

AVN 224S: SUT valve actuator with safety function

How energy efficiency is improved

Automatic adaptation to valve, precision activation and high energy efficiency with minimal operating noise

Features

- Operation of 2-way or 3-way valves of type series VUG/BUG and VUP as per DIN EN 14597
- For controllers with constant output (0...10 V or 4...20 mA) and switching output (2-point or 3-point control)
- Valve actuator with safety function (as per DIN 32730, DIN EN 14597) and pushing force of 1100 N, in normally closed (NC) or normally open (NO) version
- Stepping motor with SAUTER Universal Technology (SUT) electronic control unit and electronic, force-dependent cut-off
- Simple assembly with valve; spindle is automatically connected after control voltage is applied (patented system)
- Automatic recognition of applied control signal (constant or switched); indicated by two LEDs
- Coding switches for selecting characteristic and running time
- Type of characteristic (linear/quadratic/equal-percentage) can be set on the actuator
- Automatic adaptation to the valve stroke (min. valve stroke 8 mm, max. valve stroke 49 mm); the measured stroke is stored and is not lost in the event of a power failure
- Direction of operation can be selected via screw terminals when making the electrical connection
- Push-buttons on outside of housing for manual adjustment with motor cut-off and as trigger for re-initialisation
- Numerous adaptors enable the unit to be fitted onto non-SAUTER valves
- Maintenance-free gear unit made of sintered steel; gearbox base-plate made of steel
- Spring pack and mounting column made of stainless steel; mounting bracket made of cast light alloy for valve fitting
- Electrical connections (max. 2.5 mm²) with screw terminals
- Three break-out cable inlets for M20 × 1.5 (2×) and M16 × 1.5
- Fitting vertically upright to horizontal, not suspended



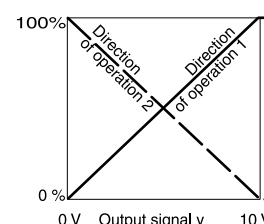
AVN224SF132



AVN224SF132



AVN224SF232



Technical data

Power supply

Power supply 24 V~	±20%, 50...60 Hz
Power supply 24 V=	±15%
Power supply 230 V~	±15% (with accessories)
Power consumption	24 V~/24 V= 10 W, 18 VA 230 V~ (with accessories) 11 W / 24 VA

Parameters

Running time of motor	2/4/6 s/mm
Running time of spring ¹⁾	15...30 s
Actuating power	1100 N
Number of spring returns	> 40 000
Response time for 3-point	200 ms
Control signal 1	0...10 V, R _i = 100 kΩ
Control signal 2	4...20 mA, R _i = 50 Ω
Positional feedback signal	0...10 V; load > 2.5 kΩ
Starting point U ₀	0 V or 10 V
Control span ΔU	10 V
Switching range X _{sh}	300 mV

Ambient conditions

Admissible ambient temperature	-10...55 °C
Admissible ambient humidity	< 95% rh, no condensation

¹⁾ Spring return time equates to stroke of 14...40 mm and does not depend on set running time



Temperature of medium	Max. 130 °C
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Construction

Housing	Two-part, yellow
Housing material	Fire-retardant plastic

Standards and directives

Type of protection	IP66 (EN60529)
Protection class	III (IEC 60730)
EMC Directive 2004/108/EC ²⁾	EN 61000-6-2, EN 61000-6-4
Electrical safety 2006/95/EC	EN 60730-1, EN 60730-2-14
Over-voltage categories	III
Degree of contamination	III
PED 97/23/EC, cat. IV	Category IV, fluid group II, modules B+D
Test marks	TÜV ID: 0000018388

Overview of types

Type	Actuator stroke	Weight	Direction of operation of spring
AVN224SF132	0...40 mm	5.6 kg	Spindle retracted
AVN224SF132-5	14 mm	5.6 kg	Spindle retracted
AVN224SF132-6	40 mm	6 kg	Spindle retracted
AVN224SF232	0...40 mm	5.6 kg	Spindle extended

⚡ AVN224SF132, -5, -6: Valve normally closed (NC) with: VUG, BUG (as per DIN 32730, DIN EN 14597); valve normally open (NO) with: VUP

⚡ AVN224SF232: Valve normally open (NO) with: VUG, BUG; valve normally closed (NC) with: VUP (as per DIN 32730, DIN EN 14597)

Accessories

Type	Description
0313529001	Split-range unit for adjusting sequences, fitted in separate junction box

Modules can be added for 2-point/3-point and continuous activation; additional power 2 VA

Type	Description
0372332001	230 V ±15%, supply voltage
0372332002	100 V ±15%, supply voltage

Auxiliary change-over contacts (2 each) 12...250 V~

Type	Description
0372333001	Infinitely variable, min. 100 mA and 12 V permissible load 6(2) A
0372333002	Gold-plated contacts, from 1 mA, to max. 30 V, wider range 3(1) A
0372334001	Potentiometer, 2000 Ω, 1 W; 24 V
0372334002	Potentiometer, 130 Ω, 1 W; 24 V
0372334006	Potentiometer, 1000 Ω, 1 W; 24 V
0372336180	Adapter (required when temperature of the medium is 130...180 °C)
0372336240	Adaptor (required when temperature of the medium is 180...200 °C)

Mounting set for AVN224SF*32 onto SAUTER valves (no adaptor needed for 0372338 002)

Type	Description
0372338001	V/B6 to DN 50, V/BXD, V/BXE, to DN 50, stroke 14 mm
0372338002	V/B6 DN 65...150, V/BXD, V/BXE from DN 65, stroke 40 mm
0372338003	Conversion kit from AV*2*4SF132-5 to standard actuator AV*2*4SF132
0372338004	Conversion kit from AV*2*4SF132-6 to standard actuator AV*2*4SF132

Adapter set for non-SAUTER valves

Type	Description
0372376010	Siemens with 20 mm stroke or Ø 10 mm spindle
0372376014	Siemens with 40 mm stroke or Ø 14 mm spindle
0372377001	Johnson Controls DN 15...150, 14, 25, 40 mm stroke, Ø 10, 12, 14 mm spindle
0372378001	Honeywell with 20 mm stroke
0372378002	Honeywell with 38 mm stroke

²⁾ EN 61000-6-2: HF immunity, limitation of feedback signal between 80 MHz and 1000 MHz criterion B, otherwise criterion A

Type	Description
0372386001	LDM type RY113 R/M
0372389001	ITT-Dräger, DN 15...32
0372389002	ITT-Dräger, DN 40...50
0378263001	End stop (needed for V/BXD, V/BXE DN 15...50, V/B6 DN 15 with $kvs \leq 1 \text{ m}^3/\text{h}$)
0386263001	Cable screw fitting M16 × 1,5
0386263002	Cable screw fitting M20 × 1.5
0372387001	SAUTER Satchwell VZF1727 mounting set
0372461001	Forced operation for AVx2xS

⚡ *Adaptor: Not needed for version AV*2*4SF132-6*

⚡ *Potentiometer 130 Ω: This potentiometer must only be used as a voltage divider.*

Description of operation

After a restart or a start after triggering of the emergency function (terminal 21), a waiting time of up to 45 s elapses until the actuator is available again. Depending on the type of connection (see connection diagram), the actuator can be used as a continuous (0...10 V or 4...20 mA), 2-point (OPEN/CLOSE) or 3-point actuator (OPEN/STOP/CLOSE).

The running time of the actuator can be set with switches S1 and S2 according to the relevant requirements. Switches S3 and S4 are used to configure the characteristic (equal-percentage, linear or quadratic).

The external pressure switches enable manual positional setting. This only functions if the emergency function (terminal 21) is electrically connected and the power is supplied. When one of the two pushbuttons is pressed for 5 s, the actuator switches to the manual operating mode. Both LEDs flash red/green. When one pushbutton is pressed (OPEN/CLOSE), the actuator moves in the corresponding direction. When a pushbutton is pressed again, the actuator stops. However, when a pushbutton is pressed for at least 5 s, the actuator switches to the control mode. If an emergency function is performed during the manual mode, the emergency function has priority. After an emergency function, the actuator is always in control mode.

Intended use

This product is only suitable for the purpose intended by the manufacturer, as described in the "Description of operation" section.

All related product regulations must also be adhered to. Changing or converting the product is not admissible.

Engineering and fitting notes

Condensate, dripping water, etc. must be prevented from entering the actuator along the valve spindle.

The actuator is mounted directly on the valve and fixed with screws (no further adjustments are required). The actuator is connected with the valve spindle automatically. Depending on the type and how it is delivered ex works, the stroke of the actuator spindle is 0% or 100%.

The housing contains three break-out cable inlets which are broken out automatically when the cable inlet is screwed in.

The concept of DC motor/electronics enables parallel operation of multiple valve actuators of the same type. The cross-section of the power cable must be selected based on the cable length and the number of actuators. With five actuators wired in parallel and a cable length of 50 m, we recommend a cable cross-section of 1.5 mm^2 (power consumption of the actuator × 5).

The maximum equipment for the actuator is one 230 V module, one additional accessory component (auxiliary contact or potentiometer) and the split-range unit.

Outdoor installation

If installed outside of buildings, the devices must be additionally protected from the weather.

Initialisation and feedback signal

The actuator does not initialise itself autonomously. Voltage must be connected to terminals 1 and 21, and then the manual mode must be activated (see description of operation). First the valve spindle must be coupled with the actuator spindle. This is performed by moving the actuator spindle out until the closing mechanism snaps in. With model N0, the initialisation and the assembly with the valve can only be performed when the working spindle has previously moved in.

Once the actuator is connected to the valve, the safety screw must be fitted in the locking ring. When the safety screw is fitted, a manual initialisation must be triggered. To do this, the two pushbuttons must be pressed for at least 5 s. The actuator then moves to the lower limit stop of the valve. Then it moves to the upper limit stop. The distance is measured and stored by a travel measurement system. The control signal and the feedback are adapted to this effective stroke. After a power failure or an emergency function, no re-initialisation is carried out. The values remain saved.

During initialisation, the feedback signal is inactive or equal to the value "0". Initialisation is carried out with the shortest running time. The initialisation is only valid when the whole process is completed without an interruption. Pressing a pushbutton interrupts this process.

If the actuator detects jamming, it will report this by setting the feedback signal to 0 V after about 90 s. During this time, the actuator tries to overcome the jamming. If the jamming can be overcome, the normal control function is activated again. The feedback signal is present again.

Safety function or emergency function

Depending on the valve type, this valve actuator and its safety function conform to DIN 14597 or DIN 32730. If the supply voltage fails or is switched off, or if a monitoring contact (STB/SDB) is activated, the brushless DC motor releases the gear unit and the preloaded spring moves the actuator to the relevant end position (depending on the model). In the process, the control function of the actuator is locked for 45 s so that the end position can definitely be reached. Both LEDs light up for these 45 s. The reset speed is controlled using the motor so that no pressure surges can occur in the supply line. The brushless DC motor is used to create the holding force, and functions as a brake with its integrated eddy-current brake and as a motor for the control function. After an emergency function, the actuator does not re-initialise itself.

Connection as 2-point valve actuator (24 V)

This activation (OPEN/CLOSE) can be performed via two wires. The voltage is applied to terminals 1, 2a and 21. When voltage (24 V) is applied to terminal 2b, the actuator spindle moves out. After this voltage is switched off, the actuator moves to the opposite end position. In the end positions (valve limit stop or maximum stroke reached) or in the case of an overload, the electronic motor cut-off is activated (no limit switches).

The running times can be set using the coding switch. The characteristic cannot be selected here (the result is the characteristic of the valve). The feedback signal is active as soon as the initialisation has been performed and there is a voltage on terminal 21. Terminals 3i and 3u must not be connected.

Connection as 3-point valve actuator (24 V)

If voltage is applied to terminals 2b (or 2a) and 21, the valve can be moved to any desired position. If voltage is applied to terminals 1 and 2b, the actuator spindle moves out and opens the valve. It moves in and closes the valve when the electrical circuit is closed via terminals 1 and 2a.

In the end positions (valve limit stop or maximum stroke reached) or in the case of an overload, the electronic motor cut-off is activated (no limit switches). The direction of the stroke can be changed by swapping the connections.

The running times are set using the coding switch. The characteristic cannot be selected here (the result is the characteristic of the valve). The feedback signal is active as soon as the initialisation has been performed and there is a voltage on terminal 21. Terminals 3i and 3u must not be connected.

Connection with 230 V or 100...110 V as 2-point/3-point or with continuous activation of valve actuator (accessory 0372332).

The accessory module is plugged into the connection area and then connected as required. During commissioning, the actuator must be initialised manually together with the valve. The running times can be selected using the coding switch on the baseboard. The characteristic can only be selected for continuous activation. The characteristic of the valve is decisive.

A switch is integrated into the module which is automatically moved to the correct position when the module is being installed. In this application, the switch lever is in the top position.

The accessory module is not suitable for 2-point actuation.

Connection to a control voltage (0...10 V or 4...20 mA)

The built-in positioner controls the actuator depending on controller's output signal y.

A voltage signal (0...10 V[−]) at terminal 3u or a current signal at terminal 3i serves as the control signal. If there is a control signal at the two terminals (3u (0...10 V) and 3i (4...20 mA)) at the same time, the input with the higher value has priority.

Direction of operation 1 (mains power supply on internal connection 2a):

When the positioning signal is increasing, the actuator spindle moves out.

Direction of operation 2 (mains power supply on internal connection 2b):

When the positioning signal is increasing, the actuator spindle moves in.

The starting point and control span are fixed. To set partial ranges, a split-range unit is available as an accessory (only for voltage input 3u) – see the split-range unit function – which is intended to be installed in the actuator.

After the connection of the power supply and the initialisation, the actuator moves to every valve stroke between 0% and 100%, depending on the control signal. Thanks to the electronics and the travel measurement system, no stroke is lost, and the actuator does not require periodic re-initialisation. When the end positions are reached, this position is checked, corrected if necessary, and saved again. It is thus possible to operate multiple actuators of the same type in parallel. The feedback signal $y_0 = 0 \dots 10$ V corresponds to the effective stroke of 0 to 100%.

If the control signal 0...10 V or 4...20 mA is interrupted with direction of operation 1, the actuator spindle moves in completely, or moves out completely with direction of operation 2.

The coding switch can be used to set the characteristic of the valve: Linear, equal-percentage or quadratic. This characteristic can only be generated when the actuator is used as a continuous actuator. Additional switches can be used to select the running times (with the 2-point, 3-point or continuous functions). Continuous actuation can also be used with a power supply of 230 V or 110 V (accessory required). You must ensure that the neutral wire of the controller is connected to the control voltage. The neutral wire of the power supply may only be used for the module.

LED indicator: The indicator consists of bi-colour LEDs (red/green).

In automatic mode	
Both LEDs flash red	Initialisation
Top LED lights up red	Top limit stop or "CLOSED" position reached
Bottom LED lights up red	Bottom limit stop or "OPEN" position reached
Top LED flashes green	Actuator is running, moving to "CLOSED" position
Top LED lights up green	Actuator is stopped, last direction of travel "CLOSED"
Bottom LED flashes green	Actuator is running, moving to "OPEN" position
Bottom LED lights up green	Actuator is stopped, last direction of travel "OPEN"
Both LEDs light up green	Waiting time after switching on or after the emergency function
No LED lights up	No power supply (terminal 21)

In manual mode	
Top LED lights up red, bottom red and green	Top limit stop or "CLOSED" position reached
Top LED lights up red and green, bottom red	Bottom limit stop or "OPEN" position reached
Top LED flashes green, bottom LED red and green	Actuator is running, moving to "CLOSED" position
Top LED flashes red and green, bottom LED green	Actuator is running, moving to "OPEN" position
Top and bottom LEDs flash red and green	actuator stopped

Split-range unit (accessory 0313529)

This accessory can be built into the actuator or externally housed in an electrical junction box.

Starting point U_0 and control span ΔU can be set with the potentiometer. In this way, several control units can be operated by the control signal of the controller in sequence or in a cascade. The input signal (partial range) is converted into an output signal of 0...10 V.

Additional technical information

The yellow housing, consisting of the front part, rear part and connecting lid, only serves as a cover. The pushbuttons for manual adjustment are located on the front side. The DC motor, electronic control unit, load-bearing section and maintenance-free gear unit are located in the housing. The actuator spindle and the column are made of rust-proof material. The inner printed circuit boards, gear unit and spring are made of steel. The valve spindle guide and the valve neck coupling are made of die-cast aluminium.

**Note on ambient temperatures**

With a media temperature of up to 110 °C in the valve, the ambient temperature is allowed to reach 60 °C. With a media temperature above 110 °C, the ambient temperature must not exceed 55 °C. Otherwise, the intermediate piece accessory 0372336 180 must be fitted.

Auxiliary change-over contacts

0372333 001	Switch rating max. 250 V~, current min. 250 mA at 12 V (or 20 mA at 20 V) Switch rating max. 12...30 V=, current max. 100 mA
0372333 002	Switch rating max. 250 V~, current min. 1 mA at 5 V Switch rating max. 0.1...30 V=, current 1...100 mA If it is used one time in the range up to 10 mA or up to 50 V, the gold plating is eliminated. The switch can then only be used for a higher switch rating.

Warning

- If there is a high media temperature in the valve, the actuator columns and the spindle can attain similarly high temperatures.
- Actuators with safety functions must be checked regularly for operability (test run).
- If damage can occur due to the failure of the control unit, additional protective measures must be implemented.
- Due to the high risk of injury, it is forbidden to remove the spring from the device.

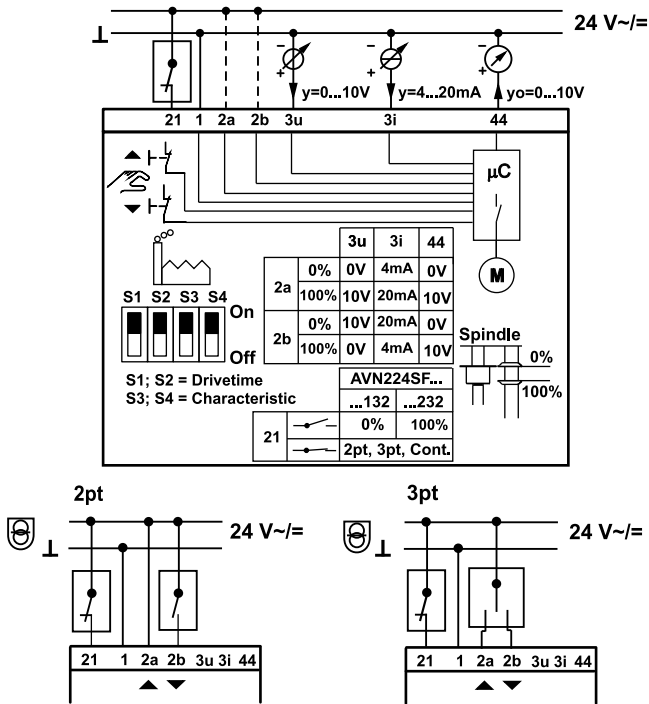
Desired character. curve	Switch coding	Characteristic curve for valve	Characteristic curve for drive	Effective on valve
Equal percentage				
Quadratic				
Linear				
Equal percentage				
Linear				
= factory setting				

Run time per mm	Switch coding	Run time for 14 mm stroke	Run time for 20 mm stroke	Run time for 40 mm stroke
2s		28s ± 1	40s ± 1	80s ± 4
4s		56s ± 2	80s ± 4	160s ± 4
6s		84s ± 4	120s ± 4	240s ± 8

= factory setting

Connection diagram

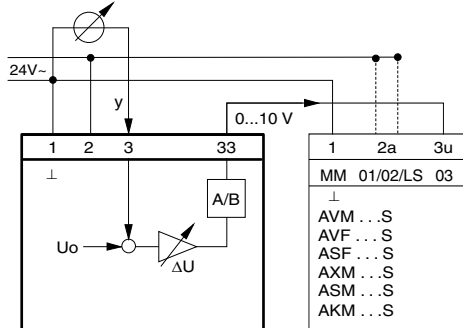
Continuous



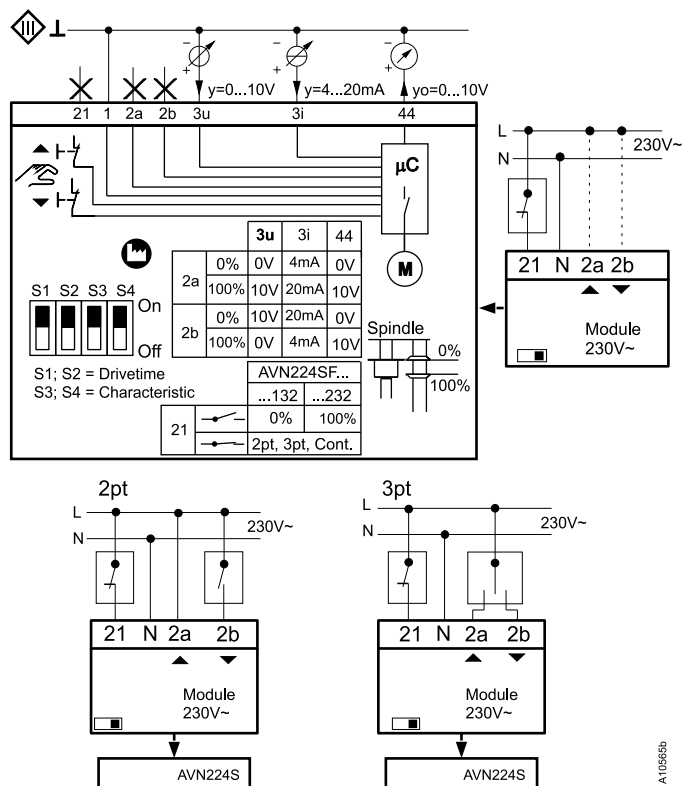
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Accessories

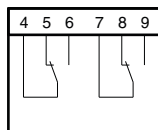
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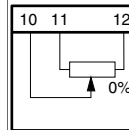
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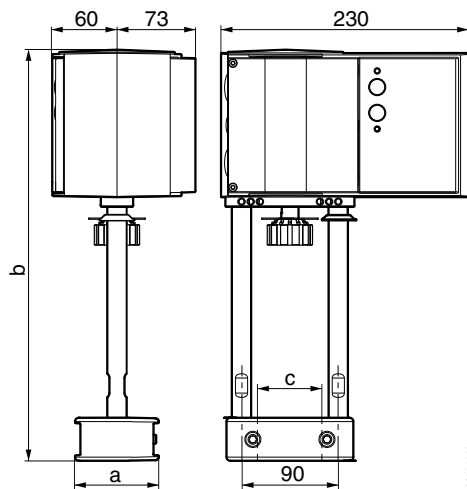
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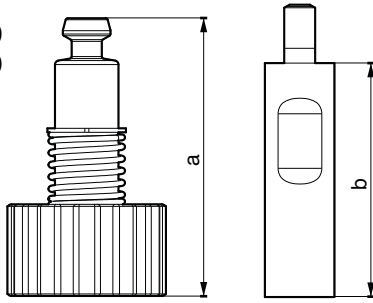
Dimension drawing



Type	a	b	c
AVN224SF132/232	64	289	44
AVN224SF132-5	58	289	38
AVN224SF132-6	78	382	60

Accessories

0372336 180
0372336 240



0372336	T (°C)	a (mm)	b (mm)
180	180	69,4	60
240	240	109,4	100