

BUL: 3-way unit valve, PN 16

How energy efficiency is improved

Linear mixture and no loss through leakage in the control passage for energy-efficient regulation

Features

- Ideally suited for AXF 217S, AXM 217(S), AXS 315S and AXT 301 unit valve actuators
- Flat-sealing standard version or version with clamping ring screw fitting for pipe Ø 15 mm with DN 10
- Valve with male thread as per DIN EN ISO 228-1, class B
- Special model for fan coil units with cast-on bypass T-piece
- Control passage A–AB is closed when the spindle is moved in
- Can be used as a control valve and, thanks to its tight-sealing third passage, as a distribution valve
- Valve body made of nickel-plated cast brass
- Plug with EPDM soft seal for control passage and mixing passage
- Stainless-steel spindle
- Stuffing box with double O-ring seal

Technical data

Parameters		
Nominal pressure		PN 16
Operating pressure		Max. 16 bar (up to 120 °C)
Operating temperature		2...120 °C
Control passage valve characteristic		Equal percentage
Mixing passage valve characteristic		Linear
Valve stroke		3.7 mm
Leakage rate of control passage A–AB		0.0001% of K_{VS} value
Leakage rate of mixing passage B–AB		Approx. 0.1% of K_{VS} value
Ambient conditions		
Operating temperature at valve		Max. 100 °C in combination with AXF 217S, AXM 217(S), AXS 315S and AXT 301
Standards, directives		
Pressure and temperature data		EN 764, EN 1333
Flow parameter		VDI/VDE 2173
PED 2014/68/EU		Fluid group II, No CE label (article 4.3)

Overview of types

i The BUL 3-way valve must not be used as a 2-way valve

i K_{VS} value: The K_{VS} value of the mixing passage (B–AB) is approx. 30% lower

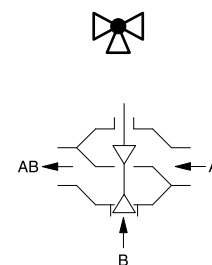
Type	Nominal diameter	K_{VS} value	Connection	Weight
BUL010F330	DN 10	0.4 m³/h	G½" B	0.30 kg
BUL010F320	DN 10	0.63 m³/h	G½" B	0.30 kg
BUL010F310	DN 10	1 m³/h	G½" B	0.30 kg
BUL010F300	DN 10	1.6 m³/h	G½" B	0.30 kg
BUL015F310	DN 15	2.5 m³/h	G¾" B	0.33 kg
BUL015F300	DN 15	4 m³/h	G¾" B	0.33 kg
BUL020F300	DN 20	5 m³/h	G1" B	0.36 kg
BUL010F430	DN 10	0.4 m³/h	G½" B	0.38 kg
BUL010F420	DN 10	0.63 m³/h	G½" B	0.38 kg
BUL010F410	DN 10	1 m³/h	G½" B	0.38 kg
BUL010F400	DN 10	1.6 m³/h	G½" B	0.38 kg
BUL015F410	DN 15	2.5 m³/h	G¾" B	0.42 kg



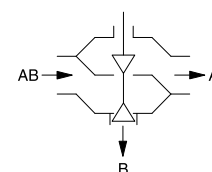
BUL015F310



BUL010F410



Control valve



Distribution valve



Type	Nominal diameter	K_{vs} value	Connection	Weight
BUL015F400	DN 15	4 m ³ /h	G $\frac{3}{4}$ " B	0.42 kg
BUL020F400	DN 20	5 m ³ /h	G1" B	0.50 kg
BUL010F630	DN 10	0.4 m ³ /h	Clamping ring version Ø 15 mm	0.38 kg
BUL010F620	DN 10	0.63 m ³ /h	Clamping ring version Ø 15 mm	0.38 kg
BUL010F610	DN 10	1 m ³ /h	Clamping ring version Ø 15 mm	0.38 kg
BUL010F600	DN 10	1.6 m ³ /h	Clamping ring	0.38 kg

 **BUL0**F4****: Version with bypass T-piece

Accessories

Type	Description
0378133010	Threaded sleeve, R $\frac{3}{8}$, flat-sealing, with cap nut and flat seal, G $\frac{1}{2}$ - R $\frac{3}{8}$
0378133015	Threaded sleeve, R $\frac{1}{2}$, flat-sealing, with cap nut and flat seal, G $\frac{3}{4}$ - R $\frac{1}{2}$
0378133020	Threaded sleeve, R $\frac{3}{4}$, flat-sealing, with cap nut and flat seal, G1 - R $\frac{3}{4}$
0378134010	Solder nipple, Ø 12, flat-sealing, with cap nut and flat seal, G $\frac{1}{2}$
0378134015	Solder nipple, Ø 15, flat-sealing, with cap nut and flat seal, G $\frac{3}{4}$
0378134020	Solder nipple, Ø 22, flat-sealing, with cap nut and flat seal, G1
0378135010	Clamping ring screw fitting for pipe Ø 15 mm, DN 10
0378145015	Clamping ring screw fitting for pipe Ø 15 mm, DN 15, flat-sealing, G $\frac{3}{4}$
0378145020	Clamping ring screw fitting for pipe Ø 22 mm, DN 20, flat-sealing, G1
0378126001	Stuffing box for BUL valves
0378126002	Stuffing box for BUL valves as of manufacturing date 1501

Combination of BUL with electric actuators

- i Warranty:** The technical data and pressure differences indicated here are applicable only in combination with SAUTER valve actuators. Any warranty will be invalidated if used with valve actuators from other manufacturers.
- i Definition of Δp_s :** Maximum admissible pressure drop in the event of a malfunction (pipe break after the valve) at which the actuator reliably closes the valve.
- i Definition of Δp_{max} :** Maximum admissible pressure drop in control mode at which the actuator reliably opens and closes the valve.

Pressure differences with motorised actuators

Actuator	AXF217SF404 AXF217SF405 AXM217SF402 AXM217SF404	AXM217F200	AXM217F202
Voltage	24 VAC/DC	230 VAC	24 VAC/DC
Control signal	0/2...10 V, 0...5 V, 5...10 V, 0/4...20 mA	2-/3-point	2-/3-point
Running time	8 s/mm	13 s/mm	13 s/mm
As control valve	Δp_{max} [bar]	Δp_{max} [bar]	Δp_{max} [bar]
BUL010F330 BUL010F320 BUL010F310 BUL010F300 BUL010F430 BUL010F420 BUL010F410 BUL010F400 BUL010F630 BUL010F620 BUL010F610 BUL010F600	1.7	1.7	1.7
BUL015F310 BUL015F410	1.4	1.4	1.4
BUL015F300 BUL015F400	1.2	1.2	1.2

Actuator	AXF217SF404 AXF217SF405 AXM217SF402 AXM217SF404	AXM217F200	AXM217F202
BUL020F300 BUL020F400	1.0	1.0	1.0
As distribution valve	Δp_{max} [bar]	Δp_{max} [bar]	Δp_{max} [bar]
BUL010F330 BUL010F320 BUL010F310 BUL010F300 BUL010F430 BUL010F420 BUL010F410 BUL010F400 BUL010F630 BUL010F620 BUL010F610 BUL010F600	1.9	1.9	1.9
BUL015F310 BUL015F300 BUL020F300 BUL015F410 BUL015F400 BUL020F400	1.2	1.2	1.2

Pressure differences with thermal actuators

Actuator	AXT301F100 AXT301F110		AXT301F102 AXT301F112		AXT301F210	AXT301F212	AXT301HF110		AXT301HF112	
Voltage	230 VAC		24 VAC/DC		230 VAC	24 VAC/DC	230 VAC		24 VAC/DC	
Control signal	2-point		2-point		2-point	2-point	2-point		2-point	
Running time	48 s/mm		48 s/mm		48 s/mm	48 s/mm	52 s/mm		52 s/mm	
As control valve	Δp_{max} [bar]	Δp_s [bar]	Δp_{max} [bar]	Δp_s [bar]	Δp_{max} [bar]	Δp_{max} [bar]	Δp_{max} [bar]	Δp_s [bar]	Δp_{max} [bar]	Δp_s [bar]
BUL010F330 BUL010F320 BUL010F310 BUL010F300 BUL010F430 BUL010F420 BUL010F410 BUL010F400 BUL010F630 BUL010F620 BUL010F610 BUL010F600	1.7	1.8	1.7	1.8	1.7	1.7	1.7	1.8	1.7	1.8
BUL015F310 BUL015F410	1.4	1.5	1.4	1.5	1.4	1.4	1.4	1.5	1.4	1.5
BUL015F300 BUL015F400	1.2	1.3	1.2	1.3	1.2	1.2	1.2	1.3	1.2	1.3
BUL020F300 BUL020F400	1.0	1.1	1.0	1.1	1.0	1.0	1.0	1.1	1.0	1.1
As distribution valve	Δp_{max} [bar]	Δp_s [bar]	Δp_{max} [bar]	Δp_s [bar]	Δp_{max} [bar]	Δp_{max} [bar]	Δp_{max} [bar]	Δp_s [bar]	Δp_{max} [bar]	Δp_s [bar]
BUL010F330 BUL010F320 BUL010F310 BUL010F300 BUL010F430 BUL010F420 BUL010F410 BUL010F400 BUL010F630 BUL010F620 BUL010F610 BUL010F600	1.9	4.0	1.9	4.0	1.9	1.9	1.9	4.0	1.9	4.0

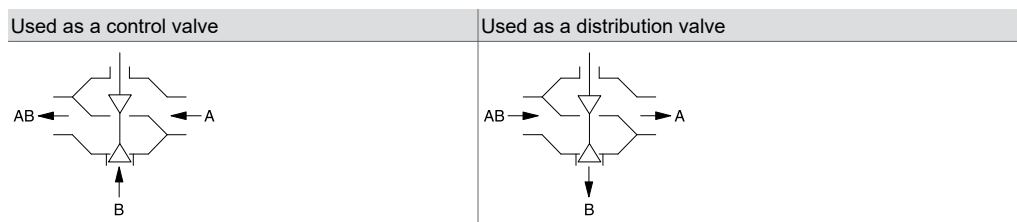
Actuator	AXT301F100		AXT301F102		AXT301F210	AXT301F212	AXT301HF110		AXT301HF112	
	AXT301F110		AXT301F112							
BUL015F310 BUL015F410	1.6	2.1	1.6	2.1	1.6	1.6	1.6	2.1	1.6	2.1
BUL015F300 BUL015F400	1.4	2.1	1.4	2.1	1.4	1.4	1.4	2.1	1.4	2.1
BUL020F300 BUL020F400	1.2	2.0	1.2	2.0	1.2	1.2	1.2	2.0	1.2	2.0

Pressure differences with thermal continuous actuators

Actuator	AXS315SF102		AXS315SF202	
Voltage	24 VAC/DC		24 VAC/DC	
Control signal	0...10 V		0...10 V	
Running time	30 s/mm		30 s/mm	
As control valve	Δp_{\max} [bar]	Δp_s [bar]	Δp_{\max} [bar]	
BUL010F330 BUL010F320 BUL010F310 BUL010F300 BUL010F430 BUL010F420 BUL010F410 BUL010F400 BUL010F630 BUL010F620 BUL010F610 BUL010F600	1.7	1.8	1.7	
BUL015F310 BUL015F410	1.4	1.5	1.4	
BUL015F300 BUL015F400	1.2	1.3	1.2	
BUL020F300 BUL020F400	1.0	1.1	1.0	
As distribution valve	Δp_{\max} [bar]	Δp_s [bar]	Δp_{\max} [bar]	
BUL010F330 BUL010F320 BUL010F310 BUL010F300 BUL010F430 BUL010F420 BUL010F410 BUL010F400 BUL010F630 BUL010F620 BUL010F610 BUL010F600	1.9	4.0	1.9	
BUL015F310 BUL015F410	1.6	2.1	1.6	
BUL015F300 BUL015F400	1.4	2.1	1.4	
BUL020F300 BUL020F400	1.1	1.2	1.2	

Description of operation

The BUL 3-way valve can be moved to any intermediate position with a thermal or motorised actuator. When the spindle is pressed in, the control passage (passage A-AB) is closed and the mixing passage B-AB is open. It is reset by spring force in the valve.



The BUL is used as a control or distribution valve in heating and cooling circuits of HVAC installations and may only be used for these purposes. The direction of flow is marked on the valve.

The valve can be moved to the open or closed positions with the thermal actuator for unit valves AXT 301. In combination with the NC (normally closed) version of the actuator, the control passage of the valve closes in the event of a power failure.

The valve can be moved to any position with the AXS 315S continuous actuator for unit valves. The positioner integrated in the actuator controls the actuator depending on positioning signal y.

The valve can be moved to any position with the AXM 217 motorised actuator for unit valves. With the AXF 217S and AXM 217S types (with positioner), the valve is continuously adjusted with a 0...10 V or 4...20 mA control signal.

The kvs values in the bypass are reduced by approx. 30% compared to the kvs values of the control passage. This takes into account the flow rate resistance of the consumer, so that the total flow rate remains as constant as possible in every stroke position. The practically equal-percentage characteristic in the control passage allows optimal control together with a continuous 0...10 V actuator.

Intended use

This product is only allowed to be used in HVAC building systems for control and regulation purposes. Other uses require the prior consent of the manufacturer.

The section "Description of operation" and all product instructions in this data sheet must be observed.

Modifying or converting the product is not permitted.

Improper use

The product is not suitable for:

- Safety applications
- Drinking water installations



Notice in accordance with California Proposition 65

The product contains lead. To be marketed in North America, the appropriate warnings must be affixed to the product or packaging.

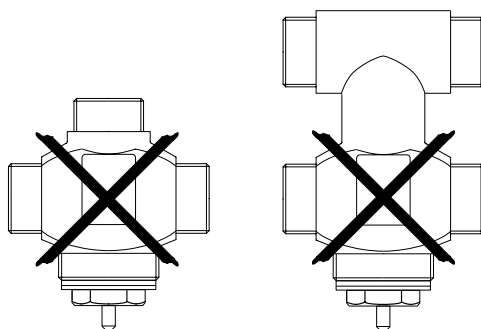
Engineering and fitting notes

The valve may only be insulated up to the level of the cap nut or bayonet ring of the actuator.

The stuffing box must not be replaced when the valve is pressurised. The stuffing box is sealed against the medium.

Fitting position

Do not install the valve in a suspended position. The control unit could be damaged by the ingress of condensate or dripping water.



Using with water

To increase the functional reliability of the valve, the system should conform to DIN EN 14336 (heating systems in buildings). The standard states, amongst other things, that the system has to be flushed through before being put into service.

So that impurities are retained in the water (e.g. weld beads, rust particles, etc.) and the spindle seal is not damaged, we recommend installing collecting filters, for example one for each floor or pipe run. Requirements for water quality as per VDI 2035.

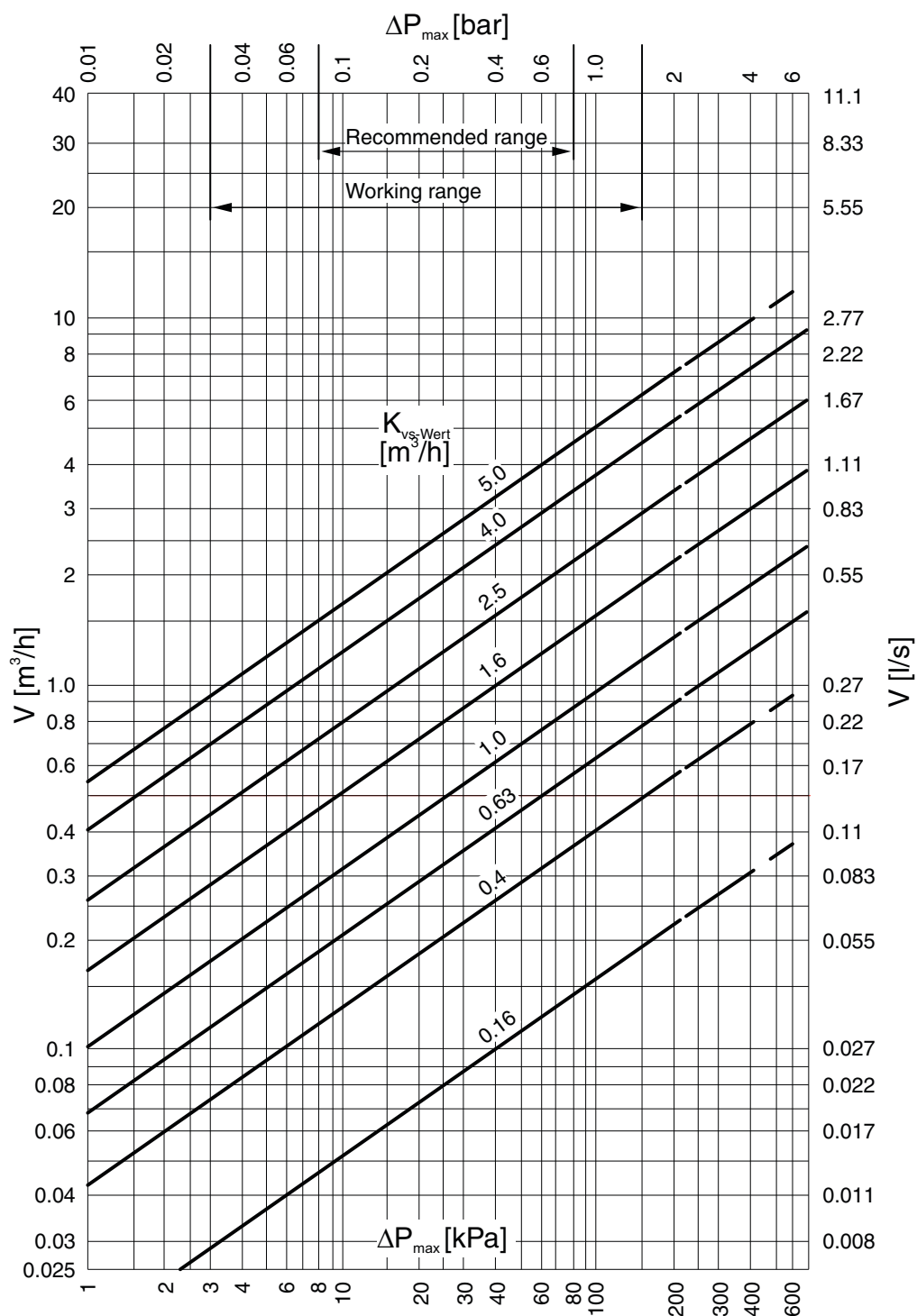
When using an additive in the water, the compatibility of the valve materials must be checked with the manufacturer of the medium. The materials table shown below may be used. When glycol is used, the recommended concentration is between 16% and 40%.

Hydraulics and noise in plants

The valve can be used in a low-noise environment. To prevent flow noise, the pressure difference Δp_{\max} across the valve should not exceed the following values:

Valve	Δp_{\max}
BUL010F*30	0.5 bar
BUL010F*20	0.6 bar
BUL010F*10	0.8 bar
BUL010F*00	0.8 bar
BUL015F*10	0.6 bar
BUL015F*00	0.8 bar
BUL020F*00	0.5 bar

Flow-rate chart



k_{vs} value in m^3/h

Valve	Control passage	Mixing passage
BUL010F*30	0.40	0.30
BUL010F*20	0.63	0.47
BUL010F*10	1.0	0.75
BUL010F*00	1.6	1.2
BUL015F*10	2.5	1.9
BUL015F*00	4.0	3.0
BUL020F*00	5.0	3.8

Additional information

	Document no.
Fitting instructions for BUL	P100011092
Fitting instructions for AXF 217S	P100019389
Fitting instructions for AXM 217/217S	P100011418
Fitting instructions for AXS 315S	P100019937
Fitting instructions for AXT 301	P100019922
SAUTER slide rule for valve sizing	P100013496
Manual for SAUTER slide rule	7000129001
Declaration on materials and the environment	MD 55.009



Valve design

SAUTER provides various tools for valve design and engineering:

- ValveDim smartphone app
- ValveDim PC program
- ValveDim slide rule

You can find the tools under the link www.sauter-controls.com/en/performance/valve-calculation/ or scan the QR code



Design and materials

Valve body and T-piece made of permanent mould casting nickel-plated, and male thread as per ISO 228/1, class B, flat seal on body. Stuffing box with O-ring made of ethylene propylene, plug made of brass with EPDM sealing ring and spindle made of stainless steel, protective cap (or manual adjustment knob) made of plastic.

Material numbers as per DIN

	DIN/EN material no.	DIN/EN designation
Valve body	CC754S	CuZn39Pb1Al-C as per EN 1982
Valve seat	CC754S	CuZn39Pb1Al-C as per EN 1982
Spindle	1.4305	X8CrNiS18-9 as per EN 10088-1
Plug	CW617N	CuZn40Pb2 as per EN 12164
Stuffing box	CW617N	CuZn40Pb2 as per EN 12164

Definition of pressure differences

- Δp_v :** Maximum admissible pressure difference over the valve at every stroke position, limited by noise level and erosion. With this parameter, the valve is characterised as a flow element with specific hydraulic behaviour. Monitoring the cavitation and erosion along with the associated noise increases both the service life and the operational capacity.
- Δp_{max} :** Maximum admissible pressure difference over the valve at which the actuator can reliably open and close the valve. The following are considered: Static pressure and flow effects. This value ensures trouble-free stroke movement and tightness. The value Δp_v of the valve is never exceeded.
- Δp_s :** Maximum admissible pressure difference over the valve in the event of a malfunction (e.g. power failure, excessive temperature or pressure, pipe break) at which the actuator can close the valve tightly and, if necessary, maintain the entire operating pressure against atmospheric pressure. Because this is a safety function with a rapid stroke movement, Δp_s can be greater than Δp_{max} or Δp_v . The flow disturbing effects that arise here are quickly passed through. They are of secondary importance with this method of operation. For 3-way valves, the values only apply to the control passage.
- Δp_{stat} :** Line pressure behind the valve. This essentially corresponds to the idle pressure when the pump is switched off, caused for example by the fluid level in the system, increased pressure due to pressure tanks or steam pressure. For valves that close with pressure, the static pressure plus the pump pressure are used.

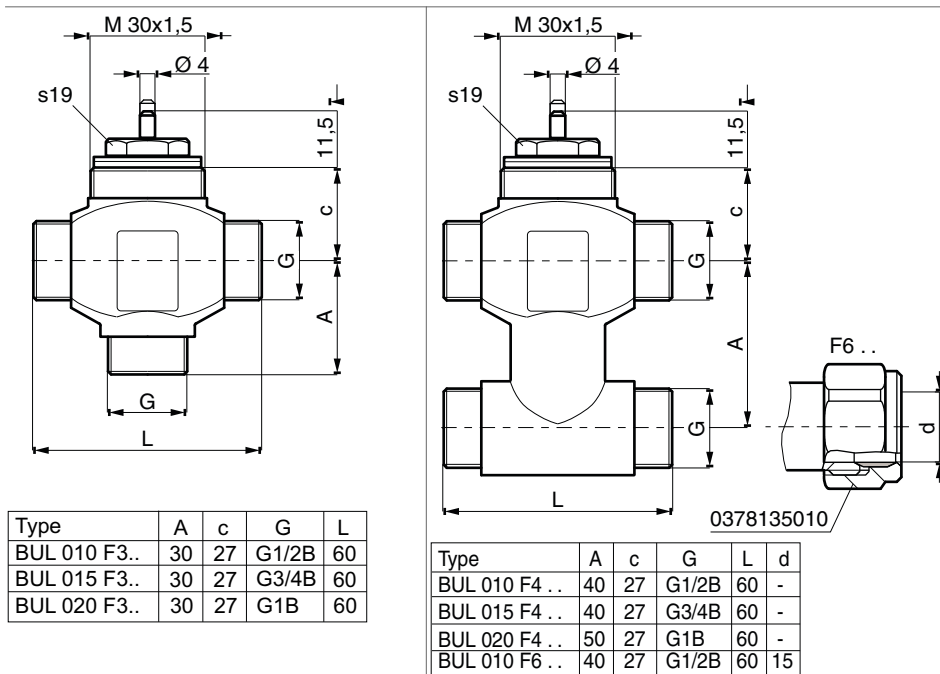
Disposal

When disposing of the product, observe the currently applicable local laws.

More information on materials can be found in the Declaration on materials and the environment for this product.

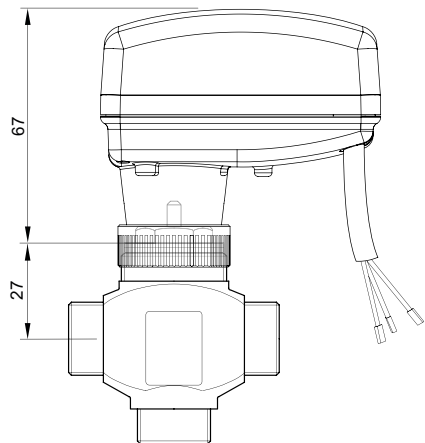
Dimension drawings

All dimensions in mm.

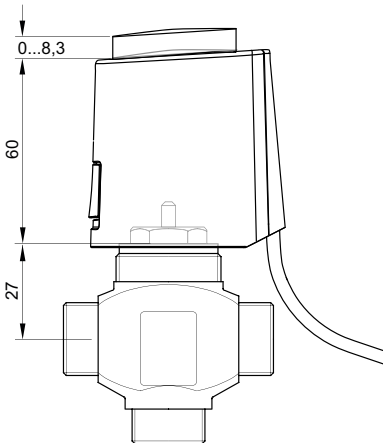


Combinations

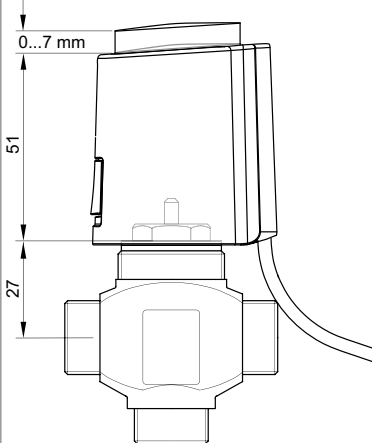
BUL with AXF 217S / AXM 217(S)



BUL with AXS 315S

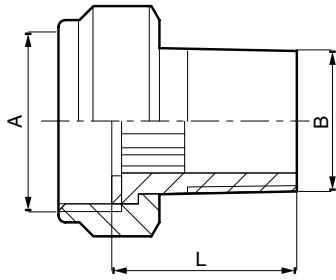


BUL with AXT 301



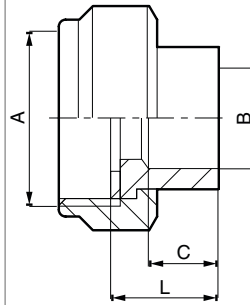
Accessories

Threaded sleeve 03781330**



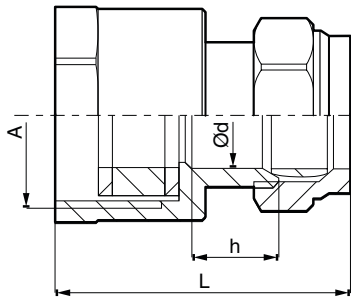
DN	A	B	L
10	G1/2	R3/8	24
15	G3/4	R1/2	27,5
20	G1	R3/4	32,5

Solder nipple 03781340**



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

Clamping ring screw fitting 03781450**



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