







#### **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	equal percentage
Servicing	maintenance-free
Flow Pattern	2-way
Leakage rate	0% for A – 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

#### Materials

Valve body	Nickel-plated brass body
Stem seal	EPDM (lubricated)
Seat	PTFE
Pipe connection	NPT female ends
0-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

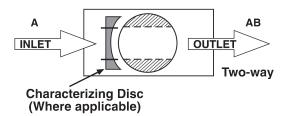
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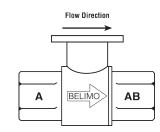
#### **Product features**

### **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.

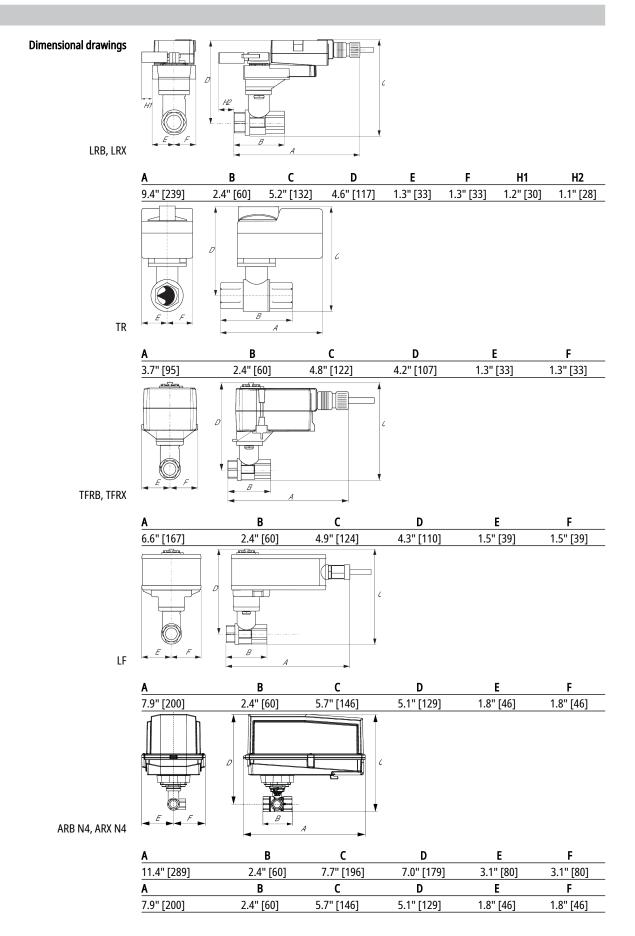
# Flow/Mounting details



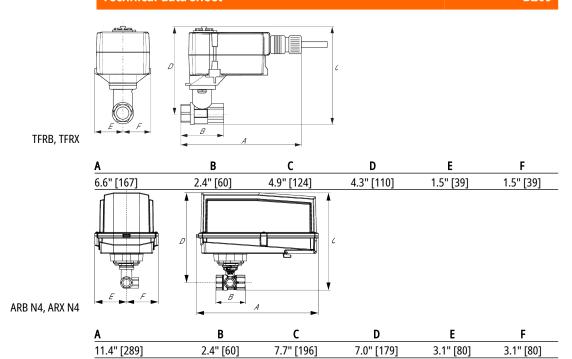




## **Dimensions**







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				
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  Ava (0.0 Ω, 1/4 W resistor)  Amount of connector  Amount of connector  Amount of connector  Ava (0.0 Ω, 1/4 W resistor)  Amount of connector  Ava (0.0 Ω, 1/4 W resistor)  Amount of connector  Ava (0.0 Ω, 1/4 W resistor)  Amount of connector  Ava (0.0 Ω, 1/4 W resistor)  Amount of connector  Ava (0.0 Ω, 1/4 W resistor)  Ava (0.0 Ω, 1/4 W resistor)  Amount of connector  Ava (0.0 Ω, 1/4 W resistor)  Ava (0.0 Ω, 1/4 W resistor)  Amount of connector  Ava (0.0 Ω, 1/4 W resistor)  Ava (0.0 Ω, 1/4 W resist		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 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 $\Omega$ 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  Ambient temperature  Journal of the IMC 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.

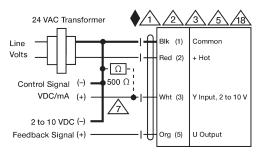
 $\Lambda$  A 500 Ω resistor (ZG-R01) converts the 4...20 mA control signal to 2...10 V.

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