Data sheet

Manual balancing

USV-S

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.

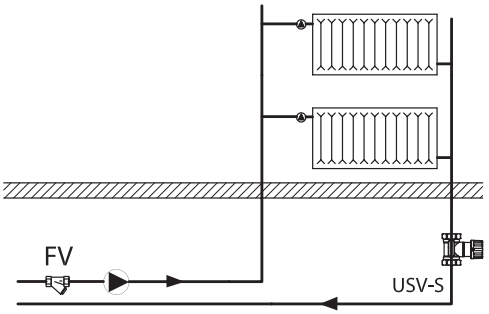
USV-S is compact valves in which the operating elements and connections are placed within an arc of 90°, so that in spite of small valve dimensions, access for installation and operation is optimal.

Features & benefits

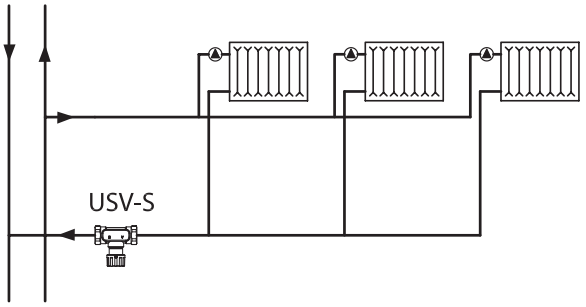
- USV-S is supplied in a set-pack with internal thread
- Insulation caps for temperature up to 80°C or 120°C are available as accessory

Applications

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

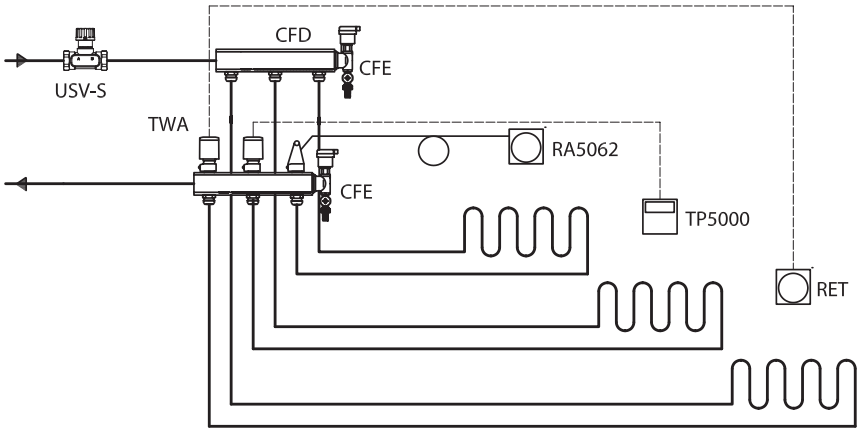


USV-S in radiator application - vertical riser



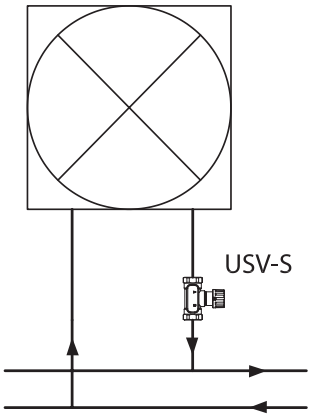
USV-S in radiator application - horizontal loop

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.



USV-S in floor heating systems

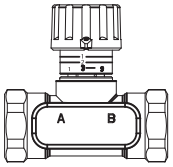
The USV-S valves are to be used in systems with fan coils to limit the flow in order to provide efficient heat distribution.



Ordering

Product code numbers

USV-S valve

Type	DN	k_{vs} [m³/h]	Int. thread ISO 7/1	Code No.
	15	1.6	Rp ½	**003Z2231**
	20	2.5	Rp ¾	**003Z2232**
	25	4	Rp 1	**003Z2233**
	32	6.3	Rp 1¼	**003Z2234**
	40	10	Rp 1½	**003Z2235**
	50	16	Rp 2	**003Z2236**

Accessories code numbers

003L8139

EPP insulation cap ASV / USV DN 40

EPP insulation cap ASV / USV DN 40

003L8167

Insulation cap USV DN 25

Insulation cap USV DN 25

003L8172

EPP insulation cap ASV / USV DN 25

EPP insulation cap ASV / USV DN 25

003L8170

EPP insulation cap ASV / USV DN 15

EPP insulation cap ASV / USV DN 15

003L8166

Insulation cap USV DN 20

Insulation cap USV DN 20

003L8165

Insulation cap USV DN 15

Insulation cap USV DN 15

003L8173

EPP insulation cap ASV / USV DN 32

EPP insulation cap ASV / USV DN 32

003L8138

EPP insulation cap ASV / USV DN 50

EPP insulation cap ASV / USV DN 50

003L8169

Insulation cap USV DN 40

Insulation cap USV DN 40

003L8171

EPP insulation cap ASV / USV DN 20

EPP insulation cap ASV / USV DN 20

003L8168

Insulation cap USV DN 32

Insulation cap USV DN 32

003L8164

Insulation cap USV DN 50

Insulation cap USV DN 50

Product details

General data

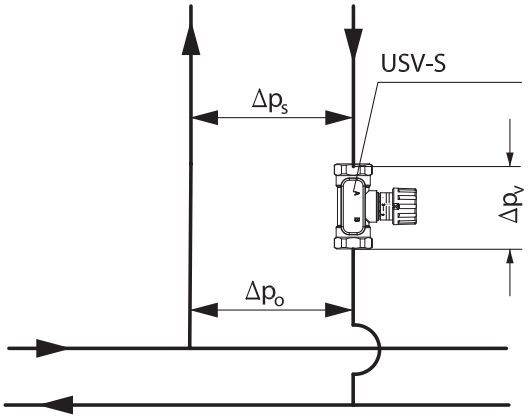
Technical data

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

Sizing

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

Given:
1. Required max. flow in the riser
   Q = 0,80 [m^3/h]
2. Pressure drop across riser
   Δp_s = 15 [kPa]
3. Available pump pressure
   Δp_o = 35 [kPa]
4. Connection pipe: DN 25



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

A straight line conecting this point and
Q = 0,80 [m^3/h] intersects the differential pressure bar at Δp_v (USV-S) = 10 [kPa].

B) Correct valve size and presetting of USV-S:
The differential pressure across USV-S can be calculated as follows:
Δp_v (USV-S) = $\Delta p_o - \Delta p_s$
Δp_v = 35 [kPa] – 15 [kPa]

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

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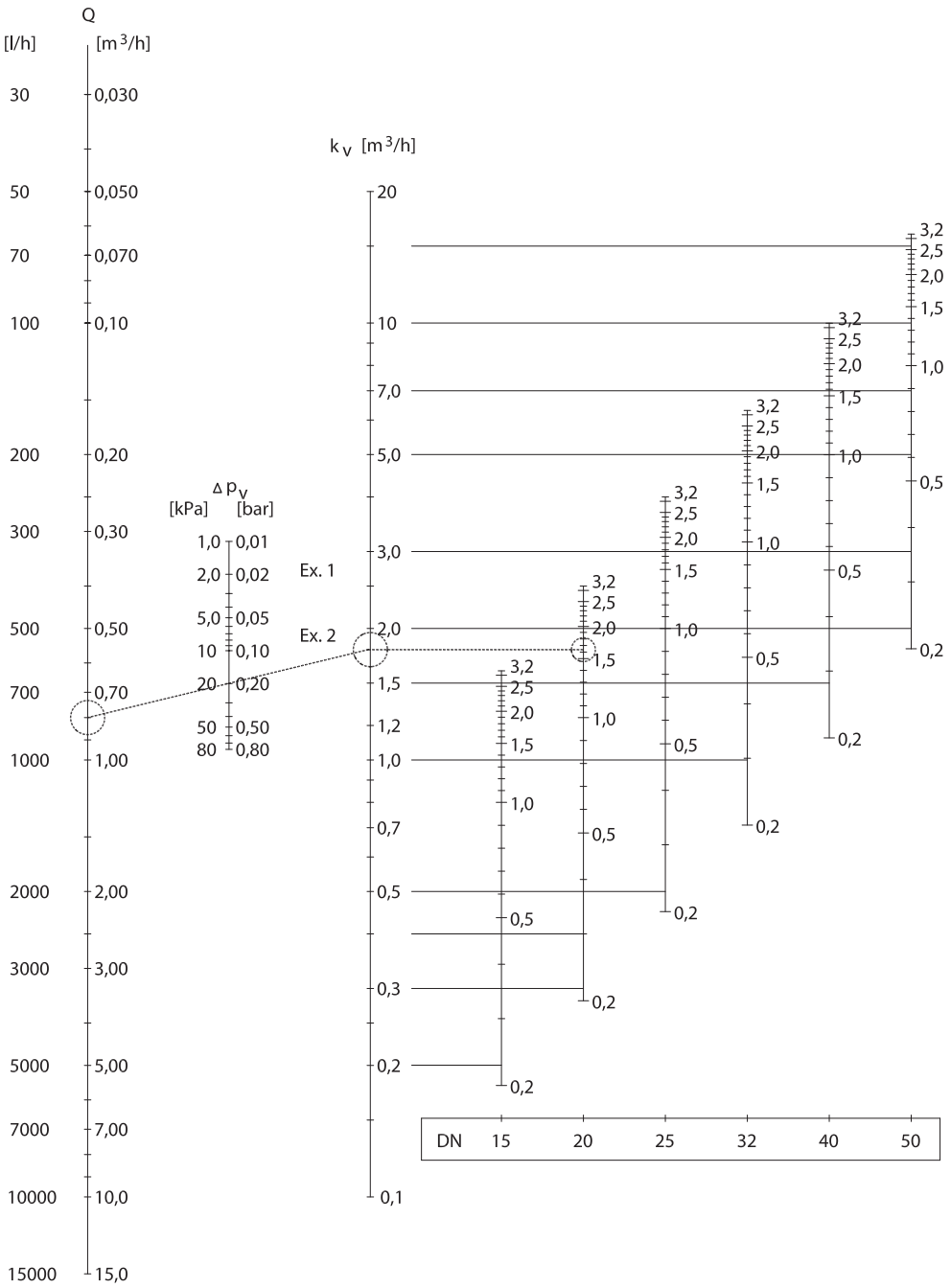
k_v-values [m^3/h] for various presettings:

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
DN 50	1,7	4,1	7,6	10,5	12,7	14	15,2	16



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

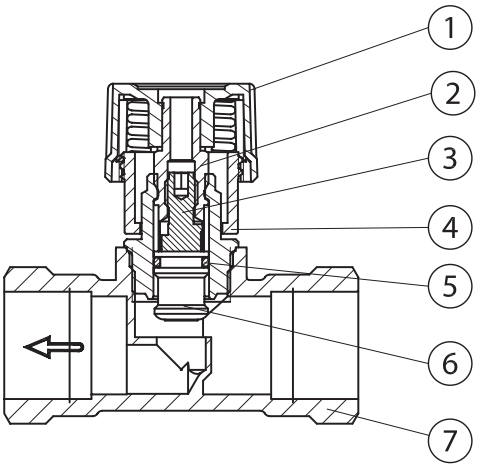
A horizontal line from the intersection with the k_v bar shows the presetting value for each valve size.

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

Q [m³/h]
Δp [kPa]

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

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 convertion 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.

Materials

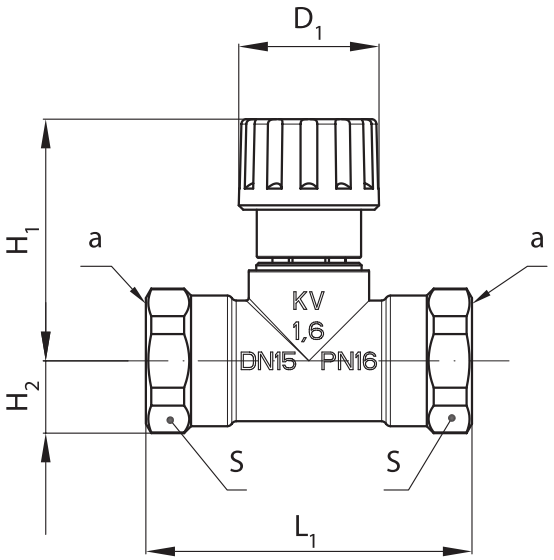
Valve body, spindle, etc.	Brass
Cone	DZR Brass
Diaphragm and O-rings	EPDM
Spring	Stainless steel

Pressure and temperature data

Pressure testing

Max. test pressure	25 bar

Dimensions



USV-S

DN	L_1	H_1	H_2	D_1	S	a	b	Weight
	[mm]					ISO 7/1	ISO 228/1	[kg]
15	65	48	15	28	27	R_p ½	G ¾ A	0,31
20	75	60	18	35	32	R_p ¾	G 1 A	0,4
25	85	75	23	45	41	R_p 1	G 1¼ A	0,67
32	95	95	29	55	50	R_p 1¼	G 1½ A	1,1
40	100	100	31	55	55	R_p 1½	G 1¾ A	1,22
50	130	106	38	55	67	R_p 2	G 2¼ A	2

Installation

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

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

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.

Certificates, declarations and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

When you click on the link you will be directed to the latest version of the 'Declaration of Conformity'. Products developed and sold before this date of issue conform to the directives/standards in force at the time of their sale.

Approval type	Title	Certification body	Approval topic
Export Control Declaration	Butterfly, other valves, Manual balancing valves, one pipe solution valves and hot water balancing valves	Danfoss	
Manufacturer's Declaration	Danfoss MD BF206986516781en-000401.01	Danfoss	PED, Pressure, EU RoHS
UA Declaration	Danfoss UA 2023-01-23 MTC ASV RA FH RAX PL03 PL28	Danfoss	PED, Pressure

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