Renewable Energy
ABOUT CARLO GAVAZZI

Carlo Gavazzi Automation is an international group active in designing, manufacturing and marketing electronic equipment targeted at the global markets of industrial and building automation.

Our history is full of firsts and our products are installed in a huge number of applications all over the world. With more than 80 years of successful operation, our experience is unparalleled.

We have our headquarters in Europe and numerous offices around the world.

Our R&D competence centres and production sites are located in Denmark, Italy, Lithuania, Malta and the People’s Republic of China.

We operate worldwide through 22 of our own sales companies and also selected representatives in more than 65 countries, from the United States in the West to the Pacific Rim in the East.

Our core competence in automation spans three product lines: Sensors, Switches and Controls.

Our wide array of products includes sensors, monitoring relays, timers, energy management system, solid state relays, safety devices and fieldbus systems.

We focus our expertise on offering state-of-the-art product solutions in selected market segments.

Our customers include original equipment manufacturers of packaging machines, plastic injection moulding machines, food and beverage production machines, conveying and material handling equipment, door and entrance control systems, lifts and escalators, as well as heating, ventilation and airconditioning devices.
DESIGNED TO MEET MARKET REQUIREMENTS

The increasing demand for energy, the availability and cost of oil and issues of pollution make alternative sources of renewable energy essential.

Sun and wind energy can be transformed into electricity that can be used directly or fed into the grid according to national regulations.

Renewable energy, in combination with energy efficiency, is the basis for sustainable development and respect for the environment in which we all live.

Carlo Gavazzi’s wide expertise is focused on developing and offering a package of products and devices for the Renewable Energy market, specifically photovoltaic power plants.

The growing development of cost effective solar energy technology has great potential to benefit our world. Solar technologies diversify the energy supply, reduce our dependence on fossil fuels, improve air quality and offset greenhouse gas emissions.

Carlo Gavazzi offers complete and modular solutions to monitor and control the efficiency of photovoltaic plants.

Our PV monitoring solution consists of Eos-Array, Eos-Web devices, depending upon the requirements and complexity of the photovoltaic plant.

The Eos-Array and Eos-Array Lite are modular systems, providing efficient local string control to the PV plant.

The Eos-Web is a web-server suitable for controlling and supervising small to medium installations as a stand-alone solution.
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Photovoltaic parks

In terms of scale and accessibility, solar parks represent the most economical option as regards planning and construction. Carlo Gavazzi products ensure an important contribution to the maximum capacity utilization of the solar electricity produced in photovoltaic power plants - both fixed plants or plants with tracking systems, with 1 or 2 axes.

To complement photovoltaic modules, Carlo Gavazzi provides many components for a photovoltaic installation, especially for surge protection and plant monitoring. Systems and devices to monitor and control the efficiency of photovoltaic parks are essential to ensure that the solar investment is a solid and efficient one. The Eos-Web is the ideal solution for installations up to 1 MW.

The Eos-Web is a web server gathering data from string monitoring units such as the Eos-Array, inverters and

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<td>VMU-C PV</td>
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<td></td>
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<td>DSC</td>
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energy meters. All plant information is available simply by using the PC web browser and any Internet connection. The Eos-Array is a comprehensive string control system, suitable for being integrated into both Eos-Web based solutions and standard SCADA software packages.

Based on glass optical fibre, the SIUFO is the solution for reliable communication where a traditional RS485 network cannot guarantee the correct level of immunity from electromagnetic emissions from inverters, substations or power wiring. Carlo Gavazzi’s flexible and modular PV monitoring architecture allows all the needs of investors, PV plant installers and maintenance services to be satisfied. Carlo Gavazzi application engineers and product specialists with solid expertise provide complete support, starting from project planning up to start up.

<table>
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<tr>
<th>3-phase energy analysers</th>
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<th>Environmental sensors</th>
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<tr>
<td>EM26 96</td>
<td>PI-DIN</td>
<td>PVS-1 TEMPSOL IKE2000</td>
<td>PVS-2A</td>
<td>DWS-V DWS-D</td>
</tr>
<tr>
<td>EM24 DIN</td>
<td></td>
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</tr>
</tbody>
</table>
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Photovoltaic small business, commercial and tracking

Carlo Gavazzi provides everything for PV plant monitoring. Eos-Array and Eos-Array Lite are systems composed of individual modular elements interacting with one another, providing efficient local control to the solar plant and ensuring effective information management in medium or high power plants.

Carlo Gavazzi provides the Eos-Web, where the VMU-C unit is a local web-based data management system which gathers measurements and status information from one or more inverters to your PC or to a centralised cloud monitoring solution based on the Eos-Server. With some rented roofs, wired internet is not available, but VMU-D solves this problem by using diffuse mobile communication.

Carlo Gavazzi energy meters and analysers measure the energy produced and provided to the grid or locally consumed. These meters can be supplied with MID certification (Annex D).

The energy produced at low voltage by a PV plant can be measured with a MID approved meter such as the EM210, EM24 or EM26.

When supplying energy to the grid, it is necessary to use a protection device installed between the generator and the power grid in order to grant the required voltage and/or frequency control.

Carlo Gavazzi’s interface protections are the most compact solutions currently available on the market.

DPC72 and PI-DIN protection add a control function to frequency derivative and event recording and are equipped with a large display for local information readout and a serial port for remote readout.

The surge arresters for direct and indirect lightning discharge complete the Carlo Gavazzi portfolio for the photovoltaic market.
Energy storage systems

PV energy is generated during the day, while the user generally consumes it during the evening. To minimise the flow between the plant and the grid, it is worth having an energy storage system on site.

In order to evaluate the amount of energy going through the battery system compared to the quantity sent to the grid, it is necessary to measure the flow in both these 2 directions. The information gathered allows the evaluation of the efficiency and payback of the system, but it is also useful to know the charging status of the battery pack.

Carlo Gavazzi offers two solutions for the energy storage systems for new plants and for retrofitted.

The CPA is the ideal solution for new renewable energy plants and storage systems, thanks to its smart mounting system and a comprehensive set of measurable variables, such as voltage, power, energy, frequency, power factor and THD, available through RS485/Modbus communication.

The EM271 and the relevant TCDxM split core current sensing units are frequently used in energy storage systems both new and retrofitted. The EM271 is able to measure 2 loads in a single meter, allowing for time and space savings.
PV plants in residential areas are mostly grid connected installations. Modules are set on roofs and the energy produced by the PV modules is delivered to the inverters and then fed into the public grid. Carlo Gavazzi offers a wide range of devices and components for the configuration of the electrical solar plant. Separate interface protection can be achieved with our wide range of monitoring relays such as the PI-DIN, DPC and DPC02, according to national norm requirements.

For energy metering you can use the EM1xx single-phase energy meter series or the EM2xx and EM3xx series for 3-phase PV residential system applications, all with LCD data display.

The real-time energy usage measurements, made via our touch screen and data logger SmartHUB, will lead to more efficiency in energy consumption needs, resulting in significant energy savings. The system reads and logs the energy consumption of the whole installation or of a single load. Data can be accessed anytime by means of a web-server/web-app and shown as instantaneous values, or in the form of graphs and/or diagrams.

For protection against surges and overvoltages it is possible to use the DSB or DSF surge arresters for both DC and AC lines. In the case of direct lightning discharge protection, the DSC series can be used.
In remote areas renewable energy systems are gaining popularity, using stand-alone, off-grid plants with or without battery storage. Carlo Gavazzi provides some additional components that can play an important role in such installations.

DSC surge arresters provide protection for PV installations where an LPS (Lightning Protection System) is installed, hence subject to direct lightning strikes. This device is Type 1 and Type 2 approved.

DSB and DSF surge arresters can be used either on wind turbines or on PV installations. They are available for DC and AC networks and are Type 2, suitable for indirect lightning protection.

Wind speed and direction are extremely important parameters. Accurate measurements are necessary to keep the wind turbine structure under control. The Carlo Gavazzi anemometer DWS-V, with opto electronic detection, measures speed from 2 to 30 m/s. The sensor is designed with a dust and humidity seal, which makes the sensor impervious to all weather conditions. The micro-processor-based digital panel meter (UDM60), with its dual 6-dgt LCD indicator, displays the wind speed by measuring the input from the anemometer, while the energy produced is measured by a 3-phase energy analyser (EM23, EM24, EM210, EM330 or EM340).
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The VMU-C PV is the core solution for effective Photovoltaic Monitoring in applications of all sizes. It collects measurements from EosArray string control units, energy meters and inverters; it stores information (variables and alarms) in its local database and displays it through its web-based graphical user interface.

The whole system set-up and operation is possible via the VMU-C’s web interface, without any external software. The VMU-C PV can exchange data with other systems by means of standard FTP/HTTP communication.
VMU-C PV’s benefits at a glance

- No crash or compatibility problems due to different operative systems, different languages, libraries, etc.
- Improved IT security
- On-site database
- Application-focused software embedded inside industrial grade hardware: no need for a dedicated PC for monitoring
- Modular solution for additional inputs/outputs
- Polling device, data-logger and Ethernet gateway in a single compact unit
- Optional modular modem for wireless Ethernet connections
# Renewable Energy

## Our product range

<table>
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<tr>
<th>Solar monitoring solutions</th>
<th>Web servers and dataloggers</th>
<th>USB dongle connection modules</th>
</tr>
</thead>
</table>

### Eos-Array / Eos-Array Lite
- Modular local monitoring system for PV plant
- Up to 16 DIN module configuration
- Eos-ArrySoft, firmware configuration software
- Eos-Array can manage in addition to VMU-H unit: up to 1 VMU-P, up to 15 VMU-S, and up to 7 VMU-O for a total of maximum 15 units

**MAIN FEATURES**
- The Eos-Array solution may be composed of: VMU-M, the master unit and data logger; VMU-S, the string controller; VMU-P, the environmental variable unit and VMU-O, the I/O unit
- Eos-Array Lite is the answer to those photovoltaic applications where a less sophisticated monitoring solution is needed

### VMU-C PV (Eos-Web)
- Dimensions: 2 DIN modules
- Micro PC with web server and web service capability
- Data and event logging capability
- Internal 4GB memory and 16GB SDHC card back-up memory (on request)
- Variables shown as graphs and numbers in formatted tables
- All data exports in HTML format compatible with Excel or other similar spreadsheets
- Management up to 11 Eos-Array, 64 inverters + energy meters

**MAIN FEATURES**
- Efficiency calculation and control on different levels: string, BOS, and Performance ratio and Yield indices
- Alarms control with automatic emailing and SMS management by means of VMU-D

### VMU-D
- Dimensions: 2 DIN modules
- VMU-D is compatible with Carlo Gavazzi approved 3G/4G USB modems
- Power supply: 24 VDC (+/- 20%)
- Suitable for use with VMU-C and VMU-Y

**MAIN FEATURES**
- 3G or 4G Mobile Internet connectivity
- SMS alerting
- SMS commands

### Touch screens / Data loggers
- **VMU-D**
  - Energy data logging from meters and PV inverters
  - Colour touch screen 7” (BTM-T7) and 4.3” (BTM-T4)
  - Remote access through web browsers
  - Alarms management

**MAIN FEATURES**
- Wide screen display, 64 K colours
- 2 Ethernet port with integrated switch
- SD memory card slot
- USB host port
- Multistandard Modbus RTU serial communication port (selectable: RS485, RS422 or RS232)

### 1-phase energy meters
- **EM10 DIN / EM11 DIN**
  - Dimensions: 1 DIN module
  - Single-phase energy meters with direct connection
  - Current input up to 32 A
  - Class 1 (kWh) acc. to EN62053-1
  - Pulse open collector output

**MAIN FEATURES**
- Direct measurement in a very compact housing to save space
- Suitable for measuring generated energy
- MID Annex B certification available
- CE, UL

### 1-phase energy analysers
- **EM111**
  - Dimensions: 1 DIN module
  - Backlit touch LCD
  - Measurement of voltage, current, power factor and frequency
  - Measuring inputs: 120 VAC, 230 VAC, 45 A
  - Bi-directional energy metering, 7 digits, cl. B (EN50470)

**MAIN FEATURES**
- Self-powered
- Pulse output or as an alternative: RS485 Modbus, M-Bus
- Sealable terminal covers
- MID Annex B certification available (230 V)
- CE, UL (120 V)
Our product range

<table>
<thead>
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<th>1-phase energy analysers</th>
<th>3-phase energy analysers</th>
<th>3-phase energy meters</th>
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<tr>
<td><strong>EM112</strong></td>
<td><strong>EM26 96</strong></td>
<td><strong>EM23 DIN</strong></td>
</tr>
<tr>
<td>- Dimensions: 2 DIN modules</td>
<td>- Dimensions: 96 x 96 mm housing, only 45 mm behind the panel</td>
<td>- Dimensions: 4 DIN modules</td>
</tr>
<tr>
<td>- Backlit touch LCD</td>
<td>- 3-phase energy meters with CT/VT connection</td>
<td>- 3-phase energy meters with direct connection</td>
</tr>
<tr>
<td>- Measurement of voltage, current, power, power factor and frequency</td>
<td>- Primary current input: 5 A</td>
<td>- Current input for direct connection up to 65A</td>
</tr>
<tr>
<td>- Measuring inputs: 120 VAC, 230 VAC, 100 A</td>
<td>- Class 1 (kWh) acc. to EN62053-1</td>
<td>- Class 1 (kWh) acc. to EN62053-1</td>
</tr>
<tr>
<td>- Bi-directional energy metering, 8 digits, cl. B (EN50470)</td>
<td>- Modbus communication port</td>
<td>- Pulse open collector output</td>
</tr>
<tr>
<td><strong>MAIN FEATURES</strong></td>
<td><strong>MAIN FEATURES</strong></td>
<td><strong>MAIN FEATURES</strong></td>
</tr>
<tr>
<td>- Self-powered</td>
<td>- Energy analyser in a very compact housing to save space</td>
<td>- Direct measurement in a very compact housing to save space</td>
</tr>
<tr>
<td>- Pulse output or as an alternative: RS485 Modbus, M-Bus</td>
<td>- Suitable for measuring generated and consumed energy</td>
<td>- MID Annex D certification available</td>
</tr>
<tr>
<td>- Sealable terminal covers</td>
<td>- MID Annex D certification available</td>
<td></td>
</tr>
<tr>
<td>- MID Annex D certification available (230 V)</td>
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<tr>
<td>- CE, UL (120 V)</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3-phase energy analysers</th>
<th>3-phase energy analysers</th>
<th>3-phase energy analysers</th>
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<tbody>
<tr>
<td><strong>EM24 DIN</strong></td>
<td><strong>EM330</strong></td>
<td><strong>EM340</strong></td>
</tr>
<tr>
<td>- Dimensions: 4 DIN modules</td>
<td>- Dimensions: 3 DIN modules</td>
<td>- Dimensions: 3 DIN modules</td>
</tr>
<tr>
<td>- 3-phase energy analysers with direct connection or by CT</td>
<td>- Backlit touch LCD</td>
<td>- Backlit touch LCD</td>
</tr>
<tr>
<td>- Current input for direct connection up to 65A or external CT connection</td>
<td>- Measurement of voltage, current, power, power factor and frequency</td>
<td>- Measurement of voltage, current, power, power factor and frequency</td>
</tr>
<tr>
<td>- CT connection</td>
<td>- Bi-directional energy metering on 2 8-digit counters, cl. B (EN50470)</td>
<td>- Bi-directional energy metering on 2 8-digit counters, cl. B (EN50470)</td>
</tr>
<tr>
<td>- Class 1 (kWh) acc. to EN62053-1</td>
<td>- Measuring inputs: 3 x 230 (400) VAC, 5 A</td>
<td>- Measuring inputs: 3 x 230 (400) VAC, 65 A</td>
</tr>
<tr>
<td>- Pulse open collector output</td>
<td>- Auxiliary power supply: 90 to 260 VAC/DC</td>
<td>- Power supply: self-powered</td>
</tr>
<tr>
<td>- Modbus or M-bus communication port</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MAIN FEATURES</strong></td>
<td><strong>MAIN FEATURES</strong></td>
<td><strong>MAIN FEATURES</strong></td>
</tr>
<tr>
<td>- Direct or external CT measurement in a very compact housing to save space</td>
<td>- Pulse output or as an alternative: RS485 Modbus, M-Bus</td>
<td>- Pulse output or as an alternative: RS485 Modbus, M-Bus</td>
</tr>
<tr>
<td>- Suitable for measuring generated and consumed energy</td>
<td>- Sealable terminal covers</td>
<td>- Sealable terminal covers</td>
</tr>
<tr>
<td>- MID Annex D certification available</td>
<td>- CE approved</td>
<td>- CE approved and MID Annex D certification available</td>
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Our product range

### Renewable Energy

#### 3-phase energy analysers

- **EM210**
  - Dimensions: 4 DIN modules or 72x72mm
  - Installation: DIN-rail and panel mounting in a single product
  - 3-phase energy meters with CT/VT connection
  - Measurement of voltage, current, power, power factor and frequency
  - Self-powered (MID version: 230 Vac power supply)
  - Pulse output
  - RS485 Modbus RTU, high speed (up to 115kbps)

#### Quick-fit 3-phase energy analysers

- **EM271 + TCDM**
  - Dimensions: 4-DIN rail module or 72 x 72 mm housing
  - Two 3-phase energy analysers with sum function
  - Current measurement by triple CT, split-core with RJ plug
  - Equivalent to class 1 (kW)
  - Two pulse open collectors and serial RS485 outputs

#### Current transformers

- **CTD / TADK**
  - CTD: currents from 40 to 4000 A
  - TADK2: 1-250 A
  - Removable panel fixing clips
  - DIN rail and panel mounting facility (TAD...)
  - Double screw terminals (CTD)
  - Sealable covers
  - Case: ABS, self-extinguishing level UL 94 V-O
  - Accuracy class: 0.5

### Main Features

**Contactless power analysers**

- **CPA050**
  - Dimensions: 63 x 46 x 25 mm (without connectors);
  - DIN rail and panel mounting
  - Power analyser
  - 1-phase AC (from 1 to 400 Hz) or DC
  - Power supply from 9 to 30 VDC

- **CPA300**
  - Dimensions: 99 x 89 x 30 mm (without connectors);
  - DIN rail and panel mounting
  - Power analyser
  - 1-phase AC (from 1 to 400 Hz) or DC
  - Power supply from 9 to 30 VDC

- **CPA300-V**
  - Dimensions: 99 x 89 x 30 mm (without connectors);
  - DIN rail and panel mounting
  - Current transducer for PV installations up to 1500 VDC
  - 1-phase AC (from 1 to 400 Hz) or DC
  - Power supply from 9 to 30 VDC

**Main Features**

- Contactless Hall effect sensing for current (15 mm hole diameter)
- True RMS AC and DC monitoring
- Voltage range: 800 VAC, 1000 VDC
- Current range: 50 AAC, 50 ADC

- Contactless Hall effect sensing for current (33 mm hole diameter)
- True RMS AC and DC monitoring
- Voltage range: 800 VAC, 1000 VDC
- Current range: 300 AAC, 400 ADC

- Contactless Hall effect sensing for current
- Current range: 300 AAC, 400 ADC
- Modbus RS485 and analog output

**Contactless power analysers**

**Main Features**

- Wound primary (TADK2)/ split-core (CTD)
- Compliance with EN60044-1 regulations
- Removable DIN rail mounting holder
### Our product range

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<tr>
<th>Interface protections</th>
<th>Interface protections</th>
<th>Interface protections</th>
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</thead>
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<td><strong>DPC02DM...B005</strong></td>
<td><strong>DPC72DM</strong></td>
<td><strong>DSB / DSF</strong></td>
</tr>
<tr>
<td>Dimensions: 45 x 80 x 99.5 mm</td>
<td>Dimensions: 90 x 71 x 65 mm, 4 DIN module</td>
<td>Dimensions: 90 x 36 x 72 mm</td>
</tr>
<tr>
<td>DIN rail mounting</td>
<td>DIN rail mounting — sealable housing</td>
<td>DIN rail mounting</td>
</tr>
<tr>
<td>Power: 208 to 240 VAC or 380 to 415 VAC</td>
<td>Values and intervention time programming</td>
<td>Available for PV and AC installations</td>
</tr>
<tr>
<td>Protection degree: IP20</td>
<td>Serial port RS485 Modbus RTU</td>
<td>Models for communication lines</td>
</tr>
<tr>
<td>Output: programmable relays 2 SPDT N.E. or 1 DPDT N.E.</td>
<td>Protection degree: IP50</td>
<td>Optional remote monitoring</td>
</tr>
<tr>
<td>MAIN FEATURES</td>
<td>MAIN FEATURES</td>
<td>MAIN FEATURES</td>
</tr>
<tr>
<td>One-phase and three-phase relays for monitoring maximum and minimum voltage and frequency, phase sequence and phase failure. It checks that frequency and voltage are within the limits set by the utility</td>
<td>One-phase and three-phase relays for monitoring maximum and minimum voltage and frequency, phase sequence and phase failure. It checks that frequency and voltage are within the limits set by the utility</td>
<td>Designed for Dupline® communication lines</td>
</tr>
<tr>
<td>Record of the last 10 events (date, time and reason for the event)</td>
<td></td>
<td>Three stage topology with dual GDT</td>
</tr>
<tr>
<td><strong>DSB51XXDP</strong></td>
<td><strong>DSC</strong></td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>Dimensions: 90 x 12 x 71.5 mm DIN-rail housing</td>
<td>Dimensions: 90 x 72 x 70 mm</td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>15 VDC nominal voltage</td>
<td>Class I and II</td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>10 kA Inom, 20 kA Ilimax</td>
<td>Protective element: High Energy MOV</td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>Rated spark overvoltage 184V to 276V</td>
<td>High surge discharge rating: limp = 12.5 kA per pole</td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>C1/C2/C3 according to IEC 61643-21</td>
<td>Housing: compact design</td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>MAIN FEATURES</td>
<td>MAIN FEATURES</td>
<td>MAIN FEATURES</td>
</tr>
<tr>
<td>Designed for Dupline® communication lines</td>
<td>NO backup fuse required</td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>Appx. Acc. to IEC61643-11 and UTE C61-740-51</td>
<td>Appx. Acc. to IEC61643-11 and UTE C61-740-51</td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>Complies with prEN50539-11</td>
<td><strong>Surge arresters</strong></td>
<td><strong>Surge arresters</strong></td>
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<tr>
<td><strong>Surge arresters</strong></td>
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<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td><strong>PI-DIN</strong></td>
<td><strong>DSC</strong></td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>Dimensions: 90 x 71 x 66 mm</td>
<td>Dimensions: 90 x 72 x 70 mm</td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>Interface protection monitoring relay for 1-phase or 3-phase systems with or without neutral</td>
<td>Class I and II</td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>Voltage and frequency protection</td>
<td>Protective element: High Energy MOV</td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>4 inputs (CEH021) or 2 inputs (VDE4105), 2 outputs</td>
<td>High surge discharge rating: Iimp = 12.5 kA per pole</td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>Measure V, Hz</td>
<td>Housing: compact design</td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>Auxiliary power supply 230 VAC or 24 VDC</td>
<td><strong>Surge arresters</strong></td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>Data logger with 10 last events logging</td>
<td><strong>Surge arresters</strong></td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>MAIN FEATURES</td>
<td>MAIN FEATURES</td>
<td>MAIN FEATURES</td>
</tr>
<tr>
<td>Specifically designed for PV installations with or without LPS (Lightning Protection System)</td>
<td>NO backup fuse required</td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
<td>Location of use: photovoltaic system - PV module side</td>
<td>Designed for Dupline® communication lines</td>
<td><strong>Surge arresters</strong></td>
</tr>
<tr>
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</tr>
</tbody>
</table>

**Surge arresters**

- DSB51XXDP
  - Dimensions: 90 x 12 x 71.5 mm DIN-rail housing
  - 15 VDC nominal voltage
  - 10 kA Inom, 20 kA Ilimax
  - Rated spark overvoltage 184V to 276V
  - C1/C2/C3 according to IEC 61643-21

- DSC
  - Dimensions: 90 x 72 x 70 mm
  - Class I and II
  - Protective element: High Energy MOV
  - High surge discharge rating: limp = 12.5 kA per pole
  - Housing: compact design

- **Surge arresters**
  - **DSB / DSF**
    - Dimensions: 90 x 36 x 72 mm
    - Class II
    - Available for PV and AC installations
    - Models for communication lines
    - Optional remote monitoring
    - For DIN rail mounting

- **Surge arresters**
  - **PI-DIN**
    - Dimensions: 90 x 71 x 66 mm
    - Interface protection monitoring relay for 1-phase or 3-phase systems with or without neutral
    - Voltage and frequency protection
    - 4 inputs (CEH021) or 2 inputs (VDE4105), 2 outputs
    - Measure V, Hz
    - Auxiliary power supply 230 VAC or 24 VDC
    - Data logger with 10 last events logging
  - **DSC**
    - Dimensions: 90 x 72 x 70 mm
    - Class I and II
    - Protective element: High Energy MOV
    - High surge discharge rating: Iimp = 12.5 kA per pole
    - Housing: compact design
## Our product range

### DIN rail DC/DC converters

<table>
<thead>
<tr>
<th>Model</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCC 24151K-D</td>
<td>- DIN rail mounting&lt;br&gt;- Ultra wide input: 100 – 1000 VDC&lt;br&gt;- 24VDC output 15W&lt;br&gt;- High efficiency up to 80%&lt;br&gt;- Wide temperature range -40 to +70°C&lt;br&gt;- Output over voltage and short circuit protection&lt;br&gt;- Reverse input protection</td>
</tr>
</tbody>
</table>

### Switching power supplies

<table>
<thead>
<tr>
<th>Model</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPM</td>
<td>- DIN rail housing&lt;br&gt;- Universal input 90-264 VAC / 120-370 VDC&lt;br&gt;- Single phase and battery charger versions available&lt;br&gt;- Approvals/Marks: UL, cUL listed and TÜV/CE approved</td>
</tr>
</tbody>
</table>

### Digital modular indicators

<table>
<thead>
<tr>
<th>Model</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>UDM60 / UDM40 / USC</td>
<td>- Dimensions: 48 x 96 x 105 mm&lt;br&gt;- Modular Controller for pulse signals (UDM60)&lt;br&gt;- Dual 6-DGT&lt;br&gt;- 0.001% RDG basic accuracy&lt;br&gt;- NIM, PNP, NAMUR, TTL, Pick-up, free of voltage contacts and AC signal inputs&lt;br&gt;- Multifunctional instrument (UDM40, USC)&lt;br&gt;- 4-DGT three colour LED&lt;br&gt;- 0.1% RDG basic accuracy&lt;br&gt;- Dual rate, speed, frequency and period measurement (0.001 Hz to 50 kHz)</td>
</tr>
</tbody>
</table>

### Temperature sensors

<table>
<thead>
<tr>
<th>Model</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMPSOL / IKE20001K</td>
<td>- Temperature Pt100 or Pt1000 (TEMPSOL)&lt;br&gt;- Temperature Pt1000 (IKE20001K)&lt;br&gt;- ±0.3°C connection type&lt;br&gt;- 2 wire connection type</td>
</tr>
</tbody>
</table>

### Irradiation sensors

<table>
<thead>
<tr>
<th>Model</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVS-1</td>
<td>- Dimensions: 57 x 48 x 15 mm (not including clamp)&lt;br&gt;- Sensor type: crystalline silicon cell&lt;br&gt;- No need for external power supply (self-powered)&lt;br&gt;- Long lasting 3% accuracy, thanks to a special antiaging treatment&lt;br&gt;- Calibration process according to IEC 60904-2 and 60904-4&lt;br&gt;- Two available versions: 4-20 mA output / 0-80 mV output</td>
</tr>
</tbody>
</table>

### Pyranometers

<table>
<thead>
<tr>
<th>Model</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVS-2A</td>
<td>- Dimensions: 162 x 215 x 40 mm (not including clamp)&lt;br&gt;- 2nd class thermopile pyranometer&lt;br&gt;- 4-20 mA output for reliable connections&lt;br&gt;- Calibration certificate according to ISO 9847</td>
</tr>
</tbody>
</table>

**MAIN FEATURES**

- Widely used in Photovoltaic power generation with high voltage inverters
- It provides stable operating voltage to low voltage DC equipment

**MAIN FEATURES**

- Operating temperature w/o derating -25°C to +60°C
- Short circuit and Overload protection
- High efficiency (up to 89%)

**MAIN FEATURES**

- Compact and rugged IP67 aluminium case
- Compliant with WMO (World Meteorological Organization) for environmental monitoring
- Compliant with ISO 9847 and IEC 17025 for photovoltaic monitoring

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.
# Our product range

## Anemometers / Wind vanes

<table>
<thead>
<tr>
<th>DWS-D / DWS-V</th>
<th>SIUFO</th>
<th>VMU-O AT/VMU-AT</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Rotor size: 145 mm</td>
<td>• 4-DIN size: DIN-rail mounting</td>
<td>• Eos-Array standard expansion I/O module (VMU-O AT)</td>
</tr>
<tr>
<td>• PNP &amp; NPN open collector output in one unit</td>
<td>• SIUFO1: RS485 to single loop fibre optic conversion</td>
<td>• Plastic optical fiber sensor (VMU-AT)</td>
</tr>
<tr>
<td>• Rotor: black painted stainless steel</td>
<td>• SIUFO2: RS485 to double loop fibre optic conversion</td>
<td>• Up to 3 VMU-AT modules per VMU-O AT</td>
</tr>
<tr>
<td>• Wind vane for relative wind direction (0 and 90 degree intervals-DWS-D-DAC13) (+/- 7 degree of wind direction, left/right wind indication DWS-D-DDC13)</td>
<td>• Power supply from 12 to 18VAC or from 10 to 24VDC</td>
<td>• Up to 1 VMU-AT per Eos-Array</td>
</tr>
<tr>
<td>• Anemometer with opto-electronic detection (DWSV...)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Measuring range 2 to 30 m/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Current source output 10 to 28 VDC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MAIN FEATURES
- Opto-electronic detection
- All inputs and outputs are protected against reverse polarity and transients
- Dust sealed stainless steel ball bearing

## Accessory modules

<table>
<thead>
<tr>
<th>SIUFO</th>
<th>VMU-O AT/VMU-AT</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 4-DIN size: DIN-rail mounting</td>
<td>• Eos-Array standard expansion I/O module (VMU-O AT)</td>
</tr>
<tr>
<td>• SIUFO1: RS485 to single loop fibre optic conversion</td>
<td>• Plastic optical fiber sensor (VMU-AT)</td>
</tr>
<tr>
<td>• SIUFO2: RS485 to double loop fibre optic conversion</td>
<td>• Up to 3 VMU-AT modules per VMU-O AT</td>
</tr>
<tr>
<td>• Power supply from 12 to 18VAC or from 10 to 24VDC</td>
<td>• Up to 1 VMU-AT per Eos-Array</td>
</tr>
</tbody>
</table>

### MAIN FEATURES
- Modbus/IEC61158(RTU) compliant
- Wire to optical fiber and optical fiber to wire conversion
- Status LED
- Compatible with Multimode Optical fiber
- Up to 160 transceivers on the same bus
- Up to 247 Modbus addresses, automatically managed
- Baudrate and RS485 parameters selectable by dip-switches
- Plastic optical fiber loops (up to 200 m) to protect PV modules
- Plug’n play set-up (optical fiber cutter included)
- Anti-theft alarm events integrated in the Eos-Array and VMU-C PV solutions
- 3 digital inputs, 1 relay output (VMU-O AT)
- 1 optical fiber loop, digital output (VMU-AT)
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