PV OFF GRID
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.

Explanation of Symbols for Inside Pages

**Solar home system**
This device is particularly suitable for solar home systems.

**Inverter system**
This device is suitable for applications of higher performance classes or for supplying entire villages.

**Hybrid system**
Suitable for hybrid systems in which additional generators are used.

**Night light function**
This device is suitable for night light systems.

**Uninterruptible power supply**
This device can also charge the battery from an external AC source.

**SOC**
This device calculates the state of charge of the battery using the AtonIC processor.

**Telecom**
This device is specially suitable for all kinds of telecommunication applications.

**Remote monitoring**
This device can transfer data using wires, telephone cables or wirelessly.

**Sea water**
This device is particularly protected against moisture and corrosion.

**Solar module performance**
Maximum input power of the connected solar modules.

**LCD display**
This device has a digital display which allows different system information to be shown.

**Camping**
This device is particularly suitable for use in mobile homes or for camping applications.

**Energy efficiency class**
This device is highly energy efficient – highest qualification A+++. 
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. In 2007, 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.

»Simple business processes, fair partnerships and transparent communication contribute to our joint success.«
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.

»GROWTH BASED ON RELIABILITY – IN USE ALL OVER THE WORLD.«
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. The circuit board is completely electronically protected and with the LED user interface it is easy to check the battery state of charge at any time. Large terminals guarantee a simple connection of solar panels, battery and load. The Steca Solsum F works on PWM as a low loss series controller.

Product features
- Series controller
- Voltage regulation
- Automatic detection of voltage
- PWM control
- Multistage charging technology
- Current compensated load disconnection
- Automatic load reconnection
- Temperature compensation
- Common positive grounding or negative grounding on one terminal
- 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
- Overcurrent protection at module
- Open circuit voltage solar module < 47 V
- DC input side
- Equalisation charge 14.7 V (29.4 V)
- Boost charge voltage 14.4 V (28.8 V)
- End of charge voltage 13.9 V (27.8 V)
- Load current 6 A 8 A 10 A
- Voltage and current regulation
- PWM control
- Voltage and current regulation
- PWM control
- Multistage charging technology
- Current compensated load disconnection
- Automatic load reconnection
- Temperature compensation
- Common positive grounding or negative grounding on one terminal
- Integrated self test
- Monthly maintenance charge

Displays
- Multi-function LED display
- Multi-coloured LED
- 4 LEDs show operating states
- For operation, state of charge, fault messages

Options
- Night light function pre-set in the factory or adjustable via Steca ParC 100
- Parameterisation of function values via Steca ParC 100

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

Steca Solarix PRS
PRS 1010, PRS 1515, PRS 2020, PRS 3030
The simplicity and high performance of the Steca Solarix PRS solar charge controller makes 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 emulate a tank display, which gives 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.

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
- Common positive grounding or negative grounding on one terminal
- 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
- Battery overvoltage shutdown

Displays
- Multi-function LED display
- Multi-coloured LED
- 5 LEDs show operating states
- For operation, state of charge, fault messages

Options
- Night light function pre-set in the factory or adjustable via Steca ParC 100
- Parameterisation of function values via Steca ParC 100

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

Areas of application:
- Home use
- Holiday homes
- Traditional energy users

Technical data at 25 °C / 77 °F

Steca PA RC160 Remote control
(area 35)

Dimensions (X x Y x Z) 145 x 100 x 30 mm
Weight approx. 150 g

Steca PA RC110 Remote control
(area 35)

Dimensions (X x Y x Z) 187 x 96 x 45 mm
Weight 345 g
Steca Solarix MPPT
MPPT 1010, MPPT 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.

### 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
- Battery overvoltage shutdown

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

### Options
- Night light function pre-set in the factory or adjustable via Steca ParC 100
- 5 LEDs show operating states

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

### Technical data at 25 °C / 77 °F

<table>
<thead>
<tr>
<th>Steca Solarix MPPT MPPT 1010</th>
<th>MPPT 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System voltage</strong></td>
<td>12 V (24 V)</td>
</tr>
<tr>
<td><strong>Terminal power</strong></td>
<td>125 W (125 W)</td>
</tr>
<tr>
<td><strong>Max. efficiency</strong></td>
<td>&gt; 98 %</td>
</tr>
<tr>
<td><strong>Max. input voltage</strong></td>
<td>40 V</td>
</tr>
<tr>
<td><strong>Open circuit voltage solar module</strong></td>
<td>19 V (25 V)</td>
</tr>
<tr>
<td><strong>Module voltage</strong></td>
<td>9 V (30 V)</td>
</tr>
<tr>
<td><strong>DC input side</strong></td>
<td>10 A</td>
</tr>
<tr>
<td><strong>DC output side</strong></td>
<td>10 A</td>
</tr>
<tr>
<td><strong>Load current</strong></td>
<td>10 A</td>
</tr>
<tr>
<td><strong>End of charge voltage</strong></td>
<td>13.9 V (27.8 V)</td>
</tr>
<tr>
<td><strong>Boost charging voltage</strong></td>
<td>14.7 V (29.4 V)</td>
</tr>
<tr>
<td><strong>Reconnection voltage</strong></td>
<td>12.5 V (25 V)</td>
</tr>
<tr>
<td><strong>Boost voltage</strong></td>
<td>12.4 V (24.8 V)</td>
</tr>
<tr>
<td><strong>Boost current</strong></td>
<td>1.2 A (2.4 A)</td>
</tr>
<tr>
<td><strong>Peak current</strong></td>
<td>4 A (8 A)</td>
</tr>
<tr>
<td><strong>Peak power</strong></td>
<td>50 W (100 W)</td>
</tr>
<tr>
<td><strong>Max. efficiency</strong></td>
<td>&gt; 98 %</td>
</tr>
</tbody>
</table>

### Steca Solarix MPPT
**Practical applications:**
- **Telecommunications** and **traffic management**
- **Industrial applications**

### Steca PR
PR 0303, PR 0505
The Steca PR 0303 and PR 0505 solar charge controllers are optimally suited for use in small solar home systems with module currents up to 5 A.

A 75 Wp module can be connected, which already allows operation of lamps, radios and a small television. All loads can be switched off using the manual load switch on the controller. The extremely low own consumption makes the Steca PR especially suitable for professional applications in telecommunications and traffic management technology. Since this is a serial controller, it is extremely flexible in the type of power source that can be connected. The electronic fuse makes the controller completely maintenance-free and robust.

### 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
- Battery overvoltage shutdown

### Displays
- Multi-coloured LED
- 3 multi-coloured LEDs show operating states
  - for operation, state of charge, fault messages

### Operation
- Manual load switch

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

### Technical data at 25 °C / 77 °F

<table>
<thead>
<tr>
<th>Steca PR PR 0303</th>
<th>PR 0505</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System voltage</strong></td>
<td>12 V</td>
</tr>
<tr>
<td><strong>Own consumption</strong></td>
<td>3 mA</td>
</tr>
<tr>
<td><strong>DC input side</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Open circuit voltage solar module</strong></td>
<td>17 V</td>
</tr>
<tr>
<td><strong>Module current</strong></td>
<td>3 A</td>
</tr>
<tr>
<td><strong>DC output side</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Load current</strong></td>
<td>3 A</td>
</tr>
<tr>
<td><strong>End of charge voltage</strong></td>
<td>13.9 V</td>
</tr>
<tr>
<td><strong>Boost charging voltage</strong></td>
<td>14.7 V</td>
</tr>
<tr>
<td><strong>Reconnection voltage</strong></td>
<td>12.5 V</td>
</tr>
<tr>
<td><strong>Boost voltage</strong></td>
<td>12.4 V</td>
</tr>
<tr>
<td><strong>Boost current</strong></td>
<td>1.2 A</td>
</tr>
<tr>
<td><strong>Peak current</strong></td>
<td>4 A</td>
</tr>
<tr>
<td><strong>Peak power</strong></td>
<td>60 W (120 W)</td>
</tr>
<tr>
<td><strong>Max. efficiency</strong></td>
<td>&gt; 98 %</td>
</tr>
</tbody>
</table>

### Steca PA TS 10
**Fitting and construction**
- **Terminals**:
  - Single wire (6 mm² / 10 mm² - AWG 10 / 8)
  - Multi-coloured LED

### Steca PA RC 100
**Multi-colour LED**
- night light function pre-set in the factory or adjustable

### Steca PA T510
**External temperature sensor** (page 31)

### Product features
- **Maximum Power Point Tracker (MPP-Tracker)**
- **Voltage and current regulation**
- **PWM control**
- **Current compensated load disconnection**
- **Automatic load reconnection**
- **Temperature compensation**
- **Low battery maintenance charge**

### Options
- **Night light function**
- **Temperature compensation**
- **Manual load switch**

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

### Important notes:
- Technical data at 25 °C / 77 °F
- **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 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.

### Specifications
- **Common positive grounding**
- **Series controller**
- **Automatic load reconnection**
- **Current compensated load disconnection**

### Technical data at 25 °C / 77 °F

<table>
<thead>
<tr>
<th>Steca PA TS 10</th>
<th>Steca PA RC 100</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Max. input voltage</strong></td>
<td>40 V</td>
</tr>
<tr>
<td><strong>Module voltage</strong></td>
<td>9 V (30 V)</td>
</tr>
<tr>
<td><strong>DC input side</strong></td>
<td>10 A</td>
</tr>
<tr>
<td><strong>DC output side</strong></td>
<td>10 A</td>
</tr>
<tr>
<td><strong>Load current</strong></td>
<td>10 A</td>
</tr>
<tr>
<td><strong>End of charge voltage</strong></td>
<td>13.9 V (27.8 V)</td>
</tr>
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<td><strong>Boost charging voltage</strong></td>
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</tr>
<tr>
<td><strong>Reconnection voltage</strong></td>
<td>12.5 V (25 V)</td>
</tr>
<tr>
<td><strong>Boost voltage</strong></td>
<td>12.4 V (24.8 V)</td>
</tr>
<tr>
<td><strong>Boost current</strong></td>
<td>1.2 A (2.4 A)</td>
</tr>
<tr>
<td><strong>Peak current</strong></td>
<td>4 A (8 A)</td>
</tr>
<tr>
<td><strong>Peak power</strong></td>
<td>50 W (100 W)</td>
</tr>
<tr>
<td><strong>Max. efficiency</strong></td>
<td>&gt; 98 %</td>
</tr>
</tbody>
</table>

### Steca PA T510
**External temperature sensor** (page 21)

### Steca PA RC 100
**Remote control** (page 31)

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Steca Solarix MPPT
Steca PR
www.steca.com
Steca PR
PR 1010, PR 1515, PR 2020, PR 3030

The Steca PR 10-30 series of charge controllers is the highlight in the range.

The latest charging technologies, combined with a Steca Atomic state of charge determination which has been significantly improved once again, result in optimal battery maintenance and control of the module output of up to 900 Wp which can be connected to it.

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 tank display. 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.

Steca PR 2020 IP

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 graphically in the form of a tank. The key component of the charge controller is the state of charge determination, which has been significantly improved. The auto-adaptive state of charge algorithm results in optimal battery maintenance and control of the module output of up to 480 Wp which can be connected to it. 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 Atomic (SOC)
- Automatic detection of voltage
- PWM control
- Multistage charging technology
- Load disconnection depending on SOC
- Automatic load reconnection
- Temperature compensation
- Common positive grounding or negative grounding on one terminal
- Integrated data logger
- Night light and morning light function
- Integrated self test
- Monthly maintenance charge
- Deep discharge protection
- Overcharge protection

**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
- Overcurrent protection
- Temperature compensation
- Common positive grounding or negative grounding on one terminal
- Integrated data logger
- Night light and morning light function
- Integrated self test
- Monthly maintenance charge
- Integrated energy meter

**Steca PA TS 10/15**

**Technical data at 25 °C / 77 °F**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open circuit voltage solar module</td>
<td>~ 47 V</td>
</tr>
<tr>
<td>Module current</td>
<td>10 A</td>
</tr>
<tr>
<td>DC input voltage</td>
<td>14.4 V (28.8 V)</td>
</tr>
<tr>
<td>Boost charge voltage</td>
<td>14.4 V (28.8 V)</td>
</tr>
<tr>
<td>Equalisation charge</td>
<td>14.7 V (29.4 V)</td>
</tr>
<tr>
<td>Deep discharge protection voltage (SOC)</td>
<td>&gt; 50% / 12.6 V (25.2 V)</td>
</tr>
<tr>
<td>State of charge determination with Steca Atomic (SoC)</td>
<td>&gt; 30% / 11.1 V (22.2 V)</td>
</tr>
</tbody>
</table>

**Steca PR 2020 IP**

**Technical data at 25 °C / 77 °F**

<table>
<thead>
<tr>
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<th>Value</th>
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<tbody>
<tr>
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</tr>
</tbody>
</table>

**Options**
- Manual load switch
- Programming by buttons
- Prepayment interface
- Alarm contact (page 31)
- Equalisation charge
- Open circuit voltage solar module
- System voltage
- Module voltage
- Equalisation charge
- Boost charge voltage
- Deep discharge protection voltage
- State of charge determination with Steca Atomic (SoC)

**Certificates**
- Approved by the World Bank for Nepal
- CE approved
- Made in Germany
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

**Areas of application**
- Marine applications
- Commercial applications
- Residential
- Hope energy
- Agricultural
- Remote areas
- Solar irrigation
- Off-grid
- Switchgear
- Outdoor use
- Homes
- Caravans
- Boats
- Industrial
- Remote areas
- Halls
- Marine applications
- Solar irrigation
- Off-grid
- Switchgear
- Outdoor use
- Homes
- Caravans
- Boats
- Industrial
- Remote areas
- Halls

**Technical data at 25 °C / 77 °F**

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<tr>
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<tbody>
<tr>
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<td>Module current</td>
<td>20 A</td>
</tr>
<tr>
<td>DC output voltage</td>
<td>12 V (24 V)</td>
</tr>
<tr>
<td>Boost charge voltage</td>
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<tr>
<td>Equalisation charge</td>
<td>14.7 V (29.4 V)</td>
</tr>
<tr>
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</tr>
<tr>
<td>State of charge determination with Steca Atomic (SoC)</td>
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</tr>
</tbody>
</table>

**Area of application**
- Marine applications
- Commercial applications
- Residential
- Hope energy
- Agricultural
- Remote areas
- Solar irrigation
- Off-grid
- Switchgear
- Outdoor use
- Homes
- Caravans
- Boats
- Industrial
- Remote areas
- Halls

**Technical data at 25 °C / 77 °F**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open circuit voltage solar module</td>
<td>~ 47 V</td>
</tr>
<tr>
<td>Module current</td>
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<tr>
<td>State of charge determination with Steca Atomic (SoC)</td>
<td>&gt; 30% / 11.1 V (22.2 V)</td>
</tr>
</tbody>
</table>
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 best choice for system sizes of up to 2,400 Wp at three voltage levels (12 V, 24 V, 48 V).

The integrated data logger stores all important system data which can be read via an open Steca RS232 interface. As an option, an external temperature sensor can also be connected. Two additional switching contacts can be freely configured as a timer, a night light function, to start generators or as surplus management.

### Electronic protection functions
- Overcharge protection
- Deep discharge protection
- Reverse polarity protection of module and battery
- Reversal polarity protection by internal fuse
- Automatic electronic fuse
- Short circuit protection of load and module
- Open circuit protection without battery
- Overtemperature and overload protection
- Battery voltage shutdown

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

### Options
- External temperature sensor (page 31)

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

### Area of application:
- Developed in Germany
- Produced in Germany

### Technical data at 25 °C / 77 °F

#### Product features
- Hybrid controller
- Solar charge controller
- Commissions without limitations
- Easy menu-driven operation
- Protective functions
- Data logger
- Robust metal casing
- Temperature compensation
- Monthly maintenance charge
- Integrate有多级智能功能
- Automatic electronic fuse
- Reverse polarity protection by internal fuse
- Overcharge protection
- Night light function with Steca Pa 15
- Innovative data logger
- Common positive grounding or negative grounding on temperature compensation
- Automatic load reconnection
- Load disconnection depending on SoC
- PWM control
- Automatic detection of voltage
- State of charge determination (SoC)
- Hybrid controller

### Technical data

<table>
<thead>
<tr>
<th>Model</th>
<th>4545</th>
<th>4545-48</th>
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</thead>
<tbody>
<tr>
<td>System voltage</td>
<td>12 V (24 V)</td>
<td>12 V (24 V)</td>
</tr>
<tr>
<td>User consumption</td>
<td>20 A</td>
<td>-</td>
</tr>
<tr>
<td>DC input side</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Module current</td>
<td>45 A</td>
<td>-</td>
</tr>
<tr>
<td>DC output side</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Load current</td>
<td>45 A</td>
<td>-</td>
</tr>
<tr>
<td>End of charge voltage</td>
<td>14.1 V (28.2 V)</td>
<td>14.1 V (28.2 V)</td>
</tr>
<tr>
<td>Start charge voltage</td>
<td>14.4 V (28.8 V)</td>
<td>14.4 V (28.8 V)</td>
</tr>
<tr>
<td>Equalization charge</td>
<td>15 V (30 V)</td>
<td>15 V (30 V)</td>
</tr>
<tr>
<td>Reconnection voltage (DC / U1)</td>
<td>&gt; 50 V / 105 V</td>
<td>&gt; 50 V / 105 V</td>
</tr>
<tr>
<td>Deep discharge protection (DC / U2)</td>
<td>&lt; 30 V / 60 V</td>
<td>&lt; 30 V / 60 V</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>-10 °C ... +60 °C</td>
<td>-10 °C ... +60 °C</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-25 °C ... +50 °C</td>
<td>-25 °C ... +50 °C</td>
</tr>
<tr>
<td>Frost protection</td>
<td>-26 °C - +50 °C</td>
<td>-26 °C - +50 °C</td>
</tr>
<tr>
<td>Fitting and construction</td>
<td>Liquid (adjustable via menu)</td>
<td>Liquid (adjustable via menu)</td>
</tr>
<tr>
<td>Technical data at 25 °C / 77 °F</td>
<td>300 g</td>
<td>300 g</td>
</tr>
</tbody>
</table>

Steca Tarom MPPT 6000

The Steca Tarom MPPT 6000 solar charge controller sets new standards in the area of Maximum Power Point charge controllers. Outstanding efficiency along with unique safety features make it a universal top-grade charge controller.

There are two available inputs to be used either in parallel or separately. Different module arrays can be flexibly combined using one charge controller.

- With an input voltage of up to 200 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.

### Electronic protection functions
- Overcharge protection
- Deep discharge 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
- Earth fault monitoring

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

### Options
- External temperature sensor (page 31)

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

### Technical data

<table>
<thead>
<tr>
<th>Model</th>
<th>MPPT 6000</th>
</tr>
</thead>
<tbody>
<tr>
<td>System voltage</td>
<td>12 V (24 V) / 48 V</td>
</tr>
<tr>
<td>Normal power</td>
<td>360 W / 720 W / 1,440 W</td>
</tr>
<tr>
<td>Max. efficiency</td>
<td>&gt; 98 %</td>
</tr>
<tr>
<td>Overcharge</td>
<td>25 °C</td>
</tr>
<tr>
<td>DC input side</td>
<td>10 V ... 170 V</td>
</tr>
<tr>
<td>MPPT voltage / setting</td>
<td>20 V ... 205 V</td>
</tr>
<tr>
<td>Open circuit voltage solar module / setting</td>
<td>20 V ... 205 V</td>
</tr>
<tr>
<td>(prevailing operating temperature)</td>
<td>20 V ... 205 V</td>
</tr>
<tr>
<td>Absolute current</td>
<td>2 x 30 A</td>
</tr>
<tr>
<td>DC output side</td>
<td>50 A</td>
</tr>
<tr>
<td>End of charge voltage</td>
<td>13.9 V (27.8 V) / 35.6 V</td>
</tr>
<tr>
<td>Boost (charge voltage)</td>
<td>14.4 V (28.8 V) / 37.6 V</td>
</tr>
<tr>
<td>Separation voltage</td>
<td>18.9 V (37.8 V) / 37.8 V</td>
</tr>
<tr>
<td>Reconnection voltage (DC)</td>
<td>12.5 V (25 V) / 50 V</td>
</tr>
<tr>
<td>Deep discharge protection (DC)</td>
<td>11.5 V (23 V) / 46 V</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>-26 °C - +50 °C</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-26 °C - +50 °C</td>
</tr>
<tr>
<td>Fitting and construction</td>
<td>Liquid (adjustable via menu)</td>
</tr>
</tbody>
</table>
**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 can be used to control system sizes of up to 8,400 Wp at three voltage levels (12 V, 24 V, 48 V). The Steca Power Tarom is based on the technology of the Steca Tarom and 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
- **Soft start:**
- **Solar power:**
- **Protection class:**
- **Overvoltage protection:**
- **Overtemperature and overload protection:**
- **Open circuit protection:**
- **Protection insolation:**
- **Remote control:**

### Areas of applications:

**Technical data at 25 °C / 77 °F**

- **System voltage:** 12 V (DC) 48 V
- **Output voltage:** 230 V AC +/-10 % 115 V AC +/-10 %
- **Output frequency:** 50 Hz 60 Hz
- **Compliance with:** European Standards (CE)

### Technical data

- **Model:** Steca PLI-300
- **System voltage:** 12 V
- **Continuous power:** 300 VA
- **Power 5 sec:** 350 VA
- **Power asymmetric:** 250 VA
- **Max. efficiency:** 85 %
- **Own consumption:** 0.5 W / 9 W
- **DC input side:**
- **Battery voltage:** 10.5 V ... 15 V
- **Resonance voltage (Uef):** 12.5 V
- **Deep discharge protection (UOb):** 10.5 V
- **AC output side:**
- **Max. efficiency:** 90 %
- **Protection class:** (double insulated)
- **Electrical protection:** No reverse polarity protection for the battery, overvoltage, over current, over temperature
- **Protection insolation:** Protection class II
- **Safety:**
- **Ambient temperature:** -20 °C ... +60 °C
- **Fitting and construction:**
- **Nominal power:** 300 W
- **Degree of protection:** IP 22
- **Dimensions:** (X x Y x Z): 245 x 117 x 62 mm
- **Weight:** 1.2 kg
- **Technical data at 25 °C / 77 °F**

**Steca PA HS200**

- **Rated power:** 200 W
- **Protection class:** II
- **Electrical protection:** No reverse polarity protection for the battery, overvoltage, over current, over temperature

**Steca PA Cab1 Tarom data cable**

- **Material:** Polyethylene
- **Length:** 5 m

**Steca PA 15**

- **Rated power:** 15 W
- **Protection class:** II
- **Electrical protection:** No reverse polarity protection for the battery, overvoltage, over current, over temperature

**Steca Tarom data logger and Steca PA CAB1 Tarom data cable**

- **Material:** Polyethylene
- **Length:** 5 m

**Steaca Power Tarom 2140, Power Tarom 4110, Power Tarom 4140**

- **Specifications:**
- **Model:** Steca Power Tarom 2140, Power Tarom 4110, Power Tarom 4140
- **System voltage:** 12 V (DC) 48 V
- **Output voltage:** 230 V AC +/-10 % 115 V AC +/-10 %
- **Output frequency:** 50 Hz 60 Hz
- **Compliance with:** European Standards (CE)

### Technical data

- **Model:** Steca PLI-300
- **System voltage:** 12 V
- **Continuous power:** 300 VA
- **Power 5 sec:** 350 VA
- **Power asymmetric:** 250 VA
- **Max. efficiency:** 85 %
- **Own consumption:** 0.5 W / 9 W
- **DC input side:**
- **Battery voltage:** 10.5 V ... 15 V
- **Resonance voltage (Uef):** 12.5 V
- **Deep discharge protection (UOb):** 10.5 V
- **AC output side:**
- **Max. efficiency:** 90 %
- **Protection class:** (double insulated)
- **Electrical protection:** No reverse polarity protection for the battery, overvoltage, over current, over temperature

### Protection insolation

- **Protection class:** II
- **Safety:**
- **Ambient temperature:** -20 °C ... +60 °C
- **Fitting and construction:**
- **Nominal power:** 300 W
- **Degree of protection:** IP 22
- **Dimensions:** (X x Y x Z): 245 x 117 x 62 mm
- **Weight:** 1.2 kg

**Technical data at 25 °C / 77 °F**

**Steca PA HS200**

- **Rated power:** 200 W
- **Protection class:** II
- **Electrical protection:** No reverse polarity protection for the battery, overvoltage, over current, over temperature

**Steca PA Cab1 Tarom data cable**

- **Material:** Polyethylene
- **Length:** 5 m

**Steca PA 15**

- **Rated power:** 15 W
- **Protection class:** II
- **Electrical protection:** No reverse polarity protection for the battery, overvoltage, over current, over temperature

**Steca Tarom data logger and Steca PA CAB1 Tarom data cable**

- **Material:** Polyethylene
- **Length:** 5 m

### Technical data

- **Model:** Steca Power Tarom 2140, Power Tarom 4110, Power Tarom 4140
- **System voltage:** 12 V (DC) 48 V
- **Output voltage:** 230 V AC +/-10 % 115 V AC +/-10 %
- **Output frequency:** 50 Hz 60 Hz
- **Compliance with:** European Standards (CE)

### Technical data

- **Model:** Steca PLI-300
- **System voltage:** 12 V
- **Continuous power:** 300 VA
- **Power 5 sec:** 350 VA
- **Power asymmetric:** 250 VA
- **Max. efficiency:** 85 %
- **Own consumption:** 0.5 W / 9 W
- **DC input side:**
- **Battery voltage:** 10.5 V ... 15 V
- **Resonance voltage (Uef):** 12.5 V
- **Deep discharge protection (UOb):** 10.5 V
- **AC output side:**
- **Max. efficiency:** 90 %
- **Protection class:** (double insulated)
- **Electrical protection:** No reverse polarity protection for the battery, overvoltage, over current, over temperature

### Protection insolation

- **Protection class:** II
- **Safety:**
- **Ambient temperature:** -20 °C ... +60 °C
- **Fitting and construction:**
- **Nominal power:** 300 W
- **Degree of protection:** IP 22
- **Dimensions:** (X x Y x Z): 245 x 117 x 62 mm
- **Weight:** 1.2 kg

**Technical data at 25 °C / 77 °F**
Steca Solarix PI

550, 550-600, 600, 600-600, 1100, 1100-600, 1200, 1200-600

In developing the Steca Solarix PI sine wave inverter, Steca has brought about some innovations which are unprecedented in this form. These are, above all, parallel connection1), 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 Power Tarom, and the electronic fuse. Furthermore, our 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.

Steca PI SET

Parallel connection made easy1)

The days of combining individual components to create a parallel connection of sine wave inverters have come to an end. All devices and elements required for the desired power class are now supplied in a single package. One package – and your order is complete!

You can choose from four Steca Solarix PI sets for off-grid systems – with one, two, three or four Steca Solarix PI inverters with outputs of up to 4,400 W. The sets include all the cables required and the Steca Pax4 parallel switch box. The data cable for connecting the appropriate charge controller is also included in the set.

The Steca Solarix PI set greatly simplifies the ordering process. Fully integrated packaged solutions are supplied.

Product features

- True sine wave voltage
- Can be connected to the Steca Power Tarom with a Steca Pax4 parallel switch box
- Excellent overload capabilities
- Optional battery protection
- Automatic load detection
- Parallel connectable2)
- 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

Certificates

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

* As of January 2016, these solutions still also work with Steca Solarix PI 600 and Steca Solarix PI 1100.

Steca Solarix PI

<table>
<thead>
<tr>
<th>Power 30 min.</th>
<th>550 Va</th>
<th>1,100 Va</th>
<th>1,650 Va</th>
<th>2,200 Va</th>
<th>550 Va</th>
<th>1,100 Va</th>
<th>2,200 Va</th>
<th>3,300 Va</th>
<th>4,400 Va</th>
</tr>
</thead>
<tbody>
<tr>
<td>550 W...4,400 W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System voltage</th>
<th>12 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous power</td>
<td>450 VA</td>
</tr>
<tr>
<td>Power 30 min.</td>
<td>550 VA</td>
</tr>
<tr>
<td>Power 10 sec.</td>
<td>750 VA</td>
</tr>
<tr>
<td>Power asymmetry</td>
<td>250 VA</td>
</tr>
<tr>
<td>Max. efficiency</td>
<td>93 %</td>
</tr>
<tr>
<td>DC input side</td>
<td>50 Hz</td>
</tr>
<tr>
<td>Protection class</td>
<td>ii (double insulated)</td>
</tr>
<tr>
<td>Electrical protection</td>
<td>reverse polarity battery, reverse polarity AC, over voltage, over current, over temperature</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>Ambient temperature</td>
</tr>
<tr>
<td>Fitting and construction</td>
<td>Cable length battery / AC</td>
</tr>
<tr>
<td>Protection</td>
<td>IP 20</td>
</tr>
<tr>
<td>Dimensions (L x W x H)</td>
<td>212 x 195 x 130 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>6.6 kg 2)</td>
</tr>
</tbody>
</table>

Set-12

<table>
<thead>
<tr>
<th>Power 100 sec.</th>
<th>700 Va</th>
<th>1,400 Va</th>
<th>2,100 Va</th>
<th>2,800 Va</th>
<th>700 Va</th>
<th>1,400 Va</th>
<th>2,100 Va</th>
<th>2,800 Va</th>
<th>3,500 Va</th>
<th>700 Va</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System voltage</th>
<th>12 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous power</td>
<td>450 VA</td>
</tr>
<tr>
<td>Power 30 min.</td>
<td>550 VA</td>
</tr>
<tr>
<td>Power 10 sec.</td>
<td>750 VA</td>
</tr>
<tr>
<td>Power asymmetry</td>
<td>250 VA</td>
</tr>
<tr>
<td>Max. efficiency</td>
<td>93 %</td>
</tr>
<tr>
<td>DC input side</td>
<td>60 Hz</td>
</tr>
<tr>
<td>Protection class</td>
<td>ii (double insulated)</td>
</tr>
<tr>
<td>Electrical protection</td>
<td>reverse polarity battery, reverse polarity AC, over voltage, over current, over temperature</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>Ambient temperature</td>
</tr>
<tr>
<td>Fitting and construction</td>
<td>Cable length battery / AC</td>
</tr>
<tr>
<td>Protection</td>
<td>IP 20</td>
</tr>
<tr>
<td>Dimensions (L x W x H)</td>
<td>212 x 195 x 130 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>6.6 kg 2)</td>
</tr>
</tbody>
</table>

* Data communication with Steca Power Tarom in dependence of Steca Power Tarom SOC

1) Technical data at 25 °C / 77 °F
2) per inverter

www.steca.com
**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 PAx4. 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 PAx4 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 off 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 usage 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 inverts 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.

*As of January 2014, these solutions will also work with Steca Solarix PI 600 and Steca Solarix PI 1200.*
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.

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

### Technical data at 25 °C / 77 °F

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery voltage</td>
<td>12 V</td>
<td>24 V</td>
</tr>
<tr>
<td>Continuous power</td>
<td>200 VA</td>
<td>300 VA</td>
</tr>
<tr>
<td>Power factor</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Power factor 5 sec.</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>Max. efficiency</td>
<td>93%</td>
<td>94%</td>
</tr>
<tr>
<td>DC input side</td>
<td>12 V</td>
<td>24 V</td>
</tr>
<tr>
<td>Battery voltage</td>
<td>15.5 V</td>
<td>16 V</td>
</tr>
<tr>
<td>AC output side</td>
<td>220 VA</td>
<td>330 VA</td>
</tr>
<tr>
<td>Load detection (default)</td>
<td>2 W</td>
<td>3 W</td>
</tr>
<tr>
<td>Adjustable load detection (0 W ... 60 W)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-20 °C ... +50 °C</td>
<td></td>
</tr>
<tr>
<td>Altitude</td>
<td>up to 2000 m</td>
<td></td>
</tr>
<tr>
<td>Water protection</td>
<td>IP 20</td>
<td></td>
</tr>
<tr>
<td>Dimensions (X x Y x Z)</td>
<td>170 x 142 x 84 mm</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>2.4 kg</td>
<td></td>
</tr>
</tbody>
</table>

Steca XPC

1400-12, 2200-24, 2200-48

The Steca XPC series of inverters combine a very high overload capacity with the capability to operate highly critical loads. Other important features of these high-quality inverters are their powerful device protection and their low own consumption. The Steca XPCs combine a sine wave inverter, four-stage battery charger and transfer system in one device, therefore making them also suitable for hybrid systems. The built-in multifunctional contact enables you, for example, to switch on and off diversion loads for excess power or start a diesel generator to recharge batteries.

### Electronic protection functions
- Deep discharge protection
- Battery overvoltage shutdown
- Overtemperature and overload protection
- Short circuit protection
- Reverse polarity protection by internal fuse
- Acoustic alarm at deep discharge or overheating

### Displays
- 7 LEDs show operating states
- For operation, built messages

### Operation
- Main switch
- Adjustable load detection
- Programming by buttons

### Options
- Types with 230 V / 60 Hz
- Types with 115 V / 60 Hz
- Model with protective lacquered mainboard

### Technical data at 25 °C / 77 °F

<table>
<thead>
<tr>
<th>Steca XPC 1400-12, 2200-24, 2200-48</th>
<th>1,400 W</th>
<th>2,200 W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery voltage</td>
<td>12 V</td>
<td>24 V</td>
</tr>
<tr>
<td>Continuous power</td>
<td>1,100 VA</td>
<td>1,800 VA</td>
</tr>
<tr>
<td>Power 5 sec.</td>
<td>1,400 VA</td>
<td>2,200 VA</td>
</tr>
<tr>
<td>Power 5 sec.</td>
<td>3,300 VA</td>
<td>4,800 VA</td>
</tr>
<tr>
<td>Max. efficiency</td>
<td>94%</td>
<td>95%</td>
</tr>
<tr>
<td>Own consumption</td>
<td>0.8 W / 4 W</td>
<td>0.9 W / 7 W</td>
</tr>
<tr>
<td>Power 5 sec.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery voltage</td>
<td>9.5 V</td>
<td>16 V</td>
</tr>
<tr>
<td>Battery monitoring</td>
<td>UUV, IUV, floating and equalization voltage adjustable by user via optional remote control RCC-01</td>
<td></td>
</tr>
<tr>
<td>AC output side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output voltage</td>
<td>230 V aC +10% / -10% (true sine wave)</td>
<td></td>
</tr>
<tr>
<td>Output frequency</td>
<td>50 Hz +/-0.05% (crystal controlled)</td>
<td></td>
</tr>
<tr>
<td>Load detection (standby)</td>
<td>adjustable: 1 W ... 25 W</td>
<td></td>
</tr>
<tr>
<td>Input side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input voltage adjustable: 150 V aC ... 230 V aC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input current</td>
<td>0 a ... 45 a</td>
<td>0 a ... 37 a</td>
</tr>
<tr>
<td>Output voltage</td>
<td>230 V aC +10% / -10% (true sine wave)</td>
<td></td>
</tr>
<tr>
<td>Output frequency</td>
<td>50 Hz +/-0.05% (crystal controlled)</td>
<td></td>
</tr>
<tr>
<td>Load detection (standby)</td>
<td>adjustable: 1 W ... 25 W</td>
<td></td>
</tr>
<tr>
<td>Operating conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-20 °C ... +56 °C</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fitting and connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable length battery</td>
<td>160 cm</td>
<td></td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 20</td>
<td>with optional top cover IP 22</td>
</tr>
<tr>
<td>Dimensions (X x Y x Z)</td>
<td>215 x 410 x 124 mm</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>11.7 kg</td>
<td></td>
</tr>
</tbody>
</table>

Certificates

- Compliant with European Standards (CE)
- RoHS compliant

### Product features
- True sine wave voltage
- Excellent overload capabilities
- Optimal battery protection
- Adjustable integrated battery charger
- Automatic load detection
- Best reliability
- Can be used as a back-up system or uninterruptible power supply (UPS)
- Multifunction contact
- Ultra-fast transfer relay

### Electronic protection functions
- Deep discharge protection
- Battery overvoltage shutdown
- Overtemperature and overload protection
- Short circuit protection
- Reverse polarity protection by internal fuse
- Acoustic alarm at deep discharge or overheating

### Displays
- 7 LEDs show operating states
- For operation, built messages

### Operation
- Main switch
- Adjustable load detection
- Programming by buttons

### Options
- Types with 230 V / 60 Hz
- Types with 115 V / 60 Hz
- Model with protective lacquered mainboard

### Technical data at 25 °C / 77 °F

<table>
<thead>
<tr>
<th>Steca XPC 1400-12, 2200-24, 2200-48</th>
<th>1,400 W</th>
<th>2,200 W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery voltage</td>
<td>12 V</td>
<td>24 V</td>
</tr>
<tr>
<td>Continuous power</td>
<td>1,100 VA</td>
<td>1,800 VA</td>
</tr>
<tr>
<td>Power 5 sec.</td>
<td>1,400 VA</td>
<td>2,200 VA</td>
</tr>
<tr>
<td>Power 5 sec.</td>
<td>3,300 VA</td>
<td>4,800 VA</td>
</tr>
<tr>
<td>Max. efficiency</td>
<td>94%</td>
<td>95%</td>
</tr>
<tr>
<td>Own consumption</td>
<td>0.8 W / 4 W</td>
<td>0.9 W / 7 W</td>
</tr>
<tr>
<td>Power 5 sec.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery voltage</td>
<td>9.5 V</td>
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<tr>
<td>Battery monitoring</td>
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<td></td>
</tr>
<tr>
<td>AC output side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output voltage</td>
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<td></td>
</tr>
<tr>
<td>Output frequency</td>
<td>50 Hz +/-0.05% (crystal controlled)</td>
<td></td>
</tr>
<tr>
<td>Load detection (standby)</td>
<td>adjustable: 1 W ... 25 W</td>
<td></td>
</tr>
<tr>
<td>Input side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input voltage adjustable: 150 V aC ... 230 V aC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input current</td>
<td>0 a ... 45 a</td>
<td>0 a ... 37 a</td>
</tr>
<tr>
<td>Output voltage</td>
<td>230 V aC +10% / -10% (true sine wave)</td>
<td></td>
</tr>
<tr>
<td>Output frequency</td>
<td>50 Hz +/-0.05% (crystal controlled)</td>
<td></td>
</tr>
<tr>
<td>Load detection (standby)</td>
<td>adjustable: 1 W ... 25 W</td>
<td></td>
</tr>
<tr>
<td>Operating conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-20 °C ... +56 °C</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fitting and connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable length battery</td>
<td>160 cm</td>
<td></td>
</tr>
<tr>
<td>Degree of protection</td>
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<td></td>
</tr>
<tr>
<td>Weight</td>
<td>11.7 kg</td>
<td></td>
</tr>
</tbody>
</table>

Certificates

- Compliant with European Standards (CE)
- RoHS compliant

### Product features
- True sine wave voltage
- Excellent overload capabilities
- Optimal battery protection
- Adjustable integrated battery charger
- Automatic load detection
- Best reliability
- Can be used as a back-up system or uninterruptible power supply (UPS)
- Multifunction contact
- Ultra-fast transfer relay
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.

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 (e.g. 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 land connection, can be combined with the Steca Xtender with almost all inverters which are already available. It is also possible to combine the Steca Xtender with almost all inverters which are already available. 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 Solsum VC
Voltage converter
When appliances such as cassette recorders or radios which are designed to use dry batteries are connected to 12 V or 24 V batteries, they normally require a lower voltage than that supplied by the system battery. These appliances can be powered using the Steca Solsum VC adjustable voltage converter. The Solsum VC is also suitable for operating a 12-V appliance with a 24-V battery. The maximum output current for doing so is 1.5 A. When developing this converter, the greatest value was placed on safety and reliability. Five programmed output voltages enable universal usage.

Product features
- Wide input voltage range
- Low own consumption
- Screw terminals allow universal and rapid installation

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

Displays
- 2 multi-coloured LEDs show operating states
- for operation and polarity

Operation
- Configuration by jumpers

Certificates
- Compliant with European Standards (CE)
- Manufactured according to ISO 9001 and ISO 14001

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 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

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

Certificates
- Compliant with European Standards (CE)

Characterisation of the operating performance

<table>
<thead>
<tr>
<th>System voltage</th>
<th>own consumption 1)</th>
<th>DC input side</th>
<th>DC output side</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 V / 24 V</td>
<td>2 mA (12 V = 12 V)</td>
<td>5 V ... 30 V</td>
<td>3 V / 6 V / 7.5 V / 9 V / 12 V</td>
</tr>
<tr>
<td>Output current</td>
<td>1.5 mA</td>
<td></td>
<td>&lt; 1,500 mA</td>
</tr>
</tbody>
</table>

Fitting and construction

Terminal (fine / single wire) 1.5 mm² / 2.5 mm² - AWG 16 / 14
Dimensions (X x Y x Z) 98 x 88 x 35 mm
Weight 50 g

Technical data at 25 °C / 77 °F

Determining the output current

<table>
<thead>
<tr>
<th>Output current</th>
<th>0 V</th>
<th>5 V</th>
<th>6 V</th>
<th>7.5 V</th>
<th>9 V</th>
<th>12 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>System voltage 12 V</td>
<td>1,000 mA</td>
<td>1,750 mA</td>
<td>3,500 mA</td>
<td>5,000 mA</td>
<td>5,000 mA</td>
<td></td>
</tr>
<tr>
<td>System voltage 24 V</td>
<td>400 mA</td>
<td>500 mA</td>
<td>500 mA</td>
<td>600 mA</td>
<td>700 mA</td>
<td></td>
</tr>
</tbody>
</table>

1) The input voltage has to be at least 2 V higher than the output voltage.
2) The max. current depends on the input and output voltage.

Characterisation of the operating performance

<table>
<thead>
<tr>
<th>Nominal power</th>
<th>65 W</th>
<th>105 W</th>
<th>180 W</th>
<th>275 W</th>
<th>415 W</th>
<th>170 W</th>
<th>100 W</th>
<th>200 W</th>
<th>360 W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. efficiency</td>
<td>90 %</td>
<td>85 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC input side</td>
<td>Input voltage 18 V ... 35 V</td>
<td>20 V ... 35 V</td>
<td>9 V ... 18 V</td>
<td>9 V ... 18 V / 20 V ... 35 V / 30 V ... 60 V / 60 V ... 120 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output voltage 13.2 V</td>
<td>13.8 V</td>
<td>24 V</td>
<td>12.5 V / 24 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output current 5.5 A</td>
<td>8 A</td>
<td>12 A</td>
<td>20 A</td>
<td>30 A</td>
<td>7 A</td>
<td>8 A / 8 A</td>
<td>16.5 A / 8 A</td>
<td>30 A / 15 A</td>
<td></td>
</tr>
</tbody>
</table>

Operating conditions

| Ambient temperature | -20 °C ... + 40 °C | -20 °C ... + 45 °C |

Technical data at 25 °C / 77 °F

Dimensions (X x Y x Z) 87 x 55 x 49 mm / 87 x 115 x 49 mm / 87 x 115 x 49 mm / 87 x 115 x 49 mm / 88 x 153 x 49 mm / 88 x 182 x 49 mm / 163 x 160 x 64 mm
Weight 170 g / 250 g / 260 g / 460 g / 930 g / 3000 g / 500 g / 600 g / 1.4 kg
Casing principle convection / fan / convection / fan / convection / fan

Areas of application:

[Image of Steca Solsum VC]

[Image of Steca MDCI 100]

[Image of Steca MDCI 360]

www.steca.com
Steca 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.1)

The Steca PF 166, Steca PF 240 and Steca PF 166 battery free 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. Thanks to the latest a++ energy efficiency class, together with optimal electronic control and an RPM control of the compressor, it is possible to ensure that the energy is used extremely efficiently. This leads to significant cost reductions.

Product features
- a++ energy efficiency class
- Fast cooling due to compressor speed control
- Refrigerator runs on a 70 W photovoltaic module in most climates
- Automatic detection of voltage
- Temperature fully programmable
- Adjustable refrigerator or freezer1) 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)
- Approved by the World Bank for China and Sri Lanka
- Developed in Germany
- Manufactured according to ISO 9001 and ISO 14001

Product features
- Brightness of a 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 Solsum ESL

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 LEDs or incandescent bulbs.

Product features
- a++ energy efficiency class
- Energy consumption of an ESL is comparable with an incandescent bulb
- 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 ESL 7, ESL 11

Characterisation of the operating performance
- Nominal voltage 12 V
- Nominal power 5 W, 7 W, 11 W
- Rated current 420 ma, 580 ma, 920 ma
- Luminous flux 250 lm, 370 lm, 650 lm
- Luminous efficiency 50 lm/W, 52 lm/W, 60 lm/W
- Life span > 9,000 h
- Switching cycles 100,000
- DC input side
- DC output side
- Input voltage 10 V … 15 V
- Operating conditions
- Ambient temperature -20 °C … + 50 °C
- Fitting and construction
- Dimensions (X x Y x Z) 123 x 55 mm, 133 x 55 mm, 163 x 55 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

Consumption Steca PF 166 (Wh / day)
- Ambient temperature 10 °C
- Interior temperature +8 °C
- Interior temperature +3 °C
- Interior temperature -10 °C
- Interior temperature -3 °C
- Interior temperature -10 °C
- Interior temperature -20 °C
- Interior temperature +10 °C … +43 °C
- Interior temperature +10 °C … +40 °C
- Interior temperature -20 °C … +10 °C
- Interior temperature -30 °C … +40 °C

Consumption Steca PF 240 (Wh / day)
- Ambient temperature 10 °C
- Interior temperature +8 °C
- Interior temperature +3 °C
- Interior temperature -10 °C
- Interior temperature -3 °C
- Interior temperature -10 °C
- Interior temperature -20 °C
- Interior temperature +10 °C … +40 °C
- Interior temperature -20 °C … +10 °C
- Interior temperature -30 °C … +40 °C

Consumption Steca PF 166 battery free
- Ambient temperature 10 °C
- Interior temperature +8 °C
- Interior temperature +3 °C
- Interior temperature -10 °C
- Interior temperature -3 °C
- Interior temperature -10 °C
- Interior temperature -20 °C
- Interior temperature +10 °C … +43 °C
- Interior temperature +10 °C … +40 °C
- Interior temperature -20 °C … +10 °C
- Interior temperature -30 °C … +40 °C

Consumption Steca PF 240 battery free
- Ambient temperature 10 °C
- Interior temperature +8 °C
- Interior temperature +3 °C
- Interior temperature -10 °C
- Interior temperature -3 °C
- Interior temperature -10 °C
- Interior temperature -20 °C
- Interior temperature +10 °C … +43 °C
- Interior temperature +10 °C … +40 °C
- Interior temperature -20 °C … +10 °C
- Interior temperature -30 °C … +40 °C

Certificates
- Energy efficiency class a++
- Characterisation of the operating performance
- System voltage 10 V (24 V) 17 V
- Nominal power 40 W … 100 W 50 Wp … 200 Wp
- Cooling volume 146 liters 240 liters 166 liters
- Refrigerator temperature +2 °C … +10 °C
- Freezer temperature -20 °C … -10 °C
- DC input side
- Input voltage 10 V … 17 V 12 V / 24 V battery
- Operating conditions
- Ambient temperature +10 °C … +43 °C
- DC output side
- Rectification voltage (12V) 11.7 V 24.2 V
- Deep discharge protection (DOP) 10.6 V (22.8 V)
- Operating conditions
- Ambient temperature +10 °C … +43 °C
- +10 °C … +40 °C
- Fitting and construction
- Dimensions (X x Y x Z) 917 x 670 x 255 mm
- Weight 47 kg, 62 kg, 47 kg
- Cooling principle compressor
- Celsius Fahrenheit temperature display
- Adjustable
- Display brightness adjustable
- Hanging baskets 2
- Freezer trays 3
- Cold battery 1
- Automatic energy-saving mode

Steca ESL battery free
- only Steca PF 166 and Steca PF 240
- Technical data at 25 °C / 77 °F
- no battery required

Steca ESL 7, ESL 11
- a++ energy efficiency class
- Energy consumption of ESL is comparable with an incandescent bulb
- 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 ULED
ULED 11, ULED 3, ULED 5
Steca ULEDs are compact LEDs for 12 V DC applications. The stable glass-ceramic housing means that it can even be used in critical environments. These are an optimum solution for use in remote locations due to their very long service life that makes replacement seldom necessary.

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

Luminous flux
- 1.1 W...5 W

Technical data at 25 °C / 77 °F
- Input voltage: 10.5 V ... 14.5 V
- Nominal power: 1.1 W...5 W
- Rated current: 92 mA ... 250 mA
- Rated voltage: 12 V
- Luminous flux: 45 lm ... 120 lm
- Luminous efficiency: 42 lm/W ...
- Life span: > 25,000 h
- DC input side: 10.5 V ... 14.5 V
- Weight: 40 g

Dimensional drawings:
- GU4/5.3 mount for Steca ULED 3
- GU4/5.3 mount for Steca ULED 5
- E27 base for Steca Solsum ESL and Steca ULED 11

Options for Steca solar charge controllers
Accessories for Steca PR 10-30, Steca Solarix MPP7, Steca PR 2020 iP, Steca Tarom 4545 and Steca Tarom MPP7 6000

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 MPP7, Steca PR 2020 iP, Steca Tarom 4545 and Steca Tarom MPP7 6000 solar charge controllers.

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

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

<table>
<thead>
<tr>
<th>Steca solar charge controller</th>
<th>Signal</th>
<th>Dry contact</th>
<th>Additional electronics necessary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steca PR 10-30</td>
<td>0 V / 5 V</td>
<td>no</td>
<td>y/n, y/n</td>
</tr>
<tr>
<td>Steca PR 2020 iP ALARM</td>
<td>0 V / 100 mA</td>
<td>no</td>
<td>n/a</td>
</tr>
<tr>
<td>Steca Tarom 4545</td>
<td>switch contact max. 30 V DC / 1 A</td>
<td>yes</td>
<td>n/a</td>
</tr>
<tr>
<td>Steca Tarom 4545-48</td>
<td>switch contact max. 50 V DC / 100 mA</td>
<td>yes</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Optional alarm contact
Steca solar charge controllers provide alarm contacts which allow to process this information in any other application. In case of an alarm such as low battery voltage, over temperature, overvoltage or other alarms a signal is processed which can be used for any purpose. The alarm codes are different among the Steca solar charge controllers. Each controller has its own alarm code table. In case an alarm is active either a 5 V signal to ground is active on the alarm contact or a galvanic isolated switch is closed. As soon as the alarm is no longer active the signal goes back to 0 V. The following table provides an overview on the available alarm options for Steca solar charge controllers.

Options for Steca solar charge controllers
Accessories for Steca PR 10-30, Steca Solarix MPP7, Steca PR 2020 iP, Steca Tarom 4545 and Steca Tarom MPP7 6000

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 MPP7, Steca PR 2020 iP, Steca Tarom 4545 and Steca Tarom MPP7 6000 solar charge controllers.

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

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

<table>
<thead>
<tr>
<th>Steca solar charge controller</th>
<th>Signal</th>
<th>Dry contact</th>
<th>Additional electronics necessary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steca PR 10-30</td>
<td>0 V / 5 V</td>
<td>no</td>
<td>y/n, y/n</td>
</tr>
<tr>
<td>Steca PR 2020 iP ALARM</td>
<td>0 V / 100 mA</td>
<td>no</td>
<td>n/a</td>
</tr>
<tr>
<td>Steca Tarom 4545</td>
<td>switch contact max. 30 V DC / 1 A</td>
<td>yes</td>
<td>n/a</td>
</tr>
<tr>
<td>Steca Tarom 4545-48</td>
<td>switch contact max. 50 V DC / 100 mA</td>
<td>yes</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Optional alarm contact
Steca solar charge controllers provide alarm contacts which allow to process this information in any other application. In case of an alarm such as low battery voltage, over temperature, overvoltage or other alarms a signal is processed which can be used for any purpose. The alarm codes are different among the Steca solar charge controllers. Each controller has its own alarm code table. In case an alarm is active either a 5 V signal to ground is active on the alarm contact or a galvanic isolated switch is closed. As soon as the alarm is no longer active the signal goes back to 0 V. The following table provides an overview on the available alarm options for Steca solar charge controllers.

<table>
<thead>
<tr>
<th>Steca solar charge controller</th>
<th>Signal</th>
<th>Dry contact</th>
<th>Additional electronics necessary</th>
</tr>
</thead>
<tbody>
<tr>
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<td>no</td>
<td>y/n, y/n</td>
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<td>Steca PR 2020 iP ALARM</td>
<td>0 V / 100 mA</td>
<td>no</td>
<td>n/a</td>
</tr>
<tr>
<td>Steca Tarom 4545</td>
<td>switch contact max. 30 V DC / 1 A</td>
<td>yes</td>
<td>n/a</td>
</tr>
<tr>
<td>Steca Tarom 4545-48</td>
<td>switch contact max. 50 V DC / 100 mA</td>
<td>yes</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Technical data at 25 °C / 77 °F
- Weight: 95 g
- Dimensional drawings:
  - GU4/5.3 connector block
  - GU4/5.3 luster terminal
  - GU4/5.3 luster terminal

Batteries:
- Steca Power tarom switch contact max. 50 V DC / 100 ma yes no
- Steca tarom 4545 switch contact max. 30 V DC / 1 a yes no

Cables:
- Steca Pr 10-30 0 V / 5 V no yes, for: - signal processing
- Steca Solarix MPP7 Steca Pa TSiP10 twice a 2-pole luster terminal
- Steca Pr 2020 iP Steca Pa TSiP10 twice a 2-pole luster terminal
- Steca Tarom 4545 Steca Pa TSiP10 two-pole connector
- Steca Tarom 4545-48 Steca Pa TSiP10 two-pole connector
- Steca MPP7 6000 Steca Pa TSiP10 two-pole connector
- Steca Tarom MPP7 6000 Steca Pa TSiP10 two-pole connector

External temperature sensors
- Steca Pa TS10, Steca Pa TSiP10 and Steca Pa TS-S external temperature sensors
  - Suitable for use with Steca PR 10-30, Steca Solarix MPP7, Steca PR 2020 iP, Steca Tarom 4545 and Steca Tarom MPP7 6000 solar charge controllers.

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

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

<table>
<thead>
<tr>
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<th>Signal</th>
<th>Dry contact</th>
<th>Additional electronics necessary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steca PR 10-30</td>
<td>0 V / 5 V</td>
<td>no</td>
<td>y/n, y/n</td>
</tr>
<tr>
<td>Steca PR 2020 iP ALARM</td>
<td>0 V / 100 mA</td>
<td>no</td>
<td>n/a</td>
</tr>
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<td>n/a</td>
</tr>
<tr>
<td>Steca Tarom 4545-48</td>
<td>switch contact max. 50 V DC / 100 mA</td>
<td>yes</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Steca PA Tarcom  Accessories for Steca Power Tarom

Data logger
- The Steca PA Tarcom data logger is connected to the RS485 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 RS232 interface to directly save and read data on the PC or Laptop (Steca PA Tarcom 01), as a data logger with an integrated GSM modem (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.

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

Displays
- LED shows operating states
- Interface indicators

Interfaces
- RS485 communication interface to Steca Power Tarom
- RS232 serial interface to PC
- 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
- Configures the telephone number and text message recipient
- Setting the interval for calls and for sending text messages
- Data transfer by modem or by text message

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

Example of application
Steca PA Tarcom GSM

Schematic diagram of Steca PA Tarcom

Steca PA HS200 Accessories for Steca Power Tarom

Shunt
- The Steca PA HS200 is a highly intelligent current sensor with extremely low own consumption.
- The Steca PA HS200 comes into play when (e.g.) an inverter is directly connected to the battery and the Steca Power Tarom charge controller cannot measure the current consumption. A shunt is also required when an additional generator (e.g. PV, wind or diesel) is directly charged by the battery without being connected to a Steca Power Tarom charge controller. The current is measured contact-free via a Hall-effect sensor.

Displays
- LCD shows operating states
- Messages via Steca Power Tarom LCD display

Interfaces
- Two RS485 cable sockets

Modes of operation
- Batteries: measures currents which flow through the battery cable
- Loads: measures currents of external loads not connected to the charge controller
- «Charger»: measures currents of back-up generators

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

Technical data
- System voltage: 12 V / 24 V / 48 V
- Logger capacity: 1 Mbit = 2 min. (11 days) → 4 h (14 years)
- Own consumption: 10 mA to 30 mA
- Recorded values: relative time, total charge current, battery current, solar module current, load current, SOC, battery voltage, system status, analog sensor
- System status information: right, overload, load disconnect, overvoltage, low voltage, over temperature, no module
- TDC output side: battery voltage: 0 V ... 65 V
- Safety: Alarm output: for all recorded parameters programmable
- Fitting and construction: Interfaces: RS232, 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

Areas of application:
- Solar system
- Battery
- Energy management
- Power supply
- Data acquisition

Technical data at 25 °C / 77 °F

Areas of application:
- Inverters
- Solar modules
- Battery

www.steca.com
Steca PAX4
Accessories for Steca Solarix Pi

Parallel switch box
Up to four Steca Solarix Pi can be operated in parallel*. The connections are made via an external box, the Steca PAX4.
A further innovation that has gone into the Steca Solarix Pi is the communication with the solar charge controllers from the Steca Power Taron series. A data connection to the charge controller can be created via the Steca PAX4.

*As of January 2016, these solutions will also work with Steca Solarix Pi 600 and Steca Solarix Pi 1200.

<table>
<thead>
<tr>
<th>PAX4</th>
<th>Operating conditions</th>
<th>Fitting and construction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ambient temperature</td>
<td>Cable</td>
</tr>
<tr>
<td></td>
<td>-20 °C … +45 °C</td>
<td>data cable master</td>
</tr>
<tr>
<td></td>
<td>Relative humidity</td>
<td>0 % … 95 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5 m red</td>
</tr>
<tr>
<td></td>
<td></td>
<td>data cable slave 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5 m grey</td>
</tr>
<tr>
<td></td>
<td></td>
<td>data cable slave 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 m grey</td>
</tr>
<tr>
<td></td>
<td></td>
<td>data cable Steca Power Taron</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 m black</td>
</tr>
<tr>
<td></td>
<td>Interfaces</td>
<td>6 x RJ45</td>
</tr>
<tr>
<td></td>
<td>Degree of protection</td>
<td>IP 20</td>
</tr>
<tr>
<td></td>
<td>Dimensions (X x Y x Z)</td>
<td>205 x 117 x 64 mm</td>
</tr>
<tr>
<td></td>
<td>Weight</td>
<td>800 g</td>
</tr>
</tbody>
</table>

Technical data at 25 °C / 77 °F

Steca RC02
Accessories for Steca Xtender XTS*, XTM and XTH

Remote control and display
Lots of information on the status of the system can be retrieved using the graphic display of the Steca RC02. Any incidents within the system are also saved and displayed. This means that any problems which might occur are identified easily.
Many values of the Steca Xtender can be set using the Steca RC02, 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.

Areas of application:
- Multi-function graphical LCD display with backlighting
- Programming by buttons
- Compliant with European Standards (CE)
- RoHS compliant

Steca PA RC100
Remote control
Steca PA RC100 remote control 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

Areas of application:
- Suitable for the following Steca charge controllers:
  - Steca Solarix F
  - Steca FTS
  - Steca Solaric MPP 2010

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.

Areas of application:
- 7 m / 180°
- Degree of protection: IP 65

Technical data:
- Technical data at 25 °C / 77 °F

*In conjunction with TCM-01

Displays
- Multi-function graphical LCD display with backlighting

Operation
- Programming by buttons

Certificates
- Compliant with European Standards (CE)
- RoHS compliant
Steca PA 15

Accessories for Steca Power Tarom

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

Electronic protection functions
- Switch-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
- Manufactured according to ISO 9001 and ISO 14001

Steca PA EV200 DC
12 V / 24 V, 36 V / 48 V 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.

Steca PA CAB1 Tarcom and Steca TP CAB2 Tarcom

Data cable
Steca data cables are used to connect the Steca Tarom 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 R45 v3+ 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-RS232 converter

Interfaces
- Steca Tarom connected via connector block
- Connection to Steca Power Tarom via R45 plug
- Connection to PC via USB

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

Steca top-hat rail mounting kit
The Steca top-hat rail mounting kit allows easy mounting of Steca solar charge controllers on a top-hat rail. The set consists of two retaining brackets and two screws.

The retaining brackets are screwed to the solar charge controller using one screw per bracket. This then allows the solar charge controller to be positioned on the top-hat rail and clicked into place. The brackets can be easily retrofitted to Steca solar charge controllers.

Product features
- Simple installation
- Best reliability
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.
Overview of devices:

- **Steca Solum F**: Solar charge controller
  - 6 - 10 A, 12 / 24 V
  - (page 8)

- **Steca Solarix PR5**: Solar charge controller
  - 10 - 30 A, 12 / 24 V
  - (page 9)

- **Steca Solarix MPPT**: Maximum Power Point Tracker
  - 10 - 20 A, 12 / 24 V
  - (page 10)

- **Steca Solarum ESL**: Energy-saving light
  - 5 W, 7 W, 11 W / 12 V
  - (page 29)

- **Steca ULED**: Energy-saving light
  - 1.1 W, 3 W, 5 W / 12 V
  - (page 30)

- **Steca PF 166**: Solar refrigerator/freezer
  - 12 / 24 V (page 28)

- **Steca PF 240**: Solar refrigerator/freezer
  - 12 / 24 V (page 28)

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**SOLAR HOME SYSTEMS**

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 modules charge 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.

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.
These fit with the design of the solar home systems, but are equipped with a special Steca solar 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 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.

**Overview of devices:**

- **Steca Solsum F**
  - Solar charge controller
  - 6 - 10 A, 12 / 24 V
  - (page 8)

- **Steca Solaris PRS**
  - Solar charge controller
  - 10 - 30 A, 12 / 24 V
  - (page 9)

- **Steca Solarix MPPT**
  - Maximum Power Point Tracker
  - 10 - 20 A, 12 / 24 V
  - (page 10)

- **Steca PR**
  - Solar charge controller
  - 10 - 30 A, 12 / 24 V
  - (page 12)

- **Steca PR 2020 IP**
  - Solar charge controller
  - 20 A, 12 / 24 V
  - (page 13)

- **Steca Tarom**
  - Solar charge controller
  - 45 A, 12 / 24 / 48 V
  - (page 14)

- **Steca Solarix prS**
  - Solar charge controller
  - 10 - 30 A, 12 / 24 V
  - (page 9)

- **Steca Solarix mPPt**
  - Maximum Power Point Tracker
  - 10 - 20 A, 12 / 24 V
  - (page 10)

- **Steca Tarom**
  - Solar charge controller
  - 45 A, 12 / 24 / 48 V
  - (page 14)

- **Steca P 15**
  - Solar charge controller
  - 10 A, 12 / 24 V
  - (page 12)

- **Steca PBR 2020 iP**
  - Solar charge controller
  - 10 - 30 A, 12 / 24 V
  - (page 13)

- **Steca P 15 with Pa 150 dC relay**
  - Solar charge controller
  - 15 A, 12 / 24 V
  - (page 15)

- **Steca P 15 with Pa 150 dC relay**
  - Solar charge controller
  - 15 A, 12 / 24 V
  - (page 15)

- **Steca P 15 with Pa 150 dC relay**
  - Solar charge controller
  - 15 A, 12 / 24 V
  - (page 15)

- **Steca P 15 with Pa 150 dC relay**
  - Solar charge controller
  - 15 A, 12 / 24 V
  - (page 15)

- **Steca PA 15**
  - Solar charge controller
  - 10 - 30 A, 12 / 24 V
  - (page 12)

- **Steca PA 15 with Pa eV200 dC relay**
  - Solar charge controller
  - 10 - 30 A, 12 / 24 V
  - (page 12)

**Duration of night light function**

<table>
<thead>
<tr>
<th>Solar charge controller</th>
<th>All night</th>
<th>After sunset</th>
<th>Before sunrise</th>
<th>Turn-on time delay</th>
<th>Maximum light current</th>
<th>Catalogue page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steca Solsum F</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0 - 12 h*</td>
<td>10 A</td>
<td>8</td>
</tr>
<tr>
<td>Steca PR</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0 - 12 h</td>
<td>30 A</td>
<td>72</td>
</tr>
<tr>
<td>Steca PR 2020 IP</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0 - 12 h</td>
<td>30 A</td>
<td>73</td>
</tr>
<tr>
<td>Steca Solaris PRS</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0 - 12 h*</td>
<td>30 A</td>
<td>9</td>
</tr>
<tr>
<td>Steca Solarix MPPT</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0 - 12 h*</td>
<td>20 A</td>
<td>70</td>
</tr>
<tr>
<td>Steca Tarom 4545</td>
<td>—</td>
<td>—</td>
<td>0 - 12 h</td>
<td>0 - 12 h</td>
<td>45 A</td>
<td>74</td>
</tr>
<tr>
<td>Steca Power Tarom</td>
<td>—</td>
<td>—</td>
<td>0 - 12 h</td>
<td>0 - 3 h</td>
<td>15 A</td>
<td>36</td>
</tr>
<tr>
<td>Steca PA 15</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>200 A</td>
<td>36</td>
</tr>
</tbody>
</table>

* Only for projects with larger order quantities.
* The type of night light function selected must be specified in the order.

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**Greece**

These fit with the design of the solar home systems, but are equipped with a special Steca solar 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 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.

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**Spain**

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Another special model makes these systems 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.
Inverter systems are designed as solar home systems. The central 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.

**Overview of devices:**

- **Steca PR**
  - Solar charge controller
  - 10 - 30 A, 12 / 24 V
  - (page 12)

- **Steca Solarix PES**
  - Solar charge controller
  - 10 - 30 A, 12 / 24 V
  - (page 9)

- **Steca Solarix PI**
  - Sine wave inverters
  - 550 - 4,400 W, 12 / 24 V
  - (page 10)

- **Steca PI-300**
  - Sine wave inverter
  - 300 W, 12 V
  - (page 17)

- **Steca Solarix MPPT**
  - Maximum Power Point Tracker
  - 10 - 20 A, 12 / 24 V
  - (page 10)

- **Steca Tarom**
  - Solar charge controller
  - 45 A, 12 / 24 / 48 V
  - (page 14)

- **Steca Tarom MPPT 6000**
  - Solar charge controller
  - 60 A, 12 / 24 / 48 V
  - (page 14)

- **Steca AJ**
  - Sine wave inverter
  - 500 - 2,400 W, 12 / 24 / 48 V
  - (page 22)
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 DC 24V 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 (page 14)
- **Steca Tarom MPPT 6000** Solar charge controller 60 A, 12 / 24 / 48 V (page 15)
- **Steca Xcender XTS** Hybrid inverter 1,000 W - 12,600 W (page 24)
- **Steca Xcender XTM** Hybrid inverter 1,500 W - 36,000 W (page 24)
- **Steca Xcender XTH** Hybrid inverter 3,000 W - 72,000 W (page 24)
- **Steca Power Tarom** Solar charge controller 15 - 140 A, 12 / 24 / 48 V (page 16)
- **Steca PA 15** Remote control 720 W (page 36)
- **Steca PA HS200** Shunt 10 - 65 V (page 33)
- **Steca PA Tarcom** Data logger 12 / 24 / 48 V (page 32)
- **Steca RCC-02** Remote control and display (page 34)
The central, intelligent element within the system is the Steca Tarom or Power Tarom solar charge controller (B): it controls the energy flow and protects the battery against critical states. Steca Tarom/ 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 tarom / Power tarom. Based on the calculated state of charge of the battery, the Steca PA 15 switches the extra generator on or off. The load is now being supplied from the generator (G), and 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 Tarom / Power Tarom controls the DC hybrid system. The Steca PA HS200 current sensor (E) transfers all information on the charge and discharge currents at the DC bus to the Steca Tarom / 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 Tarom / 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.

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 Taroms / Power Taroms, inverters etc., are determined and communicated to the master Tarom / 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.

The control concept is similar to that of the single-phase system. If more than one Steca Tarom / 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 Tarom / Power Tarom is directly connected to the battery and all slaves are connected to the DC bus. Only the master Tarom / Power Tarom shows the correct state of charge on its display and controls the energy flow around the system. Slave Taroms / 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.
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 load 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.

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 output power.

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 StecaGrid 3000/3600 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.

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.
If there is a grid outage, the hybrid system inverter (C) automatically switches mode by means of the Steca S-Box (D) to operate as a sine wave inverter, and continues to feed power to the supplied loads (L) without any interruption. Because the grid inverter can no longer supply power to the grid, its output is channelled directly to the supplied loads (L). In this way, the loads can receive power directly from the grid inverter of the solar modules. At the same time, the battery is recharged with the available solar energy, which increases the length of time for which the supplied loads can receive power during the night.

With this set-up, the capacity of the battery can be kept small, allowing for an optimal design of system costs. The Solsafe system is fully automatic, and can be integrated into any new or existing PV system. Solsafe ensures the power supply, and furthermore allows the solar energy to be fully utilised.

Why choose Steca Solsafe?
- it allows great system flexibility. The grid inverter is designed according to the PV generator, and the sine wave inverter according to the desired emergency power supply.
- The PV system’s output and operating voltage can be freely selected, and do not depend on the size and battery voltage of the emergency power supply.
- It should be noted, however, that the AC output of the grid inverter may never be greater than the rated output of the sine wave inverter.
- The PV voltage of the grid inverter does not depend on the battery voltage.
- Existing grid-connected solar power systems can be fitted with Steca Solsafe without alterations of any kind.
- The available PV capacity is added to that of the sine wave inverter in the event of a power outage, or the solar power is stored in the battery.

Simple wiring with the Steca S-Box
The Steca S-Box offers a professional solution for simple wiring of a Steca Solsafe system. It contains all power switches necessary for implementation. The grid inverters and all inputs and outputs on the Steca Xtender inverters (XTS, XTM and XTH) are connected to the Steca S-Box. This means that installation errors are virtually impossible.
SteCa Soluse Basic System intelligently combines a supply system with an off-grid and battery-supported self-consumption solution.

Due to rising electricity prices and falling feed-in tariffs, it is becoming increasingly sensible to consume one’s own generated electricity. SteCa Soluse Basic System makes this possible: via the Soluse Basic Box (D), selected loads (L) can be supplied directly or by intermediately stored solar power.

The system consists of the grid inverter StecaGrid 3600 (B), the Soluse Basic Box (D) and the lithium storage system SUN. The Soluse Basic Box contains the bidirectional sine wave inverter Steca XTM 4000-48 (C), which is responsible for charging the battery (H), supplying the loads (L) and controlling the system. It also features a smart switching function which connects the grid inverter and the supply grid inverter (B) and commences feed-in. At minimum voltage, the loads are connected to the grid.

Given continuously unfavourable solar irradiation conditions, the battery (H) can be additionally charged by the grid (K).

Steca Soluse Basic Box

The Steca Soluse Basic Box is the central unit of the Steca Soluse Basic system. It supplies selected consumers either directly or with stored solar energy.

The Soluse Basic Box includes the bi-directional sine wave inverter Steca XTM 4000-48, which is responsible for charging the battery, supplying the loads and controlling the system. It also features smart switching of grid inverters and consumers to be connected to the supply grid or stand-alone grid depending on the battery voltage.

Single-phase grid inverters up to 3.6 kW, for example the StecaGrid 3600, can be connected to the Soluse Basic Box. The Soluse Basic Box is therefore optimally suited for extending supply systems.

Product features
- Safely switches loads to the grid in case of deep discharge
- Safely switches the grid inverter when the battery is fully charged
- Full grid conformity as per VDE AR 4105
- Grid-independent load operation
- Reinforced insulation between supply and stand-alone grid
- Synchronisation when switching the grid inverter
- Switching consumers < 200 ms
- Manual switching in case of deep discharge
- Monitoring via built-in energy meters and SD interface
- Battery not included
- Load or Li-ion batteries can be used
- Fully automated operation
- Simple installation
- Retrofitting possible
- Lower own consumption
- PFC as per 61000-3-2

Electronic protection functions
- Residual current circuit breaker and automatic cutout in the stand-alone grid protect consumers
- Redundant droop mode to protect batteries
- Grid and system protection with StecaGrid 3600

Displays
- Energy flows with kWh meter
- Configuration via display unit

Overview of devices:

Steca Soluse Basic Box

Steca Grid Connected

Steca RCC-02

Steca Xtender XTM

Steca NCC-A2

Technical data at 25 °C / 77 °F

- Interface 3.6 kW AC (single-phase)
- System frequency 50 Hz
- Max. input current 16 A
- Max. grid transformer power 9 kW
- Max. consumer power 8 kW
- DC side
- Battery voltage 48 V
- Max. charging current 30 A
- Max. discharging performance 3.6 kW
- Capacity 100 Ah (expandable)
- Equipment and design
- Engine oil protection: IP 22
- Dimensions (W x D x H) 600 x 180 x 178 mm
- Weight 27 kg
- Cooling principle: fan from 55 °C

Full flexibility with practical functions make the Steca Soluse Basic System stand out:

Installation
Single-phase grid inverters with up to 3.6 kW, for example the StecaGrid 3600, can be connected to the Soluse Basic Box. Existing supply systems can be expanded using this system. In addition to supply lines from the grid, lines from the battery and the public grid can be connected to the Soluse Basic Box.

Backup function
Connected loads are still supplied with power during a power failure. This is possible as long as the battery has not reached its minimum voltage.

Configuration via display unit

Remote control

Steca RCC-02
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 ratio of 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 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.
SELECTING THE SOLAR CHARGE 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. Thus, it 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 largescale 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 (Isc) 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.

Two criteria are decisive for charge controllers with MPP tracking. Firstly, the total output of all connected solar modules (in Wp) must not exceed the maximum input power of the solar charge controller. Secondly, the open circuit voltage (Uoc) on all solar modules (also series-connected) must not exceed the maximum input voltage of the solar charge controller under any circumstances. Care must be taken here, especially due to the temperature dependence of the open circuit voltage on the solar modules. This voltage increases as the temperature decreases. Based on the lowest temperature which occurs during the application, the open circuit voltage of the solar module must be calculated using the temperature coefficients from the module data sheet. The maximum input voltage of the solar charge controller must be higher than this voltage.

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 nonflammable 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.
**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 requirements 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 load current. In some applications, however, technical properties also play an important role in the choice of solar charge controller.

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.

\[
C_{bat} \geq 5 \times \frac{P_{inv}}{U_{bat}}
\]

\(P_{inv}\) is the rated power of the inverter in watts and \(U_{bat}\) is the rated voltage of the battery.

**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.
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. In conception, development, production and marketing, the company is committed to the highest quality standards.

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