MT-50 Remote Tracer Meter

RENOGY MT-50 Remote Tracer Meter for
ViewStar Charge Controller

RENOGY
THE FUTURE OF CLEAN ENERGY

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Table of Contents

⚠️ Important Safety Instructions ⚠️
Please save these instructions.

This manual contains important safety, installation, and operating instructions for the charge controller. 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
- Read all instructions, cautions, and notes in the manual before starting the installation.
- There are no serviceable parts inside the MT-50. Do not disassemble or attempt to repair the meter electronics
- Do not allow water to enter the MT-50.

General Information

The Renogy MT-50 Tracer meter is the remote digital display used for the 10Amp/20Amp/30Amp ViewStar 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 Tracer meter could also be flush mounted on a wall or flat surface using the mounting frame provided. The MT-50 Tracer is supplied with a 2 meter long cable and is connected using the RS485 port located on the back.
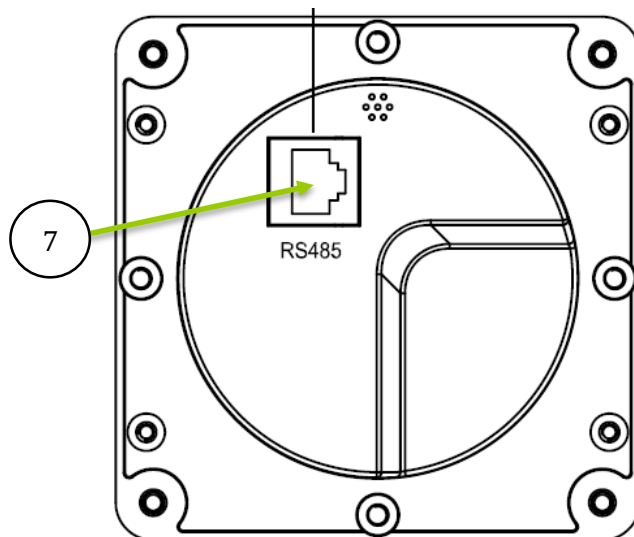
Key Features
- Large LCD Display
- Compatible with multiple ViewStar Charge Controllers
- Real-time monitoring and graphical display
- Customizable parameters for the device, charge rate, and load
- Remote control of the Load

Included Components
- Wall Mounting Frame
- 2 meter cable
- 4 x ST4.2X32 Self-tapping Screws

Identification of Parts

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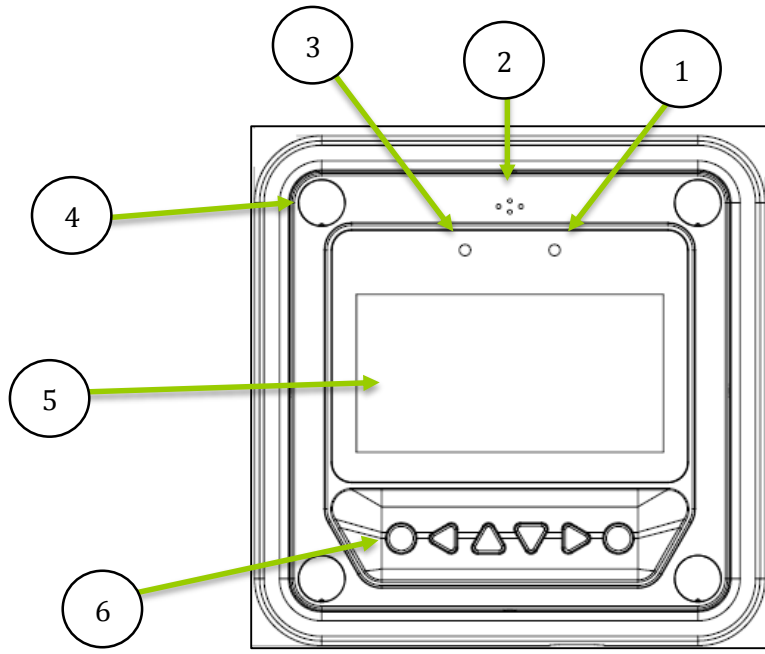
1. **Communication Indicator (Green)**
2. **Alarm Sound port (Alarm will be discontinued in new models)**
3. **Warning Indicator (Red)**
4. **4 X Mounting Holes**
5. **Display Screen**
6. **Navigation Buttons**
7. **RS485 Port**

Installation

⚠ **WARNING: BEFORE drilling, make sure that 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 Tracer, 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 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 the 4 x ST4.2X32 self-tapping screws to fix the frame
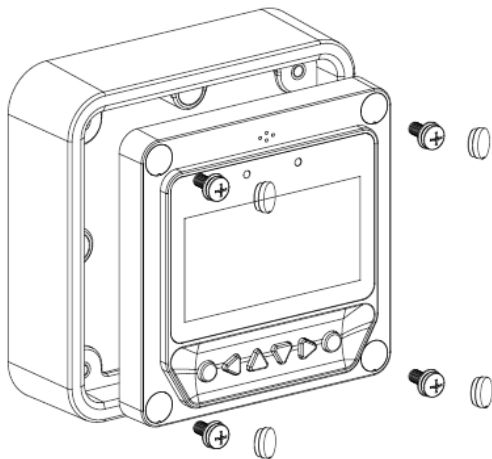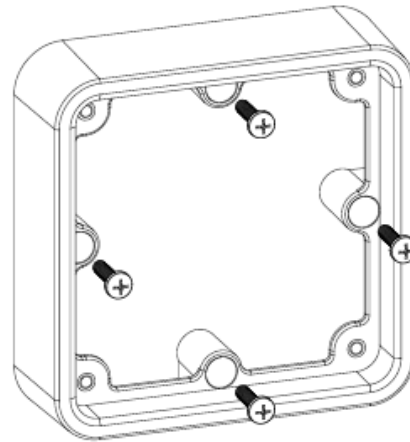
3. Use the 4 x M4X8 pan head screws to mount the MT-50 front to the frame

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

5. Plug the meter in and verify that the meter powers up and displays 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 the 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.
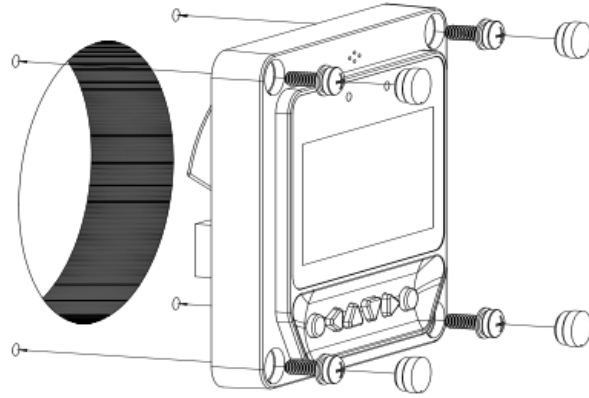
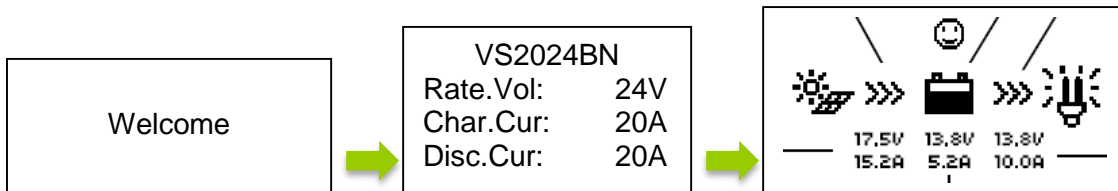## Operation

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.

Welcome	VS2024BN	
	Rate.Vol:	24V
	Char.Cur:	20A
	Disc.Cur:	20A

17.5V 13.8V 13.8V
15.2A 5.2A 10.0A

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. The main menu options will be the following:

1. Monitoring
2. Device Info
3. Test Operation
4. Control Parameters
5. Load Set
6. Device Parameters
7. Device Password
8. Charge Mode
9. Factory Reset
10. Failure Info
11. Meter Parameters

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, BATT must be set to <u>USER,</u> under <u>4. CONTROL PARAMETERS</u>

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.

NOTE: You do NOT have to program the control. These parameters are for extra features. Once you connect the battery the settings are automatically synced.

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

17.5V 13.8V 13.8V
15.2A 5.2A 10.0A
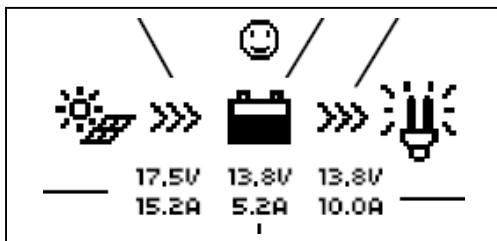
The Default Screen displays information regarding the PV module, Battery, and Load. The PV module indicator will have a sun or a moon depending on the time of day. The face will indicate normal system behavior in terms of the battery.

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).
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. **NOTE: Under Mode it should display PWM. If it displays anything else such as MPPT or DCC, please disregard this as it is due to a software error that does not affect the performance of the meter.**

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	Displays device info for the charge controller and the next menu displays the charge controller name and screen number.
↕	
VS2024BN SN: 16 digit code	

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 <u>OK</u> to change from reading mode to parameter setting mode. Once the parameter is highlighted, use the <u>UP</u> and <u>DOWN</u> arrows to adjust the setting and press <u>OK</u> once again to save the setting.**

NOTE: **To customize charge parameters, BATT must be set to <u>USER,</u> under 4. <u>CONTROL PARAMETERS</u>**

NOTE: **A <u>Control Parameters</u> table can be found under <u>Technical Specifications</u> 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.
↕	
Battery Charge SOC 100% **Battery Discharge SOC** 30%	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.**
↕	
Equalize Time 120min **Boost Time** 120min	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 <u>OK</u> to change from reading mode to parameter setting mode. Once the parameter is highlighted, use the <u>UP</u> and <u>DOWN</u> arrows to adjust the setting and press <u>OK</u> once again to save the setting.
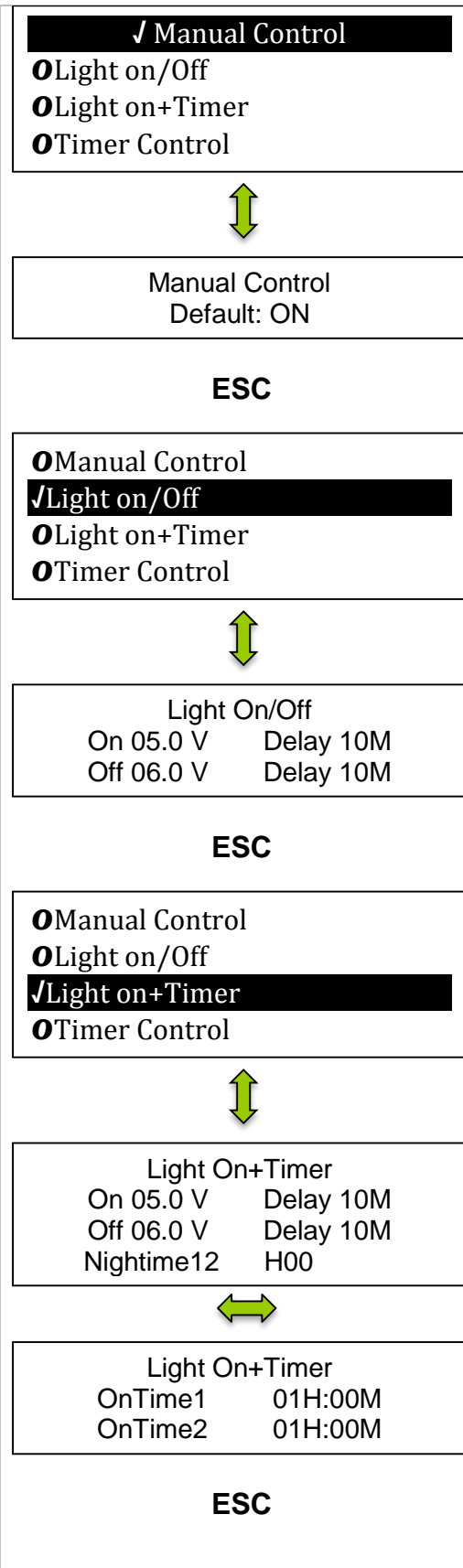
√ Manual Control **O** Light on/Off **O** Light on+Timer **O** Timer Control	Manual control gives the user complete control over the load terminals. The user can set it to be manual by default or not. **NOTE: If ON, load will remain on assuming battery capacity is enough and no abnormal conditions occur. Load can be turned off and on by pressing the <u>OK</u> button on the meter**
⇕	
Manual Control Default: ON	
ESC	
O Manual Control **√ Light on/Off** **O** Light on+Timer **O** Timer Control	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.
⇕	
Light On/Off On 05.0 V Delay 10M Off 06.0 V Delay 10M	**NOTE: Minimum and maximum charge parameter values can be found in <u>Technical Specifications</u>**
ESC	
O Manual Control **O** Light on/Off **√ Light on+Timer** **O** Timer Control	
⇕	
Light On+Timer On 05.0 V Delay 10M Off 06.0 V Delay 10M Nightime12 H00	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
⟷	
Light On+Timer OnTime1 01H:00M OnTime2 01H:00M	**NOTE: Timer needs to be activated for it to work**
ESC	

```
𝗢 Manual Control
𝗢 Light on/Off
𝗢 Light on+Timer
√ Timer Control
```

⇕

```
Time Control
Time1/Time2
OnTime      19:00:00
OffTime     06:00:00
```

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. Charge Mode

Charge Mode Voltage Compensation	Choose from Voltage Compensation or State of Charge Battery Managing modes to determine battery charge status. **NOTE: It is not possible to measure actual SOC, but rather express it as a percentage of some reference. In this case it is voltage alone (VC) or battery capacity over a time span (SOC)** **VC. converts a reading from battery voltage to determine SOC by utilizing the charge controller's algorithm for known discharge. It is highly sensitive to temperature changes and battery disturbances thus having less accurate battery charge statuses.** **SOC is more accurate by keeping track of the voltage and current flow in and out of the battery when reporting battery charge status. The SOC is determined by multiplying current by the time for which it flowed.**

9. Factory Reset

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.

10. Failure Info

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**

11. Meter Parameters

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

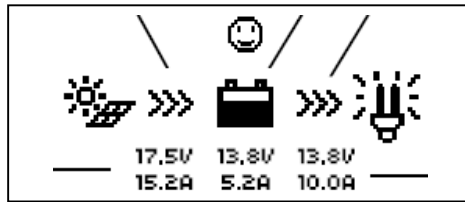|	
Meter Parameters Type: MT-50 Version: version # SN: SN #	First screen displays information regarding the controller and the tracer type.
Meter Parameters SW-Pages:　　　000S Backlight:　　　000S AudAlarm　　　ON	The Switch-Pages feature allows the menu screens, under <u>Monitoring,</u> to cycle through the 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

Each strip equals to 20% of battery capacity. The bar that is flashing indicates that the battery is within the next increment of 20% of the battery capacity. For example: when the first bar is flashing, the battery is at 1-19% of capacity. Similarly, when the second bar of the battery is flashing, then the capacity is at 21-39%.

NOTE: **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 meters
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	< 23mA
Backlight and LED indicator off	< 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

CAD Dimensions
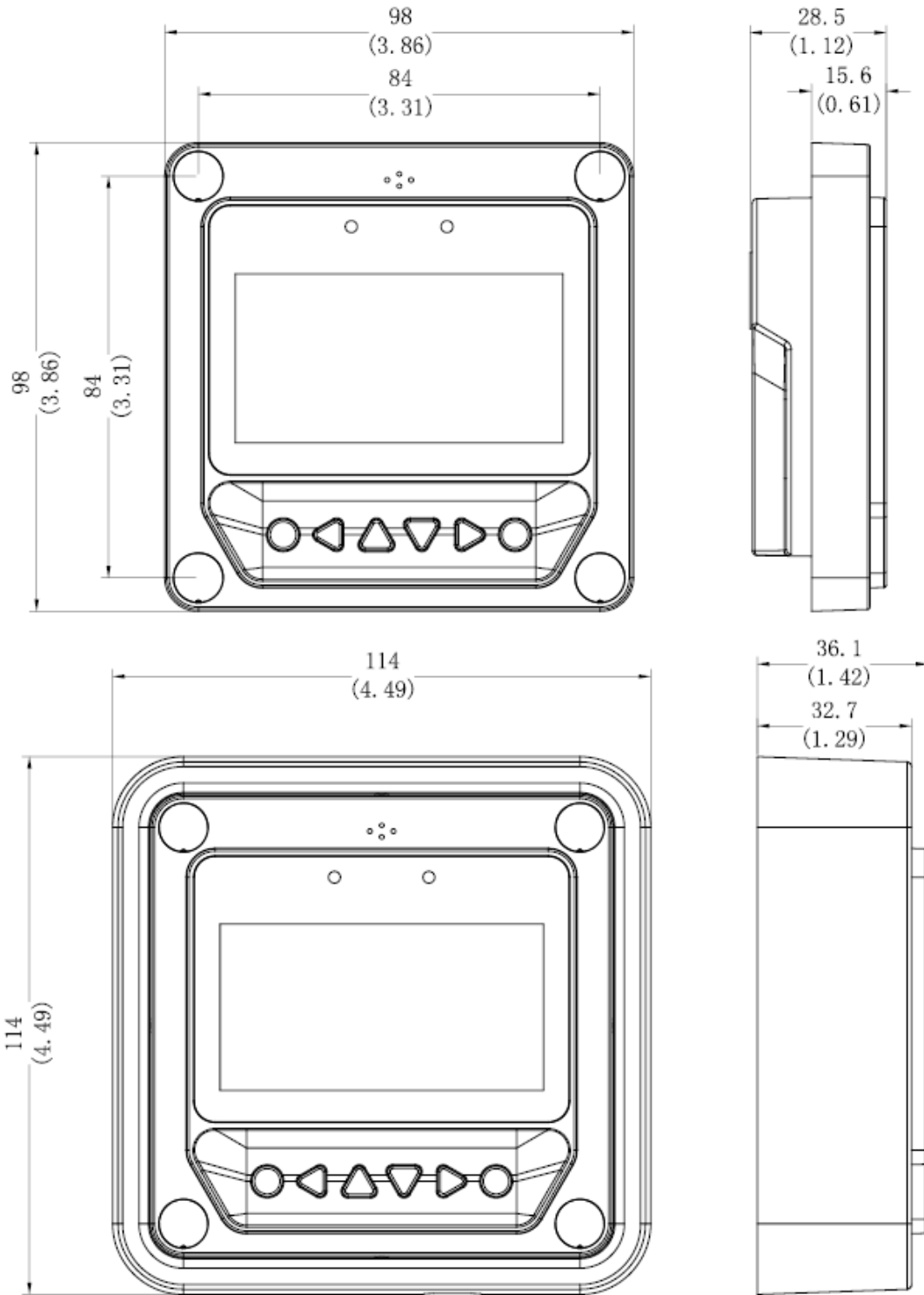
NOTE: Dimensions are in millimeters (inches)

RNG Group Inc. Limited Warranty

Thank you for your interest in the products and services of RNG Group Inc. The products manufactured by RNG Group Inc. (the "Warrantor") is warranted to be free from defects in workmanship and materials under normal use and service. The warranty is in effect from the date of purchase by the user (the "Purchaser"). The warranty covers substantial defects in material or workmanship including but not limited to: solar panels, charge controllers, battery inverters, wiring, and accessories.

Register your product by visiting http://www.renogy-store.com/Warranty-Registration-s/1913.htm or by going to www.renogy-store.com > Support > Product Registration at the bottom of the page.

Warranty period for various components:

Renogy brand solar panels (Monocrystalline and polycrystalline models 150W and below, exclude bendable models)	**5 year product material and workmanship warranty** **5 year 95% output warranty** **10 year 90% output warranty** **25 year 80% output warranty**
Renogy brand solar panels (Monocrystalline and polycrystalline models 240W and above)	**10 year product material and workmanship warranty** **5 year 95% output warranty** **10 year 90% output warranty** **25 year 80% output warranty**
Renogy brand solar panels (Suitcase models excluding charge controller and wires)	**5 year product material and workmanship warranty** **5 year 95% output warranty** **10 year 90% output warranty** **25 year 80% output warranty**
Renogy brand solar panels (bendable models)	**5 year product material and workmanship warranty**
Renogy brand charge controllers	**1 year product material and workmanship warranty**
Renogy brand battery inverters	**3 year product material and workmanship warranty**
Renogy brand mounting hardware and wiring	**1 year product material and workmanship warranty**
Other Renogy brand products (LED & camping gear)	**1 year product and material workmanship warranty**
Renogy Firefly	**1 year product material warranty**

Please note that all outsourced products will not be covered by RNG Group Inc. limited warranty. Instead, outsourced products will be covered under the original manufacturer's warranty, if applicable.

For warranty outside the United States, the Purchaser should contact the Warrantor for specific warranty claims.

The warranty extends only to the original purchaser of the Warrantor's products. Products or components that have been serviced or replaced under their warranty period do not receive extended warranties. Instead, the serviced/replaced products will abide to the original warranty period issued when first purchased.

The warranty does NOT cover any failures that result from incorrect handling, product modifications, installation, natural elements, excessive or deficient energy supply, chemicals, or improper troubleshooting. It is the sole responsibility of the Purchaser to communicate to the Warrantor of any issues experienced with the product. If the Warrantor determines that the problem with the product is not due to a manufacturing or workmanship defect, then the Purchaser is responsible for all costs necessary to repair and transport the product back to the original Purchaser.

If the Purchaser experiences any difficulty with a potentially defective product, it is their responsibility to contact the Warrantor's Technical Support Team. The technicians will offer steps and procedures to repair a product or require the Purchaser to ship the product to the Technical Team if needed. Based on the outcome, the warranty service will then be in effect.

The Warrantor does not make any other warranties or conditions not explicitly defined on this page. Under no circumstances will the Warrantor, its employees, and its representatives be liable or responsible for any loss of use, business interruption, lost profits, lost data, and indirect/special/incidental consequential damage of any kind regardless of the form of action. They are neither liable for injury to any persons or property incurred through the use or sale of the equipment. The Warrantor assumes no liability for incidental or consequential damages of any kind.

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