



<https://www.tacticalflowmeter.com/>

Remit to: Take 5, Inc.  
22642 Indian Springs Road, Salinas, CA 93908  
(831)-455-0418

[Dave@TacticalFlowMeter.com](mailto:Dave@TacticalFlowMeter.com)

Modulating Ball Valve 24 VDC Power

4-20 mA control signal

## **QUICK User Manual**

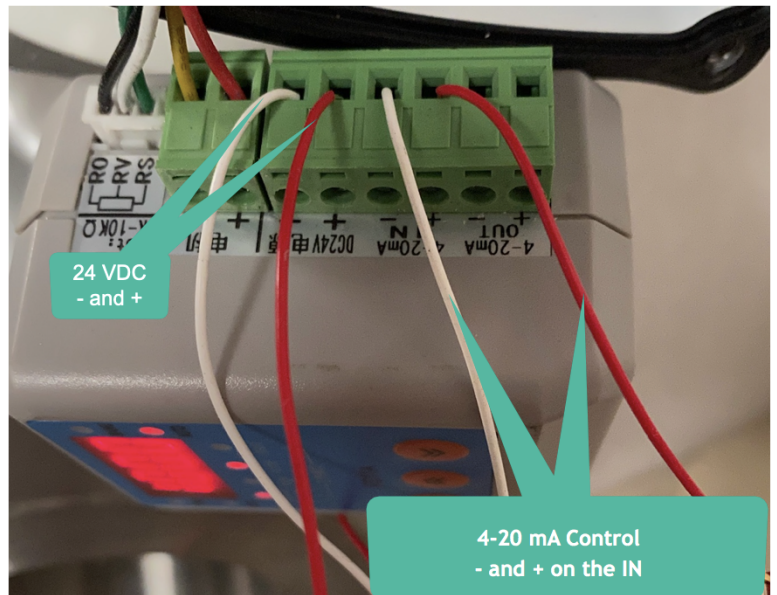


Take 5, Inc.  
22642 Indian Springs Road  
Salinas, CA 93908  
Dave.Korpi@TacticalFlowMeter.com  
Call 831-455-0418

## Modulating Control Valve:

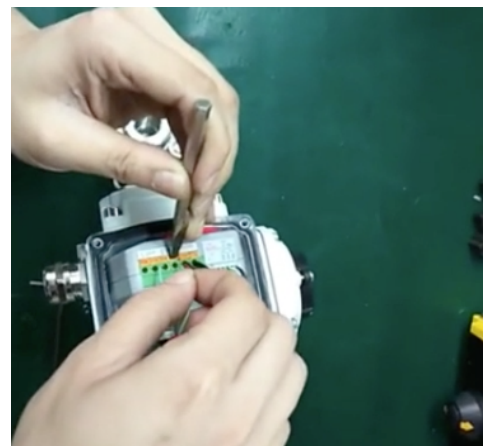


## General TFM Series Modulating Control Valves



## Video

[Link](#) Click the link, or the video, to see the video of the valve and how to hook up and note response time.



**Positioner Junction Facet**

- + OUT - : 4-20mA Output Signal
- + IN - : 4-20mA Input Signal
- L N : 24 VDC Power

**Internal Positioner**

- COM OPEN SHUT : Positioner Control
- RS RV RO : Positioner Feedback

**Electric Actuator**

- COM OPEN SHUT : Actuator Control
- 0% 100% : Actuator Feedback

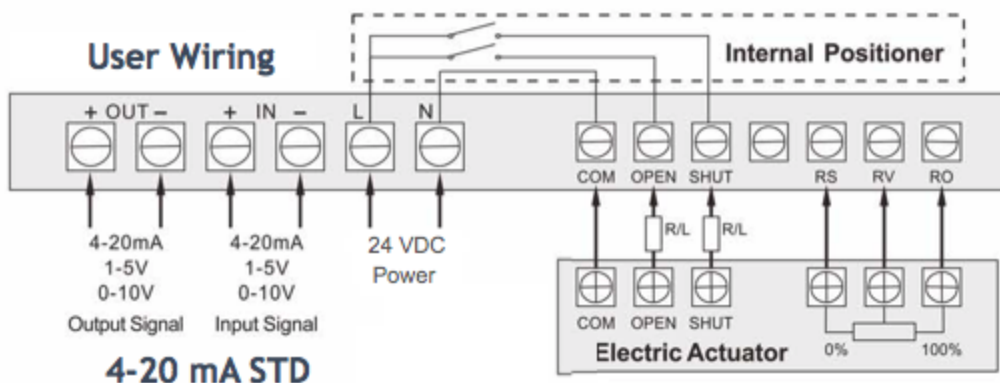
**RD connect 24V positive**  
**BK connect 24 V gnd and - 4-20 mA GR + 4-20mA**  
**YW connect ERR output ,OC output (Optional)**  
**WT OC output PWM signal (Optional)**

Provide 24 VDC and feed 4 mA for valve off and 20 mA (between GR and BK) for full open.

Integrate with a PID controller to use the 4-20 mA Flow Signal and provide a setpoint to the PID Controller to attain the desired setpoint.

Note: The current required for the valve motor is a function of valve size.

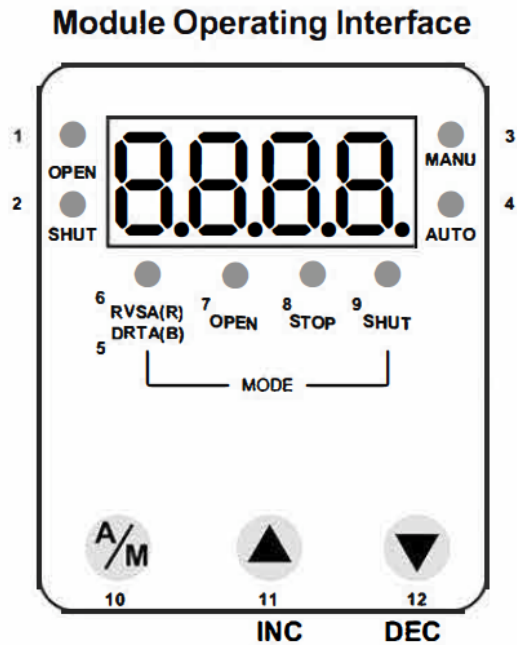
**4-20 mA is Self Powered. Do not put 24 VDC into 4-20 mA**



## Valve specifications

Variable	4" Valve	6" Valve
150# ANSI Size	4"	6"
Maximum working pressure	1.6 MPA, 232 PSIG	1.6 MPA, 232 PSIG
Fluid medium	Fluid, air	Fluid, air
Rated voltage	24 VDC 4 Amps max, 3.6 A running	24 VDC 6 Amps max, 5.8 A running
control signal	4-20mA for off to full open, Programmable	4-20mA for off to full open, Programmable
Wiring control methods	2 wire control with feedback signal	2 wire control with feedback signal
Open/close time	≤ 10 Seconds	≤ 10 Seconds
Valve Body material	304 SS	304 SS
Actuator material	Cast Aluminum and 304 SS	Cast Aluminum and 304 SS
Sealing material	FKM & PTFE	FKM & PTFE
Actuator rotation	90°	90°
Torque force	15NM / 133 in LBF	15NM / 133 in LBF
Environment temperature	-15°C to 60°C	-15°C to 60°C
Liquid temperature	2°C to 90°C	2°C to 90°C
Manual override	Yes	Yes
Indicator	Yes	Yes
Enclosure Rating	IP67	IP67
Locked-rotor Current	3 A	6 A
Locked-rotor Delay Time	2-4s	2-4s

## User Interface



Status indication	1	OPEN	Output control "open"
	2	SHUT	Output control "shut"
	3	MANU	Manual control status
	4	AUTO	Auto control status
Mode indication	5	DRTA	Clockwise Operation, the input signal corresponds to 4mA-full position (usually we calibrate it to fully open), 20mA-zero position (usually we set it to be fully closed)
	6	RVSA	CounterClockwise Operation, the input signal 4mA-full position ( set it to be fully open), 20mA-zero position (set to fully closed)
	7	OPEN	Input opening signal to make the actuator open to maximum opening degrees
	8	STOP	Input stop signal to make the actuator stop running
	9	SHUT	Input shutting signal to make the actuator shut to minimum closing degrees
Button	10	A/M	Automatic or manual mode toggle key, parameter change and toggle key
	11	▲	Values increase button, it use for switching display to original set degree of opening, when it's in automatic mode, opening action when it's maual mode
	12	▼	Values decrease button, it's use for switching display to the value of valve positioner when it's in automatic mode

## Error Codes:

Error Code	Description
E-01	The 4 ma zero position is calibrate at 4mA, but the input 4-20 current $\leq 3.0\text{mA}$ . The actuator will invoke the signal interrupt handler and show error E-01 in screen. Valve will still function.
E-03	Signal feedback lines of valve positioner and actuator may be connected in reverse or the switch lines may be inversely connected
E-05	The actuator is oscillating because of input signal or feedback signal is unstable, the PID may be "too hot" adjust your integral term or open the deadband.
E-06	The actuator isn't able to achieve the open position
E-07	The actuator isn't able to achieve to closed position
E-08	The Internal temperature of actuator is greater than 176 Degrees F or 80 Degrees C. Cool it down!

## Troubleshooting:

Fault phenomenon	Possible reason	Solution
Motor does not start	No power supply	Connect the actuator to power supply
	Electric wire broken, wiring terminals loose	Repair the wire, tighten wiring terminals
	Supply voltage is wrong or below level	Check the voltage is correct
	Overheat protector activated (ambient temperature is too high, the valve is stuck)	Reduce ambient temperature, manually open/close the valve to see if it is working
	Limit switch disfunction	Replace the limit switch
	Capacitance doesn't start or running	Replace the capacitance
Opening & dosing Indicator light doesn't light	Indicator light is broken	Replace the indicator light
	Limit switch disfunction	Replace the limit switch
	Adjusting of block disfunction	Readjustment
Opening degree changing constantly	Signal source has interference signal	Check input signal
	Voltage divider generated interference	Replace the potentiometer
	Voltage divider gear or opening gear loose	Tightening the screws to the gear



## 1. Function of electrical limit and mechanical limit

### ① Electrical stroke limit function:

When the actuator reaches at fully opened/fully closed or the middle position, the built-in electrical limit switch will cut off the circuit to protect the actuator.

### ② Mechanical limit function of output shaft:

When electrical stroke limit function fails, output shaft will be locked by mechanical limit to protect the valve from damage.

Figure 10 shows the position relationship between electrical limit and mechanical limit.

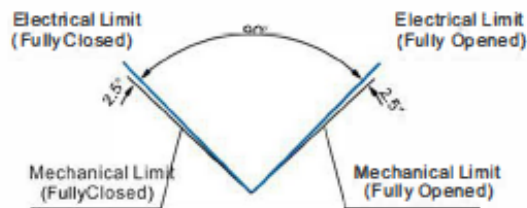
## 2. Adjustment of actuator (Figure 10)

- ① Adjust the over-travel limit stopper to zero position and full position, and ensure electrical limit position angle is 90°.
- ② Adjust mechanical position limitation base on electrical limit position angle.

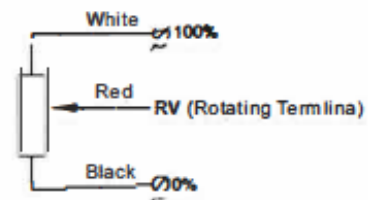
## 3. Connection of actuator with servo control module

### ● Potentiometer installation and connection (Figure 11)

- ① Finish potentiometer installation and connection according to "Commission" in previous chapter.
- ② Use multimeter to check resistance of potentiometer in middle opening position, and ensure it has homogeneous continuous variable from 0-100% opening.

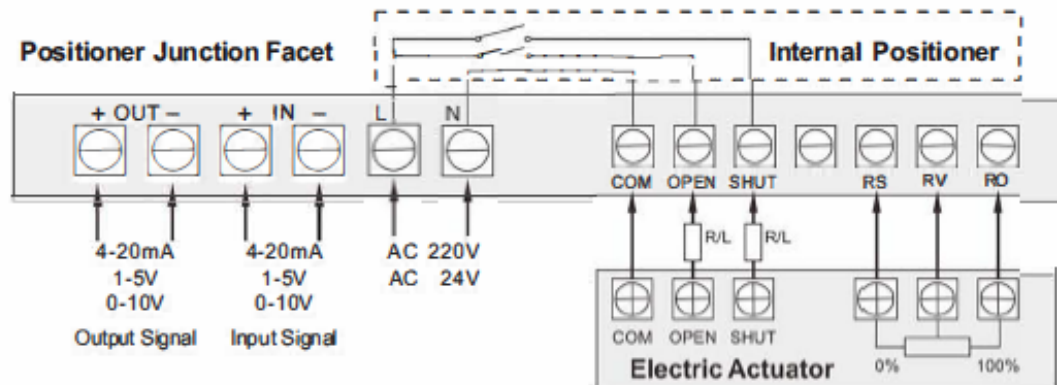


(Figure 10)

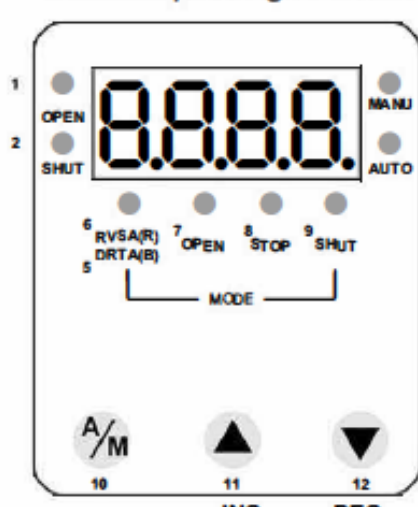


(Figure 11)

### ● Electrical wiring of the servo control module (Figure 12)



(Figure 12)

Module Operating Interface				
 <p>The diagram shows a control module with a 4-digit LCD display showing '8.8.8.8'. It has several buttons: 1 (OPEN), 2 (SHUT), 3 (MANU), 4 (AUTO), 5 (MODE), 6 (RVSA(R)/DRTA(B)), 7 (OPEN), 8 (STOP), 9 (SHUT), 10 (A/M), 11 (INC), and 12 (DEC).</p>	Status Indication	1	OPEN	Output control "open"
		2	SHUT	Output control "shut"
		3	MANU	Manual control status
		4	AUTO	Auto control status
	Mode Indication	5	DRTA	Operating by clockwise, the input signal is corresponding to 4mA-full position (usually we calibrate it to be full opening), 20mA-zero position (usually we set it to be full closing)
		6	RVSA	Operating by anticlockwise, the input signal is corresponding to 4mA-full position (usually we set it to be full opening), 20mA-zero position (usually we calibrate it to be full closing)
		7	OPEN	Input opening signal to make the actuator open to maximum opening degree
		8	STOP	Input stopping signal to make the actuator stop running
	Button	9	SHUT	Input shutting signal to make the actuator shut to minimum closing degree
		10	A/M	Automatic or manual mode toggle key, parameter change and toggle key
		11	▲	Values increase button, it use for switching display to original set degree of opening, when it's in automatic mode, opening action when it's manual mode
		12	▼	Values decrease button, it's use for switching display to the temperature of valve positioner shell when it's in automatic mode

#### 4. Zero Calibration

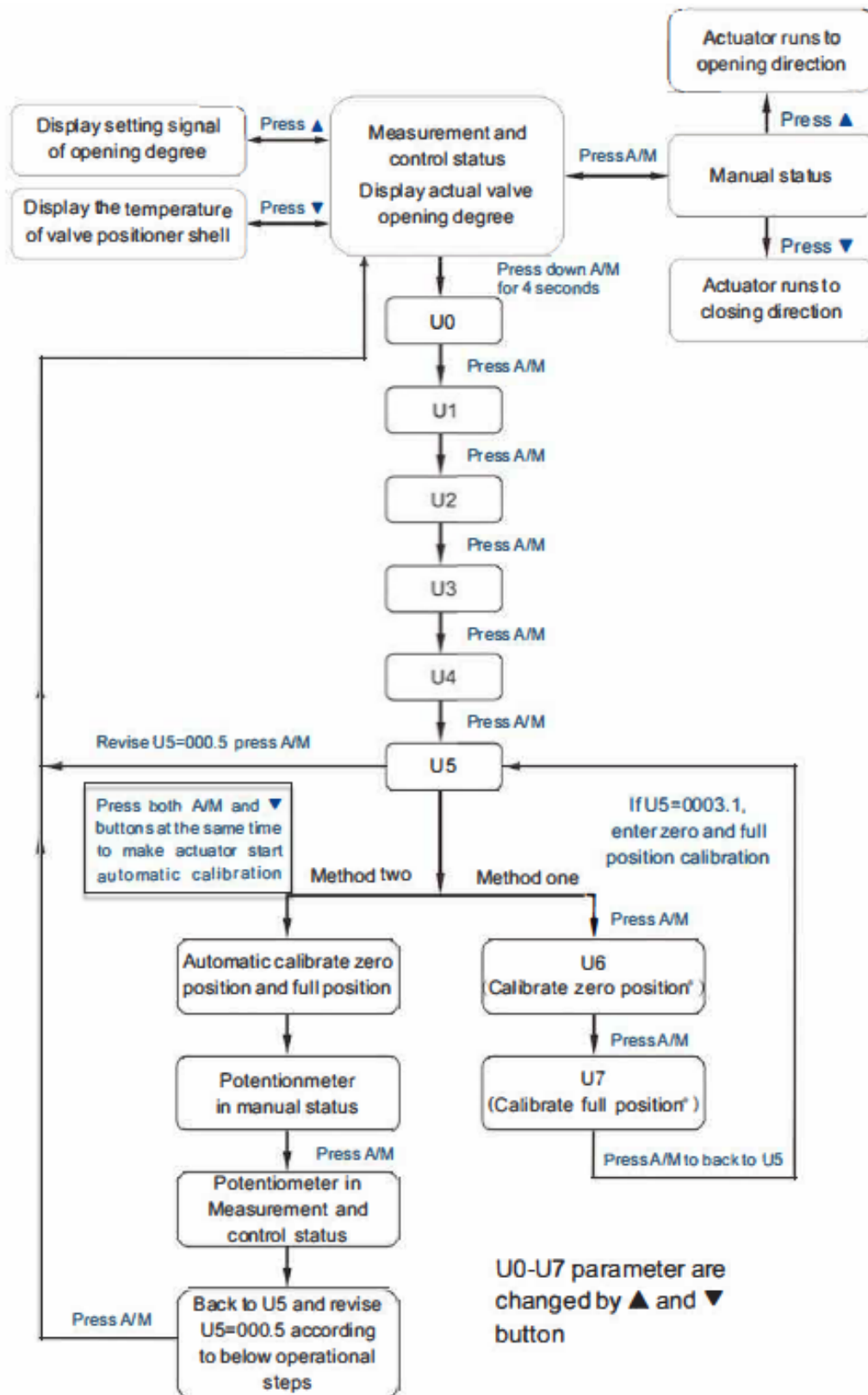
After wiring between valve positioner and actuator like Figure 12, the rotation angle has to be calibrated in the first match between positioner and actuator, after that the positioner could work correctly, the demarcation has no effect on input and output of valve positioner.

Method one: simple automatic calibration (this method request the actuator has electric limit position stopper and mechanical limit position stopper). In the automatic mode, press both A/M and buttons at the same time, then release these two buttons at the same time, the actuator will start automatic calibration and confirm the zero position (full closing) first. The valve runs to the small angle direction and reaches at minimal opening position which is judged as zero position (valve position 0.0). After that the actuator runs to maximum opening direction and reaches at maximum opening position which is judged as full position (valve position 100.0). After judgment, the actuator returns to automatic calibration and saves results by itself.

Method two: calibrate your need (this method request button idle time less than 8 seconds in the progress of calibration). In the automatic mode, press A/M button into u0 parameter, pass u1, u2, u3, u4 and into u5, revise u5=003.1, finally press A/M button.

- ① Enter u6, press ▲ or ▼ button to make actuator to run to "open" or "shut" direction, meanwhile, the screen shows the situation of actual valve opening degree is increasing or decreasing. If the opening arrival at Zero position that it's your expected position (you can see it if actuator is already assembled valve body, and the valve is set in full closing position in general), press A/M button to confirm it, enter u7 parameter.
- ② In u7 parameter, press ▲ or ▼ to run to your expected full position in the same way, and press A/M to confirm full position (you can see it if actuator is already assembled valve body, and the valve is set in full opening position in general), then back to u5.
- ③ Revise u-00.5 and back to measurement and control status.





# Simple Troubleshooting...

## **The Control box blinks -E1-**

If the box indicates -E1- it MOST LIKELY means that the 4-20 mA control is NOT CONNECTED, (be sure to seat the Multi Stranded cable securely) and make sure that there is AT LEAST 3 mA. No connection to the 4-20 mA control line will throw this error. Use a FLUKE DVM, set in the Current Mode to MAKE SURE that the 4-20 mA signal does indeed vary from 4 to 20 mA. You do NOT have to cycle the power to clear the error after you connect a proper 4-20 mA Control Signal.

This can ALSO happen if the input power is reversed momentarily. Just connect the DC 24+ to the DC24+ and the 1 to the DC 24 -. Provide at least 850 mA of current.

## **The valve does not fully close with 4 mA or does not fully open with 20 mA**

If a user happens to push the programming buttons incorrectly the controller can go out of calibration. The controller can be easily instructed to self calibrate for 4-20 mA for the 0-100% open position. Use the Automatic Calibration method shown on page 9 of the manual. Be careful with "live processes" because the valve will go from closed to full open and take about 80 seconds to complete. It does not matter what your 4-20 mA command signal is set to at this point. Details here...

Press the A/M and the DOWN button (the two OUTER buttons) AT THE SAME TIME and hold until the display circles around, like a race track, then release (3 seconds or so). The calibration has been initiated when the race track circles around and it takes about 80 seconds to complete the entire process.

If the valve is currently in the closed position it will likely display a number in the range of 28 and "measure" it for a while. If not closed it will drive the valve to the closed position and then then advance to the full open position and likely indicate a number of around 965. After a moment it will tweak the valve to the fully open position and the display will blink 100.0 indicating it is done.

Hit the A/M button to resume normal operation. The valve will go to the position commanded by the 4-20 mA signal. 4 mA (or below) is 0.0% and 12 mA is 50.0% and 20 mA is 100.0%