

Electric
Modulating
Boiler
Feedwater
Valve System

Shadow

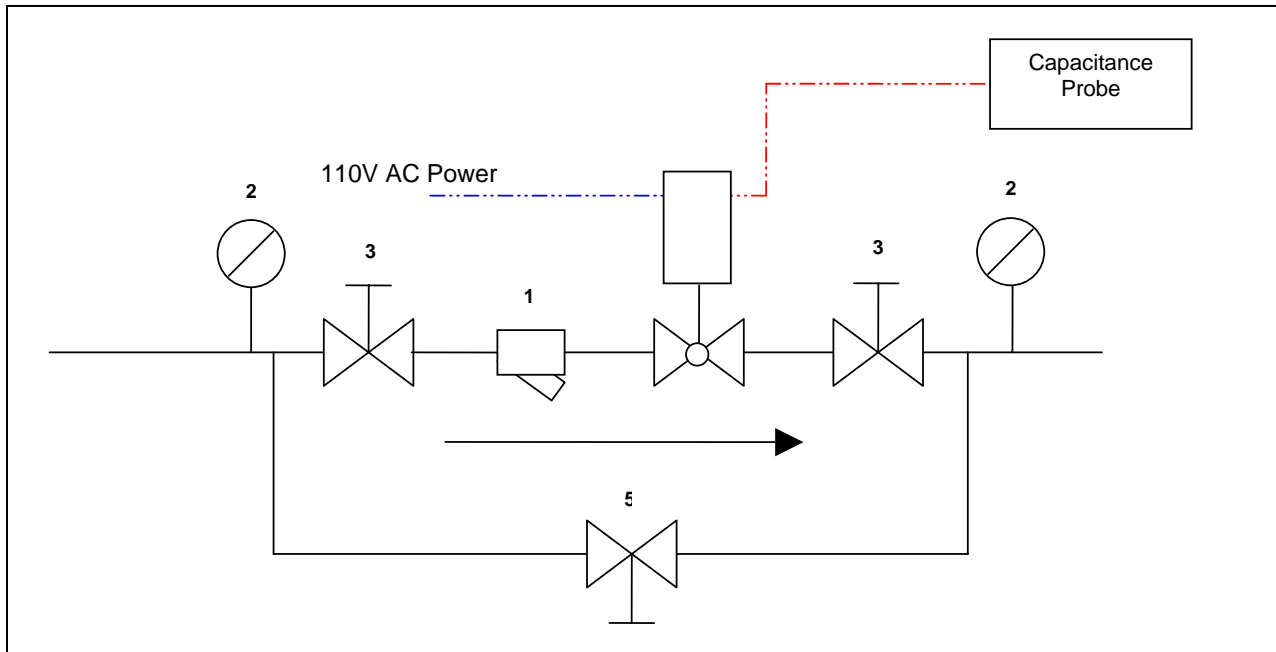


**SHADOW Model S-CE
Installation Recommendations for
McDonnell & Miller 157 or 193
Water Column with an E-Head**

Water Column: The SHADOW package contains a **Capacitance Probe** with a 9-foot long coaxial cable. The cable has a special shielding and may be shortened, but cannot be lengthened. The Capacitance Probe is 3/4" male npt. Use a 1 1/4" wrench to tighten the capacitance probe, on the lower nut only.



Valve Piping: Pipe the SHADOW **Ball Valve** into a three-valve network. The Recommended Piping Diagram shows a typical isolation and by-pass valve set-up. Note the importance of the pressure gauges and strainer. If the valve must be separated from the actuator to complete this installation procedure, be careful to reassemble the actuator to the valve in exactly the same position. Do not manually open or close the valve when it is detached from the **Actuator**. The reassembly must align all the yellow dots that are located the valve mounting flange, on the set-off bracket, on the valve coupling rod, and on the **Actuator** body.



- 1) Y-Strainer
- 2) Pressure Gauges
- 3) Isolation Values
- 4) SHADOW Feed Water Valve
- 5) By-Pass Valve

Electrical: The **Capacitance Probe** coaxial cable must be connected to the SHADOW **Actuator**. The outer shielding of the coaxial cable is connected to the terminal marked “G” on the capacitance signal generator (Figure 1). The center wire on the coaxial cable is connected to the terminal marked “P” on the signal generator. The coaxial cable is low voltage wiring and therefore does not require external protection, such as Greenfield or conduit. The installation contractor must bring a 5 amp fused source of 110volt (with ground) power to the SHADOW **Actuator**. There are two electrical connector blocks inside the SHADOW **Actuator**. Block 1 contains connections numbered 1 through 6. Block 2 contains connections numbered 1 through 8. All the 110-volt wires are connected to Block 2. The white (L2/N) wire from the 110-volt source is connected to terminal 1 in Block 2; the black (L1) wire is connected to terminal 2 in Block 2; and the ground wire is connected to terminal 3 in Block 2. Terminal 3 already contains a system ground connection, so there will be two wires inserted in terminal 3. PLEASE NOTE that Block 1 connector, Terminals numbered 1-3 are 110-volt; Terminals numbered 4-8 are 24-volt.

The wiring connections for the 110-volt power supply to Terminal Block 2 are shown in Figure 1.

Wiring Connections between 110-volt power and SHADOW Terminal Block 2			
110-volt supply	White (L2/N)	Black (L1)	Ground
SHADOW Terminal Block 2	1	2	3

System Set-Up:

1. Set-up for Capacitance Signal Generator

- a. Fill the boiler so that the water level is at ½ inch in the sight glass.
- b. Apply 110-volt power to the SHADOW **Actuator**.
- c. Attach a DC voltmeter to terminal #4 and #5 on connector Block 2 (the terminal Block numbered 1 through 8). NOTE: Check to make sure the reading is positive, if not, switch the leads.
- d. Adjust the capacitance signal generator damping screw fully clockwise.
- e. When performing the following steps, the **Actuator** may open or close the **Valve**. This is normal and you do not have to do anything.
- f. Push and Hold the Zero and Span “DOWN” buttons together for 5 seconds.
- g. Push and Hold the Zero and Span “UP” buttons together for 5 seconds.
- h. This should yield a meter reading in DC volts. Adjust the Zero UP or DOWN Button as required to produce a reading of about +1.0 DC volt.
- i. Press the Zero “UP” button until it reads +1.5 DC volt. Be patient, you may have to hold the button for 60-90 seconds before it is ready to move. This is normal.
- j. Press the Zero “DOWN” button until the meter reads +1.0 DC volt.
- k. Fill the Boiler 3 ½ inches above the LOW Water Level. Mark this line on the McDonnell & Miller housing.
- l. Adjust the Span “UP” or “DOWN” to get a reading of +5.0 DC volt.
- m. This finishes the **Capacitance Signal Generator setup**. Leave the damping screw fully turned clockwise. Remove the meter.

2. Set-up for the Ball Valve Actuator.

- a. Apply 110-volt power to the SHADOW **Actuator**.
- b. Remove Jumper A (refer to Figure 2).
- c. Remove the yellow wire connected to terminal #5 on terminal connector Block 2 (the terminal Block numbered 1 through 8).
 - i. This will cause the valve to drive to its “OPEN” setting. This setting is 55 degrees open (out of a range of 0 to 90 degrees). This does not need to be adjusted at this time.
 - ii. If the pump can’t keep up with the boiler on high fire, or if the “OPEN” position causes the pressure to drop off causing potential pump cavitation issues, then you will have to adjust the valve “OPEN” position. See “the separate instructions “Adjusting the Valve” for this activity.
 - iii. With the valve in the “OPEN” position, the red and green set-up lights referenced in Figure 1 should be “off”. This is normal. If the red or the

green LED set-up light stays on with the valve in the “OPEN” position, refer to the instructions for “Adjusting the Valve”.

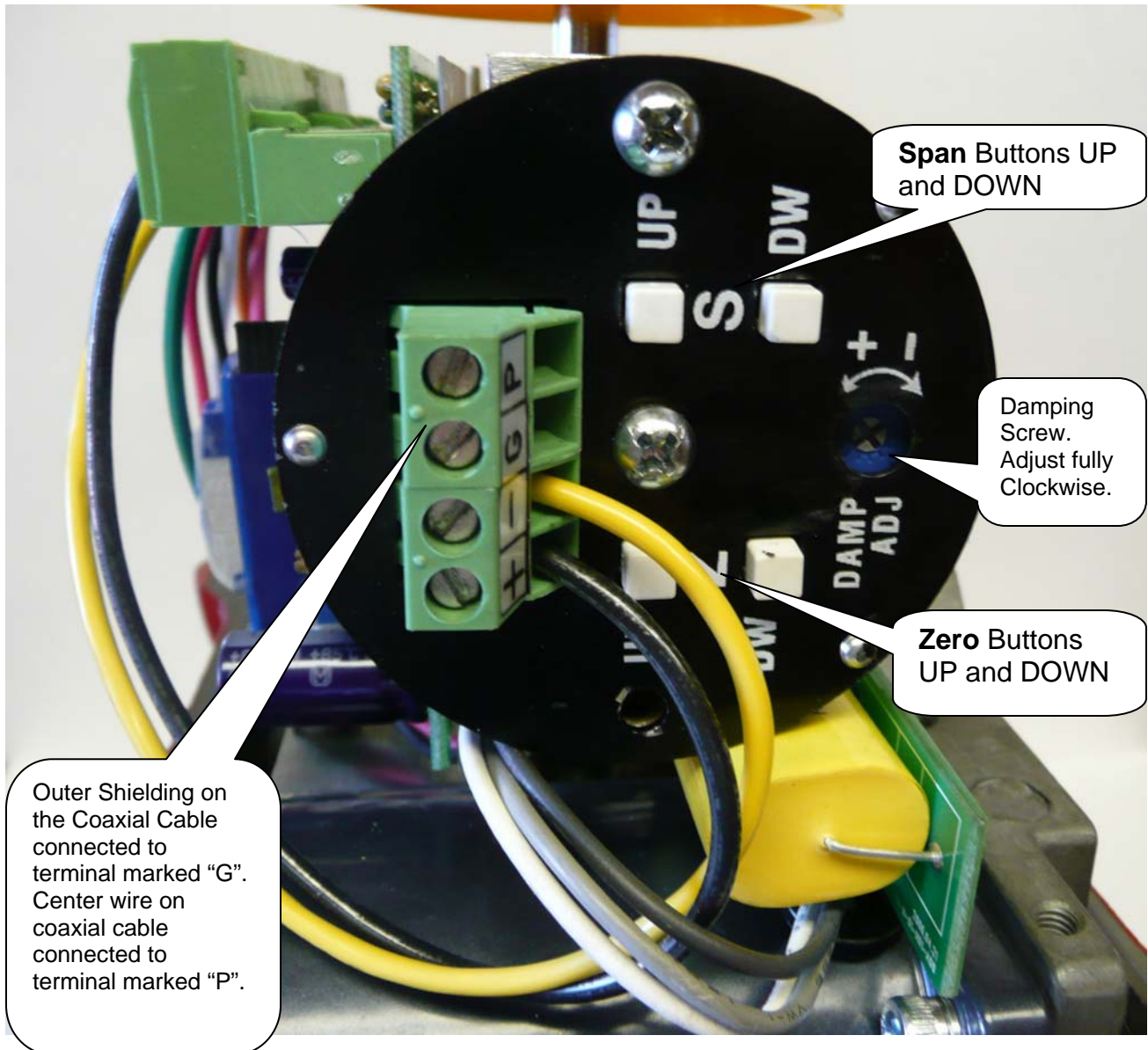
- d. Add a jumper from terminal #6 to terminal #7 on Block 2 (the terminal Block numbered 1 through 8).
 - i. This will cause the valve to go to its “CLOSED” position. While the valve is closing, the red set-up light referenced in Figure 1 will be on, but should turn off when the valve has completely closed. Adjust the lower potentiometer Clockwise until the red LED set-up light stays on; then turn the potentiometer counter Clockwise until the green LED set-up light flashes on. Stop. The green set-up light will turn off. You have now adjusted the valve “CLOSED” position.
 - ii. Set the cover back on the SHADOW **Actuator**. See if the “valve position indicator cap” is displaying fully “CLOSED”. If not, use a 4mm Allen wrench to loosen the “valve position indicator cap” and adjust the cap so it will show fully “CLOSED” when the cover is placed on the actuator.
- e. Finishing Up
 - i. Remove the Jumper form terminal #6 and #7.
 - ii. Reinstall the yellow wire on terminal #5.
 - iii. Reinstall Jumper A.
- f. Normal Operation – What to look for:
 - i. With the actuator cover removed, the red and green LED set-up lights go and off, but do not stay on.
 - ii. The actuator motor is NOT HOT to the touch.
 - iii. The water level is stable.
 - iv. The water level is in the sight glass in the range you set it for.
 - v. The pump discharge pressure is constant.

3. Set-up for the Ball Valve.

- a. **If it was necessary to adjust the “OPEN” position on the Ball Valve Actuator, it will also be necessary to adjust the “CLOSED” position.**
- b. Valve “OPEN” position Adjustment.
 - i. Apply 110 volt power to the valve **Actuator**.
 - ii. Remove the wire from terminal #5 Yellow wire) on connector Block 2 (terminals numbered 1-8).
 - iii. Remove the “Jumper A”.
 - iv. This drives the valve to its “OPEN” position.
 - v. To open the valve more:
 - 1. Adjust the top potentiometer Counter Clockwise. This will drive the valve further open. The green LED set-up light will be on while the valve is opening.
 - 2. When the actuator stops, both set-up lights must be off. If not, adjust until the lights stay off.
- c. Valve “CLOSED” position Adjustment

- i. Apply 110 volt power to the valve **Actuator**.
 - ii. Remove the wire from terminal #5 Yellow wire) on connector Block 2 (terminals numbered 1-8).
 - iii. Remove the “Jumper A”.
 - iv. Add a Jumper from the terminal #6 to #7.
 - v. This drives the valve to its “CLOSED” position.
 - vi. To adjust the “CLOSED” position:
 - 1. Adjust the bottom potentiometer Clockwise until the red Set-up light stays on; then turn the potentiometer counter Clockwise until the green set-up light flashes on.
 - 2. Now, both set-up lights are off, and the valve is in its “CLOSED” position.
 - v. Set the cover back on the SHADOW **Actuator**. See if the “valve position indicator cap” is displaying fully “CLOSED”. If not, use a 4mm Allen wrench to loosen the “valve position indicator cap” and adjust the cap so it will show fully “Closed” when the cover is placed on the **Actuator**.
- d. Finishing Up
- i. Remove the Jumper form terminal #6 and #7.
 - ii. Reinstall the yellow wire on terminal #5.
 - iii. Reinstall Jumper A.

Figure 1 – Capacitance Signal Generator



Wiring Connections 110-volt power SHADOW Terminal Block 2 Capacitance Signal Generator Device								
110-volt supply	White	Black	Ground					
SHADOW Terminal Block 2	1 (L2/N)	2 (L1)	3	4	5	6	7	8
Capacitance Signal Generator Device								

Figure 2 – SHADOW Actuator

