JOHNSON CONTROLS

M35BE Replacement Damper Actuator

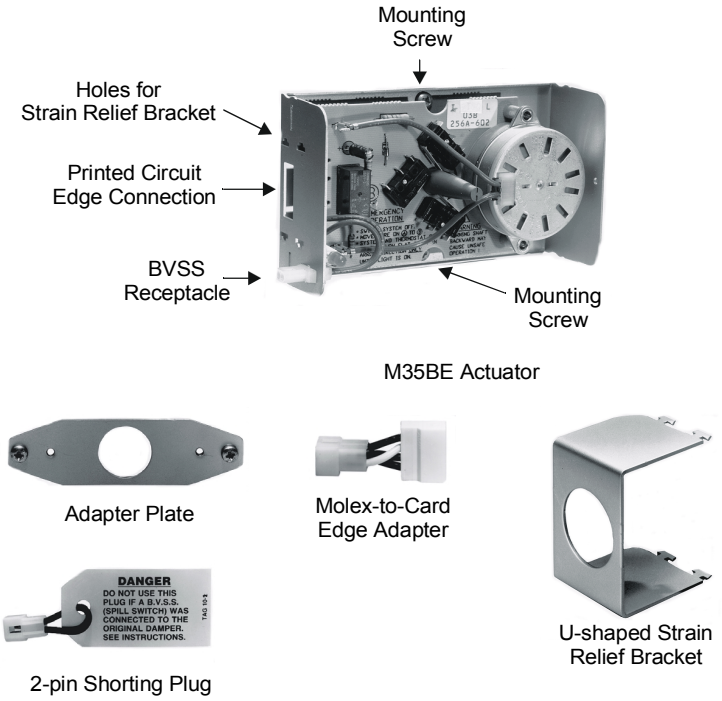

Figure 1: M35BE Replacement Damper Actuator Kit

Application

The M35BE damper actuator may be used to replace any Johnson Controls M15 or M35 actuator. Included in this replacement kit are the following:

- M35BE with printed circuit card with edge type main connector
- 2-pin Molex shorting plug for use when a Blocked Vent Shutoff System (BVSS) is not interfaced
- adapter plate and mounting screws for replacing an M15
- Molex-to-Card edge adapter for use with 4-pin Molex terminated wiring harness
- strain relief bracket for use when replacing an M15

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Part No. 24-8711-471, Rev. —
Code No. LIT-121341

Table 1: Specifications

Product	M35BE Damper Actuator
Voltage	24 VAC, 50/60 Hz
Cover and Case Material	Galvanized Steel
Maximum Operating Temperature	66°C (150°F)
Y84 Harness Cable Termination	Board Edge Connection (Standard) Molex Receptacle (Optional)
Agency Listing	CSA (AGA/CGA) Certificate Number 112518-0-23
Specification Standards	ANSI Standard Z21.66 CGA 6.14

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.

Refer to the *Q35 Series Product Bulletin (LIT-4350750*) for necessary information on operating and performance specification of this product.

Operation

The damper actuator opens and closes the damper blade upon heat demand from the system thermostat.

Damper must be in open position when appliance main burner(s) is operating.

Visible on the front label of the actuator are a damper blade position indicator and a green light (see Figure 2). The light indicates that power from the thermostat has opened the damper and that power is available to the appliance for main burner ignition.

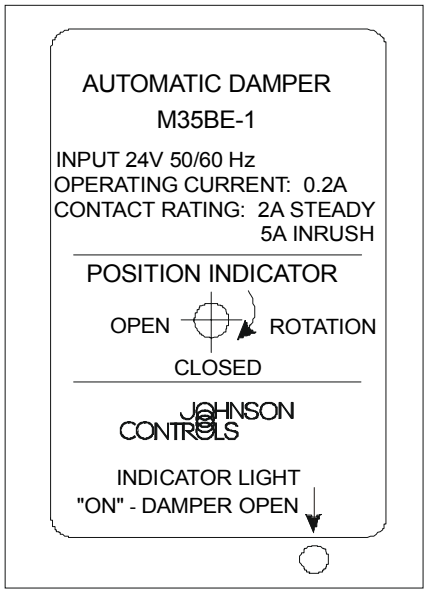


Figure 2: Label Diagnostic Indicators

Sequence of Operation

The M35 operates as follows:

1. The damper is in the closed position.
2. The thermostat contacts close on a call for heat.
3. The M35BE actuator rotates the damper blade to the open position. Power is available for main burner ignition (green light is on).
4. The system thermostat reaches setpoint and contacts open.
5. The burner circuit is de-energized and the M35BE closes the damper.
6. The system is now ready for the next heating cycle.

Installation

IMPORTANT:	This technical bulletin is intended as a guide for authorized service personnel installing or servicing Johnson Controls products. Carefully follow all instructions in this sheet and all instructions on the appliance. Limit repairs, adjustments and servicing to the operation listed in this sheet or on the appliance.

⚠ WARNING:	**Fire or Explosion Hazard.** The system must meet all applicable codes. Improper installation may cause gas leaks, explosions, property damage, and injuries.

⚠ WARNING:	**Shock Hazard.** Avoid electrical shock and equipment damage. Disconnect electrical power and turn off the gas before replacing the M15 or M35 actuator.

All installations must comply with local codes or, in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1, and the National Electrical Code, ANSI/NFPA 70.

Replacing an M15

Perform the following procedure to replace an old M15 with a new M35BE damper actuator.

1. Shut off power to the appliance.
2. Turn off gas at the manual shutoff valve adjacent to the appliance.
3. Remove the cover from the old M15.
4. Disconnect the wiring harness by unplugging the Molex connector and removing the nut from the strain relief fitting.
5. Remove the screws holding the old M15 to the Y15 damper.
6. Discard the old M15 actuator.
7. Mount the M35BE adapter plate to the Y15 damper bracket with the screws provided (see Figure 3).

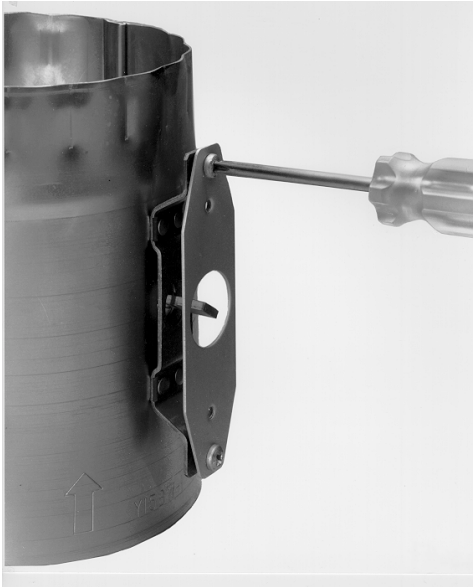


Figure 3: Installing Adapter Plate for M15 Replacement

8. Remove the cover from the new M35BE.
9. Mount the M35BE with the wiring end oriented the same way as the old actuator. Ensure the damper shaft engages in slot in M35BE output gear.
10. Fasten the new actuator to the adapter plate, with the screws provided inside the back of the actuator case.
11. Replace the M35BE actuator cover.
12. Fasten the strain relief fitting to the strain relief bracket using the nut that was removed in Step 4.
13. Plug the Molex-to-Card edge adapter to the Molex connector on the end of the wiring harness cable.
14. Plug the edge connector securely onto the printed circuit board through the slot in the end of the M35BE case.
15. Slide the strain relief bracket to the actuator and clip it into the holes in the end of the case (see Figure 4).

    Note: The rounded edges of the bracket face the back of the actuator.
16. Connect the 2-pin Molex shorting plug to the BVSS receptacle on the end of the case.

Figure 4: Attaching the Strain Relief Bracket to Actuator

Replacing an M35

Perform the following procedure to replace an old M35 with a new M35BE damper actuator.

1. Shut off power to the appliance.
2. Turn off gas at the manual shutoff valve adjacent to the appliance.
3. Remove the cover from the old M35.
4. Disconnect the wiring harness from the old M35 by squeezing the legs of the strain relief bracket (if used) together to disengage the tabs from the case, then unplug the connector from the M35.
5. Disconnect the BVSS, if directly interfaced from the old M35.
6. Remove the screws holding the old M35 to the Y15 damper bracket.
7. Discard the old M35 actuator.
8. Discard the adapter plate supplied with the new M35BE.
9. Remove the cover on the new M35BE and mount it with the wiring end oriented the same way as the old actuator. Ensure the damper shaft engages the slot in M35BE output gear.
10. Fasten the new actuator to the Y15 damper bracket, with the screws provided inside the back of the actuator case.
11. Replace the M35BE actuator cover.

12. Plug the Molex-to-Card edge adapter into the Molex connector on the end of the wiring harness cable.
13. Plug the edge connector securely onto the printed circuit board through the slot in the end of the M35BE case.
14. Slide the strain relief bracket to the actuator and clip it into the holes in the end of the case (see Figure 4).
15. When replacing an M35 with Molex connection (i.e., M35BC or BD), if a BVSS was interfaced to the old M35, reconnect it to the new one. If a BVSS was not connected to the original M35, connect the 2-pin Molex shorting plug to the BVSS receptacle on the end of the case.

    When replacing an M35 with card-edge connector (i.e., M35BA, BB, or BE), make the main wiring harness, strain relief, and BVSS connections the same as on the M35 being replaced. (Discard the Molex-to-Card connector adapter).

> ⚠ CAUTION: **Safety Hazard.** Do not use the 2-pin Molex shorting plug if the original M35 was connected directly to a BVSS. Using the shorting plug bypasses the safety of the BVSS.

Checkout Procedure

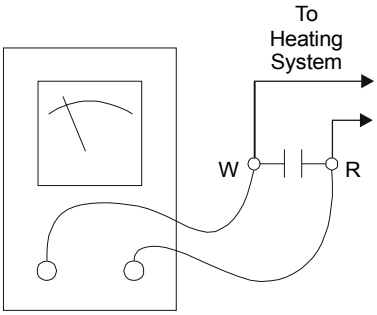
A qualified service agency should conduct an annual inspection of the flue product carrying areas, the vent system, and the damper device for deterioration from corrosion, and for safe operation by performing the *Checkout Procedure* in these instructions. More frequent inspections by the homeowner for corrosion and safe operation of the damper device in accordance with the checkout procedure are recommended.

1. Turn on the electrical power and gas supply to the appliance.
2. Turn the system thermostat to a high setting (call for heat).
3. Observe that the damper rotates open and that the ignition circuit is energized only after the damper is fully open, as shown by the position indicator and green light on the actuator.
4. If the actuator is directly interfaced with a BVSS, unplug the BVSS cable momentarily to ensure that the ignition circuit becomes de-energized.
5. Turn the thermostat to a low setting. The ignition circuit should immediately de-energize (the green light goes off), and the damper should rotate and stop in the closed position.
6. Return the thermostat to its normal setting. Adjust the thermostat's heat anticipator if necessary (see Figure 5).
7. Before leaving the installation, observe at least three complete operating cycles.

Thermostat Heat Anticipator

The anticipator setting is normally equal to the ignition system current draw, plus that of the pilot and main valve.

Due to variations in wiring and valve options, it is advisable to measure the actual current draw of the heating system at the thermostat location. Measuring this current can be accomplished by opening the thermostat contact (lowering the setpoint) and installing an AC ammeter across the terminal, or by using a clamp-on ammeter with a 10-turn multiplier attached to the terminals (see Figure 5).



AC Ammeter Low Scale Setting

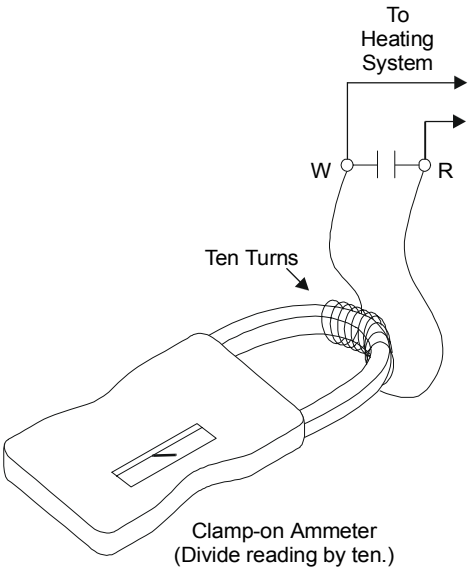


Figure 5: Measuring the Thermostat Current

Emergency Operation

If the ignition circuit is not operating when the system thermostat is calling for heat and the damper is open with the green light on, check the following.

- BVSS
- appliance ignition circuit (valves, pilot, ignition control, etc.)

If the damper is not in the open position (with the green light on) when the system thermostat is calling for heat, verify that the transformer, thermostat, limits, and Y84 wiring harness are not the problem. If it appears that the actuator has failed and a replacement is not readily available, the appliance may temporarily be returned to service by manually turning the damper to the open position.

To manually open the damper:

1. Turn off the electrical power to the appliance at the disconnect switch.
2. Remove the M35 actuator cover.
3. Remove the motor wire from Terminal A and reconnect it to Terminal B (see Figure 6). This disables the motor.

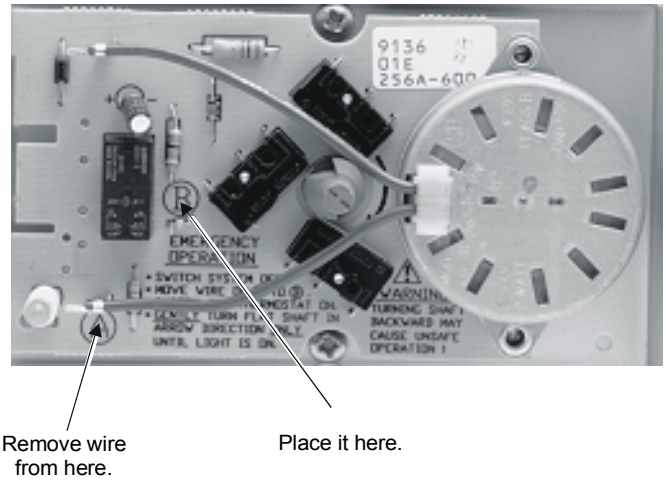


Figure 6: Moving Motor Lead Wire

4. Turn on the power at the disconnect switch and turn the system thermostat to a high setting.

> ⚠ CAUTION: **Equipment Damage.** Forcing the shaft in the wrong direction could damage the switches and cause unsafe operation.

5. Locate the section of flat shaft between the actuator and the damper. Using a small wrench or pliers, **gently** turn the shaft **only** in the direction indicated by the rotational arrows on the actuator case until the green light comes on (see Figure 7).

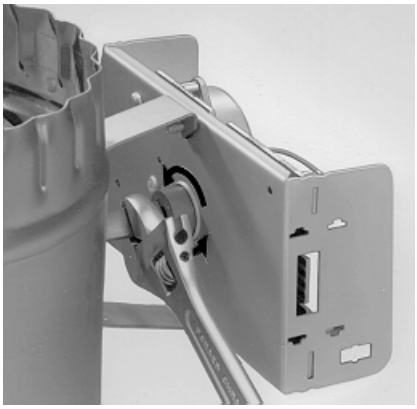


Figure 7: Manual Rotation

6. Replace the actuator cover and return the system thermostat to its normal setting.

The damper will now remain in the open position and supply power to the ignition circuit on demand of the system thermostat; however, the damper will not provide energy savings until a replacement actuator is obtained.

Repairs and Replacement

The M35BE actuators are not field repairable, other than the emergency operation procedure. **Do not** attempt field repairs. For a replacement M35BE actuator, contact the original equipment manufacturer or the nearest Johnson Control distributor.

Notes

Notes

Controls Group
507 E. Michigan Street
P.O. Box 423
Milwaukee, WI 53201

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FAN 121
Installation Sheets Manual
Printed in U.S.A.