dal 1954 made in Italy

Barberi®

RUBINETTERIE INDUSTRIALI s.r.l.

EN	DATASHEET	rev. C

ST00074

460	**461**	**475**	**V60**	**W28.020**
450	**451**	**476**	**V50**	**W28.022**

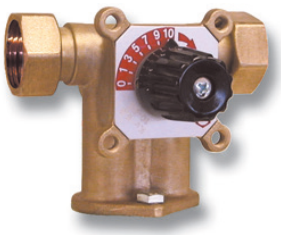
MOTORIZABLE ROTARY MIXING VALVES

460

461

475

V60



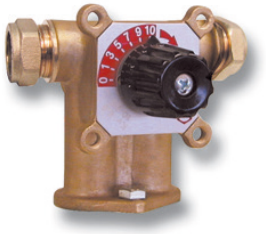
W28.020

450

451

476

V50



W28.022

Description

Barberi® motorizable mixing valves allow the mixing between two fluids (e.g. hot and cold water) to get the desired temperature. They are used in heating and cooling systems, central heating systems, heat generators (wall-mounted boilers, solid fuel generators, heat pumps). The mixing is obtained through a shaped rotor that regulates the passage of the fluids. This rotor can be a sector or a butterfly, according to the valve type. The rotary mixing valves can be adjusted manually or by means of an electric actuator. If a regulation in diverting mode is needed, the 3-way mixing valves can be applied as diverting valves (art. 460, 461, 475, V60). Note: both the 3 and 4-way valves can be used to increase the return temperature to the generator as anti-condensation devices (in solid fuel or diesel generators).

Range of articles

Series 460	3-way mixing valve F
Series 461	3-way mixing valve M
Series 475	3-way mixing valve with compression ends
Series V60	Double thread 3-way rotary mixing valve - MF thread on each port
Series 450	4-way mixing valve F
Series 451	4-way mixing valve M
Series 476	4-way mixing valve with compression ends
Series V50	Double thread 4-way rotary mixing valve - MF thread on each port
Series W28.020	4-way vertical mixing valve with running nuts
Series W28.022	4-way vertical mixing valve with compression ends

Features

Working temperature range (peaks):
-20 *(see suitable fluids)*–**130 °C**
Working temperature range: **0** *(no frost)*–**110 °C**
Max working pressure: **10 bar**
Obturator rotation torque: **<5 N·m**
Rotation angle: **90°**
Leakage: **<0,1%**
Suitable fluids: **water for thermal systems, glycol solutions (max 50%)**
Threaded connections: **female EN 10226-1 (V60, V50: ISO 228-1)**
male ISO 228-1
Tests: **EN 12266-1 §A.3**

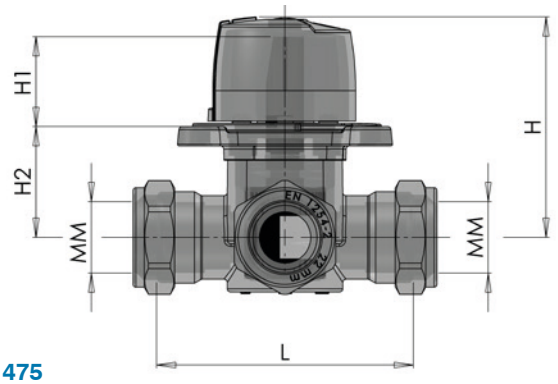
Materials

Body: **brass EN 12165 CW617N**
Flanges: **brass EN 12165 CW617N**
Obturator: **brass EN 12165 CW617N**
Gaskets: **EPDM**
Graduated plate: **aluminum**
Knob: **ABS**

Barberi Rubinetterie Industriali s.r.l. • 13018 VALDUGGIA (VC) ITALY • Via Monte Fenera, 7 • Tel. 0039 0163 48.284 r.a. • Fax 0039 0163 48.287 • e-mail: barberi@barberi.it • website: http://www.barberi.it

MOTORIZABLE ROTARY MIXING VALVES

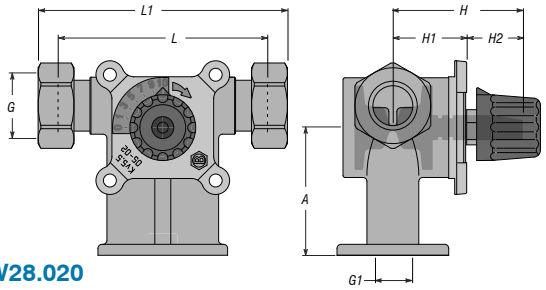
Dimensions



475
476

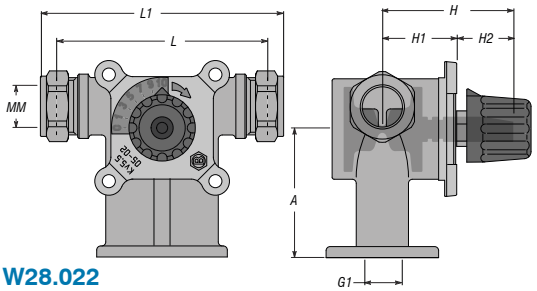
Code	MM	Kv	L	H	H1	H2	Weight [g]	N. P/B	N. P/C
475022 00MA ON	22 mm	2,5	80	69	28	35	760	1	10
475022 00MB ON	22 mm	4	80	69	28	35	760	1	10
475022 00MC ON	22 mm	6	80	69	28	35	760	1	10
475028 00ME ON	28 mm	12	82	69	28	35	810	1	12
475035 00MG ON	35 mm	18	88	71	28	37	810	1	8

Code	MM	Kv	L	H	H1	H2	Weight [g]	N. P/B	N. P/C
476022 00MA ON	22 mm	2,5	80	69	28	35	800	1	10
476022 00MB ON	22 mm	4	80	69	28	35	800	1	10
476022 00MC ON	22 mm	6	80	69	28	35	800	1	10
476028 00ME ON	28 mm	12	82	69	28	35	850	1	10
476035 00MG ON	35 mm	18	88	71	28	37	850	1	8



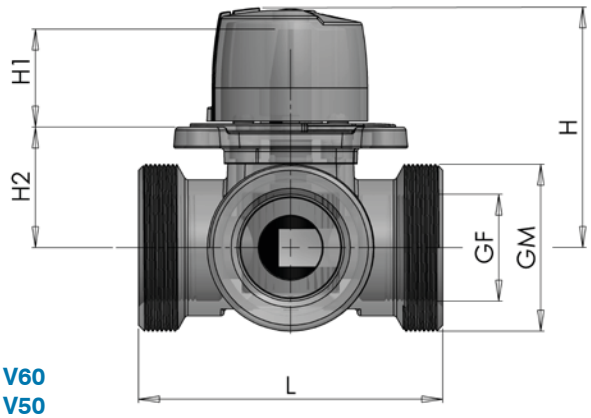
W28.020

Code	G	Kv	L	L1	H	H1	H2	A	G1	Weight [g]	N. P/B	N. P/C
W28020 00MH01 ON	G 1	5,5	105	125	65	37	28	64	G 1/2	1270	1	16
W28020 00MH02 ON	G 1	5,5	90	110	65	37	28	64	G 1/2	1120	1	16



W28.022

Code	MM	Kv	L	L1	H	H1	H2	A	G1	Weight [g]	N. P/B	N. P/C
W28022 00MH01 ON	22 mm	5,5	105	125	65	37	28	64	G 1/2	1220	1	16



V60
V50

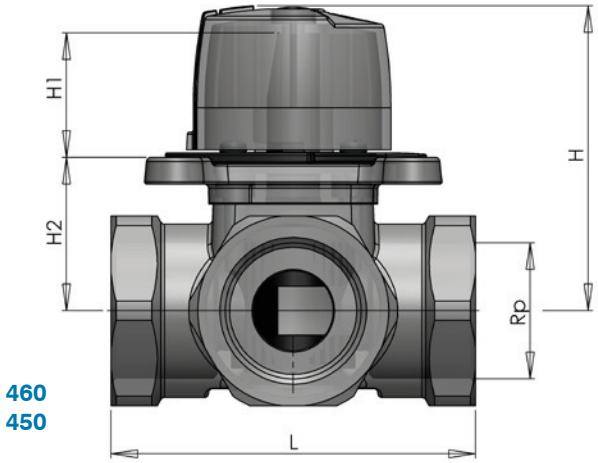
Code	GF	GM	Kv	L	H	H1	H2	Weight [g]	N. P/B	N. P/C
V60025 00MD	G 1 F	G 1 1/2 M	8	87	69	28	35	1043	1	10
V60025 00ME	G 1 F	G 1 1/2 M	12	87	69	28	35	1020	1	10

Code	GF	GM	Kv	L	H	H1	H2	Weight [g]	N. P/B	N. P/C
V50025 00MD	G 1 F	G 1 1/2 M	8	87	69	28	35	1175	1	10

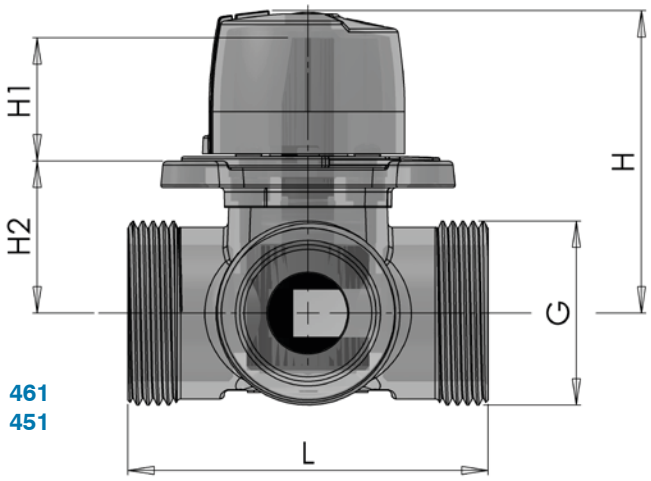
ON on request

N. P/B: number of pieces in box - N. P/C: number of pieces in carton

MOTORIZABLE ROTARY MIXING VALVES



460
450



461
451

Code	Rp	Kv	L	H	H1	H2	Weight [g]	N. P/B	N. P/C
460 01500 MN	Rp 1/2	1,6	80	69	28	35	661	1	10
460 01500 MA	Rp 1/2	2,5	80	69	28	35	678	1	10
460 02000 MB	Rp 3/4	4	80	69	28	35	754	1	10
460 02000 MC	Rp 3/4	6	80	69	28	35	738	1	10
460 02500 MD	Rp 1	8	82	69	28	35	906	1	10
460 02500 ME	Rp 1	12	82	69	28	35	882	1	10
460 03200 MF	Rp 1 1/4	15	85	71	28	37	1273	1	10
460 03200 MG	Rp 1 1/4	18	85	71	28	37	1246	1	10
460 04000 ML	Rp 1 1/2	26	116	77	28	42	2283	1	10
460 05000 MM	Rp 2	40	125	77	28	43	2532	1	10

Code	Rp	Kv	L	H	H1	H2	Weight [g]	N. P/B	N. P/C
450 01500 MA	Rp 1/2	2,5	80	69	28	35	736	1	10
450 02000 MB	Rp 3/4	4	80	69	28	35	812	1	10
450 02000 MC	Rp 3/4	6	80	69	28	35	812	1	10
450 02500 MD	Rp 1	8	82	69	28	35	1073	1	10
450 02500 ME	Rp 1	12	82	69	28	35	1044	1	10
450 03200 MF	Rp 1 1/4	15	85	71	28	37	1374	1	10
450 03200 MG	Rp 1 1/4	18	85	71	28	37	1250	1	10
450 04000 ML	Rp 1 1/2	26	116	77	28	42	2485	1	10
450 05000 MM	Rp 2	40	125	77	28	43	2616	1	10

Code	G	Kv	L	H	H1	H2	Weight [g]	N. P/B	N. P/C
461 02000 MA	G 3/4 M	2,5	80	69	28	35	648	1	10
461 02500 MA	G 1 M	2,5	80	69	28	35	764	1	10
461 02500 MB	G 1 M	4	80	69	28	35	761	1	10
461 02500 MC	G 1 M	6	80	69	28	35	751	1	10
461 03200 MD	G 1 1/4 M	8	82	69	28	35	817	1	10
461 03200 ME	G 1 1/4 M	12	82	69	28	35	800	1	10
461 04000 MF	G 1 1/2 M	15	85	71	28	37	1302	1	10
461 04000 MG	G 1 1/2 M	18	85	71	28	37	1279	1	10

Code	G	Kv	L	H	H1	H2	Weight [g]	N. P/B	N. P/C
451 02000 MA	G 3/4 M	2,5	80	69	28	35	697	1	10
451 02500 MB	G 1 M	4	80	69	28	35	846	1	10
451 02500 MC	G 1 M	6	80	69	28	35	846	1	10
451 03200 MD	G 1 1/4 M	8	82	69	28	35	987	1	10
451 03200 ME	G 1 1/4 M	12	82	69	28	35	960	1	10
451 04000 MF ON	G 1 1/2 M	15	85	71	28	37	1414	1	10
451 04000 MG ON	G 1 1/2 M	18	85	71	28	37	1372	1	10

ON on request

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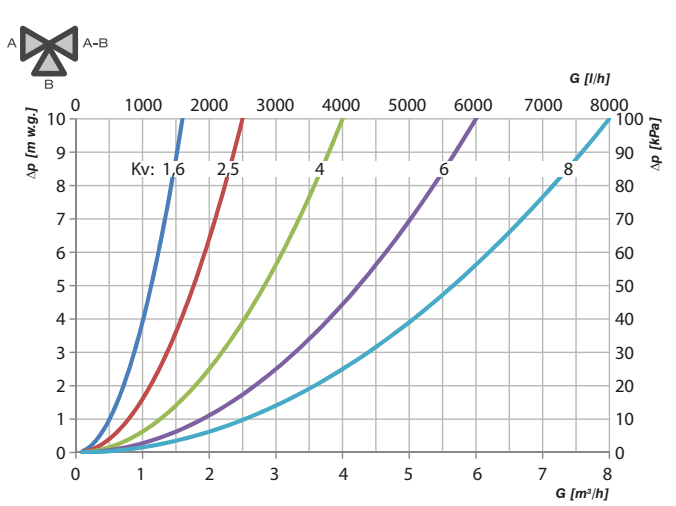
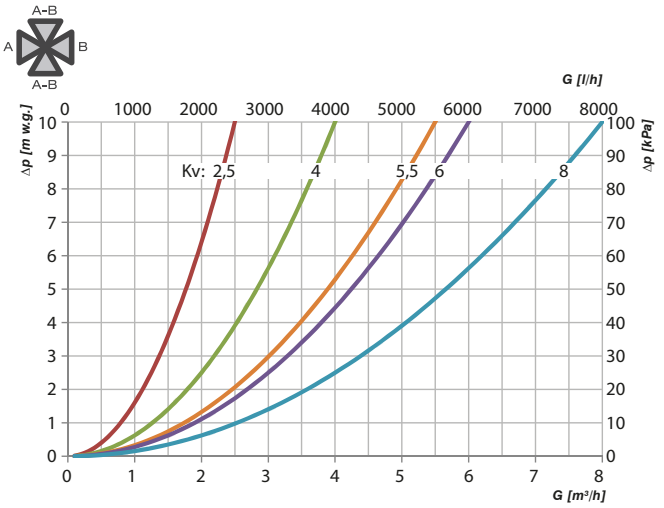
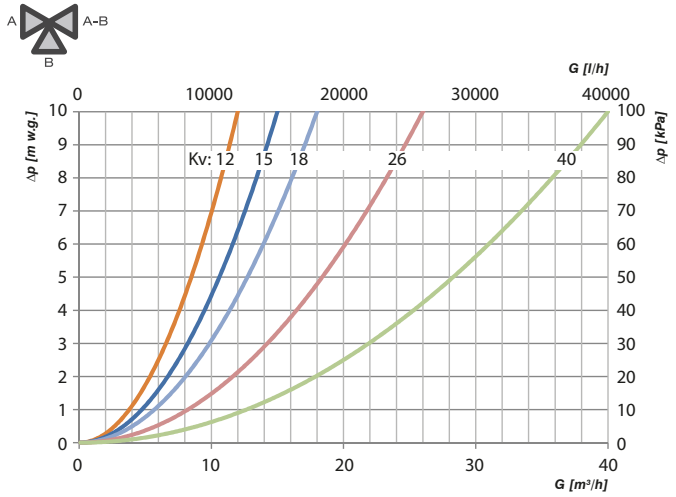
MOTORIZABLE ROTARY MIXING VALVES

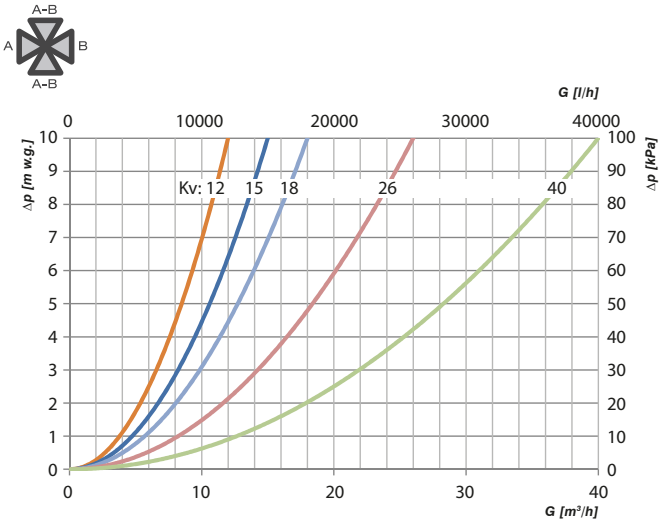
Diagrams

Hydraulic characteristics

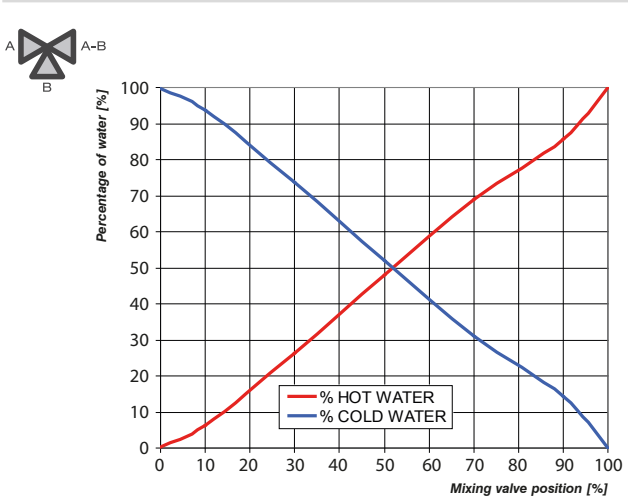


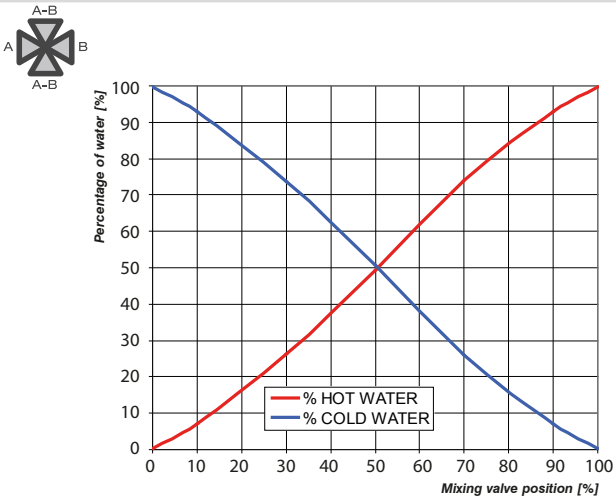






Mixing curve

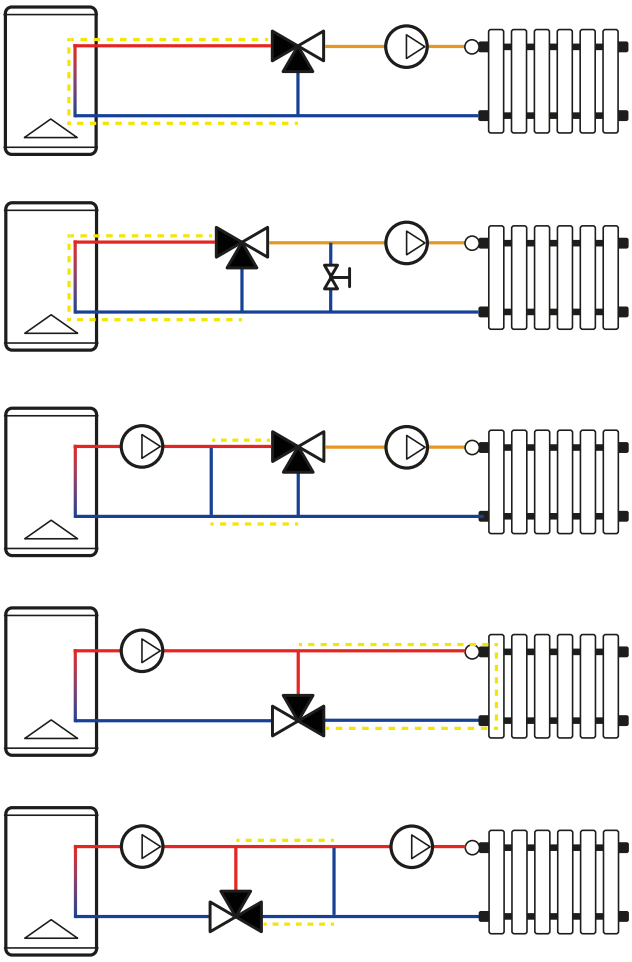




MOTORIZABLE ROTARY MIXING VALVES

Sizing

Barberi® mixing valves can be sized, by authorized technical personnel, according to one of the following methods:



1) **Valve authority "a" (suggested method).**
- Let's take into account the part of the circuit that, due to the regulating effect of the valve, works at "variable flow rate". In this picture, the dashed yellow line puts into evidence the segments, working at variable flow rate, of different hydraulic configurations.
- Let's take into account the desing flow rate which flows through the valve with by-pass port fully closed (therefore, all the flow rate passing through the circuit working at "variable flow rate").
- We calculate the head losses of the circuit "at variable flow rate" (Δp_C) when the design flow rate passes through it.
- We calculate the valve head losses (Δp_V) by applying the valve authority formula:

$a=\Delta p_V/(\Delta p_V+\Delta p_C)$ therefore $\Delta p_V=(a\cdot\Delta p_C)/(1-a)$

a=authority (value decided by the designer)
Δp_V=valve head losses (value to be calculated)
Δp_C=head losses of the circuit working at "variable flow rate" (value previously calculated by the designer)

According to the type of the system and the use of the mixing valve in mixing or diverting mode, the designer should decide the most appropriate authority value. Common values for the authority are between 0,3 and 0,5. This means we consider the valve head losses between the 30% and 50% of the total head losses of the "variable flow rate" circuit (circuit + valve).
Too low values of authority are synonymous with too large valve and possible difficulty of regulation: the valve can have an effect on the flow rate variation only when approaching the closing position.
Too high values of authority mean small valve with high head losses and, as a consequence, the necessity to select a high head pump.
In this case the regulation is fast but at risk of instability: the valve has an immediate effect on the flow rate variation at the beginning of the stroke, but the induced head losses could be excessive, the flow rate too limited and a correct regulation point could be difficult to obtain.
For this reason, a correct value of authority is a compromise between the type of the system and the application mode of the valve (mixing or diverting mode).
- After calculating the Δp_V value, on the hydraulic characteristic diagram we select a valve which, at the design flow rate, shows head losses of a value similar to Δp_V. From the diagram we therefore obtain the Kv of the necessary valve and, as a consequence, the valve size and model.

2) **Method of the fluid speed.**
The maximum fluid speed is decided by the designer according to the valve installation point in the system (for example 1,2 m/s for central heating system and 0,5 m/s for secondary circuits). We calculate the valve diameter with the following formula:

$d=1000\cdot\sqrt{[G/(2827\cdot v)]}$

d=valve diameter [mm]
G=design flow rate [m^3/h]
v=fluid speed [m/s]

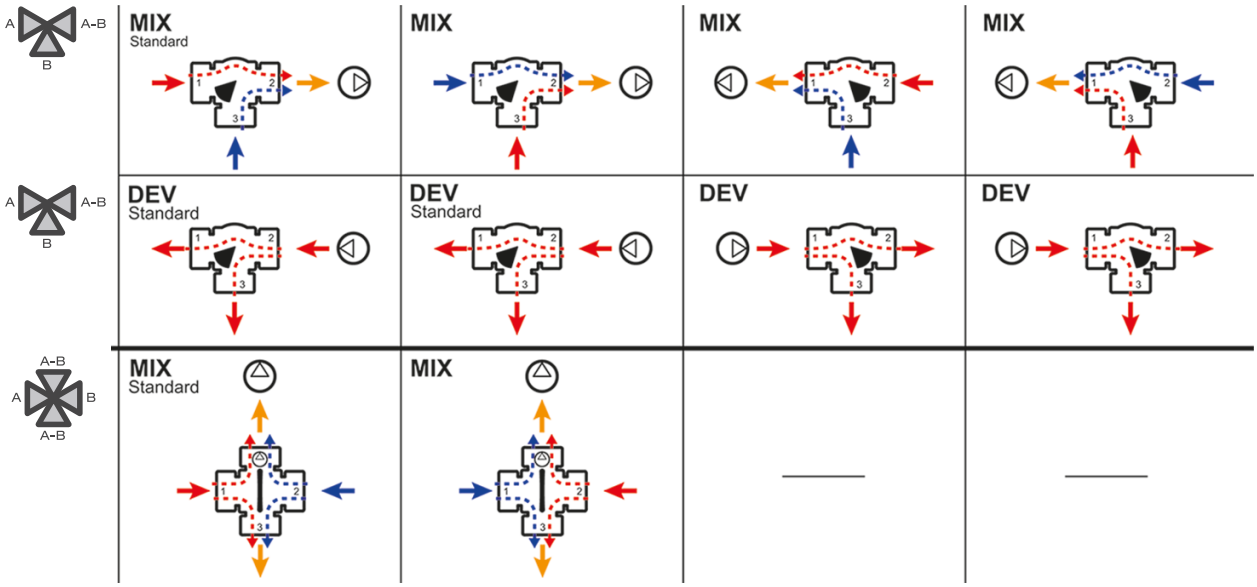
This fast method could lead to select a valve diameter which, in the available range, corresponds to different Kv values (for example 460 series valve, Rp 1 connections, available Kv values 8 and 12).
For this reason, the most reliable method is the valve authority.

MOTORIZABLE ROTARY MIXING VALVES

Working way

Rotary mixing valves adjust the temperature of the thermal medium by mixing a fluid at higher temperature with another one with lower temperature inside the mixing chamber. The adjustment is performed by a shaped obturator which allows the opening and closing of both the fluid passages.
3-way valves can be used as:
- mixing valves: 2 inlets, 1 outlet. We obtain the temperature regulation of the circuit downstream of the valve (for example: weather compensated temperature adjustment of the flow rate sent to the user; temperature adjustment of the flow rate returning to diesel or solid fuel generators with anti-condensation function);
- diverting valves used in adjustment mode: 1 inlet, 2 outlets. This working mode is obtained by inverting the flow direction inside the valve: the unique fluid inlet is the port used as mixed water outlet in the mixing valve working mode. The regulation of the downstream circuit is obtained therefore by a flow rate variation;
- diverting valves: 2 inlets, 1 outlet (for example to connect two generators to the same system) or 1 inlet, 2 outlets (for example as priority valve to connect the boiler to the heating system or to the domestic water storage).
4-way valves can be used only as mixing valves.

This table shows the use of the valves in mixing (MIX) or diverting mode (DEV). The valves are supplied with the factory configuration called “Standard”. Ports can be used according to the other configurations indicated in the table



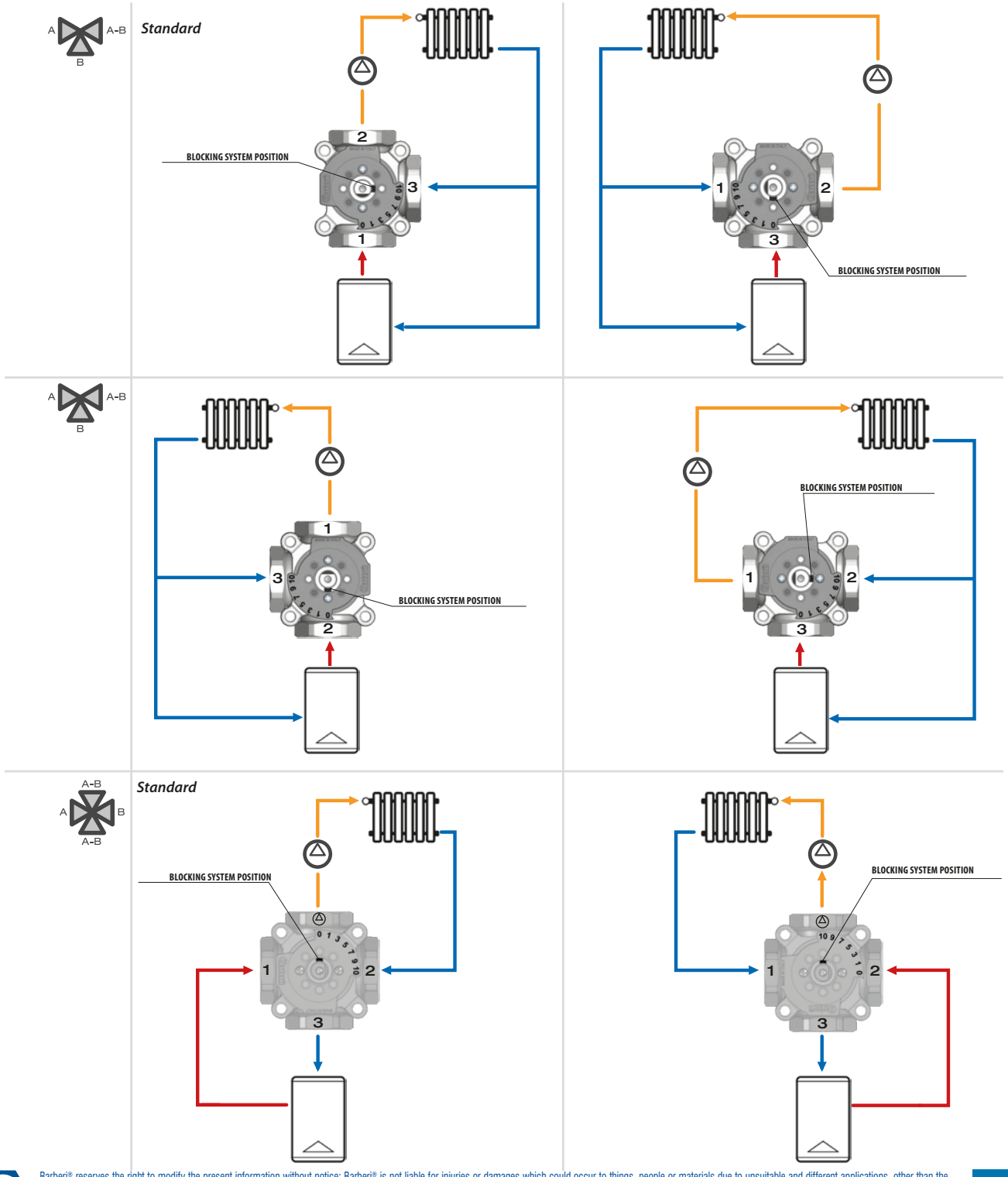
Installation

Mixing valves are supplied with manual setting knob and locking screw. These valves, in addition to being motorized for automatic regulation, can be configured according to the needs of the system. The motorized valves can be installed according to the following positions.

MOTORIZABLE ROTARY MIXING VALVES

Configuration

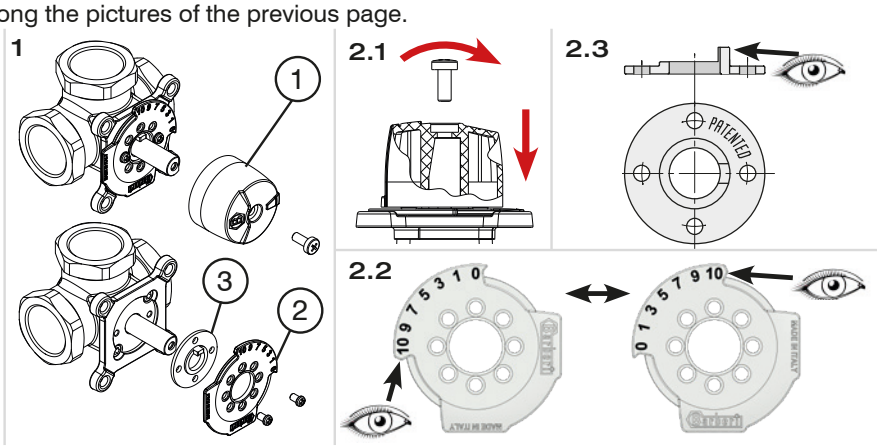
3- and 4-way mixing valves can be set according to several system configurations. Pictures named “Standard” show the valve in its factory configuration. The other pictures show all the possible ways to use the valve ports. In all the pictures, pay attention to the position of the mechanical blocking system and the plate with graduated scale and observe the port numeration.



MOTORIZABLE ROTARY MIXING VALVES

In order to set the valve in a different mode w.r.t. the “standard” configuration, proceed as follows.
- Disassemble the regulating knob (1) (fig. 1), the plate with graduated scale (2) and the blocking system (3).
- Choose your own system configuration among the pictures of the previous page.
- Insert the blocking system (fig. 2.3) with the protrusion oriented as in the chosen diagram. The blocking system limits the knob rotation, and as a consequence the valve obturator rotation, in a range of 90°.
- Insert the graduated plate as visible in the chosen diagram, observing the arrow position close to the number 10 (fig. 2.2). Number 10 shows the valve position to obtain the highest value of the mixed water temperature, corresponding to the hot water inlet port fully open and cold water inlet port fully closed. Screw both the plate locking screws.
- Install the knob on the obturator stem (rotor) in the way shown in figure 2.1 and, before locking it with the screw, put the rotor in position 5.
- Tighten the locking screw on the knob.

NB: we suggest to modify the valve configuration before installing it on the system to verify the correct functioning of the rotor.

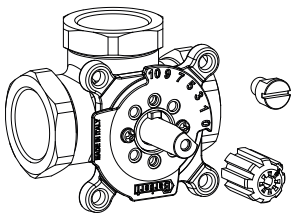


Actuator installation

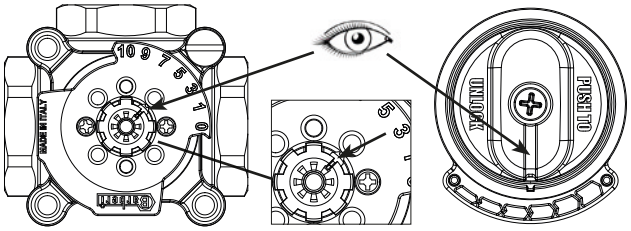
Barberi® mixing valves can be actuated with 2 or 3 point actuators (M03.2, M03.3), fixed point actuators (P27T2) or proportional actuators (M04). To install the actuator, follow its instructions supplied in the package.

To install Barberi® actuator M03 series follow these steps:

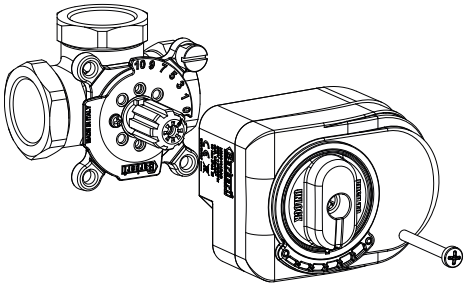
1. Disassemble the valve knob, if installed; assemble the adaptor to move the rotor, as indicated in the figure, and screw the anti-rotation pin on the valve.

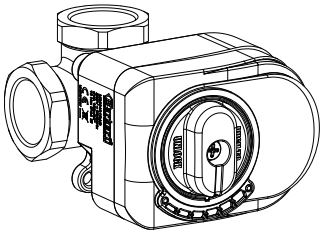


2. IMPORTANT: align the adaptor indicator to the position 5 (at about 45°) and verify that the actuator knob is in the shown position in the following figure.



3. Apply the actuator onto the valve body by aligning the shaft with the adaptor and the anti-rotation pin with the slot on the rear part of the actuator. Screw the supplied screw to lock the actuator to the valve.





MOTORIZABLE ROTARY MIXING VALVES

Accessories

M03.3

Actuator for mixing valves, rotation angle 90°, 3 point regulation. Complete with blocking screw, valve adaptor, anti-rotation pin, 1,5 m integrated cable, auxiliary microswitch (only in 6 pole version)

Torque: ***10 N·m***
Protection class: ***IP 44***
Frequency: ***50 Hz***
Power consumption: ***4 VA***
Aux. microswitch contact rating: ***6 (1) A***

Code	V	Running time [s]	Nr. poles	Cable [m]		
M03 010 1DA B TBS	230	120	3	1,5	1	16
M03 010 1GA B	230	120	6	1,5	1	16
M03 010 1DB B	230	60	3	1,5	1	16
M03 010 1GB B	230	60	6	1,5	1	16
M03 010 2DA B	24	120	3	1,5	1	16
M03 010 2GA B	24	120	6	1,5	1	16
M03 010 2DB B	24	60	3	1,5	1	16
M03 010 2GB B	24	60	6	1,5	1	16

M03.2

Actuator for mixing valves (diverting working mode), rotation angle 90°, on/off regulation. Complete with blocking screw, valve adaptor, anti-rotation pin, 1,5 m integrated cable, auxiliary microswitch (only in 6 pole version)

Torque: ***10 N·m***
Protection class: ***IP 44***
Frequency: ***50 Hz***
Power consumption: ***4 VA***
Aux. microswitch contact rating: ***6 (1) A***

Code	V	Running time [s]	Nr. poles	Cable [m]		
M03 010 1AA B	230	120	3	1,5	1	16
M03 010 1HA B	230	120	6	1,5	1	16
M03 010 1AB B	230	60	3	1,5	1	16
M03 010 1HB B	230	60	6	1,5	1	16
M03 010 2AA B	24	120	3	1,5	1	16
M03 010 2AB B	24	60	3	1,5	1	16

P27T2

Actuator for mixing valves, rotation angle 90°, for 3 point regulation with integrated probe and temperature regulator. Temperature adjustment range 5–95 °C. Complete with blocking screw, mixing valve adaptor, anti-rotation pin, Pt 1000 probe (1,6 m cable), contact probe holder, integrated Shuko electrical plug (1,9 m cable).

Temperature adjustment range: ***5–95 °C***
Torque: ***6 N·m***
Protection class: ***IP 42***
Frequency: ***50 Hz***
Power consumption: ***1,5 VA***

Code	V	Running time [s]	Nr. poles	Cable [m]		
P27 230 010 T2 TBS	230	120	2	1,9	1	10

M04

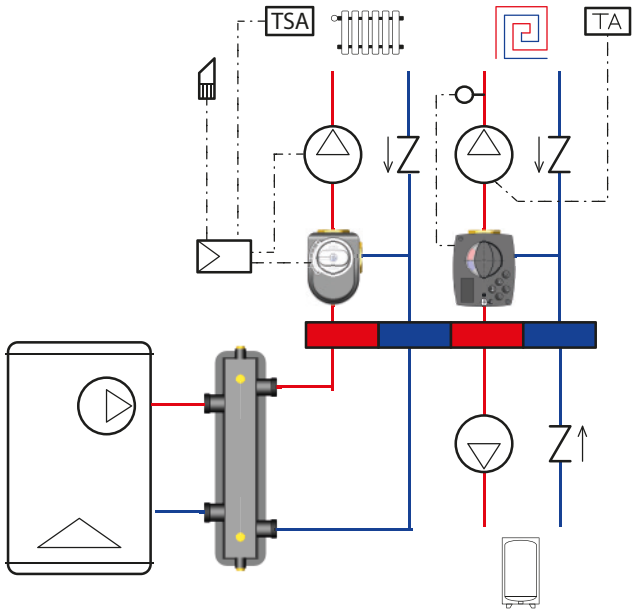
Actuator for mixing valves, rotation angle 90°, proportional regulation 0 (2)-10 V. Complete with blocking screw, valve adaptor, anti-rotation pin, 1,95 m integrated cable

Torque: ***5 N·m***
Feedback: ***0–10 V/4-20 mA***
Protection class: ***IP 42***
Frequency: ***50 Hz***
Power consumption: ***4 VA***

Code	V	Running time [s]	Nr. poles	Cable [m]		
M04 010 3MA B	24	60 - 90 - 120	4	1,95	1	10

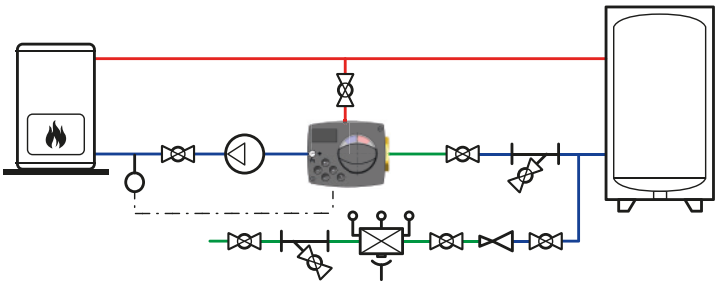
MOTORIZABLE ROTARY MIXING VALVES

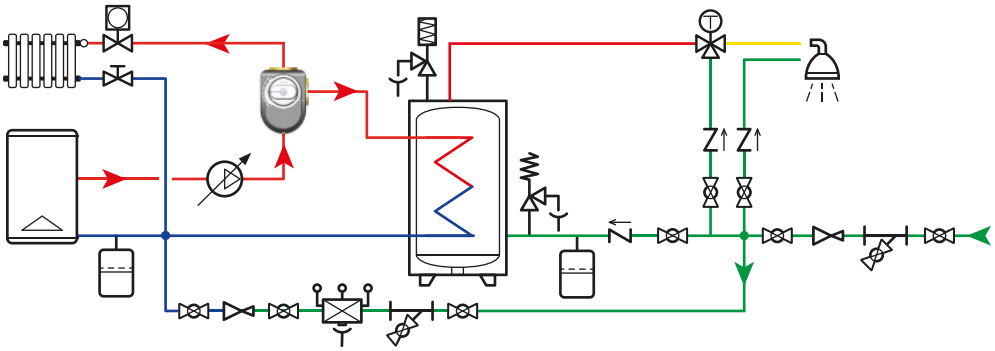
System diagrams



- 460 mixing valve with M03.3 actuator and weather compensated regulation,
- 460 mixing valve with P27T2 actuator and fixed point regulation.

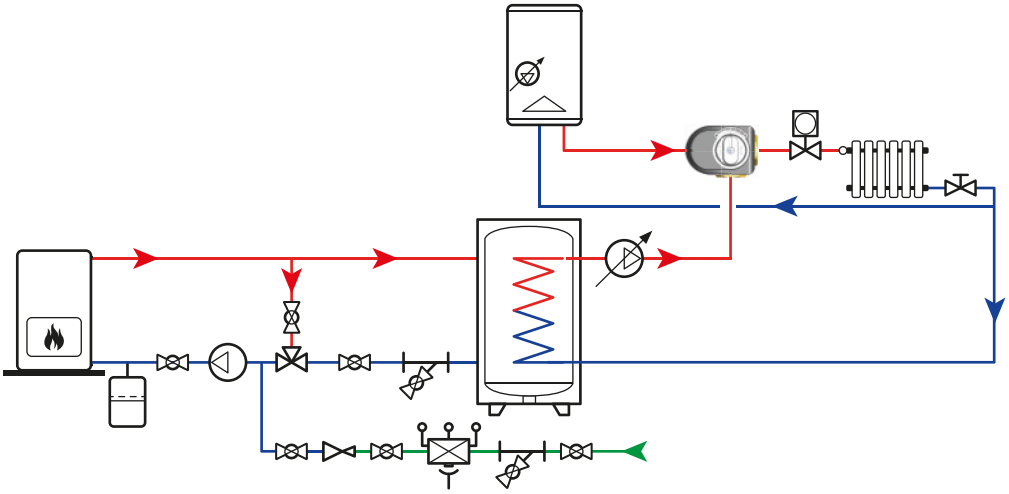
Use of 3-way valves with P27T2 actuator with anti-condensation function





Use of 3-way valves as priority between heating and DHW production

Coupling of two generators



MOTORIZABLE ROTARY MIXING VALVES

Specifications

Series 460
3-way rotary mixing valve with manual knob. Fitted to be actuated. Threaded connections Rp 1/2 (from Rp 1/2 to Rp 2). Body, closing flange and obturator in brass; EPDM gaskets; graduated plate and knob in technopolymer. Maximum working pressure 10 bar. Working temperature range 0–110 °C. Obturator rotation torque lower than 5 N·m. Leakege lower than 0,1%. Suitable fluids water for thermal systems, glycol solutions (max 50%).

Series 461
3-way rotary mixing valve with manual knob. Fitted to be actuated. Threaded connections G 3/4 M (from G 3/4 to G 1 1/2). Body, closing flange and obturator in brass; EPDM gaskets; graduated plate and knob in technopolymer. Maximum working pressure 10 bar. Working temperature range 0–110 °C. Obturator rotation torque lower than 5 N·m. Leakege lower than 0,1%. Suitable fluids water for thermal systems, glycol solutions (max 50%).

Series 475
3-way rotary mixing valve with manual knob. Fitted to be actuated. Compression ends 22 mm (28 and 35 mm). Body, closing flange and obturator in brass; EPDM gaskets; graduated plate and knob in technopolymer. Maximum working pressure 10 bar. Working temperature range 0–110 °C. Obturator rotation torque lower than 5 N·m. Leakege lower than 0,1%. Suitable fluids water for thermal systems, glycol solutions (max 50%).

Series V60
Double thread 3-way rotary mixing valve with manual knob. Fitted to be actuated. Threaded connections G 1 F+G 1 1/2 M on each port. Body, closing flange and obturator in brass; EPDM gaskets; graduated plate and knob in technopolymer. Maximum working pressure 10 bar. Working temperature range 0–110 °C. Obturator rotation torque lower than 5 N·m. Leakege lower than 0,1%. Suitable fluids water for thermal systems, glycol solutions (max 50%).

Series 450
4-way rotary mixing valve with manual knob. Fitted to be actuated. Threaded connections Rp 1/2 (from Rp 1/2 to Rp 2). Body, closing flange and obturator in brass; EPDM gaskets; graduated plate and knob in technopolymer. Maximum working pressure 10 bar. Working temperature range 0–110 °C. Obturator rotation torque lower than 5 N·m. Leakege lower than 0,1%. Suitable fluids water for thermal systems, glycol solutions (max 50%).

Series 451
4-way rotary mixing valve with manual knob. Fitted to be actuated. Threaded connections G 3/4 M (from G 3/4 to G 1 1/2). Body, closing flange and obturator in brass; EPDM gaskets; graduated plate and knob in technopolymer. Maximum working pressure 10 bar. Working temperature range 0–110 °C. Obturator rotation torque lower than 5 N·m. Leakege lower than 0,1%. Suitable fluids water for thermal systems, glycol solutions (max 50%).

Series 476
4-way rotary mixing valve with manual knob. Fitted to be actuated. Compression ends 22 mm (28 and 35 mm). Body, closing flange and obturator in brass; EPDM gaskets; graduated plate and knob in technopolymer. Maximum working pressure 10 bar. Working temperature range 0–110 °C. Obturator rotation torque lower than 5 N·m. Leakege lower than 0,1%. Suitable fluids water for thermal systems, glycol solutions (max 50%).

Series V50
Double thread 4-way rotary mixing valve with manual knob. Fitted to be actuated. Threaded connections G 1 F+G 1 1/2 M on each port. Body, closing flange and obturator in brass; EPDM gaskets; graduated plate and knob in technopolymer. Maximum working pressure 10 bar. Working temperature range 0–110 °C. Obturator rotation torque lower than 5 N·m. Leakege lower than 0,1%. Suitable fluids water for thermal systems, glycol solutions (max 50%).

Series W28.020.H1-W28.020.H2-W28.022
4-way rotary vertical mixing valve with manual knob. Fitted to be actuated. Threaded connections G 1 RN - G 1/2 F (W28.022: compression ends 22 mm). Connection distance 105 and 90 mm (W28.022: 105 mm). Body, closing flange and obturator in brass; EPDM gaskets; graduated plate in aluminum, ABS knob. Maximum working pressure 10 bar. Working temperature range 0–110 °C. Obturator rotation torque lower than 5 N·m. Leakege lower than 0,1%. Suitable fluids water for thermal systems, glycol solutions (max 50%).

Barberi Rubinetterie Industriali s.r.l. • 13018 VALDUGGIA (VC) ITALY • Via Monte Fenera, 7 • Tel. 0039 0163 48.284 r.a. • Fax 0039 0163 48.287 • e-mail: barberi@barberi.it • website: http://www.barberi.it