Device for monitoring and controlling with 3G Cellular / Satellite communication and Programmable Logic

Using the GRD-3G allows for remote monitoring and control of sensors, transducers, and intelligent devices from your own control system or through our Web Server for Telemetry applications.

**GENERAL FEATURES**
- 3G Cellular Communication
- Satellite communication (optional)
- 4-20mA and 0-10V Inputs
- Digital Inputs
- Pulse Counter Inputs
- Digital Outputs
- Serial Ports

**FUNCIONALIDAD**
- Remote Serial Port (Modbus or wireless)
- Modbus Master protocol in port RS232/485 for I/O expansion
- Modbus Slave protocol for local access to I/O
- Logic programming with Scripts
- Alarms and capability to control by SMS text messages
- Record Logs
- Automatic reconnection by shear link
- Display of data through:
  - SCADA Software
  - Your own software
  - Exemys provided web page

The GRD family of products helps control and supervise any kind of equipment from distance, be it a control system or process system facilitating the implementation of the remote telemetry systems. Additionally it includes the possibility to load a text script to perform internal logics.

**Internal Programming Logic**

The GRDs incorporate programming logic and calculation by loading a simple text script.

- Mathematical Operations
- Binary Logic Operations
- Date and Time Operations
- Operations with timers
- Reading of Analog Variables
- Records of Variables
- Turning on and off digital pins of I/O
- Sending and Receiving SMS text messages
- Interpretation of data from the serial port
- Sending of data through the serial port

Whilst every effort has been made to ensure the accuracy of this specification, we cannot accept responsibility for damage, injury, loss or expense from errors or omissions. In the interest of technical improvement, this specification may be altered without notice.

For pricing or any further information, please contact Omni Instruments Ltd.
### TECHNICAL SPECIFICATIONS

**RF Wireless**
- Protocol: 2G GSM, 2.5G EDGE, 3G UMTS (Automatic)
- Frequency:
  - Quad-Band GSM / GPRS / EDGE (850/900/1800/1900MHz)
  - Hexa-Band UMTS WCDMA FDD (800MHz-B19, 850MHz-B5/B6, 900MHz-B8, 1900MHz-B2, 2100MHz-B1)
- Micro SIM Card: Supports all providers
- Antenna: 0dBi SMA Connector (other antennas, optional)
- Cellular module certification: FCC, CE, RyTTE, PTCRS, ATyT

**General**
- Led Lights: GSM / GPRS / Link a datos
- Enclosure: Industrial, DIN Rail
- Dimensions: 70 x 90 x 65 mm
- Weight: 160g
- Operation Temperature: -20°C to +65°C
- Warranty: 1 year

**Power**
- Power Input: +10Vdc min. a +30 Vdc max.
- Average Consumption: 190mA at 12Vdc, 150mA at 24Vdc

**Communications**
- Serial Port: 2 ports. 1x RS232 and 1x RS485
- Protocols: Modbus Master, NMEA, Modbus Slave, ITAS Iridium Satellite and others by scripts programming.
- USB port: 1 Port for configuration.
- Configuration: Local by USB or remote by GPRS
- Data Encryption: User's own encryption.

**Inputs and Outputs**
- Analog Inputs: 0-10V, 4-20mA (Software configuration)
  - Analog Inputs 0-1Vdc: Precision 0.1mV
  - Analog Inputs 0-10Vdc: Precision 1mV
  - Analog Inputs 4-20mA: Precision 1uA, Surge protected input
- Digital Inputs and Outputs: 6 Transistor type, software configuration
  - Inputs:
    - Activation: +7Vdc min to 50Vdc Max
    - Impedance input: 280KOhm
  - Outputs:
    - +50Vdc max. input voltage, 200mA max. current output

**Counting and Recording of Events**
- Counting Input:
  - Frequency Input: 50Hz max
  - Pulse Input: 10ms min.
- Recording Events:
  - With Real Time Clock (RTC)
  - Can register without Cell Signal (Offline)

#### AVAILABLE MODELS

<table>
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<th>Digital I/O</th>
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<td>1 RS232</td>
<td>1 RS485</td>
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<tr>
<td></td>
<td>1 RS485</td>
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<td>---</td>
</tr>
<tr>
<td>GRD3625-XF-3G</td>
<td>1 RS232</td>
<td>0-1V/0-10V/4-20mA</td>
<td>6 (6 for pulses of up to 50Hz)</td>
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<tr>
<td></td>
<td>1 RS485</td>
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#### GENERAL SCHEME OF OPERATION

- 4-20mA
- 0-1V/0-10V
- Digital I/O
- Modbus port
- Pressure
- Temperature
- Flow
- Level
- Etc
In this way of use, the client simply enters a set web page that we will sent them and there the customer puts in username and password and will be able to view all of the information on his or her remote GRD devices. The web site is hosted by the Telemetry Server developed by Exemys and is available for any user of the GRD products.

**DIFFERENT WAYS OF USE**

1) **Through a Web page**

In the Telemetry Server are installed two simple software applications:

1) Middleware: The software in charge of communicating with all of the remote GRD devices.
2) Web Server: The software in charge of taking the data from the Middleware and publishing it on the web page, which the customer can access by entering their username and password.

### How does it work?

In the Telemetry Server are installed two simple software applications:

1) **Middleware**: The software in charge of communicating with all of the remote GRD devices.
2) **Web Server**: The software in charge of taking the data from the Middleware and publishing it on the web page, which the customer can access by entering their username and password.
2) Database

In this way of use all of the information obtained by the GRD devices is stored in a MySQL type database. This kind of database can be accessed by a few different ways, for example:

- SCADA system that takes the information in the database and displays it in its own ways.
- Software system developed by the client itself that can obtain the information from the database.

How does it work?

In the Telemetry Server are installed two simple software applications:

1) Middleware: The software in charge of communicating with all of the remote GRD devices.
2) Database: The Middleware then deposits all of the information from the GRDs in the database. Then the different software programs depend on the database to obtain the information from the GRDs.
3) SCADA system

Exemys’ Cellular telemetry system has been developed to be compatible with any kind of SCADA system and under different ways of use. The SCADA System can access the information of the remote GRD devices in any of the following forms:

**SCADA Database:** Obtains the information from the database on whichever of the remote GRD devices. The SCADA systems should possess the function, Data Mining.

**SCADA I/O:** The SCADA System consults directly, in Modbus protocol, for the records of the GRD devices; consulting about the state of the inputs and outputs.

**SCADA Serial port:** This form consults, in Modbus, DNP3, or IEC101 protocol, the devices connected through the serial port of the GRDs. In this way the devices’ demultiplexing feature can be used.
4) Remote and Wireless Serial Port (not available for satellite module)

In this mode, any software application that uses a serial port to communicate with a device locally may be adapted to communicate with multiple remote devices, using a GRD as a means of communication to reach others. A wireless communication channel is established through which the data travels from the GRD to the remote device in question.

There are 2 ways of doing this:

**Virtual COM mode:** On the computer where the device’s software is hosted, a Virtual Redirector is hosted with COM and TCP/IP ports. Thus, all the information previously circulated through a serial port is now circulated within a package of TCP/IP data thanks to the redirector. This package processes the Middleware and sends it to the corresponding GRD, which is responsible for decompressing and going back to a pattern of serial communication.

**SCADA Serial port mode:** Consults are made in Modbus, DNP3, or IEC101 protocols, between the devices connected through the serial ports of the GRDs. This mode uses the Demultiplexing feature.
INTERNAL LOGIC PROGRAMMING THROUGH SCRIPTS

What is a Script?

A Script is a file with orders that once loaded on to the GRD is interpreted and executed.

Operations performed by a Script:
The Script describes what operations should be executed by the device, for example:

- Mathematical Operations
- Logic and Binary Operations
- Operations with Timers
- Reader of Analog Variables
- Control of digital pins of I/O
- Sending and Receiving of SMS text messages
- Interpretation of data from the serial port

Example of a Script

Below is a simple example which turns on and off a digital outputs in a predetermined time:

```
start
{   b=0;
    timer a,10000;
};
check_timer a
{   timer a,10000;
    neg b,b;
    write_io 1,1,b;
};
end;
```

How are the Scripts loaded?

The script is programmed with a simple software, which lets you write in an orderly manner, the commands are executed within the GRD.

The scripts are loaded to the GRD through a USB port or remotely by Middleware.

Once the scripts are loaded, the GRD is ready to execute the logics.

Examples of application

- **Calculation of Flow:**
  Calculates flow by measuring the differential pressure

- **Alternating of 2 Pumps:**
  Alternates the use of 2 pumps using a timer

- **Detection of faults in the Dosing Machine:**
  Stops the dispenser through its digital outputs based on measurements of two temperatures and a digital signal.

- **Remote Turning On an Off:**
  Using an SMS text message or a button on the telemetry website server, the outputs of the GRD can be activated temporarily to control the equipment by turning it on or off

- **Automatic Turning On or Off:**
  A temporary logic can turn on or off a system
**ALARMS AND ALERTS BY SMS**

The GRD devices can operate in the form of SMS text messages

### Outgoing SMS text messages

The GRD can be configured to send text messages when predetermined values on a sensor are reached. Such as:

- Analog and digital Inputs
- Results from mathematical and logic operations of Scripts
- Values of Modbus records

### Incoming SMS text messages

The GRD can receive text messages and report values from its Modbus records or the state of its inputs and outputs. In turn it can trigger a process or operation of a Script.

- Values of
  - Modbus register
  - Inputs and outputs
- Execution of SCRIPTS
EXAMPLES OF APPLICATION

Power Generator

Measurements
- Hours of Usage
- Combustion Level
- Motor Temperature
- Battery Voltage
- Electric Parameters

Compressor Gas

Measurements
- Water Pressure
- Gas Pressure
- Oil Pressure
- Combustion Level
- Electric Parameters

Tank Levels

Measurements
- Level of storage tanks
- Pump Activation
- Temperatures

Extraction Oil

Measurements
- Parameters of the Controller of the well

Power Meters

Measurements
- Measured Electrical Parameters by the Power Meter