MT-50 Remote Tracer Meter

RENOGY Remote Tracer Meter for Commander Series and ViewStar Series Charge Controllers

RENOGY

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Version 2.0

Table of Contents

⚠ Important Safety Instructions ⚠

Please save these instructions.

This manual contains important safety, installation, and operating instructions for the unit. The following symbols are used throughout the manual to indicate potentially dangerous conditions or important safety information.

⚠ **WARNING: Indicates a potentially dangerous condition. Use extreme caution when performing this task.**

CAUTION: Indicates a critical procedure for safe and proper operation of the controller

NOTE: Indicates a procedure or function that is important to the safe and proper operation of the controller.

General Safety Information

- Inspect the MT-50 after it is delivered. If any damage, notify the company immediately. A photograph might be helpful as well.
- Read all directions and cautions in the manual before installation
- Keep the MT-50 away from rain, severe dust, and electromagnetic interference.

General Information

The Renogy MT-50 is a new generation meter compatible with the Commander Series and ViewStar Series charge controllers. It is a self-diagnostics meter ideal for monitoring and displaying the current solar system status information and any error indications the system might be experiencing. The information is displayed on a backlit LCD display and is easily navigated using the buttons on the meter. The MT-50 could also be flush mounted on a wall or flat surface using the mounting frame provided.

NOTE: The MT-50 is not compatible with the Commander 60A charge controller.

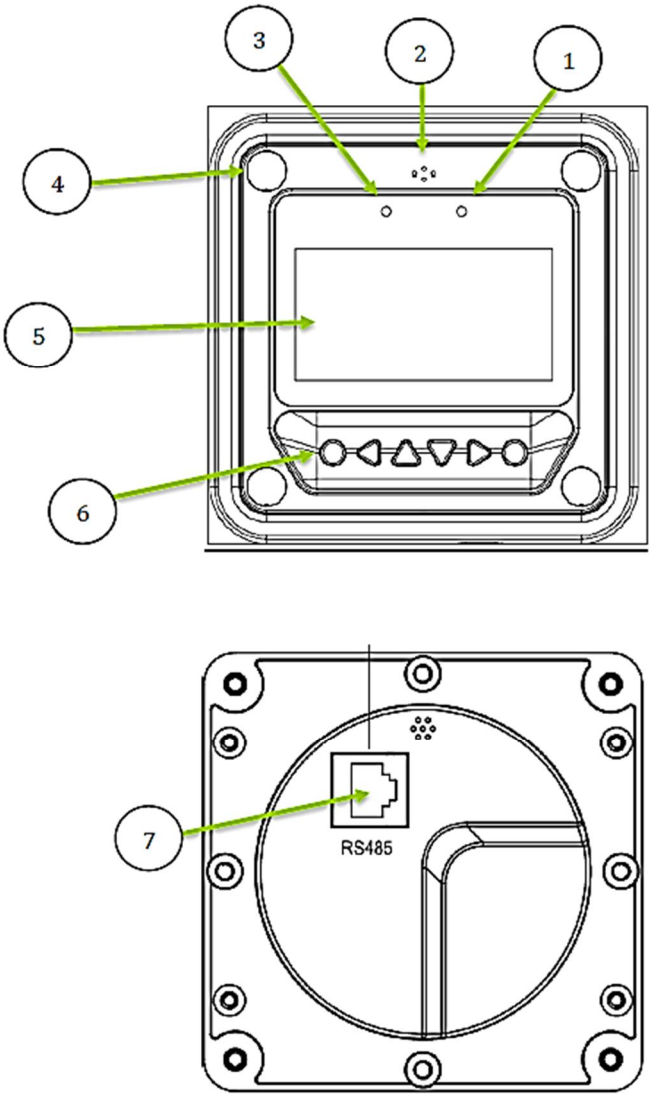
Key Features

- Large backlit LCD display
- Compatible with multiple Commander Series (20A/40A) and ViewStar Series (10A/20A/30A) charge controllers
- Real-time monitoring and graphical display
- Customizable parameters for charge control and load control

Included Components

- Wall Mounting Frame
- 6.5 foot cable
- 4 x ST4.2X32 self-tapping screws

Identification of Parts



Key Parts

1. **Communication Indicator (Green)**
2. **Alarm Sound port (Alarm will be discontinued in new models)**
3. **Warning Indicator (Red)**
4. **4 X Mounting Holes**
5. **Display Screen**
6. **Navigation Buttons**
7. **RS485 Port**

Installation

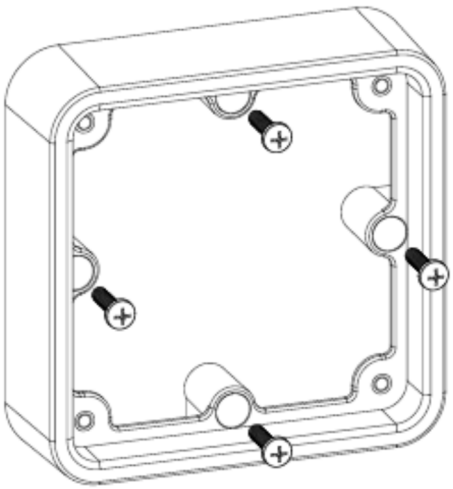
⚠ **WARNING: BEFORE drilling, make sure there are no electrical components or other obstacles that may interfere with installation on the other side of the mounting surface.**

CAUTION: Before installing the MT-50, apply power and make sure the meter is working properly. Resolve any issues before installing the meter and the meter cable.

The MT-50 can be mounted in two ways: Frame Wall Mount or in a Flush Wall Mount. A plastic mounting frame has been included for the purpose of Frame Wall Mounting. If Flush Wall Mounting then the MT-50 faceplate sits flush with the mounting surface and the body of the meter would be able to rest comfortably in a hole cut-out on the mounting surface.

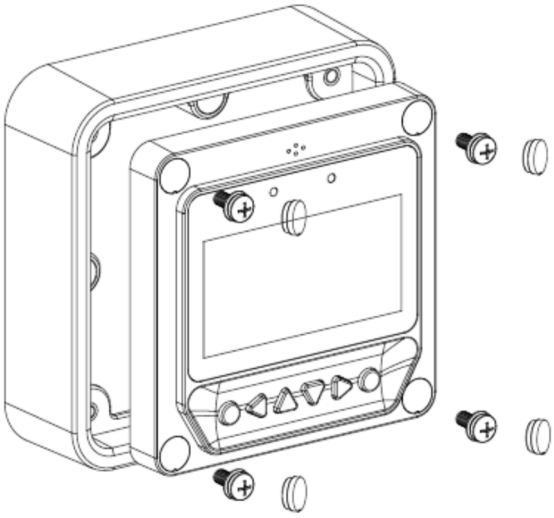
Frame Wall Mount Installation

When frame mounting, the MT-50 Tracer will be utilizing the provided frame and be mounted on a wall or surface. No cut-outs are required for the surface with the exception of the 4 x screw holes.



1. Locate and drill the screw holes based on the mounting frame dimension and erect the plastic expansion bolts on the wall.

2. Use 4 x ST4.2x32 self-tapping screws to fix the frame.



3. Use 4 x M4x8 pan head screws to mount the MT-50 front to the frame

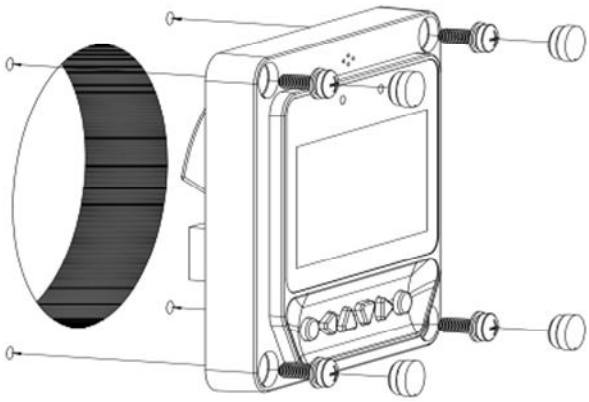
4. Mount the 4 associated screw plugs into the screw holes

5. Plug the meter in and verify the meter powers up and displays the appropriate data. Troubleshoot if necessary.

Flush Wall Mount Installation

This is a low-profile installation. The faceplate of the MT-50 sits flush with the mounting surface or wall and the body of the meter rests in a hole cut-out on the mounting surface. The meter wiring is concealed behind the mounting surface, or the interior of the wall.

1. Locate and drill screw holes based on the installation size of the surface. Level the faceplate and remove a hole-cutout.
2. Use 4 x M4x8 cross recessed pan head screws with the M4 nuts to mount the MT-50 surface onto surface.
3. Mount and use white plugs in the screw holes.

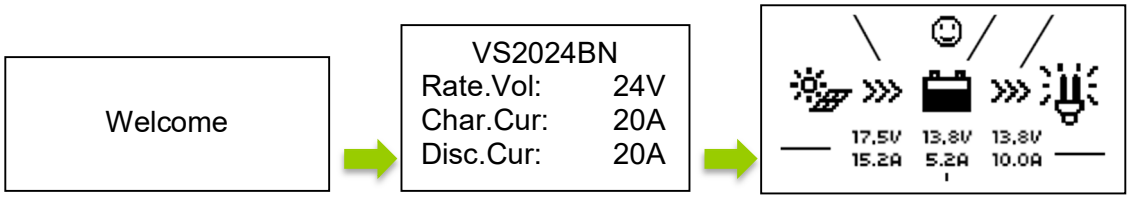


Operation

NOTE: The MT-50 is not compatible with the Commander 60A charge controller.

The following keys are used to cycle through the screens or adjust the parameters on the tracer:

Once the Tracer Meter is connected, the user will see welcome screen followed by a device info screen, before settling on the Default Screen.



Menu Display

Press **ESC** to access the main menu, and utilize the up and down keys to maneuver through the menu. Select **OK** to choose an option

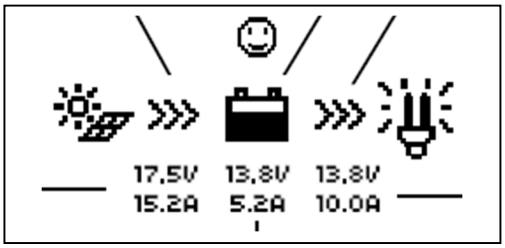
NOTE: In some models, you might be prompted to enter a password. Simply put "0" all the way through and press enter.

NOTE: To customize charge parameters, Battery Type must be set to USER, under 4. CONTROL PARAMETERS

NOTE: The values found in your controller are default values and will not necessarily match the ones listed. The values on this table are to show the user what the different screens are used for.

1. Monitoring

NOTE: Use the up and down arrows to maneuver through the monitoring menus. The left and right arrows indicate submenus and display further information regarding the system



The Default Screen displays information regarding the PV module, Battery, and Load. The PV module indicator will have a sun or a moon depending on the time of day. The face will indicate normal system behavior in terms of the battery.

VS2024BN
Jan-01-2015
04:40:44

The screen displays the Charge Controller Model Number, followed by the Date and Time.

Charge Energy
Day: 0.00 kWh
Month: 0.00 kWh
Total: 0.05 kWh

The kilowatt hours accumulated in a day, Month, and total since the controller has been turned on
NOTE: Once the battery is disconnected, the values are reset to 0 unless there is an external battery installed on the controller face

Discharge Energy
Day: 0.00 kWh
Month: 0.00 kWh
Total: 0.05 kWh

Same as above but regarding discharged energy

Battery
Voltage: 0.00 V
Current: 0.00 A
SOC: 0.05 %

Demonstrates the battery's Voltage, Amperage, and State of Charge (SOC).
NOTE: The Battery SOC% is an estimation based on the charging voltage.

Battery Temperature: 0.00 °C Max Voltage: 0.00 V Min Voltage: 2.4 V	Demonstrates Battery Temperature, the Max. Voltage detected and the Minimum Voltage Detected by the Battery.
	
Battery Charge: No Charge Energy: Normal Fault: No	This screen gives the user a visual of battery status beyond voltage, temperature, and amperage. The user can see if they battery is charging, the energy flow, and if there are any faults In the system.
	
PV Voltage: 0.0 V Current: 0.0 A Power: 0.0 W	Looks at PV voltage, current, and power generated.
	
PV Work: Disconnect Fault: No Mode: PWM	Demonstrates PV status in terms of it PV state, whether there is a fault detected, and the mode of charge.
	
Controller Temperature: 000.0 °C Status: Normal	The charge controller's temperature and status is displayed.
	
Load Voltage: 000.0 V Current: 000.0 A Power: 000.0 kWh	Displays the current Load Voltage, Current, and Power generated in kilowatt hours.
	
Load Work: OFF Fault: Yes	Indicates whether the load is on or off and whether it is experiencing any error.
	
Manual Control Default: Off	Determines whether the user wants to manually control the paramaters of the Load. **NOTE: If timers are on, then it will display that screen as opposed to this screen.**

2. Device Info

NOTE: Use the up and down arrows to maneuver through the monitoring menus. The left and right arrows indicate submenus and display further information regarding the system

VS2024BN Rate.Vol: 24V Char.Cur: 20A Disc.Cur: 20A ⇕ VS2024BN SN: 16 digit code	Displays device info for the charge controller and the next menu displays the charge controller name and screen number.

3. Test Operation

NOTE: Press OK to change from reading mode to parameter setting mode. Once the parameter is highlighted, use the UP and DOWN arrows to adjust the setting and press OK once again to save the setting.

Test Operation VS2024BN: ON	The test operation is used for the load terminal and determines whether the output is normal. It does not affect the working-load settings (if there are any preset) and upon turning the test operation on/off, the screen will save and exit.

4. Control Parameters

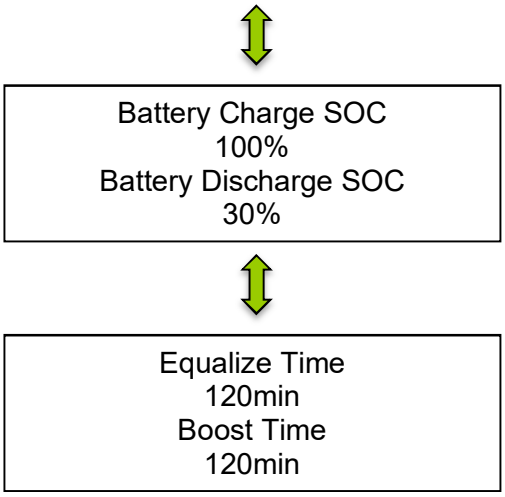
NOTE: Press OK to change from reading mode to parameter setting mode. Once the parameter is highlighted, use the UP and DOWN arrows to adjust the setting and press OK once again to save the setting.

NOTE: To customize charge parameters, BATT must be set to USER, under 4. CONTROL PARAMETERS

NOTE: A Control Parameters table can be found under Technical Specifications for parameter boundary limits.

Battery Type Sealed Battery AH 200AH	Choose **Gel, Sealed, Flooded or User** battery and modify the Amp-hours(Ah) if necessary. Choose from **1-999 Ah**.

Temp Comp. Coeff -3mV/°C/2V Rated Voltage Auto	Temperature fluctuation can affect performance in the system. Therefore, the purpose of temperature compensation is to adjust the performance of the system to keep the system functioning normally. Choose from **0mV to -9mV** Choose between **12V, 24V or AUTO** for rated battery voltage.
Over Voltage Disconnect 16.0V Charge Limit 15.0 V	Default parameters for over-voltage disconnect and charge limit.
Over Voltage Reconnect 15.0 V Equalization Charge 14.6 V	Default parameters for over-voltage reconnect and equalization charge rate.
Boost Charge 14.4 V Float Charge 13.8 V	Default Parameters for Boost and Float Charge
Boost Reconnect 13.2 V Low Voltage Reconnect 12.6	Default parameters for Boost reconnection and Low voltage reconnect
Under Voltage Reconnect 12.2 V Under Voltage Warning 12.0 V	Default parameters for under voltage reconnect and under voltage warning
Low Voltage Disconnect 11.1 V Discharge Limit 10.6 V	Default parameters for low voltage disconnect and the discharge limit.



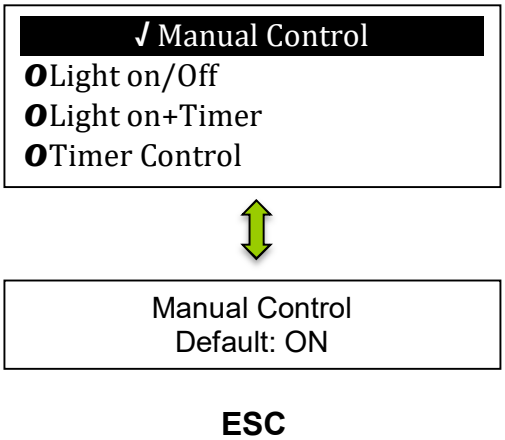
If using the SOC for battery management, then these parameters let the Charge Controller/Tracer know the SOC of the battery based on these boundary limits.
NOTE: This function will be discontinued in future models.

Set a time for how long equalization and boost charges occur.

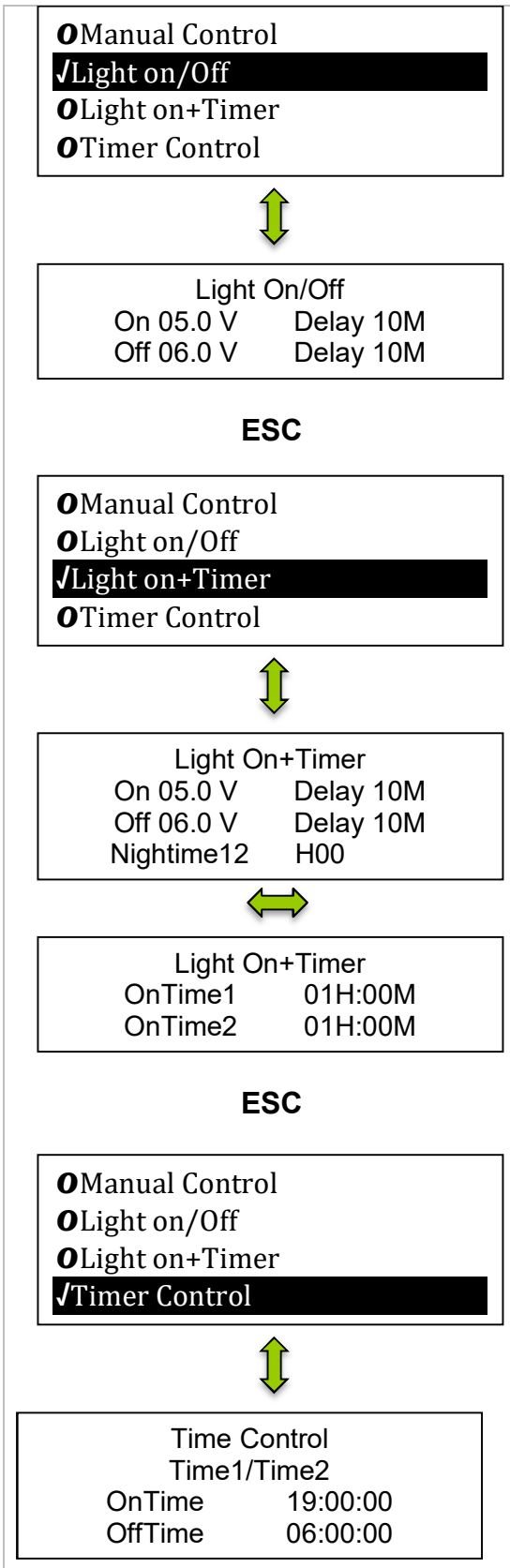
5. Load Set

NOTE: Use the up and down arrows to maneuver through the monitoring menus. The left and right arrows indicate submenus and display further information regarding the system

NOTE: Press OK to change from reading mode to parameter setting mode. Once the parameter is highlighted, use the UP and DOWN arrows to adjust the setting and press OK once again to save the setting.



Manual control gives the user complete control over the load terminals. The user can set it to be manual by default or not.
NOTE: If ON, load will remain on assuming battery capacity is enough and no abnormal conditions occur. Load can be turned off and on by pressing the OK button on the meter



In Light On/Off the user sets to load to be operated by the time of day.

The load terminal automatically turns ON when the solar voltage goes BELOW the point of NTTV (Night Time Threshold Voltage).The load automatically turns OFF when the voltage goes ABOVE the point of DTTV (Day Time Threshold Voltage). There is a delay between turning the load on or off and can be programmed to be from 0-99minutes.

NOTE: Minimum and maximum charge parameter values can be found in Technical Specifications

Similar to Light On/Off parameter with the addition of a timer that the user sets in order to indicate how long a load will be on or off. The user also sets an appropriate time for when it is night time. Nightime12 indicates the remaining time between the Load being on and off

NOTE: Timer needs to be activated for it to work

Using a 24-hour clock, the user is able to set the time for when the load will turn on and the time for when the load will turn off. The system works fine with just one timer, the second timer serves the purpose of dual functioning. For example, if the user wants to turn the load on and off within 3 hours of night time and turn the load on and off again before sunrise they will be able to with a dual timer.

6. Device Parameters

NOTE: Use the up and down arrows to maneuver through the monitoring menus. The left and right arrows indicate submenus and display further information regarding the system

NOTE: Press OK to change from reading mode to parameter setting mode. Once the parameter is highlighted, use the UP and DOWN arrows to adjust the setting and press OK once again to save the setting.

Device Parameter Ver: Version # ID: 001  Device Parameter Backlight 60S Month-Date-Year HH:MM:SS	The display will be the version number of the Charge Controller as well as display the ID. The ID is important if there are custom settings (For Example, the **USER** function), then the parameters will be saved under that certain ID. This serves the purpose of having the tracer work for various charge controllers and their respective ID's. **NOTE: The ID of the charge controller and the tracer must match for them to be operable together.** The backlight is also modifiable as well as the date and time.

7. Device Password

NOTE: In some models, you might be prompted to enter a password. Simply put "0" all the way through and press enter.

NOTE: Press OK to change from reading mode to parameter setting mode. Once the parameter is highlighted, use the UP and DOWN arrows to adjust the setting and press OK once again to save the setting.

Device Password OriPsw: XXXXXX NewPsw: XXXXXX	Before making any parameter changes, the user can have the charge controller require a password.

8. Factory Reset

NOTE: Press OK to change from reading mode to parameter setting mode. Once the parameter is highlighted, use the UP and DOWN arrows to adjust the setting and press OK once again to save the setting.

Factory Reset YES NO	Reset the controller to factory settings. This will erase any customized parameters the user may have set. The default "0" password may also be activated.

9. Failure Info

NOTE: Press OK to change from reading mode to parameter setting mode. Once the parameter is highlighted, use the UP and DOWN arrows to adjust the setting and press OK once again to save the setting.

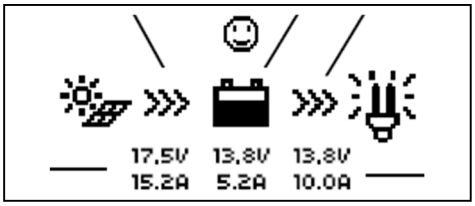
Failure Info.	Any faults or indicators that the controller experiences will be readily available to view in the Tracer's Failure information. A maximum of 15 failure messages could be displayed. When the failure has been corrected, it will disappear from the failure information log. For a list of common failures, check the **Failure Information Table**

10. Meter Parameters

NOTE: Press OK to change from reading mode to parameter setting mode. Once the parameter is highlighted, use the UP and DOWN arrows to adjust the setting and press OK once again to save the setting.

Meter Parameters Type: MT-50 Version: version # SN: SN # ⇕ Meter Parameters SW-Pages: 000S Backlight: 000S AudAlarm ON	First screen displays information regarding the controller and the tracer type. The Switch-Pages feature allows the menu screens, under Monitoring, to cycle through the displays at every second desired by the user. **NOTE: There is a 10 minute delay when modifying the switch pages feature.** The backlight controls the time it is on, following the last button being pressed. The alarm sound can be turned on or off to indicate error. **NOTE: This alarm feature will be discontinued in future models.**

System Status Icons



PV	BATTERY	SYSTEM	LOAD
			
Day/ PV Charging	Battery Charging	System Normal	Load ON
			
Night/ PV Not Charging	Battery Level Full	System Under Voltage	Load OFF
			
	Battery Over Discharge	System Over Discharged	

System Status Glossary

PV Status	Meaning
Connect	PV is Connected
Disconnect	PV is Disconnected
Measure Err	Measurement Error at the PV terminal
Input O. cur.	PV is Overcurrent
RPP Short	(Metal oxide semiconductor) used for PV reverse polarity is short.
MOS-C Short	(Metal oxide semiconductor) used for charging is short.
RPP Break	(Metal oxide semiconductor) in control circuit is damaged

BATT Status	Meaning
Equalize	Battery is equalizing
Boost	Battery is in boost mode
Float	Battery is in float mode
NoCharge	No charge to battery
LVD	Low voltage disconnect
UVW	Under voltage warning
Normal	Battery is normal
OVD	Over voltage disconnect
Disc.O.O.Ctrl.	Battery experiencing error charging/discharging
Ctrler O.Temp.	Battery is too hot, over temperature
LOAD Status	**Meaning**
On	Load On
Off	Load Off
Load O. cur.	Load is overloaded
Load Circuit	Load connection is short
Error	Load experiencing error
MOS Short	Metal oxide semiconductor used in load is short

Failure Information

Indicator	Troubleshoot
Load MOS-Short	Reset the controller to factory settings. If problem persists, contact supplier.
Load Circuit	Load circuit is short. Check the device wiring and connections going into the load. There may be a break in the wire.
Load O. cur.	Load is overcurrent. Check to make sure the devices connected to the load terminal are within the load specification. If so, then reduce the number of loads and it will reconnect automatically.
Input O. cur.	PV terminal overcurrent. Use a multi-meter to determine whether solar panel(s) specification match the nominal parameters of the charge controller.
RPP Short	Check connections to make sure they are not reverse. Reset the controller to factory settings. If problem persists, contact the supplier
RPP Break	Reset the controller to factory settings. If problem persists, contact the supplier
Char.MOS-Short	The charge driver is short. Reset the controller to factory settings. If problem persists, contact the supplier

Disc.O.O.Ctrl.	Check that the battery connections are properly connected to the battery terminals of the charge controller. Make sure there is no short along the line. Reboot the controller. If problem continues, reset the controller.
Ctrler O.Temp.	Controller Over temperature. Place the controller in a cooler environment where it will automatically reconnect.
Comm. Timeout	Error with the communication port. Check controller connection and reboot device.

Device Considerations

Warning Indicator
The red LED on the tracer will turn on where there is an issue. Check the Failure Information Log first. The following are possible reasons for the warning indicator

1. One battery could be disconnected, over voltage, or open circuit. Check connections. Disconnect and reconnect.
2. The remote temperature sensor probe is malfunctioning. Check the sensor probe. Disconnect and reconnect.
3. The system is experiencing overcharging current. Check connections, disconnect and reconnect
4. Solar PV is short circuited. Check connections, disconnect and reconnect.

Telecommunication Port
When the meter running on individual power or the communication is cut off, the MT-50 will display graphical symbols abnormally. Press any key to stop the display and resume normal activity. If problem persists, disconnect the port and connect it again. Normal behavior is when the meter updates every 20 seconds.

NOTE: Errors could occur in the telecommunication port if the connection is not properly secured. Also, too long of a cable may cause some inconsistencies.

Battery Level Flashing
The meter measures battery capacity by the voltage it is experiencing. When batteries are charging, they will not necessarily match the accurate battery capacity.

Battery capacity AH
AH is the accumulation of charging, each one minute will count. The data is not accurate while the charge current is too small. The min. is 1AH, means 1 amps charging for 1 hour, Ah comes to show.

Troubleshooting

MT-50 has no display

- Verify the charge controller is powered on and that it is securely connected to the MT-50.

LCD display is dim

- Check the system battery voltage. The MT-50 needs a minimum of 8 V to operate.
- Verify that the temperature is within range of the LCD operating parameters.

MT-50 turns on, but shows no data

- MT-50 is potentially damaged or the cable is damaged. Replace the cable by contacting the manufacturer.

MT-50 display does not match product manual

- Our products undergo manual revisions from time to time. Please check our website at Renogy-store.com > downloads for latest documentation.

Buttons do not work

- Disconnect the MT-50 and clean the faceplate to remove any potential buildup of residue
- Reconnect MT-50

Technical Specifications

Mechanical Parameters	
Communication Cable	RJ45 (8 pin)
Cable Length	2 m (6.5 ft)
Faceplate Dimensions	98 x 98mm (3.86 x 3.86in)
Wall Frame Dimensions	114 x 114mm (4.49 x 4.49in)
Weight	0.23 Kg

Temperature Parameters	
Operation Temperature	-4°F to 158°F
Humidity	0-100%
Electrical Parameters	
Rated Voltage	12V
Minimum Voltage Suggested	8V
Strong backlight on consumption	< 23mA
Backlight and LED indicator off consumption	< 15mA

Charging Parameters

Battery type		Gel	Sealed	Flooded
High Volt Disconnect	**Default**	**16.0V; x2/24V**	**16.0V; x2/24V**	**16.0V; x2/24V**
	Max	17.0V; x2/24V	17.0V; x2/24V	17.0V; x2/24V
	Min	15.0V; x2/24V	15.0V; x2/24V	15.0V; x2/24V
Charging Limit Voltage	**Default**	**15.5V; x2/24V**	**15.5V; x2/24V**	**15.5V; x2/24V**
	Max	16.0V; x2/24V	16.0V; x2/24V	16.0V; x2/24V
	Min	14.0V; x2/24V	14.0V; x2/24V	14.0V; x2/24V
Over Voltage Reconnect	**Default**	**15.0V; x2/24V**	**15.0V; x2/24V**	**15.0V; x2/24V**
	Max	16.0V; x2/24V	16.0V; x2/24V	16.0V; x2/24V
	Min	14.0V; x2/24V	14.0V; x2/24V	14.0V; x2/24V
Equalization Voltage	**Default**	**N/A**	**14.6V; x2/24V**	**14.8V; x2/24V**
	Max	N/A	15.2V; x2/24V	15.2V; x2/24V
	Min	N/A	14.2V; x2/24V	14.2V; x2/24V
Boost Voltage	**Default**	**14.2V; x2/24V**	**14.4V; x2/24V**	**14.6V; x2/24V**
	Max	15V; x2/24V	15V; x2/24V	15V; x2/24V
	Min	13.8V; x2/24V	13.8V; x2/24V	13.8V; x2/24V
Float Voltage	**Default**	**13.8V; x2/24V**	**13.8V; x2/24V**	**13.8V; x2/24V**
	Max	14.2V; x2/24V	14.2V; x2/24V	14.2V; x2/24V
	Min	13.2V; x2/24V	13.2V; x2/24V	13.2V; x2/24V
Boost Return Voltage	**Default**	**13.2V; x2/24V**	**13.2V; x2/24V**	**13.2V; x2/24V**
	Max	13.5V; x2/24V	13.5V; x2/24V	13.5V; x2/24V
	Min	12.7V; x2/24V	12.7V; x2/24V	12.7V; x2/24V
Low Voltage Reconnect	**Default**	**13.2V; x2/24V**	**13.2V; x2/24V**	**13.2V; x2/24V**
	Max	13.5V; x2/24V	13.5V; x2/24V	13.5V; x2/24V
	Min	12.7V; x2/24V	12.7V; x2/24V	12.7V; x2/24V
Under Voltage Recover	**Default**	**12.2V; x2/24V**	**12.2V; x2/24V**	**12.2V; x2/24V**
	Max	12.6V; x2/24V	12.6V; x2/24V	12.6V; x2/24V
	Min	11.8V; x2/24V	11.8V; x2/24V	11.8V; x2/24V
Under Voltage Warning	**Default**	**12.0V; x2/24V**	**12.0V; x2/24V**	**12.0V; x2/24V**
	Max	12.4V; x2/24V	12.4V; x2/24V	12.4V; x2/24V
	Min	11.6V; x2/24V	11.6V; x2/24V	11.6V; x2/24V
Low Voltage Disconnect	**Default**	**11.1V; x2/24V**	**11.1V; x2/24V**	**11.1V; x2/24V**
	Max	11.8V; x2/24V	11.8V; x2/24V	11.8V; x2/24V
	Min	10.5V; x2/24V	10.5V; x2/24V	10.5V; x2/24V
Discharging Limit Voltage	**Default**	**10.8V; x2/24V**	**10.8V; x2/24V**	**10.8V; x2/24V**
	Max	11V; x2/24V	11V; x2/24V	11V; x2/24V
	Min	10.5V; x2/24V	10.5V; x2/24V	10.5V; x2/24V
Equalize Duration	N/A	N/A	2 hours	2 hours
Boost Duration	N/A	2 hours	2 hours	2 hours

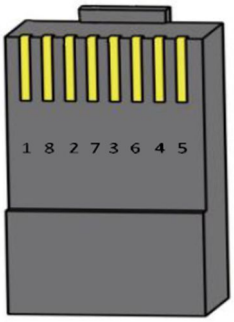
Threshold Voltage Parameters

The following chart demonstrates the parameters when using the Timer under load settings.

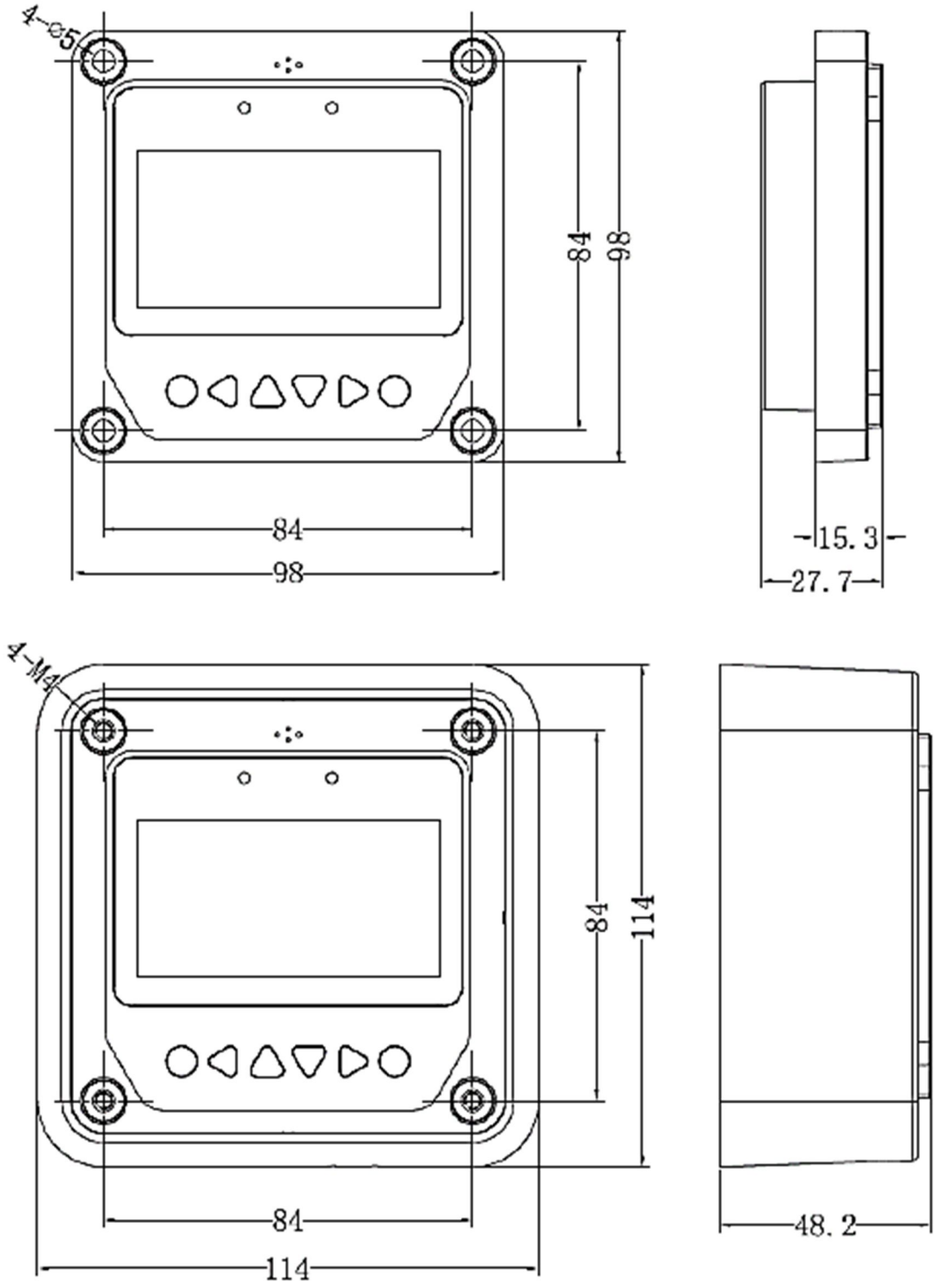
Description	Parameter	
Day Time Threshold Voltage (DTTV)	**Default**	**5V; x2/24V**
	Max	10V; x2/24V
	Min	1V; x2/24V
Night Time Threshold Voltage (NTTV)	**Default**	**6V; x2/24V**
	Max	10V; x2/24V
	Min	1V; x2/24V

Interface Pin Numbers

Pin Number	Definition
1	Power +5 to 12V input
2	Power +5 to 12V input
3	RS485-B
4	RS485-B
5	RS485-A
6	RS485-A
7	GND
8	GND



CAD Dimensions



NOTE: Dimensions are in millimeters