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SCW15M

User Manual

Please read the instructions carefully
before installation and use.

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1 General Description

1.1 Ultra fast MPPT tracking

Especially in case of a clouded sky, when light intensity is changing continuously, a fast MPPT algorithm will improve energy harvest by up to 30% compared to PWM charge controllers and by up to 10% compared to slower MPPT controllers.

1.2 BatteryLife: intelligent battery management

● 1.2.1. Conventional battery management
When a solar charge controller is not able to recharge the battery to its full capacity within one day, the result is often that the battery is constantly fluctuating between a "partially charged" state and the "end of discharge" state. This mode of operation (no regular full recharge) will destroy a lead-acid battery within weeks or months.

● 1.2.2. BatteryLife algorithm
The BatteryLife algorithm will monitor the state of charge of the battery and day by day slightly increase the load disconnect level until absorption voltage is reached. From that point onwards the load disconnect level will be modulated so that absorption voltage is reached about once every week. The BatteryLife algorithm will substantially increase service life of the battery when compared to 1.2.1.

● 1.2.3. Upsizing the PV array or regularly 'downsizing' the load
A lead-acid battery will last even longer if a full recharge, including several hours absorption time, is achieved at least once every week.

1.3 Load output

The load output is short circuit proof and can supply loads with a large DC input capacitor such as an inverter (but it can not start a DC load and an inverter simultaneously). Alternatively, an inverter can be

switched on and off by using the load output to switch the remote on-off of the inverter (see section 3.4).

1.4 Internal temperature sensor

Compensates absorption and float charge voltages for temperature.

1.5 Automatic battery voltage recognition

The SCW15M will automatically adjust itself to a 12V or a 24V system.

1.6 Three step charging

The SCW15M Charge Controller is configured for a three step charging process: Bulk – Absorption – Float.

● 1.6.1. Bulk stage
During this stage the Controller delivers as much charge current as possible to rapidly recharge the batteries. When the battery voltage reaches the absorption voltage setting, the Controller activates the next stage (absorption).

● 1.6.2. Absorption stage
During this stage, the Controller switches to the constant voltage mode, where the absorption voltage is applied to the battery. When the charge current decreases to the float transition current setting, the battery is fully charged and the Controller switches to the float stage.

● 1.6.3. Float stage
During this stage, the float voltage is applied to the battery to maintain it in a fully charged state.

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2 Safety instructions

● It is advised to read this manual carefully before the product is installed and put into use.

● This product is designed and tested in accordance with international standards. The equipment should be used for the designated application only.

● Install the product in a heatproof environment. Ensure therefore that there are no chemicals, plastic parts, curtains or other textiles, etc. in the immediate vicinity of the equipment.

● Ensure that the equipment is used under the correct operating conditions. Never operate it in a wet environment.

● Never use the product at sites where gas or dust explosions could occur.

● Ensure that there is always sufficient free space around the product for ventilation.

● Refer to the specifications provided by the manufacturer of the battery to

ensure that the battery is suitable for use with this product. The battery manufacturer's safety instructions should always be observed.

● Protect the solar modules from direct light during installation, e.g. cover them.

● Never touch uninsulated cable ends.

● Use only insulated tools.

● Connections must always be made in the sequence described in section 3.3.

● The installer of the product must provide a means for cable strain relief to prevent the transmission of stress to the connections.

● In addition to this manual, the system operation or service manual must include a battery maintance manual applicable to the type of batteries used.

3. Installation

3.1. General

● Mount vertically on a non-flammable surface, with the power terminals facing downwards.

● Mount close to the battery, but never directly above the battery (in order to prevent damage due to gassing of the battery).

● Use cables with a diameter of 6mm². The recommended maximum length of the cable is 5m, in order to restrict cable loss. (if the cables to the PV panels must be longer than 5m, increase cross section or use parallel cables and install a junction box next to the controller and connect with a short 6mm² cable to the controller).

● 20A battery fuse: replacable fuse in the controller, next to the battery terminals.

● Grounding: if grounding is required, use one grounding point only. Never ground both the minus of the solar array and the minus of the battery.

3.2. PV configuration

● The MPPT solar charge controller will operate only if the PV voltage exceeds battery voltage (Vbat).

● PV voltage must exceed Vbat + 5V for the MPPT solar charge controller to start. Thereafter minimum PV voltage is Vbat + 1V.

● Maximum open circuit PV voltage: 100V.

The MPPT solar charge controller can be used with any PV configuration that satisfies the three above mentioned conditions.

For example:

12V battery and mono- or polycristalline panels

● Minimum number of cells in series:

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36 (12V panel).

● Recommended number of cells for highest controller efficiency: 72 (2x 12V panel in series or 1x 24V panel).

● Maximum: 144 cells 4x 12V panel in series).

24V battery and mono- or polycristalline panels

● Minimum number of cells in series: 72 (2x 12V panel in series or 1x 24V panel).

● Maximum: 144 cells (4x 12V panel in series).

Note: at low temperatures the open circuit voltage of a 144 cell solar array may exceed 100V, depending on local conditions and cell specifications. In that case the number of cells in series must be reduced.

3.3 Cable connection sequence (see figure 3)

First: connect the cables to the load, but ensure that all loads are switched off.

Second: connect the battery (this will allow the controller to recognize system voltage).

Third: connect the solar array (when connected with reverse polarity, the MPPT solar charge controller will heat up but will not charge the battery). The system is now ready for use.

3.4 Connecting an inverter

The load output can be used to supply DC loads and simultaneously to control an inverter

3.5 Battery charging information

The MPPT solar charge controller starts a new charge cycle every morning, when the sun starts shining. The maximum duration of the absorption period is determined by the battery voltage measured just before the solar charger starts up in the morning:

Battery voltage Vb (@start-up)	Maximum absorption time
Vb < 23,8V	6h
23,8V < Vb < 24,4V	4h
24,4V < Vb < 25,2V	2h
Vb > 25,2V	1h

(divide voltages by 2 for a 12V system)

If the absorption period is interrupted due to a cloud or due to a power hungry load, the absorption process will resume when absorption voltage is reached again later that day, until the absorption period has been completed. The absorption period also ends when the output current of the solar charger drops to less than 1 Amp, not because of low solar array output but because the battery is fully charged (tail current cut off). This algorithm prevents over charge of the battery due to daily absorption charging when the system operates without load or with a small load.

Navigation

Status

This shows the current status of the MPPT solar charge controller.
By pressing the up and down button, one can switch between the following values:

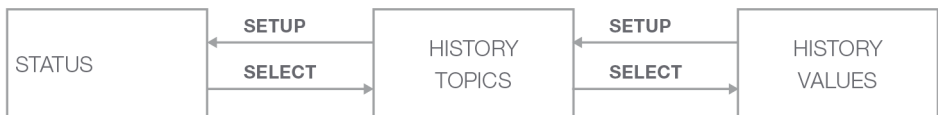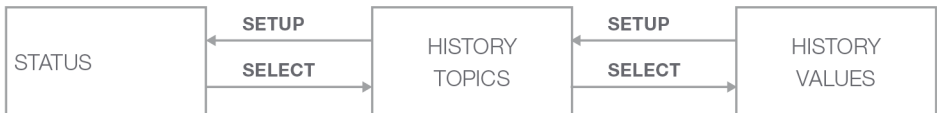|		
`88888` W	PANEL POWER	
`8888.8` V	PANEL VOLTAGE	
`88888` kWh	YIELD TODAY	
`88888` !	CHARGER ERROR	This is only visible when there is an actual error
`88888`	CHARGER STATE	Possible value: OFF, FAULT, BULK, ABSORPTION, FLOAT
`8888.8` A	BATTERY CURRENT	
`8888.8` V	BATTERY VOLTAGE	
`88888`	LOAD OUTPUT STATE	Possible values: ON, OFF
`8888.8` A	LOAD CURRENT	

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History

By pressing SELECT in the status menu, the history menu is entered. Here, the history stored in the MPPT solar charge controller can be viewed. This contains both overall history and well as a day to day history. This is a 30 day history. When viewing values, one can select a different day by pressing the up and down button. The MPPT solar charge controller will first show the value for a short time, then the currently selected day, and then the value again. When viewing an overall history value, pressing the up or down button will cause the MPPT

solar charge controller to show "TOTAL".
Pressing SETUP causes the MPPT solar charge controller to go back to the status menu topics when viewing topics or go back to the topics menu when viewing values.

| STATUS | ← SETUP / SELECT → | HISTORY TOPICS | ← SETUP / SELECT → | HISTORY VALUES |

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```
┌─────────┐   SETUP   ┌─────────┐   SETUP   ┌─────────┐
│         │ ◄──────── │ HISTORY │ ◄──────── │ HISTORY │
│ STATUS  │   SELECT  │ TOPICS  │   SELECT  │ VALUES  │
│         │ ────────► │         │ ────────► │         │
└─────────┘           └─────────┘           └─────────┘
```

The topics are listed in the table below. Only topics marked with a * are visible in case of 2 day history.

Overall topics

	TOTAL YIELD*	The cumulative yield since the last history reset
	MAX PANEL VOLTAGE	The maximum panel voltage since the last history rese
	MAX BATTERY VOLTAGE	The maximum battery voltage since the last history reset
	MIN BATTERY VOLTAGE	The minimum battery voltage since the last history reset. (Only available for MPPT software version >= 1.17)
	LAST ERRORS	The last 4 errors since the last history reset.The number of blocks in the lower right of the screens determines which error is currently shown with 1 block being the latest and 4blocks being the oldest.

Daily topics

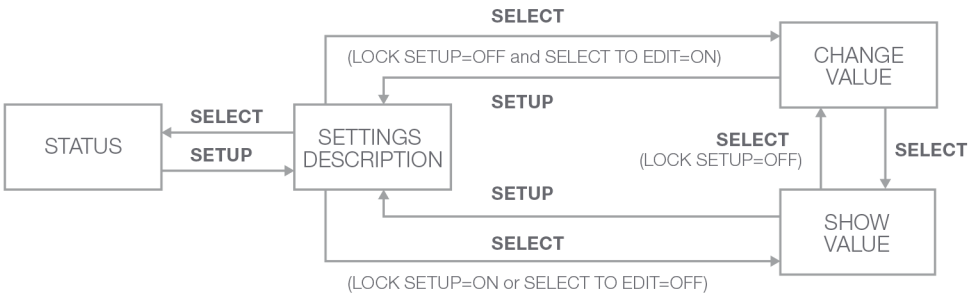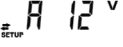|		
	YIELD*	The daily yield
	MAX POWER*	The maximum power per day
	MAX PANEL VOLTAGE	The maximum panel voltage per day
	MAX BATTERY CURRENT	The maximum battery current per day
	MAX BATTERY VOLTAGE	The maximum battery voltage per day
	MIN BATTERY VOLTAGE	The minimum battery voltage per day
	BULK TIME	The time spend in bulk per day
	ABSORPTION TIME	The time spend in absorption per day
	FLOAT TIME	The time spend in float per day
	LAST ERROR	The last 4 errors per day.The number of blocks in the lower right of the screens determines which error is currently shown.

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Settings

By pressing SETUP for 2 seconds in the status menu, the settings menu is entered. Here, the MPPT solar charge controller setting can be viewed and changed. First the topic is shown and when SELECT is pressed, the corresponding value is shown. When SELECT TO EDIT is OFF, the value is shown before it can be changed by pressing SELECT again. When SELECT TO EDIT is ON, the current value is shown and a new value can immediately be selected. When LOCK SETUP is ON, settings only be changed after setting LOCK SETUP to off. When editing a value, one can change its

value by pressing the up and down buttons. When changing numeric values, pressing SELECT will go to the next digit, until the last digit. In this case, pressing SELECT will save the setting. When editing non numeric values, pressing SELECT will save the setting.

Pressing SETUP causes the MPPT solar charge controller to go back to the status menu topics when viewing topics or go back to the topics menu when viewing values.

The settings are listed in the table below.

01 LOCK SETUP	When this is ON, other settings cannot be changed. When trying to change a setting (except LOCK SETUP), the MPPT solar charge controller will show "LOCK" and show the value of that setting.
02 BATTERY VOLTAGE	The battery voltage that the MPPT solar charge controller is working with. When the setting is AUTO,it will show the A character in front of the voltage.
03 BATTERY TYPE	The battery type that the MPPT solar charge controller is working with. This can be set to FIXED or USER. When set to fixed, the rotary switch on the MPPT determines the actual battery type. When set to USER, all other charging related settings can be edited. It will be automatically set to USER when editing a charger related setting.
04 MAXIMUM CURRENT	The maximum charging current
05 BULK TIME LIMIT	The maximu time continuously spent in biulk
06 ABSORPTION TIME LIMIT	The maximu time continuously spent in absorption
07 ABSORPTION VOLTAGE	Battery voltage at which the MPPT solar charge controller switches to the absorption phase
08 FLOAT VOLTAGE	Battery voltage at which the MPPT solar charge controller switches to the float phase
09 TEMP COMPENSATION	
10 LOAD OUTPUT	Load output operating mode possible values:OFF,AUTO,ALT1,ALT2,ON,USER1,USER2
11 LOAD SWITCH HIGH	The high voltage level in case LOAD OUTPUT is set to USER1 or USER2
12 LOAD SWITCH LOW	The low voltage level in case LOAD OUTPUT is set to USER1 or USER2
13 CLEAR HISTORY	Clears the history of the MPPT solar charge controller
14 FACTORY DEFAULTS	Resets the MPPT solar charge controller back to factory defaults
15 BACKLIGHT INTENSITY	Sets the backlight intensity of the LCD
16 BACKLIGHT ALWAYS ON	Determines whether the backlight of the LCD is always on
17 SCROLL SPEED	Determines the scroll speed of the LCD
18 SELECT TO EDIT	when set to OFF,the MPPT solar charge controller first shows the value of a setting and SELECT has to be pressed to be able to edit the value
19 AUTOLOCK	When set to ON,LOCK SETUO will be automatically set to ON,2 minutes after changing a setting

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5 Specifications

Solar Charge Controller	SCW15M
Battery voltage	12/24 V Auto Select
Maximum battery current	15A
Maximum PV power, 12V 1a,b)	200W (MPPT range 15V to 100V)
Maximum PV power, 24V 1a,b)	400W (MPPT range 30V to 100V)
Automatic load disconnect	Yes, maximum load 15A
Maximum PV open circuit voltage	100V
Peak efficiency	98%
Self consumption	20mA
Charge voltage 'absorption'	14,4V / 28,8V (adjustable)
Charge voltage 'float'	13,8V / 27,6V (adjustable)
Charge algorithm	multi-stage adaptive
Temperature compensation	-16mV / °C resp. -32mV / °C
Continuous/peak load current	15A / 50A
Low voltage load disconnect	BatteryLife algorithm
Low voltage load reconnect	BatteryLife algorithm
Protection	Battery reverse polarity (fuse) Output short circuit / Over temperature
Operating temperature	-30 to +60°C (full rated output up to 40°C)
Humidity	100%, non-condensing
Maximum altitude	2000m

Environmental condition	Indoor, unconditioned
Pollution degree	PD3

ENCLOSURE

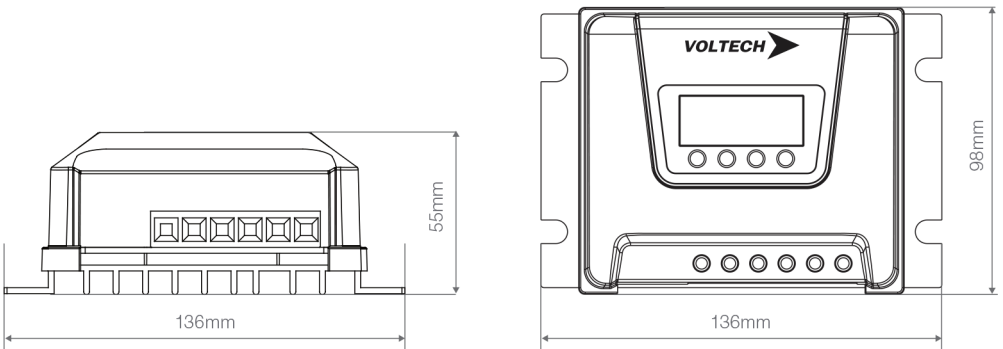|	
Power terminals	6mm² / AWG10
Protection category	IP22 (connection area)
Weight	0,4kg
Dimensions (h x w x d)	136 x 98 x 55mm

STANDARDS

Safety	EN/IEC 62109

1a) If more PV power is connected, the controller will limit input power to 200W resp. 400W.
1b) PV voltage must exceed Vbat + 5V for the controller to start. Thereafter minimum PV voltage is Vbat + 1V.

Dimension drawing