FlowControl

FlowControl BUE/BQE

2 & 3 - way control valves

FlowControl

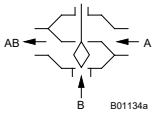
FlowControl BUE/BQE
3 - way control vavles with flange connection

These valves are used for continuous control of secondary refrigerants, cold** and hot water** in closed networks. Water quality as per VDI 2035. Together with actuators AVM321S, AVM322S, AVM 234S and AVF 234S the valve works as a regulating unit. These valves are not suitable for drinking water or potentially explosive atmospheres.
Nominal pressure is 16 bar the control valve contains no silicone grease and is painted black. Nominal diameters DN15 to DN150. With the spindle retracted, the control branch i closed. Can be used as control valve or diverting valve.

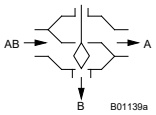
Art. No.	Description	DN	Connection	Kvs	Stroke, mm	Weight kg
BUE050 F200	3-way control valve	50	PN 10/16	40	8	11
BQE065 F300	3-way control valve	65	PN 10/16	63	20	15
BQE080 F300	3-way control valve	80	PN 10/16	100	20	19
BQE100 F300	3-way control valve	100	PN 10/16	160	40	31
BQE125 F300	3-way control valve	125	PN 10/16	240	40	42
BQE150 F300	3-way control valve	150	PN 10/16	320	40	61

2-way version of the valves can also be found, please contact FlowControl.

Mixing valve



Diverting valve



Art. No.	Description	Supply	Stroke (mm)	Run time sek/mm	Spring ret. Sec	Spring return	Weight kg
AVM321S	Actuator for BUE DN 50	24V~ (230V opt.)	8	12	-	-	1,5 kg
AVM322S	Actuator for BQE DN 65	24V~ (230V opt.)	20	6	-	-	1,6 kg
AVM234S	Actuator for BQE DN 80->	24V~ (230V opt.)	40	2/4/6	-	-	~5 kg
AVF234	Actuator for BQE DN 80 <-	24V~ (230V opt.)	40	2/4/6	15...30	NO/NC	~5 kg

Operating temp*	-10...150 °C
Operating pressure	> 120 °C 16 bar
	> 130 °C 13 bar
	> 150 °C 10 bar
Valve characteristic for	
control passage **	equal-percentage
mixing passage	linear
Valve control ratio	>50:1
Stuffing box	2 O-ringas in EPDM
Leakage rate for	
control passage	≤ 0,02% of kvs value
mising passage	≤ 1% of kvs value

Technical description
- Valve with flange connection as per EN 1092-2, Form B, raised face, for PN16 and PN10
- Valve body and seat made of cast iron
- Stainless steel spindle
- Nominal diameter DN15 to DN50 cones in brass with glass-fibre reinforced Teflon sealing ring
- Cone nominal diameter DN65 to DN150 in brass, metal-to-metal seal
- Stuffing box made of brass with wiper ring and double O-ring seal in EPDM

* At temperatures below 0 °C, use the stuffing box heater.
** Humidity can not exceed above 75%.

AVM234S

Operation
Depending on the type of connection (see the wiring diagram), the actuator may be used as a continuous (0...10 V and/or 4...20 mA), 2-point (OPEN/CLOSED) or 3-point (OPEN/STOP/CLOSED) device with an intermediate position.
The actuator's running time can be set according to the specific requirements, using switches S1 and S2.
Switches S3 and S4 are used to set the characteristic (equal percentage, linear or quadratic).
The external lever allows you to adjust the position manually. When the lever is folded out, the motor cuts out. When the lever is folded back into place, the setpoint position is adopted again (without initialisation). If the lever is folded out again, the actuator stays in this position.

Initialisation and feedback signal
When used as a continuous actuator, the device initialises itself automatically. As soon as power is applied to the actuator for the first time, it moves to the valve's lower limit, thus enabling automatic connection with the valve spindle. Then it moves to the upper limit and the value is recorded and saved by a travel measurement system. The control signal and the feedback signal are adjusted to this actual stroke. There is no re-initialisation in the event of a power failure. The values are saved.
To re-initialise, the actuator must be connected to the power supply and there must be a continuous input signal at 3u or 3i.
To trigger an initialisation, fold the lever out and back in again twice within 4 s. Both of the LEDs will then flash red.
During initialisation, the feedback signal is inactive, or it corresponds to a value of 0. Initialisation uses the shortest running time. The re-initialisation is not valid until the entire procedure has been completed. Folding the lever out again will interrupt the procedure. If the valve actuator detects a blockage, it will report this by setting the feedback signal to 0 V after approx. 90 s. However, the actuator will try to overcome the blockage during this time. If the blockage can be rectified, the normal control function is activated again and the feedback signal is restored. No initialisation is performed with 2-point or 3-point control. The feedback signal is inactive.

Connected as a 2-point valve actuator (24 V)
This type of activation (OPEN/CLOSED) can be achieved by two wires. Power is applied to terminals 1 and 2a. By applying power (24 V) at terminal 2b, the shaft extends. When the power is switched off, the actuator moves to the opposite end position. The motor's electronic cut-out responds in the end positions (valve limit, or when maximum stroke is reached) or in the event of an overload (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). Terminals 3i, 3u and 44 must not be connected.

Connected as a 3-point valve actuator (24 V)
Applying power at terminal 2a (or 2b) makes it possible to move the valve to any desired position. If power is applied at terminals 1 and 2b, the shaft extends. It retracts if power is applied at terminals 1 and 2a. In the end positions (at the valve stop, or when the maximum stroke is reached), or in the event of an overload, the motor's electronic cut-out is activated (no limit switches). The direction of the stroke can be changed by transposing the connections. The coding switch is used to set the running times. In this case, the characteristic cannot be selected (resulting in the characteristic for the valve). Terminals 3i, 3u and 44 must not be connected. Connected (with 230 V) as a 2-/3-point or with continuous control (accessory 0372332)
The accessory module is slotted into place in the terminal compartment and then connected accordingly.
The coding switch on the board is used to select the running times. The characteristic can be selected only in the case of continuous activation; the characteristic for the valve is applicable. On this actuator (which has no spring return action), the switching lever is in the lower position.

Connected to a control voltage (0...10 V and/or 4...20 mA)
The in-built positioner controls the actuator in accordance with the controller output signal y. The control signal used is a voltage signal (0...10 V–) at terminal 3u, or a current signal at terminal 3i. If a control signal is present at both terminals (3u (0...10 V) and 3i (4...20 mA)) simultaneously, the input with the higher value takes priority. Mode of action 1 (mains voltage to internal connection 2a): as the output signal increases, the shaft extends. Mode of action 2 (mains voltage to internal connection 2b): as the output signal increases, the shaft retracts. The starting point and the control span are fixed. To set partial ranges, a split-range unit (for voltage input 3 u only) is available as an accessory (see the description below); this unit can be fitted in the actuator. When the power supply is applied and initialisation has been carried out, the actuator moves to every valve stroke between 0% and 100%, depending on the control signal. The electronics and the travel measurement system ensure that no stroke is lost, and the actuator does not require re-initialisation at intervals. When the end positions are reached, the position is checked, adjusted as necessary and stored again. This ensures parallel running of several drives of the same SUT type. Feedback signal y0 = 0...10 V corresponds to the effective valve stroke of 0 to 100%.
If the 0...10 V control signal is interrupted in direction of action 1, the spindle retracts completely. So that he shaft can extend (direction of action 1), a voltage of 10 V must be applied at 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. Equal-percentage and square characteristics can be produced only if the actuator is used as a continuous actuator. Further switches can be used to select the running times (can be used for 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 indicators (dual-colour, red and green), AVM234S /AVF234

Both LEDs flashing red:	initialisation procedure
Upper LED lit red:	upper limit or “CLOSED” position reached
Lower LED lit red:	lower limit or “OPEN” position reached
Upper LED flashing green:	actuator running, moving towards “CLOSED” position
Upper LED lit green:	actuator stationary, last direction of running “CLOSED”
Lower LED flashing green:	actuator running, moving towards “OPEN” position
Lower LED lit green:	actuator stationary, last direction of running “OPEN”
No LED lit:	no power supply (terminal 2a or 2b)
Both LEDs flashing red and green:	actuator is in manual mode

Split-range unit (accessory 0313529)

This accessory can be fitted either in the actuator itself or externally in an electrical distribution box. The starting point U0 and the control span DU can be set with the help of a potentiometer. This makes it possible to operate several regulating units in sequence or in a cascade with the control signal from the controller. The input signal (partial range) is converted into an output signal of 0...10 V.

Engineering and installation notes

The ingress of condensate or water droplets etc. along the valve spindle and into the actuator should be prevented.
The valve is slotted straight onto the actuator and fixed with screws (no further action is required). The actuator is automatically connected to the valve spindle. The actuator spindle is supplied ex works in the middle position. The housing has three pre-scored cable inlets which are broken open automatically when the cable inlet grommet is screwed in. The combination of stepping motor and electronics unit enables several actuators of the same type to be run in parallel. The cross-section of the power cable’s wires should be selected according to the cable length and the number of drives. With five drives connected in parallel and a cable length of 50 m, we recommend a cross-section of 1.5 mm2 (power consumption of the actuator × 5). The actuator can be fitted with a maximum of one 230 V module, one additional accessory (auxiliary contacts 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) serves merely as a cover. The DC motor, the electronics control unit, the load-bearing parts and the maintenance-free gear unit are accommodated in the housing. The actuator shaft and column are made of rust-proof materials. The interior plates and the gear unit are made of steel. The valve spindle guide and the valve collar coupling are made of die-cast aluminium. Note on ambient temperatures: if the temperature of the medium in the valve is up to 110 °C, the ambient temperature may be up to 60 °C. If the temperature of the medium is above 110 °C, the ambient temperature must not exceed 55 °C; alternatively use acce ssory 0372336 180 (adaptor).

Auxiliary change-over contacts

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

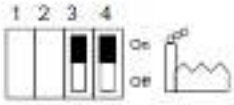
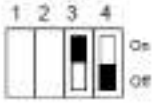
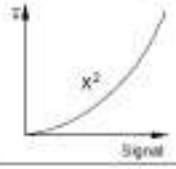
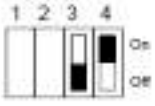
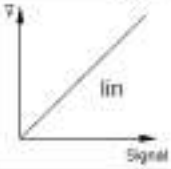
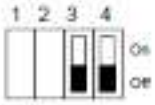
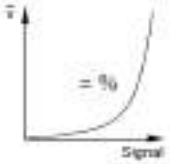
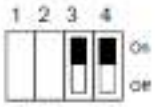
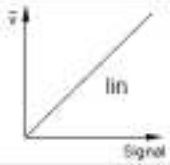
· If the temperature of the medium in the valve is high, the actuator columns and the shaft may also reach high temperatures.
· Additional protective precautions must be taken if a failure of the final control element would cause serious damage.

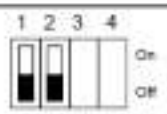
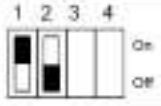
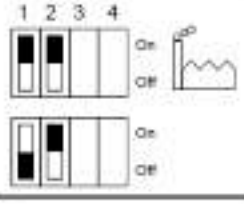
CE conformity

EMC Directive 2004/108/EC	Low-Voltage Directive 2006/95/EC
EN 61000-6-2 *)	EN 60730-1
EN 61000-6-4	EN 60730-2-14
	Over-voltage category III
	Degree of pollution III

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

AVM234S

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 ± 2
4s		56s ± 2	80s ± 2	160s ± 4
6s		84s ± 4	120s ± 4	240s ± 8
	 = factory setting			

AVM321S /AVM322S

Operation

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 a 3-point actuator (OPEN/STOP/CLOSE).
The positioning time of the actuator can be set with the S1 switches according to the respective requirements.
Using switch S2, the direction of operation can be changed. In the end positions (valve limit stop or when the maximum stroke is reached) or upon overload, the electronic motor cut-off (no limit switch) responds and turns off the motor.
The external crank handle enables manual positional setting. After the crank handle is folded back, the target position is approached again (without initialisation). If the crank handle is unfolded, the actuator remains in this position.

Connection as 2-point actuator (24 V)

The OPEN/CLOSE activation is via two wires. The actuator is connected to permanent voltage via the terminal MM and terminal 01. When voltage (24 V) is applied to terminal 02, the coupling rod extends into the end position. After switching off the voltage at terminal 02, the actuator automatically retracts into the basic position. Terminal 03 may not be connected or come into contact with other contacts. We recommend that you insulate them.

Connection as 3-point actuator (24 V)

If voltage is applied to the terminals MM and 01 (or 02), the valve can be moved to any desired position. If voltage is applied to terminal MM and 01, the coupling rod retracts. If the electrical circuit is closed on terminal MM and 02, the coupling rod extends. If there is no voltage on terminals 01 and 02, the actuator remains in the respective position until voltage is applied. Terminal 03 may not be connected or come into contact with other contacts. We recommend that you insulate them.

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

The built-in positioner controls the actuator as a function of the controller positioning signal y. A voltage signal (0...10 V) at terminal 03 serves as the control signal. Coding switch S4 can be switched to a current input (4...20 mA). In case of voltage on the terminals MM/01 and rising positioning signal, the coupling rod extends. The direction of operation can be reversed with coding switch S2. The starting point and control span are fixed. For setting partial ranges (only for voltage input), a Splitrange unit is available as an accessory (see function Splitrange unit). After connection of the power supply and initialisation, the actuator goes to between 0% and 100% with each valve stroke, depending on the control signal. Thanks to the electronics and the absolute distance measurement system, no stroke is lost, and the actuator does not require periodic re-initialisation. If the control signal 0...10 V is interrupted in the direction of operation 1, the spindle retracts completely. If the control signal 0...10 V is interrupted in the direction of operation 2, the spindle extends completely. This is true if the forced operation is switched off. (Coding switch S5 OFF). With coding switch S3, the characteristic of the valve/actuator combination can be adjusted. An equal-percentage characteristic can only be generated when the actuator is used as a continuousactuator.

Initialisation and feedback signal

The actuator initialises itself automatically when it is connected as a continuous actuator (not in 2-/3-point mode). Once a voltage is, applied to the actuator for the first time, the actuator first moves to the first and then to the second valve limit stop or to the internal actuator stop. The two values are recorded and stored by the absolute distance measurement system. The control signal and the feedback are adapted to this effective stroke. After initialisation, the actuator goes to between 0% and 100% with each valve stroke, depending on the control voltage. In case of a power failure or the removal of the power supply, no re-initialisation needs to be carried out. The values remain saved. If the initialisation is interrupted, the initialisation is started again when the voltage is re-applied. You trigger a re-initialisation by switching the coding switch S8 from OFF to ON or vice versa. When the process is triggered, the LED blinks green. During initialisation, the feedback signal is inactive or equal to the value “0”. Initialisation is carried out with the shortest positioning time. The re-initialisation is only valid if the whole process is complete. If a change of the stroke is carried out, a re-initialisation must be triggered so that the new stroke can be adapted. 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 continues to try to overcome the jamming. If the jamming can be overcome, the normal control function is activated again, and the feedback signal is restored. With 2-point or 3-point control without a feedback signal, no initialisation is performed. Continuous activation can also be implemented with a 230 V power supply with the external accessory 0500570003 “230 V module”. You must ensure that the neutral conductor of the controller is connected to the control voltage. The neutral conductor of the power supply may only be used for the 230 V module.

Forced operation (in continuous mode)

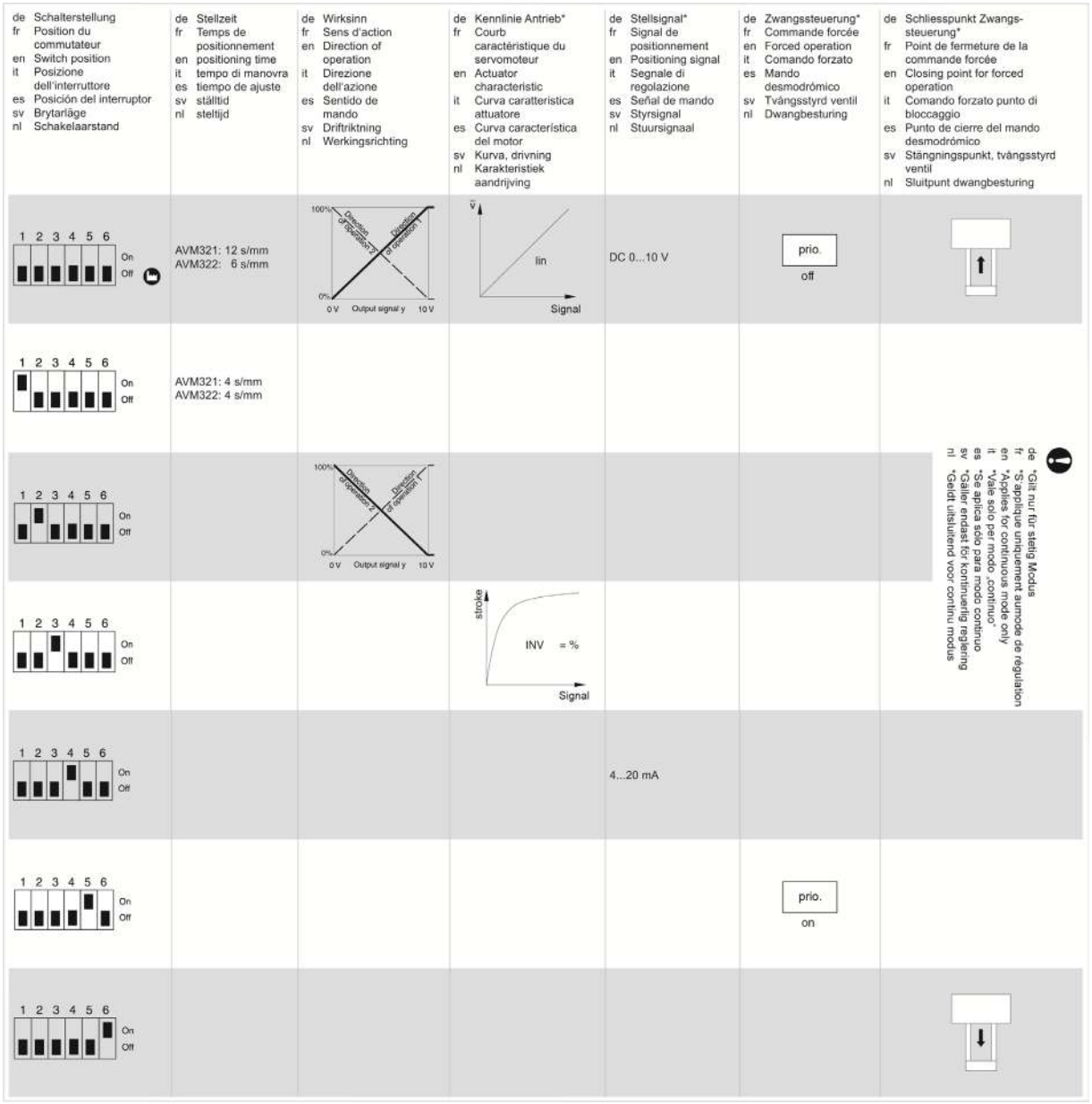
Forced operation is activated with coding switch S5. To use for this function, an 2 point controller must be attached to terminal 6. The 2 point controller is used as a normally-closed contact. If the 2 point controller detects the electrical circuit, then the spindle extends into the end position defined in the coding switch S 6. Forced operation can be used only in continuous mode.

2p/3p operation making use of the reset signal

If terminal 6 is continuously connected to the power and the coding switch S5 is set to off, the feedback signal 0...10V can be used. If this function is used, the actuator automatically performs an initialisation during commissioning.

FlowControl

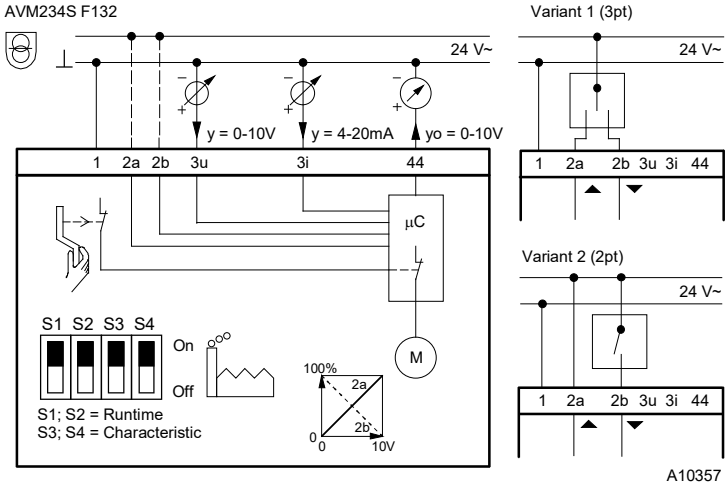
Coding switch AVM321S /AVM322S



LED description

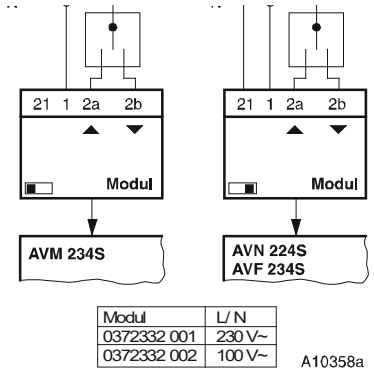
Flashes green (T1s)	Valve adapting, initialisation
Flashes green (T3s)	Position reached
Lights up green	Spindle retracts/extends
Flashes orange	Manual adjustment activated
Flashes red	Actuator blocked, actuator at end stop
Lights up red	Incorrect configuration of forced operation, undervoltage, insufficiently.

Electrical wiring AVM 234S



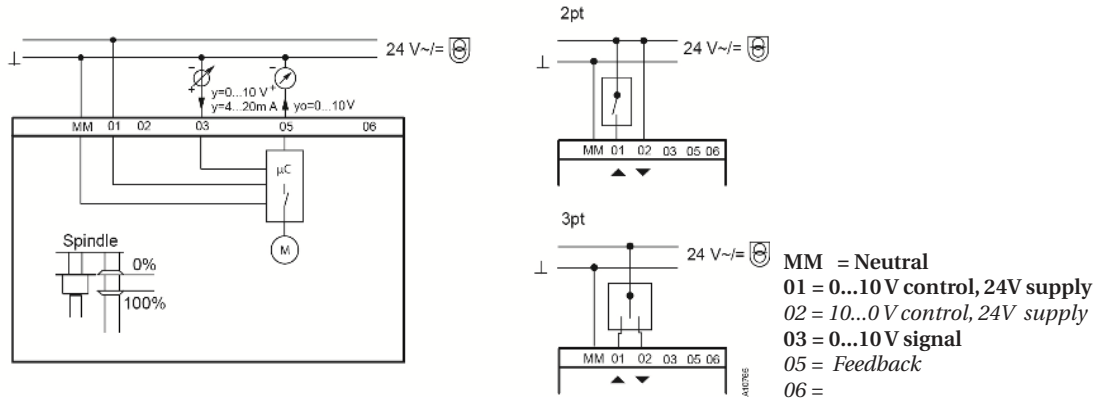
1 = Neutral
2a = 0...10 V control, 24V supply
2b = 10...0 V control, 24V supply
3u = 0...10 V signal
3i = 4...20 mA signal
44 = Feedback

Accessories



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

Electrical wiring AVM321S / AVM322S

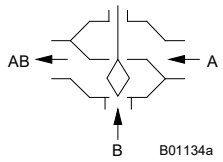


MM = Neutral
01 = 0...10 V control, 24V supply
02 = 10...0 V control, 24V supply
03 = 0...10 V signal
05 = Feedback
06 =

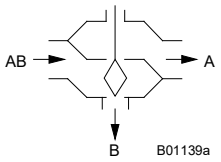
Installation notes
-Condensation, water etc. along the spindle that can come into the actuator must be avoided.
-Do not install the valve with the actuator below the horizontal line.
-Do not use in enviroments with higher humidity than 95% rf.

How the valve operates
The valve can be controlled into any desired intermediate position by means of an electric drive. If the valve stem is extended, the control passage of the valve is closed. These valves may be used as control valves as well as diverting valves. The direction of flow marked on the valve must be observed. Parameters related to flow mechanics conform to EN 60534.

Used as a mixing valve



Used as a diverting valve



Description
The key features of these control valves are their high reliability and precision, and they make a major contribution towards environment-friendly control. They meet demanding requirements including quick-close functions, coping with differential pressures, controlling the medium temperature and providing a shut-off function - and all this is achieved with a low noise level.
An automatic and fixed connection is made between the valve stem and the drive shaft. The cone (which is made of brass) controls an equal-percentage flow in the control passage. To compensate for the complementary characteristic of the consumer and to guarantee an identical quantity of medium regardless of the valve position, the mixing passage acts with a linear characteristic. The tightness of this valve is guaranteed by the seat which is machined in the body.
The stuffing box is maintenance-free; it consists of a brass body, 2 O-rings, a wiper ring and the grease reserve. This is free of silicone grease and no silicone oil must be used for the stem.

Engineering and fitting notes
The valves are combined with actuators without spring return action, or actuators with spring return action. The drive is placed directly on top of the valve and is fixed either with a nut or with screws. The connection between the drive and the valve stem is made automatically. When the plant is operated for the first time, the drive moves out and the lock closes automatically once it has reached the lower valve seat. The valve stroke is also detected by the drive and no further adjustments are required. This means that the force on the seat is always equal and the lowest leakage rate is always guaranteed. With the SUT drives, the characteristic can be changed over to linear or quadratic as desired. For the combination AVM 105S with DN50 F200 it is not possible to change the character from linear to equal-percentage.

Installation position
The final control element can be installed in any desired position, but the installed position facing downwards is not recommended. Condensate and water drips etc. must be prevented from penetrating into the drive. With nominal diameters DN 65 to DN 150 in a horizontal installed position and in relation to the valve stem, the permitted maximum drive (or other) weight is 25 kg unless a support is provided by the customer or others.
When fitting the drive onto the valve, you must make sure that the cone is not rotated on the seat (this would damage the sealing surface). If the valve is insulated, the insulation must only extend as far as the connecting clip of the drive.
To increase the functional reliability of the valve, the system must conform to DIN EN 14336 (heating systems in buildings). DIN EN 14336 states, amongst other things, that the system has to be flushed through before being put into service.

Applications with water
To ensure that impurities in the water (such as welding beads or particles of rust, etc.) are retained and the cone seal is not damaged, it is advisable to install collective filters, e.g. for each storey or pipe run. Water quality requirements conform to VDI 2035. If an additional medium is used, the compatibility of the materials must be clarified with the manufacturer of the medium. The Material Table shown below can be used for this purpose. If glycol is used, we recommend that a concentration of between 20% and 55% should be selected.

Other notes concerning hydraulics and noises in systems

The valves can be used in a low-noise environment. To avoid noises, the pressure differences pmax listed below should not be exceeded.

Pressure difference pv is the maximum pressure that may be present on the valve, regardless of the stroke position, so that the danger of cavitation and erosion is limited. These values are independent of the drive force. Cavitation accelerates wear and causes noises. To prevent cavitation, the differential pressure should not exceed value delta p krit:

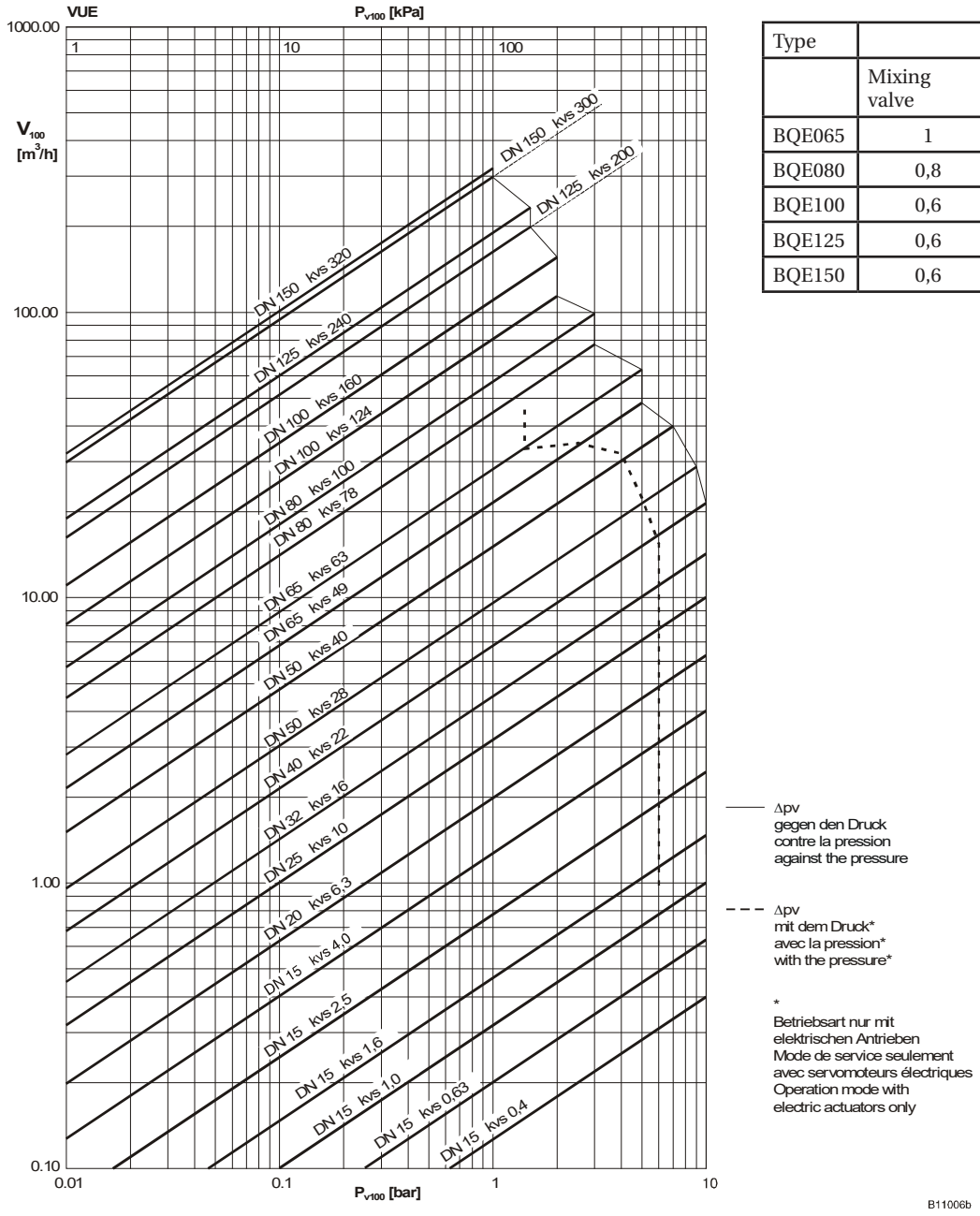
pkrit = (p1 – pv) × 0,5

p1 = upstream pressure in front of the valve (bar)

pv = Steam pressure at operating temperature (bar)

Absolute pressure is used for the calculations.

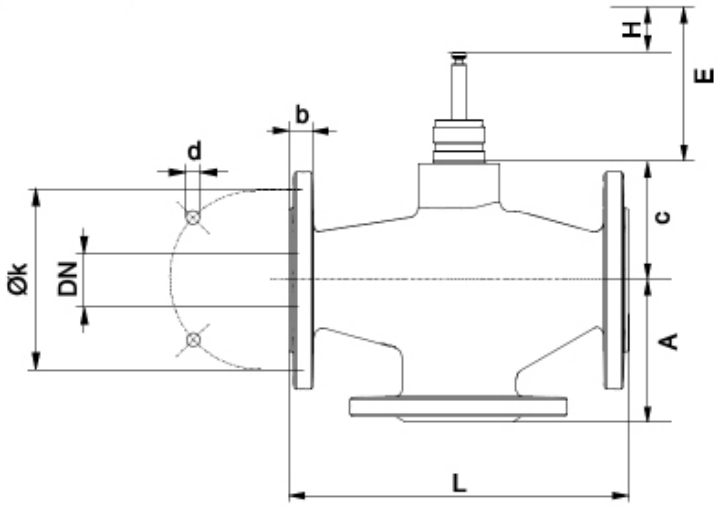
The close/off pressure values which are also listed represent the maximum pressures at which the drive can still use its own force to move the valve. It should be pointed out here that if these pressures are used and the pressure difference delta p max is exceeded, the valve may sustain damage due to cavitation and erosion. In case of a spring return function, the stated delta ps values also represent the permitted differential pressure up to which the drive guarantees closure of the valve in case of an incident. As this is a quick-close function with 'fast' passage through the stroke (by means of the spring), this value may exceed delta p max.



Type	ΔPv	
	Mixing valve	Diverting valve
BQE065	1	1,0
BQE080	0,8	0,75
BQE100	0,6	0,5
BQE125	0,6	0,5
BQE150	0,6	0,5

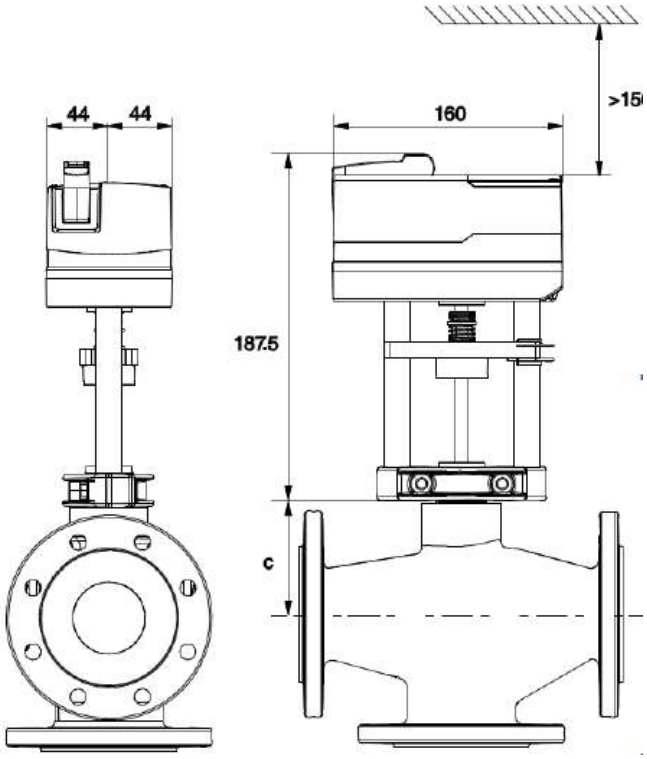
FlowControl

Drawings DN 65...150

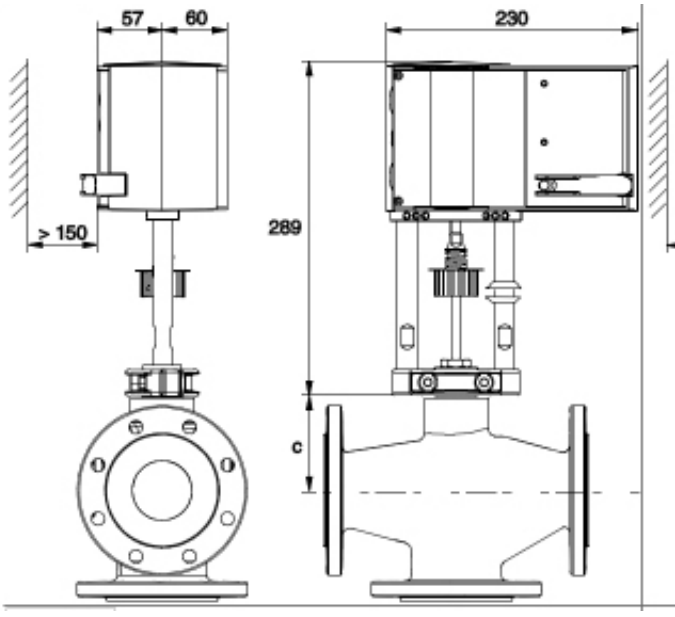


BQE	DN	A	c	L	H	k	d	b	E
065	65	120	102	290	20	145	4x19	20	93
080	80	130	112	310	20	160	8x19	22	93
100	100	150	127	350	40	180	8x19	24	113
125	125	200	160	400	40	210	8x19	27	113
150	150	210	181	480	40	240	8x23	27	113

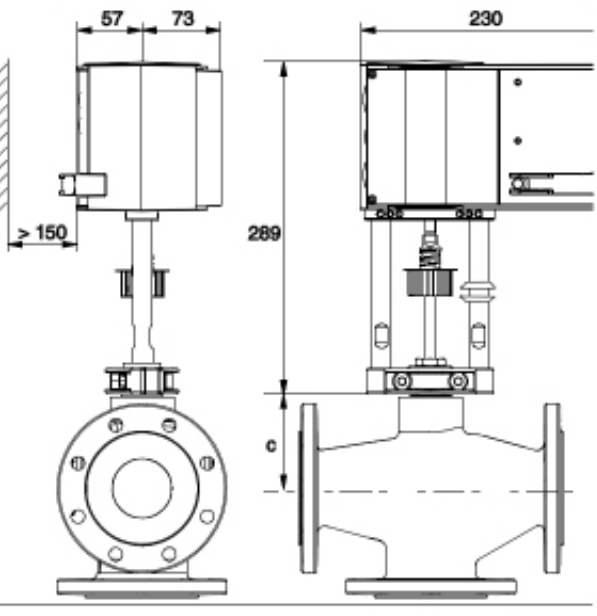
AVM321/322



AVM234S



AVF234S



DIN material number

	DIN material number	**DIN kod**
Valvebody	EN-JL 1040	EN-GJL-250 (GG25)
Valveseat, diverting	EN-JL 1040	EN-GJL-250
Valveseat, mixing	1,4021	X20Cr13
Spindle	1.4305	X 8 Cr Ni S 18-9
Cone	1,4021	X20Cr13
Stuffingbox	1,4021	X20Cr13

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