

Chrome Plated Brass Ball and Nickel Plated Brass Stem









Technical data

Functional data

Valve Size	0.5" [15]	
Fluid	chilled or hot water, up to 60% glycol	
Fluid Temp Range (water)	0250°F [-18120°C]	
Body Pressure Rating	600 psi	
Close-off pressure Δps	200 psi	
Flow characteristic	A-port Equal percentage; B-port modified linear for constant flow	
Servicing	maintenance-free	
Flow Pattern	3-way Mixing/Diverting	
Leakage rate	0% for A – AB, <2.0% for B – AB	
Controllable flow range	75°	
Cv	1.9	
Body pressure rating note	600 psi	
Cv Flow Rating	A-port: as stated in chart B-port: 70% of A – AB Cv	
Valve body	Nickel-plated brass body	
Stem seal	EPDM (lubricated)	
Seat	PTFE	
Pipe connection	NPT female ends	
O-ring	EPDM (lubricated)	
Ball	chrome plated brass	
Non-Spring	TR LRB(X)	

Suitable actuators



Materials

• WARNING: This product can expose you to lead which is known to the State of California to cause cancer and reproductive harm. For more information go to www.p65warnings.ca.gov

Product features

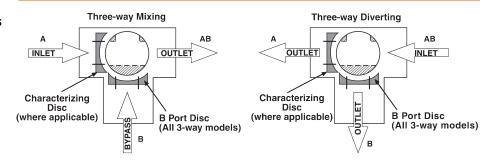
Safety notes

Application

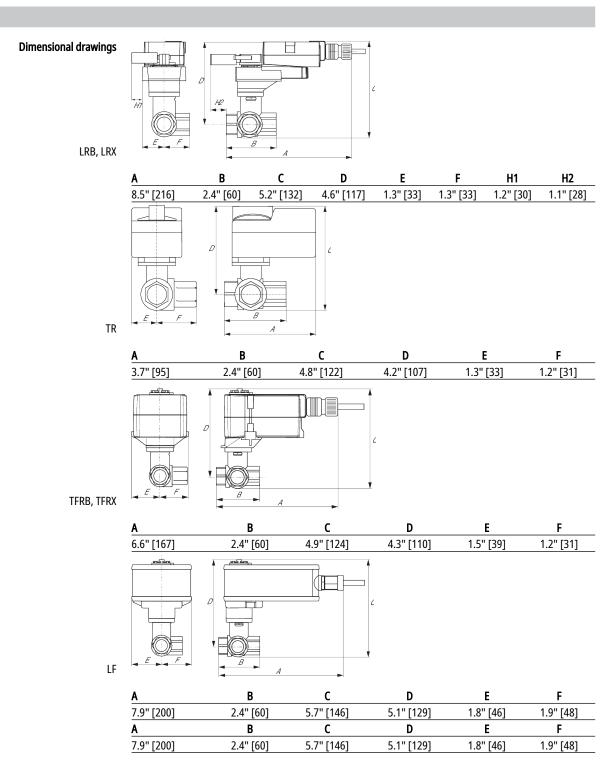
This valve is typically used in air handling units on heating or cooling coils, and fan coil unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV box re-heat coils and bypass loops. This valve is suitable for use in a hydronic system with variable or constant flow.

Technical data sheet B311B

Flow/Mounting details

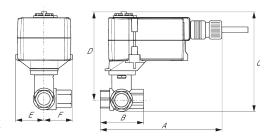


Dimensions





Technical data sheet B311B



TFRB, TFRX

Α	В	С	D	E	F
6.6" [167]	2.4" [60]	4.9" [124]	4.3" [110]	1.5" [39]	1.2" [31]

Technical data sheet

Modulating, Spring Return, AC 24 V for DC 2...10 V or 4...20 mA Control Signal





TFRB24-SR



_		
IAC	hnica	しんつけつ
ICL	IIIILa	ıuau

Connector				
Power consumption in operation Power consumption in rest position Transformer sizing Electrical Connection Overload Protection Overload Protection Punctional data Operating range Y Operation Vol. 1 mol. 2.5 mol. 2.10 V (0.1 mA), 500 Ω for 420 Position feedback U Operating range Y Operation Vol. 1 mol. 2.0 V (0.1 mA), 500 Ω (0.1 mA), 50	Electrical data	Nominal voltage	AC/DC 24 V	
Power consumption in rest position Transformer sizing Electrical Connection Diectrion Degrating range Y Operating range Y Operating range Y Operating range Y Operating range Y Position feedback U Position feedback U Direction of motion motor Direction of motion fail-safe Angle of rotation note Running Time (Motor) Running Time (Motor) Running time fail-safe Noise level, fail-safe Position indication Safety data Safety data Pegree of protection NEMA/UL Agency Listing Quality Standard Ambient temperature Quality Standard Ambient temperature Ambient temperature Ambient temperature Ambient temperature Ambient temperature Aux Operating Aux Operating Name Source 18 GA plenum cable, 3 ft [1 m], with 1/2" cor connector 18 GA plenum cable, 3 ft [1 m], with 1/2" cor connector 18 GA plenum cable, 3 ft [1 m], with 1/2" cor connector 18 GA plenum cable, 3 ft [1 m], with 1/2" cor connector 210 V Operating range Y 210 V Operating name y/ 210 V (0.1 mA), 500 Ω for 420 Ava20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor) Input Impedance 100 kΩ for 210 V (0.1 mA), 500 Ω for 420 Ama, 25 on Ω		Nominal voltage frequency	50/60 Hz	
Transformer sizing 4 VA (class 2 power source) Electrical Connection 18 GA plenum cable, 3 ft [1 m], with 1/2" corconnector Overload Protection electronic throughout 095° rotation Functional data Operating range Y 210 V Operating range Y 100 kΩ for 210 V (0.1 mA), 500 Ω for 420 mA w/ ZG-R01 (500 Ω, 1/4 W resistor) Input Impedance 100 kΩ for 210 V (0.1 mA), 500 Ω for 420 mA w/ ZG-R01 (500 Ω, 1/4 W resistor) Input Impedance 100 kΩ for 210 V Position feedback U 100 max. 0.5 mA Direction of motion motor selectable with switch 0/1 Direction of motion fail-safe reversible with cw/ccw mounting Angle of rotation mote 90° Running Time (Motor) 95 s Running Time (Motor) 95 s Running time fail-safe <25 s tamb = 68°F [20°C] Noise level, motor 35 dB(A) Noise level, fail-safe 62 dB(A) Position indication Mechanical Safety data Degree of protection IEC/EN IP42 Degree of protection NEMA/UL NEMA 2 UL Enclosure Type 2 CULus acc. to UL60730-1AV-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201 EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Quality Standard ISO 9001 Ambient temperature -22122°F [-3050°C] Storage temperature -40176°F [-4080°C] Ambient humidity max. 95% r.H., non-condensing		Power consumption in operation	2 W	
Electrical Connection Deveload Protection Punctional data Operating range Y Operating Y Operating range Y Operating Y Oper		Power consumption in rest position	1 W	
connector Functional data Operating range Y 210 V Operating range Y note 420 mA w/ ZG-R01 (500 Ω, 1/4 W resistor) Input Impedance 100 kΩ for 210 V (0.1 mA), 500 Ω for 420 Position feedback U 210 V Position feedback U note Max. 0.5 mA Direction of motion motor selectable with switch 0/1 Direction of motion fail-safe reversible with cw/ccw mounting Angle of rotation Max. 95°, 90° Angle of rotation note 90° Running Time (Motor) 95 s Running time fail-safe <25 s tamb = 68°F [20°C]		Transformer sizing	4 VA (class 2 power source)	
Functional data Operating range Y Operating range Y note Input Impedance Input Impedance Input Impedance Input Impedance Position feedback U Operating range Y note Input Impedance Input Impedance Input Impedance Operating range Y note Input Impedance Input Impedance Input Impedance Operating range Y note Input Impedance Input Impedance Input Impedance Input Impedance Input Impedance Operating range Y note Input Impedance Input Impedance Input Impedance Operating range Y a20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor) Input Impedance Input		Electrical Connection	18 GA plenum cable, 3 ft [1 m], with 1/2" conduit connector	
Operating range Y note Input Impedance Position feedback U Position feedback U Position feedback U note Direction of motion motor Direction of motion fail-safe Angle of rotation note Running Time (Motor) Running time fail-safe Noise level, fail-safe Position indication Safety data Degree of protection IEC/FN Degree of protection NEMA/UL Agency Listing Quality Standard Ambient temperature Storage temperature Ambient humidity Auguanto Max. 95 (C.1) (1.00 Mc) (0.1 mA), 500 Ω for 420 A20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) A20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) A20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) A20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) A20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) Ama. 20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) Amax. 20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) Amax. 20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) Amax. 20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) Amax. 20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) Amax. 20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) Amax. 20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) Amax. 20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) Amax. 20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) Amax. 20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) Amax. 20 mA w / ZG-R01 (500 Ω, 1/4 W resistor) Amax. 20 mA w / Zo-R01 (100 N) Amax. 25 s tamb = 68°F (20°C) Ambient humidity A20 mA w / Z-R01 (500 Ω, 1/4 W resistor) Ambient humidity A20 mA w / Z-R01 (500 Ω, 1/4 W resistor) Ambient humidity A20 mA w / Z-R01 (100 Ω, 1/4 W resistor) Ambient humidity A20 mA w / Z-R01 (100 Ω, 1/4 W resistor) A20 mA w / Z-R01 (100 Ω, 1/4 W resistor) A20 mA w / Z-R01 (100 Ω, 1/4 W resistor) Amax. 25 mA A20 mA w / Z-R01 (100 N)		Overload Protection	electronic throughout 095° rotation	
Input Impedance Position feedback U Position feedback U Position feedback U note Position of motion motor Direction of motion motor Angle of rotation Angle of rotation note Running Time (Motor) Noise level, motor Safety data Safety data Degree of protection IEC/EN Degree of protection NEMA/UL Agency Listing Quality Standard Quality Standard Ambient temperature Angle of Runnior Runnior Impedance Amax. 95°, 90° Angle of rotation note 90° Running Time (Motor) 95 s Running Time (Motor) 95 s Running Time (Motor) 95 s Running time fail-safe 425 s tamb = 68°F [20°C] Abax. 95°, 90° Angle of rotation note 90° Running Time (Motor) 95 s Running Time (Motor) 96 c V=25 s tamb = 68°F [20°C] V=20°C] V=20°C = 40°C = 4	Functional data	Operating range Y	210 V	
Position feedback U Position feedback U note Direction of motion motor Direction of motion fail-safe Angle of rotation Angle of rotation note Running Time (Motor) Safety data Safety data Degree of protection IEC/EN Degree of protection NEMA/UL Agency Listing Quality Standard Ambient temperature Ambient temperature Ambient temperature Direction of motion motor Amax. 95%, 90° Angle of rotation note 90° Running Time (Motor) 95 s Running Time (Motor) 95 s Running time fail-safe 425 s tamb = 68°F [20°C] Noise level, fail-safe 62 dB(A) Position indication Mechanical IP42 Degree of protection IEC/EN IP42 CULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201 EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC and Section 602.2 of the IMC Quality Standard Ambient temperature -22122°F [-3050°C] Ambient humidity max. 95% r.H., non-condensing		Operating range Y note	420 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)	
Position feedback U note Direction of motion motor Direction of motion fail-safe Angle of rotation Angle of rotation note Running Time (Motor) Running time fail-safe Noise level, motor Noise level, fail-safe Degree of protection IEC/EN Degree of protection NEMA/UL Agency Listing Quality Standard Ambient temperature Ambient temperature Angle of rotation motor Angle of rotation note 90° Running Time (Motor) 95 s		Input Impedance	100 k Ω for 210 V (0.1 mA), 500 Ω for 420 mA	
Direction of motion motor Direction of motion fail-safe Angle of rotation Angle of rotation note Running Time (Motor) Running time fail-safe Noise level, motor Noise level, fail-safe Position indication Safety data Safety data Degree of protection IEC/EN Degree of protection NEMA/UL Agency Listing Agency Listing Degree of protection Section 602.2 of the IMC Quality Standard Ambient temperature Storage temperature Agency Listing Direction of motion motor Max. 95°, 90° Ambient humidity Max. 95°, 90° And x.		Position feedback U	210 V	
Direction of motion fail-safe reversible with cw/ccw mounting Angle of rotation Max. 95°, 90° Angle of rotation note 90° Running Time (Motor) 95 s Running time fail-safe <25 s tamb = 68°F [20°C] Noise level, motor 35 dB(A) Noise level, fail-safe 62 dB(A) Position indication Mechanical Safety data Degree of protection IEC/EN IP42 Degree of protection NEMA/UL NEMA 2 UL Enclosure Type 2 Agency Listing cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201 EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Quality Standard ISO 9001 Ambient temperature -22122°F [-3050°C] Storage temperature -40176°F [-4080°C] Ambient humidity max. 95% r.H., non-condensing		Position feedback U note	Max. 0.5 mA	
Angle of rotation Max. 95°, 90° Angle of rotation note 90° Running Time (Motor) 95 s Running time fail-safe <25 s tamb = 68°F [20°C] Noise level, motor 35 dB(A) Noise level, fail-safe 62 dB(A) Position indication Mechanical Safety data Degree of protection IEC/EN IP42 Degree of protection NEMA/UL NEMA 2 UL Enclosure Type 2 Agency Listing cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201 EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Quality Standard ISO 9001 Ambient temperature -22122°F [-3050°C] Storage temperature -40176°F [-4080°C] Ambient humidity max. 95% r.H., non-condensing		Direction of motion motor	selectable with switch 0/1	
Angle of rotation note Running Time (Motor) 95 s Running time fail-safe <25 s tamb = 68°F [20°C] Noise level, motor 35 dB(A) Noise level, fail-safe 62 dB(A) Position indication Mechanical Safety data Degree of protection IEC/EN Degree of protection NEMA/UL Agency Listing CULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201 EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Quality Standard Ambient temperature -22122°F [-3050°C] Storage temperature -40176°F [-4080°C] Ambient humidity max. 95% r.H., non-condensing		Direction of motion fail-safe	reversible with cw/ccw mounting	
Running Time (Motor) Running time fail-safe Running time fail-safe Running time fail-safe Safety data Degree of protection IEC/EN Degree of protection NEMA/UL Agency Listing CULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201-EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Quality Standard Ambient temperature Storage temperature Ambient humidity Standard Ambient humidity Standard Section 602.2 of the IMC Ambient humidity Max. 95% r.H., non-condensing		Angle of rotation	Max. 95°, 90°	
Running time fail-safe Noise level, motor Safety data Degree of protection IEC/EN Degree of protection NEMA/UL Agency Listing CULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201 EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Quality Standard Ambient temperature Storage temperature Ambient humidity Associated Assoc		Angle of rotation note	90°	
Noise level, motor Noise level, fail-safe Position indication Mechanical Degree of protection IEC/EN Degree of protection NEMA/UL Agency Listing CULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201 EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Quality Standard Ambient temperature -22122°F [-3050°C] Storage temperature -40176°F [-4080°C] Ambient humidity max. 95% r.H., non-condensing		Running Time (Motor)	95 s	
Noise level, fail-safe Position indication Mechanical Degree of protection IEC/EN Degree of protection NEMA/UL Agency Listing CULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201. EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Quality Standard Ambient temperature Storage temperature Ambient humidity Mechanical NEMA 2 UL Enclosure Type 2 CULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201. EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Quality Standard Ambient temperature -40176°F [-3050°C] Ambient humidity max. 95% r.H., non-condensing		Running time fail-safe	<25 s tamb = 68°F [20°C]	
Position indication Mechanical Degree of protection IEC/EN Degree of protection NEMA/UL Agency Listing CULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201 EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Quality Standard Ambient temperature Journal of the IMC Storage temperature Journal of the IMC Ambient humidity Mechanical NEMA 2 UL Enclosure Type 2 CULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201 EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Quality Standard ISO 9001 Ambient humidity Max. 95% r.H., non-condensing		Noise level, motor	35 dB(A)	
Safety data Degree of protection IEC/EN Degree of protection NEMA/UL Agency Listing CULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201 EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Quality Standard Ambient temperature JSO 9001 Storage temperature -40176°F [-4080°C] Ambient humidity IP42 NEMA 2 UL Enclosure Type 2 CULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201 EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Ambient temperature -22122°F [-3050°C] Ambient humidity max. 95% r.H., non-condensing		Noise level, fail-safe	62 dB(A)	
Degree of protection NEMA/UL Agency Listing CULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201 EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Quality Standard ISO 9001 Ambient temperature -22122°F [-3050°C] Storage temperature -40176°F [-4080°C] Ambient humidity max. 95% r.H., non-condensing		Position indication	Mechanical	
Agency Listing CULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 201 EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Quality Standard ISO 9001 Ambient temperature -22122°F [-3050°C] Storage temperature -40176°F [-4080°C] Ambient humidity max. 95% r.H., non-condensing	Safety data	Degree of protection IEC/EN	IP42	
E60730-1:02, CE acc. to 2014/30/EU and 201 EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC an Section 602.2 of the IMC Quality Standard ISO 9001 Ambient temperature -22122°F [-3050°C] Storage temperature -40176°F [-4080°C] Ambient humidity max. 95% r.H., non-condensing		Degree of protection NEMA/UL	NEMA 2 UL Enclosure Type 2	
Ambient temperature -22122°F [-3050°C] Storage temperature -40176°F [-4080°C] Ambient humidity max. 95% r.H., non-condensing		Agency Listing	E60730-1:02, CE acc. to 2014/30/EU and 2014/35/ EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC and	
Storage temperature -40176°F [-4080°C] Ambient humidity max. 95% r.H., non-condensing		Quality Standard	ISO 9001	
Ambient humidity max. 95% r.H., non-condensing		Ambient temperature	-22122°F [-3050°C]	
		Storage temperature	-40176°F [-4080°C]	
Servicing maintenance-free		Ambient humidity	max. 95% r.H., non-condensing	
		Servicing	maintenance-free	
Weight Weight 1.6 lb [0.80 kg]	Weight	Weight	1.6 lb [0.80 kg]	
Materials Housing material UL94-5VA	Materials	Housing material	UL94-5VA	

Electrical installation

Technical data sheet TFRB24-SR

> INSTALLATION NOTES

<u>1</u> Provide overload protection and disconnect as required.

Actuators may be connected in parallel. Power consumption and input impedance must be observed.

Actuators may also be powered by 24 VDC.

6 Only connect common to negative (-) leg of control circuits.

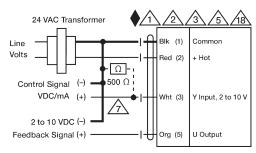
 Λ A 500 Ω resistor (ZG-R01) converts the 4...20 mA control signal to 2...10 V.

Actuators with plenum cable do not have numbers; use color codes instead.

Meets cULus requirements without the need of an electrical ground connection.

Marning! 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.



2...10 V / 4...20 mA Control