



La MARCHÉ

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SCP

Solar Charge Controller (PWM)



Installation and Operation Manual

Important Safety Instructions

Before using this equipment read all manuals and other documents related to this unit and other equipment connected to this unit. Always have a copy of a units manual on file nearby, in a safe place; if a replacement copy of a manual is needed it can be found at the www.lamarchemfg.com.

Electrical Safety



WARNING: Hazardous Voltages are present at the input of power systems. The output from systems and from batteries may be low in voltage, but can have a very high current capacity that may cause severe or even fatal injury.

When working with any live battery or power system, follow these precautions:

- Never work alone on any live power system, someone should always be close enough to come to your aid
- Remove personal metal items such as rings, bracelets, necklaces, and watches.
- Wear complete eye protection (with side shields) and clothing protection.
- Always wear gloves and use insulated hand tools.



WARNING: Lethal Voltages are present within the power system. Parts inside the unit may still be energized even when the unit has been disconnected from the power source. Check with a meter before proceeding. Do not touch any uninsulated parts.

- Connect the controller to a DC Circuit only.
- A licensed electrician should be used in the installation of any unit.
- Always disconnect the unit from the supply, batteries and loads before performing maintenance or cleaning.
- Always assume that an electrical connection is live and check the connection relative to ground.
- Be sure that neither liquids nor any wet material come in contact with any internal components.
- Do not operate this unit outside the input and output ratings listed on the unit nameplate.
- Do not use this unit for any purpose not described in the operation manual.

Mechanical Safety

- Mount the system on a wall in a well ventilated area.
- This unit or parts of the unit may get very hot during normal operation, use care when working nearby.
- Do not expose equipment to rain or snow. Always install in a clean, dry location.
- Do not operate equipment if it has received a sharp blow, been dropped, or otherwise damaged in any way.
- Do not disassemble this unit. Incorrect re-assembly may result in a risk of electric shock or fire.

Battery Safety



WARNING: Follow all of the battery manufacturer's safety recommendations when working with or around battery systems. DO NOT smoke or introduce a spark or open flame in the vicinity of a battery. Some batteries generate explosive gases during normal battery operation.

- To reduce risk of arc, connect and disconnect the battery only when the unit is off.
- If it is necessary to remove the battery connections, always remove the grounded terminal from the battery first.
- Remove personal metal items such as rings, bracelets, necklaces, and watches.
- Always wear rubber gloves, safety glasses, and a rubber lined vest/apron when working near a battery.
- Have plenty of fresh water and soap nearby in case the battery electrolyte contacts skin, clothing, or eyes.
- If the battery electrolyte contacts skin or clothing, wash immediately with soap and water.
- If the electrolyte enters the eye, immediately flood the eye with running cold water for at least ten (10) minutes and seek medical attention immediately.
- Do not drop metal on a battery. A spark or short-circuit could occur and could cause an explosion.

Charger Location

- Allow at least 6 inches of free air on all vented surfaces for proper cooling
- Do not operate this unit in a closed-in area or restrict ventilation in any way.
- Do not set any battery on top of this unit.
- Never allow battery electrolyte to drip on this unit when reading the specific gravity or filling the battery.
- Never place this unit directly above a standard flooded battery. Gases from the battery will corrode and damage equipment.
- A sealed maintenance free or valve regulated lead acid (VRLA) battery may be placed below this equipment.

Check for Damages

Prior to unpacking the product, note any damage to the shipping container. Unpack the product and inspect the exterior of product for damage. If any damage is observed, contact the carrier immediately. Continue the inspection for any internal damage. In the unlikely event of internal damage, please inform the carrier and contact La Marche for advice on the risk due to any damage before installing the product. Verify that you have all the necessary parts per your order for proper assembly.



CAUTION: Failure to properly file a claim for shipping damages, or provide a copy of the claim to La Marche, may void warranty service for any physical damages reported for repair.

Returns for Service

Save the original shipping container. If the product needs to be returned for service, it should be packaged in its original shipping container. If the original container is damaged/unavailable, make sure the product is packed with at least three inches of shock-absorbing material to prevent shipping damage. *La Marche is not responsible for damage caused by improper packaging of returned products.*

Inspection Checklist

- Enclosure exterior and interior is not marred or dented.
- There are no visibly damaged components.
- All internal components are secure.
- Printed circuit boards are firmly seated.
- All hardware and connections are tight.
- All wire terminations are secure.
- All items on packing list have been included.

Handling

Equipment can be very heavy and/or top heavy. Use adequate manpower or equipment for handling. Until the equipment is securely mounted, care must be used to prevent the equipment from being accidentally tipped over.

Table of Contents

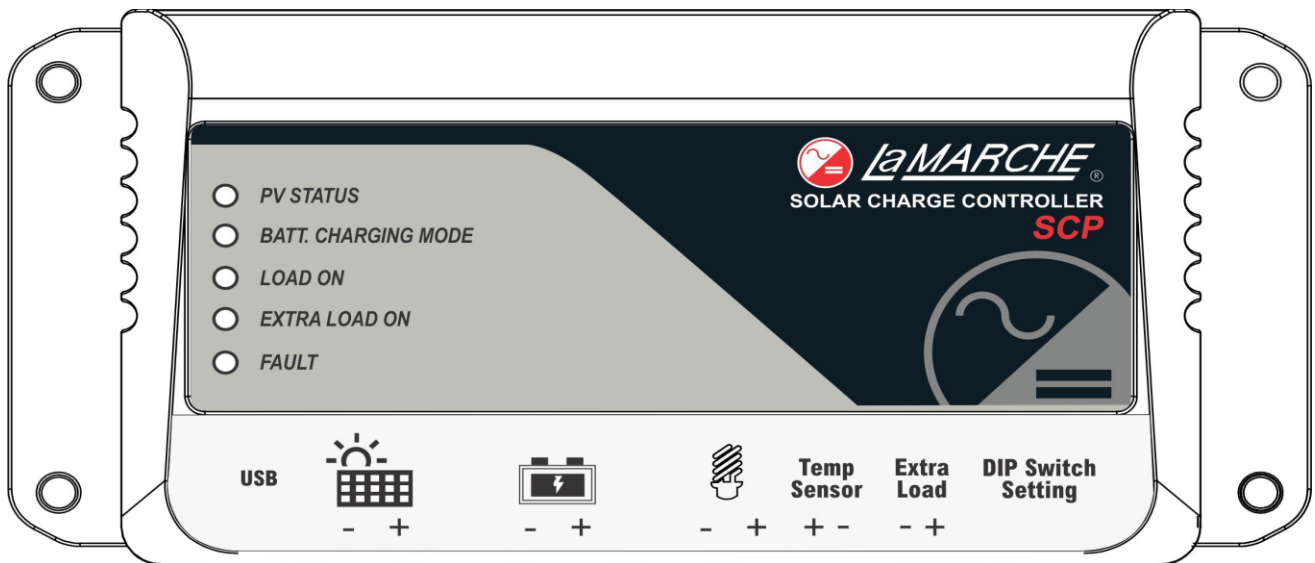
Important Safety Instructions	i
Table of Contents.....	iv
1. General Information.....	5
1.1 Product Overview	5
1.2 Features	6
1.3 Block Diagram	7
1.4 Battery Charging.....	7
2. LED Indicators/Alarms.....	8
3. Configuration & Settings.....	9
4. Data Logging	10
5. Protections	13
6. Installation and Uninstallation.....	14
6.1 Mounting.....	14
6.2 Installation Procedure	14
6.3 Uninstallation Procedure.....	15
7. Troubleshooting.....	16
Appendix A: Technical Specifications	17
Appendix B: Manufacturer’s Warranty	20
Appendix C: Document Control and Revision History	21

1. General Information

1.1 Product Overview

Solar Charge Controller makes use of resources efficiently so that it can provide better performance. This charge controller is compact in form so it takes less space to install. Many functions are user selectable so the user can choose according to their need. Although the charge controller is very simple to use, please take time to read this user manual and become familiar with the controller. This will allow full usage of the many advantages the Solar Charge Controller can provide for your solar system. Solar Charge Controller acts as a switch that connects a solar array to the battery for battery charging. The result is that the voltage of the solar array will be pulled down near to that of the battery.

Front View



1.2 Features

User Programmable Settings: Battery Type Selection (Sealed, Flooded), Low Voltage Load Disconnect, Low Voltage Load Reconnect, Equalize Mode Selection for Battery Charging.

Battery Voltage Auto Detection: Solar Charge Controller automatically detects the battery voltage when a battery is connected. Solar Charge Controller will intelligently detect the battery voltage and adjust to the respective battery mode i.e. 12V mode/24V mode.

High/ Low Temperature Protection: Solar Charge Controller keeps track of its ambient temperature, if temperature exceeds a safe value then it will automatically shutdown to protect against temperature hazard.

Extra Load Terminal: Solar Charge Controller has an additional extra load terminal of 12V/2A which can be used by the user along with the standard load for extra use. Extra load is conditionally enabled when the below conditions are satisfied:

1. Battery State Of Charge > 80%
2. Solar Voltage > 15V/32V
3. Charger ON

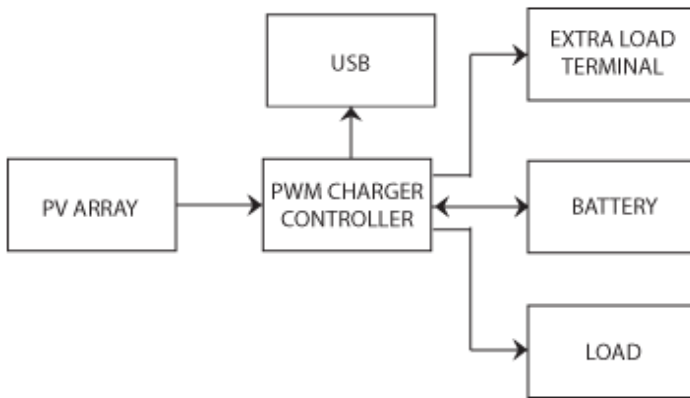
Low Voltage Disconnect (LVD) and Reconnect (LVR): An automatic load disconnect protects the battery from deep discharge. The load automatically reconnects when the battery recovers to the specified LVR voltage.

Temperature Compensation: Protects against overcharging and undercharging due to high and low ambient temperatures. An external temp. probe can be connected to the system through a terminal block to use this feature. The controller will automatically detect when installed and begin using this feature. The internal temperature sensor will still function and protect against dangerous temperatures without the external probe connected as well.

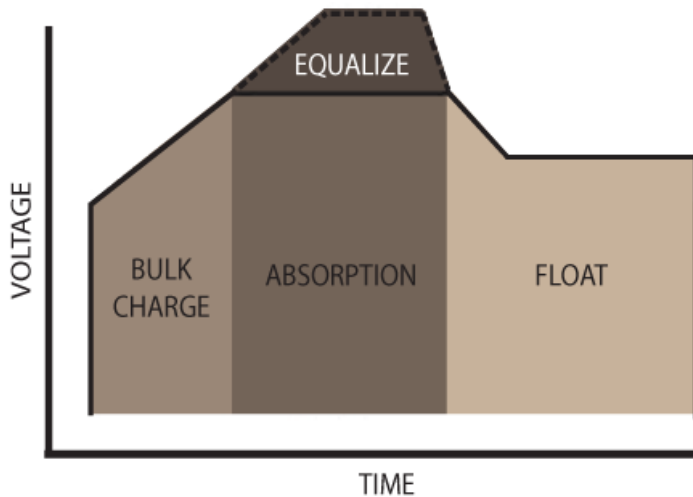
Communication Port: USB is used as an O/P interface through which different parameters mentioned below can be accessed through the Termite software tool:

1. Solar Voltage
2. Battery Voltage
3. Charging Current
4. Charging Mode
5. SOC of Battery
6. Load ON/OFF Status With Load Current
7. Extra Load ON/OFF Status With Extra Load Current
8. Remote Temperature: Remote temperature will be displayed when RTS probe is connected. If RTS probe is not connected (open), probe fault will be displayed.
9. System Temperature
10. Fault Indications: If any fault occurs in the system then it will be displayed under fault indications at USB.

1.3 Block Diagram



1.4 Battery Charging



4 Stage Battery Charging Algorithm: - Bulk/Absorption/Float/Equalize (optional) that slowly lowers the amount of power applied to the batteries as the batteries get closer to getting fully charged. This type of controller allows the batteries to be fully charged more with less stress on the battery, preventing the battery from overheating and over gassing, while extending battery life. It can also keep batteries in a fully charged state (called "float") indefinitely.

Bulk Charge: The battery voltage has not yet reached absorption voltage level and 100% of available solar power is used to recharge the battery.

Absorption: When the battery has recharged to the absorption voltage level, constant-voltage regulation is used to prevent heating and excessive battery gassing.

Float: After the battery is fully charged, the Charge Controller reduces the battery voltage to a float charge which is sometimes called a trickle charge. The battery remains in the absorption stage for 3 hours before transitioning to the float stage.

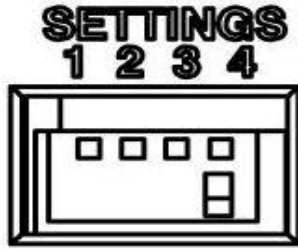
Equalize (flooded battery type only): The Charge Controller will equalize the flooded type battery for three hours after every 28 days. Equalize charging raises the battery voltage above the standard absorption voltage. This process prevents electrolyte stratification and equalizes the individual cell voltages within the battery.

2. LED Indicators/Alarms



LED INDICATIONS			
S.No		LED status	INDICATION
1.	LED1	Solid Glow	PV in range
		Flash with 500ms delay	PV Overvoltage / Undervoltage
		Flash with 100ms delay	PV Overload
2.	LED 2	Flash with 100ms delay	Bulk Charging
		Flash with 500ms delay	Absorption Charging
		Flash with 1 sec delay	Float Charging
		Solid Glow	Equalize Charging
		1sec Flash with 100 msec interval and OFF for 1 sec	Dead Battery Charging
3.	LED 3	Solid Glow	Load ON
4.	LED 4	Solid Glow	Extra Load ON
5.	LED 5	Solid Glow	Load Overload
		1sec Flash with 500 msec interval and OFF for 1 sec	Load Short Circuit
		1sec Flash with 100 msec interval and OFF for 1 sec	Extra Load Short Circuit
		Flash at 100 msec interval	Extra Load Overload

3. Configuration & Settings



Switch 1: Battery Type Selection:

0(up) = Sealed Battery
1(down) = Flooded Battery

Switch 2: LVD/LVR Set points Selection:

0(up) = LVD → 11.0V/22V
 LVR → 12.1V/24.2V
1(down) = LVD → 10.5V/21V
 LVR → 11.6V/23.2V

Switch 3: Manual Equalize: When Switch_3 is toggled, Charge Controller will enter into Equalize Mode charging stage for 3 hours with a flooded battery type only.

Switch 4: Not Used

5. Temperature Compensation: Battery charging voltage is temperature compensated when a temp. probe is connected to the RTS connector with correct polarity.

Temp. Compensation Coefficient (25°C Reference Temp.) = -5mV/cell/°C rise in Temp.

Temp. Compensation Range = -30°C to +60°C

4. Data Logging

The USB data logging feature can be used to monitor and keep track of the Solar Charge Controller. Through the Termite software application, parameters can be viewed in real-time as well as saved for historical data logs.

Several parameters mentioned below can be accessed through the Termite software tool:

1. Battery Voltage
2. Solar Voltage
3. Charging Current
4. Charging Mode
5. SOC of Battery
6. Load ON/OFF Status With Load Current
7. Extra Load ON/OFF Status With Extra Load Current
8. Remote Temperature: Remote temperature will be displayed when RTS probe is connected. If RTS probe is not connected (open), probe fault will be displayed.
9. System Temperature
10. Fault Indications: If any fault occurs in the system then it will be displayed under fault indications at USB.

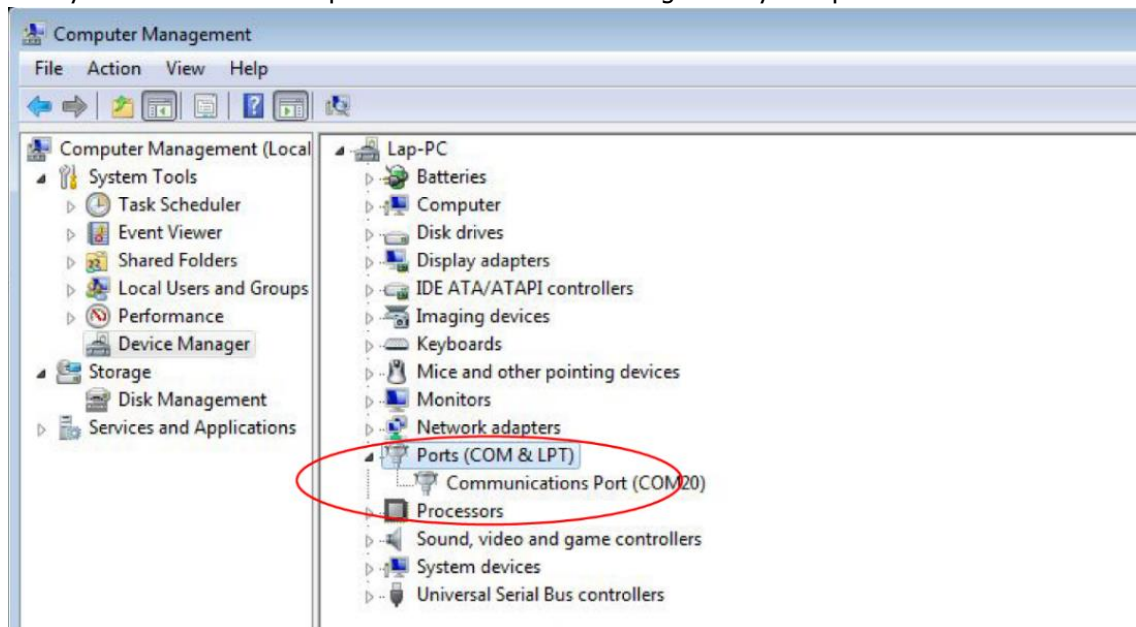
STEPS FOR USB DATA LOGGING:

1. Please install the custom software tool [Termite Data Logger](#).

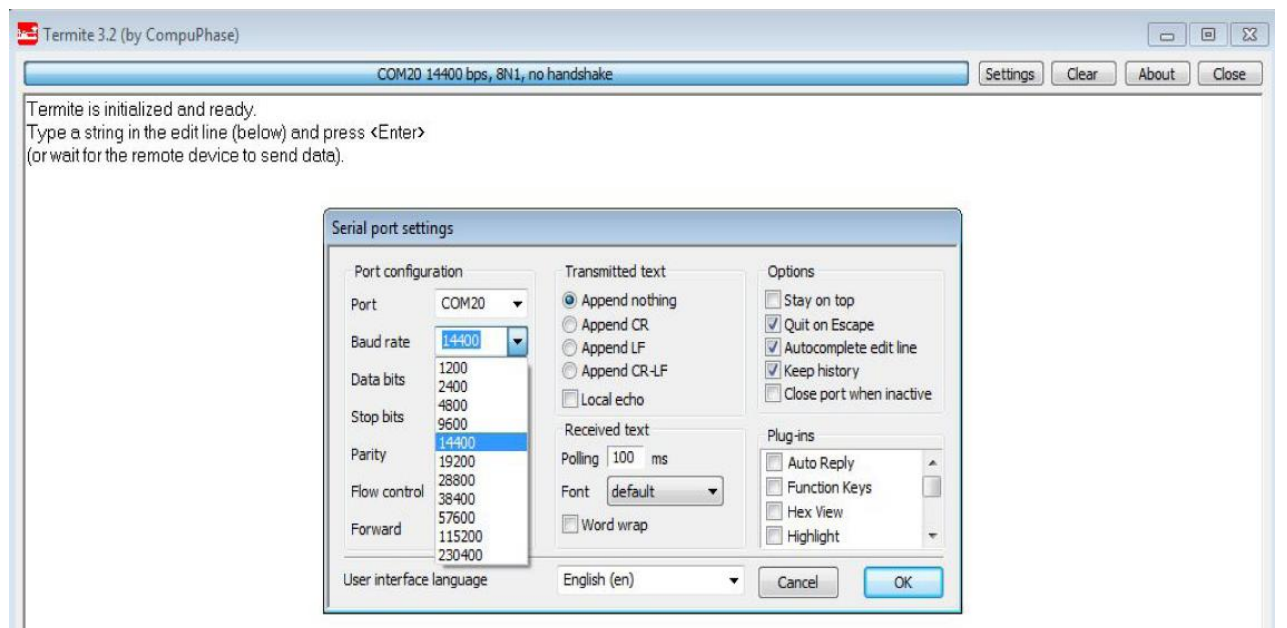
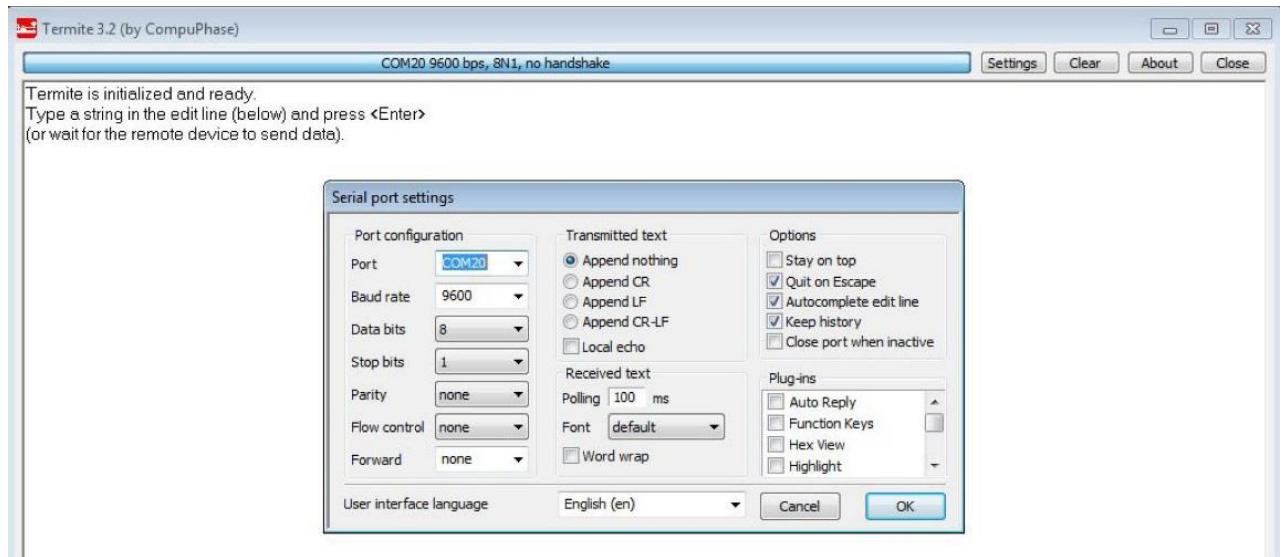


NOTE: Termite Data Logger can be found easily online and is freeware.

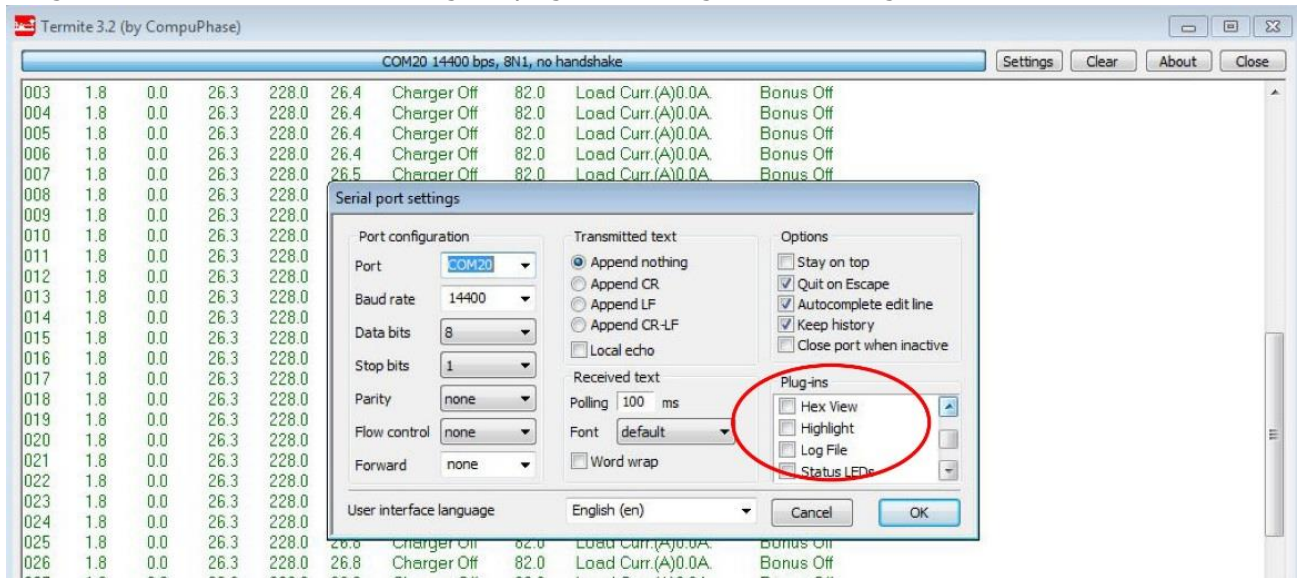
2. Connect the charge controller to PC via USB cable, then it will require the driver. Please install the dedicated driver.
3. After installing the driver, please disconnect and reconnect the charge controller.
4. Now you will find the COM port number in device manager in My Computer.



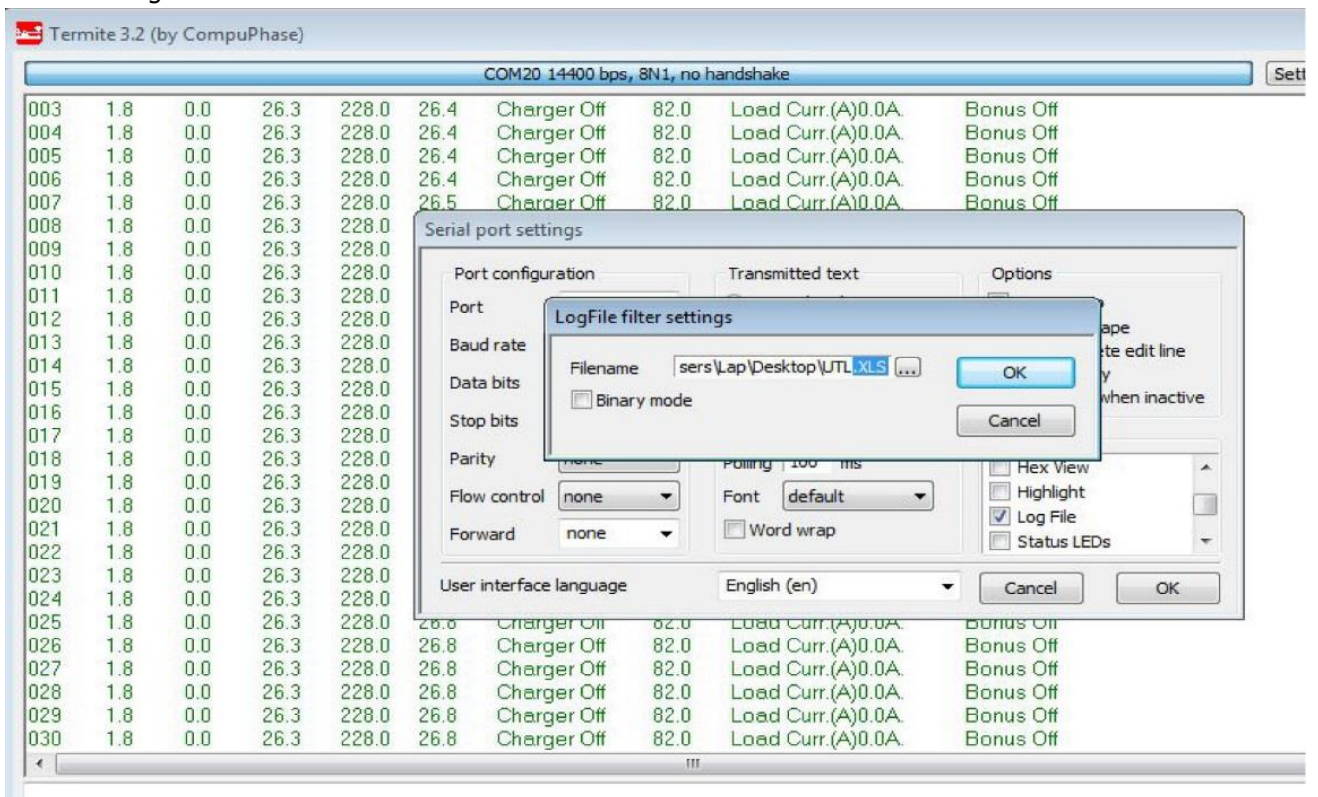
- Open Termitte software, go to settings and enter the COM port number and set Baud Rate to 14400. After these settings are entered you can view the USB data.



6. A log file can also be created. Please go to plugins in settings and select log file.



7. Now save log file name with .xls extension.



5. Protections

Solar Overload: If solar current exceeds 105% of max. current rating 20A i.e.(21A), Charge Controller will disconnect solar and attempt to reconnect solar 3 times with 30 sec time hysteresis, if overload remains then solar is disabled permanently and fault is cleared by removing and connecting power, fault is shown by LED1.

Load Overload: If load current exceeds 105% of max. current rating 20A i.e.(21A), Charge Controller will disconnect load and attempt to reconnect load 2 times with 5 sec time hysteresis, if overload remains then load is disabled permanently and fault is cleared by removing and connecting power, fault is shown by LED5.

Extra Load Overload: If extra load current exceeds 105% of max. current rating 2A i.e.(2.1A), Charge Controller will disconnect extra load and attempt to reconnect extra load 2 times with 5 sec time hysteresis, if overload remains then extra load is disabled permanently and fault is cleared by removing and connecting power, fault is shown by LED5.

Load Short Circuit: Load will be disabled after 200 usec and fault is shown by LED5. It will attempt to reconnect the load every 30 minutes.

Solar Short Circuit: The Charge Controller will stop charging during short circuit condition and charging will automatically start when short circuit is cleared.

Extra Load Short Circuit: Extra Load will be disabled after 200 usec and fault is shown by LED5. It will attempt to reconnect every 30 minutes.

Battery Reverse Polarity: Fully protected against battery reverse polarity. Ensure correct battery connection for normal operation.

Solar Reverse Polarity: Fully protected against solar reverse polarity. Ensure correct solar input connection for normal operation.

Solar High Voltage Protection: If solar input voltage exceeds the max. voltage rating, Charge Controller will disconnect solar until input voltage returns to its operating range.

Battery High Voltage Protection: If battery voltage exceeds the max. regulation voltage rating, Charge Controller will disconnect solar and load until battery voltage comes down to high voltage reconnect set point.

Protection From Reverse Current From Battery to Panel :

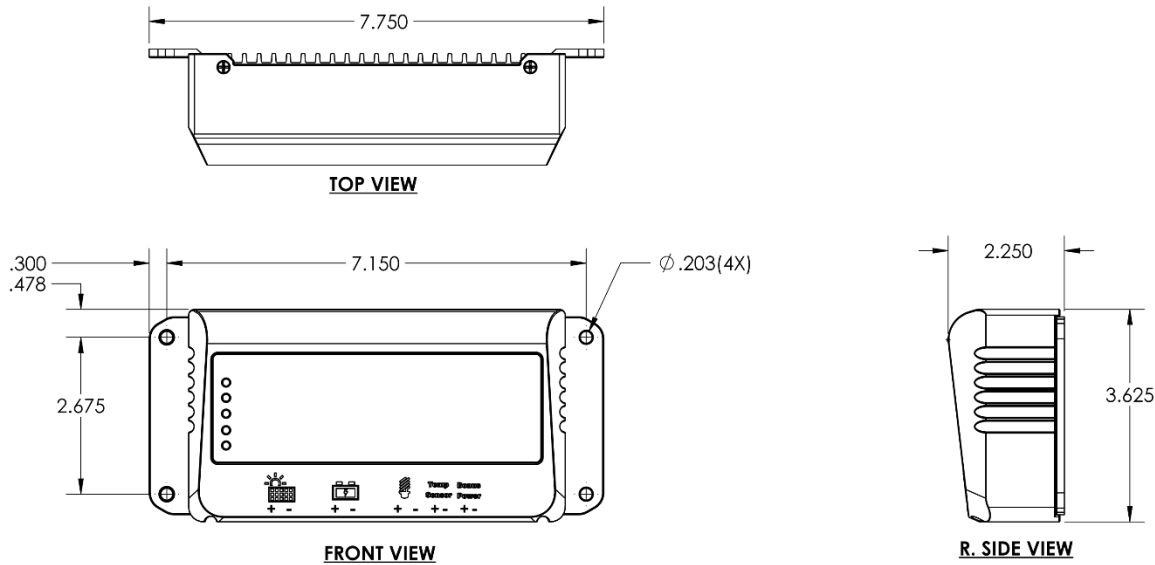
During night time when solar voltage becomes less than battery voltage, current will start to flow from battery to PV panel. This will discharge the battery and stored energy get wasted. Solar Charge Controller makes sure that the current only flows from panel to battery and not in reverse direction.

Solar Low Power Charging: During solar low power, when solar voltage becomes less than or equal to battery voltage and charging current is less than 0.5A, charger goes OFF due to solar low power protection. This protection also prevents reverse current flow from battery to solar.

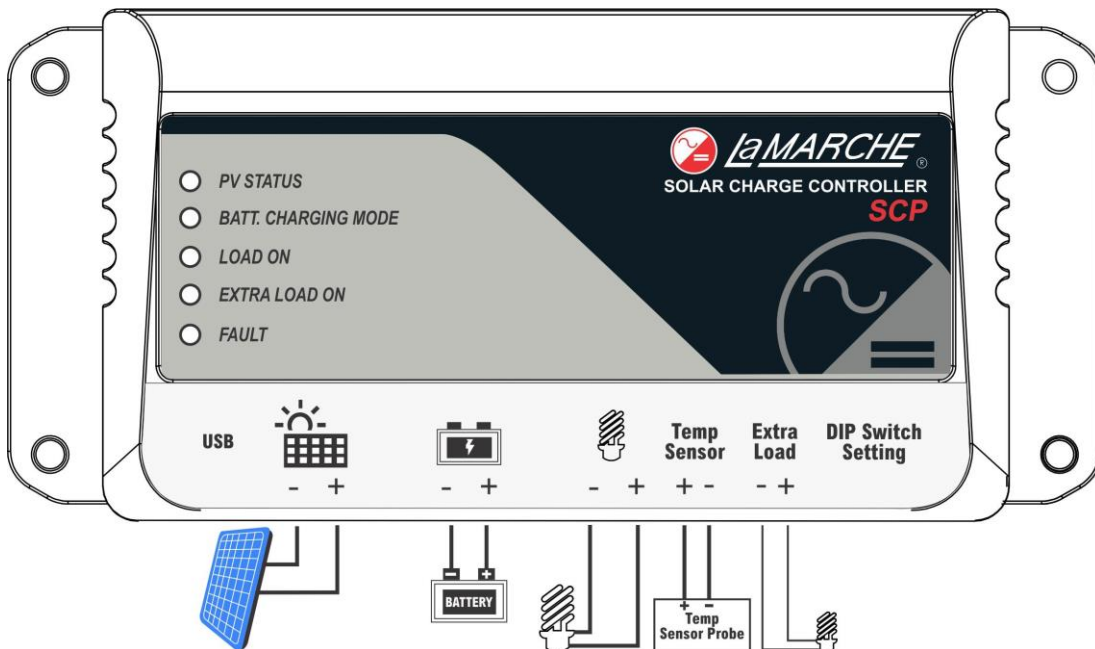
6. Installation and Uninstallation

6.1 Mounting

The PWM Controller can be wall mounted. Install the PWM using appropriate hardware on the wall.



6.2 Installation Procedure



Step-1: Connect battery positive (+ve) terminal to the positive (+ve) terminal of Solar Charge Controller battery terminal block and connect negative (-ve) battery terminal to the negative (-ve) terminal of Solar Charge Controller battery terminal block which is marked with a 'BATTERY' symbol.

Step- 2: Connect +ve terminal of temp. probe to the positive(+) terminal of Solar Charge Controller terminal block and -ve terminal to the negative(-) terminal of Solar Charge Controller terminal block which is marked using a 'TEMP SENSOR' symbol.

Step-3: Connect PV positive (+ve) terminal to the positive (+ve) terminal of Solar Charge Controller terminal block and connect PV negative (-ve) terminal to the negative (-ve) terminal of Solar Charge Controller terminal block which is marked using a 'SOLAR PANEL' symbol.



Note: Please first verify the Voc of the solar panel, it must be according to the specified rating of the system.

Step-4: Connect load positive (+ve) terminal to the positive (+ve) terminal of Solar Charge Controller terminal block and connect load negative(-ve) terminal to the negative(-ve) terminal of Solar Charge Controller terminal block which is marked as using a 'LOAD' symbol.

Step-5: Connect extra load positive(+ve) terminal to the positive(+ve) terminal of Solar Charge Controller terminal block and connect extra load negative(-ve) terminal to the negative(-ve) terminal of Solar Charge Controller terminal block which is marked using a 'EXTRA LOAD' symbol, if required.



CAUTION: Do not disconnect the battery wires while system is ON.

6.3 Uninstallation Procedure

To uninstall the system, follow the procedure below:

Step-1: Disconnect loads connected to the load and extra load terminals of the system.

Step-2: Disconnect solar input from the system.

Step-3: Disconnect battery from the system.



CAUTION: Do not touch system while it is in operation or briefly after turned off as the Solar Charge Controller heat-sink can become very hot during operation.

7. Troubleshooting

S.NO	CONDITION	FAULT	USER CHECKPOINTS	SOLUTION
1	Battery ON & Solar OFF	a)+12V supply not ON	1. Check battery wire connections & terminal polarity. 2. Check Battery MCB switched ON/OFF. 3. Check DC fuse.	1. Battery wire must be connected properly (-ve left side & +ve right side) as indicated. 2. Battery MCB must be switched ON. 3. DC Fuse should not be blown.
		b)+5V supply not ON	1. Check Battery wire connections to the terminal. 2. Check battery MCB switched ON/OFF. 3. Check DC Fuse.	1. Battery wire must be connected properly (-ve left side & +ve right side). 2. Battery MCB must be switched ON. 3. DC fuse Should not be blown.
		c)RTS	1. Check for connection and polarity of temp. probe.	1. Connection of temp. probe should be correct polarity i.e. +ve right side and -ve left side as indicated.
		d) Load not ON	1. Make sure that the battery voltage is in range i.e. battery volt> LVD and battery volt<HVD	1. Charge/maintain the battery to the specified LV/HVR set point.
2	Battery ON & Solar ON	Extra load not ON	1. Verify that charger is properly ON. 2. Check that the panel voltage is in range and battery SOC>80%.	1. Extra load will turn ON if solar is present and charger is ON. 2. Extra load will turn ON if solar voltage is in range and battery SOC>80%..
3	USB Communication	Data not displayed on computer screen	1. Check the COM port. 2. Check the baud rate. 3. Check the USB cable.	1. Verify that the correct COM port is selected. 2. Baud rate must be 14400. 3. Make proper connections of USB cable with the PWM system and PC.

Appendix A: Technical Specifications

Technical Specifications of PWM SCC- 12V/24V- 20A			
		12V	24V
Electrical Parameters	Nominal System Voltage	12V	24V
	Battery Type	Sealed Battery Flooded Battery	
	Operating Solar Input Voltage	22V	44V
	Max. Solar Input Voltage (Voc)	25V	50V
	Min. Solar Input Voltage @ Start-Up	15V	32V
	Solar Panel High Cut Voltage	25V	50V
	Solar Panel High Cut Recovery Voltage	23V	46V
	Solar Panel Low Cut Voltage	(P.V. \leq B.V- 0.2 & Charging Current $<$ 0.5A)	
	Solar Panel Low Cut Recovery Voltage	17V	34V
	Max. Battery Charging Current	20A	
	Battery Voltage Range	6V-16V	17V-30V
	Max. Input Power	300W	600W
	Load Voltage	12V	24V
	Max. Load Current	20A	
	Extra Load Voltage	12V	
	Max. Extra Load Current	2A	
	System Operating Temp. Range	-30°C to +60°C	
Low Voltage Disconnect/Low Voltage Reconnect	Yes		
Enclosure	Type	IP20, Type 1	
Electronic Protections	Solar Reverse Polarity Protection		
	Solar Short-Circuit Protection		
	Solar Overload Protection		
	Solar High Voltage Protection		
	Solar Reverse Current Protection at Night		
	Load Reverse Polarity Protection		
	Load Overload Protection		
	Load Short-Circuit		
Battery Reverse Polarity Protection			

	Battery High Voltage Protection		
	Extra Load Overload Protection		
	Extra Load Short-Circuit Protection		
	High/Low Temp. Protection		
	Surge Protection		
	Battery Temperature Compensation		
Battery Set Points @ 25°C		Sealed Battery 12V/24V	Flooded Battery 12V/24V
	Bulk Voltage	14.4V/28.8V	14.7V/29.4V
	Absorption Voltage	14.1V/28.2V	14.4V/28.8V
	Absorption Duration	3hr	3hr
	Float Voltage	13.7V/27.4V	13.7V/27.4V
	Equalize Voltage	N/A	14.9V/29.8V
	Equalize Duration	N/A	3hr
	Equalize Calendar	N/A	28 days
	Max. Regulation Voltage	15.3V	30.6V
	Low Voltage Disconnect Load (LVD)	11.0V/22V	
	Low Voltage Reconnect Load (LVR)	12.1V/24.2V	
	High Voltage Disconnect Load (HVD)	15.3V/30.6V	
	High Voltage Reconnect Load (HVR)	14V/28V	
	Start-Up LVD	11.7V	23.4V
DIP Switch Settings	Switch_1:	Battery Type Selection	
	SW1 = 0(UP)	Sealed Battery	
	SW1 = 1(DOWN)	Flooded Battery	
	Switch_2:	LVD/LVR Selection	
		12V	24V
	SW2 = 0(UP)	LVD=11.0V	LVD= 22V
		LVR= 12.1V	LVR= 24.2V
	SW2 = 1(DOWN)	LVD= 10.5V	LVD= 21V
		LVR= 11.6V	LVR=23.2V
Switch_3: Toggle	Manual Equalize		

	Switch_4:	Not Used	
Battery Charging	Regulation Method	4 Stage PWM (Bulk/Absorption/Float/Equalize)	
	Temp. Compensation Coefficient (25°C Reference Temp.)	12V	24V
		-30mV/°C	-60mV/°C
	Temp. Compensation Range	-30°C to +60°C	
	Temp. Compensation Enable Region	Absorption	
		Float	
		Equalize	
	Temp. Compensation Disable	Bulk	
		15V @ 12V nominal	30V @ 24V nominal
	System Operating Temp. Range	-30°C to +60°C	
	NTC High Cut	+62°C	
	NTC High Cut Recovery	+55°C	
	NTC Low Cut	-30°C	
NTC Low Cut Recovery	-20°C		
Communication	USB	Solar Voltage	
		Battery Voltage	
		Charging Current	
		Charging Mode	
		SOC of Battery	
		Load ON/OFF Status With Load Current	
		Extra Load ON/OFF Status With Current	
		Remote Temperature	
		System Temperature	
		Fault Indications	

Appendix B: Manufacturer's Warranty

All La Marche Manufacturing Co. equipment has been thoroughly tested and found to be in proper operating condition upon shipment from the factory and is warranted to be free from any defect in workmanship and material that may develop within one year from date of purchase. In addition to the standard one (1) year warranty, La Marche warrants its magnetics and power diodes on a parts replacement basis only for one (1) additional year under normal use.

Any part or parts of the equipment (except fuses, d.c. connectors and other wear-related items) that prove defective within a one (1) year period shall be replaced without charge providing such defect, in our opinion, is due to faulty material or workmanship and not caused by tampering, abuse, misapplication or improper installation. Magnetics and power diodes are warranted for two (2) years after date of purchase. During the last one (1) year of this two (2) year warranty period, the warranty covers parts replacement only, and no labor or other services are provided by La Marche, nor is La Marche obligated to reimburse the owner or any other person for work performed.

Should a piece of equipment require major component replacement or repair during the first year of the warranty period, these can be handled in one of two ways:

1. The equipment can be returned to the La Marche factory to have the inspections, parts replacements and testing performed by factory personnel. Should it be necessary to return a piece of equipment or parts to the factory, the customer or sales representative must obtain authorization from the factory. If upon inspection at the factory, the defect was due to faulty material or workmanship, all repairs will be made at no cost to the customer during the first year. Transportation charges or duties shall be borne by purchaser.
2. If the purchaser elects not to return the equipment to the factory and wishes a factory service representative to make adjustments and/or repairs at the equipment location, La Marche's field service labor rates will apply. A purchase order to cover the labor and transportation cost is required prior to the deployment of the service representative.

In accepting delivery of the equipment, the purchaser assumes full responsibility for proper installation, installation adjustments and service arrangements. Should minor adjustments be required, the local La Marche sales representative should be contacted to provide this service only.

All sales are final. Only standard La Marche units will be considered for return. A 25% restocking fee is charged when return is factory authorized. Special units are not returnable.

In no event shall La Marche Manufacturing Co. have any liability for consequential damages, or loss, damage or expense directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with other equipment or materials, or from any other cause. In addition, any alterations of equipment made by anyone other than La Marche Manufacturing Co. renders this warranty null and void.

La Marche Manufacturing Co. reserves the right to make revisions in current production of equipment, and assumes no obligation to incorporate these revisions in earlier models.

The failure of La Marche Manufacturing Co. to object to provisions contained in customers' purchase orders or other communications shall not be deemed a waiver of the terms or conditions hereof, nor acceptance of such provisions.

The above warranty is exclusive, supersedes and is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness. No person, agent or dealer is authorized to give any warranties on behalf of the Manufacturer, nor to assume for the Manufacturer any other liability in connection with any of its products unless made in writing and signed by an official of the manufacturer.

Appendix C: Document Control and Revision History

Part Number: 136329
Instruction Number: P25-LSCP-1
Issue ECN: 21449

21449			