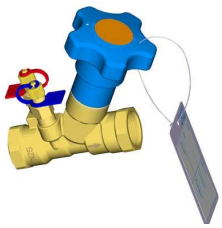
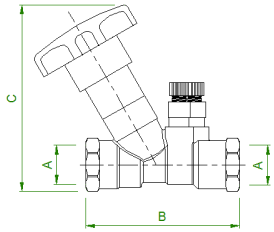
STATIC BALANCING VALVE

Available sizes



90-04	1/2”
90-05	3/4”
90-06	1”
90-07	1 ¼”
90-08	1 ½”
90-09	2”



Art.	A	B	C
90-04	1/2"	88	103
90-05	3/4"	96	103
90-06	1"	100	103
90-07	1-1/4"	117	123
90-08	1-1/2"	127	126
90-09	2"	145	136

General information

The balancing valves **90 series** are Fixed Orifice Double Regulating, this it means that they provide both functions of flow measurement over the Venturi insert (the fixed orifice) and the regulation and isolation properties of a standard Double Regulating Valve. These static balancing valves permit to balance heating and chilled water systems. They allow to have:

- easy evaluating the flowrate passing through the valve using the same Kvs value for all the topset® handwheel settings (see graphs section)
- regulate the flow with the throttling disk operated by means of the handwheel (40 stroke positions showed by figures)
- fully stop the flow at any time and recover the previous handwheel presetting by means of the memory stop option (set by the provided 3 mm Allen key)
- the valves are designed and manufactured to comply with the specifications of BS 7350 British Standard
- sizes from ½” to 2”, that are intended to be used on non-hazardous liquids only, defined as Group 2 by the Pressure Equipment Directive 97/23/EC : this fact beside the Pressure/Temperature ratings shown below, the **90 series** valves to be categorized as SEP so they do not require the CE mark
- sizes from 1” to 2” have female ends connections threaded ISO 7/1 Rp parallel, while sizes ½” and ¾” have female end connections threaded ISO 228/1 parallel

Technical data

All flushed brass components are made of DZR BRASS CW602N EN 12164-5
All external brass components are made of BRASS CW617N EN 12164-5
All flushed rubber gaskets are in PEROSSIDIC EPDM
The disk gasket is in P.T.F.E.
The topset® handwheel is in ABS and Acetylic plastic

Non shock rating pressure of 25 bar in the temperature range from –10°C (*) to 100°C
Non shock rating pressure of 20,2 bar at max. temperature of 130°C (**)

(*) = below zero temperatures only for water added with antifreezing fluids.
(**) = over 100°C temperatures only for water added with liquids to avoid boiling.

The operating ratings showed above are intended for non-shock conditions. Water hammer, impacts, fatigue loads, corrosive and erosive external environment and transporting fluids with abrasive properties should be avoided.

Coefficients of the balancing valves

WITH VALVE FULLY OPEN						
VALVE	**SIZE**	**DN**	**Kvs**	**Kv**	**HLF**	**K**
90-04	1/2"	15	2.8	1.92	2.14	29.3
90-05	3/4"	20	5.33	3.66	2.12	26.5
90-06	1"	25	9.72	6.25	2.42	22.8
90-07	1 1/4"	32	20.25	12.64	2.57	16.9
90-08	1 1/2"	40	30.23	19.65	2.37	12.8
90-09	2"	50	55.07	29.59	3.46	14.6

$$Q = \frac{K_{VS} \cdot \sqrt{\Delta p_s}}{36}$$

Q = flowrate [l/s]
Δp_s = differential pressure (signal) through the pressure test points of the valve [kPa]
Kvs = flow coefficient through the pressure test points of the valve [m³/hour @ 1 bar]

$$K_V = \frac{36 \cdot Q}{\sqrt{\Delta p}}$$

Q = project calculated local flowrate [l/s]
Δp = project calculated total loss of head (permanent frictional pressure loss) to be given by the valve [kPa]
Kv = flow coefficient through the valve [m³/hour @ 1 bar]

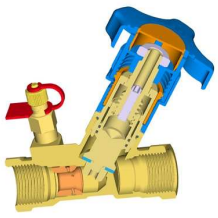
PRESSURE LOSS in fully open position = $HLF \cdot \Delta p_s$ [kPa]

PRESSURE LOSS in fully open position = $K \cdot \frac{v^2}{2 \cdot g}$ [m.c.w.]

Where:

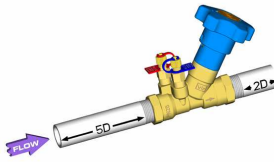
HLF = head loss factor (fully open)
K = head loss coefficient (fully open & for medium series tubes BS 1387 - ISO 65)
v = flow velocity [m/s]
g = gravitational constant 9.81 m/s²

Key points of the 90 series



- The differential pressure signal is evaluated by means of a Venturi insert (the most important lower pressure is measured in the actual restricted section) allowing the real Kvs response of the valve to belong to ±1.5% of Kvs printed value (following the BS 7350 test procedure and in the optimal laboratory test conditions)
- The really high precision of the valve leave room for the others inevitable errors due to joints, turbulence from other nearby items or bends, roughness, etc., leading to a real Kvs = ± 3% of Kvs printed value
- The low pressure is measured from a groove connected to the restricted section flow by means of four 90 degrees separated bores so that the pressure reading is a mean value : this helps to avoid measurement errors due to asymmetric flows entering the valve (typical when pipe bends or different items are assembled too near upstream the valve)
- The DZR brass forged body gives the typical bronze corrosion strength beside the forged brass mechanical strength
- The standard Kvs values series and total pressure loss characteristics of the valves have been studied to fully comply with the BS 7350 : this assure optimal performances in the flow ranges for which balancing valves are usually used
- Having the Venturi insert fixed in the housing gives the possibility to customize the Kvs valve performances on special request of the clients

Installation

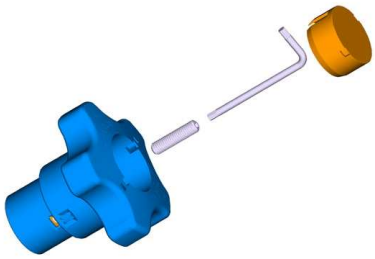


In order to obtain the best flow measurement accuracy the valves should be installed as follows:

- in a pipe line of the same nominal size
- having a minimum straight pipe length equivalent to 5 pipe diameters at inlet and 2 diameters at outlet
- having a minimum straight pipe length equivalent to 10 pipe diameters at the inlet when installed on the outlet of a pump
- paying attention to respect the flow direction shown on the valves bodies
- not allowing thread jointing materials to protrude inside the bore
- deburring or reaming steel pipes after having them cut and threaded
- deburring or reaming to the bore diameter copper pipes after having them cut
- the **te-sa** series 90 valves should be installed orienting the pressure test points in a way to leave enough room for manometer probes connection and prevent the accumulation of debris into them.

Valve setting

To set the valves it is possible to use electronic equipment or by using the balancing graphs.
The flow regulation is achieved by turning the handwheel along its four turns stroke until the flowrate, derived from the differential pressure signal measured from the two test points, is the one required in that point of the plant (see flow charts).
This working setting of the valve will be displayed by the two figures shown in the two windows of the handwheel (Double zero means the valve is fully closed). In the window towards the handwheel, it is possible to read the tenths of a turn, while in the window towards the valve body it is possible to read the numbers of full turns.



Once reached the requested flowrate, is possible to set the memory stop device as follows:

1) with a little tool gently lever up the center handwheel cap using its slots
2) insert the provided hexagonal 3 mm Allen key in the central bore and leaving the handle in its desired position, tighten clockwise the inner screw until it stops (do not over-wrench) ;
3) replace the plastic cap : it is possible to prevent tampering by sealing the cap to the upper part of the handwheel using the existing slots and a sealing wire

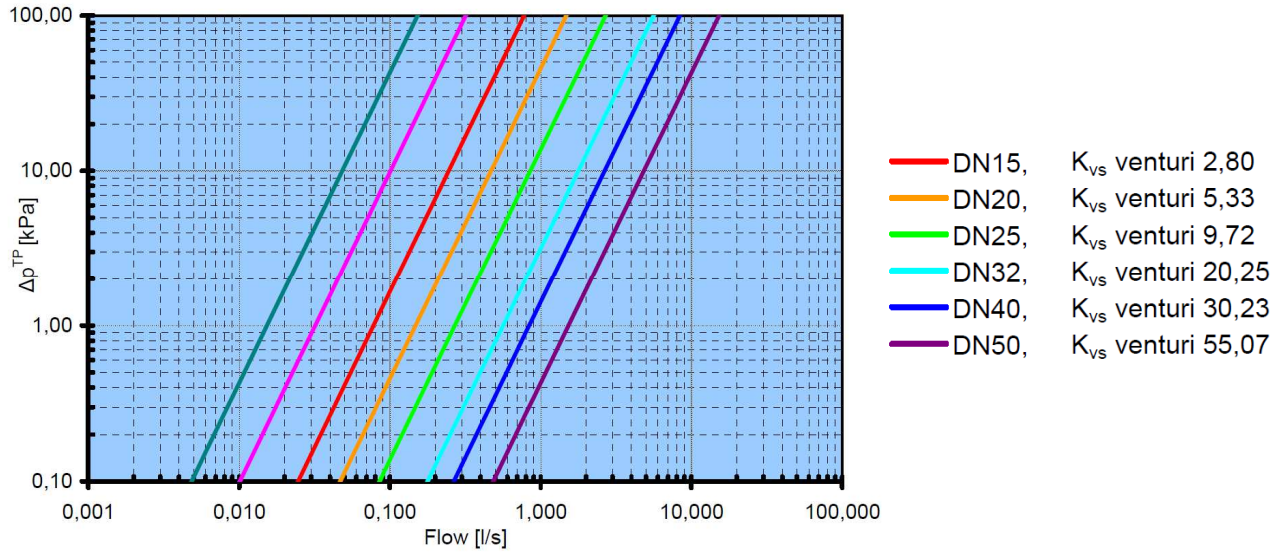
Now the valve may be closed at any time, and when re-opened it will stop exactly at the previous set point.

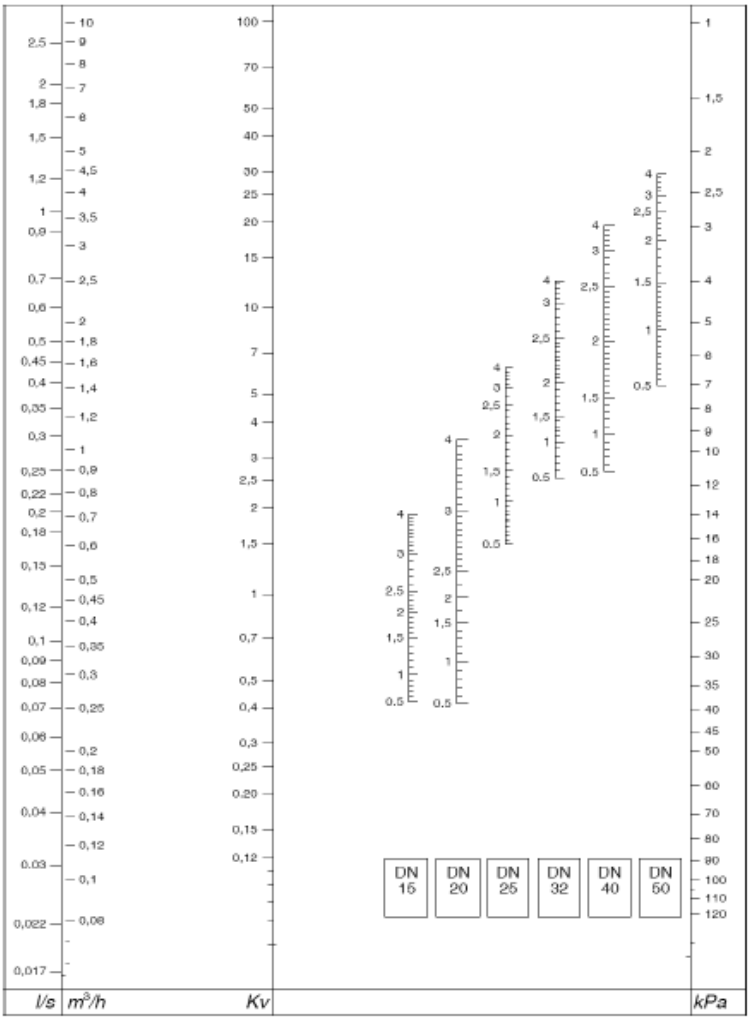
Handwheel position	Kv (m3/h @ 1bar)					
	015	020	025	032	040	050
0,5	0,41	0,41	1,47	2,56	2,72	5,36
0,7	0,41	0,47	1,73	2,92	3,12	6,54
1,0	0,53	0,58	2,09	3,42	3,69	8,35
1,3	0,62	0,70	2,44	3,88	4,29	10,54
1,5	0,70	0,78	2,70	4,18	4,82	12,37
1,7	0,78	0,86	3,01	4,54	5,71	14,39
2,0	0,86	0,97	3,57	5,42	7,78	17,45
2,3	0,95	1,08	4,18	6,76	10,45	20,20
2,5	1,02	1,20	4,57	7,92	12,29	21,73
2,7	1,14	1,40	4,87	9,05	14,13	23,06
3,0	1,38	1,94	5,27	10,56	16,34	24,84
3,3	1,63	2,54	5,61	11,58	17,88	26,44
3,5	1,76	2,93	5,74	12,06	18,63	27,44
3,7	1,83	3,24	5,88	12,40	19,17	28,42
4,0	1,89	3,51	6,14	12,54	19,59	29,72
4,4	1,92	3,67	6,24	-	-	-

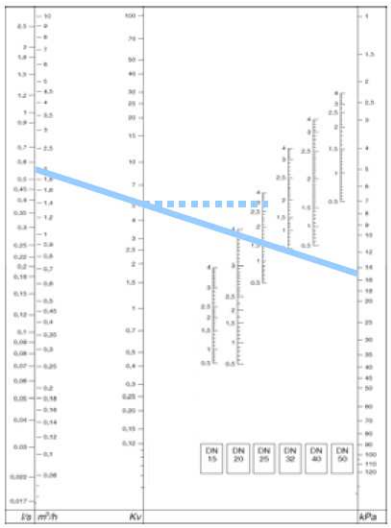
Valve data tag

The **90 series** valves are supplied with a data tag on which are indicated the part number of the valve, the nominal size and the value of the flow coefficient Kvs. On the tag there is room to write the required setting of the valve, indicating either the handwheel setting figures, the desired flowrate or the pressure signal.
It can be fixed to the handwheel with the provided plastic barb tie. Realizing a long ring with the tie, the data tag could be leaved outside of a possible insulation, simplifying the identification of the hidden device.

Valve setting graphs







In the example for a design flowrate of 2m³/h and design Δp 15kPa, handwheel position of 2.9 is determined for a DN25

By using diagram above is possible to esteem the presetting position of the valve with given design flowrate and headloss: **1)** draw a straight line joining design flowrate and design headloss **2)** determine design K_v value as intersection of drawn line and K_v axis **3)** draw a straight horizontal line from intersection previously identified and the specific valve DN Axis **4)** intersection determines handwheel position to use for presetting.