

# Chrome Plated Brass Ball and Nickel Plated Brass Stem









#### **Technical data**

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|   |      |     |    |      |

| Valve Size                | 0.75" [20]  |
|---------------------------|---|
| 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 ∆ps    | 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                        | 7.4   |
| 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<br>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

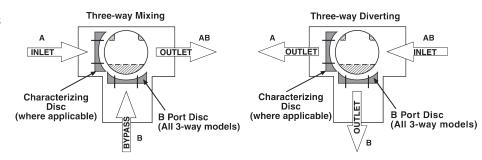
## **Product features**

#### **Application**

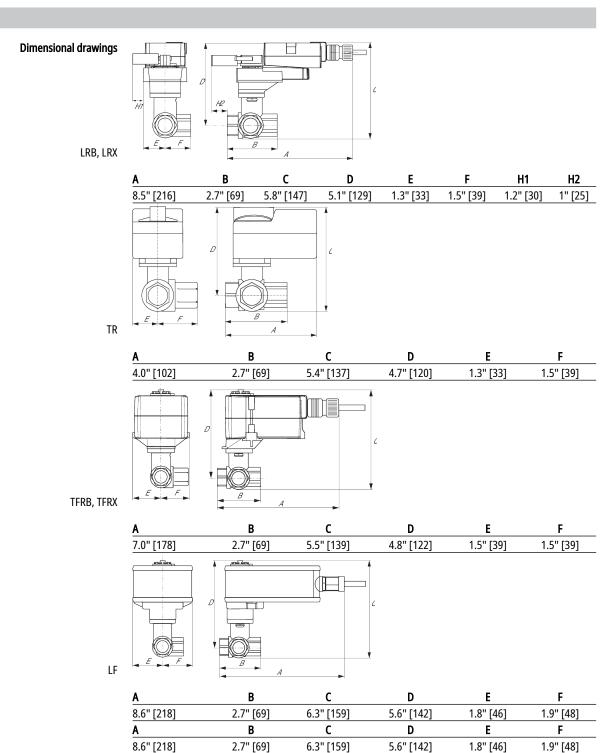
This valve is typically used in air handling units on heating or cooling coils, and fan coil unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV box re-heat coils and bypass loops. This valve is suitable for use in a hydronic system with variable or constant flow.



#### Flow/Mounting details

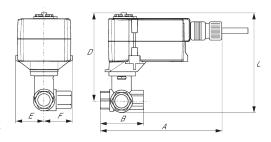


#### **Dimensions**





Technical data sheet B318B



TFRB, TFRX

| A          | В         | С          | D          | E         | F         |
|------------|-----------|------------|------------|-----------|-----------|
| 7.0" [178] | 2.7" [69] | 5.5" [139] | 4.8" [122] | 1.5" [39] | 1.5" [39] |

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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|-----|--------|-------|
| IAC | hnical | 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, 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 num, 95° rotation  Max. 95° rotation  Max. 0.5 mA  Max. 95°, 90°  Angle of rotation note  90°  Running time fail-safe  <25 s tamb = 68°F [20°C]  Noise level, fail-safe  425 s tamb = 68°F [20°C]  Noise level, fail-safe  426 dB(A)  Position indication  Mechanical  Page of protection NEMA/UL  NEMA 2 UL Enclosure Type 2  Cultus 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]  Ambient humidity  max. 95% r.H., non-condensing   |                 | 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 P Operating Y Operating P Operating Y Operating N Operating Y Operating   |                 | 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 Imp  |                 | 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 position indication  Input Impedance  210 V  Ambient humidity  210 V  210 V  Amx. 95°, 90°  Amy continue mounting  210 V  21  | 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 $\Omega$ for 210 V (0.1 mA), 500 $\Omega$ 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/<br>EU; Listed to UL 2043 - suitable for use in air<br>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**

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#### > 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.

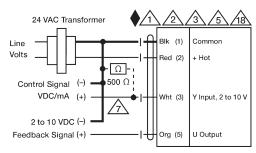
 $\Lambda$  A 500 Ω resistor (ZG-R01) converts the 4...20 mA control signal to 2...10 V.

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