



V-TORK USA

VTM Series Electric Actuator

Instruction Manual

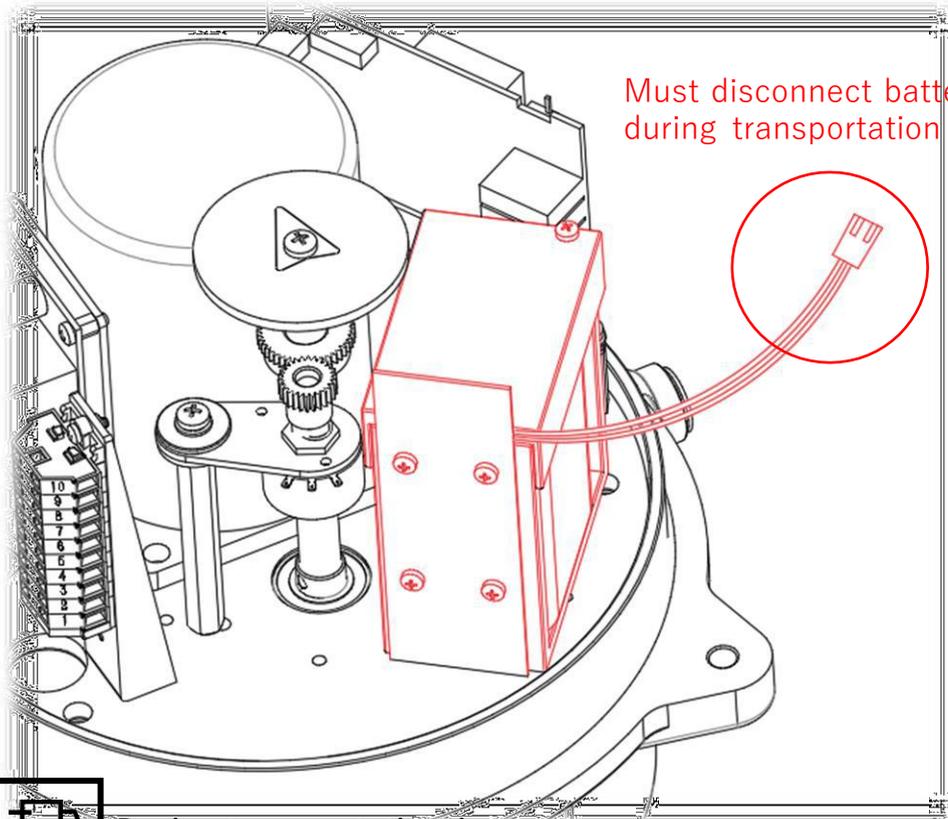


- Quarter-Turn Electric Actuator
- Optional Failsafe Battery Backup
- Wide range of sizes and torque outputs
- Explosion-proof enclosure





CAUTION :



Must disconnect battery pack during transportation



During transportation :

Please disconnect the battery pack from the circuit board.



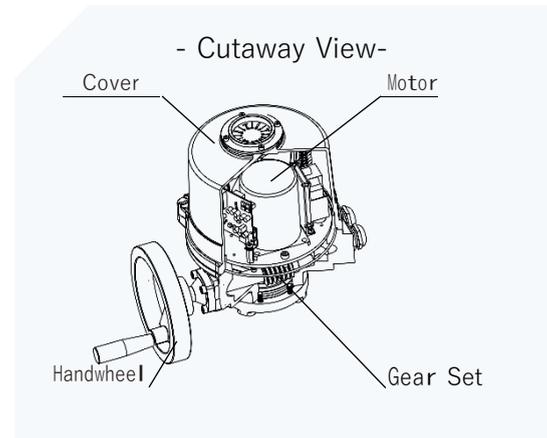
During storage :

Store in cool, dry location, avoid direct sunlight.

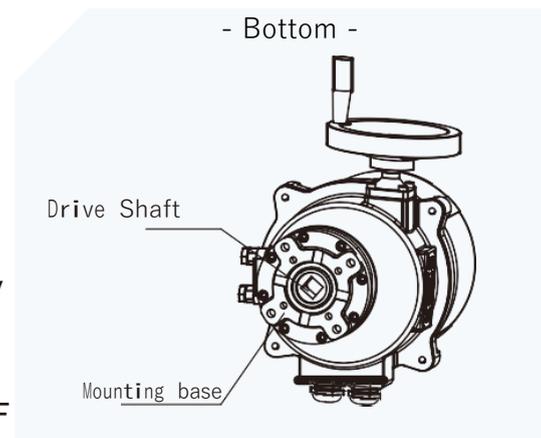
Introduction

The V-Tork VTM Series is a rugged, compact electric quarter-turn actuator for on-off and modulating control of valves and dampers. The VTM electric actuator offers a high quality, reliable solution for valve automation that is also cost-effective.

Specifications



- Torque Range: 177 to 44,250 in-lb.
- ATEX Explosion Proof enclosure
- On-Off or Modulating Control
- Optional Battery Backup for Failsafe functionality
- Temperature rating: -4°F to 158°F
- Optional Low Temperature rating: -40°F to 158°F
- Maximum Humidity: 90%
- Power Voltage: 120VAC/220V60Hz±10%; or 12VDC/24VDC
- ISO 5211 Mounting Base
- Clutchless Manual Override on VTM2-5

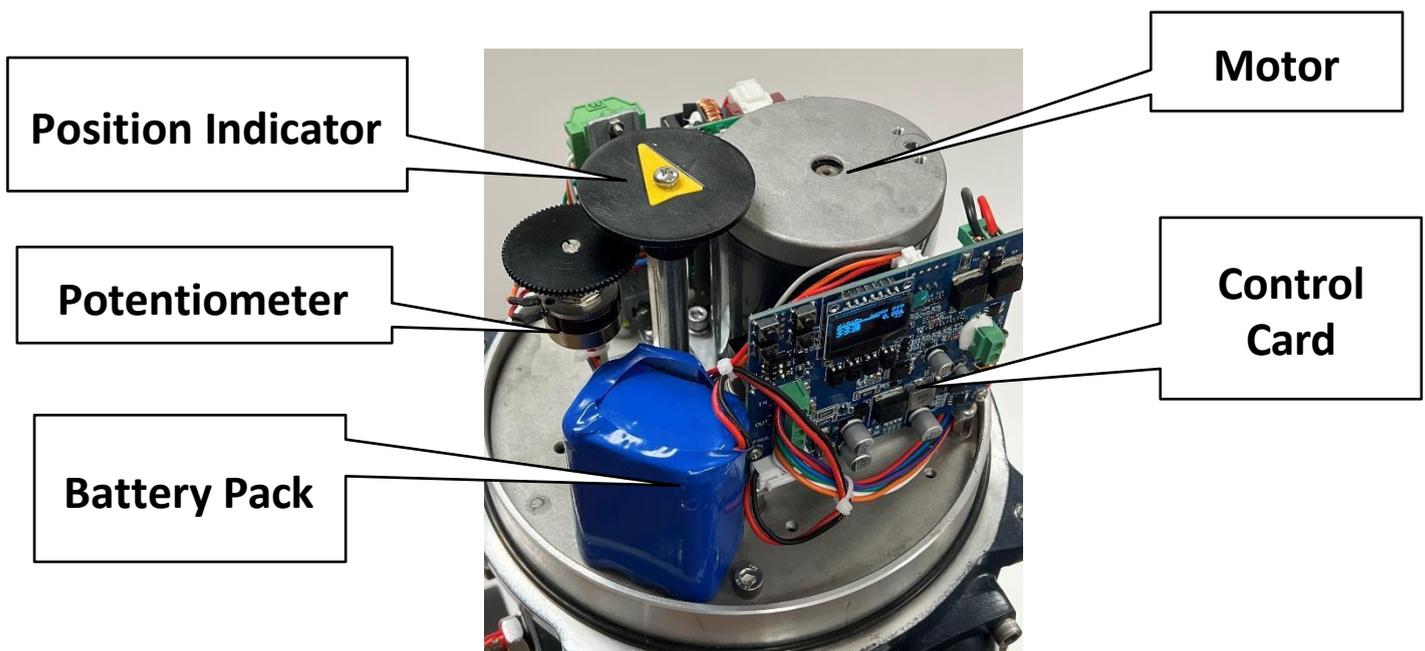


VTM Modulating Version

VTM Modulating electric actuators integrate a multi-functional servo amplifier and a position signal transmitter into the standard actuator to provide modulating control. All operations such as calibration, sensitivity setting and automatic/manual switching are controlled by four buttons on the Control Card for easy set up and installation.

Specifications

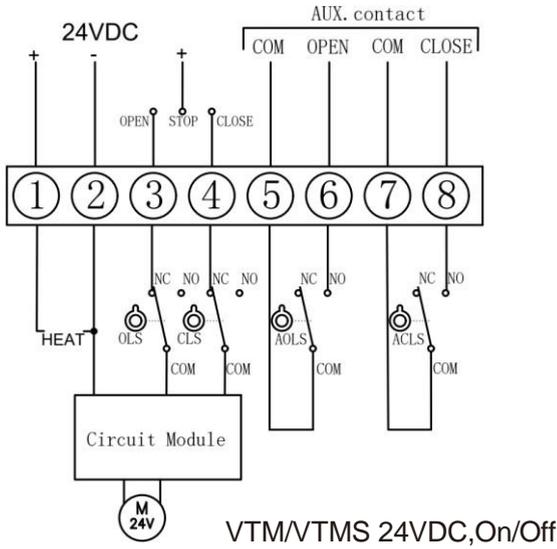
- Input Signal: 4-20mA DC, 0-5VDC, 0-10VDC
- Input Impedance: 250 Ω (4-20mA) or 500 Ω (0-10mA)
- Valve Position Sensor: Single-turn absolute value encoder
- Valve Position Output Signal: 4-20mA DC
- Duty Cycle: 75%
- Motor Blocking Protection Time: 1-25 S (default 6.4S)
- Power Consumption : $\leq 3VA$
- Actuator Operating Sensitivity: 0.1%-12.5%
- Insulation Strength: power frequency 1500V, 1min
- Insulation Resistance: above 50M Ω
- Temperature rating: -4°F to 158°F (-40°F to 158°F with optional internal heater)
- Maximum Humidity: 90%
- Power Voltage: 120VAC/220V60Hz $\pm 10\%$; or 12VDC/24VDC
- Signal loss, feedback loss, motor stalling failure protection function.
- Failure code warning function



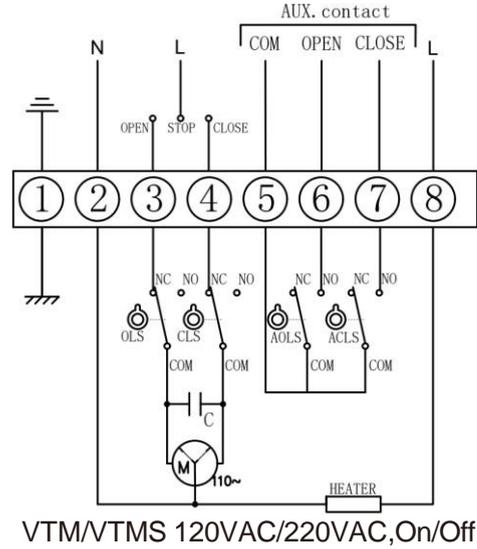
VTM Series Electric Actuator

VTM Specifications

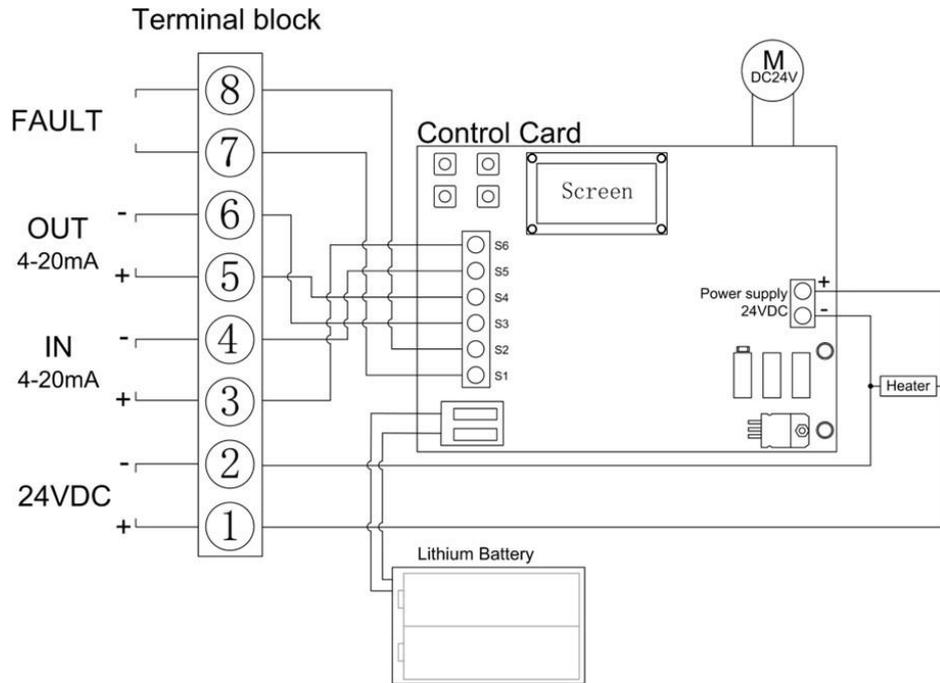
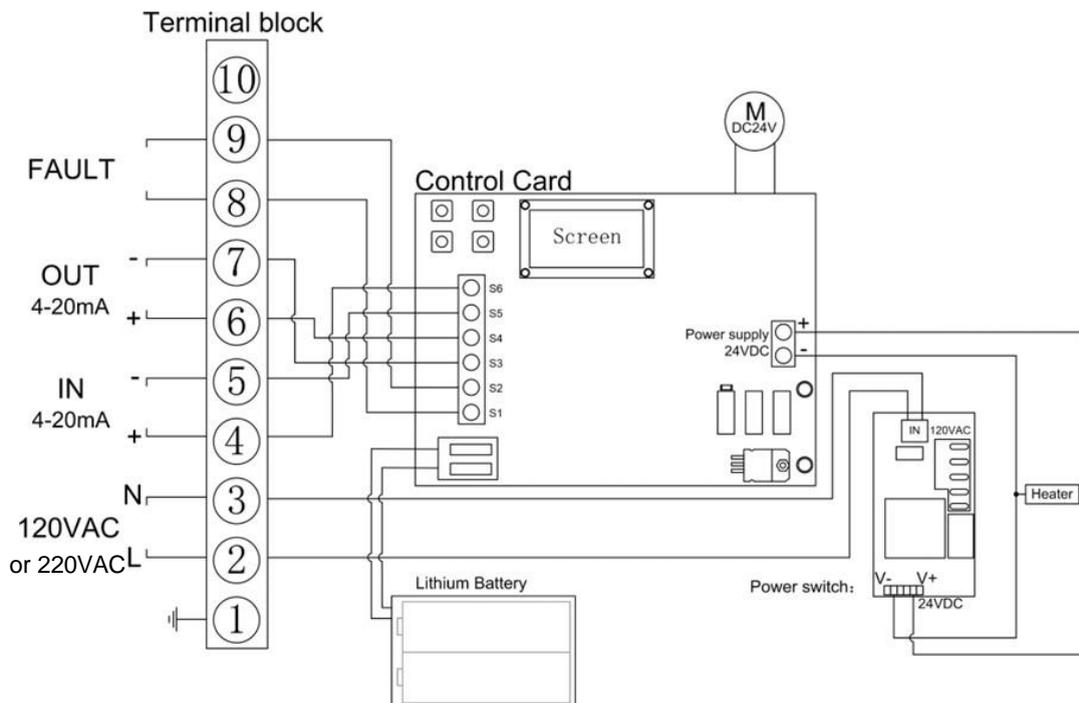
| Model No | Torque | | Cycle Time Sec/90° | Motor Power Watts | ISO Mounting Base | Rated Current (amps) | | | | Weight lbs | Manual Override |
|----------|--------|-------|-----------------------|----------------------|-------------------|----------------------|--------|--------|-----------|---------------|----------------------|
| | NM | in-lb | | | | 24VDC | 120VAC | 220VAC | 440VAC/3Ø | | |
| VTM0S | 20 | 177 | 10 | 8 | F03/F05 | 0.2 | - | - | - | 2.7 | Spanner |
| VTM1S | 35 | 310 | 12 | 10 | F03/F05/F07 | 1.2 | 0.4 | 0.4 | - | 6.2 | Spanner |
| VTM1H | 50 | 443 | 10 | 18 | F03/F05/F07 | 1.6 | 0.8 | 0.4 | - | 7.1 | Push Handwheel |
| VTM1H | 70 | 620 | 15 | 18 | F03/F05/F07 | 1.6 | 0.8 | 0.4 | - | 7.1 | Push Handwheel |
| VTM2H | 100 | 885 | 8 | 40 | F05/F07 | 3.5 | 0.7 | 0.3 | 0.2 | 24.2 | Push Handwheel |
| VTM2H | 200 | 1770 | 8 | 60 | F05/F07 | 4.2 | 0.8 | 0.5 | 0.2 | 24.2 | Push Handwheel |
| VTM2 | 100 | 885 | 20 | 20 | F05/F07 | 2.2 | 0.8 | 0.6 | 0.3 | 26.5 | Clutchless Handwheel |
| VTM2 | 200 | 1770 | 30 | 20 | F05/F07 | 2.3 | 0.8 | 0.6 | 0.3 | 26.5 | Clutchless Handwheel |
| VTM3 | 300 | 2655 | 20 | 40 | F07/F10 | 3.0 | 1.6 | 0.9 | 0.5 | 30.9 | Clutchless Handwheel |
| VTM3 | 450 | 3983 | 30 | 60 | F07/F10 | 3.6 | 1.9 | 0.9 | 0.5 | 30.9 | Clutchless Handwheel |
| VTM4 | 600 | 5310 | 40 | 90 | F10/F12 or F14 | 8.5 | 1.8 | 1.0 | 0.6 | 48.5 | Clutchless Handwheel |
| VTM4 | 800 | 7080 | 48 | 90 | F10/F12 or F14 | 8.5 | 1.8 | 1.0 | 0.6 | 48.5 | Clutchless Handwheel |
| VTM4 | 1000 | 8850 | 48 | 120 | F10/F12 or F14 | 10.5 | 2.0 | 1.1 | 0.6 | 48.5 | Clutchless Handwheel |
| VTM5 | 1500 | 13275 | 60 | 120 | F12/F14/F16 | 10.5 | 4.8 | 2.8 | 1.1 | 110.2 | Clutchless Handwheel |
| VTM5 | 2300 | 20355 | 82 | 120 | F12/F14/F17 | 10.5 | 4.8 | 2.8 | 1.1 | 110.2 | Clutchless Handwheel |
| VTM5+G | 4000 | 35400 | 138 | 120 | F14/F16 | 10.5 | 4.8 | 2.8 | 1.5 | 180.6 | Clutchless Handwheel |
| VTM5+G | 5000 | 44250 | 160 | 120 | F14/F16 | 10.5 | 4.8 | 2.8 | 1.5 | 180.6 | Clutchless Handwheel |

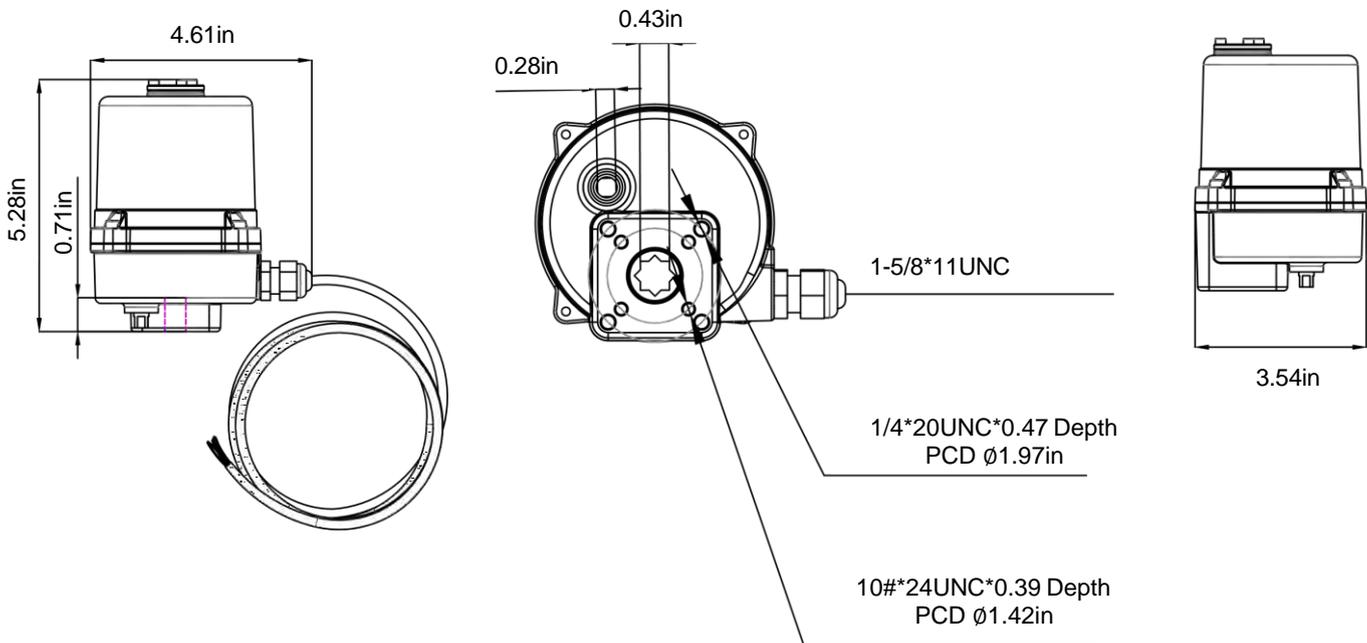
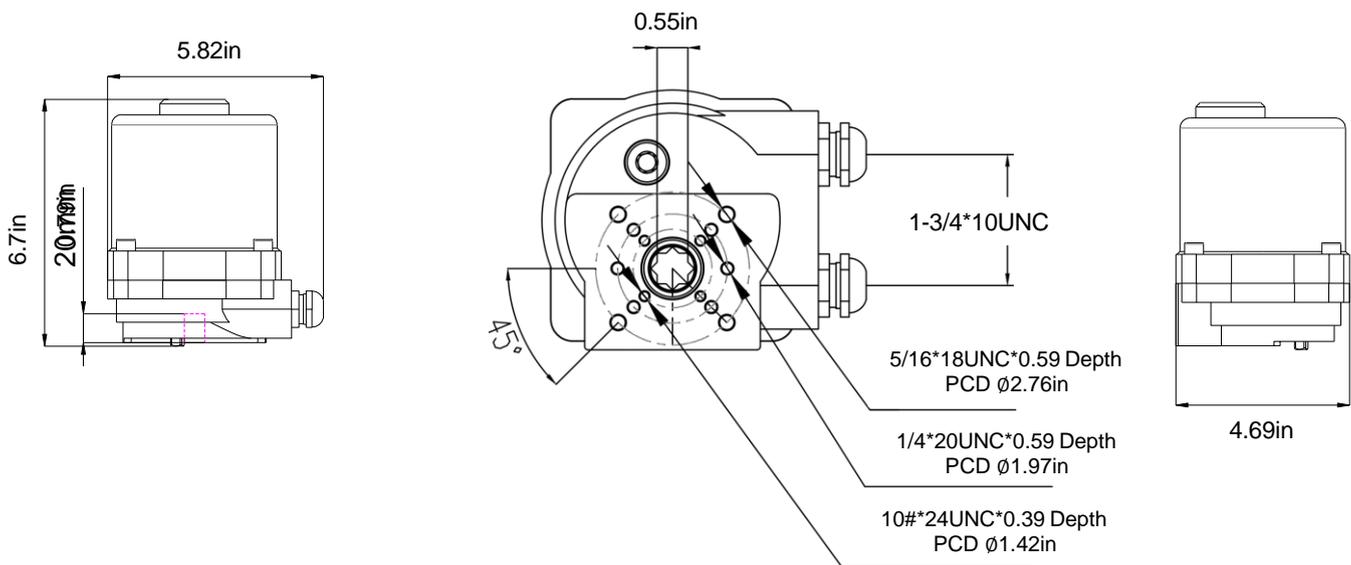
VTM Series Electric Actuator Wiring Diagram
VTM On-Off Version Wiring Diagram


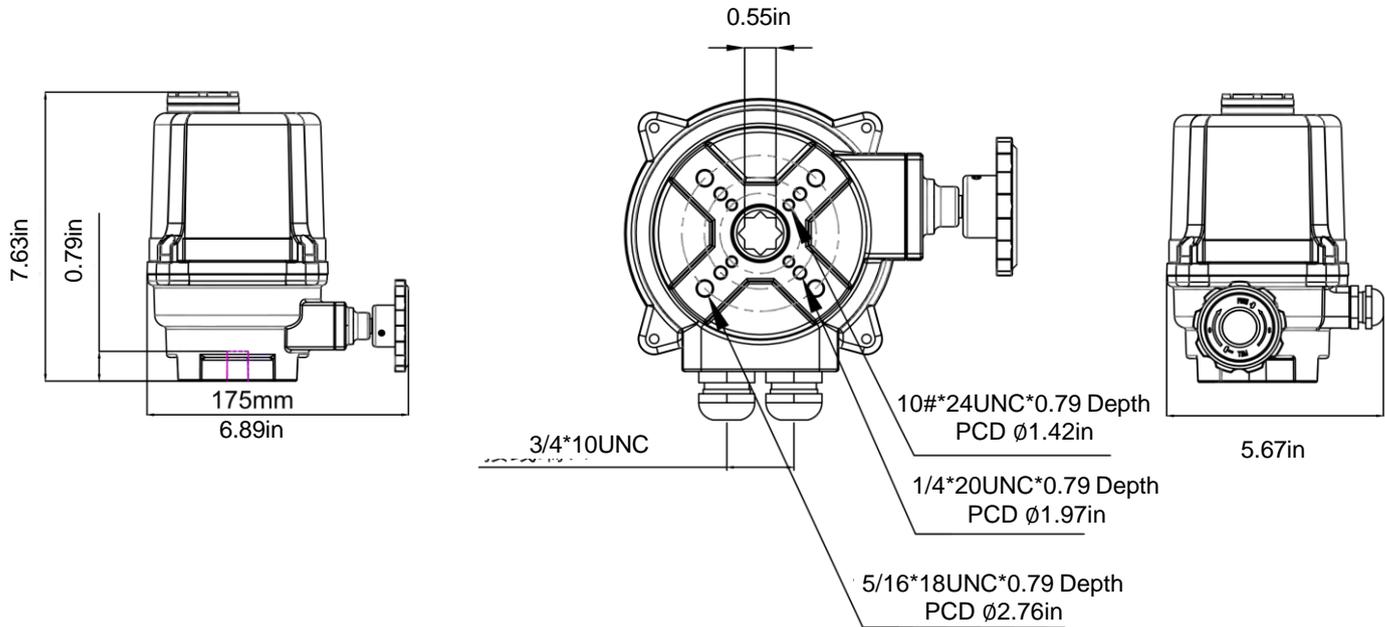
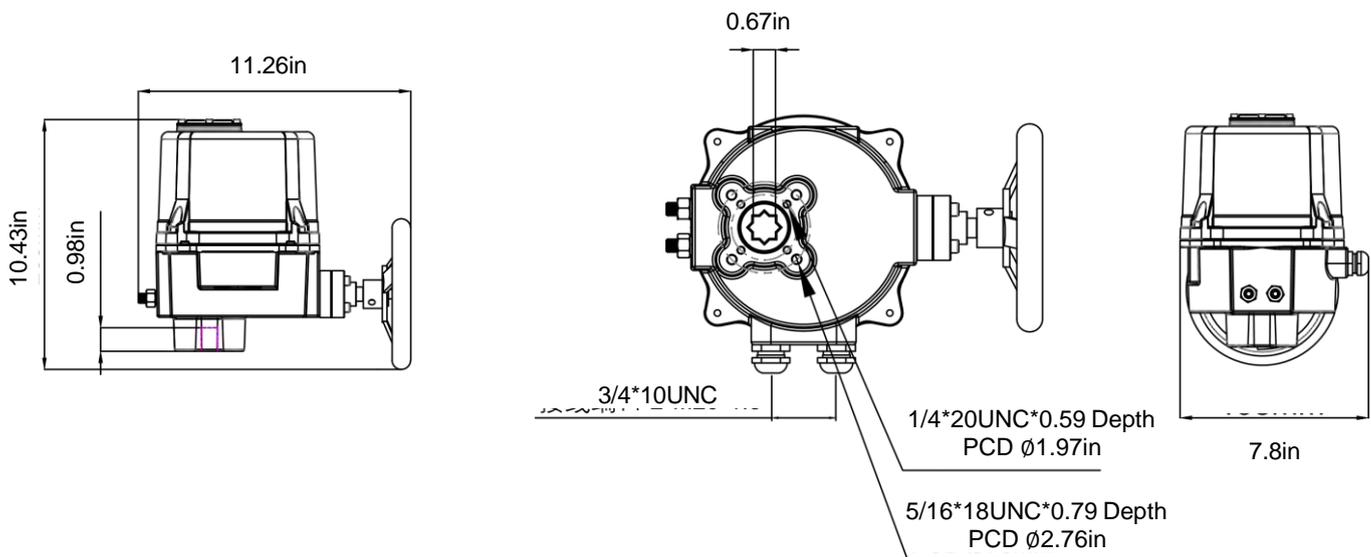
- ① - ② : Internal Heater
- ② - ③ : Open control
- ② - ④ : Close control
- ⑤ - ⑥ : Full-open switch output
- ⑦ - ⑧ : Full-close switch output

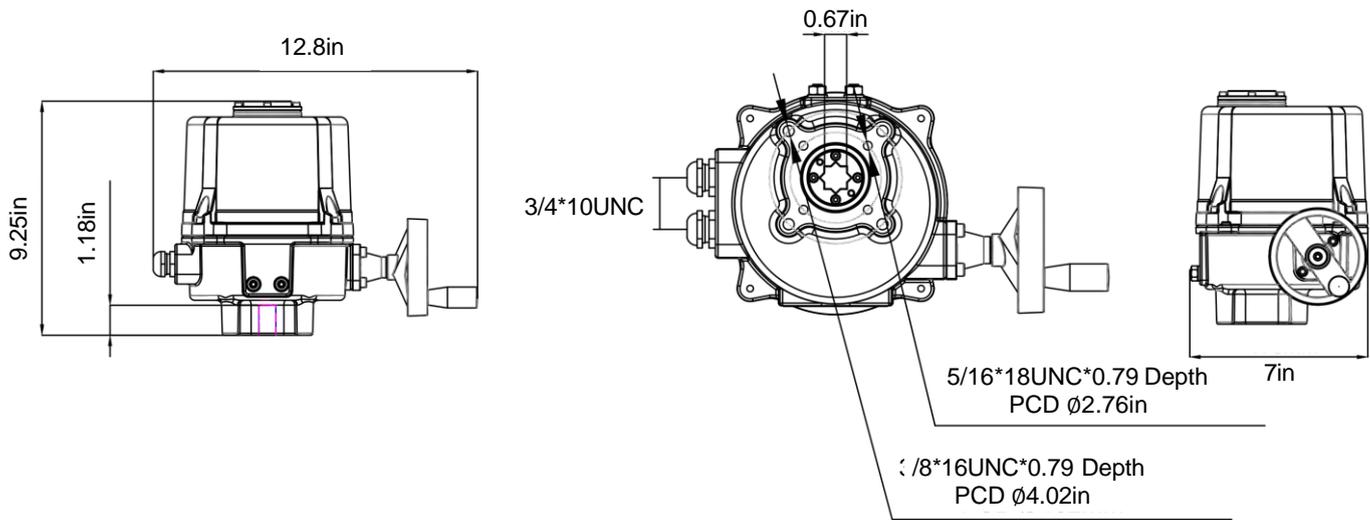
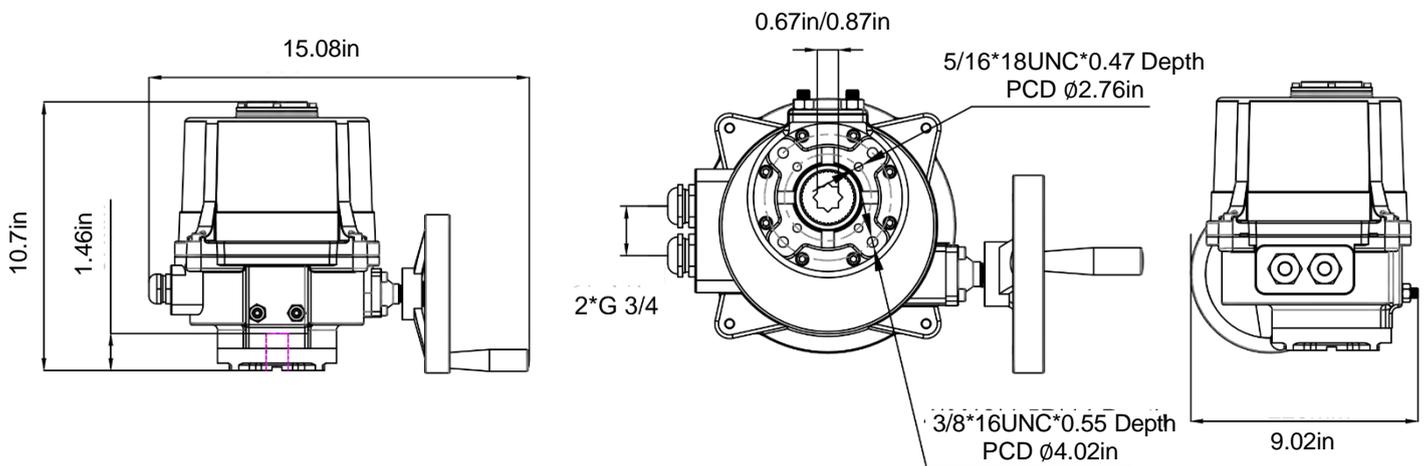
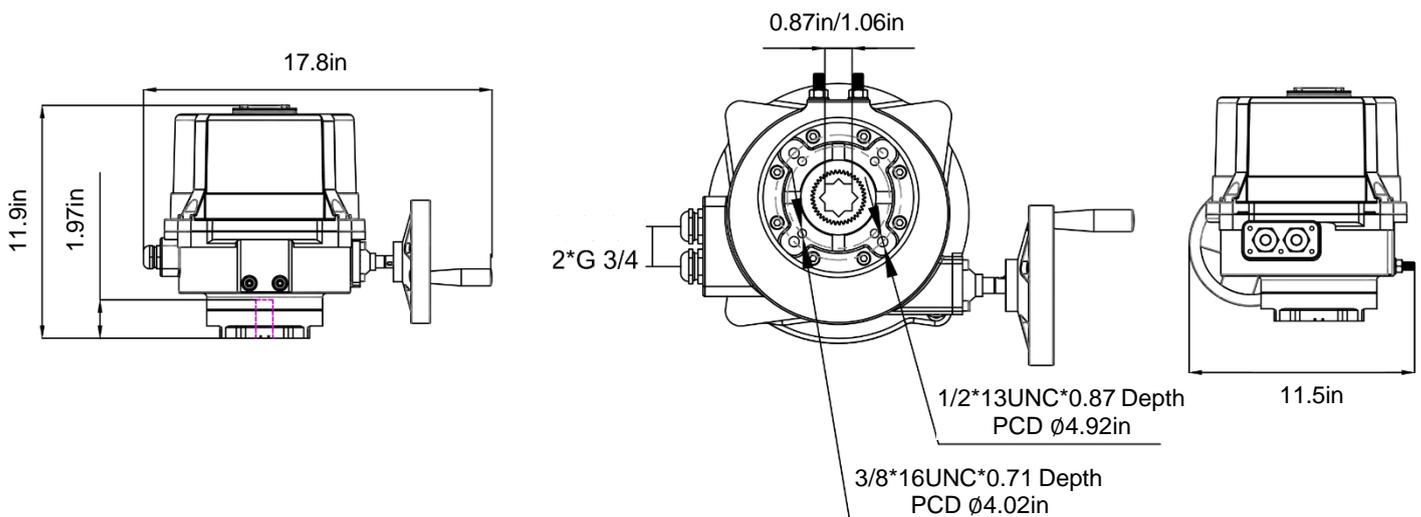


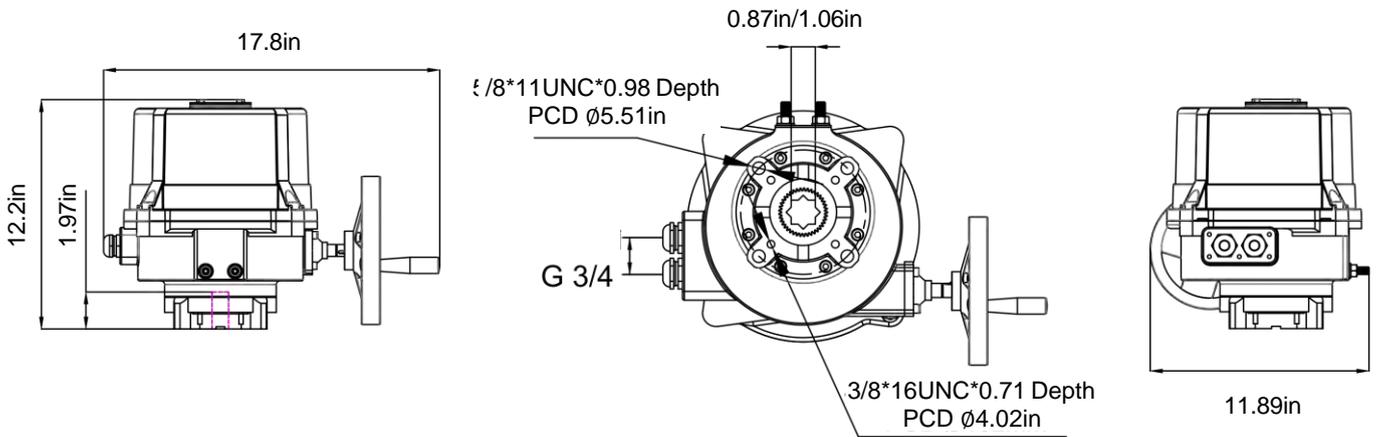
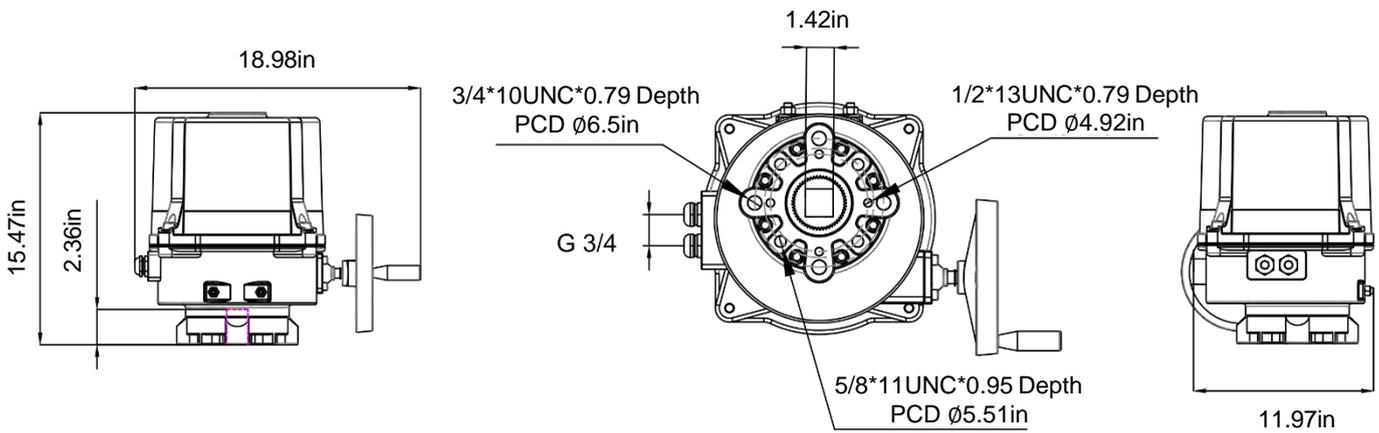
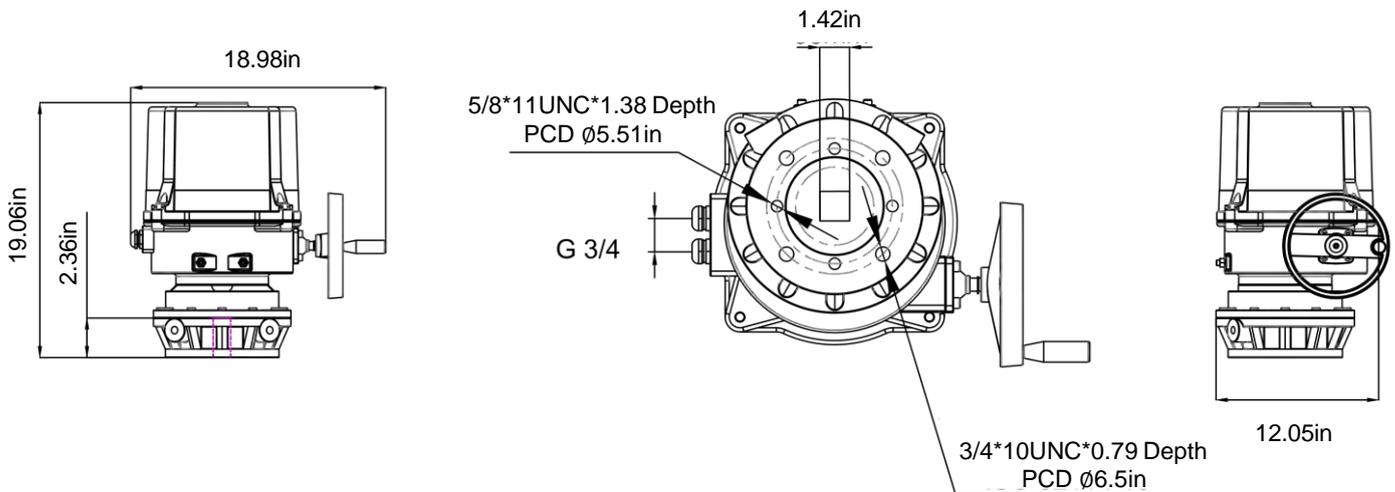
- ① : GND
- ② - ⑧ : Internal Heater
- ② - ③ : Open control
- ② - ④ : Close control
- ⑤ - ⑥ : full-open switch output
- ⑤ - ⑦ : full-close switch output

VTM series Electric Actuator Wiring Diagram
VTM Modulating Version Wiring Diagram (24VDC) with battery backup

VTM Modulating Version Wiring Diagram (120VAC/220VAC) with battery backup


VTMS Series Electric Actuator Dimensions
VTM0S Dimensions

VTM1S Dimensions


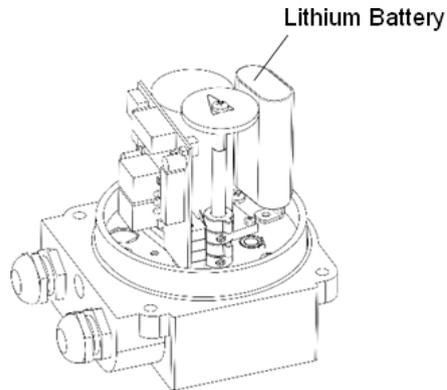
VTMS Series Electric Actuator Dimensions
VTM1H Dimensions

VTM2H Dimensions


VTM Series Electric Actuator Dimensions
VTM2 Dimensions

VTM3 Dimensions

VTM4 Dimensions F10-F12


VTM Series Electric Actuator Dimensions
VTM4 Dimensions F14

VTM5 Dimensions

VTM5+G Dimensions


VTM Battery Backup Options introduction

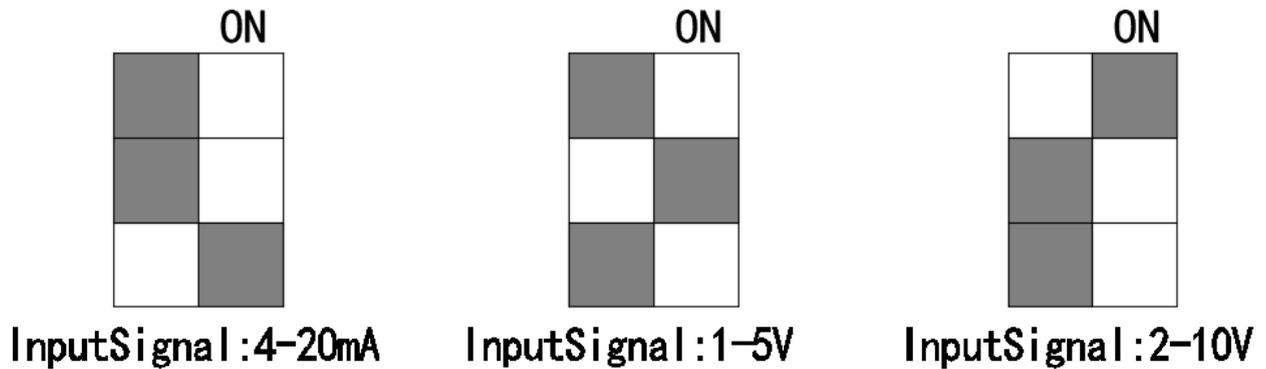
When the VTM is powered off and the valve is not in the fail position, the product will use its backup battery to drive the motor to operate the valve to the fail position. This backup battery will be charged with daily use. The lithium batteries have reserve power to operate the actuator up to 10 times in a brief time



Input signal setting

Analog Input signal can be selected via the 3 dip switches on the Control Card. Factory default setting is for 4-20 ma unless ordered otherwise. See diagrams below for selecting: 4-20ma, 1-5vdc, 2-10vdc.

After changing the input signal setting, it is necessary to calibrate the input signal again.



Configuration Instructions for Battery Backup version

There are four key parameters that can be configured in the VTM Series Electric Actuator:

1. The open and close stop limits can be configured between 0° and 360° rotation.
2. The fail position for input signal loss can be configured as OPEN, CLOSE or STOP (LAST).
3. The fail position for power loss can be configured as OPEN, CLOSE, or a specific position between 0 and 100% rotation.
4. The Power Loss Fail function can be enabled or disabled; with this function enabled, the actuator will fail to the selected position upon power loss; with this function disabled, the actuator will remain in the last position upon power loss.

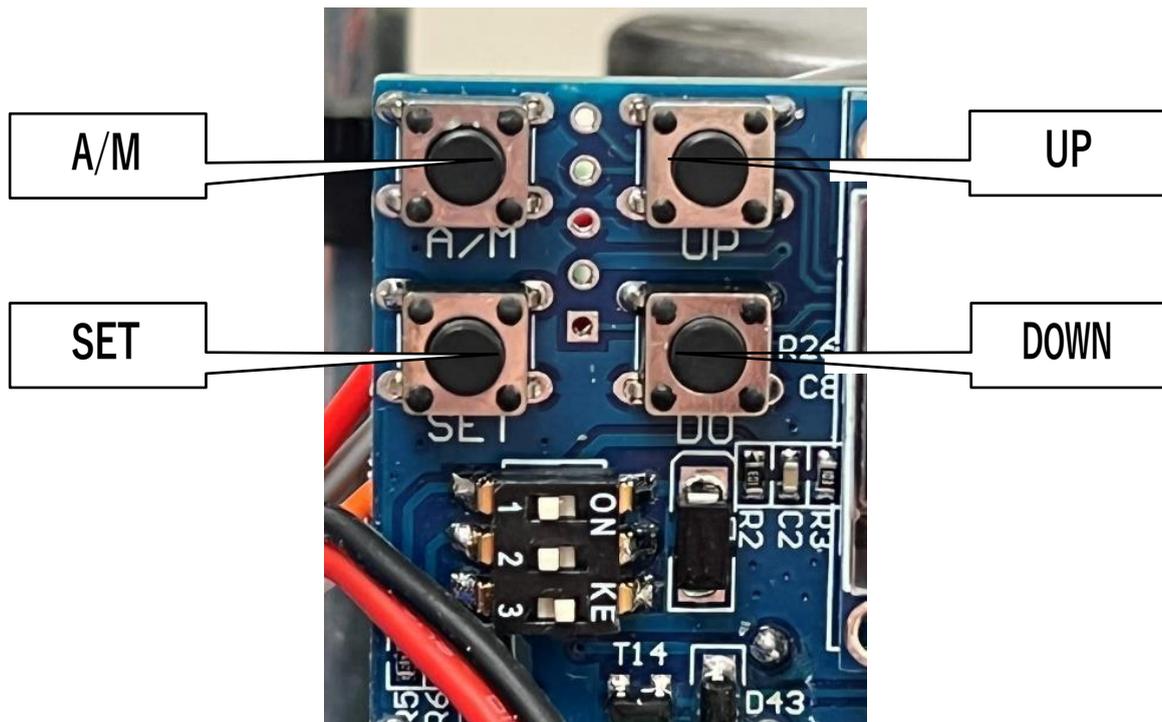
All configuration functions are performed using the four buttons in the upper left corner of the Control Card.

A/M – Auto/Manual or Remote/Local; also functions as esc button to return to prior menu

UP – Up button; increases values or moves up a row in the menu

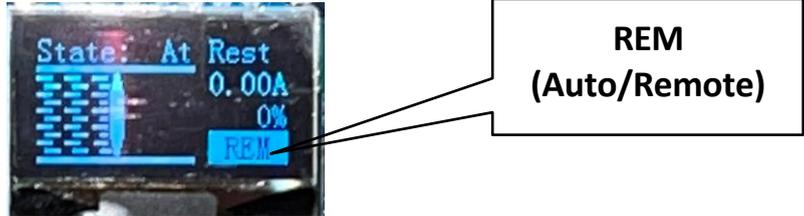
SET – functions as the enter button

DO – Down button; decreases values or moves down a row in the menu



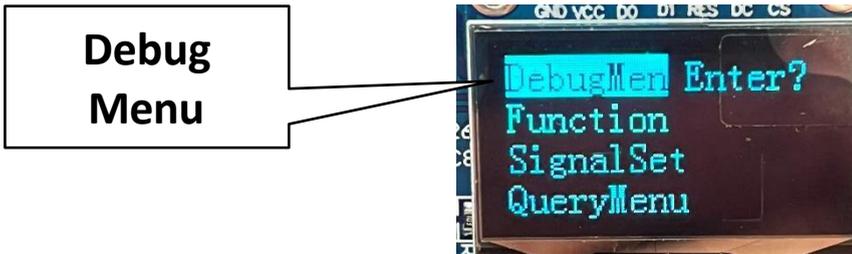
NOTE: The A/M button must be set to Auto (display will show REM) prior to starting configuration process.

NOTE: The A/M button must be set to Manual (Local) to operate the handwheel and manually rotate the actuator/valve



CONFIGURING STOP LIMITS

1. The stop limits are configured on the control card by selecting corresponding resistance value (ohms) of the 0-1000 ohm potentiometer that corresponds to the actuator rotation (degrees) as shown in chart below for the desired Closed and Open positions. The stop limits can be set anywhere between 0° and 360°.
2. To set the closed position, the actuator should be mounted on valve with the valve in the CLOSED position.
3. Hold down the DO button for 5 seconds until the menu appears as shown below



4. "Debug Men" will appear on the first row of the menu. Push the SET button to enter the Debug menu
5. Set the Close position by selecting "SetClose" and pushing the SET button as shown below

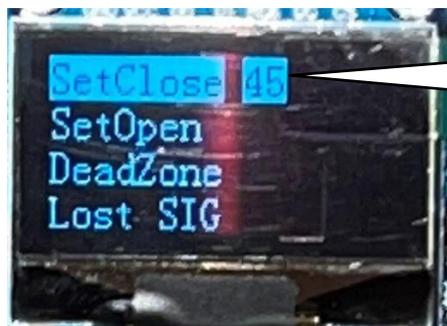


6. The CLOSE and OPEN positions are set according to the position of the 0-1000 Ohm potentiometer output resistance values (ohms) corresponding to the actuator rotation (in degrees) from the chart below:

VTM Calibration Chart

| Pot. Ohms | Degrees Rotation |
|-----------|------------------|
| 45 | 0 |
| 245 | 90 |
| 450 | 180 |
| 685 | 270 |
| 920 | 360 |

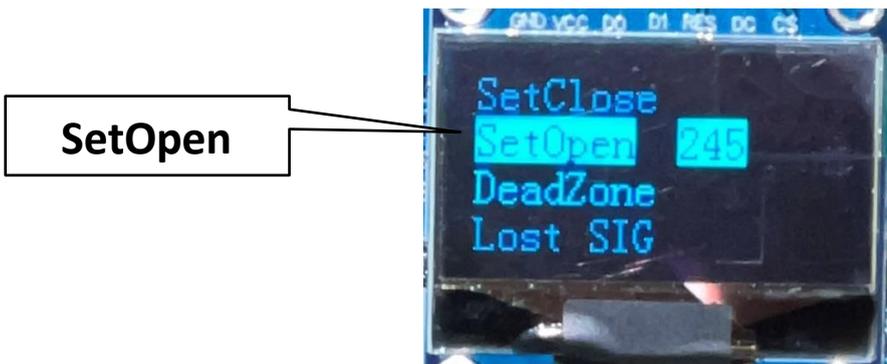
7. Set the CLOSE position by increasing or decreasing the resistance value (in ohms) using the UP and DO buttons to select the appropriate value. Example: if the desired CLOSE position is 0°, then the “SetClose” value should be set to 45.



SetClose set to 45 ohms

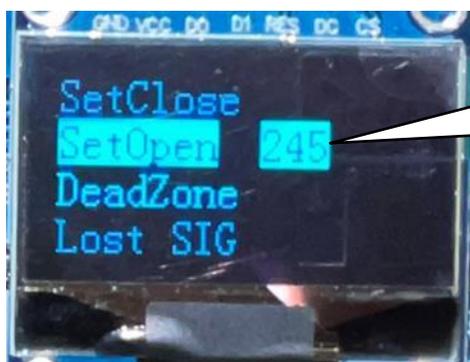
8. As you increase or decrease the “SetClose” value, the actuator/valve will rotate to the selected position.
9. Use the UP and DO buttons to fine tune the exact stop limits for the actuator/valve. The final number may be slightly different than the values shown in the chart depending on the valve and mounting arrangement.
10. Once the final value is determined, push the SET button to save the value

11. To set the OPEN position, select “SetOpen” by scrolling down the menu using the DO key and pushing the SET button.



SetOpen

12. Select the OPEN position by increasing or decreasing the resistance value (in ohms) using the UP and DO buttons to select the appropriate value. Example: if the desired OPEN position is 90°, then the SetOpen value should be set to 245.



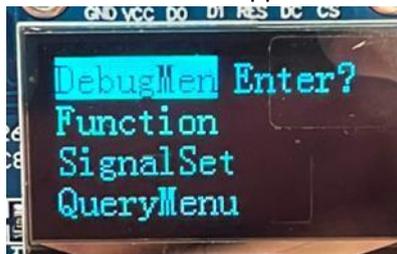
SetOpen to 245 ohms

13. As you increase or decrease the “SetOpen” value, the actuator/valve will rotate to the selected position.
14. Use the UP and DO buttons to fine tune the exact stop limits for the valve. The final number may be slightly different than the values shown in the chart depending on the valve and mounting arrangement.
15. Once the final value is determined, push the SET button to save the value

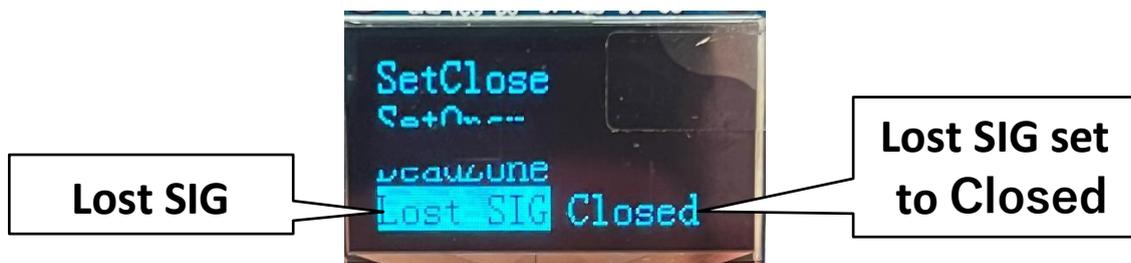
CONFIGURING INPUT SIGNAL LOSS FAILURE POSITION

This configuration will allow the user to select the position the actuator will assume if the input signal is lost.

1. Hold down the DO button for 5 seconds until the menu appears



2. “Debug Menu” Enter will appear on the first row of the menu. Push the SET button to enter the Debug menu
3. Scroll down the menu using the DO button until you reach the “Lost SIG” parameter and push the SET button to enter the parameter



4. Choose the desired Signal Loss Failure position using the UP and DO keys:
 - a. OPEN – upon input signal loss the actuator will rotate to the OPEN position
 - b. CLOSED - upon input signal loss the actuator will rotate to the CLOSED position
 - c. STOP - upon input signal loss the actuator will remain in the LAST position the actuator was in prior to input signal loss
5. Once the desired value is selected, push the SET button to save the value

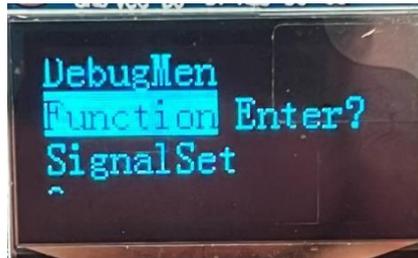
CONFIGURING THE POWER LOSS FAIL POSITION

This configuration will allow the user to select the position the actuator will assume if the supply power is lost. The power loss fail position can be set to any position between 0 and 100% of the configured stop limits.

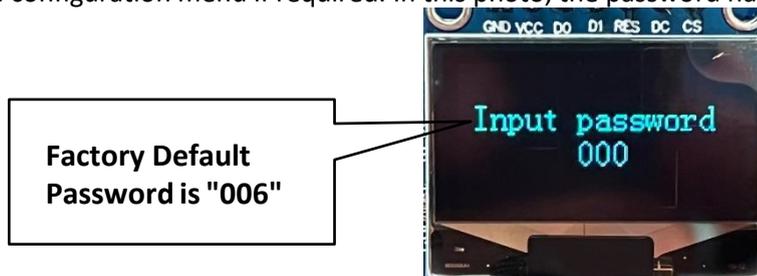
1. Hold down the DO button for 5 seconds until the menu appears



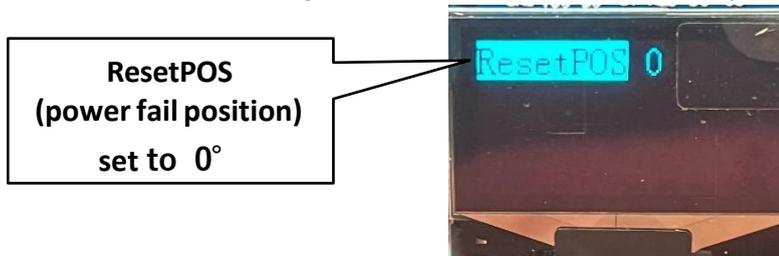
2. Using the DO button to scroll down to "Function" and push the SET button to enter



3. After pushing SET button to enter, there will be a prompt for the password. The factory default password is "006". Push the SET button to enter the password. The password may be changed to another 3-digit number in the configuration menu if required. In this photo, the password has been changed to "000".



4. Scroll down the menu using the DO button to "ResetPOS" and push the SET button to enter



5. Select the desired power loss fail position by using the UP and DO buttons. The value may be any number between 0 and 100% of the configured rotation of the actuator/valve.
6. Once the desired value is selected, push the SET button to save the value

CONFIGURING THE POWER LOSS FAIL FUNCTION

This allows the user to enable or disable the Power Loss fail function

1. Hold down the DO button for 5 seconds until the menu appears



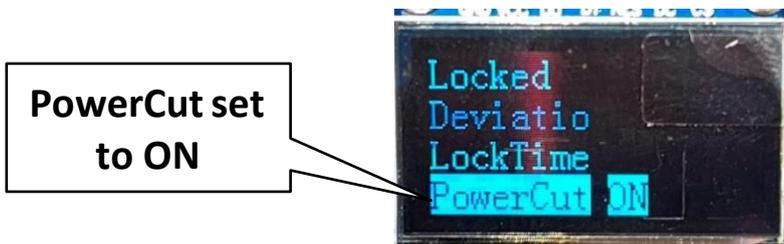
2. Using the DO button to scroll down to "Function" and push the SET button to enter



3. After pushing SET button to enter, there will be a prompt for the password. The factory default password is "006". Push the SET button to enter the password. The password may be changed to another 3-digit number in the configuration menu if required. In this photo, the password has been changed to "000".



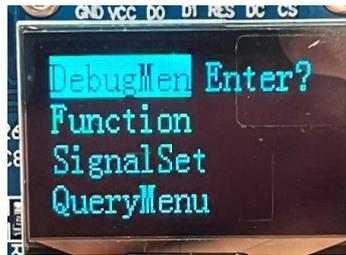
4. Scroll down the menu using the DO button to "PowerCut" and push the SET button to enter



5. Select "ON" to enable the Power Loss Fail function or select "OFF" to disable the Power Loss Fail function.
6. Once the desired value is selected, push the SET button to save the value

CONFIGURING INPUT SIGNAL

1. This section will explain how to set the low and high signal inputs for the actuator. Normally, for a modulating control M1 option (4-20ma), the factory default is to have the low signal set for 4ma and 0%; the high signal set at 20ma and 100%. This can be changed by the user to any range required, including reverse or split control.
2. In the example shown below we will set the input signals with 4ma input as the low signal at 0% and with 20ma as the high signal at 100%. This means that when 4ma is sent to the actuator, the actuator will rotate to 0% and when 20ma is sent to the actuator it will rotate to 100%.
 - a. The position for 0% and 100% is determined by the configuration steps above in setting the stop limits.
3. Connect a 4-20ma signal generator to the input signal terminals
4. To adjust the Low Signal (Low Sig) input
5. Hold down the DO button for 5 seconds until the menu appears as shown below



6. Scroll down to the Signal Set and push the SET button to enter the Signal Set menu



7. To calibrate the Low Signal, push SET button
8. Set input from signal generator to 4ma
9. Adjust the Low Signal to 0.0%, push SET button to save
10. To calibrate the High Signal, scroll down to the HighSIG and push SET button



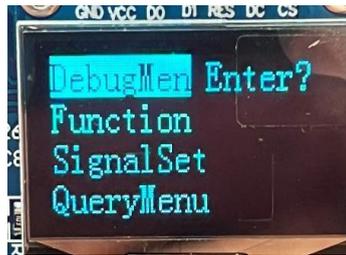
11. Set the input from the signal generator to 20ma
12. Adjust the HighSIG to 100% and push SET button to save

If the application calls for a different range, simply set the Low Signal at the % of the stop limits desired and the High Signal at the % of the stop limits desired.

If the application requires the Low Signal to be rotate the actuator to 100%, apply the low input signal and adjust the LOW SIG to 100%. In the case above, you could configure the actuator to open at 4ma and close at 20ma for reverse modulating control.

CONFIGURING POSITION OUTPUT SIGNAL

1. The analog output signal represents the position of the actuator which is an output of the potentiometer through the control card to the terminal board.
2. To set the position outputs for 4ma as the Low Position and 20ma as the High Position:
3. Connect a multimeter capable of measuring milliamps to the position output terminals
4. To set the Low Position output at 4ma which would correspond to the 0% position of the actuator determined by the Stop Limits:
5. Hold down the DO button for 5 seconds until the menu appears as shown below



6. Scroll down to the Signal Set and push the SET button to enter the Signal Set menu



7. Select LOW POS and push the SET button.
8. Adjust the LOW POS output signal using the UP and DO buttons until the multimeter indicates 4ma.
9. Push the SET button to save.
10. To set the High Position output at 20ma which would correspond to the 100% position of the actuator determined by the Stop Limits:
11. Hold down the DO button for 5 seconds until the menu appears as shown below



12. Scroll down to the Signal Set and push the SET button to enter the Signal Set menu



13. Select High POS and push the SET button.

14. Adjust the High POS output signal using the UP and DO buttons until the multimeter indicates 20ma.

15. Push the SET button to save.