Controller
- Controlling up to 12 inverters
- Total and single output power detection
- Configurable manually or via terminal program
- System events storage
- Automatic alarm report via modem

Bypass
- Electronic bypass
- Versions 120A or 200A
- Overtemperature and fan failure detection
- Redundant to controller

Inverter
- Efficiency > 88%
- Low output impedance
- Robust IGBT-end-stage
- High crestfactor
- Overload- and short-circuit protected
- High-frequent switching

... a modular inverter concept
The system includes one controller and up to twelve inverters in parallel. The series inverters are available in 2kVA and 4kVA output power versions.

The controller is mandatory for systems operation. The controller is able to either manage a single inverter, or several inverters with even differing output power classes, due to an automatic recognition function by the controller.

An optional electronic bypass can be connected to the controller, the controller will automatically detect bypass error messages and assure the power supply of the connected load by switching over to mains (in OnLine mode) or inverter output (in OffLine mode).

The system is redundant. The bus communication among all devices and the AC output of each single device is built in a manner that assures exchange of a single inverter at any given time without having to shut down the entire system.

Diagram 1.1: Battery surveillance

<table>
<thead>
<tr>
<th>Restart Low (3)</th>
<th>After inverter shut down due to &quot;UVP&quot;, the DC level has to come up to &quot;Restart Low&quot; level again. The inverters are enabled again.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVP (4)</td>
<td>At voltage level &quot;OVP&quot;, all inverters are shut down (overvoltage protection).</td>
</tr>
<tr>
<td>Restart High (5)</td>
<td>If inverters were shut down due to &quot;OVP&quot;, decreasing the DC voltage to &quot;Restart High&quot; causes the inverters to be enabled again.</td>
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<tr>
<td>Reset (6)</td>
<td>If the inverters are breaking off from battery (for example, the user switches off the battery switch) the terminal voltage drops below &quot;Reset&quot; limit, the limit for the system to operate again is reseted to &quot;First Start&quot; level.</td>
</tr>
</tbody>
</table>

In order to assure operation within all limits, the controller remains enabled at all times, exceeding these limits.

The controller can be connected to an optional bypass module (please see ByPass). With the bypass the system can be operated in either OnLine mode (load is supplied by inverters) or in OffLine mode (load is supplied by mains). The configuration is to be set in the controller module.

The bypass is redundant to the controller. In case of a controller failure the bypass assures the power supply of the connected load.
Some additional configuration values can be altered when a bypass is connected:

**Voltage limits:** When a load is fed by a mains supply that has permanent distortions, the voltage limits can be changed to more suitable values, percentagewise, in order to avoid repeatedly switching. The limits for undervoltage can be altered to -10% and -15%, the overvoltage limits can be set to +10%, +15% and +20%.

It is recommended to alter the values only with relatively insensitive loads attached, electrical machines or heaters, respectively. For sensitive loads like computers or measuring equipment, running the system in On-Line mode would be the more suitable option, since the output voltage of the inverters is generated and stabilized by processors. This only applies when having a distorted mains sine, though.

By sending trigger pulses to the inverters, the bypass processor synchronizes mains and inverter voltage. In some cases this might take several seconds. Anyhow, if the bypass processor detects a failure condition, it switches over to the second voltage at any given time, even in asynchronous mode, to assure uninterrupted load feed. As soon as the processor detects the original voltage to be within the limits again, it synchronizes both voltages before the load is switched back.

The controller has an additional signal connector located on the front panel, showing the state of the system (OnLine, OffLine, Power Good). The "normal-open" and "normal-closed" contacts are potential free.

The display on the front panel reads the current address of the particular inverter module.

### Parallel connection of modules

All inverters are connected with one another by CAT5 cables. Each inverter has its own address to identify itself on the bus to the controller. The two digit seven segment indicator on the front panel reads the current address of the particular inverter module.