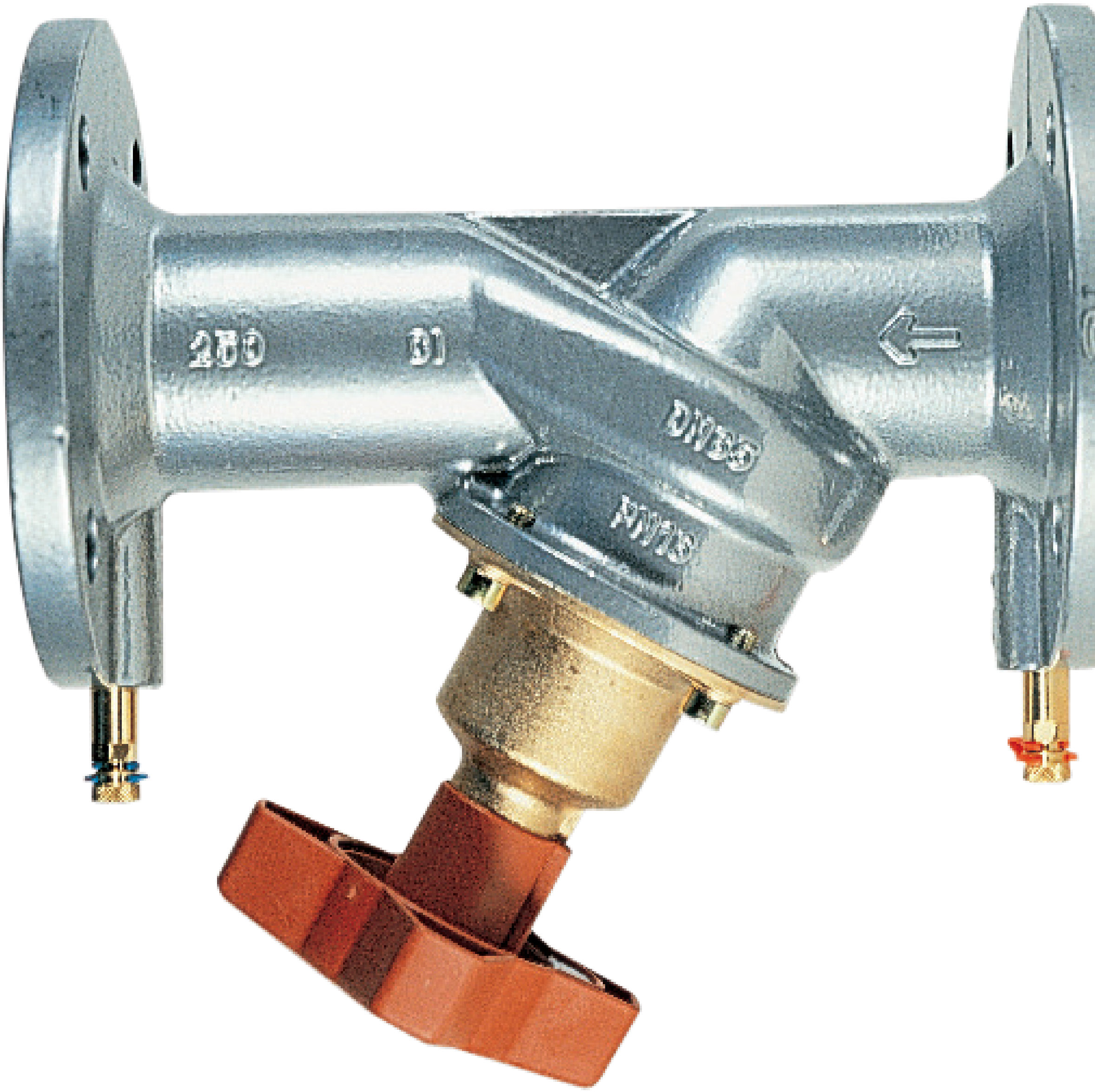
STAF-SG Series

Balancing and control valves

Technical Data Sheet



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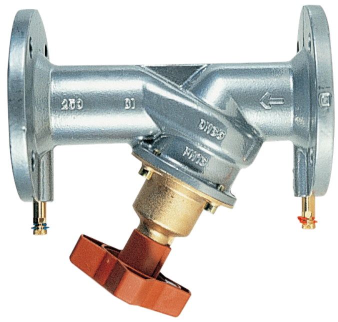
Description

STAF-SG Series flanged variable-orifice valves are designed for flow control and monitoring in climate control (heating and cooling) systems.
By connecting differential pressure gauges (**BVT-SET Series**) to the piezometric connections on the valve body, these valves can be used as a diagnostic tool for monitoring system performance (flow rate, pressure and temperature).



STAF-SG

Balancing and control valve **with flanged connections** for heating and cooling systems. Shut-off and pre-setting functions; diagnosis using computerised instrument (**BVT-SET Series**) on self-sealing pressure test points.
PN 25 bar. Body centre distance ISO 5752 Series 1 and EN 558 Series 1 (the DN 20-50 versions can also use counterflanges for PN16), flanges ISO 7005-2, EN 1092-2.
Seat seal: disc with EPDM O-ring.
Operating temperature range: from -20 to 120°C.
EN-GJS-400-15 ductile iron valve body with epoxy paint surface treatment, other parts in AMETAL® (DZR alloy).
Polyamide manual handwheel with **40-80 setpoint positions** (to DN).
Compliant with PED 2014/68/EU

Type	Part No.	DN	Kvs	Weight (Kg)
STAF-SG	STAF-SG20	20	5.7	2.3
STAF-SG	STAF-SG25	25	8.7	2.9
STAF-SG	STAF-SG32	32	14.2	4.3
STAF-SG	STAF-SG40	40	19.2	5.2
STAF-SG	STAF-SG50	50	33	6.6
STAF-SG	STAF-SG65	65	85	11.0
STAF-SG	STAF-SG80	80	120	14.0
STAF-SG	STAF-SG100	100	190	19.6
STAF-SG	STAF-SG125	125	300	28.1
STAF-SG	STAF-SG150	150	420	37.1

52189

CFC-free polyurethane insulation shells for balancing valves.
Thermal conductivity λ at 50°C: 0.028 W/mK.
Fire-resistance Class: B2-DIN 4102.

Type	Part No.	Description
52189	52189-850	DN 50
52189	52189-865	DN 65
52189	52189-880	DN 80
52189	52189-890	DN 100
52189	52189-891	DN 125
52189	52189-892	DN 150

Technical features	
Nominal pressure	PN25
Operating temperature	from -20 to 120°C
Flanges	ISO 7005-2, EN 1092-2
Body centre distance	ISO 5752 Series 1 EN 558 Series 1
No. of setpoint positions	40 (DN20-50) 80 (DN 65-150)
Marking	CE (DN50-125) CE0409 (DN150)

Materials	
Body	EN-GJS-400-15 cast iron
Top, stem and disc	AMETAL® - Top is threaded (DN20-50) or bolted (DN65-150)
Seat seal	disc with EPDM O-ring
Top bolts	chrome-plated steel
Surface treatment	epoxy paint
Handwheel	polyamide DN 65-150; polyamide+TPE DN 20-50

Application

All distribution networks, even the simplest, are made up of different branches, whose flow rates need to be defined at the design stage and must then correspond to the values calculated in the course of operation. In an unbalanced system (Fig.1), the flow rate to the circuits nearest the pump is too high, while the flow rate to the circuits furthest from the pump is too low. The resulting temperature differences between different rooms not only detract from comfort but also increase energy consumption. The use of thermostatic or control valves in this situation can cause noise. The installation and correct setting of **STAF-SG Series** balancing and control valves (Fig. 2) on boiler room manifolds, at the bottom of risers and upstream of heat production and exchange units or zones ensures correct flow distribution, thus offering immediate benefits in terms of comfort and energy saving, as well as optimising the efficiency of the control system.

Unbalanced system

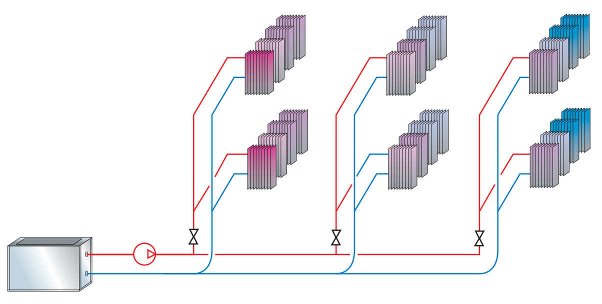


Fig. 1

Balanced system

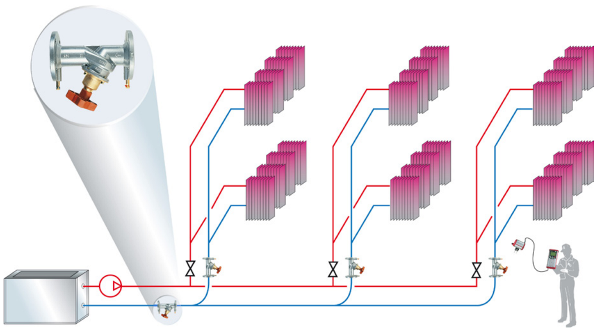


Fig. 2

Operation

The number of turns between the fully open and fully closed positions is either 4 (DN 20-50) or 8 (DN 65-150).
To set a valve, to 2.3 turns for example, and obtain a given pressure drop (calculated either analytically or from the flow curve), proceed as follows:

1. Fully close the valve (Fig. 1)
2. Open the valve by 2.3 turns (Fig. 2)
3. Fully tighten the internal stem using a 3 mm hex wrench
4. The valve is now set.

To check the setting, close the valve. The indicator should show 0.0. Now open the valve fully.
The indicator should show the setpoint, in this case 2.3 (Fig. 2). For correct valve selection and pre-setting (pressure drop), consult the flow curve, which shows the pressure drop at various setpoints and flow rates for all valve sizes. To conduct a field check, using differential pressure gauges (BVT-SET Series), remove the plug and insert the needle through the test point seal; the test points are self-sealing.

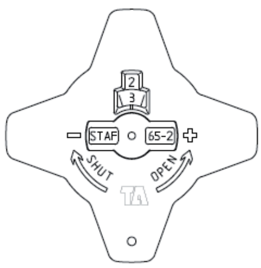


Fig. 1 - Fully closed

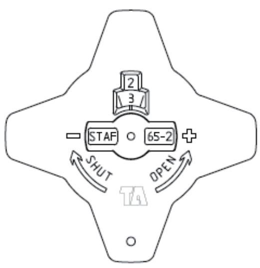


Fig. 2 - Valve open by 2.3 turns

Sizing

Where the pressure drop (Δp) to be balanced and the design flow are known, use the flow curve or formula shown below:

$$Kv = \frac{q}{\sqrt{\Delta p}}$$

where:

Kv = volumetric flow coefficient
q = flow rate in m^3/h
Δp = pressure drop (resistance) to be balanced in bar

The following can be determined from the above:

$$Kv = 0.01x \frac{q}{\sqrt{\Delta p}}$$ if q is expressed in l/h and Δp in kPa

$$Kv = 36 \ x \frac{q}{\sqrt{\Delta p}}$$ if q is expressed in l/s and Δp in kPa

Table of Kv values at the various setpoint positions

TURNS	DN20	DN25	DN32	DN40	DN50	DN65	DN80	DN100	DN125	DN150
0.5	0.511	0.60	1.14	1.75	2.56	1.8	2.0	2.5	5.5	6.5
1.0	0.757	1.03	1.90	3.30	4.20	3.4	4.0	6.0	10.5	12.0
1.5	1.19	2.10	3.10	4.60	7.20	4.9	6.0	9.0	15.5	22.0
2.0	1.90	3.62	4.66	6.10	11.7	6.5	8.0	11.5	21.5	40.0
2.5	2.80	5.30	7.10	8.80	16.2	9.3	11.0	16.0	27.0	65.0
3.0	3.87	6.90	9.50	12.6	21.5	16.3	14.0	26.0	36.0	100
3.5	4.75	8.00	11.8	16.0	26.5	25.6	19.5	44.0	55.0	135
4.0	5.70	8.70	14.2	19.2	33.0	35.3	29	63.0	83.0	169
4.5	-	-	-	-	-	44.5	41.0	80.0	114	207
5.0	-	-	-	-	-	52.0	55.0	98.0	141	242
5.5	-	-	-	-	-	60.5	65.0	115	167	279
6.0	-	-	-	-	-	68.0	80.0	132	197	312
6.5	-	-	-	-		73.0	92.0	145	220	340
7.0	-	-	-	-	-	77.0	103	159	249	367
7.5	-	-	-	-	-	80.5	113	175	276	391
8.0	-	-	-	-	-	85.0	120	190	300	420

Balancing valves are generally selected in such a way that the desired setpoint value is reached when the valve is 75% open. This setpoint position leaves a certain margin for manoeuvre in the field.
For existing systems, it is often difficult to calculate the necessary setpoint value. To avoid undue oversizing, make sure the pressure drop, in the fully open position and at nominal flow rate, is at least 3 kPa. Similarly, when using a balancing valve on a circuit that does not require balancing a priori (e.g. the least favourable circuit), it is advisable to install a valve of the same DN as the pipe, with a setpoint position close to fully open and a pressure drop of at least 3 kPa (approximately 300 mm wg). This makes the valve, with diagnostic function, an essential tool for monitoring the actual flow rate in the field: during commissioning, you can both "open" the valve further to increase the flow rate, and measure the Δp easily with the aid of the differential pressure gauge (**BVT-SET Series**).

Charts

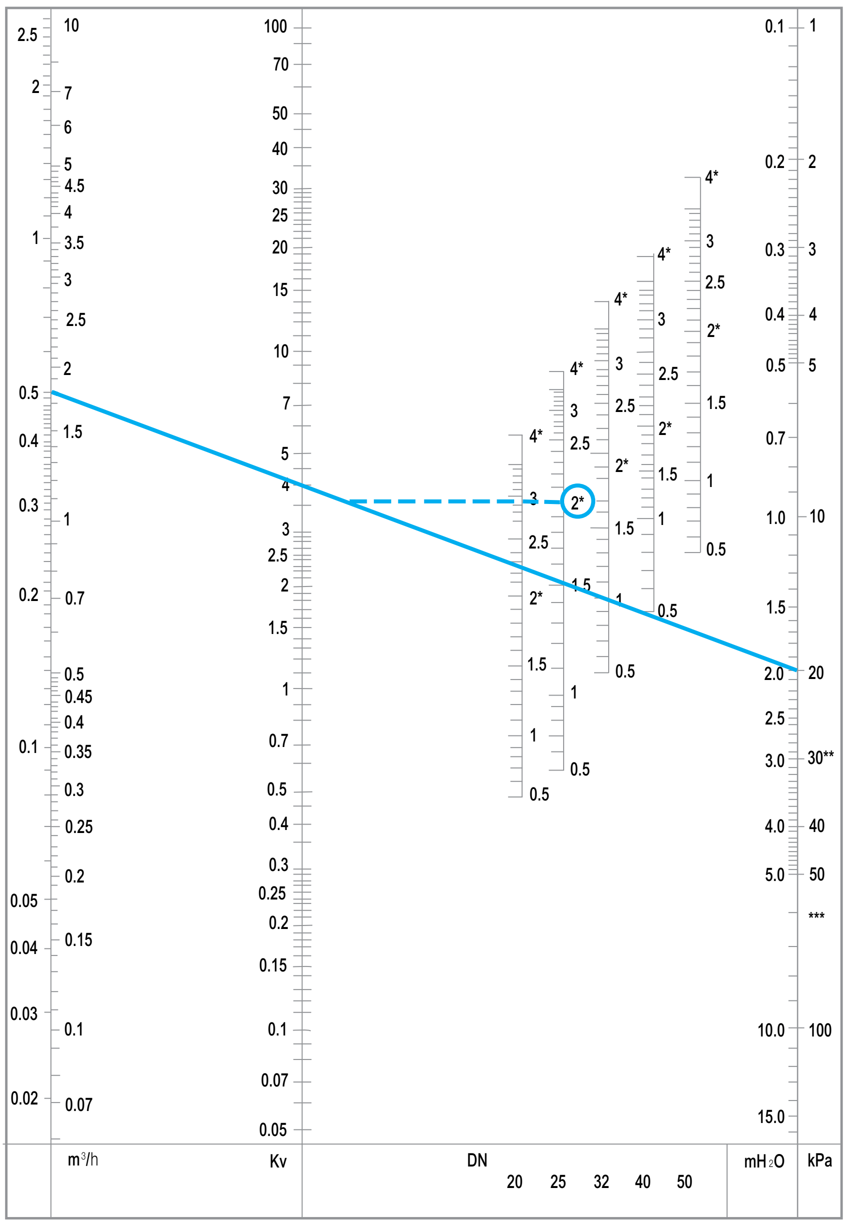
The flow curve enables you to determine the pressure drop of the valve, measured at the test points.
The straight line that joins the flow rate, Kv and pressure drop scales indicates the correlation between these two variables.
To obtain the setpoint positions corresponding to the different valve diameters, now draw a horizontal line from the resulting Kv.

Worked example of how to use the flow curve (DN 20-50)
Calculate the setpoint to assign to a DN 25 valve with a flow rate of 1.8m³/h and a pressure drop of 20 kPa.

Solution:
Draw a line between 1.8 m³/h and 20 kPa. The resulting Kv = 4.
From this point, draw a horizontal line that meets the DN 25 column.
The result is 2.1 turns.

Note: if any value is off the scale, you can still use the flow curve, bearing in mind that for the same pressure drop, the pairs of values (flow rate and Kv) can be read proportionally, by multiplying them by 0.1 and 10.
Using the previous example again (20 kPa, Kv = 4 and flow rate 1.8 m³/h), we can deduce that with 20 kPa we will have two pairs of values: Kv = 0.40 and flow rate 0.18 m³/h, and Kv = 40 and flow rate 18 m³/h.

DN 20-50



*) Recommended Zone
**) 25 dB(A)
***) 35 dB(A)

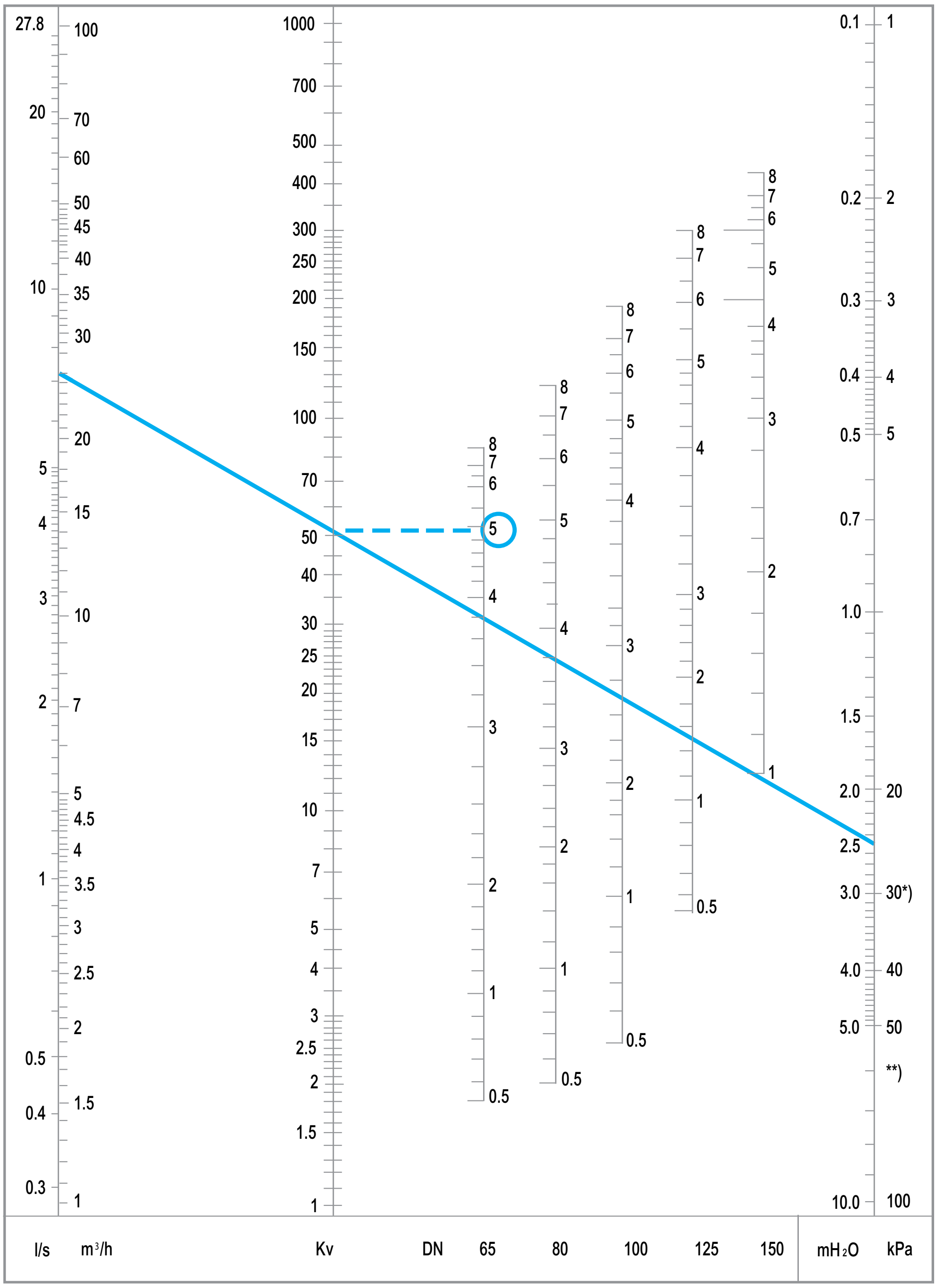
Worked example of how to use the flow curve (DN 65-150)

Calculate the setpoint to assign to a DN 65 valve with a flow rate of 26m³/h and a pressure drop of 25 kPa.

Solution:

Draw a line between 26 m³/h and 25 kPa. The resulting Kv = 52.
From this point, draw a horizontal line that meets the DN 65 column.
The result is 5 turns.

DN 65-150



*) 25 db(A)
**) 35 db(A)

Installation

STAF-SG Series balancing and control vales are easy to identify: the key technical specifications, such as PN, DN, CE, flow direction arrow, material and date of casting (year, month, day) are marked on the body and handwheel. The valves can be fitted in any position, but they are designed in such a way that their accuracy of measurement (Fig. 3) is highest if they are fitted in the direction of flow on a straight run (Fig. 4).
For liquids other than water (+20°C), but with similar viscosity (<20 cSt = 3°E = 100 SSU, i.e. the majority of water/glycol blends and water/brine solutions at room temperature), the pressure drops determined from the flow curves can be corrected by applying a correction factor based on their specific weight. At lower temperatures, the viscosity increases and the flow through the valves can become laminar. This gives rise to a deviation in the measurement of flow rate, which increases in small valves, at low settings and low differential pressures.
This deviation can be corrected automatically by setting the type of fluid using the **BVT-SET Series** differential pressure gauge.

Handwheel position “0” is factory-set and must not be changed.

Use of the specific insulation shells (Item 52189) provides effective insulation, reduces thermal dispersion and prevents condensation in applications involving chilled water. The insulation shells do not conceal the indicator showing the number of turns, and are easy to remove for inspection purposes.

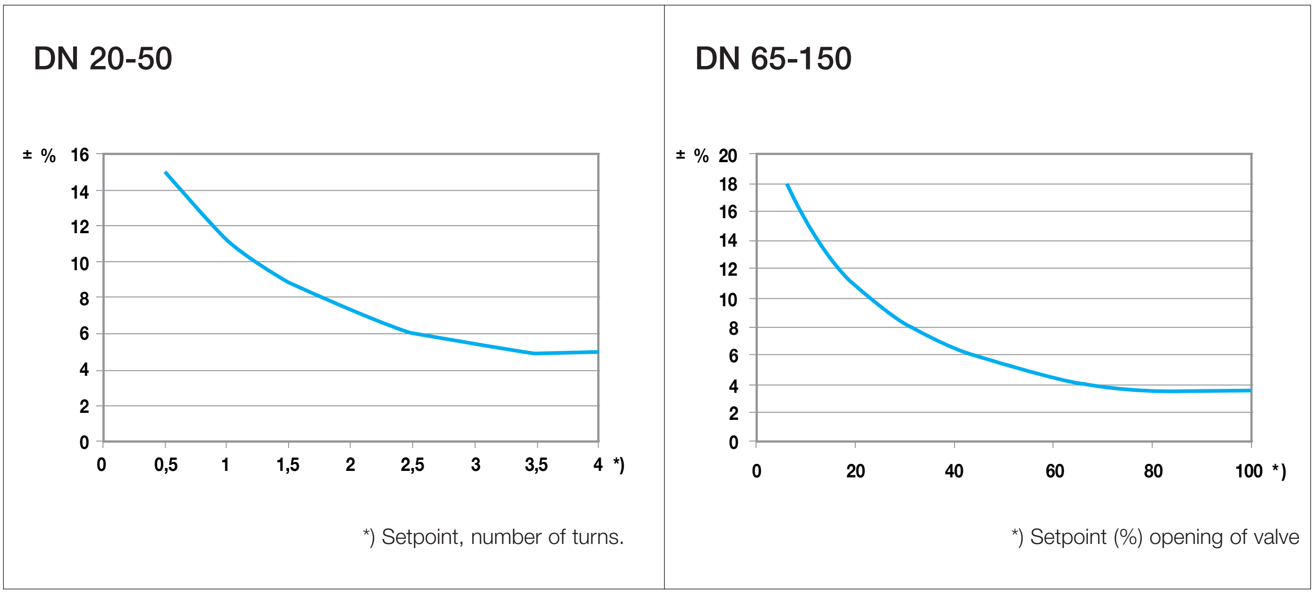


Fig. 3
Measurement deviation

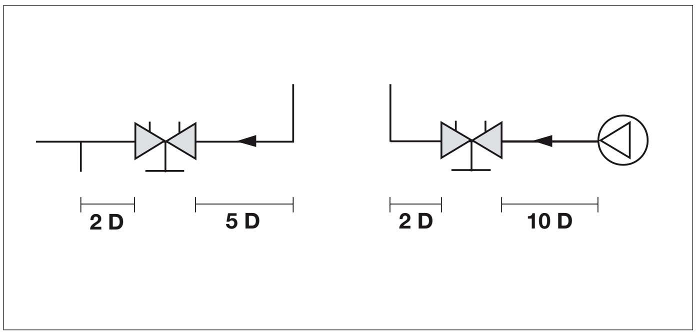
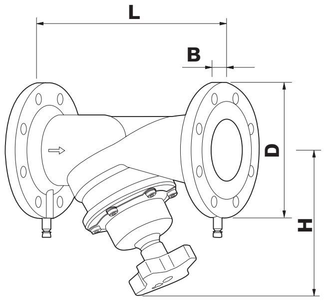


Fig. 4
Installation positions

Overall dimensions (mm)

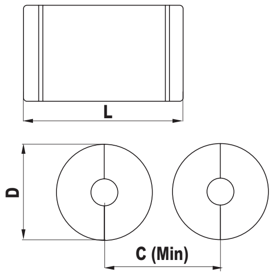
STAF-SG



DN	L	H	D	B	No. of holes
20	150	100	105	16	4
25	160	109	115	16	4
32	180	111	140	18	4
40	200	122	150	19	4
50	230	122	165	19	4
65	290	205	185	19	8
80	310	220	200	19	8
100	350	240	235	19	8
125	400	275	270	19	8
150	480	285	300	19	8

(DN 20-50 can also use counterflanges for PN 16)

52189



DN	L	D	C
50	390	250	252
65	450	270	272
80	480	290	292
100	520	320	322
125	570	350	352
150	660	380	382

Specification text

STAF-SG Series

Variable-orifice balancing and control valve **STAF-SG Series** – WATTS brand – with flanged connections from DN 20 to DN 150 for heating and cooling systems. Shut-off function, pre-setting function with 40 or 80 positions on numerical indicator in the handwheel, and diagnosis using a computerised instrument (BVT-SET Series) on self-sealing pressure test points.

Mechanical memory of the setpoint position. EN-GJS-400-15 ductile iron valve body with epoxy paint surface treatment, other parts in AMETAL® (DZR alloy).

Body centre distance ISO 5752 Series 1 and EN 558 Series 1. Flanges ISO 7005-2, EN 1092-2. Seat seal: disc with EPDM O-ring. Nominal pressure 25 bar. Operating temperature range: from -20 to 120°C.

Compliant with PED 2014/68/EU

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