



5-year warranty



Technical data

|                           |                           |  |
|---------------------------|---------------------------|--|
| <b>Functional data</b>    | Valve Size                | 0.75" [20]   |
|                           | Fluid                     | chilled or hot water, up to 60% glycol                                 |
|                           | Fluid Temp Range (water)  | 0...250°F [-18...120°C]  |
|                           | Body Pressure Rating      | 600 psi  |
|                           | Body pressure rating note | 600 psi  |
|                           | Close-off pressure Δps    | 200 psi  |
|                           | Flow characteristic       | A-port equal percentage, B-port modified for constant common port 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                        | 24   |
|                           | Cv Flow Rating            | A-port: as stated in chart B-port: 70% of A – AB Cv                    |
| <b>Materials</b>          | Valve body                | Nickel-plated brass body   |
|                           | Stem                      | stainless steel  |
|                           | Stem seal                 | EPDM (lubricated)  |
|                           | Seat                      | PTFE   |
|                           | Characterizing disk       | TEFZEL®  |
|                           | Pipe connection           | NPT female ends  |
|                           | O-ring                    | EPDM (lubricated)  |
|                           | Ball                      | stainless steel  |
| <b>Suitable actuators</b> | Non-Spring                | LRB(X)<br>NRB(X) N4  |
|                           | Spring                    | LF   |

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](http://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

Dimensional drawings



LRB, LRX

Type

DN

Weight [kg]  
[kg]

B321

20

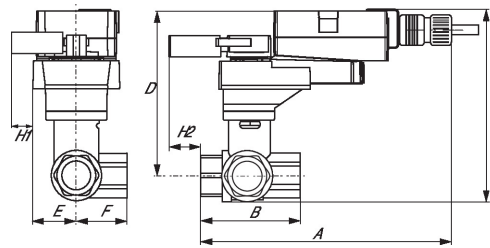
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| A          | B         | C          | D          | E         | F         | H1        | H2      |
|------------|-----------|------------|------------|-----------|-----------|-----------|---------|
| 8.5" [216] | 2.7" [69] | 5.8" [147] | 5.1" [129] | 1.3" [33] | 1.5" [39] | 1.2" [30] | 1" [25] |



ARB N4, ARX N4

| A           | B         | C          | D          | E         | F         |
|-------------|-----------|------------|------------|-----------|-----------|
| 11.4" [289] | 2.8" [70] | 7.7" [196] | 7.0" [179] | 3.1" [80] | 3.1" [80] |



LRQB, LRQX

| A          | B         | C          | D          | E         | F         | H1        | H2        |
|------------|-----------|------------|------------|-----------|-----------|-----------|-----------|
| 8.9" [226] | 2.7" [69] | 6.3" [159] | 5.6" [142] | 1.6" [40] | 1.6" [40] | 1.2" [30] | 1.3" [33] |



TFRB, TFRX

| A           | B          | C          | D          | E         | F         |
|-------------|------------|------------|------------|-----------|-----------|
| 11.4" [289] | 4.9" [125] | 9.8" [249] | 4.3" [110] | 3.1" [80] | 3.1" [80] |



5-year warranty



Technical data

|                        |                                    |   |
|------------------------|------------------------------------|---|
| <b>Electrical data</b> | Nominal voltage                    | AC/DC 24 V  |
|                        | Nominal voltage frequency          | 50/60 Hz  |
|                        | Power consumption in operation     | 2.5 W   |
|                        | Power consumption in rest position | 1 W   |
|                        | Transformer sizing                 | 5 VA (class 2 power source)   |
|                        | Electrical Connection              | 18 GA plenum cable, 3 ft [1 m], with 1/2" conduit connector   |
|                        | Overload Protection                | electronic throughout 0...95° rotation  |
|                        | Electrical Protection              | actuators are double insulated  |
| <b>Functional data</b> | Torque motor                       | 35 in-lb [4 Nm]   |
|                        | Direction of motion motor          | selectable with switch 0/1  |
|                        | Direction of motion fail-safe      | reversible with cw/ccw mounting   |
|                        | Angle of rotation                  | Max. 95°  |
|                        | Running Time (Motor)               | 150 s constant, independent of load   |
|                        | Running time motor note            | constant, independent of load   |
|                        | Running time fail-safe             | <25 s @ -4...122°F [-20...50°C], <60 s @ -22°F [-30°C]  |
|                        | Noise level, motor                 | 30 dB(A)  |
|                        | Noise level, fail-safe             | 62 dB(A)  |
|                        | Shaft Diameter                     | 3/8...1/2" round, centers on 1/2"   |
| Position indication    | Mechanical                         |   |
| <b>Safety data</b>     | Degree of protection IEC/EN        | IP54  |
|                        | Degree of protection NEMA/UL       | NEMA 2  |
|                        | Enclosure                          | UL Enclosure Type 2   |
|                        | Agency Listing                     | cULus acc. To UL 873 and CAN/CSA C22.2 No. 24-93; 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                | -22...122°F [-30...50°C]  |
|                        | Storage temperature                | -40...176°F [-40...80°C]  |
|                        | Ambient humidity                   | Max. 95% RH, non-condensing   |
|                        | Servicing                          | maintenance-free  |
|                        | <b>Weight</b>                      | Weight  |
| <b>Materials</b>       | Housing material                   | galvanized steel  |

Product features

**Application** For fail-safe, modulating control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. The actuator is mounted directly to a damper shaft from 3/8" up to 1/2" in diameter by means of its universal clamp, 1/2" shaft centered at delivery. For shafts up to 3/4" use K6-1 accessory. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft. The actuator operates in response to a 2...10 V, or with the addition of a 500Ω resistor, a 4...20 mA control input from an electronic controller or positioner. A 2...10 V feedback signal is provided for position indication.

**Operation** The LF series actuators provide true spring return operation for reliable fail-safe application and positive close-off on air tight dampers. The spring return system provides consistent torque to the damper with, and without, power applied to the actuator. The LF series provides 95° of rotation and is provided with a graduated position indicator showing 0 to 95°. The LF24-SR US uses a brushless DC motor which is controlled by an Application Specific Integrated Circuit (ASIC) and a microprocessor. The microprocessor provides the intelligence to the ASIC to provide a constant rotation rate and to know the actuator's exact fail-safe position. The ASIC monitors and controls the brushless DC motor's rotation and provides a digital rotation sensing function to prevent damage to the actuator in a stall condition. The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. Power consumption is reduced in holding mode.

**Typical specification** Spring return control damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a shaft up to a 3/4" diameter and center on a 1/2" shaft (default). Actuator shall deliver a minimum output torque of 35 in-lbs. The actuator must provide modulating damper control in response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller. Actuators shall use a brushless DC motor controlled by a microprocessor and be protected from overload at all angles of rotation. Run time shall be constant, and independent of torque. A 2 to 10 feedback signal shall be provided for position feedback. The actuator must be designed so that they may be used for either clockwise or counter clockwise failsafe operation. Actuators shall be cULus listed, have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Accessories

| Electrical accessories | Description   | Type    |
|------------------------|---|---------|
|                        | DC Voltage Input Rescaling Module   | IRM-100 |
|                        | Auxiliary switch, mercury-free  | P475    |
|                        | Auxiliary switch, mercury-free  | P475-1  |
|                        | Signal simulator, Power supply AC 120 V   | PS-100  |
|                        | Convert Pulse Width Modulated Signal to a 2...10 V Signal for Belimo Proportional Actuators | PTA-250 |
|                        | Positioner for wall mounting  | SGA24   |
|                        | Positioner for front-panel mounting   | SGF24   |
|                        | Resistor, 500 Ω, 1/4" wire resistor with 6" pigtail wires                                   | ZG-R01  |
|                        | Resistor kit, 50% voltage divider   | ZG-R02  |
|                        | Transformer, AC 120 V to AC 24 V, 40 VA   | ZG-X40  |

| Mechanical accessories | Description   | Type          |
|------------------------|---|---------------|
|                        | Shaft extension 170 mm Ø10 mm for damper shaft Ø 6...16 mm  | AV6-20        |
|                        | End stop indicator  | IND-LF        |
|                        | Shaft clamp<br>for LF..   | K6 US         |
|                        | Shaft clamp reversible, clamping range Ø16...20 mm  | K6-1          |
|                        | Ball joint suitable for damper crank arm KH8 / KH10   | KG10A         |
|                        | Ball joint suitable for damper crank arm KH8  | KG6           |
|                        | Ball joint suitable for damper crank arm KH8  | KG8           |
|                        | Actuator arm, clamping range Ø8...16 mm, Slot width 8.2 mm  | KH-LF         |
|                        | V-bolt Kit for KH-LF.   | KH-LFV        |
|                        | Damper crank arm Slot width 8.2 mm, for Ø1.05"  | KH12          |
|                        | Damper crank arm Slot width 6.2 mm, clamping range Ø10...18 mm  | KH6           |
|                        | Damper crank arm Slot width 8.2 mm, clamping range Ø10...18 mm  | KH8           |
|                        | Anti-rotation bracket LF.   | LF-P          |
|                        | Push rod for KG10A ball joint 36" L, 3/8" diameter  | SH10          |
|                        | Push rod for KG6 & KG8 ball joints (36" L, 5/16" diameter).   | SH8           |
|                        | Wrench 0.32 in and 0.39 in [8 mm and 10 mm]   | TOOL-06       |
|                        | Angle of rotation limiter, with end stop  | ZDB-LF        |
|                        | Form fit adapter 8x8 mm   | ZF8-LF        |
|                        | Mounting Bracket: ZS-260 Right Angle  | ZG-109        |
|                        | Linkage kit   | ZG-110        |
|                        | Mounting bracket<br>for LF..  | ZG-112        |
|                        | Damper clip for damper blade, 3.5" width.   | ZG-DC1        |
|                        | Damper clip for damper blade, 6" width.   | ZG-DC2        |
|                        | LF crankarm adaptor kit (includes ZG-112).  | ZG-LF112      |
|                        | LF crankarm adaptor kit (T bracket included).   | ZG-LF2        |
|                        | Shaft extension for 3/8" diameter shafts (4" L).  | ZG-LMSA-1     |
|                        | Shaft extension for 1/2" diameter shafts (5" L).  | ZG-LMSA-1/2-5 |
|                        | Weather shield 330x203x152 mm [13x8x6"] (LxBxH)   | ZS-100        |
|                        | Base plate, for ZS-100  | ZS-101        |
|                        | Weather shield 406x213x102 mm [16x8-3/8x4"] (LxWxH)   | ZS-150        |
|                        | Explosion proof housing 406x254x164 mm [16x10x6.435"] (LxBxH), UL<br>and CSA, Class I, Zone 1&2, Groups B, C, D, (NEMA 7), Class III, Hazardous<br>(classified) Locations | ZS-260        |
|                        | Weather shield 438x222x140 mm [17-1/4x8-3/4x5-1/2"] (LxBxH), NEMA<br>4X, with mounting brackets   | ZS-300        |
|                        | Weather shield 438x222x140 mm [17-1/4x8-3/4x5-1/2"] (LxBxH), NEMA<br>4X, with mounting brackets   | ZS-300-5      |
|                        | Shaft extension 1/2"  | ZS-300-C1     |
|                        | Shaft extension 3/4"  | ZS-300-C2     |
|                        | Shaft extension 1"  | ZS-300-C3     |

## Electrical installation



### Warning! 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.



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



1 Provide overload protection and disconnect as required.



3 Actuators may also be powered by DC 24 V.



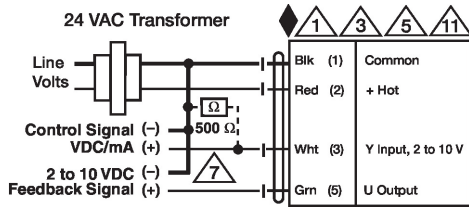
5 Only connect common to negative (-) leg of control circuits.



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



11 Actuators may be connected in parallel if not mechanically linked. Power consumption and input impedance must be observed.



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

**Dimensions**

**Dimensional drawings**

