OmégaWatt
La Faurie
F-26340 AUREL, France
www.omegawatt.fr

Users Manual

MULTIVOIES WIRELESS :
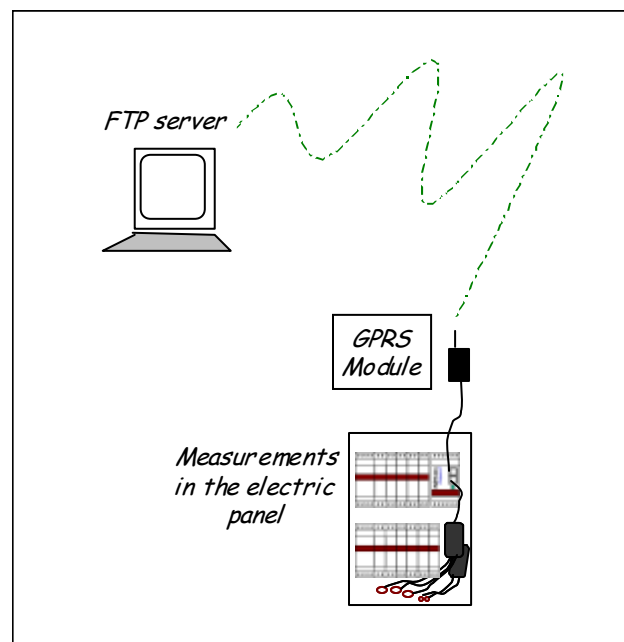# GPRS Module

11 - 2009

TABLE OF CONTENTS

1 OVERVIEW

This manual describes mains features and how to use the GPRS Module. The user is supposed to be familiar with the configuration use of the Multivoies system. Otherwise, please refer to the corresponding user manual.

The GPRS Module is designed to periodically send the data recorded by the Multivoies system to a central server. It also allows to remotely change some configuration parameters by sending an SMS to the GPRS Module.

1.1 Safety remarks :

The GPRS Modules complies with the CE Norms (electromagnetic compatibility) :
EN 55022 (Radiation)
EN 60950 (Electrical safety)
directive R&TTE 1999/5/EC
directive 200/95/CE
GSM Phase 2 standards.

Safety recommandations :
• The Module is designed to work with the Multivoies system. Connect to any other system at your own risk.
  • No internal parts can be repaired by the user.
  • Keep GPRS Module antenna away from people.

2 MAIN FEATURES

The GPRS Module sends daily the recorded data to a remote FTP server. A SIM card (3 Volts or 1.8 Volts) is required with GPRS access. The SIM card is carefully inserted in the GPRS Module :
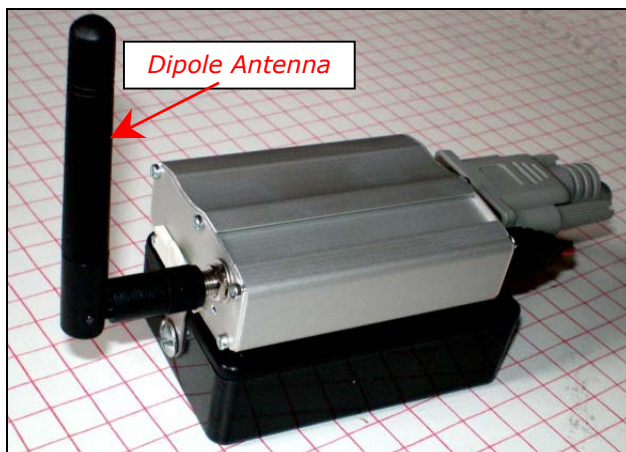
Dipole Antenna

The Multivoies GPRS Module with a dipole antenna.

RJ12 (6/6) *Green LED*
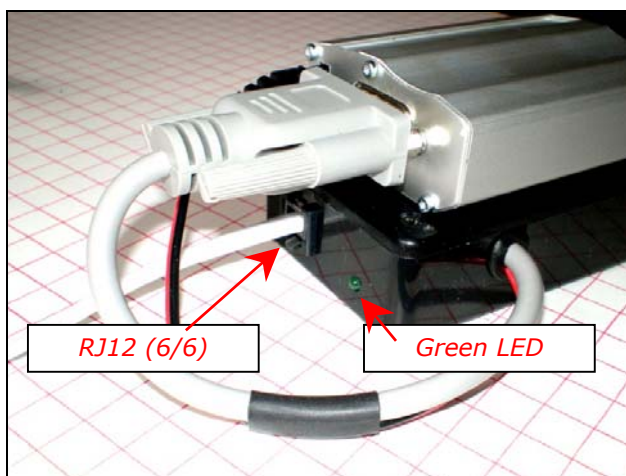
Rear View.

The **RJ12** cable connects directly to the Multivoie Concentrator.
Usual 6/4 RJ11 cables **cannot** be used for this link. 6/6 RJ12 is needed.

The green LED blinks slowly normally and fast during data transfers.
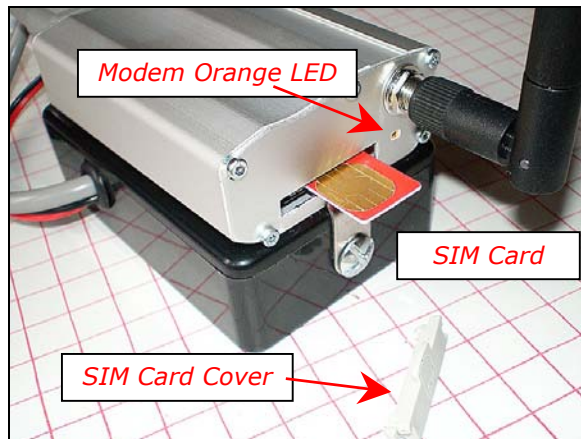
The GPRS module uses standard SIM Cards.

Use the cover to prevent unauthorized access to the SIM card.

The Modem orange LED blinks when attached to the GPRS network.

What you need to use the GPRS module :
- ✓ SIM Card with corresponding phone number
- ✓ APN (Acces Point Name) of your Mobile Phone operator
- ✓ FTP server with read/write/delete/directory creation access rights.

The data transfer will occur daily at a programmed hour:minute. A forced data transfer can be obtained by simply ringing once the GPRS Module.

The FTP transfer will induce the use of automatic internet access through your mobile operator. Depending on the volumes of data and rates of the operator, this access can be very cheap to rather costy.

Choose an appropriate mobile phone plan. You may evaluate the transfer volumes by the following formula :

kBytes transfered per day = 30 x (1 + *nb_module*) / *recording_period*

nb_module   is the number of Multivoies Modules
recording_period   is the recording period in minutes.

In this formula, the Wireless Module counts for 1 to 8 modules depending on the number of radio channels selected (6 to 48).

The FTP transfer is limited to 30000 x (1 + *nb_module*) bytes per transfer. (this corresponds to about 2 days of data at 1 minute interval)
The unsent data will be sent upon next transfer. If you need to force the transfer of more data, then you need ringing the GPRS Module several times (you should wait until transfer is done before ringing once more).

3 <u>BEFORE INSTALLATION</u>

Before installation, you should get your FTP server ready, preferably with 24 hour access. It is strongly recommended to ask your IT manager for all access rights in at least one directory and its sub-directories.

It is necessary to prepare the subdirectories corresponding to your project. The GPRS module CANNOT create directories in your server, so you need to prepare the following :

YourFTPServer\test\SNConcentrator1
YourFTPServer\test\SNConcentrator2 ...

"test" is a 4 characters directory of your choice.
SNConcentrator1, SNConcentrator2..   are 8 digits directory corresponding to the serial numbers of the Multivoies Concentrators you will be using. The serial numbers of the concentrator is indicated in front of the concentrator.

These directories MUST be created **before** the GPRS Module can be used.

To configure the GPRS Module, the FTP server name, User Name and Password are required. It is recommended to configure and test the GPRS module in the Lab on a basic Multivoies system (1 concentrator / 1 module).

4 **INSTALLATION**

The GPRS module must be directly connected to the Multivoies concentrator using a **RJ12 6/6 cable**. Be aware that this cable is different than the RJ11 cables (6/4) used between the Concentrator and other modules. This is because the GPRS module needs more power during transmission.
When supplied by Omégawatt the RJ12 6/6 cable is white when other cables are black or gray.

Example of bus cabling :
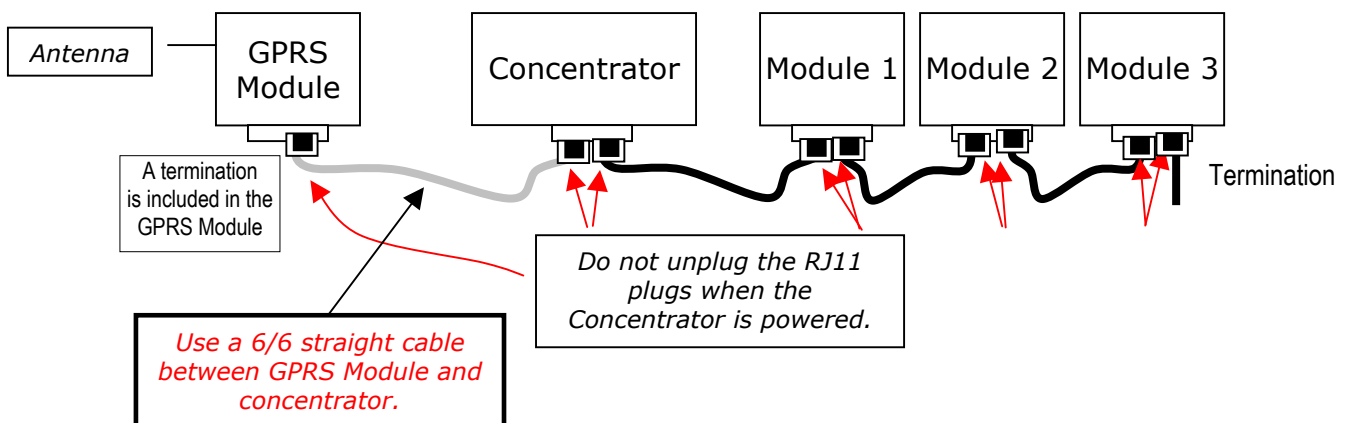
The GPRS module should be placed and secured near the Concentrator.

A dipole antenna may be directly attached to the GPRS Module or an extension cable can be used to locate the antenna in a better place.
Use an antenna with SMA-M connector and (850-900-1800-1900MHz frequency range).

The antenna should be placed where the better signal is obtained. Use a mobile phone to evaluate roughly the mobile operator signal quality. The precise location can be optimized by the signal quality measurement from the GPRS Module itself (see later, command +CSQ).

5 <u>CONFIGURING THE GPRS MODULE</u>

The configuration of the GPRS Module is made just like other elements of the Multivoies system – using a Palm PDA.

			Launch the MV1 software like usual (MV1IR, MV1BT or MV1Z depending on whether you use Infrared, Bluetooth or Zigbee connection) On the PDA screen, tap "Option"

			In the option menu, tap "GPRS Module"

GPRS Module

```
00000601
00008014
```
List of Modules found on this system

`>`

no module

List of Modules configured in the GPRS Module

Configure GPRS Module by transferring list from left to right

Multivoies   GPRS

Call Time : 04:05

GPRS Time : 30/11/09 18:36:18 (Use)

FTP directory: test

Last Data: 0

(Resend all)   (Status) (OK)

Resets 'Last Data' and thus forces the GPRS Module to send data starting from the beginning of the Multivoies memory upon the next FTP transfer.

Address of the last data sent to the FTP server by the GPRS Module.
Only new data (from this address to the current one) will be transferred.

to check the GPRS Module Status

The GPRS Module needs to know which modules are present on the Multivoies system.
Check the list on the left and tap the transfer button to configure GPRS module list.

The GPRS module will call daily at 04:05. You may change this to make different systems call at different times.

The GPRS Time is obtained from the mobile phone operator. It can be used to set the Multivoies system clock. (Tap "Use")

This is the main directory on your FTP server (4 characters). The complete directory includes the serial number of the Concentrator.
For instance :
..\test\01000278\ file1.pdc

GPRS Module

```
00000601
00008014
```

`>`

```
00000601
00008014
```

Multivoies   GPRS

Call Time : 04:05

GPRS Time : 30/11/09 18:36:18 (Use)

FTP directory: test

Last Data: 170400

(Resend all)   (Status) (OK)

Once configured, all the modules present on the Multivoies system should appear in the list on the right.

After each successful transfer, the address of the Last Data transferred will change.

The status of the GPRS Module can also be seen in more details in the "Status" Menu.

When configuring a new site, don't fail to tap on the 'Resend all' button to clear the 'Last Data' value. This will force the next FTP transfer to start at the beginning of the Multivoies memory and add a *header* with the conféguration information (see later).

GPRS Status

Status:
$RTCUPD: 2, 0
OK
$RTCUPD: 2, 1
OK
$RTCTIME: 01, 09, 11, 30, 16, 15, 23
OK
OK

Up

(OK)   (Send Config) ▼

The status list recalls all recent information and errors sent by the GPRS Modem.

It can also be used for advanced configuration of the GPRS Modem.

Text can be input in this field to send AT commands to the Modem.

Use "Send Config " to send the command to the Modem

A list of predefined commands is available

GPRS Status

Status:
$RTCUPD
OK
$RTCUPD
OK
$RTCTIM
OK
OK

+CSQ
+CPIN="1234"
+CLCK="SC",0,"PIN"
E0
$HOSTIF=1
$PADDISC=1
$RTCUPD=2,0
$IFC=1
+IPR=115200
+CGDCONT=1,"ip","m2ln...
+CGDCONT=1,"ip","gp... ↓

(OK)   (Send Config) ▼

For example :
Tap "+Csq" in the list.
Tap "Send Config"

+CSQ :-> Returns the GPRS Modem signal quality.

GPRS Status

Status:

```
$RTCUPD: 2, 1
OK
$RTCTIME: 01, 09, 11, 30, 16, 15, 23
OK
OK
+CSQ: 17,99
OK
```

+CSQ ....

....

(OK)   (Send Config) ▼

The signal quality is indicated :
0   -113 dBm or less
1   -111 dBm
2-30   -109…-53 dBm
31-51 dBm or greater
99 not known or not detectable

Second number (after the ',')

0-7 as RXQUAL values in the table in GSM 05.08 [20] subclause 8.2.4
99 not known or not detectable

GPRS Status

Status:

```
$RTCUPD: 2, 1
OK
$RTCTIME: 01, 09, 11, 30, 16, 15, 23
OK
OK
+CSQ: 17,99
OK
```

$FTPCFG="YourFtpServer",21,"User Name","Password"

(OK)   (Send Config) ▼ $

Use the $FTPCFG to configure your FTP server name, User name and Password.

You may check the FTP server parameters using the request :
$FTPCFG?

Always tap "Send Config" to send the command to the Modem.

This is only needed once, as it will be saved in the Modem.

GPRS Status Status: $RTCUPD: 2, 1 OK $RTCTIME: 01, 09, 11, 30, 16, 15, 23 OK OK +CSQ: 17,99 OK +CGDCONT=1,"ip","YourAPN","",0,0 (OK) (Send Config) ▼ +	Same as above for your APN. +CGDCONT? to check. ***Important :*** The configuration (APN and FTP parameters) needs to be **stored** in the Modem using the : &W command. (Otherwise the configuration is lost at next power up)
GPRS Status Status: OK $FTPOPEN: FTP CONNECTION OPEN OK $FTPPUT 30732 OK OK NO CARRIER (OK) (Send Config) ▼	After a successful FTP transfer, the Status screen should look like this. $FTPPUT shows the number of bytes transferred to the server. NO CARRIER indicates that the connection was properly deactivated after the transfer. When errors occur, they are displayed with the format : Err x:y. Refer to §10

- ✓ During the transfer, the green LED of the GPRS module flashes rapidly, otherwise, it blinks slowly.
- ✓ You should not communicate with the Multivoies system while a GPRS module FTP transfer is in progress.
- ✓ The FTP transfer can last up to 5 minutes depending on the GPRS connection and how many data are to be sent.
- ✓ The orange LED on the GPRS Modem blinks when the Modem is attached to GPRS network (=at all time). If not, check your Modem configuration. Power down, wait 2 seconds, and then power up the system after changing FTP and APN configuration.
- ✓ The SIM PIN must be unlocked. Use +CPIN="1234" (your PIN code) and then +CLCK="SC",0,"1234" to unlock your SIM card PIN code.

Once configuration is done, (and after power-down/power-up), the GPRS modem should automatically attach to the GPRS network and the orange LED of the GPRS Modem should blink slowly after a few seconds. If not, the APN is wrong or the network is not available. Check modem status to learn more.

Then a (normal voice) call to the SIM card number should be placed. Make sure the PDA communication with the Mutivoies system is not active. (PDA off)

Ring the GPRS module once. Hang up.

The green LED of the GPRS module should blink fast.
After a few seconds to minutes, the green LED should blink slowly again.

Check the data on your FTP server or use the PDA to check the GPRS modem status.

6 DATA FILES

During the FTP transfer, new files are automatically created on your server. For example, the following files will be seen :
..\test\01000278\091129_162229.pdc
..\test\01000278\091130_040611.pdc
..\test\01000278\091201_040618.pdc

The file names are made with the GPRS date/time of the transfer :

091129_162229 corresponds to the 29/11/2009 at 16:22:29.
(This name format makes the files automatically sorted by date when sorted by alphabetical order.)

A new file will be added daily to the server with the new data. Different systems will send files to different directories, based on the Concentrator SN.
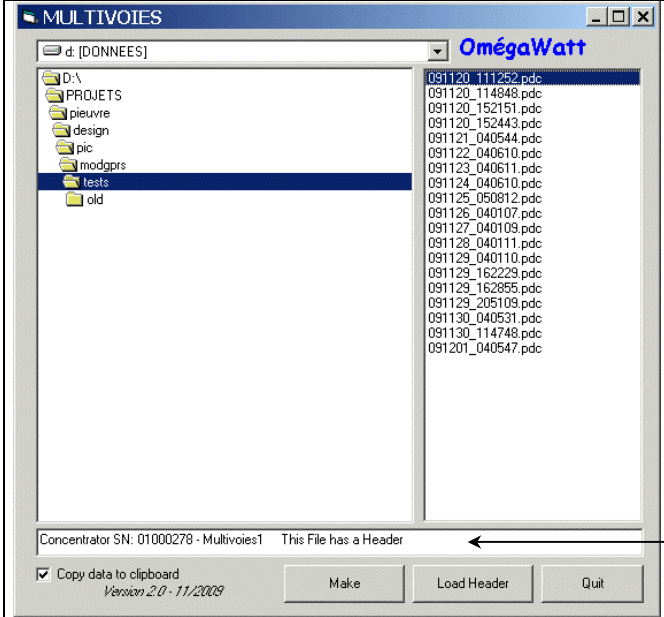
The first file created after configuration contains a **_header_** with the Multivoies Modules parameters (among them the names entered for each measurement channel and sensors information which are required to calculate the measurement values). Other files only contain rough data. The header is necessary to convert the rough data to a text file. See later.

In the GPRS menu if you tap "resend all", "Last Data" is set to 0, all data will be sent at next call, and a header will also be included in that file.

7 DATA FILES TREATEMENT

First install CREBASE1.EXE.

Copy your .pdc files to a working directory (recommended). Launch CREBASE1.

Select the .pdc files to convert. Multiple selection is allowed and obtained using SHIFT or CTRL.

The first selected file must have a header or you may first "Load Header" from a file which has one, and then just convert the files you need.

Click « Make»

Wait until « Done » appears in the state bar.

CREBASE1.EXE automatically copies the data to the clipboard. So you can simply paste them in an Excel datasheet :

Test1D											
01000007	Volts	Volts	Volts	00000505	00000505	00000505	00000505	00000505	00000505	00000510	…
Multivoies1	Ph 1	Ph 2	Ph 3	Voie1	Voie2	Voie3	Voie4	Voie5	Voie6	Voie1	…
16/03/05 18:53:27	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	…
16/03/05 18:54:00	233,0	0,0	0,0	18,2	0,0	0,0	1407	0,0	0,0	0,0	…
16/03/05 18:55:00	233,0	0,0	0,0	17,8	0,0	0,0	1421	0,0	0,0	0,0	…
16/03/05 18:56:00	233,0	0,0	0,0	17,3	0,0	0,0	1437	0,0	0,0	0,0	…

First lines : File name, serial number and name of the concentrator.
1. Column 1 : Date time (end of the recording interval)
2. Columns 2,3,4 : voltages phases P1, P2, P3 (Volts)
3. Columns 5 à 10 : mean active power for sensor 1 to 6 of the module whose serial number is in second line of the file.
4. Columns 11 à 17 : mean active power of next module.
5. Columns 18 à 23 : …

During voltage sags, the concentrator adds a line (As a result, beware that all dates are not always following with a fixed interval - equal to the period of recording). In these voltage sags lines, all 3 phases voltage are zeroed.

When a time period is made of several lines, it is necessary to add the power of the modules to obtain the average power during the period.

8 <u>SMS REMOTE CONFIGURATION</u>

The Multivoies system configuration can be altered remotely by sending an SMS to the phone number corresponding to the SIM card in use.

The SMS message should exactly match the following syntax. Text is not case sensitive but :
 ✓ no space, blanks allowed
 ✓ "." or "," must be included, exactly as described

8.1 Set New recording period

Per=*new_period*.
new_period=10, 15, 20, 30, 60, 120, 300, 600, 900 or 3600 seconds

Example :
per=60.   *(do not forget the '.' – no blanks allowed)*
-> sets recording period to 60 seconds

8.2 Restart campaign

Res=1.   -> Restart campaign (Clears Multivoie system Memory and Clears 'Last Data' sent by the GPRS Module)
Res=2.   -> Sends remaining data by FTP and then Restart
 Beware that this command is at risk because if the transfer fails, the Memory is cleared anyway. It is recommended to force an FTP transfer (Call the Module), then check the data and then only send an sms with a Res=1 command instead.
Res=3.   -> Resend all data from the Multivoies system memory

8.3 Updates Multivoies Clock

Upd=1.   -> Updates Multivoies sytem time with the GPRS time.
Upd=2.   -> Activate Time AutoUpdate (Multivoies sytem time with the GPRS time everyday at 3:05).
Upd=3.   -> Deactivate Time AutoUpdate

(Upd=2..3 -> Under Beta testing as of 11/09)

8.4 Module sensor Phase change

Pha=SNModule,Channel,NewPhase. -> Sets a module sensor Phase
',' and '.' are compulsory.
SNModule is 8 digits, Channel is 1 digit, NewPhase is 1 digit.

Example:
Pha=00001106,3,2. -> Sets channel 3 of Module 00001106 to phase 2.

8.5 Wireless Module Sensor change

Sen=SNModule,Channel,NewSensor.   -> Sets a Wireless sensor
SNModule is 8 digits, Channel is 1-2 digits, NewSensor is the 4 digits of the Wireless Sensor serial number.

Example:
Sen=00008020,40,9004.

8.6 Wireless Module Sensor Channel change

Sch=SNModule,Channel,NewSensorChannel.
SNModule is 8 digits, Channel is 1-2 digits, NewSensorChannel is 1-3
digits.
Example:
Sen=00008020,40,1.

Sensor Channels list :
0 : Temperature
1 : Humidity
2 : Voltage
3 : Current
4 : Active Power
5 : Apparent Power
6 : Light
7 : Average Temperature
128 : Pulse count
129 : ON Time
130 : Link quality to sensor
131 : RSSI from Sensor
132 : Battery state
144 : Active Energy
145 : Apparent Energy
146 : Switch ON count

9 **CHARACTERISTICS**

Electrical safety :
CAT III 250 V. Max overvoltage : 4 kVca
Electromagnetic compatibility : CE (CEI 61236-1, CEI 61236/A1)

Environnemental conditions :
Service temperature 0°C to +40°C
Storage temperature –10°C to +60°C (without battery)
Relative humidity 80 % maximum, not condensing
Altitude 2000 m maximum
Mecanical : IP 20
Power Consumption : <2W (during transmission – 0,2W otherwise)

Dimensions :
Modules : L x h x l : 84 mm x 55 mm x 50 mm. Weight 300g

Main characteristics :
Power Class1 at 850/900 = 33 dBm +/-2dB
Power Class1 at 1800/1900 = 30 dBm +/-2dB
Sensitivity : -104 dBm.
RF Power : 2W with 850/900 MHz and 1W in 1800/1900 MHz

SIM Card : 3V or 1.8V dc.

10 ERROR LIST

Err x:y indicated by the GPRS Module in the status list :

x:y	Description
1:1	Communication error between GPRS module and Concentrator Could not read concentrator SN *->Check cable between GPRS Module and Concentrator*
1:2	Communication error between GPRS module and Concentrator Could not read concentrator Adress
1:4	Communication error between GPRS module and Concentrator Could not read concentrator Name
1:5	Communication error between GPRS module and Concentrator Could not read concentrator Recording Period
1:6	Communication error between GPRS module and one Module *->Check GPRS Module Configuration*
2:2	Error reading Module Header
2:3	Internal communication error with GPRS Modem *->Check GPRS Modem Cable and Configuration (+IPR=115200 ?)*
2:4	CAN Bus error reading a Module *->Check GPRS Module Configuration*
2:5	Error creating GPRS Modem intermediate file
3:1..4	Error creating GPRS Modem intermediate file
3:5..6	CAN Bus error reading data
5:1	GPRS Modem Activation error *->Check APN and GPRS Modem configuration*
6:2	No valid IP : The GPRS Modem could not connect to the internet *->Check mobile phone operator. SIM card still valid ?*
6:3..4	Could not open FTP connection *->Check FTP server parameters*
7:1	Communication error with the GPRS Modem
7:2	Could not send the data to the remote FTP server
9:1	Transfer failed. The GPRS modem was reset.

If the status list indicates "Invalid file name" or "ftp bad response", please check the directory on your ftp server. Refer to §3.