

## AVN 224S: SUT valve drive with safety function to DIN 32730

For controllers with a continuous (0...10 V and/or 4...20 mA) or switched output (2- or 3-point control). To activate the through valves or three-way valves in type series VUD / BUD, VUE / BUE, VUG / BUG, VUS / BUS and VUP, and the V6 and B6 series; and is also a safety device with a defined end position in case of a voltage failure or if a limiter responds. Suitable for valves that close against and with the pressure. The choice of characteristic (linear / equal-percentage / square) can be set on the positioner. Housing made of self-extinguishing yellow plastic. DC motor, control electronics, LED display, maintenance-free gear unit made of sintering steel, spring assembly (package), installation column in stainless steel and mounting bracket made of cast light alloy for building onto the valve. Further characteristics: electronic, force-dependent switch-off using stop guides in the device or on the valve, automatic adaptation to the valve stroke, coding switch to select the characteristic and run-time. Pushbuttons on the outside of the housing for manual adjustment and to trigger a re-initialisation. Possibility of switching over the direction of action externally (voltage supply to connection 2a or 2b). Electrical connections (max. 2.5 mm<sup>2</sup>) with screwed terminals. Three break-out cable leadthroughs for M20×1.5 (2×) and M16×1.5. Installed position: vertically upright to horizontal.



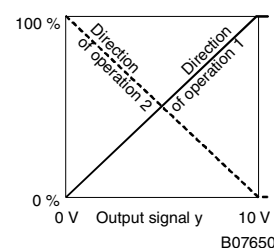
T10393



Y02158



Y10161



B07650

Type	Run-time		Reset function	Pushing force [N]	Stroke [mm]	Weight [kg]
	Motor [s/mm]	Spring [s] <sup>1)</sup>				
Valve drive for valves: VUD / BUD, VUE / BUE, VUG / BUG, VUS / BUS and VUP						
<b>AVN 224S F132</b>	2 / 4 / 6	15...30	closed (NC)	1100	0...40	5.6
<b>AVN 224S F232</b>	2 / 4 / 6	15...30	open (NO)	1100	0...40	5.6
to match valve series: V / B6 and VXD, VXE, BXD, BXE						
<b>AVN 224S F132-5</b>	2 / 4 / 6	15...30	closed (NC)	1100	14	5.6
<b>AVN 224S F132-6</b>	2 / 4 / 6	15...30	closed (NC)	1100	40	6.0

### Positioner:<sup>2)</sup>

Control signal 1	0...10 V, R <sub>i</sub> = 100 kΩ	Starting point U <sub>O</sub>	0 V, or 10 V
Control signal 2	4...20 mA, R <sub>i</sub> = 50 Ω	Control span ΔU	10 V
Position feedback signal	0...10 V, load > 2.5 kΩ	Switching range X <sub>Sh</sub>	300 mV
Supply voltage	24 V~ ± 20%, 50...60 Hz	Permitted ambient humidity	< 95 %rh (no condensation)
with accessories	230 V~ ± 15%	Degree of protection	IP 66 (EN 60529)
Power consumption	7 W 18 VA <sup>3)</sup>	Protection class	III to IEC 60730
Stroke	8...49 mm	Response time for 3-point	200 ms
Number of spring returns	> 40.000	Wiring diagram	<a href="#">A10384</a>
Max. medium temperature	130 °C <sup>4)</sup>	Dimension drawing	<a href="#">M10400</a>
Permitted ambient temperature	-10...60 °C	Installation instructions	<a href="#">MV 505927</a>
		Declaration of materials	<a href="#">MD 51.379</a>

### Accessories

- 0313529 001\*** Split range unit to set sequences. [MV 505671](#); A09421
- 0372332 001\*** Module, plug-in type, for 230 V ± 15% supply voltage and 3-point control, power: 2 VA, installation as per [MV 505901](#)
- 0372332 002\*** Module, plug-in type, for 100 V ± 15% voltage supply and 3-point activation, additional power 2 VA, installation as per [MV 505901](#)
- 0372333 001\*** 2 auxiliary changeover switches, continuously adjustable, permitted load 6(2) A and 12...250 V~, min. load 100 mA and 12 V, installation as per [MV 505866](#)
- 0372333 002\*** Two auxiliary change-over contacts with gold-plated contacts for low currents from 1 mA and voltage up to 30 V; further range 3(1) A and 12...250 V; fitted as per [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\*** Intermediate piece (required for medium above 130 °C and up to 180 °C, [MV 505902](#))<sup>5)</sup>
- 0372336 240\*** Intermediate piece (required for medium above 180 °C and up to 240 °C, [MV 505902](#))<sup>5)</sup>
- 0372338 001** Installation set for AVN 224S F132 on Sauter V / B6 up to DN50 and VXD, VXE, BXD, BXE up to DN50valves with stroke of 14 mm. [MV 505903](#)
- 0372338 002** Installation set for AVN 224S F132 on Sauter V / B6 for DN65...150 and VXD, VXE, BXD, BXE from DN65 valves with stroke of 40 mm. [MV 505903](#) (Intermediate piece not required for media up to 180 °C / 240 °C)
- 0372376 010** Set of adaptors for Siemens valves with 20 mm stroke or spindle ø10 mm, [MV 505974](#)
- 0372376 014** Set of adaptors for Siemens valves with 40 mm stroke or spindle ø14 mm, [MV 505974](#)
- 0372377 001** Set of adaptors for JCI valves DN15...150 with 14, 25 or 40 mm stroke or spindle ø10, 12 or 14 mm, [MV 505975](#)
- 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 connection, M16×1.5
- 0386263 002** Screwed cable connection, M20×1.5

<sup>\*)</sup> Dimension drawing or wiring diagram available under the same number

- 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~
- 3) Engineer the transformers for this value, otherwise functional faults may occur.
- 4) For higher medium temperatures (180 °C or 240 °C), an intermediate piece is necessary (see Accessories).
- 5) Intermediate piece is not required for the F132-6 version.

### 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 and/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 seconds, 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 seconds, 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 seconds. 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 pushbutton will interrupt the procedure.

If the valve drive 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 valve drive 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 seconds. 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 valve drive (24 V)

This actuation (OPEN/CLOSED) can take place via two leads. The voltage is applied to terminals 1, 2a and 21. Applying the voltage (24 V) to terminal 2b causes the coupling rod to move out and opens the valve. After this voltage is turned off, the drive moves to the opposite end position and closes the valve. 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 valve drive (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 coupling rod 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.

**Connection as 3-point valve drive with 230 V (accessory 0372332)**

The accessory module is plugged into the terminal compartment and is then connected for 3-point mode. If this accessory is used, only control in 3-point mode is available, and 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 cannot be selected; 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 coupling rod moves out and opens the valve (control passage).

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

As the control signal increases, the coupling rod moves in and closes the valve (control passage).

The starting point and the control span are fixed settings. To set partial ranges (and only for voltage input 3u), a split range unit is available 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 and the valve is closed. So that the valve can be opened (direction of action 1), a voltage of 10V must be connected between terminals 1 and 3u, or it is necessary to switch over to direction of action 2.

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).

**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  $\Delta U$  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 leadthroughs which are broken open automatically when the cable leadthrough is screwed in.

The DC motor/electronics concept guarantees that several valve drives 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 mm<sup>2</sup> (power consumption of the drive × 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, we recommend that additional measures be taken to protect them against the effects of 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 (intermediate piece).

**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 89/336/EEC	Machinery Directive 98/37/EEC (II B)	Low Voltage Directive 73/23/EEC
EN 61000-6-1	EN 1050	EN 60730-1
EN 61000-6-2	EN 14597	EN 60730-2-14
EN 61000-6-3		Over-voltage category III
EN 61000-6-4		Degree of pollution III

For AVN 224SF132-5 and AVN224SF132-6 with V6 / B6 valves

Pressure Equipment Directive 97/23/EEC. Category IV, Fluid Group II, Modules B+D  
DIN 32730

Approval centre: TÜVCE-0035.

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

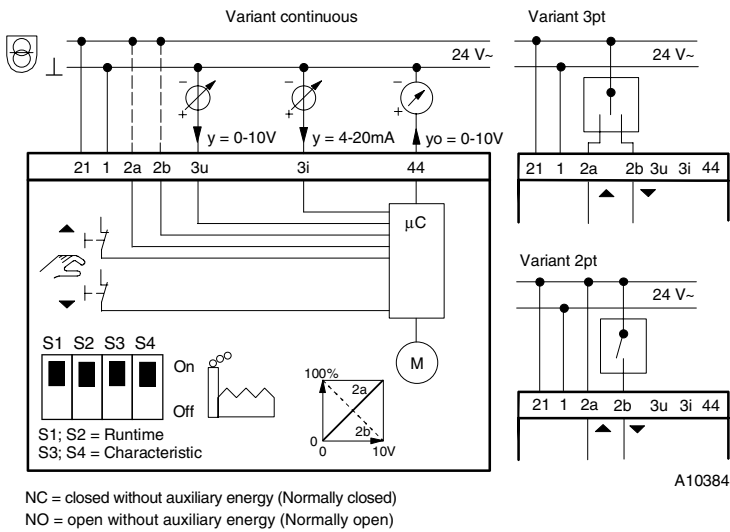
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Run time per mm	Switch coding	Run time for 14 mm stroke	Run time for 20 mm stroke	Run time for 40 mm stroke
2s		28s ± 1	40s ± 1	80s ± 2
4s		56s ± 2	80s ± 2	160s ± 4
6s		84s ± 4	120s ± 4	240s ± 8

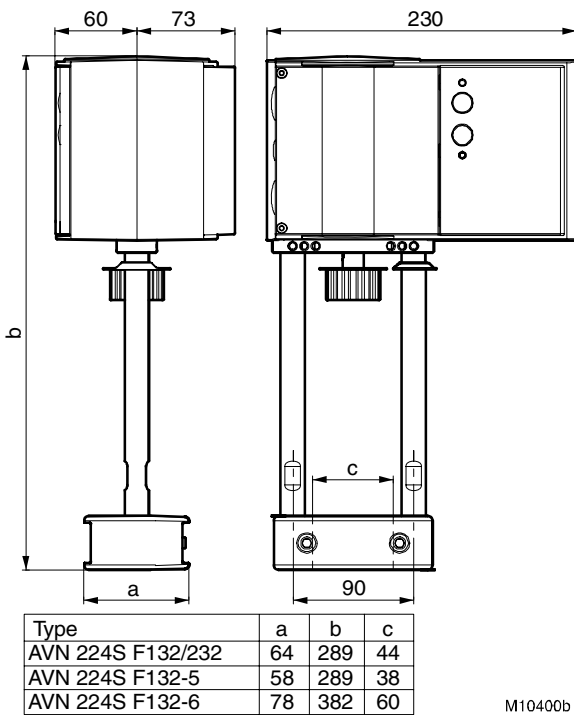
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**Wiring diagram**

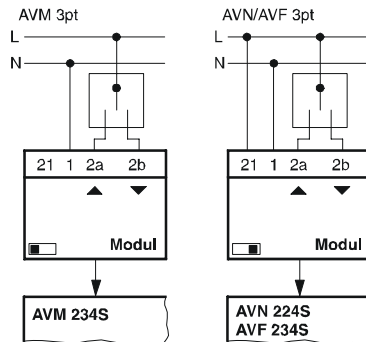
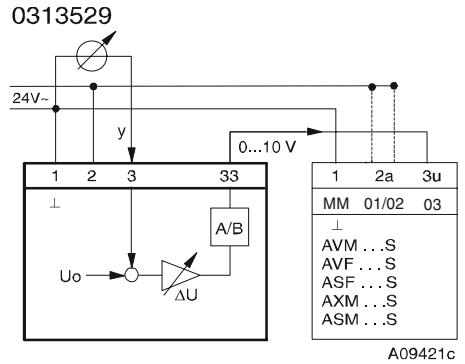


**Dimension drawing**



M10400b

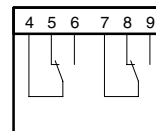
**Accessories**



Modul	L/N
0372332 001	230 V~
0372332 002	100 V~

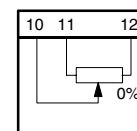
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**372333**



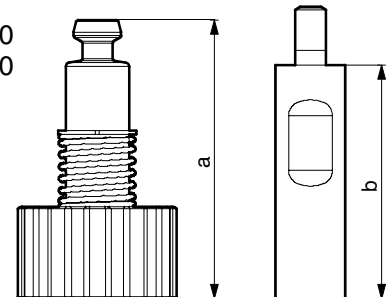
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**372334**



A01363

0372336 180  
0372336 240



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

M10217