

1. INTRODUCTION

The actuator delivers between 440 and 17,600in-lbs of torque in a completely enclosed compact package. The unit is designed for NEMA 4, and IP65 corrosion protection.

2. INSTALLATION

Installing the actuator is simple and straightforward. The principle of operation requires a signal (voltage source) to be supplied, which tells the unit to drive to the open position or to drive to the close position. Note that separate signals must be sent to tell the unit which direction to rotate. The AC unit is equipped with a Permanent Split Capacitor gearmotor. This means that there are two windings (one for each direction of travel). The Capacitor helps the motor start rotating and is specially sized for actuator requirements. The capacitor is wired across both windings of the motor and is energized in both directions

1. Before applying power to the unit and before mounting it onto a valve, make sure the unit is able to rotate freely. Use the supplied hex wrench to rotate the actuator back and forth to verify free movement. It may also be used to position the actuator to align with the valve.
2. Take care to align the actuator to operate within the travel stop screw settings.
3. Also make sure manually that the valve rotates freely. Remove any physical valve stops if possible to prevent valve damage from stalling the motor.
4. Mount the actuator onto the valve such that it is in the same operating sequence as the valve (i.e. valve open – actuator open).

CAUTION:

Some valves and dampers have manual stops; remove if appropriate or adjust actuator travel switches to operate within those stops.

5. Carefully align the output shaft of the actuator with the valve or damper stem. **Mis-alignment will cause premature failure.** Tighten the bolts to the actuator evenly.
6. Position the valve/actuator assembly in the mid-stroke position manually before applying power to prevent damage.
7. Connect to a power supply as per the wiring instructions. The wiring instructions are attached to the inside of the cover. Almost all applications require some type of customer-supplied switch used to direct the rotation of the unit.
8. Power to the unit should be fused with a 5amp slow blow fuse. All wiring is to be completed in accordance to National and Local electric codes.
9. Once wired, the unit should be rotated electrically to verify directional operation.

3. OPERATION

Limit Switches

The limit switches are factory set for 90° rotation.. The switches are the SPDT type which means that they have an extra contact connected when at the end of travel that can be used to electrically indicate position. The NO normally open contact is wired to the terminal strip.

All of the switches are rated 15amp at 115Vac. Two extra switch contacts may be ordered as an option (dry contacts). These switches can be used for indication or to control other devices.

Manual Override

Remove power to the actuator prior to manual operation. Serious

CAUTION:

Disconnect mains power before manual operation. Serious injury/damage can occur without removing power first.

injury could occur because the motor will start to drive if connected to the main power source. A 6mm hex wrench is supplied with the actuator to allow for manual operation of the valve. Simply remove the cover on the side of the unit and insert one end of the wrench. CW rotation of the wrench causes the actuator to rotate CW. The unit is geared so it will take several rotations to produce 90 degree actuator rotation. Note that an optional “spring to engage” handwheel can be ordered.

Position Indicator

A position indicator is provided to visually determine actuator position. Avoid direct sunlight on the indicator.

AC Motors

The motor is a permanent split capacitor type (PSC). It has an automatically re-setting thermal protector. This means that if the unit is excessively stroked in an elevated temperature environment, the unit will shut down. The thermal switch buried in the windings of the motor opens up the current flow through the windings preventing it from burning. After the unit is left to cool the thermal switch will automatically close allowing operation again. The length of time the unit can run continuously without thermal trip is known as its duty cycle and depends on the ambient temperature. All motors are sized specifically for valve automation for long motor life. The motors are rated for 50 or 60Hz. However, the speed ratings are based on 60Hz operation. 50Hz supply increases the cycle time by approximately 1.2 times and reduces the duty cycle roughly 25%.

Housing

The cover and base have a thick protective polyester paint to guard them from corrosion. The base gasket, which seals the cover, is secured in place to prevent its loss.

4. MAINTENANCE

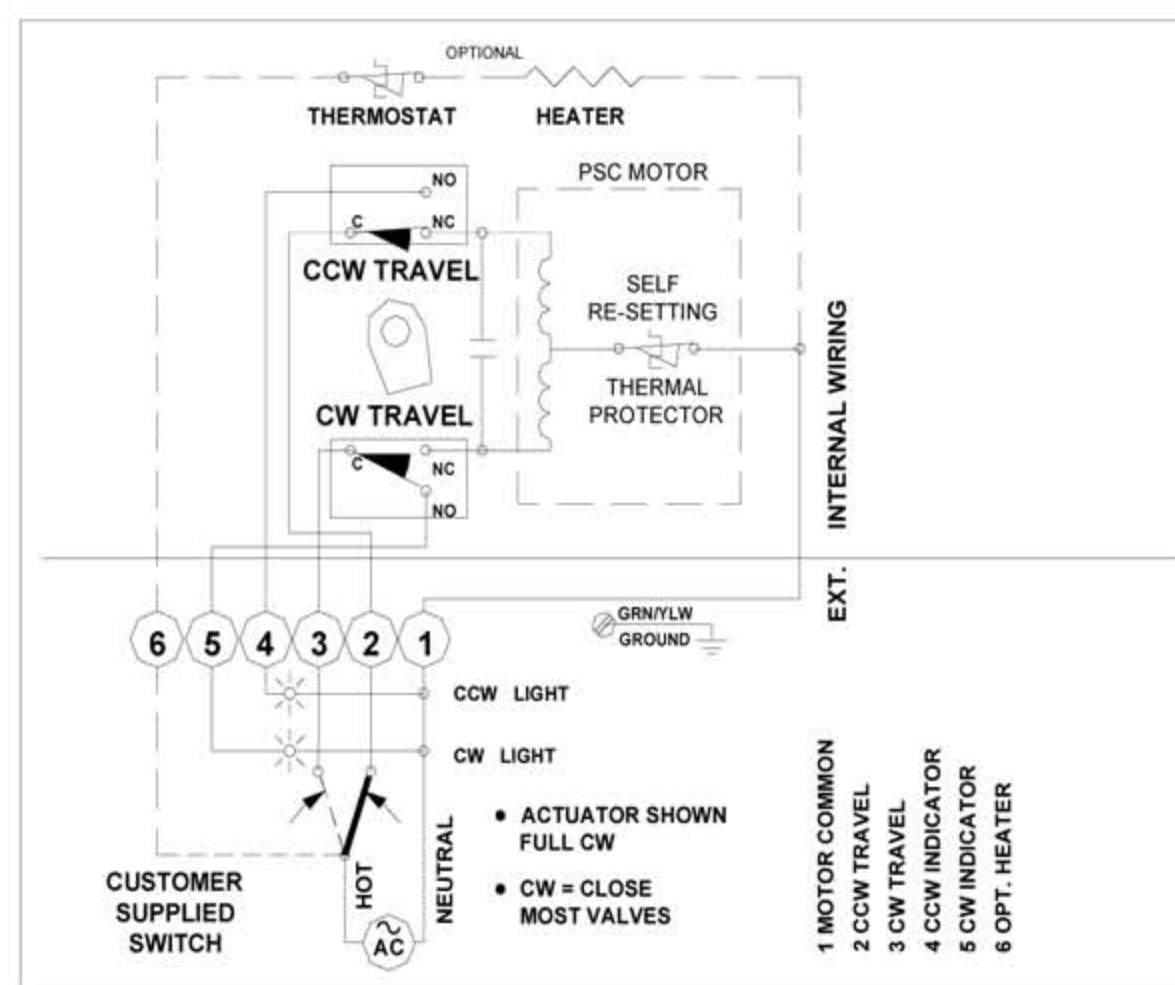
There are no special requirements for maintaining your electric actuator. The gear train has been permanently lubricated for a long life. If it should become necessary to re-fill the lubrication it is recommended that the unit be filled with Multi-purpose grease.

The unit should be cycled periodically to verify its operation.

5. TROUBLE SHOOTING

- 1 PROBLEM: There is power to the unit but it does not respond.
 - 1.1 Verify that the correct voltage has been applied according to the ratings listed on the nameplate.
- 2 Check the wiring to verify it against the wiring schematic.
 - 2.1 Check the limit switches to see if they are tripped and operating in the correct range.
 - 2.2 Check the travel limit screws and adjust accordingly.
- 3 PROBLEM: Power is getting to the motor but it merely hums.
 - 3.1 Check to make sure that the proper voltage is applied and that all of the wiring connections are tight.
 - 3.2 Check to see that the unit is properly grounded.
 - 3.3 Check to see that the CW and CCW switches are not being powered at the same time. This will happen if the customer directional control switch is not wired correctly.
- 4 PROBLEM: The actuator performs erratically.
 - 4.1 Check to see that the actuator is not stalling. Remove the actuator from the valve and verify the freeness of the valve operation.
 - 4.2 Check to see that the valve torque requirements are less than the rated torque output of the actuator.
 - 4.3 Check the ambient temperature rating. The PSC motors are equipped with thermal protectors which cut power to the motor if excessively cycled. High temperature ambients and cycle frequencies may heat up the motor causing the

1. Actuator model number
2. Actuator serial number
3. Input signal being used
4. Valve application



Caution:
Keep cover closed while circuits are energized.

thermal protector to automatically turn off power to the motor. Simply allow the unit to cool and it will automatically re-set.

1. INTRODUCTION

The modulating control card allows the actuator to be positioned intermediate of full open/close. Either a 4-20mA or 1-5Vdc input signal allows complete control over the position of the valve. The actuator responds linearly to changes in input. Thus the valve is rotated in a direct proportion to a change in the input signal.

2. FEATURES

The Modulating control card has many features that make it state of the art. Some of these features are:

- Digital setup (no trim pots to adjust)
- Microchip microprocessor with flash memory (retains software nearly indefinitely)
- 10bit Analog to Digital converter chip
- Concurrent processor algorithm with interrupt routine
- Dip Switch Settings
- 115Vac – 220Vac power versions available
- 4-20Ma - 1-5Vdc input
- 4-20mA output (RL: 250Ohm)

3. INPUT OPTIONS

The actuator can be controlled via a 4-20mA or 1-5Vdc signal. There are no jumpers to change. Simply hook the signal to the terminal strip marked 4-20mA (-IN+) taking note of the positive and negative polarity.

4. DIRECT / REVERSE ACTION

MODE SWITCHES- Dip Switches 1-3 are used to set the action. The unit is set at the factory for direct acting where the unit drives in a CCW rotation upon receiving a low signal, i.e. 4mA = CCW. The rotation is viewed from the top of the unit. The position of the DIP switches also determine what the unit does if the input signal is lost. See the Fig 1 to determine the proper positions.

5. SET-UP (CALIBRATION)

1. Verify that the actuator and valve move freely. Any travel stops on the valve should be removed or the actuator should be positioned to operate within those stops by rotating the manual override or by mounting the actuator in that arrangement.
2. Connect the input signal to terminals marked (-IN+). Note the direct/reverse acting requirement. See 4. above.
3. Connect power to the terminals marked (AC Power). Power should be fused with an appropriate sized fast acting fuse. See the actuator nameplate for the max amp draw.

4. Once the power is connected, the unit will do a self-test. This will take approximately 2-3 seconds. Then the unit will rotate to the factory set position corresponding to the input signal given.
5. Normally "Demarcation" (setting of the span) is not necessary because the units are factory set for 90° operation. If a smaller span is required see setting the span in Section 6.

6. SPAN (AUTO DEMARCATION)

Typically the actuator is set for 90° of span. However, the modulating control card can be set up for spans less than 90°. (Note: if the unit is traveling opposite from direction expected see Direct/Reverse operation Section 4.)

1. Disconnect power to the unit.
2. Manually rotate the actuator to the end position (CW or CCW) that is going to be set. Manually position the unit so that it is physically where the 4 or 20mA signal is required.
3. Using a hex wrench on the cam assemblies loosen the set screw and rotate the cam so that the limit switch just trips (makes contact). A clicking sound will be heard.
4. Repeat for the opposite direction if required.
5. Tighten the cam set screws.
6. Connect power. Note: once power is connected the unit may run to the travel stop position and signal an alarm.
7. Press and hold the AUTO SETTING button for at least 3 seconds.
8. The RUN lamp will light and the unit will automatically drive to each end of travel limit switch to "find" the limits. It may do this at least 2 times.
9. After the unit stops, input various signal positions (0%, 50%, 100%) to verify the operation.
10. Finally, connect to the Feedback Output signal terminals and adjust the endpoints using the Output Adj trim pots.

7. FAIL ON LOSS OF SIGNAL

The unit can be calibrated to respond to a loss of signal in one of three ways; fail to the Lo input signal (4mA or 1Vdc) position, fail to the Hi input signal (20mA or 5Vdc) position, or stop.

1. MODE SWITCHES – The DIP switches are used to calibrate how the unit responds to a loss of signal. (Note: a loss of power causes the unit to stop immediately).
2. See Fig 1 to determine how to select loss of signal.

8. FEEDBACK SIGNAL (4-20MA OUT)

The unit has a built in 4-20mA signal out which can be used to determine the actuator position. Simply hook up to the terminal marked (-OUT+) to read the signal.

9. DEADBAND ADJUSTMENT

The deadband is factory calibrated. However, in some instances it may be necessary to adjust the deadband. Deadband refers to the tolerance surrounding the set point. A tight deadband makes the unit move in smaller steps. A large deadband requires bigger input changes before the unit will move. (Note that the unit has a built in delay. The unit waits a couple of seconds before responding to a signal change.) If the unit is "hunting" (i.e. continuous movement back and forth) the deadband will have to be increased.

1. MODE SWITCES – DIP Switch 4 sets the deadband.
2. Switch 4 ON = a wide deadband.
3. Switch 4 Off = a narrow deadband (tight).
4. The units are factory set for a narrow (tight) deadband.
5. If the unit is continuously moving CW and CCW without a signal change then the deadband will have to be more wide (loose.)

10. ALARMS

The controller can indicate if something is wrong. An alarm signal is indicated by the Yellow Lamp flashing.

1. When flashing the unit will stop responding and the problem will have to be fixed.
2. Check to see that the unit hasn't reached the end of travel limit switches. Under normal operation the unit stops before it reaches the limit switches. If for some reason it reaches the limit before the signal required position the alarm stops the unit.
3. Check to see that the motor has not overheated. It is thermally protected.
4. Check to see that the wire connections are tight.

11. TROUBLE SHOOTING

- 1 PROBLEM: There is power to the unit but it does not respond.
- 2 Verify that the correct voltage has been applied according to the ratings listed on the nameplate.
- 3 Check the wiring to verify it against the wiring schematic.
- 4 PROBLEM: Power is getting to the motor but it merely hums.
 - 4.1 Check to make sure that the proper voltage is applied and that all of the wiring connections are tight.
 - 4.2 Check to see that the unit is properly grounded.
 - 4.3 Check to see if the valve has travel stops. Remove or set the unit to run within those stops.
 - 4.4 Check the travel stops of the actuator. Verify manually that the unit operates in the correct 90° quadrant. Adjust the screw and nut on the travel stops.
- 5 PROBLEM: The actuator performs erratically.
 - 5.1 Check to see that the actuator is not stalling. Remove the actuator from the valve and verify the freeness of the valve operation.
 - 5.2 Check to see that the valve torque requirements are less than the rated torque output of the actuator.
 - 5.3 Check the ambient temperature rating. The PSC motors are equipped with thermal protectors which cut power to the motor if excessively cycled. High temperature ambient and cycle frequencies may heat up the motor causing the thermal protector to automatically turn off power to the motor. Simply allow the unit to cool and it will automatically re-set.
 - 5.4 If the deadband is too tight, the unit will constantly oscillate (short strokes CW and CCW) which will heat up the motor. Increase the deadband (see deadband settings above).
- 6 Unit drives opposite of required signal position.
 - 6.1 Check the reverse/direct acting settings. See explanation above.

Switch	1	2	3	4
	Action Mode	Loss of Signal		Deadband
On	Direct	Open	Close	Wide
Off	Reverse	Stop		Narrow

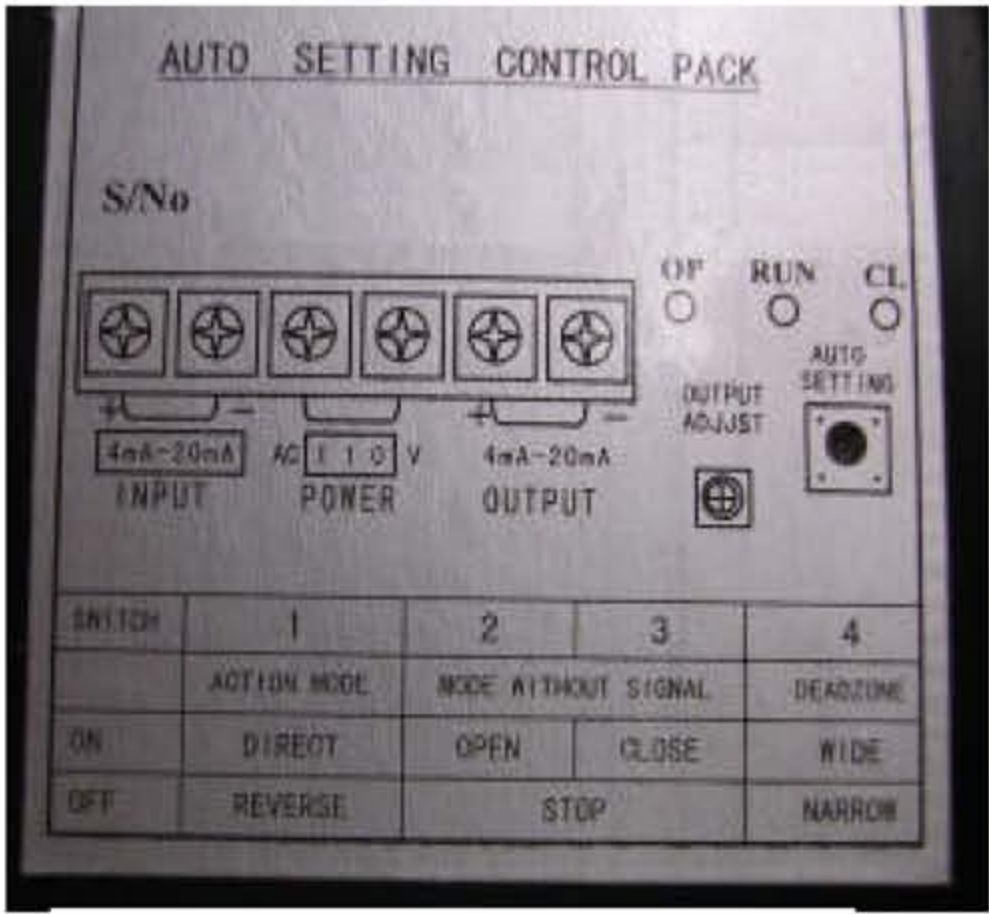


Fig. 1 – Switch Mode Settings

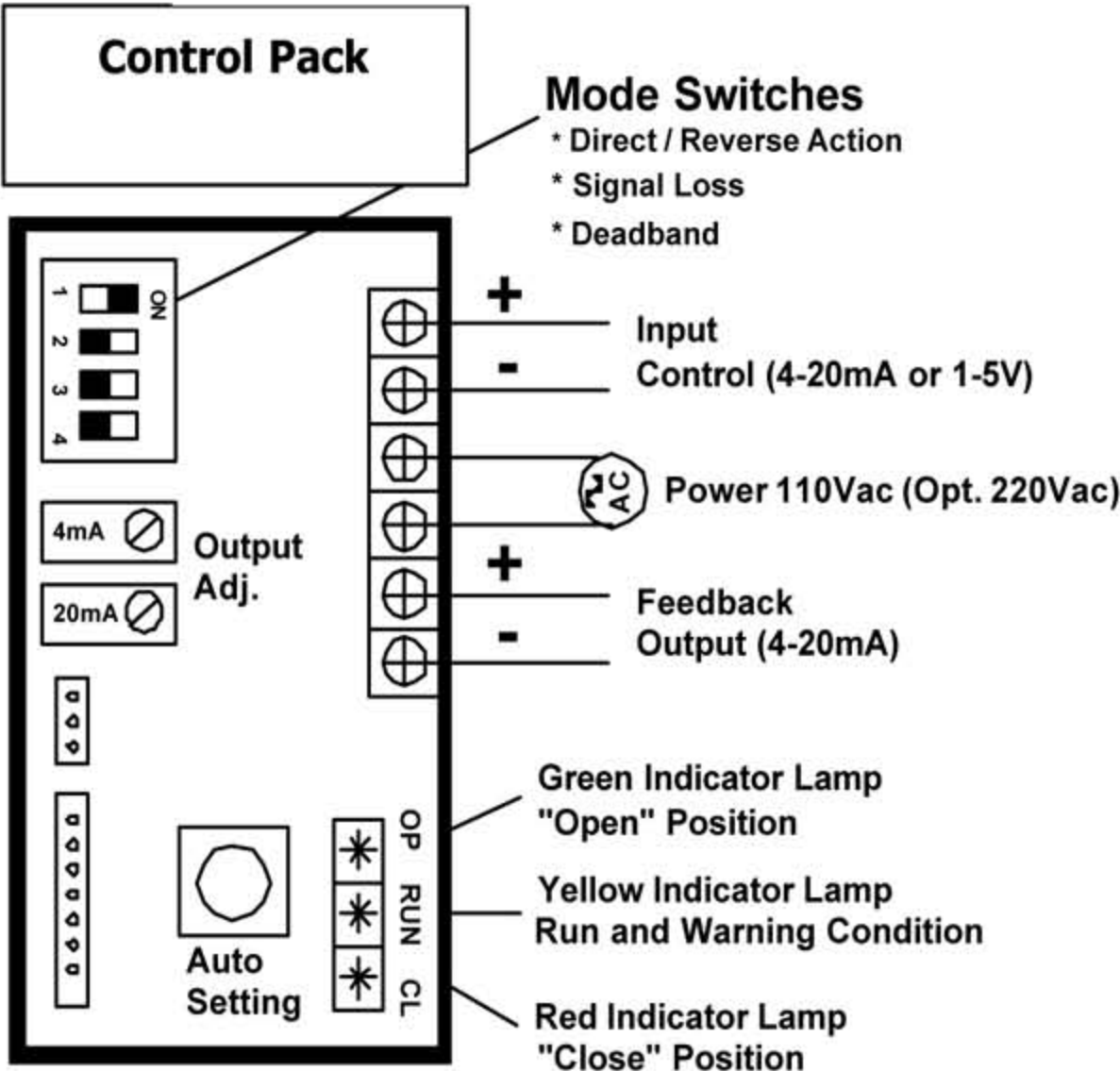


Fig. 2 – Connections