



# PowerXtreme

## User manual

### **MPPT Solar charge controller PowerXtreme XS20s**



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# PowerXtreme

Dear customer,

Thank you for purchasing the high quality MPPT Solar charge controller from PowerXtreme! This product has been developed using the most modern technologies and quality systems. We assure you that we make every effort to ensure trouble-free operation so that you are happy with your purchase. Our ultimate goal is a satisfied customer.

If you have any questions, please contact one of our dealers or our service department.

We hope you enjoy your MPPT Solar charge controller!

Cordial greetings,

EmergoPlus BV

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## 1. Product description

### 1.1 Product information

The MPPT Solar charge controller is a fully automatic battery charger that converts the energy, generated by the Solar panel, into a regulated battery voltage. MPPT stands for Maximum Power Point Tracking. Using this technology, the charger continuously searches for the maximum deliverable capacity of the Solar panel. This to ensure to get maximum return from your Solar panel. This return is more than 20% higher than for conventional systems.

This product can be connected to an external LDC display or Bluetooth communication module.

### 1.2 Product properties

- The charger has a dual-peak or multi peak tracking technology. This will always monitor the maximum power point, if the solar panel is partly in the shade or partly dysfunctional.
- The charger can be set for the following types of batteries: gel-batteries, low-maintenance batteries, lead batteries, lithium batteries, etc.
- The charger is protected against too high currents. In case the capacity of the solar panel exceeds a certain level and the charging current is higher than the rated current, the charger will automatically assume downward adjustment and align the charging current to the rated level.
- High start-up currents or capacitive loads do not cause failures.
- The charger will automatically set to 12 or 24V-DC battery voltage.
- The charger has a data log function. Details can be stored for up to a year.
- The charger has built-in temperature monitoring. When the temperature exceeds the set value, the charging current will linearly drop to reduce the temperature increase of the charger.

This is to prevent the charger from getting damaged by overheating.

- During the charging of lead batteries, in case of a temperature increase, the charger will automatically reduce the charging voltage to lengthen the life span of the battery.

### 1.3 Introduction to Maximal Power Point Tracking (MPPT) technology

Maximum Power Point Tracking (MPPT) is an advanced charging technology in which the solar panel generates more output capacity, due to the adjustment of the settings of the electrical module. Due to the non-linear character of solar panels there is a maximum output capacity (maximum power point) on the power curve. As conventional PWM chargers do not continuously follow this point, they do not get the maximum capacity of the solar panel. But a Solar charge controller with MPPT-technology will continuously monitor the maximum power point to get the maximum quantity of energy from the panel.

Take a 12V Solar system for example. The maximum peak voltage ( $V_{mpp}$ ) of the solar panel is approximately 17V, whereas the battery voltage is approximately 12V. When using a conventional charger, the voltage of the solar panel will remain around 12V, not being able to provide the maximum capacity. The MPPT-charger solves this problem by continuously adjusting the input voltage and current of the solar panel and, as such, realise maximum input power.

In comparison with conventional PWM-chargers, the MPPT-charger uses the maximum capacity of the solar panel and, as a consequence, it is able to provide a higher charging current. In general, the MPPT charger is able to increase the energy consumption by over 20% compared to conventional chargers. A series connected panel can also be connected with lower currents and losses.

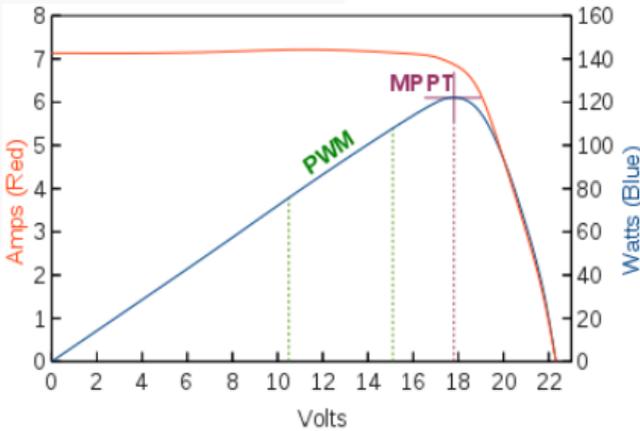
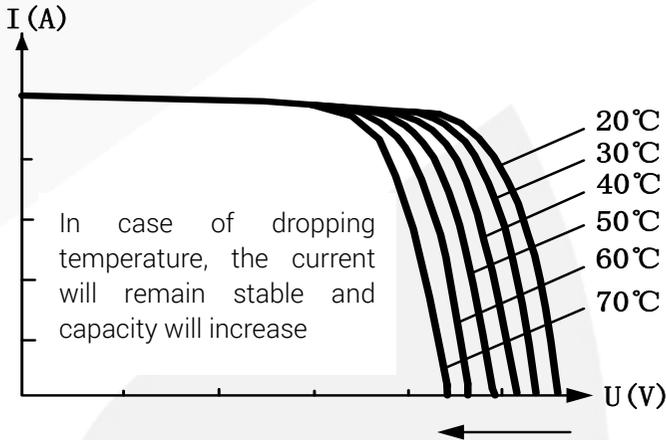


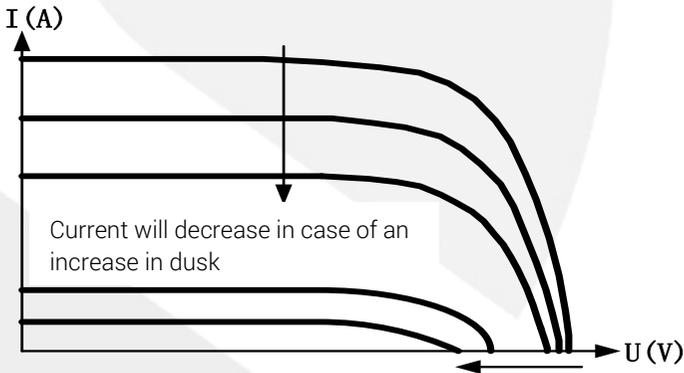
Image 1. Typical output curve solar panel

As a consequence of the changing ambient temperature and light intensity, the maximum power point will vary significantly. Our MPPT-charger will adjust the parameter settings, based on the conditions so that the system will always function close to the max. operational point. The entire process is fully automatic.



Voltage will decrease in case of an increase in temperature

Image 2. Relation between solar panel output and temperature



Current will decrease in case of an increase in dusk

Image 3. Relation between solar panel output and light intensity

### 1.4 Introduction of charging phases

The MPPT charger makes use of a 3-step charging curve for the charging of the battery. A full charging process includes: A] consistent current charging, B] consistent voltage charging, C] floating charging. The charging curve as shown below:

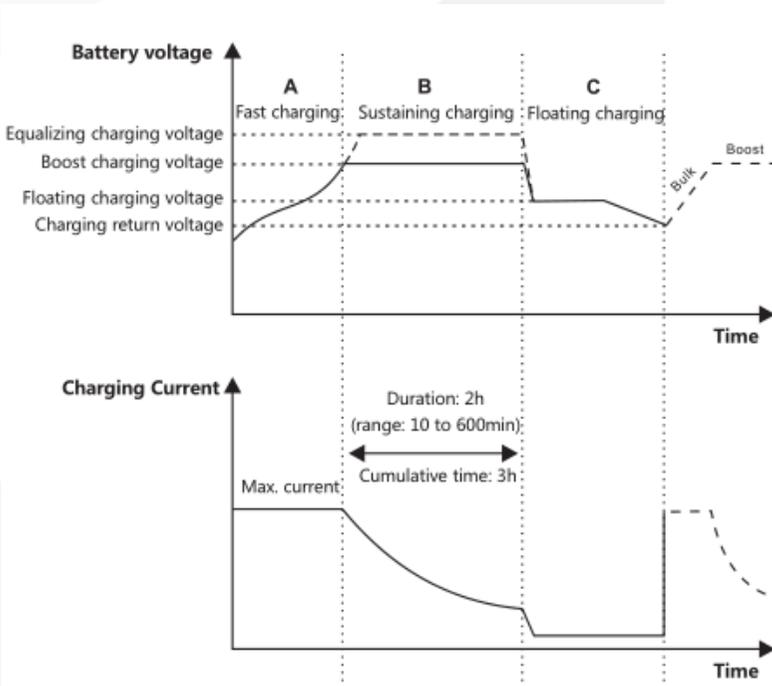


Image 4. Charging diagram

#### A] consistent current (CC) charging

During CC charging, if the battery voltage hasn't yet reached the set value of charged voltage, the charger will charge the battery with maximum MPPT Solar energy capacity. When the battery voltage reaches the pre-set value, charging at consistent voltage will start.

## B] consistent voltage (CV) charging

During this phase in the charging process no MPPT charging is used. During this phase the charging current will gradually reduce. The consistent voltage charging consists of two sub-phases, i.e. equalizing charging and boost charging. These two phases are not executed alternately, but equalizing is activated once every 30 days. This does not happen in the charger is in Lithium mode.

### B.1] Boost charging

As a rule, the boost charging takes approximately 2 hours. Users can adjust the pre-defined values of duration and boost voltage point for lead batteries to suit their own needs. When the time set has been reached, the system will switch to floating charging.

### B.2] Equalizing charging.



#### **WARNING!**

During the equalizing charging, an open lead battery could produce explosive gas. For that reason, the battery should be charged in a well-ventilated location!



#### **CAUTION!**

During the equalizing charging, the battery voltage could reach values high enough to cause damage to the sensitive DC users. Check and ensure that all permitted input voltages of all users in the system are higher than the voltage set for battery equalizing charging.

**CAUTION!**

Overcharging, or situations where too much gas is being generated, may cause damage to the battery. Equalizing charging up to an excessively high level or during too long a period of time may cause damage. Carefully read the instructions of the battery that is applied in the system.

Some types of batteries benefit from frequent equalizing charging as this ensure mixing of the electrolyte, balancing of the battery voltage and the cessation of the electro-chemical reaction. Equalizing charging increases the battery voltage to a higher level than the standard supply voltage and ensure the electrolyte to start gasifying. If subsequently the charger automatically sets the battery to equalizing charging, the charging will take 120 minutes (standard). In order to prevent that too much gas is being generated or that the battery becomes overheated, equalizing charging and boost charging will not be repeated during a full charging cycle.

**Remarks:**

1. If, as a consequence of the installation or load of the battery, the system is not able to continuously stabilise the battery voltage at a consistent level, the charger will start a timing-process and after 3 hours, when the battery voltage reaches the set value, the system will automatically switch to the equalizing charging.

**C] Floating charging**

When the consistent voltage charging phase is finished, the charger will switch to floating charging. In this case the charger reduces the battery voltage by decreasing of the charging current and keeps the battery voltage at the set value of floating battery voltage. During the floating charging process, the battery is lightly charged to keep it fully charged. In this stage all solar energy is available for users. When the load requires

more capacity than the solar panel is able to generate, the charger will not be able to keep the battery voltage at the floating charging level. When the battery voltage reaches a value below the set value for CC charging, the system will cease the floating charging and start the CC charging again.

## 2. Safety instructions

### 2.1 Explanation of safety instructions

The safety instructions will help you avoid risks while carrying out activities. The safety instructions are sub-divided into the following categories:



#### **WARNING!**

Means that the relevant activity is hazardous and you must prepare well before proceeding.



#### **CAUTION!**

Means that relevant implementation could cause damage.



#### **NOTE!**

Means advice or instruction for the operator.

### 2.2 General instructions

1. As the charger may have loads with voltages that exceed the limit for human safety, it is not permitted to work with the charger unless you have carefully read this manual.
2. The charger does not have internal parts that require maintenance or service. You are not permitted to open the charger or disassemble it, with the exclusion of the connectors on the terminal strip.
3. The charger must be installed indoors. Avoid exposure to and penetration of water, rain, snow, moisture, highly polluting conditions and condensation.

4. While in operation the charger may reach a high temperature. Therefore, place the charger in a well-ventilated room and ensure that ventilation channels are not covered or obstructed.
5. We highly recommend the use of a fuse (25A) outside the charger. Position this as close as possible to the positive pole of the battery. The same goes for the connection of the consumer. Also make use of a suitable fuse, as close as possible to the positive pole.
6. Regarding installation and wiring of the charger, you must ensure that the connection with the Solar panel and the fuse are disconnected.
7. After the installation check if all connections are fixed solidly and reliably. Loose connection cause heat which may lead to extremely dangerous situations.

### 2.3 Installation precautions

1. Be very careful when positioning the battery. When working with open lead-acid batteries always wear safety glasses. In case of contact with battery acid, rinse with water for a long time.
2. In order to prevent short circuit, do not place any metal objects on or near the battery.
3. During charging gas may be generated. Always ensure a well-ventilated room.
4. Keep the battery away from sparks and fire, because the battery may produce highly flammable gas.
5. In case of installation in the open, protect the battery against direct sunlight and penetration of rain water.
6. Loose connection or corroded wire will lead to excessive heat development. This may result in melting of the insulation layer of the wire and surrounding materials and even cause fire. Therefore, make sure that all connections are firmly fixed or tightened.
7. When connecting the system, the output voltage may exceed the upper limit for human safety. Therefore, make use of insulated tools at all times and keep your hands dry.

8. Always observe the safety recommendations of the manufacturer.
9. The system connection wires are selected according to the current density not more than 4A / mm<sup>2</sup>.
10. Ground the charge controller.

## 2.4 Wiring specifications

Wiring and installation methods must meet the national and local electrical specifications.

The specifications of the wiring of the battery and the load must be selected in accordance with the rated currents, refer to the following table for wiring specifications:

Model	PV maximum Input current	Maximum wire diameter at PV end (mm <sup>2</sup> )	Rated charging current	Diameter charge cable (mm <sup>2</sup> )
XS20s	20	4	20A	6

Image 1. Prescribed cable diameter

### 3. Description and functioning

#### 3.1 LED-indicators

There is a total of three indicators on the charge controller.

1.		Solar panel indicator	Indication present charge mode of the charger.
2.		BAT indicator	Indicates present status of the battery.
3.		BAT-type indicator	Indicates the current battery type.

##### 1. Solar panel indicator

Diagram	Indicator	Charging status
	On	MPPT charging
	Flashes slowly	Boost charging
	Single flash	Float charging
	Fast flashing	Equalizing
	Double flash	Charging constant current
	Off	No charging

## 2. BAT indicator:

Indicator color	Indicator status	Battery status
Green	On	Battery fully charged
Yellow	On	Normal battery voltage
Red	On	Battery low voltage
	Slowly flashing	Battery discharged too far
	Fast flashing (On: 0,1 sec., off: 0,1 sec., cycle: 0,2 sec.)	Over-voltage of over temperature of the battery

Note: connect the display for more detailed information about the error indication or look in the App.

## 3. BAT-type indicator:

Indicator color	Battery status
Green	Sealed Lead Acid Battery (SLD)
Yellow	Gel-Head battery (GEL)
Red	Wet lead battery (FLD)
Blue	12V Li battery (standard: LiFePO4)
Purple	24V Li battery (standard: LiFePO4)
White	User (customized)

### 3.2. Keys Operation

There is a button on the bottom of the charge controller that is used in conjunction with the BAT type indicator to select the battery type ("SET"). The specific operating mode is as follows: In the current operating state, press and hold the button for 8 seconds with a blunt, long and thin object. The BAT type indicator (the color displayed is that of the previously saved battery type) starts flashing (the charge controller shuts off charging and

other operations and enters idle mode). At this point, each time the button is pressed, the battery type indicator changes color to correspond to a battery type. After selecting the battery type, press and hold the button again for 8 seconds or do not perform any operation for 15 seconds. Then the charge controller will automatically save the currently set battery type and go to normal operating mode; In addition, if you keep the button pressed for 20 seconds, the charge controller will restore the factory default settings.

#### 4. Unpacking and mounting/installing

In the packaging of the Solar charge controller you will find the following components:

Amount	Description	Art. nr	Art. nr in combination with charger
1	Charger XS20s	EP5100002	
1	Manual EN (download)		

Optional:

1	Bluetooth module BT-2	EP2500001	EP5100004
1	Display	EP2500002	EP5100003

- Take all the components carefully out of the packaging and check whether all parts are present in accordance with the parts list.



#### CAUTION!

Keep children away from the plastic packaging material. Risk of suffocation.

## 4.1 Mounting MPPT Solar charge controller



### **WARNING!**

Never install the charger together with the lead battery in the same enclosed space! Never install the charger in a confined space where battery gas can build up!



### **WARNING!**

Solar panels can generate extremely high voltages in the open-circuit. Be very careful during the mounting process of the wires.



### **WARNING!**

During installation of the charger, ensure that enough air flows along the cooling radiator and leave at least 150 mm of space above and below the charger to safeguard the natural convection of heat dissipation.

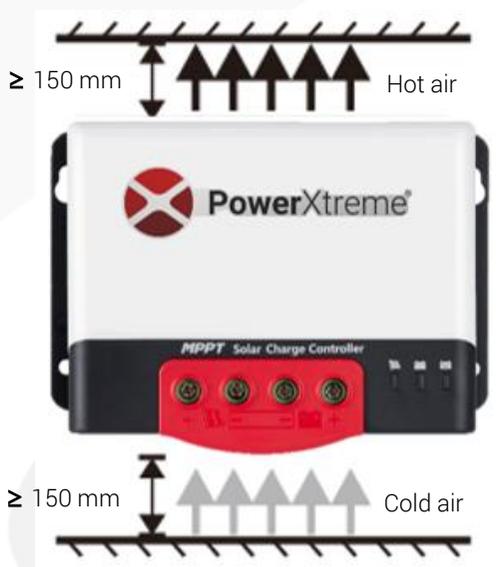


Image 6. Distance for purposes of ventilation

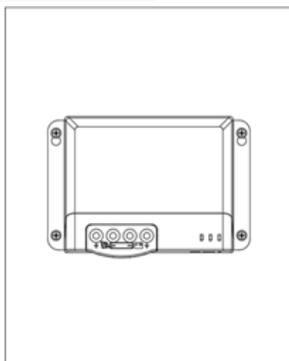
### Step 1: select the installation location

Do not place the charger in a location where it is exposed to direct sunlight, high temperatures or water penetration. Ensure a well-ventilated mounting location.

**Step 2:** place the drilling template in the correct position and mark the attachment points with a pen. Drill 4 mounting holes on the 4 marked points and place the screws.

### Step 3: mount the charger

Align the charge controller mounting holes with the two pre-attached screws and hang the charge controller. And then fix the bottom two screws.



#### Step 4: cabling

Remove the two screws on the charger and then start to lay out the wiring. In order to ensure your own safety during this process, we recommend the following work sequence.



#### **WARNING!**

We recommend connecting the fuses to the side of the Solar panel, load side and battery side to prevent electric shock while working on the wiring or handling errors. Ensure that the fuses have been removed before starting the activities.

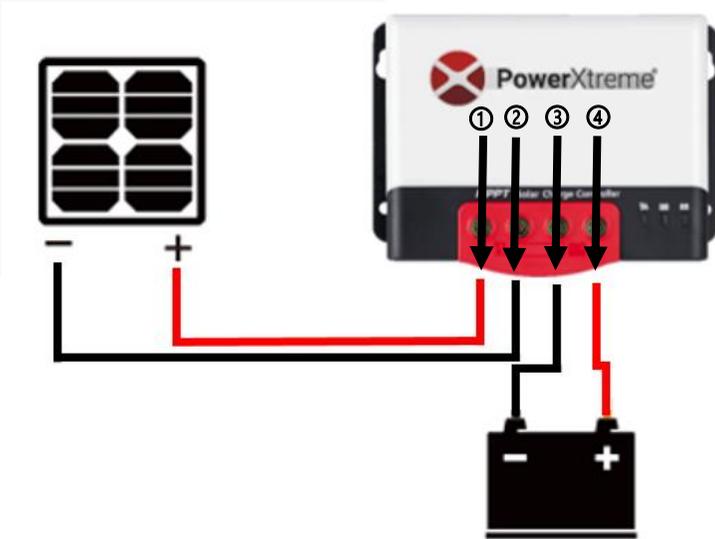


Image 2. Wiring diagram charge controller one solar panel

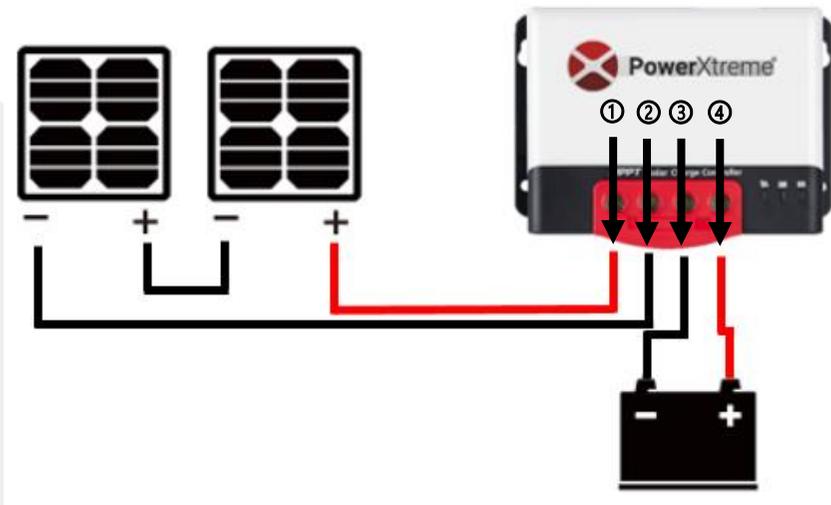


Image 8. Wiring diagram for the charge controller of several solar panels in series.

**WARNING!**

When the positive and negative cables, that make a connection with the two terminals, create short-circuit, fire or an explosion will occur. Always take caution while working!

First connect the battery and then the load and finally the solar panel. When connecting the wiring, adhere to the sequence of "+" first and then "-".

**Step 5: power on**

After carefully connecting all cabling, check it again to see if everything was properly connected and all connection are firmly secured. After checking, first place the fuse or the breaker of the battery, check whether the LED-lights light up and if information is displayed on the LCD-screen. If the LCD-screen does not show any information, remove the fuse immediately and check again if everything is properly connected.

If the battery functions normally. You connect the solar panel. If there is sufficient sunlight intensity, the battery-indicator on the charger will light up or flash and charging of the battery will commence.

After the successful connection of the battery and the solar panel, you finally connect the fuse or the breaker of the load and that you can manually check whether the load can be activated and deactivated normally.

Our advice is not to use a temperature compensation cable with this application.



**WARNING!**

When the battery poles have been connected the wrong way around, the internal components of the controller may get damaged within 10 minutes after the charger has stopped charging.



**NOTE!**

In case no additional external temperature sensor was connected to the controller, the battery temperature will remain at 25°C.



**NOTE!**

Install the battery fuse as close to the battery as possible. The distance should be no more than 150 mm.



**NOTE!**

When a sine wave inverter is mounted into the system, connect the inverter directly to the battery, rather than to the controller output terminals.

## 5. Operation

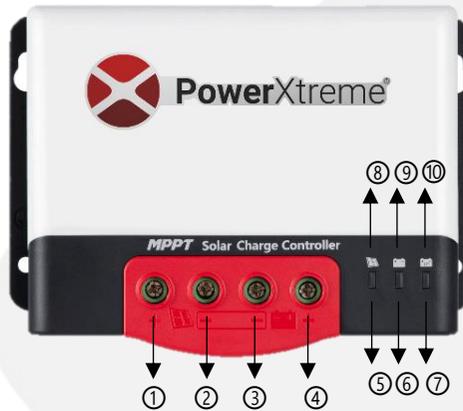


Image 9. Appearance and ports of charge controller

No.	Name	No.	Name
1	Solar panel "+" connection	6	Communication interface
2	Solar panel "-" connection	7	Control keys
3	Battery "-" connection	8	PV charging indicator
4	Battery "+" connection	9	Battery capacity
5	External temperature connection	10	Battery type indicator

The charger has the following safety devices:

1. **Degree of protection**

Classification: IP32

2. **Input power limitation of the protection**

When the solar panel capacity exceeds the nominal capacity, the charger will reduce the capacity of the solar panel until below the nominal capacity, in order to prevent excessively high currents damaging the charger.

**3. Battery reversed polarity protection**

If the battery was connected the wrong way around, the system won't work, in order to prevent that the charger gets damaged or becomes overheated.

**4. Photovoltaic input side too high voltage protection**

If the voltage on the Solar panel input side is too high, the charger will automatically interrupt the solar panel input.

**5. Photovoltaic input side short circuit**

If the Solar panel input side is short-circuited, the charger will stop charging. As the short-circuit is deactivated, charging will automatically resume.

**6. Photovoltaic input reversed connection protection**

In case the Solar panel is connected the wrong way around, the charger will not become defective. As soon as the connection problem is solved, normal functioning will resume.

**7. Overload protection**

When the capacity of the load exceeds the nominal value, the overload protection will be activated.

**8. Short-circuit of the load**

When the load is short-circuited, the charger protection will intervene. After a delay, the charger will attempt to activate the load again. This protection can be operated to a maximum of 5 times per day.

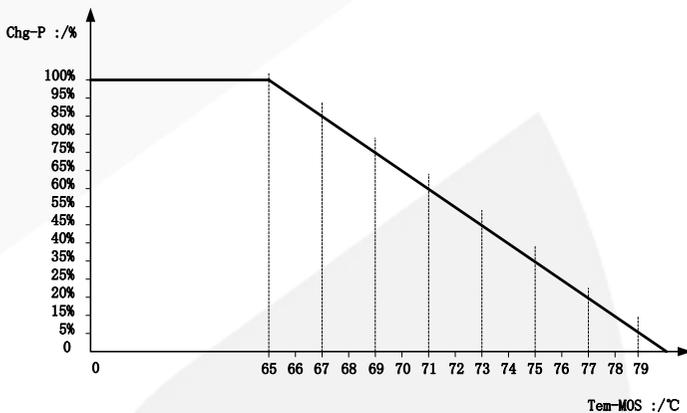
**9. Reversed protection charging at night**

This protective function prevents the battery from becoming discharged via the solar panel during the night.

**10. Lightning protection**

**11. Temperature protection**

When the temperature of the charger is higher than the set value, the charging current will be decreased or even stopped altogether. See the following diagram:



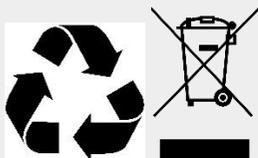
## 6. Maintenance

In order to keep the performance of the charger optimal, we recommend to service the following components once per year:

- Check whether the air flow around the charger is not blocked and clean the heatsinks.
- Check whether the cabling is still in order: are the contacts secured and has any corrosion occurred, is the cable insulation worn. Repair or replace the cabling if necessary.
- Check whether the LED indicators are functioning in accordance with their role. Note any failures and displayed error messages and take the necessary precautions if required.
- Check all wiring terminals for corrosion, insulation, damage, signs of high temperature or burning/discoloration.
- Tighten terminal screws.
- Check for dirt, insects nesting and corrosion and clean as required.

## 7. Decommissioning

Electric appliances should not be disposed of with normal household waste. According to the European Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), these devices must be collected separately in order to recycle them in an environmentally friendly manner possible.

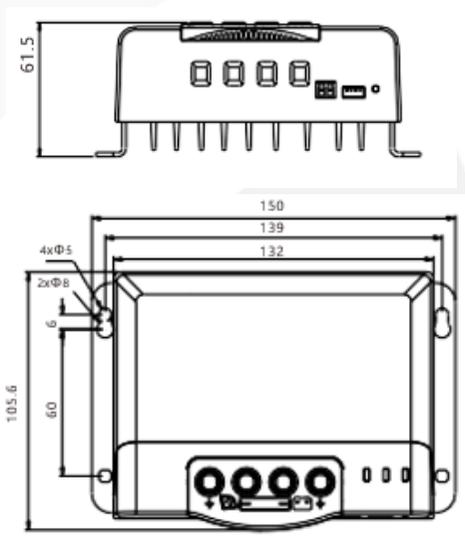


## 8. Technical Parameters

### 8.1 Electrical parameters

Parameter	Value
Model	XS20s
System voltage	12V/24V
Zero load loss	<10mA
Battery voltage	9V ~ 32V
Maximum PV open circuit voltage	92V (25°C) ; 100V (Lowest ambient temperature)
Maximal power point voltage range	(Battery voltage +2V) ~ 72V
Rated charging current	20A
Maximum PV input power	260W/12V 520W/24V
Charging conversion efficiency	≤98%
MPPT tracking efficiency	> 99%
Temperature compensation coefficient	-3mv/°C/2V (default); Lithium battery features no temperature compensation
Operating temperature	-35°C ~ +60°C
IP rating	IP32
Weight	650g
Communication mode	Communication interface port
Attitude	≤ 3000 meters
Dimensions (mm)	150*105.6*61.5

## 8.2 Product Dimensions



Outline dimensions: 150\*105.6\*61.5mm;  
Mounting dimensions: 139\*60mm;  
Fixed holes dia: Φ5mm;  
Wire specifications: 20-6AWG.

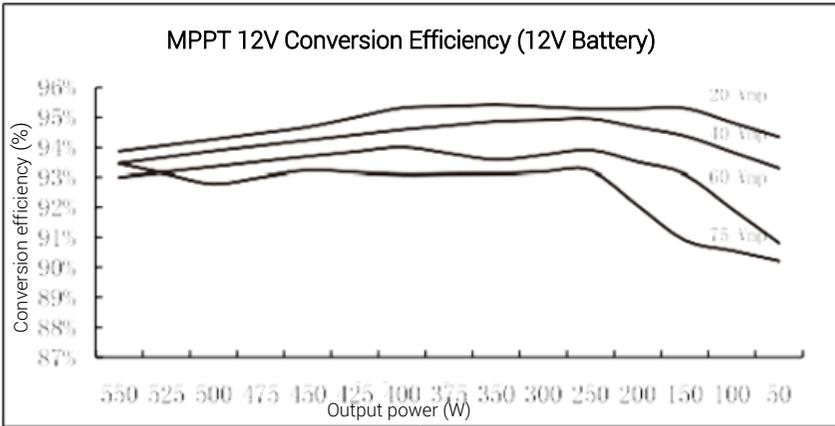
### 8.3 Standard settings

Comparison of parameters of various types of battery					
Set voltage Battery type	Sealed lead- acid battery	Gel lead- acid battery	Flooded lead-acid battery	Lithium battery	User defined
Overvoltage disconnection voltage	16.0V	16.0V	16.0V	--	9 ~ 17V
Equalizing charge voltage	14.6V	--	14.8V	--	9 ~ 17V
Boost charge voltage	14.4V	14.2V	14.6V	14.4V	9 ~ 17V
Floating charge voltage	13.8V	13.8V	13.8V	--	9 ~ 7V
Boost charge recovery voltage	13.2V	13.2V	13.2V	--	9 ~ 17V
Equalizing charge duration	120 minutes	--	120 minutes	--	0 ~ 600 minutes
Equalizing charge interval	30 days	0 days	30 days	--	0 ~ 2500 (0 indicates turning off equalizing charge function)
Boost charge duration	120 minutes	120 minutes	120 minutes	--	10 ~ 600 minutes

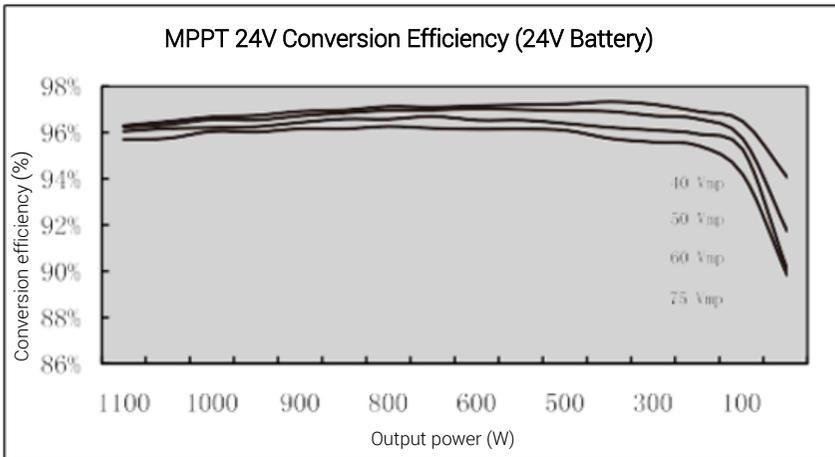
If a user-defined battery is used, the default voltage parameters of the system are the same as those of the sealed lead-acid battery. The following logic must be followed when you modify battery charge and discharge parameters:

- Overvoltage disconnection voltage > charge limit voltage ≥ equalizing charge voltage ≥ boost charge voltage ≥ floating charge voltage > boost charge recovery voltage;
- Overvoltage disconnection voltage > Overvoltage disconnection recovery voltage;

### 8.4 12V system efficiency



### 8.5 24V system efficiency



## 9. BT-2 Bluetooth Connector (optional)

### 9.1 General

The BT-2 Bluetooth connector, available as an option, can easily be connected. Via an app, that you can download for free, you can use the Bluetooth connector to wirelessly monitor data of the Solar charge controller (range up to 15 m).

### 9.2 Product specifications



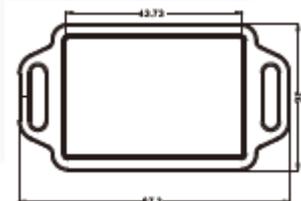
### 9.3 Mounting

- Mount the connector in a location that is suitable for you, in the sitting area. This way you will have optimal range and the charger will be protected against moisture.
- Connect the communication cable to the XS20s Solar charge controller in the designated communication interface port.
- Status indication LED will light up.

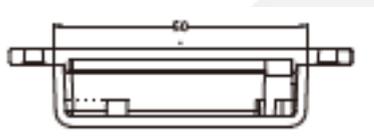
Indication LED	Status	Function
	Flashing red	Working on communication

	Off	Waiting for
--	-----	-------------

### 9.4 Product dimensions



Model BT-2  
External Dimensions:  
67.3\*36\*15.5mm  
Fixed hole dia:  $\phi$ 3.5



### 9.5 System wiring diagram



Note: Connect the cable using the standard Ethernet cable (parallel line).

## 9.6 Technical data

Type	BT-2
Input voltage	5V-12V
Stand-by power consumption	0.04W
Run power consumption	0.05W
Communication distance	≤15m
Serial port baud rate	Fixed baud rate 9600bps
Communication methods	Communication interface port
Interface type	PH2.0
Connecting line	Standard Ethernet cable (parallel line)
Size	67.3*36*15.5mm
Installation dimension	57.8*12mm
Fixed holes dia	Φ3.5
Operating temperature	-20°C-75°C
Level of protection	IP67
Net weight	120g

## 9.7 App data

The app can be found in the App Store and Playstore under the name "Solar app" or scan the QR code below. This app also works for both the XS20 and XS20s.

Administrator password: 135790123

App IOS



App Android



## 10. Display (optional)

### 10.1 General

- Graphic LCD main menu, for real-time monitoring of data and operating status of the controller;
- Two button design for menu viewing and parameter setting (easy to operate);
- No external power is needed and the LCD unit can be powered by connecting it to the controller via a communication cable;
- Industrial design, suitable for use in various demanding environments.

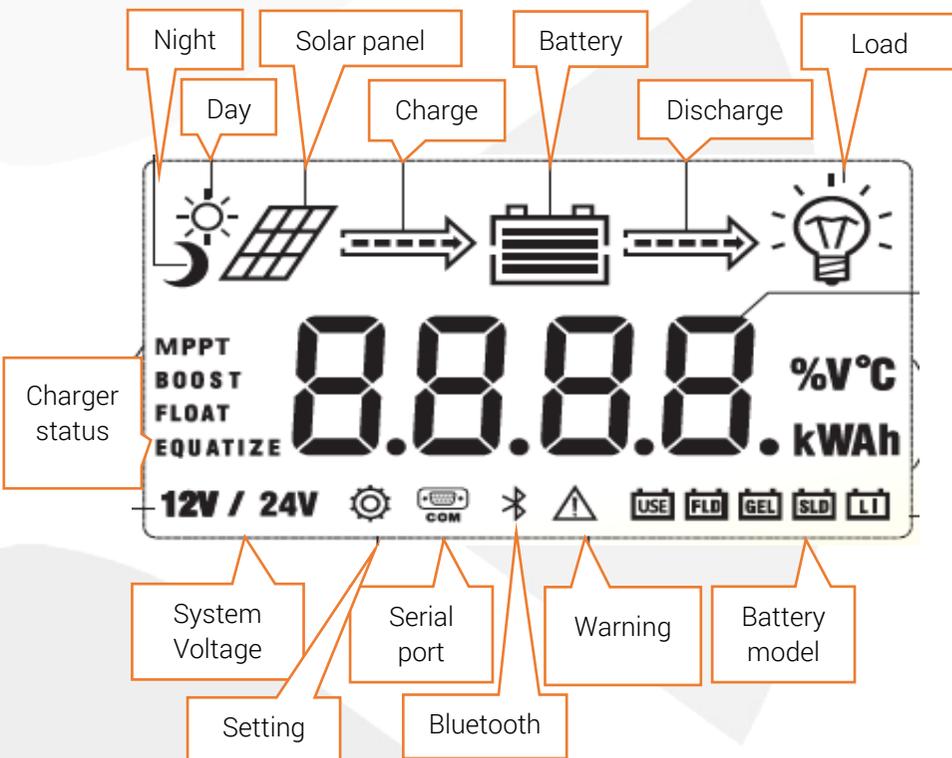
### 10.2 Display



### 10.3 LCD menu

Functions to be read from the LCD screen.

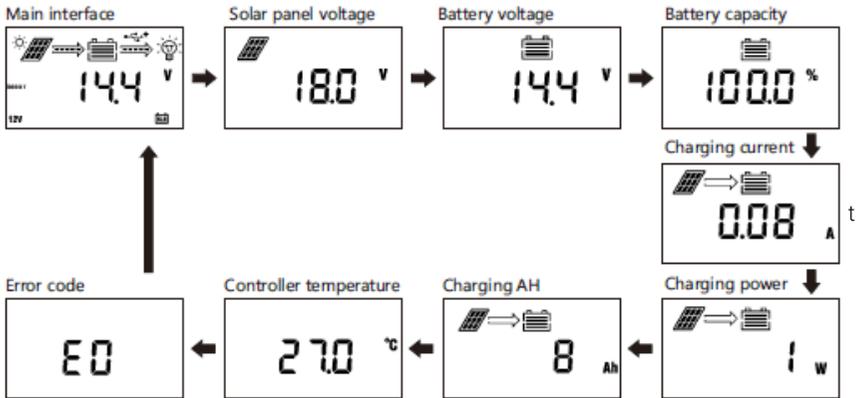
#### 10.3.1 Stating interface



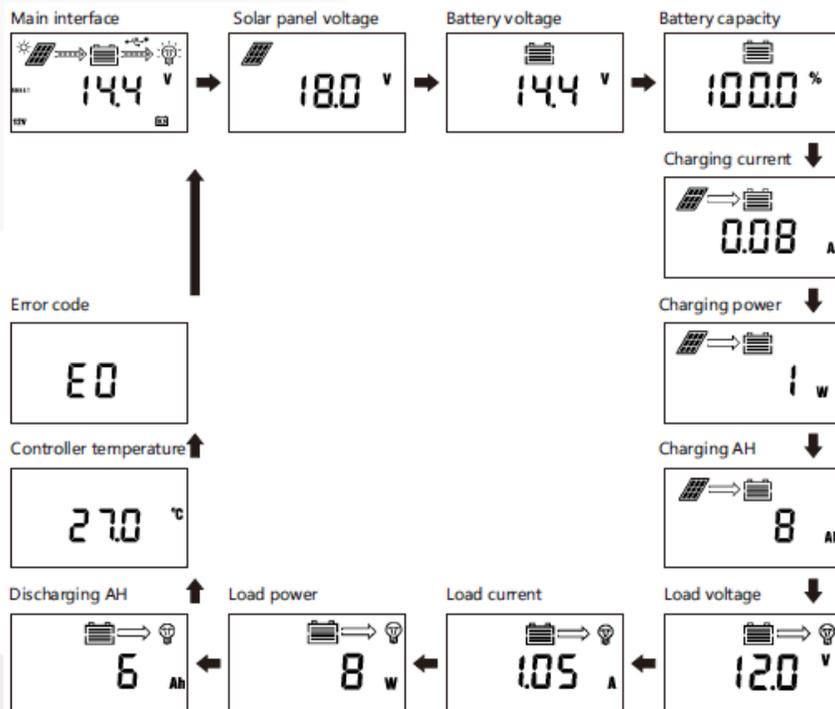
During start-up the 4 battery charging indicators will successively start to flash, and after the self-inspection the LCD-screen will be started and the battery voltage level will be displayed. This is a fixed voltage value chosen by the user or a voltage that is automatically recognised.

### 10.3.2 Main menu

Unloaded controller menu



### Loaded controller menu



## 10.4 Charging mode setting interface

### 10.4.1 Charge modes introduction

The charger has 5 charging operation modes that are described below:

No.	Modus	Description
0	Only light control (on during the night, off during the daytime)	When sunlight appears, the voltage of the solar panel will become higher than where there is no light, and after a delay the charger will activate

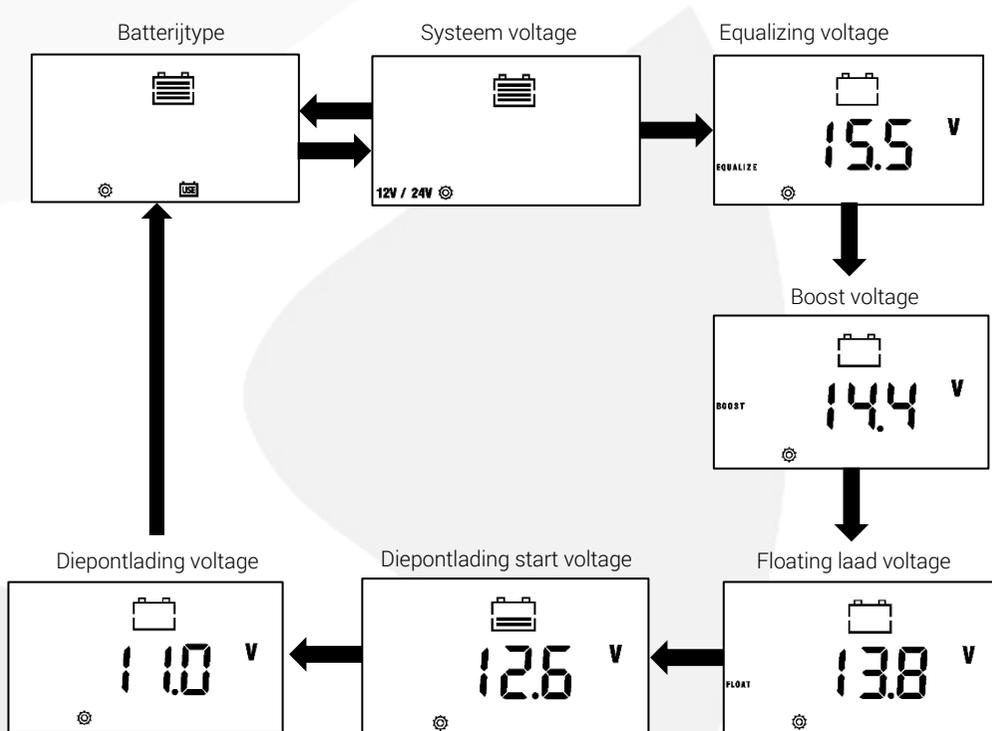
		the charging. When the sun goes down, the opposite takes place.
1 to 14	Light + time control 1 to 14 hours	When sunlight appears, the voltage of the solar panel will be higher than where there is no light, and after a delay the charger will activate the charging. The load will be turned off after a pre-set time.
15	Manual mode	In this mode, the user can activate or deactivate charging by use of the buttons, regardless whether it is day or night. This mode was designed for some specially intended loads, and is also used during the debugging process.
16	Troubleshooting mode	Used for the debugging of the system. The charging is deactivated with light signals, the charging is activated without light signals. This mode makes it possible to quickly check the proper functioning of the installation during troubleshooting.
17	Normal on mode	The charger keeps providing voltage continuously. This mode is suitable for loads that require current 24 hours per day.

#### 10.4.2 Activating and deactivating of charging manually

Manual operation only works when the charge-mode is set to manual mode (15). In the main menu press the Set button on activate or deactivate the charging.

## 10.5 System parameter settings

In order to reach the parameter settings, you must press the Set button for a few moments.



Once you are in the menu, press the Set button again to get to settings. Adjust the value with the up and down buttons. Then press the return button to close (without saving or setting parameter), or hold down the Set-button to save the settings and close.



### CAUTION!

After set-up of the system voltage power needs to be switched off-and on again.

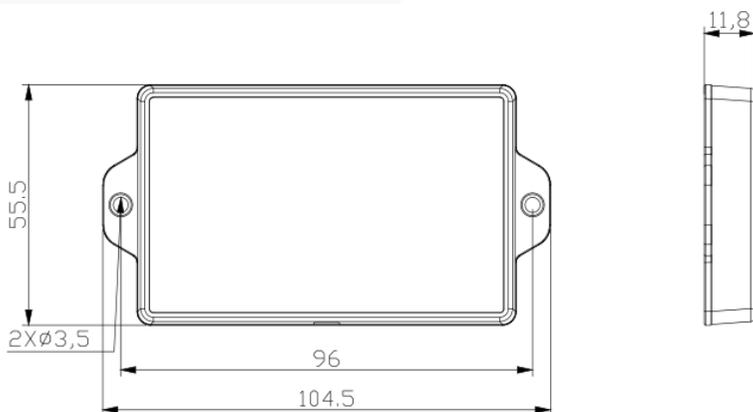
Users can adjust the parameters to the actual conditions, but parameter setting must take place under supervision of a competent person. Faulty parameter settings may cause the system to not function properly. For more information about parameter settings, see the table below.

Parameter setting reference table				
No.	Item in screen	Description	Parameter range	Notes
1	USE	Battery type	User/Lead-acid/Maintenance-free/Gel /Li	Maintenance-free
2	12V/24V	System voltage	12V/24V	
3	EQUALIZE	Equalizing charge voltage	9.0 to 17.0V	
4	BOOST	Boost charge voltage	9.0 to 17.0V	
5	FLOAT	Floating charge voltage	9.0 to 17.0V	
6		Low voltage disconnection recovery voltage	9.0 to 17.0V	
7		Low voltage disconnection voltage	9.0 to 17.0V	

## 10.6 Installation dimensions

Product dimensions: 104,5 \* 55,5 \* 11,8 mm

Installation dimensions: 96 \*  $\varnothing$ 3,5 mm



## 10.7 Technical data

Items	Parameter values
Applicable models of controller	XS20s
Input voltage	5V-12V
Standby power consumption	< 0.03W
Operating power consumption	< 0.04W
Fixed baud rate	9600 bps
Communication mode	Communication interface port
Connection cable length	1.5M
Operating temperature	-35°C ~ +65°C
IP rating	IP32
Weight	50g
Dimensions	104.5*55.5*11.8mm

## 10.8 Error search table

No.	Error indication	Description	Results of execution
1	E0	No exception	System normal
2	E1	Battery over discharge	Disable load output
3	E2	Battery over voltage	Do not charge
4	E3	Battery under-voltage warning	If battery voltage is lower than the under-voltage warning threshold, only give a reminder, and the system is normal
5	E4	Load short circuit	The load is turned off and the maximum recovery is 5 times a day.
6	E5	Load over-current	The load power is too large. So, reduce the load, and the output power will return to normal
7	E6	Controller internal over temperature	MPPT controller starts intelligent linear power charging; PWM controller turns off charging
8	E7	Battery over temperature	Turn off charging and discharging, and automatically recover as the voltage is below a certain value
9	E8	Solar panel input power too large	The MPPT controller charges at a rated current; PWM controller turns off charging
10	E10	Solar panel over voltage	Solar panel over-voltage; turn off charging,

			and automatic recover as the voltage is lower than the set value
11	E13	Solar panel reverse polarity	Do not charge
12	E15	Battery not connected or lithium battery feed	As long as the solar panel voltage meets the charging condition, the lithium battery will have a voltage pulse, while the lead acid battery does not have a voltage output
13	E16	Battery over temperature	Do not charge and disable load output
14	E17	Battery low temperature 1	Disable load output
15	E18	BMS overcharge protection	Do not charge
16	E19	Battery low temperature 2	Do not charge
17	E20	Battery reverse polarity	Do not charge and disable load output
18	E21	Output capacitor over-voltage	Do not charge

## **11. Warranty conditions**

EmergoPlus guarantees that the MPPT Solar charge controller is constructed in accordance with the legally applicable standards and regulations. During production and prior to delivery, all MPPT Solar charge controllers were extensively tested and checked. If you do not act in accordance with the instructions and the regulations of this manual, damage may occur and/or the unit will not comply with our specifications. This could imply that the warranty becomes void.

## **12. Liability**

EmergoPlus cannot be held liable for:

- Damage as a consequence of the use of the MPPT Solar charge controller.
- Possible failures in the included manual and the consequences there of.
- Usage that is inconsistent with the purpose of the product.

### 13. EG-declaration of conformity

#### EG-DECLARATION OF CONFORMITY FOR ELECTRICAL EQUIPMENT

Declaration in accordance with Directive 2014/35/EG, as modified.

This language version of the declaration will be checked by the manufacturer.

We:

Name : EmergoPlus BV  
 Address : Informaticastraat 20  
 Country : 4538 BT Terneuzen Netherlands

Declare, regarding the product described below:

Trade name : MPPT Solar charge controller XS20s  
 Model : PowerXtreme XS20s  
 Function : Controlling and optimising energy of solar panels towards battery and consumers.

that all relevant regulations of the machine directive have been complied with,  
 that the product also meets the requirements of the following European directives:

2014/35-EU	DIRECTIVE 2014/35 / EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonization of the laws of the Member States regarding the making available on the market of electrical equipment intended for use within certain voltage limits
2014/30/EU	DIRECTIVE 2014/30 / EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the approximation of the laws of the Member States related to electromagnetic compatibility.
2011/65/EU	DIRECTIVE 2011/65 / EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

And that the following harmonised standards have been applied:

EN 61000-6-1:2007	Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) - Part 6-2: General standards - Immunity for industrial environments
EN 61000-3-2:2014	Electromagnetic compatibility (EMC) - Part 3-2: Limit values - Limit values for the emission of harmonic currents (input current of the devices $\leq 16$ A per phase)
EN 61000-3-3:2013	Electromagnetic compatibility (EMC) - Part 3-3: Limit values for voltage fluctuations, voltage fluctuations and flicker in public low-voltage networks for equipment with an input current $\leq 16$ A per phase and without conditional connection

EN60950- Information technology equipment - Safety - Part 1: General  
1:2005+A1:2009+A2:2013 requirements

and that for the compiling of the technical dossier the following natural or legal person, established in the community, is authorised:

Name : EmergoPlus BV  
Name and position : Dick van Wijck, CEO  
Address : Informaticastraat 20, 4538 BT Terneuzen  
Country : Netherlands

Drawn up at Kapelle, 02-07-2018.

Dick van Wijck, Emergoplus

