



# Solutions for Renewable Energy





**Photovoltaic:** Grid Connected Systems (up to 6 kW)



**Photovoltaic:** Grid Connected Systems (from 6 to 50 kW)



**Wind Power:** Wind Turbine Generators - Wind Power Stations



**Photovoltaic:** Grid Connected Systems (More than 50 kW)



## **Designed to Market Requirements**

Dedicated applications engineering teams design special products upon request from the customer.

## Solution to Applications Challenges

The Carlo Gavazzi individual product ranges complement one another thereby offering the customer all the advantages of a synergistic range of products in terms of application and availability.

## **Guaranteed reliability**

Each product group is designed and manufactured in a centre of excellence to assure that each individual product is the best in its field. Carlo Gavazzi products are subject to stringent quality tests to guarantee they exceed the performance we specify.

For further information or to download datasheets, visit www.gavazziautomation.com

## Solutions for Photovoltaic - Grid Connected Systems (up to 6 kW)





• There is a growing interest in the renewable energy. "Solar photovoltaic" continues to be the fastest increasing power generation in the world. Carlo Gavazzi offers a wide range of devices and components for the configuration of the electrical Solar System.

The new Solar Inverters ISG..., ISMG... convert direct current from the solar panels into alternate current enabling you to feed the self produced energy into the public grid. The range include several models from 2.4 up to 6 kWp. The solar inverter is functional in grid parallel operation exclusively. A dedicate software (ISMG Soft) enables the remote, instantaneous readout of the working parameters of one or more ISMG inverters.

For the energy metering you can use the one-phase energy meters (EM10), with LCD data displaying, The one-phase energy analyzer (EM11) with built-in configuration push button and LCD data displaying are indicated for the active and reactive metering and for the cost allocation.

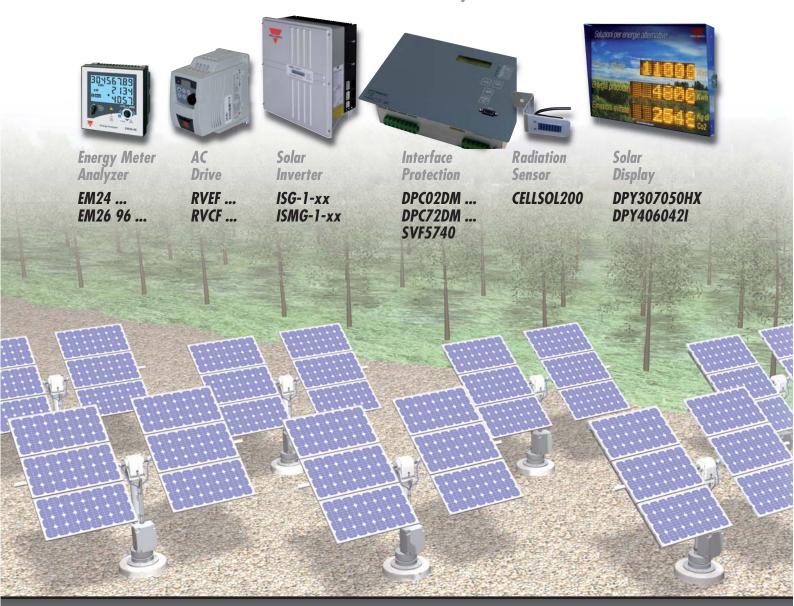
## Solutions for Photovoltaic - Grid Connected Systems (from 6 to 50 kW)



• When introducing energy into the mains, it is necessary to use a protection device installed between generator and the power grid in order to introduce the required voltage and/or frequency values. Our interface protections (DPC02...., DPC72...) are the most compact solutions currently available on the market. DPC02... interface protections check required electric values such as minimum and maximum frequency and voltage, unbalances and asymmetries. The new protections DPC72...add control function on frequency derivative and event recording. These devices are equipped with a large display for local information readout and a serial port for remote readout. The energy produced by a PV plant can be measured with a MID approved meter like our EM24-DIN (from 20 to 50kW) or with the new EM21, the first 3-phase energy meter with detachable display. Furthermore the new DPY displays - for indoor and outdoor environments show instantaneous power, energy output, saved CO<sub>2</sub> emission.



## Solutions for Photovoltaic - Grid Connected Systems (more than 50 kW)





• Carlo Gavazzi products ensure an important contribution to the maximum capacity utilization of the solar energy.

In medium-large PV power plants, the ISMG Inverters - with exclusive Smart MPPT technology - allows to control up to 2/3 independent strings of PV panels. In this way energy may increase up to 20%, thanks also to the fully functional PV string control software. In PV plants with solar trackers is fundamental to check the position of the PV panels mounted in order to be always well exposed towards the sun, detecting when the tracker reaches the limit and cannot continue avoiding damages at the structure. On this purpose Carlo Gavazzi range includes also the VariFlex² a simple and compact AC variable speed drive to be used with 3-phase AC induction motors.

## Solutions for Wind Power - Wind Turbine Generators - Wind Power Stations



Inductive Sensors

IA18 ... EI18 ...



**Anemometer** and Wind vane

DWS-V ... DWS-D ...



Digital modular Indicator

UDM60 ...



**Energy Meter** Analyzer

EM24 ... EM26 96 ...



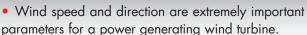
Current **Transformer** 

TADK ... TADK2 ...



Interface **Protection** 

DPC02DM ... DPC72DM ... SWF5740 ...



Carlo Gavazzi wind vane DWS-D... is used to detect relative wind direction, (indication of 0 degree and 90 degree intervals. Anemometers DWS-V... thanks to optoelectronic detection measure speed between 2 and 30 m/s. This sensor will give output also with much higher wind speed which are used to stop the generator. The DWS-V...are equipped with a protection mechanism, which protect the bearings and the electronic parts against dirt and humidity.

Inductive sensors detect the rotation of the shaft, the position of the nacelle, the position of the wings.

Furthermore, to keep the power generation and the whole wind turbine structure under full control, it is necessary to perform accurate measurements. The Power quality transducer (PQT H) gathers the power information with a 0.5% accuracy class. PQT H communicates via Modbus all the information about electrical variables and is able to carry out eight requested alarm controls.



# Our Product Range



## **Energy Meter**

## EM10 . . . / EM11 . . .

#### **MAIN FEATURES**

EM10 - One-phase Energy Meter EM11 - One-phase Network Analyser

- Dimensions: 90x17,5x65 mm
- · Housing for DIN-Rail mounting
- Direct connection up to 32A
- Self-power supply, 230 VAC
- Display LCD 5+1 DGT
- Active/reactive energy metering (only EM11)
- TRMS measurement of VLN, A, Hz, W, Wdmd, var, VA, PF (only EM11)
- Impulsive output open collector or relays
- Precision: V and A cl. 0,5;
  cl. 1 kWh (EN62053-21);
  cl. B kWh (EN50470-3)
- · Prot. degree: IP40, sealable terminal covers
- Certifications: CE (EM10-EM11) PTB, MID, UTF (only EM10)



## **Energy Meters**

## EM2172D ...

### **MAIN FEATURES**

Thee-phase Energy Meter with Detatchable Display

- Dimensions: 71x71x65 mm
- Mounting on DIN rail 4 modules
- Mounting on front board 72X72mm
- Energy meter, transducer: connection on 400V line, from TA 1 or 5A
- Self-power supply (18-260Vac VLN)
- Display LCD 3x3 DGT, Energy 6+1 DGT Outputs: 1 static, 1 RS485 (optional) output
- Accuracy: V and A cl. 0,5;
  cl. 1 kWh (EN62053-21);
  cl. B kWh (EN50470-3)
- Protection degree: IP50, sealable terminal covers:
- · Certifications: CE, PTB, MID, UTF



## **Energy Analyzer**

### **EM24DIN...**

## MAIN FEATURES

One/two/three-hase Energy Analyzer

- Dimensions: 90x71x65 mm
- 4-DIN modules mounting Direct connection up to 75A, 65A or 1/5A
- Net voltage 18-60 VAC/DC or 115-230 VAC
- Display LCD 3x4 DGT, Energy 8 DGT
- Incentive rate setting in Euro and Saved CO<sub>2</sub> emissions display (for some models only)
- 3 digital inputs for external events meter (e.g. interface protection measures)
- Outputs: 2 impulsive, 2 relays, 1 RS485, 1 Dupline
- Accuracy: V e A cl. 0,5;
  cl. 1 kWh (EN62053-21)
  cl. B kWh (EN50470-3)
- · Prot. degree: IP50, sealable terminal cover
- · Certifications: CE, PTB, MID, UTF



## **Energy Meter/Analyzer**

## EM26 96 ...

### **MAIN FEATURES**

Energy analyser, one/two/three-phase energy meter connection

- · Dimensions: 96x96x46 mm
- Connection TA 1A or 5A
- Universal power supply: 18-60 VAC/DC or 90-260VAC/DC
- Display LCD 3x4 DGT, 8 digit energy
- Measurement: TRMS of all system values, active and reactive energy value, water and gas consumption data
- 3 inputs for water, gas, rate meter
- Outputs: 3 impulsive, 2 relays, 1 RS485
- Accuracy: V e A cl. 0,5;
  cl. 1 kWh (in compliance with EN62053-21)
  cl. B kWh (EN50470-3)
- · Prot. degree: IP50, sealable terminal cover
- Certifications: CE, PTB, MID, UTF



## Current Transformer

## TADK . . . / TADK2 . . .

### **MAIN FEATURES**

Wound primary current transformer

- Dimensions: 115,5x75x44 mm
- For TADK: 10/15/20/25/40 A
  For TADK2: from 10 to 250 A
- Features: 5 A or 1 A secondary current output (on demand)
- Permanent overload: 20%
- Operating frequency 40÷60Hz
- Max. system voltage 0,72kV
- Compliance with IEC 60185, VDE 0414-1 regulations
- Case: ABS, self-extinguishing level UL 94 V-0
- Precision class: 0,5



## **Power Quality Transducer**

## **PQT**

### MAIN FEATURES

Modular smart power quality transducer

- Dimensions: 90x90x140 mm
- Measurement of all instantaneous variables
- Measured energies (imported/exported): kWh and kvarh
- Harmonic distortion analysis (FFT) up to the 63rd harmonic with numeric indication (current and voltage)
- 3independent communication ports: optional RS 422/485 serial port,optional RS232 + real time clock function (with back-up), optional Ethernet port
- MODBUS RTU and TCP, JBUS protocol, iFIX SCADA compatibility
- Class 0.2 (current/voltage)
- ARM® powered
- Protection degree: IP20
- · Certifications: CE, cURus, CSA

# for Renewable Energy



## Single phase Solar Inverter

### ISG-1-xx

#### **MAIN FEATURES**

#### **Solar Inverter for Photovoltaic Plants**

- Dimensions: 410x410x180 mm (for ISG-140 series)
- Single phase inverter, DC power pick range from 2.4-6kW; HF insulation transformer .
- · Housing material: anodized aluminium.
- DC input range: 100~540VDC
- DC input current: 0~24ADC
- Max. efficiency: 96% EU efficiency: 94.8%
- Serial communication: RS485
- Protection degree: IP65
- Approvals: CE, DK5940 ed.2.2 april 2007, R.D. 1663/2000 and R.D.661/2007, VDE0126-1-1
- Available models: ISG124 (max. DC power 2.4kW) ISG131 (max. DC power 3.1kW) ISG140 (max. DC power 4.0kW) ISG160 (max. DC power 6.0kW)



## Interface Protection

## DPC02DM ... B003

### **MAIN FEATURES**

## DK5940 Ed. 2.2 Interface Protection

- Dimensions: 45x80xx99,5 mm
- 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 energy supplier.
- DIN rail mounting
- Re-entering time setting: from 0,1 to 30 s
- Power: 208 to 240 VAC or 380 to 415 VAC
- Protection degree: IP20
- Output: programmable relays 2 SPDT N.E. or 1 DPDT N.E.
- Approvals: ENEL DK5940 ed 2.2 apr 2007 and CEI 11.20



## Single phase Solar Inverter

## ISMG-1-xx

#### **MAIN FEATURES**

### **Solar Inverter for Photovoltaic Plants**

- Dimensions: 580x422x182 mm
- Single phase inverter, DC power pick range from 4.5~6.0kW, with Multi MPPT truckers
- Transformerless (equipped with electronical RCMU device for galvanic insulation)
- · Housing material: Powder coated aluminium
- DC input range: 100~450VDC DC input current: up to 10ADC per string
- Max. efficiency: 96.3% EU efficiency: 95.4%
- Serial communication: RS485
- Protection degree: IP65
- Approvals: CE, DK5940 ed.2.2 april 2007, R.D. 1663/2000 and RD.661/2007, VDE0126-1-1
- Available models: ISMG145 (max. DC power 4.5kW) ISMG150 (max. DC power 5.0kW) ISMG160 (max. DC power 6.0kW)



## Interface Protection

## DPC72DM ... B003

### **MAIN FEATURES**

## **DK5940 Ed. 2.2 Interface Protection**

- Dimensions: 90x71x65 mm, 4 4-DIN mod.
- Three-phase relay with display for monitoring max. and min. voltage and frequency, frequency derivative, sequence and phase loss. It checks that electric values are within the limits set by the energy supplier.
- Record of the last 10 events (date, time and reason for the event)
- Self-test function and Self-power supply
- DIN rail mounting sealable housing
- Values and intervention time programming
- Serial port RS485 Modbus RTU
- · Protection degree: IP50 · Output: 1 DPDT N.E.
- Approvals: ENEL DK5940 ed 2.2 apr 2007 and CEI 11.20



## Software for Inverter

## **ISMG Soft**

## **MAIN FEATURES**

## Software for ISMG One-phase Inverter

- Software for working parameters remote readout via serial port of one or more ISMG-1xxIT inverters.
- · Data log for data detected from one or more inverters connected to each other. Opportunity to read important instantaneous values such as DC input power, CA output power, energy produced, efficiency expressed in Euros, saved CO2, etc. Events and graphs download



## Interface Protection

## SVF5740...

### **MAIN FEATURES**

## **DK5940 Ed. 2.2 Interface Protection**

- Dimensions: 166X235X78,5 mm
- Can be used by MT customers in compliance with ENEL DK5740 and CEI 11-20 regulations
- · Recessed or protruding installation
- Measurement Inputs: one/three voltmetric inputs (line voltage) with one input for residual voltage
- Phase voltmetric inputs: 100V or 400V
- One/three voltmetric inputs, one for each residual voltage
- Auxiliary power: 24 to 480 VAC and up to
- Protection degree: IP51
- Output: totally programmable 4 SPDT relays
- Approvals: ENEL DK5740

## Our Product Range



## Digital Indicator

### MDM40 . . .

#### **MAIN FEATURES**

## Microprocessor digital indicator

- Dimensions: 48X96X105mm
- Supply voltage: 9-32, 40-150VDC 24, 48, 115, 230VAC
- Display 4 DGT LED 9999
- Measurement: frequency/period (wind speed)
- Field: 0,001Hz to 50 KHz
- · 2 independent measuring channels
- 2 relays outputs, 1 analogical output 0...20mA/0...10V, RS485 output



## Solar Display

## DPY307050HX - DPY4060421

### **MAIN FEATURES**

Solar Display for Photovoltaic Plant DPY307050HX: 700x500x70mm for outdoor environments, semi-exposed (IP40)

- DPY406042I: 600x420x75mm for indoor environments
- Display with 3-line indicator for: instantaneous power, energy output, saved CO<sub>2</sub> emissions in DPY406042I freely programmable additional line
- Visibility: 10mt (DPY406042I), >30mt (DPY307050HX)
- Automatic lightening adjustment (for out door type)
- RS485 2 wires



## Digital Modular Indicator

### UDM60 . . .

### MAIN FEATURES

### **Modular Indicator and Controller**

- Dimensions: 48X96X105mm
- Digital modular indicator with microprocessor for rate, speed, frequency and period measurement
- Dual backlit LCD display with digital and analogical indicator
- Dual measurement input
- Range: 0,001Hz to 50 kHz for PNP/NPN TTL and NAMUR signals or voltage values up to 500VAC
- Outputs: analogical 0-20mA output, 0-10V, relays, open collector, RS485 serial output, RS232 output
- · Accuracy: 0.001% RDG class
- Protection degree: IP67, NEMA 12
- Certifications: CE



## **AC Drives**

## VariFlex<sup>2</sup> RVEF / RVCF series

#### **MAIN FEATURES**

## Variable Frequency AC Drives

- Dimensions: 132 x 77 x 30,5 mm (size 1) 132 x 118 x 48 mm (size 2)
- AC variable speed drive for use with AC induction motors
- Sensorless vector control or V/F mode, high starting torque
- Able to control motor with a full torque at low frequncy
- Input voltage ranges: 1-ph 110VAC, 1- ph 230VAC, 3-ph 230VAC, 3-ph 480VAC
- All Parameters accessible both via Keypad and PC
- RS232 or RS485 MODBus RTU/ASCII serial communications available on all models through an option card
- · 8-step speeds setting
- Copy card option for fast and easy setup of identical drives

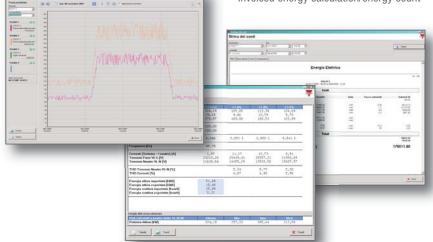
## Plant Control PowerSoft01

Carlo Gavazzi suggests an integrated system with tools and software programs designed to read electrical and physical parameters of the photovoltaic power plant.

The PowerSoft01 system, developed in the Microsoft Windows environment (compatible with Win2000, XP, Vista) was specifically designed to communicate via Modbus protocol (RTU and TCP/IP) with Carlo Gavazzi products.

Composed of a basic module and a range of optional modules, it allows correct and effective management of photovoltaic or wind power plants, enables to monitor plant efficiency, to assess return on investment, to operate quickly in case of fault.

- Network analyser, energy meters or digital board tools management
- Animated interactive synoptic
- Alarm threshold and digital outputs management
- Invoiced energy calculation/energy count



# for Renewable Energy



## **Radiation Sensor**

## CELLSOL200

#### **MAIN FEATURES**

#### **Radiation Sensor**

- Dimensions: 40X115X45mm
- Anodized aluminium body
- · Sensor type: monocrystalline cell
- Application field 0-1500W/m<sup>2</sup>
  Calibration value on plate at 1000W/m<sup>2</sup>
- Output: 75 mV@1000W/m²
- UV-resistant cable, 3 m
- · Light-weight, sturdy, easy to install



## **Inductive Sensor**

## IA18 . . .

## MAIN FEATURES

## **Inductive Proximity Sensors**

- Dimensions: M18 x 69.7 mm
- Nickel plated brass cylindrical housing (ranging from M12 to M30)
- Sensing distance:2 to 15 mm
- · Rated operational voltage: 10 to 40 VDC
- Output: DC 200 mA, NPN or PNP
- Make and break switching function
- Protection: Short circuit, reverse polarity. transients
- Protection degree: IP67
- · Approvals: UL, CSA



## El18 . . .

## **MAIN FEATURES**

## **Inductive Proximity Sensors**

- Dimensions: M18 x 57 mm
- Stainless steel cylindrical housing (ranging from M12 to M30)
- · Sensing distance:2 to 15 mm
- Power supply: 10 to 40 VDC
- Output: Transistor NPN/PNP, make or break switching
- Protection: Short circuit and reverse polarity
- Protection degree: IP67
- Approvals: UL, CSA



## Wind vane

## DWS-D-...

## **MAIN FEATURES**

Wind vane for relative wind direction

- Rotor size: 145 mm
- Opto-electronic detection
- PNP & NPN open collector output in one unit
- Indication of 0 and 90 degree internals 10 to 28 VDC supply (DWS-D-DAC13)
- Indication of +/- 7 degree of wind direction Left/right wind indication (DWS-D-DDC13)
- All inputs and outputs are protected against reverse polarity and transients
- Built-in heater
- · Dust sealed stainless steel ball bearing
- 8 x 0,25 mm², 13 m of shielded connection cable
- Body: Black PVC
- Rotor: Black painted stainless steel
- Protection degree: IP54



### Anemometer

## DWS-V...

### **MAIN FEATURES**

Anemometer with opto-electronic detection

- Rotor size: 145 mm
- Measuring range 2 to 30 m/s
- PNP & NPN open collector output in one unit
- Current source output 10 to 28 VDC supply
- All inputs and outputs are protected against reverse polarity and transients
- High ESD protevtion
- Built-in heater (DWS-V-DAC13)
- Dust sealed stainless steel ball bearing
- 6 x 0,25 mm², 13 m of shielded connection
- Body: Black PVC
- · Rotor: Black painted stainless steel
- Protection degree: IP54

BELGIUM - Carlo Gavazzi NV/SA Schaarbeeklei 213/3, B-1800 Vilvoorde Tel: +32 2 257 4120 Fax: +32 2 257 41 25 sales@carlogavazzi.be

DENMARK - Carlo Gavazzi Handel A/S Over Hadstenvej 38, DK-8370 Hadsten Tel: +45 89 60 6100 Fax: +45 86 98 15 30 handel@gavazzi.dk

FINLAND - Carlo Gavazzi OY AB Petaksentie 2-4, FI-00630 Helsinki Tel: +358 9 756 2000 Fax: +358 9 756 20010 myynti@carlogavazzi.fi FRANCE - Carlo Gavazzi Sarl Zac de Paris Nord II, 69, rue de la Belle Etoile, F-95956 Roissy CDG Cedex Tel: +33 1 49 38 98 60 Fax: +33 1 48 63 27 43 french.team@carlogavazzi.fr

GERMANY - Carlo Gavazzi GmbH Rudolf-Diesel-Strasse 23, D-64331 Weiterstadt Tel: +49 6151 81000 Fax: +49 61 51 81 00 41 info@carlogavazzi.de

GREAT BRITAIN - Carlo Gavazzi UK Ltd 7 Springlakes Industrial Estate, Deadbrook Lane, Hants GU12 4UH, GB-Aldershot Tel: +44 1 252 339600 Fax: +44 1 252 326 799 sales@carlogavazzi.co.uk

ITALY - Carlo Gavazzi SpA Via Milano 13, I-20020 Lainate Tel: +39 02 931 761 Fax: +39 02 931 763 01 info@gavazziacbu.it

NETHERLANDS - Carlo Gavazzi BV Wijkermeerweg 23, NL-1948 NT Beverwijk Tel: +31 251 22 9345 Fax: +31 251 22 60 55 info@carlogavazzi.nl

NORWAY - Carlo Gavazzi AS Melkeveien 13, N-3919 Porsgrunn Tel: +47 35 93 0800 Fax: +47 35 93 08 01 gavazzi@carlogavazzi.no

PORTUGAL - Carlo Gavazzi Lda Rua dos Jerónimos 38-B, P-1400-212 Lisboa Tel: +351 21 361 7060 Fax: +351 21 362 13 73 carlogavazzi@carlogavazzi.pt SPAIN - Carlo Gavazzi SA Avda. Iparraguirre, 80-82, E-48940 Leioa (Bizkaia) Tel: +34 94 480 4037 Fax: +34 94 480 10 61 gavazzi@carlogavazzi-sa.es

SWEDEN - Carlo Gavazzi AB V:a Kyrkogatan 1, S-652 24 Karlstad Tel: +46 54 85 1125 Fax: +46 54 85 11 77 gavazzi@carlogavazzi.se

SWITZERLAND - Carlo Gavazzi AG Verkauf Schweiz/Vente Suisse Sumpfstrasse 32, CH-632 Steinhausen Tel: +41 41 747 4535 Fax: +41 41 740 45 40 verkauf\_vente@carlogavazzi.ch

#### **OUR SALES NETWORK IN NORTH AMERICA**

USA - Carlo Gavazzi Inc. 750 Hastings Lane, USA-Buffalo Grove, IL 60089, Tel: +1 847 465 6100 Fax: +1 847 465 7373 sales@carlogavazzi.com CANADA - Carlo Gavazzi Inc. 2660 Meadowvale Boulevard, CDN-Mississauga Ontario L5N 6M6, Tel: +1 905 542 0979 Fax: +1 905 542 22 48 gavazzi@carlogavazzi.com CANADA - Carlo Gavazzi LTEE 3777 Boulevard du Tricentenaire Montreal, Quebec H1B 5W3 Tel: +1 514 644 2544 Fax: +1 514 644 2808 gavazzi@carlogavazzi.com

#### **OUR SALES NETWORK IN ASIA AND PACIFIC**

SINGAPORE - Carlo Gavazzi Automation Singapore Pte. Ltd. 61 Tai Seng Avenue #05-06 UE Print Media Hub Singapore 534167 Tel: +65 67 466 990 Fax: +65 67 461 980

MALAYSIA - Carlo Gavazzi Automation (M) SDN. BHD. (574812-H) No. 54, Jalan Rugbi 13/30, Tadisma Business Park, Sek. 13, 40100 Shah Alam, Selangor, Malaysia. Tel: +60 3 5512 1162 Fax: +60 3 5512 6098 CHINA - Carlo Gavazzi Automation (China) Co. Ltd. Rm. 2308 - 2310, 23/F., News Building, Block 1, 1002 Shennan Zhong Road, Shenzhen, China Tel: +86 755 83699500

HONG KONG - Carlo Gavazzi Automation Hong Kong Ltd. Unit 3 12/F Crown Industrial Bldg., 106 How Ming St., Kowloon, Hong Kong Tel: +852 23041228 Fax: +852 23443689

### **OUR PRODUCTION SITES**

Carlo Gavazzi Industri A/S Hadsten - **DENMARK** 

Uab Carlo Gavazzi Industri Kaunas Kaunas - **LITHUANIA**  Carlo Gavazzi Ltd Zejtun - **MALTA** 

Carlo Gavazzi Automation (Kunshan) Co., Ltd. Kunshan - **CHINA**  Carlo Gavazzi Controls SpA Controls Division Belluno - ITALY

Fax: +86 755 83699300

Carlo Gavazzi Controls SpA Sensors Division Castel Maggiore (BO) - **ITALY** 

#### **HEADQUARTERS**

Carlo Gavazzi Automation SpA Via Milano, 13 - I-20020 Lainate (MI) - ITALY Tel: +39 02 931 761 info@gavazzi-automation.com www.carlogavazzi.com/ac













Further information on www.gavazziautomation.com www.carlogavazzi.com

