ENGLISH EDITION 05/05

POWERSTOCC®

INVERTERS OF A NEW DIMENSION

Solarstocc AG

PRO-SYSTEMS FROM GERMANY

POWERSTOCC®

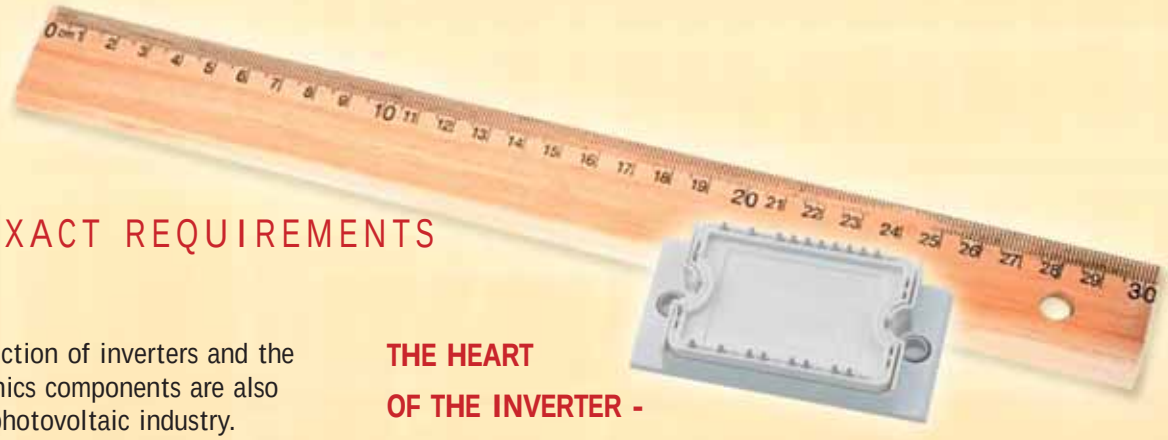
INVERTERS OF A NEW DIMENSION

The most important criteria for selecting a photovoltaic installation are reliability, longevity and the cost to use ratio. The inverter, the heart of the photovoltaic installation, plays an important role here.

Solarstocc inc. faced this challenge and developed inverters in cooperation with an international firm that has core competency in the area of industrial electronics - the PowerStocc series.

THE POWERSTOCC® EXTENDED FAMILY

Solarstocc inc. draws on proven string technology and constructs 6 different inverters from 1 to 6 kilowatts into modular construction architecture. With intelligent interconnecting concepts, photovoltaic installations can thus be operated for the grid-connection from 1 kilowatt up to the megawatt area.



TO MEET YOUR EXACT REQUIREMENTS

In the future, industrial production of inverters and the use of high-efficiency electronics components are also going to be available to the photovoltaic industry. Solarstocc inverters of the PowerStocc series comprise high-tech components that were still considered unaffordable just a short time ago.

The functional principle of an inverter consists in turning the direct current (DC) generated in photovoltaic modules into network-conforming AC. Transistors which, as it were, 'hack' this by a lightning fast opening and closing of circuits generate the intermediate product for AC and perform the primary effort with the greatest demands on an inverter. Today, they primarily decide whether an inverter is to work reliably for 5, 10 or 20 years.

Solarstocc inc. is fully onto this trend and already uses high-performance modules from Danfoss Silicon Power with integrated driver circuits and protection facilities.

The technology to unite performance transistors in a module is called compactness and with it improved reliability, just like optimized heat management in an appliance. High-performance modules, also called power modules, replace the discreet semiconductors that were previously used.

They are manufactured in a clean room using only the most modern fully-automated production facilities.

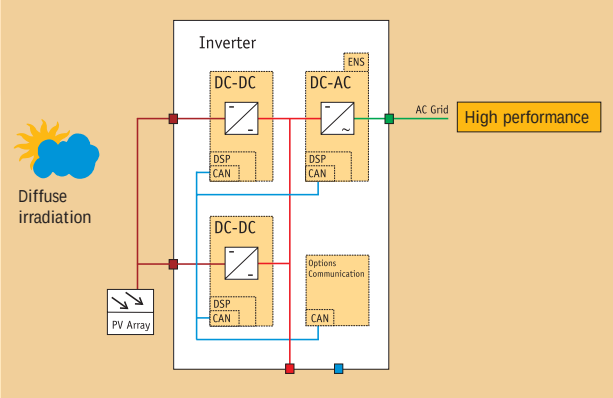
THE HEART
OF THE INVERTER -
INTELLIGENT TECHNOLOGY IN THE SMALLEST SPACE!

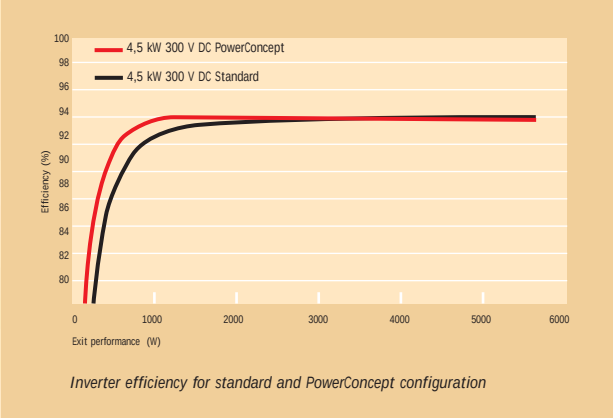
The key for reliable production of performance modules is:

- the lastest production technologies
- perfect soldering in vacuum soldering ovens, monitored by x-ray
- exclusively unleaded soldering material
- electric insulation final testing, statically and dynamically
- SPC - statistical process control
- thermal and mechanical stress simulation
- close cooperation with independent institutes and universities
- dependability and lifetime examinations

POWERCONCEPT®

Inverters from PowerStocc 3000 possess several DC performance units. In order to use diffuse radiation optimally, the strings of the inverter are interconnected, becoming an internal master/slave-switch with major advantages. The master is taken over by different operative units depending on the operating hours. PowerConcept also guarantees high efficiency in the partial cargo area.



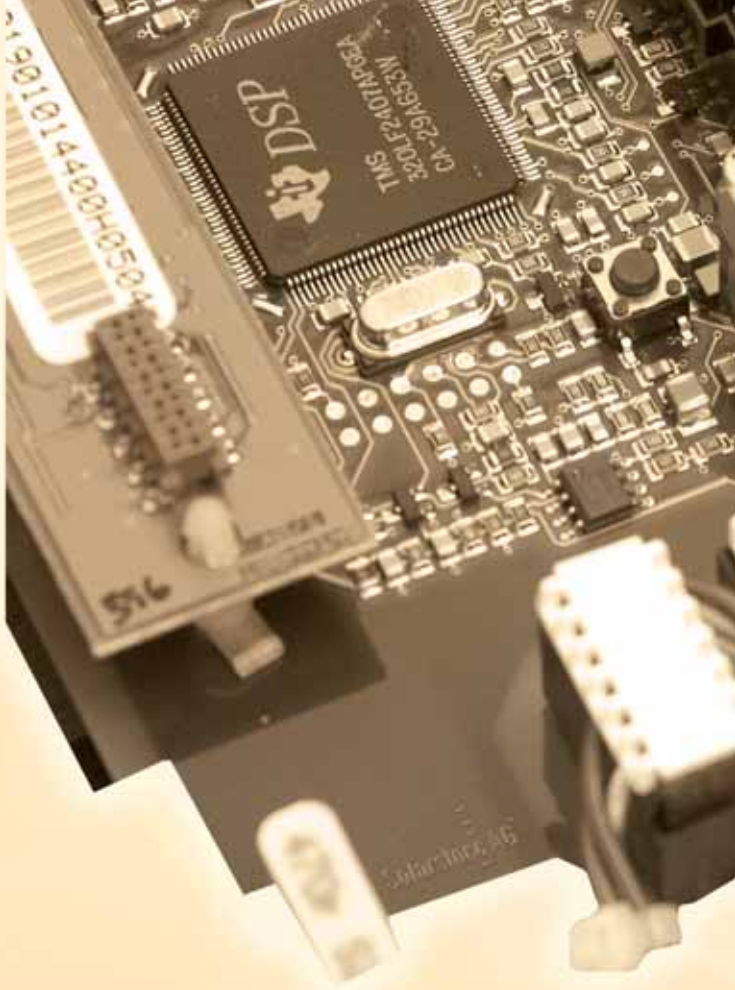


Inverter efficiency for standard and PowerConcept configuration

The diagram shows that: During a time of low radiation efficiency is at a very high level thanks to the PowerConcept. With a diffuse radiation allotment of approximately 50 % in Germany every PowerStocc owner profits from this innovation.
The requirements are the same operative parameters as for the module of a photovoltaic installation.

CAN-BUS

The reliable and industrially proven data transfer protocol takes over the internal control of PowerStocc inverters. CAN Bus technology is, among others, applied a million-fold in the auto industry and stands for security at the highest level. With its data communication galvanically separated from the performance part, inverter downtime is as good as out of the question.



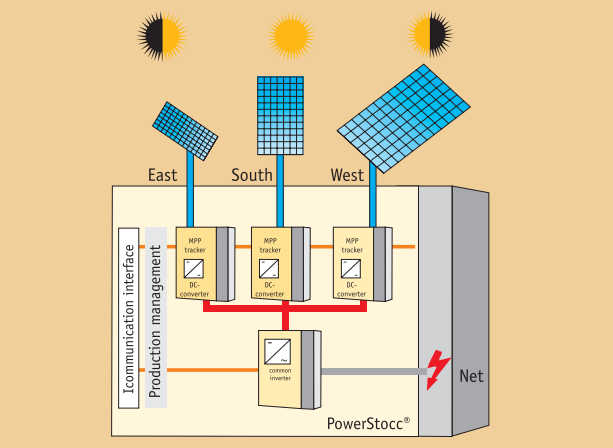
POWER

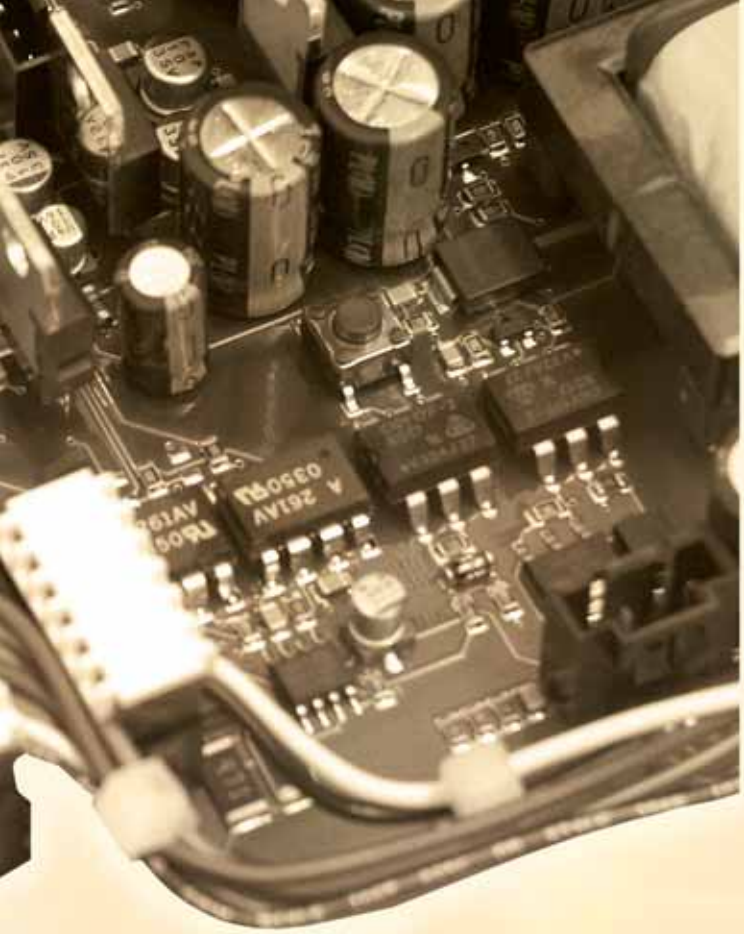
NEW DIMENSIONS

INDIVIDUAL MPP TRACKING

Every DC-performance unit is assigned an individual MPP-Tracker. Strings with different parameters can be connected to an inverter and optimal profit is guaranteed, so for example:

- installations with partial interconnections
- east/west installations
- different number of modules per string
- different types of modules per string





STOCC®

S OF SOLARSTOCC

MODULAR DESIGN

Developing a readily comprehensible service concept is called innovation. With consistent modular construction, individual units can be simply exchanged. The forward-looking architecture of the PowerStocc inverter shows the state of the most modern developments of performance electronics.

MV/HV - TENSION MODULES

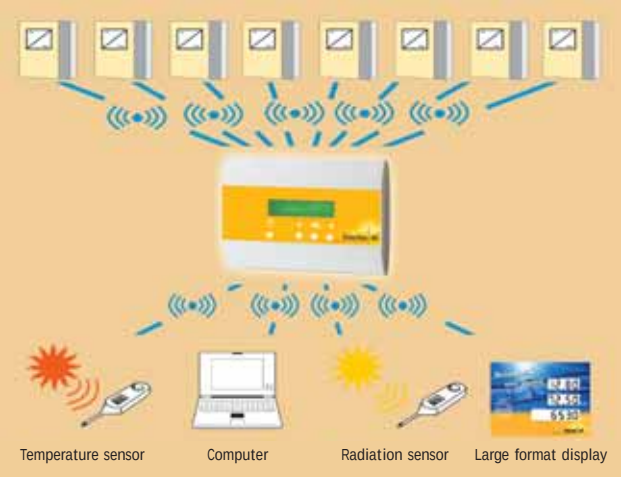
PowerStocc inverters can be equipped with different DC input tension modules. Targeted tracking in a smaller tension frame generates a very good efficiency factor over the entire field of operation. With its modular technology, Solarstocc sets up optimal adjustable-speed behavior and consequently high profits. Very large input tension ranges mean 'universal' and are always a compromise.

PERFECT & PRACTICAL ASSEMBLIES

Connection of the entire periphery generally takes place as plug/socket implementation. On the AC-side, **all** PowerStocc inverters are connected to the base of the housing by means of a plug system.
The string binding is executed in its customary form as MC plug/socket and the interface connection for PC and data logger systems is realized as RJ45 (network technology).

WIRELESS COMMUNICATION NETWORK

PowerStocc inverters are equipped with an RS485 interface in the RJ45 format. Wireless implementation has a special future. Data communication takes place by means of radio interface and can optionally be arranged with a low surcharge.
In the process, variations are available for you at home or also as systems for professional data evaluation. Optional accessories such as displays, sensors, data loggers or PC's are hard-wired or controlled wire less.



POWERSTOCC® INVERTERS OPTIMALLY CONNECTS ALL PHOTOVOLTAIC INSTALLATIONS TO THE NET

PowerStocc inverters are available in closely staggered performance classes. This makes optimal adaptation of hardware to photovoltaic installation possible, and with the best possible cost efficiency.

TAKE IT FOR GRANTED WITH POWERSTOCC®

- **Qualification approval and certification by a professional association**
  Net connection following VDE 0126 (Association of German Electricians), integrated ENS in line with the latest guidelines.

- **Separate connection space**
  Implementation protection class II, DC - connection with the MultiContact plug system.

- **Galvanic separation with a small HF-transformer**
  The operative part is built on HF technology and silently transfers the energy generated with optimal protection for the photovoltaic installation and the people under your roof.

- **Stand-by mode at night**
  Individual consumption is below 0.2 watts at night.

- **Voltage overload protection**
  Resistors on the DC entry side

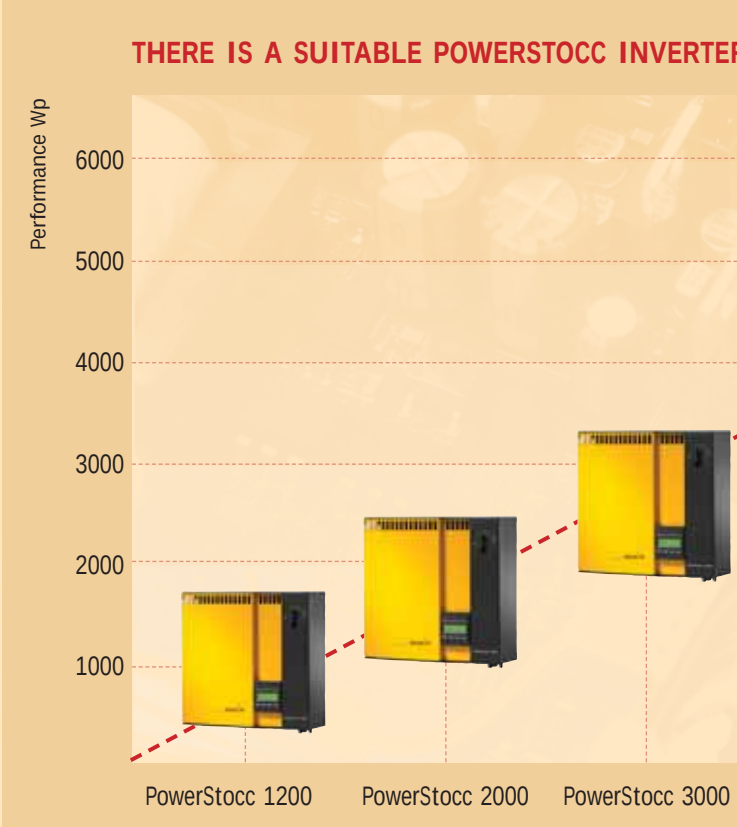
- **Extended temperature range**
  -25°C to +60°C

- **Stainless aluminum casing**
  Powder coated

- **Extended warranties**
  5 years of product warranty with options for expansion

- **International environmental and quality standards**
  Our principles for manufacturing our products are:
  - Minimal consumption of raw materials and energy
  - Active protection of the environment
  - Efficient exploitation of resources

  Our environmental and quality management system is continuously being adjusted to the latest international demands of ISO standards. Our business is certified according to ISO 9001 and 14001.



The graphics show that any installation size can be configured w
planners have made the job easy, thanks to an innovative produ

POWERSTOCC® INVERTERS AS OUTDOOR APPLIANCES

The PowerStocc brand is distinguished by its multitasking ability. Solarstocc Inc. engineers developed an innovative outdoor concept for the proven quality of the PowerStocc inverter series. Outstanding in its functionality and design is how this equipment presents itself today. As for hardware, the inverters were supplemented by 2 precision fans which are regulated depending on the temperature. All electrical connections are implemented in the accustomed quality with plug solutions from outside.

The inverters are designed to implement IP65, whereby the fan required for exterior cooling of the inverter's rear wall is implemented in IP54.

R FOR EVERY PHOTOVOLTAIC INSTALLATION

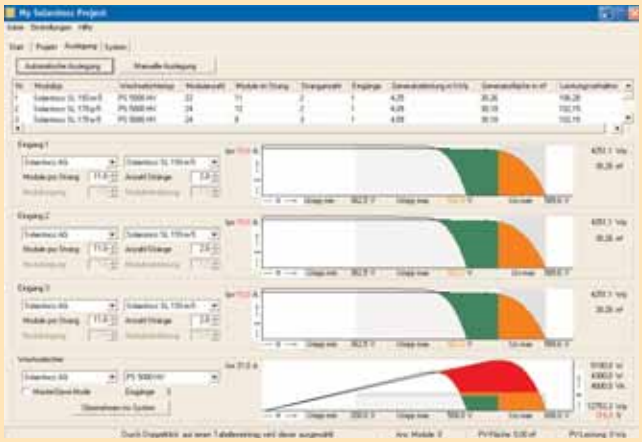
PowerStocc 4000 PowerStocc 5000 PowerStocc 6000

ith a custom PowerStocc inverter. Powerstocc technicians and
ct concept. Just use our **My Solarstocc Project** design software.

DATA COMMUNICATION

Intelligent software solutions from Solarstocc

Mature and reliable hardware for performance electronics from PowerStocc is an important functional feature. The intelligent software solutions from Solarstocc optimally supplement the inverter series. There are three useful PC programs in the Solarstocc software package of professional tools available for the technician, planner and operator.



My Solarstocc Project version 1.0

A prerequisite for an optimal balance of services from a photovoltaic installation is the best possible configuration of the PV module and inverters. In the extended version, calculation of proceeds is possible that is even localized and based on weather data. Use this user-friendly software.

- site-oriented design of inverters
- graphic presentation of parameters
- suggestions for optimal design depending on the material available
- generating projects with several inverters
- automatic generation of a principle circuit diagram
- accessibly formatted modular data bank

PowerStocc Control version 1.0

A well functioning photovoltaic installation with high returns presupposes undisturbed operation of, for example, the inverters. PowerStocc Control software is the software to use to avoid bugs or recognize them as early as possible. Via the inverter's RS485 interface you reach the inverter's internal data with a laptop (PC) and USB cable adapter units.

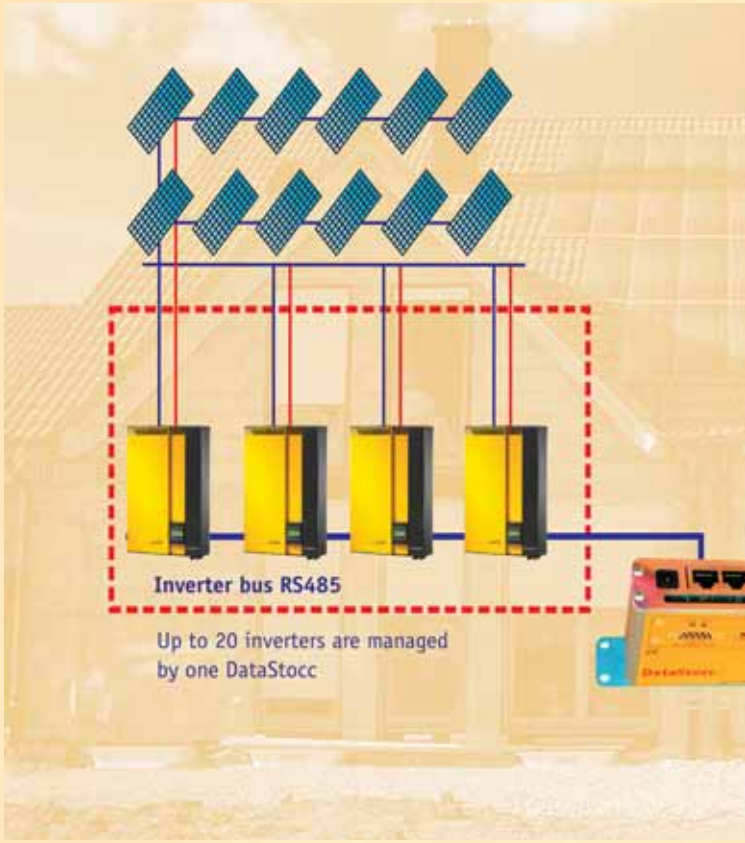
- automatic generation of an initial operational protocol with all system and company data
- read-outs of all inverter data
- configurations such as regional adjustments, PowerConcept and others
- simple and intelligent handling with lucid Windows software
- unnecessary opening of the appliance

DataStocc Browser version 1.0

Solarstocc favors installation supervision with systems. A key component of this is DataStocc Browser software. The site parameters collected in the data logger are graphically prepared and evaluated on the PC.

- data analysis of the photovoltaic installation
- graphic statement of the parameters in diagrams
- visualization of the photovoltaic installation in its online mode
- zooms of specific data in predetermined time slots
- data export from other programs
- graphics export from any program

DATA COMMUNICATIONS - DATA LOGGER SYSTEMS



DataStocc® - Data Logger System

Professional data communication is very definitely part of the PowerStocc inverter concept. The DataStocc communication medium enables project managers, installers and operators of photovoltaic systems to understand the installation's physical procedures at any time.

The DataStocc product line was conceived with the premises of independence and compatibility. Modern storage media make the system very flexibly deployable as generically related systems. DataStocc can therefore completely store site parameters for several years or months.

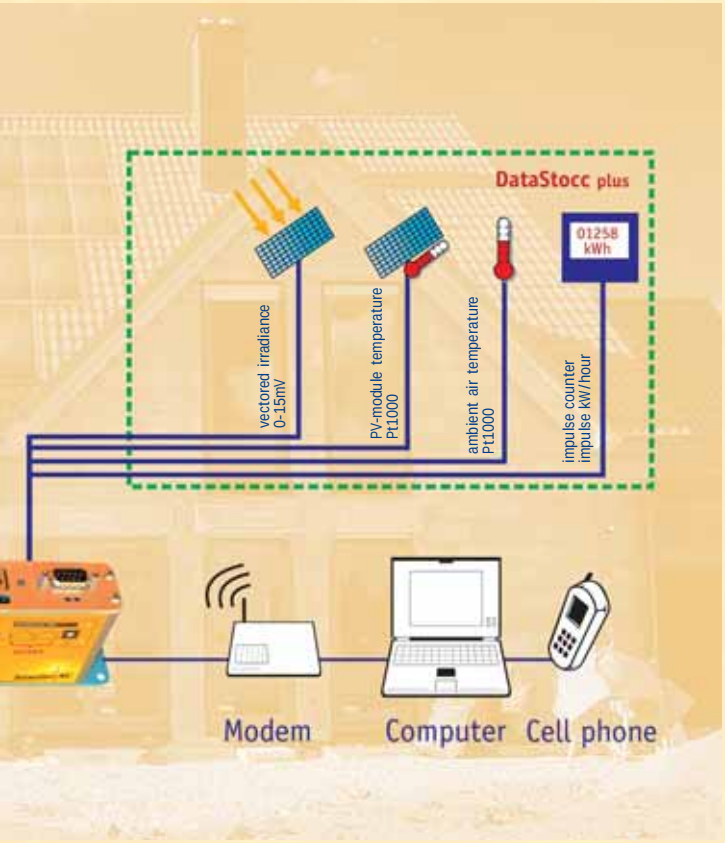
Data exchange between the inverters and the DataStocc data logger takes place by radio or is hard-wired. The RS485 interface, with a reliable range of up to 1000 meters, is executed as an RJ45 (western plug) plug/jack variation. The inverters and DataStocc are simply hooked up to each other by patch cables that are already familiar from the network.

The storage medium in the data logger is a Compact Flash® card as it is used in digital cameras. Huge storage volume in the smallest space - and that is readily exchangeable - are outstanding features.

The data processing possibilities are highly versatile. The DataStocc system can be directly hooked up with a PC via the RS232 interface. Telecommunication is accomplished by connecting a modem with this interface.

Since the data are completely deposited in the storage card, they can also be read out by means of an external device such as, for example, a laptop. The extensive and highly commodious "DataStocc browser" Windows software is available to handle this. DataStocc is offered in 4 configuration variations.

HARDWARE	DATASTOCC®
· radio interface for connecting the inverters, including radio module, range of approximately 30m	-
· RS485 interface for connecting the inverters	✔
· RS232 (Sub-D9) interface for connecting a PC, modem (ISDN or the like) or GSM (cell phone net)	✔
· RS485 (2) interface for connecting a big display	✔
· 9-30 V external power adapter	✔
· Compact Flash® adapter units, Type 1, externally accessible, expandable with a backup (memory) card of 64 MBS up to 512 MBS	✔
· IP21 aluminum housing (optional IP54)	✔
· signaling the operating condition with LED's	✔
· EMC tested according to DIN	✔
· **additional interfaces for:** Radiation sensor (0 ...150 MA); outside temperature sensor PT 1000 (-40°C to 160°C); Module temperature sensor PT 1000 (-40°C to 160°C)); energy feed in count over S0-input, optically decoupled, adjustable up to 10,000 impulses	-



DATA COMMUNICATIONS - VISUALIZATION

PowerStocc 70 - big display: Specifications

Display: Represented with 7 segment LED's, Height 70mm, 1st line: current performance in kW, 2nd line: day's production in kWh, 3rd line: total production in kWh

Interfaces: For impulse current counters with potential-free impulse output and RS232/RS485 for Sunny Boy Control.

Connection: 5m cables with DCF-77 socket, 24V external power adapters

Housing: powder-coated enclosed housing, protection type IP65, dimensions: 600 x 450 x 40mm, 2mm reflow glass, coated and non-reflective, Weight: approximately 5 kg

Warranty: 2 years, 5 years for Solarstocc-Teampartner

Optional: Time and/or temperature displays in rotation with current capacity, automatic dimmer

PowerStocc 10 - Wireless Display: Specifications

Display: 2 x 16 signs, monochrome, 4 buttons

Interface: wireless, Frequency: 868 MHz, communication protocol Z-wave

Range: up to 150m outside, approximately 15m inside buildings

Housing: Dimensions: 151 x 101 x 44mm, protection type IP21

Power supply: 2x LR14 batteries (approximately 1 year lifespan)

Optional: Signal reinforcer repeater (Dimensions: 80 x 120 x 58mm, 230V, protection type IP64)

DATASTOCC® PLUS	DATASTOCC® RADIO	DATASTOCC™ RADIO PLUS
-	✔	✔
✔	-	-
✔	✔	✔
✔	-	-
✔	✔	✔
✔	✔	✔
✔	✔	✔
✔	✔	✔
✔	-	✔

POWERSTOCC® INVERTERS SPECIFICATIONS

ENTRY LEVEL SIZES

			PS 1200	PS 2000	PS 3000	PS 4000	PS 5000	PS 6000
Nominal PV generator proficiency P_{PVnorm}			810 W	1600 W	2700 W	3200 W	4300 W	4800 W
Maximum PV generator proficiency P_{PVmax}			1100 W	1950 W	3200 W	3900 W	5100 W	5850 W
Input voltage area U_{PV} in 2 implementations MPP tension range	High-voltage suitable for modules with 5 inch cell technology	HV	200 V-500 V	200 V-500 V	200 V-500 V	200 V-500 V	200 V-500 V	200 V-500 V
	Maximum input voltage, U_{PVmax} (with 1000 W/m²; -10°C)	HV	600 V	600 V	600 V	600 V	600 V	600 V
	Medium voltage suitable for modules with 6 inch cell technology	MV	100 V-350 V	100 V-350 V	100 V-350 V	100 V-350 V	100 V-350 V	100 V-350 V
	Maximum input voltage, U_{PVmax} (with 1000 W/m²; -10°C)	MV	450 V	450 V	450 V	450 V	450 V	450 V
Max. input current I_{PVmax}		HV	5 A	7 A	14 A	14 A	21 A	21 A
		MV	10 A	11 A	22 A	22 A	33 A	33 A
DC input module			1	1	2	2	3	3
Independent MPP-Tracker			1	1	2	2	3	3
DC separation facility			tamper-proof MC plug system					
Overload protection			resistors on the DC entry side					
Power surge Uss			amounts to less than 10 %					
Grounding surveillance			serially integrated					
Reverse polarity protection			realized by short circuit diodes					

OUTPUT VARIABLES

	PS 1200	PS 2000	PS 3000	PS 4000	PS 5000	PS 6000
Proficiency rating *1, P_{nom}	825 W	1650 W	2750 W	3300 W	4000 W	4600 W
Maximum output proficiency, P_{max}	900 W	1800 W	3000 W	3600 W	4400 W	5000W/5400W*2
Nominal exit current I_{nom}	3,3 A	6,5 A	11,3 A	13,0 A	17,5 A	19,0 A
Maximum exit current I_{max}	4,0 A	8,0 A	13 A	15,5 A	19,2 A	22,0 A
Line voltage/frequency Country-specific adjustability	195 V-264 V 50 Hz	195 V-264 V 50 Hz	195 V-264 V 50 Hz	195 V-264 V 50 Hz	195 V-264 V 50 Hz	195 V-264 V 50 Hz
Distortion factor of the exit current	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%
Short circuit solidity	circuit side by current regulation					
Phase-shift corners	keyed to the basic wave of the current: 0°					

*1: 25°C | *2: with 3 phase feed in

GENERAL SIZES

	PS 1200	PS 2000	PS 3000	PS 4000	PS 5000	PS 6000
Measurements						
Length	369 mm	369 mm	498 mm	498 mm	631 mm	631 mm
Width	386 mm	386 mm	386 mm	386 mm	386 mm	386 mm
Height (with wall mounting)	188 mm	188 mm	188 mm	188 mm	188 mm	188 mm
Built-in display	2 x 16 signs, monochrome, 4 buttons					
Weight	10,5 kg	10,5 kg	15,5 kg	15,5 kg	20 kg	20 kg
Consumption at night	< 0,2 W	< 0,2 W	< 0,2 W	< 0,2 W	< 0,2 W	< 0,2 W
Maximum efficiency	93,4%	93,9%	94,4%	94,4%	94,5%	94,5%
Euro efficiency	90,7%	91,9%	92,6%	93,1%	93,2%	93,2%
Ambient temperature range	-25°C bis 60°C	-25°C bis 60°C	-25°C bis 60°C	-25°C bis 60°C	-25°C bis 60°C	-25°C bis 60°C
Housing variations	Indoor variant, rustproof aluminum-housing, dustproof; outdoor variant ready for delivery.					

CERTIFICATION

	PS 1200	PS 2000	PS 3000	PS 4000	PS 5000	PS 6000
Protection type	Protection type according to EN 60529 IP21					
Network supervision	VDE 0126 (ASSOCIATION OF GERMAN ELECTRICIANS) (ENS) only for Germany					
CE conformity EC guidelines	73/23/EEC LVD 89/336/EEC EMV 93/68/EEC CE					
Network repercussions	EN 61000-3-2/A14					
EMC-Compatibility	EN 50082-2 EN 61000-6-1, EN 61000-6-2 EN/IEC 61000-4-2, EN/IEC 61000-4-3, EN/IEC 61000-4-4, EN/IEC 61000-4-5 EN/IEC 61000-4-6, EN/IEC 61000-4-11 ENV 50204					
EMC emission	EN 50081-1 EN 61000-6-3, EN 61000-6-4 EN 55011, EN 55022, EN 55014-2					
Security standard	EN 50178					
Insulation	EN 60664-1					

Subject to technical alteration.

OUR BRANDS

SolarStocc®
Photovoltaics in a new quality

ConStocc®
Assembly systems to perfection

QuickStocc®
Securest solar mounting in the world

PowerStocc®
Inverter in a new dimension

WattPoints®
Biggest marketing campaign

PowerConcept®
Highest efficiency

DataStocc®
Data communication is system

Solarstocc AG®

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