

SINTESI

MOTORIZED VALVES

USE

The **SINTESI** motorized valve is specifically used for the interception and regulation of fluids in:

- heating/cooling systems (HVAC)
- drinking water systems
- systems using alternative energy
- thermal solar systems with suitable valve body
- household automation systems in general

SINTESI actuator comes with a "press-on" coupling system to the valve body, which allows a fast and reliable coupling, without the need of any tool.

The "ALL IN ONE" system allows to directly select a 2-way or 3-way electric control during the installation, by means of a special selector in the actuator.



Actuators

SINTESI actuator is available in the following versions:



TECHNICAL FEATURES		SINTESI		
Electric control	2-point	3-point	ALL IN ONE, <i>patented</i> with selector in the actuator	
			3-point	2-point
Connection with ball valve	patented fast push coupling			
Operation (see dedicated sections)	ON/OFF	modulating ON/OFF		ON/OFF
Rotation	90° clockwise and counter clockwise			
Brass valve bodies (see diameters in the "Ball valves" section)	2-way			
	-	2-way with regulation disk		-
	square 2-way			
	diverter/mixer 3-way			
	by-pass			
Position indicator	rotating arrow, which indicates the ball position			
Motor	unidirection	bidirection		
Power supply	230 V ; 50/60 Hz 24 V ; 50/60 Hz 110 V ; 50/60 Hz upon request			
Power cable length	80 cm (more sizes upon request)			
Operating time (↗ 90°) and relative pickup torque	45 seconds; 8 Nm	35 seconds; 8 Nm		
		15 seconds; 5 Nm - fast version		
		120 seconds; 8 Nm- slow version		
Input power	3,9 VA			
Power output of the outlet phase to grey wire	1 A resistive			
Power output of the extra micro switch	1 A resistive ; 250 V			
Maximum noise (At a 1 m distance)	40 dB(A)			
Operational room temperature	+5°C ÷ +50°C			
Fluid temperature	see page 10			
Protection degree	IP 54			
Insulation degree	II - double insulation <input type="checkbox"/>			
External case material	polyamide PA 6, 30% fibreglass			
Required maintenance	none			
Certification	EC			



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SINTESI

MOTORIZED VALVES

ELECTRICAL CONNECTIONS

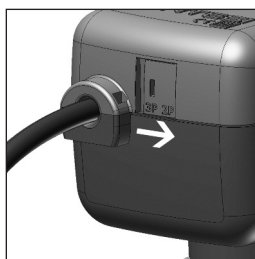
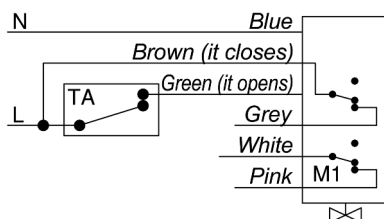
2-POINT CONTROL – ON/OFF (SWITCH)

- blue wire: neutral;
- brown wire: **fissa** closing phase;
- green wire: opening phase.

The phase to the green wire can be supplied by means of a switch.

One electric control can activate several actuators.

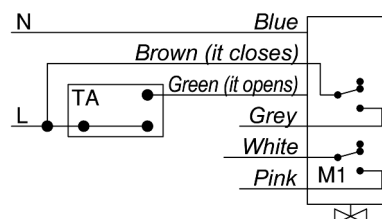
ACTUATOR ON OPENING



"ALL IN ONE" ACTUATOR

GREY= OUTPUT PHASE WITH OPEN VALVE
TA= ENVIRONMENT THERMOSTAT
M1= EXTRA OPENING MICRO SWITCH

ACTUATOR ON CLOSING



The pictures show the wiring diagram of the actuator with a **2-POINT - ON/OFF** control device.

The wiring diagram is shown open and closed, respectively.

Supplying power by means of a phase across the brown wire causes the valve to close (electrical automatic closing); supplying power across the green wire, too, causes the valve to open.

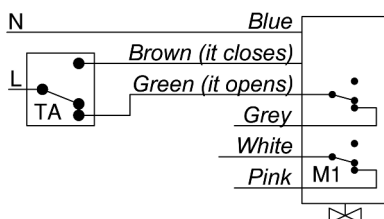
3-POINT CONTROL – ON/OFF (DIVERTER)

- blue wire: neutral;
- brown wire: fixed closing phase;
- green wire: opening phase.

Phase shall be diverted to the brown wire or the green wire.

Each actuator must be operated by a single electric control.

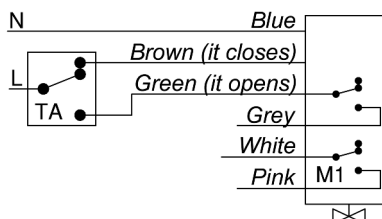
ACTUATOR ON OPENING



"ALL IN ONE" ACTUATOR

GREY= OUTPUT PHASE WITH OPEN VALVE
TA= ENVIRONMENT THERMOSTAT
M1= EXTRA OPENING MICRO SWITCH

ACTUATOR ON CLOSING



The pictures show the wiring diagram of the actuator with a **3-POINT - ON/OFF** control device.

The wiring diagram is shown open and closed, respectively.

When the phase flows through the green wire, the valve opens; on the contrary, when it flows through the brown wire, the valve closes.



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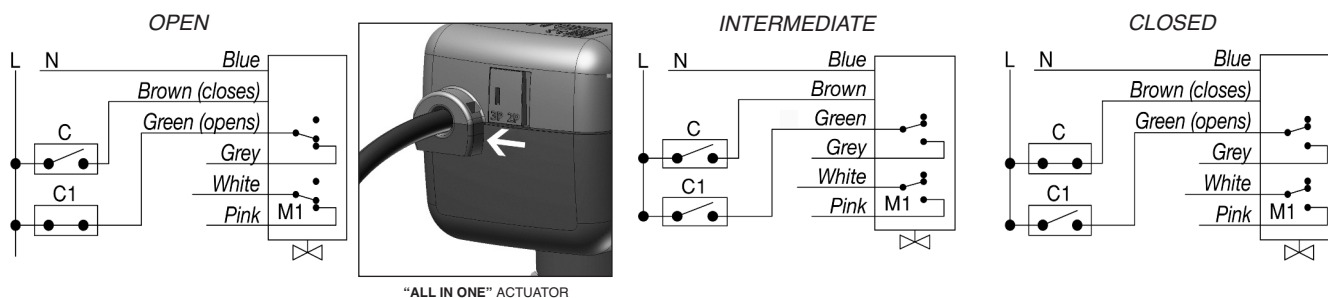
MOTORIZED VALVES

3-POINT CONTROL – MODULATING (2 SWITCHES)

- blue wire: neutral;
- brown wire: fixed closing phase;
- green wire: opening phase.

The phase can be diverted to the brown wire or to the grey wire or to none of them, in order to obtain partial openings of the valve. This is necessary for modulating the flow when a regulation is needed.

Each actuator must be operated by a single electric control.



C = CLOSE CONTROL C1 = OPEN CONTROL GREY = OUTLET PHASE WITH OPEN VALVE M1 EXTRA MICRO SWITCH FREE IN OPENING POSITION

The pictures show the wiring diagram of the actuator with a **3-POINT MODULATING** control device. The wiring diagram is shown in an open, closed and intermediate position, respectively.

When the phase flows through the green wire, the valve opens; on the contrary, when it flows through the brown wire, the valve closes. When there is no phase on the above mentioned wires, the actuator can take intermediate positions between the complete closure and complete opening points, allowing a modulating operation.

GENERAL NOTES

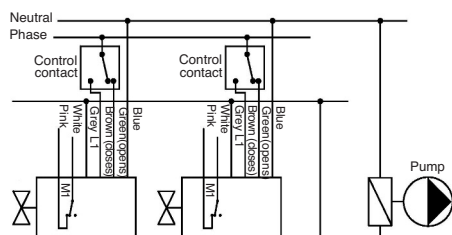
Should power fail, the actuator remains in the position it was when the power outage occurred.

SINTESI actuators have the following features:

- voltage phase to grey wire with completely open valve, used as a remote control (actuator power voltage). Its use is optional (e.g.: notification of opening, pump relay actuation, etc.)
- one additional opening microswitch (white and pink wire, **free contact**) which electrically closes when the valve is open. Its use is optional (e.g.: notification of opening, pump relay actuation, boiler control, notification to PLC, etc..)

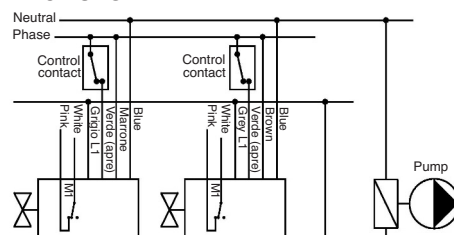
NOTE: The connection of the feeder cable should be made inside a branch box with at least an IP 54 or higher protection.

EXAMPLES OF ELECTRICAL CONNECTIONS



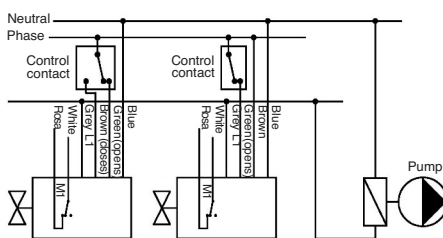
M1 EXTRA MICRO SWITCH FREE IN OPENING POSITION

Connection of the pump stop with two 3-point servocontrols



M1 EXTRA MICRO SWITCH FREE IN OPENING POSITION

Connection of the pump stop with two 2-point servocontrols



M1 EXTRA MICRO SWITCH FREE IN OPENING POSITION

Connection of the pump stop with a 3-point actuator and a 2-point actuator



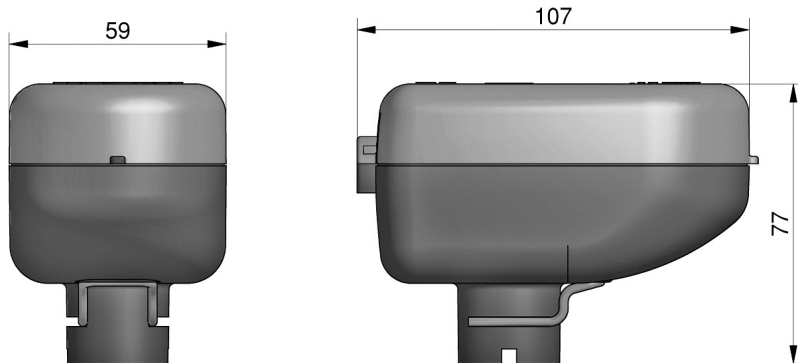
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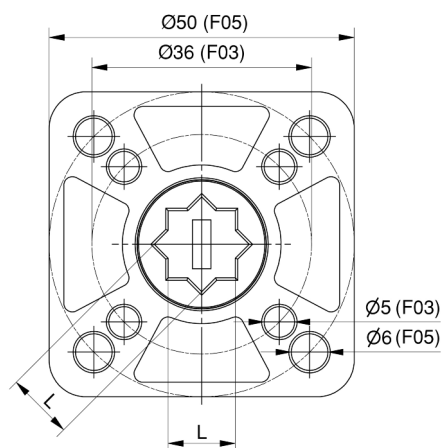
MOTORIZED VALVES

ACTUATOR OVERALL SIZE



CONNECTION KIT ISO 5211

A spacer model that, besides having insulation properties, allows the matching with the **SINTESI** actuator to valve bodies with ISO 5211 F03 and F05 connections is also available.



ISO connection	L
F03	9
F05	11

EXAMPLES



AVAILABLE UPON REQUEST



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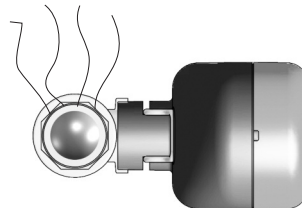
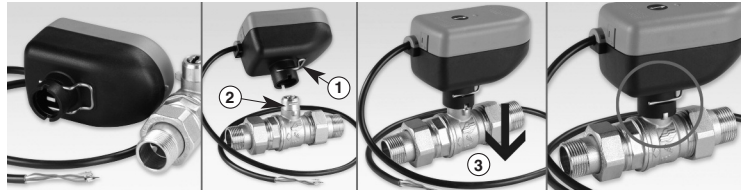
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SINTESI

MOTORIZED VALVES

SINTESI COUPLING SEQUENCE TO VALVE BODIES WITH FAST CONNECTION

1. Coupling spring (do not remove);
2. Spring coupling seat;
3. First insert the outlet shaft of the actuator in the relevant "female" seat of the ball valve, then rotate the shaft so that both coupling joints are aligned. Then, press the actuator on the ball valve until the perfect coupling is achieved thanks to the spring..



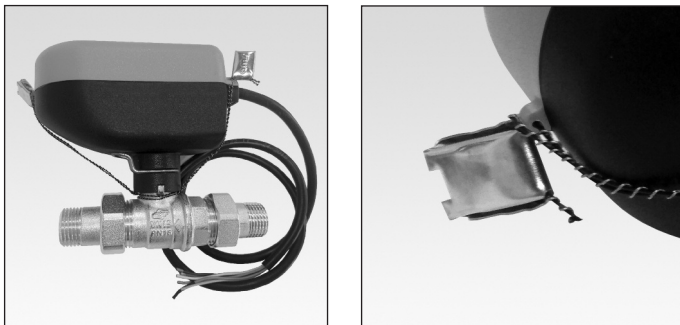
RECOMMENDED POSITION

SUGGESTED MOUNTING POSITION IN CASE OF LOW OR HIGH TEMPERATURE FLUID CIRCULATION

For more information, please read the instruction manual

MOTORIZED VALVE SEALING WITH LEAD

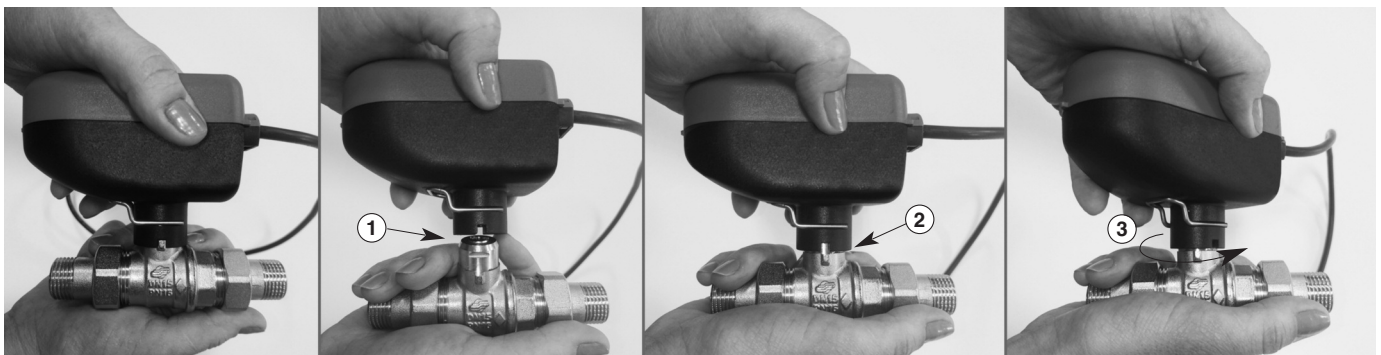
By means of special seals (not included), it is possible to seal with lead the motorized valve, in order to prevent the actuator to be removed from the valve body.



MANUAL OPERATION

In case of need, it is possible to open/close the valve body manually, as follows:

1. Release the actuator from the ball valve body.
2. Insert the actuator in the body of the valve, without pressing it.
3. Proceed with the desired manual activation, using the actuator as a knob.



SINTESI

MOTORIZED VALVES

FAST CONNECTION Valve Bodies



2-WAY · FULL FLOW
MALE-MALE CONNECTION
Ø 1/2" · 3/4" · 1"



2-WAY · FULL FLOW
MALE-FEMALE CONNECTION
Ø 1/2" · 3/4" · 1"



3-WAY DIVERTER / MIXER
FULL FLOW
Ø 1/2" · 3/4" · 1"



BY-PASS
Ø 1/2" · 3/4" · 1"



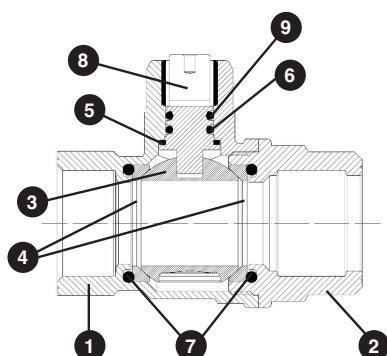
2-WAY · FULL FLOW
MALE-FEMALE CONNECTION
Ø 3/4"



$Kv_S = 2,5 \text{ m}^3/\text{h}$ $Kv_S = 4 \text{ m}^3/\text{h}$
2-WAY · FULL FLOW
MALE-MALE CONNECTION
WITH REGULATION DISK
Ø 1/2"

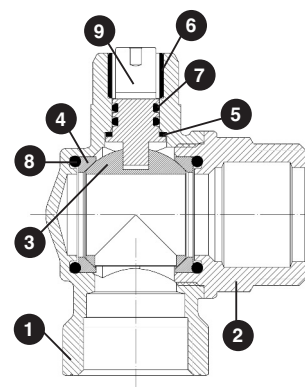
Male connections are all provided with tang, which is extremely convenient during the installation and allows to position the ball valve and then the actuator properly; moreover, it helps performing any maintenance work.

The ball cut-off ensures the best hydraulic tightness and reduced pressure loss.



MATERIALS USED FOT BODY VALVE

1 BODY	BRASS CW617N UNI EN 12165
2 COUPLING	BRASS CW617N UNI EN 12165
3 SPHERE	BRASS CW617N UNI EN 12165
4 SPHERE GASKET	P.T.F.E.
5 ANTI-FRICTION ROD	P.T.F.E.
6 O-RING ROD	EPDM PEROX
7 BALANCE O-RING	EPDM PEROX
8 CONTROL	BRASS CW617N UNI EN 12165
9 ANTI-FRICTION GASKET	P.T.F.E.



MATERIALS USED FOR SQUARE BODY VALVE

1 BODY	BRASS CW617N UNI EN 12165
2 COUPLING	BRASS CW617N UNI EN 12165
3 SPHERE	BRASS CW617N UNI EN 12165
4 SPHERE GASKET	P.T.F.E.
5 ANTI-FRICTION GASKET	P.T.F.E.
6 ANTI-FRICTION ROD	P.T.F.E.
7 O-RING	EPDM PEROX
8 O-RING	EPDM PEROX
9 CONTROL	BRASS CW617N UNI EN 12165

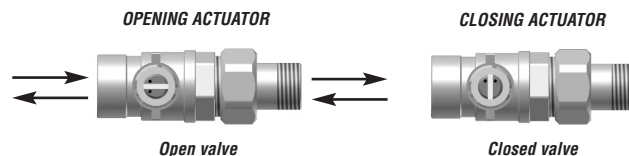


SINTESI

MOTORIZED VALVES

2-WAY Valve body

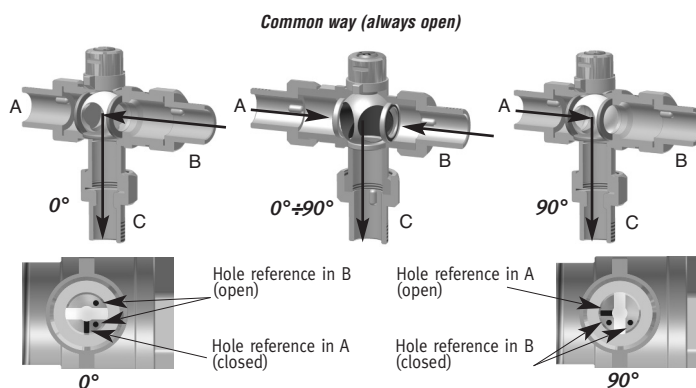
The valve body can be mounted in both flow directions, without distinction. It is available in the male-male and male-female version.



3-WAY DIVERTER/MIXER Valve body

It has a 3-hole ball with one hole pointed towards the common way (always open) and two more holes which are orthogonal to the first one and to each other. When one of these two holes is pointed towards one of the two inlets, the second inlet is closed. By means of a rotation of 90° of the ball, the second hole points towards the second inlet and closes the first one. One of the special features of the 3-hole ball valve is the fact that the 3 ways can communicate simultaneously, during the ball rotation from one deviation position to another. At the end of the operation, the valve is a diverter again, for all practical purposes; therefore, the use of. The 3-way 3-hole diverter valve is advisable when the diverted ways can communicate.

This is generally the case of heating systems. Moreover, the above mentioned condition allows this valve to be used for mixing. On the control rod there are two symbols (**two dots and a dash**) which indicate which way is **communicating to the common one**.



BY-PASS Valve body

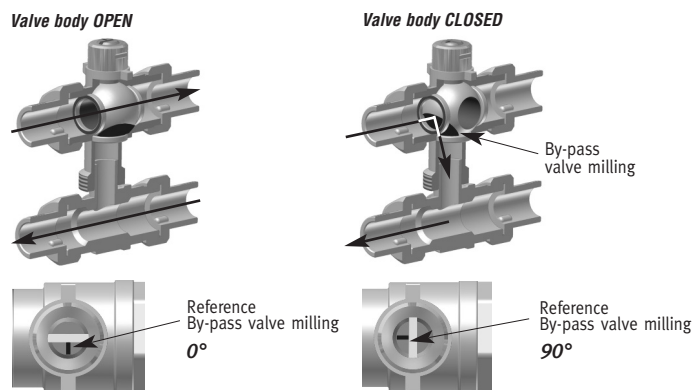
In by-pass valves, the cut-off is made of a ball with a through hole and a faceting, as in 2-way ones.

One of the features that distinguishes the by-pass ball from the 2-way ball is a "faceting" which allows the recirculation of part of the outlet flow towards the return line when the valve is closed.

Therefore, in by-pass valves it is important to recognize the flow direction.

On the control rod there is a symbol (a dash) which indicates the position of the milling on the ball; when the valve is closed, it must always be oriented towards the direction of the incoming flow.

The span between the outlet and return ways can be adjusted from 50 to 60 mm for Ø 1/2" and 3/4" valve bodies and from 55 to 60 mm for Ø 1" valve bodies.



The actuator rotates **90° COUNTERCLOCKWISE** in order to move from the open position to the closed position

2-WAY Valve body with ADJUSTMENT DISK

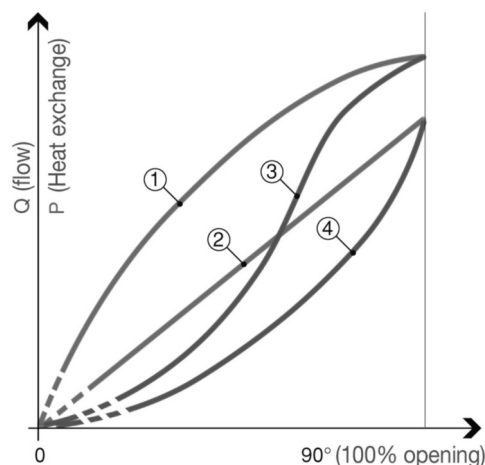
This valve body provides a 2-way motorized ball valve with equal-percentage adjustment curve, which operation is shown below:

In general, the thermal exchange based on the flow rate is described by a typically non-linear relation which tends to become saturated as the flow rate raises.

In the initial phase, the trend is partially mitigated by the natural opening feature of the ball valve, whereas in the final stage of the opening movement there is an inversion which does not allow the offsetting to come to completion.

Thanks to **COMPARATO'S ADJUSTMENT DISK** you will get an equal-percentage overall characteristic curve for the valve. Thanks to the new feature, the offsetting is such that the trend between the magnitude of the thermal exchange and the opening degree of the valve is almost linear.

It's easy to see that the stability of the adjustment system is positively affected by the action of the constant-gain actuator.



1. Thermal exchange with standard valve;
2. Thermal exchange with equal-percentage valve;
3. Standard characteristic curve of the flow rate;
4. Equal-percentage characteristic curve of the flow rate;



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Note that the presence of the adjustment disk reduces the flow coefficient to values which are similar to those of traditional regulating valves of the same size.

With the adjustment disk, the **SINTESI** valve becomes a regulating valve, adding several advantages:

- Great stability of the control ring;
- Flow coefficient similar to that of traditional regulating valves;
- Equal-percentage standardized feature;
- Fewer operations of the actuator.

Key:

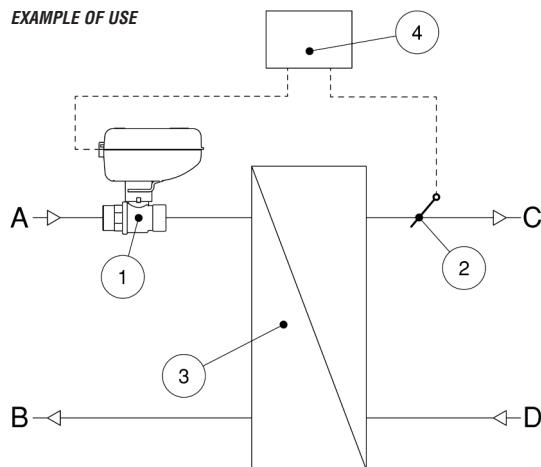
1. 3-point **SINTESI** motorized valve with regulation disk;
2. Temperature probe;
3. Heat exchanger;
4. Electronic adjuster.

- A. Primary fluid outlet;
B. Primary fluid return;
C. Secondary fluid outlet;
D. Secondary fluid return;

CAUTION: the 2-way valve with regulation disk cannot be mounted regardless of the flow direction:

First, observe the position of the disk inside the valve body (see picture beside), then proceed with the installation so that the regulation disk is **upstream the valve ball with respect to the flow direction**.

EXAMPLE OF USE



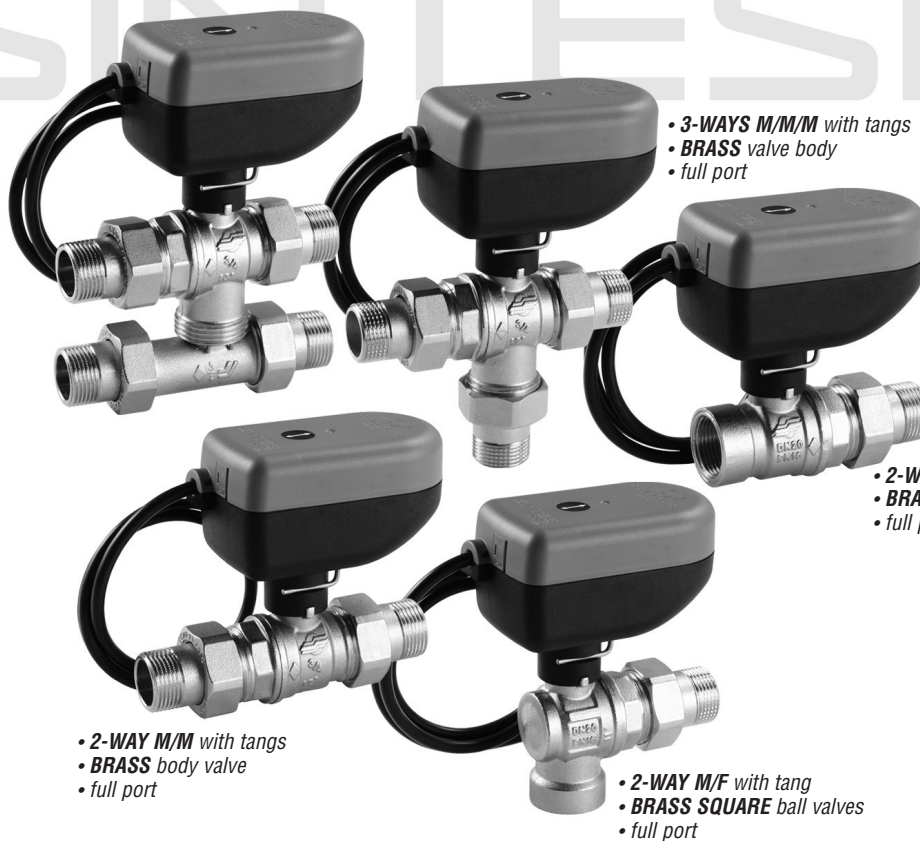
$Kv_S = 2,5 \text{ m}^3/\text{h}$



$Kv_S = 4 \text{ m}^3/\text{h}$



- **BY-PASS** with tangs
- **BRASS** valve body
- full port



- **3-WAYS M/M/M** with tangs
- **BRASS** valve body
- full port

- **2-WAY M/F** with tang
- **BRASS** valve body
- full port

- **2-WAY M/M** with tangs
- **BRASS** body valve
- full port

- **2-WAY M/F** with tang
- **BRASS SQUARE** ball valves
- full port



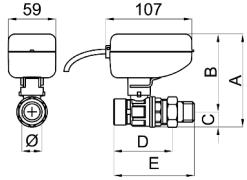
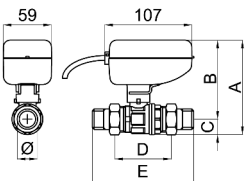
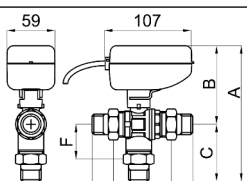
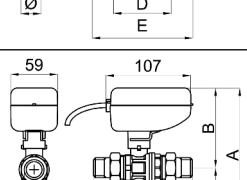
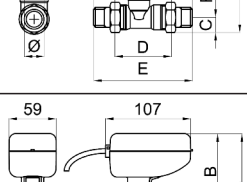
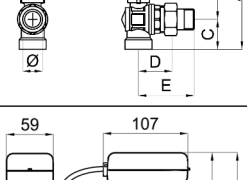
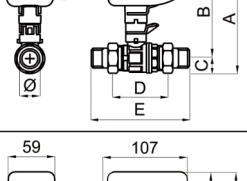
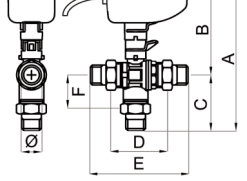
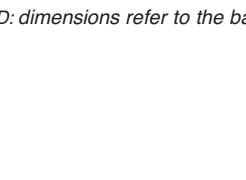
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SINTESI

MOTORIZED VALVES

OVERALL SIZE

MODEL	DN	Ø TANGS	Ø BALL VALVES	A	B	C	D	E	F
 2-Way male female	15	1/2"	3/4"	111	94	17	66	93	
	20	3/4"	1"	120	100	20	70	100	
	25	1"	1"1/4	126	103	23	79	114	
 2-Way male/male	15	1/2"	3/4"	111	94	17	63	118	
	20	3/4"	1"	120	100	20	67	128	
	25	1"	1"1/4	126	103	23	77	147	
 2-Way male/male with REGULATING DISC	15	1/2"	3/4"	111	94	17	63	118	
	20	3/4"	1"	120	100	20	67	128	
	25	1"	1"1/4	126	103	23	77	147	
 3-Way Diverter / Mixer 3-hole ball	<i>F: dimensions refer to the ball valve without tangs and caps.</i>								
	15	1/2"	3/4"	159	94	65	63	118	37
	20	3/4"	1"	170	100	70	67	128	40
 By-pass	25	1"	1"1/4	181	103	78	77	147	43
	15	1/2"	3/4"	161	94	17	63	118	50
	20	3/4"	1"	170	100	20	67	128	50
 2-Way SQUARE valve body	25	1"	1"1/4	181	103	23	77	147	55
				171					60
				180					60
 2-Way male/male	20	3/4"	1"	138	100	38	40	70	
	FOR THERMAL SOLAR								
	15	1/2"	3/4"	135	118	17	63	118	
 2-Way male/male	20	3/4"	1"	144	124	20	67	128	
	25	1"	1"1/4	150	127	23	77	147	
	FOR THERMAL SOLAR								
 3-Way Diverter / Mixer	15	1/2"	3/4"	183	118	65	63	118	37
	20	3/4"	1"	194	124	70	67	128	40
	25	1"	1"1/4	205	127	78	77	147	43

D: dimensions refer to the ball valve without tangs and caps.

VALVE BODY
QUICK CONNECTION (with caps and tangs)



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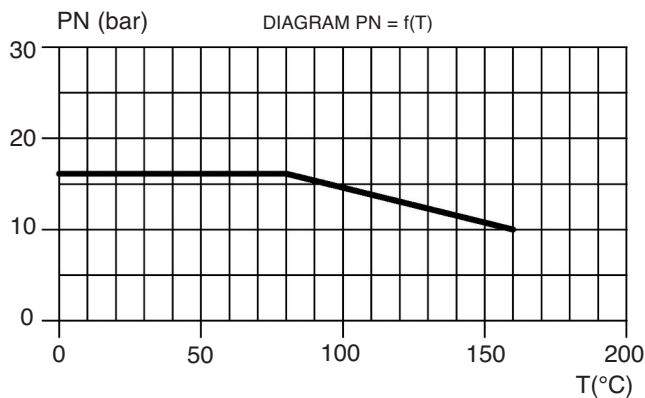
SINTESI

MOTORIZED VALVES

FLUID MECHANICAL CHARACTERISTICS

Kv_S (m³/h with $\Delta p = 100\text{kPa} = 1\text{bar}$)

MODEL	Ø	Kv_S
2-Way	1/2"	16,3
	3/4"	29,5
	1"	43
2-Way with REGULATING DISC	1/2"	2,5
	1/2"	4
SQUARE body valve	3/4"	11,5
	1/2"	6
Diverter/ Mixer	3/4"	11,5
	1"	18,3
By-pass	1/2"	16,3 / 0,8
	3/4"	29,5 / 1,9
	1"	43 / 2,9



When the value of the flow is known, the general expression for the calculation of pressure losses is the following:

$$\Delta p [\text{bar}] = \left[\frac{Q [\text{m}^3/\text{h}]}{k_v} \right]^2$$

The simplified expression provided applies to water or technically similar fluids.

PRESSURE

- Nominal operating 16 bar
- Max. differential operating 16 bar

FLUIDS Usable fluids Water and fluids compatible with EPDM and P.T.F.E. • Other fluids on request

TEMPERATURES

- Min. +5 °C SOLAR THERMAL PLANTS body valve *
- Max. +100 °C +5 °C
+160 °C

* see page 11



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SOLAR THERMAL PLANTS

SINTESI motorised valve offer a wide range of body valve provided with special gaskets suitable for the fluid circulation at high temperatures (max 160°). When it is paired with a spacer a complete thermal cutting between the body valve and the actuator is realized, allowing the installation of the **SINTESI** motorised valve into thermal solar plants, where a water circulation at high temperature is usually detected.

- a** **SINTESI** motorised valve with spacer and a 2 way body valve, suitable for high temperatures (max 160°).
- b** **SINTESI** motorised valve with spacer and MIXING/DEVIATING body valve, suitable for high temperatures (max 160°).



SINTESI

MOTORIZED VALVES



GLOSSARY

- Pickup torque: Torque which can be occasionally provided by the actuator, with no risk of breaks nor permanent deformation of the actuator components.
- Kv_S : Fluid coefficient when the valve is completely open (2-way valve) or when the flow is completely diverted to a perpendicular (3-way valve).
- PN: Nominal operating pressure.
- Δp max: Maximum differential operating pressure.

UPDATED DATA SHEETS AVAILABLE ON THE WEBSITE www.comparato.com



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