JOHNSON CONTROLS

M100A Series On-Off/Floating Control Actuator

Installation

IMPORTANT:	All M100A Series actuators are intended to control equipment under normal operating conditions. Where failure or malfunction of M100A actuators could lead to an abnormal operating condition that could cause personal injury or damage to the equipment or other property, other devices (limit or safety controls) or systems (alarm or supervisory) intended to warn of, or protect against, failure or malfunction of M100A actuators must be incorporated into and maintained as part of the control system.

Tools Needed

- 1/4 in. (6 mm) flat-blade screwdriver
- punch and hammer

Precautions

Observe the following ranges and limitations:

- Do not install the actuator in atmospheres with explosive vapors, escaping gases, or in environments where substances corrosive to the device's internal components could be present.
- Seal wiring entering into return air systems to prevent aspiration of corrosive air into the actuator.

Direction of Rotation

The direction of rotation on all M100A models is field adjustable from 45 to 270°. The actuators are factory set at the zero position and for 90° travel. The zero position is approximately 10° Clockwise (CW) from vertical. (See Figure 1.) Spring return models return Counterclockwise (CCW) to the zero position when power is removed.

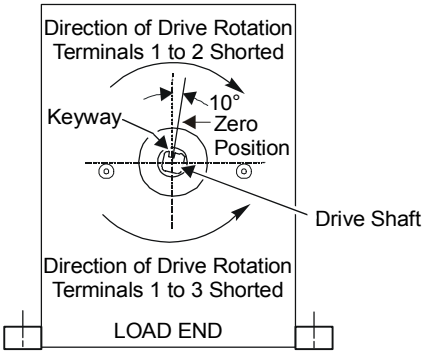

Figure 1: Direction of Rotation

All reference to the direction of rotation is when viewing the load end stamped on the actuator housing as shown in Figure 1. From this view, the CCW limit is the zero position.

Mounting

Follow installation steps for the linkage kit used to couple the actuator and the controlled device. When not utilizing a damper linkage kit, use four 1/4 x 1 in. bolts to mount the actuator (not included).

Upright mounting of the actuator is preferred with the output shaft parallel to the floor. Locate the actuator where the shaft and wiring terminals are accessible.

IMPORTANT:	For installations using the CVR83A-600R Weather Cover Kit, mount the actuator in an upright position so water will not enter the enclosure and damage the actuator.

Make all linkage connections to the drive shaft on the load end of the actuator, rated for up to 200 lb dead weight. Limit the load on the auxiliary end to 10 lb dead weight.

When mounting on a valve, mount the actuator above the horizontal plane of the valve piping. This avoids damage to the actuator if the valve leaks or develops condensation.

Note: Valve medium temperatures above 250°F (121°C) are acceptable only if the actuator's maximum ambient temperature is below 105°F (41°C).

Part No. 34-636-62, Rev. B
Code No. LIT-2681292

Wiring

> CAUTION: **Equipment Damage Hazard.** Disconnect all power supplies before wiring connections are made. Check all wiring connections before applying power to the system. Short-circuited or improperly connected wires will result in permanent damage to the equipment.

The M100A has two terminals (T1 and T2) for 24 VAC power only and three terminals for the control circuit:

1 - COM (Common)

2 - CW

3 - CCW

Follow these procedures to wire the actuator:

- Make all splices in junction boxes using approved solderless connectors, or by soldering and then taping the connections.
- Make all wiring connections using copper conductors only. Wire in accordance with the National Electrical Code and local regulations.
- Use separate transformers on each M100A actuator to avoid potential miswiring or control signal problems.
- Locate all splicing and excess wiring outside the actuator wiring compartment. If desired, add a standard electrical box to the actuator's wiring compartment. (See Figure 2.)

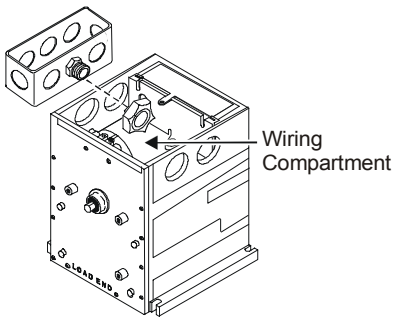

Figure 2: Wiring Compartment

To connect the wires:

1. Loosen the two screws securing the top cover, and remove the top cover for access to the wiring terminals.
2. Use a hammer and punch, and push out one of the access hole plugs.
3. Install the conduit connector to the actuator, and secure with the conduit nut provided with the connector.
4. Connect the controller to Terminals 1, 2, and 3 located in the wiring compartment. (See Figure 3.)

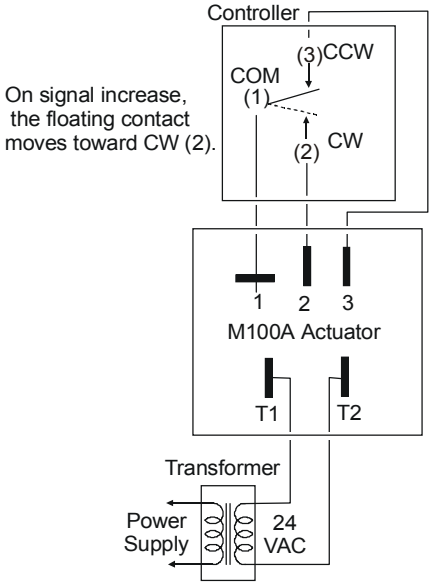

Figure 3: Wiring to the Controller

5. Connect 24 VAC to Terminals T1 and T2.

> IMPORTANT: To avoid miswiring or control problems, all M100A actuators must be powered using separate transformers.

Note: For information on controllers, refer to the applicable controller literature.

Use 18 AWG wire (or larger) for all connections to the actuator. Use 14 AWG wire on runs over 500 feet. When the wiring is in a conduit run with other wires, the actuator wires must have insulation equal to the other conductors in the conduit run.

Figure 3 shows a typical wiring diagram for an actuator controlled by a snap acting/floating temperature (for example, an A19), pressure, or humidity controller.

When using an A350A/S350A controller and stage module as shown in Figure 4, set the differential on both the controller and the stage module to the one degree minimum. Set the heat/cool jumpers to heat on the A350 and to cool on the S350. The desired deadband between CW and CCW actuator rotation is set by adjusting the offset on the stage module.

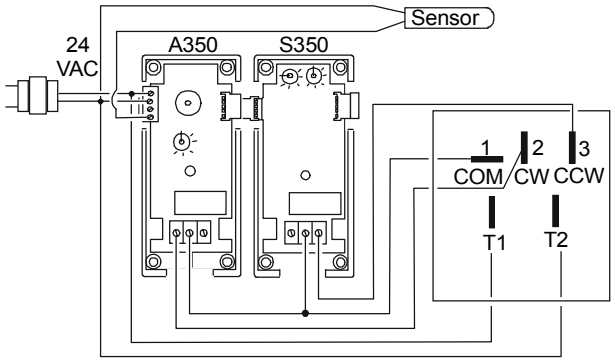

Figure 4: Tri-State Floating Using the A350/S350 Controller

Refer to applicable controller literature for detailed operation and setting.

Adjusting Actuator Travel

The limit pointers shown in Figure 5 move together for CW or CCW actuator rotation, and indicate the amount of travel in degrees.

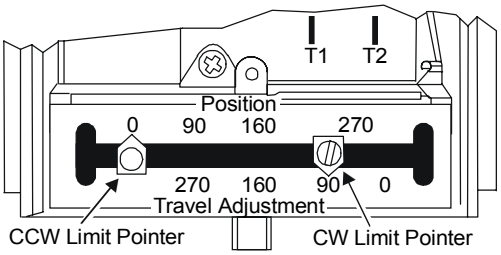

Figure 5: Travel Adjustment

The CCW Limit Pointer is factory set, and cannot be field adjusted. The CCW Limit Pointer is at the 0 located on the Position (top) scale when the actuator rotates fully CCW, and indicates actuator rotation as the actuator rotates CW. When the selected maximum amount of CW rotation is reached, the CW Limit Pointer activates a switch to prevent further travel.

When power is off or removed from Terminals T1 and T2 on spring return models, the actuator spring returns to the zero CCW position. When the actuator is powered, and Terminals 1 and 2 (shown in Figure 3) are jumpered, the actuator will run between electrical zero and the CW limit. When setting up damper or valve linkages, maintain power to Terminals T1 and T2 to hold the position against the spring and accurately indicate CW and CCW limit adjustments.

To adjust the CW limit:

1. Loosen the screw in the CW Limit Pointer.
2. Using the Travel Adjustment (bottom) scale, move the pointer to the desired actuator rotation. Moving the pointer to the left increases the amount of actuator travel. (See Figure 5.)

Note: Use the Position (top scale), as an indicator of travel position. The CCW and CW limit pointers will be far apart for 45° of rotation, but close together for 270°.

3. Tighten the screw. (The CW Limit Pointer indicates the current rotational position of the actuator.)

Refer to Table 1 for accessories available and Table 2 for product specifications.

Table 1: Accessories

Product Code	Description
Y68AA-1	Transformer, 120/24 VAC, 40 VA, 60 Hz, Class 2
Y68DA-1	Transformer, 240/24 VAC, 40 VA, 60 Hz, Class 2
Y68HA-1	Transformer, 24/24 VAC, 40 VA, 60 Hz, Class 2
S91DJ-1	Auxiliary switch kit with one Single-Pole, Double-Throw (SPDT) switch
S91EJ-1	Auxiliary switch kit with two SPDT switches
S91PT-1	Auxiliary potentiometer kit, 1000 ohm, 1/3 watt
CVR83A-600R	Weather cover kit
Y20DAA-2	Mounts actuator to top of a duct or any flat surface; includes LVR27A-602, LVR27A-600, ROD16-3, and SWL10A-603Y (2)
Y20DAB-2	Mounts the actuator to the side of a duct or wall; includes all items in the Y20DAA-2 plus one BKT22A-602
Y20EBA-1	Valve linkage kit for mounting Honeywell® valves with 1/4-28 stem connection to M120 or M130 actuators
Y20EBA-2	Valve linkage kit for mounting Honeywell valves with 1/4-28 stem connection to M150 actuators
Y20EBA-3	Valve linkage kit for mounting Barber-Coleman® valves with 1/4-28 stem connection to M120 or M130 actuators
Y20EBA-4	Valve linkage kit for mounting Barber-Coleman valves with 1/4-28 stem connection to M150 actuators
Y20EBD-1	Linkage kit for M120 or M130 actuators and 1-1/4 in. (DN 32) valves, produces 75 lb (334 N) seating force
Y20EBD-2	Linkage kit for M140 actuators and 1-1/4 in. (DN 32) valves, produces 150 lb (607 N) seating force
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Product Code (Cont.)	Description
Y20EBD-3	Linkage kit for M150 actuators and 1-1/4 in. (DN 32) valves, produces 270 lb (1202 N) seating force
Y20EBD-5	Linkage kit for M110 actuators and 1-1/4 in. (DN 32) valves, produces 40 lb (178 N) seating force
Y20EBD-6	Linkage kit for M120 or M130 actuators and 1-1/4 in. (DN 32) valves, produces 100 lb (449 N) seating force
Y20EBE-1	Coupling adaptor to convert valves with a 5/16 in. stem and a hold down nut for Johnson Controls 1/2 to 3 in. valves manufactured prior to March 1969
Y20EBE-2	Stem adaptor and centerpiece collar to adapt VT Series valves with slotted stems (Y20EBD-5 kit also required)
Y20EBE-3	Hold down nut for cast iron and VB Series 2-1/2 to 4 in. valves and yoke nut for Barber-Coleman 1/2 to 2 in. valves
Y20EBE-4	Stem connector for Barber-Coleman 2-1/2 to 4 in. valves (5 per package). Used with Y20EBD-3 or -6.
Y20EBE-11	Valve linkage adaptor kit for VG7000 valves (Y20EBD Series kit also required)
VG7000-M110	Mounting kit for M110 actuator and 1/2 through 2 in. (DN15 through DN50) valves
VG7000-M130	Mounting kit for M130 actuator and 1/2 through 2 in. (DN15 through DN50) valves
VG7000-M140	Mounting kit for M140 actuator and 1/2 through 2 in. (DN15 through DN50) valves
VG7000-M150	Mounting kit for M150 actuator and 1/2 through 2 in. (DN15 through DN50) valves
Y20DFC-1	Damper linkage kit for mounting the actuator to the inside or outside frame of CD-1300 dampers only

Table 2: Specifications

Product	M100A Series On-Off/Floating Control Actuator		
Power Requirements	24 VAC, Class 2, (20 to 30 VAC) at 50/60 Hz, 25 VA spring return, 20 VA non-spring return		
Mechanical Connection	3/8 in. (9.5 mm) square shaft, both ends; Maximum dead weight on output shaft: 200 lb (9l kg), load end; 10 lb (4.5 kg), auxiliary end		
Mechanical Ouput		Running Torque:	Breakaway and Stall (minimum):
	M110	25 lb·in (2.8 N·m) spring return	100 lb·in (11 N·m)
	M120	35 lb·in (4.0 N·m)	70 lb·in (7.9 N·m)
	M130	50 lb·in (5.6 N·m) spring return	200 lb·in (23 N·m)
	M140	75 lb·in (8.5 N·m)	150 lb·in (17 N·m)
	M150	150 lb·in (17 N·m)	300 lb·in (34 N·m)
Rotation Range	Fixed zero, adjustable full travel 45 to 270°; factory set at 90° full travel		
Rotation Timing (Rated Load)	60 seconds for 160° travel, 60 Hz; 38 seconds for 90° travel, 60 Hz; 75 seconds for 90° spring return		
Cycle Life	M110 and M130 spring return models: 150,000 cycles at rated load M120, M140, and M150 non-spring return models: 200,000 cycles at rated load		
Electrical Connection	1/4 in. quick-connect spade terminals		
Ambient Operating Conditions	Spring Return: -35 to 125°F (-37 to 52°C), 90% RH Non-spring Return: -40 to 125°F (-40 to 52°C), 90% RH		
Ambient Storage Conditions	-40 to 140°F (-40 to 60°C), 90% RH		
Dimensions (H x W x D)	Spring Return: 5.81 x 5.64 x 7.68 in. (148 x 143 x 195 mm) Non-spring Return: 5.81 x 5.64 x 4.94 in. (148 x 143 x 125 mm)		
Shipping Weight	Spring Return: 9 lb (4.1 kg)	Non-spring Return:	6.5 (2.9 kg)
Enclosure	NEMA 2, IP32		
Agency Compliance	UL Recognized, File E27734, CCN XAPX2 M1x0AGx models are UL Listed, File E107041, CCN PAZX CSA Certified, File LR948, Class 4813 02		
EU Directive Compliance	89/336/EEC (CE Mark), M1x0AGA and AGD models only		

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

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