

AVN 224S: SUT actuator with safety function to DIN 32730

How energy efficiency is improved

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

Areas of application

Actuation of through or three-way valves in the VUG/BUG series as per EN 14597 and VUP as per DIN 32730/150. For controllers with continuous output (0...10 V or 4...20 mA) or switching output (2-point or 3-point control).

Features

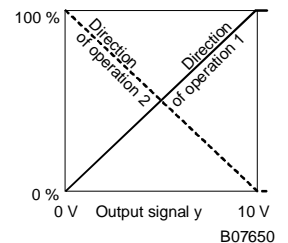
- Actuator with safety function and pushing force of 1100 N, in 'normally closed' or 'normally open' versions
- DC motor with SUT (Sauter Universal Technology) electronic control unit and electronic load-dependent cut-off
- Automatic detection of control signal applied (continuous or switching), display via 2 LEDs
- The type of characteristic curve (linear, quadratic or equal percentage) can be adjusted in the drive
- Independent adaptation to valve stroke between 8 and 49 mm, captive even if the power is turned off
- Direction of travel can be selected via screw terminals when making electrical connection or remotely
- Coding switch for selection of characteristic and running time (2 sec./mm, 4 sec./mm, 6 sec./mm)
- Push-buttons on outside of housing for manual adjustment with motor cut-off and as trip for re-initialisation
- Easy assembly with valve, spindle connection takes place automatically after application of control voltage
- Many adaptors allow assembly on third-party valves

Technical description

- Power supply 230 V with modules or direct connection for 24 V~ or 24 V=, continuous activation also permissible at 230 V
- Two-part housing made of self-extinguishing yellow plastic and sealing to IP66 protection class
- Maintenance-free gearbox in sintered steel, gearbox base-plate in steel
- Spring assembly in stainless steel
- Patented drive-valve coupling
- Mounting column made of stainless steel and mounting bracket for fitting valve made of cast light alloy
- Electrical connections (max. 2.5 mm²) with screw terminals
- Three knock-out cable entries for M20×1.5 (2×) and M16×1.5
- Fitting position: vertical to horizontal, but not upside down



T1.0993



| Type | Run-time | | Pushing Force B | Stroke mm | Weight kg |
|--|-----------------------------------|---------------------------|---------------------------------|--------------|--------------|
| | Motor s/mm | Spring s ¹⁾ | | | |
| Actuator spindle normally retracted | | | | | |
| NC with: VUG / BUG | | | | | |
| NO with: VUP | | | | | |
| AVN 224S F132 | 2 / 4 / 6 | 15...30 | 1100 | 14...40 | 5,6 |
| Actuator spindle normally extended | | | | | |
| NO with: VUG / BUG | | | | | |
| NC with: VUP | | | | | |
| NC with: V6R/B6R | | | | | |
| AVN 224S F132-5 | 2 / 4 / 6 | 15...30 | 1100 | 14 | 5,6 |
| AVN 224S F132-6 | 2 / 4 / 6 | 15...30 | 1100 | 40 | 6 |
| AVN 224S F232 | 2 / 4 / 6 | 15...30 | 1100 | 0...40 | 5,6 |
| Positioner: 2) | | | | | |
| Control signal 1 | 0...10 V, R _i = 100 kΩ | | Starting point U ₀ | 0 V, or 10 V | |
| Control signal 2 | 4...20 mA, R _i = 50 Ω | | Control span ΔU | 10 V | |
| Position feedback signal | 0...10 V, load > 2,5 kΩ | | Switching range X _{sh} | 300 mV | |

1) The return travel time corresponds to a stroke of 14 to 40 mm and does not depend on the run-time that is set
2) Also for 2-point or 3-point depending on connection for 24 V~

| | | | | |
|---------------------------|----------------------|---------------------|-------------------------------|-------------------|
| Supply voltage | 24 V~ | ± 20%, 50...60 Hz | Permitted ambient temperature | -10...55(60) °C |
| | 24 V= | ± 15% | Permitted ambient humidity | < 95% rh |
| with accessories | 230 V~ | ± 15% | | (no condensation) |
| Power consumption | 7 W | 18 VA ²⁾ | Degree of protection | IP 66 (EN 60529) |
| Stroke | 8...49 mm | | Protection class | III (IEC 60730) |
| Number of spring returns | > 40.000 | | Wiring diagram | A10384 |
| Response time for 3-point | 200 ms | | Dimension drawing | M10400 |
| | | | Fitting instructions | MV 505927 |
| Max. medium temperature | 130 °C ³⁾ | | Material declaration | MD 51.379 |

Accessories

0313529 001* Split range unit to set sequences, MV 505671; A09421

Module, plug-in type, 3-point activation, additional power 2 VA

0372332 001* 230 V ± 15% voltage supply, MV 505901

0372332 002* 100 V to 110 V ± 10% voltage supply, MV 505901

Auxiliary changeover switches (2 pcs. each) 12...250 V~

0372333 001* Continuously adjustable, min. 100 mA and 12 V, additional load 6(2) A, MV 505866

0372333 002* Gold-plated contacts, from 1 mA and up to 30 V; further range 3(1) A; MV 505866

0372334 001* Potentiometer 2000 Ω, 1 W, 24 V; installation as per MV 505894

0372334 002* Potentiometer 130 Ω, 1 W, 24 V; installation as per MV 505894

0372334 006* Potentiometer 1000 Ω, 1 W, 24 V; installation as per MV 505894

0372336 180* Adaptor ¹⁾ (required for medium above 130 °C and up to 180 °C, MV 505902)

0372336 240* Adaptor ¹⁾ (required for medium above 180 °C and up to 240 °C, MV 505902)

Installation kit for AVN 224S F132 on Sauter valves (for 0372338 002, no adaptor required)

0372338 001 V/B6 up to DN 50 and V/BXD, V/BXE up to DN 50 with stroke 14 mm. MV 505903

0372338 002 V/B6 of DN 65...150 and V/BXD, V/BXE from DN 65 with stroke 40 mm. MV 505903

0372338 003 Conversion kit for AVM 234S F132-5 on standard drive AVM 234S F132, MV 505903

0372338 004 Conversion kit for AVM 234S F132-6 on standard drive AVM 234S F132, MV 505903

Set of adaptors for non-Sauter valves

0372376 010 Siemens with 20 mm stroke or spindle ø10 mm, MV 505974

0372376 014 Siemens with 40 mm stroke or spindle ø14 mm, MV 505974

0372377 001 JCI DN15...150 with 14, 25 or 40 mm stroke or spindle ø10, 12 or 14 mm, MV 505975

0372378 001 Honeywell with 20 mm stroke, MV 506069

0372378 002 Honeywell with 38 mm stroke, MV 506069

0372386 001 LDM Typ RY113 R/M, MV P100000538

0372389 001 ITT-Dräger, DN 15...32, MV P100000376

0372389 002 ITT-Dräger, DN 40...50, MV P100000376

0378263 001 End stop guide (required for valves DN15...50 VXD, VXE, BXD, BXE)

0378263 002 End stop guide (required for valves DN15 and reduction steps of types V / B6)

0386263 001 Screwed cable fitting, M16x1.5

0386263 002 Screwed cable fitting, M20x1.5

0372387 001 Fitting kit SAUTER-Satchwell VZF1727

^{*)} Dimension drawing or wiring diagram available under the same number

1) Adaptor is not required for the F132-6 version.

2) Engineer the transformers for this value, otherwise functional faults may occur.

3) For higher medium temperatures (180 °C or 240 °C), an adaptor is necessary (see Accessories).

Operation

After a new start, or after a start following activation of the emergency function (terminal 21), up to 45 s of waiting time will pass before the drive is available again. Depending on the type of connection (see the wiring diagram), the device can be used as a continuous-action drive (0...10 V or 4...20 mA), a 2-point drive (OPEN/CLOSED) or a 3-point drive (OPEN/STOP/CLOSED).

The runtime of the drive can be set with switches S1 and S2 according to the requirements in each case. Switches S3 and S4 are used to configure the characteristic (equal-percentage, linear or square).

The external pressure switches allow manual adjustment of the position. This can only function if the emergency function (terminal 21) is electrically connected and has voltage. If one of the two pushbuttons is pressed for 5 s, the drive changes over to manual operating mode. Both the LEDs flash red and green. Pressing a pushbutton (OPEN/CLOSED) moves the drive in the relevant direction. Pressing a button again stops the drive. If a button is pressed once more for at least 5 s, the drive changes over to control mode. If an emergency function is executed during manual mode, the emergency function takes priority. The drive is always in control mode after an emergency function.

Initialisation and feedback signal

The drive does not initialise itself automatically. Voltage must be connected to terminals 1 and 21, and then it is necessary to switch over to manual mode (see Description of function). First, the valve stem has to be connected with the drive shaft. This is done by moving the drive shaft out until the closing mechanism snaps shut. On version N0, the initialisation and assembly with the valve can only be carried out if the working spindle has been retracted beforehand.

As soon as the drive is connected to the valve, the safety screw must be fitted in the locking ring. Once the safety screw is fitted, a manual initialisation must be triggered. To do this, both the pushbuttons must be pressed for at least 5 s. The drive then moves to the lower stop guide of the valve. After this, it moves to the upper stop guide, and the distance measured is recorded and stored by a distance measurement system. The control and feedback signals are adapted to this effective stroke. After a voltage interruption or an emergency function, a new initialisation will not be performed and the values remain saved.

During the initialisation, the feedback signal is inactive or corresponds to a value of '0'. The shortest run-time is used for initialisation. The new initialisation is only valid once the entire procedure has been completed without interruptions. Pressing a button will interrupt the procedure.

If the actuator detects a blockage, the feedback signal is set to 0V after about 90 s in order to signal it. During this period, however, the drive will attempt to overcome the blockage. If it is possible to overcome the blockage, the normal control function is activated again and the feedback signal will be present again.

Safety function or emergency function

This actuator and its safety function conform to DIN 32730. If the supply voltage fails or is switched off, or if a monitoring contact (STB / SDB) responds, the brushless DC motor releases the gear and the drive is moved into the respective end position (depending on the version) by means of the pre-tensioned spring. If this happens, the control function of the drive is disabled for 45 s so that the end position can be reached in every case. Both LEDs are lit during these 45 s. The reset speed is controlled with the help of the motor so that there can be no pressure surges in the pipe. The brushless DC motor is not only used to generate the holding force, but also as a brake by the integrated eddy current brake and as a motor for the control function. The drive does not re-initialise itself after an emergency function.

Connection as a 2-point actuator (24 V)

This actuation (OPEN/CLOSED) can take place via two wires. The voltage is applied to terminals 1, 2a and 21. Applying the voltage (24 V) to terminal 2b causes the actuator spindle to move out. After this voltage is turned off, the drive moves to the opposite end position. In the end positions (valve stop guide, or when maximum stroke is reached) or in case of an overload, the electronic motor switch-off will respond (no limit switches).

The coding switch can be used to set the run-times. The characteristic cannot be selected in this case (resulting in the characteristic for the valve). The feedback signal is active as soon as the initialisation has been carried out and a voltage is present at terminal 21. Terminals 3i and 3u must not be connected.

Connection as 3-point actuator (24 V)

The valve can be moved to any desired position by applying a voltage to terminals 2b (or 2a) and 21. 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 power circuit is closed via terminals 1 and 2a.

In the end positions (valve stop guide, or when maximum stroke is reached) or in case of an overload, the electronic motor switch-off will respond (no limit switches). The direction of the stroke can be changed by transposing the connections.

The coding switch is used to set the run-times. The characteristic cannot be selected in this case (resulting in the characteristic for the valve). The feedback signal is active as soon as the initialisation has been carried out and a voltage is present at terminal 21. Terminals 3i and 3u must not be connected.

Supplied with 230 V respectively 100 V to 110 V, as 2-/3-point or with continuous control actuator (accessory 0372332)

The accessory module is slotted into place in the terminal compartment and then connected accordingly. The drive must be manually initialised together with the valve when putting into service. The coding switch on the base board can be used to select the run-times. The characteristic can be selected only in the case of continuous activation; it is governed by the characteristic of the valve.

There is a built-in switch in the module which is automatically moved into the correct position when the module is installed. With this application, the switching lever is in the upper position.

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

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

The built-in positioner controls the drive dependent on the control signal from the controller, y. The control signal used is a voltage signal (0...10 V-) to terminal 3u, or a current signal to terminal 3i. If a control signal is simultaneously present at both terminals (3u (0...10 V) and 3i (4...20 mA), the input with the higher value takes priority.

Direction of action 1 (mains voltage to internal connection 2a):

As the control signal increases, the actuator spindle moves out.

Direction of action 2 (mains voltage to internal connection 2b):

As the control signal increases, the actuator spindle moves in.

The starting point and the control span are fixed settings. To set partial ranges, a split range unit is available (and only for voltage input 3u) as an accessory (see Function of Split Range Unit); this is designed to be built into the drive.

After the supply voltage has been applied and after initialisation, the drive moves to between 0% and 100% of each valve stroke, according to the control signal. Thanks to the electronics and the distance measurement system, no strokes are lost and the drive does not require re-initialisation at periodic intervals. When the end positions are reached, this position is checked, corrected if necessary and the new value is stored. This guarantees that several drives of the same type can run in parallel. The feedback signal $y_0 = 0...10$ V corresponds to the effective valve stroke of 0 to 100%.

If the control signal 0...10 V is interrupted in direction of action 1, the spindle retracts completely respectively in direction of action 2 extends.

The coding switch can be used to set the characteristic for the valve: linear, equal-percentage or square. This characteristic can only be produced if the device is used as a continuous-action drive. Further switches can be used to select the run-times (can be used for the 2-point, 3-point or continuous functions). Continuous activation can also be used with 230 V or 110 V. Note that the controller's neutral conductor should be connected to the control voltage. The neutral conductor of the power supply should be used only for the module.

LED display: the display consists of two-colour LEDs (red/green).

In automatic mode:

| | |
|---------------------------|---|
| both LEDs flashing red : | initialisation |
| upper LED lit red: | upper stop guide or 'CLOSED' position reached |
| lower LED lit red: | lower stop guide or 'OPEN' position reached |
| upper LED flashing green: | drive is running, controlling towards 'CLOSED' position |
| upper LED lit green: | drive is stationary, last direction of running 'CLOSED' |
| lower LED flashing green: | drive is running, controlling towards 'OPEN' position |
| lower LED lit green: | drive is stationary, last direction of running 'OPEN' |
| both LEDs lit green: | waiting time after switching on or after emergency function |
| no LED lit | no voltage supply (terminal 21) |

In manual mode:

| | |
|--|---|
| upper LED lit red, lower red and green: | upper stop guide or 'CLOSED' position reached |
| upper LED lit red and green, lower red: | lower stop guide, or 'OPEN' position reached |
| upper LED flashing green, lower LED red and green: | drive is running, controlling towards 'CLOSED' position |
| upper LED flashing red and green, lower LED green: | drive is running, controlling towards 'OPEN' position |
| upper and lower LEDs flashing red and green: | drive is stationary |

Split range unit (accessory 0313529)

This accessory can be built into the drive or accommodated externally in an electrical distribution box. The starting point U_0 and the control span ΔU can be set with the help of a potentiometer. This means that the control signal from the controller can be used to operate several regulating units in sequence or in a cascade. The input signal (partial range) is converted into an output signal of 0...10 V.

Engineering and installation notes

The penetration of condensate and dripping water, etc. into the drive along the valve stem must be avoided.

The drive is plugged directly onto the valve and is fixed with screws (no further adjustments are needed). The drive is automatically connected to the valve stem. Depending on the condition of the drive shaft when delivered and the type, its stroke is 0% or 100%.

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

The DC motor/electronics concept guarantees that several actuators of the same type can run in parallel. The cross-section of the connecting cable must be chosen according to the length of the line and the number of drives. With five drives connected in parallel and a line length of 50 m, we advise using a cable cross-section of 1.5 mm² (power consumption of the drive x 5).

As a maximum, the drive can be assembled with a 230 V module, one additional accessory component (auxiliary contact or potentiometer) and the split range unit.

Fitting outdoors. If the devices are fitted outdoors, additional measures must be taken in order to protect them from the weather.

Additional technical information

The yellow housing (consisting of the front and back sections and the connecting lid) only serves the purpose of a cover. The pushbuttons for manual adjustment are located on the front. The DC motor, the control electronics, the load-bearing parts and the maintenance-free gear unit are accommodated in the housing. The drive shaft and column are made of rustproof materials. The interior plates, the gear unit and the springs are made of steel. The valve axle guideway and the valve collar connection are made of die-cast aluminium.

Note on ambient temperatures: if the medium temperature in the valve is up to 110 °C, the ambient temperature may reach 60 °C. For medium temperatures above 110 °C, the ambient temperature must not exceed 55 °C, or insert accessory 0372336 180 (adaptor).

Auxiliary changeover switch

0372333 001 Switching capacity max. 250 V~, min. current 250 mA at 12 V (or 20 mA at 20 V)
Switching capacity max. 12...30 V=, max. current 100 mA

0372333 002 Switching capacity max. 250 V~, min. current 1 mA at 5 V
Switching capacity max. 0.1...30 V=, current 1...100 mA
Even if used only once above 10 mA or up to 50 V, the gold coating will be destroyed.
The switch can then be used only for higher switching outputs.

Warnings

- If the temperature of the medium in the valve is high, the drive columns and the shaft may also reach high temperatures.
- Drives with safety functions must be regularly checked to see that they are in working order (trial run).
- If a failure of the final control element could cause damage, additional protective precautions must be taken.
- It is forbidden to dismantle the springs in the device due to the high risk of injuries.

CE conformity

EMC Directive 2004/108/EC
EN 61000-6-2 *)
EN 61000-6-4

Low Voltage Directive 2006/95/EC
EN 60730-1
EN 60730-2-14
Over-voltage category III
Degree of pollution III

Pressure Equipment Directive 97/23/EEC. Category IV, Fluid Group II, Modules B+D
DIN 32730
Approval centre: TÜVCE-0035.
DIN EN 14597

*) HF immunity restriction. Feedback signal between 80 MHz and 1000 MHz: criteria B, otherwise criteria A

| 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 | | | | |

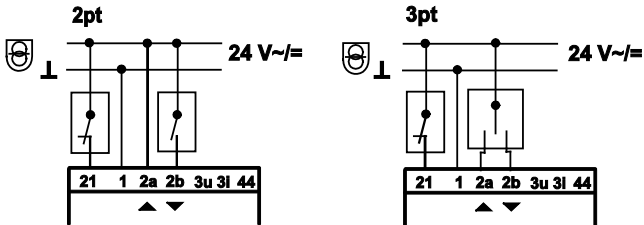
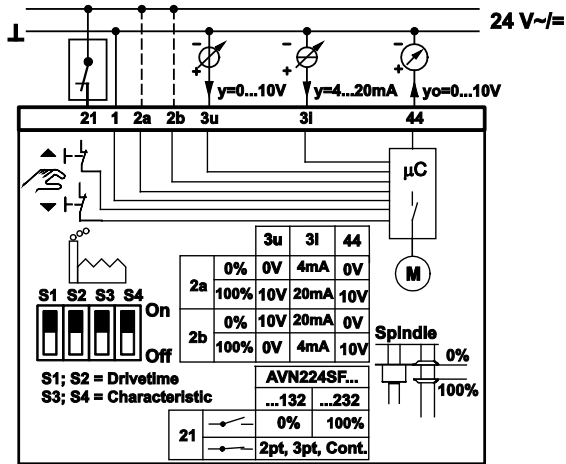
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| Run time per mm | Switch coding | Run time for 14 mm stroke | Run time for 20 mm stroke | Run time for 40 mm stroke |
|-------------------|---------------|---------------------------|---------------------------|---------------------------|
| 2s |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

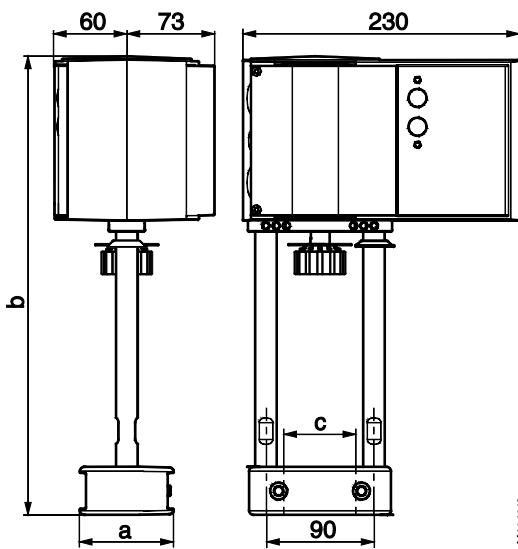
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Wiring diagrams

Continuous



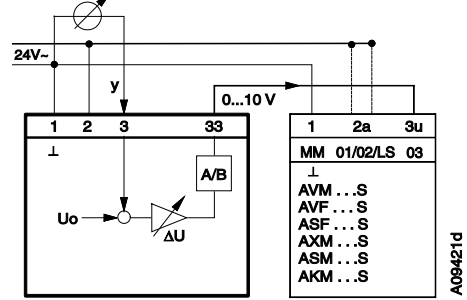
Massbild



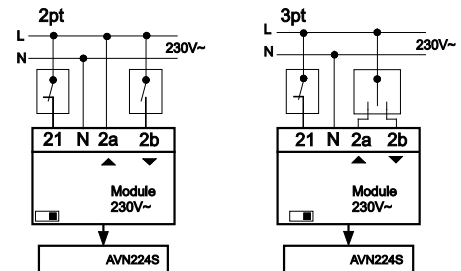
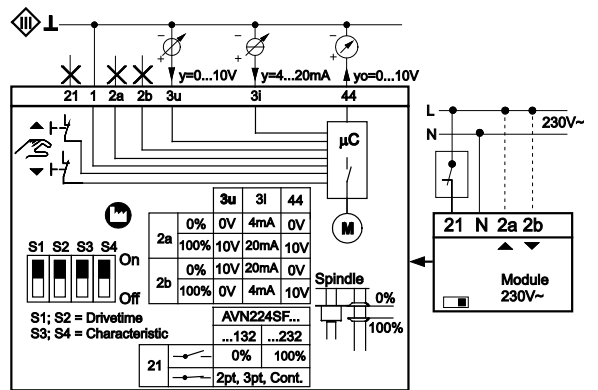
| Typ | a | b | c |
|-------------------|----|-----|----|
| AVN 224S F132/232 | 64 | 289 | 44 |
| AVN 224S F132-5 | 58 | 289 | 38 |

Accessory

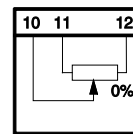
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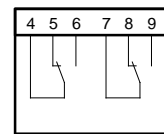


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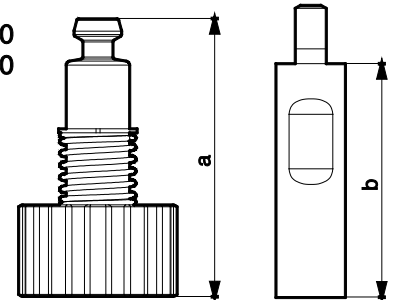
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372333



A10376

0372336 180
0372336 240



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

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