





GEI ELECTRONICS GEOTECHNICAL DIVISION DESIGNS AND MANUFACTURES A FULL RANGE OF DATALOGGERS AND MONITORING SYSTEMS EQUIPMENT TO MEET THE MOST VARIED DEMANDS IN THE FIELDS OF GEOTECHNICAL ENGINEERING, HYDROLOGIC AND METEOROLOGIC MONITORING AND DATA ACQUISITION APPLICATIONS.

Main fields of application:

- GEOTECHNICAL ENGINEERING
- ► HYDROLOGY
- ▶ METEOROLOGY

# Geoj

## readout and datalogger unit

The G801 module is a device, designed for the realization of complex geotechnical, structural and environmental monitoring systems. G801 is digitally connected to active devices such as: multiplexers, digital inclinometer tilt arrays or directly to compatible sensors, which can be situated either near the module or at hundreds of meters distance. The connection of G801 to other devices is realized by a four poles cable, which is used both to provide power and for digital data exchange. Connections can also be realized via radio. In the second case, each device has its own system of local power supply. Peripherals are responsible just for data acquisition, while G801 module manages the data storage, the acquisition period and the user interface. It also has some local characteristics, such as: analogue and digital channels, power outputs and alarm signals. G801 is a managing module, designed for creating monitoring systems.

## **OPTIONAL:**

- Router GPRS/UMTS
- Radio Network

#### SIGNALS:

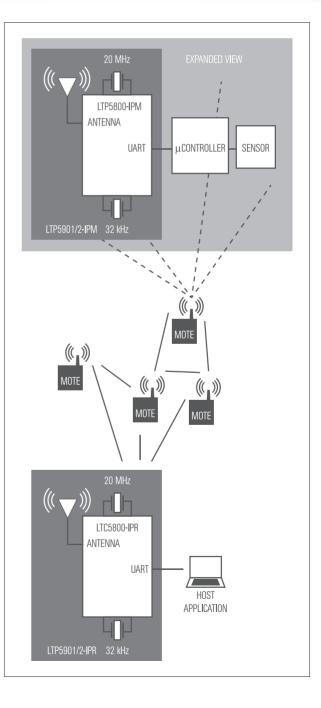
V, mV/V, 4/20mA, vibrating wire, Pt100, NTC Digital sensors

## INSTRUMENTS, COMPATIBLE LOCAL CHANNELS:

- · Pulse pluviometer
- Alarm triggered instruments
- · Pulse or digital hydrogeological instrumentation
- Pulse or digital meteorological instrumentation

## INSTRUMENTS, COMPATIBLE MULTIPLEXER CHANNELS:

- · Vibrating wire strain gauge
- Electric strain gauge
- Tensometers
- Inclinometers and pendulums
- Piezometers
- Load cells
- Crackmeters
- Thermistors
- Hydrological instruments
- · Meteorological instruments



DIGITAL INTERCONNECTION LOGGING MODULE **G**eo) 3 DEF MNC 9 WXYZ <mark>8</mark> тиv PQRS ESC  $\cap$ 0000 0000 60 60 99

## + accessories

<b>GMUX</b> acquisition module 4, 8, 12 and 16 channels	<b>DMUX</b> multiple digital devices	<b>RADIO-M</b> SmartMesh IP embedded manager
for more information pag. $\rightarrow 12$	for more information pag. $\rightarrow 12$	for more information pag. $\rightarrow 13$
UMTS-GEOL router	<b>GDATA</b> 2.4MHz wireless RS485	<b>BSM</b> battery saving device
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for more information pag. $\rightarrow 13$	for more information pag. $\rightarrow 14$	for more information pag. $\rightarrow 14$



## datalogger

Universal multifunctional 4+8/256 channels datalogger, designed for remote data acquisition of the main electric and vibrating wire transducers, existing on the market. The basic module consists of a motherboard with a display, provided with 4 digital channels. The channels can be configured as triggered, pulse counter or digital signal. The system manages from 1 to 32 multiplexers in total, therefore 256 channels in the maximum configuration. The datalogger is equipped with a display which is used for the channels configuration and data visualization and an SD card, which memorizes the system configurations and acquisitions. Operation also at 12Vdc battery eliminates awkward network connections. The technology based on an ultralow quiescent current guarantees an operation for about a year in maximum configuration, in standby mode. Optional external connector for 110/220 Vac or solar cell panel 5W power supply.



#### **OPTIONAL:**

- GSM
- Radio Module

SIGNALS:

4/20mA, V, mV, mV/V, Vac, Pt100, vibrating wire, Ohm

## INSTRUMENTS, COMPATIBLE LOCAL CHANNELS:

- · Pulse pluviometer
- · Alarm triggered instruments
- · Pulse or digital hydrogeological instrumentation
- · Pulse or digital meteorological instrumentation

### INSTRUMENTS, COMPATIBLE MULTIPLEXER CHANNELS:

- Vibrating wire strain gauge
- Electric strain gauge
- · Inclinometers and pendulums
- Piezometers
- Load cells
- Crackmeters
- Thermistors
- Hydrological instruments
- Meteorological instruments



## datalogger

readout

logger unit.

8/16 channels universal multifunctional datalogger, designed for the remote data acquisition of the main electric and vibrating wire transducers, existing on the market. The basic module consists of an 8 channels multiplexer, which can be extended to 16 channels maximum, adding another 8 channel multiplexer. Each channel is characterized by a four-way terminal block for electrical connection of a sensor with a multiplexer. The datalogger is equipped with a display which is used for the channels configuration and data visualization and an SD card, which memorizes the system configurations and acquisitions. Operation also at 12Vdc battery eliminates awkward network connections. The technology based on an ultralow quiescent current guarantees an operation for about a year in maximum configuration, in standby mode. The datalogger also has an optional external connector for 110/220Vac or solar cell panel 5W power supply.

#### **OPTIONAL:**

- GSM
- Radio Module

#### SIGNALS:

4/20mV, V, mV, mV/V, Pt100, vibrating wire, NTC, Ohm

#### INSTRUMENTS, COMPATIBLE:

- · Vibrating wire strain gauge
- Electric strain gauge
- · Inclinometers and pendulums
- Piezometers
- Load cells
- Crackmeters
- Thermistors
- Hydrological instruments



## datalogger

GSA

vibrating wire logger unit

The GS8 is a low cost, battery powered datalogger product family, designed for reliable long period monitoring of a single, four or eight vibrating wire sensors and thermistors. A user friendly software provides all the feature for setting, testing and data downloading. This product family is designed to be connected to all vibrating wire sensor types, including piezometers, crack meters, and strain gauges.

### CHANNELS:

GS8-1 1VW+1NTC, GS8-4 4VW+4NTC, GS8-8 8VW+8NTC

## VIBRATING WIRE:

- Excitation 0-5V
- Resolution 0.10Hz
- Range 260 to 4800Hz
- Accuracy 0,01% Full scale

#### THERMISTOR:

- Range 1000 to 640000hm
- Accuracy (25°C) 0.3°C
- Resolution <4 Ohm

#### COMMUNICATION:

- Port Mini B USB
- Software Windows XP onwards

#### DATA STORAGE:

Memory 8MB • Readings up to 279,000 1Ch, 135,000 4Ch,
83,000 8Ch • On memory full Overwrite old data or stop •
Reading interval sec/min/hr/month/year • Time format Day/month/ year hr/min/sec

#### POWER:

Voltage 3-7Vdc • Standard battery GS8-1: 4 xAA Alkaline - GS8-4 & GS8-8: 4 Alkaline C (lithium battery available on request) • Battery life > 8years/8 memory fill > 5years/4memory fills > 5years/ 3memory fills • Reading interval sec/min/hr/month/year • Time format Day/month/year hr/min/sec



## readout unit

MP

(backlight)

MP2 readout unit is designed to acquire manually data of all the types of vibrating wire transducers. A single device for all applications. It operates with rechargeable 9.6Vdc batteries. An acoustic sound, electronic amplification of the real sound produced by the wire of the sensor, is available. The back-light graphic screen displays VW values both in Hertz and Digit and temperature readings. The battery-charge, the audio option and the reading status are also shown. A two button keyboard allows very easy to use applications. MP2 is also particularly useful during installation and for transducers control.

## SIGNALS:

Vibrating Wire, NTC

## INSTRUMENTS, COMPATIBLE LOCAL CHANNELS:

- Tensometers
- Piezometers
- Load cells
- Crackmeters
- Thermistors
- Hydrological instruments
- Meteorological instruments





## readout unit

Multifunction readout unit is designed to acquire manually data of all the main types of electric and vibrating wire transducers. A single device for all applications. It operates with rechargeable 12Vdc batteries. A back-light screen displays: readouts, the battery-charge and the wiring guide. The six button keyboard allows to perform various types of the instrument configuration. MULTIGEO is also particularly useful during installation and transducers control.



## SIGNALS:

4/20mA, V, mV/V, Ohm, Hz/Digit

## INSTRUMENTS, COMPATIBLE LOCAL CHANNELS:

- Tensometers
- Inclinometers and pendulums
- Piezometers
- Load cells
- Crackmeters
- Thermistors
- Hydrological instruments
- Meteorological instruments

## FLYCASE80)

readout unit

Flycase801 is a battery powered portable device, designed for the realization of short/medium time geotechnical, structural and environmental monitoring systems. Flycase801 is also used as a support to test the functionalities during the installation of complex monitoring systems.

Flycase801 is digitally connected to active devices such as: multiplexers, digital inclinometer tilt arrays or directly to compatible sensors, which can be situated either near the module or at hundreds of meters distance. The connection of Flycase801 to other devices is realized by a four poles cable, which is used both to provide power and for digital data exchange. Connections can also be realized via radio. In the second case, each device has its own system of local power supply. Peripherals are responsible just for data acquisition, while Flycase801 module manages the data storage, the acquisition period and the user interface. Flycase801 and digital multiplexers can also be used as advanced manual terminal switch boxes for low cost migration from manual to automatic acquisitions systems.

## **OPTIONAL:**

Router GPRS/UMTS Radio Network

SIGNALS:

V, mV/V, 4/20mA, VW, Pt100, NTC Digital sensors

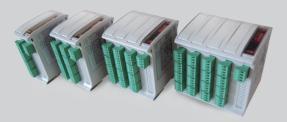
## INSTRUMENTS, COMPATIBLE MULTIPLEXER CHANNELS:

- · Vibrating wire strain gauge
- Electric strain gauge
- Tensometers
- Inclinometers and pendulums
- Piezometers
- · Load cells
- Crackmeters
- Thermistors
- Hydrological instruments
- · Meteorological instruments

GMUX

accessories

G801 - Flycase801



GMUX is an acquisition module for all types of analog instrumentation, designed to be used in geotechnical, structural and environmental monitoring. The module is created as an accessory device to a G801 datalogger, with which it is connected via cable or via radio. GMUX can read different types of sensors with different signal types (4/20mA, mV/V, V) and all the vibrating wire instruments. It is also possible to read thermistor sensors as Pt100, NTC, etc. Upon request of one of the input digital channels, coming from a G801 module, GMUX provides the correct power supply to the analog channel, and, after some time (which can be set and changed), starts the acquisition of the electric signal. The information turns back to the G801 module, which has requested it (always on the same digital channel). So, you can connect more than one GMUX to the same digital channel but in this case every GMUX should be identified by a unique code. GMUX is available in four versions: from 4 channels up to 16 channels (including also 8 and 12 channels).

#### CHARACTERISTICS:

Current supply 30mA in standby. Zero with RS485 connection Operating temperature from -20/+70°C MUX channels number 4+4ch, 8+8ch, 12+12ch, 16+16ch Measuring type V, mV/V, 4/20mA, VW, Pt100, NTC N. Multiplexer supported up to 255 for RS485 port, max 512 N. channels supported up to 32 for MUX, max 16320 Measurement resolution 24 bit V, mV/V, 4/20mA, Pt100, NTC 0.1Hz, VW Supply voltage +20V, +12V, +/-12V, +5V

MUX communication type RS485, Dust Network

DMUX

accessories G801 - Flycase801



DMUX allows multiple digital devices, or arrays of them, to be independently switched to a single G801 input. DMUX enable general purpose input expansion simplifying interface busses. G801's digital multiplexers are available in multiple sizes with one digital I/O connectiong to one of 4, 8, 12 or 16 input lines based on the digital code present at control inputs. DMUX digital multiplexer is useful in serial RS485 connections, realising a star configuration. DMUX can be locally or remotely supplied and can be battery saved by BSM module.

#### CHARACTERISTICS:

Supply 4/13Vdc. Optional 110/220Vac or solar panel Current supply 30uA in standby. Zero in connection RS485 Operating temperature -20/+70 °C Protection Defined by the box type DMUX channels number 4, 8, 12, 16 Dimensions 79/159/204/249 x 110 x 54 mm Weight 180/280/380/480g DMUX communication type RS485

#### **UMTS-GEOL**

## accessories

#### G801 - Flycase801

RBMTX-Ux1 is a modem made for wireless m2m applications. It is a compact device powered by Telit UL865 embedded engine. Supporting GPRS/UMTS features, it is dedicated for users seeking for easy and mobile Internet access. Modem enables operators to use Internet/VPN access in easy way and support all the necessary interfaces. It is a universal solution for all low-volume M2M and mobile data applications including metering, traffic systems, transportation and logistics, security, vending machines and facility management.

#### CHARACTERISTICS:

Network standard GSM/GPRS/EDGE/UMTS Frequencies EU variant: 900/2100 Mhz UMTS 900/1800 Mhz GSM/GPRS/EDGE

#### NA variant:

850/1900 Mhz UMTS 850/1900 Mhz GSM/GPRS/EDGE Transmission speed 7.2 Mbps download 5.76 Mbps upload

#### INTERFACES:

RS232/RS485RJ45 connector LAN Ethernet 10/100 Mbps Antenna SMASIM card external,  $3\mathrm{V}$ 

#### FUNCTIONS:

Operating system Linux SMStext, PDUTCP/IP, UDP, HTTPS, SMTP, FTP m2m Locate m2m AIR e Call

#### OTHER.

Power supply 9/30V (w/o connectors) Dimensions 70x59,9x30,9mm Case Aluminium



SmartMesh IP wireless sensor networks are self managing, low power internet protocol (IP) networks built from wireless nodes called motes. The RADIO-M is the IP manager product in the Eterna® family of IEEE 802.15.4e printed circuit board assembly solutions, featuring a highly integrated, low power radio design by Dust Networks® as well as an ARM Cortex-M3 32-bit microprocessor running Dust's embedded Smart-Mesh IP networking software. Based on the IETF 6LoWPAN and IEEE-802.15.4e standards, the RADIO-M runs SmartMesh IP network management software to monitor and manage network performance and provide a data ingress/egress point via a UART interface. It provides the core networking functionality, enabling the network to achieve unsurpassed levels of resilience, reliability, and scalability with advanced network management and comprehensive security features. With Dust's timesynchronized SmartMesh IP networks, all motes in the network may route, source or terminate data, while providing many years of battery-powered operation. The RADIO-M module includes an on-board chip antenna and modular RF certifications. Also available module which includes an MMCX antenna connector.

#### CHARACTERISTICS:

Serves as a Network Manager in a SmartMesh IP network to enable >99.999% Network Reliability in the most challenging RF Enviroments

Sub 50uA Routing nodes

Incorporates a 2,4 GHz, IEEE 802.15.4e System-on-Chip

On-board chip antenna or external magnetic fixing. MMCX antenna connector

**GDATA** 

accessories G801 - Flycase801

GDATA is a 2.4MHz Wireless RS485 to mesh radio Bridge. It is a Multi-Point Ready device, allowing communication to multiple radios or modules. The radio contains a long-range wireless SmartMeshIp radio transceiver. GDATA is used to create a wireless RS232 or RS485 link. GDATA allows you to connect RS485 devices wirelessly when the direct wired connections are too expensive or have insufficient range, security or noise immunity. GDATA can also be used to wirelessly interconnect multiple separate RS485 busses. The 2.4GHz band is the most globally accepted unlicensed portion of the RF spectrum. GDATA module includes an on-board chip antenna and modular RF certifications. The MMCX antenna connector version is also availble.

#### CHARACTERISTICS:

Supply 4/13Vdc. Optional 110/220Vac or solar panel Current supply 40uA in standby. Operating temperature -20/+70 °C Protection defined by the box type Dimensions 36x32x90mm Weight 75g + batt + case Cable interface RS485 Radio interface Dust network

#### NETWORK FEATURES:

Time Synchronized, Channel Hopping Communications: >99.999% network reliability in even the most challenging RF environments Sub 50 $\mu$ A Routers: Can build out a network without any line powered devices. Flexibility to be line powered or energy harvested if desired. Can build out a network without any line powered devices. Flexibility to be line powered or energy harvested if desired. Secure Mesh with 128-bit AES Encryption: NIST Certified Security. Compromise of one node does not compromise network.

Standards-based: Based on 6LoWPAN and IEEE 802.15.4e standards Highly Accurate Time Stamping: Time stamping on every node is available to applications with millisecond accuracy

#### MANAGE FEATURES:

Advanced Network Management. Dynamically optimizes mesh connectivity based on the changing RF environment - Scalable Network Management. Manages Networks of Up to 100 Nodes - Load Balancing and Optimization. Adds more bandwidth for the busiest motes while maintaining normal traffic flow for the rest of network - Deterministic Power Management and Optimization. Balances traffic so that power consumption is also balanced within the network - Network Management and Diagnostics. Monitor, configure and manage the network; includes APIs to build custom management and diagnostics applications. - Sub 1mA Average Manager Current Consumption. Enables Battery-Powered Network Management - RF Modular Certifications. Pre-certified in USA, Canada, EU, Japan, and more



BSM is a battery saving device for long distance RS485 cable data connections. If there is a necessity for long cable connections between G801 and other devices and standard section data cable are used, additional batteries can be installed on device side to guarantee the best data performance. BMS is installed when a long life battery is requested.

#### CHARACTERISTICS:

Supply 8/16Vdc Operating temperature -30/+ 85°C Dimensions 80x23x50mm Weight 41 gr. Connection Rail DIN



G602 and G401 dataloggers can be supplemented by this GSM module for transmetting the stored data, making it directly accessible on the operator's PC, thus eliminating the necessity to be present at the place of installation for data downloading. Through the GSM module it is also possible to change remotely some parameters of the datalogger, such as, for example, the sampling period, the channels disabling/enabling and the time of data downloading.

## RJX232-A

## accessories

GO41-G602



G602 and G401 can be supplemented by a radio module, also making possible the connection of more G602 and G401 to a single radio receiver module installed directly on the operator's PC, thus creating a real instrument network in a star configuration. The network allows to visualize and immediately convert in graphics all the values, received from the individual transducers. A radio module also makes acquisitions remotely on demand, by operating directly from the workstation. By means of optional softwares, it is possible to manage the whole system remotely via Internet, with the possibility of recovering data, receiving individual readings and modify the acquisition parameters.

#### CHARACTERISTICS:

Dual-Band GSM 900/1800 MHz GPRS multi-slot class 8 Compliant to GSM phase 2/2+ Output power: Class 4 (2W) for EGSM900/Class 1 (1W) for GSM1800 Control via AT commands SIM Application Toolkit Supply voltage range: 8/30V Temperature range Normal Operation: -20/+70°C Restricted Operation: -25/+75°C Switch off: +80°C Storage: -40/+85°C Dimensions: 65x74x33mm Weight: 130 g

## CHARACTERISTICS:

Freq. range: 169.400 - 169.475 MHz Available channels 6: 169.40625 - 169.41875 - 169.43125 -169.44375 - 169.45625 - 169.46875 MHz Channels spacing 12.5kHz (tuning spacing 6.25kHz) Modulation 8K50F1D Data rate radio 2400 - 3600 bps (4800 bps not certified) Frequency stability +/- 1 kHz Operating voltage 11.5  $\rightarrow$  13.5 VDC DC RX current about 60 mA DC TX current typ. 350 mA DC current DTR OFF < 100 nA Antenna  $\lambda$  / 4, vertical dipole or 3 elements Yagi Dimensions 90x60x13mm Operating temperature -20/+60°C [-4/+140°F] European Norm and directives EN 300 220-1/2 RX Class 1

#### TRANSMITTERS:

RF power 500 mW erp (2W for RMO400) Frequency deviation +/-1.5 kHz RF power stability +/1.5 dB Spurious radiation EN 300 220-1/2 Adj. Channel power -60 dB

#### RECEIVER:

Sensitivity -118dBm@ 12dB SINAD - Selectivity -60dB - IMD attenuation -65dB - Spurios radiation -60dBm - Interface UART TTL + RT485 - Data rate interface 1200  $\rightarrow$  38400 bps - Data format Asynchronous 8,N,1 and Parity Control - Communication mode Simplex or Half-duplex - RMO4IN general Simplex or Half-duplex: Interface RS232-RS485 - Connector D9F - Data rate 1200  $\rightarrow$  38400 bps - Operating voltage 11/13.5VDC



	Highway A5 Aosta Monte Bianco tunnel (Italy) Genoa: underground construction (Italy) Montereale Val Cellina (Italy) Ravedis Dam Dorso Castello argumentatas monitoring	
	Frejus tunnel (Italy) Prapontin tunnel monitoring	
	Highway A15 Parma-La Spezia: Berceto (Parma - Italy)	
2006	Trieste (Italy): the by-pass highway and the new highway traffic intersection	
	Viggiù (Varese): reopening of an old quarry	
2007	Highway A1 Milan-Naples: new highway segment Bologna-Florence (Italy).	
2008	Brescia (Italy): underground construction Aosta A5 highway: Monte Bianco tunnel (Italy), Highway A1 Milan-Naples: new highway segment Bologna-Florence (Italy).	A
	New railway section Milan-Naples (Italy) Bologna Central train station; Structural monitoring	
2009	Rome: underground B1	A. Start
2010	Highway A1 Milan-Naple: new highway segment Bologna-Florence Montereale Valcellina (Italy): Ravedis Dam basin monitoring Highway A1 Milan-Naple: new highway segment Bologna-Florence	
2010	Rome:underground B1	
	Highway A1 Milan-Naple: new highway segment Bologna-Florence (Italy) Highway A14 Bologna-Taranto: Rimini (Italy) Genoa (Italy)	
2011	Quadrilateral State road 77 Val Di Chienti: Section Collesentino II – Pontelatrave	
	State road 77 Val Di Chienti: Section Foligno – Pontelatrave Connection: State road 77 – State road 16 in Civitanuova (Marche)	
	Connection: State road 77 – State road 3 in Foligno State road 78 Val Di Fiastra: section Sforzacosta – Sarnano	
	State road 3 Flaminia: section Foligno – Pontecentesimo State road 3 Flaminia: section Foligno – Pontecentesimo	
	State road 76 Val D'Esino: section Fossato di Vico – Cancelli section Albacina – Serra Sa	n Quirico
	Pedemontana delle Marche : Fabriano – Muccia/Sfercia State road 318 Valfabbrica: section Pianello - Valfabbrica	
	Genoa railway Hub: Genoa railway station enlargement (Italy) Pavimental JSC - Senigallia (Ancona) Road expansion Al Rimini – Ancona (Italy)	
2012	Vicenza (Italy)	
	Quadrilateral (Marche – Umbria) - Italy Ancona- Riccione (Italy)	
	Genoa (Cantiere consorzio Eureca) - Italy Terna – Favazzina (RC) - Italy	and the second division of the second divisio
	Variante di valico (Italy)	
	Pedemontana Lombarda - BRE.BE.MI (Brescia.Bergamo.Milano) - Italy Vicenza (Italy)	
	Borgo Val di Taro (Parma - Italy) Arcisate - Stabio (Italy)	
2013	Ancona - Senigallia (Italy)	
	Pedemontana Lombarda - BRE.BE.MI (Brescia.Bergamo.Milano) - Italy) Roccamurata (Parma - Italy)	
	Belluno (Italy) Tunnel Frejus (Italy)	
	Venaus Dam (Val di Susa - Torino) - Italy	
	Barberino del Mugello (Florence - Italy) ATM (Milan - Italy)	
	Ghella – Ancona Castelferretti (Falconara) - Italy Boschetto (Parma - Italy)	
2014	Maranello (Modena - Italy) Ferrari new structural	
	Barberino del Mugello (Florence - Italy) COCIV (Genoa - Italy)	
	Parma (Italy) Frejus Tunnel (Torino - Italy)	
and the second	Bologna – Florence (Italy), Tunnel Sparvo Sanremo (Italy)	
	Empedacle (Sicilia - Italy) Variante di Valico (Italy)	
	Genoa Nodo (Italy)	
	Bologna – Florence Italy, Tunnel Sparvo Lotto 7 Doha Tunnel (QATAR)	and the state
	Pampeago (Trento - Italy) Jakarta - Indonesia	
2015	Tempa Rossa (Basilicata - Italy)	
	Milan City Life (Italy) Slovakia	and the second second
	Vicenza (Italy) Calabria (Italy)	
2016	Calaoria (Italy) Val Sambro Gallery (Al Bologna - Florence)	
2016	L'Aquilla (Italy) - Historic church	Sales o
	SAMAC A14 Senigallia (Ancona - Italy) Carrara (Italy) - Marble extraction	Purchasing department:
		Technical suppo

## GEI S.r.l.

Via R. Koch 55/A Pilastrello 43123 Parma Italy

> Tel. +39 (0)521 642229 Fax +39 (0)521 030744

www.geielettronica.it info@geielettronica.it

Sales office: sales@geielettronica.it Purchasing department: purchasing@geielettronica.it Technical support: support@geielettronica.it Accounting office: invoice@geielettronica.it