

User Guide

GenPro 2xe

GenPro 22e
(GenPro 20e AOB)



GenPro 23e
(GenPro 24e AOB)



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

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PRÉSENTATION

Entirely dedicated to the wireless markets throughout the world, the GenPro 2xe (Application On Board) allows a simple and rapid integration of GSM / GPRS Quad-Band (850/900/1800/1900 MHz) connectivity into M2M applications.

The GenPro 2xe is a robust, reliable and long life product. Its very compact metal case makes it ideally adapted to onboard standards

The range GenPro 2xe comes in two versions: GenPro 22e and [GenPro 23e](#)

Optional back-up battery and accelerometer associated with EGM (Erco & Gener Middleware) development tools, offer the possibility for the personalisation of supplementary applications

Unlike GenPro 22e, [GenPro 23e](#) has 3 inputs and 1 digital output

The GenPro 2xe has 3 operating modes:

- External mode (standard): The driving is made by an external application. The modem is used with the AT commands set (see EG_EGM_CL_xxx_yy of ERCO & GENER).
- Autonomous mode (optional): Once configured, the modem is autonomous; it cyclically registers the positions and transmits them automatically to the client's application via different services: SMS, GSM Data, TCP socket GPRS (see EG_EasePro_01_CL_xxx_yy of ERCO & GENER).
- Specific development mode: the EGM development tool allows to develop personalized embedded application. For more information concerning the tools and the training, please contact our sales department.

The GenPro 2xe 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,
- Recommended accessories for the use of the modem.

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

- Commands List
 - External mode EG_EGM_CL_xxx_yy
 - Autonomous mode EG_EasePro_01_xxx_yy
- Application Note EG_GenPro2xe_1003_AN_xxx_yy
- Release Note EG_GenPro2xe_1003_RL_xxx_yy
- Support client (Hot-Line)

Avertissement

- Erco&Gener advises to read carefully all the documents concerning the GenPro 2xe (User Guide, Application Notes, Command List).
 - ERCO & GENER cannot be held responsible for:
 - The problems due to an inappropriate use of the GenPro 2xe .
 - The problems due to a wrong configuration
 - The problems due to a wrong use of an embedded software application developed or supplied by a third party.
 - The dysfunctions due to the absence or a bad coverage of the GSM, GPRS networks.
 - The 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 2xe " 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 2xe** must be returned to the factory for any repair.
- The **GenPro 2xe** 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 supply cable and the inputs/outputs cable must not exceed 3 meters.
- The **GenPro 2xe** must not be connected directly to the mains supply; a voltage adapter must be used.



SCRAP THE WORN BATTERIES ACCORDING TO INSTRUCTIONS.

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1 Références

1.1 Various References

The functionality according to the references GenPro 2xe are summarized in the table below

Modem GenPro 2xe	22e	23e
GSM Functions		
- E-GSM Quad-Bandes 850/900/1800/1900 MHz	X	X
- ETSI GSM Phase 2+ Classe 4 (2W @ 850 / 900 MHz) Classe 1 (1W @ 1800 / 1900 MHz)	X	X
- SIM Toolkit Release 99	X	X
Voice Functions		
- Voice (GSM mode)	X	X
- Telephony, Emergency call 112	X	X
- Full Rate, Enhanced Full Rate, Half Rate and Adaptive Multi-Rate (FR/EFR/HF/AMR)	X	X
- Echo cancelation and noise reduction	X	X
- Full Duplex Free-hand	X	X
DATA Functions		
- GPRS Classe 10 (Jusqu'à 4Rx / 2Tx)	X	X
- Supporte le PBCCH, Schémas de codage : CS1 à CS4	X	X
- TCP/IP libraries (PPP, TCP Socket, UDP Socket*, FTP, SMTP*)	X	X
- Asynchronous data circuit, transparent and non-transparent 9600 (Standard) at 14400bds (depending on network)	X	X
- SMS Text, PDU, point to point MT/MO and SMS Cell Broadcast	X	X
Memory Type		
- Flash memory 512 Kbytes, SDRAM 16 Mbits, Serial Flash 16 Mbits.	X	X
Interfaces		
- GSM Antenna: SMA-F connector	X	X
- Power supply : +5.5 to +32 VDC (micro-FIT connector)	X	X
- RS232 (300 to 115200bds) + Audio through the female 15-pin Sub-D	X	X
- Commandes AT : GSM 07.05 et 07.07	X	X
- 3 opto-inputs from 3Vdc to 32Vdc (Micro-FIT connector)		X
- 1 open-collector Output 60Vdc – 1A (Micro-FIT connector)		X
- SIM reader (SIM 3V – 1,8V)	X	X
- Watchdog	X	X
Accessories supplied		
- Fixing brackets (x2)	X	X
- 2-wire Micro FIT Power supply cables (2 Inputs)	X	
- 4-wire Micro FIT cables (Power supply, Input and Output)		X
- 2-wire Micro FIT cables (2 Inputs)		X

1.2 Referred documents

Commands List of

Standard library of ERCO & GENER : EG_EGM_CL_xxx_yy
 the embedded application EasePro of ERCO & GENER : EG_EasePro_01_CL_xxx_yy
 Application Notes GenPro 2xe of ERCO & GENER : EG_GenPro2xe_1003_AN_xxx_yy

GSM reference documents:

- GSM 07.05.
- GSM 07.07.

1.3 Abréviations

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
dBi	Decibel relative to an Isotropic radiator
dBm	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)
FR	Full Rate
FTA	Full Type Approval
FTP	File Transfert Protocol
GCF	Global Certification Forum
GND	GrouND
GPIO	General Purpose Input Output

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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
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
TCP/IP	Transmission Control Protocol / Internet Protocol
TDMA	Time Division Multiple Access
TU	Typical Urban fading profile
TUHigh	Typical Urban, High speed fading profile
TX	Transmit
TYP	TYPical
UTC	Universal Time Clock
VSWR	Voltage Stationary Wave Ratio

1.4 Symbols

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



A symbol for the essential information concerning 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 2xe (see table 1.1) is supplied with:

- a GenPro 2xe cardboard packaging
- a modem GenPro 2xe ,
- 2 fixing brackets,
- A technical sheet (Instructions Sheet)

Table 1.1

GenPro 2xe cable is supplied with	22e	23e
2-wire stripped cable (Red/Black) with fuse	X	
4-wire stripped cable Red/Black/Orange/Green stripped with 5x20 fuse of 2.5A/250V or depending on the supplying Red/Black/Yellow/Brown stripped with mini Blade fuse of 2A/32V.		X
2-wire stripped cable (Blue/Yellow).		X



Depending on the reference GenPro ordered, 2 or 4 wires cables are supplied.

2.2 Packing case

The external dimensions of the packing case are:

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

An identification label is put on the top of the packing case. It shows:

- The ERCO & GENER logo,
- The product reference: GenPro 2xe,
- The CE mark,
- The ROHS Compliant 2002 / 95 / EC mark,
- The IMEI bar code with 15 digits.

The dimensions of the label are:

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

2.3 Modem labels

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

- A production label indicating the following information:
 - The CE mark,
 - The crossed wheelie-bin mark (DEEE standards),
 - The direct current mark (VDC),
 - ~~The mark AOB (R30),~~
 - The IMEI bar code with 15 digits.
- A label of the markings: ROHS (2002/95/CE).



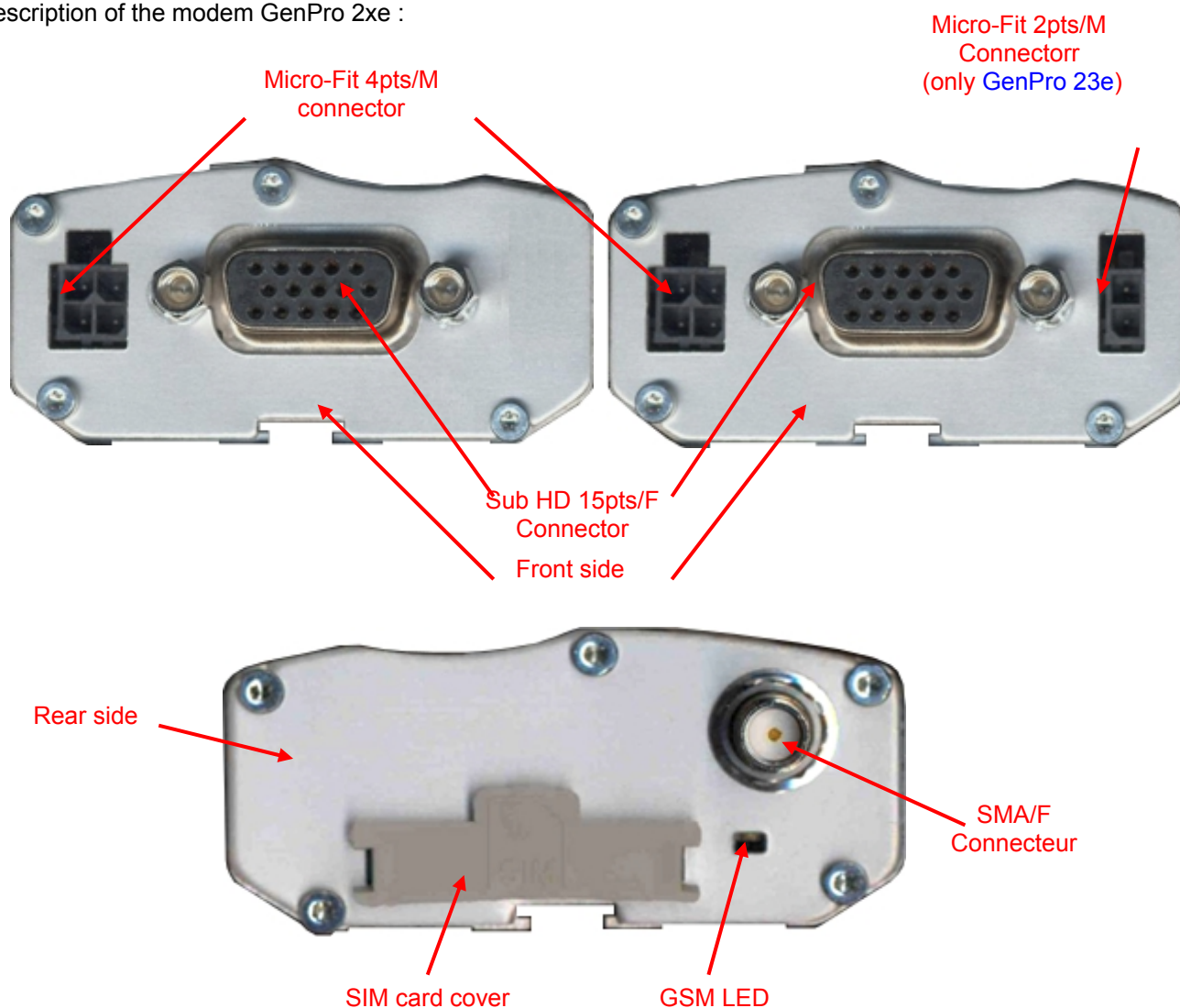
If the internal battery option has been mounted during production, the modem has the following label: "Lithium-Polymer Battery Inside".



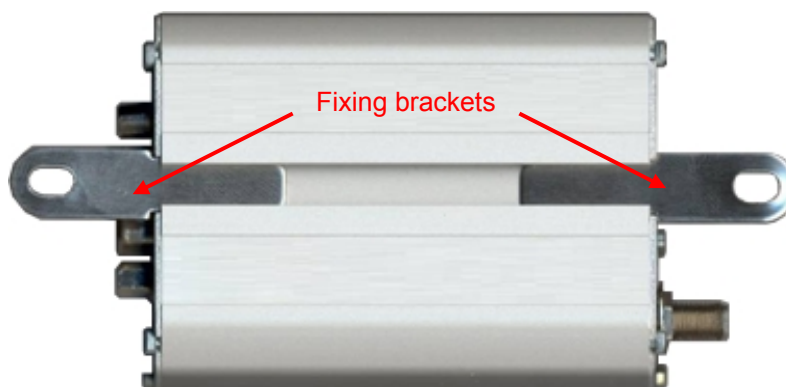
3 General Presentation

3.1 Description

Description of the modem GenPro 2xe :



2 brackets to fix the modem on a support.



3.2 External connections

3.2.1 Connections

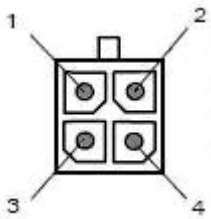
3.2.1.1 Antenna connectors

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 GenPro 2xe is a connector for external power DC and GPIO (these 2 Input and output signals are available only for the [GenPro 24e](#) version).



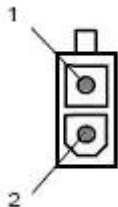
Pin N°	Signal	
	GenPro 22e	GenPro 23e
1	+VDC	+VDC
2	GND	GND
3	---	INPUT 1(E1)
4	---	OUTPUT (S1)



The pins 3 and 4 are used for the Input/Output functions. The modem can only be powered by the pins 1 (+VDC) and 2 (GND)..

Female Micro FIT connector with 2 male pins:

Only [GenPro 23e](#), this connector is used for the GPIO (2 Input signals).



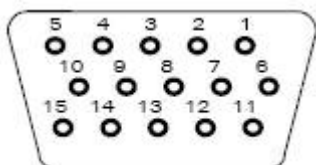
Pin N°	Signal
1	INPUT 3 (E3)
2	INPUT 2 (E2) *

* as an option, E2 can be an analog input (contact us)

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 loud-speaker),
- The BOOT and RESET signals.



Pin N°	Description	Circuit (V24 – RS232C)	I/O
1	Signal detection / Buzzer *	109 – DS – DCD	O
2	Data emission	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	Clear to send	106 – PAE – CTS	O
12	Request To Send	105 – DPE – RTS	I
13	Ring indicator / 3,8V *	125 – IA – RI	O
14	Reset	RESET	I
15	Loud Speaker -	SPKN	O

(*)by default:

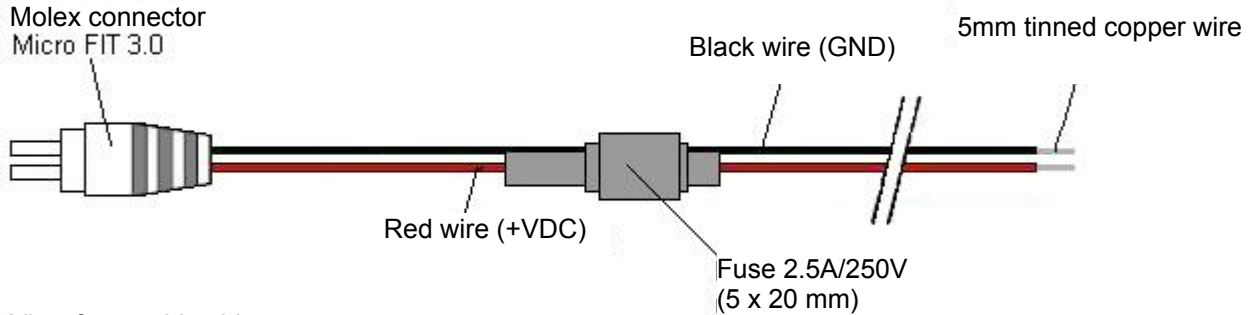
- The pin 1 is the Buzzer output (wiring of the output 109/DCD optional).
- The pin 13 is a fixed tension (to power accessories like GenBlue 15e) of 3,8V 100mA (wiring of the output 125/RI optional).

3.2.2 Cables

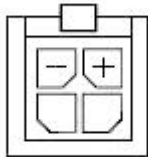
According GenPro ordered, different cables described below will be delivered (refer to table 1.1).

3.2.2.1 2-wire micro FIT cable GenPro 22e

The 2-wire micro FIT cable allows to power the modem.



View from cable side

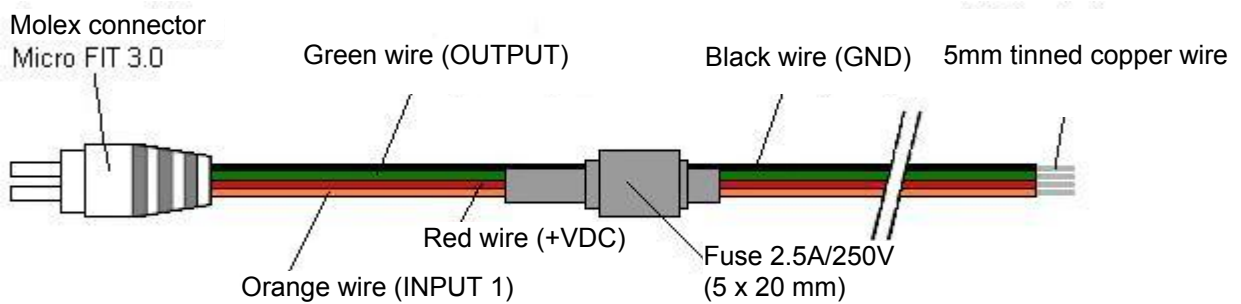


Component	Characteristics
4-pin Micro FIT connector	Supplier: MOLEX
Cable	Length ≈ 1.5m
Wire	Tinned copper 24 x 0.2 mm
	Section : 0.75 mm ²
Fuse	F2.5A L250V

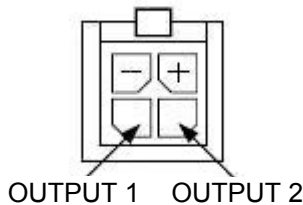
3.2.2.2 4-wire micro FIT cable GenPro 23e

One of the two following cables is provided

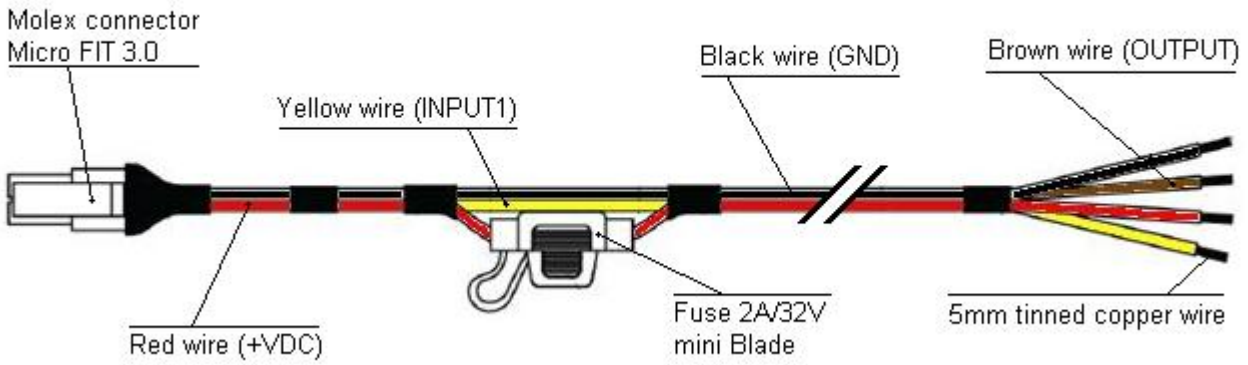
The 4-wire micro FIT cable allows to power the modem and to use the 2 signals Input and Output.



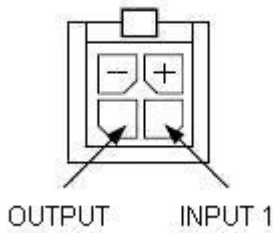
View from cable side



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	F2.5A L250V



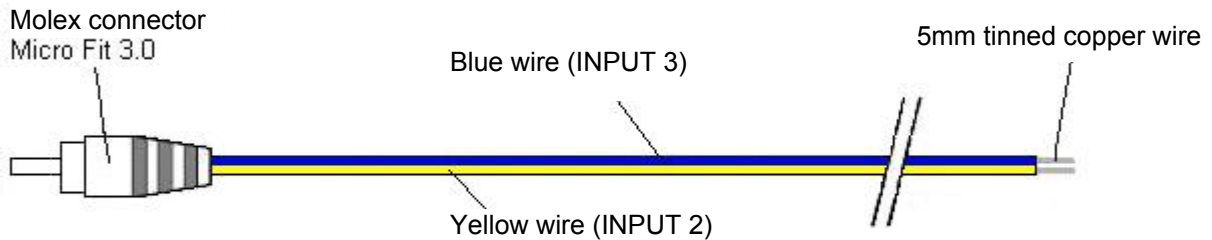
View from cable side



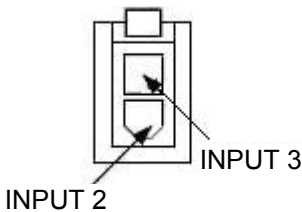
Component	Characteristics
4-pin Micro FIT connector	
Cable	Length ≈ 1.5m
Wire	Tinned copper 24 x 0.2 mm
	Surface area : 0.75 mm ²
Fuse	mini N 2A 32V Fast (Grey)

3.2.2.3 2-wire micro FIT cable GenPro 23e

The 2-wire micro FIT cable allows to use the 2 supplementary inputs.



View from cable side



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 2xe is a class10 GSM/GPRS modem dedicated to asynchronous binary data transmission, SMS and voice.

It may also have 3 inputs and 1 output

The characteristics of different GenPro 2xe are summarized in the table in paragraph 1.1

The available services are summarized in the table below.

Options / Accessories for Modem GenPro 2xe modem	22e	23e
Options *		
- Back-up battery	X	X
- Real-Time-Clock backup	X	X
- Analog input (instead of opto-coupled input E2)		X
- Buzzer Output	X	X
- External power 3.8V for GenBlue 15e	X	X
- Bus One Wire		X
- Software development kit : cdrom SDK EGM	X	X
Accessories *		
- Serial data cable - 15M/9F or Serial data cable / Audio- 15M/9F/RJ9	X	X
- power supply 230 Vac - 12 Vdc	X	X
- GSM (SMA-M) antenna	X	X
- GenBlue 15e : Adapter Bluetooth® / RS232 auto-supplied	X	X

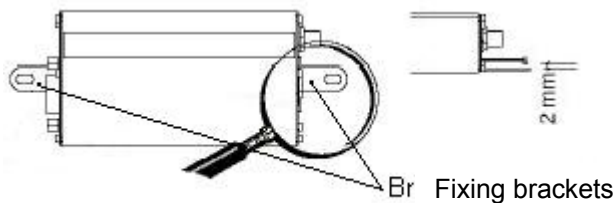
* contact us

5 Using the modem

5.1 Starting with the modem

5.1.1 Mounting the modem

To mount the modem on a support, use the fixing brackets as described below



Note:

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



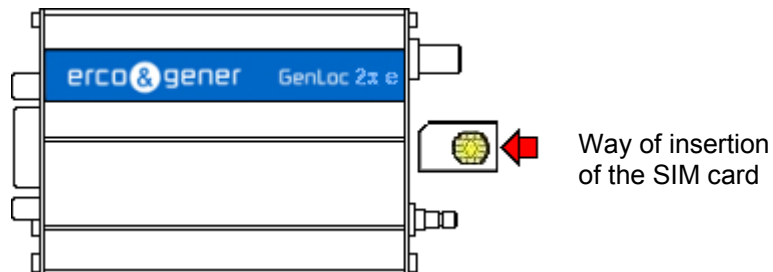
The aluminum casing of the modem is connected to the 0V (GND) of the power supply and to the 0V of the RS232 serial link. To avoid any risk of conduction of the ground plane to other equipments,

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 rear side.
- Carefully insert the SIM card into the reader.



- Push the SIM card until hearing a "clac" that ensures its correct positioning.
- Put the SIM cover back.
- Connect the GSM antenna to the SMA connector.
- Connect the GPS antenna to the SMB 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 the 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.

There are different cases depending on the application or library installed inside the equipment:

- Without library: corresponds to the Boot_Loader.
- With EGM standard library.
- The application ERCO & GENER EasePro-01.
- The owner application..

5.1.3 Checking the communication with the modem

5.1.3.1 Without Library

The GenPro 2xe does not contain any library, it will return the menu of the Boot-Loader.

Connect the link RS232 between the DTE (the 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 HyperTerminal ® of Windows.

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

```
Bootloader V2.27L UE GenPro 2xe ENF (HW0C rev C)
1 - Update application
2 - Erase objects
M - GSM direct access
A - Advanced
E - Exit
```

With this status, 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 Standard with EGM Library

The GenPro 2xe contains the EGM standard library; 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 HyperTerminal ® of Windows.

Send the AT command. The modem returns OK. For more precision about the commands, see the documents "EG_EGM_CL_xxx_yy" of ERCO & GENER.

With this status, 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.

5.1.3.3 The application ERCO & GENER EasePro-01

This application is being developed. Contact us.

5.1.3.4 The owner application

The GenPro 2xe 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 HyperTerminal ® of Windows.

Check the display and the dialogue with the GenPro 2xe according to your our 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 rear 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 made when the RESET signal (pin 14) is held at a low level during 10ms.



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

5.2 Specific recommendations for the use of the modem in vehicles



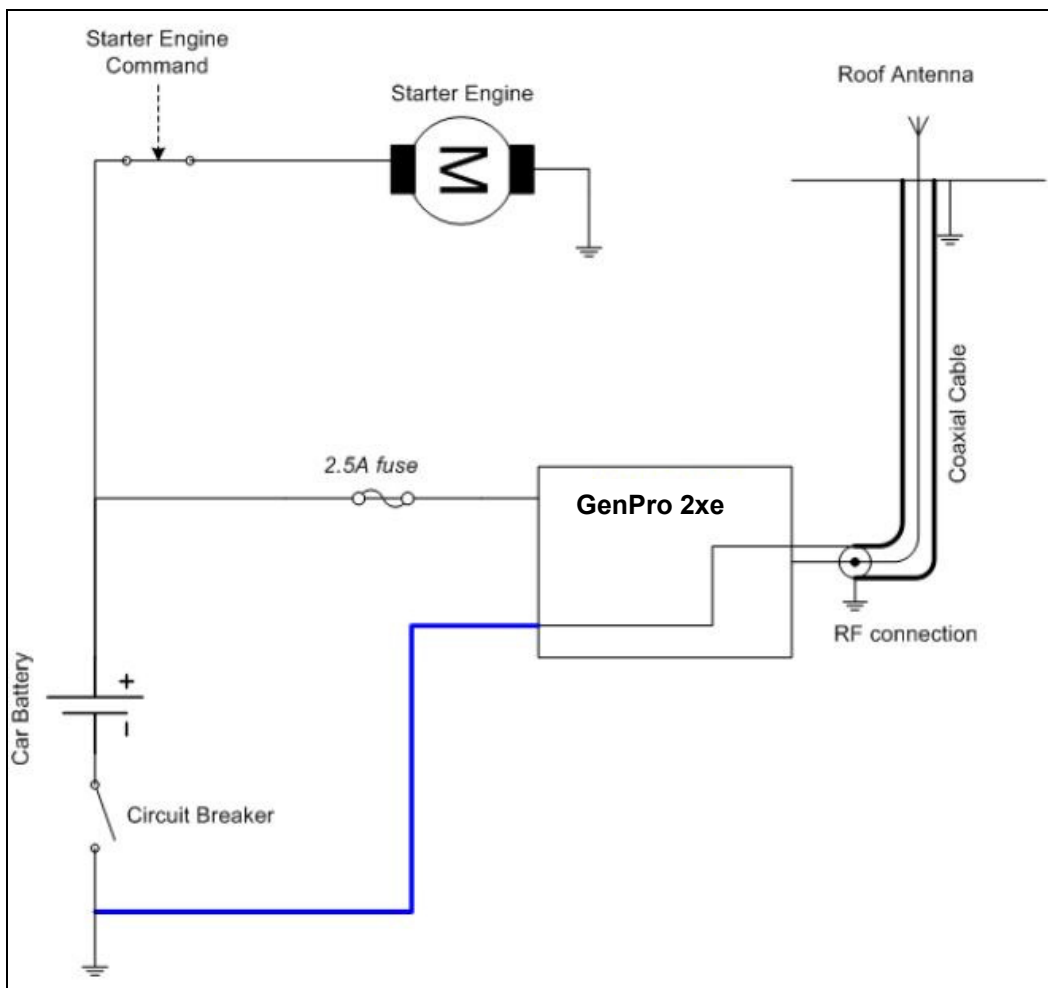
The power supply connector of the modem GenPro 2xe must **NOT** be connected directly to the battery of the vehicle.

5.2.1 Recommended Connection on the battery of a truck

All lorries 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 lorry, the driver can cut off the power source and avoid more damage (explosion).

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

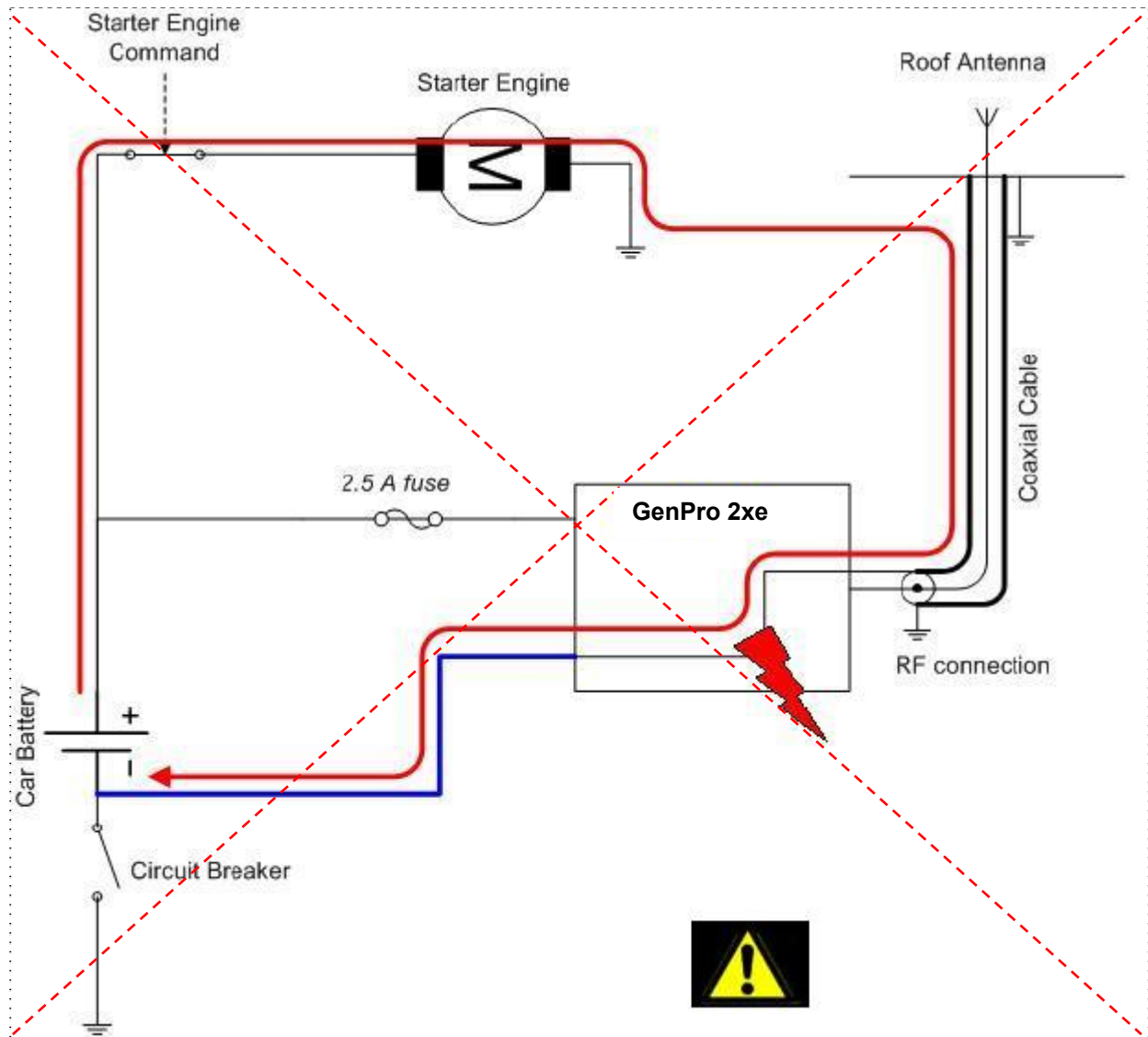
Most of lorry circuit breakers do not cut off the PLUS of the battery, but cut off the ground.



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 lorry or in the fuse box).

5.2.2 Technical constraints in truck

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 lorry is starting up if the circuit breaker is closed (in this case, the ground of the lorry and the ground of the battery will be connected via the modem as described in the scheme below)



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 lorry (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 about 60 A (when starting the lorry), or they would be destroyed.

5.3 Modem leds

5.3.1 Without library

The GenPro 2xe does not contain any library. The led is off.

5.3.2 With EGM standard library

The led remains off.

5.3.3 The application ERCO & GENER EasePro-01

This application is currently under development. Contact us.

5.3.4 The owner application

The GenPro 2xe contains your application. The led status depends on your parameters.

5.4 Echo function of the deactivated AT commands

The modem contains the EGM standard library (see the documents "EG_EGM_CL_xxx_yy" of ERCO & GENER) 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**. To activate the echo function of the modem, enter the command **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 "EG_EGM_CL_xxx_yy" of ERCO & GENER.

5.5 Checking the quality of the GSM reception signal

The modem contains the EGM standard library (see the documents "EG_EGM_CL_xxx_yy" of ERCO & GENER) in this case, the modem will be able to make a call only if the received GSM signal is sufficient.

The command **AT+CSQ** allows to know the reception level (*rssr*) 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.

This command can also be used without the SIM card, it indicates in this case the nearest BTS which can be ORANGE, SFR or BOUYGUES for France (Without SIM card, the current subscription is not recognized). It is therefore advisable to do the measure when the SIM card is present.

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 : <rssr>, <ber> with:

<rssr> = indicates the reception level,

<ber> = receive bit error rate.

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

<rssr> Value	Gain in dbm	Interpretation	<ber> Value	Interpretation
0	-113 dbm	Insufficient	0 à 7	See ETSI GSM 05.08 standards
1 à 10	-111 à -95 dbm	Insufficient		
11 à 30	-93 à -53 dbm	Insufficient		
31 (max)	-51dbm	Perfect		
99		Unknown/not detectable	99	Unknown/not detectable

The GSM modem works normally with a minimum **<rssr>** 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 sufficient.

For more information about AT commands, see the document "EG_EGM_CL_xxx_yy" of ERCO & GENER.

5.6 Verification of the 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 essential in order to make a call or to accept a response coming from the GSM network. This code is held in the SIM card and 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:

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 "EG_EGM_CL_xxx_yy" of ERCO & GENER.

5.7 Verification of the modem registration on the GSM network

The modem contains the EGM standard library (see the documents "EG_EGM_CL_xxx_yy" of ERCO & GENER) in this case:

1. Ensure that a valid SIM card has been inserted in the SIM card reader of the modem.
2. Using a communications application 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 (code PUK) supplied by the operator, will allow you to chose a new PIN code.
 - b. **AT+CREG?** to check the registration status on the 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 hereunder.

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 or the reception level of the signal (cf. paragraph 5.5).

For more information about AT commands, see the document "EG_EGM_CL_xxx_yy" of ERCO & GENER.

5.8 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 "EG_EGM_CL_xxx_yy" of ERCO & GENER.

Table: Main AT commands used with the modem.

Description	AT Command	Response	Interpretation
Enter the PIN code	AT+CPIN="xxxx" (xxxx = PIN code)	OK	PIN code accepted
		+CME ERROR: 16	PIN code incorrect (1*)
		+CME ERROR: 3	PIN code already entered (1*)
Verification of registration on the 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 network.
Reception of an incoming call (2*)	ATA	OK	Reply to the call
Make a voice call	ATD<telephone number>; (the ; at the end of the sequence is important; it allows to make a voice call)	OK	Communication established
		+CME ERROR: 11	PIN code not entered
		+CME ERROR: 3	The credit has run out or a communication has already been 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 command **AT&W**.

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 canal called. This message corresponds to the type of number called: voice, data, it is possible to save it with the command **AT&W**.

Examples:

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

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

5.9 Turning off the modem

The modem contains the EGM standard library (see the documents "EG_EGM_CL_xxx_yy" of ERCO & GENER) in this case, it is strongly advised to un-register from the network with the command **AT+COPS=2**.

5.10 Modem updating procedure

To be able to benefit from the latest functions of the GenPro 2xe , 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, refer to the table below to see the possible causes and the solutions.

Table: 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 tension from 5.5V to 32V (§ 8.2.1).
	Is the serial cable connected at both ends (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 paragraph 3.2.1.3.
Returns nothing or random characters	Is the communications terminal correctly configured on the PC?	<p>Ensure that the configuration of the communication terminal corresponds with the one of the modem.</p> <p>Factory configuration of the modem:</p> <p>Without library (BootLoader)</p> <ul style="list-style-type: none"> Speed = 115 200 bps Data Bits = 8 Parity = none Stop Bits = 1 Flow Control = material <p>With standard library</p> <ul style="list-style-type: none"> Speed = 115 200 bps Data Bits = 8 Parity = sans Stop Bits = 1 Flow Control = material <p>ERCO&GENER Application – EasePro-01</p> <p>Contact us.</p> <p>Owner application</p> <ul style="list-style-type: none"> 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 if a backup is required.

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 2xe but to another modem. Enter **ATI1**, and the response must be **Enabler_III...** Any other response indicates a dialog with another modem. In this case, check the COM port used in the Hyperterminal.
- The syntax of the AT command is incorrect : then check it (refer to document "EG_EGM_CL_xxx_yy" ERCO & GENER.
- 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 by the command **AT+CMEE**, see the document "EG_EGM_CL_xxx_yy" of ERCO & GENER.



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), check the table below to see the possible causes and the solutions.

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

If the modem...	Check :	Action
"NO CARRIER"	Is the received GSM signal strong enough?	See the paragraph 5.5 to check the quality of the received signal
	Is the modem registered on the network?	See the paragraph 5.7 to check its registration.
	Is the antenna correctly connected?	See the paragraph 8.2.6.3 for the recommendations about the GSM antenna installation.
"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?	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 "EG_EGM_CL_xxx_yy" of ERCO & GENER.

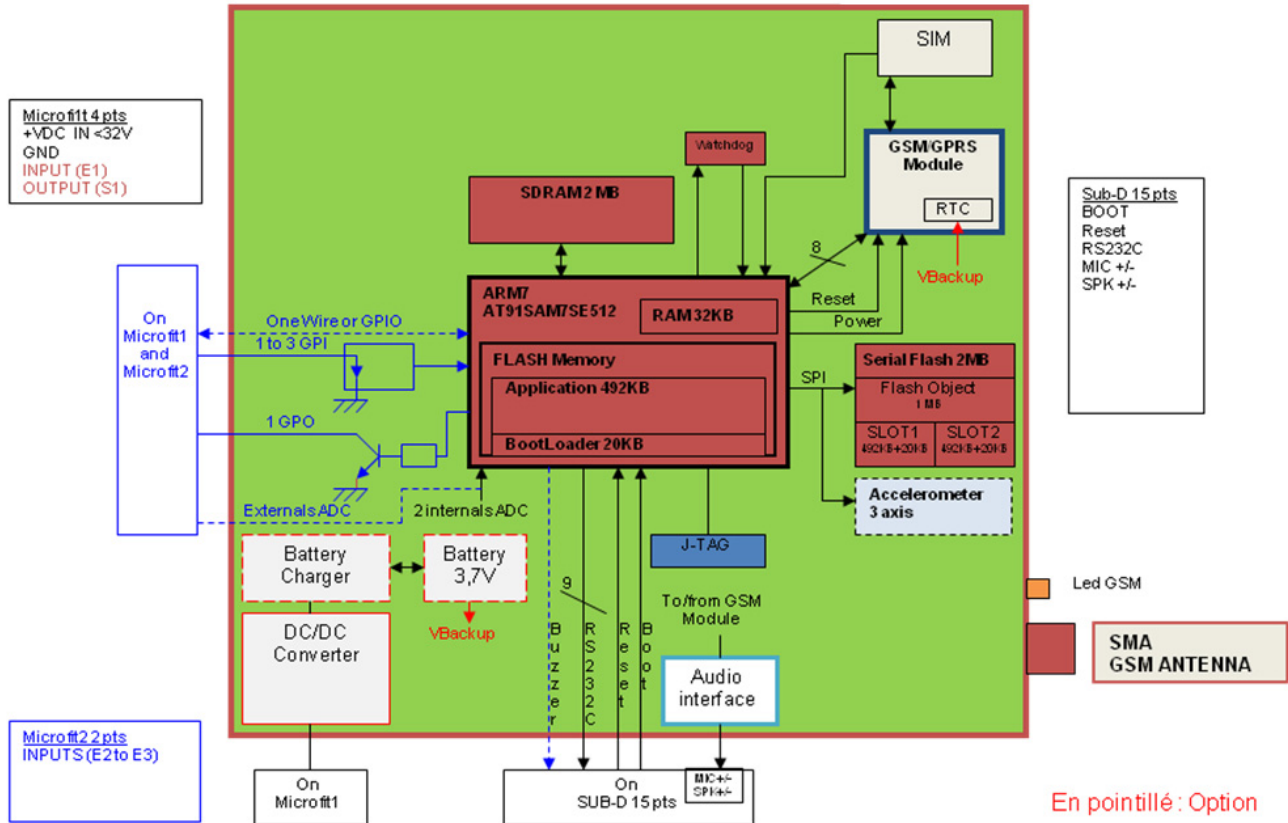
If the modem returns the message "NO CARRIER", you can get the extended error code with the command **AT+CEER**.

For more information about the error codes returned after having sent the command **AT+CEER**, see the document "EG_EGM_CL_xxx_yy" of ERCO & GENER.

7 Functional Description

7.1 Architecture

Architecture GenPro 22e/23e



7.2 Power supply

7.2.1 General presentation

The modem must be powered by an external DC tension (V+BATTERY) between +5.5V and +32V.

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

For the GPS module, another regulation is made for its internal power supply.

A correct functioning of the modem in communication cannot be guaranteed if the input tension (V+BATTERY) falls below 5.5 V.

7.2.2 Internal battery option

7.2.2.1 Presentation of internal battery option

The battery is fixed inside the GenPro 2xe . It is connected to an additional charging circuit cabled on the mother board of the GenPro 2xe .

This battery allows to maintain the GenPro 2xe functioning in the 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 charge 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 that the box gently heated in this case.

The autonomy of the battery essentially depends on the mode of use of the GenPro 2xe (attachment in GSM/GPRS, Inputs/Outputs, GPS power supply, RS232 connected...).



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

7.2.2.2 Specifications of the internal battery option

The external power supply of the GenPro 2xe remains unchanged (from +5,5V to 32V DC). The internal regulator of charge supplies the 4.2V tension necessary for the battery charge.

Table: Characteristics of the polymer lithium battery

Voltage (max.)	4.2V	
Capacity	1000 mA/h typical	
Exp. Cycle time	>300 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)	

7.2.2.3 Charge voltage and supply voltage

The following table shows the consumptions of the modem with GSM Off and Rs232 disconnected. These values were measured after a complete discharge of the battery.

Table : Power consumption (2*)

CONDITIONS		I Charge Nom.(mA)
T=25°C		without RS232
External supply tension	@ 5.5V	358
	@ 12V	173
	@ 24V	92
	@ 32V	72

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

7.2.2.4 Indication of presence/absence of the external power supply

The modem contains the EGM standard library (see the documents "EG_EGM_CL_xxx_yy" of ERCO & GENER) 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>

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

Table: Examples of responses with the internal battery option cabled

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

For more information concerning this command, see the "EG_EGM_CL_xxx_yy" of ERCO & GENER.

7.2.2.5 Instruction and restrictions of use

The internal battery option is not cabled by default and its implementation must be made by us 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 connected and charged, it is not possible to do an On/Off of the device. Only putting the Reset input (pin 14) to the ground or sending the command **AT+EGMRST** allows a reset of the modem.

The battery cannot be replaced or modified by the user. The device must not be opened, under any circumstances. For any problem concerning the battery: the device MUST be returned to the factory.

Do not throw the modem and the battery on the fire.

7.2.3 Protections of the power supply

The modem is protected by a F2.5A / L250V or 2A / 32V fuse directly assembled on the power supply cable supplied with the modem.

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

Filter guarantees: EMI/RFI protection in input and output and signal smoothing.

7.3 RS232 serial link

7.3.1 general presentation

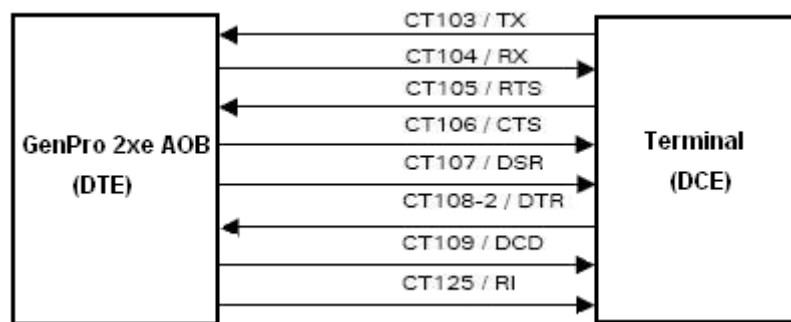
The RS232 interface provides an adaptation of the tension levels (V24/CMOS \Leftrightarrow V24/V28) between the GSM/GPRS module (DCE) and the communication port of a PC (DTE).

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

Filter guarantees: EMI/RFI protection in input and output and signal smoothing.

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 (optional) and Buzzer output (by default),
- Ring Indicator (CT125/RI) / 3.8V : Call indicator (optional) and 3.8V power supply for GenBlue 15e or Gen10400 (by default).



Normalized signals of a RS232 serial link

The RS232 interface was designed to allow a 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/Buzzer and RI/3.8V that may not be used.

7.3.2 Pins description

Signal	Sub HD Connector Pins numbers	I/O	RS232 Standard	Description	Added function
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		Buzzer output (1*)
CRI/CT125	13	O	RI		Power supply 3.8V (1*)
CT102/GND	9			Ground	

(1*) By default


7.4 Output +3.8V

The tension available on the pin 13 of the 15-pin sub D HD is: see table below

Table: Conditions of use

Parameters	Condition	Min.	Typ.	Max.	Unit
V_{out}	$5.5\text{ V} \leq +\text{VDC} \leq 32\text{V}$		3.8		Vdc
I_{out}	Max.			100	mA

When the battery option is present, the tension available on the pin 13 of the 15-pin sub D HD is



Parameters	Condition	Min.	Typ.	Max.	Unit
V_{out}	Without power supply *	2.8		4.2	Vdc
	$5.5\text{ V} \leq +\text{VDC} \leq 32\text{V}$	4.4		4.5	Vdc
I_{out}	Max.			100	mA

* The min. 2.8 V is the limit of auto protection of the battery. From this moment, the battery puts itself in protection, and the output tension becomes null.

When the battery is not connected, the output tension is $4.4\text{V} \leq V_{out} \leq 4.5\text{ V}$ as long as the power supply +VDC is present

7.5 Inputs/Outputs functioning - GenPro 23e

The modem contains the EGM standard library (see the documents "EG_EGM_CL_xxx_yy" of ERCO & GENER) in this case, the modem GenPro 23e provides 3 inputs (opto-coupled) and 1 output (open collector) available for an external use.

The input / output are not available on the GenPro 22e.

These functions can 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.

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 GenLoc 31e AOB (so n=10),
 - <x> = 0** : Output OFF
 - 1** : Output ON

Examples:

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

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

Examples:

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



See table of the paragraph 8.2.3 Inputs/Output – GenPro 23e for the characteristics of use of the Inputs/Outputs.

7.6 BOOT

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

7.7 RESET

7.7.1 General presentation

This signal allows to make a Hardware RESET of the modem. In fact, this pin is used to force a RESET of the modem, doing a low level 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.

Pin description

Signal	Sub HD Connector Pins number	I/O	E/S 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 network operator.
- Using the RESET does not restore the factory parameters.



For more information concerning the Software RESET, see the document "EG_EGM_CL_xxx_yy" of ERCO & GENER and refer to paragraph 5.10 to turn the device off and detach correctly the modem from the network operator

7.7.2 RESET sequence

To activate the emergency RESET sequence, the RESET signal must be put to a low level 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. Moreover, the acquisition time of a GPS position will have to be taken into consideration.



- Using the RESET does not restore the factory parameters.

7.8 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. That's why, it is imperative to remove the SIM card during a Firmware updating.

7.9 Audio

The modem contains the EGM standard library (see the documents "EG_EGM_CL_xxx_yy" of ERCO & GENER) in this case, the audio interface is standard to connect an equipment like a telephone handset.

The echo cancelation (command **AT\$MICAEC**) 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\$VSELECT** allows the Handset selection, see the document "EG_EGM_CL_xxx_yy" of ERCO & GENER).

ERCO & GENER advises 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).

Designation	SUBD 9 F	SUBD 15 M-HD
DCD/Buzzer	1	1
RXD	2	6
TXD	3	2
DTR	4	8
GND	5	9
DSR	6	7
RTS	7	12
CTS	8	11
RI/3.8V	9	13
	RJ9	
Micro +	1	4
Speaker +	2	10
Speaker -	3	15
Micro -	4	5

7.9.1 Microphone inputs

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

They 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 36 kΩ.

The gain of the microphone inputs is internally adjusted by a differential amplifier and can be adjusted with the command **AT+PREAMP** (see the document "EG_EGM_CL_xxx_yy" of ERCO & GENER). The amplifier has a gain of 25.6 dB and a Bias generator that supplies an external tension of 2 or 2.5V for the microphone Bias.

Pin description

Signal	Sub HD connector Pins number	I/O	I/O Type	Description
CMIC2P	4	E	Analog	Microphone positive input
CMIC2N	5	E	Analog	Microphone negative input

7.9.2 Loud-speaker 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.

Pin description

Signal	Sub HD connector Pins number	I/O	I/O Type	Description
CSPK2P	10	S	Analog	Loudspeaker positive output
CSPK2N	15	S	Analog	Loudspeaker negative output

7.9.3 Buzzer output

In option the le GenPro 2xe provides a Buzzer output on output 1 (instead of the DCD) of the 15-pin Sub-D connector. This output provides a frequency, and is used to drive a **Transducer**.

7.10 Internal processor

7.10.1 EGM presentation

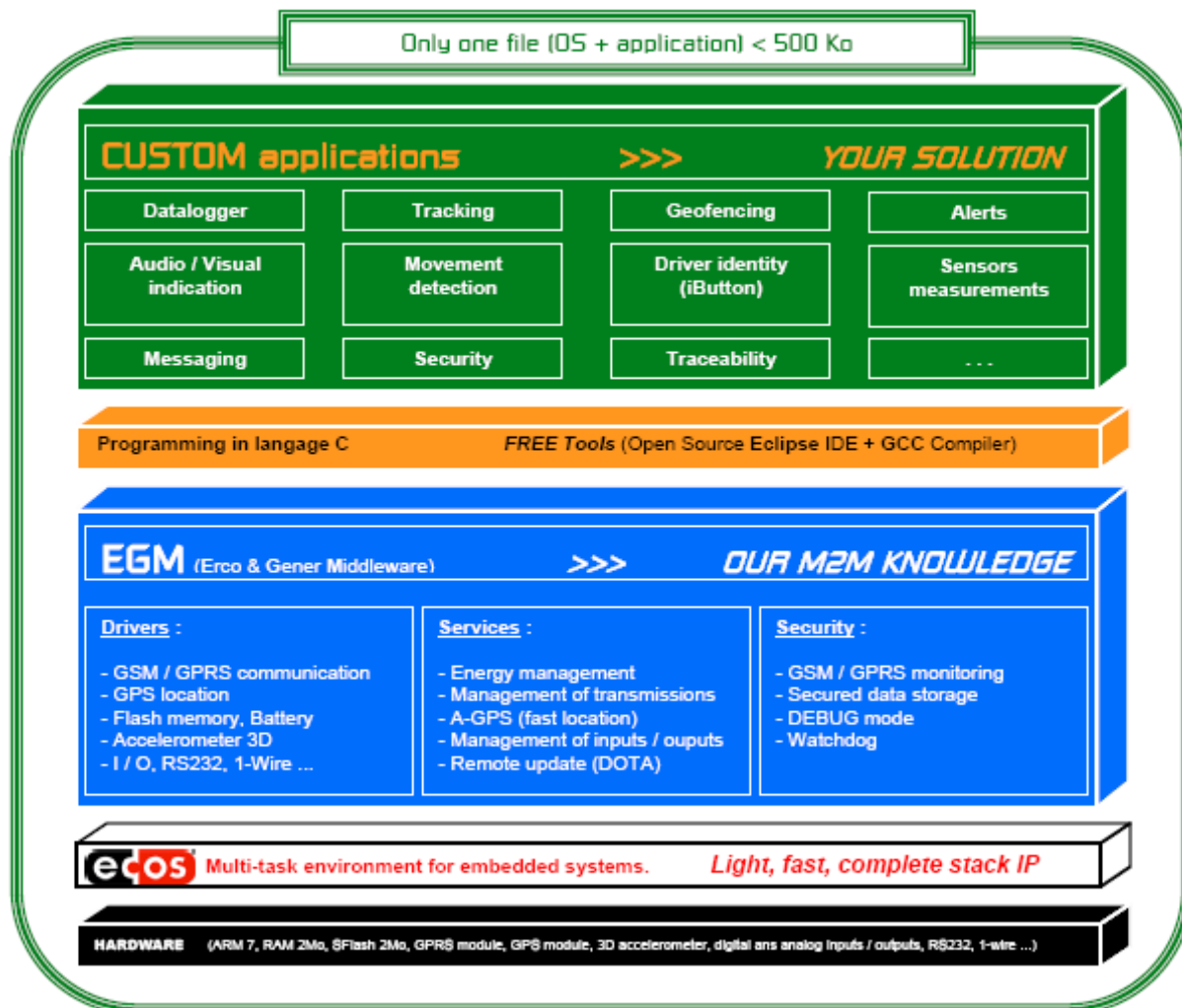
The GenPro 2xe has an ARM7 processor that allows to have an embedded application developed from the EGM and based on eCos libraries.

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.

7.10.2 EGM Architecture

The software architecture is described below.



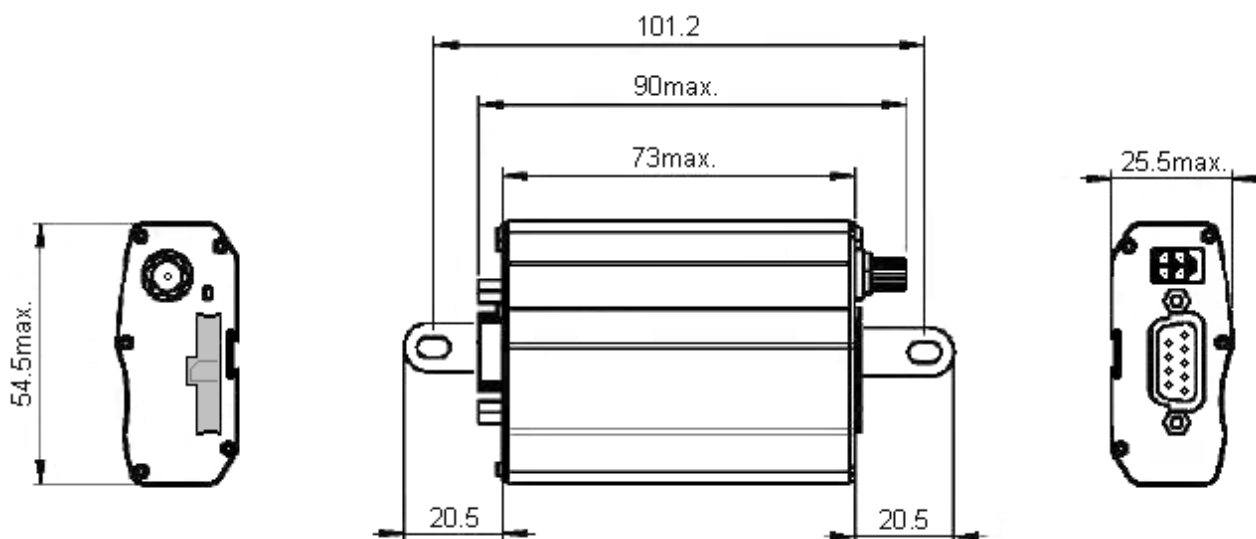
For more information about EGM, see the documents ERCO & GENER for a description of the different functionalities.

8 Technical Characteristics

8.1 Mechanical characteristics

	GenPro 22e	GenPro 23e
Dimensions	73 x 54.5 x 25.5 mm (excluding the connectors)	
Complete dimensions	90 x 54.5 x 25.5 mm	
Weight	≈ 82 grams (modem only) < 115 grams (modem + fixing brackets + cables)	≈ 84 grams (modem only) < 147 grams (modem + fixing brackets + cables)
Volume	101.5 cm ³	
Casing	Aluminum profile	
Waterproof level	IP31	

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



8.2 Electrical characteristics

8.2.1 Power supply

Table: Electrical characteristics without battery option

Power supply range	- 5.5V à 32V DC (GSM ou DCS ou GPRS)
Average consumption	- GSM 900 MH : 109 mA @ 12V in communication - GSM 1800 MHz: 97 mA @ 12V in communication - Idle mode : 18 mA @ 12V



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

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

Table: Effects of a power supply defect

	Then :
▪ Voltage falls below 5.5V	▪ 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 short-circuited by an internal surge suppressor).

The following tables show the modem consumption without the RS232 connected.

Table 1 : Power supply consumption (1*) with RS232 disconnected and without battery option

CONDITIONS		850 MHz	900 MHz	1800 MHz	1900 MHz
T=25°C et carte SIM 3V		I Nom.(mA)	I Nom.(mA)	I Nom.(mA)	I Nom.(mA)
Idle mode (2*)	@ 5,5V	33	33	33	33
	@ 12V	18	18	18	18
	@ 24V	11	11	11	11
	@ 32V	10	10	10	10
In GSM communication 1RX/1TX, Full Power	@ 5,5V	261	259	231	221
	@ 12V	129	128	115	110
	@ 24V	69	69	62	60
	@ 32V	55	55	50	48
In GPRS CL10 communication 2RX/2TX, Full Power	@ 5,5V	370	372	310	298
	@ 12V	174	175	148	143
	@ 24V	106	106	91	88
	@ 32V	84	84	72	70
During TX bursts	@ 5,5V	1699	1699	1231	1128
	@ 12V	707	707	542	501
	@ 24V	391	391	321	299
	@ 32V	308	308	244	226

Table 2 : Power supply consumption (1*) with RS232 disconnected and with battery option

Battery full

CONDITIONS T=25°C et carte SIM 3V		850 MHz	900 MHz	1800 MHz	1900 MHz
		I Nom.(mA)	I Nom.(mA)	I Nom.(mA)	I Nom.(mA)
Idle mode (2*)	@ 5,5V	43	43	43	43
	@ 12V	23	23	23	23
	@ 24V	14	14	14	14
	@ 32V	13	13	13	13
In GSM communication 1RX/1TX, Full Power	@ 5,5V	261	259	231	221
	@ 12V	129	128	115	110
	@ 24V	69	69	62	60
	@ 32V	55	55	50	48
In GPRS CL10 communication 2RX/2TX, Full Power	@ 5,5V	421	422	356	343
	@ 12V	201	201	172	166
	@ 24V	106	106	91	88
	@ 32V	84	84	72	70
During TX bursts	@ 5,5V	1785	1785	1396	1288
	@ 12V	777	777	623	578
	@ 24V	391	391	321	299
	@ 32V	308	308	244	226

Table 3 : Power supply consumption (1*) with RS232 disconnected and with battery option

During the charge

CONDITIONS T=25°C et carte SIM 3V		850 MHz	900 MHz	1800 MHz	1900 MHz
		I Nom.(mA)	I Nom.(mA)	I Nom.(mA)	I Nom.(mA)
Idle mode (2*)	@ 5,5V	361	361	361	361
	@ 12V	174	174	174	174
	@ 24V	93	93	93	93
	@ 32V	73	73	73	73
In GSM communication 1RX/1TX, Full Power	@ 5,5V	623	620	583	570
	@ 12V	289	289	272	266
	@ 24V	152	152	143	140
	@ 32V	118	118	111	109
In GPRS CL10 communication 2RX/2TX, Full Power	@ 5,5V	824	825	745	728
	@ 12V	377	377	342	335
	@ 24V	198	199	180	177
	@ 32V	151	151	138	135
During TX bursts	@ 5,5V	2423	2423	1837	1698
	@ 12V	1017	1017	797	744
	@ 24V	505	505	400	376
	@ 32V	389	389	316	295

Table 4 : Consumption with internal battery Without external power supply

CONDITIONS T=25°C et carte SIM 3V		850 MHz	900 MHz	1800 MHz	1900 MHz
		I Nom.(mA)	I Nom.(mA)	I Nom.(mA)	I Nom.(mA)
Idle mode (2*)	@ 3.8V	36	36	36	36
In GSM communication 1RX/1TX, Full Power Power (2W/1W)	@ 3.8V	283	281	248	237
In GPRS CL10 communication 2RX/2TX, Full Power Power (2W/1W)	@ 3.8V	453	455	387	373
During TX bursts Power (2W/1W)	@ 3.8V	1633	1633	1313	1213

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

(2*) Idle mode = modem registered on network but not in communication.

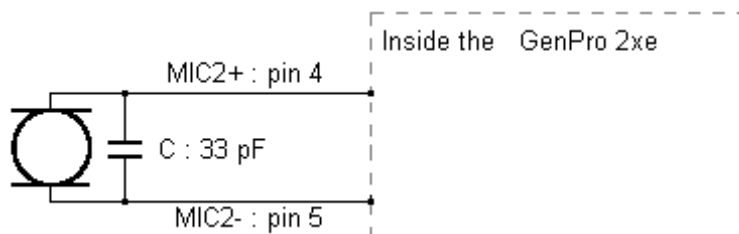
8.2.2 Audio interface

The audio interface is available via the 15-pin Sub HD connector, see the paragraph 7.9 Audio.

8.2.2.1 Microphone

Characteristics recommended for the microphone

Mic Input	Parameter/Conditions	Min	Typ	Max	Units
Maximum Input Range – Mic(+) to Mic(-)	Inputs 3 dBm0 (Max. digital sample amplitude when PGA gain set to 0 dB)			32.5	mV _{RMS}
Nominal Ref. Level – Mic(+) to Mic(-)	Differential MIC		-10		dBm0
Differential Input Resistance – Mic(+) to Mic(-)	Differential MIC, MICAMP gain = 25.6 dB		36		kΩ
Microphone Pre-Amplifier Gain	Differential MIC		25.6		dB

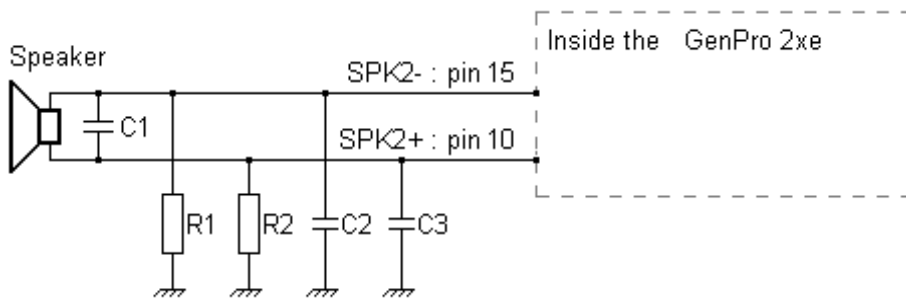


8.2.2.2 Loudspeaker

Characteristics of the output for the loudspeaker

Spkr Output	Parameter/Conditions	Min	Typ	Max	Units
Maximum Differential Resistive Load	Output Swing 3.9 V _{PP}		120		Ω
	Output Swing 1.5 V _{PP}		33		Ω
Maximum Differential Capacitive Load				100	pF
Common Mode Minimum Resistive Load	At Internal Speaker (+) or (-)		200		kΩ
Common Mode Maximum Capacitive Load	At Internal Speaker (+) or (-)			50	pF
Amplifier Gain	EARG = 1		1		dB
	EARG = 0		-11		dB

Parameter	Conditions	Min	Typ	Max	Units
Earphone output swing at EARP-EARN	Distortion ≤ 2% and 120 Ω, VSP input level = +3 dBm0, amp gain = -11 dB		0.98		V _{P-P}
	Distortion ≤ 2% and 33 Ω, VSP input level = -5.34 dBm0, amp gain = -11 dB		0.38		
	Distortion ≤ 2% and 120 Ω, I2S input level = +3 dBm0, amp gain = -11 dB		0.93		
	Distortion ≤ 2% and 120 Ω, VSP input level = +3 dBm0, amp gain = 1 dB	3.1	3.92		



Component	Value
C1	CAPACITOR 100 pF
C2, C3	CAPACITOR 47pF
R1, R2	RESISTOR 200 KOhms

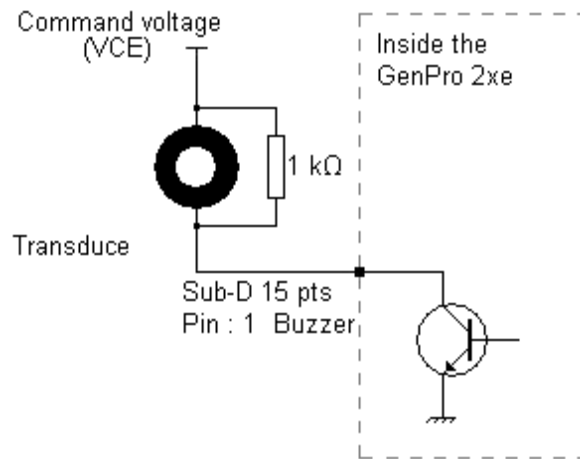
8.2.2.3 Buzzer

Characteristics of the output for the Buzzer

Characteristics	Symbols	Conditions	Min.	Typ.	Max.	Unit
collector-base voltage	V_{CB0}	Emetteur ouvert			75	V_{dc}
collector-emitter voltage	V_{CE0}	Open base			40	V_{dc}
collector current (DC)	I_C				600	mA_{dc}
peak collector current	I_{CM}				800	mA_{dc}
Collector Cutoff Current	I_{CB0}	$I_E = 0; V_{CB} = 60 V; T_j = 25\text{ }^\circ C$			10	nA_{dc}
		$I_E = 0; V_{CB} = 60 V; T_j = 125\text{ }^\circ C$			10	μA_{dc}
collector-emitter saturation voltage	V_{CEsat}	$I_C = 150\text{ mA}; I_B = 15\text{ mA} *$			300	mV_{dc}
		$I_C = 500\text{ mA}; I_B = 50\text{ mA} *$			1	V_{dc}
transition frequency	f_T	$I_C = 20\text{ mA}; V_{CE} = 20\text{ V}; f = 100\text{ MHz}$			300	MHz
collector capacitance	C_C	$I_E = I_e = 0; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$			8	pF
total power dissipation	P_{Tot}	$T_{amb} \leq 25\text{ }^\circ C$			225	mW

Example of transducer tested with the GenPro 2xe

Buzzer characteristics	Values
Type	Transducer AT-2720-T-R
Consumption	1-30V peak /3.5mA max.
Resonance frequency	2.048Hz ±500HZ
Acoustic level (SPL)	Min.88dBA @10cm



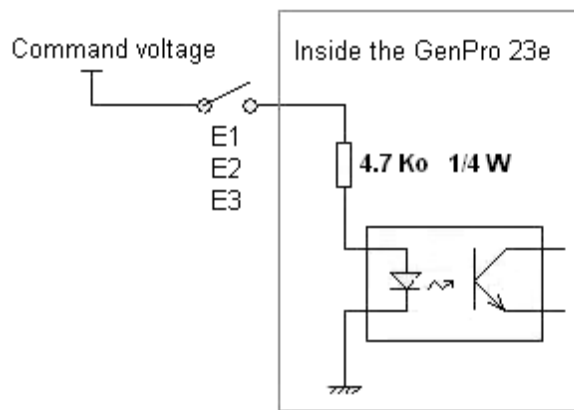
8.2.3 Inputs/Output – GenPro 23e

The GenPro 23e provides 3 opto-coupled inputs (E1 to E3) and 1 open-collector output (S1). As an option, it is possible to have an analog input instead of the opto-coupled input E2.

8.2.3.1 Opto-coupled Inputs – GenPro 23e

Table: Diode Characteristics of the opto-coupled inputs

Characteristics	Symbols	Conditions	Min.	Typ.	Max.	Unit
max. current	$I_{F (rms)}$				50	mA
max. inverted tension	V_R				5	V
Direct tension	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 the transfer ratio	$I_C / I_{F(SAT)}$	$I_F = 1 \text{ mA}, V_{CE} = 0.4 \text{ V}$		60		%



Internal electric scheme of the 3 inputs



The minimum of voltage command for voltage detection is: **5 V**

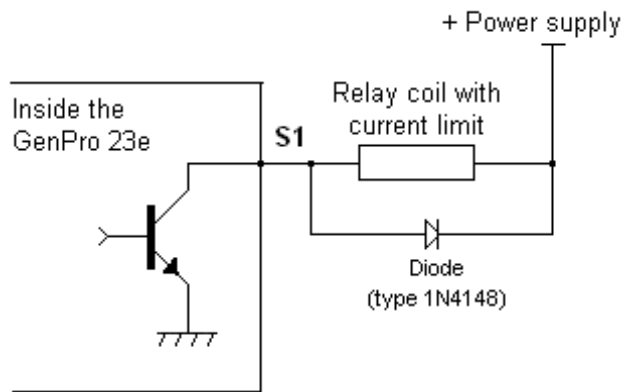


The maximum voltage command is : **35 V**

8.2.3.2 Output – GenPro 23e

Table: Characteristics of the open-collector output

Characteristics	Symbols	Conditions	Max.	Unit
max. tension	V_{CE0}	Open transmitter	80	V_{DC}
max. tension	V_{CES}	$V_{BE} = 0 V$	60	V_{DC}
Collector current	I_C		1	A
Saturation tension	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



Electric scheme of the output



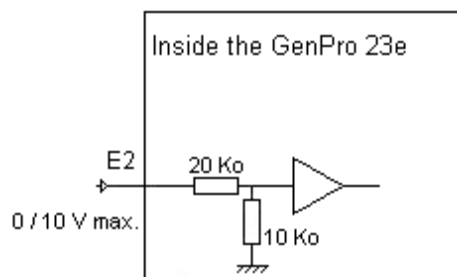
No protection is provided. The user must respect the values of the table above.

8.2.3.3 Analog input – GenPro 23e

As an option on the GenPro 23e, it is possible to have an analog input instead of the opto-coupled input E2. This analog input allows to do a measure in tension (contact us).

Table: Characteristics of the analog input option

Characteristics	Min. value	Max. value
Command tension	0 V DC	10 V DC



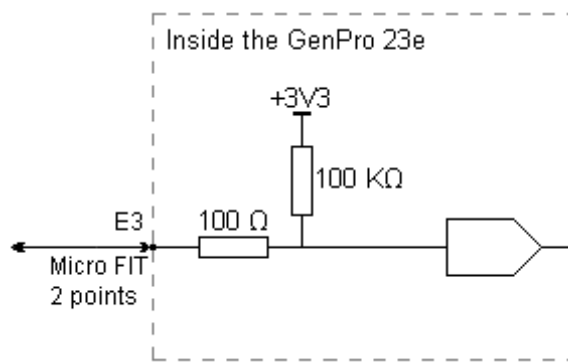
Internal electrical scheme of the analog input option

8.2.3.4 Bus One Wire – GenPro 23e

As an option on the GenPro 23e, it is possible to have an input Bus One Wire instead of the opto-coupled input E3.

Table: Characteristics of bus One Wire

Parameters	Condition	Min.	Typ.	Max.	Unit
V_{IL}	Input Voltage – Low	-0.3		0.8	V_{dc}
V_{IH}	Input Voltage – High	2	3.3	3.6	V_{dc}
R_{PULLUP}	Internal Pull-Up Resistor		100		$K\Omega$
C_{IN}	Input Capacitance			14	pF
F_{max}				100	KHz



Internal Wiring Diagram of One Wire bus

8.2.4 Sim Interface

Table: Characteristics of the SIM card supply tension

SIM card	3 V ou 1.8 V
----------	--------------

8.2.5 RESET signal

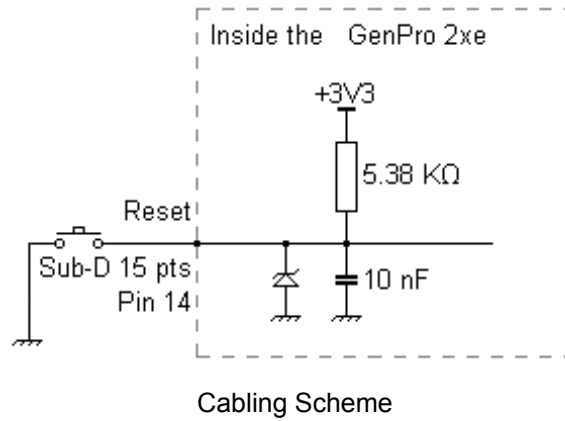


Table: Conditions of use

Parameters	Condition	Min.	Typ.	Max.	Unit
V _{IL}	Input Voltage – Low or float	-0.3		0.8	Vdc
V _{IH}	Input Voltage – High	2		3.3	Vdc
R _{IPU}	Internal Pull-Up Resistor		5.38K		Ohms

8.2.6 RF GSM/DCS characteristics

8.2.6.1 RF functioning

The RF functioning complies with the ETSI GSM Standards.

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

Table: Parameters of the RF receiver and transmitter

Receiver	
Sensitivity in 850/900	- 106 dBm, GPRS Coding Scheme 1 (CS1)
Sensitivity in 1800/1900	- 106 dBm, GPRS Coding Scheme 1 (CS1)
Transmitter	
Maximum power (Power Class1 - 850/900) at ambient temperature	33 dBm +/- 2 dB @ antenna connection
Maximum power (Power Class4 - 1800/1900) at ambient temperature	30 dBm +/- 2 dB @ antenna connection

8.2.6.2 GSM external antenna

The GSM external antenna is connected to the modem via the SMA/M connector.
The external antenna must have the characteristics described in the table below.

Table: Characteristics of the GSM external antenna

Frequency band	850/900/1800/1900 MHz
Impedance	50 Ohms nominal
DC impedance	0 Ohm
Gain	0 dBi in a minimum direction
VSWR (Rx max TX max)	1.5:1
Polarization	Linear



See chapter 10 for the GSM antennas recommended by ERCO & GENER.

8.2.7 Characteristics of the accelerometer

Table: Characteristics of the accelerometer

Dynamic	± 2g or ± 8g driven by software
Interface (internal)	SPI with the ARM
Multiple Interruption	programmable
Up-going filter	programmable

8.3 Environmental characteristics

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

Table: Environmental characteristics

Operating temperature	-20 °C à +60 °C
Storage temperature	-40 °C à +85 °C
Operating humidity without condensation	HR < 70% @ +55°C
Atmospheric pressure	normal



If the battery option is used, 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 ±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
- EN50385 :2002
- ROHS Compliant : Directive 2002/95/CE
- "REACH" N°1907/2006
- 2002/96/CE DEEE (Poubelle Barrée).

The following marking appears under the device.



9 Security recommendations

9.1 General security

It is important to respect the specific regulations concerning 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 telephone 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 concerning 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 made 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 activate the headlights or the horn of a vehicle on public highway is not authorized.

9.3 Care and maintenance

The suggestions hereunder 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 used, 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 2xe 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 concerning the EGM developments is optional (contact us)

DECLARATION OF CONFORMITY

Manufacturer : ERCO & GENER

Address : Rue des Petites Granges
Z.I. de Saint Lambert des Levées
B.P. 30163
49412 SAUMUR CEDEX – France

Website : <http://www.ercogener.com>

declares that the product :

Name : GenPro 22e Type : Modem
Name : GenPro 23e Type : Modem

Complies with :

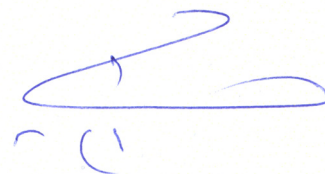
- R&TTE 1999/5/EC Directive,
- EN301489-1:V1.8.1
- EN301489-7:V1.3.1
- §6.5, §6.6, §6.8 and §6.9 of the 2004/104/CE directive
- EN 301 511 v9.0.2
- EN 60950-1:2006 + A11:2009
- EN50385 :2002
- ROHS Compliant : Directive 2002/95/CE
- "REACH" N°1907/2006- R&TTE 1999/5/EC Directive



The corresponding markings appear under the appliance.

Saumur, January 10th 2011

Charles CHAUSSONNIER
Managing Director

A handwritten signature in blue ink, appearing to be 'C. Chaussonnier'.