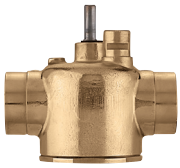
Z-one™ zone valves

Z series

01115/26 NA
Replaces 01115/23 NA



E239721
US LISTED
86BP

LOW LEAD

.US Patent 7,048,251

Function

Z-one™ valves are used to automatically shut-off the flow or redirect hot and chilled water in hydronic systems, open systems, closed systems, low-pressure steam; and are UL listed for plenum installations. The motorized two-position, on/off, spring return Z1 series actuator has an end mounted push button for quick installation to the valve body. The actuator is equipped with or without an auxiliary micro-switch and models are either normally closed or normally open and with wire or terminal connections. The high temperature zone valve body Z2 series is 2-way straight through and the valve body Z3 series is 3-way diverting or mixing. The Z1 series actuator is easily attached by a push button lock and requires no tools. The Z-one valve provides 100% bubble-tight seat close-off leakage. The high temperature and high close-off performance characteristics of these zone valves, combined with the compact size, makes them suitable to fit inside baseboards or directly in fan coil units. Z-one valves are available with ½ to 1 inch press fittings, a copper tail-piece with union nut, making installation and maintenance fast, easy and efficient. Special slots in the EPDM O-ring allows fluid to leak during system testing if unpressed and provide a perfect leak proof seal when completely pressed. Some models are low-lead brass, for domestic hot water applications.

Caleffi code 290030 full-port ball valve is designed for isolating the Z-one valve bodies 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.

Quick Order Code Numbers: 24VAC Normally Closed Actuator and 2-way Valve Body Combinations

Z45

Z55

Z55P

Code	Description	Connection
Z40	Z111500 with auxiliary switch, 18 inch wire connection + Z200043 flare body + NA61241 retrofit kit	Inverted
Z40F	Z111500 with auxiliary switch, 18 inch wire connection + Z200043 flare body + two NA10006 adapters	sweat ¾"
Z42	Z111500 with auxiliary switch, 18 inch wire connection + Z200053 flare body	½" SAE
Z44	Z111500 with auxiliary switch, 18 inch wire connection + Z200432 sweat body	½"
Z44P	Z111500 with auxiliary switch, 18 inch wire connection + Z200687 male union body + two NA16264 press fittings	½"
Z45	Z111500 with auxiliary switch, 18 inch wire connection + Z200537 sweat body	¾"
Z45P	Z111500 with auxiliary switch, 18 inch wire connection + Z200687 male union body + two NA16265 press fittings	¾"
Z45PL*	Z111500 with auxiliary switch, 18 inch wire connection + Z200687 male union body + one NA16265L press fitting + one NA16265 press fitting	¾"
Z46	Z111500 with auxiliary switch, 18 inch wire connection + Z200637 sweat body	1"
Z46P	Z111500 with auxiliary switch, 18 inch wire connection + Z200687 male union body + two NA16266 press fittings	1"
Z47	Z111500 with auxiliary switch, 18 inch wire connection + Z200737 sweat body	1 ¼"
Z50	Z151500 with auxiliary switch, screw terminal connection + Z200043 flare body + NA61241 retrofit kit	Inverted
Z50F	Z151500 with auxiliary switch, screw terminal connection + Z200043 flare body + two NA10006 adapters	sweat ¾"
Z54	Z151500 with auxiliary switch, screw terminal connection + Z200432 sweat body	½"
Z54P	Z151500 with auxiliary switch, screw terminal connection + Z200687 male union body + two NA16264 press fittings	½"
Z55	Z151500 with auxiliary switch, screw terminal connection + Z200537 sweat body	¾"
Z55P	Z151500 with auxiliary switch, screw terminal connection + Z300687 male union body + two NA16265 press fittings	¾"
Z55PL*	Z151500 with auxiliary switch, screw terminal connection + Z300687 male union body + one NA16265L press fitting + one NA16265 press fitting	¾"
Z55S	Z151500 with auxiliary switch, screw terminal connection + Z300687 male union body + two NA10003 swaet fittings	¾"
Z56	Z151500 with auxiliary switch, screw terminal connection + Z200637 sweat body	1"
Z56P	Z151500 with auxiliary switch, screw terminal connection + Z200687 male union body + two NA16266 press fittings	1"
Z57	Z151500 with auxiliary switch, screw terminal connection + Z200737 sweat body	1 ¼"

NA10005	Inverted flare nut with attached copper sweat tail piece	½"
NA10006	Inverted flare nut with attached copper sweat tail piece	¾"
NA10007	Inverted flare nut with attached copper sweat tail piece	1"
NA61241	Inverted flare extension adapter to retrofit body into an old style asymmetrical zone valve opening	Inverted
NA16264*	Copper press tail piece with 1" brass union nut	½"
NA16265*	Copper press tail piece with 1" brass union nut	¾"
NA16265L**	Extra long copper press tail piece with 1" brass union nut, for retrofit	¾"
NA16266*	Copper press tail piece with 1" brass union nut	1"

* Valve bodies field assembled with press tailpieces are rated to 200 psi (13 bar) maximum static pressure.
**Models with "L" suffix have one long tailpiece on outlet to provide extra long lay length for retrofit convenience.

Technical specification

Valve body

Material:	- body:	forged brass (optional low-lead brass*)
	- seat:	machined brass
	- stem:	stainless steel
	- two o-ring seals and paddle:	peroxide-cured EPDM
Flow:		1.0, 2.5, 3.5, 5.0, 7.5 Cv
Suitable fluids:		water and glycol, low pressure steam
Maximum percent of glycol:		50%
Temperature range:		32 to 240° F (0 to 115° C)
Max. static pressure:		15 psi (1 bar) steam
		300 psi (20 bar)
		200 psi (13 bar) max. for press models
Max. close-off Δ pressure:		20 to 75 psid (138 to 517 kPa)
Close-off seat leakage:		100% bubble-tight

Connection:	- sweat:	½", ¾" 1" & 1 ¼"
	- press:	½", ¾" & 1"
	- NPT female:	½", ¾" & 1"
	- SAE flare:	½"
	- inverted flare:	½", ¾" & 1" sweat, fittings separate
Lay length (press connections):		size ½ inch: 3 ½"
		size ¾ inch: 3 ⅝"
		size ¾ inch (PL)*: 5"
		size 1 inch: 4 ⅛"

*Complies with NSF/ANSI/CAN 372, Drinking Water System Components-Lead Content Reduction of Lead in Drinking Water Act, California Health and Safety Code 116875 S.3874, Reduction of Lead in Drinking Water Act, as certified by ICC-ES, file PMG-1360.

Actuator

Material:	- base and cover:	polycarbonate
	- base plate:	aluminum
Motor:	- AC voltage:	24 V - 120 V; 50/60 Hz
Power requirements:		5.0 W, 7 VA
Power connections:	- Terminal screws with auxiliary switch:	24 V only
	- Wire lead length:	18" (45 cm), 24 V only
		6" (15 cm), 120 V

Auxiliary micro-switch:
0.0 A min, 0.4 A max, 24 V (24V, except Z11900, actuators only)
0.25 A min, 5.0 A max, 230 V (120 V & Z111900 actuators)

Ambient temperature range:
32 to 104°F (0 to 40°C) 120 V actuators with micro-switch
32 to 125 °F (0 to 50°C) all models 24 V actuators
32 to 170°F (0 to 77°C) 120 V without micro-switch

Humidity:		95% non-condensing
Full Stroke Time:	- On:	<60 seconds
	- Off:	6 seconds

Approvals:	UL873, cUL Listed & CE
	UL 1995 sec. 18 approved for air plenum and ducts.
Environmental:	Indoor only

Power to Normally Open Actuators should be turned off during extended idle periods.

Z-one Normally Closed Actuators

Code	Description
Z111000	24V with auxiliary micro-switch 18" wire
Z119000	24V, high current switch, 18" wire
Z116000	120V with auxiliary micro-switch 6" wire
Z151000	24V w/auxiliary micro-switch terminal block
Z161000	24V w/o auxiliary micro-switch terminal block
Z121000	24V without auxiliary micro-switch 18" wire
Z126000	120V without auxiliary micro-switch 6" wire

Z-one Normally Open Actuators

Code	Description
Z131000	24V with auxiliary micro-switch 18" wire
Z136000	120V with auxiliary micro-switch 6" wire
Z141000	24V without auxiliary micro-switch 18" wire
Z146000	120V without auxiliary micro-switch 6" wire

Soft Close Z-one Normally Closed Actuators

Code	Description
Z111500	24V with auxiliary micro-switch 18" wire
Z151500	24V w/auxiliary micro-switch terminal block

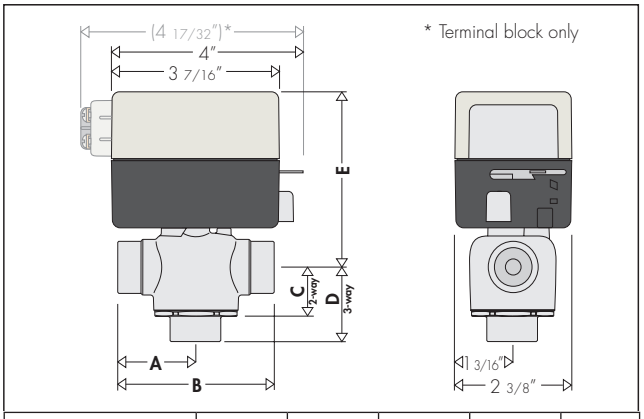
Z-one 2-way Valve Bodies

Code	Description	Cv	ΔP
Z200041	Inverted flare	1.0	75 psi
Z200042	Inverted flare	2.5	50 psi
Z200043	Inverted flare	3.5	30 psi
Z200053	1/2" SAE flare	3.5	30 psi
Z200411	1/2" NPT	1.0	75 psi
Z207411	1/2" NPT low-lead brass	1.0	75 psi
Z200412	1/2" NPT	2.5	50 psi
Z200413	1/2" NPT	3.5	30 psi
Z200431	1/2" sweat	1.0	75 psi
Z200432	1/2" sweat	2.5	50 psi
Z207433	1/2" sweat low-lead brass	3.5	30 psi
Z200512	3/4" NPT	2.5	50 psi
Z200513	3/4" NPT	3.5	30 psi
Z200515	3/4" NPT	5.0	25 psi
Z200517	3/4" NPT	7.5	20 psi
Z200532	3/4" sweat	2.5	50 psi
Z207533	3/4" sweat low-lead brass	3.5	30 psi
Z200535	3/4" sweat	5.0	25 psi
Z200537	3/4" sweat	7.5	20 psi
Z207537	3/4" sweat low-lead brass	7.5	20 psi
Z200617	1" NPT	7.5	20 psi
Z200635	1" sweat	5.0	25 psi
Z200637	1" sweat	7.5	20 psi
Z200737	1-1/4" sweat	7.5	20 psi
Z200683	1" male union	3.5	30 psi
Z200687	1" male union	7.5	20 psi

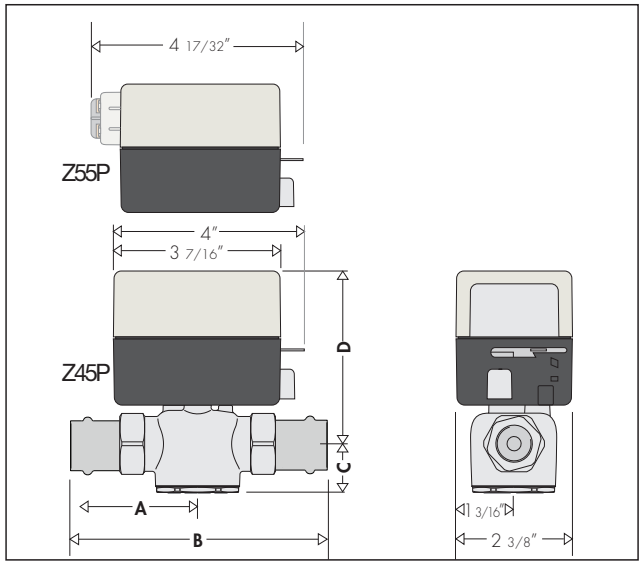
Z-one 3-way Valve Bodies

Code	Description	Cv	ΔP
Z300053	1/2" SAE flare	3.5	30 psi
Z300411	1/2" NPT	1.0	75 psi
Z300412	1/2" NPT	2.5	50 psi
Z300413	1/2" NPT	3.5	30 psi
Z300431	1/2" sweat	1.0	75 psi
Z300432	1/2" sweat	2.5	50 psi
Z307433	1/2" sweat low-lead brass	3.5	30 psi
Z300512	3/4" NPT	2.5	50 psi
Z300513	3/4" NPT	3.5	30 psi
Z300515	3/4" NPT	5.0	25 psi
Z300517	3/4" NPT	7.5	20 psi
Z300532	3/4" sweat	2.5	50 psi
Z300533	3/4" sweat	3.5	30 psi
Z300535	3/4" sweat	5.0	25 psi
Z307537	3/4" sweat low-lead brass	7.5	20 psi
Z300617	1" NPT	7.5	20 psi
Z300635	1" sweat	5.0	25 psi
Z300637	1" sweat	7.5	20 psi
Z300737	1-1/4" sweat	7.5	20 psi
Z300687	1" male union	7.5	20 psi

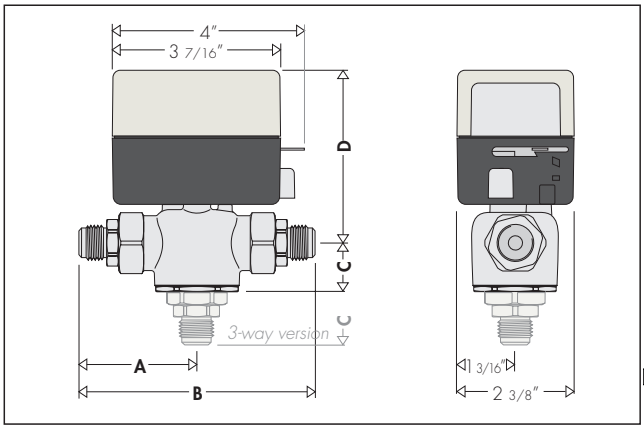
Dimensions

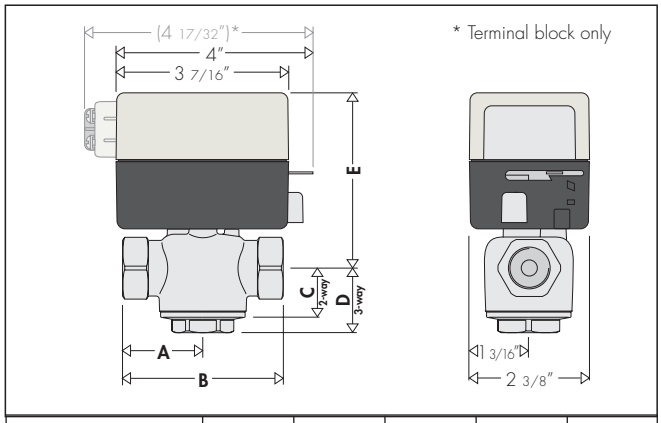


Connections	A	B	C	D	E
½" Sweat	$1^{5}/_{16}$"	$2^{5}/_{8}$"	$^{15}/_{16}$"	$1^{5}/_{16}$"	3½"
¾" Sweat	$1^{3}/_{8}$"	2¾"	$^{15}/_{16}$"	1½"	3½"
1" Sweat	$1^{11}/_{16}$"	$3^{3}/_{8}$"	$^{15}/_{16}$"	$1^{9}/_{16}$"	$3^{11}/_{16}$"
1¼" Sweat	$1^{13}/_{16}$"	$3^{5}/_{8}$"	$^{15}/_{16}$"	$1^{11}/_{16}$"	$3^{11}/_{16}$"

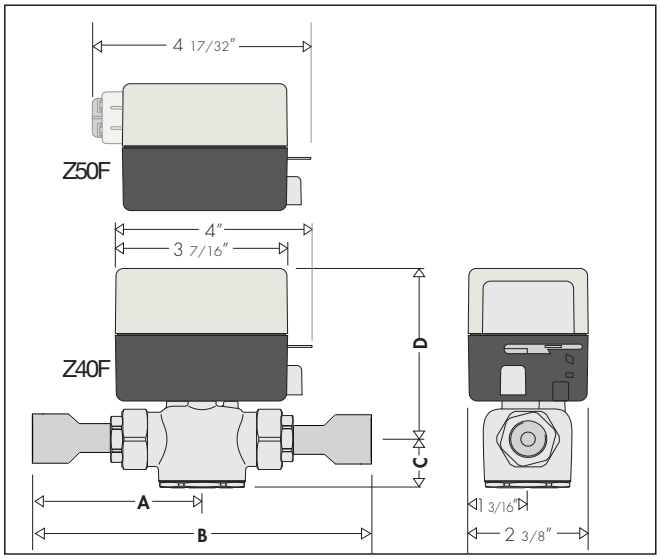


Connections	A	B	C	D
½" Press	2½"	5"	$^{15}/_{16}$"	3½"
¾" Press	$2^{13}/_{16}$"	$5^{5}/_{8}$"	$^{15}/_{16}$"	3½"
¾" Press (Long)	$2^{13}/_{16}$"	7"	$^{15}/_{16}$"	3½"
1" Press	$2^{15}/_{16}$"	$5^{7}/_{8}$"	$^{15}/_{16}$"	3½"





Connections	A	B	C	D	E
½" NPT Female	$1^{7}/_{16}$"	$2^{7}/_{8}$"	$^{15}/_{16}$"	1¼"	3½"
¾" NPT Female	$1^{9}/_{16}$"	$3^{1}/_{16}$"	$^{15}/_{16}$"	1¼"	$3^{11}/_{16}$"
1" NPT Female	$1^{13}/_{16}$"	$3^{5}/_{8}$"	$^{15}/_{16}$"	$1^{11}/_{16}$"	$3^{11}/_{16}$"
Inverted Flare	$1^{3}/_{8}$"	2¾"	$^{15}/_{16}$"	1¼"	3½"
w/ Adapter (NA61241)	$1^{3}/_{8}$"	3½"	$^{15}/_{16}$"	1¼"	3½"



Connections	A	B	C	D
Z40/50F ½" Sweat	$2^{7}/_{8}$"	5¾"	$^{15}/_{16}$"	3½"
Z40/50F ¾" Sweat	$3^{5}/_{16}$"	$6^{5}/_{8}$"	$^{15}/_{16}$"	3½"
Z40/50F 1" Sweat	$3^{5}/_{8}$"	6¾"	$^{15}/_{16}$"	3½"

*Inverted flare bodies (7/8" UNS female threads) with 2 attached copper sweat tailpieces:
½" = Z20004X + (2) NA10005 field assembled
¾" = Z20004Z + (2) NA10006, Z40F or Z50F Quick Order Codes
1" = Z20004X + (2) NA10007 field assembled

Connections	A	B	C	D
1/2" SAE Flare (2-way)	$2^{11}/_{32}$"	$4^{11}/_{16}$"	$^{15}/_{16}$"	3½"
1/2" SAE Flare (3-way)	$2^{11}/_{32}$"	$4^{11}/_{16}$"	$2^{1}/_{8}$"	3½"

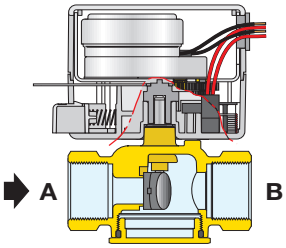
Operating principle

The Z-one actuator has a synchronous motor that winds the return spring and moves the valve paddle to the desired position. When power is removed the actuator spring returns the valve paddle. The Zone actuator is equipped with or without auxiliary micro-switch.

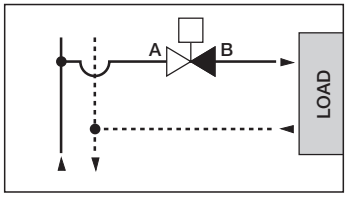
Operation of normally closed valve

	2-way	3-way
N.C. without power	Port “A” closed	Port “A” closed Port “B” open Port “AB” open
N.C. opened with power	Port “A” open	Port “A” open Port “B” closed Port “AB” open
N.C. manually opened	Port “A” open	Port “A” open Port “B” open Port “AB” open

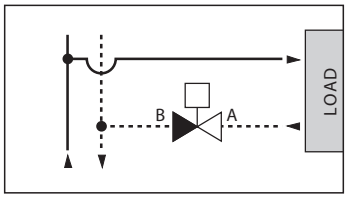
2-way
(with the power off, passage A is closed, when using a normally closed actuator)



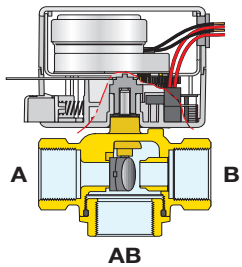
2-way installed on the flow side



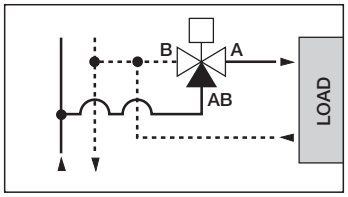
2-way installed on the return side



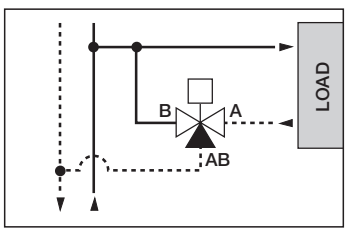
3-way
(with the power off, passage A is closed)



3-way installed on the flow side as a diverting valve configuration

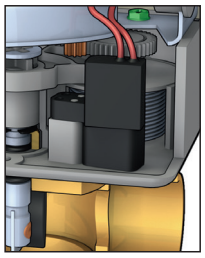


3-way installed on the return side as a mixing valve configeration



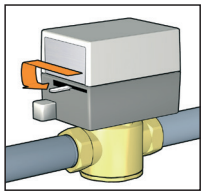
Construction details

• Auxiliary micro-switch



The actuator contains an auxiliary micro-switch to operate other devices. The 24 V actuators use a sealed reed switch, which has been produced specifically for use with relays, boiler contacts (TT) and DDC systems. It requires no minimum current load. The 120 V to 277 V actuators use a conventional micro-switch with silver contacts. The auxiliary micro-switch is activated when the valve is 60% open or when the actuator is manually opened.

• Manual opening (Normally closed actuator only)



Use the manual opening lever to open the valve. When the power is restored the manual control is automatically overridden. The auxiliary micro-switch in 24 V actuators is tripped when the unit is put into manual open position. This helps during start up to check if the wiring is correct without firing the valve electrically with the thermostat. Note: The manual open lever travels through nearly all of the actuator stroke, providing a good indicator of the valve's position.

• Easy push button

A simple push of the button makes it easy to remove the actuator from the body of the valve for maintenance or replacement operations. Warning: the actuator can only be used with valve bodies Z2-Z3 series.

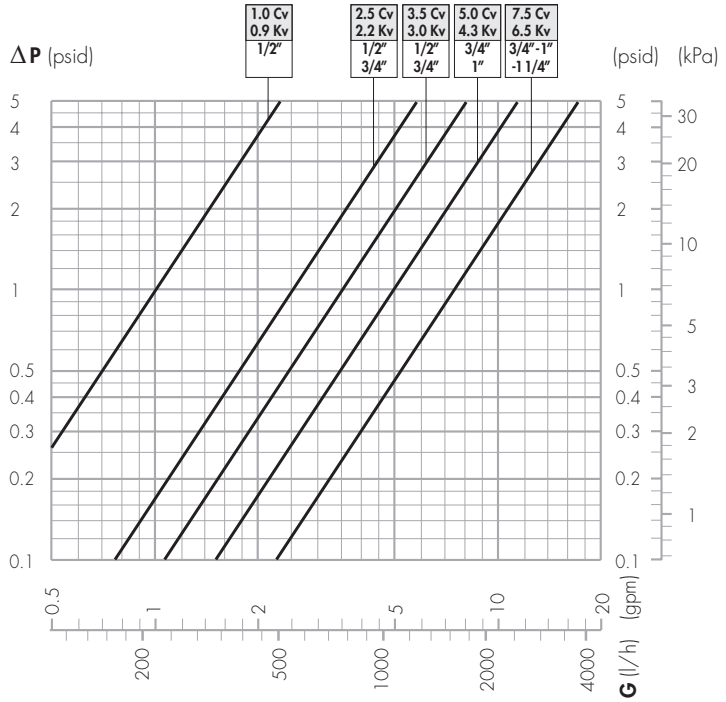
• Operation

The actuator uses a special mechanism for gradual movement of the valve paddle which provides smooth and quiet constant operation. Power-on full stroke run time is 60 seconds with 6 second power-off return time eliminating the effects of water hammer.

• Innovative motion

When power is delivered to the actuator, the motor drives a series of gears against a pre-wound torsion spring until it reaches its fully stroked position. When power is dropped to the actuator, the torsion spring back drives the motor and gear train until the unit returns to its normal position. A lost motion mechanism disengages the motor from the gear train at the end of stroke to prevent the impact that would occur in directly coupled gears. This allows the Z-one actuator to have high spring force resulting in higher close-off pressures without compromising motor and gear longevity.

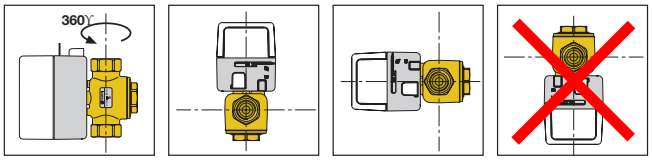
Hydraulic characteristics



Connection Size	Flow Coefficient	Max. Close-off ΔP	
		Standard Actuators	Soft Close Actuators Z111500 & Z151500
½"	1.0 Cv (0.9 Kv)	75 psi (517 kPa)	45 psi (310 kPa)
½" - ¾"	2.5 Cv (2.2 Kv)	50 psi (345 kPa)	30 psi (207 kPa)
½" - ¾"	3.5 Cv (3.0 Kv)	30 psi (207 kPa)	18 psi (124 kPa)
¾" - 1"	5.0 Cv (4.3 Kv)	25 psi (172 kPa)	15 psi (103 kPa)
¾" - 1" - 1 ¼"	7.5 Cv (6.5 Kv)	20 psi (138 kPa)	12 psi (83 kPa)

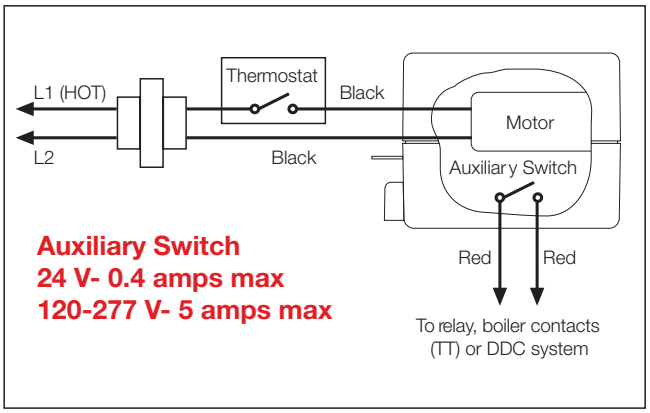
Installation

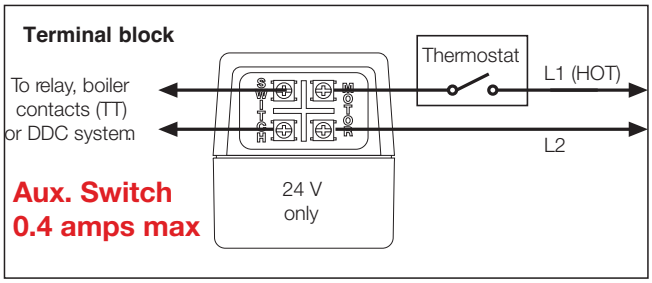
- The valve can be installed either vertically or horizontally, with the actuator in any position, **except upside down**.



- If it is installed inside an enclosure it is important to ensure that there is adequate ventilation inside the enclosure itself.
- The three-way valve cannot be transformed into a two-way valve and vice versa.
- When zone valves are installed, the direction of flow must be observed.
- Two-way zone valves can be installed either in the supply or return piping; the direction of flow indicated by the arrow on the body of the valve must be observed.
- Three-way zone valves use the normally closed actuator only (rotate 180° the valve body for normally open application).

Wiring diagram

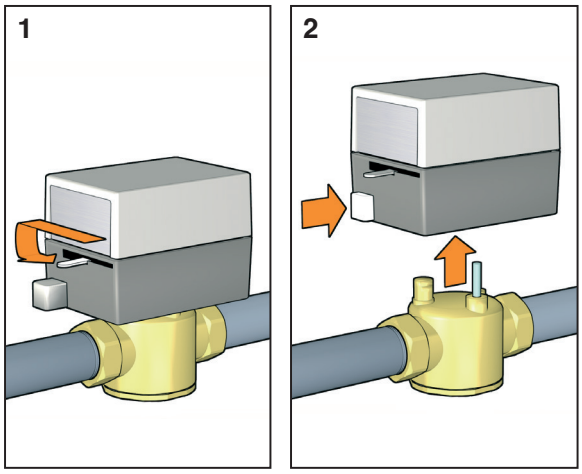




Remove the actuator

1. Move the manual open lever to the lock open position.

2. Press the push button in and pull the actuator up.

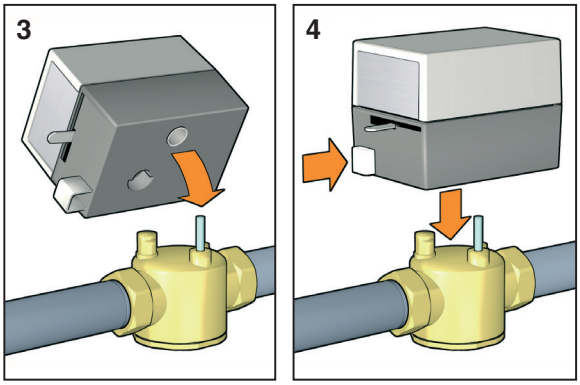


Install the actuator

1. Move the manual open lever to the lock open position.

3. Verify the correct position of the valve stem into the mating actuator hole. Move stem if required to allign.

4. Press the push button in and slide the actuator onto the valve body, release the push button.



Repair parts and accessories

Two-way and three-way zone valve body repair kit. Includes valve stem paddle with O-rings, C clip and one bottom cap O-ring.

Code	Description
F69293	Repair kit for all 1/2" & 3/4" sweat Z2, Z3 valves
F69294	Repair kit for 3/4" NPT and all 1" Z2, Z3 valves

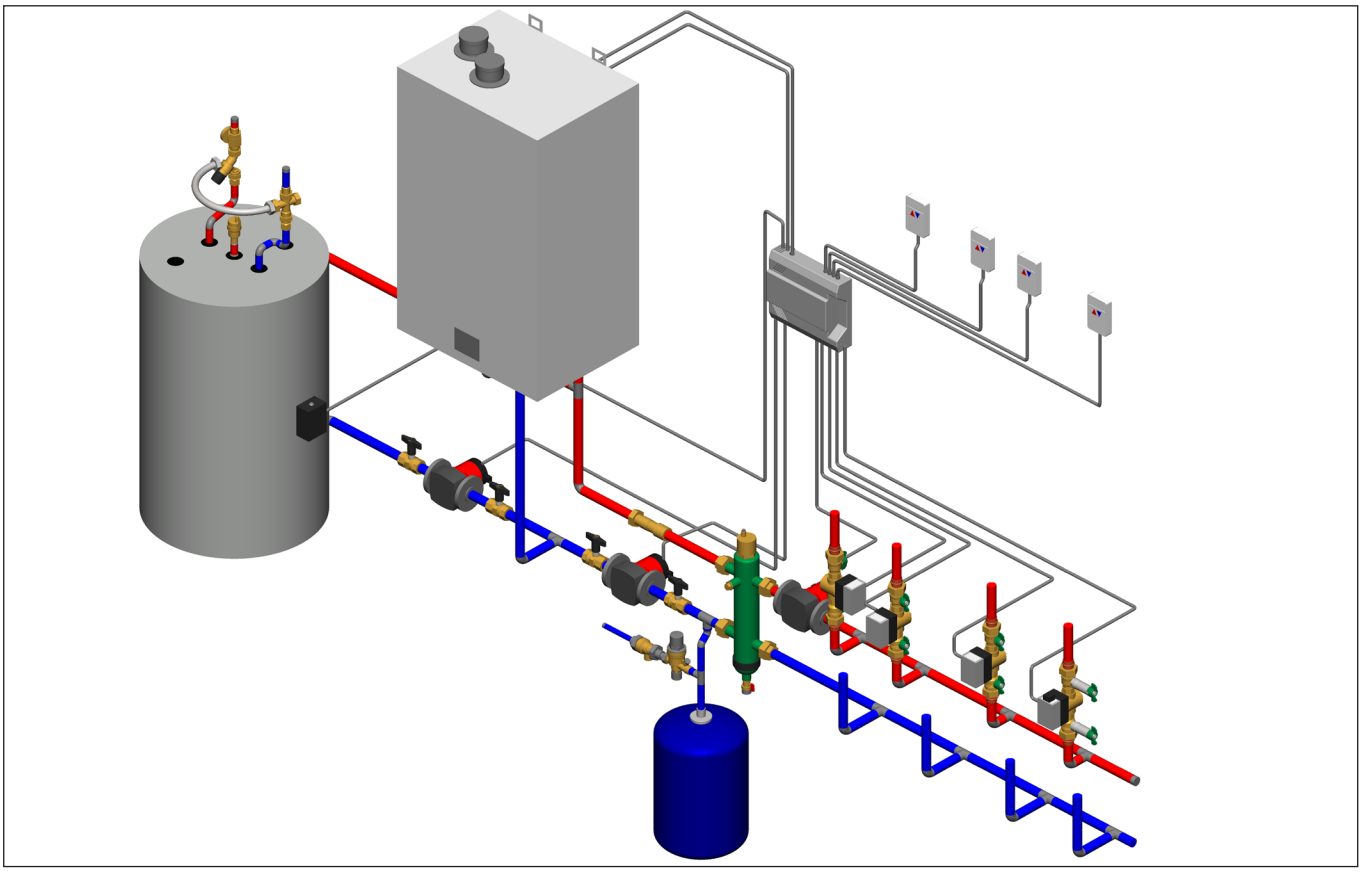
Isolation ball valve.
Low lead Male x Female union fits 1" valves between body and tailpiece. See below.

Code	Description	Lbs
290030	Isolation ball valve 1" M x 1" F union	1.0

For more information, consult Technical Brochure 1397-22.1 NA at www.caleffi.com

Isolation ball valves, installed on Z-one motorized zone valve.

NOTES



find BIM Revit files and system templates at
https://bim.caleffi.com/en-us

SPECIFICATION SUMMARY

The Z-one series two-position spring return with removable actuator zone valve. Z1 series actuator is normally closed (NC) or normally open (NO) 24 V to 120 V 50/60 Hz, 5 W, 7 VA, with or without auxiliary micro-switch {(24 V: 0.0 min, 0.4A max, 24 V) (120 V: 0.25A min, 5.0A max, 230 V)}, Auxiliary micro-switch for 24 V actuator is a sealed reed switch requiring no minimum current load, includes leads or terminal block (24 V only); Lost motion transmission disengagement actuation mechanism; Quick-connect actuator-to-valve body assembly (no fastener); ambient temperature from 32 to 104 deg F (0 to 40 deg C) for 120 V actuators with micro-switch; 32 to 125 deg F (0 to 50 deg C) for 24 V actuators; 32 to 170 deg F (0 to 77 deg C) for 120 V actuators without micro-switch. Z2 (2-way) series and Z3 (3-way) series are forged brass (2-way and 3-way 1/2” and 3/4” sweat valve bodies pn Z207411, Z207433, Z307433, Z207533, Z207537 and Z307537 are low-lead brass [<0.25% lead content] and complies with NSF/ANSI/CAN 372, low lead, as certified by ICC-ES, file PMG-1360). Valve body rated at 300 psi (20 bar), 15 psi (1 bar) steam, except models field assembled with optional press tailpieces rated at 200 psi (13 bar) maximum. Temperature rated 32 to 240 deg F (0 to115 deg C). Valve stem stainless steel, peroxide-cured EPDM seals, flows: 1.0, 2.5, 3.5, 5.0 or 7.5 Cv. Close-off seat leakage: 100% bubble-tight. Connections and sizes: 1/2”, 3/4", 1" and 1 1/4” sweat or 1/2”, 3/4" and 1" NPT female threads, 1/2" SAE flare, inverted flare, 1" straight male threaded union, and 1/2”, 3/4" and 1" press, PEX crimp or PEX expansion end connections with unions. Actuator approved to UL 873, cUL listed and CE, and UL 1995 section 18 air plenum and ducts rating. US Patent 7,048,251. Provide with optional inlet and outlet isolation ball valves, code 290030, separately sourced, field installed.

We reserve the right to make changes and improvements to the products and related data in this publication, at any time and without prior notice. The technical brochure on www.caleffi.com always has the most up-to-date version of the document, which should be used for technical verification.

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