









#### **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 ∆ps	200 psi
Flow characteristic	equal percentage
Servicing	maintenance-free
Flow Pattern	2-way
Leakage rate	0% for A – 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)

#### Materials

Valve body	Nickel-plated brass body
Stem seal	EPDM (lubricated)
Seat	PTFE
Pipe connection	NPT female ends
O-ring	EPDM (lubricated)
Ball	stainless steel
Non-Spring	TR
	LRB(X)

## Suitable actuators

## Safety notes



· 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

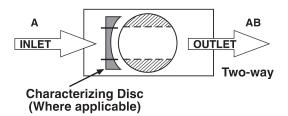
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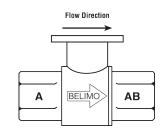
#### **Product features**

### **Application**

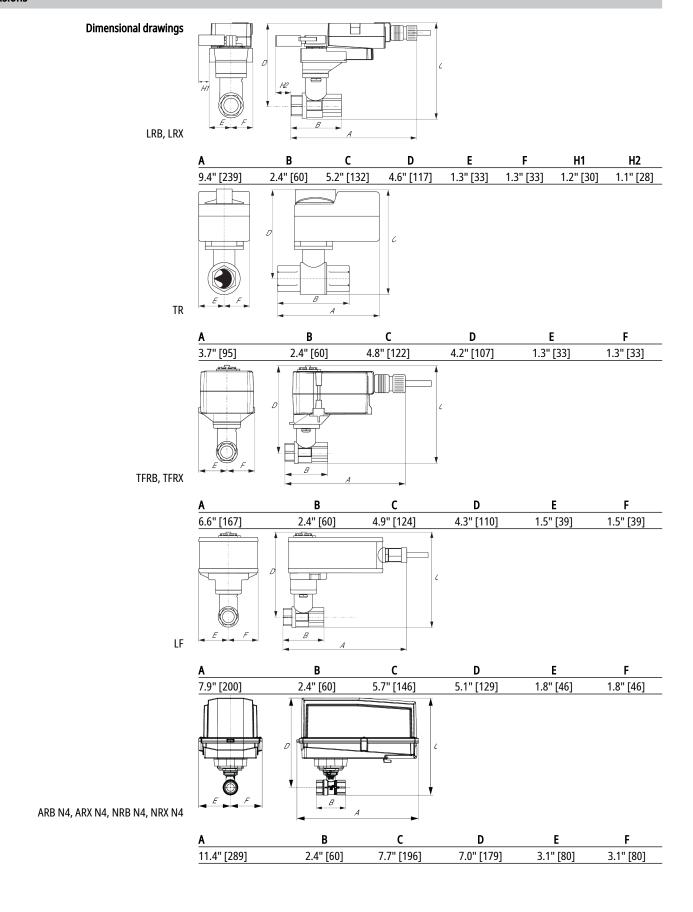
This valve is typically used in air handling units on heating or cooling coils, and fan coil unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV box re-heat coils and bypass loops. This valve is suitable for use in a hydronic system with variable flow.

## Flow/Mounting details

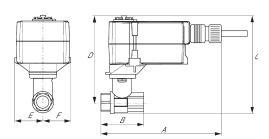




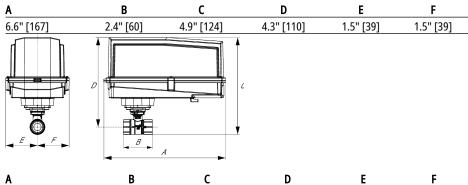








TFRB, TFRX



ARB N4, ARX N4, NRB N4, NRX N4

A	В	С	D	E	F
11.4" [289]	2.4" [60]	7.7" [196]	7.0" [179]	3.1" [80]	3.1" [80]

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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Connector  Overload Protection  Punctional data Operating range Y Operating range Y Operating range Y overload Max. 2G-R01 (500 Ω, 1/4 W resistor) Input Impedance Position feedback U Position feedback U onte 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 Safety data  Safety data  Degree of protection NEMA/UL Agency Listing  Connector electronic throughout 095° rotation  210 V  210 V  And w/ ZG-R01 (500 Ω, 1/4 W resistor)  And w/ ZG-R01 (			
Power consumption in operation Power consumption in rest position 1 W Transformer sizing Electrical Connection Overload Protection  Punctional data Operating range Y Operation Operation Operation Operation Operation of Section 602.10 V (0.1 mA), 500 Ω for 420 r Ambient temperature Ambient temperature Ambient temperature Ambient humidity max. 95% r.H., non-condensing maintenance-free	Electrical data	Nominal voltage	AC/DC 24 V
Power consumption in rest position  Transformer sizing  4 VA (class 2 power source)  Electrical Connection  0verload Protection  0verload Protection  18 GA plenum cable, 3 ft [1 m], with 1/2" conconnector  0verload Protection  electronic throughout 095° rotation  Functional data  Operating range Y  210 V  Operating range Y note  Input Impedance  100 kΩ for 210 V (0.1 mA), 500 Ω for 420 r  Position feedback U  Position feedback U note  Max. 0.5 mA  Direction of motion motor  selectable with switch 0/1  Direction of motion fail-safe  Angle of rotation  Max. 95°, 90°  Angle of rotation  Angle of rotation note  90°  Running Time (Motor)  Noise level, fail-safe  Noise level, fail-safe  Position indication  Mechanical  Safety data  Safety data  Safety data  Degree of protection IEC/EN  Degree of protection NEMA/UL  Agency Listing  Cullus acc. 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  3culty Standard  Ambient temperature  -22122°F [-3050°C]  Ambient humidity  max. 95% r.H., non-condensing  maintenance-free		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" conconnector  Overload Protection electronic throughout 095° rotation  Functional data Operating range Y 210 V Operating range Y 100 kΩ for 210 V Operating range Y 100 kΩ for 210 V (0.1 mA), 500 Ω for 420 r Position feedback U 210 V Position feedback U 100 kΩ for 210 V (0.1 mA), 500 Ω for 420 r 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 (Motor) 95 s Running time fail-safe <25 s tamb = 68°F [20°C] 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 2014 EU; tisted 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 ISO 9001 Ambient temperature -22122°F [-3050°C] Ambient humidity max. 95% r.H., non-condensing maintenance-free		Power consumption in operation	2 W
Electrical Connection  18 GA plenum cable, 3 ft [1 m], with 1/2" conconnector  Overload Protection  electronic throughout 095" rotation  Punctional data  Operating range Y  Operating range Y  Operating range Y 100 kΩ for 210 V  Operating range Y 100 kΩ for 210 V (0.1 mA), 500 Ω for 420 m Max. 0.5 mA  Direction feedback U 1010 V  Position feedback U 1010 V  Position feedback U 1010 V  Position for motion motor 10 selectable with switch 0/1  Direction of motion fail-safe 10 max. 95°, 90°  Angle of rotation 10 max. 95°, 90°  Angle of rotation 10 mote 10 90°  Running Time (Motor) 10 95 s  Running Time (Motor) 10 95 s  Running time fail-safe 10 c25 s tamb = 68°F [20°C]  Noise level, motor 10 sold (A)  Noise level, fail-safe 10 c2 dB(A)  Position indication 10 mechanical  Safety data 10 Degree of protection IEC/EN 11 P42  Degree of protection NEMA/UL 10 NEMA 2 UL Enclosure Type 2  CULus acc. to UL60730-1A/-2-14, CAN/CSA 160730-1-102, CE acc. to 2014/30/EU and 2014 EU; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the IMC  Quality Standard 150 9001  Ambient temperature 10 2-12122°F [-3050°C]  Storage temperature 10 2-12122°F [-3050°C]  Ambient humidity 10 max. 95% r.H., non-condensing 10 maintenance-free		Power consumption in rest position	1 W
Connector           Overload Protection         electronic throughout 095° rotation           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 m           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 100 kΩ for 210 V (0.1 mA), 500 Ω for 420 r Position feedback U Position feedback U note Direction of motion motor Selectable with switch 0/1 Direction of motion fail-safe Angle of rotation Angle of rotation Angle of rotation note Running Time (Motor) Safety data  Safety data  Safety data  Degree of protection IEC/EN Degree of protection NEMA/UL Agency Listing  Quality Standard Ambient temperature Ambient humidity Ambient humidity Amz. 95% r.H., non-condensing Angle of value in the data of the size		Electrical Connection	18 GA plenum cable, 3 ft [1 m], with 1/2" conduit connector
Operating range Y note Input Impedance 100 kΩ for 210 V (0.1 mA), 500 Ω for 420 r 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 Angle of rotation Angle of rotation note Running Time (Motor) Selevel, motor Noise level, fail-safe Degree of protection IEC/EN Degree of protection NEMA/UL Agency Listing  Degree of protection NEMA/UL Agency Listing  Quality Standard Ambient temperature Storage temperature Ambient humidity A20 mA w/ZG-R01 (500 Ω, 1/4 W resistor) Inou Mor 210 V (0.1 mA), 500 Ω for 420 r A20 r A20 m Aw/ZG-R01 (500 Ω, 1/4 W resistor) Inou Mor 210 V (0.1 mA), 500 Ω for 420 r Ambient humidity A20 m Aw/ZG-R01 (500 Ω, 1/4 W resistor) Inou Max. 95°, 90° Andle of rotation Mort. Ams. 95°, 90° Angle of rotation note 90° Running Time (Motor) 95 s Running Time (Motor) 95 s Running time fail-safe <25 s tamb = 68°F [20°C] 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 Agency Listing CULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 2014 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  Section 602.2 of the IMC  Ambient temperature -22122°F [-3050°C] -40176°F [-4080°C] Ambient humidity max. 95% r.H., non-condensing maintenance-free		Overload Protection	electronic throughout 095° rotation
Input Impedance Position feedback U note Max. 0.5 mA Direction of motion motor Selectable with switch 0/1 Direction of motion fail-safe Angle of rotation Max. 95°, 90° Angle of rotation note Position feelback U Running Time (Motor) Position indication Max. 95°, 90° Running time fail-safe Position indication Mechanical  Safety data  Safety data  Degree of protection IEC/EN Degree of protection NEMA/UL Agency Listing  Degree of protection NEMA/UL Agency Listing  Quality Standard Ambient temperature  Storage temperature  -22122°F [-3050°C] Ambient humidity Max. 95% r.H., non-condensing maintenance-free	Functional data	Operating range Y	210 V
Position feedback U Position feedback U note Max. 0.5 mA Direction of motion motor Direction of motion fail-safe Angle of rotation Angle of rotation Angle of rotation note Running Time (Motor) Safety data Degree of protection IEC/EN Degree of protection NEMA/UL Agency Listing  Agency Listing Quality Standard Ambient temperature Apple of Agency Listing Position indicty Agency Listing Position and Iso 9001 Ambient temperature Agency Listing Position indication Agency Listing Position indication Agency Listing Age		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 Angle of rotation note Running Time (Motor) Position indication  Safety data  Degree of protection NEMA/UL Agency Listing  Quality Standard Ambient temperature Ambient humidity Ambient level, motor Angle of rotation note Angle of rotation note Angle of rotation note Position indication Amax. 95°, 90° Angle of rotation note Position indication Angle of rotation		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 of motion selectable with cw/ccw mounting  Angle of rotation of motion fail-safe  Running Time (Motor)  Running Time (Motor)  Running time fail-safe  Safety data  Safety data  Safety data  Degree of protection IEC/EN  Degree of protection NEMA/UL  Agency Listing  Degree of protection NEMA/UL  Agency Listing  Quality Standard  Ambient temperature  -22122°F [-3050°C]  Storage temperature  -40176°F [-4080°C]  Ambient humidity  max. 95% r.H., non-condensing  maintenance-free		Position feedback U	210 V
Direction of motion fail-safe Angle of rotation Angle of rotation 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 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 2014 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] Storage temperature -40176°F [-4080°C] Ambient humidity max. 95% r.H., non-condensing maintenance-free		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 2014 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 ISO 9001  Ambient temperature -22122°F [-3050°C]  Storage temperature -40176°F [-4080°C]  Ambient humidity max. 95% r.H., non-condensing  Servicing maintenance-free		Direction of motion motor	selectable with switch 0/1
Angle of rotation note Running Time (Motor)  Running time fail-safe  Position indication  Safety data  Degree of protection IEC/EN  Degree of protection NEMA/UL  Agency Listing  Quality Standard  Ambient temperature  Ambient humidity  Servicing  Running Time (Motor)  95 s  Running time fail-safe  90°  Running time fail-safe  95 s  Safeky data  1P42  Degree of protection IEC/EN  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 2014  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  ISO 9001  Ambient temperature  -22122°F [-3050°C]  Ambient humidity  max. 95% r.H., non-condensing  maintenance-free		Direction of motion fail-safe	reversible with cw/ccw mounting
Running Time (Motor)  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  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 2014 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] Storage temperature  -40176°F [-4080°C]  Ambient humidity  max. 95% r.H., non-condensing maintenance-free		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  Position 62.2 of the IMC  Quality Standard  Ambient temperature  Ambient humidity  Servicing  Running time fail-safe  <25 s tamb = 68°F [20°C]  Noise level, motor  35 dB(A)  NeMA 2 dB(A)  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 2014  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  ISO 9001  Ambient humidity  Max. 95% r.H., non-condensing  maintenance-free		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 2014 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 Storage temperature Ambient humidity Ambient humidity  Servicing  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 2014 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 ISO 9001  Ambient humidity  Max. 95% r.H., non-condensing  maintenance-free		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 2014 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 Storage temperature Ambient humidity Ambient humidity Ambient humidity Ambient numidity Ambient		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 2014 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] Storage temperature -40176°F [-4080°C] Ambient humidity max. 95% r.H., non-condensing Servicing maintenance-free		Noise level, motor	35 dB(A)
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 2014 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  Journal of Storage temperature  -40176°F [-4080°C]  Ambient humidity  max. 95% r.H., non-condensing  Servicing  maintenance-free		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 2014 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  ISO 9001  Ambient temperature  -22122°F [-3050°C]  Storage temperature  -40176°F [-4080°C]  Ambient humidity  max. 95% r.H., non-condensing  Servicing  maintenance-free		Position indication	Mechanical
Agency Listing  CULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 2014 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  Jegun 122°F [-3050°C]  Storage temperature  -40176°F [-4080°C]  Ambient humidity  max. 95% r.H., non-condensing  Servicing  maintenance-free	Safety data	Degree of protection IEC/EN	IP42
E60730-1:02, CE acc. to 2014/30/EU and 2014 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 ISO 9001 Ambient temperature -22122°F [-3050°C] Storage temperature -40176°F [-4080°C] Ambient humidity max. 95% r.H., non-condensing Servicing maintenance-free		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  Servicing maintenance-free		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  Servicing maintenance-free		Quality Standard	ISO 9001
Ambient humidity max. 95% r.H., non-condensing  Servicing maintenance-free		Ambient temperature	-22122°F [-3050°C]
Servicing maintenance-free		Storage temperature	-40176°F [-4080°C]
		Ambient humidity	max. 95% r.H., non-condensing
Weight Weight 1.6 lb [0.80 kg]		Servicing	maintenance-free
	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.

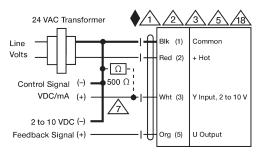
 $\Lambda$  A 500 Ω resistor (ZG-R01) converts the 4...20 mA control signal to 2...10 V.

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