




















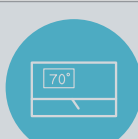
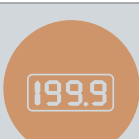
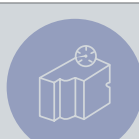


ACTUATORS & DAMPERS

 ACCESS CONTROL	 ACTUATORS & DAMPERS	 ALARMS & INDICATION	 CONTROL VALVES	 ELECTRICAL WIRING MATERIALS	 ENCLOSURES
 FLOW	 GAS & SPECIALTY SENSORS	 HAZARDOUS LOCATIONS	 HUMIDITY	 LEVEL & LEAK DETECTION	 LIGHTING CONTROLS
 MOTOR CONTROLS	 NETWORK & WIRELESS	 PANEL FABRICATION	 PNEUMATICS & FITTINGS	 POWER MONITORING & PROTECTION	 POWER SUPPLIES
 PRESSURE	 RELAYS & CONTACTORS	 TEMPERATURE SENSORS & TRANSMITTERS	 THERMOSTATS & CONTROLLERS	 TOOLS & TEST EQUIPMENT	 TRANSDUCERS

Kele Carries All of the Major Manufacturers, Including Fire and Smoke Solutions.

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Honeywell



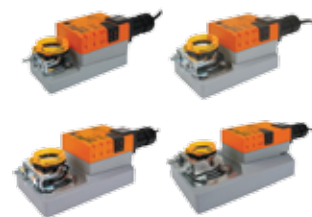
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Kele



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Kele

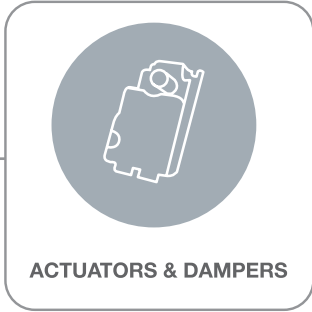




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ACTUATORS & DAMPERS



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

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

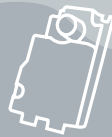
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ACTUATORS & DAMPERS

Brand	Torque	Supply Voltage	Control Signal	Model	Damper Area (ft ²)
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 ±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 ±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 ±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

2



WHISKER SWITCH KLNJ-A2

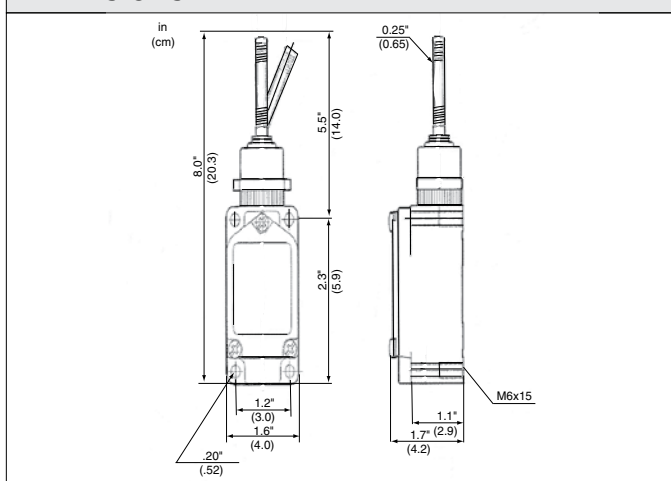
DESCRIPTION

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



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ACTUATORS & DAMPERS

SPECIFICATIONS

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

ORDERING INFORMATION

MODEL	DESCRIPTION
KLNJ-A2	Whisker switch with coated spring-rod and 10A @ 120 VAC contacts

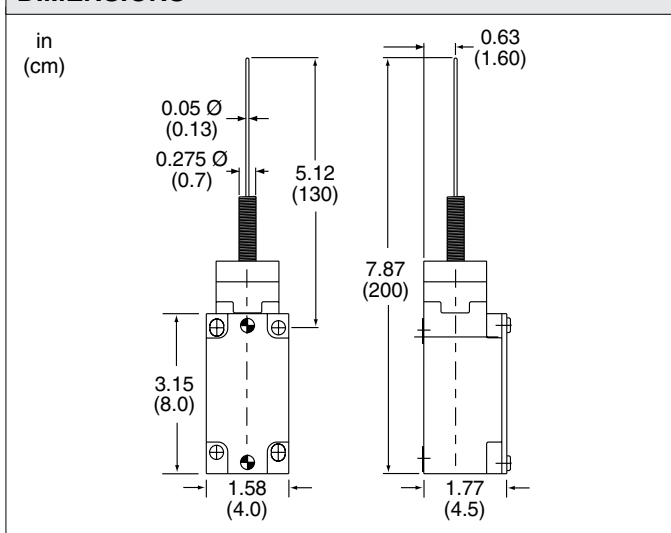
WHISKER SWITCH

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

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

ORDERING INFORMATION

MODEL	DESCRIPTION
LS45M91B11	Whisker switch with steel spring-rod and 5A @ 120 VAC contacts



ACTUATORS & DAMPERS

DAMPER POSITION SWITCHES TS-470 SERIES

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

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

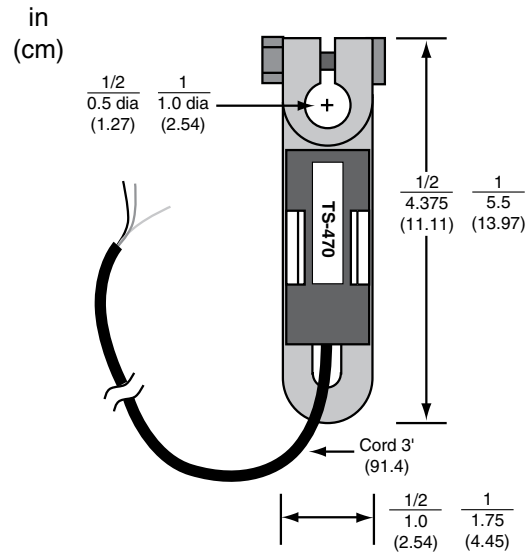


TS-470-2



TS1-470

WIRING / DIMENSIONS



ORDERING INFORMATION

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

RELATED PRODUCTS

MODEL	DESCRIPTION	PAGE
KLNJ-A2	Whisker switch with coated spring-rod and 10A @ 120 VAC contacts	3
LS45M91B11	Whisker switch with steel spring-rod and 5A @ 120 VAC contacts	3
TS-475	Non-mercury damper position switch, SPDT, for 1/2" damper shaft	5
TT-470	Tilt transducer with 1/2-in crank arm, 4-20 mA loop powered	6
TT1-470	Tilt transducer with 1-in crank arm	6

ACTUATORS & DAMPERS

NON-MERCURY DAMPER POSITION SWITCH

TS-475 SERIES

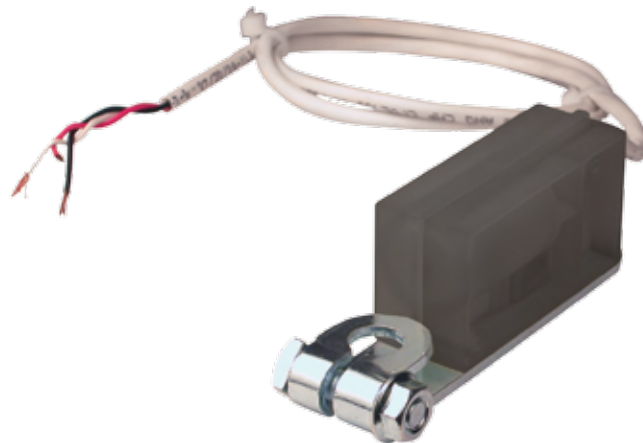


DESCRIPTION

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 (3.8 x 3.8 x 11.1 cm)
TS1-	1.8"H x 1.5"W x 5.5"L (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

1

ACTUATORS & DAMPERS

ACTUATORS & DAMPERS

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

ACTUATORS & DAMPERS

1

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).



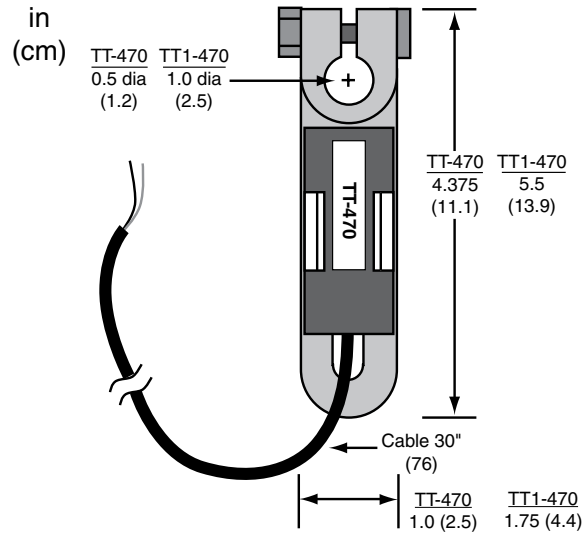
TT-470



SPECIFICATIONS

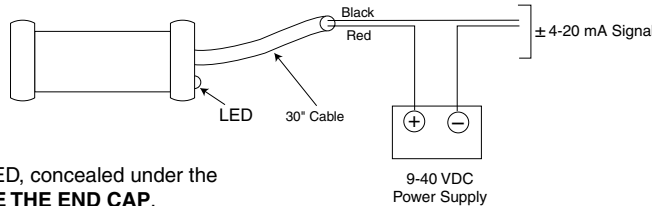
Supply Voltage	9 to 40 VDC
Wiring	30" plenum-rated cable, 2-conductor 16 AWG unshielded
Sensor Measurement Range	Programmable from ±10° to 360° rotation
Sensing Technology	Solid state orientation sensor
Signal Output	4-20 mA, 2-wire loop powered
Output Resolution	0.8 mA @ 90° rotation, 0.2 mA @ 360° rotation, ±0.1 mA
Maximum Output Impedance	1000Ω @ 24 VDC
Lamps	Red LED for programming
Operating Temperature	-20° to 150°F (-29° to 66°C)
Dimensions	
TT-470	1.4"H x 1.0"W x 4.4" L (3.4 x 2.5 x 11.1 cm)
TT1-470	1.4"H x 1.8"W x 5.5" L (3.4 x 4.4 x 13.9 cm)
Weight	
TT-470	0.5 lb (0.2 kg)
TT1-470	0.8 lb (0.4 kg)
Installation	
TT-470	1/2" round shaft
TT1-470	1" round shaft
Enclosure Rating	Indoors only, not suitable for outdoor installation
RoHS Statement	Yes
Warranty	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
995

ACTUATORS & DAMPERS

MECHANICAL AND ELECTRICAL ACCESSORIES ACTUATOR ACCESSORIES



1

ACTUATORS & DAMPERS

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



ZS-100



ZS-150



KH6-K

KH8-K

CA-1

205830A



KC-1403S-K



KC-1405L-K



BJ-809-K



KG8-K



ZG-DC2-K



DMPR-KC054



ZG-DC1-K



AV10-18-K



ZG-NMSA-1-K



DMPR-KC008

DMPR-KC003 (shaft only)



ESK050-K



DMPR-KC005-K



ACTUATORS & DAMPERS

MECHANICAL AND ELECTRICAL ACCESSORIES ACTUATOR ACCESSORIES

ACTUATORS & DAMPERS

1

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



PR-24



PR-48



50001194-001



ZG-103



ZG-107



ZG-104



ZG-108



ZG-112



ZG-100



ZG-101



ZG-102



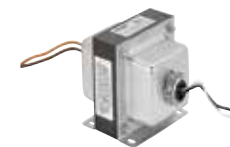
DMPR-KC255



ZG-R01



691-K0A



691-U100



SGF24



SGA24

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)



1
ACTUATORS & DAMPERS

COMMON SPECIFICATIONS			
Supply Voltage	21-27 VAC 50/60 Hz, 24 VDC (VAC only for KA-175-2T, KA-301-2T)	Noise	
Motor	Synchronous with magnetic clutch (2-pos, floating), Brushless DC (proportional)	-44, -88	<35 db @ 3' (1m)
Wiring	Enclosed terminals	-175, -301	<40 db @ 3' (1m)
Action	Switch selectable direct/reverse acting	Resolution	400 steps
Rotation	95° ± 3°	Life Expectancy	60,000 cycles, 1.5 million repositions
Drive Time	95 seconds @ 60Hz	Operating Temperature	-5° to 140°F (-20° to 60°C)
Manual Override	Disengage button	Operating Humidity	5 to 95% RH
		Approvals	cULus, CE, C-tick, plenum rated, E4436/E179109
		Warranty	5 years

INDIVIDUAL SPECIFICATIONS						
Model	Torque	Supply VA	Control Signal	Input Impedance	Feedback	Auxiliary Switch
KA-44-2T	44 in-lb (5 Nm)	5.0 VA	Two-position, floating		None	None
KA-44-M	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
KA-88-2T	88 in-lb (10 Nm)	5.0 VA	Two-position, floating		None	None
KA-88-M	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
KA-175-2T	175 in-lb (20 Nm)	6.0 VA	Two-position, floating		None	SW2 accessory
KA-175-P	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
KA-301-2T	301 in-lb (34 Nm)	9.0 VA	Two-position, floating		None	SW2 accessory
KA-301-P	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



ACTUATORS & DAMPERS

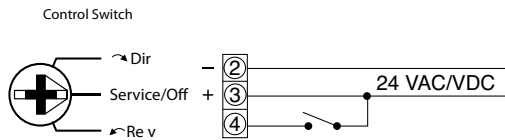
KELE REVOLUTION™ DIRECT COUPLED ACTUATORS NON-SPRING RETURN KA-44, KA-88, KA-175, KA-301 SERIES

ACTUATORS & DAMPERS

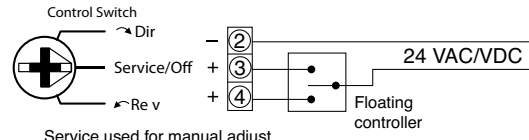
DIMENSIONS

Model	Torque	Dimensions	Maximum Shaft Diameter	Minimum Shaft Length	Enclosure Rating	Weight
KA-44-2T	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)
KA-44-M	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)
KA-88-2T	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)
KA-88-M	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)
KA-175-2T	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)
KA-175-P	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)
KA-301-2T	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)
KA-301-P	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)

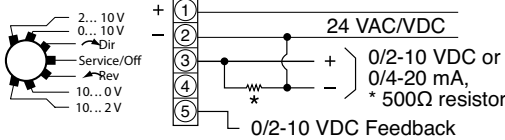
WIRING



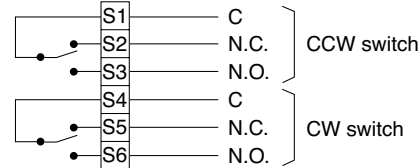
Service used for manual adjust
KA-44-2T, KA-88-2T, KA-175-2T, KA-301-2T
Two-position Control



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

KA-44-2T

KA-44-M

KA-88-2T

KA-88-M

KA-175-2T

KA-175-P

KA-301-2T

KA-301-P

DESCRIPTION

Non-spring return, 44 in-lb (5 Nm), two-position or tri-state (floating) control

Non-spring return, 44 in-lb (5 Nm), proportional, two-position or tri-state (floating) control

Non-spring return, 88 in-lb (10 Nm), two-position or tri-state (floating) control

Non-spring return, 88 in-lb (10 Nm), proportional, two-position or tri-state (floating) control

Non-spring return, 175 in-lb (20 Nm), two-position or tri-state (floating) control

Non-spring return, 175 in-lb (20 Nm), proportional, two-position or tri-state (floating) control

Non-spring return, 301 in-lb (34 Nm), two-position or tri-state (floating) control

Non-spring return, 301 in-lb (34 Nm), proportional, two-position or tri-state (floating) control

ACCESSORIES

32004254-003

Replacement shaft coupler for KA-301, MNxx34

50000407-001

Tandem mount bracket for KAS-175 actuators

50001194-001

Universal surface mount bracket with crank arm and 1/2" shaft

SW2

2X/SPDT/AUX SWTCH/KA/KAS/1000-X

ZG-R01

500Ω, 1/2W, 1% resistor

ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS NON-SPRING RETURN LMB, NMB, AMB, GMB SERIES



BELIMO



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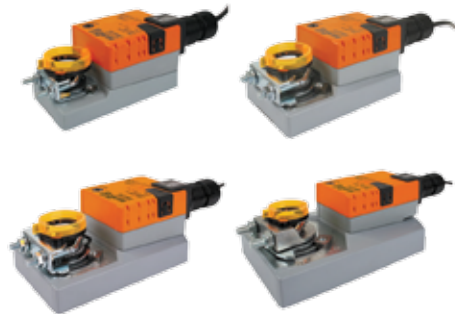
ACTUATORS & DAMPERS

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

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

INDIVIDUAL SPECIFICATIONS						
Model	Torque	Supply VA	Control Signal	Feedback	Auxiliary Switch	Drive Time
LMB24-3	45 in-lb, (5 Nm)	2 VA	Two-position, floating	P1000A (1 kΩ option)	S1A or S2A (option)	95 seconds
LMB24-3-S	45 in-lb, (5 Nm)	2 VA	Two-position, floating	P1000A (1 kΩ option)	1 SPDT, 3A @ 250V	95 seconds
LMB24-SR	45 in-lb, (5 Nm)	3 VA	Prop. 2-10 VDC, 4-20 mA	2-10 VDC	S1A or S2A (option)	95 seconds
LMB24-MFT	45 in-lb, (5 Nm)	5 VA	Prop. (default 2-10 VDC)	2-10 VDC	S1A or S2A (option)	150 seconds
NMB24-3	90 in-lb (10 Nm)	4 VA	Two-position, floating	P1000A (1 kΩ option)	S1A or S2A (option)	95 seconds
NMB24-SR	90 in-lb (10 Nm)	5 VA	Prop. 2-10 VDC, 4-20 mA	2-10 VDC	S1A or S2A (option)	95 seconds
NMB24-MFT	90 in-lb (10 Nm)	6 VA	Prop. (default 2-10 VDC)	2-10 VDC	S1A or S2A (option)	150 seconds
AMB24-3	180 in-lb (20 Nm)	5.5 VA	Two-position, floating	P1000A (1 kΩ option)	S1A or S2A (option)	95 seconds
AMB24-3-S	180 in-lb (20 Nm)	5.5 VA	Two-position, floating	P1000A (1 kΩ option)	1 SPDT, 3A @ 250V	95 seconds
AMB24-SR	180 in-lb (20 Nm)	5 VA	Prop. 2-10 VDC, 4-20 mA	2-10 VDC	S1A or S2A (option)	95 seconds
AMB24-MFT	180 in-lb (20 Nm)	6 VA	Prop. 2-10 VDC, 4-20 mA	2-10 VDC	S1A or S2A (option)	150 seconds
GMB24-3	360 in-lb (40 Nm)	6 VA	Two-position, floating	P1000A (1 kΩ option)	S1A or S2A (option)	95 seconds
GMB24-SR	360 in-lb (40 Nm)	6.5 VA	Prop. 2-10 VDC, 4-20 mA	2-10 VDC	S1A or S2A (option)	95 seconds
GMB24-MFT	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
LMB	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) UL94-5V	1.0 lb (0.5 kg)
NMB	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) UL94-5V	1.65 lb (.75 kg)
NMB-N4	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 (IP66/IP67)	3.8 lb (1.7 kg)
AMB	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) UL94-5V	2.2 lb (1.0 kg)
AMB-N4	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 (IP66/IP67)	4.4 lb (2.0 kg)
GMB	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) UL94-5V	3.0 lb (1.1kg)



ACTUATORS & DAMPERS

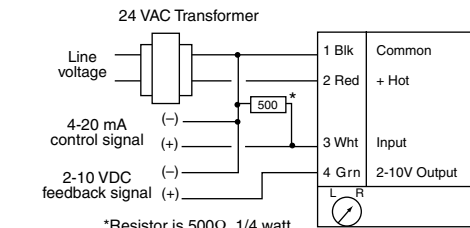
DIRECT COUPLED ACTUATORS NON-SPRING RETURN

LMB, NMB, AMB, GMB SERIES

1

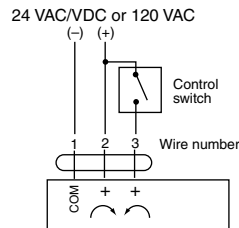
ACTUATORS & DAMPERS

WIRING

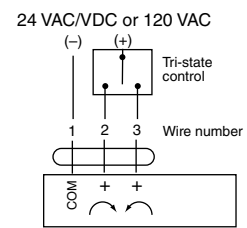


*Resistor is 500Ω, 1/4 watt
ZG-R01, required for 4-20 mA, leave out for 2-10 VDC

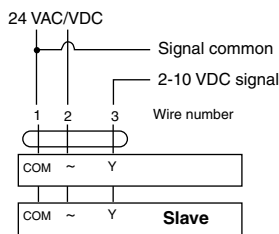
LMB24-SR, NMB24-SR, AMB24-SR, GMB24-SR
4-20 mA, 2-10 VDC



LMB24-3, AMB24-3, GMB24-3
Two-position



LMB24-3, AMB24-3, GMB24-3
Tri-state

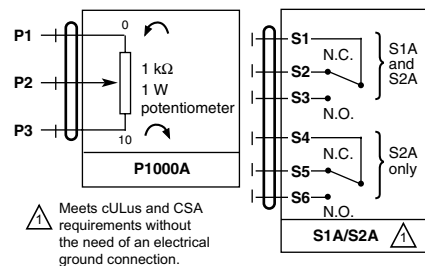


Parallel connection of four motors is possible. No more than 2 GMB motors on the same shaft.

AMB24-SR, GMB24-SR
Modulating (2-10 VDC) with slave actuator

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 0.59 - 2.95 sec	2-10 VDC
W02	PWM 0.02 - 5.00 sec	2-10 VDC
F01	Floating	2-10 VDC
J2	Two-position	2-10 VDC

MFT Function Codes



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

P1000A/S1/S2A
for GM, AM, NM, and LM Motors (add-on auxiliary functions)

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-LMSA
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

ACTUATORS & DAMPERS

KMC ACTUATORS
MEP SERIES



KMC
CONTROLS



1

ACTUATORS & DAMPERS



DESCRIPTION

The **MEP-4000 Series** are compact but powerful direct-coupled actuators which provide tri-state or proportional control for small dampers or valves in HVAC systems. A minimum torque of 40 (MEP-40xx) or 80 (MEP-48xx) in-lbs. is available over the 95° angular rotation. The **MEP-7000 Series** are powerful, efficient, durable, direct-coupled actuators which also provide tri-state or proportional control for large control air dampers or valves in HVAC systems. A minimum torque of 120, 180, or 320 in-lbs. is available over the 94° angular rotation. Capacitor-driven fail-safe models provide efficient operation with switch-selectable fail direction.

FEATURES

- *Proportional models include “anti-jitter” circuitry*
- *Switch-selectable feedback on selected models*
- *Fully adjustable, built-in auxiliary switch on selected models*
- *Removable terminals and removable 1/2" NPS conduit fitting (except the MEP-4003)*
- *Direct mounting to standard shaft sizes*
- *Gear disengagement button*
- *Adjustable mechanical end stop*
- *Valve body quick-mount option on MEP- 4002V/4003V*
- *A patent-pending noise reducer provides whisper-quiet operation on the MEP-4201, 4501, 4901 series*
- *Fast rotation—less than 35 seconds for 90° with 25 or 45 in-lb. of torque or less than 45 seconds with 90 in-lb. torque on the MEP-4201, 4501, 4901 series*

NEW!



MEP-4252



MEP-7852

SPECIFICATIONS

Supply Voltage		Approvals	
MEP-4xx5 Series	100 to 240 VAC	MEP-4000 Series	SASO PCP Registration KSA R-103260; UL 873 Temperature Indicating and Regulating Equipment; FCC Class B, Part 15, Subpart B and complies with Canadian ICES-003 Class B (MEP-4xx4 models only are Class A)
MEP-4000 (all others)	24 VDC/VAC (+20%/–15%), Class 2 only	MEP-7000 Series	UL 873 Temperature Indicating and Regulating Equipment; FCC Class B, Part 15
MEP-7000 Series	24 VDC/VAC (+20%/–15%), Class 2 only or 22-35 VDC	Dimensions	
Supply VA		MEP-4003	5.3"H x 2.6"W x 1.8"D (13.5 x 6.6 x 4.6 cm)
MEP-4000 Series	2 VA Tri-state models, 4 VA Proportional models	MEP-4003V	5.3"H (w/o handle extended) x 2.6"W x 2.59"D (13.5 x 6.6 x 6.6 cm)
MEP-750X Series	6 VA	MEP-4002V	5.3"H (w/o handle extended) x 2.6"W x 3.28"D (13.5 x 6.6 x 8.32 cm)
MEP-755X Series	8 VA	MEP-4201, 4501, 4901	6.0"H x 2.8"W x 3.4"D (15.2 x 7.14 x 8.65 cm)
MEP-780X Series	8 VA	MEP-4000 (all others)	5.3"H x 2.6"W x 2.5"D (13.5 x 6.6 x 6.35 cm)
MEP-785X Series	10 VA	MEP-7000 Series	10.1"H x 5"W x 3"D (25.7 x 12.7x 7.6 cm)
Control Signal	Floating, Proportional, 2-Position	Weight	
Wiring	14-22 AWG, 12-26 AWG	MEP-4000 Series	1.1 lb (0.49 kg)
Wiring Terminations	Screw Terminals, Cable Pigtail	MEP-7x0x	5 lb (2.27 kg)
Conduit Connection	Yes, dual	MEP-7x5x	5.4 lb (2.45 kg)
Enclosure	Flame-retardant plastic	Warranty	5 years
Operating Torque	25 in-lbs to 320 in-lbs		
Rotation	95 degrees		
Drive Time	25 to 90 seconds		
Operating Temperature	-22 to 131°F (-30 to 55°C)		
Operating Humidity	5-95% RH non-condensing		
Maximum Shaft Diameter			
MEP-4000 Series	1/4" to 5/8" round, 1/4" to 7/16" square		
MEP-7000 Series	3/8" to 1.05" round, 5/16" to 5/8" square		
Noise Level	Less than 45 dbA maximum at 1 meter		

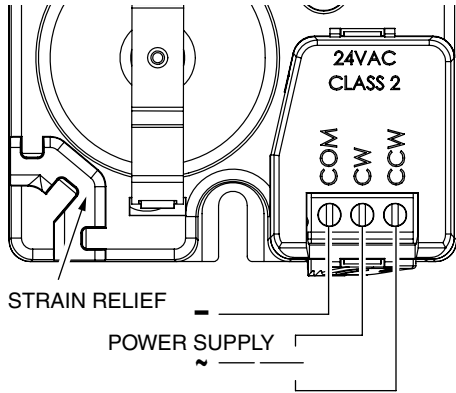
NEW!



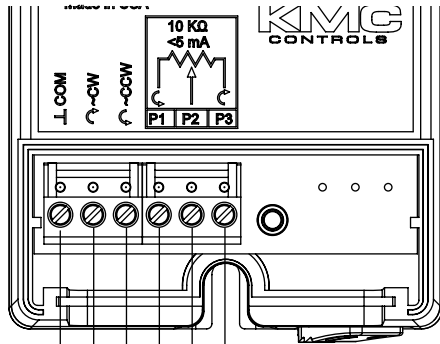
ACTUATORS & DAMPERS

KMC ACTUATORS MEP SERIES

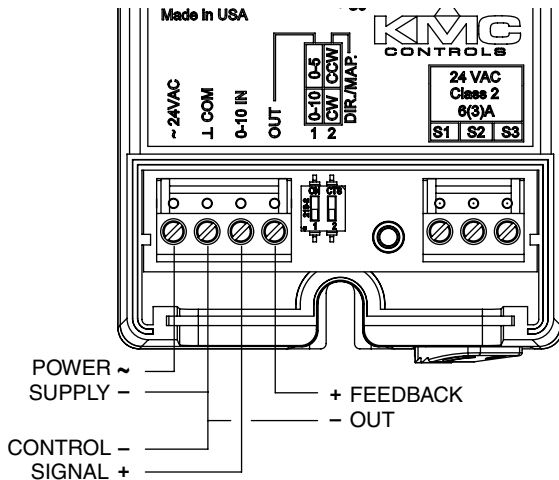
WIRING



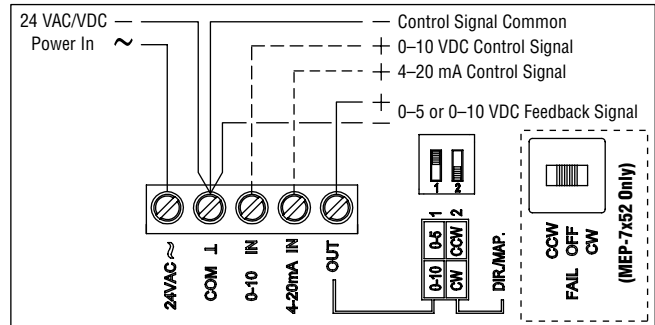
MEP-4003 (Only) Wiring Detail



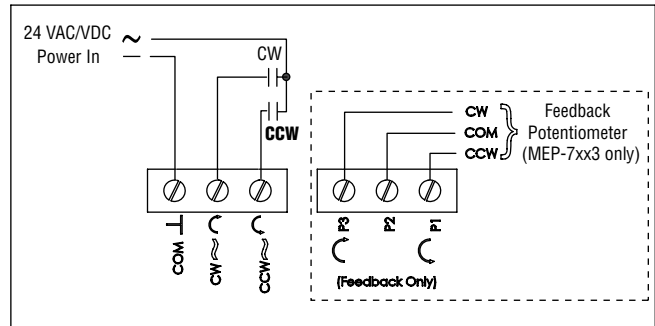
MEP-4x01/4x13/4x21 Wiring Detail



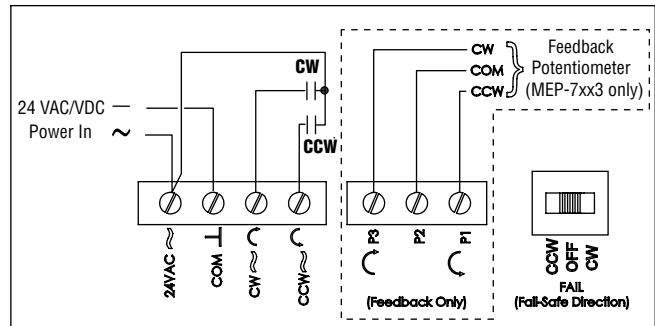
MEP-4x02/4x22 Wiring Detail



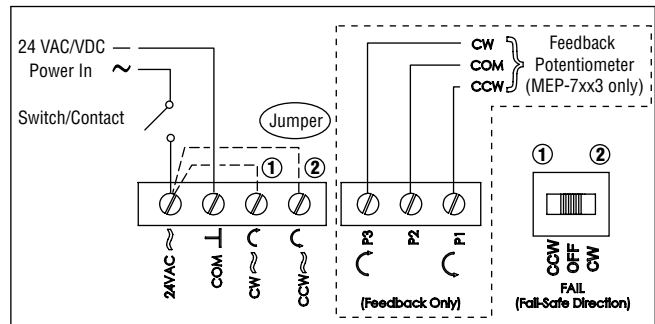
MEP-7xx2 Wiring (Proportional)



MEP-7x01/7x03 Wiring (Tri-State, Non-Fail-Safe)



MEP-7x51/7x53 (Normal) Wiring (Tri-State, Fail-Safe)



MEP-7x51/7x53 Two-Position Wiring (Tri-State, Fail-Safe)

NEW!



WIRING (continued)		
<p>MEP-4xx2 Proportional Control</p>	<p>MEP-4x51 Tri-State Floating Point Control</p>	<p>MEP-4x51 2-Position Control, CCW Leg</p>
<p>MEP-4x51 2-Position Control, CW Leg</p>	<p>MEP-4xx4 Two-Position 24 VAC/VDC</p>	<p>MEP-4xx5 Two-Position 100-240 VAC</p> <p>NOTE: Double Insulated. Meets UL requirements without the need of an electrical ground connection.</p>

ORDERING INFORMATION, NON-FAIL-SAFE MODELS

MODEL	DESCRIPTION
MEP-4001	Non-Failsafe, 40 in-lb, 24 VAC, Tri-state
MEP-4002	Non-Failsafe, 40 in-lb, 24 VAC, Proportional
MEP-4003	Non-Failsafe, 40 in-lb, 24 VAC, Tri-state 90 second no cover
MEP-4013	Non-Failsafe, 40 in-lb, 24 VAC, Tri-state w/potentiometer
MEP-4021	Non-Failsafe, 40 in-lb, 24 VAC, Tri-state w/auxilliary switch
MEP-4022	Non-Failsafe, 40 in-lb, 24 VAC, Proportional w/auxilliary switch
MEP-4201	Non-Failsafe, 25 in-lb, 24 VAC/VDC Tri-state or 2 position
MEP-4501	Non-Failsafe, 40 in-lb, 24 VAC/VDC Tri-state or 2 position
MEP-4801	Non-Failsafe, 80 in-lb, 24 VAC, Tri-state
MEP-4802	Non-Failsafe, 80 in-lb, 24 VAC, Proportional
MEP-4813	Non-Failsafe, 80 in-lb, 24 VAC, Tri-state w/potentiometer
MEP-4821	Non-Failsafe, 80 in-lb, 24 VAC, Tri-state w/ auxilliary switch
MEP-4822	Non-Failsafe, 80 in-lb, 24 VAC, Proportional w/ auxilliary switch
MEP-4901	Non-Failsafe, 90 in-lb, 24 VAC, Tri-state or 2 position
MEP-7501	Non-Failsafe, 180 in-lb, 24 VAC, Tri-state
MEP-7502	Non-Failsafe, 180 in-lb, 24 VAC, Proportional
MEP-7503	Non-Failsafe, 180 in-lb, 24 VAC, Tri-state w/potentiometer
MEP-7801	Non-Failsafe, 320 in-lb, 24 VAC, Tri-state
MEP-7802	Non-Failsafe, 320 in-lb, 24 VAC, Proportional
MEP-7803	Non-Failsafe, 320 in-lb, 24 VAC, Tri-state w/potentiometer



ACTUATORS & DAMPERS

KMC ACTUATORS MEP SERIES

ORDERING INFORMATION, ELECTRONIC FAIL-SAFE MODELS

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ACTUATORS & DAMPERS

MODEL	DESCRIPTION
MEP-4251	Failsafe, 25 in-lb, 24 VAC, Tri-state
MEP-4252	Failsafe, 25 in-lb, 24 VAC, Proportional
MEP-4254	Failsafe, 25 in-lb, 24 VAC, 2-position
MEP-4255	Failsafe, 25 in-lb, 100-240 VAC, 2-position
MEP-4272	Failsafe, 25 in-lb, 24 VAC, Proportional w/auxilliary switch
MEP-4274	Failsafe, 25 in-lb, 24 VAC, 2-position w/auxilliary switch
MEP-4275	Failsafe, 25 in-lb, 100-240 VAC 2-position w/auxilliary switch
MEP-4551	Failsafe, 45 in-lb, 24 VAC, Tri-state
MEP-4552	Failsafe, 45 in-lb, 24 VAC, Proportional
MEP-4554	Failsafe, 45 in-lb, 24 VAC, 2-position
MEP-4555	Failsafe, 45 in-lb, 100-240 VAC, 2-position
MEP-4572	Failsafe, 45 in-lb, 24 VAC, Proportional w/auxilliary switch
MEP-4574	Failsafe, 45 in-lb, 24 VAC, 2-position w/auxilliary switch
MEP-4575	Failsafe, 45 in-lb, 100-240 VAC, 2-position w/auxilliary switch
MEP-4951	Failsafe, 90 in-lb, 24 VAC, Tri-state
MEP-4952	Failsafe, 90 in-lb, 24 VAC, Proportional
MEP-4954	Failsafe, 90 in-lb, 24 VAC, 2-position
MEP-4955	Failsafe, 90 in-lb, 100-240 VAC, 2-position
MEP-4972	Failsafe, 90 in-lb, 24 VAC, Proportional w/2 auxilliary switches
MEP-4974	Failsafe, 90 in-lb, 24 VAC, 2-position w/2 auxilliary switches
MEP-4975	Failsafe, 90 in-lb, 100-240 VAC, 2-position w/2 auxilliary switches
MEP-7551	Failsafe, 180 in-lb, 24 VAC, Tri-state
MEP-7552	Failsafe, 180 in-lb, 24 VAC, Proportional
MEP-7553	Failsafe, 180 in-lb, 24 VAC, Tri-state w/potentiometer
MEP-7851	Failsafe, 320 in-lb, 24 VAC, Tri-state
MEP-7852	Failsafe, 320 in-lb, 24 VAC, Proportional
MEP-7853	Failsafe, 320 in-lb, 24 VAC, Tri-state w/potentiometer

ACCESSORIES

MODEL	DESCRIPTION
CTE-5202	Proportional thermostat (MEP-4000 series)
HLO-4001	Crank arm kit (MEP-4000 series)
HCO-1151	Weather shield kit (MEP-4000 series)
HMO-4001	non-rotation "t" bracket (MEP-4000 series)
HMO-4002	Replacement non-rotation bracket (MEP-4000 series)
HMO-4004	Non-rotation bracket kit for VEB series ball valves (MEP-4000 series)
HPO-5074	Ball valve to actuator quick mount kit for MEP-400xv only
HPO-5073	Ball valve to actuator repair kit for standard (MEP-4000 series)
CME-7001	Rotary auxilliary cam switch-single (MEP-7000 series)
CME-7002	Rotary auxilliary cam switch-double (MEP-7000 series)
HCO-1152	Weather shield kit (MEP-7000 series)
HLO-1020	Crank arm kit (MEP-7000 series)
HMO-4535	Replacement non-rotation bracket (MEP-7000 series)
HMO-4536	Adjustable end stop kit (MEP-7000 series)

NEW!

ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS NON-SPRING RETURN MN SERIES



Honeywell

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



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ACTUATORS & DAMPERS

COMMON SPECIFICATIONS			
Supply Voltage	21-27 VAC 50/60 Hz, 24 VDC (except MN6120, MN6134)	Noise	
Motor	Brushless DC; Synchronous with magnetic clutch (floating 175, 300 in-lb)	44, 88 in-lb	<35 dB @ 3' (1m);
Wiring	Enclosed terminals	175, 300 in-lb	<40 dB @ 3' (1m)
Rotation	95° ± 3°	Resolution	400 steps
Drive Time	95 seconds	Life Expectancy	60,000 cycles, 1 million repositions
Manual Override	Disengage button	Operating Temperature	-5° to 140°F (-20° to 60°C)
		Operating Humidity	5 to 95% RH
		Approvals	UL, cUL, CE, C-tick, plenum rated, E4996
		Warranty	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; 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; 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; 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; 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; 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; 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; 500Ω @ 4-20 mA	0/2-10 VDC	SW2 add-on



ACTUATORS & DAMPERS

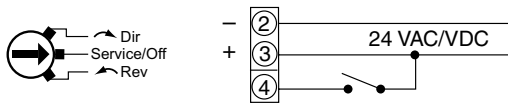
DIRECT COUPLED ACTUATORS NON-SPRING RETURN MN SERIES

ACTUATORS & DAMPERS

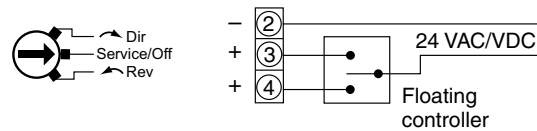
DIMENSIONS

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)

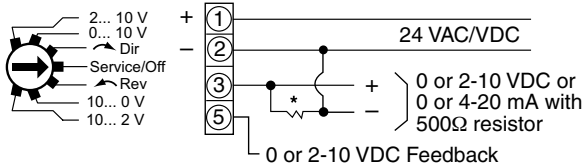
WIRING



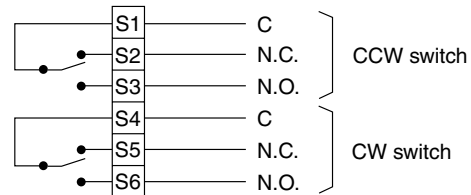
MN61xx
Two-position Control



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	DESCRIPTION
MN6105A1011	Non-spring return, 44 in-lb (5 Nm), two-position/tri-state control
MN6105A1201	Non-spring return, 44 in-lb (5 Nm), two-position/tri-state, aux switches
MN7505A2001	Non-spring return, 44 in-lb (5 Nm), proportional/two-pos/tri-state control
MN7505A2209	Non-spring return, 44 in-lb (5 Nm), proportional/two-pos/tri-state, aux sw.
MN6110A1003	Non-spring return, 88 in-lb (10 Nm), two-position and tri-state control
MN6110A1201	Non-spring return, 88 in-lb (10 Nm), two-position/tri-state, aux switches
MN7510A2001	Non-spring return, 88 in-lb (10 Nm), proportional/two-pos/tri-state control
MN7510A2209	Non-spring return, 88 in-lb (10 Nm), proportional/two-pos/tri-state control, aux sw.
MN6120A1002	Non-spring return, 175 in-lb (20 Nm), two-position and tri-state control
MN6120A1200	Non-spring return, 175 in-lb (20 Nm), two-position/tri-state control, aux switches
MN7220A2007	Non-spring return, 175 in-lb (20 Nm), proportional/two-pos/tri-state control
MN7220A2205	Non-spring return, 175 in-lb (20 Nm), proportional/two-pos/tri-state, aux sw.
MN6134A1003	Non-spring return, 300 in-lb (34 Nm), two-position and tri-state control
MN7234A2008	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	2X/SPDT/AUX SWTCH/KA/KAS/1000-X
ZG-R01	500Ω, 1/2W, 1% resistor

ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS NON-SPRING RETURN GBB, GDE, GEB, GIB, GLB, GAP SERIES



SIEMENS

DESCRIPTION

Siemens **GDE, GLB, GEB, GBB, GIB, and GAP 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*



GBB

GEB

GDE



1

ACTUATORS & DAMPERS

COMMON SPECIFICATIONS			
Supply Voltage	20-28 VAC, 50/60 Hz	Noise	<45 db @ 3" (1m), (except GAP Series)
GAP Series	24 VAC/VDC, ±20%, 50/60 Hz	Life Expectancy	60,000 cycles, 1.5 million repositions
Motor	Brushless DC	GAP Series	100,000 full stroke cycles, 7,000,000 repositions
Wiring	3" (0.9 m) AWG 18 plenum-rated cable	Operating Temperature	-25° to 130°F (-32° to 55°C)
Action	DA/RA wire connections (2-pos, floating), DA/RA switch selectable (proportional)	GAP Series	0° to 122°F (-18° to 50°C)
Rotation	95°	Operating Humidity	5 to 95% RH non-condensing
Manual Override	Disengage button	Approvals	UL, cUL, CE, plenum rated, E35198
		RoHS Statement	Yes
		Warranty	2 years

INDIVIDUAL SPECIFICATIONS							
Model	Torque	Supply VA	Control Signal	Input Impedance	Feedback	Auxiliary Switch	Drive Time
GDE131.1P	44 in-lb (5 Nm)	2.3 VA	Two-position, floating		None, order GDE132.1P	None, order GDE136.1P	90 seconds
GDE161.1P	44 in-lb (5 Nm)	3.3 VA	Proportional 0 to 10 VDC	100 kΩ	None	None, order GDE166.1P	90 seconds
GAP191.1P	53 in-lb (6 Nm)	28 VA	Two-position, floating, proportional 0/2-10 VDC	100 kΩ	0-10 VDC	None, order GAP196.1P	2 seconds
GLB131.1P	88 in-lb (10 Nm)	2.3 VA	Two-position, floating		None, order GLB132.1P	None, order GLB136.1P	125 seconds
GLB161.1P	88 in-lb (10 Nm)	3.3 VA	Proportional 0 to 10 VDC	100 kΩ	None	None, order GLB166.1P	125 seconds
GEB131.1P	132 in-lb (15 Nm)	3.3 VA	Two-position, floating		None, order GEB132.1U	None, order GEB136.1P	125 seconds
GEB161.1P	132 in-lb (15 Nm)	5.0 VA	Proportional 0 to 10 VDC	100 kΩ	None	None, order GEB164.1P	125 seconds
GBB131.1P	177 in-lb (20 Nm)	7.0 VA	Two-position, floating		None, order GBB132.1P	None, order GBB136.1P	150 seconds
GBB161.1P	177 in-lb (20 Nm)	8.0 VA	Proportional 0 to 10 VDC	100 kΩ	None	None, order GBB166.1P	150 seconds
GIB131.1P	310 in-lb (35 Nm)	7.0 VA	Two-position, floating		None, order GIB132.1P	None, order GIB136.1P	150 seconds
GIB161.1P	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

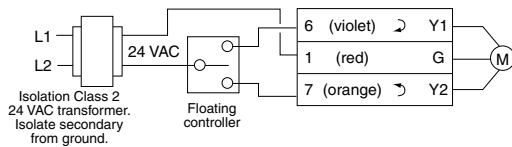
GBB, GDE, GEB, GIB, GLB, GAP SERIES

ACTUATORS & DAMPERS

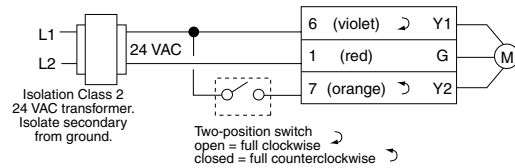
DIMENSIONS

Model	Torque	Dimensions	Maximum Shaft Diameter	Minimum Shaft Length	Enclosure Rating	Weight
GDE	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)
GAP	53 in-lb (6 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)	3.4 lb (1.5 kg)
GLB	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)
GEB	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)
GBB	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)
GIB	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)

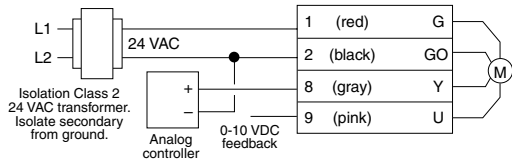
WIRING



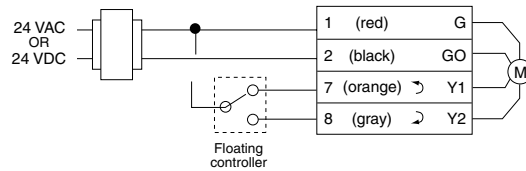
GDE13x, GLB13x, GBB13x, GIB13x
Floating Control



GBB17x, GIB17x
Two-position Control with Floating Control Actuator



GDE16x, GLB16x, GBB16x, GIB16x, GAP19x
0-10 VDC Control



GAP19x
2-Position Floating Control
(for 2-position, eliminate connection 8 (gray))

ORDERING INFORMATION

MODEL

GDE131.1P
GDE161.1P
GAP191.1P
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 53 in-lb (6 Nm), 2-position, floating or 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 Auxiliary switch kit (DPDT) for GIB, GBB, GEB actuators
ASK71.11 Combined foot mount/frame mount kit for GEB/GMA actuators
ASK71.1U Floor mount kit for GCA/GBB/GIB actuators
ASK71.2U Frame mount kit for GCA/GBB/GIB actuators
ASK71.4 Linear stroke kit for GEB/GMA actuators
ASK71.6 Universal mounting kit w/ball joints and crank arm, for GDE, GLB
ASK75.1U Weather shield for GBB/GIB/GCA actuators
ASK75.3U Weather shield for GEB/GMA actuators
ASK76.1U 1/2" conduit adapter for GDE, GLB
ZG-R01 500Ω, 1/2W, 1% resistor

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ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS NON-SPRING RETURN M9100 SERIES



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*



COMMON SPECIFICATIONS

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

INDIVIDUAL SPECIFICATIONS

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



ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS NON-SPRING RETURN M9100 SERIES

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ACTUATORS & DAMPERS

DIMENSIONS

Model	Torque	Dimensions	Maximum Shaft Diameter	Minimum Shaft Length	Weight
M9104-AGA	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)
M9104-GGA	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)
M9106	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)
M9108	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)
M9116	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)
M9124	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)
M9132	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

M9104-AGA-2S
Tri-state

M9104-GGA-2S
Proportional

M9106-AGA
Tri-state

M9106-GGA
Proportional

Terminal	Description
4	Current input
5	Voltage input
6	Feedback

M9108
M9116, M9124, M9132 (GGA)
Proportional

M9116, M9124, M9132 (AGA)
Tri-state/
Two-position

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

ORDERING INFORMATION

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

	ACCESSORIES	PAGE
M9000-103	120/24 VAC, 14 VA inline transformer	8
M9000-151	Floor mount linkage kit	
M9000-154	Jackshaft coupler, 1", for M9100 actuators	
M9000-158	Tandem mount kit for M9132/M9220 actuators	
ZG-R01	500Ω, 1/2W, 1% resistor	

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**
- **Compact, lightweight design**
- **Tri-state and proportional control models**



MF41-6343



MF4E-60830



MS41-6043



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ACTUATORS & DAMPERS

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

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



ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS NON-SPRING RETURN

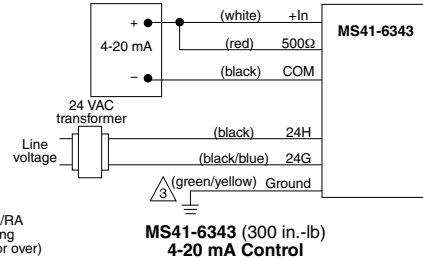
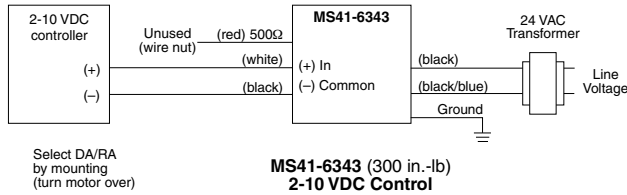
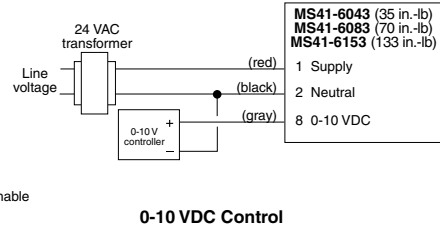
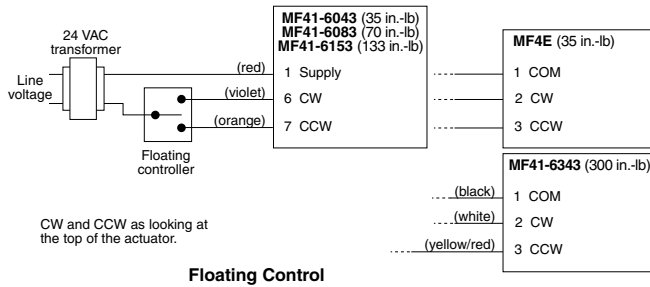
MF4, MS4 SERIES

ACTUATORS & DAMPERS

DIMENSIONS

Model	Torque	Dimensions	Maximum Shaft Diameter	Minimum Shaft Length	Enclosure Rating	Weight
MF4E-xxxx	35 in.-lb (4 Nm)	2.6"H x 3.5"W x 5.8"L (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 (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 (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 (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 (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 (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	DESCRIPTION
MF4E-60430-100	Non-spring return 35 in.-lb (4 Nm), two-position, floating, terminals
MF41-6043	Non-spring return 35 in.-lb (4 Nm), tri-state control
MS41-6043	Non-spring return 35 in.-lb (4 Nm), proportional control
MF4E-60830-100	Non-spring return 70 in.-lb (8 Nm), tri-state control, terminals
MF41-6083	Non-spring return 70 in.-lb (8 Nm), tri-state control
MS41-6083	Non-spring return 70 in.-lb (8 Nm), proportional control
MF41-6153	Non-spring return 133 in.-lb (15 Nm), tri-state control
MS41-6153	Non-spring return 133 in.-lb (15 Nm), proportional control
MF41-6343	Non-spring return 300 in.-lb (34 Nm), tri-state control
MS41-6343	Non-spring return 300 in.-lb (34 Nm), proportional control
MS41-6340	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
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ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS NON-SPRING RETURN ML61XX, ML71XX SERIES



DESCRIPTION

The Honeywell **ML6161** and **ML7161** actuators have 35 in-lb (4 Nm) torque ratings and the **ML6174** and **ML7174** have 70 in-lb (8 Nm) of torque. These non-spring return actuator families are designed to control VAV terminal unit dampers, or Honeywell ball valves. The **ML61xx** models take an SPDT/ floating control signal and the **ML71xx** models take a 2-10 VDC (or 4-20 mA, with a 500 ohm resistor) control signal.

FEATURES

- *Superior A/C synchronous submotor for consistent timing and long life*
- *Manual declutch lever for override*
- *Two minimum position setscrews included*
- *Perfect for Honeywell D690 Round Dampers*
- *Square shaft input only*

NEW!

Honeywell



ML6161



1
ACTUATORS & DAMPERS

SPECIFICATIONS	
Supply Voltage	24 VAC ±20% 50/60 Hz
Control Signal	Two-position, floating, proportional 0-10 VDC, 4-20 mA
Auxiliary Switch	NO or NC, 50 VA, 24 VAC, Differential: 3 angular degree minimum
Action	Non-spring return
Torque	35 in-lb, 70 in-lb
Rotation	CW and CCW
Noise	45-60 dBA at 1 meter maximum
Operating Temperature	20° to 125°F (-18° to 50°C)
Operating Humidity	5% to 95% RH noncondensing
Stroke	Selectable: 45 degree, 60 degree, 90 degree
Approvals	UL Recognized: File # E4436; Guide No. XAPX2, UL 94-5V: meets plenum requirements, CE (select models only)
Weight	1.3 lb (0.59 kg)

INPUT SIGNAL/ACTUATOR DRIVE RELATIONSHIP	
Input Signal	Actuator Drive Relationship
1.50 ±0.2 VDC	Actuator drives to extreme CCW position
2.00 ±0.2 VDC	Actuator remains at CCW position
3.00 ±0.2 VDC	Actuator leaves CCW position
10.70 ±0.7 VDC	Actuator drives to extreme CW position
10.00 ±0.7 VDC	Actuator remains at CW position
8.50 ±0.6 VDC	Actuator leaves CW position



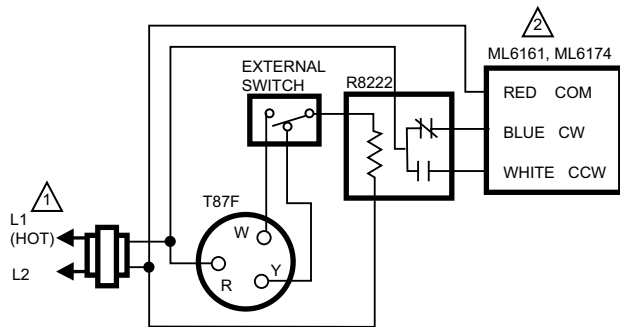
ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS NON-SPRING RETURN

ML61XX, ML71XX SERIES

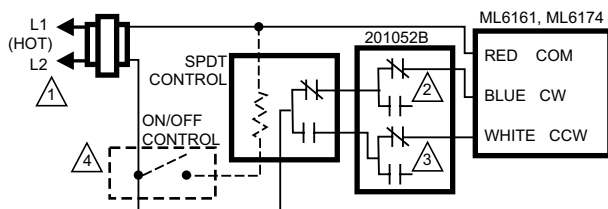
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ACTUATORS & DAMPERS

WIRING

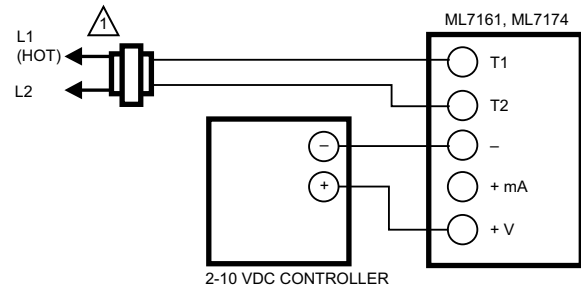


ML6161 or ML6174 used with T87F in heating-only or cooling-only application

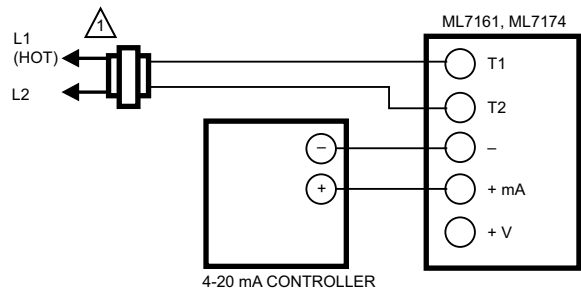
NOTE: See below for the 201052B Auxiliary Switch wiring.



201052B Auxiliary Switch wiring



ML7161 or ML7174 used with 2-10 VDC control



ML7161 or ML7174 used with 4-20 mA control

INSTALLATION NOTES:

- 1 Power supply. Provide disconnect means and overload protection as required.
- 2 Set switch to close when stroke reaches full CW position.
- 3 Set switch to close when stroke reaches full CCW position.
- 4 On-off control requires an R8222 SPDT relay in place of the SPDT control.

APPLICATION NOTES:

Auxiliary Switches: The 201052A or B Auxiliary Switch is used in conjunction with the actuator. It allows for control of equipment external to the actuator (for example, electric reheat coils and fan) at an adjustable point in the stroke (0° to 90°) of the actuator.

The 201052A and B Auxiliary Switches are field-addable. For mounting instructions, see form 63-2218, provided with the device.

IMPORTANT: When operating an ML6161 or ML6174 from a two-position controller, a 201052B Auxiliary Switch is required for proper operation.

NEW!

ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS NON-SPRING RETURN

ML61XX, ML71XX SERIES



ORDERING INFORMATION

MODEL

ML6161A2009

ML6161A2017

ML6161B2024

ML6161B2032

ML6161B2073

ML6174B2019

ML7161A2008

ML7174A2001

ML6161C2015

ML6174A2002

ML6161D2006

ML6161C2007

ML6174D2009

ML6174A2010

ML6161A2025

DESCRIPTION

Non-spring return 35 in-lb 24 VAC floating 90 second stroke time with potentiometer option

Non-spring return 35 in-lb 24 VAC floating 7 minute stroke time with potentiometer option

Non-spring return 35 in-lb 24 VAC floating 90 second stroke time set point switch

Non-spring return 35 in-lb 24 VAC floating 7 minute stroke time with set point switch

Non-spring return 35 in-lb 24 VAC floating 3 minute stroke time with set point switch

Non-spring return 70 in-lb 24 VAC floating 90 second stroke time with set point switch

Non-spring return 35 in-lb 24 VAC proportional 90 second stroke time with potentiometer option

Non-spring return 70 in-lb 24 VAC proportional 90 second stroke time with set point switch

Non-spring return 35 in-lb 24 VAC floating 7 minute stroke time

Non-spring return 70 in-lb 24 VAC floating 90 second stroke time with potentiometer option

Non-spring return 35 in-lb 24 VAC floating 90 second stroke time with set point

Non-spring return 35 in-lb 24 VAC floating 90 second stroke time

Non-spring return 70 in-lb 24 VAC floating 90 second stroke time with set point switch

Non-spring return 70 in-lb 24 VAC floating 3 minute stroke time with potentiometer option

Non-spring return 35 in-lb 24 VAC floating 3 minute stroke time with potentiometer option

ACCESSORIES

201052A

Auxiliary switch (1 SPDT) for ML6161/ML7161/KA-35 actuators

201052B

Auxiliary switch (2 SPDT) for ML6161/ML7161/KA-35 actuators

7640Qw

Metal enclosure for attaching conduit to ML61xx, ML71xx

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ACTUATORS & DAMPERS

ACTUATORS & DAMPERS

KELE REVOLUTION™ DIRECT COUPLED ACTUATORS SPRING RETURN

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

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



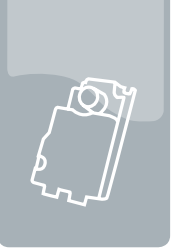
COMMON SPECIFICATIONS

Input Impedance	100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA	Spring Return Time	27, 44 in-lb 25 seconds
Motor		88, 175 in-lb 20 seconds	
2-position	DC with brushes	Manual Override	Crank (88, 175 in-lb only)
Modulating	Brushless DC	Noise	<60 db @ 3' (1m)
Wiring	Enclosed terminals	Life Expectancy	60,000 cycles, 1.5 million repositions
Action		Operating Temperature	
2-pos./float	Mounting orientation direct/reverse acting	KAS-27-2, -44-2	-22° to 150°F (-30° to 65°C)
Proportional	Switch selectable direct/reverse acting	KAS-27-M, -44-M	-40° to 150°F (-40° to 65°C)
Rotation	95°, ±3°	KAS-88, -175	-40° to 140°F (-40° to 60°C)
Drive Time		Operating Humidity	5 to 95% RH
2-position	45 seconds	Enclosure Rating	NEMA 2 (IP54)
Modulating	90 seconds	Approvals	cULus, CE, C-tick, plenum rated, E179109
		Warranty	5 years

INDIVIDUAL SPECIFICATIONS

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

ACTUATORS & DAMPERS



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

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

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

ORDERING INFORMATION		
MODEL	DESCRIPTION	
KAS-27-2	Spring return, 27 in-lb (3 Nm), two-position, 24 VAC/VDC, two-wire control	
KAS-27-2-15	Spring return, 27 in-lb (3 Nm), two-position, 24 VAC/VDC, two-wire control, SPDT aux	
KAS-27-2-120	Spring return, 27 in-lb (3 Nm), two-position, 120 VAC, two-wire control	
KAS-27-2-120-15	Spring return, 27 in-lb (3 Nm), two-position, 120 VAC, two-wire control, SPDT aux	
KAS-27-M	Spring return, 27 in-lb (3 Nm), modulating control (proportional and tri-state), 24 VAC	
KAS-27-M-15	Spring return, 27 in-lb (3 Nm), modulating control (proportional and tri-state), 24 VAC, SPDT aux	
KAS-44-2	Spring return, 44 in-lb (5 Nm), two-position, 24 VAC/VDC, two-wire control	
KAS-44-2-15	Spring return, 44 in-lb (5 Nm), two-position, 24 VAC/VDC, two-wire control, SPDT aux	
KAS-44-120	Spring return, 44 in-lb (5 Nm), two-position, 120 VAC, two-wire control	
KAS-44-120-15	Spring return, 44 in-lb (5 Nm), two-position, 120 VAC, two-wire control, SPDT aux	
KAS-44-M	Spring return, 44 in-lb (5 Nm), modulating control (proportional and tri-state), 24 VAC/VDC	
KAS-44-M-15	Spring return, 44 in-lb (5 Nm), modulating control (prop./tri-state), 24 VAC/VDC, SPDT aux	
KAS-88-2	Spring return, 88 in-lb (10 Nm), two-position, 24 VAC/VDC, two-wire control	
KAS-88-120	Spring return, 88 in-lb (10 Nm), two-position, 120 VAC, two-wire control	
KAS-88-M	Spring return, 88 in-lb (10 Nm), modulating control (proportional and tri-state), 24 VAC/VDC	
KAS-175-2	Spring return, 175 in-lb (20 Nm), two-position, 24 VAC/VDC, two-wire control	
KAS-175-120	Spring return, 175 in-lb (20 Nm), two-position, 120 VAC, two-wire control	
KAS-175-M	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	8
SW2	Auxiliary switch kit for KA-175/301 and KAS-88/175	
ZG-R01	500Ω, 1/2W, 1% resistor	8



ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS SPRING RETURN

TF, LF, NF, AF, EF SERIES

ACTUATORS & DAMPERS

1

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 a 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



LF24



TF24



NFB24



AFB24



EFB24



COMMON SPECIFICATIONS

Input Impedance		Rotation	95°
-SR models	100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA	Manual Override	Manual crank (except TF)
-MFT models	100 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA; 1500Ω @ PWM, float, on/off	Noise	
Motor	Brushless DC	TF, LF, NF	<62 db
Wiring		AF	<45 db
TF, LF	3' (0.9 m) cable, 18 AWG, plenum rated	EF	<71.4 db
NF, AF, EF	3' (0.9 m) appliance cable, 18 AWG	Resolution	100 steps
NEMA 4	Terminal blocks inside housing	Life Expectancy	
Conduit Connection		2-position	60,000 cycles
W/cables	1/2" NPT	Float/prop.	60,000 cycles; 500,000 repositions
NEMA 4	Four knockouts for waterproof conduit fittings	Operating Temperature	-22° to 122°F (-30° to 50°C); NEMA 4 models with heater option can go down to -40°F (-40°C)
Feedback	2-10 VDC (-SR and -MFT models only)	Operating Humidity	5 to 95% RH
Auxiliary Switch		Enclosure Rating	
TF, LF (-S)	1 SPDT, 3A @ 250V	TF	NEMA 2 (IP42)
NF, AF, EF (-S)	2 SPDT, 3A @ 250V	LF, NF, AF, EF	NEMA 2 (IP54)
Action		NEMA 4	NEMA 4 (IP66)
2-position	CW/CCW reversible mounting	Approvals	cULus, CE, RoHS
Float/prop.	DA/RA switch, CW/CCW rev. mt.	Warranty	5 years

ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS SPRING RETURN

TF, LF, NF, AF, EF SERIES



1

ACTUATORS & DAMPERS

INDIVIDUAL SPECIFICATIONS							
Model	Torque	Supply Voltage	Supply VA	Control Signal	Feedback	Drive Time	Spring Return Time
TF24	22 in-lb (2.5 Nm)	24 VAC ±20% 50/60 Hz, 24 VDC ±10%	5.0 VA	Two-position		75 seconds	<60 seconds
TF120	22 in-lb (2.5 Nm)	120 VAC 50/60 Hz	5.0 VA	Two-position		75 seconds	<60 seconds
TF24-3	22 in-lb (2.5 Nm)	24 VAC ±20% 50/60 Hz, 24 VDC ±10%	4.0 VA	Floating		95 seconds	<60 seconds
TF24-SR	22 in-lb (2.5 Nm)	24 VAC ±20% 50/60 Hz, 24 VDC ±10%	4.0 VA	Prop. 2-10 VDC, 4-20 mA	2-10 VDC	95 seconds	<60 seconds
TF24-MFT	22 in-lb (2.5 Nm)	24 VAC ±20% 50/60 Hz, 24 VDC ±10%	4.0 VA	Prop. (default 2-10 VDC)	2-10 VDC	150 seconds	<60 seconds
LF24	35 in-lb (4 Nm)	24 VAC ±20% 50/60 Hz, 24 VDC ±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 ±20% 50/60 Hz, 24 VDC ±10%	5.0 VA	Floating		150 seconds	<60 seconds
LF24-SR	35 in-lb (4 Nm)	24 VAC ±20% 50/60 Hz, 24 VDC ±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 ±20% 50/60 Hz, 24 VDC ±10%	5.0 VA	Prop. (default 2-10 VDC)	2-10 VDC	150 seconds	<60 seconds
NFB24	90 in-lb (10 Nm)	24 VAC ±20% 50/60 Hz, 24 VDC ±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 ±20% 50/60 Hz, 24 VDC ±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 ±20% 50/60 Hz, 24 VDC ±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 ±20% 50/60 Hz, 24 VDC ±10%	10 VA	Prop. (default 2-10 VDC)	2-10 VDC	150 seconds	<60 seconds
AFB24-MFT95	180 in-lb (20 Nm)	24 VAC ±20% 50/60 Hz, 24 VDC ±10%	10 VA	Prop. (default 0-135 ohms)	2-10 VDC	150 seconds	<60 seconds
EFB24	270 in-lb (30 Nm)	24 VAC ±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 ±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 ±20% 50/60 Hz, 24 VDC +20%/-10%	16 VA	Prop. (default 2-10 VDC)	2-10 VDC	150 seconds	<60 seconds

For models not shown please contact Kele for more information.



ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS SPRING RETURN

TF, LF, NF, AF, EF SERIES

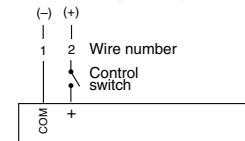
ACTUATORS & DAMPERS

DIMENSIONS

Model	Torque	Dimensions	Maximum Shaft Diameter	Minimum Shaft Length	Weight
TF	22 in-lb (2.5 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 3.9"W x 7.7"L (8.1 x 9.8 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

24 VAC/VDC or (120 VAC)

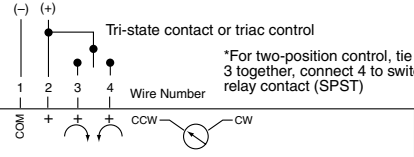


Parallel connection of several actuators is possible.

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

(See Note 1)

24 VAC/VDC

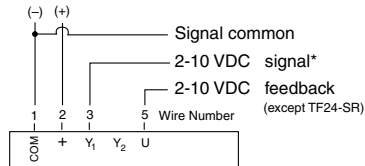


*For two-position control, tie 2 and 3 together, connect 4 to switch or relay contact (SPST)

For each direction of rotation left or right selection switch, arrows on actuator show rotation selected.

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

24 VAC/VDC



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

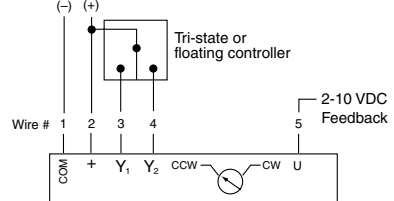
*4-20 mA signal with 500Ω resistor across terminals 1 and 3.

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 0.59 - 2.95 sec	2-10 VDC
W02	PWM 0.02 - 5.00 sec	2-10 VDC
F01	Floating	2-10 VDC
J2	Two-position	2-10 VDC

MFT Function Codes

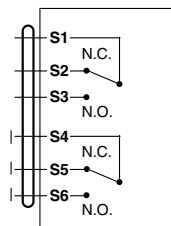
24 VAC/VDC



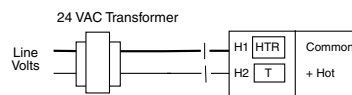
MFT Code = F01 (Pre-programmed at Kele)

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

ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS SPRING RETURN

TF, LF, NF, AF, EF SERIES



1

ACTUATORS & DAMPERS

ORDERING INFORMATION

ORDERING INFORMATION	
MODEL	TORQUE
EF	270 in-lbs (30 Nm)
AF	180 in-lbs (20 Nm)
NF	90 in-lbs (10 Nm)
LF	35 in-lbs (4 Nm)
TF	22 in-lbs (2.5 Nm)
CONFIGURATION OPTIONS	
Blank	L Models Only
B	Basic
X	Customizable
POWER SUPPLY	
24	24 VAC/DC
120	120 VAC*
230	230 VAC
UP	24 to 240 VAC or 24 to 125 VDC **
CONTROL TYPE	
Blank	On/Off
-SR	2-10 VDC
-3	Floating Point
-PC	0-20 Volt (Phasecut)
-ECON-R03	3K ohm NTC Type 10 Thermistor
-MFT	Multifunction (Pcode required)
-MFT95	0 to 135K ohm
-MFT-20	6 to 9 VDC, 20 VDC Power Supply***
OPTIONAL AUXILLIARY	
-S	Built In Auxilliary
NEMA OPTION	
-N4	NEMA 4 Rated****
-N4H	NEMA 4 Rated w/Internal Heater****

EF	B	24	-SR	-S	-N4	Example: EFB24-SR-S-N4
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* EF, LF and TF Models only. Use UP option for AF and NF to get 120 VAC.
EF and TF models have 100 to 240 Nominal Power Supply

** Only available on AF and NF models

*** Only available on LF models

**** Only available on certain AF, EF, NF models

NOTES:

- 1) All functions and options are not available with all versions
- 2) Most models available with internal auxiliary switches; order with -S suffix (N4 models are shown with -S included).
- 3) 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	8
ZG-102	Tandem actuator mounting bracket for AF/AFB/GMB actuators	8
ZG-112	Floor mount bracket, vertical, for LF actuators	8
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	8

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

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

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

ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS SPRING RETURN

MS SERIES



1

ACTUATORS & DAMPERS

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

MS75xx — Proportional Control

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

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

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

The SW2 is a field-adaptable auxiliary switch kit that fits only the 88 and 175 in-lb actuators

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	8
50000407-001	
50001194-001	
SW2	
ZG-R01	

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

ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS SPRING RETURN

GMA, GCA, GQD, GNP SERIES



DESCRIPTION

Siemens **GMA, GCA, GQD** and **GNP Series** direct coupled spring return actuators provide control for a complete range of HVAC damper applications. 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**
- **Rugged, lightweight housings**
- **Manual override on GMA, GCA models**
- **Conduit connection on GMA, GCA models**



SIEMENS

GCA, GMA, GQD Series



COMMON SPECIFICATIONS

Manual Override	Manual crank (except GQD), Disengage button (GNP)	Motor Wiring	Brushless DC 3 ft (1.0 m), 18 AWG plenum cable (.1P models), 3 ft (1.0 m), 18 AWG standard cable (.1U models)
Life Expectancy	60,000 cycles, 100,000 full stroke cycles, 7,000,000 repositions (GNP)	Input Impedance	100kΩ @ 0/2-10VDC 500Ω @ 4-20ma
Rotation	95°	Approvals	cULus, CE, plenum rated, E35198
Operating Temperature	-25° to 130°F (-32° to 55°C), 0° to 122°F (-18° to 50°C) (GNP)	Warranty	2 years
Operating Humidity	5 to 95% RH non-condensing		

INDIVIDUAL SPECIFICATIONS

Model	Torque	Supply Voltage	Supply VA	Control Signal	Input Resistance	Feedback	Drive Time	Spring Return Time	Built-in Auxiliary Switches
GQD121.1P	20 in-lb (2 Nm)	24 VAC/VDC	6.5 VA	Two-position		None	30 seconds	15 seconds	
GQD126.1P	20 in-lb (2 Nm)	24 VAC/VDC	6.5 VA	Two-position		None	30 seconds	15 seconds	X
GQD131.1P	20 in-lb (2 Nm)	24 VAC/VDC	4 VA	Floating		None	30 seconds	15 seconds	
GQD136.1P	20 in-lb (2 Nm)	24 VAC/VDC	4.5 VA	Floating		None	30 seconds	15 seconds	X
GQD151.1P	20 in-lb (2 Nm)	24 VAC/VDC	10 VA	Prop. 2-10 VDC	>100kΩ	2-10 VDC	30 seconds	15 seconds	
GQD156.1P	20 in-lb (2 Nm)	24 VAC/VDC	10 VA	Prop. 2-10 VDC	>100kΩ	2-10 VDC	30 seconds	15 seconds	X
GQD221.1U	20 in-lb (2 Nm)	120 VAC	6.5 VA	Two-position		None	30 seconds	15 seconds	
GQD226.1U	20 in-lb (2 Nm)	120 VAC	6.5 VA	Two-position		None	30 seconds	15 seconds	X
GNP191.1P	53 in-lb (6 Nm)	24 VAC/VDC	20 VA	Universal-Selectable	>100kΩ	0-10 VDC	2 seconds	Fail-Safe* 2 seconds	
GNP196.1P	53 in-lb (6 Nm)	24 VAC/VDC	20 VA	Universal-Selectable	>100kΩ	0-10 VDC	2 seconds	Fail-Safe* 2 seconds	X
GMA121.1P	62 in-lb (7 Nm)	24 VAC/VDC	5 VA	Two-position		None	90 seconds	15 seconds	
GMA121.1U	62 in-lb (7 Nm)	24 VAC/VDC	5 VA	Two-position		None	90 seconds	15 seconds	
GMA126.1U	62 in-lb (7 Nm)	24 VAC/VDC	5 VA	Two-position		None	90 seconds	15 seconds	X
GMA131.1P	62 in-lb (7 Nm)	24 VAC/VDC	5 VA	Floating		None	90 seconds	15 seconds	
GMA151.1P	62 in-lb (7 Nm)	24 VAC/VDC	5 VA	Prop. 2-10 VDC	>100kΩ	2-10 VDC	90 seconds	15 seconds	
GMA161.1P	62 in-lb (7 Nm)	24 VAC/VDC	5 VA	Prop. 0-10 VDC	>100kΩ	0-10 VDC	90 seconds	15 seconds	
GMA161.1U	62 in-lb (7 Nm)	24 VAC/VDC	5 VA	Prop. 0-10 VDC	>100kΩ	0-10 VDC	90 seconds	15 seconds	
GMA166.1U	62 in-lb (7 Nm)	24 VAC/VDC	5 VA	Prop. 0-10 VDC	>100kΩ	0-10 VDC	90 seconds	15 seconds	X
GMA221.1U	62 in-lb (7 Nm)	120 VAC	5 VA	Two-position		None	90 seconds	15 seconds	
GMA226.1U	62 in-lb (7 Nm)	120 VAC	5 VA	Two-position		None	90 seconds	15 seconds	X
GCA121.1P	160 in-lb (18 Nm)	24 VAC/VDC	8 VA	Two-position		None	90 seconds	15 seconds	
GCA126.1P	160 in-lb (18 Nm)	24 VAC/VDC	8 VA	Two-position		None	90 seconds	15 seconds	X
GCA131.1P	160 in-lb (18 Nm)	24 VAC/VDC	8 VA	Floating		None	90 seconds	15 seconds	
GCA151.1P	160 in-lb (18 Nm)	24 VAC/VDC	9 VA	Prop. 0/2-10 VDC	>100kΩ	0-10 VDC	90 seconds	15 seconds	
GCA151.1U	160 in-lb (18 Nm)	24 VAC/VDC	9 VA	Prop. 0/2-10 VDC	>100kΩ	0-10 VDC	90 seconds	15 seconds	
GCA161.1P	160 in-lb (18 Nm)	24 VAC/VDC	9 VA	Prop. 0-10 VDC	>100kΩ	0-10 VDC	90 seconds	15 seconds	
GCA161.1U	160 in-lb (18 Nm)	24 VAC/VDC	9 VA	Prop. 0-10 VDC	>100kΩ	0-10 VDC	90 seconds	15 seconds	
GCA166.1U	160 in-lb (18 Nm)	24 VAC/VDC	9 VA	Prop. 0-10 VDC	>100kΩ	0-10 VDC	90 seconds	15 seconds	X
GCA221.1U	160 in-lb (18 Nm)	120 VAC	9 VA	Two-position		None	90 seconds	15 seconds	
GCA226.1U	160 in-lb (18 Nm)	120 VAC	9 VA	Two-position		None	90 seconds	15 seconds	X

*Fail Safe = capacitor, no physical spring

ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS SPRING RETURN

GMA, GCA, QGD, GNP SERIES



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ACTUATORS & DAMPERS

DIMENSIONS						
Model	Torque	Dimensions	Maximum Shaft Diameter	Minimum Shaft Length	Enclosure Rating	Weight
QGD	20 in-lb (2 Nm)	2.5"H x 2.8"W x 4.8"L (6.3 x 6.9 x 12.0 cm)	0.5" (1.3 cm)	0.75" (2.0 cm)	NEMA 1 (IP40)	1.06 lb (.48 kg)
GNP	53 in-lb (6 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)	3.4 lb (1.5 kg)
GMA	62 in-lb (7 Nm)	2.7"H x 3.3"W x 8.4"L (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)
GCA	160 in-lb (18 Nm)	2.9"H x 4.8"W x 12.0"L (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

QGD12x, GMA12x, GCA12x
24 VAC Two-position control

GMA16x, GCA16x, GNP19x
0-10 VDC control

GMA22x, GCA22x
120 VAC Two-position control

QGD15x, GMA15x, GCA15x
4-20 mA control

GMA13x, GCA13x
Floating control



ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS SPRING RETURN

GMA, GCA, GQD, GNP SERIES

1

ACTUATORS & DAMPERS

ORDERING INFORMATION

MODEL	DESCRIPTION
GQD121.1P	Spring return 20 in-lb (2 Nm), 24 VAC/VDC, 2-position, plenum cable
GQD126.1P	Spring return 20 in-lb (2 Nm), 24 VAC/VDC, 2-position, plenum cable, aux. sw.
GQD131.1P	Spring return 20 in-lb (2 Nm), 24 VAC/VDC, floating control, plenum cable
GQD136.1P	Spring return 20 in-lb (2 Nm), 24 VAC/VDC, floating control, plenum cable, aux. sw.
GQD151.1P	Spring return 20 in-lb (2 Nm), 24 VAC/VDC, proportional 2-10 VDC, 2-10 VDC feedback, plenum cable
GQD156.1P	Spring return 20 in-lb (2 Nm), 24 VAC/VDC, proportional 2-10 VDC, 2-10 VDC feedback, plenum cable, aux. sw.
GQD221.1P	Spring return 20 in-lb (2 Nm), 120 VAC, 2-position, standard cable
GQD226.1P	Spring return 20 in-lb (2 Nm), 120 VAC, 2-position, standard cable, aux. sw.
GNP191.1P	Fail-safe (capacitor) 53 in-lb (6 Nm) 24 VAC/VDC, universal selectable control signals, 0-10 VDC feedback, plenum cable
GNP196.1P	Fail-safe (capacitor) 53 in-lb (6 Nm) 24 VAC/VDC, universal selectable control signals, 0-10 VDC feedback, plenum cable, aux. sw.
GMA121.1P	Spring return 62 in-lb (7 Nm), 24 VAC/VDC, 2-position, plenum cable
GMA121.1U	Spring return 62 in-lb (7 Nm), 24 VAC/VDC, 2-position, standard cable
GMA126.1U	Spring return 62 in-lb (7 Nm), 24 VAC/VDC, 2-position, standard cable, auxillary switches
GMA131.1P	Spring return 62 in-lb (7 Nm), floating control, plenum cable
GMA151.1P	Spring return 62 in-lb (7 Nm), 24 VAC/VDC, proportional 2-10 VDC, 2-10 VDC feedback, plenum cable
GMA161.1P	Spring return 62 in-lb (7 Nm), 24 VAC/VDC, proportional 0-10 VDC, 0-10 VDC feedback, plenum cable
GMA161.1U	Spring return 62 in-lb (7 Nm), 24 VAC/VDC, proportional 0-10 VDC, 0-10 VDC feedback, standard cable
GMA221.1U	Spring return 62 in-lb (7 Nm), 120 VAC, 2-position, standard cable
GMA166.1U	Spring return 62 lb-in (7 Nm), 24 VAC/VDC, proportional 0-10 VDC, 0-10 VDC feedback, standard cable, aux. sw.
GMA226.1U	Spring return 62 lb-in (7 Nm), 120 VAC, 2-position, standard cable, auxillary switches
GCA121.1P	Spring return 160 in-lb (18 Nm), 24 VAC/VDC, 2-position, plenum cable
GCA131.1P	Spring return 160 in-lb (18 Nm), floating control, plenum cable
GCA151.1P	Spring return 160 lb-in (18 Nm), 24 VAC/VDC, proportional 0/2-10 VDC, 0-10 VDC feedback, plenum cable
GCA151.1U	Spring return 160 in-lb (18 Nm), prop. 0/2-10 VDC, 0-1K ohm feedback, standard cable
GCA161.1P	Spring return 160 lb-in (18 Nm), 24 VAC/VDC, proportional 0-10 VDC, 0-10 VDC feedback, plenum cable
GCA161.1U	Spring return 160 in-lb (18 Nm), prop. 0-10 VDC, 0-1K ohm feedback, standard cable
GCA221.1U	Spring return 160 in-lb (18 Nm), 120 VAC, 2-position, standard cable
GCA226.1U	Spring return 160 in-lb (18 Nm), 120 VAC, 2-position, aux. switches, standard cable
GCA126.1P	Spring return 160 lb0in (18 Nm), 24 VAC/VDC, 2-position, plenum cable, auxillary switches
GCA166.1U	Spring return 160 lb-in (18 Nm), 24 VAC/VDC, proportional 0-10 VDC, 0-10 VDC feedback, standard cable

ACCESSORIES

ASC77.2U	Auxiliary switch kit (DPDT) for GIB, GBB, GEB actuators
ASK71.11	Combined foot mount/frame mount kit for GEB/GMA actuators
ASK71.1U	Floor mount kit for GCA/GBB/GIB actuators
ASK71.2U	Frame mount kit for GCA/GBB/GIB actuators
ASK71.4	Linear stroke kit for GEB/GMA actuators
ASK75.1U	Weather shield for GBB/GIB/GCA actuators
ASK75.3U	Weather shield for GEB/GMA actuators

ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS SPRING RETURN M9200 SERIES



1

ACTUATORS & DAMPERS

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**



COMMON SPECIFICATIONS	
Input Impedance	200 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA
Motor	Brushless DC
Wiring	18 AWG, 120" (3m), plenum leads (-2 models); 18 AWG, 48" (1.2m), appliance cable (-3 models)
Conduit Connection	1/2" conduit connectors (M9203 only); Integral 3/8" flex connectors (all others)
Action	Select by wiring (2-pos./floating); Switch or hub re-position (proportional)
Rotation	95° (M9203, M9208); 93° (M9210, M9220)
Manual Override	Manual crank (M9210, M9220 only)
Noise	<55 db (M9203); <52 db (M9208); <40 db (M9210/M9220 2-pos.); <66 db (M9210/M9220 floating/prop.)
Resolution	120 steps
Life Expectancy	60,000 cycles, 1.5 million repositions
Operating Temperature	-40° to 140°F (-40° to 60°C) (M9203, M9208); -40° to 131°F (-40° to 55°C) (M9210, M9220)
Operating Humidity	0 to 95% RH
Enclosure Rating	NEMA 2 (IP54)
Approvals	cULus, CE (M9203, M9208); UL, CE, CSA, C-tick (M9210, M9220)
Warranty	5 years

INDIVIDUAL SPECIFICATIONS							
Model	Torque	Supply Voltage	Supply VA	Control Signal	Feedback	Drive Time	Spring Return Time
M9203-AGA-2Z	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
M9203-BGA-2	27 in-lb (3 Nm)	24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10%	5.0 VA	Two-position	None	75 seconds	25 seconds
M9203-GGA-2Z	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
M9208-AGA-x	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
M9208-BGA-x	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
M9208-GGA-x	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
M9210-AGA-3	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
M9210-BAA-3	89 in-lb (10 Nm)	120 VAC, +10%/-15%, 60 Hz	25 VA	Two-position	None	150 seconds	11 to 15 seconds
M9210-BGA-3	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
M9210-GGA-3	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
M9210-HGA-3	89 in-lb (10 Nm)	24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10%	9.6 VA	Floating	None	150 seconds	26 seconds
M9220-AGA-3	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
M9220-BAA-3	177 in-lb (20 Nm)	120 VAC, +10%/-15%, 60 Hz	25 VA	Two-position	None	24 to 57 seconds	11 to 15 seconds
M9220-BGA-3	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
M9220-GGA-3	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
M9220-HGA-3	177 in-lb (20 Nm)	24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10%	15.5 VA	Floating	None	150 seconds	20 seconds



ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS SPRING RETURN M9200 SERIES

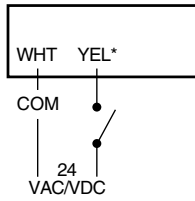
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ACTUATORS & DAMPERS

DIMENSIONS

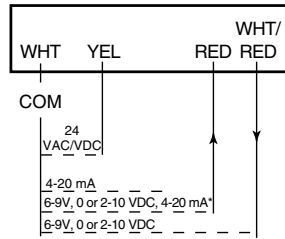
Model	Dimensions	Maximum Shaft Diameter	Minimum Shaft Length	Weight
M9203	3.2"H x 3.2"W x 6.4"L (7.6 x 3.3 x 21.1 cm)	0.63" (1.6 cm)	1.7" (5.2 cm)	4.2 lb (1.9 kg)
M9208	3.2"H x 3.2"W x 6.4"L (7.6 x 3.3 x 21.1 cm)	0.63" (1.6 cm)	1.7" (5.2 cm)	4.2 lb (1.9 kg)
M9210/M9220, 24V	3.3"H x 4.0"W x 10.3"L (8.4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



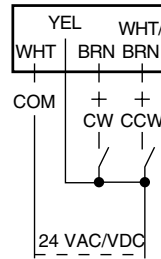
*For AGA models, this wire color is BRN.

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

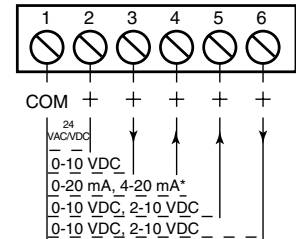


*500 Ω resistor required

M9206-, M9210-, M9220-GGA
Proportional



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



TERMINAL	DESCRIPTION
3	Calibration Out
4	Current Input
5	Voltage Input
6	Feedback

*500Ω resistor required

Proportional

ORDERING INFORMATION

MODEL

DESCRIPTION

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

ACCESSORIES

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

ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS SPRING RETURN

MA, MF, MS SERIES



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



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ACTUATORS & DAMPERS

COMMON SPECIFICATIONS

Input Impedance	80 kΩ @ 0/2-10 VDC; 500Ω @ 4-20 mA (proportional models)	Manual Override	Crank (MA41, MF41, MS41 models)
Motor	DC with brushes (MA40-70xx, MA41-70xx, MF40-70xx, MF41-70xx); Brushless DC (all others)	Resolution	100 steps
Wiring	3-foot cable, 18 AWG	Operating Temperature	-22° to 140°F (-30° to 60°C)
Conduit Connection	1/2" FNPT	Operating Humidity	15 to 95% RH
Action	Mounting orientation direct/reverse acting	Enclosure Rating	NEMA 2 (IP54) (35, 60, 133 in-lb models), NEMA 4 (IP56) (150 in-lb models)
Rotation	95° ±5°	Approvals	UL, CE, cUL (varies by model)
		Warranty	5 years

INDIVIDUAL SPECIFICATIONS

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

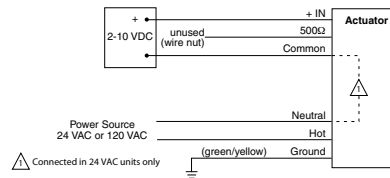
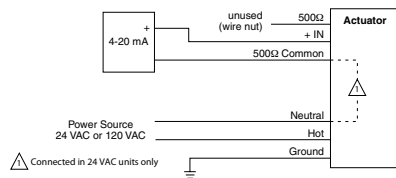
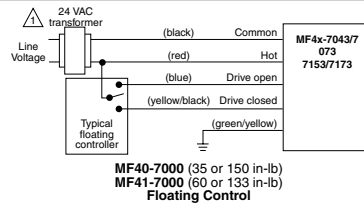
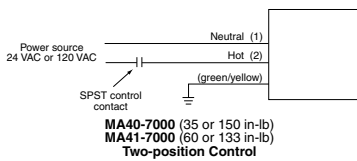
MA, MF, MS SERIES

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



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

DIRECT COUPLED ACTUATORS FAIL-SAFE GK SERIES



BELIMO



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ACTUATORS & DAMPERS

DESCRIPTION

The Belimo **GK Series** fail-safe actuators provide 360 in-lb of torque for operation of dampers up to approximately 90 square feet. The direction of rotation is reversible, the fail-safe position is adjustable and a manual override button is standard. Add-on field mount auxiliary switches and feedback potentiometers are available.

FEATURES

- *Fail-safe operation upon power loss for positive damper or valve positioning*
- *360 in-lb is more power than spring return models*

NEW!



GKX24-MFT



COMMON SPECIFICATIONS			
Supply Voltage	24 VAC \pm 20% 50/60 Hz, 24 VDC \pm 10%	Operating Humidity	5 to 95% RH
Control Signal	Two-position, floating, Proportional 2-10 VDC, 4-20 mA	Approvals	UL, CE, cUL
		Warranty	5 years

INDIVIDUAL SPECIFICATIONS						
MODEL	TORQUE	SUPPLY VA	CONTROL SIGNAL	FEEDBACK	AUXILIARY	DRIVE TIME
GKB24-3	360 in-lb (40 Nm)	21 VA	On/Off or Floating	None	SPDT 3A (0.5A inductive) (@ 250 VAC)	150 seconds
GKB24-3-T N4	360 in-lb (40 Nm)	21 VA	On/Off or Floating	None	SPDT 3A (0.5A inductive) (@ 250 VAC)	150 seconds
GKB24-3-T N4H	360 in-lb (40 Nm)	21 VA	On/Off or Floating	None	SPDT 3A (0.5A inductive) (@ 250 VAC)	150 seconds
GKB24-MFT-T N4H	360 in-lb (40 Nm)	21 VA	Proportional (2 to 10 VDC default)	Variable (2 to 10 VDC default)	SPDT 3A (0.5A inductive) (@ 250 VAC)	90 to 150 seconds
GKB24-SR	360 in-lb (40 Nm)	21 VA	Proportional 2 to 10 VDC (4 to 20 mA)	2 to 10 VDC	SPDT 3A (0.5A inductive) (@ 250 VAC)	150 seconds
GKB24-SR-T N4	360 in-lb (40 Nm)	21 VA	Proportional 2 to 10 VDC (4 to 20 mA)	2 to 10 VDC	SPDT 3A (0.5A inductive) (@ 250 VAC)	150 seconds
GKB24-SR-T N4H	360 in-lb (40 Nm)	21 VA	Proportional 2 to 10 VDC (4 to 20 mA)	2 to 10 VDC	SPDT 3A (0.5A inductive) (@ 250 VAC)	150 seconds



ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS FAIL-SAFE

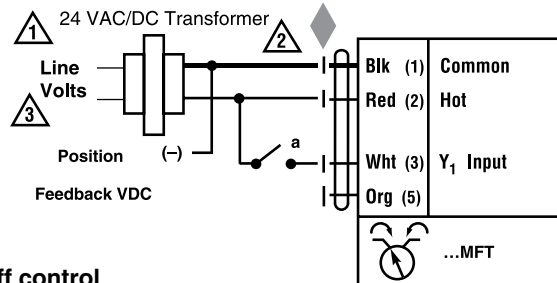
GK SERIES

ACTUATORS & DAMPERS

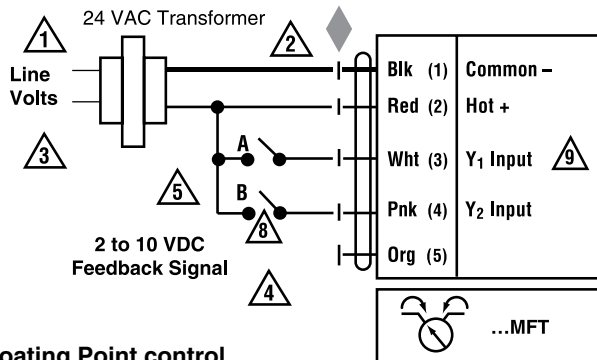
1

WIRING

GKB-24-3 / GKX24-3 SERIES (Includes Nema 4)



On/Off control



Floating Point control

APPLICATION NOTES

◆ Meets UL requirements without the need for an electrical ground connection.

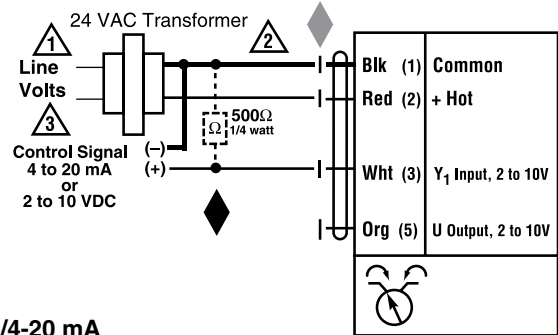
◆ The ZG-R01 500Ω resistor may be used.



WARNING: LIVE ELECTRICAL COMPONENTS

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

GKB-24-SR / GKX24-SR-T SERIES (Includes Nema 4)



VDC/4-20 mA

INSTALLATION NOTES

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

NEW!

ACTUATORS & DAMPERS

DIRECT COUPLED ACTUATORS FAIL-SAFE GK SERIES



1

ACTUATORS & DAMPERS

DIMENSIONS						
MODEL	TORQUE	DIMENSIONS	MAXIMUM SHAFT DIAMETER	MINIMUM SHAFT LENGTH	ENCLOSURE RATING	WEIGHT
GKB24-3	360 in-lb (40 Nm)	3.4"H x 4.5"W x 8.3"L (8.6 x 11.43 x 21.08 cm)	1.05" (2.7 cm)	1.75" (4.5 cm)	NEMA 2	3.85 lb (1.75 kg)
GKB24-3-T N4	360 in-lb (40 Nm)	12.99"H x 6.77"W x 6.42"L (33 x 17.2 x 16.3 cm)	1.05" (2.7 cm)	1.75" (4.5 cm)	NEMA 4	8.95 lb (4.05 kg)
GKB24-3-T N4H	360 in-lb (40 Nm)	12.99"H x 6.77"W x 6.42"L (33 x 17.2 x 16.3 cm)	1.05" (2.7 cm)	1.75" (4.5 cm)	NEMA 4	9.45 lb (4.3 kg)
GKB24-MFT-T N4H	360 in-lb (40 Nm)	12.99"H x 6.77"W x 6.42"L (33 x 17.2 x 16.3 cm)	1.05" (2.7 cm)	1.75" (4.5 cm)	NEMA 2	3.85 lb (1.75 kg)
GKB24-SR	360 in-lb (40 Nm)	3.4"H x 4.5"W x 8.3"L (8.6 x 11.43 x 21.08 cm)	1.05" (2.7 cm)	1.75" (4.5 cm)	NEMA 2	3.85 lb (1.75 kg)
GKB24-SR-T N4	360 in-lb (40 Nm)	12.99"H x 6.77"W x 6.42"L (33 x 17.2 x 16.3 cm)	1.05" (2.7 cm)	1.75" (4.5 cm)	NEMA 4	8.95 lb (4.05 kg)
GKB24-SR-T N4H	360 in-lb (40 Nm)	12.99"H x 6.77"W x 6.42"L (33 x 17.2 x 16.3 cm)	1.05" (2.7 cm)	1.75" (4.5 cm)	NEMA 4	9.45 lb (4.3 kg)

ORDERING INFORMATION

MODEL	DESCRIPTION
GKB24-3	Electronic fail-safe 360 in-lb 24 VAC/VDC on-off or floating control
GKB24-3-T N4	Electronic fail-safe 360 in-lb 24 VAC/VDC on-off or floating control Nema 4
GKB24-3-T N4H	Electronic fail-safe 360 in-lb 24 VAC/VDC on-off or floating control Nema 4 w/heater
GKB24-MFT-T N4H	Electronic fail-safe 360 in-lb 24 VAC/VDC MFT proportional control Nema 4 w/heater
GKB24-SR	Electronic fail-safe 360 in-lb 24 VAC/VDC 2-10VDC proportional control
GKB24-SR-T N4	Electronic fail-safe 360 in-lb 24 VAC/VDC 2-10VDC proportional control Nema 4
GKB24-SR-T N4H	Electronic fail-safe 360 in-lb 24 VAC/VDC 2-10VDC proportional control Nema 4 w/heater
GKX24-3	Electronic fail-safe 360 in-lb 24 VAC/VDC on-off or floating control w/custom option
GKX24-3-T N4	Electronic fail-safe 360 in-lb 24 VAC/VDC on-off or floating control w/custom option Nema 4
GKX24-MFT	Electronic fail-safe 360 in-lb 24 VAC/VDC MFT proportional control w/custom option
GKX24-MFT-T N4	Electronic fail-safe 360 in-lb 24 VAC/VDC MFT proportional control w/custom option Nema 4
GKX24-SR	Electronic fail-safe 360 in-lb 24 VAC/VDC 2-10VDC proportional control w/custom option
GKX24-SR-T N4	Electronic fail-safe 360 in-lb 24 VAC/VDC 2-10VDC proportional control w/custom option Nema 4

	ACCESSORIES	PAGE
K-GM20	0.75" (1.91 cm) shaft clamp	
P370	Shaft mount auxilliary switch	
S1A	Optional SPDT auxiliary switch for LM, NM, AM, GM, GK, NK	
ZG-102	Tandem actuator mounting bracket for AF/AFB/GMB actuators	8
ZG-GMA	Crank arm adapter kit	
ZS-100	Galvanized weather shield for Belimo AFB/NFB/LF/TF/GMB/AMB/NMB/LMB	7
ZS-150	Polycarbonate weather shield for Belimo AFB/NFB/LF/TF/GMB/AMB/NMB/LMB	7
ZS-260	Explosion proof housing	487

ACTUATORS & DAMPERS

FAST-ACTING FAIL SAFE ACTUATORS NKQ SERIES

ACTUATORS & DAMPERS

DESCRIPTION

The Belimo **NKQ Series** actuators are electronic, fail safe, fast acting actuators. They are designed to deliver 4 to 10 second (4 second is standard) fail safe return. They are not spring return, but rather they are driven by a super capacitor which allows a very fast return to the normal or fail safe position desired. The basic models come in both ON/OFF and 2-10VDC options. Auxillary switches and feedback options are available on the **NKQB24-1** model. The **NKQB24-SR** comes with a feedback of 2-10 VDC standard and the auxillary switch is an optional add-on. For more customized control, the **NKQx-MFT** models can be custom ordered based on the options available.

FEATURES

- **Standard 4 second run time**
- **Standard 1/2" to 1.05" clamp**
- **3' plenum rated cable with conduit connector**
- **24VAC/DC power supply**
- **Direct coupled**
- **5 year warranty**

NEW!



NKQ Series



INDIVIDUAL SPECIFICATIONS

MODEL	TORQUE	SUPPLY VA	CONTROL SIGNAL	FEEDBACK	AUXILIARY	DRIVE TIME
NKQB24-1	54 in-lb (6 Nm)	22 VA	On/Off	None	SPDT 3A (0.5A inductive) @ 250 VAC	4 seconds
NKQB24-SR	54 in-lb (6 Nm)	22 VA	Proportional 2 to 10 VDC (4-20 mA)	Proportional (2-10 VDC)	SPDT 3A (0.5A inductive) @ 250 VAC	4 seconds
NKQX24-MFT*	54 in-lb (6 Nm)	22 VA	Proportional 2 to 10 VDC (4-20 mA)	Proportional (2-10 VDC)	SPDT 3A (0.5A inductive) @ 250 VAC	4 seconds

*Custom multi-function technology option. Default is 2 to 10 VDC.

DIMENSIONS

TORQUE	DIMENSIONS	MAXIMUM SHAFT DIAMETER	MINIMUM SHAFT LENGTH	ENCLOSURE RATING	WEIGHT
54 in-lb (6 Nm)	3.9"H x 3.0"W x 7.25"L (9.9x7.6x19.3 cm)	1.05" (2.7 cm)	1.75" (4.5 cm)	NEMA2 / IP54 UL enclosure type 2	2.4 lb (1.0 kg)

ORDERING INFORMATION

MODEL	DESCRIPTION
NKQB24-1	Electronic failsafe actuator, 54 in-lb, 24 VAC/VDC, On/Off
NKQB24-SR	Electronic failsafe actuator, 54 in-lb, 24 VAC/VDC, 2-10 VDC proportional (4-20 mA)
NKQX24-MFT	Electronic failsafe actuator, 54 in-lb, 24 VAC/VDC, 2-10 VDC proportional (4-20 mA) w/ MFT technology

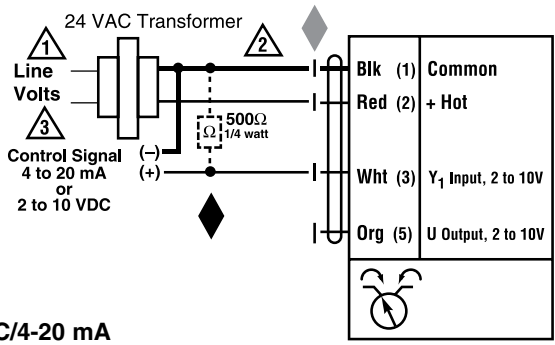
	ACCESSORIES	PAGE
K-AM25	0.75" (1.91 cm) shaft clamp	
P370	Shaft mount auxilliary switch	
S1A	Optional SPDT auxiliary switch for LM, NM, AM, GM, GK, NK	
ZG-102	Tandem actuator mounting bracket for AF/AFB/GMB actuators	8
ZG-NMA	Crank arm adapter kit for AMB, NMB	
ZS-100	Galvanized weather shield for Belimo AFB/NFB/LF/TF/GMB/AMB/NMB/LMB	7
ZS-150	Polycarbonate weather shield for Belimo AFB/NFB/LF/TF/GMB/AMB/NMB/LMB	7
ZS-260	Explosion proof housing	487

NEW!



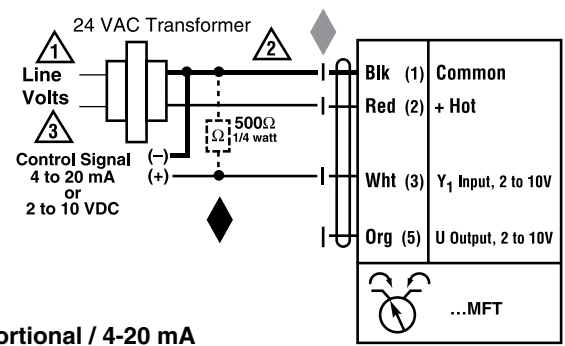
WIRING

NKQ SERIES



VDC/4-20 mA

NKQX24-MFT SERIES



Proportional / 4-20 mA

INSTALLATION NOTES

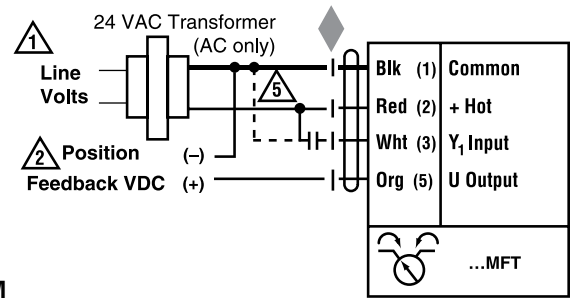
- 1 Provide overload protection and disconnect as required.
- 2 **CAUTION EQUIPMENT DAMAGE!** Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.
- 3 Actuators may also be powered by 24 VDC.
- 4 Position feedback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

APPLICATION NOTES

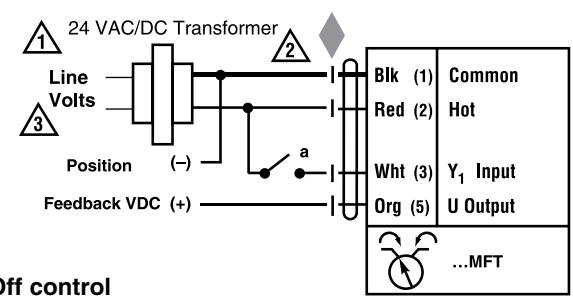
◆ Meets UL requirements without the need for an electrical ground connection.

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

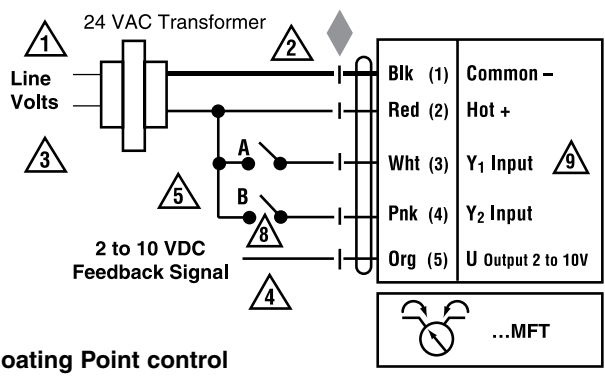
WARNING: LIVE ELECTRICAL COMPONENTS
 During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



PWM



On/Off control



Floating Point control

NEW!



ACTUATORS & DAMPERS

FIRE AND SMOKE DAMPER ACTUATORS

GND, GGD SERIES

1

ACTUATORS & DAMPERS

DESCRIPTION

Siemens fire/smoke damper actuators are spring return, 2-position, 15 second actuators designed to operate UL Listed smoke control dampers and combination fire/smoke dampers. The **GND Series** has 53 in-lb (6 Nm) of torque and the more powerful **GGD Series** has 142 in-lb (16 Nm) of torque. These actuators have patented built-in electronic fusible links; there is no need to buy/install separate parts to perform that function.

FEATURES

- **Reversible fail-safe spring return for CCW, CW rotation in the same actuator**
- **Patented built-in electronic fusible link**
- **Fast, 15-second operation**
- **2 year warranty**

NEW!

SIEMENS



GGD221.1U



GND221.1U



INDIVIDUAL SPECIFICATIONS

MODEL	TORQUE	SUPPLY VOLTAGE	SUPPLY VA	CONTROL SIGNAL	DRIVE TIME	SPRING RETURN TIME	WEIGHT
GGD121.1U	142 in-lb (16 Nm)	24 VAC	150 VA running, 10 VA holding	Two-position	15 seconds	15 seconds	7 lb (3.2 kg)
GGD121.3U	142 in-lb (16 Nm)	24 VAC		Two-position	15 seconds	15 seconds	7 lb (3.2 kg)
GGD126.1U	142 in-lb (16 Nm)	24 VAC		Two-position	15 seconds	15 seconds	7 lb (3.2 kg)
GGD221.1U	142 in-lb (16 Nm)	120 VAC		Two-position	15 seconds	15 seconds	7 lb (3.2 kg)
GGD221.3U	142 in-lb (16 Nm)	120 VAC		Two-position	15 seconds	15 seconds	7 lb (3.2 kg)
GGD226.1U	142 in-lb (16 Nm)	120 VAC		Two-position	15 seconds	15 seconds	7 lb (3.2 kg)
GGD321.1U	142 in-lb (16 Nm)	230 VAC		Two-position	15 seconds	15 seconds	7 lb (3.2 kg)
GGD326.1U	142 in-lb (16 Nm)	230 VAC		Two-position	15 seconds	15 seconds	7 lb (3.2 kg)
GND121.1U	53 in-lb (6 Nm)	24 VAC	20 VA running, 8 VA holding	Two-position	15 seconds	15 seconds	4 lb (1.8 kg)
GND126.1U	53 in-lb (6 Nm)	24 VAC		Two Position	15 seconds	15 seconds	4 lb (1.8 kg)
GND221.1U	53 in-lb (6 Nm)	120 VAC	20 VA running, 9 VA holding	Two-position	15 seconds	15 seconds	4 lb (1.8 kg)
GND226.1U	53 in-lb (6 Nm)	120 VAC		Two-position	15 seconds	15 seconds	4 lb (1.8 kg)
GND321.1U	53 in-lb (6 Nm)	230 VAC		Two-position	15 seconds	15 seconds	4 lb (1.8 kg)
GND326.1U	53 in-lb (6 Nm)	230 VAC		Two-position	15 seconds	15 seconds	4 lb (1.8 kg)

Add /B for bulk pack (GGD Series is 8 per pack; GND is 10 per pack)
Add/F for fusible link (GND Series only)

NEW!

ACTUATORS & DAMPERS

FIRE AND SMOKE DAMPER ACTUATORS

GND, GGD SERIES



1

ACTUATORS & DAMPERS

GGD SPECIFICATIONS	
Operating Voltage	24 VAC ±20%, 115 VAC ±15%
Power Supply	230 VAC ±10%
Frequency	50/60 Hz
Power Consumption	
Running	150 VA
Holding	10 VA
Running Torque	142 lb-in (16 Nm)
Spring Return Torque	108 lb-in (12 Nm)
Minimum Stall Torque	350 lb-in (39 Nm)
Torque Reduction at Elevated Temperature	Less than 10%
Runtime for 90°	
Operating with Motor at 60 Hz	15 seconds nominal
Closing (On Power Loss) with Spring Return	15 seconds maximum
Life Expectancy	Minimum 35,000 stroke cycles
Damper Shaft Size	
Standard	3/8" to 1" (8 to 25.6 mm)
Oversize	1.05 inch maximum (26.6 mm)
Enclosure	NEMA 1
Housing Material	Die cast aluminum alloy
Ambient Temperature	
Operation	0° to 130°F (-18° to 55°C) One time 350°F (177°C) for 1/2 hour (per UL555S)
Storage and Transport	-25° to 158°F (-32° to 70°C)
Agency Certification	UL listed to UL873, cUL certified to Canadian standard C22.2 No. 24-93
Pre-Cabled Connection	18 AWG
Dimensions	See dimensions table
Weight	≈7 lbs. (3.2 kg) Eight pack ≈56 lbs. (25.4 kg)

GND SPECIFICATIONS	
Operating Voltage	24 VAC/VDC ±20%, 230 VAC ±10%, 50/60 Hz 120 VAC ±10%, 60 Hz only
Power Consumption	24 VAC/VDC
Running	20 VA/12W
Holding	8 VA/6W
Power Consumption 120 VAC/230 VDC	
Running	20 VA
Holding	9 VA
Running Torque	53 lb-in (6 Nm) (minimum)
Stall Torque (Minimum)	160 lb-in (18 Nm)
Torque reduction at elevated temperature	Less than 10%
Runtime for 90°	15 seconds nominal
Closing (on power loss) with spring return	15 seconds maximum
Nominal angle of rotation	95°
Life Expectancy	Minimum 35,000 full stroke cycles
Damper Shaft Size	0.5" (12.7 mm) round
Damper Shaft Length, Minimum	1.4" (36 mm)
Enclosure	NEMA 1
Housing Material	Die cast aluminum alloy
Ambient Conditions	
Operation	0° to 140°F (-18° to 60°C) one time 350°F (177°C)
Storage and Transport	-40° to 158°F (-40° to 70°C)
Humidity (Non-condensing)	Maximum 95% RH non-condensing
Teflon® Cable	400°F (200°C)
Fixed Dual End Switches	
AC Rating	24 VAC to 250 VAC, 24 VDC 6A resistive/ 2 FLA/12 LRA
Temperature Rating	350°F (177°C)
Agency Certification	UL873 , cUL C22.2 No. 24-93 , AS/ NZS 2064 1/2:1997; conforms to CE requirements for the EMC and low voltage directives; Australian Electromagnetic Compatibility (EMC) per AS/NZS 4251.1/2:1999 (C-tick)
Pre-Cabled Connection	
Type	FEP Teflon® jacketed
Length	3 ft (0.9m), 19/30 strand 18 GA
Country of Origin	USA
Dimensions	See dimensions table
Weight	≈4 lb (1.8 kg) Ten pack ≈40 lb (18 kg)



ACTUATORS & DAMPERS

FIRE AND SMOKE DAMPER ACTUATORS

GND, GGD SERIES

ACTUATORS & DAMPERS

1

DIMENSIONS						
MODEL	TORQUE	DIMENSIONS	MAXIMUM SHAFT DIAMETER	MINIMUM SHAFT LENGTH	ENCLOSURE RATING	WEIGHT
GGD121.1U	142 in-lb (16 Nm)	3.25"H x 3.9"W x 11"L (8.26 x 9.9 x 27.9 cm)	1" (2.54 cm)	3/4" (1.9 cm)	Nema 1	4.8 (2.2 kg)
GGD121.3U	142 in-lb (16 Nm)	3.25"H x 3.9"W x 11"L (8.26 x 9.9 x 27.9 cm)	1.05" (26.6mm)	3/4" (1.9 cm)	Nema 1	4.8 (2.2 kg)t
GGD126.1U	142 in-lb (16 Nm)	3.25"H x 3.9"W x 11"L (8.26 x 9.9 x 27.9 cm)	1" (2.54 cm)	3/4" (1.9 cm)	Nema 1	4.8 (2.2 kg)
GGD221.1U	142 in-lb (16 Nm)	3.25"H x 3.9"W x 11"L (8.26 x 9.9 x 27.9 cm)	1" (2.54 cm)	3/4" (1.9 cm)	Nema 1	4.8 (2.2 kg)
GGD221.3U	142 in-lb (16 Nm)	3.25"H x 3.9"W x 11"L (8.26 x 9.9 x 27.9 cm)	1.05" (26.6mm)	3/4" (1.9 cm)	Nema 1	4.8 (2.2 kg)
GGD226.1U	142 in-lb (16 Nm)	3.25"H x 3.9"W x 11"L (8.26 x 9.9 x 27.9 cm)	1" (2.54 cm)	3/4" (1.9 cm)	Nema 1	4.8 (2.2 kg)
GGD321.1U	142 in-lb (16 Nm)	3.25"H x 3.9"W x 11"L (8.26 x 9.9 x 27.9 cm)	1" (2.54 cm)	3/4" (1.9 cm)	Nema 1	4.8 (2.2 kg)
GGD326.1U	142 in-lb (16 Nm)	3.25"H x 3.9"W x 11"L (8.26 x 9.9 x 27.9 cm)	1" (2.54 cm)	3/4" (1.9 cm)	Nema 1	4.8 (2.2 kg)
GND121.1U	53 in-lb (6 Nm)	3.25"H x 3.9"W x 11"L (8.26 x 9.9 x 27.9 cm)	1" (2.54 cm)	3/4" (1.9 cm)	Nema 1	2.9 (1.3 kg)
GND126.1U	53 in-lb (6 Nm)	3.25"H x 3.9"W x 11"L (8.26 x 9.9 x 27.9 cm)	1" (2.54 cm)	3/4" (1.9 cm)	Nema 1	2.9 (1.3 kg)
GND221.1U	53 in-lb (6 Nm)	3.25"H x 3.9"W x 11"L (8.26 x 9.9 x 27.9 cm)	1" (2.54 cm)	3/4" (1.9 cm)	Nema 1	2.9 (1.3 kg)
GND226.1U	53 in-lb (6 Nm)	3.25"H x 3.9"W x 11"L (8.26 x 9.9 x 27.9 cm)	1" (2.54 cm)	3/4" (1.9 cm)	Nema 1	2.9 (1.3 kg)
GND321.1U	53 in-lb (6 Nm)	3.25"H x 3.9"W x 11"L (8.26 x 9.9 x 27.9 cm)	1" (2.54 cm)	3/4" (1.9 cm)	Nema 1	2.9 (1.3 kg)
GND326.1U	53 in-lb (6 Nm)	3.25"H x 3.9"W x 11"L (8.26 x 9.9 x 27.9 cm)	1" (2.54 cm)	3/4" (1.9 cm)	Nema 1	2.9 (1.3 kg)

NEW!

ACTUATORS & DAMPERS

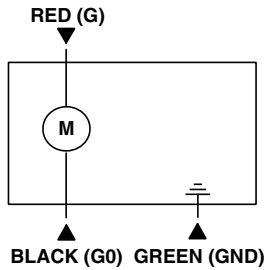
FIRE AND SMOKE DAMPER ACTUATORS GND, GGD SERIES



WIRING

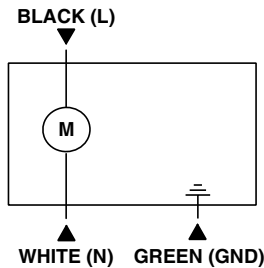
Wire Designations

24 VAC



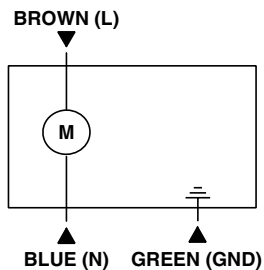
Function	Color
Supply (SP)	Red
Neutral (SN)	Black
Ground	Green

115 VAC



Function	Color
Line	Black
Neutral	White
Ground	Green

230 VAC



Function	Color
Line	Brown
Neutral	Blue
Ground	Green

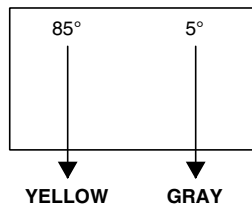
All wiring must conform to NEC and local codes and regulations.



CAUTION: The actuator must be wired with a 230 VAC line with respect to neutral and the ground lead must be connected for proper protection of the actuator. Any other connection, such as phase to phase, can damage the actuator.

GND, GGD Actuators

Fixed Dual End Switches



Switch	Wire Color	Switch Makes	Switch Breaks
5°	Gray	<5°	>5°
85°	Yellow	>85°	<85°

NOTE: Both sets of contacts are open when actuator is between 5° and 85°.



CAUTION: Mixed switch operation to the switching outputs of both dual end switches (5° and 85°) is not permitted.

Either AC line voltage from the same phase must be applied to all four outputs of the fixed dual end switches, or UL-Class 2 voltage must be applied to all four outputs.

GND Actuators ONLY



ACTUATORS & DAMPERS

FIRE AND SMOKE DAMPER ACTUATORS

GND, GGD SERIES

1

ACTUATORS & DAMPERS

ORDERING INFORMATION

MODEL	DESCRIPTION
GGD121.1U	F/S, 142 in-lb, 2-position, 24 VAC, 15-second return
GGD121.3U	F/S, 142 in-lb, 2-position, 24 VAC, 15-second return, oversize shaft adapter
GGD126.1U	F/S, 142 in-lb, 2-position, 24 VAC, 15-second return, auxiliary switches
GGD221.1U	F/S, 142 in-lb, 2-position, 120 VAC, 15-second return
GGD221.3U	F/S, 142 in-lb, 2-position, 120 VAC, 15-second return, oversize shaft adapter
GGD226.1U	F/S, 142 in-lb, 2-position, 120 VAC, 15-second return, auxiliary switches
GGD321.1U	F/S, 142 in-lb, 2-position, 230 VAC, 15-second return
GGD326.1U	F/S, 142 in-lb, 2-position, 230 VAC, 15-second return, auxiliary switches
GND121.1U	F/S, 53 in-lb, 2-position, 24 VAC, 15-second return
GND126.1U	F/S, 53 in-lb, 2-position, 24 VAC, 15-second return, auxiliary switches
GND221.1U	F/S, 53 in-lb, 2-position, 120 VAC, 15-second return
GND226.1U	F/S, 53 in-lb, 2-position, 120 VAC, 15-second return, auxiliary switches
GND321.1U	F/S, 53 in-lb, 2-position, 230 VAC, 15-second return, auxiliary switches
GND326.1U	F/S, 53 in-lb, 2-position, 230 VAC, 15-second return, auxiliary switches

NOTES: Add /B for bulk pack (GGD Series is 8 per pack; GND is 10 per pack)
Add/F for fusible link (GND Series only)

Standard shaft adapter is 3/8 to 1 in (8 to 25.6mm)

Oversize shaft adapter is 1.05 in maximum (26.6mm) - (GGD series only)

ACCESSORIES

GND SERIES

ASK79.165	Electronic fusible link 165°F, 74°C
ASK79.212	Electronic fusible link 212°F, 100°C
ASK79.250	Electronic fusible link 250°F, 121°C
ASK79.350	Electronic fusible link 350°F, 177°C

GGD SERIES

985-006	Anti-rotation bracket
985-004	Self centering adapter
ASK74.1	Oversized shaft adapter up to 1.05 in (26.6mm)
985-035P25	Conduit adapter male (box of 25 only)
985-008P20	Conduit adapter female 1/2 in (12mm) (box of 20 only)

NEW!

ACTUATORS & DAMPERS



FIRE AND SMOKE DAMPER ACTUATORS MS4XXX, MS81XX SERIES

Honeywell

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



MS4104F1210



MS4120F1006



ACTUATORS & DAMPERS

1

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			
Control Signal	Two-position	Rotation	95° ±3°, mechanically limited
Motor	DC with brushes	Noise	
Wiring		Driving Open	80 dBA @ 3' (1.0 m)
MS4xxx	32" leads, 18 AWG and 7/8" knockout holes for conduit fittings	Holding	20 dBA @ 3' (1.0 m) no audible noise
MS8xxx	39" leads, 18 AWG and 7/8" knockout holes for conduit fittings	Life Expectancy	30,000 cycles
Action	CW/CCW mounting method	Operating Temperature	0° to 130°F (-18° to 55°C)
		Operating Humidity	5 to 95% RH, non-condensing
		Approvals	CE, C-TICK, cULus, UL873, NEMA1
		Warranty	5 years

DIMENSIONS						
Model	Torque	Dimensions	Maximum Shaft Diameter	Minimum Shaft Length	Weight	Enclosure Rating
MS4xxx	30 in-lb (3.4 Nm)	8.94"H x 5.125"W x 3.25"D (22.7 x 13.0 x 8.3 cm)	0.5" (1.3 cm)	2" (5.1 cm)	5.0 lb (2.3 kg)	NEMA 1 (IP40)
MS8xxx	80 in-lb (9 Nm)					
MSxx20	175 in-lb (20 Nm)	10.7"H x 2.9"W x 3.9"D (2.71 x 7.5 x 10.0 cm)	1.03" (2.6 cm)	1.0" (2.5 cm)	7.0 lb (3.2 kg)	NEMA 2 (IP54)



ACTUATORS & DAMPERS

FIRE AND SMOKE DAMPER ACTUATORS

MS4XXX, MS81XX SERIES

1

ACTUATORS & DAMPERS

INDIVIDUAL SPECIFICATIONS						
Model	Torque	Supply Voltage	Supply Current	Auxiliary Switch	Drive Time	Spring Return Time
MS8104F1010	30 in-lb (3.4 Nm)	24 VAC +20%, -10%, 50/60 Hz	16 VA running, 8 VA holding	None	15 seconds	15 seconds
MS8104F1210				2 SPST, 5A res., 3A ind. @ 250 VAC		
MS4104F1010		120 VAC +10%, 60 Hz	0.18A running, 0.11A holding	None		
MS4104F1210				2 SPST, 5A res., 3A ind. @ 250 VAC		
MS4604F1010		230 VAC ±10%, 50/60 Hz	0.13A running, 0.10A holding	None		
MS4604F1210				2 SPST, 5A res., 3A ind. @ 250 VAC		
MS8109F1010	80 in-lb (9 Nm)	24 VAC +20%, -10%, 50/60 Hz	23VA running, 8VA holding	None		
MS8109F1210				2 SPST, 5A res., 3A ind. @ 250 VAC		
MS4109F1010		120 VAC ±10%, 50/60Hz	0.25A running, 0.13A holding	None		
MS4109F1210				2 SPST, 5A res., 3A ind. @ 250 VAC		
MS4609F1010		230 VAC ±10%, 50/60Hz	0.13A running, 0.09A holding	None		
MS4609F1210				2 SPST, 5A res., 3A ind. @ 250 VAC		
MS8109F1010	175 in-lb (20 Nm)	24 VAC +20%, -10%, 50/60 Hz		None		
MS8109F1210				2 SPST, 5A res., 3A ind. @ 250 VAC		
MS8120F1002		120 VAC +10%, 60 Hz	0.35A running, 0.15A holding	None		
MS8120F1200				2 SPST, 5A res., 3A ind. @ 250 VAC		
MS4120F1006		230 VAC +10%, 50/60 Hz	0.20A running, 0.14A holding	None		
MS4120F1204				2 SPST, 5A res., 3A ind. @ 250 VAC		

ORDERING INFORMATION

MODEL	DESCRIPTION
MS4104F1010	Fire/smoke actuator, 30 in-lb, 120 VAC
MS4104F1210	Fire/smoke actuator, 30 in-lb, 120 VAC, w/ 2 aux. switches
MS4604F1010	Fire/smoke actuator, 30 in-lb, 230 VAC
MS4604F1210	Fire/smoke actuator, 30 in-lb, 230 VAC, w/ 2 aux. switches
MS8104F1010	Fire/smoke actuator, 30 in-lb, 24 VAC
MS8104F1210	Fire/smoke actuator, 30 in-lb, 24 VAC, w/ 2 aux. switches
MS4109F1010	Fire/smoke actuator, 80 in-lb, 120 VAC
MS4109F1210	Fire/smoke actuator, 80 in-lb, 120 VAC, w/ 2 aux. switches
MS4609F1010	Fire/smoke actuator, 80 in-lb, 230 VAC
MS4609F1210	Fire/smoke actuator, 80 in-lb, 230 VAC, w/ 2 aux. switches
MS8109F1010	Fire/smoke actuator, 80 in-lb, 24 VAC
MS8109F1210	Fire/smoke actuator, 80 in-lb, 24 VAC, w/ 2 aux. switches
MS8120F1002	Fire/smoke actuator, 175 in-lb, 24 VAC
MS8120F1200	Fire/smoke actuator, 175 in-lb, 24 VAC, w/ 2 aux. switches
MS4120F1006	Fire/smoke actuator, 175 in-lb, 120 VAC
MS4120F1204	Fire/smoke actuator, 175 in-lb, 120 VAC, w/ 2 aux. switches

ACCESSORIES

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

ACTUATORS & DAMPERS

FIRE AND SMOKE DAMPER ACTUATORS FSLF, FSNF, FSAF SERIES



BELIMO

1

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

COMMON SPECIFICATIONS

Motor	Brushless DC	Operating Temperature	
Wiring	3-foot leads, 18 AWG, 1/2" NPT conduit connection	FSLF, FSNF	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;
Feedback	2-10 VDC (FSAF24-SR only)	FSAF	-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
Action	CW/CCW mounting method	Operating Humidity	5 to 95% RH
Rotation	95°	Approvals	cULus
Manual Override	3 mm hex crank (FSAF only)	Warranty	5 years
Noise	40 db drive, 62 db spring		
Life Expectancy	20,000 cycles per UL555S		

ORDERING INFORMATION AND INDIVIDUAL SPECIFICATIONS

Model	Torque	Supply Voltage	Supply VA	Control Signal	Drive Time	Spring Return Time	Weight
FSLF24	30 in-lb (3.5 Nm)	24 VAC	5 VA	Two-position	15 seconds	15 seconds	3.4 lb (1.5 kg)
FSLF120	30 in-lb (3.5 Nm)	120 VAC	18 VA	Two-position	15 seconds	15 seconds	4.0 lb (1.8 kg)
FSLF230	30 in-lb (3.5 Nm)	230 VAC	17 VA	Two-position	15 seconds	15 seconds	4.0 lb (1.8 kg)
FSNF24	70 in-lb (7.8 Nm)	24 VAC	27 VA	Two-position	15 seconds	15 seconds	6.0 lb (2.7 kg)
FSNF120	70 in-lb (7.8 Nm)	120 VAC	27 VA	Two-position	15 seconds	15 seconds	6.1 lb (2.8 kg)
FSNF230	70 in-lb (7.8 Nm)	230 VAC	27 VA	Two-position	15 seconds	15 seconds	6.1 lb (2.8 kg)
FSAF24	133 in-lb (15 Nm)	24 VAC/VDC	10 VA	Two-position	75 seconds	20 seconds	5.7 lb (2.6 kg)
FSAF120	133 in-lb (15 Nm)	120 VAC	11 VA	Two-position	75 seconds	20 seconds	6.1 lb (2.8 kg)
FSAF230	133 in-lb (15 Nm)	230 VAC	11 VA	Two-position	75 seconds	20 seconds	6.1 lb (2.8 kg)
FSAF24-SR	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)
FSAF24-BAL	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)
FSAFB24-SR	180 in-lb (20Nm)	24 VAC	9 VA	Proportional, 2-10 VDC, 4-20 mA	75 seconds	20 seconds	4.6 lb (2.1 kg)

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

Note: FSAFB24-SR model available with shorter 8" connection cable. Add "-SC" to the end of the model number.



ACTUATORS & DAMPERS

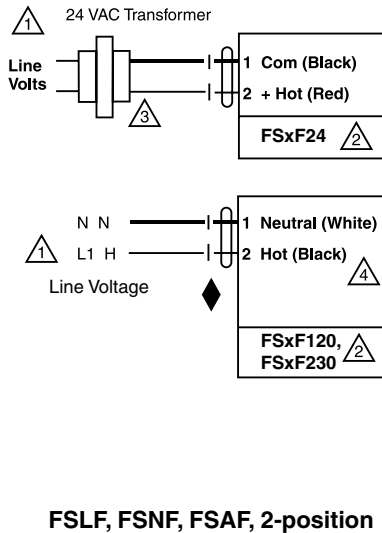
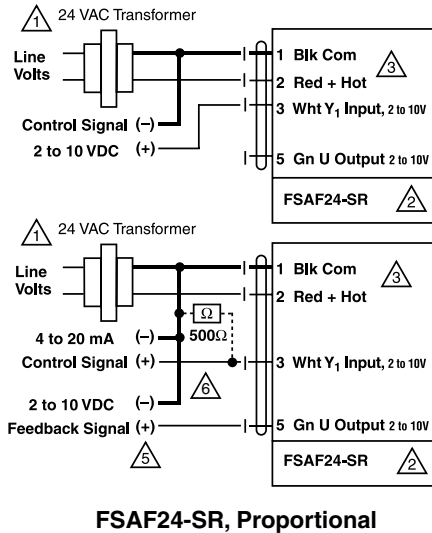
FIRE AND SMOKE DAMPER ACTUATORS

FSLF, FSNF, FSAF SERIES

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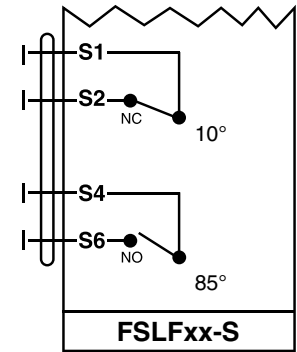
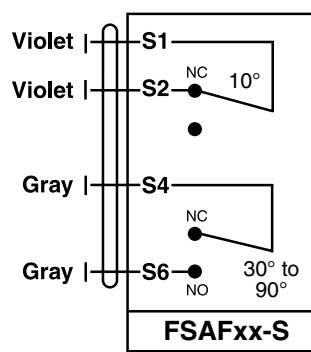
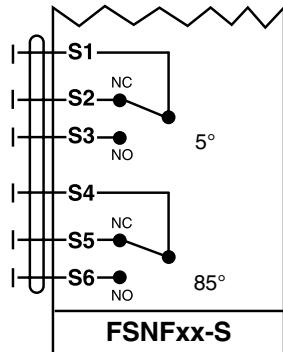
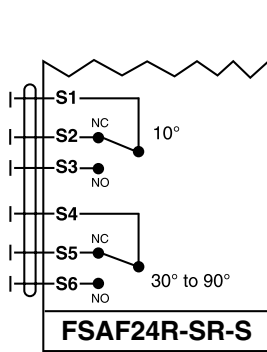
ACTUATORS & DAMPERS

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



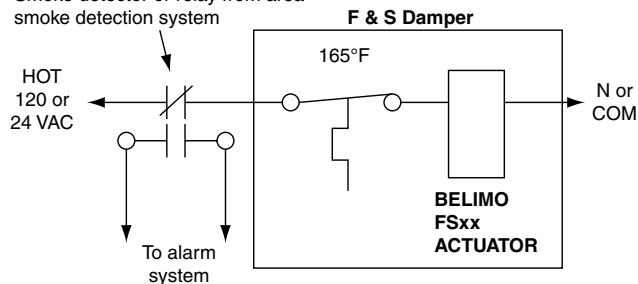
NOTE: Refer to Belimo FS Actuators Guide for complete wiring information.

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. Confirm with Local Authority Having Jurisdiction (AHJ).

APPLICATION WIRING

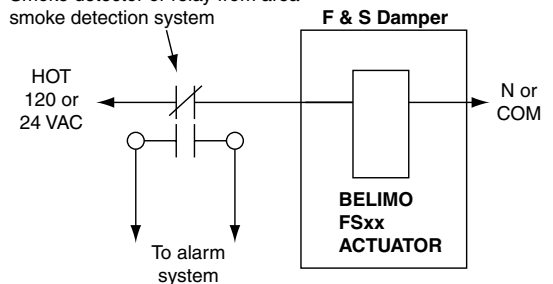
Thermal sensor application

Smoke detector or relay from area smoke detection system



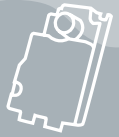
Fusible link and shaft spring application

Smoke detector or relay from area smoke detection system



ACTUATORS & DAMPERS

ROUND DAMPERS D690 SERIES



Honeywell



D690A1044



D690A1044/KA-35-VAV



1

ACTUATORS & DAMPERS

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.

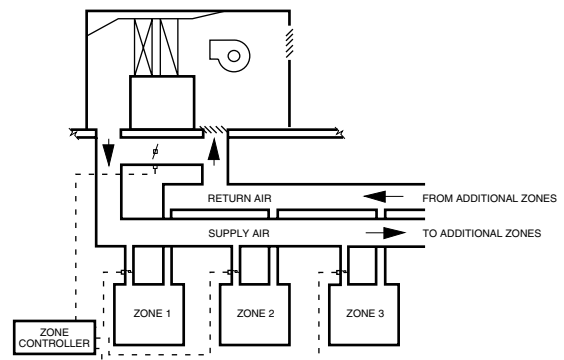
FEATURES

- **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.

ZONE DAMPER APPLICATION



SPECIFICATIONS	
Size	6" round through 16" round (even sizes)
Type	Round, single-blade, 90° rotation
Shaft	1/2" (1.3 cm) diameter shaft, 3.9" (9.9 cm) length
Actuator Bracket	Pre-drilled holes to fit Honeywell or Kele 35 in-lb or 44 in-lb actuators
Operating Torque	Less than 35 in-lb (4 Nm)
Maximum Static Pressure	4" WC (1.0 kPa)
Maximum Velocity	2500 ft/min (17.8 m/s)
Leakage Class	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
Frame	
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
Bearings	Flanged bronze oilite, pressed onto frame
Blade Design	16 gauge galvanized steel blade with closed-cell neoprene seal
Operating Temperature	32° to 130°F (0° to 54°C)
Warranty	1 year

PRESSURE DROP AND FLOW RATE		
Model	Pressure drop "WC (kPa)	Flow rate CFM
D690A1002	0.05 (0.012)	180
	0.075 (0.019)	210
	0.10 (0.025)	240
D690A1010	0.05 (0.012)	410
	0.075 (0.019)	485
	0.10 (0.025)	580
D690A1028	0.05 (0.012)	693
	0.075 (0.019)	849
D690A1036	0.10 (0.025)	980
	0.05 (0.012)	1200
	0.075 (0.019)	1460
D690A1044	0.10 (0.025)	1600
	0.05 (0.012)	1336
	0.075 (0.019)	1636
D690A1051	0.10 (0.025)	1890
	0.05 (0.012)	1690
	0.075 (0.019)	2080
	0.10 (0.025)	2400



ACTUATORS & DAMPERS

ROUND DAMPERS D690 SERIES

1

ACTUATORS & DAMPERS

DIMENSIONS

Model	Dimensions	Weight
D690A1002	6" diameter, 12" length	3.0 lb (1.36 kg)
D690A1010	8" diameter, 12" length	4.0 lb (1.81 kg)
D690A1028	10" diameter, 12" length	5.0 lb (2.27 kg)
D690A1036	12" diameter, 13" length	6.0 lb (2.72 kg)
D690A1044	14" diameter, 15" length	8.0 lb (3.63 kg)
D690A1051	16" diameter, 17" length	10.0 lb (4.54 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

D690A1002
 D690A1010
 D690A1028
 D690A1036
 D690A1044
 D690A1051
 D690A1002/KA-35-P
 D690A1010/KA-35-P
 D690A1028/KA-35-P
 D690A1036/KA-35-P
 D690A1044/KA-35-P
 D690A1051/KA-35-P
 D690A1002/KA-35-VAV
 D690A1010/KA-35-VAV
 D690A1028/KA-35-VAV
 D690A1036/KA-35-VAV
 D690A1044/KA-35-VAV
 D690A1051/KA-35-VAV
 D690A1002/ML7161A2008
 D690A1010/ML7161A2008
 D690A1028/ML7161A2008
 D690A1036/ML7161A2008
 D690A1044/ML7161A2008
 D690A1051/ML7161A2008
 D690A1002/ML6161A2009
 D690A1010/ML6161A2009
 D690A1028/ML6161A2009
 D690A1036/ML6161A2009
 D690A1044/ML6161A2009
 D690A1051/ML6161A2009

DESCRIPTION

6" round damper with actuator mounting plate, 12" spiral duct length
 8" round damper with actuator mounting plate, 12" spiral duct length
 10" round damper with actuator mounting plate, 12" spiral duct length
 12" round damper with actuator mounting plate, 13" spiral duct length
 14" round damper with actuator mounting plate, 15" spiral duct length
 16" round damper with actuator mounting plate, 17" spiral duct length
 6" D690A1002 with Kele non-spring return proportional actuator
 8" D690A1010 with Kele non-spring return proportional actuator
 10" D690A1028 with Kele non-spring return proportional actuator
 12" D690A1036 with Kele non-spring return proportional actuator
 14" D690A1044 with Kele non-spring return proportional actuator
 16" D690A1051 with Kele non-spring return proportional actuator
 6" D690A1002 with Kele non-spring return floating actuator
 8" D690A1010 with Kele non-spring return floating actuator
 10" D690A1028 with Kele non-spring return floating actuator
 12" D690A1036 with Kele non-spring return floating actuator
 14" D690A1044 with Kele non-spring return floating actuator
 16" D690A1051 with Kele non-spring return floating actuator
 6" D690A1002 with Honeywell non-spring return proportional actuator
 8" D690A1010 with Honeywell non-spring return proportional actuator
 10" D690A1028 with Honeywell non-spring return proportional actuator
 12" D690A1036 with Honeywell non-spring return proportional actuator
 14" D690A1044 with Honeywell non-spring return proportional actuator
 16" D690A1051 with Honeywell non-spring return proportional actuator
 6" D690A1002 with Honeywell non-spring return floating actuator
 8" D690A1010 with Honeywell non-spring return floating actuator
 10" D690A1028 with Honeywell non-spring return floating actuator
 12" D690A1036 with Honeywell non-spring return floating actuator
 14" D690A1044 with Honeywell non-spring return floating actuator
 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

6



RUSKIN

1



ACTUATORS & DAMPERS

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.



OPTIONS

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

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

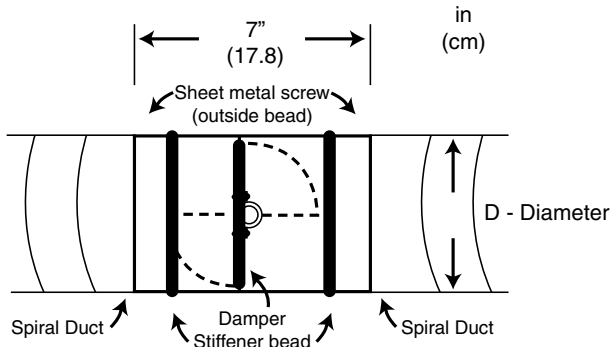


ACTUATORS & DAMPERS

ROUND CONTROL DAMPERS CDRS25 SERIES

ACTUATORS & DAMPERS

INSTALLATION



PERFORMANCE REFERENCE STANDARD PER AMCA

Pressure/Class	Leakage, FT ³ /MIN/FT ² (L/S/M ²)			
	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
BLADE SEAL OPTIONS	
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
AXLE CONSTRUCTION	
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)
MOTOR MOUNTING OPTIONS	
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
SIZE (OUTSIDE DIAMETER IN INCHES)	
(OD)	Duct outside diameter (4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20, 22, 24) inches available
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	4
TS-470-2	Damper position switch with two SPDT switches, for 1/2" shaft	4
TS-470-P	Damper position switch with SPDT switch, for 1/2" shaft, stainless steel housing, and plenum-rated cable	4
TS-475	Non-mercury damper position switch, SPDT, for 1/2" damper shaft	5
TT-470	Tilt transducer with 1/2-in crank arm, 4-20 mA loop powered	6

ACTUATORS & DAMPERS

RECTANGULAR DAMPERS CD40, CD50, CD60 SERIES



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



1

ACTUATORS & DAMPERS

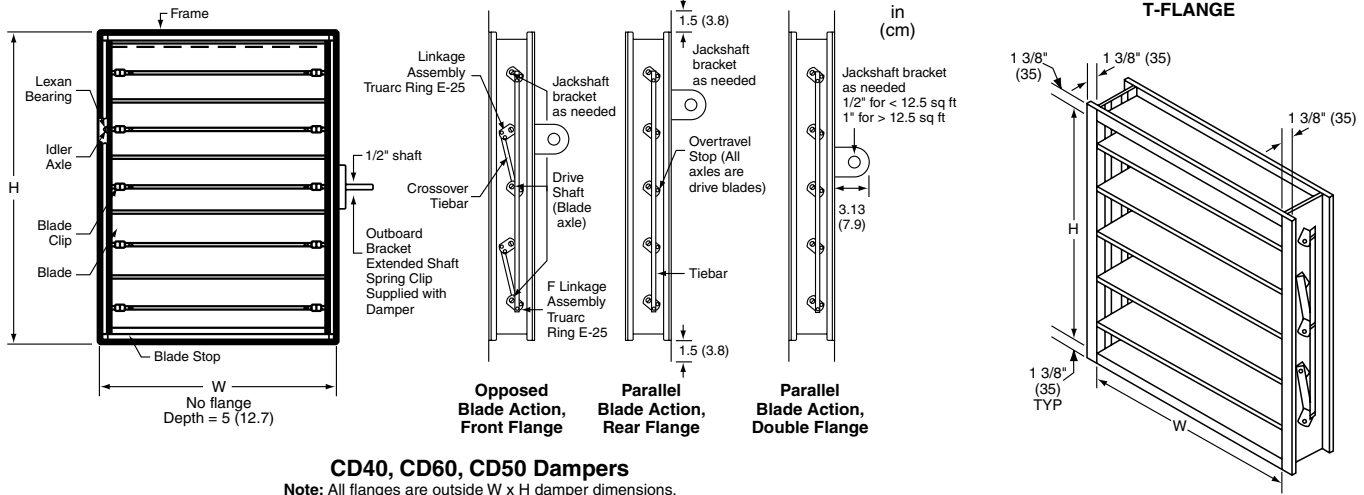
COMMON SPECIFICATIONS			
Type	Parallel or opposed blade	Side Seals	Self-adjusting steel (CD45, 46, 50, 60)
Shaft	6"L x 0.5" Dia. (15.2 x 1.3 cm) located on linkage side	Linkage	Concealed in frame
Frame	Equivalent 13 gauge galvanized (CD 50 aluminum); 5" face-to-face dimension	Available Options	Flanges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

INDIVIDUAL SPECIFICATIONS					
	CD44	CD45	CD46	CD50	CD60
Blades	16-gauge V-groove	16-gauge V-groove	16-gauge V-groove	Aluminum airfoil	14-gauge steel airfoil
Jamb seals	None	Flexible steel	Flexible steel	Flexible steel	Flexible steel
Blade seals	None	Foam	PVC coated polyester	Ruskiprene®	Ruskiprene®
Leakage (% of maximum flow)	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
AMCA Class	Not classified	Class 3	Class 2	Class 1A	Class 1A
Operating Temperature	-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)
Maximum Velocity	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
Torque required	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

DAMPER OPTION DIAGRAMS



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 ² 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 ² 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 ² 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 ² 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"
	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"	Special construction -- call Kele		
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"	Special construction -- call Kele		
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"	Special construction -- call Kele		

* 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

ACTUATORS & DAMPERS

RECTANGULAR DAMPERS VD-1300 SERIES



1

ACTUATORS & DAMPERS

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**



Leakage Resistance	
VD-1310	17 cfm/sq ft maximum at 1 in. static pressure 45 cfm/sq ft maximum at 4 in. static pressure
VD-1320	3.4 cfm/sq ft maximum at 1 in. static pressure 6.0 cfm/sq ft maximum at 4 in. static pressure
VD-1330	2.2 cfm/sq ft maximum at 1 in. static pressure 3.7 cfm/sq ft maximum at 4 in. static pressure

TABLE 1. LEAKAGE RESISTANCE CLASSES ¹				
Class	Static Pressure (inches water)			
	1	4	8	12
IA	3	--	--	--
I	4	8	11	14
II	10	20	28	35
III	40	80	112	140

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

GENERAL SPECIFICATIONS			
Type	Parallel or opposed blade	Side Seals	optional for VD-1320)
Shaft	7"L x 0.5" Dia. (17.8 x 1.3 cm) with holding clip	Linkage	Self-adjusting stainless steel
Frame	13 gauge galvanized steel; 3.1" face-to-face dimension	Operating Temperature	-40° to 200°F (-40° to 93°C); high temperature option with bronze bearings, silicon seals up to 250°F (121°C)
Bearings	Acetal (bronze optional)	Weight	7 lbs/sq. ft (shipping weight estimate)
Blade Design	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	RoHS Statement	Yes
		Warranty	3 years

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



ACTUATORS & DAMPERS

RECTANGULAR DAMPERS VD-1300 SERIES

ACTUATORS & DAMPERS

DIMENSIONS

Dimensions notes

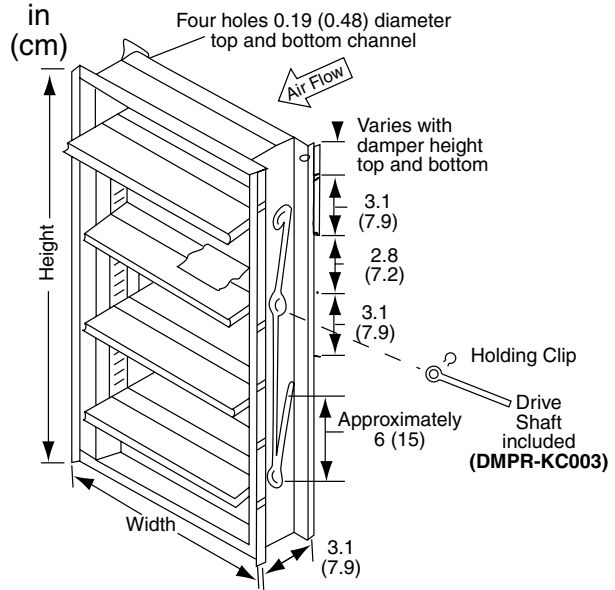
- 1) Unit furnished approximately 1/4" (0.6 cm) undercut for proper fit in duct. If no undercut wanted, order "E" Option code.
- 2) Dimensions shown are from the outside edges of the damper frame

Table 2. Damper Section Sizes (1" increments)

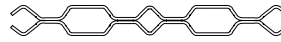
Single Section	Dimension
Width (VD-1310)	8" to 36" (20 to 91 cm)
Width (VD-1320, -1330)	8" to 48" (20 to 122 cm)
Height (VD-1310, -1320, -1330)	6" to 76" (15 to 193 cm)
Multi-section	Dimension
Width (VD-1310)	36" to 108" (91 to 274 cm)
Width (VD-1320, -1330)	48" to 192" (124 to 488 cm)
Height (VD-1310)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

Table 3. Option Codes

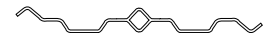
E	Exact, whole inch size, no undercut
F	1.5" flange on entering side
G	1.5" flange on leaving side
H	1.5" flange on both sides
J	Jackshaft, field-installed (must specify if needed, not automatically included with multi-section dampers)



VD-1330 Class I Blade



VD-1320 Class II Blade



VD-1310 Class III Blade

ORDERING INFORMATION

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

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.