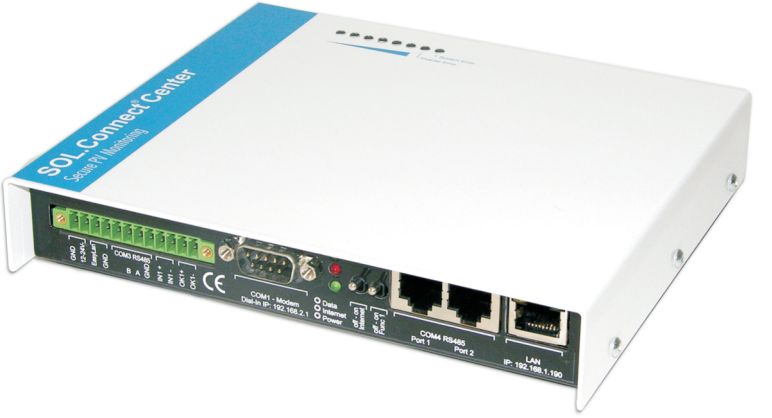
SOL.Connect® Center

Secure PV Monitoring

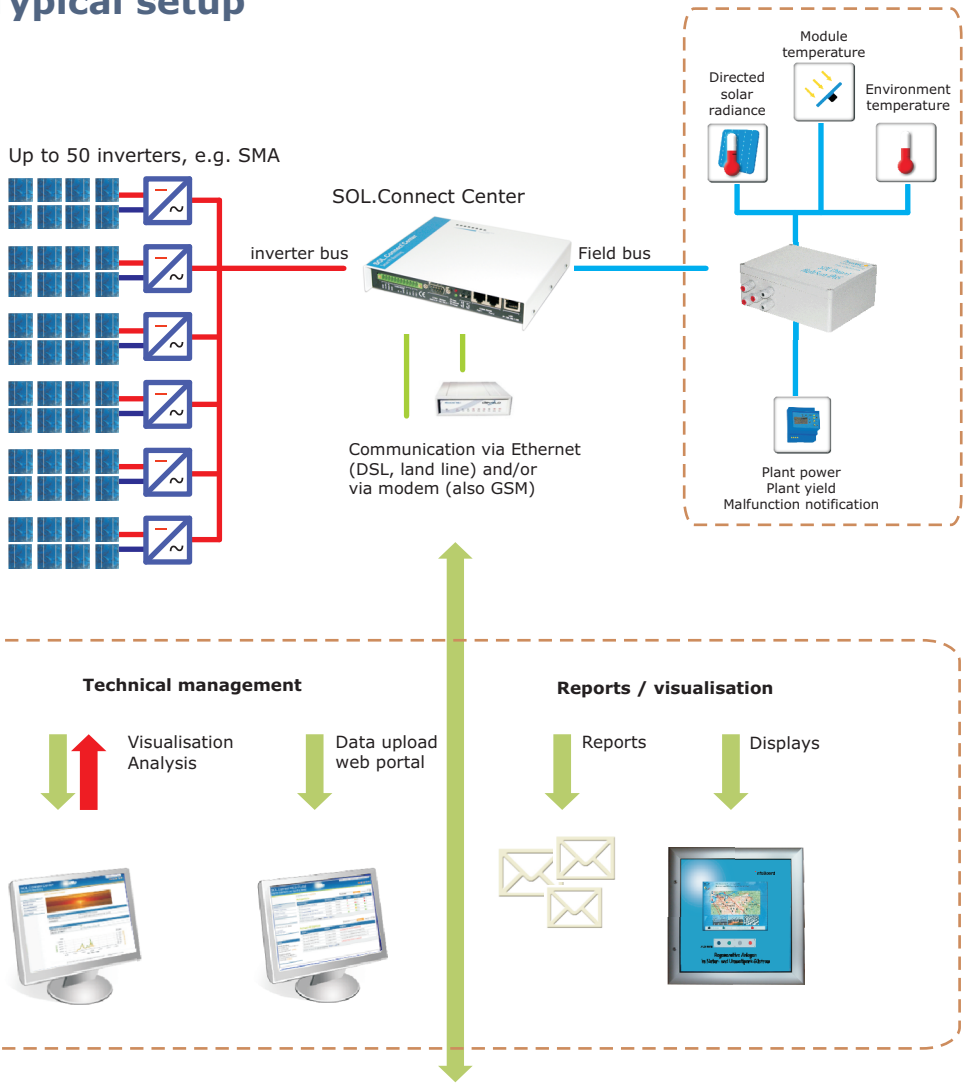
Overview, functionality, technical data

Real-time monitoring for large-scale plants



Monitoring, visualisation und active communication

Typical setup



Open interfaces

- Master display access via OPC (e.g WINCC)
- Data export via XML /to MySQL data bases
- Data export to web portals of third party provider (e.g. Meteo Control)

Product description

The **SOL.Connect® Center** has been designed for the **process monitoring** of renewable energy plants. The user is getting a multi-functional device that **actively monitors** the processes and values of a plant **indepentenly**, **visualizes** data, **sets off alarms** in case of an error and can initiate emergency shutdowns.

SOL.Connect® Center captures the inverter data via RS485- or RS232- or LAN interface.

Additional measurements e.g. directed solar radiation, PV-module temperature, energy production, etc. can be captured by the analogue digital converter **SOL.Connect® MultiScan or SOL.Connect® MultiIO**.

To this end we have been working over recent months to provide new interfaces and access possibilities for the user:

OPC Server - Integration into Master Display Technology

OPC (OLE for Process Control) stands for „Openess, Productivity & Collaboration" and describes an initiative for standardisation of automation data exchange.

With this, operators such as local councils, finally have the ability to integrate PV-plants into established master displays - e.g. Siemens WINCC.

XML - Standardised Data Exchange

XML (Extensible Markup Language) is an extensible markup language, which allows the user to visualize data hierarchically and structured. XML is for data exchange between computer systems

The SOL.Connect® Center can transfer cyclical data as XML files to any address via FTP. The exchange per web services is in preparation (keyword SOAP).

Direct database export

For the dedicated user there is also the possibility to transfer all online values to a MySQL® data base with an direct data export.

MySQL® software is a open source SQL-data base management system (structured query language, structured query language) for structured data collection.

Applications not only for photovoltaics

With the SOL.Connect® Center many different measuring and controlling setups are possible. Nowadays applications already exist in the following areas:

- Heat pump measuring
- Facility management
- Decentralised energy management (ISET-BEMI+®)
- SOL.Connect meter®

Our integrated script interpreter IB1 allows application programming even for non-professionals. Our partners are already implementing their own solutions based on this platform.

Technical data

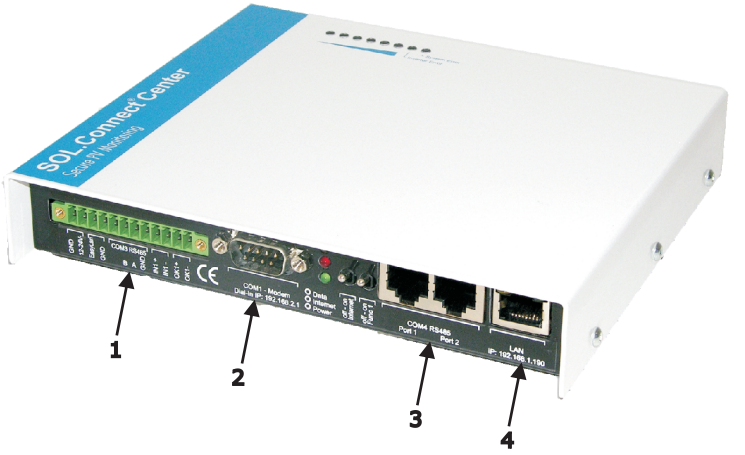
- Industrial PC for use in switch cabinet/box
  Non-ventilated metal casing for indoor wall- and carrier-rail mounting.
- Dimensions: 175 x 155 x 45mm (W x D x H)
- Weight: 800g net (without accessories and cables)

- System status display 3 LEDs (to connection side)
  - yellow: modem active
  - red: Internet dial-out allowed
  - green: power supply ok
- Power and event display via LEDs (upside)
  - 6x green: plant total power bar
  - 1x red: inverter error
  - 1x red: system error

- Interfaces to data sources
  - RS232 or RS485 via frame connector (edition dependent)
  - EasyLan field bus via frame connector
  - RS485 via RJ45 double socket
- D-SUB9 plug for remote maintenance and internet dial-in
- LAN Ethernet (10/100mBit full duplex)

- Architecture Pentium CPU AMD SC520, 133MHz, Flash BIOS
- Memory 64MB RAM
- Compact Flash® memory card, plugable, from 1 GB
- Battery buffered clock (RTC), life time at least 5 years (typically 10 years), exchangeable by the manufacturer
- Operating system Linux

- External power supply 12-24Vdc (5W typical)
- Operating temperature 0°C to + 50°C
- Certified according to the electromagnetic compatibility (EMC) - 89/336/EEC and Electrical safety - 73/23/EEC

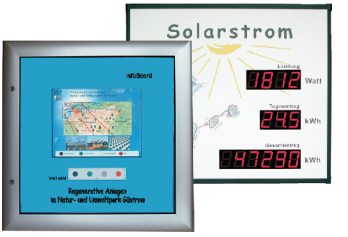


Connections

1) Terminal strip:
   - power supply 12-24Vdc
   - Field bus EasyLan
   - RS232 or Rs485 system data interface
   - 1x relay output
   - 1x optical input
2) Data telecommunications internet interface (modem)
3) RS485 RJ45 data interface double socket
4) LAN (Ethernet)

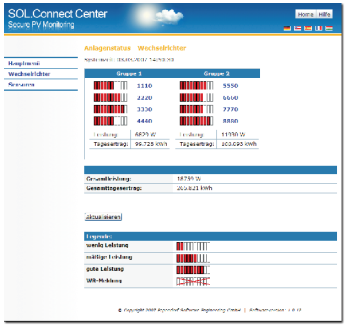
On-site presentation

Connecting displays and display cabinets via RS232/RS485/LAN is a provided feature in SOL.Connect® Center and can easily be adapted to the respective manufacturer, like Schneider, HVG or Rico.



Data measurement

- Complete logging in database files (period-based depending on memory card circular buffer)
- Recording of up to 50 inverters at 10 minute intervals, e.g.:
  - Serial number
  - Inverter number
  - Status/Operating mode
  - Inverter temperature [°C]
  - DC Voltage [V]
  - DC Current [A]
  - AC Voltage [V]
  - AC Current [A]
  - AC Power [W]
  - Daily yield [kWh]
- Optional logging data of additional sensor data via SOL.Connect® MultiScan or SOL.Connect® MultiIO for example:
  - Solar radiation (directed)
  - Module temperature
  - Environment temperature
  - Inducted electrical energy
  - Power (transmitter)



Monitoring and alarming (monitoring)

Configurable real-time monitoring of errors and events (selection):

- Inverter events
- Communication breakdown
- Yield deviation from normal values
- Loss of production (per inverter and total plant)
- System events (restart, system configurations changes,...)
- Performance standard given by the network operator (ripple control receiver; in preparation)

Notification

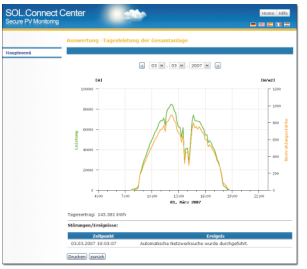
On occurence of respective events, messages can be sent via e-mail, FTP, SMS or an alarm contact can be triggered

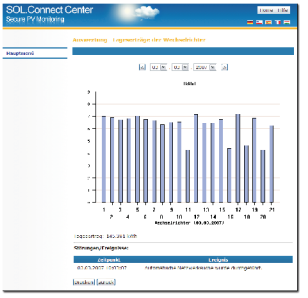
Dending via modem or LAN possible:

- SMS
- E-mail
  - Daily yield report of the plant (sums)
  - Event report on different reporting time frames

Visualisation

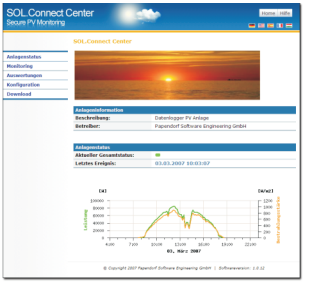
- Online visualisation
  - Production compared with radiation
  - Plant overview (structured overview of current energy production)
  - Inverter status/details
  - Sensor overview (current measurements)
- Diagrams
  - Daily power (per INV, INV-group and total plant)
  - Daily yield (per INV, INV-group and total plant)
  - Monthly yield (per INV, INV-group and total plant)
  - Yearly yield (per INV, INV-group and total plant)
  - Performance ratio (total plant)
- Normalized month yield (kWh/kWp)





Configuration

- Searching, naming and grouping of inverters
- Selection of inverters for logging
- Yield threshold for the alarm function
- Acceptable yield deviance (in %) for alarm function
- Activation of additional sensors (SOL.Connect MultiScan) with stating of calibration values
- System control (network, modem, e-mails, etc.)
- **SOL.Connect® Power Manager** (in preparation) for load management after EEG Novelle 2009 for plants exceeding 100kWPeak
- Administration of message recipients
- Latency until notification
- Password and access administration



Data upload

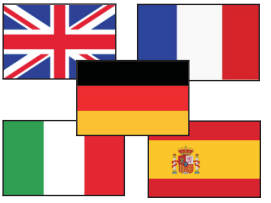
Automatic dial-in to the internet via modem or LAN for

- FTP
- Web portal (via FTP)
- Other servers
- Service portal access for customer service and internet presentation

Languages

Multi-lingual user interface:

- German, English, Spanish, French, Italian



Scope of delivery

- SOL.Connect® Center (multilingual)
- Compact Flash® memory card
- Plugable power supply (12V, 2,0A)
- Crosslink-network cable (for direct PC connection)
- Assembly kit: Assembly adapter, hat-rail clamp, mounting set (3 screws and dowels)
- Manual

Accessories

Modems/Network

- Analogue: DEVOLO Microlink 56k i
- ISDN: DEVOLO Microlink ISDN i
- GSM: Siemens MC35i Terminal , Insys GSM
- WLAN: Access Points (e.g. D-Link, Netgear)
- Powerline (e.g. Netgear) and
- further devices on request

SOL.Connect® MultiScan

Accurate AD-converter (16bit), universally configurable sensor module with 2/4/6 analogue and 2 optical inputs

SOL.Connect® MultiIO

For simultaneously recording of several transmitters and meters

SOL.Connect® Data Warehouse

Internet portal with public and private areas

- Plant presentation
- Creation of graphical reports
- Publishing and comparing of plant data
- Backup of logging- and configuration data
- Service interface for fitter, supplier and manufacturer

Displays, display cabinets, interactive terminals

Visualization possibilities of different manufacturers and power levels for on-site presentations

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