

# Ball zone valves

series 6460



## Function

Zone valves are used to automatically shut-off the flow of carrier fluid distributed to a system. Specifically:

- In central heating systems, they support the ambient temperature regulation and indirect heat metering when connected to a meter.
- In domestic hot water systems, they allow control of the temperature in the storage cylinders.
- In commercial and industrial systems, they can shut-off the flow in the distribution networks.

Motorised ball valves are used in the above applications mainly because of the following characteristics:

- No seeping across the valve.
- Rapid operation (valve opening - closing).
- Ability to operate with high differential pressures.
- Low head losses.

## Registered design.

## European Directives conformity

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



## Product range

Series 6460..	actuator for zone valve	_____	supply voltage 220 or 24 V
Series 6470..	2-way ball zone valve	_____	sizes 1/2", 3/4", 1", 1 1/4" M with union
Series 6480..	3-way ball zone valve	_____	sizes 1/2", 3/4", 1", 1 1/4" M with union
Series 6489..	4-way ball zone valve, telescopic	_____	size 3/4" M with union
Series 6490..	by-pass tee without calibrated nozzle	_____	sizes 1/2", 3/4", 1" M with union
Series 6490..	by-pass tee with calibrated nozzle U4 – U6 – U8	_____	sizes 1/2", 3/4", 1" M with union
Series 6480..	off-centre union fittings	_____	sizes 3/4", 1" M

## Technical specification

### Valve body

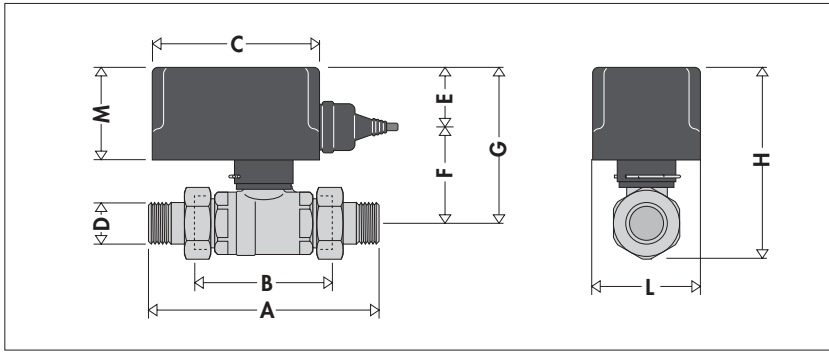
Materials:-	body	brass EN 12165 CW617N
- ball		brass EN 12165 CW617N, chrome plated
- ball seal		PTFE with O-Ring in EPDM
- control shaft seal		double O-Ring in EPDM

Medium:	water, glycol solution
Max percentage of glycol:	50%
Max working pressure:	10 bar
Temperature range:	-5÷110°C
Max differential pressure:	10 bar
Connections:	1/2"÷1 1/4" M with union
3-way bottom connection:	3/4" F

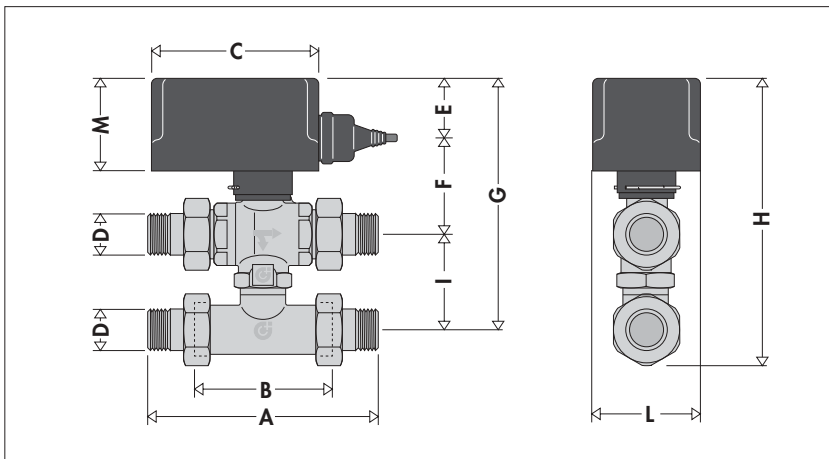
### Actuator

Synchron motor	
Electrical supply:	220 V (± 20%) - 50 ...60 Hz 24 V (± 10%) - 50 ...60 Hz
Power consumption:	4 VA
Rating of auxiliary microswitch contacts:	220 V; 0,8 A 24 V; 1,3 A
Protection class:	IP 44
Operating time:	50 s
Max ambient temperature:	55°C
Permissible humidity:	class G to DIN 40040
Dynamic starting torque:	9 N·m

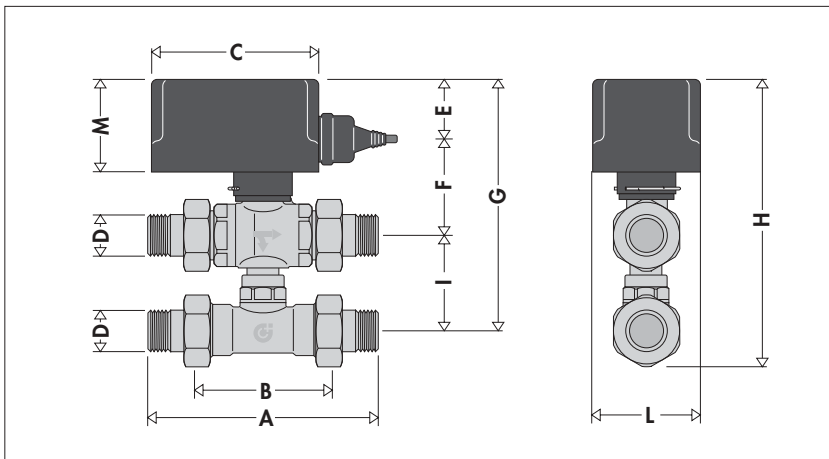
## Dimensions



Code	D	A	B	C	E	F	G	H	L	M
647040+6460..	1/2"	141	80	105	36	65,5	101,5	124	68,5	59
647050+6460..	3/4"	141	80	105	36	65,5	101,5	124	68,5	59
647060+6460..	1"	178	92	105	36	70	106	128,5	68,5	59
647070+6460..	1 1/4"	172	92	105	36	70	106	128,5	68,5	59



Code	D	A	B	C	E	F	G	H	I	L	M
648040+64904.+6460..	1/2"	141	80	105	36	65,5	161,5	184	60	68,5	59
648050+64905.+6460..	3/4"	141	80	105	36	65,5	161,5	184	60	68,5	59
648060+64906.+6460..	1"	178	92	105	36	70	166	188,5	60	68,5	59
648070+6460..	1 1/4"	172	92	105	36	70	-	-	-	68,5	59



Code	D	A	B	C	E	F	G	H	I	L	M
648950+6460..	3/4"	141	80	105	36	65,5	150,5+164,5	173+187	49+63	68,5	59

## Operating principle

### • Ambient temperature control in central heating systems.

A reduction in ambient temperature causes the room thermostat contacts to close, and the actuator controlling the opening of the valve to receive electrical power.

The zone is then supplied with hot water and the area is heated.

When the required ambient temperature is reached, the thermostat causes the contacts to open, and the valve then closes again.

The room thermostat must be of the two-position (ON/OFF) type and of reduced thermal inertia.

### • Ambient temperature control and indirect heat metering

Heat metering is carried out by means of a meter which totals the hours run time when the zone valve is open.

The principle of metering for the heat consumption with the zone valve and hours-run meter is defined by the following technical standards, issued by the Italian Standards organization:

**UNI 8465:** System of sharing heating expenses using zone valves and meters for hours run time.

This standard also contains an interesting appendix designed to allow checking of the heating power installed in each dwelling and the relevant heating quotas;

**UNI 8156:** The use of zone valves in dividing heating costs;

**UNI 8631:** Hours-run time meters.

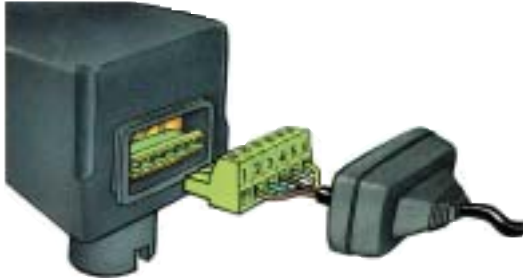
### - Control of fluids in commercial and industrial systems.

In these types of system, non seeping devices are required, with short operating times, ability to operate at high differential pressures, and low head loss.

## Constructional details

### • Electrical connections

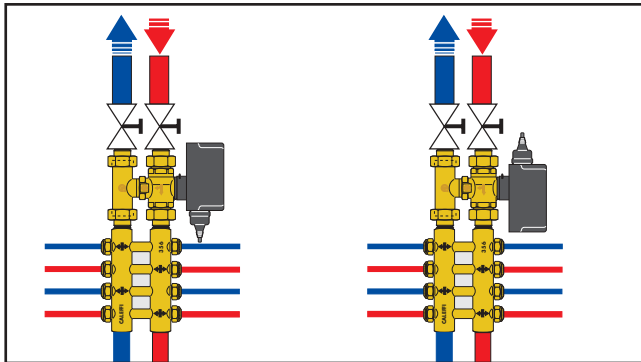
The electrical connection of the actuator consists of an external plug-in socket system, which does not require the cover to be opened for the supply cable to be connected. This solution is particularly useful if the actuator needs to be replaced. An efficient rubber protective cover safeguards the connection system.



### • Actuator

The actuator has an auxiliary microswitch which can be used to switch on an hours-run meter when the valve opens or for shut-down of the pump. The microswitch contacts are closed when the valve is approximately 80% open.

The actuator mechanisms are contained in a self-extinguishing polycarbonate box; for this reason it is suitable for all installations with the highest guarantee of safety.



The actuator can be mounted on the valve body in the two positions indicated, vertical or horizontal. Fixing is via a stainless steel clamp ring.

### • Manual opening

By removing the actuator, the valve can be opened and closed manually by means of a screwdriver.

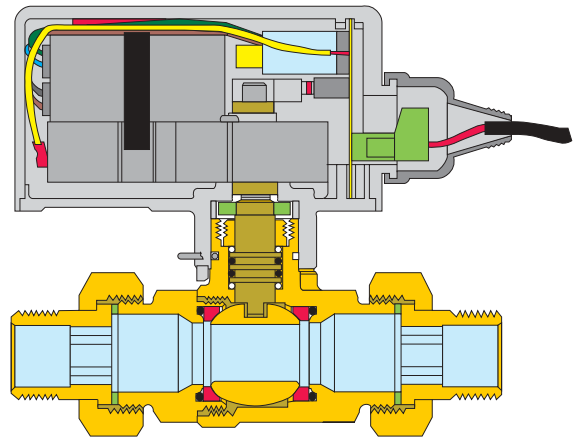
### • 3-way zone valve, PATENTED

Although this is a 3-way ball valve, the technical solution adopted and patented enables it to be used as a normal piston valve (CALEFFI series 633), which can thus be connected to dual manifolds.

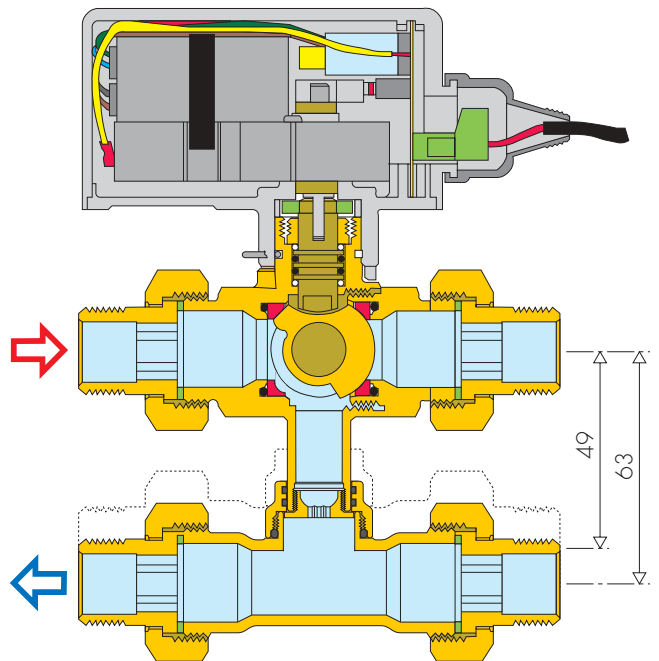
This obviously simplifies the system and makes it possible to connect the valve directly to the manifold, thus avoiding more complicated pipework.

### • 4-way telescopic valve

The 4-way telescopic valve, series 6489, allows connection with manifolds whose main centre distances are between 49 and 63 mm. The tee has a U6 calibrated nozzle.



**2-way valve, series 6470**



**4-way valve, series 6489**

### • Balanced by-pass tee

This is provided with union connections of 1/2", 3/4" or 1" and is particularly useful for connecting 3-way zone valves with dual manifolds.

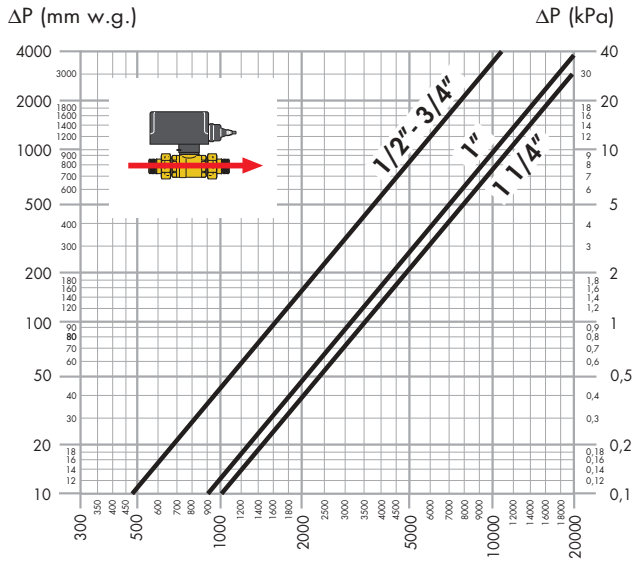
The connection to the third outlet has a calibrated nozzle whose purpose is to balance the loss of head in the user circuit. This makes it possible to keep the flow in the system constant and thus the pump head, with the valves both open and closed.

This is particularly important when the pump curve has a very steep characteristic and the distribution network has a considerable length of pipework.

The fixed nozzle system is preferable to the adjusting screw system as:

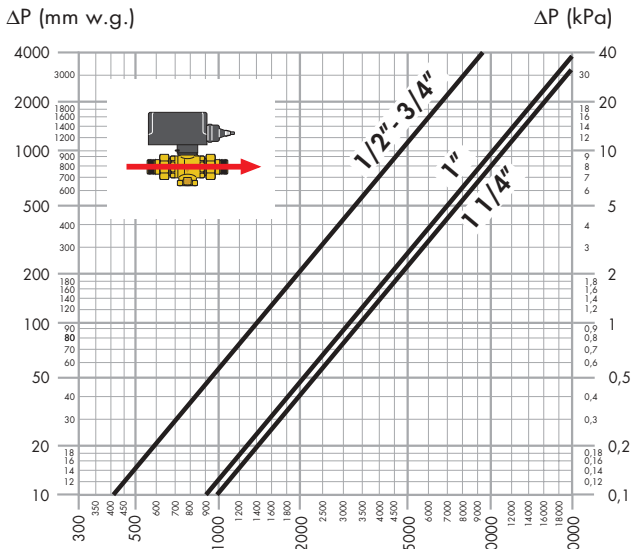
- it avoids the need for complicated adjusting operations;
- calibration cannot be lost;
- it does not cause noise due to possible vibrations of the moving regulator.

## Hydraulic characteristics



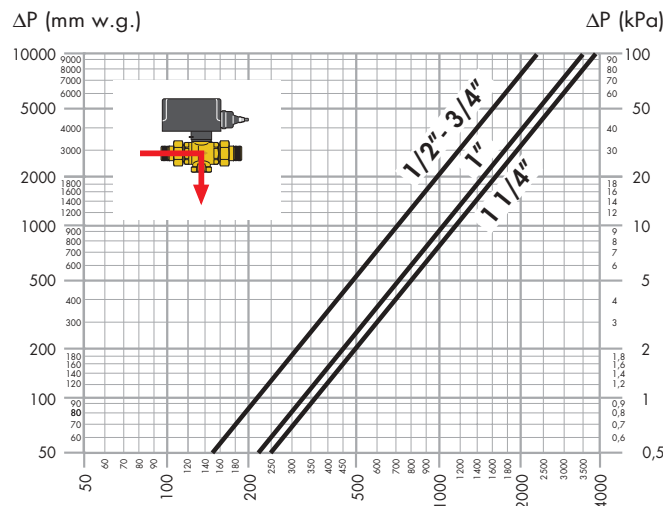
2-way zone valve, series 6470

Ø	1/2"	3/4"	1"	1 1/4"
Kv (m³/h)	17,00	17,27	36,58	39,50



3-way zone valve, series 6480 and 4-way valve, series 6489 operating in "OPEN" position

Ø	1/2"	3/4"	1"	1 1/4"
Kv (m³/h)	14,10	14,43	33,52	36,00



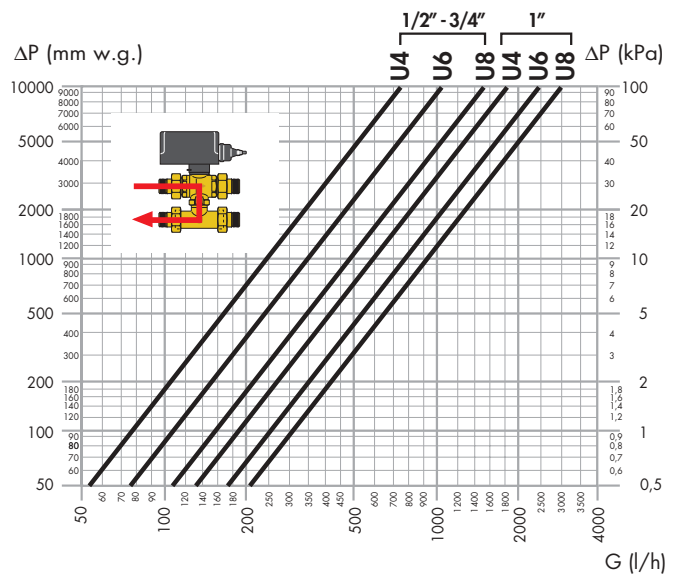
3-way zone valve, series 6480 operating in "BY-PASS" mode without by-pass tee

Ø	1/2"	3/4"	1"	1 1/4"
Kv (m³/h)	2,45	2,50	3,60	3,80

## Calibrated nozzles

Three different nozzles are provided of suitable dimensions for incorporation on the different types of manifold (4+4, 6+6, 8+8 connections).

The flow characteristics of the nozzles, which determine the third way flow, are shown in the graph below.

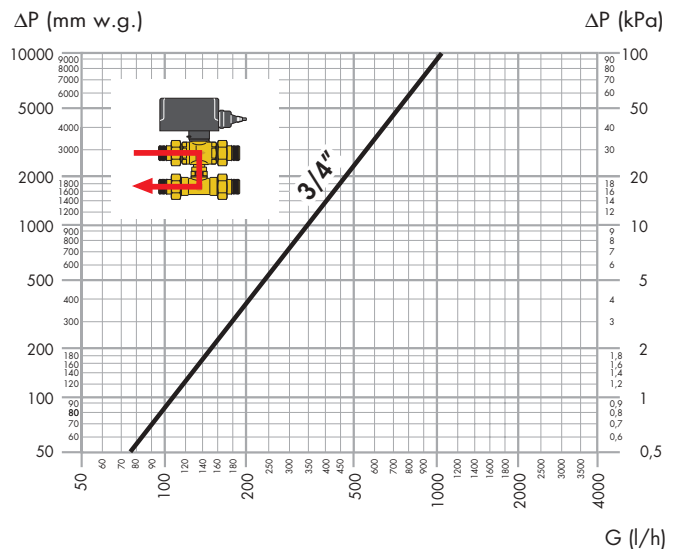


3-way zone valve series 6480, in "BY-PASS" operation with by-pass tee series 6490 supplied with nozzles U4 - U6 - U8, to be specified when ordering

Ø	1/2" U4	1/2" U6	1/2" U8	3/4" U4	3/4" U6	3/4" U8	1" U4	1" U6	1" U8
Kv (m³/h)	0,78	1,16	1,40	0,87	1,20	1,50	1,90	2,50	3,10

3-way zone valve series 6480, in "BY-PASS" operation with by-pass tee series 6490 without nozzles

Ø	1/2"	3/4"	1"
Kv (m³/h)	2,20	2,25	3,25



4-way telescopic zone valve, series 6489 in "BY-PASS" operation with nozzle U6

Ø	3/4"
Kv (m³/h)	1,20

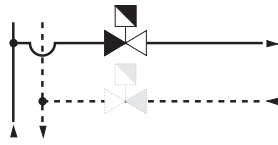
## Example

Choice of nozzle for 3/4" 3-way valve tee.  
 G = 400 l/h by-pass circuit flow rate  
 ΔP = 12 kPa by-pass circuit pressure drop  
 Using the above diagram, U6 3/4" nozzle is specified.

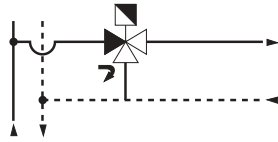
## Installation

The zone valve must be installed in line with the direction of the water circulation shown on the valve body.

**The 2-way zone valve, series 6470 can be installed in either the flow or the return pipework.**



**The 3-way valve, series 6480 and 4-way valve, series 6489 must be installed in the flow pipework.**



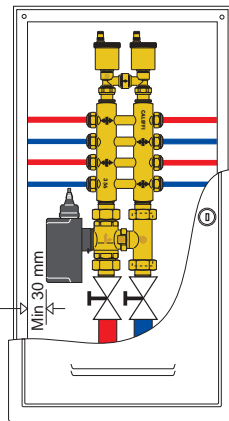
## Fitting the zone valve in a manifold box

When installing valves in the relevant zone manifold boxes, sufficient space must be left above the electrical actuator to allow its replacement, whenever necessary.

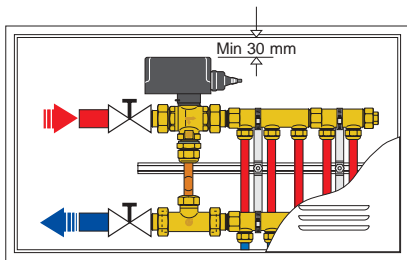
In order to prevent excessively high temperatures in the zone manifold box, sufficient air circulation must be provided for inside the box.

The figures represent:

- installation in inspection box, series 5901 with dual manifold, series 356 and differential by-pass, code 356050;



- installation in manifold box, series 5902 with off-centre kit for connection to the by-pass tee allowing installation of the zone valve with simple manifolds.



## System applications

Zone control systems act in such a way as to shut-off automatically the hydraulic loops supplying the heat transfer terminals, according to the temperature reached in the room. This can cause variations in pressure and flow rates throughout the system, and it is therefore vital to ensure that these variations are kept under control within acceptable limits.

### System with 3-way zone valve

The system operates with a constant flow rate only if the zone valves are provided with balanced tees or the circuits are balanced with Autoflow automatic flow regulators, which keep the zone flow rate constant with the zone valve open or in by-pass. In this case, the closing of the zone valves does not cause variations in either differential pressure or flow rate to the loops which remain open.

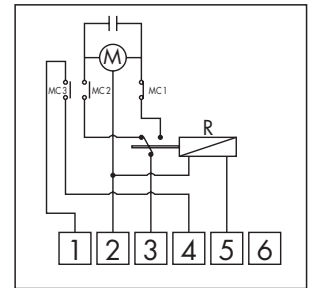
### System with 2-way zone valves

The system operates with a variable flow rate and the pressure increase generated by the closing of the zone valve must be kept under control. This increase, which may reach levels which are unacceptable for the correct operation of the system, is translated as an increase in head in the circuits which are left open, with consequent problems at the pump and boiler. It is therefore necessary to keep the differential pressures under control by means of differential by-pass valves or variable speed pumps. However, the insertion of Autoflow regulators always limits the flow rate in the open circuits to the nominal value.

## Electrical connections

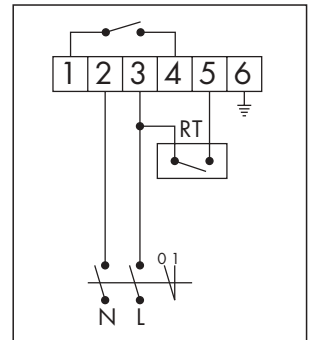
### Internal diagram with valve in closed position

- R relay
- MC1 opening end microswitch.
- MC2 closing end microswitch.
- MC3 free auxiliary microswitch. With the valve open, the free microswitch contacts are closed.



### Connection diagram for room thermostat (RT) and electricity supply.

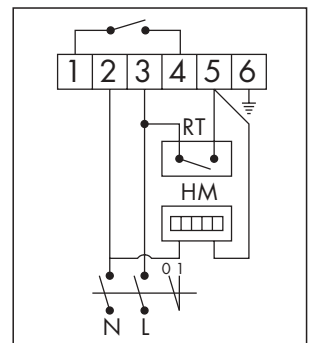
The connections shown allow the valve to open and close, as demanded by the room thermostat (RT).



### Connection diagram with hours-run meter installed.

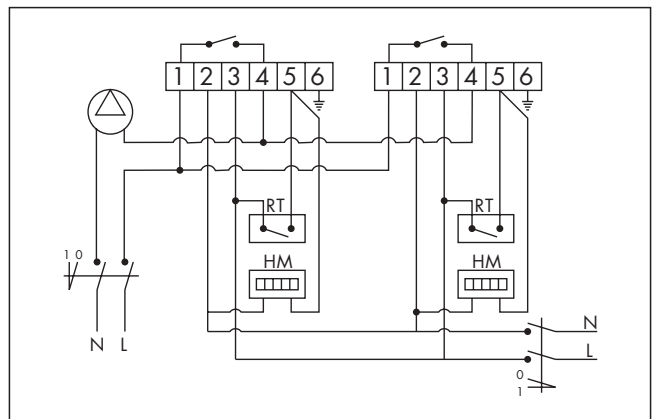
The connections shown allow the hours-run meter (HM) to operate whenever the zone valve is opened as governed by the room thermostat (RT).

The total hours-run on the meter constitute a basis for sharing the heating expenses.



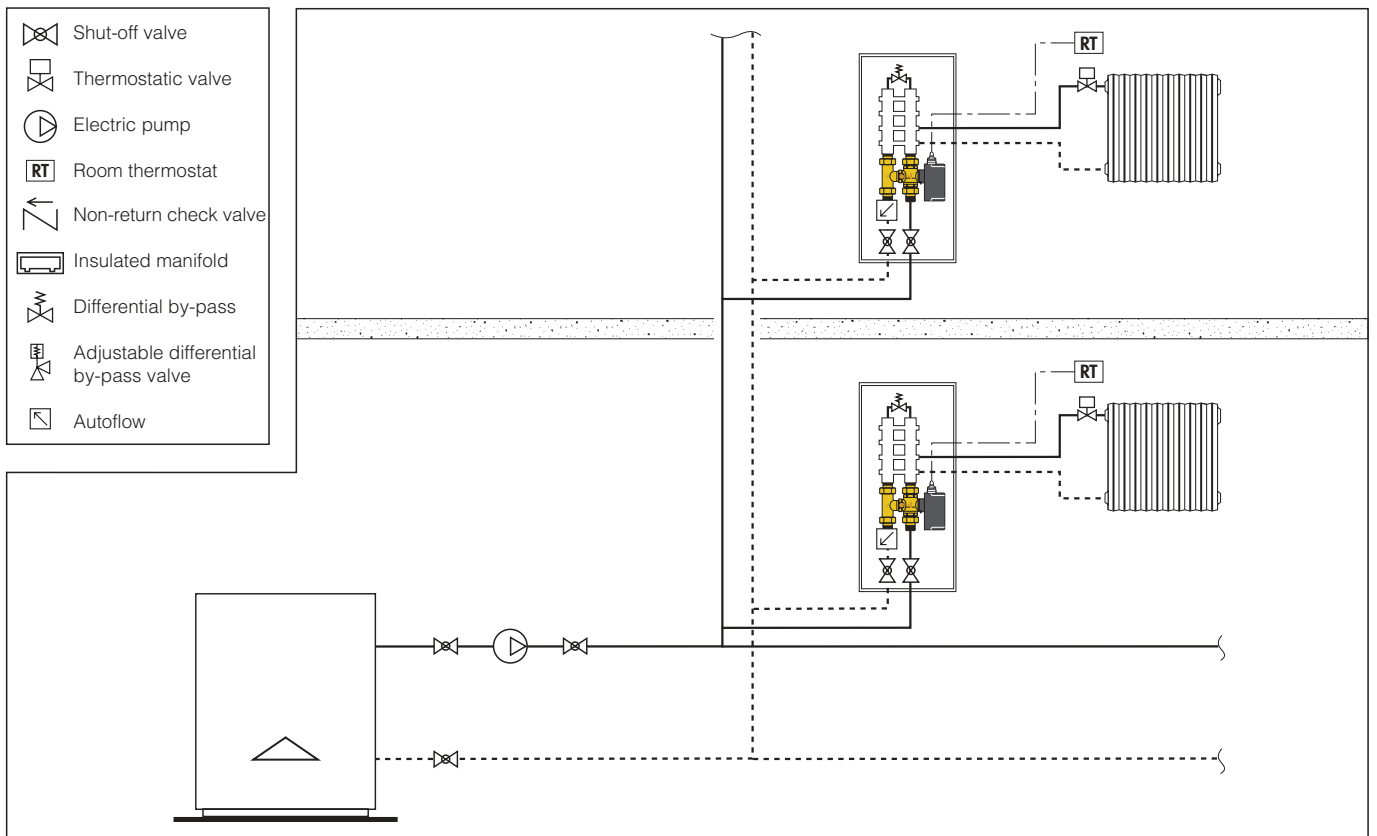
### Diagram allowing pump shut-down when no zone is operating.

The diagram below, using the auxiliary microswitch, enables the pump to be shut down when no zone is operating. If the pump has a consumption higher than 0,8 A (170 VA) an intermediate remote relay switch must be used.

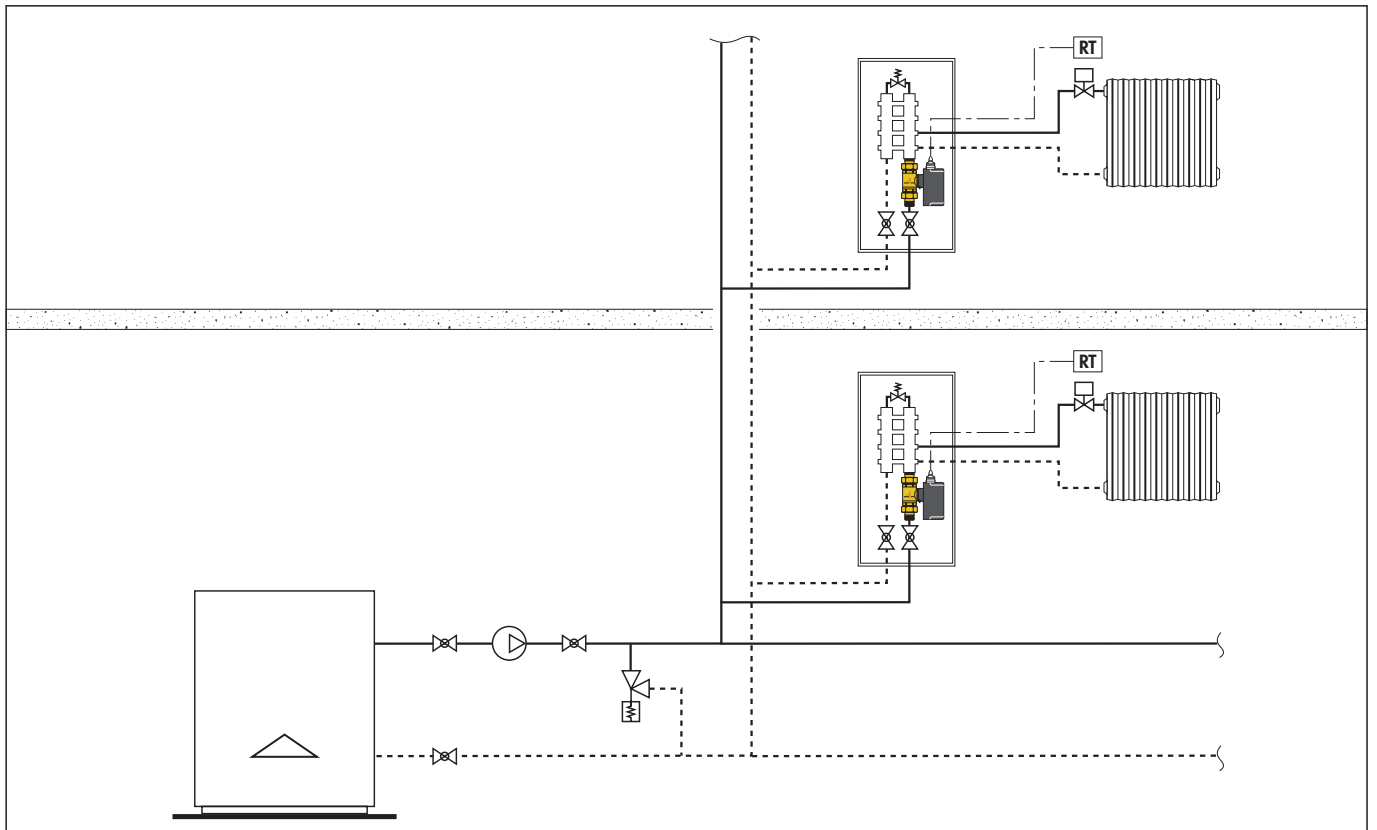


## Application diagrams

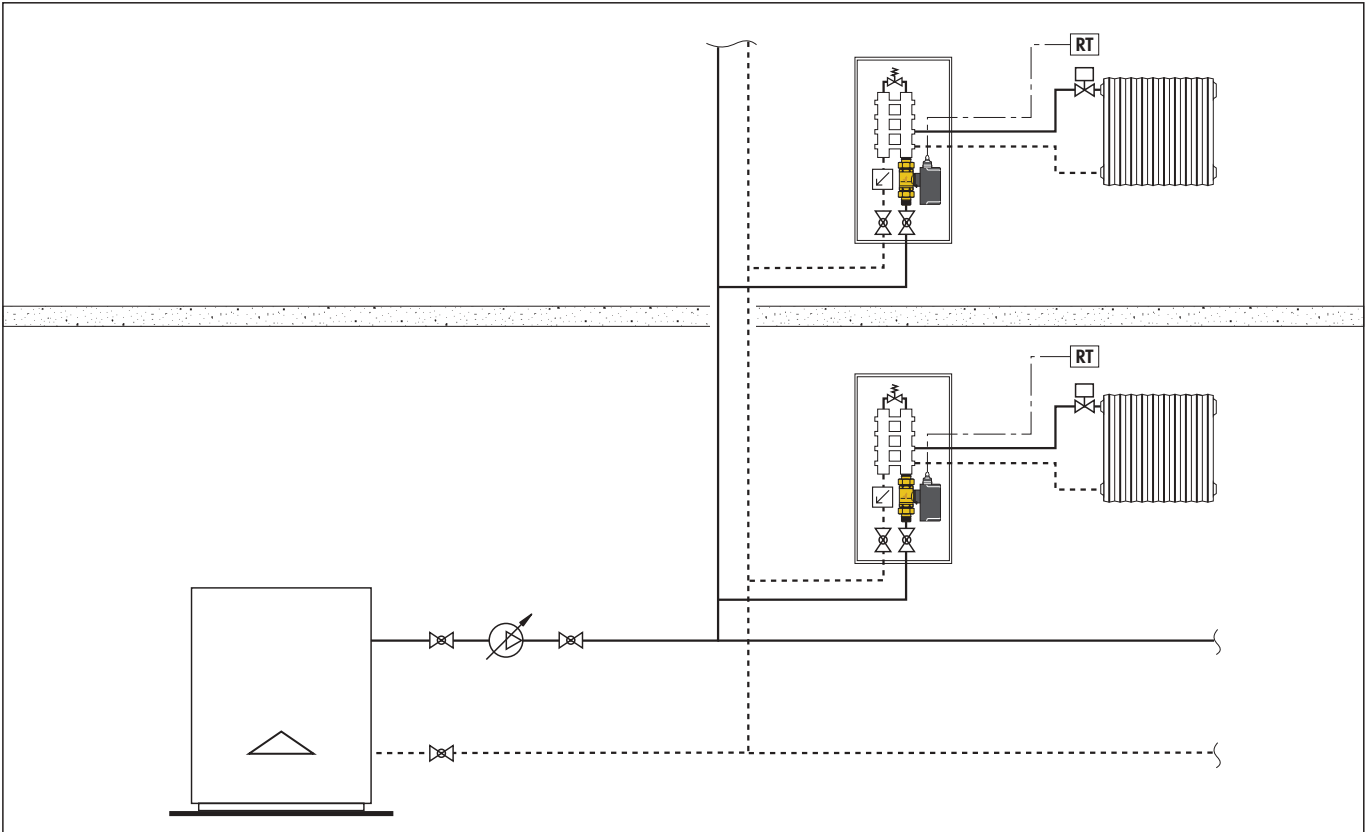
### System with 3-way zone valves and Autoflow



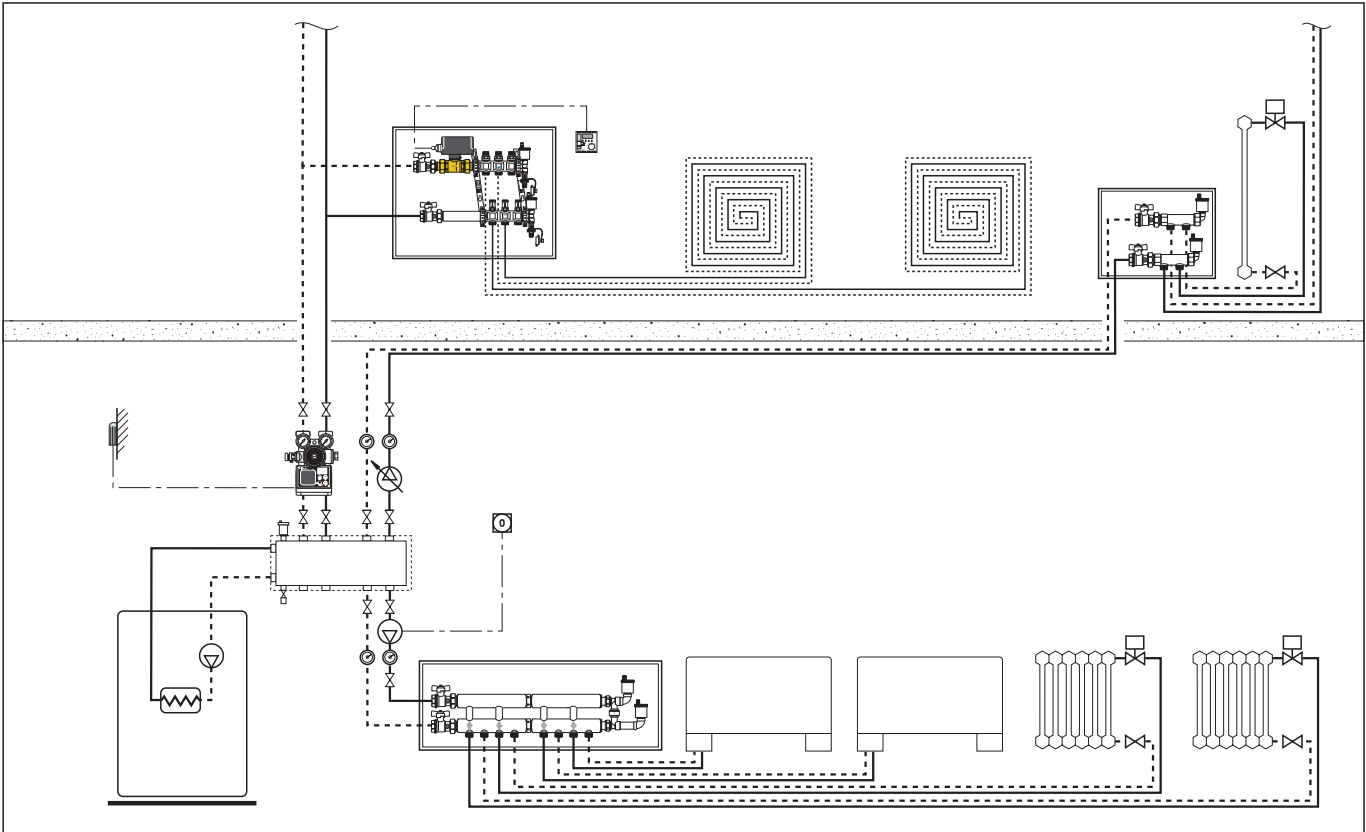
### System with 2-way zone valves and adjustable differential by-pass valve



**System with 2-way zone valves, variable speed pump and Autoflow**



**System with 2-way zone valves, temperature regulating unit and Sepsoll**



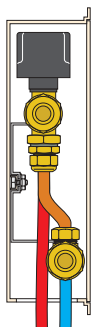


## Accessories

### · Off-centre kit



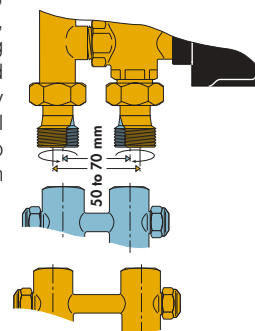
Off-centre kit, code 648018 for connection of valves, series 6480 to the relevant by-pass tee, series 6490, for installation in manifold box, series 5902 and connection to manifolds, series 349, 350 and 592.



### · Off-centre fittings



Off-centre fittings 3/4", (ref. 648005 and 1", ref. 648006) for connecting the 3-way zone valve and the by-pass tee assembly to any type of dual manifold with centre to centre distance between 50 and 70 mm.



## SPECIFICATION SUMMARIES

### Series 6460

Electrical actuator for ball zone valve. Power supply 220 V (or 24 V). With auxiliary microswitch. Dynamic starting torque 9 N·m. Auxiliary contact current 0,8 A (220 V), 1,3 A (24 V). Power consumption 4 VA. Operating time 50 seconds. Protection class IP 44. Maximum ambient temperature 55°C. Electrical connection by means of external plug and socket system. Self-extinguishing polycarbonate protective box.

### Series 6470

2-way ball zone valve. Threaded connections 1/2" M (from 1/2" to 1 1/4") with unions. Brass body. PTFE ball seal with extra EPDM O-Ring. Control shaft seal with EPDM double O-Ring. Maximum working pressure 10 bar. Temperature range from -5°C to +95°C (110°C maximum peak). Maximum differential pressure 10 bar. Maximum glycol 50%.

### Series 6480

3-way ball zone valve. Threaded connections 1/2" M (from 1/2" to 1 1/4") with unions. Third way connection 3/4" F. Brass body. PTFE ball seal with extra EPDM O-Ring. Control shaft seal with EPDM double O-Ring. Maximum working pressure 10 bar. Temperature range from -5°C to +95°C (110°C maximum peak). Maximum differential pressure 10 bar. Maximum glycol 50%.

### Series 6489

4-way telescopic zone valve. Threaded connections 3/4" M with unions. Brass body. PTFE ball seal with extra EPDM O-Ring. Control shaft seal with EPDM double O-Ring. Maximum working pressure 10 bar. Temperature range from -5°C to +95°C (110°C maximum peak). Maximum differential pressure 10 bar. Maximum glycol 50%. Centre to centre distance between connections adjustable from 49 to 63 mm. By-pass tee supplied with U6 calibrated nozzle.

### Series 6490

By-pass tee for 3-way ball zone valve. Threaded connections 1/2" M (from 1/2" to 1") with unions. Third way connection 3/4" M. Brass body. Maximum working pressure 10 bar. Supplied with calibrated nozzle (U4, U6, U8), for the third way (version without nozzle also available) for balancing the system.

### Series 6480

Off-centre fittings for connection of the ball zone valves to manifolds with centre to centre distances between 50 and 70 mm. 1/2" M connections (1/2" and 3/4"). In brass.

### Code 648018

Eccentric kit for connection of 3-way zone valves to relevant by-pass tees. Connection 3/4" M x 3/4" F. For installation in Caleffi manifold box, series 5902 and connection to simple manifolds.

We reserve the right to change our products and their relevant technical data, contained in this publication, at any time and without prior notice.



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