L'esprit Modem

User Guide

GenPro 35e

Reference : EG_GenPro35e_1006_UG_000_UK

Revision : 000

Date : 07/09/10

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Document history

Revision	Modifications	Author	Date
000	CREATION	YST	07/09/10

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

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Presentation

Entirely dedicated to the wireless markets throughout the world, the modem GenPro 35e allows a simple and quick integration of 3G (UMTS) and 3G+ (HSDPA, HSUPA, HSPA, HSPA+), Quad-bands (850/900/1900/2100 MHz) connectivity in a M2M application.
For a use in Europe, the GenPro 35e works in 3G on the 900 MHz and 2100 MHz bands.

HSPA + allows to have up to 21 Mbps downlink and up to 5,76 Mbit/s uplink.

The GenPro 35e is a robust, reliable and long-life product. Its very compact metallic casing makes it ideally adapted to the world of embedded applications.

Its USB interface allows it to manage and optimize the performances of 3G and 3G+ high-speed networks.

The GenPro 35e is dedicated to high-speed IP markets and must be associated to an external application with an IP stack.

The GenPro 35e provides an external use via the 3G Display graphic interface or via a set of AT commands AT (see Commands List of ERCO & GENER EG_GenPro35e_1006_CL_xxx_yy).

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 of ERCO & GENER EG_GenPro35e_1006_CL_xxx_yy
- Application Note
- Release Note
- Client support (Hot-Line)

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Warning

- Erco&Gener advises to read carefully all the documents concerning the GenPro 35e (User Guide, Application notes, Command List).

- ERCO & GENER cannot be held responsible for:
  - The problems due to an inappropriate use of the GenPro 35e.
  - 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 and 3G 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 35e" without previous notice.

- For any functioning, the casing must be closed.
- No internal part can be repaired by the user. The **GenPro 35e** must be returned to the factory for any repair.
- The **GenPro 35e** must be placed in a normally ventilated area, out of sources of heat.
- The **GenPro 35e** must not be connected directly to the mains supply; a voltage adapter must be used.

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1 References

1.1 Referred documents

Commands List of ERCO & GENER .....: EG_GenPro35e_1006_CL_xxx_yy

Application Notes of ERCO & GENER .....: EG_GenPro35e_1006_AN_xxx_yy

GSM reference documents:

- 3GPP TS 05.08
- 3GPP TS 27.005
- 3GPP TS 27.007

1.2 Abbreviations

Abbreviations definition

3GPP	3rd Generation Partnership Project
8PSK	Octagonal Phase Shift Keying
AC	Alternative Current
AT	Attention (prefix for modem commands)
AUX	AUXilary
BER	Bit Error Rate
BTS	Base Transceiver Station
CS	Circuit Switched
dB	Decibel
dBi	Decibel relative to an Isotropic radiator
dBm	Decibel relative to one milliwatt
DC	Direct Current
DCE	Data Communication Equipment
DCS	Digital Cellular System
DTE	Data Terminal Equipment
EDGE	Enhanced Data rates for GSM Evolution
E-GSM	Extended GSM
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
ETSI	European Telecommunications Standards Institute
FIT	Series of connectors (micro-FIT)
GND	GrouND
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
GSMK	Gaussian Minimum Shift Keying modulation
HSDPA	High Speed Downlink Packet Access
HSPA+	Enhanced HSPA, as defined in 3GPP Release 7 and beyond
HSUPA	High Speed Uplink Packet Access
I	Input
I/O	Input / Output
IMEI	International Mobile Equipment Identification

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LED	Light Emitting Diode
MAX	MAXimum
Micro FIT	Family of connectors from Molex
MIN	MINimum
MO	Mobile Originated
MS	Mobile Station
MT	Mobile Terminated
NOM	NOMinal
O	Output
PC	Personal Computer
PIN	Personal Identity Number
PUK	Personal Unblocking Key
RF	Radio Frequency
RFI	Radio Frequency Interference
RI	Ring Indicator
RMS	Root Mean Square
ROS	Rapport d'Ondes Stationnaires
RSSI	Received Signal Strength Indication
RX	Receive
SIM	Subscriber Identification Module
SMA	SubMiniature version A RF connector
SMS	Short Message Service
TBD	To Be Determined
TCP/IP	Transmission Control Protocol / Internet Protocol
TS	Technical Specification
TX	Transmit
TYP	TYPical
UMTS	Universal Mobile Telecommunications System
USB	Universal Serial Bus
USIM	Universal Subscriber Identity Module (UMTS)
VSWR	Voltage Stationary Wave Ratio
WCDMA	Wideband Code Division Multiple Access

1.3 Symbols

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

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

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2 Packaging

2.1 Content

By default, the GenPro 35e is delivered with:

- a GenPro 35e cardboard packaging,
- a GenPro 35e modem,
- 2 fixing brackets,
- a technical sheet (Instructions Sheet),
- a USB 2 cable (type A Male / type mini B Male),
- a 2-wire stripped cable (Red/Black) with fuse.

2.2 Packing case

The external dimensions of the GenPro 35e packing case are:

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

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

- The ERCO & GENER logo,
- The product reference (GenPro 35e),
- The CE and ROHS Compliant marks,
- The IMEI barcode with 15 digits.

The dimensions of the label are:

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

2.3 Modem labels

On the casing, there is a label that shows the following information:

- The CE mark,
- The crossed wheelie-bin mark (DEEE standards),
- The direct current mark (VDC),
- The IMEI barcode with 15 digits.

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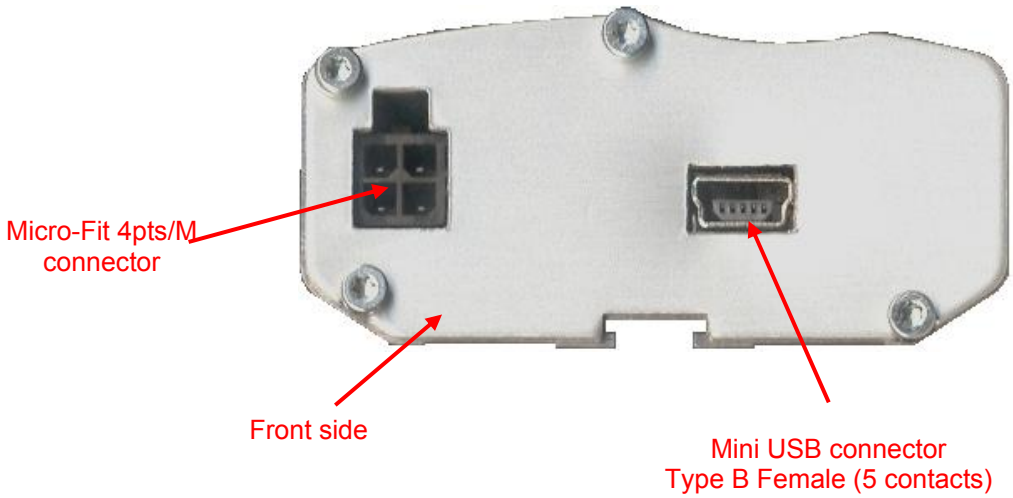
3 General presentation

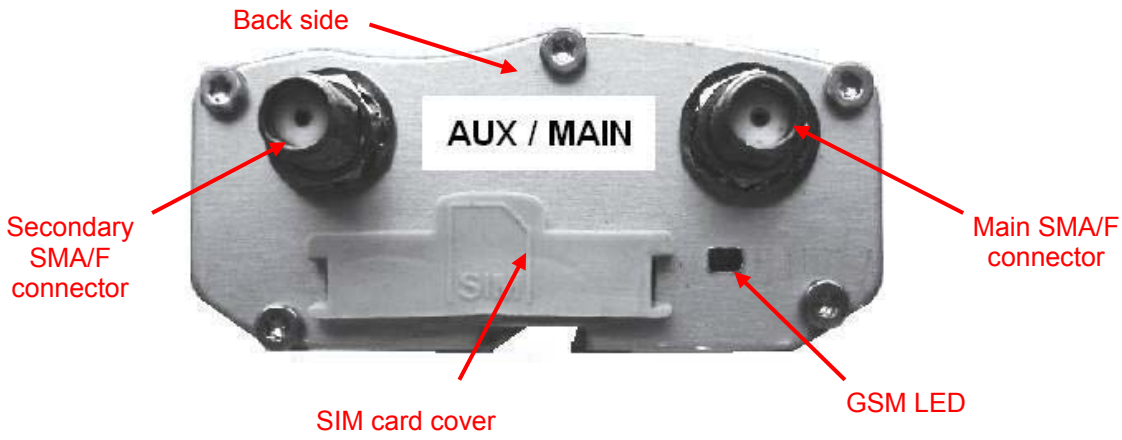
3.1 Description

Description of the modem GenPro 35e:

3.1.1 Front side

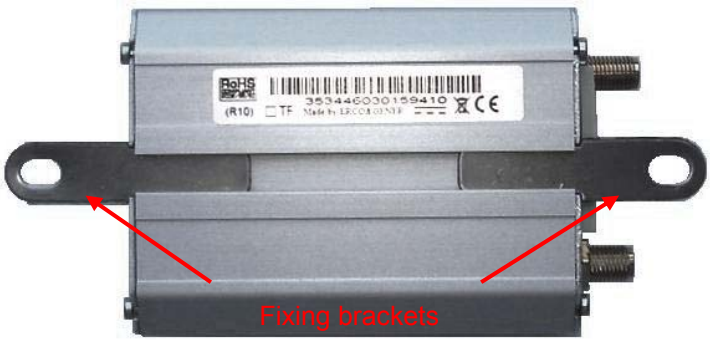


3.1.2 Back side



3.1.3 Fixing brackets

2 fixing brackets to fix the modem on a support.



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3.2 External connections

3.2.1 Connections

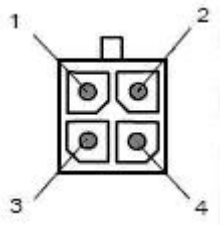
3.2.1.1 GSM antenna connector

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

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

3.2.1.2 Female Micro FIT connector with 4 male pins

This connector of the GenPro 35e is used to connect the external DC supply.

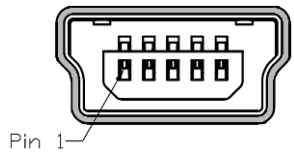


Pin N°	Signal
1	+VDC
2	GND
3	NC
4	NC

Note: The pins 3 and 4 are not used

3.2.1.3 Mini USB B connecteur (5 contacts)

The mini USB 2.0 connector is B Female (5 contacts).



Pin N°	Appellation	Description
1	NC	Not used
2	Data –	USB_D–
3	Data +	USB_D+
4	NC	Not used
5	Ground	GND

Note: The pins 1 and 4 are not used

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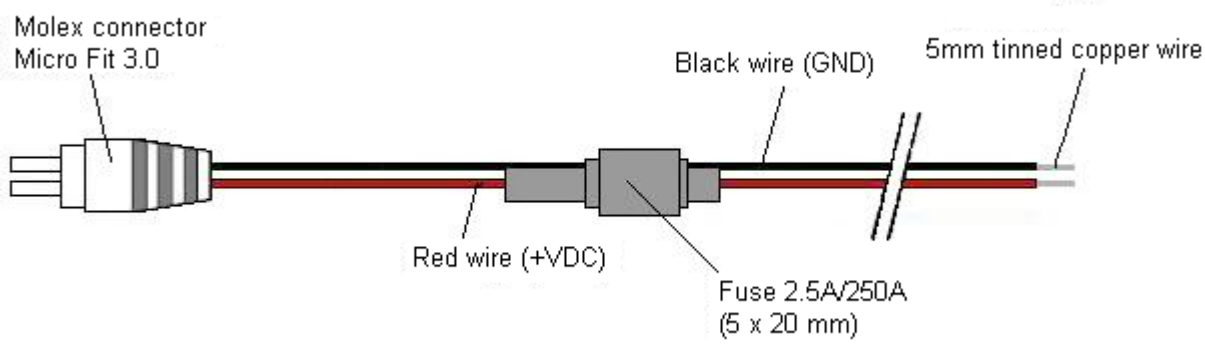
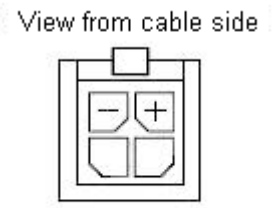
3.2.2 Cables supplied

3.2.2.1 Micro FIT 2-wire supply cable

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

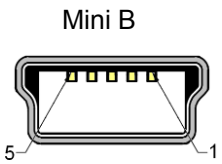


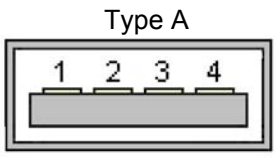


Component	Characteristics
4-pin Micro FIT connector	Supplier : MOLEX
Cable	Length ≈ 1.5m
Wire	Tinned copper 24 x 0.2 mm
	Section : 0.75 mm²
Fuse	F2.5A L250V

3.2.2.2 USB 2.0 cable with connectors A Male and mini B Male

The USB A Male and mini B Male cable allows the dialog via the USB port between the GenPro 35e and a communication terminal.





Pin N°		Description
Mini B	Type A	
1	1	NC
2	2	Data (D-)
3	3	Data (D+)
4	NC	NC
5	4	Ground (GND)

Component	Characteristics
Cable USB 2.0	Length ≈ 80cm
	USB A Male USB mini B Male

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4 Characteristics and Services

The GenPro 35e functions are summarized in the table below.

Modem GenPro 35e
GSM / GPRS / EDGE functions
- E-GSM Quad-band 850/900/1800/1900 MHz
- ETSI GSM Phase 2+
- Class 4 (2W @ 850 / 900 MHz)
- Class 1 (1W @ 1800 / 1900 MHz)
- GPRS / EDGE Class 12
- CS1 to CS4 and MCS1 to MCS9 coding
- SMS point to point MT/MO and SMS CB
3G / 3G+ functions
- 850/900/1900/2100 MHz
- HSPA+: 21.1 Mbps downlink / 5.76 Mbps uplink Category 10 / 14
- HSUPA: 5.76 Mbps Category 3 / 5 / 6
- HSDPA: 21.1 / 14.0 / 7.2 / 3.6 Mbps downlink Category 6 / 8 / 10 / 12 / 14
- UMTS (WCDMA) 2.0 Mbps downlink, 384 Kbps uplink
Interfaces
- Primary GSM antenna: SMA-F connector
- Secondary GSM antenna: SMA-F connector
- Power supply : +5.5 to +32 VDC (4-pin micro-FIT connector)
- USB 2.0 : Mini USB Female connector (5 contacts)
- AT commands
- SIM reader (SIM 3V – 1,8V)
Accessories supplied
- Fixing brackets (x2)
- Supply cable Micro FIT 2-wire with fuse
- Cable USB 2.0 (A Male / Mini B Male)
Option (contact us)
GSM antenna (SMA-male)
Power supply ($230V_{AC}$ – 12 V_{DC})

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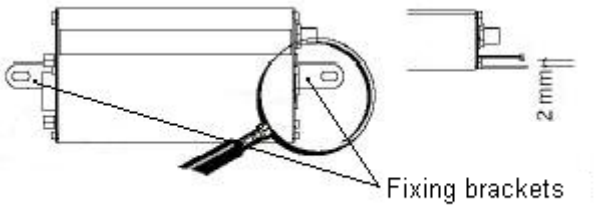
5 Using the modem

5.1 Starting with the modem

5.1.1 Mounting the modem

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

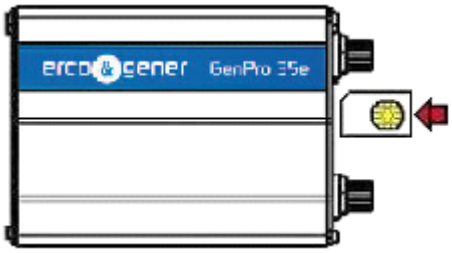


- Must be fixed on a flat surface
- Max. height of the screw head : 2 mm

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 inside the reader.



- Push the SIM card until hearing a "clic" that ensures its correct positioning.
- Put the SIM cover back.
- Connect the GSM antenna(s) to the SMA connectors.
- For the connection to the DTE, connect the USB cable.
- Connect the supply cable to the external DC regulated supply source

Before turning on the modem, it is advised to install the driver of the modem (see § 5.1.3 USB driver installation)

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5.1.3 USB driver installation

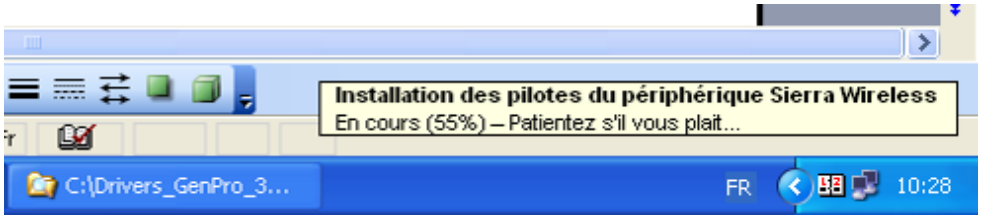
It is necessary to use the Drivers available on our website when using and installing the modem GenPro 35e associated to the USB port.
It is advised to install the driver before switching the modem on.

The installation of several GenPro 35e, on a PC with several USB ports is not supported.
On a PC, only one GenPro 35e can be connected.
Uninstalling all the drivers of the GenPro 35e previously installed as well as 3G Display followed by a restarting of the PC may be necessary for a new installation of new drivers and 3G Display (due to an evolution of the module heart used in the GenPro 35e).
It is preferable to wait for the complete starting of your PC before powering the GenPro 35e and connecting the USB port.

1- For the installation, download and extract the files that contain the Drivers in a directory on the root of the PC hard disk (example: C:\Drivers_GenPro_35e).

2- In the directory : C:\...\Drivers_GenPro_35e\DriverInstaller, run the file DriverInstaller.exe

The following window will appear and show the progression status of the pilots installation:



3- Once the installation completed, do the following operations in the right order:

- For the connection to the DTE (PC), connect the USB cable.
- Connect the DC regulated external power source to the GenPro 35e.

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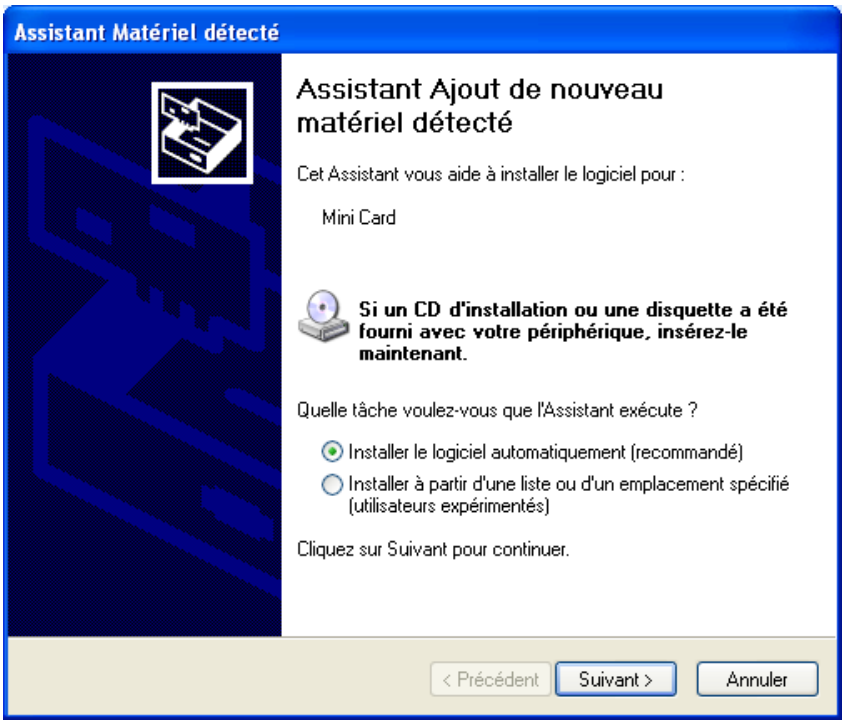
If the following window appears, cancel it and check that you have correctly done the operations 1 and 2.



5.1.4 Verification of the communication with the modem

Once the Driver is correctly installed, it is possible to dialog with the GenPro 35e and to use the modem GenPro 35e with a terminal.

At this moment, you must absolutely know the virtual USB port that was attributed to it.

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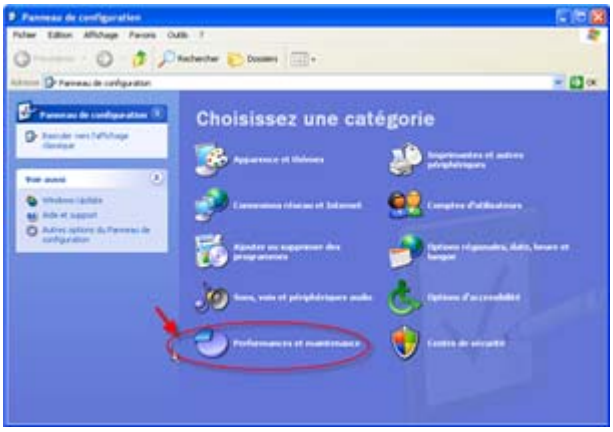
For that, click on “START” 

Choose "Configuration pannel" ("Panneau de configuration")

Choose "Performances and maintenance"



Depending on the presentation, you may directly see the figure below.

Choose "System"

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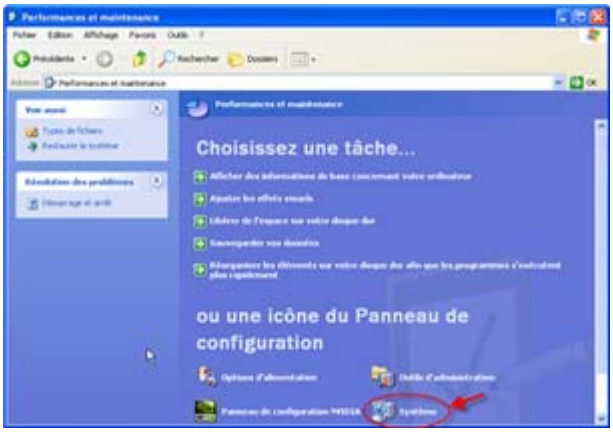
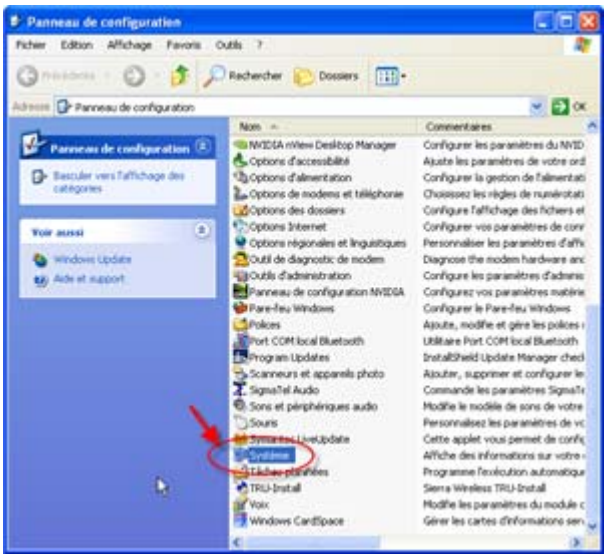
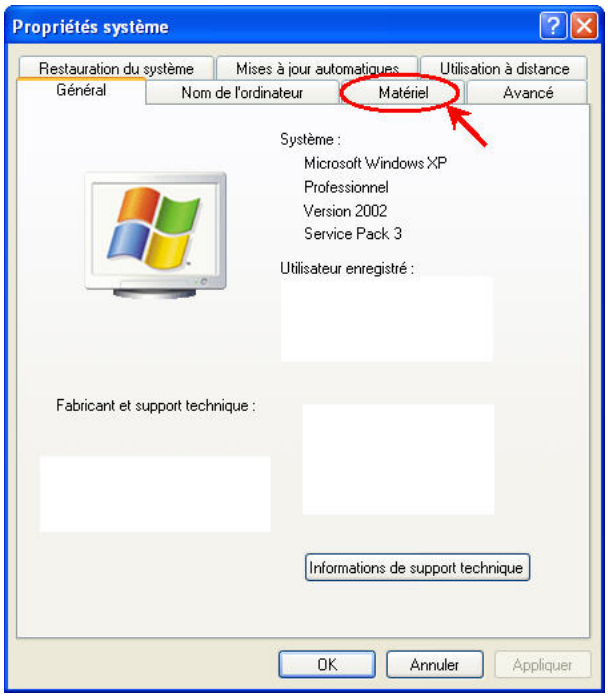




Choose "Material"



Choose " Peripheral management system" (" Gestionnaire de périphérique")

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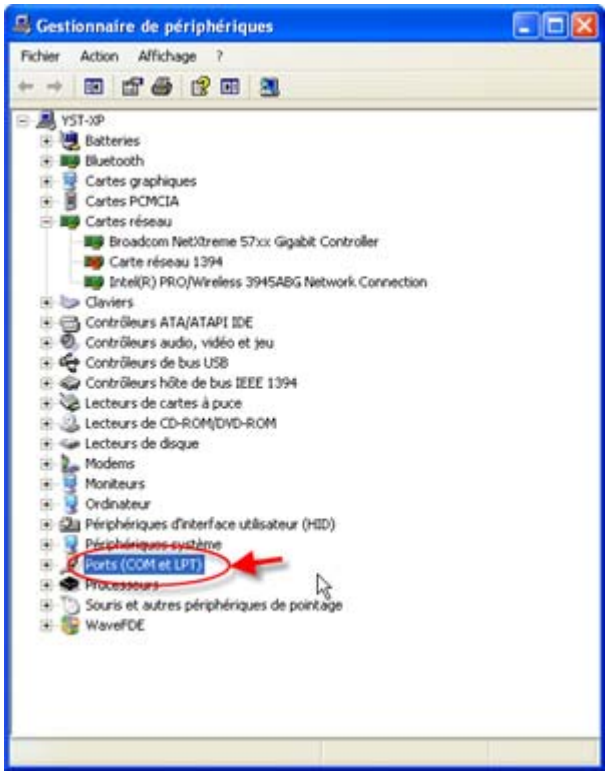
Choose "Ports (COM and LPT)"



In the section "Ports (COM and LPT)", the COM port to send AT commands is **AT Command Port (UMTS) (COM26).**
As the port number is virtual, it may change depending on the PC installations.
You can close the window of Peripheral management system.

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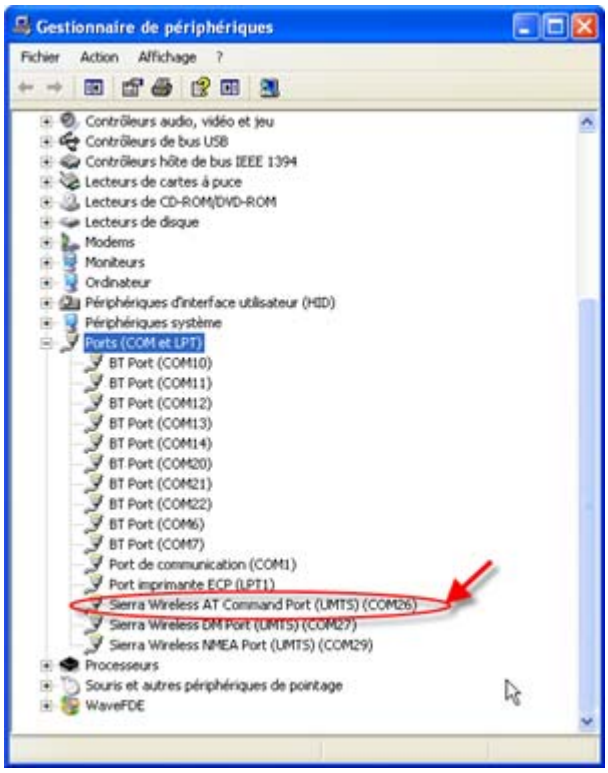

Use a communication software like HyperTerminal of Windows

Configure the COM port of the DTE as follows:

- Bits per second ..... : **115200 bps**,
- Data Bits..... : **8**,
- Parity ..... : **None**,
- Stop Bits ..... : **1**,
- Flow control ..... : **hardware.**

Send the command ***AT↵***. In the window under HyperTerminal, the modem must reply ***OK***.

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

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

Example of AT commands that can be sent when the communication with the modem is validated (commands detailed in the following paragraphs):

- ***AT+CGSN*** : the reply of the modem must be a 15-digit number (beginning with "**35411802**xxxxxxxx") when the serial link is correct.
- ***AT+CPIN="xxxx"*** : enter the code of the SIM card xxxx (if activated).
- ***AT!BAND?*** : check the selected frequency(ies).
- ***AT+CSQ*** : check the reception level of the GSM signal received with the SIM card inserted.
- ***AT+CREG?*** : check the registration of the modem on the GSM network.

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- ***AT+CGREG?*** : check the registration of the modem on the GPRS network.
- ***ATD<telephone number>*** : to launch a data call.
- ***ATH*** : to hang-up (end of call).

For more information about these AT commands and their associated parameters, see the document "Commands List of ERCO & GENER EG_GenPro35e_1006_CL_xxx_yy".

5.1.5 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.
- Replace the SIM cover.
- Do a Reset or an On/Off to take it into account.

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5.2 Specific recommendations for the use of the modem in vehicles

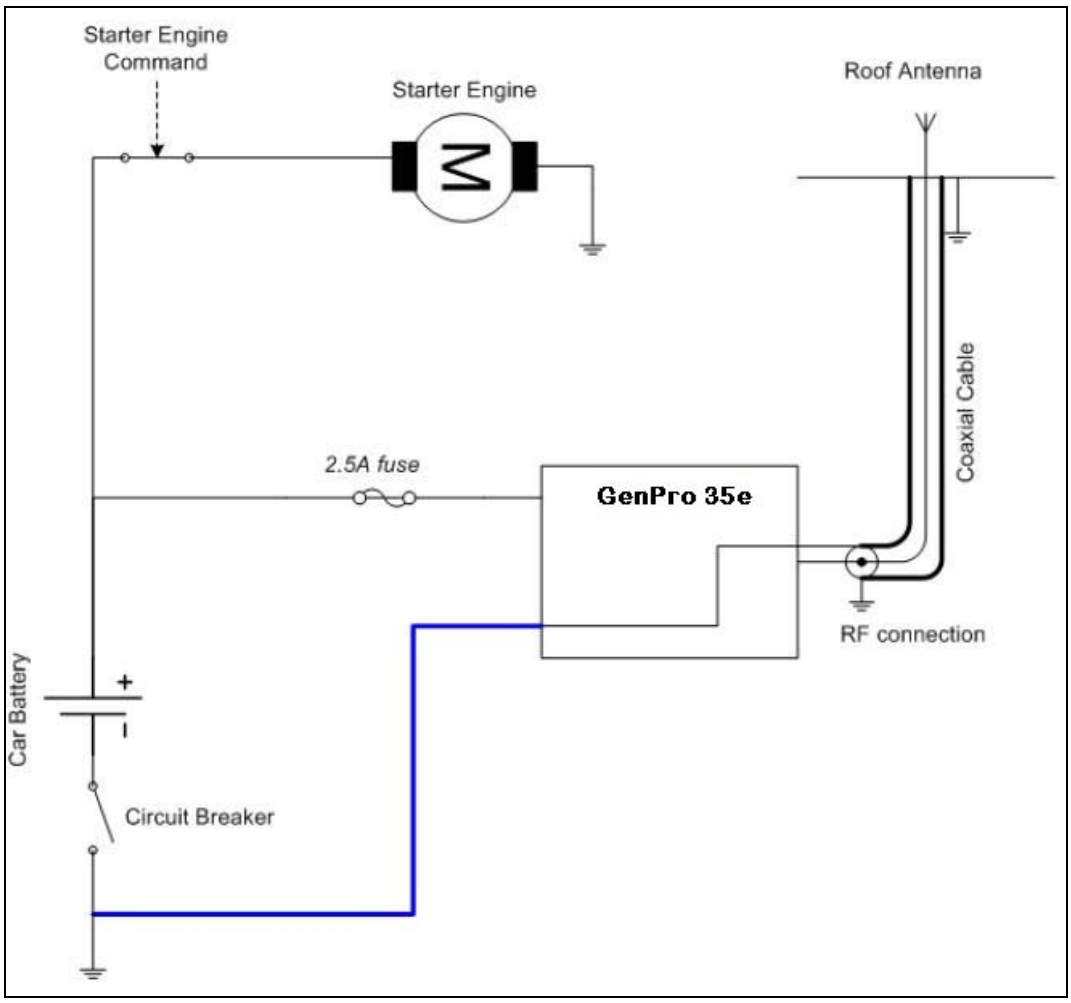
The power supply connector of the modem GenPro 35e must NOT be connected directly to the battery of the vehicle.

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).

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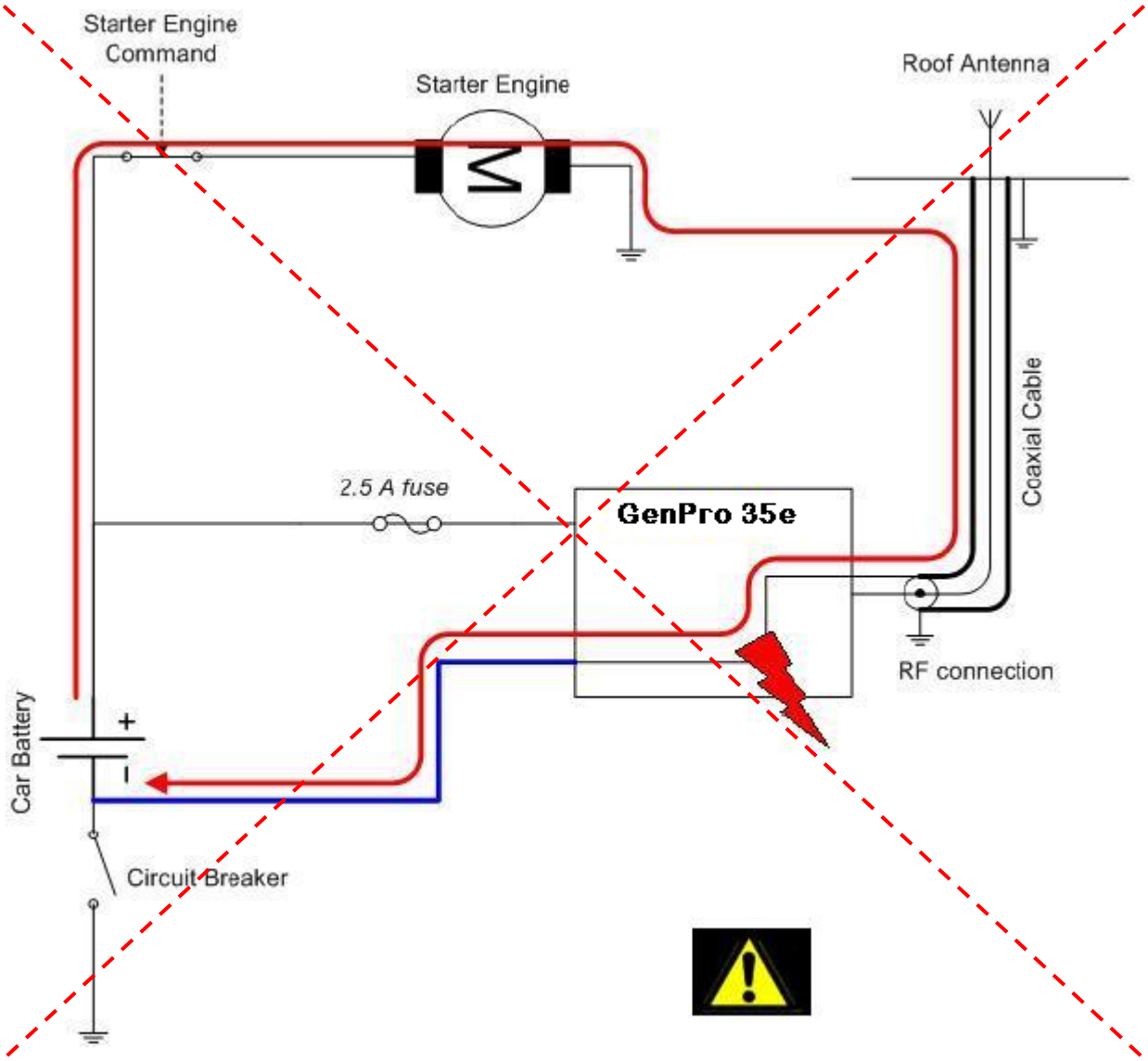
5.2.2 Technical constraints in truck

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.

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5.3 GSM led of the modem

The status of the modem is indicated by the status of the GSM LED located on the back side of the modem.

It is the LED situated next to the SIM reader (see § 3.1.2 Back side).

The table below shows the signification of the different available status of the GSM LED.

GSM LED status	LED activity	Modem status
On	LED fixed on	The modem is ready to work. It is recognized by the network.
Flashing	LED flashing slowly (every 5 s)	The modem is powered on, and it is trying to attach to the network.
	LED flashing quickly (every 0.33 s – 3 Hz)	The modem has an established communication.
	LED flashing (every 1 s – 1 Hz)	The modem is in low consumption. The RF module is inhibited but the USB port is active. Also called "plane mode ". Send the command AT+CFUN=1 to make the modem operational.
Off	LED off	The modem is off or in RESET phase.

5.4 Echo function of AT commands deactivated

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 Machine to Machine communication 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 ***ATE*** commands, see the document "Commands List of ERCO & GENER EG_GenPro35e_1006_CL_xxx_yy".

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5.5 Checking the quality of the GSM reception signal

To know the reception level, the GenPro 35e must absolutely have an activated SIM card inserted.

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 (***rssi***) 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 station of the subscribed operator network.

The "ERROR" message is returned if the SIM card is absent or if it has not been activated (PIN code not entered).

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 : <rssi>, <ber> with:

<rssi> = indicates the reception level,

<ber> = receive bit error rate.

Check the answered value ***<rssi>*** with the help of the table below.

<rssi> value	Gain in dbm	Interpretation	***<ber>*** value	Interpretation
0	-113 dbm	Insufficient	0 to 7	See recommendation 3GPP TS 45.008
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 minimal ***<rssi>*** between 11 and 15.
Below 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 "Commands List of ERCO & GENER EG_GenPro35e_1006_CL_xxx_yy".

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5.6 Verification of the PIN code

The PIN code is essential 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 previously 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 the AT commands, see the document "Commands List of ERCO & GENER EG_GenPro35e_1006_CL_xxx_yy".

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5.7 Verification of the modem registration

1. Ensure that a valid SIM card has been inserted in the SIM reader of the modem.
2. Using a communication software like HyperTerminal, enter the following AT command:

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.

5.7.1 On the GSM network

1. Using a communication software like HyperTerminal, enter the following AT command: ***AT+CREG?***
   Check the registration status on the network. The response must be with the following format:

   +CREG : <mode>, <stat> with :

   <Mode> = configuration of the registration message not solicited,

   <Stat> = registration status.
2. Check the registration status according to the value given in the table below.

Command	Response	Interpretation
AT+CREG?	***+CREG : 0,0*** or ***0,3***	The modem is not recognized by the network.
	+CREG : 0,2	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.

The "ERROR" message is returned when the SIM card is absent or if it has not been activated (PIN code not entered).

If the modem is not registered, check:
- the connection between the modem and the antenna
- or 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 "Commands List of ERCO & GENER EG_GenPro35e_1006_CL_xxx_yy".

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5.7.2 On the GPRS network

1. Using a communication software like HyperTerminal, enter the following AT command: ***AT+CGREG?***

   Check the registration status on the network. The response will be of the following format:

   +CGREG : **<mode>,<stat>** with:

   <mode> = configuration of the registration message not solicited,

   <Stat> = registration status.

2. Check the registration status according to the value given in the table below.

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

The "ERROR" message is returned when the SIM card is absent or if it has not been activated (PIN code not entered).

If the modem is not registered, check:
- the connection between the modem and the antenna
- or 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 "Commands List of ERCO & GENER EG_GenPro35e_1006_CL_xxx_yy".

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5.8 Main AT commands (HAYES)

The table below shows the main AT commands necessary for the control of the modem.

Other AT commands are available, see the document "Commands List of ERCO & GENER EG_GenPro35e_1006_CL_xxx_yy".

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 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 network
Verification of registration on the 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 GPRS 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 call	ATD<telephone number>	***CONNECT 9600***	Communication established
		+CME ERROR: 11	PIN code not entered
		+CME ERROR: 3	The credit has run out or a communication has already been established.
Lost communication		***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***.

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

Examples:

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

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5.9 Turning off the modem

There is no particular AT command to send to the modem GenPro 35e before turning it off.

5.10 Modem updating procedure

To be able to benefit from the latest functions of the GenPro 35e, 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 USB link.
See the software update procedure (Update Procedure) for a detailed description.

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 USB link

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

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Table: Solutions when there is no connection between the modem and the USB 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 5.5V to 32V (§ 8.2.1 Power supply).
	Is the USB cable connected at both ends (PC and Modem)?	Check the connection of the USB cable.
	Is the USB cable correctly cabled according to § 3.2.1.3 Mini USB B connecteur (5 contacts)	Connect the USB cable according to the table of the § 3.2.1.3 Mini USB B connecteur (5 contacts)
Returns nothing or random characters	Is the communication terminal correctly configured on the PC?	Ensure that • the configuration of the communication complies with the one of the modem. Factory configuration of the modem: Speed = 115200 bps Data Bits = 8 Parity = none Stop Bits = 1 Flow control = hardware • the virtual port of the terminal configuration corresponds with the one of the modem installed. See § 5.1.4 Verification of the communication with the modem
	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 reporting?	Send the command ***ATE1Q0*** followed by ***AT&W*** if a backup is necessary.

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6.2 "ERROR" message

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

- The COM port is not directed to the modem GenPro 35e but to another modem. Enter ***ATI***, the response must be ***Manufacturer: Sierra***.... 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 (see the document "Commands List of ERCO & GENER EG_GenPro35e_1006_CL_xxx_yy".
- The syntax of the AT command is correct, but transmitted with wrong parameters (see the document "Commands List of ERCO & GENER EG_GenPro35e_1006_CL_xxx_yy".

6.3 "NO CARRIER" message

If the modem returns the message "NO CARRIER" after an attempted call, check the table below for 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 § 5.5 Checking the quality of the GSM reception signal , to check the quality of the received signal.
	Is the modem registered on the network?	See the § 5.7 Verification of the modem registration to check its registration.
	Is the antenna correctly connected?	See the § 8.2.3.2 Installation of the antennas about the installation of the GSM antenna.
	Is the SIM card 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 supported by the called number?	Ensure that the selected modulation is supported by the called number.
	Is the selected modulation supported by the network?	Ensure that the selected modulation is supported by the network. If not, select a modulation compatible with the command ***AT+CBST=0,0,1*** (1*)

(1*) For more information about this AT command, see the document "Commands List of ERCO & GENER EG_GenPro35e_1006_CL_xxx_yy".

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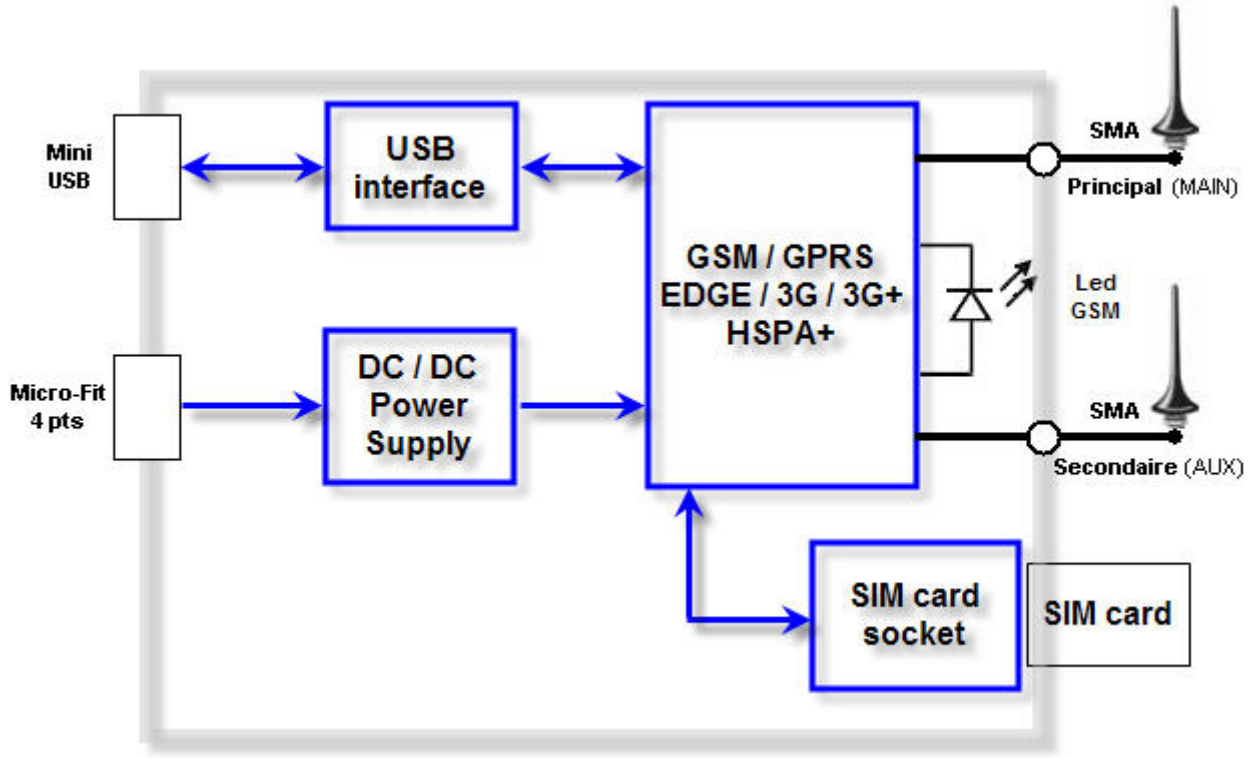
7 Functional description

7.1 Architecture



7.2 Power supply

7.2.1 General presentation

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

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

A correct functioning of the modem is not guaranteed if the input voltage (+VDC) falls below 5.5 V.

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7.2.2 Protections

The modem is protected by a 2.5 A / 250 V fuse directly assembled on the supply cable supplied with the modem.

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

Filter guarantees:

- EMI/RFI protection in input and output
- Signal smoothing.

The modem does not have internal protection. For that, you must absolutely use the supply cable supplied with the modem, which has this protection.

7.3 USB interface

The USB interface is the only link for the communication between Master USB (Host = USB COM port of the PC) and the modem.

The interface complies with the USB 2.0 specifications (Universal Serial Bus Specifications rev. 2.0).

Characteristics of the USB interface:

- Supports the max. output (full speed 12Mbps)
- General transfer of data between the modem and the USB master
- Use with the Windows drivers of the modem like a COM port
- Complies with the USB transmission/reception.

8 Technical characteristics

8.1 Mechanical characteristics

Dimensions	73 x 54.5 x 25.5 mm (excluding the connectors)
Complete dimensions	85.5 x 54.5 x 25.5 mm
Weight	≈ 84 grams max. (modem only) < 116 grams max. (modem + brackets + cables)
Volume	101.5 cm³
Casing	Aluminum profile
Waterproof level	Class IP31

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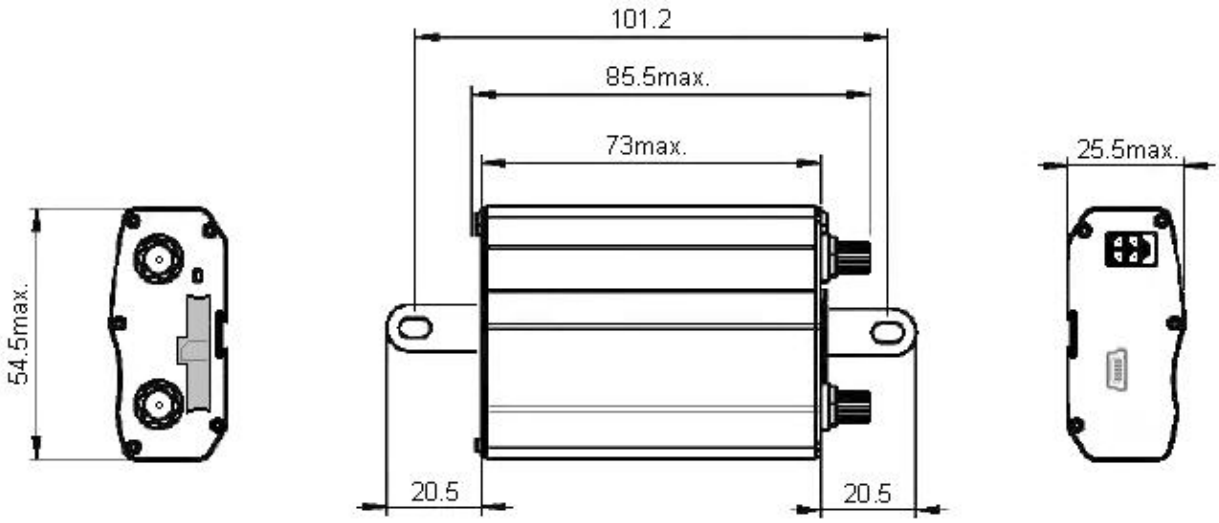
The illustration below shows the dimensions of the modem including the clearances necessary for the installation of the modem.



8.2 Electrical characteristics

8.2.1 Power supply

Table: Electrical characteristics

Power supply range	- 5.5V to 32V DC
Average consumption	- GSM 850/900 MHz : 139 mA @ 12V in communication - GSM 1800/1900 MHz : 106 mA @ 12V in communication- - EDGE 850/900 MHz : 246 mA @ 12V in communication - EDGE 1800/1900 MHz : 213 mA @ 12V in communication

Note: once the power supply is connected, the modem is permanently consuming.

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

Table: Effects of a power supply defect

	Then:
▪ Voltage falls below 5.5V	▪ The GSM communication is 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.

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The modem does not have any internal protection. For that, you must absolutely use the supply cable supplied with the modem, which has this protection.

The typical values are measured at ambient temperature. The minimal and maximal values are measured on the whole operating temperature range.

8.2.1.1 Consumption

The following tables show the modem consumptions.

Standby current consumption with Sleep mode activated (assumes USB bus is fully suspended during measurements)					
Description	Band	Vdc (V)	I Typ (mA)	I Max (mA)	Remarks
HSDPA / WCDMA	UMTS bands	5.5	Tbd	Tbd	DRX cycle = 8 (2.56 s)
		12	Tbd	Tbd	
		24	Tbd	Tbd	
		32	Tbd	Tbd	
GSM / GPRS / EDGE	GSM bands	5.5	Tbd	Tbd	MFRM = 5 (1.175 s)
		12	Tbd	Tbd	
		24	Tbd	Tbd	
		32	Tbd	Tbd	

Standby current consumption with Sleep mode deactivated (assumes USB bus is fully suspended during measurements)					
Description	Band	Vdc (V)	I Typ (mA)	I Max (mA)	Remarks
HSDPA / WCDMA	UMTS bands	5.5	Tbd	Tbd	DRX cycle = 8 (2.56 s)
		12	Tbd	Tbd	
		24	Tbd	Tbd	
		32	Tbd	Tbd	
GSM / GPRS / EDGE	GSM bands	5.5	Tbd	Tbd	MFRM = 5 (1.175 s)
		12	Tbd	Tbd	
		24	Tbd	Tbd	
		32	Tbd	Tbd	

Low Power Mode (LPM) / Offline Mode				
Description	Vdc (V)	I Typ (mA)	I Max (mA)	Remarks
RF disabled, but module is operational	5.5	Tbd	Tbd	This state is entered when Watcher shuts down / turns off the radio.
	12	Tbd	Tbd	
	24	Tbd	Tbd	
	32	Tbd	Tbd	

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WCDMA data current consumption (includes USB bus current) [1]				
Description	Band	Vdc (V)	I Moy (mA)	Remarks
WCDMA	UMTS bands	5.5	518	384 kbps at 20 dBm Tx power [2]
		12	239	
		24	123	
		32	94	
		5.5	275	0 dBm Tx power
		12	126	
		24	65	
		32	50	
HSUPA	UMTS bands	5.5	562	2 Mbps at 20 dBm Tx power
		12	259	
		24	133	
		32	102	
		5.5	353	0 dBm Tx power
		12	163	
		24	84	
		32	65	
HSDPA (1.8 Mbps / 3.6 Mbps / 7.2 Mbps)	UMTS bands	5.5	606	All speeds at 20 dBm Tx power [3]
		12	279	
		24	143	
		32	110	
		5.5	339	0 dBm Tx power
		12	156	
		24	80	
		32	62	
HSPA+ (21.1 Mbps)	UMTS bands	5.5	628	20 dBm Tx power
		12	289	
		24	148	
		32	114	
		5.5	375	0 dBm Tx power
		12	173	
		24	89	
		32	69	
Peak current (averaged over 100 µs)	UMTS bands	5.5	742	
		12	340	
		24	175	
		32	133	

[1] All values are preliminary values.
[2] Max. values on the band II (PCS1900).
[3] Difference of voltage between the speeds ≈ 30 mA.

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GSM / EDGE data current consumption (assumes USB bus current) [1]					
Description	Band	Vdc (V)	I Moy.(mA) (850/900 MHz)	I Moy.(mA) (1800/1900 Mhz)	Remarks
GSM / GPRS	GSM bands	5.5	518	446	Max PCL for each band [2]
		12	239	206	
		24	123	106	
		32	94	82	
		5.5	304	232	10 dBm Tx
		12	139	106	
		24	72	55	
		32	55	42	
EDGE	GSM bands	5.5	532	460	Class 12 [2]
		12	246	213	
		24	126	109	
		32	97	84	
Peak current (averaged over 100 µs)	GSM bands	5.5	1863		Worst case on 850/900 band
		12	873		
		24	371		
		32	321		

[1] All measures are preliminary values.
[2] Max. values on the band 850/900 MHz in class 10. (Class 12 implements power backoff).

Miscellaneous DC power consumption [1]					
Description	Band	Vdc (V)	I Typ.(mA)	I Max.(mA)	Remarks
Module OFF leakage current	All bands	5.5	0.17	0.59	Full operating temperature range
		12	0.07	0.26	
		24	0.04	0.14	
		32	0.03	0.1	
USB transmit current	All bands	5.5	8	8	Full speed USB connection, C_L= 50 pF on D+ and D- signals
		12	4	4	
		24	2	2	
		32	1	1	

[1] All measures are preliminary values.

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8.2.2 SIM interface

Table: Characteristics of the SIM card supply voltage

SIM card	3 V or 1.8 V

8.2.3 RF characteristics

8.2.3.1 RF functioning

The RF functioning complies with the ETSI GSM Phase 2+ recommendation

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

Table: Parameters of the RF receiver and transmitter

Band	Frequency (MHz)	Conducted Rx Sensitivity (dBm) (1)		Conducted Transmit Power (dBm) (1)
		Typical	Maximum	
GSM 850 (2%) (2) CS (3)	Tx: 824-849 Rx: 869-894	-109	-110	+32 ± 1 (GSMK class4) +27 ± 1 (8PSK class E2)
EGSM 900 (2%) (1) CS (3)	Tx: 880-915 Rx: 925-960	-109	-110	+32 ± 1 (GSMK class4) +27 ± 1 (8PSK class E2)
DCS 1800 (2%) (1) CS(3)	Tx: 1710-1785 Rx: 1805-1880	-109	-110	+29 ± 1 (GSMK class4) +26 ± 1 (8PSK class E2)
PCS 1900 (2%) (1) CS (3)	Tx: 1850-1910 Rx: 1930-1990	-109	-110	+29 ± 1 (GSMK class4) +26 ± 1 (8PSK class E2)
Band I UMTS 2100 (0.1%) (1) 12.2Kbps	Tx: 1920-1980 Rx: 2110-2170	-109	-110.5	+23 ± 1 (class 3)
Band II UMTS 1900 (0.1%) (1) 12.2Kbps	Tx: 1850-1910 Rx: 1930-1990	-109	-110	+23 ± 1 (class 3)
Band V UMTS 850 (0.1%) (2) 12.2Kbps	Tx: 824-849 Rx: 969-894	-109	-110	+23 ± 1 (class 3)
Band VI UMTS 800 (0.1%) (2) 12.2 kbps	Tx: 830–840 Rx: 875–885	-109	-110	+23 ± 1 (class 3)
Band VIII UMTS 900 (0.1%) (2) 12.2 kbps	Tx: 880–915 Rx: 925–960	-109	-110	+23 ± 1 (class 3)

(1) All measures are preliminary values.
(2) % = Binary error rate.
(3) CS = Circuit switched.

Characteristics	Remarks
EGSM 900 / GSM 850 Power Class 4)	2 W 33 dBm
GSM 1800 / 1900 Power Class 1	1 W 30 dBm
EDGE Power Class for 850 / 900MHz	Class E2 (1) 27 dBm, 0.5 W
EDGE Power Class for 1800 / 1900MHz	Class E2 (1) 26 dBm, 0.4 W

(1) E2 power class applies to 8PSK modulation.

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8.2.3.2 External antenna

The main external antenna must be connected to the modem via the SMA/M connector.

The secondary external antenna must be connected to the modem via the SMA/M connector.

The external antennas must comply with the characteristics described in the table below.

Table: Characteristics of the external antenna

Parameters	Min.	Typ.	Max.	Unit.	Description
Impédance		50		Ohm	impédance de charge d'antenne
Perte du câble			0.5	dB	Maximum loss to antenna
VSWR			3:1		ROS maximal autorisé
Gain max.			8.22	dBi	
Fréquence	850/900/1800/1900/2100			MHz	
Polarisation	Linéaire				

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

8.2.3.2 Installation of the antennas

The GenPro 35e provides the function "Antenna diversity ". It means that in WCDMA mode only, it optimizes the RF transmission and reception of the 2 antennas.

In all cases, the main antenna (MAIN) must be connected.

The non connection of the secondary antenna (AUX), does not stop the functioning but can reduce the performances of information transfer

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The antenna diversity on the GenPro35e works better if the antennas are placed on a distance between 1 wave length and 4 wave lengths.

Fréquence MHz	Distance recommandée min. 1 λ cm	Distance recommandée max. 4 λ cm
2 100	14.2	57.1
1 800	16.6	66.6
900	33.3	133.2

The non respect of these distances does not stop the functioning but reduces the capacity and the benefices of the antenna diversity.

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8.3 Environmental characteristics

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

Table: Environmental characteristics

Operating temperature	-25 °C to +60 °C
Storage temperature	-30 °C to +85 °C
Operating humidity without condensation during 48h	HR < 85% @ +85°C

8.4 Standards/Conformities

The product complies with the following requirements:

- R&TTE 1999/5/EC Directive,
- Regulations of standard ETSI EN 301 489-7 (02),
- ROHS Compliant : Directive 2002/95/CE,
- 2002/96/CE DEEE (crossed out wheelie bin).

The following marking appears under the device.

CE

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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 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 telephone 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 telephones 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 equipment 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.

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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. 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 made.
The use of a warning equipment that activates the headlights or the horn of a vehicle on public highways 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 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 your 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 authorized by ERCO & GENER can cancel the guarantee of the modem.

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 use or in case of theft.

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10 Recommended accessories

The accessories recommended by ERCO & GENER for the modem GenPro 35e, are shown 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

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L'esprit Modem

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 35e AOB** Type : **Modem**

Complies with :
-
-
-
-

Safety :

EMC :

Certification in progress

The corresponding markings appear under the appliance.

CE

Saumur, --- --th ---

Charles CHAUSSONNIER
Managing Director