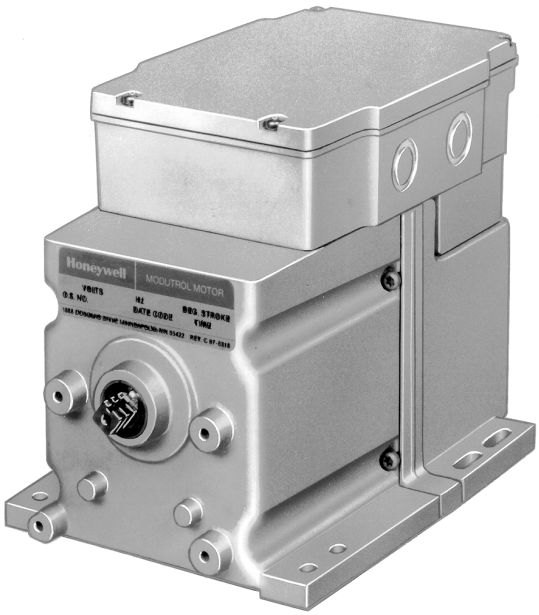
Honeywell

# MODUTROL IV MOTORS

THE M7185, M7186 AND M7183 ELECTRONIC MODUTROL MOTORS PROVIDE PROPORTIONING CONTROL FOR DAMPERS AND VALVES IN AIR CONDITIONING SYSTEMS CONTROLLED BY THE W7080 MULTIZONE PANEL.

- ❑ M7185A replaces M745P motors.
- ❑ M7186G replaces M745G motors.
- ❑ M7185 rated for 60 lb.-in. torque; M7183, M7186 rated for 50 lb.-in. torque.
- ❑ M7185A is normally closed, M7186G and M7183G are normally open.
- ❑ Integral spring returns motor to normal position when power is interrupted.
- ❑ Electronic control circuit operates from 4-7 volts dc..
- ❑ Oil immersed motor and gear train for reliable performance and long life.
- ❑ Wiring box provides NEMA 3 weather protection.
- ❑ Actuator motor and circuitry operate from 24 volts AC. Models available with factory installed transformer, or an internal transformer can be field added.
- ❑ Quick-connect terminals standard—screw terminal adapter available.
- ❑ Adapter bracket for matching shaft height of older motors is standard with replacement motors.
- ❑ Nominal timing of 30 seconds for 90° and 60 seconds for 160° stroke.
- ❑ Available accessories include valve and damper linkages, explosion proof housing, and auxiliary switches.
- ❑ Die-cast magnesium housing.
- ❑ M7186G may be used for field replacement of Ranco series LA2-2000 Linear Actuators.




# M7183; M7185; M7186

**S.M.**
**11-90**

**Form Number 63-2199**

# SPECIFICATIONS

## *STANDARD MODELS*

**M 7 1 8 3 G**
**M 7 1 8 5 A**
**M 7 1 8 6 G**

**Control Type**
**71** is dc voltage

**Power Rating**
**8** is high power
60 lb.-in. torque for normally closed motors.
50 lb.-in. torque for normally open motors.

**Output Drive**
**5** is spring return, dual-ended shaft, Normally closed mechanically
**6** is spring return, dual-ended shaft, Normally open mechanically
**3** is spring return, single-ended shaft, Normally open mechanically

**Suffix Letter**
**A:** Is fixed stroke, Normally closed electrically[a] No auxiliary switches

**G:** Is fixed stroke, Normally open electrically[a] No auxiliary switches

[a] Electrical normal position is the position the motor shaft assumes at minimum input signal; closed is fully counterclockwise and open is fully clockwise viewed from the power end. See Fig. 2.

ELECTRICAL RATINGS:

| | VOLTAGE (V @ 50/ 60 Hz) | CURRENT DRAW (A) | POWER CONSUMPTION (W) |
|---|---|---|---|
| Without Transformer | 24 | 1.0 | 23 |
| With Internal Transformer | 120 | 0.28 | 28 |
| | 208 | 0.16 | 28 |
| | 240 | 0.14 | 28 |

MOTOR ROTATION:
Normally closed M7185A rotates to the full counterclockwise position as viewed from the power end when the input signal is at a minimum or power is interrupted. M7183G, M7186G rotate to the full clockwise position under these conditions.

INPUT SIGNAL: 4-7 Vdc.
STROKE: 160°.
TIMING: 60 seconds.
TORQUE:
Maximum Operating—50 lb.-in. [5.7 N-m] for normally open motors; 60 lb.-in. [6.8 N-m] for normally closed motors.
Breakaway—200 lb.-in. [23 N-m]. Breakaway torque is the maximum torque available to overcome occasional large loads such as a seized damper or valve. *Motor must not be used continuously at this rating.*
DEAD WEIGHT LOAD ON SHAFT:
Power or Auxiliary End—200 lb. [90.8 kg] maximum.
Maximum Combined Load—300 lb. [136 kg].
AMBIENT TEMPERATURE RATINGS:
Maximum—150° F [66° C] @ 25% duty cycle.
Minimum—minus 40° F [-40° C].
SHAFT: 3/8 inch [9.5 mm] square.
M7185, M7186 have double-ended shaft.
M7183 has single-ended shaft.
DIMENSIONS: See Fig. 1.
UNDERWRITERS LABORATIRIES INC. LISTED: File No. E4436, Guide No. XAPX.
CANADIAN STANDARDS ASSOCIATION CERTIFIED: General listed File No. LR1620; Guide No. 400-E.
BRAKE: Electromechanical; holds load when motor is stopped and releases when motor is running and on power interruption.
ACCESSORIES:
ES650117 Explosion-proof Housing—encloses motor for use in explosive atmospheres. Not for use with Q601, Q618, and Q455 Linkages. Order separately from Nelson Electric Co. Requires Honeywell

*(continued on page 3)*

# ORDERING INFORMATION

**WHEN PURCHASING REPLACEMENT AND MODERNIZATION PRODUCTS FROM YOUR AUTHORIZED DISTRIBUTOR, REFER TO THE TRADELINE CATALOG OR PRICE SHEETS FOR COMPLETE ORDERING NUMBER.**

**IF YOU HAVE ADDITIONAL QUESTIONS, NEED FURTHER INFORMATION, OR WOULD LIKE TO COMMENT ON OUR PRODUCTS OR SERVICES, PLEASE WRITE OR PHONE:**

1. **YOUR LOCAL HONEYWELL RESIDENTIAL AND BUILDING CONTROLS SALES OFFICE (CHECK WHITE PAGES OF YOUR PHONE DIRECTLRY).**
2. **RESIDENTIAL AND BUILDING CONTROLS CUSTOMER SERVICE HONEYWELL INC. 1885 DOUGLAS DRIVE NORTH MINNEAPOLIS, MINNESOTA 55422-4386 (612)542-7500**

**(IN CANADA—HONEYWELL LIMITED/HONEYWELL LIMITEE, 740 ELLESMERE ROAD, SCARBOROUGH, ONTARIO M1P 2V9) INTERNATIONAL SALES AND SERVICE OFFICES IN ALL PRINCIPAL CITIES OF THE WORLD.**

7617DM Coupling.

Q607 External Auxiliary Switch—controls auxiliary equipment as a function of motor position.

Q605 Damper Linkage—connects motor to damper. INCLUDES MOTOR CRANK ARM.

Q618 Linkage—connects Modutrol motor to water or steam valve.

Q601 Bracket and Linkage Assembly—connects Modutrol motor to water or steam valve.

Q100 Linkage—connects Modutrol motor to butterfly valve.

221455A Motor Crank Arm—Infinitely adjustable crank arm. Approximately 0.75 inches shorter than the 4074ELY crank arm, can rotate through downward position and clear base of motor without requiring use of adapter bracket.

7617ADW Motor Crank Arm—Approximately 0.75 inches shorter than the 7616BR crank arm, can rotate through downward position and clear base of the motor without requiring use of adapter bracket.

220741A Screw Terminal Adapter—converts the standard quick-connect terminals to screws terminals.

Transformers—mounted internally, provide 24 Vac power to motor

198162JA—24 Vac; 50/60 Hz (for electrical isolation).

198162EA—120 Vac; 50/60 Hz.

198162GA—220 Vac; 50/60 Hz.

198162AA—120/208/240 Vac; 50/60 Hz.

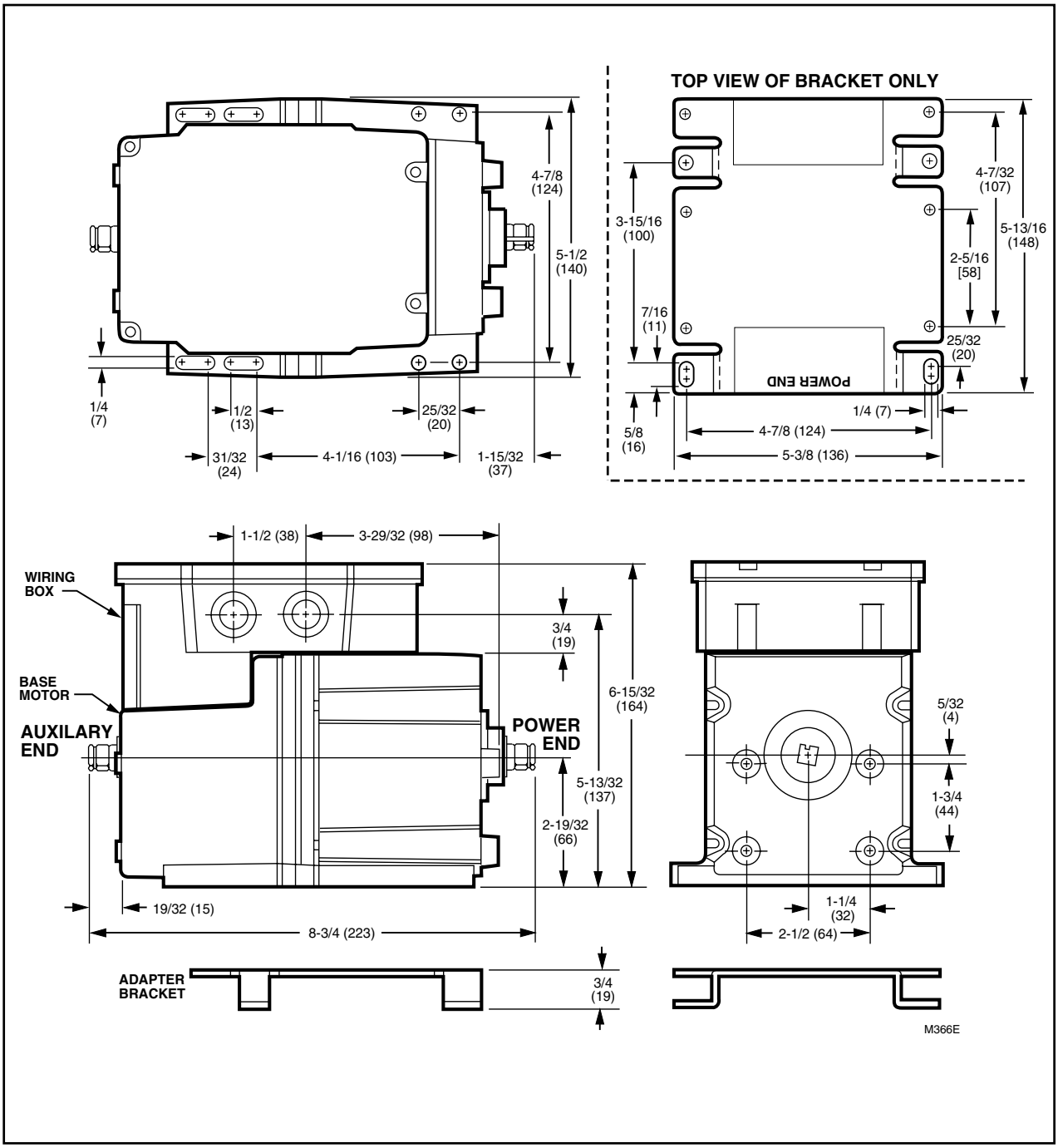



**FIG. 1—DIMENSIONS OF M7185, M7186 MOTORS IN in. [mm IN BRACKETS].**

**NOTE: M7183 motors do not have auxiliary shaft. All other dimensions are the same.**

# INSTALLATION

**WHEN INSTALLING THIS PRODUCT…**

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

## CAUTION

1. Disconnect power supply before beginning installation to prevent electrical shock and equipment damage.
2. Never turn the motor shaft by hand or with a wrench—this will damage the motor.
3. Always conduct a thorough checkout when installation is complete.

**LOCATION**

Install the Modutrol motor in any location except where acid fumes or other deteriorating vapors might attack the metal parts, or in atmospheres of escaping gas or explosive vapors. Motors are rated for ambient temperatures between -40° F and 150° F [-40° C and 66° C].

In excessive salt environments, mounting base and screws should be zinc or cadmium plated, not stainless steel or brass: Use the 220738A adapter bracket for mounting on these surfaces.

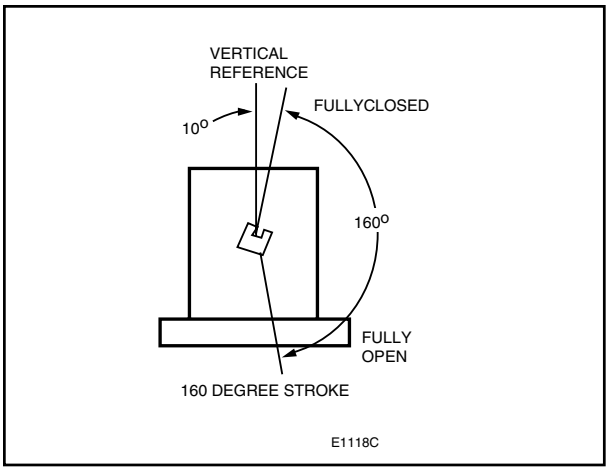



**FIG. 2—LIMITS OF MOTOR SHAFT ROTATION VIEWED FROM POWER END.**

**MOUNTING**

Always install motors with the shaft horizontal.

Mounting flanges extending from the bottom of the motor housing are drilled for 1/4 inch [6.4 mm] machine screws or bolts.

M7185 motors are shipped from the factory in closed position (at the limit of counterclockwise ↶ rotation as viewed from the power end of the motor, as shown in Fig. 2). M7183, M7186 motors are shipped in the open (clockwise ↷ ) position.

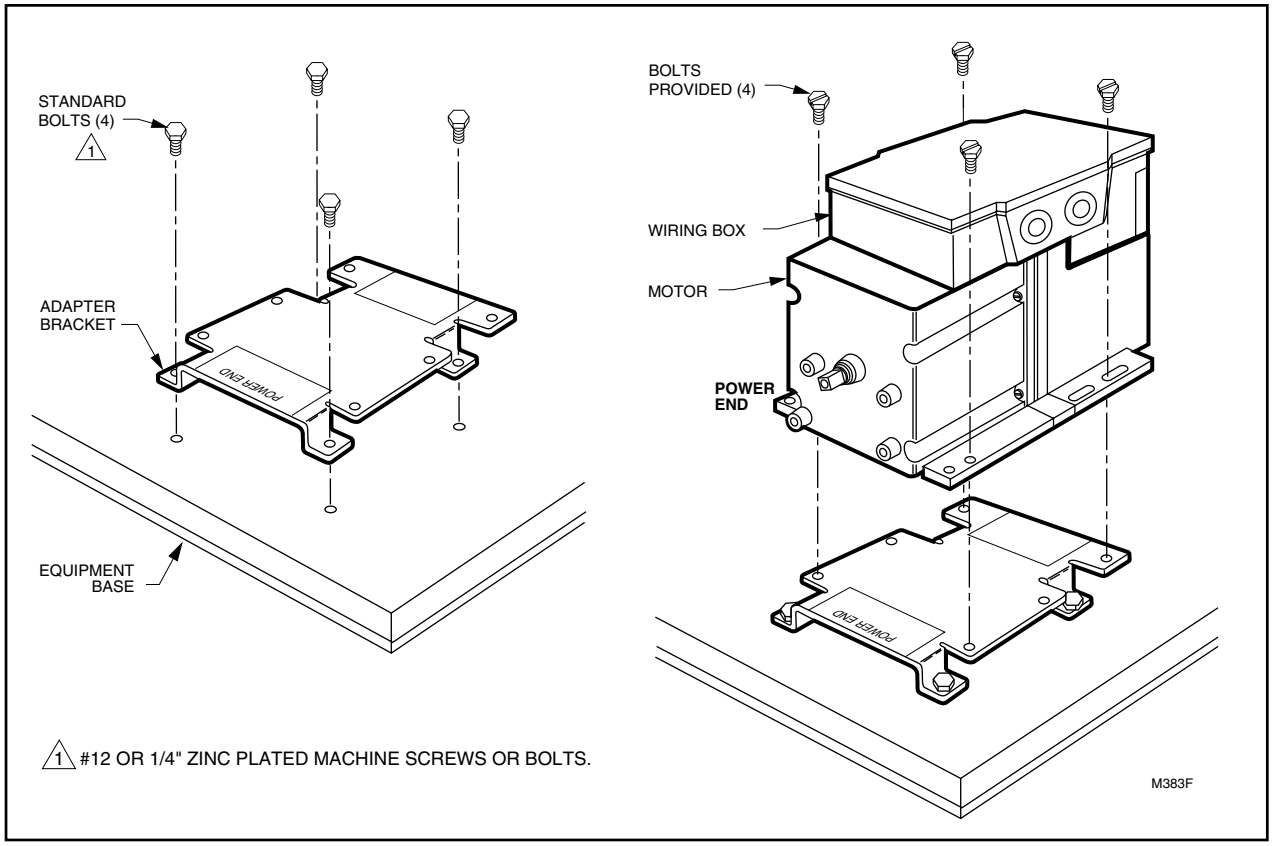



**FIG. 3—MOUNTING MOTOR WITH ADAPTER BRACKET.**

## ADAPTER BRACKET

The adapter bracket, positioned between the motor and the equipment, raises the shaft height of the motor by 0.75 inch to match that of the M745 Modutrol motor. This is required on all valve linkage applications, Q607 External Auxiliary Switch applications, and on some damper linkage applications (either to provide clearance for the crank arm to rotate through the downward position, or to allow the damper linkage to reach the shaft).

To mount the motor with the bracket:

1. Mount the bracket to the equipment with existing or standard bolts.
2. Mount the motor to the bracket using the bolts provided to the threaded holes in the bracket. See Fig. 3.

For valve linkage applications, the bracket should first be mounted to the linkage. The bracket then provides a convenient base on which the motor can be positioned.After the motor shaft is aligned to the linkage, it can be attached to the bracket with the 4 bolts provided. These bolts go through the holes of the motor flange and into the outer threaded holes of the bracket. See Figure 4.

## DAMPER LINKAGES

A 220738A Adapter Bracket is packed with replacement motors. Use of this bracket is optional for many damper applications. The bracket might be needed in damper applications requiring the crank arm to rotate through the bottom plane of the actuator. If the bracket is not used in a replacement application, the damper linkage will have to be adjusted to the new shaft position.

The motor comes without a crank arm. The crank arm is included in the Q605 linkage or may be ordered separately (see Accessories).

For detailed instructions on the assembly of specific linkages, refer to the instruction sheet packed with each linkage. In general, however, check the following points of operation when installing a motor and linkage.

1. Linkages for valves and louver type dampers should be adjusted so that the damper or valve moves through only the maximum required distance when the motor moves through its full stroke.
2. With modulating control, maximum damper opening should be no more than 60°. Little additional airflow is provided beyond this point.
3. The motor must be stopped at the end of its stroke by the limit switch and must not be stalled by the damper or valve. The motor will be damaged if it is not permitted to complete its full stroke.
4. Do not exceed the motor ratings in any installation.
5. Do not turn motor shaft manually or with a wrench—this will damage the motor.

## VALVE LINKAGES

The 220738A Adapter Bracket must be used with the Q100, Q601 and Q618 linkages in all valve applications.

## WIRING

Disconnect power supply before wiring to prevent electrical shock or equipment damage. All wiring must agree with applicable codes, ordinances, and regulations.

A transformer is required to supply 24 Vac power to the motor. Make sure that the power requirements stamped on the motor correspond to the characteristics of the power supply.

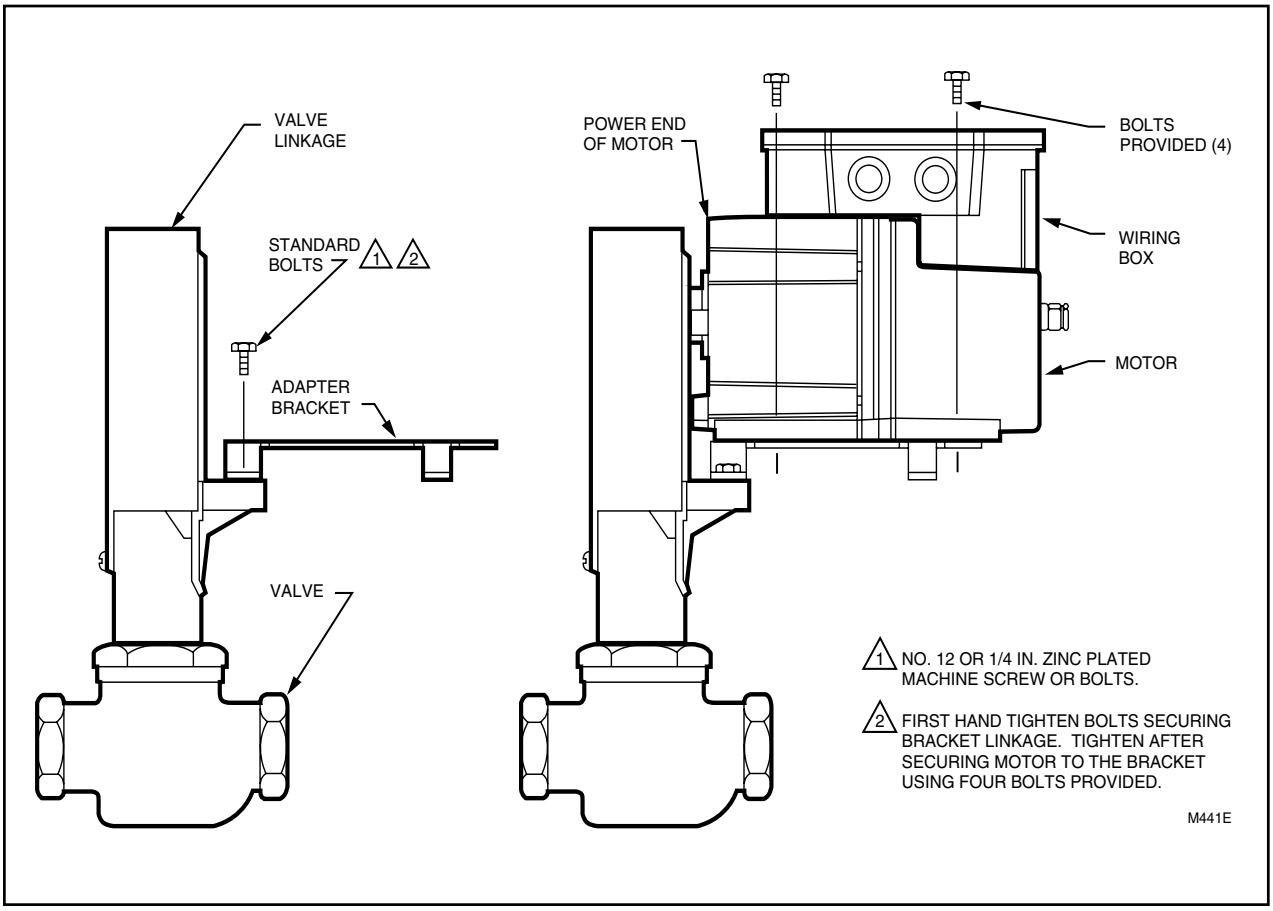



**FIG. 4—MOTOR MOUNTING ON VALVE LINKAGE.**

Access to the wiring compartment is gained by removing the 4 screws in the top of the wiring box and lifting off the cover. See Fig. 5 for terminal location. See Fig. 6 for the internal schematic.

Fig. 7 shows connections for a typical system application.

**WIRING BOX**

When used with liquid-tight conduit connectors, the wiring box provides NEMA 3 weather protection for the motor. The box also provides knockouts for wiring conduits and encloses terminals.

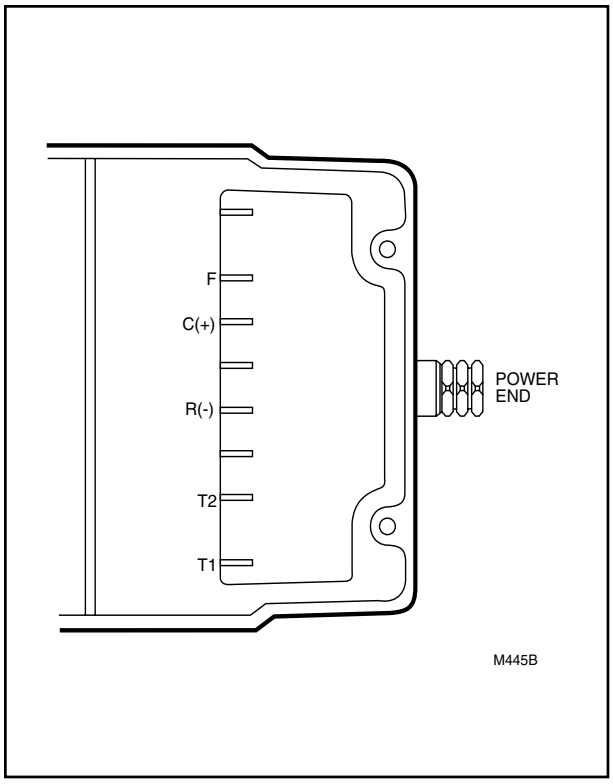



**FIG. 5—MOTOR TERMINAL ARRANGEMENT.**

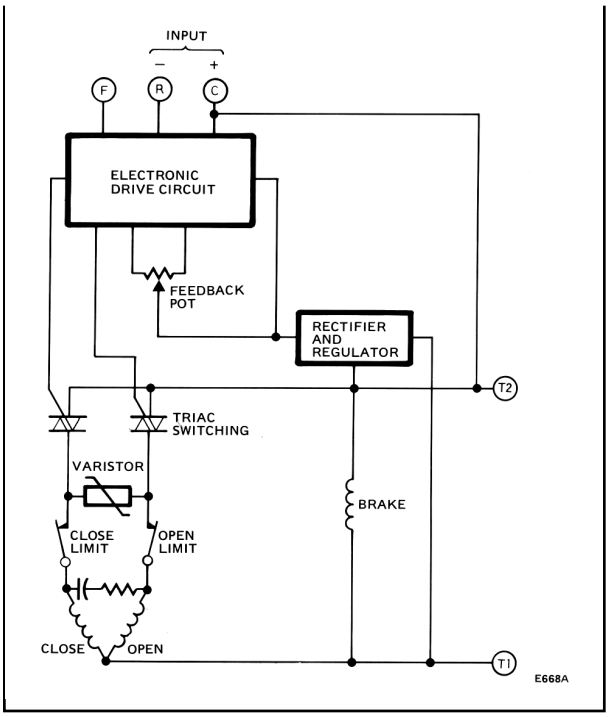



**FIG. 6—INTERNAL SCHEMATIC.**

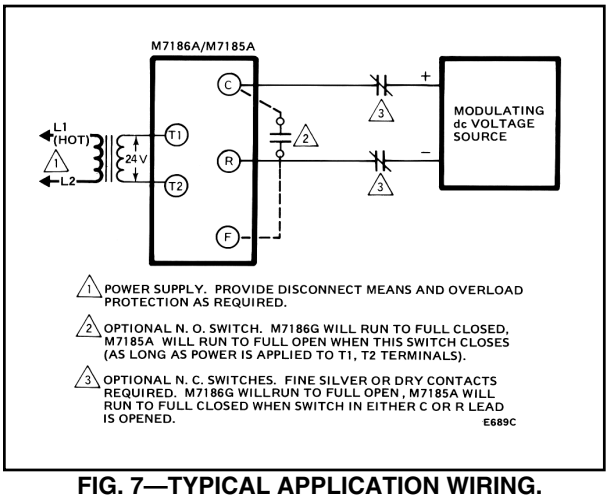



**FIG. 7—TYPICAL APPLICATION WIRING.**

# OPERATION AND CHECKOUT

## OPERATION

The M7183, M7185 and M7186 operate in response to a DC voltage input signal to terminals C and R, positioning a valve or damper at any position between fully open and fully closed. The input signal causes the modified DC bridge circuit in the motor to become unbalanced. The small signal resulting from the bridge unbalance is amplified and energizes 1 of 2 triacs to run the motor. As the motor runs, a feedback potentiometer driven by the motor moves to rebalance the bridge. When the bridge is balanced, the motor stops.

If power to the $T_1$ – $T_2$ terminals is interrupted, the M7185 motors will spring close (full counterclockwise as viewed from the power end); the M7183, M7186 motors will spring open.

### REPLACEMENT OF RANCO LA2 LINEAR ACTUATORS AND HONEYWELL SPECIAL PACKAGED HVAC UNIT MOTORS

The M7185, M7186 motors may be used for field replacement of LA2-2000 Series Modulating Heating Valve Actuators as described below. To select the appropriate motor refer to Table 1.

TABLE 1—CROSS-REFERENCE OF RANCO AND HONEYWELL ELECTRONIC MOTORS.

| RANCO ACTUATOR FAMILY | INPUT VOLTAGE | HONEYWELL MOTOR REPLACEMENT | |
|---|---|---|---|
| LA2-2000 MODULATING HEATING VALVE ACTUATOR verse-acting, spring return, 35 lb. [155.6 N] force, 2 in. [50.8 mm] stroke. | 4.0 TO 7.0 | M7186G1000[abc] | 160 deg. 60 sec., 24 Vac, 50 lb.-in. [5.7 N-m], spring re-return. Mechanically normally open; electrically normally open. |

[a] "Electrical normal position" is the position (extended = open; retracted = closed) of the actuator drive shaft (as viewed from the power end) when power is applied to the motor and the input (command) signal is at the lowest point of the input voltage range.

[b] "Mechanical normal position" is the position of the actuator drive shaft (as viewed from the power end) when no power is applied to the motor.

[c] These motors are for use with modulating steam or hot water valves: valve and linkage replacement is required.

TABLE 2—LA2-2000 TO M7186 TERMINAL INTERCHANGES.

| FROM RANCO LA2-2000 | | TO HONEYWELL M7186[a] | |
|---|---|---|---|
| TERMINAL | FUNCTION | TERMINAL | FUNCTION |
| 1 — COMD (+) | + command signal | C | + signal |
| 6 — REF (—) | signal common | R | - signal |
| 9 — 24 Vac | power supply | $T_1$ | power supply |
| 10 — 24 Vac | power supply | $T_2$ | power supply |

[a] Terminal "F" is not used when replacing Ranco actuators.

### MOUNTING/MECHANICAL CONVERSION

Remove the Ranco actuator and mount the M7186 replacement as shown in Fig. 8.

### WIRING CONVERSION FOR THE M7186

Disconnect power supply before beginning installation to prevent electrical shock or equipment damage. All wiring must comply with local electrical codes, ordinances, and regulations.

Remove wiring from the Ranco Actuator and connect to the M7186 according to Fig. 9 and the terminal interchanges in Table 2.

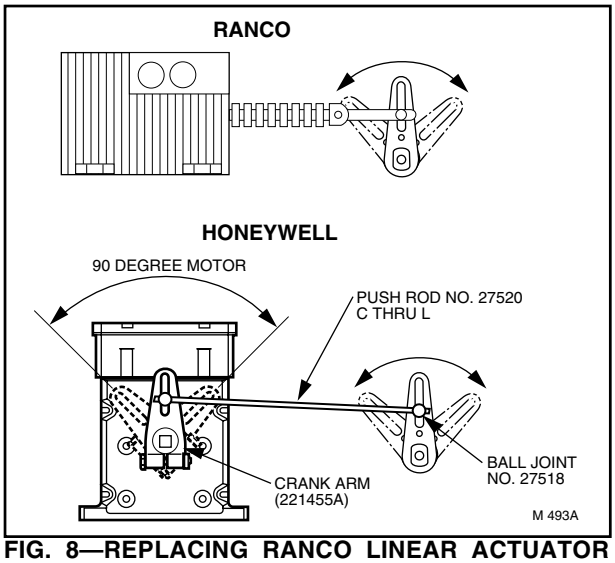



**FIG. 8—REPLACING RANCO LINEAR ACTUATOR WITH M7186 INVOLVES A SIMPLE CHANGE FROM A LINEAR FORCE TO A CIRCULAR FORCE.**

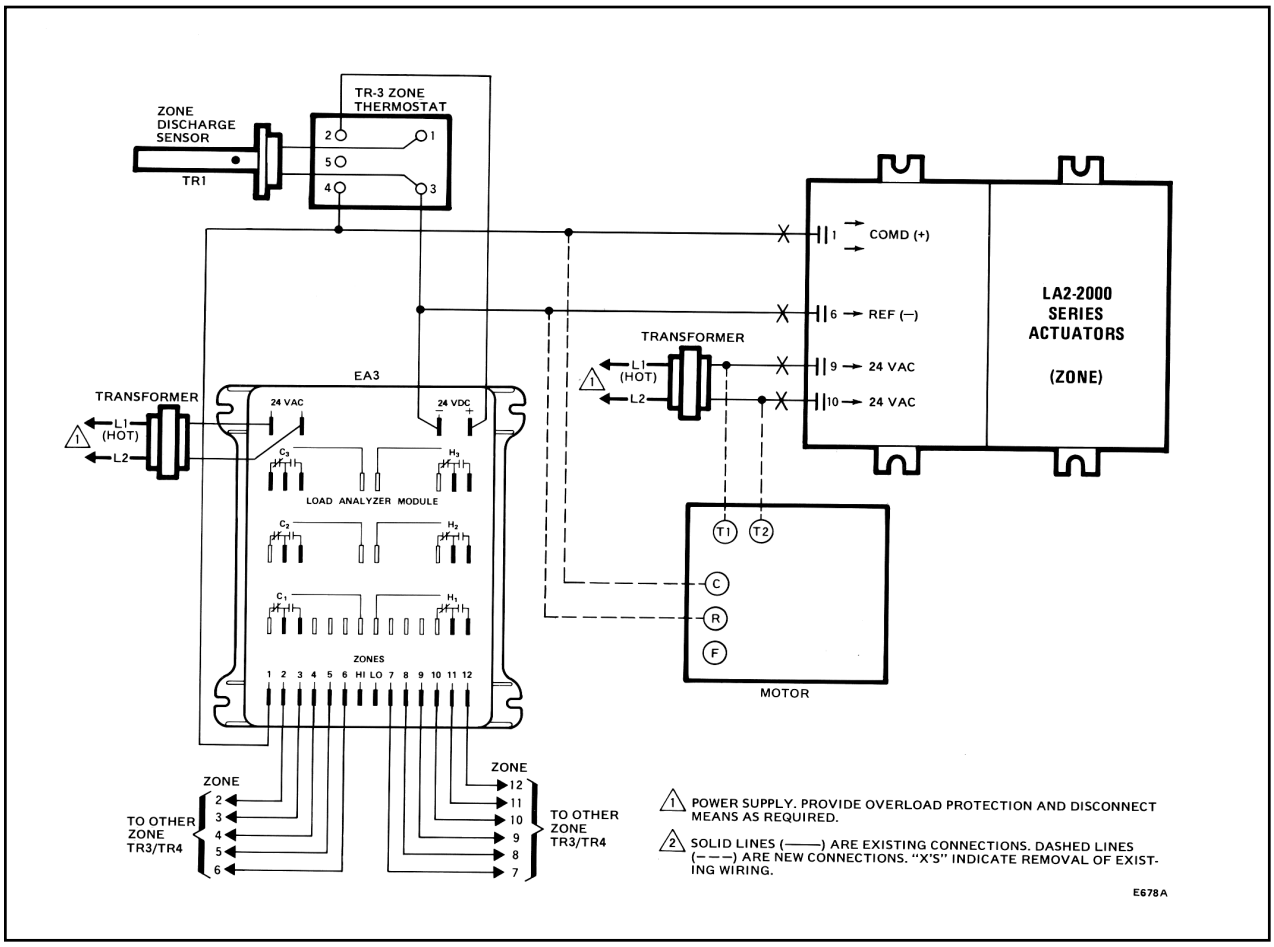



**FIG. 9—WIRING FOR REPLACEMENT OF RANCO LA2-2000 SERIES ACTUATORS WITH HONEYWELL M7186G.**

## CHECKOUT

After installation and linkage adjustment, operate the motor through the thermostat or panel. Make sure that—

- — the motor operates the damper or valve properly.
- — the motor responds properly as input voltage is varied.
- — the auxiliary switch, if used, operates at the desired point of motor rotation.

Inspect the motor, linkage, and valve or damper to see that all mechanical connections are correct and secure. In damper installations, the pushrod should not extend more than a few inches past the ball joints. Check to see that there is adequate clearance for the linkage to move through its stroke without binding or striking other objects. See system instructions for additional checkout procedures.

TABLE3—MOTOR OPERATION CHECK.

| STEP | MOTOR RESPONSE[a] M7183G, M7186G | M7185A |
|---|---|---|
| 1. Open terminal C or R | Motor runs full open. | Motor runs full closed. |
| 2. Short terminal C-F | Motor runs full closed. | Motor runs full open. |
| 3. Open either $T_1$ or $T_2$ terminal or disconnect power supply. | Motor spring return open. | Motor spring return closed. |

[a]Motor rotation viewed at power end: open clockwise , close counterclockwise .

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