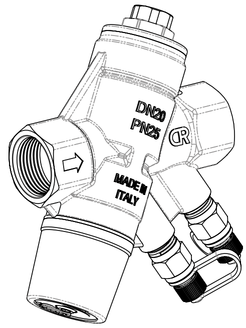
ART24 Differential Pressure Control Valve (DPCV)

Technical Data and Installation Instructions

Dimensions in mm

ART24 Differential Pressure Control Valve (DPCV)



PN 16

Main features:

ART24 is used for balancing the flow in cooling, heating and domestic water systems.
ART24 is a differential pressure control valve that maintains constant differential pressure regardless of flow rate with the following features:

- Selection of the required differential pressure with an Allen key on the handle;
- Supplied with 2 pcs. of measuring nipples for needles;
- Simple removal of the internal cartridge for the flushing stage;
- No need of inlet and outlet straight pipelines to stabilize the flow.

It is supplied with internal thread.
It is made of "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 the 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	16 bar
Max. differential pressure	400 kPa
Differential pressure range	5-30 kPa -Low Pressure (24LP) 20-60/80 kPa -High Pressure (24HP)
Flow rate range	50-2500 l/h - Low Pressure (24LP) 100-15000 l/h - High Pressure (24HP)
Max. flow temperature	120°C
Min. temperature	-10°C
Fluids:	Water and Glycol
Material of parts in contact with water:	Valve body; Cartridge, etc.
Materials:	"CR"Brass (EN 12165-CW602N-M)
O-rings:	EPDM Perox
Threads:	ISO 228

Approved by*:

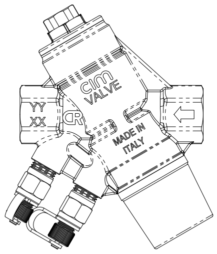
EAC

Dimensions in mm

ART24 Differential Pressure Control Valve (DPCV)

Models:

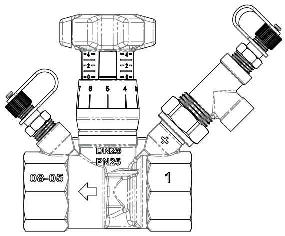
Differential pressure control valve



ART24 LP - Differential pressure control valve - PN 16 - "CR" Brass - Low Pressure					
DN	Material	Thread	Δp range	Flow rate	Part Code
15	CR Brass EN 12165-CW602N-M	G. 1/2"	5 ÷ 30 kPa	50 ÷ 600 l/h	ADPC24L050
20		G. 3/4"	5 ÷ 30 kPa	100 ÷ 1000 l/h	ADPC24L075
25		G. 1"	5 ÷ 30 kPa	600 ÷ 2500 l/h	ADPC24L100
32		-	-	-	-
40		-	-	-	-
50		-	-	-	-

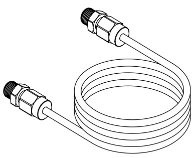
ART24 HP - Differential pressure control valve - PN 16 - "CR" Brass - High Pressure					
DN	Material	Thread	Δp range	Flow rate	Part Code
15	CR Brass EN 12165-CW602N-M	G. 1/2"	20 ÷ 60 kPa	100 ÷ 1200 l/h	ADPC24H050
20		G. 3/4"	20 ÷ 60 kPa	150 ÷ 2000 l/h	ADPC24H075
25		G. 1"	20 ÷ 60 kPa	700 ÷ 4200 l/h	ADPC24H100
32		G. 1"1/4	20 ÷ 80 kPa	1000 ÷ 5000 l/h	ADPC24H125
40		G. 1"1/2	20 ÷ 80 kPa	3000 ÷ 8000 l/h	ADPC24H150
50		G. 2"	20 ÷ 80 kPa	5000÷ 15000 l/h	ADPC24H200

Partner valve

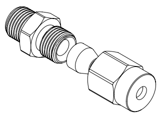


ART28DP - Balancing valve - Variable orifice - PN 25 - Capillary fitting				
DN	Material	Thread	Kv - Kvs	Part Code
15	CR Brass EN 12165-CW602N-M	1/2" Rp	0.42 ÷ 1.75	ADPC28DP050
20		3/4" Rp	0.44 ÷ 2.87	ADPC28DP075
25		1" Rp	0.52 ÷ 4.08	ADPC28DP100
32		1"1/4 Rp	0.7 ÷ 6.71	ADPC28DP125
40		1"1/2 Rp	0.82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

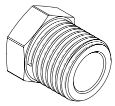
Accessories:



ART24 IT 1M - Impulse tube				
DN	Material	Thread	Length	Part Code
4	Copper	G. 1/8"	1 m	ADPC24IT1M
ART24 IT 2M - Impulse tube				
DN	Material	Thread	Length	Part Code
4	Copper	G. 1/8"	2 m	ADCP24IT2M



ART24 VF - Fitting for impulse tube			
DN	Material	Thread	Part Code
4	Standard Brass EN 12165-CW617N-M	G. 1/8"	RC09120000

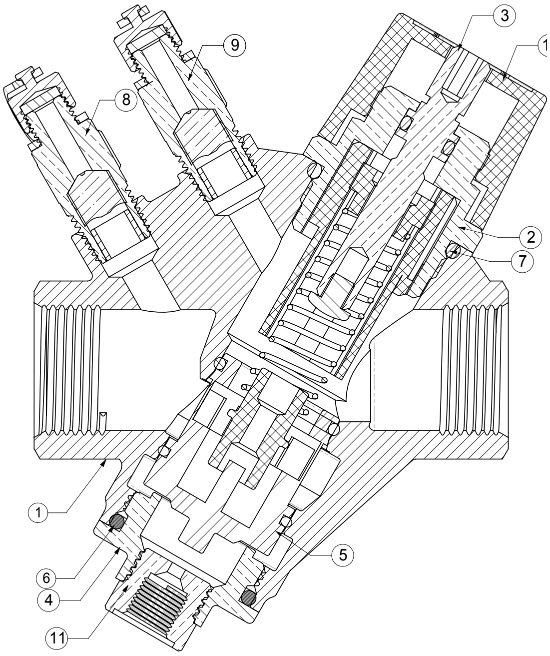


ART24 VG - Reducer			
DN	Material	Thread	Part Code
1/4"x1/8"	Standard Brass EN 12165-CW617N-M	G. 1/4"x1/8"	RC09130000

Dimensions in mm

Cross section:

1. Valve body
2. Bonnet
3. Stem
4. Screwed end
5. Differential pressure Cartridge
6. O-ring
7. O-ring
8. Red binder point
9. Blue binder point
10. Cap



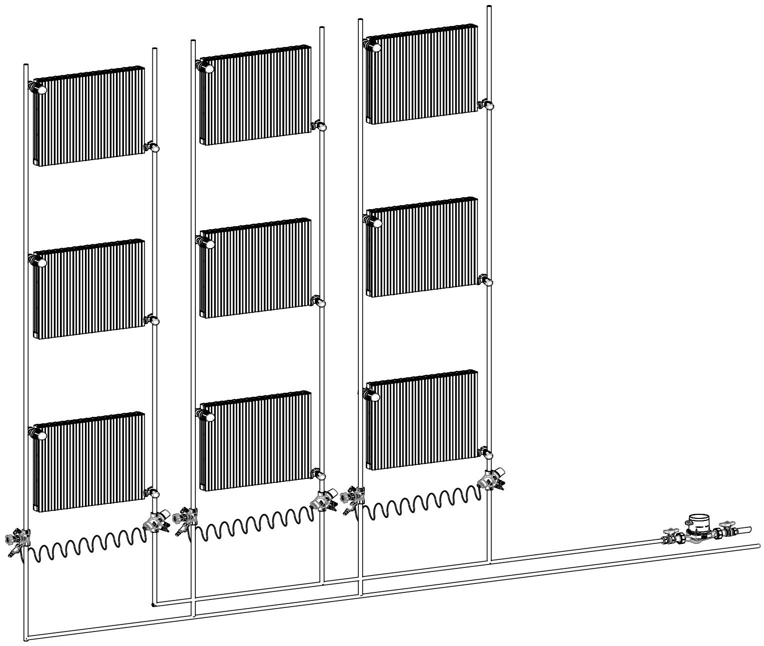
Installation procedure:

Before installation of ART24, check that inside the valve and the pipes there are no foreign matters which might damage the tightness of the valve.
Burr pipe connections after having threaded them and distribute the sealing material on pipe threads only and not on valve threads.
Make sure that required flow rate is within operating range of the valve. ART24 shall be installed on the return line either on horizontal or vertical position, but following the arrow direction casted on valve body, which shall be the same as the flow one.
ART24 is coupled with partner valve ART28DP, installed on the flow pipeline by a copper capillary pipe (Implulse tube).
For assembly purpose, use a spanner, not a pipe wrench, by applying necessary working torque only on the valve end nearest to 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.
After DPC cartridge removal, it is possible to flush the system branch where the valve is installed; when flushing process is over, place the DP control cartridge again.

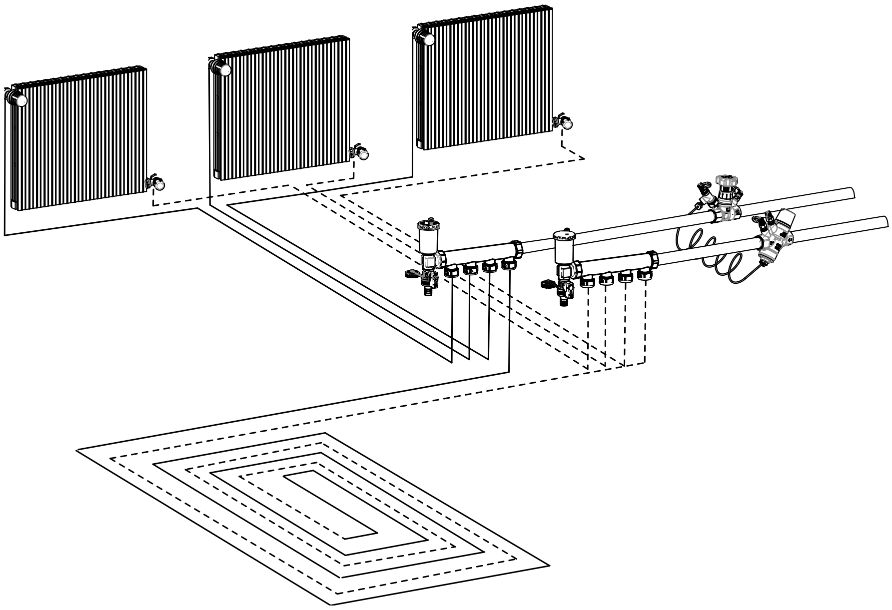
Dimensions in mm

Typical installations:

ART24 DPCV should be used in radiator heating systems to control the pressure fluctuations and limit the extra-flow rates in the radiators.
Generally in these systems, thermostatic valves are installed in order to give the possibility to regulate the temperatures in the heated rooms. The flow rates in each emitter will be constantly modulated as the thermal load changes. As a result the system pressure will fluctuate significantly and the DPCV will absorb the extra-pressures.
Controlling differential pressure over the riser means also that the thermostatic valve authority is high, allowing an efficient and stable temperature control and consequently an energy saving. They are often used to prevent noise problems within pipework and TRV.

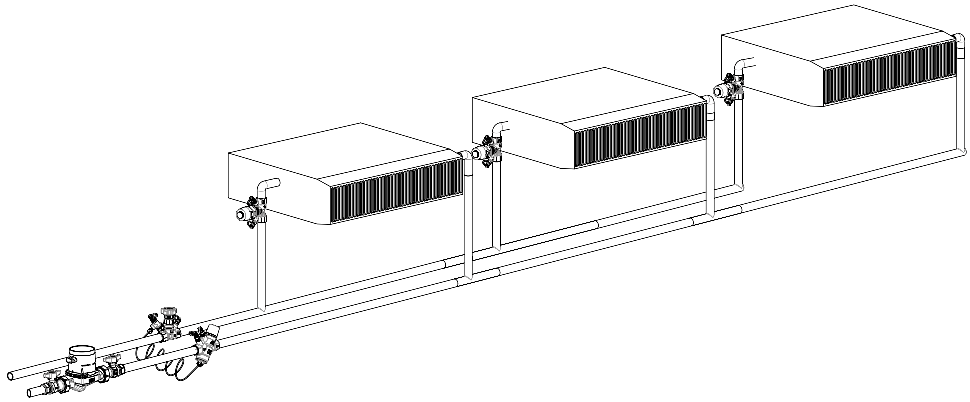


ART24 valves are used in floor heating systems in order to limit the flow rates of each loop, their installation in the pipeline that supplies the manifold, enables an easier flow rate regulation.

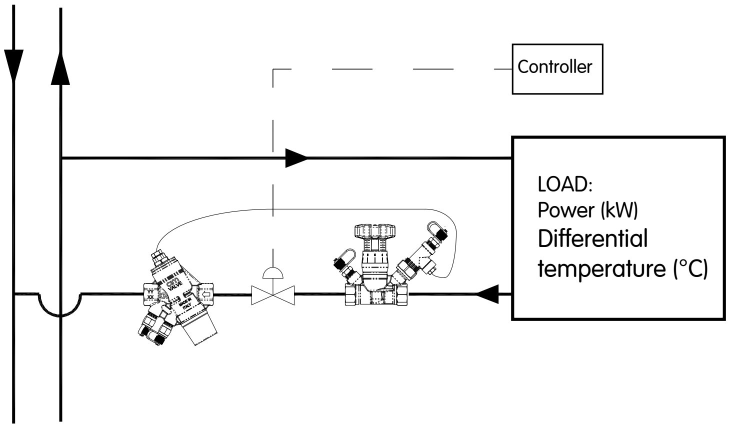


Dimensions in mm

ART24 installation is advisable on fan-coil units with 2 port control valves already existing.



It is possible to install a DPCV to control the flow rate of a generic load by changing the layout of installation as it is shown in the scheme below. This configuration is the basis of the Pressure Independent Control Valves (PICV ART20C, ART20 & ART200) where the three valves are integrated in one single body.



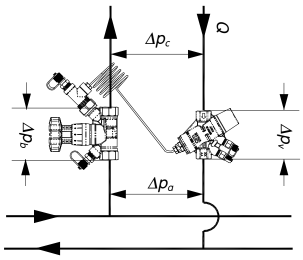
Dimensions in mm

Configurations:

ART24 DPCV can be installed in two configurations:

- Partner valve inside the control loop;
- Partner valve outside the control loop.

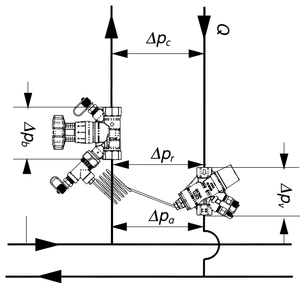
The first configuration is suitable for the plants where there are balancing valves for the regulations of the maximun flow rates or thermostatic valves with pre-setting.
In this way, the ART28DP, or a generic regulating valve, is used to regulate the pressure drop across the DPCV.
By closing the partner valve the pressure across the DPCV decreases and the shutter opens, in the other way, by opening the partner valve the pressure across the DPCV increases and the shutter closes.
This configuration does not permit to regulate the total flow rate in the branch.
This installation has the best performance in terms of control of the pressure and energy saving. If a ART28DP is used, it is possible to measure the flow rate using a differential pressure instrument (for quick reference use the ART28 data sheet).



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

Δp_b *Pressure drop across Cim 787DP*
Δp_v *Pressure drop across Cim 767LP*
Δp_c *Necessary pressure for the circuit*
Δp_a *Available pressure for the riser*

The other configuration is suitable for plants where there are not devices for the limitation and regulation of the flow rates in each emitters. The partner valve is used to set the total flow rate in the branch. If an ART28DP is used, it is possible to measure the flow rate using a differential pressure instrument (for quick reference use the ART28 data sheet).

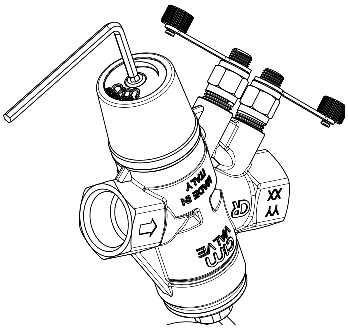


$\Delta p_a = \Delta p_b + \Delta p_c + \Delta p_v$
$\Delta p_r = \Delta p_b + \Delta p_c$

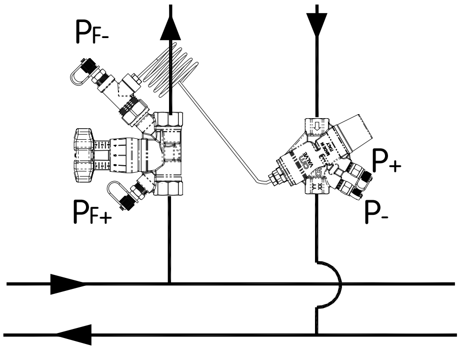
Δp_b *Pressure drop across ART28DP*
Δp_v *Pressure drop across ART24*
Δp_c *Necessary pressure for the circuit*
Δp_a *Available pressure for the riser*
Δp_r *Set pressure*

Dimensions in mm

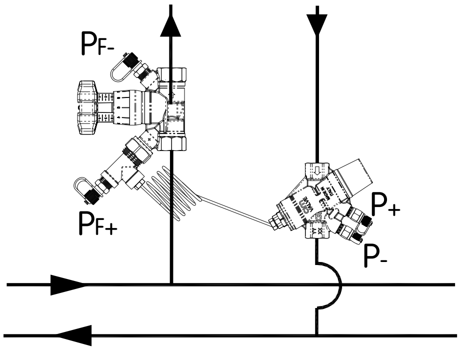
Regulating:



ΔP regulation of ART24 valve (see picture) is carried out by a 4mm Allen key.
The relation between flow rate, ΔP of flow and return pipework and screwing turns of regulating Allen screw are given by the tables stated in the following pages.
ΔP increase and decrease is reached by turning clockwise or anticlockwise Allen screw respectively (see picture).
During regulation of differential pressure, the valve shall be set to minimum value to proceed with turns numbering; after that, the valve shall be regulated according to tables.
ΔP of the system is measured through a differential pressure manometer with two sensors, red and blue, which are inserted in binder points P_{F-} and P_+ respectively (see picture below).
Flow rate of the system is measured through a partner balancing valve ART28DP, by measuring the difference in pressure between points P_{F+} and P_{F-} and referring to the graphs in the ART28 Data sheet.
Pressure drop of ART24 valve under service is shown when the two sensors of measuring device are inserted in the binder points of the said valve.

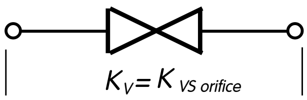


Partner valve outside the control loop.



Partner valve inside the control loop.

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 international system represents the flow in m³/h of water at the temperature of 15 °C (density =998 kg/m³) which causes a pressure drop of 1 bar. In USA flow coefficient is called Cv (Kv = 0.865 Cv).

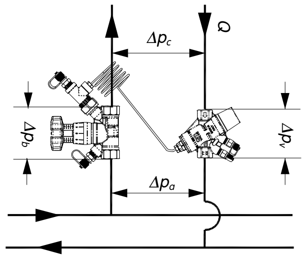
$$Kv=\frac{Q}{\sqrt{\Delta p}}$$

It is possible 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



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

Δp_b Pressure drop across ART28DP
Δp_v Pressure drop across ART24
Δp_c Necessary pressure for the circuit
Δp_a Available pressure for the riser

SUGGESTED VALUES AND TIPS:

- Velocities in the pipeline:
  Max = 1.15 m/s
  Min = 0.75 m/s

EXAMPLE - Partner valve outside the control loop

It is required to keep constant the supplying pressure of a group of emitters that has the following charateristics at the design conditions:

- Necessary pressure for the circuit: Δp_c=13 kPa;
- Available pressure for the riser: Δp_a=35 kPa;
- Flow rate: Q= 1.5 m^3/h=0.417 l/s;
- Pipeline size: DN 25.

The required differential pressure is quite low, it is possible to use the ART24 version (5-30 kPa) and set it to get the required pressure drop across the circuit (13 KPa). In order to simplify the installation, it is possible to select the same diameter of the pipeline (DN 25). Using the attached tables, it is possible to calculate the pressure drop across the DPCV when it is fully open:

$$\Delta p_v = r \cdot \left(\frac{Q}{Kvs}\right)^2 = 1 \cdot \left(\frac{1.5}{9.5}\right)^2 = 0.0249\ bar = 2.49\ kPa$$

The pressure drop across the partner valve should be:

$$\Delta p_b = \Delta p_a - \Delta p_c - \Delta p_v = 35 - 13 - 2.49 = 19.51\ kPa$$

In order to get the value found above, the partner valve should be set with the following value of Kv:

$$Kvs = \frac{Q}{\sqrt{\Delta p_b}} = \frac{1.5}{\sqrt{0.1951}} = 3.4$$

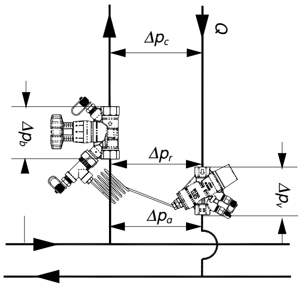
The correct valve should be a ART28DP DN25 with the set 3.2.
By closing the partner valve it is possible to change the pressure drop across the DPCV, when the Cim 787DP is fully open (Set 4.0 - Kv = 4.08), the pressures will be:

$$\Delta p_b = r \cdot \left(\frac{Q}{Kvs}\right)^2 = 1 \cdot \left(\frac{1.5}{4.08}\right)^2 = 0.135\ bar = 13.5\ kPa$$

$$\Delta p_v = \Delta p_a - \Delta p_b - \Delta p_c = 35 - 13.5 - 13 = 8.5\ kPa$$

In this situation the shutter of the DPCV is not fully open as before.
The user can select the balancing valve using positions of the handle that are between the values written over. This setting affects only the position of the DPCV shutter at the design conditions.
Using the regulation charts it is possible to get the setting of the DPCV: 13.5 turns.

Dimensions in mm



$\Delta p_a = \Delta p_b + \Delta p_c + \Delta p_v$
$\Delta p_r = \Delta p_b + \Delta p_c$

Δp_b *Pressure drop across ART28DP*
Δp_v *Pressure drop across ART24*
Δp_c *Necessary pressure for the circuit*
Δp_a *Available pressure for the riser*
Δp_r *Set pressure*

SUGGESTED VALUES AND TIPS:

- Velocities in the pipeline:
  Max = 1.15 m/s
  Min = 0.75 m/s

EXAMPLE - Partner valve inside the control loop

It is required to keep constanst the supplying pressure of a group of emitters that has the following charateristics at the design conditions:

- Necessary pressure for the circuit: Δp_c=13 kPa;
- Available pressure for the riser: Δp_a=35 kPa;
- Flow rate: Q= 1.5 m^3/h=0.417 l/s;
- Pipeline size: DN 25.

The DPCV with the partner valve have to create a total pressure drop that is:

$$\Delta p_v + \Delta p_b = \Delta p_a - \Delta p_c = 35 - 13 = 22\ kPa$$

According to technical good practice rule, the advisable pressure across a DPCV should be less then or equal to 10 kPa, it is possible to size the manual balancing valve in order to get this limit value. Supposing a pressure drop on the manual balancing valve of 15 kPa, it is possible to select the size of this valve:

$$Kvs = \frac{Q}{\sqrt{\Delta p_b}} = \frac{1.5}{\sqrt{0.15}} = 3.87$$

The correct valve should be a ART28DP DN25 with the pre-set 3.7.
The remaining part of extra-pressure has to be absorbed by the DPCV.
In order to get the required flow rate, the DPCV has to be set with a design differential pressure that can be calculated as below:

$$\Delta p_r = \Delta p_b + \Delta p_c = 15 + 13 = 28\ kPa$$

It is possible to select a DPCV Low Pressure (5-30 kPa). Supposing the same diameter of the partner valve and pipiline (DN 25) and seeing the regulation charts it is possible to get the setting of the DPCV: 32.5 turns.

By closing the partner valve it is possible to reduce the flow rate in the whole circuit, otherwise by opening the partner valve it is possible to increase the total flow rate.

SUGGESTED VALUES AND TIPS:

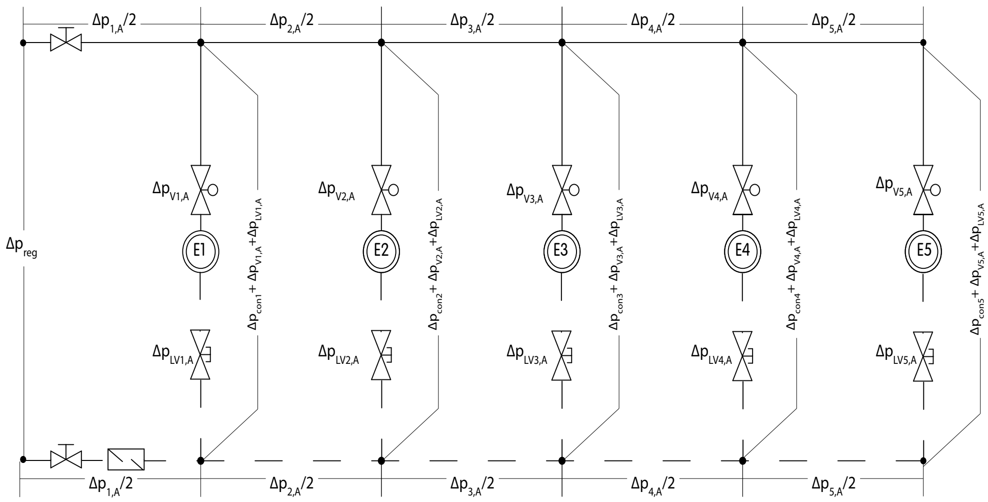
- Authority:
  Min = 0.3
  Optimal = 0.5
- Velocities in the pipeline:
  Max = 1.15 m/s
  Min = 0.75 m/s
- Pressure drop across control valve:
  Max = 10 kPa;

AUTHORITY

It is the ratio between the design pressure drop (calculated at valve opened as design) and the diffrential pressure at closed valve.

EXAMPLE - Needed pressure for the circuit

The circuit pressure has to be selected in order to give authority to the control valves that are installed for each emitters, in this way the control will be stable with the maximun energy saving. A good sizing avoids also noises problems.
A good reference for the sizing of an hydraulic system in bulding service is the german guide VDI 2073 that gives the indications in order to get it.
Taking into consideration a generic circuit as the below drawing, it is possible to calculate the flow rates for each connection using the power of the emitters and the design spread.



Name	Type	Power	Design spread	Qm	Qm
		W	°C	kg/s	l/h
E1	Fancoill	1600	10	0.0382	137
E2	Fancoil	1500	10	0.0358	129
E3	Radiator	1250	15	0.0199	72
E4	Radiator	1300	15	0.0207	74
E5	Radiator	1450	15	0.0231	83
TOTAL		7100	12,31	0.1378	495

There is in the distribution circuits a pronunced grading of the differential pressures in corrispondence of the emitters connections.
In the design conditions (case A), the pressure drop of each sections *i* from *1* to *k* is:

$$\sum_{i=1}^{k} \Delta p_{i,A}$$

For each emitter, it is possible to calculate the required differential pressure that is used to regulate the DPCV:

$$\Delta p_{reg} = \sum_{i=1}^{k} \Delta p_{i,A} + \Delta p_{con,A} + \Delta p_{V,A} + \Delta p_{LV,A}$$

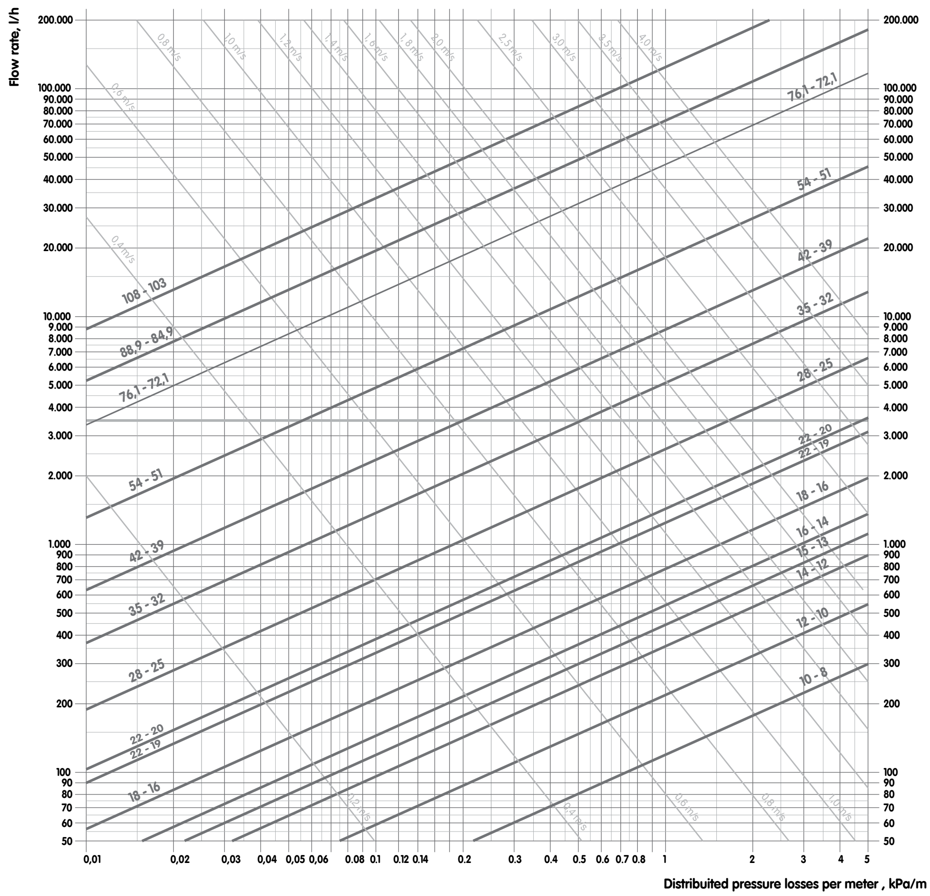
Where:
$\Delta p_{V,A}$ is the pressure loss across a control valve;
$\Delta p_{LV,A}$ is the pressure loss across a lockshield valve;
$\Delta p_{con,A}$ is the pressure loss of a connection.

Dimensions in mm

Section	L Length	Qm	DN	v	R_L	R_L*L	∑z	Z	R_L*L+Z
	m	l/h	mm	m/s	kPa/m	kPa	-	kPa	kPa
1	12	495	18x1	0.68	0.441	5.29	7.7	1.80	7.09
2	8	358	18x1	0.49	0.252	2.02	3.5	0.43	2.44
3	8	229	16x1	0.41	0.219	1.75	2	0.17	1.92
4	8	157	16x1	0.28	0.116	0.93	2	0.08	1.01
5	8	83	16x1	0.15	0.025	0.20	2	0.02	0.22
Con.1	3	137	14x1	0.34	0.189	0.57	9	0.51	1.08
Con.2	2	129	14x1	0.32	0.169	0.34	9	0.45	0.79
Con.3	5	72	14x1	0.18	0.039	0.20	6	0.09	0.29
Con.4	3	74	14x1	0.18	0.041	0.12	6	0.10	0.22
Con.5	2	83	14x1	0.20	0.080	0.16	6	0.12	0.28

Where:
Qm is the flow rate in each branch;
DN is the nominal diameter of the pipe (Copper EN 1057);
v is the velocity in the pipe;
RL are the distribuited pressure losses per meter;
∑z is the sum of the concentred pressure losses coefficents (bends, fittings,emitters etc.);
Z are concentred pressure losses.

COPPER PIPE EN 1057



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Emitter	E1	E2	E3	E4	E5	-
Section from 1 to	1	2	3	4	5	-
Connection pipe	Con.1	Con.2	Con.3	Con.4	Con.5	-
$\sum \Delta p_{i,A}$	7.09	9.53	11.45	12.46	12.68	kPa
$\Delta p_{con,A}$	1.08	0.79	0.29	0.22	0.28	kPa
$\sum \Delta p_{i,A} + \Delta p_{con,A}$	8.17	10.32	11.74	12.68	12.96	kPa
Kv Control valve	0.60	0.60	0.43*	0.43*	0.43*	$(m^3/h)/bar^{0.5}$
$\Delta p_{V,A}$	5.24	4.60	2.77	2.99	3.72	kPa
Kv lockshield valve**	2.7	2.7	2.7	2.7	2.7	$(m^3/h)/bar^{0.5}$
$\Delta p_{LV,A}$	0.26	0.23	0.07	0.08	0.09	kPa
Δp_{reg}	13.66	15.15	14.58	15.75	**16.78**	kPa
Δp_{bal}	3.12	1.63	2.20	1.03	0.00	KPa

Where:
$\Delta p_{V,A}$ is the pressure loss across the control valve;
$\Delta p_{LV,A}$ is the pressure loss across the lockshield valve;
Δp_{reg} is the required differential pressure for the emitter;
Δp_{bal} is the required pressure loss across the balancing valve or lockshield valve;

* The Kv of the thermostatic valves is taken with a proportional band of 1K.
** The Kv is related to the lockshield valve when it is fully open.

The DPCV will be set with the maximum differential pressure ($\Delta p_{reg,DPCV}$) in order to supply each emitters with the nominal flow. In this example we have 16.78 kPa, it is necessary to instal balancing valves in order to avoid extraflows in the other branches where it would be required a lower value of pressure. The pressures introduced with the manual balancing valves can be calculated using the following relation:

$$\Delta p_{bal} = \Delta p_{reg,DPCV} - \Delta p_{reg}$$

While in the radiator it is possible to use the lockshield valves, in the fan coils it is possible to install a balancing valve like the ART28:

Emitter	E1	E2	E3	E4	E5	-
Δp_{bal}	3.12	1.63	2.20	1.03	0.00	KPa
Balancing Kv	0.78	1.01	0.49	0.73	-	$(m^3/h)/bar^{0.5}$
Cim 787	DN15	DN15	-	-	-	-
Preset	0.6	0.9	-	-	-	-
Lockshield valve Kv ***	-	-	0.48	0.71	-	$(m^3/h)/bar^{0.5}$

* The Kv is calculated taking into consideration that the pressure across the fully open lockshield valve was already used.

If in an operational case (case B) a generic control valve V closes the flow rate in an emitter and the regulated pressure is maintained constant (for example with a DPCV), the flow in all the sections from 1 to k decreases by $q_{m,V,A}$ and the pressure drop decreases to:

$$\sum_{i=1}^{k} \Delta p_{i,B}$$

The pressure drop in a section *i* in the design case $\Delta p_{i,A}$, can be expressed approximately by an equivalent resistance R_i:

$$\Delta p_{i,A} = R_i \cdot q_{i,A}^2$$

When the water flow changes, the equivalent resistance remains constant. If the flow is reduced by $q_{m,V,A}$, the variation of pressure in a generic sector is:

$$\Delta p_{i,B} = R_i \cdot (q_{i,A} \text{-} q_{V,A})^2$$

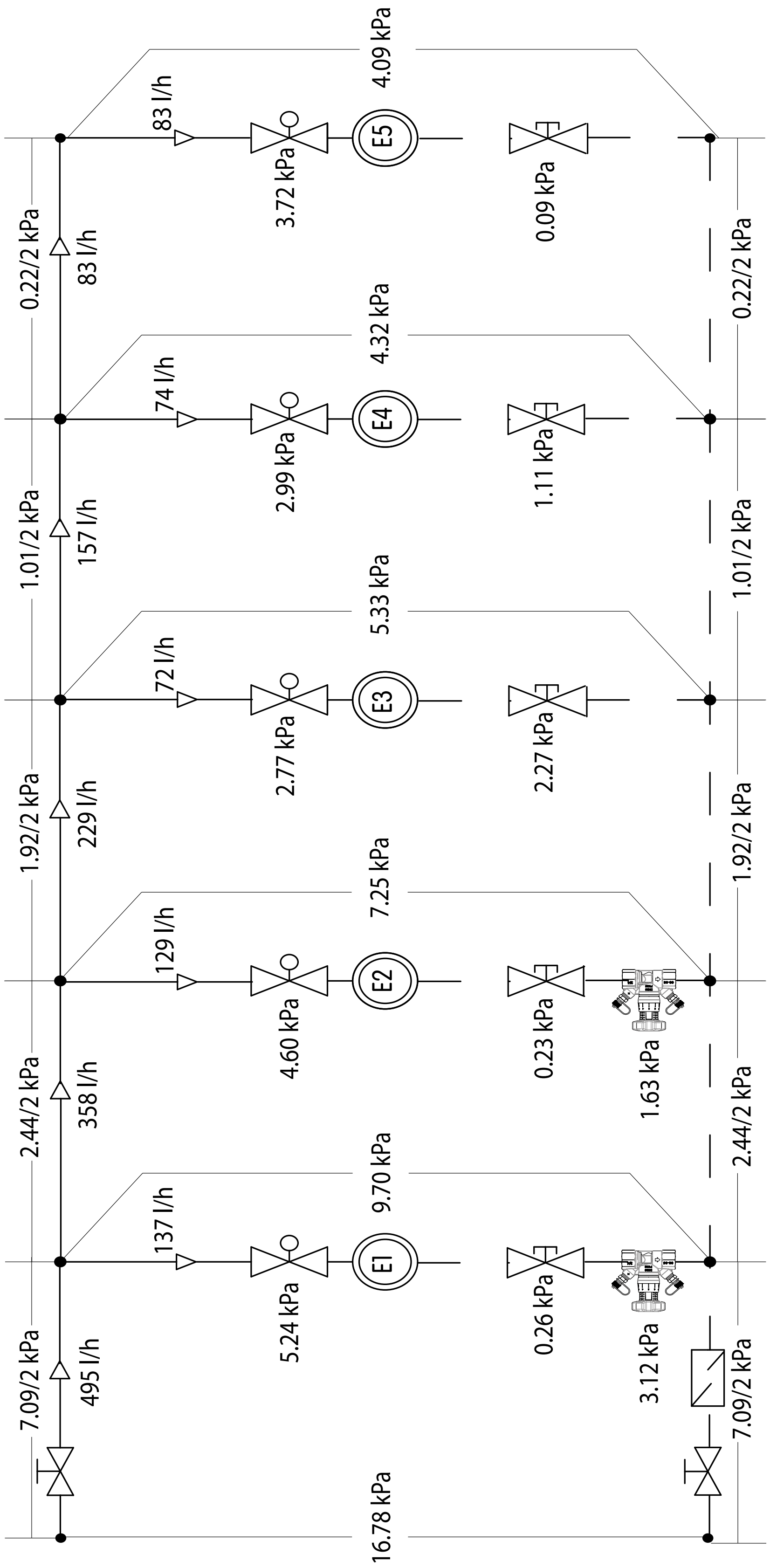
Section	Ri	$\Delta p_{i,B}$				
	kPa/(l/h)²	E1	E2	E3	E4	E5
		kPa	kPa	kPa	kPa	kPa
1	$28.93 \cdot 10^{-6}$	3.70	3.88	5.19	5.12	4.91
2	$19.09 \cdot 10^{-6}$		1.00	1.56	1.53	1.44
3	$36.73 \cdot 10^{-6}$			0.91	0.88	0.78
4	$40.62 \cdot 10^{-6}$				0.28	0.23
5	$31.82 \cdot 10^{-6}$					0.00
Con.1	$57.21 \cdot 10^{-6}$					
Con.2	$47.48 \cdot 10^{-6}$					
Con.3	$56.43 \cdot 10^{-6}$					
Con.4	$40.20 \cdot 10^{-6}$					
Con.5	$41.39 \cdot 10^{-6}$					
$\sum \Delta p_{i,B}$		3.70	4.88	7.66	7.81	7.36

If the control valve V is designed with a pressure drop $\Delta p_{V,A}$, its authority is:

$$a_V = \frac{\Delta p_{V,A}}{\Delta p_{reg} - \sum_{i=1}^{k} \Delta p_{i,B}}$$

Using a minimum authority that is introduced for control engineering reason (i.e. $a_v > 0.3$), it is possible to check if the selected valves are suitable.

Emitter	E1	E2	E3	E4	E5	-
Section from 1 to	1	2	3	4	5	-
Connection pipe	Con.1	Con.2	Con.3	Con.4	Con.5	-
$\Delta p_{V,A}$	5.24	4.60	2.77	2.99	3.72	kPa
Δp_{reg}			16.78			kPa
Δp_{bal}	3.12	1.63	2.20	1.03	0.00	kPa
$\sum \Delta p_{i,B}$	3.70	4.88	7.66	7.81	7.36	kPa
a_v	0.40	0.39	0.30	0.33	0.40	-



Dimensions in mm

Measurement conversion chart:

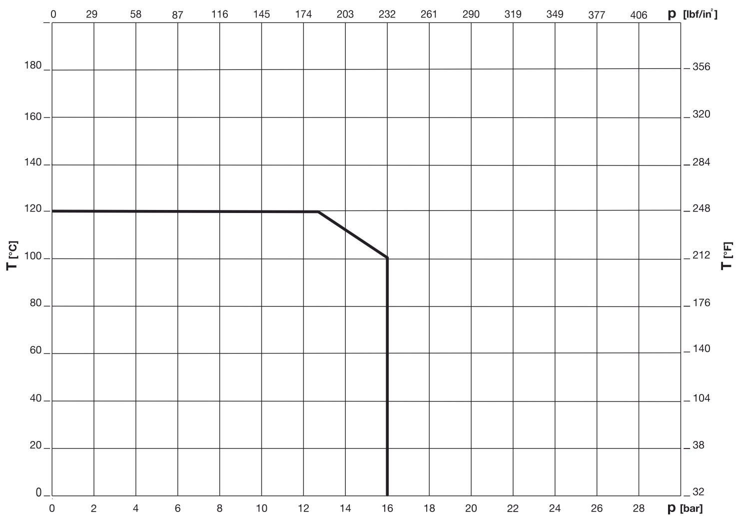
Pressure

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/cm^2, 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/cm^2, kilograms per square centimetre
atm, atmosphere	10,3323	m_{H2O}, metres of water
atm, atmosphere	14,6959	psi, pound per square inch
Kg/cm^2	10	m_{H2O}, metres of water
Kg/cm^2	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	m^2, metri quadrati
square feet	0,09290304	m^2, square metres
square inches	6,4516	cm^2, square centimetres
square feet	929,0304	cm^2, square centimetres
square yards	0,8361274	m^2, square metres
l, litres	0,001	m^3, cubic metres
gallons	0,003789412	m^3, cubic metres
cubic yards	0,7645549	m^3, cubic metres
cubic feet	0,02831685	m^3, cubic metres
cubic inches	0,0000164	m^3, cubic metres
cubic inches	16,38706	cm^3, cubic centimetres
cubic feet	28,31685	l, litres
gallons	3,875412	l, litres
TO OBTAIN	DIVIDE BY	FROM

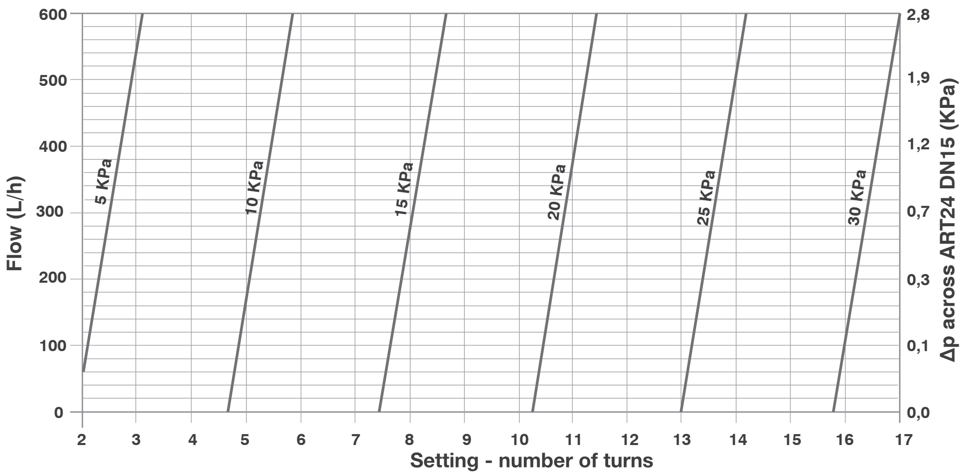
Pressure-temperature ratings:

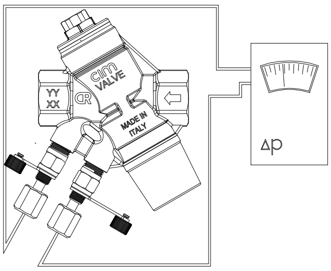


Dimensions in mm

Kv Values - DN 15

ART24LP

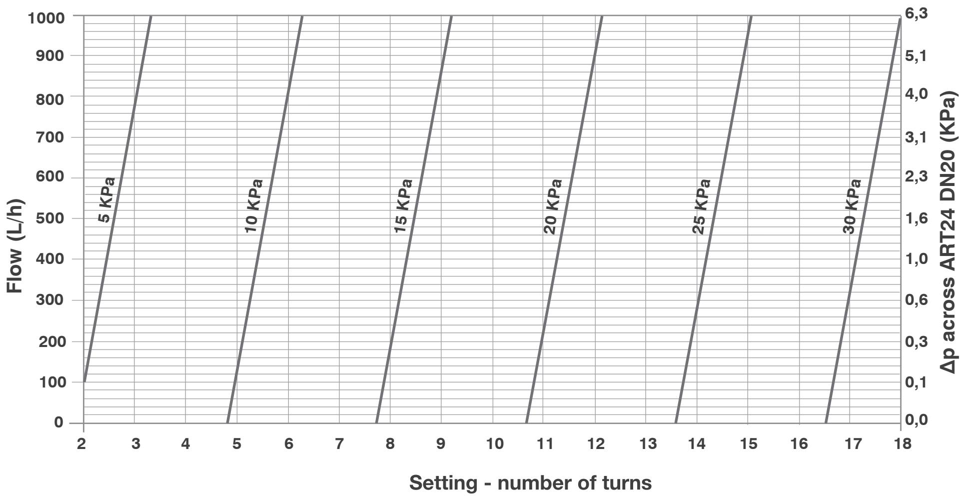


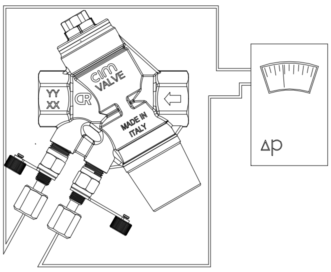


Control ΔP Range	Flow Rate			Kvs
	l/h	l/s	GPM	
5-30 kPa	50-600	0.04-0.167	0.22-2.65	3.6

Kv Values - DN 20

ART24LP



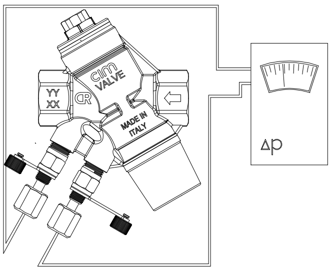


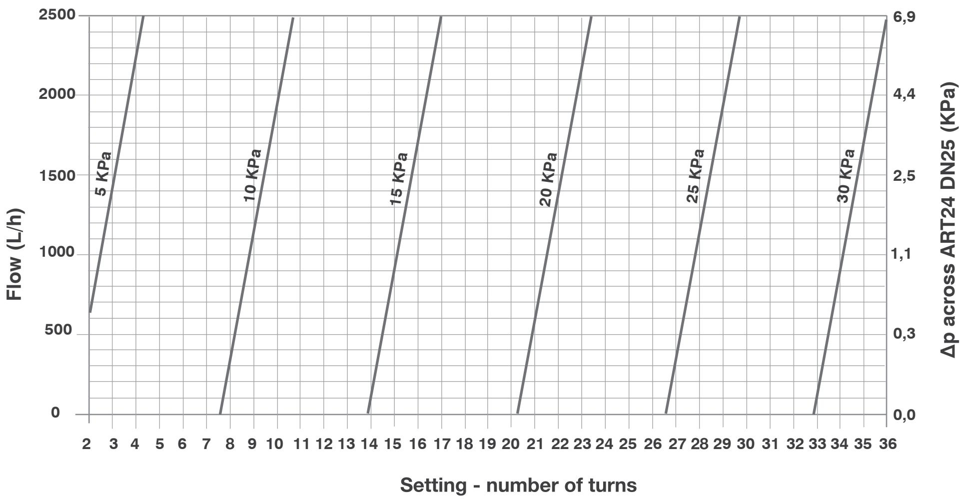
Control ΔP Range	Flow Rate			Kvs
	l/h	l/s	GPM	
5-30 kPa	100-1000	0.028-0.278	0.44-4.41	4.0

Dimensions in mm

Kv Values - DN 25

ART24LP

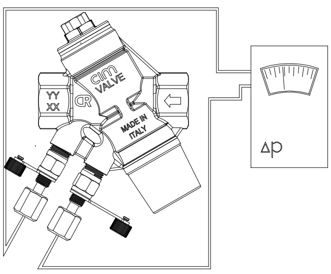


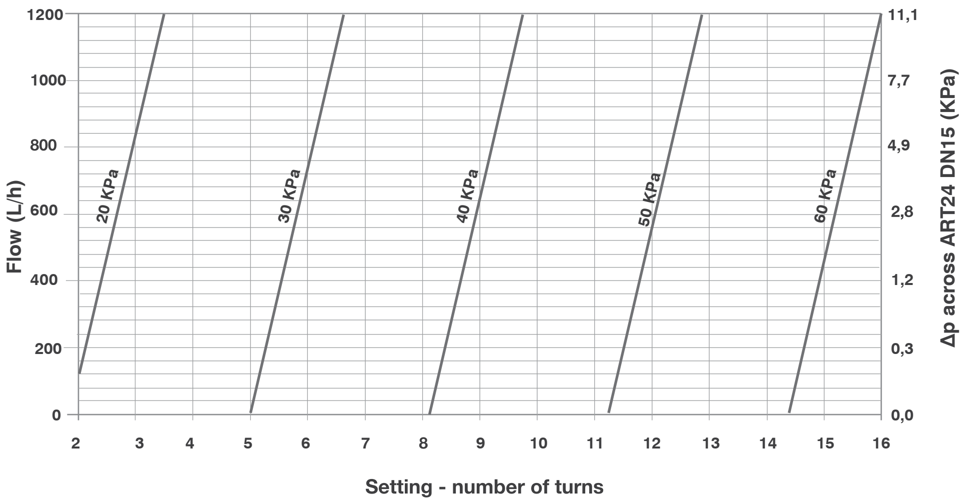


Control ΔP Range	Flow Rate			Kvs
	l/h	l/s	GPM	
5-30 kPa	600-2500	0.167-0.694	2.65-11.02	9.5

Kv Values - DN 15

ART24HP



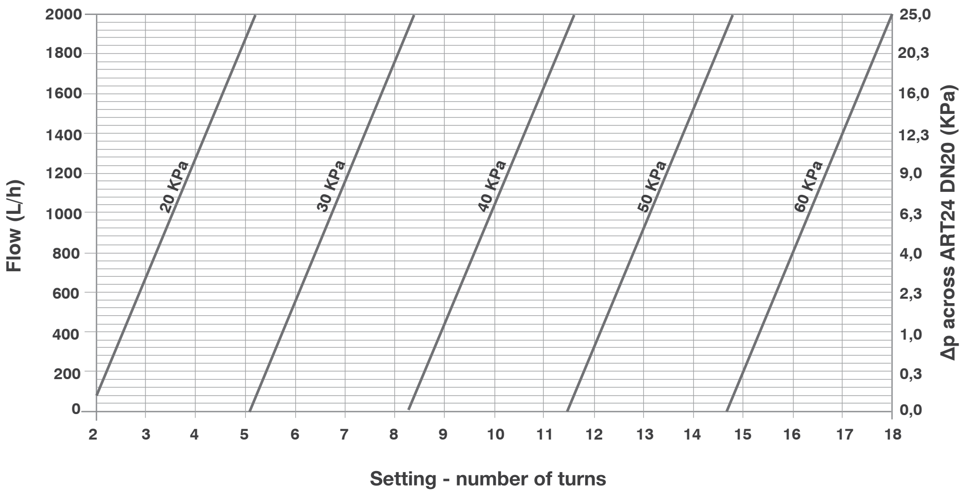


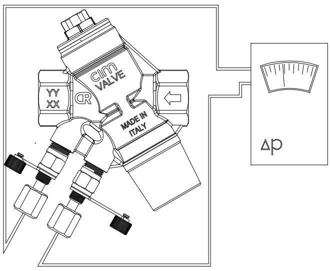
Control ΔP Range	Flow Rate			Kvs
	l/h	l/s	GPM	
20-60 kPa	100-1200	0.028-0.333	0.44-2.29	3.6

Dimensions in mm

Kv Values - DN 20

ART24HP

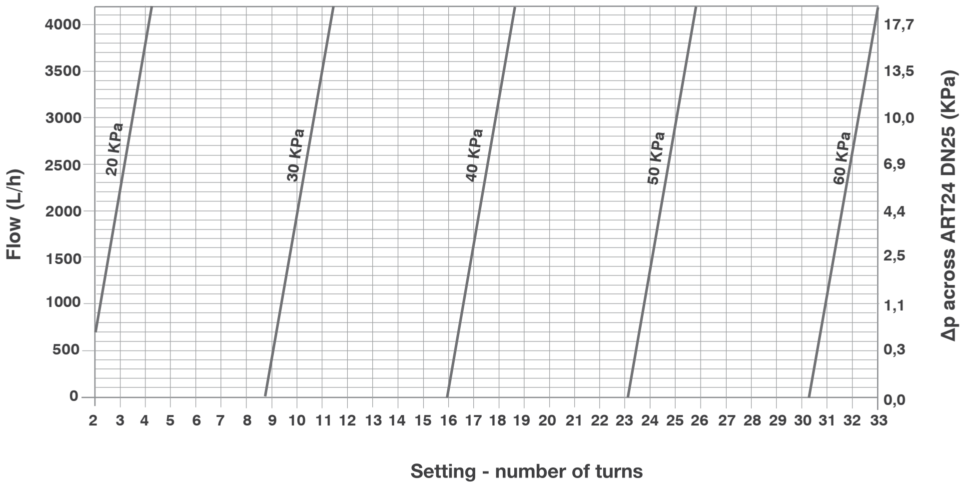


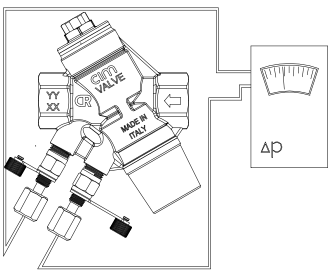


Control ΔP Range	Flow Rate			Kvs
	l/h	l/s	GPM	
20-60 kPa	150-2000	0.042-0.556	0.66-8.82	4

Kv Values - DN 25

ART24HP



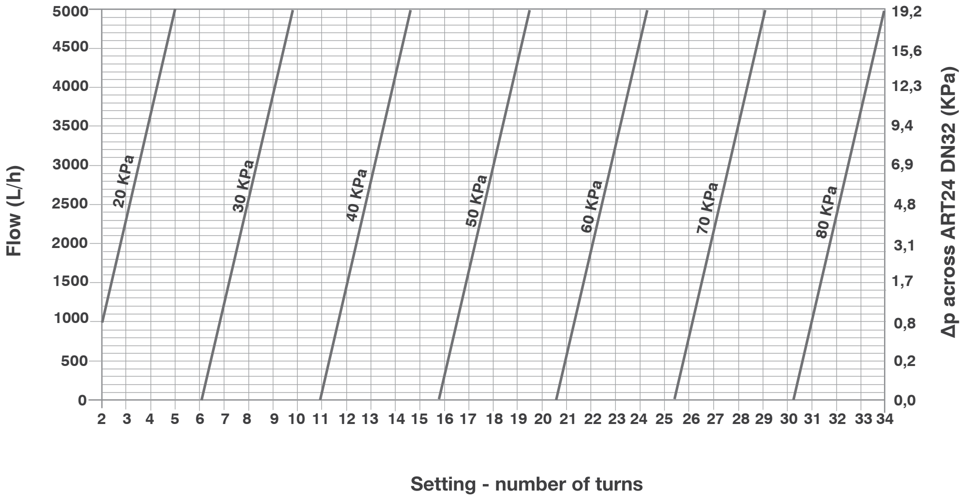


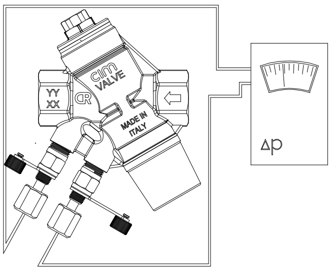
Control ΔP Range	Flow Rate			Kvs
	l/h	l/s	GPM	
20-60 kPa	700-4200	0.194-1.167	3.09-18.52	9.5

Dimensions in mm

Kv Values - DN 32

ART24HP

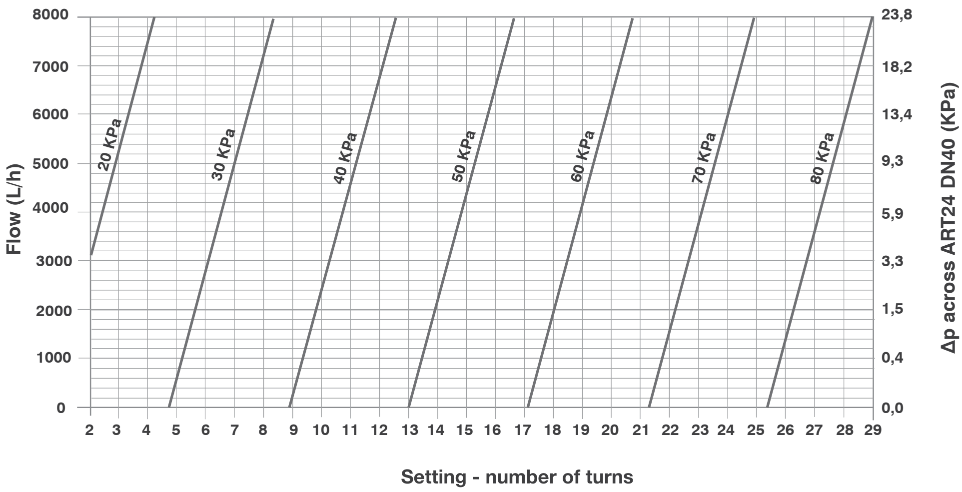


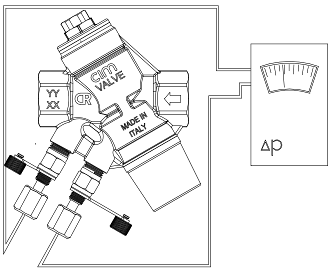


Control ΔP Range	Flow Rate			Kvs
	l/h	l/s	GPM	
20-80 kPa	1000-5000	0.278-1.389	4.41-22.05	11.4

Kv Values - DN 40

ART24HP



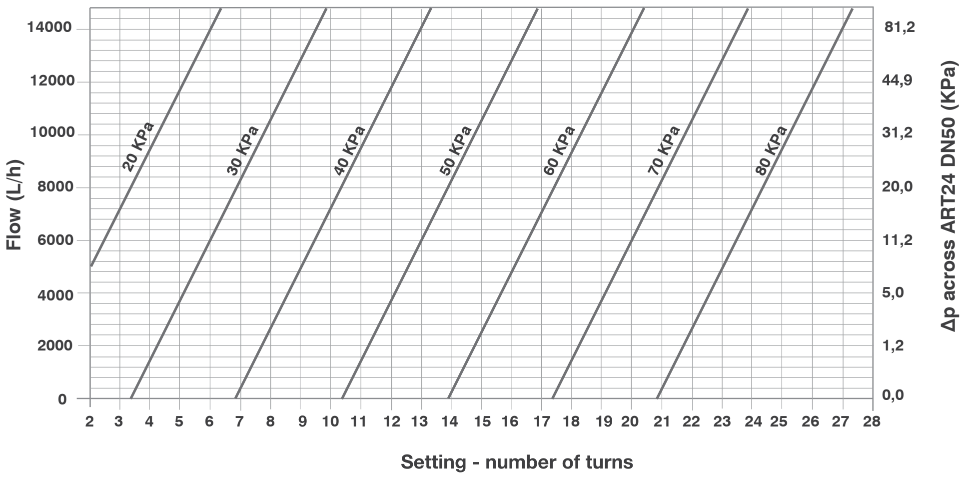


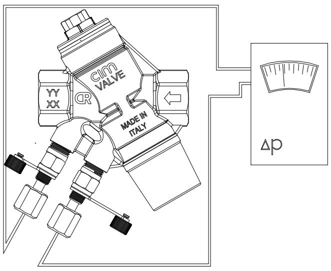
Control ΔP Range	Flow Rate			Kvs
	l/h	l/s	GPM	
20-80 kPa	3000-8000	0.833-2.222	13.28-35.27	16.4

Dimensions in mm

Kv Values - DN 50

ART24HP



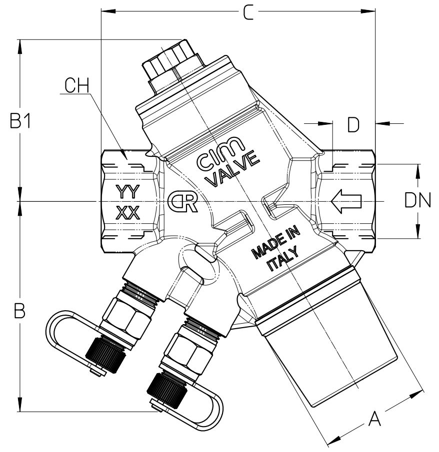


Control ΔP Range	Flow Rate			Kvs
	l/h	l/s	GPM	
20-80 kPa	5000-15000	1.389-4.187	22.05-66.14	17.9

Dimensions in mm

Main dimensions:

ART24LP
ART24HP



DN	15	20	25	32	40	50
Grms.	825	880	1535	1625	2475	2970
A	40	40	50	50	65	65
B	70	72	91	91	98	105
B1	57	57	74	74	85	90
C	95.5	96.5	132	132	144.5	155
D	11	13	14.5	17	17	20
CH	27	32	39	47	54	67

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.

Dimensions in mm

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

Distributor