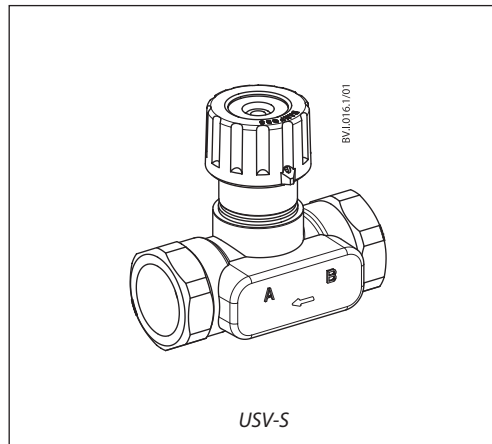


# Data sheet

## Balancing valves

### USV-S

#### Application / Description



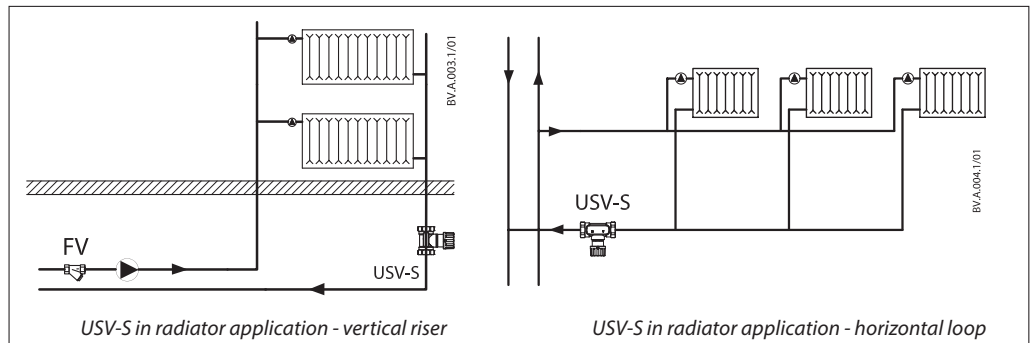
USV-S valves are designed for manual hydronic balancing of heating and cooling systems.

USV-S (black knob) is used to limit the flow in heating or cooling installation or can work separately as manual balancing valves for flow limitation.

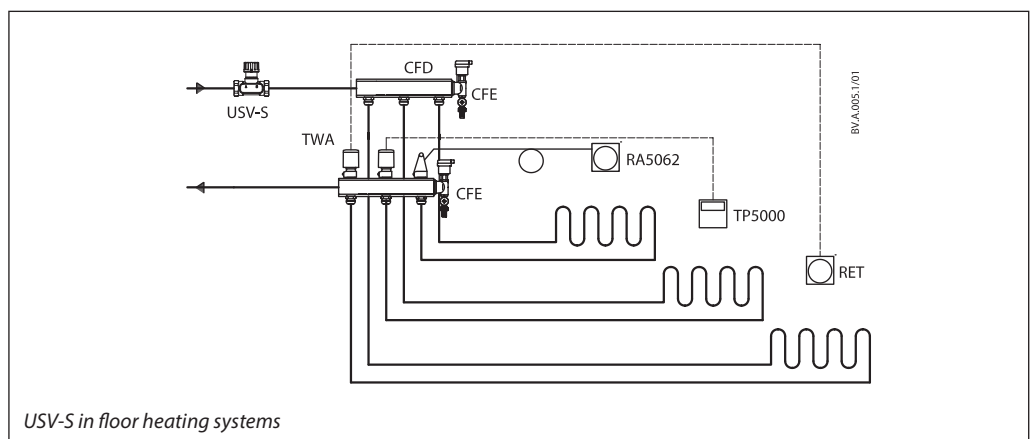
USV-S is compact valves in which the operating elements and connections are placed within an arc of 90°, so that in spite of small valve dimensions, access for installation and operation is optimal. Insulation caps for temperature up to 80 °C or 120 °C are available as accessory.

USV-S is supplied in a set-pack with internal thread.

USV-S valves are to be used in radiator heating systems to limit the flow in risers or horizontal loops.

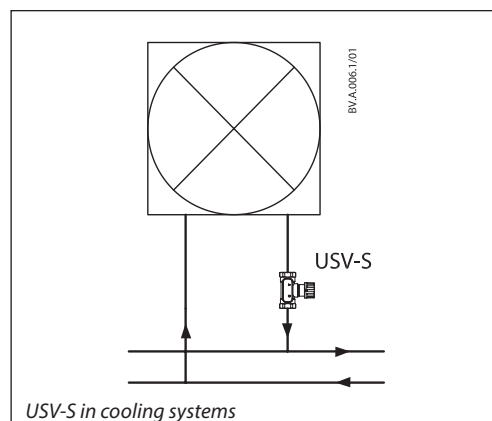


USV-S can also be used in floor heating systems. To limit the flow, every manifold with constant flow should be used together with USV-S valves.



**Application / Description**  
(continued)

The USV-S valves are to be used in systems with fan coils to limit the flow in order to provide efficient heat distribution.



**Ordering**

USV-S valve

Type	DN	$k_{VS}$ [m <sup>3</sup> /h]	Int. thread ISO 7/1	Code No.
	15	1,6	R <sub>p</sub> 1/2	<b>003Z2231</b>
	20	2,5	R <sub>p</sub> 3/4	<b>003Z2232</b>
	25	4	R <sub>p</sub> 1	<b>003Z2233</b>
	32	6,3	R <sub>p</sub> 1 1/4	<b>003Z2234</b>
	40	10	R <sub>p</sub> 1 1/2	<b>003Z2235</b>
	50	16	R <sub>p</sub> 2	<b>003Z2236</b>

**Accessories and spare parts**

Type	Comments/connection	Code No.	
Insulation cap	up to 80 °C	DN 15	<b>003L8165</b>
		DN 20	<b>003L8166</b>
		DN 25	<b>003L8167</b>
		DN 32	<b>003L8168</b>
		DN 40	<b>003L8169</b>
		DN 50	<b>003L8164</b>
	up to 120 °C	DN 15	<b>003L8170</b>
		DN 20	<b>003L8171</b>
		DN 25	<b>003L8172</b>
		DN 32	<b>003L8173</b>
		DN 40	<b>003L8139</b>
		DN 50	<b>003L8138</b>


Technical data

Max. working pressure..... 16 bar  
 Test pressure .....25 bar  
 Max. differential pressure across  
 the valve (USV-S) ..... 1,5 bar (150 kPa)  
 Flow temperature ..... -20 to 120 °C

Material of parts in contact with water:  
 Valve body, spindle, etc. ....Brass  
 Cone .....DZR Brass  
 Diaphragm and O-rings..... EPDM  
 Spring ..... Stainless steel

Design

- 1. Shut-off knob
- 2. Shut-off spindle
- 3. Setting spindle
- 4. Scale disc
- 5. O-rings
- 6. Valve cone
- 7. Valve body

DN	
15	2,5
20	3
25	4
32	5
40	5

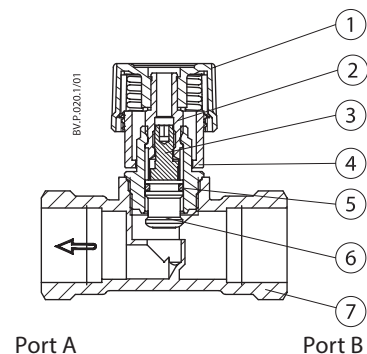


Fig. 8 USV-S

USV-S incorporates a double cone (3.6) able to give maximum stroke limitation, thus achieving flow limitation. It also incorporates shut off function.

Use the following procedure to limit the flow:

- turn the valve knob ① fully counter clockwise to open the valve. The mark on the knob will now be opposite »0« on the scale ④.
- turn the valve knob ① clockwise to the required setting (e.g. for setting 2.2 the knob must be rotated two full turns and then forward to »2« on the scale.
- hold the knob ① to keep the setting (e.g. 2.2) and using a hexagon socket key turn the spindle ③ fully counter clockwise (until a stop can be felt).

- turn the valve knob ① fully counter clockwise so that the mark on the knob is opposite »0« on the scale ④. The valve is now open as many turns from the closed position (2.2) as indicated by the conversion from required flow.
- to annul the setting, turn the hexagon socket key fully clockwise (until a stop can be felt).

Remember, at the same time the knob must be held on its »0« setting.

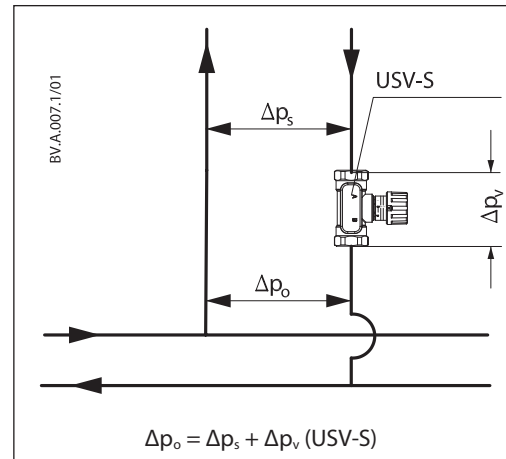
**Sizing**

Required:

- A. Correct valve size USV-S
- B. Correct USV-S presetting

Given:

- 1. Required max. flow in the riser  
 $Q = 0,80 \text{ [m}^3/\text{h]}$
- 2. Pressure drop across riser  
 $\Delta p_s = 15 \text{ [kPa]}$
- 3. Available pump pressure  
 $\Delta p_o = 35 \text{ [kPa]}$
- 4. Connection pipe: DN 25



Solution:

- A) USV-S DN20 is selected (same size as connection pipe).

A straight line connecting this point and  $Q = 0,80 \text{ [m}^3/\text{h]}$  intersects the differential pressure bar at  $\Delta p_v \text{ (USV-S)} = 10 \text{ [kPa]}$ .

- B) Correct valve size and presetting of USV-S: The differential pressure across USV-S can be calculated as follows:

$$\Delta p_v \text{ (USV-S)} = \Delta p_o - \Delta p_s$$

$$\Delta p_v = 35 \text{ [kPa]} - 15 \text{ [kPa]}$$

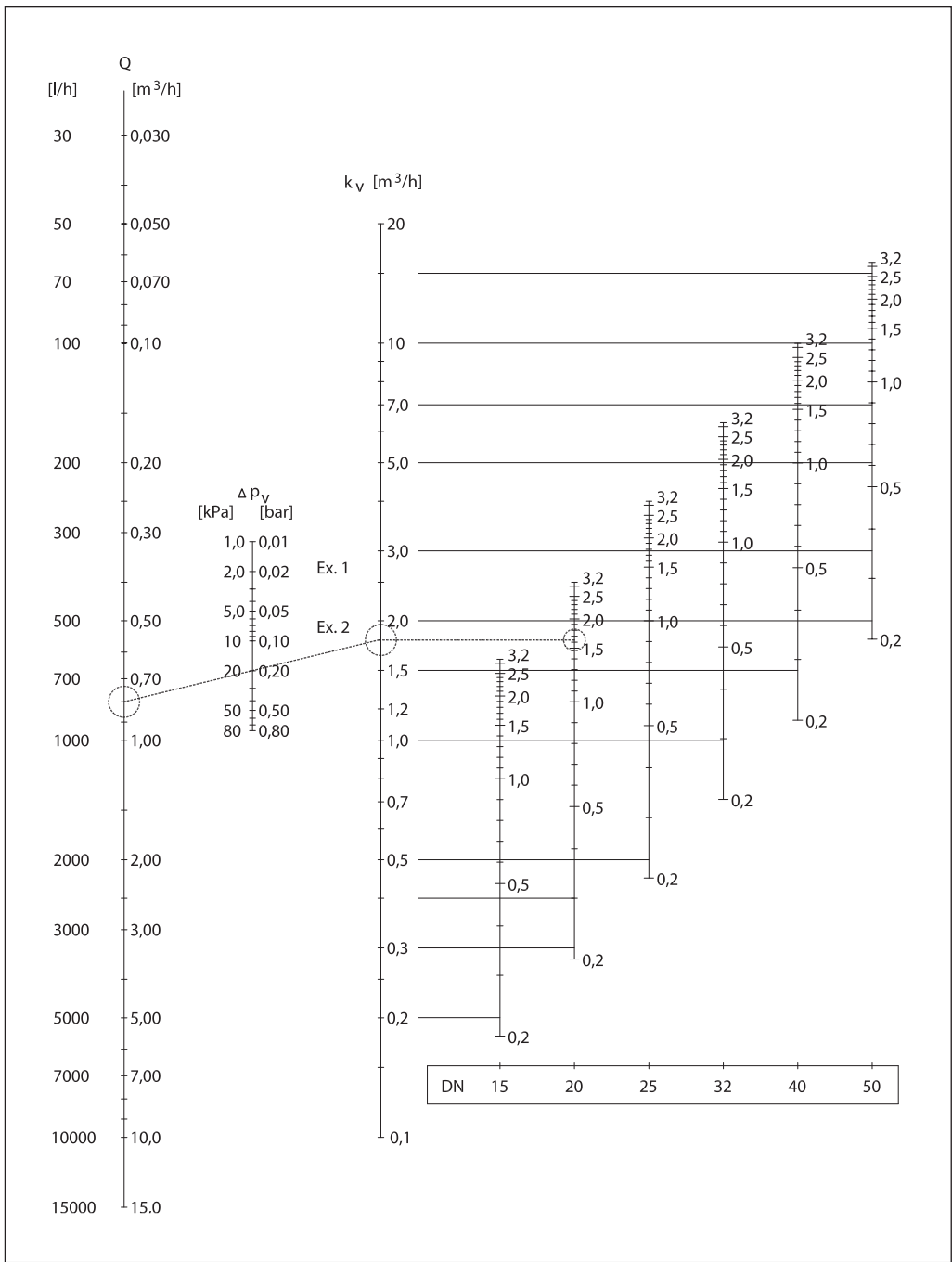
The example selects USV-S DN 20. Presetting is read from the sizing diagram (page 5) by taking a straight line from from max. flow  $Q = 0,80 \text{ [m}^3/\text{h]}$  to the differential pressure  $\Delta p_v \text{ (USV-S)} = 20 \text{ [kPa]}$  and to the intersection with  $k_v$ -axis at  $k_v = 1,8 \text{ [m}^3/\text{h}]$ .

Draw a horizontal line from this point to the adjustment curve of the chosen valve (DN 20). Starting from closed valve, the presetting of 1,6 turns is required.

$k_v$ -values [m<sup>3</sup>/h] for various presettings:

Size	Number of turns							
	0,2	0,5	1,0	1,5	2,0	2,5	3,0	3,2
DN 15	0,2	0,4	0,8	1,1	1,3	1,5	1,6	1,6
DN 20	0,3	0,7	1,3	1,7	2,0	2,3	2,5	2,5
DN 25	0,4	1,1	1,9	2,7	3,3	3,6	3,9	4,0
DN 32	0,7	1,7	3,1	4,3	5,2	5,7	6,1	6,3
DN 40	0,9	2,1	4,2	5,9	7,4	8,7	9,7	10,0
DN 50	1,7	4,1	7,6	10,5	12,7	14,0	15,2	16,0

Sizing (continued)



A straight line connecting the bars of flow, differential pressure and kv value shows the relationship between these three variables.

A horizontal line from the intersection with the kv bar shows the presetting value for each valve size.

$$k_v = \frac{10 \times Q}{\sqrt{\Delta p}}$$

Q [m³/h]  
 Δp [kPa]

**Installation**

USV-S should be installed in the flow or return pipe. The direction of the flow must follow the direction of the arrow on the valve body.

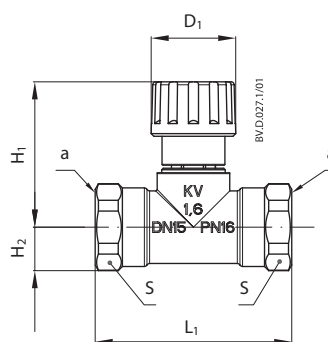
USV-S can be installed in any positions if installation instructions are being observed. It is recommended that a filter i.e. Danfoss Typ FV is installed in the supply pipe.

Small installation dimensions enable easy installation and shut-off of the system.

**Pressure testing**

Max. test pressure ..... 25 bar

**Dimensions**



USV-S

DN	L <sub>1</sub> [mm]	H <sub>1</sub> [mm]	H <sub>2</sub> [mm]	D <sub>1</sub> [mm]	S [mm]	a ISO 7/1	b ISO 228/1	Weight [kg]
15	65	48	15	28	27	R <sub>p</sub> ½	G ¾ A	0,31
20	75	60	18	35	32	R <sub>p</sub> ¾	G 1 A	0,4
25	85	75	23	45	41	R <sub>p</sub> 1	G 1¼ A	0,67
32	95	95	29	55	50	R <sub>p</sub> 1¼	G 1½ A	1,1
40	100	100	31	55	55	R <sub>p</sub> 1½	G 1¾ A	1,22
50	130	106	38	55	67	R <sub>p</sub> 2	G 2¼ A	2



