Installation Instructions

Belimo Characterized Control Valves (CCV)

Belimo B2 and B3 Series

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

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Warnings, Cautions, and Notices

Read this manual thoroughly before operating or servicing this unit. Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert
NOTICE	Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs such as HCFCs and HFCs.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠ WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

⚠ WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury. Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/ sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labeling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**
- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

⚠ WARNING

Follow EHS Policies!

Failure to follow instructions below could result in death or serious injury.

- **All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Trane personnel should always follow local regulations.**

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Product Data

Belimo CCV provide optimum control of hot and/or chilled water flow in various heating and cooling applications such as variable air volume terminals, fan coil units, reheat coils, and perimeter heating systems.

Belimo water valves consists of either a 24 volt floating point control or an analog (2-10Vdc) control actuator offered in 2-way or 3-way flow pattern. 3-way valve provides flow control in mixing applications. They are designed so the actuator can be removed from valve without removing valve from piping.

Specifications

Supply Voltage: 24Vac, 50-60Hz
Power Consumption: 1 VA
Control Type: 24Vac 3-wire floating point or 2-10Vdc analog
Nominal 90° Valve Open Cycle Time: 90s @ 60Hz, 108s @ 50Hz
Electrical Termination: 8" plenum rated cable with AMP 172166-1 3-position connector
Operating Ambient Temperature: -30 to 50°C (-22 to 122°F)
Minimum and Maximum Fluid Temperature: 0 to 94°C (32 to 201°F)
Shipping and Storage Temperature: -40 to +80°C (-40 to 176°F)
Atmosphere: Non-corrosive, non-explosive
Close Off Pressure: 1.38 mPa (200 psi)
Rated Body Pressure: 4.14 mPa (600 psi)
Valve Body: Brass
Valve Ball: Chrome plated brass
Valve Ball Seals: PTFE+5% graphite
Valve Ball Stem: Nickel plated brass
Actuator Cover: Fire-retardant GRPA6-230
Actuator Chassis: Reinforced nylon GRPA6-230
Actuator Gear: GRPA6-230 + Brass HPb59-1 + iron-base powder metallurgy
Flow Characteristics: Linear, Equal Percentage

Note: *The specifications above are nominal and conform to generally acceptable industry standards. Belimo or Trane is not responsible for damages resulting from misapplication or misuse of its products.*

Table 1. Modulating CCV - 3-wire floating point

Type	X-Code	Kv	Cv	Thread	Pressure (Mpa)	
					Close off	Rated Body
2-way	X15333105010	0.26	0.30	1/2" NPT	1.4	4.14
	X15333105020	0.40	0.46			
	X15333105030	0.69	0.80			
	X15333105040	1.03	1.20			
	X15333105050	1.64	1.90			
	X15333105060	2.59	3.00			
	X15333105070	4.05	4.70			
3-way	X15333106010	0.26	0.30	1/2" NPT	1.4	4.14
	X15333106020	0.40	0.46			
	X15333106030	0.69	0.80			
	X15333106040	1.03	1.20			
	X15333106050	1.64	1.90			
	X15333106060	2.59	3.00			
	X15333106070	4.05	4.70			

Table 2. Modulating CCV - 2-10Vdc analog

Type	X-Code	Kv	Cv	Thread	Pressure (Mpa)	
					Close Off	Rated Body
2-way	X15333107010	0.26	0.30	1/2" NPT	1.4	4.14
	X15333107020	0.40	0.46			
	X15333107030	0.69	0.80			
	X15333107040	1.03	1.20			
	X15333107050	1.64	1.90			
	X15333107060	2.59	3.00			
	X15333107070	4.05	4.70			
3-way	X15333108010	0.26	0.30	1/2" NPT	1.4	4.14
	X15333108020	0.40	0.46			
	X15333108030	0.69	0.80			
	X15333108040	1.03	1.20			
	X15333108050	1.64	1.90			
	X15333108060	2.59	3.00			
	X15333108070	4.05	4.70			

Dimensions and Positions

Figure 1. Valve dimensions

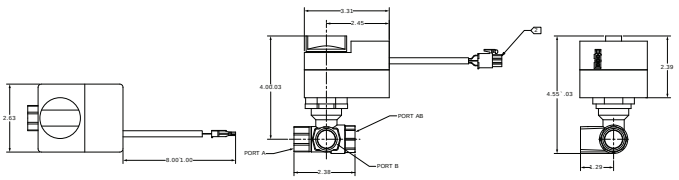
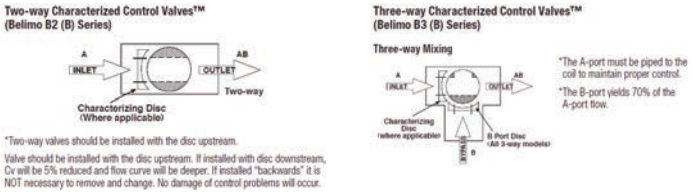


Figure 2. Flow pattern



Installation

⚠ WARNING

Hazardous Voltage!
Failure to disconnect power before servicing could result in death or serious injury.
Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

1. Read instructions carefully. Failure to follow them could damage the product or cause hazardous condition.
2. Check ratings given in instructions and on product to make sure the product is suitable for your application.
3. Installer must be a trained and experienced service technician.
4. See Figure 1 for actuator dimensions, and Figure 3 for exploded view.
5. Always conduct a thorough check-out when installation is completed.
6. While not necessary to remove the actuator from the body, it can be removed for ease of installation. The orientation of the actuator must be set as shown in Figure 2.
7. An extra 4 inches (101 mm) head clearance above the actuator is required to remove the actuator.

Note: *For trouble-free operation of the product, good installation practice must include initial system flushing, chemical water treatment, and the use of a 50 micron (or finer) system side stream filter(s).*

Figure 3. Valve - exploded view

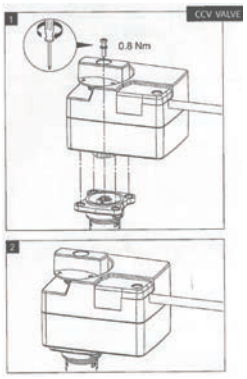
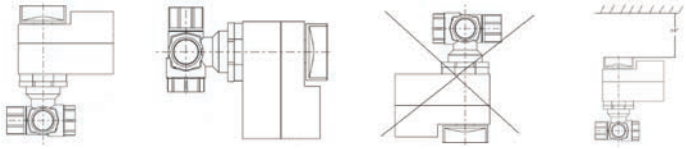


Figure 4. Installation guidelines



The manual lever on the actuator is used as a position indicator and as a manual opener for putting the valve in full open position to allow initial system flushing.

Do not use boiler additives, solder flux, and wetted materials. These are petroleum based or contain mineral oil, hydrocarbons, or ethylene glycol acetate. Compounds which can be used, with minimum 50% water dilution are diethylene glycol, ethylene glycol, and propylene glycol (antifreeze solution).

Plumbing

In mixing applications the valve is installed with inlet to A, bypass to B and outlet through AB.

For 2-way or 3-way control, mount the valve directly in the tube or pipe. Do not grip actuator while making and tightening up plumbing connections. Hold valve body in your hand or attach adjustable spanner across hexagonal or flat faces of valve body. If assembling valve train on a bench, take care not to deform body with vice. Excess jaw force can deform body.

Installing Replacement Actuator

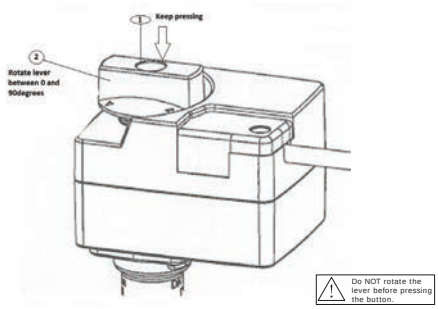
Note: *Installation of a new actuator does not require draining the system, provided the valve body remain in the pipeline.*

1. Check replacement part number and voltage ratings for match with old device.
2. Disconnect power supply before servicing to avoid electrical shock or equipment damage.
3. Disconnect lead wires to actuator. Where appropriate, label wires for rewiring.
4. Remove the screw attaching actuator to valve.
5. Install new actuator by matching the positions of the square shaft and actuator stem.
6. Match locating pins to mating holes.
7. Screw actuator to valve body hand tight.
8. Reconnect lead wires.
9. Restore power and check-out operation.

Manual Operation

The valve can be manipulated to any position manually as required. To manually operate the valve, simultaneously press the manual button and rotate the lever to the desired position (see Figure 5). The manual open position may be used for filling, venting and draining the system, or for opening the valve in case of power failure. The valve and actuator will return to the automatic position when power is restored.

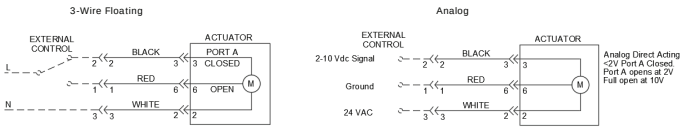
Figure 5. Manual operation



Wiring

One controller is required to operate each valve. A common controller may be used with isolation relays between each actuator. Actuator interaction can result otherwise. Figure 6 shows single unit wiring connections. Port "A" open and closed denote valve open and closed positions respectively.

Figure 6. Wiring diagram



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