attachment

- Series V2001 Valves (DN 15 to 80)
 - Type 3260 (DN 65 to 150)
 - Type 3214 (DN 65 to 100)
- ➔ Refer to Fig. 6
4. Remove protective covers and unscrew nut (6) from the valve.
 5. Connect the power supply to the actuator as described in section 5.2.
 6. Retract actuator stem (3) as described in section 3.3.
 7. Place actuator with yoke onto the valve and fasten tight using nut (6, width across flats 36) with a minimum tightening torque of 150 Nm.
 8. When the plug stem (5) fits closely onto the actuator stem (3), attach both stem connector clamps (4) and fasten with screws.

5.1.3 Construction with ring nut

Attachment to Series 240 Valves

- ➔ See Fig. 7 on page 26.
1. Slide plug stem down to close the valve.
 2. Turn the stem connector nut (8) until the measurement $x = 75$ mm (DN 100 and larger: $x = 90$ mm) from the top of the yoke to the head of the stem connector nut (8) is achieved. Lock this position with the lock nut (9).

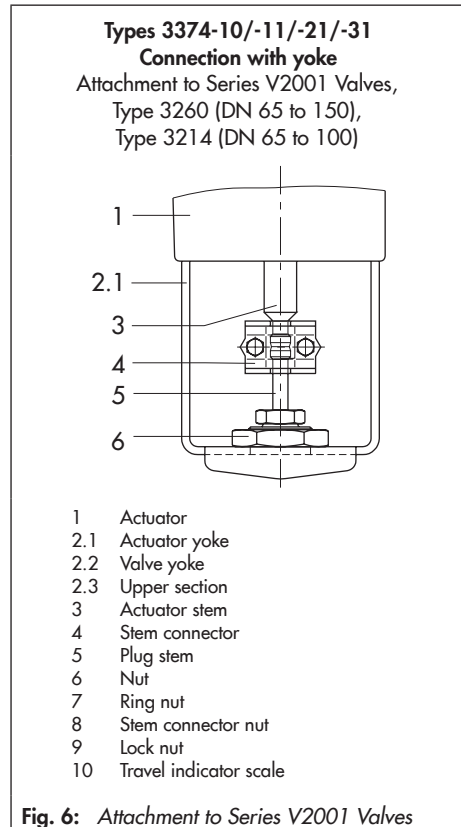


Fig. 6: Attachment to Series V2001 Valves

3. Connect the power supply as described in section 5.2.
4. Retract actuator stem (3) as described in section 3.3.
5. Place actuator onto the valve bonnet (2.3) and secure using the ring nut (7).
6. When the stem connector nut (8) rests on the actuator stem, attach both stem connector clamps (4) and fasten with screws.
7. Move actuator stem (3) to the end position (valve closed) as described in section 3.3.
8. Align travel indicator scale (10) with the middle of the stem connector (4) and screw tight.

Attachment to Type 3214 Valve (DN 125 to 250)

➔ Refer to Fig. 8

1. Connect the power supply as described in section 5.2.
2. Retract actuator stem (3) as described in section 3.3.
3. Place actuator onto the valve and secure using the ring nut (7). If necessary, retract the actuator stem slightly beforehand.
4. When the plug stem fits closely onto the actuator stem (3), attach both stem connector clamps (4) and fasten with screws.

Move actuator stem (3) to the end position (valve closed) as described in section 3.3.

5. Align travel indicator scale (10) with the middle of the stem connector (4) and screw tight.

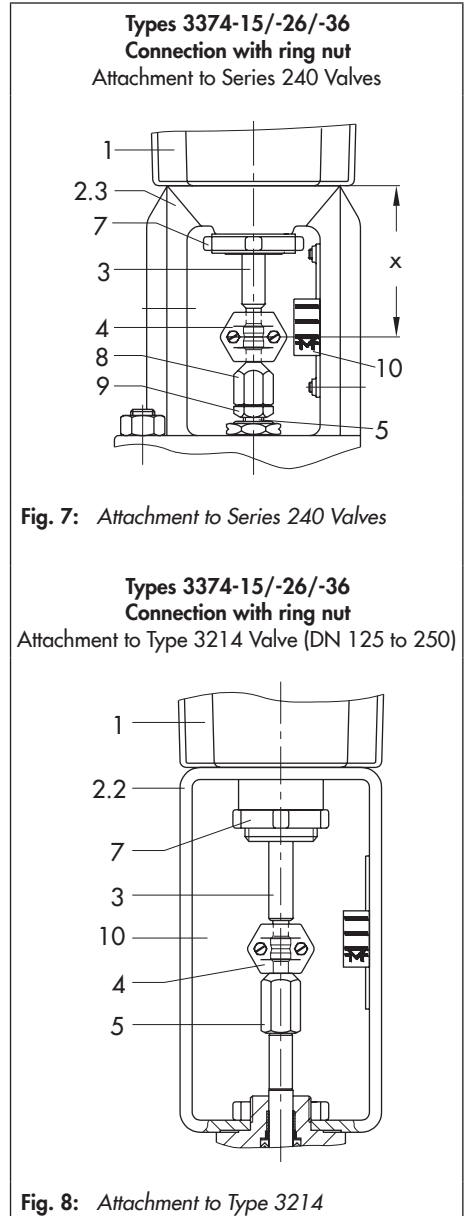


Fig. 8: Attachment to Type 3214

5.2 Electrical connections

DANGER

Risk of electric shock.

- Upon installation of the electric cables, you are required to observe the regulations concerning low-voltage installations according to DIN VDE 0100 as well as the regulations of your local power supplier.
- Use a suitable power supply which guarantees that no dangerous voltages reach the device in normal operation or in the event of a fault in the system or any other system parts.
- Connect the actuator to the electrical network only after the power supply is first switched off. Make sure the power cannot be switched on unintentionally.

NOTICE

Risk of actuator damage due to incorrect wiring of the binary inputs.

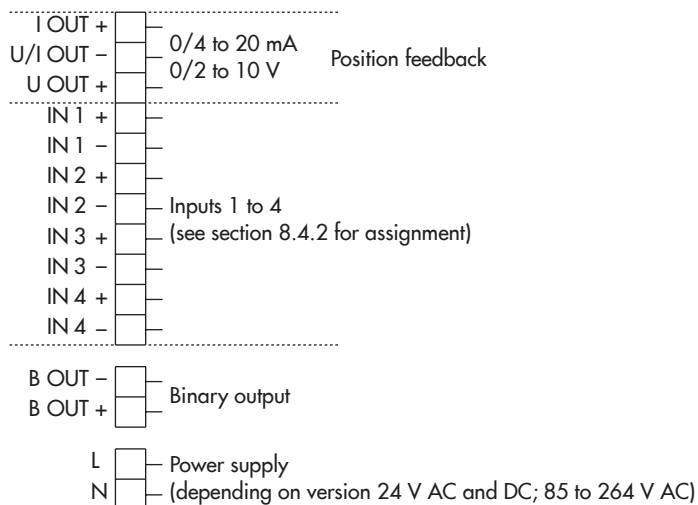
Always wire the binary inputs free of voltage.

Note

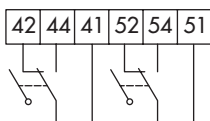
After connecting the power supply on starting up the actuator for the first time, the start screen and the error reading E00 "RUNT" (no initialization performed) appear in alternating sequence (see Fig. 15 on page 40).

5.2.1 Connecting the power supply

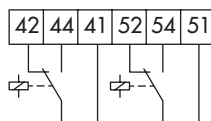
- ➔ Connect the wiring as shown in Fig. 9. Additionally, the terminal assignment depends on the selected application (see section 8.4 on p. 50 and section 8.4.2 on page 52).
- ➔ Guide the cables to the spring-cage terminals from the top.
- ➔ Connect binary signals over floating contacts.

**Options:**

Mechanical limit contacts



Electronic limit contacts

**Table 4:** Cables and stranded wires that can be used

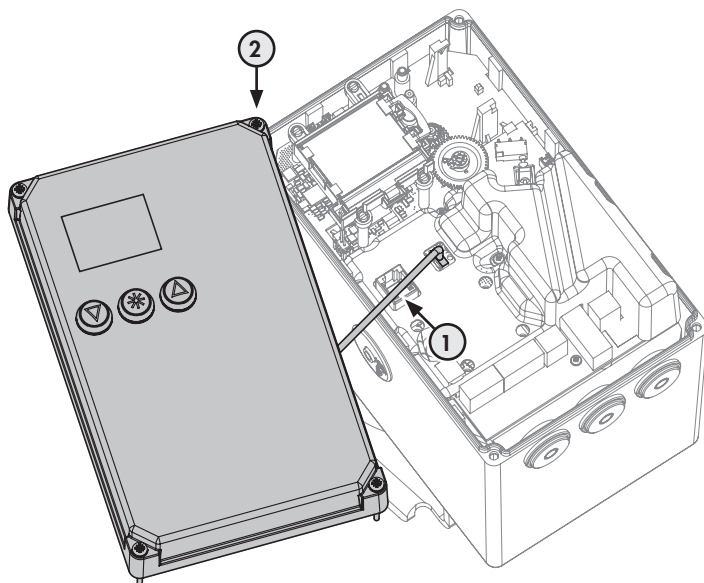
Cable	Cross section
Single-wire H05(07) V-U ¹⁾	0.2 to 1.5 mm ²
Fine-wire H05(07) V-K ¹⁾	0.2 to 1.5 mm ²
With wire ferrule acc. to DIN 46228-1	0.25 to 1.5 mm ²
With wire ferrule and sleeve acc. to DIN 46228-4	0.25 to 0.75 mm ²

¹⁾ 8 mm stripped insulation at cable end**Fig. 9:** Electrical connection

5.2.2 Connection for special version with three-key operation

Perform electrical connection for the special version of Type 3374 with three-key operation as follows:

- ➔ Refer to Fig. 10.
- 1. Unthread the four fastening screws of the housing cover. Lift off the housing cover.
- ➔ Make sure the connecting cables (1) of the housing cover are not damaged by tensile load.
- 2. Move the housing cover to the position as shown in Fig. 10:
- 3. Place on cover. Briefly turn the screw counterclockwise to center it. Tighten it slightly.
- ➔ Make sure that the screw is not screwed all the way into the thread. Otherwise, the cover seal may become damaged.
- 4. Connect the wiring as shown in Fig. 9.
- 5. Loosen the screw (2), while holding the housing cover to ensure the connecting cables (1) of the housing cover do not get damaged by tensile load.
- 6. Place the housing cover on the housing and route the connecting lines in the housing as shown in Fig. 10.
- ➔ Make sure the connecting cables of the housing cover do not get jammed.
- 7. Briefly turn the fastening screws counterclockwise to center them. Then fasten down the cover by tightening the screws.



! NOTICE

Risk of actuator damage due to incorrect handling of the housing cover with connecting lines.

When installing the connecting lines, do not apply any tensile load to them or allow them to get jammed.

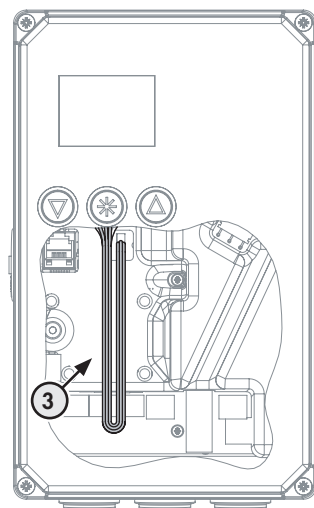


Fig. 10: Connection for special version with three-key operation

6 Additional functions

6.1 Mechanical limit contacts

6.1.1 Installing the limit contacts

- ➔ When ordering the limit contacts, state the configuration ID and the type designation of the actuator. Both specifications are written on the nameplate (see section 2.1).
- ➔ Required accessories (see Fig. 11):
To install the electronic limit contacts, the retrofit kit (order no. **1402-0898**) is required.

Installing limit contacts (Fig. 12 to Fig. 14):

DANGER

Risk of electric shock.

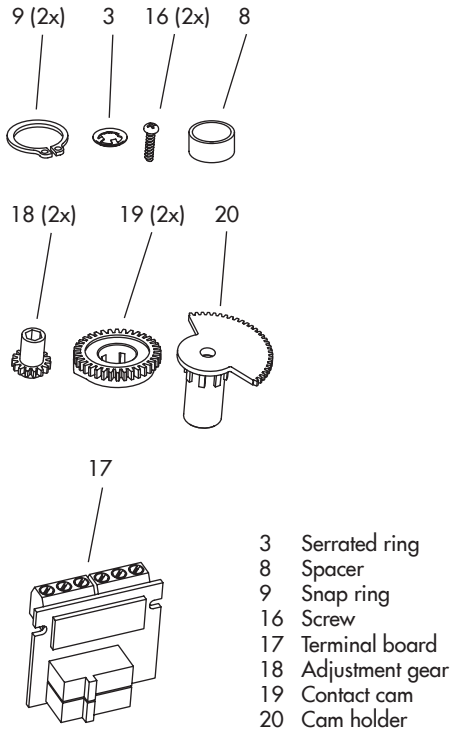
Before installing electrical accessories, switch off the power supply and disconnect the signal input.

Tip

We recommend applying a small amount of lubricant (e.g. Vaseline) to the spindles on the gear faces and to the sides of the cogs.

Note

To undo the screws on the housing cover, use a Pozidriv PZ2 screwdriver to get enough hold on the screw heads.



i Note

The contact cams (19) are ready-mounted to the cam holder (20) and the retaining rings (9) to form the contact cam unit (21, see Fig. 14).

Fig. 11: Accessories (order no. 1402-0898)

Additional functions

1. Undo screws on housing cover and take the cover off the actuator.
2. Move the actuator stem to the end position depending on the fail-safe action "actuator stem extends" or "actuator stem retracts" (see section 3.3).
3. Remove serrated ring and shim from spindle (11).
4. Slide adjustment gears (18) onto their spindles and fasten with one screw (16) each. Check whether the adjustment gears can be turned easily. If not, slightly loosen its screw again.
5. Turn contact cams (19) on the cam holder (20) as illustrated in Fig. 12 corresponding with the position of the actuator stem.
6. Slide the spacer (8) onto the spindle (11). Make sure that the long wire of the tension spring rests on the spacer and on the intermediate gear.
7. Slide the contact cam unit (21) onto the spindle corresponding with the position of the actuator stem as illustrated in Fig. 13. Make sure that the outermost cog of the contact cam unit engages in the gearwheel of the intermediate gear (1). In addition, the adjustment gears (18) must engage properly in the corresponding gears of the contact cam unit (21).
8. Secure the contact cam unit (21) and intermediate gear (1) with the serrated ring (3); push down the serrated ring as far as it will go.
9. Position the terminal board (17) at the base of the support at a 45° angle (approx.) with the switches pointing towards the gears. Swivel the upper end of the terminal board towards the gears until the board is in a vertical position and properly engaged in the support.

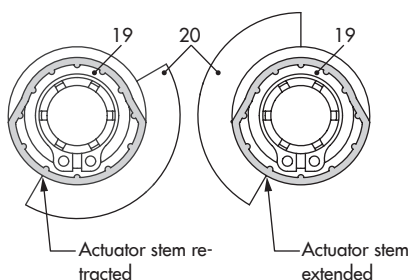


Fig. 12: Alignment of contact cam and cam holder

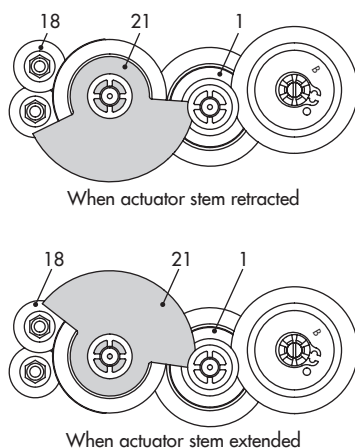


Fig. 13: Alignment of the contact cam unit

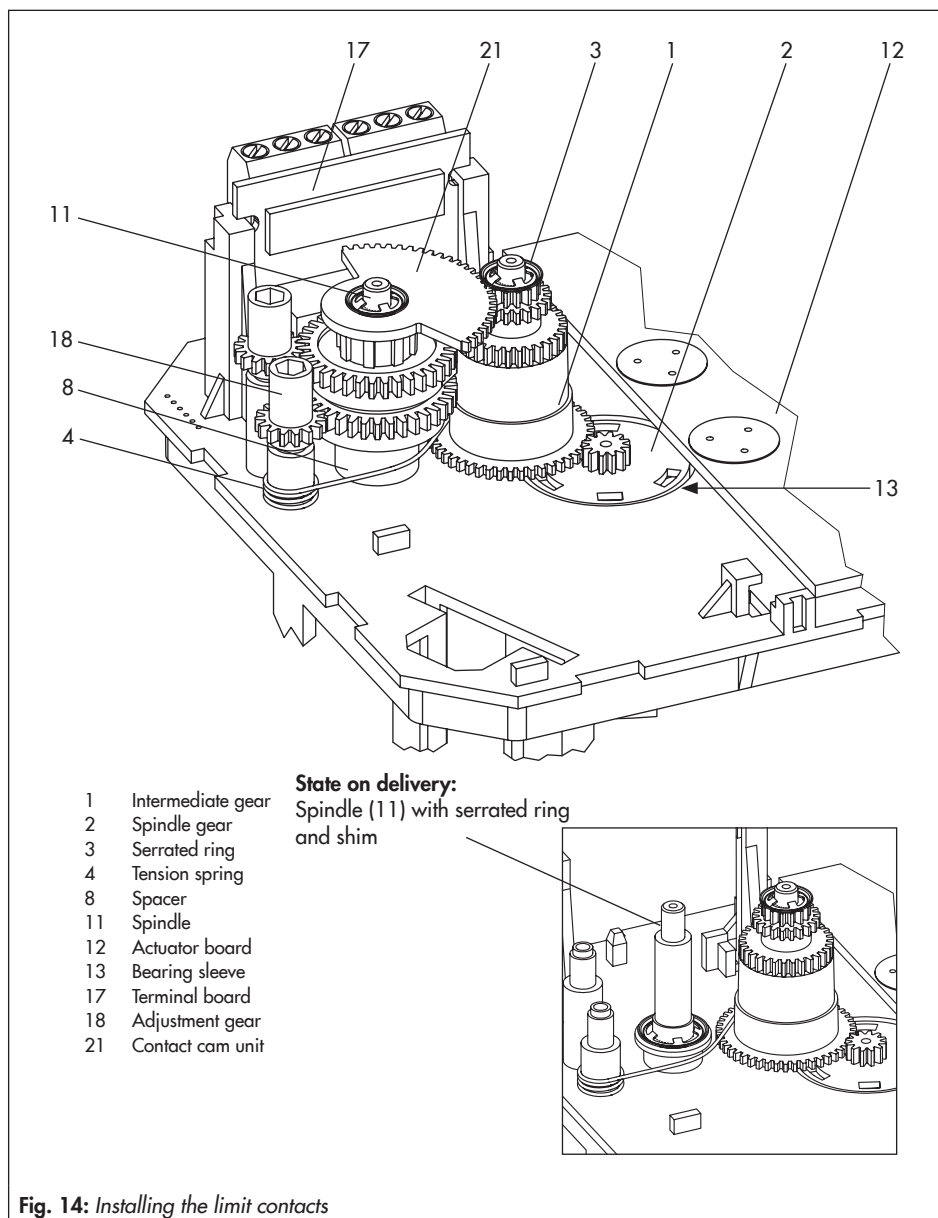


Fig. 14: Installing the limit contacts

10. Adjust limit contacts as described in section 6.1.2.
11. Replace cover. Briefly turn the fastening screws counterclockwise with a screwdriver to center them. Then fasten down the cover by tightening the screws.

6.1.2 Adjusting the limit contacts

Note

To undo the screws on the housing cover, use a Pozidriv PZ2 screwdriver to get enough hold on the screw heads.

1. Undo screws on housing cover and take the cover off the actuator.
2. Switch on power supply.
3. Move the valve, using manual override or the "manual level" operating mode, to the point at which the contact should react.
4. Use a 4 mm hex wrench to turn the spindle of the adjustment gears (18) for the upper limit contact or for the lower limit contact until the associated contact cam (19) of the contact cam unit (21) triggers the switch contact of the upper or lower microswitch on the terminal board (17).
5. Replace cover. Briefly turn the fastening screws counterclockwise with a screwdriver to center them. Then fasten down the cover by tightening the screws.

6.2 Electronic limit contacts

6.2.1 Installing the limit contacts

Required accessories

To install the electronic limit contacts, the retrofit kit (order no. **1402-0591**) is required.

Installing limit contacts:

DANGER

Risk of electric shock.

Before installing electrical accessories, switch off the power supply and disconnect the signal input.

Note

To undo the screws on the housing cover, use a Pozidriv PZ2 screwdriver to get enough hold on the screw heads.

1. Undo screws on housing cover and take the cover off the actuator.
2. Connect connecting cable to the plug-in location intended for it on the board.
3. Position the terminal board (17, see Fig. 14) at the base of the support at a 45° angle (approx.) with the relay pointing towards the edge of the intermediate board. Swivel the upper end of the terminal board until the board is properly engaged.
4. Replace cover. Briefly turn the fastening screws counterclockwise with a screw-

driver to center them. Then fasten down the cover by tightening the screws.

6.2.2 Adjusting the limit contacts

The electronic limit contacts are adjusted at the operating controls of the actuator (see section 3.5). See section 9.8 on how to adjust them.

6.3 Setting up Modbus-RTU communication

The electric actuator can be connected to a control station over Modbus and can be configured using TROVIS-VIEW. For this purpose, the actuator with firmware version 3.10 and higher can be fitted with an RS-485 module. Various communications protocol (SSP or Modbus-RTU slave) are used for various functions.

For Modbus-RTU communication, the RS-485 module (order no. 1 402-1 522) must be inserted into the actuator.

➔ Excerpt from Modbus list: see section 17.2.8.

6.3.1 Protocol

– **Setting: automatic**

The SSP and Modbus-RTU protocols are automatically detected: the interface parameters are fixed internally to Baud rate 9600 bit/s, 8 data bits, no parity, 1 stop bit. The electric actuator can exchange data with TROVIS-VIEW or the control station without switching over. The station address and bus failure monitoring are adjustable.

– **Setting: Modbus-RTU**

Communication is based on the Modbus-RTU protocol. All interface parameters listed in 6.3 are adjustable.

i Note

General information on operating the electric actuator: see section 7.

Station address (Code A64)

The station number is used to identify the electric actuator for the Modbus-RTU protocol.

Baud rate (Code A65)

It is the transmission rate between the electric actuator and control station/computer. The Baud rate adjusted at the electric actuator must be the same as that in the control station. Otherwise, no communication is established.

Stop bit and parity (Code A66)

The number of stop bits and the parity are set in Code A66. The parity is used to detect data transmission errors. The parity bit is added to the end of the string of data bits and the total value is made up from the data and parity bit.

Bus failure monitoring (Code A67)

The external manual level of the communication is monitored by the bus failure monitoring (timeout). After a bus failure is detected, automatic operation is reestablished. The time for the bus failure monitoring is adjustable. Set the value to 0 to deactivate bus failure monitoring.

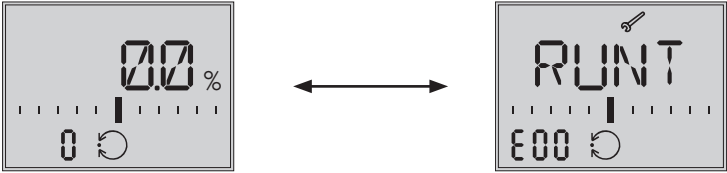
Table 5: *Modbus-RTU parameter (setting in the communication level, see section 12)*

Code	Parameters	Display/select (select ESC to cancel)
Serial interface		
A51	Communication	ENAB (enabled) DISA (disabled)
Interface module		
A61	Communication	ENAB (enabled) DISA (disabled)
A62	Interface module	485 (RS-485) USB (USB) ETH (Ethernet) NONE (none)
A63	Protocol	AUTO (automatic: SSP, Modbus) MODX (Modbus, adjustable)
Modbus interface module		
A64	Station address	1 to 247
A65	Baud rate (in Baud)	1200 2400 4800 9600 192 (19200) 384 (38400)
A66	Stop bits and parity	1SNP (1 stop bit, no parity) 1SEP (1 stop bit, even parity) 1SOP (1 stop bit, odd parity) 2SNP (2 stop bits, no parity)
A67	Bus failure monitoring in min (timeout)	0 to 99
A00	Exit level	> ESC

7 Operation

7.1 Display

After switching on the power supply, the current firmware is displayed for two seconds. Afterwards, the start screen appears.



On starting up the actuator for the first time, the start screen and the error reading E00 (no initialization performed) appear in alternating sequence.

Fig. 15: Start screen after starting up the actuator for the first time

Start screen

The start screen (Fig. 16) depends on the selected application (see section 8.4 on page 50). On starting up the actuator for the first time and after loading default settings, the positioner application (POSI) is automatically selected.

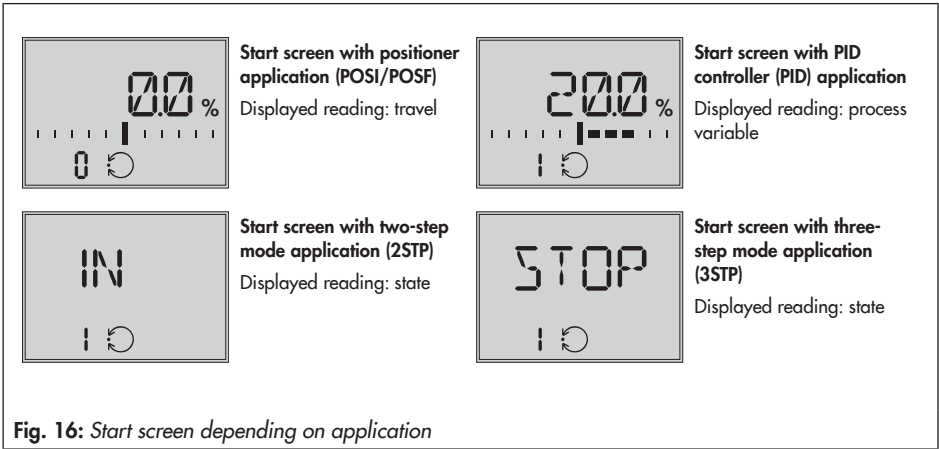
















Fig. 16: Start screen depending on application

Table 6: Display icons

Operating modes	 Automatic mode  Manual mode
Bar graph The bars indicate the set point deviation that depends on the sign (+/-) and the value.	 One bar element appears per 1 % set point deviation. Example:  Bar graph indicates a +3 % set point deviation. A maximum of five bar elements can appear on each side. Five bar elements indicate a set point deviation ≥ 5 %.
Status messages These icons indicate that an error has occurred.	 Failure  Maintenance demanded
Binary input/output active Code in bottom left-hand corner of the display	 Code 0 on the display, binary input active  Code 0 on the display, binary output active  Code 0 on the display, binary input/output active
Enable configuration	 Indicates that the parameters in the configuration and service levels have been enabled for configuration.
Limit contacts	 Display reading 1  Display reading 2 Indicates that the actuator stem position has fallen below or exceeded the switching point of the electronic limit contact.
Default setting	 When the scale of the bar graph is not visible and only one bar element either side of the center is visible, this means the indicated parameter is the same as the default setting.
mA unit	 The icon indicates the mA unit in conjunction with a reading.


i Note

The display can be adapted to the mounting situation of the actuator (see section 8.2).

7.2 Rotary pushbutton

The rotary pushbutton is used for on-site operation of the actuator.

Turn : select/change codes and values

Press : confirm setting/change

NOTICE


Changed parameters are immediately effective!



The process is directly affected by these changes.

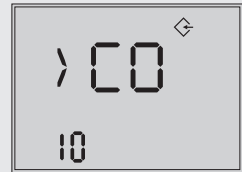
First check any changes made to parameters before confirming them by pressing the rotary pushbutton.

7.2.1 Menu control




Activating the level/parameters

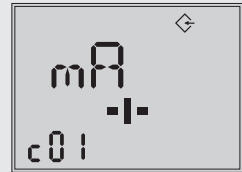
→  icon indicates a jump to another level with further options.

1. Turn  to select the required code.
2. Press  to confirm. The code is selected. Example shown:
Configuration level Code 10 selected




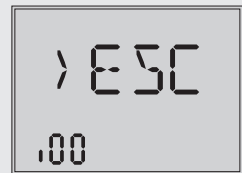
Setting parameters

1. Press . The reading blinks on the display.
2. Turn  until the required setting is reached.
3. Press  to confirm the setting.
Example shown: source Code c01 set to mA.






Exit level

- Press  to exit the level.
Example shown: Information level exited.






7.3 Three-key operation

In the special version with three-key operation, the actuator is operated using three keys on the cover:

-  Select/change codes and values (increase value)
-  Confirm setting/change
-  Select/change codes and values (reduce value)

i Note

The operation and setting of the Type 3374 Actuator is described in these Mounting and Operating Instructions based on the version with rotary pushbutton.

Pressing keys  and  corresponds to turning the rotary pushbutton and the key  corresponds to pressing the rotary pushbutton of the standard actuator version.

7.4 Serial interface

The actuator can be configured with the TROVIS-VIEW software. In this case, the serial interface on the actuator is used to connect the actuator to the computer.

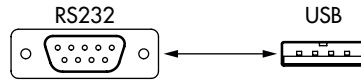
The TROVIS-VIEW software enables the user to easily configure the positioner as well as view process parameters online.

Note

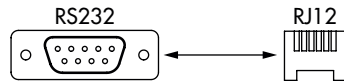
TROVIS-VIEW can be downloaded free of charge from our website at www.samson.de > Services > Software > TROVIS-VIEW. Further information on TROVIS-VIEW (e.g. system requirements) is available on our website and in the Data Sheet ► T 6661 as well as the Operating Instructions ► EB 6661.

Required accessories for connecting the actuator to a computer

- Connecting cable RJ-12/D-Sub, 9 pin (order no. 1400-7699)
- USB/RS-232 adapter (order no. 8812-2001)
- Hardware package consisting of connecting cable, modular adapter and memory pen: order no. 1400-9998



Adapter: order no. 8812-2001



Connecting cable: order no. 1400-7699



Modular adapter: order no. 1400-7698



Memory pen-64: order no. 1400-9753

Hardware package: order no. 1400-9998, consisting of:

- Memory pen-64
- Connecting cable
- Modular adapter

Fig. 17: Accessories for data transmission

7.5 Optional key number protection

To change parameters in the configuration level, a key number can be activated in the actuator over Code c94. When the key number function is activated, the key number must be entered before the parameter setting can be changed. If a code is selected without entering a key number beforehand when the key number function is activated, **LOCK** is displayed and the parameter settings cannot be changed.

Code	Description	WE	Adjustment range
c94	Key number active	NO	NO (deactivated) YES (activated)


When the key number is active, proceed as follows:

1. Turn  (when the start screen appears) to select Code 9.

2. Press  to confirm.


→ Display: Input field for key number

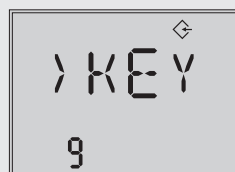
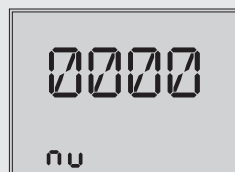
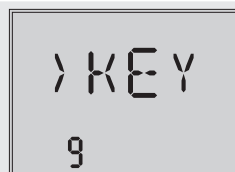
3. Press  to activate the input field.


4. Turn  to enter the service key number.



→ The service key number can be found at the end of these mounting and operating instructions.

5. Press  to confirm.

→  icon indicates that the configuration level is enabled to change the parameter.



After entering the key number, the corresponding levels are enabled for five minutes (indicated by  icon). The levels are automatically locked again after five minutes.

Levels can also be locked again: Select Code 9 again. *OFF* is displayed. After confirming it by pressing , the  icon disappears.

7.5.1 Customized key number

In addition to the fixed service key number, a customized key number can be used. It is entered in the same way as the service key number in Code 9 and is set by default to 0000. You can change the customized key number in Code c92. The service key number becomes effective if the customized key number is deactivated in Code c91.

Code	Description	WE	Adjustment range
c91	Customized key number active	YES	NO (deactivated) YES (activated)
c92	Customized key number	0000	0000 to 1999




An additional write protection function can be achieved by deactivating the communication in Code A51 or Code A61 (see sections 12 and 17.2.6).


8 Operating level

The operating level is active while the actuator is in the automatic mode. In this level, important information on the operation is shown, the operating mode is selected and the initialization started. The other levels are accessible from the operating level.

All the parameters of the operating level as well as fatal and EEPROM errors are listed in section 17.2.1.

8.1 Selecting the operating mode

The actuator is normally in automatic mode indicated by the  icon (displayed in Code 0 to 3). In automatic mode, the actuator stem follows the input signal according to the functions set in the configuration level.

In manual mode, the actuator stem moves to the adjusted manual positioning value. An active manual mode is indicated in Code 0 by the  icon.

Code	Description	WE	Adjustment range
2	Operating mode	AUTO	AUTO (automatic mode) MAN (manual mode)
3	Positioning value (manual mode)	—	0.0 to 100.0 %

Note

The positioning value (manual mode) selected in Code 3 must be adjusted by the amount corresponding to at least half the dead band (adjustable in c67, page 64). Otherwise, the actuator stem will not move.

Example: Dead band adjusted to 2.0 % (default setting)

→ The positioning value (manual mode) must be adjusted by at least 1.0 % (for example, moving the actuator stem from 2.2 % to 3.2 %).

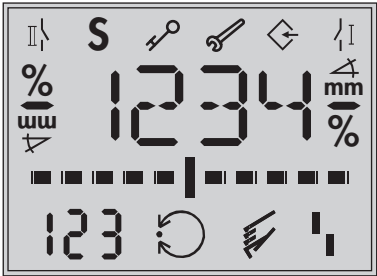
8.2 Adapting the display

8.2.1 Reading direction

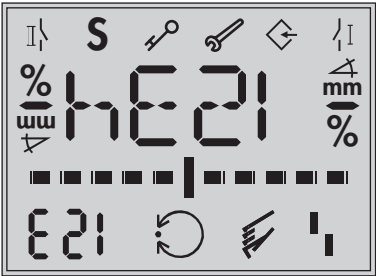
To adapt the reading on the display to the mounting situation of the actuator, the display contents can be turned by 180° in Code 4.

Code	Description	WE	Adjustment range
4	Reading direction	DISP	DISP, dSID

On changing the reading direction, the position of the icons and bar graph reading remains unchanged, while the segments for numbers, text as well as binary input and output are turned by 180°:



Default reading direction



Reading direction turned by 180°

8.2.2 Backlight

The display backlight can be changed to be always switched on in Code c93.

Code	Description	WE	Adjustment range
c93	Backlight always on	NO	NO YES

i Note

- Regardless of the setting in Code c93, the backlight starts to blink whenever an error occurs (section 15).
- The display backlight can also be switched on and off by the binary input (section 9.6).

8.3 Initializing the actuator

WARNING

*Risk of injury due to the actuator stem extending or retracting.
Do not touch or block the actuator stem.*

NOTICE

*The process is disturbed by the movement of the actuator stem.
Do not perform the initialization while the process is running. First isolate the plant by closing the shut-off valves.*

The initialization is performed in Code 5. During initialization, the actuator stem moves from its current position to the 100 % end position. Starting from the 100 % end position, the actuator stem moves to the 0 % end position.






Note

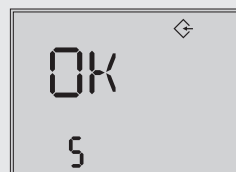
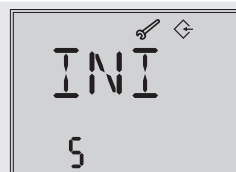
The 0 % and 100 % end positions depend on the operating direction used (see section 9.3).

→ Before initialization, mount the actuator on the valve as described in section 5.1.

Code	Description	WE	Adjustment range
5	Start initialization		INI

How to proceed:


1. Turn  (when the start screen appears) to select Code 5.
 2. Press . INI blinks on the display.
 3. Press  again. INI and the  icon appear. Initialization starts.
- Initialization can be canceled at all times by selecting ESC.
- After the initialization has been successfully completed, OK is indicated.
4. Press  to confirm.
- **The actuator is ready for use.**



8.4 Applications

The actuator's application can be selected from one of the following applications:

- Positioner (POSI)
- PID controller (PID)
- Two-step mode (2STP)
- Three-step mode (3STP)
- Temperature closed-loop control upon input signal failure (POSF)

 **Note**

- Depending on the selected application, wire the terminals of the actuator as specified (see section 8.4.2).
- Not all parameters and settings are shown when a certain application is selected.

Selecting the application:

Code	Description	WE	Adjustment range
6	Application	POSI	POSI (positioner) PID (PID controller) 2STP (two-step mode) 3STP (three-step mode) POSF (temperature closed-loop control upon input signal failure)

8.4.1 Selecting the application

Positioner application

The actuator stem's position directly follows the input signal.

- ➔ Set Code 6 to **POSI**.
- ➔ Use terminal assignment according to Fig. 18.

PID controller application

The set point adjustable at the actuator is used to position the valve using a PID algorithm. The input signal is used as the process variable. The PID controller is adjusted using the parameters: *Proportional-action coefficient* K_p , *Reset time* T_n , *Derivative-action time* T_v and *Operating point* Y_0 :

The proportional-action coefficient K_p acts as gain.

The *reset time* T_n is the time it takes for the integral component during a step response in a PI controller to produce a change in the manipulated variable identical to the change produced by the P component. Increasing the reset time T_n reduces the rate of change in the output when the set point deviation is constant.

The *derivative-action time* T_v is the time it takes the rise response of a PD controller to reach a certain manipulated variable value earlier than it would take the response with the P component only. Increasing the derivative-action time T_v causes an increase in the manipulated variable amplitude when the rate of change is constant. After ramped changes of the set point deviation, a longer derivative-action time T_v causes the D component to have a longer effect.

The *operating point* Y_0 determines the positioning value, which is fed to the controlled system when the process variable is the same as the set point. The operating point is normally only important for P and PD controllers, but it can also be set for control strategies PI, PID and I due to the possible limitation of the integral-action component. For control strategies with integral-action component, the operating point can also be used as the initial value for a restart.

→ Set Code 6 to **PID**.

→ Use terminal assignment according to Fig. 19.

Two-step mode application

The binary input IN 2 is used for this function. When the binary input is in the active switching state, the actuator stem retracts to 100 % of the adjusted travel range. When the binary input is in the inactive switching state, the actuator stem moves to the closed position (0 %).

→ Set Code 6 to **2STP**.

→ Use terminal assignment according to Fig. 20.

Three-step mode application

The binary input *IN 2* is used for this function to retract the actuator stem and binary input *IN 3* to extend the actuator stem.

→ Set Code 6 to **3STP**.

→ Use terminal assignment according to Fig. 21.

Temperature closed-loop control upon input signal failure application

The travel follows the input signal. Upon failure of the input signal, the set point determined in the actuator by the integrated PID controller is used to position the stem.

- ➔ Set Code 6 to **POSF**.
- ➔ Use terminal assignment according to Fig. 22.

i Note

The 0 to 10 V or 0 to 20 mA setting for the input signal is not possible in combination with this function. The lower value must be at least 0.5 V or 1 mA.

8.4.2 Terminal assignment depending on the application selected

- ➔ Wire the terminals of the actuator according to Fig. 18 to Fig. 22.

! NOTICE

Risk of actuator damage due to incorrect wiring of the binary inputs.
Always wire the binary inputs free of voltage.

i Note

The function of the inputs depend on how the actuator is configured: inputs that have not been configured do not have any effect.

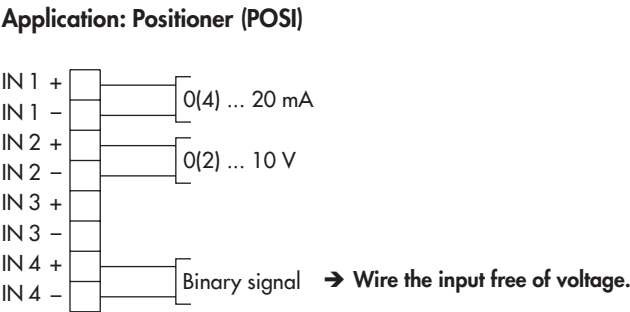


Fig. 18: Terminal assignment when positioner selected as the application

Application: PID controller (PID)

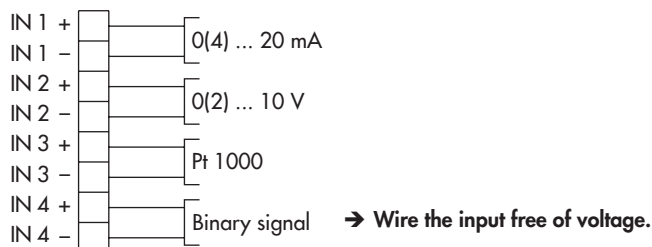


Fig. 19: Terminal assignment when PID controller selected as the application

Application: Two-step mode (2STP)

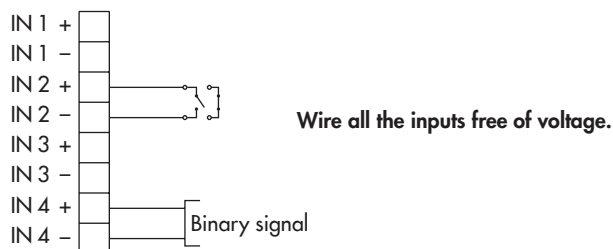
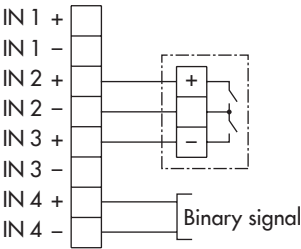


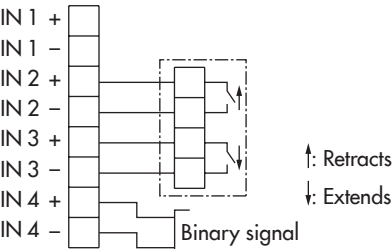
Fig. 20: Terminal assignment when two-step mode selected as the application

Application: Three-step mode (3STP)

Three-wire connection:



Four-wire connection:



Wire all the inputs free of voltage.

Fig. 21: Terminal assignment when three-step mode selected as the application

Application: Temperature closed-loop control upon input signal failure (POSF)

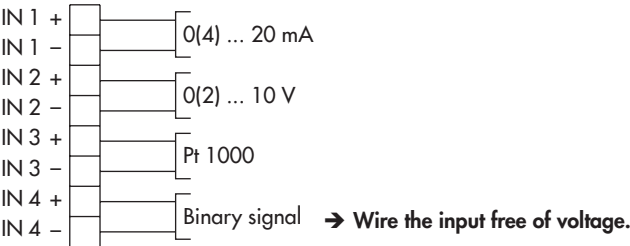


Fig. 22: Terminal assignment when temperature closed-loop control upon input signal failure selected as the application

9 Configuration level



The actuator is adapted to its control task in the configuration level. The codes in this level have a 'c' prefix to identify them.

All the parameters of the configuration level are listed in section 17.2.2 on page 88.

9.1 Activating and setting parameters




Changing settings in the configuration level

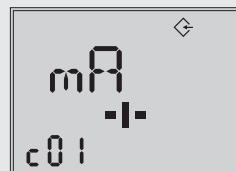
Activate the configuration level

1. Turn  (when the start screen appears) to select Code 10.
2. Press  to activate the configuration level.





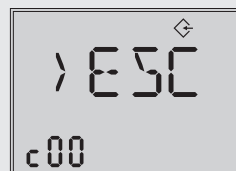
Change parameter setting (example shown: source Code c01)

1. Press . The reading blinks on the display.
2. Turn  until the required setting is reached.
3. Press  to confirm the setting.



Exit configuration level

1. Turn  to select the code c00.
2. Press  to confirm the setting.



9.2 Input signal

The input signal determines the actuator stem position. Either a current or voltage signal can be applied to the input depending on the configuration in Code c01. The default values for the lower range and upper range of the input signal are between 2 and 10 V or 4 to 20 mA. The input signal range can be adapted as required, e.g. to achieve a plant operation characteristic by connecting two or more actuators in parallel (split-range operation).

i Note

The input signal must be $\geq 0.5\text{ V}$ or $\geq 1\text{ mA}$.

Example: Two valves regulate the process medium in one common pipeline to achieve a large rangeability. One valve opens with a 0 to 5 V input signal, while the second valve also opens when the input signal increases further (5 to 10 V) and the first valve remains open. The two valves close in the reverse order.

i Note

At least 2.5 V or 5 mA (depending on the input signal used) must separate the upper and lower range values.

Code	Description	WE	Adjustment range
c01	Source (depending on the selected application)	mA	mA (current signal) V (voltage signal) C (Pt-1000) VIA (via interface)
c02	Lower range value	2.0 V or 4.0 mA	0.0 to 7.5 V or 0.0 to 15.0 mA
c03	Upper range value	10.0 V or 20.0 mA	2.5 to 10.0 V or 5.0 to 20.0 mA

Detect input signal failure

The actuator detects a configured failure of the input signal and the error reading E01 starts to blink on the display as soon as the input signal falls below the lower range value by 0.3 V or 0.6 mA. If the input signal failure function is active (c31 = YES), the reaction of the actuator upon failure of the input signal is determined by Code c32:

- **Internal positioning value (c32 = INT):** The actuator stem moves to the position specified in Code c33 upon failure of the input signal.
- **Last position (c32 = LAST):** The actuator stem remains in the last position that the valve moved to before failure of the input signal.

The error message is reset and the actuator returns to closed-loop operation if the input signal moves within 0.2 V or 0.4 mA of the lower range value.

Code	Description	WE	Adjustment range
c31	Detect input signal failure	NO	NO (function inactive) YES (function active)
c32	Positioning value upon input signal failure	INT	INT (internal positioning value) LAST (last position)
c33	Internal positioning value	0.0 %	0.0 to 100.0 %

9.3 Operating direction

→ See Fig. 23 on page 58.

- **Increasing/increasing (c42 = >>):**
The actuator stem retracts as the input signal increases.
- **Increasing/decreasing (c42 = <>):**
The actuator stem extends as the input signal increases.

Actuator stem extended

- With globe valves: Valve closed
- With three-way mixing valves: Port A → AB open, B → AB closed
- With three-way diverting valves: Port AB → A closed, AB → B open

Actuator stem retracted

- With globe valves: Valve open
- With three-way mixing valves: Port A → AB closed, B → AB open
- With three-way diverting valves: Port AB → A open, AB → B closed

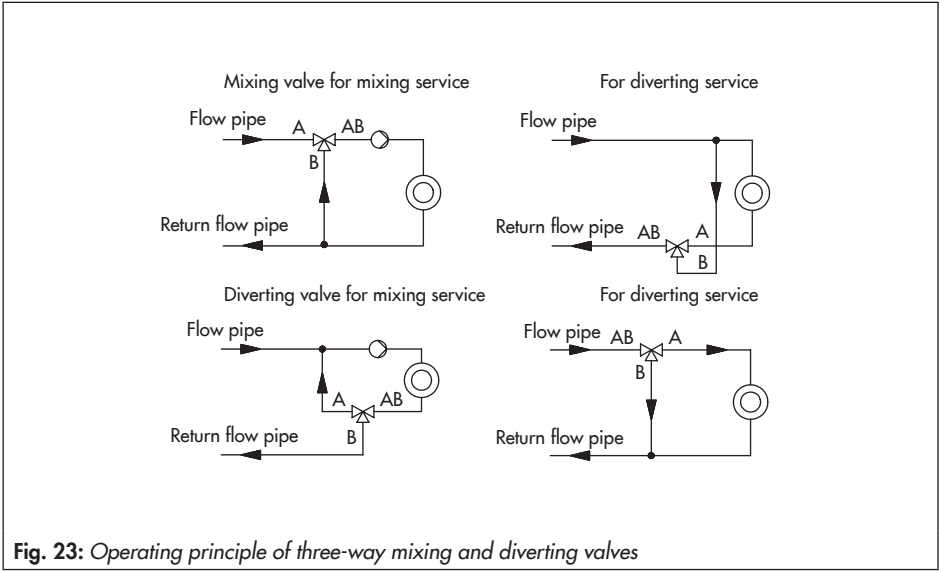


Fig. 23: Operating principle of three-way mixing and diverting valves

Code	Description	WE	Adjustment range
c42	Direction of action	>>	>> (increasing/increasing) << (increasing/decreasing)

9.4 End position guiding

The actuator stem moves to the end positions earlier if the end position guiding function is active.

9.4.1 Operating direction increasing/increasing

- **End position guiding (stem retracts) (c35):** The actuator stem moves the valve to the **top end position** if the input signal reaches the value entered in this code. Setting c35 = 100.0 % causes this function with a retracting actuator stem to be deactivated.
- **End position guiding (stem extends) (c36):** The actuator stem moves the valve to the **lower end position** if the input signal reaches the value entered in this code. Setting c36 = 0.0 % causes this function with an extending actuator stem to be deactivated.

9.4.2 Operating direction increasing/decreasing

- **End position guiding (stem retracts) (c35):** The actuator stem moves the valve to the **lower end position** if the input signal reaches the value entered in this code. Setting c35 = 100.0 % causes this function with a retracting actuator stem to be deactivated.
- **End position guiding (stem extends) (c36):** The actuator stem moves the valve to the **top end position** if the input signal reaches the value entered in this code. Setting c36 = 0.0 % causes this function with an extending actuator stem to be deactivated.

Code	Description	WE	Adjustment range
c35	End position guiding (stem retracts)	97.0 %	50.0 to 100.0 %
c36	End position guiding (stem extends)	1.0 %	0.0 to 49.9 %

9.5 Position feedback signal

The position feedback indicates the actuator stem position, which is issued as an analog signal at the terminals *U OUT* or *I OUT*. The span of the position feedback signal is adjusted over the *lower and upper range value* parameters.

i Note

- *At least 2.5 V or 5 mA (depending on the input signal used) must separate the upper and lower range values.*
- *When c37 = YES, the position feedback signal is 12 V or 24 mA in the event of a fault.*
- *During initialization, transit time measurement or zero calibration, the position feedback signal = 0 V or 0 mA.*

Code	Description	WE	Adjustment range
c05	Unit	mA	mA (current signal) V (voltage signal)
c06	Lower range value	4.0 mA	0.0 to 7.5 V or 0.0 to 15.0 mA
c07	Upper range value	20.0 mA	2.5 to 10.0 V or 5.0 to 20.0 mA
c37	Superimposing an error message	NO	YES (error reading active) NO (error reading inactive)

9.6 Binary input


The function of the binary input can be configured as required. Code c12 is used to determine the switching state for the active function. **c12 = NINV**: the binary input is active when the input terminals *IN 4 +/IN 4 -* are connected with each other. **c12 = INV**: The binary input is active when the connection between the input terminals *IN 4 +/IN 4 -* is interrupted.

- ➔ Do not connect an external power supply to the input terminals.
- **Inactive (c11 = NONE)**: No function is assigned to the binary input.
 - **Priority position (c11 = PRIO)**: The priority position is triggered and the actuator stem moves to the position entered in Code c34 as soon as the binary input changes to the active switching state. The valve leaves the priority position and follows the input signal after the binary input changes to the inactive switching state.
 - **Next entry in information level (c11 = NEXT)**: If the NEXT function is selected in Code c11, the first code of the information level (i01) is displayed as soon as binary input switching state is changed. After every new change to the active state, the next code of the information level appears (i02, i03, etc.). The display switches back to the start screen after all the codes of the information level have been displayed due to the binary input switching or when the binary input's switching state remains unchanged for five minutes.
 - **Backlight (c11 = LAMP)**: When the binary input's switching state is active, the display backlight is switched on permanently.
 - **Exit manual level for travel adjustment (c11 = MEND)**: When the binary input's switching state is active, the actuator exits the manual mode. The actuator stem moves to the valve position determined by the automatic mode.

Code	Description	WE	Adjustment range
c11	Function	NONE	NONE (inactive) PRIO (priority position) NEXT (next entry in information level) LAMP (backlight activated) MEND (exit manual level for travel adjustment)
c12	Switching state for active function	NINV	NINV (not inverted) INV (inverted)
When c11 = PRIO:			
c34	Travel for priority position	0.0 %	0.0 to 100.0 %

9.7 Binary output

The binary output is a floating contact. The function and switching state of the binary input can be configured as required.


- **Inactive (c15 = NONE):** No function is assigned to the binary output.
- **Error indication (c15 = FAIL):** when an error () is registered, the error message is issued at the binary output.
- **Limit contact (c15 = LIM):** the binary output is used as an electronic limit contact (see section 9.8). To configure this function, the required settings must be made in Codes c21 to c23. The use of the binary output as an electronic limit contact is independent from the optionally installed electronic limit contacts.
- **Priority position (c15 = PRIO):** When the priority position function is active (c11 = PRIO), this is registered at the binary output after the actuator stem stops moving.
- **Adopt binary input's state (c15 = BIN):** The binary output reproduces the logical state of the binary input.
- **Indicate manual mode (c15 = MAN):** The binary output is active when the manual mode (MAN) is active (Code 2) or the manual level in TROVIS-VIEW is active.

Code	Description	WE	Adjustment range
c15	Function	NONE	NONE (inactive) FAIL (error indication) LIM (limit contact) PRIO (priority position) BIN (adopt binary input) MAN (indicate manual mode)
c16	Switching state for active function	NINV	NINV (not inverted) INV (inverted)
When c15 = LIM			
c21	Electronic limit contact (binary output) Message in case of event	NONE	NONE (inactive) HIGH (value above limit) LOW (value below limit)
c22	Switching point of limit contact (binary output)	10.0 %	0.0 to 100.0 %
c23	Hysteresis of electronic limit contact (binary output)	1.0 %	0.0 to 10.0 %

9.8 Electronic limit contacts

The electronic limit contact can be triggered by the actuator stem position exceeding or falling below an adjustable switching point.

- **Triggered when the position exceeds the switching point:** The limit contact is activated when the actuator stem position moves beyond the *switching point*. The limit contact is deactivated when the actuator stem moves below the switching point plus *hysteresis*.
- **Triggered when the position moves below the switching point:** The limit contact is activated when the actuator stem position moves below the *switching point*. The limit contact is deactivated when the actuator stem position moves beyond the switching point plus *hysteresis*.

 **NOTICE**

An activated limit contact remains permanently active if the switching point is smaller or larger than the hysteresis. This limit contact can only be deactivated by a restart (see section 11.4) or by resetting to NONE (c24, c27).

Code	Description	WE	Adjustment range
c24	Limit contact 1 Message in case of event	NONE	NONE (inactive) HIGH (value above limit) LOW (value below limit)
c25	Switching point of limit contact 1	10.0 %	0.0 to 100.0 %
c26	Hysteresis of limit contact 1	1.0 %	0.0 to 10.0 %
c27	Limit contact 2 Message in case of event	NONE	NONE (inactive) HIGH (value above limit) LOW (value below limit)
c28	Switching point of limit contact 2	90.0 %	0.0 to 100.0 %
c29	Hysteresis of limit contact 2	1.0 %	0.0 to 10.0 %

9.9 Restart

After the power supply returns after a power supply failure, the actuator starts according to the restart conditions.


- **Normal (c43 = NORM):** The actuator remains in automatic mode and immediately follows the input signal.
- **Zero calibration (c43 = ZERO):** The actuator performs a zero calibration.

- **Fixed positioning value (c43 = FIX):** The actuator switches to the manual mode and moves the actuator stem to the *Fixed positioning value for restart*.
- **Stop in manual level (c43 = STOP):** The actuator switches to the manual mode and sets the last positioning value to be the same as the manual positioning value.

Code	Description	WE	Adjustment range
c43	Restart	NORM	NORM (normal) ZERO (zero calibration) FIX (fixed positioning value) STOP (stop in manual level)
When c43 = FIX			
c44	Fixed positioning value for restart	0.0 %	0.0 to 100.0 %

9.10 Blockage

Blockage detection (c51)

The actuator detects a valve blockage by comparing the travel after the torque-dependent switch has been triggered with the travel measured on initialization. If the comparison shows that the limit switch was triggered too early, this indicates that there is a valve blockage. A blockage is indicated on the display by the  icon.

Remove blockage (c52)

When the Blockage removal function is active, the actuator stem extends and retracts 1 mm at the adjusted stroking speed three times at the most in sequence.

Blocking protection (c53)

The blocking protection prevents the valve from seizing up. If the actuator stem is in the closed position (0 %), it is extended slightly and then moved back to the closed position 24 hours after it last moved.

Code	Description	WE	Adjustment range
c51	Blockage detection	NO	NO (function inactive) YES (function active)
c52	Blockage removal	NO	NO (function inactive) YES (function active)
c53	Blocking protection	NO	NO (function inactive) YES (function active)

9.11 Travel

Limited travel range (c63)

The *Limited travel range* parameter determines in % how far the actuator stem can move at the maximum. The rated travel (c61) acts as the reference. When c63 = 100.0 %, the travel range is not limited.

Code	Description	WE	Adjustment range
c61	Rated travel	[mm]	► Read only
c63	Limited travel range	100.0 %	10.0 to 100.0 %

Speed level (c64)

The actuator stem moves to the position determined by the input signal at the selected stroking speed. There are two different speed levels (*NORM* and *FAST*).

The transit time (c66) is calculated from the travel and the stroking speed (c65). The transit time is the time that the actuator stem needs to move through the adjusted travel. The following applies:

$$\text{Transit time [s]} = \frac{\text{Travel [mm]}}{\text{Stroking speed [mm/s]}}$$

Code	Description	WE	Adjustment range
c64	Speed level	NORM	NORM (normal), FAST (fast)
c62	Gear version		► Read only
c65	Stroking speed	[mm/s]	► Read only
c66	Transit time	[s]	► Read only

Dead band (switching range)

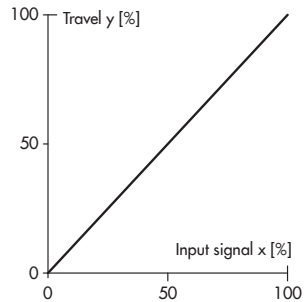
The dead band suppresses slight movements of the stem. The dead band represents the sum of the positive and negative hysteresis. After the actuator has been stationary, the input signal must change by at least half of the dead band to cause the actuator to move again.

Code	Description	WE	Adjustment range
c67	Dead band (switching range)	2.0 %	0.5 to 5.0 %

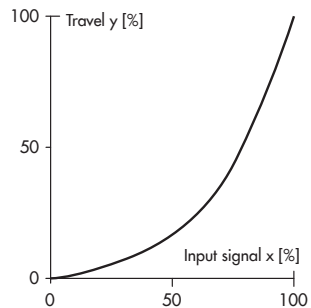
9.12 Characteristic

The characteristic expresses the relation between the input signal and the actuator stem's position.

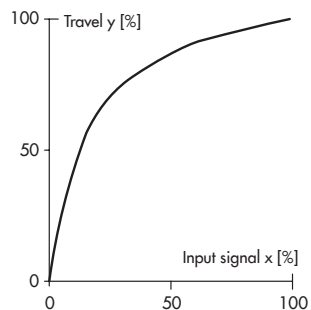
- **Linear (c71 = LIN):** The travel is proportional to the input signal.



- **Equal percentage (c71 = EQUA):** The travel is exponential to the input signal.



- **Reverse equal percentage (c71 = INV):** The travel is reverse exponential to the input signal.



- **User-defined (c71 = USER):** A new characteristic based on the last characteristic used can be defined over eleven points.

Configuration level

Code	Description	WE	Adjustment range
c71	Characteristic type	LIN	LIN (linear) EQUA (equal percentage) INV (reverse equal percentage) USER (user-defined)
When c71 = USER:			
c72 = USE	User-defined characteristic		
H0, Y0	Input signal X0, travel value Y0	0.0 %	0.0 to 100.0 %
H1, Y1	Input signal X1, travel value Y1	10.0 %	0.0 to 100.0 %
H2, Y2	Input signal X2, travel value Y2	20.0 %	0.0 to 100.0 %
H3, Y3	Input signal X3, travel value Y3	30.0 %	0.0 to 100.0 %
H4, Y4	Input signal X4, travel value Y4	40.0 %	0.0 to 100.0 %
H5, Y5	Input signal X5, travel value Y5	50.0 %	0.0 to 100.0 %
H6, Y6	Input signal X6, travel value Y6	60.0 %	0.0 to 100.0 %
H7, Y7	Input signal X7, travel value Y7	70.0 %	0.0 to 100.0 %
H8, Y8	Input signal X8, travel value Y8	80.0 %	0.0 to 100.0 %
H9, Y9	Input signal X9, travel value Y9	90.0 %	0.0 to 100.0 %
H10, Y10	Input signal X10, travel value Y10	100.0 %	0.0 to 100.0 %

9.13 Fast configuration level

Code 8 opens the fast configuration level, which allows the selection of several parameter configurations.

Code	Description	Display	Adjustment range
8	Fast configuration	FCO	In, Out, dir (see table below)

The settings for the following areas can be selected:

- Input signal (Code **In**)
- Position feedback signal (Code **Out**)
- Operating direction (Code **dir**)



Code	Description	Display
In	Input signal 0 to 20 mA	0 – 20
	Input signal 4 to 20 mA	4 – 20
	Input signal 0 to 10 V	0 – 10
	Input signal 2 to 10 V	2 – 10
Out	Position feedback signal 0 to 20 mA	0 – 20
	Position feedback signal 4 to 20 mA	4 – 20
	Position feedback signal 0 to 10 V	0 – 10
	Position feedback signal 2 to 10 V	2 – 10
dir	Operating direction increasing/increasing	>>
	Operating direction increasing/decreasing	<>

i Note

Only one setting can be selected for each range. Selected settings are marked on the display by dashes (see next page).

Configuration level

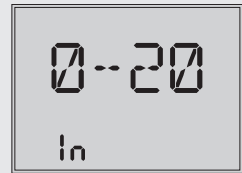
Open fast configuration level

1. Turn  (when the start screen appears) to select Code 8 (display: FCO).
2. Press . First setting that can be selected appears.




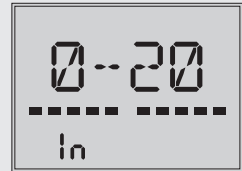
Selectable setting


→ Code In, input signal 0 to 20 mA



Select setting

3. Press  to select setting (indicated by the dashes).



4. Turn  to open other selectable settings (see list on page 67).

Example shown: Code dir, operating direction increasing/
increasing selected.



9.14 Plausibility error

Due to an invalid combination of interacting parameters in the configuration level, a plausibility error arises which is indicated by **PLAU** blinking on the display. A correction of the interacting parameters resets the error message.

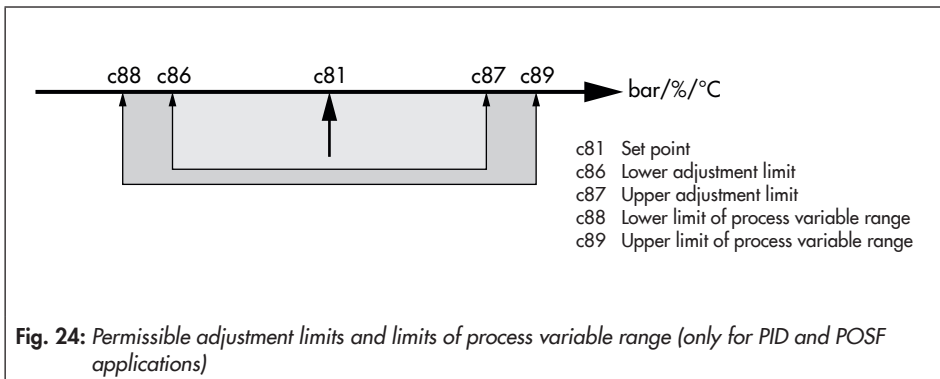
Causes of plausibility error

- **Invalid application selected (when Code c01 = C):**
 "Pt 1000" (Code c01 = C) is set as the source (only available for PID controller application, Code 6 = PID). Afterwards, the application is changed to "Positioner" (Code 6 = POSI) or "Temperature closed-loop control upon input signal failure" (Code 6 = POSF), causing a plausibility error.
Recommended action: Set Code 6 to PID controller.
- **Invalid application selected (when Code c01 = VIA):**
 "Interface" is set as the source (Code c01 = VIA). Afterwards, the application is changed to "Temperature closed-loop control upon input signal failure" (Code 6 = POSF), causing a plausibility error.
Recommended action: Set Code 6 to positioner or PID controller.
- **Invalid value for lower range value (Code c02):**
 A value < 1.0 mA or < 0.5 V is set in Code c02 combined with an active detection of input signal failure (Code c31 = **YES**).
Recommended action: Set Code c31 to **NO** or c02 to a value ≥ 1.0 mA or ≥ 0.5 V.
- **Invalid value for lower range value during fast configuration (FCO):**
 Lower range value (Code c02) and active detection of input signal failure (Code c31 = **YES**) are a valid combination. However, a plausibility error arises if an input signal from 0 to 20 mA or 0 to 10 V is selected through fast configuration.
Recommended action: Set Code c02 to a value ≥ 1.0 mA or ≥ 0.5 V.
- **Invalid set point (Code c81):**
 The set point (Code c81) is not within the range defined by the lower (Code c86) and upper adjustment limits (Code c87).
Recommended action: Set the set point (Code c81) or the adjustment limits (Code c86/ c87) so that the set point is within the adjustment limits.

– **Invalid limits of process variable range (Code c88/c89):**

The set point (Code c81) is within the range defined by the lower (Code c86) and upper adjustment limits (Code c87). The lower limit of process variable range (Code c88) has a greater value than the lower adjustment limit (Code c86) or the upper limit of process variable range (Code c89) has a lower value than the upper adjustment limit (Code c87).

Recommended action: Adjust the limits of the process variable range (Code c88/c89) so that they are identical to the adjustment limits (Code c86/c87) or that the adjustment limits (Code c86/c87) are within the limits of the process variable range (Code c88/c89). See Fig. 24).





10 Information level

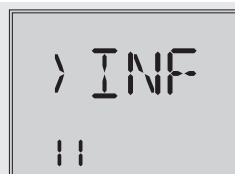
In the information level, all the actuator data important for closed-loop operation are displayed. Codes of the information level have an 'i' prefix to identify them.

All the parameters of the information level are listed in section 17.2.4 on page 93.



10.1 Activating parameters

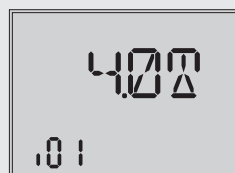
Activate the information level

1. Turn  (when the start screen appears) to select Code 11.
2. Press  to activate the information level.
(display: i01).





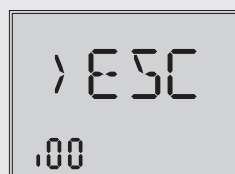
Activating parameters

- Turn  to activate the required code.
- In this example:
Code i01, Lower range value of input signal (the  icon stands for the mA unit).



Exit information level

1. Turn  to select the code i00 (ESC).
2. Press  to exit information level.





11 Service level

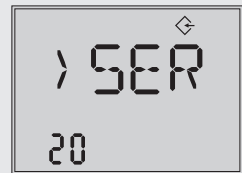
The service level contains detailed information on the actuator and its operating state. Additionally, various test functions can be performed in this level. Codes in the diagnostic level have a 'd' prefix to identify them.

All the parameters of the service level are listed in section 17.2.5 on page 94.




11.1 Activating and setting parameters

Activate the service level

1. Turn  (when the start screen appears) to select Code 20.
2. Press  to activate the service level.
(display: d01).





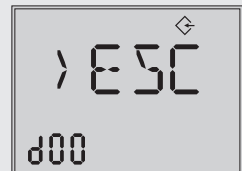
Example shown: Start transit time measurement

1. Turn  to activate Code d61.
 2. Press . The reading blinks on the display.
 3. Press  again to start the transit time measurement.
- ➔ The transit time measurement can be canceled at all times by selecting *ESC*.



Exiting the service level

1. Turn  to select the code d00 (ESC).
2. Press  to exit the service level.



11.2 Start zero calibration

WARNING

*Risk of injury due to the actuator stem extending or retracting.
Do not touch or block the actuator stem.*

The actuator stem moves to the 0 % end position. Following this, the actuator changes to closed-loop operation and moves the actuator stem to the position defined by the input signal.

Code	Description	Adjustment range
d51	Start zero calibration	ZER

→ Zero calibration can be canceled at all times by selecting *ESC*.

11.3 Start initialization

WARNING

*Risk of injury due to the actuator stem extending or retracting.
Do not touch or block the actuator stem.*

→ The procedure is described in section 8.3 on page 49.

Code	Description	WE	Adjustment range
d52	Start initialization		INI

→ Initialization can be canceled at all times by selecting *ESC*.

11.4 Restarting the actuator (reset)

The actuator can be restarted by performing a reset. Upon restart, the actuator goes into the operating mode previously set unless a different restart condition has been defined (see section 9.9 on page 62).

Code	Description	Adjustment range
d53	Perform reset	RES

11.5 Load default settings

All the parameters of the configuration level can be reset to their default settings (WE).





Code	Description	Adjustment range
d54	Load default settings in actuator	DEF

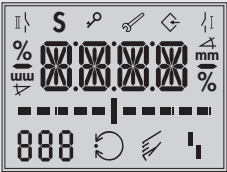
11.6 Testing the display

All the segments of the display are shown during the display test when a display functions properly. The display test is performed by selecting Code d55 in the service level (Code 20).

Code	Description	Adjustment range
d55	Testing the display	TEST (all segments displayed)

Activate display test (service level/Code 20)

1. Turn  (when the start screen appears) to select Code d55 (display: TEST).
2. Press  to start test.
- All segments are shown.
3. Press  to hide all segments (backlight remains switched on)
4. Press  again to return to the d55 TEST reading.



11.7 Measuring the transit time

WARNING

*Risk of injury due to the actuator stem extending or retracting.
Do not touch or block the actuator stem.*

NOTICE

*The process is disturbed by the movement of the actuator stem.
Do not perform the initialization while the process is running. First isolate the plant by closing the shut-off valves.*

During transit time measurement, the actuator stem moves from its current position to the 0 % end position. Starting from the 0 % end position, the actuator stem moves to the 100 % end position and back again to the 0 % end position. The transit time is measured during the up and down strokes and the average transit time calculated.
After the measurement is completed, the actuator returns to operating mode last used.

Note

The 0 % and 100 % end positions depend on the operating direction used (see section 9.3).

Code	Description	Adjustment range
d61	Start transit time measurement	RUN
d62	Measured transit time [s]	► Read only
d63	Measured travel [mm]	► Read only
d64	Speed level	► Read only

➔ The transit time measurement can be canceled at all times by selecting *ESC*.

12 Communication level

In the communication level, details and possible settings for the actuator interfaces are displayed. Codes of the communication level have an 'A' prefix to identify them. All the parameters of the communication level are listed in section Fig. 24 on page 70.

12.1 Activating and setting parameters


Activate the communication level

1. Turn  (when the start screen appears) to select Code 23.




→ Code A51 is displayed.

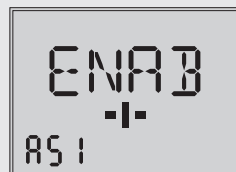


Activating parameters



→ Turn  to select the required code.

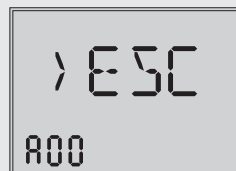
Setting parameters

1. Press . The reading blinks on the display.
2. Turn  until the required setting is reached.
3. Press  to confirm the setting.



Exiting the communication level

1. Turn  to select the code a00 (ESC).
2. Press  to exit communication level.



13 Memory pen

The memory pen is optional (accessories) and is used to store and transfer data:

- **Memory pen-64 (order no. 1400-9753)**



The memory pen can be configured in TROVIS-VIEW. The following functions for the actuator can be selected:

- Read data from the memory pen
- Write data to the memory pen
- Time-controlled data logging
- Event-triggered data logging

Refer to the operating instructions ► EB 6661 for TROVIS-VIEW for details on how to configure the memory pen.

Using the memory pen

1. Open the actuator cover.
 2. Insert the memory pen into the serial interface of the actuator.
 - ➔ The actuator automatically recognizes the memory pen. The dialog for the memory pen is displayed. The function (command) selected in TROVIS-VIEW is represented by a code on the display (see Table 7).
 3. Select the required action using the rotary pushbutton (depending on the function selected. See Table 7).
 - ➔ OK is displayed after data transmission is completed.
 4. Remove memory pen after data transmission is completed.
 - ➔ The memory pen dialog ends. The start screen appears.
- Close the actuator cover.

Table 7: *Memory pen dialog*

Code	Function	Action	Text
S02/ S03	Read data from memory pen/ Write data to memory pen	Reading memory pen/ Writing on memory pen	READ WRIT
S10	Time-controlled data logging	Data logging in progress	TLOG
S11	Event-triggered data logging	Data logging in progress	ELOG

Table 8: *Memory pen error*

Code	Error	Text
E51	Read error (memory pen)	ERD
E52	Write error (memory pen)	EWR
E53	Plausibility error	EPLA

13.1 Command pen

The following executable commands can be written to the memory pen in TROVIS-VIEW:

- Retract actuator stem
- Extend the actuator stem

These commands turn a memory pen into a command pen. After inserting the command pen into the actuator's interface, all functions running are ended and the command is executed since the command pen has priority over all functions.

Note

- *A command pen remains active as long as it is inserted into the actuator's interface (even after a reset).*
 - *Only one command at a time can be written to the memory pen and executed.*
-

Using the command pen

1. Open the actuator cover.
2. Insert the command pen into the serial interface of the actuator.
 - ➔ The actuator automatically recognizes the command pen. The dialog for the command pen is displayed. The function (command) selected in TROVIS-VIEW is represented by a code on the display (see Table 9).
3. Remove command pen after the command has been executed.
 - ➔ The command pen dialog ends. The start screen appears.
Close the actuator cover.

Table 9: *Command pen dialog*

Code	Command/function	Text
S21	Retract actuator stem	IN
S22	Extend the actuator stem	OUT

14 Servicing

Note

The electric actuator 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.*
-

14.1 Preparation for return shipment


Defective actuators can be returned to SAMSON for repair.

Proceed as follows to return devices to SAMSON:

1. Put the control valve out of operation and remove it from the pipeline. See associated valve documentation.
2. Remove the electric actuator from the valve (see section 16.2).
3. Send the electric actuator to your nearest SAMSON subsidiary. SAMSON subsidiaries are listed on our website at
► www.samson.de > (SAMSON > Sales offices).

15 Malfunctions

15.1 Error messages

Active errors are added at the end of the top operating level. An error is indicated by the display blinking and alternating between the start screen and the indicated error with the  error icon. If several errors have occurred, only the error with the highest priority is shown on the start screen. In the operating level, the active errors appear on the display after Code 20.

Error messages in order of their priority:

Error		Message	Type of error	Priority
EF	ENDT	Final test failed	Fatal error	1
E11	NTRV	EEPROM error: no basic setting	Fatal error	2
E12	NCO	EEPROM error: no configuration	Fatal error	3
E08	PLAU	Plausibility error	Fatal error	4
E06	MOT	Motor or potentiometer not turning	Fatal error	5
E03	SWI	Both limit contacts are active	Fatal error	6
E04	SIN	Retracting of actuator stem canceled	Fatal error	7
E05	SOUT	Extending of actuator stem canceled	Fatal error	8
E02	BLOC	Blockage	Fatal error	9
E01	FAIL	Input signal failure (application: positioner)	Fatal error	10
		Input signal failure (application: temperature closed-loop control upon input signal failure)	Maintenance demanded	
E07	SENS	Sensor failure (application: PID controller)	Fatal error	11
		Sensor failure (application: temperature closed-loop control upon input signal failure)	Maintenance demanded	
E09	BUS	Bus failure	Fatal error	12
E14	NPOT	EEPROM error: no potentiometer calibration	Maintenance demanded	13
E00	RUNT	No initialization performed	Maintenance demanded	14
E13	NCAL	EEPROM error: no calibration	Maintenance demanded	15
E15	NRUN	EEPROM error: no transit time	Maintenance demanded	16

15.2 Troubleshooting

Code	Error	Corrective action to be taken
Fatal error		
EF	Final test failed	Contact SAMSON's After-sales Service department.
E01	Input signal failure	Check signal source and wiring
E02	Blockage	Unblock stem and valve.
E03	Both limit contacts are active	Contact SAMSON's After-sales Service department.
E04	Retracting of actuator stem canceled	Contact SAMSON's After-sales Service department.
E05	Extending of actuator stem canceled	Contact SAMSON's After-sales Service department.
E06	Motor or potentiometer not turning	Contact SAMSON's After-sales Service department.
E07	Sensor failure	Check signal source and wiring
E08	Plausibility error	Correct configuration
E09	Bus failure	Check Modbus master and connection
E11	EEPROM error: no basic setting	Contact SAMSON's After-sales Service department.
E12	EEPROM error: no configuration	Perform configuration again
Maintenance demanded		
E01	Input signal failure	Check signal source and wiring
E07	Sensor failure	Check signal source and wiring
E00	No initialization performed	Perform an initialization
E13	EEPROM error: no calibration	Contact SAMSON's After-sales Service department.
E14	EEPROM error: no potentiometer calibration	Contact SAMSON's After-sales Service department.
E15	EEPROM error: no transit time	Perform an initialization or transit time measurement
Warnings (over service level)		
d41	EEPROM error: no serial number	Contact SAMSON's After-sales Service department.
d42	EEPROM error: no manufacturing parameters	Contact SAMSON's After-sales Service department.
d44	EEPROM error: no status messages	Contact SAMSON's After-sales Service department.
d45	EEPROM error: no statistics	Contact SAMSON's After-sales Service department.

i Note

EEPROM errors are marked by 'E RD' on the display when they are read errors and 'E WR' when they are write errors.

15.3 Emergency action

The valve, on which the electric actuator with fail-safe action is mounted, is moved to its fail-safe position upon power supply failure (see section 3.1).

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.

16 Decommissioning and disassembly

DANGER

Risk of electric shock.

Before disconnecting live wires, switch off the power supply at the actuator and protect it against unintentional reconnection.

WARNING

Risk of personal injury due to residual process medium in the valve.

While working on the valve, residual process medium can escape and, depending on its properties, may lead to personal injury, e.g. (chemical) burns.

Wear protective clothing, safety gloves and eyewear.

WARNING

Risk of burn injuries due to hot or cold components and pipeline.

Valve components and the pipeline may become very hot or cold. Risk of burn injuries.

– Allow components and pipelines to cool down or heat up.

– Wear protective clothing and safety gloves.

16.1 Decommissioning

To decommission the electric actuator for repair work or disassembly, proceed as follows:

1. Put the control valve out of operation.
See associated valve documentation.
2. Switch off the power supply.

16.2 Removing the actuator from the valve

16.2.1 Construction with integrated yoke

1. Retract actuator stem as described in section 3.3.
2. Undo the stem connector parts between the plug and actuator stems.
3. Loosen the nut at the yoke.
4. Lift the actuator off the valve.
5. Disconnect the supply and signal lines.

16.2.2 Construction with ring nut

1. Retract actuator stem as described in section 3.3.
2. Undo the stem connector parts between the plug and actuator stems.
3. Unscrew the ring nut on the valve bonnet.
4. Lift the actuator off the valve.
5. Disconnect the supply and signal lines.

16.3 Disposal

- Observe local, national and international refuse regulations.
- Do not dispose of components, lubricants and hazardous substances together with your household waste.

17 Appendix

17.1 After-sales service

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

E-mail

You can reach the After-sales Service Department at aftersalesservice@samson.

Addresses of SAMSON AG and its subsidiaries

The addresses of SAMSON AG, its subsidiaries, representatives and service facilities worldwide can be found on the SAMSON website or in all SAMSON product catalogs.

Required specifications

Please submit the following details:

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

17.2 Levels and parameters

17.2.1 Operating level

Code	Parameters	Display/select (select ESC to cancel)	Section
Start screen			
0/1	Depending on application	► Read only	7
Operating level			
1	Positioning value	► Read only	
2	Operating mode	AUTO (automatic mode) MAN (manual mode)	8.1
3 ¹⁾	Positioning value (manual mode)	0.0 to 100.0 %	8.1
4	Reading direction	DISP, dSID	8.2
5	Start initialization	> INI	8.3
6	Application	POSI (positioner) PID (PID controller) 2STP (two-step mode) 3STP (three-step mode) POSF (temperature closed-loop control upon input signal failure)	8.4
8	Fast configuration level	IN, OUT, DIR	9.13
9	Select key number	> KEY	7.5
10	Activate the configuration level	> CO	9.1
11	Activate the information level	> INF	10.1
20	Activate the service level	> SER	11.1
23	Activate the communication level	> COM	
Fatal error (can only be seen when error exists)			
EF	Final test failed	ENDT	15
E00	Error: No initialization performed	RUNT	15
E01	Error: Input signal failure	FAIL	15
E02	Error: Blockage	BLOC	15
E03	Error: Both limit switches are active	SWI	15
E04	Error: Canceled while retracting stem	SIN	15
E05	Error: Canceled while extending stem	SOUT	15
E06	Error: Motor or potentiometer not turning	MOT	15
E08	Plausibility error	PLAU	9.14
E09	Bus failure	BUS	15

¹⁾ Only in manual mode (MAN)

Code	Parameters	Display/select (select ESC to cancel)	Section
EEPROM error (can only be seen when error exists)			
E11	Error: No basic setting	NTRV	15
E12	Error: No configuration	NCO	15
E13	Error: No calibration	NCAL	15
E14	Error: No potentiometer calibration	NPOT	15
E15	Error: No transit time	NRUN	15

17.2.2 Configuration level

Code	Parameters	Setting range (select ESC to cancel)	WE	Section	Customer data
Input signal					
c01	Source	mA (current signal) V (voltage signal) C (Pt-1000) VIA (via interface)	mA	9.2	
c02	Lower range value	0.0 to 15.0 mA	4.0 mA	9.2	
		0.0 to 7.5 V	2.0 V		
c03	Upper range value	5.0 to 20.0 mA	20.0 mA	9.2	
		2.5 to 10.0 V	10.0 V		
c04	Logic	0: Inverted; 1: Not inverted	1		
Position feedback signal					
c05	Unit	mA (current signal) V (voltage signal)	mA	9.5	
c06	Lower range value	0.0 to 15.0 mA	4.0 mA	9.5	
		0 to 7.5 V			
c07	Upper range value	5.0 to 20.0 mA	20.0 mA	9.5	
		2.5 to 10.0 V			
Binary input					
c11	Function	NONE (inactive) PRIO (priority position) NEXT (next entry in information level) LAMP (backlight activated) MEND (exit manual level for travel adjustment)	NONE	9.6	

Code	Parameters	Setting range (select ESC to cancel)	WE	Section	Customer data
c12	Logic	NINV (not inverted) INV (inverted)	NINV	9.6	
Binary output					
c15	Function	NONE (inactive) FAIL (indicate error during operation) LIM (electronic limit contact) PRIO (priority position reached) BIN (adopt binary input) MAN (indicate manual mode)	NONE	9.7	
c16	Logic	NINV (not inverted) INV (inverted)	NINV	9.7	
Electronic limit contact (binary output)					
c21	Message in case of event	NONE (inactive) HIGH (value above limit) LOW (value below limit)	NONE	9.7	
c22	Switching point	0.0 to 100.0 %	10.0 %	9.7	
c23	Hysteresis	0.0 to 10.0 %	1.0 %	9.7	
Electronic limit contact 1					
c24	Message in case of event	NONE (inactive) HIGH (value above limit) LOW (value below limit)	NONE	9.8	
c25	Switching point	0.0 to 100.0 %	10.0 %	9.8	
c26	Hysteresis	0.0 to 10.0 %	1.0 %	9.8	
Electronic limit contact 2					
c27	Message	NONE (inactive) HIGH (value above limit) LOW (value below limit)	NONE	9.8	
c28	Switching point	0.0 to 100.0 %	90.0 %	9.8	
c29	Hysteresis	0.0 to 10.0 %	1.0 %	9.8	
Input signal					
c31	Detect input signal failure	NO YES	NO	9.2	
c32	Positioning value upon input signal failure	INT (internal positioning value) LAST (last position)	INT	9.2	
c33	Internal positioning value	0.0 to 100.0 %	0.0 %	9.2	
c34	Travel for priority position	0.0 to 100.0 %	0.0 %	9.6	

Appendix

Code	Parameters	Setting range (select ESC to cancel)	WE	Section	Customer data
c35	End position guiding (stem retracts)	50.0 to 100.0 %	97.0 %	9.4	
c36	End position guiding (stem extends)	0.0 to 49.9 %	1.0 %	9.4	
c37	Superimposing an error message	YES (error reading active) NO (error reading inactive)	NO	9.5	
Operation					
c42	Direction of action	>> (increasing/increasing) <> (increasing/decreasing)	>>	9.3	
c43	Restart	NORM (normal) ZERO (zero calibration) FIX (fixed positioning value) STOP (stop in manual level)	NORM	9.9	
c44	Fixed positioning value for restart	0.0 to 100.0 %	0.0 %	9.9	
Blockage					
c51	Blockage detection	NO (function inactive) YES (function active)	NO	9.10	
c52	Blockage removal	NO (function inactive) YES (function active)	NO	9.10	
c53	Blocking protection of valve	NO (function inactive) YES (function active)	NO	9.10	
Valve travel					
c61	Rated travel	► Read only	[mm]	9.11	–
c62	Gear version	► Read only		9.11	–
c63	Limited travel range	10.0 to 100.0 %	100.0 %	9.11	
c64	Speed level	NORM (normal), FAST (fast)	NORM	9.11	
c65	Stroking speed	► Read only	[mm/s]	9.11	–
c66	Transit time	► Read only	[s]	9.11	–
c67	Dead band (switching range)	0.5 to 5.0 %	2.0 %	9.11	
Characteristic					
c71	Characteristic type	LIN (linear) EQUA (equal percentage) INV (reverse equal percentage) USER (user-defined)	LIN	9.12	

Code	Parameters	Setting range (select ESC to cancel)	WE	Section	Customer data
c72	User-defined characteristic	User-defined		9.12	
PID controller					
c80	Operating point Y_0	0 to 100 %	0 %	8.4	
c81	Set point	0.0 to 100.0 %	50.0 %	8.4	
c82	Proportional-action coefficient KP	0.1 to 50.0	1.0	8.4	
c83	Reset time T_n	0 to 999 s	20 s	8.4	
c84	Derivative-action time T_v	0 to 999 s	0 s	8.4	
Scaling of the set point for PID controller					
c85	Unit	NONE (none) PER (%) CEL (°C) BAR (bar)	PER		
c86	Lower range value	-999 to 999	0		
c87	Upper range value	-999 to 999	100		
Process variable adjustment					
c88	Lower limit of range	Depending on c85 (see above)	0		
c89	Upper limit of range	Depending on c85 (see above)	100		
Error signal					
c90	Function	0: Not inverted; 1: Inverted	0		
Actuator					
c91	Customized key number active	NO YES	NO	7.5.1	
c92	Customized key number	0000 to 1999	0000	7.5.1	
c93	Backlight always on	NO YES	NO	8.2.2	
c94	Key number is active	NO YES	NO	7.5	

17.2.3 Characteristic level

Code	Parameters	Selection	WE	Section	Customer data
H0	X0	0.0 to 100.0 %	0.0 %	9.12	
Y0	Y0	0.0 to 100.0 %	0.0 %	9.12	
H1	X1	0.0 to 100.0 %	10.0 %	9.12	
Y1	Y1	0.0 to 100.0 %	10.0 %	9.12	
H2	X2	0.0 to 100.0 %	20.0 %	9.12	
Y2	Y2	0.0 to 100.0 %	20.0 %	9.12	
H3	X3	0.0 to 100.0 %	30.0 %	9.12	
Y3	Y3	0.0 to 100.0 %	30.0 %	9.12	
H4	X4	0.0 to 100.0 %	40.0 %	9.12	
Y4	Y4	0.0 to 100.0 %	40.0 %	9.12	
H5	X5	0.0 to 100.0 %	50.0 %	9.12	
Y5	Y5	0.0 to 100.0 %	50.0 %	9.12	
H6	X6	0.0 to 100.0 %	60.0 %	9.12	
Y6	Y6	0.0 to 100.0 %	60.0 %	9.12	
H7	X7	0.0 to 100.0 %	70.0 %	9.12	
Y7	Y7	0.0 to 100.0 %	70.0 %	9.12	
H8	X8	0.0 to 100.0 %	80.0 %	9.12	
Y8	Y8	0.0 to 100.0 %	80.0 %	9.12	
H9	X9	0.0 to 100.0 %	90.0 %	9.12	
Y9	Y9	0.0 to 100.0 %	90.0 %	9.12	
H10	X10	0.0 to 100.0 %	100.0 %	9.12	
Y10	Y10	0.0 to 100.0 %	100.0 %	9.12	
H00	Exit level				

17.2.4 Information level

Code	Parameters (read only)	Reading/unit	Section
Input signal			
i01	Lower range value of input signal	V or mA ¹⁾	9.2
i02	Upper range value of input signal	V or mA ¹⁾	9.2
i03	Positioning value	%/state	9.2
i04	Unit	V or mA ¹⁾	9.2
Control			
i05	Valve position	%/°C/bar/without unit	
i06	Set point	%/°C/bar/without unit	
i07	Error signal	%	
i08	Active controller	State	
i09	Positioning value	%	
Travel			
i11	Actuator travel	%	9.11
i12	Actuator travel	mm	9.11
Position feedback signal			
i21	Lower range value of position feedback signal	V or mA ¹⁾	9.5
i22	Upper range value of position feedback signal	V or mA ¹⁾	9.5
i23	Position feedback signal	%	9.5
i24	Position feedback signal	V or mA ¹⁾	9.5
Binary signals			
i31	Binary input status	ON/OFF	9.6
i32	Binary output status	ON/OFF	9.7
Limit contact			
i41	Status of limit switch (stem retracted)	ON/OFF	9.4
i42	Status of limit switch (stem extended)	ON/OFF	9.4
Configuration			
i51	Direction of action	>>/<<	9.3
i52	Limited travel range	%	9.11
i53	Transit time	s	9.11
i54	Application	POSI/PID/2STP/3STP/POSF	8.4

¹⁾ The mA unit is represented in the display by the icon .

Code	Parameters (read only)	Reading/unit	Section
Diagnostics			
i61	Travel cycles	From 10000 onwards, reading in K	
i62	Temperature inside actuator	°C	
i63	Lowest temperature inside actuator	°C	
i64	Highest temperature inside actuator [°C]	°C	
i00	Exit information level		

17.2.5 Service level

Code	Parameters	Display/selection (select ESC to cancel)	Section
Information – Actuator			
d01	Firmware version	► Read only	15
d02	Revision number	► Read only	15
Errors – Status			
d10	Error during operation	► Read only	15
d11	Priority position triggered	YES NO	
Errors – Fatal errors			
d20	No initialization performed	► Read only YES NO	15
d21	Input signal failure		
d22	Blockage		
d23	Both limit contacts active		
d24	Canceled while retracting stem		
d25	Canceled while extending stem		
d26	Motor or potentiometer not turning		
d26	Sensor failure		
Error – EEPROM error			
d31	EEPROM error: Basic setting	► Read only E RD (read error) E WR (write error)	15
d32	EEPROM error: Configuration		
d35	EEPROM error: Calibration		
d36	EEPROM error: Potentiometer calibration		
d41	EEPROM error: Serial number		

Code	Parameters	Display/selection (select ESC to cancel)	Section
d42	EEPROM error: Manufacturing parameters	► Read only E RD (read error) E WR (write error)	15
d43	EEPROM error: Transit time		
d44	EEPROM error: Status messages		
d45	EEPROM error: Statistics		
Test – Actions			
d51	Start zero calibration	ZER	11.2
d52	Start initialization	INI	8.3
d53	Perform reset	RES	11.4
d54	Load default settings in actuator	DEF	11.5
d55	Test the display	TEST (all segments displayed)	11.6
Test – Transit time			
d61	Start transit time measurement	RUN	11.7
d62	Measured transit time	► Read only in s	11.7
d63	Measured travel	► Read only in mm	11.7
d64	Speed level during measurement	► Read only NORM (normal), FAST (fast)	11.7
d00	Exit level	> ESC	

**Tip**

Other parameters of the service level can viewed in the TROVIS-VIEW software.

17.2.6 Communication level

Code	Parameters	Display/select (select ESC to cancel)	Section
Serial interface			
A51	Communication	ENAB (enabled) DISA (disabled)	
Interface module			
A61	Communication	ENAB (enabled) DISA (disabled)	
A62	Interface module	485 (RS-485) USB (USB) ETH (Ethernet) NONE (none)	
A63	Protocol	AUTO (automatic: SSP, Modbus) MODX (Modbus, adjustable)	
Modbus interface module			
A64	Station address	1 to 247	
A65	Baud rate (in Baud)	1200 2400 4800 9600 192 (19200) 384 (38400)	
A66	Stop bits and parity	1SNP (1 stop bit, no parity) 1SEP (1 stop bit, even parity) 1SOP (1 stop bit, odd parity) 2SNP (2 stop bits, no parity)	
A67	Bus failure monitoring in min (timeout)	0 to 99	
A00	Exit level	> ESC	

17.2.7 Further codes on the display

Code	Function	State	Text
F11	Zero calibration	Active	ZERO
F12	Initialization	Active	INIT
F13	Transit time measurement	Active	RUN
F41	Blocking protection	Active	BPRO
F42	Blockage removal	Active	BREM
F61	Retract actuator stem in manual level	Active	MIN
F63	Extend actuator stem in manual level	Active	MOUT
F64	Stop actuator stem in manual level	Active	MSTO

17.2.8 Excerpt from Modbus list

The electric actuator in firmware version 3.10 and higher can be fitted with an RS-485 module to use the Modbus-RTU protocol. This protocol is a master/slave protocol. In this case, a control station is the master and the electric actuator the slave, for example.

The following Modbus functions are supported:

Code	Modbus function	Application
1	Read Coils	Read state of several digital outputs in bit format
3	Read Holding Registers	Read several parameters
5	Write Single Coil	Write a single digital output in bit format
6	Write Single Register	Write a value into a single holding register
15	Write Multiple Coils	Write several digital outputs in bit format
16	Write Multiple Registers	Write a value into several holding registers

The electric actuator can issue the following Modbus error responses:

Error code	Error	Cause
1	Illegal function	The function code is not supported.
2	Illegal data address	A register address is invalid or write-protected.
3	Illegal data value	A value contained in the data is not allowed or not plausible.
4	Slave device failure	An unrecoverable error occurred during an action.
6	Slave device busy	The slave is busy and cannot accept the query.

Several important data points from the Modbus data point list are listed below. The entire data point list is available on request.

i Note

Data are saved in a non-volatile EEPROM. This type of memory has a limited life of at least 100,000 write operations per memory address. It is almost impossible to exceed this limitation if configurations and data are only changed manually using TROVIS-VIEW or at the device. If parameters are changed automatically (e.g. by Modbus communication), make sure to observe the maximum number of write operations and take appropriate action to prevent that parameters are written too frequently.

HR	Designation	Access	Transmission range		Indicating range	
			Start	End	Start	End
Actuator version						
1	Device type (3374 or 3375)	R	3374	3375	3374	3375
2	Reserved					
3	Revision	R	300	9999	3.00	99.99
4	Part one of serial number (top four digits)	R	0	9999	0	9999
5	Part two of serial number (bottom four digits)	R	0	9999	0	9999
6	Firmware version	R	100	9999	1.00	99.99
7	Released firmware version	R	0	1	0	1
8	Modbus station address	R	0	255	0	255
9	Gear version	R	0	2	0	2
Control						
10	Application	R	0	4	0	4
11	Direction of action	R	0	1	0	1
Inputs (operating values) for positioner application						
12	Positioning value in %	R/W	0	1000	0	100.0
13	Input signal in mA or in V	R	0	2400	0	24.0
14	Unit of input signal	R	0	1	0	1
Inputs (operating values) for PID controller application						
15	Process variable in unit (PID controller)	R	−10000	10000	−1000	1000
16	Set point in unit (PID controller)	R	−10000	10000	−1000	1000
17	Unit (PID controller)	R	0	3	0	3
Operating values (outputs)						
18	Travel in %	R	0	1000	0	100.0
19	Travel in mm	R	0	1000	0	100

Appendix

HR	Designation	Access	Transmission range		Indicating range	
			Start	End	Start	End
20	Set point deviation of positioner in % (positioning value/travel)	R	-1000	1000	0	100
21	Set point deviation of PID controller in % (set point/process variable)	R	-1000	1000	0	100
Operating values (position feedback)						
22	Position feedback in %	R	0	1000	0	100.0
23	Position feedback in mA/V	R	0	240	0	24.0
24	Unit of position feedback	R	0	1	0	1
Manual level of control station						
25	Manual positioning value in manual level of control station in %	R/W	0	1000	0	100.0
26	Set point deviation of manual level (control station) in %	R	-1000	1000	-100.0	100.0
Process data						
27	Positioning value (manual level on site) in %	R	0	1000	0	100.0
28	Status of positioning value	R				

Binary operating data

Class	Designation COILS (1-bit)	Access	Status 0	Status 1
Operating states				
1	Error during operation	R	No	Yes
2	Maintenance demanded	R	No	Yes
3	Manual level on site active	R	No	Yes
4	Enable manual level of control station (travel adjustment)	R/W *H	No	Yes
Binary input				
5	Binary input status	R	Off	On
6	Binary input (switching contact)	R	Off	On
Limits				
7	State of electronic limit contact 1	R	Off	On
8	State of electronic limit contact 2	R	Off	On
9	Electronic limit contacts exist	R	Off	On
Limit contact				
10	Torque switch: Actuator stem retracted	R	Off	On
11	Torque switch: Actuator stem extended	R	Off	On

Class	Designation COILS (1-bit)	Access	Status 0	Status 1
Binary output				
12	Logical state of binary output	R	Off	On
13	Binary output (switching contact)	R	Off	On
14	Enable manual level of control station (binary output)	R/W	No	Yes
15	Logical state of binary output (manual level of control station)	R/W	Off	On
Fatal error				
16	Final test failed	R	No	Yes
17	Plausibility error	R	No	Yes
18	Motor or potentiometer not turning	R	No	Yes
19	Both limit contacts are active	R	No	Yes
20	Retracting of actuator stem canceled	R	No	Yes
21	Extending of actuator stem canceled	R	No	Yes
22	Blockage	R	No	Yes
23	Input signal failure	R	No	Yes
24	Sensor failure	R	No	Yes
EEPROM error				
25	Basic setting: state	R	No	Yes
26	Basic setting: cause	R	Read error	Write error
27	Settings: state	R	No	Yes
28	Settings: cause	R	Read error	Write error
29	Calibration: state	R	No	Yes
30	Calibration: cause	R	Read error	Write error
31	Potentiometer calibration: state	R	No	Yes
32	Potentiometer calibration: cause	R	Read error	Write error
33	Serial number: state	R	No	Yes
34	Serial number: cause	R	Read error	Write error
35	Manufacturing parameter: state	R	No	Yes
36	Manufacturing parameter: cause	R	Read error	Write error
37	Transit time: state	R	No	Yes
38	Transit time: cause	R	Read error	Write error
39	Status messages: state	R	No	Yes
40	Status messages: cause	R	Read error	Write error
41	Statistics: state	R	No	Yes
42	Statistics: cause	R	Read error	Write error

Class	Designation COILS (1-bit)	Access	Status 0	Status 1
Functions				
43	Zero calibration active	R	No	Yes
44	Initialization active	R	No	Yes
45	Blocking protection active	R	No	Yes
46	Blockage removal active	R	No	Yes
States				
48	Active controller (only application: temperature closed-loop control upon input signal failure)	R	No	Yes
49	Excessive temperature inside the actuator	R	No	Yes
50	Priority position active	R	No	Yes
51	No initialization performed	R	No	Yes

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Customized key number	

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