



# ***MODULAR POWER MANAGEMENT***

The Core of Independence



*phocos*

# ***THE ART OF CHARGE***

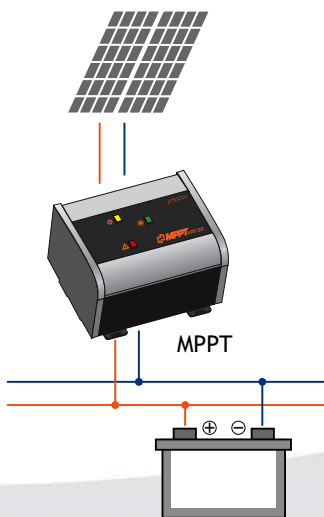
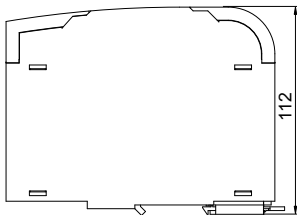
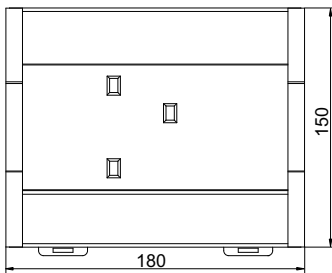
**The Art of Charge, 1.** [Origin: Germany] **2.** Def.: A concept of empowering the world to freely and creatively design battery-based power supplies in a manner that is most appropriate for the individual.

Twenty years of engineering and manufacturing high-quality, cost-effective components for the solar industry has made Phocos the world's largest supplier of charge controllers. The award-winning Modular Power Management design sets new standards for versatility by enabling the installer to design their system as they see fit. The use of multi-functional components ensures that there are virtually no system design demands which cannot be met. This innovative concept empowers the installer to truly explore The Art of Charge.



The Core of Independence

## MPPT Maximum Power Point Tracker



Innovative Maximum Power Point Tracking Technology Increases System Efficiency and Reduces System Cost.

- **Maximum Power Point Tracking Technology**

With innovative maximum power point tracking technology, Phocos' MPP Tracker ensures maximum performance from your solar array at all times and in any weather conditions. The MPPT can yield an energy gain of up to 30% from your PV system.

- **Use Solar Panels for Grid-Feed-in Systems**

The possibility to use less expensive grid-feed-in solar panels with up to 95V open circuit voltage for 12V or 24V stand-alone-systems will significantly reduce cost of the total system.

- **3 Stage I-U Curve Charge Regulation**

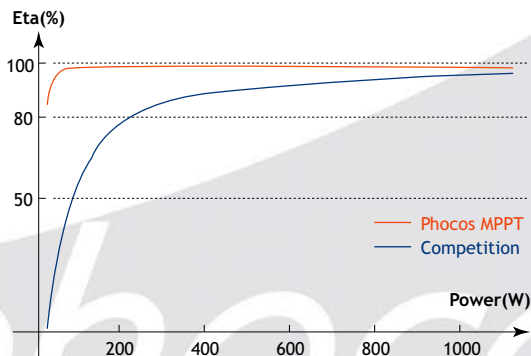
The temperature-compensated three-stage I-U curve charge regulation algorithm significantly extends the life span of your battery.

- **Parallel Operation of Multiple MPPTs**

Up to 16 MPPTs can be operated in parallel enabling you to increase your system capacity substantially. Parallel operation is accomplished by integrating the Modular Central Unit MCU (synchronizes up to eight units) or the MGR\* (synchronizes up to 16 units).

Technical Data	MPPT100/30
Nominal Voltage	12/24 V, automatic recognition
Recommended Max. PV Power	12 V, 450 W; 24 V, 900 W
Max. Solar Input Voltage Voc	95 V
Max. Battery Charge Current	33 A
Power Conversion Efficiency	over 98%
Standby Power Consumption	<30 mW@12 V system voltage(<2 mA) <80 mW@24 V system voltage(<3 mA)
Temperature Compensation	-4 mV/cell* K
Max. Wire Size	32 mm <sup>2</sup> (AWG#2)
Ambient Temperature Range	-40 °C to +50 °C
Weight	1581 g

During the day there is quite a significant amount of time where the PV generator will not operate at its full rated power but in its lower power range. Bad weather conditions increase those hours per day due to the lack of direct sunlight on the PV panel. Thus, in these scenarios, if the MPPT has a poor efficiency rating in the lower power levels the battery cannot be charged optimally, and the power gain from the PV panel cannot be realized. The Phocos MPPT100/30 was designed in a way that allows it to perform at a high efficiency whenever it charges the battery.



The Phocos MPPT100/30 was designed in order to yield all benefits of Maximum Power Point Tracking. Its efficiency is comparably high even on the lowest power levels. This means that the MPPT 100/30 keeps charging even in cloudy or rainy seasons where batteries cannot always be fully charged.

\* MGR: future option

## MPS Modular Power Switch



Multi-Functional Switching Module with either Overcharge Protection or Low Voltage Disconnect for Stand-Alone Systems.

**• Power Switch Functions**

MPS is Phocos' innovative new multi-functional power switching module for stand-alone power supplies. It can be configured to operate as a charge controller, load controller or diversion controller by simple toggling of DIP switch settings.

**• Low Voltage Disconnect and Overcharge Protection**

MPS offers integrated, adjustable low voltage disconnect as a load controller and sophisticated overcharge protection as a solar charge controller.

**• Flexible Grounding**

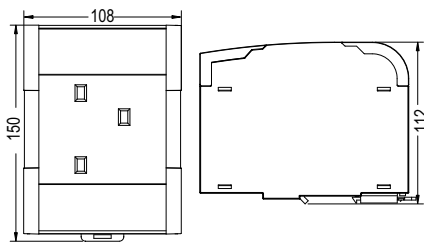
The new flexible power electronics allow for positive or negative grounding.

**• Parallel Operation of Multiple MPS Units**

Multiple MPS units can be operated together with the help of Phocos' MCU modular central unit. This allows to charge the same battery bank at an aggregate charge current of up to 640 A and can control up to 200 A single load current.

**• Modular Charge Controller Applications**

MPS units can be operated together with MPPT units with the help of Phocos' MCU modular control unit.

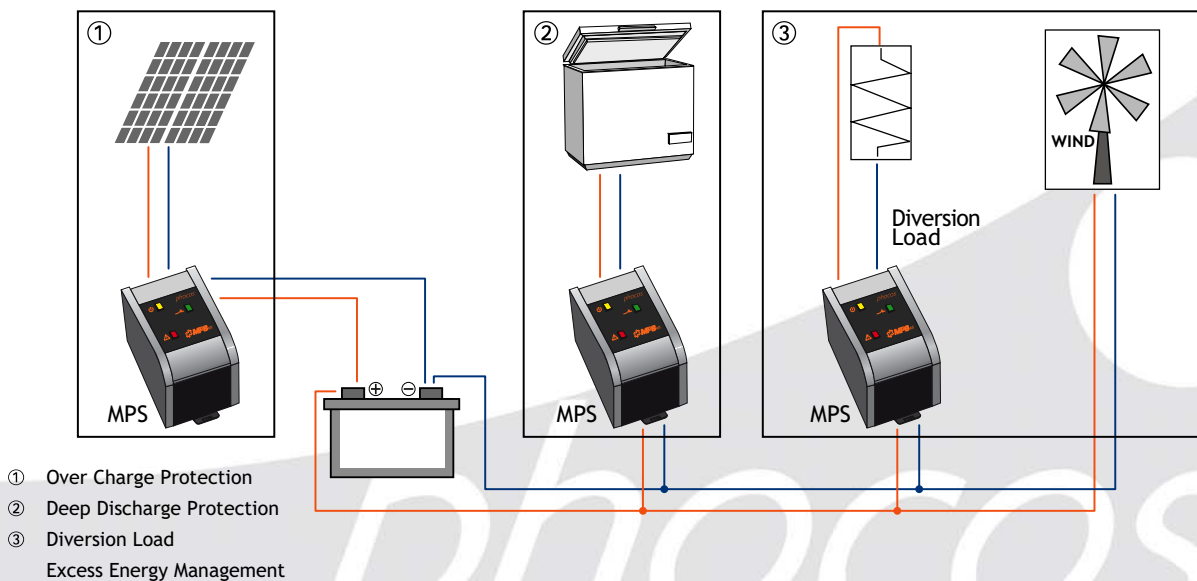


Technical Data	MPS45	MPS80
Nominal Voltage	12/24/48 V	12/24/48 V
Load Current Max.	45 A	80 A
Self Power Consumption	<10 mA	<10 mA
Ambient Temp. Range	-25 to +50 °C	-25 to +50 °C
Dimensions	108x150x112 mm	108x150x112 mm
Weight	1007 g	1100 g
Type of Protection	IP22	IP22

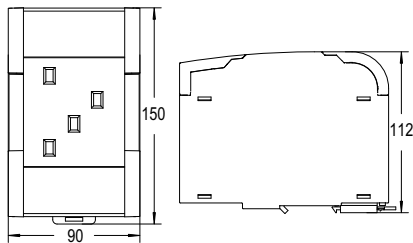
**Application:**

**MPS Used As Diversion Controller:**

MPS can be used as diversion load switch that can direct excess energy to a diversion-load when the battery reserve is full. This prevents over-charging from inputs such as wind and micro-hydro turbines.



## MCU Modular Central Unit



MCU is a Key Component of Phocos' Modular Power Management Family.

- **Intelligent Load Management**

The Modular Central Unit lets the user prioritize system loads with an Intelligent Load Management. The user can create preferences based on battery state-of-charge and on time; these preferences are then used to calculate which loads will be powered.

- **Synchronizes up to 8 Power Modules (MPS/MPPT)**

The central unit allows the use and synchronization of up to four power components (MPPT or MPS).

- **UP to 5-year Datalogging Memory**

System data for all components is recorded and stored by the datalogger function of the MCU.

- **Relay Control Output**

Control or alarm output for diesel generator.

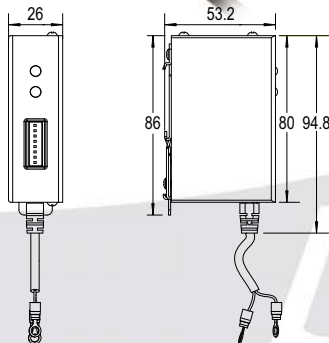
- **PC Interface**

With the use of a converter module, all system settings can be adjusted via PC/ laptop. MODCOM PC Software enables the user/installer to view historical and current system values. This significantly helps installers with system diagnostics.

Technical Data	MCU
Nominal Voltage	12/24/48 V
Self Power Consumption	<20 mA
Ambient Temp. Range	-25 to +50 °C
Dimensions	90x150x112 mm
Weight	380 g
Type of Protection	IP22

## MCS Modular Current Sensor

Universal Current Sensor for Off-Grid Hybrid Systems



- **Measures External Currents**

Equipped with a current shunt, the MCS measures external charge currents (e. g. diesel-, wind-, hydro- and/or fuel cell generators) as well as external load currents (Inverters, other loads connected directly to the battery) and reports data to the MCU data logger.

- **Plug & Play**

MCS data connection can be connected to any free bus port within the Modular Power Management System. Simple DIP-Switch settings for address allocation and shunt configuration are made at the time of installation. No further configuration is necessary. A sensor cable runs from MCS to the shunt resistor which must be in series with the corresponding generator or load device.

- **Flexible Grounding**

The MCS allows to choose system grounding as necessary (Negative or Positive).

- **Powder-Coated Steel Housing**

The MCS is encased in a rugged, powdered-coated steel housing and prepared for 32 mm DIN-rail mounting.

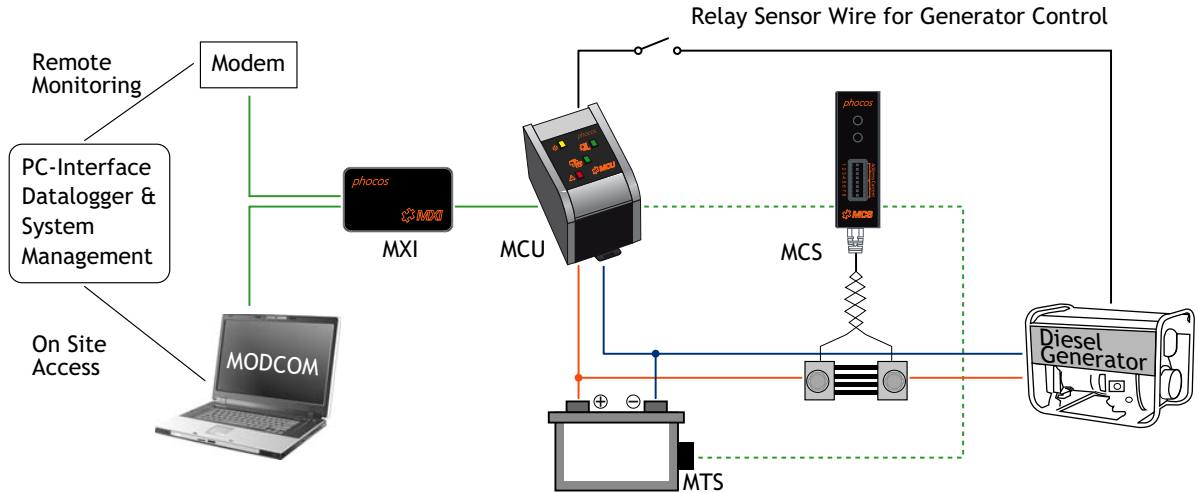
- **Two Status LED Display**

Two LEDs clearly display the status of the MCS.

Technical Data	MCS
Nominal Voltage	12/24/48 V
Self Power Consumption	10 mA
Ambient Temp. Range	-40 until 60 °C
Dimensions	26x80x50 mm
Weight	300 g
Type of Protection	IP22
<b>Shunt Resistor Specification</b>	
Input Voltage Range	0-50 mV
Length of Connecting Wire	50 cm
Current Range	50/100/200/400/800 A

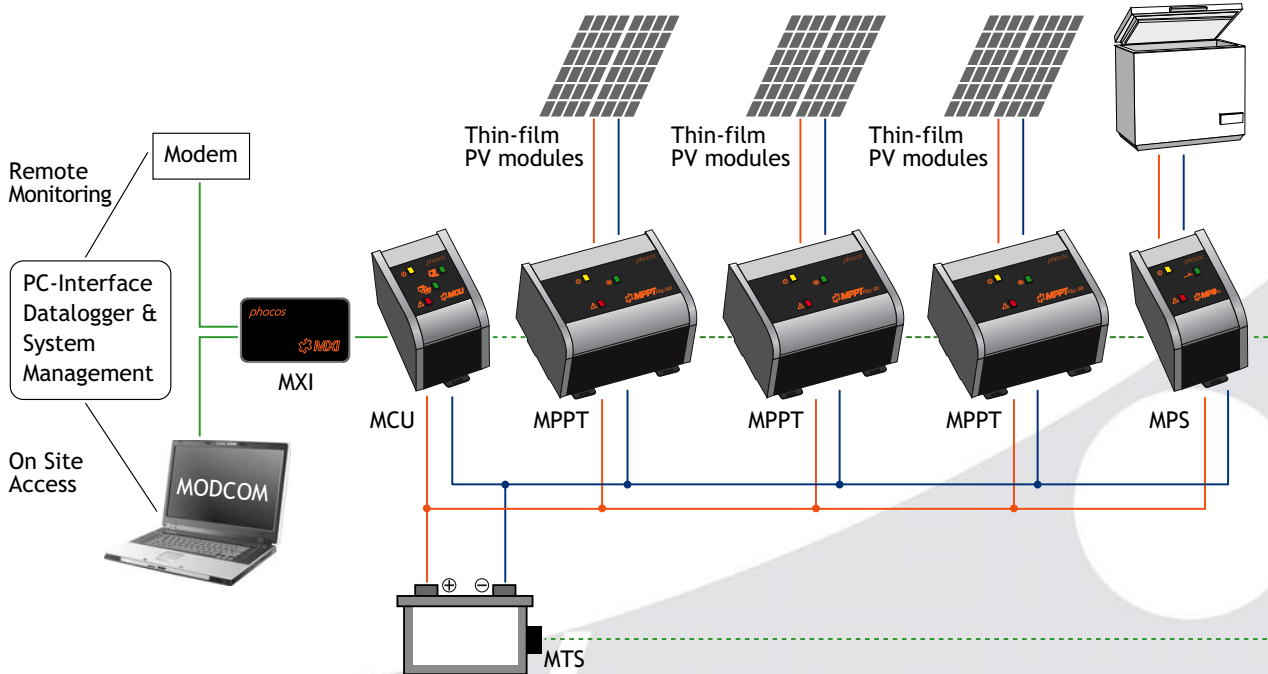
## MCU Modular Central Unit

### 1. Generator Management and Current Sensing



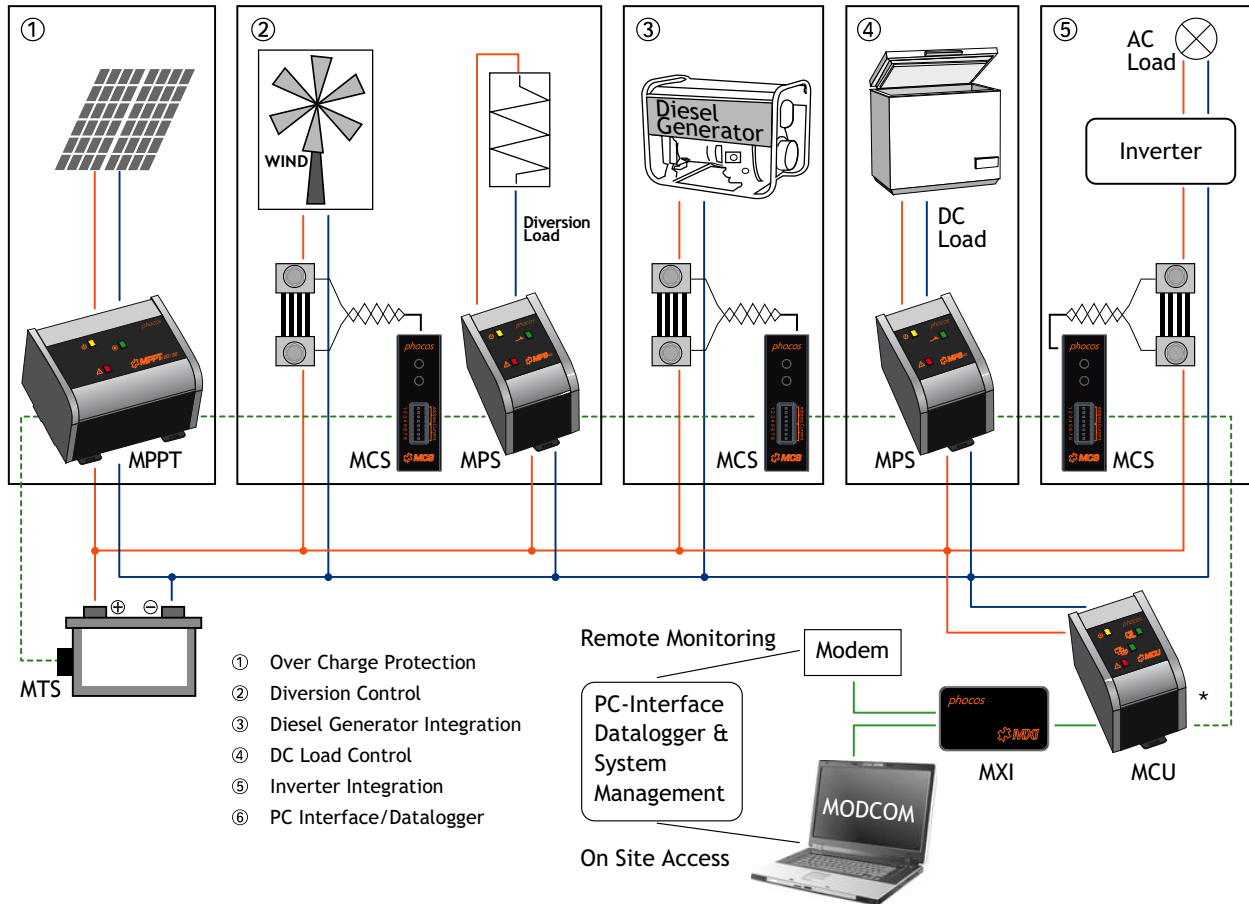
### 2. High Efficiency MPPT Charging

Operation with thin-film PV modules to increase efficiency and cut down cost.



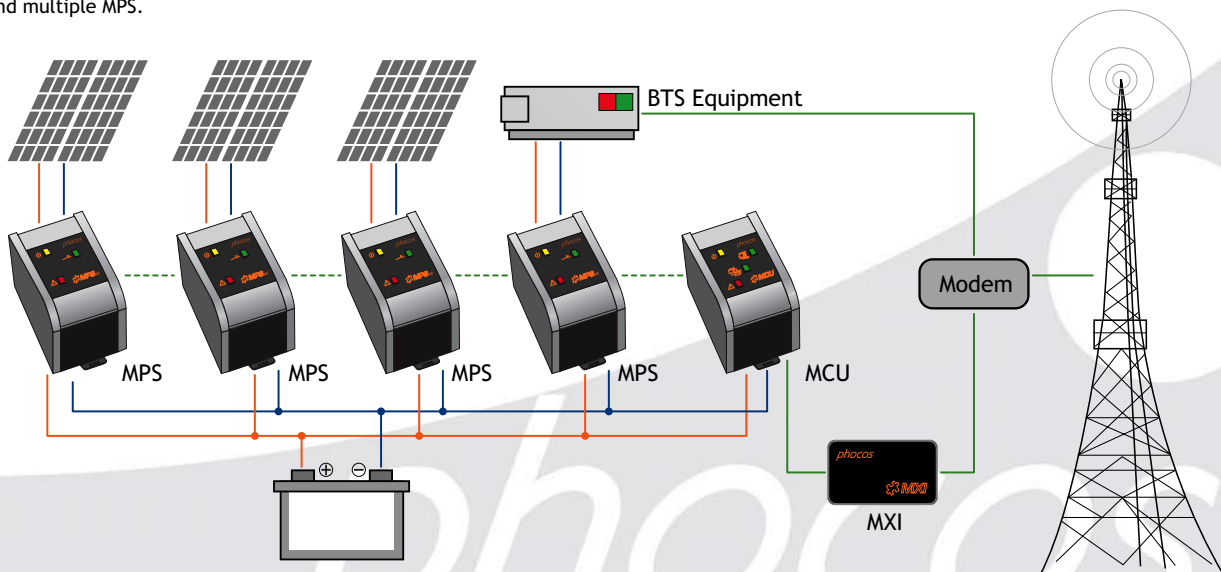
## MCU Modular Central Unit

### 3. Advanced Diversion Control and MPPT/PWM Combined Charging



### 4. Bank Switching for Telecommunication Systems

In order to reduce electromagnetic interference (EMI) in telecommunication systems, bank switching can be applied by integration of one MCU and multiple MPS.



The logo for Phocos, featuring the word "phocos" in a lowercase, orange, sans-serif font. To the right of the text is a circular icon consisting of an orange outer ring and a grey inner circle.

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