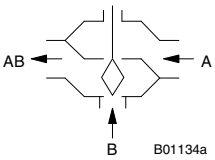
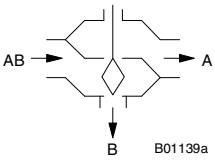
BUG: Flanged three-way valves, PN 25 / 16

Y07545





How energy efficiency is improved

Precision control with high level of reliability means efficiency.

Areas of application

Continuous control of cold, warm and hot water, steam and air in HVAC systems, in closed networks. Water quality as per VDI 2035. Together with actuators AVM 234S, AVF 234S and AVN 224S as regulating unit.

Features

- Nominal pressure 25 bar for DN15 to DN150, nominal pressure 16 bar for DN15 to DN80
- Complies with standard for regulating units as per DIN 32730 [1) 2) 3)]
- Control valve, contains no silicone grease; painted black
- Nominal diameters DN15 to DN150
- Equal percentage characteristic, adjustable with SUT actuators to linear or quadratic
- Linear mixing passage characteristic
- With the spindle retracted, the valve is closed
- Can be used as control valve or diverting valve
- Temperature range up to 240 °C

Technical description

- Valve with flange connection as per EN 1092-2, Form B, raised face, for PN25 and PN16 depending on type
- Ductile cast iron valve body
- Stainless steel valve seat
- Stainless steel spindle
- Nominal diameter DN15 to DN50 cones in stainless steel with glass-fibre reinforced PTFE sealing ring
- Cone nominal diameter DN65 to DN150 in stainless steel, metal-to-metal seal
- Maintenance-free brass stuffing box with spring-loaded PTFE washer

Type	Nominal diameter DN	Connection PN	k_{VS} value m^3/h	Weight kg
BUG 015 F334	15	25 / 16	1	3.1
BUG 015 F324	15	25 / 16	1.6	3.1
BUG 015 F314	15	25 / 16	2.5	3.1
BUG 015 F304	15	25 / 16	4	3.1
BUG 020 F304	20	25 / 16	6.3	4.0
BUG 025 F304	25	25 / 16	10	4.7
BUG 032 F304	32	25 / 16	16	7.2
BUG 040 F304	40	25 / 16	25	9.2
BUG 050 F304	50	25 / 16	40	11.9
BUG 065 F316 [2)]	65	16	63	26.8
BUG 065 F304	65	25	63	27.1
BUG 080 F304	80	25 / 16	100	36.3
BUG 100 F304	100	25	160	53
BUG 125 F304	125	25	250	79.1
BUG 150 F304	150	25	340	108.7

Operating temperature [1)]	-20...240 °C	Valve stroke	
Operating pressure	up to 120 °C 25 bar	DN 15...50	20 mm
	up to 240 °C 20 bar	DN 65...150	40 mm
	-20...-10 °C 18 bar	Dimension drawing	
Valve characteristic for		DN 15...50 (65)	M10425
control passage	equal-percentage	DN 65...150	M10446
mixing passage	linear	Fitting instructions	
Control ratio	> 50:1	DN 15...50	MV 505947
Stuffing box	brass / PTFE	DN 65...150	MV 505973
Leakage rate at max. Δp_s:		AVM 234 / assembly	MV 505919
control passage	≤ 0.05% of k_{vs} value	AVF 234 / assembly	MV 505920
mixing passage	≤ 1.0% of k_{vs} value	AVN 224 / assembly	MV 505927
		Material declaration	MD 56.121

1) At temperatures below 0 °C, use the stuffing box heater; at temperatures above130 °C or 180 °C use the appropriate intermediate piece (accessory).
Down to –10 °C, as per AD code of practice W 10. Water with anti-frost products and brines
For use in accordance with DIN 32730, the permissible temperature of the medium is > 0 °C.

2) The BUG 065 F316 valves do not have TÜV approval. They do not bear the test institute's code and are classified under Category I of the Directive on Pressure Equipment. These valves can be employed with the AVN 224S F… actuator, but not as a safety unit

3) DIN 32730 has been substituted by DIN EN 14597.

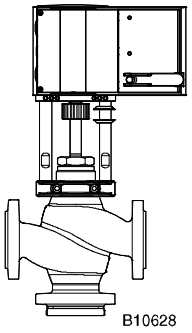
Accessories

0372336 180* Adaptor (required for medium > 130 °C / < 180 °C; MV 505902)
0372336 240* Adaptor (required for medium > 180 °C / < 240 °C; MV 505902)
0378283 001 Replacement pack for stuffing box, nominal diameter DN 15-150; MV 505950
0378284 100* Stuffing box heater, 230 V~; 15 W, for media below 0 °C; MV 505978
0378284 102* Stuffing box heater, 24 V~; 15 W, for media below 0 °C; MV 505978
0378285 001 Stuffing box, stainless steel / PTFE DN 15…150
0378384 001 Anti-torsion device DN 65…150

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

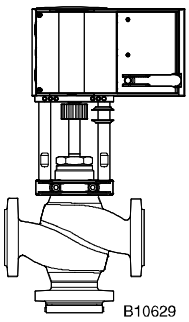
Warranty The technical data and pressure differences indicated here are applicable only when used with Sauter valve drives. Any warranty shall lapse if valve drives from other manufacturers are used.

Combination: BUG with electric drive, 2500 N pushing force


B10628

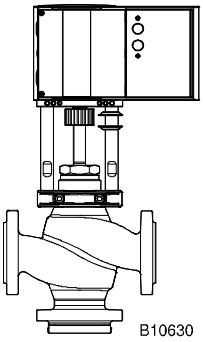
Drive Input: Running time DN15..50: Running time DN65..150:	**AVM 234S F132 (24 V)** **2pt / 3pt / 0…10 V / 4…20 mA; with accessories 3-pt. 230 V** **40 / 80 / 120 s** **80 / 160 / 240 s**						**> 130 °C accessories required**
Valve	Used as a control valve			Used as a diverting valve			
	Δp_{max}	**Δp_s**	**Close/off pressure**	**Δp_{max}**	**Δp_s**	**Close/off pressure**	
BUG 015	16	–	25	6	–	25	
BUG 020	16	–	25	6	–	25	
BUG 025	16	–	25	6	–	25	
BUG 032	16	–	25	6	–	24	
BUG 040	16	–	17	6	–	15.5	
BUG 050	11	–	11	6	–	10	
BUG 065	7.1	–	7.1	4.5	–	6.5	
BUG 080	4.7	–	4.7	3.5	–	4.4	
BUG 100	3.0	–	3.0	3.0	–	2.8	
BUG 125	2.0	–	2.0	2.0	–	2.0	
BUG 150	1.5	–	1.5	1.0	–	1.5	

Combination: BUG with electric drive, with spring return, 2000 N pushing force


B10629

Drive Input: Running time DN15..50: Running time DN65..150: Spring return:	**AVF 234S F132, F232** **2-/3-pt.; 0..10 V / 4..20 mA; 24 V; with accessories 3-pt. 230 V** **40 / 80 / 120 s** **80 / 160 / 240 s** **15 - 30 s, with F132 (NC), with F232 (NO**						**> 130 °C accessories required**
Valve	Used as a control valve			Used as a diverting valve			
	Δp_{max}	**Δp_s**	**Close/off pressure**	**Δp_{max}**	**Δp_s**	**Close/off pressure**	
BUG 015	16	25	25	6	25	25	
BUG 020	16	25	25	6	25	25	
BUG 025	16	25	25	6	25	25	
BUG 032	16	21	21	6	25	18	
BUG 040	13.5	13.5	13.5	6	25	12	
BUG 050	8.5	8.5	8.5	6	25	7.5	
BUG 065	5.6	5.6	5.6	4.5	25	5.1	
BUG 080	3.4	3.4	3.4	3.4	25	3.4	
BUG 100	2.2	2.2	2.2	2.2	25	2.2	
BUG 125	1.6	1.6	1.6	1.6	25	1.6	
BUG 150	1.2	1.2	1.2	1.0	25	1.2	

Combination: BUG with electric drive, with safety function (DIN), 1100 N pushing force



Drive							
Input:	**AVN 224S F132, F232**						**> 130 °C accessories required**
Running time DN 15 50:	**2-/3-pt.; 0..10 V / 4..20 mA; 24 V; with accessories 3-pt. 230 V**						
Running time DN 65..150:	**40 / 80 / 120 s**						
Safety function:	**80 / 160 / 240 s**						
	15 - 30 s, with F132 (NC), with F232 (NO)						
Valve	Used as a control valve			Used as a diverting valve			
	Δp_{max}	**Δp_s**	**Close/off pressure**	**Δp_{max}**	**Δp_s**	**Close/off pressure**	
BUG 015	16	25	25	6	25	25	
BUG 020	16	25	25	6	25	22	
BUG 025	16	17	17	6	25	14.5	
BUG 032	10.5	10.5	10.5	6	25	9.4	
BUG 040	6.5	6.5	6.5	6	25	6.5	
BUG 050	4	4	4	4	25	4.0	
BUG 065 F304	3.0	3	3.0	2.6	25	2.6	
BUG 080	2.0	2.0	2.0	1.7	25	1.7	
BUG 100	1.1	1.1	1.1	1.1	25	1.1	
BUG 125	0.8	0.8	0.8	0.8	25	0.8	
BUG 150	0.6	0.6	0.6	0.6	25	0.6	

Valve: Variant F, for technical data and accessories see Valve Type Table
Drive: Variant F, for technical data, accessories and installation position see section 51
Example: BUG 040 F304 / AVM 234 S F132

Δp_{max} [bar]= Maximum permitted pressure difference across the valve at which the drive can still reliably open and close the valve, taking account of Δp_v.

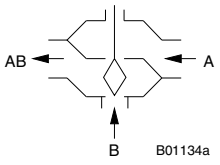
Δp_s [bar]= Maximum permitted pressure difference across the valve in case of a fault (pipe break downstream of the valve) at which the drive can close the valve reliably with "fast" performance of the stroke.

Close/off pressure [bar]= Maximum possible pressure difference over the valve in control mode, at which the drive can still open and close the valve. A reduced lifetime must be expected with this mode. Cavitation, erosion and pressure surges can damage the valve. The values are only valid for the assembled combination valve fitted on the drive.

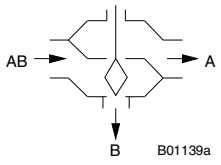
Function

The valve can be controlled into any desired intermediate position by means of an electrical 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 or a sticker must be placed over it when 'used as a diverting valve' (the sticker is on the installation instructions). Parameters related to flow mechanics conform to EN 60534.

Used as a control 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 safety 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 professional Sauter cone, made of stainless steel, 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 stainless steel ring pressed into the seat and the corresponding valve cone.

The stuffing box is maintenance-free; it consists of 6 conically shaped PTFE rings and a spring. The spring ensures constant tension in the seals, thereby guaranteeing tightness in relation to the valve stem. In addition, a grease reserve ensures constant lubrication of the valve stem. The grease reserve also prevents any particles that might be present in the medium from reaching as far as the PTFE seal.

Engineering and fitting notes
The valves are combined with the AVM 234 S valve drives without spring return action, or valve drives AVF 234 S, AVN 224 S with spring return. The drive is placed directly on top of the valve and is fixed with screws. The connection between the drive and the valve stem is made automatically. When the plant is operated for the first time, the AVM 234 S and AVF 234 S drive moves out and the lock automatically closes the connection with the valve 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.
If AVN 224 S valve drives are used, the drive has to be initialised manually. For a more precise description of this, see PDS 51.379 'Initialisation and feedback signal'.

Installation position
The final control element can be installed in any position, except facing downwards. Condensate and water drips etc. must be prevented from penetrating into the drive. With a horizontal installed position, the permitted maximum weight on the valve is 25 kg unless a support is provided by the customer or others.

up to 130 °C: in any position, but not facing downwards.

above 130 °C: at temperatures above 130 °C or 180 °C respectively, the horizontal installed position is recommended and the intermediate piece corresponding to the temperature must be inserted. However, the intermediate piece can also serve as an extension so as to bring the drive out of the pipe insulation. The pipes must be insulated to protect the valve drive against great heat.

When fitting the drive onto the valve, you must make sure that the cone is not rotated on the stainless steel seat (this would damage the sealing surfaces). If the valve is insulated, the insulation must only extend as far as the connecting clip of the drive.

Applications with steam
The valves can be used for steam applications up to 200 °C with the same Δp_{max} values shown in the combination tables. However, we advise you only to use the valves for open-closed switching. For use as a control valve, you should make sure that the majority of the work is not done in the lower third of the valve stroke range. In this position, an extremely high flow speed would develop, severely reducing valve's lifetime.

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 valve 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.
The valves are not suitable for drinking water or in zones where there is a risk of explosion.

Approval for DIN 32730
With exception of the BUG 065 F316 the valves can be employed together with the AVN 224 S actuator with emergency function in accordance with DIN 32730.

Other notes concerning hydraulics and noises in systems
The valves can be used in a low-noise environment. To avoid noises, the pressure differences Δp_{max} listed below should not be exceeded. These are shown as recommended values in the pressure loss table.

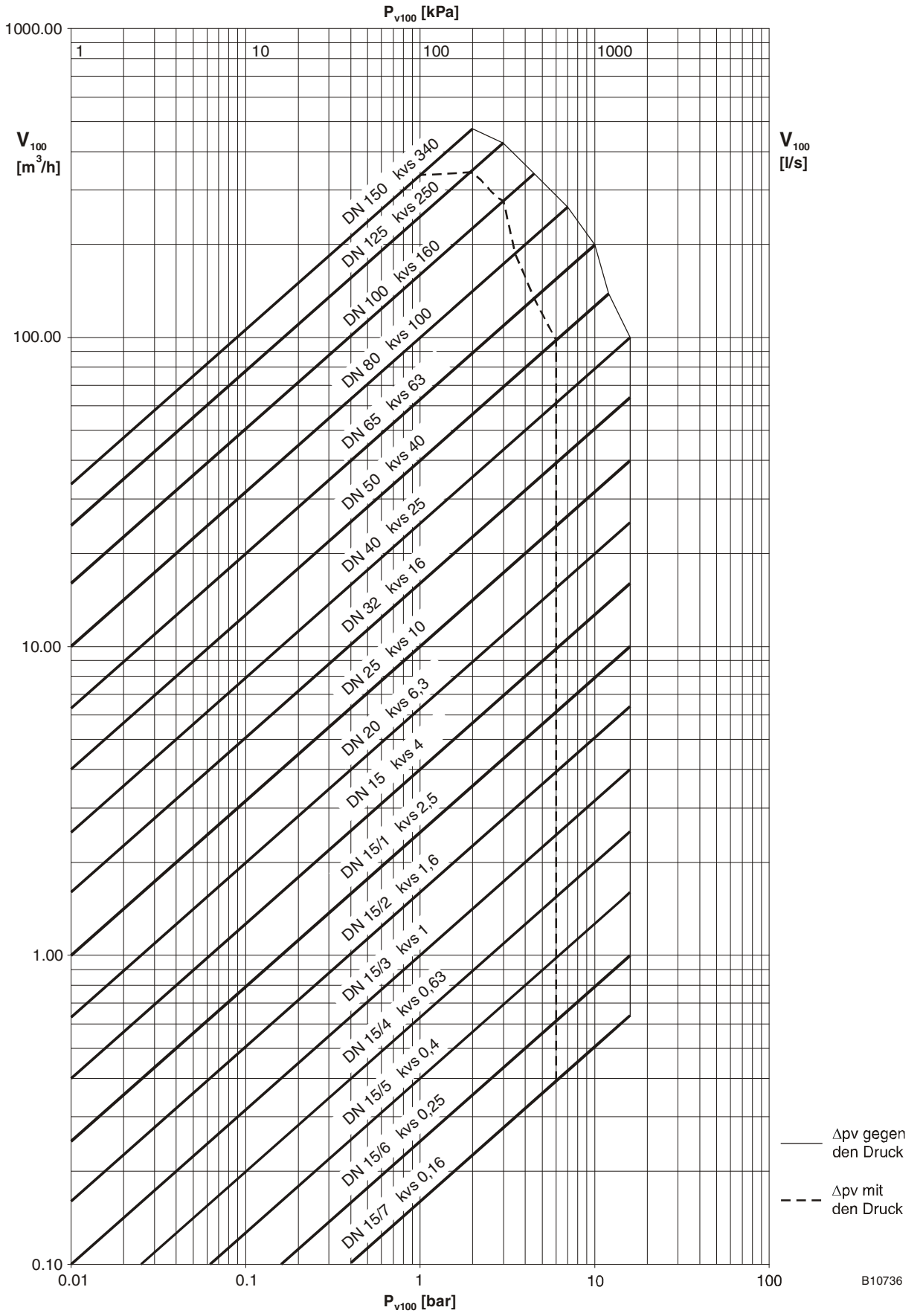
Pressure difference Δp_v is the maximum pressure that may be present on the valve, regardless of the stroke position, so that the danger of cavitation and erosion is limited. These values are independent of the drive force. Cavitation accelerates wear and causes noises. To prevent cavitation, which mainly occurs with applications involving vapour or steam, differential pressure Δp_{max} should not exceed value Δp_{krit}:

$\Delta p_{krit} = (p1 - p_v) \times 0{,}5$

p1 = upstream pressure in front of the valve (bar) p_v = steam/vapour pressure
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 Δp_{max} is exceeded, the valve may sustain damage due to cavitation and erosion. In case of a spring return function, the stated Δp_s 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 safety function with 'fast' passage through the stroke (by means of the spring), this value may exceed Δp_{max}.

Flow-rate chart BUG



Additional technical data

Type	Δpv	
	against the pressure	with the pressure
BUG 015 F334	16 bar	6 bar
BUG 015 F324	16 bar	6 bar
BUG 015 F314	16 bar	6 bar
BUG 015 F304	16 bar	6 bar
BUG 020 F304	16 bar	6 bar
BUG 025 F304	16 bar	6 bar
BUG 032 F304	16 bar	6 bar
BUG 040 F304	16 bar	6 bar
BUG 050 F304	12 bar	6 bar
BUG 065 F304	10 bar	4.5 bar
BUG 065 F316	10 bar	4.5 bar
BUG 080 F304	7 bar	3.5 bar
BUG 100 F304	4.5 bar	3 bar
BUG 125 F304	3 bar	2 bar
BUG 150 F304	2 bar	1 bar

Pressure and temperature data	EN 764. EN 1333
Parameters related to flow mechanics	EN 60534
Sauter slide rule for valve sizing	7 090011 003
Manual for slide rule	7 000129 003
Technical manual: 'Regulating Units'	7 000477 003
Parameters, installation notes, control, general	Valid EN, DIN, AD, TRD and UVV regulations
CE conformity, Pressure Equipment Directive (fluid group II)	97/23/EC
BUG 065 F316 CE symbol	Category I
BUG … with AVN 224S F132: CE-0035 symbol (look 2) page 1)	Category IV DIN 32730
BUG … without AVN 224S F132: CE-0035 symbol	Category II

Additional information

Valve body made of graphite cast iron as per EN 1563. Code EN-GJS-400-18-LT. Material number EN-JS1025 with smooth drilled flanges to EN 1092-2, form B, sealing strip. Valve body protected by matt paint to RAL 9005, dark black. Overall valve length to EN 558-1, basic series 1. Flat seal on valve body made of asbestos-free material.

DIN material numbers

	DIN material number	DIN designation
Valve body	EN-JS1025	EN-GJS-400-18-LT (GGG40.3)
Valve seat	1.4021	X 20 Cr 13
Stem	1.4305	X 8 Cr Ni S 18-9
Cone	1.4305	X 8 Cr Ni S 18-9
Conical seal	PTFE	glass-fibre reinforced
Stuffing box	CW 617 N	Cu Zn 40 Pb 2
Seal below stuffing box	CW024A	Cu-DHP

Detailed information on pressure difference definitions

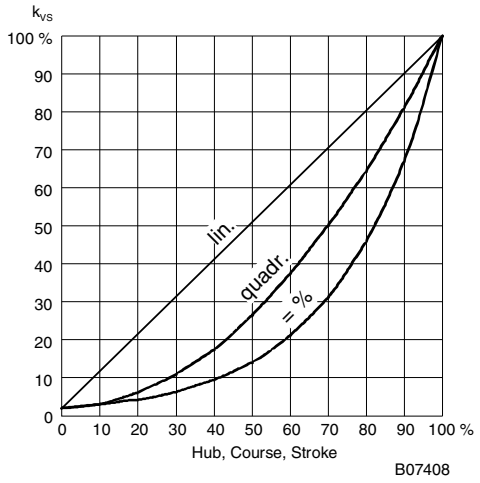
Δp_v:
Maximum permitted pressure difference across the valve for every position of the stroke, limited by noise level and erosion.
This parameter specifically characterises the hydraulic behaviour of the valve as an element through which a flow passes. Monitoring of cavitation and erosion, and the associated development of noise, will improve the valve's lifetime as well as its usability.

Δp_{max}:
Maximum permitted pressure difference across the valve at which the drive can reliably open and close the valve.
The following are taken into account: static pressure and influences related to flow mechanics. Faultless performance of the stroke and tightness are guaranteed with this value, and in no case is valve value Δp_v exceeded.

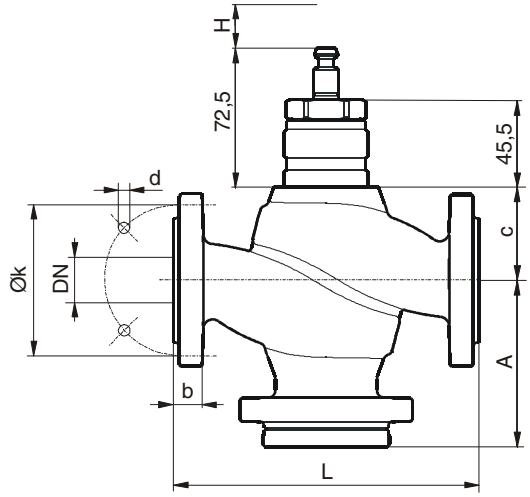
Δp_s:
Maximum permitted pressure difference across the valve in case of a fault (such as a voltage failure, excessive increase in temperature and pressure, and pipe break) at which the drive can close the valve tightly and can hold the full operating pressure against atmospheric pressure if need be. As this is a safety function with a 'fast' performance of the stroke, Δp_s may be greater than Δp_{max} or Δp_v. The disruptive influences arising here in connection with flow mechanics are quickly passed through, and are of secondary importance in this functioning mode.
For three-way valves, the values only apply to the control passage.

Δp_{stat}:
Pipe pressure upstream of the valve. Essentially corresponds to the dead pressure with the pump switched off, caused (for example) by the fluid level in the system, increase in pressure due to the pressure tank, steam pressure, etc.
For valves which close with the pressure, the static pressure added to the pump pressure must be used for this purpose.

Characteristic for drives with a positioner (only 24 V)
On drive AVM 234 S. AVF 234 S or AVN 224 S
Equal-percentage / linear / quadratic
Can be set with the code switch

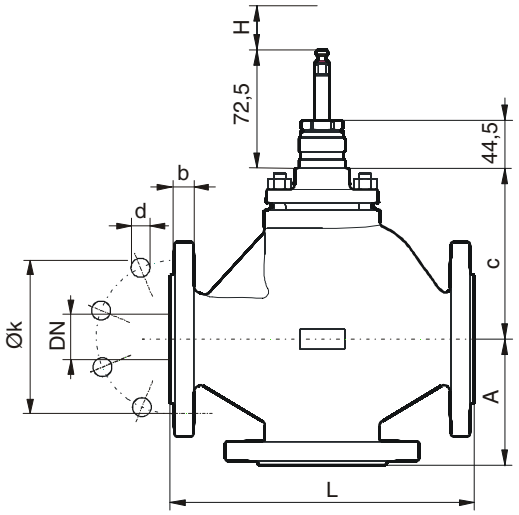


Dimension drawings



BUG	DN	A	c	L	H	k	d	b
015	15	75,5	54	130	20	65	14 x 4	14
020	20	83,5	48	150	20	75	14 x 4	16
025	25	86,5	50	160	20	85	14 x 4	16
032	32	99,5	59	180	20	100	19 x 4	18
040	40	105,5	63	200	20	110	19 x 4	19
050	50	113,5	67	230	20	125	19 x 4	19
065	65/ PN16	120,0	163	290	40	145	19 x 4	19

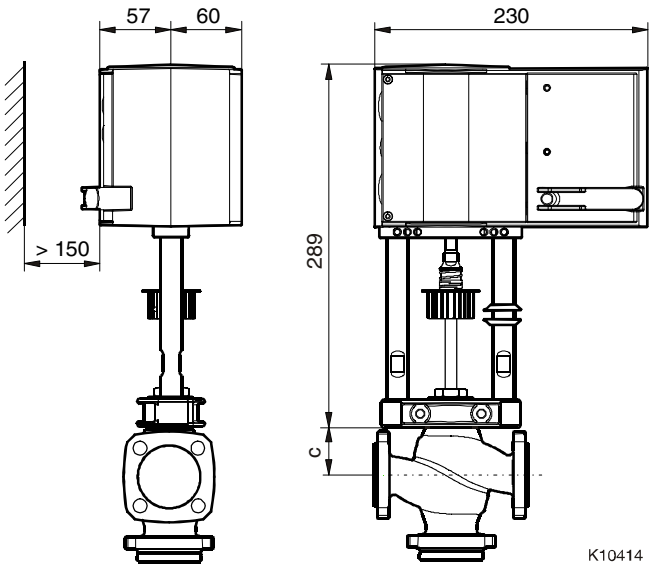
M10425c



BUG	DN	A	c	L	H	k	d	b
065	65/PN25	120	163	290	40	145	19 x 8	19
080	80	130	182	310	40	160	19 x 8	19
100	100	150	183	350	40	190	23 x 8	19
125	125	200	223	400	40	220	28 x8	19
150	150	210	257	480	40	250	28 x 8	20

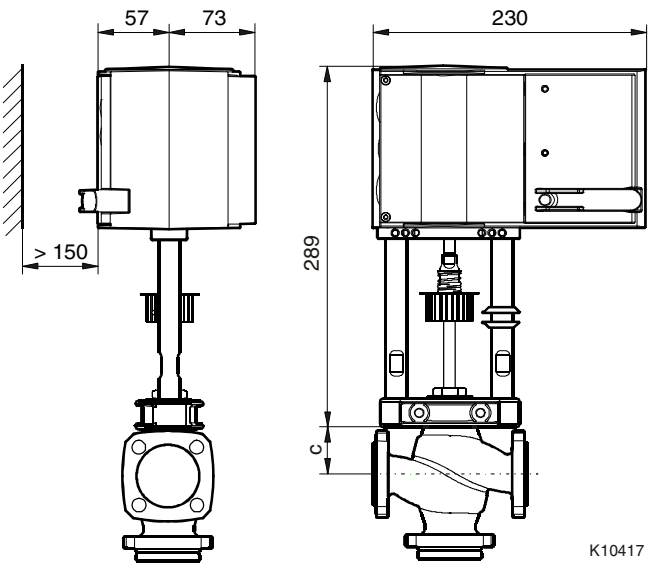
M10446c

AVM



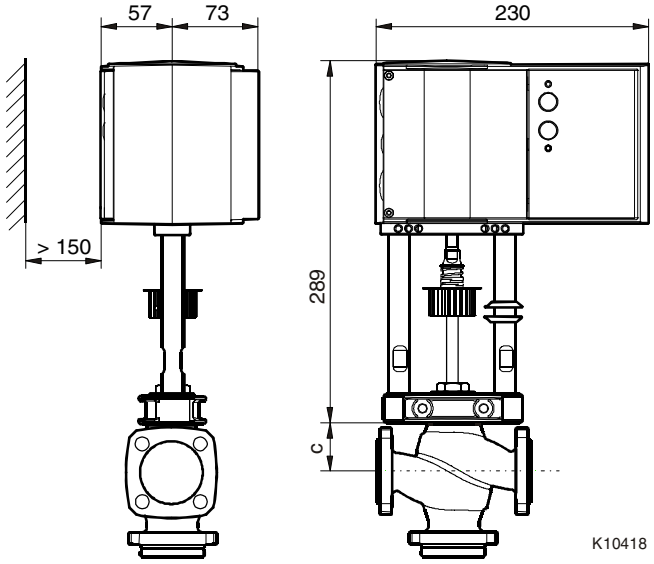
K10414

AVF



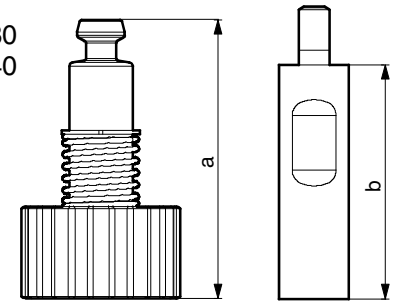
K10417

AVN



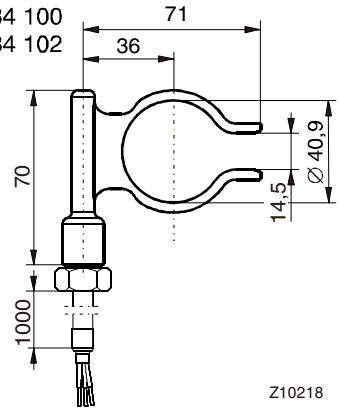
Accessories

0372336 180
0372336 240



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

0378284 100
0378284 102



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