



VTM Series Electric Actuator

Battery Backup Type Version

1.6 Control Card

Instruction Manual



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

VTM Series Electric Actuator (Failsafe Battery Backup Version)

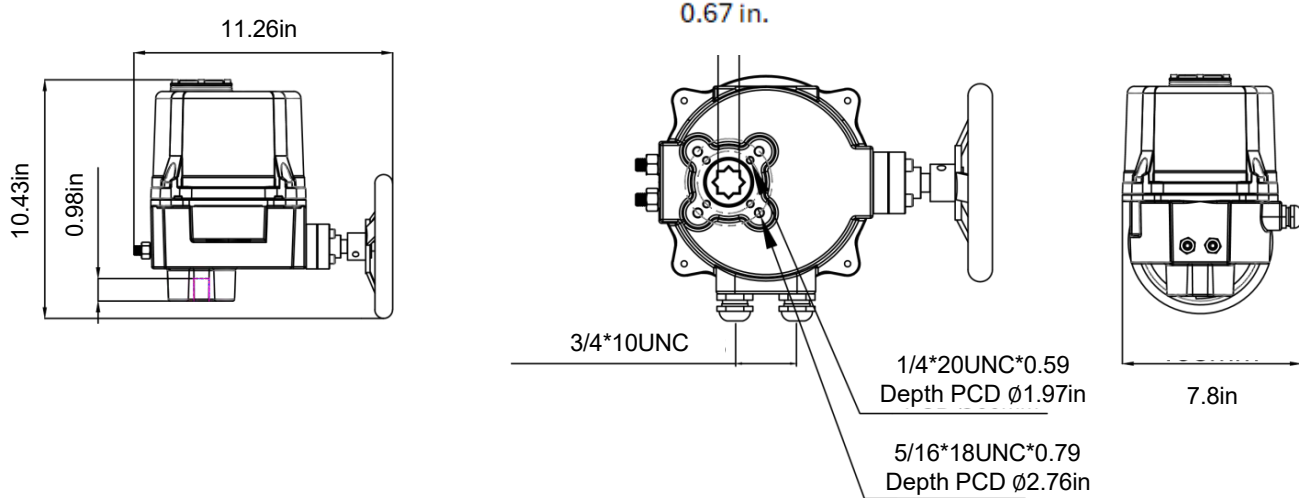
VTM Version 1.6 with Battery Backup Wiring Diagram (24VDC)

		18	
24 VDC	(-) —	17	Optional Heater or Low Temp. Heater
	(+) —	16	
CLOSE	—	15	On-Off Control Inputs (Non-powered Dry Contact Inputs Only)
	—	14	
	—	13	
	OPEN —	12	
Fault	—	11	Auxiliary Switch Outputs
	Fully Closed —	10	
	Fully Open —	9	
	Common —	8	
4-20 ma OUT	(-) —	7	Position Output
	(+) —	6	
4-20 ma IN	(-) —	5	Modulating Control Input
	(+) —	4	
24 VDC	(-) —	3	Power Supply
	(+) —	2	
		1	

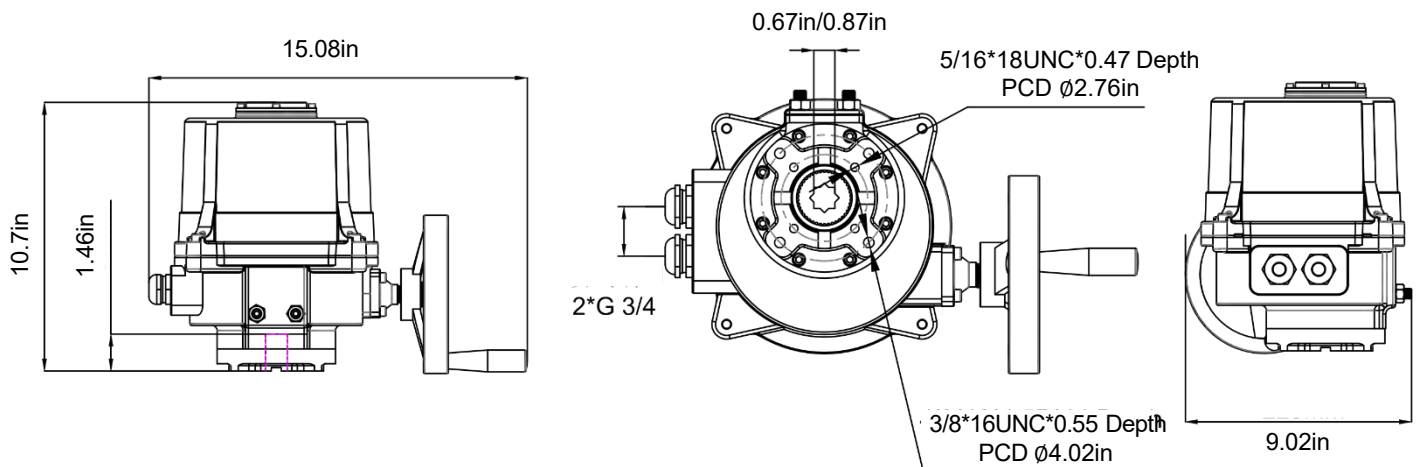
VTM Version 1.6 with Battery Backup Wiring Diagram (120VAC)

		18	
120VAC	N —	17	Optional Heater or Low Temp. Heater
	L —	16	
CLOSE	—	15	On-Off Control Inputs (Non-powered Dry Contact Inputs Only)
	—	14	
	—	13	
	OPEN —	12	
Fault	—	11	Auxiliary Switch Outputs
	Fully Closed —	10	
	Fully Open —	9	
	Common —	8	
4-20 ma OUT	(-) —	7	Position Output
	(+) —	6	
4-20 ma IN	(-) —	5	Modulating Control Input
	(+) —	4	
120VAC	N —	3	Power Supply
	L —	2	
Ground	—	1	Ground

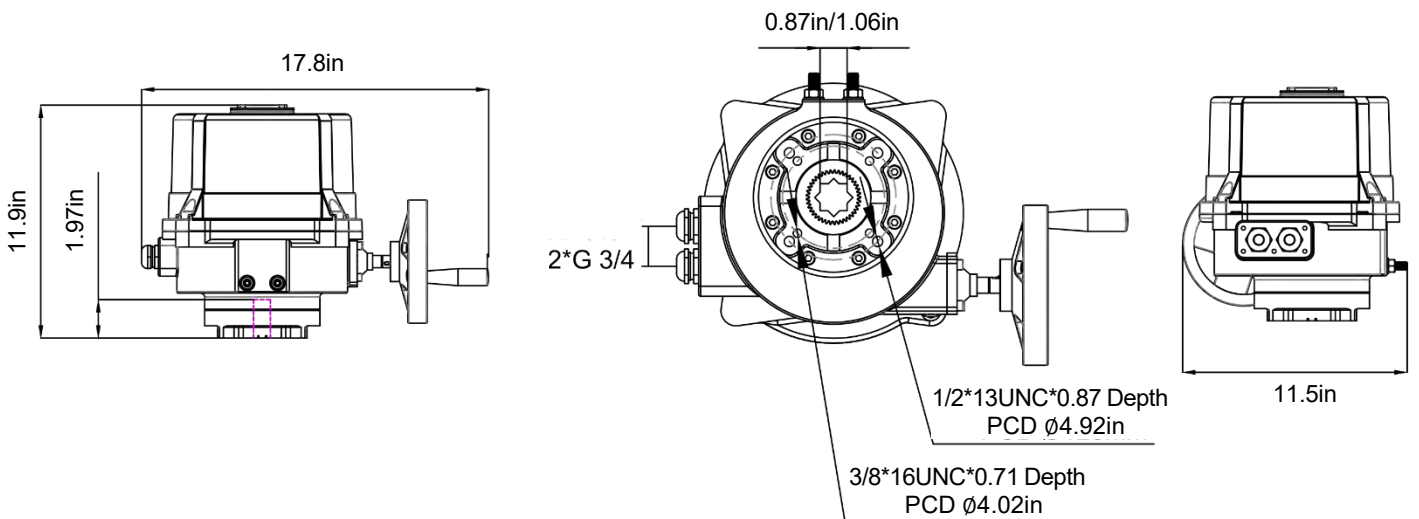
VTM2H Dimensions



VTM3 Dimensions



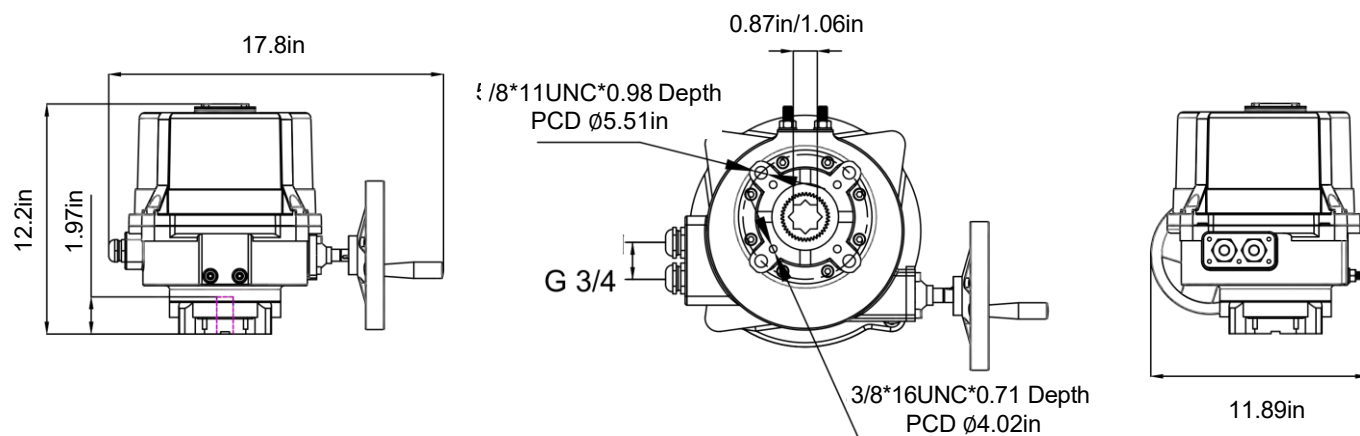
VTM4 Dimensions F10-F123



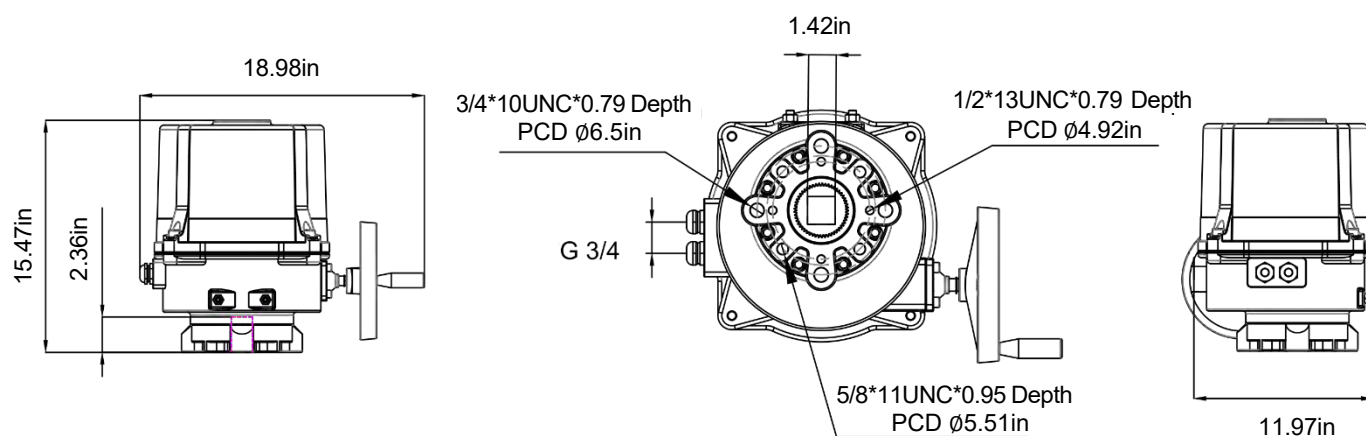
VTM Series Electric Actuator Dimensions

V-TORK USA

VTM4 Dimensions F14



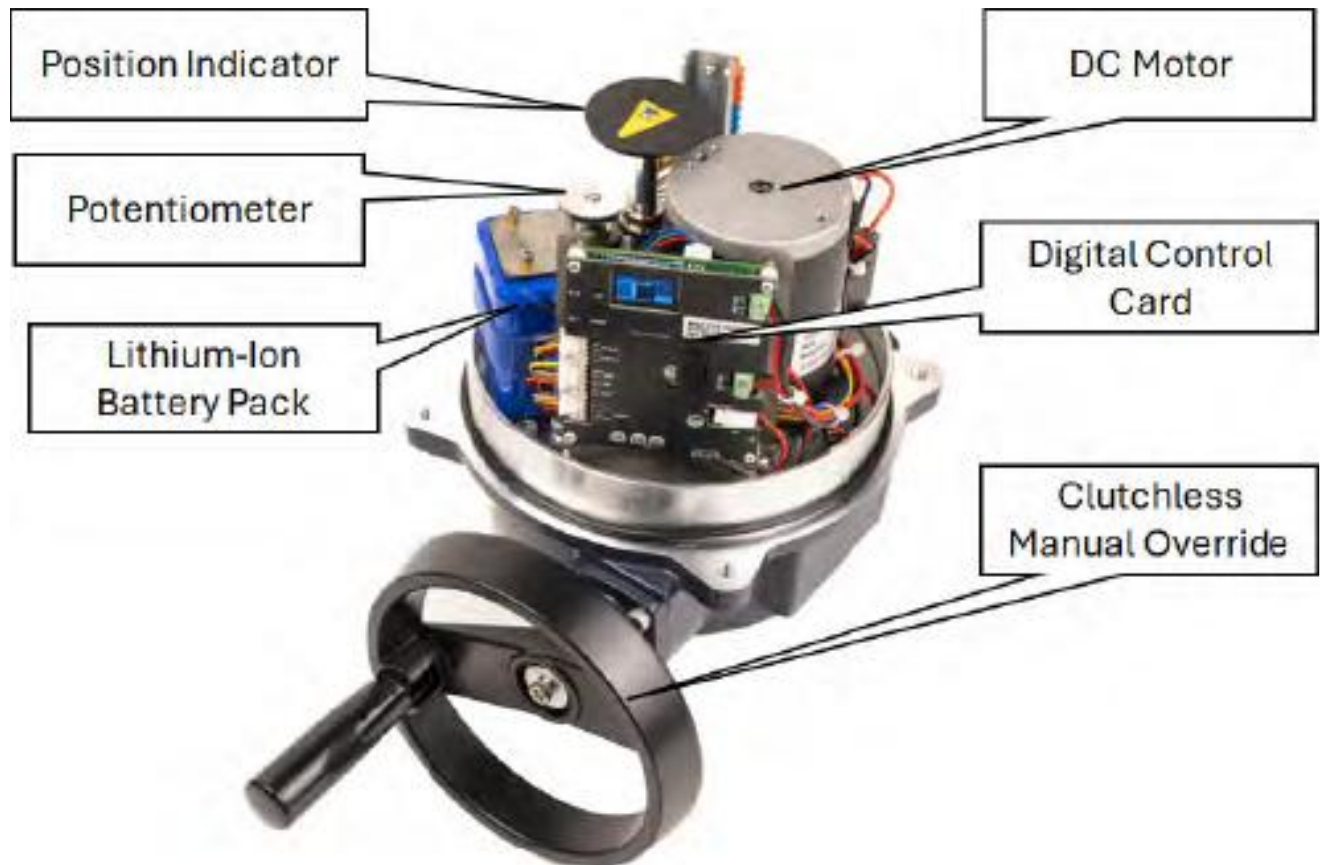
VTM5 Dimensions



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



Configuration Instructions for Battery Backup version

There are four key parameters that can be configured in the VTM Series Battery Backup 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.
5. The Control Method may be selected in the configuration process (Modulating, Keep, Switch or ESD). See page 18.

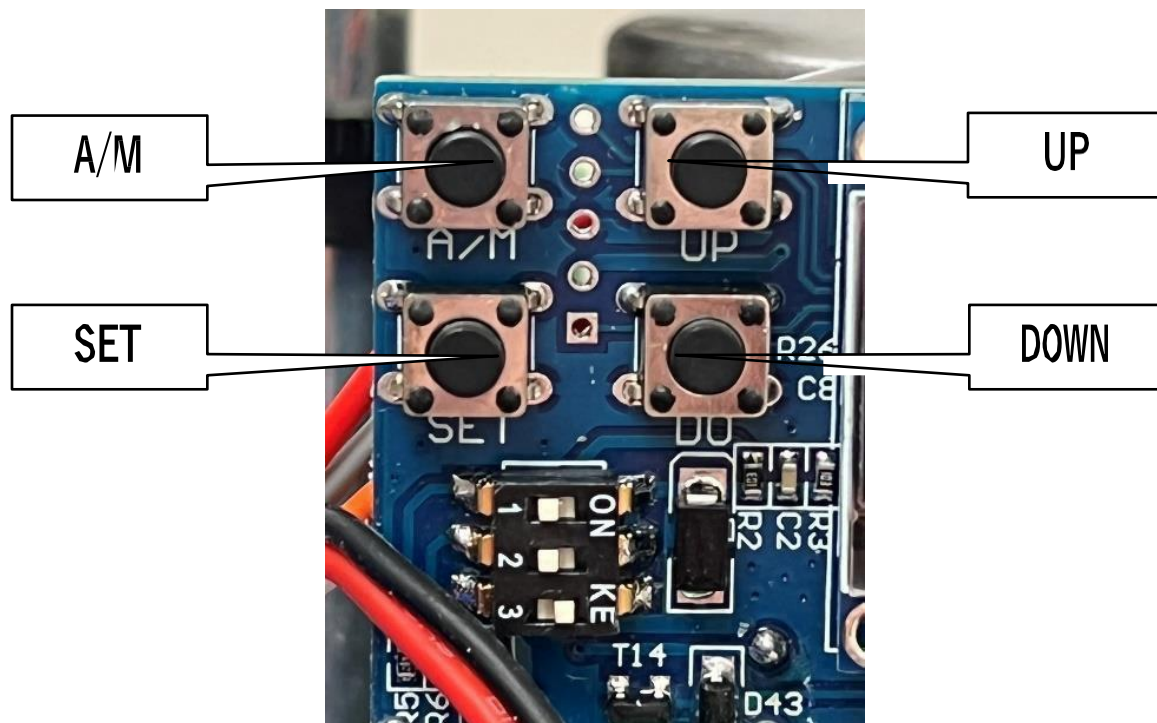
All configuration functions are performed using the four buttons in the upper left corner of the Control Card.

A/M – Auto/Manual or Remote/Local; also functions as escape 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

To configure the Torque 2:

- 1. Before configuring the VTM, verify that the Torque 2 setting is correct. The Torque 2 setting is the Torque Switch for the VTM. The Torque2 setting is the maximum current that would be supplied to the motor. Exceeding this current setting will cause the actuator to lock. Torque2 setting is found under the “Debug Men” section.



- a. The Torque2 value should be set according to the following chart:

Model	Maximum
VTM2H-35	1.3
VTM2H-70	1.5
VTM2H-140	4.0
VTM3-100	2.0
VTM3-200	3.5
VTM3-300	5.5
VTM3-450	7.2

Model	Maximum
VTM4-600	7.1
VTM4-600-10S	14.0
VTM4-800	8.0
VTM5-1000	12.0
VTM5-1500	10.0
VTM5-2300	13.0
VTM5+G-4000	13.0
VTM5+G-5000	13.0

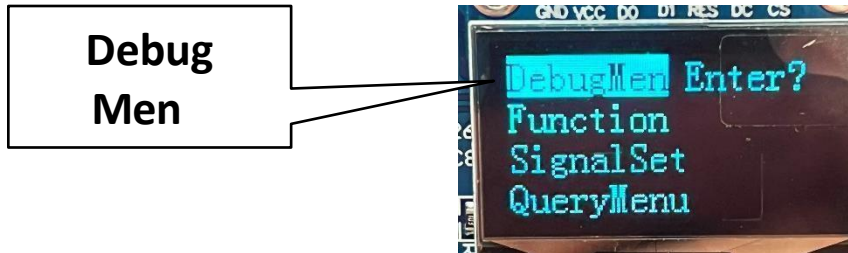


**REM
(Auto or
Remote)**

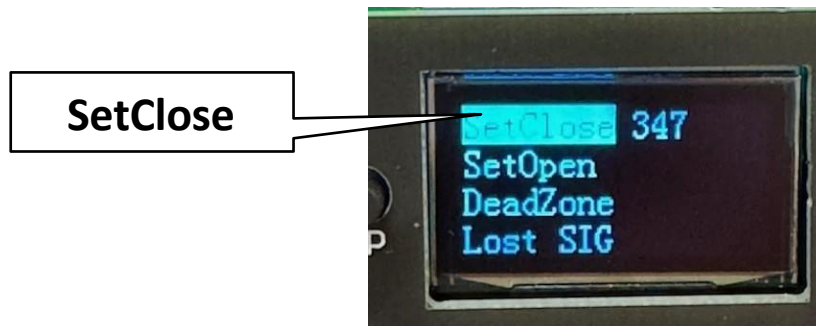
CONFIGURING STOP LIMITS

- 1. The stop limits are configured on the control card by selecting corresponding resistance value (ohms) of the potentiometer that corresponds to the actuator rotation. 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



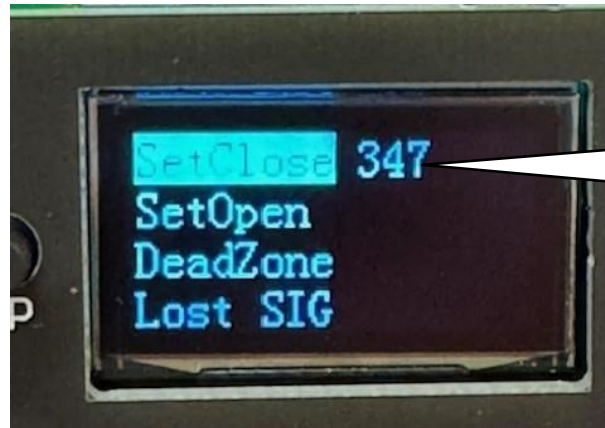
4. "Debug Men" will appear on the first row of the menu. Push the SET button to enter the Debug menu
5. Set the Close position by selecting "SetClose" and pushing the SET button as shown below



6. The CLOSE and OPEN positions are set according to the position of the potentiometer output resistance values (ohms) corresponding to the actuator rotation

CAUTION: DO NOT SET THE CLOSE POSTION AT A VALUE LESS THAN 100

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 when the valve is closed.

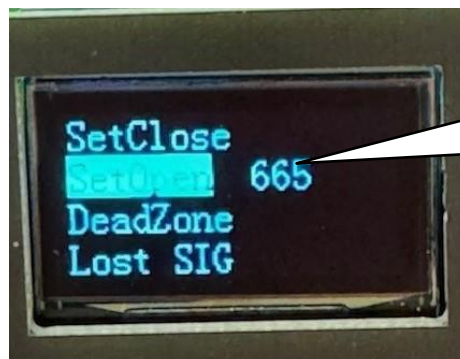


Set Close position
by pressing SET
button

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.
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.



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 once the valve is exactly open.



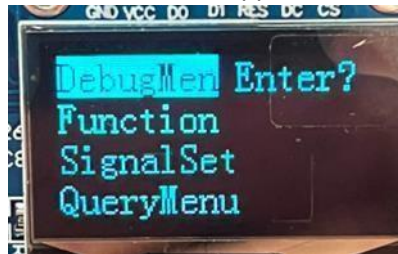
SetOpen by
pressing SET
Button

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.
15. Once the final value is determined, push the SET button to save the value

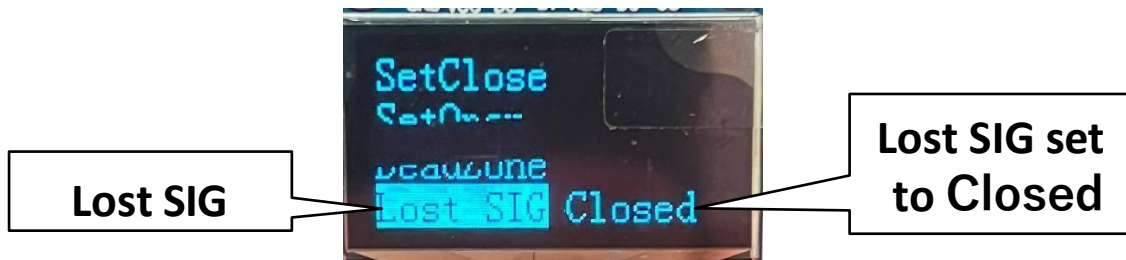
CONFIGURING INPUT SIGNAL LOSS FAILURE POSITION

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 Men” 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

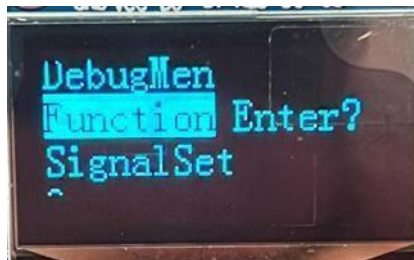
CONFIGURING THE POWER LOSS FAIL FUNCTION

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

**PowerCut set
to ON**



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

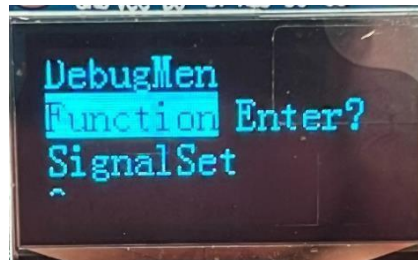
CONFIGURING THE POWER LOSS FAIL POSITION

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.

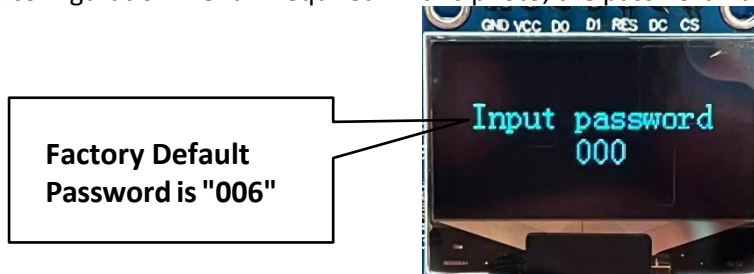
1. Hold down the DO button for 5 seconds until the menu appears



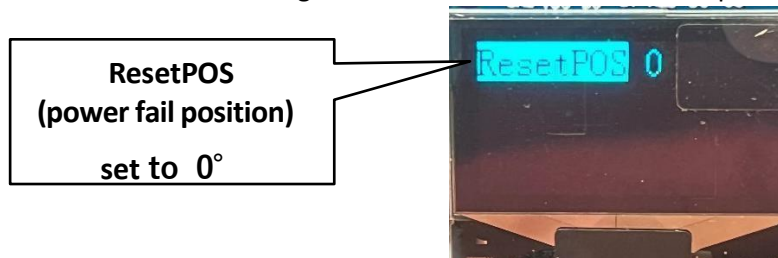
2. Using the DO button to scroll down to "Function" and push the SET button to enter



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".



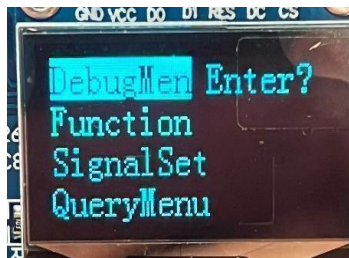
4. Scroll down the menu using the DO button to "ResetPOS" and push the SET button to enter



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 INPUT SIGNAL

1. This section will explain how to calibrate the low and high signal inputs for the actuator. Normally, for a modulating control mode (4-20ma), the factory mode 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 calibrate 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



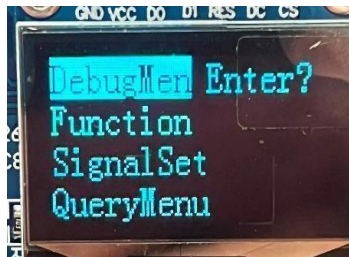
11. Set the input from the signal generator to 20ma
12. Adjust the HighSIG to 100% and push SET button to save

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 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.

CALIBRATING POSITION OUTPUT SIGNAL

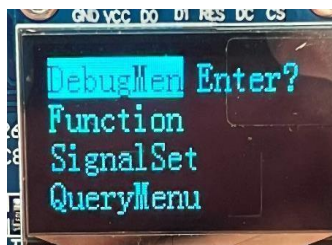
1. The analog output signal represents the position of the actuator which is an output of the potentiometer through the control card to the terminal board.
2. To set the position outputs for 4ma as the Low Position and 20ma as the High Position:
3. Connect a multimeter capable of measuring milliamps 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.

CONFIGURING CONTROL METHOD

This allows the user to select Modulating, Switch, Keep, or ESD Control Method for the actuator using the configuration menu.

- 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 “Control” and push the SET button to enter the Control Method menu.
5. There are four possible control methods to choose from:
 - a. **Analog** – this is the Modulating control method that accepts a 4-20ma input signal
 - b. **Keep** – this is the most commonly used On-Off control method that accepts a momentary dry contact (switch) input signal to open or close the actuator
 - c. **Switch** – this is the least used On-Off control method that accepts a constant dry contact (switch) input. This control method is used for jogging (or pulsing) the actuator to a specific position with a constant switch input
 - d. **ESD** - On-off control that requires that the input discrete signal be continuous. Any loss of this discrete input signal results in loss of signal status and will drive actuator to the preconfigured Signal Loss position (Open, Closed, or Last)
6. Select the desired Control Method and push the SET button to confirm
7. Push the A/M button four times for the new Control Method to be entered



CONFIGURING THE TORQUE CLOSE FUNCTION

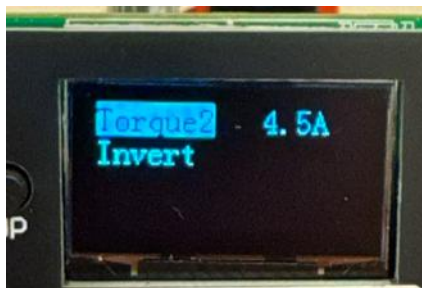
The Torque Close Function allows the user to configure the actuator to close to an approximate torque setting instead of closing to a specific limit setting. This function is normally used for torque-seated globe control valves and triple offset butterfly valves..

NOTE: THE TORQUE CLOSE FUNCTION SHOULD ONLY BE USED ON GLOBE STYLE VALVES OR TRIPLE OFFSET VALVES THAT REQUIRE TORQUE SEATING. DO NOT USE THE TORQUE CLOSE FUNCTION ON ANY OTHER TYPE VALVE.

BEFORE ATTEMPTING TO CONFIGURE THE TORQUE CLOSE FUNCTION, BACK MECHANICAL STOPS OUT TWO FULL TURNS.

To configure the Torque Close Function:

2. Before setting the Torque Close function, verify that the Torque 2 setting is correct. The Torque 2 setting is the Torque Switch for the VTM. The Torque2 setting is the maximum current that would be supplied to the motor. Exceeding this current setting will cause the actuator to lock. Torque2 setting is found under the “Debug Men” section You must verify that Torque2 is set to the correct value prior to setting the C-Torque setting for Torque Closing.



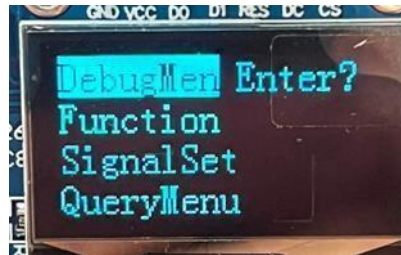
- b. The Torque2 value should be set according to the following chart:

Model	Maximum
VTM2H-35	1.3
VTM2H-70	1.5
VTM2H-140	4.0
VTM3-100	2.0
VTM3-200	3.5
VTM3-300	5.5
VTM3-450	7.2

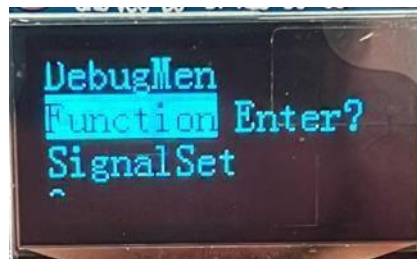
Model	Maximum
VTM4-600	7.1
VTM4-600-10S	14.0
VTM4-800	8.0
VTM5-1000	12.0
VTM5-1500	10.0
VTM5-2300	13.0
VTM5+G-4000	13.0
VTM5+G-5000	13.0

2. To set the Torque Close function

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



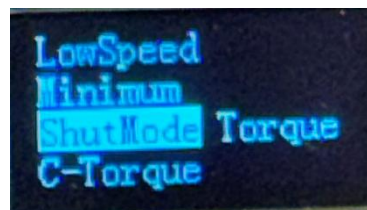
- b. Using the DO button to scroll down to "Function" and push the SET button to enter



- c. 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".

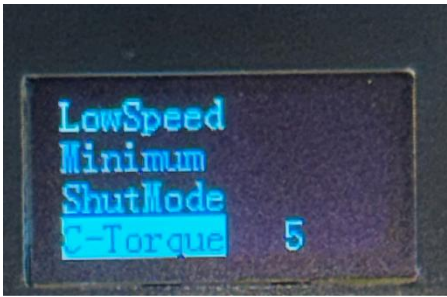


- d. Scroll down the menu using the DO button to "Protect" and scroll down menu and select "Shut Mode" and push the SET button to enter the Shut Mode selection:

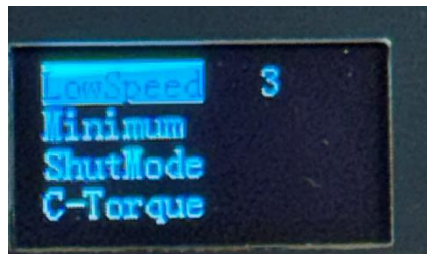


- i. Default is "Limit" which means that when the actuator moves to the 0% position, it stops moving. The 0% (or Close) position is set in the Debug Men section as covered on page 11.
- ii. The second option is "Torque" in which the actuator will move to 0% (or Close) position and will continue to close the valve until actuator reaches a preset torque value (C-Torque)

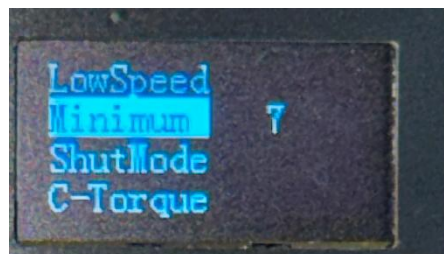
- e. To configure the C-Torque value, scroll down to C-Torque and select C-Torque.



- f. C-Torque value is a percentage of the Torque2 setting to which the actuator will close. Each C-Torque number represents 10% of the Torque2 setting. Example: A C-Torque setting of "8" represents 80% of the Torque2 setting.
- g. To configure the LowSpeed function, scroll to "LowSpeed" and select "LowSpeed". The LowSpeed setting allows the user to slow the motor speed once the difference between the valve position signal and control signal reaches a specified percentage value
- h. The default Low Speed percentage value is "3" and may be set to any percentage between 1 and 20



- i. To configure the Minimum Speed Setting, scroll to "Minimum". Based on the LowSpeed setting, the actuator will decelerate to a low speed until it reaches the dead zone, then it will stop.
- j. The Minimum Speed can be set to any value between 1 and 20. The higher setting increases the lowspeed; the lower setting decreases the lowspeed.
- k. Default value is "7"

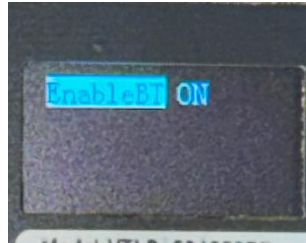


OPERATING STATUS AND ERROR CODES

Operating status and fault alarm		
State:	Loss SIG	Signal input fault, module not receiving control signal
	Loss POS	Position fault, potentiometer disconnected, module unable to collect potentiometer resistance signal
	Overheat	Motor overheating fault
	O-Torque	Fault during valve opening process, over torque, valve stuck
	C-Torque	Fault during valve closing process, over torque, valve stuck
	Locked	Motor not rotating or motor burned out or potentiometer not rotating
	Opening	The valve is in the process of opening
	Closing	The valve is in the process of closing
	At Rest	The valve is in a stationary state

1. Connect Bluetooth device

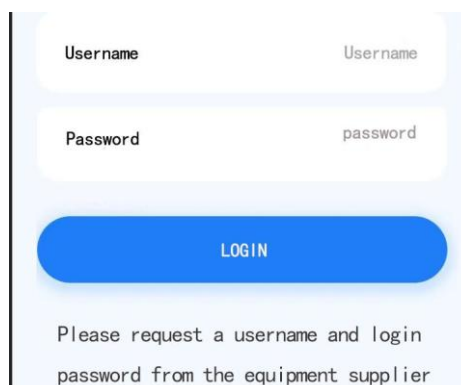
1.1 Enable Bluetooth on the VTM by entering the configuration menu by holding the DO button down for 3 seconds and selecting Function. Scroll to end of menu items to Enable BT and select ON



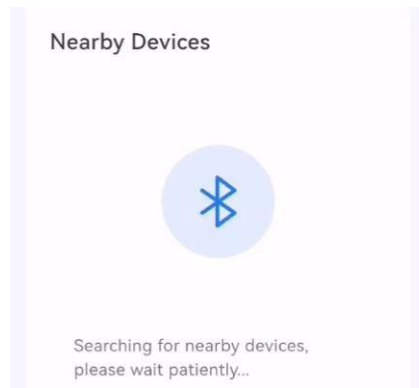
1.2 Set the Bluetooth password for the VTM (not the app) by entering the configuration menu by holding the DO button down for 3 seconds and selecting DebugMen and scrolling the menu to Bluetooth and selecting a four-digit number for the Bluetooth password.



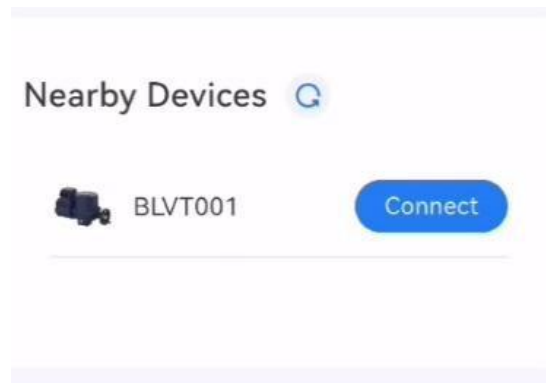
1.3 Tap the iPhone app icon Open the Bluetooth controller app and display the user login interface.

A screenshot of a mobile application's login screen. The background is light blue. There are two white input fields: the top one is labeled 'Username' and the bottom one is labeled 'Password'. Below these fields is a large blue button with the word 'LOGIN' in white. At the bottom of the screen, there is a line of text that reads: 'Please request a username and login password from the equipment supplier'.

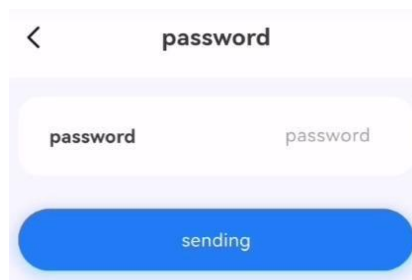
1.4 Enter the correct username and password to access the Bluetooth search interface



1.5 After locating the BLVT001 Bluetooth device, tap the Connect button on the right to access the VTM.



1.6 Enter the correct password to access the Bluetooth controller main interface



1.7 After the connection is successful, the Bluetooth icon in the upper right corner of the control panel will stop flashing, indicating a successful Bluetooth connection.



2. Home Page will appear

HOME PAGE

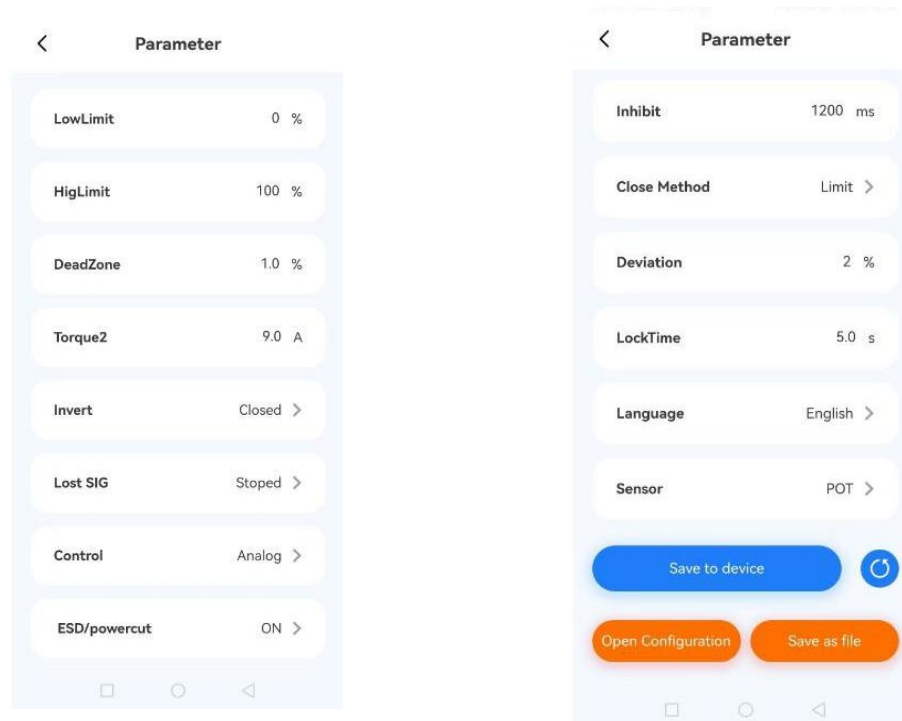
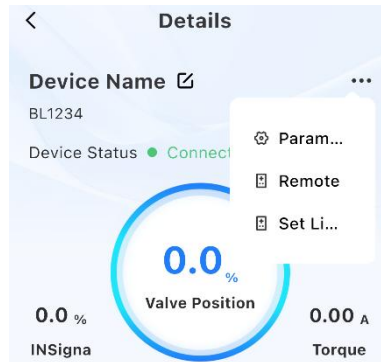


3. Introduction to the Parameter Setting Interface of Bluetooth Controller

3.1 On the Home Page Open parameter settings.



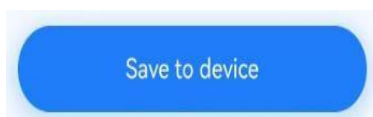
3.2 Click the parameter settings option to open the parameter settings interface



3.3 When the parameter settings interface is opened, the displayed values represent the current parameters of the VTM.

3.4 Click the numeric value to the right of the parameter settings to modify the current parameter value.

3.5 After making changes, click the bottom the Save to Device button saves the modified information to the VTM.

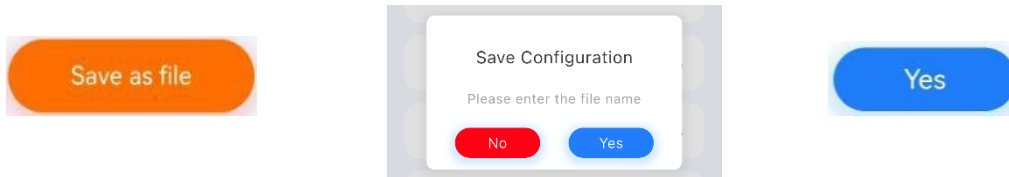


3.6 Press Refresh button, Check the parameters of the VTM again.



3.7 To save the configuration parameters to a file, press Save as file and enter a file name 10 characters or less and press the Yes button.

3.8 Program save files are for local use only;

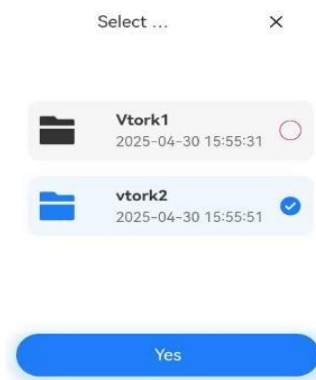


3.9 To open a saved configuration file:

3.10 Press Open Configuration button which opens the Selection Configuration screen.

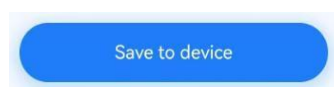


3.11 Click on the desired Configuration File. Press Yes button to open the configuration file.



3.12 Press the Save to device button to save the desired configuration to the VTM. The new configuration has been saved to the VTM.

3.13



4. Setting Limits in the Bluetooth App

4.1 Open Set Limits by pressing the three dots in the upper right corner of the Home Screen



4.2 The Set Limits screen will appear

4.3 Press SetClose button to set the close limit. Press Open or Close button to rotate the VTM to desired close position. Press the Set button to confirm the Close limit.

4.4 Press SetOpen button to set the open limit. Press Open or Close button to rotate the VTM to desired open position. Press the Set button to confirm the Open limit.

4.5 Press the Exit button to exit the Set Limits page.

