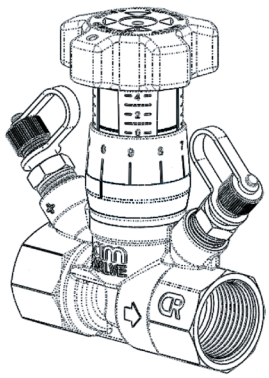
ART28/28DP Variable Orifice Balancing Valve

Technical Data and Installation Instructions

Dimensions in mm

ART28/28DP Variable Orifice Balancing Valve



PN 25

Main features:

ART28 is used for balancing the flow in cooling, heating and domestic water systems.
Cim 787 is a combined manual presetting valve with following features:

- Variable measurement orifice;
- Supplied with 2 pcs. of measuring nipples for needles;
- Handwheel with shut-off function and clear 360° reading;
- Digital scale with lock function;
- High measuring accuracy.

It is supplied with internal thread.
It is made of standard brass and "CR" brass ("CR" - Corrosion Resistant).

This article is made in compliance with the quality management requirements of ISO 9001:2008 standard.
All articles are tested according to EN 12266-1:2003 standard.
It can be used in a wide variety of sectors: heating, air conditioning, water, sanitary systems and generally with any non corrosive liquid.

Technical data:

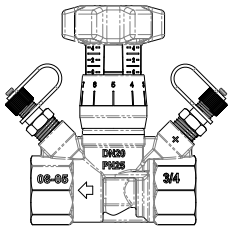
Max. static working pressure	25 bar
Max. flow temperature	120 °C
Min. temperature	-10°C
Fluids:	Water and Glycol
Material of parts in contact with water:	
	Valve body;
	Spindle;
	Cone, etc.
Materials:	
	"CR"Brass (EN 12165-CW602N-M.)
	Standard Brass (EN 12165-CW617N-M)
O-rings:	EPDM Perox
Threads:	ISO 7

Approved by*:

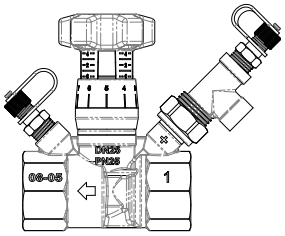
Dimensions in mm

ART28/28DP Variable Orifice Balancing Valve

Models:



ART28 - Balancing valve - Variable orifice - PN 25 - "CR" Brass				
DN	Material	Thread	Kv - Kvs	Part Code
15	CR Brass EN 12165-CW602N-M	1/2" Rp	0.42 ÷ 1.75	ADRX28050
20		3/4" Rp	0.44 ÷ 2.87	ADRX28075
25		1" Rp	0.52 ÷ 4.08	ADRX28100
32		1"1/4 Rp	0.7 ÷ 6.71	ADRX28125
40		1"1/2 Rp	0.82 ÷ 10.40	ADRX28150
50		2" Rp	1.14 ÷ 15.06	ADRX28200

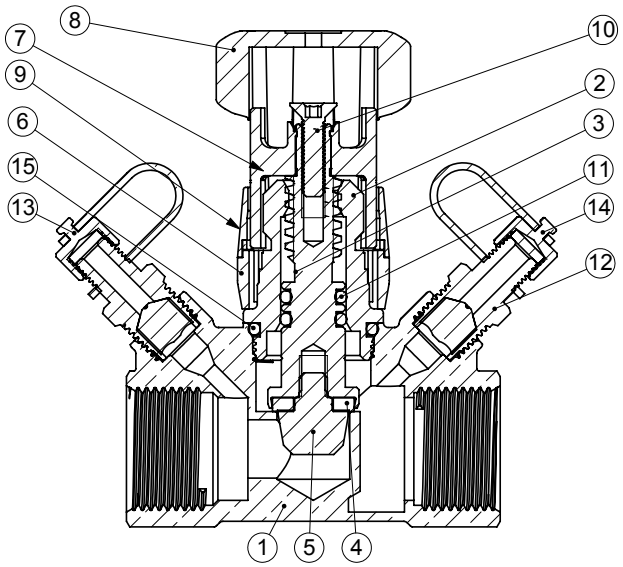


ART28DP - Balancing valve - Variable orifice - PN 25 - Capillary fitting				
DN	Material	Thread	Kv - Kvs	Part Code
15	CR Brass EN 12165-CW602N-M	1/2" Rp	0.42 ÷ 1.75	ADPC28DP050
20		3/4" Rp	0.44 ÷ 2.87	ADPC28DP075
25		1" Rp	0.52 ÷ 4.08	ADPC28DP100
32		1"1/4 Rp	0.7 ÷ 6.71	ADPC28DP125
40		1"1/2 Rp	0.82 ÷ 10.40	ADPC28DP150
50		2" Rp	1.14 ÷ 15.06	ADPC28DP200

Dimensions in mm

Cross section:

1. Valve body
2. Bonnet
3. Stem
4. Gasket
5. Shutter
6. Index
7. Entrainer
8. Knob
9. Tenth turn index
10. Screw
11. O-ring
12. Binder point
13. Red cap
14. Blue cap
15. O-ring



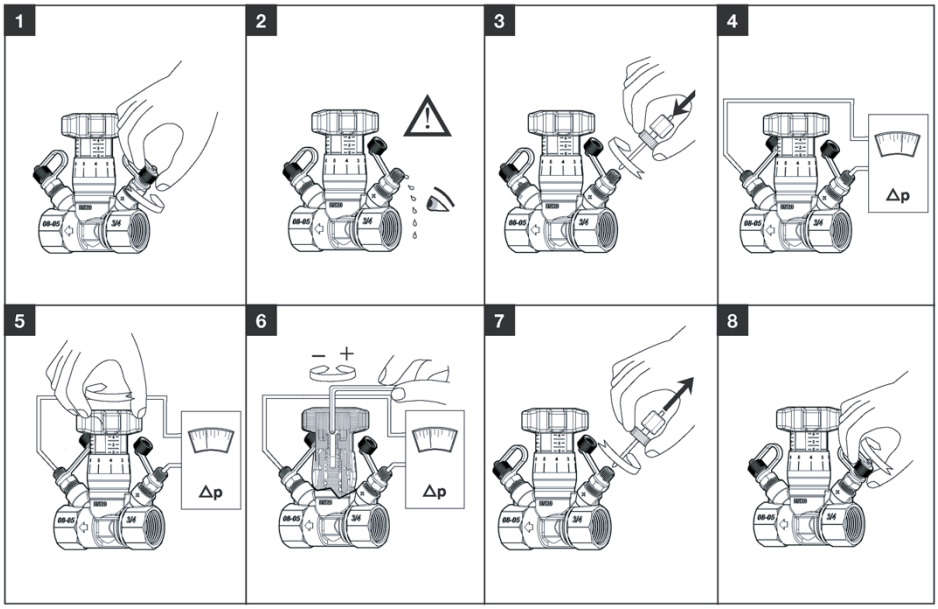
Installation procedure:

Before installation of ART28, check that inside the valve and the pipes there are no foreign matters which might damage the tightness of the valve.
When installing the valve, please make sure to have a pipe length 5 times the DN upstream the valve and 2 times the DN downstream, and pay attention to the arrow direction casted on the valve body, which shall be the same as the flow direction.
Deburr pipe connections after having threaded them and distribute the sealing material on pipe threads only and not on valve threads. The sealing material quantity shall be according to the dimension of parts to be coupled. An excessive quantity of sealing material could submit the threaded ends to extreme stress and/or fall inside the valve and cause problem to the flow.
For assembly purposes, use a spanner, not a pipe wrench, by applying necessary working torque only on the valve end nearest the pipe. This helps get a firmer grip and avoids potential damages to valve body.
Make sure that pipe threading length is not longer than valve threads.

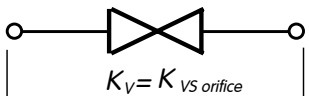
Dimensions in mm

Regulating:

To close the valve, rotate clockwise the handle until the stop. Looking at the data showed in the herewith attached diagrams, it is possible to regulate the flow by rotating the handle anticlockwise until the required flow rate is reached. The reading of this flow rate can be done by using a differential manometer.
This interfaces with the balancing valve through two sensors inserted in the binder points placed before and after the calibrated diaphragm of the valve.
The main index scale showing values from 0 up to 4 of the handle, states the turns of opening of the obturator, while the second circular one from 0 up to 9 registers the tenths of one turn.
The position of the handle for the required flow rate can be memorized by a 3mm Allen Key.



Sizing:



Kvs orifice - Kv across orifices
Kv - Kv across valve

Relative density	
Fluid	r
Water	1.000
Water and glycol 10%	1.012
Water and glycol 20%	1.028
Water and glycol 30%	1.040
Water and glycol 40%	1.054
Water and glycol 50%	1.067

FLOW COEFFICIENT

Kv, in metric system represents the flow in m³/h of water at the temperature of 15.5°C (density =998 kg/m³) which causes a pressure drop of 1 bar. In the USA flow coefficient is called Cv (Kv = 0.865 Cv).

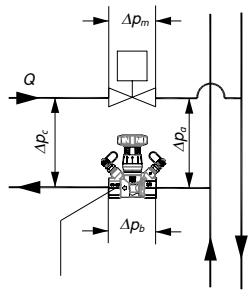
$$Kv = \frac{Q}{\sqrt{\Delta p}}$$

It is possible to calculate the pressure drop across a valve with a generic flow rate and fluid:

$$\Delta p = r \cdot \left(\frac{Q}{kv}\right)^2$$

where:
r is the relative density, Q is the flow rate in m³/h.

Dimensions in mm



$\Delta p_a = \Delta p_b + \Delta p_c + \Delta p_m$

Δp_b *Pressure drop across Cim 787*
Δp_m *Pressure drop across the control valve*
Δp_c *Necessary pressure for the circuit*
Δp_a *Available pressure for the riser*

SUGGESTED VALUES AND TIPS:

- Pressure drop across the valve:
  Max = 50 kPa
- Pressure drop across the binders:
  Max = 50 kPa
  Min = 1 kPa
- Velocities in the pipeline:
  Max = 1.15 m/s
  Min = 0.75 m/s

For the preliminary sizings where the value of pressure drop across the valve is not known, use a value of 10 kPa.

EXAMPLE

It is required to balance the circuit in the figure, the given data are:

- Necessary pressure for the circuit: Δp_c=13 kPa;
- Available pressure for the riser: Δp_a=35 kPa;
- Pressure drop across the control valve: Δp_m= 10 Kpa;
- Flow rate: Q= 3 m³/h=0.833 l/s.

The required differential pressure across the balancing valve can be calculated using the following relation:

$$\Delta p_b = \Delta p_a - \Delta p_m - \Delta p_c = 35\text{-}10\text{-}13 = 12\ kPa = 0{,}12\ bar$$

the required Kv is:

$$Kv = Q \cdot \sqrt{\frac{r}{\Delta p_b}} = 3 \cdot \sqrt{\frac{1}{0{,}12}} = 8.66$$

Using the attached tables to this datasheet, it is possible to find the following available valves with the relative position of the handle:

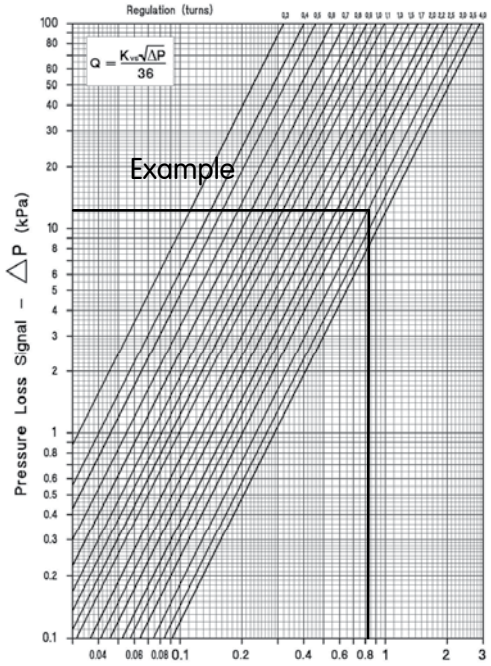
- ART28 DN 40 --> Preset: 3.1 (Kv=8.66);
- ART28 DN 50 --> Preset: 2.0 (Kv=8.75);

The two selected models are comparable. As a general rule, it is better to choose the valve with the smallest diameter, in this way the valve will be quite opened and there will be no problem with noises and cavitations.

Measuring the pressure drop across the binders of the ART28 DN 40 (Preset 3.1), the operator will find this value:

$$\Delta p_{bin} = r \cdot \left(\frac{Q}{Kvs}\right)^2 = 1 \cdot \left(\frac{3}{8.66}\right)^2 = 0.12\ bar = 12\ kPa$$

N.B. The Kvs value is equal to the Kv of the valve and the measured pressure drop across the binders is the pressure drop across the valve too.



Dimensions in mm

Measurement conversion chart:

Pressure

FROM	MULTIPLY BY	TO OBTAIN
Pa, Pascal	0,001	kPa, kiloPascal
Pa, Pascal	0,000001	MPa, Mega Pascal
Pa, Pascal	0,00001	bar
Pa, Pascal	0,00010972	m_{H2O}, metres of water
Pa, Pascal	0,000145038	psi, pound per square inch
bar	1,01325	atm, atmosphere
bar	0,980665	Kg/cm², kilograms per square centimetre
bar	10,1972	m_{H2O}, metres of water
bar	14,5038	psi, pound per square inch
atm, atmosphere	1,03323	Kg/cm², kilograms per square centimetre
atm, atmosphere	10,3323	m_{H2O}, metres of water
atm, atmosphere	14,6959	psi, pound per square inch
Kg/cm²	10	m_{H2O}, metres of water
Kg/cm²	14,2233	psi, pound per square inch
m_{H2O}	1,42233	psi, pound per square inch

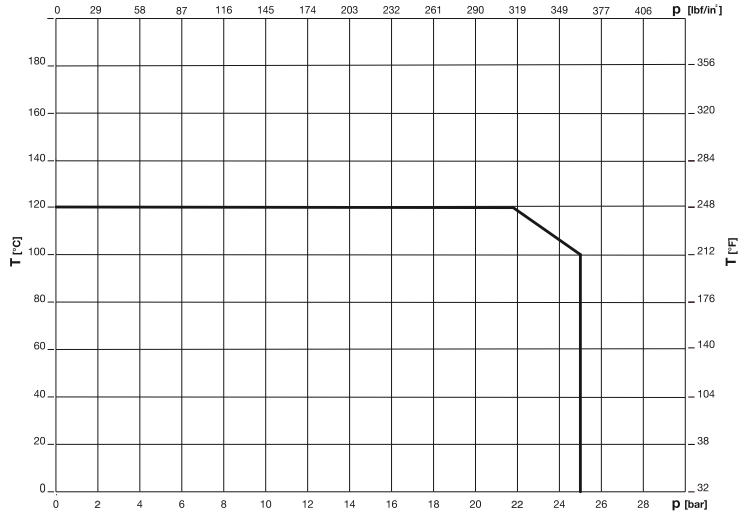
TO OBTAIN — DIVIDE BY — FROM

Length, Area, Volume, Density

FROM	MULTIPLY BY	TO OBTAIN
inches	0,0254	m, metres
inches	2,54	cm, centimetres
feet	0,3048	m, metres
feet	30,48	cm, centimetres
yards	0,9144	m, metres
square inches	0,00064516	m², metri quadrati
square feet	0,09290304	m², square metres
square inches	6,4516	cm², square centimetres
square feet	929,0304	cm², square centimetres
square yards	0,8361274	m², square metres
l, litres	0,001	m³, cubic metres
gallons	0,003789412	m³, cubic metres
cubic yards	0,7645549	m³, cubic metres
cubic feet	0,02831685	m³, cubic metres
cubic inches	0,0000164	m³, cubic metres
cubic inches	16,38706	cm³, cubic centimetres
cubic feet	28,31685	l, litres
gallons	3,875412	l, litres

TO OBTAIN — DIVIDE BY — FROM

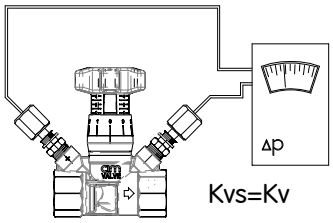
Pressure-temperature ratings:

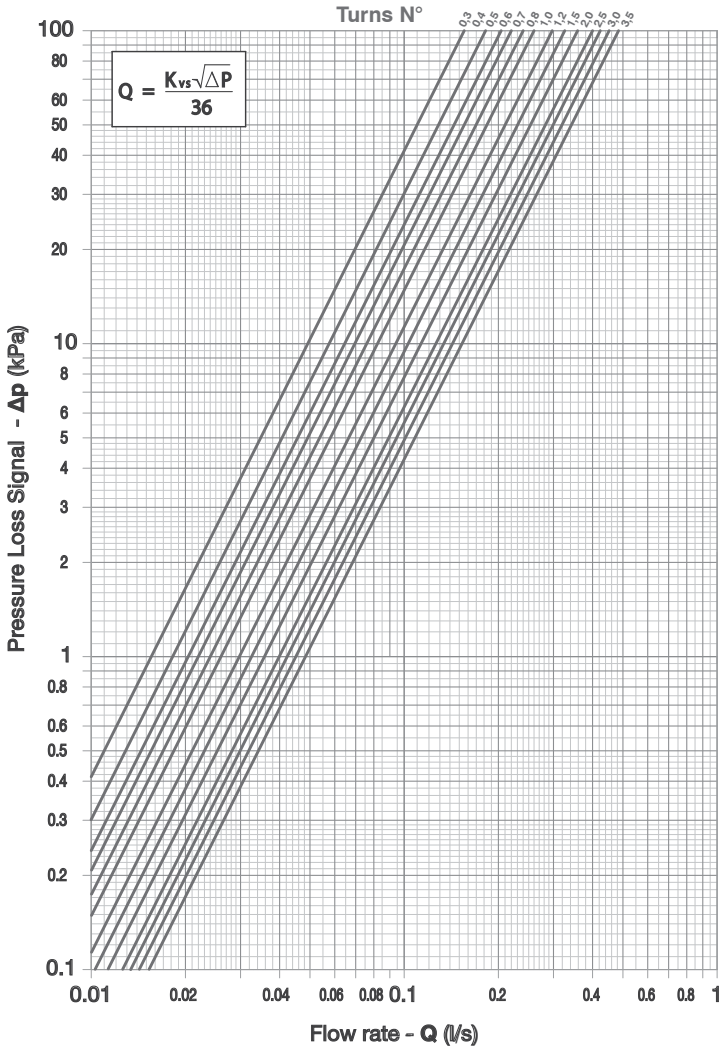


Dimensions in mm

Kv Values - DN 15

ART28
ART28DP



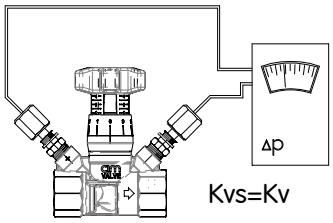


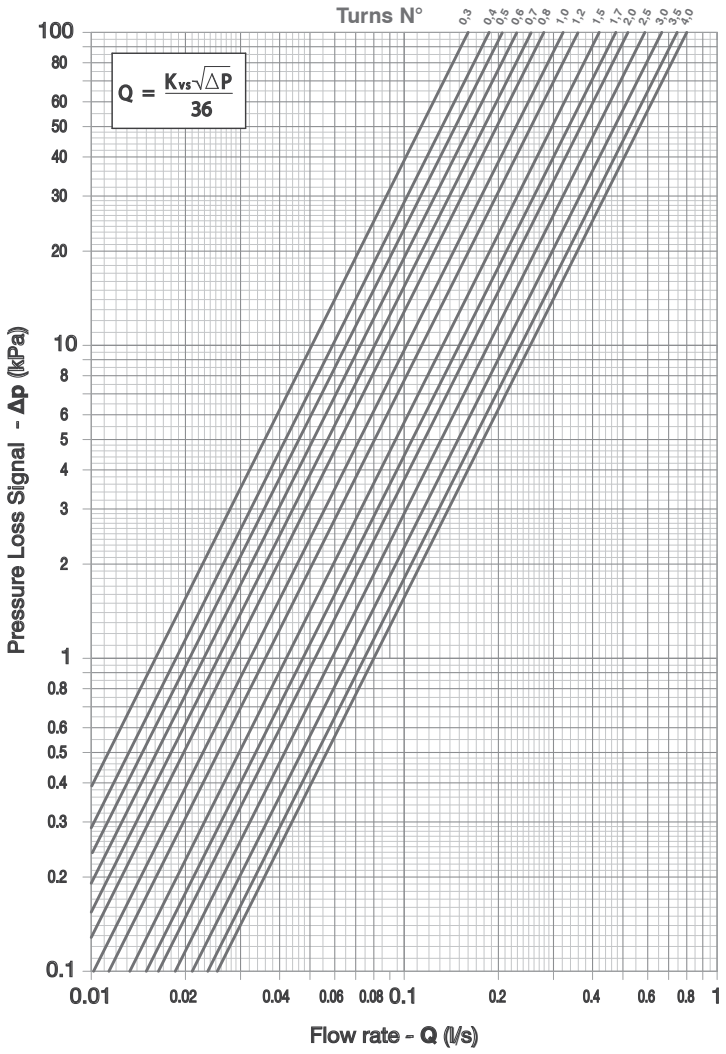
Kv-Kvs (Flow rate in m³/h @ 1 bar pressure drop)										
Full turn		Tenths of turn								
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	-	-	0.42	0.56	0.65	0.71	0.79	0.86	0.94	1.01
1	1.07	1.12	1.17	1.22	1.25	1.28	1.31	1.34	1.37	1.41
2	1.44	1.46	1.49	1.50	1.51	1.53	1.55	1.58	1.60	1.62
3	1.64	1.65	1.66	1.68	1.69	1.70	1.71	1.72	1.73	1.74
4	1.75									

Dimensions in mm

Kv Values - DN 20

ART28
ART28DP



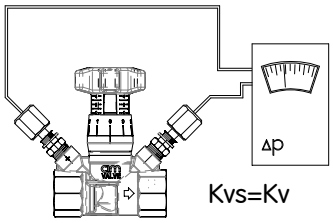


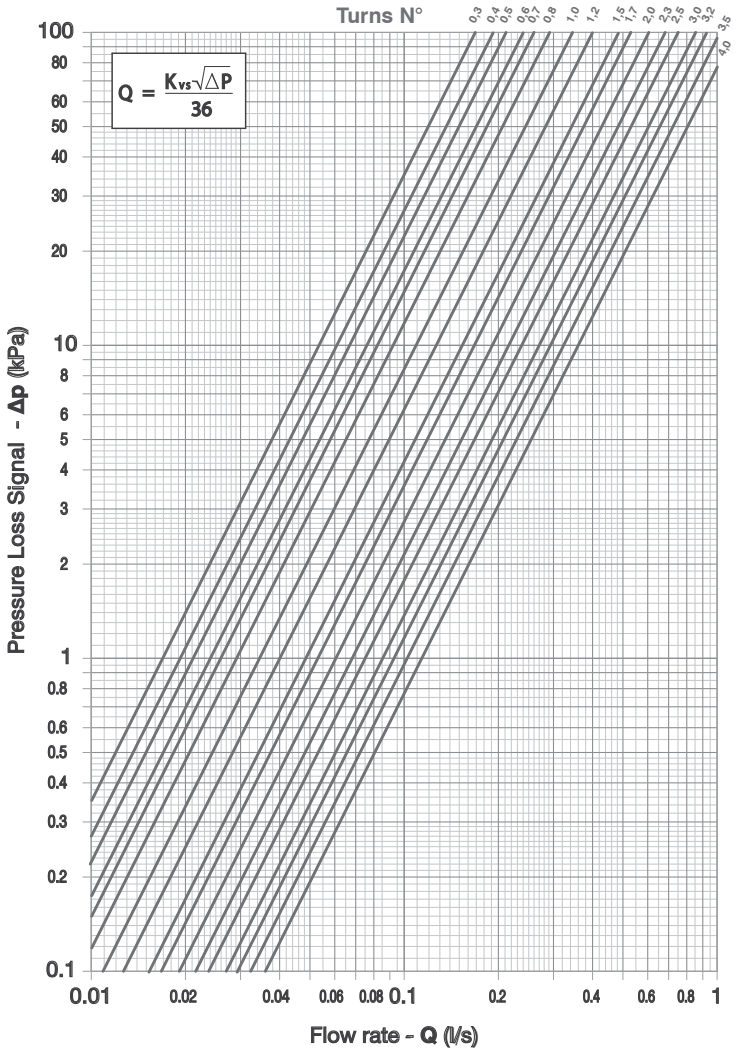
Kv-Kvs (Flow rate in m³/h @ 1 bar pressure drop)										
Full turn		Tenths of turn								
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	-	-	0.44	0.56	0.67	0.74	0.82	0.91	1.00	1.08
1	1.16	1.24	1.31	1.38	1.44	1.52	1.62	1.70	1.77	1.83
2	1.89	1.94	1.99	2.04	2.09	2.13	2.18	2.22	2.29	2.35
3	2.42	2.47	2.53	2.59	2.65	2.71	2.74	2.77	2.80	2.84
4	2.87									

Dimensions in mm

Kv Values - DN 25

ART28
ART28DP



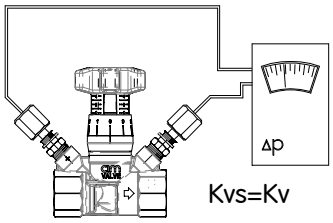


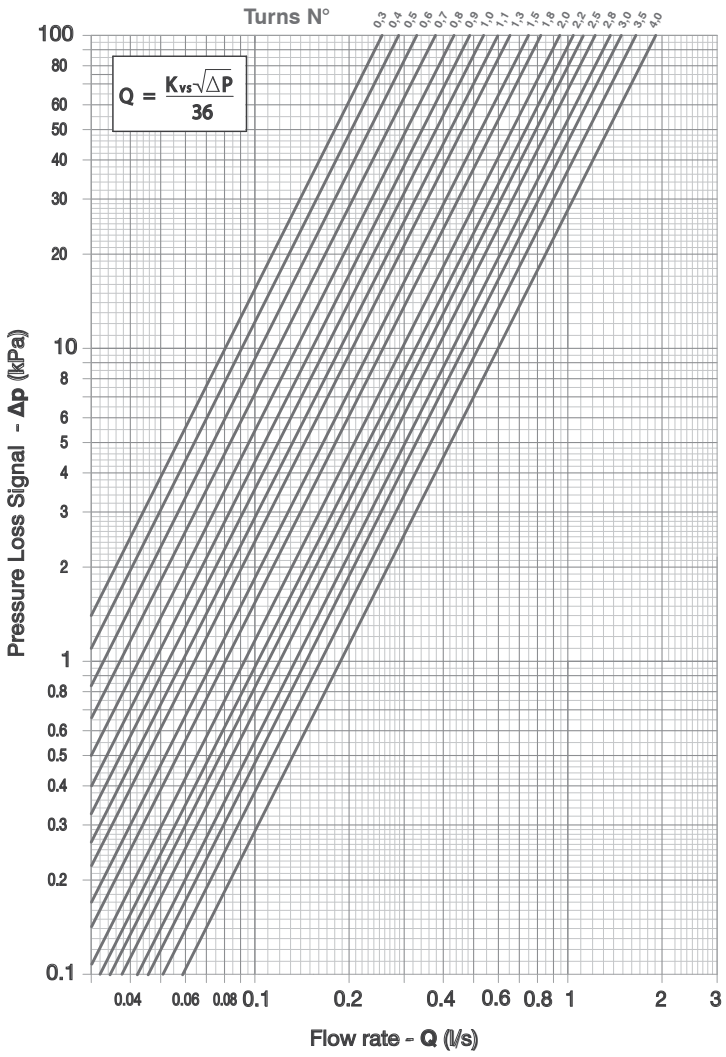
Kv-Kvs (Flow rate in m³/h @ 1 bar pressure drop)										
Full turn		Tenths of turn								
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	-	-	0.52	0.61	0.69	0.76	0.86	0.94	1.05	1.15
1	1.25	1.35	1.46	1.55	1.64	1.74	1.83	1.92	1.99	2.06
2	2.15	2.22	2.33	2.45	2.59	2.69	2.70	2.72	2.82	2.94
3	3.08	3.20	3.34	3.46	3.58	3.67	3.75	3.87	3.95	4.03
4	4.08									

Dimensions in mm

Kv Values - DN 32

ART28
ART28DP



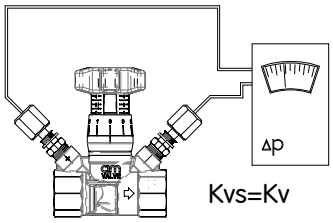


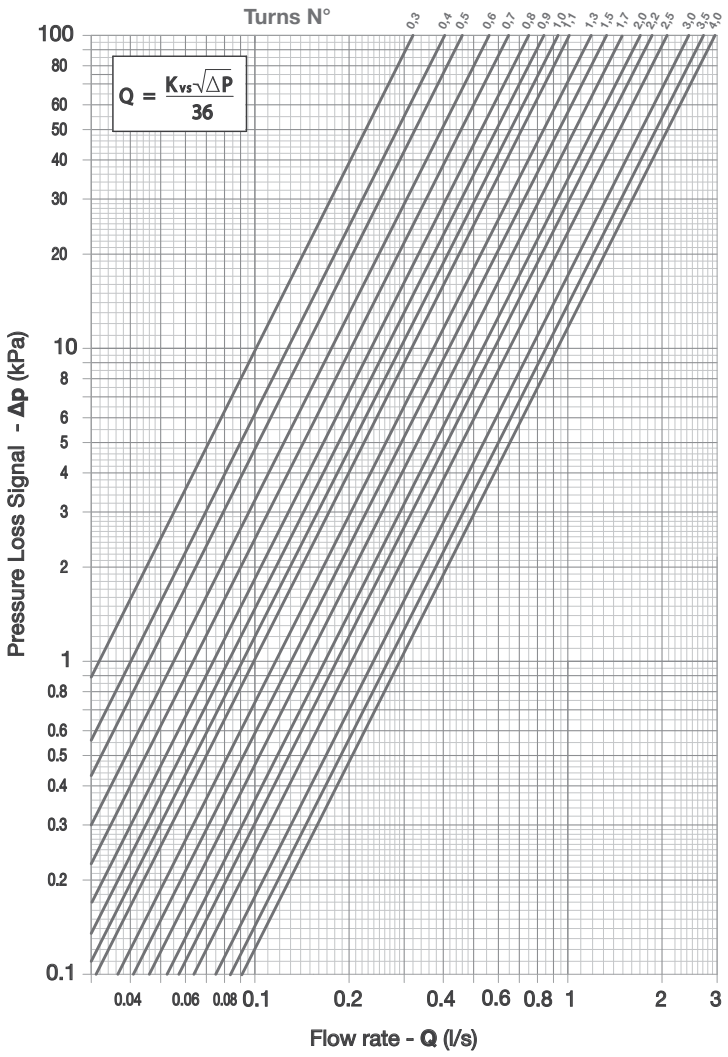
Kv-Kvs (Flow rate in m³/h @ 1 bar pressure drop)										
Full turn		Tenths of turn								
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	-	-	0.70	0.92	1.03	1.17	1.35	1.53	1.71	1.90
1	2.11	2.31	2.47	2.63	2.74	2.87	3.00	3.16	3.31	3.48
2	3.64	3.76	3.92	4.02	4.17	4.29	4.42	4.60	4.82	5.01
3	5.17	5.29	5.53	5.66	5.79	5.81	5.99	6.01	6.19	6.37
4	6.71									

Dimensions in mm

Kv Values - DN 40

ART28
ART28DP



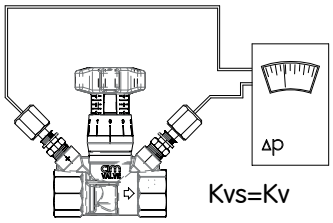


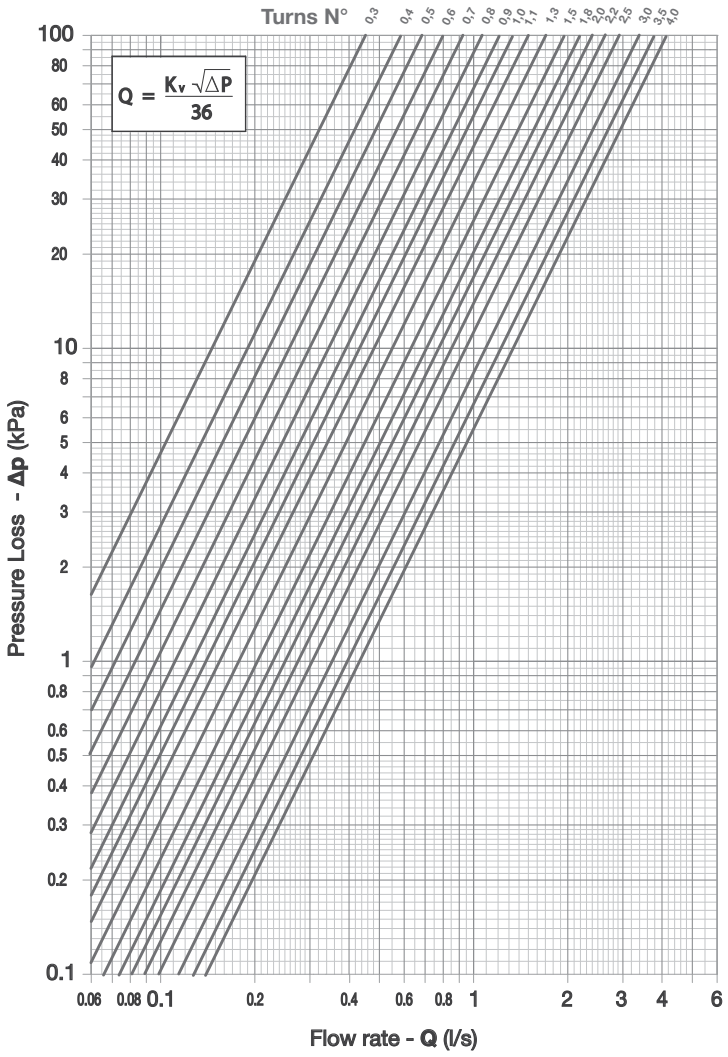
Kv-Kvs (Flow rate in m³/h @ 1 bar pressure drop)										
Full turn		Tenths of turn								
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	-	-	0.82	1.15	1.45	1.65	1.97	2.28	2.63	2.93
1	3.25	3.57	3.88	4.16	4.37	4.67	4.96	5.19	5.47	5.69
2	5.96	6.24	6.51	6.75	6.99	7.26	7.47	7.69	7.91	8.16
3	8.45	8.66	8.84	9.05	9.26	9.51	9.69	9.92	10.10	10.28
4	10.40									

Dimensions in mm

Kv Values - DN 50

ART28
ART28DP



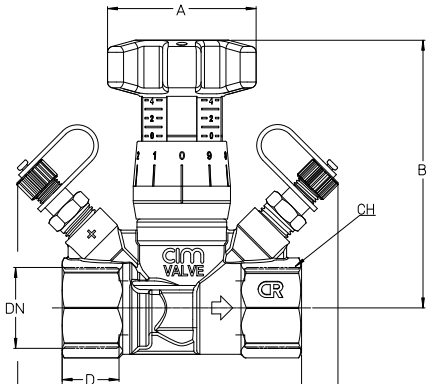


Kv-Kvs (Flow rate in m³/h @ 1 bar pressure drop)										
Full turn		Tenths of turn								
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	-	-	1.14	1.63	2.11	2.42	2.88	3.34	3.88	4.38
1	4.80	5.33	5.76	6.13	6.55	7.01	7.30	7.64	7.92	8.34
2	8.75	9.17	9.57	9.96	10.34	10.58	10.93	11.29	11.60	11.90
3	12.19	12.48	12.85	13.15	13.44	13.66	13.94	14.28	14.56	14.84
4	15.06									

Dimensions in mm

Main dimensions:

ART28



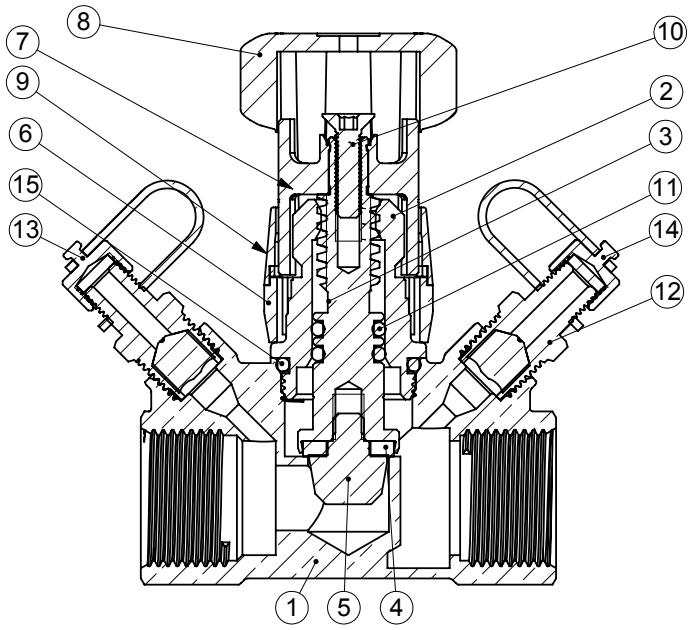
DN	15	20	25	32	40	50
Grms.	380	440	535	960	1120	1350
A	50	50	50	50	50	50
B	87.5	89.5	91.5	99	99	100
C	77	80	87	108	115	124
C1	106	107	107	123	129	132
D	17	18.5	21	22.5	23	26.5
CH	25	31	38	48	55	66

Dimensions in mm

Maintenance

As a rule, the balancing valve does not need any maintenance. In case of replacement or need of disassembling of some components of the valve, make sure that the installation is not under service or pressure.
Should you need to replace the tightening o-ring (15) between valve body (1) and bonnet (2), follow the instructions given here below:

- Open the obturator partially (5)
- Lift the index scale (9) placed over the handle (8), unthread the handle (8) and the reference ring (6);
- Unscrew the bonnet (2) with a key, acting on the hexagonal side;
- Replace the o-ring (15)
- Open the obturator (5) until the maximum opening;
- Screw the bonnet (2) on until its fastening on the valve body (1) with a key acting on the hexagonal side;
- Insert the reference ring (6) and the handle (8) in their site, acting on the valve body;
- Close the valve completely by turning the handle clockwise;
- When the valve is closed, the index scale (9) shall be placed with the "0" value in correspondence with the sign marked on the reference ring (6).



Dimensions in mm

9a Fallbank Industrial Estate,
Dodworth, Barnsley, S75 3LS

Certificate No. 1437B

Certificate No. 1437A

Distributor