

BUL: Unit three-way valve, PN 16

How energy efficiency is improved

Linear mixing and no losses through leakage for energy-efficient control.

Areas of application

Control valve for controlling heating zones, air secondary-treatment appliances, fan-coil units and two-wire systems with heat exchangers in combination with thermal unit valve drive AXT 211, continuous drive AXS 215S or motorised unit valve drive AXM 117(S).

Features

- Nominal pressure 16 bar
- Nominal diameter DN10 to DN20
- Equal percentage characteristic
- Linear reduced mixing passage characteristic
- Flat sealing standard version or version with compression fitting for pipe \varnothing 15 mm with DN10
- Special version for fan-coil units with cast on bypass T-piece
- If the spindle is depressed, the control passage is closed
- Use as mixing valve, diverting valve and, thanks to tightly-closing third passage, as diverting valve

Technical description

- Valve with male thread as per DIN EN ISO 228-1, Class B
- Nickel-plated cast brass valve body
- Stainless steel spindle
- Cone with soft seal made of EPDM for control passage and mixing passage
- Stuffing box with double O-ring seal

Type ¹⁾	Nominal dia. DN	k _{VS} value ²⁾ m ³ /h	Connection	Weight kg
BUL 010 F330	10	0.40	G½B	0.30
BUL 010 F320	10	0.63	G½B	0.30
BUL 010 F310	10	1.0	G½B	0.30
BUL 010 F300	10	1.6	G½B	0.30
BUL 015 F310	15	2.5	G¾B	0.33
BUL 015 F300	15	4.0	G¾B	0.33
BUL 020 F300	20	5.0	G1B	0.36
Version with T-piece bypass				
BUL 010 F430	10	0.40	G½B	0.38
BUL 010 F420	10	0.63	G½B	0.38
BUL 010 F410	10	1.0	G½B	0.38
BUL 010 F400	10	1.6	G½B	0.38
BUL 015 F410	15	2.5	G¾B	0.42
BUL 015 F400	15	4.0	G¾B	0.42
BUL 020 F400	20	5.0	G1B	0.50
Version with T-piece bypass for compression fitting for pipes of \varnothing 15 mm				
BUL 010 F630	10	0.40	–	0.38
BUL 010 F620	10	0.63	–	0.38
BUL 010 F610	10	1.0	–	0.38
BUL 010 F600	10	1.6	–	0.38

Nominal pressure	PN 16	Leakage rate	
Max. operating pressure	up to 120 °C 16 bar	control passage A-AB	0.0001% of k _{VS}
Operating temperature	2...120 °C	mixing passage B-AB	approx. 0,1% of k _{VS}
Characteristic:		Dimension drawings	M10004 , M10005
control passage	equal-percentage	Fitting instructions	MV 505864
mixing passage	linear	fitted onto AXT 211/215S	MV P100002547
Valve stroke	3.7 mm	with auxiliary contacts	
		fitted onto AXM 117/117S	MV 505456
		fitted onto AXM 117 F200	MV 505816
		Material declaration	MD 55.009

1) Do not use as through valve.

2) The k_{VS} value of the mixing passage (B-AB) is lower by approx. 30%. Therefore, the max. throughflow is practically the same as in the load-related control passage.



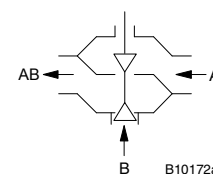
T10811



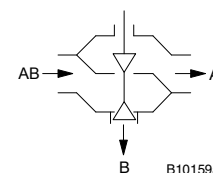
T10812



Y07545



B10172a



B10159a

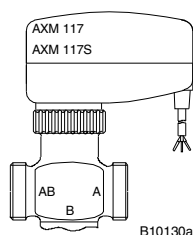
Accessories

0378133 010*	1 threaded sleeve, R 3/8 flat seal DN 10 with cap nut and flat seal
0378133 015*	1 threaded sleeve, R 1/2 flat seal DN 15 with cap nut and flat seal
0378133 020*	1 threaded sleeve, R 3/4 flat seal DN 20 with cap nut and flat seal
0378134 010*	1 solder nipple, Ø 12; flat seal DN 10, with cap nut and flat seal
0378134 015*	1 solder nipple, Ø 15; flat seal DN 15, with cap nut and flat seal
0378134 020*	1 solder nipple, Ø 22; flat seal DN 20, with cap nut and flat seal
0378135 010	1 compression fitting for pipe Ø 15 mm, DN 10
0378145 015*	1 compression fitting for pipes of Ø 15 mm, DN 15, flat seal 3/4 B
0378145 020*	1 compression fitting for pipes of Ø 22 mm, DN 20, flat seal 1 B
0378126 001	Stuffing box for BUL valves

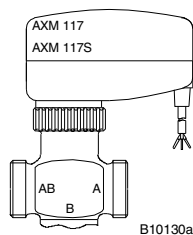
*) Dimension drawing or wiring diagram are available under the same number

Combined with a 24 V electric drive

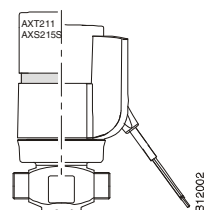
Actuator	Used as a control valve			Used as a diverting valve			AXM 117 F202	AXM 117S F.0.
	Δp_{max}	Δp_s	close/off pressure	Δp_{max}	Δp_s	close/off pressure		
BUL 010 F...	1.7	–	1.8	1.9	–	2.3		
BUL 015 F.10	1.4	–	1.5	1.2	–	1.2		
BUL 015 F.00	1.2	–	1.3	1.2	–	1.2		
BUL 020 F.00	1.0	–	1.1	1.2	–	1.2		

**Combined with a 230 V electric drive**

Actuator	Used as a control valve			Used as a diverting valve			AXM 117 F200
	Δp_{max}	Δp_s	close/off pressure	Δp_{max}	Δp_s	close/off pressure	
BUL 010 F...	1.7	–	1.8	1.9	–	4.0	
BUL 015 F.10	1.4	–	1.5	1.6	–	2.1	
BUL 015 F.00	1.2	–	1.3	1.4	–	2.1	
BUL 020 F.00	1.0	–	1.1	1.2	–	2.0	

**Combined with a thermal and continuous drive**

Actuator	Used as a control valve			Used as a diverting valve			AXT 211 F...	AXS 215S F...
	Δp_{max}	Δp_s ¹⁾	close/off pressure	Δp_{max}	Δp_s ¹⁾	close/off pressure		
BUL 010 F...	1.7	1.8	1.8	1.9	4.0	4.0		
BUL 015 F.10	1.4	1.5	1.5	1.6	2.1	2.1		
BUL 015 F.00	1.2	1.3	1.3	1.4	2.1	2.1		
BUL 020 F.00	1.0	1.1	1.1	1.2	2.0	2.0		

**Complete type code for valve and actuator with F variant**

Valve: For F variant, technical data and accessories, see table of valve types

Actuator: For F variant, technical data, accessories and fitting position, see Section 51

Example: BUL 015 F310 / AXS 215S F122

Δp_{max} [bar]= max. permissible pressure difference across the valve at which the actuator can still firmly open and close the valve. Figures stated are for a static pressure of 6 bar; at a static pressure of 16 bar, the values are reduced by 15%.

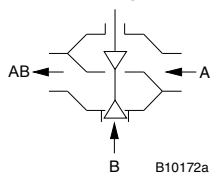
Δp_s [bar]= max. permissible pressure difference across the valve at which, in the event of a malfunction, the actuator can close the valve. The pressure difference across the valve in control mode that the force of the drive can overcome. In this mode, a reduced serviceable life can be expected. Cavitation, erosion and pressure surges may damage the valve. The values stated apply only when the valve is fitted to the actuator.

1) for NC variants only

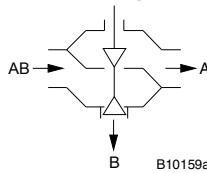
Operation

The control passage (A-AB) is closed and the mixing passage (B-AB) is opened by pressing the spindle in; it is returned by spring pressure (the spring is in the valve). The AXT 211 thermal drive can be used to move the valve to the OPEN or CLOSED position. Used in combination with the 'normally closed' drive version, the control passage closes in the event of power failure.

Used as a mixing valve



Used as a diverting valve



Used with the AXS 215S actuator, the valve can be moved to any position. Depending on the settings of the DIP switches, the valve is moved continuously with a control voltage of 0...10 V / 10...0 V or 2...10 V / 10...2 V. The control signal is then assigned linearly to the valve stroke and provides the equal-percentage characteristic in the valve. The positioner integrated within the actuator controls the actuator in relation to the settings of the DIP switches and the positioning signal y . The actuator positions the valve and, as soon as the position has been reached, it stops.

Used with the AXM 117 motorised drive, the valve can be moved to any position. On the AXM 117S (with positioner), the valve is moved continuously by a control voltage of 0...10V-. Variants: F202 opens (and F302 closes) the control passage as the control voltage rises.

Used with a continuous drive (0...10 V), the practically equal-percentage characteristic provides optimum control.

The k_{VS} values in the bypass are about 30% less than those of the control passage. Therefore, the flow resistance of the load is taken into account, so that the total throughflow in every stroke position remains fairly constant. The practically equal-percentage characteristic in the control passage provides optimum control when used together with a continuous 0...10 V drive.

Engineering and fitting notes

The final control element can be fitted in any position except facing downwards. The ingress of condensate, dripping water etc. into the drive should be prevented.

In order to prevent cavitation noise from affecting rooms where quietness is essential, the pressure difference across the valve should not exceed the following values:-

BUL 010 F .30 = 0.5 bar, F .20 = 0.6 bar / F .10 and F .00 = 0.8 bar

BUL 015 F .10 = 0.6 bar, F .00 = 0.8 bar

BXL 020 F .00 = 0.5 bar

In order to restrain contaminants in the water (e.g. welding beads, rust particles etc.) and prevent the spindle seal from being damaged, we recommend the employment of collective filters, e.g. for each floor or feed pipe. The composition of the water should be in accordance with VDI 2035. Medium with coolant such as glycol, min. 16% max. 40%.

When insulating the unit valve, the insulation should not extend beyond the cap nut or the bayonet ring on the drive.

Additional technical data

Valve body and T-piece of nickel-plated chill cast and male thread as per ISO 228/1 Class B, flat seal on body. stuffing box with O-ring of ethylene-propylene, cone of brass with EPDM sealing ring and spindle of stainless steel, protective cap (or manual-adjustment knob) of plastic.

Material numbers as per DIN

	DIN material no.	DIN code
Valve body	CC 754S-GM	Cu Zn 39 Pb 1 Al-C as per EN1982
Valve seat	CC 754S-GM	Cu Zn 39 Pb 1 Al-C as per EN1982
Spindle	1.4305	X 8 Cr Ni S 18-9 as per EN188-1
Plug	CW617N	Cu Zn 40 Pb 2 as per EN12164
Stuffing box	CW617N	Cu Zn 40 Pb 2 as per EN12164

Additional technical data

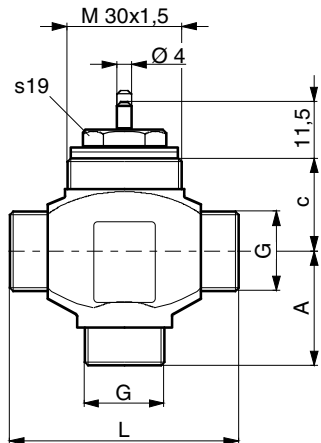
Valve	k_{VS} value in m ³ /h	
	Control passage	Mixing passage
BUL 010 F .30	0.40	0.30
BUL 010 F .20	0.63	0.47
BUL 010 F .10	1.0	0.75
BUL 010 F .00	1.6	1.2
BUL 015 F .10	2.5	1.9
BUL 015 F .00	4.0	3.0
BUL 020 F .00	5.0	3.8

Technical information

- Pressure and temperature specifications
- Flow parameters
- Sauter slide rule for valve sizing
- Slide rule manual
- PC program: Valve and drive sizing
- Valvedim.exe
- Technical manual: 'Regulating units'
- CE conformity: Directive on Pressure Equipment 97/23/EC Article 3.3

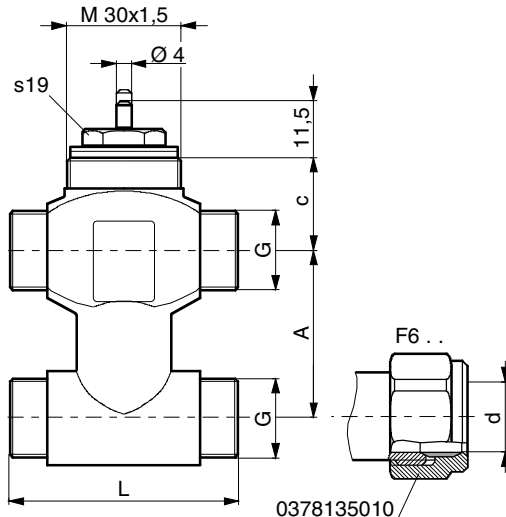
EN764, EN1333
 VDI/VDE 2173
 7 090011 003
 7 000129 003
 7 000675 003
 7 000477 003

Dimension drawings



Type	A	c	G	L
BUL 010 F3 ..	30	27	G1/2B	60
BUL 015 F3 ..	30	27	G3/4B	60
BUL 020 F3 ..	30	27	G 1B	60

M10004



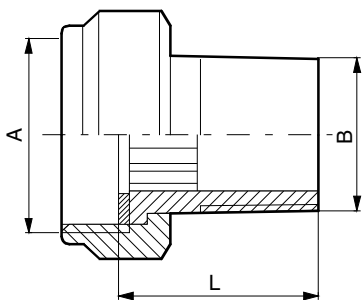
Type	A	c	G	L	d
BUL 010 F4 ..	40	27	G1/2B	60	-
BUL 015 F4 ..	40	27	G3/4B	60	-
BUL 020 F4 ..	50	27	G1B	60	-
BUL 010 F6 ..	40	27	G1/2B	60	15

M10005a

Accessories

Screw-type fitting

378133

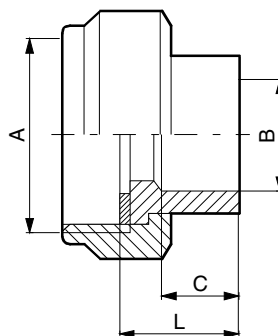


DN	A	B	L
10	G1/2	R3/8	24
15	G3/4	R1/2	27,5
20	G1	R3/4	32,5

M10143

Soldered fitting

378134

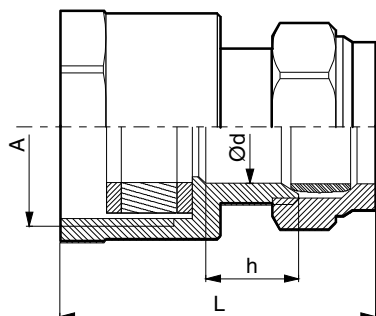


DN	A	B	C	L
10	G1/2	12	8,6	14
15	G3/4	15	10,6	15,5
20	G1	22	15,4	20

M10144

Compression fitting

0378145



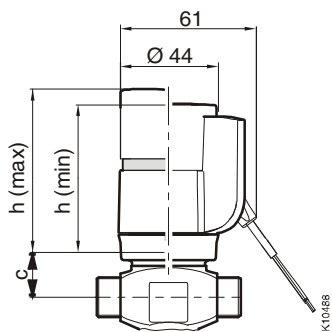
DN	A	L	Ød	h
15	G3/4	39	15,2	12,5
20	G1	41,5	22,2	16

Z10211

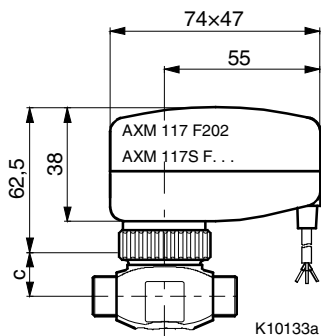
Assembly

Combinations with AXT thermal drive and AXM motorised drive

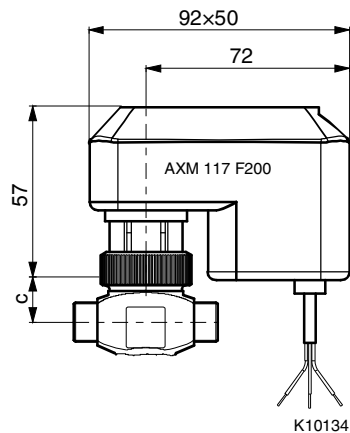
AXT 211/AXS 215S



AXM 117/117S



AXM 117 F200



	h (min)	h (max)
NC	59	66
NO	59	64
manual	66.5	73.5

Table of pressure losses for VUL and BUL valves

