

INSTRUCTIONS



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 207 Carter Drive Unit C
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Cleaver-Brooks

DIVISION OF AQUA-CHEM, INC.

Modutrol Motor
 894-3435

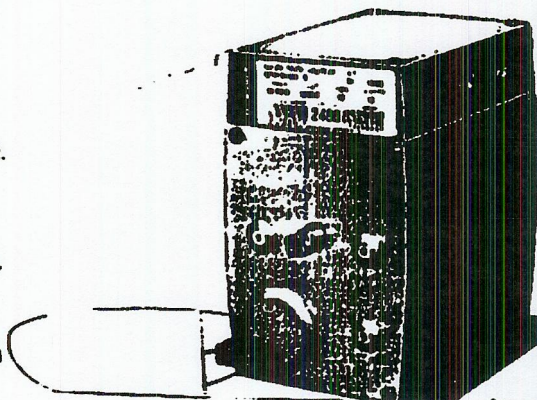
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APPLICATION

The 894-3435 is a low voltage, reversing proportional modutrol motor used to drive a fuel valve and combustion air damper as commanded by the Boiler Controller.

FEATURES

- 894-3435 has an electronic, vibration resistant drive circuit.
- Requires 24 Vac power supply.
- Die-cast aluminum case
- Feedback potentiometer circuit provides position indication input to the Boiler Controller.
- Motor stroke is fixed 90°, 30 second timing
- Feedback potentiometer circuit proves Low and High fire position
- 150 lb.-in. torque
- Accessories include weather proofing kit and intern transformer



SPECIFICATIONS

MODEL	TIMING	INTERNAL ELECTRONIC DRIVE CIRCUIT	INTERNAL AUXILIARY SWITCH
894-3435	30 Sec	Yes	No

CRANKSHAFT: Double ended, 3/8 in square
 STROKE: 90° Fixed
 TORQUE: [lb.-in.]

TIMING (NOMINAL) 90° STROKE	NORMAL RUNNING TORQUE	BREAKAWAY TORQUE
30 Sec	150 lb.-in.	300 lb.-in.

*The maximum torque available to overcome occasional large loads such as seized damper or valve. MUST NOT BE USED CONTINUOUSLY AT THIS RATING.

DEADWEIGHT LOAD ON SHAFT:

Power End: 200 lb (91 kg) maximum
 Auxillary End: 100 lb (45 kg) maximum

ELECTRICAL RATINGS

TERMINAL	DESCRIPTION	RATING
G	Common (Negative Supply)	0 V
Y	• Power Supply From Boiler Controller • Overvoltage continuous	8.0 V ± 0.050 VDC 9.0 VDC Maximum
T	Signal to Boiler Controller	1.25-4.75 VDC
1	Damper Motor Close	24 Vac 50/60 Hz
2	Damper Motor Open	
3	Damper Motor Common	

Current Draw: 0.8A at 24 Vac
 Power Consumption: 18 Watts

ENVIRONMENTAL RATINGS

Ambient Temperature
 Operating: 32° F to 130° F
 Storage: -30° F to 150° F

Humidity

Operating: 85% RH continuous, noncondensing

Vibration

Continuous 0.5g environment

Dimensions

See Figure 1

ACCESSORIES

DHE-94 Explosion-proof Housing encloses motor for use in explosive atmospheres. Not for use with Q601 and Q455 Linkage. Requires 7617DM Coupling.

Transformers-mounted Internally, include mounting screws and barrier.

7640PK-120Vac; 50/60 Hz.

7640PL-220Vac; 50/60 Hz.

7640PN-120/308/240 Vac; 50/60 Hz.

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

Q605 Damper Linkage-connects motor to damper; includes motor crank arm.

Q601 Linkage-connects motor to water or steam valve.

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

Q100 Linkage-connects modutrol motor to butterfly valve.

Q181A Auxiliary Potentiometer for control of auxiliary motor.

7640JS Weatherproofing Kit weatherproofs the 894-3435 motor.

7616BR Motor Crank Arm-included with Q605 but not with motor.

7640PP Screw Terminal Adapter-use to convert motor quick-connect terminals to screw terminals.

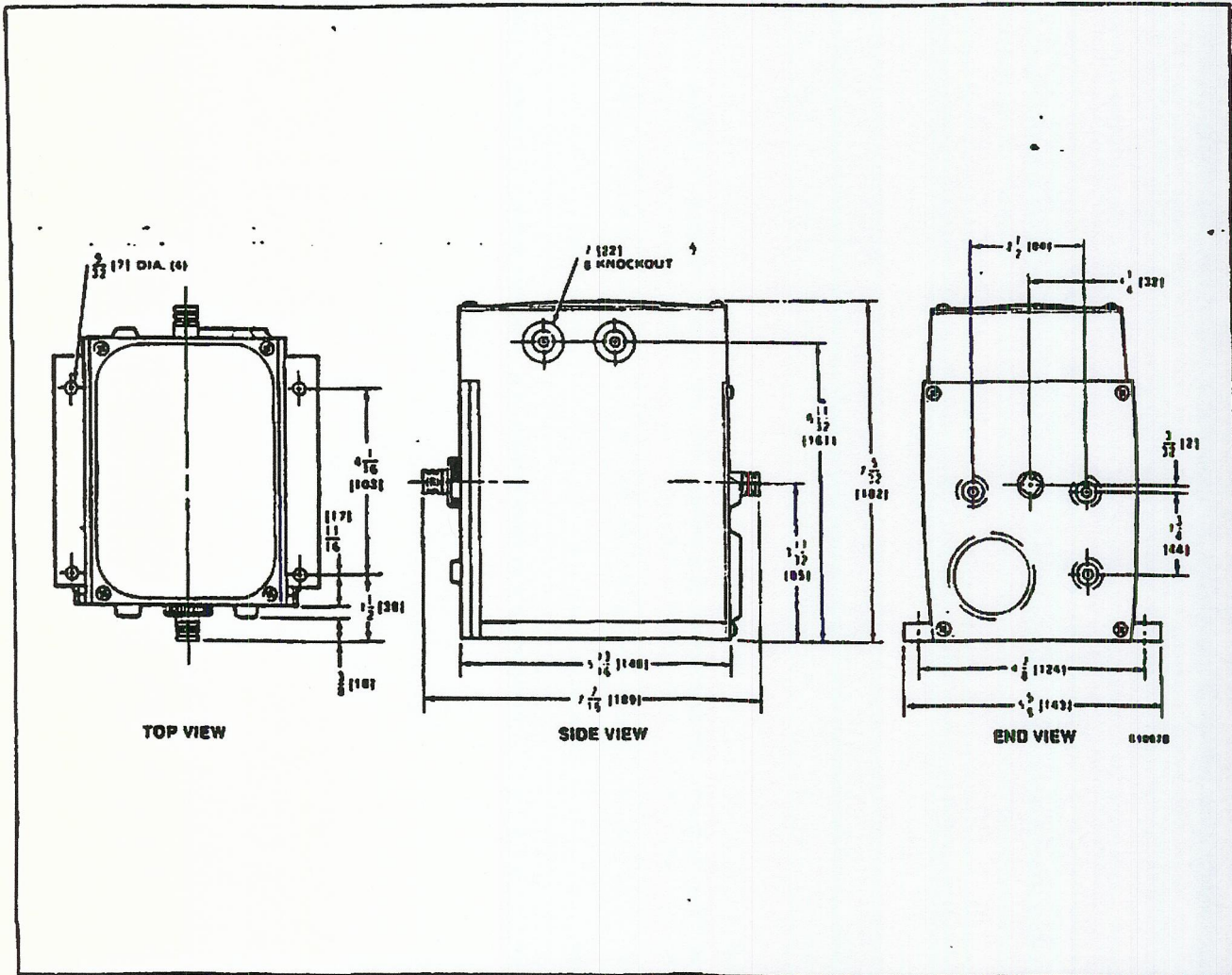


FIG. 1—APPROXIMATE DIMENSIONS OF 894-3435 MOTORS IN In. (mm SHOWN IN BRACKETS).

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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, checkout product operation as provided in these instructions.

CAUTION

1. Disconnect power supply before beginning installation to prevent electric shock or equipment damage.
2. Do not attempt to turn the motor shaft by hand or with a wrench. Damage to the gear train will result.

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 other explosive vapors. The 894-3435 is rated for temperatures between 32° F to 130° F. If located outdoors, use weather-proofing kit; see Accessories section.

Allow enough clearance for installing accessories and servicing the motor when selecting a location. See Figure 1.

MOUNTING

Always install the motor with the crankshaft horizontal. Mounting flanges extending from the bottom of the motor housing are drilled for 1/4 in. machine screws or bolts.

The 894-3435 is shipped from the factory in the closed position, which is the limit of counterclockwise rotation as viewed from the power end of the motor, see Figure 2.

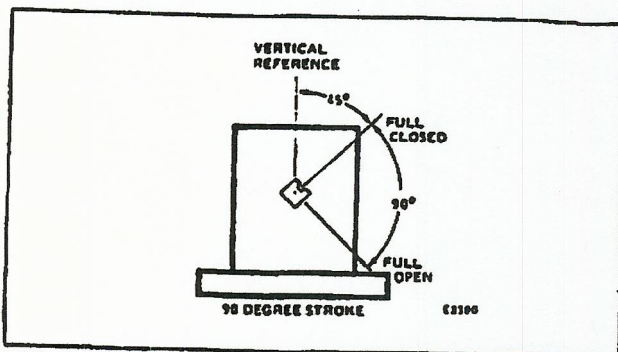


FIG. 2—MOTOR SHAFT POSITION AT ROTATIONAL LIMITS (as viewed from the power end of the motor).

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INSTALLING LINKAGES

The motor comes without a crank arm. The motor arm is included in the Q605 Linkage or may be ordered separately [see Accessories].

For detail instructions on the assembly of specific linkages, refer to the instruction sheet 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. 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.

3. Do not exceed the motor ratings in any installation.

WIRING

Disconnect power supply before wiring to prevent electrical shock or equipment damage.

1. All wiring must agree with applicable codes, ordinances, and regulations.

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

3. Figure 3 shows internal schematics and terminal connections to the 894-3435 motor.

4. The recommended wire size and type is listed below:

- Terminals 1, 2, 3, T1, and T2 #18 wire insulated for voltages and temperatures encountered in the application is recommended. Suggested conductor types include TW(60C), (THW 75C) and THHN (90C).

- Terminals G, T, and Y for the motor position indication circuit requires a shielded three conductor cable that is UL listed for temperatures and voltages encountered in the application. Suggested cables include Belden's 9365 rated for 300V 105° C Belden's 8770 rated for 300V 60° C.

a. The shield should not be connected to anything at the motor end, it should be taped to avoid and unintended contact with the motor housing. At the Boiler Controller end the shield must be grounded to the control panel with as short a lead wire length as practical.

b. The feedback potentiometer circuit leadwires should not be routed in conduit with line voltage circuits.

c. Avoid routing the feedback potentiometer circuit leadwires close to the ignition transformer leadwires.

d. Feedback potentiometer circuit leadwires are low voltage and can be routed outside of conduit if properly supported and protected from damage.

e. The maximum feedback potentiometer circuit leadwire length is 100 feet.

5. Complete required checkout as indicated in this specification sheet and return the system to normal operation.

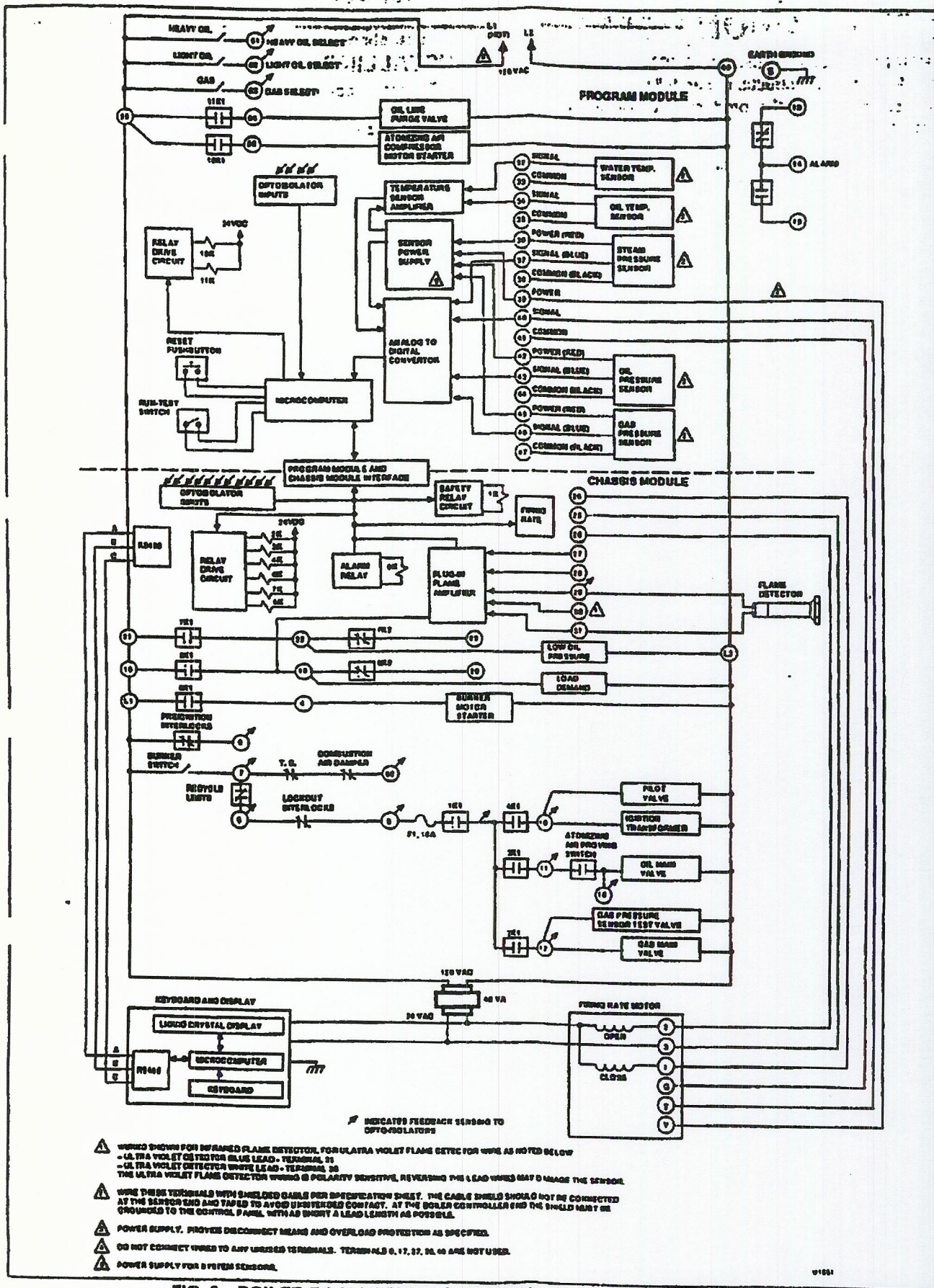


FIG. 3—BOILER ROOM CONTROL INTERNAL BLOCK WIRING DIAGRAM.

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SETTINGS AND ADJUSTMENTS

The 894-3435 proof of Low fire position and High fire position is made via the feedback potentiometer circuit. The Low fire position and High fire position are set through the Keyboard and Display Module. The Keyboard and Display Module is the primary user interface to the system. It consists of a keyboard, LCD display, and three status LED's. The module is used to program the Boiler Controller and display boiler operating status and parameters. To ensure proper understanding of the Keyboard and Display

Module and that programming will be performed correctly forms CB68-40 and CB68-42 should be read. Failure to read the reference manual results in a higher probability of error by the user. Reading the reference manual makes system operation straight forward.

Two settings are required for proper 894-3435 operation. These are Low Fire Rate and Max Fire Rate. To make these settings review the Programming specification sheet form CB68-42.

OPERATION AND CHECKOUT

OPERATION

The 894-3435 is a fixed 90° stroke non-spring return motor. An internal sensing circuit incorporates a feedback potentiometer in a bridge circuit. The feedback potentiometer circuit output is proportional to the mechanical shaft position. An 8 vdc power source from the Boiler Controller is required for circuit operation.

The 894-3435 is driven by applying 24 Vac to either the "open" or "closed" motor coils. Position control is accomplished by the Boiler Controller monitoring the feedback potentiometer circuit and energizing or de-energizing the drive coil(s) to achieve the required position.

CHECKOUT

After installation and linkage adjustment, check the entire motor and control hookup to prove that-

- the motor operates the damper or valve properly.
- the motor responds properly to the Boiler Controller.

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 assure there

is adequate clearance for the linkage to move through its stroke without binding or sticking other objects.

The 894-3435 is shipped in the fully closed position (the limit of counterclockwise rotation as viewed from the power end of the motor).

To check operation of the 894-3435;

1. Place the Boiler Controller in Standby, open the Burner Switch.
2. Place the Run/Test switch in the Test position.
3. Place the Boiler Controller in the Manual mode [AUTO/MANUAL] key of the Keyboard and Display module.
4. Place the cursor in the Keyboard and Display Modules Liquid Crystal Display beneath % Rate, [<] key.
5. Using the Keyboard and Display Modules [+] or [-] keys, under manual control, drive the motor through its entire stroke to assure the motor is responding to the Boiler Controllers commands.
6. While manually adjusting the motors position observe the position of the motor, as displayed on the Keyboard and Display Module, to assure proper operation of the feedback potentiometer circuit.

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