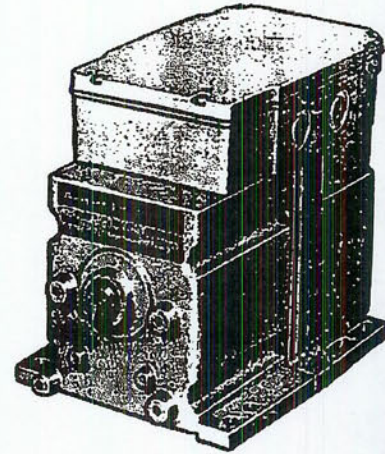


M9172; M9175 Modutrol IV Motors

M9172, M9175 Modutrol IV Motors are reversing proportional, spring return motors used to actuate dampers in series 90 control circuits and provide proportioning control for valves.



- Replaces M965 and M975 Motors.
- Integral spring returns motor to closed position when power is interrupted.
- Oil immersed motor and gear train for reliable performance and long life.
- Wiring box provides NEMA3 weather protection.
- Actuator motor and circuitry operate from 24 vac. Models available with factory mounted 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.
- Field adjustable stroke (90° to 160°) model available.
- Nominal timing of 30 seconds for 90° and 60 seconds for 160° strokes.
- Available accessories include damper linkages, explosion proof housing, and auxiliary switches.
- Integral auxiliary switches are available factory mounted, or can be field added to the TRADELINE® model.
- Field addable interface modules can be mounted in wiring box to upgrade actuator to Series 70 (electronic) control.
- M9172, M9175 rated for 25 lb.-in. torque.

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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. The TRADELINE® model is M9175D1014. TRADELINE® model includes auxiliary switch cams.

STANDARD MODELS

M9172A,W

M9175A,B,C,D,V,W,Y

Control Type
91 is Series 90

Power Rating
7 is medium power
25 lb-in. torque.

Output Drive
5 is spring return,
normally closed,
dual-ended shaft.
2 is spring return,
normally closed,
single-ended shaft.

Suffix Letter

- A:** Fixed stroke
(90° or 160°)
No auxiliary switches
- B:** Fixed stroke
(90° or 160°)
One auxiliary switch
- C:** Fixed stroke
(90° or 160°)
Two auxiliary switches
- D:** Adjustable stroke
(90° to 160°)
No auxiliary switches
- V:** Fixed stroke
(90° or 160°)
No auxiliary switches
Minimum position
potentiometer
- W:** Fixed stroke
(90° or 160°)
One auxiliary switch
Minimum position
potentiometer
- Y:** Fixed stroke
(90° or 160°)
Two auxiliary switches
Minimum position
potentiometer

ELECTRICAL RATINGS:

	Voltage (V at 50/ 60 Hz)	Current Draw (A)	Power Consumption (W)
Without Transformer	24	0.91	21
With Internal Transformer	120	0.26	26
	208	0.15	26
	240	0.13	26

CONTROLLER TYPE: Series 90 control circuit: 135 ohm Series 90 proportioning controller. Series 90 high or low limit controller with manual minimum position potentiometer (with a combined total resistance of up to 500 ohms) may also be used in the control circuit.

MOTOR ROTATION: M9175 Motors rotate counterclockwise to a closed position on power interruption.

STROKE: Fixed stroke models available with 90° or 160° stroke. Adjustable stroke models may be set between 90° and 160°.

TIMING: Nominal 30 seconds for 90° stroke and 60 seconds for 160° stroke.

TORQUE: 25 lb.-in. [2.8 N•m].

DEAD WEIGHT LOAD ON SHAFT:
Power or Auxiliary End: 200 lb [90.8 kg] maximum.
Maximum Combined Load: 300 lb [136.2 kg].

MAXIMUM DAMPER RATING: B dimension: 34 in.

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 Home and Building Control Sales Office (check white pages of phone directory).
2. Home and Building Control Customer Logistics
Honeywell Inc., 1885 Douglas Drive North
Minneapolis, Minnesota 55422-4386 (612) 951-1000

In Canada—Honeywell Limited/Honeywell Limitée, 740 Ellesmere Road, Scarborough, Ontario M1P 2V9. International Sales and Service 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.

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AMBIENT TEMPERATURE RATINGS:

Maximum: 150° F [66° C] at 25% duty cycle.
Minimum: Minus 40° F [-40° C].

CRANKSHAFT: 3/8 in. [9.5 mm] square.

M9175 Motors: Double-ended shaft.
M9172 Motors: Single-ended shaft.

AUXILIARY SWITCH RATINGS (AMPERES):

One Contact ^a	120V	240V
Full Load	7.2	3.6
Locked Rotor	43.2	21.6

^a40 VA pilot duty, 120/240 Vac on opposite contact.

DIMENSIONS: See Fig. 1.

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

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

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 7617DM Coupling.
- Q607 External Auxiliary Switch—controls auxiliary equipment as a function of motor position.
- Internal Auxiliary Switch Kits—can be field-installed on TRADELINE models.
 - 220736A—One-switch kit.
 - 220736B—Two-switch kit.
- Q605 Damper Linkage—connects motor to damper. INCLUDES MOTOR CRANK ARM.
- Q100A,B Linkage—connects Modutrol motor to butterfly valve. Requires adapter bracket included with replacement motors.
- Q209E,F Potentiometer—limits minimum position of motor.
- Q68 Dual Control Potentiometer—controls 1 through 9 additional motors.
- Q181 Auxiliary Potentiometer—controls 1 or 2 additional motors.

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.

7617ADW Motor Crank Arm—approximately 0.75 inch shorter than the 7616BR Crank Arm; can rotate through the 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.

Q7130A Interface Module—with selectable voltage ranges (4-7 Vdc, 6-9 Vdc, and 10.5-13.5 Vdc). Adapts motor to M71XX function.

Q7230A Interface Module—selectable voltage or current control, with adjustable null and span. Adapts motor to M72XX function; 4-20 mA or 2-10 Vdc.

Q7330A Interface Module—for W936 Economizer applications. Adapts motor to M73XX function.

Q7630A Interface Module—14-17 Vdc control with minimum position capability. Adapts motor to M76XX function.

4074BYK—control up to 6 M91XX Motors in unison from one Series 90 controller.

4074EAU—drives 2 or 3 M91XX Motors from a W973 Single-zone Logic Panel or W7100 Discharge Air Controller.

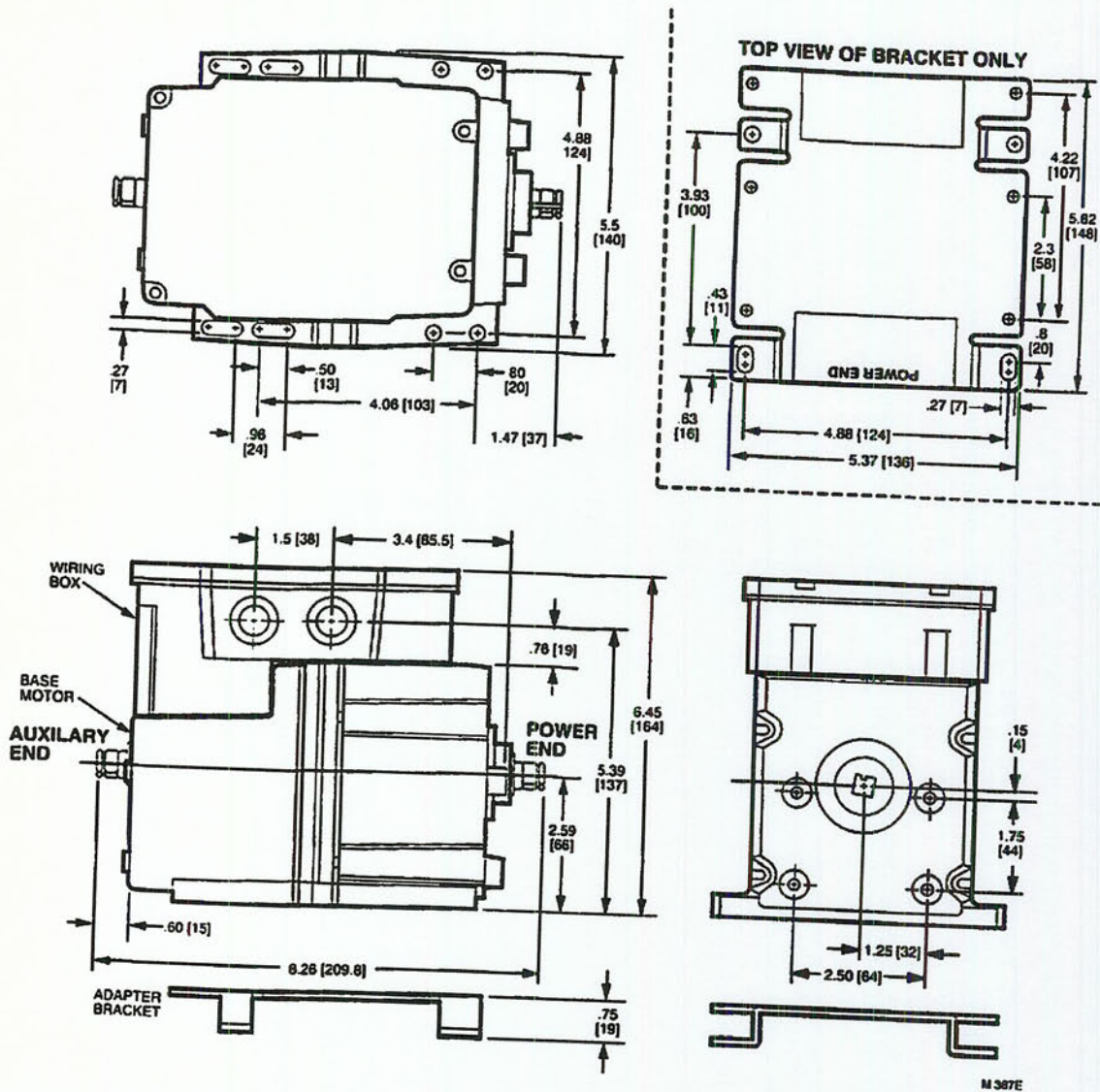
4074EDC—drives one M91XX Motor from a 4-20 mA Controller.

4074EED—drives up to 4 M91XX Motors from a 4-20 mA Controller.

221508A Resistor Board—plugs onto quick-connects in wiring box of M91XX Motor. Can be used in place of 4074BYK, EAU, EDC, or EED Resistor Kits (functions described above).

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Fig. 1—M9175 dimensions in in. [mm]. Note: M9172 does 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.

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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, mount upright and use liquid-tight conduit connectors with wiring box to provide NEMA3 weather resistant protection.

MOUNTING

Always install motors with the shaft horizontal.

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

M9172 and M9175 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).

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 former 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).

Fig. 2—Limits of shaft rotation viewed from power end.

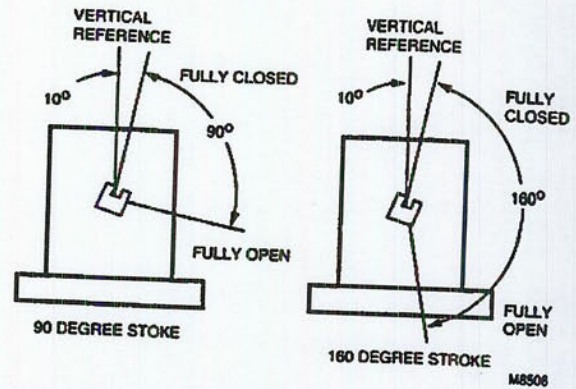
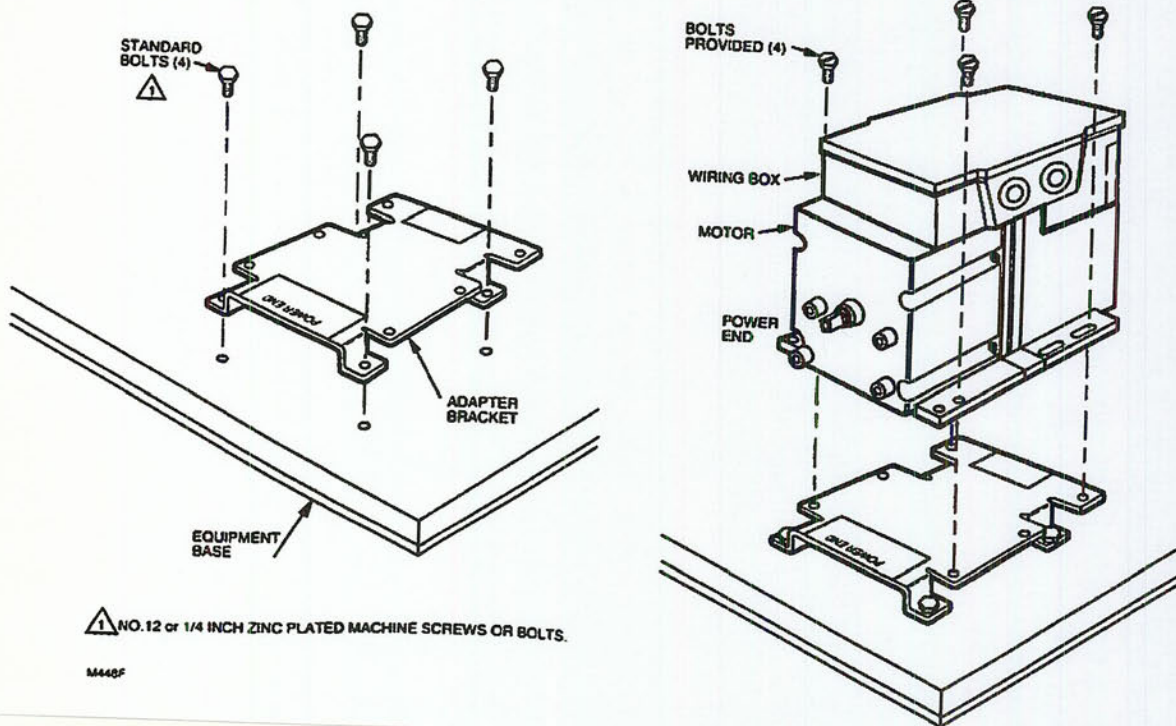


Fig. 3—Mounting motor with adapter.



⚠ NO. 12 or 1/4 INCH ZINC PLATED MACHINE SCREWS OR BOLTS.

M448F

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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 for 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 with the linkage, it can then be attached to the bracket with the four bolts provided. These bolts go through the inner set of holes on the motor flange and into the threaded holes of the bracket.

DAMPER LINKAGES

A 220738A Adapter Bracket is packed with replacement motors. Use of this bracket is optional for many damper applications. The bracket is 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 must be adjusted to the new shaft location.

The motor is shipped 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 instructions packed with each linkage. In general, 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 for any installation.

5. Do not turn motor shaft manually or with a wrench—this will damage the motor.

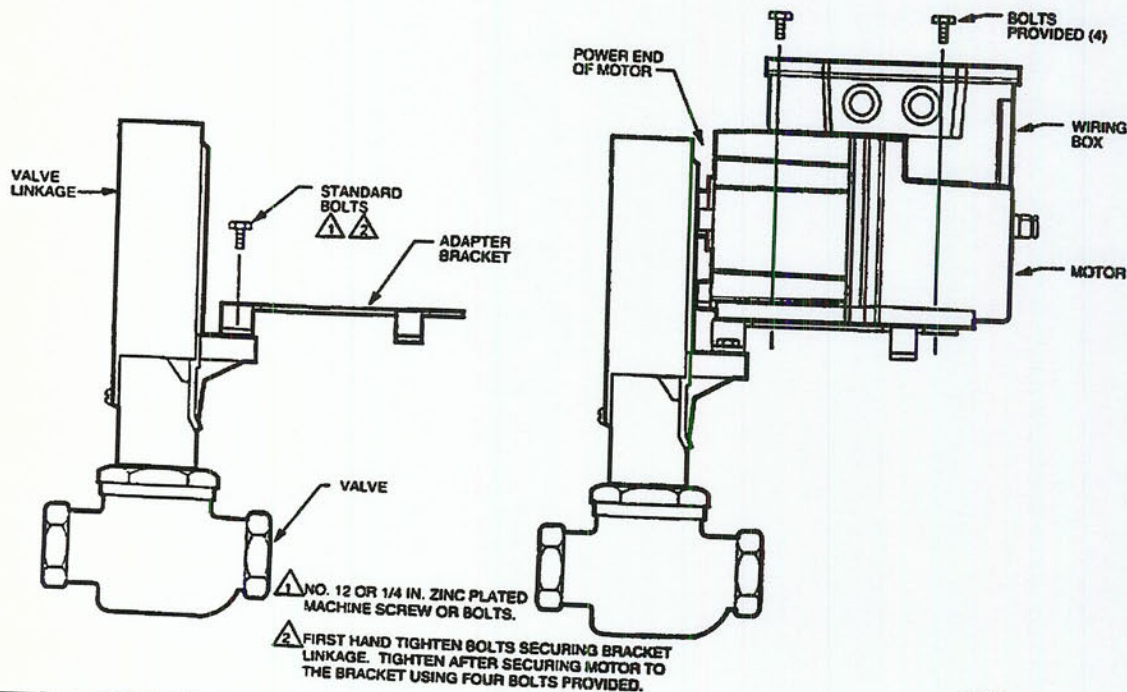
The M9172, M9175 Motor does not provide sufficient torque to be used reliably with Q618 Linkages and V5011/V5013 Valves.

VALVE LINKAGES

The M9172, M9175 Modutrol IV Motors are intended for use with the Q100, Q601 and Q5001 Valve Linkages, and can be used in 1/2-inch to 3-inch valve applications.

NOTE: The 220738A Adapter Bracket must be used with the Q100 and Q601 Valve Linkages in all applications. See Fig. 4. Refer to the Q5001 Valve Linkage Specification, form 63-2425, for Q5001 Mounting Instructions.

Fig. 4— Mounting M9172/M9175 Modutrol IV Motors on Q100, Q601 and Q618 Valve Linkages.



M 441E

WIRING

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

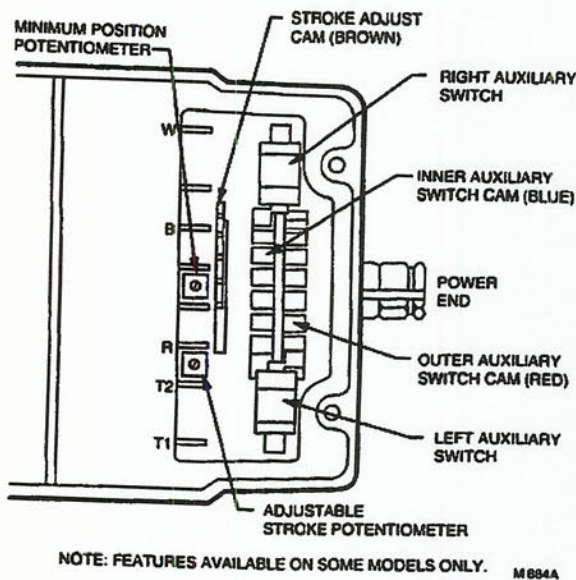
Make sure that the voltage and frequency stamped on the motor correspond to the characteristics of the power supply.

A transformer is required to supply 24 Vac power to the motor.

Fig. 5 shows terminals and adjustment. Figs. 6 and 7 show internal schematics. Fig. 8 shows auxiliary switch wiring. Figs. 9-14 show connections for various system applications. Figs. 17 and 18 show connections for unison control, Fig. 15 shows two-position control, and Fig. 16 shows connection for operation from a 4-20 mA controller.

Access to the wiring compartment is gained by removing the four screws in the top of the motor and lifting off the cover.

Fig. 5—Terminals and adjustments.



WIRING BOX

When used with liquid-tight conduit connectors, the wiring box provides NEMA3 weather resistance for the motor. The box also provides knockouts for wiring conduits and encloses terminals. The wiring box, standard with replacement motors, is required for housing an internal transformer, internal auxiliary switches, or Series 70 Interface Modules.

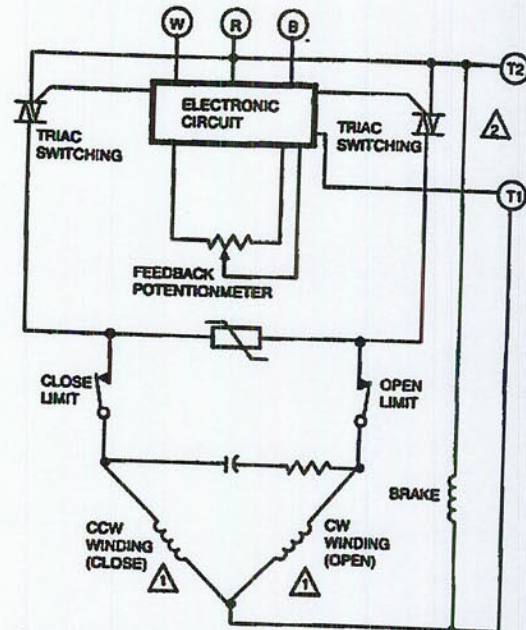
CONNECTION DIAGRAMS

These motors are designed for use in Series 90 proportioning control circuits employing a 135 ohm Series 90 controller. Series 90 high or low limit controls or manual minimum position potentiometers may also be used in the control circuit.

The standard series 90 controller has R, W, and B terminals. As the controller reduces R to W resistance, the motor will drive closed (ccw as viewed from the power end).

IMPORTANT: Modutrol Motors with the electronic balancing relay are designed to ignore the presence of electrical pickup (unwanted input signals) and will work with standard wiring used with other nonsolid state Modutrol motors. However, there may be infrequent situations in which very large pickup is present, such that motor performance becomes erratic. This may happen when the Series 90 controller wires are run near wires carrying large electrical currents (large electric motors). Reroute Series 90 controller wires away from these conductors, or use twisted cable (Belden type 8443-3 wire, or equivalent) to ensure proper control. If shielded cable is used, the shield must not be grounded.

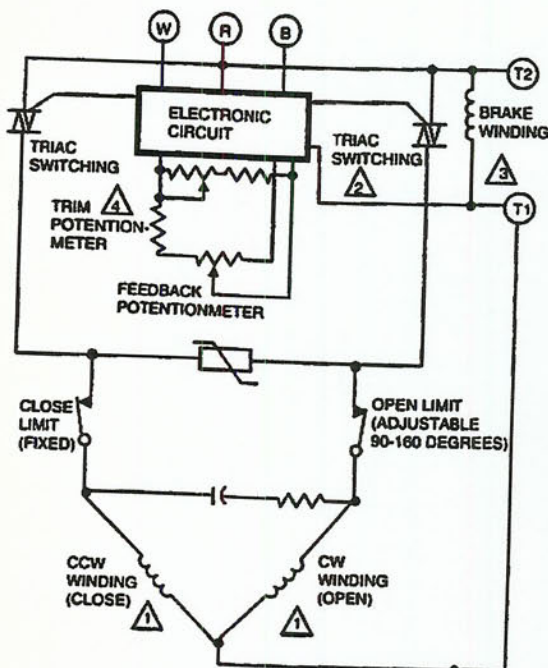
Fig. 6—Internal wiring of M9172, M9175 Modutrol Motors with fixed stroke.



NOTE: In most applications, a single 135 ohm potentiometer in the limit controller provides only 50 percent operation of a valve or damper. For those applications where the limit controller must be able to operate the valve or damper to 100 percent of its capacity, it must have either one 270 ohm potentiometer or two-series-connected potentiometers with combined total resistance up to 280 ohms. If a 2-potentiometer limit controller is used, it should be wired into the circuit as shown in Fig. 11. In general, a 2-position controller, or a controller with a narrow throttling range, should not be used as a high or low limit in a series 90 circuit because this will usually cause rapid cycling (hunting) of the motor.

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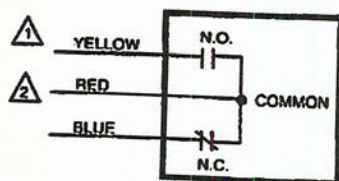
Fig. 7—Internal wiring for M9175D Modutrol motor with adjustable stroke.



- 1 DIRECTION OF MOTOR TRAVEL AS VIEWED FROM POWER END.
- 2 CONNECT 24V POWER TO T1-T2 TERMINALS ONLY. DO NOT CONNECT POWER SUPPLY TO CONTROLLER TERMINALS. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 3 WHEN MOTOR IS POWERED, BRAKE HOLDS MOTOR POSITION AGAINST SPRING RETURN ACTION.
- 4 ON ADJUSTABLE STROKE MOTORS ONLY.

M794B

Fig. 8—Auxiliary switch wiring.



- 1 WIRING SHOULD BE NEC CLASS 1 UNLESS POWER SUPPLY MEETS CLASS 2 REQUIREMENTS. TAPE UNUSED LEADS. MAKE CERTAIN THE CURRENT DRAW OF THE EXTERNAL CIRCUITS IS LESS THAN CONTACT RATING OF SWITCH.
- 2 LEFT SWITCH LEADWIRES ARE WHITE WITH COLORED TRACERS; RIGHTS SWITCH LEADWIRES ARE BLACK WITH COLORED TRACERS.

M882

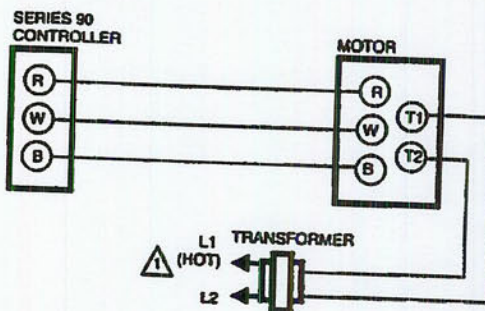
UNISON CONTROL OF M9175 MODUTROL MOTORS

IMPORTANT:

1. Use the same stroke on all motors connected in parallel.
2. When individual motor transformers are used, they must have the same characteristics and must all be powered by a single branch circuit.
3. All motors must be in phase when using common transformer supply. Connect same transformer lead to T1 on each motor; connect the other transformer lead to T2 on each motor.
4. M9175 Motors cannot be wired in parallel with electromechanical balance relay Modutrol Motors.
5. Do not disconnect any parallel-motor, or remaining motors will not operate properly.

Up to six motors may be operated from one controller by placing the proper value resistor across the W-B control terminals. The 4074BYK Resistor Kit contains five specially labeled resistors for this purpose. See Table 1.

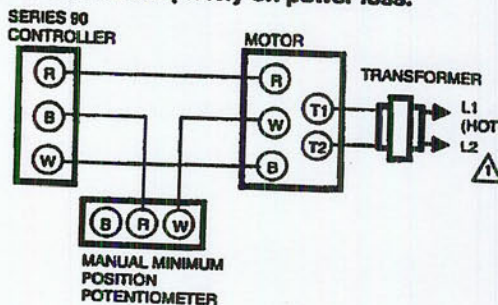
Fig. 9—M9172, M9175 Motor used with a Series 90 controller.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 TRANSFORMER MAY BE INTERNAL OR EXTERNAL

M770A

Fig. 10—Typical hookup for M9172, M9175 Motor when manual potentiometer is used to limit minimum position of motor when powered. Motor closed completely on power loss.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

M785A

Fig. 11—M9172, M9175 Motor used with modulating low limit.

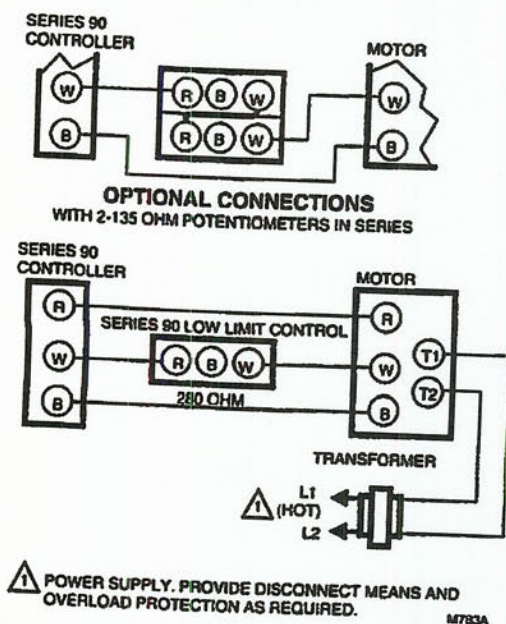
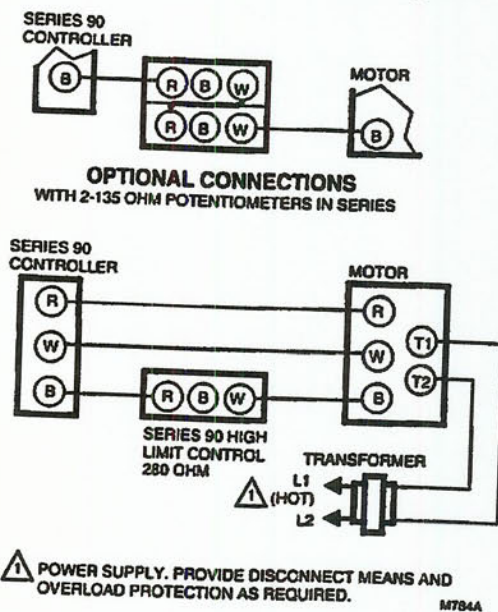


Fig. 12—M9172, M9175 Motor used with a Series 90 controller and a Series 90 high limit.



1. Select the proper resistor for the number of motors used.
2. Install 220741A Screw Terminal Adapter if not already present.
3. Connect selected resistor across W and B terminals as in Fig. 17.

Up to four M9172, M9175 motors may be operated in unison from the W973 Singlezone Logic Panel and W7100

Discharge Air Controller when the proper value resistor is placed across the R and B terminals. The 4074EAU Resistor Kit (ordered separately) contains two resistors for this purpose. Use the 1300 ohm resistor when two motors are paralleled and the 910 ohm resistor when three motors are paralleled. If four motors are to be connected in parallel, use a 768 ohm, 1/4 watt, 5 percent carbon resistor (not included in the resistor kit). Fig. 14 illustrates the connections required for unison operation of three motors from the W973 logic panel.

The M9172, M9175 can be used with some Honeywell Industrial Control Products such as the Dialatrol/Dialapak, which has a 4-20 mA control output. It is necessary to use a resistor kit (4074EDC for controlling one motor or 4074EED for controlling up to six motors from one controller) or Q7230 Interface Module to interface to the 4-20 mA signal source (Fig. 16).

The 221508A Resistor Board can be used in place of any of the above resistor kits.

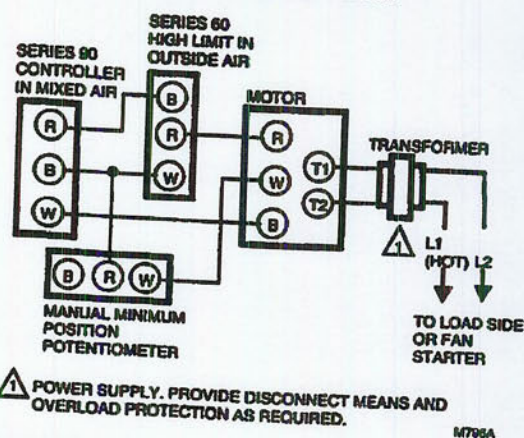
IMPORTANT: After the damper linkage is connected to the motor, it may be necessary to interchange the blue and yellow connections at the motor terminals to obtain the proper action of the valve or damper on a temperature increase or decrease at the controller.

TABLE 1—4074BYK RESISTORS
(1% METAL FILM, 1/8 WATT).

No. Motors	Resistor No.	Resistance (Ohms)
2	802139 BEAA	140.0
3	802139 HBFH	71.5
4	802139 EHFH	47.5
5	802139 DFHH	35.7
6	802139 CJAH	28.0
Two-position ^a	100100BFB	150.0

^a5% composition, 1/2 watt.

Fig. 13—Typical ventilating system hookup using spot high limit and manual potentiometer to limit minimum position of motor.



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Fig. 14—Unison control of M9175 motors using one minimum position potentiometer and a W973 single zone logic panel system in an economizer application.

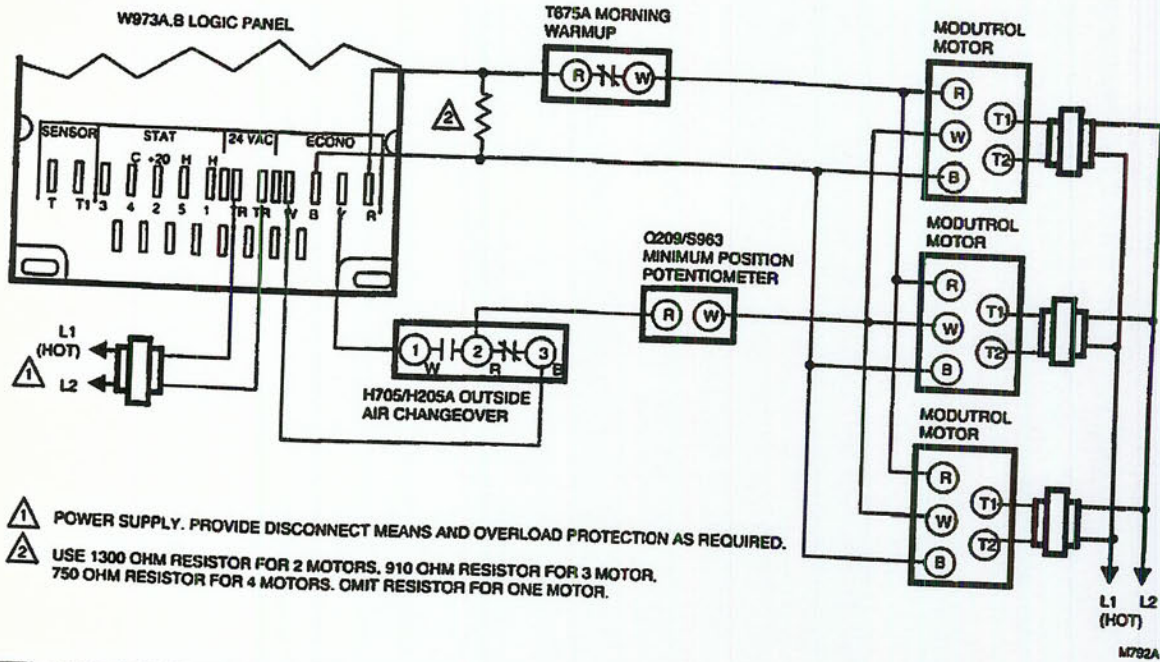


Fig. 15—Wiring connections for an M9175 employed in a spst, control circuit. Example shown is a series 80 (low voltage) application.

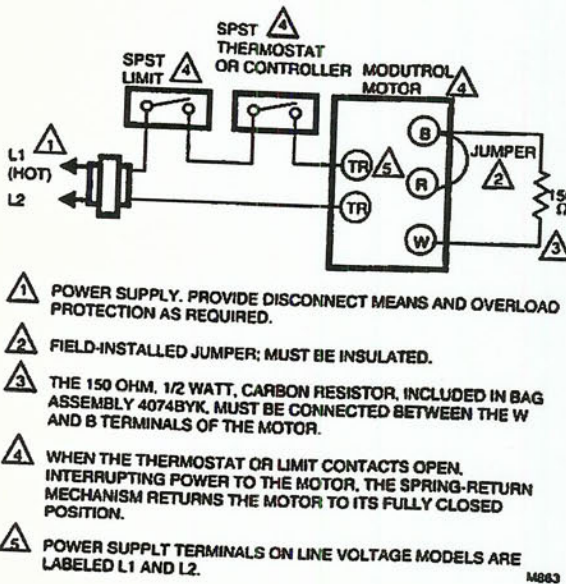
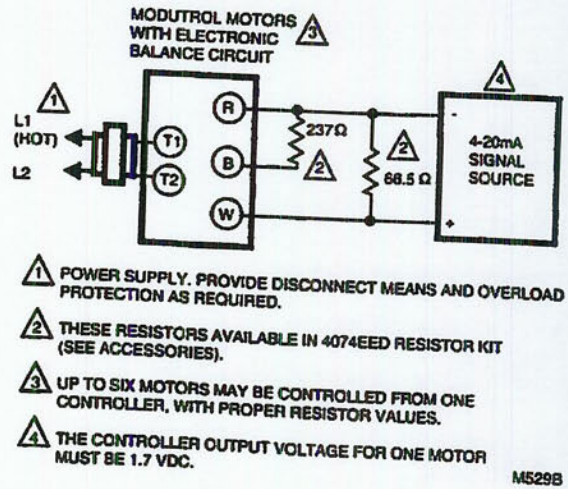
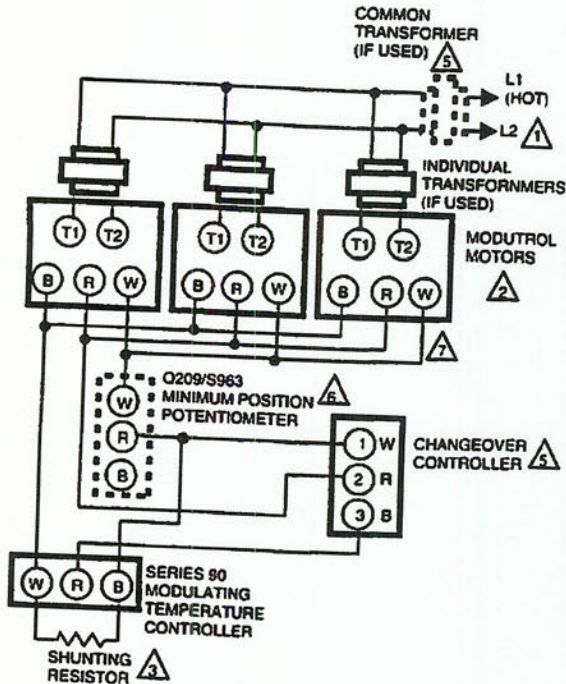


Fig. 16—M9175 motor used with 4-20 mA signal source.



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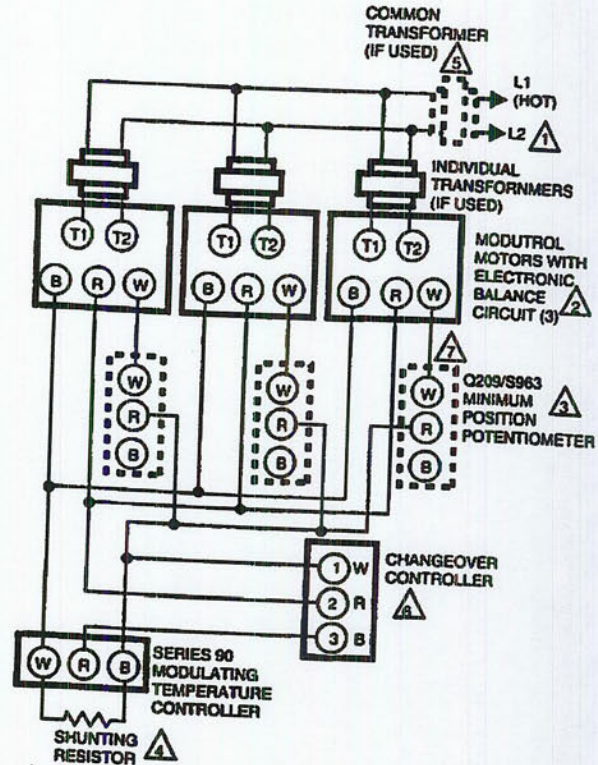
Fig. 17—Unison control of M9172, M9175 Motors. Using one minimum position potentiometer for all motors. System is shown connected for cooling; for heating, reverse the W and B leads at the controllers.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 UP TO SIX SIMILAR MOTORS CAN BE CONNECTED IN UNISON.
- 3 VALUE OF SHUNTING RESISTOR VARIES WITH NUMBER OF MOTORS. IF 2-POSITION CONTROLLER IS USED, 150 OHM RESISTOR MUST BE USED IN PARALLEL WITH SHUNTING RESISTOR. (AVAILABLE IN 4074BYK RESISTOR KIT: SEE ACCESSORIES.)
- 4 IF COMMON TRANSFORMER IS USED, ALL MOTORS MUST BE IN PHASE. CONNECT SAME TRANSFORMER LEAD TO T1 ON EACH MOTOR; CONNECT OTHER TRANSFORMER LEAD TO T2 ON EACH MOTOR.
- 5 USE TEMPERATURE OR ENTHALPY CONTROLLER, SUCH AS H205, H705, OR T675A, FOR CHANGEOVER CONTROL.
- 6 AUTHORITY OF MINIMUM POSITION POTENTIOMETER, IF USED, INCREASES WITH NUMBER OF MOTORS PARALLED. WITH ONE MOTOR, 50 PERCENT STROKE; WITH TWO MOTORS, 100 PERCENT STROKE; WITH THREE MOTORS, 100 PERCENT STROKE WITH 1/3 OF FULL POTENTIOMETER ROTATION.
- 7 REVERSING B AND W TERMINALS ON ONE OR MORE MOTORS WILL NOT AFFECT CONTROL PERFORMANCE OF OTHER MOTORS. SYSTEM CAN BE CONFIGURED TO HAVE SOME MOTORS REVERSE ACTING AND OTHER MOTORS DIRECT ACTING.

M7868

Fig. 18—Unison control of M9172, M9175 Motors for ventilation control using individual minimum position potentiometers. System is shown connected for cooling; for heating, reverse and W and B leads at the controller.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 UP TO SIX SIMILAR MOTORS CAN BE CONNECTED IN UNISON.
- 3 USE OF OPTIONAL Q209/S963 ON ANY ONE MOTOR HAS NO EFFECT ON TOHER MOTORS. IF NOT USED, CONNECT TERMINAL W ON MOTOR TO TERMINAL B ON MODULATING TEMPERATURE CONTROLLER.
- 4 VALUE OF SHUNTING RESISTOR VARIES WITH NUMBER OF MOTORS. IF 2-POSITION CONTROLLER IS USED, 150 OHM RESISTOR MUST BE USED IN PARALLEL WITH SHUNTING RESISTOR. (AVAILABLE IN 4074BYK RESISTOR KIT: SEE ACCESSORIES.)
- 5 IF COMMON TRANSFORMER IS USED, ALL MOTORS MUST BE IN PHASE. CONNECT SAME TRANSFORMER LEAD TO T1 ON EACH MOTOR; CONNECT OTHER TRANSFORMER LEAD TO T2 ON EACH MOTOR.
- 6 USE TEMPERATURE OR ENTHALPY CONTROLLER, SUCH AS H205, H705, OR T675A, FOR CHANGEOVER CONTROL.
- 7 REVERSING B AND W TERMINALS ON ONE OR MORE MOTORS WILL NOT AFFECT CONTROL PERFORMANCE OF OTHER MOTORS. SYSTEM CAN BE CONFIGURED TO HAVE SOME MOTORS REVERSE ACTING AND OTHER MOTORS DIRECT ACTING.

M7868

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Settings and Adjustments

STROKE SETTING

On M9175D Motors, stroke is field adjustable and can be set from 90° to 160°. To set stroke, both mechanical and electrical adjustments are required. The mechanical adjustment (cam) establishes the fully open (clockwise, as viewed from the power end) and fully closed (counterclockwise) positions of the motor shaft. The electrical adjustment (trim potentiometer) provides sufficient resistance change to ensure that cams will actuate both limit switches. TRADELINE® models are shipped with stroke set for 160° rotation; all other adjustable stroke models are shipped with stroke set at 90°.



CAUTION

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


BEFORE SETTING STROKE:

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



To set 160° stroke (Fig. 16):

1. Turn motor stroke adjust potentiometer fully clockwise .
2. Drive motor to midposition. This can be done by jumpering B-R-W or with a 135 ohm potentiometer (Q209 or S963) connected to the motor R,B,W terminals.
3. Insert 1/8 in. [3 mm] screwdriver blade into a slot on the brown cam (inner cam) and move screwdriver handle to the left to rotate cam counterclockwise  to the stop.


To set 90° stroke:


1. Drive motor to midposition. This can be done by jumpering B-R-W or with a 135 ohm potentiometer (Q209 or S963) connected to the motor R,B,W terminals.
2. Insert 1/8 in. [3 mm] screwdriver blade into a slot on the brown cam (inner cam) and move screwdriver handle to the right to rotate cam clockwise to the stop.
3. Turn motor stroke adjust potentiometer fully counterclockwise .



To set stroke between 90° and 160°:

1. Connect R,B,W terminals of 135 ohm potentiometer (Q209 or S963) to matching terminals on motor.
2. Turn motor stroke adjust potentiometer fully clockwise .
3. Drive motor to midposition by adjusting the 135 ohm potentiometer.
4. Insert 1/8 in. [3 mm] screwdriver blade into the brown cam slot (inner cam) and move screwdriver handle to the right to rotate cam clockwise  to the stop.

5. Adjust the 135 ohm potentiometer to drive the motor fully open (clockwise as viewed from the power end). The motor should now be in the 90° position.



6. Insert 1/8 in. [3 mm] screwdriver blade into the brown cam slot (inner cam) and move screwdriver handle slowly to the left to rotate cam counterclockwise  allowing the motor to reposition after each move of the cam. Repeat this procedure until the motor reaches the desired fully open position. (Each click of the cam provides a 2° rotation.)

7. If the motor turns past the desired position, DO NOT MOVE THE CAM. Drive the motor to midposition using the 135 ohm potentiometer, then move the cam clockwise  to the stop and repeat steps 5 and 6.


8. When the desired position is reached in step 6, set the electrical stroke limit. This is done by turning the motor stroke adjust potentiometer slowly counterclockwise  until the motor starts to move. Stop and then turn the potentiometer 1/8 in. turn clockwise . This last adjustment ensures total motor movement over the full range of the 135 ohm controller.

9. Check that the electrical stroke is set properly by opening the W lead. The motor should not move.

AUXILIARY SWITCHES

The auxiliary spdt switches are actuated by adjustable cams. The cams are 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. Also, switch differentials of 1° or 10° may be selected by choosing the slow-rise or fast-rise portion of the cams. Auxiliary switch wiring is shown in Fig. 8. With 1° differential, the N.C. switch contacts (red to blue) make and the N.O. switch contacts (red to yellow) break on a counterclockwise  (closed) rotation. If 10° differential is chosen, the operation is reversed; the N.O. switch contacts (red to yellow) make and the N.C. switch contacts (red to blue) 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 switch differential is approximately 1° of rotation. Do not use the fast-rise portion of the cam if fast cycling of auxiliary equipment is undesirable.

The M9172, M9175 motors are shipped in the closed position (counterclockwise , viewed from the power end) with auxiliary switch cams set to actuate switches 30° from the closed position, and to provide 1° differential. With motor in full closed position, N.C. auxiliary switch contacts (red to blue) are closed.

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

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TABLE 2—AUXILIARY SWITCH POSITION WITH MOTOR SHAFT ROTATED TO EITHER SIDE OF AUXILIARY SWITCH OPERATING POINT, AS VIEWED FROM POWER END.

Motor Type	Cam Orientation	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
M9175D1014	Red inner cam, Blue outer cam	1°	Closed	Open	Open	Closed
		10°	Open	Closed	Closed	Open
M9172W1004	Red inner cam	1°	Closed	Open	Open	Closed
		10°	Open	Closed	Closed	Open
	Red outer cam	1°	Open	Closed	Closed	Open
		10°	Closed	Open	Open	Closed
All other M9172, M9175	Blue inner cam, Red outer cam	1°	Open	Closed	Closed	Open
		10°	Closed	Open	Open	Closed

AUXILIARY SWITCH ADJUSTMENT PROCEDURE

! WARNING

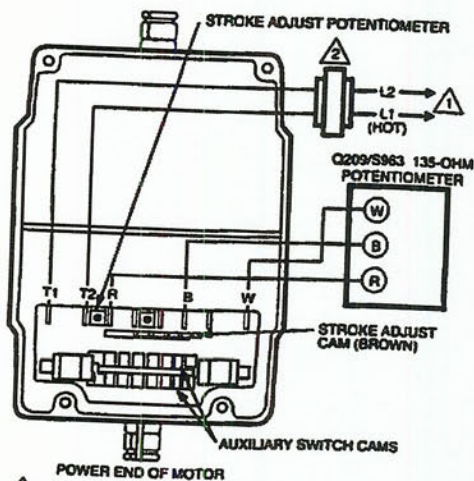
FIRE OR EXPLOSION HAZARD CAN CAUSE SEVERE INJURY OR DEATH
 When auxiliary switches control combustion equipment, incorrect wiring of the switches can allow the burner to come on at high fire. Check auxiliary switch wiring and cam adjustment before turning on the system. Watch the controlled equipment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

! CAUTION

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

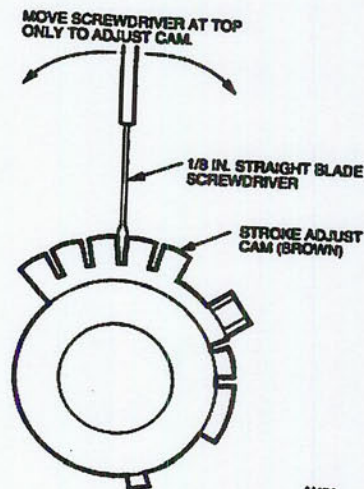
NOTE: The following instructions are for normally closed motors (motor shaft rotates clockwise, as viewed from the power end of the motor, on an increase in signal).

Fig. 19—Stroke adjustments.



- 1 POWER SUPPLY. PLEASE PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
 2 TRANSFORMER MAY BE EXTERNAL OR INTERNAL.

M425A



M424

SETTINGS AND ADJUSTMENTS

To rotate the cams, insert small screwdriver (1/8 in. or 3 mm blade) through the wiring box into the slot on the cam and move the screwdriver at the top. Refer to Fig. 19. Each division on the cam represents 15° of motor rotation.

1. Remove cover of wiring box.
2. Disconnect controller from motor.
3. Connect 135 ohm potentiometer to terminals R, W, and B as shown in Fig. 19.
4. Adjust potentiometer to drive motor to the position where auxiliary equipment is to be switched.

5. For switch differential of 1°, check continuity of auxiliary switch N.O. (red to yellow) contacts and rotate cams as follows:

- a. If contacts are open, rotate cam clockwise ↻, until N.O. (red to yellow) contacts close.
- b. If contacts are closed, rotate cam counterclockwise ↺, until N.O. (red to yellow) contacts open.

6. For switch differential of 10°, the cams must be rotated approximately 180° prior to setting switching action. See Fig. 20. Check continuity of the N.O. (red to yellow) contacts and rotate cams as follows:

- a. If contacts are open, rotate cam counterclockwise ↺, until N.O. (red to yellow) contacts close.
 - b. If contacts are closed, rotate cam clockwise ↻, until N.O. (red to yellow) contacts open.
7. Check for proper switch differential and switching of auxiliary equipment by driving the motor through full stroke (in both directions) using the potentiometer. If necessary, repeat steps 5 and 7 for 1° differential, or 6 and 7 for 10° differential until correct switching action is obtained.
8. Disconnect potentiometer.
 9. Reconnect controller and power supply to motor.
 10. Replace cover of wiring box.

TABLE 3—SETTING CAM FOR 1° SWITCH DIFFERENTIAL.

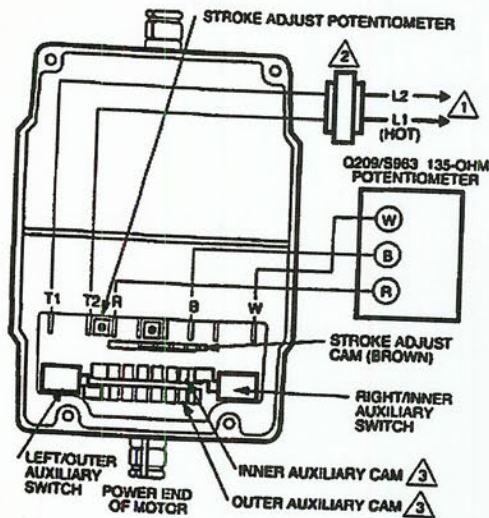
Model	If N.O. Contact Position at 1° Differential is:	Rotate cam with screwdriver:
M9175D1014 (both cams)	Open	Counterclockwise until contacts close
M9172W1004 (inner cam)	Closed	Clockwise until contacts open
M9172W1004 (outer cam)	Open	Clockwise until contacts open
All other M9172, M9175 (both cams)	Closed	Counterclockwise until contacts close

TABLE 4—SETTING CAM FOR 10° SWITCH DIFFERENTIAL.

Model	If N.O. Contact Position at 10° Differential is:	Rotate cam with screwdriver:
M9175D1014 (both cams)	Open	Clockwise until contacts close
M9172W1004 (inner cam)	Closed	Counterclockwise until contacts open
M9172W1004 (outer cam)	Open	Counterclockwise until contacts open
All other M9172, M9175 (both cams)	Closed	Clockwise until contacts close

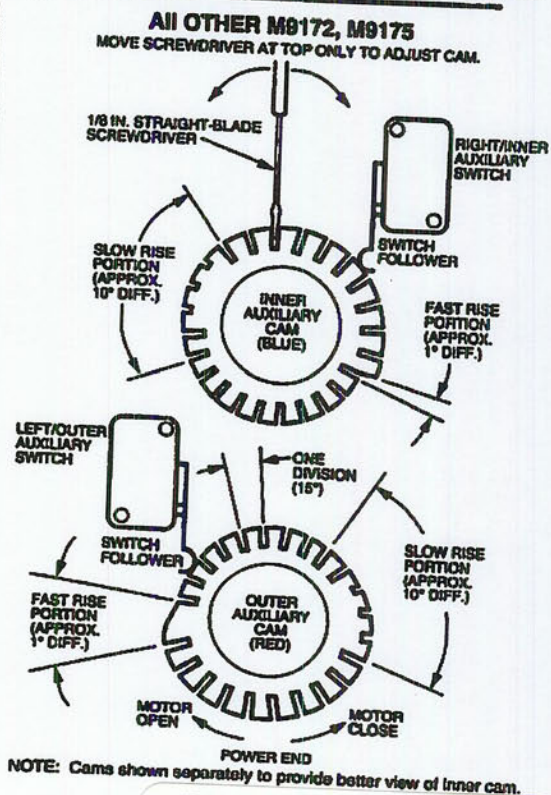
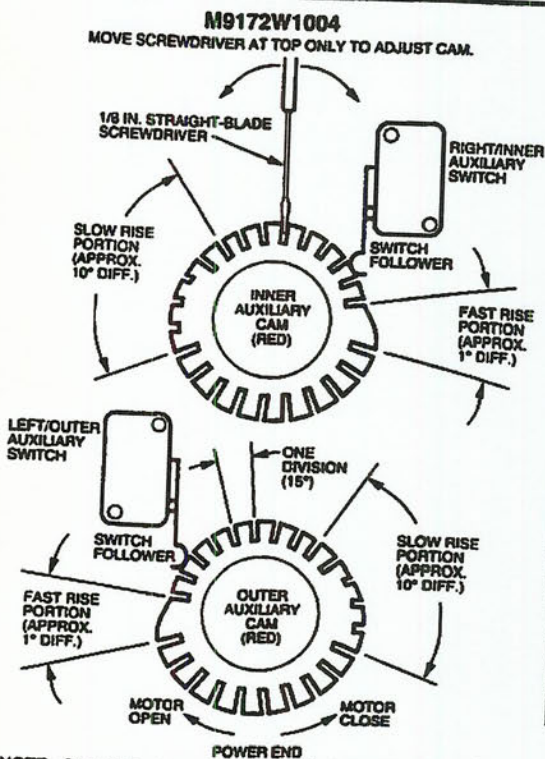
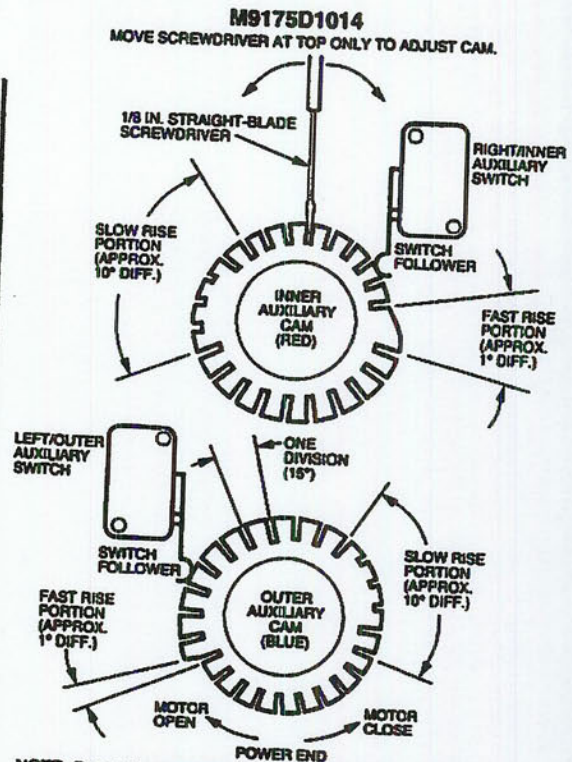
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Fig. 20—Auxiliary switch adjustment setup.



- ⚠ Power supply. Provide disconnect means and overload protection as required.
- ⚠ Transformer may be external or internal.
- ⚠ Cam arrangement varies as shown in table.

MOTOR MODEL	INNER CAM	OUTER CAM
M9175D1014	Red	Blue
M9172W1004	Red	Red
ALL OTHER M9172, M9175	Blue	Red



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