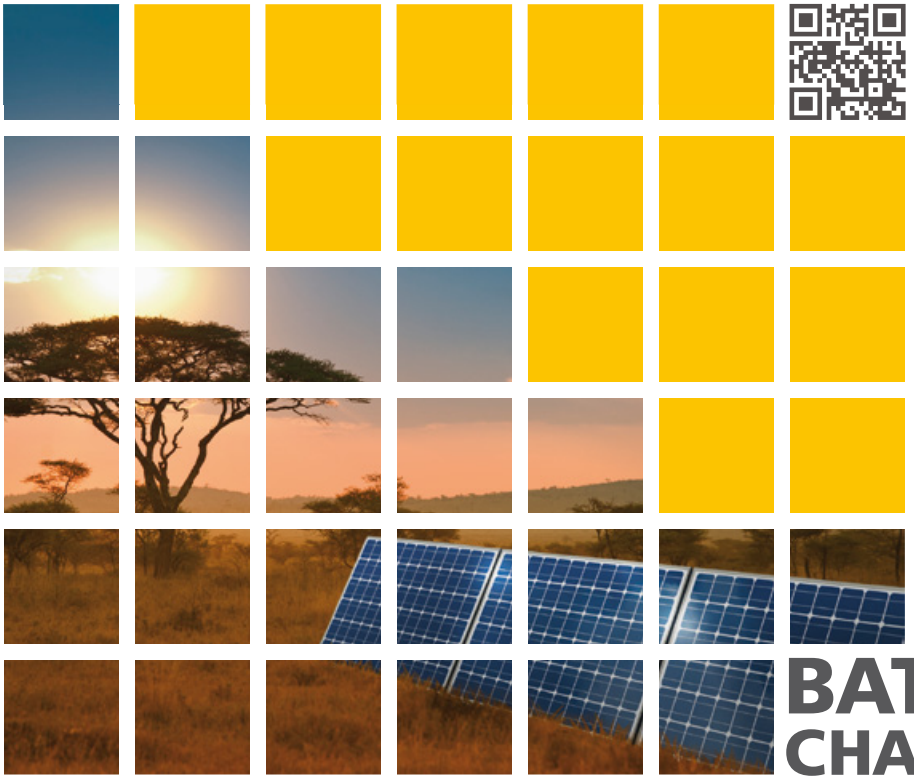
ENGLISH

Steca Elektronik

# PV OFF GRID



## BATTERY CHARGING SYSTEMS

# »CAPTURE THE SUN'S ENERGY USING INTELLIGENT SYSTEMS FROM STECA.«

Two billion people in rural areas still have no access to an electricity grid. Steca has set itself the target of improving the quality of life of these people. To this end, Steca develops and manufactures top-quality products which, thanks to their long lifetime, ensure extremely low costs.

## CONTENT

# »WE ARE THINKING OF TOMORROW.«

Full power for you: Management board Dr.-Ing. Gerald Katzler, Peter Voigtsberger and Michael Voigtsberger.

## Owner-managed family business

As a family company built up over time, we have years of experience behind us and can boast of innovation excellence as an electronics service provider and manufacturer of Steca brand product lines in solar electronics and battery charging systems.

Our day-to-day business dealings are characterised by mutual appreciation, transparent communication and prudent decision-making. We passionately serve our customers and provide an unrivalled service.

Through technological prominence and global partnerships, we are assured of a successful future together.

**Quality made in Germany**

**PV GRID CONNECTED**

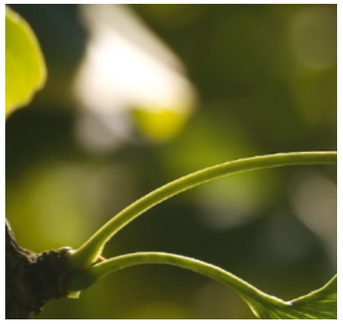
**PV OFF GRID**

**SOLAR THERMAL**

**ELECTRONICS SERVICES**

**BATTERY CHARGING SYSTEMS**

**Products and services for an ecological future**



## Environmental protection in series

Services and production have an ecological future at the Memmingen electronics specialist company Steca. The company makes a worldwide contribution to reducing power consumption and allowing alternative energy sources to be used efficiently by providing high-performance products.

Steca has established a wide base in order to achieve these goals. The company offers electronic services for residential, automotive, agricultural, environmental, traffic and building technology and also for the industrial and medical sectors. The company also develops products for the environmentally friendly use of solar energy under the brand name of Steca. Steca Elektronik is one of the few manufacturers that cover all three segments of the solar market: PV grid feeding systems, off-grid PV systems and solar thermal systems. Steca also produces battery charging systems that extract the maximum potential from the energy storage system.

Steca sets a good example in its own production methods: the company uses only manufacturing processes that conform to strict ecological criteria. Steca is actively involved in research projects for efficient energy use and climate protection. The German federal government therefore listed Steca as an authority for energy generation in the environmental technology atlas „Green Tech made in Germany“.

Steca's environmental policy is based on sustainability and environmental compatibility, with a view to providing services and producing products for an ecological future. The company considers the whole value-added chain from this perspective and also involves its suppliers and customers. Steca is certified in accordance with ISO 14001:2004 and organised in accordance with the EU Environmental Management and Audit Scheme.

# »GROWTH BASED ON RELIABILITY – IN USE ALL OVER THE WORLD.«

As a central control element in off-grid photovoltaic systems, Steca solar charge controllers control the entire energy flow while ensuring optimal battery maintenance. The products developed and manufactured by Steca ensure extremely low costs due to their long service lives. Steca solar charge controllers and sine wave inverters are the best choice for a modern and professional power supply – all over the world.

# PRODUCTS | PV OFF GRID

**Solar charge controllers**

**Sine wave inverters**

**DC loads for solar systems**
**Voltage converters**
**Solar refrigerator / freezer**
**Energy-saving lights and LEDs**

**Accessories**


Communication between Steca Tarom MPPT 6000-M, Steca Tarom MPPT 6000-S and Steca PA HS400

Steca offers an innovative, integrated RS-485 communication interface, the StecaLink bus. This interface allows a charge controller to act as a communication master (e.g. Steca Tarom MPPT 6000-M) to exchange measurements and setting information with other devices (e.g. Tarom MPPT 6000-S and/or PA HS400). In the StecaLink communication system, the master collects all relevant data of the other controllers or electricity sensors, to record them in the data logger. Optionally, it can also calculate the battery's state of charge as a percentage (SOC).

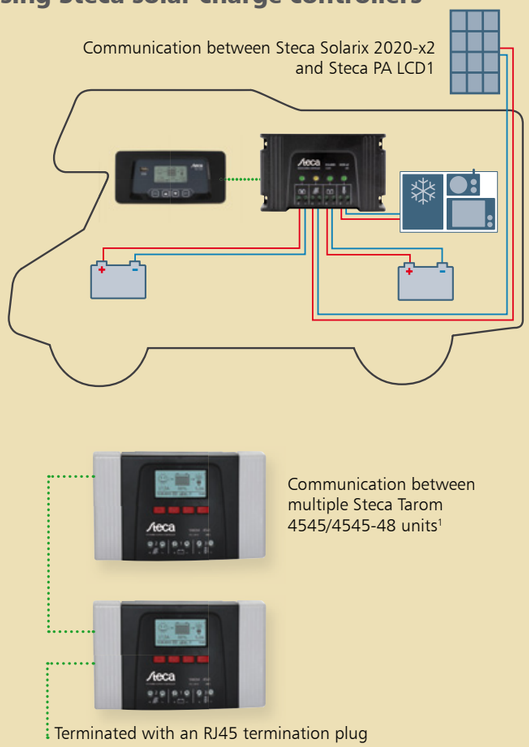
This ability to link multiple devices and their data creates a connected system which collects and records all information centrally. At the same time, it achieves a high level of redundancy.

An overview of the StecaLink bus communication options is shown below:

| Slave / Master | Tarom MPPT 6000-S | Tarom 4545 / 4545-48 | PA HS400 | Solarix 2020-x2 |
|---|---|---|---|---|
| Tarom MPPT 6000-M | from Q4/ 2015 | from Q1/ 2016 [1] | availa-ble | |
| Tarom 4545 / 4545-48 | | from Q1/ 2016 [1] | from Q1/ 2016 | |
| PA LCD1 | | | | availa-ble |

[1] Only devices with the same system voltage can be combined

## Examples of communication using Steca solar charge controllers






## Steca Solsum F

**6.6F, 8.8F, 10.10F**

The Steca Solsum F-Line continues the huge success of one of the most used SHS controllers. With a power range of up to 10 A at automatically recognized 12 V or 24 V it fits to a system sizes of maximum 240 W.

Full circuit board protection with LED display for simple recognition of battery status. Various connections make it possible to connect easily to solar panels, battery and load. The Steca Solsum F works on PWM as a low loss series controller.

**Product features**
- Series controller
- Automatic detection of voltage
- Voltage regulation
- PWM control
- Multistage charging technology
- Current compensated load disconnection
- Automatic load reconnection
- Temperature compensation
- Negative earthing of one or positive earthing of several terminals possible
- Monthly maintenance charge

**Electronic protection functions**
- Overcharge protection
- Deep discharge protection
- Reverse polarity protection of module (≤ 36 V), load and battery
- Automatic electronic fuse
- Short circuit protection of load and module
- Overvoltage protection at module input
- Open circuit protection without battery
- Reverse current protection at night
- Overtemperature and overload protection
- Load disconnection on battery overvoltage

**Displays**
- Multifunction LED display
- Multi-coloured LED
- 4 LEDs show operating states
  ~ for operation, state of charge, fault messages

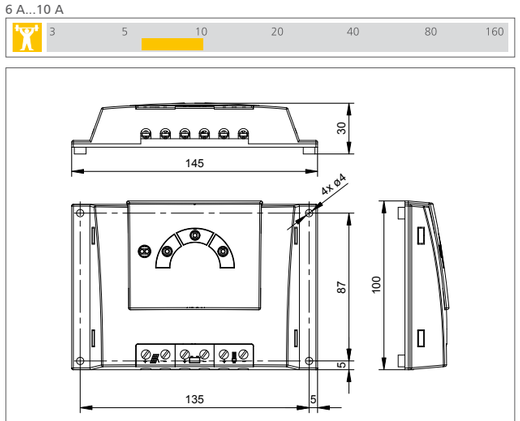
**Options**
- Evening or night light function pre-set in the factory or adjustable via Steca PA RC 100
- Parameterisation of function values via Steca PA RC 100

**Certificates**
- Compliant with European Standards (CE)
- RoHS compliant
- Made in EU
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

**Steca accessories**
- Remote control Steca PA RC100

BASIC


6 A...10 A




| | 6.6F | 8.8F | 10.10F |
|---|---|---|---|
| **Characterisation of the operating performance** | | | |
| System voltage | 12 V (24 V) | | |
| Own consumption | < 4 mA | | |
| **DC input side** | | | |
| Open circuit voltage solar module (at minimum operating temperature) | < 47 V | | |
| Module current | 6 A | 8 A | 10 A |
| **DC output side** | | | |
| Load current** | 6 A | 8 A | 10 A |
| Reconnection voltage (LVR)* | 12.4 V … 12.7 V (24.8 V … 25.4 V) | | |
| Deep discharge protection (LVD)* | 11.2 V … 11.6 V (22.4 V … 23.2 V) | | |
| **Battery side** | | | |
| End of charge voltage* | 13.9 V (27.8 V) | | |
| Boost charge voltage* | 14.4 V (28.8 V) | | |
| Set battery type* | gel | | |
| **Operating conditions** | | | |
| Ambient temperature | -25 °C … +50 °C | | |
| **Fitting and construction** | | | |
| Terminal (fine / single wire) | 4 mm² / 6 mm² - AWG 12 / 9 | | |
| Degree of protection | IP 32 | | |
| Dimensions (X x Y x Z) | 145 x 100 x 30 mm | | |
| Weight | approx. 150 g | | |

* adjustable via Steca PA RC100
Technical data at 25 °C / 77 °F
** Inverters must not be connected to the load output.

## Steca Solarix PRS

**1010, 1515, 2020, 3030**

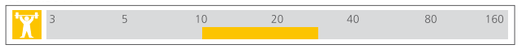
The simplicity and high performance of the Steca Solarix PRS solar charge controller make it particularly appealing. At the same time, it offers a modern design and a convenient display, all at an extremely attractive price.

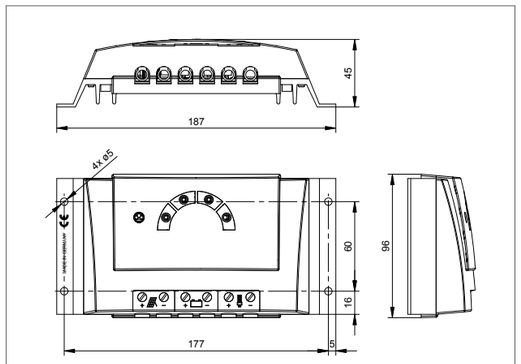
Several LEDs in various colours give information on the battery's state of charge. Here, Steca's latest algorithms are employed, resulting in optimal battery maintenance. The Solarix PRS charge controllers are equipped with an electronic fuse, thus making optimal protection possible. They operate on the serial principle, and separate the solar module from the battery in order to protect it against overcharging.

For larger projects, the charge controllers can also be equipped with special functions: e.g. with night light function and selectable charging plateau and deep-discharge protection voltages.

BASIC


10 A...30 A




**Product features**
- Series controller
- Automatic detection of voltage
- Voltage regulation
- PWM control
- Multistage charging technology
- Current compensated load disconnection
- Automatic load reconnection
- Temperature compensation
- Negative earthing of one or positive earthing of several terminals possible
- Monthly maintenance charge

**Electronic protection functions**
- Overcharge protection
- Deep discharge protection
- Reverse polarity protection of module (≤ 36 V), load and battery
- Automatic electronic fuse
- Short circuit protection of load and module
- Overvoltage protection at module input
- Open circuit protection without battery
- Reverse current protection at night
- Overtemperature and overload protection
- Load disconnection on battery overvoltage

**Displays**
- Multifunction LED display
- Multi-coloured LED
- 5 LEDs show operating states
  ~ for operation, state of charge, fault messages

**Options**
- Evening or night light function pre-set in the factory or adjustable via Steca PA RC 100
- Parameterisation of function values via Steca PA RC 100

**Certificates**
- Compliant with European Standards (CE)
- RoHS compliant
- Made in Germany
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

**Steca accessories**
- Remote control Steca PA RC100

| | 1010 | 1515 | 2020 | 3030 |
|---|---|---|---|---|
| **Characterisation of the operating performance** | | | | |
| System voltage | 12 V (24 V) | | | |
| Own consumption | < 4 mA | | | |
| **DC input side** | | | | |
| Open circuit voltage solar module (at minimum operating temperature) | < 47 V | | | |
| Module current | 10 A | 15 A | 20 A | 30 A |
| **DC output side** | | | | |
| Load current** | 10 A | 15 A | 20 A | 30 A |
| Reconnection voltage (LVR)* | 12.4 V … 12.7 V (24.8 V … 25.4 V) | | | |
| Deep discharge protection (LVD)* | 11.2 V … 11.6 V (22.4 V … 23.2 V) | | | |
| **Battery side** | | | | |
| Battery voltage | 9 V ... 17 V (17.1 V ... 34 V) | | | |
| End of charge voltage* | 13.9 V (27.8 V) | | | |
| Boost charge voltage* | 14.4 V (28.8 V) | | | |
| Equalisation charge* | 14.7 V (29.4 V) | | | |
| Set battery type* | liquid | | | |
| **Operating conditions** | | | | |
| Ambient temperature | -25 °C … +50 °C | | | |
| **Fitting and construction** | | | | |
| Terminal (fine / single wire) | 16 mm² / 25 mm² - AWG 6 / 4 | | | |
| Degree of protection | IP 32 | | | |
| Dimensions (X x Y x Z) | 187 x 96 x 45 mm | | | |
| Weight | 345 g | | | |

* adjustable via Steca PA RC100
** Inverters must not be connected to the load output.

Technical data at 25 °C / 77 °F



## Steca Solsum

**2525, 4040**

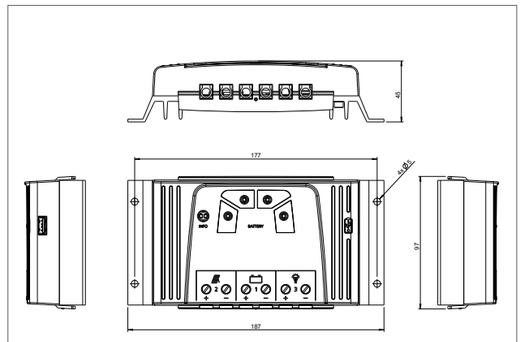
Solar charge controllers Steca Solsum 2525 and 4040 are newly developed products based on the internationally renowned controller family Solarix PRS. With increased module and load current, the controllers are now also suitable for even larger systems. The devices also feature an integrated USB charging port for charging smartphones and tablets. The controllers demonstrate impressive performance, are simple to use and offer unbeatable value for money.

Several LEDs in various colours give information on the battery's state of charge. Here, Steca's latest algorithms are employed, resulting in optimal battery maintenance. The Steca Solsum charge controllers are equipped with an electronic fuse, thus making optimal protection possible. They operate on the serial principle, and separate the solar module from the battery in order to protect it against overcharging.

For larger projects, the charge controllers can also be equipped with special functions: e.g. with night light function and selectable charging plateau and deep-discharge protection voltages.

BASIC


25 A...40 A


**Product features**
- Series controller
- Automatic detection of voltage
- Voltage regulation
- PWM control
- Multistage charging technology
- Current compensated load disconnection
- Automatic load reconnection
- Temperature compensation
- Negative earthing of one or positive earthing of several terminals possible
- Monthly maintenance charge
- USB charge socket for smartphones and tablets

**Electronic protection functions**
- Overcharge protection
- Deep discharge protection
- Reverse polarity protection of module (≤ 36 V), load and battery
- Automatic electronic fuse
- Short circuit protection of load and module
- Overvoltage protection at module input
- Open circuit protection without battery
- Reverse current protection at night
- Overtemperature and overload protection
- Load disconnection on battery overvoltage

**Displays**
- Multifunction LED display
- Multi-coloured LED
- 5 LEDs show operating states
  ~ for operation, state of charge, fault messages

**Options**
- Evening or night light function pre-set in the factory or adjustable via Steca PA RC 100
- Parameterisation of function values via Steca PA RC 100

**Certificates**
- Compliant with European Standards (CE)
- RoHS compliant
- Made in Germany
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

**Steca accessories**
- Remote control Steca PA RC100

| | 2525 | 4040 |
|---|---|---|
| **Characterisation of the operating performance** | | |
| System voltage | 12 V (24 V) | |
| Own consumption | < 4 mA | |
| **DC input side** | | |
| Open circuit voltage solar module (at minimum operating temperature) | < 47 V | |
| Module current | 25 A | 40 A |
| **DC output side** | | |
| Load current** | 25 A | 40 A |
| USB charge socket | 5.2 V / 1.5 A | |
| Reconnection voltage (LVR)* | 12.4 V ... 12.7 V (24.8 V ... 25.4 V) | |
| Deep discharge protection (LVD)* | 11.2 V ... 11.6 V (22.4 V ... 23.2 V) | |
| **Battery side** | | |
| Charge current | 9 V ... 17 V (17.1 V ... 34 V) | |
| End of charge voltage* | 13.9 V (27.8 V) | |
| Boost charge voltage* | 14.4 V (28.8 V) | |
| Equalisation charge* | 14.7 V (29.4 V) | |
| Set battery type* | liquid | |
| **Operating conditions** | | |
| Ambient temperature | -25 °C … +50 °C | |
| **Fitting and construction** | | |
| Terminal (fine / single wire) | 16 mm² / 25 mm² - AWG 6 / 4 | |
| Degree of protection | IP 32 | |
| Dimensions (X x Y x Z) | 187 x 97 x 45 mm | |
| Weight | 345 g | |

* adjustable via Steca PA RC100
** Inverters must not be connected to the load output.

Technical data at 25 °C / 77 °F

## Steca Solarix MPPT

**1010, 2010**

Steca Solarix MPPT is a solar charge controller with Maximum Power Point Tracking. It is specially designed to work with all established module technologies and is optimized for solar systems with module voltages higher than the battery voltage. The Steca Solarix MPPT is especially qualified in combination with grid tied solar modules. The advanced MPP-tracking algorithm from Steca assures that the maximum available power of the solar generator is charged to the batteries. The Steca Solarix MPPT with latest technology ensures full performance in all conditions, a professional battery care combined with modern design and excellent protection.

**Product features**
- Maximum Power Point Tracker (MPP tracker)
- Voltage and current regulation
- Automatic load reconnection
- Temperature compensation
- Positive earthing of one or negative earthing of several terminals possible
- Monthly maintenance charge

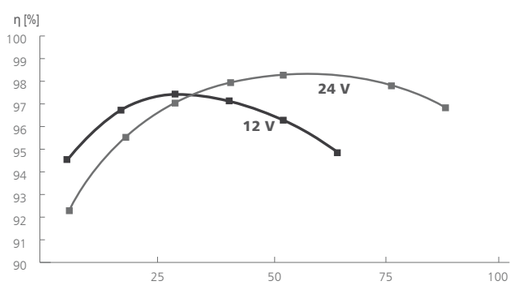
**Electronic protection functions**
- Overcharge protection
- Deep discharge protection
- Reverse polarity protection of module, load and battery
- Reverse polarity protection by internal fuse
- Automatic electronic fuse
- Short circuit protection
- Overvoltage protection at module input
- Open circuit protection without battery
- Reverse current protection at night
- Overtemperature and overload protection
- Load disconnection on battery overvoltage

**Displays**
- Multifunction LED display
- Multi-coloured LED
- 5 LEDs show operating states
  ~ for operation, state of charge, fault messages

**Options**
- Evening or night light function pre-set in the factory or adjustable via Steca PA RC 100
- Parameterisation of function values via Steca PA RC 100

**Certificates**
- Compliant with European Standards (CE)
- RoHS compliant
- Made in Germany
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

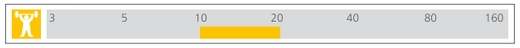
**Steca accessories**
- External temperature sensor Steca PA TS10
- Remote control Steca PA RC100

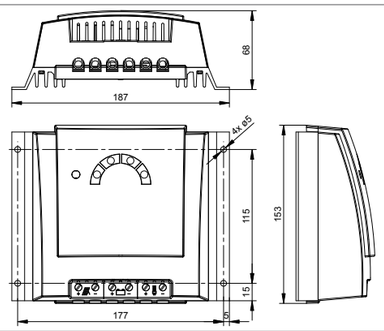



BASIC


Quality made in Germany

10 A...20 A




| | 1010 | 2010 |
|---|---|---|
| **Characterisation of the operating performance** | | |
| System voltage | 12 V (24 V) | |
| Nominal power | 125 W (250 W) | 250 W (500 W) |
| Max. DC-DC efficiency | 98.3 % ($U_{Batt}$=24 V; $U_{in}$=30 V; P=0.6*$P_{nom}$) | |
| European efficiency | 94.7 % ($U_{Batt}$=12 V; $U_{in}$=30 V)<br>96.7 % ($U_{Batt}$=24 V; $U_{in}$=30 V) | |
| European efficiency (weighted across all $U_{Batt}$ and $U_{in}$) | 95.2 % | |
| Static MPP efficiency | 99.9 % (DIN EN 50530) | |
| Dynamic MPP efficiency | 97.7 % (DIN EN 50530) | |
| Weighted REW (Realistic Equally Weighted efficiency) | 92.8 % | |
| Own consumption | 10 mA | |
| **DC input side** | | |
| MPP voltage | 15 V (30 V) < $U_{Modul}$ < 75 V | 15 V (30 V) < $U_{Modul}$ << 100 V |
| Open circuit voltage solar module (at minimum operating temperature) | 17 V...75 V (34 V … 75 V) | 17 V...100 V (34 V … 100 V)*** |
| Module current | 9 A | 18 A |
| **DC output side** | | |
| Load current** | 10 A | |
| Reconnection voltage (LVR)* | 12.5 V (25 V) | |
| Deep discharge protection (LVD)* | 11.5 V (23 V) | |
| **Battery side** | | |
| Charge current | 10 A | 20 A |
| End of charge voltage* | 13.9 V (27.8 V) | |
| Boost charge voltage* | 14.4 V (28.8 V) | |
| Equalisation charge* | 14.7 V (29.4 V) | |
| Set battery type* | liquid | |
| **Operating conditions** | | |
| Ambient temperature | -25 °C … +40 °C | |
| **Fitting and construction** | | |
| Terminal (fine / single wire) | 16 mm² / 25 mm² - AWG 6 / 4 | |
| Degree of protection | IP 32 | |
| Dimensions (X x Y x Z) | 187 x 153 x 68 mm | |
| Weight | approx. 900 g | |

* adjustable via Steca PA RC100 — Technical data at 25 °C / 77 °F
** Inverters must not be connected to the load output.
*** CAUTION: If an open circuit voltage of more than 100 V is supplied to the connected solar module, the controller will be destroyed. When selecting the solar module, it is important to bear in mind that the open circuit voltage should never exceed 100 V over the entire working temperature range. When using solar modules with a maximum open circuit voltage of between 75 and 100 V (over the entire temperature range), all installation steps must be carried in accordance with protection class II.



## Steca PR

**1010, 1515, 2020, 3030**

The Steca PR 10-30 series of charge controllers is the highlight in the range. Use of the latest charging technologies combined with state of charge determination enable optimal battery maintenance and module power monitoring. A large display informs the user about all operating modes with the aid of symbols. The state of charge is represented visually in the form of a level meter. Data such as voltage, current and state of charge can also be displayed digitally as figures on the display. In addition, the controller has an energy meter which can be reset by the user.

**Product features**
- Hybrid controller
- State of charge determination with Steca AtonIC (SOC)
- Automatic detection of voltage
- PWM control
- Multistage charging technology
- Load disconnection depending on SOC
- Automatic load reconnection
- Temperature compensation
- Negative earthing of one or positive earthing of several terminals possible
- Integrated data logger (energy meter)
- Evening, night light and daylight functions
- Integrated self test
- Monthly maintenance charge

**Electronic protection functions**
- Overcharge protection
- Deep discharge protection
- Reverse polarity protection of module, load and battery
- Automatic electronic fuse
- Short circuit protection of load and module
- Overvoltage protection at module input
- Open circuit protection without battery
- Reverse current protection at night
- Overtemperature and overload protection
- Load disconnection on battery overvoltage

**Displays**
- Graphical LCD display
  ~ for operating parameters, fault messages, self test

**Operation**
- Simple menu-driven operation
- Programming by buttons
- Manual load switch

**Options**
- Alarm contact

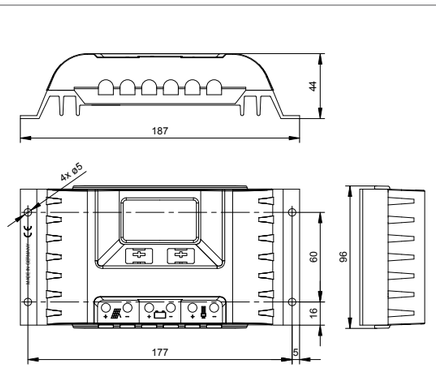
**Certificates**
- Approved by the World Bank for Nepal
- Compliant with European Standards (CE)
- RoHS compliant
- Made in Germany
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

**Steca accessories**
- External temperature sensor Steca PA TS10

CLASSIC


Quality made in Germany

10 A...30 A


| | 1010 | 1515 | 2020 | 3030 |
|---|---|---|---|---|
| **Characterisation of the operating performance** | | | | |
| System voltage | 12 V (24 V) | | | |
| Own consumption | 12.5 mA | | | |
| **DC input side** | | | | |
| Open circuit voltage solar module (at minimum operating temperature) | < 47 V | | | |
| Module current | 10 A | 15 A | 20 A | 30 A |
| **DC output side** | | | | |
| Load current* | 10 A | 15 A | 20 A | 30 A |
| programmable: Reconnection voltage (SOC / LVR) | > 50 % / 12.6 V (25.2 V) | | | |
| programmable: Deep discharge protection (SOC / LVD) | < 30 % / 11.1 V (22.2 V) | | | |
| **Battery side** | | | | |
| End of charge voltage | 13.9 V (27.8 V) | | | |
| Boost charge voltage | 14.4 V (28.8 V) | | | |
| Equalisation charge | 14.7 V (29.4 V) | | | |
| Set battery type | liquid (adjustable via menu) | | | |
| **Operating conditions** | | | | |
| Ambient temperature | -10 °C … +50 °C | | | |
| **Fitting and construction** | | | | |
| Terminal (fine / single wire) | 16 mm² / 25 mm² - AWG 6 / 4 | | | |
| Degree of protection | IP 32 | | | |
| Dimensions (X x Y x Z) | 187 x 96 x 44 mm | | | |
| Weight | 350 g | | | |

Technical data at 25 °C / 77 °F
*Inverters must not be connected to the load output.

## Steca Solarix

**2525, 4040**

Solar charge controllers Steca Solarix 2525 and 4040 are newly developed products based on the internationally renowned controller family Steca PR. With increased module and load current, the controllers are now also suitable for even larger systems. The devices also feature an integrated USB charging port for charging smartphones and tablets..

Use of the latest charging technologies combined with state of charge determination enable optimal battery maintenance and module power monitoring. A large display informs the user about all operating modes with the aid of symbols. The state of charge is represented visually as a level meter. Data such as voltage, current and state of charge can also be displayed digitally as figures on the display. In addition, the controller has an energy meter which can be reset by the user.

**Product features**
- Hybrid controller
- State of charge determination with Steca AtonIC (SOC)
- Automatic detection of voltage
- PWM control
- Multistage charging technology
- Load disconnection depending on SOC
- Automatic load reconnection
- Temperature compensation
- Negative earthing of one or positive earthing of several terminals possible
- Integrated data logger (energy meter)
- Evening, night light and daylight functions
- Integrated self test
- Monthly maintenance charge
- USB charge socket for smartphones and tablets

**Electronic protection functions**
- Overcharge protection
- Deep discharge protection
- Reverse polarity protection of module, load and battery
- Automatic electronic fuse
- Short circuit protection of load and module
- Overvoltage protection at module input
- Open circuit protection without battery
- Reverse current protection at night
- Overtemperature and overload protection
- Load disconnection on battery overvoltage

**Displays**
- Graphical LCD display
  ~ for operating parameters, fault messages, self test

**Operation**
- Simple menu-driven operation
- Programming by buttons
- Manual load switch

**Options**
- Alarm contact

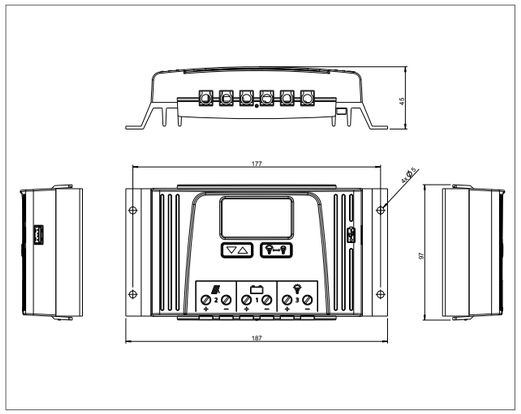
**Certificates**
- CE compliant
- RoHS compliant
- Made in Germany
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

**Steca accessories**
- External temperature sensor Steca PA TS10

CLASSIC


Quality made in Germany

25 A...40 A


| | 2525 | 4040 |
|---|---|---|
| **Characterisation of the operating performance** | | |
| System voltage | 12 V (24 V) | |
| Own consumption | 12.5 mA | |
| **DC input side** | | |
| Open circuit voltage solar module (at minimum operating temperature) | < 47 V | |
| Module current | 25 A | 40 A |
| **DC output side** | | |
| Load current* | 25 A | 40 A |
| USB charge socket | 5.2 V / 1.5 A | |
| programmable: Reconnection voltage (SOC / LVR) | > 50 % / 12.6 V (25.2 V) | |
| programmable: Deep discharge protection (SOC / LVD) | < 30 % / 11.1 V (22.2 V) | |
| **Battery side** | | |
| End of charge voltage | 13.9 V (27.8 V) | |
| Boost charge voltage | 14.4 V (28.8 V) | |
| Equalisation charge | 14.7 V (29.4 V) | |
| Set battery type | liquid (adjustable via menu) | |
| **Operating conditions** | | |
| Ambient temperature | -10 °C … +50 °C | |
| **Fitting and construction** | | |
| Terminal (fine / single wire) | 16 mm² / 25 mm² - AWG 6 / 4 | |
| Degree of protection | IP 32 | |
| Dimensions (X x Y x Z) | 187 x 97 x 45 mm | |
| Weight | 350 g | |

Technical data at 25 °C / 77 °F
* Inverters must not be connected to the load output.



## Steca PR 2020 IP

**IP 65 version**

The functionality of the Steca PR 2020 IP is based on the Steca PR line of solar charge controllers. This is equipped with a large display which shows the current state of charge (SOC) as a percentage and visually as a level meter. State of charge recognition forms the core of the charge controller. The auto-adaptive state of charge algorithm results in optimal battery maintenance and control. The Steca PR 2020 IP has been specially designed for operation in difficult environments with high salt, moisture and dust content.

**Product features**
- Hybrid controller
- State of charge determination with Steca AtonIC (SOC)
- Automatic detection of voltage
- PWM control
- Multistage charging technology
- Load disconnection depending on SOC
- Automatic load reconnection
- Temperature compensation
- Negative earthing of one or positive earthing of several terminals possible
- Integrated data logger (energy meter)
- Evening, night light and daylight functions
- Integrated self test
- Monthly maintenance charge

**Electronic protection functions**
- Overcharge protection
- Deep discharge protection
- Reverse polarity protection of module, load and battery
- Automatic electronic fuse
- Short circuit protection of load and module
- Overvoltage protection at module input
- Open circuit protection without battery
- Reverse current protection at night
- Overtemperature and overload protection
- Load disconnection on battery overvoltage

**Displays**
- Graphical LCD display
  ~ for operating parameters, fault messages, self test

**Operation**
- Simple menu-driven operation
- Programming by buttons
- Manual load switch

**Options**
- Alarm contact (special version, needs to be mentioned on the purchase order)

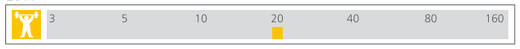
**Certificates**
- Fit for use in tropical areas (DIN IEC 68 part 2-30)
- Compliant with European Standards (CE)
- RoHS compliant
- Made in Germany
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

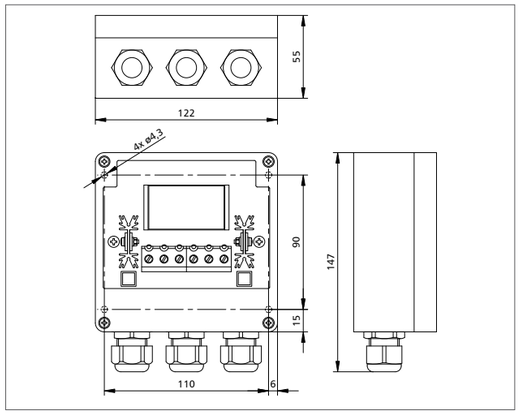
**Steca accessories**
- External temperature sensor Steca PA TSIP10

CLASSIC


Quality made in Germany

20 A




| | PR 2020 IP |
|---|---|
| **Characterisation of the operating performance** | |
| System voltage | 12 V (24 V) |
| Own consumption | 12 mA |
| **DC input side** | |
| Open circuit voltage solar module (at minimum operating temperature) | < 47 V |
| Module current | 20 A |
| **DC output side** | |
| Load current* | 20 A |
| programmable: Reconnection voltage (SOC / LVR) | > 50 % / 12.6 V (25.2 V) |
| programmable: Deep discharge protection (SOC / LVD) | < 30 % / 11.1 V (22.2 V) |
| **Battery side** | |
| End of charge voltage | 13.9 V (27.8 V) |
| Boost charge voltage | 14.4 V (28.8 V) |
| Equalisation charge | 14.7 V (29.4 V) |
| Set battery type | liquid (adjustable via menu) |
| **Operating conditions** | |
| Ambient temperature | -10 °C … +50 °C |
| **Fitting and construction** | |
| Terminal (fine / single wire) | 16 mm² / 25 mm² - AWG 6 / 4 |
| Degree of protection | IP 65 |
| Dimensions (X x Y x Z) | 122 x 147 x 55 mm |
| Weight | 350 g |

Technical data at 25 °C / 77 °F
* Inverters must not be connected to the load output.

## Steca Solarix 2020-x2

**Dual battery charge controller**

The Steca Solarix 2020-x2 is a state-of-the-art dual battery charge controller that is ideal for use in leisure applications. It is equipped with a solar module input suitable for all 72-cell crystalline solar modules in 24 V systems and for all 36-cell crystalline solar modules in 12 V systems. Both main battery and starter battery are charged simultaneously and continuously by the solar module. 90 percent of the available power flows into the main battery while 10 percent of the power is retained to keep the auxiliary battery fully-charged.

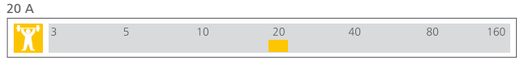
The charge power split can be adapted using the Steca PA LCD1 remote display. The charge controller is equipped with a high-power load output fed by the main battery only. The charge controller has a USB charge socket, which can be used to charge smartphones and tablets. Connection of the Steca PA LCD1 remote display is optional.

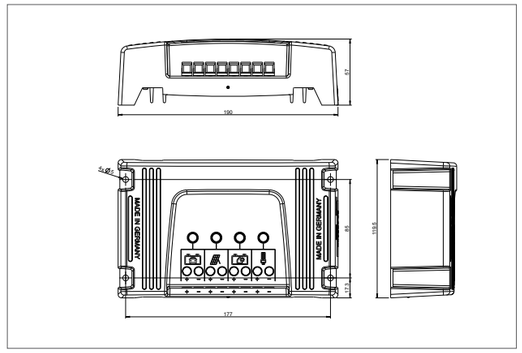
CLASSIC

NEW

Quality made in Germany

20 A



**Product features**
- Series controller
- Automatic detection of voltage
- Voltage and current regulation
- PWM control
- Multistage charging technology
- Current compensated load disconnection
- Automatic load reconnection
- Temperature compensation
- Positive earthing of one or negative earthing of several terminals possible
- Integrated self test
- Monthly maintenance charge
- USB charge socket for smartphones and tablets

**Electronic protection functions**
- Overcharge protection
- Deep discharge protection
- Reverse polarity protection of module (≤ 36 V), load and battery
- Automatic electronic fuse
- Short circuit protection of load and module
- Open circuit protection without battery
- Reverse current protection at night
- Overtemperature and overload protection
- Load disconnection on battery overvoltage

**Displays**
- 4 LEDs show operating states

**Interfaces**
- StecaLink Bus

**Certificates**
- Compliant with European Standards (CE)
- RoHS compliant
- Made in Germany
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

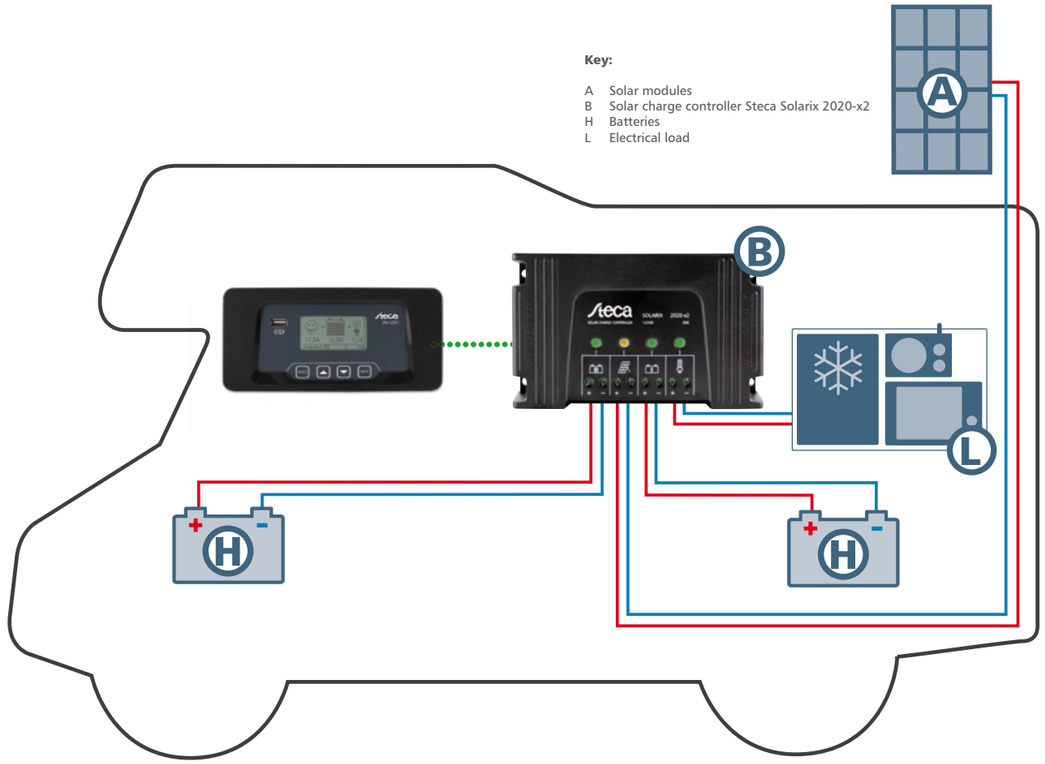
**Steca accessories**
- Remote display Steca PA LCD1

| | Solarix 2020-x2 |
|---|---|
| **Characterisation of the operating performance** | |
| System voltage | 12 V (24 V) |
| Own consumption | 22 mA |
| **DC input side** | |
| Open circuit voltage solar module (at minimum operating temperature) | < 60 V |
| Module current | 20 A |
| **DC output side** | |
| Load current | 20 A |
| USB charge socket | 5 V / 1.5 A |
| Reconnection voltage (LVR)* | 12.5 V |
| Deep discharge protection (LVD)* | 11.7 V |
| **Battery side** | |
| End of charge voltage* | 14.1 V (28.2 V) |
| Boost charge voltage* | 14.4 V (28.8 V) |
| Equalisation charge* | 15 V (30 V) |
| Set battery type* | gel |
| Main / auxiliary battery charging ratio | 90 % / 10 % |
| **Operating conditions** | |
| Ambient temperature | -10 °C … +60 °C |
| **Fitting and construction** | |
| Terminal (fine / single wire) | 6 mm² / 10 mm² - AWG 10 / 8 |
| Degree of protection | IP 31 |
| Dimensions (X x Y x Z) | 190 x 120 x 57 mm |
| Weight | 500 g |

* adjustable via Steca PA LCD1

Technical data at 25 °C / 77 °F






The innovative dual battery charge controller with remote display is particularly appealing for leisure applications with high demands around professional battery management and visual appearance in the visible part.

Numerous application options exist for the dual battery charge controller aside from the recreational market: any small to medium-sized stationary PV system designed to charge two independent batteries via one module field represents a potential application for the controller.

## Overview of devices:

**Steca LED**
**LEDs**
4 W, 6 W, 8 W, 12 W
12 / 24 V

**Steca Solsum ESL**
**Energy-saving lights**
7 W, 11 W; 12 V

**Steca PF 166**
**Solar refrigerator / freezer**
12 / 24 V

**Steca PA LCD1**
**Remote display**

## Steca Tarom

**4545, 4545-48**

The new design for the Steca Tarom sets new standards in this power class. A graphic display informs the user about all important system data and enables configuration and adjustment of the controller to the specific requirements of the individual system.

Numerous clever functions allow the user to adjust the controller to the particular features of the system in question. Thanks to the significantly improved state of charge determination, the system is optimally controlled and the batteries are protected. The Steca Tarom charge controller is the ideal choice for larger systems at three voltage levels (12 V, 24 V, 48 V).

The integrated data logger stores all important system data. Controller data can be read by the minute via an open Steca UART interface. As an option, an external temperature sensor can also be connected.

**Product features**
- Hybrid controller
- State of charge determination (SOC)
- Automatic detection of voltage
- PWM control
- Multistage charging technology
- Load disconnection depending on SOC
- Automatic load reconnection
- Temperature compensation
- Negative earthing of one or positive earthing of several terminals possible
- Real-time clock (date, time)
- Innovative, comprehensive data logger with energy meter
- MicroSD slot for data logging of all minute values
- Evening, night light and daylight functions
- Four freely programmable timers with week day function
- Integrated self test
- Monthly maintenance charge
- Two configurable multifunctional contacts
- Can be connected in parallel via StecaLink bus

**Electronic protection functions**
- Overcharge protection
- Deep discharge protection
- Reverse polarity protection of module and battery
- Automatic electronic fuse
- Short circuit protection of load and module
- Open circuit protection without battery
- Reverse current protection at night
- Overtemperature and overload protection
- Load disconnection on battery overvoltage

**Displays**
- Multifunction graphical LCD display with backlighting
  - ~ for operating parameters, fault messages, self test

**Operation**
- Simple menu-driven operation
- Programming by buttons
- Manual load switch

**Interfaces**
- StecaLink Bus
- Open Steca UART interface

**Options**
- Alarm contact

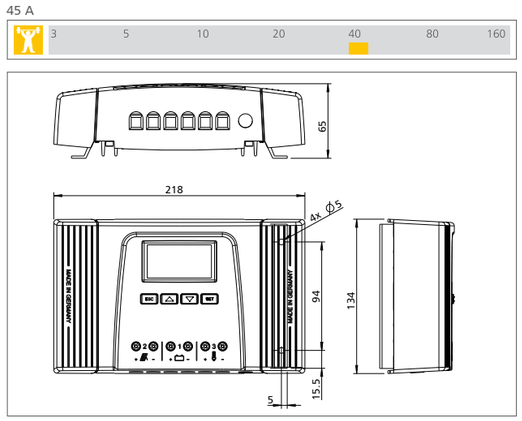
**Certificates**
- Compliant with European Standards (CE)
- Made in Germany
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

**Steca accessories**
- External temperature sensor Steca PA TS-S
- Data cable Steca PA CAB2 Tarcom
- Current sensor PA HS 400 (software update required)

ADVANCED

Quality made in Germany

Two additional switching contacts can be freely configured as a timer, a night light function, to start generators or as surplus management. Up to six devices can be connected in parallel and communicate with one another via the StecaLink bus.




| | 4545 | 4545-48 |
|---|---|---|
| **Characterisation of the operating performance** | | |
| System voltage | 12 V (24 V) | 12 / 24 / 48 V |
| Own consumption | 30 mA | |
| **DC input side** | | |
| Circuit voltage solar module (at minimum operating temperature) | < 60 V | < 100 V |
| Module current | 45 A | |
| **DC output side** | | |
| Load current* | 45 A | |
| programmable: Reconnection voltage (SOC / LVR) | > 50 % / 12.5 V (25 V) | > 50 % / 50 V |
| programmable: Deep discharge protection (SOC / LVD) | < 30 % / 11.7 V (23.4 V) | < 30 % / 46.8 V |
| **Battery side** | | |
| End of charge voltage | 14.1 V (28.2 V) | 56.4 V |
| Boost charge voltage | 14.4 V (28,8 V) | 57.6 V |
| Equalisation charge | 15 V (30 V) | 60 V |
| Set battery type | liquid (adjustable via menu) | |
| **Operating conditions** | | |
| Ambient temperature | -10 °C … +60 °C | |
| **Fitting and construction** | | |
| Terminal (fine / single wire) | 25 mm² / 35 mm² - AWG 4 / 2 | |
| Degree of protection | IP 31 | |
| Dimensions (X x Y x Z) | 218 x 134 x 65 mm | |
| Weight | 800 g | |

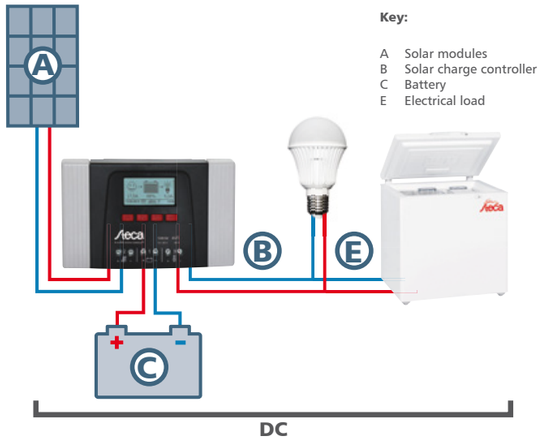
Technical data at 25 °C / 77 °F
* Inverters must not be connected to the load output.



**User-friendly graphical LCD display**
All system states are displayed intuitively via icons on the graphical multifunction display enabling simple understanding of the energy flow. All parameters can be modified via the multi-language, intuitive menu.

**Twelve-year data logging**
The Steca Tarom is equipped with a unique, comprehensive data logger which stores module and load data for twelve years. The previous 18 hours can be graphically displayed. Daily, monthly and annual totals are summarised automatically for an outstanding overview of system utilisation at a glance.

**Load output**
The 45 A load output on the Steca Tarom enables a multitude of programming options: deep discharge protection, manual load switch, automatic evening, night light and daylight functions plus timer and generator functions and surplus manager. Virtually any combination of these individual functions is possible along with independent programming for the load output and the two multifunctional contacts.




- **Deep discharge protection:** Deep discharge protection automatically protects the battery against harmfully low levels of discharge. All voltage thresholds can be freely configured via a menu based either on the battery's current state of charge (SOC) or on the battery voltage.

- **Manual load switch:** The Steca Tarom is equipped with a manual load switch. This enables the load to be safely switched on or off via a menu meaning there is no need for additional external switches.

- **Automatic evening, night light and daylight function:** The charge controller allows configuration of three different automatic timer functions: evening light, night light and daylight. All the important time and delay values can be set with this. With the evening light function, the load is automatically switched on at sunset and the time after which the load is switched off again can be individually specified. The night light function specifies the time after which the load is switched on after sunset and switched off again before sunrise. With the daylight function, the load is switched on automatically at night and switched off again automatically at sunrise.

- **Four freely programmable timers with week day function:** The four freely programmable timers can be set individually based on day of the week, start and finish time. With the week day function, each timer can be used for just one or several days of the week at a time if required. Four timers can be set for each multifunctional contact. Together with the load output, a maximum of twelve timers are therefore available.

- **Generator function:** Using the generator function, the Steca Tarom – based on the SOC or the battery voltage – can start a generator automatically when the battery is discharged and switch this off again when the battery is full. Using the surplus manager, an additional load can be activated automatically when the battery is full. This is switched off again as soon as no more energy surplus is available in the solar system. This guarantees that all available energy is used.

**Simple-to-access, easy-to-connect terminals**
The extra spacious connection terminal area is designed for cables with thicknesses of up to 35 mm². The highly sophisticated connection terminals make attachment and fastening of cables easier. Rather than thin screws or bolts, with the Steca Tarom an entire platform is raised up as a connecting piece. This guarantees safe connection of the cables to the charge controller. The spaciousness of the terminals with this additional function means installation is child's play.

## Steca Tarom MPPT

**6000-S, 6000-M**

The Steca Tarom MPPT solar charge controller sets new standards in the area of Maximum Power Point trackers. Outstanding efficiency along with unique safety features make it a universal top-grade charge controller.

There are two inputs that can be connected in parallel or used separately. Each input has its own MPP tracker. So there are two charge controllers available in one device. Different module arrays can be flexibly combined in one charge controller.

With an input voltage of up to 180 V, all kinds of solar modules can be used in various connection schemes. This charge controller combines high flexibility, maximum yields, professional battery care and an appealing design on the basis of advanced technology. One Steca Tarom MPPT 6000-M can communicate with up to 22 Steca Tarom MPPT 6000-S units.

**Product features**
- Two independent maximum power point trackers (MPP trackers)
- Two inputs (connected in parallel or used separately for two different module arrays)
- Robust metal casing
- Comprehensive data logging of energy values for up to 20 years
- MicroSD slot for data logging of all minute values (6000-M only)
- Voltage and current regulation
- Temperature compensation
- Monthly maintenance charge
- Three configurable multifunctional contacts (6000-M only)
- Adjustable cut-off voltages
- Battery type: gel/liquid lead battery (for 6000-M also Li and NiCd batteries)
- Integrated, automatic module switch
- 36 V and 60 V batteries can be charged with special settings in expert menu level
- Parallel connectable

**Electronic protection functions**
- Overcharge protection
- Reverse polarity protection of module and battery
- Automatic electronic fuse
- Open circuit protection without battery
- Reverse current protection at night
- Overtemperature and overload protection
- PE connection

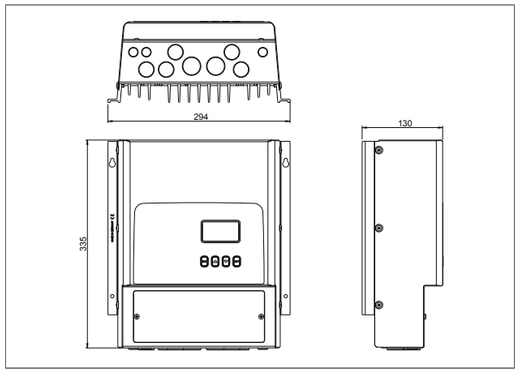
**Displays**
- Multifunction graphical LCD display with backlighting
- Configuration via display unit

**Interfaces**
- StecaLink Bus
- Open Steca RS-232 interface (6000-M only)
- Battery emergency off signal connection (optional, 6000-M only)

**Options**
- Connection for battery voltage sensor cable

**Certificates**
- Compliant with European Standards (CE)
- RoHS compliant
- Made in Germany
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

**Steca accessories**
- External temperature sensor Steca PA TS-S (for 6000-M included in the scope of delivery)
- Data cable Steca PA CAB3 Tarcom (6000-M only)
- Current sensor Steca PA HS400 (6000-M only)


| | 6000-S / 6000-M |
|---|---|
| **Characterisation of the operating performance** | |
| System voltage | 12 V / 24 V / 48 V |
| Nominal power | 900 W / 1,800 W / 3,600 W |
| Max. DC-DC efficiency | 99.4 % ($U_{Batt}$=48 V; $U_{in}$=70 V; P=0,65*$P_{nom}$) |
| European efficiency | 96.6 % ($U_{Batt}$=24 V; $U_{in}$=30 V)<br>98.9 % ($U_{Batt}$=48 V; $U_{in}$=70 V) |
| European efficiency (weighted across all $U_{Batt}$ and $U_{in}$) | 96.4 % |
| Static MPP efficiency | 99.9 % (DIN EN 50530) |
| Dynamic MPP efficiency | 99.8 % (DIN EN 50530) |
| Weighted REW (Realistic Equally Weighted efficiency) | 94.8 % |
| Own consumption | < 1 W |
| **DC input side** | |
| Min. MPP voltage / input | 17 V / 34 V / 68 V |
| Max. MPP voltage / input | 180 V* |
| Min. open circuit voltage solar module / input (at minimum operating temperature) | 20 V / 40 V / 80 V |
| Max. open circuit voltage solar module / input (at minimum operating temperature) | 200 V* |
| Module current | 2 x 30 A / 1 x 60 A |
| **Battery side** | |
| Charge current | 60 A |
| End of charge voltage (programmable) | 14.1 V / 28.2 V / 56.4 V |
| Boost charge voltage (programmable) | 14.4 V / 28.8 V / 57.6 V |
| Equalisation charge (programmable) | 15 V / 30 V / 60 V |
| Set battery type (programmable) | liquid (adjustable via menu) |
| **Operating conditions** | |
| Ambient temperature | -25 °C … +50 °C |
| **Fitting and construction** | |
| Terminal (fine wire) | 35 mm² - AWG 2 |
| Degree of protection | IP 31 |
| Dimensions (X x Y x Z) | 294 x 335 x 130 mm |
| Weight | approx. 6,300 g |

Technical data at 25 °C / 77 °F
* Starting software version PU-APP 1.2.0



# DOUBLE AWARDEE

**The Steca Tarom MPPT solar charge controller sets new standards in the area of Maximum Power Point trackers. Therefore the Steca Tarom MPPT 6000-M has won even two famous awards**

The Steca Tarom MPPT 6000-M dual MPPT peak charge controller, which won the renowned OTTI Innovation Prize, was awarded the Intersolar Award 2014 at the world's largest trade fair for the solar sector.

This innovative product won over the judges due to its outstanding benefits. At 3.6 kW, the unit is suitable for use with all types of lithium-ion batteries. In addition to complex charging algorithms, the charge controller features battery diagnosis, a long-term data logger, interfaces and exceptionally high efficiency: the Steca Tarom MPPT 6000-M is the first charge controller to achieve a conversion efficiency of 99 percent as measured in the field. The unit provides extremely practical answers to issues raised by the current wave of technological change gripping the photovoltaic sector.


inter solar award 2014 WINNER

WINNER
OTTI INNOVATION AWARD 2014

## Overview of functions:

| | Tarom MPPT 6000-S | Tarom MPPT 6000-M |
|---|---|---|
| Comprehensive, integrated data logger for 20 years of data recording | ✓ | ✓ |
| Buzzer for alarms | ✓ | ✓ |
| Three configurable multifunctional contacts for…<br>• … programmable deep discharge protection (LVD)<br>• … generator/surplus manager<br>• … automatic switch functions (day, evening, night)<br>• … four timers | | <br>✓<br>✓<br>✓<br>✓ |
| Unique lithium-ion battery charge strategy | | ✓ |
| Innovative charge strategy for NiCd batteries | | ✓ |
| Determination of the actual battery capacity during ongoing operation | | ✓ |
| Optimised SOC algorithm | | ✓ |
| IUIa charging for increased battery capacity (optional) | | ✓ |
| Capacity test | | ✓ |

Lead acid

### Revolutionary innovative algorithms for lead batteries

**State of charge (SOC):**
The Steca Tarom MPPT 6000-M is equipped with a new type of highly-flexible algorithm for precise state of charge (SOC) calculation enabling automatic adaptation to battery and user behaviour. This enables the current state of charge to be assessed at any time.

**Battery capacity test**
The Steca Tarom MPPT 6000-M has an entirely new and professional battery capacity measurement system, which determines the actual capacity of the battery. To date, capacity generally had to be measured by the battery manufacturer in a complex process or locally with additional measuring equipment. In the Steca Tarom MPPT 6000-M, the Steca PA HS400 electricity sensor can measure the capacity and supply information on battery ageing.

This revolutionary new development provides advanced inspection options for users, operators and manufacturers – e.g. for awarding battery warranties based on the actual residual capacity.

**IUIa charging:**
Depending on the type of battery and its state, the battery capacity can be increased by up to 20 percent by means of a constant current charge phase following full charging (IUIa charging). This function is now available for the first time for stand-alone PV systems too in the Steca Tarom MPPT 6000-M.

Lithium

### Professional charging strategy for all lithium-ion batteries

only with TAROM MPPT 6000-M

The Steca Tarom MPPT 6000-M is the first MPPT charge controller to also offer the option of charging lithium-ion batteries professionally using PV current. The latest research results in this area were used in its development, which took place in close cooperation with renowned, international research institutes. A self-developed charge strategy can be perfectly adapted to all available lithium chemistries using a wide range of parameters.

NiCd

### Professional charging of NiCd batteries

Alkaline chemicals like NiCd batteries can also be charged using the innovative Steca Tarom MPPT 6000-M. A professional, configurable charging characteristic curve is available for this, which can be adapted to special battery and system prerequisites. Particularly with professional use, this charge strategy opens up entirely new possibilities.

**Greater efficiency. Greater flexibility. Greater comfort.
Less devices. Less modules. Less costs.**

**Save in the right places with Steca Tarom MPPT**
With its innovative functions, the Steca Tarom MPPT not only offers greater efficiency, flexibility and comfort but also helps to avoid certain unnecessary costs that are incurred during the planning, implementation and ongoing operation of PV systems.

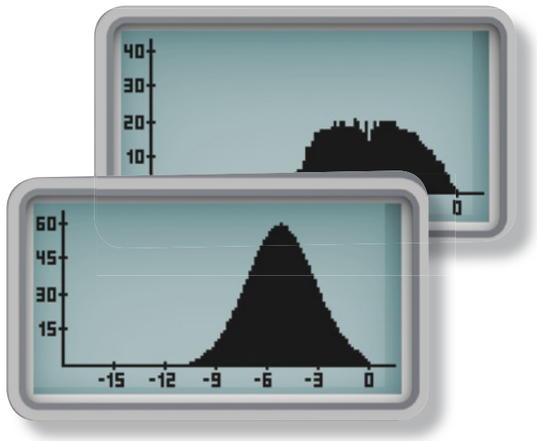
**No need for additional devices!**

**... due to added flexibility as a result of the wide input voltage range**
The Steca Tarom MPPT can be used with a wide input voltage range, which allows greater flexibility when selecting modules.

**... due to the two separate inputs**
Two inputs each with independent MPP tracking in one charge controller provide greater options when it comes to system planning. With the Steca Tarom MPPT you can not only vary the module types for each input but the circuits too. Series and parallel circuits can be combined easily in one system using the universal and flexible Steca Tarom MPPT. There is no need for an external module circuit box as all module strings can be connected directly to the charge controller leading to savings on installation costs.

**... due to two maximum power point trackers (MPPT)**
The two independent separate maximum power point trackers enable various module types to be used with just one Steca Tarom MPPT charge controller. Leftover module stock can also be used in a system without any problems. Significantly greater options are also available when upgrading existing systems – without the extra cost of replacing an existing charge controller. The Steca Tarom MPPT is particularly suitable for systems where partial shading of the module array is unavoidable. Due to the two separate MPP trackers, the charge controller can power different strings with an individually adjusted MPP. This enables the maximum efficiency to be exploited for each string enhancing the total output of the system – in spite of partial shading. The same principle applies also for use on roofs or areas with various angles of inclination or orientations.

**... due to the comprehensive, integrated data logger**
The Steca Tarom MPPT is equipped with a unique, comprehensive data logger, which enables data of the two inputs to be monitored and saved independently over a period of up to twenty years. The previous 18 hours can be graphically displayed. Daily, monthly and annual totals are summarised automatically for an outstanding overview of system utilisation at a glance.



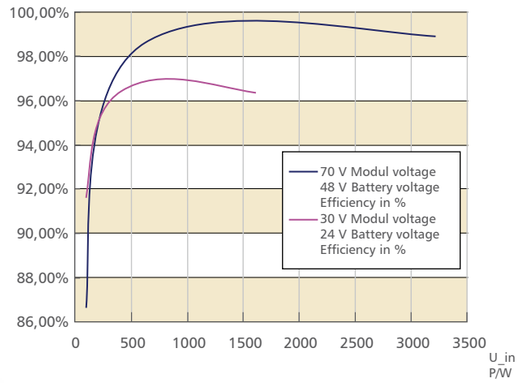

**No need for additional modules!**

**... due to the extra high efficiency**
The Steca Tarom MPPT is one of the few MPPT charge controllers that can reliably attain a high and – more importantly – constant efficiency across all input and output voltage ranges. The high level of reliability of the MPPT solar charge controller enables you to obtain even more power from your PV system. For example, significantly less energy is lost due to unnecessary heat losses. Conversely this means that, using the same power, as much as an entire module can be saved during planning if required. Particularly with limited mounting options or a limited budget this is an indisputable benefit.

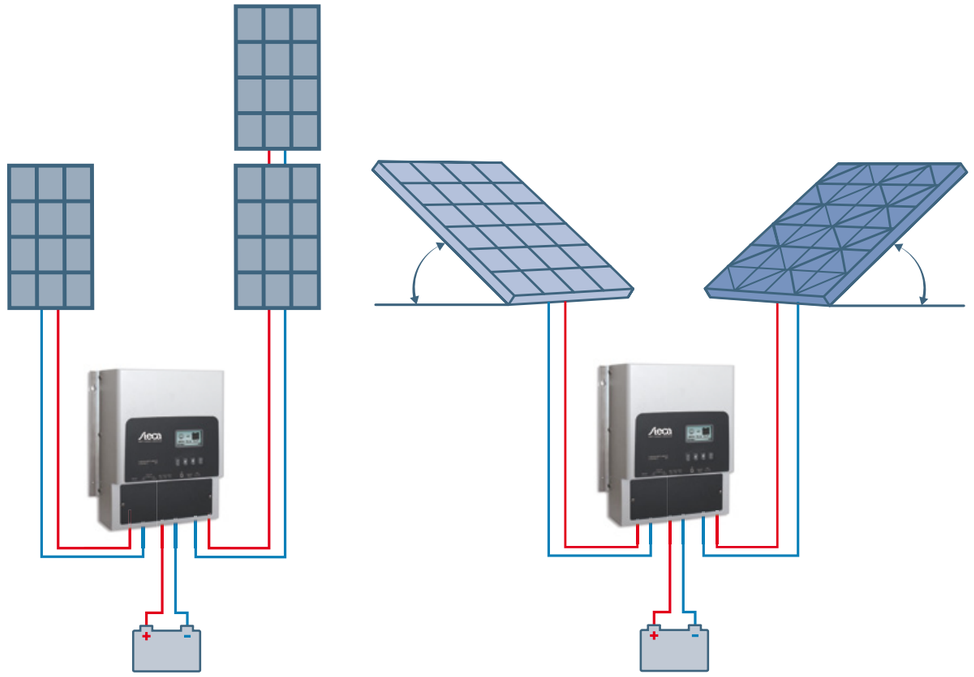
**Save time and effort during installation!**

**... due to the easily accessible, easy-to-connect terminals**
The extra spacious connection terminal area can be accessed via two screws on the front of the device meaning installation of cables with a thickness of up to 35 mm² is simple, fast and secure. An integrated module switch means the Steca Tarom MPPT can be connected without any voltage connection, sparks or light arcs. Only when the charge controller is switched on via the menu are the module arrays connected up. This makes installation child's play.

DC-DC efficiency





**Enjoy numerous added benefits!**

**User-friendly graphical LCD display**
All system states are displayed intuitively via icons on the graphical multifunction display enabling simple understanding of the energy flow. All parameters can be configured using the multilingual, intuitive menu.

**Communication options**
The SecaLink bus facilitates communication between a Steca Tarom MPPT 6000-M and up to 22 further Steca Tarom MPPT 6000-S units. Accessories like the Steca PA HS400 electricity sensor or the Steca PA Link1 parallel switch box can also be integrated via the SecaLink bus. All currents and other data are recorded in this way in the system and tracked in the data logger. The charge controller determines and displays the battery's current state of charge (SOC) (Steca PA HS400 and/or PA Link1 required). The connected Steca Tarom MPPT 6000-S units even continue working in a special redundancy mode when communication errors occur. The Steca Tarom MPPT 6000-M also has an RS-232 interface, which can output all relevant system data once a minute. A MicroSD card slot allows you to record comprehensive data for all devices in the SecaLink communication system on a standard MicroSD card. Professional control of loads and generators is possible via the multifunctional contacts.

The Steca Tarom MPPT 6000-M is equipped with three multifunctional contacts, which can be programmed independently of one another. These versatile individual functions can be combined virtually as required:

**Function overview of multifunctional contacts:**

**Deep discharge protection**
Deep discharge protection automatically protects the battery against harmfully low levels of discharge. All voltage thresholds can be freely configured via a menu based either on the battery's current state of charge (SOC) or on the battery voltage.

**Evening, night light and daylight function**
The charge controller allows configuration of three different automatic timer functions: evening light, night light and daylight. All the important time and delay values can be set with this. With the evening light function, the load is automatically switched on at sunset and the time after which the load is switched off again can be individually specified. The night light function specifies the time after which the load is switched on after sunset and switched off again before sunrise. With the morning light function, the load is switched on automatically at night and automatically switched off again at sunrise.

**Four freely programmable timers with week day function**
The four freely programmable timers can be set individually based on day of the week, start and finish time. With the week day function, each timer can be used for just one or several days of the week at a time if required.

**Generator function**
Using the generator function, the Steca Tarom MPPT 6000-M – based on the SOC or the battery voltage – can start a generator automatically when the battery is discharged, and switch this off again when the battery is full. Using the surplus manager, an additional load can be activated automatically when the battery is full. This is switched off again as soon as no more energy surplus is available in the solar system. This guarantees that all available energy is used.

## Steca Power Tarom

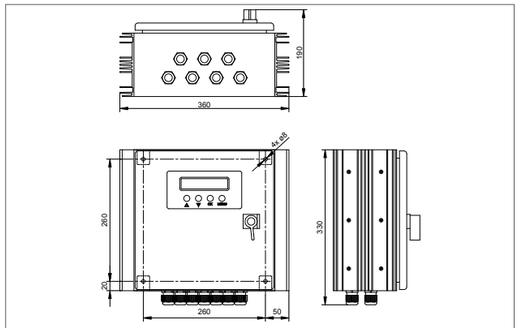
**2070, 2140, 4055, 4110, 4140**

Specially designed for industrial and outdoor applications, the Steca Power Tarom comes with an IP 65 casing made of powder-coated steel.

This solar charge controller is capable of regulating large systems at three voltage levels (12 V, 24 V, 48 V). The Steca Power Tarom is based on the technology of the Steca Tarom controller. When connected in parallel, several controllers from this series can be operated via a standard DC bus in a simple solar home system or in complex hybrid systems.

ADVANCED


55 A...140 A


Steca Power Tarom 2140, Power Tarom 4110, Power Tarom 4140

**Product features**
- Hybrid controller
- State of charge determination with Steca AtonIC (SOC)
- Automatic detection of voltage
- PWM control
- Multistage charging technology
- Load disconnection depending on SOC
- Automatic load reconnection
- Temperature compensation
- Negative earthing of one or positive earthing of several terminals possible
- Integrated data logger (energy meter)
- Night light function with Steca PA 15
- Integrated self test
- Monthly maintenance charge

**Electronic protection functions**
- Overcharge protection
- Deep discharge protection
- Reverse polarity protection of module, load and battery
- Reverse polarity protection by internal fuse
- Automatic electronic fuse
- Short circuit protection of load and module
- Overvoltage protection at module input
- Open circuit protection without battery
- Reverse current protection at night
- Overtemperature and overload protection
- Load disconnection on battery overvoltage

**Displays**
- Text LCD display
  ~ for operating parameters, fault messages, self test

**Operation**
- Simple menu-driven operation
- Programming by buttons
- Manual load switch

**Interfaces**
- RJ45 interface to PA Tarcom / PA HS200

**Options**
- External temperature sensor (included in the scope of delivery)
- Alarm contact
- System monitoring via a Steca PA CAB1 Tarcom

**Certificates**
- Approved by the World Bank for Nepal
- Fit for use in tropical areas (DIN IEC 68 part 2-30)
- Compliant with European Standards (CE)
- Made in Germany
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

**Steca accessories**
- External temperature sensor Steca PA TS10
- Steca PA Tarcom data logger and Steca PA CAB1 Tarcom data cable
- Current sensor Steca PA HS200
- Remote control Steca PA 15

| | 2070 | 2140 | 4055 | 4110 | 4140 |
|---|---|---|---|---|---|
| **Characterisation of the operating performance** | | | | | |
| System voltage | 12 V (24 V) | | 48 V | | |
| Own consumption | 14 mA | | | | |
| **DC input side** | | | | | |
| Open circuit voltage solar module (at minimum operating temperature) | < 50 V | | < 100 V | | |
| Module current | 70 A | 140 A | 55 A | 110 A | 140 A |
| **DC output side** | | | | | |
| Load current* | 70 A | 70 A | 55 A | 55 A | 70 A |
| programmable: Reconnection voltage (SOC / LVR) | > 50 % / 12.6 V (25.2 V) | | > 50 % / 50.4 V | | |
| programmable: Deep discharge protection (SOC / LVD) | < 30 % / 11.1 V (22.2 V) | | < 30 % / 44.4 V | | |
| **Battery side** | | | | | |
| End of charge voltage | 13.7 V (27.4 V) | | 54.8 V | | |
| Boost charge voltage | 14.4 V (28.8 V) | | 57.6 V | | |
| Equalisation charge | 14.7 V (29.4 V) | | 58.8 V | | |
| Set battery type | liquid (adjustable via menu) | | | | |
| **Operating conditions** | | | | | |
| Ambient temperature | -10 °C … +60 °C | | | | |
| **Fitting and construction** | | | | | |
| Terminal (fine / single wire) | 50 mm² - AWG 1 | 95 mm² - AWG 000 | 50 mm² - AWG 1 | 70 mm² - AWG 00 | 95 mm² - AWG 000 |
| Degree of protection | IP 65 | | | | |
| Dimensions (X x Y x Z) | 330 x 330 x 190 mm | 360 x 330 x 190 mm | 330 x 330 x 190 mm | 360 x 330 x 190 mm | |
| Weight | 10 kg | | | | |

Technical data at 25 °C / 77 °F
* Inverters must not be connected to the load output.



## Steca AJ

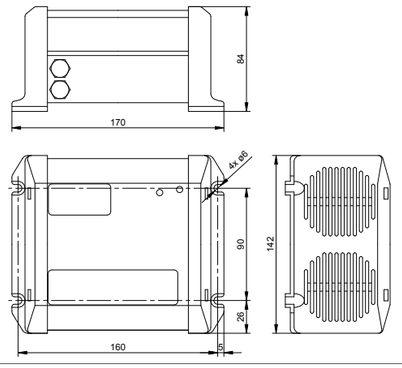
**275-12, 350-24, 400-48, 700-48, 1000-12, 2100-12, 2400-24**

The Steca AJ inverter series stands out with its wide range of available power classes and DC input voltages.

This enables the optimal inverter to be used for any application. The cables for connecting the battery and the load are already mounted on the Steca AJ, thus making it easier to install the device. The automatic standby mode considerably reduces the inverter's own consumption. The Steca AJ inverter's excellent overload capacity ensures that even critical loads can be operated easily.


275 W...2,400 W


Steca AJ 275-12, AJ 350-24, AJ 400-48




**Product features**
- True sine wave voltage
- Excellent overload capabilities
- Optimal battery protection
- Automatic load detection
- Best reliability

**Electronic protection functions**
- Deep discharge protection
- Battery overvoltage shutdown
- Overtemperature and overload protection
- Short circuit protection
- Reverse polarity protection by internal fuse (except Steca AJ 2100-12)
- Acoustic alarm at deep discharge or overheating

**Displays**
- Multi-coloured LED shows operating states

**Operation**
- Main switch
- Adjustable load detection

**Options**
- Types with 115 V / 50 Hz, 115 V / 60 Hz or 230 V / 60 Hz
- Model with protective lacquered mainboard

**Certificates**
- Compliant with European Standards (CE)
- RoHS compliant

**Steca accessories**
- Remote control JT8 (On/Off, LED) for connection to Steca AJ 1000-12 to Steca AJ 2400-24

| | 275-12 | 350-24 | 400-48 | 700-48 | 1000-12 | 2100-12 | 2400-24 |
|---|---|---|---|---|---|---|---|
| **Characterisation of the operating performance** | | | | | | | |
| System voltage | 12 V | 24 V | 48 V | | 12 V | | 24 V |
| Continuous power | 200 VA | 300 VA | | 500 VA | 800 VA | 2,000 VA | |
| Power 30 min. | 275 VA | 350 VA | 400 VA | 700 VA | 1,000 VA | 2,100 VA | 2,400 VA |
| Power 5 sec. | 450 VA | 650 VA | 1,000 VA | 1,400 VA | 2,200 VA | 5,000 VA | 5,200 VA |
| Max. efficiency | 93 % | 94 % | | | 93 % | 92 % | 94 % |
| Own consumption standby / ON | 0.3 W / 2.4 W | 0.5 W / 3.5 W | 1.1 W / 5.2 W | 1.5 W / 12 W | 0.7 W / 10 W | 0.7 W / 16 W | 1.2 W / 16 W |
| **DC input side** | | | | | | | |
| Battery voltage | 10.5 V … 16 V | 21 V … 32 V | 42 V … 64 V | | 10.5 V … 16 V | | 21 V … 32 V |
| **AC output side** | | | | | | | |
| Output voltage | 230 V AC +0 / -10 % (true sine wave) | | | | | | |
| Output frequency | 50 Hz +/-0.05 % (crystal controlled) | | | | | | |
| Load detection (standby) | 2 W | | | adjustable: 1 W … 20 W | | | |
| **Operating conditions** | | | | | | | |
| Ambient temperature | -20 °C … +50 °C | | | | | | |
| **Fitting and construction** | | | | | | | |
| Cable length battery / AC | 1.2 m / 1 m | | | 1.5 m / 1m | | 1.7 m / 1 m | |
| Degree of protection | IP 30 | | | | | IP 20 | |
| Dimensions (X x Y x Z) | 170 x 142 x 84 mm | | | 252 x 142 x 84 mm | 455 x 142 x 84 mm | 406 x 273 x 117 mm | |
| Weight | 2.4 kg | 2.6 kg | | 4.5 kg | 8.5 kg | 19 kg | 18 kg |

Technical data at 25 °C / 77 °F

## Steca Solarix PI

**500-12, 550-24, 1100-24, 1500-48**

The new generation of sine wave inverters, Steca Solarix PI, demonstrates greatly enhanced functionality and robustness. The new parallel switch box Steca PA Link1, for instance, facilitates communication with the new charge controller generation Steca Tarom 4545/4545-48 and Steca Tarom MPPT 6000-M (Software update required). Existing safety functions too have been made more customer-friendly and robust. The new generation of the Steca Solarix PI possess different technical properties to predecessor models and may not be suitable to replace these.*

In developing the Solarix PI sine wave inverter, Steca has brought about some innovations. These are, above all, parallel connection, the novel operating concept which uses a single rotary switch, direct communication in order to calculate the state of charge (SOC) with Steca Tarom and Steca Tarom MPPT 6000-M, and the electronic fuse. Furthermore, many years of experience have come into play for deploying these inverters specifically in photovoltaic systems. This comes through, for instance, in the way that a most diverse range of appliances is provided with a low operating consumption and a stable energy supply.

### Product features
- True sine wave voltage
- Connectible to Steca Tarom 4545/4545-48 and Steca Tarom MPPT 6000-M via parallel switch box Steca PA Link1 (Software update required)
- Excellent overload capabilities
- Optimal battery protection
- Automatic load detection
- Parallel connectable
- Best reliability
- Protective insulation according to protection class II
- Control by digital signal processor (DSP)

### Electronic protection functions
- Deep discharge protection
- Battery overvoltage shutdown
- Overtemperature and overload protection
- Short circuit protection
- Reverse polarity protection
- Automatic electronic fuse

### Displays
- Multi-coloured LED shows operating states

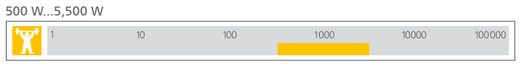
### Operation
- Main switch
- Adjustable load detection

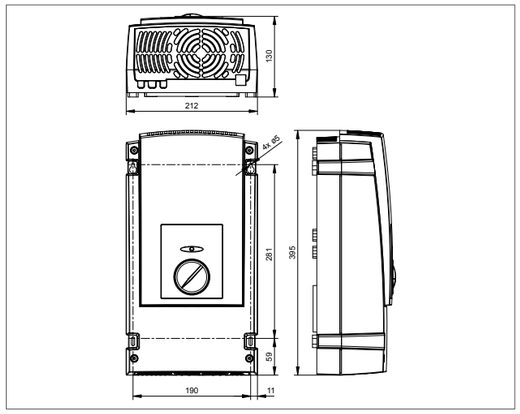
### Options
- Type with 230 V / 60 Hz
- Type with 115 V / 60 Hz

### Certificates
- Compliant with European Standards (CE)
- Made in Germany
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

* The following components are compatible:

| Sine wave inverter | Parallel switch box | Solar charge controller |
|---|---|---|
| Steca Solarix PI (New generation) | Steca PA Link1 | Steca Tarom 4545/4545-48 and Tarom MPPT 6000-M |
| Steca Solarix PI (Predecessor generation) | Steca PAx4 | Steca Tarom 235/245/440 and Power Tarom |




| 24 V | 550-24 | 1000-24 SET | 1500-24 SET | 2010-24 SET | 1100-24 | 2000-24 SET | 3000-24 SET | 4000-24 SET |
|---|---|---|---|---|---|---|---|---|
| Inverter type | PI 550-24 | PI 550-24 | PI 550-24 | PI 550-24 | PI 1100-24 | PI 1100-24 | PI 1100-24 | PI 1100-24 |
| Number of inverters / Steca PA Link1 | 1 / 0 | 2 / 1 | 3 / 1 | 4 / 1 | 1 / 0 | 2 / 1 | 3 / 1 | 4 / 1 |
| **Characterisation of the operating performance** | | | | | | | | |
| System voltage | 24 V | | | | | | | |
| Continuous power | 450 VA | 900 VA | 1,350 VA | 1,800 VA | 900 VA | 1,800 VA | 2,700 VA | 3,600 VA |
| Power 30 min. | 550 VA | 1,000 VA | 1,500 VA | 2,010 VA | 1,100 VA | 2,000 VA | 3,000 VA | 4,000 VA |
| Power 5 sec. | 1,000 VA | 1,350 VA | 2,050 VA | 2,750 VA | 1,400 VA | 2,700 VA | 4,100 VA | 5,500 VA |
| Max. efficiency | 93 % | | | | 94 % | | | |
| Own consumption standby / ON | 0.5 W / 6 W | | | | 0.7 W / 10 W | | | |
| **DC input side** | | | | | | | | |
| Battery voltage | 21 V … 32 V | | | | | | | |
| Reconnection voltage (LVR) | 25 V | | | | | | | |
| Deep discharge protection (LVD) [1] | 21 V | | | | | | | |
| **AC output side** | | | | | | | | |
| Output voltage | 230 V AC +/-10 % | | | | | | | |
| Output frequency | 50 Hz | | | | | | | |
| Load detection (standby) | adjustable: 2 W ... 50 W | | | | | | | |
| **Safety** | | | | | | | | |
| Protection class | II (double insulated) | | | | | | | |
| Electrical protection | reverse polarity battery, reverse polarity AC, over voltage, over current, over temperature | | | | | | | |
| **Operating conditions** | | | | | | | | |
| Ambient temperature | -20 °C … +50 °C | | | | | | | |
| **Fitting and construction** | | | | | | | | |
| Cable length battery / AC | 1.5 m / 1.5 m | | | | | | | |
| Cable cross-section battery / AC | 16 mm² / 1.5 mm² | | | | | | | |
| Degree of protection | IP 20 | | | | | | | |
| Dimensions (X x Y x Z) | 212 x 395 x 130 mm [2] | | | | | | | |
| Weight | 6.6 kg [2] | | | | 9 kg [2] | | | |

| 12 / 48 V | 500-12 | 950-12 SET | 1400-12 SET | 1850-12 SET | 1500-48 | 2800-48 SET | 4150-48 SET | 5500-48 SET |
|---|---|---|---|---|---|---|---|---|
| Inverter type | PI 500-12 | PI 500-12 | PI 500-12 | PI 500-12 | PI 1500-48 | PI 1500-48 | PI 1500-48 | PI 1500-48 |
| Number of inverters / Steca PA Link1 | 1 / 0 | 2 / 1 | 3 / 1 | 4 / 1 | 1 / 0 | 2 / 1 | 3 / 1 | 4 / 1 |
| **Characterisation of the operating performance** | | | | | | | | |
| System voltage | 12 V | | | | 48 V | | | |
| Continuous power | 450 VA | 900 VA | 1,350 VA | 1,800 VA | 900 VA | 1,800 VA | 2,700 VA | 3,600 VA |
| Power 30 min. | 500 VA | 950 VA | 1,400 VA | 1,850 VA | 1,500 VA | 2,800 VA | 4,150 VA | 5,500 VA |
| Power 5 sec. | 500 VA | 950 VA | 1,400 VA | 1,850 VA | 2,800 VA | 4,100 VA | 5,400 VA | 6,600 VA |
| Max. efficiency | 93 % | | | | 94 % | | | |
| Own consumption standby / ON | 0.5 W / 6 W | | | | 0.7 W / 10 W | | | |
| **DC input side** | | | | | | | | |
| Battery voltage | 10,5 V … 16 V | | | | 42 V … 64 V | | | |
| Reconnection voltage (LVR) | 12.5 V | | | | 50 V | | | |
| Deep discharge protection (LVD) [1] | 10.5 V | | | | 42 V | | | |
| **AC output side** | | | | | | | | |
| Output voltage | 230 V AC +/-10 % | | | | | | | |
| Output frequency | 50 Hz | | | | | | | |
| Load detection (standby) | adjustable: 2 W ... 50 W | | | | | | | |
| **Safety** | | | | | | | | |
| Protection class | II (double insulated) | | | | | | | |
| Electrical protection | reverse polarity battery, reverse polarity AC, over voltage, over current, over temperature | | | | | | | |
| **Operating conditions** | | | | | | | | |
| Ambient temperature | -20 °C … +50 °C | | | | | | | |
| **Fitting and construction** | | | | | | | | |
| Cable length battery / AC | 1.5 m / 1.5 m | | | | | | | |
| Cable cross-section battery / AC | 16 mm² / 1.5 mm² | | | | | | | |
| Degree of protection | IP 20 | | | | | | | |
| Dimensions (X x Y x Z) | 212 x 395 x 130 mm [2] | | | | | | | |
| Weight | 6.6 kg [2] | | | | 9 kg [2] | | | |

[1] Adjustable via charge controller together with compatible parallel switch box
[2] per inverter

Technical data at 25 °C / 77 °F

## Steca Solarix PI: flexible and versatile

### Parallel connection

A stand-alone PV system is relatively difficult to size, since often the loads and their average running times are not adequately known, or because, when the system is subsequently expanded, more loads are added.

This is where the simple expandability of the Steca Solarix PI inverters pays off. Up to four devices can be operated in parallel. The connections are made via an external box, the Steca PA Link1.

From the outside, the combination of two, three or four inverters functions like one device with a correspondingly higher capacity. Internally, in case of open-circuit operation or low output, e.g. for the lighting, only one inverter continues to operate. This has a positive effect on the electricity consumption, since the devices which are not turned on do not consume any power. Only when a higher capacity is called for, for example when a refrigerator is turned on, are all the inverters automatically switched on, thus ensuring trouble-free operation.

In this regard, Steca Solarix PI inverters are all the same. Only via the connection to the Steca PA Link1 parallel switch box is one inverter designated as the master. This device then has control over the system, whilst the other Steca Solarix PI inverters operate as slaves.

### Rotary switch

Operating the Steca Solarix PI is made very easy by the large rotary switch on the front of the device.

If the Steca Solarix PI is being used as a single device, three different modes of operation are possible, and these may be selected using the rotary switch. The load detection section follows on from the 'off' setting on the far left. In this section, the switch can be turned continuously to match the power consumption of the smallest load. In order to reduce power consumption, the inverter is then turned off, and it checks periodically whether a load has been turned on. Only if this is the case does the inverter switch itself on. The 'on' setting on the rotary switch follows on from the load detection section. In this operating status, the inverter makes the output voltage continually available.

If several inverters are connected in parallel, the desired mode of operation is selected using the rotary switch of the device connected to the 'master socket'. In addition to the modes of operation described above, there is also the setting 'all on'. This means that not only the master device is continually switched on, but all other connected inverters as well.

The use of the rotary switch makes it possible to see very quickly which mode of operation the inverter is in.




### Electronic fuse

One innovation in sine wave inverters is the electronic fuse as it is employed by Steca in solar charge controllers. With this fuse, the Steca Solarix PI is protected against overloads, and also against the accidental connection of the AC output to the public grid. Because the fuse is electronic, it does not need to be replaced after it has been triggered, as is the case with mechanical fuses. As soon as the problem has been remedied, the inverter automatically reverts back to its selected mode of operation.

The Steca Solarix PI is also internally protected against an incorrect wiring of the battery. In case of reverse polarity, the device remains undamaged, and there is no need to replace the fuse.

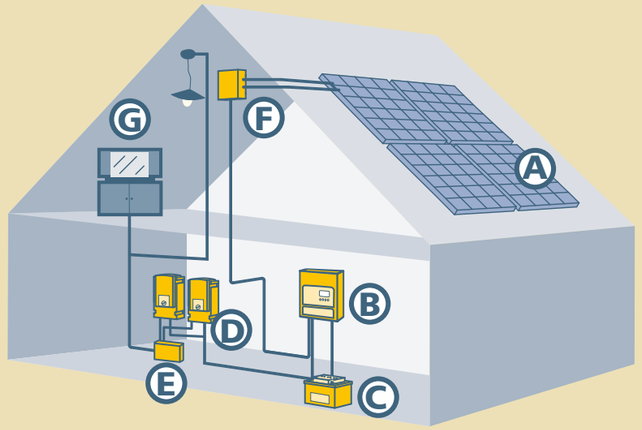
### Quick and robust control

The Steca Solarix PI inverter was developed to supply power to a wide range of loads. Even critical loads can be operated, thanks to the quick control. At the heart of the controller is a DSP which takes on the extensive calculation work. The inverter's necessary robustness is supplied by a control software program which was developed in cooperation with a renowned research institute.

### Low own consumption

The sine wave inverter has benefited from Steca's 15 years of experience in the field of stand-alone PV systems. This is reflected, for instance, in the low own consumption of the Steca Solarix PI. When used in solar home systems, the inverter is connected to the battery 24 hours a day, and is designed to consume as little as possible of the solar-generated energy whilst in load-detection or open-circuit modes.






**Key:**

A Solar module
B Solar charge controller
C Battery
D Steca Solarix PI sine wave inverter
E Steca PA Link1 parallel switch box
F Generator junction box
G Electrical load (230 V)

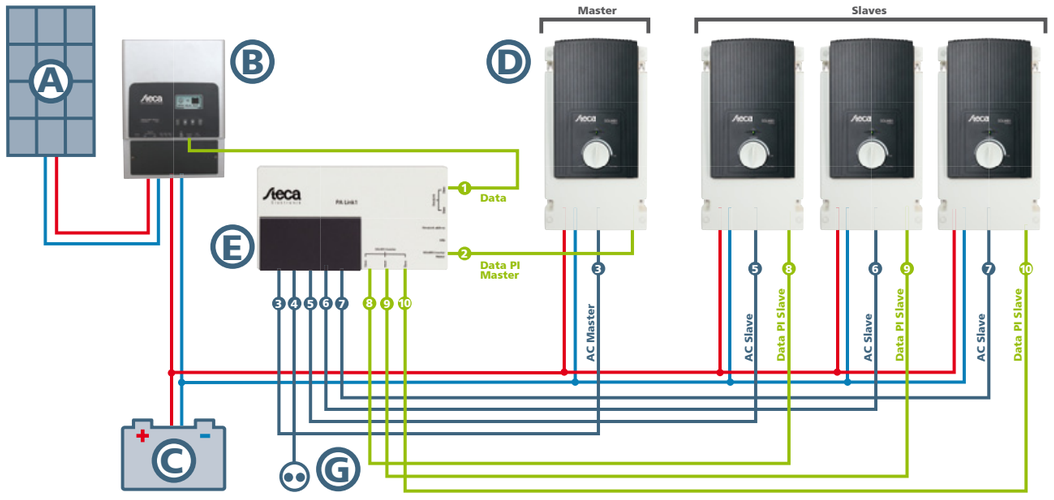
## Communication with Steca solar charge controllers

A further innovation that has gone into the Steca Solarix PI is the communication with the solar charge controllers Steca Tarom 4545/4545-48 and Tarom MPPT 6000-M. A data connection to the charge controller can be created via the Steca PA Link1 parallel switch box.

In this case, the inverter connected directly to the battery communicates the amount of energy that has been withdrawn to the solar charge controller. The controller is thus able to calculate the correct state of charge (SOC).

This means that these systems no longer need to be switched to voltage-controlled operation or an additional current shunt.

If the switch-off threshold of 30 % SOC is reached, the Steca Solarix PI receives a signal from the solar charge controller and subsequently switches itself off in order to protect the battery from deep discharge. It turns itself back on again once the SOC has reached the 50 % mark.



## Steca Xtender

**XTS 900-12, 1200-24, 1400-48**
**XTM 1500-12, 2000-12, 2400-24, 3500-24, 2600-48, 4000-48**
**XTH 3000-12, 5000-24, 6000-48, 8000-48**

The basic functions of the combined inverters Steca Xtender are the inverter, the battery charger, the switching function and the support of external sources of alternating current. These functions can be combined and controlled fully automatically. The inverters offer outstanding user-friendliness and very good exploitation of the energy available.

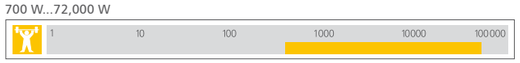
All the settings of the Steca Xtender can be remote controlled. When a software with new functions is available, it can be loaded into the system, so the Steca Xtender always stays up to date. Several Steca Xtender can be connected in parallel or to form a three-phase system. That means that up to nine Steca Xtender can work together.

Steca Xtender XTS

Steca Xtender XTM

Steca Xtender XTH

700 W...72,000 W



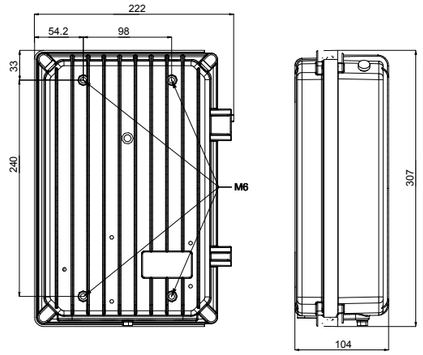

### Multifunction contacts

These potential-free contacts can be programmed for many different applications. They can react to any event outside or inside of the inverter (grid availability, battery voltage, fault message ...). They can also be programmed on a timer or can be switched on during particular times (at night, at the weekend ...). In this way, they can serve to start up a generator, to switch off less important loads, to signal a fault, to charge batteries depending on the situation, etc.

### Smart-boost function

With the smart-boost function, the output of another source of alternating current, such as a power generator or a charger connection, can be increased; even when special loads are being used (inductive, asymmetric, with high switch-on current). It is also possible to combine the Steca Xtender with almost all inverters which are already present in order to increase the available output.

**Steca Xtender XTS**




### Product features

- True sine wave voltage
- Excellent overload capabilities
- Optimal battery protection
- Adjustable integrated battery charger
- Multistage programmable battery charger with PFC
- Automatic load detection
- Standby load detection adjustable over a wide range, starting from a low value
- Parallel connectable
- Best reliability
- Can be used as a back-up system or uninterruptible power supply (UPS)
- Multifunction contact
- Adjustable power sharing
- Reliable and noiseless with any kind of load
- Support of sources of alternating current (Smart Boost)
- Automatic support for peak loads (Power Shaving)
- Ultra-fast transfer relay
- High efficiency
- Control by digital signal processor (DSP)

### Electronic protection functions

- Deep discharge protection
- Battery overvoltage shutdown
- Overtemperature and overload protection
- Short circuit protection
- Reverse polarity protection by internal fuse (except Steca Xtender XTH 3000)
- Acoustic alarm at deep discharge or overheating

### Displays

- 5 LEDs show operating states
  ~ for operation, fault messages

### Operation

- Main switch
- Adjustable load detection

### Options

- Type with 115 V / 60 Hz (except Steca Xtender XTH 8000-48)
- Model with protective lacquered mainboard

### Certificates

- Compliant with European Standards (CE)
- RoHS compliant

### Steca- accessories

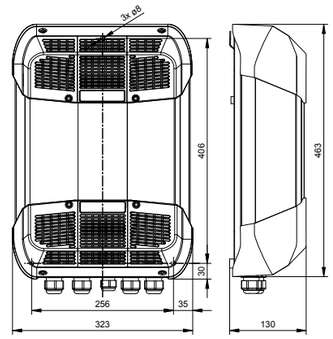
- Remote control and display Steca RCC-02/03
- Additional accessories on request:
  Prewired mounting structure Steca X-Connect-System,
  Battery temperature sensor Steca BTS-01,
  Integrated cooling unit ECF-01, Current Sensor BSP-500/1200,
  Communications cable, Connection to the three-phase system / parallel connection CAB-RJ45-2

| | XTS 900-12 | XTS 1200-24 | XTS 1400-48 | XTM 1500-12 | XTM 2000-12 | XTM 2400-24 | XTM 3500-24 | XTM 2600-48 | XTM 4000-48 | XTH 3000-12 | XTH 5000-24 | XTH 6000-48 | XTH 8000-48 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Characterisation of the operating performance** | | | | | | | | | | | | | |
| System voltage | 12 V | 24 V | 48 V | 12 V | | 24 V | | 48 V | | 12 V | 24 V | 48 V | |
| Continuous power | 500 VA / 650 VA [1] | 650 VA / 800 VA [1] | 750 VA / 900 VA [1] | 1,500 VA | 2,000 VA | | 3,000 VA | 2,000 VA | 3,500 VA | 2,500 VA | 4,500 VA | 5,000 VA | 7,000 VA |
| Power 30 min. | 700 VA / 900 VA [1] | 1,000 VA / 1,200 VA [1] | 1,200 VA / 1,400 VA [1] | 1,500 VA | 2,000 VA | 2,400 VA | 3,500 VA | 2,600 VA | 4,000 VA | 3,000 VA | 5,000 VA | 6,000 VA | 8,000 VA |
| Power 5 sec. | 2.3 kVA | 2.5 kVA | 2.8 kVA | 3.4 kVA | 4.8 kVA | 6 kVA | 9 kVA | 6.5 kVA | 10.5 kVA | 7.5 kVA | 12 kVA | 15 kVA | 21 kVA |
| Max. efficiency | 93 % | | | | | 94 % | | 96 % | | 93 % | 94 % | 96 % | |
| Own consumption standby / ON | 1.4 W / 7 W | 1.5 W / 8 W | 1.6 W / 8 W | 1.4 W / 8 W | 1.4 W / 10 W | 1.6 W / 9 W | 1.6 W / 12 W | 2 W / 10 W | 2.1 W / 14 W | 1.4 W / 14 W | 1.8 W / 18 W | 2.2 W / 22 W | 2.4 W / 30 W |
| Power Factor Correction (PFC) | according EN 61000-3-2 | | | | | | | | | | | | |
| Acoustic level | < 40 dB / < 45 dB (without / with ventilation) | | | | | | | | | | | | |
| **Input side** | | | | | | | | | | | | | |
| Input voltage | < 265 V AC (adjustable: 150 V AC … 265 V AC) | | | | | | | | | | | | |
| Charging current adjustable | 0 A … 35 A | 0 A … 25 A | 0 A … 12 A | 0 A … 70 A | 0 A … 100 A | 0 A … 55 A | 0 A … 90 A | 0 A … 30 A | 0 A … 50 A | 0 A … 160 A | 0 A … 140 A | 0 A … 100 A | 0 A … 120 A |
| Max. current on transfer system | 16 A | | | 50 A | | | | | | | | | |
| Input frequency | 45 Hz … 65 Hz | | | | | | | | | | | | |
| **Battery side** | | | | | | | | | | | | | |
| Battery voltage | 9.5 V … 17 V | 19 V … 34 V | 38 V … 68 V | 9.5 V … 17 V | | 19 V … 34 V | | 38 V … 68 V | | 9.5 V … 17 V | 19 V … 34 V | 38 V … 68 V | |
| **AC output side** | | | | | | | | | | | | | |
| Output voltage | 230 V AC +/-2 % / 190 V AC … 245 V AC (true sine wave) / 120 V AC [2] | | | | | | | | | | | | |
| Output frequency | 50 Hz, adjustable: 45 Hz … 65 Hz +/-0.05 % (crystal controlled) | | | | | | | | | | | | |
| Total harmonic distortion | < 2 % | | | | | | | | | | | | |
| Load detection (standby) | 2 W … 25 W | | | | | | | | | | | | |
| **Operating conditions** | | | | | | | | | | | | | |
| Ambient temperature | -20 °C … +55 °C | | | | | | | | | | | | |
| **Fitting and construction** | | | | | | | | | | | | | |
| Power Smart-Boost 30 min. | 900 VA | 1,200 VA | 1,400 VA | 1,500 VA | 2,000 VA | 2,400 VA | 3,500 VA | 2,600 VA | 4,000 VA | 3,000 VA | 5,000 VA | 6,000 VA | 8,000 VA |
| Input current balance adjustment | 2 A … 16 A | | | 1 A … 50 A | | | | | | | | | |
| Multifunction contact adjustable | 2 independent contacts 16 A / 250 V AC (potential free change-over contacts) | | | | | | | | | | | | |
| Degree of protection | IP 54 | | | IP 20 | | | | | | | | | |
| Dimensions (X x Y x Z) | 222 x 307 x 104 mm | | | 323 x 463 x 130 mm | | | | | | 300 x 497 x 250 mm | | | |
| Weight | 8.2 kg | 9 kg | 9.3 kg | 15 kg | 18.5 kg | 16.2 kg | 21.2 kg | 16.2 kg | 22.9 kg | 34 kg | 40 kg | 42 kg | 46 kg |
| Cooling principle | convection | | | fan from 55 °C | | | | | | | | | |
| Parallel connection possible | 3 x 1 phase and three-phase | | | | | | | | | | | | |

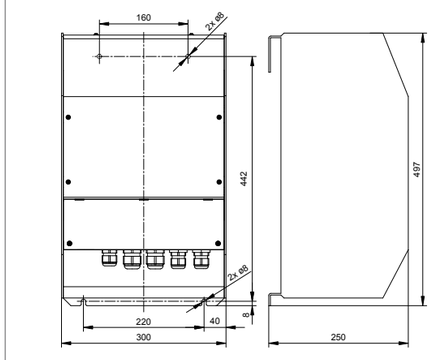
[1] Steca Xtender XTS in conjunction with ECF-01
[2] Special version, please note on order.

Technical data at 25 °C / 77 °F

**Steca Xtender XTM**




**Steca Xtender XTH**



## Steca PLI

**300, 300-L60**

The Steca PLI-300 is a low-cost 300 W sine wave inverter for supplying small AC appliances. It has a manual on/off switch allowing the inverter to be switched off to reduce own consumption. The device is especially suitable for use in solar home systems where manually switched small AC appliances are occasionally used in addition to the normal DC appliances. The device is supplied with DC cables and has a european AC power socket.


**Product features**
- True sine wave voltage
- Optimal battery protection
- Protective insulation according to protection class II

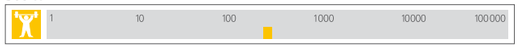
**Electronic protection functions**
- Deep discharge protection
- Battery overvoltage shutdown
- Overtemperature and overload protection
- Short circuit protection on the AC output side

**Displays**
- 2 LEDs show operating states

**Operation**
- Main switch

**Certificates**
- Compliant with european Standards (CE)

300 W




| | 300 | 300-L60 |
|---|---|---|
| **Characterisation of the operating performance** | | |
| System voltage | 12 V | |
| Continuous power | 300 VA | |
| Power 30 min. | 300 VA | |
| Power 5 sec. | 350 VA | |
| Power asymmetric | 250 VA | |
| Max. efficiency | 85 % | |
| Own consumption standby / on | 0.5 W / 9 W | |
| **DC input side** | | |
| Battery voltage | 10.5 V … 15 V | |
| Reconnection voltage (LVR) | 12.5 V | |
| Deep discharge protection (LVD) | 10.5 V | |
| **AC output side** | | |
| Output voltage | 230 V AC +/-10 % | 115 V AC +/-10 % |
| Output frequency | 50 Hz | 60 Hz |
| **Safety** | | |
| Protection class | II (double insulated) | |
| Electrical protection | no reverse polarity protection for the battery, reverse polarity AC, over voltage, over current, over temperature | |
| **Operating conditions** | | |
| Ambient temperature | -20 °C … +50 °C | |
| **Fitting and construction** | | |
| AC output side connection | European plug | |
| Cable cross-section battery | 4 mm² (AWG 12) | |
| Degree of protection | IP 20 | |
| Dimensions (X x y x Z) | 245 x 117 x 62 mm | |
| Weight | 1.2 kg | |

Technical data at 25 °C / 77 °F



## Steca MDC / MDCI

**DC-DC-voltage converters**

DC-DC voltage converters are used when the DC-output voltage of the PV system does not match the requirements of the appliance.

Since a voltage level of 12 V is required for most low-voltage appliances such as lamps, multimedia devices, radios or mobile phones, the various models of the voltage converters deliver a stable supply of 12 V. For instance, if a 12 V energy-saving light is operated in a 24 V or 48 V system, then a suitable DC-DC voltage converter must be inserted between the load output of the charge controller and the 12-V energy-saving light.

The Steca MDC and MDCI voltage converters are designed for use in photovoltaic systems. The models with an output voltage of 13.6 V can also be used as battery chargers for a 12 V battery in a 24 V system.

For safety reasons, the Steca MDCI series is electrically insulated to protect the user. Both the Steca MDCI and the Steca MDC series are protected against high voltage spikes at the input, thus preventing harmful voltage spikes at the input of the loads.

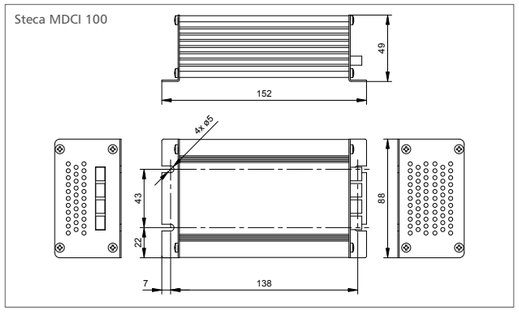

**Product features**
- High efficiency
- Automatic detection of voltage
- Wide input voltage range
- Best reliability
- Parallel switching of up to two MDCI

**Electronic protection functions**
- Overtemperature and overload protection
- Reverse polarity protection
- Short circuit protection

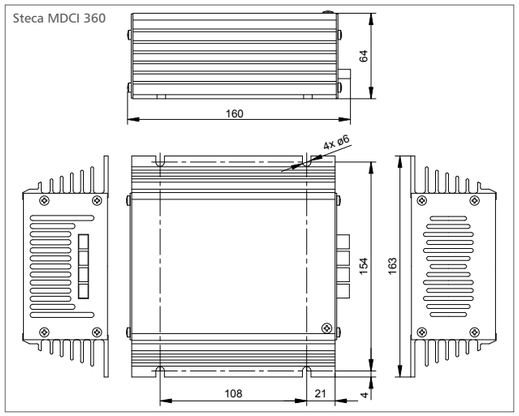
**Certificates**
- Compliant with European Standards (CE)

70 W...360 W


Steca MDCI 100




Steca MDCI 360




| | MDC | | | | | | MDCI | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2412-5 | 2412-8 | 2412-12 | 2412-20 | 2412-30 | 1224-7 | 100 | 200 | 360 |
| **Characterisation of the operating performance** | | | | | | | | | |
| Nominal power | 65 W | 105 W | 160 W | 275 W | 415 W | 170 W | 100 W | 200 W | 360 W |
| Max. efficiency | 90 % | | | | | | 85 % | | |
| **DC input side** | | | | | | | | | |
| Input voltage | 18 V … 35 V | | 20 V … 35 V | | | 9 V … 18 V | 9 V … 18 V / 20 V … 35 V / 30 V … 60 V / 60 V … 120 V | | |
| **DC output side** | | | | | | | | | |
| Output voltage | 13.2 V | | | 13.8 V | | 24 V | 12.5 V / 24 V | | |
| Output current | 5.5 A | 8 A | 12 A | 20 A | 30 A | 7 A | 8 A / 4 A | 16.5 A / 8 A | 30 A / 15 A |
| **Operating conditions** | | | | | | | | | |
| Ambient temperature | -20 °C … +40 °C | | | | | | -20 °C … +45 °C | | |
| **Fitting and construction** | | | | | | | | | |
| Galvanic isolation | no | | | | | | yes | | |
| Dimensions (X x Y x Z) | 87 x 55 x 49 mm | 87 x 85 x 49 mm | | 87 x 115 x 49 mm | 87 x 125 x 49 mm | 87 x 115 x 49 mm | 88 x 152 x 49 mm | 88 x 182 x 49 mm | 163 x 160 x 64 mm |
| Weight | 170 g | 250 g | 260 g | 480 g | 600 g | 300 g | 500 g | 600 g | 1.4 kg |
| Cooling principle | convection | | | | fan | convection | convection | fan | |

Technical data at 25 °C / 77 °F

## Steca PF 166 and Steca PF 240

**Solar refrigerator/freezer**

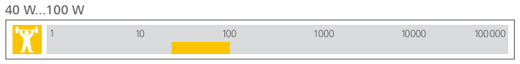
Steca PF refrigerators are the most efficient DC energy-saving refrigerators ever developed. They can be used as either a refrigerator or a freezer.

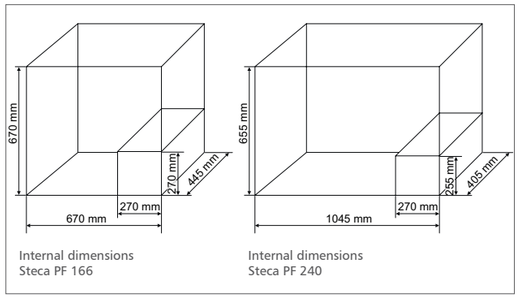
The Steca PF 166 and Steca PF 240 are fully programmable. The inside temperature and each of the other configuration values can be set by the user. They are therefore perfectly suited for all DC applications including even the refrigeration of medicines in hospitals. The optimal electronic control and speed regulation of the compressor guarantees extremely efficient use of energy. This leads to significant cost reductions.

This product stands out for its user-friendliness, thanks to a large digital display with setting options, the highest standards of quality and reliability and a long service life. The refrigerator or freezer is easy to clean as it has a sealing plug on the bottom for draining water.

Steca PF 240

Steca PF 166




Internal dimensions Steca PF 166

Internal dimensions Steca PF 240

### Product features

- Fast cooling due to compressor speed control
- The freezers can be operated via an off-grid battery system with a 70 Wp photovoltaic module in most climates
- Automatic detection of voltage
- Temperature fully programmable
- Adjustable refrigerator or freezer function
- Suitable for all DC applications
- Low maintenance and easy to clean
- Lock with two keys
- Also suitable for mobile use
- Auto-dimming for reduction of own consumption

### Electronic protection functions

- Reverse polarity protection
- Deep discharge protection
- Power breakdown display
- Temperature alarm

### Displays

- Multifunction LED display
- Digital temperature display

### Operation

- Programming by buttons

### Certificates

- Compliant with European Standards (CE)
- RoHS compliant
- Abstinence of ozone destroying materials according EC 1005/2009 (CFC-free)
- Made in Austria
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

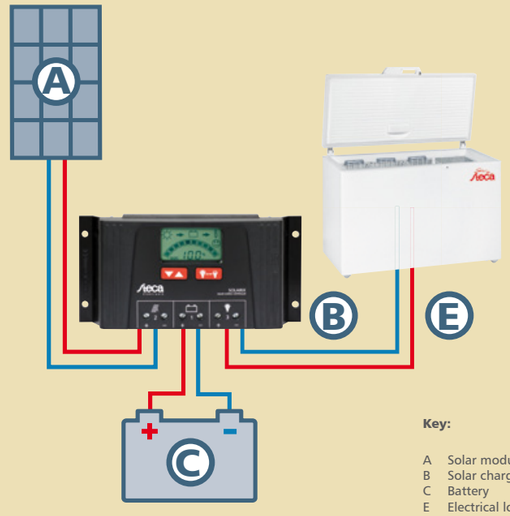
| Consumption Steca PF 166 [Wh / day] | | | | | |
|---|---|---|---|---|---|
| Ambient temperature | 20 °C | 25 °C | 30 °C | 35 °C | 40 °C |
| Interior temperature +8 °C | 44 | 72 | 109 | 156 | 216 |
| Interior temperature +3 °C | 72 | 109 | 156 | 216 | 291 |
| Interior temperature -10 °C | 190 | 259 | 346 | 454 | 589 |
| Interior temperature -20 °C | 346 | 454 | 589 | 756 | 946 |
| **Consumption Steca PF 240 [Wh / day]** | | | | | |
| Ambient temperature | 20 °C | 25 °C | 30 °C | 35 °C | 40 °C |
| Interior temperature +8 °C | 49 | 82 | 125 | 183 | 256 |
| Interior temperature +3 °C | 82 | 125 | 183 | 256 | 351 |
| Interior temperature -10 °C | 225 | 311 | 421 | 561 | 739 |
| Interior temperature -20 °C | 421 | 561 | 739 | 964 | 1,246 |

| | PF 166 | PF 240 |
|---|---|---|
| **Characterisation of the operating performance** | | |
| System voltage | 12 V (24 V) | |
| Nominal power | 40 W … 100 W | |
| Cooling volume | 166 litres | 240 litres |
| Refrigerator temperature | +2 °C … +12 °C | |
| Freezer temperature | -20 °C … -10 °C | |
| **DC input side** | | |
| Input voltage | 10 V … 17 V (17 V … 31.5 V)<br>12 V / 24 V battery | |
| **DC output side** | | |
| Reconnection voltage (LVR) | 11.7 V (24.2 V) | |
| Deep discharge protection (LVD) | 10.4 V (22.8 V) | |
| **Operating conditions** | | |
| Ambient temperature | +10 °C … +43 °C | |
| **Fitting and construction** | | |
| Dimensions (X x Y x Z) | 872 x 917 x 709 mm | 1,288 x 919 x 760 mm |
| Insulation strength | 11 cm | 12 cm |
| Weight | 47 kg | 62 kg |
| Cooling principle | compressor | |
| Refrigerant | 190 g R134a | |
| Celsius / Fahrenheit temperature display | adjustable | |
| Display brightness | adjustable | |
| Hanging baskets | 2 | |
| Freezer trays | 3 | |
| Cold battery | 1 | |
| Automatic energy-saving mode | yes | |

Technical data at 25 °C / 77 °F



## »KEEPS IT ALL FRESH«




**Key:**

A Solar modules
B Solar charge controller
C Battery
E Electrical load

## Example applications

The application areas of the Steca PF 166 and Steca PF 240 solar refrigerators and freezers are multifarious: solar refrigerators and freezers by Steca cater for the most demanding requirements at all times, whether for cooling drinks in solar home systems, for storing medication in hospitals supplied by stand-alone systems or for storage of frozen food. The most important parameters for the planning of such applications are summarized at a glance in the table opposite.

| | Minimum case | Steca PF 166 refrigerator | Steca PF 166 freezer | Steca PF 240 refrigerator | Steca PF 240 freezer |
|---|---|---|---|---|---|
| Irradiation | 7kWh / m² / d | 5 kWh / m² / d | 5 kWh / m² / d | 5 kWh / m² / d | 5 kWh / m² / d |
| Ambient temperature | 20 °C | 35 °C | 35 °C | 35 °C | 35 °C |
| Inside temperature | 8 °C | 5 °C | -15 °C | 5 °C | -15 °C |
| PV power required | 45 Wp | 175 Wp | 510 Wp | 185 Wp | 550 Wp |
| Battery power required | 12 V, 50 Ah | 24 V, 120 Ah | 24 V, 350 Ah | 24 V, 125 Ah | 24 V, 375 Ah |
| Duration of battery independence | 2 days | 3 days | 3 days | 3 days | 3 days |

Cooled drinks, Caribbean

Hospital, Nigeria

Hospital , Afghanistan

## Steca LED

**LEDs**

Steca LEDs are modern, compact LED lamps that are specially developed for all 12 V and 24 V direct voltage applications. This makes them ideal for all lighting in leisure, caravan and home applications. Their high efficiency and excellent light yield make them particularly suitable for solar home systems.


4 W...12 W


**Product features**
- High efficiency
- Low weight
- Very long lifetime
- Simple installation
- Maintenance-free
- Low own consumption
- Best reliability

**Electronic protection functions**
- Reverse polarity protection

**Certificates**
- Compliant with European Standards (CE)
- RoHS compliant

**Steca accessories**
- E27 socket

| | LED 4 | LED 6 | LED 8 | LED 12 |
|---|---|---|---|---|
| **Characterisation of the operating performance** | | | | |
| Nominal voltage | 12 / 24 V | | | |
| Nominal power | 4.4 W | 5.6 W | 7.8 W | 11.5 W |
| Rated current | 0.36 A / 0.18 A | 0.42 A / 0.21 A | 0.62 A / 0.31 A | 0.90 A / 0.45 A |
| Luminus flux | 500 lm | 600 lm | 800 lm | 1,100 lm |
| Luminus efficiency | 110 lm / W | 105 lm / W | 100 lm / W | 95 lm / W |
| Life span | > 30,000 h | | | |
| **DC input side** | | | | |
| Input voltage | 10 V ... 30 V | | | |
| **Operating conditions** | | | | |
| Ambient temperature | -10 °C ... +50 °C | | | |
| **Fitting and construction** | | | | |
| Dimensions (X x Y x Z) | 60 x 105 mm | 65 x 135 mm | 75 x 135 mm | 94 x 151 mm |
| Weight | 10 g | 12 g | 15 g | 29 g |
| Socket | E27 | | | |
| Light colour | neutral white (5,700 K) | | | |

Technical data at 25 °C / 77 °F

## Steca Solsum ESL

**Energy-saving lights**

The electronics of these 12 V DC energy-saving compact fluorescent lamps (CFLs) was developed by Steca and continuously improved. Preheating, a high electronic efficiency and low thermal losses increase the service life of these CFLs to about 100,000 switch cycles. The Steca energy-saving lights feature a much higher efficiency (lm/W) than incandescent bulbs.

7 W...11 W


**Product features**
- Brightness of 11 W CFL is comparable with a 60 W incandescent bulb
- Saves up to 80 % of energy compared to an incandescent bulb
- Greatest switch cycle stability
- Best reliability
- Easy to install by a E27 or bayonet socket
- Compact and robust product design

**Electronic protection functions**
- Reverse polarity protection

**Certificates**
- Approved by the World Bank for China and Sri Lanka
- Compliant with European Standards (CE)
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

**Steca accessories**
- E27 socket

| | ESL 7 | ESL 11 |
|---|---|---|
| **Characterisation of the operating performance** | | |
| Nominal voltage | 12 V | |
| Nominal power | 7 W | 11 W |
| Rated current | 580 mA | 920 mA |
| Luminus flux | 370 lm | 650 lm |
| Luminus efficiency | 52 lm / W | 60 lm / W |
| Life span | > 9,000 h | |
| Switching cycles | 100,000 | |
| **DC input side** | | |
| Input voltage | 10 V ... 15 V | |
| **Operating conditions** | | |
| Ambient temperature | -20 °C ... +50 °C | |
| **Fitting and construction** | | |
| Degree of protection | IP 20 | |
| Dimensions (X x Y x Z) | 55 x 133 mm | 55 x 163 mm |
| Weight | 125 g | 135 g |
| Socket | E27 / bayonet | |
| Light colour | cool white (6,400K) / warm white (2,700K) | |

Technical data at 25 °C / 77 °F



## Steca PA LCD1

**Remote display, accessories for Steca Solarix 2020-x2**

The Steca PA LCD1 is a remote graphical display for the Steca Solarix 2020-x2 solar charge controller. All system information is shown at a glance, with the energy flow displayed as a graphic, rendering it intuitively comprehensible. The remote display is equipped with a comprehensive data logger with a graphical display, which enables full monitoring of the entire system. Virtually all charge controller parameters can be set and modified using the remote display. This enables the distribution of charge power between the two batteries to be adjusted. For the load output, all automatic time and battery voltage functions are fully programmable. A USB charge socket for smartphones and tablets is also available.


Quality made in Germany

**Product features**
- Can only be used in conjunction with the Steca Solarix 2020-x2
- Simple installation
- Maintenance-free
- Fully-fledged integrated data logger
- Best reliability
- Four freely programmable timers with week day function
- Evening, night light and daylight functions
- Generator manager
- Surplus manager
- Automatic shutdown when not in use for more than week

**Displays**
- Multifunction graphical LCD display with backlighting
  - for operating parameters, voltage, current, fault messages

**Operation**
- Simple menu-driven operation
- Programmable via 4 buttons

**Interfaces**
- StecaLink Bus

**Certificates**
- Compliant with European Standards (CE)
- RoHS compliant
- Made in Germany
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

| | PA LCD 1 |
|---|---|
| **Characterisation of the operating performance** | |
| System voltage | 10 V ... 60 V |
| Own consumption | 30 mA |
| Adjustable parameters | – End of charge voltages (float / boost / equal)<br>– Distribution of the charge power between main and auxiliary battery<br>– Type of battery<br>– LVD / LVR load output |
| **Safety** | |
| Alarm output | for all recorded parameters programmable |
| **Operating conditions** | |
| Ambient temperature | -10 °C ...+ 60 ° C |
| Relative humidity | 0 % ... 95 %, non-condensating |
| **Fitting and construction** | |
| Interfaces | 1x RJ45, StecaLink Bus |
| USB charger socket | 5 V / 500 mA ... 800 mA |
| Degree of protection | IP 21 |
| Mounting | surface-mounted / flush-mounted |
| Dimensions (X x Y x Z) | 90 x 180 x 30 mm |
| Weight | approx. 400 g |

Technical data at 25 °C / 77 °F

## Steca RCC-02/03

**Remote control and display (incl. 2m cable), accessories for Steca Xtender XTS, XTM and XTH**

Lots of information on the status of the system can be retrieved using the graphic display of the Steca RCC. Any incidents within the system are also saved and displayed. This means that any problems which might occur are identified early.

Many values of the Steca Xtender can be set using the Steca RCC, such as the charging process of the battery charger, the programming of the multifunctional contacts and the various operating modes.

An SD-card slot can be used to save parameters, for transferring data or updating the software.


**Displays**
- Multifunction graphical LCD display with backlighting

**Operation**
- Programming by buttons

**Certificates**
- Compliant with European Standards (CE)
- RoHS compliant

| | RCC-02 | RCC-03 |
|---|---|---|
| **Fitting and construction** | | |
| Degree of protection | IP 20 | |
| Mounting | Surface-mounted | Flush-mounted |
| Dimensions (X x Y x Z) | 170 x 170 x 46 mm | 120 x 130 x 43 mm |
| Weight | 400 g | 268 g |

Technical data at 25 °C / 77 °F

## Steca PA RC100

**Programming unit**

The programming unit Steca PA RC100 allows to program Steca solar charge controllers. The values can be adjusted with the help of switches. After a restart of the charge controller the new settings can be activated by pressing the program-button on the Steca PA RC100. An LED will transfer the values to the controller.

**Product features**
- Low weight
- Simple installation
- Maintenance-free
- Low own consumption
- Best reliability


| | PA RC100 |
|---|---|
| **Characterisation of the operating performance** | |
| Supply voltage | 3 V (2 x 1.5 V AAA / R03 batteries) |
| Adjustable parameters | – Type of battery: gel / liquid<br>– Night light function<br>– End of charge voltages (float / boost / equal)<br>– Deep discharge protection (LVD)<br>– LVD factor<br>– Switch-on threshold |
| Suitable for the following Steca charge controllers | – Steca Solsum F<br>– Steca Solarix PRS<br>– Steca Solarix MPPT 1010/2010<br>– Steca Solsum 2525/4040 |
| **Fitting and construction** | |
| Dimensions (X x Y x Z) | 115 x 57 x 20 mm |
| Weight | 90 g |

Technical data at 25 °C / 77 °F



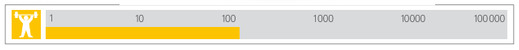
## Steca PA EV200 DC

**DC relay**

The Steca PA EV200 relay increases the switching capacity of the Steca PA 15 remote control from 15 A to 200 A (up to 10 kW). The relay is connected to the Steca PA 15 remote control at the load output and, for example, interrupts the battery voltage to a back-up generator when the end-of-charge voltage is reached. The relay is hermetically sealed and operates safely in difficult environmental conditions such as dust, salt and moisture.

**Product features**
- Low own consumption
- Ready for connection to the Steca PA 15 remote control

0 A...200 A




| | Type A | Type B |
|---|---|---|
| **Characterisation of the operating performance** | | |
| System voltage | 12 V (24 V) | 36 V (48 V) |
| Coil voltage | 9 V ... 36 V | 32 V ... 95 V |
| Rated current | 200 A | |
| Life span | 1 million switching cycles | |
| Contact resistance | 0.1 mΩ … 0.3 mΩ | |
| **Operating conditions** | | |
| Ambient temperature | -40 °C … +85 °C | |
| **Fitting and construction** | | |
| Dimensions (X x Y x Z) | 63 x 80 x 72 mm | |
| Weight | 430 g | |

Technical data at 25 °C / 77 °F

## Steca PA IRS 1008/180

**Motion detector**

The Steca PA IRS 1008/180 motion detector is connected to the load output of the night light charge controller. This supplies power to the light, which is then turned on for a few minutes when some movement is detected.

The Steca PA IRS 1008/180 stands out, above all, with its extremely low own consumption, and is therefore optimal for use in solar power systems.

0 A...5 A


| | PA IRS 1008/180 | PA IRS 1008/180-24 |
|---|---|---|
| **Characterisation of the operating performance** | | |
| Own consumption | 6 mA | 2 mA |
| Turn on time | 1 min. ... 5 min. | |
| **DC output side** | | |
| Battery voltage | 12 V | 24 V |
| Load current* | 5 A | |
| **Fitting and construction** | | |
| Reach / detection area | 7 m / 180° | |
| Degree of protection | IP 65 | |

Technical data at 25 °C / 77 °F
* Inverters must not be connected to the load output.

## Steca PA Tarcom

**Data logger, accessories for Steca Power Tarom**

The Steca PA Tarcom data logger is connected to the RJ45 interface of the Steca Power Tarom charge controller, or via the Steca PA HS200.

The data logger is available in several different versions: as a simple RS-232 interface to directly save and read data on the PC or Laptop (Steca PA Tarcom 01), as a data logger with an integrated analogue modem (Steca PA Tarcom RMT), as a data logger with an integrated GSM modem for remote monitoring (Steca PA Tarcom GSM) and as a data logger with an Ethernet interface for connection to a PC network (Steca PA Tarcom Ethernet). The Steca PA Tarcom is delivered with its accompanying software.

Quality made in Germany

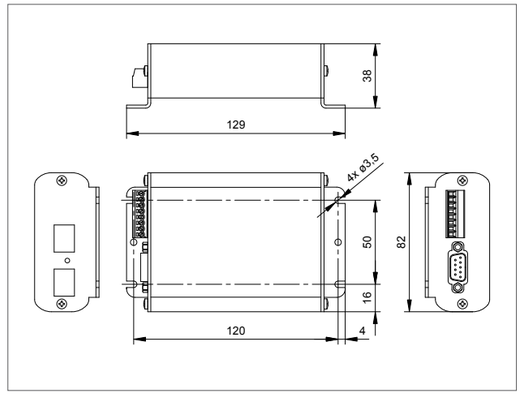
**Product features**
- 4 years maximum storage capacity (1 Mbit)
- Adjustable logging intervals
- Stores 8 data sets at programmed intervals
- Freely programmable alarm states

**Displays**
- LED shows operating states

**Interfaces**
- RJ45 communication interface to Steca Power Tarom
- Open Steca RS-232 interface
- Analogue sensor input e.g. for radiation or wind speed
- Alarm contact

**Tarcom software**
- Data transfer by modem or by text message
- Downloads data from the logger to a PC
- List of data sets can be exported to MS-EXCEL
- Graphic visualisation of data sets (values/time)
- Analyzes energy flows (Ah) within a PV hybrid system
- Activation and selection of alarm types
- Setting the interval for calls and for sending text messages
- Configures the telephone number and text message recipient
- Tells the data logger at what time it has to call
- Alarms can be set by text message

**Certificates**
- Compliant with European Standards (CE)
- Made in Germany
- Developed in Germany

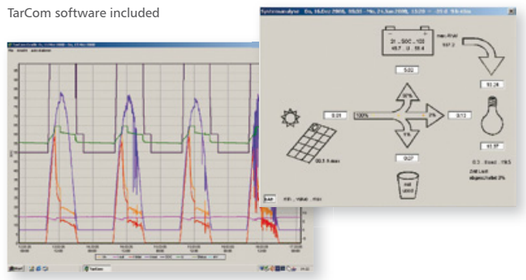



| | 01 | RMT | GSM | Ethernet |
|---|---|---|---|---|
| **Characterisation of the operating performance** | | | | |
| System voltage | 12 V / 24 V / 48 V | | | |
| Logger capacity | 1 Mbit = 2 min. (11 days) → 4 h (4 years) | | | |
| Own consumption | < 10 mA | | | 30 mA |
| Recorded values | relative time, total charge current, battery current, solar module current, load current, SOC, battery voltage, system voltage, analog sensor | | | |
| System status information | night, overload, load disconnect, overvoltage, low voltage, over temperature, no module | | | |
| **DC output side** | | | | |
| Battery voltage | 8 V ... 65 V | | | |
| **Safety** | | | | |
| Alarm output | for all recorded parameters programmable | | | |
| **Fitting and construction** | | | | |
| Interfaces | RS-232 | analog modem | gsm modem | ethernet |
| Configurable analog auxiliary input | 0 mV ... 150 mV | | | |
| Dimensions (X x Y x Z) | 129 x 82 x 38 mm | | | |
| Weight | 150 g | | | |

Technical data at 25 °C / 77 °F

**Example of application**
**Steca PA Tarcom GSM**


TarCom software included





## Steca PA HS200/400

**Current sensor, accessories for Steca Tarom MPPT 6000-M and Steca Power Tarom**

The Steca PA HS200/400 is a highly intelligent current sensor with extremely low own consumption.

The Steca PA HS200/400 comes into play when (e.g.) an inverter is directly connected to the battery and the charge controller cannot measure the current consumption. A shunt is also required when an additional generator (e.g. PV, wind or diesel) directly charges the battery. The current is measured contact-free via a Hall-effect sensor. The data is transmitted to the charge controller over a cable connection. All types of current flows can be detected: charge current, load current and battery and DC-side inverter current flows.


Quality made in Germany

**Product features**
- Robust metal casing
- Automatic detection of voltage
- Wide current measuring range
- Potential free current measurement
- Communicates and transfers current flows to the charge controller
- Integrated Hall sensor

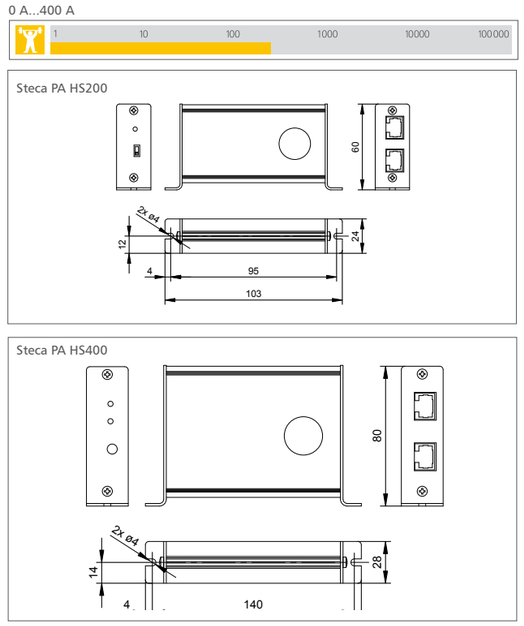
PA HS400 only:
- Convenient configuration via charge controller
- Connection of up to 8 sensors possible
- Enhanced measuring precision due to multiple winding possible
- Zero calibration possible via charge controller

**Displays**
- 1 or 2 LEDs indicate operating states
- Display via charge controller screen

**Interfaces**
- Two RJ45 cable sockets
- StecaLink Bus (only Steca PA HS400)

**Modes of operation**
- »Battery«: measures all battery current flows
- »Load«: measures currents of external loads not connected to the charge controller
- »Charge«: measures currents of generators
- »Charge/discharge procedure«: measures incoming and outgoing currents, e.g. for inverters with battery charger

**Certificates**
- Compliant with European Standards (CE)
- Made in Germany
- Developed in Germany




| Solar charge controller | Type |
|---|---|
| Steca Power Tarom | Steca PA HS200 |
| Steca Tarom 4545/4545-48 | Steca PA HS400 |
| Steca Tarom MPPT 6000-M | Steca PA HS400 |

| | PA HS200 | PA HS400 |
|---|---|---|
| **Characterisation of the operating performance** | | |
| System voltage | 10 V ... 65 V | 12 V ... 65 V |
| Own consumption | < 9 mA | ≤ 9 mA |
| Measurement accuracy | (-20 A ... +20 A) +/-1 % (-200 A ... +200 A) +/-3 % | (-40 A ... +40 A) +/-1 % (-400 A ... +400 A) +/-3 % |
| Measuring interval | 60 s | 1 s |
| **Operating conditions** | | |
| Ambient temperature | -15 °C ... +50 °C | -25 °C ... +50 °C |
| Relative humidity | 75 % | |
| **Fitting and construction** | | |
| Interfaces | Power Tarom | StecaLink Bus (Tarom 4545/4545-48, Tarom MPPT 6000-M) |
| Current range "battery" mode | -200 A... +200 A | -400 A... +400 A |
| Current range "charge" mode | 0 A ... +200 A | 0 A ... +400 A |
| Current range "load" mode | -200 A ... 0 A | -400 A ... 0 A |
| Degree of protection | IP 22 | |
| Dimensions (X x Y x Z) | 103 x 60 x 24 mm | 140 x 80 x 28 mm |
| Weight | 120 g | 250 g |
| Max. diameter for battery cable | 19 mm | 20 mm |

Technical data at 25 °C / 77 °F

## Steca PA Link1

**Parallel switch box, accessories for Steca Solarix PI**

Up to four Steca Solarix PI can be operated in parallel. The connections are made via an external box, the Steca PA Link1.

A further innovation that has gone into the Steca Solarix PI is the communication with the solar charge controllers Steca Tarom 4545/4545-48 and Tarom MPPT 6000-M. A data connection to the charge controller can be created via the Steca PA Link1 (Software update required).

The following components are compatible:

| Sine wave inverter | Parallel switch box | Solar charge controller |
|---|---|---|
| Steca Solarix PI (New generation) | Steca PA Link1 | Steca Tarom 4545/4545-48 and Tarom MPPT 6000-M |
| Steca Solarix PI (Predecessor generation) | Steca PAx4 | Steca Tarom 235/245/440 and Power Tarom |


| | PA Link1 |
|---|---|
| **Operating conditions** | |
| Ambient temperature | -20 °C … +45 °C |
| Relative humidity | 0 % … 95 % |
| **Fitting and construction** | |
| Cable | 1 x data cable master<br>3 x data cable slave<br>1 x data cable solar charge controller |
| Interfaces | 6 x RJ45<br>(4 x inverter, 2 x StecaLink Bus) |
| Dimensions (X x Y x Z) | 200 x 110 x 54 mm |

Technical data at 25 °C / 77 °F

## Steca PA 15

**Remote control, accessories for Steca Power Tarom**

The Steca Power Tarom charge controllers send out signals (125 kHz on 300 Baud) which are modulated on the DC cable and received by the Steca PA 15 remote control.

These signals contain information on the batteries' state of charge (SOC). The Steca PA 15 features five different operating modes (see below) which can be set using five different jumper positions. The maximum switching capacity of 15 A can be increased with a Steca PA EV200 DC relay to up to 200 A if desired.

**Product features**
- Receives information on SOC and time (day/night)
- Load control via priority assignment
- Adjustable SOC thresholds
- Connects a maximum of 9 solar arrays in parallel
- Current surge switch function

**Electronic protection functions**
- Switches off load if there is no signal
- Reverse polarity protection by internal fuse
- Overtemperature and overload protection

**Operation**
- Configuration by jumpers

**Modes of operation**
- Management of parallel solar generators
- When the battery is full, excess energy is redirected to additional loads such as pumps, water heaters
- Automatic start / stop of diesel or wind back-up generators
- Night light function
- Acoustic alarm at deep discharge or overheating

**Certificates**
- Compliant with European Standards (CE)
- Made in Germany
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001


| | PA 15 |
|---|---|
| **Characterisation of the operating performance** | |
| Power supply | 10.5 V … 60 V DC, 5 mA |
| Data transmission | 300 Baud |
| Transmission frequency | 125 kHz signal frequency,<br>450 kHz intermediate frequency |
| **DC output side** | |
| Load current* | 15 A; 10 A at 40 °C; 100 A pulse < 10 µs |
| **Safety** | |
| Overload protection | by 15 A fuse |
| Wrong polarity protection | fuse |
| **Operating conditions** | |
| Ambient temperature | -10 °C … +50 °C |
| **Fitting and construction** | |
| Terminal (fine / single wire) | 2.5 mm² / 4 mm² - AWG 14 / 12 |
| Degree of protection | IP 22 |
| Dimensions (X x Y x Z) | 98 x 87 x 34 mm |
| Weight | 110 g |

Technical data at 25 °C / 77 °F
* Inverters must not be connected to the load output.



## Steca PA CAB1 Tarcom, Steca PA CAB2 Tarcom and Steca PA CAB3 Tarcom

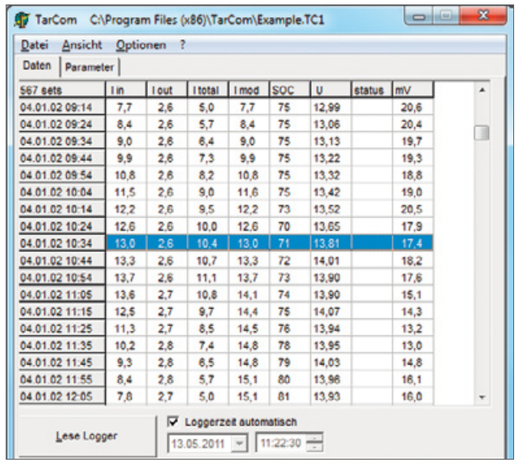
**Data cable**

Steca data cables are used to connect the Steca Tarom 4545/4545-48, Steca Tarom MPPT 6000-M and Steca Power Tarom solar charge controllers to a PC via a USB port. This allows direct monitoring of a system without using a data logger. This feature is especially suitable for short-term system monitoring and on-site testing. The most important system information is transferred to the PC in real time and can be conveniently analysed and graphically visualised using the Steca TarCom software. To use this convenient data transfer system a driver and the Steca TarCom software must first be installed on the PC (Download available at www.stecasolar.com). „Tarom RJ45 in" can be selected under options/settings/extra in the Steca TarCom software menu system. The software then directly accesses the data from the Steca Power Tarom solar charge controller and displays this on the PC.

**Product features**
- Connection cable 1.8 m
- FTDI chip as USB-RS-232 converter

**Interfaces**
- Connection to Steca Tarom 4545/4545-48 and Tarom MPPT 6000-M via connector block
- Connection to Steca Power Tarom via RJ45 plug
- Connection to PC via USB

**Installation software (Windows)**
- Steca TarCom PC-Software (only Steca Power Tarom and Steca Tarom 4545/4545-48)
- Virtual COM port (by FTDI driver)
- Driver for FTDI chip (by FTDI driver)
- Configuration of the Steca Power Tarom and Steca Tarom 4545/4545-48 for data transfer



Software Steca TarCom

| Solar charge controller | Type |
|---|---|
| Steca Tarom MPPT 6000-M | Steca PA CAB3 Tarcom |
| Steca Tarom 4545/4545-48 | Steca PA CAB2 Tarcom |
| Steca Power Tarom | Steca PA CAB1 Tarcom |

## Steca PA TS10, Steca PA TSIP10 and Steca PA TS-S

**External temperature sensors**

The Steca PA TS10, Steca PA TSIP10 and Steca PA TS-S external temperature sensors are used for monitoring the battery temperature. All Steca solar charge controllers have an integrated temperature sensor that makes them capable of adjusting the charging strategy to suit the current temperature conditions. The external temperature sensors are only required when the battery must be installed in a different room to the solar charge controller. The Steca PA TS10 and Steca PA TSIP10 are supplied with a plug for connection to the solar charge controller and ring eyelets for connection to the battery screw. The external temperature sensors are suitable for use with Steca PR 10-30, Steca Solarix, Steca Solarix MPPT, Steca Power Tarom, Steca PR 2020 IP, Steca Tarom 4545/4545-48 and Steca Tarom MPPT 6000-S/6000-M solar charge controllers.

**Product features**
- Passive sensor
- Low weight
- Very long lifetime
- Simple installation
- Maintenance-free
- No own consumption
- Best reliability

**Certificates**
- Compliant with European Standards (CE)
- RoHS compliant


Steca PA TS-S

| | PA TS10 | PA TSIP10 | PA TS-S |
|---|---|---|---|
| **Characterisation of the operating performance** | | | |
| Measurement accuracy | +/-5 % | | |
| **Operating conditions** | | | |
| Ambient temperature | -25 °C … +125 °C | | |
| **Fitting and construction** | | | |
| Battery connection | ring eyelet Ø 10 mm | | pin |
| Charge controller connection | plug | twice a 2-pole luster terminal | 2-pole cable, optional connector |
| Cable | 3.75 m | without cable | 1.8 m |
| Degree of protection | IP 22 | | |
| Weight | 95 g | 30 g | 40 g |

Technical data at 25 °C / 77 °F

| Solar charge controller | Type | Connection |
|---|---|---|
| Steca PR 10-30, Steca Solarix, Steca Solarix MPPT 1010/2010, Steca Power Tarom | Steca PA TS10 | spring connector strip |
| Steca PR 2020 IP | Steca PA TSIP10 | twice a 2-pole luster terminal |
| Steca Tarom 4545, Steca Tarom 4545-48 | Steca PA TS-S | connector block |
| Steca Tarom MPPT 6000-S, Steca Tarom MPPT 6000-M | Steca PA TS-S | 2-pole connector |

# »POWER FROM THE SUN FOR RURAL ELECTRIFICATION - ALL OVER THE WORLD.«

Today, modern and professional electricity supplies are necessary in every part of the world. For these supplies, the focus is on high industrial demands, flexibility, environmental sustainability and reliability. Steca system technology for hybrid and telecommunication systems unites these aspects, thereby creating a basis for the forthcoming multimedia and communication age.

# SYSTEM OVERVIEW | PV OFF GRID

South Africa

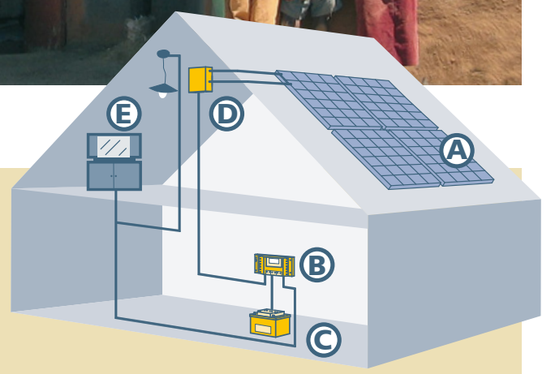
# SOLAR HOME SYSTEMS

**with Steca solar charge controllers**

A solar home system consists of a Steca solar charge controller, one or more solar modules, a battery and the connected loads.

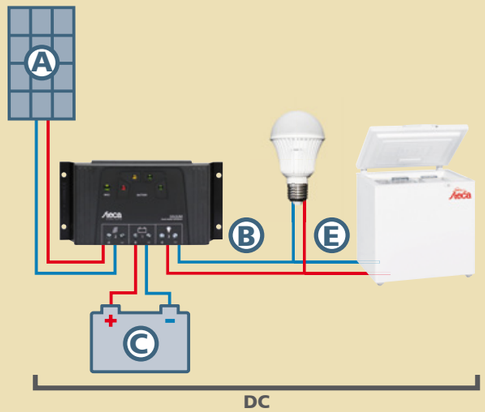
The Steca solar charge controllers control the energy flow of the entire system. They make sure that the solar module charges the battery quickly and effectively, but they also protect the battery against overcharging. If the loads discharge the battery, the solar charge controller, thanks to its precision in calculating the state of charge, switches off the load at exactly the right moment, thus protecting the battery from the dangers of deep discharge.

Furthermore, Steca solar charge controllers are equipped with an intelligent battery monitoring system. The most effective charging method is selected according to the requirements of the batteries. The solar charge controller is the central controlling component in solar home systems, for it affects all the functions of the system. For this reason, it is important to choose a reliable and high-performance solar charge controller.




**Key:**

A Solar modules
B Solar charge controller
C Battery
D Generator junction box
E Electrical load






## Overview of devices:

**Steca Solsum F**
Solar charge controller
6 - 10 A; 12 / 24 V

**Steca Solarix PRS**
Solar charge controller
10 - 30 A; 12 / 24 V

**Steca Solsum ESL**
Energy-saving lights
7 W, 11 W ; 12 V

**Steca LED**
LEDs
4 W, 6 W, 8 W, 12 W
12 / 24 V

**Steca Solsum**
Solar charge controller
25 - 40 A; 12 / 24 V

**Steca Solarix MPPT**
Maximum Power Point Tracker
10 - 20 A; 12 / 24 V

**Steca PF 166**
Solar refrigerator/freezer
166 l; 12 / 24 V

**Steca PF 240**
Solar refrigerator/freezer
240 l; 12 / 24 V

**Steca PR**
Solar charge controller
10 - 30 A; 12 / 24 V

**Steca Solarix 2020-x2**
Solar charge controller
20 A; 12 / 24 V

**Steca Solarix**
Solar charge controller
25 - 40 A; 12 / 24 V

**Steca PR 2020 IP**
Solar charge controller
20 A; 12 / 24 V

The solar charge controller is connected directly to the battery using a cable as short as possible, and fixed to the wall near to the battery, so that it can be effectively cooled by the passing air flow.

In principle, the battery is always connected to the solar charge controller first. Then the solar module array is connected to the solar module input of the solar charge controller. Only direct current loads are used in solar home systems. They are connected directly to the load output of the solar charge controller. This means the Steca solar charge controllers always show the battery's exact state of charge, and thus ensure optimal battery maintenance in all situations. Various Steca energy-saving lights, Steca solar cooling units, DC-to-DC converters and other loads can be used.

Sri Lanka

Australia

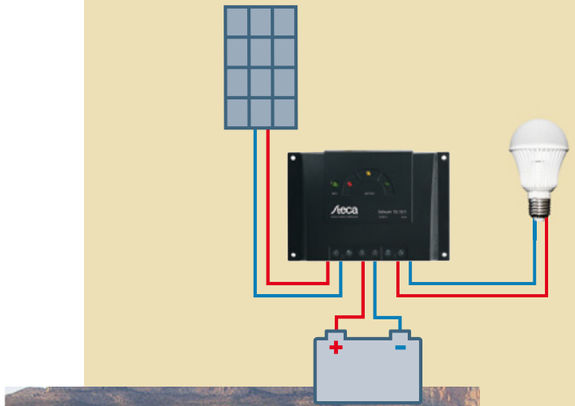
Greece

# NIGHT LIGHT SYSTEMS

**an important special application of solar home systems**

Night light systems match the structure of the solar home systems, but are equipped with any Basic, Classic or Advanced Steca charge controller, which automatically turns on the connected lights for a set time after sunset, and turns them off again the next morning at the latest. These systems are perfectly suited for street lamps and automatic night-time lighting.

Another special model makes these systems to the ideal solution for bus stops and similar applications. Operating in conjunction with a motion detector, the lamp is only turned on at night time when movement is detected in a specified area. After a few minutes, the light is then automatically turned off again. This function can be implemented with any Steca night light charge controller by connecting it to an external motion detector.



Spain



## Overview of devices:

**Steca Solsum F**
Solar charge controller
6 - 10 A; 12 / 24 V

**Steca Solarix PRS**
Solar charge controller
10 - 30 A; 12 / 24 V

**Steca Solsum**
Solar charge controller
25 - 40 A; 12 / 24 V

**Steca Solarix MPPT**
Maximum Power Point Tracker
10 - 20 A; 12 / 24 V

**Steca Tarom MPPT 6000-M**
Maximum Power Point Tracker
60 A; 12 / 24 / 48 V

**Steca PR**
Solar charge controller
10 - 30 A; 12 / 24 V

**Steca Solarix**
Solar charge controller
25 - 40 A; 12 / 24 V

**Steca PR 2020 IP**
Solar charge controller
20 A; 12 / 24 V

**Steca Tarom**
Solar charge controller
45 A; 12 / 24 / 48 V

**Steca Power Tarom**
Solar charge controller
55 - 140 A; 12 / 24 / 48 V

**Steca PA EV200 DC**
DC relay
200 A; 12 / 24 / 48 V

**Steca PA IRS 1008/180**
Motion detector

**Steca Solsum ESL**
Energy-saving lights
7 W, 11 W; 12 V

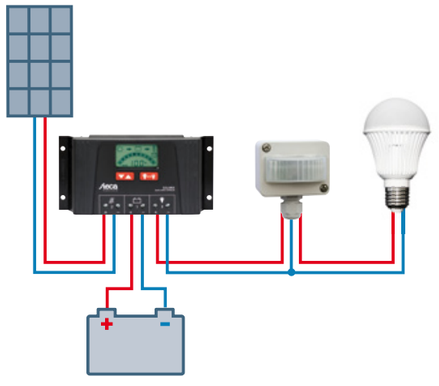
**Steca LED**
LEDs
4 W, 6 W, 8 W, 12 W
12 / 24 V

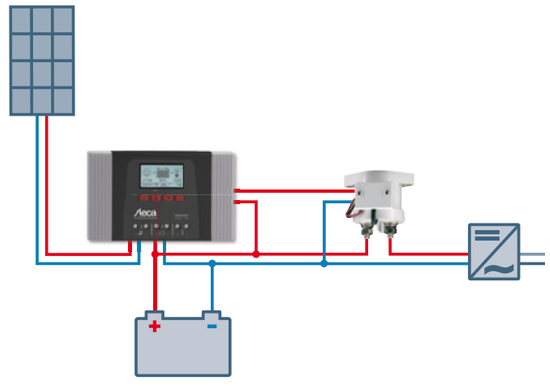
**Steca PA 15**
Remote control
10.5 - 60 V

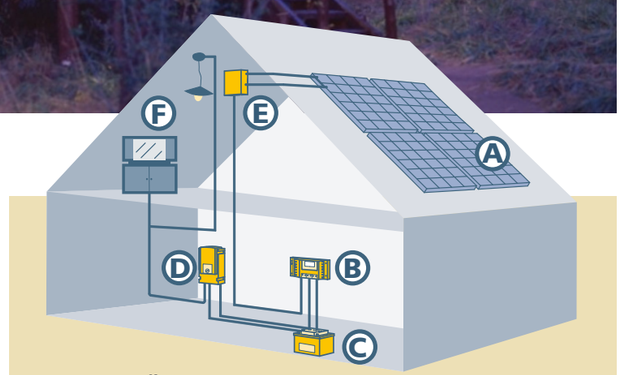
| Duration of night light function "Light on": | All night | After sunset | Before sunrise | Turn-on time delay | Maximum light current |
|---|---|---|---|---|---|
| **Solar charge controller:** | | | | | |
| Steca Solsum F | ■* | 0 - 8 h* | – | – | 10 A |
| Steca Solarix PRS | ■* | 0 - 8 h* | – | – | 30 A |
| Steca Solsum | ■* | 0 - 8 h* | – | – | 40 A |
| Steca Solarix MPPT | ■* | 0 - 8 h* | – | – | 20 A |
| Steca PR | ■ | 0 - 12 h | 0 - 12 h | – | 30 A |
| Steca Solarix | ■ | 0 - 12 h | 0 - 12 h | – | 40 A |
| Steca PR 2020 IP | ■ | 0 - 12 h | 0 - 12 h | – | 30 A |
| Steca Solarix 2020-x2 (only with PA LCD1) | ■ | 0 - 12 h | 0 - 12 h | 0 - 12 h | 20 A |
| Steca Tarom 4545, Steca Tarom 4545-48 | ■ | 0 - 12 h | 0 - 12 h | 0 - 12 h | 45 A |
| Steca Tarom MPPT 6000-M (only with PA EV200 DC relay) | ■ | 0 - 12 h | 0 - 12 h | 0 - 12 h | 100 mA (only via multi-functional contact) |
| Steca Power Tarom Steca PA 15 / Steca PA 15 with PA EV200 DC relay | ■ | 0 - 12 h | – | 0 - 3 h | 15 A 200 A |

* only for projects with larger order quantities.

The type of night light function selected must be specified in the order.








# INVERTER SYSTEMS

**for both AC and DC**

Inverter systems are designed as solar home systems. The central Steca solar charge controller ensures the battery is charged correctly and protects it against overcharging. In addition, a stand-alone inverter is connected directly to the battery in these systems so that AC appliances can be operated.

If DC appliances are also used, they can be connected directly to the charge controller.

An AC system can be created with a system voltage or battery voltage of 12 V, and also with 24 V or 48 V for greater capacities.

The simple system concept makes installation quick and easy.

**Key:**

A Solar modules
B Solar charge controller
C Battery
D Sine wave inverter
E Generator junction box
F Electrical load
(12 V ... 48 V DC, 115 V ... 230 V AC)



## Overview of devices:

**Steca Solarix PRS**
Solar charge controller
10 - 30 A; 12 / 24 V

**Steca Solsum**
Solar charge controller
25 - 40 A; 12 / 24 V

**Steca Tarom**
Solar charge controller
45 A; 12 / 24 / 48 V

**Steca AJ**
Sine wave inverter
500 - 2,400 W; 12 / 24 / 48 V

**Steca Solarix MPPT**
Maximum Power Point Tracker
10 - 20 A; 12 / 24 V

**Steca PR**
Solar charge controller
10 - 30 A; 12 / 24 V

**Steca Solarix**
Solar charge controller
25 - 40 A; 12 / 24 V

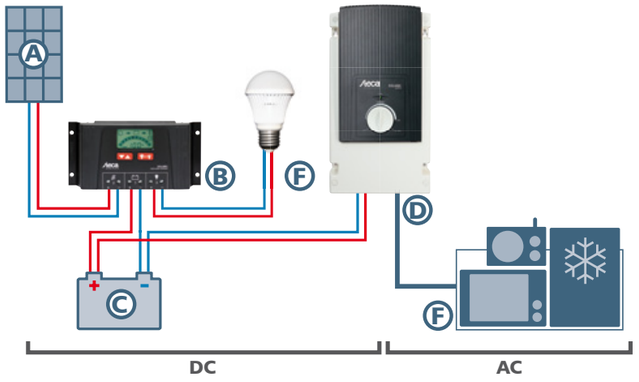
**Steca Tarom MPPT 6000-S**
**Steca Tarom MPPT 6000-M**
Maximum Power Point Tracker
60 A; 12 / 24 / 48 V

**Steca PLI**
Sine wave inverter
300 W; 12 V

**Steca Solarix PI**
Sine wave inverter
500 - 5,500 W; 12 / 24 / 48 V

DC AC

Bangladesh




Greece

# HYBRID SYSTEMS

**The main feature of a hybrid system is the use of two or more different electricity sources.**

Alongside solar energy, photovoltaic hybrid systems generally employ a diesel generator, a wind turbine or the public grid as a further electricity source. The inverters used in hybrid systems, which have integrated battery chargers, supply the connected AC loads according to demand from the battery bank of solar energy or the second electricity source. These devices also allow the batteries to be recharged from the extra energy source.

Photovoltaic hybrid systems offer the advantage that the solar generator does not have to be significantly oversized for periods of low sunlight. This avoids substantial costs. When selecting its energy source, the system always gives priority to the energy provided by the module. In combination with a controllable second source, the energy supply remains reliable and available 24 hours a day, all year round.

**Important features for single-phase and three-phase hybrid systems**

- Combination of different power sources such as PV, wind, diesel generators
- 400 V AC three-phase and 230 V AC single-phase available 24 hours a day
- 12 V / 24 V or 48 V overall DC bus
- Automatic energy management based on the state of charge calculation of the battery, including automatic start of controllable power sources like e.g. diesel generators
- Optimised battery charging algorithm
- Data logger function with automatic alarm and remote monitoring (GSM)
- Optimised system efficiency through DC and AC bus



## Overview of devices:

**Steca Tarom**
Solar charge controller
45 A; 12 / 24 / 48 V

**Steca Tarom MPPT 6000-S**
**Steca Tarom MPPT 6000-M**
Maximum Power Point Tracker
60 A; 12 / 24 / 48 V

**Steca Xtender XTS**
Hybrid inverter
900 W - 12,600 W

**Steca Xtender XTM**
Hybrid inverter
1,500 W - 36,000 W

**Steca Xtender XTH**
Hybrid inverter
3,000 W - 72,000 W

**AC**

**Steca Power Tarom**
Solar charge controller
55 - 140 A; 12 / 24 / 48 V

**Steca PA 15**
Remote control
10.5 - 60 V

**Steca PA HS200/400**
Current sensor
10 - 65 V

**Steca PA Tarcom**
Data logger
12 / 24 / 48 V

**Steca RCC-02/03**
Remote control and display

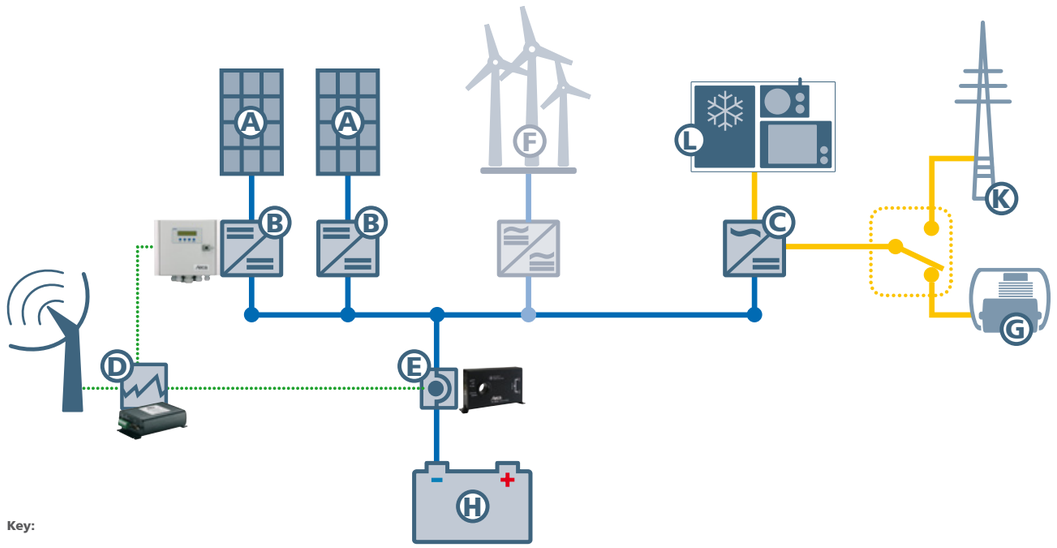
**DC**

South Africa

United Kingdom



Morocco




**Key:**

A Solar modules
B Solar charge controller Steca Power Tarom
C Hybrid inverter
Steca Xtender (XTS, XTM, XTH)
D Data logger Steca PA Tarcom
E Current sensor (shunt) Steca PA HS200
F Wind turbines with inverter
G Diesel generator
H Battery
K Public grid
L Electrical load (230 V AC)

# SINGLE-PHASE DC HYBRID SYSTEMS

The central, intelligent element within the system is the Steca Power Tarom solar charge controller (B): it controls the energy flow and protects the battery against critical states. Steca Power Tarom is directly connected to the battery, just as the DC bus is. Using a shunt, the Steca PA HS200 (E), which is situated on the minus cable attached to the battery, the battery current is measured and this information is passed on to the Steca Power Tarom (B). Further components, such as an inverter or the Steca PA 15 remote control, are directly connected to the DC bus. In order to automatically start a diesel generator (G) if the battery's state of charge (SOC) falls below an adjustable threshold, the output of the Steca PA 15 is connected to a relay. The normally open contact of the relay switches the diesel generator on, and subsequently switches it off again.

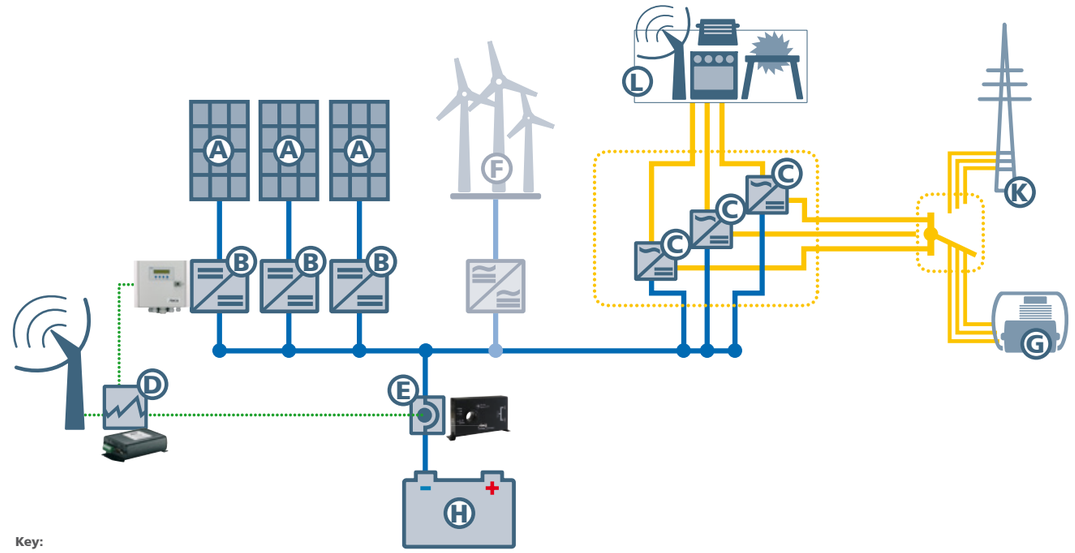
The Steca Power Tarom controls the DC hybrid system. The Steca PA HS200 current sensor (E) transfers all infor mation on the charge and discharge currents at the DC bus to the Steca Power Tarom. With the aid of this data, the controller is able to calculate the current state of charge of the battery. This information is transferred via the DC cabling (powerline modulation) to all connected Steca PA 15. Every Steca PA 15 can be independently configured to a certain switch-on and switch-off threshold of the state of charge.

If, in the above example, the inverter is discharging the battery, then this information is transferred to the Steca Power Tarom, which calculates the state of charge. As soon as the state of charge falls below the appointed threshold value of the connected Steca PA 15 (e.g. 30 %), the controller switches on the diesel generator via a relay. The load is now being supplied from the generator (G), and at the same time the battery is being recharged. After the state of charge has reached the Steca PA 15's appointed upper value (e.g. 90 %), the diesel generator is switched off again.

In order to create an automatic energy management system, the AC output of the diesel generator is connected to the AC input of the inverter (with integrated battery charger). The load is always connected to the output of the inverter. If the diesel generator is running, and this current flows to the inverter, then the inverter automatically switches to transfer mode. The loads are supplied from the diesel generator whilst the battery recharges via the inverter. If the AC output voltage of the diesel generator falls under a certain voltage level, which can be adjusted on the inverter, then battery operation is automatically switched back on.

This system allows for automatic energy management which gets optimum use from the available solar energy, maintains the batteries reliably, and ensures electricity supply around the clock.






**Key:**

A Solar modules
B Solar charge controller Steca Power Tarom
C 3 Hybrid inverters
Steca Xtender (XTS, XTM, XTH)
D Data logger Steca PA Tarcom
E Current sensor (shunt) Steca PA HS200
F Wind turbines with inverter
G Diesel generator
H Battery
K Public grid
L Electrical load (400 V AC)

# THREE-PHASE DC HYBRID SYSTEMS

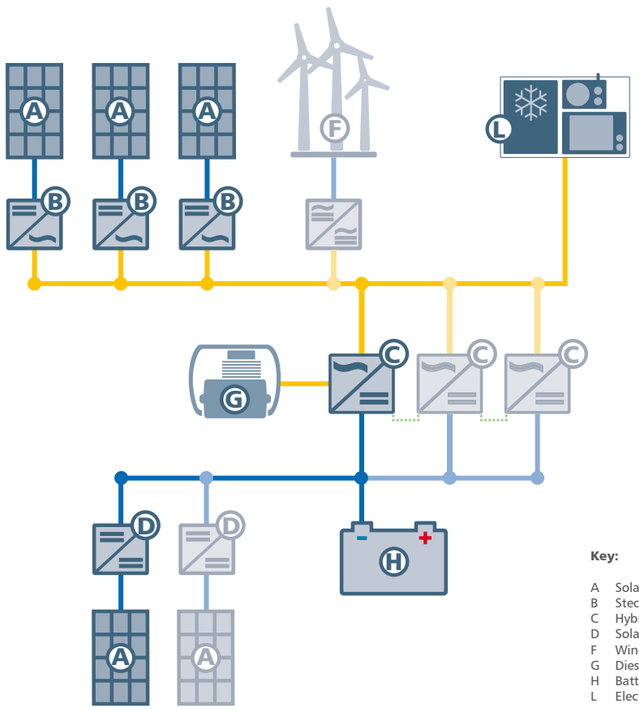
The control concept is similar to that of the single-phase system. If more than one Steca Power Tarom is employed, one of the devices must be designated as the master Tarom. All other charge controllers are then automatically designated as slave Taroms. The master Power Tarom is directly connected to the battery and all slaves are connected to the DC bus. Only the master Power Tarom shows the correct state of charge on its display and controls the energy flow around the system. Slave Power Taroms perform the function of controlling the charging from the connected PV modules.

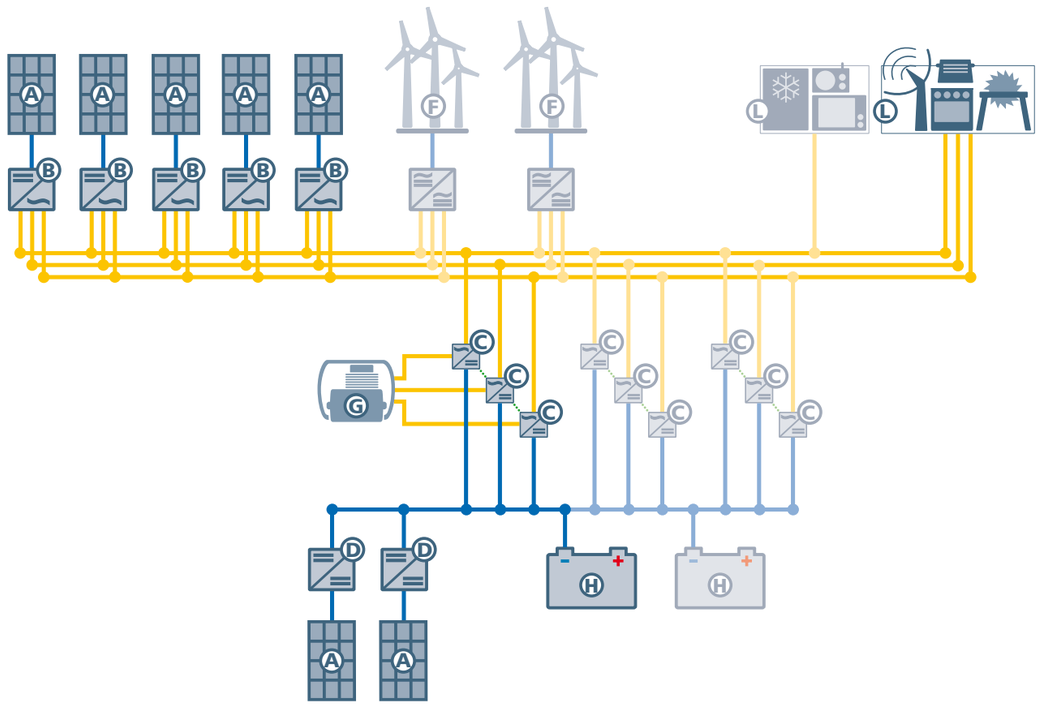
In order to assemble a three-phase energy supply, three inverters are connected to the DC bus. Various three-phase generators can be connected to the three inverters for controlled recharging of the battery via a Steca PA 15 and a relay. These may be wind, water, or diesel generators or the public grid. Suitable inverters with integrated battery chargers in three-phase mode are the Steca Xtender devices (XTS, XTM, XTH). In total, a maximum of 72 kW can be supplied.



Australia

Both single-phase and three-phase hybrid system concepts are based on the same principles of energy management. With the help of the Steca PA HS200 current sensor, the charge and discharge currents of the components, such as slave Power Taroms, inverters etc., are determined and communicated to the master Power Tarom. Based on the calculated state of charge of the battery, the Steca PA 15 switches the extra generator on or off. The three single-phase inverters switch off if the voltage falls below a given threshold in order to protect the battery from deep discharge.





**Key:**

A Solar modules
B StecaGrid inverter (single-phase or three-phase)
C Hybrid inverter Steca Xtender (XTS, XTM, XTH)
D Solar charge controller Steca Power Tarom
F Wind turbines with inverter
G Diesel generator
H Battery
L Electrical load (230 V AC or 400 V AC)

| Steca Xtender allowed in AC-coupled systems |
|---|
| Steca XTM 3500-24 |
| Steca XTM 4000-48 |
| Steca XTH 5000-24 |
| Steca XTH 6000-48 |
| Steca XTH 8000-48 |

Observe minimum battery capacity

# SINGLE-PHASE AND THREE-PHASE AC HYBRID SYSTEMS

With very large load requirements, AC-coupled hybrid systems can provide a sensible alternative to the very effective and cheap to implement DC hybrid systems. This topology is beneficial if the largest part of the loading is required on the AC side (L) during the day. Steca AC hybrid systems can be implemented using the Steca grid and sine wave inverters (B and C).

Various generators (A and F) are coupled to the AC bus. In addition, bi-directional sine wave inverters (C) are deployed, which are used for charging the batteries and can also be used for supplying the load if the AC generators (A and F) supply insufficient power. In addition, it is also possible to couple solar generators via a Steca solar charge controller (D) directly to the batteries (H) on the DC side.

If not enough energy should be available in the system in order to supply the load, a diesel generator (G) can be started automatically. When the diesel generator is running, it must be ensured that all grid inverters (B) have been disconnected from the grid. This is necessary in order to prevent the inverters (B) from feeding back into the diesel generator and destroying it when the battery is full. As soon as the diesel generator has been switched off, the grid inverters (B) can again be automatically connected to the grid. The loads are then again supplied by the PV generators (A) via the grid inverters (B).

The Steca Xtender battery inverters (C) here create the grid into which the grid inverters (B) feed, and from which the loads (L) are supplied. If the PV generators (A) produce a higher output than the loads (L) take up, the battery inverters (C) charge the batteries (H) with the excess power difference.

## Steca droop mode

When the batteries (H) have reached the cut-off voltage, they can no longer fully take up this power difference. There is then more output available in the system than can be used. The battery inverters (C) then activate the Steca droop mode.

The coolcept grid inverters with the droop mode are specially designed to meet the demands of AC-coupled hybrid systems and interact perfectly with the Steca Xtender battery inverters (C). These increase the frequency of the AC grid in a linear fashion, depending on the excess output of the grid inverters. The more excess output available, the higher the grid frequency. The grid inverters then restrict the feed output to precisely the feed output which fully supplies the loads (L) and maintains the batteries (H) at the cut-off voltage. In this way, they create a balanced output level in the hybrid system. If the level of the load changes, the grid inverters immediately adjust their feed output and continuously offset the output balance so that the batteries (H) can be fully loaded in an optimum manner. As soon as the excess output from the grid inverters decreases, the battery inverter (C) again reduces the grid frequency until the standard grid frequency with a balanced output level has been reached. If not enough output is provided by the grid inverters (B) to supply the loads (L), the necessary difference comes from the battery inverters (C) in the batteries.

South Africa

With very large outputs, this kind of Steca AC hybrid system can also be designed as a three-phase system in order to supply corresponding loads directly. Here the StecaGrid grid inverters (B) provide direct three-phase feeding on the AC side.

The required bi-directional Steca Sinus inverters Steca Xtender (C) can be used in both single-phase and three-phase cases. Up to three devices can be connected in parallel per phase. This means that a total of 24 kW per phase is available, with a maximum of 72 kW in three-phase operation. Diesel generators (G) can be used to produce approx. 100 kW, while grid inverters (B) are used for up to 70 kW. Thus, loads of up to 70 kW can be supplied. The power per phase of the grid inverters must not exceed the rated power of the Steca Xtender(s) in a phase.

## Overview of devices:

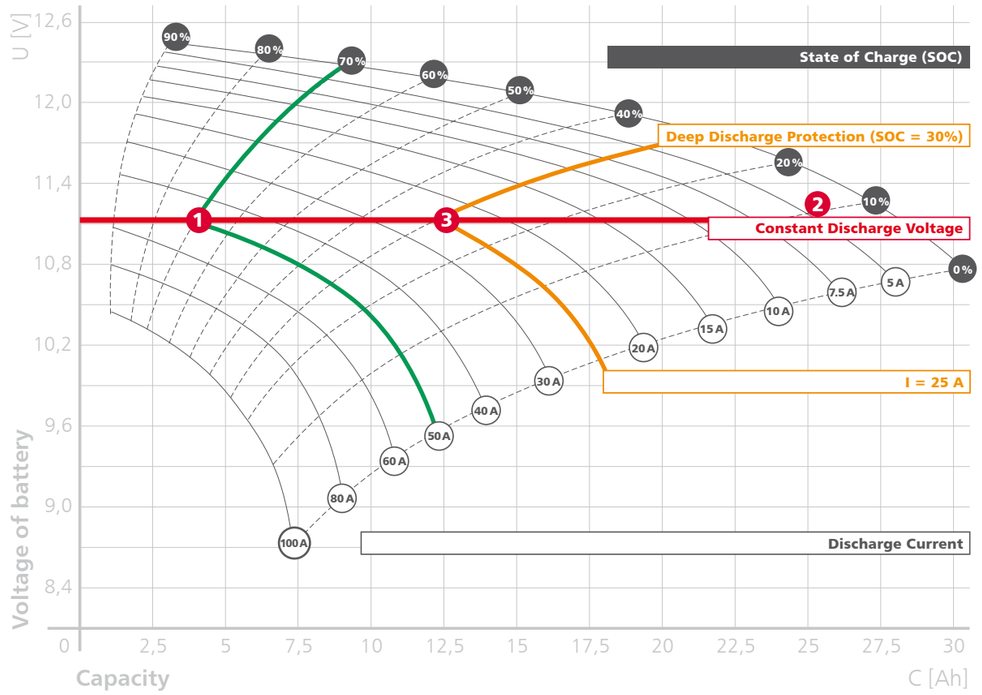
**Steca Tarom MPPT 6000-S**
**Steca Tarom MPPT 6000-M**
**Maximum Power Point Tracker**
60 A; 12 / 24 / 48 V

**Steca Xtender XTH**
**Hybrid inverter**
3,000 W - 72,000 W

### PV Grid Connected:

**coolcept, coolcept-x, coolcept³, coolcept³-x**
**Grid inverter**
1,500 W up to several 10,000 W

**StecaGrid 10000+ 3ph**
**Grid inverter**
10,000 W up to several 1,000,000 W




# STECA'S CHARGING TECHNOLOGY

**The Steca products stand out thanks to an optimal state of charge determination. This is the key to the batteries having a long service life.**

**What does SOC mean?**
SOC means the current ‚state of charge' of the battery. This is given as a percentage. A battery is fully charged when the SOC is at 100%. The lowest value which can be reached is 0%. In theory, all other values in between can be reached, but most types of batteries should not reach state of charge values of less than 30%. Such values can quickly lead to dangerous deep discharges which decrease the service life of the batteries or destroy them directly. A battery's state of charge should not be confused with its remaining available capacity. The actual remaining capacity depends on many parameters such as the temperature, age and history of the battery and many others. It is possible to gain a rough estimate of a battery's current remaining capacity by multiplying the correct state of charge of the battery by its rated capacity. As the age of the battery increases, however, the rated capacity can change significantly, which means that the prediction of the available capacity can be strongly distorted.

**Figure above**
...shows the characteristics of a 12 V lead-acid battery with a rated capacity of 28 Ah. Its voltage changes in relation to the charge and discharge currents and the state of charge. If a fixed discharge cut-off voltage of 11.1 V is now specified, this means that, at a discharge current of 50 A, a full battery is disconnected when its state of charge is still 70% *(point 1)*. This is represented in the diagram by the green line. The majority of the capacity which is still available cannot be used in this case.

If the same battery is discharged with 5 A, however, the system disconnects it at the same fixed voltage of 11.1 V, which in this case means at a state of charge of around 10% *(point 2)*.

This is already a dangerously low state of charge which can result in significant damage to the battery. Only with a discharge current of 25 A would the battery in this case be correctly disconnected at an SOC of 30% *(point 3)*.

Using the Steca state of charge algorithm the charger is able to disconnect the battery at the correct threshold with any discharge current. The cut-off voltage is determined by the point at which the 30% line crosses the discharge current line (Steca SOC deep-discharge protection). Only a method of this kind can ensure that the battery is maintained correctly, and thus has a long service life.



**Why is a state of charge determination so important?**
During charging, the solar charge controller has to know when the battery is fully charged so that it can protect it against overcharging at the right moment and in the correct manner. When discharging the battery it is equally important to know the state of charge in order to protect the battery against harmful deep discharge. In order to carry out this function, there are various criteria which can indicate how full the battery is at a given time. Some of these criteria are better suited than others. The simplest and most common criterion is the voltage of the battery. With this method, a fixed charge cut-off voltage is defined. When this voltage is reached, charging is stopped. A fixed deep discharge threshold is also defined. If the battery voltage falls below this value, the load is switched off. This method is simple, since the voltage of the battery is easy to measure precisely, yet it is not ideal for most types of batteries because their state of charge does not change in direct proportion to the voltage. Low discharge currents are common in solar power systems in particular. This leads to inadequate battery maintenance if fixed voltage values determine the charging or discharging processes.

The full-charge and deep-discharge thresholds provide better solutions, for the battery currents are taken into account alongside the voltage. But this method does not allow the state of charge to be determined accurately either, since many important factors are not considered. Only if the state of charge is calculated precisely is it possible for the solar charge controller to treat the battery correctly, to end a charge cycle using the solar module at the correct time and to switch off a load neither too early nor not too late. For this reason, Steca has developed a high-performance algorithm with which the state of charge can be calculated with a sufficient degree of accuracy and the battery can be optimally protected.

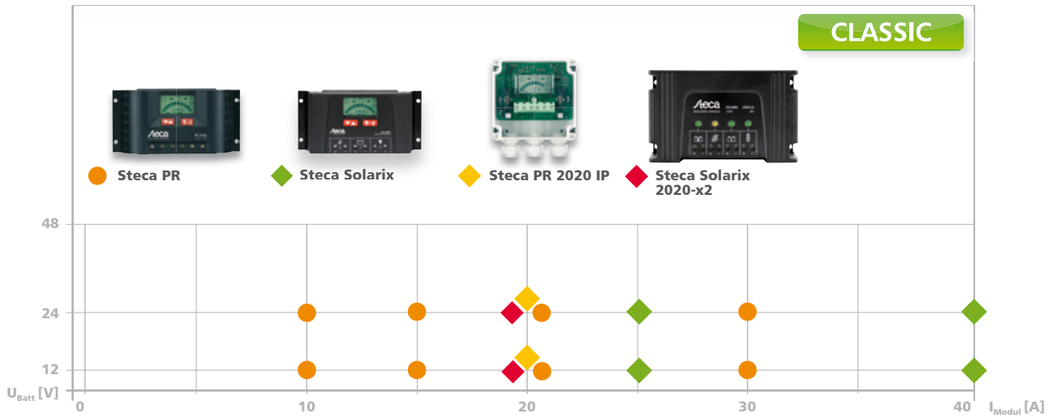
**How does Steca's state of charge determination work?**
Steca's algorithm for determining a battery's state of charge is a combination of various methods which ensure that the SOC is calculated accurately enough and delivers reliable, stable values over a long period of time. Furthermore, attention is paid to making a calculation method which can be carried out simply and at a low cost in various solar charge controllers. Years of experience in the research and development of battery state of charge algorithms has led to an auto-adaptive ‚fuzzy logic' algorithm. This includes the age and usage history of the battery in the calculation as well as the other important parameters. The battery voltage and its currents and the temperature are constantly measured as accurately as possible by the solar charge controller. During a learning phase, the solar charge controller estimates the state of charge on the basis of experience values. At the same time, the controller monitors the behaviour of the battery and adjusts various parameters to the current system. The learning phase lasts for a few cycles. The advantage of this method is that it makes it possible to respond dynamically to the requirements of the system and individually adjust the battery maintenance to the requirements of every individual system. This feature explains the high performance and reliability of the Steca battery state of charge algorithm. At the same time, this algorithm guarantees optimum battery maintenance, which is reflected in the long service life of the battery. In addition, the user benefits from the fact that the battery's current state of charge can be displayed, which means the user constantly has optimal control over the system.


**Which chargers from Steca carry the optimised algorithm?**
The Steca product range is divided into three product lines. The Basic line is optimised for use in simple, less demanding applications and equipped with the minimum necessary features for basic operation. Nevertheless, all necessary battery protection functions are included. The Classic and Advanced lines are designed to cover high-end applications to supply a more complete communication interface to the user and optimised battery maintenance features. All Classic and Advanced controllers (except Steca Solarix 2020-x2 and Steca Tarom MPPT 6000-S) can use the state of charge algorithm. All three product lines include solar charge controllers from a wide power range.

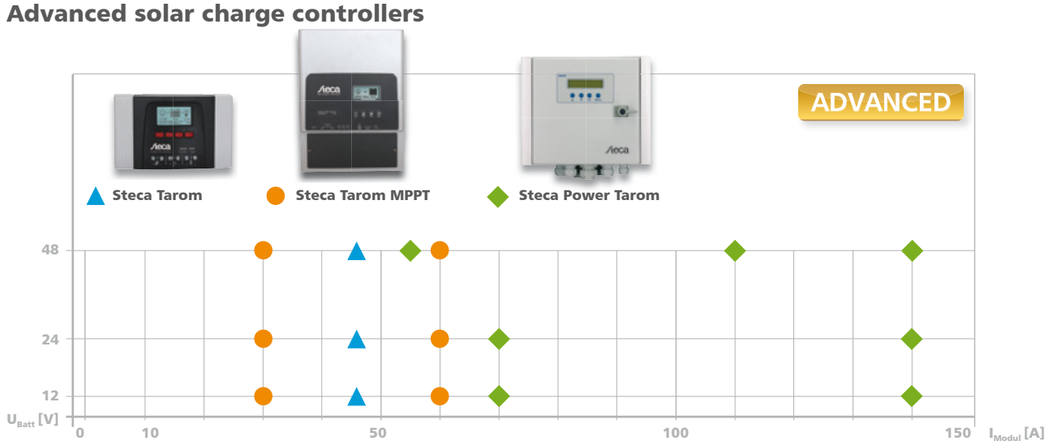
# SELECTING THE SOLAR CHARGE CONTROLLER

## Basic solar charge controllers


## Classic solar charge controllers




## Advanced solar charge controllers






# GENERAL RECOMMENDATIONS

**Selecting the solar controller**

The solar charge controller is the central component in a stand-alone system. It controls the energy flow in the entire system and determines the system function and service life. This means that a suitable solar charge controller must be selected carefully.

The solar charge controller only accounts for between 3 % and 5 % of the total cost of a stand-alone system, and yet it is the most important component. A high-quality, reliable solar charge controller in a higher price class pays for itself very quickly, as it increases the battery life and thus leads to a significant saving in system costs.

### Selecting the topology

Steca solar charge controllers are available as professional hybrid-shunt controllers, serial charge controllers or MPP trackers. A suitable topology should be selected depending on the requirements of the application.

Switch charge controllers such as shunt and serial charge controllers can only be used on 12 V systems in connection with 36-cell solar modules. On 24 V or 48 V systems, two 36-cell solar modules (24 V) or two 72-cell solar modules (48 V) must be wired serially as a string.

Serial charge controllers are well suited to small applications and solar home systems. Shunt controllers are recommended for larger-scale applications and hybrid systems, as these have a lower power loss during charging.

Due to their good electromagnetic compatibility, shunt controllers are also recommended for use in telecommunication applications.

A solar charge controller with MPP tracking must be used when solar modules which are not comprised of 36 or 72 cells are used. These include most optimised solar modules for grid-connected systems and all thin-film modules.

The use of an MPP tracker is also increasingly recommended depending on the coldness of the average annual temperature and importance of efficient charging at low battery charges (even when standard 36-cell modules are used).

### Dimensioning the solar charge controller

The short-circuit current ($I_{sc}$) of the solar module is decisive when dimensioning solar charge controllers (under standard test conditions). Steca recommends always dimensioning the solar charge controller generously. The rated current on the solar charge controller should be approximately 20 % higher than the total short-circuit current on all connected solar modules.

### User interface

If the solar charge controller is used in an application where persons have access to the system, it is important that the controller is equipped with a large LCD screen for displaying the operating statuses using symbols. The solar charge controller should be equipped with an integrated energy meter for notifying the user of the system and its operation.

On pure technical systems (such as night-light systems), a solar charge controller with a simple LED display is sufficient.

### Cables and design

In order to ensure a long service life, it is important to use a robust solar charge controller with short, thick cables for connecting it to the battery. The device should always be screwed to a non-flammable wall directly above the battery. It is important that there is enough free space around the solar charge controller so that it can be cooled sufficiently by the ambient air. The guidelines in the instruction manuals must be adhered to in all cases.

### Additional functions

It makes sense to use solar charge controllers with additional functions in applications with stand-alone inverters or hybrid systems. The possibility of connecting to the stand-alone inverters for communication and synchronisation of the devices is a requirement for effective inverter systems or hybrid systems. Special energy management functions remain of key importance on hybrid systems.

# USE AND CONFIGURATION OF MPP TRACKERS

**When is the use of an MPPT charge controller recommended?**
There are essentially three situations where we recommend selecting an MPPT charge controller (Maximum Power Point Tracker) like the Steca Solarix MPPT or Tarom MPPT rather than a conventional PWM charge controller (Pulse Width Modulation) like the Steca Solsum, PRS, PR, Tarom or Power Tarom.

- Situation 1: 36 or 72-cell crystalline PV modules are not used
  36-cell modules (for 12 V systems) have MPP voltages of around 17 V and open circuit voltages close to 21 V. 72-cell modules for 24 V systems have double this voltage – i.e. roughly 34 $V_{mpp}$ and 42 $V_{oc}$. PV modules which are conventionally used in grid-connected PV systems with e.g. 60 cells (usually around 30 $V_{mpp}$) are not suitable for 12 / 24 / 48 V systems with regular PWM charge controllers. An MPPT charge controller must be used here to attain optimal efficiency values. This controller type can convert higher PV voltages into lower battery voltages – with minimal losses.

- Situation 2: Battery frequently low
  If configuration of the solar energy system is tight or the battery is frequently at low voltage over long periods of time, an MPPT charge controller can provide more energy. In such cases the MPP tracker, in contrast to the switching charge controller, can convert the voltage difference between the battery and the solar module into additional charge current. In this way the energy yield can be increased when battery voltage is low.

- Situation 3: Low average temperatures and severe winters
  The colder the crystalline PV modules become, the higher the optimal working voltage (MPP or Maximum Power Point) will be. Due to their variable PV module voltage, MPPT charge controllers can adapt to this situation and convert the high voltage into a higher charge current.
  If the ground is covered with snow, background radiation of the environment will be significantly higher due to the irradiation being reflected on the snow. The power of the solar modules therefore increases, resulting in a higher battery charge current due to the MPPT charge controller.

For installations which are in operation throughout the year, it is important to maximise the energy yield in the months with the least sunlight. It is precisely here that the Steca MPPT charge controller can provide added value.

| | Max. PV power for a 12 V battery | Max. PV power for a 24 V battery | Max. PV power for a 48 V battery |
|---|---|---|---|
| Steca Solarix MPPT 1010 | 125 W | 250 W | - |
| Steca Solarix MPPT 2010 | 250 W | 500 W | - |
| Steca Tarom MPPT 6000-S | 900 W | 1.800 W | 3.600 W |
| Steca Tarom MPPT 6000-M | 900 W | 1.800 W | 3.600 W |

Overview of Steca MPPT charge controller rated output

**Which criteria need to be observed when configuring MPPT charge controllers?**
In order to select the correct MPPT charge controller, the following data must be known: the input voltage of the PV modules ($U_{oc}$), the maximum power voltage ($U_{mpp}$), the total output of the PV modules (in Wp) and the battery voltage (12 V, 24 V or 48 V) and temperature coefficient ($V_{OC}$).

- PV input voltage ($U_{oc}$)
  The open circuit voltage of the entire module array ($U_{oc}$) that occurs during the lowest possible ambient temperature must never exceed the MPPT charge controller's maximum input voltage. If it does, this will destroy the charge controller.

- Maximum power voltage ($U_{mpp}$)
  The maximum power voltage of the module string ($U_{mpp}$) must never fall below the minimum input voltage of the MPPT charge controller when the maximum ambient temperature occurs. The MPP voltage must be above the maximum battery voltage at all times – regardless of the temperature conditions and consequently at maximum ambient temperature too. For systems with a 12 V battery, this corresponds to an MPP voltage of at least 17 $V_{mpp}$; with use of a 24 V battery this will accordingly be at least 34 $V_{mpp}$ and in case of a 48 V battery at least 68 $V_{mpp}$.

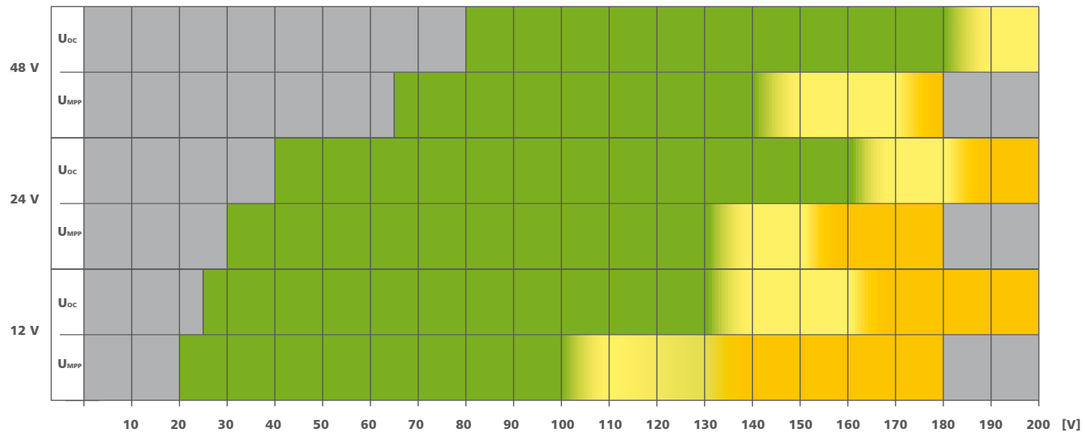
- Total output of the PV modules (Wp)
  The total output of the PV modules (in Wp) when connected should be less than or equal to the MPPT charge controller's rated power. Although module arrays with higher powers can be connected up without the Steca MPPT charge controller being destroyed, the actual charge capacity will then be limited to the charge controller's rated capacity. In practice, a module array that is oversized by up to 20 percent may be a good idea as the peak power (Wp) is only attained at very low temperatures, in strong sunlight and with clear skies. The module data is specified under „Standard Test Conditions" (STC) at 25 °C. In real application situations, the cell temperature will be significantly higher however. This leads to a lower output power – regardless of which charge controller is used.

- Note on efficiency
  The lower the voltage difference between the current PV input voltage and the battery voltage, the higher the MPP tracker's rate of efficiency will be. This is true for all MPPT charge controllers, regardless of the manufacturer.

- Battery voltage
  The battery voltage is selected depending on the power of the consumers. It is generally a good idea to select a battery voltage that is as high as possible to keep the current low and hence save costs.

**Choosing the optimal PV voltages**
When choosing the optimal PV voltages $U_{mpp}$ and $U_{oc}$ for the Steca Tarom MPPT 6000-S/6000-M you may consult the chart.

- Insufficient/excessive PV voltage; cannot be used
- Optimal PV voltage range; can be used with maximum efficiency
- Possible PV voltage range; can be used with minor efficiency restrictions
- Unfavourable PV voltage range; can be used with clear efficiency restrictions, but still without damage




# EXAMPLE

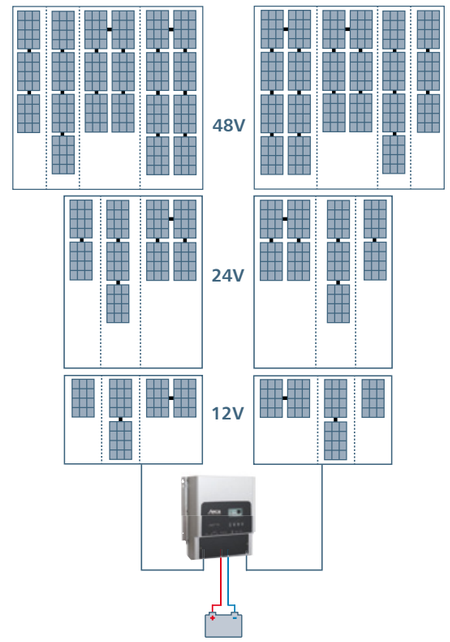
To illustrate this better, a concrete example with certain conditions can be found below:

- **Solar module (typical module for PV grid feeding with 60 cells)**
  Open circuit voltage $U_{oc}$: 37.6 V
  Temperature coefficient of open circuit voltage: -0.3 % / K
  MPP voltage $U_{mpp}$: 31.2 V
  Peak performance: 250 Wp
  Module current $I_{mpp}$ resp. $I_{sc}$: 8.0 / 8.5 A
  Specifications with STC = 25 °C

- **Battery: 48 V**
  Minimum MPP voltage of solar modules: 56 V

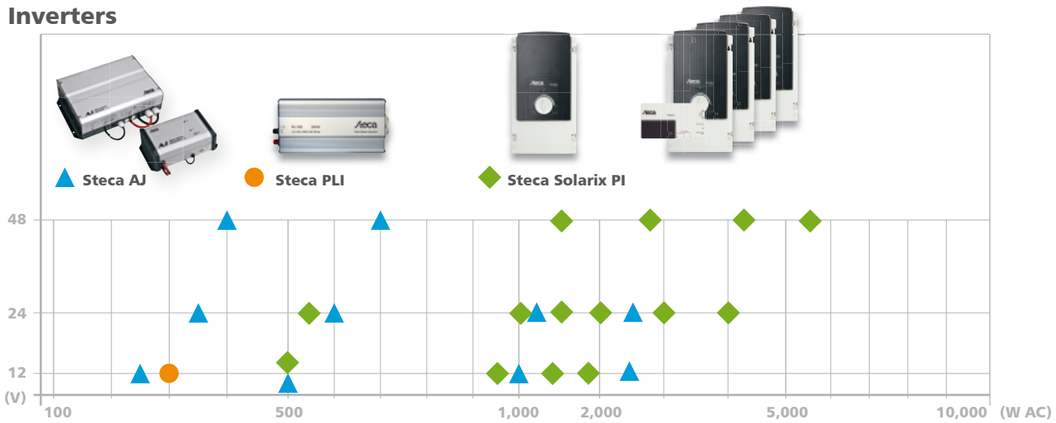
- **Charge controller: Steca Tarom MPPT 6000-S**
  Maximum open circuit voltage $U_{oc}$ < 200 V
  Rated power by 48 V: 3,600 W

- **Boundary conditions:**
  Temperature range: -30 °C up to +90 °C

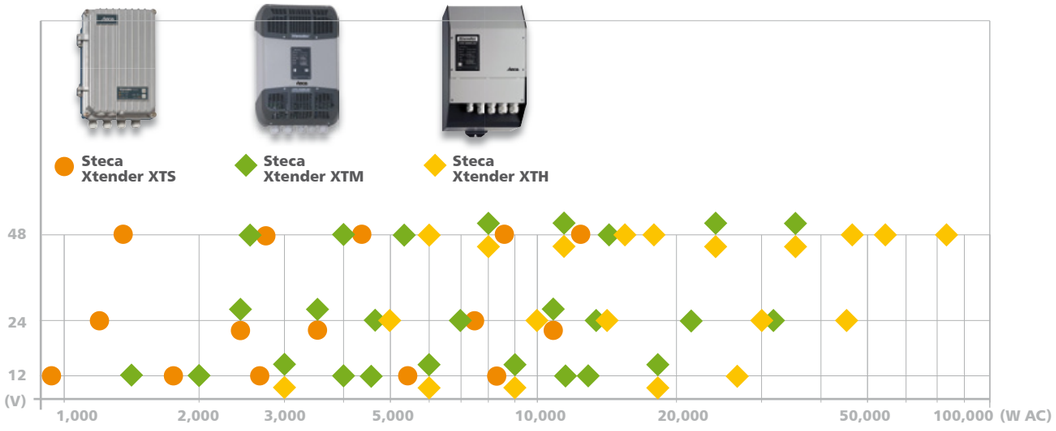


# INVERTER SELECTION

## Inverters




## Inverters with battery chargers



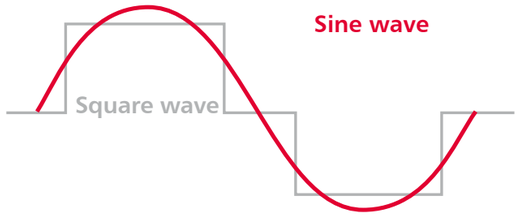



# GENERAL RECOMMENDATIONS

**for alternating current and hybrid systems**

### Sine wave inverters

In contrast to so-called square wave or trapezoidal inverters (grey square curve), Steca sine wave inverters produce a real and precisely controlled sine wave (red sine wave) at their output. The sine wave inverters assure that all loads which are suitable for grid operation can also be operated on a solar home system without any problems. Furthermore, they offer the advantage that no significant noises are produced in the inverter and there is no loud background noise to be heard on a connected radio, for example.




### Selecting an inverter

The power of the inverter must be selected according to the way it will be used. The sum of the power of all loads must not exceed the rated power of the inverter. The maximum power of the inverter must be able to cover the starting currents of the loads.

In order to allow the connection of more loads, Steca recommends overdimensioning the inverter.

### Selecting the PV generator and solar charge controller

The solar module array has to be adjusted to the local sunlight conditions and the system's energy requirement. In order to avoid stagnation times, the PV generator must also provide enough power during months with little solar radiation in order to cover the requirement of the connected loads.

The chosen solar charge controller must also be suitable for the maximum short-circuit current of the PV generator and the maximum load current. In some applications, however, technical properties also play an important role in the choice of solar charge controller. This may mean that a high-performance solar charge controller with corresponding additional functions is used in a system with a low output.

In order to keep the initial investment small, we recommend planning the size of the PV generator and battery according to the current energy consumption and choosing a solar charge controller which will allow the system to be expanded later.

### Selecting the battery

In order to also be able to supply loads with high requirements without any problems, the size of the battery must be chosen with care. Some critical loads such as fridges, freezers, pumps and motors need extremely high starting currents in their start-up phases. In order to be able to power such loads, it is important to use a high-performance inverter with a high overload capacity, particularly in the start-up phase. The battery must also possess a large enough capacity so that sufficient currents are made available to the inverter in the start-up phase. We recommend choosing the battery size according to the following formula: the battery capacity should be at least five times as large as the rated power of the inverter divided by the rated voltage of the battery.

$C_{batt} \geq 5\ h * P_{nom} / U_{nom}$

$P_{nom}$ is the rated power of the inverter in watts and
$U_{nom}$ is the rated voltage of the battery.

| $P_{nom}$ inverter | $U_{nom}$ battery | Battery capacity |
|---|---|---|
| 200 W | 12 V | > 100 Ah |
| 500 W | 12 V | > 200 Ah |
| 1,000 W | 12 V | > 400 Ah |
| 2,000 W | 12 V | > 800 Ah |
| 2,000 W | 24 V | > 400 Ah |
| 3,500 W | 24 V | > 700 Ah |
| 3,500 W | 48 V | > 350 Ah |
| 5,000 W | 48 V | > 500 Ah |
| 7,000 W | 48 V | > 700 Ah |

### Selecting the system voltage

The power requirement of the loads should be the decisive factor when choosing the system voltage. The higher the power, the higher the system voltage. If no 12 V DC loads are connected to the system, a higher system voltage of 24 V or 48 V should be chosen in order to reduce the alternating currents, and thus the losses on the DC side. Inverters also generally work more effectively with a higher input voltage. All in all, a higher system voltage leads to the system having a greater efficiency, since losses are reduced

### Cable lengths and cross sections

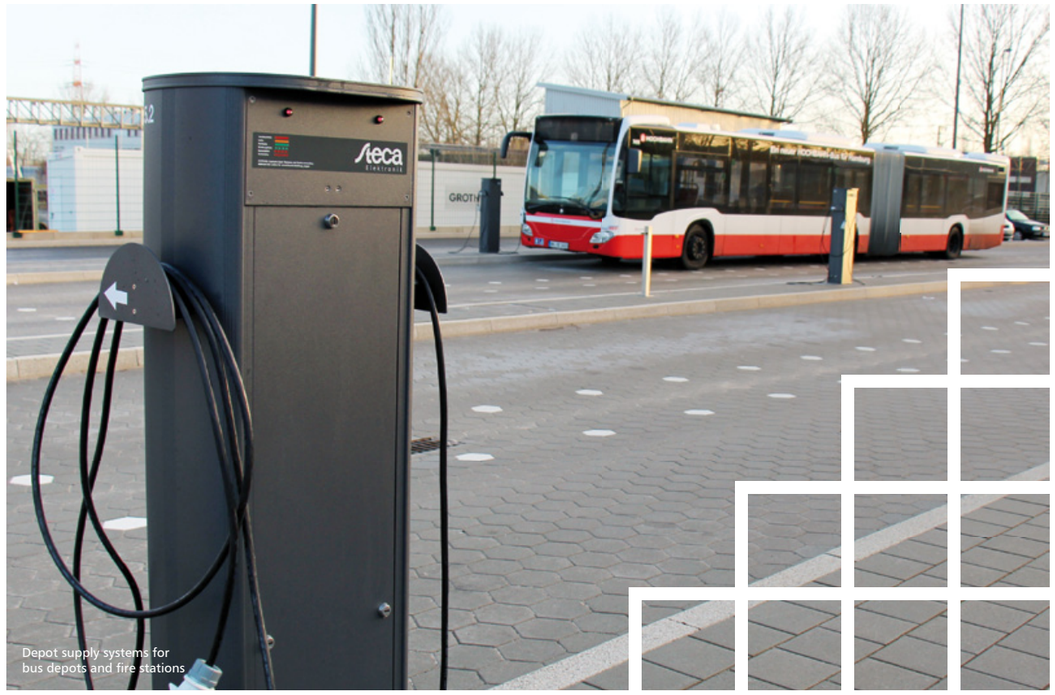
Direct currents in inverter systems are typically large. For this reason, it is important to dimension the cables between the battery and the inverter appropriately. Always connect the inverter directly to the battery. The cable you use should be as short as possible. In addition, the cable cross section should match the expected flow of current. In case of doubt, a thicker cable should be chosen. This can have a significant influence on the overall behaviour of the system. Using thick and short cables can limit losses and thus allow you to create a system with a better level of efficiency and/or better performance.

If the cables on the direct current side of the inverter are included in the delivery, these should not be lengthened, and a smaller cross section should not be used.

# »ALWAYS IN FOCUS: THE BEST POSSIBLE BATTERY CHARGE..«

The main focus of Steca charging technology is on making the charging devices easy to use and achieving the best battery charge possible. The products we offer range from reasonably-priced single charging units via modular charging devices with microcontrollers right through to computer-controlled charging and electric power supply programs. Our range of products is rounded off by accessories for battery charging devices and stations. Whatever device you go for, battery charging devices from Steca provide the highest flexibility of use and ensure trouble-free operation during use.


# PRODUCTS | BATTERY CHARGING SYSTEMS



Depot supply systems for
bus depots and fire stations

# BATTERY CHARGING SYSTEMS

**Efficient, intuitive and safe**

Steca battery charging technology stands out from the start thanks to its high quality and durability. For decades we have been developing efficient and user-friendly charging technology in cooperation with leading battery manufacturers and institutes in order to allow you to use your batteries safely.

Our main focus is on making the charging devices easy to use and achieving the best battery charge possible. The charging process is fully automatic and the user has access to information about the charging behaviour of their battery at all times. Steca battery charging technology can even test batteries in terms of their charging capacity and remaining capacity. This way, the user knows whether or not the battery is still working efficiently and if it is suitable for the planned application. This avoids unexpected battery failures and the resulting costs.

In addition to battery charging devices and testing devices, we provide parking space supply systems for bus depots for example. If you are planning to construct a battery charging station, you will find that the charging technology in Steca battery charging devices conforms to all relevant standards.

**Consultation and planning**
In connection with our battery chargers our staff will be glad to give you expert advice on all questions regarding batteries and battery use. We focus on finding the best solution for your application. This way, we can keep a constant eye on the applicable standards for the application in question and implement them. Our engineers and partners can plan your ideal configuration and help you draw up specifications.

**After-sales service**
We are constantly expanding our network of service partners for distribution, maintenance and repairs. This allows us to react to your enquiries as quickly as possible. We are also happy to advise you over our customer hotline.



# PRODUCT OVERVIEW

**Battery chargers**
Steca battery charging devices charge your batteries quickly and safely thanks to the processor-controlled charging processes. Fixed and programmable characteristic curves allow for flexibility during use. Highly efficient and advanced switching power supplies minimise energy losses. A wide range of features and ease of use make for trouble-free operation.

**Trickle charging system**
With the Steca trickle charging system, up to ten lead-acid batteries can be connected simultaneously without being connected in parallel. Thanks to the integrated Steca long-life cycle, lasting operational readiness is a given. A visual error message appears if a connected battery is faulty. This ensures that only flawless batteries are connected for reuse.

**Small charging units**
Even lead-acid batteries with small capacities need optimal charging. With our small charging units, we ensure this by controlled IU characteristic curves and a subsequent automatic trickle charging function.

**Parking space supply units**
For many applications, vehicles must be ready for use at all times. Regardless of whether your application involves a fire engine, a bus or a driverless transport system (DTS), you have to be able to rely on your system. Parking space supply units from Steca provide the optimum charging technology. Our devices are already providing successful and reliable service in lots of areas. They are used at many local public transport depots, as stand-by systems in fire brigades and for charging driverless transport systems (DTS) during ongoing operation.

The bus depot is one of the main areas of application for parking space supply units. Parking space supply systems are available as individual devices or as charging posts. They charge the batteries of the connected vehicle and guarantee a charged battery at all times. The parking space supply system also charges parallel loads in the bus. This protects the battery set and improves the service lives of the batteries. With their internal communication interfaces, Steca parking space supply units are best prepared for application in depot management systems. We supply all necessary components as well as bus identification modules or our Steca gateway which transfers the data from the bus and charging post to depot management software. For example, a heating signal can be sent to the bus and the feedback can be monitored. The depot management system can display and process the battery charging parameters, parking space data and bus number.

## Examples of application:


Trickle charging


Mobile charging points:
warning trailers, trolleys and supporting frames


Parking space supply units for bus depots


Battery chargers in use

## Stecamat 860

**Processor-controlled charger for lead-acid batteries**

The battery charger Stecamat 860 is available in a dust and hose-proof housing. The processor-controlled charging process ensures gentle and rapid charging of the battery. The Stecamat 860 also enables the processing of damaged or totally discharged batteries, ensuring long service life. A LED provides rapid information on the state of charge.

Maximum flexibility is provided by the extensive features. This and the easy handling of the device make for trouble-free operation.


Quality made in Germany

**Product features**
- IP 65 jet waterproof case
- Half the charging time compared to simple, non-controlled chargers with the same rated current
- Optimal for charging batteries with liquid electrolyte and solid gel / absorbed electrolyte (AGM)
- Suitable for totally discharged batteries
- Constant battery operational readiness through integrated trickle charge
- Charging below the gassing voltage
- Optimal charging of damaged batteries
- Potential-free contact for ventilator control of the battery room venting system

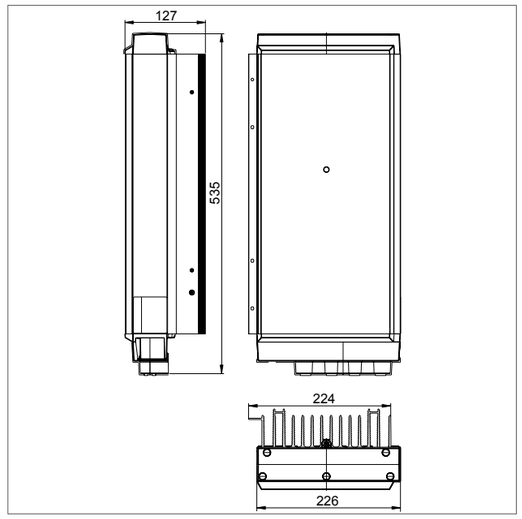
**Electronic protection functions**
- Protection in the case of wrong or damaged batteries
- Battery overcharge protection
- Charger output protected against short circuits, reverse polarity and overvoltage

**Display**
- Multi-coloured LED shows operating statuses

**Operation**
- Mains grid switch

**Interfaces**
- Control contact for ventilation control system in accordance with DIN EN 50272

**Options**
- IO box with mains plug and relay for ventilator control




| Technical data | | | |
|---|---|---|---|
| Charging rated voltage | 12 V | 24 V | 48 V |
| Charging current | 50 A | 35 A | 18 A |
| End-of-charge voltage | 14.4 V | 28.8 V | 57.6 V |
| Trickle charge voltage | 13.8 V | 27.6 V | 55.2 V |
| Characteristic curve | UoIUoIU | | |
| Grid voltage | 230 V AC ± 10 % | | |
| Grid frequency | 50 Hz (45 Hz ... 65 Hz) | | |
| Mains electricity | 3.7 A (230 V) | 5.5 A (230 V) | |
| Discharge current during grid failure | 1 mA | | |
| Protection class | I | | |
| Casing / ingress protection | aluminium / plastic, IP 65 | | |
| Ambient temperature | -40 °C ... +60 °C | | |
| Cooling | convection | | |
| Dimensions X x Y x Z | 226 x 535 x 127 mm | | |
| Weight | approx. 11.5 kg | | |

Technical data at 25 °C / 77 °F



## Stecamat 861

**Processor-controlled charger for lead-acid batteries**

The battery charger Stecamat 861 is available in a dust and hose-proof housing. The processor-controlled charging process ensures gentle and rapid charging of the battery. For individual adjustment of current, voltage, time and the ideal monitoring of the battery, the Stecamat 861 battery charger has a selection of preset battery profiles and the option of entering new battery profiles. The Stecamat 861 also enables the processing of damaged or totally discharged batteries, ensuring long service life. A backlit display provides rapid information on the state of charge.

Maximum flexibility is provided by the extensive features. This and the easy handling of the device make for trouble-free operation.


Quality made in Germany

**Product features**
- Besides preset battery profiles there is the option of entering new battery profiles
- IP 65 jet waterproof case
- Half the charging time compared to simple, non-controlled chargers with the same rated current
- Optimal for charging batteries with liquid electrolyte and solid gel / absorbed electrolyte (AGM)
- Adjustable rated capacity determines the charging current
- Suitable for totally discharged batteries
- Constant battery operational readiness through integrated trickle charge
- Charging below the gassing voltage
- Optimal charging of damaged batteries
- Potential-free contact for ventilator control of the battery room venting system

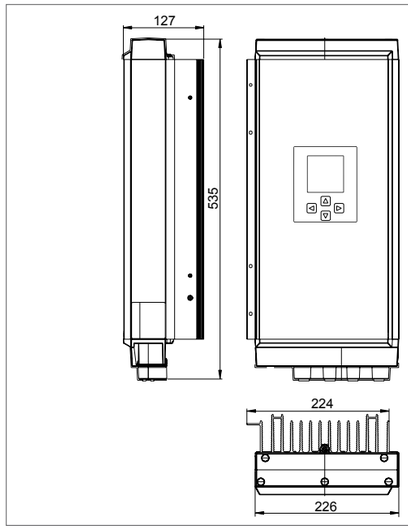
**Electronic protection functions**
- Protection in the case of wrong or damaged batteries
- Battery overcharge protection
- Charger output protected against short circuits, reverse polarity and overvoltage
- Surge protection in on-board power supplies

**Display**
- Multifunction graphical LCD display with backlighting for voltage, current, charged capacity, charging phase, menu

**Operation**
- Mains grid switch
- Four cursor buttons for menu selection

**Interfaces**
- Control contact for ventilation control system in accordance with DIN EN 50272

**Options**
- IO box with mains plug and relay for ventilator control




| Technical data | | | |
|---|---|---|---|
| Charging rated voltage | 12 V | 24 V | 48 V |
| Charging current | 50 A | 35 A | 18 A |
| End-of-charge voltage | 14.4 V | 28.8 V | 57.6 V |
| Trickle charge voltage | 13.8 V | 27.6 V | 55.2 V |
| Characteristic curve | UoIUoIU | | |
| Grid voltage | 230 V AC ± 10 % | | |
| Grid frequency | 50 Hz (45 Hz ... 65 Hz) | | |
| Mains electricity | 3.7 A (230 V) | 5.5 A (230 V) | |
| Discharge current during grid failure | 1 mA | | |
| Protection class | I | | |
| Casing / ingress protection | aluminium / plastic, IP 65 | | |
| Ambient temperature | -20 °C ... +60 °C | | |
| Cooling | Convection | | |
| Dimensions X x Y x Z | 226 x 535 x 127 mm | | |
| Weight | approx. 11.5 kg | | |

Technical data at 25 °C / 77 °F

## Stecamat 861 ES

**Processor-controlled charger / discharger for lead-acid batteries**

The Stecamat 861 ES battery charger features a discharging stage of 140 W. It can recharge 12 V batteries with 720 W of power or discharge, charge and evaluate batteries in one automated test cycle.

For individual adjustment of current, voltage, time and the ideal monitoring of the battery, the Stecamat 861 ES battery charger has a selection of preset battery profiles and the option of entering new battery profiles. The Stecamat 861 ES also enables the processing of damaged or totally discharged batteries, ensuring long service life. A backlit display provides rapid information on the state of charge.

Maximum flexibility is provided by the extensive features. This and the easy handling of the device make for trouble-free operation.


Quality made in Germany

**Product features**
- IP 65 jet waterproof case
- Battery processing for wet, gel and AGM batteries possible
- Charges 12 V lead-acid batteries (max. 50 A)
- Adjustable rated capacity determines the charging current
- Charging below the gassing voltage
- Features 2 pre-set and 4 programmable charging characteristics
- Automated testing for 12 V lead-acid batteries (charge – discharge – charge)
- 12 V discharging stage with 10 A discharge current (you can select between 2.5 A, 5 A and 10 A)
- Capacity detection of 12 V lead-acid batteries
- Suitable for treating deep-discharged batteries
- Potential-free contact for ventilator control of the battery room venting system

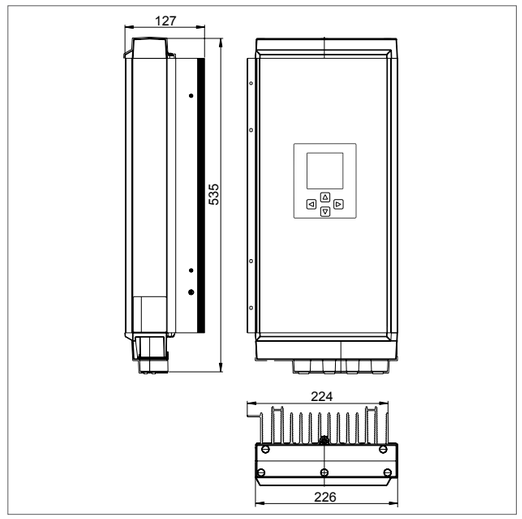
**Electronic protection functions**
- Protection in the case of wrong or damaged batteries
- Battery overcharge protection
- Charger output protected against short circuits, reverse polarity and overvoltage
- Surge protection in on-board power supplies

**Display**
- Multifunction graphical LCD display with backlighting for voltage, current, charged capacity (charging), spent capacity (discharging), charging phase, test phase, menu

**Operation**
- Mains grid switch
- Four cursor buttons for menu selection
- Capacity test cycle: charge, discharge, charge

**Interfaces**
- Control contact for ventilation control system in accordance with DIN EN 50272

**Options**
- IO box with mains plug and relay for ventilator control




| Technical data | |
|---|---|
| Charging rated voltage | 12 V |
| Charging current | 50 A |
| End-of-charge voltage | 14.4 V |
| Trickle charge voltage* | 13.8 V |
| Max. rated discharge voltage | 12 V |
| Discharge cut-off voltage | 10.5 V (10 V ... 11 V adjustable) |
| Discharge current | selectable: 2.5 A / 5 A / 10 A |
| Characteristic curve | UoIUoIU (charging), UoIUa (testing) |
| Capacity test cycle | charging / discharging / charging |
| Grid voltage | 230 V AC ± 10 % |
| Grid frequency | 50 Hz (45 Hz ... 65 Hz) |
| Mains electricity | 3.7 A (230 V) |
| Discharge current during grid failure | 1 mA |
| Protection class | I |
| Casing / ingress protection | aluminium / plastic, IP 65 |
| Ambient temperature | -20 °C ... +60 °C |
| Cooling | convection |
| Dimensions X x Y x Z | 226 x 535 x 127 mm |
| Weight | approx. 11.5 kg |

Technical data at 25 °C / 77 °F

* only for charging programme



## Stecamat 820

**Processor-controlled charger for lead-acid batteries**

The battery charger Stecamat 820 is available in a light, compact housing. The processor-controlled charging process ensures gentle and rapid charging of the battery. The current, voltage, time and ideal monitoring of the battery are individually adjusted by the setting of the rated capacity. The Stecamat 820 also enables the processing of damaged or totally discharged batteries, ensuring long service life. A LED provides rapid information on the state of charge.

The wide range of features make for high flexibility of use. This and the easy handling make for trouble-free operation, even when wearing gloves.

Quality made in Germany

**Product features**
- Half the charging time compared to simple, non-controlled chargers with the same rated current
- Optimal for charging batteries with liquid electrolyte and solid gel / absorbed electrolyte (AGM)
- Adjustable rated capacity determines the charging current
- Suitable for totally discharged batteries
- Constant battery operational readiness through integrated trickle charge
- Ready for operation in just a few minutes
- Charging below the gassing voltage
- Optimal charging of damaged batteries

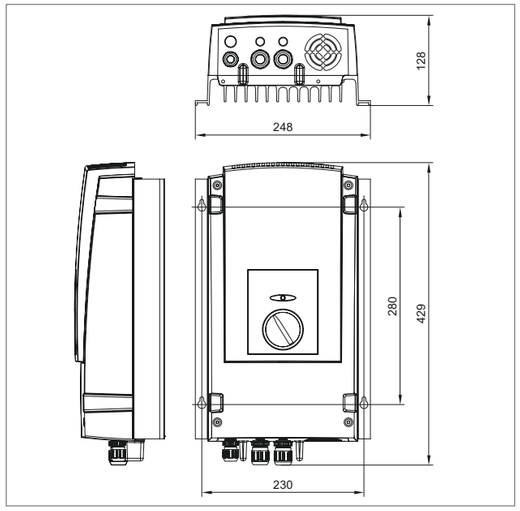
**Electronic protection functions**
- Protection in the case of wrong or damaged batteries
- Battery overcharge protection
- Charger output protected against short circuits, reverse polarity and overvoltage

**Display**
- Multi-coloured LED shows operating statuses

**Operation**
- Adjustable rated capacity via rotary switch

**Interfaces**
- Control contact for ventilation control system in accordance with DIN EN 50272

**Options**
- IO box with mains plug and relay for ventilator control




| Technical data | | | |
|---|---|---|---|
| Charging rated voltage | 12 V | 24 V | 48 V |
| Charging current | 50 A | 35 A | 18 A |
| End-of-charge voltage | 14.4 V | 28.8 V | 57.6 V |
| Trickle charge voltage | 13.8 V | 27.6 V | 55.2 V |
| Characteristic curve | UoIUoIU | | |
| Grid voltage | 230 V AC ± 10 % | | |
| Grid frequency | 50 Hz | | |
| Mains electricity | 3.7 A (230 V) | 5.5 A (230 V) | |
| Discharge current during grid failure | 1 mA | | |
| Protection class | I | | |
| Casing / ingress protection | plastic, IP 20 | | |
| Ambient temperature | -20 °C ... +60 °C | | |
| Cooling | regulated fan | | |
| Dimensions X x Y x Z | 248 x 429 x 128 mm | | |
| Weight | approx. 6 kg | | |

Technical data at 25 °C / 77 °F

## Stecamat 821

**Processor-controlled charger for lead-acid batteries**

The battery charger Stecamat 821 is available in a light, compact housing. The processor-controlled charging process ensures gentle and rapid charging of the battery. For individual adjustment of current, voltage, time and the ideal monitoring of the battery, the Stecamat 821 battery charger has a selection of preset battery profiles and the option of entering new battery profiles. The Stecamat 821 also enables the processing of damaged or totally discharged batteries, ensuring long service life. A backlit display provides rapid information on the state of charge.

The wide range of features make for high flexibility of use. This and the easy handling of the device make for trouble-free operation.


Quality made in Germany

**Product features**
- Besides preset battery profiles there is the option of entering new battery profiles
- Half the charging time compared to simple, non-controlled chargers with the same rated current
- Optimal for charging batteries with liquid electrolyte and solid gel / absorbed electrolyte (AGM)
- Adjustable rated capacity determines the charging current
- Suitable for totally discharged batteries
- Constant battery operational readiness through integrated trickle charge
- Ready for operation in just a few minutes
- Charging below the gassing voltage
- Optimal charging of damaged batteries

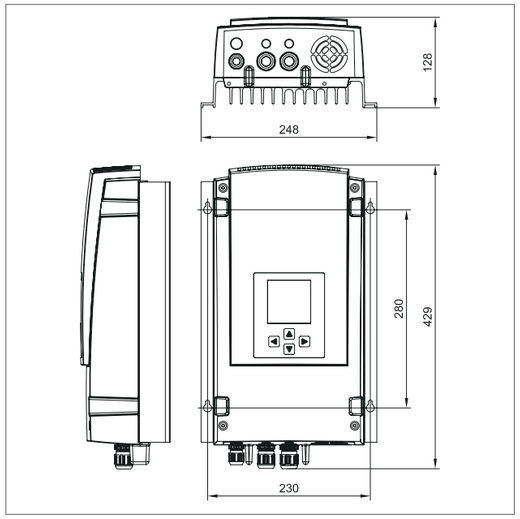
**Electronic protection functions**
- Protection in the case of wrong or damaged batteries
- Battery overcharge protection
- Charger output protected against short circuits, reverse polarity and overvoltage

**Display**
- Multifunction graphical LCD display with backlighting for voltage, current, charged capacity, charging phase, menu

**Operation**
- Four cursor buttons for menu selection

**Interfaces**
- Control contact for ventilation control system in accordance with DIN EN 50272

**Options**
- IO box with mains plug and relay for ventilator control




| Technical data | | | |
|---|---|---|---|
| Charging rated voltage | 12 V | 24 V | 48 V |
| Charging current | 50 A | 35 A | 18 A |
| End-of-charge voltage | 14.4 V | 28.8 V | 57.6 V |
| Trickle charge voltage | 13.8 V | 27.6 V | 55.2 V |
| Characteristic curve | UoIUoIU | | |
| Grid voltage | 230 V AC ± 10 % | | |
| Grid frequency | 50 Hz (45 Hz ... 65 Hz) | | |
| Mains electricity | 3.7 A (230 V) | 5.5 A (230 V) | |
| Discharge current during grid failure | 1 mA | | |
| Protection class | I | | |
| Casing / ingress protection | plastic, IP 20 | | |
| Ambient temperature | -20 °C ... +60 °C | | |
| Cooling | regulated fan | | |
| Dimensions X x Y x Z | 248 x 429 x 128 mm | | |
| Weight | approx. 6 kg | | |

Technical data at 25 °C / 77 °F



## Stecamat 210

**Processor-controlled 10x charger and trickle charger for lead-acid batteries with Steca battery connection system (BAS)**

Batteries are often used only intermittently or on a seasonal basis. If lead-acid batteries are not charged for several weeks or months, their capacity decreases and permanent damage is done. With the Stecamat 210, up to 10 lead-acid batteries can be individually processed. The processor-controlled charging process, with voltage, current and time control, ensures the gentle charging of batteries, for all ten channels. Equalisation charging with a long life cycle is conducted on a weekly basis. This ensures the optimal charge status of the batteries in the trickle charge state, even over a long period of time. The charging status of each individual battery can be accessed in the display by means of the rotary switch.

Maximum flexibility is provided by the extensive features. A battery connection system for ten batteries can also be supplied. This and the easy handling of the device make for trouble-free operation.


Quality made in Germany

**Product features**
- Optimal for charging batteries with liquid electrolyte and solid gel / absorbed electrolyte (AGM)
- Charging below the gassing voltage
- Battery performance is maintained over years
- Minimal electrolyte loss (no maintenance work)
- The current and voltage values of every battery can be individually accessed
- Replaceable battery connection cables with battery pliers
- Hanging rack for unused battery connection cables

**Electronic protection functions**
- Protection in the case of wrong or damaged batteries
- Battery overcharge protection
- Charger output protected against short circuits, reverse polarity and overvoltage

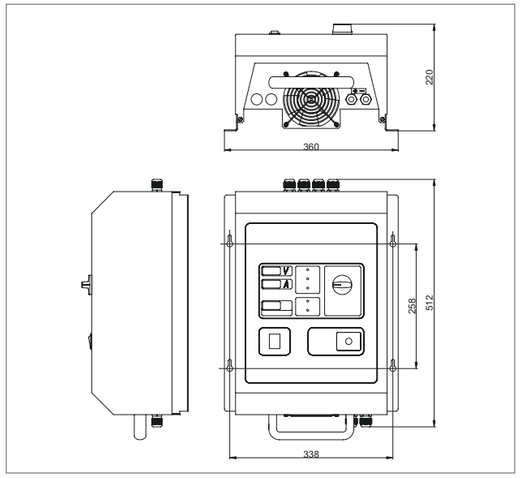
**Display**
- 3-digit 7-segment LED display for voltage, current, battery number
- 5 LEDs show operating statuses for charging (pre-charging), trickle charging, long life cycle, piping error, battery fault

**Operation**
- Mains grid switch
- Battery selection via rotary switch
- Charge stop via button

**Interfaces**
- Control contact for ventilation control system in accordance with DIN EN 50272

**Options**
- Battery connection system Steca BAS10

Example for Steca BAS (battery connection system)




| Technical data | |
|---|---|
| Charging rated voltage | 10 x 12 V |
| Charging current | 10 x 1 A |
| End-of-charge voltage | 14.4 V |
| Trickle charge voltage | 13.8 V |
| Characteristic curve | 10 x IU |
| Grid voltage | 230 V AC ± 10 % |
| Grid frequency | 50 Hz |
| Mains electricity | 0.8 A (230 V) |
| Discharge current during grid failure | 1 mA |
| Protection class | I |
| Casing / ingress protection | metal, coated, IP 21 |
| Ambient temperature | -20 °C ... +40 °C |
| Cooling | convection |
| Dimensions X x Y x Z (Stecamat 210) | 360 x 512 x 220 mm |
| Dimensions X x Y x Z (Steca BAS-10) | 2,000 x 200 x 108 mm |
| Weight | approx. 13 kg |

Technical data at 25 °C / 77 °F

## Steca HP 8204B

**Processor-controlled charger for lead-acid batteries**

The battery charger Steca HP 8204B charges the battery gently and quickly thanks to a processor-controlled charging process. The Steca HP 8204B thus enables the processing of damaged or totally discharged batteries, ensuring long service life. LEDs provide rapid information on the state of charge.

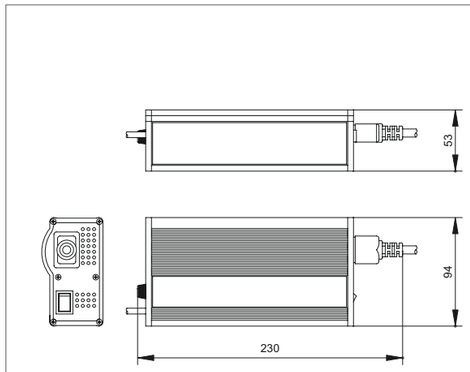
The Steca HP 8204B battery charger stands out with its robust casing, handy format and low weight, and is suitable for both mobile and domestic use. The easy and comfortable handling of the device makes for trouble-free operation. The Steca HP 8204B battery charger was specially developed for charging batteries for electric wheelchairs, electric scooters, electric bicycles, electric buggies and electric cleaning machines.


**Product features**
- Optimal for charging batteries with liquid electrolyte and solid gel / absorbed electrolyte (AGM)
- Suitable for totally discharged batteries
- Constant battery operational readiness through integrated trickle charge
- Optimal charging of damaged batteries

**Electronic protection functions**
- Battery overcharge protection
- Charger output protected against short circuits, reverse polarity and overvoltage

**Display**
- 2 LEDs show operating statuses

**Operation**
- Mains grid switch




| Technical data | | |
|---|---|---|
| Charging rated voltage | 24 V | |
| Charging current | 4 A | 5 A |
| End-of-charge voltage | 29.4 V | |
| Trickle charge voltage | 27.6 V | |
| Characteristic curve | UIoIU | |
| Grid voltage | 230 V AC ± 10 %, can be switched to 115 V AC ± 10 % | |
| Grid frequency | 50 Hz / 60 Hz | |
| Mains electricity | 0.6 A (230 V) 1.2 A (115 V) | 0.7 A (230 V) 1.4 A (115 V) |
| Discharge current during grid failure | 2.5 mA | |
| Protection class | I | |
| Casing/ ingress protection | aluminium with edge protection, IP 21 | |
| Ambient temperature | -10 °C ... +50 °C | |
| Cooling | regulated fan | |
| Dimensions X x Y x Z | 230 x 94 x 53 mm | |
| Weight | approx. 0.85 kg | |

Technical data at 25 °C / 77 °F



## Steca G1 300

**Processor-controlled charger for lead-acid batteries**

The battery charger Steca G1 300 charges the battery gently and quickly thanks to a processor-controlled charging process. The G1 300 thus enables the processing of damaged or totally discharged batteries, ensuring long service life. LEDs provide rapid information on the state of charge.

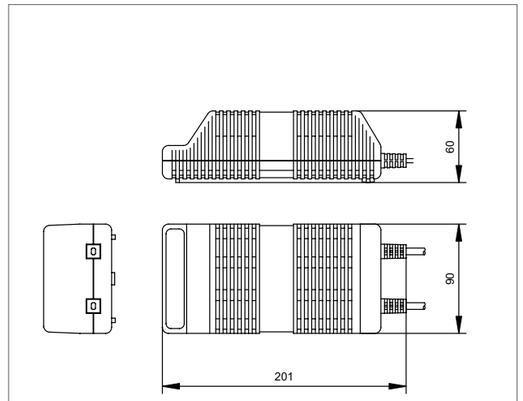
The G1 300 battery charger stands out with its robust casing, handy format, low weight and different voltage versions. The easy and comfortable handling of the device makes for trouble-free operation.

Quality made in Germany

**Product features**
- Optimal for charging batteries with liquid electrolyte and solid gel / absorbed electrolyte (AGM)
- Suitable for totally discharged batteries
- Constant battery operational readiness through integrated trickle charge
- Charging below the gassing voltage
- Optimal charging of damaged batteries

**Electronic protection functions**
- Battery overcharge protection
- Charger output protected against short circuits, reverse polarity and overvoltage

**Display**
- 4 LEDs show operating statuses for grid, charge, charged, polarity




| Technical data | G1 306-5 | G1 312-4 | G1 312-5 | G1 324-2,5 |
|---|---|---|---|---|
| Charging rated voltage | 6 V | 12 V | | 24 V |
| Charging current | 5 A | 4 A | 5 A | 2.5 A |
| End-of-charge voltage | 7.2 V | 14.4 V | | 28.8 V |
| Trickle charge voltage | 6.9 V | 13.8 V | | 27.6 V |
| Characteristic curve | UIoIU | | | |
| Grid voltage | 230 V AC ± 10 % | | | |
| Grid frequency | 50 Hz | | | |
| Mains electricity | 0.2 A (230 V) | 0.4 A (230 V) | | |
| Discharge current during grid failure | 2.5 mA | | | |
| Protection class | II / VDE 0805 | | | |
| Casing / ingress protection | plastic, IP 21 | | | |
| Ambient temperature | 0 °C ... +35 °C | | | |
| Cooling | convection | | | |
| Dimensions X x Y x Z | 201 x 60 x 90 mm | | | |
| Weight | approx. 0.6 kg | | | |

Technical data at 25 °C / 77 °F

## Steca G2 300

**Processor-controlled charger for lead-acid batteries**

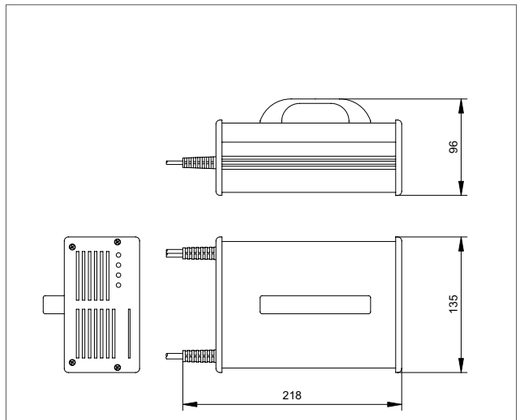
The battery charger Steca G2 300 charges the battery gently and quickly thanks to a processor-controlled charging process. The G2 300 thus enables the processing of damaged or totally discharged batteries, ensuring long service life. LEDs provide rapid information on the state of charge.

The G2 300 battery charger stands out with its robust casing, handy format, low weight and different voltage versions. The easy and comfortable handling of the device makes for trouble-free operation.

Quality made in Germany

**Product features**
- Optimal for charging batteries with liquid electrolyte and solid gel / absorbed electrolyte (AGM)
- Suitable for totally discharged batteries
- Constant battery operational readiness through integrated trickle charge
- Charging below the gassing voltage
- Optimal charging of damaged batteries

**Display**
- 4 LEDs show operating statuses for grid, charge, charged, polarity




| Technical data | G2 312-10 | G2 324-5 | G2 324-7 |
|---|---|---|---|
| Charging rated voltage | 12 V | 24 V | |
| Charging current | 10 A | 5 A | 7 A |
| End-of-charge voltage | 14.4 V | 28.8 V | |
| Trickle charge voltage | 13.8 V | 27.6 V | |
| Characteristic curve | UIoIU | | |
| Grid voltage | 230 V AC ± 10 %, optional 100 V ... 240 V AC | | |
| Grid frequency | 50 Hz / 60 Hz | | |
| Mains electricity | 0.9 A (230 V)<br>1.8 A (110 V) | 1.1 A (230 V)<br>2.2 A (110 V) | 1.5 A (230 V)<br>3.0 A (110 V) |
| Discharge current during grid failure | 1 mA | | |
| Protection class | II / VDE 0805 | | |
| Casing / ingress protection | plastic, IP 20 | | |
| Ambient temperature | 0 °C ... +35 °C | | |
| Cooling | regulated fan | | |
| Dimensions X x Y x Z | 135 x 96 x 218 mm | | |
| Weight | approx. 1.2 kg | | approx. 1.6 kg |

Technical data at 25 °C / 77 °F



## Stecamat 862

**Processor-controlled charger for lead-acid batteries with communication feature**

The battery charger Stecamat 862 charges the battery gently and quickly thanks to a processor-controlled charging process. The Stecamat 862 thus enables the processing of damaged or totally discharged batteries, ensuring long service life. The IP 65-certified dust and splash-proof housing allows for outdoor installation. Data can be read and processed centrally thanks to the integrated RS-485 interface. With this communication interface, the various charging parameters can be adjusted and the charging current can be increased to a maximum of 35 A. The integrated interface allows for communication with buses that are equipped with an integrated bus identification module (BIM).


Quality made in Germany

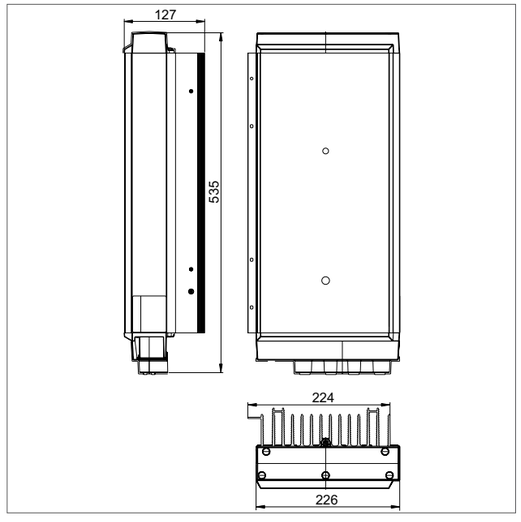
**Product features**
- IP 65 jet waterproof casing
- Half the charging time compared to simple, non-controlled chargers with the same rated current
- Optimal for charging batteries with liquid electrolyte and solid gel / absorbed electrolyte (AGM)
- Suitable for totally discharged batteries
- Constant battery operational readiness through integrated trickle charge
- Charging below the gassing voltage
- Optimal charging of damaged batteries
- Communication with bus identification module for vehicle identification, heating control and query of ignition status
- Interface for bidirectional communication

**Electronic protection functions**
- Protection in the case of wrong or damaged batteries
- Battery overcharge protection
- Charger output protected against short circuits, reverse polarity and overvoltage

**Displays**
- Multi-coloured LED shows operating states

**Operation**
- Charging parameters adjustable via RS-485

**Interfaces**
- RS-485 for connection to the depot management software




| Technical data | |
|---|---|
| Charging rated voltage | 24 V |
| Charging current | 20 A (max. 35 A) |
| End-of-charge voltage | 27.6 V |
| Trickle charge voltage | 27.2 V |
| Characteristic curve | UoIUoIU |
| Grid voltage | 230 V AC ± 10 % |
| Grid frequency | 50 Hz (45 Hz ... 65 Hz) |
| Mains electricity | 4.0 A (230 V) |
| Discharge current during grid failure | 1 mA |
| Protection class | I |
| Casing / ingress protection | aluminium / plastic, IP 65 |
| Ambient temperature | -40 °C ... +60 °C |
| Cooling | convection |
| Dimensions X x Y x Z | 226 x 535 x 127 mm |
| Weight | approx. 11.5 kg |

Technical data at 25 °C / 77 °F

## Steca SVE-822

**Parking space supply unit with processor-controlled chargers for lead-acid batteries**

The parking space supply unit SVE-822 consists of an aluminium column with one (SVE-822-E) or two (SVE-822-D) chargers. Up to two vehicles can be loaded simultaneously and independently. Connecting the bus to an optional bus information module (BIM) further allows for the identification of each respective vehicle, and for heating control and ignition status queries. This is especially important for bus depots. These data can be managed centrally, and individual parameters can be changed via the RS-485 interface. Batteries are charged gently and quickly thanks to the processor-controlled charging process.

**Product features**
- Aluminium housing with lockable front flap
- Half the charging time compared to simple, non-controlled chargers with the same rated current
- Optimal for charging batteries with liquid electrolyte and solid gel / absorbed electrolyte (AGM)
- Suitable for totally discharged batteries
- Constant battery operational readiness through integrated trickle charge
- Charging below the gassing voltage
- Optimal charging of damaged batteries
- Communication with bus identification module for vehicle identification, heating control and query of ignition status
- Interface for bidirectional communication

**Electronic protection functions**
- Protection in the case of wrong or damaged batteries
- Battery overcharge protection
- Charger output protected against short circuits, reverse polarity and overvoltage

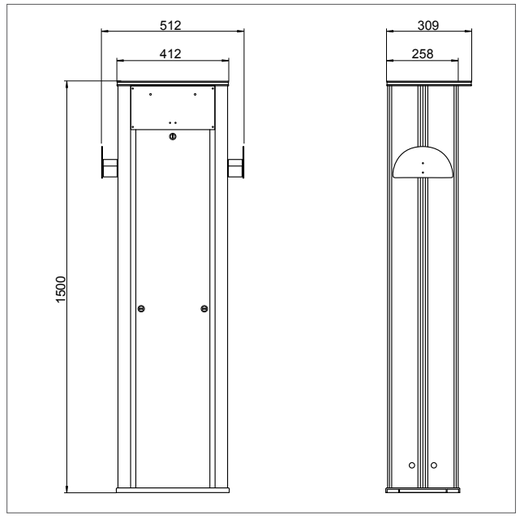
**Displays**
- Multi-coloured LED shows operating states

**Operation**
- Mains grid switch
- Charging parameters adjustable via RS-485

**Interfaces**
- RS-485 for connection to the depot management software

**Options**
- Spacer plate to compensate uneven foundations


Quality made in Germany




| Technical data | SVE 822-E | SVE 822-D |
|---|---|---|
| Charging rated voltage | 24 V | 2 x 24 V |
| Charging current | 20 A | 2 x 20 A |
| End-of-charge voltage | 27.6 V | |
| Trickle charge voltage | 27.2 V | |
| Characteristic curve | 2 x UoIUoIU | |
| Grid voltage | 230 V AC ± 10 % | |
| Grid frequency | 50 Hz (45 Hz ... 65 Hz) | |
| Mains electricity | 4 A (230 V) | 8 A (230 V) |
| Discharge current during grid failure | 1 mA | 2 mA |
| Protection class | I | |
| Casing / ingress protection | aluminium, IP 44 | |
| Ambient temperature | -20 °C ... +60 °C | |
| Cooling | Regulated fan | |
| Dimensions X x Y x Z | 385 x 225 x 1500 mm | |
| Weight | 35 kg | 41 kg |

Technical data at 25 °C / 77 °F


Ill. similar

## Steca Gateway

**Data server for Steca charger modules from RS-485 to Ethernet**

The Steca gateway is the link between RS-485-compatible chargers and an Ethernet network. The gateway serves as a LAN or Internet interface. Thanks to the integrated web server with Steca software, the Internet can be accessed locally from the local area network, and remotely with SSL encryption – or optionally with a VPN connection. With the eight independent RS-485 terminals, up to 240 chargers can be grouped and managed centrally via a browser, and therefore independent of the platform.



## ROOM FOR NOTES

# »STECA SOLAR ELECTRONICS PRODUCTS AND SOLUTIONS FOR AN ECOLOGICAL FUTURE.«

Steca has long stood for ideas and innovations as an electronic manufacturing services (EMS) provider and manufacturer of Steca brand product lines in solar electronics and battery charging systems. As a leading supplier of products for the solar electronics industry, Steca sets the international standard for the regulation and control of solar energy systems. In the three market segments PV grid connected, PV off grid and Solar thermal, the Steca brand is synonymous with innovation and vision.

# OTHER PRODUCT AREAS

# PV GRID CONNECTED

## Residential Systems – Single-phase Inverters

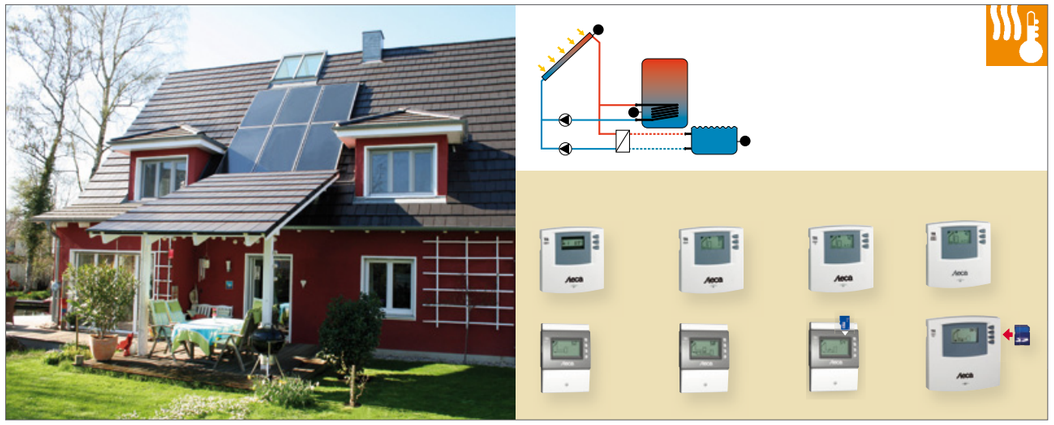

## Residential Systems – Three-phase Inverters


## Commercial Systems

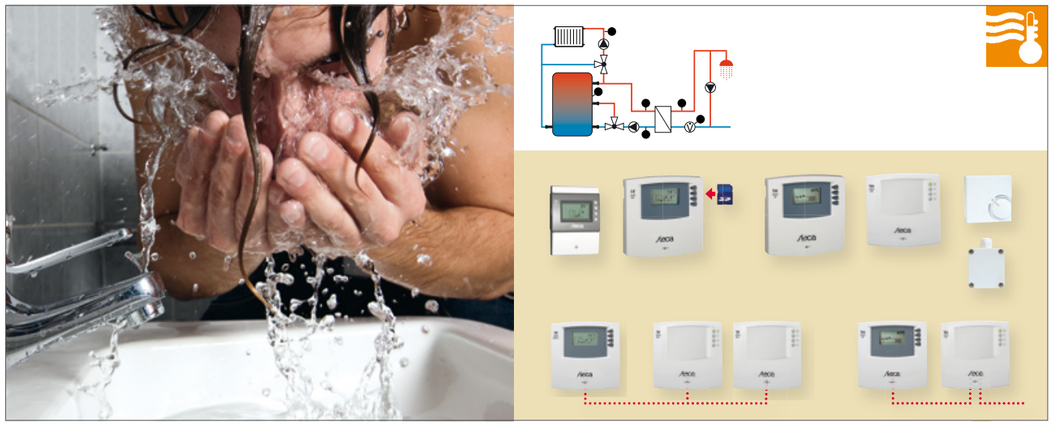



# SOLAR THERMAL

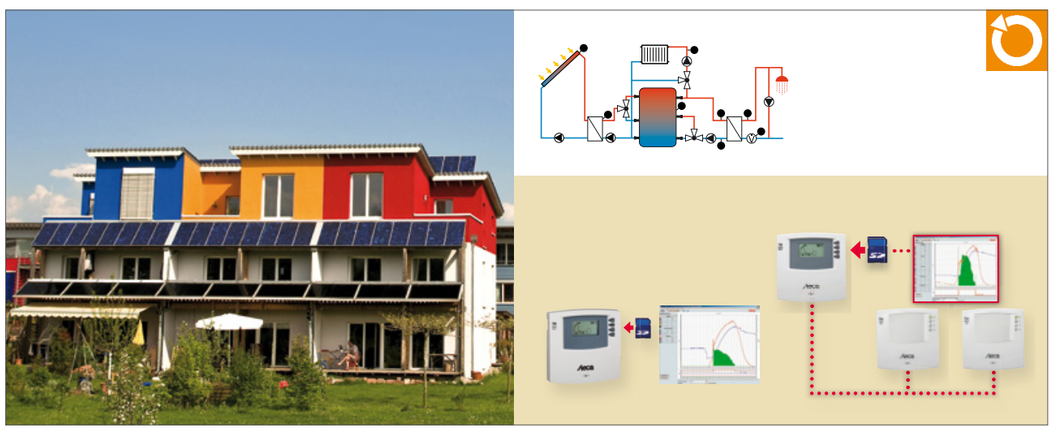
## Solar Controllers



## Heating and Domestic Hot Water Controllers



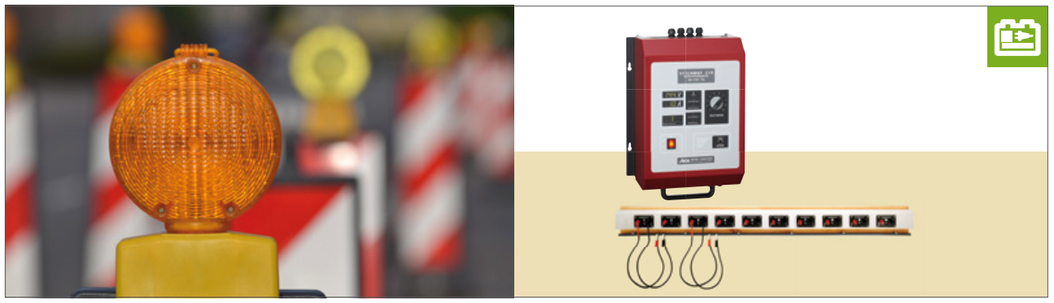
## System Controllers



# BATTERY CHARGING SYSTEMS

## Battery Chargers

## Trickle Charging System



## Small Charging Units

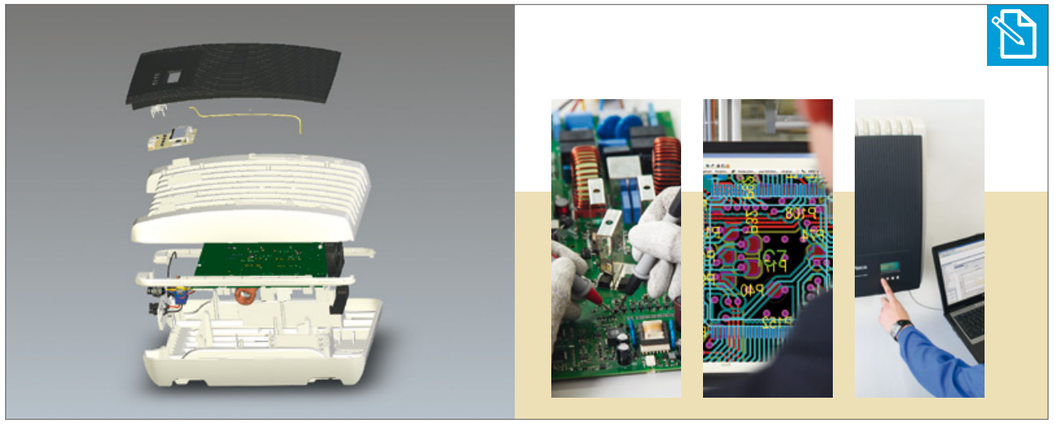
## Parking Space Supply Units



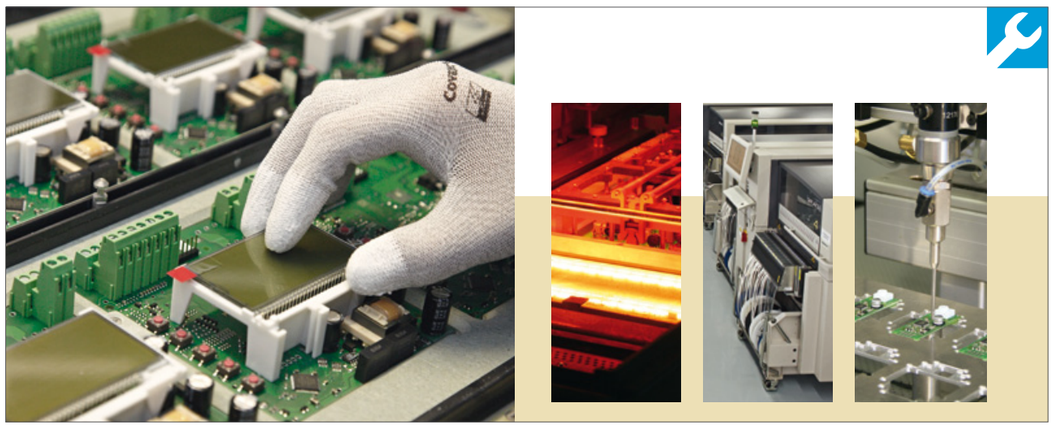
# ELECTRONICS SERVICES

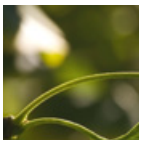
## Quality

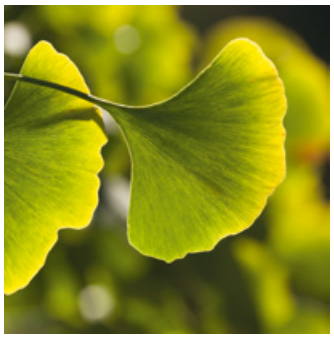
## Development



## Production







732.238 | 36.2015


Steca Elektronik GmbH
Mammostraße 1
87700 Memmingen
Germany
Fon +49-(0)8331-8558-100
Fax +49-(0)8331-8558-132

**www.steca.com**