

AXS215S: Continuous actuator for unit valves, with stroke indicator**How energy efficiency is improved**

Reliable and accurate operation as part of efficient closed-loop control systems.

Areas of application

Used to operate the through and three-way unit valves of the VUL, BUL, VXL and BXL series, the SAUTER Valveco range or other popular makes of unit valves. For controllers with a continuous output of 0(2)...10 V used in combination with intelligent unitary control systems.

Features

- Easy to fit to the valve due to the Low-Force-Locking® (LFL) mechanism
- Fitted to valve via M30 × 1.5 thread with automatic adaptation
- Max. 125 N of closing force
- With 24 V~ expansion element and accurate continuous input
- Choice of control action 0(2)...10 V / 10...(2)0 V and split-range function 0...4.5 V or 5.5...10 V
- Choice of stroke for 100% control signal 4.5 mm or 3 mm
- Position monitor with inductive, non-wearing sensor; needs no periodic re-adjustment
- Large, tangible and visible position indicator
- NC (normally closed) and NO (normally open) versions
- Silent and maintenance-free
- With modular connectors for electrical connection (with various functions, cable lengths and cable types)
- Modern design

Technical description

- Housing made of high-quality, self-extinguishing plastic, pure white (RAL 9010) or jet black (RAL 9005), high-gloss finish (fire protection according to EN 60695-2-11, EN 60695-10-2)
- Connected to valve with plastic bayonet connection
- Bayonet nuts for connection to all valves with M30 × 1.5 (black) M28 × 1.5 (grey) or M30 × 1.0 (white) threads; also suitable for refitting existing systems without adaptors.
- Connecting cable, white or black, standard length 2 m, H03, of PVC or halogen-free, Ø 0.22 mm²
- Run time: approx. 30 s/mm in control mode
- Installation position: any, including upside-down

**Products**

Type	Voltage	Max. stroke (mm)	Closing force ¹⁾ (N)	NC/NO	Min. running time ²⁾ (s/mm)	Weight (kg)
White version, incl. bayonet nut M30 × 1.5, cable 2 m, pack of one						
AXS215SF122	24 V	4.5/3	115	NC	approx. 30	0.21
AXS215SF222	24 V	4.5/3	110	NO	approx. 30	0.21
Black version, incl. bayonet nut M30 × 1.5, cable 2 m, pack of one						
AXS215SF122B	24 V	4.5/3	115	NC	approx. 30	0.21
AXS215SF222B	24 V	4.5/3	110	NO	approx. 30	0.21

1) Closing force applies when used in combination with SAUTER valves

2) The total time for 100% stroke is approx. 3.5...4.5 min (warm-up time) from cold or approx. 150 s in operating mode excluding dead time, i.e. in stand-by mode, add a dead time of approx. 110 s

Technical data**Electrical supply**

Power supply	24 V~ ± 20%
	50...60 Hz
Power consumption during operation	approx. 3 W
Start-up power	max. 5 W
Start-up current	approx. 220 mA
Stand-by current	max. 6 mA
Operating current	max. 90 mA

Features

Max. operating temperature	100 °C (at the valve)
Control voltage	0...10 V; R _i ≥ 100 kΩ

Permitted ambient conditions

Operating temperature	0...50 °C
Storage and transport temperature	-25...70 °C
Humidity	< 85% rh
	no condensation

Standards and directives

Degree of protection	IP 54 (EN 60730)
Protection class (24 V)	III (EN 60730-1, -2, -14)

Additional information

Fitting instructions, with auxiliary contacts	MV P100002547
Material declaration	MD 55.100
Dimension drawing	M10503 , M11422
Wiring diagram	A10581

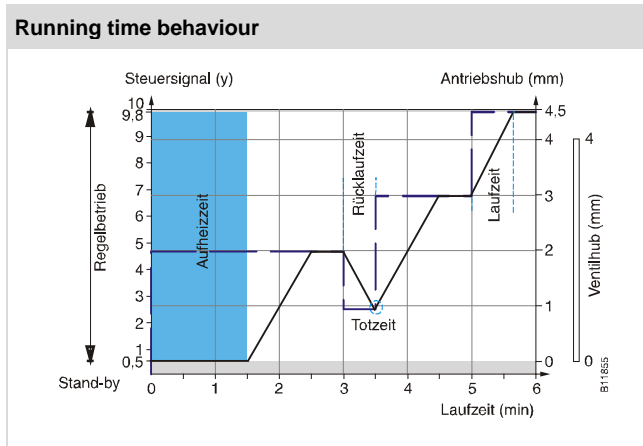
Accessories

Type	Description
	Connectors with continuous actuation (for 24 V version only)
0550423121	Continuous activation NC can be set: 0 (2)...10 V/10...0 (2) V, split range 0...4.5 V or 5.5...10 V, for stroke of 4.5 mm or 3.2 mm, 2 m cable, white, PVC H03 Ø 0.22 x 3
0550423121B	Continuous activation NC can be set: 0 (2)...10 V/10...0 (2) V, split range 0...4.5 V or 5.5...10 V, for stroke of 4.5 mm or 3.2 mm, 2 m cable, black, PVC H03 Ø 0.22 x 3
0550423221	Continuous activation NO can be set: 0 (2)...10 V/10...0 (2) V, split range 0...4.5 V or 5.5...10 V, for stroke of 4.5 mm or 3.2 mm, 2 m cable, white, PVC H03 Ø 0.22 x 3
0550423221B	Continuous activation NO can be set: 0 (2)...10 V/10...0 (2) V, split range 0...4.5 V or 5.5...10 V, for stroke of 4.5 mm or 3.2 mm, 2 m cable, black, PVC H03 Ø 0.22 x 3
0550423151	Continuous activation NC can be set: 0 (2)...10 V/10...0 (2) V, split range 0...4.5 V or 5.5...10 V, for stroke of 4.5 mm or 3.2 mm, 5 m cable, white, PVC H03 Ø 0.22 x 3
0550423151B	Continuous activation NC can be set: 0 (2)...10 V/10...0 (2) V, split range 0...4.5 V or 5.5...10 V, for stroke of 4.5 mm or 3.2 mm, 5 m cable, black, PVC H03 Ø 0.22 x 3
0550423251	Continuous activation NO can be set: 0 (2)...10 V/10...0 (2) V, split range 0...4.5 V or 5.5...10 V, for stroke of 4.5 mm or 3.2 mm, 5 m cable, white, PVC H03 Ø 0.22 x 3
0550423171	Continuous activation NC can be set: 0 (2)...10 V/10...0 (2) V, split range 0...4.5 V or 5.5...10 V, for stroke of 4.5 mm or 3.2 mm, 7 m cable, white, PVC H03 Ø 0.22 x 3
0550423171B	Continuous activation NC can be set: 0 (2)...10 V/10...0 (2) V, split range 0...4.5 V or 5.5...10 V, for stroke of 4.5 mm or 3.2 mm, 7 m cable, white, PVC H03 Ø 0.22 x 3
0550423271	Continuous activation NO can be set: 0 (2)...10 V/10...0 (2) V, split range 0...4.5 V or 5.5...10 V, for stroke of 4.5 mm or 3.2 mm, 7 m cable, white, PVC H03 Ø 0.22 x 3
0550423123	Continuous activation NC can be set: 0 (2)...10 V/10...0 (2) V, split range 0...4.5 V or 5.5...10 V, for stroke of 4.5 mm or 3.2 mm, 2 m halogen-free cable, white, H03, Ø 0.22 x 3
0550423153	Continuous activation NC can be set: 0 (2)...10 V/10...0 (2) V, split range 0...4.5 V or 5.5...10 V, for stroke of 4.5 mm or 3.2 mm, 5 m halogen-free cable, white, H03, Ø 0.22 x 3
0550423173	Continuous activation NC can be set: 0 (2)...10 V/10...0 (2) V, split range 0...4.5 V or 5.5...10 V, for stroke of 4.5 mm or 3.2 mm, 7 m halogen-free cable, white, H03, Ø 0.22 x 3
	Miscellaneous accessories
0550240001	Disassembly protection, white for AXT201/211 and AXS215 (prevents unauthorised disassembly of plug and actuator)
	Adaptors & adaptor sets
0550390001	Raised bayonet nut, M30 x 1.5 (black), with N (standard, black) and S (reduced, white) insert, for all valves with M30 x 1.5 thread plus corner valves or valves with measurement fitting. Size of actuator +5 mm. Closing dimension depending on use: NC 4.5 mm to 18.5 mm and NO 8.5 mm to 22.5 mm
0550390101	Raised bayonet nut, M28 x 1.5 (grey), with N (standard, black) and S (reduced, white) insert, for all valves with M28 x 1.5 thread plus corner valves or valves with measurement fitting. Size of actuator +5 mm. Closing dimension depending on use: NC 4.5 mm to 18.5 mm and NO 8.5 mm to 22.5 mm, e.g. <i>Pettinaroli</i>
0550390201	Raised bayonet nut, M30 x 1.0 (white), with N (standard, black) and S (reduced, white) insert, for all valves with M30 x 1.0 thread plus corner valves or valves of various makes. Dimensions of actuator +5 mm. Closing dimension depending on use: NC 4.5 mm to 18.5 mm and NO 8.5 mm to 22.5 mm, e.g. <i>Oventrop</i> (old), <i>Beulco</i> (old)
0550393004	Adaptor for fitting to <i>Danfoss</i> valves type RA 2000, 22 mm
0550393002	Adaptor for fitting to <i>Danfoss</i> valves type RAVL, 26 mm
0550393003	Adaptor for fitting to <i>Danfoss</i> valves type RAV, 34 mm
0550394001	Adaptor for fitting to <i>Giacomini</i> valves type R450, R452, R456 and programme 60
0550399001	Adaptor set comprising: raised bayonet nut, black, M30 x 1.5 (all makes, M30 x 1.5), raised bayonet nut, grey M28 x 1.5 (all makes, M28 x 1.5), raised bayonet nut, white M30 x 1.0 (e.g. <i>Oventrop</i> , <i>Beulco</i>), 2x insert N (black) and 2x insert S (white), <i>Danfoss</i> adaptor RA 2000 (Ø 22 mm), <i>Giacomini</i> adaptor
0550395001	Adaptor set comprising: 10 pcs M28 x 1.5 raised with labelling

*) Wiring diagram available under the same number

Operation

The actuator has an electrically heated, overload-protected expansion element that transfers its stroke directly to the attached valve. It operates silently and requires no maintenance. If the heating element is switched on from cold (ambient temperature of approx. 21 °C), the valve starts to open after a pre-heating time of about 2.4 minutes and has performed a stroke of 4.5 mm after a further approx. 2.7 minutes. When the actuator is regulating, it moves to the desired stroke position as a function of control voltage *y*. A movement (warm-up) of 1 mm in approx. 30 s is carried out: the stroke is monitored by an inductive sensor. The closing procedure is chronologically almost symmetrical to the opening procedure, whereby the expansion element cools down and the valve is closed by means of a spring.



Stand-by mode

The actuator changes to stand-by mode as soon as the control voltage falls below 0.5 V (in direction of operation 1) or exceeds 9.5 V (in direction of operation 2).

Running time (preparation)

When cold, the actuator requires a warming-up period of about 2.4 min. The same time is also needed when the actuator has been in stand-by mode for over 6 min. The actuator is then ready for regulation.

Running time (regulation)

When the actuator is in regulating mode, the stroke of 4.5 mm is attained in approx. 2.7 min. A change of 1 mm stroke (warm-up) can be achieved within about 30 seconds. The running time depends on how long the actuator stays in one position before the position is changed.

Depending on the setting of DIP switch 1 (see 'DIP switch settings'), the continuous actuator can be used as a 0...10 V (direction of operation 1) or a 10...0 V (direction of operation 2). The control signal is then assigned linearly to the set stroke. The integrated positioner controls the actuator in accordance with the command signal *y*. The continuous actuator positions the valve, and as soon as the position has been attained, it stops.

When the plug-in module is inserted, the actuator adopts the factory settings for the electric zero point. The initial position detection (calibration) is carried out as soon as the actuator attains the stand-by mode for the first time. This takes into account the mechanical zero point and the positional tolerances between the positional plate and the coil on the printed circuit board. This sets the current position as the new zero point. Because of the accuracy of the sensor, it is not necessary to make any adjustments across the stroke range. To compensate for any possible shift in the mechanical zero point, due to the ageing of the soft on the plug, re-calibration is carried out automatically whenever the actuator remains in stand-by mode for 17 minutes.

NC with direction of operation 1

DIP switch 1 is set to the 'off' position. As the positioning signal increases, the actuator's spindle retracts and opens the VUL or VXL through valve or the control passage of the BUL three-way valve. On the BXL three-way valve, the control passage is closed and the mixing passage opened.

NC with direction of operation 2

DIP switch 1 is set to the 'on' position. As the positioning signal increases, the actuator's spindle extends and closes the VUL or VXL through valve or the control passage of the BUL three-way valve. On the BXL three-way valve, the control passage is opened and the mixing passage closed.

DIP switch settings (NC and NO versions)

Switch 1	Off	0...10 V	Direction of action 1
	On	10...0 V	Direction of action 2
Switch 2	Off	Stroke 4.5 mm	
	On	Stroke 3 mm	
Switch 3	Off	Split range off	
	On	Split range on	
Switch 4	Off	0...4.5 V = 0...100%	Switches to 4.5...0 V = 0...100% when switch 1 is at 'on'
	On	5.5...10 V = 0...100%	Switches to 10...5.5 V = 0...100% when switch 1 is at 'on'
Switch 3	Off	2...10 V = 0...100%	Switches to 10...2 V = 0...100% when switch 1 is at 'on'
Switch 4	On		

Definition of NC and NO

NC version (normally closed)

After the actuator has been installed, the VUL/BUL valves (or normal commercial radiator valves) are closed when idle or when there is no control voltage. When the control voltage is applied to the actuator, the actuator spindle retracts, so the valve stem extends and opens the valve.

Valve status when actuator is without power: closed.

NO version (normally open)

After the actuator has been installed, the VUL/BUL valves (or normal commercial radiator valves) are open when idle or when there is no control voltage. When power is applied to the actuator, the actuator spindle extends, thereby pressing the valve stem and closing the valve.

Valve status when actuator is without power: open.

Definition of closing dimension

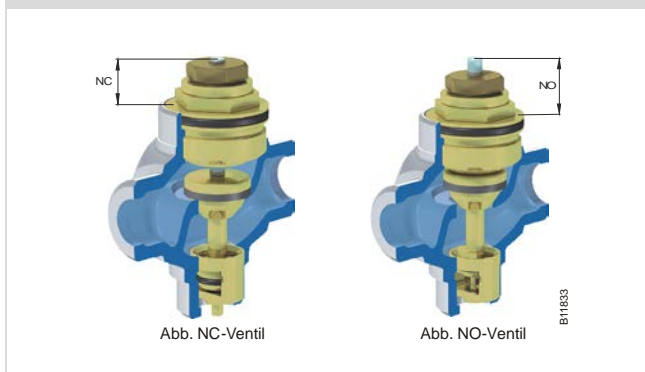
NC version (normally closed)

The closing dimension of a valve is the distance between the face of the stem (pushed in with pre-tension of < 100 N) and the contact surface of the lower thread. The bayonet nut supports itself on this surface.

NO version (normally open)

The closing dimension of a valve is the distance between the face of the stem (not pushed in) and the contact surface of the lower thread. The bayonet nut supports itself on this surface.

Cross-section of unit valve



Installation

The actuator is fitted to the valve without force using Low-Force-Locking® (LFL) technology. If the actuator is removed from the valve, the closing dimension and the pre-tension are relieved again. The ex-works condition is restored and the actuator can be refitted using LFL functionality.

First screw the bayonet nut to the valve and tighten with 2 N. Then fit the actuator to the valve, using no force. Three grooves on the bayonet ring indicate the correct position opposite the three ribs on the bayonet nut. Turn the bayonet ring 90° clockwise until a click is heard: the valve plug is pre-tensioned. When a second click is heard, the actuator is operable. This position is the safety position to prevent slackening caused by vibrations.

Whilst the bayonet ring is being rotated, the actuator adapts itself to the closing dimension of the valve. Parallel operation of several actuators is possible because the zero point of the valve is defined mechanically, and the valve's tolerances are compensated for. To ensure faultless operation with the NO actuator type, the spring in the valve should have a force $F_v \geq 30$ N. The actuator should not be removed when warm, otherwise the closing dimension will not be set correctly if re-fitted to a valve.

Compensation of closing dimension

The closing dimension compensation is mechanical. Whilst the bayonet ring is being rotated, the compensation pin in the actuator is released and pressed by the built-in spring onto the valve stem with a minimum force of 105 N (in the locked condition and after the second click is heard). The closing dimension is therefore set between this compensation pin and the compensation sleeve and fixed by toothing. The toothing is designed such that the compensation pin automatically engages in the next row of teeth further down. This ensures that there is always pre-tension acting on the valve plug, making the valve close firmly. Valves can start to leak due to ageing or because the plug seal has become defective. In this case, simply slacken the bayonet ring and turn it clockwise again until two clicks are heard. The actuator has taken on the new closing dimension and the valve is sealed again. On the NO version, the compensation pin positions itself without force on the valve stem.

Compensation of closing dimension (normally closed or NC)

If the supplied standard bayonet nut is used, the actuator can compensate for a closing dimension of 8.5 mm to 13.5 mm.

Compensation of closing dimension (normally open or NO)

If the supplied standard bayonet nut is used, the actuator can compensate for a closing dimension of 12.5 mm to 17.5 mm.

Compensation with raised bayonet nut (accessory)

The raised bayonet nut is used if the diameter of the bayonet ring of 42.5 mm on the actuator prevents fitting, e.g. with corner valves or valves with measuring brackets or distributors for underfloor heating. The above-mentioned standard closing dimension is attained when the raised bayonet nut is combined with the N insert (normal, black). If the raised bayonet nut is combined with the S insert (reduced, white), the closing dimension is reduced by 5 mm. If the

raised bayonet nut without insert is combined with the valve, the closing dimension is raised by 5 mm.

Closing dimension

NC (mm)	4.5...9.5	8.5...13.5	8.5...13.5	13.5...18.5
NO (mm)	8.5...13.5	12.5...17.5	12.5...17.5	17.5...22.5

Bayonet nut

	Raised	Standard	Raised	Raised
M30 x 1.5 ¹⁾	Yes, black	Yes, black	Yes, black	Yes, black
M28 x 1.5 ¹⁾	Yes, grey	Yes, grey	Yes, grey	Yes, grey
M30 x 1.0 ¹⁾	Yes, white		Yes, white	Yes, white
N/S insert	S (reduced, white)	no required	N (normal, black)	no insert

1) Thread on throat of valve

Position indicator

The cover acts as the largest-possible position indicator. It is visible from all directions and tangible in the dark.

On the 'normally closed' (NC) version, the cover rises and the grey stroke part becomes visible. At full stroke, the cover stands up to 5 mm above the upper edge of the plug.

On the 'normally open' (NO) version, the cover falls until it is at the same level as the upper edge of the plug. The grey stroke part is no longer visible.

Modular plug module for changing the type

The actuator gets its type function from the plug used, i.e. the basic unit remains unchanged with regard to its basic operation, which offers some advantages. For instance, after it has been used in one way, the actuator can be converted into a new type at a later stage. To do so, it is necessary merely to fit the new type plug onto the lower part of the housing and, if need be, an additional part onto the stroke part.

Note

Before fitting, check that the plug module and the actuator are compatible with respect to the power supply.

The following changes are possible:

- Two-point type into the type with auxiliary contacts and vice versa.
- Two-point type into the type with continuous 0...10 V and vice versa (24 V only).
- Continuous type (0...10 V) into type with auxiliary contacts (the metal positioning part must be removed beforehand and replaced by a cam).

Note

The type with auxiliary contacts cannot be changed into a continuous type because the cam cannot be removed.

The plug module can be removed by hand from the actuator by pressing (at about 30 N), without having to use any tools.

Engineering and fitting notes

The starting current of the heating element must be taken into account when choosing the mains fuses. In order to adhere to the technical specifications, the voltage loss due to the electric wires should not exceed 10%.

Standards and directives

The actuator has been tested in accordance with the relevant standards, i.e. the necessary European standards have been met (see table).

CE conformity

EMC Directive 2004/108/EC	EN 61000-6-1 / EN 61000-6-2 EN 61000-6-3 / EN 61000-6-4
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The disassembly protection consists of two half-sleeves fitted round the actuator. Once these sleeves have been closed, they can be removed only by breaking them. The disassembly protection prevents the actuator from being removed from the valve, the electrical plug from being disassembled and the position of the DIP switch from being changed. The position indicator remains visible and tangible.

Accessories

Disassembly protection

Dimension drawing

	h (min.)	h (max.)
NC	59	66
NO	59	64
	66,5	73,5

Accessories
0550390*01

Wiring diagram

BN	BU	RD
Braun	Blau	Rot
Brown	Blue	Red
Brun	Bleu	Rouge