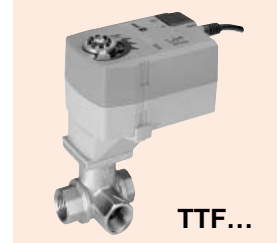
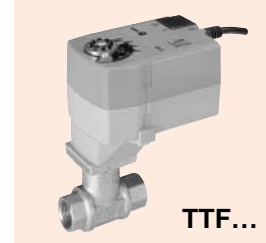




B2/B3 Series Characterized Control Valve,™ Spring Return Actuator

Two-way and Three-way Valves with **Chrome Plated Brass Ball and Brass Stem**, NPT Female Ends

Service	Chilled or hot water, 60% glycol
Flow Characteristic	A port equal percentage B port modified linear for constant flow.
Media Temp Range	0°F to 212°F [-18°C to 100°C]
Ambient Temp Range	-22°F to 122°F [-30°C to 50°C]
Maximum differential pressure (ΔP)	For characterized A-port 20 psi for typical applications For full flow versions only (no A-Disc) On/Off control 150 psi
C _v rating	A port as stated in chart B port is 48% to 70% of A port flow (see page106)
Leakage	0% for A to AB 0.5% to 2.0% B to AB



B2...B Two-way Characterized Control Valve, Chrome Plated Brass Ball and Brass Stem



Model # CCV Valve	C _v Rating	Valve		Close-Off psi	Spring Return Actuator		
		Nominal Size			On/Off	Floating	Proportional
		Inches	DN mm		TTFX24	TTF24-3	TTF24-SR
B207B	0.3	1/2"	15	200	<input type="checkbox"/> Pg 28	<input type="checkbox"/> Pg 30	<input type="checkbox"/> Pg 32
B208B	0.46	1/2"	15	200	<input type="checkbox"/> Pg 28	<input type="checkbox"/> Pg 30	<input type="checkbox"/> Pg 32
B209B	0.8	1/2"	15	200	<input type="checkbox"/> Pg 28	<input type="checkbox"/> Pg 30	<input type="checkbox"/> Pg 32
B210B	1.2	1/2"	15	200	<input type="checkbox"/> Pg 28	<input type="checkbox"/> Pg 30	<input type="checkbox"/> Pg 32
B211B	1.9	1/2"	15	200	<input type="checkbox"/> Pg 28	<input type="checkbox"/> Pg 30	<input type="checkbox"/> Pg 32
B212B	3.0	1/2"	15	200	<input type="checkbox"/> Pg 28	<input type="checkbox"/> Pg 30	<input type="checkbox"/> Pg 32
B213B	4.7	1/2"	15	200	<input type="checkbox"/> Pg 28	<input type="checkbox"/> Pg 30	<input type="checkbox"/> Pg 32
B214B	7.4	1/2"	15	200	<input type="checkbox"/> Pg 28	<input type="checkbox"/> Pg 30	<input type="checkbox"/> Pg 32
B215B*	10	1/2"	15	200	<input type="checkbox"/> Pg 28	<input type="checkbox"/> Pg 30	<input type="checkbox"/> Pg 32
B217B	4.7	3/4"	20	200	<input type="checkbox"/> Pg 28	<input type="checkbox"/> Pg 30	<input type="checkbox"/> Pg 32
B218B	7.4	3/4"	20	200	<input type="checkbox"/> Pg 28	<input type="checkbox"/> Pg 30	<input type="checkbox"/> Pg 32
B219B	10	3/4"	20	200	<input type="checkbox"/> Pg 28	<input type="checkbox"/> Pg 30	<input type="checkbox"/> Pg 32
B220B*	24	3/4"	20	200	<input type="checkbox"/> Pg 28	<input type="checkbox"/> Pg 30	<input type="checkbox"/> Pg 32
Electrical Connection					3 ft cable, 1/2" conduit fitting	3 ft cable, 1/2" conduit fitting	3 ft cable, 1/2" conduit fitting

* Models without characterizing discs.
See [pg 11](#) for corrected C_vs with piping reduction factor.

B3...B Three-way Characterized Control Valve, Chrome Plated Brass Ball and Brass Stem



Model # CCV Valve	C _v Rating	Valve		Close-Off psi	Spring Return Actuator		
		Nominal Size			On/Off	Floating	Proportional
		Inches	DN mm		TTFX24	TTF24-3	TTF24-SR
B307B	0.3	1/2"	15	200	<input type="checkbox"/> Pg 34	<input type="checkbox"/> Pg 36	<input type="checkbox"/> Pg 38
B308B	0.46	1/2"	15	200	<input type="checkbox"/> Pg 34	<input type="checkbox"/> Pg 36	<input type="checkbox"/> Pg 38
B309B	0.8	1/2"	15	200	<input type="checkbox"/> Pg 34	<input type="checkbox"/> Pg 36	<input type="checkbox"/> Pg 38
B310B	1.2	1/2"	15	200	<input type="checkbox"/> Pg 34	<input type="checkbox"/> Pg 36	<input type="checkbox"/> Pg 38
B311B	1.9	1/2"	15	200	<input type="checkbox"/> Pg 34	<input type="checkbox"/> Pg 36	<input type="checkbox"/> Pg 38
B312B	3.0	1/2"	15	200	<input type="checkbox"/> Pg 34	<input type="checkbox"/> Pg 36	<input type="checkbox"/> Pg 38
B313B	4.7	1/2"	15	200	<input type="checkbox"/> Pg 34	<input type="checkbox"/> Pg 36	<input type="checkbox"/> Pg 38
B315B*	10	1/2"	15	200	<input type="checkbox"/> Pg 34	<input type="checkbox"/> Pg 36	<input type="checkbox"/> Pg 38
B317B	4.7	3/4"	20	200	<input type="checkbox"/> Pg 34	<input type="checkbox"/> Pg 36	<input type="checkbox"/> Pg 38
B318B	7.4	3/4"	20	200	<input type="checkbox"/> Pg 34	<input type="checkbox"/> Pg 36	<input type="checkbox"/> Pg 38
B320B*	24	3/4"	20	200	<input type="checkbox"/> Pg 34	<input type="checkbox"/> Pg 36	<input type="checkbox"/> Pg 38
Electrical Connection					3 ft cable, 1/2" conduit fitting	3 ft cable, 1/2" conduit fitting	3 ft cable, 1/2" conduit fitting

* Models without characterizing discs.
See [pg 11](#) for corrected C_vs with piping reduction factor.

Options	TTFX24
120 VAC power supply	<input type="checkbox"/> Pg 28/34

Note: For TTF/TTR actuators, no weather shield available at this time. Call 800-543-9038

120711 - Subject to change.

B2...B Two-way Characterized Control Valve, Chrome Plated Brass Ball and Stem TTF Actuators, On/Off



Technical Data/Submittal



Valve Specifications

Service	chilled or hot water, 60% glycol
Flow characteristic	A port equal percentage
Action	max 95° rotation
Sizes	1/2" to 3/4"
Type of end fitting	female, NPT
Materials	
Body	forged brass, nickel plated
Ball	chrome plated brass
Stem	brass
Seats	PTFE
Characterizing disc	TEFZEL®
Packing	2 EPDM O-rings, lubricated
Pressure rating	600 psi
Ambient temp. range	-22°F to 122°F [-30°C to 50°C]
Media temp. range	0°F to 212°F [-18°C to 100°C]
Close off pressure	200 psi
Maximum differential pressure (ΔP)	for characterized A-port 20 psi for typical applications For full flow versions only (no A-disc) On/Off control 150 psi
Leakage	0%
Cv rating	A port: see product chart for values

Tefzel® is a registered trademark of DuPont.

Application

This valve is typically used in air handling units on heating or cooling coils, and fan coil unit heating or cooling coils. Some other common applications include unit ventilators and VAV box re-heat coils. This valve is suitable for use in a hydronic system with variable flow.

This valve is designed for on/off control using 24 VAC/DC or 100 to 240 VAC where fail safe is required.

Actuator Specifications

TTFX24

TTFX120

Control	On/Off
Power supply TTFX24	24 VAC ± 20%, 50/60Hz 24 VDC ± 10%
Power supply TTFX120	(nominal) 100 to 240 VAC, 50/60 Hz (tolerance) 85 to 265 VAC, 50/60 Hz
Power consumption	running: 2.5 W holding: 1.3 W
Transformer sizing	5 VA (class 2 power source)
Electrical connection	3 ft, 18 GA appliance cable 1/2" conduit connector
Overload protection	electronic throughout 0° to 95° rotation
Angle of rotation	90°, adjust. with mechanical stop
Direction of rotation	reversible with cw/ccw mounting
Position indication	visual indicator, 0° to 95° (0° spring return position)
Running time	motor: < 75 sec (0 to 18 in-lb) spring: < 75 sec @-22°F to +122°F [-20°C to +50°C]
Humidity	5% to 95% RH non-condensing
Ambient temperature	-22°F to +122°F [-30°C to +50°C]
Storage temperature	-40°F to +176°F [-40°C to +80°C]
Housing	NEMA type 2 / IP42
Housing material	UL94 - 5VA
Agency listings	cULus listed acc. to UL 60730-1/-2-14 and CAN/CSA C22.2 No.24, CE according to 73 / 23 / EEC
Noise level	max: running < 40 db (A) spring return < 40 dB (A)
Quality standard	ISO 9001

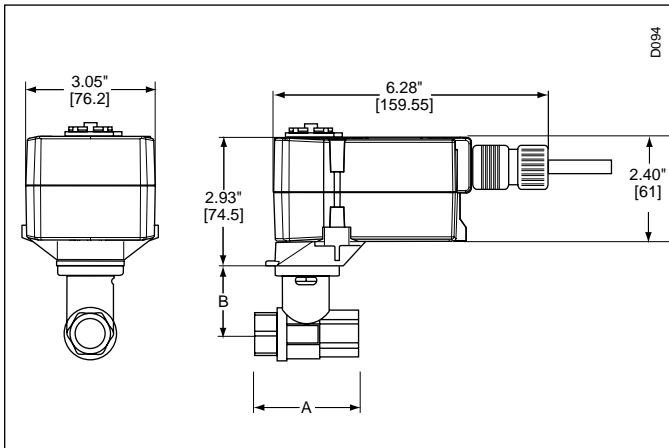




B2...B Two-way Characterized Control Valve, Chrome Plated Brass Ball and Stem TTF Actuators, On/Off

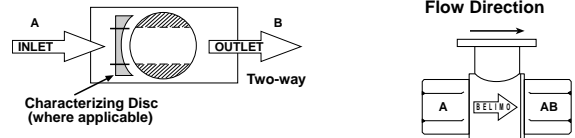
Technical Data/Submittal

Dimensions



Valve Body	Nominal Valve Size		Dimensions in Inches [mm]	
	in	[mm]	A	B
B207B-B211B	1/2"	15	2.40" [61.1]	1.39" [35.3]
B212B-B215B	1/2"	15	2.38" [60.5]	1.78" [45.2]
B217B-B220B	3/4"	20	2.72" [69.3]	1.86" [47.4]

Flow Pattern



Wiring Diagrams

CAUTION

- Equipment damage! Actuators may be connected in parallel. Power consumption must be observed.

INSTALLATION NOTES

- Actuators may also be powered by 24 VDC.

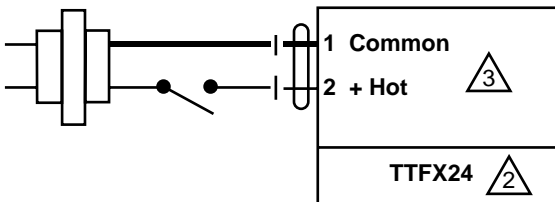
APPLICATION NOTES

- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

WARNING

Live Electrical Components!
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

24 VAC Transformer

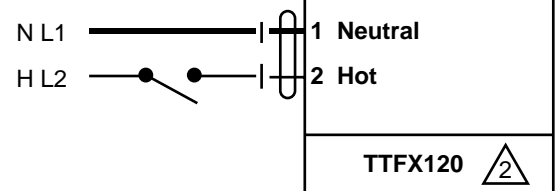


On/Off wiring for TTFX24

WARNING

Live Electrical Components!
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

100 to 240 VAC



On/Off wiring for TTFX120

Default Set-Up

	Two-way Valve (Default)	Two-way valve (Specify upon ordering)	Three-way Valve (Default)	Three-way Valve (Specify upon ordering)
Non-Spring Return - Stays in last position	TTR24-3-T	Power to pin 2 will drive valve CCW. Power to pin 3 will drive valve CW.	Power to pin 2 will drive valve CCW. Power to pin 3 will drive valve CW.	
	TTR24-SR-T	NC: Closed A to AB, will open as voltage increases.	NO: Open A to AB, will close as voltage increases. (Can be chosen with switch inside terminal block of actuator).	NC: Closed A to AB, will open as voltage increases. NO: Open A to AB, will close as voltage increases. (Can be chosen with switch inside terminal block of actuator).
	TLRB24-3, TLRB24-SR, TARB24-3,	Power to pin 2 will drive valve CCW. Power to pin 3 will drive valve CW.	NO: Open A to AB, will close as voltage increases or power applied. (Can be chosen with CW/CCW switch).	Power to pin 2 will drive valve CCW. Power to pin 3 will drive valve CW.
Spring Return - Note Fail Position	TTFX24 TLF24 TAF24	NO/FO Valve: Open A to AB will drive closed. Spring Action: Will spring open A to AB upon power loss.	NC/FC Valve: Closed A to AB will drive open. Spring Action: Will spring closed A to AB upon power loss.	NO/FO Valve: Open A to AB will drive closed. Spring Action: Will spring open A to AB upon power loss. NC/FC Valve: Closed A to AB will drive open. Spring Action: Will spring closed A to AB upon power loss.
	TTF (-3), SR TLF (-3), SR TAF (-3), SR Floating or proportional type actuators	NC/FO Valve: Closed A to AB will drive open. Spring Action: Will spring open A to AB upon power loss.	NC/FC or NO/FC Valve: Closed A to AB or Open A to AB (Can be chosen with CW/CCW switch). Spring Action: Will spring closed A to AB upon power loss. NO/FO Valve: Open A to AB Spring Action: Will spring open A to AB upon power loss. (NO action can be chosen with CW/CCW switch).	NC/FO Valve: Closed A to AB will drive open. Spring Action: Will spring open A to AB upon power loss. NC/FC or NO/FC Valve: Closed A to AB or Open A to AB (Can be chosen with CW/CCW switch). Spring Action: Will spring closed A to AB upon power loss. NO/FO Valve: Open A to AB Spring Action: Will spring open A to AB upon power loss. (NO action can be chosen with CW/CCW switch).

General Wiring Instructions


WARNING The wiring technician must be trained and experienced with electronic circuits. Disconnect power supply before attempting any wiring connections or changes. Make all connections in accordance with wiring diagrams and follow all applicable local and national codes. Provide disconnect and overload protection as required. Use copper, twisted pair, conductors only. If using electrical conduit, the attachment to the actuator must be made with flexible conduit.

Always read the controller manufacturer's installation literature carefully before making any connections. Follow all instructions in this literature. If you have any questions, contact the controller manufacturer.

Transformer(s)

Actuators require a 24 VAC class 2 transformer and draws a maximum of 10 VA per actuator. The actuator enclosure

cannot be opened in the field, there are no parts or components to be replaced or repaired.

- EMC directive: 89/336/EEC
- Software class A: Mode of operation type 1
- Low voltage directive: 73/23/EEC



CAUTION: It is good practice to power electronic or digital controllers from a separate power transformer than that used for actuators or other end devices. The power supply design in our actuators and other end devices use half wave rectification. Some controllers use full wave rectification. When these two different types of power supplies are connected to the same power transformer and the DC commons are connected together, a short circuit is created across one of the diodes in the full wave power supply, damaging the controller. Only use a single power transformer to power the controller and actuator if you know the controller power supply uses half wave rectification.

Electronic Characterized Control Valves™

B2/B3 Series Characterized Control Valves™

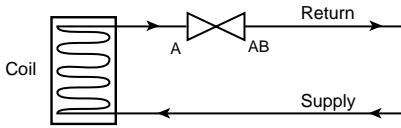


Operation/Installation

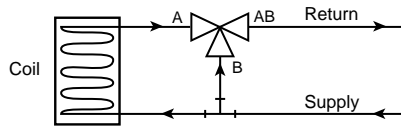
Correct Piping:

2-way valves should be installed with the disc upstream. If installed with disc downstream, flow curve will be deeper. If installed “backwards” it is NOT necessary to remove and change. No damage or control problems will occur.

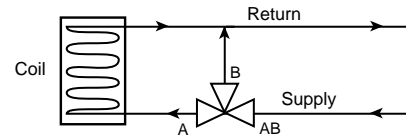
Two-Way Valve Piping Diagram
(1 Input, 1 Output)



Three-Way Mixing Valve Piping Diagram
(2 Inputs, 1 Output)



Three-Way Diverting Valve Piping Diagram
(1 Input, 2 Outputs)



3-way valves must be piped correctly. They can be mixing or diverting. Mixing is the preferred piping arrangement.

The Characterized Control Valve is a CONTROL valve, not a manual valve adapted for actuation. The control port is the A port. It is similar to the globe valve in that the middle port is the B or bypass port. The common port AB is on the main opposite the A port. These diagrams are for typical applications only. Consult engineering specification and drawings for particular circumstances.

Reduced B Port Flow

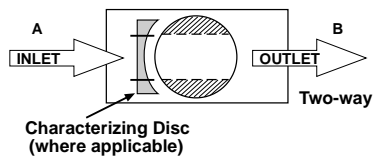
Note: The B port flow of the 3-way CCV is lower than that of the A port. In most applications this is beneficial since the reduced flow compensates for the in-existent pressure drop across the coil in the bypass mode. Therefore, proper sizing is important to avoid flow noise in particular when the system is designed with constant speed pumps.

The flow velocity in the pipe upstream and downstream of the valve should be considered as well. The typical HVAC design maximum flow is 4 to 8 ft/s to avoid noise issues.

Also the pipe reduction factor on page 11 must be considered. Pipe reducers decrease the Cv value of a valve and consequently increase the pressure drop across the valve. A situation that could lead to noise or a lower than designed flow.

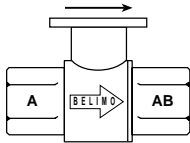
Flow Pattern

Two-way Characterized Control Valves™ (B2 Series) (B6 Series)

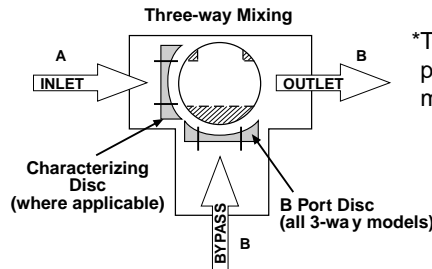


*Two-way valves should be installed with the disc upstream.

Flow Direction



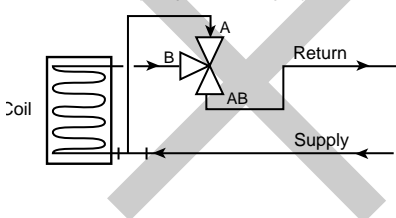
Three-way Characterized Control Valves™ (B3 Series)



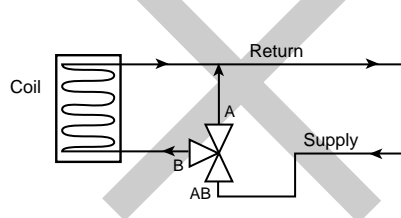
*The A port must be piped to the coil to maintain proper control.

Incorrect Piping:

Three-Way Mixing Valve Piping Diagram
(2 Inputs, 1 Output)



Three-Way Diverting Valve Piping Diagram
(1 Input, 2 Outputs)



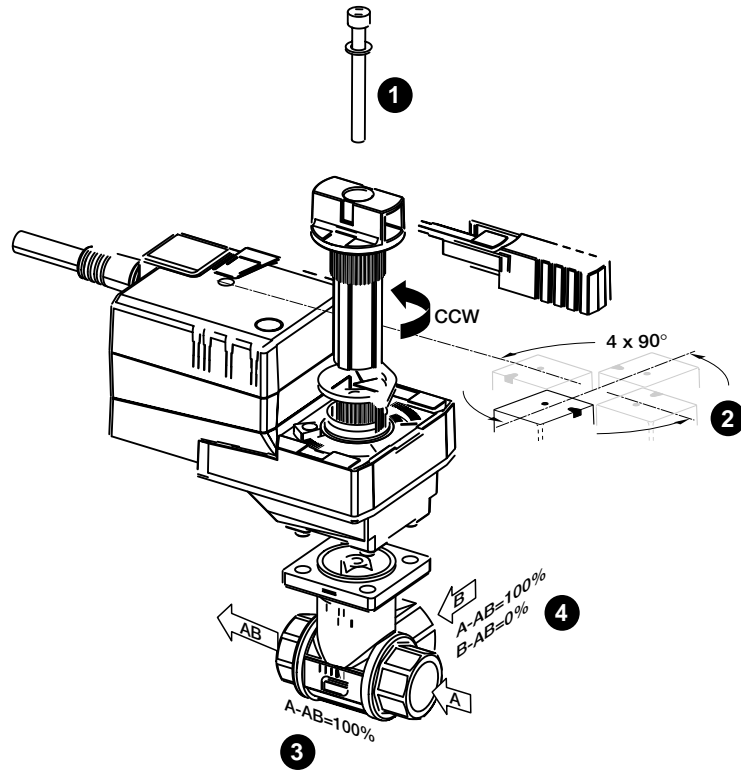
WARNING! Do Not Pipe in this manner! Note Valve Porting! The A port must be piped to the coil! Not the B port!

Flow is not possible from A to B. If AB port is not piped as the common port, the valve must be re-piped. It is good practice to install a balancing valve in the bypass line. These valves are intended for closed loop systems. Do not install in an open loop system or in an application that is open to atmospheric pressure.

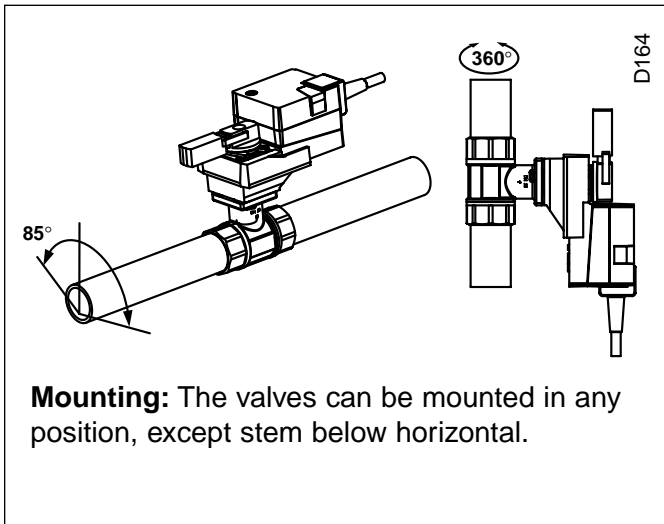
Assembly

- 1 One screw attaches actuator to valve
- 2 Four actuator mounting positions
- 3 2-way flow pattern
- 4 3-way flow pattern (mixing shown)
- 5 Top of valve stem indicates direction of flow (Flow A to AB shown)

Note: For diverting flow, flow enters in AB and diverts to A and B ports.



Mounting



Mounting: The valves can be mounted in any position, except stem below horizontal.