

Chrome Plated Brass Ball and Nickel Plated Brass Stem





5-year warranty



Technical data

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| 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 | 0.8 |
| 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) |

Safety notes



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

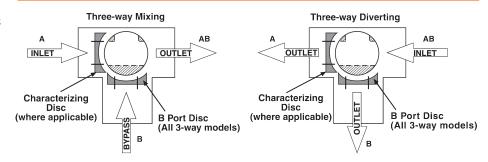
Product features

Application

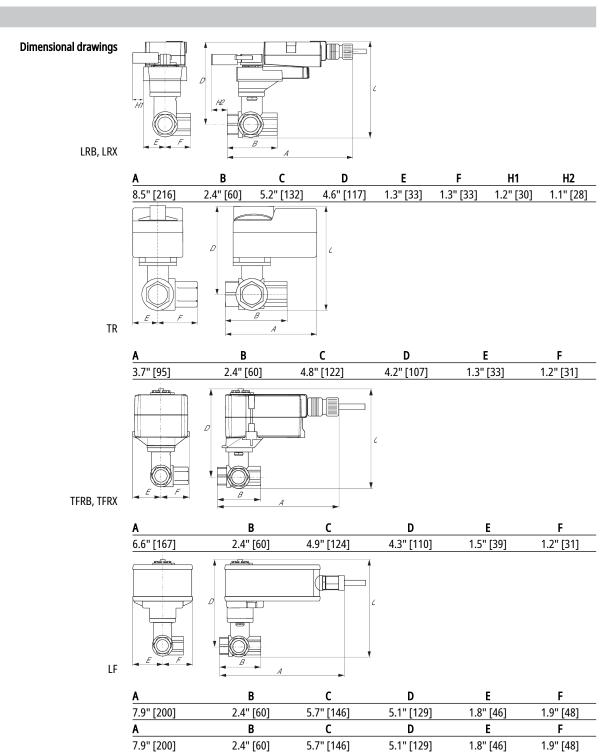
This valve is typically used in air handling units on heating or cooling coils, and fan coil unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV box re-heat coils and bypass loops. This valve is suitable for use in a hydronic system with variable or constant flow.

Technical data sheet B309B

Flow/Mounting details

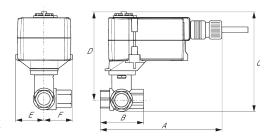


Dimensions





Technical data sheet B309B



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



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| 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, and Pale Aux Operation 18 GA plenum cable, 3 ft [1 m], with 1/2" corconnector 18 GA plenum cable, 3 ft [1 m], with 1/2" corconnector 18 GA plenum cable, 3 ft [1 m], with 1/2" corconnector 18 GA plenum cable, 3 ft [1 m], with 1/2" corconnector 210 V Operating range Y 210 V Operating name y/ 210 V Operation Operation Amount of Connection Amount of Connection Ava. 0.5 mA Ama, 0.5 mA Max. | | 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 1000 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] 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 UL60730-1A/-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 | | 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 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) A20 mA w / Z-R01 (100 Ω, 1/4 Color) A20 mA w / Z-R01 (100 Ω, 1/4 Color) A20 mA w / Z-R01 (100 Ω, 1/4 Color) A20 mA w / Z-R01 (100 Ω, 1/4 Color) A20 mA w / Z-R01 | | 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.

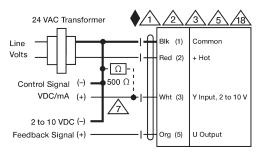
 Λ A 500 Ω resistor (ZG-R01) converts the 4...20 mA control signal to 2...10 V.

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