

User Guide

GenPro 25e



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The main modifications of this document compared to the previous version are easily identifiable on a screen by the blue color of the text.

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Presentation

Entirely dedicated for Machine To Machine (M2M) applications and embedded data services, the modem **GenPro 25e** combines both GSM/GPRS functions in the same robust casing.

The modem is Quad-Bands 850/900/1800/1900 MHz and GSM/GPRS Class 10.

The **GenPro 25e** provides 3 operating modes:

- Direct mode (transparent mode application): the control is done by an external application. The modem is used with the AT commands set of the GSM/GPRS module (see [ublox_AT_Commands_Manual_xxx.pdf](#))
- Autonomous mode (EasePro application): Once configured, the modem is autonomous, it automatically transmits the information to the client application via different services: GSM SMS and GPRS UDP/TCP/FTP/SMTP (see [EG_EasePro_V2xx_CL_yyy_UK.pdf](#)).
- Specific development mode: the EGM development tool allows the development of a customized application. For more information about the tools and trainings, please contact our sales department.

The **GenPro 25e** provides digital inputs/outputs allowing the creation of embedded telematic solutions with high added value.

This document describes the modem and provides the following information:

- General presentation,
- Functional description,
- Available basic services,
- Installation and use of the modem (first level),
- Trouble shooting,
- Accessories recommended for the use of the modem.
- Options, contact us

For more information about this document, ERCO & GENER puts at your disposal the following elements:

- Command List
 - Direct mode: [ublox_AT_Commands_Manual_xxx.pdf](#)
 - Autonomous mode .: [EG_EasePro_V2xx_CL_yyy_UK.pdf](#)
- Application Note: [EG_GenPro25e_1055_AN_xxx_yy](#)
- Release Note: [EG_GenPro25e_1055_RL_xxx_yy](#)
- Client support (Hot-Line)

Warning

- **ERCO & GENER** to read carefully all documents linked to the **GenPro 25e** (User Guide, Application Notes, Command List).

 - **ERCO & GENER** cannot be held responsible for:
 - Problems due to an inappropriate use of the **GenPro 25e**.
 - Problems due to a wrong configuration
 - Problems due to the wrong use of an embedded software application developed or supplied by a third party.
 - Dysfunctions due to the absence or a bad coverage of the GSM, GPRS networks.
 - Dysfunctions if the product is used for the watching of physical persons where human life is engaged.

 - **ERCO & GENER** reserves the right to modify the functions of its products "**GenPro 25e**" and "**EasePro**" without previous notice.
- In order to avoid any risk of electrocution, do not open the casing.
- For any functioning, the casing must be closed.
- No internal part can be repaired by the user. The **GenPro 25e** must be returned to the factory for any repair.
- The **GenPro 25e** must be placed in a normally ventilated area, out of sources of heat.
- In order to guarantee the electromagnetic compatibility, the length of the serial cable, the power cable and the inputs/outputs cable must not exceed 3 meters.
- The **GenPro 25e** must not be connected directly to the mains supply; a voltage adapter must be used.



SCRAP THE WORN BATTERIES ACCORDING TO THE USUAL INSTRUCTIONS

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1 References

1.1 Referred documents

Commands List

- AT Command list of the GSM/GPRS module : u-blox_AT_Commands_Manual_xxx.pdf
- Embedded application EasePro of ERCO & GENER : EG_EasePro_V2.xx_CL_yyy_UK.pdf

Application Notes GenPro 25e of ERCO & GENER : EG_GenPro25e_1055_AN_xxx_yy

GSM reference documents:

- 3GPP TS 27.007 Technical Specification Group Core Network and Terminals; AT command set for User Equipment (UE)
- 3GPP TS 27.005 - Technical Specification Group Terminals; Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE-DCE) interface for Short Message Services (SMS) and Cell Broadcast Service (CBS)
- 3GPP TS 27.010 - Terminal Equipment to User Equipment (TE-UE) multiplexer protocol (Release 1999)

1.2 Abbreviations

Abbreviations definition

AC	Alternative Current
ACM	Accumulated Call Meter
AMR	Adaptive Multi-Rate
AT	Attention (prefix for modem commands)
BTS	Base Transceiver Station
CLK	Clock
CMOS	Complementary Metal Oxide Semiconductor
CS	Coding Scheme
CTS	Clear To Send
dB	Decibel
dBc	Decibel relative to the Carrier power
dB_i	Decibel relative to an Isotropic radiator
dB_m	Decibel relative to one milliwatt
DC	Direct Current
DCD	Data Carrier Detect
DCE	Data Communication Equipment
DCS	Digital Cellular System
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi-Frequency
DTR	Data Terminal Ready
EEPROM	Electrically Erasable Programmable Read-Only Memory
EFR	Enhanced Full Rate
EGM	Erco Gener Middleware
E-GSM	Extended GSM
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
ESD	ElectroStatic Discharges
ETSI	European Telecommunications Standards Institute
FIT	Series of connectors (micro-FIT)

Descriptions and non-contractual illustrations in this document are given as an indication only.
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FR	Full Rate
FTA	Full Type Approval
FTP	File Transfert Protocol
GCF	Global Certification Forum
GND	GrouND
GPIO	General Purpose Input Output
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile communications
HR	Half Rate
I	Input
IEC	International Electrotechnical Commission
IMEI	International Mobile Equipment Identification
I/O	Input / Output
LED	Light Emitting Diode
LLC	Low Level Command
MAX	MAXimum
ME	Mobile Equipment
MIC	MICrophone
Micro FIT	Family of connectors from Molex
MIN	MINimum
MNP	Microcom Networking Protocol
MO	Mobile Originated
MS	Mobile Station
MT	Mobile Terminated
NOM	NOMinal
O	Output
Pa	Pascal (for speaker sound pressure measurements)
PBCCH	Packet Broadcast Control Channel
PC	Personal Computer
PCL	Power Control Level
PDP	Packet Data Protocol
PIN	Personal Identity Number
PLMN	Public Land Mobile Network
PUK	Personal Unblocking Key
PWM	Pulse Width Modulation
RF	Radio Frequency
RFI	Radio Frequency Interference
RI	Ring Indicator
RMS	Root Mean Square
RTS	Request To Send
RX	Receive
SIM	Subscriber Identification Module
SMA	SubMiniature version A RF connector
SMB	SubMiniature version B RF connector
SMS	Short Message Service
SNR	Signal-to-Noise Ratio
SNTP	Simple Network Time Protocol
SPI	Serial Peripheral Interface
SPL	Sound Pressure Level
SPK	SpeaKer
SRAM	Static RAM
TBD	To Be Determined
TCP/IP	Transmission Control Protocol / Internet Protocol
TDMA	Time Division Multiple Access
TU	Typical Urban fading profile
TUHigh	Typical Urban, High speed fading profile

Descriptions and non-contractual illustrations in this document are given as an indication only.
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TX	Transmit
TYP	TYPical
UTC	Universal Time Clock
VSWR	Voltage Stationary Wave Ratio

1.3 Symbols

The following symbols are used to highlight the important information of this user guide.



A symbol for the essential information about the module integration and performance.



A warning symbol indicates the actions that could harm or damage the module

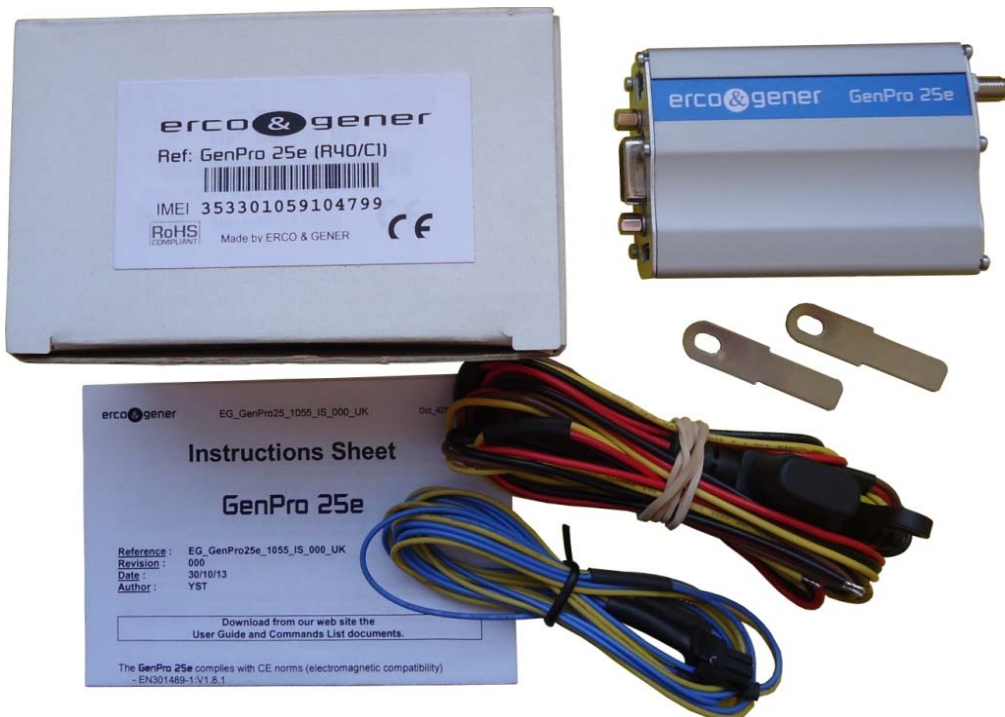
2 Packaging

2.1 Content

The GenPro 25e is supplied with:

- a GenPro 25e cardboard packaging,
- a modem GenPro 25e,
- 2 fixing brackets,
- a 4-wire cable Red/Black/Yellow/Brown stripped with fuse mini Blade 2A/32V
- a 2-wire cable (Blue/Yellow) stripped.
- a technical sheet (Instructions Sheet).

Figure 1 : Content



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2.2 Modem packaging

The external dimensions of the modem packaging are:

- Width: 54.5 mm,
- Height: 68 mm,
- Length.....: 108 mm.

An identification label is placed on the top of the packaging. It shows:

- The ERCO & GENER logo,
- The product reference: GenPro 25e,
- The CE mark,
- The IMEI barcode with 15 digits.

The dimensions of this label are:

- Height: 37 mm,
- Length.....: 70 mm.

2.3 Modem labels

On the standard casing, there are 2 labels placed on the back side of the modem:

- A production label indicating the following information:
 - The CE mark,
 - The crossed out wheelie-bin mark (DEEE),
 - The direct current mark (VDC),
 - The R40 mark,
 - The IMEI barcode with 15 digits.
- A label with the markings: ROHS (2002/95/CE).



If the internal battery option has been mounted during production, the modem has the following label: Lithium-Polymer Battery Inside.



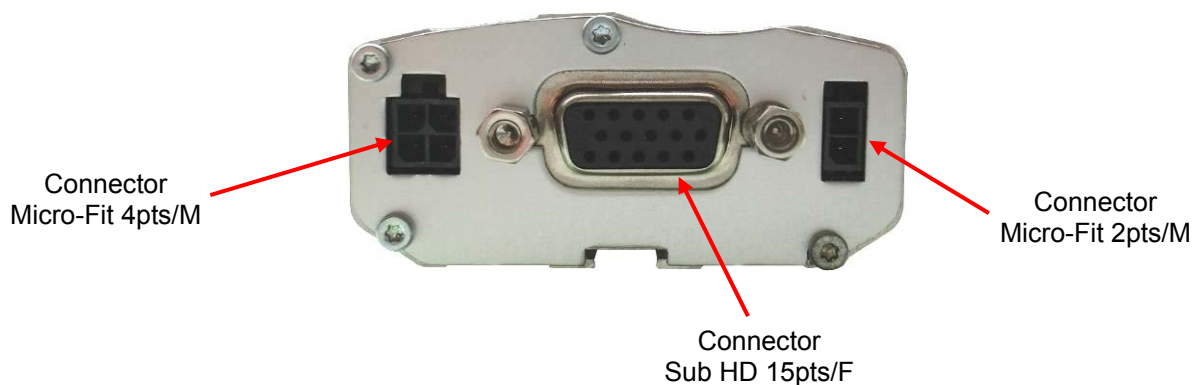
3 General presentation

3.1 Description

Description of the modem GenPro 25e, hereunder:

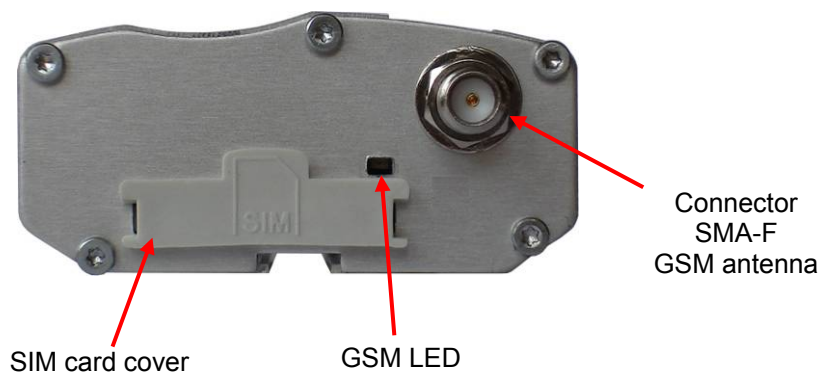
3.1.1 Front side

Figure 2 : Front side



3.1.2 Back side

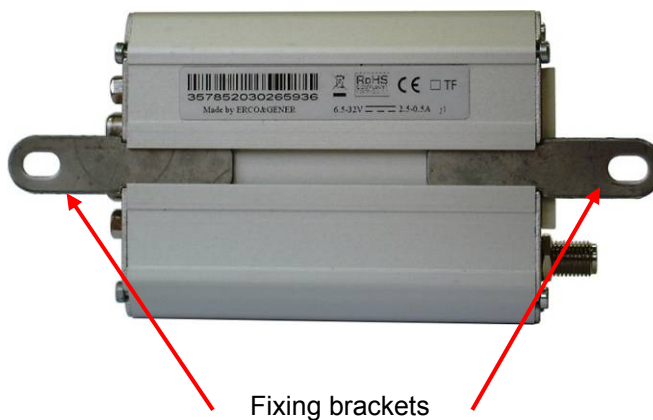
Figure 3 : Back side



3.1.3 Modem fixing

2 brackets are used to fix the modem on a support.

Figure 4 : Fixing



3.2 External connections

3.2.1 Connections

3.2.1.1 Antenna connector

GSM antenna connector:

The GSM antenna connector is SMA-female with a 50Ω impedance.

3.2.1.2 Micro FIT connectors

Female Micro FIT connector with 4 male pins:

This connector of the GenPro 25e is used for the DC external power supply and the GPIOs (the 2 signals Input and Output).

Figure 5 : 4-pin Micro FIT connector

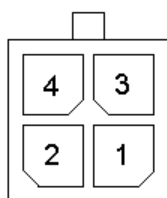


Table 1 : 4-pin Micro FIT connector

Pin N°	Signal
1	Digital OUTPUT 1 (S1)
2	Digital INPUT 1 (E1)
3	GND
4	+V _{DC}



The pins 1 and 2 are used for the Input/Output functions. The modem can only be powered by the pins 4 (+V_{DC}) and 3 (GND).
 You must absolutely use the power cable provided with the modem. It ensures the protection of the equipment.

Female Micro FIT Connector with 2 male pins:

This connector of the GenPro 25e is used for the GPIO (2 Inputs signals).

Figure 6 : 2-pin Micro FIT connector

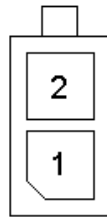


Table 2 : 2-pin Micro FIT connector

Pin N°	Standard name	Circuit	I/O	Option	I/O	Option	I/O
1	INPUT 2	Opto 5 / 35 V	I	Analog Input ANA- 1 0-10V	I	Analog Input ANA-1 4-20mA	I
2	INPUT 3	Opto 5 / 35 V	I	One Wire INPUT multi-slaves 0-3V	I/O		I/O

3.2.1.3 15-pin Sub D HD connector

The female 15-pin high density Sub D connector is used for:

- The RS232 serial link connection,
- The audio line connection (microphone and loudspeaker),
- The BOOT and RESET signals.

Figure 7 : 15-pin Sub D HD connector



Table 3 : 15-pin Sub D HD connector

Pin N°	Standard name	Circuit (V24 – RS232C)	I/O
1	Signal detection	109 – DS – DCD	O
2	Data transmission	103 – ED – TXD	I
3	Boot	BOOT	I
4	Microphone +	MICP	I
5	Microphone -	MICN	I
6	Data reception	104 – RD – RXD	O
7	Data set ready	107 – PDP – DSR	O
8	Data terminal ready	108/2 – TDP – DTR	I
9	Signalization ground	102 – TS – GND	-
10	Loudspeaker +	SPKP	O
11	Ready to send	106 – PAE – CTS	O
12	Request to send	105 – DPE – RTS	I
13	Call indicator	125 – IA – RI	O
14	Reset	RESET	I
15	Loudspeaker -	SPKN	O

3.2.2 Cables

3.2.2.1 4-wire micro FIT cable

The 4-wire micro FIT cable is used to supply power to the modem and to use the 2 signals Input and Output.

Figure 8 : 4-wire Micro FIT cable

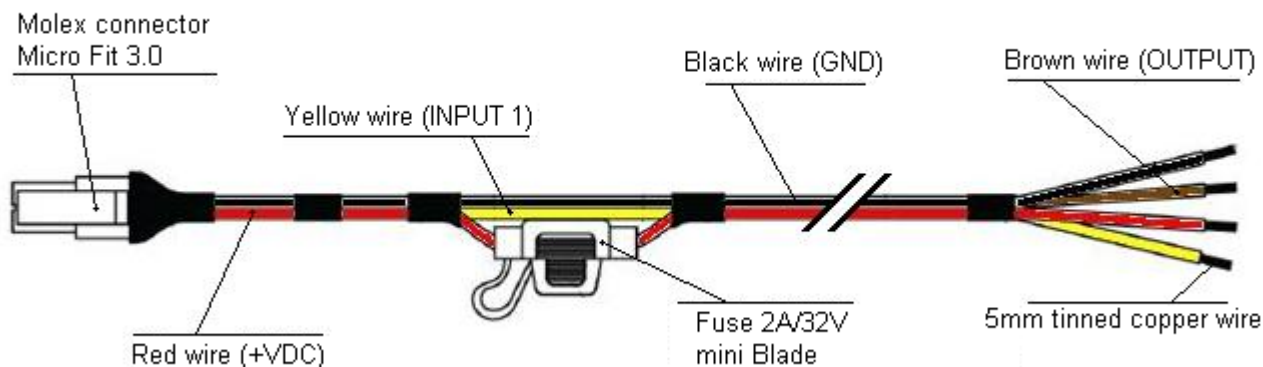


Figure 9 : 4-wire Micro FIT cable connector

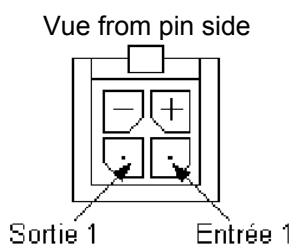
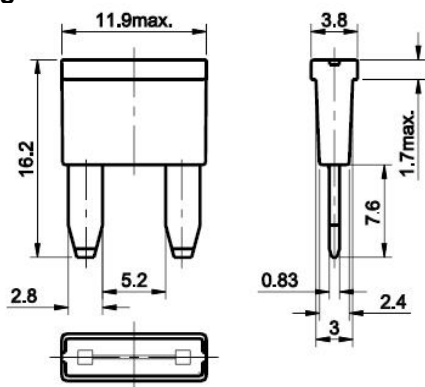


Table 4 : Characteristics of the 4-wire Micro FIT cable

Component	Characteristics
4-pin Micro FIT connector	Supplier : MOLEX
Cable	Length ≈ 1.5m
Wire	Tinned copper 24 x 0.2 mm Section : 0.75 mm ²
Fuse	mini N 2A 32V RAPIDE (Grey)

Reference of fuse: Mini Blade for vehicle 2A - 32V (color code: grey)

Figure 10 : Fuse Mini Blade for vehicle



3.2.2.2 2-wire micro FIT cable

The 2-wire micro FIT cable allows to use the 2 additional Inputs.

Figure 11 : 2-wire Micro FIT cable

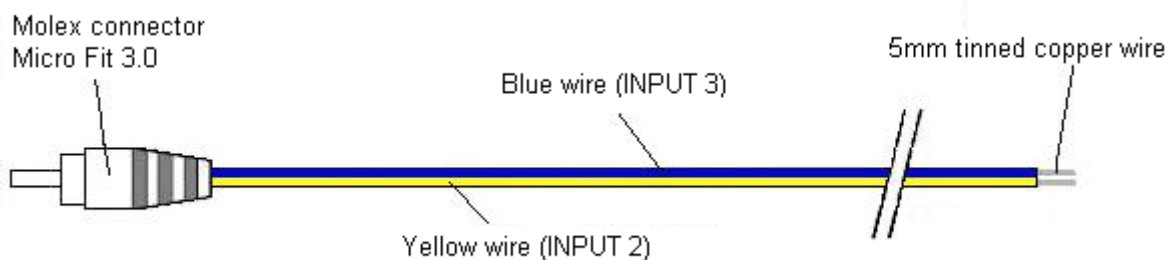


Figure 12 : 2-wire Micro FIT cable connector

Vue from pin side

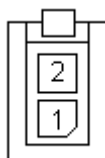


Table 5 : Characteristics of 2-wire Micro FIT cable

Component	Characteristics
2-pin Micro FIT connector	Supplier : MOLEX
Cable	Length ≈ 1.5m
Wire	Section : 0.5 mm ²

4 Characteristics and Services

The GenPro 25e is a modem GSM/GPRS class10 dedicated to the transmission of binary data in asynchronous, SMS, Voice and Fax Group 3 Class 2.0.

Table 6 : Modem characteristics and available services

GSM functions
- Quad-Bands GSM 850/EGSM 900/DCS 1800/PCS 1900 MHz
- ETSI GSM Phase 2 Class 4 (2W @ 850 / 900 MHz - 33 dBm) Class 1 (1W @ 1800 / 1900 MHz - 30 dBm)
- SIM Toolkit
VOICE functions
- Voice (GSM mode)
- Telephone, Emergency number 112
- Full Rate, Enhanced Full Rate, Half Rate and AMR (FR/EFR/HF/AMR)
- Echo cancelation and noise reduction
- Hands free Full Duplex
DATA functions
- GPRS Class 10 (up to 4Rx / 2Tx)
- Supports PBCCH/PCCCH, Coding scheme : CS1 to CS4
- Library TCP/IP (UDP Socket*, TCP*)
- CSD 9600 kbs (Max.)
- SMS Text, PDU, point to point MT/MO and SMS Cell Broadcast
Interfaces
- GSM Antenna: SMA-F connector
- Power supply : $+6.5 \leq +V_{DC} \leq +32$ VDC (micro-FIT connector)
- RS232 (300 to 115200bds) + Audio via 15-pin Sub-D female
- AT commands: 3GPP TS 27.007 / 27.005 / 27.010
- SIM reader (SIM 3V – 1,8V)
- 3 opto-coupled Inputs and 1 open collector Output
- Power down of RS232 by soft
Accessories supplied
- Fixing brackets (x2)
- 4-wire Micro FIT cables (Power supply, Input and Output)
- 2-wire Micro FIT cables (2 Inputs)
Options / Additional accessories *
- Backup battery and management of battery charging
- Real Time Clock backup (with backup battery option)
- Analog Input Analogique in tension or voltage (replaces the opto-coupled Input E2)
- 1 port Multi ONE_WIRE
- Software development kit: SDK EGM
- Accessories: Antennas, cables, power supply... (consult our website)
* contact us

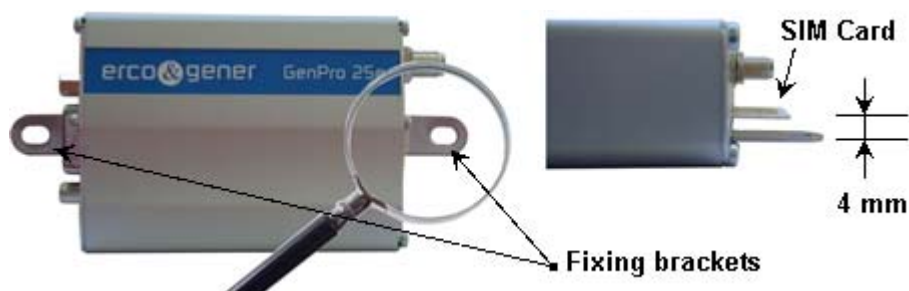
5 Use of the modem

5.1 Starting with the modem

5.1.1 Assembly of the modem

To place the modem on a support, use the fixing brackets as indicated on the scheme below.

Figure 13 : Assembly of the modem



- Must be fixed on a flat surface.
- Max. height of the screw head : 2 mm.



The aluminum casing of the modem is connected to the 0V (GND) of the power supply and to the 0V of the RS232 serial link. To avoid any risk of conduction of the ground plane to other equipments, the modem must be electrically insulated from its mechanical support.

5.1.2 Installation of the modem

To install the modem, it is recommended to do the following operations with the modem turned OFF:

- Remove the SIM card cover on the back side.
- Carefully insert the SIM card in the reader.

Figure 14 : Insertion SIM card



**Way of insertion
of SIM card**

- Push the SIM card until hearing a "clic" that ensures its correct positioning.
- Put the SIM cover back.
- Connect the GSM antenna to the SMA-F connector.
- For the connection to the DTE, connect the V24 link via the 15-pin Sub HD cable.
- Connect the supply cable to the continuous and regulated power source (for an automobile application, see paragraph 5.2 Specific recommendations for the use of the modem in vehicles).
- Connect the supply cable to the modem and turn ON the external power supply.

The modem is now ready.

Depending on the application installed inside the equipment:

- Without library: corresponds to the Bootloader.
- With the ERCO & GENER transparent mode application
- The ERCO & GENER application EasePro-V2.xx
- The owner application.

We obtain different display. See following paragraph.

5.1.3 Checking the communication with the modem

5.1.3.1 Without library

The GenPro 25e does not contain any library, it will return the menu of the Bootloader.

Connect the RS232 link between the DTE (the COM port) and the modem (DCE).

Configure the RS232 port of the DTE as follows:

- Bits per second: 115 200 bps,
- Data Bits.....: 8,
- Parity.....: None,
- Stop Bits.....: 1,
- Flow control.....: material.

Use a communication software like Windows HyperTerminal ®.

Menu by default when there is no library inside the equipment (example of display)

```
Bootloader V4.11 GP25 UA Gener Ublox (HWF7 rev C)
GSM voltage = 3655 mV
1 - Update application
2 - Erase objects
M - GSM direct access (external supply required)
A - Advanced
P - Power off
E - Exit
```

In this configuration, the led is OFF.

In the case where no communication can be established with the modem:

- Check the RS232 connection between the DTE and the modem (DCE),
- Check the configuration of the COM port of the DTE.

5.1.3.2 With transparent mode application

The GenPro 25e contains the transparent mode application; it is waiting for a command.

Connect the link RS232 between the DTE (COM port) and the modem (DCE).

Set the RS232 port of the DTE as follows:

- Bits per second: 115 200 bps,
- Data Bits.....: 8,
- Parity.....: none,
- Stop Bits.....: 1,
- Flow control.....: material.

Use a communication software like Windows HyperTerminal ®.

Send the AT command. The modem returns OK. For more precision about the commands, see the documents "u-blox_AT_Commands_Manual_xxx.pdf"

With this status, the two leds are OFF.

In the case where no communication can be established with the modem:

- Check the RS232 connection between the DTE and the modem (DCE),
- Check the configuration of the COM port of the DTE.

5.1.3.3 The ERCO & GENER application EasePro-V2.xx

The GenPro 25e contains the application EasePro_V2.xx.

Send the command AT+I8. The modem returns the version (example of display)

```
EasePro V2.10_EGM405 - GenPro25e - Mon Jan 13 11:04:52      2014
```

For more information about these AT commands of the application EasePro and their associated parameters, see the documents "EG_EasePro_V2.xx_CL_yyy_UK.pdf" of ERCO & GENER.

5.1.3.4 The owner application

The GenPro 25e contains your application.

Connect the RS232 link between the DTE (the COM port) and the modem (DCE).

Set the RS232 port of the DTE according to your parameters (speed, data bits, parity and stop bit).

Use a communication software like Windows HyperTerminal ®.

Check the display and the dialogue with the GenPro 25e according to your own characteristics.

5.1.4 SIM card extraction

To remove the SIM card from the modem, it is recommended to do the following operations with the modem turned OFF:

- Remove the SIM card cover on the back side.
- Press the SIM card (simple pressure) until hearing a "clic" that ensures its ejection.
- Remove delicately the SIM card from the reader.
- Put the SIM cover back.

5.1.5 Hardware reset of the modem

To trigger a Hardware reset of the modem, a RESET signal (hardware) is available on the pin 14 of the 15-pin Sub HD connector (RESET).

The modem Reset is done when the RESET signal (pin 14) is downwards during 10ms.



**This signal must be considered as a way of resetting the modem in case of emergency only.
For more details about the modem RESET, see the § 7.6 RESET**

5.2 Specific recommendations for the use of the modem in vehicles



The power supply connector of the modem GenPro 25e must NOT be directly connected to the battery of the vehicle.

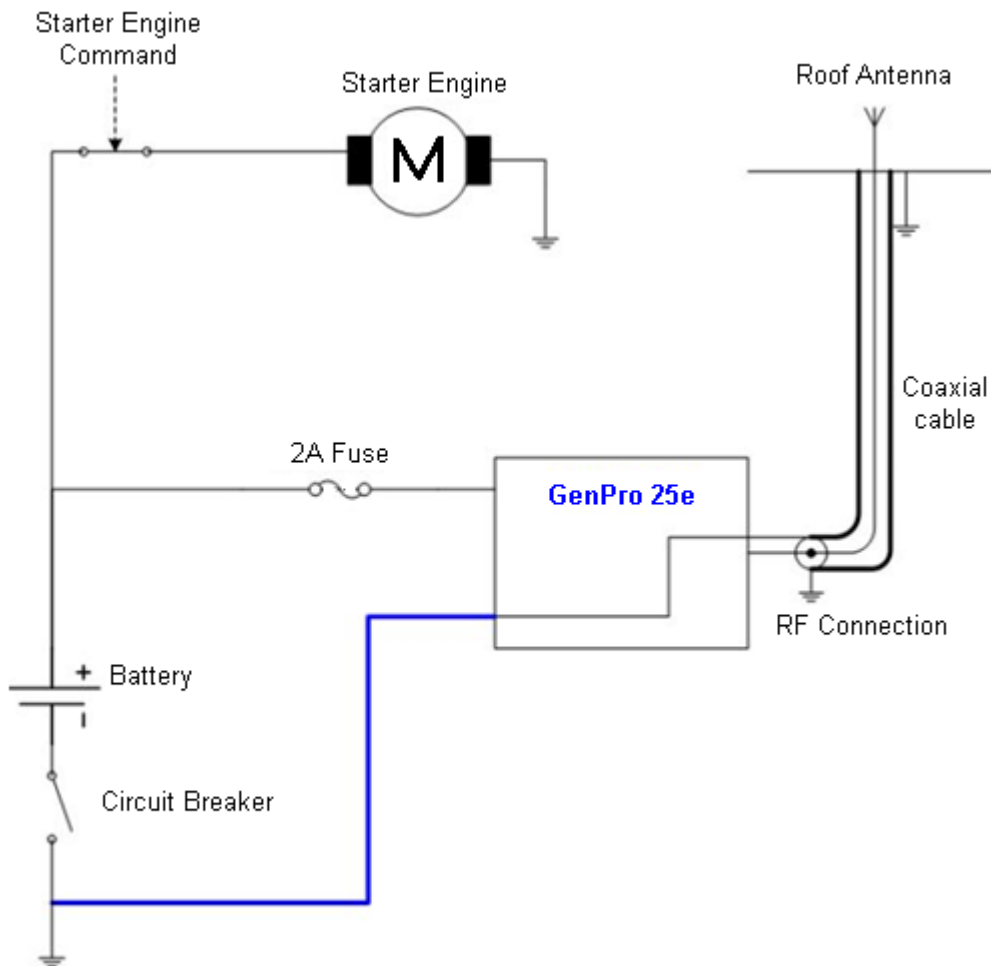
5.2.1 Recommended connection on the battery of a truck

All trucks have a Circuit Breaker outside the cabin. The circuit breaker is used for security reasons: for example, if a fire breaks out in the electric box of the truck, the driver can cut off the power source and avoid more damage (explosion).

The circuit breaker is connected to the ground of the truck, usually connected to the fuse box.

Most of truck circuit breakers do not cut off the PLUS of the battery, but cut off the ground.

Figure 15 : Recommended connection on the battery of a truck

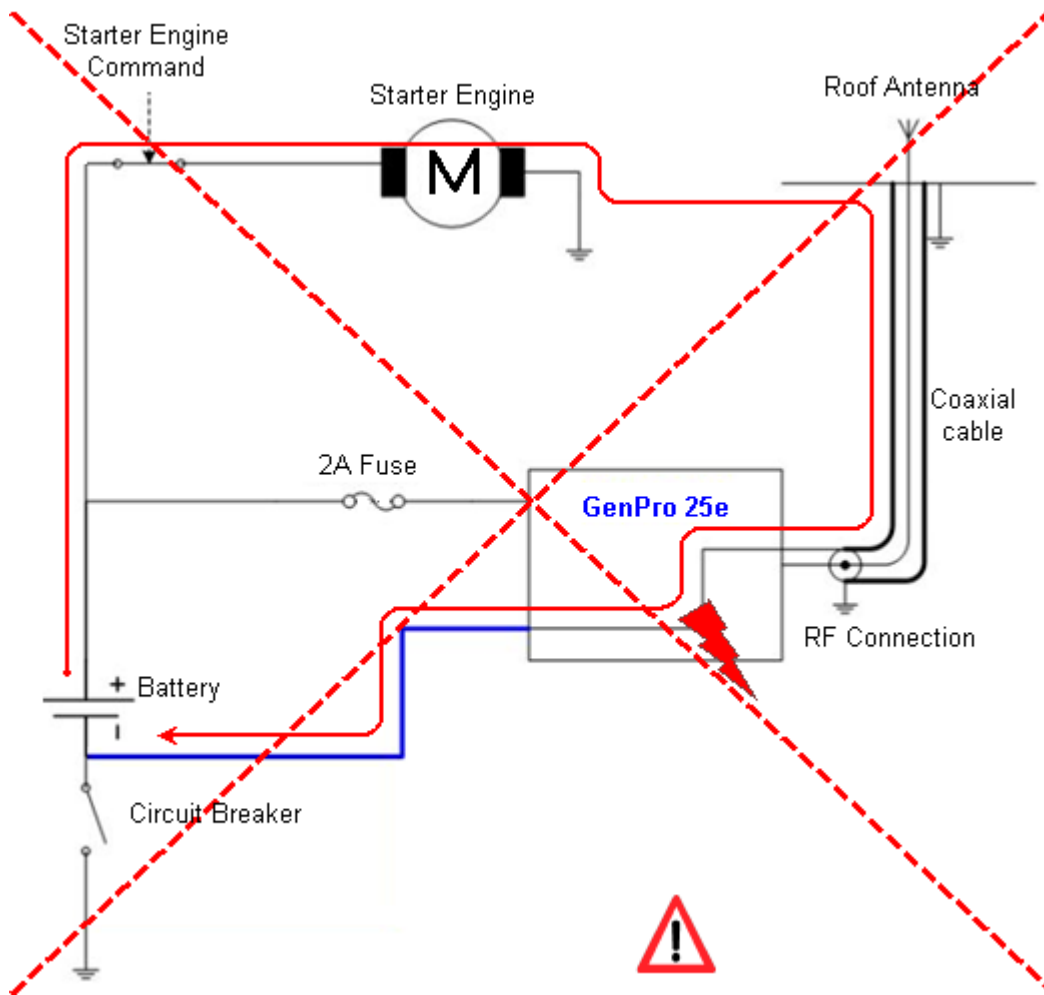


The scheme above shows a recommended power connection where the connection of the modem ground is not directly connected to the battery, but connected after the circuit breaker (to the ground of the truck or in the fuse box).

5.2.2 Technical constraints in trucks

It is highly recommended NOT to connect the modem supply directly to the battery but to the circuit breaker. Otherwise the modem can be damaged when the truck is starting up if the circuit breaker is closed (in this case, the ground of the truck and the ground of the battery will be connected via the modem as described in the scheme below).

Figure 16 : Example of forbidden electrical connection (risk of damage on the modem)



The scheme above shows an example of electrical connection that could damage the modem due to the fact that the ground connection is directly connected to the battery ground.

In fact in this example, when the circuit breaker is open, the current escapes via the modem and the electrical circuits of the truck (the dashboard for example). And when the motor's starter is used, it will destroy the cables or the modem.

Moreover, the internal circuits of the modem are not designed to resist to a current of about 60 A (when starting the truck), or they would be destroyed.

5.3 GSM led of the modem

5.3.1 Without EGM application

The GenPro 25e does not contain any library. Only Boot Loader menu is displayed. The led is OFF.

5.3.2 With the transparent mode application

The yellow led is directly driven by the GSM/GPRS module.

5.3.3 With the ERCO & GENER application EasePro-Vx

The status of the GSM module is indicated by the status of the GSM yellow led situated on the back side of the modem on the right side of the SIM reader (see §3.1.2 Back side).

Table 7 : Status of GSM LED with the application EasePro

State	ON time	OFF time	Description
Fixed ON	Always ON	-	No network / no SIM
Flash	500ms	1s	Attached to GSM only
Flash	500ms	500ms	Connecting to GPRS network (waiting for IP address)
Flash	200ms	800ms	Connected to GPRS network (got IP address)
Flash	100ms	100ms	TCP/UDP session open

5.3.4 Owner application

The GenPro 25e contains your application. The led status depends on your parameters.

5.4 Echo function of AT commands deactivated

The modem contains the transparent mode application (see the documents "ublox_AT_Commands_Manual_xxx.pdf"; in this case, if no echo is returned when entering an AT command, it means that:

- the "local echo " of your communication software (like Hyperterminal) is not activated,
- the echo function of the modem has been deactivated.

The echo function can be set with the command **ATE** ; it requires a back-up with the command **AT&W** and **AT+CFUN=15**

To activate the echo function of the modem, enter the commands **ATE1**

When sending AT commands to the modem using a communication software, it is recommended to:

- Deactivate the "local echo" parameter in your communication software (like Hyperterminal),
- Activate the echo function of the modem (the command **ATE1**).

For a communication Machine to Machine with the modem, it is recommended to deactivate the echo function of the modem (the command **ATE0**) in order to avoid the CPU receiving redundant responses.

For more information about the **ATE** commands, see the document "ublox_AT_Commands_Manual_xxx.pdf".

5.5 Checking the quality of the GSM reception signal

The modem will be able to make a call only if the GSM signal received is sufficient.

The command **AT+CSQ** allows to know the reception level (**rsqi**) of the signal sent by the closest GSM Base Transceiver Station (BTS), as well as the receive bit error rate (**ber**).

When the SIM card is inserted and the PIN code entered, the command **AT+CSQ** allows to measure the signal from the BTS of the subscribed operator network.

To check the quality of the GSM signal, do the following operations:

Use a communication software like Hyperterminal, enter the command **AT+CSQ**.

The response is in the following format:

+CSQ : <rsqi>, <ber> with :

<rsqi> = indicates the reception level,

<ber> = receive bit error rate.

Check the returned value **<rsqi>** with the help of the table below.

Table 8 : RSSI value

<rss> value	Gain in dbm	Interpritation	<ber> value	Interpretation
0	-113 dbm	Insufficient	0 to 7	See Standards ETSI GSM 05.08
1 to 10	-111 to -95 dbm	Insufficient		
11 to 30	-93 to -53 dbm	Sufficient		
31 (max)	-51dbm	Perfect		
99		Unknown/not detectable	99	Unknown/not detectable

The GSM modem works normally with a minimum **<rss>** between 11 and 15.

Bellow 10, the signal level is insufficient; the modem cannot work depending on the geographical situation or the vehicle mobility. Above 15, the signal is satisfactory.

For more information about AT commands, see the document "u-blox_AT_Commands_Manual_xxx.pdf"

5.6 Verification of PIN code

The modem contains the EGM standard library (see the documents "EG_EGM_CL_xxx_yy" of ERCO & GENER); in this case, the PIN code is necessary to make a call or to accept a response coming from the GSM network. This code is held in the SIM card, and it can be modified by the user.

To check that the PIN code has been entered, use a communication software like HyperTerminal, and enter the command **AT+CPIN?**

The table below shows the main responses given by the modem:

Table 9 : Verification of PIN code

Command	Response	Interpretation
AT+CPIN?	+CPIN : ERROR	The SIM card is absent or not recognized
	+CPIN : READY	The PIN code is correct
	+CPIN : SIM PIN	The PIN code is wrong or not entered yet
	+CPIN : SIM PUK	The PUK code is required

For more information about AT commands, see the document "ublox_AT_Commands_Manual_xxx.pdf"

5.7 Verification of modem registration on GSM network

1. Ensure that a valid SIM card has been inserted in the SIM card reader of the modem.
2. Using a communication software like HyperTerminal, enter the following AT commands:
 - a. **AT+CPIN="xxxx"** to enter the PIN code. The user has only 3 attempts to enter the PIN code. After the third attempt, only a second code (PUK code) supplied by the operator, will allow you to choose a new PIN code.
 - b. **AT+CREG?** to check the registration status on the GSM network. The response will be of the following format: **+CREG : <mode>, <stat>** with:
 - <Mode>** = configuration of the registration message not solicited
 - <Stat>** = registration status
3. Check the registration status according to the value returned in the table below.

Table 10 : Verification of registration on GSM network

Command	Response	Interpretation
AT+CREG?	+CREG : 0,0	The modem is not recognized by the network.
	+CREG : 0,2 or 0,3	The modem is searching for a network operator.
	+CREG : 0,1	The modem is attached in GSM to the local operator.
	+CREG : 0,5	The modem is attached in GSM to the roaming operator.



If the modem is not registered, check:

- the connection between the modem and the antenna
- the reception level of the signal (cf. §5.5 Checking the quality of the GSM reception signal).

For more information about the AT commands, see the document "u-blox_AT_Commands_Manual_xxx.pdf"

5.8 Verification of modem registration on GPRS network

1. Ensure that a valid SIM card has been inserted in the SIM card reader of the modem.
2. Using a communication software like HyperTerminal, enter the following AT commands:
 - a. **AT+CPIN="xxxx"** to enter the PIN code. The user has only 3 attempts to enter the PIN code. After the third attempt, only a second code (PUK code) supplied by the operator, will allow you to choose a new PIN code.
 - b. **AT+CGREG?** to check the registration status on the GPRS network. The response will be of the following format: **+CGREG : <mode>, <stat>** with:
 - <Mode>** = configuration of the registration message not solicited,
 - <Stat>** = registration status.
3. Check the registration status according to the value returned in the table below.

Table 11 : Verification of GPRS registration

Command	Response	Interpretation
AT+CGREG?	+CGREG : 1,0	The modem is not recognized by the network.
	+CGREG : 1,2 or 1,3	The modem is searching for a network operator.
	+CGREG : 1,1	The modem is attached in GPRS to the local operator.
	+CGREG : 1,5	The modem is attached in GPRS to the roaming operator.



If the modem is not registered, check:

- the connection between the modem and the antenna
- the reception level of the signal (cf. § 5.5 Checking the quality of the GSM reception signal).
- the subscription of the SIM card.

For more information about the AT commands, see the document "u-blox_AT_Commands_Manual_xxx.pdf"

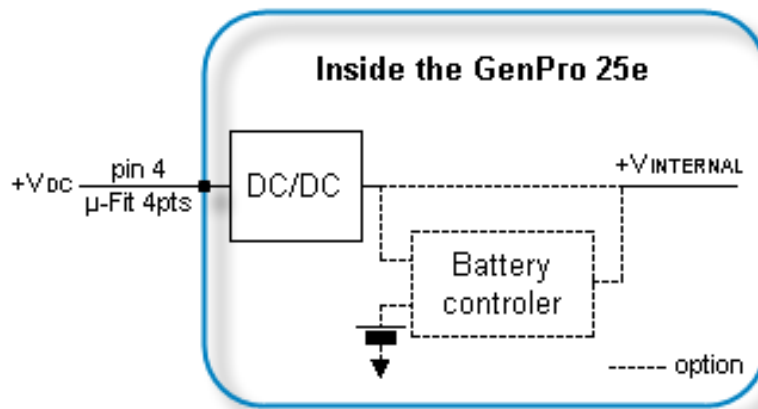
5.9 Verification of internal voltages of the modem

The modem contains the application EasePro V2.xx (see the documents EG_EasePro_V2.xx_CL_yyy_UK.pdf)

Two commands allow reading the internal voltages of the modem.

- The input of the DC/DC converter **+V_{DC}**
- The battery voltage if this option is present **+V_{INTERNE}**

Figure 17 : Internal voltages of the modem



5.9.1 Reading the power supply voltage +V_{DC}

The command **AT+EGADC=0** allows to read the power supply voltage +V_{DC} of the modem. This voltage is measured in mV_{DC}.

Check the conversion correction factors with the command **AT+EGADC=0,0,0**

They must be **+EGADC: 0,987,100,"0"**

If this is not the case, enter them with the command **AT+EGADC=0,987,100,0** These parameters are memorized.

Example:

```
AT+EGADC=0
+EGADC: 0, 11939
OK
```

For more information about the AT commands, see the document "EG_EasePro_V2.xx_CL_yyy_UK.pdf"

5.9.2 Reading the internal voltage +V_{INTERNE}

The command **AT+EGADC=3** allows to read the power supply voltage +V_{INTERNE} of the modem. This voltage is measured in mV_{DC}.

Table 12 : Reading the internal voltage +V_{INTERNE}

Standard	Battery option	
	Presence of power supply +V _{DC}	Without power supply +V _{DC}
This measure corresponds to the output voltage of the DC/DC converter	This measure corresponds to the output voltage of the battery controller	This measure corresponds to the battery voltage
+V_{INTERNE} ≈ 3.8V	4.4V ≤ +V_{INTERNE} ≤ 4.5V	+V_{INTERNE} = V_{BATTERIE}

See Figure 17 : Internal voltages of the modem

Check the conversion correction factors with the command **AT+EGADC=3,0,0**

They must be **+EGADC: 3,2715,2000, "0"**

If this is not the case, enter them with the command **AT+EGADC=3,2715,2000,0**

These parameters are memorized.

Example:

```
AT+EGADC=3
+EGADC: 3,3709
OK
```

For more information about the AT commands, see the document "EG_EasePro_V2.xx_CL_yyy_UK.pdf"

5.10 Main AT commands (HAYES)

The modem contains the EGM standard library (see the documents "EG_EGM_CL_xxx_yy" of ERCO & GENER); in this case, the table below shows the main AT commands necessary for the control of the modem.

Other AT commands are available, see the document "u-blox_AT_Commands_Manual_xxx.pdf".

Table 13 : Main AT commands used with the modem

Description	AT command	Response	Interpretation
Enter the PIN code	AT+CPIN="xxxx"	OK	PIN code accepted
	(xxxx = PIN code)	+CME ERROR: 16	PIN code incorrect (1*)
		+CME ERROR: 3	PIN code already entered (1*)
Verification of registration on GSM network	AT+CREG?	+CREG : 0,1	The modem is attached in GSM to the local operator.
		+CREG : 0,5	The modem is attached in GSM to the roaming operator.
		+CREG : 0,2	The modem is searching for a network operator.
		+CREG : 0,0 or 0,3	The modem is not recognized by the GSM network.
Verification of registration on GPRS network	AT+CGREG?	+CGREG : 0,1	The modem is attached in GPRS to the local operator.
		+CGREG : 0,5	The modem is attached in GPRS to the roaming operator.
		+CGREG : 0,2	The modem is searching for a network operator.
		+CGREG : 0,0 or 0,3	The modem is not recognized by the GPRS network.
Reception of an incoming call (2*)	ATA	OK	Answer to the call
Make an outgoing voice call	ATD<telephone number>;	OK	Communication established
	(the ; at the end of the sequence is important; it allows to make a voice call)	+CME ERROR: 11	PIN code not entered
		+CME ERROR: 3	The credit has run out or a communication is already established.
Make an emergency call (112)	ATD112;	OK	Communication established
Communication lost		NO CARRIER	
Hang-up	ATH	OK	

(1*) with **+CMEE=1**. The command **AT+CMEE=1** allows the display of extended error codes; it is possible to save it with the commands **AT+W** and **AT+CFUN=15**

By default, some event codes **+EGEVT** allow the display of status change of the SIM card (card present, card ready ...) and allows to know some status of the modem (modem ready after a RESET...), see the Command List of ERCO & GENER.

(2*) with **+CRC=1**. The command **AT+CRC=1** allows in the case of an incoming call to display an extended message that indicates the channel called. This message corresponds to the type of number called: voice or data, it is possible to save it with the commands **AT+W** and **AT+CFUN=15**

Examples:

If the VOICE number is called, the modem replies: **+CRING : VOICE**

If the DATA number is called, the modem replies: **+CRING : REL ASYNC**

5.11 Turning OFF the modem

The modem contains the EGM standard library (see the documents "ublox_AT_Commands_Manual_xxx.pdf"); in this case, it is strongly advised to un-register from the network with the command `AT+COPS=2`.

If the Battery option is present, a mechanism allows to stop completely the application if the external power supply is unplugged, and also to prepare the modem for storage or transport phases in order to limit high discharges of the battery.

If the device is not used, it has to be deactivated by sending the following command:

- **If the modem contains an application developed with EGM**
 - Switch off the external power supply of the modem
 - Wait 20s
 - Send the command **`AT+GPIOSET=35,0`**
- **If the modem does not contain any embedded application** via the Boot-Loader menu
Bootloader V4.11 GP25 UA Gener Ublox (HWF7 rev C)
GSM voltage = 3655 mV
 - 1 - Update application
 - 2 - Erase objects
 - M - GSM direct access (external supply required)
 - A - Advanced
 - P - Power off
 - E - Exit



Switch off the external power supply of the modem
Wait 20s
Enter **"P"**

Important note : The switching and the auto-maintain of the battery will be automatically reactivated once the modem will be connected again to its external power supply.

5.12 Updating procedure of the modem

To be able to benefit from the latest functions of the GenPro 25e, an updating procedure can be used to upgrade the software program in the modem.

This procedure consists in downloading the software into the internal Flash memory of the modem via the RS232 link available on the 15-pin Sub HD connector.

Contact us for the software updating.

6 Trouble Shooting

This section of the document describes the problems that may be encountered when using the modem.

6.1 Problem of communication between the modem and the RS232 link (V24)

If the modem does not respond to the AT commands via the RS232 link, see the table below for the possible causes and the solutions.

Table 14 : Solutions when there is no dialogue between the modem and the RS232 link

If the modem...	Check:	Action
Returns nothing	Is the modem correctly powered?	Ensure that the modem is connected to an external regulated power source and supplies a voltage from 6.5V to 32V (§ 8.2 Electrical characteristics).
	Is the serial cable connected on both sides (PC and Modem)?	Check the connection of the serial cable.
	Is the serial cable correctly cabled according to the paragraph 3.2.1.3?	Connect the serial cable according to the table of le § 3.2.1.3 15-pin Sub D HD connector.
Returns nothing or random characters	Is the communications terminal correctly configured on the PC?	Ensure that the configuration of the communication terminal corresponds with the one of the modem. Factory configuration of the modem : Without library (BootLoader) Speed = 115 200 bps Data Bits = 8 Parity = none Stop Bits = 1 Flow control = none With standard library Speed = 115 200 bps Data Bits = 8 Parity = none Stop Bits = 1 Flow control = none Application ERCO&GENER – EasePro-Vx Contact us. Owner application speed, data bits, Parity and stop bit according to your parameters
	Is there another application used, creating a conflict during the access to the communication port?	Close the conflicting application.
	Is the modem without echo and without message reporting?	Send the command ATE1Q0 followed by AT&W and AT+CFUN=15 if a backup is necessary.

6.2 "ERROR" message

The modem returns a message "**ERROR**" (in response to an AT command) in the following cases:

- The COM port is not directed to the modem GenPro 25e but to another modem. Enter **ATIO**, the response must be "**LEON-G100-xxx-yy**". Any other response indicates a dialog with another modem. In this case, check the COM port used in Hyperterminal.
- The syntax of the AT command is incorrect: check it with the AT Command List of the application
- The syntax of the AT command is correct, but transmitted with wrong parameters:
 - Enter the command **AT+CMEE=1** to obtain an error message with its error code instead of a simple "ERROR" message,
 - Enter again the AT command which previously caused the "ERROR" message in order to obtain the error code.

In case of an error code, the response of the modem may be:

+CME ERROR : < error code >

For more information about the error codes returned after sending the command **AT+CMEE**, see the document "u-blox_AT_Commands_Manual_xxx.pdf"



With the transparent mode application it is strongly recommended to systematically allow the modem to return the error codes (enter the command **AT+CMEE=1**).

6.3 "NO CARRIER" message

If the modem returns the message "NO CARRIER" after an attempted call (voice or data), see the table below for the possible causes and their solutions.

Table 15 : Solutions when a message "NO CARRIER" is returned

If the modem...	Check:	Action
"NO CARRIER"	Is the received GSM signal strong enough?	See § 5.5 Checking the quality of the GSM reception signal.
	Is the modem registered on the network?	See § 5.7 Verification of modem registration on GSM network
	Is the antenna correctly connected?	See § 5.7 Verification of modem registration on GSM network.
"NO CARRIER" (when attempting a VOICE call)	Has the semi-colon (;) been entered immediately after the telephone number in the AT command?	Ensure that the semi-colon (;) has been entered immediately after the telephone number in the AT command. For example: ATD0123456789;
" NO CARRIER" (when attempting a DATA call)	Has the SIM card been configured for data calls.	Ensure that the SIM card is allowed to make data calls (check with your SIM card supplier)
	Is the selected modulation type supported by the called number?	Ensure that the selected modulation type is supported by the called number.
	Is the selected modulation type supported by the network?	Ensure that the selected modulation type is supported by the network. If not, select a compatible modulation type with the command AT+CBST=0,0,1 (1*)

(1*) For more information about this AT command, see the document "ublox_AT_Commands_Manual_xxx.pdf"

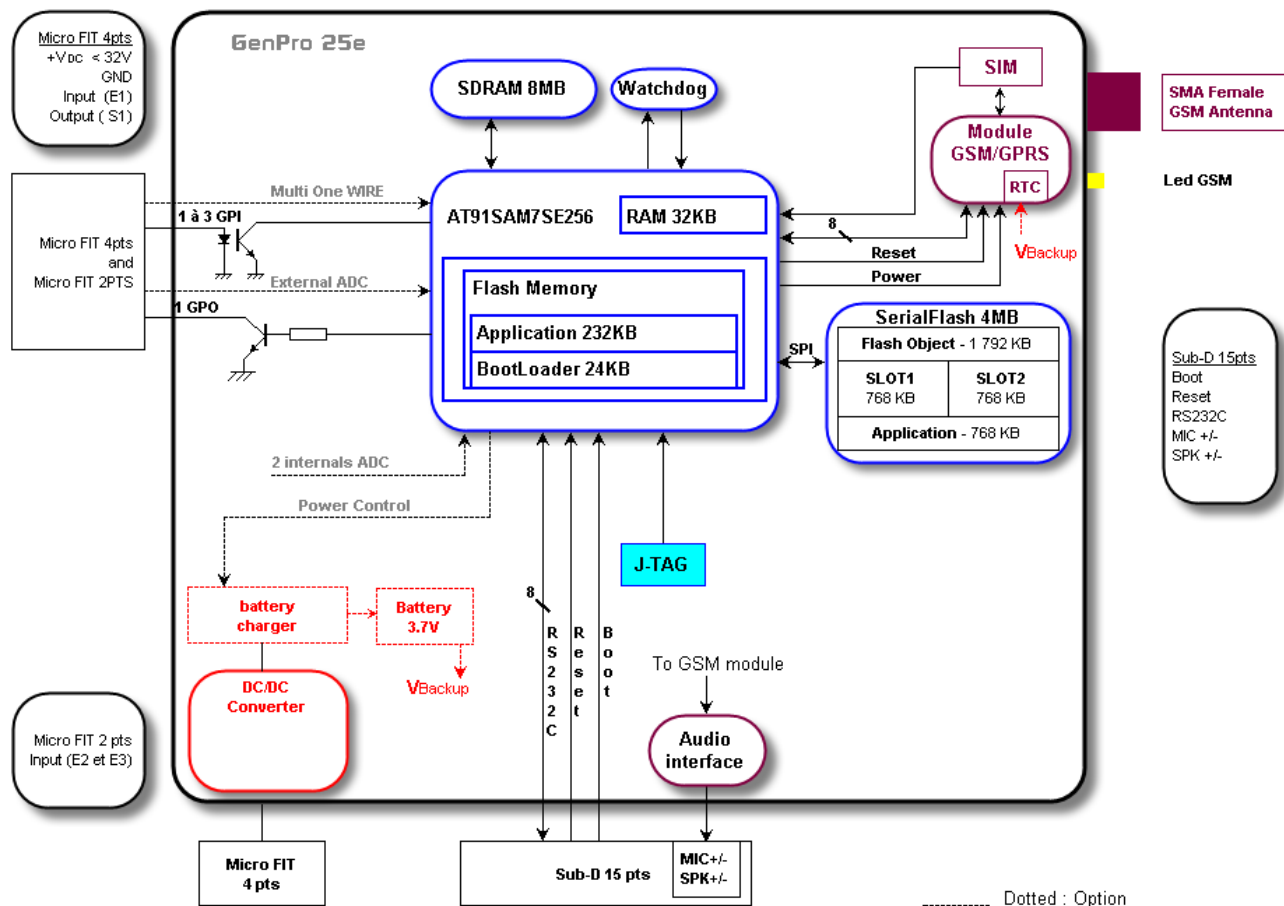
If the modem returns the message "NO CARRIER", you can get the extended error code with the command **AT+CEER**.

For more information about the error codes returned after having sent the command **AT+CEER**, see the document "ublox_AT_Commands_Manual_xxx.pdf"

7 Functional description

7.1 Architecture

Figure 18 : Functional architecture



7.2 Power supply

7.2.1 General presentation

The modem must be powered by an external DC voltage (+V_{DC}) between:

Table 16 : Power supply range

Standard	+6.5V ≤ +V _{DC} ≤ +32V
With battery option	+7.2V ≤ +V _{DC} ≤ +32V

The regulation of the modem power supply is made with a DC/DC internal converter in order to supply all necessary internal DC voltages.

A correct functioning of the modem in communication cannot be guaranteed if the input voltage (+V_{DC}) falls below 6.5 V or 7.2 V depending on the presence of the battery option or not.

7.2.2 Internal battery option

The battery is fixed inside the GenPro 25e. It is connected to an additional charging circuit cabled on the mother board of the GenPro 25e.

This battery allows to maintain the GenPro 25e functioning in case of absence of its external power supply (power supply connected on the Micro-FIT 4-pin female connector).

The internal charging circuit allows to keep permanently the charging of the battery from the external power supply.

When the battery is completely discharged, 3 hours are necessary to obtain a new complete charge. It is normal if the box heats a little bit in this case.

The autonomy of the battery mainly depends on the mode of use of the GenPro 25e (attachment in GSM/GPRS, Inputs/Outputs, RS232 connected...).



The internal battery option is not cabled by default and its assembly must be made by ourselves in our factory (contact us). The option is identified by a label (see § 2.3 Modem labels)

If the battery option is present, prepare the modem for storage or transport phases in order to limit high discharges of the battery. For that, see the § 5.11 Turning OFF the modem

7.2.2.1 Specifications of the internal battery option

The external power supply of the GenPro 25e is from +7,2V to 32V DC. The internal regulator of charge supplies the 4.2V voltage necessary for the battery charge.

Table 17 : Characteristics of the polymer lithium battery

Voltage (max.)	4.2V
Capacity	1000 mA/h typical
Exp. Cycle time	>500 cycles > 70% of initial capacity
Temperature range	Charge : 0°C to +45°C Discharge : -20°C to +45°C
Protection (Rearmable fuse)	Discharge voltage : 2.30V ±0.058V Maximum discharge current : 2A to 4A (1.0±0.3s)

7.2.2.2 Charge voltage and power supply voltage

The following table shows the consumptions of the modem when the GSM antenna and the SIM card are present.

These values were measured after a complete discharge of the battery.

Table 18 : Consumption of power supply (2*) GSM

CONDITIONS T=25°C		I Charge Nom.(mA) Without RS232
External supply voltage	@ 7.2V	174
	@ 12V	105
	@ 24V	55
	@ 32V	43

(2*) The power supply consumption may vary by 5% depending on the temperature range (-20 °C to +55 °C).

7.2.2.3 Indication of presence/absence of the external power supply

The modem contains the EGM standard library (see the documents "EG_EasePro_V2.xx_CL_yyy_UK.pdf"); in this case, the command **AT+GPIOGET=27** allows to know the status of the external power supply for the internal battery.

AT+GPIOGET=27

<Index>

- 1 indication of absence of external power supply
- 0 indication of presence of external power supply

Table 19 : Examples of responses with internal battery option cabled

Command	Response	Interpretation
AT+GPIOGET=?	+GPIOGET: (0-37) OK	Syntax
AT+GPIOGET=27	+GPIOGET: 27=0 OK	External power supply present
AT+GPIOGET=27	+GPIOGET: 27=1 OK	External power supply absent



The indication of presence/absence of the external power supply is valid only if the battery option is present.
In standard mode (without battery option), the response is **+GPIOGET: 27=1**

For more information about this command, see the document "EG_EasePro_V2.xx_CL_yyy_UK.pdf"

7.2.2.4 Instructions and restrictions of use

The internal battery option is not cabled by default and its implementation must be made by ourselves in our factory (contact us).

When the battery is completely discharged, it takes around three hours to obtain a complete charge.



When the battery is present and charged, the fact of removing the power supply +V_{DC} does not turn OFF the equipment. For this, see §5.11 Turning OFF the modem.



The battery cannot be replaced or modified by the user. The device must NOT be opened. For any action on the battery: the device MUST be returned to factory. Do not throw the modem and the battery on fire.

7.2.3 Protections of power supply

The modem is protected by a fuse 2A / 32V directly assembled on the power cable supplied with the modem.

The modem is also internally protected against voltage peaks of more than 32 V.

Filter guarantees: According to CE certification.

7.3 RS232 serial link

7.3.1 General presentation

The RS232 interface makes an adaptation of the voltage levels (V₂₄/CMOS ⇔ V₂₄/V₂₈) between the GSM/GPRS module (DCE) and the communication port of a PC (DTE).

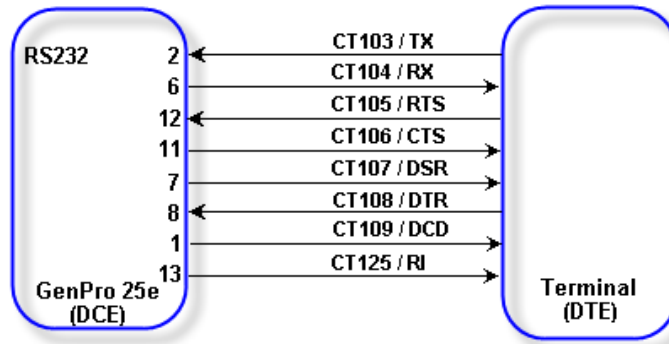
The RS232 interface is internally protected (ESD protection) against electrostatic peaks coming from the RS232.

Filter guarantees: According to CE certification.

The available signals on the RS232 serial link are:

- TX data (CT103/TX) : Data emission,
- RX data (CT104/RX) : data reception,
- Request To Send (CT105/RTS) : Request to send,
- Clear To Send (CT106/CTS)..... : Ready to send,
- Data Terminal Ready (CT108-2/DTR).. : Data terminal ready,
- Data Set Ready (CT107/DSR) : Data set ready,
- Data Carrier Detect (CT109/DCD)..... : Signal detection,
- Ring Indicator (CT125/RI)..... : Call indicator.

Figure 19 : Normalized signals of a RS232 serial link



The RS232 interface was designed to allow certain flexibility in the use of the serial interface signals. In fact, after the setting (see command **AT+IFC**), the modem can work in 3-wire mode (using only the signals TX, RX, GND), but the use of the signals TX, RX, GND, CTS, RTS is required for a GPRS application, which is not the case for the signals DTR, DSR, DCD and RI which may not be used.

7.3.2 Pins description

Table 20 : Pins description of RS232 interface

Signal	Connector Sub HD Pin N°	I/O	RS232 Standards	Description
CTXD/CT103	2	I	TX	Transmit serial data
CRXD/CT104	6	O	RX	Receive serial data
CRTS/CT105	12	I	RTS	Request To Send
CCTS/CT106	11	O	CTS	Clear To Send
CDSR/CT107	7	O	DSR	Data Set Ready
CDTR/CT108-2	8	I	DTR	Data Terminal Ready
CDCD/CT109	1	O	DCD	
CRI/CT125	13	O	RI	
CT102/GND	9			Ground

7.4 Inputs/Output functioning

The modem contains an EGM application: in this case, the modem GenPro 25e provides 3 inputs (opto-coupled) and 1 output (open collector) available for an external use.

These functions can also be controlled by AT commands:

- AT+GPIOSET** for a writing access to a GPIO with the GPIO used as an output,
- AT+GPIOGET** for a reading access to the GPIO with the GPIO used as an input.

7.4.1 Output functioning

AT+GPIOSET=10 This command is used to control the output. By default, the output is cabled as an open collector. To control it:

AT+GPIOSET=<n>,<x> with:

- <n> = 10** : Only 1 output available on the GenPro 25e (so, n=10),
- <x> = 0** : Output OFF
- 1** : Output ON

Examples:

Table 21 : Output functioning

Command	Response	Interpretation
AT+GPIOSET=10,1	OK	Output 1 OFF, transistor closed
AT+GPIOSET=10,0	OK	Output 1 goes to ON (transistor open)

7.4.2 Inputs functioning

AT+GPIOGET This command is used to read the inputs. By default the inputs 1 to 3 are opto-coupled. To read them:

AT+GPIOGET=<n> with:

- <n> = 7** : reading the input 1
- 8** : reading the input 2
- 9** : reading the input 3

Table 22 : Inputs functioning

Command	Response	Interpretation
AT+GPIOGET=7	+GPIOGET: 7= 0 OK	Input 1 read at 0 , the input 1 is controlled
AT+GPIOGET=9	+GPIOGET: 9= 1 OK	Input 3 read a 1 , the input 3 is not controlled



See Table of § Inputs/Output.

7.5 BOOT



This signal must NOT be connected, NOT used. Its use is strictly reserved for the manufacturer.

7.6 RESET

7.6.1 General presentation

This signal allows performing a Hardware RESET of the modem. In fact, this pin is used to force a RESET of the modem by putting it downwards during at least 10 ms.

This signal must be used only in case of emergency RESET.

This signal must be driven with an open collector assembly:

- pin 14 (RESET) at 0, for the modem Reset,
- pin 14 (RESET) at 1, for normal mode.

Table 23 : Description of RESET pin

Signal	Connector Sub HD Pin number	I/O	I/O type	Description
RESET	14	I/O	SCHMITT	Reset Modem

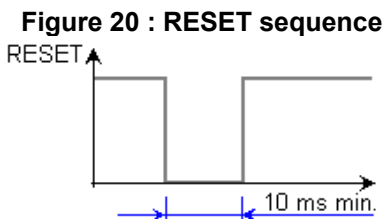


- This signal must be used only in case of emergency RESET. A Software RESET is always preferable to a Hardware RESET. It is strongly unadvised to execute this function whilst in communication or dialog, without having first detached it from the operator network.
- Using the RESET does not restore the factory parameters.

7.6.2 RESET sequence

To activate the emergency RESET sequence, the RESET signal must be put downwards during at least 10 ms.

As soon as the modem has been RESET, if a SIM card is inserted inside the SIM reader, you must wait for the end of the initialization before accessing it again.



Using the RESET does not restore the factory parameters.

7.7 WatchDog

The Hardware WatchDog function allows the surveillance of the modem software activity: the Software management of the WatchDog is implanted in the embedded application by default. In the case of a development (EGM) it must be implanted in the embedded application of the final customer.

If the software activity is interrupted, the WatchDog component starts a hardware Reset.

The WatchDog function is active only if the SIM card is present.

7.8 Audio

The modem contains the transparent mode application. The audio interface is standard to connect an equipment like a telephone handset.

The echo cancelation (command **AT+UMGC**) and noise reduction features are also available in order to improve the audio quality in the case of free-hand applications.

The audio interface is standard to connect a telephone handset (the command **AT+UHFP** allows the Handset selection, see the document "u-blox_AT_Commands_Manual_xxx.pdf"

ERCO & GENER recommends the use of the cable DATA/AUDIO Sub D 9pts Fem / Sub HD 15pts Male / RJ9 (order code 4404000205) and a telephone handset (order code 3153400000).

Table 24 : Audio cable pins

Designation	SUBD 9 F	SUBD 15 M-HD
DCD	1	1
RXD	2	6
TXD	3	2
DTR	4	8
GND	5	9
DSR	6	7
RTS	7	12
CTS	8	11
RI	9	13
	RJ9	
Micro +	1	4
Speaker +	2	10
Speaker -	3	15
Micro -	4	5

7.8.1 Microphone inputs

The microphone inputs are assembled in differential to reduce the noise in common mode and the TDMA noise.

They already include the functionality for a microphone like Electret (0.5 mA and 2 Volts) and they are ESD protected. This Electret microphone can be directly connected to these inputs allowing an easy connection to a telephone handset.

The microphone impedance is around 1.5 kΩ.

The gain of the microphone inputs is internally adjusted by a differential amplifier and can be adjusted with the command **AT+UMGC** (see the document "u-blox_AT_Commands_Manual_xxx.pdf"). The amplifier has a gain of 25.6 dB and a Bias generator that supplies an external voltage of 2 or 2.5V for the microphone Bias.

Table 25 : Description of microphone input

Signal	Connector Sub HD Pins number	I/O	I/O type	Description
MICP	4	I	Analog	Positive input of Microphone
MICN	5	I	Analog	Negative input of Microphone

7.8.2 Loudspeaker outputs (Speaker)

The outputs are assembled in differential to reduce the noise in common mode and the TDMA noise.

These outputs can be directly connected to a loudspeaker.

Table 26 : Description of loudspeaker output

Signal	Connector Sub HD Pins number	I/O	I/O type	Description
SPKP	10	O	Analog	Positive output of loudspeaker
SPKN *	15	O	Analog	Negative output of loudspeaker



* When the ANA2 option is present, the speaker audio output is available between the SPKP (pin 10 of the 15-pin sub D HD) and the 0V. In this case, the audio power available is divided by 2 compared with the § 8.2.4.2 Loudspeaker.

7.9 Internal processor

7.9.1 EGM presentation

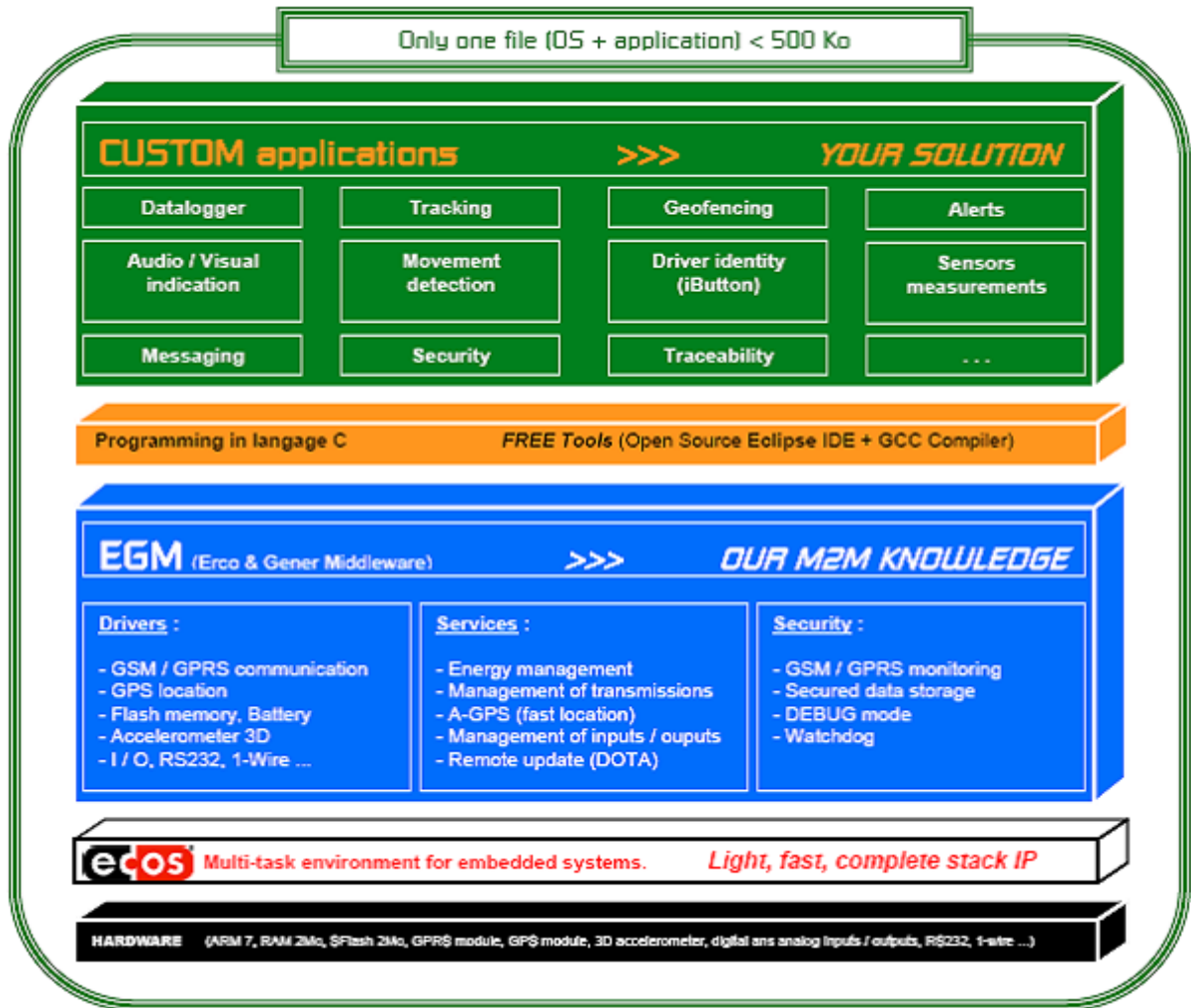
The GenPro 25e has an ARM7 processor that allows to have an embedded application developed from the EGM libraries and based upon eCos.

The EGM libraries supplied by ERCO & GENER contain the following elements:

- EGM software library,
- eCos software library,
- A set of header files (.h) defining the EGM API functions,
- Source code samples.

7.9.2 EGM architecture

Figure 21 : EGM architecture



For more information about EGM, see the ERCO & GENER documents for a description of the different functionalities.

8 Technical characteristics

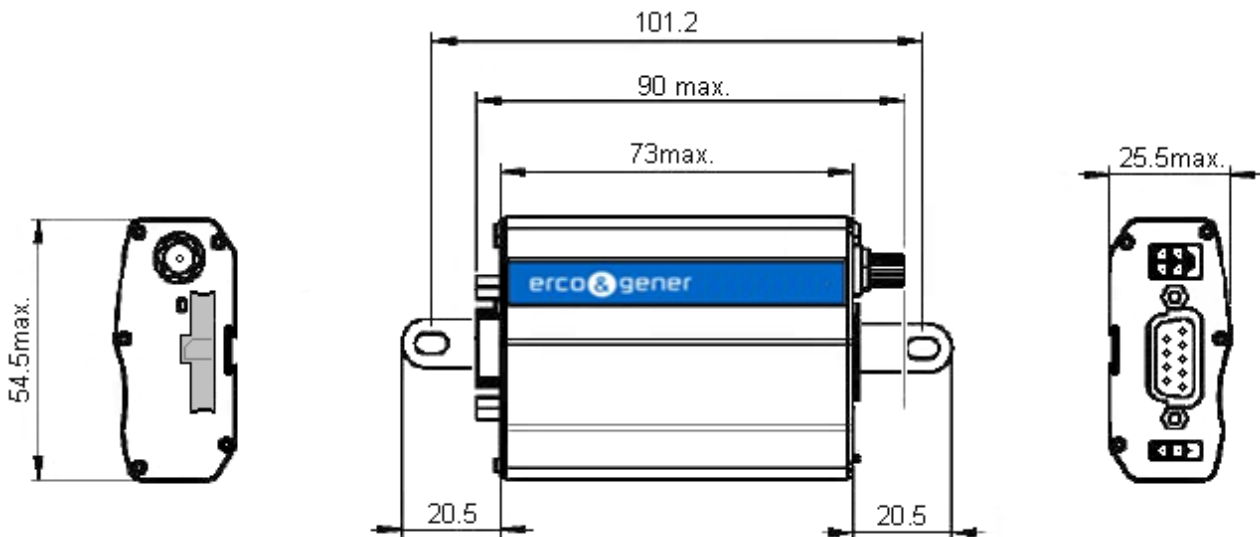
8.1 Mechanical characteristics

Table 27 : Mechanical characteristics

Dimensions	73 x 54.5 x 25.5 mm (excluding the connectors)
Complete dimensions	88 x 54.5 x 25.5 mm
Weight	≈ 88 grams (modem only) < 190 grams (modem + brackets + cables)
Volume	101.5 cm ³
Casing	Aluminium profile
Waterproof class	IP31

The illustration below shows the dimensions of the modem including the clearances necessary for the installation of the modem.

Figure 22 : Mechanical characteristics



8.2 Electrical characteristics

8.2.1 Typical consumption

Table 28 : Electrical characteristics

Power supply range	- 6.5V to 32V DC (GSM or DCS or GPRS)
Average consumption	- GSM 900 MHz : 154 mA @ 12V in communication - GSM 1800 MHz : 146 mA @ 12V in communication - Idle mode : 20 mA @ 12V



Once the power supply is connected, the modem is permanently consuming.



If the battery option is present, prepare the modem for storage or transport phases in order to limit high discharges of the battery. For that, see the 5.11 Turning OFF the modem

The following table describes the consequences of over-voltage or insufficient voltage on the modem.

Table 29 : Effects of power supply defect

	Then:
▪ Voltage falls below 6.5V	▪ The functioning and the GSM communication are not guaranteed
▪ Voltage above 32V (Punctual peaks)	▪ The modem guarantees its own protection.
▪ Voltage above 32V (Continuous over-voltage)	▪ The modem is protected by the fuse (the modem is put in c.c. via a para surtensior internal varistance).

The following tables show the consumption of the different functions of the modem.



The power supply consumptions may vary by 5% depending on the temperature range (-20 °C to +55 °C).

Table 30 : Mother board consumption @ 25 °C

Mother board	Average I Nominal				Unit.
	6.5	12	24	32	
V _{IN}	37	20,8	12,4	10,3	V mA

Table 31 : Battery charge consumption (option) @ 25 °C

Battery charge	Average I Nominal				Unit.
	7.2	12	24	32	
V _{IN}	160	87	46	36	V mA



When the battery is completely discharged, 3 hours are necessary to obtain a new complete charge.

Table 32 : GSM module consumption @ 25 °C

GSM module	Band	Mode	Average I Nominal				Unit.
			6.5	12	24	32	
V_{IN}			6.5	12	24	32	V
Low consumption	Power Off Mode		0,1	0,1	0,03	0,02	mA
	GSM/GPRS Power	@ DRX = 5	1,4	0,9	0,5	0,4	mA
	Saving (Idle) ⁽¹⁾	@ DRX = 9	0,9	0,6	0,32	0,26	mA
Peak current			2184	1065	504	374	mA
GSM ⁽²⁾	850 / 900 MHz (P = 32.2 dBm typ.)		212	115	60	47	mA
	1800 / 1900 MHz (P = 29.2 dBm typ.)		177	96	50	39	mA
GPRS ⁽²⁾	850 MHz (P = 30.5 dBm typ.)		290	158	81	63	mA
	900 MHz (P = 30.5 dBm typ.)		247	135	70	54	mA
2 Tx + 3 Rx slots TBF	1800 MHz (P = 27.5 dBm typ.)		233	127	66	51	mA
	1900 MHz (P = 27.5 dBm typ.)		240	131	68	53	mA

⁽¹⁾ The module is attached to the network

⁽²⁾ The module transmits at its maximum power.

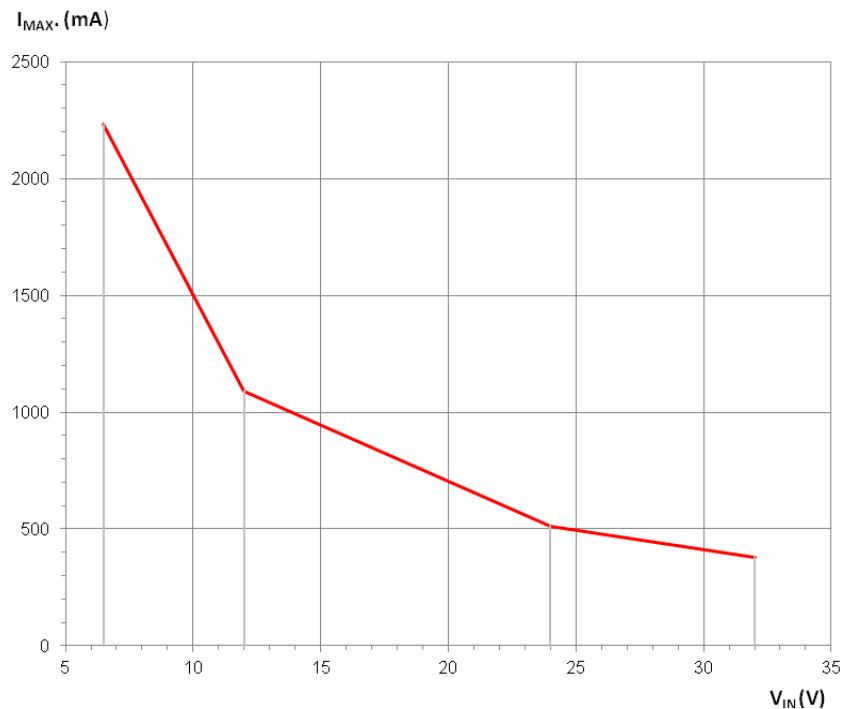
8.2.2 Consumption in Low Power mode

By default, the Low Power function is wired. Its use is reserved for EGM developers.

8.2.3 Max. consumption

The graph below shows the maximum current peak. The power supply must be able to provide this current during the GSM "Burts".

Figure 23 : Max. consumption



8.2.4 Audio interface

The audio interface is available via the 15-pin Sub HD connector, see the § 3.2.1.3 15-pin Sub D HD connector .



Main AT commands to control the audio string.

- AT+UHFP: Hand Free Parameters
 - AT+UMGC: Microphone Gain Control
 - AT+USGC: Speaker Gain Control
 - AT+USTN: Sidetone
 - AT+USPM: Audio Path mode setting
 - AT+USTN: Sidetone
-

8.2.4.1 Microphone

The microphone input is designed for a direct connection of the electret condenser micro. (For more details, see the command AT+USPM).



By default, the microphone input is active (pins MICP, MICN)

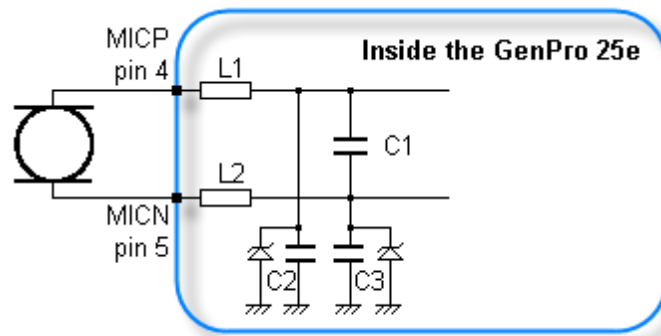
Table 33 : Polarization characteristics for a dynamic microphone

Micro Input	Parameter/Conditions	Min	Typ	Max	Units
Microphone supply open circuit voltage output	Provided by MICP with MICN.		2.2		V
Microphone supply current				2	mA
Microphone supply output resistance		2.85	3	3.15	kΩ
Microphone ground	MICN		0		V

Table 34 : Characteristics recommended for the dynamic Microphone

Micro Input	Parameter/Conditions	Min	Typ	Max	Units
Maximum Input Level Range	Full scale single-ended voltage. Signal applied to MICP with MICN as reference.			1.03	V _{PP}
Input Impedance – Mic(+) to Mic(-)	At 1 kHz. Impedance between MICP and MICN.		1.5		kΩ
Internal discrete high-pass -3dB cutoff frequency	Differential MIC		70		Hz

Figure 24 : Microphone input



Component	Value
C1, C2, C3	CONDENSER 22pF
L1, L2	Inductance 82nH

8.2.4.2 Loudspeaker



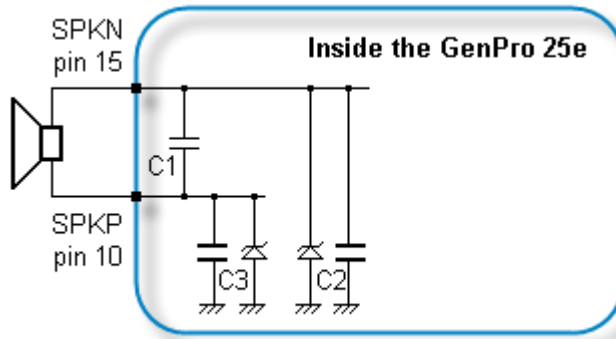
By default, the loudspeaker output is not active.
For more details, see the command AT+USPM. This output corresponds to SPK_P and SPK_N of the documentation.

Table 35 : Characteristics of the output for the loudspeaker

Speaker Output	Parameter/Conditions	Min	Typ	Max	Units
Maximum differential output voltage	Overdrive Gain stage = +9 dB		7.8		V _{PP}
Common mode output voltage			1.6		V
Output load resistance			8		Ω
Single-ended output load capacitance				10	nF
Inductive load				400	μH
Signal to noise	Load = 16 Ω, Gain stage = +0 dB, Input signal = 0 dBFS, Code 0, A-weighted	70	80		dB
Signal to distortion (THD)	Load = 8 Ω, 350 mW	50			dB
Power supply rejection	1 kHz	60			dB

If not precised, the parameters are measured in the frequency band 20 Hz,...,20 kHz.

Figure 25 : loudspeaker output



Component	Value
C1, C2, C3	CONDENSER 22pF

8.2.5 Inputs/Output

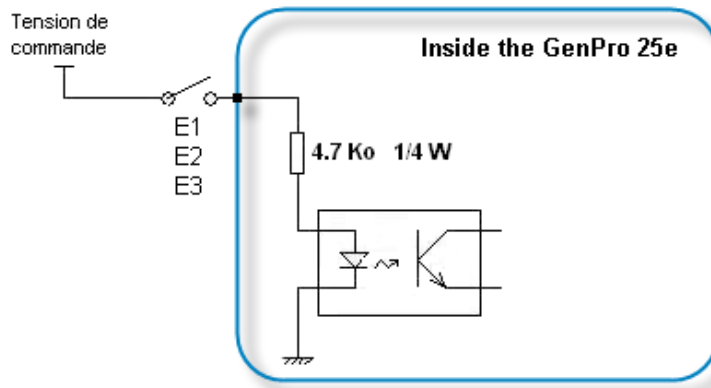
By default, the GenPro 25e provides 3 opto-coupled inputs (I1 to I3) and 1 open-collector output (O1).
As an option, it is possible to have an analog input instead of the opto-coupled input I2.

8.2.5.1 Opto-coupled inputs (I1, I2, I3)

Table 36 : Diode characteristics of opto-coupled inputs

Characteristics	Symbols	Conditions	Min.	Typ.	Max.	Unit
Max. current	$I_{F (rms)}$				50	mA
Max. inverted voltage	V_R				5	V
Direct voltage	V_F	$I_F = 10 \text{ mA}$	1.0	1.15	1.3	V
Inverted current	I_R	$V_R = 5 \text{ V}$			10	μA
Capacity	C_T	$V=0, f = 1 \text{ MHz}$	---	30	---	pF
Transfer ratio	I_C / I_F	$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}$	50	---	600	%
Saturation of transfer ratio	$I_C / I_{F(SAT)}$	$I_F = 1 \text{ mA}, V_{CE} = 0.4 \text{ V}$		60		%
Command voltage			3,5		35	V
Idle voltage					1	V

Figure 26 : internal electrical scheme of the 3 inputs



The minimum command voltage for the detection is: **3,5 V**



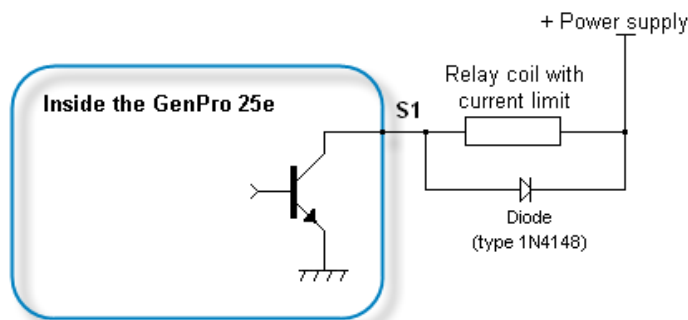
The maximum command voltage is: **35 V**

8.2.5.2 Output (S1)

Table 37 : Characteristics of open-collector output

Characteristics	Symbols	Conditions	Max.	Unit
Max. voltage	V_{CE0}	Transmitter open	48	V_{DC}
Max. voltage	V_{CES}	$V_{BE} = 0 V$	48	V_{DC}
Collector current	I_C		0.5	A
Saturation voltage	V_{CEsat}	$I_C = 500 mA$	1.3	V
Dissipation	P_{Tot}	$T_{amb} \leq 25\text{ }^\circ C, T_j = 110\text{ }^\circ C$	0.78	W

Figure 27 : Electrical scheme of the output



No protection is provided. The user must respect the values of the table above.

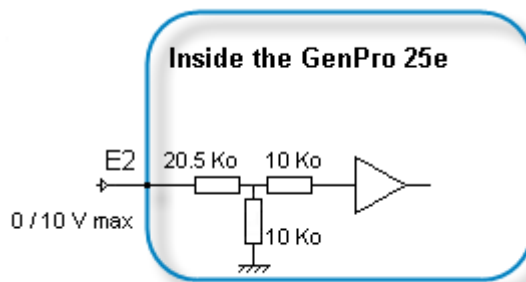
8.2.5.3 Analog input - ANA1 (0 - 10V) on INPUT 2

As an option, it is possible to have an analog input instead of the opto-coupled input I2. This analog input allows to do a voltage measure (contact us).

Table 38 : Characteristics of the analog input option in voltage

Characteristics	Symbols	Conditions	Min.	Typ.	Max.	Unit
Analog input	ANA1				12	V_{dc}
Conversion range		$6.5 V \leq +V_{DC} \leq 32V$	0.010		10.33	V_{dc}
Polarization current		From 10 mV to 10.33 V	1.34		350	μA_{dc}

Figure 28 : Internal electrical scheme of the option Analog Input 1



The integrator has the responsibility to protect the input from electric disturbances and to respect the values of the functioning parameters.

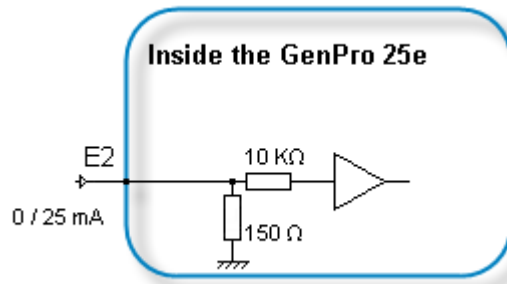
8.2.5.4 Analog Input – ANA1 (4 – 20mA) on INPUT 2

As an option, it is possible to have an analog input instead of the opto-coupled input I2.
This analog input allows to do a current measure (contact us).

Table 39 : Characteristics of the option Analog Input 1 in current

Characteristics	Symbols	Conditions	Min.	Typ.	Max.	Unit
Analog input	ANA1				25	mA _{dc}
Conversion range		6.5 V ≤ +V _{DC} ≤ 32V	0.66		24	mA _{dc}
Polarization current					32	pA _{dc}

Figure 29 : Internal electrical scheme of the option Analog Input 1 in courant



The integrator has the responsibility to protect the input from electric disturbances and to respect the values of the functioning parameters.

8.2.5.5 Bus One Wire (0 - 3.3V) multi-salves Dallas on INPUT3

As an option on the GenPro 25e, it is possible to have an input Bus One Wire instead of the opto-coupled input I3.
The bus is managed by a DS 2482S-100 from Maxim.

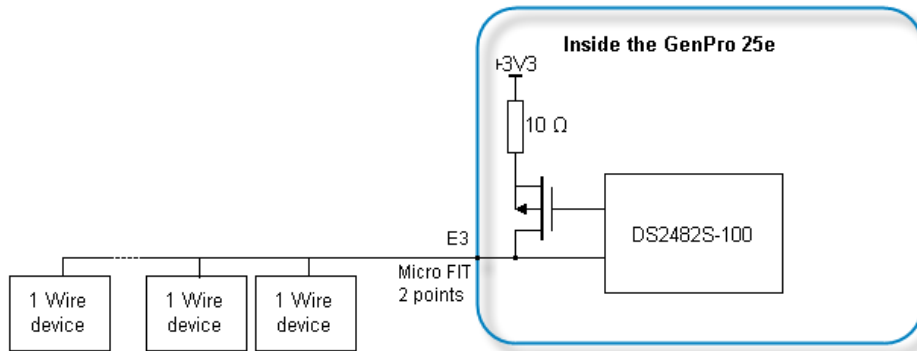
Table 40 : main electrical characteristics of the DS2482S-100

Characteristics	Symbols	Conditions	Min.	Typ.	Max.	Unit
1-Wire Input High	V _{IH1}		1.9			V _{dc}
1-Wire Input Low	V _{IL1}				0.9	V _{dc}
1-Wire Weak Pullup Resistor	R _{WPU}		1 000		1 675	Ω
1-Wire Output Low	V _{OL1}	@ 4mA load			0.4	V _{dc}
Active Pullup On Time	t _{APUOT}	Standard	2.3	2.5	2.7	μs
		Overdrive	0.4	0.5	0.6	μs
Strong Pullup Voltage Drop	ΔV _{STRPU}	VCC ≥ 3.2V, 1.5mA load			0.3	V _{dc}
Pulldown Slew Rate	PD _{SRC}	Standard (3.3V ±10%)	1		4.2	V _{dc} /μs
		Overdrive (3.3V ±10%)	5		22.1	V _{dc} /μs
Pullup Slew Rate	PU _{SRC}	Standard (3.3V ±10%)	0.8		4	V _{dc} /μs
		Overdrive (3.3V ±10%)	2.7		20	V _{dc} /μs



For more information, see the manufacturer documentation.
<http://datasheets.maxim-ic.com/en/ds/DS2482-100.pdf>

Figure 30 : Internal electrical scheme of the bus One Wire multi salves



The integrator has the responsibility to protect the input from electric disturbances and to respect the values of the functioning parameters.

8.2.6 SIM interface

Table 41 : Characteristics of the SIM card power voltage

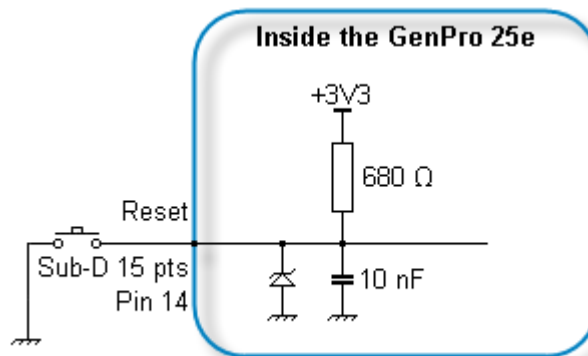
Component	Value
SIM Card	3 V or 1.8 V

8.2.7 RESET signal

Table 42 : Conditions of use of the RESET

Component	Value
R _{IPU} Internal Pull-Up Resistor	680 Ohms

Figure 31 : Wiring scheme of the RESET



8.2.8 RF GSM/DCS characteristics

8.2.8.1 RF functioning

The RF functioning complies with the recommendation ETSI GSM Standard.

The RF performances for the receiver and the transmitter are described below.

Table 43 : Parameters of RF receiver and transmitter

Receiver	
Sensitivity in 850/900 @ 25 °C	- 110 dBm, GPRS Coding Scheme 1 (CS1)
Sensitivity in 1800/1900 @ 25 °C	- 109 dBm, GPRS Coding Scheme 1 (CS1)
Transmitter	
Maximum power (Power Class4 - 850/900) at ambient temperature	33 dBm +/- 2 dB @ antenna connection
Maximum power (Power Class1 - 1800/1900) at ambient temperature	30 dBm +/- 2 dB @ antenna connection

8.2.8.2 GSM external antenna

The GSM external antenna is connected to the modem via the SMA female connector

The external antenna must have the characteristics described in the table below.

Table 44 : Characteristics of the GSM external antenna

Frequency band	
GSM 900	880..960 MHz
GSM 1800	1710..1880 MHz
GSM 850	824..894 MHz
GSM 1900	1850..1990 MHz
Impedance	50 Ohms nominal
Input power	> 2 W peak
Gain	< 3 dBi
VSWR	< 2:1 recommended < 3:1 acceptable
Return Loss	S ₁₁ <-10 dB recommended S ₁₁ <-6 dB acceptable



See § 10 Recommended accessories , for the GSM antennas recommended by ERCO & GENER.

8.2.9 Characteristics of the serial link (UART)

Table 45 : Characteristics of the UART

Characteristics	Symbols	Conditions	Min.	Typ.	Max.	Unit
Input Voltage – Range	V_{Input}	Input Voltage – Range	-25		+25	V_{dc}
Input Voltage – Low	V_{IL}	Input Voltage – Low	0.4	1.3		V_{dc}
Input Voltage – High	V_{IH}	Input Voltage – High		2	24	V_{dc}
Input Hysteresis	V_{Hys}	Input Hysteresis		0.14		V_{dc}
Input Resistance	R_{in}	Input Resistance	3	5	7	K Ω
Output Voltage	V_{out}	All transmitter outputs loaded with 3 k Ω to ground	± 5	± 6.4		V_{dc}
Transmitter Output Resistance	R_{out}		300			Ω
RS-232 Output Short-Circuit Current	I_{cc}			± 15	± 60	mA

8.3 Environmental characteristics

To ensure a correct functioning of the modem, the limits listed in the table below must be respected.

Table 46 : Environmental characteristics

Operating temperature range	-20 °C to +60 °C
Storage temperature range	-40 °C to +85 °C
Operating humidity without condensation	HR < 70% @ +55°C
Atmospheric pressure	700 hPa to 1060 hPa (-400 m to 3000 m)



If the battery option is present, the environmental conditions are different. See table below.

Operating temperature range	
Battery charging	0 °C to +45 °C
Battery discharging	-20 °C to +45 °C
Storage temperature range	1 year of storage between -20°C to + 35°C 3 months of storage between -20°C to + 45°C 1 month of storage between -20°C to + 60°C
Relative humidity	65% \pm 20%

8.4 Standards/Conformities

The product complies with the following requirements:

- R&TTE 1999/5/EC Directive,
- EN301489-1:V1.8.1
- EN301489-7:V1.3.1
- §6.5, §6.6, §6.8 and §6.9 of the 2004/104/CE directive
- EN 301 511 v9.0.2
- EN 60950-1:2006 + A11:2009
- ROHS Compliant : Directive 2002/95/CE
- "REACH" N°1907/2006
- 2002/96/CE DEEE (Crossed-out wheelie bin).

The following marking appears under the device.



9 Security recommendations

9.1 General security

It is important to respect the specific regulations regarding the use of radio equipment, in particular with the possible risks of interference due to radio frequency (RF). Please respect carefully the following security advices.

Turn OFF your GSM modem:

- On an aircraft, the use of cellular telephones can endanger the plane operations; disturbing the cellular network is illegal. The non-observance of this instruction can lead to the suspension or the exclusion of the cellular phone services, or even to a trial, or both,
- At a refueling station,
- In any area with a potential explosive atmosphere that could cause an explosion or a fire,
- In hospitals and other places where medical equipment may be used.

Restrictions of use of radio equipments in:

- Fuel warehouses,
- Chemical factories,
- Places where destruction operations are in the running,
- Other places where signs indicate that the use of cellular phones is prohibited or dangerous.
- Other places where you should normally turn OFF the engine of your vehicle.

There can be a danger associated with the use of your GSM modem close to insufficiently protected medical devices such as acoustic devices and pacemakers.

Consult the manufacturers of medical equipment to know if it is adequately protected.

Using your GSM modem close to other electronic equipments may also cause interferences if the equipment is insufficiently protected.

Pay attention to the warnings and the recommendations of the manufacturers.

The modem is designed to be used with "fixed" and "mobile" applications:

- "Fixed" application: The GSM modem is physically linked to a site and it is not possible to move it easily to another site.
- "Mobile" application: The GSM modem is designed to be used in various places (other than fixed) and is intended to be used in portable applications.
- The modem must be used at more than 20cm from the human body.

This equipment is supplied in Very Low Security Voltage and at non-dangerous energy level.

9.2 Security in a vehicle

Do not use your Modem whilst driving, unless equipped with a correctly installed ear-piece/hands-free kit.

Respect the national regulations regarding the use of cellular telephones in vehicles. Road safety is always a priority.

An incorrect installation of the GSM modem in a vehicle could cause an incorrect functioning of the vehicle's electronics. To avoid such problems, ensure that the installation was done by a qualified person. During the installation, a verification of the electronic protection system of the vehicle must be done.

The use of a warning equipment that activates the headlights or the horn of a vehicle on public highway is not authorized.

9.3 Care and maintenance

The suggestions below will help you to preserve this product for many years.

Do not expose the modem to the extreme environments, to high temperature or high humidity.

Do not use or store the modem in dusty or dirty places, it could be damaged.

Do not try to disassemble the modem, at the risk of cancelation of the guarantee.

Do not expose the modem to water, rain or spilled beverage, it is not impermeable.

Avoid dropping, striking, or shaking the modem violently. The lack of care can damage it.

Do not place the modem next to computer disks, credit or travel cards or other magnetic supports. The information contained on disks or cards can be affected by the modem.

The use of other equipments or accessories not made or not authorized by ERCO & GENER can cancel the guarantee of the modem.



If the battery option is present, the battery is not under guarantee.

9.4 Your responsibility

This modem is under your responsibility. Treat it with care, it is not a toy. Keep it always in a secure place and out of the reach of children.

Try to remember your PIN and PUK codes. Familiarize yourself with the modem and use the security functions to lock it in case of non-authorized using or in case of theft.

10 Recommended accessories

The accessories recommended by ERCO & GENER for the modem GenPro 25e are described on our website in the section Products/Accessories. For more information, contact our sales department.

11 Client support

ERCO & GENER ensures the client support for all its modems sold. You will then have access to:

- The latest version of this document
- The datasheet of the product
- The latest versions of the OS user guides
- Certificates
- Application notes



The support for the EGM developments is proposed as an option (contact us).
