ThermoSetter™
Recirculation thermal balancing valve

1164A series

01365/22 NA
Replaces 01365/21 NA

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 optional check valve protects against circuit thermo-syphoning.

The ThermoSetter 1164A series is also available pre-assembled with the Caleffi NA108 series low-lead brass full-port ball valve for isolation. This can be ordered complete with two of these ball valves plus low-lead close nipples by adding a suffix "001" to the order code number.

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

1164xxA(C) series	Thermal balancing valve, models with and without temperature gauge, with and without check valve.....size ½" & ¾" NPT female
1164xxA(C) 001 series	Thermal balancing valve, models with and without temperature gauge, with and without check valve, with inlet and outlet ball valves..... size ½" & ¾" NPT female

Technical specifications

Materials:

Body:	DZR low-lead brass EN 12165 CW724R
Adjustable cartridge:	PSU
Springs:	stainless steel AISI 302 (EN 10270-3)
Hydraulic seals:	peroxide-cured EPDM
Adjustment knob:	ABS

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

Temperature gauge code 116010

Scale:	30 - 180°F (0–80°C)
Diameter:	1½" (40 mm)
Stem diameter:	0.35" (9 mm)

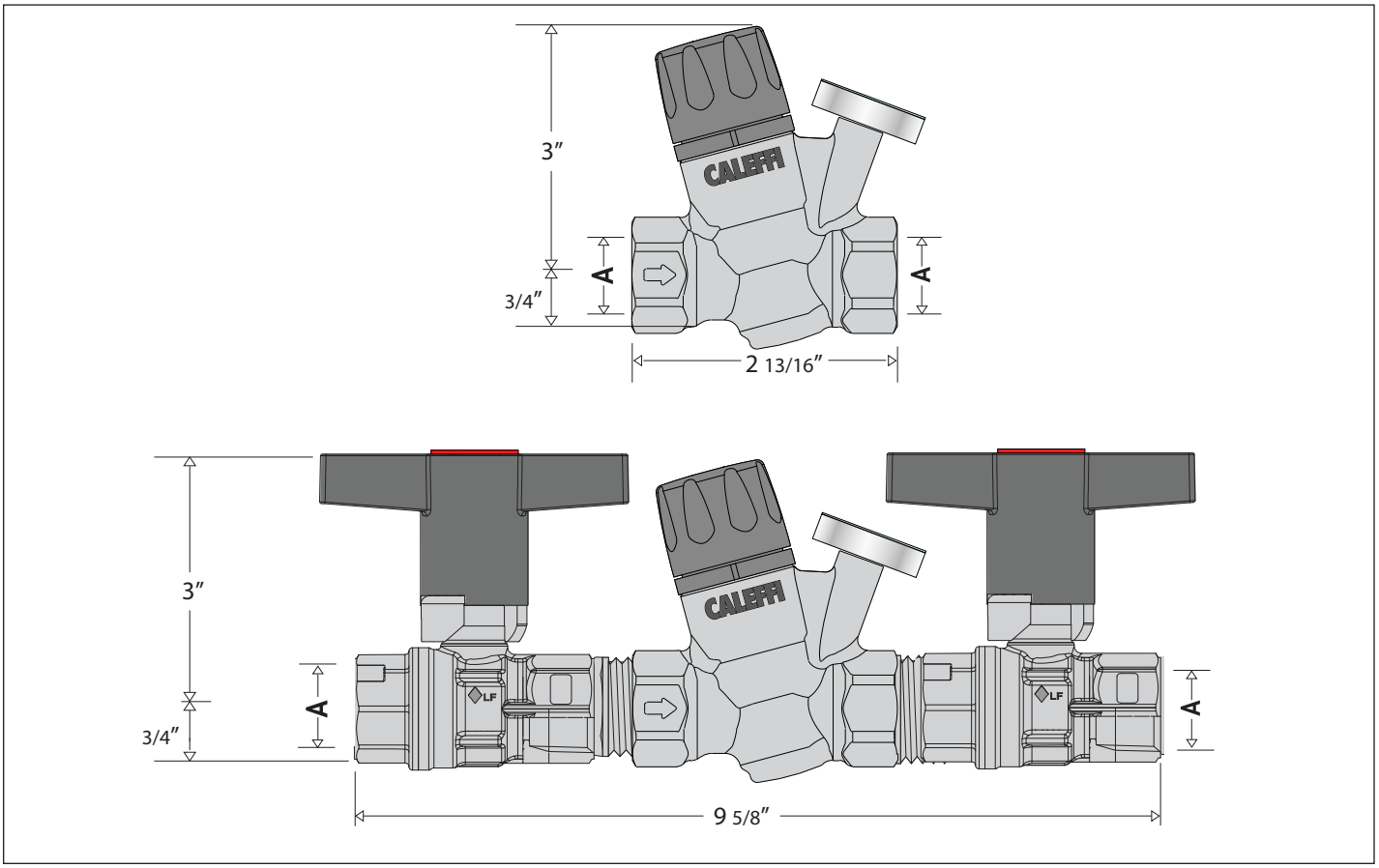
Technical specifications of insulation

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:

1. 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).
2. Complies with NSF/ANSI/CAN 372, low lead, as certified by ICC-ES, file PMG-1360.

Dimensions

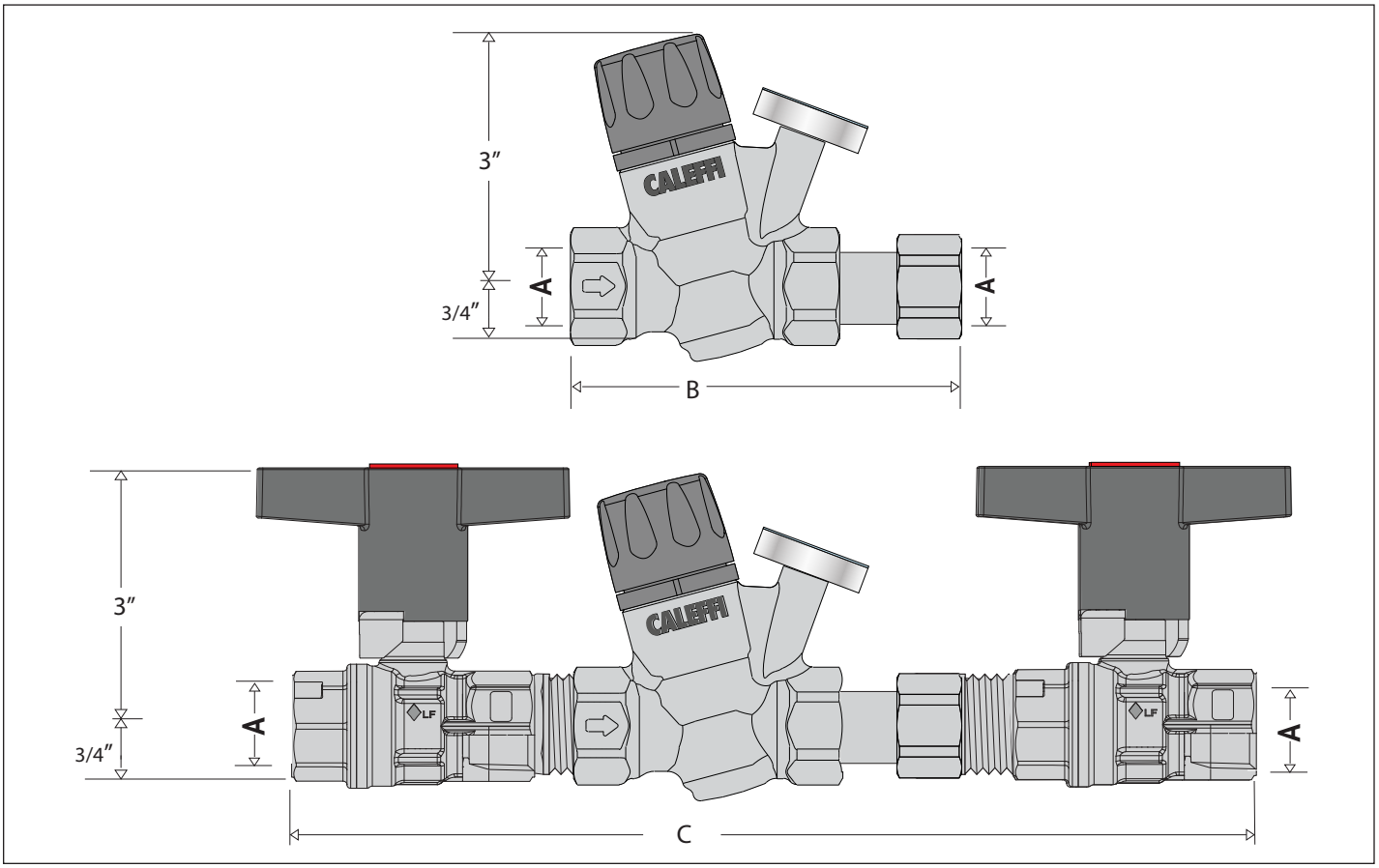


ThermoSetter 1164 series without check

Code*	A	Wt w/o ball valves lb (kg)	Wt with ball valves lb (kg)
116440A	½" NPT F	1.6 (0.7)	---
116440A 001	½" NPT F	---	2.6 (1.1)
116441A*	½" NPT F	1.7 (0.8)	---
116441A 001*	½" NPT F	---	2.7 (1.2)
116450A	¾" NPT F	1.6 (0.7)	---
116450A 001	¾" NPT F	---	3.6 (1.6)
116451A*	¾" NPT F	1.7 (0.8)	
116451A 001*	¾" NPT F		3.7 (1.7)

All codes in table do not include check valve.
*with integral outlet temperature gauge.

Dimensions



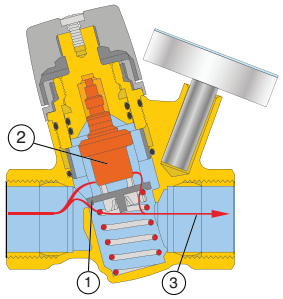
ThermoSetter 1164 series with check valves

Code*	A	B	C	Wt w/o ball valves lb (kg)	Wt with ball valves lb (kg)
116440AC	½" NPT F	4 13/16"	---	1.8 (0.8)	---
116440AC 001	½" NPT F	---	11 5/8"	---	2.8 (1.2)
116441AC*	½" NPT F	4 13/16"	---	1.9 (0.9)	---
116441AC 001*	½" NPT F	---	11 5/8"	---	2.9 (1.3)
116450AC	¾" NPT F	5"	---	1.8 (0.8)	---
116450AC 001	¾" NPT F	---	11 13/16"	---	3.8 (1.7)
116451AC*	¾" NPT F	5"	---	1.9 (0.8)	
116451AC 001*	¾" NPT F	---	11 13/16"		3.9 (1.8)

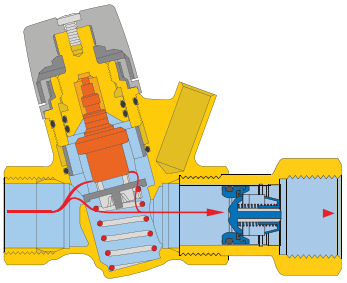
All codes in this table DO include a check valve.
*with integral outlet temperature gauge.

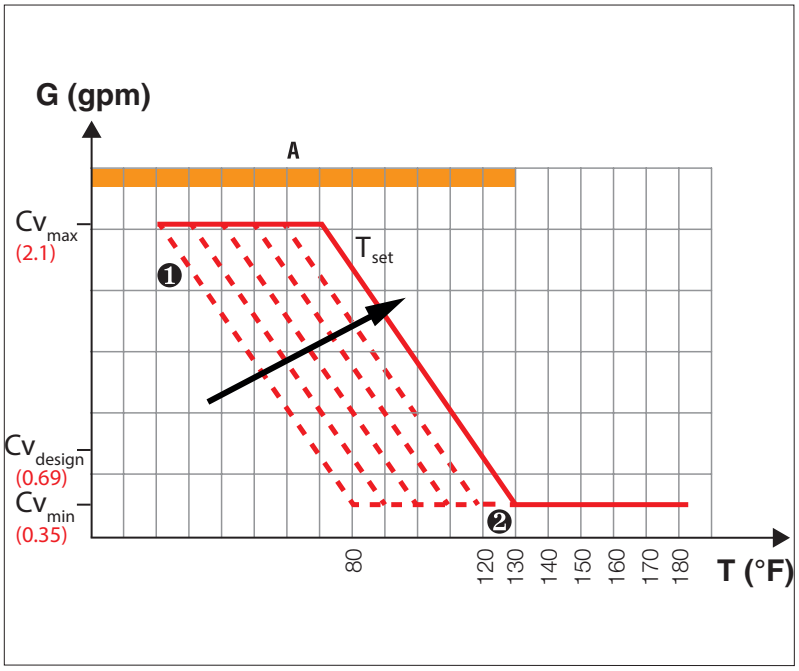
Operating principle

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.



Thermostatic control,
1164xxA series

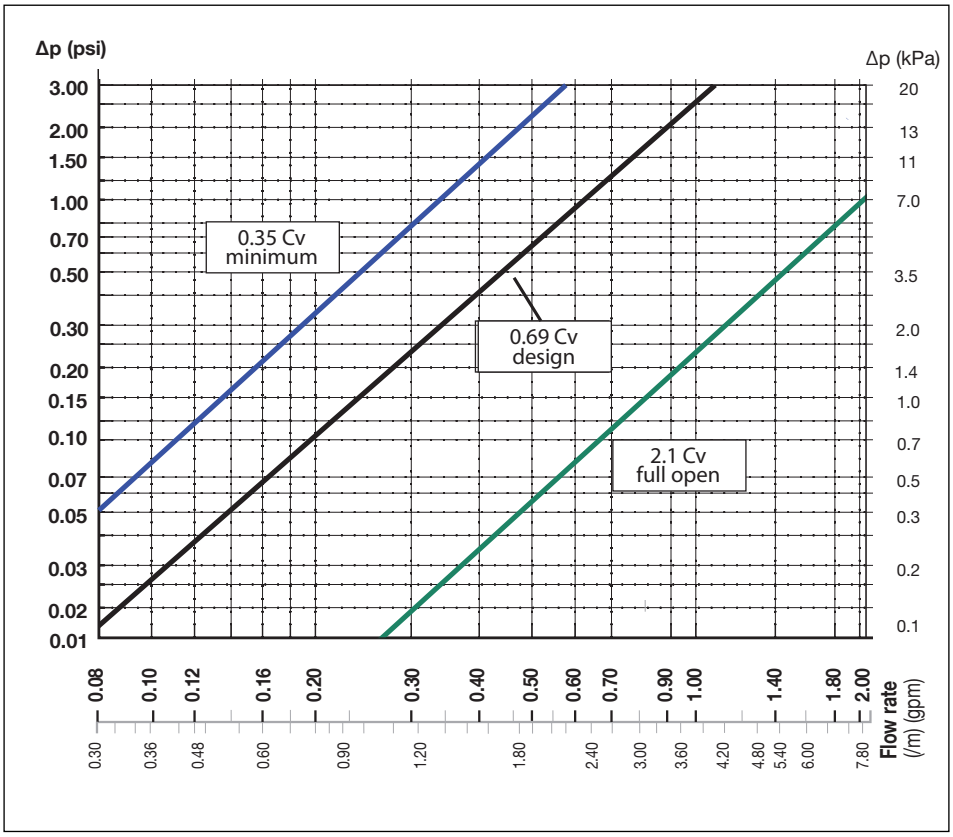

Thermostatic control with check valve,
11614xAC series



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:

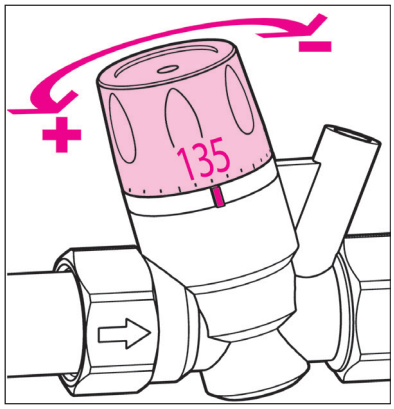
Calculate the recirculation circuit flow rate for 100 feet of ¾" non-insulated copper pipe. Assume an average heat loss of 30 BTU/h per foot.

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.

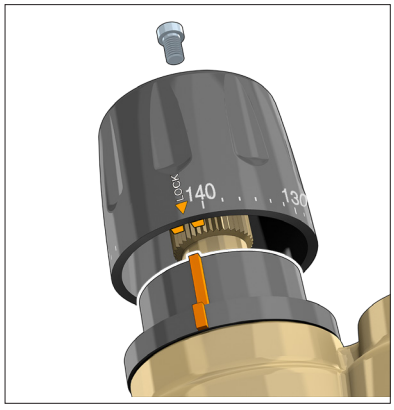
Temperature adjustment

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.



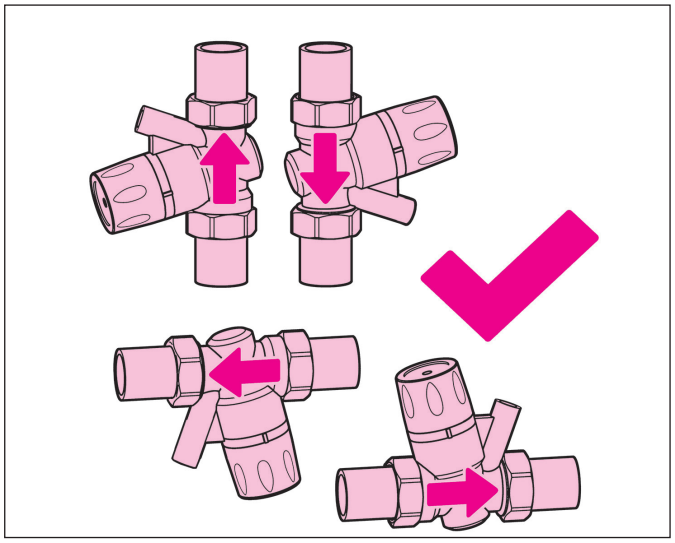
Temperature locking

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.



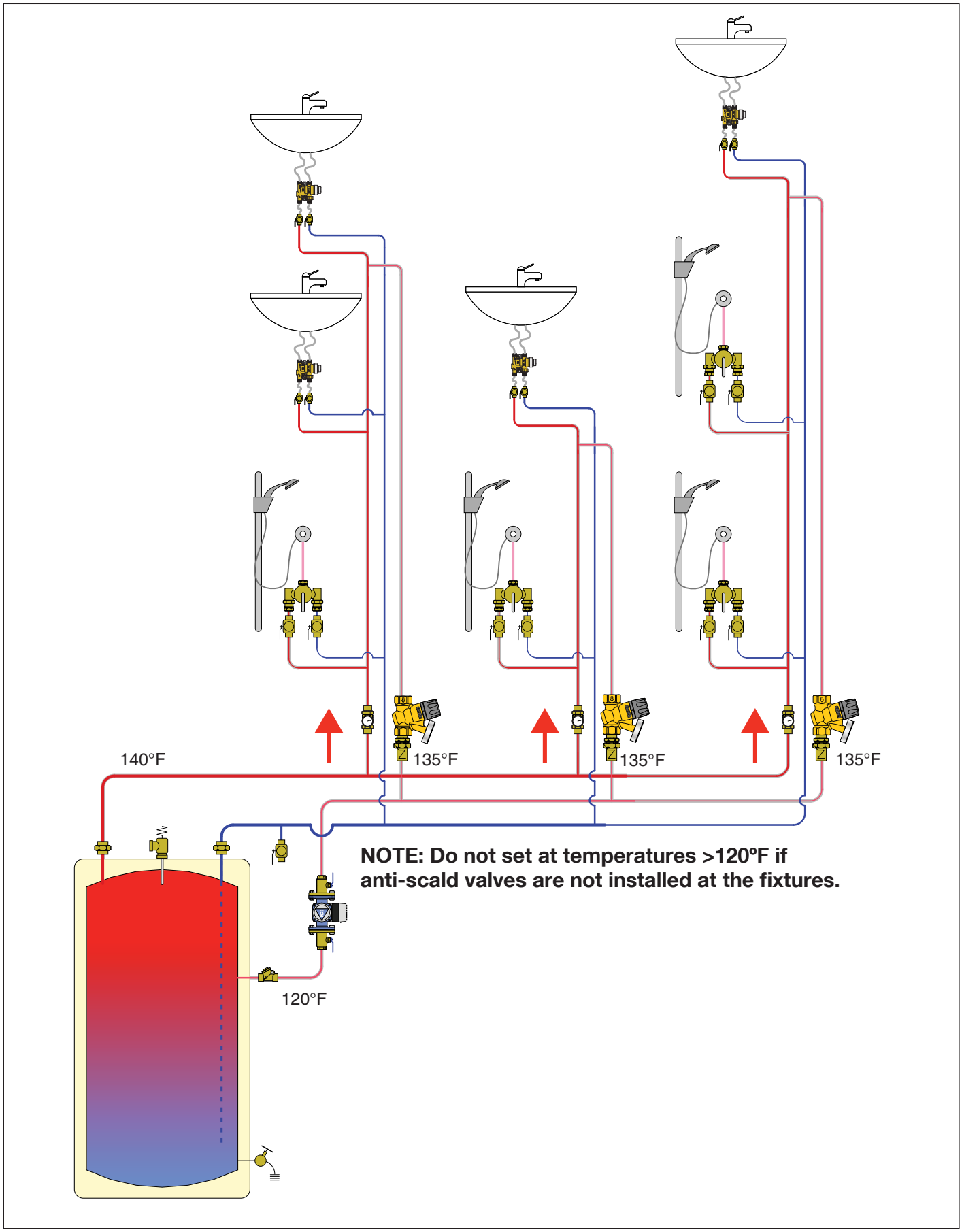
Installation

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.



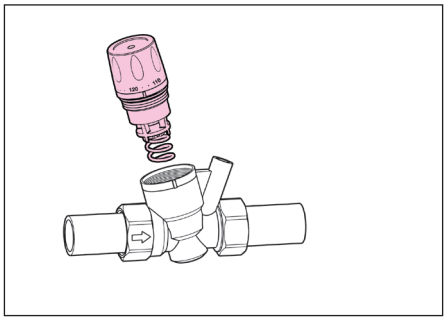
Typical application diagram

Hot water recirculation with thermal balancing valves



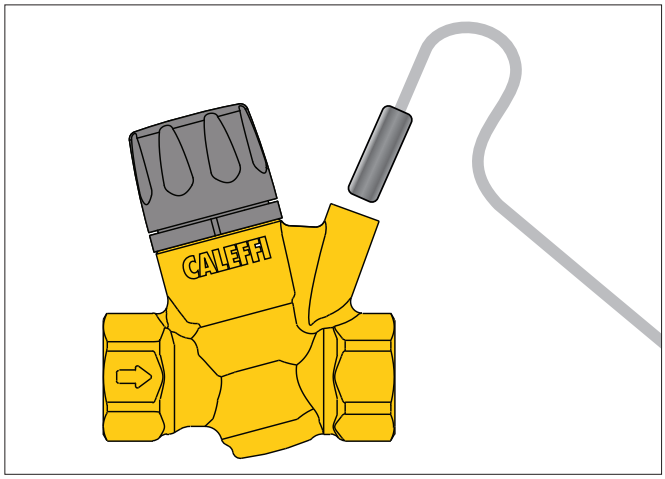
Maintenance

The adjustable balancing cartridge can be removed from the valve body for periodic inspection, cleaning or replacement.



Accessories

ThermoSetter codes 116440A(C) and 116450A(C) come standard without temperature gauge, but temperature gauge, code 116010 can be field-installed later for confirming the temperature of the hot water in the circuit.
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

The NA108 series low-lead brass full-port ball valves are designed for isolating ThermoSetter 1164 series thermal balancingi valves with the 1/2" and 3/4" FNPT connections. The isolation valve easily installs in the inlet and outlet sides of the valve body using a low-lead close nipple. Some products are available pre-assembled with the NA108 series isolation valve. For example, the Caleffi 116 series ThermoSetter can be ordered complete with two of these ball valves plus low-lead close nipples by adding a suffix "001" to the order code number, see page 2 and 3.

The NA108 series have an extended stem which allows operation if the valve body gets insulated. There is no need to purchase an expensive separate stem extension which then has to be field-installed between the valve body and handle. The valve features a blowout proof stem, PTFE seats, double o-ring stem seals, lead free brass ball and stem, and polyamide thermal plastic T handle.

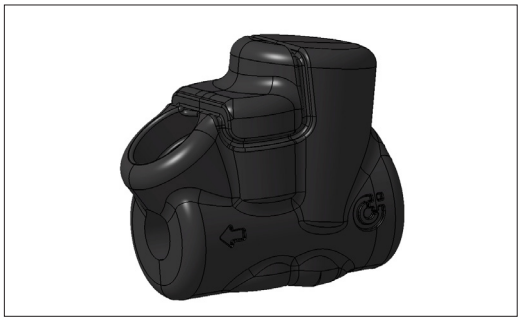
The following codes can be ordered separately for field installation with separately sourced low-lead close nipples.

Code **NA108**24.....1/2" FNPT

Code **NA108**25.....3/4" FNPT

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" with NPT female connections. 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 105–150°F (40 – 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. Provide with optional outlet temperature gauge with 30°F to 180°F (0°C-80°C) temperature scale. Provide with optional check valve. Provide with optional inlet and outlet low-lead brass full-port ball valves, NPT female x NPT female, for isolation, factory-assembled, or separately-sourced, Code NA108 series, with separately-sourced low-lead close nipples.
Pre-formed insulation shell is available for field installation.

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