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# ACTUATORS & DAMPERS



Products manufactured in the  
United States

**NEW**

Products that are new to  
the catalog



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**Kele**

www.kele.com



You have selected your damper by size and functional requirements, but now the question, “How much actuator do I need to obtain maximum closeoff and to withstand the many cycles of operation?” This is a good question, and yet little information is published on this subject. Hopefully the following guidelines will aid you in your selection process. Damper torque loading (measured in inch-pounds per square foot) used in selecting the correct size actuator should be provided by the damper manufacturer; however, if this information is not available, the following general guidelines can be used.

| DAMPER TYPE                                                         | TORQUE LOADING FACTOR |
|---------------------------------------------------------------------|-----------------------|
| Opposed blade, without seals, for non-tight close-off applications  | 3 in-lb/sq ft         |
| Parallel blade, without seals, for non-tight close-off applications | 4 in-lb/sq ft         |
| Opposed blade, with seals, for tight close-off applications         | 5 in-lb/sq ft         |
| Parallel blade, with seals, for tight close-off applications        | 7 in-lb/sq ft         |

Where direct-coupled (rotary-motion) actuators are used, the above torque loading will work with most applications under 2” W.C. static pressure or 1000 fpm face velocity. For higher applications up to 3” W.C. or 2500 fpm, the torque loading should be increased by a multiplier of 1.5. If your application calls for even higher criteria up to 4” W.C. or 3000 fpm, use a multiplier of 2.0. This is a good general set of rules to follow. We have found it better to have more torque available because dirt build up and corrosion of the damper over time will put an extra burden on the actuator.

With these things taken into consideration, along with your initial static and velocity parameters, you may find it better to oversize the actuator by using the next larger unit available. This suggestion may offer you some assurance of tight closeoff and longer life of the actuator.

However, in choosing an electric (gear train or hydraulic) or pneumatic actuator where linking arms are used, you may find the manufacturer has rated their actuator by the square foot area it can effectively control. This is done, in part, because of the change in torque produced throughout the stroke of the actuator when using crank arms and linking rods. These ratings are typically best case scenarios based on nominal conditions and dampers without seals. To correctly apply these actuators, you must know the conditions under which the actuators will be used. If your application involves pressures or velocities higher than the conditions the actuators were rated for, or involves dampers with seals, you should derate the manufacturer’s square foot area by at least 33% (0.67 multiplier). If your application involves pressure or velocities higher than the conditions the actuators were rated for, and the dampers also have seals, you should derate the manufacturer’s square foot area by at least 50% (0.50 multiplier).

This method may not be as precise as selecting the direct-mount actuators, but is a good rule of thumb if more suitable information is not available.



# ACTUATORS & DAMPERS

## DIRECT-COUPLED ACTUATORS TORQUE AND DAMPER AREA RATINGS

### *DIRECT COUPLED ACTUATOR CROSS REFERENCE CHART NON-SPRING RETURN*

2

ACTUATORS & DAMPERS

| Brand            | Torque            | Supply Voltage             | Control Signal                                  | Model                 | Damper Area (ft <sup>2</sup> ) |
|------------------|-------------------|----------------------------|-------------------------------------------------|-----------------------|--------------------------------|
| <b>Kele</b>      | 44 in-lb (5 Nm)   | 21-27 VAC 50/60 Hz, 24 VDC | Two-position, floating                          | <b>KA-44-2T</b>       | 6.3                            |
| <b>Honeywell</b> | 44 in-lb (5 Nm)   | 21-27 VAC 50/60 Hz, 24 VDC | Two-position, floating                          | <b>MN6105A1011</b>    | 6.3                            |
| <b>Johnson</b>   | 35 in-lb (4 Nm)   | 20-30 VAC, 50/60 Hz        | Two-position, floating                          | <b>M9104-AGA-2S</b>   | 5.0                            |
| <b>Johnson</b>   | 53 in-lb (6 Nm)   | 20-30 VAC, 50/60 Hz        | Two-position, floating                          | <b>M9106-AGA-2</b>    | 7.6                            |
| <b>Siemens</b>   | 44 in-lb (5 Nm)   | 20-28 VAC, 50/60 Hz        | Two-position, floating                          | <b>GDE131.1P</b>      | 6.3                            |
| <b>Schneider</b> | 35 in-lb (4 Nm)   | 21-28 VAC 50/60 Hz         | Two-position, floating                          | <b>MF4E-60430-100</b> | 5.0                            |
| <b>Schneider</b> | 35 in-lb (4 Nm)   | 21-28 VAC 50/60 Hz         | Two-position, floating                          | <b>MF41-6043</b>      | 5.0                            |
| <b>Belimo</b>    | 45 in-lb, (5 Nm)  | 20-28 VAC 50/60 Hz, 24 VDC | Two-position, floating                          | <b>LMB24-3</b>        | 6.4                            |
| <b>Kele</b>      | 44 in-lb (5 Nm)   | 21-27 VAC 50/60 Hz, 24 VDC | Prop. 0/2-10 VDC, 0/4-20 mA, two-pos., floating | <b>KA-44-M</b>        | 6.3                            |
| <b>Honeywell</b> | 44 in-lb (5 Nm)   | 21-27 VAC 50/60 Hz, 24 VDC | Prop. 0/2-10 VDC, 0/4-20 mA                     | <b>MN7505A2001</b>    | 6.3                            |
| <b>Johnson</b>   | 35 in-lb (4 Nm)   | 20-30 VAC, 50/60 Hz        | Prop. 0-10 VDC, 4-20 mA                         | <b>M9104-GGA-2S</b>   | 5.0                            |
| <b>Johnson</b>   | 53 in-lb (6 Nm)   | 20-30 VAC, 50/60 Hz        | Prop. 0-10 VDC, 4-20 mA                         | <b>M9106-GGA-2</b>    | 7.6                            |
| <b>Siemens</b>   | 44 in-lb (5 Nm)   | 20-28 VAC, 50/60 Hz        | Proportional 0 to 10 VDC                        | <b>GDE161.1P</b>      | 6.3                            |
| <b>Schneider</b> | 35 in-lb (4 Nm)   | 21-28 VAC 50/60 Hz         | Proportional 0-10 VDC                           | <b>MS41-6043</b>      | 5.0                            |
| <b>Belimo</b>    | 45 in-lb, (5 Nm)  | 20-28 VAC 50/60 Hz, 24 VDC | Prop. 2-10 VDC, 4-20 mA                         | <b>LMB24-SR</b>       | 6.4                            |
| <b>Kele</b>      | 88 in-lb (10 Nm)  | 21-27 VAC 50/60 Hz, 24 VDC | Two-position, floating                          | <b>KA-88-2T</b>       | 12.6                           |
| <b>Honeywell</b> | 88 in-lb (10 Nm)  | 21-27 VAC 50/60 Hz, 24 VDC | Two-position, floating                          | <b>MN6110A1003</b>    | 12.6                           |
| <b>Johnson</b>   | 70 in-lb (8 Nm)   | 20-30 VAC, 50/60 Hz        | Two-position, floating                          | <b>M9108-AGA-2</b>    | 10.0                           |
| <b>Siemens</b>   | 88 in-lb (10 Nm)  | 20-28 VAC, 50/60 Hz        | Two-position, floating                          | <b>GLB131.1P</b>      | 12.6                           |
| <b>Schneider</b> | 70 in-lb (8 Nm)   | 21-28 VAC 50/60 Hz         | Two-position, floating                          | <b>MF41-6083</b>      | 10.0                           |
| <b>Belimo</b>    | 90 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 24 VDC | Two-position, floating                          | <b>NMB24-3</b>        | 12.9                           |
| <b>Kele</b>      | 88 in-lb (10 Nm)  | 21-27 VAC 50/60 Hz, 24 VDC | Prop. 0/2-10 VDC, 0/4-20 mA, two-pos., floating | <b>KA-88-M</b>        | 12.6                           |
| <b>Honeywell</b> | 88 in-lb (10 Nm)  | 21-27 VAC 50/60 Hz, 24 VDC | Prop. 0/2-10 VDC, 0/4-20 mA                     | <b>MN7510A2001</b>    | 12.6                           |
| <b>Johnson</b>   | 70 in-lb (8 Nm)   | 20-30 VAC, 50/60 Hz        | Prop. 0-10 VDC, 4-20 mA                         | <b>M9108-GGA-2</b>    | 10.0                           |
| <b>Siemens</b>   | 88 in-lb (10 Nm)  | 20-28 VAC, 50/60 Hz        | Proportional 0 to 10 VDC                        | <b>GLB161.1P</b>      | 12.6                           |
| <b>Schneider</b> | 70 in-lb (8 Nm)   | 21-28 VAC 50/60 Hz         | Proportional 0-10 VDC                           | <b>MS41-6083</b>      | 10.0                           |
| <b>Belimo</b>    | 90 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 24 VDC | Prop. 2-10 VDC, 4-20 mA                         | <b>NMB24-SR</b>       | 12.9                           |
| <b>Kele</b>      | 175 in-lb (20 Nm) | 21-27 VAC 50/60 Hz, 24 VDC | Two-position, floating                          | <b>KA-175-2T</b>      | 25.0                           |
| <b>Honeywell</b> | 175 in-lb (20 Nm) | 21-27 VAC 50/60 Hz, 24 VDC | Two-position, floating                          | <b>MN6120A1002</b>    | 25.0                           |
| <b>Johnson</b>   | 140 in-lb (16 Nm) | 20-30 VAC, 50/60 Hz        | Two-position, floating                          | <b>M9116-AGA-2</b>    | 20.0                           |
| <b>Siemens</b>   | 132 in-lb (15 Nm) | 20-28 VAC, 50/60 Hz        | Two-position, floating                          | <b>GEB131.1P</b>      | 18.9                           |
| <b>Schneider</b> | 133 in-lb (15 Nm) | 21-28 VAC 50/60 Hz         | Two-position, floating                          | <b>MF41-6153</b>      | 19.0                           |
| <b>Belimo</b>    | 180 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 24 VDC | Two-position, floating                          | <b>AMB24-3</b>        | 25.7                           |
| <b>Kele</b>      | 175 in-lb (20 Nm) | 21-27 VAC 50/60 Hz, 24 VDC | Prop. 0/2-10 VDC, 0/4-20 mA, two-pos., floating | <b>KA-175-P</b>       | 25.0                           |
| <b>Honeywell</b> | 175 in-lb (20 Nm) | 21-27 VAC 50/60 Hz, 24 VDC | Prop. 0/2-10 VDC, 0/4-20 mA                     | <b>MN7220A2007</b>    | 25.0                           |
| <b>Johnson</b>   | 140 in-lb (16 Nm) | 20-30 VAC, 50/60 Hz        | Prop. 0-10 VDC, 4-20 mA                         | <b>M9116-GGA-2</b>    | 20.0                           |
| <b>Siemens</b>   | 132 in-lb (15 Nm) | 20-28 VAC, 50/60 Hz        | Proportional 0 to 10 VDC                        | <b>GEB161.1P</b>      | 18.9                           |
| <b>Siemens</b>   | 177 in-lb (20 Nm) | 20-28 VAC, 50/60 Hz        | Proportional 0 to 10 VDC                        | <b>GBB161.1P</b>      | 25.3                           |
| <b>Schneider</b> | 133 in-lb (15 Nm) | 21-28 VAC 50/60 Hz         | Proportional 0/2-10 VDC                         | <b>MS41-6153</b>      | 19.0                           |
| <b>Belimo</b>    | 180 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 24 VDC | Prop. 2-10 VDC, 4-20 mA                         | <b>AMB24-SR</b>       | 25.7                           |
| <b>Kele</b>      | 301 in-lb (34 Nm) | 21-27 VAC 50/60 Hz, 24 VDC | Two-position, floating                          | <b>KA-301-2T</b>      | 43.0                           |
| <b>Honeywell</b> | 300 in-lb (34 Nm) | 21-27 VAC 50/60 Hz, 24 VDC | Two-position, floating                          | <b>MN6134A1003</b>    | 42.9                           |
| <b>Johnson</b>   | 210 in-lb (24 Nm) | 20-30 VAC, 50/60 Hz        | Two-position, floating                          | <b>M9124-AGA-2</b>    | 30.0                           |
| <b>Johnson</b>   | 280 in-lb (32 Nm) | 20-30 VAC, 50/60 Hz        | Two-position, floating                          | <b>M9132-AGA-2</b>    | 40.0                           |
| <b>Schneider</b> | 300 in-lb (34 Nm) | 21-28 VAC 50/60 Hz         | Two-position, floating                          | <b>MF41-6343</b>      | 42.9                           |
| <b>Belimo</b>    | 360 in-lb (40 Nm) | 20-28 VAC 50/60 Hz, 24 VDC | Two-position, floating                          | <b>GMB24-3</b>        | 51.4                           |
| <b>Kele</b>      | 301 in-lb (34 Nm) | 21-27 VAC 50/60 Hz, 24 VDC | Prop. 0/2-10 VDC, 0/4-20 mA, two-pos., floating | <b>KA-301-P</b>       | 43.0                           |
| <b>Honeywell</b> | 300 in-lb (34 Nm) | 21-27 VAC 50/60 Hz, 24 VDC | Prop. 0/2-10 VDC, 0/4-20 mA                     | <b>MN7234A2008</b>    | 42.9                           |
| <b>Johnson</b>   | 210 in-lb (24 Nm) | 20-30 VAC, 50/60 Hz        | Prop. 0-10 VDC, 4-20 mA                         | <b>M9124-GGA-2</b>    | 30.0                           |
| <b>Johnson</b>   | 280 in-lb (32 Nm) | 20-30 VAC, 50/60 Hz        | Prop. 0-10 VDC, 4-20 mA                         | <b>M9132-GGA-2</b>    | 40.0                           |
| <b>Siemens</b>   | 310 in-lb (35 Nm) | 20-28 VAC, 50/60 Hz        | Proportional 0 to 10 VDC                        | <b>GIB161.1P</b>      | 44.3                           |
| <b>Schneider</b> | 300 in-lb (34 Nm) | 21-28 VAC 50/60 Hz         | Prop. 2-10 VDC, 4-20 mA                         | <b>MS41-6343</b>      | 42.9                           |
| <b>Belimo</b>    | 360 in-lb (40 Nm) | 20-28 VAC 50/60 Hz, 24 VDC | Prop. 2-10 VDC, 4-20 mA                         | <b>GMB24-SR</b>       | 51.4                           |

\*Maximum damper area assuming 7 in-lb/sq. ft damper torque

# ACTUATORS & DAMPERS



## DIRECT-COUPLED ACTUATORS TORQUE AND DAMPER AREA RATINGS DIRECT COUPLED ACTUATOR CROSS REFERENCE CHART SPRING RETURN

2

ACTUATORS & DAMPERS

| Brand     | Torque            | Supply Voltage                 | Control Signal                                | Model        | Damper Area (ft <sup>2</sup> ) |
|-----------|-------------------|--------------------------------|-----------------------------------------------|--------------|--------------------------------|
| Kele      | 44 in-lb (5 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC  | Two-position                                  | KAS-44-2     | 6.3                            |
| Honeywell | 27 in-lb (3 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC  | Two-position                                  | MS8103A1130  | 3.6                            |
| Honeywell | 44 in-lb (5 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC  | Two-position                                  | MS8105A1030  | 6.3                            |
| Johnson   | 27 in-lb (3 Nm)   | 20-28 VAC 50/60 Hz, 22-26 VDC  | Two-position                                  | M9203-BGA-2  | 3.6                            |
| Schneider | 35 in-lb (4 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC  | Two-position                                  | MA40-7043    | 5.0                            |
| Belimo    | 18 in-lb (2 Nm)   | 20-28 VAC 50/60 Hz, 22-26 VDC  | Two-position                                  | TF24         | 2.6                            |
| Belimo    | 35 in-lb (4 Nm)   | 20-28 VAC 50/60 Hz, 22-26 VDC  | Two-position                                  | LF24         | 5.0                            |
| Kele      | 44 in-lb (5 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC  | Prop. 0/2-10 VDC, 4-20 mA, two-pos., floating | KAS-44-M     | 6.3                            |
| Honeywell | 27 in-lb (3 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC  | Prop. 0/2-10 VDC, 4-20 mA, two-pos., floating | MS7503A2030  | 3.6                            |
| Honeywell | 44 in-lb (5 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC  | Prop. 0/2-10 VDC, 4-20 mA, two-pos., floating | MS7505A2030  | 6.3                            |
| Johnson   | 27 in-lb (3 Nm)   | 20-28 VAC 50/60 Hz, 22-26 VDC  | Tri-state, two-position                       | M9203-AGA-2Z | 3.6                            |
| Schneider | 35 in-lb (4 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC  | Floating                                      | MF40-7043    | 5.0                            |
| Belimo    | 18 in-lb (2 Nm)   | 20-28 VAC 50/60 Hz, 22-26 VDC  | Floating                                      | TF24-3       | 2.6                            |
| Belimo    | 35 in-lb (4 Nm)   | 20-28 VAC 50/60 Hz, 22-26 VDC  | Floating                                      | LF24-3       | 5.0                            |
| Johnson   | 27 in-lb (3 Nm)   | 20-28 VAC 50/60 Hz, 22-26 VDC  | Prop. 2-10 VDC, 4-20 mA                       | M9203-GGA-2Z | 3.6                            |
| Schneider | 35 in-lb (4 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC  | Prop. 2-10 VDC, 4-20 mA                       | MS40-7043    | 5.0                            |
| Belimo    | 18 in-lb (2 Nm)   | 20-28 VAC 50/60 Hz, 22-26 VDC  | Prop. 2-10 VDC, 4-20 mA                       | TF24-SR      | 2.6                            |
| Belimo    | 35 in-lb (4 Nm)   | 20-28 VAC 50/60 Hz, 22-26 VDC  | Prop. 2-10 VDC, 4-20 mA                       | LF24-SR      | 5.0                            |
| Kele      | 88 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-30 VDC  | Two-position                                  | KAS-88-2     | 12.6                           |
| Honeywell | 88 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-30 VDC  | Two-position                                  | MS8110A1008  | 12.6                           |
| Johnson   | 70 in-lb (80 Nm)  | 20-28 VAC 50/60 Hz, 22-26 VDC  | Two-position                                  | M9208-BGA-2  | 10.0                           |
| Johnson   | 89 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-26 VDC  | Two-position                                  | M9210-BGA-3  | 12.7                           |
| Siemens   | 62 in-lb (7 Nm)   | 20-28 VAC 50/60 Hz, 21-27 VDC  | Two-position                                  | GMA121.1P    | 8.9                            |
| Schneider | 60 in-lb (7 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC  | Two-position                                  | MA41-7073    | 8.6                            |
| Belimo    | 90 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-26 VDC  | Two-position                                  | NFB24        | 12.9                           |
| Kele      | 88 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-30 VDC  | Prop. 0/2-10 VDC, 4-20 mA, two-pos., floating | KAS-88-M     | 12.6                           |
| Honeywell | 88 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-30 VDC  | Prop. 0/2-10 VDC, 4-20 mA, two-pos., floating | MS7510A2008  | 12.6                           |
| Johnson   | 70 in-lb (80 Nm)  | 20-28 VAC 50/60 Hz, 22-26 VDC  | Two-position, floating                        | M9208-AGA-2  | 10.0                           |
| Johnson   | 89 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-26 VDC  | Two-position, floating                        | M9210-AGA-3  | 12.7                           |
| Siemens   | 62 in-lb (7 Nm)   | 20-28 VAC 50/60 Hz, 21-27 VDC  | Floating                                      | GMA131.1P    | 8.9                            |
| Schneider | 60 in-lb (7 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC  | Floating                                      | MF41-7073    | 8.6                            |
| Belimo    | 90 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-26 VDC  | Prop. (default 2-10 VDC)                      | NFB24-MFT    | 12.9                           |
| Johnson   | 70 in-lb (80 Nm)  | 20-28 VAC 50/60 Hz, 22-26 VDC  | Prop. 2-10 VDC, 4-20 mA                       | M9208-GGA-2  | 10.0                           |
| Johnson   | 89 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-26 VDC  | Prop. 2-10 VDC, 4-20 mA                       | M9210-GGA-3  | 12.7                           |
| Siemens   | 62 in-lb (7 Nm)   | 20-28 VAC 50/60 Hz, 21-27 VDC  | Prop. 0/2-10 VDC                              | GMA151.1P    | 8.9                            |
| Siemens   | 62 in-lb (7 Nm)   | 20-28 VAC 50/60 Hz, 21-27 VDC  | Prop. 0-10 VDC                                | GMA161.1P    | 8.9                            |
| Schneider | 60 in-lb (7 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC  | Prop. 2-10 VDC, 4-20 mA                       | MS41-7073    | 8.6                            |
| Belimo    | 90 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-26 VDC  | Prop. 2-10 VDC, 4-20 mA                       | NFB24-SR     | 12.9                           |
| Kele      | 175 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC  | Two-position                                  | KAS-175-2    | 25.0                           |
| Honeywell | 175 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC  | Two-position                                  | MS8120A1007  | 25.0                           |
| Johnson   | 177 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 22-26 VDC  | Two-position                                  | M9220-BGA-3  | 25.3                           |
| Siemens   | 142 in-lb (16 Nm) | 20-28 VAC 50/60 Hz, 22-26 VDC  | Two-position                                  | GCA121.1P    | 20.3                           |
| Schneider | 133 in-lb (15 Nm) | 24 VAC $\pm$ 20%, 22 to 30 VDC | Two-position                                  | MA41-7153    | 19.0                           |
| Schneider | 150 in-lb (17 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC  | Two-position                                  | MA40-7173    | 21.4                           |
| Belimo    | 180 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 22-26 VDC  | Two-position                                  | AFB24        | 25.7                           |
| Kele      | 175 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC  | Prop. 0/2-10 VDC, 4-20 mA, two-pos., floating | KAS-175-M    | 25.0                           |
| Honeywell | 175 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC  | Prop. 0/2-10 VDC, 4-20 mA, two-pos., floating | MS7520A2007  | 25.0                           |
| Johnson   | 177 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 22-26 VDC  | Two-position, floating                        | M9220-AGA-3  | 25.3                           |
| Siemens   | 142 in-lb (16 Nm) | 20-28 VAC 50/60 Hz, 22-26 VDC  | Floating                                      | GCA131.1P    | 20.3                           |
| Schneider | 133 in-lb (15 Nm) | 24 VAC $\pm$ 20%, 22 to 30 VDC | Floating                                      | MF41-7153    | 19.0                           |
| Schneider | 150 in-lb (17 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC  | Floating                                      | MF40-7173    | 21.4                           |
| Belimo    | 180 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 22-26 VDC  | Prop. (default 2-10 VDC)                      | AFB24-MFT    | 25.7                           |
| Johnson   | 177 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 22-26 VDC  | Prop. 2-10 VDC, 4-20 mA                       | M9220-GGA-3  | 25.3                           |
| Siemens   | 142 in-lb (16 Nm) | 20-28 VAC 50/60 Hz, 22-26 VDC  | Prop. 0-10 VDC                                | GCA161.1P    | 20.3                           |
| Siemens   | 142 in-lb (16 Nm) | 20-28 VAC 50/60 Hz, 22-26 VDC  | Prop. 0/2-10 VDC                              | GCA151.1P    | 20.3                           |
| Schneider | 133 in-lb (15 Nm) | 24 VAC $\pm$ 20%, 22 to 30 VDC | Prop. 2-10 VDC, 4-20 mA                       | MS41-7153    | 19.0                           |
| Schneider | 150 in-lb (17 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC  | Prop. 2-10 VDC, 4-20 mA                       | MS40-7173    | 21.4                           |

\*Maximum damper area assuming 7 in-lb/sq. ft damper torque



# ACTUATORS & DAMPERS

## MECHANICAL AND ELECTRICAL ACCESSORIES ACTUATOR ACCESSORIES

2

ACTUATORS & DAMPERS

| Model                                  | Description                                                           |
|----------------------------------------|-----------------------------------------------------------------------|
| <b>DAMPER ACTUATOR WEATHER SHIELDS</b> |                                                                       |
| <b>ZS-100</b>                          | Galvanized weather shield for Belimo AFB/NFB/LF/TF/GMB/AMB/NMB/LMB    |
| <b>ZS-150</b>                          | Polycarbonate weather shield for Belimo AFB/NFB/LF/TF/GMB/AMB/NMB/LMB |
| <b>DAMPER SHAFT CRANK ARMS</b>         |                                                                       |
| <b>KH6-K</b>                           | Crank arm for 3/4" shaft, 3-1/2" length, use with BJ-809-K ball joint |
| <b>KH8-K</b>                           | Crank arm for 3/4" shaft, 3-1/2" length, use with KG8-K ball joint    |
| <b>CA-1</b>                            | Crank arm for 1" shaft, 3-1/2" length, use with BJ-809-K ball joint   |
| <b>205830A</b>                         | Crank arm/ball joint kit for KA-44, KA-88 actuators                   |
| <b>KC1403S-K</b>                       | Crank arm for 3/8" shaft, 2-7/8" length, use with BJ-809-K ball joint |
| <b>KC1405L-K</b>                       | Crank arm for 1/2" shaft, 4-3/4" length, use with BJ-809-K ball joint |
| <b>BALL JOINTS</b>                     |                                                                       |
| <b>BJ-809-K</b>                        | Ball joint, straight, use with 5/16" diameter pushrod                 |
| <b>KG8-K</b>                           | Ball joint, 90° angle, use with 5/16" diameter pushrod                |
| <b>DAMPER BLADE CRANK ARMS</b>         |                                                                       |
| <b>ZG-DC1-K</b>                        | Universal damper blade crank arm, 3-1/2" length                       |
| <b>ZG-DC2-K</b>                        | Universal damper blade crank arm, 6" length                           |
| <b>DMPR-KC054</b>                      | Damper blade crank arm for JCI CD1300 dampers                         |
| <b>SHAFT EXTENSIONS</b>                |                                                                       |
| <b>AV10-18-K</b>                       | Shaft extension for 3/8" to 9/16" diameter shafts, 9-1/2" length      |
| <b>ZG-NMSA-1-K</b>                     | Shaft extension for 1/2" diameter shaft, 2" length                    |
| <b>DMPR-KC008</b>                      | Shaft extension for JCI damper square shaft, 7-1/2" length            |
| <b>DMPR-KC005-K</b>                    | Shaft extension for 1/2" shafts, 7" length                            |
| <b>ESK050-K</b>                        | Ruskin damper shaft extension kit                                     |
| <b>DMPR-KC003</b>                      | Shaft extension for 1/2" shafts, 7-1/2" length                        |



**DMPR-KC003 (shaft only)**





| Model                               | Description                                                       |
|-------------------------------------|-------------------------------------------------------------------|
| <b>PUSH RODS</b>                    |                                                                   |
| <b>PR-24</b>                        | 5/16" dia. 24" (.61m) length push rod                             |
| <b>PR-48</b>                        | 5/16" dia., 48" (1.2m) length push rod                            |
| <b>FLOOR MOUNT BRACKETS</b>         |                                                                   |
| <b>50001194-001</b>                 | Universal surface mount bracket with crank arm and 1/2" shaft     |
| <b>ZG-103</b>                       | Right angle horizontal mounting bracket for Belimo GMB, NMB, AMB  |
| <b>ZG-104</b>                       | Right angle vertical mounting bracket for Belimo GMB, NMB, AMB    |
| <b>ZG-107</b>                       | Floor mounting bracket, horizontal, for AF actuators              |
| <b>ZG-108</b>                       | Floor mounting bracket, vertical, for AF actuators                |
| <b>ZG-112</b>                       | Floor mount bracket, vertical, for LF actuators                   |
| <b>DAMPER MOUNT BRACKETS</b>        |                                                                   |
| <b>ZG-100</b>                       | Right angle mounting bracket for AFB/NFB and AMB/GMB actuators    |
| <b>ZG-101</b>                       | Right angle floor mount bracket for AFB/NFB and AMB/GMB actuators |
| <b>ZG-102</b>                       | Tandem actuator mounting bracket for AF/AFB/GMB actuators         |
| <b>DMPR-KC255</b>                   | Internal-mount bracket for JCI M9000 actuators                    |
| <b>POWER AND SIGNAL ACCESSORIES</b> |                                                                   |
| <b>ZG-R01</b>                       | 500Ω, 1/2W, 1% resistor                                           |
| <b>691-K0A</b>                      | Control transformer, 120:24 VAC, 40 VA, Class 2                   |
| <b>691-U100</b>                     | Class 2 control transformer, 120:24 VAC, 96 VA                    |
| <b>SGF24</b>                        | Remote control dial, proportional, flush mount                    |
| <b>SGA24</b>                        | Remote control dial, proportional, surface mount                  |



PR-24



PR-48



50001194-001



ZG-103



ZG-104



ZG-108



ZG-107



ZG-112



ZG-100



ZG-101



ZG-102



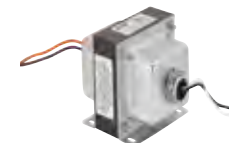
DMPR-KC255



ZG-R01



691-K0A



691-U100



SGF24



SGA24



# ACTUATORS & DAMPERS

## DAMPER POSITION SWITCHES

### TS-470 SERIES

2

ACTUATORS & DAMPERS

#### DESCRIPTION

The **TS-470 Series** damper position switches consist of an encapsulated mercury switch mounted on a 1/2" (1.3 cm) damper shaft crank arm. The **TS1-470 Series** includes the same switch, mounted on a 1" (2.5 cm) crank arm. They are mounted on a horizontal damper shaft to provide opened/closed indication. Switch contacts are normal when the cable end of the switch is horizontal or above, and makes when the cable end drops more than 15° below horizontal.

#### FEATURES

- **Easy to install**
- **Easily adjustable**

#### SPECIFICATIONS

|                                  |                                                                                                                                            |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Wiring</b>                    |                                                                                                                                            |
| <b>TS(1)-470</b>                 | 3' length, AWG 18, 3-conductor cable; green = common, black = N.C., white = N.O.                                                           |
| <b>TS(1)-470-2</b>               | 3' length, AWG 18, two 3-conductor cables; green = common, black = N.C., white = N.O.                                                      |
| <b>TS(1)-470-P</b>               | 3' length, plenum AWG 18, 3-conductor cable; black = common, blue = N.C., red = N.O. Encapsulated mercury switch, contains 0.03 cc mercury |
| <b>Switch Type</b>               |                                                                                                                                            |
| <b>Contact Rating</b>            |                                                                                                                                            |
| <b>Non-plenum</b>                |                                                                                                                                            |
| SPDT; 2A @ 120 VAC, 1A @ 240 VAC |                                                                                                                                            |
| <b>-P models</b>                 |                                                                                                                                            |
| SPDT; 1A @ 120 VAC, 240 VAC      |                                                                                                                                            |
| <b>Switch Angle</b>              |                                                                                                                                            |
| Makes at 15° below horizontal    |                                                                                                                                            |
| <b>Operating Temperature</b>     |                                                                                                                                            |
| -30° to 130°F (-34° to 54°C)     |                                                                                                                                            |
| <b>Dimensions</b>                |                                                                                                                                            |
| <b>TS-</b>                       | 1.4"H x 1.0"W x 4.4"L<br>(3.6 x 2.5 x 11.1 cm)                                                                                             |
| <b>TS1-</b>                      | 1.5"H x 1.8"W x 5.5"L<br>(3.8 x 4.5 x 14.0 cm)                                                                                             |
| <b>Weight</b>                    |                                                                                                                                            |
| <b>TS-</b>                       |                                                                                                                                            |
| 0.46 lb (0.21 kg)                |                                                                                                                                            |
| <b>TS1-</b>                      |                                                                                                                                            |
| 0.8 lb (0.36 kg)                 |                                                                                                                                            |
| <b>Mounting</b>                  |                                                                                                                                            |
| <b>TS-</b>                       |                                                                                                                                            |
| 1/2" (1.3 cm) damper shaft       |                                                                                                                                            |
| <b>TS1-</b>                      |                                                                                                                                            |
| 1" (2.5 cm) damper shaft         |                                                                                                                                            |
| <b>Warranty</b>                  |                                                                                                                                            |
| 1 year                           |                                                                                                                                            |

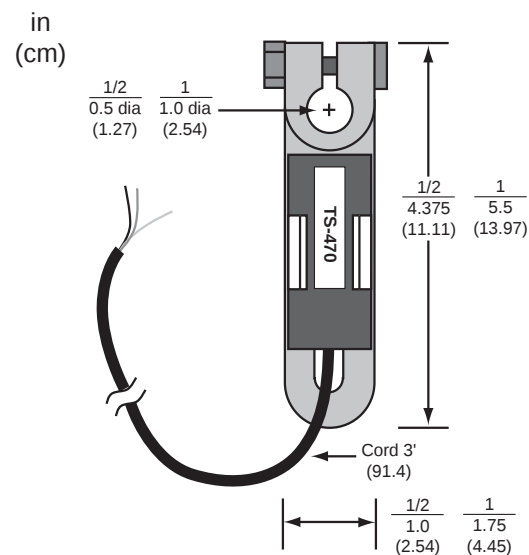


TS-470-2



TS1-470

#### WIRING / DIMENSIONS



#### ORDERING INFORMATION

| MODEL            | DESCRIPTION                                                                                              |
|------------------|----------------------------------------------------------------------------------------------------------|
| <b>TS-470</b>    | Damper position switch with SPDT switch, for 1/2" shaft                                                  |
| <b>TS-470-2</b>  | Damper position switch with two SPDT switches, for 1/2" shaft                                            |
| <b>TS-470-P</b>  | Damper position switch with SPDT switch, for 1/2" shaft, stainless steel housing, and plenum-rated cable |
| <b>TS1-470</b>   | Damper position switch with SPDT switch, for 1" shaft                                                    |
| <b>TS1-470-2</b> | Damper position switch with two SPDT switches, for 1" shaft                                              |
| <b>TS1-470-P</b> | Damper position switch with SPDT switch, for 1" shaft, stainless steel housing and plenum-rated cable    |

#### RELATED PRODUCTS

|                   |                                                                  | PAGE      |
|-------------------|------------------------------------------------------------------|-----------|
| <b>KLNJ-A2</b>    | Whisker switch with coated spring-rod and 10A @ 120 VAC contacts | <b>41</b> |
| <b>LS45M91B11</b> | Whisker switch with steel spring-rod and 5A @ 120 VAC contacts   | <b>41</b> |
| <b>TS-475</b>     | Non-mercury damper position switch, SPDT, for 1/2" damper shaft  | <b>39</b> |
| <b>TT-470</b>     | Tilt transducer with 1/2-in crank arm, 4-20 mA loop powered      | <b>40</b> |
| <b>TT1-470</b>    | Tilt transducer with 1-in crank arm                              | <b>40</b> |



## NON-MERCURY DAMPER POSITION SWITCH TS-475 SERIES

2

ACTUATORS & DAMPERS

### DESCRIPTION

The **TS-475 Series** damper position switches use a roller ball and mechanical switch to provide open/closed damper position status. The **TS-475 Series** offers a non-mercury alternative for applications and for projects which do not allow mercury.

| SPECIFICATIONS        |                                                                                             |
|-----------------------|---------------------------------------------------------------------------------------------|
| Wiring                | 3' length, AWG 18, 3-conductor plenum-rated cable; black = common, white = N.C., red = N.O. |
| Switch Type           | Mechanical roller ball, SPDT                                                                |
| Contact Rating        | 5A @ 120/250 VAC                                                                            |
| Switch Angle          | N.O. makes at 20° above horizontal, breaks at 15° below horizontal                          |
| Operating Temperature | -30° to 130°F (-34° to 54°C)                                                                |
| Dimensions            |                                                                                             |
| TS-                   | 1.5"H x 1.5"W x 4.4"L<br>(3.8 x 3.8 x 11.1 cm)                                              |
| TS1-                  | 1.8"H x 1.5"W x 5.5"L<br>(4.5 x 3.8 x 14.0 cm)                                              |
| Weight                |                                                                                             |
| TS-                   | 0.4 lb (0.2 kg)                                                                             |
| TS1-                  | 0.7 lb (0.3 kg)                                                                             |
| Mounting              |                                                                                             |
| TS-                   | 1/2" (1.3 cm) damper shaft                                                                  |
| TS1-                  | 1" (2.5 cm) damper shaft                                                                    |
| Enclosure Rating      | UL 94V-0 flammability rating                                                                |
| Warranty              | 1 year                                                                                      |



TS-475

### ORDERING INFORMATION

| MODEL   | DESCRIPTION                                                     |
|---------|-----------------------------------------------------------------|
| TS-475  | Non-mercury damper position switch, SPDT, for 1/2" damper shaft |
| TS1-475 | Non-mercury damper position switch, SPDT, for 1" damper shaft   |



# ACTUATORS & DAMPERS

## SOLID STATE TILT TRANSDUCER FOR DAMPER/VALVE POSITION FEEDBACK TT-470 SERIES

2

ACTUATORS & DAMPERS

### DESCRIPTION

The **TT-470 Series** solid state tilt transducer is a programmable, 2-wire, 4-20 mA loop-powered device specifically designed to provide positive feedback of damper or valve position to a building automation system. The transducer is quickly and easily field programmed, using an integral pushbutton, to span any shaft rotational range between 10° and 360° (one full rotation).

The **TT-470** contains no mercury or other hazardous substances and meets or exceeds all current RoHS environmental standards. The transducer includes an integral crankarm style mounting bracket and is available in 2 models; the **TT-470** fits a 1/2" shaft and the **TT1-470** fits a 1" shaft. The transducer must be mounted on a horizontal shaft, typically a damper shaft or a globe valve linkage shaft (for example the Honeywell Q5020 linkage).



TT-470

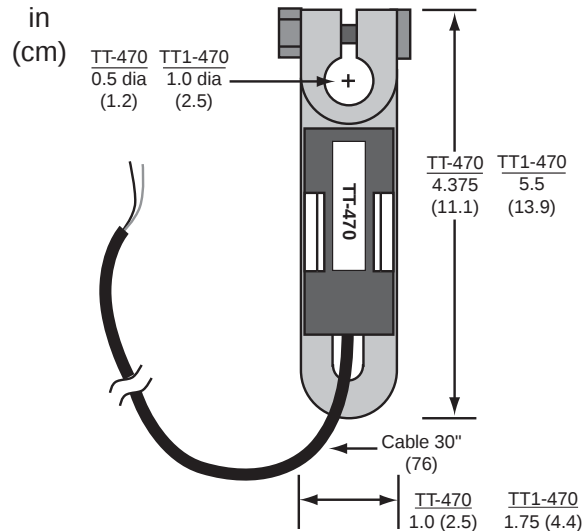
NEW!



### SPECIFICATIONS

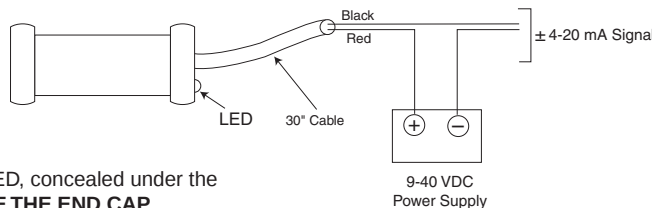
|                                 |                                                        |
|---------------------------------|--------------------------------------------------------|
| <b>Supply Voltage</b>           | 9 to 40 VDC                                            |
| <b>Wiring</b>                   | 30" plenum-rated cable, 2-conductor 16 AWG unshielded  |
| <b>Sensor Measurement Range</b> | Programmable from ±10° to 360° rotation                |
| <b>Sensing Technology</b>       | Solid state orientation sensor                         |
| <b>Signal Output</b>            | 4-20 mA, 2-wire loop powered                           |
| <b>Output Resolution</b>        | 0.8 mA @ 90° rotation, 0.2 mA @ 360° rotation, ±0.1 mA |
| <b>Maximum Output Impedance</b> | 1000Ω @ 24 VDC                                         |
| <b>Lamps</b>                    | Red LED for programming                                |
| <b>Operating Temperature</b>    | -20° to 150°F (-29° to 66°C)                           |
| <b>Dimensions</b>               |                                                        |
| <b>TT-470</b>                   | 1.4"H x 1.0"W x 4.4" L<br>(3.4 x 2.5 x 11.1 cm)        |
| <b>TT1-470</b>                  | 1.4"H x 1.8"W x 5.5" L<br>(3.4 x 4.4 x 13.9 cm)        |
| <b>Weight</b>                   |                                                        |
| <b>TT-470</b>                   | 0.5 lb (0.2 kg)                                        |
| <b>TT1-470</b>                  | 0.8 lb (0.4 kg)                                        |
| <b>Installation</b>             |                                                        |
| <b>TT-470</b>                   | 1/2" round shaft                                       |
| <b>TT1-470</b>                  | 1" round shaft                                         |
| <b>Enclosure Rating</b>         | Indoors only, not suitable for outdoor installation    |
| <b>RoHS Statement</b>           | Yes                                                    |
| <b>Warranty</b>                 | 1 year                                                 |

### DIMENSIONS



**Note:** Transducer must be oriented in the snap-in clip as shown in the drawing; the TT-470 text must be visible.

### WIRING



**Note:** The calibration button is near the LED, concealed under the flexible plastic end cap. **DO NOT REMOVE THE END CAP.**

### ORDERING INFORMATION

**MODEL**  
**TT-470**  
**TT1-470**

**DESCRIPTION**  
Tilt transducer with 1/2-in crank arm  
Tilt transducer with 1-in crank arm

**DCP-1.5-W**

**RELATED PRODUCTS**  
Power supply, 24 VAC IN to 24 VDC OUT

**PAGE**  
**837**



## WHISKER SWITCH KLNJ-A2

NEW!



2

ACTUATORS & DAMPERS

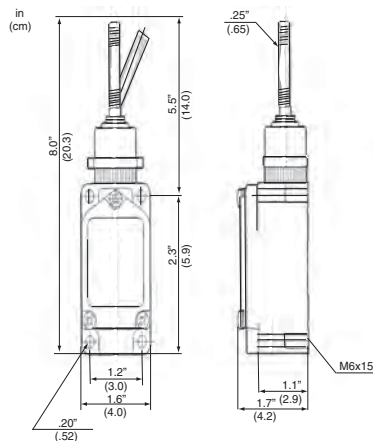
### DESCRIPTION

The **KLNJ-A2 Whisker Switch** is a high-quality, multi-directional contact switch with a plastic coated spring-rod whisker. It is perfect for sensing damper blade position and can be used to provide position status of valve linkages or other mechanical devices.

### FEATURES

- *Plastic coated spring-rod whisker for long life*
- *Captive wiring cover screws to save time*
- *Heavy duty 10A @ 120 VAC contacts*

### DIMENSIONS



KLNJ-A2

### SPECIFICATIONS

|                              |                                           |
|------------------------------|-------------------------------------------|
| <b>Wiring Terminations</b>   | Screw terminals                           |
| <b>Conduit Connection</b>    | 1/2" NPT                                  |
| <b>Contact Rating</b>        | 10A @ 24 VAC, 10A @ 120 VAC, 6A @ 24 VDC  |
| <b>Contact Arrangement</b>   | 1 N.O. and 1 N.C.                         |
| <b>Switch Angle</b>          | 15° make, 6° reset                        |
| <b>Operating Temperature</b> | -13° to 131°F (-25° to 55°C)              |
| <b>Dimensions</b>            | 8.0"H x 1.6"W x 1.7"D (20 x 4.0 x 4.2 cm) |
| <b>Weight</b>                | 0.5 lb (0.2 kg)                           |
| <b>Enclosure Rating</b>      | IP67                                      |
| <b>Approvals</b>             | CE, cUL recognized, NRNT8, E117960        |
| <b>Warranty</b>              | 1 year                                    |

### ORDERING INFORMATION

**MODEL**  
KLNJ-A2

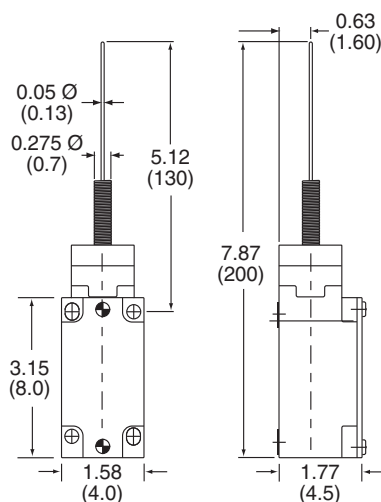
**DESCRIPTION**  
Whisker switch with coated spring-rod and 10A @ 120 VAC contacts

## WHISKER SWITCH LS45M91B11

### DESCRIPTION

The **LS45M91B11 Whisker Switch** is a multidirectional metal limit switch. This spring rod whisker version allows flexibility when applying to damper, valve, and other HVAC applications that need position sensing.

### DIMENSIONS



LS45M91B11



### SPECIFICATIONS

|                              |                                           |
|------------------------------|-------------------------------------------|
| <b>Wiring Terminations</b>   | Screw terminals                           |
| <b>Conduit Connection</b>    | 1/2" NPT                                  |
| <b>Contact Rating</b>        | 10A @ 24 VAC, 5A @ 120 VAC, 2.8A @ 24 VDC |
| <b>Contact Arrangement</b>   | 1 N.O. and 1 N.C.                         |
| <b>Switch Angle</b>          | 14° make, 6° reset                        |
| <b>Operating Temperature</b> | -13° to 158°F (-25° to 70°C)              |
| <b>Dimensions</b>            | 7.9"H x 1.6"W x 1.8"D (20 x 4.0 x 4.5 cm) |
| <b>Weight</b>                | 0.5 lb (0.2 kg)                           |
| <b>Enclosure Rating</b>      | NEMA 4X                                   |
| <b>Approvals</b>             | CE, UL Listed, CSA                        |
| <b>Warranty</b>              | 1 year                                    |

### ORDERING INFORMATION

**MODEL**  
LS45M91B11

**DESCRIPTION**  
Whisker switch with steel spring-rod and 5A @ 120 VAC contacts

NEW!



# ACTUATORS & DAMPERS

## KELE REVOLUTION™ DIRECT COUPLED ACTUATORS NON-SPRING RETURN

**KA-44, KA-88, KA-175, KA-301 SERIES**

### DESCRIPTION

The Kele Revolution™ **KA-44, KA-88, KA-175, and KA-301 Series** actuators are designed and tested to provide reliable non-spring return control for dampers and valves. They are powered by 24 VAC/VDC and accept tri-state/two-position and proportional control signals.

### FEATURES

- **Switchable drive direction**
- **Service/Off switch (tri-state/two-position models)**
- **Auto-adapt switch (proportional models)**
- **Manual override**
- **Self-centering, reversible hub**
- **Adjustable mechanical rotation stops**
- **Dual SPDT auxiliary switches available**
- **60,000 cycles nominal**



**KA-175-P**  
(KA-301 Higher torque)



**KA-44-M**  
(KA-88 Higher torque)



### COMMON SPECIFICATIONS

|                        |                                                                                 |                              |                                        |
|------------------------|---------------------------------------------------------------------------------|------------------------------|----------------------------------------|
| <b>Supply Voltage</b>  | 21-27 VAC 50/60 Hz, 24 VDC                                                      | <b>Noise</b>                 |                                        |
| <b>Motor</b>           | Synchronous with magnetic clutch (2-pos, floating), Brushless DC (proportional) | <b>-44, -88</b>              | <35 db @ 3' (1m)                       |
| <b>Wiring</b>          | Enclosed terminals                                                              | <b>-175, -301</b>            | <40 db @ 3' (1m)                       |
| <b>Action</b>          | Switch selectable direct/reverse acting                                         | <b>Resolution</b>            | 400 steps                              |
| <b>Rotation</b>        | 95° +/- 3°                                                                      | <b>Life Expectancy</b>       | 60,000 cycles, 1.5 million repositions |
| <b>Drive Time</b>      | 95 seconds @ 60Hz                                                               | <b>Operating Temperature</b> | -5° to 140°F (-20° to 60°C)            |
| <b>Manual Override</b> | Disengage button                                                                | <b>Operating Humidity</b>    | 5 to 95% RH                            |
|                        |                                                                                 | <b>Approvals</b>             | UL, cUL, CE, C-tick, plenum rated      |
|                        |                                                                                 | <b>Warranty</b>              | 5 years                                |

### INDIVIDUAL SPECIFICATIONS

| Model            | Torque            | Supply VA | Control Signal                                  | Input Impedance                     | Feedback   | Auxiliary Switch |
|------------------|-------------------|-----------|-------------------------------------------------|-------------------------------------|------------|------------------|
| <b>KA-44-2T</b>  | 44 in-lb (5 Nm)   | 5.0 VA    | Two-position, floating                          |                                     | None       | None             |
| <b>KA-44-M</b>   | 44 in-lb (5 Nm)   | 5.0 VA    | Prop. 0/2-10 VDC, 0/4-20 mA, two-pos., floating | 100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA | 0/2-10 VDC | None             |
| <b>KA-88-2T</b>  | 88 in-lb (10 Nm)  | 5.0 VA    | Two-position, floating                          |                                     | None       | None             |
| <b>KA-88-M</b>   | 88 in-lb (10 Nm)  | 5.0 VA    | Prop. 0/2-10 VDC, 0/4-20 mA, two-pos., floating | 100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA | 0/2-10 VDC | None             |
| <b>KA-175-2T</b> | 175 in-lb (20 Nm) | 6.0 VA    | Two-position, floating                          |                                     | None       | SW2 accessory    |
| <b>KA-175-P</b>  | 175 in-lb (20 Nm) | 6.0 VA    | Prop. 0/2-10 VDC, 0/4-20 mA, two-pos., floating | 100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA | 0/2-10 VDC | SW2 accessory    |
| <b>KA-301-2T</b> | 301 in-lb (34 Nm) | 9.0 VA    | Two-position, floating                          |                                     | None       | SW2 accessory    |
| <b>KA-301-P</b>  | 301 in-lb (34 Nm) | 8.0 VA    | Prop. 0/2-10 VDC, 0/4-20 mA, two-pos., floating | 100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA | 0/2-10 VDC | SW2 accessory    |



## KELE REVOLUTION™ DIRECT COUPLED ACTUATORS NON-SPRING RETURN

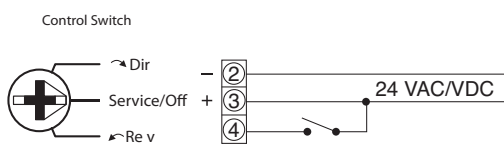
**KA-44, KA-88, KA-175, KA-301 SERIES**

2

ACTUATORS & DAMPERS

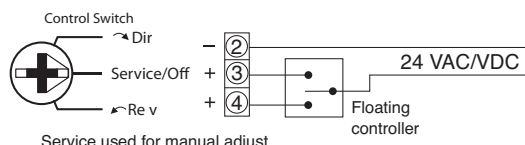
| DIMENSIONS       |                   |                                              |                        |                      |                  |                  |
|------------------|-------------------|----------------------------------------------|------------------------|----------------------|------------------|------------------|
| Model            | Torque            | Dimensions                                   | Maximum Shaft Diameter | Minimum Shaft Length | Enclosure Rating | Weight           |
| <b>KA-44-2T</b>  | 44 in-lb (5 Nm)   | 2.4"H x 2.6"W x 5.3"L (6.2 x 6.6 x 13.4 cm)  | 0.6" (1.6 cm)          | 1.6" (4.1 cm)        | NEMA 2 (IP54)    | 1.0 lb (0.4 kg)  |
| <b>KA-44-M</b>   | 44 in-lb (5 Nm)   | 2.4"H x 2.6"W x 5.3"L (6.2 x 6.6 x 13.4 cm)  | 0.6" (1.6 cm)          | 1.6" (4.1 cm)        | NEMA 2 (IP54)    | 1.0 lb (0.4 kg)  |
| <b>KA-88-2T</b>  | 88 in-lb (10 Nm)  | 2.4"H x 2.6"W x 5.3"L (6.2 x 6.6 x 13.4 cm)  | 0.6" (1.6 cm)          | 1.6" (4.1 cm)        | NEMA 2 (IP54)    | 1.0 lb (0.4 kg)  |
| <b>KA-88-M</b>   | 88 in-lb (10 Nm)  | 2.4"H x 2.6"W x 5.3"L (6.2 x 6.6 x 13.4 cm)  | 0.6" (1.6 cm)          | 1.6" (4.1 cm)        | NEMA 2 (IP54)    | 1.0 lb (0.4 kg)  |
| <b>KA-175-2T</b> | 175 in-lb (20 Nm) | 3.9"H x 3.6"W x 8.8"L (10.0 x 9.2 x 22.3 cm) | 1.06 in (2.7 cm)       | 0.87 in (2.2 cm)     | NEMA 2 (IP54)    | 3.2 lb (1.45 kg) |
| <b>KA-175-P</b>  | 175 in-lb (20 Nm) | 3.9"H x 3.6"W x 8.8"L (10.0 x 9.2 x 22.3 cm) | 1.06 in (2.7 cm)       | 0.87 in (2.2 cm)     | NEMA 2 (IP54)    | 3.2 lb (1.45 kg) |
| <b>KA-301-2T</b> | 301 in-lb (34 Nm) | 3.9"H x 3.6"W x 8.8"L (10.0 x 9.2 x 22.3 cm) | 1.06 in (2.7 cm)       | 0.87 in (2.2 cm)     | NEMA 2 (IP54)    | 3.2 lb (1.45 kg) |
| <b>KA-301-P</b>  | 301 in-lb (34 Nm) | 3.9"H x 3.6"W x 8.8"L (10.0 x 9.2 x 22.3 cm) | 1.06 in (2.7 cm)       | 0.87 in (2.2 cm)     | NEMA 2 (IP54)    | 3.2 lb (1.45 kg) |

### WIRING



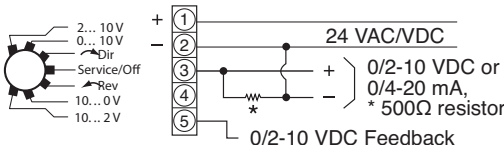
Service used for manual adjust

**KA-44-2T, KA-88-2T, KA-175-2T, KA-301-2T**  
**Two-position Control**



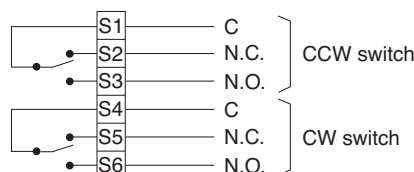
Service used for manual adjust

**KA-44-2T, KA-88-2T, KA-44-M, KA-88-M, KA-175-2T, KA-301-2T**  
**Floating Control**



Service used for manual adjust

**KA-44-M, KA-88-M, KA-175-P, KA-301-P**  
**Proportional Control**  
**0 or 2-10 VDC / 0 or 4-20 mA Signal**  
**(500Ω resistor required)**



**SW2 Auxiliary Switch Kit**

Switch ratings: Adjustable between 5 and 85 degrees, 24 VAC/VDC, 5A resistive, 3A inductive

### ORDERING INFORMATION

| MODEL            | DESCRIPTION                                                                                      |
|------------------|--------------------------------------------------------------------------------------------------|
| <b>KA-44-2T</b>  | Non-spring return, 44 in-lb (5 Nm), two-position or tri-state (floating) control                 |
| <b>KA-44-M</b>   | Non-spring return, 44 in-lb (5 Nm), proportional, two-position or tri-state (floating) control   |
| <b>KA-88-2T</b>  | Non-spring return, 88 in-lb (10 Nm), two-position or tri-state (floating) control                |
| <b>KA-88-M</b>   | Non-spring return, 88 in-lb (10 Nm), proportional, two-position or tri-state (floating) control  |
| <b>KA-175-2T</b> | Non-spring return, 175 in-lb (20 Nm), two-position or tri-state (floating) control               |
| <b>KA-175-P</b>  | Non-spring return, 175 in-lb (20 Nm), proportional, two-position or tri-state (floating) control |
| <b>KA-301-2T</b> | Non-spring return, 301 in-lb (34 Nm), two-position or tri-state (floating) control               |
| <b>KA-301-P</b>  | Non-spring return, 301 in-lb (34 Nm), proportional, two-position or tri-state (floating) control |

| ACCESSORIES         |                                                               | PAGE |
|---------------------|---------------------------------------------------------------|------|
| <b>32004254-003</b> | Replacement shaft coupler for KA-301, MNxx34                  |      |
| <b>50000407-001</b> | Tandem mount bracket for KAS-175 actuators                    |      |
| <b>50001194-001</b> | Universal surface mount bracket with crank arm and 1/2" shaft | 37   |
| <b>SW2</b>          | Auxiliary switch kit for KA-175/301 and KAS-88/175            |      |
| <b>ZG-R01</b>       | 500Ω, 1/2W, 1% resistor                                       | 37   |



# ACTUATORS & DAMPERS

## DIRECT COUPLED ACTUATORS NON-SPRING RETURN

### LMB, NMB, AMB, GMB SERIES

#### DESCRIPTION

The Belimo **LMB, NMB, AMB, and GMB Series** direct coupled actuators provide control of dampers and valves for non-spring return applications. They come in two-position, tri-state (floating), proportional, and Multi-Function Technology (MFT) models. All actuators include a manual release mechanism for manual override.

#### FEATURES

- **Manual override for testing and verification**
- **Reversing switch for control flexibility**
- **UL, CSA, and CE approved for worldwide application**
- **Plenum-rated housing and cable connections**
- **NEMA 4 models available for outdoor locations**



LMB, NMB, AMB, GMB Series

**BELIMO**



#### COMMON SPECIFICATIONS

|                        |                                                           |                              |                                                 |
|------------------------|-----------------------------------------------------------|------------------------------|-------------------------------------------------|
| <b>Supply Voltage</b>  | 24 VAC +/- 20% 50/60 Hz, 24 VDC +/- 10%                   | <b>Noise</b>                 | <45 db @ 3' (1m); <35 db @ 3' (1m) (LMB models) |
| <b>Input Impedance</b> | 100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA (-SR and -MFT models) | <b>Resolution</b>            | 100 steps                                       |
| <b>Motor</b>           | Brushless DC                                              | <b>Life Expectancy</b>       | 100,000 cycles, 1 million repositions           |
| <b>Wiring</b>          | 3-foot plenum cable, 18 AWG, terminals                    | <b>Operating Temperature</b> | -22° to 122°F (-30° to 50°C)                    |
| <b>Action</b>          | Non-spring return                                         | <b>Operating Humidity</b>    | 5 to 95% RH                                     |
| <b>Rotation</b>        | 95 degrees                                                | <b>Approvals</b>             | cULus, CE, plenum rated                         |
| <b>Manual Override</b> | Pushbutton disengage                                      | <b>RoHS Statement</b>        | Yes                                             |
|                        |                                                           | <b>Warranty</b>              | 5 years                                         |

#### INDIVIDUAL SPECIFICATIONS

| Model            | Torque            | Supply VA | Control Signal           | Feedback             | Auxiliary Switch    | Drive Time  |
|------------------|-------------------|-----------|--------------------------|----------------------|---------------------|-------------|
| <b>LMB24-3</b>   | 45 in-lb, (5 Nm)  | 2 VA      | Two-position, floating   | P1000A (1 kΩ option) | S1A or S2A (option) | 95 seconds  |
| <b>LMB24-3-S</b> | 45 in-lb, (5 Nm)  | 2 VA      | Two-position, floating   | P1000A (1 kΩ option) | 1 SPDT, 3A @ 250V   | 95 seconds  |
| <b>LMB24-SR</b>  | 45 in-lb, (5 Nm)  | 3 VA      | Prop. 2-10 VDC, 4-20 mA  | 2-10 VDC             | S1A or S2A (option) | 95 seconds  |
| <b>LMB24-MFT</b> | 45 in-lb, (5 Nm)  | 5 VA      | Prop. (default 2-10 VDC) | 2-10 VDC             | S1A or S2A (option) | 150 seconds |
| <b>NMB24-3</b>   | 90 in-lb (10 Nm)  | 4 VA      | Two-position, floating   | P1000A (1 kΩ option) | S1A or S2A (option) | 95 seconds  |
| <b>NMB24-SR</b>  | 90 in-lb (10 Nm)  | 5 VA      | Prop. 2-10 VDC, 4-20 mA  | 2-10 VDC             | S1A or S2A (option) | 95 seconds  |
| <b>NMB24-MFT</b> | 90 in-lb (10 Nm)  | 6 VA      | Prop. (default 2-10 VDC) | 2-10 VDC             | S1A or S2A (option) | 150 seconds |
| <b>AMB24-3</b>   | 180 in-lb (20 Nm) | 5.5 VA    | Two-position, floating   | P1000A (1 kΩ option) | S1A or S2A (option) | 95 seconds  |
| <b>AMB24-3-S</b> | 180 in-lb (20 Nm) | 5.5 VA    | Two-position, floating   | P1000A (1 kΩ option) | 1 SPDT, 3A @ 250V   | 95 seconds  |
| <b>AMB24-SR</b>  | 180 in-lb (20 Nm) | 5 VA      | Prop. 2-10 VDC, 4-20 mA  | 2-10 VDC             | S1A or S2A (option) | 95 seconds  |
| <b>AMB24-MFT</b> | 180 in-lb (20 Nm) | 6 VA      | Prop. 2-10 VDC, 4-20 mA  | 2-10 VDC             | S1A or S2A (option) | 150 seconds |
| <b>GMB24-3</b>   | 360 in-lb (40 Nm) | 6 VA      | Two-position, floating   | P1000A (1 kΩ option) | S1A or S2A (option) | 95 seconds  |
| <b>GMB24-SR</b>  | 360 in-lb (40 Nm) | 6.5 VA    | Prop. 2-10 VDC, 4-20 mA  | 2-10 VDC             | S1A or S2A (option) | 95 seconds  |
| <b>GMB24-MFT</b> | 360 in-lb (40 Nm) | 7 VA      | Prop. (default 2-10 VDC) | 2-10 VDC             | S1A or S2A (option) | 150 seconds |

#### DIMENSIONS

| Model         | Torque            | Dimensions                                     | Maximum Shaft Diameter | Minimum Shaft Length | Enclosure Rating         | Weight           |
|---------------|-------------------|------------------------------------------------|------------------------|----------------------|--------------------------|------------------|
| <b>LMB</b>    | 45 in-lb, (5 Nm)  | 2.3"H x 2.6"W x 7.4"L (5.9 x 6.6 x 18.9 cm)    | 0.75 in (1.9 cm)       | 1.8" (4.5 cm)        | NEMA 2 (IP54)<br>UL94-5V | 1.0 lb (0.5 kg)  |
| <b>NMB</b>    | 90 in-lb (10 Nm)  | 2.4"H x 3.2"W x 7.7"L (6.1 x 8.0 x 19.6 cm)    | 1.05" (2.7 cm)         | 2.4" (6.0 cm)        | NEMA 2 (IP54)<br>UL94-5V | 1.65 lb (.75 kg) |
| <b>NMB-N4</b> | 70 in-lb (8 Nm)   | 4.9"H x 5.3"W x 10.7"L (12.4 x 13.4 x 27.1 cm) | 1.05" (2.7 cm)         | 2.4" (6.0 cm)        | NEMA 4/4X<br>(IP66/IP67) | 3.8 lb (1.7 kg)  |
| <b>AMB</b>    | 180 in-lb (20 Nm) | 2.5"H x 3.5"W x 8.3"L (6.3 x 8.8 x 21.1 cm)    | 1.05" (2.7 cm)         | 2.2" (5.6 cm)        | NEMA 2 (IP54)<br>UL94-5V | 2.2 lb (1.0 kg)  |
| <b>AMB-N4</b> | 160 in-lb (18 Nm) | 4.9"H x 5.3"W x 10.7"L (12.4 x 13.4 x 27.1 cm) | 1.05" (2.7 cm)         | 2.2" (5.6 cm)        | NEMA 4/4X<br>(IP66/IP67) | 4.4 lb (2.0 kg)  |
| <b>GMB</b>    | 360 in-lb (40 Nm) | 2.9"H x 4.6"W x 9.0"L (7.3 x 11.9 x 23.0 cm)   | 1.05" (2.7 cm)         | 2.4" (6.0 cm)        | NEMA 2 (IP54)<br>UL94-5V | 3.0 lb (1.1kg)   |



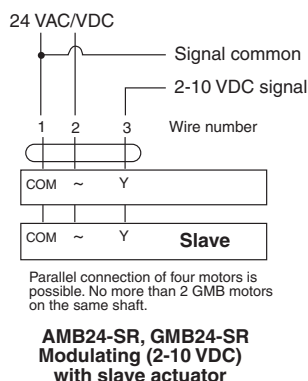
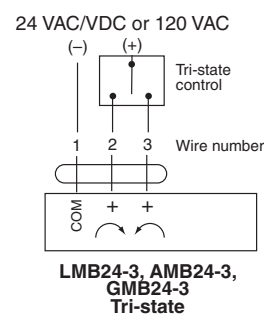
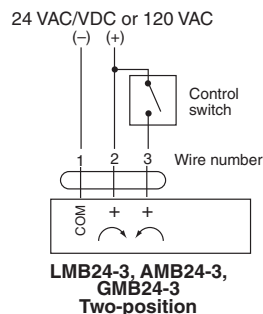
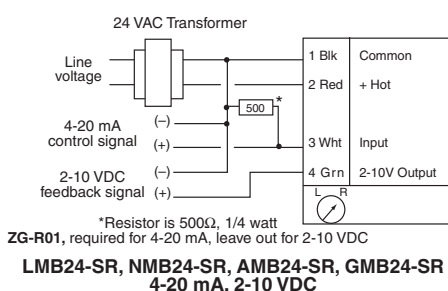
## DIRECT COUPLED ACTUATORS NON-SPRING RETURN

**LMB, NMB, AMB, GMB SERIES**

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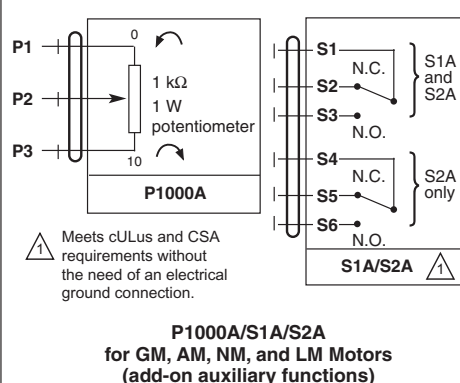
ACTUATORS & DAMPERS

### WIRING



| Code | Signal                 | Feedback |
|------|------------------------|----------|
| A01  | 2-10 VDC               | 2-10 VDC |
| A02  | 0-10 VDC               | 0-10 VDC |
| A07  | 0-5 VDC                | 2-10 VDC |
| A09  | 5-10 VDC               | 2-10 VDC |
| A16  | 2-6 VDC                | 2-10 VDC |
| A17  | 6-10 VDC               | 2-10 VDC |
| W01  | PWM<br>0.59 - 2.95 sec | 2-10 VDC |
| W02  | PWM<br>0.02 - 5.00 sec | 2-10 VDC |
| F01  | Floating               | 2-10 VDC |
| J2   | Two-position           | 2-10 VDC |

**MFT Function Codes**



### ORDERING INFORMATION

#### MODEL

**LMB24-3**  
**LMB24-3-S**  
**LMB24-3-T**  
**LMB24-MFT**  
**LMB24-MFT-C**  
**LMB24-SR**  
**LMB24-SR-T**  
**NMB24-3**  
**NMB24-3-T-N4**  
**NMB24-MFT**  
**NMB24-MFT-C**  
**NMB24-SR**  
**NMB24-SR-T-N4**  
**AMB24-3**  
**AMB24-3-S**  
**AMB24-3-T-N4**  
**AMB24-3-T-N4H**  
**AMB24-MFT**  
**AMB24-MFT-C**  
**AMB24-SR**  
**AMB24-SR-T-N4**  
**AMB24-SR-T-N4H**  
**GMB24-3**  
**GMB24-MFT**  
**GMB24-MFT-C**  
**GMB24-SR**

#### DESCRIPTION

Non-spring return 45 in-lb (5 Nm), 24 VAC/VDC two-position/tri-state control  
Non-spring return 45 in-lb (5 Nm), 24 VAC/VDC two-position/tri-state control, aux. switch  
Non-spring return 45 in-lb (5 Nm), 24 VAC/VDC two-position/tri-state control, terminals  
Non-spring return 45 in-lb (5 Nm), configurable control  
Non-spring return 45 in-lb (5 Nm), configurable control, pre-configured  
Non-spring return 45 in-lb (5 Nm), 2-10 VDC proportional control  
Non-spring return 45 in-lb (5 Nm), 2-10 VDC proportional control, terminals  
Non-spring return 90 in-lb (10 Nm), 24 VAC/VDC two-position/tri-state control  
Non-spring return 70 in-lb (8 Nm), 24 VAC/VDC two-position/tri-state control  
Non-spring return 90 in-lb (10 Nm), configurable control  
Non-spring return 90 in-lb (10 Nm), configurable control, pre-configured  
Non-spring return 90 in-lb (10 Nm), 2-10 VDC proportional control  
Non-spring return 70 in-lb (8 Nm), 2-10 VDC proportional, terminals, NEMA 4 enclosure  
Non-spring return 180 in-lb (20 Nm), 24 VAC/VDC two-position/tri-state control  
Non-spring return 180 in-lb (20 Nm), 24 VAC/VDC two-position/tri-state control, aux. switch  
Non-spring return 160 in-lb (18 Nm), 24 VAC/VDC two-pos./tri-state, NEMA 4 enclosure  
Non-spring return 160 in-lb (18 Nm), 24 VAC/VDC two-pos./tri-state, NEMA 4 encl. w/heater  
Non-spring return 180 in-lb (20 Nm), configurable control  
Non-spring return 180 in-lb (20 Nm), configurable control, pre-configured  
Non-spring return 180 in-lb (20 Nm), 2-10 VDC proportional control  
Non-spring return 160 in-lb (18 Nm), 2-10 VDC proportional control, NEMA 4 enclosure  
Non-spring return 160 in-lb (18 Nm), 2-10 VDC proportional control, NEMA 4 encl. w/heater  
Non-spring return 360 in-lb (40 Nm), 24 VAC/VDC two-position/tri-state control  
Non-spring return 360 in-lb (40 Nm), configurable control  
Non-spring return 360 in-lb (40 Nm), configurable control, pre-configured  
Non-spring return 360 in-lb (40 Nm), 2-10 VDC proportional control

#### RELATED PRODUCTS

**P1000A**  
**S1A**  
**S2A**  
**ZG-LSMA**  
**ZG-NMSA-1-K**  
**ZG-R01**

Optional 1000Ω feedback pot for LMB, NMB, AMB, GMB  
Optional SPDT auxiliary switch for LMB, NMB, AMB, GMB  
Optional dual SPDT auxiliary switch for LMB, NMB, AMB, GMB  
Shaft extension for 1/2" diameter shafts, 3.8" length, for LMB actuators  
Shaft extension for 1/2" diameter shaft, 2" length  
500Ω, 1/2W, 1% resistor

#### PAGE

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# ACTUATORS & DAMPERS

## DIRECT COUPLED ACTUATORS NON-SPRING RETURN

### MN SERIES

2

ACTUATORS & DAMPERS

#### DESCRIPTION

The **MN Series** actuators are non-spring return direct coupled actuators from Honeywell. They are designed and tested to provide reliable non-spring return control for dampers and valves that require up to 300 in-lb (34 Nm) of torque. The **MN Series** is powered by 24 VAC/VDC and has an excellent feature set that combines flexibility and simplicity.

#### FEATURES

- *Adjustable mechanical range stops*
- *Auto adapt on modulating models*
- *Internal or field-installable auxiliary switches*
- *Signal mode switch*
- *Adjustable zero and span*
- *Mechanical override declutch*
- *Detachable wiring cover*
- *Consistent wiring*



MN6105A1011, 44 in-lb  
MN7510A2209, 88 in-lb



MN6120A1002, 175 in-lb  
MN7234A2008, 300 in-lb

**Honeywell**



#### COMMON SPECIFICATIONS

|                        |                                                                          |                              |                                      |
|------------------------|--------------------------------------------------------------------------|------------------------------|--------------------------------------|
| <b>Supply Voltage</b>  | 21-27 VAC 50/60 Hz, 24 VDC                                               | <b>Noise</b>                 |                                      |
| <b>Motor</b>           | Brushless DC; Synchronous with magnetic clutch (floating 175, 300 in-lb) | <b>44, 88 in-lb</b>          | <35 dB @ 3' (1m);                    |
| <b>Wiring</b>          | Enclosed terminals                                                       | <b>175, 300 in-lb</b>        | <40 dB @ 3' (1m)                     |
| <b>Rotation</b>        | 95° ± 3°                                                                 | <b>Resolution</b>            | 400 steps                            |
| <b>Drive Time</b>      | 95 seconds                                                               | <b>Life Expectancy</b>       | 60,000 cycles, 1 million repositions |
| <b>Manual Override</b> | Disengage button                                                         | <b>Operating Temperature</b> | -5° to 140°F (-20° to 60°C)          |
|                        |                                                                          | <b>Operating Humidity</b>    | 5 to 95%RH                           |
|                        |                                                                          | <b>Approvals</b>             | UL, cUL, CE, C-tick, plenum rated    |
|                        |                                                                          | <b>Warranty</b>              | 5 years                              |

#### INDIVIDUAL SPECIFICATIONS

| Model       | Torque            | Supply VA | Control Signal              | Input Impedance                        | Feedback   | Auxiliary Switch                   |
|-------------|-------------------|-----------|-----------------------------|----------------------------------------|------------|------------------------------------|
| MN6105A1011 | 44 in-lb (5 Nm)   | 5.0 VA    | Two-position, floating      |                                        | None       | SW2 add-on                         |
| MN6105A1201 | 44 in-lb (5 Nm)   | 5.0 VA    | Two-position, floating      |                                        | None       | Internal, dual SPDT, class II only |
| MN7505A2001 | 44 in-lb (5 Nm)   | 5.0 VA    | Prop. 0/2-10 VDC, 0/4-20 mA | 100 kΩ @ 0/2-10 VDC;<br>500Ω @ 4-20 mA | 0/2-10 VDC | SW2 add-on                         |
| MN7505A2209 | 44 in-lb (5 Nm)   | 5.0 VA    | Prop. 0/2-10 VDC, 0/4-20 mA | 100 kΩ @ 0/2-10 VDC;<br>500Ω @ 4-20 mA | 0/2-10 VDC | Internal, dual SPDT, class II only |
| MN6110A1003 | 88 in-lb (10 Nm)  | 5.0 VA    | Two-position, floating      |                                        | None       | SW2 add-on                         |
| MN6110A1201 | 88 in-lb (10 Nm)  | 5.0 VA    | Two-position, floating      |                                        | None       | Internal, dual SPDT, class II only |
| MN7510A2001 | 88 in-lb (10 Nm)  | 5.0 VA    | Prop. 0/2-10 VDC, 0/4-20 mA | 100 kΩ @ 0/2-10 VDC;<br>500Ω @ 4-20 mA | 0/2-10 VDC | SW2 add-on                         |
| MN7510A2209 | 88 in-lb (10 Nm)  | 5.0 VA    | Prop. 0/2-10 VDC, 0/4-20 mA | 100 kΩ @ 0/2-10 VDC;<br>500Ω @ 4-20 mA | 0/2-10 VDC | Internal, dual SPDT, class II only |
| MN6120A1002 | 175 in-lb (20 Nm) | 6.0 VA    | Two-position, floating      |                                        | None       | SW2 add-on                         |
| MN6120A1200 | 175 in-lb (20 Nm) | 6.0 VA    | Two-position, floating      |                                        | None       | Internal, dual SPDT, class II only |
| MN7220A2007 | 175 in-lb (20 Nm) | 6.0 VA    | Prop. 0/2-10 VDC, 0/4-20 mA | 100 kΩ @ 0/2-10 VDC;<br>500Ω @ 4-20 mA | 0/2-10 VDC | SW2 add-on                         |
| MN7220A2205 | 175 in-lb (20 Nm) | 6.0 VA    | Prop. 0/2-10 VDC, 0/4-20 mA | 100 kΩ @ 0/2-10 VDC;<br>500Ω @ 4-20 mA | 0/2-10 VDC | Internal, dual SPDT, class II only |
| MN6134A1003 | 300 in-lb (34 Nm) | 9.0 VA    | Two-position, floating      |                                        | None       | SW2 add-on                         |
| MN7234A2008 | 300 in-lb (34 Nm) | 8.0 VA    | Prop. 0/2-10 VDC, 0/4-20 mA | 100 kΩ @ 0/2-10 VDC;<br>500Ω @ 4-20 mA | 0/2-10 VDC | SW2 add-on                         |

# ACTUATORS & DAMPERS

## DIRECT COUPLED ACTUATORS NON-SPRING RETURN

MN SERIES



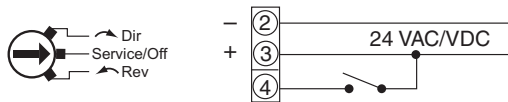
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ACTUATORS & DAMPERS

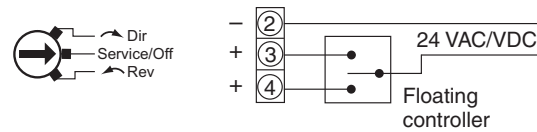
### DIMENSIONS

| Model  | Torque            | Dimensions                                   | Maximum Shaft Diameter | Minimum Shaft Length | Weight           |
|--------|-------------------|----------------------------------------------|------------------------|----------------------|------------------|
| MNxx05 | 44 in-lb (5 Nm)   | 2.4"H x 2.6"W x 5.3"L (6.2 x 6.6 x 13.4 cm)  | 0.63" (1.6 cm)         | 1.62" (4.1 cm)       | 1.0 lb (0.4 kg)  |
| MNxx10 | 88 in-lb (10 Nm)  | 2.4"H x 2.6"W x 5.3"L (6.2 x 6.6 x 13.4 cm)  | 0.63" (1.6 cm)         | 1.62" (4.1 cm)       | 1.0 lb (0.4 kg)  |
| MNxx20 | 175 in-lb (20 Nm) | 3.9"H x 3.6"W x 8.8"L (10.0 x 9.2 x 22.3 cm) | 1.06 in (2.7 cm)       | 0.87" (2.2 cm)       | 3.2 lb (1.45 kg) |
| MNxx34 | 300 in-lb (34 Nm) | 3.9"H x 3.6"W x 8.8"L (10.0 x 9.2 x 22.3 cm) | 1.06 in (2.7 cm)       | 0.87" (2.2 cm)       | 3.2 lb (1.45 kg) |

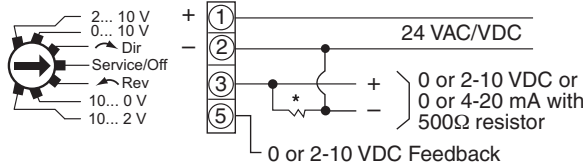
### WIRING



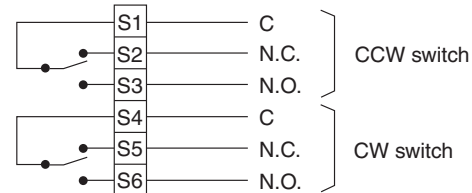
**MN61xx**  
**Two-position Control**



**MN61xx, MN75xx**  
**Floating Control**



**MN75xx/72xx**  
**Proportional Control**  
**0 or 2-10 VDC or 0 or 4-20 mA Signal\***  
(ZG-R01 500Ω resistor required for 4-20 mA signal)



**SW2 Auxiliary Switch Kit**  
Switch ratings: Adjustable between 5 and 85 degrees, 24 VAC/VDC, 5A resistive, 3A inductive  
Models with internal switches have same contact ratings

### ORDERING INFORMATION

#### MODEL

**MN6105A1011**  
**MN6105A1201**  
**MN7505A2001**  
**MN7505A2209**  
**MN6110A1003**  
**MN6110A1201**  
**MN7510A2001**  
**MN7510A2209**  
**MN6120A1002**  
**MN6120A1200**  
**MN7220A2007**  
**MN7220A2205**  
**MN6134A1003**  
**MN7234A2008**

#### DESCRIPTION

Non-spring return, 44 in-lb (5 Nm), two-position/tri-state control  
Non-spring return, 44 in-lb (5 Nm), two-position/tri-state, aux switches  
Non-spring return, 44 in-lb (5 Nm), proportional/two-pos/tri-state control  
Non-spring return, 44 in-lb (5 Nm), proportional/two-pos/tri-state, aux sw.  
Non-spring return, 88 in-lb (10 Nm), two-position and tri-state control  
Non-spring return, 88 in-lb (10 Nm), two-position/tri-state, aux switches  
Non-spring return, 88 in-lb (10 Nm), proportional/two-pos/tri-state control  
Non-spring return, 88 in-lb (10 Nm), proportional/two-pos/tri-state control, aux sw.  
Non-spring return, 175 in-lb (20 Nm), two-position and tri-state control  
Non-spring return, 175 in-lb (20 Nm), two-position/tri-state control, aux switches  
Non-spring return, 175 in-lb (20 Nm), proportional/two-pos/tri-state control  
Non-spring return, 175 in-lb (20 Nm), proportional/two-pos/tri-state, aux sw.  
Non-spring return, 300 in-lb (34 Nm), two-position and tri-state control  
Non-spring return, 300 in-lb (34 Nm), proportional control

#### ACCESSORIES

**32004254-003** Replacement shaft coupler for KA-301, MNxx34  
**50001194-001** Universal surface mount bracket with crank arm and 1/2" shaft  
**SW2** Auxiliary switch kit for KA-175/301 and KAS-88/175  
**ZG-R01** 500Ω, 1/2W, 1% resistor

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# ACTUATORS & DAMPERS

## DIRECT COUPLED ACTUATORS NON-SPRING RETURN

**GBB, GDE, GEB, GIB, GLB SERIES**

2

ACTUATORS & DAMPERS

### DESCRIPTION

Siemens **GDE, GLB, GEB, GBB, and GIB Series** direct coupled, non-spring return actuators provide actuation for a complete range of HVAC non-spring return damper applications, from terminal units to inlet vane dampers and more. They range in torque from 44 in-lb (5 Nm), handling approximately 11 sq ft of damper area, to 310 in-lb (35 Nm), handling approximately 77 sq ft of damper area. These actuators are available in all standard control signal types and offer a wide variety of options and accessories.

### FEATURES

- **Self-centering shaft coupling**
- **Brushless motor technology on all models**
- **Rugged, lightweight housing**
- **Manual override on all models**



GBB

GEB

GDE

**SIEMENS**



### COMMON SPECIFICATIONS

|                        |                                                                                  |                              |                                        |
|------------------------|----------------------------------------------------------------------------------|------------------------------|----------------------------------------|
| <b>Supply Voltage</b>  | 20-28 VAC, 50/60 Hz                                                              | <b>Noise</b>                 | <45 db @ 3' (1m)                       |
| <b>Motor</b>           | Brushless DC                                                                     | <b>Life Expectancy</b>       | 60,000 cycles, 1.5 million repositions |
| <b>Wiring</b>          | 3' (0.9 m) AWG 18 plenum-rated cable                                             | <b>Operating Temperature</b> | -25° to 130°F (-32° to 55°C)           |
| <b>Action</b>          | DA/RA wire connections (2-pos, floating); DA/RA switch selectable (proportional) | <b>Operating Humidity</b>    | 5 to 95% RH                            |
| <b>Rotation</b>        | 90°                                                                              | <b>Approvals</b>             | cULus, CE, plenum rated                |
| <b>Manual Override</b> | Disengage button                                                                 | <b>RoHS Statement</b>        | Yes                                    |
|                        |                                                                                  | <b>Warranty</b>              | 2 years                                |

### INDIVIDUAL SPECIFICATIONS

| Model            | Torque            | Supply VA | Control Signal           | Input Impedance | Feedback              | Auxiliary Switch      | Drive Time  |
|------------------|-------------------|-----------|--------------------------|-----------------|-----------------------|-----------------------|-------------|
| <b>GDE131.1P</b> | 44 in-lb (5 Nm)   | 2.3 VA    | Two-position, floating   |                 | None, order GDE132.1P | None, order GDE136.1P | 90 seconds  |
| <b>GDE161.1P</b> | 44 in-lb (5 Nm)   | 3.3 VA    | Proportional 0 to 10 VDC | 100 kΩ          | None                  | None, order GDE166.1P | 90 seconds  |
| <b>GLB131.1P</b> | 88 in-lb (10 Nm)  | 2.3 VA    | Two-position, floating   |                 | None, order GLB132.1P | None, order GLB136.1P | 125 seconds |
| <b>GLB161.1P</b> | 88 in-lb (10 Nm)  | 3.3 VA    | Proportional 0 to 10 VDC | 100 kΩ          | None                  | None, order GLB166.1P | 125 seconds |
| <b>GEB131.1P</b> | 132 in-lb (15 Nm) | 3.3 VA    | Two-position, floating   |                 | None, order GEB132.1U | None, order GEB136.1P | 125 seconds |
| <b>GEB161.1P</b> | 132 in-lb (15 Nm) | 5.0 VA    | Proportional 0 to 10 VDC | 100 kΩ          | None                  | None, order GEB164.1P | 125 seconds |
| <b>GBB131.1P</b> | 177 in-lb (20 Nm) | 7.0 VA    | Two-position, floating   |                 | None, order GBB132.1P | None, order GBB136.1P | 150 seconds |
| <b>GBB161.1P</b> | 177 in-lb (20 Nm) | 8.0 VA    | Proportional 0 to 10 VDC | 100 kΩ          | None                  | None, order GBB166.1P | 150 seconds |
| <b>GIB131.1P</b> | 310 in-lb (35 Nm) | 7.0 VA    | Two-position, floating   |                 | None, order GIB132.1P | None, order GIB136.1P | 150 seconds |
| <b>GIB161.1P</b> | 310 in-lb (35 Nm) | 8.0 VA    | Proportional 0 to 10 VDC | 100 kΩ          | None                  | None, order GIB166.1P | 150 seconds |

# ACTUATORS & DAMPERS

## DIRECT COUPLED ACTUATORS NON-SPRING RETURN

*GBB, GDE, GEB, GIB, GLB SERIES*



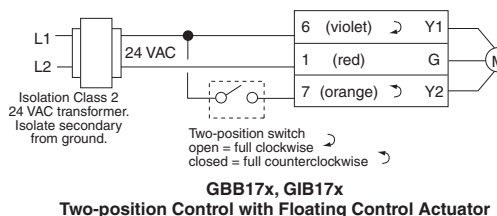
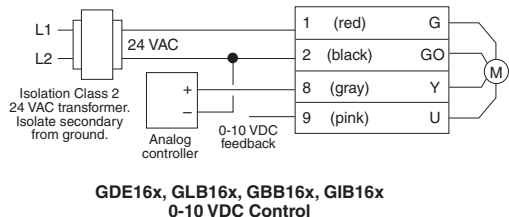
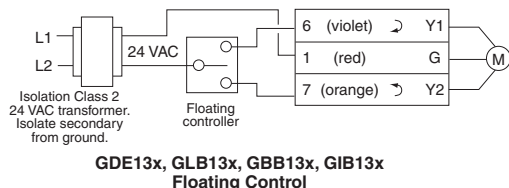
2

ACTUATORS & DAMPERS

### DIMENSIONS

| Model      | Torque            | Dimensions                                    | Maximum Shaft Diameter | Minimum Shaft Length | Enclosure Rating | Weight          |
|------------|-------------------|-----------------------------------------------|------------------------|----------------------|------------------|-----------------|
| <b>GDE</b> | 44 in-lb (5 Nm)   | 2.4"H x 2.8"W x 5.4"L (6.0 x 7.0 x 13.7 cm)   | 0.63" (1.6 cm)         | 0.75" (2.0 cm)       | NEMA 2 (IP54)    | 1.0 lb (0.4 kg) |
| <b>GLB</b> | 88 in-lb (10 Nm)  | 2.4"H x 2.8"W x 5.4"L (6.0 x 7.0 x 13.7 cm)   | 0.63" (1.6 cm)         | 0.75" (2.0 cm)       | NEMA 2 (IP54)    | 1.0 lb (0.4 kg) |
| <b>GEB</b> | 132 in-lb (15 Nm) | 2.4"H x 3.3"W x 8.4"L (6.0 x 8.3 x 21.2 cm)   | 0.75" (2.0 cm)         | 0.75" (2.0 cm)       | NEMA 1 (IP54)    | 2.8 lb (1.3 kg) |
| <b>GBB</b> | 177 in-lb (20 Nm) | 2.8"H x 3.9"W x 11.8"L (7.2 x 10.0 x 30.0 cm) | 1.0" (2.6 cm)          | 0.75" (2.0 cm)       | NEMA 2 (IP40)    | 4.8 lb (2.2 kg) |
| <b>GIB</b> | 310 in-lb (35 Nm) | 2.8"H x 3.9"W x 11.8"L (7.2 x 10.0 x 30.0 cm) | 1.0" (2.6 cm)          | 0.75" (2.0 cm)       | NEMA 2 (IP40)    | 4.8 lb (2.2 kg) |

### WIRING



### ORDERING INFORMATION

#### MODEL

**GDE131.1P**  
**GDE161.1P**  
**GLB131.1P**  
**GLB161.1P**  
**GEB131.1U**  
**GEB161.1P**  
**GBB131.1P**  
**GBB161.1P**  
**GIB131.1P**  
**GIB161.1P**

#### DESCRIPTION

Non-spring return 44 in-lb (5 Nm), tri-state control  
Non-spring return 44 in-lb (5 Nm), 0-10 VDC proportional control  
Non-spring return 88 in-lb (10 Nm), tri-state control  
Non-spring return 88 in-lb (10 Nm), 0-10 VDC proportional control  
Non-spring return 132 in-lb (15 Nm), tri-state control  
Non-spring return 132 in-lb (15 Nm), 0-10 VDC proportional control  
Non-spring return 177 in-lb (20 Nm), tri-state control  
Non-spring return 177 in-lb (20 Nm), 0-10 VDC proportional control  
Non-spring return 310 in-lb (35 Nm), tri-state control  
Non-spring return 310 in-lb (35 Nm), 0-10 VDC proportional control

#### ACCESSORIES

**ASC77.2U**  
**ASK71.11**  
**ASK71.1U**  
**ASK71.2U**  
**ASK71.4**  
**ASK71.6**  
**ASK75.1U**  
**ASK75.3U**  
**ASK76.1U**  
**ZG-R01**

Auxiliary switch kit (DPDT) for GCA/GMA actuators  
Combined foot mount/frame mount kit for GEB/GMA actuators  
Floor mount kit for GCA/GBB/GIB actuators  
Frame mount kit for GCA/GBB/GIB actuators  
Linear stroke kit for GEB/GMA actuators  
Universal mounting kit w/ball joints and crank arm, for GDE, GLB  
Weather shield for GBB/GIB/GCA actuators  
Weather shield for GEB/GMA actuators  
1/2" conduit adapter for GDE, GLB  
500Ω, 1/2W, 1% resistor

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# ACTUATORS & DAMPERS

## DIRECT COUPLED ACTUATORS NON-SPRING RETURN M9100 SERIES

2

ACTUATORS & DAMPERS

### DESCRIPTION

Johnson Controls **M9100 Series** non-spring return actuators offer consistent designs and operating features to make installation easy, and they have many built-in features to minimize the need for add-on options. Manufactured in an ISO-9001 facility, these actuators are high quality, reliable, and long lasting.

### FEATURES

- **Manual override**
- **Electronic stall detection**
- **Travel indicator**



M9104



M9106



M9108, M9116,  
M9124, M9132



### COMMON SPECIFICATIONS

|                          |                                                                              |                              |                                         |
|--------------------------|------------------------------------------------------------------------------|------------------------------|-----------------------------------------|
| <b>Supply Voltage</b>    | 20-30 VAC, 50/60 Hz                                                          | <b>Rotation</b>              | 90°                                     |
| <b>Motor</b>             |                                                                              | <b>Manual Override</b>       | Disengage button                        |
| <b>M9104, 06</b>         | Synchronous with magnetic clutch                                             | <b>Noise</b>                 |                                         |
| <b>M9108, 16, 24 32</b>  | Brushless DC                                                                 | <b>M9104, 06</b>             | <35 dB @ 3" (1m)                        |
| <b>Wiring</b>            |                                                                              | <b>M9108, 16, 24, 32</b>     | <45 dB @ 3" (1m)                        |
| <b>M9104</b>             | 48" (1.2 m) plenum leads                                                     | <b>Life Expectancy</b>       | 100,000 cycles, 2.5 million repositions |
| <b>M9106</b>             | 0.25" (6 mm) spade terminals                                                 | <b>Operating Temperature</b> | -4° to 122°F (-20° to 50°C)             |
| <b>M9108, 16, 24, 32</b> | Screw terminals 22-14 AWG                                                    | <b>Operating Humidity</b>    | 0 to 90% RH                             |
| <b>Action</b>            | DA/RA wiring connections (2-pos., floating); Jumper selection (proportional) | <b>Approvals</b>             | CE, cULus, C-tick (varies by model)     |
|                          |                                                                              | <b>Warranty</b>              | 5 years                                 |

### INDIVIDUAL SPECIFICATIONS

| Model               | Torque            | Supply VA | Control Signal          | Input Impedance                    | Feedback             | Auxiliary Switch     | Drive Time      |
|---------------------|-------------------|-----------|-------------------------|------------------------------------|----------------------|----------------------|-----------------|
| <b>M9104-AGA-2S</b> | 35 in-lb (4 Nm)   | 2.1 VA    | Two-position, floating  |                                    | None                 | None                 | 60 seconds      |
| <b>M9104-GGA-2S</b> | 35 in-lb (4 Nm)   | 3.6 VA    | Prop. 0-10 VDC, 4-20 mA | 100kΩ (VDC input); 500Ω (mA input) | None                 | None                 | 60 seconds      |
| <b>M9106-AGA-2</b>  | 53 in-lb (6 Nm)   | 2.5 VA    | Two-position, floating  |                                    | None                 | No, order -AGC model | 60 seconds      |
| <b>M9106-GGA-2</b>  | 53 in-lb (6 Nm)   | 3.2 VA    | Prop. 0-10 VDC, 4-20 mA | 100kΩ (VDC input); 500Ω (mA input) | 0/2-10 VDC           | None                 | 60 seconds      |
| <b>M9108-AGA-2</b>  | 70 in-lb (8 Nm)   | 6.5 VA    | Two-position, floating  |                                    | No, order -ACD, -AGE | No, order -AGC model | 25-50 seconds   |
| <b>M9108-GGA-2</b>  | 70 in-lb (8 Nm)   | 7.5 VA    | Prop. 0-10 VDC, 4-20 mA | 100kΩ (VDC input); 500Ω (mA input) | 0/2-10 VDC           | No, order -GGC model | 25-50 seconds   |
| <b>M9116-AGA-2</b>  | 140 in-lb (16 Nm) | 6.5 VA    | Two-position, floating  |                                    | No, order -ACD, -AGE | No, order -AGC model | 70-115 seconds  |
| <b>M9116-GGA-2</b>  | 140 in-lb (16 Nm) | 7.5 VA    | Prop. 0-10 VDC, 4-20 mA | 100kΩ (VDC input); 500Ω (mA input) | 0/2-10 VDC           | None                 | 70-115 seconds  |
| <b>M9124-AGA-2</b>  | 210 in-lb (24 Nm) | 6.5 VA    | Two-position, floating  |                                    | No, order -ACD, -AGE | No, order -AGC model | 115-175 seconds |
| <b>M9124-GGA-2</b>  | 210 in-lb (24 Nm) | 7.5 VA    | Prop. 0-10 VDC, 4-20 mA | 100kΩ (VDC input); 500Ω (mA input) | 0/2-10 VDC           | No, order -GGC model | 115-175 seconds |
| <b>M9132-AGA-2</b>  | 280 in-lb (32 Nm) | 6.5 VA    | Two-position, floating  |                                    | None                 | None                 | 115-205 seconds |
| <b>M9132-GGA-2</b>  | 280 in-lb (32 Nm) | 7.5 VA    | Prop. 0-10 VDC, 4-20 mA | 100kΩ (VDC input); 500Ω (mA input) | 0/2-10 VDC           | None                 | 115-205 seconds |



### DIMENSIONS

| Model            | Torque            | Dimensions                                   | Maximum Shaft Diameter | Minimum Shaft Length | Weight          |
|------------------|-------------------|----------------------------------------------|------------------------|----------------------|-----------------|
| <b>M9104-AGA</b> | 35 in-lb (4 Nm)   | 2.6"H x 2.8"W x 5.2"L (6.7 x 7.1 x 13.1 cm)  | 0.5" (1.3 cm)          | 1.25" (3.2 cm)       | 1.0 lb (0.4 kg) |
| <b>M9104-GGA</b> | 35 in-lb (4 Nm)   | 2.6"H x 2.8"W x 5.2"L (6.7 x 7.1 x 13.1 cm)  | 0.5" (1.3 cm)          | 1.25" (3.2 cm)       | 1.3 lb (0.6 kg) |
| <b>M9106</b>     | 53 in-lb (6 Nm)   | 2.6"H x 4.2"W x 5.9"L (6.7 x 10.7 x 15.0 cm) | 0.5" (1.3 cm)          | 1.75" (4.5 cm)       | 2.5 lb (1.0 kg) |
| <b>M9108</b>     | 70 in-lb (8 Nm)   | 2.5"H x 3.9"W x 7.1"L (6.5 x 10.0 x 18.0 cm) | 0.75" (1.9 cm)         | 2.25" (5.7 cm)       | 2.9 lb (1.3 kg) |
| <b>M9116</b>     | 140 in-lb (16 Nm) | 2.5"H x 3.9"W x 7.1"L (6.5 x 10.0 x 18.0 cm) | 0.75" (1.9 cm)         | 2.25" (5.7 cm)       | 2.9 lb (1.3 kg) |
| <b>M9124</b>     | 210 in-lb (24 Nm) | 2.5"H x 3.9"W x 7.1"L (6.5 x 10.0 x 18.0 cm) | 0.75" (1.9 cm)         | 2.25" (5.7 cm)       | 2.9 lb (1.3 kg) |
| <b>M9132</b>     | 280 in-lb (32 Nm) | 2.5"H x 3.9"W x 7.1"L (6.5 x 10.0 x 18.0 cm) | 0.75" (1.9 cm)         | 2.25" (5.7 cm)       | 2.9 lb (1.3 kg) |

### WIRING

|                                          |                                             |                                       |                                          |                                                                           |                                                                         |
|------------------------------------------|---------------------------------------------|---------------------------------------|------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------|
| <p><b>M9104-AGA-2S</b><br/>Tri-state</p> | <p><b>M9104-GGA-2S</b><br/>Proportional</p> | <p><b>M9106-AGA</b><br/>Tri-state</p> | <p><b>M9106-GGA</b><br/>Proportional</p> | <p><b>M9108</b><br/><b>M9116, M9124, M9132 (GGA)</b><br/>Proportional</p> | <p><b>M9116, M9124, M9132 (AGA)</b><br/>Tri-state/<br/>Two-position</p> |
|------------------------------------------|---------------------------------------------|---------------------------------------|------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------|

\* Provide constant power to terminal 2 for two-position control.

### ORDERING INFORMATION

| MODEL               | DESCRIPTION                                                                                |
|---------------------|--------------------------------------------------------------------------------------------|
| <b>M9104-AGA-2S</b> | Non-spring return 35 in-lb (4 Nm), two-position and tri-state control                      |
| <b>M9104-GGA-2S</b> | Non-spring return 35 in-lb (4 Nm), 0-10 VDC proportional control                           |
| <b>M9106-AGA-2</b>  | Non-spring return 53 in-lb (6 Nm), two-position and tri-state control                      |
| <b>M9106-AGC-2</b>  | Non-spring return 53 in-lb (6 Nm), two-position and tri-state control, aux. switches       |
| <b>M9106-GGA-2</b>  | Non-spring return 53 in-lb (6 Nm), 0-10VDC proportional control                            |
| <b>M9108-AGA-2</b>  | Non-spring return 70 in-lb (8 Nm), two-position and tri-state control                      |
| <b>M9108-AGC-2</b>  | Non-spring return 70 in-lb (8 Nm), two-position and tri-state control, aux. switches       |
| <b>M9108-AGD-2</b>  | Non-spring return 70 in-lb (8 Nm), two-position and tri-state control, 135Ω feedback       |
| <b>M9108-AGE-2</b>  | Non-spring return 70 in-lb (8 Nm), two-position and tri-state control, 1000Ω feedback      |
| <b>M9108-GGA-2</b>  | Non-spring return 70 in-lb (8 Nm), 0-10 VDC proportional control                           |
| <b>M9108-GGC-2</b>  | Non-spring return 70 in-lb (8 Nm), 0-10 VDC proportional control, aux. switches            |
| <b>M9116-AGA-2</b>  | Non-spring return 140 in-lb (16 Nm), two-position and tri-state control                    |
| <b>M9116-AGC-2</b>  | Non-spring return 140 in-lb (16 Nm), two-position and tri-state control, aux. switches     |
| <b>M9116-AGD-2</b>  | Non-spring return 140 in-lb (16 Nm), two-position/tri-state, aux. switches, 135Ω feedback  |
| <b>M9116-AGE-2</b>  | Non-spring return 140 in-lb (16 Nm), two-position/tri-state, aux. switches, 1000Ω feedback |
| <b>M9116-GGA-2</b>  | Non-spring return 140 in-lb (16 Nm), 0-10 VDC proportional control                         |
| <b>M9124-AGA-2</b>  | Non-spring return 210 in-lb (24 Nm), two-position and tri-state control                    |
| <b>M9124-AGC-2</b>  | Non-spring return 210 in-lb (24 Nm), two-position and tri-state control, aux. switches     |
| <b>M9124-AGD-2</b>  | Non-spring return 210 in-lb (24 Nm), two-position/tri-state, aux. switches, 135Ω feedback  |
| <b>M9124-AGE-2</b>  | Non-spring return 210 in-lb (24 Nm), two-position/tri-state, aux. switches, 1000Ω feedback |
| <b>M9124-GGA-2</b>  | Non-spring return 210 in-lb (24 Nm), 0-10 VDC proportional control                         |
| <b>M9124-GGC-2</b>  | Non-spring return 210 in-lb (24 Nm), 0-10 VDC proportional control, aux. switches          |
| <b>M9132-GGA-2</b>  | Non-spring return 280 in-lb (32 Nm), 0-10 VDC proportional control                         |
| <b>M9132-AGA-2</b>  | Non-spring return 280 in-lb (32 Nm), two-position and tri-state control                    |

### ACCESSORIES

|                  |                                            | PAGE |
|------------------|--------------------------------------------|------|
| <b>M9000-103</b> | 120/24 VAC, 14 VA inline transformer       |      |
| <b>M9000-151</b> | Floor mount linkage kit                    |      |
| <b>M9000-154</b> | Jackshaft coupler, 1", for M9100 actuators |      |
| <b>M9000-158</b> | Tandem mount kit for M9132/M9220 actuators |      |
| <b>ZG-R01</b>    | 500Ω, 1/2W, 1% resistor                    | 37   |



# ACTUATORS & DAMPERS

## DIRECT COUPLED ACTUATORS NON-SPRING RETURN

### MF4, MS4 SERIES

#### DESCRIPTION

The **MF4** and **MS4 Series** DuraDrive™ direct coupled, non-spring return actuators are designed to accept tri-state or proportional control signals from a DDC system or a thermostat for HVAC damper applications. Typical applications include air handling unit dampers and inlet vanes, VAV boxes, and unitary equipment. The actuators range in torque from 35 to 300 in-lb (4 to 34 Nm).

#### FEATURES

- *Direct mount to round or square shaft*
- *Manual override on all models*



**Schneider**  
Electric

MF4, MS4 Series



#### COMMON SPECIFICATIONS

|                        |                                                       |                              |                                     |
|------------------------|-------------------------------------------------------|------------------------------|-------------------------------------|
| <b>Supply Voltage</b>  | 21-28 VAC 50/60 Hz, 120 VAC 50/60 Hz (MS41-6340 only) | <b>Resolution</b>            | 100 steps                           |
| <b>Wiring</b>          |                                                       | <b>Operating Temperature</b> |                                     |
| <b>MF4E</b>            | Screw terminals                                       | <b>MF4E</b>                  | -22° to 140°F (-30° to 60°C)        |
| <b>All others</b>      | 24" (0.6 m) pigtails, 18 AWG                          | <b>All others</b>            | -25° to 130°F (-32° to 55°C)        |
| <b>Rotation</b>        | 90°                                                   | <b>Operating Humidity</b>    | 5 to 95% RH                         |
| <b>Manual Override</b> |                                                       | <b>Approvals</b>             | cULus, CE, C-tick (varies by model) |
| <b>35, 70 in-lb</b>    | Disengage button                                      | <b>Warranty</b>              | 5 years                             |
| <b>133, 300 in-lb</b>  | Crank                                                 |                              |                                     |

#### INDIVIDUAL SPECIFICATIONS

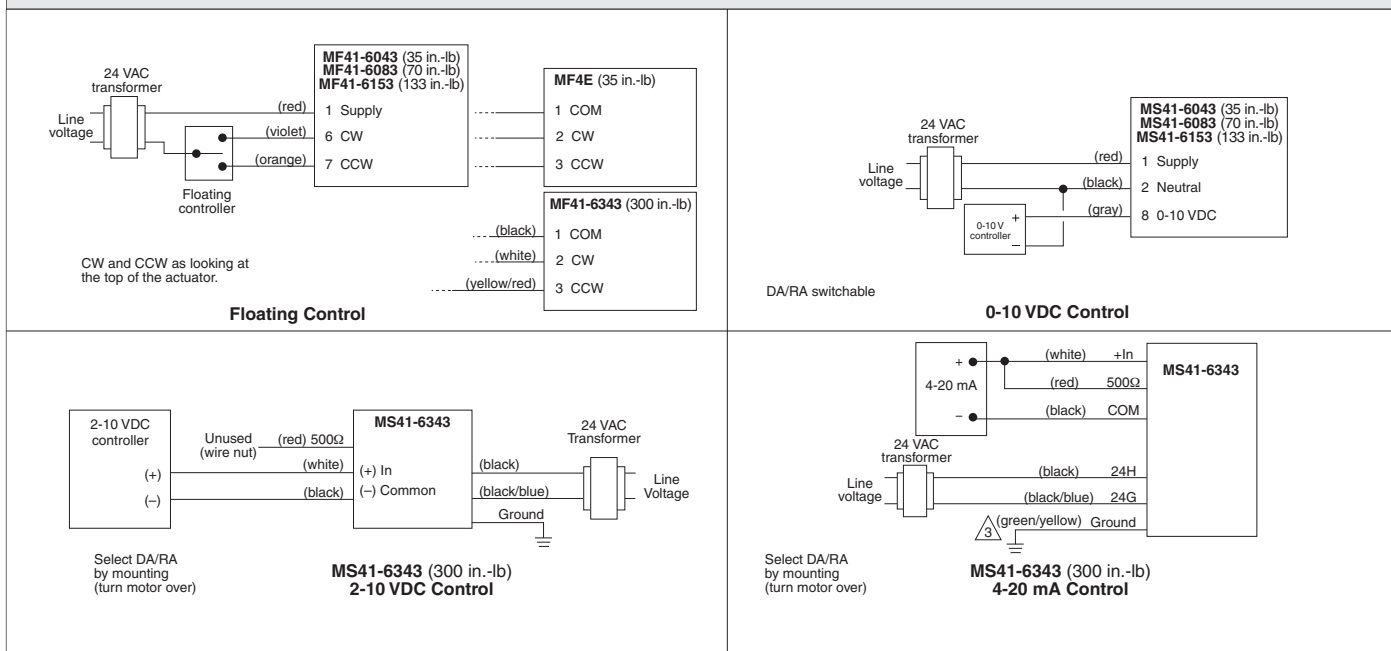
| Model                 | Torque            | Supply VA | Control Signal          | Input Impedance                  | Drive Time  |
|-----------------------|-------------------|-----------|-------------------------|----------------------------------|-------------|
| <b>MF4E-60430-100</b> | 35 in-lb (4 Nm)   | 2.0 VA    | Two-position, floating  |                                  | 90 seconds  |
| <b>MF41-6043</b>      | 35 in-lb (4 Nm)   | 2.3 VA    | Two-position, floating  |                                  | 90 seconds  |
| <b>MS41-6043</b>      | 35 in-lb (4 Nm)   | 3.3 VA    | Proportional 0-10 VDC   | 100 kΩ                           | 90 seconds  |
| <b>MF4E-60830-100</b> | 70 in-lb (8 Nm)   | 2.0 VA    | Two-position, floating  |                                  | 90 seconds  |
| <b>MF41-6083</b>      | 70 in-lb (8 Nm)   | 2.3 VA    | Two-position, floating  |                                  | 125 seconds |
| <b>MS41-6083</b>      | 70 in-lb (8 Nm)   | 3.3 VA    | Proportional 0-10 VDC   | 100 kΩ                           | 125 seconds |
| <b>MF41-6153</b>      | 133 in-lb (15 Nm) | 3.0 VA    | Two-position, floating  |                                  | 125 seconds |
| <b>MS41-6153</b>      | 133 in-lb (15 Nm) | 5.0 VA    | Proportional 0/2-10 VDC | 100 kΩ                           | 125 seconds |
| <b>MF41-6343</b>      | 300 in-lb (34 Nm) | 7.0 VA    | Two-position, floating  |                                  | 145 seconds |
| <b>MS41-6343</b>      | 300 in-lb (34 Nm) | 7.1 VA    | Prop. 2-10 VDC, 4-20 mA | 10 kΩ (2-10 VDC), 500Ω (4-20 mA) | 145 seconds |
| <b>MS41-6340</b>      | 300 in-lb (34 Nm) | 7.1 VA    | Prop. 2-10 VDC, 4-20 mA | 10 kΩ (2-10 VDC), 500Ω (4-20 mA) | 145 seconds |



### DIMENSIONS

| Model     | Torque            | Dimensions                                        | Maximum Shaft Diameter | Minimum Shaft Length | Enclosure Rating | Weight           |
|-----------|-------------------|---------------------------------------------------|------------------------|----------------------|------------------|------------------|
| MF4E-     | 35 in-lb (4 Nm)   | 2.6"H x 3.5"W x 5.8"L<br>(6.9 x 8.9 x 14.8 cm)    | 0.5" (1.3 cm)          | 2.0" (5.1 cm)        | NEMA 1 (IP30)    | 3.5 lb (1.6 kg)  |
| Mx41-6043 | 35 in-lb (4 Nm)   | 2.4"H x 2.7"W x 5.4"L<br>(6.1 x 6.9 x 13.7 cm)    | 0.63" (1.58 cm)        | 2.0" (5.1 cm)        | NEMA 2 (IP54)    | 1.0 lb (0.5 kg)  |
| Mx41-6083 | 70 in-lb (8 Nm)   | 2.4"H x 2.7"W x 5.4"L<br>(6.1 x 6.9 x 13.7 cm)    | 0.63" (1.58 cm)        | 2.0" (5.1 cm)        | NEMA 2 (IP54)    | 1.0 lb (0.5 kg)  |
| Mx41-6153 | 133 in-lb (15 Nm) | 2.4"H x 3.25"W x 8.4"L<br>(6.1 x 16.0 x 21.3 cm)  | 0.75" (1.9 cm)         | 2.8" (7.0 cm)        | NEMA 1 (IP54)    | 2.2 lb (1.0 kg)  |
| Mx41-6343 | 300 in-lb (34 Nm) | 4.0"H x 4.0"W x 10.8"L<br>(10.2 x 10.2 x 27.5 cm) | 1.0" (2.5 cm)          | 4.7" (11.9 cm)       | NEMA 4 (IP56)    | 10.5 lb (4.8 kg) |
| MS41-6340 | 300 in-lb (34 Nm) | 4.0"H x 4.0"W x 10.8"L<br>(10.2 x 10.2 x 27.5 cm) | 1.0" (2.5 cm)          | 4.7" (11.9 cm)       | NEMA 4 (IP56)    | 10.5 lb (4.8 kg) |

### WIRING



### ORDERING INFORMATION

#### MODEL

MF4E-60430-100  
MF41-6043  
MS41-6043  
MF4E-60830-100  
MF41-6083  
MS41-6083  
MF41-6153  
MS41-6153  
MF41-6343  
MS41-6343  
MS41-6340

#### DESCRIPTION

Non-spring return 35 in-lb (4 Nm), tri-state control, terminals  
Non-spring return 35 in-lb (4 Nm), tri-state control  
Non-spring return 35 in-lb (4 Nm), proportional control  
Non-spring return 70 in-lb (8 Nm), tri-state control, terminals  
Non-spring return 70 in-lb (8 Nm), tri-state control  
Non-spring return 70 in-lb (8 Nm), proportional control  
Non-spring return 133 in-lb (15 Nm), tri-state control  
Non-spring return 133 in-lb (15 Nm), proportional control  
Non-spring return 300 in-lb (34 Nm), tri-state control  
Non-spring return 300 in-lb (34 Nm), proportional control  
Non-spring return 300 in-lb (34 Nm), proportional control, 120 VAC

### ACCESSORIES

#### AM-756

Metric to 1/2" NPT conduit adapter for damper actuators



# ACTUATORS & DAMPERS

## KELE REVOLUTION™ DIRECT COUPLED ACTUATORS SPRING RETURN

**KAS-27, KAS-44, KAS-88, KAS-175 SERIES**

2

ACTUATORS & DAMPERS

### DESCRIPTION

The Kele Revolution **KAS-27, KAS-44, KAS-88, and KAS-175 Series** actuators are designed and tested to provide accurate and reliable spring return control for dampers and valves. They accept two-position or modulating (tri-state and proportional in one actuator) control signals.

### FEATURES

- **Auto-adapt feature for automatic stroke setting**
- **Signal mode switch for installation flexibility**
- **Self-centering hub for accurate control**
- **Built-in indicator shows position at a distance**
- **60,000 cycles, 1.5 million repositions for long life**



**KAS-175-M**



**KAS-27-M-15**



### COMMON SPECIFICATIONS

|                        |                                            |                              |                                        |
|------------------------|--------------------------------------------|------------------------------|----------------------------------------|
| <b>Input Impedance</b> | 100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA        | <b>Spring Return Time</b>    | 25 seconds                             |
| <b>Motor</b>           |                                            | <b>27, 44 in-lb</b>          | 20 seconds                             |
| <b>2-position</b>      | DC with brushes                            | <b>88, 175 in-lb</b>         | Crank (88, 175 in-lb only)             |
| <b>Modulating</b>      | Brushless DC                               | <b>Manual Override</b>       | <60 db @ 3' (1m)                       |
| <b>Wiring</b>          | Enclosed terminals                         | <b>Noise</b>                 | 60,000 cycles, 1.5 million repositions |
| <b>Action</b>          |                                            | <b>Life Expectancy</b>       |                                        |
| <b>2-pos./float</b>    | Mounting orientation direct/reverse acting | <b>Operating Temperature</b> |                                        |
| <b>Proportional</b>    | Switch selectable direct/reverse acting    | <b>KAS-27-2, -44-2</b>       | -22° to 150°F (-30° to 65°C)           |
| <b>Rotation</b>        | 95°, ±3°                                   | <b>KAS-27-M, -44-M</b>       | -40° to 150°F (-40° to 65°C)           |
| <b>Drive Time</b>      |                                            | <b>KAS-88, -175</b>          | -40° to 140°F (-40° to 60°C)           |
| <b>2-position</b>      | 45 seconds                                 | <b>Operating Humidity</b>    | 5 to 95% RH                            |
| <b>Modulating</b>      | 90 seconds                                 | <b>Enclosure Rating</b>      | NEMA 2 (IP54)                          |
|                        |                                            | <b>Approvals</b>             | UL, cUL, CE, C-tick, plenum rated      |
|                        |                                            | <b>Warranty</b>              | 5 years                                |

### INDIVIDUAL SPECIFICATIONS

| Model                  | Torque            | Supply Voltage                | Supply VA | Control Signal                                | Feedback   | Auxiliary Switch                    |
|------------------------|-------------------|-------------------------------|-----------|-----------------------------------------------|------------|-------------------------------------|
| <b>KAS-27-2</b>        | 27 in-lb (3 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 7 VA      | Two-position                                  | None       | None                                |
| <b>KAS-27-2-15</b>     | 27 in-lb (3 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 7 VA      | Two-position                                  | None       | One SPDT, 250 VAC, 8A res., 3A ind. |
| <b>KAS-27-2-120</b>    | 27 in-lb (3 Nm)   | 120 VAC, 50/60 Hz             | 10 VA     | Two-position                                  | None       | None                                |
| <b>KAS-27-2-120-15</b> | 27 in-lb (3 Nm)   | 120 VAC, 50/60 Hz             | 10 VA     | Two-position                                  | None       | One SPDT, 250 VAC, 8A res., 3A ind. |
| <b>KAS-27-M</b>        | 27 in-lb (3 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 7 VA      | Prop. 0/2-10 VDC, 4-20 mA, two-pos., floating | 0/2-10 VDC | None                                |
| <b>KAS-27-M-15</b>     | 27 in-lb (3 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 7 VA      | Prop. 0/2-10 VDC, 4-20 mA, two-pos., floating | 0/2-10 VDC | One SPDT, 250 VAC, 8A res., 3A ind. |
| <b>KAS-44-2</b>        | 44 in-lb (5 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 8 VA      | Two-position                                  | None       | None                                |
| <b>KAS-44-2-15</b>     | 44 in-lb (5 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 8 VA      | Two-position                                  | None       | One SPDT, 250 VAC, 8A res., 3A ind. |
| <b>KAS-44-120</b>      | 44 in-lb (5 Nm)   | 120 VAC, 50/60 Hz             | 11 VA     | Two-position                                  | None       | None                                |
| <b>KAS-44-120-15</b>   | 44 in-lb (5 Nm)   | 120 VAC, 50/60 Hz             | 11 VA     | Two-position                                  | None       | One SPDT, 250 VAC, 8A res., 3A ind. |
| <b>KAS-44-M</b>        | 44 in-lb (5 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 8 VA      | Prop. 0/2-10 VDC, 4-20 mA, two-pos., floating | 0/2-10 VDC | None                                |
| <b>KAS-44-M-15</b>     | 44 in-lb (5 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 8 VA      | Prop. 0/2-10 VDC, 4-20 mA, two-pos., floating | 0/2-10 VDC | One SPDT, 250 VAC, 8A res., 3A ind. |
| <b>KAS-88-2</b>        | 88 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-30 VDC | 30 VA     | Two-position                                  | None       | Optional add-on SW2, DPDT           |
| <b>KAS-88-120</b>      | 88 in-lb (10 Nm)  | 120 VAC, 50/60 Hz             | 45 VA     | Two-position                                  | None       | Optional add-on SW2, DPDT           |
| <b>KAS-88-M</b>        | 88 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-30 VDC | 14 VA     | Prop. 0/2-10 VDC, 4-20 mA, two-pos., floating | 0/2-10 VDC | Optional add-on SW2, DPDT           |
| <b>KAS-175-2</b>       | 175 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC | 40 VA     | Two-position                                  | None       | Optional add-on SW2, DPDT           |
| <b>KAS-175-120</b>     | 175 in-lb (20 Nm) | 120 VAC, 50/60 Hz             | 60 VA     | Two-position                                  | None       | Optional add-on SW2, DPDT           |
| <b>KAS-175-M</b>       | 175 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC | 16 VA     | Prop. 0/2-10 VDC, 4-20 mA, two-pos., floating | 0/2-10 VDC | Optional add-on SW2, DPDT           |



## KELE REVOLUTION™ DIRECT COUPLED ACTUATORS SPRING RETURN

**KAS-27, KAS-44, KAS-88, KAS-175 SERIES**

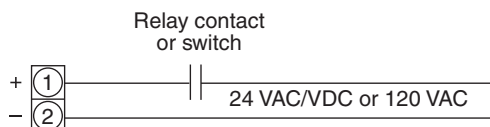
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ACTUATORS & DAMPERS

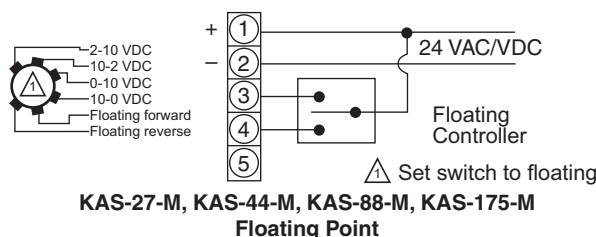
### DIMENSIONS

| Model           | Dimensions                                   | Maximum Shaft Diameter | Minimum Shaft Length | Weight          |
|-----------------|----------------------------------------------|------------------------|----------------------|-----------------|
| KAS-27, KAS-44  | 3.2"H x 3.9"W x 7.0"L (8.0 x 10.0 x 17.7 cm) | 0.6" (1.6 cm)          | 1.0" (2.5 cm)        | 3.5 lb (1.6 kg) |
| KAS-88, KAS-175 | 2.9"H x 3.9"W x 9.8"L (7.5 x 10.0 x 25.0 cm) | 1.06" (2.7 cm)         | 1.0" (2.5 cm)        | 7.0 lb (3.2 kg) |

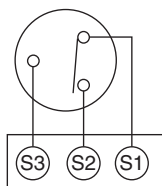
### WIRING



**KAS-27-2, KAS-44-2, KAS-88-2,  
KAS-88-120, KAS-175-120**  
Two-position Control

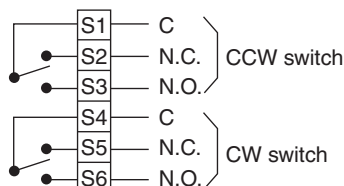


**KAS-27-M, KAS-44-M, KAS-88-M, KAS-175-M**  
Floating Point



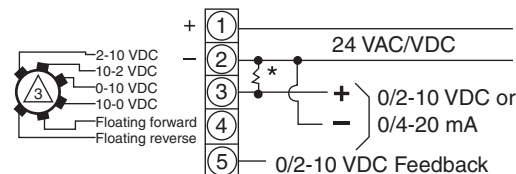
#### Internal Auxiliary Switch

Switch adjustable from 0° to 95° 500 uA resistive at 5 VDC (minimum) 250 VAC, 8A resistive, 3A inductive  
Only available on models with -15 suffix



#### SW2 Auxiliary Switch Kit

Switch ratings: Adjustable between 5° and 85°, 24 VAC/VDC, 5A resistive, 3A inductive



\* 500Ω, 1/2W or greater resistor required when control signal is 0/4-20 mA

Set switch to modulating

**KAS-27-M, KAS-44-M, KAS-88-M, KAS-175-M**  
Proportional Control

### ORDERING INFORMATION

#### MODEL

KAS-27-2  
KAS-27-2-15  
KAS-27-2-120  
KAS-27-2-120-15  
KAS-27-M  
KAS-27-M-15  
KAS-44-2  
KAS-44-2-15  
KAS-44-120  
KAS-44-120-15  
KAS-44-M  
KAS-44-M-15  
KAS-88-2  
KAS-88-120  
KAS-88-M  
KAS-175-2  
KAS-175-120  
KAS-175-M

#### DESCRIPTION

Spring return, 27 in-lb (3 Nm), two-position, 24 VAC/VDC, two-wire control  
Spring return, 27 in-lb (3 Nm), two-position, 24 VAC/VDC, two-wire control, SPDT aux  
Spring return, 27 in-lb (3 Nm), two-position, 120 VAC, two-wire control  
Spring return, 27 in-lb (3 Nm), two-position, 120 VAC, two-wire control, SPDT aux  
Spring return, 27 in-lb (3 Nm), modulating control (proportional and tri-state), 24 VAC  
Spring return, 27 in-lb (3 Nm), modulating control (proportional and tri-state), 24 VAC, SPDT aux  
Spring return, 44 in-lb (5 Nm), two-position, 24 VAC/VDC, two-wire control  
Spring return, 44 in-lb (5 Nm), two-position, 24 VAC/VDC, two-wire control, SPDT aux  
Spring return, 44 in-lb (5 Nm), two-position, 120 VAC, two-wire control  
Spring return, 44 in-lb (5 Nm), two-position, 120 VAC, two-wire control, SPDT aux  
Spring return, 44 in-lb (5 Nm), modulating control (proportional and tri-state), 24 VAC/VDC  
Spring return, 44 in-lb (5 Nm), modulating control (prop./tri-state), 24 VAC/VDC, SPDT aux  
Spring return, 88 in-lb (10 Nm), two-position, 24 VAC/VDC, two-wire control  
Spring return, 88 in-lb (10 Nm), two-position, 120 VAC, two-wire control  
Spring return, 88 in-lb (10 Nm), modulating control (proportional and tri-state), 24 VAC/VDC  
Spring return, 175 in-lb (20 Nm), two-position, 24 VAC/VDC, two-wire control  
Spring return, 175 in-lb (20 Nm), two-position, 120 VAC, two-wire control  
Spring return, 175 in-lb (20 Nm), modulating control (proportional and tri-state), 24 VAC/VDC

#### ACCESSORIES

32004254-002 Replacement shaft coupler for KAS-88, -175  
50000407-001 Tandem mount bracket for KAS-175 actuators  
50001194-001 Universal surface mount bracket with crank arm and 1/2" shaft  
SW2 Auxiliary switch kit for KA-175/301 and KAS-88/175  
ZG-R01 500Ω, 1/2W, 1% resistor

#### PAGE

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# ACTUATORS & DAMPERS

## DIRECT COUPLED ACTUATORS SPRING RETURN

TF, LF, NF, AF, EF SERIES

2

ACTUATORS & DAMPERS

### DESCRIPTION

The Belimo **TF, LF, NF, AF, and EF Series** direct coupled actuators provide control of dampers and valves for spring return applications. They come in two-position, tri-state, proportional, and Multi-Function Technology (MFT) models. All include spring return to drive the damper or valve to a "normal" position when power is lost. Unique universal power supply models work with 24 to 240 VAC or 24 to 125 VDC. The new **EF Series** is true spring return with a high 270 in-lb torque output and most models are available with optional NEMA 4 housing. Dual-mount EF actuators on one shaft is possible, for a total of 540 in-lb.

### FEATURES

- *Symmetrical, reversible rotation design for installation flexibility*
- *ISO 9001 manufacturing facility assures high quality*
- *New EF Series delivers 270 in-lb of spring return power*
- *Some models with NEMA 4 enclosure rating for outdoor locations*
- *Low power consumption for high efficiency and smaller transformer sizing*
- *MFT models offer flexibility to customize and adapt a single actuator to various controllers and applications*

**BELIMO**



### COMMON SPECIFICATIONS

|                           |                                                                 |
|---------------------------|-----------------------------------------------------------------|
| <b>Input Impedance</b>    |                                                                 |
| -SR models                | 100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA                             |
| -MFT models               | 100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA; 1500Ω @ PWM, float, on/off |
| <b>Motor</b>              | Brushless DC                                                    |
| <b>Wiring</b>             |                                                                 |
| TF, LF                    | 3' (0.9 m) cable, 18 AWG, plenum rated                          |
| NF, AF, EF                | 3' (0.9 m) appliance cable, 18 AWG                              |
| <b>NEMA 4</b>             | Terminal blocks inside housing                                  |
| <b>Conduit Connection</b> |                                                                 |
| W/cables                  | 1/2" NPT                                                        |
| <b>NEMA 4</b>             | Four knockouts for waterproof conduit fittings                  |
| <b>Feedback</b>           | 2-10 VDC (-SR and -MFT models only)                             |
| <b>Auxiliary Switch</b>   |                                                                 |
| TF, LF (-S)               | 1 SPDT, 3A @ 250V                                               |
| NF, AF, EF (-S)           | 2 SPDT, 3A @ 250V                                               |
| <b>Action</b>             |                                                                 |
| 2-position                | CW/CCW reversible mounting                                      |
| Float/prop.               | DA/RA switch, CW/CCW rev. mt.                                   |

|                              |                                                                                             |
|------------------------------|---------------------------------------------------------------------------------------------|
| <b>Rotation</b>              | 95°                                                                                         |
| <b>Manual Override</b>       | Manual crank (except TF)                                                                    |
| <b>Noise</b>                 |                                                                                             |
| TF, LF, NF                   | <62 db                                                                                      |
| AF                           | <45 db                                                                                      |
| EF                           | <71.4 db                                                                                    |
| <b>Resolution</b>            | 100 steps                                                                                   |
| <b>Life Expectancy</b>       |                                                                                             |
| 2-position                   | 60,000 cycles                                                                               |
| Float/prop.                  | 60,000 cycles; 500,000 repositions                                                          |
| <b>Operating Temperature</b> | -22° to 122°F (-30° to 50°C); NEMA 4 models with heater option can go down to -40°F (-40°C) |
| <b>Operating Humidity</b>    | 5 to 95% RH                                                                                 |
| <b>Enclosure Rating</b>      |                                                                                             |
| TF                           | NEMA 2 (IP42)                                                                               |
| LF, NF, AF, EF               | NEMA 2 (IP54)                                                                               |
| <b>NEMA 4</b>                | NEMA 4 (IP66)                                                                               |
| <b>Approvals</b>             | cULus, CE, RoHS                                                                             |
| <b>Warranty</b>              | 5 years                                                                                     |



| INDIVIDUAL SPECIFICATIONS |                   |                                                  |                  |                            |          |               |                    |
|---------------------------|-------------------|--------------------------------------------------|------------------|----------------------------|----------|---------------|--------------------|
| Model                     | Torque            | Supply Voltage                                   | Supply VA        | Control Signal             | Feedback | Drive Time    | Spring Return Time |
| TF24                      | 18 in-lb (2 Nm)   | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $\pm 10\%$    | 5.0 VA           | Two-position               |          | 75 seconds    | <60 seconds        |
| TF-120                    | 18 in-lb (2 Nm)   | 120 VAC 50/60 Hz                                 | 5.0 VA           | Two-position               |          | 75 seconds    | <60 seconds        |
| TF24-3                    | 18 in-lb (2 Nm)   | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $\pm 10\%$    | 4.0 VA           | Floating                   |          | 95 seconds    | <60 seconds        |
| TF24-SR                   | 18 in-lb (2 Nm)   | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $\pm 10\%$    | 4.0 VA           | Prop. 2-10 VDC, 4-20 mA    | 2-10 VDC | 95 seconds    | <60 seconds        |
| TF24-MFT                  | 18 in-lb (2 Nm)   | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $\pm 10\%$    | 4.0 VA           | Prop. (default 2-10 VDC)   | 2-10 VDC | 150 seconds   | <60 seconds        |
| LF24                      | 35 in-lb (4 Nm)   | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $\pm 10\%$    | 7.0 VA           | Two-position               |          | 40-75 seconds | <60 seconds        |
| LF120                     | 35 in-lb (4 Nm)   | 120 VAC 50/60 Hz                                 | 7.5 VA           | Two-position               |          | 40-75 seconds | <60 seconds        |
| LF24-3                    | 35 in-lb (4 Nm)   | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $\pm 10\%$    | 5.0 VA           | Floating                   |          | 150 seconds   | <60 seconds        |
| LF24-SR                   | 35 in-lb (4 Nm)   | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $\pm 10\%$    | 5.0 VA           | Prop. 2-10 VDC, 4-20 mA    | 2-10 VDC | 150 seconds   | <60 seconds        |
| LF24-MFT                  | 35 in-lb (4 Nm)   | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $\pm 10\%$    | 5.0 VA           | Prop. (default 2-10 VDC)   | 2-10 VDC | 150 seconds   | <60 seconds        |
| NFB24                     | 90 in-lb (10 Nm)  | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $\pm 10\%$    | 8.5 VA           | Two-position               |          | 75 seconds    | <60 seconds        |
| NFBUP                     | 90 in-lb (10 Nm)  | 24-240 VAC, 24-125 VDC                           | 6.5 VA @ 120 VAC | Two-position               |          | 75 seconds    | <60 seconds        |
| NFB24-SR                  | 90 in-lb (10 Nm)  | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $\pm 10\%$    | 6.0 VA           | Prop. 2-10 VDC, 4-20 mA    | 2-10 VDC | 95 seconds    | <60 seconds        |
| NFB24-MFT                 | 90 in-lb (10 Nm)  | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $\pm 10\%$    | 9.0 VA           | Prop. (default 2-10 VDC)   | 2-10 VDC | 150 seconds   | <60 seconds        |
| AFBUP                     | 180 in-lb (20 Nm) | 24-240 VAC, 24-125 VDC                           | 8.5 VA @ 120 VAC | Two-position               |          | 75 seconds    | <60 seconds        |
| AFB24-MFT                 | 180 in-lb (20 Nm) | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $\pm 10\%$    | 10 VA            | Prop. (default 2-10 VDC)   | 2-10 VDC | 150 seconds   | <60 seconds        |
| AFB24-MFT95               | 180 in-lb (20 Nm) | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $\pm 10\%$    | 10 VA            | Prop. (default 0-135 ohms) | 2-10 VDC | 150 seconds   | <60 seconds        |
| EFB24                     | 270 in-lb (30 Nm) | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $+20\%/-10\%$ | 16 VA            | Two-position               |          | 75 seconds    | <60 seconds        |
| EFB120                    | 270 in-lb (30 Nm) | 100-240 VAC $+10\%/-20\%$ 50/60 Hz               | 21 VA            | Two-position               |          | 75 seconds    | <60 seconds        |
| EFB24-SR                  | 270 in-lb (30 Nm) | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $+20\%/-10\%$ | 14 VA            | Prop. 2-10 VDC, 4-20 mA    | 2-10 VDC | 95 seconds    | <60 seconds        |
| EFB24-MFT                 | 270 in-lb (30 Nm) | 24 VAC $\pm 20\%$ 50/60 Hz, 24 VDC $+20\%/-10\%$ | 16 VA            | Prop. (default 2-10 VDC)   | 2-10 VDC | 150 seconds   | <60 seconds        |



# ACTUATORS & DAMPERS

## DIRECT COUPLED ACTUATORS SPRING RETURN

TF, LF, NF, AF, EF SERIES

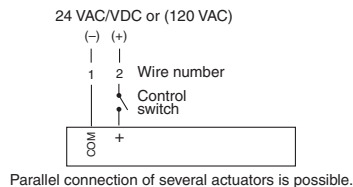
2

ACTUATORS & DAMPERS

### DIMENSIONS

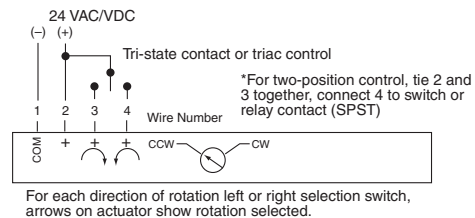
| Model | Torque            | Dimensions                                     | Maximum Shaft Diameter | Minimum Shaft Length | Weight           |
|-------|-------------------|------------------------------------------------|------------------------|----------------------|------------------|
| TF    | 18 in-lb (2 Nm)   | 3.3"H x 3.0"W x 6.3"L (8.4 x 7.6 x 15.9 cm)    | 0.5" (1.3 cm)          | 3.5" (8.9 cm)        | 1.4 lb (0.64 kg) |
| LF    | 35 in-lb (4 Nm)   | 3.2"H x 3.2"W x 7.7"L (8.1 x 8.1 x 19.5 cm)    | 0.5" (1.3 cm)          | 3.5" (8.9 cm)        | 3.4 lb (1.5 kg)  |
| NFB   | 90 in-lb (10 Nm)  | 3.4"H x 3.9"W x 9.7"L (8.7 x 9.8 x 24.6 cm)    | 1.05" (2.7 cm)         | 3.5" (8.9 cm)        | 4.1 lb (1.8 kg)  |
| AFB   | 180 in-lb (20 Nm) | 3.4"H x 3.9"W x 9.7"L (8.7 x 9.8 x 24.6 cm)    | 1.05" (2.7 cm)         | 3.5" (8.9 cm)        | 4.2 lb (1.9 kg)  |
| EFB   | 270 in-lb (30 Nm) | 4.7"H x 5.4"W x 13.1"L (12.1 x 13.8 x 33.3 cm) | 1.05" (2.7 cm)         | 3.5" (8.9 cm)        | 9.8 lb (4.5 kg)  |

### WIRING

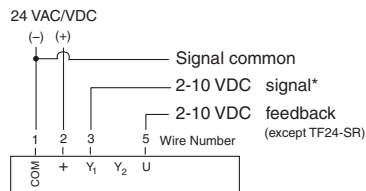


(See Note 1)

**TF24, AFB24, NFB24, LF24, EFB24**  
**TF120, LF120, NF120, AF120, EFB120**  
**Two-position**



**TF24-3, LF24-3**  
**Tri-state** (may also be wired two-position)



Parallel connection of up to four motors is possible.  
Power consumption and polarity must be observed.

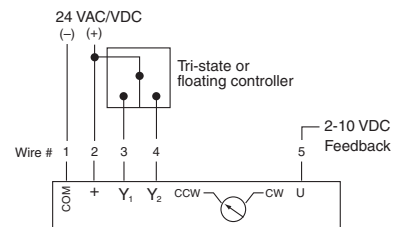
**TF24-SR, NFB24-SR, LF24-SR, EFB24-SR**  
**2-10 VDC**

\*4-20 mA signal with 500Ω resistor across terminals 1 and 3.

**Note 1:** See new Belimo NFB//AFB/EFB literature for complete wiring information on those models.

| Code | Signal                 | Feedback |
|------|------------------------|----------|
| A01  | 2-10 VDC               | 2-10 VDC |
| A02  | 0-10 VDC               | 0-10 VDC |
| A07  | 0-5 VDC                | 2-10 VDC |
| A09  | 5-10 VDC               | 2-10 VDC |
| A16  | 2-6 VDC                | 2-10 VDC |
| A17  | 6-10 VDC               | 2-10 VDC |
| W01  | PWM<br>0.59 - 2.95 sec | 2-10 VDC |
| W02  | PWM<br>0.02 - 5.00 sec | 2-10 VDC |
| F01  | Floating               | 2-10 VDC |
| J2   | Two-position           | 2-10 VDC |

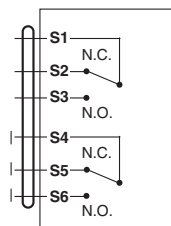
**MFT Function Codes**



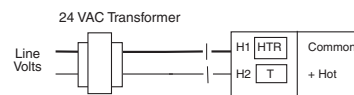
MFT Code = F01 (Pre-programmed at Kele)

**NFB24-MFT, AFB24-MFT, EFB24-MFT**  
**Tri-state**

(See Note 1)



**Auxiliary Switch Wiring**  
**3 A @ 250V maximum load**



**Heater Wiring - NEMA 4**  
**models with heater**



### ORDERING INFORMATION

| MODEL          | DESCRIPTION                                                                                         |
|----------------|-----------------------------------------------------------------------------------------------------|
| TF24           | Spring return 18 in-lb (2 Nm), two-position, 24 VAC/VDC, two-wire control                           |
| TF120          | Spring return 18 in-lb (2 Nm), two-position, 120 VAC, two-wire control                              |
| TF24-3         | Spring return 18 in-lb (2 Nm), tri-state control, 24 VAC/VDC                                        |
| TF24-SR        | Spring return 18 in-lb (2 Nm), 2-10 VDC proportional control, 24 VAC/VDC                            |
| TF24-MFT       | Spring return 18 in-lb (2 Nm), programmable (2-10 VDC default) control, 24 VAC/VDC                  |
| LF24           | Spring return 35 in-lb (4 Nm), two-position, 24 VAC/VDC, two-wire control                           |
| LF120          | Spring return 35 in-lb (4 Nm), two-position, 120 VAC, two-wire control                              |
| LF24-3         | Spring return 35 in-lb (4 Nm), tri-state control, 24 VAC/VDC                                        |
| LF24-SR        | Spring return 35 in-lb (4 Nm), 2-10 VDC proportional control, 24 VAC/VDC                            |
| LF24-MFT       | Spring return 35 in-lb (4 Nm), programmable (2-10 VDC default) control, 24 VAC/VDC                  |
| NFB24          | Spring return 90 in-lb (10 Nm), two-position, 24 VAC/VDC, two-wire control                          |
| NFBUP          | Spring return 90 in-lb (10 Nm), two-position, 24-240 VAC, 24-125 VDC, two-wire control              |
| NFBUP-S-N4     | Spring return 90 in-lb (10 Nm), two-pos., 24-240 VAC, 24-125 VDC, two-wire, aux. switch, N4 housing |
| NFB24-SR       | Spring return 90 in-lb (10 Nm), 2-10 VDC proportional control, 24 VAC/VDC                           |
| NFB24-MFT      | Spring return 90 in-lb (10 Nm), programmable (2-10 VDC default) control, 24 VAC/VDC                 |
| NFB24-MFT-S-N4 | Spring return 90 in-lb (10 Nm), prog. (2-10 VDC default), 24 VAC/VDC, aux. switch, N4 housing       |
| AFBUP          | Spring return 180 in-lb (20 Nm), two-position, 24-240 VAC, 24-125 VDC, two-wire control             |
| AFBUP-N4       | Spring return 180 in-lb (20 Nm), two-position, 24-240 VAC, 24-125 VDC, two-wire, N4 housing         |
| AFBUP-S-N4     | Spring return 180 in-lb (20 Nm), two-pos., 24-240 VAC, 24-125 VDC, aux. switch, N4 housing          |
| AFB24-MFT      | Spring return 180 in-lb (20 Nm), programmable (2-10 VDC default), 24 VAC/VDC                        |
| AFB24-MFT-S-N4 | Spring return 180 in-lb (20 Nm), prog. (2-10 VDC default), 24 VAC/VDC, aux. switch, N4 housing      |
| AFB24-MFT95    | Spring return 180 in-lb (20 Nm), programmable (135 ohm default) control, 24 VAC/VDC                 |
| EFB24          | Spring return 270 in-lb (30 Nm), two-position, 24 VAC/VDC, two-wire control                         |
| EFB24-N4       | Spring return 270 in-lb (30 Nm), two-position, 24 VAC/VDC, N4 housing                               |
| EFB24-S-N4     | Spring return 270 in-lb (30 Nm), two-pos., 24 VAC/VDC, aux. switches, N4 housing                    |
| EFB120         | Spring return 270 in-lb (30 Nm), two-position, 120 VAC, two-wire control                            |
| EFB120-S-N4    | Spring return 270 in-lb (30 Nm), two-pos., 120 VAC, aux. switches, N4 housing                       |
| EFB24-SR       | Spring return 270 in-lb (30 Nm), 2-10 VDC proportional control, 24 VAC/VDC                          |
| EFB24-SR-N4    | Spring return 270 in-lb (30 Nm), 2-10 VDC prop., 24 VAC/VDC, N4 housing                             |
| EFB24-SR-S-N4  | Spring return 270 in-lb (30 Nm), 2-10 VDC prop., 24 VAC/VDC, aux. switches, N4 housing              |
| EFB24-MFT      | Spring return 270 in-lb (30 Nm), programmable (2-10 VDC default), 24 VAC/VDC                        |
| EFB24-MFT-S-N4 | Spring return 270 in-lb (30 Nm), prog. (2-10 VDC default), 24 VAC/VDC, aux. switches, N4 housing    |

#### NOTES:

- 1) Most models available with internal auxiliary switches; order with -S suffix (N4 models are shown with -S included).
- 2) MFT models can be ordered pre-configured at Kele if other than default configuration is needed; add -C suffix and specify custom configuration parameters or MFT code.

### ACCESSORIES

### PAGE

|        |                                                                                          |    |
|--------|------------------------------------------------------------------------------------------|----|
| AV6-20 | Shaft extension for 1/4" to 3/4" diameter shafts, 6.7" length, for LF/TF actuators       |    |
| AV8-25 | Shaft extension for 5/16" to 1" diameter shafts, 9.8" length, for LF, NFB, AFB actuators |    |
| KH-AFB | Crank arm for shafts to 3/4", for AFB/NFB actuators                                      |    |
| KH-LF  | Crank arm for shafts to 1/2", for LF actuators                                           |    |
| ZG-100 | Right angle mounting bracket for AFB/NFB and AMB/GMB actuators                           | 37 |
| ZG-102 | Tandem actuator mounting bracket for AF/AFB/GMB actuators                                | 37 |
| ZG-112 | Floor mount bracket, vertical, for LF actuators                                          | 37 |
| ZG-113 | Floor mount bracket for TF actuators                                                     |    |
| ZG-118 | Channel mounting bracket for NFB/AFB actuators                                           |    |
| ZG-JSL | Jackshaft linkage for AFB/NFB and AMB/NMB                                                |    |
| ZG-R01 | 500Ω, 1/2W, 1% resistor                                                                  | 37 |



# ACTUATORS & DAMPERS

## DIRECT COUPLED ACTUATORS SPRING RETURN

### MS SERIES

#### DESCRIPTION

The **MS Series** high-performance spring return direct coupled actuators from Honeywell are designed and tested to provide reliable spring return control for dampers and valves. The **MS Series** has an excellent feature set that combines flexibility and simplicity.

#### FEATURES

- Self-centering shaft adapter for steady operation
- Auto adapt on modulating models for stroke precision
- Selector switch for proportional or floating control
- Detachable wiring cover



MS7510



MS8103A

**Honeywell**



#### COMMON SPECIFICATIONS

|                        |                                            |                              |                                        |
|------------------------|--------------------------------------------|------------------------------|----------------------------------------|
| <b>Input Impedance</b> | 100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA        | <b>Spring Return Time</b>    | 25 seconds                             |
| <b>Motor</b>           | DC with brushes                            | <b>27, 44 in-lb</b>          | 20 seconds                             |
| <b>2-position</b>      | Brushless DC                               | <b>88, 175 in-lb</b>         | Manual crank (88, 175 in-lb only)      |
| <b>Modulating</b>      | Enclosed terminals                         | <b>Manual Override</b>       | <50 db @ 3' (1m)                       |
| <b>Wiring</b>          |                                            | <b>Noise</b>                 | 60,000 cycles, 1.5 million repositions |
| <b>Action</b>          |                                            | <b>Life Expectancy</b>       |                                        |
| <b>2-position</b>      | Mounting orientation direct/reverse acting | <b>Operating Temperature</b> | -22° to 150°F (-30° to 65°C)           |
| <b>Modulating</b>      | Switch selectable direct/reverse acting    | <b>MSxx03, xx05 2-pos.</b>   | -40° to 150°F (-40° to 65°C)           |
| <b>Rotation</b>        | 95°, ±3°                                   | <b>MSxx03, xx05 Mod.</b>     | -40° to 140°F (-40° to 60°C)           |
| <b>Drive Time</b>      |                                            | <b>MXxx10, xx20</b>          | 5 to 95% RH                            |
| <b>2-position</b>      | 45 seconds                                 | <b>Operating Humidity</b>    | NEMA 2 (IP54)                          |
| <b>Modulating</b>      | 90 seconds                                 | <b>Enclosure Rating</b>      | UL, cUL, CE, C-tick, plenum rated      |
|                        |                                            | <b>Approvals</b>             | 5 years                                |
|                        |                                            | <b>Warranty</b>              |                                        |

#### INDIVIDUAL SPECIFICATIONS

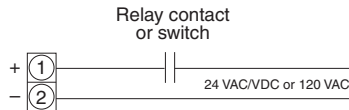
| Model       | Torque            | Supply Voltage                | Supply VA | Control Signal                 | Feedback   | Auxiliary Switch |
|-------------|-------------------|-------------------------------|-----------|--------------------------------|------------|------------------|
| MS8103A1030 | 27 in-lb (3 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 7 VA      | Two-position                   | None       | None             |
| MS8103A1130 | 27 in-lb (3 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 7 VA      | Two-position                   | None       | One SPDT         |
| MS4103A1030 | 27 in-lb (3 Nm)   | 120 VAC, 50/60 Hz             | 10 VA     | Two-position                   | None       | None             |
| MS4103A1130 | 27 in-lb (3 Nm)   | 120 VAC, 50/60 Hz             | 10 VA     | Two-position                   | None       | One SPDT         |
| MS7503A2030 | 27 in-lb (3 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 7 VA      | Prop. VDC/mA, 2-pos., floating | 0/2-10 VDC | None             |
| MS7503A2130 | 27 in-lb (3 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 7 VA      | Prop. VDC/mA, 2-pos., floating | 0/2-10 VDC | One SPDT         |
| MS8105A1030 | 44 in-lb (5 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 8 VA      | Two-position                   | None       | None             |
| MS8105A1130 | 44 in-lb (5 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 8 VA      | Two-position                   | None       | One SPDT         |
| MS4105A1030 | 44 in-lb (5 Nm)   | 120 VAC, 50/60 Hz             | 11 VA     | Two-position                   | None       | None             |
| MS4105A1130 | 44 in-lb (5 Nm)   | 120 VAC, 50/60 Hz             | 11 VA     | Two-position                   | None       | One SPDT         |
| MS7505A2030 | 44 in-lb (5 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 8 VA      | Prop. VDC/mA, 2-pos., floating | 0/2-10 VDC | None             |
| MS7505A2130 | 44 in-lb (5 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 8 VA      | Prop. VDC/mA, 2-pos., floating | 0/2-10 VDC | One SPDT         |
| MS8110A1008 | 88 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-30 VDC | 30 VA     | Two-position                   | None       | None             |
| MS8110A1206 | 88 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-30 VDC | 30 VA     | Two-position                   | None       | Two SPDT         |
| MS4110A1002 | 88 in-lb (10 Nm)  | 120 VAC, 50/60 Hz             | 45 VA     | Two-position                   | None       | None             |
| MS4110A1200 | 88 in-lb (10 Nm)  | 120 VAC, 50/60 Hz             | 45 VA     | Two-position                   | None       | Two SPDT         |
| MS7510A2008 | 88 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-30 VDC | 14 VA     | Prop. VDC/mA, 2-pos., floating | 0/2-10 VDC | None             |
| MS7510A2206 | 88 in-lb (10 Nm)  | 20-28 VAC 50/60 Hz, 22-30 VDC | 14 VA     | Prop. VDC/mA, 2-pos., floating | 0/2-10 VDC | Two SPDT         |
| MS8120A1007 | 175 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC | 40 VA     | Two-position                   | None       | None             |
| MS8120A1205 | 175 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC | 40 VA     | Two-position                   | None       | Two SPDT         |
| MS4120A1001 | 175 in-lb (20 Nm) | 120 VAC, 50/60 Hz             | 60 VA     | Two-position                   | None       | None             |
| MS4120A1209 | 175 in-lb (20 Nm) | 120 VAC, 50/60 Hz             | 60 VA     | Two-position                   | None       | Two SPDT         |
| MS7520A2007 | 175 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC | 16 VA     | Prop. VDC/mA, 2-pos., floating | 0/2-10 VDC | None             |
| MS7520A2205 | 175 in-lb (20 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC | 16 VA     | Prop. VDC/mA, 2-pos., floating | 0/2-10 VDC | Two SPDT         |



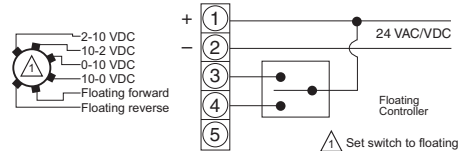
### DIMENSIONS

| Model          | Dimensions                                   | Maximum Shaft Diameter | Minimum Shaft Length | Weight          |
|----------------|----------------------------------------------|------------------------|----------------------|-----------------|
| MSxx03, MSxx05 | 3.2"H x 3.9"W x 7.0"L (8.0 x 10.0 x 17.7 cm) | 0.6" (1.6 cm)          | 1.0" (2.5 cm)        | 3.5 lb (1.6 kg) |
| MSxx10, MSxx20 | 2.9"H x 3.9"W x 9.8"L (7.5 x 10.0 x 25.0 cm) | 1.06" (2.7 cm)         | 1.0" (2.5 cm)        | 7.0 lb (3.2 kg) |

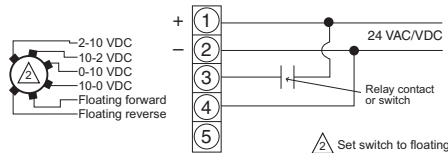
### WIRING



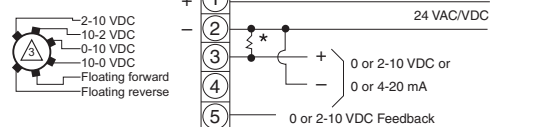
**MS81xx, MS41xx**  
**Two-position Control**



**MS75xx**  
**Floating Control**

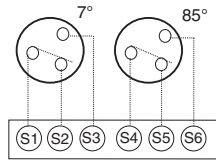


**MS75xx**  
**Two-position Control**

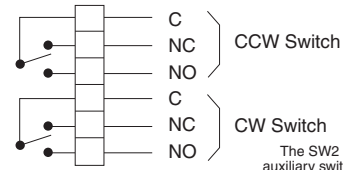


\*ZG-R01 500Ω, 1/2W or greater resistor required when control signal is 0/4-20 mA

**MS75xx**  
**Proportional Control**



**Internal Auxiliary Switch**  
Dual shown; 27 and 44 in-lb models have only one auxiliary switch.  
Switch ratings: 250 VAC, 5A resistive,  
must use same power source on both contact sets



**SW2 Auxiliary Switch Kit**  
The SW2 is a field-adaptable auxiliary switch kit that fits only the 88 and 175 in-lb actuators  
Switch ratings: Adjustable between 5 and 85 degrees,  
24 VAC/VDC, 5A resistive, 3A inductive

### ORDERING INFORMATION

| MODEL       | DESCRIPTION                                                                      |
|-------------|----------------------------------------------------------------------------------|
| MS8103A1030 | Spring return, 27 in-lb (3 Nm), two-position, 24 VAC, two-wire control           |
| MS8103A1130 | Spring return, 27 in-lb (3 Nm), two-position, 24 VAC, two-wire, 1 aux sw.        |
| MS4103A1030 | Spring return, 27 in-lb (3 Nm), two-position, 120 VAC, two-wire control          |
| MS4103A1130 | Spring return, 27 in-lb (3 Nm), two-position, 120 VAC, two-wire, 1 aux sw.       |
| MS7503A2030 | Spring return, 27 in-lb (3 Nm), modulating control (proportional or tri-state)   |
| MS7503A2130 | Spring return, 27 in-lb (3 Nm), modulating control (prop/tri-state), 1 aux sw.   |
| MS8105A1030 | Spring return, 44 in-lb (5 Nm), two-position, 24 VAC, two-wire control           |
| MS8105A1130 | Spring return, 44 in-lb (5 Nm), two-position, 24 VAC, two-wire, 1 aux sw.        |
| MS4105A1030 | Spring return, 44 in-lb (5 Nm), two-position, 120 VAC, two-wire control          |
| MS4105A1130 | Spring return, 44 in-lb (5 Nm), two-position, 120 VAC, two-wire, 1 aux sw.       |
| MS7505A2030 | Spring return, 44 in-lb (5 Nm), modulating control (proportional or tri-state)   |
| MS7505A2130 | Spring return, 44 in-lb (5 Nm), modulating control (prop/tri-state), 1 aux sw.   |
| MS8110A1008 | Spring return, 88 in-lb (10 Nm), two-position, 24 VAC, two-wire control          |
| MS8110A1206 | Spring return, 88 in-lb (10 Nm), two-position, 24 VAC, two-wire, 2 aux sw.       |
| MS4110A1002 | Spring return, 88 in-lb (10 Nm), two-position, 120 VAC, two-wire control         |
| MS4110A1200 | Spring return, 88 in-lb (10 Nm), two-position, 120 VAC, two-wire, 2 aux sw.      |
| MS7510A2008 | Spring return, 88 in-lb (10 Nm), modulating control (proportional or tri-state)  |
| MS7510A2206 | Spring return, 88 in-lb (10 Nm), modulating control (prop/tri-state), 2 aux sw.  |
| MS8120A1007 | Spring return, 175 in-lb (20 Nm), two-position, 24 VAC, two-wire control         |
| MS8120A1205 | Spring return, 175 in-lb (20 Nm), two-position, 24 VAC, two-wire, 2 aux sw.      |
| MS4120A1001 | Spring return, 175 in-lb (20 Nm), two-position, 120 VAC, two-wire control        |
| MS4120A1209 | Spring return, 175 in-lb (20 Nm), two-position, 120 VAC, two-wire, 2 aux sw.     |
| MS7520A2007 | Spring return, 175 in-lb (20 Nm), modulating control (proportional or tri-state) |
| MS7520A2205 | Spring return, 175 in-lb (20 Nm), modulating control (prop/tri-state), 2 aux sw. |

| ACCESSORIES  | PAGE |
|--------------|------|
| 32004254-002 | 55   |
| 50000407-001 | 43   |
| 50001194-001 | 37   |
| SW2          | 43   |
| ZG-R01       | 37   |



# ACTUATORS & DAMPERS

## DIRECT COUPLED ACTUATORS SPRING RETURN

**GMA, GCA SERIES**

**SIEMENS**



GMA, GCA Series



### DESCRIPTION

Siemens **GMA** and **GCA Series** direct coupled spring return actuators provide control for a complete range of HVAC spring return damper applications. They are available in either 62 in-lb (7 Nm) torque, handling approximately 16 sq ft of damper area, or 142 in-lb (16 Nm) torque, handling approximately 36 sq ft of damper area. These actuators are available in all standard control signal types and offer a wide variety of options and accessories.

### FEATURES

- **Self-centering shaft coupling**
- **Brushless DC motor technology on all models**
- **Rugged, lightweight metal housing**
- **Manual override on all models**
- **Integral conduit connection**

### COMMON SPECIFICATIONS

|                     |                                                                                                                       |                              |                                        |
|---------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------------|
| <b>Motor Wiring</b> | Brushless DC<br>3 ft (1.0 m), 18 AWG plenum cable (.1P models); 3 ft (1.0 m), 18 AWG standard cable (.1U models)      | <b>Manual Override</b>       | Manual crank                           |
| <b>Action</b>       | Mounting orientation direct/reverse acting (2-pos., floating); Switch selectable direct/reverse acting (proportional) | <b>Life Expectancy</b>       | 60,000 cycles, 1.5 million repositions |
| <b>Rotation</b>     | 95°                                                                                                                   | <b>Operating Temperature</b> | -25° to 130°F (-32° to 55°C)           |
|                     |                                                                                                                       | <b>Operating Humidity</b>    | 5 to 95% RH                            |
|                     |                                                                                                                       | <b>Approvals</b>             | cULus, CE, plenum rated                |
|                     |                                                                                                                       | <b>Warranty</b>              | 2 years                                |

### INDIVIDUAL SPECIFICATIONS

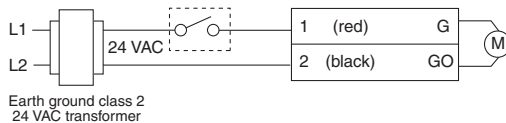
| Model            | Torque            | Supply Voltage                     | Supply VA | Control Signal   | Input Impedance                     | Feedback | Drive Time | Spring Return Time |
|------------------|-------------------|------------------------------------|-----------|------------------|-------------------------------------|----------|------------|--------------------|
| <b>GMA121.1P</b> | 62 in-lb (7 Nm)   | 24 VAC ±20%, 50/60 Hz, 24 VDC ±15% | 5 VA      | Two-position     |                                     | None     | 90 seconds | 15 seconds         |
| <b>GMA131.1P</b> | 62 in-lb (7 Nm)   | 24 VAC ±20%, 50/60 Hz, 24 VDC ±15% | 5 VA      | Floating         |                                     | None     | 90 seconds | 15 seconds         |
| <b>GMA151.1P</b> | 62 in-lb (7 Nm)   | 24 VAC ±20%, 50/60 Hz, 24 VDC ±15% | 5 VA      | Prop. 0/2-10 VDC | 100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA | 1 kΩ     | 90 seconds | 15 seconds         |
| <b>GMA161.1P</b> | 62 in-lb (7 Nm)   | 24 VAC ±20%, 50/60 Hz, 24 VDC ±15% | 5 VA      | Prop. 0-10 VDC   | 100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA | 1 kΩ     | 90 seconds | 15 seconds         |
| <b>GMA221.1U</b> | 62 in-lb (7 Nm)   | 120 VAC, ±10%, 50/60 Hz            | 5 VA      | Two-position     |                                     | None     | 90 seconds | 15 seconds         |
| <b>GCA121.1P</b> | 142 in-lb (16 Nm) | 24 VAC ±20%, 50/60 Hz, 24 VDC ±10% | 8 VA      | Two-position     |                                     | None     | 90 seconds | 15 seconds         |
| <b>GCA131.1P</b> | 142 in-lb (16 Nm) | 24 VAC ±20%, 50/60 Hz, 24 VDC ±10% | 8 VA      | Floating         |                                     | None     | 90 seconds | 15 seconds         |
| <b>GCA151.1P</b> | 142 in-lb (16 Nm) | 24 VAC ±20%, 50/60 Hz, 24 VDC ±10% | 9 VA      | Prop. 0/2-10 VDC | 100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA | 1 kΩ     | 90 seconds | 15 seconds         |
| <b>GCA161.1P</b> | 142 in-lb (16 Nm) | 24 VAC ±20%, 50/60 Hz, 24 VDC ±10% | 9 VA      | Prop. 0-10 VDC   | 100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA | 1 kΩ     | 90 seconds | 15 seconds         |
| <b>GCA221.1U</b> | 142 in-lb (16 Nm) | 120 VAC, ±10%, 50/60 Hz            | 9 VA      | Two-position     |                                     | None     | 90 seconds | 15 seconds         |



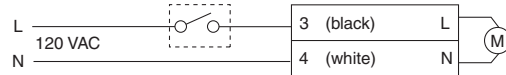
### DIMENSIONS

| Model      | Torque            | Dimensions                                       | Maximum Shaft Diameter | Minimum Shaft Length | Enclosure Rating | Weight          |
|------------|-------------------|--------------------------------------------------|------------------------|----------------------|------------------|-----------------|
| <b>GMA</b> | 62 in-lb (7 Nm)   | 2.7"H x 3.3"W x 8.4"L<br>(6.8 x 8.3 x 21.2 cm)   | 0.75" (2.0 cm)         | 0.75" (2.0 cm)       | NEMA 1 (IP54)    | 2.9 lb (1.3 kg) |
| <b>GCA</b> | 142 in-lb (16 Nm) | 2.9"H x 4.8"W x 12.0"L<br>(7.3 x 12.1 x 30.5 cm) | 1.0" (2.6 cm)          | 0.75" (2.0 cm)       | NEMA 2 (IP54)    | 4.8 lb (2.2 kg) |

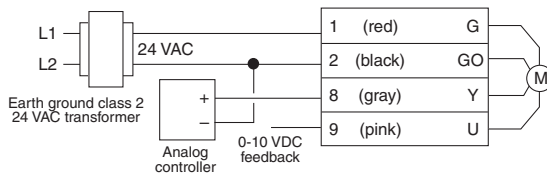
### WIRING



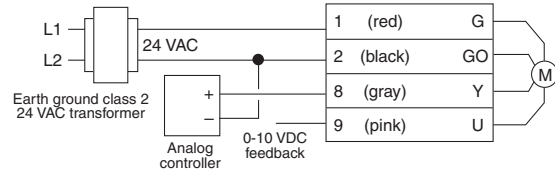
**GMA12x, GCA12x**  
**24 VAC Two-position control**



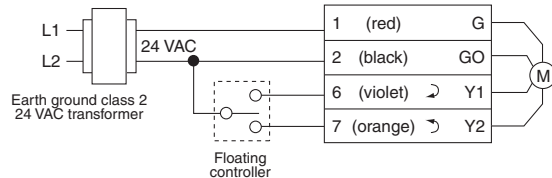
**GMA22x, GCA22x**  
**120 VAC Two-position control**



**GMA15x, GCA15x**  
**4-20 mA control**



**GMA16x, GCA16x**  
**0-10 VDC control**



**GMA13x, GCA13x**  
**Floating control**

### ORDERING INFORMATION

#### MODEL

**GMA121.1P**  
**GMA131.1P**  
**GMA151.1P**  
**GMA161.1P**  
**GMA221.1U**  
**GCA121.1P**  
**GCA131.1P**  
**GCA151.1P**  
**GCA161.1P**  
**GCA221.1U**

#### DESCRIPTION

Spring return 62 in-lb (7 Nm), 24 VAC/VDC, 2-pos. control, plenum cable  
Spring return 62 in-lb (7 Nm), tri-state control, plenum cable  
Spring return 62 in-lb (7 Nm), 2-10 VDC prop. control, 0-1K ohm feedback, plenum cable  
Spring return 62 in-lb (7 Nm), 0-10 VDC prop. control, 0-1K ohm feedback, plenum cable  
Spring return 62 in-lb (7 Nm), 120 VAC, 2-pos control, standard cable  
Spring return 142 in-lb (16 Nm), 24 VAC/VDC, 2-pos. control, plenum cable  
Spring return 142 in-lb (16 Nm), tri-state control, plenum cable  
Spring return 142 in-lb (16 Nm), 0/2-10 VDC prop. control, 0-1K ohm feedback, plenum cable  
Spring return 142 in-lb (16 Nm), 0-10 VDC prop. control, 0-1K ohm feedback, plenum cable  
Spring return 142 in-lb (16 Nm), 120 VAC, 2-pos control, standard cable

#### ACCESSORIES

**ASC77.2U**  
**ASK71.11**  
**ASK71.1U**  
**ASK71.2U**  
**ASK71.4**  
**ASK75.1U**  
**ASK75.3U**

Auxiliary switch kit (DPDT) for GCA/GMA actuators  
Combined foot mount/frame mount kit for GEB/GMA actuators  
Floor mount kit for GCA/GBB/GIB actuators  
Frame mount kit for GCA/GBB/GIB actuators  
Linear stroke kit for GEB/GMA actuators  
Weather shield for GBB/GIB/GCA actuators  
Weather shield for GEB/GMA actuators



# ACTUATORS & DAMPERS

## DIRECT COUPLED ACTUATORS SPRING RETURN

### M9200 SERIES

#### DESCRIPTION

Johnson Controls **M9200 Series** spring return actuators are designed to position return air, exhaust air, or outside air dampers. Torques range from 27 to 177 in-lbs and available control signals are two-position (on/off), tri-state (floating), and proportional.

#### FEATURES

- **Reversible mounting design**
- **Electronic stall detection**
- **Models with auxiliary switches available (i.e. -AGC, -GGC, etc.)**
- **Minimum 60,000 cycles life expectancy**



M9203



M9208



M9210, M9220



#### COMMON SPECIFICATIONS

|                           |                                                                                              |
|---------------------------|----------------------------------------------------------------------------------------------|
| <b>Input Impedance</b>    | 200 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA                                                          |
| <b>Motor</b>              | Brushless DC                                                                                 |
| <b>Wiring</b>             | 18 AWG, 120" (3m), plenum leads (-2 models); 18 AWG, 48" (1.2m), appliance cable (-3 models) |
| <b>Conduit Connection</b> | 1/2" conduit connectors (M9203 only); Integral 3/8" flex connectors (all others)             |
| <b>Action</b>             | Select by wiring (2-pos./floating); Switch or hub re-position (proportional)                 |
| <b>Rotation</b>           | 95° (M9203, M9208); 93° (M9210, M9220)                                                       |
| <b>Manual Override</b>    | Manual crank (M9210, M9220 only)                                                             |
| <b>Noise</b>              | <55 db (M9203); <52 db (M9208); <40 db                                                       |

**Resolution**  
**Life Expectancy**  
**Operating Temperature**

(M9210/M9220 2-pos.); <66 db (M9210/M9220 floating/prop.)  
120 steps  
60,000 cycles, 1.5 million repositions  
-40° to 140°F (-40° to 60°C) (M9203, M9208); -40° to 131°F (-40° to 55°C) (M9210, M9220)  
0 to 95% RH  
NEMA 2 (IP54)  
cULus, CE (M9203, M9208); UL, CE, CSA, C-tick (M9210, M9220)  
5 years

**Operating Humidity**  
**Enclosure Rating**  
**Approvals**

**Warranty**

#### INDIVIDUAL SPECIFICATIONS

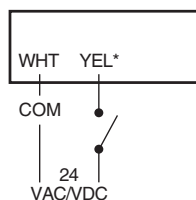
| Model               | Torque            | Supply Voltage                       | Supply VA | Control Signal          | Feedback   | Drive Time       | Spring Return Time |
|---------------------|-------------------|--------------------------------------|-----------|-------------------------|------------|------------------|--------------------|
| <b>M9203-AGA-2Z</b> | 27 in-lb (3 Nm)   | 24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10% | 4.7 VA    | Tri-state, two-position | None       | 90 seconds       | 25 seconds         |
| <b>M9203-BGA-2</b>  | 27 in-lb (3 Nm)   | 24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10% | 5.0 VA    | Two-position            | None       | 75 seconds       | 25 seconds         |
| <b>M9203-GGA-2Z</b> | 27 in-lb (3 Nm)   | 24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10% | 5.1 VA    | Prop. 2-10 VDC, 4-20 mA | 0/2-10 VDC | 150 seconds      | 25 seconds         |
| <b>M9208-AGA-x</b>  | 70 in-lb (80 Nm)  | 24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10% | 7.9 VA    | Two-position, floating  | None       | 150 seconds      | 18 to 24 seconds   |
| <b>M9208-BGA-x</b>  | 70 in-lb (80 Nm)  | 24 VAC ± 25%, 50/60 Hz, 24 VDC ± 10% | 6.1 VA    | Two-position            | None       | 75 seconds       | 13 to 26 seconds   |
| <b>M9208-GGA-x</b>  | 70 in-lb (80 Nm)  | 24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10% | 7.9 VA    | Prop. 2-10 VDC, 4-20 mA | 0/2-10 VDC | 150 seconds      | 18 to 24 seconds   |
| <b>M9210-AGA-3</b>  | 89 in-lb (10 Nm)  | 24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10% | 9.6 VA    | Two-position, floating  | None       | 150 seconds      | 26 seconds         |
| <b>M9210-BAA-3</b>  | 89 in-lb (10 Nm)  | 120 VAC, +10%/-15%, 60 Hz            | 25 VA     | Two-position            | None       | 150 seconds      | 11 to 15 seconds   |
| <b>M9210-BGA-3</b>  | 89 in-lb (10 Nm)  | 24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10% | 17.7 VA   | Two-position            | None       | 24 to 57 seconds | 11 to 15 seconds   |
| <b>M9210-GGA-3</b>  | 89 in-lb (10 Nm)  | 24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10% | 9.6 VA    | Prop. 2-10 VDC, 4-20 mA | 0/2-10 VDC | 150 seconds      | 26 seconds         |
| <b>M9210-HGA-3</b>  | 89 in-lb (10 Nm)  | 24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10% | 9.6 VA    | Floating                | None       | 150 seconds      | 26 seconds         |
| <b>M9220-AGA-3</b>  | 177 in-lb (20 Nm) | 24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10% | 15.5 VA   | Two-position, floating  | None       | 150 seconds      | 20 seconds         |
| <b>M9220-BAA-3</b>  | 177 in-lb (20 Nm) | 120 VAC, +10%/-15%, 60 Hz            | 25 VA     | Two-position            | None       | 24 to 57 seconds | 11 to 15 seconds   |
| <b>M9220-BGA-3</b>  | 177 in-lb (20 Nm) | 24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10% | 24.6 VA   | Two-position            | None       | 24 to 57 seconds | 11 to 15 seconds   |
| <b>M9220-GGA-3</b>  | 177 in-lb (20 Nm) | 24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10% | 15.5 VA   | Prop. 2-10 VDC, 4-20 mA | 0/2-10 VDC | 150 seconds      | 20 seconds         |
| <b>M9220-HGA-3</b>  | 177 in-lb (20 Nm) | 24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10% | 15.5 VA   | Floating                | None       | 150 seconds      | 20 seconds         |



### DIMENSIONS

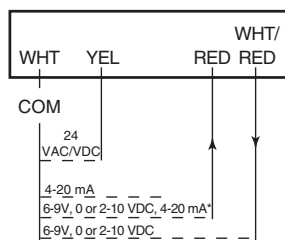
| Model                    | Dimensions                                    | Maximum Shaft Diameter | Minimum Shaft Length | Weight          |
|--------------------------|-----------------------------------------------|------------------------|----------------------|-----------------|
| <b>M9203</b>             | 3.2"H x 3.2"W x 6.4"L (7.6 x 3.3 x 21.1 cm)   | 0.63" (1.6 cm)         | 1.7" (5.2 cm)        | 4.2 lb (1.9 kg) |
| <b>M9208</b>             | 3.2"H x 3.2"W x 6.4"L (7.6 x 3.3 x 21.1 cm)   | 0.63" (1.6 cm)         | 1.7" (5.2 cm)        | 4.2 lb (1.9 kg) |
| <b>M9210/M9220, 24V</b>  | 3.3"H x 4.0"W x 10.3"L (8.4 x 10.2 x 26.2 cm) | 0.75" (1.9 cm)         | 1.2" (3.0 cm)        | 6.4 lb (2.9 kg) |
| <b>M9210/M9220, 120V</b> | 3.3"H x 4.0"W x 10.3"L (8.4 x 10.2 x 26.2 cm) | 0.75" (1.9 cm)         | 1.2" (3.0 cm)        | 7.6 lb (3.5 kg) |

### WIRING



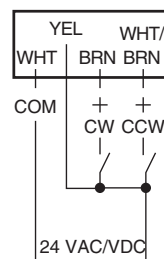
\*For AGA models, this wire color is BRN.

**M9206-, M9210-, M9220-BGA/AGA Two-position**

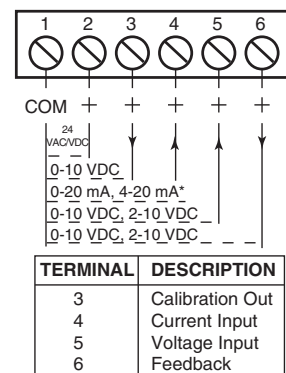


\*500 Ω resistor required

**M9206-, M9210-, M9220-GGA Proportional**



**M9206-, M9210-, M9220-AGA Tri-state/Two-position**



\*500Ω resistor required

**Proportional**

### ORDERING INFORMATION

| Model               | Description                                                                             |
|---------------------|-----------------------------------------------------------------------------------------|
| <b>M9203-AGA-2Z</b> | Spring return 27 in-lb (3 Nm), two-position and tri-state control, 10 ft. plenum cable  |
| <b>M9203-BGA-2</b>  | Spring return 27 in-lb (3 Nm), two-position control, 4 ft. cable                        |
| <b>M9203-GGA-2Z</b> | Spring return 27 in-lb (3 Nm), 0/2-10 VDC proportional control, 10 ft. plenum cable     |
| <b>M9208-AGA-2</b>  | Spring return 70 in-lb (8 Nm), two-position and tri-state control, 10 ft. plenum cable  |
| <b>M9208-AGA-3</b>  | Spring return 70 in-lb (8 Nm), two-position and tri-state control, 4 ft. cable          |
| <b>M9208-BGA-2</b>  | Spring return 70 in-lb (8 Nm), two-position control, 10 ft. plenum cable                |
| <b>M9208-BGA-3</b>  | Spring return 70 in-lb (8 Nm), two-position control, 4 ft. cable                        |
| <b>M9208-GGA-2</b>  | Spring return 70 in-lb (8 Nm), 0/2-10 VDC proportional control, 10 ft. plenum cable     |
| <b>M9208-GGA-3</b>  | Spring return 70 in-lb (8 Nm), 0/2-10 VDC proportional control, 4 ft. cable             |
| <b>M9210-AGA-3</b>  | Spring return 89 in-lb (10 Nm), two-position and tri-state control, 4 ft. cable         |
| <b>M9210-BAA-3</b>  | Spring return 89 in-lb (10 Nm), 120 VAC two-position, two-wire control, 4 ft. cable     |
| <b>M9210-BGA-3</b>  | Spring return 89 in-lb (10 Nm), 24 VAC/VDC two-position, two-wire control, 4 ft. cable  |
| <b>M9210-GGA-3</b>  | Spring return 89 in-lb (10 Nm), 0 or 2-10 VDC proportional control, 4 ft. cable         |
| <b>M9210-HGA-3</b>  | Spring return 89 in-lb (10 Nm), floating control, 4 ft. cable                           |
| <b>M9220-AGA-3</b>  | Spring return 177 in-lb (20 Nm), two-position and tri-state control, 4 ft. cable        |
| <b>M9220-BAA-3</b>  | Spring return 177 in-lb (20 Nm), 120 VAC two-position, two-wire control, 4 ft. cable    |
| <b>M9220-BGA-3</b>  | Spring return 177 in-lb (20 Nm), 24 VAC/VDC two-position, two-wire control, 4 ft. cable |
| <b>M9220-GGA-3</b>  | Spring return 177 in-lb (20 Nm), 0 or 2-10 VDC proportional control, 4 ft. cable        |
| <b>M9220-HGA-3</b>  | Spring return 177 in-lb (20 Nm), floating control, 4 ft. cable                          |

### ACCESSORIES

|                  |                                                                        |
|------------------|------------------------------------------------------------------------|
| <b>M9000-115</b> | Universal mounting kit for M9203 includes crankarm                     |
| <b>M9000-158</b> | Tandem mount kit for M9132/M9220 actuators                             |
| <b>M9000-171</b> | Floor mount linkage kit for M9210 and M9220 actuators                  |
| <b>M9000-321</b> | Weathershield kit for M9203 and M9208 actuators on damper applications |
| <b>M9220-600</b> | Jackshaft coupler, 1", for M9210 and M9220                             |
| <b>M9220-603</b> | Adjustable stop kit for M9210 and M9220 proportional control actuators |



# ACTUATORS & DAMPERS

## DIRECT COUPLED ACTUATORS SPRING RETURN

**MA, MF, MS SERIES**

2

ACTUATORS & DAMPERS

### DESCRIPTION

The Schneider Electric **DuraDrive™ Series** direct coupled, spring return actuators accept two-position, tri-state, or proportional control signals from a DDC control system or a thermostat and are designed to provide years of trouble-free control for HVAC dampers.

### FEATURES

- **Direct mount to round or square shaft**
- **NEMA 4 models available**
- **Overload protection on all models**



**Schneider**  
Electric



### COMMON SPECIFICATIONS

|                           |                                                                                         |                                   |                                                                            |
|---------------------------|-----------------------------------------------------------------------------------------|-----------------------------------|----------------------------------------------------------------------------|
| <b>Input Impedance</b>    | 80 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA (proportional models)                                | <b>Manual Override Resolution</b> | Crank (MA41, MF41, MS41 models) 100 steps                                  |
| <b>Motor</b>              | DC with brushes (MA40-70xx, MA41-70xx, MF40-70xx, MF41-70xx); Brushless DC (all others) | <b>Operating Temperature</b>      | -22° to 140°F (-30° to 60°C)                                               |
| <b>Wiring</b>             | 3-foot cable, 18 AWG                                                                    | <b>Operating Humidity</b>         | 5 to 95% RH                                                                |
| <b>Conduit Connection</b> | 1/2" FNPT                                                                               | <b>Enclosure Rating</b>           | NEMA 2 (IP54) (35, 60, 133 in-lb models), NEMA 4 (IP56) (150 in-lb models) |
| <b>Action</b>             | Mounting orientation direct/reverse acting                                              | <b>Approvals</b>                  | UL, CE, cUL (varies by model)                                              |
| <b>Rotation</b>           | 95° ±5°                                                                                 | <b>Warranty</b>                   | 5 years                                                                    |

### INDIVIDUAL SPECIFICATIONS

| Model            | Torque            | Supply Voltage                | Supply VA | Control Signal          | Feedback | Drive Time  | Spring Return Time |
|------------------|-------------------|-------------------------------|-----------|-------------------------|----------|-------------|--------------------|
| <b>MA40-7043</b> | 35 in-lb (4 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 4.4 VA    | Two-position            | None     | 50 seconds  | 26 seconds         |
| <b>MA40-7040</b> | 35 in-lb (4 Nm)   | 120 VAC 50/60 Hz              | 4.3 VA    | Two-position            | None     | 50 seconds  | 26 seconds         |
| <b>MF40-7043</b> | 35 in-lb (4 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 5.9 VA    | Floating                | None     | 130 seconds | 25 seconds         |
| <b>MS40-7043</b> | 35 in-lb (4 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 5.9 VA    | Prop. 2-10 VDC, 4-20 mA | 2-10 VDC | 130 seconds | 25 seconds         |
| <b>MA41-7073</b> | 60 in-lb (7 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 4.8 VA    | Two-position            | None     | 80 seconds  | 40 seconds         |
| <b>MA41-7070</b> | 60 in-lb (7 Nm)   | 120 VAC 50/60 Hz              | 5.6 VA    | Two-position            | None     | 80 seconds  | 40 seconds         |
| <b>MF41-7073</b> | 60 in-lb (7 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 6.2 VA    | Floating                | None     | 195 seconds | 30 seconds         |
| <b>MS41-7073</b> | 60 in-lb (7 Nm)   | 20-28 VAC 50/60 Hz, 22-30 VDC | 5.8 VA    | Prop. 2-10 VDC, 4-20 mA | 2-10 VDC | 195 seconds | 30 seconds         |
| <b>MA41-7153</b> | 133 in-lb (15 Nm) | 24 VAC ±20%, 22 to 30 VDC     | 9.7 VA    | Two-position            | None     | 190 seconds | 30 seconds         |
| <b>MA41-7150</b> | 133 in-lb (15 Nm) | 120 VAC 50/60 Hz              | 10.0 VA   | Two-position            | None     | 190 seconds | 30 seconds         |
| <b>MF41-7153</b> | 133 in-lb (15 Nm) | 24 VAC ±20%, 22 to 30 VDC     | 9.7 VA    | Floating                | None     | 190 seconds | 30 seconds         |
| <b>MS41-7153</b> | 133 in-lb (15 Nm) | 24 VAC ±20%, 22 to 30 VDC     | 9.7 VA    | Prop. 2-10 VDC, 4-20 mA | 2-10 VDC | 190 seconds | 30 seconds         |
| <b>MA40-7173</b> | 150 in-lb (17 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC | 9.6 VA    | Two-position            | None     | 145 seconds | 75 seconds         |
| <b>MA40-7170</b> | 150 in-lb (17 Nm) | 120 VAC 50/60 Hz              | 11.4 VA   | Two-position            | None     | 145 seconds | 75 seconds         |
| <b>MF40-7173</b> | 150 in-lb (17 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC | 10.0 VA   | Floating                | None     | 145 seconds | 75 seconds         |
| <b>MS40-7173</b> | 150 in-lb (17 Nm) | 20-28 VAC 50/60 Hz, 22-30 VDC | 9.4 VA    | Prop. 2-10 VDC, 4-20 mA | None     | 145 seconds | 75 seconds         |
| <b>MS40-7170</b> | 150 in-lb (17 Nm) | 120 VAC 50/60 Hz              | 11.1 VA   | Prop. 2-10 VDC, 4-20 mA | None     | 145 seconds | 75 seconds         |

# ACTUATORS & DAMPERS

## DIRECT COUPLED ACTUATORS SPRING RETURN

MA, MF, MS SERIES



2

ACTUATORS & DAMPERS

### DIMENSIONS

| Model     | Torque            | Dimensions                                     | Maximum Shaft Diameter | Minimum Shaft Length | Weight           |
|-----------|-------------------|------------------------------------------------|------------------------|----------------------|------------------|
| MA40-7043 | 35 in-lb (4 Nm)   | 3.5"H x 4.0"W x 6.8"L (8.8 x 10.1 x 17.2 cm)   | 0.63" (1.6 cm)         | 3.75" (9.5 cm)       | 4.5 lb (2.0 kg)  |
| MA40-7040 | 35 in-lb (4 Nm)   | 3.5"H x 4.0"W x 6.8"L (8.8 x 10.1 x 17.2 cm)   | 0.63" (1.6 cm)         | 3.75" (9.5 cm)       | 4.5 lb (2.0 kg)  |
| MF40-7043 | 35 in-lb (4 Nm)   | 3.5"H x 4.0"W x 6.8"L (8.8 x 10.1 x 17.2 cm)   | 0.63" (1.6 cm)         | 3.75" (9.5 cm)       | 4.5 lb (2.0 kg)  |
| MS40-7043 | 35 in-lb (4 Nm)   | 3.5"H x 4.0"W x 6.8"L (8.8 x 10.1 x 17.2 cm)   | 0.63" (1.6 cm)         | 3.75" (9.5 cm)       | 4.5 lb (2.0 kg)  |
| MA41-7073 | 60 in-lb (7 Nm)   | 3.5"H x 4.0"W x 10.5"L (8.8 x 10.1 x 26.7 cm)  | 0.75" (1.9 cm)         | 3.75" (9.5 cm)       | 7.5 lb (3.4 kg)  |
| MA41-7070 | 60 in-lb (7 Nm)   | 3.5"H x 4.0"W x 10.5"L (8.8 x 10.1 x 26.7 cm)  | 0.75" (1.9 cm)         | 3.75" (9.5 cm)       | 7.5 lb (3.4 kg)  |
| MF41-7073 | 60 in-lb (7 Nm)   | 3.5"H x 4.0"W x 10.5"L (8.8 x 10.1 x 26.7 cm)  | 0.75" (1.9 cm)         | 3.75" (9.5 cm)       | 7.5 lb (3.4 kg)  |
| MS41-7073 | 60 in-lb (7 Nm)   | 3.5"H x 4.0"W x 10.5"L (8.8 x 10.1 x 26.7 cm)  | 0.75" (1.9 cm)         | 3.75" (9.5 cm)       | 7.5 lb (3.4 kg)  |
| MA41-7153 | 133 in-lb (15 Nm) | 3.5"H x 4.0"W x 10.5"L (8.8 x 10.1 x 26.7 cm)  | 0.75" (1.9 cm)         | 3.75" (9.5 cm)       | 7.5 lb (3.4 kg)  |
| MA41-7150 | 133 in-lb (15 Nm) | 3.5"H x 4.0"W x 10.5"L (8.8 x 10.1 x 26.7 cm)  | 0.75" (1.9 cm)         | 3.75" (9.5 cm)       | 7.5 lb (3.4 kg)  |
| MF41-7153 | 133 in-lb (15 Nm) | 3.5"H x 4.0"W x 10.5"L (8.8 x 10.1 x 26.7 cm)  | 0.75" (1.9 cm)         | 3.75" (9.5 cm)       | 7.5 lb (3.4 kg)  |
| MS41-7153 | 133 in-lb (15 Nm) | 3.5"H x 4.0"W x 10.5"L (8.8 x 10.1 x 26.7 cm)  | 0.75" (1.9 cm)         | 3.75" (9.5 cm)       | 7.5 lb (3.4 kg)  |
| MA40-7173 | 150 in-lb (17 Nm) | 4.0"H x 4.0"W x 10.8"L (10.2 x 10.2 x 27.5 cm) | 1.05" (1.7 cm)         | 3.5" (8.9 cm)        | 10.5 lb (4.8 kg) |
| MA40-7170 | 150 in-lb (17 Nm) | 4.0"H x 4.0"W x 10.8"L (10.2 x 10.2 x 27.5 cm) | 1.05" (1.7 cm)         | 3.5" (8.9 cm)        | 10.5 lb (4.8 kg) |
| MF40-7173 | 150 in-lb (17 Nm) | 4.0"H x 4.0"W x 10.8"L (10.2 x 10.2 x 27.5 cm) | 1.05" (1.7 cm)         | 3.5" (8.9 cm)        | 10.5 lb (4.8 kg) |
| MS40-7173 | 150 in-lb (17 Nm) | 4.0"H x 4.0"W x 10.8"L (10.2 x 10.2 x 27.5 cm) | 1.05" (1.7 cm)         | 3.5" (8.9 cm)        | 10.5 lb (4.8 kg) |
| MS40-7170 | 150 in-lb (17 Nm) | 4.0"H x 4.0"W x 10.8"L (10.2 x 10.2 x 27.5 cm) | 1.05" (1.7 cm)         | 3.5" (8.9 cm)        | 10.5 lb (4.8 kg) |

### WIRING

|                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Power source<br/>24 VAC or 120 VAC</p> <p>Neutral (1)<br/>Hot (2)</p> <p>SPST control contact</p> <p>MA40-7000 (35 or 150 in-lb)<br/>MA41-7000 (60 or 133 in-lb)<br/>Two-position Control</p>                                                                                   | <p>24 VAC transformer<br/>Line Voltage</p> <p>(black) Common<br/>(red) Hot<br/>(blue) Drive open<br/>(yellow/black) Drive closed<br/>(green/yellow) Ground</p> <p>MF4x-7043/7073<br/>7153/7173</p> <p>MF40-7000 (35 or 150 in-lb)<br/>MF41-7000 (60 or 133 in-lb)<br/>Floating Control</p> |
| <p>4-20 mA</p> <p>unused (wire nut)<br/>500Ω<br/>+ IN<br/>500Ω Common</p> <p>Power Source<br/>24 VAC or 120 VAC</p> <p>Neutral<br/>Hot<br/>Ground</p> <p>Connected in 24 VAC units only</p> <p>MS40-7000 (35 or 150 in-lb)<br/>MS41-7000 (60 or 133 in-lb)<br/>4-20 mA Control</p> | <p>2-10 VDC</p> <p>unused (wire nut)<br/>500Ω<br/>+ IN<br/>Common</p> <p>Power Source<br/>24 VAC or 120 VAC</p> <p>Neutral<br/>Hot<br/>Ground</p> <p>Connected in 24 VAC units only</p> <p>MS40-7000 (35 or 150 in-lb)<br/>MS41-7000 (60 or 133 in-lb)<br/>2-10 VDC Control</p>            |

### ORDERING INFORMATION

#### MODEL

MA40-7043  
MA40-7040  
MF40-7043  
MS40-7043  
MA41-7073  
MA41-7070  
MF41-7073  
MS41-7073  
MA41-7153  
MA41-7150  
MF41-7153  
MS41-7153  
MA40-7173  
MA40-7170  
MF40-7173  
MS40-7173  
MS40-7170

#### DESCRIPTION

Spring return 35 in-lb (4 Nm), two-position, 24 VAC, two-wire control  
Spring return 35 in-lb (4 Nm), two-position, 120 VAC, two-wire control  
Spring return 35 in-lb (4 Nm), floating, 24 VAC  
Spring return 35 in-lb (4 Nm), proportional control, 24 VAC  
Spring return 60 in-lb (7 Nm), two-position, 24 VAC, two-wire control  
Spring return 60 in-lb (7 Nm), two-position, 120 VAC, two-wire control  
Spring return 60 in-lb (7 Nm), tri-state control, 24 VAC  
Spring return 60 in-lb (7 Nm), proportional control, 24 VAC  
Spring return 133 in-lb (15 Nm), two-position, 24 VAC, two-wire control  
Spring return 133 in-lb (15 Nm), two-position, 120 VAC, two-wire control  
Spring return 133 in-lb (15 Nm), tri-state control, 24 VAC  
Spring return 133 in-lb (15 Nm), proportional control, 24 VAC  
Spring return 150 in-lb (17 Nm), two-position, 24 VAC, two-wire control  
Spring return 150 in-lb (17 Nm), two-position, 120 VAC, two-wire control  
Spring return 150 in-lb (17 Nm), floating, 24 VAC  
Spring return 150 in-lb (17 Nm), proportional control, 24 VAC  
Spring return 150 in-lb (17 Nm), proportional control, 120 VAC



# ACTUATORS & DAMPERS

## FIRE AND SMOKE DAMPER ACTUATORS

**MLXX15, MSXX09, MSXX20 SERIES**

### DESCRIPTION

Honeywell fire and smoke damper actuators are designed to meet both UL-555 and UL-555S 350°F safety requirements for combined fire and smoke applications. The fast-acting actuators close dampers in 15-20 seconds, and the integral spring return ensures the consistent, proper level of torque.

### FEATURES

- **Designed to meet UL-555 and UL-555S requirements**
- **Robust die-cast aluminum housing for protection and long service life**
- **Maximum spring return timing of 15-20 seconds**
- **Reliably built by the industry leader**
- **Energy-saving patented design**
- **No audible noise during holding**

### APPLICATION

Fire and Smoke actuator replacement must be installed correctly, per local codes, and approved by the Local Authority Having Jurisdiction (AHJ). Honeywell recommends following all local, state and national codes for periodic testing of the entire smoke control system. Refer to National



**ML4115B1008**



**MS4120F1006**

**Honeywell**

**NEW!**



Fire Protection Association (NFPA) National Fire Codes NFPA90A, NFPA92A, and NFPA92B for the application. NFPA recommends periodic examination of each fire/smoke damper (annually or semi-annually) to ensure proper performance.

### COMMON SPECIFICATIONS

|                                  |                                                                    |                              |                              |
|----------------------------------|--------------------------------------------------------------------|------------------------------|------------------------------|
| <b>Control Signal</b>            | Two-position                                                       | <b>Noise</b>                 |                              |
| <b>Motor</b>                     | DC with brushes                                                    | <b>MLxx15</b>                | 65 dBA @ 3' (1.0 m)          |
| <b>Wiring</b>                    |                                                                    | <b>MSxx09</b>                | 80 dBA @ 3' (1.0 m)          |
| <b>MLxx15, MSxx09 (24V/120V)</b> |                                                                    | <b>MSxx20</b>                | 70 dBA @ 3' (1.0 m)          |
|                                  | 16" 2-conductor leads and 7/8" knockout holes for conduit fittings | <b>Life Expectancy</b>       |                              |
| <b>MSxx09 (230V)</b>             | 3' appliance cable and 7/8" knockout holes for conduit fittings    | <b>MLxx15, MSxx09</b>        | 60,000 cycles                |
| <b>MSxx20</b>                    | 3' high-temperature Teflon lead and 3/8" flex conduit connections  | <b>MSxx20</b>                | 30,000 cycles                |
| <b>Action</b>                    |                                                                    | <b>Operating Temperature</b> |                              |
| <b>MLxx15, MSxx09</b>            | Spring return CCW or Spring return CW                              | <b>MLxx15, MSxx09</b>        | 0° to 130°F (-18° to 55°C)   |
| <b>MSxx20</b>                    | CW/CCW mounting method                                             | <b>MSxx20</b>                | -40° to 130°F (-40° to 55°C) |
| <b>Rotation</b>                  | 95° ±3°, mechanically limited                                      | <b>Operating Humidity</b>    | 5 to 95% RH, non-condensing  |
|                                  |                                                                    | <b>Approvals</b>             | CE, C-TICK, cULus            |
|                                  |                                                                    | <b>Warranty</b>              | 5 years                      |

### DIMENSIONS

| Model         | Torque            | Dimensions                                       | Maximum Shaft Diameter | Minimum Shaft Length | Weight          | Enclosure Rating |
|---------------|-------------------|--------------------------------------------------|------------------------|----------------------|-----------------|------------------|
| <b>MLxx15</b> | 30 in-lb (3.4 Nm) | 3.3"H x 5.1"W x 7.5"L<br>(8.4 x 13.0 x 19.2 cm)  | 0.5" (1.3 cm)          | 1.8" (4.5 cm)        | 5.0 lb (2.3 kg) | NEMA 1 (IP54)    |
| <b>MSxx09</b> | 80 in-lb (9 Nm)   |                                                  |                        |                      |                 |                  |
| <b>MSxx20</b> | 175 in-lb (20 Nm) | 2.9"W x 3.9"W x 10.7"L<br>(7.5 x 10.0 x 27.1 cm) | 1.03" (2.6 cm)         | 1.0" (2.5 cm)        | 7.0 lb (3.2 kg) | NEMA 2 (IP54)    |



#### INDIVIDUAL SPECIFICATIONS

| Model       | Torque               | Supply Voltage                 | Supply VA                       | Supply Current                  | Supply Watts                | Auxiliary Switch       | Drive Time | Spring Return Time                    |
|-------------|----------------------|--------------------------------|---------------------------------|---------------------------------|-----------------------------|------------------------|------------|---------------------------------------|
| ML8115A1005 | 30 in-lb<br>(3.4 Nm) | 24 VAC +20%,<br>-10%, 50/60 Hz | 16 VA running,<br>8 VA holding  |                                 |                             | Accessory 32003532-005 | 25 seconds | 15 seconds                            |
| ML8115B1004 |                      |                                |                                 |                                 |                             |                        |            |                                       |
| ML4115A1009 |                      | 120 VAC +10%,<br>60 Hz         |                                 | 0.18A running, 0.11A<br>holding | 18W running,<br>9W holding  |                        |            |                                       |
| ML4115B1008 |                      |                                |                                 |                                 |                             |                        |            |                                       |
| MS8209F1003 | 80 in-lb<br>(9 Nm)   | 24 VAC +20%,<br>-10%, 50/60 Hz | 23 VA running,<br>7 VA holding  |                                 |                             |                        |            | 20 seconds                            |
| MS8309F1001 |                      |                                |                                 |                                 |                             |                        |            |                                       |
| MS4209F1007 |                      | 120 VAC +10%,<br>-15%, 60 Hz   |                                 | 0.25A running, 0.13A<br>holding | 23W running,<br>7W holding  |                        |            |                                       |
| MS4309F1005 |                      |                                |                                 |                                 |                             |                        |            |                                       |
| MS4709F1014 |                      | 230 VAC ± 10%,<br>50/60 Hz     |                                 | 0.13A running, 0.09A<br>holding |                             |                        |            |                                       |
| MS4809F1012 |                      |                                |                                 |                                 |                             |                        |            |                                       |
| MS8120F1002 | 175 in-lb<br>(20 Nm) | 24 VAC +20%,<br>-10%, 50/60 Hz | 45 VA running,<br>10 VA holding |                                 |                             | 15 seconds             | 15 seconds |                                       |
| MS8120F1200 |                      |                                |                                 |                                 |                             |                        |            | None                                  |
| MS4120F1006 |                      | 120 VAC +10%,<br>60 Hz         |                                 | 0.35A running, 0.15A<br>holding | 35W running,<br>10W holding |                        |            | 2 SPST, 5A res., 3A ind. @<br>250 VAC |
| MS4120F1204 |                      |                                |                                 |                                 |                             |                        |            | None                                  |
| MS4620F1005 |                      | 230 VAC +10%,<br>50/60 Hz      |                                 | 0.20A running, 0.14A<br>holding | 35W running,<br>10W holding |                        |            | None                                  |
| MS4620F1203 |                      |                                |                                 |                                 |                             |                        |            | 2 SPST, 5A res., 3A ind. @<br>250 VAC |

#### ORDERING INFORMATION

##### MODEL

**ML8115A1005**  
**ML8115B1004**  
**ML4115A1009**  
**ML4115B1008**  
**MS8209F1003**  
**MS8309F1001**  
**MS4209F1007**  
**MS4309F1005**  
**MS4709F1014**  
**MS4809F1012**  
**MS8120F1002**  
**MS8120F1200**  
**MS4120F1006**  
**MS4120F1204**  
**MS4620F1005**  
**MS4620F1203**

##### DESCRIPTION

Fire/smoke actuator, 30 in-lb, 24 VAC, SR-CCW  
 Fire/smoke actuator, 30 in-lb, 24 VAC, SR-CW  
 Fire/smoke actuator, 30 in-lb, 120 VAC, SR-CCW  
 Fire/smoke actuator, 30 in-lb, 120 VAC, SR-CW  
 Fire/smoke actuator, 80 in-lb, 24 VAC, SR-CW  
 Fire/smoke actuator, 80 in-lb, 24 VAC, SR-CCW  
 Fire/smoke actuator, 80 in-lb, 120 VAC, SR-CW  
 Fire/smoke actuator, 80 in-lb, 120 VAC, SR-CCW  
 Fire/smoke actuator, 80 in-lb, 230 VAC, SR-CW  
 Fire/smoke actuator, 80 in-lb, 230 VAC, SR-CCW  
 Fire/smoke actuator, 175 in-lb, 24 VAC  
 Fire/smoke actuator, 175 in-lb, 24 VAC, 2 aux. sw.  
 Fire/smoke actuator, 175 in-lb, 120 VAC  
 Fire/smoke actuator, 175 in-lb, 120 VAC, 2 aux. sw.  
 Fire/smoke actuator, 175 in-lb, 230 VAC  
 Fire/smoke actuator, 175 in-lb, 230 VAC, 2 aux. sw.

##### ACCESSORIES

**205649** Surface mounting bracket (not supplied with actuator) for MLxx15, MSxx09  
**201391** Shaft adapter for 3/8" shafts  
**32003532-005** Auxiliary switch, dual SPDT, for MLxx15, MSxx09 fire/smoke actuators



# ACTUATORS & DAMPERS

## FIRE AND SMOKE DAMPER ACTUATORS

*FSLF, FSNF, FSAF SERIES*

2

ACTUATORS & DAMPERS

### DESCRIPTION

Belimo's broad product line of fire and smoke damper actuators covers the established range of system applications including active smoke control for stairwell, under-floor and other pressurization applications.

### FEATURES

- *ISO 9001 Certified Quality Control and a 5-year warranty assure reliable operation*
- *24, 120 and 230 VAC availability to meet various installation requirements*
- *24 VDC model (FSAF only) with 2-position and proportional control for DC power applications*
- *Unique FSAF24-BAL actuator allows duct balancing capabilities in fire and smoke dampers*
- *UL555 and UL555S listed with U.S. damper manufacturers*



FSAF24



FSLF120

**BELIMO**

**NEW!**



### COMMON SPECIFICATIONS

|                        |                                                   |                              |                                                                                                                                |
|------------------------|---------------------------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Motor</b>           | Brushless DC                                      | <b>Operating Temperature</b> |                                                                                                                                |
| <b>Wiring</b>          | 3-foot leads, 18 AWG, 1/2" NPT conduit connection | <b>FSLF, FSNF</b>            | 32° to 122°F (0° to 50°C) normal duty; 3 on/off cycles after 30 minutes at ambient temperature of 350°F (177°C) safety duty;   |
| <b>Feedback</b>        | 2-10 VDC (FSAF24-SR only)                         | <b>FSAF</b>                  | -22° to 122°F (-30° to 50°C) normal duty; 3 on/off cycles after 30 minutes at ambient temperature of 250°F (121°C) safety duty |
| <b>Action</b>          | CW/CCW mounting method                            | <b>Operating Humidity</b>    | 5 to 95% RH                                                                                                                    |
| <b>Rotation</b>        | 95°                                               | <b>Approvals</b>             | cULus                                                                                                                          |
| <b>Manual Override</b> | 3 mm hex crank (FSAF only)                        | <b>Warranty</b>              | 5 years                                                                                                                        |
| <b>Noise</b>           | 40 db drive, 62 db spring                         |                              |                                                                                                                                |
| <b>Life Expectancy</b> | 20,000 cycles per UL555S                          |                              |                                                                                                                                |

### ORDERING INFORMATION AND INDIVIDUAL SPECIFICATIONS

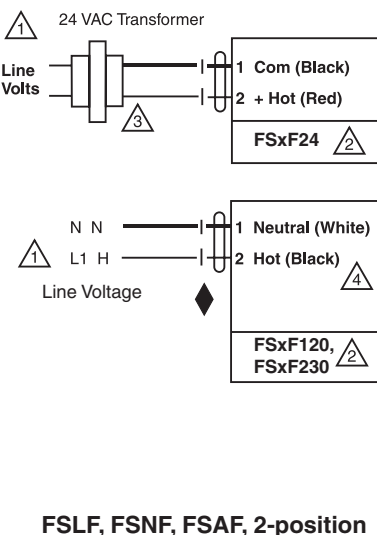
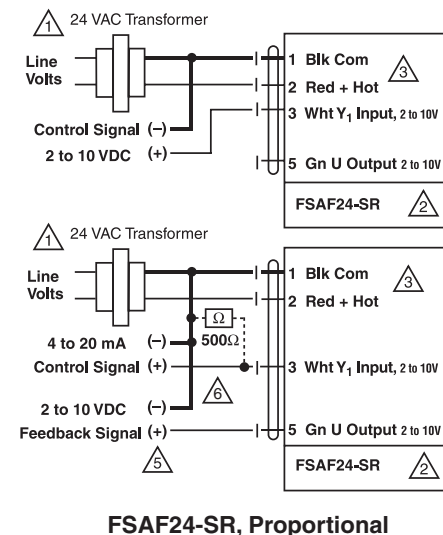
| Model             | Torque            | Supply Voltage | Supply VA | Control Signal                              | Drive Time | Spring Return Time | Weight          |
|-------------------|-------------------|----------------|-----------|---------------------------------------------|------------|--------------------|-----------------|
| <b>FSLF24</b>     | 30 in-lb (3.5 Nm) | 24 VAC         | 5 VA      | Two-position                                | 15 seconds | 15 seconds         | 3.4 lb (1.5 kg) |
| <b>FSLF120</b>    | 30 in-lb (3.5 Nm) | 120 VAC        | 18 VA     | Two-position                                | 15 seconds | 15 seconds         | 4.0 lb (1.8 kg) |
| <b>FSLF230</b>    | 30 in-lb (3.5 Nm) | 230 VAC        | 17 VA     | Two-position                                | 15 seconds | 15 seconds         | 4.0 lb (1.8 kg) |
| <b>FSNF24</b>     | 70 in-lb (7.8 Nm) | 24 VAC         | 27 VA     | Two-position                                | 15 seconds | 15 seconds         | 6.0 lb (2.7 kg) |
| <b>FSNF120</b>    | 70 in-lb (7.8 Nm) | 120 VAC        | 27 VA     | Two-position                                | 15 seconds | 15 seconds         | 6.1 lb (2.8 kg) |
| <b>FSNF230</b>    | 70 in-lb (7.8 Nm) | 230 VAC        | 27 VA     | Two-position                                | 15 seconds | 15 seconds         | 6.1 lb (2.8 kg) |
| <b>FSAF24</b>     | 133 in-lb (15 Nm) | 24 VAC/VDC     | 10 VA     | Two-position                                | 75 seconds | 20 seconds         | 5.7 lb (2.6 kg) |
| <b>FSAF120</b>    | 133 in-lb (15 Nm) | 120 VAC        | 11 VA     | Two-position                                | 75 seconds | 20 seconds         | 6.1 lb (2.8 kg) |
| <b>FSAF230</b>    | 133 in-lb (15 Nm) | 230 VAC        | 11 VA     | Two-position                                | 75 seconds | 20 seconds         | 6.1 lb (2.8 kg) |
| <b>FSAF24-SR</b>  | 133 in-lb (15 Nm) | 24 VAC/VDC     | 11 VA     | Proportional 2-10 VDC, 4-20 mA              | 75 seconds | 20 seconds         | 5.7 lb (2.6 kg) |
| <b>FSAF24-BAL</b> | 133 in-lb (15 Nm) | 24 VAC/VDC     | 10 VA     | Floating/3-position, built-in potentiometer | 75 seconds | 20 seconds         | 5.7 lb (2.6 kg) |

Note: Add "-S" suffix to model number for models with auxiliary contacts: 2 SPST, 3A (0.5 A inductive) @ 125/250 VAC

NEW!

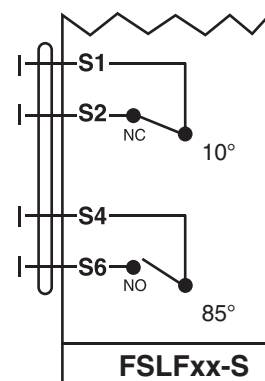
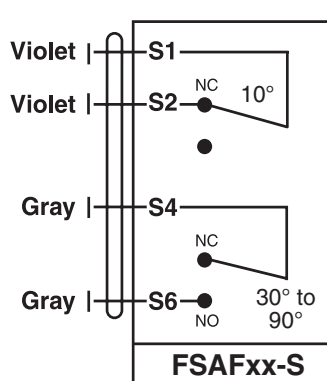
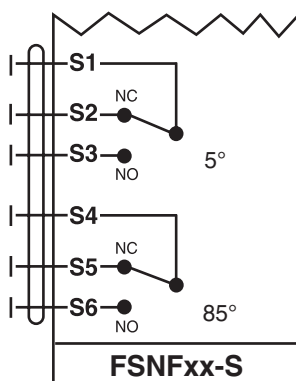
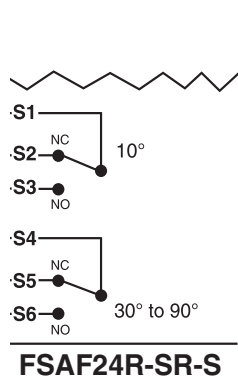


### WIRING



- 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 Actuator may also be powered by 24 VDC.
  - 4 No ground connection required for AF models. Double insulated.
  - 5 Only connect common to neg. (-) leg of control circuits.
  - 6 The ZG-R01-500 Ω resistor converts a 4 to 20 mA control signal to 2 to 10 VDC.
- ◆ AF models meet cULus or UL and CSA Standard requirements without the need of an electrical ground connection. LF and NF high voltage models require ground.
- NOTE:** Refer to Belimo FS Actuators Guide for complete wiring information.

### AUXILIARY SWITCH WIRING



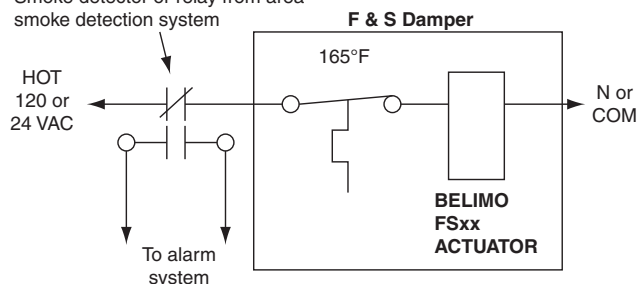
**NOTE:** Refer to Belimo FS Actuators Guide for complete wiring information.

**IMPORTANT:** In most jurisdictions, replacement is considered a normal repair and no permit is required. A record must be kept on site per NFPA 105. UL expects instructions to be used. See [www.belimo.com/firesmoke](http://www.belimo.com/firesmoke). Confirm with Local Authority Having Jurisdiction (AHJ).

### APPLICATION WIRING

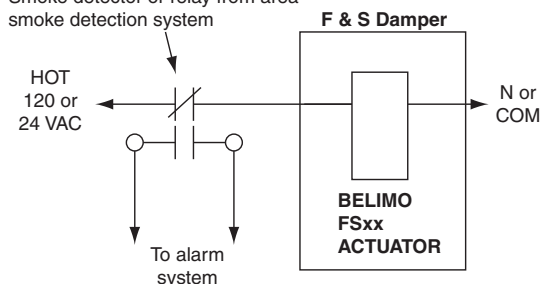
#### Thermal sensor application

Smoke detector or relay from area smoke detection system



#### Fusible link and shaft spring application

Smoke detector or relay from area smoke detection system





# ACTUATORS & DAMPERS

## FIRE AND SMOKE DAMPER ACTUATORS

2

ACTUATORS & DAMPERS

If you've been in the BAS business for more than a couple of years, you've probably run into a smoke damper or combination fire and smoke damper that caused you some grief.

One common occurrence is finding a smoke damper closed with a dead motor after hours of tracing out why a zone had no airflow. Another is making a service call to "replace a faulty actuator" and finding out it's on a smoke damper when you arrive.

The UL Standard for Smoke Dampers (UL 555S) covers the majority of what we find in smoke control products. The UL Standard for Fire Dampers (UL 555) covers combination smoke and fire dampers, which must meet applicable provisions of both standards. Neither of these standards precludes field replacement or substitution of actuators, as field service is not covered within the scope of the UL certification. The most important criterion is that replacement is accomplished "... in accordance with the damper manufacturer's normal field servicing program."

Depending on which marketing report you read, or who you talk to, there are millions (perhaps even as many as tens of millions) of smoke and combination fire/smoke dampers installed in the field today. They are actuated (unlike fire dampers, which are held open with a fusible link and rarely actuated), and codes require that all life safety systems be maintained in proper operating order. Smoke dampers are part of life safety systems.

### WHERE TO START?

- Familiarize yourself, and your team, with the smoke damper codes and local codes. Take a look at UL555, UL555S and research the local practices. NFPA 80 and NFPA 105 are applicable to dampers and doors; get a copy and review them.
- Know your specific job's control system sequence and smoke damper specifics (dimensions, torque, make, UL label, etc); estimate the scope of the repair/replace project.
- Discuss the technical situation and the specific application with the Authority Having Jurisdiction (AHJ), the local Fire Marshal, and the building inspectors. Assure them that the work will be done in accordance with local codes and "... in accordance with the damper manufacturer's normal field servicing program.\*"
- Get the model number and any available information on the actuator being replaced. You may be able to replace it with a like-for-like model or you may need to replace it with new. Actuator replacement really starts with the damper, not the actuator. The same old motor can be applied in several ways, depending on the spring, thermal disc, etc. You will come across some very old models that cannot be directly replaced with a like actuator because they are no longer made or do not meet the new UL standards.



FSLF120



ML4115B1008

- If the actuator has an internal or external spring, and there is a separate thermal sensor/high limit switch with reset, you should be able to replace the spring/actuator with a new model.
- If there are dual springs, one for the fusible link and one for the actuator (older models including Greenheck), you should be able to remove the actuator and its spring while leaving the fusible link and its spring in place.
- Old dampers that use cables and pulleys generally must be replaced entirely; you can't simply replace the actuator.

\* UL Marking and application guide, dampers for fire barrier smoke applications & ceiling dampers (April 2003)



### DESCRIPTION

The **D690 Series** round control dampers are low-leakage, single blade dampers designed for use in conventional air handling system round ductwork. They come standard with an actuator mounting bracket that accommodates the Honeywell ML6161/ML7161/MN6105/MN7505 and the Kele KA-35/KA-44 direct-coupled actuators. The dampers are available for standard same-day shipping from Kele with or without an actuator pre-mounted.

### FEATURES

- **Neoprene seal for tight closing and low leakage**
- **Oilite bearings for long life**
- **Optional Honeywell or Kele actuator pre-mounted**

### APPLICATION

The D690 Series is intended to be used in commercial zoning systems as an individual zone damper controlled by a zone thermostat, or as a bypass damper controlled by a duct static pressure sensor/controller.



D690A1044



D690A1044/KA-35-VAV

**Honeywell**

**NEW!**

2



ACTUATORS & DAMPERS

### ZONE DAMPER APPLICATION

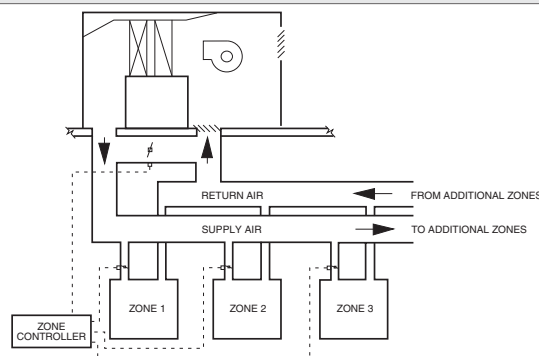


Figure 1

### SPECIFICATIONS

|                                |                                                                                                                        |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Size</b>                    | 6" round through 16" round (even sizes)                                                                                |
| <b>Type</b>                    | Round, single-blade, 90° rotation                                                                                      |
| <b>Shaft</b>                   | 1/2" (1.3 cm) diameter shaft, 3.9" (9.9 cm) length                                                                     |
| <b>Actuator Bracket</b>        | Pre-drilled holes to fit Honeywell or Kele 35 in-lb or 44 in-lb actuators                                              |
| <b>Operating Torque</b>        | Less than 35 in-lb (4 Nm)                                                                                              |
| <b>Maximum Static Pressure</b> | 4" WC (1.0 kPa)                                                                                                        |
| <b>Maximum Velocity</b>        | 2500 ft/min (17.8 m/s)                                                                                                 |
| <b>Leakage Class</b>           | 12.5 cfm per sq. ft. @ 1" WC; 17.6 cfm per sq. ft. @ 2" WC; 21.6 cfm per sq. ft. @ 3" WC; 25.0 cfm per sq. ft. @ 4" WC |
| <b>Frame</b>                   |                                                                                                                        |
| 6" through 10"                 | Mill galvanized, 24 gauge, sleeve-type, spiral duct, crimped on downstream side                                        |
| 12" through 16"                | Mill galvanized, 22 gauge, sleeve-type, spiral duct, crimped on downstream side                                        |
| <b>Bearings</b>                | Flanged bronze oilite, pressed onto frame                                                                              |
| <b>Blade Design</b>            | 16 gage galvanized steel blade with closed-cell neoprene seal                                                          |
| <b>Operating Temperature</b>   | 32° to 130°F (0° to 54°C)                                                                                              |
| <b>Warranty</b>                | 1 year                                                                                                                 |

### PRESSURE DROP AND FLOW RATE

| Model            | Pressure drop "WC (kPa) | Flow rate CFM |
|------------------|-------------------------|---------------|
| <b>D690A1002</b> | 0.05 (0.012)            | 180           |
|                  | 0.075 (0.019)           | 210           |
|                  | 0.10 (0.025)            | 240           |
| <b>D690A1010</b> | 0.05 (0.012)            | 410           |
|                  | 0.075 (0.019)           | 485           |
|                  | 0.10 (0.025)            | 580           |
| <b>D690A1028</b> | 0.05 (0.012)            | 693           |
|                  | 0.075 (0.019)           | 849           |
|                  | 0.10 (0.025)            | 980           |
| <b>D690A1036</b> | 0.05 (0.012)            | 1200          |
|                  | 0.075 (0.019)           | 1460          |
|                  | 0.10 (0.025)            | 1600          |
| <b>D690A1044</b> | 0.05 (0.012)            | 1336          |
|                  | 0.075 (0.019)           | 1636          |
|                  | 0.10 (0.025)            | 1890          |
| <b>D690A1051</b> | 0.05 (0.012)            | 1690          |
|                  | 0.075 (0.019)           | 2080          |
|                  | 0.10 (0.025)            | 2400          |

**NEW!**



# ACTUATORS & DAMPERS

## ROUND DAMPERS D690 SERIES

2

ACTUATORS &amp; DAMPERS

### DIMENSIONS

| Model     | Dimensions               | Weight           |
|-----------|--------------------------|------------------|
| D690A1002 | 6" diameter, 12" length  | 4.5 lb (2.0 kg)  |
| D690A1010 | 8" diameter, 12" length  | 5.9 lb (2.7 kg)  |
| D690A1028 | 10" diameter, 12" length | 7.1 lb (3.2 kg)  |
| D690A1036 | 12" diameter, 13" length | 9.3 lb (4.2 kg)  |
| D690A1044 | 14" diameter, 15" length | 11.7 lb (5.3 kg) |
| D690A1051 | 16" diameter, 17" length | 14.9 lb (6.8 kg) |

Note: Add the following weights when ordering with actuator:

KA-35-P or ML7161A2008 1.3 lb (.59 kg)

KA-35-VAV or ML6161A2009 1.1 lb (.50 kg)

### ORDERING INFORMATION

| Model                 | Description                                                           |
|-----------------------|-----------------------------------------------------------------------|
| D690A1002             | 6" round damper with actuator mounting plate, 12" spiral duct length  |
| D690A1010             | 8" round damper with actuator mounting plate, 12" spiral duct length  |
| D690A1028             | 10" round damper with actuator mounting plate, 12" spiral duct length |
| D690A1036             | 12" round damper with actuator mounting plate, 13" spiral duct length |
| D690A1044             | 14" round damper with actuator mounting plate, 15" spiral duct length |
| D690A1051             | 16" round damper with actuator mounting plate, 17" spiral duct length |
| D690A1002/KA-35-P     | 6" D690A1002 with Kele non-spring return proportional actuator        |
| D690A1010/KA-35-P     | 8" D690A1010 with Kele non-spring return proportional actuator        |
| D690A1028/KA-35-P     | 10" D690A1028 with Kele non-spring return proportional actuator       |
| D690A1036/KA-35-P     | 12" D690A1036 with Kele non-spring return proportional actuator       |
| D690A1044/KA-35-P     | 14" D690A1044 with Kele non-spring return proportional actuator       |
| D690A1051/KA-35-P     | 16" D690A1051 with Kele non-spring return proportional actuator       |
| D690A1002/KA-35-VAV   | 6" D690A1002 with Kele non-spring return floating actuator            |
| D690A1010/KA-35-VAV   | 8" D690A1010 with Kele non-spring return floating actuator            |
| D690A1028/KA-35-VAV   | 10" D690A1028 with Kele non-spring return floating actuator           |
| D690A1036/KA-35-VAV   | 12" D690A1036 with Kele non-spring return floating actuator           |
| D690A1044/KA-35-VAV   | 14" D690A1044 with Kele non-spring return floating actuator           |
| D690A1051/KA-35-VAV   | 16" D690A1051 with Kele non-spring return floating actuator           |
| D690A1002/ML7161A2008 | 6" D690A1002 with Honeywell non-spring return proportional actuator   |
| D690A1010/ML7161A2008 | 8" D690A1010 with Honeywell non-spring return proportional actuator   |
| D690A1028/ML7161A2008 | 10" D690A1028 with Honeywell non-spring return proportional actuator  |
| D690A1036/ML7161A2008 | 12" D690A1036 with Honeywell non-spring return proportional actuator  |
| D690A1044/ML7161A2008 | 14" D690A1044 with Honeywell non-spring return proportional actuator  |
| D690A1051/ML7161A2008 | 16" D690A1051 with Honeywell non-spring return proportional actuator  |
| D690A1002/ML6161A2009 | 6" D690A1002 with Honeywell non-spring return floating actuator       |
| D690A1010/ML6161A2009 | 8" D690A1010 with Honeywell non-spring return floating actuator       |
| D690A1028/ML6161A2009 | 10" D690A1028 with Honeywell non-spring return floating actuator      |
| D690A1036/ML6161A2009 | 12" D690A1036 with Honeywell non-spring return floating actuator      |
| D690A1044/ML6161A2009 | 14" D690A1044 with Honeywell non-spring return floating actuator      |
| D690A1051/ML6161A2009 | 16" D690A1051 with Honeywell non-spring return floating actuator      |

### RELATED PRODUCTS

201052A  
TT-470

Auxiliary switch (1 SPDT) for ML6161/ML7161/KA-35 actuators  
Tilt transducer with 1/2-in crank arm, 4-20 mA loop powered

PAGE

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### DESCRIPTION

**CDRS25 Series** round damper frames are made of 20-gauge welded, galvanized steel, 7" in length. Blades are double-skin galvanized steel, strength-equivalent to 14-gauge steel but lighter to handle. Shaft extensions are half-inch diameter with stainless steel bearings for long life damper actuation. Standard neoprene blade edge seals offer superior low-leakage performance. Optional aluminum or stainless steel construction is available, as well as an actuator mounting bracket.

### FEATURES

- **Round sizes from 4" to 24"**
- **Velocities up to 4000 FPM**
- **Neoprene blade seal standard**
- **20-gauge frame**
- **Two-ply blade, strength equivalent to 14-gauge steel**

### OPERATION

The **CDRS25** is ideal for exhaust air modulation, supply air volume control, zone temperature control, minimum outdoor air intake control, and many other applications in both high-velocity and high-pressure systems. Made specifically for easy installation in spiral ductwork, stiffener beads allow for easy sealing of duct connections.

**RUSKIN**



2

ACTUATORS & DAMPERS

### OPTIONS

- **Edge seals (none, silicon, EPDM, Viton®)**
- **Stainless steel construction**
- **Aluminum construction**
- **Actuator mounting bracket**

| SPECIFICATIONS                 |                                                                          |                              |                                                                                              |
|--------------------------------|--------------------------------------------------------------------------|------------------------------|----------------------------------------------------------------------------------------------|
| <b>Size</b>                    | 4", 5", 6", 7", 8", 9", 10" to 24" (even)                                | <b>Frame</b>                 | Galvanized 20-gauge steel                                                                    |
| <b>Type</b>                    | Round, single-blade, 90° rotation                                        | <b>Bearings</b>              | Stainless steel                                                                              |
| <b>Shaft</b>                   | 1/2" (1.3 cm) diameter shaft, 7" (17.8 cm) length                        | <b>Blade Design</b>          | Riveted double-layer galvanized steel, full blade neoprene seals (standard, others optional) |
| <b>Actuator Bracket</b>        | Optional, galvanized or stainless steel, 5.5"W x 9.3"L (to shaft center) | <b>Operating Temperature</b> | -50° to 250°F (-46° to 121°C)                                                                |
| <b>Operating Torque</b>        | (4xD") + 20 in-lb (with seals); (1.5xD") + 20 in-lb (without seals)      | <b>Dimensions</b>            | 4" through 24" diameter, 7" frame length                                                     |
| <b>Maximum Static Pressure</b> | 10" WC (4" to 6")<br>8" WC (7" to 12")<br>6" WC (>12")                   | <b>Weight</b>                | Approximately 1 lb per inch diameter                                                         |
| <b>Maximum Velocity</b>        | 4000 ft/min (28.5 m/s)                                                   | <b>RoHS Statement</b>        | Yes                                                                                          |
| <b>Leakage Class</b>           | AMCA Class 1 (with seals); 1.4% to 5.5% of maximum flow (without seals)  | <b>Warranty</b>              | 1 year                                                                                       |



# ACTUATORS & DAMPERS

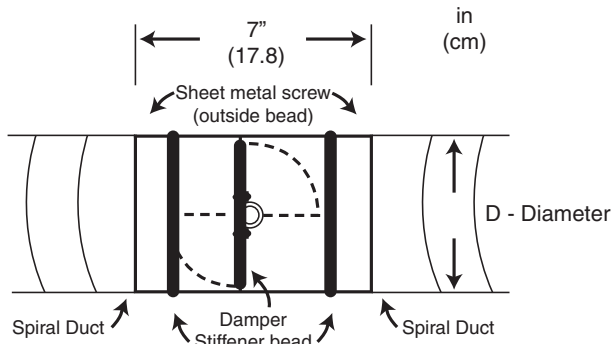
## ROUND CONTROL DAMPERS

### CDRS25 SERIES

2

ACTUATORS & DAMPERS

#### INSTALLATION



#### PERFORMANCE REFERENCE STANDARD PER AMCA

| Pressure/<br>Class | Leakage, FT <sup>3</sup> /MIN/FT <sup>2</sup> (L/S/M <sup>2</sup> ) |              |                        |               |
|--------------------|---------------------------------------------------------------------|--------------|------------------------|---------------|
|                    | Required Rating                                                     |              | Extended Ranges (Opt.) |               |
|                    | 1" (0.25 kPa)                                                       | 4" (1.0 kPa) | 8" (2.0 kPa)           | 12" (3.0 kPa) |
| 1A                 | 3 (15.2)                                                            | 8 (40.6)     | 11 (55.9)              | 14 (71.1)     |
| 1                  | 4 (20.3)                                                            | 8 (40.6)     | 11 (55.9)              | 14 (71.1)     |
| 2                  | 10 (50.8)                                                           | 20 (102)     | 28 (142)               | 35 (178)      |
| 3                  | 40 (203)                                                            | 80 (406)     | 112 (569)              | 140 (711)     |

#### ORDERING INFORMATION

| MODEL                                    | DESCRIPTION                                                                                                                                                                                                                     |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CDRS25G                                  | Round galvanized steel control damper                                                                                                                                                                                           |
| CDRS25A                                  | Round aluminum control damper                                                                                                                                                                                                   |
| CDRS25S                                  | Round 304* stainless steel control damper                                                                                                                                                                                       |
| <b>BLADE SEAL OPTIONS</b>                |                                                                                                                                                                                                                                 |
| N                                        | Standard neoprene seals, AMCA Class 1 leakage                                                                                                                                                                                   |
| X                                        | No blade seals, no leakage class, approximate leakage 1.4% to 5.5% of maximum flow at 4" W.C., not recommended for OSA intake                                                                                                   |
| E                                        | EPDM blade seals, AMCA Class 1 leakage                                                                                                                                                                                          |
| S                                        | Silicone blade seals, 400°F (204°C), AMCA Class 1 leakage                                                                                                                                                                       |
| V                                        | Viton blade seals, AMCA Class 1 leakage                                                                                                                                                                                         |
| <b>AXLE CONSTRUCTION</b>                 |                                                                                                                                                                                                                                 |
| 1                                        | Standard galvanized steel axle, 1/2" diameter, extending 5.5" outside damper                                                                                                                                                    |
| 2                                        | Stainless steel axle, 1/2" diameter, extending 5.5" outside damper (Note: used on all stainless steel dampers)                                                                                                                  |
| <b>MOTOR MOUNTING OPTIONS</b>            |                                                                                                                                                                                                                                 |
| X                                        | No mounting bracket, with 5.5" shaft extension                                                                                                                                                                                  |
| B                                        | Galvanized steel actuator mounting plate, 16 AWG, 5.5"W x 12"L, with 4" shaft extension                                                                                                                                         |
| SSB                                      | Stainless steel actuator mounting plate, 16 AWG, 5.5"W x 12"L, with 4" shaft extension                                                                                                                                          |
| <b>SIZE (OUTSIDE DIAMETER IN INCHES)</b> |                                                                                                                                                                                                                                 |
| (OD)                                     | Duct outside diameter (4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20, 22, 24) inches available<br>Note: All units are furnished approximately 1/8" smaller than the outside diameter dimension to facilitate spiral duct connection. |

**Example:** CDRS25N1B(12) CDRS25 round steel control damper, with seals and actuator mounting plate, 12" diameter.

\* 316 stainless steel also available as special order, call Kele

#### ACCESSORIES

|          |                                                                                                          | PAGE |
|----------|----------------------------------------------------------------------------------------------------------|------|
| TS-470   | Damper position switch with SPDT switch, for 1/2" shaft                                                  | 38   |
| TS-470-2 | Damper position switch with two SPDT switches, for 1/2" shaft                                            | 38   |
| TS-470-P | Damper position switch with SPDT switch, for 1/2" shaft, stainless steel housing, and plenum-rated cable | 38   |
| TS-475   | Non-mercury damper position switch, SPDT, for 1/2" damper shaft                                          | 39   |
| TT-470   | Tilt transducer with 1/2-in crank arm, 4-20 mA loop powered                                              | 40   |



### DESCRIPTION

Ruskin parallel and opposed-blade HVAC control dampers are custom made-to-order. The damper frames are made of galvanized steel in a channel frame construction, offering an equivalent 13-gauge metal strength. The **CD40 Series** has 6" wide V-groove blades that are made of 16-gauge galvanized steel with synthetic bearings. The **CD50** has aluminum airfoil blades with synthetic bearings. **CD60** dampers offer 14-gauge blades.

**CD44** Basic control damper, approximately 4% leakage

**CD45** Standard control damper, AMCA Class 3

**CD46** Low leakage control damper, AMCA Class 2

**CD50** Aluminum frame air foil, ultra-low AMCA Class 1A

**CD60** Steel air foil, ultra-low AMCA Class 1A

**RUSKIN**



CD-46



2

ACTUATORS & DAMPERS

| COMMON SPECIFICATIONS |                                                                                     |                          |                                         |
|-----------------------|-------------------------------------------------------------------------------------|--------------------------|-----------------------------------------|
| <b>Type</b>           | Parallel or opposed blade                                                           | <b>Side Seals</b>        | Self-adjusting steel (CD45, 46, 50, 60) |
| <b>Shaft</b>          | 6"L x 0.5" Dia. (15.2 x 1.3 cm) located on linkage side                             | <b>Linkage</b>           | Concealed in frame                      |
| <b>Frame</b>          | Equivalent 13 gauge galvanized (CD 50 aluminum); 5" face-to-face dimension          | <b>Available Options</b> | Flanges (front and/or rear)             |
| <b>Bearings</b>       | Synthetic                                                                           | <b>Weight</b>            | 7 lbs/sq. ft (shipping weight estimate) |
| <b>Blade Design</b>   | 6" galvanized steel for CD40, CD60; 6" aluminum for CD50; blade pins 0.5" steel hex | <b>RoHS Statement</b>    | Yes                                     |
|                       |                                                                                     | <b>Warranty</b>          | 1 year                                  |

| INDIVIDUAL SPECIFICATIONS          |                                           |                                           |                                           |                                              |                                              |
|------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|----------------------------------------------|----------------------------------------------|
|                                    | CD44                                      | CD45                                      | CD46                                      | CD50                                         | CD60                                         |
| <b>Blades</b>                      | 16-gauge V-groove                         | 16-gauge V-groove                         | 16-gauge V-groove                         | Aluminum airfoil                             | 14-gauge steel airfoil                       |
| <b>Jam seals</b>                   | None                                      | Flexible steel                            | Flexible steel                            | Flexible steel                               | Flexible steel                               |
| <b>Blade seals</b>                 | None                                      | Foam                                      | PVC coated polyester                      | Ruskiprene®                                  | Ruskiprene®                                  |
| <b>Leakage (% of maximum flow)</b> | 2.7 to 4.3% @ 1" WC differential pressure | 0.7 to 1.1% @ 1" WC differential pressure | 0.4 to 0.5% @ 1" WC differential pressure | <8 cfm/sq. ft. @ 4" WC differential pressure | <3 cfm/sq. ft. @ 1" WC differential pressure |
| <b>AMCA Class</b>                  | Not classified                            | Class 3                                   | Class 2                                   | Class 1A                                     | Class 1A                                     |
| <b>Operating Temperature</b>       | -40° to 240°F (-40° to 116°C)             | -25° to 180°F (-32° to 83°C)              | -25° to 180°F (-32° to 83°C)              | -72° to 275°F (-58° to 135°C)                | -72° to 275°F (-58° to 135°C)                |
| <b>Maximum Velocity</b>            | 2000 fpm @ 2.5" WC                        | 2000 fpm @ 2.5" WC                        | 2000 fpm @ 2.5" WC                        | 3000 fpm @ 3.5" WC                           | 3000 fpm @ 3.5" WC                           |
| <b>Torque required</b>             | 2.5 in-lb/sq. ft.                         | 5 in-lb/sq. ft.                           | 7 in-lb/sq. ft.                           | 7 in-lb/sq. ft.                              | 7 in-lb/sq. ft.                              |



# ACTUATORS & DAMPERS

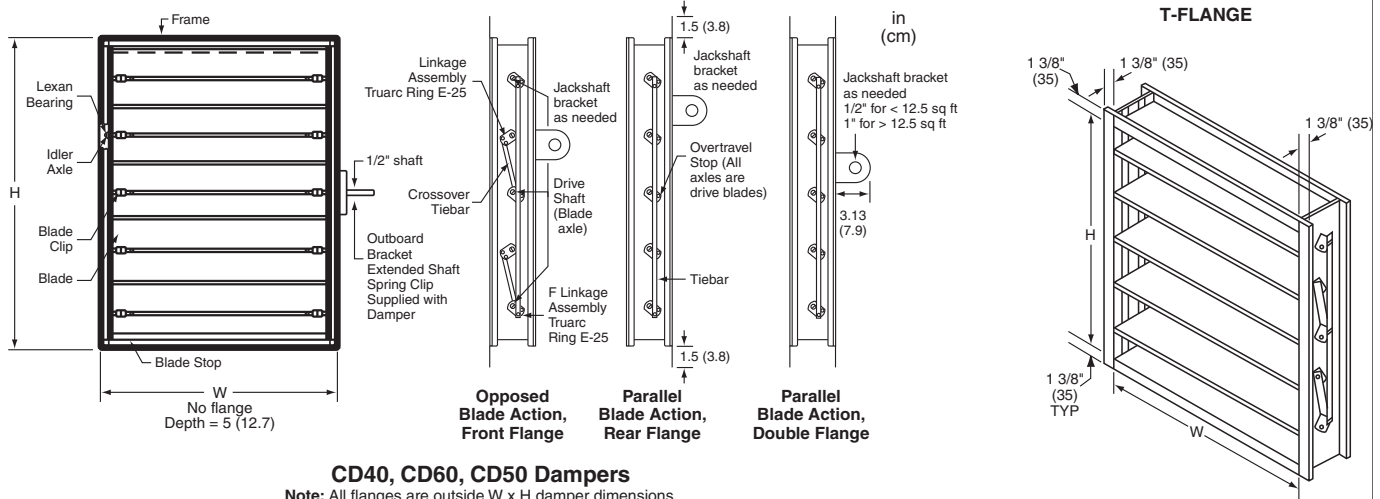
## RECTANGULAR DAMPERS

### CD40, CD50, CD60 SERIES

2

ACTUATORS & DAMPERS

#### DAMPER OPTION DIAGRAMS



#### CD40, CD60, CD50 Dampers

Note: All flanges are outside W x H damper dimensions.

#### ORDERING INFORMATION

| MODEL | DESCRIPTION                                                                                                                                                     |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CD44  | Steel control damper without jamb or blade seals. No leakage class, 4% of maximum flow approximate leakage at 4" W.C., not recommended for OSA intake           |
| CD45  | Steel control damper with flexible stainless steel jamb seals and foam blade seals. AMCA Class 3 leakage, 40 CFM/ft <sup>2</sup> at 1" W.C.                     |
| CD46  | Steel control damper with flexible stainless steel jamb seals and PVC blade seals. Very low AMCA Class 2 leakage, 10 CFM/ft <sup>2</sup> at 1" W.C.             |
| CD50  | Aluminum control damper with flexible stainless steel jamb seals and Ruskiprene® blade seals. Ultra-low AMCA Class 1A leakage, 3 CFM/ft <sup>2</sup> at 1" W.C. |
| CD60  | Steel control damper with flexible stainless steel jamb seals and Ruskiprene® blade seals. Ultra-low AMCA Class 1A leakage, 3 CFM/ft <sup>2</sup> at 1" W.C.)   |

#### BLADE CONFIGURATION

OB Opposed blade (damper must have two blades minimum)

PB Parallel blade (single blade available)

#### MOUNTING OPTIONS

0 No flange

1\* Flange on front of damper, opposite side of jack shaft (if jack shaft included)

2\* Flange on back of damper, same side as jack shaft (if jack shaft included)

3\* Flanges both front and back

4\* T-flange frame option for wafer-style mounting with increased free area (see T-Flange Frame drawing)

#### SPECIAL CONSTRUCTION

X Horizontal blade mounting, no special construction

T\*\* Vertical blade mounting configuration (includes thrust bearings)\*\*

SIZE - WIDTH\*\*\* by HEIGHT in INCHES (0.01" INCREMENTS), PLEASE OBSERVE LIMITS IN THIS TABLE

| (W*** x H) | Model and mounting            | Blade style | Single section † |           | Multi-section †                   |           |
|------------|-------------------------------|-------------|------------------|-----------|-----------------------------------|-----------|
|            |                               |             | Minimum          | Maximum   | Minimum                           | Maximum   |
|            |                               |             |                  |           |                                   |           |
|            | CD4x models horizontal blade: | Opposed     | 5" x 10"         | 48" x 72" | 48" x 72.01"                      | Unlimited |
|            |                               | Parallel    | 5" x 5"          | 48" x 72" | 48" x 72.01"                      | Unlimited |
|            | CD4x models vertical blade:   | Opposed     | 5" x 10"         | 36" x 48" | Special construction -- call Kele |           |
|            |                               | Parallel    | 5" x 5"          | 36" x 48" |                                   |           |
|            | CD50 models horizontal blade: | Opposed     | 6" x 9"          | 60" x 72" | 48" x 72.01"                      | Unlimited |
|            |                               | Parallel    | 6" x 8"          | 60" x 72" | 48" x 72.01"                      | Unlimited |
|            | CD50 models vertical blade:   | Opposed     | 6" x 9"          | 36" x 48" | Special construction -- call Kele |           |
|            |                               | Parallel    | 6" x 8"          | 36" x 48" |                                   |           |
|            | CD60 models horizontal blade: | Opposed     | 8" x 11"         | 60" x 72" | 48" x 72.01"                      | Unlimited |
|            |                               | Parallel    | 8" x 10"         | 60" x 72" | 48" x 72.01"                      | Unlimited |
|            | CD60 models vertical blade:   | Opposed     | 8" x 11"         | 36" x 48" | Special construction -- call Kele |           |
|            |                               | Parallel    | 8" x 10"         | 36" x 48" |                                   |           |

\* All flanges are outside the ordered damper dimension (W x H). See damper option diagrams for flange dimensions.

\*\* Vertical blade construction

\*\*\* Damper width is defined as the outside dimension parallel to the blade(s), regardless of vertical or horizontal orientation.

† Jackshaft is included in all multi-section dampers. Crank arm is not included.

‡ All single-section dampers have 1/2"Ø drive shaft

Example: CD46-OB-0X-12X18 CD46 steel control damper, opposed blade, no flange, standard horizontal construction, 12"W x 18"H



#### DESCRIPTION

Johnson Controls **VD-1300 Series** parallel/opposed blade HVAC Control Dampers are custom made to size requirements. Damper frames are constructed of formed 13-gauge galvanized sheet metal mechanically joined with dual linkage concealed in the side channels to eliminate noise and friction. Compressible spring stainless steel side seals and acetal or bronze bearings are also available. Dampers are available in Class I, II, and III leakage performance grades.

#### FEATURES

- **Three-day construction standard**
- **24-hour fast track shipping available**
- **Tested to over 100,000 cycles**
- **Self-compensating, stainless steel side seals**
- **Blade rotation stops**
- **Square blade pins for non-slip pivoting**



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ACTUATORS & DAMPERS

#### Leakage Resistance

|                |                                                                                                  |
|----------------|--------------------------------------------------------------------------------------------------|
| <b>VD-1310</b> | 17 cfm/sq ft maximum at 1 in. static pressure<br>45 cfm/sq ft maximum at 4 in. static pressure   |
| <b>VD-1320</b> | 3.4 cfm/sq ft maximum at 1 in. static pressure<br>6.0 cfm/sq ft maximum at 4 in. static pressure |
| <b>VD-1330</b> | 2.2 cfm/sq ft maximum at 1 in. static pressure<br>3.7 cfm/sq ft maximum at 4 in. static pressure |

**TABLE 1. LEAKAGE RESISTANCE CLASSES<sup>1</sup>**

| Class      | Static Pressure (inches water) |    |     |     |
|------------|--------------------------------|----|-----|-----|
|            | 1                              | 4  | 8   | 12  |
| <b>IA</b>  | 3                              | -- | --  | --  |
| <b>I</b>   | 4                              | 8  | 11  | 14  |
| <b>II</b>  | 10                             | 20 | 28  | 35  |
| <b>III</b> | 40                             | 80 | 112 | 140 |

1. Maximum allowable leakable in cfm/sq ft is m3/s x 196) for all sizes.

#### GENERAL SPECIFICATIONS

|                     |                                                                                                                                                                                                         |                              |                                                                                                                                                |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type</b>         | Parallel or opposed blade                                                                                                                                                                               | <b>Side Seals</b>            | optional for VD-1320)                                                                                                                          |
| <b>Shaft</b>        | 7"L x 0.5" Dia. (17.8 x 1.3 cm) with holding clip                                                                                                                                                       | <b>Linkage</b>               | Self-adjusting stainless steel                                                                                                                 |
| <b>Frame</b>        | 13 gauge galvanized steel; 3.1" face-to-face dimension                                                                                                                                                  | <b>Operating Temperature</b> | 1/8" zinc-plated rolled steel<br>-40° to 200°F (-40° to 93°C); high temperature option with bronze bearings, silicon seals up to 250°F (121°C) |
| <b>Bearings</b>     | Acetal (bronze optional)                                                                                                                                                                                | <b>Weight</b>                | 7 lbs/sq. ft (shipping weight estimate)                                                                                                        |
| <b>Blade Design</b> | Single 16-gauge galvanized steel (VD-1310); double 22-gauge galvanized (VD-1320); 1/16" extruded aluminum airfoil (VD-1330); blade pins 3/8" square zinc-plated steel; Santoprene blade seals (silicon) | <b>RoHS Statement</b>        | Yes                                                                                                                                            |
|                     |                                                                                                                                                                                                         | <b>Warranty</b>              | 3 years                                                                                                                                        |

#### INDIVIDUAL SPECIFICATIONS

|                                                           | <b>VD-1310</b>                   | <b>VD-1320</b>                   | <b>VD-1330</b>                  |
|-----------------------------------------------------------|----------------------------------|----------------------------------|---------------------------------|
| <b>Leakage (see Table 1 above)</b>                        | Class III                        | Class I                          | Class IA                        |
| <b>Blade construction</b>                                 | Single 16-gauge galvanized steel | Double 22-gauge galvanized steel | 1/16" airfoil extruded aluminum |
| <b>6" wide nominal</b>                                    |                                  |                                  |                                 |
| <b>Operating torque @</b>                                 |                                  |                                  |                                 |
| <b>0.5" W.C. (100 fpm)</b>                                | 4.25 in-lb                       | 4.5 in-lb                        | 4.5 in-lb                       |
| <b>1" W.C. (1000 fpm)</b>                                 | 5.25 in-lb                       | 5.5 in-lb                        | 5.5 in-lb                       |
| <b>Velocity/Pressure limits for specified performance</b> |                                  |                                  |                                 |
| <b>Damper 24"W (60.96 cm)</b>                             | 4500 fpm @ 6" W.C.               | 6000 fpm @ 8" W.C.               | 8000 fpm @ 10" W.C.             |
| <b>Damper 48"W (121.9 cm)</b>                             | 1500 fpm @ 3" W.C.               | 2000 fpm @ 8" W.C.               | 4000 fpm @ 8" W.C.              |



# ACTUATORS & DAMPERS

## RECTANGULAR DAMPERS

### VD-1300 SERIES

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ACTUATORS & DAMPERS

#### DIMENSIONS

##### Dimensions notes

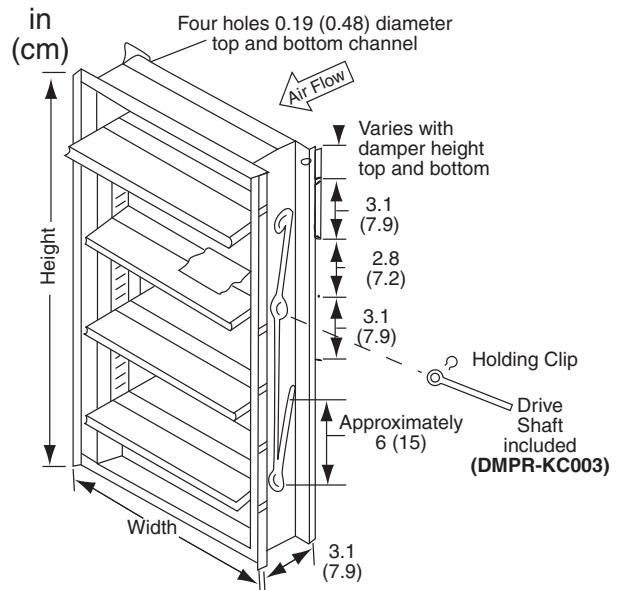
- 1) Unit furnished approximately 1/4" (0.6 cm) undercut for proper fit in duct. If no undercut wanted, order "E" Option code.
- 2) Dimensions shown are from the outside edges of the damper frame

Table 2. Damper Section Sizes (1" increments)

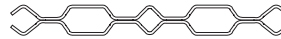
| Single Section                 | Dimension                   |
|--------------------------------|-----------------------------|
| Width (VD-1310)                | 8" to 36" (20 to 91 cm)     |
| Width (VD-1320, -1330)         | 8" to 48" (20 to 122 cm)    |
| Height (VD-1310, -1320, -1330) | 6" to 76" (15 to 193 cm)    |
| Multi-section                  | Dimension                   |
| Width (VD-1310)                | 36" to 108" (91 to 274 cm)  |
| Width (VD-1320, -1330)         | 48" to 192" (124 to 488 cm) |
| Height (VD-1310)               | 6" to 76" (15 to 193 cm)    |
| Height (VD-1320, -1330)        | 6" to 228" (15 to 732 cm)   |

Table 3. Option Codes

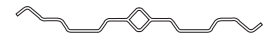
|   |                                                                                                            |
|---|------------------------------------------------------------------------------------------------------------|
| E | Exact, whole inch size, no undercut                                                                        |
| F | 1.5" flange on entering side                                                                               |
| G | 1.5" flange on leaving side                                                                                |
| H | 1.5" flange on both sides                                                                                  |
| J | Jackshaft, field-installed (must specify if needed, not automatically included with multi-section dampers) |



VD-1330 Class I Blade



VD-1320 Class II Blade



VD-1310 Class III Blade

#### ORDERING INFORMATION

|          |                          |          |          |                                                                                                                                                                                                        |              |              |                           |  |  |  |
|----------|--------------------------|----------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|---------------------------|--|--|--|
| <b>V</b> | <b>PRODUCT FAMILY</b>    |          |          |                                                                                                                                                                                                        |              |              |                           |  |  |  |
|          | <b>BLADE OPERATION</b>   |          |          | <b>O</b> = Opposed<br><b>P</b> = Parallel                                                                                                                                                              |              |              |                           |  |  |  |
|          | <b>BLADE TYPE</b>        |          |          | <b>A</b> = Class I VD-1330 airfoil design<br><b>P</b> = Class II VD-1320 double piece design<br><b>V</b> = Class III VD-1310 with seals single piece design (not recommended for outside air)          |              |              |                           |  |  |  |
|          | <b>BEARING/SEAL TYPE</b> |          |          | <b>E</b> = Extended - bronze/santoprene<br><b>H</b> = High - bronze/silicone<br><b>S</b> = Standard - acetal/santoprene<br><b>N</b> = None (integral actuators available, special order, contact Kele) |              |              |                           |  |  |  |
|          | <b>ACTUATOR</b>          |          |          | <b>N</b> = None (integral actuators available, special order, contact Kele)                                                                                                                            |              |              |                           |  |  |  |
|          | <b>W W W</b>             |          |          | <b>WIDTH DIMENSIONS</b> See Table 2 above for limitations (1" increments), use all 3 digits                                                                                                            |              |              |                           |  |  |  |
|          | <b>H H H</b>             |          |          | <b>HEIGHT DIMENSIONS</b> See Table 2 above for limitations (1" increments), use all 3 digits                                                                                                           |              |              |                           |  |  |  |
|          |                          |          |          | <b>OPTIONS (LIMIT TWO)</b> See Table 3 above                                                                                                                                                           |              |              |                           |  |  |  |
| <b>V</b> | <b>O</b>                 | <b>V</b> | <b>S</b> | <b>N</b>                                                                                                                                                                                               | <b>W W W</b> | <b>H H H</b> | <b>Option Code Number</b> |  |  |  |

**Example:** VOVSN-024-025 Opposed blade Class III damper 24" x 25", with standard bearings/seal.

Note: The jackshaft components and dampers will be shipped as separate panels a maximum of 48"W and 76"H. The required jackshafts, coupling kits, and support bars must be field-assembled.