

T1 Modulating (Servo) Electric Actuator Use and Care Manual

1. INTRODUCTION

The T1 Modulating electric actuator by Valvsys, LLC brings the latest technology in valve positioning. The modulating control card allows the actuator to be positioned intermediate of full open/close. Either a 4-20mA or 0-10Vdc 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. Local on board switches mean that the user can move the valve to the desired set up positions without having to have a handheld control source. Once in position these settings are stored digitally into the microprocessor. Having the microprocessor means no trim pots to adjust and allows for control problems such as a blocked valve by shutting down and sending alarm signals to the control room preventing further problems.

Note: this manual is for the Calibration Use and Care of the T1 Servo card. For the Use and Care of the valve actuator see the specific bulletin pertaining to that model such as B00001 for the EV series and B00019 for the NV series, etc. These manuals can be obtained from contacting Valvsys.

2. FEATURES

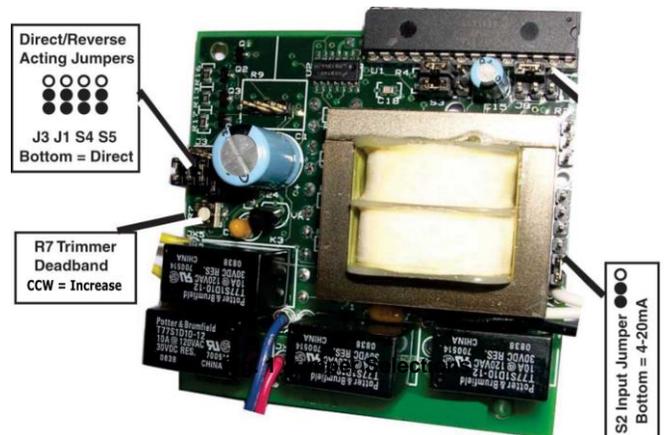
The Valvsys T1 Modulating control card has many features that make it state of the art. Some of these features are:

- Digital setup (no trim pots to adjust)
- Microchip 8bit microprocessor with flash memory (retains software nearly indefinitely)
- 10bit Analog to Digital converter chip
- Concurrent processor algorithm with interrupt routine
- Pushbutton Local Control (Mode, Jog CW, Jog CCW, Enter, Reset)
- 10amp relay contact for motor input
- 10amp relay contact for alarm signal output (excessive cycling, failure to reach position, etc.)
- UL508/CSA high voltage trace design
- 48 pitch precision feedback potentiometer gears
- 115Vac - 12/24Vdc power versions available
- 4-20Ma - 0-10Vdc input jumper select
- RS232 serial port header
- 30° to 300° rotational operating range
- Potentiometer mounting complete with clutch (allows 360° rotation before final span is set)

3. INPUT OPTIONS

The input jumper S2 must be set according to the input type selected.

| | | Signal | Jumper Position |
|---------|----------------|---------|-----------------|
| Current | 250 Ohms Shunt | 4-20mA | Lower Two Posts |
| | | | |
| Voltage | | 2-10Vdc | Upper Two Posts |



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4. DIRECT / REVERSE ACTION

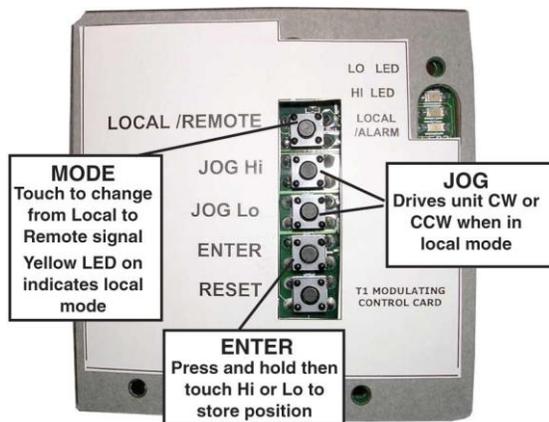
Jumpers set the action of the actuator. The unit is set at the factory for direct acting where the unit drives in a CW rotation upon receiving a low signal, i.e. 4mA = CW. The rotation is viewed from the top of the unit. However, moving the jumper

| Action | Rotation | Setting |
|----------------|-------------------------|-----------------------------|
| Direct Acting | 4mA = CW 0Vdc = CW | jumpers on upper two posts |
| Reverse Acting | 20mA = CW 10Vdc = CW | jumpers on bottom two posts |

can set the unit to drive CCW upon receiving a low signal (reverse acting).

5. SET-UP (CALIBRATION)

1. Verify that the actuator and valve move freely. Any travel stops 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 6,7 and 8. Note the position of the input Jumper S2 and select the appropriate position corresponding to your input. 4-20mA is on the bottom two posts and 0-10Vdc is on



- the upper two posts. See 3. Input above.
3. Connect power to terminals 1 and 2. Power should be fused with a 2 amp slow-blow fuse.
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. Simply touch the Local / Remote switch see Fig. 2 below to stop the unit. The local / Alarm LED will light. The unit can now be positioned using the Jog Hi and Jog Lo buttons. Jog

Hi means the unit rotates to the 20mA (or 10Vdc) direction. Jog Lo means the unit rotates to the 4mA (or 0Vdc) direction.

5. Push and hold the Jog Hi button to drive the unit to the desired end of travel position. Drive a little past the desired position (approximately 5°) and then use the Jog Lo to come back to the set point. Once the unit is in position press and hold the enter button. While holding Enter press the Jog HI button. The Jog Hi LED will go out. The position is now stored in memory.
6. Now, drive the unit to the Lo position. Once again press and hold the Enter button. Then touch the Jog Lo button simultaneously. The Jog Lo LED will go out indicating that it has been stored.
7. Touch the Local / Remote button. The Local / Alarm LED goes off and the unit rotates to the corresponding input signal.

6. SPAN 90°, 180°

Typically the actuator is set for 90° of span (4mA = 0° to 20mA = 90° rotation). However, the T1 modulating control card can be set up for any degree of span from 30° to 180°. There is no need to set any jumpers. Simply follow the steps in 5. Set-Up above and drive the unit to the span that is desired between 30° and 180°. Note other spans are available upon special order.

7. SAFETY OVERTRAVEL SWITCHES

The unit has two "safety overtravel" switches. Two cams are attached to the output shaft that trip these switches when the unit travels outside of the required span. For instance most actuators are set for 90° rotation and these switches are set for 110° of rotation. They simply disconnect the motor. Therefore if one of the LED drive lights is on but the actuator is not rotating it is most likely stopped by the switch.

8. ALARM

The unit will signal an alarm condition by closing dry contacts across 3 and 4. **Time Out.** If the unit fails to reach the desired set point because of valve blockage or some other mechanical failure the microcontroller times out and closes the alarm contacts. The unit may also time out because the deadband is set too tight. The unit can't make small enough movements to resolve the set point. See deadband below.

9. DEADBAND ADJUSTMENT

The deadband is factory calibrated. However, in some instances especially if the re-set button has been used it may be necessary to re-calibrate 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

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bigger input changes before the unit will move. If the unit is "hunting" (i.e. continuous movement back and forth) the deadband will have to be increased (CCW). The deadband trim pot position is only "read" once during power up. Further changes to the deadband trim do not change its performance.

1. Disconnect the power to the unit.
2. Rotate trimmer R7 CW to decrease the deadband or CCW to increase the deadband.
3. Re-connect the power.

10. 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.
- 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.
- 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 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.
 - 4.4 If the Reset button has been pressed the unit will have to be re-calibrated. Disconnect the power and wait 5 seconds. Then See 4. Set-Up and repeat steps 4 through 7.
- 5 PROBLEM: The Alarm LED is lit and the unit does not respond.
 - 5.1 The unit will have to be re-calibrated. Disconnect the power and wait 5 seconds. Then See 4. Set-Up and repeat steps 4 through 7.
- 6 PROBLEM: The actuator drives continuously in the wrong direction.

- 6.1 It may have been that the unit was calibrated in reverse.

In other words, the Jog CW position was entered into memory and then the Jog CCW was entered further CW. The unit will have to be re-calibrated. Disconnect the power and wait 5 seconds. Then See 4. Set-Up and repeat steps 4 through 7. Be sure to store Jog CW on the CW side of Jog CCW.
- 6.2 It may be that the feedback potentiometer connection has been reversed. The feedback pot is the gear driven device that tells the micro of the actual physical position. It has a green, yellow, and blue wire attached. The connector should be attached such that the blue wire is closer to the white bobbin transformer.

9. TECHNICAL ASSISTANCE

Valvsys, LLC will be more than happy to provide technical assistance should it become necessary.

Please have the following available when calling for assistance:

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

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10. SCHEMATIC

