BALANCING VALVES

ACS CONFORMITY

PRODUCTION RANGE

Code	Measurement	Kvs	Reading field		Possible field of use	
			Min flow rate (p 100 daPa)	Max flow rate (p 2.500 daPa)	heating t 10°C	cooling t 5°C
Threaded			**l/h**		**kW exchangeable**	**kW exchangeable**
619.03.50 *	⅜"	2,35	235÷1.175		2,7÷13,7	1,4÷6,8
619.04.50 *	½"	3,35	335÷1.675		3,9÷19,5	1,9÷9,7
619.05.50 *	¾"	4	400÷2.000		4,7÷23	2,3÷12
619.06.50 *	1"	11,2	1.120÷5.600		13÷65	6,5÷33
619.07.50 *	1"¼	13,4	1.340÷6.700		16÷78	7,8÷39
619.08.50 *	1"½	19	1.900÷9.500		22÷110	11÷55
619.09.50 *	2"	28,4	2.840÷14.200		33÷165	16,5÷83
Flanged			**m^3/h**		**kW exchangeable**	**kW exchangeable**
619.10.60	DN65	74,4	7,44÷37,2		87÷433	43÷216
619.11.60	DN80	111	11,1÷55,5		129÷645	65÷323
619.13.60	DN100	165	16,5÷82,5		192÷959	96÷480
619.14.60	DN125	242	24,2÷121		281÷1.407	141÷703
619.15.60	DN150	372	37,2÷186		433÷2.163	216÷1.081
619.17.60	DN200	704	70,4÷352		819÷4.093	409÷2.047
619.19.60	DN250	812	81,2÷406		944÷4.721	472÷2.360
619.21.60	DN300	1380	138÷690		1.605÷8.023	802÷4.012

* Products conform with ACS French Standard

ACCESSORIES

Code		
621.01.50		Pressure inlets to be set-up on the threaded balancing valves if these are also used for indirect reading of transfer flow rate (Meas. ⅛")
1422.02.00		Reductions torque 1/4" M x 1/8" F, for adapting 1/8" gauge taps code 621.01.50 to DN65 and DN300 flanged balancing valves and nozzles (fitted with 1/4" pressure inlets connections)
622.00.00		Electronic differential pressure measuring device suitable for direct reading of flow rates and pressures on water circuits. Battery powered, complete with case and kit for connection to piezometric inlets.

The table on *Possible field of use* only purpose is to supply the technician with a quick reference in associating the chosen component with a given heating or cooling system unit size. This advice can be used when providing an estimate without having specific data or when estimating budget bills of quantities.
The values in the table are calculated estimating a minimum and maximum field of use, for each component, based on a pressure drop between 100 and 2.500 daPa (102 and 2.550 mm H_2O). However, said values are not binding and therefore do not represent the performance limits of the components.

DESCRIPTION

The *balancing valve* is a single component device having adjustment functions and that measures cold and hot fluids transiting inside closed and open circuit systems.

THE PURPOSE

The *balancing valve*, inserted in fluidic circuits, allows accurately adjusting the flow rate, with the following objectives and advantages:

micrometric adjustment of the transfer flow.
indication of calibration turns made during direct reading of numerical value on the valve's knob.
possibility of checking circuit performances via indirect measuring of flow rate using the piezometric inlets on the valve's body.
Memory stop function with sealable stop of valve's calibration rating, allowing run stop upon re-opening, in exact initial calibration position.

USE

It is particularly suitable in the following cases:

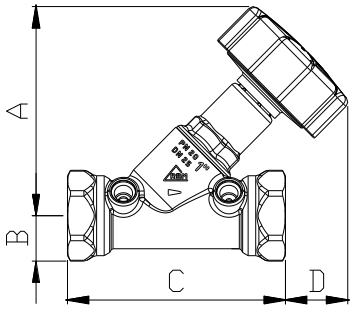
adjusting at pumping stations service inside heat fluid production stations.
balancing of utility extensions.
balancing of upright columns.
adjustment and balancing of third airway on thermal regulation units.

CHOICE

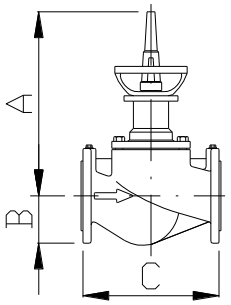
We recommend choosing a *balancing valve* with adjustment rating corresponding to about half of the shutter's run.
A sufficient calibration margin to face any corrections caused by inevitable changes to routes, is in this way reserved to the transfer of nominal project flow rate.

NOTE:
The piezometric inlets for measuring the differential pressure, are standard provided for flanged balancing valves only.

DIMENSIONAL FEATURES



Code	Size	A [mm]	B [mm]	C mm	D [mm]	Weight [kg]
619.03.50	⅜"	84,5	12	89	25	0,4
619.04.50	½"	84	15	96	22	0,5
619.05.50	¾"	85,6	17,8	97	21,5	0,5
619.06.50	1"	98	21,3	103,3	29,5	0,7
619.07.50	1"¼	101	28	111	29	1
619.08.50	1"½	107	31	120	27	1
619.09.50	2"	115	37	132	21,9	1,8



Flanged valve

Code	Size	A [mm]	B [mm]	C [mm]	Weight [kg]
619.10.60	DN65	365	92,5	290	18,5
619.11.60	DN80	395	100	310	24,5
619.13.60	DN100	430	110	350	40
619.14.60	DN125	495	125	400	79
619.15.60	DN150	530	142,5	480	91
619.17.60	DN200	665	170	600	170
619.19.60	DN250	600	202,5	730	265
619.21.60	DN300	685	230	850	360

CONSTRUCTION FEATURES

Threaded valve

Body and contact parts	:	brass
Seals	:	VITON
Threaded connections	:	FF UNI-EN-ISO 228
Pressure inlets connections	:	G⅛"

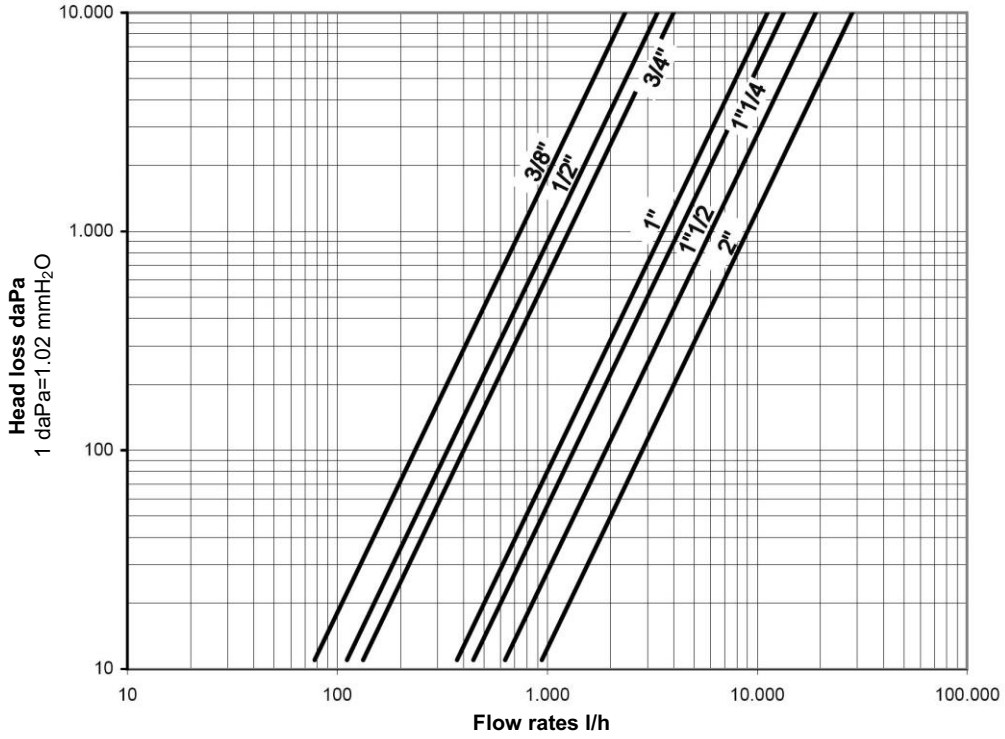
Flanged valve

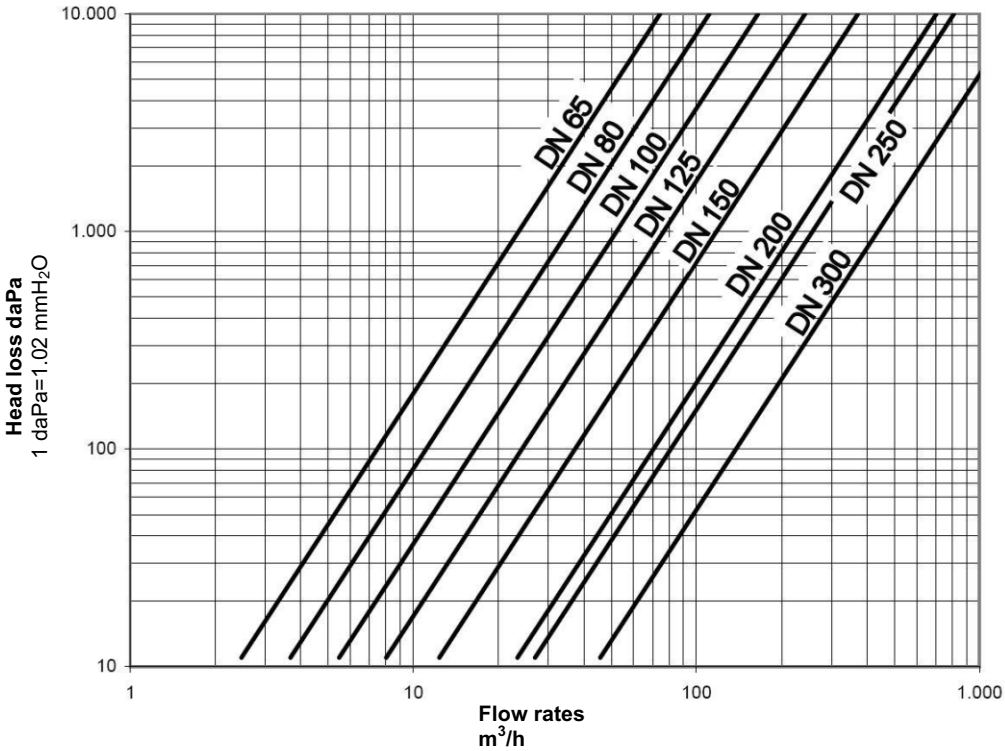
Body	:	cast iron
Contact parts	:	EPDM, stainless steel, brass
Seals	:	PTFE
Flanged connections	:	PN 16 according to DIN
Pressure inlets connections	:	G ¼"

TECHNICAL FEATURES

Max. working pressure		
- threaded	:	2000 KPa
- flanged	:	1600 KPa
Permitted temperatures		
- threaded	:	-30 +120 °C
- flanged	:	-10 +120 °C (130° for a short period)
Permitted fluid	:	water water+glycol (max at 50%)
No. adjustment shares	:	see table page 4

FLUID DYNAMIC FEATURES





Threaded

Size	Kvs m^3/h
⅜"	2,35
½"	3,35
¾"	4
1"	11,2
1"¼	13,4
1"½	19
2"	28,4

determination of pressure drop for liquids with 1 kg/dm³

$$\Delta P \quad \frac{Q}{Kvs}^{2} \quad 10.000$$

valid for water with Temp. from 0 to 30 °C

correction of P for fluids with different from 1 kg/dm³

$$\Delta P' \quad \Delta P \quad \rho$$

where:

P = head loss in daPa

P' = correct head loss in daPa

Q = flow rate in m^3/h

Kvs = hydraulic feature in m^3/h

' = density of liquid in

Flanged

Size	Kvs m^3/h
DN65	74,4
DN80	111
DN100	165
DN125	242
DN150	372
DN200	704
DN250	812
DN300	1380

The given features refer to threaded and flanged balancing valves with fully open shutter (see table page 4)

FLOW RATE ADJUSTMENT

Fluid dynamic features of the balancing valves in the different adjustment positions

No. turns	Threaded valves values of Kv in m^3/h							Flanged valves values of Kv in m^3/h							
	3/8"	1/2"	3/4"	1"	1"1/4	1"1/2	2"	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250	DN 300
0,50	0,21	0,20	0,14	0,32	0,42	0,66	0,90	2,98	3,65	-	-	-	-	-	-
1,00	0,30	0,30	0,28	0,52	0,61	1,16	1,55	5,30	6,60	-	-	-	-	66	109
1,50	0,38	0,38	0,38	0,72	0,82	1,50	1,95	6,64	8,52	3,8	8,30	16,2	32,5	-	-
2,00	0,47	0,49	0,48	0,92	1,00	1,80	2,35	7,80	10,0	6,20	11,3	20,4	41,3	178	248
2,50	0,52	0,58	0,56	1,10	1,20	2,10	2,75	9,60	11,7	9,60	14,4	23,8	48,9	-	-
3,00	0,64	0,69	0,82	1,30	1,38	2,35	3,45	12,1	13,7	13,4	17,7	26,7	55,5	297	411
3,50	0,74	0,86	1,12	1,48	1,52	2,65	4,50	15,2	16,1	17,3	21,1	29,5	62,1	-	-
4,00	0,99	1,11	1,42	1,67	1,70	3	6,20	19,0	19,2	21,8	24,6	33,0	69,3	410	560
4,50	1,10	1,32	1,62	1,85	1,90	3,80	7,60	23,6	23,2	27,6	28,2	37,6	77,8	-	-
5,00	1,35	1,55	1,85	2,08	2,10	5,20	9	29,1	28,1	35,7	32,3	42,3	88,1	514	696
5,50	1,45	1,75	2,12	2,50	2,62	6,80	10,60	35,2	-	47,2	37,4	48,0	101	-	-
6,00	1,65	2	2,48	3,00	3,32	8,40	12,20	41,3	40,4	62,4	44,9	54,5	115	587	825
6,50	1,75	2,32	2,78	3,70	4,00	10,20	14	47,0	-	79,3	56,1	61,5	133	-	-
7,00	2,08	2,69	3,18	4,45	4,80	11,40	15,90	52,1	55,4	96,6	72,5	69,6	154	649	944
7,50	2,12	3,06	3,50	5,35	5,82	12,50	17,50	-	-	110	93,2	80,0	179	-	-
8,00	2,25	**3,35**	3,80	6,30	6,98	13,50	19	60,7	70,9	121	120	92,9	208	731	1044
8,50	**2,35**	-	**4**	7,40	7,98	15	20,60	-	-	-	-	-	-	-	-
9,00	-	-	-	8,40	8,90	16	22,40	67,9	84,8	137	162	136	284	800	1138
9,50	-	-	-	9,40	10,00	17	23,70	-	-	-	-	-	-	-	-
10,00	-	-	-	10,20	10,98	18	25	**74,4**	96,1	148	192	193	364	-	1226
10,50	-	-	-	**11,20**	12,00	**19**	26,25	-	-	-	-	-	-	-	-
11,00	-	-	-	-	12,60	-	27,30	-	104	157	211	240	435	**812**	1291
11,50	-	-	-	-	**13,40**	-	**28,40**	-	-	-	-	-	-	-	-
12,00	-	-	-	-	-	-	-	-	**111**	**165**	225	274	489	-	1324
13,00	-	-	-	-	-	-	-	-	-	-	236	300	537	-	1345
13,50	-	-	-	-	-	-	-	-	-	-	**242**	-	-	-	-
14,00	-	-	-	-	-	-	-	-	-	-	-	320	575	-	**1380**
15,00	-	-	-	-	-	-	-	-	-	-	-	337	613	-	-
16,00	-	-	-	-	-	-	-	-	-	-	-	352	646	-	-
17,00	-	-	-	-	-	-	-	-	-	-	-	365	677	-	-
17,50	-	-	-	-	-	-	-	-	-	-	-	**372**	-	-	-
18,00	-	-	-	-	-	-	-	-	-	-	-	-	**704**	-	-

Determination of adjustment rating
valid for water with
Temp. from 0 to 30°C and 1 kg/dm^3

$$Kv \quad Q \quad \frac{10.000}{P}^{0,5}$$

valid with P in **daPa**

$$Kv \quad Q \quad \frac{10.200}{P}^{0,5}$$

valid with P in **mmH$_2$O**

where:

Q = flow rate in m^3/h
Kv = valve's hydraulic feature in m^3/h
Kv' = correct valve's hydraulic feature in m^3/h
' = density of liquid in kg/dm^3

$$Kv' \quad \frac{Kv}{\sqrt{\rho'}}$$

Kv correction for liquids with different from 1 kg/dm^3

Example:

An upright column having 1" diameter, must distribute a 2.2 m^3/h flow rate. An additional head loss of 2.500 mmH_20 must be created for balancing compared to a more hydraulically unfavourable upright column.

$$Kv \quad 2,2 \quad \frac{10.200}{2.500}^{0,5} = 4.44 \ m^3/h$$

For a smoother transfer of the fluid, the calculated value must be corrected using a fluid having a density of 1.12 kg/dm^3, maintaining the pressure drop generated by the valve, unaltered.

$$Kv' \quad \frac{4,44}{\sqrt{1,12}} = 4,20 \ m^3/h$$

By installing a 1" balancing valve, it is possible to obtain the number of calibration turns corresponding to the nearest Kv value to that calculated (*7.00 turns in the example*)

FLOW RATE MEASUREMENT

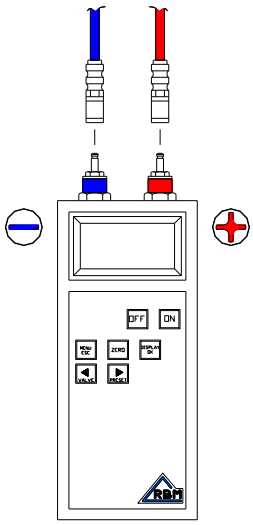
Measurement is through the pressure inlets on the valves' body.

Electronic differential manometer (code 622.00.00)

Portable device required for hydraulic balancing and maintenance of heating and air conditioning systems.
The device, that can be connected to PC for analysing and printing of detected data, provides a digital processing of measuring data via an integrated differential pressuring measuring device and a flow rate measuring device.
(The flow rate is calculated using the measured differential pressure and the valves' specific technical data: the equipment incorporates a data log concerning the hydraulic features of the RBM balancing valves and of those of the main European manufacturing companies).

Supplied

Measuring computer
Flexible connecting pipes
Quick connectors
Measuring adapter
Connection cable to PC
Software for connection to PC
Use manual



ΔP_{max}	10 bar
P_{max} at inlet	15 bar
Filtering	50µm
Temperature:	
- of fluid	-5 90 °C
- room	-5 50 °C
- of storage	+2 70 °C
Fluid	Water, water + glycol (50% max)
Power supply	Battery 6F22; 9V
Energy consumption:	
- maximum	10 mA
- with connection to PC	15 mA (maximum)
- in stand-by	0,8 mA (maximum)
Electric protection rating	IP40
Minimum requisites for connection to PC	PC 486, 16MB RAM, 2MB of free space on Hard disk, Windows 95/98/NT
Data entering capacity	2.500 entries
Data entry interval	From 1 sec to 24 hours
Maximum capacity of memory types of valves	Maximum of 170 different types of valves memorisable
Interface	RS 232
Sizes	77 x 192 x 25 *mm*
Weight	0.350 Kg

Never expose the instrument to temperatures below freezing point (solidification) of the measured liquid to avoid damaging the sensor, once the liquid in question has been measured.

The fittings for pipes connection are fitted with filters with 50µm retina: if systems with a high degree of impurity are measured, these may clog; also, if after having disconnected the flexible pipes the instrument gives an excessive pressure value or one of the pressure inlets is not working, the filters must be replaced.
However, for the instrument to correctly work, we recommend re-calibrating the device in factory, approximately every 12 months, whereas we recommend replacing the filters every 6 months (consult the "Maintenance" paragraph in the instructions manual provided with the instrument for further indications).

When a system with high temperature fluid is measured, particular attention must be given to:

Ensuring to work in safe conditions: improper connections or disconnections may cause injuries if high temperature liquids or dangerous fluids are being measured.
Do not expose the instrument to temperatures below 0°C immediately after this has come into contact with water.
To obtain accurate differential pressure measurements, the pipes must be fully bled (consult the "Preparing the instrument for measurement" paragraph in the instructions manual provided with the instrument for further indications).

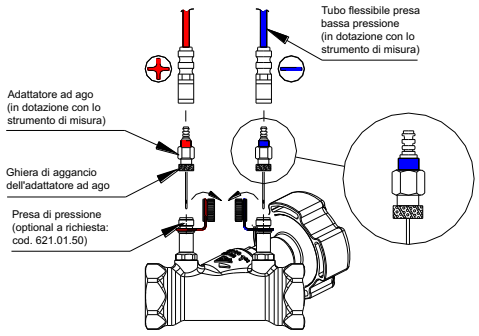
With the aim of making the detected values comparable, but in particular to guarantee safety against burns and scalding, we recommend reading the pressure with system cold.

This page is an extract of the instructions manual supplied with the instrument. Follow the prescriptions in the above-said manual for further indications on the start-up, use, maintenance, etc.

Connection to valves

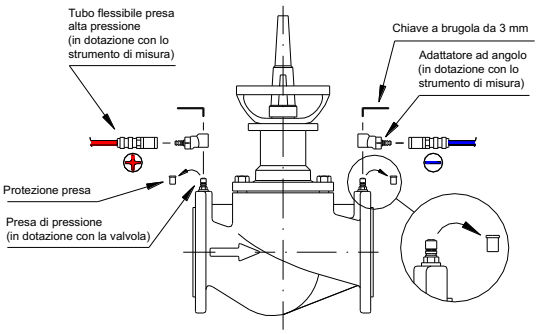
Threaded Balancing valves

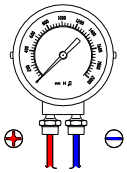
1) Connect the flexible pipes with the needle adapters (immediate coupling).
2) Open both pressure inlets by loosening the caps.
3) Push the adapters in the pressure inlets fully tightening the hooking ring nut to the pressure inlet.
4) Read the measuring instrument.
5) Loosen the hooking ring nut, remove the adapters from the pressure inlets and close them with relative caps.



Flanged Balancing valves

1) Connect the flexible pipes with the corner adapters (immediate coupling).
2) Remove the protections from the pressure inlets.
3) Fully push the corner adapters on the pressure inlets.
4) Open both pressure inlets, inserting a 3 *mm* Allen wrench and turning it anti-clockwise by ½ turn.
5) Read the measuring instrument.
6) Close the pressure inlets (clockwise with a 3 *mm* Allen wrench).
7) Remove the corner adapters and slide the pressure inlets protections on them.





Square differential manometer

The differential pressure can be detected with alternative instruments, even if without the portable electronic measuring device.
The Figure shows the use of a square differential manometer with:

Reading field between 0 and 2000 3000 daPa (2000 3000 mmH_2O)
Reading shares of at least 20 daPa (20 mm H_2O).

In all cases not envisioning the use of a portable electronic measuring device, the transfer water flow rate will be obtained by applying the detected differential pressure value, for the specific coefficient identifying the hydraulic feature of each balancing valve in its every calibration rating.

Determination of the Transfer flow rate

$$Q' = \frac{Q}{\sqrt{\rho'}}$$ correction of Q flow rate for liquids with different from 1kg/dm^3

where:
Q = flow rate in m^3/h (valid for water with temperature from 0 to 30°C and 1 kg/dm^3)
Q'= correct flow rate in m^3/h
Kv = hydraulic feature in m^3/h of valve
ρ' = density of liquid in kg/dm^3

$Q = Kv\sqrt{P}$	P = differential pressure detected in **bar**
$Q = \sqrt{\frac{Kv^2 \cdot P}{100}}$	P = differential pressure detected in **kPa**
$Q = \sqrt{\frac{Kv^2 \cdot P}{10.000}}$	P = differential pressure detected in **daPa**
$Q = \sqrt{\frac{Kv^2 \cdot P}{10.200}}$	P = differential pressure detected in **mmH_2O**
$Q = \sqrt{\frac{Kv^2 \cdot P}{100000}}$	P = differential pressure detected in **Pa**

The following measurements are possible with the electronic differential manometer:

Static pressure measurement
The static pressure is measured at inlet (red, +) or high pressure side. The low pressure side (blue, -) or outlet, remains disconnected.
The computer measures the relative pressure, meaning by how much the system pressure exceeds that of the atmosphere (remember that the relative maximum pressure at inlet cannot exceed the 15 bar, or the measuring system will be damaged).

Differential pressure measurement and flow rate calculation
Connect both instrument's pressure inlets with the valves' pressure inlets to take this measurement, ensuring to combine the pipes colours with the pressure inlets:

Red, + : high pressure side or first valve inlet/seat.
Blue, - : low pressure side or after valve outlet/seat.

Carefully read the instructions manual supplied with the instrument for further information.

ADVICE FOR INSTALLATION

We recommend respecting the installation prescriptions of the *Balancing valve*:

The *Balancing valve* can be installed on either vertical or horizontal piping.

Exclusively respect the flow direction as reported on the valve's body

If the *Balancing valve* is also used for indirectly reading the transfer flow rate, we recommend it is installed away from direction changes, throttling, adjustment and shut-off parts to limit interferences and increase reading stability and accuracy of the differential pressure reading.

In order to avoid thickening of mud and difficult to remove impurities, the piezometric inlets connections in horizontal paths must <u>always</u> be directed so that inlets are positioned upwards when they are installed.

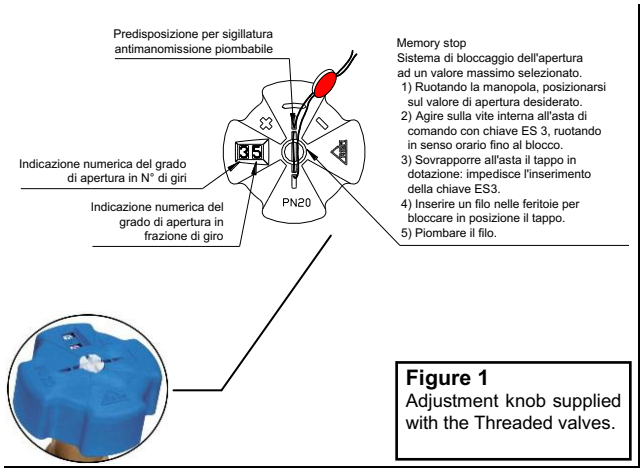


Figure 1
Adjustment knob supplied with the Threaded valves.

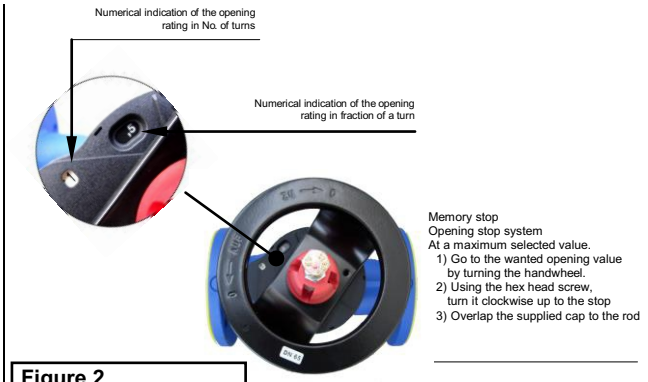


Figure 2
Adjustment knob supplied with the Flanged valves.

SOME POSSIBLE APPLICATIONS

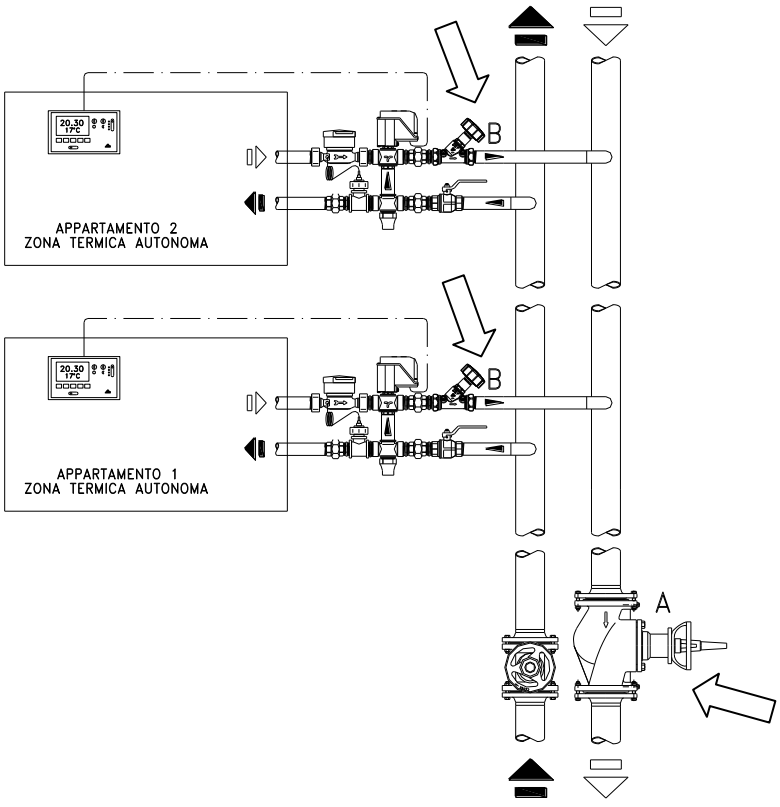


Figure 3 - <u>Application in autonomous thermal areas supplied by one or more upright columns.</u>

(A) Balancing of upright columns compared to hydraulically unfavourable column.
(B) Balancing among different power supplies to apartments derived from the same upright column.
[Balancing of the third by-pass airway of the area valve, (family code 114) is assured by calibration of its micrometric small valve, with heat area not powered].

SOME POSSIBLE APPLICATIONS

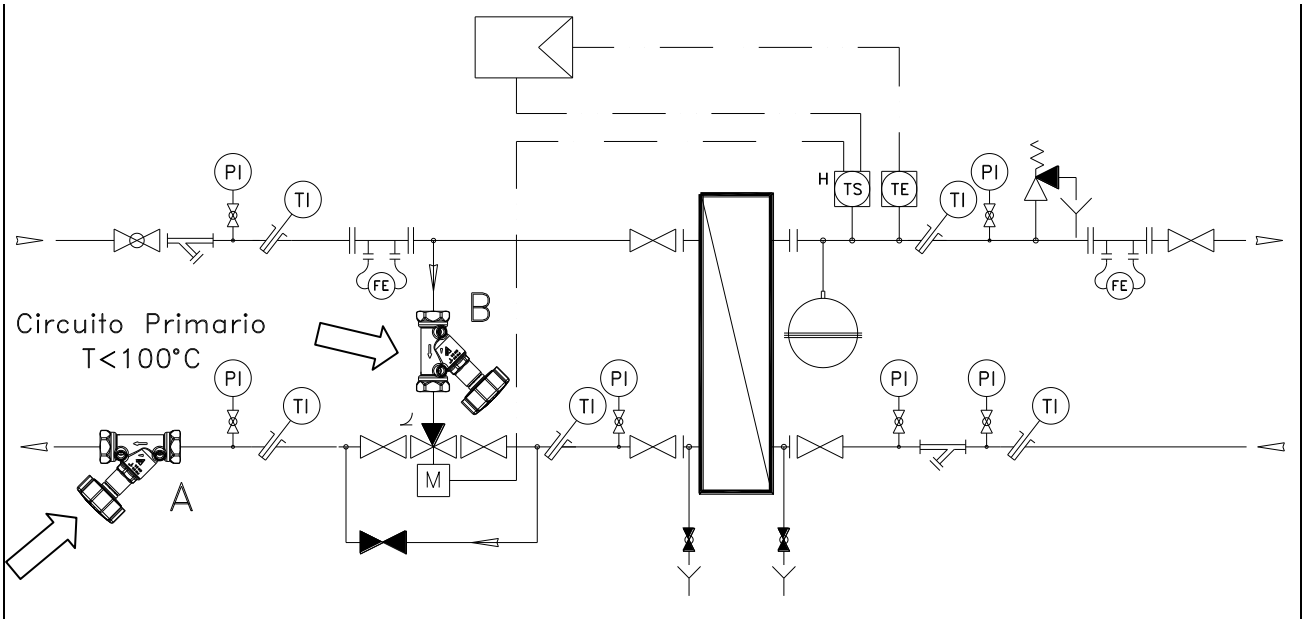


Figure 4 – Application to <u>hot water central heating sub-station.</u>

(A) Balancing of thermal regulation unit compared to main distribution network.
(B) Balancing of by-pass airway compared to straight one.
[The valve's adjustment (B) must be as resistant as the circuit powering the heat exchanger].

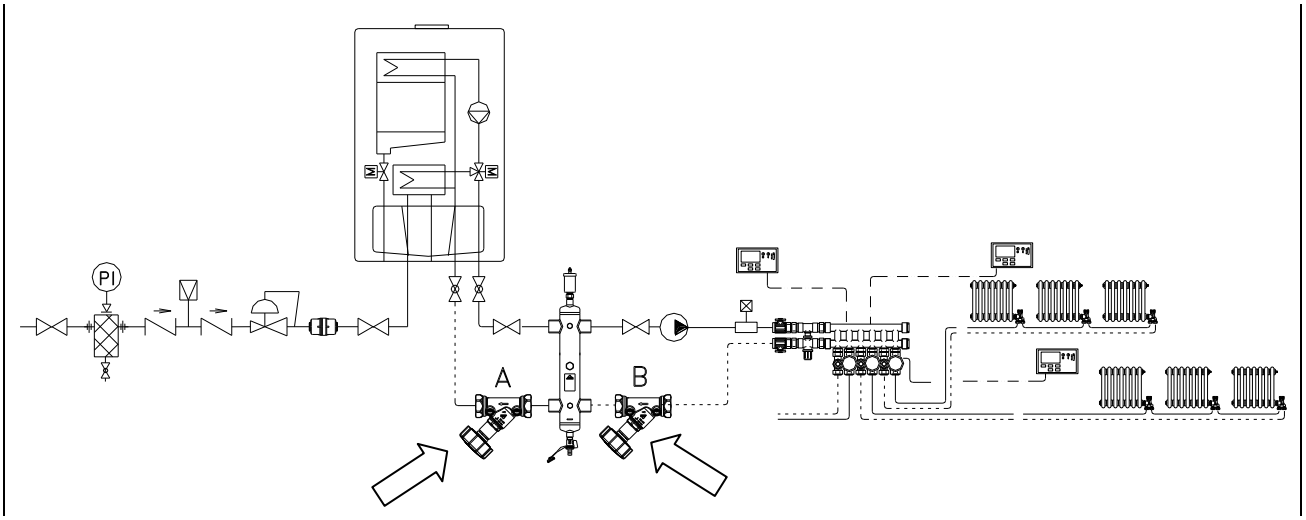


Figure 5 - <u>Single-family heating system.</u>

(A) Adjustment and measurement of flow rate supplied by circulation pump of wall boiler.
(B) Adjustment and measurement of flow rate relating to secondary distribution circuit

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