

MV electrical network management

Easergy range

FLITE 395-GPRS-DNP3

MV substation remote monitoring – Directional FPI

DNP 3.0 communication

Appendix to the User Manual



SUMMARY	3
COMMISSIONING	4
GENERAL	6
SOFTWARE CONFIGURATION.....	7
DNP3 PROTOCOL FEATURE.....	8
MAIN MENU	9
ALARM PARAMETERS.....	10
GPRS PARAMETERS	11
DNP3 PARAMETERS.....	13
EQUIPMENT STATE	14
DNP3 ANALYSER	15
DISPLAY EVENTS	16
SOLAR VERSION CONSIDERATION.....	17
INTRODUCTION	17
TCP CLIENT MODE SETTINGS	17
TCP SERVER MODE SETTINGS.....	20
SPECIAL CONSIDERATIONS.....	27

Commissioning

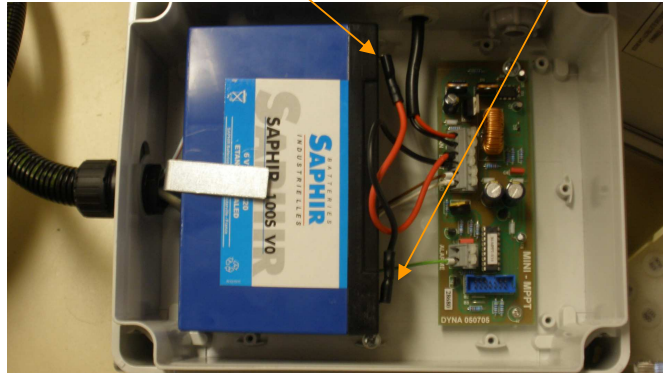
Before the first use, the following steps have to be followed :

First step :

Place and connect the battery in the box of the solar panel,

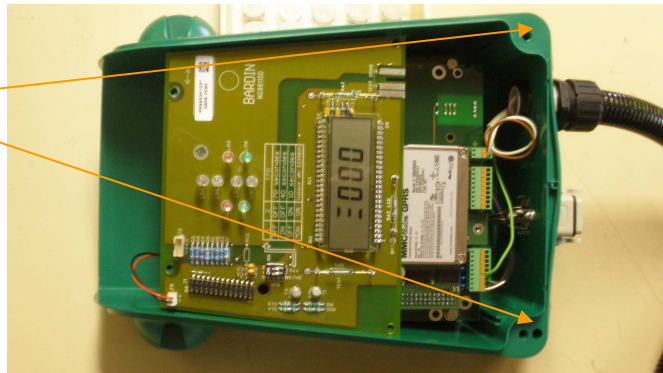
Connect the red to the positive connector

Connect the black wire to the negative connector



Second step :

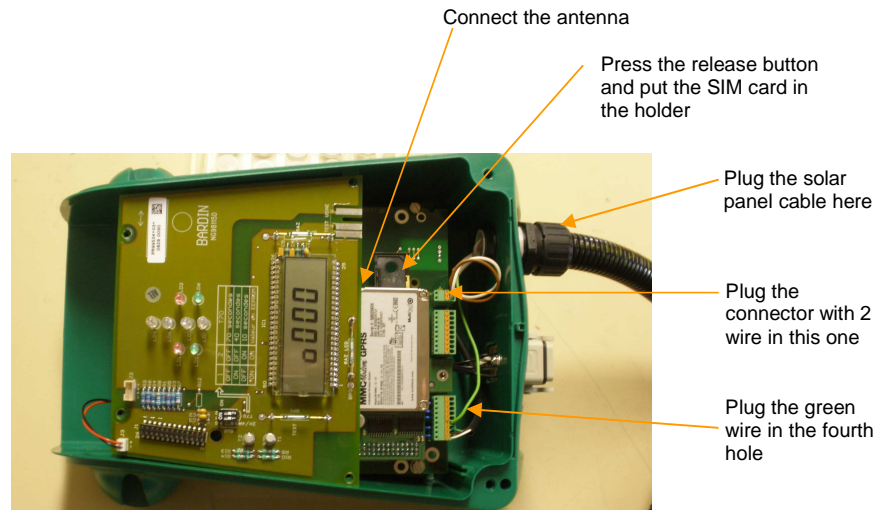
Remove the cover to access the communication card.



Third step :

- Put the SIM card in the modem
- Plug the solar panel cable in the hole.
- Pull the cable within the box in order to connect the connector and the green wire
- Plug the little connector "Power supply" with two wires in the corresponding connector
- Plug the green wire in the other connector, in the fourth hole (just near the other wire)
- Connect the antenna

Nota : the LED on the modem blinks when the network connection is established



WARNING : Before putting the SIM card

- **Don't touch the contacts with the fingers**
- **Clean the contacts with a cleanser and lubricant deoxidiser very high protection(For example : Cleaner Jeltonet Plus)**

Fourth step :

- Replace the cover
- Proceed the setting and placing into service with the user manuel NT00047-01 (Directory "Documentation" on CD-Rom)

)

General

Local configuration

Configuration and diagnosis of the FLITE395 are performed by connecting a laptop PC.

This software can be used to :

- Change the FLITE395 configuration (communication parameters, alarms, etc.)
- Read the equipment state of the FLITE395
- Read the recordings made by the FLITE395
- Reset the time of the FLITE395

Requisite equipment

The equipment is configured using a PC provided with MS-DOS and :

- "FLITE395 Configuration and diagnostic" software,
- Connection cable provided

Running the configuration program

- Connect the cable to serial port 1 (COM1) of the computer and to the external connector of FLITE395.
- Start the PC under Windows and insert the CD-Rom.
- Select and open "MG.exe" program in the "FLITE395_Cfgeaser" directory

The configuration program is running.
The main menu appears.

Comments concerning the use of the software :

- Following modifications, the configuration data are only acknowledged by the equipment after validation in the "**OK**" zone.
- During modifications and before the validation operation, the equipment runs with the previous data, which are therefore at least partially different from the data currently displayed on the screen.
- Action in the "**Cancel**" zone displays the old parameters again.
- The zone in which the cursor is positioned is highlighted.
- To move between zones (data input fields or function title), the "**arrow keys**" or "**tabulation**" key are used.
- To select a highlighted zone, the "**Enter**" or "**Space**" keys are used.

- Parameter values are modified using:
 - the "+" or "**Space**" keys to increase the value,
 - the "-" key to reduce the value.

When a parameter value is at its maximum, pressing the "+" or "**Space**" key changes the value to its minimum. Pressing the "-" key changes it back to the maximum.

- To exit a sub-menu, the user presses the "**Escape**" key.
- To exit the main menu, the user presses the "**Alt**" and "**F4**" keys simultaneously.

Specific messages :

When the configuration software is started up, several types of message may appear on the screen:

- "**Unidentified Equipment connected**": the serial link between the configuration computer and the equipment to be configured is not valid: check the connection cord, and the connection location at the computer end.
- "**Fault messages**": related to a configuration loss or internal problem.

Software configuration :

Pressing the F10 key accesses the software configuration menu. The menu is used to modify:

- display colors,
- the serial port used.

SCADA :

The SCADA has to be connected to internet, and its IP address must be known for the configuration of the FLITE395.

DNP3 Protocol Feature

Introduction

DNP3 TCP protocol is implemented for GPRS communication. Only TCP connections are accepted, UDP is not implemented.

FLITE395 can work as TCP server or TCP client.

Unsolicited message have to be enabled in both cases to limit the flow of message. In this case no permanent polling needs to be done.

Use as a TCP server

In this mode, the TCP connection is always established and maintained by the SCADA. The TCP connection is monitored by the SCADA with a Keep Alive mechanism. We recommend using an application message as "delay measurement" (or Class 0 but the consumption is higher) for keep alive message.

In this case, the "alarm message" parameter must be disabled and no Cyclic Dial up has to be activated.

The Keepalive timeout on the FLITE395 has to be configured a little bit higher than the keep alive frequency. (one minute higher) configured on the SCADA size. Only application messages are taken into account by FLITE395 to reset the timer.

The frequency of the Keep alive can be configured from 10s to 3600s by 10s step.

Use as a TCP client

In this mode, the FLITE395 initiates the TCP connection on alarm events and sends unsolicited messages. The TCP connection is not maintained except if the SCADA sends application message periodically.

In this mode is not necessary to maintain the TCP connection. On each alarm, the equipment will establish the connection to provide the events. The Keep Alive timeout should be chosen at 1 minute for this mode.

The SCADA must do some automatic request depending IIN status. When IIN indicates that a synchronization is needed, the SCADA must send synchronization. When IIN indicates that the equipment restarts, the SCADA must send an integrity polling (Class 1 follow by class 0 polling).

"Alarm message" parameters must be enabled and the alarms on DI and "Stack over 80%" bit must be enabled. A daily connection (Cyclic Dial Up) must also be configured to check the status the equipment once a day.

To monitor the IP connection, it is recommended to activate ping features on a remote IP. If the ping failed the FLITE395 will restart the modem and re-establish the IP connection.

Main menu

RTU address :

- May take every value between 0 and 65534.
- Default value is 0.

SCADA address :

- May take every value between 0 and 65534.
- Default value is 0.

DNP3 Parameters :

Displays the configuration screen of protocol dedicated parameters.

Modem type

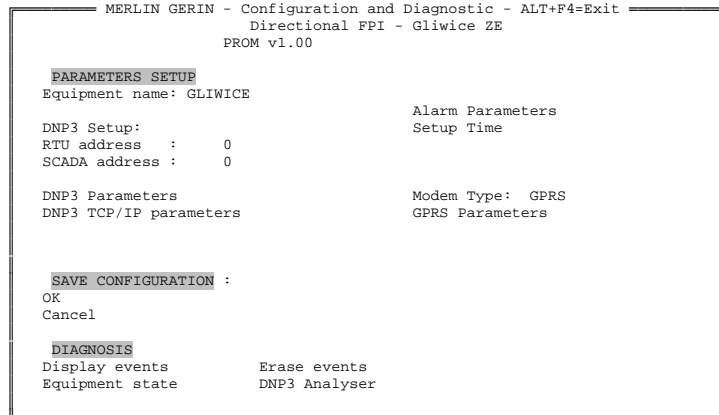
- Defines the communication medium.
Possible values : GPRS.
- In this example, default value is : GPRS.

DNP3 TCP/IP parameters :

Displays the configuration screen of TCP/IP dedicated parameters

GPRS Parameters :

Displays the configuration screen of GPRS dedicated parameters.



Alarm Parameters :

Displays the alarm configuration screen.

DNP3 Analyser :

Displays the trace of exchanges between the equipment and the control station, and the AT traces.

Display events :

Displays the events. A maximum of 150 events are memorized. The existing events are given in this document.

Erase events :

Select yes to erase the events.

Alarm Parameters

Digital Input :

- For each Digital Input, the "yes" option causes sending of an alarm on each change of state of the input.
- Default value is no.

Stack overflow :

- The "yes" option causes sending of an alarm upon occurrence of a stack overflow.
- Default value is yes.

Alarm message enabled :

- The yes option activates alarm transmission.
- Default value is no.

^
/! \: In client mode it must be set to yes.

Alarm test:

- The "yes" option allows a test to be performed on alarm transmission to the control station. The FLITE395 is calling the supervisor after recording of the configuration.
- Default value is no.

```

MERLIN GERIN - Configuration and Diagnostic - ALT+F4=Exit
Alarm Parameters

Alarm message enabled : no

Digital input 1 : yes
Digital input 2 : yes
Digital input 3 : yes
Digital input 4 : yes
Digital input 5 : yes
Digital input 6 : yes
Stack overflow : yes

Alarm test : no
Cyclic dial up : no
Starting time (min) : 0
(hour) : 0
Period (hours) : 24

Escape=Exit
    
```

Cyclic dial-up :

- The yes option causes cyclic dial-up to the control station.
- Default value is no.

Note : In client mode the Cyclic Dial up has to be activated so the SCADA know that the FLITE395 is alive.

^
/! \ **To validate the change of starting time, the Cyclic dial up alarm has to be deactivated and activated again.**

Starting time (min & hour) :

- Starting time (in the following 24 hours) of the cyclic dial-up.
- Default value is midnight.

Period :

- Time interval between two consecutive cyclic dial-ups, from 0 to 255h.
- Default value is 24 hours

Note : Each dial up causes the change of the : tss Toogle Bit on cyclic alarm (see p25).

^
/! \ **It is recommended to keep a period of 24hours.**

GPRS Parameters

PIN code:

Setting of the PIN code into the SIM card (default value is 0000).

In case of wrong PIN code, "SIM card failure" appears in the screen "Equipment states".

Important: after three incorrect attempts the SIM card becomes invalid. To make it valid, a mobile phone must be used (The FLITE395 cannot do this).

Please, consult the user guide of the SIM Card to return to an available status.

APN Server:

Enter the APN(Access Point Name) which you obtain from your GPRS provider

APN Login and Password:

Enter the login and the password provided with your GPRS account.

Note: In major case, no login and password are required for GPRS access.

Time between connection attempt :

- Delay time between 2 failed connection attempts to the IP network
- Default value is 1min

^
/ ! \ It is recommended to chose 1 hour.

Daily disconnect :

Hour and minutes of the daily modem reset time

Specific Ping IP Address :

- Internal Pingable IP address (if available) in order to monitor the IP connection.
- If "0.0.0.0" IP is configured, the ping process is disabled
- Default value is "0.0.0.0"

```

MERLIN GERIN - Configuration and Diagnostic - ALT+F4=Exit
GPRS Parameters

SIM CARD PARAMETERS
PIN code : 0000

GPRS COMMUNICATION PARAMETERS
APN Server (Max 30 Digits) :
APN Login (Max 30 Digits) :
APN Password (Max 30 Digits) :

Time between connection attempt: 1mn

Specific Ping IP Address : 0.0.0.0      Test
Ping time : 1h
Ping delay(s) : 5
Ping number : 3

Daily disconnect : 0 h 0 min

Escape=Exit
    
```

Ping test :

- When a configuration has been saved and the product is connected to the IP network(see "modem state" on equipment state menu), a ping test can be performed using this control.
- Possible answer:
 - "In progress " : a ping test is in progress
 - "OK " : ping succeeded
 - "NOK" : ping failed
 - "Not available": Modem is not IP connected or a periodic ping is already in progress or the modem is TCP connected to the SCADA. (See "modem stat" on equipment state menu)

Ping time :

- Frequency of the ping request
- Default value is 1h

Ping delay(s) :

- Waiting time of the answer to ping request
- Default value is 5s

Ping number :

- Number of ping request
- Default value is 3

If the pings fails it means that the FLITE395 is not connected to the GPRS network, so the modem is reseted.

^
/ ! \ It is recommended to choose 3 pings every hour.

(GPRS version only)

TCP/IP Parameters

Local Port :

- Enter the port number you want FLITE395 to listen to incoming TCP connection. Value is from 1 to 65535.
- Default value is 20000.

Keepalive timeout :

- In client mode : Maximum duration of a TCP/IP connection. On time-out expiry, the TCP/IP connection is closed. Each time the FLITE395 receives a request, the timer is re-armed.
- In server mode : Maximum duration of a TCP/IP connection after the reception of a SCADA request. Each time the FLITE395 receives a request, the timer is re-armed. It is recommended to choose a longer time (about 1 hour)

^
/!\ If the FLITE395 is used as a client, keepalive timeout has to be chosen equal to 1 min, so the FLITE395 can send all this data to the SCADA.
If the FLITE395 is used as a server the keepalive has to be chosen long enough. It is recommended to choose a longer time (1hour and 1min).

```

MERLIN GERIN - Configuration and Diagnostic - ALT+F4=Exit
DNP3 TCP/IP parameters

F2DGPL PARAMETERS
Local port                : 20000
Keepalive timeout        : 10mn
TCP connect. delay - 1st try : 1s
(0s = random value) - 2nd try : 1mn
                        - 3rd try : 2mn

SCADA PARAMETERS
IP address                 : 192.168.1.1
Remote port                : 20000

Escape=Exit
    
```

TCP/IP connect. delay:

Time to send an alarm configured with "delayed" option:

- **first attempt:** adjustable from **0 to 1min. per steps of 1s.** Setting it to "0" selects a random time between 0 and 1 min (this is mandatory to prevent all equipment calling the SCADA at the same time).
- **second attempt:** configurable from **0 to 5min. per steps of 1min.** Setting it to "0" selects a random time between 0 and 5 min.
- **third attempt:** configurable from **0 to 10 min, in steps of 1 min.** Setting it to "0" selects a random time between 0 and 10 min

Note: The 2nd and 3rd emissions are only used by the equipment if the preceding one did not manage to send the frame.

Scada parameters

IP address :

- Enter the destination IP address of the SCADA

Remote port:

- Enter the port number on which the SCADA is reachable.
- Default value is 20000

DNP3 Parameters

Idle line delay :

- It's the minimum line idle interval between two consecutive frames. Values are from 10 to 100 ms.
- 10 ms is the default value.

Requires Data Link Layer Confirm :

- Select "yes" if you want User Data to be sent using a "SEND – CONFIRM expected" frame type by the Link Layer. Selecting "no" configures Link Layer to use a "SEND – NO REPLY expected" frame type for User Data transmission. Notice that in the case where "SEND – NO REPLY expected" frame type is used FLITE395 will never send "RESET of remote link" frames. It will work strictly as a slave.
- Default is "yes".

Maximum Data Link Re-tries :

- Defines the number of re-tries by the Link Layer, when the RTU doesn't receive any "CONFIRM" frame (ACK or NACK) to a frame using a "SEND – CONFIRM expected" frame type. When the Maximum Data Link Re-tries is reached without confirmation, Link Layer will perform "RESET of remote link" to re-initialise the link.
- Default value is 3.

Time-out :

- It's the delay Link Layer will wait for a "CONFIRM" frame after sending a "SEND – CONFIRM expected" frame. Values are from 1 to 10 s.
- Default value is 5 s.

Delay before emission :

- To avoid collision when spontaneously emitting on a half-duplex link, FLITE395 will wait a T delay after seeing the link is no more busy (using CD). If at this moment, CD is still not present, FLITE395 will send the message. If present, it will wait another T delay. T delay is the sum of "Delay before emission" and a random value. Configured values are from 0 to 10 s.
- Default value is 1s.
- This time must be beyond keepalive timeout.

```

MERLIN GERIN - Configuration and Diagnostic - ALT+F4=Exit
DNP3 Parameters

LINK LAYER
Idle line delay           : 10ms
Requires Data Link Confirm : no
Maximum Data Link Re-tries : 3
Time-out                 : 5s
Delay before emission     : 1 s

APPLICATION LAYER
Handle requested object(s) unknown bit : yes
Sends Unsolicited Responses           : no
Wait delay                             : 100ms
Requires Application Confirm           : no
Maximum Application Re-tries           : 3
Time-out                               : 1mn

Escape=Exit
    
```

Handle requested object(s) unknown bit :

- If a requested object is unknown it will be indicated in the IIN byte.
- Default value is "yes".

Send Unsolicited Responses :

- Select "yes" if you want the FLITE395 to send the change of states of the DI or defaults to the SCADA without any request of the SCADA.
- Default value is no

^
 /!\ It is recommended to choose "yes" in client mode and in server mode too so the SCADA does not need to send requests every seconds to know the state of FLITE395 in real time.

Wait delay :

- Minimum delay between 2 concatenated messages.
- Default value is 100ms.

Requires application confirm :

- Select "yes" if you want the class 1 objects and unsolicited responses to ask for a confirmation request.
- Default value is "no".

Maximum Application Re-tries :

- Maximum number of confirmation request sent if no confirmation is received
- Default value is "3".

Time-out :

- Maximum time to wait before sending a new confirmation request.
- Default value is 1min.

Equipment State

The equipment states menu is used to display the information linked to the state of the FLITE395.

Equipment States

Current states are indicated in reverse video

Digital Outputs

Use the “S” (select), “C” (confirm) and “A” (cAncel) keys to control the relay outputs

The state of the relay is also indicated in 2 tss : Digital Output 1 state and Digital Output 2 state (see p25). Their value is “0” when they are open and “1” when they are closed.

Digital Inputs

Inputs in logical state 1 are indicated in reverse video

Modem not identified: FLITE395 was unable to communicate with the modem used.

SIM card failure: FLITE395 has detected the embedded GSM modem card, but cannot read the SIM card.

IP address : Indicates the current IP address of the FLITE395.

GSM signal quality

Specific to the GSM modem, the bar chart indicates the quality of the reception signal

```

MERLIN GERIN - Configuration and Diagnostic - ALT+F4=Exit
Equipment state

Equipment state:
Flair 200C fault
Config. fault
Alarm processing...

Communication state:
Modem not identified
SIM card failure

Modem state :
TCP Listened !
Ip address :
80.10.61.197

GSM signal quality:
The signal must be between 17 and 31 (0 at start, 99 is faulty)
0 Max(31)
received signal: 17

Digital outputs:
----[ ]----> DO1
----[ ]----> DO2

DO Controle: Select
Confirm command
cAncel command

Digital inputs:
DI 1
DI 2
DI 3
DI 4
DI 5
DI 6

Escape=Exit
    
```

Modem state	comments
Modem Init...	FLITE395 is configuring the modem
Entering code pin...	-
Code pin error !	Wrong code pin
Network registration...	IMSI registration
GPRS registration...	
PDP Init...	Open a PDP session
PDP Closing...	Close the PDP session
PDP Status...	Check the PDP status
PDP Connected !	Modem is connected to ip network
Ping...	A ping is in progress
Closing TCP listened	Close the listen port
TCP Closing...	Disconnection from the SCADA
TCP Listening...	Opening the listen port
TCP Listened !	Stand-bye state when listen mode is activated.
TCP Connecting...	Try to connect to the SCADA
TCP Connected !	Connected to the SCADA
Modem failure !	
GSM registration denied !	IMSI registration is refused by the operator (check your SIM card right with your provider)
GPRS registration denied !	GPRS registration or PDP activation is refused by the operator (check your SIM card right with your provider)

DNP3 Analyser

This analyser shows the different frames recognised with some complementary information such as the direction of the frame (Host -> FLITE395 or FLITE395 -> Host), possibly the error detected (character framing error, overflow, checksum, bad length, bad control character). In case of multiple errors, it's the first one that is indicated.

Each correct frame is shown, one block per line (10 bytes for the first one, 18 bytes for next ones, last one may be shorter).

```

MERLIN GERIN - Configuration and Diagnostic - ALT+F4=Exit
06:26.89 >>..... 05 64 1E 44 02 00 01 00 BF C5
E1 D3 82 00 00 02 02 17 02 01 01 50 9A 2A 11 1A D5 0B
01 02 01 D2 9A 2A 11 1A 01 A4 07
06:28.19 < ..... 05 64 11 C4 01 00 02 00 C3 5A
D2 C4 01 3C 02 06 3C 03 06 3C 04 06 34 23
06:28.20 >>..... 05 64 0A 44 02 00 01 00 10 F0
E2 C4 81 00 02 5A 06
06:29.71 < ..... 05 64 0B C4 01 00 02 00 69 9E
D3 C5 01 3C 04 06 F4 88
06:29.72 >>..... 05 64 0A 44 02 00 01 00 10 F0
E3 C5 81 00 02 B4 E7
06:32.16 < ..... 05 64 14 C4 01 00 02 00 4A A2
D4 C6 01 3C 02 06 3C 03 06 3C 04 06 3C 01 06 5C 21
06:32.17 >>..... 05 64 11 44 02 00 01 00 5D 81
E4 C6 81 00 02 01 01 00 00 0F 10 00 AD D6
06:34.77 < ..... 05 64 14 C4 01 00 02 00 4A A2
D5 C7 01 3C 02 06 3C 03 06 3C 04 06 3C 01 06 B4 71
06:34.78 >>..... 05 64 11 44 02 00 01 00 5D 81
E5 C7 81 00 02 01 01 00 00 0F 10 00 C4 2C
06:36.90 < ..... 05 64 0E C4 01 00 02 00 E0 66
D6 C8 01 01 00 06 1E 00 06 5B 08
06:36.91 >>..... 05 64 11 44 02 00 01 00 5D 81
E6 C8 81 00 02 01 01 00 00 0F 10 00 4E 81
```

Display events

This menu displays the events with the date of occurrence.

The existing events are the following :

- Digital Input 1 Off
- Digital Input 1 On
- Digital Input 2 Off
- Digital Input 2 On
- Digital Input 3 Off
- Digital Input 3 On
- Digital Input 4 Off
- Digital Input 4 On
- Digital Input 5 Off
- Digital Input 5 On
- Digital Input 6 Off
- Digital Input 6 On
- Absence Digital Output 1 open
- Digital Output 1 open
- Absence Digital Output 1 close
- Digital Output 1 close
- Absence Digital Output 2 open
- Digital Output 2 open
- Absence Digital Output 2 close
- Digital Output 2 close
- Modem Reset
- Modem Fault
- Modem OK
- Modem answer NOK
- Modem answer OK
- GSM DOWN
- GSM UP
- GPRS DOWN
- GPRS UP
- Network access denied (GSM or GPRS)
- Network access accepted
- PPP session failed
- PPP session established
- IP traffic timeout
- IP traffic enabled
- Long Range Communication failed
- Long Range Communication succeeded
- Ping test : NOK
- Ping test : OK
- End of Directional FPI fault
- Directional FPI Fault
- Cyclic Dial Up
- Equipment start
- Events loss
- Ext. comm. pb
- DNP3 Stack under 70%
- DNP3 Stack over 80%
- DNP3 Stack ready
- DNP3 Stack overflow

SOLAR version consideration

Introduction

The solar panel sizing has been studied for 10 minutes of communication a day.

In GPRS, the equipment is in communication in the following phase:

- IP network connection at start-up: duration 30s
- IP network connection on daily reset: duration 30s
- IP network connection on provider disconnection⁽¹⁾: duration 30s
- Protocol transmission: duration depends of protocol settings.
- Ping transmission: 5 seconds

(1): provider often disconnects equipments on network that does not transmit during a period of time or disconnect equipment after a fixed duration. This interval can sometimes be configured by provider. To avoid waste of energy due to provider disconnection, **a maximum of 2 disconnections a day is recommended.**

We recommend having an "energy budget" of:

- **5 minutes for IP connection and disconnection**
- **2 minutes for IP monitoring**
- **3 minutes for Protocol transmission**

TCP client mode settings

For solar version, we **recommend to use the equipment as a TCP client** with the following settings:

```
MERLIN GERIN - Configuration and Diagnostic - ALT+F4=Exit
Alarm Parameters

Alarm message enabled : yes

Digital input 1 : yes
Digital input 2 : yes
Digital input 3 : yes
Digital input 4 : yes
Digital input 5 : Yes
Digital input 6 : yes
Stack overflow  : yes

Alarm test : no
Cyclic dial up : yes
Starting time (min) : 0
                (hour) : 12
Period (hours) : 24

Escape=Exit
```

Alarm message must be enabled and a daily connection must be configured to check the equipment status.

```
===== MERLIN GERIN - Configuration and Diagnostic - ALT+F4=Exit =====
                          DNP3 TCP/IP parameters

F2DGPL PARAMETERS
  Local port                : 20000
  Keepalive timeout       : 1mn
  TCP connect. delay - 1st try : 1s
  (0s = random value) - 2nd try : 1mn
                           - 3rd try : 2mn

SCADA PARAMETERS
  IP address                : 192.168.1.1
  Remote port               : 20000

Escape=Exit
```

KeepAlive timeout, in TCP client mode, corresponds to the max TCP connection time. As the TCP connection is not maintained, the max duration must be below 1 minute.

FLITE395-GPRS-DNP 3.0

```
MERLIN GERIN - Configuration and Diagnostic - ALT+F4=Exit
GPRS Parameters

SIM CARD PARAMETERS
  PIN code : 0000

GPRS COMMUNICATION PARAMETERS
  APN Server (Max 30 Digits)      :
  APN Login (Max 30 Digits)      :
  APN Password (Max 30 Digits)   :

  Time between connection attempt: 1 h

  Specific Ping IP Address       : 83.206.1.3      Test
  Ping time                      : 1h
  Ping delay(s)                  : 5
  Ping number                     : 3

  Daily disconnect                : 0 h 0 min

Escape=Exit
```

If GPRS network is not available for a long period of time, the equipment must not waste too much of energy by trying to connect to it. "1 hour" permits to limit the impact on solar panel sizing.

For the ping period, a period of 1 hour limits the "energy budget" to 2 minutes.

TCP server mode settings

If the SCADA system is not compliant with DNP3 TCP client slave, FLITE395 can be used as TCP server with the following settings:

```
MERLIN GERIN - Configuration and Diagnostic - ALT+F4=Exit
Alarm Parameters

Alarm message enabled : No

Digital input 1 : yes
Digital input 2 : yes
Digital input 3 : yes
Digital input 4 : yes
Digital input 5 : Yes
Digital input 6 : yes
Stack overflow  : yes

Alarm test : no
Cyclic dial up : No
Starting time (min) : 0
                (hour) : 12
Period (hours) : 24

Escape=Exit
```

Alarm message and cyclic dial up must be disabled.

```
MERLIN GERIN - Configuration and Diagnostic - ALT+F4=Exit
DNP3 TCP/IP parameters

F2DGPL PARAMETERS
Local port : 20000
Keepalive timeout : 1h1min
TCP connect. delay - 1st try : 1s
(0s = random value) - 2nd try : 1mn
- 3rd try : 2mn

SCADA PARAMETERS
IP address : 192.168.1.1
Remote port : 20000

Escape=Exit
```

In TCP server mode, the "keepalive timeout" must be inferior to the SCADA ping frequency ("delay measurement" request is recommended). To limit the energy budget to 2 minutes, the period must be above 1 hour.

```
MERLIN GERIN - Configuration and Diagnostic - ALT+F4=Exit
GPRS Parameters

SIM CARD PARAMETERS
  PIN code : 0000

GPRS COMMUNICATION PARAMETERS
  APN Server (Max 30 Digits)      :
  APN Login (Max 30 Digits)      :
  APN Password (Max 30 Digits)   :

  Time between connection attempt: 1 h

  Specific Ping IP Address       : 83.206.1.3      Test
  Ping time                      : 1h
  Ping delay(s)                  : 5
  Ping number                     : 3

  Daily disconnect                : 0 h 0 min

Escape=Exit
```

If GPRS network is not available for a long period of time, the equipment must not waste too much of energy by trying to connect to it. "1 hour" permits to limit the impact on solar panel sizing.

For the ping period, a period of 1 hour limits the "energy budget" to 2 minutes.

Device Profile Document

<h1>DNP V3.00</h1> <h2>DEVICE PROFILE DOCUMENT</h2>	
Vendor Name :	SCHNEIDER ELECTRIC
Device Name :	F2DGPL C DNP3 V1.00
Highest DNP Level Supported : For Requests : L1 For Responses : L1	Device Function : <input checked="" type="checkbox"/> Master <input checked="" type="checkbox"/> Slave
Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP Levels Supported (the complete list is described in the attached table) : <ul style="list-style-type: none"> • Binary input - All Variations : Read all points • Binary output - All Variations : Read all points 	
Maximum Data Link Frame Size (octets) : Transmitted : 292 Received : (must be 292)	Maximum Application Fragment Size (octets) : Transmitted : 1369 ⁽¹⁾ Received : 498
Maximum Data Link Re-tries : <input type="checkbox"/> None <input type="checkbox"/> Fixed at _____ <input checked="" type="checkbox"/> Configurable, range 1 to 10 ⁽²⁾	Maximum Application Layer Re-tries : <input type="checkbox"/> None <input type="checkbox"/> Fixed at _____ <input checked="" type="checkbox"/> Configurable, range 1 to 10 ⁽²⁾

⁽¹⁾ Enables an application fragment to contain all class 0 data (including expansion, future use and reserved points) and 100 event objects (corresponding to event buffer capacity).

⁽²⁾ Local configuration with a PC.

Requires Data Link Layer Confirmation :

- Never
- Always
- Sometimes
- Configurable⁽³⁾

Requires Application Layer Confirmation :

- Never
- Always (not recommended)
- When reporting Event Data (Slave devices only)
- When sending multi-fragment responses (Slave devices only)

- Sometimes If 'Sometimes', when? _____
- Configurable⁽³⁾

Timeouts while waiting for :

- | | | | | |
|-------------------------|--|---|-----------------------------------|---|
| Data Link Confirm | <input type="checkbox"/> None | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input checked="" type="checkbox"/> Configurable ⁽³⁾ |
| Complete Appl. Fragment | <input checked="" type="checkbox"/> None | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input type="checkbox"/> Configurable |
| Application Confirm | <input type="checkbox"/> None | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input checked="" type="checkbox"/> Configurable ⁽³⁾ |
| Complete Appl. Response | <input checked="" type="checkbox"/> None | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input type="checkbox"/> Configurable |
- Others _____

Sends/Executes Control Operations :


- | | | | | |
|-------------------------|---|---|------------------------------------|---------------------------------------|
| WRITE Binary Outputs | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| SELECT/OPERATE | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always ⁽⁴⁾ | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| DIRECT OPERATE | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always ⁽⁵⁾ | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| DIRECT OPERATE – NO ACK | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always ⁽⁵⁾ | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Count > 1 | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always ⁽⁵⁾ | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Pulse On | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always ⁽⁶⁾ | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Pulse Off | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always ⁽⁶⁾ | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Latch On | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always ⁽⁶⁾ | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Latch Off | <input type="checkbox"/> Never | <input checked="" type="checkbox"/> Always ⁽⁶⁾ | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Queue | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |
| Clear Queue | <input checked="" type="checkbox"/> Never | <input type="checkbox"/> Always | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Configurable |

⁽³⁾ Local configuration with a PC.
⁽⁴⁾ Executes as it has been received.
⁽⁵⁾ Always executes a "Pulse On" with "on-time" = 3 s.

<p>Reports Binary Input Change Events when no specific variation requested :</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input checked="" type="checkbox"/> Only time-tagged <input type="checkbox"/> Only non-time-tagged <input type="checkbox"/> Configurable to send both, one or the other (attach explanation) 	<p>Reports time-tagged Binary Input Change Events when no specific variation requested :</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input checked="" type="checkbox"/> Binary Input Change With Time <input type="checkbox"/> Binary Input Change With Relative Time <input type="checkbox"/> Configurable (attach explanation)
<p>Sends Unsolicited Responses :</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input checked="" type="checkbox"/> Configurable (attach explanation) <input type="checkbox"/> Only certain objects <input type="checkbox"/> Sometimes (attach explanation) <p><input type="checkbox"/> ENABLE/DISABLE UNSOLICITED Function codes supported</p>	<p>Sends Static Data in Unsolicited Responses :</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Never <input type="checkbox"/> When Device Restarts <input type="checkbox"/> When Status Flags Change <p>No other options permitted.</p>
<p>Default Counter Object/Variation :</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> No Counters Reported <input type="checkbox"/> Configurable (attach explanation) <input type="checkbox"/> Default Object <u>20</u> Default Variation <u>01</u> <input type="checkbox"/> Point-by-point list attached 	<p>Counters Roll Over at :</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> No Counters Reported <input type="checkbox"/> Configurable (attach explanation) <input type="checkbox"/> 16 Bits <input type="checkbox"/> 32 Bits <input type="checkbox"/> Other Value _____ <input type="checkbox"/> Point-by-point list attached
<p>Sends Multi-Fragment Responses : <input checked="" type="checkbox"/> Yes No <input type="checkbox"/></p>	

Implementation Table

OBJECT			REQUEST (slave must parse)		RESPONSE (master must parse)		Notes
Obj	Var	Description	Func Codes (dec)	Qual Codes (hex)	Func Codes (dec)	Qual Codes (hex)	
1	0	Binary Input – All Variations	1	06			
1	1	Binary Input			129	00	
1	2	Binary Input with Status			129	00	
2	2	Binary Input Change with Time			129	17	
12	1	Control Relay Output Block	5,6	17,28	129	Echo of request	
20	0	Binary Counter – All Variations	1	06			
20	1	32-Bit Binary Counter			129	00	
50	1	Time and Date	2 (see 4.14)	07 where quantity=1			
60	1	Class 0 Data	1	06			
60	2	Class 1 Data	1	06,07,08			
60	3	Class 2 Data	1	06,07,08			(7)
60	4	Class 3 Data	1	06,07,08			(7)
80	1	Internal Indications	2	00 index=7			
		No object	13				
		No object	23 (see 4.14)				

 Addition to Highest DNP Levels Supported

(7) : RESPONSE TO THIS REQUEST IS OBJECT UNKNOWN

Description	Index (hex/dec)	Default Static Variation			Default Event Variation				Point Name
		Obj	Var	Desc	Obj	Var	Class	Desc	
Control Relay Output Block	0/0	12	1						Digital Output 1
Control Relay Output Block	1/1	12	1						Digital Output 2

Control relay output block :

0 and 1 : Command of digital output 1 and 2.

Description	Index (hex/dec)	Default Static Variation			Default Event Variation				Point Name
		Obj	Var	Desc	Obj	Var	Class	Desc	
Binary Input	0 / 0	1	1	No Status	2	2	1	With Time	Digital Input 1
Binary Input	1 / 1	1	1	No Status	2	2	1	With Time	Digital Input 2
Binary Input	2 / 2	1	1	No Status	2	2	1	With Time	Digital Input 3
Binary Input	3 / 3	1	1	No Status	2	2	1	With Time	Digital Input 4
Binary Input	4 / 4	1	1	No Status	2	2	1	With Time	Digital Input 5
Binary Input	5 / 5	1	1	No Status	2	2	1	With Time	Digital Input 6
Binary Input	6 / 6	1	1	No Status	2	2	1	With Time	Digital Output 1 state
Binary Input	7 / 7	1	1	No Status	2	2	1	With Time	Digital Output 2 state
Binary Input	8 / 8	1	1	No Status	2	2	1	With Time	Toogle Bit on cyclic alarm
Binary Input	9 / 9	1	1	No Status	2	2	1	With Time	Stack 80%
Binary Input	A / 10	1	1	No Status	2	2	1	With Time	Reserved
Binary Input	B / 11	1	1	No Status	2	2	1	With Time	Reserved
Binary Input	C / 12	1	1	No Status	2	2	1	With Time	Reserved
Binary Input	D / 13	1	1	No Status	2	2	1	With Time	Reserved
Binary Input	E / 14	1	1	No Status	2	2	1	With Time	Reserved
Binary Input	F / 15	1	1	No Status	2	2	1	With Time	Reserved

Special considerations

Internal Indications (IIN)

Control center time synchronization

Bit 4 of first IIN byte is set when FLITE395 starts up. This bit is cleared when the SCADA sends its first clock synchronization message.

Then FLITE395 sets it again regularly (every hour) to ensure the SCADA is answering it on a regular basis.

This clock synchronization is required to ensure a proper accuracy of time-stamping process. Should FLITE395 not receive a new synchronization message from the master within an hour after the last one, the IIN bit is set.

Annexe 1

Digital input

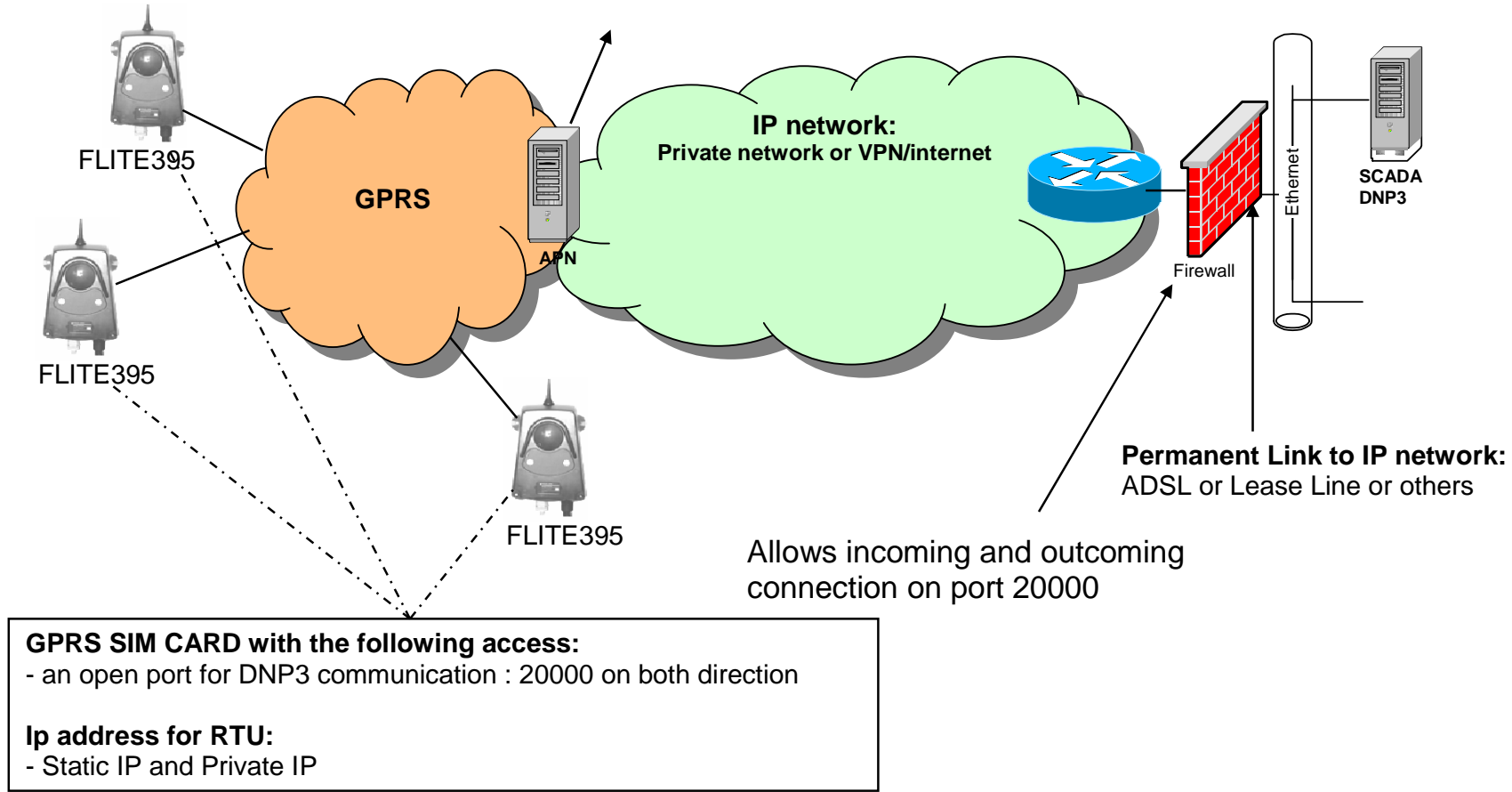
Red Fault is connected to Digital input 1, so when Digital input 1 equal "1" it means that a Red Fault is present. (Homopolar fault)

Green Fault is connected to Digital input 2 so when Digital input 2 equal "1" it means that a Green Fault is present. (Homopolar fault)

When Digital input 1 and Digital input 2 are both equal to "1", it means that there is a polyphase fault.

On solar version only : Digital input 3 is connected to the battery fault. So, when Digital Input 3 equal "1" it means that there is a battery fault.

Annexe 2 GPRS network characteristics



Schneider Electric Industries SAS

Schneider Electric Telecontrol
839 chemin des Batterses
Z.I. Ouest
F-01700 St Maurice de Beynost
Tel.: +33 (0)4 78 55 13 13
Fax: +33 (0)4 78 55 50 00

<http://www.schneider-electric.com>
E-mail: telecontrol@schneider-electric.com

NT00191-EN-01

09/2008

As standards, specifications and designs develop from time to time, always ask for confirmation of the information given in this publication.

Publication, production and printing: Schneider Electric Telecontrol
Made in France - Europe