

## BUL: Unit three-way valve, PN 16

Used as a mixing, diverting or change-over valve in conjunction with either the AXT 111 thermal drive for unit valves, the continuous AXS 111S drive or the AXM 117(S) motorised drive for unit valves for controlling heating zones, air secondary-treatment appliances, fan convectors and two-wire systems with heat exchanger.

Valve and drive are assembled either by simply screwing together or by using the bayonet fitting. Nickel-plated valve body of cast brass, with male thread, without cap nut. Spindle of stainless steel with soft-sealing valve cone for control and mixing passages. Characteristic practically equal-percentage. The flow through the mixing passage has been reduced by 30%. Stuffing box with double O-ring seal. The control passage A-AB is closed when the spindle is pressed in.

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

Nominal pressure	PN 16	Leakage rate: control passage	0.0001% of $k_{vs}$
Max. operating pressure	up to 120 °C 16 bar	Leakage rate: mixing passage	approx. 0.1% of $k_{vs}$
Operating temperature	2...120 °C	Dimension drawings	<a href="#">M10004</a> , <a href="#">M10005</a>
Characteristic:		Fitting instructions	<a href="#">MV 505864</a>
control passage	equal-percentage	fitted onto AXT 111	<a href="#">MV 505511</a>
mixing passage	linear	with auxiliary contacts	<a href="#">MV 505822</a>
Valve stroke	3.7 mm	fitted onto AXS 111S	<a href="#">MV 505821</a>
		fitted onto AXM 117/117S	<a href="#">MV 505456</a>
		fitted onto AXM 117 F200	<a href="#">MV 505816</a>
		Declaration of materials	<a href="#">MD 55.009</a>

### Accessories

<b>0378133 010*</b>	1 threaded sleeve, R ⅜ flat seal DN 10 with cap nut and flat seal
<b>0378133 015*</b>	1 threaded sleeve, R ½ flat seal DN 15 with cap nut and flat seal
<b>0378133 020*</b>	1 threaded sleeve, R ¾ flat seal DN 20 with cap nut and flat seal
<b>0378134 010*</b>	1 solder nipple, Ø 12; flat seal DN 10, with cap nut and flat seal
<b>0378134 015*</b>	1 solder nipple, Ø 15; flat seal DN 15, with cap nut and flat seal
<b>0378134 020*</b>	1 solder nipple, Ø 22; flat seal DN 20, with cap nut and flat seal
<b>0378135 010</b>	1 compression fitting for pipe Ø 15 mm, DN 10
<b>0378145 015*</b>	1 compression fitting for pipes of Ø 15 mm, DN 15, flat seal ¾ B
<b>0378145 020*</b>	1 compression fitting for pipes of Ø 22 mm, DN 20, flat seal 1 B
<b>0378126 001</b>	Stuffing box for BUL valves

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

1) 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.



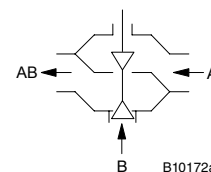
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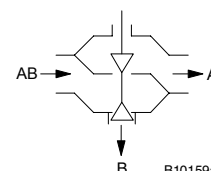
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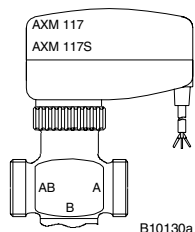
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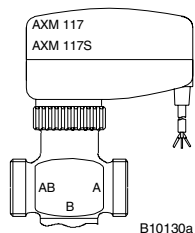
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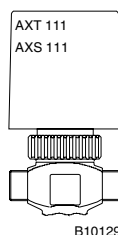
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**Combined with a 24 V electric drive****AXM 117 F202****AXM 117S F...**

Actuator	Used as a control valve			Used as a diverting valve		
	Valve	$\Delta p_{\max}$	$\Delta p_s$	close/off pressure	$\Delta p_{\max}$	$\Delta p_s$
BUL 010 F3 ..	1.7	–	1.8	1.9	–	2.3
BUL 015 F310	1.4	–	1.5	1.2	–	1.2
BUL 015 F300	1.2	–	1.3	1.2	–	1.2
BUL 020 F300	1.0	–	1.1	1.2	–	1.2

**Combined with a 230 V electric drive****AXM 117 F200**

Actuator	Used as a control valve			Used as a diverting valve		
	Valve	$\Delta p_{\max}$	$\Delta p_s$	close/off pressure	$\Delta p_{\max}$	$\Delta p_s$
BUL 010 F3 ..	1.7	–	1.8	1.9	–	4.0
BUL 015 F310	1.4	–	1.5	1.6	–	2.1
BUL 015 F300	1.2	–	1.3	1.4	–	2.1
BUL 020 F300	1.0	–	1.1	1.2	–	2.0

**Combined with a thermal and continuous drive****AXT 111 F...****AXS 111S F...**

Actuator	Used as a control valve			Used as a diverting valve		
	Valve	$\Delta p_{\max}$	$\Delta p_s$	close/off pressure	$\Delta p_{\max}$	$\Delta p_s$
BUL 010 F3 ..	1.7	1.8	1.8	1.9	4.0	4.0
BUL 015 F310	1.4	1.5	1.5	1.6	2.1	2.1
BUL 015 F300	1.2	1.3	1.3	1.4	2.1	2.1
BUL 020 F300	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

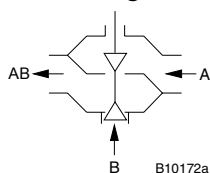
Example: BUL 015 F310 / AXM 117S F202

$\Delta p_{\max}$ [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%.
$\Delta p_s$ [bar]=	Max. permissible pressure difference across the valve at which, in the event of a malfunction, the actuator can close the valve.
Close/off pressure	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.

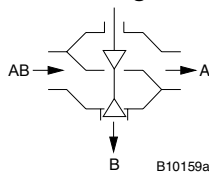
**Operation**

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 111 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 AXM 111S drive, the valve can be moved to any position. Depending on the way the control voltage is connected, the valve is moved continuously with a control voltage of 0...10 V. Connected to red cable: the control passage opens as the control voltage rises. Connected to white cable: the control passage closes as the control voltage rises.

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

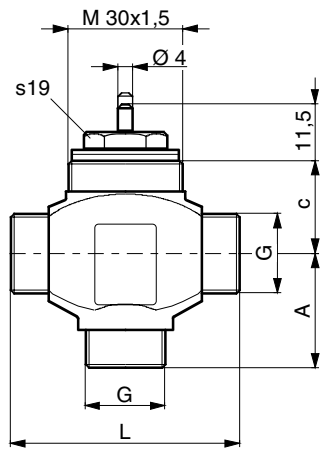
**Additional technical data**

Valve	$k_{VS}$ value in m <sup>3</sup> /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**

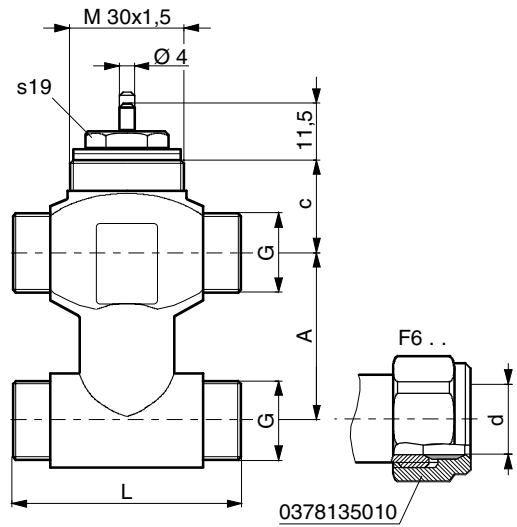
- Pressure and temperature specifications EN764, EN1333
- Flow parameters VDI/VDE 2173
- Sauter slide rule for valve sizing 7 090011 003
- Slide rule manual 7 000129 003
- PC program: Valve and drive sizing 7 000675 003
- Valvedim.exe 7 000477 003
- Technical manual: 'Regulating units'
- CE conformity: Directive on Pressure Equipment 97/23/EG Article 3.3

**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



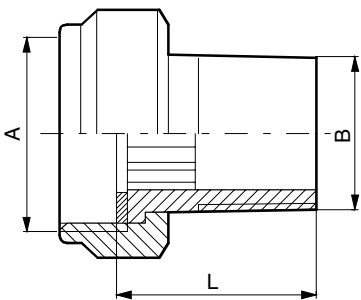
Type	A	c	G	L	d
BUL 010 F4 ..	40	27	G1/2B	60	-
BUL 015 F4 ..	40	27	G3/4B	60	-
BUL 020 F4 ..	50	27	G1B	60	-
BUL 010 F6 ..	40	27	G1/2B	60	15

M10005a

**Accessories**

Screw-type fitting

378133

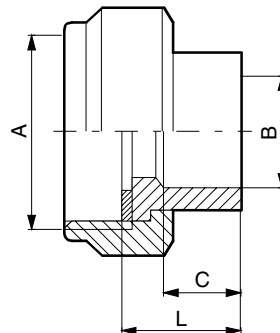


DN	A	B	L
10	G1/2	R3/8	24
15	G3/4	R1/2	27,5
20	G1	R3/4	32,5

M10143

Soldered fitting

378134

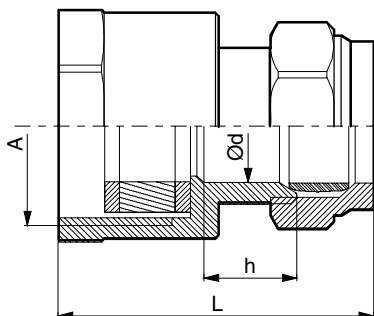


DN	A	B	C	L
10	G1/2	12	8,6	14
15	G3/4	15	10,6	15,5
20	G1	22	15,4	20

M10144

Compression fitting

0378145



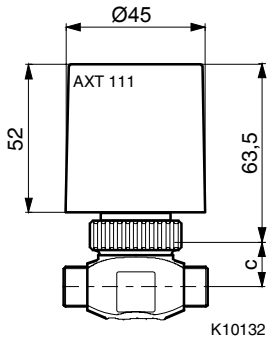
DN	A	L	Ød	h
15	G3/4	39	15,2	12,5
20	G1	41,5	22,2	16

Z10211

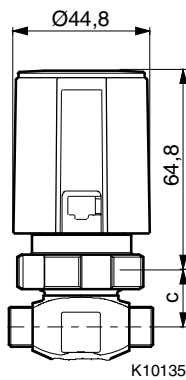
**Assembly**

Combinations with AXT thermal drive and AXM motorised drive

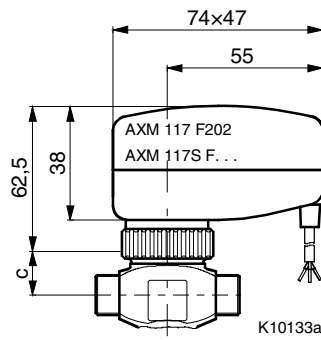
AXT 111



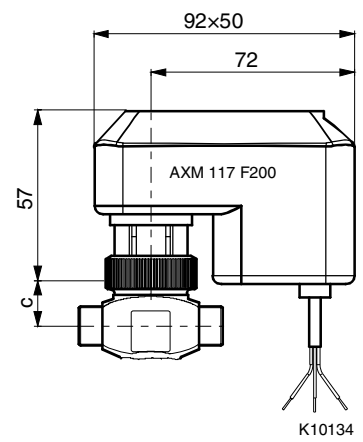
AXS 111S



AXM 117/117S



AXM 117 F200



**Table of pressure losses for VUL and BUL valves**

