

Thermo-electric actuator

series 656



cert. n° 0003
ISO 9001

01042/03 GB

Replaces 01042/00 GB



Function

The thermo-electric actuator, in conjunction with convertible thermostatic radiator valves, with radiator and underfloor heating systems distribution manifolds and with zone valves, allows automatic shut-off of the system fluid under the control of a room thermostat or of another electrical switching device.

European Directives conformity

CE mark as per Directives 89/336 EC and 73/23 EC.



Reference documentation

- Leaflet **01051** Convertible thermostatic radiator valves for single and two pipe systems, series 455.
- Leaflet **01072** Zone valves, series 676.
- Leaflet **01044** Distribution manifolds for underfloor heating systems, series 668.
- Leaflet **01065** Distribution manifolds for radiator systems, series 663.

Product range

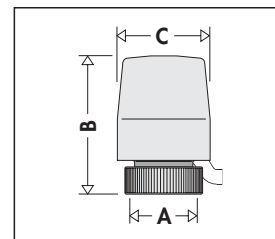
Code 656102	Standard thermo-electric actuator	Supply 220 V
Code 656104	Standard thermo-electric actuator	Supply 24 V (ac) or 24 V (dc)
Code 656112	Standard thermo-electric actuator with auxiliary microswitch	Supply 220 V
Code 656114	Standard thermo-electric actuator with auxiliary microswitch	Supply 24 V (ac) or 24 V (dc)
Code 656002	Thermo-electric actuator with special connection	Supply 220 V
Code 656004	Thermo-electric actuator with special connection	Supply 24 V (ac) or 24 V (dc)

Technical specification

- Materials: - protective cover self-extinguishing polycarbonate
- colour white RAL 9010
- Normally closed
- Power supply: 220 V (ac) - 24 V (ac) - 24 V (dc)
- Starting current: ≤ 1 A
- Working current: 220 V (ac) = 13 mA
24 V (ac) - 24 V (dc) = 140 mA
- Power consumption: 3 W
- Rating of auxiliary microswitch contacts (code 656112/114): 0,8 A (220 V)
- Level of protection: IP44 (in vertical position)
- Product with double insulation: CE
- Max ambient temperature: 50°C
- Operating time: opening and closing from 120 s to 180 s
- Supply cable length: 80 cm

Dimensions

Code	A	B	C
656102	M 30 x 1,5	62	41
656104	M 30 x 1,5	62	41
656112	M 30 x 1,5	62	41
656114	M 30 x 1,5	62	41
656002	M 30 x 1,5	62	41
656004	M 30 x 1,5	62	41



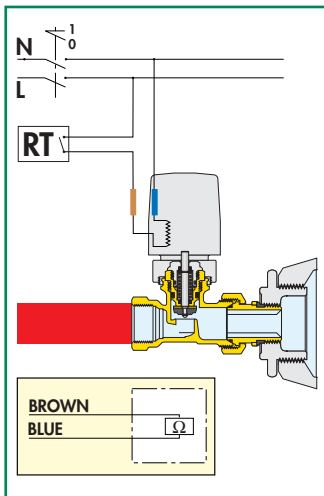
Operating principle

With power off, the device (actuator + valve) is "normally closed".

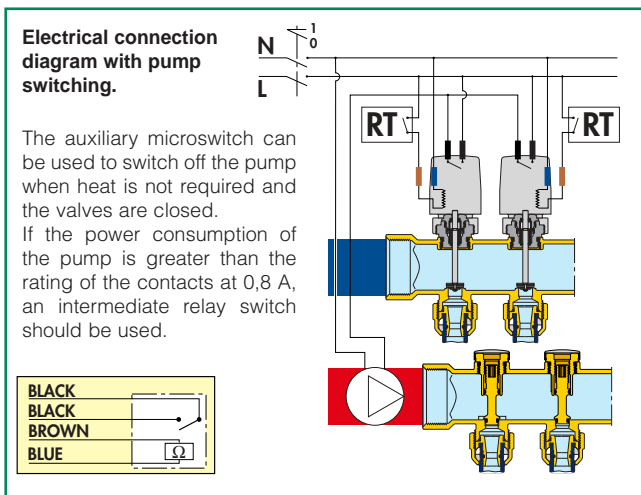
With power on, the valve opens thanks to the action of a wax expansion thermostatic element, directly controlled by a PTC resistor.

Constructional details

- Electrical connections for code 656002, 656004, 656102 and 656104.



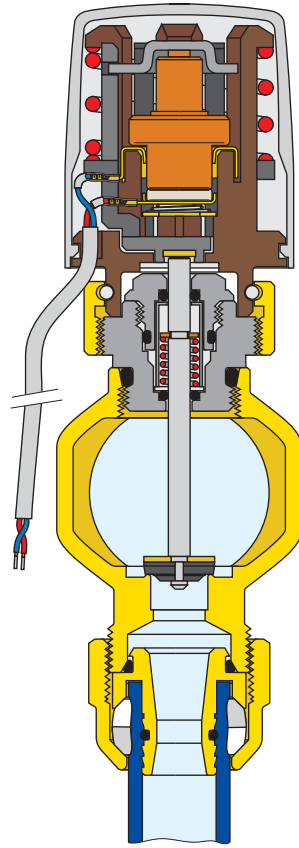
- Electrical connections for code 656112 and 656114



Special connection

The different configuration of some of these series of valves makes necessary the modification of the connection geometry of the thermo-electric actuator. Compared to the standard actuators ①, actuators code 656002 and 656004 are supplied with a "longer" control spindle ②.

Attention: actuators 656002 and 656004 cannot be connected to a valve body designed for use with actuators 656102, 656104, 656112 and 656114, and vice-versa.



Connection table

The following table highlights the connections between the various types of valve body and the thermo-electric actuator types.

656102	656104	656112	656114	
338	339	401	402	455

656102	656104	656112	656114	220	221	222	223	224	225
				227	*480	*481	*482	*483	*484
				663	666 - 668				
				676	677	678			

* Discontinued

656002	656004	*6750	652	6620	6621	*670	*671
		*672	*673	*674			

* Discontinued

Fluid-dynamic characteristics

Hydraulic characteristics table for 656 actuator + valve body.

656102, 656104, 656112, 656114 +	Series	DN	kv _{0,01} (l/h)	Δp _{max} * (m w.g.)
Elbow valve with thermostatic option	338 - 401	3/8"	185	25
		1/2"	210	25
		3/4"	270	18
		1"	440	12
Straight valve with thermostatic option	339 - 402	3/8"	110	25
		1/2"	145	25
		3/4"	225	18
		1"	420	12
Single / Two pipe	455	1/2"	200/110	10
		3/4"	200/110	10
		1"	200/110	10
Elbow thermostatic	220 - 222	3/8"	180	25
		1/2"	200	25
		3/4"	255	18
Straight thermostatic	221 - 223	3/8"	100	25
		1/2"	135	25
		3/4"	200	18
Reverse valve	224 - 227	3/8"	80	25
		1/2"	125	25
Double elbow thermostatic	225	3/8"	85	25
		1/2"	125	25
Elbow valve thermostatic (old)	480-482	3/8"	178	25
		1/2"	267	25
		3/4"	446	12
Straight valve thermostatic (old)	481-482	3/8"	119	25
		1/2"	178	25
		3/4"	356	12
Reverse valve (old)	484	1/2"	277	12
		3/4"	138	12
Underfloor heating manifold	663 (ret.)	1 1/4"	287	25
	666	1 1/4"	287	25
	668 (ret.)	1 1/4"	287	25
Zone valve (straight / by-pass)	676	1/2" ÷ 1"	370	12
	677	1/2" ÷ 1"	370/100	12
	678	1/2" ÷ 1"	370/100	12

* Maximum pressure differential to ensure correct operation of the actuator

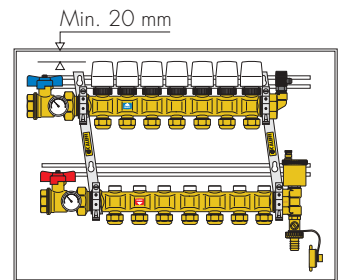
656002, 656004 +	Series	DN	kv _{0,01} (l/h)	Δp _{max} * (m w.g.)
3-way zone valves	6750	3/4"	445	12
Valves for underfloor heating systems	652	1/2"	140	25
	6620	1/2"	140	25
	6621	1/2"	140	25
Elbow valve thermostatic (old)	670-672	3/8"	178	25
		1/2"	267	25
		3/4"	446	12
Straight valve thermostatic (old)	671-673	3/8"	119	25
		1/2"	178	25
		3/4"	356	12
Single pipe (old)	674	1/2"	247 total	12

* Maximum pressure differential to ensure correct operation of the actuator

Installation

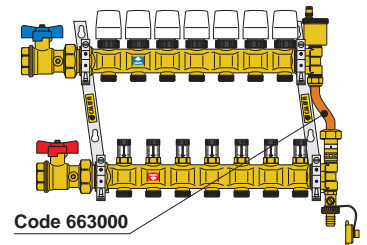
- The thermo-electric actuator should be tightened by hand without the use of tools.
- The thermo-electric actuator should not be dismantled for possible repair. Such interference could lead to permanent damage.
- The actuator should always be fitted in a horizontal or vertical position, **never upside-down**. In chilled water circuits, positions which allow condensation to get into the actuator are not advisable.
- For the correct functioning of the actuator, **the electrical circuit should be sized on the basis of the starting current**.
- **If it is necessary to control multiple zones with actuators in parallel using the same thermostat, the possibility of including an intermediate relay to prevent electrical overload should be considered.**

- In assemblies with zone valves or manifolds in manifold boxes, a space of at least 20 mm between the thermo-electric actuator and the frame should be left for possible servicing or replacement.

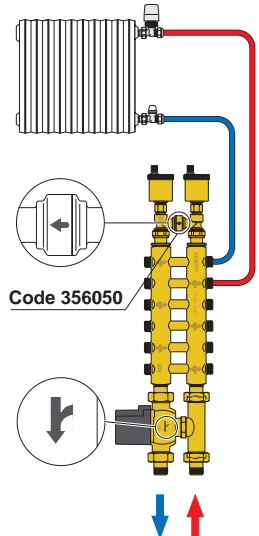


Recommendations for use

- When thermo-electric actuators are to be installed on devices which shut-off heat emitters automatically, it is always advisable to use a differential by-pass to control the over-pressure of the system during the partial or total closure of the circuits.
- For pre-assembled manifolds series 663-668, a differential by-pass with a fixed calibration setting of 2000 mm w.g. is available (code 663000).



- For installations with series 356-357 dual manifolds, a differential by-pass having a fixed differential pressure setting of 2000 mm w.g. is also available (code 356050).

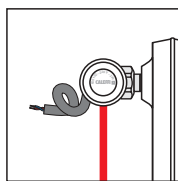


- For centralised installations or installations with rising pipes, a differential by-pass valve is available with an adjustable setting of 1 to 6 m w.g. (series 519).

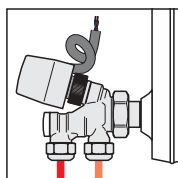
Applications

Thermo-electric actuators can be installed:

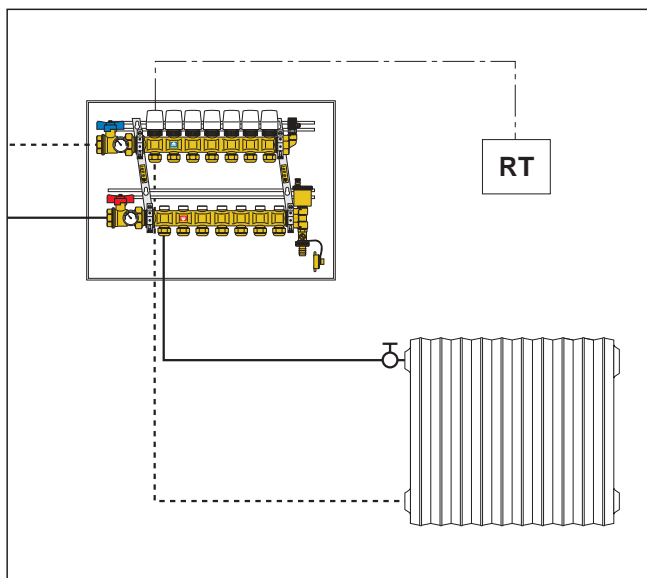
- On individual radiators as an alternative to thermostatic controls to allow the radiator valves to be converted from manual to automatic operation, in combination with a room thermostat for each room or zone.



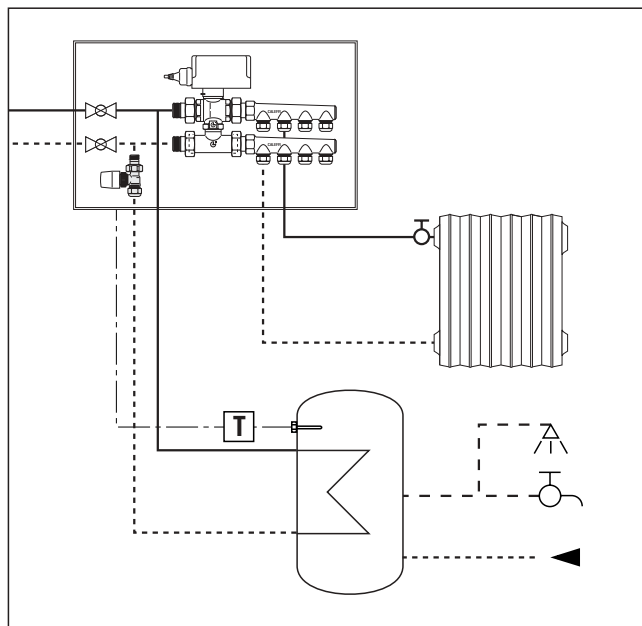
- In loop systems with single pipe valves (series 455).



- In radiator systems, with automatic shut-off of the heat emitter directly at the manifold, with reduced work and cost associated with the electrical connections.

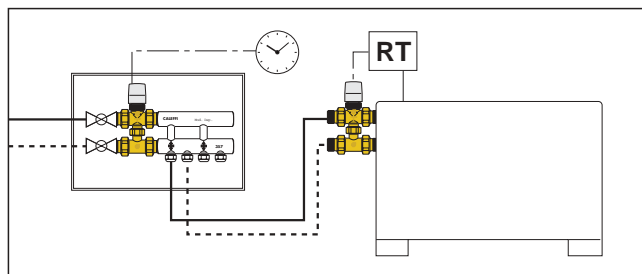


- In domestic water heating systems, for controlling the temperature of the water heater.



- In fan coil systems, if they are to be fitted with valves for automatic shut-off of the fluid.

- In zoned systems, where reduced dimensions and limited flow rate coefficient at the automatic regulating valve are required.



SPECIFICATION SUMMARIES

Series 656002/004/102/104

Thermo-electric actuator. Normally closed. Supply voltage 220 V (ac); 24 V (ac); 24 V (dc). Starting current ≤ 1 A. Working current 13 mA (220 V (ac)), 140 mA (24 V (ac) - 24 V (dc)). Rated power consumption 3 W. Level of protection IP44 (in vertical position). Maximum ambient temperature 50°C. Operating time of 120 to 180 seconds. Length of supply cable 80 cm.

Series 656112/114

Thermo-electric actuator. Normally closed, with auxiliary microswitch. Supply voltage 220 V (ac); 24 V (ac); 24 V (dc). Starting current ≤ 1 A. Working current 13 mA (220 V (ac)), 140 mA (24 V (ac) - 24 V (dc)). Rated power consumption 3 W. Level of protection IP44 (in vertical position). Rating of auxiliary microswitch contacts 0,8 A. Maximum ambient temperature 50°C. Operating time of 120 to 180 seconds. Length of supply cable 80 cm.

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