Features and Benefits

**FEATURES**

- Thermal isolating adapter between flange and actuator.
- Easy direct coupling of actuator with a single screw.
- Perpendicular mounting flange and square drive head eliminate lateral forces on the stem.
- Blow-out proof stem with thrust-bearing Teflon® disc and double O-ring design for long service life.*
- Non-corroding chrome-plated brass or stainless ball.
- Vent holes reduce condensation build-up.
- Forged brass valve body — no pin-hole leaks.
- Characterizing disc — made of Tefzel® known for excellent strength and chemical resistance.
- Teflon® seats with O-rings provide constant seating force against the ball and reduce torque requirement.
- Actuator can be mounted in four different positions.

* Designed for service life of over 100,000 full cycles. Teflon® and Tefzel® are both registered trademarks of Dupont.

**EQUAL PERCENTAGE VALVE CHARACTERISTIC**

In order to ensure good stability of control, it is essential for a control valve to have an equal percentage characteristic. This type of characteristic produces a linear variation in thermal output according to the amount of opening of the valve (also known as the system characteristic). Under normal testing conditions a conventional ball valve exhibits an S-shaped characteristic. When it is installed in a real system, however, this characteristic is seriously deformed because, compared with its nominal size, a ball valve possesses an extremely high flow coefficient. Whether used with or without pipe reducers or a reduced bore, they do not normally allow stable regulation of the thermal capacity.

Belimo’s unique Characterized Control Valve™ (CCV) is very different. A special characterizing disc inside the valve gives it an equal percentage characteristic which is comparable with that of a globe valve of the same nominal size. The flow (the Cv value) is reduced to the required value by a combination of the hole in the ball and the shaped aperture in the disc. The increase in flow as the valve is opened is very slow and controlled.

This produces better part-load behavior and improved stability of control while also optimizing energy consumption.

**BENEFIT OF THE BELIMO CHARACTERIZING DISC**

- Equal percentage flow characteristic.
- Excellent control stability assured with the characterizing disc.
- Cv values equal to Cv values of globe valves the same size.
- The need for multiple pipe reduction is usually eliminated.
- Better control prevents “hunting” of the control loop, increasing life span of actuator and valve.
COORDINATED MOTORIZED OPERATION

The optimum functionality of the Belimo CCV is assured by properly coordinating its actuation with MFT. Specially developed rotary actuators provide the necessary precision for modulating, floating-point, and on/off methods of control.

All CCVs are supplied with the appropriate rotary actuator to provide the close-off and operation desired.

OPTIMIZED FOR CONTROL

The Belimo CCV marries known technology with an innovative development – the unique characterizing disc.

The marriage of CCV and MFT technologies has produced a range of valuable features which surpass the capabilities of globe valves at a very attractive price level:

- An equal-percentage valve characteristic
- Unlike a globe valve, no sudden change in inlet flow upon opening
- Excellent stability of control
- \(C_v\) values comparable with those of globe valves of the same size or larger
- Higher close-off ratings than standard globe valves
- 100% tight shut-off on two-way valves means NO leak-by unlike globe valves that have ANSI IV shutoff (leakage rate of 0.01% of the \(C_v\) rating)
- Three-way valve can be piped in mixing or diverting application

**Flow Characteristics of Conventional Ball Valves versus BELIMO CHARACTERIZED CONTROL VALVES**

- Stable control is hard to achieve
- Desirable valve authority is not achieved
- Desirable Equal Percent Flow and resulting heat output is achieved with linear results

**Feature / Benefits**

**Characterized Control Valves™ (CCV)**

<table>
<thead>
<tr>
<th>B2 Series</th>
<th>Two-way ½” to 3”</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3 Series</td>
<td>Three-way ½” to 2” Mixing*/Diverting</td>
</tr>
<tr>
<td>B6 Series</td>
<td>Two-way Flanged 2½” to 6”</td>
</tr>
</tbody>
</table>

**Service:** Chilled/hot water, 60% glycol

**\(C_v\) Range:** 0.3-240

**Material:** Stainless trim or Brass trim

**Control:** On/Off, Floating, 2-10 VDC

- Multi-Function Technology®
- Spring Return or Non-Spring Return

Mixing* (Not for use in change over applications)
### 2-Way Valve Flow Rate for Water Applications (Gallons Per Minute, GPM)

<table>
<thead>
<tr>
<th>Cv</th>
<th>Maximum Rating</th>
<th>Inches</th>
<th>DN mm</th>
<th>2-Way CCV</th>
<th>Pressure Drop Across the Valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>1/2&quot;</td>
<td>15</td>
<td>B207(B)</td>
<td>1 psi</td>
<td>0.3</td>
</tr>
<tr>
<td>0.46</td>
<td>3/8&quot;</td>
<td>15</td>
<td>B208(B)</td>
<td>2 psi</td>
<td>0.5</td>
</tr>
<tr>
<td>0.8</td>
<td>1/2&quot;</td>
<td>15</td>
<td>B209(B)</td>
<td>3 psi</td>
<td>0.8</td>
</tr>
<tr>
<td>1.2</td>
<td>5/8&quot;</td>
<td>15</td>
<td>B210(B)</td>
<td>4 psi</td>
<td>1.2</td>
</tr>
<tr>
<td>1.9</td>
<td>3/4&quot;</td>
<td>15</td>
<td>B211(B)</td>
<td>5 psi</td>
<td>1.9</td>
</tr>
<tr>
<td>3</td>
<td>1&quot;</td>
<td>15</td>
<td>B212(B)</td>
<td>6 psi</td>
<td>3.0</td>
</tr>
<tr>
<td>4.7</td>
<td>1 1/4&quot;</td>
<td>15</td>
<td>B213(B)</td>
<td>7 psi</td>
<td>4.7</td>
</tr>
<tr>
<td>7.4</td>
<td>1 1/2&quot;</td>
<td>15</td>
<td>B214(B)</td>
<td>8 psi</td>
<td>7.4</td>
</tr>
</tbody>
</table>

*Models with no characterizing disc.

GPM = Cv x √Δp

The influence of the pipe geometry due to reduced flow is negligible for all valves 57 Cv and below with characterizing discs.
### 3-Way Valve Flow Rate for Water Applications (Gallons Per Minute, GPM)

<table>
<thead>
<tr>
<th>Cv</th>
<th>Inches</th>
<th>DN mm</th>
<th>3-Way CCV</th>
<th>Pressure Drop Across the Valve</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 psi</td>
</tr>
<tr>
<td>0.3</td>
<td>½&quot;</td>
<td>15</td>
<td>B307(B)</td>
<td>0.3</td>
</tr>
<tr>
<td>0.46</td>
<td>½&quot;</td>
<td>15</td>
<td>B308(B)</td>
<td>0.5</td>
</tr>
<tr>
<td>0.8</td>
<td>½&quot;</td>
<td>15</td>
<td>B309(B)</td>
<td>0.8</td>
</tr>
<tr>
<td>1.2</td>
<td>½&quot;</td>
<td>15</td>
<td>B310(B)</td>
<td>1.2</td>
</tr>
<tr>
<td>1.9</td>
<td>½&quot;</td>
<td>15</td>
<td>B311(B)</td>
<td>1.9</td>
</tr>
<tr>
<td>3</td>
<td>½&quot;</td>
<td>15</td>
<td>B312(B)</td>
<td>3.0</td>
</tr>
<tr>
<td>4.7</td>
<td>½&quot;</td>
<td>15</td>
<td>B313(B)</td>
<td>4.7</td>
</tr>
<tr>
<td>10</td>
<td>½&quot;</td>
<td>15</td>
<td>B315(B)*</td>
<td>10</td>
</tr>
<tr>
<td>16</td>
<td>½&quot;</td>
<td>15</td>
<td>B316(B)*</td>
<td>14</td>
</tr>
<tr>
<td>4.7</td>
<td>¾&quot;</td>
<td>20</td>
<td>B317(B)</td>
<td>4.7</td>
</tr>
<tr>
<td>7.4</td>
<td>¾&quot;</td>
<td>20</td>
<td>B318(B)</td>
<td>7.4</td>
</tr>
<tr>
<td>14</td>
<td>¾&quot;</td>
<td>20</td>
<td>B320(B)*</td>
<td>14</td>
</tr>
<tr>
<td>24</td>
<td>¾&quot;</td>
<td>20</td>
<td>B321(B)*</td>
<td>24</td>
</tr>
<tr>
<td>4.7</td>
<td>1&quot;</td>
<td>25</td>
<td>B222</td>
<td>7.4</td>
</tr>
<tr>
<td>10</td>
<td>1&quot;</td>
<td>25</td>
<td>B223</td>
<td>10</td>
</tr>
<tr>
<td>30</td>
<td>1&quot;</td>
<td>25</td>
<td>B325*</td>
<td>30</td>
</tr>
<tr>
<td>10</td>
<td>¼&quot;</td>
<td>32</td>
<td>B329</td>
<td>10</td>
</tr>
<tr>
<td>19</td>
<td>¼&quot;</td>
<td>32</td>
<td>B330</td>
<td>19</td>
</tr>
<tr>
<td>25</td>
<td>¼&quot;</td>
<td>32</td>
<td>B331</td>
<td>25</td>
</tr>
<tr>
<td>19</td>
<td>½&quot;</td>
<td>40</td>
<td>B338</td>
<td>19</td>
</tr>
<tr>
<td>29</td>
<td>½&quot;</td>
<td>40</td>
<td>B339</td>
<td>29</td>
</tr>
<tr>
<td>37</td>
<td>½&quot;</td>
<td>40</td>
<td>B340</td>
<td>37</td>
</tr>
<tr>
<td>46</td>
<td>½&quot;</td>
<td>40</td>
<td>B341</td>
<td>46</td>
</tr>
<tr>
<td>29</td>
<td>2½&quot;</td>
<td>50</td>
<td>B347</td>
<td>29</td>
</tr>
<tr>
<td>37</td>
<td>2½&quot;</td>
<td>50</td>
<td>B348</td>
<td>37</td>
</tr>
<tr>
<td>46</td>
<td>2½&quot;</td>
<td>50</td>
<td>B349</td>
<td>46</td>
</tr>
<tr>
<td>57</td>
<td>2½&quot;</td>
<td>50</td>
<td>B350</td>
<td>57</td>
</tr>
<tr>
<td>68</td>
<td>2½&quot;</td>
<td>50</td>
<td>B351</td>
<td>68</td>
</tr>
<tr>
<td>83</td>
<td>2½&quot;</td>
<td>50</td>
<td>B352</td>
<td>83</td>
</tr>
</tbody>
</table>

GPM = \( C_v \times \sqrt{\Delta p} \)

* = Models with no characterizing disc.

The influence of the pipe geometry due to reduced flow is negligible for all valves 83 \( C_v \) and below with characterizing discs.
### General Wiring Instructions

**WARNING** The wiring technician must be trained and experienced with electronic circuits. Disconnect power supply before attempting any wiring connections or changes. Make all connections in accordance with wiring diagrams and follow all applicable local and national codes. Provide disconnect and overload protection as required. Use copper, twisted pair conductors only. If using electrical conduit, the attachment to the actuator must be made with flexible conduit.

**Always read the controller manufacturer’s installation literature carefully before making any connections.** Follow all instructions in this literature. If you have any questions, contact the controller manufacturer and/or Belimo.

**Transformer(s)**

Belimo actuators require a 24 VAC class 2 transformer and draws a maximum of 10 VA per actuator. The actuator enclosure cannot be opened in the field, there are no parts or components to be replaced or repaired.

- **EMC directive**: 89/336/EEC
- **Software class A**: Mode of operation type 1
- **Low voltage directive**: 73/23/EEC

**CAUTION** It is good practice to power electronic or digital controllers from a separate power transformer than that used for actuators or other end devices. The power supply design in our actuators and other end devices use half wave rectification. Some controllers use full wave rectification. When these two different types of power supplies are connected together, a short circuit is created across one of the diodes in the full wave power supply, damaging the controller. Only use a single power transformer to power the controller and actuator if you know the controller power supply uses half wave rectification.

---

<table>
<thead>
<tr>
<th>2-WAY VALVE</th>
<th>3-WAY VALVE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPECIFY UPON ORDERING</strong></td>
<td><strong>SPECIFY UPON ORDERING</strong></td>
</tr>
<tr>
<td>Power to pin 2 will drive valve CCW. Power to pin 3 will drive valve CW.</td>
<td>Power to pin 2 will drive valve CCW. Power to pin 3 will drive valve CW.</td>
</tr>
<tr>
<td><strong>NON-SPRING RETURN</strong></td>
<td><strong>NO</strong>: Open A to AB, will close as voltage increases. (Can be chosen with switch inside terminal block of actuator.)</td>
</tr>
<tr>
<td><strong>SPRING RETURN</strong></td>
<td><strong>NO</strong>: Open A to AB, will close as voltage increases. (Can be chosen with switch inside terminal block of actuator.)</td>
</tr>
<tr>
<td>Section 1</td>
<td>Section 2</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>TR24-3 US</strong></td>
<td><strong>TR24-3 US</strong></td>
</tr>
<tr>
<td><strong>On/Off or Floating Point Actuators</strong></td>
<td><strong>On/Off or Floating Point Actuators</strong></td>
</tr>
<tr>
<td><strong>TR24-SR US</strong></td>
<td><strong>TR24-SR US</strong></td>
</tr>
<tr>
<td><strong>Proportional Actuators</strong></td>
<td><strong>Proportional Actuators</strong></td>
</tr>
<tr>
<td><strong>LRFB24 (-3), MFT, SR</strong></td>
<td><strong>LRFB24 (-3), MFT, SR</strong></td>
</tr>
<tr>
<td><strong>LRX24 (-3), MFT, SR</strong></td>
<td><strong>LRX24 (-3), MFT, SR</strong></td>
</tr>
<tr>
<td><strong>AR24 (-3), MFT, SR</strong></td>
<td><strong>AR24 (-3), MFT, SR</strong></td>
</tr>
<tr>
<td><strong>Floating Point or Proportional Type Actuators</strong></td>
<td><strong>Floating Point or Proportional Type Actuators</strong></td>
</tr>
<tr>
<td>Power to pin 2 will drive valve CW. Power to pin 3 will drive valve CCW. The above will function when the directional switch is in the “1” position, to reverse select the “0” position.</td>
<td>Power to pin 2 will drive valve CW. Power to pin 3 will drive valve CCW. The above will function when the directional switch is in the “1” position, to reverse select the “0” position.</td>
</tr>
<tr>
<td><strong>NO</strong>: Open A to AB, will close as voltage increases. (Can be chosen with switch inside terminal block of actuator.)</td>
<td><strong>NO</strong>: Open A to AB, will close as voltage increases. (Can be chosen with switch inside terminal block of actuator.)</td>
</tr>
</tbody>
</table>

---

| **NO/FO** Valve: Open A to AB will drive closed. Spring Action: Will spring open A to AB upon power loss. | **NO/FO** Valve: Closed A to AB will drive open. Spring Action: Will spring closed A to AB upon power loss. |
| **NC/FC** or **NO/FC** Valve: Closed A to AB or Open A to AB. (Can be chosen with CW/CCW switch.) Spring Action: Will spring closed A to AB upon power loss. | **NC/FO** Valve: Closed A to AB will drive open. Spring Action: Will spring open A to AB upon power loss. |
| **NC/FC** or **NO/FC** Valve: Closed A to AB or Open A to AB. (Can be chosen with CW/CCW switch.) Spring Action: Will spring closed A to AB upon power loss. | **NO/FO** Valve: Open A to AB Spring Action: Will spring open A to AB upon power loss. (NO action can be chosen with CW/CCW switch.) |

---

**Set-up and Wiring Instructions**

**Characterized Control Valves™ (CCV)**

**LATIN AMERICA**

800-543-9038 USA 866-805-7089 CANADA 203-791-8396 LATIN AMERICA
**FLOW PATTERNS**

### 2-way Characterized Control Valves™

- **(Belimo B2 Series)**
  - Two-way valves should be installed with the disc upstream.
  - A → AB 100%
  - B → AB 0%

### 3-way Characterized Control Valves™

**MIXING** (Not for use in change over applications)

- **(Belimo B3 Series)**
  - The A-port must be piped to the coil to maintain proper control.
  - A → AB 100%
  - B → AB 70%

### INCORRECT PIPING

- The A-port must be piped to the coil to maintain proper control.

### WARNING! Do Not Pipe in this manner! Note Valve Porting!

- The A-port must be piped to the coil! Not the B-port!
- Flow is not possible from A to B. If AB-port is not piped as the common port, the valve must be re-piped. It is good practice to install a balancing valve in the bypass line. These valves are intended for closed loop systems. Do not install in an open loop system or in an application that is open to atmospheric pressure.

### OPERATION/INSTALLATION – CORRECT PIPING

- 2-way valves should be installed with the characterizing discs upstream. No damage to the valve will result if installed incorrectly with the characterizing discs downstream.

- **3-WAY VALVES MUST BE PIPED CORRECTLY.** They can be mixing or diverting. Mixing is the preferred piping arrangement.

**Reduction B-port Flow**

- Note: The B-port flow of the 3-way CCV is lower than that of the A-port. In most applications this is beneficial since the reduced flow compensates for the inexistent pressure drop across the coil in the bypass mode. Therefore, proper sizing is important to avoid flow noise in particular when the system is designed with constant speed pumps. Please refer to our valve sizing and selection guidelines.

- The flow velocity in the pipe upstream and downstream of the valve should be considered as well. The typical HVAC design maximum flow is 4 to 8 ft/s to avoid noise issues.

- Also, the pipe reduction factor must be considered and can be found on pages 3 and 4. Pipe reducers decrease the Cv value of a valve and consequently increase the pressure drop across the valve, a situation that could lead to noise or a lower than designed flow.

**Diverting* (Not for use in change over applications)**

**FLOW PATTERNS**

- **Flow:** 800-543-9038 USA  866-805-7089 CANADA  203-791-8396 LATIN AMERICA
## Nomenclature

**Characterized Control Valve™ (CCV)**

<table>
<thead>
<tr>
<th>B2</th>
<th>09</th>
<th>+LRX</th>
<th>24</th>
<th>-MFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve</td>
<td>Valve Size</td>
<td>Trim Material</td>
<td>Actuator Type</td>
<td>Power Supply</td>
</tr>
<tr>
<td>B2 = 2-way</td>
<td>07-80 = ½” to 3”</td>
<td>B = Chrome Plated Brass Ball, Nickel Plated Stem</td>
<td>Non Fail-Safe TR LRB, LRX LRIQX NRB, NRX NRIQX ARB, ARX ARIQX</td>
<td>24 = 24 VAC/DC 120 = 120 VAC* 230 = 230 VAC UP = 24 to 240 VAC</td>
</tr>
<tr>
<td>B3 = 3-way</td>
<td></td>
<td>Blank = Stainless Steel Ball and Stem</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Ordering Example

1. Choose the valve actuator combination.

   B209+LRX24-MFT

2. Specify preference or configuration.

   TR LRB, LRX LRIQX NRB, NRX NRIQX ARB, ARX ARIQX

3. For MFT Orders Only - Select Programming Code

   P-1001 (A01)

   - P-100x (Aox) Control voltage applications
   - P-200x (Wox) Pulse width modulation applications
   - P-300x (Fxx) Floating Point applications
   - P-400x (Wxx) On/Off applications
   - X-xxxx Create custom MFT configuration code
   - X-xxxx Create custom MFT configuration in the field with MFT-actuator PC-Tool software

4. Does order require tagging?

   Tagging: Valves may be tagged per customer specification. ($10.00 charge per tag)

   Example: AHU-1 FCU-2

   PART NUMBER FOR TAGGING: 99981-00101

5. Complete Ordering Example:

   Configuration: +NO

   Programming: +A01

---

*LR and AR include 120-240 VAC
**Ordering Example**

1. Choose the valve actuator combination.  
   **B6250S-070+GRX24-MFT**

2. Specify preference or configuration.  
   **Set-Up**

3. For MFT Orders Only - Select Programming Code
   **NO**
   **Tagging (if needed)**
   **P-10001 (A01)**

4. Does order require tagging?
   **Tagging:** Valves may be tagged per customer specification. ($10.00 charge per tag)  
   **Example:** AHU-1, FCU-2  
   **Part number for tagging:** 99981-00101

5. Complete Ordering Example:  
   **B6250S-070+GRX24-MFT**  
   **Configuration:** +NO  
   **Programming:** +A01
B2 Series, 2-Way, Characterized Control Valve
Chrome Plated Brass Ball and Brass Stem

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.

Technical Data

<table>
<thead>
<tr>
<th>Service</th>
<th>chilled or hot water, 60% glycol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow characteristic</td>
<td>A-port equal percentage</td>
</tr>
<tr>
<td>Controllable Flow Range</td>
<td>75°</td>
</tr>
<tr>
<td>Sizes</td>
<td>½&quot;, ¾&quot;</td>
</tr>
<tr>
<td>Type of end fitting</td>
<td>NPT female ends</td>
</tr>
<tr>
<td>Materials:</td>
<td></td>
</tr>
</tbody>
</table>
Body: forged brass, nickel plated  
Ball: chrome plated brass  
Stem: nickel plated brass  
Seats: PTFE  
Characterizing disc: Tefzel®  
Packing: 2 EPDM O-rings, lubricated |
| Body pressure rating | 600 psi |
| Media temp. range | 0°F to 250°F [-18°C to 120°C] |
| Close off pressure | 200 psi |
| Maximum differential pressure (∆P) | 50 psi for typical applications |
| Leakage | 0% for A to AB |
| External leakage | according to EN 12266-1:2003 |
| Cv rating | A-port: see product chart for values |

Tefzel® is a registered trademark of DuPont

Dimensions

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Valve Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
</table>
| B207B-B211B | ½" | 15  
| B212B-B216B | ¾" | 20 |

Flow Patterns

<table>
<thead>
<tr>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>
B3 Series, 3-Way, Characterized Control Valve
Chrome Plated Brass Ball and Brass Stem

Technical Data
Service: chilled or hot water, 60% glycol
Flow characteristic:
A-port equal percentage
B-port modified for constant common port flow
Controllable Flow Range: 75°
Sizes: ½", ¾"
Type of end fitting: NPT female ends
Materials:
- Body: forged brass, nickel plated brass
- Ball: chrome plated brass
- Stem: nickel plated brass
- Seats: PTFE
- Characterizing disc: Tetzel®
- Packing: 2 EPDM O-rings, lubricated
Body pressure rating: 600 psi
Media temp. range: 0°F to 250°F [-18°C to 120°C]
Close off pressure: 200 psi
Maximum differential pressure (ΔP): 50 psi for typical applications
Leakage:
- 0% for A to AB
- <2.0% for B to AB
External leakage: according to EN 12266-1:2003
Cv rating:
- A-port: see product chart for values
- B-port: 70% of A to AB Cv

Dimensions

Valve Nominal Size | Dimensions (Inches [mm])
--- | ---
B307B-B311B ½" 15 | A: 2.41" [61.1], B: 1.39" [35.2], C: 1.20" [30.6]
B312B-B316B ½" 15 | A: 2.38" [60.4], B: 1.78" [45.2], C: 1.29" [32.8]
B317B-B321B ¾" 20 | A: 2.73" [69.3], B: 1.87" [47.4], C: 1.47" [37.3]

Flow Patterns

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.

* (Not for use in change over applications)
B2 Series, 2-Way, Characterized Control Valve
Stainless Steel Ball and Stem

Technical Data

Service: chilled or hot water, 60% glycol
Flow characteristic: A-port equal percentage
Controllable Flow Range: 75°
Sizes: ½", ¾", 1", 1¼", 1½", 2", 2½", 3"
Type of end fitting: NPT female ends

Materials:
- Body: forged brass, nickel plated
- Ball: stainless steel
- Stem: stainless steel
- Seats: PTFE
- Characterizing disc: Tefzel®
- Packing: 2 EPDM O-rings, lubricated

Body pressure rating: 600 psi
Media temp. range: 0°F to 250°F [-18°C to 120°C]
Close off pressure: 200 psi
Maximum differential pressure (∆P): 50 psi for typical applications
Leakage: 0% for A to AB
External leakage: according to EN 12266-1:2003
Cv rating:
- A-port: see product chart for values

Dimensions

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN [mm]</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B207-B211</td>
<td>½&quot;</td>
<td>15</td>
<td>2.41&quot; [61.1]</td>
<td>1.39&quot; [35.2]</td>
</tr>
<tr>
<td>B212-B216</td>
<td>¾&quot;</td>
<td>15</td>
<td>2.38&quot; [60.4]</td>
<td>1.78&quot; [45.2]</td>
</tr>
<tr>
<td>B217-B221</td>
<td>1½&quot;</td>
<td>20</td>
<td>2.73&quot; [69.3]</td>
<td>1.87&quot; [47.4]</td>
</tr>
<tr>
<td>B222-B225</td>
<td>1&quot;</td>
<td>25</td>
<td>3.09&quot; [78.4]</td>
<td>1.87&quot; [47.4]</td>
</tr>
<tr>
<td>B229-B230</td>
<td>1¼&quot;</td>
<td>32</td>
<td>3.72&quot; [94.6]</td>
<td>2.04&quot; [51.9]</td>
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<tr>
<td>B231-B232</td>
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<td>32</td>
<td>3.72&quot; [94.6]</td>
<td>2.04&quot; [51.9]</td>
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<tr>
<td>B238-B240</td>
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<td>40</td>
<td>3.88&quot; [98.5]</td>
<td>2.04&quot; [51.9]</td>
</tr>
<tr>
<td>B248-B250</td>
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<td>4.21&quot; [107.0]</td>
<td>2.27&quot; [57.7]</td>
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<tr>
<td>B251-B254</td>
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<tr>
<td>B261-B265</td>
<td>3&quot;</td>
<td>80</td>
<td>5.55&quot; [140.9]</td>
<td>2.73&quot; [69.5]</td>
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</tbody>
</table>

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 Patterns

<table>
<thead>
<tr>
<th>Characterizing Disc</th>
<th>Where applicable</th>
</tr>
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<tbody>
<tr>
<td>OUTLET</td>
<td>A</td>
</tr>
<tr>
<td>A</td>
<td>NLET</td>
</tr>
</tbody>
</table>

*Models without characterizing disc
B3 Series, Three Way, Characterized Control Valve
Stainless Steel Ball and Stem

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.

* (Not for use in change over applications)

<table>
<thead>
<tr>
<th>Valve Nominal Size</th>
<th>Type</th>
<th>Suitable Actuators</th>
</tr>
</thead>
<tbody>
<tr>
<td>C\text{v}</td>
<td>Inches</td>
<td>DN [mm]</td>
</tr>
<tr>
<td>0.3</td>
<td>½</td>
<td>15</td>
</tr>
<tr>
<td>0.46</td>
<td>½</td>
<td>15</td>
</tr>
<tr>
<td>0.8</td>
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<td>1.9</td>
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<tr>
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<tr>
<td>4.7</td>
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<td>2</td>
<td>50</td>
</tr>
<tr>
<td>83</td>
<td>2</td>
<td>50</td>
</tr>
</tbody>
</table>

*Models without characterizing disc

Flow Patterns

Technical Data
Service: chilled or hot water, 60% glycol
Flow characteristic: A-port equal percentage, B-port modified for constant common port flow

Controllable Flow Range: 75°
Sizes: ½”, ¾”, 1”, 1¼", 1½", 2”
Type of end fitting: NPT female ends

Materials:
Body: forged brass, nickel plated stainless steel
Ball: stainless steel
Stem: stainless steel
Packing: 2 EPDM O-rings, lubricated

Body Pressure Rating: 600 psi, 400 psi, ½” - 1” 1¼” - 2”
Media temp. range: 0°F to 250°F [-18°C to 120°C]
Close off pressure: 200 psi, ½” - 2”
Maximum differential pressure (ΔP): 50 psi for typical applications

Leakage: 0% for A to AB, <2.0% for B to AB
External leakage: according to EN 12266-1:2003
C\text{v} rating: A-port: see product chart for values, B-port: 70% of A to AB C\text{v}

Tefzel® is a registered trademark of DuPont

Dimensions

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve Body</td>
<td>Inches</td>
</tr>
<tr>
<td>B307-B311</td>
<td>½&quot;</td>
</tr>
<tr>
<td>B312-B316</td>
<td>½&quot;</td>
</tr>
<tr>
<td>B317-B321</td>
<td>¾”</td>
</tr>
<tr>
<td>B322-B325</td>
<td>1”</td>
</tr>
<tr>
<td>B329-B331</td>
<td>1¼”</td>
</tr>
<tr>
<td>B338-B341</td>
<td>1½”</td>
</tr>
<tr>
<td>B347-B352</td>
<td>2”</td>
</tr>
</tbody>
</table>

Tefzel® is a registered trademark of DuPont
B6 Series, Two Way, Characterized Control Valve
Stainless Steel Ball and Stem

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

Service
chilled or hot water, 60% glycol

Flow characteristic
A-port equal percentage

Controllable Flow Range
75°

Sizes
2½", 3", 4", 5", 6"

Type of end fitting
pattern to mate with ANSI 125 flange

Materials:
Body: cast iron - GG25
Ball: stainless steel
Stem: stainless steel
Seats: PTFE
Characterizing disc: stainless steel
Packing: 2 EPDM O rings, lubricated

Body pressure rating
according to ANSI 125, standard class B

Media temp. range
0°F to 248°F [-18°C to +120°C]

Close off pressure
100 psi

Maximum differential pressure (∆P)
50 psi

Leakage
0% for A to AB

Cv rating
A-port: see product chart for values

Dimensions

Valve Nominal Size

<table>
<thead>
<tr>
<th>Cv</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>2-way Flange</th>
<th>Non-Spring</th>
<th>Spring</th>
<th>Electronic Fail-Safe</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>2½&quot;</td>
<td>65</td>
<td>B6250S-070</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>110</td>
<td>2½&quot;</td>
<td>65</td>
<td>B6250S-110</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>110</td>
<td>3&quot;</td>
<td>80</td>
<td>B6300S-110</td>
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</tr>
<tr>
<td>186</td>
<td>4&quot;</td>
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<tr>
<td>290</td>
<td>5&quot;</td>
<td>125</td>
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<tr>
<td>400</td>
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<td>150</td>
<td>B6600S-400</td>
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</tr>
</tbody>
</table>

NOTES:
1) Flange bolt pattern matches ANSI class 125 flanges (not ANSI/ASME rated)
2) Maximum allowable working pressure: 100 PSIG
3) It is not recommended to connect raised-face flanges to flat-faced flanges

Flow Pattern

2-way B6250 to B6600 Characterized Control Valves™

Upstream A
Downstream AB
Characterized Control Valve Product Range Overview
B2.., B3.., 2-way, 3-way, Stainless Steel Ball and Stem

<table>
<thead>
<tr>
<th>Valve Nominal Size</th>
<th>Type</th>
<th>Suitable Actuators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cv</td>
<td></td>
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<tr>
<td>Inches</td>
<td>DN</td>
<td>2-way NPT</td>
</tr>
<tr>
<td>0.3</td>
<td>½</td>
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<tr>
<td>0.46</td>
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</tr>
<tr>
<td>0.8</td>
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<td>½</td>
<td>15</td>
</tr>
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<td>3</td>
<td>½</td>
<td>15</td>
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<tr>
<td>4.7</td>
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<tr>
<td>7.4</td>
<td>½</td>
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<td>14</td>
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<tr>
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</tr>
<tr>
<td>240</td>
<td>2</td>
<td>50</td>
</tr>
</tbody>
</table>

* Models without characterizing discs. (B) Models with chrome plated brass ball and brass stem
* 3-Way Valves not for use in change over applications

**Mode of Operation**
The Characterized Control Valve is operated by a rotary actuator. The actuators are controlled by a standard voltage for on/off control or a proportional signal or 3-point control system which move the ball of the valve to the position dictated by the control system.

**Product Features**
The equal-percentage characteristic of the flow is ensured by the integral characterizing disc. This characteristic provides linear heating or cooling output from the coil improving energy efficiency and comfort.

**Actuator Specifications**
- Control type: on/off, floating point, 2-10 VDC, multi-function technology (MFT)
- Manual override: TR, LR, AR, NR, AFR series
- Electrical connection: 3 ft [1m] cable with ½" conduit fitting or covered screw terminal strip

**Valve Specifications**
- Service: chilled or hot water, 60% glycol
- Flow characteristic: A-port equal percentage, B-port modified for constant common port flow
- Controllable flow range: 75°
- Sizes: ½" - 2" (2-way)
- Type of end fitting: NPT female ends
- Materials:
  - Body: forged brass, nickel plated
  - Ball: stainless steel or chrome
  - Stem: stainless steel or chrome
  - Seats: Teﬂon® PTFE
  - Characterizing disc: ½" - 1½" (2-way), 1½" - 2" (3-way)
  - Packing: 2 EPDM O-rings, lubricated
- Media temp range: 0°F to 250°F [-18°C to 120°C]
- Body pressure rating:
  - ½" - 1½" (B20U): 500 psi
  - 1½" (B217): 400 psi
- Close-off pressure: 200 psi
- Maximum differential pressure (∆P): 50 psi
- Leakage: 0% for A to AB, < 2.0% for B to AB

**Cv rating/GPM**
- A port: see product chart above for values
- B port: 70% of A to AB Cv

Teﬂon® and Teﬂon® are registered trademarks of DuPont.
## Characterized Control Valve Product Range Overview

### B6.., 2-way, Stainless Steel Ball and Stem

<table>
<thead>
<tr>
<th>Valve Nominal Size</th>
<th>CV</th>
<th>Type</th>
<th>2-way NPT</th>
<th>Non-Spring Return</th>
<th>Spring Return</th>
<th>Electronic Fail-Safe</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>2½</td>
<td>65</td>
<td>86250S-070</td>
<td></td>
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<td>110</td>
<td>2½</td>
<td>65</td>
<td>86250S-110</td>
<td>AR</td>
<td>AFR</td>
<td></td>
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<tr>
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</table>

### Applications
Water-side control of heating and cooling systems for AHU supply, cooling towers and chillers.

### Mode of Operation
The Characterized Control Valve is operated by a rotary actuator. The actuators are controlled by a standard voltage for on/off control or a proportional signal or 3-point control system which move the ball of the valve to the position dictated by the control system.

### Product Features
The equal-percentage characteristic of the flow is ensured by the integral characterizing disc. This characteristic provides linear heating or cooling output from the coil improving energy efficiency and comfort.

### Actuator Specifications
- **Control type**: On/Off, Floating Point, 2-10 VDC, Multi-Function Technology (MFT)
- **Manual override**: AR, GR, AFR and GKR series
- **Electrical connection**: 3 ft [1m] cable with ½" conduit fitting or covered screw terminal strip

### Valve Specifications
- **Service**: chilled or hot water, 60% glycol
- **Flow characteristic**: A-port equal percentage
- **Action**: max 90° rotation
- **Sizes**: 2½", 3", 4", 5", 6"
- **Type of end fitting**: ANSI 1½" flange pattern
- **Materials**:
  - **Body**: cast iron (painted)
  - **Ball**: stainless steel
  - **Stem**: stainless steel
  - **Seats**: PTFE
  - **Characterizing disc**: stainless steel
  - **Packing**: 2 EPDM O-rings, lubricated
- **Body pressure rating**: According to ANSI 125, standard class B
- **Media temp range**: 0°F to 250°F [-18°C to +120°C]
- **Close-off pressure**: 100 psi
- **Maximum differential pressure (ΔP)**: 50 psi
- **Leakage**: 0% for A to AB

**Equal Percentage Characteristic**

---

**Table**: Characterized Control Valve Product Range Overview

B6.., 2-way, Stainless Steel Ball and Stem

---

**Diagram**: Characterized Control Valve Product Range Overview

B6.., 2-way, Stainless Steel Ball and Stem

---

**Diagram**: Equal Percentage Characteristic
### Models

<table>
<thead>
<tr>
<th>Models</th>
<th>TR24-3-T US</th>
<th>TR24-3/300 US</th>
<th>TR24-3/500 US</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR24-3-1 US</td>
<td>TR24-3-T US with 3 ft plenum rated cable</td>
<td>TR24-3-1 US with 10 ft plenum rated cable</td>
<td>TR24-3-1 US with 16 ft plenum rated cable</td>
</tr>
<tr>
<td>TR24-3-T US</td>
<td>TR24-3-T US with 3 ft plenum rated cable</td>
<td>TR24-3-T US with 10 ft plenum rated cable</td>
<td>TR24-3-T US with 16 ft plenum rated cable</td>
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### Technical Data

<table>
<thead>
<tr>
<th>Control</th>
<th>On/off, floating point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
<td>24 VAC 50/60 Hz</td>
</tr>
<tr>
<td>Nominal voltage range</td>
<td>19.2…28.8 VAC</td>
</tr>
<tr>
<td>Power consumption</td>
<td>1 W</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>1VA (class 2 power source)</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>Screw terminals accessible after removal of small cover (3 ft, 10 ft, 16 ft cables optional)</td>
</tr>
<tr>
<td>Input impedance</td>
<td>0.36 kΩ</td>
</tr>
<tr>
<td>Angle of rotation</td>
<td>90°</td>
</tr>
<tr>
<td>Position indication</td>
<td>Integrated into handle</td>
</tr>
<tr>
<td>Manual override</td>
<td>Push down handle</td>
</tr>
<tr>
<td>Running time</td>
<td>90 seconds @ 60 Hz, 108 seconds @ 50 Hz</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 to 95% non-condensing</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-22°F to 122°F (-28°C to 50°C)</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°F to 176°F (-40°C to 80°C)</td>
</tr>
<tr>
<td>Housing</td>
<td>NEMA 1/IP40</td>
</tr>
<tr>
<td>Housing rating</td>
<td>UL94-5V(B)</td>
</tr>
<tr>
<td>Agency listing†</td>
<td>cULus according to UL 60730-1A/2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or -S versions</td>
</tr>
<tr>
<td>Noise level</td>
<td>Max. 35 db (A)</td>
</tr>
<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
</tr>
</tbody>
</table>

† Rated impulse voltage 330V, Control pollution degree 2, Type of action 1

### Dimensions with 2-Way Valve

<table>
<thead>
<tr>
<th>Valve Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>B207(B)-B211(B)</td>
<td>½&quot; 15 2.41&quot; [61.1] 1.39&quot; [35.2]</td>
</tr>
<tr>
<td>B212(B)-B215(B)</td>
<td>⅜&quot; 15 2.38&quot; [60.4] 1.78&quot; [45.2]</td>
</tr>
<tr>
<td>B217(B)-B221(B)</td>
<td>¾&quot; 20 2.73&quot; [69.3] 1.87&quot; [47.4]</td>
</tr>
</tbody>
</table>

### Dimensions with 3-Way Valve

<table>
<thead>
<tr>
<th>Valve Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>B307(B)-B311(B)</td>
<td>½&quot; 15 2.41&quot; [61.1] 1.39&quot; [35.2] 1.20&quot; [30.6]</td>
</tr>
<tr>
<td>B312(B)-B315(B)</td>
<td>⅜&quot; 15 2.38&quot; [60.4] 1.78&quot; [45.2] 1.29&quot; [32.8]</td>
</tr>
<tr>
<td>B317(B)-B321(B)</td>
<td>¾&quot; 20 2.73&quot; [69.3] 1.87&quot; [47.4] 1.47&quot; [37.3]</td>
</tr>
</tbody>
</table>
## INSTALLATION NOTES

- The common connection from the actuator must be connected to the Hot connection of the controller.
- Actuators with plenum rated cable do not have numbers on wires; use color codes instead.
- The actuator Hot must be connected to the control board Hot.

**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.

### Wiring Diagrams

**TR24-3(-T) US cannot be wired in parallel with themselves or any other actuator.**

#### Floating Control

You may not use one wire control.

#### On/Off Control

You may not use one wire control.
TR24-SR Actuators, Proportional

Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR24-SR-T US</td>
<td>TR24-SH-I US with 3 ft plenum rated cable</td>
</tr>
<tr>
<td>TR24-SR/300 US</td>
<td>TR24-SR-T US with 10 ft plenum rated cable</td>
</tr>
<tr>
<td>TR24-SR/500 US</td>
<td>TR24-SR-T US with 16 ft plenum rated cable</td>
</tr>
</tbody>
</table>

Technical Data

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>proportional</td>
</tr>
<tr>
<td>Nominal voltage</td>
<td>24 VAC 50/60 Hz, 24 VDC</td>
</tr>
<tr>
<td>Nominal voltage range</td>
<td>19.2…28.8 VAC, 21.6…28.8 VDC</td>
</tr>
<tr>
<td>Power consumption</td>
<td>0.5 W</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>1VA (class 2 power source)</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>screw terminals accessible after removal of small cover (3 ft, 10 ft, 16 ft cables optional)</td>
</tr>
<tr>
<td>Input impedance</td>
<td>100 kΩ</td>
</tr>
<tr>
<td>Angle of rotation</td>
<td>90°</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>reversible with switch under cover</td>
</tr>
<tr>
<td>Position indication</td>
<td>integrated into handle</td>
</tr>
<tr>
<td>Manual override</td>
<td>push down handle</td>
</tr>
<tr>
<td>Running time</td>
<td>90 seconds</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 to 95% non-condensing</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-22°F to 122°F (-30°C to 50°C)</td>
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<tr>
<td>Storage temperature</td>
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<td>Housing</td>
<td>NEMA 1/IP40</td>
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<tr>
<td>Housing rating</td>
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</tr>
<tr>
<td>Noise level</td>
<td>max. 35 db (A)</td>
</tr>
<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
</tr>
</tbody>
</table>

† Rated impulse voltage 500V, Control pollution degree 2, Type of action 1

**NOTE:** Response sensitivity is 75mV

### Dimensions with 2-Way Valve

<table>
<thead>
<tr>
<th>Valve Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve Body</td>
<td>Inches</td>
</tr>
<tr>
<td>B207(B)-B211(B)</td>
<td>½”</td>
</tr>
<tr>
<td>B212(B)-B215(B)</td>
<td>½”</td>
</tr>
<tr>
<td>B217(B)-B221(B)</td>
<td>¼”</td>
</tr>
</tbody>
</table>

### Dimensions with 3-Way Valve

<table>
<thead>
<tr>
<th>Valve Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
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<tr>
<td>Valve Body</td>
<td>Inches</td>
</tr>
<tr>
<td>B307(B)-B311(B)</td>
<td>½”</td>
</tr>
<tr>
<td>B312(B)-B315(B)</td>
<td>½”</td>
</tr>
<tr>
<td>B317(B)-B321(B)</td>
<td>¼”</td>
</tr>
</tbody>
</table>
**Wiring Diagrams**

- **INSTALLATION NOTES**
  - Actuators with color coded wires are optional. Wire numbers are provided for reference.
  - **CAUTION Equipment damage!** Actuators may be connected in parallel. Power consumption and input impedance must be observed.
  - Actuators may also be powered by 24 VDC.

- **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.

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**2 to 10 VDC Control of TR24-SR(-T) US**

![Diagram of 2 to 10 VDC Control of TR24-SR(-T) US]

**4 to 20 mA Control of TR24-SR(-T) US**

![Diagram of 4 to 20 mA Control of TR24-SR(-T) US]

Direct/Reverse acting switch is under wiring cover.
R = CW with decrease in signal
L = CCW with decrease in signal
No feedback
Models
LRB24-3-T  LRX24-3-T  w/Terminal Block
LH824-3  LHX24-3  w/3 ft. cable
LRB24-3-S  LRX24-3-S  w/built-in Aux. Switch

Technical Data
Control  on/off, floating point
Power supply  24 VAC ± 20% 50/60 Hz
24 VDC ± 10%
Power consumption  running 1.5 W
holding 0.2 W
Transformer sizing  2 VA (class 2 power source)
Electrical connection  LRB24-3  LHX24-3
½" conduit connector  18 GA, plenum rated cable
3 ft [1m]  3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection  electronic throughout 0° to 95° rotation
Input impedance  600 Ω
Angle of rotation  90°, adjustable with mechanical stop
Direction of rotation  reversible with protected switch
Position indication  handle
Manual override  external push button
Running time  LRB24-3  LRX24-3
90 seconds, constant independent of load
150, 95, 60, 45, 35 seconds, constant independent of load
Humidity  5 to 95% RH, non-condensing (EN 60730-1)
Ambient temperature  -22°F to 122°F [-30°C to 50°C]
Storage temperature  -40°F to 176°F [-40°C to 80°C]
Housing type  NEMA 2/IP54
Housing material  UL94-5VA
Agency listings†  cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level  less than 35 dB (A)
Quality standard  ISO 9001

Dimensions with 2-Way Valve

Dimensions with 3-Way Valve

LRB24-3-T Actuators, On/Off, Floating Point

Valve Nominal Size  Dimensions (Inches [mm])

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN [mm]</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>B307(B)-B311(B)</td>
<td>⅜&quot;</td>
<td>15</td>
<td>2.06&quot; [52.2]</td>
<td>1.39&quot; [35.2]</td>
<td>1.20&quot; [30.6]</td>
</tr>
<tr>
<td>B312(B)-B315(B)</td>
<td>⅜&quot;</td>
<td>15</td>
<td>2.38&quot; [60.4]</td>
<td>1.78&quot; [45.2]</td>
<td>1.29&quot; [32.8]</td>
</tr>
<tr>
<td>B317(B)-B321(B)</td>
<td>¼&quot;</td>
<td>20</td>
<td>2.73&quot; [69.3]</td>
<td>1.87&quot; [47.4]</td>
<td>1.47&quot; [37.3]</td>
</tr>
<tr>
<td>B322-B325</td>
<td>1&quot;</td>
<td>25</td>
<td>3.09&quot; [78.4]</td>
<td>1.87&quot; [47.4]</td>
<td>1.59&quot; [40.3]</td>
</tr>
</tbody>
</table>

† Rated impulse voltage 800V, Control pollution degree 3, Type of action 1 (1.B for -S models)
**Wiring Diagrams**

### INSTALLATION NOTES

⚠️ **CAUTION** Equipment damage!
- Actuators may be connected in parallel.
- Power consumption and input impedance must be observed.
- Actuators are provided with color coded wires.
- Wire numbers are provided for reference.
- Actuators may also be powered by 24 VDC.

### APPLICATION NOTES

- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

⚠️ **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.

---

**LR...24-3 Actuators, On/Off, Floating Point**

![Wiring Diagrams](image)

**On/Off control**

**Floating Point or On/Off control**

**Auxiliary switch**

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P10419 - 09/13 - Subject to change.
LR...24-SR Actuators, Proportional

**Technical Data**

- **Power supply**: 24 VAC ± 20% 50/60 Hz
- **Power consumption**
  - Running: 1.5 W
  - Holding: 0.4 W
- **Transformer sizing**: 3 VA (class 2 power source)
- **Electrical connection**
  - LR824-SR: ½" conduit connector
  - LH24-SH: 3 ft [1m], 10 ft [3m], 16 ft [5m]
- **Overload protection**: electronic throughout 0° to 95° rotation
- **Operating range Y**: 2 to 10 VDC, 4 to 20 mA
- **Feedback output U**: 1 to 10 VDC, max 0.5 mA
- **Input impedance**: 100 kΩ (0.1 mA), 500 Ω
- **Angle of rotation**: 90°, adjustable with mechanical stop
- **Direction of rotation**: reversible with protected √ switch
- **Position indication**: handle
- **Manual override**: external push button
- **Running time**: constant independent of load
  - LR824-SR: 90 seconds
  - LH24-SH: 150, 95, 60, 45, 35 seconds
- **Humidity**: 5 to 95% RH non-condensing (EN 60730-1)
- **Ambient temperature**: -22°F to 122°F [-30°C to 50°C]
- **Storage temperature**: -40°F to 176°F [-40°C to 80°C]
- **Housing**: NEMA 2/IP54
- **Housing material**: UL94-5VA
- **Agency listings†**: cULus according to UL 60730-1/-2-14, CAN/CSA E60730-1-02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or -S versions
- **Noise level**: ≤35 dB(A)
- **Quality standard**: ISO 9001

**LR...24-SR-T**

- **Electrical connection**: screw terminal (for 26 to 14 GA wire) protected (NEMA 2/IP20)

† Rated impulse voltage 800V, Control pollution degree 3, Type of action 1 (1.B for -S models)

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**LRB24-SR, LRX24-SR Actuators, Proportional**

**LRB24-SR-T**

- **LRB24-SR**
- **LRX24-SR**
  - w/ Terminal Block
  - w/ 3ft. cable

---

**Dimensions with 2-Way Valve**

<table>
<thead>
<tr>
<th>Valve Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>B207(B)-B211(B)</td>
<td>½&quot;</td>
</tr>
<tr>
<td>B212(B)-B215(B)</td>
<td>½&quot;</td>
</tr>
<tr>
<td>B217(B)-B221(B)</td>
<td>¼&quot;</td>
</tr>
<tr>
<td>B222-B225</td>
<td>1&quot;</td>
</tr>
<tr>
<td>B229-B231</td>
<td>1¼&quot;</td>
</tr>
</tbody>
</table>

---

**Dimensions with 3-Way Valve**

<table>
<thead>
<tr>
<th>Valve Nominal Size</th>
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<tbody>
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<td>¼&quot;</td>
</tr>
<tr>
<td>B322-B325</td>
<td>1&quot;</td>
</tr>
</tbody>
</table>
**Wiring Diagrams**

**INSTALLATION NOTES**

**CAUTION Equipment damage!**

Actuators may be connected in parallel.

Power consumption and input impedance must be observed.

Actuators may also be powered by 24 VDC.

Only connect common to neg. (–) leg of control circuits.

**APPLICATION NOTES**

- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.
- The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

**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.

---

**2 to 10 VDC control**

**4 to 20 mA control**
**LR...120-3 Actuators, On/Off, Floating Point**

**Models**
- LRB120-3
- LRX120-3

**Technical Data**

<table>
<thead>
<tr>
<th>Control</th>
<th>On/Off, Floating Point</th>
</tr>
</thead>
</table>
| Power supply     | 100 to 240 VAC, 50/60 Hz (nominal)  
5 to 265 VAC, 50/60 Hz (tolerance) |
| Power consumption| running 2 W  
holding 0.5 W |
| Transformer sizing| 4 VA (class 2 power source) |
| Electrical connection | ½" conduit connector  
18 GA, plenum rated cable  
3 ft [1m], 10 ft [3m], 16 ft [5m] |
| Overload protection | electronic throughout 0° to 95° rotation |
| Input impedance  | 600 Ω |
| Angle of rotation | 90°, adjustable with mechanical stop |
| Direction of rotation | reversible with protected √/√ switch |
| Position indication | handle |
| Manual override  | external push button |

**Dimensions with 2-Way Valve**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches DN [mm]</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B201(B)-B211(B)</td>
<td>½&quot;</td>
<td>15</td>
<td>1.20 [30.6]</td>
</tr>
<tr>
<td>B212(B)-B215(B)</td>
<td>½&quot;</td>
<td>15</td>
<td>1.78 [45.2]</td>
</tr>
<tr>
<td>B217(B)-B221(B)</td>
<td>¾&quot;</td>
<td>20</td>
<td>1.87 [47.4]</td>
</tr>
<tr>
<td>B222-B225</td>
<td>1&quot;</td>
<td>25</td>
<td>1.87 [47.4]</td>
</tr>
<tr>
<td>B229-B230</td>
<td>1¼&quot;</td>
<td>32</td>
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**Dimensions with 3-Way Valve**

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</tr>
</tbody>
</table>

**Agency listings†**
- cULus according to UL 60730-1A-1-2,  
  CAN/CSA E60730-1-02, CE according to  
  2004/108/EC and 2006/95/EC for line voltage  
  and/or –S versions

**Noise level**
- <35 dB(A)

**Quality standard**
- ISO 9001

† Rated impulse voltage 4kV, Control pollution degree 3, Type of action 1
**CAUTION Equipment damage!**
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

**APPLICATION NOTES**
- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.
- **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.

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**Wiring Diagrams**

**INSTALLATION NOTES**

**CAUTION Equipment damage!**
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

**APPLICATION NOTES**
- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.
- **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.

---

**LR...120-3 Actuators, On/Off, Floating Point**

**On/Off**

```
N L1
H L2
```

| (1) Common |
| (2)       |
| (3)       |

The indication of direction is valid for switch position 1.

**Floating Point or On/Off control**

```
N L1
H L2
```

| (1) Common |
| (2)       |
| (3)       |

The indication of direction is valid for switch position 1.
LR...120-SR Actuators, Proportional

**Technical Data**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>100 to 240 VAC, 50/60 Hz (nominal) 85 to 265 VAC, 50/60 Hz (tolerance)</td>
</tr>
<tr>
<td>Power consumption</td>
<td>running 2.5 W, holding 1 W</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>4.5 VA (class 2 power source)</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>LRB120-SR: ½&quot; conduit connector 18 GA, plenum rated cable 3 ft [1m], 6 ft [3m], 10 ft [5m]</td>
</tr>
<tr>
<td>Overload protection</td>
<td>electronic throughout 0° to 95° rotation</td>
</tr>
<tr>
<td>Operating range Y</td>
<td>2 to 10 VDC, 4 to 20 mA</td>
</tr>
<tr>
<td>Feedback output U</td>
<td>1 to 10 VDC, max 0.5 mA</td>
</tr>
<tr>
<td>Input impedance</td>
<td>100 kΩ (0.1 mA), 500 Ω</td>
</tr>
<tr>
<td>Angle of rotation</td>
<td>90°, adjustable with mechanical stop</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>reversible with protected switch</td>
</tr>
<tr>
<td>Position indication</td>
<td>handle</td>
</tr>
<tr>
<td>Manual override</td>
<td>external push button</td>
</tr>
<tr>
<td>Running time</td>
<td>constant independent of load 90 seconds 150, 95, 60, 45, 35 seconds</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 to 95% RH non-condensing (EN 60730-1)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-22°F to 122°F [-30°C to 50°C]</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°F to 176°F [-40°C to 80°C]</td>
</tr>
<tr>
<td>Housing</td>
<td>NEMA 2/IP54</td>
</tr>
<tr>
<td>Housing material</td>
<td>UL94-5VA</td>
</tr>
<tr>
<td>Agency listings†</td>
<td>cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1-02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or -S versions</td>
</tr>
<tr>
<td>Noise level</td>
<td>&lt;35 dB(A)</td>
</tr>
<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
</tr>
</tbody>
</table>

† Rated impulse voltage 4kV, Control pollution degree 3, Type of action 1
**Wiring Diagrams**

**INSTALLATION NOTES**

- **CAUTION Equipment damage!**
  Actuators may be connected in parallel. Power consumption and input impedance must be observed.
- Only connect common to neg. (−) leg of control circuits.
- A 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC.
- LRB(X) can be supplied with both 120 VAC and 230 VAC.
- All 120 VAC and 230 VAC actuators use appliance rated cables.

**APPLICATION NOTES**

- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

**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.
LR...24-MFT Actuators, Multi-Function Technology

Models
LRX24-MFT Flexible Version

Technical Data

Power supply
24 VAC ± 20% 50/60 Hz
24 VDC ± 10%

Power consumption
running 2 W
holding 1.2 W

Transformer sizing
6 VA (class 2 power source)

Electrical connection
LRX24-MFT ½” conduit connector
18 GA, plenum rated cable
3 ft [1m], 10 ft [3m], 16 ft [5m]

Overload protection
electronic throughout 0° to 95° rotation

Operating range
Y 2 to 10 VDC (default)
variable (VDC, PWM, floating point, on/off)

Feedback output
U 2 to 10 VDC, 0.5mA max
VDC variable

Input impedance
100 kΩ (0.1 mA), 500 Ω
1500 Ω (PWM, floating point, on/off)

Angle of rotation
90° electronically variable adjustable with mechanical stop

Direction of rotation
reversible with protected switch

Position indication
handle

Manual override
external push button

Running time
150 seconds (default)
variable (35 to 150 secs)

Humidity
5 to 95% RH non-condensing
(LN 60/30-1)

Ambient temperature
-22°F to 122°F [-30°C to 50°C]

Storage temperature
-40°F to 176°F [-40°C to 80°C]

Housing
NEMA 2/IP54

Agency listings†
cULus according to UL 60/930-1A/2-14,
CAN/CSA E60730-1-02, CE according to
2004/108/EC and 2006/95/EC for line voltage
and/or –S versions

Noise level
<35 dB(A)

Quality standard
ISO 9001

† Rated impulse voltage 800V, Control pollution degree 3,
Type of action 1 (1.B for -S models)

Dimensions with 2-Way Valve

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches/DN (mm)</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B207-B211</td>
<td>½” 15</td>
<td>2.41” [61.1]</td>
<td>1.39” [35.2]</td>
</tr>
<tr>
<td>B212-B215</td>
<td>½” 15</td>
<td>2.38” [60.4]</td>
<td>1.70” [43.2]</td>
</tr>
<tr>
<td>B221-B221</td>
<td>¾” 20</td>
<td>2.73” [69.3]</td>
<td>1.87” [47.4]</td>
</tr>
<tr>
<td>B222-B225</td>
<td>1” 25</td>
<td>3.09” [78.4]</td>
<td>1.87” [47.4]</td>
</tr>
<tr>
<td>B229-B230</td>
<td>1¼” 32</td>
<td>3.72” [94.5]</td>
<td>1.87” [47.4]</td>
</tr>
</tbody>
</table>

Dimensions with 3-Way Valve

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches/DN (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>B307-B311</td>
<td>½” 15</td>
<td>2.41” [61.1]</td>
<td>1.39” [35.2]</td>
<td>1.20” [30.6]</td>
</tr>
<tr>
<td>B312-B315</td>
<td>½” 15</td>
<td>2.38” [60.4]</td>
<td>1.70” [43.2]</td>
<td>1.29” [32.8]</td>
</tr>
<tr>
<td>B317-B321</td>
<td>¾” 20</td>
<td>2.73” [69.3]</td>
<td>1.87” [47.4]</td>
<td>1.47” [37.3]</td>
</tr>
<tr>
<td>B322-B325</td>
<td>1” 25</td>
<td>3.09” [78.4]</td>
<td>1.87” [47.4]</td>
<td>1.59” [40.3]</td>
</tr>
</tbody>
</table>
**Wiring Diagrams**

**INSTALLATION NOTES**

**CAUTION** Equipment damage!
- Actuators may be connected in parallel.
- Power consumption and input impedance must be observed.
- Actuators may also be powered by 24 VDC.
- Position feedback cannot be used with Triac sink controller.
- The actuator internal common reference is not compatible.
- Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.
- Contact closures A & B also can be triacs.
- A & B should both be closed for triac source and open for triac sink.
- For triac sink the common connection from the actuator must be connected to the hot connection.

**APPLICATION NOTES**

- The ZG-H01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

**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.

**On/Off control**

**Floating Point**

**VDC/4-20 mA**

**PWM**
LRX24-PC Actuators, 0 to 20V Phasecut, Proportional

Technical Data

| Power supply          | 24 VAC ± 20% 50/60 Hz  
|                      | 24 VDC ± 10%      |
| Power consumption     | running: 2 W      |
|                       | holding: 1.2 W    |
| Transformer sizing    | 5 VA (Class 2 power source) |
| Electrical connection | ½” conduit connector |
|                       | 18 GA plenum rated cable |
|                       | 3 ft [1m], 10 ft [3m], 16 ft [5m] |
| Overload protection   | electronic throughout 0 to 95° rotation |
| Operating range Y     | 0 to 20V phasecut |
| Feedback output U     | 2 to 10 VDC, 0.5mA max |
| Input impedance       | 8 kΩ (50 mW) |
| Angle of rotation     | 90°, adjustable with mechanical stop |
|                       | electronically variable |
| Direction of rotation | reversible with switch |
| Position indication   | handle |
| Manual override       | external push button |
| Running time          | 150 seconds (default) |
| Humidity              | 5 to 95% RH non-condensing (EN 60730-1) |
| Ambient temperature   | -22°F to 122°F [-30°C to 50°C] |
| Storage temperature   | -40°F to 176°F [-40°C to 80°C] |
| Housing               | NEMA 2/IP54 |
| Housing material      | UL94-5VA |
| Agency listings†      | cULus according to UL 60730-1A/2-14, CAN/CSA E60730-1-02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions |
| Noise level           | <35 dB(A) |
| Quality standard      | ISO 9001 |

Models

LRX24-PC

Dimensions with 2-Way Valve

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Valve Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>B210/-B211</td>
<td>⅝&quot;</td>
<td>13</td>
</tr>
<tr>
<td>B212-B215</td>
<td>⅝&quot;</td>
<td>15</td>
</tr>
<tr>
<td>B217/-B221</td>
<td>¾&quot;</td>
<td>20</td>
</tr>
<tr>
<td>B222-B225</td>
<td>1&quot;</td>
<td>25</td>
</tr>
<tr>
<td>B229-B230</td>
<td>1¼&quot;</td>
<td>32</td>
</tr>
</tbody>
</table>

Dimensions with 3-Way Valve

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Valve Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>B310/-B311</td>
<td>⅝&quot;</td>
<td>15</td>
</tr>
<tr>
<td>B312-B315</td>
<td>⅝&quot;</td>
<td>15</td>
</tr>
<tr>
<td>B317/-B321</td>
<td>¾&quot;</td>
<td>20</td>
</tr>
<tr>
<td>B322-B325</td>
<td>1&quot;</td>
<td>25</td>
</tr>
</tbody>
</table>
**Wiring Diagrams**

**INSTALLATION NOTES**

1. Provide overload protection and disconnect as required.

2. **CAUTION Equipment damage!**
   - Actuators may be connected in parallel.
   - Power consumption and input impedance must be observed.

3. Actuators may also be powered by 24 VDC.

**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.
LRX24-MFT95 Actuators, 0 to 135 Ω, Proportional

**Models**
LRX24-MFT95

### Technical Data

**Power supply**
- 24 VAC ± 20% 50/60 Hz
- 24 VDC ± 10%

**Power consumption**
- Running: 2 W
- Holding: 1.2 W

**Transformer sizing**
- 5 VA (Class 2 power source)

**Electrical connection**
- ½" conduit connector
- 18 GA plenum rated cable
- 3 ft [1m], 10 ft [3m], 16 ft [5m]

**Overload protection**
- Electronic throughout 0 to 95° rotation

**Operating range WRB**
- 0 to 135 Ω Honeywell Electronic Series 90, 0 to 135 Ω input

**Feedback output U**
- 2 to 10 VDC, 0.5mA max

**Input impedance**
- 100 kΩ (0.1 mW)

**Angle of rotation**
- 90°, adjustable with mechanical stop electronically variable

**Direction of rotation**
- Reversible with switch

**Position indication**
- Handle

**Manual override**
- External push button

**Running time**
- 150 seconds (default) variable (35 to 150 seconds)

**Humidity**
- 5 to 95% RH non-condensing (EN 60730-1)

**Ambient temperature**
- -22°F to 122°F [-30°C to 50°C]

**Storage temperature**
- -40°F to 176°F [-40°C to 80°C]

**Housing**
- NEMA 2/IP54

**Housing material**
- UL94-5VA

**Agency listings†**
- cULus according to UL 60730-1A/2-14, CAN/CSA E60739-1.02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions

**Noise level**
- <35 dB(A)

**Quality standard**
- ISO 9001

†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

---

**Dimensions with 2-Way Valve**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B207-B211</td>
<td>½&quot;</td>
<td>15</td>
<td>2.41&quot; [61.1]</td>
<td>1.39&quot; [35.2]</td>
</tr>
<tr>
<td>B212-B215</td>
<td>½&quot;</td>
<td>15</td>
<td>2.38&quot; [60.4]</td>
<td>1.78&quot; [45.2]</td>
</tr>
<tr>
<td>B217-B221</td>
<td>¾&quot;</td>
<td>20</td>
<td>2.73&quot; [69.3]</td>
<td>1.87&quot; [47.4]</td>
</tr>
<tr>
<td>B222-B225s</td>
<td>1&quot;</td>
<td>25</td>
<td>3.09&quot; [78.4]</td>
<td>1.87&quot; [47.4]</td>
</tr>
<tr>
<td>B229-B230</td>
<td>1¼&quot;</td>
<td>32</td>
<td>3.72&quot; [94.6]</td>
<td>1.87&quot; [47.4]</td>
</tr>
</tbody>
</table>

---

**Dimensions with 3-Way Valve**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>B312-B315</td>
<td>½&quot;</td>
<td>15</td>
<td>2.38&quot; [60.4]</td>
<td>1.78&quot; [45.2]</td>
<td>1.29&quot; [32.8]</td>
</tr>
<tr>
<td>B317-B321</td>
<td>¾&quot;</td>
<td>20</td>
<td>2.73&quot; [69.3]</td>
<td>1.87&quot; [47.4]</td>
<td>1.47&quot; [37.3]</td>
</tr>
<tr>
<td>B322-B325s</td>
<td>1&quot;</td>
<td>25</td>
<td>3.09&quot; [78.4]</td>
<td>1.87&quot; [47.4]</td>
<td>1.59&quot; [40.3]</td>
</tr>
</tbody>
</table>
**Wiring Diagrams**

**INSTALLATION NOTES**

- Provide overload protection and disconnect as required.
- Actuators and controller must have separate transformers.
- Consult controller instruction data for more detailed information.
- Resistor value depends on the type of controller and the number of actuators. No resistor is used for one actuator.
- Honeywell® resistor kits may also be used.
- To reverse control rotation, use the reversing switch.2524232221

**WARNING Live Electrical Components!**

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LRQ...24-1 Quick Running Actuators, On/Off

**Models**
- LRQB24-1: Basic Version
- LRQX24-1: Flexible Version

**Technical Data**

<table>
<thead>
<tr>
<th>Control</th>
<th>on/off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>24 VAC ± 20% 50/60 Hz 24 VDC ± 10%</td>
</tr>
<tr>
<td>Power consumption</td>
<td>running 12 W  holding 1.5 W</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>18 VA (Class 2 power source) 20A @ 5ms max</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>LRQB24-1: ½&quot; conduit connector  LRQX24-1: 18 GA plenum rated cable</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>LRQB24-1: 3 ft [1m]  LRQX24-1: 3 ft [1m], 10 ft [3m], 16 ft [5m]</td>
</tr>
<tr>
<td>Overload protection</td>
<td>electronic throughout 0 to 95° rotation</td>
</tr>
<tr>
<td>Input impedance</td>
<td>600 Ω</td>
</tr>
<tr>
<td>Angle of rotation</td>
<td>max 95°, adjustable with mechanical stop</td>
</tr>
<tr>
<td>Position indication</td>
<td>handle</td>
</tr>
<tr>
<td>Manual override</td>
<td>external push button</td>
</tr>
<tr>
<td>Running time LRQB24-1</td>
<td>5 seconds constant of independent load</td>
</tr>
<tr>
<td>Running time LRQX24-1</td>
<td>5 or 10 seconds constant of independent load</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 to 95% RH non-condensing (EN 60730-1)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-22°F to 122°F [-30°C to 50°C]</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°F to 176°F [-40°C to 80°C]</td>
</tr>
<tr>
<td>Housing material</td>
<td>UL94-V0</td>
</tr>
<tr>
<td>Agency listings†</td>
<td>cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1-02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions</td>
</tr>
<tr>
<td>Noise level</td>
<td>&lt;52 dB(A)</td>
</tr>
<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
</tr>
</tbody>
</table>

**Dimensions with 2-Way Valve**

<table>
<thead>
<tr>
<th>Valve Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve Body</td>
<td>Inches</td>
</tr>
<tr>
<td>B207-B211</td>
<td>¼&quot;</td>
</tr>
<tr>
<td>B212-B21b</td>
<td>½&quot;</td>
</tr>
<tr>
<td>B217-B221</td>
<td>¾&quot;</td>
</tr>
<tr>
<td>B222-B225</td>
<td>1&quot;</td>
</tr>
<tr>
<td>B229-B230</td>
<td>1¼&quot;</td>
</tr>
</tbody>
</table>

**Dimensions with 3-Way Valve**

<table>
<thead>
<tr>
<th>Valve Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve Body</td>
<td>Inches</td>
</tr>
<tr>
<td>B312-B315</td>
<td>½&quot;</td>
</tr>
<tr>
<td>B317-B321</td>
<td>¾&quot;</td>
</tr>
<tr>
<td>B322-B325</td>
<td>1&quot;</td>
</tr>
</tbody>
</table>
Wiring Diagrams

**INSTALLATION NOTES**

⚠️ Provide overload protection and disconnect as required.

3 Actuators may also be powered by 24 VDC.

**APPLICATION NOTES**

♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

⚠️ **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.
**LRQ...24-MFT Quick Running Actuators, Multi-Function Technology**

**Models**
- LRQB24-MFT: Basic Version
- LRQX24-MFT: Flexible Version

### Technical Data

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>24 VAC ± 20%; 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>24 VDC ± 10%</td>
</tr>
<tr>
<td>Power consumption running</td>
<td>12 W</td>
</tr>
<tr>
<td>Power consumption holding</td>
<td>1.5 W</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>18 VA (Class 2 power source) 20A @ 5ms max</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>½&quot; conduit connector 18 GA plenum rated cable</td>
</tr>
<tr>
<td></td>
<td>3 ft [1m], 10 ft [3m], 16 ft [5m]</td>
</tr>
<tr>
<td>Overload protection</td>
<td>Electronic throughout 0 to 95° rotation</td>
</tr>
<tr>
<td>Operating range Y</td>
<td>2 to 10 VDC, 4 to 20 mA (default) variable (VDC, on/off)</td>
</tr>
<tr>
<td>Feedback output U</td>
<td>2 to 10 VDC, 0.5mA max VDC variable</td>
</tr>
<tr>
<td>Input impedance</td>
<td>100 kΩ (0.1 mA), 500 Ω (1500 Ω on/off)</td>
</tr>
<tr>
<td>Angle of rotation</td>
<td>Max 95°, adjustable with mechanical stop</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>Reversible with ( \vee ) switch</td>
</tr>
<tr>
<td>Position indication</td>
<td>Reflective visual indicator (snap-on)</td>
</tr>
<tr>
<td>Manual override</td>
<td>External push button</td>
</tr>
<tr>
<td>Running time</td>
<td>LRQB24-MFT: 5 seconds</td>
</tr>
<tr>
<td></td>
<td>LRQX24-MFT: constant of independent load</td>
</tr>
<tr>
<td></td>
<td>5 or 10 seconds constant of independent load</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 to 95% RH non-condensing (EN 60/30-1)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-22°F to 122°F [-30°C to 50°C]</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°F to 176°F [-40°C to 80°C]</td>
</tr>
<tr>
<td>Housing</td>
<td>NEMA 2/IP54</td>
</tr>
<tr>
<td>Housing material</td>
<td>UL94-V5A</td>
</tr>
<tr>
<td>Agency listings†</td>
<td>cULus according to UL 60730-1A-2-14, CAN/CSA E60730-1.02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions</td>
</tr>
<tr>
<td>Noise level</td>
<td>&lt;52 dB(A)</td>
</tr>
<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
</tr>
</tbody>
</table>

### Valve Nominal Size

#### Dimensions with 2-Way Valve

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>B207-B211</td>
<td>½&quot;</td>
<td>15 [1.39] [35.2]</td>
</tr>
<tr>
<td>B212-B215</td>
<td>¾&quot;</td>
<td>15 [1.78] [45.2]</td>
</tr>
<tr>
<td>B217-B221</td>
<td>1¼&quot;</td>
<td>20 [1.87] [47.4]</td>
</tr>
<tr>
<td>B229-B230</td>
<td>1&quot;</td>
<td>32 [1.87] [47.4]</td>
</tr>
</tbody>
</table>

#### Dimensions with 3-Way Valve

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>B307-B311</td>
<td>½&quot;</td>
<td>15 [2.41] [61.1]</td>
</tr>
<tr>
<td>B312-B315</td>
<td>¾&quot;</td>
<td>15 [2.38] [60.4]</td>
</tr>
<tr>
<td>B317-B321</td>
<td>1¼&quot;</td>
<td>20 [2.73] [69.3]</td>
</tr>
<tr>
<td>B322-B325</td>
<td>1&quot;</td>
<td>25 [3.09] [78.4]</td>
</tr>
</tbody>
</table>

---

**BELIMO**

[ BELIMO logo ]

**WARRANTY**

**CE**

**UL**

**cULus**

**ISO 9001**

---

**Contact Information**

- **USA**: 800-543-9038
- **CANADA**: 866-805-7089
- **LATIN AMERICA / CARIBBEAN**: 203-791-8396

---

**P10419-0913 - Subject to change © Belimo Aircontrols (USA), Inc.**
Wiring Diagrams

**INSTALLATION NOTES**

1. Provide overload protection and disconnect as required.
2. **CAUTION** Equipment damage! Actuators may be connected in parallel. Power consumption and input impedance must be observed.
3. Actuators may also be powered by 24 VDC.
4. Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

**APPLICATION NOTES**

- The ZG-R01 500 Ω resistor may be used.

**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.
NRQ...24-1 Quick Running Actuators, On/Off

Models
NRQB24-1 Basic Version
NHUX24-1 Flexible Version

Technical Data
Control: on/off
Power supply: 24 VAC ± 20% 50/60 Hz
24 VDC ± 10%
Power consumption:
running: 12 W
holding: 1.5 W
Transformer sizing: 18 VA (Class 2 power source)
Electrical connection:
NRQB24-1: ½” conduit connector, 18 GA plenum rated cable
NHUX24-1: 3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection: electronic throughout 0 to 95° rotation
Input impedance: 600 Ω
Angle of rotation: max 95°, adjustable with mechanical stop
Direction of rotation: reversible with switch
Position indication: reflective visual indicator (snap-on)
Manual override: external push button
Running time:
NRQB24-1: constant of independent load 5 seconds
NRQX24-1: 5, 10 or 15 seconds
Humidity: 5 to 95% RH non-condensing
(AEN 60730-1)
Ambient temperature:
-22°F to 122°F [-30°C to 50°C]
Storage temperature:
-40°F to 176°F [-40°C to 80°C]
Housing: NEMA 2/IP54
Housing material: UL94-5VA
Agency listings†: cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1-02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level: <52 dB(A)
Quality standard: ISO 9001
Rated Impulse Voltage 800V. Type of action 1, Control Pollution Degree 3.

Dimensions with 2-Way Valve

Dimensions with 3-Way Valve

Valve Nominal Size | Dimensions (Inches [mm])
--- | ---
| | A | B | C |
B29-B231 | ⅛” | ⅛” | ⅛” | 1.5” | [94.6] | [51.9] |
B238-B250 | 1½" | 2” | [107] | [57.7] |
B248-B250 | 2” | [107] | [57.7] |

Valve Nominal Size | Dimensions (Inches [mm])
--- | ---
| | A | B | C |
B329-B331 | ⅛” | ⅛” | ⅛” | 1.5” | [94.6] | [51.9] |
B39-B341 | 1½” | 2” | [107] | [57.7] |
B48-B350 | 2” | [107] | [57.7] | [54.3] |

Valve Nominal Size | Dimensions (Inches [mm])
--- | ---
| | A | B | C |
B232-B232 | 1¼” | 1¼” | 1¼” | 1.5” | [94.6] | [51.9] |
B238-B240 | 1½” | 2” | [107] | [57.7] |
B248-B250 | 2” | [107] | [57.7] |

Valve Nominal Size | Dimensions (Inches [mm])
--- | ---
| | A | B | C |
B232-B232 | 1¼” | 1¼” | 1¼” | 1.5” | [94.6] | [51.9] |
B238-B240 | 1½” | 2” | [107] | [57.7] |
B248-B250 | 2” | [107] | [57.7] | [54.3] |
### INSTALLATION NOTES

Provide overload protection and disconnect as required.

Actuators may also be powered by 24 VDC.

### APPLICATION NOTES

Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

**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.

---

**Wiring Diagrams**

24 VAC Transformer

Line Volts

Bkl (1) Comm.-

Red (2) +

Wht (3) +

The indication of direction is valid for switch position 1.

NRQ...24
NRQ...24-MFT Quick Running Actuators, Multi-Function Technology

**Models**
- NRQB24-MFT Basic Version
- NHUX24-MF-I Flexible Version

**Technical Data**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>24 VAC ± 20% 50/60 Hz, 24 VDC ± 10%</td>
</tr>
<tr>
<td>Power consumption</td>
<td>running: 12 W, holding: 1.5 W</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>18 VA (Class 2 power source)</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>NRQB24-MFT, NHUX24-MF-I: ½” conduit connector, 3 ft [1m], 10 ft [3m], 16 ft [5m]</td>
</tr>
<tr>
<td>Overload protection</td>
<td>electronic throughout 0 to 95° rotation</td>
</tr>
<tr>
<td>Operating range Y</td>
<td>variable (VDC, on/off), 2 to 10 VDC, 4 to 20 mA</td>
</tr>
<tr>
<td>Feedback output U</td>
<td>2 to 10 VDC, 0.5mA max VDC variable</td>
</tr>
<tr>
<td>Input impedance</td>
<td>100 kΩ (0.1 mA), 500 Ω, 1500 Ω (on/off)</td>
</tr>
<tr>
<td>Angle of rotation</td>
<td>max 95°, adjustable with mechanical stop, electronically variable</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>reversible with switch</td>
</tr>
<tr>
<td>Position indication</td>
<td>reflective visual indicator (snap-on)</td>
</tr>
<tr>
<td>Manual override</td>
<td>external push button</td>
</tr>
<tr>
<td>Running time NRQB24-MFT</td>
<td>constant of independent load 5 seconds</td>
</tr>
<tr>
<td>Running time NHUX24-MF-I</td>
<td>5, 10 or 15 seconds</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 to 95% RH non-condensing (EN 60730-1)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-22°F to 122°F [-30°C to 50°C]</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°F to 1/6°F [-40°C to 80°C]</td>
</tr>
<tr>
<td>Housing</td>
<td>NEMA 2/IP54</td>
</tr>
<tr>
<td>Housing material</td>
<td>UL94-5VA</td>
</tr>
<tr>
<td>Agency listings†</td>
<td>cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions</td>
</tr>
<tr>
<td>Noise level</td>
<td>&lt;52 dBA</td>
</tr>
<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
</tr>
</tbody>
</table>

**Dimensions with 2-Way Valve**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN [mm]</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B231-B232</td>
<td>1¼&quot;</td>
<td>32</td>
<td>3.72&quot; [94.6]</td>
<td>2.04&quot; [51.9]</td>
</tr>
<tr>
<td>B238-B240</td>
<td>1½&quot;</td>
<td>40</td>
<td>3.88&quot; [98.5]</td>
<td>2.04&quot; [51.9]</td>
</tr>
<tr>
<td>B248-B250</td>
<td>2&quot;</td>
<td>50</td>
<td>4.21&quot; [106.7]</td>
<td>2.27&quot; [57.7]</td>
</tr>
</tbody>
</table>

**Dimensions with 3-Way Valve**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN [mm]</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>B329-B331</td>
<td>1¼&quot;</td>
<td>32</td>
<td>3.96&quot; [100.6]</td>
<td>2.27&quot; [57.7]</td>
<td>2.14&quot; [54.3]</td>
</tr>
</tbody>
</table>

Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.
Wiring Diagrams

**INSTALLATION NOTES**

1. Provide overload protection and disconnect as required.

2. **CAUTION** Equipment damage!
   - Actuators may be connected in parallel.
   - Power consumption and input impedance must be observed.

3. Actuators may also be powered by 24 VDC.

4. Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

**APPLICATION NOTES**

- The ZG-R01 500 Ω resistor may be used.

**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.
NRB24-3-T N4, NRX24-3-T N4 NEMA 4X Actuators, On/Off, Floating Point

Models
NRB24-3-T N4
NRX24-3-T N4
NRH24-3-T N4H w/built in heater
NRX24-3-T N4H w/built in heater

Technical Data

Control

on/off, floating point

Power supply

24 VAC ± 20% 50/60 Hz
24 VDC ± 10%

Power consumption

running 2.0 W / heater 24 W
holding 0.2 W

Transformer sizing

4 VA (class 2 power source) / heater 19 VA

Electrical connection

screw terminal (for 26 to 14 GA wire)

Overload protection

electronic throughout 0° to 95° rotation

Input impedance

600 Ω

Angle of rotation

90°, adjustable with mechanical stop

Direction of rotation

reversible with switch

Position indication

visual pointer

Manual override

external push button

Running time

90 seconds constant independent of load

Humidity

100% RH

Ambient temperature

-22°F to 122°F [-30°C to 50°C]

Storage temperature

-40°F to 176°F [-40°C to 80°C]

Housing type

UL Type 4X/NEMA 4X/IP66 & IP67

Housing material

Polypropylene

Agency listings†
cULus according to UL 60730-1A/-2-14, CAN/CSA 660/30-1, CSA C22.2 No. 24-93, CE according to 89/336/EEC.

Quality standard

ISO 9001

*Cannot be used with the CDV-EXT-KIT
† Rated impulse voltage 600V, Control pollution degree 3, type of action 1.

Dimensions with 2-Way Valve

<table>
<thead>
<tr>
<th>Valve Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve Body</td>
<td>Inches [mm]</td>
</tr>
<tr>
<td>B207-B211</td>
<td>½&quot; 15 [61.1]</td>
</tr>
<tr>
<td>B212-B215</td>
<td>⅝&quot; 15 [60.4]</td>
</tr>
<tr>
<td>B217-B221</td>
<td>¾&quot; 20 [69.3]</td>
</tr>
<tr>
<td>B222-B225</td>
<td>1&quot; 25 [78.4]</td>
</tr>
<tr>
<td>B229-B230</td>
<td>1¼&quot; 32 [94.6]</td>
</tr>
</tbody>
</table>

Dimensions with 3-Way Valve

<table>
<thead>
<tr>
<th>Valve Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
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</thead>
<tbody>
<tr>
<td>Valve Body</td>
<td>Inches [mm]</td>
</tr>
<tr>
<td>B307-B311</td>
<td>½&quot; 15 [61.1]</td>
</tr>
<tr>
<td>B312-B315</td>
<td>⅝&quot; 15 [60.4]</td>
</tr>
<tr>
<td>B317-B321</td>
<td>¾&quot; 20 [69.3]</td>
</tr>
<tr>
<td>B322-B325</td>
<td>1&quot; 25 [78.4]</td>
</tr>
</tbody>
</table>
**CAUTION** Equipment damage!
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.
Actuators are provided with color coded wires.
Wire numbers are provided for reference.
Actuators may also be powered by 24 VDC.

**APPLICATION NOTES**
Meets cULus or UL and CSA requirements without the
need of an electrical ground connection.

**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.

---

### Wiring Diagrams

#### NRB24-3-T N4, NRX24-3-T N4 NEMA 4X Actuators, On/Off, Floating Point

**CAUTION** Equipment damage!
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.
Actuators are provided with color coded wires.
Wire numbers are provided for reference.
Actuators may also be powered by 24 VDC.

**APPLICATION NOTES**
Meets cULus or UL and CSA requirements without the
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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.

---

**Legend**
- M = actuator
- T (°C) = Thermostat
- H = Heating

**Note**
The following points must be taken into account with independent, external wiring:
- All contact between the cables or wires that are introduced and the heating element is to be avoided.
- Where necessary, use cables with sufficient numbers of wires, e.g. so that the heating and the
  actuator can be supplied separately with voltage.

---

**On/Off control**

**Floating Point control**

**Heater wiring**
NRB24-SR-T N4, NRX24-SR-T N4 NEMA 4X Actuators, Proportional

**Models**
- NRB24-SR-T N4
- NRB24-SH-1 N4H w/built in heater
- NRX24-SR-T N4
- NRX24-SR-T N4H w/built in heater

---

**Technical Data**

<table>
<thead>
<tr>
<th>Control</th>
<th>2 to 10 VDC, 4 to 20 mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>24 VAC ± 20% 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>24 VDC ± 10%</td>
</tr>
<tr>
<td>Power consumption</td>
<td>running 2.5 W / heater 24 W</td>
</tr>
<tr>
<td></td>
<td>holding 0.4 W</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>5 VA (class 2 power source) / heater 20 VA</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>screw terminal (for 26 to 14 GA wire)</td>
</tr>
<tr>
<td>Overload protection</td>
<td>electronic throughout 0° to 95° rotation</td>
</tr>
<tr>
<td>Input impedance</td>
<td>100 kΩ (0.1mA), 500kΩ</td>
</tr>
<tr>
<td>Angle of rotation</td>
<td>90°, adjustable with mechanical stop</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>reversible with switch</td>
</tr>
<tr>
<td>Position indication</td>
<td>visual pointer</td>
</tr>
<tr>
<td>Manual override</td>
<td>external push button</td>
</tr>
<tr>
<td>Running time</td>
<td>90 seconds constant independent of load</td>
</tr>
<tr>
<td>Humidity</td>
<td>100% RH</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-22°F to 122°F [-30°C to 50°C]</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°F to 176°F [-40°C to 80°C]</td>
</tr>
<tr>
<td>Housing type</td>
<td>UL Type 4X/NEMA 4X/IP66 &amp; IP67</td>
</tr>
<tr>
<td>Housing material</td>
<td>Polypropelene</td>
</tr>
<tr>
<td>Agency listings†</td>
<td>cULus according to UL 60730-1A/-2-14, CAN/CSA C22.2 No. 24-93, CE according to 89/336/EEC.</td>
</tr>
<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
</tr>
</tbody>
</table>

†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3

*Cannot be used with the CCV-EXT-KIT*

---

**Dimensions with 2-Way Valve**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN [mm]</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>B207-B211</td>
<td>¾&quot;</td>
<td>15</td>
<td>2.41” [61.1]</td>
<td>1.39” [35.2]</td>
<td></td>
</tr>
<tr>
<td>B212-B215</td>
<td>¾&quot;</td>
<td>15</td>
<td>2.38” [60.4]</td>
<td>1.78” [45.2]</td>
<td></td>
</tr>
<tr>
<td>B217-B221</td>
<td>¾&quot;</td>
<td>20</td>
<td>2.73” [69.3]</td>
<td>1.87” [47.4]</td>
<td></td>
</tr>
<tr>
<td>B222-B225</td>
<td>1”</td>
<td>25</td>
<td>3.09” [78.4]</td>
<td>1.87” [47.4]</td>
<td></td>
</tr>
<tr>
<td>B229-B230</td>
<td>1¼”</td>
<td>32</td>
<td>3.72” [94.6]</td>
<td>1.87” [47.4]</td>
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</tr>
</tbody>
</table>

**Dimensions with 3-Way Valve**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN [mm]</th>
<th>A</th>
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<th>C</th>
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<tbody>
<tr>
<td>B307-B311</td>
<td>½&quot;</td>
<td>15</td>
<td>2.41” [61.1]</td>
<td>1.39” [35.2]</td>
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<td>B312-B315</td>
<td>½&quot;</td>
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<td>2.38” [60.4]</td>
<td>1.78” [45.2]</td>
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<td>B317-B321</td>
<td>¾&quot;</td>
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<td>2.73” [69.3]</td>
<td>1.87” [47.4]</td>
<td>1.47” [37.3]</td>
</tr>
<tr>
<td>B322-B325</td>
<td>1”</td>
<td>25</td>
<td>3.09” [78.4]</td>
<td>1.87” [47.4]</td>
<td>1.59” [40.3]</td>
</tr>
</tbody>
</table>
**Wiring Diagrams**

**INSTALLATION NOTES**

⚠️ **CAUTION** Equipment damage!
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

⚠️ Actuators may also be powered by 24 VDC.

⚠️ Only connect common to neg. (–) leg of control circuits.

**APPLICATION NOTES**

♦ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

⚠️ **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.

---

**Legend:**
- **M** = actuator
- **T** (°C) = Thermostat
- **H** = Heating

**Wiring Diagrams**

**Heater wiring**

The following points must be taken into account with independent, external wiring:
- All contact between the cables or wires that are introduced and the heating element is to be avoided.
- Where necessary, use cables with sufficient numbers of wires, e.g. so that the heating and the actuator can be supplied separately with voltage.
NRX24-MFT-T N4 NEMA 4X Actuators, Multi-Function Technology

Models
NRX24-MFT-T N4
NRX24-MFT-I-1 N4H w/built in heater

Technical Data
Control
2 to 10 VDC, 4 to 20 mA (default) variable (VUC, PWM, floating point, on/off)

Power supply
24 VAC ± 20% 50/60 Hz
24 VDC ± 10%

Power consumption
running 3.5 W (1.25 W) / heater 24 W
holding 1.25 W

Transformer sizing
6 VA (class 2 power source) / heater 21 VA

Electrical connection
screw terminal (for 26 to 14 GA wire)

Overload protection
electronic throughout 0° to 95° rotation

Input impedance
100 kΩ (0.1 mA), 500 Ω (PWM, floating point, on/off)
1500 Ω (variable)

Angle of rotation
95°, adjustable with mechanical stop electronically variable

Direction of rotation
reversible with switch

Position indication
visual pointer

Manual override
external push button

Running time
150 seconds (default)
constant independent of load variable (75 to 350 seconds)

Humidity
100% RH

Ambient temperature
-22°F to 122°F [-30°C to 50°C]

Storage temperature
-40°F to 176°F [-40°C to 80°C]

Housing type
UL type 4X/NEMA 4X/IP66 & IP67

Housing material
Polypropylene

Agency Listings†
cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE according to 89/336/EEC.

Quality standard
ISO 9001

†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3
*Cannot be used with the CCV-EXT-KIT

Dimensions with 2-Way Valve

Dimensions with 3-Way Valve
**Wiring Diagrams**

**INSTALLATION NOTES**

⚠️ CAUTION Equipment damage!

Actuators may be connected in parallel.

Power consumption and input impedance must be observed.

Actuators may also be powered by 24 VDC.

Position feedback cannot be used with Triac sink controller.

The actuator internal common reference is not compatible.

Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

Contact closures A & B also can be triacs.

A & B should both be closed for triac source and open for triac sink.

For triac sink the common connection from the actuator must be connected to the hot connection.

**APPLICATION NOTES**

- The ZG-H01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

**WARNING Live Electrical Components!**

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---

**Legend:**

- M = actuator
- T°C = Thermostat
- H = Heating

**Note:**

The following points must be taken into account with independent, external wiring:

- All contact between the cables or wires that are introduced and the heating element is to be avoided.
- Where necessary, use cables with sufficient numbers of wires, e.g. so that the heating and the actuator can be supplied separately with voltage.
AR...24-3 Actuators, On/Off, Floating Point

Models
ARB24-3
ARB24-3-S w/built-in Aux. Switch
AHX24-3 Flexible
ARB24-3-S Flexible w/built-in Aux. Switch
AHX24-3-5-14
ARB24-3-5-14

Technical Data

Control
on/off, floating point

Power supply
24 VAC ± 20% / 50/60 Hz
24 VDC ± 10%

Power consumption
running 2.5 W
holding 0.2 W

Transformer sizing
5.5 VA (class 2 power source)

Electrical connection
½” conduit connector
18 GA plenum rated cable
ARB24-3...
3 ft. [1m]
ARB24-3...
3 ft. [1m] 10 ft. [3m] 16 ft. [5m]

Overload protection
electronic throughout 0° to 95° rotation

Input impedance
600 Ω

Angle of rotation
90°, adjustable with mechanical stop

Direction of rotation
reversible with protected √/√ switch

Position indication
handle

Manual override
external push button

Running time
AHX24-3...
90 seconds
ARB24-3...
300, 150, 90 seconds, constant independent of load

Humidity
5 to 95% RH non-condensing (EN 60730-1)

Ambient temperature
-22°F to 122°F [-30°C to 50°C]

Storage temperature
-40°F to 176°F [-40°C to 80°C]

Housing
NEMA 2/IP54

Housing material
UL94-5VA

Agency listings†
cULus according to UL 60730-1A/2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions

Noise level
<45 dB(A)

Quality standard
ISO 9001

AR...24-3-S
Auxiliary switch (-S models)
1 x SPDT, 3A (0.5A) @ 250 VAC, UL Listed, adjustable 0 to 90°

† Rated impulse voltage 800V, Control pollution degree 3, Type of action 1 (1.8 for -S models)

Dimensions with 2-Way Valve

Dimensions with 3-Way Valve
AR...24-3 Actuators, On/Off, Floating Point

Wiring Diagrams

**INSTALLATION NOTES**

⚠️ **CAUTION** Equipment damage!
Actuators may be connected in parallel. Power consumption and input impedance must be observed. For end position indication, interlock control, etc., ARB24-3-S incorporates one built-in auxiliary switches: 1 x SPDT, 3A (0.5A) @250 VAC, UL listed, adjustable 0° to 95°.
Actuators may also be powered by 24 VDC.

**APPLICATION NOTES**

- Meets cULus and UL and CSA requirements without the need of an electrical ground connection.

⚠️ **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.

### Dimensions

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Nominal Pipe Size</th>
<th>Top Flange Design</th>
<th>Flange Diameter</th>
<th>Face-to-Face Length</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>B6250</td>
<td>2½&quot; [65]</td>
<td>F05</td>
<td>7.50&quot; [190.5]</td>
<td>5.50&quot; [139.7]</td>
<td>8.10&quot; [205.4]</td>
</tr>
<tr>
<td>B6300</td>
<td>3&quot; [80]</td>
<td></td>
<td>8.00&quot; [203.2]</td>
<td>6.60&quot; [167.6]</td>
<td>8.40&quot; [213.1]</td>
</tr>
</tbody>
</table>

**Notes:**

- For end position indication, interlock control, etc., ARB24-3-S incorporates one built-in auxiliary switches: 1 x SPDT, 3A (0.5A) @250 VAC, UL listed, adjustable 0° to 95°.
- Actuators may also be powered by 24 VDC.
- Meets cULus requirements without the need of an electrical ground connection.
- Provide overload protection and disconnect as required.
- Actuators may also be powered by 24 VDC.
- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

**On/Off control**

**Floating Point or On/Off control**

**Auxiliary switch**
AR...24-SR Actuators, Proportional

**Technical Data**

- **Power supply**: 24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
- **Power consumption**
  - Running: 2.5 W
  - Holding: 0.4 W
- **Transformer sizing**: 5 VA (class 2 power source)
- **Electrical connection**
  - ½” conduit connector
  - 18 GA plenum rated cable
  - 3 ft [1m], 10 ft [3m], 16 ft [5m]
- **Overload protection**: electronic throughout 0° to 95° rotation
- **Operating range Y**: 2 to 10 VDC, 4 to 20 mA
- **Feedback output U**: 1 to 10 VDC, max 0.5 mA
- **Input impedance**: 100 kΩ (0.1 mA), 500 Ω
- **Angle of rotation**: 90°, adjustable with mechanical stop
- **Torque**: 180 in-lb [20 Nm]
- **Direction of rotation**: reversible with protected switch
- **Position indication**: handle
- **Manual override**: external push button
- **Running time**
  - ARB24-SR...
  - ARX24-SR...
  - 90 seconds
  - 300, 150, 90 seconds, constant independent of load
- **Humidity**: 5 to 95% RH non-condensing (EN 60730-1)
- **Ambient temperature**: -22°F to +122°F [-30°C to +50°C]
- **Storage temperature**: -40°F to +176°F [-40°C to +80°C]
- **Housing**: NEMA 2/IP54
- **Housing material**: UL94-5VA
- **Agency listings†**: cULus according to UL 60730-1A/2-14, CAN/CSA 680730-1-02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
- **Noise level**: <45 dB(A)
- **Quality standard**: ISO 9001

† Rated impulse voltage 800V, Control pollution degree 3, Type of action 1 (1.8 for -S models)

**Models**

- **ARB24-SR**
- **ARX24-SR Flexible Version**

---

**Dimensions with 2-Way Valve**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B231-B232</td>
<td>1¼”</td>
<td>32</td>
<td>3.72” [94.6]</td>
<td>2.04” [51.9]</td>
</tr>
<tr>
<td>B238-B240</td>
<td>1½”</td>
<td>40</td>
<td>3.88” [98.5]</td>
<td>2.04” [51.9]</td>
</tr>
<tr>
<td>B248-B250</td>
<td>2”</td>
<td>50</td>
<td>4.21” [107.0]</td>
<td>2.27” [57.7]</td>
</tr>
</tbody>
</table>

**Dimensions with 3-Way Valve**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B329-B331</td>
<td>1¼”</td>
<td>32</td>
<td>3.96” [100.6]</td>
<td>2.27” [57.7]</td>
</tr>
<tr>
<td>B338-B341</td>
<td>1½”</td>
<td>40</td>
<td>4.39” [111.6]</td>
<td>2.51” [63.7]</td>
</tr>
<tr>
<td>B347-B552</td>
<td>2”</td>
<td>50</td>
<td>4.90” [124.5]</td>
<td>2.73” [69.5]</td>
</tr>
</tbody>
</table>

---

**Valve Nominal Size**

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**Wiring Diagrams**

**INSTALLATION NOTES**

![CAUTION Equipment damage!](image)

Actuators may be connected in parallel.

Power consumption and input impedance must be observed.

Actuators may also be powered by 24 VDC.

Only connect common to neg. (–) leg of control circuits.

**APPLICATION NOTES**

The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

![WARNING Live Electrical Components!](image)

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.

![Wiring Diagram 1](image)

**2 to 10 VDC control**

![Wiring Diagram 2](image)

**4 to 20 mA control**
AR...120-3 Actuators, On/Off, Floating Point

Models
AHB120-3
ARX120-3 Flexible Version

Technical Data
Control  on/off, floating point
Power supply  100 to 240 VAC, 50/60 Hz (nominal)
85 to 265 VAC, 50/60 Hz (tolerance)
Power consumption  running 3 W
holding 0.6 W
Transformer sizing  7 VA (class 2 power source)
Electrical connection
ARB120-3  1½" conduit connector
ARBX120-3  3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection  electronic throughout 0° to 95° rotation
Input impedance  600 Ω
Angle of rotation  90°, adjustable with mechanical stop
Direction of rotation  reversible with protected switch
Position indication  handle
Manual override  external push button
Running time  ARB120-3  90 seconds
ARBX120-3  300, 150, 90 seconds, constant independent of load
Humidity  5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature  -22°F to 122°F [-30°C to 50°C]
Storage temperature  -40°F to 176°F [-40°C to 80°C]
Housing  NEMA 2/IP54
Housing material  UL94-5VA
Agency listings†  cULus according to UL 60/30-1A/-2-14,
CAN/CSA E60730-1-02, CE according to 2004/108/EC and 2006/95/EC
for line voltage and/or –S versions
Noise level  <45 dB(A)
Servicing  maintenance tree
Quality standard  ISO 9001

† Rated impulse voltage 4kV, Control pollution degree 3, Type of action 1

---

**Dimensions with 2-Way Valve**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches DN [mm]</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>B231-B232</td>
<td>1¼&quot; 32</td>
<td>A 3.72 [94.6]  B 2.04 [51.9]</td>
</tr>
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<td>B238-B240</td>
<td>1½&quot; 40</td>
<td>A 3.88 [98.5]  B 2.04 [51.9]</td>
</tr>
<tr>
<td>B248-B250</td>
<td>2&quot; 50</td>
<td>A 4.21 [107.0]  B 2.27 [57.7]</td>
</tr>
<tr>
<td>B251-B254</td>
<td>2&quot; 50</td>
<td>A 4.93 [125.2]  B 2.73 [69.5]</td>
</tr>
<tr>
<td>B261-B265</td>
<td>2½&quot; 65</td>
<td>A 5.55 [140.9]  B 2.73 [69.5]</td>
</tr>
<tr>
<td>B277-B280</td>
<td>3&quot; 80</td>
<td>A 5.82 [147.9]  B 2.73 [69.5]</td>
</tr>
</tbody>
</table>

**Dimensions with 3-Way Valve**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches DN [mm]</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
</table>

---

**Valve Nominal Size**

- Dimensions (Inches [mm])
- Valve Body
  - ARB, ARX 120-3 Actuators, On/Off, Floating Point
  - Models
    - ARB120-3
    - ARX120-3 Flexible Version

---

**Technical Data**

- Control: on/off, floating point
- Power supply: 100 to 240 VAC, 50/60 Hz (nominal)
- Power consumption: running 3 W, holding 0.6 W
- Transformer sizing: 7 VA (class 2 power source)
- Electrical connection:
  - ARB120-3: 1½" conduit connector
  - ARX120-3: 3 ft [1m], 10 ft [3m], 16 ft [5m]
- Overload protection: electronic throughout 0° to 95° rotation
- Input impedance: 600 Ω
- Angle of rotation: 90°, adjustable with mechanical stop
- Direction of rotation: reversible with protected switch
- Position indication: handle
- Manual override: external push button
- Running time:
  - ARB120-3: 90 seconds
  - ARX120-3: 300, 150, 90 seconds, constant independent of load
- Humidity: 5 to 95% RH non-condensing (EN 60730-1)
- Ambient temperature: -22°F to 122°F [-30°C to 50°C]
- Storage temperature: -40°F to 176°F [-40°C to 80°C]
- Housing: NEMA 2/IP54
- Housing material: UL94-5VA
- Agency listings†: cULus according to UL 60/30-1A/-2-14,
  CAN/CSA E60730-1-02, CE according to 2004/108/EC and 2006/95/EC
  for line voltage and/or –S versions
- Noise level: <45 dB(A)
- Servicing: maintenance tree
- Quality standard: ISO 9001

† Rated impulse voltage 4kV, Control pollution degree 3, Type of action 1
AR...120-3 Actuators, On/Off, Floating Point

**Wiring Diagrams**

**INSTALLATION NOTES**
- Provide overload protection and disconnect as required.
- **CAUTION** Equipment damage! Actuators may be connected in parallel. Power consumption and input impedance must be observed.

**APPLICATION NOTES**
- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

**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.

### Valve Body Nominal Pipe Size

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Nominal Pipe Size</th>
<th>Top Flange Design</th>
<th>Flange Diameter</th>
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**Dimensions**

**On/Off control**

**Floating Point or On/Off control**
AR...120-SR Actuators

Models
ARB120-SR
ARX120-SR  Flexible Version

Technical Data

Control  on/off, floating point
Power supply  100 to 240 VAC, 50/60 Hz (nominal)
             85 to 265 VAC, 50/60 Hz (tolerance)
Power consumption  running 3 W
             holding 0.6 W
Transformer sizing  7.5 VA (class 2 power source)

Electrical connection
ARB120-SR    ½” conduit connector
ARX120-SR    18 GA plenum rated cable
             3 ft [1m], 10 ft [3m], 16 ft [5m]

Overload protection  electronic throughout 0° to 95° rotation

Feedback output U  1 to 10 VDC, max 0.5 mA

Input impedance  600 Ω

Angle of rotation  90°, adjustable with mechanical stop

Direction of rotation  reversible with protected √√√ switch

Position indication  handle

Manual override  external push button

Running time
ARB120-SR    90 seconds
ARX120-SR    300, 150, 90 seconds, constant independent of load

Humidity  5 to 95% RH non-condensing (EN 60730-1)

Ambient temperature  -22°F to 122°F [-30°C to 50°C]

Storage temperature  -40°F to 176°F [-40°C to 80°C]

Housing  NEMA 2/IP54

Housing material  UL94-5VA

Agency listings†  cULus according to UL 60730-1A/-2-14, CAN/CSA B607-30-1-02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions

Noise level  <45 dB(A)

Servicing  maintenance free

Quality standard  ISO 9001

† Rated impulse voltage 4kV, Control pollution degree 3, Type of action 1

Dimensions with 2-Way Valve

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
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Dimensions with 3-Way Valve

<table>
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<td>2”</td>
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</tr>
</tbody>
</table>

Dimensions with 2-Way Valve

Dimensions (Inches [mm])

Valve Nominal Size

<table>
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<tr>
<th>Valve Body</th>
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<th>DN (mm)</th>
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<th>B</th>
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<tr>
<td>B248-B250</td>
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<td>4.21” [107.0]</td>
<td>2.27” [57.7]</td>
<td></td>
</tr>
</tbody>
</table>
**Wiring Diagrams**

**INSTALLATION NOTES**

**CAUTION** Equipment damage!
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

- Only connect common to neg. (−) leg of control circuits.
- A 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VAC.
- ARB(X) can be supplied with both 120 VAC and 230 VAC.

All 120 VAC and 230 VAC actuators use appliance rated cables.

**APPLICATION NOTES**

- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

**WARNING** Live Electrical Components!
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**APPLICATION NOTES**

- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.
### Technical Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power supply</strong></td>
<td>24 VAC ± 20% 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>24 VDC ± 10%</td>
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<tr>
<td><strong>Power consumption</strong></td>
<td>running: 4 W</td>
</tr>
<tr>
<td></td>
<td>holding: 1.25 W</td>
</tr>
<tr>
<td><strong>Transformer sizing</strong></td>
<td>6 VA (class 2 power source)</td>
</tr>
<tr>
<td><strong>Electrical connection</strong></td>
<td>ARX24-MFT</td>
</tr>
<tr>
<td></td>
<td>½&quot; conduit connector</td>
</tr>
<tr>
<td></td>
<td>18 GA plenum rated cable</td>
</tr>
<tr>
<td></td>
<td>3 ft. [1m], 10 ft. [3m], 16 ft. [5m]</td>
</tr>
<tr>
<td><strong>Overload protection</strong></td>
<td>electronic throughout 0° to 95° rotation</td>
</tr>
<tr>
<td><strong>Operating range Y</strong></td>
<td>2 to 10 VDC, 4 to 20 mA (default) variable (VDC, PWM, floating point, on/off)</td>
</tr>
<tr>
<td><strong>Feedback output U</strong></td>
<td>2 to 10 VDC, 0.5 mA max VDC variable</td>
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<tr>
<td><strong>Input impedance</strong></td>
<td>100 kΩ (0.1 mA), 500 Ω 1500 Ω (PWM, floating point, on/off)</td>
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<tr>
<td><strong>Angle of rotation</strong></td>
<td>95° electronically variable</td>
</tr>
<tr>
<td><strong>Direction of rotation</strong></td>
<td>reversible with protected switch</td>
</tr>
<tr>
<td><strong>Position indication</strong></td>
<td>handle</td>
</tr>
<tr>
<td><strong>Manual override</strong></td>
<td>external push button</td>
</tr>
<tr>
<td><strong>Running time</strong></td>
<td>ARH24-MH i ARX24-MFT</td>
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<tr>
<td></td>
<td>150 seconds variable (90 to 350 seconds)</td>
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<td><strong>Humidity</strong></td>
<td>5 to 95% RH non-condensing (EN 60730-1)</td>
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<tr>
<td><strong>Ambient temperature</strong></td>
<td>-22°F to 122°F [-30°C to 50°C]</td>
</tr>
<tr>
<td><strong>Storage temperature</strong></td>
<td>-40°F to 1/6°F [-40°C to 80°C]</td>
</tr>
<tr>
<td><strong>Housing</strong></td>
<td>NEMA 2/IP54</td>
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<td><strong>Housing material</strong></td>
<td>UL94-V5A</td>
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<tr>
<td><strong>Agency listings†</strong></td>
<td>cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1.02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions</td>
</tr>
<tr>
<td><strong>Noise level</strong></td>
<td>&lt;45 dB(A)</td>
</tr>
<tr>
<td><strong>Quality standard</strong></td>
<td>ISO 9001</td>
</tr>
</tbody>
</table>

† Rated impulse voltage 4kV, Control pollution degree 3, Type of action 1
Wiring Diagrams

**INSTALLATION NOTES**

- **CAUTION** Equipment damage!
  Actuators may be connected in parallel.
  Power consumption and input impedance must be observed.

- Actuators may also be powered by 24 VDC.

- Position feedback cannot be used with Triac sink controller.
  The actuator internal common reference is not compatible.
  Control signal may be pulsed from either the Hot (source)
  or the Common (sink) 24 VAC line.
  Contact closures A & B also can be triacs.
  A & B should both be closed for triac source and open for triac sink.
  For triac sink the common connection from the actuator
  must be connected to the hot connection.

**APPLICATION NOTES**

- The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to
  2 to 10 VDC, up to 2 actuators may be connected in parallel.

**WARNING** Live Electrical Components!
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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.
**ARX24-PC Actuators, Phasecut**

**Models**
ARX24-PC

---

**Technical Data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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</tr>
<tr>
<td></td>
<td>holding: 1.25 W</td>
</tr>
<tr>
<td><strong>Transformer sizing</strong></td>
<td>5.5 VA (Class 2 power source)</td>
</tr>
<tr>
<td><strong>Electrical connection</strong></td>
<td>½” conduit connector</td>
</tr>
<tr>
<td></td>
<td>18 GA plenum rated cable</td>
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<tr>
<td></td>
<td>3 ft. [1m], 10 ft. [3m], 16 ft. [5m]</td>
</tr>
<tr>
<td><strong>Overload protection</strong></td>
<td>electronic throughout 0 to 95° rotation</td>
</tr>
<tr>
<td><strong>Operating range Y</strong></td>
<td>0 to 20V phasecut</td>
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<tr>
<td><strong>Feedback output U</strong></td>
<td>2 to 10 VDC, 0.5mA max VDC variable</td>
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<tr>
<td><strong>Input impedance</strong></td>
<td>8 kΩ (50 mW)</td>
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<td><strong>Angle of rotation</strong></td>
<td>90°, adjustable with mechanical stop electronically variable</td>
</tr>
<tr>
<td><strong>Direction of rotation</strong></td>
<td>reversible with switch</td>
</tr>
<tr>
<td><strong>Position indication</strong></td>
<td>handle</td>
</tr>
<tr>
<td><strong>Manual override</strong></td>
<td>external push button</td>
</tr>
<tr>
<td><strong>Running time</strong></td>
<td>150 seconds (default)</td>
</tr>
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<td><strong>Humidity</strong></td>
<td>5 to 95% RH non-condensing (EN 60730-1)</td>
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<tr>
<td><strong>Ambient temperature</strong></td>
<td>-22°F to 122°F [-30°C to 50°C]</td>
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<td><strong>Storage temperature</strong></td>
<td>-40°F to 176°F [-40°C to 80°C]</td>
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<td></td>
<td>2004/108/EC and 2006/95/EC for line voltage and/or –S versions</td>
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<tr>
<td><strong>Quality standard</strong></td>
<td>ISO 9001</td>
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†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

---

**Valve Nominal Size**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
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</thead>
<tbody>
<tr>
<td>B231-B232</td>
<td>1⅛”</td>
<td>32</td>
<td>3.72” [94.6]</td>
<td>2.04” [51.9]</td>
<td></td>
</tr>
<tr>
<td>B238-B240</td>
<td>1⅜”</td>
<td>40</td>
<td>3.88” [98.5]</td>
<td>2.04” [51.9]</td>
<td></td>
</tr>
<tr>
<td>B248-B250</td>
<td>2”</td>
<td>50</td>
<td>4.21” [107.0]</td>
<td>2.27” [57.7]</td>
<td></td>
</tr>
<tr>
<td>B251-B254</td>
<td>2”</td>
<td>50</td>
<td>4.93” [125.2]</td>
<td>2.73” [69.5]</td>
<td></td>
</tr>
<tr>
<td>B261-B265</td>
<td>2⅜”</td>
<td>65</td>
<td>5.55” [140.9]</td>
<td>2.73” [69.5]</td>
<td></td>
</tr>
<tr>
<td>B277-B280</td>
<td>3”</td>
<td>80</td>
<td>5.82” [147.9]</td>
<td>2.73” [69.5]</td>
<td></td>
</tr>
</tbody>
</table>

---

**Dimensions with 2-Way Valve**

---

**Dimensions with 3-Way Valve**

---
Wiring Diagrams

**INSTALLATION NOTES**

1. Provide overload protection and disconnect as required.

2. **CAUTION** Equipment damage!
   - Actuators may be connected in parallel.
   - Power consumption and input impedance must be observed.

3. Actuators may also be powered by 24 VDC.

**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.

### 0 to 20V Phase Cut

- **24 VAC Transformer**
- **Line Volts**
- **Control Signal**
- **0 to 20 V Phasecut**

**Notes:**
ARX24-MFT95 Actuators, 0 to 135 °Ω

Models
ARX24-MFT95

Technical Data

- **Power supply**: 24 VAC ± 20% 50/60 Hz, 24 VDC ± 10%
- **Power consumption**
  - **running**: 4 W
  - **holding**: 1.25 W
- **Transformer sizing**: 6 VA (Class 2 power source)
- **Electrical connection**
  - ½" conduit connector
  - 18 GA plenum rated cable
  - 3 ft [1m], 10 ft [3m], 16 ft [5m]
- **Overload protection**: electronic throughout 0 to 95° rotation
- **Operating range WRB**: 0 to 135 °Ω Honeywell Electronic Series 90, 0 to 135 °Ω input
- **Feedback output U**: 2 to 10 VDC, 0.5mA max
- **Input impedance**: 100 kΩ (0.1 mW)
- **Angle of rotation**: 90°, adjustable with mechanical stop electronically variable
- **Direction of rotation**: reversible with switch
- **Position indication**: handle
- **Manual override**: external push button
- **Running time**: 150 seconds (default) variable (90 to 350 seconds)
- **Humidity**: 5 to 95% RH non-condensing (EN 60730-1)
- **Ambient temperature**: -22°F to 122°F [-30°C to 50°C]
- **Storage temperature**: -40°F to 176°F [-40°C to 80°C]
- **Housing**: NEMA 2/IP54
- **Housing material**: UL94-5VA
- **Agency listings†**: cULus according to UL 60730-1A-2-14, CAN/CSA E60730-1-02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
- **Noise level**: <45 dB(A)
- **Quality standard**: ISO 9001

†Hated Impulse Voltage 8kV, Type of action 1,AA, Control Pollution Degree 3.

---

### Dimensions with 2-Way Valve

*Table with dimensions in Inches (mm)*

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B231-B232</td>
<td>1¼&quot;</td>
<td>32</td>
<td>3.72&quot; [94.6]</td>
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<td>B238-B240</td>
<td>1½&quot;</td>
<td>40</td>
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<td>2½&quot;</td>
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<td>5.55&quot; [140.9]</td>
<td>2.73&quot; [69.5]</td>
</tr>
<tr>
<td>B277-B280</td>
<td>3&quot;</td>
<td>80</td>
<td>5.82&quot; [147.9]</td>
<td>2.73&quot; [69.5]</td>
</tr>
</tbody>
</table>

### Dimensions with 3-Way Valve

*Table with dimensions in Inches (mm)*

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<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
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<tbody>
<tr>
<td>B329-B331</td>
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<td>32</td>
<td>3.96&quot; [100.6]</td>
<td>2.27&quot; [57.7]</td>
<td>2.14&quot; [54.3]</td>
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<td>B338-B341</td>
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<td>40</td>
<td>4.39&quot; [111.6]</td>
<td>2.51&quot; [63.7]</td>
<td>2.40&quot; [61.1]</td>
</tr>
<tr>
<td>B347-B352</td>
<td>2&quot;</td>
<td>50</td>
<td>4.90&quot; [124.5]</td>
<td>2.73&quot; [69.5]</td>
<td>2.74&quot; [69.7]</td>
</tr>
</tbody>
</table>
**INSTALATION NOTES**

- Provide overload protection and disconnect as required.
- **CAUTION Equipment damage!**
  - Actuators and controller must have separate transformers.
  - Consult controller instruction data for more detailed installation information.
- Resistor value depends on the type of controller and the number of actuators. No resistor is used for one actuator. Honeywell resistor kits may also be used.
- To reverse control rotation, use the reversing switch.

**WARNING Live Electrical Components!**

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Wiring Diagrams

- **Switch A**
  - **Switch B**
  - **Damper Position**

  *The direction of rotation switch is set so that the fail-safe position and the position of the damper is closed with no signal at wire R.*

- ** Override**

  *To reverse control rotation, use the reversing switch.*

- **Wiring multiple actuators to a Series 90 controller using a minimum position potentiometer.**

- **Low Limit Control**

- **High Limit Control**

---

**ARX24-MFT95 Actuators, 0 to 135 Ω**

800-543-9030 USA 866-805-7089 CANADA 203-791-8396 LATIN AMERICA / CARIBBEAN
Models
ARB24-3-T N4
AHX24-3-T N4H w/built in heater
ARX24-3-T N4
AHX24-3-T N4H w/built in heater

Technical Data
Control on/off, floating point

Power supply
- 24 VAC ± 20% 50/60 Hz
- 24 VDC ± 10%

Power consumption
- running: 2.5 W / heater 23 W
- holding: 0.5 W

Transformer sizing
- 5.5 VA (class 2 power source) / heater 20.5 VA

Electrical connection
- screw terminal (for 26 to 14 GA wire)

Overload protection
- electronic throughout 0° to 95° rotation

Input impedance
- 600 Ω

Angle of rotation
- 90°, adjustable with mechanical stop

Direction of rotation
- reversible with switch

Position indication
- visual pointer

Manual override
- external push button

Running time
- 90 seconds constant independent of load

Humidity
- 100% RH

Ambient temperature
- -22°F to 122°F [-30°C to 50°C]

Storage temperature
- -40°F to 176°F [-40°C to 80°C]

Housing type
- UL Type 4X/NEMA 4X/IP66 & IP67

Housing material
- Polypropylene

Agency listings†
- cULus according to UL 60730-1A/-2-14, CAN/CSA 660/30-1, CSA C22.2 No. 24-93, CE according to 89/336/EEC.

Quality standard
- ISO 9001

†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3

*Cannot be used with the CCV-EXT-KIT
**CAUTION Equipment damage!**
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.
For end position indication, interlock control, etc.,
ARB24-3-S incorporates one built-in auxiliary switches:
1 x SPDT, 3A (0.5A) @250 VAC, UL listed, adjustable 0° to 95°.
Actuators may also be powered by 24 VDC.

**APPLICATION NOTES**
Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

**WARNING Live Electrical Components!**
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### Wiring Diagrams

**Notes:**
- The indication of direction is valid for switch position 1.
- Power consumption and input impedance must be observed.
- Actuators may be connected in parallel.

**Legend:**
- M = actuator
- T (°C) = Thermostat
- H = Heating

**Note:**
The following points must be taken into account with independent, external wiring:
- All contact between the cables or wires that are introduced and the heating element is to be avoided.
- Where necessary, use cables with sufficient numbers of wires, e.g. so that the heating and the actuator can be supplied separately with voltage.

---

**On/Off control**

**Floating Point or On/Off control**

**Heater wiring**
Models
ARB24-SR-T N4
AHB24-SH-1 N4H w/built in heater
ARB24-SR-T N4
ARB24-SR-T N4H w/built in heater

Technical Data

<table>
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<tr>
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<tr>
<td>Power supply</td>
<td>24 VAC ± 20% 50/60 Hz 24 VDC ± 10%</td>
</tr>
<tr>
<td>Power consumption</td>
<td>running 2.5 W / heater 23 W</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>5 VA (class 2 power source) / heater 20 VA</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>screw terminal (for 26 tp 14 GA wire)</td>
</tr>
<tr>
<td>Overload protection</td>
<td>electronic throughout 0° to 95° rotation</td>
</tr>
<tr>
<td>Operating range Y</td>
<td>2 to 10 VDC, 4 to 20 mA</td>
</tr>
<tr>
<td>Input impedance</td>
<td>600 Ω</td>
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<td>Angle of rotation</td>
<td>90°, adjustable with mechanical stop</td>
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<td>Direction of rotation</td>
<td>reversible with switch</td>
</tr>
<tr>
<td>Position indication</td>
<td>visual pointer</td>
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<tr>
<td>Manual override</td>
<td>external push button</td>
</tr>
<tr>
<td>Running time</td>
<td>90 seconds constant independent of load</td>
</tr>
<tr>
<td>Humidity</td>
<td>100% RH</td>
</tr>
<tr>
<td>Ambient temperature</td>
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</tr>
<tr>
<td>Storage temperature</td>
<td>-40°F to 176°F [-40°C to 80°C]</td>
</tr>
<tr>
<td>Housing type</td>
<td>UL Type 4X/NEMA 4X/IP66 &amp; IP67</td>
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<td>Housing material</td>
<td>Polypropylene</td>
</tr>
<tr>
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</tr>
<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
</tr>
</tbody>
</table>

†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3
*Cannot be used with the CCV-EXT-KIT
**Wiring Diagrams**

**INSTALLATION NOTES**

⚠️ **CAUTION** Equipment damage!
- Actuators may be connected in parallel.
- Power consumption and input impedance must be observed.
- Actuators may also be powered by 24 VDC.
- Only connect common to neg. (−) leg of control circuits.

**APPLICATION NOTES**

- The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

⚠️ **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.

---

**Heater wiring**

![Heater wiring diagram](image1)

**Note**

The following points must be taken into account with independent, external wiring:
- All contact between the cables or wires that are introduced and the heating element is to be avoided.
- Where necessary, use cables with sufficient numbers of wires, e.g., so that the heating and the actuator can be supplied separately with voltage.

---

**2 to 10 VDC control**

![2 to 10 VDC control diagram](image2)

**4 to 20 mA control**

![4 to 20 mA control diagram](image3)
ARX24-MFT-T N4 NEMA 4X Actuators, Multi-Function Technology

Models
ARX24-MFT-T N4
ARX24-MFT 1-1 N4H w/built in heater

Technical Data

<table>
<thead>
<tr>
<th>Control</th>
<th>2 to 10 VDC, 4 to 20 mA (default) variable (VUC, PWM, floating point, on/off)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>24 VAC ± 20% 50/60 Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>running 3.5 W / heater 24 W</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>6 VA (class 2 power source) / heater 21 VA</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>screw terminal (for 26 tp 14 GA wire)</td>
</tr>
<tr>
<td>Overload protection</td>
<td>electronic throughout 0° to 95° rotation</td>
</tr>
<tr>
<td>Input impedance</td>
<td>100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 1500 Ω for PWM, floating point and on/off control</td>
</tr>
<tr>
<td>Angle of rotation</td>
<td>95°, adjustable with mechanical stop electronically variable</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>reversible with switch</td>
</tr>
<tr>
<td>Position indication</td>
<td>visual pointer</td>
</tr>
<tr>
<td>Manual override</td>
<td>external push button</td>
</tr>
<tr>
<td>Running time</td>
<td>150 seconds (default) constant independent of load variable (75 to 350 seconds)</td>
</tr>
<tr>
<td>Humidity</td>
<td>100% RH</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-22°F to 122°F [-30°C to 50°C]</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°F to 176°F [-40°C to 80°C]</td>
</tr>
<tr>
<td>Housing type</td>
<td>UL Type 4X/NEMA 4X/IP66 &amp; IP67</td>
</tr>
<tr>
<td>Housing material</td>
<td>Polypropelene</td>
</tr>
<tr>
<td>Agency listings†</td>
<td>cULus according to UL 60730-1A/-2-14, CAN/CSA B60/30U-1, CSA C22.2 No. 24-93, UL according to 89/336/EEC.</td>
</tr>
<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
</tr>
</tbody>
</table>

† Rated impulse voltage 4kV, Control pollution degree 3, Type of action 1
*Cannot be used with the CCV-EXT-KIT

Dimensions with 2-Way Valve

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B231-B232</td>
<td>1 1/4&quot;</td>
<td>32</td>
<td>3.72&quot; [94.6]</td>
<td>2.04&quot; [51.9]</td>
</tr>
<tr>
<td>B238-B240</td>
<td>1 1/2&quot;</td>
<td>40</td>
<td>3.88&quot; [98.5]</td>
<td>2.04&quot; [51.9]</td>
</tr>
<tr>
<td>B248-B250</td>
<td>2&quot;</td>
<td>50</td>
<td>4.21&quot; [107.0]</td>
<td>2.27&quot; [57.7]</td>
</tr>
<tr>
<td>B251-B254</td>
<td>2&quot;</td>
<td>50</td>
<td>4.93&quot; [125.2]</td>
<td>2.73&quot; [69.5]</td>
</tr>
<tr>
<td>B261-B265</td>
<td>2 1/2&quot;</td>
<td>65</td>
<td>5.55&quot; [140.9]</td>
<td>2.73&quot; [69.5]</td>
</tr>
<tr>
<td>B277-B280</td>
<td>3&quot;</td>
<td>80</td>
<td>5.82&quot; [147.9]</td>
<td>2.73&quot; [69.5]</td>
</tr>
</tbody>
</table>

Dimensions with 3-Way Valve

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>B329-B331</td>
<td>1 1/4&quot;</td>
<td>32</td>
<td>3.96&quot; [100.6]</td>
<td>2.27&quot; [57.7]</td>
<td>2.14&quot; [54.3]</td>
</tr>
<tr>
<td>B338-B341</td>
<td>1 1/2&quot;</td>
<td>40</td>
<td>4.39&quot; [111.6]</td>
<td>2.51&quot; [63.7]</td>
<td>2.40&quot; [61.1]</td>
</tr>
<tr>
<td>B347-B352</td>
<td>2&quot;</td>
<td>50</td>
<td>4.90&quot; [124.5]</td>
<td>2.73&quot; [69.5]</td>
<td>2.74&quot; [69.7]</td>
</tr>
</tbody>
</table>
**Wiring Diagrams**

**INSTALLATION NOTES**

⚠️ **CAUTION** Equipment damage!
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

Actuators may also be powered by 24 VDC.

Position feedback cannot be used with Triac sink controller.
The actuator internal common reference is not compatible.

Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

Contact closures A & B also can be triacs.
A & B should both be closed for triac source and open for triac sink.
For triac sink the common connection from the actuator must be connected to the hot connection.

**APPLICATION NOTES**

⚠️ The ZG-H01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

**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.

---

**Legend:**

M = actuator

T (°C) = Thermostat

H = Heating

<table>
<thead>
<tr>
<th>N</th>
<th>L</th>
<th>L</th>
<th>N</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Note:
The following points must be taken into account with independent, external wiring:

- All contact between the cables or wires that are introduced and the heating element is to be avoided.
- Where necessary, use cables with sufficient numbers of wires, e.g. so that the heating and the actuator can be supplied separately with voltage.

**Heater wiring**

---

**On/Off control**

**Floating Point**

**VDC/4-20 mA**

**PWM**
ARQX24-1 Quick Running Actuators, On/Off

Models
ARQX24-1 Flexible Version

Technical Data
- Control: on/off
- Power supply: 24 VAC ± 20% 50/60 Hz
  24 VDC ± 10%
- Power consumption:
  - running: 15 W
  - holding: 1.5 W
- Transformer sizing: 26 VA (Class 2 power source)
- Electrical connection:
  - ½" conduit connector,
  - 18 GA plenum rated cable
  - 3 ft [1m], 10 ft [3m], 16 ft [5m]
- Overload protection: electronic throughout 0 to 95° rotation
- Input impedance: 100 Ω
- Angle of rotation: max 95°, adjustable with mechanical stop
- Direction of rotation: reversible with switch
- Position indication: reflective visual indicator (snap-on)
- Manual override: external push button
- Running time: constant of independent load
  - 10 or 15 seconds
- Humidity: 5 to 95% RH non-condensing
- Ambient temperature: -22°F to 122°F [-30°C to 50°C]
- Storage temperature: -40°F to 176°F [-40°C to 80°C]
- Housing:
  - NEMA 2/IP54
- Housing material: UL94-5VA
- Agency listings†: cULus according to UL 60/3U-1A/2-14,
  CAN/CSA E60730-1-02, CE according to
  2004/108/EC and 2006/95/EC for line voltage
  and/or –S versions
- Noise level: <52 dB(A)
- Quality standard: ISO 9001

Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

Dimensions with 2-Way Valve

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B248-B280</td>
<td>2&quot;</td>
<td>50</td>
<td>4.21&quot; [107]</td>
<td>2.27&quot; [57.7]</td>
</tr>
</tbody>
</table>

Dimensions with 3-Way Valve

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>B330-B332</td>
<td>1¼&quot;</td>
<td>32</td>
<td>3.96&quot; [100.6]</td>
<td>2.27&quot; [57.7]</td>
<td>2.14&quot; [54.3]</td>
</tr>
<tr>
<td>B338-B340</td>
<td>1½&quot;</td>
<td>40</td>
<td>4.39&quot; [111.6]</td>
<td>2.51&quot; [63.7]</td>
<td>2.90&quot; [74.1]</td>
</tr>
<tr>
<td>B348-B352</td>
<td>2&quot;</td>
<td>50</td>
<td>4.95&quot; [124.5]</td>
<td>2.73&quot; [69.5]</td>
<td>2.74&quot; [69.7]</td>
</tr>
</tbody>
</table>
Wiring Diagrams

**INSTALLATION NOTES**

⚠️ Provide overload protection and disconnect as required.

3 Actuators may also be powered by 24 VDC.

**APPLICATION NOTES**

♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

**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.

![Wiring Diagram](image-url)
ARQX24-MFT Quick Running Actuators, Multi-Function Technology

**Technical Data**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power supply</strong></td>
<td>24 VAC ± 20% 50/60 Hz 24 VDC ± 10%</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>Running: 15 W  Holding: 1.5 W</td>
</tr>
<tr>
<td><strong>Transformer sizing</strong></td>
<td>26 VA (Class 2 power source)</td>
</tr>
<tr>
<td><strong>Electrical connection</strong></td>
<td>½” conduit connector, 18 GA plenum rated cable, 3 ft [1m], 10 ft [3m], 16 ft [5m]</td>
</tr>
<tr>
<td><strong>Overload protection</strong></td>
<td>Electronic throughout 0 to 95° rotation</td>
</tr>
<tr>
<td><strong>Operating range Y</strong></td>
<td>2 to 10 VDC, 4 to 20 mA (default), variable (VDC, on/off)</td>
</tr>
<tr>
<td><strong>Feedback output U</strong></td>
<td>2 to 10 VDC, 0.5mA max VDC variable</td>
</tr>
<tr>
<td><strong>Input impedance</strong></td>
<td>100 kΩ (0.1 mA), 500 Ω, 1500 Ω (on/off)</td>
</tr>
<tr>
<td><strong>Angle of rotation</strong></td>
<td>Max 95°, adjustable with mechanical stop electronically variable</td>
</tr>
<tr>
<td><strong>Direction of rotation</strong></td>
<td>Reversible with switch</td>
</tr>
<tr>
<td><strong>Position indication</strong></td>
<td>Reflective visual indicator (snap-on)</td>
</tr>
<tr>
<td><strong>Manual override</strong></td>
<td>External push button</td>
</tr>
<tr>
<td><strong>Running time</strong></td>
<td>Constant of independent load 10 or 15 seconds</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>5 to 95% RH non-condensing (EN 60730-1)</td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>-22°F to 122°F [-30°C to 50°C]</td>
</tr>
<tr>
<td><strong>Storage temperature</strong></td>
<td>-40°F to 176°F [-40°C to 80°C]</td>
</tr>
<tr>
<td><strong>Housing</strong></td>
<td>NEMA 2/IP54</td>
</tr>
<tr>
<td><strong>Housing material</strong></td>
<td>UL94-5VA</td>
</tr>
<tr>
<td><strong>Agency listings†</strong></td>
<td>cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1-02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions</td>
</tr>
<tr>
<td><strong>Noise level</strong></td>
<td>&lt;52 dB(A)</td>
</tr>
<tr>
<td><strong>Quality standard</strong></td>
<td>ISO 9001</td>
</tr>
</tbody>
</table>

*Rated Impulse Voltage 800V. Type of action 1. Control Pollution Degree 3.*

---

**Dimensions with 2-Way Valve**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>B231-B232</td>
<td>1¼”</td>
<td>32</td>
<td>3.72” [94.6]</td>
<td>2.04” [51.9]</td>
<td></td>
</tr>
<tr>
<td>B238-B240</td>
<td>1½”</td>
<td>40</td>
<td>3.88” [98.5]</td>
<td>2.04” [51.9]</td>
<td></td>
</tr>
<tr>
<td>B248-B250</td>
<td>2”</td>
<td>50</td>
<td>4.21” [107.0]</td>
<td>2.21” [56.2]</td>
<td></td>
</tr>
<tr>
<td>B251-B254</td>
<td>2”</td>
<td>50</td>
<td>4.93” [125.2]</td>
<td>2.68” [68.0]</td>
<td></td>
</tr>
<tr>
<td>B261-B265</td>
<td>2½”</td>
<td>65</td>
<td>5.55” [140.9]</td>
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<tr>
<td>B277-B280</td>
<td>3”</td>
<td>80</td>
<td>5.82” [147.9]</td>
<td>2.68” [68.0]</td>
<td></td>
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</table>

**Dimensions with 3-Way Valve**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
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<td>B338-B340</td>
<td>1½”</td>
<td>40</td>
<td>4.39” [111.6]</td>
<td>2.51” [63.7]</td>
<td>2.90” [76.1]</td>
</tr>
<tr>
<td>B348-B352</td>
<td>2”</td>
<td>50</td>
<td>4.95” [124.5]</td>
<td>2.73” [69.5]</td>
<td>2.74” [69.7]</td>
</tr>
</tbody>
</table>
Wiring Diagrams

**INSTALLATION NOTES**

1. Provide overload protection and disconnect as required.
2. **CAUTION** Equipment damage! Actuators may be connected in parallel. Power consumption and input impedance must be observed.
3. Actuators may also be powered by 24 VDC.
4. Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

**APPLICATION NOTES**

- The ZG-R01 500 Ω resistor may be used.

**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.
GRB24-3, GRX24-3 Actuators, On/Off, Floating Point

Models
GRB24-3-5-14
GRX24-3-5-14

Technical Data
Control
On/off, floating point
Power supply
24 VAC ± 20% 50/60 Hz
Power consumption
Running: 4 W
Holding: 2 W
Transformer sizing
6 VA (Class 2 power source)
Electrical connection
GRX 3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection
Electronic throughout 0° to 95° rotation
Input impedance
600 Ω
Angle of rotation
Max. 95°, adjustable with mechanical stop
Direction of rotation
Reversible with switch
Position indication
Visual indicator
Running time
150 seconds, constant independent of load
Manual override
External push button
Ambient temperature
-22°F to 122°F [-30°C to 50°C]
Housing
NEMA 2/IP54, Enclosure Type 2
Agency listings †
cULus according to UL 60730-1A/-2-14,
CAN/CSA E60730-1:02, CE according to
2004/108/EEC and 2006/95/EC.
Noise level
<45 dB(A)
Quality standard
ISO 9001

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

Dimensions

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Nominal Pipe Size</th>
<th>Top Flange Design</th>
<th>Flange Diameter</th>
<th>Face-to-Face Length</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>B6500</td>
<td>5&quot; [125]</td>
<td>H 1/2</td>
<td>10.00&quot; [254]</td>
<td>10.30&quot; [261.6]</td>
<td>10.50&quot; [266.4]</td>
</tr>
<tr>
<td>B6600</td>
<td>6&quot; [150]</td>
<td>H 1/2</td>
<td>11.00&quot; [279.4]</td>
<td>12.50&quot; [317.5]</td>
<td>11.70&quot; [296.9]</td>
</tr>
</tbody>
</table>
**INSTALLATION NOTES**

- Provide overload protection and disconnect as required.
- Actuators may also be powered by 24 VDC.

**APPLICATION NOTES**
- Meets cULus requirements without the need of an electrical ground connection.

**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.

---

**On/Off control**

![On/Off control diagram]

- The indication of direction is valid for switch position 1.

**Floating Point or On/Off control**

![Floating Point or On/Off control diagram]

- The indication of direction is valid for switch position 1.
### Technical Data

**Power Supply**
- 100 to 240 VAC, 50/60 Hz (nominal)
- 85 to 265 VAC, 50/60 Hz (tolerance)

**Power consumption**
- Running: 4 W
- Holding: 2 W

**Transformer sizing**
- 7 VA (Class 2 power source)

**Electrical connection**
- 18 GA appliance rated cable
- ½" conduit connector
- 3 ft. [1m], 10 ft. [3m], 16 ft. [5m]

**Overload protection**
- Electronic throughout 0° to 95° rotation

**Control**
- On/off, floating point

**Input impedance**
- 600 Ω

**Angle of rotation**
- Max. 95°, adjustable with mechanical stop

**Direction of rotation**
- Reversible with switch

**Position indication**
- External push button

**Running time**
- 150 seconds, constant independent of load

**Humidity**
- 5 to 95% RH non-condensing (EN 60730-1)

**Ambient temperature**
- -22°F to 122°F [-30°C to 50°C]

**Housing**
- NEMA 2/IP54, Enclosure Type 2

**Housing material**
- UL94-5VA

**Agency listings †**
- cULus according to UL 60730-1A/-2-14, CAN/CSA b60/30-1:02, CE according to 2004/108/EEC and 2006/95/EC.

**Noise level**
- <45 dB(A)

**Quality standard**
- ISO 9001

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.
**INSTALLATION NOTES**

1. Provide overload protection and disconnect as required.
2. Actuators may be connected in parallel.
3. Power consumption and input impedance must be observed.

**APPLICATION NOTES**

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

**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.

---

**On/Off control**

1. 100 to 240 VAC

- N L1
- H L2

Diagram:

- a open
- a closed

(1) Common
(2) +
(3) +

The indication of direction is valid for switch position 1.

---

**Floating Point or On/Off control**

1. 100 to 240 VAC

- N L1
- H L2

Diagram:

- a open
- a closed

(1) Common
(2) +
(3) +

The indication of direction is valid for switch position 1.
GRX24-MFT Actuators, Multi-Function Technology

Models
GRX24-MFT-5-14

Technical Data
Control
2 to 10 VDC, 4 to 40 mA (default) variable (VDC, PWM, floating point, on/off)

Power supply
24 VAC ± 20% 50/60 Hz
24 VDC ± 10%

Power consumption
running 4.5 W
holding 1.5 W

Transformer sizing
7 VA (Class 2 power source)

Electrical connection
3 ft, 18 GA plenum rated cable
½" conduit connector
3 ft. [1m], 10 ft. [3m], 16 ft. [5m]

Overload protection
electronic throughout 0° to 95° rotation

Feedback output
2 to 10 VDC, 0.5 mA max, VDC variable

Input impedance
100 kΩ (0.1 mA, 500 Ω)
1500 Ω (PWM, floating point, on/off)

Angle of rotation
max. 95°, adjustable with mechanical stop electronically variable

Direction of rotation
reversible with switch

Position indication
visual indicator

Running time
150 seconds (default) variable (75 to 300 seconds)

Manual override
external push button

Ambient temperature
-22°F to 122°F [-30°C to 50°C]

Housing
NEMA 2/IP54, Enclosure Type 2

Housing material
UL94-5V (flammability rating)

Agency listings †
cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1-02, CE according to 2004/108/EEC and 2006/95/EC.

Noise level
<45 dB(A)

Quality standard
ISO 9001

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.
### INSTALLATION NOTES

1. Provide overload protection and disconnect as required.
2. **CAUTION Equipment Damage!**
   - Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.
   - Actuators may also be powered by 24 VDC.
   - Position feedback cannot be used with Triac sink controller.
   - Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.
   - Contact closures A & B also can be triacs.
   - For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

### APPLICATION NOTES

- Meets UL requirements without the need of an electrical ground connection.
- The ZG-R01 500 Ω resistor may be used.

### 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.
TFRB(X) Actuators, On/Off

**Models**
- IHH(X)24
- IHH(X)120
- TFRB(X)24-S
- TFRB(X)120-S w/built-in Aux. Switch

### Technical Data

<table>
<thead>
<tr>
<th>Control</th>
<th>on/off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td></td>
</tr>
<tr>
<td>TFRB(X)24(-S)</td>
<td>24VAC ± 20%, 50/60Hz</td>
</tr>
<tr>
<td>TFRB(X)120(-S)</td>
<td>(nominal) 100 to 240 VAC, 50/60 Hz (tolerance) 85 to 265 VAC, 50/60 Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>running 2.5 W  holding 1.3 W</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>TFRB(X)24(-S) 5 VA (class 2 power source)  TFRB(X)120(-S) 5 VA (class 2 power source)</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>TFRB(X)24... TFRB(X)120</td>
</tr>
<tr>
<td>(-S models have 2 cables)</td>
<td>½” conduit connector 18 GA appliance cable 10 ft [3m] 16 ft [5m]</td>
</tr>
<tr>
<td>Overload protection</td>
<td>electronic throughout 0° to 95° rotation</td>
</tr>
<tr>
<td>Angle of rotation</td>
<td>95°</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>reversible with protected mounting</td>
</tr>
<tr>
<td>Position indication</td>
<td>visual indicator, 0° to 95°</td>
</tr>
<tr>
<td>Running time</td>
<td>motor &lt;75 seconds (0 to 18 in-lb)  spring &lt;75 sec @ -22°F to 122°F [-20°C to 50°C]</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 to 95% RH non-condensing</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-22°F to 122°F [-30°C to 50°C]</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°F to 176°F [-40°C to 80°C]</td>
</tr>
<tr>
<td>Housing</td>
<td>NEMA type 2/IP42</td>
</tr>
<tr>
<td>Housing material</td>
<td>UL94 - 5VA</td>
</tr>
<tr>
<td>Agency listings†</td>
<td>cULus according to UL 60720-1A/2-14, CAN/USA b66V-3UL1812, Es according to 2004/108/EC and 2006/95/EC for line voltage and/or -S versions</td>
</tr>
<tr>
<td>Noise level (max)</td>
<td>running &lt;40 db (A)  spring return &lt;40 db (A)</td>
</tr>
<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
</tr>
</tbody>
</table>

### TFRB(X)....-S

**Auxiliary switch**
- 1 x SPDT, 3A (0.5A) @ 250 VAC, UL Listed adjustable 0° to 95°

---

† Rated impulse voltage 800V (4KV for 120V model), Control pollution degree 3, type of action 1.AA (1.AA.B for -S models)
Wiring Diagrams

**INSTALLATION NOTES**

⚠️ **CAUTION** Equipment damage!

- Actuators may be connected in parallel.
- Power consumption and input impedance must be observed.
- Actuators may also be powered by 24 VDC.

**APPLICATION NOTES**

- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

⚠️ **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.

---

**On/Off Wiring**

- **24 VAC Transformer**
  - 1 Common
  - 2 + Hot

- **On/Off Wiring**
  - 100 to 240 VAC
  - N L1
  - H L2

- **Auxiliary Switch**
  - S1
  - S2 NC
  - S3 NO
  - 0° to 95°

- **TFX120 US**

- **TFX24 US**

---

© Belimo Aircontrols (USA), Inc.
TFRB(X)24-3 Actuators, Floating Point

Models
TFRB(X)24-3
TFRB(X)24-3-S w/built-in Aux. Switch

Technical Data

Control  floating point
Power supply  24VAC ± 20%, 50/60Hz
Power consumption
  running  2.5 W
  holding  1.0 W
Transformer sizing  4 VA (class 2 power source)
Electrical connection
  (-S models have 2 cables)
  TFRB(X)24-3...
    ½” conduit connector
    18 GA plenum rated cable
    3 ft [1m]
    10 ft [3m]
    16 ft [5m]
Overload protection  electronic throughout 0° to 95° rotation
Input impedance  1000 Ω (0.6w) control inputs
Angle of rotation  95°
Direction of rotation
  spring  motor
    reversible with CW/CCW mounting
    reversible with built-in switch
Position indication
  visual indicator, 0° to 95°
Running time
  motor  95 sec constant, independent of load
  spring  <25 sec @ -4°F to 122°F [-20°C to 50°C]
  <60 sec @ -22°F [-30°C]
Humidity  5 to 95% RH non-condensing
Ambient temperature
  -22°F to 122°F [-30°C to 50°C]
Storage temperature
  -40°F to 1/6°F [-40°C to 80°C]
Housing  NEMA type 2/IP42
Housing material  UL94 - 5VA
Agency listings†  cULus according to UL 60730-1A/2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level (max)
  running  <35 dB (A)
  spring return  62 dB (A)
Quality standard  ISO 9001

TFRB(X)24-3-S US
Auxiliary switch  1 x SPDT, 3A (0.5A) @ 250 VAC, UL Listed, adjustable 0° to 95°
† Rated impulse voltage 800V (4kV for 120V model), Control pollution degree 3, Type of action 1.AA (1.AA.B for -S models)
CAUTION Equipment damage!
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.
The common connection from the actuator must be
classified to the Hot connection of the controller.
The actuator Hot must be connected to the control board common.
For end position indication, interlock control, fan startup, etc.,
TF24-3-S US incorporates one built-in auxiliary switch: 1 x SPDT, 3A
(0.5A) @250 VAC, UL listed, adjustable 0° to 95°.
Actuators with plenum rated cable do not have numbers on wires; use
color codes instead. Actuators with appliance rated cable use numbers.
APPLICATION NOTES
Meets cULus or UL and CSA requirements without the
need of an electrical ground connection.
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.

Wiring Diagrams

<table>
<thead>
<tr>
<th>INSTALLATION NOTES</th>
</tr>
</thead>
</table>

CAUTION Equipment damage!
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.
The common connection from the actuator must be
classified to the Hot connection of the controller.
The actuator Hot must be connected to the control board common.
For end position indication, interlock control, fan startup, etc.,
TF24-3-S US incorporates one built-in auxiliary switch: 1 x SPDT, 3A
(0.5A) @250 VAC, UL listed, adjustable 0° to 95°.
Actuators with plenum rated cable do not have numbers on wires; use
color codes instead. Actuators with appliance rated cable use numbers.
APPLICATION NOTES
Meets cULus or UL and CSA requirements without the
need of an electrical ground connection.
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.
TFRB(X)24-SR Actuators, Proportional

Models
TFRB(X)24-SR
TFRB(X)24-SR-S w/built-in Aux. Switch

Technical Data
- Control: proportional
- Power supply: 24 VAC ± 20%, 50/60 Hz
  24 VDC ± 10%
- Power consumption:
  running: 2.5 W
  holding: 1.0 W
- Transformer sizing: 4 VA (class 2 power source)
- Electrical connection:
  TFRB(X)24-SR...
  ½” conduit connector
  18 GA plenum rated cable
  3 ft [1m]
  10 ft [3m]
  16 ft [5m]
- Electrical protection: actuators are double insulated
- Overload protection: electronic throughout 0° to 95° rotation
- Operating range Y: 2 to 10 VDC, 4 to 20 mA
- Input impedance: 100k Ω (0.1mA), 500 Ω
- Feedback Output U: 2-10 VDC
- Angle of rotation: 95°
- Direction of rotation:
  motor: reversible with CW/CCW mounting
  spring: reversible with built-in switch
- Position indication: visual indicator, 0° to 95°
- Running time:
  motor: <25 sec @-4°F to 122°F [-20°C to 50°C]
  spring: <80 sec @-22°F [30°C]
- Humidity: 5 to 95% RH non-condensing
- Ambient temperature: -22°F to 122°F [-30°C to 50°C]
- Storage temperature: -40°F to 176°F [-40°C to 80°C]
- Housing: NEMA type 2/IP42
- Housing material: UL94 - 5VA
- Agency listings†:
  cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
- Noise level (max):
  running: <35 db (A)
  spring return: <62 db (A)
- Quality standard: ISO 9001

TFRB(X)24-SR-S
- Auxiliary switch:
  1 x SPDT, 3A (0.5A) @ 250 VAC, UL Listed, adjustable 0° to 95°

† Rated impulse voltage 800V (4kV for 120V model), Control pollution degree 3,
Type of action 1.AA (1.AA.B for -S models)
**Wiring Diagrams**

**INSTALLATION NOTES**

⚠️ **CAUTION** Equipment damage!

Actuators may be connected in parallel. Power consumption and input impedance must be observed. Up to 4 actuators may be connected in parallel. With 4 actuators wired to one 500 Ω resistor, a +2% shift of control signal may be required. Power consumption must be observed.

Actuators may also be powered by 24 VDC.

Only connect common to neg. (—) leg of control circuits.

Actuators with plenum rated cable do not have numbers on wires; use color codes instead.

For end position indication, interlock control, fan startup, etc., TF24-SR-S US incorporates one built-in auxiliary switch: 1 x SPDT, 3A (0.5A) @250 VAC, UL listed, adjustable 0° to 95°.

**APPLICATION NOTES**

♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

⚠️ **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.

**Notes:**

- 2 to 10 VDC control
- 4 to 20 mA control
- Auxiliary switch
TFRX24-MFT Actuators, Multi-Function Technology

**Technical Data**

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control</strong></td>
<td>MFT</td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>24 VAC ± 20% 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>24 VDC ± 10%</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>Running: 2.5 W</td>
</tr>
<tr>
<td></td>
<td>Holding: 1.0 W</td>
</tr>
<tr>
<td><strong>Transformer sizing</strong></td>
<td>4 VA (class 2 power source)</td>
</tr>
<tr>
<td><strong>Electrical connection</strong></td>
<td>½&quot; conduit connector</td>
</tr>
<tr>
<td></td>
<td>3 ft [1m], 18 GA plenum rated cable</td>
</tr>
<tr>
<td><strong>Overload protection</strong></td>
<td>Electronic throughout 0° to 95° rotation</td>
</tr>
<tr>
<td><strong>Operating range Y</strong></td>
<td>2 to 10 VDC, 4 to 20 mA (default) variable (VDC, PWM, floating point, on/off)</td>
</tr>
<tr>
<td><strong>Feedback output U</strong></td>
<td>2 to 10 VDC, 0.5 mA max</td>
</tr>
<tr>
<td><strong>Input impedance</strong></td>
<td>100 kΩ for 2 to 10 VDC (0.1 mA)</td>
</tr>
<tr>
<td></td>
<td>500 kΩ for 4 to 20 mA</td>
</tr>
<tr>
<td></td>
<td>1500 kΩ for PWM, floating point and on/off control</td>
</tr>
<tr>
<td><strong>Mechanical angle of rotation</strong></td>
<td>95°</td>
</tr>
<tr>
<td><strong>Angle of rotation adaptation</strong></td>
<td>Off (Default)</td>
</tr>
<tr>
<td><strong>Direction of rotation</strong></td>
<td>Spring motor, reversible with CW/CCW mounting</td>
</tr>
<tr>
<td></td>
<td>Spring motor, reversible with built-in switch</td>
</tr>
<tr>
<td><strong>Position indication</strong></td>
<td>Visual indicator, 0° to 95°</td>
</tr>
<tr>
<td><strong>Override control</strong></td>
<td>Min. (Min Position) = 0%</td>
</tr>
<tr>
<td></td>
<td>ZS (Mid. Position) = 50%</td>
</tr>
<tr>
<td></td>
<td>Max (Max. Position) = 100%</td>
</tr>
<tr>
<td><strong>Running time</strong></td>
<td>Motor* 95 seconds constant independent of load</td>
</tr>
<tr>
<td></td>
<td>Spring &lt;25 seconds @-4°F to 122°F [-20°C to 50°C]</td>
</tr>
<tr>
<td></td>
<td>&lt;60 seconds @-22°F [-30°C]</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>5 to 95% RH, non-condensing</td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>-22 to 122° F (-30 to 50° C)</td>
</tr>
<tr>
<td><strong>Storage temperature</strong></td>
<td>-40 to 176° F (-40 to 80° C)</td>
</tr>
<tr>
<td><strong>Housing</strong></td>
<td>NEMA 2/IP42</td>
</tr>
<tr>
<td><strong>Agency listings†</strong></td>
<td>cULus according to UL 60730-1A/2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions</td>
</tr>
<tr>
<td><strong>Noise level (max)</strong></td>
<td>Running &lt;35 dB (A)</td>
</tr>
<tr>
<td></td>
<td>Spring return &lt;65 dB (A)</td>
</tr>
<tr>
<td><strong>Quality standard</strong></td>
<td>ISO 9001</td>
</tr>
</tbody>
</table>

* Variable when configured with MFT options
† Rated impulse voltage 0.8 kV, Control pollution degree 3, Type of action 1AA.
Wiring Diagrams

**INSTALLATION NOTES**

- Provide overload protection and disconnect as required.
- **CAUTION** Equipment damage!
  - Actuators may be connected in parallel.
  - Power consumption and input impedance must be observed.
- Actuators may also be powered by 24 VDC.
- ZG-R01 may be used.

**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.

---

**Standard Wiring**

1. **24 VAC Transformer**
   - Line Volts
   - Control Signal 4 to 20 mA
2. **24 VAC Transformer**
   - Line Volts
   - Control Signal 2 to 10 VDC
3. **24 VAC Transformer**
   - Line Volts
   - Control Signal 2 to 10 VDC
4. **24 VAC Transformer**
   - Line Volts
   - Control Signal 4 to 20 mA

---

**Override to zero position**

- **A** Open: 4 mA Position
- **A** Closed: Normal Operation

**Override to 10 V position**

- **B** Closed: 10 V Position
- **C** Closed: Normal Operation

**Override to 20 mA position**

- **B** Closed: 20 mA Position
- **C** Closed: Normal Operation

**4 to 20 mA Control Signal**

---

**WARNING** Live Electrical Components!

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Models
LF24 US
LF24-S US w/built-in Aux. Switch
LF120 US
LF120-S US w/built-in Aux. Switch

Technical Data
Control
on/off, floating point

Power supply
LF24(-S) US
24 VAC ± 20% 50/60 Hz
24 VDC ± 10%

LF120(-S) US
120 VAC ± 10% 50/60 Hz

Power consumption
LF24(-S) US
running 5 W
holding 2.5 W

LF120(-S) US
running 5.5 W
holding 3.5 W

Transformer sizing
LF24(-S) US
7 VA, class 2 power source

LF120(-S) US
7.5 VA, class 2 power source

Electrical connection
(-S models have 2 cables)
½” conduit connector
3 ft [1m], 18 GA appliance cable

Electrical protection
120V actuators double insulated

Overload protection
electronic throughout rotation

Angle of rotation
95°

Spring return direction
reversible with CW/CCW mounting

Position indication
visual indicator 0° to 90°

Running time
motor <40 to 75 seconds (on/off)
spring <25 sec. @-4°F to 122°F [-20°C to 50°C]
<60 sec. @-22°F [-30°C]

Ambient temperature
-22°F to 122°F [-30°C to 50°C]

Agency listings†
cULus according to UL 873 and CAN/CSA C22.2 No. 24-93

Noise level (max)
running <30 dBA
spring return 62 dBA

Quality standard
ISO 9001

LF...-S US
Auxiliary switch
1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed,
adjustable 0° to 95° (double insulated)

† Rated impulse voltage 800V (4kV for 120V model), Control pollution degree 3,
Type of action 1.AA (1.AA.B for -S models)
Wiring Diagrams

**INSTALLATION NOTES**

1. Provide overload protection and disconnect as required.
2. **CAUTION Equipment damage!**
   - Actuators may be connected in parallel.
   - Power consumption must be observed.
3. Actuator may also be powered by 24 VDC.
   - For end position indication, interlock control, fan startup, etc., LF24-S US and LF120-S US incorporates a built-in auxiliary switch:
     1 x SPDT, 6A (1.5A) @ 250 VAC, UL listed, adjustable 0° to 95°.

**APPLICATION NOTES**

- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

**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.
LF24-3 Actuators, Floating Point

Technical Data

**Models**
- LF24-3 US
- LF24-3-S US with built-in Aux. Switch

**Technical Data**

- **Power supply**: 24 VAC ± 20% 50/60 Hz, 24 VDC ± 10%
- **Power consumption**
  - running: 2.5 W
  - holding: 1 W
- **Transformer sizing**: 5 VA (class 2 power source)
- **Electrical connection**
  - (-S models have 2 cables)
  - ½" conduit connector
  - 3 ft [1m], 18 GA appliance cable
- **Overload protection**: electronic throughout 0° to 95° rotation
- **Input impedance**: 1kΩ (0.6W) control inputs
- **Angle of rotation**: 95°
- **Direction of rotation**
  - spring: reversible with CW/CCW mounting
  - motor: reversible with built-in switch
- **Position indication**: visual indicator 0° to 90°
- **Running time**
  - motor: 150 seconds constant independent of load
  - spring: <25 seconds @ -4°F to 122°F [-20°C to 50°C]
    - <60 seconds @ -22°F [-30°C]
- **Humidity**: 5 to 95% RH non-condensing
- **Ambient temperature**: -22° F to 122° F [-30°C to 50°C]
- **Storage temperature**: -40° F to 176° F [-40°C to 80°C]
- **Housing**: NEMA type 2/IP54
- **Housing material**: zinc coated metal
- **Agency listings**: cULus according to UL 873 and CAN/CSA C22.2 No. 249-03
- **Noise level (max)**
  - running: <30 db(A)
  - spring return: 62 db(A)
- **Servicing**: maintenance free
- **Quality standard**: ISO 9001

**LF24-3-S US**

- **Auxiliary switch**: 1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed, adjustable 0° to 95° (double insulated)

---

**Dimensions with 2-Way Valve**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>B207(B)-B211(B)</td>
<td>½&quot;</td>
<td>15</td>
<td>2.41&quot; [61.1]</td>
<td>1.39&quot; [35.2]</td>
<td></td>
</tr>
<tr>
<td>B212(B)-B215(B)</td>
<td>½&quot;</td>
<td>15</td>
<td>2.38&quot; [60.4]</td>
<td>1.78&quot; [45.2]</td>
<td></td>
</tr>
<tr>
<td>B217(B)-B220(B)</td>
<td>¾&quot;</td>
<td>20</td>
<td>2.73&quot; [69.3]</td>
<td>1.87&quot; [47.4]</td>
<td></td>
</tr>
<tr>
<td>B222-B225</td>
<td>1&quot;</td>
<td>25</td>
<td>3.09&quot; [78.4]</td>
<td>1.87&quot; [47.4]</td>
<td></td>
</tr>
<tr>
<td>B229-B230</td>
<td>1¼&quot;</td>
<td>32</td>
<td>3.72&quot; [94.6]</td>
<td>1.87&quot; [47.4]</td>
<td></td>
</tr>
</tbody>
</table>

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**Dimensions with 3-Way Valve**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>B307(B)-B311(B)</td>
<td>½&quot;</td>
<td>15</td>
<td>2.41&quot; [61.1]</td>
<td>1.39&quot; [35.2]</td>
<td></td>
</tr>
<tr>
<td>B312(B)-B315(B)</td>
<td>½&quot;</td>
<td>15</td>
<td>2.38&quot; [60.4]</td>
<td>1.78&quot; [45.2]</td>
<td></td>
</tr>
<tr>
<td>B317(B)-B320(B)</td>
<td>¾&quot;</td>
<td>20</td>
<td>2.73&quot; [69.3]</td>
<td>1.87&quot; [47.4]</td>
<td></td>
</tr>
<tr>
<td>B322-B325</td>
<td>1&quot;</td>
<td>25</td>
<td>3.09&quot; [78.4]</td>
<td>1.87&quot; [47.4]</td>
<td></td>
</tr>
<tr>
<td>B329-B330</td>
<td>1¼&quot;</td>
<td>32</td>
<td>3.72&quot; [94.6]</td>
<td>1.87&quot; [47.4]</td>
<td></td>
</tr>
</tbody>
</table>
**Wiring Diagrams**

**INSTALLATION NOTES**

- **CAUTION** Equipment damage!
  - Actuators may be connected in parallel.
  - Power consumption must be observed.
  - Actuators may also be powered by 24 VDC.
  - The common connection from the actuator must be connected to the Hot connection of the controller.
  - The actuator Hot must be connected to the control board common.
  - For end position indication, interlock control, fan startup, etc., LF24-3 US incorporates one built-in auxiliary switch: 1 x SPDT, 6A (1.5A) @ 250 VAC, UL listed, adjustable 0° to 95°.
  - Actuators with plenum rated cable do not have numbers on wires; use color codes instead. Actuators with appliance rated cable use numbers.

**APPLICATION NOTES**

- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

**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.

**On/Off control**

```
24 VAC Transformer

Line Volts

Hot Com

Bkl (1) Common
Red (2) +
Wht (3) +
Grn (4) +

The indication of direction is valid for switch position CW.
```

**Floating Point control**

```
24 VAC Transformer

Line Volts

Hot Com

Bkl (1) Common
Red (2) +
Wht (3) +
Grn (4) +

The indication of direction is valid for switch position CW.
```

**Auxiliary switch**

```
S1 NC
S2 NO
S3 NC 0° to 95°

LF24-3-S US
```

**Triac source**

```
24 VAC Transformer

Line Volts

Hot Com

Bkl (1) Common
Red (2) +
Wht (3) +
Grn (4) +

The indication of direction is valid for switch position CW.
```

**Triac sink**

```
24 VAC Transformer

Line Volts

Hot Com

Bkl (1) Common
Red (2) +
Wht (3) +
Grn (4) +

The indication of direction is valid for switch position CW.
```

**Triac sink with separate transformers**

```
24 VAC Transformer

Line Volts

Hot Com

Bkl (1) Common
Red (2) +
Wht (3) +
Grn (4) +

The indication of direction is valid for switch position CW.
```
LF24-SR Actuators, Proportional

Models
LF24-SR US
LF24-SR-S US w/built-in Aux. Switch

Technical Data

<table>
<thead>
<tr>
<th>Control</th>
<th>proportional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control signal</td>
<td>2 to 10 VDC</td>
</tr>
<tr>
<td></td>
<td>4 to 20 mA (with 500 Ω resistor)</td>
</tr>
<tr>
<td>Power consumption</td>
<td>running 2.5 W</td>
</tr>
<tr>
<td></td>
<td>holding 1 W</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>5 VA, class 2 power</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>½&quot; conduit connector</td>
</tr>
<tr>
<td>(-S models have 2 cables)</td>
<td>3 ft [1m], 18 GA appliance cable</td>
</tr>
<tr>
<td>Overload protection</td>
<td>electronic throughout 0° to 95° rotation</td>
</tr>
<tr>
<td>Feedback output</td>
<td>2 to 10 VDC</td>
</tr>
<tr>
<td>Input impedance</td>
<td>100 kΩ</td>
</tr>
<tr>
<td>Angle of rotation</td>
<td>95°</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>spring motor</td>
</tr>
<tr>
<td></td>
<td>reversible with CW/CCW mounting</td>
</tr>
<tr>
<td></td>
<td>reversible with built-in switch</td>
</tr>
<tr>
<td>Position indication</td>
<td>visual indicator</td>
</tr>
<tr>
<td>Running time</td>
<td>motor 150 sec. independent of load (proportional)</td>
</tr>
<tr>
<td></td>
<td>spring &lt;25 seconds @ -4°F to 122°F [-20°C to 50°C]</td>
</tr>
<tr>
<td></td>
<td>&lt;60 seconds @ -22°F [-30°C]</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-22°F to 122°F [-30°C to 50°C]</td>
</tr>
<tr>
<td>Housing</td>
<td>NEMA 2</td>
</tr>
<tr>
<td>Agency listings</td>
<td>cULus according to UL 873 and CAN/CSA C22.2 No. 24-93</td>
</tr>
<tr>
<td>Noise level (max)</td>
<td>running &lt;30 dB(A)</td>
</tr>
<tr>
<td></td>
<td>spring return 62 dB(A)</td>
</tr>
<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
</tr>
</tbody>
</table>

LF24-SR-S US

Auxiliary switch 1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed, adjustable 0° to 95° (double insulated)
**Wiring Diagrams**

**INSTALLATION NOTES**

**CAUTION Equipment damage!**

Actuators may be connected in parallel. Up to 4 actuators may be connected in parallel. With 4 actuators wired to one 500 Ω resistor, a +2% shift of control signal may be required. Power consumption must be observed.

Actuators may also be powered by 24 VDC.

Actuators with plenum rated cable do not have numbers on wires; use color codes instead.

Only connect common to neg. (–) leg of control circuits.

For end position indication, interlock control, fan startup, etc., LF24-SR-S US incorporates one built-in auxiliary switch: 1 x SPDT, 6A (1.5A) @ 250 VAC, UL listed, adjustable 0° to 95°.

The LF24-SR-S US wire 5 is white.

**APPLICATION NOTES**

- The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.
- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

**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.

**2 to 10 VDC control**

![Wiring Diagram 2 to 10 VDC control](image)

**4 to 20 mA control**

![Wiring Diagram 4 to 20 mA control](image)

**Auxiliary switch**

![Auxiliary switch](image)
**Models**

LF24-MFT US  
LF24-MFT-S US w/built-in Aux. Switch

**Technical Data**

<table>
<thead>
<tr>
<th>Control</th>
<th>MFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control signal</td>
<td>2 to 10 VDC</td>
</tr>
<tr>
<td>Power consumption</td>
<td>2.5 W running 1 W holding</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>5 VA (class 2 power source)</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>½” conduit connector (-S models have 2 cables) 3 ft [1m], 18 GA appliance cable</td>
</tr>
<tr>
<td>Overload protection</td>
<td>electronic throughout 0° to 95° rotation</td>
</tr>
<tr>
<td>Feedback output</td>
<td>2 to 10 VDC, 0.5 mA max</td>
</tr>
<tr>
<td>Input impedance</td>
<td>100 kΩ for 2 to 10 VDC (0.1 mA) 500 kΩ for 4 to 20mA 750 kΩ for PWM 500 kΩ for on/off and floating point</td>
</tr>
<tr>
<td>Angle of rotation</td>
<td>95°</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>spring reversible with CW/CCW mounting motor reversible with built-in switch</td>
</tr>
<tr>
<td>Position indication</td>
<td>visual indicator</td>
</tr>
<tr>
<td>Running time</td>
<td>motor 150 seconds independent of load (proportional, default) spring &lt;25 seconds @ -4°F to 122°F [-20°C to 50°C] &lt;60 seconds @ -22°F [-30°C]</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-22° F to 122° F [-30°C to 50° C]</td>
</tr>
<tr>
<td>Housing</td>
<td>NEMA 2</td>
</tr>
<tr>
<td>Agency listings</td>
<td>cULus according to UL 873 and CAN/CSA C22.2 No. 24-93</td>
</tr>
<tr>
<td>Noise level (max)</td>
<td>running &lt;30 dB(A) spring return 62 dB(A)</td>
</tr>
<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
</tr>
</tbody>
</table>

**LF24-MFT-S US**  
Auxiliary switch 1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed, adjustable 0° to 95° (double insulated)
**Wiring Diagrams**

**INSTALLATION NOTES**

⚠️ **CAUTION** Equipment damage!

Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.

Actuators may also be powered by 24 VDC.

IN4004 or IN4007 diode (IN4007 supplied, Belimo part number 40155).

Triac A and B can also be contact closures.

Control signals may be pulsed from either the Hot (Source) or Common (Sink) 24 VAC line.

Position feedback cannot be used with triac sink controller.

The actuators' internal common reference is not compatible.

**APPLICATION NOTES**

ائه The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

**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.

---

**On/Off control**

![On/Off control diagram]

**PWM, triac source and sink**

![PWM, triac source and sink diagram]

**Floating Point control**

![Floating Point control diagram]

**Proportional 2 to 10 or 4 to 20 mA control signal**

![Proportional control signal diagram]
AFRB24(-S), AFRX24(-S) Actuators, On/Off

**Models**
- AFR24
- AFR24-S
- AFRX24
- AFRX24-S

**Technical Data**

<table>
<thead>
<tr>
<th>Power supply</th>
<th>24 VAC ± 20% 50/60 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 VDC ±20% / -10%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power consumption</th>
<th>running</th>
<th>holding</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 W</td>
<td>2.5 W</td>
</tr>
</tbody>
</table>

| Transformer sizing | 7.5 VA (class 2 power source) |

<table>
<thead>
<tr>
<th>Electrical connection AFRB24...</th>
<th>3 ft., 18 GA appliance cable, 1/2&quot; conduit connector</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>S models</em>: two 3 ft., 18 gauge appliance cables with 1/2&quot; conduit connectors</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AFRX24...</th>
<th>3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] 18 GA appliance or plenum cables, with or without 1/2&quot; conduit connector</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>S models</em>: two 3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] appliance cables, with or without 1/2&quot; conduit connectors</td>
</tr>
</tbody>
</table>

| Overload protection | electronic throughout 0 to 95° rotation |
| Control | on/off |
| Direction of rotation | spring reversible with CW/CCW mounting |
| Angle of rotation | 95° |

<table>
<thead>
<tr>
<th>Running time</th>
<th>motor spring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 75 seconds</td>
</tr>
</tbody>
</table>

| Position indication | visual indicator, 0° to 95° (0° is full spring return position) |

| Manual override | 5 mm hex cran (3/16" Allen), supplied |
| Ambient temperature | -22°F to 122°F [-30°C to 50°C] |
| Storage temperature | -40°F to 176°F [-40°C to 80°C] |
| Housing | NEMA 2, IP54, Enclosure type2 |

| Agency listings † | cULus according to UL60730-1A/1A-1, CAN/CSA C60730-1:02, CE according to 2004/108/EC & 2006/95/EC |

| Noise level | <50dB(A) motor at 75 seconds <62dB(A) spring return |
| Quality standard | ISO 9001 |

| † Rated impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3. |

**AFRB24-S, AFRX24-S**

| Auxiliary switches | 2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90° |

---

**Valve Nominal Size**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>B312-B316</td>
<td>¼&quot;</td>
</tr>
<tr>
<td>B317-B321</td>
<td>½&quot;</td>
</tr>
<tr>
<td>B322-B325</td>
<td>½&quot;</td>
</tr>
<tr>
<td>B329-B331</td>
<td>¾&quot;</td>
</tr>
<tr>
<td>B338-B341</td>
<td>1&quot;</td>
</tr>
<tr>
<td>B341-B352</td>
<td>1¼&quot;</td>
</tr>
</tbody>
</table>

---

**Dimensions**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>B212-B216</td>
<td>1½&quot;</td>
</tr>
<tr>
<td>B217-B221</td>
<td>¾&quot;</td>
</tr>
<tr>
<td>B222-B225</td>
<td>½&quot;</td>
</tr>
<tr>
<td>B229-B232</td>
<td>¼&quot;</td>
</tr>
<tr>
<td>B238-B240</td>
<td>1½&quot;</td>
</tr>
<tr>
<td>B248-B250</td>
<td>2&quot;</td>
</tr>
<tr>
<td>B251-B254</td>
<td>2¼&quot;</td>
</tr>
<tr>
<td>B261-B265</td>
<td>2½&quot;</td>
</tr>
<tr>
<td>B277-B280</td>
<td>3½&quot;</td>
</tr>
</tbody>
</table>

---

**AFRB24(-S), AFRX24(-S)**

AFRB24(-S), AFRX24(-S) Actuators, On/Off
**Wiring Diagrams**

**INSTALLATION NOTES**

1. Provide overload protection and disconnect as required.
2. **CAUTION Equipment Damage!**  
   Actuators may be connected in parallel.  
   Power consumption and input impedance must be observed.
3. Actuators may also be powered by 24 VDC.
4. For end position indication, interlock control, fan startup, etc.,  
   AFRB24-S and AFRX24-S incorporate two built-in auxiliary switches:  
   2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at  
   +10°, one is adjustable 10° to 90°.

**APPLICATION NOTES**

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

**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.

![Wiring Diagrams](image-url)
AFRBUP(-S), AFRXUP(-S) Actuators, On/Off

Models
AFRBUP
AFRBUP-S
AFRXUP
AFRXUP-S

Technical Data

Power supply
24 to 240 VAC -20% / +10%, 50/60 Hz
24 to 125 VDC ±10%

Power consumption
Running 7 W
Holding 3.5 W

Transformer sizing
7 VA @ 24 VAC (class 2 power source)
8.5 VA @ 120 VAC
18 VA @ 240 VAC

Electrical connection
AFRBUP...
3 ft., 18 GA appliance cable, 1/2” conduit connector
-S models: two 3 ft., 18 gauge appliance cables with 1/2” conduit connectors

AFRXUP...
3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] 18 GA appliance or plenum cables, with or without 1/2” conduit connector
-S models: two 3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] appliance cables, with or without 1/2” conduit connectors

Overload protection
electronic throughout 0 to 95° rotation

Control
on/off

Direction of rotation
spring reversible with CW/CCW mounting

Angle of rotation
95° (adjustable with mechanical end stop, 35° to 95°)

Running time
Motor spring < 75 seconds
20 seconds @ -4°F to 122°F [-20°C to 50°C]; < 60 seconds @ -22°F [-30°C]

Position indication
visual indicator, 0° to 95°
(0° is full spring return position)

Manual override
5 mm hex crank (3/16” Allen), supplied

Ambient temperature
-22°F to 122°F [-30°C to 50°C]

Storage temperature
-40°F to 176°F [-40°C to 80°C]

Housing
NEMA 2/IP54, Enclosure Type2

Agency listings 
UL/cULus according to UL60730-1A-2-14,
CAN/CSA E60730-1.02, CE according to 2004/108/EC & 2006/95/EC

Noise level
<50dB(A) motor @ 75 seconds
<62dB(A) spring return

Quality standard
ISO 9001

AFRBUP-S, AFRXUP-S

Auxiliary switches
2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90°

Valve Nominal Size
Dimensions (Inches [mm])

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Nominal Size</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>B212-B216</td>
<td>3/8”</td>
<td>2.36” [60.4]</td>
</tr>
<tr>
<td>B217-B221</td>
<td>¼”</td>
<td>2.33” [60.3]</td>
</tr>
<tr>
<td>B222-B225</td>
<td>⅛”</td>
<td>2.20” [55.9]</td>
</tr>
<tr>
<td>B223-B230</td>
<td>1/4”</td>
<td>3.72” [94.6]</td>
</tr>
<tr>
<td>B231-B232</td>
<td>1/4”</td>
<td>3.72” [94.6]</td>
</tr>
<tr>
<td>B233-B240</td>
<td>½”</td>
<td>3.88” [98.5]</td>
</tr>
<tr>
<td>B248-B250</td>
<td>⅝”</td>
<td>4.21” [107.0]</td>
</tr>
<tr>
<td>B251-B254</td>
<td>⅝”</td>
<td>4.96” [12.6]</td>
</tr>
<tr>
<td>B261-B265</td>
<td>1”</td>
<td>5.55” [140.9]</td>
</tr>
<tr>
<td>B277-B280</td>
<td>1¼”</td>
<td>5.32” [135.2]</td>
</tr>
<tr>
<td>B329-B331</td>
<td>3/4”</td>
<td>4.76” [115.9]</td>
</tr>
<tr>
<td>B338-B341</td>
<td>1”</td>
<td>5.63” [143.0]</td>
</tr>
<tr>
<td>B341-B352</td>
<td>1¼”</td>
<td>5.63” [143.0]</td>
</tr>
</tbody>
</table>

Dimensions

Valve Nominal Size
Dimensions (Inches [mm])

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Nominal Size</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>B12-B16</td>
<td>⅛”</td>
<td>2.36” [60.4]</td>
</tr>
<tr>
<td>B17-B22</td>
<td>⅛”</td>
<td>2.33” [60.3]</td>
</tr>
<tr>
<td>B22-B25</td>
<td>1/4”</td>
<td>3.72” [94.6]</td>
</tr>
<tr>
<td>B21-B22</td>
<td>1/4”</td>
<td>3.72” [94.6]</td>
</tr>
<tr>
<td>B23-B24</td>
<td>½”</td>
<td>3.88” [98.5]</td>
</tr>
<tr>
<td>B24-B25</td>
<td>⅝”</td>
<td>4.21” [107.0]</td>
</tr>
<tr>
<td>B25-B26</td>
<td>⅝”</td>
<td>4.96” [12.6]</td>
</tr>
<tr>
<td>B26-B27</td>
<td>1”</td>
<td>5.55” [140.9]</td>
</tr>
</tbody>
</table>

AFRBUP(-S), AFRXUP(-S) Actuators, On/Off

Models
AFRBUP
AFRBUP-S
AFRXUP
AFRXUP-S

Technical Data

Power supply
24 to 240 VAC -20% / +10%, 50/60 Hz
24 to 125 VDC ±10%

Power consumption
Running 7 W
Holding 3.5 W

Transformer sizing
7 VA @ 24 VAC (class 2 power source)
8.5 VA @ 120 VAC
18 VA @ 240 VAC

Electrical connection
AFRBUP...
3 ft., 18 GA appliance cable, 1/2” conduit connector
-S models: two 3 ft., 18 gauge appliance cables with 1/2” conduit connectors

AFRXUP...
3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] 18 GA appliance or plenum cables, with or without 1/2” conduit connector
-S models: two 3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] appliance cables, with or without 1/2” conduit connectors

Overload protection
electronic throughout 0 to 95° rotation

Control
on/off

Direction of rotation
spring reversible with CW/CCW mounting

Angle of rotation
95° (adjustable with mechanical end stop, 35° to 95°)

Running time
Motor spring < 75 seconds
20 seconds @ -4°F to 122°F [-20°C to 50°C]; < 60 seconds @ -22°F [-30°C]

Position indication
visual indicator, 0° to 95°
(0° is full spring return position)

Manual override
5 mm hex crank (3/16” Allen), supplied

Ambient temperature
-22°F to 122°F [-30°C to 50°C]

Storage temperature
-40°F to 176°F [-40°C to 80°C]

Housing
NEMA 2/IP54, Enclosure Type2

Agency listings 
UL/cULus according to UL60730-1A-2-14,
CAN/CSA E60730-1.02, CE according to 2004/108/EC & 2006/95/EC

Noise level
<50dB(A) motor @ 75 seconds
<62dB(A) spring return

Quality standard
ISO 9001

AFRBUP-S, AFRXUP-S

Auxiliary switches
2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90°

800-543-9038 USA
866-805-7089 CANADA
203-791-8396 LATIN AMERICA / CARIBBEAN
AFRBUP(-S), AFRXUP(-S) Actuators, On/Off

**Wiring Diagrams**

**INSTALLATION NOTES**

- Provide overload protection and disconnect as required.
- **CAUTION** Equipment Damage!
  Actuators may be connected in parallel.
  Power consumption and input impedance must be observed.
- No ground connection is required.
- For end position indication, interlock control, fan startup, etc.,
  AFRBUP-S and AFRXUP-S incorporate two built-in auxiliary switches:
  2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at
  +10°, one is adjustable 10° to 90°.

**APPLICATION NOTES**

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

**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.

---

On/Off wiring for AFRBUP, AFRXUP

24, 120, 240 VAC

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wht</td>
<td>N</td>
<td>1 Neutral</td>
</tr>
<tr>
<td>Blk</td>
<td>H</td>
<td>2 Hot</td>
</tr>
</tbody>
</table>

Auxiliary Switches for AFRBUP-S, AFRXUP-S

24, 120, 240 VAC

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Wht</td>
<td>N</td>
<td>1 Neutral</td>
</tr>
<tr>
<td>Blk</td>
<td>H</td>
<td>2 Hot</td>
</tr>
</tbody>
</table>

- S1 NC
- S2 NO
- S3 NC
- S4 NO
- S5 NC
- S6 NO

10° to 90°
**AFRB24-SR, AFRX24-SR**

Proportional, Spring Return, 24 V, for 2 to 10 VDC or 4 to 20 mA Control Signal

### Technical Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>24 VAC ±20%, 50/60 Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>5.5 W running / 3 W holding</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>8.5 VA (class 2 power source)</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>AFRB... 3 ft. 18 GA appliance cable, 1/2&quot; conduit connector</td>
</tr>
<tr>
<td></td>
<td>- S models: two 3 ft. 18 GA appliance cables with 1/2&quot; conduit connectors</td>
</tr>
<tr>
<td></td>
<td>AFX... 3 ft [1m], 10 ft [3m] or 16 ft [5m] 18 GA appliance or plenum cables,</td>
</tr>
<tr>
<td></td>
<td>with or without 1/2&quot; conduit connector</td>
</tr>
<tr>
<td></td>
<td>- S models: two 3 ft [1m], 10 ft [3m] or 16 ft [5m] appliance cables,</td>
</tr>
<tr>
<td></td>
<td>with or without 1/2&quot; conduit connectors</td>
</tr>
<tr>
<td>Overload protection</td>
<td>Electronic throughout 0 to 95° rotation</td>
</tr>
<tr>
<td>Operating range Y</td>
<td>2 to 10 VDC, 4 to 20mA</td>
</tr>
<tr>
<td>Input impedance</td>
<td>100 kΩ for 2 to 10 VDC (0.1 mA)</td>
</tr>
<tr>
<td></td>
<td>500 Ω for 4 to 20 mA</td>
</tr>
<tr>
<td>Feedback output U</td>
<td>2 to 10 VDC (max. 0.5 mA)</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>spring motor reversible with CW/CCW mounting</td>
</tr>
<tr>
<td></td>
<td>reversible with built-in switch</td>
</tr>
<tr>
<td>Mechanical angle of rotation</td>
<td>95° (adjustable with mechanical end stop, 35° to 95°)</td>
</tr>
<tr>
<td>Running time</td>
<td>Spring motor &lt;20 seconds @ -4°F to 122°F [-20°C to 50°C];</td>
</tr>
<tr>
<td></td>
<td>&lt;60 seconds @ -22°F [-30°C]</td>
</tr>
<tr>
<td>Position indication</td>
<td>Visual indicator, 0° to 95°</td>
</tr>
<tr>
<td></td>
<td>(0° is full spring return position)</td>
</tr>
<tr>
<td>Manual override</td>
<td>5 mm hex crank (% Allen), supplied</td>
</tr>
<tr>
<td>Humidity</td>
<td>Max. 95% RH non-condensing</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-22°F to 122°F [-30°C to 50°C]</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°F to 176°F [-40°C to 80°C]</td>
</tr>
<tr>
<td>Housing</td>
<td>Nema 2, IP54, Enclosure Type2</td>
</tr>
<tr>
<td>Housing material</td>
<td>Zinc coated metal and plastic casing</td>
</tr>
<tr>
<td>Agency listing†</td>
<td>UL/cULus acc. to UL60730-1A/2-14, CAN/CSA E60730-1-02, CE acc. to 2004/108/EC</td>
</tr>
<tr>
<td>Noise level</td>
<td>≤40dB(A) motor @ 95 seconds</td>
</tr>
<tr>
<td></td>
<td>≤62dB(A) spring return</td>
</tr>
<tr>
<td>Servicing</td>
<td>Maintenance free</td>
</tr>
<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
</tr>
<tr>
<td>Weight</td>
<td>4.6 lbs (2.1 kg); 4.9 lbs (2.25 kg) with switches</td>
</tr>
</tbody>
</table>

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

### Dimensions

#### Valve Nominal Size

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>B212-B216</td>
<td>¾&quot;</td>
<td>13</td>
<td>2.38&quot; [60.4]</td>
<td>1/2&quot; [43.7]</td>
<td></td>
</tr>
<tr>
<td>B217-B221</td>
<td>¼&quot;</td>
<td>20</td>
<td>2.73&quot; [69.3]</td>
<td>1.81&quot; [45.9]</td>
<td></td>
</tr>
<tr>
<td>B222-B225</td>
<td>1/4&quot;</td>
<td>32</td>
<td>3.70&quot; [94.6]</td>
<td>1.81&quot; [45.9]</td>
<td></td>
</tr>
<tr>
<td>B231-B232</td>
<td>1/4&quot;</td>
<td>32</td>
<td>3.72&quot; [94.6]</td>
<td>1.90&quot; [50.4]</td>
<td></td>
</tr>
<tr>
<td>B238-B240</td>
<td>1¼&quot;</td>
<td>40</td>
<td>3.88&quot; [98.5]</td>
<td>1.90&quot; [50.4]</td>
<td></td>
</tr>
<tr>
<td>B248-B250</td>
<td>2&quot;</td>
<td>50</td>
<td>4.21&quot; [107.0]</td>
<td>2.21&quot; [56.2]</td>
<td></td>
</tr>
<tr>
<td>B251-8254</td>
<td>2&quot;</td>
<td>50</td>
<td>4.93&quot; [125.2]</td>
<td>2.68&quot; [68.0]</td>
<td></td>
</tr>
<tr>
<td>B261-B265</td>
<td>2¼&quot;</td>
<td>65</td>
<td>5.55&quot; [140.9]</td>
<td>2.68&quot; [68.0]</td>
<td></td>
</tr>
<tr>
<td>B27-/B280</td>
<td>3&quot;</td>
<td>80</td>
<td>5.82&quot; [147.9]</td>
<td>2.68&quot; [68.0]</td>
<td></td>
</tr>
</tbody>
</table>

#### Dimensions (Inches [mm])

Dimensions (Inches [mm])

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>B312-B316</td>
<td>¼&quot;</td>
<td>15</td>
<td>2.38&quot; [60.4]</td>
<td>1.72&quot; [43.7]</td>
<td>1.26&quot; [32.1]</td>
</tr>
<tr>
<td>B317-B321</td>
<td>¾&quot;</td>
<td>20</td>
<td>2.73&quot; [69.3]</td>
<td>1.81&quot; [45.9]</td>
<td>1.45&quot; [36.8]</td>
</tr>
<tr>
<td>B322-B325</td>
<td>1&quot;</td>
<td>25</td>
<td>3.09&quot; [78.4]</td>
<td>1.81&quot; [45.9]</td>
<td>1.56&quot; [39.8]</td>
</tr>
<tr>
<td>B329-B331</td>
<td>1¾&quot;</td>
<td>32</td>
<td>3.96&quot; [100.6]</td>
<td>2.21&quot; [56.2]</td>
<td>2.14&quot; [54.3]</td>
</tr>
<tr>
<td>B338-B341</td>
<td>2½&quot;</td>
<td>40</td>
<td>4.39&quot; [111.6]</td>
<td>2.45&quot; [62.2]</td>
<td>2.33&quot; [59.1]</td>
</tr>
<tr>
<td>B341-/B352</td>
<td>2&quot;</td>
<td>50</td>
<td>4.90&quot; [124.5]</td>
<td>2.68&quot; [68.0]</td>
<td>2.60&quot; [66.0]</td>
</tr>
</tbody>
</table>

### Notes

- Dimensions listed are for reference only.
- For more detailed specifications and diagrams, refer to the manufacturer's manual or technical datasheet.

---

**Image:** Dimensions diagram showing the layout and specifications of the AFRB24-SR and AFRX24-SR models.
### Accessories

- AV 8-25: Shaft extension
- IND-AFB: Damper position indicator
- KH-AFB: Crank arm
- K7-2: Universal clamp for up to 1.05" dia jackshafts
- TF-CC US: Conduit fitting
- Tool-06: 8mm and 10 mm wrench
- ZG-100: Universal mounting bracket
- ZG-101: Universal mounting bracket
- ZG-118: Mounting bracket for Barber Colman® Mod III or IV or Johnson® Series 100 replacement or new crank arm type installation
- ZG-AFB: Crank arm adapter kit
- ZG-AFB118: Crank arm adapter kit
- ZS-100: Weather shield (metal)
- ZS-150: Weather shield (polycarbonate)
- ZS-260: Explosion-proof housing
- ZS-300: NEMA 4X housing

**NOTE:** When using AFRB24-SR, AFRB24-SR-S, AFX24-SR and AFRX24-SR-S actuators, only use accessories listed on this page. For actuator wiring information and diagrams, refer to Belimo Wiring Guide.

### 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 jackshaft up to a 1.05" diameter. The actuator must provide proportional damper control in response to a 2 to 20 mA control of AFRB24-SR and AFRX24-SR with 2 to 10 VDC feedback signal shall be provided for position feedback. Actuators shall be classified as UL listed and shall be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

### Wiring Diagrams

#### INSTALLATION NOTES

1. Provide overload protection and disconnect as required.
2. **CAUTION Equipment Damage!**
   - Actuators may be connected in parallel.
   - Power consumption and input impedance must be observed.
   - Up to 4 actuators may be connected in parallel if not mechanically mounted to the same shaft.
   - With 4 actuators wired to one 500 Ω resistor.
   - Power consumption must be observed.
   - Actuator may also be powered by 24 VDC.
   - For end position indication, interlock control, fan startup, etc., AFB24-SR-S and AFX24-SR-S incorporates two built-in auxiliary switches: 2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at +10°, one is adjustable 10° to 90°.
   - Only connect common to neg. (-) leg of control circuits

#### APPLICATION NOTES

- The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC.

**ATTENTION:** AFRB24-SR(S) and AFRX24-SR(S) cannot be tandem mounted on the same damper or valve shaft. Only On/Off and MFT AF models can be used for tandem mount applications.
AFRX Actuators, Multi-Function Technology

Models
AFRX24-MFT
AFRX24-MFT-S

Technical Data

<table>
<thead>
<tr>
<th>Control</th>
<th>MFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control signal</td>
<td>2 to 10 VDC, 4 to 20 mA (default) variable (VDC, PWM, floating point, on/off)</td>
</tr>
<tr>
<td>Power supply</td>
<td>24 VAC, +/- 20%, 50/60 Hz 24 VDC, +/-20% / -10%</td>
</tr>
<tr>
<td>Power consumption†</td>
<td>running 7.5 W holding 3 W</td>
</tr>
<tr>
<td>Transformer sizing†</td>
<td>10 VA (Class 2 power source)</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] appliance cables, with or without 1/2” conduit connectors</td>
</tr>
</tbody>
</table>

- S models: two 3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] appliance cables with or without 1/2” conduit connectors

Overload protection electronic throughout 0 to 90° rotation
Feedback output* 2 to 10 VDC, 0.5 mA max (variable)
Input impedance 100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 1500 Ω for on/off and floating point
Angle of rotation 95°
Direction of rotation* motor reversible with built-in switch
Position indication visual indicator 0° to 95° (0° is spring return position)
Manual override 5 mm hex crank (3/16” Allen), supplied
Running time motor* 150 seconds (default), variable (70 to 220 seconds) spring <20 sec @ -4°F to 122°F [-20°C to 50°C]
Ambient temperature -22° to 122° [-30° C to 50° C]
Housing NEMA 2, IP54, Enclosure Type 2
Agency listings cULus according to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC & 2006/95/EC
Noise level ≤400B(A) motor @ 150 seconds, run time dependent ≤620B(A) spring return
Quality standard ISO 9001

† Programmed for 70 sec motor runtime. At 150 sec motor run time, transformer sizing is 8.5 VA and power consumption is 6 W running/3 W holding.

* Variable when configured with MFT options
‡ Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

AFRX24-MFT-S
Auxiliary switches 2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10° to 90°

Valve Nominal Size

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>B212-B216</td>
<td>½&quot;</td>
<td>13</td>
</tr>
<tr>
<td>B217-B221</td>
<td>¾&quot;</td>
<td>20</td>
</tr>
<tr>
<td>B222-B225</td>
<td>1¼&quot;</td>
<td>25</td>
</tr>
<tr>
<td>B229-B230</td>
<td>1½&quot;</td>
<td>32</td>
</tr>
<tr>
<td>B231-B232</td>
<td>1¾&quot;</td>
<td>40</td>
</tr>
<tr>
<td>B238-B240</td>
<td>2”</td>
<td>50</td>
</tr>
<tr>
<td>B248-B250</td>
<td>2½”</td>
<td>65</td>
</tr>
<tr>
<td>B261-B265</td>
<td>3”</td>
<td>80</td>
</tr>
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</table>

Valve Nominal Size

<table>
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<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>B312-B316</td>
<td>½&quot;</td>
<td>15</td>
</tr>
<tr>
<td>B317-B321</td>
<td>¾&quot;</td>
<td>20</td>
</tr>
<tr>
<td>B322-B325</td>
<td>1&quot;</td>
<td>25</td>
</tr>
<tr>
<td>B329-B331</td>
<td>1¼&quot;</td>
<td>32</td>
</tr>
<tr>
<td>B338-B341</td>
<td>1½&quot;</td>
<td>40</td>
</tr>
<tr>
<td>B347-B352</td>
<td>2”</td>
<td>50</td>
</tr>
</tbody>
</table>
**AFRX Actuators, Multi-Function Technology**

### Dimensions

![Diagram](image)

**Valve Body**
- Nominal Pipe Size
- Top Flange Design
- Flange Diameter
- Face-to-Face Length
- Height

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Nominal Pipe Size</th>
<th>Top Flange Design</th>
<th>Flange Diameter (A)</th>
<th>Face-to-Face Length (B)</th>
<th>Height (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B6250</td>
<td>2½&quot; [65]</td>
<td>F05</td>
<td>7.50&quot; [190.5]</td>
<td>5.50&quot; [139.7]</td>
<td>8.10&quot; [205.4]</td>
</tr>
<tr>
<td>B6300</td>
<td>3&quot; [80]</td>
<td></td>
<td>8.00&quot; [203.2]</td>
<td>6.60&quot; [167.6]</td>
<td>8.40&quot; [213.1]</td>
</tr>
</tbody>
</table>

### Wiring Diagrams

**INSTALLATION NOTES**

1. Provide overload protection and disconnect as required.
2. **CAUTION Equipment Damage!**
   - Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.
   - Actuators may also be powered by 24 VDC.
   - Position feedback cannot be used with Triac sink controller.
   - The actuator internal common reference is not compatible.
   - Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.
   - Contact closures A & B also can be triacs.
   - A & B should both be closed for triac source and open for triac sink.
   - For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

**APPLICATION NOTES**

- Meets UL requirements without the need of an electrical ground connection.
- The ZG-R01 500 Ω resistor may be used.

**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.
AFRX24-MFT95 Actuator, Proportional Potentiometric Control

Models
AFRX24-MFT95

Technical Data

- **Control**: MFT
- **Control signal**: 0 to 135 Ω Honeywell Electronic Series 90, 0 to 135 Ω input
- **Power supply**: 24 VAC, +/- 20%, 50/60 Hz
- **Power consumption**: running 7.5 W, holding 3 W
- **Transformer sizing**: 10 VA (Class 2 power source)
- **Electrical connection**: 3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] 18 GA plenum cables, with or without 1/2” conduit connector
- **Overload protection**: electronic throughout 0 to 90° rotation
- **Feedback output**: 2 to 10 VDC, 0.5 mA max (variable)
- **Angle of rotation**: 95°
- **Direction of rotation**: spring motor reversible with CW/CCW mounting, motor reversible with built-in switch
- **Position indication**: visual indicator 0° to 95° (0° is spring return position)
- **Manual override**: 5 mm hex crank (3/16” Allen), supplied
- **Running time**: motor 150 seconds (default), variable (30 to 100 seconds)
- **Ambient temperature**: -22° F to 122° F [-20°C to 50°C]
- **Housing**: NEMA 2, IP54, Enclosure Type 2
- **Agency listings**: cULus according to UL60730-1A/-2-14, CAN/CSA E60730- 1:02, CE according to 2004/108/EC & 2006/95/EC
- **Noise level**: <40dB(A) motor 150 seconds, run time dependent <62dB(A) spring return

Quality standard: ISO 9001

† Programmed for 70 sec motor runtime. At 150 sec motor run time, transformer sizing is 8.5 VA and power consumption is 6 W running/3 W holding.
* Variable when configured with MFT options
‡ Rated Impulse Voltage 800V. Type of action 1 AA.8 for -S version, Control Pollution Degree 3.

---

Dimensions

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Valve Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>B312-B315</td>
<td>¼” 15</td>
<td>2.38” [60.4] 1.72” [43.7]</td>
</tr>
<tr>
<td>B317-B321</td>
<td>¼” 20</td>
<td>2.73” [69.3] 1.81” [45.9]</td>
</tr>
<tr>
<td>B322-B325</td>
<td>1” 25</td>
<td>3.09” [78.4] 1.81” [45.9]</td>
</tr>
<tr>
<td>B329-B331</td>
<td>1¼” 32</td>
<td>3.96” [100.6] 2.21” [56.2]</td>
</tr>
<tr>
<td>B338-B341</td>
<td>1½” 40</td>
<td>4.39” [111.6] 2.45” [62.2]</td>
</tr>
<tr>
<td>B341-B352</td>
<td>2” 50</td>
<td>4.90” [124.5] 2.68” [68.0]</td>
</tr>
</tbody>
</table>

---

Valve Nominal Size

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Dimensions (Inches [mm])</th>
</tr>
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<tbody>
<tr>
<td>B212-B215</td>
<td>⅛” 15</td>
</tr>
<tr>
<td>B217-B221</td>
<td>¼” 20</td>
</tr>
<tr>
<td>B222-B225</td>
<td>1” 25</td>
</tr>
<tr>
<td>B229-B230</td>
<td>1¼” 32</td>
</tr>
<tr>
<td>B231-B232</td>
<td>1¼” 32</td>
</tr>
<tr>
<td>B238-B240</td>
<td>1½” 40</td>
</tr>
<tr>
<td>B248-B250</td>
<td>2” 50</td>
</tr>
<tr>
<td>B251-B254</td>
<td>2” 50</td>
</tr>
<tr>
<td>B261-B265</td>
<td>2¼” 65</td>
</tr>
<tr>
<td>B277-B280</td>
<td>3” 80</td>
</tr>
</tbody>
</table>

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Var 102
**Wiring Diagrams**

### INSTALLATION NOTES

- Provide overload protection and disconnect as required.
- Actuators and controller must have separate transformers.
- Consult controller instruction data for more detailed installation information.
- To reverse control rotation, use the reversing switch.
- Resistor value depends on the type of controller and the number of actuators. No resistor is used for one actuator. Honeywell resistor kits may also be used.

### 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.

---

**Dimensions**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Nominal Pipe Size</th>
<th>Top Flange Design</th>
<th>Flange Diameter</th>
<th>Face-to-Face Length</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>B6250</td>
<td>2½&quot; [65]</td>
<td>FOS5</td>
<td>7.50&quot; [190.5]</td>
<td>5.50&quot; [139.7]</td>
<td>8.10&quot; [205.4]</td>
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<td>B6300</td>
<td>3&quot; [80]</td>
<td></td>
<td>8.00&quot; [203.2]</td>
<td>6.60&quot; [167.6]</td>
<td>8.40&quot; [213.1]</td>
</tr>
</tbody>
</table>

---

**Override of AFRX24-MFT95**

AFRX24-MFT95 used with a Series 90 controller and a Series 90 high limit control
AFRX24-MFT95 Actuator, Proportional Potentiometric Control

Typical wiring diagrams for multiple actuators used with the W973, W7100 and T775 controllers.

Wiring multiple actuators to a Series 90 controller using a minimum position potentiometer.

Wiring multiple actuators to a Series 90 controller.
**Models**

- AFRB24 N4 Basic Version
- AFRB24 N4H Basic Version w/built-in heater
- AFRB24-S N4 Basic Version w/built-in aux. switch
- AFRB24-S N4H Basic Version w/built-in aux. switch & heater
- AFHX24 N4 Flexible Version
- AFX24-S N4 Flexible Version w/built-in aux. switch
- AFRX24-S N4H Flexible Version w/built-in heater
- AFRX24-S N4H Flexible Version aux. switch & heater

**Technical Data**

- **Power supply**
  - 24 VAC ± 20% 50/60 Hz
  - 24 VDC +20% / -10%

- **Power consumption**
  - running: 5 W / heater 25 W
  - holding: 2.5 W

- **Transformer sizing**
  - 7.5 VA (class 2 power source) / heater 25 VA

- **Electrical connection**
  - 3 ft [1m], 10 ft [3m] or 16 ft [5m] 18 GA appliance cable, with or without 1/2" conduit connector
  - -S models: Two 3 ft [1m], 10 ft [3m] or 16 ft [5m] appliance cables with or without 1/2" conduit connectors

- **AFRX24 N4** heater (N4H) terminal block, 26-16 GA

- **Overload protection**
  - electronic throughout 0 to 95° rotation

- **Control**
  - on/off

- **Torque**
  - 180 in-lb [20 Nm] minimum

- **Direction of rotation**
  - spring reversible with CW/CCW mounting in housing

- **Mechanical angle of rotation**
  - 95° (adjustable with mechanical end stop, 35° to 95°)

- **Running time**
  - motor: < 75 seconds
  - spring (with heater): 20 seconds @ -4°F to 122°F [-20°C to 50°C]; < 60 seconds @ -22°F [-30°C]

- **Position indication**
  - visual indicator, 0° to 95° rotation
  - (0" is full spring return position)

- **Manual override**
  - 5 mm hex crank (³⁄₁₆" Allen), supplied

- **Ambient temperature**
  - with heater: -22°F to 122°F [-30°C to 50°C]
  - without heater: -40°F to 176°F [-40°C to 80°C]

- **Humidity**
  - max. 95% RH non-condensing

- **Agency listings†**
  - cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC

- **Noise level**
  - <50dB(A) motor @ 75 seconds
  - <62dB(A) spring return

- **Servicing**
  - maintenance free

- **Quality standard**
  - ISO 9001

- **Weight**
  - 9.7 lbs (4.4 kg); 10 lbs (4.5 kg) with switches; 10.5 lbs (4.8 kg) with heater

- **Valve Nominal Size**

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>B231-B233</td>
<td>1¼&quot; 32 3.72&quot; [94.6] 1.84&quot; [47.4]</td>
</tr>
<tr>
<td>B238-B240</td>
<td>1½&quot; 40 3.88&quot; [98.5] 2.04&quot; [51.9]</td>
</tr>
<tr>
<td>B248-B254</td>
<td>2&quot; 50 4.93&quot; [125.2] 2.73&quot; [69.5]</td>
</tr>
<tr>
<td>B277-B280</td>
<td>3&quot; 80 5.82&quot; [147.9] 2.73&quot; [69.5]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Valve Nominal Size</th>
<th>Dimensions (Inches [mm])</th>
</tr>
</thead>
<tbody>
<tr>
<td>B239-B332</td>
<td>1¼&quot; 32 3.96&quot; [100.6] 2.27&quot; [57.1] 2.14&quot; [54.3]</td>
</tr>
<tr>
<td>B338-B341</td>
<td>1½&quot; 40 4.39&quot; [111.6] 2.51&quot; [63.7] 2.40&quot; [61.1]</td>
</tr>
<tr>
<td>B347-B352</td>
<td>2&quot; 50 4.90&quot; [124.5] 2.73&quot; [69.5] 2.74&quot; [69.7]</td>
</tr>
</tbody>
</table>

**Dimensions with 2-Way Valve**

**Dimensions with 3-Way Valve**
AFRB24 N4, AFRB24 N4H, AFRB24-S N4, AFRB24-S N4H, AFRX24 N4, AFRX24 N4H, AFRX24-S N4, AFRX24-S N4H

NEMA 4, On/Off, Spring Return, 24 V

Accessories

| Tool-06 | 8mm and 10 mm wrench |
| 43442-00001 | Gland (needed for additional wires) |
| 71907-00001 | Gasket for Gland (needed for additional wires) |

**NOTE:** When using AFRB24 N4, AFRB24 N4H, AFRB24-S N4, AFRB24-S N4H, AFRX24 N4, AFRX24 N4H, AFRX24-S N4, AFRX24-S N4H actuators, only use accessories listed on this page. For actuator wiring information and diagrams, refer to Belimo Wiring Guide.

**Typical Specification**

The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall be protected from overload at all angles of rotation. If required, two SPDT auxiliary switch shall be provided having the capability of one being adjustable. Actuators with auxiliary switches must be constructed to meet the requirements for Double Insulation so an electrical ground is not required to meet agency listings. Actuators shall be cULus Approved and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

**Wiring Diagrams**

- **INSTALLATION NOTES**
  1. Provide overload protection and disconnect as required.
  2. **CAUTION** Equipment Damage!
     Actuators may be connected in parallel. Power consumption and input impedance must be observed.
  3. Actuators may also be powered by 24 VDC.
  4. For end position indication, interlock control, fan startup, etc., AFRB24-S N4, AFRB24-S N4H, AFRX24-S N4, AFRX24-S N4H incorporates two built-in auxiliary switches: 2 x SPDT, 3A (0.5A) @ 250 VAC, UL Approved, one switch is fixed at +10°, one is adjustable 10° to 90°.

- **APPLICATION NOTES**
  Meets cULus requirements without the need of an electrical ground connection.

- **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.

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![Wiring Diagram](image-url)

**24 VAC Transformer**

**On/Off wiring**

**Auxiliary Switches**

**NEMA 4 Heater**

---

800-543-9038 USA | 866-805-7089 CANADA | 203-791-8396 LATIN AMERICA / CARIBBEAN

106
**Models**

AFRBUP N4     Basic Version  
AFRBUP-S N4    Basic Version w/built-in aux. switch  
AFRBUP N4H    Basic Version w/built-in heater  
AFRBUP-S N4H  Basic Version w/built-in aux. switch & heater  
AFRXUP N4     Flexible Version  
AFRXUP-S N4   Flexible Version w/built-in aux. switch  
AFRXUP N4H    Flexible Version w/built-in heater  
AFRXUP-S N4H  Flexible Version w/built-in aux. switch & heater

**Technical Data**

- **Power supply**
  - 24...240 VAC -20% / +10%, 50/60 Hz
  - 24...125 VDC ±10%

- **Power consumption**
  - Running: 7 W / heater 25 W
  - Holding: 3.5 W

- **Transformer sizing**
  - 7 VA @ 24 VAC (class 2 power source)
  - 8.5 VA @ 120 VAC / heater 25 VA @120 VAC
  - 18 VA @ 240 VAC

- **Electrical connection**
  - AFRBUP ... N4
  - AFRXUP ... N4
  - 3 ft [1m], 10 ft [3m] or 16 ft [5m] appliance cable, with or without 1/2" conduit connectors
  - -S models: Two 3 ft [1m], 10 ft [3m] or 16 ft [5m] appliance cables with or without 1/2" conduit connectors
  - heater (N4H) terminal block, 18-16 GA

- **Overload protection**
  - electronic throughout 0 to 95° rotation

- **Control**
  - on/off

- **Torque**
  - 180 in-lb [20 Nm] minimum

- **Direction of rotation**
  - spring reversible with CW/CCW mounting inside housing

- **Mechanical angle of rotation**
  - 95° (adjustable with mechanical end stop, 35° to 95°)

- **Running time**
  - motor < 75 sec
  - spring 20 sec @ -4°F to 122°F [-20°C to 50°C]; < 60 sec @ -22°F [-30°C]
  - (with heater) 20 sec @ -4°F to 122°F [-20°C to 50°C]; < 60 sec @ -49°F [-45°C]

- **Position indication**
  - visual indicator, 0° to 95°  
  - (0° is full spring return position)

- **Manual override**
  - 5 mm hex crank (5/16” Allen), supplied

- **Humidity**
  - max. 95% RH non-condensing

- **Ambient temperature**
  - with heater -22°F to 122°F [-30°C to 50°C]
  - without heater -40°F to 122°F [-40°C to 50°C]

- **Storage temperature**
  - -40°F to 176°F [-40°C to 80°C]

- **Housing**
  - UL Type 4, NEMA 4, IP66

- **Housing material**
  - polycarbonate

- **Agency listings**
  - cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC

- **Noise level**
  - <50dB(A) motor @ 75 seconds
  - <52dB(A) spring return

- **Servicing**
  - maintenance tree

- **Quality standard**
  - ISO 9001

- **Weight**
  - 9.7 lbs (4.4 kg), 10 lbs (4.5 kg) with switches
  - 10.5 lbs (4.8 kg) with heater

**AFRBUP-S N4, AFRXUP-S N4, AFXUP-S N4, AFRXUP-S N4H**

**Auxiliary switches**

- 2 x SPDT 3A (0.5A) @ 250 VAC, UL Approved
- one set at +10°, one adjustable 10° to 90°
AFRBUP N4, AFRBUP-S N4, AFRBUP N4H, AFRBUP-S N4H, AFRXUP N4, AFRXUP-S N4, AFRXUP N4H, AFRXUP-S N4H

NEMA 4, On/Off, Spring Return, 24 to 240 VAC

Accessories

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool-06</td>
<td>9mm and 10 mm wrench</td>
</tr>
<tr>
<td>43442-00001</td>
<td>Gland (needed for additional wires)</td>
</tr>
<tr>
<td>71997-00001</td>
<td>Gasket for gland (needed for additional wires)</td>
</tr>
</tbody>
</table>

**NOTE:** When using AFRBUP N4, AFRBUP-S N4, AFRBUP N4H, AFRBUP-S N4H, AFRXUP N4, AFRXUP-S N4, AFRXUP N4H, AFRXUP-S N4H actuators, only use accessories listed on this page. For actuator wiring information and diagrams, refer to Belimo Wiring Guide.

**Typical Specification**

On/Off spring return damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a jackshaft up to a 1.05” diameter. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall be protected from overload at all angles of rotation. If required, two SPDT auxiliary switch shall be provided having the capability of one being adjustable. Actuators with auxiliary switches must be constructed to meet the requirements for Double Insulation so an electrical ground is not required to meet agency listings. Actuators shall be cULus Approved and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

**Wiring Diagrams**

**Installation Notes**

- Provide overload protection and disconnect as required.
- **CAUTION** Equipment Damage!
  - Actuators may be connected in parallel.
  - Power consumption and input impedance must be observed.
  - Actuators may also be powered by 24 VDC.
  - For end position indication, interlock control, fan startup, etc., AFRB24-S N4, AFRB24-S N4H, AFRX24-S N4, AFRX24-S N4H incorporates two built-in auxiliary switches: 2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at +10°, one is adjustable 10° to 90°.

**Application Notes**

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

**AFRBUP-S N4**

- 120 VAC
- Line Volts: N, H
- Auxiliary Switches
  - S1
  - S2
  - S3
  - S4
  - S5
  - S6
- 10° to 90°
- AFRBUP-S N4
- AFRBUP-S N4H
- AFRXUP-S N4
- AFRXUP-S N4H

**NEMA 4 Heater**

- AFR-H 120 VAC heater

---

800-543-9038 USA 866-805-7089 CANADA 203-791-8396 LATIN AMERICA / CARIBBEAN
AFRB24-MFT N4, AFRB24-MFT-S N4, AFRB24-MFT N4H, AFRB24-MFT-S N4H
AFRX24-MFT N4, AFRX24-MFT-S N4, AFRX24-MFT N4H, AFRX24-MFT-S N4H

NEMA 4, Proportional, Spring Return, Direct Coupled, 24V, Multi-Function Technology®

Models

AFRB24-MFT N4  Basic Version
AFRB24-MFT-S N4 Basic Version w/built-in aux. switch
AFRB24-MFT N4H Basic Version w/built in heater
AFRB24-MFT-S N4H Basic Version w/built-in aux. switch & heater

AFRX24-MFT N4  Flexible Version
AFRX24-MFT-S N4 Flexible Version w/built-in aux. switch
AFRX24-MFT N4H Flexible Version w/built in heater
AFRX24-MFT-S N4H Flexible Version w/built-in aux. switch & heater

Technical Data

Power supply 24 VAC, +/- 20%, 50/60 Hz
24 VDC, +20% / -10%

Power consumption running 7.5 W / heater 25 W
holding 3 W

Transformer sizing 10 VA (Class 2 power source) / heater 25 VA

Electrical connection 3 ft [1m], 10 ft [3m] or 16 ft [5m] 18 GA appliance cables, with 1/2" conduit connector
-S models: two 3 ft [1m], 10 ft [3m] or 16 ft [5m] appliance cables with 1/2" conduit connectors

Overload protection electronic throughout 0 to 95° rotation

Operating range Y* 2 to 10 VDC, 4 to 20 mA (default)
variable (VDC, PWM, floating point, on/off)

Input impedance 100 kΩ for 2 to 10 VDC (0.1 mA)
500 Ω for 4 to 20 mA
1500 Ω for PWM, floating point and on/off control

Feedback output U* 2 to 10 VDC, 0.5 mA max

Torque minimum 180 in-lb (20 Nm)

Direction of rotation* reversible with cw/ccw mounting inside housing

Mechanical angle of rotation* 95° (adjustable with mechanical end stop, 35° to 95°)

Running time motor* 150 seconds (default), variable (70 to 220 seconds)
<20 sec @ -4°F to 122°F [-20°C to 50°C];<90 sec @ -22°F [-30°C]
<20 sec @ -4°F to 122°F [-20°C to 50°C];<55 sec @ -49°F [-45°C]

Angle of Rotation adaptation off (default)

Override control* min position = 0%
mid. position = 50%
max. position = 100%

Position indication visual indicator, 0° to 95°
(0° is spring return position)

Manual override 5 mm hex crank ([½"] Allen), supplied

Humidity max. 95% RH non-condensing

Ambient temperature -22°F to 122°F (-30°C to 50°C)
with heater -49°F to 122°F (-45°C to 50°C)

Storage temperature -40°F to 176°F (-40°C to 80°C)

Housing UL Type 4, NEMA 4, IP66

Material polycarbonate

Noise level ≤40dBA motor @ 150 seconds, run time dependent
≤20dBA spring return

Agency listings † cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC

Quality standard ISO 9001

Servicing maintenance free

Weight 9.7 lbs. (4.4 kg), 10 lbs. (4.5 kg) with switches
10.5 lbs (4.8 kg) with heater

± Variable when configured with MFT options
† Rated Impulse Voltage 3000V Type of action 1AA (1.AA-B for -S version), Control Pollution Degree 4.
Programmed for 70 sec motor run time. At 150 sec motor run time, transformer sizing is 8.5 VA and power consumption is 6 W running / 3 W holding.

AFRB24-MFT-S N4, AFRB24-MFT-S N4H, AFRX24-MFT-S N4, AFRX24-MFT-S N4H

Auxiliary switches 2 x SPDT 3A (0.5A) @ 250 VAC, UL approved
one set at +10°, one adjustable 10° to 90°

Dimensions with 2-Way Valve

Valve Body Valve Nominal Size Dimensions (Inches [mm])

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN [mm]</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B231-H232</td>
<td>1¼&quot;</td>
<td>32</td>
<td>3.2&quot; [81.3]</td>
<td>5.1&quot; [130]</td>
</tr>
<tr>
<td>B238-B240</td>
<td>1½&quot;</td>
<td>40</td>
<td>3.88&quot; [98.5]</td>
<td>4.04&quot; [102]</td>
</tr>
<tr>
<td>B248-H245</td>
<td>2&quot;</td>
<td>50</td>
<td>4.93&quot; [125.2]</td>
<td>2.73&quot; [69.5]</td>
</tr>
<tr>
<td>B261-B265</td>
<td>2½&quot;</td>
<td>65</td>
<td>5.55&quot; [140.9]</td>
<td>2.73&quot; [69.5]</td>
</tr>
<tr>
<td>B277-B280</td>
<td>3&quot;</td>
<td>80</td>
<td>5.82&quot; [147.9]</td>
<td>2.73&quot; [69.5]</td>
</tr>
</tbody>
</table>

Dimensions with 3-Way Valve

Valve Body Valve Nominal Size Dimensions (Inches [mm])

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Inches</th>
<th>DN [mm]</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>B329-B331</td>
<td>1¼&quot;</td>
<td>32</td>
<td>3.96&quot; [100.6]</td>
<td>2.27&quot; [57.7]</td>
<td>2.14&quot; [54.3]</td>
</tr>
<tr>
<td>B338-B341</td>
<td>1½&quot;</td>
<td>40</td>
<td>4.39&quot; [111.6]</td>
<td>2.51&quot; [63.7]</td>
<td>2.49&quot; [62.7]</td>
</tr>
<tr>
<td>B347-B352</td>
<td>2&quot;</td>
<td>50</td>
<td>4.90&quot; [124.5]</td>
<td>2.73&quot; [69.5]</td>
<td>2.74&quot; [69.7]</td>
</tr>
</tbody>
</table>
### Typical Specification

The actuator must provide proportional 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 or positioner. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. 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 VDC feedback signal shall be provided for position feedback. Actuators shall be cULus Approved and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

### Wiring Diagrams

**INSTALLATION NOTES**

- Provide overload protection and disconnect as required.
- **CAUTION** Equipment Damage! Actuators may be connected in parallel if not mechanically linked. Power consumption and input impedance must be observed.
- Actuators may also be powered by 24 VDC.
- Position feedback cannot be used with Triac sink controller.
- The actuator internal common reference is not compatible.
- Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.
- Contact closures A & B also can be triacs. A & B should both be closed for triac source and open for triac sink.
- For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

**APPLICATION NOTES**

- Meets UL requirements without the need of an electrical ground connection.
- The 2G-R01 500 Ω resistor may be used.
- **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.

### Accessories

<table>
<thead>
<tr>
<th>Tool-06</th>
<th>9mm and 10 mm wrench</th>
</tr>
</thead>
<tbody>
<tr>
<td>43442-00001</td>
<td>Gland (needed for additional wires)</td>
</tr>
<tr>
<td>71997-00001</td>
<td>Gasket for Gland (needed for additional wires)</td>
</tr>
</tbody>
</table>

**NOTE:** When using AFRB24-MFT N4, AFRB24-MFT-S N4, AFRB24-MFT N4H, AFRB24-MFT-S N4H, AFRX24-MFT N4, AFRX24-MFT-S N4, AFRX24-MFT N4H, AFRX24-MFT-S N4H actuators, only use accessories listed on this page. For actuator wiring information and diagrams, refer to Belimo Wiring Guide.

### | 24 VAC Transformer |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Blk (1)</td>
<td>Common</td>
</tr>
<tr>
<td>Red (2)</td>
<td>+ Hot</td>
</tr>
<tr>
<td>Wht (3)</td>
<td>Y1 Input, 2 to 10V</td>
</tr>
<tr>
<td>Org (5)</td>
<td>U Output, 2 to 10V</td>
</tr>
</tbody>
</table>

**PWM**

**On/Off Control**

**Floating Point Control**

**Auxiliary Switches**

---

© Belimo Aircontrols (USA), Inc.

800-543-9038 USA
866-805-7089 CANADA
203-791-8396 LATIN AMERICA / CARIBBEAN
AFRB24-5-14, AFRB24-S-5-14 Actuators, On/Off

Models
AFRB24-5-14
AFRB24-S-5-14

Technical Data

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>24 VAC ± 20% 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>24 VDC +20% / -10%</td>
</tr>
<tr>
<td>Power consumption</td>
<td>running: 5 W</td>
</tr>
<tr>
<td></td>
<td>holding: 2.5 W</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>7.5 VA (class 2 power source)</td>
</tr>
</tbody>
</table>
| Electrical connection          | AFRB24... 3 ft., 18 GA appliance cable, 1/2” conduit connector
|                                | -S models: two 3 ft., 18 gauge appliance cables with 1/2” conduit connectors |
|                                | AFRX24... 3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] 18 GA appliance or plenum cables, with or without 1/2” conduit connector
|                                | -S models: two 3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] appliance cables, with or without 1/2” conduit connectors |
| Overload protection            | electronic throughout 0 to 95° rotation |
| Control                        | on/off                              |
| Direction of rotation          | spring reversible with CW/CCW mounting |
| Angle of rotation              | 95°                                 |
| Running time                   | motor: < 7/5 seconds                |
|                                | spring: 20 seconds @ -4°F to 122°F [-20°C to 50°C]; < 60 seconds @ -22°F [-30°C]         |
| Position indication            | visual indicator, 0° to 95° (0° is full spring return position) |
| Manual override                | 5 mm hex crank (3/16 Allen), supplied |
| Ambient temperature            | -22°F to 122°F [-30°C to 50°C]       |
| Storage temperature            | -40°F to 176°F [-40°C to 80°C]       |
| Housing                        | NEMA 2, IP54, Enclosure Type2       |
| Agency listings †              | cULus according. to UL60730-1A/-2-14, CAN/CSA E60730-1.02, CE according. to 2004/108/EC & 2006/95/EC |
| Noise level                    | <50dB(A) motor @ /7 seconds         |
|                                | <62dB(A) spring return              |
| Quality standard               | ISO 9001                            |
|                                | † Rated Impulse Voltage 800V. Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3. |
| Auxiliary switches             | 2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90° |

Valve Body Nominal Pipe Size Top Flange Design Flange Diameter Face-to-Face Length Height

<table>
<thead>
<tr>
<th>Model</th>
<th>Pipe Size</th>
<th>Flange Design</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>B6250</td>
<td>2½” [65]</td>
<td></td>
<td>7.50” [190.5]</td>
<td>5.50” [139.7]</td>
<td>8.10” [205.4]</td>
</tr>
<tr>
<td>B6300</td>
<td>3” [80]</td>
<td>H05</td>
<td>8.00” [203.2]</td>
<td>6.60” [167.6]</td>
<td>8.40” [213.1]</td>
</tr>
<tr>
<td>B6400</td>
<td>4” [100]</td>
<td></td>
<td>9.00” [228.6]</td>
<td>8.30” [210.8]</td>
<td>9.30” [235.9]</td>
</tr>
</tbody>
</table>

Dimensions

AFRB24-S, AFRX24-S

Auxiliary switches 2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90°
**Wiring Diagrams**

**INSTALLATION NOTES**

- Provide overload protection and disconnect as required.
- **CAUTION** Equipment Damage!
  
  Actuators may be connected in parallel.
  
  Power consumption and input impedance must be observed.
- Actuators may also be powered by 24 VDC.
- For end position indication, interlock control, fan startup, etc.,
  AFRB24-S and AFRX24-S incorporate two built-in auxiliary switches:
  2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at
  +10°, one is adjustable 10° to 90°.

**APPLICATION NOTES**

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

**On/Off wiring for AFRB24, AFRX24**

**Auxiliary Switches for AFRB24-S, AFRX24-S**
AFRBUP-5-14, AFRBUP-S-5-14 Actuators, On/Off

Models
AFRBUP-5-14
AFRBUP-S-5-14

Technical Data

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>24 to 240 VAC -20% / +10%, 50/60 Hz</td>
<td>24 to 125 VDC ±10%</td>
</tr>
<tr>
<td>Power consumption</td>
<td>running / W</td>
<td>3.5 W</td>
</tr>
<tr>
<td>Transformer sizing</td>
<td>7 VA @ 24 VAC (class 2 power source)</td>
<td>8.5 VA @ 120 VAC</td>
</tr>
<tr>
<td></td>
<td>16 VA @ 240 VAC</td>
<td></td>
</tr>
<tr>
<td>Electrical connection</td>
<td>AFRBUP...</td>
<td>3 ft., 18 GA appliance cable, 1/2&quot; conduit connector</td>
</tr>
<tr>
<td></td>
<td>-S models: two 3 ft., 18 gauge appliance cables with 1/2&quot; conduit connectors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AFRXUP...</td>
<td>3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] 18 GA appliance or plenum cables, with or without 1/2&quot; conduit connector</td>
</tr>
<tr>
<td></td>
<td>-S models: two 3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] appliance cables, with or without 1/2&quot; conduit connectors</td>
<td></td>
</tr>
<tr>
<td>Overload protection</td>
<td>electronic throughout 0 to 95° rotation</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>on/off</td>
<td></td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>spring</td>
<td>reversible with CW/CCW mounting</td>
</tr>
<tr>
<td>Angle of rotation</td>
<td>95° (adjustable with mechanical end stop, 35° to 95°)</td>
<td></td>
</tr>
<tr>
<td>Running time</td>
<td>motor</td>
<td>&lt; 75 seconds</td>
</tr>
<tr>
<td></td>
<td>spring</td>
<td>20 seconds @ -4°F to 122°F [-20°C to 50°C]; &lt; 60 seconds @ -22°F [-30°C]</td>
</tr>
<tr>
<td>Position indication</td>
<td>visual indicator, 0° to 95°</td>
<td>(0° is full spring return position)</td>
</tr>
<tr>
<td>Manual override</td>
<td>5 mm hex crank (3/16&quot; Allen), supplied</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-22°F to 122°F [-30°C to 50°C]</td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°F to 176°F [-40°C to 80°C]</td>
<td></td>
</tr>
<tr>
<td>Housing</td>
<td>NEMA 2/IP54, Enclosure Type2</td>
<td></td>
</tr>
<tr>
<td>Agency listings †</td>
<td>cULus according to UL60730-1, CAN/CSA E60730-1:02, CE according to 2004/108/EC &amp; 2006/95/EC</td>
<td></td>
</tr>
<tr>
<td>Noise level</td>
<td>&lt;50dB(A) motor @ 75 seconds</td>
<td>&lt;62dB(A) spring return</td>
</tr>
<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
<td></td>
</tr>
</tbody>
</table>

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

AFRBUP-S, AFRXUP-S

Auxiliary switches | 2 x SPDT 3A (0.5A) @ 250 VAC, UL approved |
|                  | one set at +10°, one adjustable 10° to 90° |

Dimensions

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Nominal Pipe Size</th>
<th>Top Flange Design</th>
<th>Flange Diameter</th>
<th>Face-to-Face Length</th>
<th>Height</th>
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<td>6.60&quot; [167.6]</td>
<td>8.40&quot; [213.1]</td>
</tr>
</tbody>
</table>
Wiring Diagrams

**INSTALLATION NOTES**

⚠️ Provide overload protection and disconnect as required.

⚠️ **CAUTION** Equipment Damage!
- Actuators may be connected in parallel.
- Power consumption and input impedance must be observed.

⚠️ No ground connection is required.

⚠️ For end position indication, interlock control, fan startup, etc., AFRBUP-S and AFRXUP-S incorporates two built-in auxiliary switches: 2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at +10°, one is adjustable 10° to 90°.

**APPLICATION NOTES**

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

⚠️ **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.

---

**On/Off wiring for AFRBUP, AFRXUP**

```
24, 120, 240 VAC

Wht N → 1 Neutral
Blk H → 2 Hot
```

**Auxiliary Switches for AFRBUP-S, AFRXUP-S**

```
24, 120, 240 VAC

Wht N → 1 Neutral
Blk H → 2 Hot

S1 NC
S2 NO
S3 NC
S4 NO
S5 NC
S6 NO

10°
10° to 90°
```
GKR B24-3-5-14 Actuators, On/Off, Floating Point, Fail-Safe

Models
GKR B24-3-5-14

Technical Data
- **Control**: on/off, floating point
- **Power supply**: 24 VAC ± 20% 50/60 Hz
  - 24 VDC ± 10%
- **Power consumption**:
  - Running: 12 W
  - Holding: 3 W
- **Transformer sizing**: 18 VA (Class 2 power source)
- **Electrical connection**: 3 ft, 18 GA plenum rated cable, ½” conduit connector
- **Overload protection**: electronic throughout 0° to 95° rotation
- **Input impedance**: 100 kΩ (0.1mA), 500 Ω, 1500 Ω (floating point, on/off)
- **Angle of rotation**: max. 95°, adjustable with mechanical stop
- **Direction of rotation**: reversible with switch
- **Position indication**: visual indicator
- **Running time**:
  - Running: 150 seconds
  - Fail-safe: 35 seconds
- **Manual override**: external push button
- **Ambient temperature**: -22°F to 122°F [-30°C to 50°C]
- **Housing**: NEMA 2/IP54, Enclosure Type 2
- **Agency listings †**: cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC
- **Noise level**: <45 dB(A)
- **Quality standard**: ISO 9001

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

Dimensions

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<tr>
<td>B6500</td>
<td>5” [125]</td>
<td></td>
<td>10.00” [254]</td>
<td>10.30” [261.6]</td>
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<tr>
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</tbody>
</table>
GKRB24-3-5-14 Actuators, On/Off, Floating Point, Fail-Safe

Electrical Installation

### Wiring Diagram

#### Note
- Connect via safety isolation transformer.
- Parallel connection of other actuators possible.
- Note performance data for supply.

#### Cable Lengths

<table>
<thead>
<tr>
<th>L</th>
<th>Y</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Note
When several actuators are connected in parallel, the maximum cable length must be divided by the number of actuators.

### Wiring Diagrams

#### INSTALLATION NOTES

1. Provide overload protection and disconnect as required.
2. **CAUTION** Equipment Damage!
   - Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.
   - Actuators may also be powered by 24 VDC.
   - Position feedback cannot be used with Triac sink controller.
   - The actuator internal common reference is not compatible.
   - Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.
   - Contact closures A & B also can be triacs.
   - A & B should both be closed for triac source and open for triac sink.
   - For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

#### APPLICATION NOTES

- Meets UL requirements without the need of an electrical ground connection.
- **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.

<table>
<thead>
<tr>
<th>Cross section</th>
<th>Max. cable length</th>
<th>Example for DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>L_1_2_3 mm²</td>
<td>L_1 m</td>
<td>L_2 m</td>
</tr>
<tr>
<td>0.75 mm²</td>
<td>&lt;30 m</td>
<td>(3, 4, 5)</td>
</tr>
<tr>
<td>1.50 mm²</td>
<td>&lt;60 m</td>
<td>(6, 7, 8)</td>
</tr>
<tr>
<td>2.50 mm²</td>
<td>&lt;100 m</td>
<td>(10, 11, 12)</td>
</tr>
</tbody>
</table>

---

**On/Off control**

- 24 VAC/DC Transformer
- Line Volts
- Position
- Feedback VDC
- Blk (1)
- Common
- Red (2)
- Hot
- Wht (3)
- Y_1 Input
- Org (5)
- ...MFT

**Floating Point control**

- 2 to 10 VDC Feedback Signal
- 24 VAC Transformer
- Line Volts
- Blk (1)
- Common
- Red (2)
- Hot +
- Wht (3)
- Y_1 Input
- Pnk (4)
- Y_2 Input
- Org (5)
- ...MFT

---

Electrical Installation

Cable colors:
- 1 = black
- 2 = red
- 3 = white
- 5 = orange

A = Actuator
C = Control unit
L_1 = Belimo connecting cable, 1 m (4 x 0.75 mm²)
L_2 = Customer cable
L_3 = Maximum cable length

Cross section | Max. cable length | Example for DC |
---|---|---|
L_1_2_3 mm² | L_1 m | L_2 m |
0.75 mm² | <30 m | (3, 4, 5) |
1.50 mm² | <60 m | (6, 7, 8) |
2.50 mm² | <100 m | (10, 11, 12) |

---
GKRX24-MFT-5-14 Actuators, Multi-Function Technology, Fail-Safe

Models
GKRX24-MFT-5-14

Technical Data

Control
2 to 10 VDC, 4 to 40 mA (default) variable (VDC, PWM, floating point, on/off)

Power supply
24 VAC ± 20% 50/60 Hz
24 VDC ± 10%

Power consumption
running 12 W
holding 3 W

Transformer sizing
21 VA (Class 2 power source)

Electrical connection
3 ft,18 GA plenum rated cable
½" conduit connector
10 ft. [3m], 16 ft. [5m]

Overload protection
electronic throughout 0° to 95° rotation

Feedback output
2 to 10 VDC, 0.5 mA max, VDC variable

Input impedance
100 kΩ (0.1 mA, 500 Ω)
1500 Ω (PWM, floating point, on/off)

Angle of rotation
max. 95°, adjustable with mechanical stop electronically variable

Direction of rotation
reversible with switch

Position indication
visual indicator

Running time
150 seconds (default) variable (90 to 150 seconds)
fail-safe 35 seconds

Manual override
external push button

Ambient temperature
-22°F to 122°F [-30°C to 50°C]

Housing
NEMA 2/IP54, Enclosure Type 2

Housing material
UL94-5V (flammability rating)

Agency listings †
cULus according to UL 60730-1A/-2-14,
CAN/CSA E60730-1-02, CE according to
2004/108/EEC and 2006/95/EC.

Noise level
<45 dB(A)

Quality standard
ISO 9001

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

Dimensions

<table>
<thead>
<tr>
<th>Valve Body</th>
<th>Nominal Pipe Size</th>
<th>Top Flange Design</th>
<th>Flange Diameter</th>
<th>Face-to-Face Length</th>
<th>Height</th>
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<td>11.70&quot; [296.9]</td>
</tr>
</tbody>
</table>
Wiring Diagrams

**INSTALLATION NOTES**

1. Provide overload protection and disconnect as required.

2. **CAUTION** Equipment Damage!
   - Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.
   - Actuators may also be powered by 24 VDC.
   - Position feedback cannot be used with Triac sink controller.
   - The actuator internal common reference is not compatible.
   - Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.
   - Contact closures A & B also can be triacs.
   - A & B should both be closed for triac source and open for triac sink.
   - For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

3. **APPLICATION NOTES**
   - Meets UL requirements without the need of an electrical ground connection.
   - The ZG-R01 500 Ω resistor may be used.

4. **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.

**Wiring Diagrams**

1. **VDC/4-20 mA**
   - 24 VAC Transformer
   - Line Volts
   - Control Signal 4 to 20 mA or 2 to 10 VDC
   - Common
   - Blk (1)
   - Red (2)
   - Wht (3)
   - Org (5)
   - + Hot
   - Y1 Input, 2 to 10V
   - U Output, 2 to 10V
   - ...MFT

2. **PWM**
   - 24 VAC Transformer (AC only)
   - Line Volts
   - Position Feedback VDC
   - Common
   - Blk (1)
   - Red (2)
   - Wht (3)
   - Org (5)
   - + Hot
   - Y1 Input
   - U Output
   - ...MFT

3. **On/Off control**
   - 24 VAC Transformer
   - Line Volts
   - 2 to 10 VDC Feedback Signal
   - Common – Hot +
   - Blk (1)
   - Red (2)
   - Wht (3)
   - Pnk (4)
   - Y1 Input
   - Y2 Input
   - Org (5)
   - U Output 2 to 10V
   - ...MFT

4. **Floating Point control**
   - 24 VAC Transformer
   - Line Volts
   - 2 to 10 VDC Feedback Signal
   - Common – Hot +
   - Blk (1)
   - Red (2)
   - Wht (3)
   - Pnk (4)
   - Y1 Input
   - Y2 Input
   - Org (5)
   - U Output 2 to 10V
   - ...MFT
Application
The CCV-EXT-KIT can be used with most CCV's* and PICCV in order to achieve a large clearance over the pipe. The Extension Kit will provide an additional 2" of space between the top of the valve and the base of the actuator. Bracket is made from aluminum and is not intended as a thermal block.

- Extension kit will be automatically assembled with any Flanged CCV assembly.

Technical Data

<table>
<thead>
<tr>
<th></th>
<th>Extension Height</th>
<th>Total Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension Height</td>
<td>2&quot;</td>
<td></td>
</tr>
<tr>
<td>Total Weight</td>
<td>0.7 lb</td>
<td></td>
</tr>
</tbody>
</table>

Material

<table>
<thead>
<tr>
<th>Extension Housing</th>
<th>Aluminum - Anodized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaft</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Threaded Hardware</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Bearing</td>
<td>Oilite® Bearing</td>
</tr>
<tr>
<td>Retaining Clip</td>
<td>Stainless Steel</td>
</tr>
</tbody>
</table>

Available for Spring and Non-Spring Actuators

* Cannot be used with N4 actuators.
* Available for previous NF assemblies.
* CCV-EXT-KIT cannot be used with any valve smaller than the B212(B) and B312(B).
* For use with B2 and B3 series only. Cannot be used with B6 series.
**Application**

The ZS-CCV... weather shield provides moderate protection for valves which are mounted outdoors. This product is designed as a water tight enclosure. The housing allows easy mounting over the actuator, while allowing easy viewing of the actuator in operation. Weather shield for PICCV/CCV to provide protection for actuators in outdoor applications.

**Specifications**

<table>
<thead>
<tr>
<th>Cover</th>
<th>PETG with UV resistant smoke tint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perimeter Gasket</td>
<td>Silicon Rubber</td>
</tr>
<tr>
<td>Rubber Gasket</td>
<td>Silicon Rubber</td>
</tr>
<tr>
<td>Spring Clips</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Temperature limitations:</td>
<td>-22˚F to 122˚F (-30˚C to 50˚C)</td>
</tr>
<tr>
<td>Plate (ZS-CCV-100)</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Plate</td>
<td>Galvaneal w/black powder coat</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Part Number</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZS - CCV - 90</td>
<td>LF, AF</td>
</tr>
<tr>
<td>ZS - CCV - 100</td>
<td>LRB(X), ARX</td>
</tr>
<tr>
<td>ZS - CCV - 110</td>
<td>ARB(X)</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>L</th>
<th>W</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.25” [413]</td>
<td>8.75” [222]</td>
<td>4.5” [114]</td>
</tr>
</tbody>
</table>

**Parts List**

- Cover including Rubber Perimeter Gasket, Rubber Gasket
- Back Plate
- Anti-Rotation Post with screw and lock washer
- Valve Gasket
- Assorted Cap plugs for unused holes

<table>
<thead>
<tr>
<th>Screws</th>
<th>AF - 2 bolts with nylon insert locking nuts</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRB(X), ARX</td>
<td>1 screw, 1 washer</td>
</tr>
</tbody>
</table>

No weather shield available at this time for the TF and TR actuators.

**Designed for NEMA 4 specifications.**

* Cannot be used with B6 series.
Application
The S1A and S2A auxiliary switches are used to indicate when a desired position of a valve is reached or to interface additional controls for a specific control sequence.

Operation
The S1A and S2A auxiliary switches are mounted onto the direct coupled actuator. The switches are modular units that mount directly onto LH and AH type actuators and are locked into place by guiding grooves on the sides of the actuator.

A driver disk is attached to the actuator handle and offers direct transmission of the actuator position to the micro switch cams. The switching points can be set over the full scale of 0 to 1 simply by adjusting the slotted discs.

Mounting Instructions
1. Press down the manual override button and rotate the actuator fully counter clockwise.
2. Place the switch/potentiometer adaptor onto the hex shaft of the handle which is in the center of the valve/actuator coupling.
3. Slide switch onto the actuator using the actuator guiding grooves on the sides of the actuator.
4. Check for correct mating of the adaptor to the switch.
5. Adjust switch dials as necessary.

<table>
<thead>
<tr>
<th>Types</th>
<th>S1A</th>
<th>S1A/300</th>
<th>S1A/500</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 SPDT</td>
<td>1 SPDT</td>
<td>1 SPDT</td>
</tr>
<tr>
<td></td>
<td>3 ft, 18 GA Appliance Cable</td>
<td>6 ft, 18 GA Appliance Cable</td>
<td>10 ft, 18 GA Appliance Cable</td>
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<table>
<thead>
<tr>
<th>Types</th>
<th>S2A</th>
<th>S2A/300</th>
<th>S2A/500</th>
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<tbody>
<tr>
<td></td>
<td>2 SPDT</td>
<td>2 SPDT</td>
<td>2 SPDT</td>
</tr>
<tr>
<td></td>
<td>3 ft, 18 GA Appliance Cable</td>
<td>6 ft, 18 GA Appliance Cable</td>
<td>10 ft, 18 GA Appliance Cable</td>
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</tbody>
</table>

Technical Data

<table>
<thead>
<tr>
<th></th>
<th>S1A</th>
<th>S2A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of switches</td>
<td>1 SPDT</td>
<td>2 SPDT</td>
</tr>
<tr>
<td>Weight</td>
<td>4.6 oz [130 g]</td>
<td>6.0 oz [170 g]</td>
</tr>
<tr>
<td>Switching capacity</td>
<td>3A (0.5A), 250 VAC</td>
<td>3A (0.5A), 250 VAC</td>
</tr>
<tr>
<td>Switching point</td>
<td>adjustable over full rotation (0° to 95°)</td>
<td>adjustable over full rotation (0° to 95°)</td>
</tr>
<tr>
<td>Pre-setting</td>
<td>with scale possible</td>
<td>with scale possible</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 to 95% RH non-condensing</td>
<td>5 to 95% RH non-condensing</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-22°F to 122°F [-30°C to +50°C]</td>
<td>-40°F to 176°F [-40°C to +80°C]</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°F to 176°F [-40°C to +80°C]</td>
<td>-40°F to 176°F [-40°C to +80°C]</td>
</tr>
<tr>
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<td>NEMA 2/1P54</td>
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<tr>
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<td>UL94-5VA</td>
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<tr>
<td>Servicing</td>
<td>maintenance free</td>
<td>maintenance free</td>
</tr>
<tr>
<td>Agency listings</td>
<td>cULus acc. to UL60730-1</td>
<td>CE according to 73/23/EEC</td>
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<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
<td>ISO 9001</td>
</tr>
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</table>

Wiring Diagram
Feedback Potentiometer P...A

For the non-spring return direct-coupled actuators

Application
The P...A feedback potentiometers are used with LR and AR actuators to provide a resistive signal which varies with valve position.

The P...A units are applied with commercial proportional temperature controllers to provide feedback of the valve position, or with electric or electronic meters to provide position indication. The signal can also be used as a positioner for parallel operation of multiple actuators.

Operation
The P...A feedback potentiometers are mounted onto the direct coupled actuator. The switches are modular units that mount directly onto LR and AR type actuators and are locked into place by guiding grooves on the sides of the actuator.

A driver disk is attached to the actuator handle and offers direct transmission of the actuator position to the micro switch cams.

Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Resistance Value</th>
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<tbody>
<tr>
<td>P140A</td>
<td>Feedback Potentiometer</td>
<td>140 Ω</td>
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<tr>
<td>P200A</td>
<td>Feedback Potentiometer</td>
<td>200 Ω</td>
</tr>
<tr>
<td>P500A</td>
<td>Feedback Potentiometer</td>
<td>500 Ω</td>
</tr>
<tr>
<td>P1000A</td>
<td>Feedback Potentiometer</td>
<td>1000 Ω</td>
</tr>
<tr>
<td>P2800A</td>
<td>Feedback Potentiometer</td>
<td>2800 Ω</td>
</tr>
<tr>
<td>P5000A</td>
<td>Feedback Potentiometer</td>
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</tr>
<tr>
<td>P10000A</td>
<td>Feedback Potentiometer</td>
<td>10000 Ω</td>
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Technical Data

<table>
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<tr>
<th>Parameter</th>
<th>Specification</th>
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<td>Resistance values</td>
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<tr>
<td>Output</td>
<td>1 W</td>
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<tr>
<td>Tolerance</td>
<td>± 5%</td>
</tr>
<tr>
<td>Linearity</td>
<td>± 2%</td>
</tr>
<tr>
<td>Resolution</td>
<td>min. 1%</td>
</tr>
<tr>
<td>Residual resistance</td>
<td>max. 5% on both sides</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>3 ft, 18 GA appliance cable, ½” conduit connector</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 to 95% RH non-condensing</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-22°F to 122°F [-30°C to 50°C]</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°F to 176°F [-40°C to 80°C]</td>
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<tr>
<td>Housing</td>
<td>NEMA 2 / IP54</td>
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<tr>
<td>Housing rating</td>
<td>UL94-5VA</td>
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<tr>
<td>Servicing</td>
<td>maintenance free</td>
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<tr>
<td>Agency listings</td>
<td>cULus acc. to UL60730-1</td>
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<td>CE</td>
<td>acc. to 73/23/EEC</td>
</tr>
<tr>
<td>Quality standard</td>
<td>ISO 9001</td>
</tr>
<tr>
<td>Weight</td>
<td>4.6 oz [130 g]</td>
</tr>
</tbody>
</table>

Mounting Instructions

1. Press down the manual override button and rotate the actuator fully counter clockwise.
2. Place the switch/potentiometer adaptor onto the hex shaft of the handle which is in the center of the valve/actuator coupling.
3. Slide switch onto the actuator using the actuator guiding grooves on the sides of the actuator.
4. Check for correct mating of the adaptor to the switch.
5. Adjust switch dials as necessary.

Wiring Diagram
Wiring Accessories

Protective Terminal Cover

For the non-spring return direct-coupled actuators

Application
Belimo non-spring return actuators with terminal strips are can be converted from NEMA 1/IP20 to NEMA 2/IP54 using the protective terminal cover ZS-T.

The ZS-T terminal cover accessory consists of:
- Terminal Cover
- Conduit Fitting
- Rubber Seal for Wire Diameter 4-6
- Rubber Seal for Wire Diameter 6-8

Mounting the Terminal Cover
1. Attach terminal cover to actuator, if not done already.
2. Slide the conduit fitting and correct size rubber seal onto wire.
3. Wire up actuator using the terminal strips.
4. Fit rubber seal into slot of terminal cover.
5. Shut terminal top and screw on conduit connector.
### MFT Standard Configuration

*P-10001 is the default configuration.

Example: AF24-MFT US is the basic model. Add the P…-set MFT configuration number and list price to the actuator when ordering, as needed.

Note: V-codes used for NV…Series actuator. All other MFT actuators use P-codes.

Note: Most popular configurations available at no additional cost.

Note: If the configuration needed is not listed, please fill in pg. 112 or call Belimo Customer Service at 800-543-9038.

Note: For Non-Spring Return Actuators the 3-digit code can be used in place of the P…-set MFT configuration number.

<table>
<thead>
<tr>
<th>Configuration (Substitute &quot;V&quot; for &quot;P&quot; for NV(F) actuators)</th>
<th>Code</th>
<th>Voltage</th>
<th>Input Range</th>
<th>Position Feedback</th>
<th>Running Time†</th>
<th>Torque %</th>
<th>Adaptation</th>
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<tbody>
<tr>
<td>P-10001</td>
<td>A01</td>
<td>2.0 to 10.0 VDC</td>
<td>2.0 to 10.0 VDC</td>
<td>150</td>
<td>100</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>P-10002</td>
<td>A02</td>
<td>0.0 to 10.0 VDC</td>
<td>0.0 to 10.0 VDC</td>
<td>150</td>
<td>100</td>
<td>Manual</td>
<td></td>
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<tr>
<td>P-10003</td>
<td>A03</td>
<td>2.0 to 10.0 VDC</td>
<td>0.0 to 5.0 VDC</td>
<td>150</td>
<td>100</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>P-10004</td>
<td>A04</td>
<td>4.0 to 7.0 VDC</td>
<td>2.0 to 10.0 VDC</td>
<td>150</td>
<td>100</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>P-10005</td>
<td>A05</td>
<td>6.0 to 9.0 VDC</td>
<td>2.0 to 10.0 VDC</td>
<td>150</td>
<td>100</td>
<td>Manual</td>
<td></td>
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<td>P-10006</td>
<td>A06</td>
<td>10.5 to 13.5 VDC</td>
<td>2.0 to 10.0 VDC</td>
<td>150</td>
<td>100</td>
<td>Manual</td>
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<td>P-10007</td>
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<td>2.0 to 10.0 VDC</td>
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<td>100</td>
<td>Manual</td>
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<td>P-10009</td>
<td>A09</td>
<td>5.0 to 10.0 VDC</td>
<td>2.0 to 10.0 VDC</td>
<td>150</td>
<td>100</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>P-10110</td>
<td>A10</td>
<td>5.0 to 10.0 VDC</td>
<td>0.0 to 10.0 VDC</td>
<td>150</td>
<td>100</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>P-10113</td>
<td>A13</td>
<td>0.0 to 10.0 VDC</td>
<td>2.0 to 10.0 VDC</td>
<td>150</td>
<td>100</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>P-10115</td>
<td>A15</td>
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<td>2.0 to 10.0 VDC</td>
<td>150</td>
<td>100</td>
<td>Manual</td>
<td></td>
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<tr>
<td>P-10116</td>
<td>A16</td>
<td>2.0 to 6.0 VDC</td>
<td>2.0 to 10.0 VDC</td>
<td>150</td>
<td>100</td>
<td>Manual</td>
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<tr>
<td>P-10117</td>
<td>A17</td>
<td>6.0 to 10.0 VDC</td>
<td>2.0 to 10.0 VDC</td>
<td>150</td>
<td>100</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>P-10118</td>
<td>A18</td>
<td>14.0 to 17.0 VDC</td>
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<td>100</td>
<td>Manual</td>
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<tr>
<td>P-10220</td>
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<td>9.0 to 12.0 VDC</td>
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<tr>
<td>P-10231</td>
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<td>100</td>
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<td>100</td>
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<td></td>
</tr>
<tr>
<td>P-20001</td>
<td>W01</td>
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<td>100</td>
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<td></td>
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<tr>
<td>P-20002</td>
<td>W02</td>
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<td>100</td>
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<tr>
<td>P-20003</td>
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<td>150</td>
<td>100</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>P-20004</td>
<td>W04</td>
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<td>100</td>
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<td>100</td>
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<td>100</td>
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<td>P-30004</td>
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<td>P-30006</td>
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</tr>
<tr>
<td>P-40001</td>
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<td>/s</td>
<td>100</td>
<td>Manual</td>
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<td>100</td>
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<td>2.0 to 10.0 VDC</td>
<td>/s</td>
<td>100</td>
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<tr>
<td>P-40004</td>
<td>J04</td>
<td>On/Off</td>
<td>0.0 to 5.0 VDC</td>
<td>100</td>
<td>100</td>
<td>Manual</td>
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<tr>
<td>P-40005</td>
<td>J05</td>
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<td>0.0 to 10.0 VDC</td>
<td>100</td>
<td>100</td>
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</tbody>
</table>
## MFT Programming Codes, Flexible Products

### PRODUCTS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>Base Actuator Codes</th>
<th>Control Input</th>
<th>Feedback</th>
<th>Running Time</th>
<th>Angle of Rotation/Stroke</th>
<th>Power Supply</th>
<th>VA Rating</th>
<th>Weight (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LHX24-3</td>
<td>LR000</td>
<td>On/Off, Floating Point</td>
<td>—</td>
<td>95 (Default)</td>
<td>95 deg</td>
<td>24 VAC/DC</td>
<td>3</td>
<td>1.08</td>
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<tr>
<td>LHX24-SR</td>
<td>LR030</td>
<td>2-10 VDC (4-20mA*)</td>
<td>—</td>
<td>95 (Default)</td>
<td>95 deg</td>
<td>24 VAC/DC</td>
<td>3</td>
<td>1.08</td>
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<tr>
<td>LHX24-PF</td>
<td>LXX07</td>
<td>0-20 V Phasecut</td>
<td>2-10 VDC</td>
<td>95 (Default)</td>
<td>95 deg</td>
<td>24 VAC/DC</td>
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<td>1.08</td>
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<td>LHX24-MFT</td>
<td>LR100</td>
<td>2-10 VDC (Default)</td>
<td>2-10 VDC</td>
<td>150 (Default)</td>
<td>95 deg</td>
<td>24 VAC/DC</td>
<td>3</td>
<td>1.08</td>
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<tr>
<td>LHX24-MFT95</td>
<td>LXX07†</td>
<td>0 to 135 Ohm</td>
<td>2-10 VDC</td>
<td>150 (Default)</td>
<td>95 deg</td>
<td>24 VAC/DC</td>
<td>3</td>
<td>1.08</td>
</tr>
<tr>
<td>LRX120-3</td>
<td>LR060</td>
<td>On/Off, Floating Point</td>
<td>—</td>
<td>95 (Default)</td>
<td>95 deg</td>
<td>120-240 VAC</td>
<td>3</td>
<td>1.08</td>
</tr>
<tr>
<td>LRX120-SR</td>
<td>LR450</td>
<td>2-10 VDC (4-20mA*)</td>
<td>—</td>
<td>95 (Default)</td>
<td>95 deg</td>
<td>120-240 VAC</td>
<td>3</td>
<td>1.08</td>
</tr>
</tbody>
</table>

| ARX24-3      | AR000               | On/Off, Floating Point         | —                      | 95 (Default) | 95 deg                   | 24 VAC/DC   | 5         | 1.08        |
| ARX24-SR     | AR030               | 2-10 VDC (4-20mA*)             | —                      | 95 (Default) | 24 VAC/DC                | 5           | 1         | 1.08        |
| ARX24-PF     | ARXX0†              | 0-20 V Phasecut                | 2-10 VDC               | 95 (Default) | 95 deg                   | 24 VAC/DC   | 5         | 1.08        |
| ARX24-MFT    | AR100               | 2-10 VDC (Default)             | 2-10 VDC               | 150 (Default)| 95 deg                   | 24 VAC/DC   | 5         | 1.08        |
| ARX24-MFT95  | ARXX0†              | 0 to 135 Ohm                   | 2-10 VDC               | 150 (Default)| 95 deg                   | 24 VAC/DC   | 5         | 1.08        |
| ARX120-3     | AR060               | On/Off, Floating Point         | —                      | 95 (Default) | 95 deg                   | 120-240 VAC | 5         | 1.08        |
| ARX120-SH    | AR450               | 2-10 VDC (4-20mA*)             | —                      | 95 (Default) | 95 deg                   | 120-240 VAC | 5         | 1.08        |

† For correct code please call Belimo Customer service 800-543-9038

### Configuration (Substitute 'V' for 'P' for NV[F] actuators)

<table>
<thead>
<tr>
<th>Code</th>
<th>Control</th>
<th>Motion</th>
<th>Adaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Input Range</td>
<td>Position Feedback</td>
<td>Running Time</td>
</tr>
</tbody>
</table>

## Codes Control Input Feedback Running Time Angle of Rotation/Stroke Power Supply VA Rating Weight (lb)

### Voltage

P-10001  A01  2.0 to 10.0 VDC  2.0 to 10.0 VDC  150 100  Manual
P-10002  A02  0.0 to 10.0 VDC  0.0 to 10.0 VDC  150 100  Manual
P-10003  A03  2.0 to 10.0 VDC  0.0 to 5.0 VDC  150 100  Manual
P-10004  A04  4.0 to 7.0 VDC  2.0 to 10.0 VDC  150 100  Manual
P-10005  A05  6.0 to 9.0 VDC  2.0 to 10.0 VDC  150 100  Manual
P-10006  A06  10.5 to 13.5 VDC  2.0 to 10.0 VDC  150 100  Manual
P-10007  A07  0.0 to 5.0 VDC  2.0 to 10.0 VDC  150 100  Manual
P-10009  A09  5.0 to 10.0 VDC  2.0 to 10.0 VDC  150 100  Manual
P-10010  A10  5.0 to 10.0 VDC  0.0 to 10.0 VDC  150 100  Manual
P-10013  A13  0.0 to 10.0 VDC  2.0 to 10.0 VDC  150 100  Manual
P-10015  A15  2.0 to 5.0 VDC  2.0 to 10.0 VDC  150 100  Manual
P-10016  A16  2.0 to 6.0 VDC  2.0 to 10.0 VDC  150 100  Manual
P-10017  A17  6.0 to 10.0 VDC  2.0 to 10.0 VDC  150 100  Manual
P-10018  A18  14.0 to 17.0 VDC  2.0 to 10.0 VDC  150 100  Manual
P-10020  A20  9.0 to 12.0 VDC  2.0 to 10.0 VDC  150 100  Manual
P-10028  A28  0.0 to 10.0 VDC  0.0 to 10.0 VDC  100 100  Manual
P-10031  A31  0.0 to 4.0 VDC  2.0 to 10.0 VDC  150 100  Manual
P-10063  A63  0.5 to 4.5 VDC  0.5 to 4.5 VDC  150 100  Manual
P-10064  A64  5.5 to 10.0 VDC  5.5 to 10.0 VDC  150 100  Manual

### PWM

P-20001  W01  0.59 to 2.93 sec.  2.0 to 10.0 VDC  150 100  Manual
P-20002  W02  0.02 to 5.00 sec.  2.0 to 10.0 VDC  150 100  Manual
P-20003  W03  0.10 to 25.50 sec.  2.0 to 10.0 VDC  150 100  Manual
P-20004  W04  0.10 to 25.60 sec.  2.0 to 10.0 VDC  150 100  Manual
P-20005  W05  0.10 to 5.20 sec.  0.0 to 5.0 VDC  150 100  Manual

### Floating Point

P-30001  F01  Floating point  2.0 to 10.0 VDC  150 100  Manual
P-30002  F02  Floating point  0.0 to 10.0 VDC  150 100  Manual
P-30003  F03  Floating point  2.0 to 10.0 VDC  100 100  Manual
P-30004  F04  Floating point  0.0 to 5.0 VDC  100 100  Manual
P-30005  F05  Floating point  0.0 to 10.0 VDC  100 100  Manual
P-30006  H06  Floating point  0.0 to 5.0 VDC  150 100  Manual

### On/Off

P-40001  J01  On/Off  None  75 100  Manual
P-40002  J02  On/Off  2.0 to 10.0 VDC  150 100  Manual
P-40003  J03  On/Off  None  75 100  Manual
P-40004  J04  On/Off  0.0 to 5.0 VDC  100 100  Manual
P-40005  J05  On/Off  0.0 to 10.0 VDC  100 100  Manual

*P-10001 is the default configuration.
#1 Select an Actuator  
(Use one sheet for each unique actuator/configuration)

<table>
<thead>
<tr>
<th>Model</th>
<th>Quantity</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF24-MFT US</td>
<td></td>
<td>AMX24-MFT</td>
</tr>
<tr>
<td>AF24-MFT-S US</td>
<td></td>
<td>AMX24-MFTX1</td>
</tr>
<tr>
<td>NF24-MFT US</td>
<td></td>
<td>NMX24-MFT</td>
</tr>
<tr>
<td>LF24-MFT US</td>
<td></td>
<td>NMX24-MFTX1</td>
</tr>
<tr>
<td>LF24-MFT-S US</td>
<td></td>
<td>LMX24-MFT</td>
</tr>
<tr>
<td>AF24-MFT95 US</td>
<td></td>
<td>LMX24-MFTX1</td>
</tr>
<tr>
<td>NF24-MFT US</td>
<td></td>
<td>GMX24-MFT95</td>
</tr>
<tr>
<td>NF24-MFT-E US</td>
<td></td>
<td>GMX24-MFT95</td>
</tr>
<tr>
<td>NVF24-MFT US</td>
<td></td>
<td>GMX24-MFT95</td>
</tr>
<tr>
<td>NVF24-MFT-E US</td>
<td></td>
<td>GMX24-MFT95</td>
</tr>
<tr>
<td>GMX24-MFT</td>
<td></td>
<td>GMX24-MFTX1</td>
</tr>
<tr>
<td>GMX24-MFTX1</td>
<td></td>
<td>LUX24-MFT</td>
</tr>
</tbody>
</table>

(-S=Auxiliary Switch)

#2 Create a Custom Configuration

1. Angle of rotation setting

- **Deactivated** (Default): The following settings 2-4 refer to the full angle of rotation of 95°.
- **Activated**: The following settings 2-4 are automatically adapted to the effective mechanical angle of rotation.
- Manual: triggering by pressing the push button twice.
- Automatic: triggering each time the unit is powered up or by pressing the push button twice.

2. Control Types

<table>
<thead>
<tr>
<th>VDC</th>
<th>PWM</th>
<th>Floating Point</th>
<th>On/Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 – 10</td>
<td>0.2 to 5.0 seconds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 – 10</td>
<td>0.1 to 25.5 seconds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td>0.59 to 2.93 seconds</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Start: [ ], Stop: [ ]

3. Feedback Signals U₂

<table>
<thead>
<tr>
<th>Position Feedback U</th>
<th>DC 2...10 V (Default)</th>
</tr>
</thead>
</table>

Position Feedback U: DC 0...10 V

Position Feedback U: Start DC [ ], Finish DC [ ]

V(0...8 V) 

V(2...10 V)

The finish must be at least 2 V above the start!

4. Running Time

- **150 seconds** (Default)

Running time [ ] [ ] seconds (75…300 seconds) (in 5 second increments)

Note: The sound power level [dB(A)] increases when the running time is below 150 seconds.

- **LM 35…150 seconds**
- **NM 45…170 seconds**
- **AM 90…300 seconds**
- **GM 90…300 seconds**
- **Others 75…300 seconds**

5. Override control and electronic angle of rotation limiting

- **Min.** (min. position) = [ ] [ ] % (0...100%) <3 (beginning of working range) default 0
- **ZS** (intermediate position) = [ ] [ ] % (0...100%) (0% = Min.; 100% = Max.) default 50
- **Max.** (max. position) = [ ] [ ] % (0...100%) <3 (end of working range) default 100