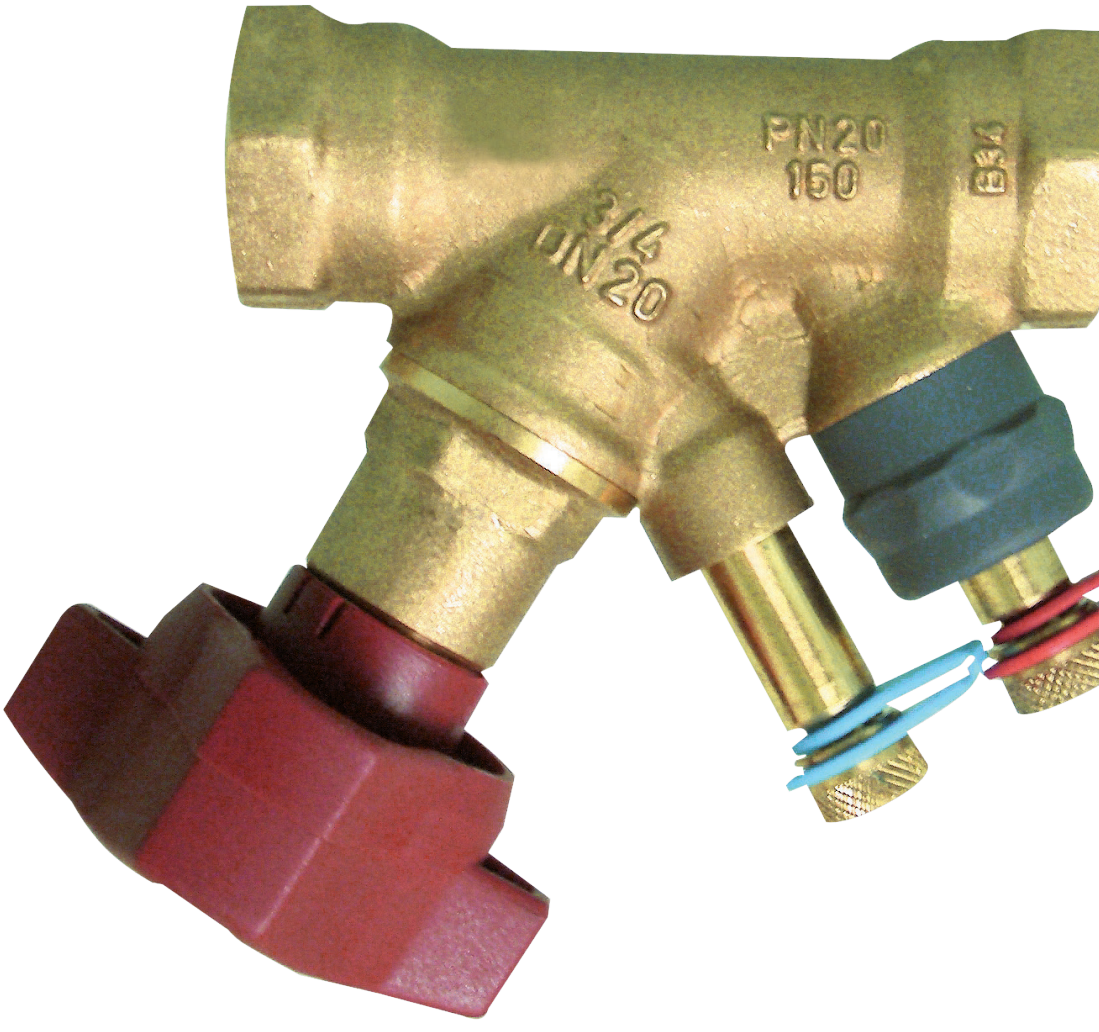
STAD Series

Balancing and control valves

Technical Data Sheet



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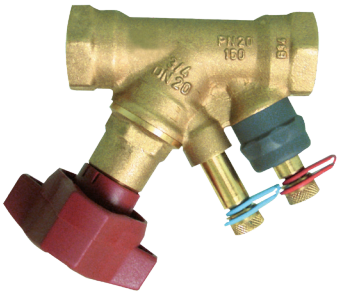
Description

STAD Series variable-orifice threaded valves are designed for flow control and monitoring in climate control and domestic hot or cold water distribution 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).



STAD

Balancing and control valve **with threaded connections** for heating, cooling and drinking water distribution systems.
Shut-off function, pre-setting function with **40 positions**, and drain function (optional accessory kit); diagnosis using computerised instrument (BVT-SET) on self-sealing pressure test points. AMETAL® (DZR alloy) valve body.
Polyamide manual handwheel.
Seat seal: disc with EPDM O-ring.
PN: 20 bar.
Operating temperature range: from -20 to 120°C.

Type	Part No.	DN	Kvs	Weight (kg)
STAD	STAD10	10	1.47	0.58
STAD	STAD15	15	2.52	0.62
STAD	STAD20	20	5.70	0.72
STAD	STAD25	25	8.70	0.88
STAD	STAD32	32	14.2	1.20
STAD	STAD40	40	19.2	1.40
STAD	STAD50	50	33.0	2.30

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	52189-615	DN 10/15/20
52189	52189-625	DN 25
52189	52189-632	DN 32
52189	52189-640	DN 40
52189	52189-650	DN 50

52179-99

Drain accessory for STAD Series balancing and control valve.
The kit can be installed with the system running.

Type	Part No.	Connection
52179-99	52179-990	1/2"M
52179-99	52179-996	3/4"M

52179

Replacement piezometric connections for STAD Series balancing valves.
Max. operating temperature: 120°C.

Type	Part No.	DN	Dimensions
52179	52179-014X2	M14 x 1	44 mm

Technical features	
Nominal pressure	PN20
Operating temperature	from -20to 120°C
Thread length	to ISO 7/1
Drain connection	1/2”M
No. of setpoint positions	40

Materials	
Body	AMETAL® (DZR zinc alloy)
Seat seal	Disc with EPDM O-ring
Stem seal	EPDM O-ring
Handwheel	Polyamide

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 **STAD 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.

STAD Series valves also act as shut-off and drain valves (if equipped with the appropriate accessory). They are particularly recommended for use in heating, cooling and drinking water distribution systems.

Unbalanced system

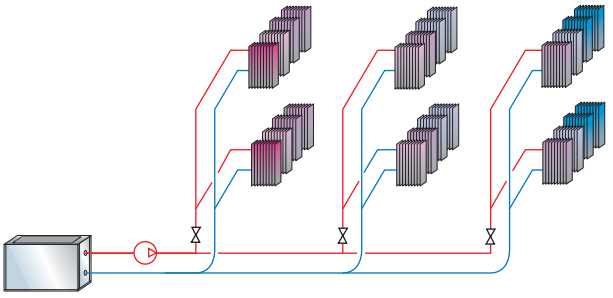


Fig. 1

Balanced system

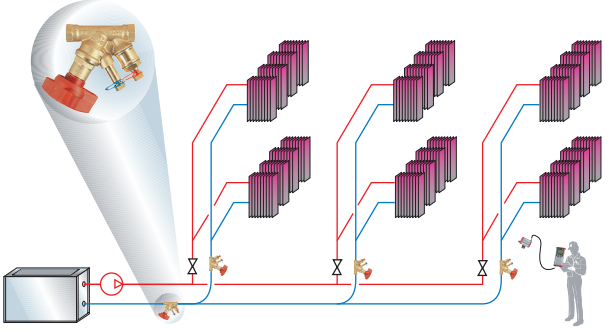


Fig. 2

Operation

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.

The valve reaches its fully open position after 4 turns (Fig. 3).
Turning the handwheel further, therefore, will not increase the flow rate.

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
Valve closed

Fig. 2
Valve 2.3 turns

Fig. 3
Valve fully open

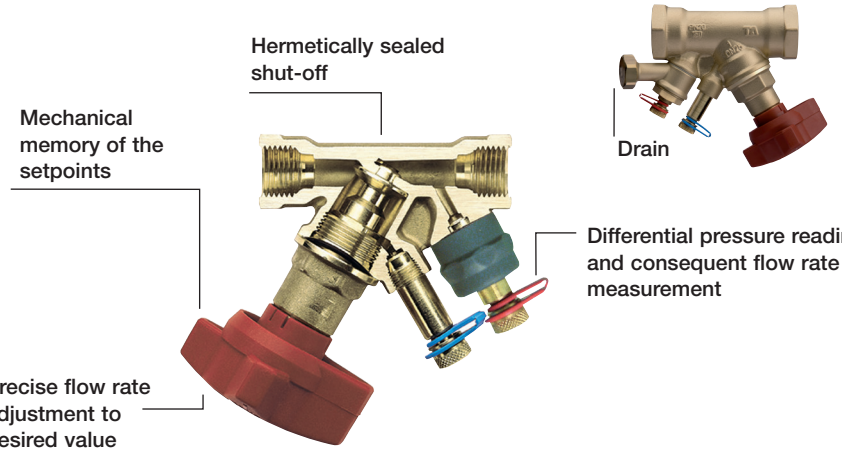


Fig. 4

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 to be balanced in bar

The following can be determined from the above:

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

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

Table of Kv values at the various setpoint positions

Turns	DN10	DN15	DN20	DN25	DN32	DN40	DN50
0.5	-	0.127	0.511	0.60	1.14	1.75	2.56
1.0	0.090	0.21	0.757	1.03	1.90	3.30	4.20
1.5	0.137	0.314	1.19	2.10	3.10	4.60	7.20
2.0	0.260	0.571	1.90	3.62	4.66	6.10	11.7
2.5	0.480	0.877	2.80	5.30	7.10	8.80	16.2
3.0	0.826	1.38	3.87	6.90	9.50	12.6	21.5
3.5	1.26	1.98	4.75	8.00	11.8	16.0	26.5
4.0	1.47	2.52	5.70	8.70	14.2	19.2	33.0

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.

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**).

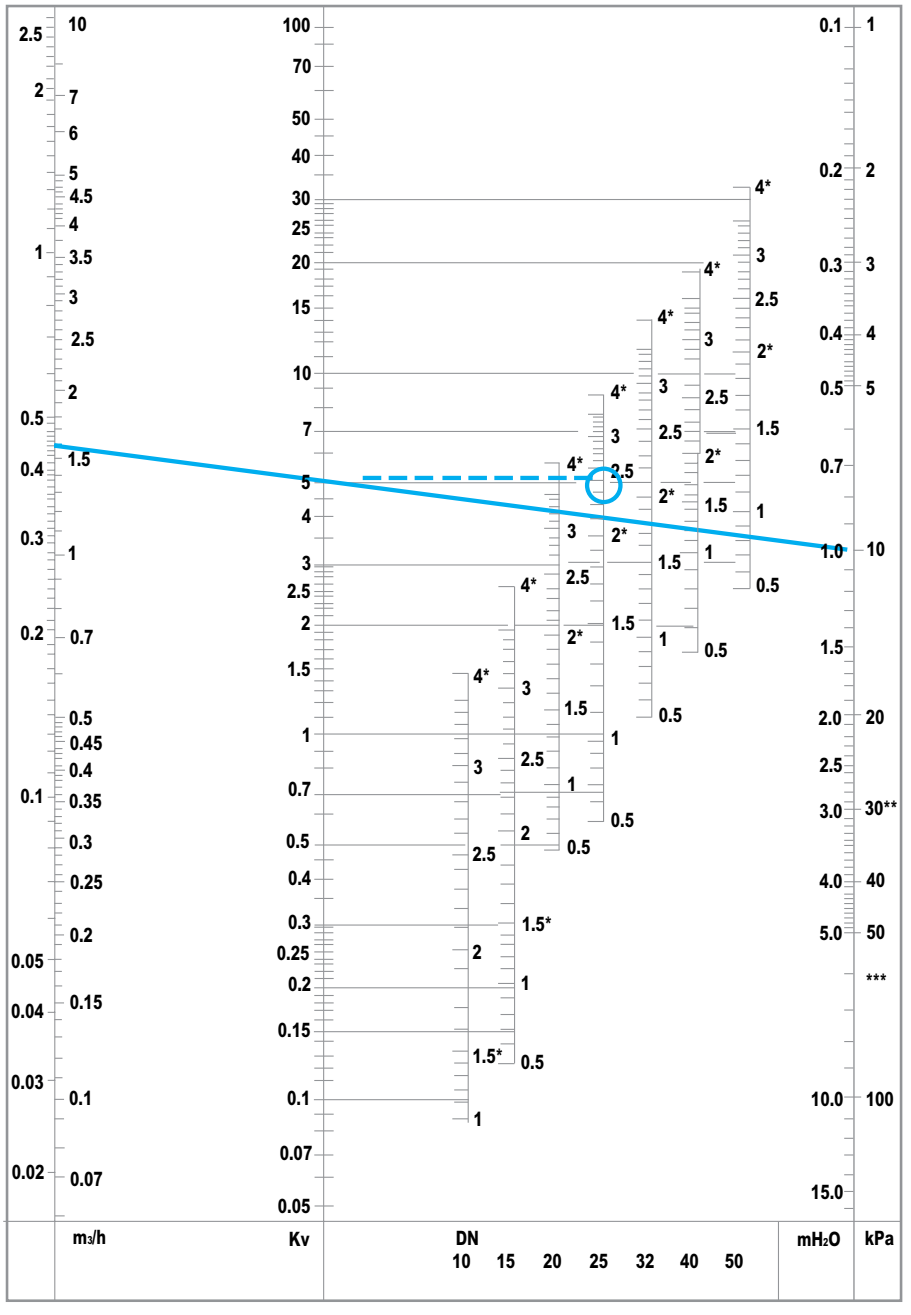
Chart

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 position corresponding to the different valve diameters, now draw a horizontal line from the resulting Kv.

Worked example of how to use the flow curve
Calculate the setpoint to assign to a DN 25 valve with a flow rate of 1.6 m^3/h and a pressure drop of 10 kPa.

Solution:
Draw a line between 1.6 m^3/h and 10 kPa. The resulting Kv = 5.
From this point, draw a horizontal line that meets the DN 25 column.
The result is 2.4 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 (10 kPa, Kv = 5 and flow rate 1.6 m^3/h), we can deduce that with 10 kPa we will have two pairs of values: Kv = 0.5 and flow rate 0.16 m^3/h, and Kv = 50 and flow rate 16 m^3/h.



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

Installation

STAD Series balancing and control vales are easy to identify: the key technical specifications, such as PN, DN and inches, 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. 4) is highest if they are fitted in the direction of flow. The curve shows that in the positions closest to fully open, measurement is very precise, whereas in the less open positions the tolerances are inevitably greater.

The valve can also be fitted in the opposite direction to the direction of flow. In this case, the nominal flow rates are still valid but the deviations can increase by a further 5%.

Fitting the valves (Fig. 5) immediately downstream of pumps or shut-off devices, or near sources of turbulence (elbows, nipples, etc.) can give rise to higher measurement errors.

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.

Valves without drain fittings are equipped with a plug, which can be replaced with the optional drain kit (Item 52179-990) accessory. The kit can be installed without draining the system.

Use of the specific insulation shells (52189 Series) 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.

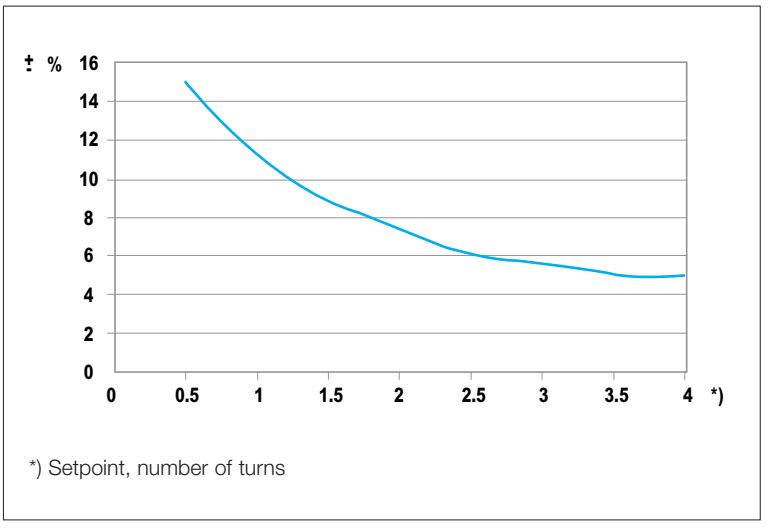


Fig. 4
Measurement deviation for the various setpoints

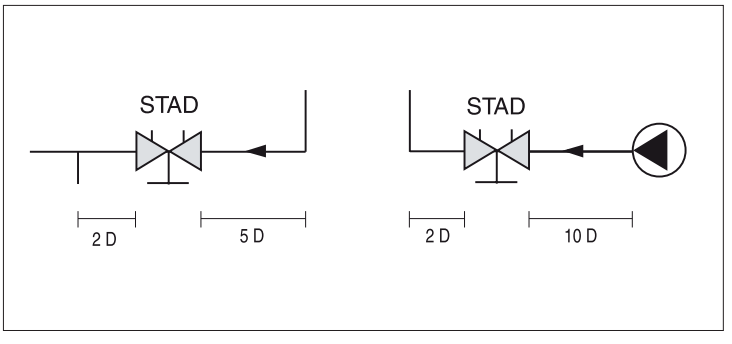
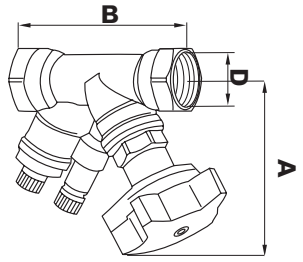


Fig. 5
Installation positions

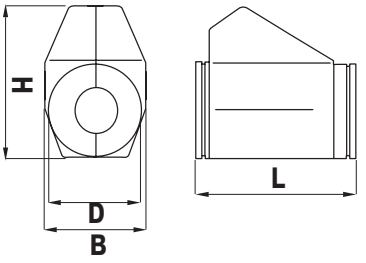
Overall dimensions (mm)

STAD



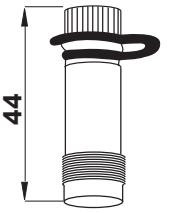
DN	A	B	D	L
10	100	83	3/8"	155
15	100	90	1/2"	155
20	100	97	3/4"	155
25	105	110	1"	175
32	110	124	1.1/4"	195
40	120	130	1.1/2"	214
50	120	155	2"	245

52189



DN	H	D	B	L
10	135	90	103	155
15	135	90	103	155
20	135	90	103	155
25	142	94	103	175
32	156	106	103	195
40	169	108	113	214
50	178	108	114	245

52179



Specification text

STAD Series

Variable-orifice balancing and control valve **STAD Series** – WATTS brand – with female threaded connections from DN10 to DN50 for heating, cooling and domestic water systems.
Shut-off function, pre-setting function with 40 positions on numerical indicator in the handwheel, drain function (optional accessory kit) and diagnosis using a computerised instrument (BVT-SET Series) on self-sealing pressure test points.
Mechanical memory of the setpoint position. AMETAL® (DZR alloy) valve body.
Nominal pressure 20 bar. Operating temperature -20-120°C.

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