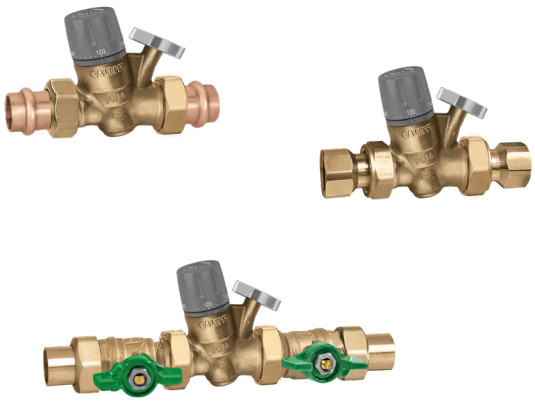
ThermoSetter™
Recirculation thermal balancing valve

1164A series

01365/24 NA
Replaces 01365/22 NA



NSF/ANSI/CAN 61
NSF/ANSI/CAN 372

Function

The ThermoSetter™ 1164A series compact adjustable thermal balancing valve is used for automatic balancing of recirculation loops in domestic hot water systems, to speed hot water delivery, reduce water waste and save energy. The internal thermostatic balancing cartridge automatically modulates flow to ensure a constant temperature in the recirculation piping system. The 1164A Series has an adjustment knob with 105 °F to 150 °F (40 °C to 65 °C) temperature scale indication. The adjustment knob is lockable for tamper-proofing. An integral dry-well holds a slide-in temperature gauge for local indication, or a sensor for remote temperature sensing. The standard integral check valve protects against circuit thermo-syphoning.

The ThermoSetter 1164A series is also available pre-assembled with the Caleffi 290030 low-lead brass full-port ball valve for isolation. This can be ordered by adding a 3-digit suffix to the order code number per the tables on page 2 and 3.

The ThermoSetter complies with NSF/ANSI/CAN 61, as certified by ICC-ES, file PMG-1512 (180 °F/82 °C Commercial Hot), and complies with NSF/ANSI/CAN 372, low lead laws, as certifed by ICC-ES, file PMG-1360. It also meets codes IPC, IRC, UPC and NPC for use in accordance with the US and Canadian plumbing codes.

Product range

1164A series ThermoSetter thermal balancing valves, models with check valve, with and without temperature gauge, with and without isolation valves .....connection sizes ½" and ¾" union NPT female, sweat, press, PEX expansion, or PEX crimp

Technical specifications

Materials:

Body and stem extension:	DZR* low-lead brass EN 12165 CW724R
Adjustable cartridge:	PSU
Springs:	stainless steel AISI 302 (EN 10270-3)
Hydraulic seals:	peroxide-cured EPDM
Check valve:	EPDM, POM color black
Adjustment knob:	ABS

* Meets the "lead free" requirement of Section 1417 of the Safe Drinking Water Act (SDWA). This product has a weighted average lead content of less than 0.25% for its wetted surfaces contacted with consumable water.

Performance:

Suitable fluid:	water
Max. working pressure:	230 psi (16 bar)
Max. differential pressure:	15 psi (1 bar)
Max. inlet temperature:	195 °F (90 °C)
Adjustment temperature range:	105 – 150 °F (40 – 65 °C)
Factory setting:	135 °F (58 °C)
Flow Cv (Kv) max:	2.1 (1.8)
Flow Cv (Kv) min:	0.35 (0.3)
Flow Cv (Kv) design:	0.69 (0.6)

Connections:

Main connections: ½" and ¾" NPT female, sweat, press, PEX expansion, PEX crimp union connections

Temperature gauge/sensor dry-well: diameter 10 mm metric

Temperature gauge code 116010

Scale:	32 – 180 °F (0 – 80 °C)
Diameter:	1½" (40 mm)
Stem diameter:	0.35" (9 mm)

Technical specifications of insulation

Materials:	closed cell expanded PE-X
Thickness:	½ inch (13 mm)
Density: -internal part:	1.9 lb/ft³ (30 kg/m³)
-external part:	5.0 lb/ ft³ (80 kg/m³)

Thermal conductivity (DIN52612):
- at 32 °F (0 °C): 0.82 BTU · in/hr · ft² · °F (0.0345 W/(m · K))
- at 105 °F (40 °C): 0.94 BTU · in/hr · ft² · °F (0.0398 W/(m · K))

Coefficient of resistance to the diffusion of vapor:	> 1,300
Working temperature range:	32 – 212 °F (0 – 100 °C)
Flammability (ASTM D 635):	Class VO

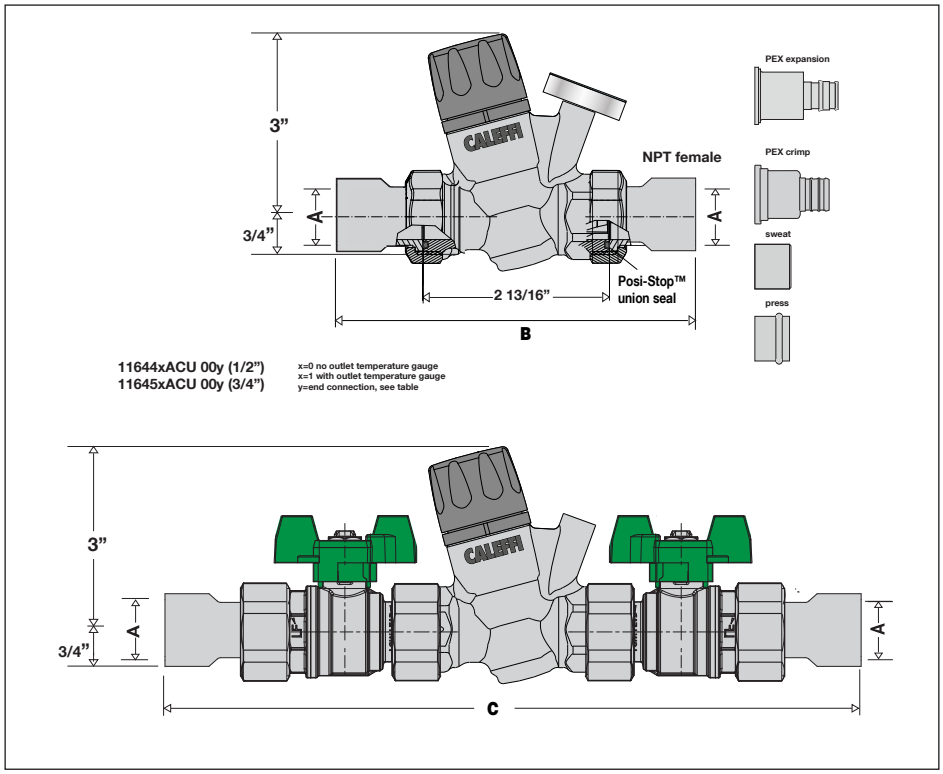
Certifications:

Complies with standards NSF/ANSI/CAN 61 (180 °F/82 °C Commercial Hot), NSF/ANSI/CAN 372 and codes IPC, IRC, UPC and NPC certified by ICC-ES.

PEX crimp fittings certified to ASTM F 1807.

PEX expansion fittings certified to ASTM F 1960.

Dimensions



ThermoSetter 1164 series

Code	A	B	C	Wt w/o ball valves lb (kg)	Wt with ball valves lb (kg)
116440AC 002	½" NPT F	5"	---	3.0 (1.3)	---
116441AC 002*	½" NPT F	5”	---	3.0 (1.3)	---
116440AC 102	½" NPT F	---	10”	---	5.0 (2.2)
116441AC 102*	½" NPT F	---	10"	---	5.0 (2.2)
116450AC 002	¾" NPT F	5½"	---	3.0 (1.3)	---
116451AC 002*	¾" NPT F	5½”	---	3.0 (1.3)	---
116450AC 102	¾" NPT F	---	11”	---	5.0 (2.2)
116451AC 102*	¾" NPT F	---	11"	---	5.0 (2.2)

All codes INCLUDE a high temperature check valve.
*with integral outlet temperature gauge.

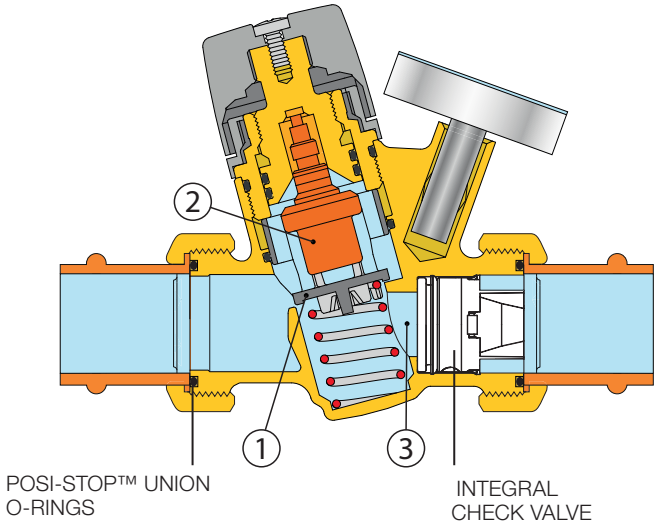
Dimensions

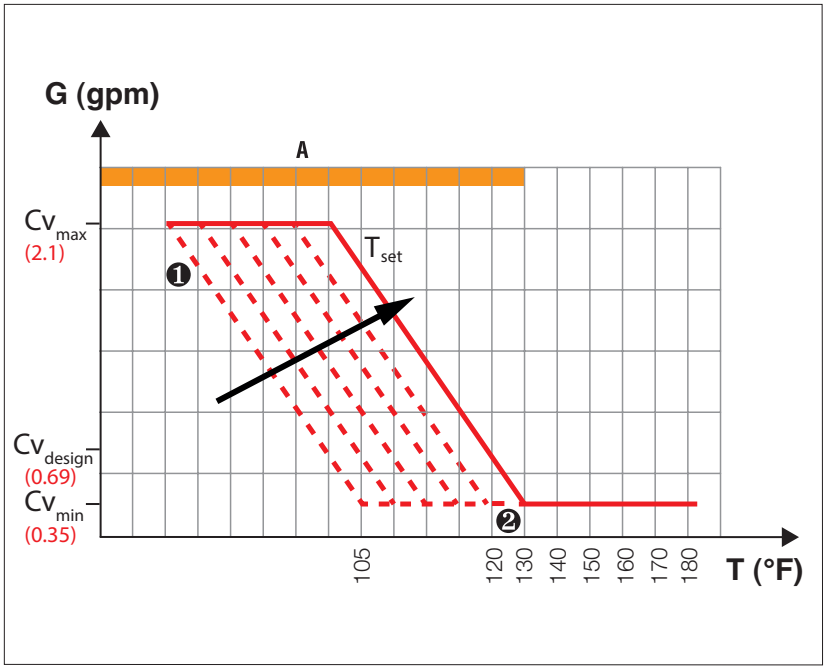
Code	A	B	C	Wt w/o ball valves lb (kg)	Wt with ball valves lb (kg)
116440AC 009	½" sweat	4 5/16"	---	2.4 (1.1)	---
116441AC 009*	½" sweat	4 5/16"	---	2.5 (1.1)	---
116440AC 109	½" sweat	---	9 13/16"	---	4.4 (2.0)
116441AC 109*	½" sweat	---	9 13/16"	---	4.5 (2.0)
116450AC 009	¾" sweat	4 13/16"	---	2.6 (1.1)	---
116451AC 009*	¾" sweat	4 13/16"	---	2.7 (1.2)	---
116450AC 109	¾" sweat	---	10 5/16"	---	4.6 (2.1)
116451AC 109*	¾" sweat	---	10 5/16"	---	4.7 (2.1)
116440AC 006	½" press**	5"	---	2.2 (1.0)	---
116441AC 006*	½" press**	5"	---	2.3 (1.0)	---
116440AC 106	½" press**	---	10 ½"	---	4.2 (1.9)
116441AC 106*	½" press**	---	10 ½"	---	4.3 (1.9)
116450AC 006	¾" press**	5"	---	2.2 (1.0)	---
116451AC 006*	¾" press**	5"	---	2.3 (1.0)	---
116450AC 106	¾" press**	---	10 ½"	---	4.2 (1.9)
116451AC 106*	¾" press**	---	10 ½"	---	4.3 (1.9)
116440AC 008	½" PEX exp	4 ¼"	---	2.2 (1.0)	---
116441AC 008*	½" PEX exp	4 ¼"	---	2.3 (1.0)	---
116440AC 108	½" PEX exp	---	9 ¾"	---	4.2 (1.9)
116441AC 108*	½" PEX exp	---	9 ¾"	---	4.3 (1.9)
116450AC 008	¾" PEX exp	7 3/16"	---	2.4 (1.1)	---
116451AC 008*	¾" PEX exp	7 3/16"	---	2.4 (1.1)	---
116450AC 108	¾" PEX exp	---	12 11/16"	---	4.4 (2.0)
116451AC 108*	¾" PEX exp	---	12 11/16"	---	4.4 (2.0)
116440AC 007	½" PEX crimp	4 3/16"	---	2.2 (1.0)	---
116441AC 007*	½" PEX crimp	4 3/16"	---	2.3 (1.0)	---
116440AC 107	½" PEX crimp	---	9 11/16"	---	4.2 (1.9)
116441AC 107*	½" PEX crimp	---	9 11/16"	---	4.3 (1.9)
116450AC 007	¾" PEX crimp	6 3/16"	---	2.4 (1.1)	---
116451AC 007*	¾" PEX crimp	6 3/16"	---	2.4 (1.1)	---
116450AC 107	¾" PEX crimp	---	11 13/16"	---	4.4 (2.0)
116451AC 107*	¾" PEX crimp	---	11 13/16"	---	4.4 (2.0)

All codes INCLUDE a high temperature check valve.
*with integral outlet temperature gauge.
**Lay Length: size 1/2": 3 ¼"; size 3/4": 2 7/16".

Operating principle

At the set temperature, the valve plug (1), controlled by the thermostatic balancing cartridge (2), gradually closes the outlet to the minimum flow (3). The outlet never fully closes to always allow a minimum flow for temperature sensing and to prevent recirculation pump dead-heading. If the temperature decreases, the outlet increases, causing flow and thus temperature to increase back to the set temperature as shown in curve 1. If temperature exceeds the set-point, the plug stays in the minimum closed position as shown in curve 2.

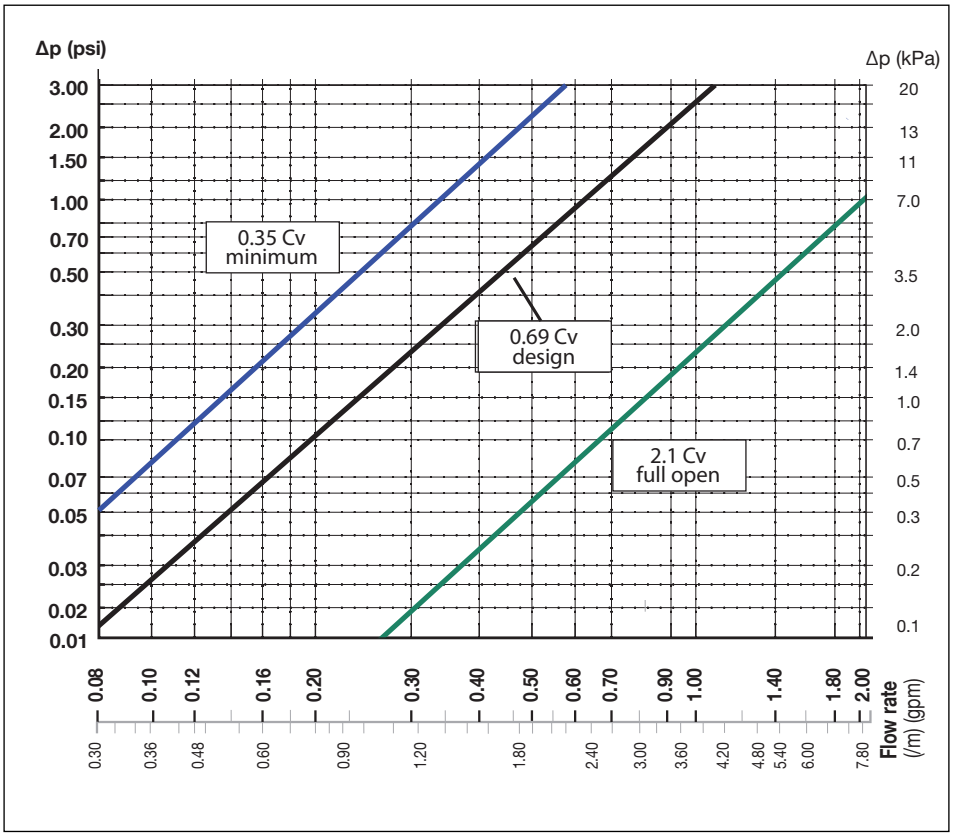




Flow characteristics

The ThermoSetter thermostatic balancing valve is designed to balance individual branches of domestic hot water recirculation systems, based on the temperature at the valve. It automatically modulates flow to maintain hot water availability to all fixtures in the branch circuit. The valve is at minimum flow (Cv = .35) when the incoming water temperature is equal to the set-point position of the adjustment dial. The valve opens as incoming water temperature drops.

For pressure loss calculations in the recirculation system, follow traditional pipe sizing and head loss practices. For pressure loss calculations across the ThermoSetter valve, use the design curve shown in the graph below. This line represents a typical valve position under normal working conditions (ΔT= 10°F). Determine the pressure drop across the valve by selecting the branch design GPM on the graph X-axis, draw a vertical line up to the "design" curve, then go across to the Y-axis to find the design pressure drop. Include that pressure drop in your head loss calculations for the circuit.



System sizing

For flow rate calculations in the recirculation system, the pump is sized to provide sufficient flow to compensate for the total heat loss in all the supply branches to the furthest fixture in each circuit. Heat loss in return lines, downstream of the balancing valves, is irrelevant and not included in the flow rate calculations.

The flow rate calculation formula to use is: GPM = BTUh/ΔT x 500.

Common design practice for recirculation lines is to use a ΔT of 10 °F. This is the temperature difference of the recirculating water between the heat source and to the furthest fixture in each circuit. Assuming the common value of a ΔT = 10 °F, the equation simplifies to:

GPM = BTUh/5000.

BTUh heat loss, will vary based on pipe type and insulation. Heat loss tables and charts are available from a variety of sources.

Example:

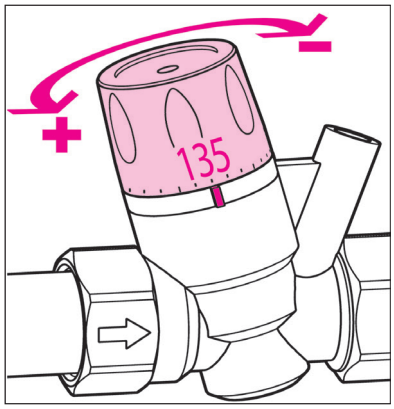
Calculate the recirculation circuit flow rate for 100 feet of ¾" non-insulated copper pipe. Assume an average heat loss of 30 BTU/h per foot.

30 BTUh per foot x 100 feet = 3000 BTU/h heat loss in the supply piping.

Flow rate = 3000 / 5000 = 0.6 GPM flow required in that circuit.

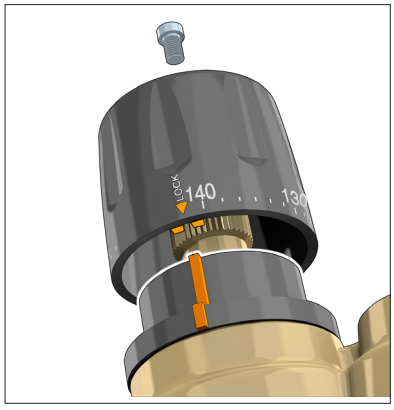
Temperature adjustment

Set the desired recirculation system temperature by turning the adjustment knob. The graduated scale shows the temperatures at which the adjustment knob can be set.



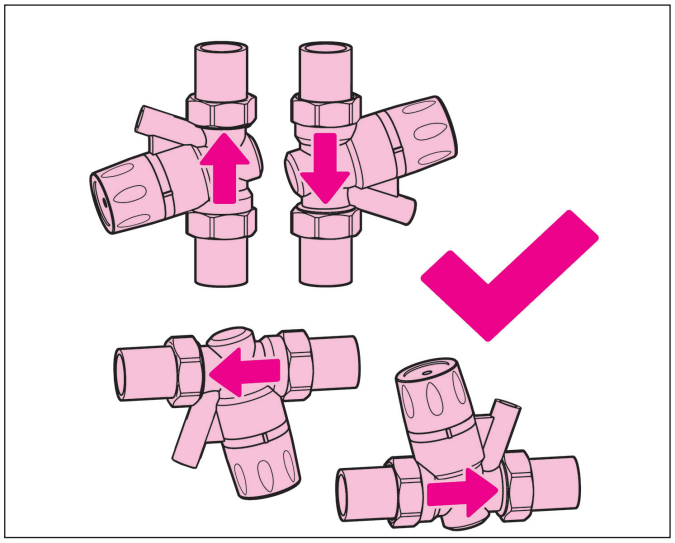
Temperature locking

After adjusting the temperature, the setting can be locked at the desired value using the adjustment knob. Unscrew the locking screw at the top of the adjustment knob, remove the knob and then put it back on so that the internal groove couples with the protrusion on the knob holder nut. When this lock is used, the reference of the indication of the temperature values on the knob is lost. To restore it, completely unscrew the locking screw. Reposition the knob on MAX value. Insert and tighten the locking screw.



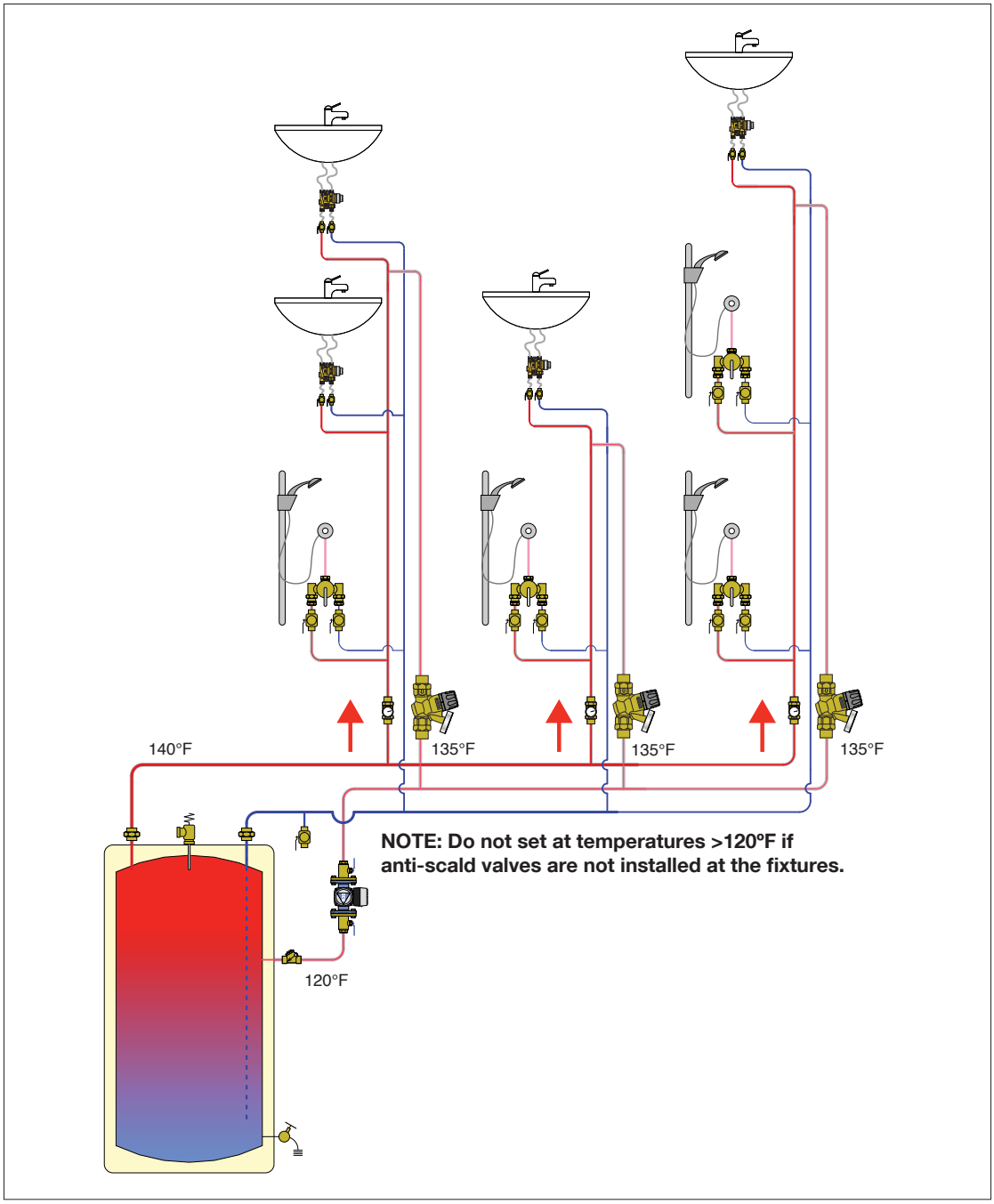
Installation

Before installing the ThermoSetter, flush the pipes to make sure that impurities in system will not interfere with valve performance. Strainers of sufficient capacity at the inlet from the water main are highly recommended. The ThermoSetter can be installed in any position, vertical or horizontal, following the flow direction indicated by the arrow on the valve body. The ThermoSetter must be installed according to the diagrams given in this manual. It must be installed to allow free access to for checking on operation and maintenance procedures.



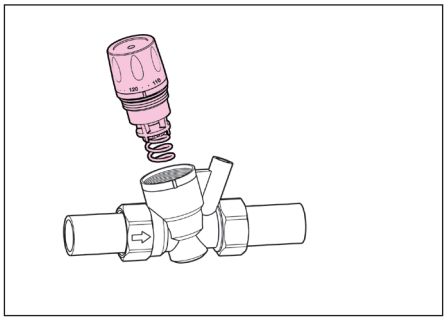
Typical application diagram

Hot water recirculation with thermal balancing valves



Maintenance

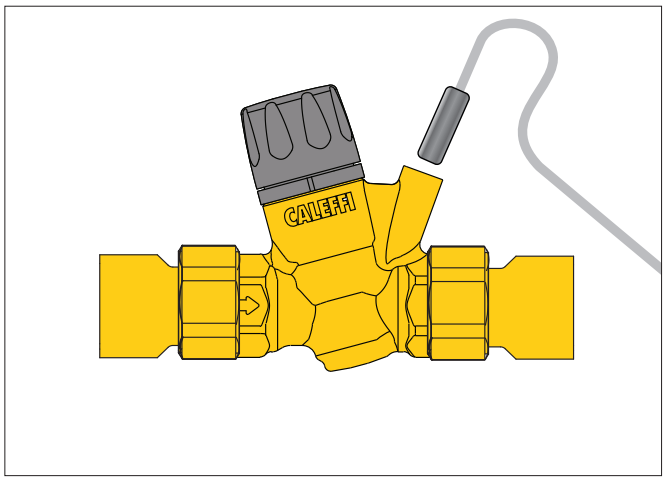
The adjustable balancing cartridge can be removed from the valve body for periodic inspection, cleaning or replacement (with the system cold or empty).



Accessories

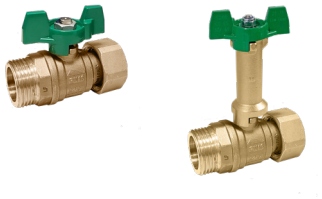
ThermoSetter codes 116440ACU and 116450ACU come standard without outlet temperature gauge, but temperature gauge, code 116010 can be field-installed later for confirming the temperature of the hot water in the circuit. ThermoSetter codes 116441ACU and 116451ACU come standard with outlet temperature gauge.

The temperature gauge dry-well can also be used for inserting a special immersion probe (with Ø < 10 mm) for remote control of the disinfection temperature by a dedicated electronic control unit.



Isolation ball valves

Caleffi code 290030 and 290031 full-port ball valve is designed for isolating the 1164A series ThermoSetter sizes ½" and ¾" that have 1" metric "G" thread union connections. The isolation valve installs in between the valve body and the tailpiece fitting assembly. Male x Female configuration and bi-directional full ball valve flow capacity provides flexibility for using one, two or three isolation valves for the primary functioning valve. An optional stem extension is also available for those projects that require pipe insulation.



Code	Description
290030	Isolation ball valve low lead 1" Male x 1" Female union
290031	Isolation ball valve low lead 1" Male x 1" Female union, with extended handle

Technical specifications of 290030 and 290031 ball valves

Materials

Body and male end cap:	DZR low-lead brass EN 12165 CW510L
Female unplated nut:	DZR low-lead brass EN CW617N EN 12165
Chrome-plated ball and unplated stem:	DZR low-lead brass EN 12164 CW510L
Seats (2):	PTFE
O-ring stem seals (2):	EPDM
Gasket:	EPDM
Green T-handle (RAL6001):	Cast Aluminum EN AC-46100 EN 1676

Performance

Suitable Fluids:	water, glycol solutions
Max. percentage of glycol:	50%
Max. working pressure:	230 psi (16 bar)
Working temperature range:	-40 – 300 °F (-40 – 150 °C)
Flow coefficient, fully open:	Cv 5.8 (Kvs 5.0)

Connections:

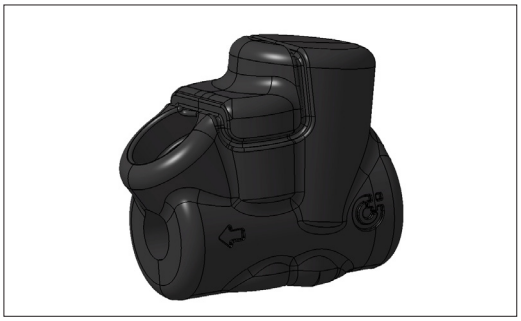
Main connections:	1" Metric "G" thread Male x Female, ISO 228/1

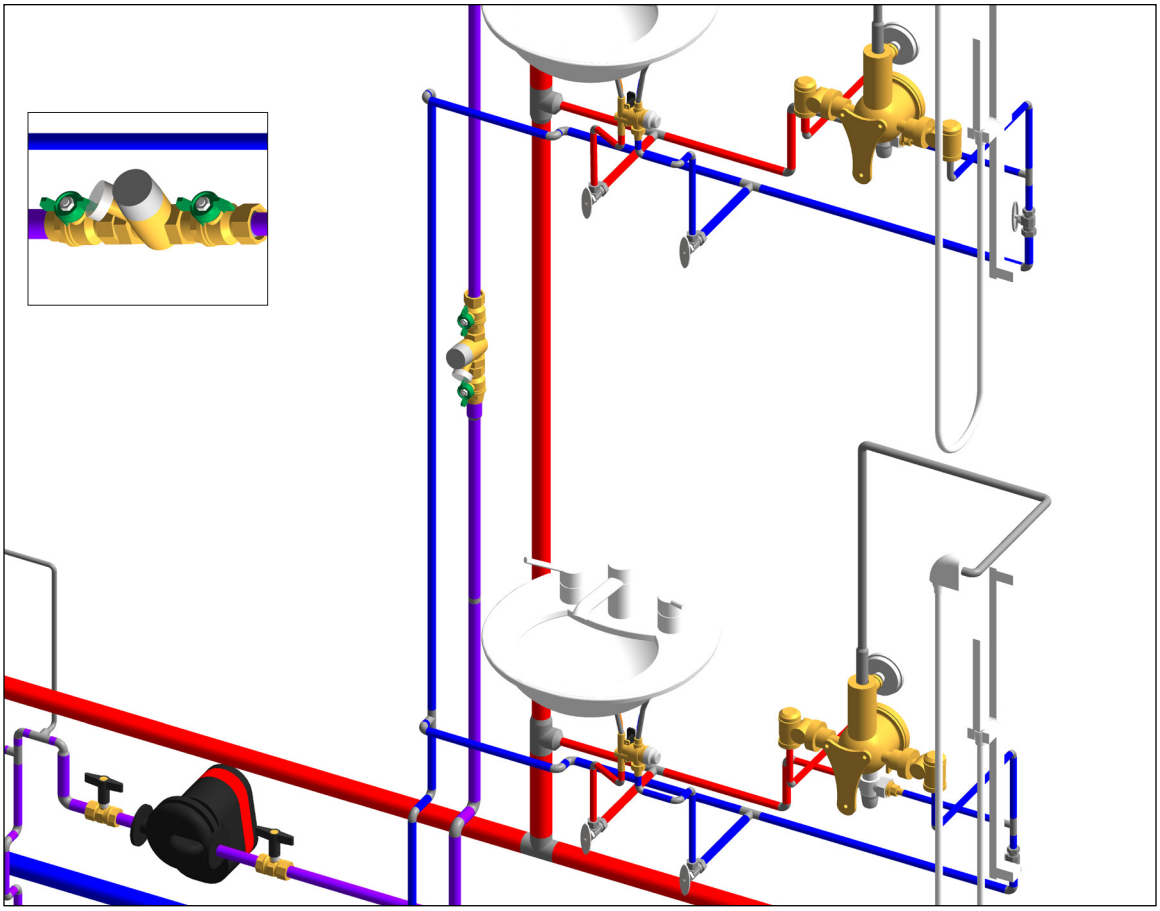
Certifications:

Complies with NSF/ANSI/CAN 61 & NSF/ANSI/CAN 372.

Insulation shell

The ThermoSetter insulation shell, code CBN116440 can be purchased separately to minimize heat loss.





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SPECIFICATION SUMMARY

Series 1164

Thermal balancing valve for domestic hot water recirculation circuits. Dezincification resistant low-lead brass body (<0.25% Lead content), complies with NSF/ANSI 372, low lead, as certified by ICC-ES, file PMG-1360. Complies with codes IPC, IRC, UPC and NPC and standard NSF/ANSI/CAN 61, as certified by ICC-ES, file PMG-1512 (180 °F/82 °C Commercial Hot). Sizes ½" and ¾": sweat, press. PEX crimp and PEX expansion union connections. PEX crimp fittings must comply with ASTM F 1807. PEX expansion fittings must comply with ASTM F 1960. Adjustable thermostatic cartridge. Peroxide-cured EPDM hydraulic seals. Temperature gauge/probe dry-well diameter 10 mm. Maximum working pressure 230 psi (16 bar). Maximum differential pressure 15 psi (1 bar). Adjustment temperature range 105 °F to 150 °F (40 °C to 65 °C). Flow rating: 2.1 Cv (1.8 Kv) maximum, 0.35 Cv (0.3 Kv) minimum, 0.69 Cv (0.6 Kv) design. Equipped with: ABS adjustment knob with temperature adjustment scale for manual setting and tamper-proof adjustment locking screw; and standard outlet check valve. Provide with optional outlet temperature gauge with 32 °F to 180 °F (0 °C to 80 °C) temperature scale. Provide with optional inlet and outlet isolation low-lead ball valves, code 290030, factory-assembled; code 290030 or 290031 with extended stem, separately sourced, field installed. Pre-formed insulation shell is available for field installation.

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