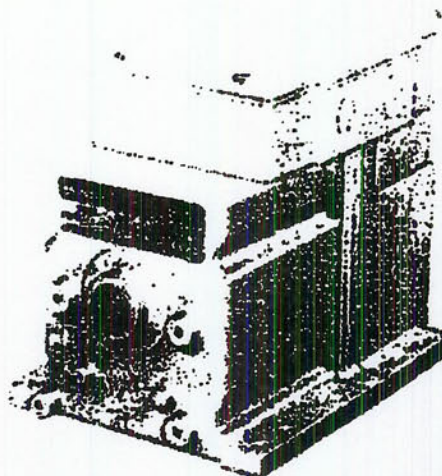


M4182, M4185, M4186, M8175, M8182, M8185 Modutrol IV Motors

The M4182, M4185, M4186, M8175, M8182 and M8185 are 2-position spring-return Modutrol motors. They are used to operate dampers or valves in applications where it is necessary or desirable to have the controlled element return to the starting position in the event of power failure or interruption.



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- Replaces M445, M845 and M865.
- M8175 rated for 25 lb.-in. torque.
- M4182, M4185, M4186, M8182 and M8185 rated for 60 lb.-in. torque.
- Integral spring return returns motor to normal position (open or closed) when power is interrupted.
- 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 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.
- TRADELINE motors have field adjustable stroke (90° to 160°).
- Die-cast magnesium housing.
- M4186 is designed for normally open valves and dampers; all other motors are normally closed.
- Available accessories include valve and damper linkages, explosion proof housing, and auxiliary switches.
- Integral auxiliary switches are available factory mounted, or can be field added to TRADELINE models.
- TRADELINE spring return motors may operate valve linkages from the power end or auxiliary end shafts for normally closed or normally open valve applications.

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Specifications

TRADELINE MODELS

TRADELINE MODELS are selected and packaged to provide ease of stocking, ease of handling and maximum replacement value. TRADELINE model specifications are the same as those of standard models unless specified otherwise. M8185D1006 is a TRADELINE model. TRADELINE model has auxiliary switch cams.

STANDARD MODELS

M4185A,B,E
 M4182A,B
 M4186H,L
 M8182B
 M8175B
 M8185A,B,D

Control Type	Suffix Letter
41 is Series 40, line voltage, two position	A: Fixed stroke (90° or 160°) No auxiliary switch
81 is Series 80, low voltage, two position	B: Fixed stroke (90° or 160°) 1 auxiliary switch
Power Designation	D: Adjustable stroke (90° to 160°) No auxiliary switch
7 is medium power, 25 lb.-in. torque.	E: Adjustable stroke (90° to 160°) 1 auxiliary switch
8 is high power, 60 lb.-in. torque	H: Fixed stroke 90° or 160° 1 auxiliary switch Normally open electrically
Spring Return Action	L: Adjustable stroke (90° to 160°) 1 auxiliary switch Normally open electrically
5 is normally closed, dual-ended shaft.	
6 is normally open, dual-ended shaft.	
2 is normally closed, single-ended shaft.	

ELECTRICAL RATINGS:

	Voltage (V @ 50/60 Hz)	Current Draw (A)	Power Consumption (W)
Without Transformer	24	0.86	20
With Internal Transformer	120	0.25	25
	208	0.14	25
	240	0.13	25

CONTROLLER TYPE: Two wire, on-off switching action.

AUXILIARY SWITCH RATINGS (Amperes):

One Contact Rating ² (Amps)	120 V	240 V
Full Load	7.2	3.6
Locked Rotor	43.2	21.6

²40 VA pilot duty, 120/240 Vac on opposite contact.

DEAD WEIGHT LOAD ON SHAFT:

Power or Auxiliary End—200 lb. (90.8 kg) maximum.
 Maximum Combined Load—300 lb. (136 kg). (For dual-stroke motors only.)

MAXIMUM DAMPER RATING:

M4182, M4185, M4186, M8182, M8185: B dim. = 68 in.
 M8175: B dim. = 34 in.

AMBIENT TEMPERATURE RATINGS:

Maximum—150° F (66° C) @ 25% duty cycle.
 Minimum—minus 40° F [-40° C].

CRANKSHAFT: 3/8 in. (9.5 mm) square. M4185, M4186, M8175, M8185 have dual-ended shaft. M4182, M8182 have single-ended shaft.

UNDERWRITERS LABORATORIES INC. LISTED: File No. E4436, Guide No. XAPX.

CANADIAN STANDARDS ASSOCIATION CERTIFIED: General listed File No. LR1620, Guide No. 400-E.

(continued on page 3)

Ordering Information

When purchasing replacement and modernization products from your Tradeline wholesaler or your 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 phone directory).
2. Residential and Building Controls Customer Satisfaction

Honeywell Inc., 1885 Douglas Drive North
 Minneapolis, Minnesota 55422 (612) 542-7500

In Canada: Honeywell Controls Limited, 740 Ellesmere Road, Scarborough, Ontario M1P 2V9. International Sales and Services Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

TORQUE AND TIMING:

	Timing (sec.)		Torque lb.-in. [N·m]
	90° Stroke Motors	160° Stroke Motors	
M8175	30	60	25 [2.8]
Other models	30	60	60 [6.8]

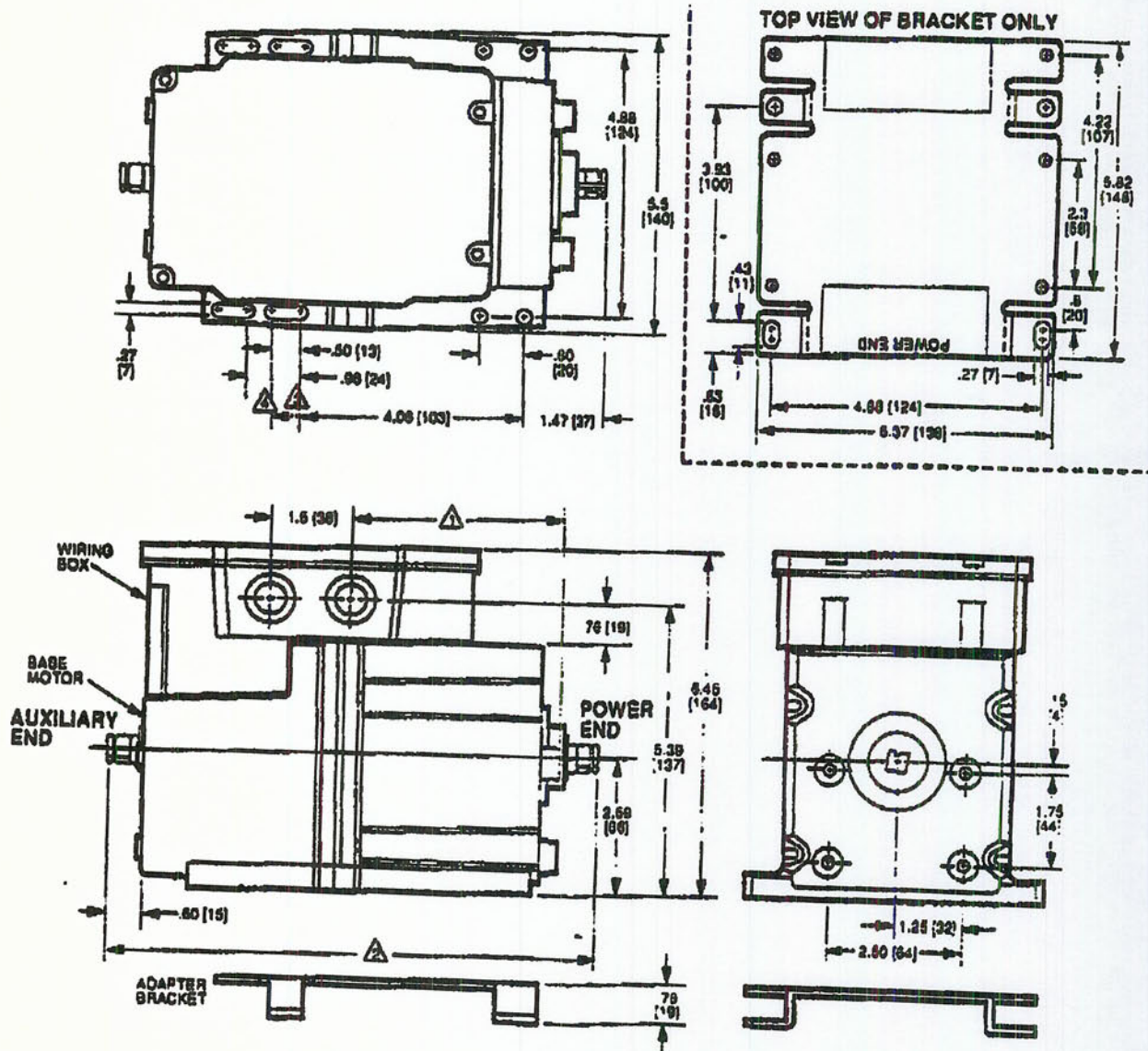
DIMENSIONS: See Fig. 1.

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. To order, contact Nelson Electric, Order Services Dept., P.O. Box 726, Tulsa, OK 74101, (918) 627-3530. Requires Honeywell 7617DM Coupling.

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

Fig. 1—M4185/M4186/M8175/M8185 mounting dimensions in in. [mm in brackets]. Note: M4182/M8182 Motors do not have auxiliary shaft, but all other dimensions are the same.



60 lb.-in. Spring Return Model Shown

- ▲ For 60 lb.-in. spring return models 3.9 [98]; for 25 lb.-in. spring return model models 3.4 [85.5].
- ▲ For 80 lb.-in. spring return models 8.76 [222.5]; for 25 lb.-in. spring return models 8.28 [209.6].
- ▲ For 80 lb.-in. spring return models.
- ▲ For 25 lb.-in. spring return models.

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M4182, M4185, M4186, M8175, M8182, M8185
SPECIFICATIONS • INSTALLATION

Internal Auxiliary Switch Kits—Can be field-installed on TRADELINE model.

220736A—One-switch kit.

220736B—Two-switch kit.

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.

7617ADW Crank Arm—Approximately 0.75 inch shorter than 7616BR Crank Arm. Can rotate through downward position and clear base of motor without

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requiring use of adapter bracket.

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

220741A Screw Terminal Adapter—Converts the standard quick-connect terminals to screw 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.

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.

Allow enough clearance for installing accessories and servicing the motor when selecting a location (see Fig. 1). If located outdoors, use liquid-tight conduit connectors with the wiring box to provide NEMA 3 weather protection.

MOUNTING

Always install motors with the crankshaft horizontal. Mounting flanges extending from the bottom of the motor

housing are drilled for 1/4 inch [6.4 mm] machine screws or bolts.

All M4182, M4185, M8175, M8182 and M8185 motors are shipped from the factory in the closed position (at the limit of counterclockwise rotation, as viewed from the power end of the motor, as shown in Fig. 2). M4186 motors are shipped in the open position (at the limit of clockwise rotation).

ADAPTER BRACKET

The 220738A 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 M445/M845/M865 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, it can then be attached to the bracket with the 4 bolts provided. These bolts go through the holes of the motor flange and into the threaded holes of the bracket (see Fig. 4).

DAMPER LINKAGES

A 220738A Adapter Bracket is packed with replacement motors. Use of this bracket is optional for many damper applications. The bracket or the 221455A Crank Arm 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 section).

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. Follow the instructions in Fig. 4 for the adapter. Either power end or auxiliary end of TRADELINE spring return motors may be used to drive valve linkages.

Fig. 2—Motor shaft positions at limits of stroke—viewed from power end of motor.

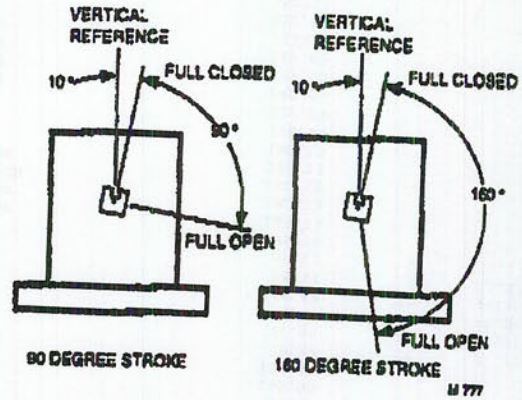


Fig. 3—Mounting motor with adapter bracket.

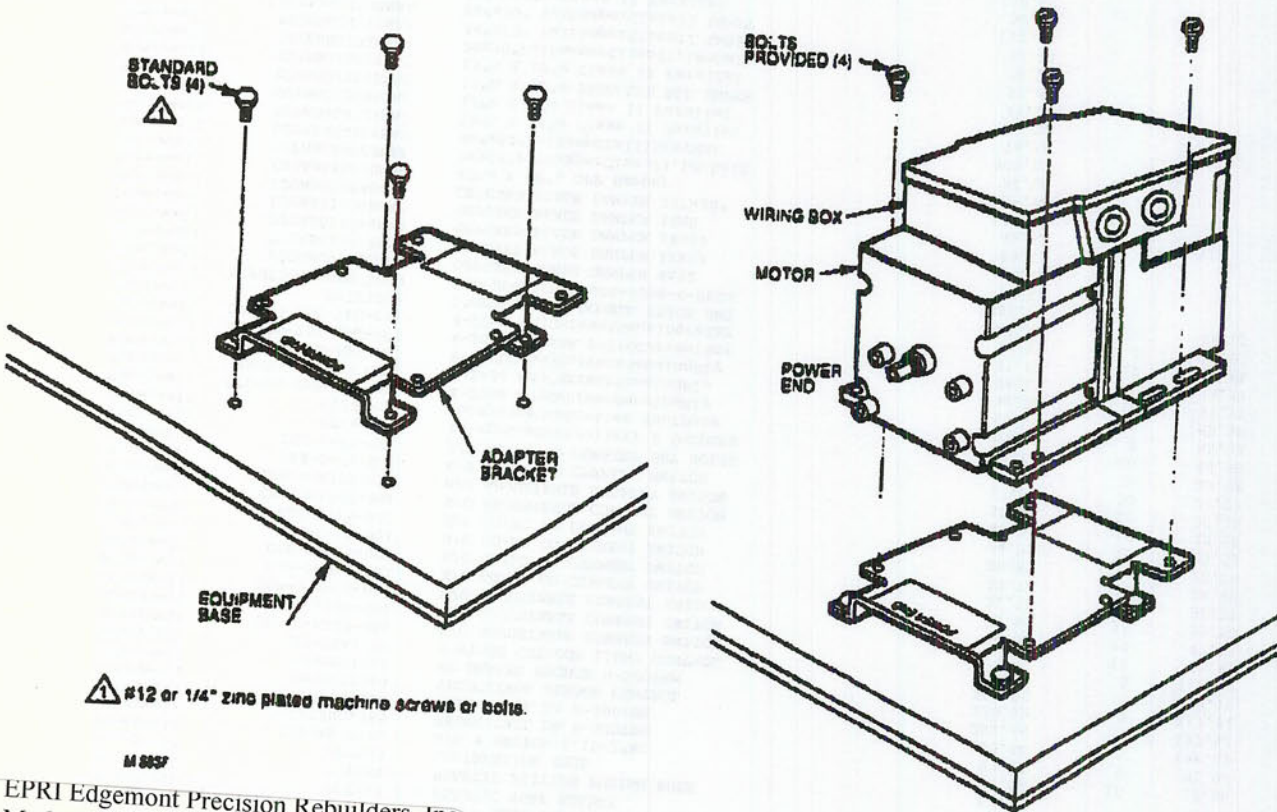
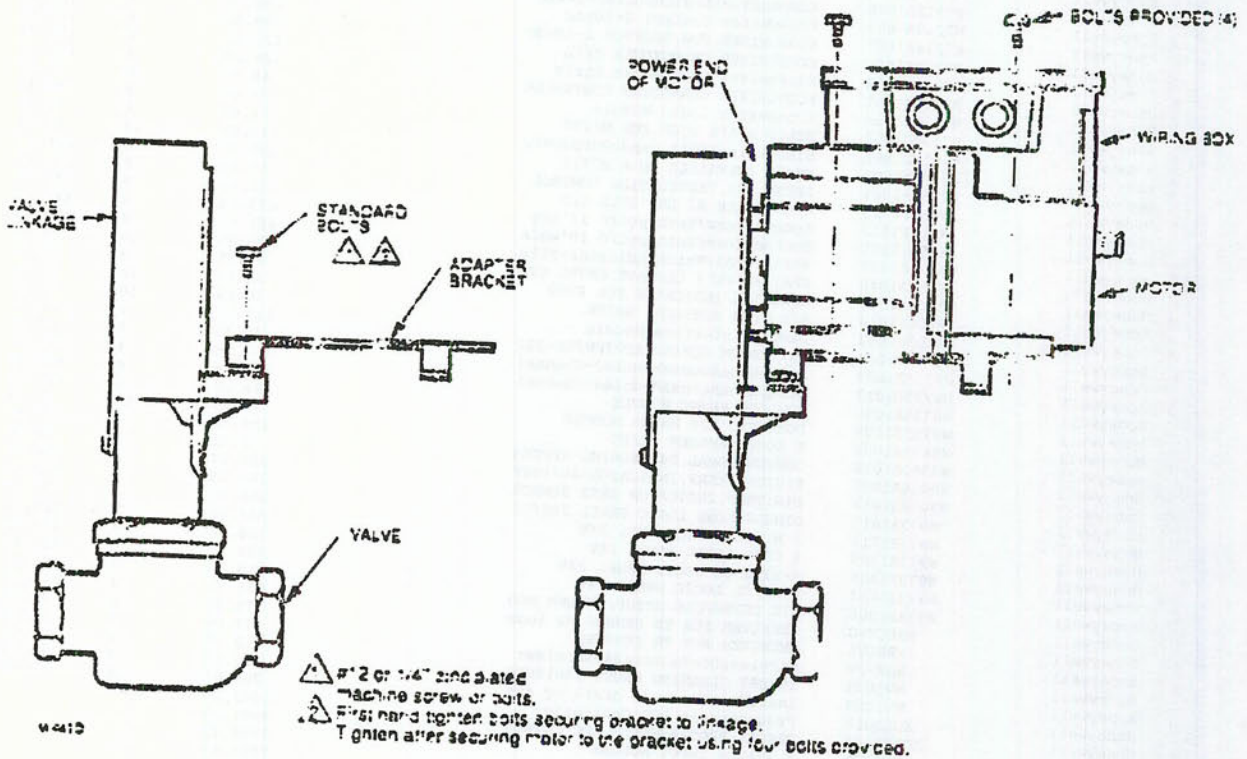


Fig. 4—Motor mounting on valve linkage.



WIRING

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

Make sure that the voltage and frequency stamped on the motor correspond to the characteristics of the power supply. See Figs. 7-10, 12 for typical system wiring.

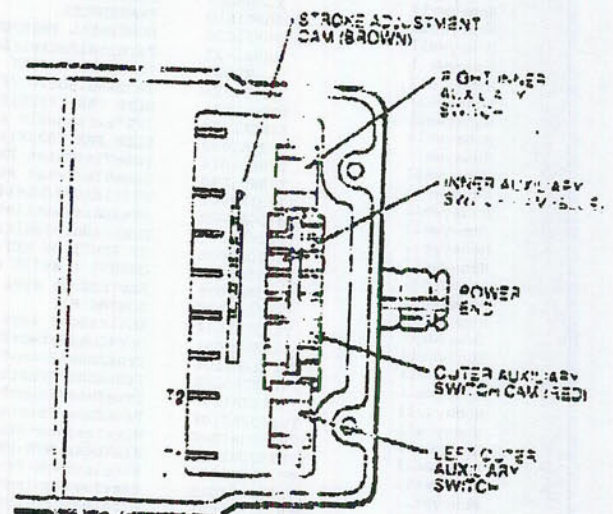
Make sure that the voltage and frequency stamped on the transformer correspond to the characteristics of the power supply.

Fig. 5 shows the motor terminals are quick-connects located on top of the printed circuit board. Access to the wiring compartment is gained by removing the 4 screws in the top of the wiring box and lifting off the cover. Fig. 6 shows internal schematics. Fig. 11 shows auxiliary switch connections.

WIRING BOX

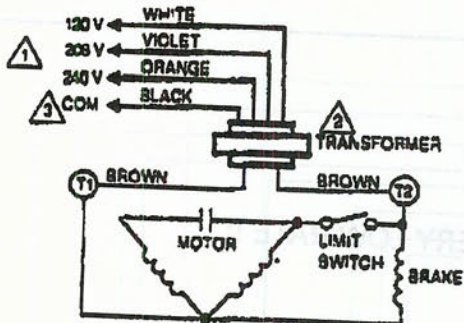
When used with liquid-tight conduit connectors, the wiring box provides NEMA 3 weather protection for the motor. The box also provides knockouts for wiring conduits and encloses terminals. The wiring box is required for housing an internal transformer or internal auxiliary switches.

Fig. 5—Terminals and adjustments.



Note: Features available on some models only.

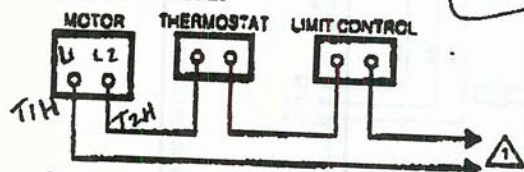
Fig. 6—Internal wiring.



- 1 Power supply. Provide disconnect means and overload protection as required.
- 2 On low voltage motors: Transformer not included.
- 3 Single voltage units have only black and white wires.

M 605A

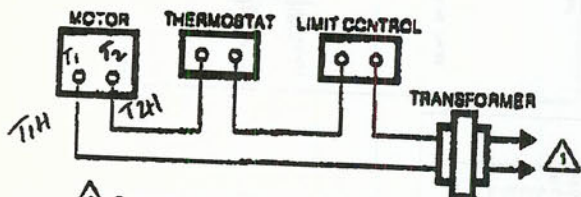
Fig. 7—Typical connections for M4182, M4185 and M4186 Motors.



- 1 Power supply. Provide disconnect means and overload protection as required.

M 606A

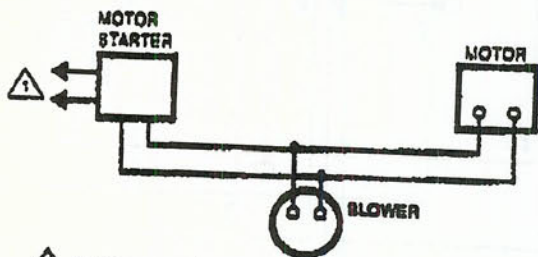
Fig. 8—Typical connections for M8175, M8182 and M8185 Motors.



- 1 Power supply. Provide disconnect means and overload protection as required.

M 607A

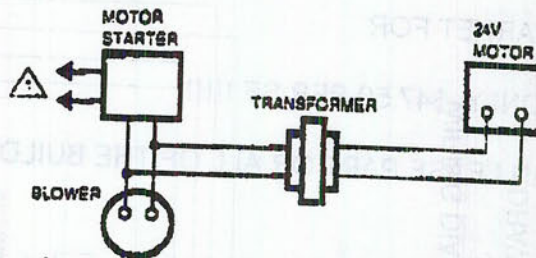
Fig. 9—Power connections for M4185 and M4186 Line Voltage Motors controlling two-position outside air damper.



- 1 Power supply. Provide disconnect means and overload protection as required.

M 608A

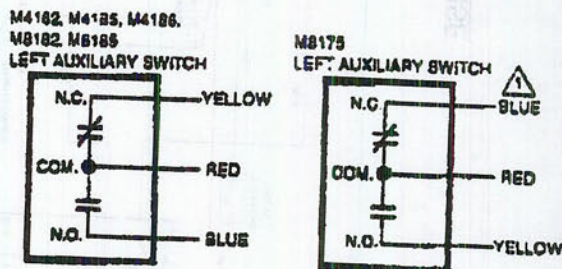
Fig. 10—Power connections for low voltage motors controlling two-position outside air dampers.



- 1 Power supply. Provide disconnect means and overload protection as required.

M 609A

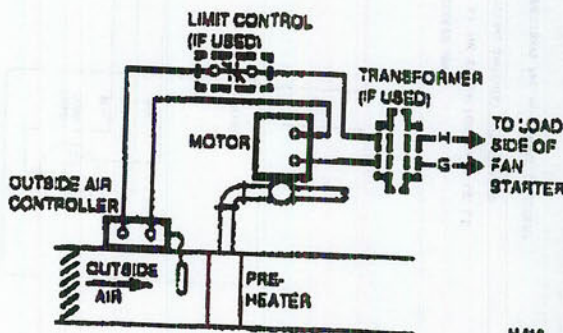
Fig. 11—Auxiliary switch wiring connections.



- 1 Colors are tracers on white wire.

M 611A

Fig. 12—Wiring connections for M8182 or M8185 Motor controlling two-position pre-heat coil valve.



M 610

Settings and Adjustments

STROKE SETTING

On the adjustable stroke motors, stroke is field adjustable and can be set between 90° and 160°. A mechanical adjustment (cam) establishes the fully open (clockwise, as viewed from the power end) position of the motor shaft. TRADELINE motors are factory set for 160°.

CAUTION

1. Detach linkage from motor before adjusting stroke.
2. Do not turn motor shaft by hand or with a wrench as damage to the gear train and circuit board stroke limit contacts will result.

IMPORTANT: Instructions are for normally closed motor. Reverse for normally open.

BEFORE SETTING STROKE:

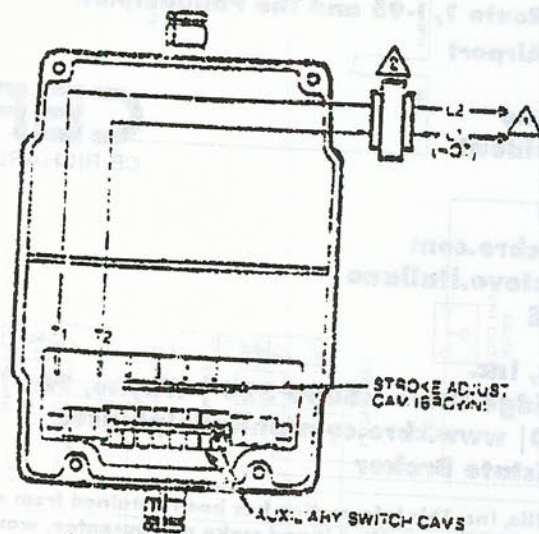
1. Remove top cover from motor.
2. Disconnect controller from motor.

SETTING STROKE (Fig. 13)

IMPORTANT: Set cams by moving top of screwdriver only. Pressing screwdriver against sides of cam slots or use of excessive force could cause damage.

1. Drive motor to fully open position by applying 24 volts to T1 and T2.
2. Insert 1/8 in. screwdriver blade into slot on brown cam

Fig. 13—Stroke adjustments.



- POWER END OF MOTOR
1. Power supply. Provide disconnect means and overload protection as required.
 2. Transformer may be external or internal.

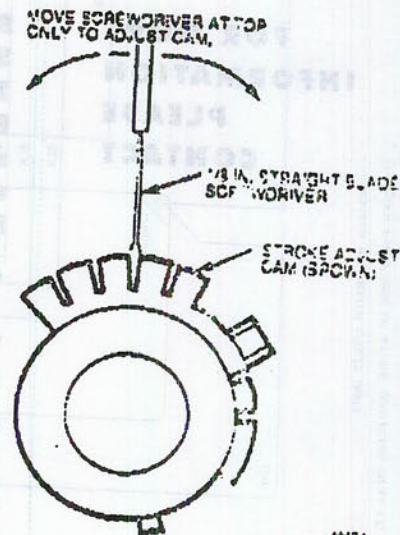
and move top of screwdriver handle clockwise, to the right, (allowing motor to reposition after each move) until motor reaches desired position. (Each click of the cam is 2° rotation.)

3. If motor turns beyond desired position, DO NOT MOVE CAM. First, allow motor to spring fully closed by disconnecting power. Then move cam back to the left (counterclockwise). Repeat steps 1, 2, 3.
4. Replace motor cover.

AUXILIARY SWITCHES

The auxiliary switches are spring switches that are actuated by adjustable cams. The cams are factory mounted on the motor shaft at the power end of the motor. The settings of the cams determine the point in motor shaft rotation at which the auxiliary equipment will be switched on or off. These cams can be set to actuate the switches at any angle within the stroke of the motor. Auxiliary switch wiring is shown in Fig. 11. With 1° differential, the N.C. switch contacts make and the N.O. switch contacts break on a counterclockwise (closed) rotation. If 10° differential is chosen, the operation is reversed, the N.O. switch contacts make and the N.C. switch contacts open on a counterclockwise (closed) rotation.

NOTE: when the slow-rise portion of the cam is used, the switching differential is approximately 10° of rotation. When the fast-rise portion of the cam is used, the switching differential is approximately 1° of rotation. Do not use the fast rise portion of the cam if fast cycling of auxiliary equipment is undesirable.





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Switch action is different depending on whether 1° or 10° differential is chosen. See Table 1.

TABLE 1—AUXILIARY SWITCH POSITION WITH MOTOR SHAFT ROTATED TO EITHER WIDE OF AUXILIARY SWITCH OPERATING POINT, AS VIEWED FROM POWER END.

Motor Type	Cam Arrangement	Switch Differential	Auxiliary Switch Contact Positions			
			N.O. Contact		N.C. Contact	
			Shaft Rotated ccw of Switch Operating Point	Shaft Rotated cw of Switch Operating Point	Shaft Rotated ccw of Switch Operating Point	Shaft Rotated cw of Switch Operating Point
M4182, M4185, M4186, M8175, M8182, M8185	Blue inner cam, red outer cam	1°	Open	Closed	Closed	Open
		10°	Closed	Open	Open	Closed

M4182, M4185, M8175, M8182 and M8185 motors are shipped in the closed position (counterclockwise , as viewed from the power end) with auxiliary switch cams set to operate switches 30° from the closed position, and to provide 1° differential. With motor in full closed position, N.C. auxiliary switch contacts are closed. The M4186 is shipped in the open position (clockwise , as viewed from the power end).

TRADELINER motors include auxiliary switch cams which permit installation of 220736A,B Internal Switch Kits. Refer to 220736A,B installation sheet, form 63-2228, to install kit.

AUXILIARY SWITCH ADJUSTMENT PROCEDURE



WARNING

**FIRE OR EXPLOSION HAZARD
 CAN CAUSE SEVERE INJURY
 OR DEATH**

When auxiliary switches control combustion equipment, incorrect wiring of the switches can allow the burner to come on at high fire. Check auxiliary switch wiring and cam adjustment before turning on the system. Watch the controlled equipment through one complete cycle. Shut the system down immediately if switches do not sequence the equipment correctly.



CAUTION

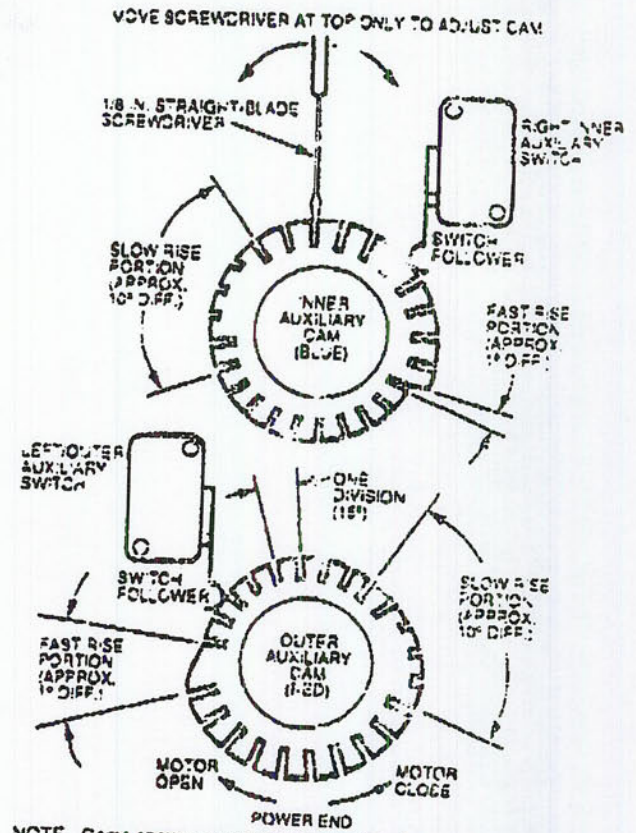
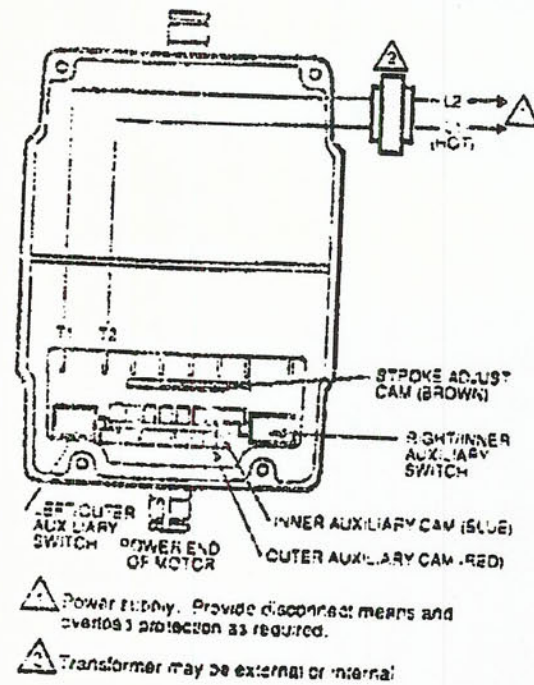
1. Disconnect all power to auxiliary switches before adjusting.
2. Do not turn motor shaft by hand or with wrench as damage to the motor can result.

To rotate the cams, insert small screwdriver (1/8" or 3 mm blade) through wiring box into slot on cam and move the screwdriver at the top. The inner cam actuates the right switch and the outer cam actuates the left switch (as viewed from the power end). Refer to Fig. 14. Each division on the cam represents 15° of motor rotation.

1. Turn off power and remove cover of wiring box.
2. Determine amount of shaft rotation, in degrees, desired before switch is energized.
3. Note the position of the cam slots and, with screwdriver, rotate the cam to the desired angle for switching action. Each division on the cam represents 15° of motor rotation. Therefore, if 60° of motor rotation is desired before switch operates, rotate the cam 4 divisions from the reference point. Turn on power.
4. Check for proper switch differential and switching of auxiliary equipment by driving the motor through full stroke (in both directions). If necessary, repeat steps 3 and 4 until correct switching action is obtained, turning off power before adjusting switch.
5. Replace cover of wiring box.

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Fig. 14- Auxiliary switch adjustments.



Operation and Checkout

OPERATION

In an operational circuit, a single-pole, single-throw controller or fan starter (line voltage for M4182, M4185, M4186 or low voltage for M5175, M5182, M5185) is wired in series with the motor circuit. When the controller switch closes, the motor is energized and runs to the end of its stroke. At this point, the limit switch is opened and the motor is de-energized. The brake solenoid is energized, however, and remains so as long as the controller is closed. The brake holds the motor in the energized position until the controller opens. At this point, the brake is released and the spring on the motor returns it to the starting position.

CHECKOUT

After the installation is complete, check the entire system for the following points of operation:

1. Motor operates the load properly.
2. Motor responds properly to the controller.
3. Motor returns to the starting position when power is interrupted.

DAMPER APPLICATION

STEP 1

Check the entire motor-damper linkage to see that the mechanical connections are secure and properly made. Make sure the ball joint on the damper crank arm is properly placed to give the required amount of travel.

STEP 2

Energize the motor and run it to the end of its stroke. Check the damper linkage while the motor is running to see that there are no loose or binding connections.

If the motor does not begin to run, check the control circuit for an open or short, the presence of power, and the voltage at the motor. (The voltage at the motor must be at least 80% of the rated voltage on the nameplate.) Make sure that the maximum net load of the motor is not exceeded.

STEP 3

Interrupt the power to de-energize the motor and allow the spring to return the motor to the starting position. If the motor does not return, check to see that power is actually interrupted.

and that the return load is not exceeding the rated motor load.

VALVE APPLICATION

STEP 1

Check the entire motorized valve assembly to see that the mechanical connections between the motor, linkage, and valve are proper and secure. Make sure that the linkage is adjusted according to the linkage instructions. Leave the cover off the linkage until the checkout is completed.

STEP 2

Make sure that the load does not exceed the motor rating. When using a Q601 Linkage with the motor, lubricate the bearing surfaces to prevent excessive loading. The valve packing must not be too tight. The motor actuating arm must be installed against the shoulder of the motor shaft to prevent binding at the connecting linkage bearings.

STEP 3

Energize the motor by setting the controller so that its

contacts close. The motor should start and run smoothly, and the valve stem should move to the opposite end of its stroke. If this is not the case, make sure that there is power to the motor. If there is not power, check the controller circuit for open or short circuits. If the trouble still cannot be found, measure the voltage at the source. Line voltage must be at least 85% of the rated voltage stamped on the nameplate of the motor.

STEP 4

De-energize the motor by resetting the controller so its contacts open, or remove one of the wires from a controller terminal. Spring power should return the valve to its normal position. If this does not happen, check the linkage for binding or in the case of normally closed valves, check for fluid pressure in excess of the close-off rating.

STEP 5

Replace the linkage cover.

Replacement

DAMPER APPLICATION

1. Turn off power and remove wiring from the old actuator.
2. Remove crank arm from shaft of old actuator and remove the old actuator.
3. Check to see whether or not the mounting bracket is needed. If the linkage can reach the lower shaft position of the new actuator and the crank arm has clearance for the needed rotation, then the bracket is not needed. Use the 220738A Adapter Bracket or 221455A Crank Arm if crank arm must rotate through the bottom plane of the motor (for damper applications).
- 4a. If the bracket is not needed, mount the new actuator directly to the equipment and refer to the Installation, Settings and Adjustments, and Operation and Checkout sections of these instructions as needed. Use the 220738A Adapter Bracket or 221455A Crank Arm if the crank arm must rotate through the bottom plane of the motor (for damper applica-

tions).

4b. If the bracket is needed, refer to the ADAPTER BRACKET section and see Fig. 3 and refer to the Installation, Settings and Adjustments, and Operation and Checkout sections of these instructions.

5. Use old mounting bolts to mount the new actuator.
6. Mount the damper crank arm and linkage to the shaft of the new actuator.
7. Use the Checkout procedures to test the proper adjustment of the crank arm and linkage.

VALVE APPLICATION

When replacing a motor in a valve application that has a Q100, Q601 or Q618 Linkage, it will be necessary to use the 220738A Adapter Bracket provided to raise the motor shaft to the same height as that of the old motor. Ensure motor stroke is 160° to operate Honeywell V5011 two-way or V5013 three-way valves.

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