STUDER

Battery chargers

Inverter-chargers

Battery monitoring

Engineered power

Inverters

Battery splitters

Battery separators

MPPT solar charge controllers

DC/DC converters

SWISS made power

Summary

Photos credits
Robert Hofer, Céline Ribordy: Studer's products; EB techniek/De Hoeve: p. 8; Hacksss-Fotolia.com: p. 10; Getek AS: p. 24; Meteorisk: p. 3, 44; Perspective: p. 5, 30; SEI AG: p.12; Siblik: p. 29; Solarni Panely: p. 20; Steca: p. 6 bottom; Studer Innotec SA: p. 15, 19.

Graphism
Atelier Perspective, R. Gigon, Sion.

January 2014

Studer Innotec was established in 1987, not as a result of market research, but founded on my wish to improve solar systems. Therefore it was natural to focus on the main component of a battery system: the inverter.

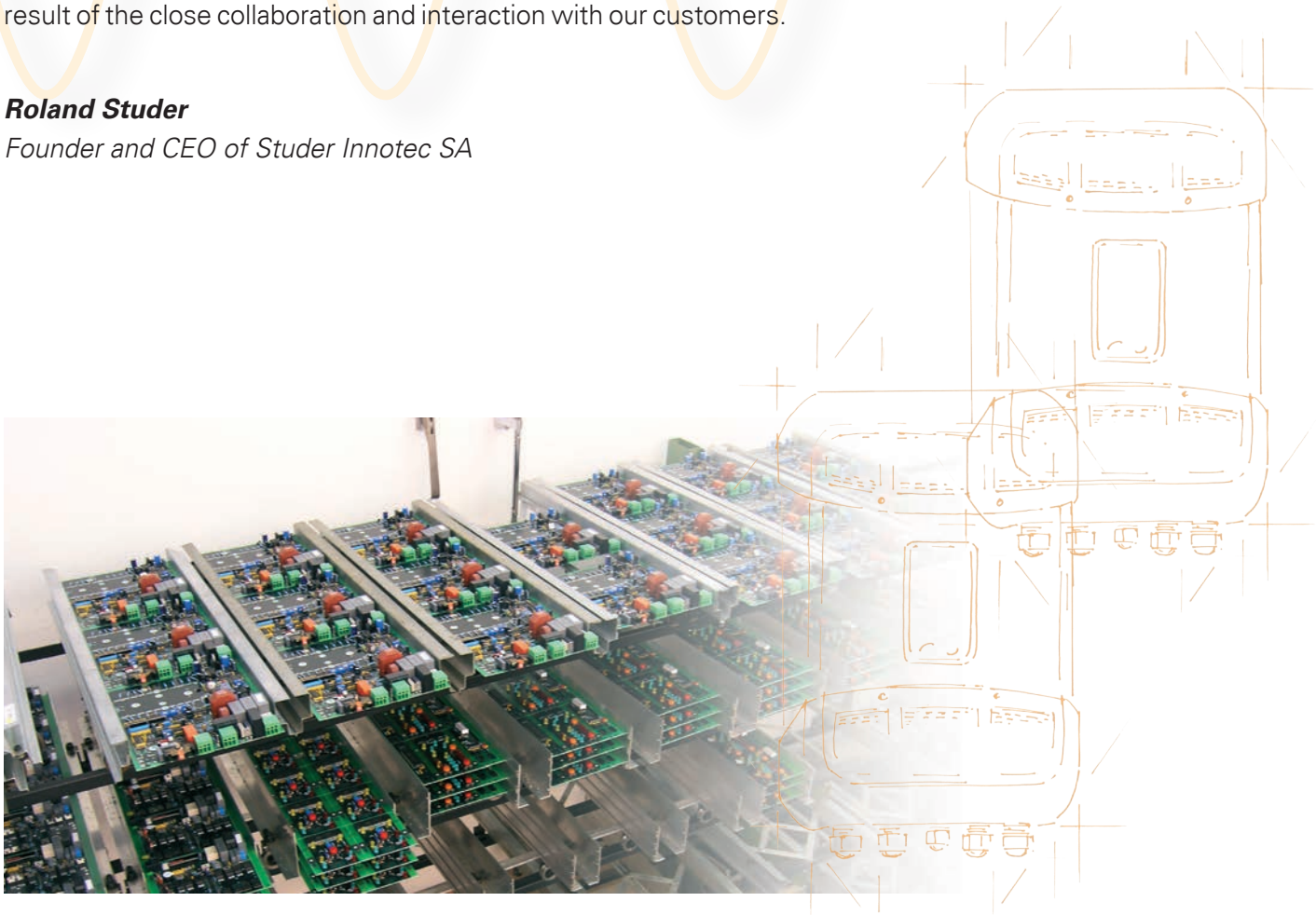
Three years later the company was manufacturing its first inverter models, eight years later it started to export them and then gradually opened up to new application areas (mobile applications, backup systems and industrial applications).

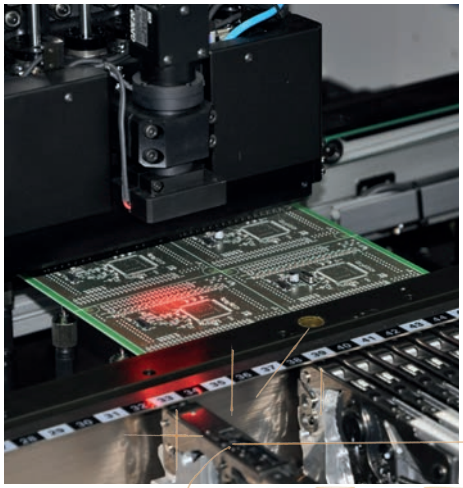
Today Studer Innotec provides an extensive product range with over 60 products that assure storage, conversion and management of energy, of which over 95% are exported through our distributor network with over 100 partners worldwide.

The key success factor in maintaining our competitive lead is constant innovation. Through its know-how and experience, Studer Innotec ensures the renewal of its product range as well as expanding into new applications such as self-consumption systems and mini-grids.

Our company's vision is the same as at its beginnings: more than a product, we offer innovative solutions to optimise any solar system whatever the application. These solutions are designed and manufactured at the same location, in Sion, Switzerland, as a result of the close collaboration and interaction with our customers.

Roland Studer
Founder and CEO of Studer Innotec SA





Production integration and flexibility

Studer Innotec's company philosophy has always been to master the complete process: from development to product sales. That is why Studer Innotec since its beginning is a vertically integrated company, capable of far greater flexibility than its competitors. Furthermore it has a team of 13 Research & Development engineers fully dedicated to turn the market expectations into products and services.

The performance choice

In order to comply with Studer Innotec's high-tech product concept including outstanding performance and reliability, the company choose its components with greatest care. This is the reason why Studer Innotec has selected the latest technologies; such as digital signal processors (DSP) that provide higher efficiency to its inverters.

Quality without compromise

Studer Innotec is an ISO enterprise that develops and manufactures its products entirely in Switzerland. It also upholds its commitment to an efficient and sustainable energy environment supplying to the market high quality products.

Ease in use and product versatility

Quality choice will continue to guide Studer Innotec's strategic axis towards the future. Beyond performance, the next inverters will have increased ease of use and will offer greater versatility to the users.

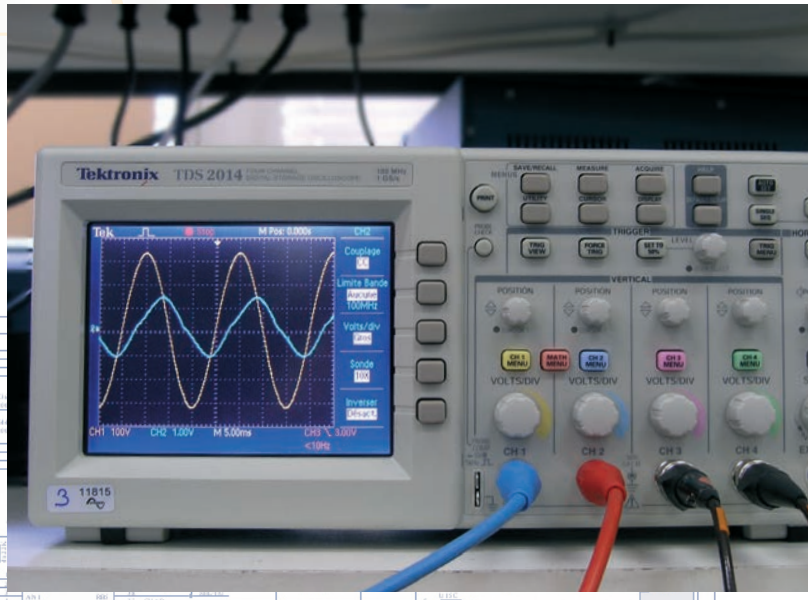
Proximity with clients

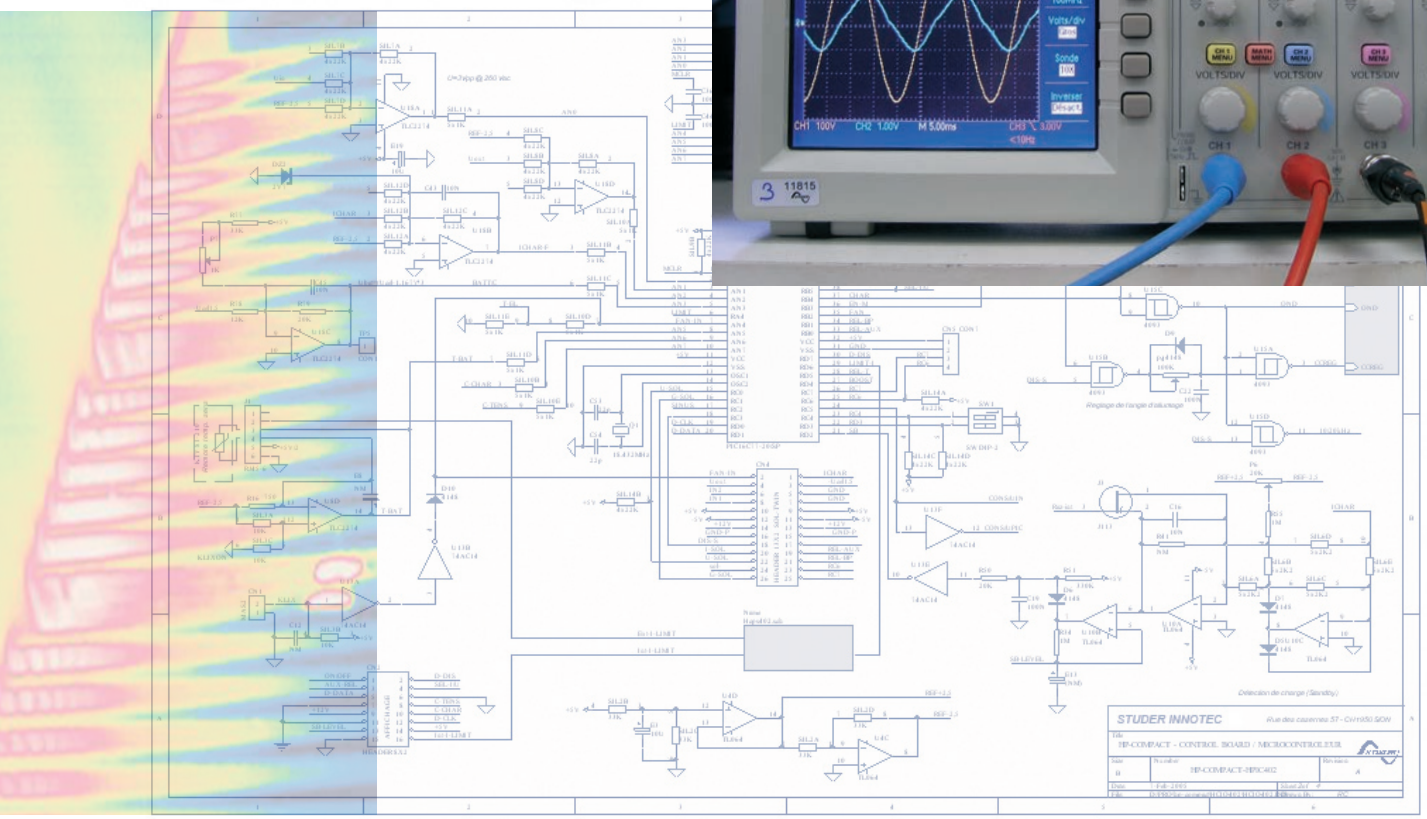
From research to commercialisation, Studer Innotec endeavours to carry on its human and financial investments in order to keep its lead in terms of global offer and proximity with clients. This closeness is maintained by a network of distributors and qualified service partners. Partner addresses can be found on the company website, under « Distributors ».

In order to offer its partners an in-depth knowledge of its products and guarantee high end support, Studer Innotec organizes twice a year trainings called Studer Qualidays.

Taking place over two to three days, depending on the modules chosen, Qualidays is also a remarkable opportunity for participants to share experiences with each other.

The Qualidays are organised in the heart of the Swiss Alps in Sion, at Studer Innotec's Headquarter and manufacturing centre.





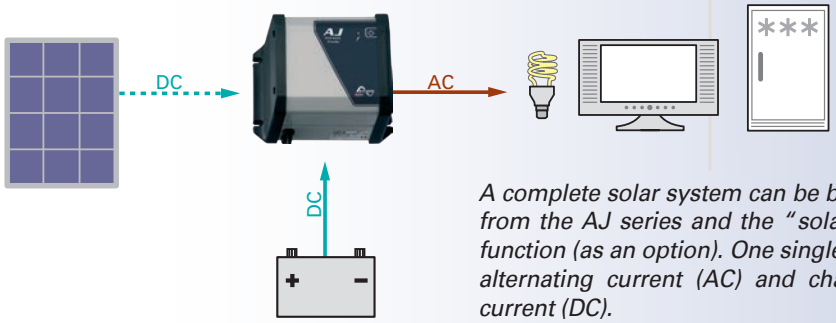
Applications in remote areas

Security and comfort (lighting, heating, household appliances, leisure electronics, telecom...) can now be provided by autonomous energy systems; when far away from any electrical grid, either by choice or necessity.

These systems consist of three main components: first an energy source; normally a genset, a solar generator, a wind turbine or a combination of these; second battery storage; and third devices (inverter/charger, battery charger) able to charge the battery from the energy source(s) and to supply users with AC voltage (inverter, inverter/charger).

The examples below show the products in some stand-alone applications.

A complete solar system

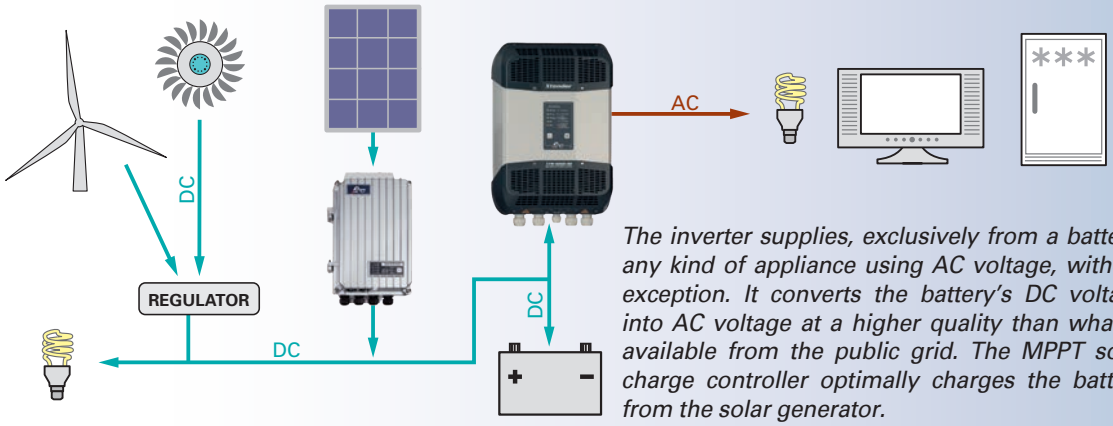


A complete solar system can be built by combining an inverter from the AJ series and the "solar charge control" integrated function (as an option). One single device can then both supply alternating current (AC) and charge the battery with direct current (DC).

Inverters

AJ Series p. 28
(275 - 2'400VA)

Quality AC voltage for all electrical appliances



The inverter supplies, exclusively from a battery, any kind of appliance using AC voltage, without exception. It converts the battery's DC voltage into AC voltage at a higher quality than what is available from the public grid. The MPPT solar charge controller optimally charges the battery from the solar generator.

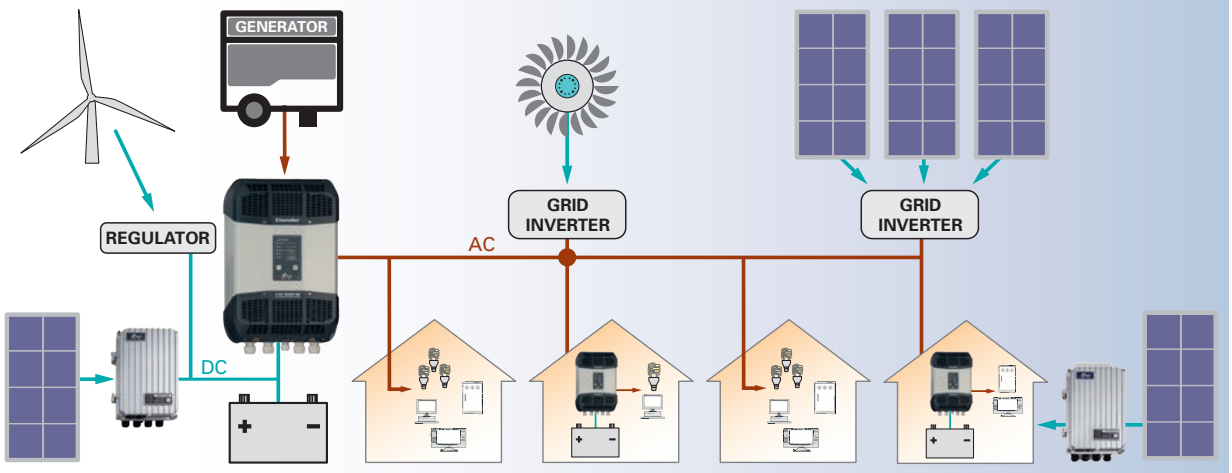
Inverters

Xtender Series p. 18
(900 - 72'000VA)
Compact Series p. 26
(1'400 - 4'000VA)
AJ Series p. 28
(275 - 2'400VA)

MPPT solar charge controllers

VarioTrack Series p. 14
(65 - 80A)
VarioString p. 15
(120A)

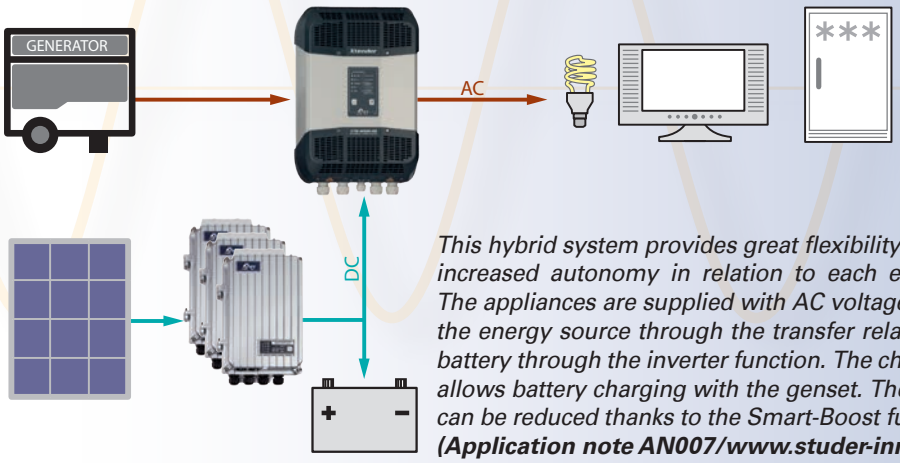
Village electrification



Various power sources supply energy to several consumer points.

Inverters
Xtender Series p. 18
(900 - 72'000VA)

Hybrid system: more autonomy and flexibility

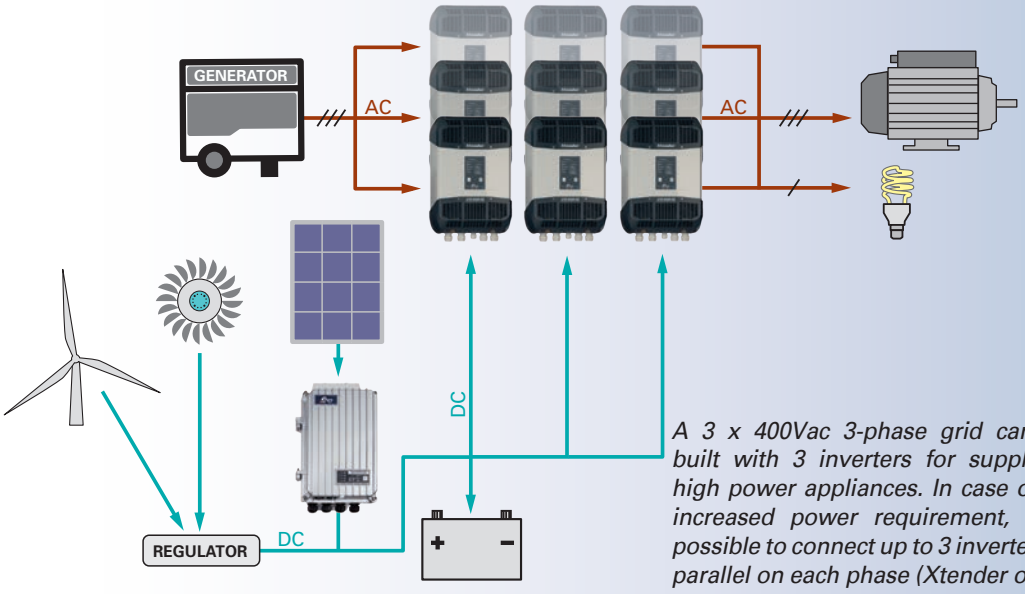


This hybrid system provides great flexibility in supply and increased autonomy in relation to each energy source. The appliances are supplied with AC voltage directly from the energy source through the transfer relay, or from the battery through the inverter function. The charger function allows battery charging with the genset. The genset's size can be reduced thanks to the Smart-Boost function.
(Application note AN007/www.studer-innotec.com)

Inverters
Xtender Series p. 18
(900 - 72'000VA)
Compact Series p. 26
(1'400 - 4'000VA)

MPPT solar charge controllers
VarioTrack Series p. 14
(65 - 80A)
VarioString p. 16
(120A)

3-phase grid 3 x 400Vac for high power appliances



A 3 x 400Vac 3-phase grid can be built with 3 inverters for supplying high power appliances. In case of an increased power requirement, it is possible to connect up to 3 inverters in parallel on each phase (Xtender only).

Inverters
Xtender Series p. 18
(900 - 72'000VA)

MPPT solar charge controllers
VarioTrack Series p. 14
(65 - 80A)
VarioString p. 16
(120A)

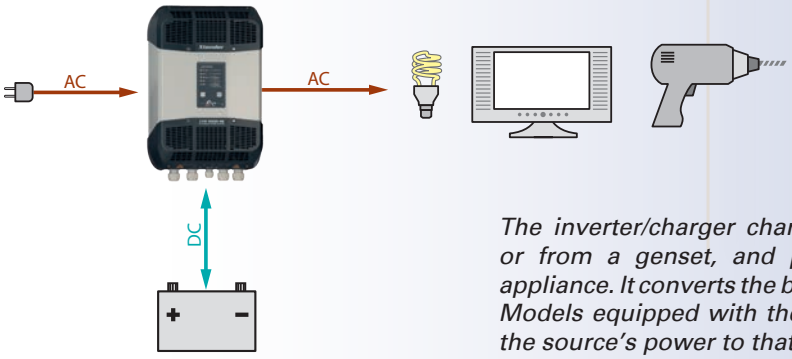
Mobile applications

A simple on-board energy system is often necessary to power the AC voltage appliances, while the vehicle or the boat is away from the electrical grid (port, garage, camping...).

In this case, energy is stored in the battery, which is actually charged by power sources on-board, such as a genset, solar generator, wind turbine, alternator or a combination of these. Studer Innotec offers a complete product range that ensures the management and conversion of this energy, while securing an optimal power supply to the on-board appliances.

The examples below show our products in some mobile applications.

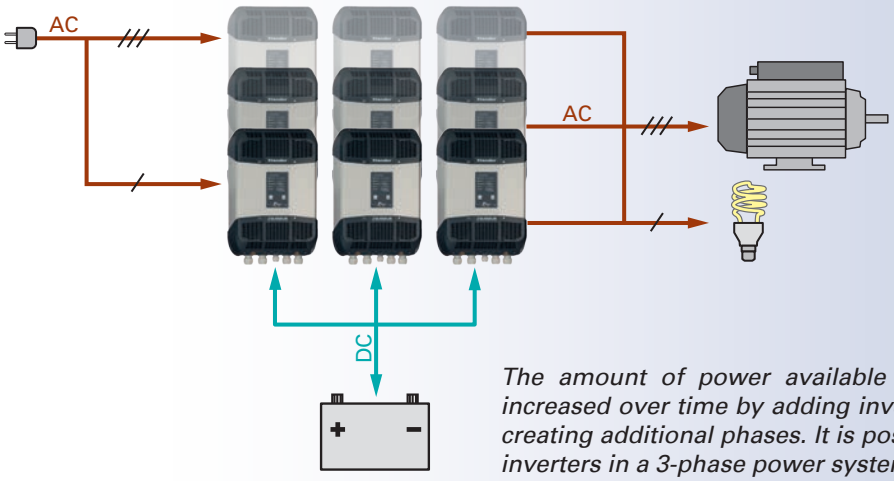
A simple and reliable on-board system



The inverter/charger charges the battery from the grid or from a genset, and powers any kind of electrical appliance. It converts the battery DC voltage to AC voltage. Models equipped with the Smart-Boost system can add the source's power to that of the inverter.

Inverters
Xtender Series p. 18
(900 - 72'000VA)
Compact Series p. 26
(1'400 - 4'000VA)

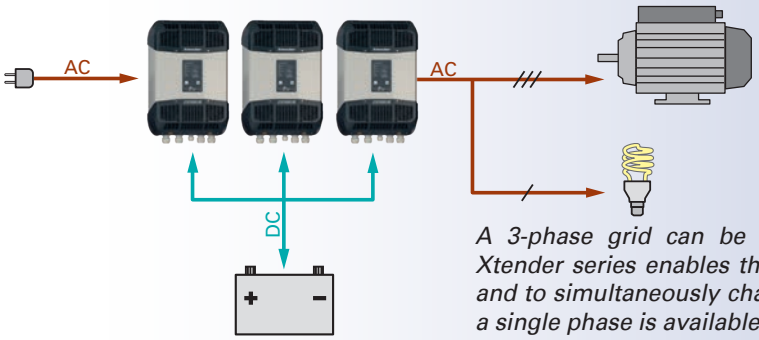
An upgradeable power



The amount of power available to the users can be increased over time by adding inverters in parallel or by creating additional phases. It is possible to install up to 9 inverters in a 3-phase power system.

Inverters
Xtender Series p. 18
(900 - 72'000VA)

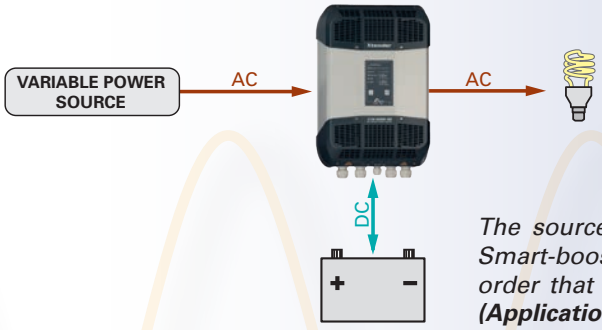
3 x 400Vac 3-phase grid on-board



A 3-phase grid can be built with 3 inverters. The Xtender series enables the creation of a 3-phase grid and to simultaneously charge the battery, even if only a single phase is available as a power source.

Inverters
Xtender Series p. 18
(900 - 72'000VA)

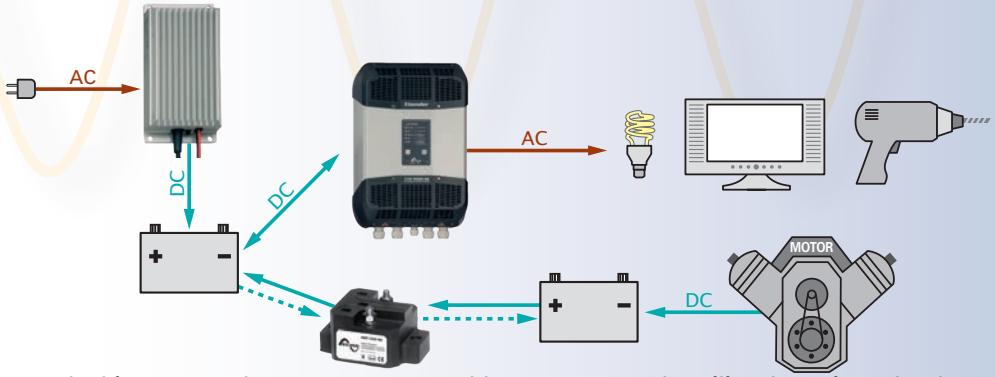
Variable power source assistance



The source being a variable power alternator, the Smart-boost will supply the power difference in order that the power delivered is always the same ***(Application note AN004/www.studer-innotec.com).***

Inverters
Xtender Series p. 18
(900 - 72'000VA)

Successive battery charging

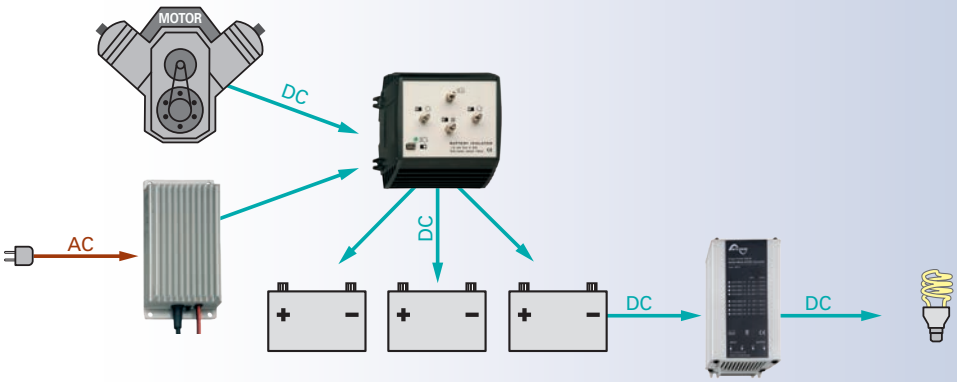


In this system, a battery separator enables one or several auxiliary batteries to be charged, once the primary battery is charged.

Battery separators
MBR Series p. 32

Battery chargers
MBC series p. 30

Simultaneous battery charging and DC/DC conversion



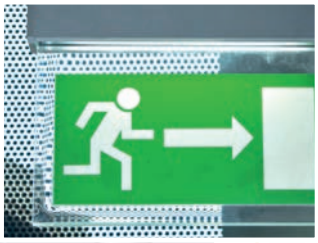
A MOSFET splitter, with almost no voltage losses, splits the charge current among several batteries. From the battery pack, a DC/DC converter will step up or down the voltage according to the voltage of the users: 12 or 24Vdc.

MOSFET battery splitters
MBI Series p. 32

Battery chargers
MBC Series p. 30

DC/DC converters
MDCI-MDC Series p. 31

Backup applications

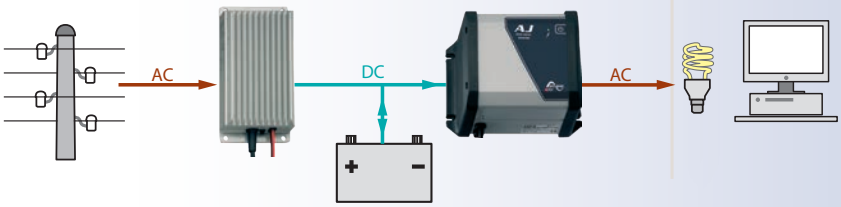


Appliances such as fridges, PCs, emergency lights, etc. which are supplied by the public grid and cannot afford any power cut, are electrically secured.

An inverter/charger with transfer relay or a combination of an inverter and a charger guarantees that the battery is well maintained and that an uninterrupted power supply to strategic appliances is sustained.

Studer Innotec offers solutions from 275VA up to 72kVA with a one of a kind product choice that remains unchallenged on the market.

Uninterruptible power supply on-line

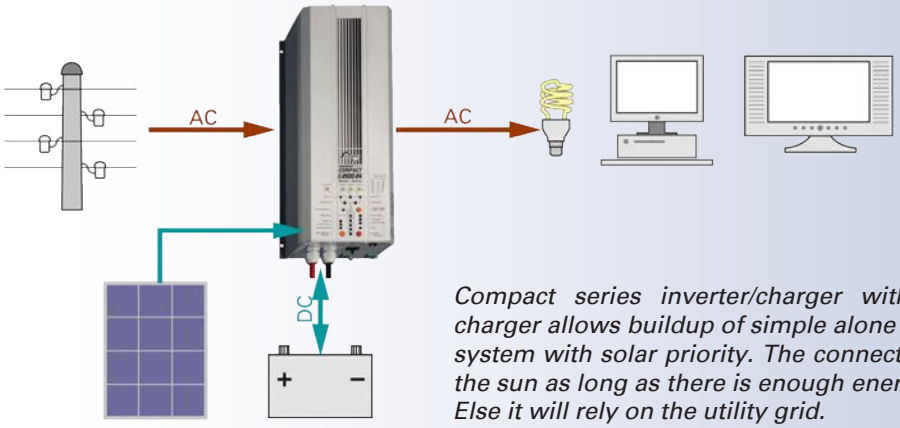


In this system, the battery charge functions and appliances' power supply are separated: On one side is a battery charger, and on the other, an inverter. Grid current fluctuations have no impact on the appliances.

Inverters
AJ Series p. 28
(275 - 2'400VA)

Battery chargers
MBC Series p. 30

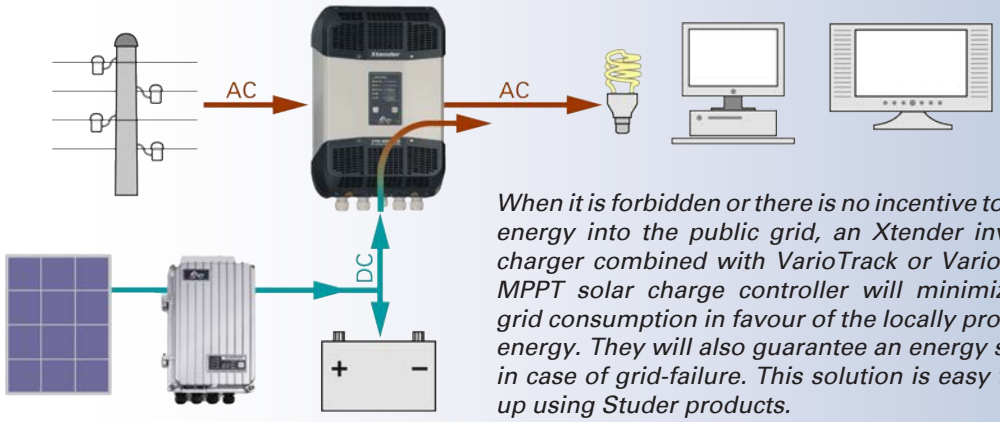
Uninterruptible power supply off-line



Compact series inverter/charger with built in solar charger allows buildup of simple alone one solar backup system with solar priority. The connected loads runs on the sun as long as there is enough energy in the system. Else it will rely on the utility grid.

Inverters
Compact Series p. 26
(1'400 - 4'000VA)

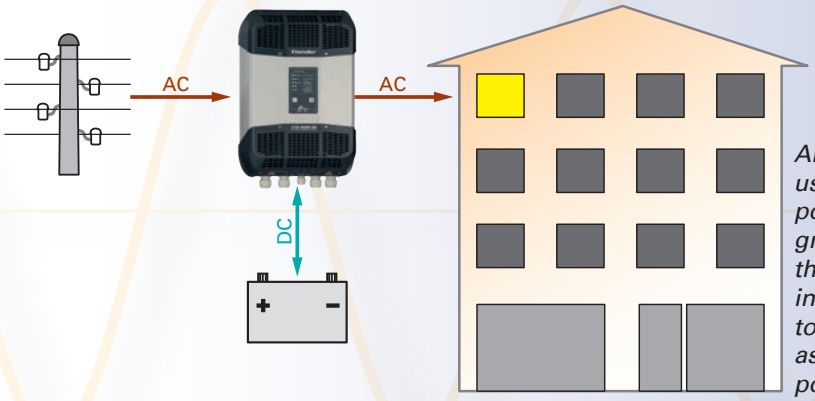
UPS with solar backup and solar priority



When it is forbidden or there is no incentive to inject energy into the public grid, an Xtender inverter-charger combined with VarioTrack or VarioString MPPT solar charge controller will minimize the grid consumption in favour of the locally produced energy. They will also guarantee an energy supply in case of grid-failure. This solution is easy to set-up using Studer products.

Inverters
Xtender Series p. 18
(900 - 72'000VA)
Compact Series p. 26
(1'400 - 4'000VA)

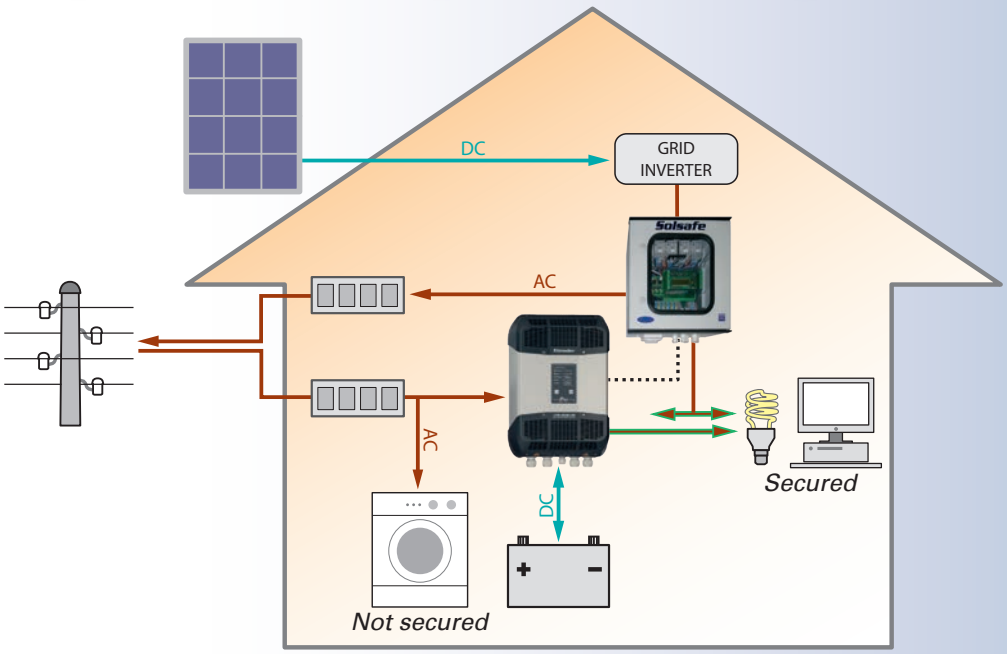
Individual Home backup



An inverter/charger is used to provide backup power in case of public grid outage. As soon as the power shuts down the inverter/charger switches to inverter mode and assures an uninterruptible power supply.

Inverters
Xtender Series p. 18
(900 - 72'000VA)
Compact Series p. 26
(1'400 - 4'000VA)

Solsafe – a backup system for grid connected solar installations



The installation of our Solsafe solution in a grid connected solar system provides the option to secure the power supply in case of a power cut to all loads or only priority loads, and thus maintains the ongoing use of solar energy being produced.
(Application note AN003/www.studer-innotec.com).

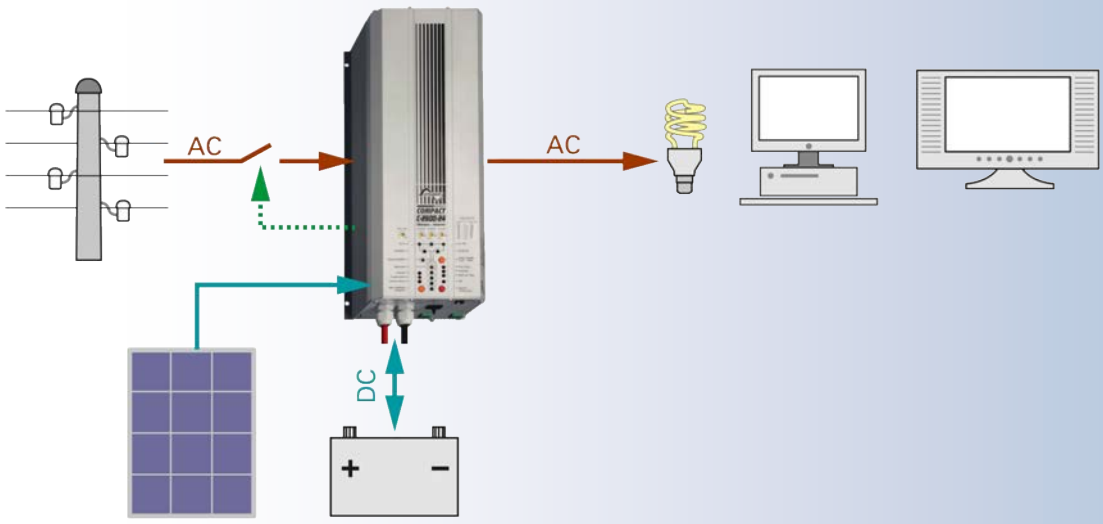
Inverters
Xtender Series p. 18
(900 - 72'000VA)
Compact Series p. 26
(1'4000 - 4'000VA)

Self-consumption systems

In order to give priority to consumption of the energy generated from your own solar or renewable installation, different systems including the Xtender inverter-chargers can be set up.

These systems store excess energy produced during daytime in batteries to be used at a later time, maximizing self-consumption. The public grid will only be used to import or export small amounts of energy if absolutely necessary.

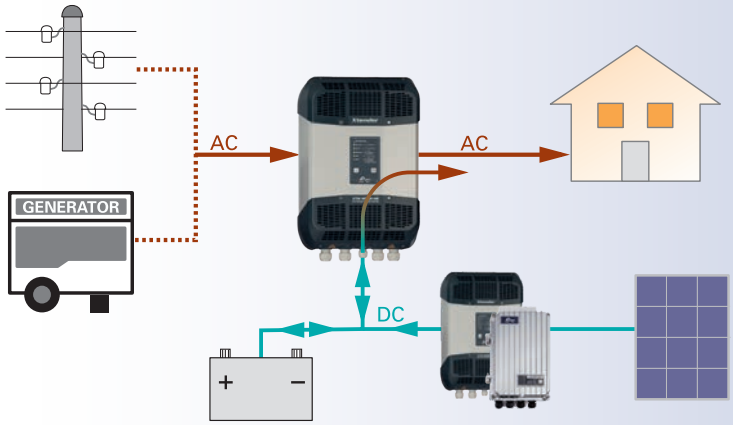
Simple solar priority system



Compact series inverter/charger with built-in (or external) solar charger allows to buildup a simple solar backup system with solar priority. The connected loads run on the sun as long as there is enough energy in the system. When the battery is below a certain level, it will rely on the utility grid.

Inverters
Compact Series p. 26
(1'400 - 4'000VA)

Priority to renewable energy without grid-injection



When it is forbidden or there is no incentive to inject energy into the public grid, an Xtender inverter-charger combined with VarioTrack or VarioString MPPT solar charge controller will minimize the grid consumption in favour of the locally produced energy. They will also guarantee an energy supply in case of grid-failure. This solution is easy to set-up using Studer products.

Inverters

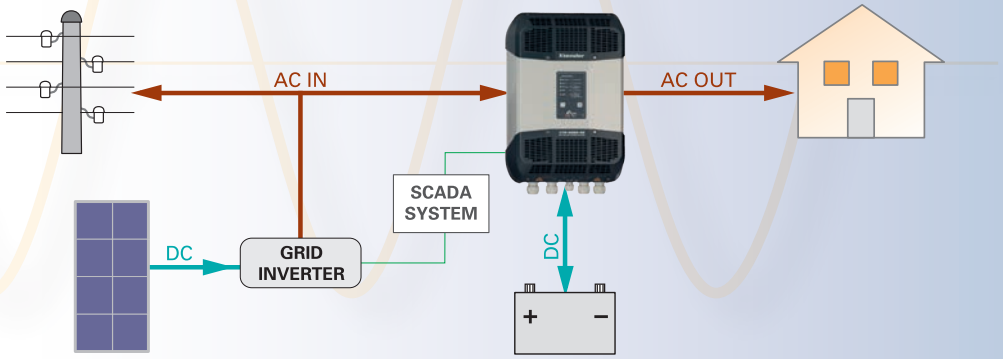
Xtender Series p. 18
(900 - 72'000VA)

MPPT solar charge controllers

VarioTrack Series p. 14
(65-80A)

VarioString p. 15
(120A)

Optimising self-consumption with partial backup

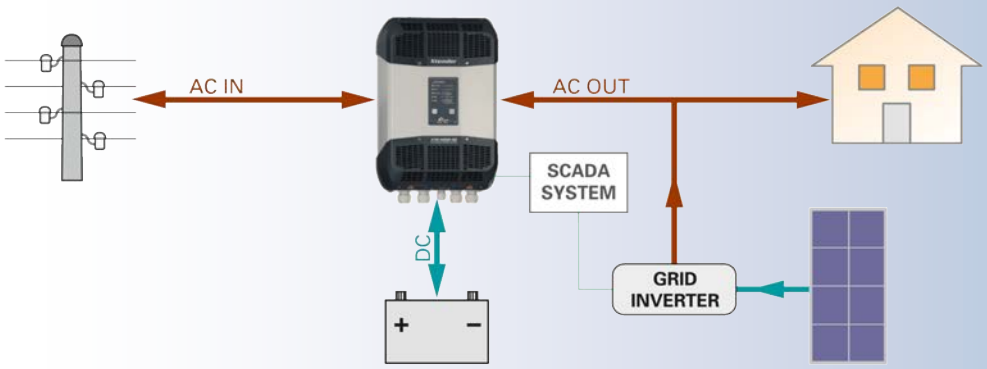


This system has the advantage of being easily integrated into an existing grid-feeding installation even when its power is higher than that of the Xtender. The self-consumption is optimized by means of an expert control system (SCADA) supplied by partners of Studer Innotec. This system also allows creating a separate secure grid adapted for selected backup appliances (e.g. lights, cooling systems and communication).

Inverters

Xtender Series p. 18
(900 - 72'000VA)

Optimising self-consumption with full backup



This system will secure all user (household) appliances however it requires that the power of the Xtender is at least equivalent to the grid inverter and that it covers the household's power needs. The self-consumption is optimized by means of an expert control system (SCADA) supplied by partners of Studer Innotec. A correctly sized system adapted to meet the customer's needs guarantees the energy supply during power outages of the public grid.

Inverters

Xtender Series p. 18
(3500 - 72'000VA)

MPPT solar charge controller

VarioTrack Series

The VarioTrack solar charge controller maximizes the energy generated from solar panels in any solar installation. It contains an MPPT (Maximum Power Point Tracking) algorithm that continuously tracks the maximum power point and automatically charges the batteries in an optimal way with all the available solar power.

VarioTrack
VT-65

VarioTrack
VT-80

Main features

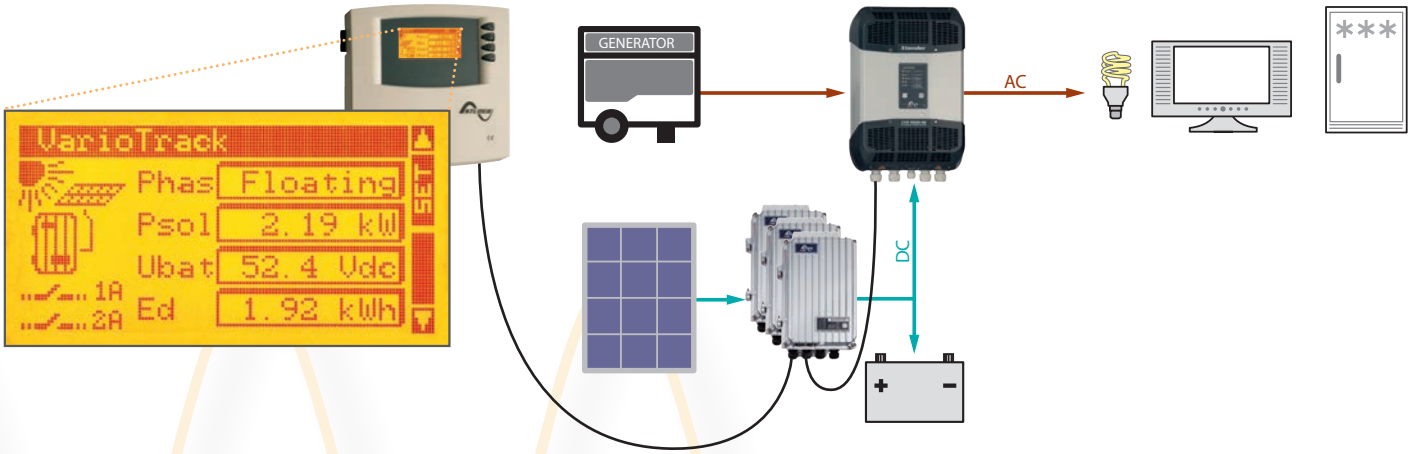
- Easy and safe commissioning with full protection against incorrect wiring
- Rugged and durable, this device is designed to perform in harsh environmental conditions (IP54)
- High conversion efficiency >99%
- Up to 15 VarioTrack in parallel on the same communication bus
- 4 step charger for longer battery life
- Low self-consumption: <1W in night time mode
- Display with 7 LEDs showing status and current
- Comprehensive display, programming and datalogging with RCC-02/-03
- Web access through Xcom-LAN or Xcom-GSM
- Suitable for any solar system
- Optimal usage in an Xtender system with synchronized battery management

VarioTrack range	Nominal battery voltage	Maximum power of the solar generator	Maximum voltage of the solar generator	Maximum charging current to the battery
VT-65	12 V	1000 W	80 Vdc	65A
	24 V	2000 W	150 Vdc	
	48 V	4000 W	150 Vdc	
VT-80	12 V	1250 W	80 Vdc	80A
	24 V	2500 W	150 Vdc	
	48 V	5000 W	150 Vdc	

* Complete technical specifications on page 34

The VarioTrack in an Xtender system

Designed to function in any solar installation, the VarioTrack works optimally in an Xtender system. The communication between the two devices allows for synchronized battery management.



Display and programming possibilities

The VarioTrack is fitted with several indicator lights and a control button for its basic operation. It is also possible to do basic programming using the DIP switches situated inside the device.

By adding a remote control and programming center RCC-02/-03, the VarioTrack can use all functions available in the remote control such as display, programming, data logging etc.

MPPT solar charge controller

VarioString

Dual MPPT solar charge controller 120A/48V.

The VarioString has two fully isolated MPPT inputs, up to 600V(Voc) or up to 900V(Voc) with MPPT inputs in series.

VarioString
VS-120

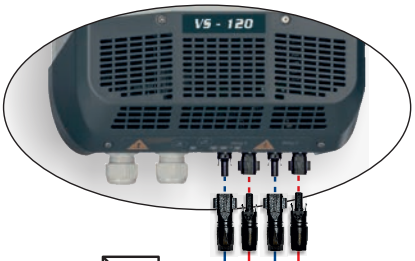
Main features

- Reduces Balance of System costs (Eliminates expensive wiring for parallel strings, saving wires, connectors, junction boxes, fuses, space, time, etc)
- Safe, simple and trouble free connection with SUNCLIX™ (Phoenix Contact "tool free") PV connector
- Fully protected against incorrect wiring
- Simplified safety rules by full isolation between PV and battery and between MPPT inputs
- Any grounding strategy applicable thanks to isolated MPPT inputs. Grounding system fault detection.
- Fast, precise, best in class tracking algorithm bring MPPT efficiency >99%
- World champion for efficiency in isolated converter with >98 % conversion efficiency
- 7kW per unit and up to 15 units in parallel: 105kW
- 4 step charger fully programmable for longer battery life
- 9 LEDs to monitor status and current
- Optimal usage in an Xtender system with synchronized battery management
- Web access through Xcom-LAN or Xcom-GSM
- Comprehensive display, programming and data logging features with RCC-02/-03

VarioString VS-120	MPPT1	MPPT2	1 + 2 in parallel	1 + 2 in serie
Maximum Solar Power recommended	3500 W	3500 W	7000 W	7000 W
Maximum PV Current	13 A	13 A	26 A	13 A
Maximum open circuit voltage	600 Vdc	600 Vdc	600 Vdc	900 Vdc
Minimum functional circuit voltage	200 Vdc	200 Vdc	200 Vdc	400 Vdc
Recommended MPPT voltage	250-500 Vdc	250-500 Vdc	250-500 Vdc	500-750 Vdc
Maximum output current	60 A	60 A	120 A	120 A
Battery voltage	48 V nom. (38-68 V)			

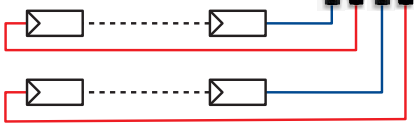
* Complete technical specifications on page 35

...Flexibility without compromise!



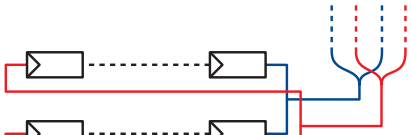
Two independent MPPT inputs each with 200 - 600Voc (2 x 3.5kWp)

Two MPPT inputs allow independent tracking of 2 different PV strings, Voc, and/or power, which brings optimized efficiency and greater flexibility for building integration.



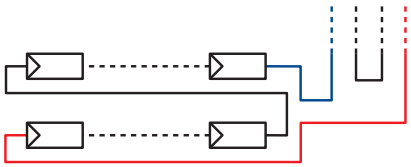
Two MPPT inputs in parallel each with 200 - 600Voc (2 x 3.5kWp)

Parallel wiring allows simplified wiring with lower voltage when strings are the same in size, power and orientation.



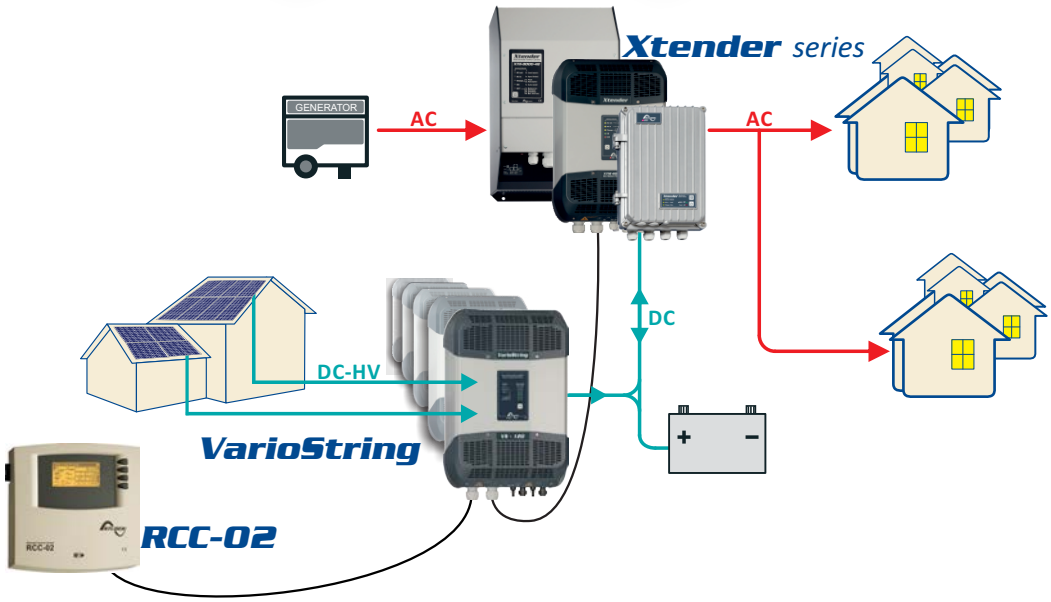
Two MPPT inputs in series with 400 - 900Voc (7kWp)

Serial wiring allows the greatest flexibility and simplest wiring with any PV module on the market.



The VarioString in an Xtender system

Designed to function in any solar installation, the VarioString works optimally in an Xtender system. The communication between the two devices allows for a synchronized battery management.



Display and programming possibilities

The VarioString is fitted with several indicator lights and a control button for its basic operation. It is also possible to do basic programming using the DIP switches situated inside the device.

By adding a remote control and programming center RCC-02/-03, the VarioString can use all functions available in the remote control such as display, programming, data logging, etc.

Xtender Series

The Xtender series provides unmatched freedom of use due to its many functions. In a basic application, it offers a total package: the functions of inverter, battery charger, transfer system and assistance to the source. These functions can be combined and controlled in a totally automatic way for exceptional ease and optimal management of available energy.

The Xtender is equipped with a command entry and 2 configurable auxiliary contacts. This allows automatic control of a genset or loadshedding when the battery voltage is too low. The flexibility obtained makes it possible to implement special functionalities, often necessary for good energy management in standalone systems.

Xtender XTS

XTS 900-12
XTS 1200-24
XTS 1400-48

Xtender XTM

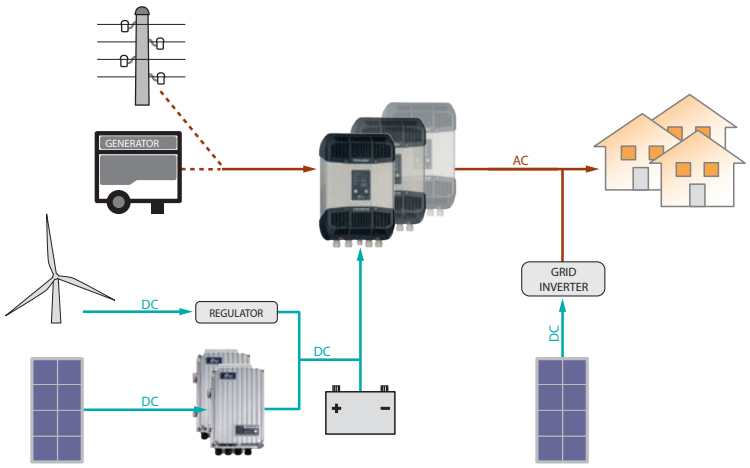
XTM 1500-12
XTM 2000-12
XTM 2400-24
XTM 2600-48
XTM 3500-24
XTM 4000-48

Xtender XTH

XTH 3000-12
XTH 5000-24
XTH 6000-48
XTH 8000-48

Main features

- Outstanding efficiency and overload
- Perfect management and limitation of AC sources
- Power shaving of the consumption peaks
- Automatic allocation of available power
- Active filtering of load steps on the genset
- Automatic protection of the sources against overload
- Battery priority (or to renewable sources)
- Parallel and three-phase setting, up to 9 units (72kVA)
- Powerful multi-stage PFC charger
- Ultra-short transfer time (from 0 to 15ms max.)
- Automatic and efficient stand-by
- 2 programmable auxiliary contacts (optional on the XTS)
- Compatible with AC coupling
- XTS electronically protected against reverse polarity
- Display, programming and data logging integrated in the remote control (RCC)
- Interactive with the Battery Status Processor (BSP)
- RS-232 communication for remote supervision



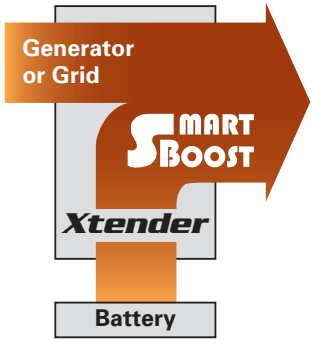
The Xtender series offers an optimal use of all sources that can be found in hybrid systems, whatever their connecting mode (AC or DC bus), up to the nominal power of the Xtender system (single, parallel and/or three phase).

Xtender range	Output power P30/Pnom	Power Smart-Boost	Battery voltage	AC voltage	Charge current	Transfer current
XTS 900-12	900 VA** / 500 VA	900 VA**	12 V	230 Vac*	0 - 35 A	16 A
XTS 1200-24	1200 VA** / 650 VA	1200 VA**	24 V	230 Vac*	0 - 25 A	16 A
XTS 1400-48	1400 VA** / 750 VA	1400 VA**	48 V	230 Vac*	0 - 12 A	16 A
XTM 1500-12	1500 VA / 1500 VA	1500 VA	12 V	230 Vac*	0 - 70 A	50 A
XTM 2000-12	2000 VA / 2000 VA	2000 VA	12 V	230 Vac*	0 - 100 A	50 A
XTM 2400-24	2400 VA / 2000 VA	2400 VA	24 V	230 Vac*	0 - 55 A	50 A
XTM 2600-48	2600 VA / 2000 VA	2600 VA	48 V	230 Vac*	0 - 30 A	50 A
XTM 3500-24	3500 VA / 3000 VA	3500 VA	24 V	230 Vac*	0 - 90 A	50 A
XTM 4000-48	4000 VA / 3500 VA	4000 VA	48 V	230 Vac*	0 - 50 A	50 A
XTH 3000-12	3000 VA / 2500 VA	3000 VA	12 V	230 Vac*	0 - 160 A	50 A
XTH 5000-24	5000 VA / 4500 VA	5000 VA	24 V	230 Vac*	0 - 140 A	50 A
XTH 6000-48	6000 VA / 5000 VA	6000 VA	48 V	230 Vac*	0 - 100 A	50 A
XTH 8000-48	8000 VA / 7000 VA	8000 VA	48 V	230 Vac	0 - 120 A	50 A

* For the 120Vac/60Hz version, -01 is added to the model designation
** These features are valid only when using the cooling module ECF-01
Complete technical specifications on page 36

Smart-Boost function and active filtering

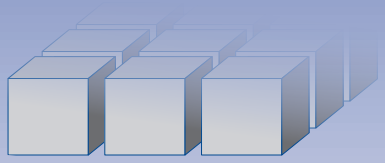
With this function it is possible to interact directly with the AC source (Genset or grid) and to implement some basic functions such as:



- Efficient and immediate limitation of the current of the source, including none linear or inductive/ capacitive loads, protecting efficiently the breakers during connection to shore power or to a camping power meter with limited current (function of power shaving and power assistance) **(more information on our website and in the Application note AN001/www.studer-innotec.com).**
- Power shaving of load steps on the generator allowing an optimal sizing of the generator and assuring the best possible efficiency of the fossil fuels (function of filtering and of power assistance).

The function of assistance to the source enables also to implement advanced functions such as the priority use of renewable energy, even when the grid is available **(more information on our website and in the Application note AN002/www.studer-innotec.com).**

The new alpine cabin of Monte-Rosa with an Xtender system

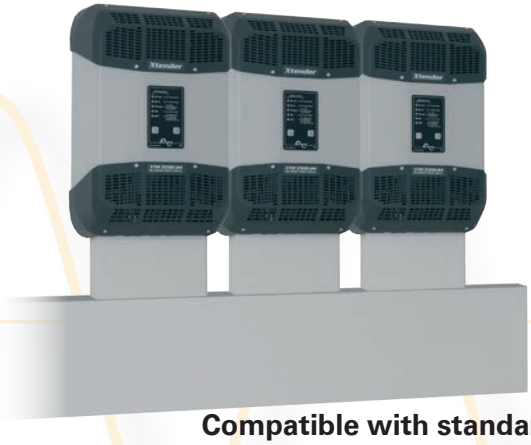


The main configurations offered by the Xtender Series

Wide modularity

By the implementation of several units, it is possible to create a 3-phase source or to set them in parallel to increase the power available without extra cost. Up to 9 inverters of the Xtender Series can be combined together for up to 72kVA!

Easy set up of multi-units

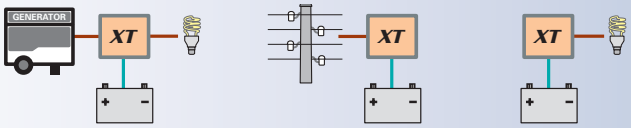


Compatible with standard cable channel (230 x 60mm)

Self-consumption system for industrial building

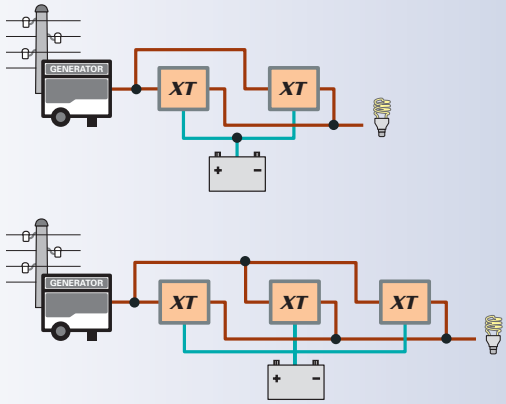
Inverter, charger and transfer relay

The Xtender works as an inverter and as a charger, combined with a transfer relay.



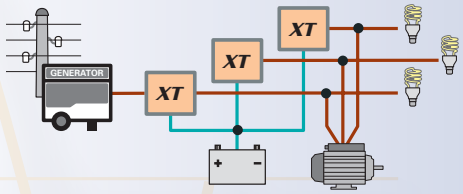
2 or 3 units in parallel on 1 phase

Increase the power on one phase by connecting 2 or 3 Xtender in parallel.



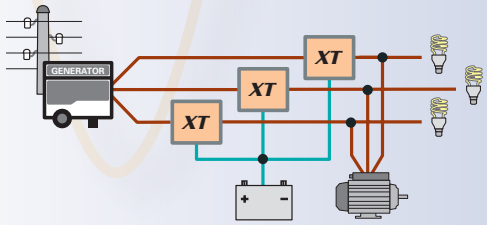
1 phase in and 3 phase out

Three-phase power supply from a single phase source.



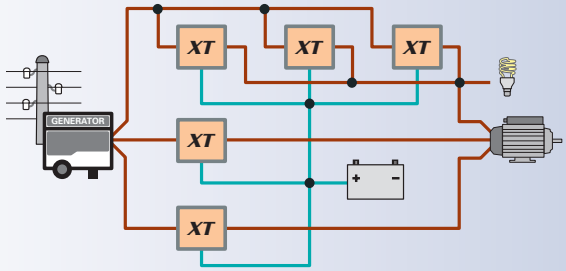
3 phase in and 3 phase out

Three-phase source for a three-phase power supply.



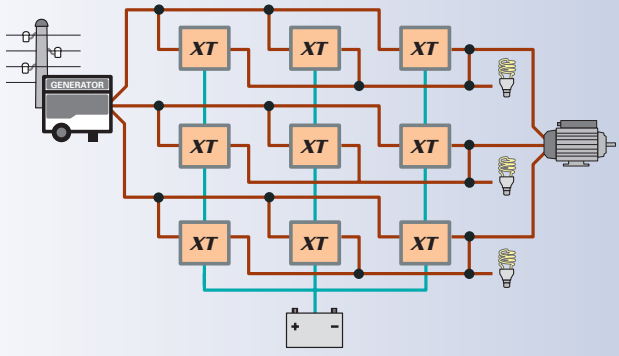
3 phase + with one reinforced phase

Three-phase power supply with increase of the power on one phase by connecting 2 or 3 Xtender in parallel on this phase.

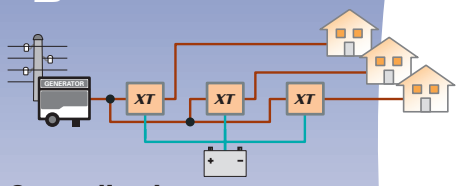


3 Xtender in parallel on 3 phases

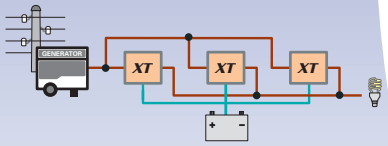
Three-phase power supply with 3 Xtender on each phase, for power up to 72kVA.



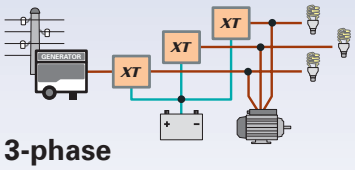
X-Connect system



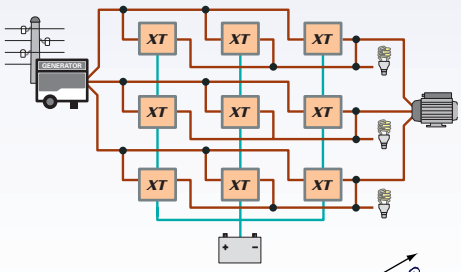
Centralized



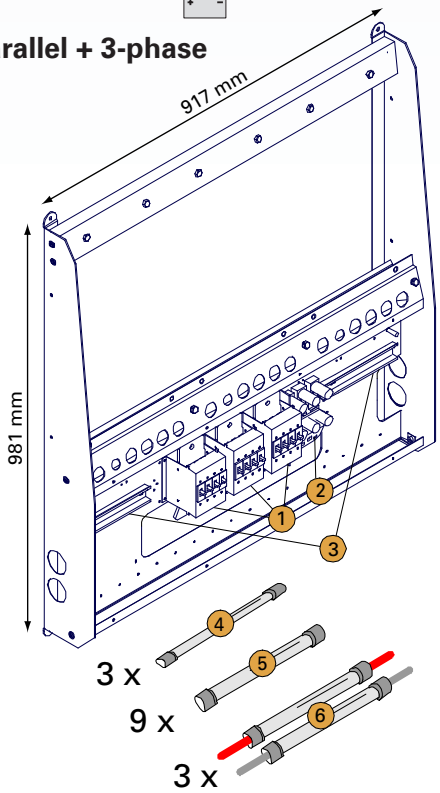
Parallel



3-phase

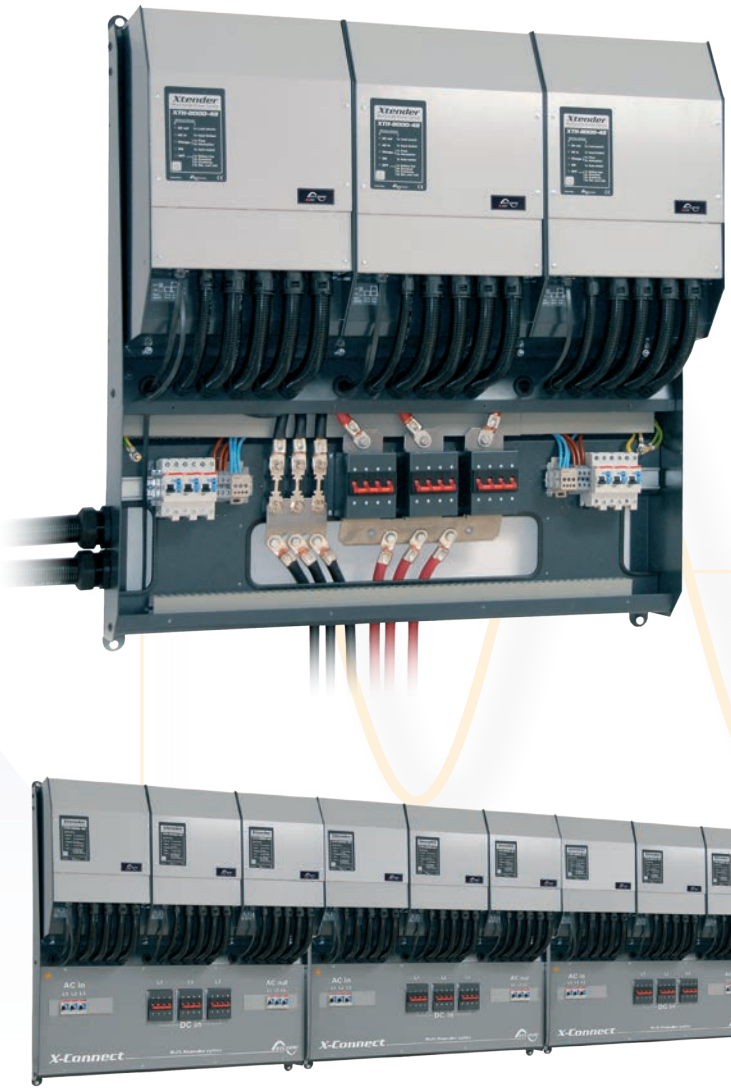


Parallel + 3-phase



Mounting frame for Xtender multi-system

Offers a flexible and cost effective solution for high power systems based on the XTH inverter.



Up to 72kVA multi-unit system

Frame is supplied with:

1. Pre-installed DC circuit breakers
2. Pre-installed DC fuses
3. Pre-installed DIN rails
4. Interconnection pipes and gland for auxiliary contact wiring
5. Interconnection pipes and gland for AC wiring
6. Interconnection pipes and gland + 90mm^2 wire terminated with appropriate ring tongues for DC wiring from Xtender to breakers and fuses

Screws set for frame assembly

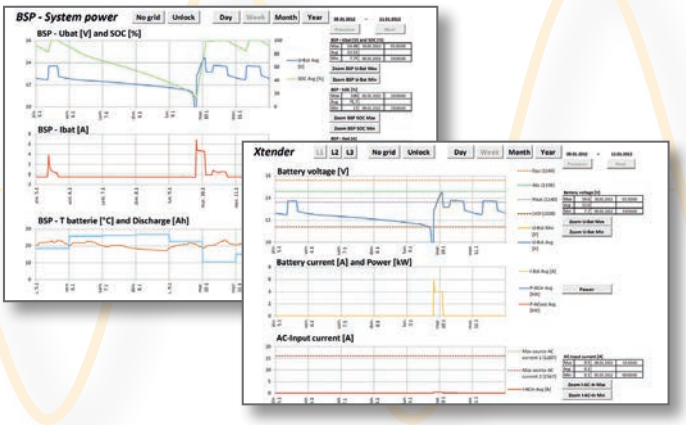
Xtender/VarioTrack/VarioString Accessories

RCC-02 

RCC-03 

Remote control and programming centre RCC-02 or RCC-03

Apart from the enclosure difference, adapted for wall or panel mounting, both units have exactly the same features and allow the user to survey his system and fully customize it to his needs. The RCC gives a controlled access to the many adjustable parameters of the Xtender and the VarioTrack/VarioString. It enables the setting of the charge curve of the battery, the programming of the auxiliary contacts and gives access to a lot of operation options. Thanks to its graphic display the RCC provides clear and comprehensive indications on the state of the system in a selectable language. The unit records and displays the events that occurred on an installation and so it anticipates the problems that might appear. A slot for an SD card is incorporated in the RCC which allows parameters and log data to be recorded as well as a software update of the entire system.



Data logging and analysis

Analyse easily your data with the RCC-02/-03 Data logger function that will record on the SD card the main electrical values of your Xtender system during its operation.

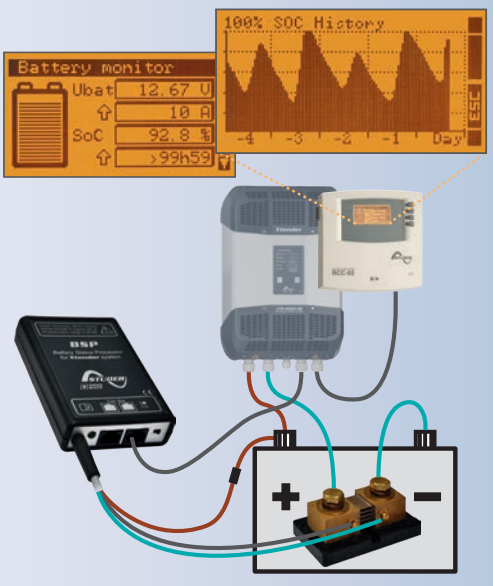
These standards enable the analysis of the system's energy consumption evolution, to check the power cuts, the state of the auxiliary contacts, the input currents and voltages, etc.

Studer Innotec offers for free a graphical and analysis tools, Xtender Data Analysis Tool. **(more information on our website and in the Application note AN006/www.studer-innotec.com).**

Battery Status Processor BSP for XTENDER and VarioTrack/VarioString systems

One of the most important values for safe and effective operating of an energy system with batteries is their state of charge.
The BSP offers, for Xtender and VarioTrack/VarioString systems, a highly precise measuring and an extremely efficient algorithm that calculates the state of charge in the most accurate way.
The remote control RCC-02/-03 provides data logging, the display of values and the graphical display of the state of charge history and the settings. Values of the BSP can be used in the programming of Xtender and VarioTrack/VarioString systems. In addition, 17 different values can be displayed such as:

- *State of charge*
- *Voltage (12-24-48Vdc)*
- *Current*
- *Time to go*
- *Throughput energy*
- *Battery temperature*



The two models, BSP 500 and BSP 1200, are supplied with a 500A or 1200A shunt respectively, a 5m cable for battery connection, and a 5m communication cable.

Communication for Xtender/ VarioTrack/VarioString

Internet based communication sets Xcom-LAN, Xcom-GSM

Xtender and/or VarioTrack/VarioString systems can be constantly controlled from any remote terminal, computer, tablet or smartphone. The communication sets Xcom-GSM and Xcom-LAN allow connecting to sites with GSM mobile coverage or with internet-connection over a local network.

Studer Innotec provides this «plug-and-play» solution using a secure server and a simple and user-friendly interface. The interface allows for remote interaction with the installation exactly as if on-site with the remote control RCC-02/-03, including: access to all parameters, real-time display of measured data and 30 days datalog of all devices included in the system.

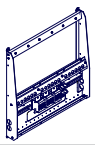
Furthermore this solution makes it possible to configure the alarm trigger, sending alarm messages to one or several persons by e-mail or by SMS, and to view the event log at any time to consult the messages sent by the system.

Xcom-GSM or Xcom-LAN?

The available means of communication at the location of the installation will determine which set to choose. If the installation has access to internet through a local area network (LAN), choose the Xcom-LAN set. If there is no available connection to the internet but access to a GPRS or 3G mobile network, choose the Xcom-GSM set.

Xtenders in the heart of the Spitzbergen...

Xtender/VarioTrack/VarioString Accessories

		XTS	XTM	XTH	VT	VS
	***RCC-02/-03*** *The remote control module (with 2m cable) enables the setting of the parameters as well as the display of the values measured. By means of an SD card it is possible to log the system data and to save and restore the parameters of the system. This module is available either for wall mounting (model RCC-02), or for panel mounting (model RCC-03).*	●	●	●	●	●
	***BTS-01*** *Battery temperature sensor (with 5m cable) offering the automatic compensation of the adjustable thresholds of the battery voltage.*	●	●	●	●	●
	***RCM-10*** *Module for rail DIN mounting (with 5m cable) giving access to the main ON/OFF and to the command entry with the models XTS and XTM.*	●	●			
	***BSP 500/1200*** *Module meant for the measuring and calculating of the battery state of charge (with 5m cable). This module is connected to the communication bus of the Xtender. It allows the display and the datalogging of the values measured and calculated (see opposite screens) and also the control of the 2 auxiliary contacts of the Xtender.*	●	●	●	●	●
	***Xcom-232i*** *Communication module with RS-232 port and 2m RJ45 cable, allowing access to the parameters and measured values of the Xtender system.* *It makes the link between an Xtender system and a SCADA supervision or control system (not supplied).*	●	●	●	●	●
	***Xcom-GSM*** *Internet based communication sets.* *The Xcom-GSM set includes one Xcom-232i, one cellular modem and all necessary accessories. The SIM card is not provided.*	●	●	●	●	●
	***Xcom-LAN*** *Internet based communication sets.* *The Xcom-LAN set includes one Xcom-232i, one Ethernet bridge and all necessary accessories.*	●	●	●	●	●
	***ARM-02*** *This module, only meant for the XTS and for the VT/VS models and for rail DIN mounting, is equipped with 2 auxiliary contacts controlled by the XTS or by the VT/VS.* *This function is already integrated in the models XTM and XTH.*	●			●	●
	***ECF-01*** *External cooling module (IP54) for XTS and VarioTrack (VT-65 only).* *The use of this accessory will increase the power of the XTS and the current of the VT65 to 80 A. The ECF-01 is directly installed on top of the casing and its mounting can be done at any time after installation.*	●			●	
	***X-Connect*** *Mounting frame for multi-XTH system, supplied as a kit. The frame is equipped with DC breakers and fuses, and with rail DIN for the mounting of protection devices upstream and downstream (see p. 22).*			●		
	***CAB-RJ45-8-xx*** *Communication cable for the connection between Xtenders and to all external accessories. The cables are available in the following lengths: 2, 5, 10, 20 or 50m (xx stands for the length). For instance: one system with 3 Xtenders requires 2 cables of 2m. One cable is supplied with every accessory. However a longer cable can be ordered when necessary.*	●	●	●	●	●

Sine wave inverter-chargers

Compact Series

The Compact series models consist of 3 fully automatic functions: a sine wave inverter, a battery charger and a transfer system. Equipped with high-end technology, they optimally perform, thanks to Studer Innotec's extensive experience in the field of electrical supply.

XP COMPACT

XPC 1400-12
XPC 2200-24
XPC 2200-48

COMPACT

C 1600-12
C 2600-24
C 4000-48

Main features

- True sine wave voltage
- Suitable for any kind of electrical appliance
- Reliable and silent working with all kind of loads
- Outstanding overload capabilities
- Stand-by level adjustable over a large range and from a very low threshold
- 4 STEP battery charger with PFC
- Ultra-fast transfer relay
- High efficiency
- Full internal protection
- Ultra-fast regulation
- Microprocessor controlled

Norm E certification

The XPC 1400-12, XPC 2200-24, C 1600-12 and C 2600-24 are certified to the ECE-R 10 norm.

Compact range	Output power P30/Pnom	Battery voltage	AC voltage	Charge current	Transfer current	Solar option (-S)
XPC 1400-12	1400 VA / 1100 VA	12 Vdc	230 Vac*	0 - 45 A	16 A	30 A
XPC 2200-24	2200 VA / 1600 VA	24 Vdc	230 Vac*	0 - 37 A	16 A	30 A
XPC 2200-48	2200 VA / 1600 VA	48 Vdc	230 Vac*	0 - 20 A	16 A	20 A
C 1600-12	1600 VA / 1300 VA	12 Vdc	230 Vac	0 - 55 A	16 A	30 A
C 2600-24	2600 VA / 2300 VA	24 Vdc	230 Vac	0 - 55 A	16 A	30 A
C 4000-48	4000 VA / 3500 VA	48 Vdc	230 Vac	0 - 50 A	16 A	20 A

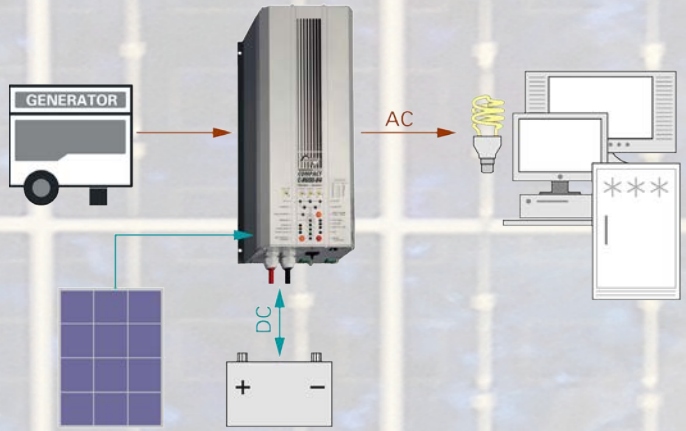
* For the 120Vac/60Hz version, -01 is added to the model designation

Complete technical specifications on page 37

Optional built-in solar charge controller (-S)
Simple and robust hybrid system

Compact or XP-Compact series inverter/charger with built in PWM solar charger allows for a simple stand-alone solar/diesel hybrid system. Compact, efficient, robust and delivered with battery cables. It is it a cost effective choice for small solar hybrid systems.

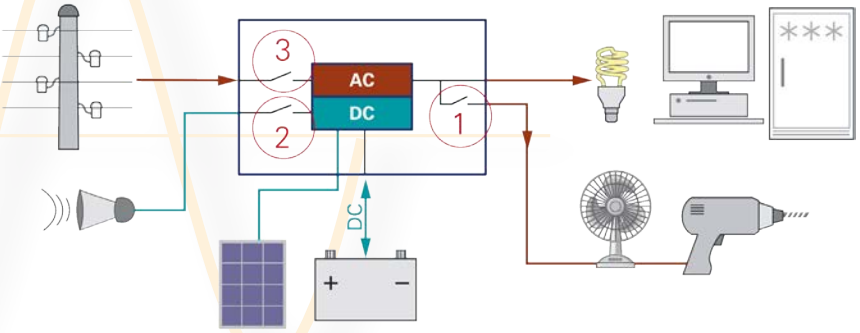
12V/24V model => solar charge controller: 30A
48V model => solar charge controller: 20A



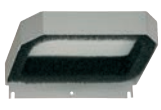
Multifunction programmable auxiliary relay

The 16A potential free contact can be programmed according to the user wishes. It reacts according to battery levels, as well as to the system status (alarm conditions, presence of public grid or sunlight...), and can be used for many diverse applications such as:

1. Load shedding according to battery status
2. Alarm signalization or start of genset according to battery status or power output
3. Conditional connection to AC source to increase self consumption of renewable energy



Accessories

		XP COMPACT	COMPACT
	***RCC-01*** *The remote control provides state of the system displayed by LED and remote programming* (supplied with a 20m cable).* **compulsory for the programming of the XP Compacts*	●	●
	***CT-35*** *This temperature sensor adapts charge levels to the battery's temperature variations (supplied with 3m cable).*	●	●
	***ARM-01*** *The Auxiliary relay module equipped with 3 programmed relays and a fourth one which is like the inverter-charger's auxiliary contact. This module allows the Solsafe system to be implemented (see page 11).*	●	●
	***CFC-01*** *This cover provides additional connection protection by means of glands.*	●	●
	***C-IP22*** *Cover for a protection against intrusions or projections, installed after the mounting of the device. It extends the protection index of the XP Compacts and Compacts from IP 20 to IP 22.*	●	●

Applications

AJ Series

The AJ range consists of sine wave inverter that convert battery voltage into utility quality 230Vac* which can be used with all usual electrical appliances.

Its proven reliability and outstanding performance make it the optimal solution for many applications. Delivered with battery and AC cables it is a true «plug and forget solution».

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

AJ
AJ 500-12
AJ 600-24
AJ 700-48

AJ
AJ 1000-12
AJ 1300-24

AJ
AJ 2100-12
AJ 2400-24

Main features

- High and steady efficiency
- Outstanding overload capabilities
- Digital regulation and control by microprocessor
- Electrical supply to any type of appliance
- Full internal protection
- Battery lifetime optimization (B.L.O.) function
- Supplied with battery and AC cables

Norm E certification

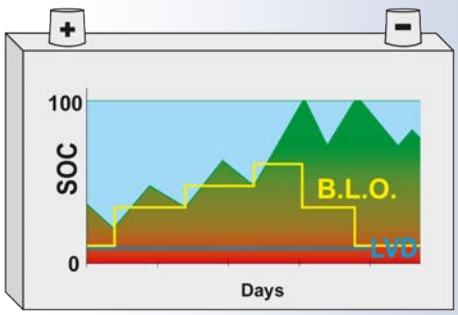
The AJs in 12 and 24Vdc are certified to the ECE-R 10 norm.

AJ range	Output power P30/Pnom	Battery voltage	Solar option (-S)
AJ 275-12 (-S)	275 VA / 200 VA	12 Vdc	10 A
AJ 350-24 (-S)	350 VA / 300 VA	24 Vdc	10 A
AJ 400-48 (-S)	400 VA / 300 VA	48 Vdc	10 A
AJ 500-12 (-S)	500 VA / 400 VA	12 Vdc	15 A
AJ 600-24 (-S)	600 VA / 500 VA	24 Vdc	15 A
AJ 700-48 (-S)	700 VA / 500 VA	48 Vdc	15 A
AJ 1000-12 (-S)	1000 VA / 800 VA	12 Vdc	25 A
AJ 1300-24 (-S)	1300 VA / 1000 VA	24 Vdc	25 A
AJ 2100-12 (-S)	2100 VA / 2000 VA	12 Vdc	30 A
AJ 2400-24 (-S)	2400 VA / 2000 VA	24 Vdc	30 A

For the 120Vac/60HZ version, -01 is added to the model designation
Complete technical specifications on pages 38-39

Battery Lifetime Optimizer:

With this activable function B.L.O. the AJ inverters offer an advanced protection of the battery, by a smart management of low voltage disconnection (LVD)

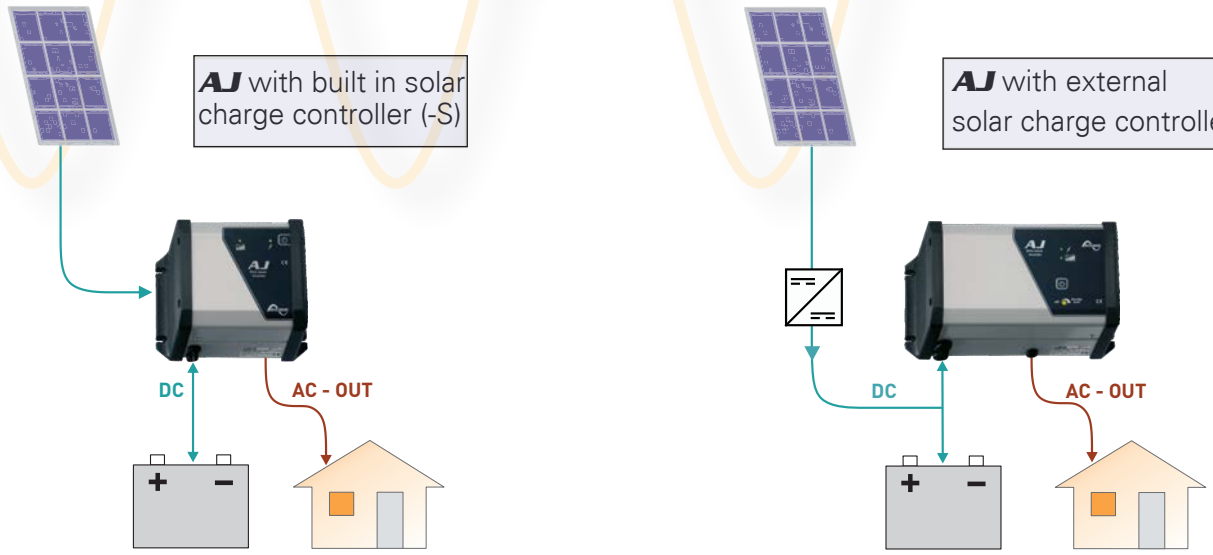


Rural electrification (Solar Home System)

AJ series inverters for rural electrification provide excellence that benefit the development of remote areas and populations. Choosing AC for rural electrification systems improves simplicity, reliability and cost savings. Indeed, compared with a DC system, one with an inverter that supplies loads in AC, is often more efficient for systems with 100W of solar power or more.

The AJ series is, due to its overload capability and to its very reliable stand-by system adjustable from 2W, the most suitable range of inverters to meet the technical and economic requirements of rural electrification projects.

Solar Home System with AJ



Option built-in solar charge controller

For a complete solar system! The AJ series can be supplied with an optional integrated PWM solar charge controller, making the inverter an "all in one" device for a solar home system.

Accessories

	***JT8 Remote control:*** (supplied with a 5m cable) For AJ 1000-12 and bigger model. Enables the control (ON/OFF) and the status display of the inverter: On, Standby, temporary Off	NOTE: For all other units from AJ275 to AJ700 its special version with remote control feature is available through a 3,2mm connector jack with 2 poles with the following 3 options: RCM-01: inverter ON when contact is closed RCM-02: inverter ON when voltage is across contacts RCM-03: inverter is ON when contact is open

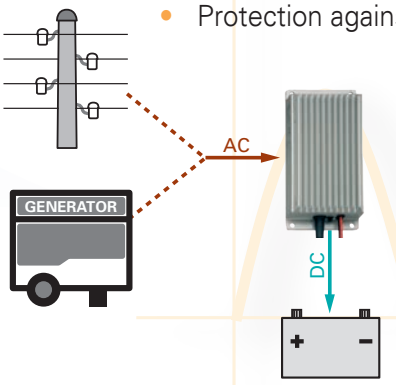
Applications

MBC Series

The MBC chargers enable battery charging from an AC voltage supply source (genset, public grid, shorepower, etc.). These chargers are also watertight and therefore specially designed for outdoor applications (IP 65).

Main features

- Universal input voltage
- Charge of lead acid batteries with liquid or gelled (GEL) electrolyte
- Protection against battery overcharge



MBC range

	Battery voltage	Input voltage	Output current	Output
MBC 12-06/1	12 Vdc	230 Vac ±15%	6 A	1
MBC 12-15/1	12 Vdc	230 Vac ±15%	15 A	1
MBC 24-03/1	24 Vdc	230 Vac ±15%	3 A	1
MBC 24-08/1	24 Vdc	230 Vac ±15%	8 A	1
MBC 24-15/1	24 Vdc	230 Vac ±15%	15 A	1
MBC 24-32/1	24 Vdc	230 Vac ±15%	32 A	1

Complete technical specifications on page 40

Applications

MDCI and MDC Series

The DC/DC converters type MDCI and MDC are used, depending on the model, either to step up or to step down a DC voltage.

The MDCI range converters are electrically isolated.

Main features

- High efficiency
- Low consumption
- Protection against short-circuit, overheating overvoltage and reverse polarity
- Great stability of the output voltage for a more reliable system

MDCI range	Power	Input variant	Output variant	Output Current	Isolated
MDCI 100	100 W	A/B/C/D	12.5/24 Vdc	8/4 A	Yes
MDCI 200	200 W	A/B/C/D	12.5/24 Vdc	16.5/8 A	Yes
MDCI 360	360 W	A/B/C/D	12.5/24 Vdc	30/15 A	Yes
MDCI 360 A24 Charger	330 W	A	24 Vdc	15 A	Yes

A = 9-18Vdc B = 20-35Vdc C = 30-60Vdc D = 60-120Vdc (ex. MDCI 200 D24)

MDC range	Power	Input voltage	Output voltage	Output Current	Isolated
MDC 1224-7	170 W	9-18 Vdc	24 Vdc	7 A	No
MDC 2412-5	65 W	18-35 Vdc	13.2 Vdc	5 A	No
MDC 2412-8	105 W	18-35 Vdc	13.2 Vdc	8 A	No
MDC 2412-12	160 W	20-35 Vdc	13.2 Vdc	12 A	No
MDC 2412-20	275 W	20-35 Vdc	13.8 Vdc	20 A	No
MDC 2412-30	415 W	20-35 Vdc	13.8 Vdc	30 A	No

Complete technical specifications on page 40

The MDC 2412-20 and 2412-30, as well as the MDCI 360 A24 "Charger" can also be used to charge a battery.

MOSFET battery splitters

Applications

MBI Series

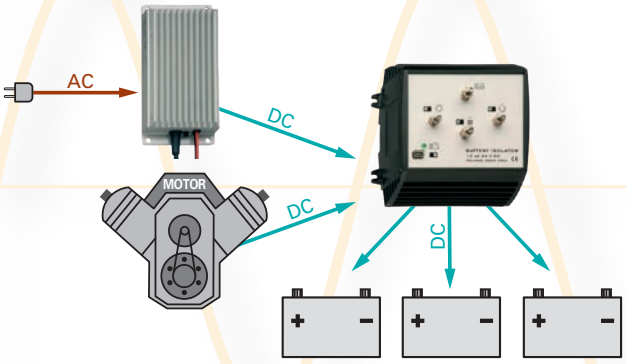
The MBI MOSFET battery splitters supply current from the charger or alternator to several batteries. They generate an insignificant voltage drop. All batteries are thus charged at the same time, and therefore will not charge or discharge each other.

MBI range	Input	Charge current	Charge input	Outputs
MBI 100/2	12/24 Vdc	100 A	1	2
MBI 150/2	12/24 Vdc	150 A	1	2
MBI 100/3	12/24 Vdc	100 A	1	3
MBI 150/3	12/24 Vdc	150 A	1	3
MBI 200/3	12/24 Vdc	200 A	1	3
MBI 2-100/3	12/24 Vdc	100 A	2	3

Complete technical specifications on page 41

Main features

- Automatic adjustment to the batteries voltage
- Possible charge of the battery from an alternator
- Voltage drop < 0.4V at 100 Amp
- Suitable for electronic alternators



Battery separators

Applications

MBR Series

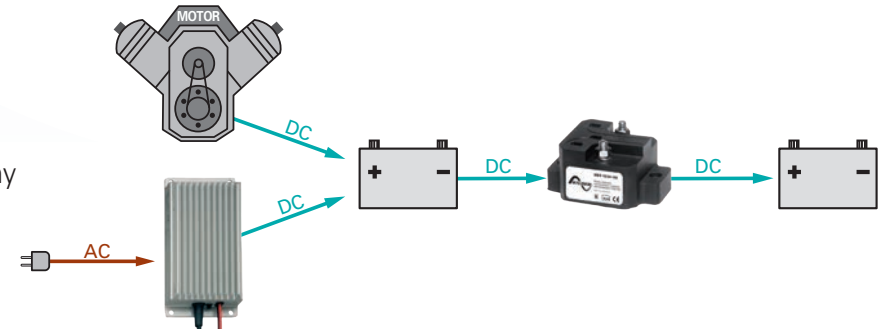
The MBR battery separators allow to supply the auxiliary battery or the appliances, as soon as the main battery voltage is high enough.

MBR range	Battery voltage	Charge current	Batteries
MBR 12/24-100	12/24 Vdc	100 A	2
MBR 12/24-160	12/24 Vdc	160 A	2
MBR 12/24-500	12/24 Vdc	500 A	2

Complete technical specifications on page 41

Main features

- Insignificant voltage drop
- Protects the auxiliary battery from any overvoltage



Battery protection

Applications

MBW Series

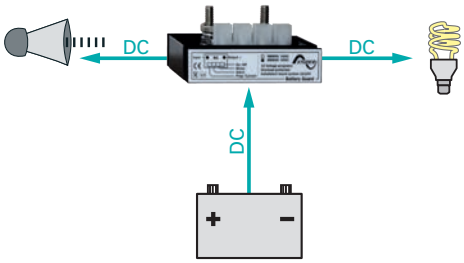
The Battery Watch protects the battery from an excessive discharge and also the consumers in case of overvoltage.

Main features and performances

- Programmed Connection and disconnection voltages by jumpers
- MOSFET switches, therefore no sparks
- Alarm output to indicate excessive voltage drops

MBW range	Maximum current	Operating voltage range (Vdc)
MBW 40	40 A	6-35 Vdc
MBW 60	60 A	6-35 Vdc
MBW 200	200 A	8-32 Vdc

Complete technical specifications on page 42

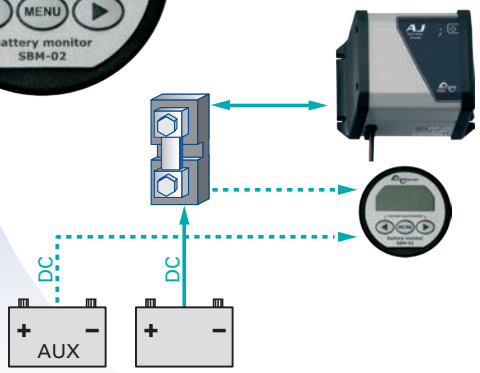


Battery monitoring

Applications

SBM-02

The SBM-02 is a highly accurate battery monitor with a data history memory. It is supplied together with a 500A/50mV shunt. This device is designed for 12 and 24V batteries. The optional SBM-PS-02 voltage pre-scaler extends the use of the SBM-01 to 27-175V batteries.



Main features and performances

- Digital display of the 6 most important parameters of a DC power system:
  1. Battery voltage (V)
  2. Current (A)
  3. Consumed Ampere-hours (Ah)
  4. Sate-of-charge (%)
  5. Time-to-go (h:m)
  6. Temperature (°C or °F)

Optional accessories

- Connection kit, type SBM-CAB-20, including 20m of twisted pair cable (3 x 2 x 0.5mm^2) and 2 fuseholders
- Communication kit, type SBM-COM, including RS232 interface box, 1.8m of 9p DSUB serial cable and software
- Communication kit, type SBM-COM-USB, including USB interface box, 1.8m of USB cable and software.
- Temperature kit, type SBM-TEMP-20, with a temperature sensor and 20 m cable
- Shunt 1200A / 50mV, type SH-1200-50, for battery monitoring in large system

VarioTrack Series

Model	VT-65			VT-80		
Electrical characteristics PV array side						
At nominal battery voltage	12 V	24 V	48 V	12 V	24 V	48 V
Maximum solar power recommended (@STC)	1000 W	2000 W	4000 W	1250 W	2500 W	5000 W
Maximum solar open circuit voltage	80 Vdc	150 Vdc		80 Vdc	150 Vdc	
Maximum solar functional circuit voltage	75 Vdc	145 Vdc		75 Vdc	145 Vdc	
Minimum solar functional circuit voltage	Above battery voltage					
Electrical characteristics battery side						
Maximum output current	65 A			80 A		
Nominal battery voltages	Automatic / manual set to 12, 24 or 48 Vdc					
Operating voltage range	Above battery voltage, minimum 7 V					
Performances of the device						
Power conversion efficiency (in a 48 V typical-system)	>99 %					
Maximum stand-by self-consumption (48 V)	25 mA > 1.2 W					
Maximum stand-by self-consumption (24 V)	30 mA > 0.8 W					
Maximum stand-by self-consumption (12 V)	35 mA > 0.5 W					
Charging stages	4 stages: Bulk, Absorption, Float, Equalization					
Battery temperature compensation (available with accessory BTS-01)	–3 mV /°C /cell (25°C ref) default value adjustable -8 to 0 mV /°C					
Electronic protections						
PV reverse polarity	Up to –150 Vdc					
Battery reverse polarity	Up to –150 Vdc					
Battery overvoltage	Up to 150 Vdc					
Over temperature	Protected					
Reverse current at night	Prevented by relays					
Environment						
Operating ambiant temperature range	–20 to 55°C					
Humidity	100 %					
Ingress protection of enclosures	IP54, IEC/EN 60529:2001					
Mounting location	indoor					
General data						
Warranty	5 years					
Weight	5.2 kg			5.5 kg		
Dimensions h/w/l [mm]	120 / 220 / 310			120 / 220 / 350		
Parallel operation (separated PV arrays)	Up to 15 devices					
Max wire size	35 mm^2					
Glands	M 20 × 1,5					
Communication						
Network cabling	STUDER communication BUS					
Remote control and display	RCC-02/-03 / Xcom-232i					
Menu languages	English / French / German / Spanish					
Data logging	With RCC-02/03 on SD card · One point every minute					
Accordance to standards						
CE compliant	EMC 2004/108/CE · LV 2006/95/CE · RoHS 2002/95/CE					
Safety	IEC/EN 62109–1:2010					
EMC (Electro Magnetic Compatibility)	IEC/EN 61000–6–3:2011 · IEC/EN 61000–6–1:2005					
Accessories						
Remote control RCC-02 or RCC-03	•			•		
Module Xcom-232i	•			•		
Internet based communication sets Xcom-LAN, Xcom-GSM	•			•		
Battery Status Processor BSP	•			•		
2 aux. contacts module ARM-02	•			•		
Cooling Module ECF-01	•			Included		
Battery temp. sensor BTS-01 (3 m)	•			•		
Communication cable CAB-RJ45-8-2	•			•		

Data may change without any notice

VarioString

Model	VS-120			
Electrical characteristics PV array side				
	MPPT 1	MPPT 2	1 + 2 in parallel	1 + 2 in series
Maximum solar power recommended (@STC)	3500 W	3500 W	7000 W	7000 W
Maximum current	13 A	13 A	26 A	13 A
Maximum solar open circuit voltage	600 Vdc	600 Vdc	600 Vdc	900 Vdc
Minimum solar functional circuit voltage	200 Vdc	200 Vdc	200 Vdc	400 Vdc
Recommended MPPT voltage	250-500 Vdc	250-500 Vdc	250-500 Vdc	500-750 Vdc
Electrical characteristics battery side				
Maximum output current	120A (60A per MPPT)			
Nominal battery voltages	48 Vdc			
Operating voltage range	38 - 68V			
Battery grounding possibility	Battery + or battery -			
Performances of the device				
Maximum efficiency	>98 %			
MPPT efficiency	>99 %			
Maximum stand-by self-consumption (48 V)	25 mA > 1.25 W			
Charging stages	4 stages: Bulk, Absorption, Float, Equalization			
Battery temperature compensation (available with accessory BTS-01)	–3 mV /°C /cell (25°C ref) default value adjustable -8 to 0 mV /°C			
Electronic protections				
PV reverse polarity	•			
Battery overvoltage	Up to max 80 Vdc			
Over temperature	•			
Reverse current at night	•			
Galvanic isolation	•			
PV grounding possibility	PV + , PV - , floating			
Ground fault Protection	Programmable			
Environment				
Operating ambient temperature range	–20 to 55°C			
Humidity	maximum 95%, non-condensing			
Ingress protection of enclosures	IP20			
Mounting location	indoor			
General data				
Warranty	5 years			
Weight	7.5kg			
Dimensions h/w/l [mm]	133 / 322 / 466			
Solar generation connection (6mm^2)	SUNCLIX™ (Phoenix Contact Tool Free) 2 pairs supplied with unit			
Parallel operation (separated PV arrays)	Up to 15 devices			
Max wire size (batery)	70 mm^2			
Glands (batery)	2xPG21			
Communication				
Network cabling	STUDER communication BUS			
Remote control and display	RCC-02/03 / Xcom-232i / Xcom-LAN / Xcom-GSM			
Menu languages	English / French / German / Spanish			
Data logging	With RCC-02/-03 on SD card · One point every minute			
Accordance to standards				
CE compliant	EMC 2004/108/CE · LV 2006/95/CE · RoHS 2002/95/CE			
Safety	IEC/EN 62109–1:2010			
EMC (Electro Magnetic Compatibility)	IEC/EN 61000–6–3:2011 · IEC/EN 61000–6–1:2005			
Accessories				
Remote control RCC-02 or RCC-03	•			
Module Xcom-232i	•			
Internet based communication sets Xcom-LAN, Xcom-GSM	•			
Battery Status Processor BSP	•			
2 aux. contacts module ARM-02	•			
Battery temp. sensor BTS-01 (3 m)	•			
Communication cable CAB-RJ45-8-2	•			

Data may change without any notice

Xtender Series

	Model	XTS 900-12	XTS 1200-24	XTS 1400-48	XTM 1500-12	XTM 2000-12	XTM 2400-24	XTM 2600-48	XTM 3500-24	XTM 4000-48	XTH 3000-12
	Inverter										
	Nominal battery voltage	12Vdc	24Vdc	48Vdc	12Vdc		24Vdc	48Vdc	24Vdc	48Vdc	12Vdc
	Input voltage range	9.5 - 17Vdc	19 - 34Vdc	38 - 68Vdc	9.5 - 17Vdc		19 - 34Vdc	38 - 68Vdc	19 - 34Vdc	38 - 68Vdc	9.5 - 17Vdc
	Continuous power @ 25°C	650**/500VA	800**/650VA	900**/750VA	1500VA	2000VA			3000VA	3500VA	2500VA
	Power 30 min. @ 25°C	900**/700VA	1200**/1000VA	1400**/1200VA	1500VA	2000VA	2400VA	2600VA	3500VA	4000VA	3000VA
	Power 5 sec. @ 25°C	2.3kVA	2.5kVA	2.8kVA	3.4kVA	4.8kVA	6kVA	6.5kVA	9kVA	10.5kVA	7.5kVA
	Maximum load	Up to short-circuit									
	Maximum asymmetric load	Up to Pcont.									
*	Load detection (stand-by)	2 to 25 W									
	Cos φ	0.1-1									
	Maximum efficiency	93%	93%	93%	93%		94%	96%	94%	96%	93%
	Consumption OFF/Stand-by/ON	1.1W/1.4W/7W	1.2W/1.5W/8W	1.3W/1.6W/8W	1.2W/1.4W/8W	1.2W/1.4W/10W	1.4W/1.6W/9W	1.8W/2W/10W	1.4W/1.6W/12W	1.8W/2.1W/14W	1.2W/1.4W/14W
*	Output voltage	Pure sine wave 230Vac (± 2%) / 120Vac (1)									
*	Output frequency	Adjustable 45 - 60Hz (1) ± 0.05% (crystal controlled)									
	Harmonic distortion	<2%									
	Overload and short-circuit protection	Automatic disconnection with 3 time restart attempt									
	Overheat protection	Warning before shut-off - with automatic restart									
	Battery charger										
*	Charge Characteristic	6 steps: Bulk, Absorption, Floating, Equalization, reduced floating, periodic absorption Number of steps, thresholds, end current and times completely adjustable with the RCC-02/-03									
*	Maximum charging current	35A	25A	12A	70A	100A	55A	30A	90A	50A	160A
*	Temperature compensation	With BTS-01 or BSP 500/1200									
	Power Factor Correction (PFC)	EN 61000-3-2									
	General data	**XTS 900-12**	**XTS 1200-24**	**XTS 1400-48**	**XTM 1500-12**	**XTM 2000-12**	**XTM 2400-24**	**XTM 2600-48**	**XTM 3500-24**	**XTM 4000-48**	**XTH 3000-12**
*	Input voltage range	150 to 265Vac / 50 to 140Vac (1)									
	Input frequency	45 to 65Hz									
	Input current max. (transfer relay) / Output current max.	16Aac/20Aac			50Aac/56Aac						
	Transfer time	<15 ms									
	Multifunction contacts	Module ARM-02 with 2 contacts, in option			2 independent contacts (potential free 3 points, 16Aac/5Adc)						
	Weight	8.2 kg	9 kg	9.3 kg	15 kg	18.5 kg	16.2 kg		21.2 kg	22.9 kg	34 kg
	Dimension hxwxl [mm]	110x210x310	110x210x310	110x210x310	133x322x466				133x322x466		230x300x500
	Protection index	IP54			IP20						
	Conformity	Directive EMC 2004/108/EC: EN 61000-6-1, EN 61000-6-3, EN 55014, EN 55022, EN 61000-3-2, 62040-2 Low voltage directive 2006/95/EC: EN 62040-1-1, EN 50091-2, EN 60950-1									
	Operating temperature range	-20 to 55°C									
	Relative humidity in operation	100%			95% without condensation						
	Ventilation	Optional cooling module ECF-01			Forced from 55°C						
	Acoustic level	<40dB / <45dB (without/with ventilation)									
	Warranty	5 years									
	Accessories										
	Remote control RCC-02 or RCC-03	•	•	•	•	•	•	•	•	•	•
	Module Xcom-232i	•	•	•	•	•	•	•	•	•	•
	Internet based communication sets Xcom-LAN, Xcom-GSM	•	•	•	•	•	•	•	•	•	•
	Battery Status Processor BSP	•	•	•	•	•	•	•	•	•	•
	Remote Control Module RCM-10 (3 m)	•	•	•	•	•	•	•	•	•	
	2 aux. contacts module ARM-02	•	•	•							
	Cooling Module ECF-01	•	•	•							
	Battery temp. sensor BTS-01 (3 m)	•	•	•	•	•	•	•	•	•	•
	Communication cable for 3ph and // CAB-RJ45-8-2	•	•	•	•	•	•	•	•	•	•
	Mounting frame X-Connect										•

* Adjustable with the RCC-02/-03

** These features are valid only when using the cooling module ECF-01.

(1) With -01 at the end of the reference, means 120V/60Hz. Available for all Xtenders except XTH 8000-48

Data may change without any notice

	XTH 5000-24	XTH 6000-48	XTH 8000-48
	24Vdc	48Vdc	
	19 - 34Vdc	38 - 68Vdc	
	4500VA	5000VA	7000VA
	5000VA	6000VA	8000VA
	12kVA	15kVA	21kVA
	94%	96%	
	1.4W/1.8W/18W	1.8W/2.2W/22W	1.8W/2.4W/30W
	140A	100A	120A
	XTH 5000-24	XTH 6000-48	XTH 8000-48
			50Aac/80Aac
	40 kg	42 kg	46 kg
	230x300x500	230x300x500	
	•	•	•
	•	•	•
	•	•	•
	•	•	•
	•	•	•
	•	•	•
	•	•	•

COMPACT Series

Model	XPC 1400-12	XPC 2200-24	XPC 2200-48	C 1600-12	C 2600-24	C 4000-48
Inverter						
Nominal battery voltage	12Vdc	24Vdc	48Vdc	12Vdc	24Vdc	48Vdc
Input voltage range	9.5 – 16Vdc	19 - 32Vdc	38 - 64Vdc	9.5 - 16Vdc	19 - 32Vdc	38 - 64Vdc
Continuous power @ 25°C	1100VA	1600VA	1600VA	1300VA	2300VA	3500VA
Power 30 min. @ 25°C	1400VA	2200VA	2200VA	1600VA	2600VA	4000VA
Power 5 sec. @ 25°C	3 x Pnom					
Maximum power	Up to short-circuit					
Maximum asymmetric load	Up to Pcont.					
Stand-by adjustment	1 to 25W					
Cos φ	0.1 - 1					
Maximum efficiency	94%	95%		94%	95%	
Consumption OFF/Stand-by/ON	0.5/0.6/4W	0.8/0.9/7W	1.2/1.3/7W	0.5/0.6/6W	0.8/0.9/9W	1.2/1.4/12W
Output voltage	Sine wave 230Vac (±5%) (XPC also available in 120Vac)					
Output frequency	50Hz ± 0.05% (crystal controlled)					
Total harmonic distortion	< 4%	< 2%				
Overload and short-circuit protection	Automatic disconnection with 3 time restart attempt					
Overheat protection	Acoustic warning before shut-off - with automatic restart					
Battery charger (4 STEP) I-U-Uo-Equalize (every 25 cycles)						
Charging current adjustable	0 - 45Adc	0 - 37Adc	0 - 20Adc	0 - 55Adc		0 - 50Adc
Input current balance adjustment	Not available			1 - 16A		
Maximum input voltage	265Vac					
Input AC voltage range	Adjustable threshold from 150 to 230Vac (XPC also available in 120Vac)					
Input frequency	45 - 65Hz					
Power Factor Correction (PFC)	EN 61000-3-2					
Battery control (thresholds and times adjustable by the user)						
Absorption time	0-4 h					
End charge cycle voltage*	14.4Vdc	28.8Vdc	57.6Vdc	14.4Vdc	28.8Vdc	57.6Vdc
Floating voltage*	13.6Vdc	27.2Vdc	54.4Vdc	13.6Vdc	27.2Vdc	54.4Vdc
Equalization time*	0-4 h					
Equalization voltage*	15.6Vdc	31.2Vdc	62.4Vdc	15.6Vdc	31.2Vdc	62.4Vdc
Deep-discharge protection*	10.8Vdc	21.6Vdc	43.2Vdc	10.8Vdc	21.6Vdc	43.2Vdc
Temparature compensation (optional CT-35)	-3mV / ° C / Cell					
General data						
Multifunction contact programmable	16A - 250Vac (potential free 3 points)					
Max. current on transfer relay	16Aac					
Transfer time	< 40 ms					
Weight	11.7 kg	12.6 kg		16 kg	17.1 kg	29.4 kg
Dimension hxwxl [mm]	124x215x410			124x215x480		124x215x670
Protection index	IP20 (IP22 with top cover C-IP22)					
Certification ECE-R 10 (E24)	•	•	Not available	•	•	Not available
EC conformity	EN 61000-6-1, EN 61000-6-3, EN 55014, EN 55022, EN 61000-3-2, Low voltage directive 2006/95/EC: EN 62040-1-1, EN 50091-2, EN 60950-1					
Operating temperature range	-20°C to +55°C					
Relative humidity in operation	95% without condensation					
Ventilation	From 45°C					
Accoustic level	<40dB / <45dB (without/with ventilation)					
Warranty	5 years					
Option solar charger (4 stages)						
Maximum PV open circuit voltage (V)	25Vdc	45Vdc	90Vdc	25Vdc	45Vdc	90Vdc
Maximum charge current (A)	30Adc	30Adc	20Adc	30Adc	30Adc	20Adc
Charging curve	I-U-Uo-Equalize (every 25 cycles)					

* Factory settings

Data may change without any notice

AJ Series

Model		AJ 275-12	AJ 350-24	AJ 400-48	AJ 500-12	AJ 600-24	AJ 700-48
Inverter							
Nominal battery voltage		12Vdc	24Vdc	48Vdc	12Vdc	24Vdc	48Vdc
Input voltage range		10.5 – 16Vdc (24Vdc max.)	21 – 32Vdc (44Vdc max.)	42 – 64Vdc (64Vdc max.)	10.5 – 16Vdc (24Vdc max.)	21 –32Vdc (44Vdc max.)	42 –64Vdc (64Vdc max.)
Continuous power @ 25°C		200VA	300VA	300VA	400VA	500VA	500VA
Power 30 min. @ 25°C		275VA	350VA	400VA	500VA	600VA	700VA
Power 5 min. @ 25°C		350VA	500VA	600VA	575VA	675VA	900VA
Power 5 sec. @ 25°C		450VA	650VA	1000VA	1000VA	1200VA	1400VA
Maximum asymmetric load		150VA	150VA	200VA	250VA	300VA	300VA
Max. efficiency (%)		93%	94%	94%	93%	94%	94%
Cos φ max.		0.1 – 1 up to 200 VA	0.1 – 1 up to 300 VA	0.1 – 1 up to 300 VA	0.1 – 1 up to 400VA	0.1 – 1 up to 500VA	0.1 – 1 up to 500VA
Detection of the load		2W (only with the solar option -S)			Adjustable: 1 to 20W		
Current of short-circuit AC 2 sec.		2.3Aac (4.6Aac*)	3.2Aac (6.4Aac*)	4.6Aac (9.2Aac*)	5.2Aac (10.4Aac*)	5.7Aac (11.4Aac*)	7Aac (14Aac*)
Output voltage		Sine wave 230Vac (120Vac*) ±5%					
Frequency		50Hz (60Hz*) ± 0.05% (crystal controlled)					
Distortion THD (resistive load)		< 5% (@ Pnom.)					
Consumption Stand-by		0.3W**	0.5W**	1.1W**	0.4W	0.6W	1.5W
Consumption «ON» no load		2.4W	3.5W	5.2W	4.6W	7.2W	12W
Overheat protection (±5°C)		Shut down @ 75°C - Auto-restart @ 70°C					
Overload and short circuit protection		Automatic disconnection with 2 time restart attempt					
Reverse polarity protection as internal fuse		60A	40A	25A	120A	90A	60A
Deep discharge battery protection		Shut off @ 0.87 x Unom - Automatic restart @ Unom					
Max. battery voltage		Shut off @ >1.33 x Unom - Automatic restart @ < Umax					
Acoustic alarm		Before low battery or overheating disconnection					
General data							
Weight		2.4 kg	2.6 kg		4.5 kg		
Dimensions hxwxl [mm]		142x163x84			142x240x84		
Protection index IP		IP 30 conforms to DIN 40050					
Certification ECE-R 10 (E24)		•	•	Not available	•	•	Not available
EC conformity		EN 61000-6-1, EN 61000-6-3, EN 55014, EN 55022, EN 60950-1					
Operating temperature		-20°C to +50°C					
Relative humidity in operation		95% without condensation					
Ventilation forced		From 45°C ± 5°C					
Acoustic level		< 45 dB (with ventilation)					
Warranty		5 years					
Approximate correction of Pnom		-1.5%/°C since +25°C					
Recommended battery capacity		> 5 x Pnom/Unom (recommended value in Ah)					
Length cables (Battery/left AC)		1.2m / 1m			1.5m / 1m		
Options		**AJ 275-12-S**	**AJ 350-24-S**	**AJ 400-48-S**	**AJ 500-12-S**	**AJ 600-24-S**	**AJ 700-48-S**
Solar regulator	Voltage max.	25Vdc	45Vdc	90Vdc	25Vdc	45Vdc	90Vdc
	Current max.	10Adc			15Adc		
	Principle	Floating 3 stages (I/U/UO)					
	Absorption voltage	14.4Vdc	28.8Vdc	57.6Vdc	14.4Vdc	28.8Vdc	57.6Vdc
	Floating voltage	13.6Vdc	27.2Vdc	54.4Vdc	13.6Vdc	27.2Vdc	54.4Vdc
Plug for remote control (RCM)		•	•	•	•	•	•

* 120Vac/60Hz on request
** Standby with solar option -S

Data may change without any notice

AJ Series

Model		AJ 1000-12	AJ 1300-24	AJ 2100-12	AJ 2400-24
Inverter					
Nominal battery voltage		12Vdc	24Vdc	12Vdc	24Vdc
Input voltage range		10.5 – 16Vdc (24Vdc max.)	21–32Vdc (44Vdc max.)	10.5 – 16Vdc (20Vdc max.)	21–32Vdc (40Vdc max.)
Continuous power @ 25°C		800VA	1000VA	2000VA	2000VA
Power 30 min. @ 25°C		1000VA	1300VA	2100VA	2400VA
Power 5 min. @ 25°C		1200VA	2000VA	2450VA	2800VA
Power 5 sec. @ 25°C		2200VA	2800VA	5000VA	5200VA
Maximum asymmetric load		500VA	600VA	1000VA	1200VA
Max. efficiency (%)		93%	94%	92% @ 300VA	94% @ 300VA
Cos φ max.		0.1 – 1 up to 800VA	0.1 – 1 up to1000VA	0.1 – 1 up to 2000VA	0.1 – 1 up to 2000VA
Detection of the load		Adjustable: 1 → 20W			
Current of short-circuit AC 2 sec.		10Aac (20Aac*)	13Aac (26Aac*)	26Aac (52Aac*)	30Aac (60Aac*)
Output voltage		Sine wave 230Vac (120Vac*) ±5%			
Frequency		50 Hz (60Hz*) ± 0.05% (crystal controlled)			
Distortion THD (resistive load)		< 5% (@ Pnom. & Uin nom.)			< 3% (@ Pnom & Uin nom.)
Consumption Stand-by		0.7W	1.2W	0.7W	1.2W
Consumption «ON» no load		10W	13W	16W	16W
Overheat protection (±5°C)		Shut down @ 75°C - Auto-restart @ 70°C			
Short circuit protection		Automatic disconnection with 2 time restart attempt			
Reverse polarity protection by internal fuse		125A	100A	Not protected	150A
Deep discharge battery protection		Shut off @ 0.87 x Unom - Automatic restart @ Unom			
Max. battery voltage		Shut off @ >1.33 x Unom - Automatic restart @ < Umax			
Acoustic alarm		Before low battery or overheating disconnection			
General data					
Weight		8.5 kg		19 kg	18 kg
Dimensions hxwxl [mm]		142x428x84		273x399x117	
Protection index IP		IP 30 conforms to DIN 40050		IP 20 conforms to DIN 40050	
Certification ECE-R 10 (E24)		•	•	•	•
EC conformity		EN 61000-6-1, EN 61000-6-3, EN 55014, EN 55022, EN 60950-1			
Operating temperature		-20°C to +50°C			
Relative humidity in operation		95% without condensation			
Ventilation forced		From 45°C ± 5°C			
Acoustic level		< 45 dB (with ventilation)			
Warranty		5 years			
Approximate correction of Pnom		-1.5%/°C since +25°C			
Recommended battery capacity		> 5 x Pnom/Unom (recommended value in Ah)			
Length cables (Battery/left AC)		1.5m / 1m		1.7m / 1m	
Options		**AJ 1000-12-S**	**AJ 1300-24-S**	**AJ 2100-12-S**	**AJ 2400-24-S**
Solar regulator	Voltage max.	25Vdc	45Vdc	25Vdc	45Vdc
	Current max.	25Adc		30Adc	
	Principle	Floating 3 stages (I/U/UO)			
	Absorption voltage	14.4Vdc	28.8Vdc	14.4Vdc	28.8Vdc
	Floating voltage	13.6Vdc	27.2Vdc	13.6Vdc	27.2Vdc
Remote control JT8 supplied with 5m cable		•	•	•	•

* 120Vac/60Hz on request

Data may change without any notice

MBC Series

Model	MBC 12-06/1	MBC 12-15/1	MBC 24-03/1	MBC 24-08/1	MBC 24-15/1	MBC 24-32/1
Battery voltage (Vdc)	12	12	24	24	24	24
Input voltage (Vac)	230 ±15% (40 - 60 Hz)					
Charge voltage (boost) (Vdc)	14.4	14.4	28.8	28.8	28.8	28.8
Charge voltage (float) (Vdc)	13.8	13.8	27.6	27.6	27.6	27.6
Output (A)	6	15	3	8	15	32
Cooling	Heat sink					
Outputs	1					
Efficiency	> 85 %					
Ambient temp. range	-25 to 50°C					
Dimensions lxwxh (mm)	155x80x36	195x100x47	155x80x36	195x100x46	193x99x46	158x245x47.5
Weight (kg)	0.9	1.8	0.9	1.8	1.8	3.8
Switch to Floating mode (A)	0.2	0.8	0.2	0.4	1.5	3.5
Secondary fuse (A)	7.5	20	7.5	15	20	40
Input wired	•	•	•	•	•	•
Ouput wired	•	•	•	•	•	•
Warranty	2 years					

MDCI and MDC Series

MDCI – DC/DC converter, switch-mode, isolated

Model	MDCI 100	MDCI 200	MDCI 360	MDCI 360 Charger
Power (W)	100	200	360	360
Input variants (Vdc)*	A-B-C-D	A-B-C-D	A-B-C-D	A
Output variants (Vdc/A) ± 2%	12.5/8-24/4	12.5/16-24/8	12.5/30-24/15	27.6/13
Output current (A)	8/4	16.5/8	30/15	13
Galvanic isolation	•	•	•	•
Isolation voltage (V)	400			
Efficiency @ full load (%)	> 85			
Off-load current (mA)	< 25			
Operating temperature	-20 / +45°C			
Ambiant temp. (20°) increase after 30 min. @ full load	25°C	30°C		
Cooling	Convection	Fan		
Dimensions HxWxD (mm)	49x88x152	49x88x182	64x163x160	
Weight (gr)	500	600	1400	

* A = 9-18 Vdc B = 20-35 Vdc C = 30-60 Vdc D = 60-120 Vdc

MDC –DC/DC converter, switch-mode, not-isolated

Model	MDC 1224-7	MDC 2412-5	MDC 2412-8	MDC 2412-12	MDC 2412-20	MDC 2412-30
Power (W)	170	65	105	160	275	415
Output current (A)	7	5.5	8	12	20	30
Input (Vdc)	9-18	18-35		20-35		
Output (Vdc)	24	13.2			13.8	
Efficiency @ full load (%)	90					
Off-load current (mA)	< 15	< 5			< 25	
Operating temperature	-20 / +40°C					
Ambiant temp. (20°) increase after 30 min. @ full load	30°C		20°C	30°C	33°C	
Cooling	Convection					Fan
Dimensions HxWxD (mm)	49x88x98	49x88x68	49x98x88		49x88x126	49x88x151
Weight (gr)	300	170	250	260	480	600

Common features MDCI & MDC		
Paralleling (only MDCI)		Max. 2 converters
Humidity		Max. 95% non condensing
Protection	Overload	Up to short-circuit
	Overheating	Output voltage reduction
	Overvoltage	Transient protection by Varistor
	Reverse polarity	Fuse
Casework		Anodized aluminium
Connections		6.3 mm Faston
Warranty		2 years
Norms		EN 50081-1 (emission) EN 50082-1 (immunity) 95/54/EC (automotive directive)

Data may change without any notice

MBI Series

MBI – Battery isolator, voltage drop free

Model	MBI 100/2 IG	MBI 150/2 IG	MBI 100/3 IG	MBI 150/3 IG	MBI 200/3 IG	MBI 2-100/3
Input nominal voltage (Vdc)	12/24					
Input voltage range (Vdc)	8-30					
Charge current max. (A)	100	150	100	150	200	100
Input number	1					2
Battery banks	2		3			
Voltage drop @ 10a/20A (V)	0.05 / 0.1					
Consumption	0.24mA@24V 0.12mA@12V					
Alternator start	•	•	•	•	•	
Operating temperature (°C)	-40 / +85					
Dimensions LxHxD (mm)	146x85x92		146x85x152			
Weight (gr)	780	810	780	810	815	780
Nominal voltage 12 or 24V	Automatic detection					
Insulation to ground	> 500V @ 60Hz					
Warranty	2 years					
Norms	EN 50081-1 (emission) EN 50082-1 (immunity) EN 60950-1 (safety)					

MBR Series

MBR – Microprocessor controlled battery separator

Model	MBR 12/24-100	MBR 12/24-160	MBR 12/24-500
Nominal voltage (Vdc)	12/24	12/24	12/24
Charge current max. (Amp)	100	160	500
Connection threshold (Vdc) ± 2%	13.2/26.4	13.2/26.4	13.2/26.4
Disconnection threshold (Vdc) ± 2%	12.8/25.6	12.8/25.6	12.8/25.6
Battery banks	2		
Alternator start	•	•	•
Start contact for batteries paralleling		•	•
Micro switch for remote status indication			•
Dimensions LxHxD (mm)	46x46x80	46x93x96	72x70x80
Weight (gr)	110	300	417
Consumption	< 5mA		
Protection of the auxiliary battery against overvoltage	16 / 32Vdc		
Connection on the battery side	M6		M8
Other connections	6.3 mm Faston		
Warranty	2 years		
Norms	EN 50081-1 (emission) EN 50082-1 (immunity) Automotive Directive 95/54/CE		

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MBW Series

MBW – Battery watch

Model	MBW 40	MBW 60	MBW 200
Nominal voltage (Vdc) depends on jumpers	12/24		
Max. continuous current 5' (Amp)	40	60	200
Peak current (Amp)	120	120	480
Operating voltage range (Vdc)	6-35		8-32
Consumption (mA)	< 7		< 3
Alarm output delay	15 seconds		
Alarm output max. current (mA)	500		
Load disconnect delay	1 minute		30 secondes
Voltage level accuracy	0.2V	2%	0.1V
Casework	Anodized aluminium, black		
Weight (gr)	200		580
Dimensions HxDxL (mm)	80x60x40	80x60x40	145x92x85
Battery protection	Against excessive discharge		
Users protection	Against overvoltages (16 / 32 Vdc)		Against overvoltages (15.5 / 31 Vdc)
MOSFET switches	No sparks		
Norms	EN 50081-1 (emission) EN 50082-1 (immunity) Automotive Directive 95/54/CE		EN 50081-1 (emission) Automotive Directive 95/54/CE

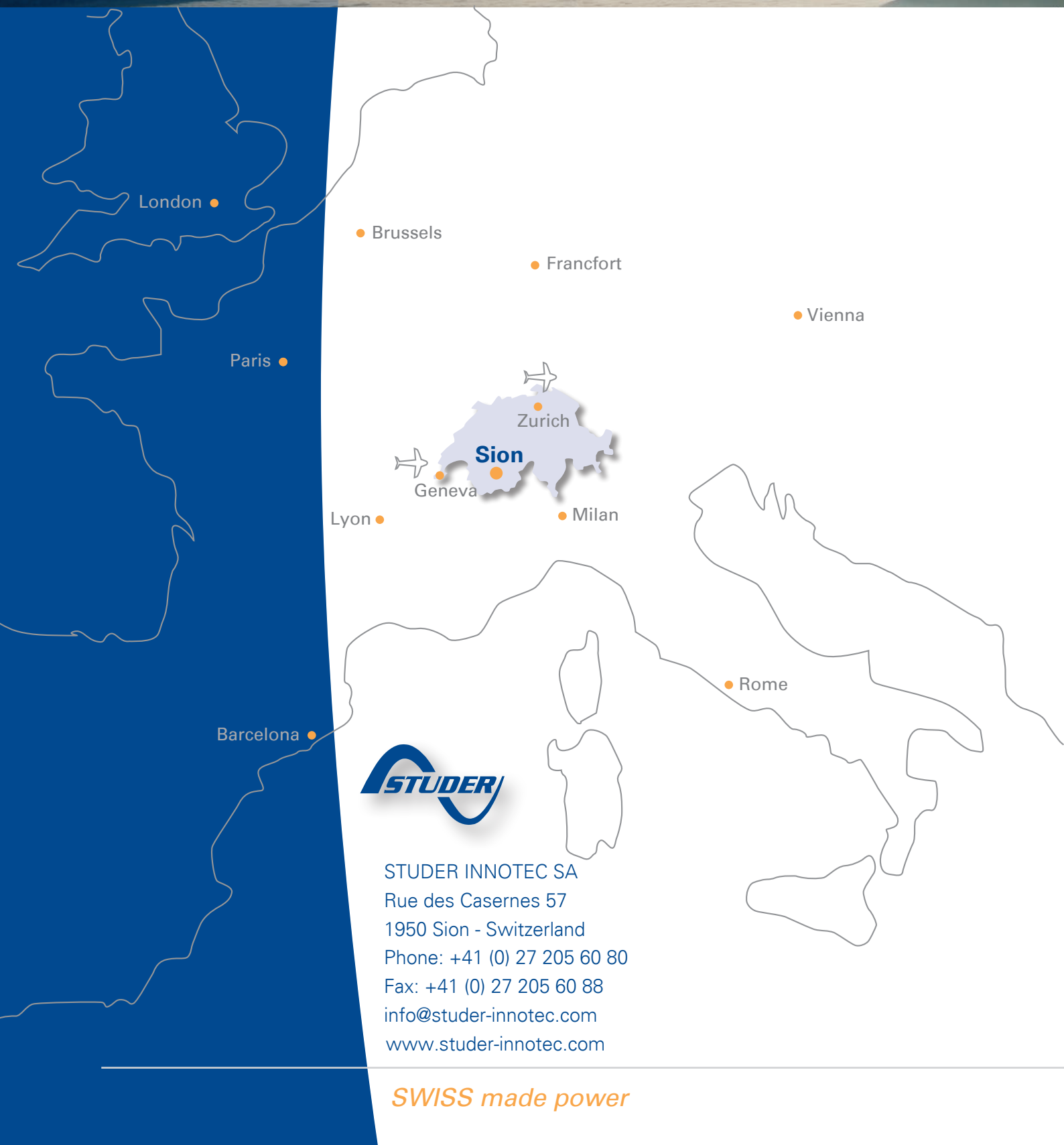
Jumper selectable voltage	
Disengage (V)	**Engage (V)**
10	11.5
10.5	12
11	13
11.5	13.8
21.5	24.5
22	25
22.5	25.5
23	26.5

SBM-02

SBM-02 – Battery monitor 12 and 24 Vdc (27-175 Vdc in option)

Model		SBM-02
Supply voltage range		9-35 Vdc
Consumption @ 12Vdc, without BL		9 mA
Consumption @ 24Vdc, without BL		7 mA
Input voltage range («Auxiliary» battery)		2...35 Vdc
Input voltage range («Main» battery)		0...35 Vdc
Input current range		-9999...+9999 A
Battery capacity range		20...9990 Ah
Operating temperature range		-20...50°C
Protection class		IP20 (Frontpanel IP65)
Dimensions	Front panel	Ø 64 mm
	Body diameter	Ø 52 mm
	Total depth	79 mm

Standart equipment SBM-02
Potential free alarm contact
500A/50mV current shunt
Optional accessories
SBM-PS-02-Voltage pre-scaler 1:5 (adapting the SBM-02 to input voltage 27-175Vdc)
Connection kit, type SBM-CAB-20, including 20 m of twisted pair cable (3x2x0.5 mm2) and 2 fuseholders
Communication kit, type SBM-COM, including RS232 interface box, 1.8 m of 9p DSUB serial cable and a software
Communication kit, type SBM-COM-USB, including USB interface box, 1.8 m of USB cable and software.
Temperature kit, type SBM;-TEMP-20, with 20 m cable
Shunt 1200 A/50 mV, type SH-1200-50



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