ercogener
COLLABORATIVE THINGS

User Guide

GenPro 325e

Reference: EG_GenPro325e_1103A4_UG_005_UK.doc

Revision: 005

Date: 16/06/2017

ZI Chacé - Rue Docteur Weiss – F-49400 SAUMUR
Tél. : +33 (0)2 41 83 13 00
SAS CAPITAL 500 000 € / R.C. ANGERS B 801 206 228 / SIRET 801 206 228 00018

Groupe ZeKat

Document History

Rev.	Modifications	Author	Date	Validation	Date
000	Creation	YST	14/08/2015		
001	Addition information about power range with and without battery. Modification power voltage to 7.2V instead of 7.5V. Output 3.8V renamed Output V_{BAT}	PBR	12/11/2015		
002	Evolution	MSU	28/12/2015		
003	Pass to release	PBR	24/02/2016	YST	24/02/2016
004	Add power cable 4 wires with fuse.	YST	12/10/2016	MSU	18/10/2016
005	Battery characteristic evolution. Add precision on pinout of µ-Fit.	PBR	16/06/2017	MSU	16/06/2017

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

TABLE OF CONTENTS

Index of Tables

Index of Figures

Presentation

Entirely dedicated to embedded data services, the modem GenPro 325e combines HSPA / GPRS/ GSM functions in the same robust casing.

Dedicated to industrial markets, the GenPro 325e provides by default two serial links of communication allowing the following configurations: either two RS232C, the second one having only RX/TX signals, or one RS232C and one RS485A.

The modem is quad-Bands (850/900//1800/1900 in 2G GSM/GPRS Class 12/EDGE.

The modem is six-Bands (Band I (2100 MHz), Band II (1900 MHz), Band IV (1700 MHz), Band V (850 MHz), Band VI (800 MHz), Band VIII (900 MHz)) in 3G UMTS/HSDPA/HSUPA.

The GenPro 325e provides 3 operating modes depending on the embedded application:

- External mode (standard) : The control is done by an external application. The modem is used with the AT command set (see Commands List EG_EGM_CL_xxx_yy of ERCOGENER).
- Autonomous mode: Once configured, the modem is autonomous; it cyclically registers the positions and automatically transmits them to the client's application via different services: SMS, GSM Data, TCP socket GPRS/UMTS (see EG_EasePro_Vx_CL_yyy_UK of ERCOGENER).
- Specific development mode: the EGM development tool allows the development of additional and customized embedded applications. For more information about the tools and the training, please contact our sales department.

Its protocols of IP connectivity integrated in the embedded application EasePro_Vx, are also available under EGM libraries for a specific development, allowing a quick installation of embedded telematics solutions with strong 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),
- Recommended accessories for the use of the modem.

For more information about this document, ERCOGENER puts at your disposal the following elements:

- Commands List
  - External mode EG_EGM_CL_xxx_yy
  - Autonomous mode EG_EasePro_Vx_CL_yyy_UK
- Application Note EG_GenPro325e_1103A4_AN_xxx_yy
- Release Note EG_GenPro325e_1103A4_RL_xxx_yy
- Client support (Hot-Line)

Warning

- ERCOGENER recommends to read carefully all documents linked to the product GenPro 325e (User Guide, Application Notes, Command List) that can be download on our website www.ercogener.com.
- ERCOGENER cannot be held responsible for:
  - The problems due to an inappropriate use of the **GenPro 325e**.
  - 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, 3G networks.
  - The dysfunctions if the product is used for the watching of physical persons where human life is engaged.
- ERCOGENER reserves the right to modify the functions of its products "**GenPro 325e**" and "**EasePro**" without previous notice.

- 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 325e** must be returned to the factory for any repair.
- The **GenPro 325e** must be placed in a normally ventilated area, out of sources of heat.
- In order to guarantee the electromagnetic compatibility, the length of the serial cable, the power supply cable and the inputs/outputs cable must not exceed 3 meters.
- The **GenPro 325e** must not be connected directly to the mains supply; a voltage adapter must be used.

SCRAP THE WORN BATTERIES ACCORDING TO INSTRUCTIONS.

Copyright

The use of some products or services described in this document may require a paying subscription. The availability of some products or services described in this document may change, depending on the configurations and the materials.
In some countries, restrictions of use of the devices may be applied. For more information, thank you to contact your nearest legally qualified local government representative.

ERCOGENER follows a method of continuous development. Consequently, **ERCOGENER** reserves the right to change and improve any of its products described in this document, without notice.
The contents of this document are provided “as it is”. Except for the applicable obligatory laws, no guarantee in any form, explicit or implicit, including but without being limited to it the implicit guarantees of aptitude to marketing and of appropriateness to a particular use, is granted concerning the precision, the liability or the contents of this document. **ERCOGENER** reserves the right to revise or withdraw this document at any time and without notice.

ERCOGENER cannot be held responsible for any loss of data or income, as well as particular damage, incidental, consecutive or indirect.

Symbols used

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

A symbol for the essential information linked to the module integration and performance.

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

1 Security recommendations

1.1 General security

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

Turn OFF your GSM modem:

- On an aircraft. 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 equipment 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 modem close to insufficiently protected medical equipment such as audio devices and pacemakers.

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

Using your 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 modem is physically linked to a site and it is not possible to move it easily to another site.
- "Mobile" application: The 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 powered at a Very Low Security Voltage and at non-dangerous energy level.

1.2 Security in a vehicle

Do not use your modem whilst driving.

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

An incorrect installation of the modem in a vehicle could cause an incorrect functioning of the vehicle's electronics. To avoid such problems, make sure 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 activates the headlights or the horn of a vehicle on a public highway is not authorized.

1.3 Care and maintenance

The following suggestions 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 equipment or accessories not made or not authorized by ERCOGENER can cancel the warranty of the modem.

The battery is not covered by the warranty when the option S0531B is installed

1.4 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.

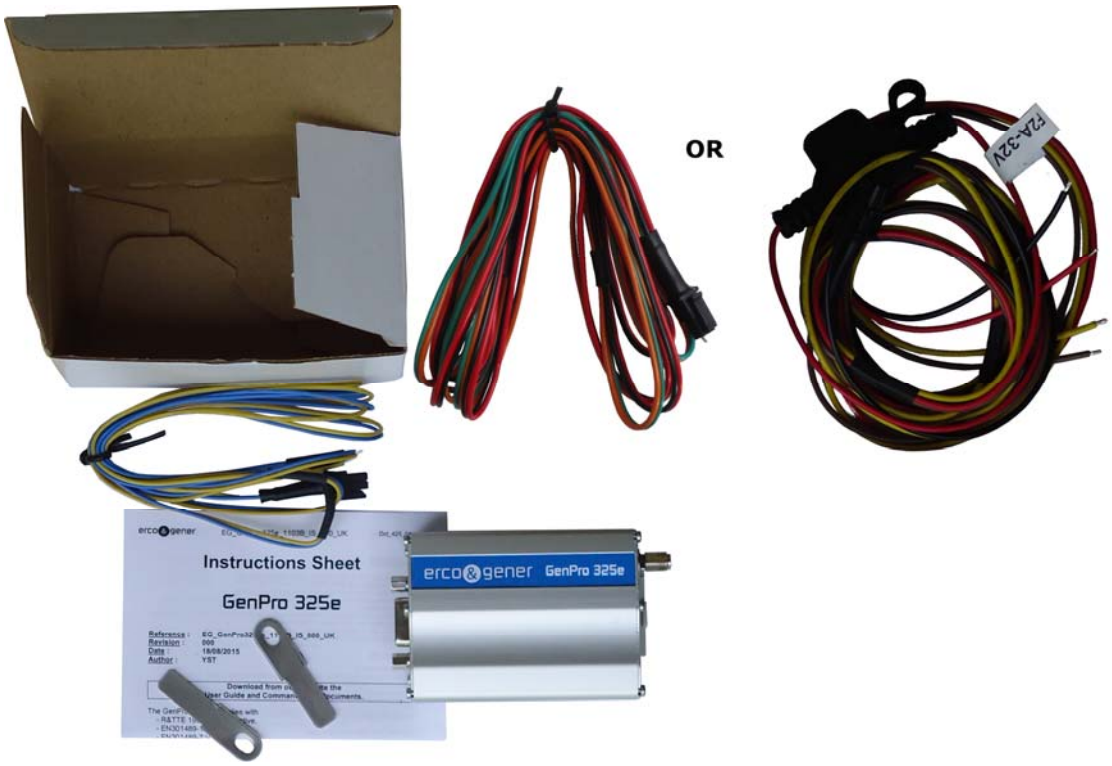
2 Presentation

2.1 Content

The GenPro 325e is supplied with:

- a GenPro 325e cardboard packaging,
- a modem GenPro 325e,
- 2 fixing brackets,
- a 4-wire power supply cable, input/output
  (Red/Black /Orange/Green) stripped without fuse.
  or
  (Red/Black /Brown/Yellow) stripped with fuse.
- a 2-wire cable (Blue/ Yellow) stripped.
- a technical sheet (Instructions Sheet).

Figure 1 : Content



2.2 Modem packaging

The external dimensions of the modem packaging are:

- Width .....: 109 mm,
- Height.....: 58 mm,
- Depth .....: 68 mm,
- Weight .....: 185 to 205 g depending on options.

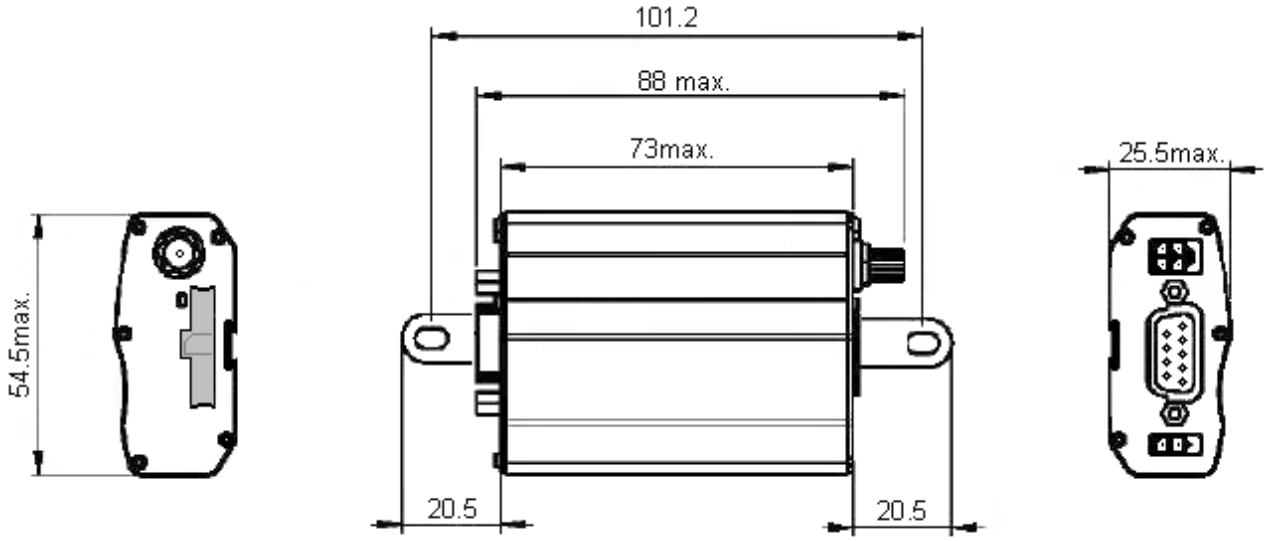
2.3 Mechanical characteristics

Table 1 : Mechanical characteristics

Dimensions	73 x 54.5 x 25.5 mm (connectors excluded)
Complete dimensions	104 x 92 x 40 mm
Weight	≈ 87 grams (modem only) < 190 grams (modem + brackets + cables)
Volume	101.5 cm³
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.

Figure 2 : Dimensions



2.3.1 Fixing brackets

2 brackets to fix the modem on a support.

Figure 3 : Back side

Fixing brackets

2.4 Characteristics and Services

2.4.1 Services

The GenPro 325e is:

- A UMTS/EDGE/GPRS/GSM modem dedicated to the transmission of binary data in asynchronous and SMS.

The modem characteristics and the available services are summarized in the table below.

Table 2 : Characteristics and services

Functions 3G UMTS / HSPA - 2G GSM / GPRS / EDGE		
• UMTS/HSPA	800/850/900/1700/1900/2100 MHz 3GPP Release 7 (HSPA+)	(Bands I, II, IV, V, VI, VIII)
• GSM	4 band 850 / 900 / 1800 / 1900 MHz 3GPP Release 7 PBCCH support	(support GSM / E-GSM / DCS / PCS)
• GPRS	Class 12, CS1-CS4 - up to 86.5 kb/s	
• EDGE	Class 12, MCS1-9 - up to 236.8 kb/s	
• CS	GSM up to 9.6 kb/s WCDMA up to 64 kb/s	
• SMS	MT/MO/CB PDU/Text mode SMS over PSD or CSD	
• WCDMA/HSDPA/HSUPA • GSM / GPRS • EDGE	Power Class 3 Power Class 4 Power Class 1 Power Class E2 Power Class E2	(24 dBm / Band VIII) (33 dBm) for GSM/E-GSM bands (30 dBm) for DCS/PCS bands (27 dBm) for GSM/E-GSM bands (26 dBm) for DCS/PCS bands
• Sensitivity	GSM850/E-GSM900 @ 25 °C DCS1800/PCS1900 @ 25 °C UMTS 800 (band VI) UMTS 850 (band V) UMTS 900 (band VIII) UMTS 1700 (band IV) UMTS 1900 (band II) UMTS 2100 (band I)	-110 dBm, Downlink RF level @ BER Class II < 2.4 % -109 dBm, Downlink RF level @ BER Class II < 2.4 % -111 dBm, Downlink RF level for RMC @ BER < 0.1 % -112 dBm, Downlink RF level for RMC @ BER < 0.1 % -111 dBm, Downlink RF level for RMC @ BER < 0.1 % -111 dBm, Downlink RF level for RMC @ BER < 0.1 % -111 dBm, Downlink RF level for RMC @ BER < 0.1 % -111 dBm, Downlink RF level for RMC @ BER < 0.1 %
Packet Switched Data Rate	HSUPA category 6, up to 5.76 Mb/s HSDPA category 8, up to 7.2 Mb/s WCDMA data up to 384 kb/s DL/UL	
Packet Switched Data Rate (GPRS/EDGE)	GPRS multi-slot class 12, CS1-CS4 up to 85.6 kb/s DL/UL EDGE multi-slot class 12, MCS1-MCS9 up to 236.8 kb/s DL, MCS1-MCS4 up to 70.4 kb/s UL	
GPRS / EDGE multi-slot class determines the number of timeslots available for upload and download and thus the speed at which data can be transmitted and received, with higher classes typically allowing faster data transfer rates. GPRS / EDGE multi-slot class 12 implies a maximum of 4 slots in DL (reception) and 4 slots in UL (transmission) with 5 slots in total.		
SIM Toolkit		

Interfaces
• GSM antenna: connector SMA-Female
• Power supply: +7.2 to +32 V_{DC} (4-pin micro-FIT connector) (+8 to 32V_{DC} with battery option)
• 1 serial port RS232 (300 to 115200bds) 15-pin Sub-D female • 1 RS485 port with spring contact
• AT commands: 3GPP TS 27.007 / 27.005 / 27.010
• SIM reader (SIM 3V – 1,8V)
• 3 opto-coupled inputs • 1 open collector output
• External device power supply via RI pin

Accessories supplied
• Fixing brackets (x2)
• Cable with 4-wire Micro FIT connector (Power supply, Input and output)
• Cable with 2-pin Micro FIT 2 connector (2 Inputs)

Options / Additional accessories *	
• Analog inputs (0 – 10 Volts)	S0534B
• Backup battery, RTC back up	S0531B
• ONE WIRE Multi slaves	S0535B
• DIN-rail kit	K002
• EaseIP application	S0519C
• NTRIP application	S0445C
• Embedded software development kit	SDK EGM
• Accessories: Antennas, cables, power supplies... (information available on our website)	

* These options are in addition or replace some existing options, contact us (see § **3.3.2 Functional architecture of optional serial ports**)

2.5 Environmental characteristics

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

Table 3 : Environmental characteristics

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

If the battery option, specific S0531B, is installed, 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 with -20°C to + 35°C 3 months of storage with -20°C to + 45°C 1 month of storage with -20°C to + 60°C
Relative humidity	65 ±20%

Above 45 °C inside the box, the protection of the battery management triggers. The battery will not be charged.

3 Interfaces

3.1 Front side

Figure 4 : Front side

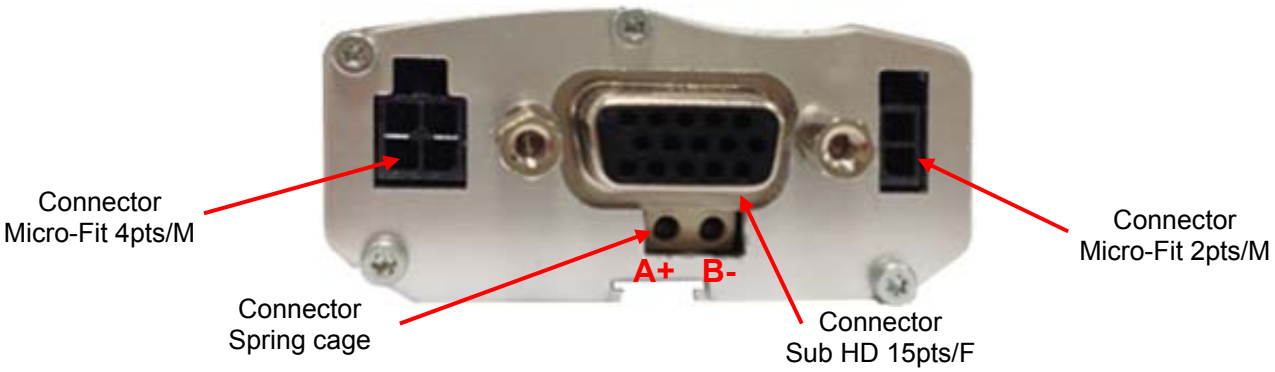
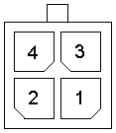
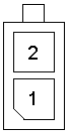
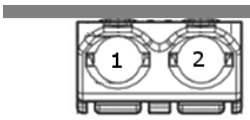


Tableau 4 : Front side connection







Micro Fit 4 pins		
1	OUTPUT 1	[S1]
2	INPUT 1	[E1]
3	GND	
4	$+V_{DC}$	

Sub-HD 15 pins		
1	109 - DS/DCD	[S]
2	103 - ED/TXD	[E]
3	Boot	[E]
4	NC	
5	NC	
6	104 - RD/RXD	[S]
7	107 - PDP/DSR	[E]
8	108/2 - TDP/DTR	[E]
9	102 - TS/GND	
10	NC	
11	106 - PAE/CTS	[S]
12	105 - DPE/RTS	[E]
13	125 – IA/RI	[S]
14	Reset	[E]
15	Analog input 0-10V	

Micro Fit 2 pins		
1	INPUT 3	[E3]
2	INPUT 2	[E2]

Spring cage	
1	RS485 A+
2	RS485 B-

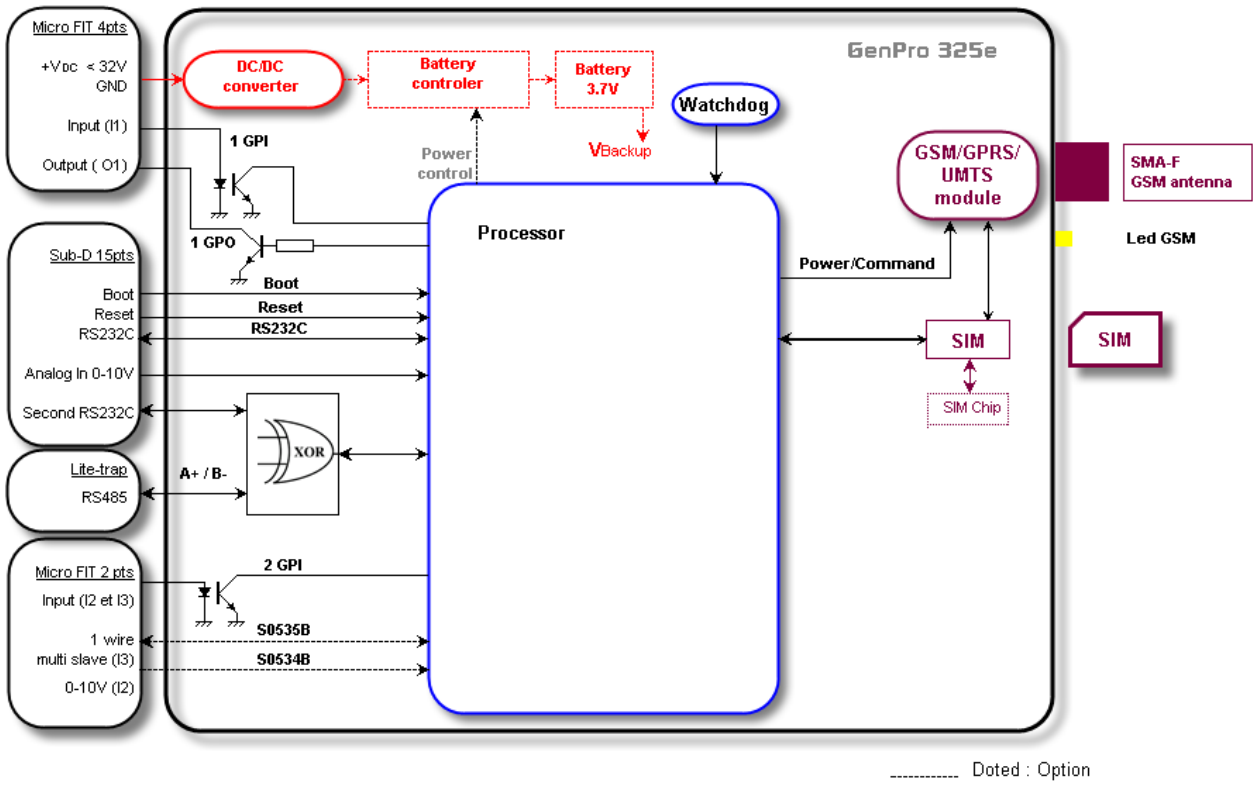
3.2 Back side

Figure 5 : Back side

3.3 Functional architecture

3.3.1 General

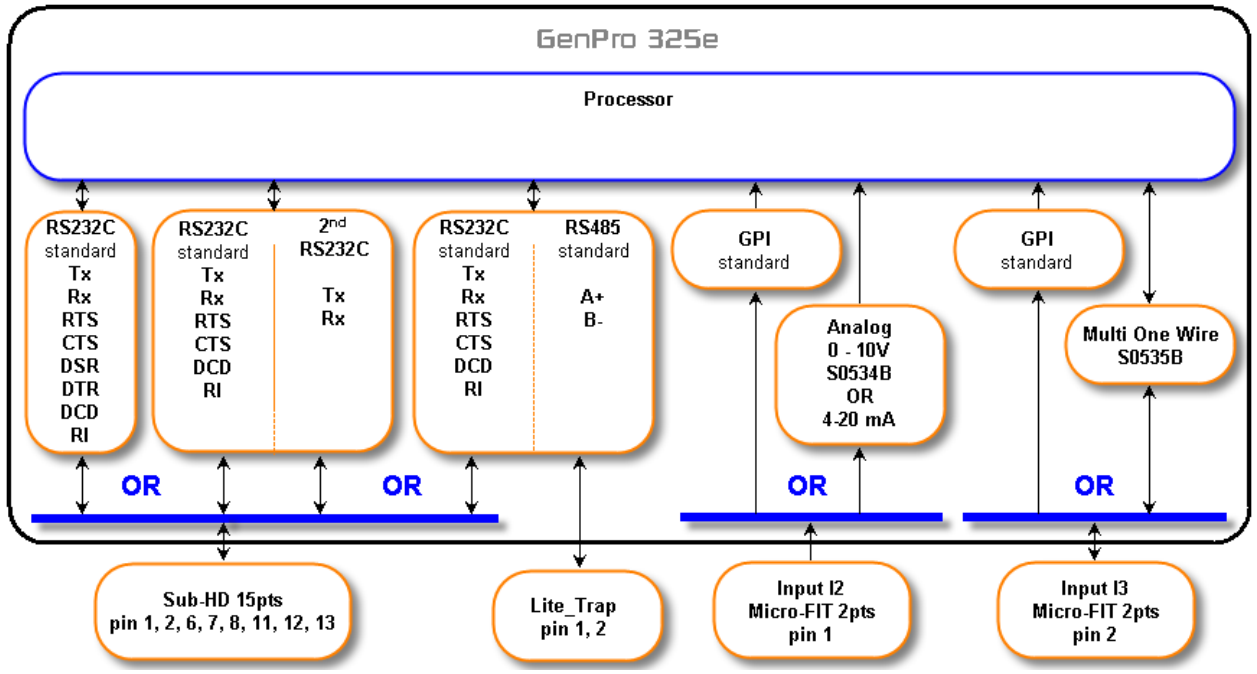
Figure 6 : Functional architecture



3.3.2 Functional architecture of optional serial ports

Contact us for the setting of the different options.

Figure 7 : Architecture of optional serial ports



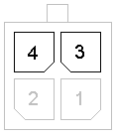
3.4 Power supply

If the battery option is present, the fact of removing the power supply $+V_{DC}$ will not turn the modem OFF. For this, see the § 5.2 Turning the modem OFF

3.4.1 Power supply cables

The modem is powered with the cable supplied with the equipment (ERCOGENER reference: 4402000107 or 4402304215). (See § ANNEX 1 – 4-pin Micro-FIT cable)

Table 5 : Description of power supply pins

Signal	Connector 4 pins Pins N°	I/O	Kind of I/O	Description
$+V_{DC}$ GND	4 3	I	Analog	Power supply
		Corresponds to wires 4 - Red for $+V_{DC}$ 3 - Black for GND See ANNEX 1 – 4-pin Micro-FIT cable without fuse, ANNEX 2 – 4-wire Micro-FIT cable with fuse		

The pins 1 and 2 are used for the functions Input/Output.
The power supply to the modem is done only via the pins 4 ($+V_{DC}$) and 3 (GND).

3.4.2 Power supply

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

Standard	**+7.2V ≤ $+V_{DC}$ ≤ +32V**
With battery option	**+8V ≤ $+V_{DC}$ ≤ +32V**

The internal regulation is done by a DC/DC converter and allows the supply of all necessary internal DC voltages.

The modem is also internally protected against voltage peaks of more than 32 V_{DC}.

The following table describes the consequences of an overvoltage or drop of voltage on the modem.

Table 6 : Effects of power supply defect

	Then:
▪ Voltage falls below 7.2V	▪ The functioning and the radio communication are not guaranteed.
▪ Voltage above 32V (Punctual peaks)	▪ The modem guarantees its own protection.
▪ Voltage above 32V (Continuous overvoltage)	▪ The modem is protected by an internal resettable fuse.

3.4.3 Internal battery option (S0531B)

This battery allows to maintain the operation of the GenPro 325e in case of absence of its external power supply.

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

When the battery is completely discharged, 4 h are necessary to obtain a new complete charge. It is normal if the box is becoming a little bit hot in this case.

The autonomy of the battery mainly depends on the mode of use of the GenPro 325e (attachment in 3G/GPRS/GSM, Inputs/Outputs, RS232 connected...).

In the case where the software management of the battery guarantees that the voltage V_{BAT} does not goes below 3,3 V, with a battery having 3 charging cycles and completely charged, the autonomy is around:

- 1h in WCDMA Band I communication, serial link not connected, no input output connected, max. power.
- 4h in GPRS communication - 900 MHz - 1Rx/1Tx P = 29.2 dBm, serial link not connected, no input output connected, max. power.
- 11h attached to GPRS network without data transfer, serial link not connected, no input output connected, max. power.

When the battery is charged, it is not possible to do an ON/OFF of the device. Only putting the Reset input (pin 10 of the 16-pin Micro-FIT connector) to the Ground or sending the command AT+EGMRST allows a reset of the modem.

When the temperature exceeds 45 °C inside the box, the protection of the battery management triggers. The battery will not be charged..

If the battery is present, prepare the modem for storage or transport conditions, in order to limit high discharges of the battery. For this, see § 5.2 Turning the modem OFF

Table 7 : Characteristics of the polymer lithium battery

Voltage (max.)	4.2V	
Type	Lithium Polymer (LiPolymer)	
Capacity	980 mA/h typique	
Exp. life time at 0.5C/0.5C	>500 cycles >80% of initial capacity at 20°C	
Temperature range	Charge : 0°C to +45°C	Discharge : -20°C to +60°C
Protection (Resettable)	Discharge voltage : 2.50V ±0.050V Maximum discharge current : 3A to 7A	

The battery cannot be replaced or modified by the user; the device must never be opened.
For any intervention on the battery: the device must be returned to the factory.
Do not throw the modem and the battery on fire.

3.4.4 Consumptions of the GenPro 325e

Table 8 : Power supply range

Power supply range	7.2 V_{DC} to 32V_{DC} (8 V_{DC} to 32V_{DC} with battery option)

Table 9 : Consumption with mode Power Off Mode @ 25 °C without battery charge

Power Off Mode (1)		$I_{MOY\ MOM.}$				**Unit.**
V_{IN}		**7.2**	**12**	**24**	**32**	**V**
$I_{MOY\ MAX}$		1.9	1.52	1	1	mA

(1) The GenPro 325e is in Power Off mode with the command ***AT+CPWROFF*** + serial port disconnected.

Table 10 : Consumption with attached mode @ 25 °C without battery charge

Attached mode		$I_{MOY\ MAX.}$				**Unit.**
V_{IN}		**7.2**	**12**	**24**	**32**	**V**
GSM / GPRS (2)	**@ DRX = 5**	3.2	2.5	1.51	1.4	mA
3G WCDMA	**@ P=23dBm**	2.8	2.3	1.45	1.3	mA

(2) AT+UPSV=1,4000 + serial port disconnected + GSM 900 attached to network PCL5

Table 11 : Maximum consumption with data transfer mode @ 25 °C without battery charge

	Band	**Mode**					**Unit**
V_{IN}			**7.2**	**12**	**24**	**32**	**V**
Peak current	**GSM/GPRS**		1955	950	500	395	mA
GSM (3)	**850/900 MHz**	**P = 32.2 dBm typ.**	300	140	70	55	mA
	1800/1900 MHz	**P = 29.2 dBm typ.**	205	110	55	45	mA
GPRS 3Rx +2Tx PCL5	**850 MHz**	**P = 30.5 dBm typ.**	240	135	70	55	mA
	900 MHz		240	135	70	55	mA
	1800 MHz	**P = 27.5 dBm typ.**	195	115	60	4v5	mA
	1900 MHz		190	110	55	45	mA
WCDMA	**Band I**	**P = 23 dBm typ.**	420	240	120	95	mA
	Band II		550	310	151	115	mA

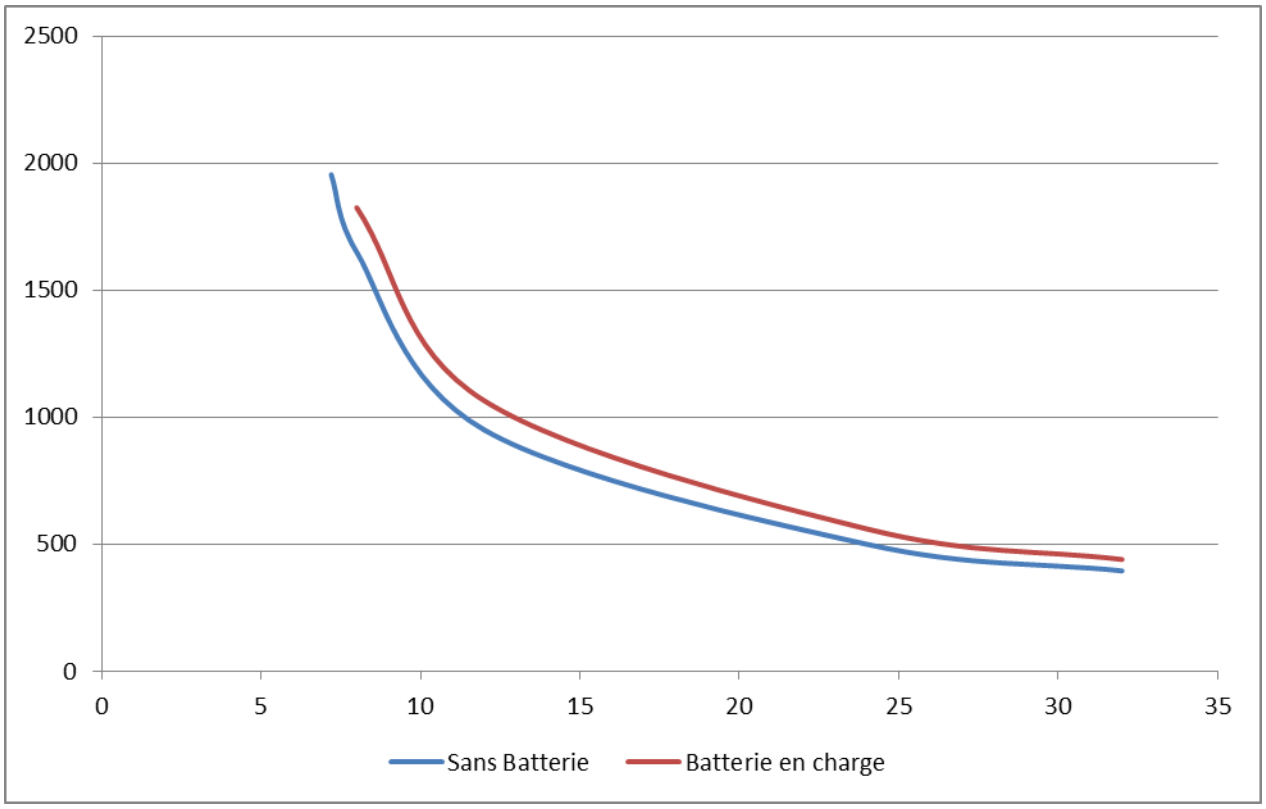
Tableau 12 : Consumption of battery charge @ 25 °C

Battery charge			**IMOY MAX.**		**Unit.**
V_{IN}	**8**	**12**	**24**	**32**	**V**
	175	115	60	45	mA

3.4.4.1 Power supply dimensioning

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

Figure 8 : Max consumption



This consumption is not permanent. It corresponds to the burst consumption during GSM communications.

3.5 Serial links RS232C

By default, the GenPro 325e provides 2 serial links, but only one of them is active.

With the use of the port **RS485**, only the signals CT103/TX, CT104/RX, CT106/CTS, CT105/RTS, CT109/DCD, CT125/RI remain available. The signals CT107/DSR and CT108-2/DTR must not be connected (no physical link with the system port).
With the use of the **second serial port** RS232C, only the signals CT103/TX, CT104/RX, CT106/CTS, CT105/RTS, CT109/DCD, CT125/RI remain available. The signals outputs CT107/DSR and CT108-2/DTR have another assignment.

The use of the second serial port is linked to the embedded software application. It may be not available with all configuration cases.

Table 13 : Electrical characteristics of RS232C signals

Characteristics	Symbols	Conditions	Min.	Typ.	Max.	Unit
Input Voltage – Range	V_{INPUT}	Input Voltage – Range	-25		+25	V_{DC}
Input Voltage – Low	V_{IL}	Input Voltage – Low	0.6	1.1		V_{DC}
Input Voltage – High	V_{IH}	Input Voltage – High		1.5	24	V_{DC}
Input Hysteresis	V_{Hys}	Input Hysteresis		0.5		V_{DC}
Input Resistance	R_{in}	Input Resistance	3	5	7	KΩ
Output Voltage	V_{OUT}	All transmitter outputs loaded with 3 kΩ to ground	±5	±5.4		V_{DC}
Transmitter Output Resistance	R_{OUT}		300	50k		Ω
RS-232 Output Short-Circuit Current	I_{CC}				±60	mA

3.5.1 Serial link RS232 by default

Table 14 : Description of pins of serial link RS232C

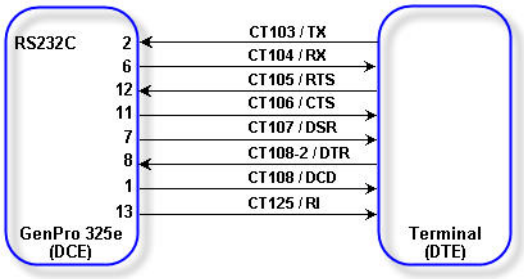
Signal	Connector Sub-HD 15 pins Pins N°	I/O	RS232 Standards	Description	
CT109 / DCD	1	O	DCD	Data Carrier Detect	
CT103 / TX	2	I	TX	Data transmission	
CT104 / RX	6	O	RX	Data reception	
CT107 / DSR	7	O	DSR	Data set ready	/ TX second serial link
CT108-2 / DTR	8	I	DTR	Data terminal ready	/ RX second serial link
CT106 / CTS	11	O	CTS	Ready to send	
CT105 / RTS	12	I	RTS	Request to send	
CT125 / RI	13	O	RI	Call indicator	
GND	9			Ground	

Table 15 : Pins description of 2nd serial link

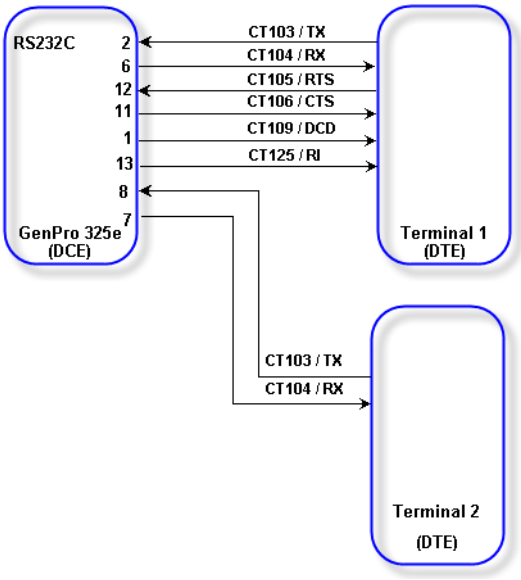
Signal	Connector Sub-HD 15 pins Pins N°	I/O	RS232 Standards	Description	Default
CT103 / TX	7	O	TX	Data transmission	DSR
CT104 / RX	8	I	RX	Data reception	DTR
GND	9			Ground	

Figure 9 : Block scheme of serial links

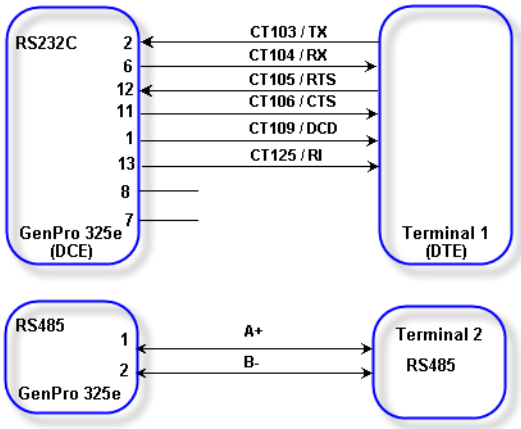
By default



With second serial port RS232C



With RS485



3.6 RS485 serial link

By default, the GenPro 325e provides a serial link RS485 that can be used with a specific software application.

Using the RS485 serial link requires the physical disconnection of the signals CT107/DSR and CT108-2/DTR of the main serial link. See scheme above.

For the connection, see recommendations below.

Table 16 : Pins description of serial link RS485

Signal	Spring cage connector Pins N°	I/O	RS485 Standards	Description
A+	1	I/O	A/Y	I/O not inverted
B-	2	I/O	B/Z	I/O inverted

Table 17 : Characteristics of RS485 serial link

Characteristics	Symbols	Conditions	Min.	Typ.	Max.	Unit
Interface voltage (A or B)	V_{IO}		-1.25		6.1	V_{DC}
Transmitter						
Differential Output Voltage	V_{OD}		1,5		3	V_{DC}
Driver Common Mode Output	V_{OC}				3	V_{DC}
Short-Circuit Current	I_{OSD}	–7V ≤ (A or B) ≤ 12V			±200	mA
Receiver						
Input Current (A, B)	I_{IN}	–7V ≤ (V_{IN}) ≤ 12V	-100		125	µA
Differential Input Threshold Voltage	V_{TH}	0V ≤ B ≤ 6.1V			±0,2	V_{DC}
Input Hysteresis	ΔV_{TH}	B = 0V		25		mV_{DC}
Output High Voltage	V_{OH}	I_O = –4mA, A-B = 200mV	2.4			V_{DC}
Output Low Voltage	V_{OL}				0,4	V_{DC}
Termination resistance						
Resistor	RT		118.8	120	121.2	ohms

Figure 10 : Cable length of RS485 serial link

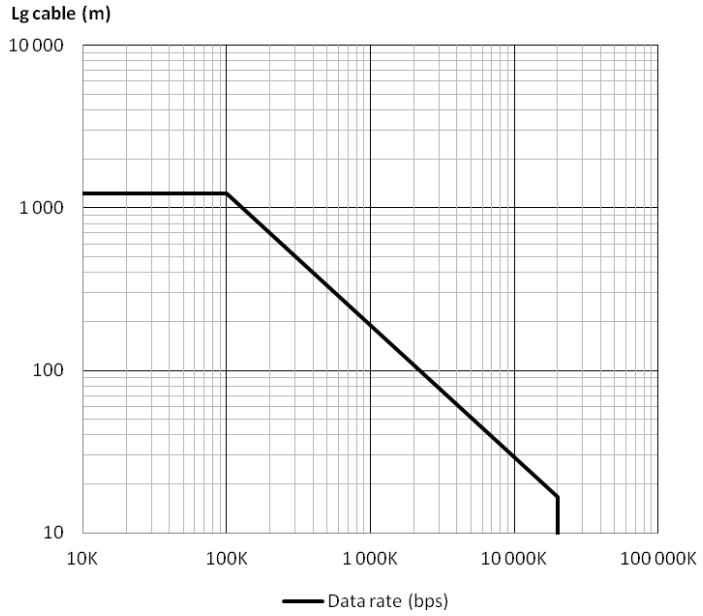
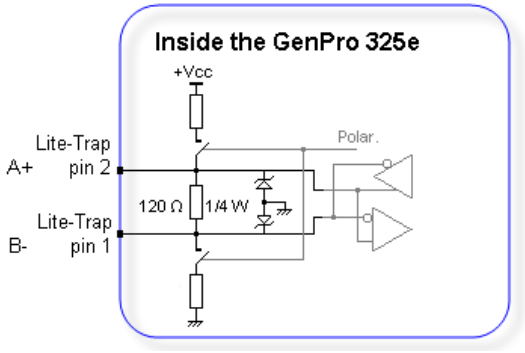


Figure 11 : Standards signals of RS485 serial link



By software, the signals A / B can be polarized in A+ / B-.

3.6.1 Connection recommendations

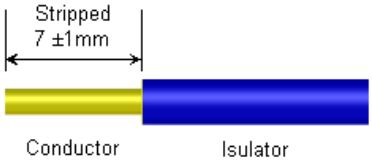
The use of rigid wires is recommended.

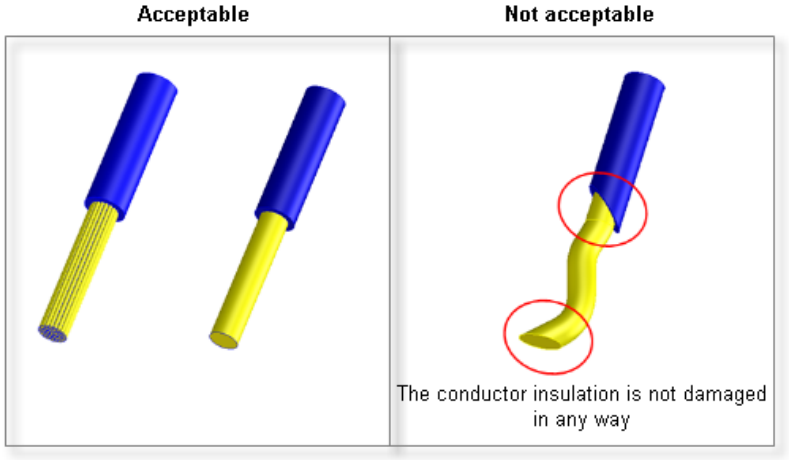
In the case of use of flexible multi-stranded wires, and in order to guarantee a correct insertion, using needle-nose pliers is mandatory.

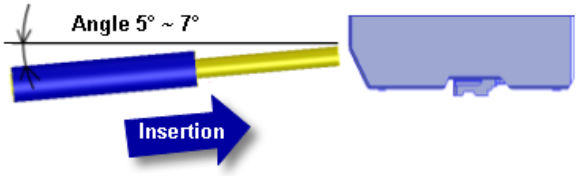
As the spring contact connector is soldered on the printed circuit, the method of intermediate connection is recommended, in case it would be necessary to disconnect the device.

Table 18 : Preparation of wire

	Min.	Max.	Unit
Wires section	0,2	0,75	mm^2
	24	18	AWG







The wires extraction is strongly NOT recommended; in case of absolute necessity, they have to be pulled gently.

3.6.1.1 Connection with intermediate connector

Using rigid wires of 0.75mm² diameter and 5 cm length between the GenPro 325e and the connector allows an easy connection and minimizes the risks of interference.

The outgoing wires can have a diameter less important.

Example of possible references:

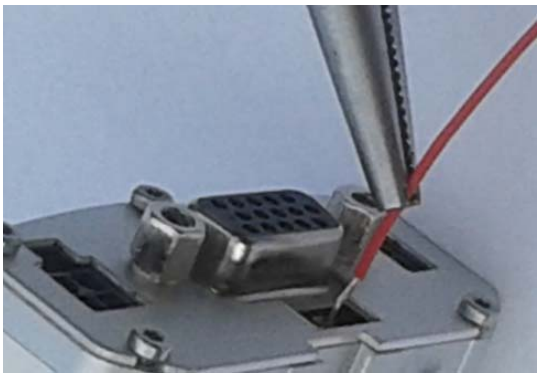
Manufacturer	WAGO	WAGO	WAGO
Ref	221-412	222-412	2273-202
Picture			
Diameters	0.2 to 4 mm² / 24 to 12 AWG	0.1 to 2.5 mm² / 28 to 12 AWG	0.5 to 2.5 mm² / 18 to 14 AWG

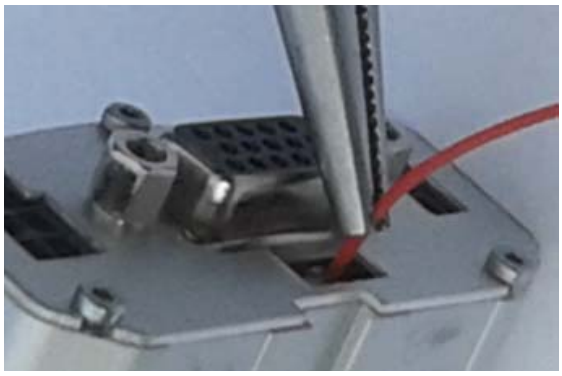
3.6.1.2 Direct connection

This method must be adapted depending on the diameter of wire used.

In the case of small-diameter wire (0.4mm²), the previous method is the most reliable.

After having prepared the wire, pinch it at more or less 12 mm from the end, and insert it in the connector.





3.7 BOOT

This signal must NOT be connected, NOT used. The use of the BOOT function is strictly reserved for the manufacturer and distributors.

Table 19 : Description of BOOT input

Signal	Sub_HD 15 pins Pins N°	I/O	Kind of I/O	Description
BOOT	3	I	SCHMITT	Boot modem
GND	9			

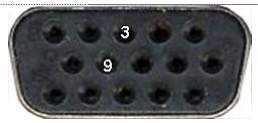
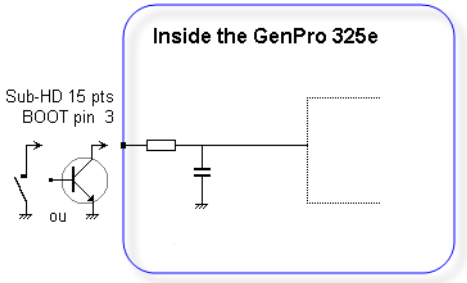


Table 20 : Conditions of use of BOOT signal

Parameters	Conditions	Min.	Typ.	Max.	Unit
VIL	Input Voltage – Low	-0.3		0.8	V_{DC}
VIH	Input Voltage – High	2		3.3	V_{DC}
RIPU	Internal Pull-Up Resistor		5.38K		Ω

Figure 12 : Internal electrical scheme of BOOT



The use of the BOOT signal must be done through a transistor assembly or via dry contact. The integrator has the responsibility to protect the input from electrical perturbations and to respect the functioning parameters values.

3.8 RESET

The use of the RESET function is strictly reserved for the manufacturer and distributors.
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 previously detached it from the operator network.
Using the RESET does not restore the factory parameters.

Table 21 : Description of RESET input

Signal	Sub-HD 15 pins Pins N°	I/O	Kind of I/O	Description
RESET	14	I	SCHMITT	Reset modem
GND	9			

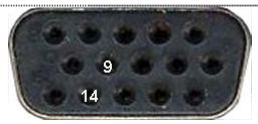
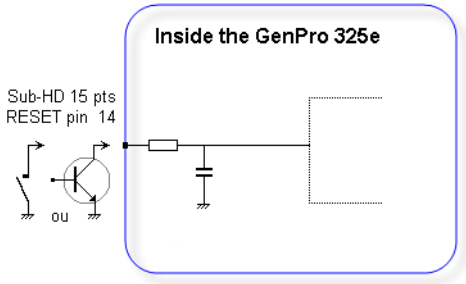


Table 22 : Conditions of use of RESET signal

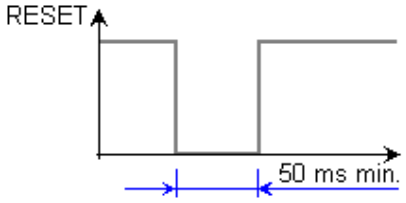
Parameters	Conditions	Min.	Typ.	Max.	Unit
VIL	Input Voltage – Low	-0.3		0.8	V_{DC}
VIH	Input Voltage – High	2		3.3	V_{DC}
RIPU	Internal Pull-Up Resistor		5.38K		Ω

Figure 13 : Internal electrical scheme of RESET



The use of the RESET signal must be done through a transistor assembly or via dry contact.
The integrator has the responsibility to protect the input from electrical perturbations and to respect the functioning parameters values.

Figure 14 : Chronogram of RESET signal



3.9 Opto-coupled inputs

By default, the GenPro 325e provides 3 opto-coupled inputs E1, E2 and E3

As an option, it is possible to have

- Analog input (0-10V) specific S0534B
- Multi One Wire Input, specific S0535B.

These options cannot be installed simultaneously with the opto-coupled inputs.

3.9.1 Standard opto-coupled inputs

Table 23 : Description of opto-coupled inputs

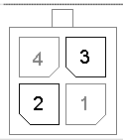
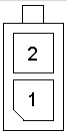
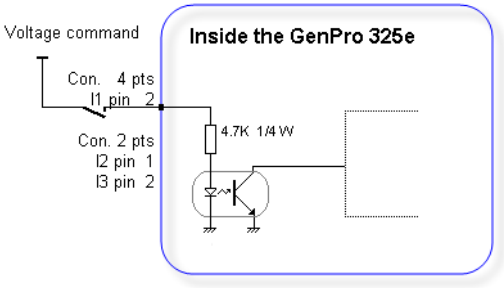
Signal	Pins N° Connector	I/O	Description
E1	2 Connector 4 pins		
E2	1 Connector 2 pins	I	Digital inputs 0 – 35 V
E3	2 Connector 2 pins		
		Corresponds to wires 2 – Orange or Yellow for E1 See ANNEX 1 – 4-pin Micro-FIT cable without fuse, ANNEX 2 – 4-wire Micro-FIT cable with fuse	
		Corresponds to wires 1 - Yellow for E2 2 - Blue for E3 See ANNEX 3 – 2-pin Micro-FIT cable	

Table 24 : Characteristics of opto-coupled inputs

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

Figure 15 : Internal electric scheme of opto-coupled inputs



The minimum command voltage for the detection is: **3.5 V**

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

3.9.1.1 Inputs functioning

This function can also be controlled with AT commands:

AT+GPIOGET This command is used to read the inputs. The reading is done with the following format:

AT+GPIOGET=<n> with:

<n> = 7 : reading input 1

8 : reading input 2

9 : reading 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 at 0, the input 3 is not controlled

3.9.2 Analog input 0-10V by default

This input allows to have an analog input able to measure a voltage between 0 and 10V.

Table 25: Description of analog input 0-10V

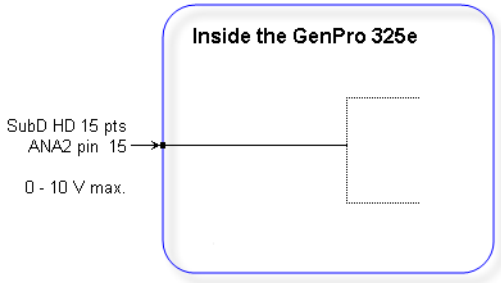
Signal	Sub-HD 15 pins Pin number	I/O	Description
ANA 2 GND	15 9	I	Analog input 0 – 10 V

Table 26: Characteristics of analog input 0-10V

Characteristics	Symbols	Conditions	Min.	Typ.	Max.	Unit
Analog input	ANA 2		-0.3		11	V_{DC}
Conversion range			0		10.20	V_{DC}
Polarization current		From 0 to 10.20 V	0		345	μA_{DC}
Resolution				10		bits

The integrator has the responsibility to protect the input from electrical perturbations and to respect the functioning parameters values.

Figure 16 : Internal electric scheme of analog input 0-10V



3.9.3 Analog input 0-10V (option)

The option ***Analog input 0-10V,*** specific ***S0534B***, provides a second analog input able to measure a voltage between 0 and 10V with GND reference.

Table 27 : Description of analog input 0-10V

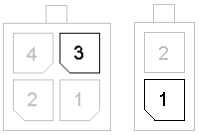
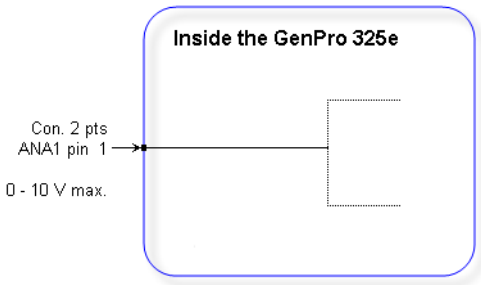
Signal	Pins N° Connector	I/O	Description
ANA1 GND	1 Connector 2 pins 3 Connector 4 pins	I	Analog input 0 – 10 V
			Corresponds to wires 1 - Yellow for ANA1 3 - Black for GND See ANNEX 1 – 4-pin Micro-FIT cable without fuse, ANNEX 2 – 4-wire Micro-FIT cable with fuse See ANNEX 3 – 2-pin Micro-FIT cable

Table 28 : Characteristics of analog input 0-10V

Characteristics	Symbols	Conditions	Min.	Typ.	Max.	Unit
Analog input	ANA1 / 2		-0.3		11	V_{DC}
Conversion range			0		10.20	V_{DC}
Polarization current		From 0 to 10.20 V	0		345	μA_{DC}
Resolution				10		bits

The integrator has the responsibility to protect the input from electrical perturbations and to respect the functioning parameters values.

Figure 17 : Internal electric scheme of analog input 0-10V



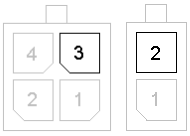
3.9.4 Multi One Wire input (option)

The option ***Multi One Wire***, specific ***S0535B,*** allows the reading of all 1-wire devices with the possibility to have several devices on the same bus.

This option Multi 1-wire cannot be used with the ***EasePro*** application, but can be directly controlled with an ***EGM*** development. Contact us.

Table 29 : Description of Multi 1- Wire Bus

Signal	Pins N° Connector	I/O	Kind of I/O	Description
Bus One Wire GND	2 Connector 2 pins 3 Connector 4 pins	I/O	Analog	Bus Multi One

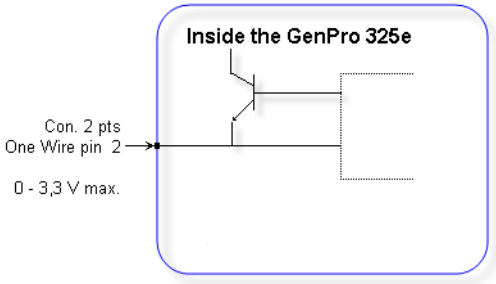


Corresponds to wires
2 - Blue for Bus One Wire
3 - Black for GND

Table 30 : Multi One Bus - Electrical characteristics

Characteristics	Symbols	Conditions	Min.	Typ.	Max.	Unit
Input Voltage – Low	V_{IL}		-0.3		0.9	V_{DC}
Input Voltage – High	V_{IH}		1.9		3.3	V_{DC}
Input Leakage Current	I_{LEAK}		-10		10	μA_{DC}
Input capacitance	C_{IN}				10	pF
Output Low-level Voltage	V_{OL}	@ charge 4mA			0.4	V_{DC}
Output High-level Voltage	V_{OH}	@ charge 4mA	2.8		3.3	V_{DC}

Figure 18 : Internal electrical scheme of Multi 1-Wire Bus



3.10 Digital outputs

Table 31 : Description of digital outputs

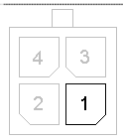
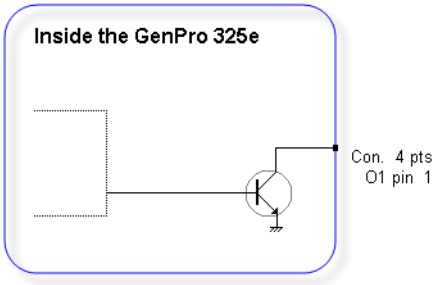
Signal	Connector 4 pts Pins N°	I/O	Description
S1	1 Connector 4 pins	O	Open collector output
			Corresponds to wires 1 – Green or Brown for S1 See ANNEX 1 – 4-pin Micro-FIT cable without fuse, ANNEX 2 – 4-wire Micro-FIT cable with fuse

Table 32 : Characteristics of open collector output

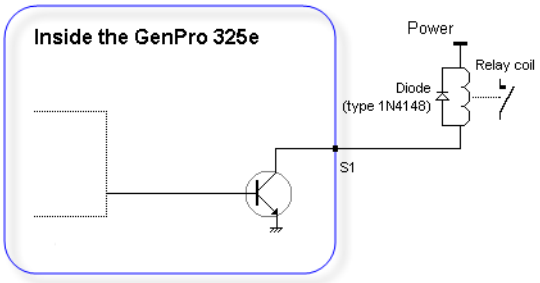
Characteristics	Symbols	Conditions	Min.	Typ.	Max.	Unit
Max. voltage	V_{CE0}	Open transmitter			48	V_{DC}
Max. voltage	V_{CES}	V_{BE} = 0 V			48	V_{DC}
Collector current	I_C				0.5	A_{DC}
Saturation voltage	V_{CEsat}	I_C = 500 mA			1.3	V_{DC}
Dissipation	P_{Ttot}	T_{amb} ≤ 25 °C, T_j = 110 °C			0.78	W

Figure 19 : Internal electrical scheme of the output



There is no protection. The user must respect the values of the above table.

Figure 20 : Example of relay control



3.10.1.1 Output functioning

This function can also be controlled with AT commands:

AT+GPIOSET=10 This command is used to control the output. By default, the output is assembled in open collector. The control is done under the following format:

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

<n> = 10 : only one output available on the GenPro 325e (then n=10),

<x> = 0 : Output OFF

1 : Output ON

Examples:

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

3.11 Watchdog

The function WatchDog Hardware allows the monitoring of the modem software activity: by default, the software management of the WatchDog is implemented in the embedded application; in case of a development (EGM), it must be implemented in the embedded application of the client.

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

The WatchDog function is active only if there is a SIM card inside the modem.

3.12 SIM card

By default, the GenPro 325e is equipped with a push-push SIM card reader accessible from the outside of the modem.

Table 33 : Characteristics of the SIM card power voltage

SIM card	3 V or 1.8 V
Format	SIM (25x15x0,76 mm)

NOTE: It is possible to replace the SIM card by a SIM component (e-SIM) directly implanted on the printed circuit. **Contact us.**

This function cannot be available simultaneously with the SIM card reader.

3.13 Leds of the modem

Figure 21 : Back side Led

3.13.1 GSM Led

3.13.1.1 Without Application

The GenPro 325e does not contain any application. The Led is OFF.

3.13.1.2 With EGM standard library

The GenPro 325e contains the standard library. The Led is OFF.

3.13.1.3 The application ERCOGENER EasePro _Vx

The status of the GSM module is indicated by the status of the YELLOW GSM LED situated on the back side of the modem. This is the yellow LED situated on the left.

Table 34 : Status of GSM LED

Status of GSM LED	LED activity	GSM status
OFF	LED OFF	The module is not activated or OFF.
ON	LED permanent	The module is attaching to GSM network.
LED flashing	0.5s ON / 1.5s OFF	The module is attached to the GSM network.
LED flashing	0.2s ON / 0.6s OFF	The module is in data, voice or GPRS communication.

3.13.1.4 Owner application

The GenPro 325e contains your application. The Led status depends on your parameters.

4 GSM external antenna

The GSM external antenna is connected to the modem via the SMA-F connector.

The external antenna must respond to the characteristics described in the table below.

Figure 22 : GSM external antenna

Table 35 : Characteristics of GSM external antenna

Frequency band	
850/900	824..960 MHz (GSM 850, GSM 900, UMTS B5, UMTS B6, UMTS B8)
1800/2100	1710..2170 MHz (GSM 1800, GSM 1900, UMTS B1, UMTS B2, UMTS B4)
Impedance	50 Ohms nominal
Input power	> 2 W peak
Gain	< 4.25 dBi for 850 MHz < 7.30 dBi for 1700 MHz < 2.74 dBi for 1900 MHz
VSWR	< 2:1 recommended < 3:1 acceptable
Return Loss	S_{11}<-10 dB recommended S_{11}<-6 dB acceptable

See § 6 Recommended accessories for the GSM antennas recommended by ERCOGENER.

5 Use of the modem

5.1 Specific recommendations for the use of the modem in vehicles

The power supply connector of the modem GenPro 325e must NEVER be connected directly to the battery of the vehicle.

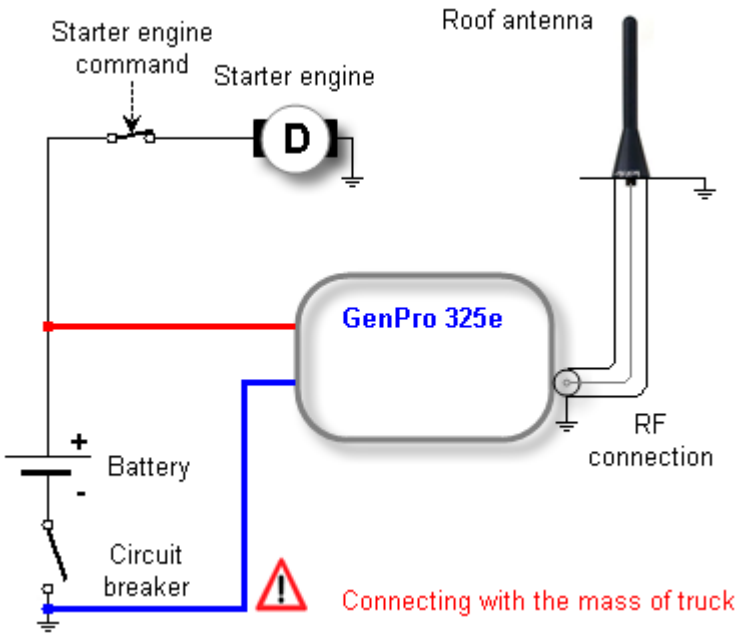
5.1.1 Recommended connection on the battery of a truck

All trucks have a circuit breaker outside the cabin. The circuit breaker is used for security reasons:

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

Most of truck circuit breakers do not cut the **+** '**PLUS**' of the battery, but cut its '**GROUND**'.

Figure 23 : Recommended connection on the battery of a truck



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

If this scheme is not respected, the modem can be damaged when starting the truck if the circuit breaker is open. It cannot support important starting currents.

5.2 Turning the modem OFF

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

When the battery is present (Option S0531B), a mechanism allows to stop completely the application if the external power supply is unplugged, and also to prepare the modem for storage or transport, in order to limit high discharges of the battery.
If the device is not used, it has to be deactivated by sending the following command:

- **If the modem contains an application developed with EGM**
  Disconnect the external power supply of the modem.
  And send the command ***AT+GPIOSET=35,0***
- **If the modem does not contain any embedded application**, via the Boot-Loader menu

```
Bootloader V4.20 GP325 UA Gener SAM7SE256B Ublox (HWE4 rev A/B)
GSM voltage = 3628 mV
 1 - Update application
 2 - Erase objects
 M - GSM direct access (external supply required)
 A - Advanced
 P - Power off
 E – Exit
```

Disconnect the external power supply of the modem.
And **Enter "P"**

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

5.3 Starting with the modem

5.3.1 Mounting the modem

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

Figure 24 : Mounting the modem

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

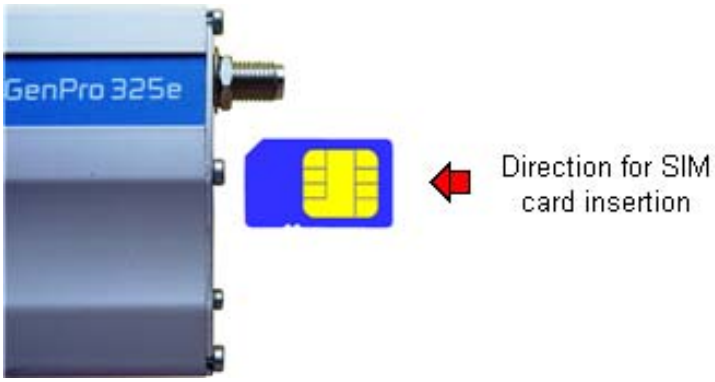
The aluminium casing of the modem is connected to the 0V (GND) of the power supply and to the 0V of the RS232 serial link. To avoid any risk of conduction of the ground plane to other equipment, the modem must be electrically insulated from its mechanical support.

5.3.2 SIM card installation

To install the SIM card, 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 into the reader.

Figure 25 : Installation of the modem



- Push the SIM card until hearing a "clic" that ensures its correct positioning.
- Put the SIM cover back.

5.4 Use of the modem

- Install the SIM card.
- Connect the GSM antenna to the SMA-Female connector.
- Connect the RS232 link between the DTE (COM port) and the modem (DCE).
- Connect the power cable to the continuous and regulated external power source (for an automobile application, see § 5.1 Specific recommendations for the use of the modem in vehicles).
- Connect the power cable to the modem.
- Use a communication software like Windows HyperTerminal ® set as follows:
  - Bits per second.....: 115 200 bps,
  - Data Bits.....: 8,
  - Parity .....: None,
  - Stop Bits.....: 1,
  - Flow control.....: None.

5.4.1 Checking the communication with the modem

5.4.1.1 Without Application

The GenPro 325e does not contain any application; it will return the menu of the BootLoader.

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

```
Bootloader V4.20 GP325 UA Gener SAM7SE256B Ublox (HWE4 rev A/B)
GSM voltage = 3628 mV
 1 - Update application
 2 - Erase objects
 M - GSM direct access (external supply required)
 A - Advanced
 P - Power off
 E – Exit
```

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.

5.4.1.2 The GenPro 325e contains the application ERCOGENER EasePro _Vx

Example of display when the EasePro application is present inside the equipment

```
*******************************************************
EasePro V2.22b6_EGM430b11 - GenPro325e A - Tue Jan 12 09:02:15     2016
0000/01/01-00:00:00: EGM_INIT_SOFTWARE_RESET
0000/01/01-00:00:01: gprs_set_account: , , , 0, 0
0000/01/01-00:00:01: hist_restore_wr_idx: write_block=0, write_idx=0
0000/01/01-00:00:01: hist_restore_rd_idx: read_block=0, read_index=0
0000/01/01-00:00:01: hist_init: flash history: ids=-3
0000/01/01-00:00:01: hist_init: flash history_CFG: ids=-3
0000/01/01-00:00:01: hist_init: subscribe flash
0000/01/01-00:00:01: hist_restore_rd_idx: read_block=0, read_index=0
0000/01/01-00:00:01: hist_restore_wr_idx: write_block=0, write_idx=0
0000/01/01-00:00:01: READY
```

Send the command AT+EGM3

The modem returns the version of the library

```
+EGM3: genapi V4.30b8, Date: Mon Nov 23 13:27:16     2015
```

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

For more information about these AT commands and their associated parameters, see the documents "Commands List EG_EasePro _Vx_CL_yyy_UK" of ERCOGENER.

5.4.1.3 The GenPro 325e contains the application ERCOGENER EaseIP _Vx

The GenPro 325e contains the application EaseIP _Vx.

Send the command ATI8. The modem returns the version (example of display)

```
EaseIP V1.20b7_EGM430b11 - GenPro325e A - Thu Jan 21 15:14:25     2016
```

For more information about these AT commands and their associated parameters, see the documents "Commands List EG_EaseIP _Vx_CL_yyy_UK" of ERCOGENER.

5.4.1.4 The GenPro 325e contains the application ERCOGENER « direct access »

The GenPro 325e contains the application « GenPro25e-325e_V110_direct_modem_access_lzo.bin »

Send the command ATI8. The modem returns:

```
Undefined
```

5.4.1.5 The owner application

The GenPro 325e contains your application.

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

Check the display and the dialogue with the GenPro 325e according to your own characteristics.

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 ERCOGENER); in this case, the modem will be able to make a call only if the received GSM signal is powerful enough.

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 reception error code (*g*).

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 cannot be used without the SIM card.

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 has the following format:

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

<***rssi***> = indicates the reception level,

<***ber***> = receive bit error rate.

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

Table 36 : RSSI value

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

For a normal operation in GSM, the minimum **<*rssi*>** must be 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.
This does not apply for UMTS communications where the level can be a lot lower.

For more information about the AT commands, see the document "EG_EGM_CL_xxx_yy" of ERCOGENER.

5.6 Verification of PIN code

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

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

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

Table 37 : Verification of PIN code

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

For more information about the AT commands, see the document "EG_EGM_CL_xxx_yy" of ERCOGENER.

5.7 Verification of modem registration on cellular network

The modem contains the EGM standard library (see the documents "EG_EGM_CL_xxx_yy" of ERCOGENER); in this case:

1. Make sure that a valid SIM card is inserted in the SIM card reader of the modem.
2. Use a communication software like Hyperterminal, and 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 choose a new PIN code.
   b. ***AT+CREG?*** to check the registration status on the network. The response has the following format**:*+CREG*** *:* <***mode***>, <***stat***> with :

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

   <***Stat***> = registration status.
3. Check the registration status according to the value returned in the table below.

Table 38 : Verification of modem registration on cellular network

Command	Response	Interpretation
AT+CREG?	**+CREG : 0,0**	The modem is not recognized by the network.
	+CREG : 0,2 or 0,3	The modem is searching for a network operator.
	+CREG : 0,1	The modem is attached to the local operator.
	+CREG : 0,5	The modem is attached 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 Checking the quality of the GSM reception signal).

For more information about AT commands, see the document "EG_EGM_CL_xxx_yy" of ERCOGENER.

5.1 Verification of modem registration on GPRS network

The modem contains the EGM standard library (see the documents "EG_EGM_CL_xxx_yy" of ERCOGENER); in this case:

1. Make sure that a valid SIM card is inserted in the SIM card reader of the modem.
2. Use a communication software like Hyperterminal, and 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 choose a new PIN code.
   b. ***AT+CGREG?*** to check the registration status on the network. The response has the following format **:*+CGREG*** *:* <***mode***>, <***stat***> with:

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

   <***Stat***> = registration status.
3. Check the registration status according to the value returned in the table below.

Table 39 : Verification of modem registration on GPRS network

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

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 Checking the quality of the GSM reception signal).

For more information about the AT commands, see the document "EG_EGM_CL_xxx_yy" of ERCOGENER.

6 Recommended accessories

The accessories recommended by ERCOGENER for the modem GenPro 325e are described on our website in the section Products/Accessories. For more information, please contact our sales department.

7 Client support

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

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

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

ANNEX 1 – 4-pin Micro-FIT cable without fuse

(ERCOGENER reference: 4402000107)

Figure 26 : 4-pin Micro-FIT cable without fuse

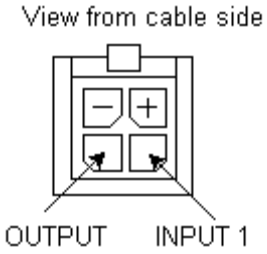


Table 40 : Characteristics of power cable without fuse

Component	Characteristics
4-pin connector	
Cable	Length ≈ 1.5m
Wire	Section : 0.75 mm²

Signal	Color
$+V_{DC}$	Red
GND	Black
INPUT 1 (I1)	Orange
OUTPUT 1 (O1)	Green

ANNEX 2 – 4-wire Micro-FIT cable with fuse

(ERCOGENER reference: 4402304215)

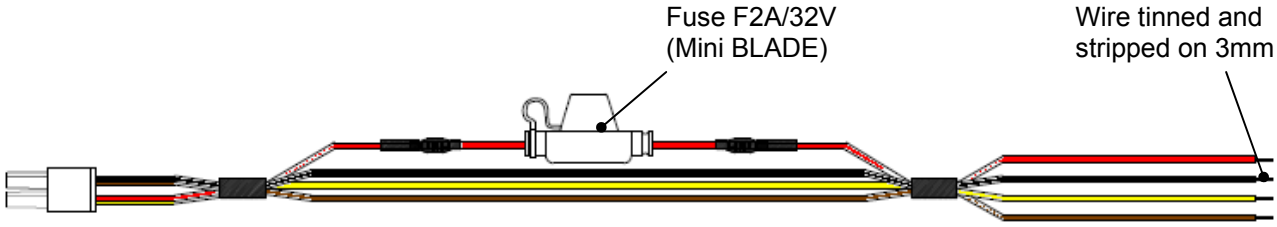


Figure 27 : 4-pin Micro-FIT cable with fuse

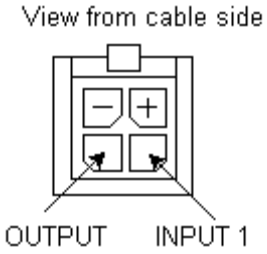


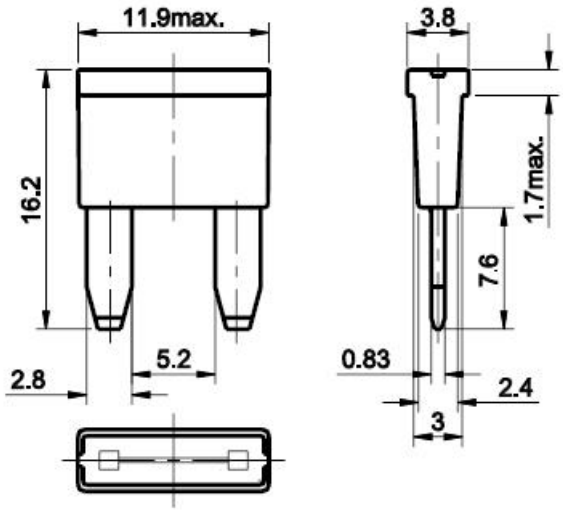
Table 41 : Characteristics of power cable with fuse

Component	Characteristics
4-pin connector	
Cable	Length ≈ 1.5m
Wire	Section : 0.75 mm²

Signal	Color
$+V_{DC}$	Red
GND	Black
INPUT 1 (I1)	Yellow
OUTPUT 1 (O1)	Brown

Fuse reference: Mini Blade for automobile 2A - 32V (color code : grey)

Figure 28 : Fuse Mini Blade



ANNEX 3 – 2-pin Micro-FIT cable

(ERCOGENER reference: 4402000108)

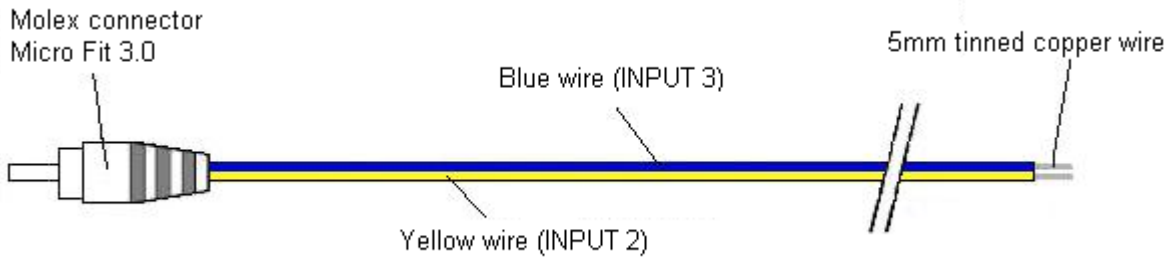


Figure 29 : 2-pin Micro-FIT cable (Inputs)

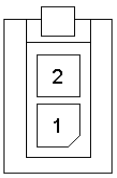


Table 42 : Characteristics of 2-wire inputs cable

Component	Characteristics
2-pin connector	
Cable	Length ≈ 1.5m
Wire	Section : 0.5 mm²

Table 43 : Wiring of 2-wire inputs cable

Pin N°	Signal	Color
1	Input (E2)	Yellow
2	Input (E3)	Blue

ANNEX 4 - Abbreviations

3GPP	3rd Generation Partnership Project
AC	Alternative Current
ACM	Accumulated Call Meter
ADC	Analog to Digital Converter
ADN	Abbreviated Dialing Numbers
AIeC	Automatically Initiated eCall
AMR	Adaptive Multi Rate
ANSI	American National Standards Institute
APN	Access Point Name
ARP	Antenna Reference Point
ASCII	American Standard Code for Information Interchange
AT	AT Command Interpreter Software Subsystem, or attention
B2B	Board-to-board connector
BB	Baseband
BEP	Bit Error Probability
BER	Bit Error Rate
BL	Black List
BSD	Berkley Standard Distribution
BTS	Base Transceiver Station
CB	Cell Broadcast
CBM	Cell Broadcast Message
CE	Conformité Européene (European Conformity)
CLI	Calling Line Identification
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
CLK	ClocK
CM	Connection Management
CMOS	Complementary Metal Oxide Semiconductor
COLP	Connected Line Identification Presentation
COLR	Connected Line Identification Restriction
CPHS	Common PCN Handset Specification
CR	Carriage Return
CS	Coding Scheme
CS	Circuit Switched
CSD	Circuit-Switched Data
CTM	Cellular Text Modem
CTS	Clear To Send
CUG	Closed User Group
DA	Destination Address
DAC	Digital-to-Analog Converter
DARP	Downlink Advanced Receiver Performance
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
DCM	Data Connection Management
DCS	Digital Cellular System
DDC	Display Data Channel (I2C compatible) Interface
DL	Down-link (Reception)
DNS	Domain Name Server
dnu	Do not use
DRX	Discontinuous Reception

DSB	Development Support Board
DSP	Digital Signal Processor
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi-Frequency
DTR	Data Terminal Ready
DTX	Discontinuous Transmission
DUT	Device Under Test
EDGE	Enhanced Data rates for Global Evolution
EEPROM	Electrically Erasable Programmable Read-Only Memory
EFR	Enhanced Full Rate
EGM	Erco Gener Middleware
EGSM	Extended GSM
E-GSM	Extended GSM
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
ERP	Effective Radiated Power
ESD	ElectroStatic Discharges
ETS	European Telecommunication Standard
ETSI	European Telecommunications Standards Institute
E-UTRAN	Evolved UTRAN
FCC	Federal Communications Commission (U.S.)
FDD	Frequency Division Duplex
FDMA	Frequency Division Multiple Access
FDN	Fixed Dialling Number
FIT	Series of connectors (micro-FIT)
FOAT	Firmware Over AT
FOTA	Firmware Over The Air
FR	Full Rate
FS	File System
FTA	Full Type Approval
FTP	File Transfert Protocol
FW	Firmware
GCF	Global Certification Forum
GDI	Generic Digital Interfaces
GLONASS	Globalnaja Nawigazionnaja Sputnikowaja Sistema
GND	GrouND
GNSS	Global Navigation Satellite System
GPIO	General Purpose Input Output
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communications
H	High
HDLC	High Level Data Link Control
HiZ	High Impedance
HPLMN	Home PLMN
HR	Half Rate
HSDPA	High Speed Downlink Packet Access
HSPA	High Speed Packet Access
HSUPA	High Speed Uplink Packet Access
HTTP	HyperText Transfer Protocol
I	Input
I/O	Input / Output
I2C	Inter-Integrated Circuit Interface
ICCID	Integrated Circuit Card ID
ICMP	Internet Control Message Protocol
ICP	Inter Processor Communication

IEC	International Electrotechnical Commission
IF	Intermediate Frequency
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Station Identity
IP	Internet Protocol
IRA	International Reference Alphabet
IRC	Intermediate Result Code
ISDN	Integrated Services Digital Network
ISO	International Standards Organization
ISP	Internet Service Provider
ITU	International Telecommunications Union
IVS	In-Vehicle System (eCall related)
kbps	kbits per second
L	Low
L3	Layer 3
LCC	Leadless Chip Carrier
LCP	Link Control Protocol
LED	Light Emitting Diode
LF	Line Feed
LLC	Low Level Command
M2M	Machine-To-Machine
MAX	MAXimum
Mbps	Mbits per second
MCC	Mobile Country Code
MCS	Modulation and Coding Scheme
ME	Mobile Equipment
MIC	MICrophone
Micro FIT	Family of connectors from Molex
MIeC	Manually Initiated eCall
MIN	MINimum
MMI	Man Machine Interface
MN	Mobile Network Software Subsystem
MNC	Mobile Network Code
MNP	Microcom Networking Protocol
MO	Mobile Originated
MS	Mobile Station, also referred to as TE
MSD	Minimum Set of Data (eCall related)
MSIN	Mobile Subscriber Identification Number
MSISDN	Mobile Systems International Subscriber Identity Number
MSPR	Multi-Slot Power Reduction
MT	Mobile Terminated
MWI	Message Waiting Indication
N/A	Not Applicable
nc	Not connected
NITZ	Network Identity and Time Zone
NMEA	National Marine Electronics Association
NOM	NOMinal
NTC	Negative Temperature Coefficient
NVM	Non-Volatile Memory
O	Output
OD	Open Drain
OLCM	On Line Commands Mode
Pa	Pascal (for speaker sound pressure measurements)
PAD	Packet Assembler/Disassembler
PBCCH	Packet Broadcast Control Channel
PC	Personal Computer
PCB	Printed Circuit Board

P-CID	Physical Cell Id
PCL	Power Control Level
PCM	Pulse Code Modulation
PCN	Personal Communication Network
PCN / IN	Product Change Notification / Information Note
PCS	Personal Communication System, also referred to as GSM 1900
PD	Pull-Down
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PIN	Personal Identity Number
PLMN	Public Land Mobile Network
POS	Power-On Input (power domain)
PPP	Point-to-Point Protocol
PS	Packet Switched
PSAP	Public Safety Answering Point (eCall related)
PSD	Packet-Switched Data
PSK	Phase Shift Keying
PU	Pull-Up
PUK	Personal Unblocking Key
QAM	Quadrature Amplitude Modulation
QoS	Quality of Service
R&TTE	Radio and Telecommunication Terminal Equipment
RAM	Random Access Memory
RDI	Restricted Digital Information
RF	Radio Frequency
RFI	Radio Frequency Interference
RFU	Reserved for Future Use
RI	Ring Indicator
RMC	Reference Measurement Channel
RMS	Root Mean Square
ROPR	Radio Output Power Reduction
RTC	Real Time Clock
RTP	Real-time Transport Protocol
RTS	Request To Send
Rx	Receiver
SAP	SIM Access Profile
SAR	Specific Absorption Rate
SC	Service Centre
SELV	Safety Extra Low Voltage
SI	SIM Application Part Software Subsystem
SIM	Subscriber Identity Module
SIP	Session Initiation Protocol
SLIC	Subscriber Line Interface Circuit
SMA	SubMiniature version A RF connector
SMB	SubMiniature version B RF connector
SMPL	Sudden Momentary Power Loss
SMS	Short Message Service
SMSC	Short Message Service Center
SMTP	Simple Mail Transfer Protocol
SNR	Signal-to-Noise Ratio
SNTP	Simple Network Time Protocol
SoR	Steering of Roaming
SPI	Serial Peripheral Interface
SPK	SpeaKer
SPL	Sound Pressure Level
SRAM	Static Random Access Memory
SRB	Signalling Radio Bearer

SUPL	Secure User Plane Location
TA	Terminal Adaptor
TCP	Transfer Control Protocol
TCP/IP	Transmission Control Protocol / Internet Protocol
TDMA	Time Division Multiple Access
TE	Terminal Equipment
TFT	Traffic Flow Template
TP	Transfer layer Protocol
TPC	Transmit Power Control
TS	Technical Specification
TTFF	Time To First Fix
TU	Typical Urban fading profile
Tx	Transmitter
TYP	TYPical
TZ	Time Zone
UART	Universal Asynchronous Receiver-Transmitter serial interface
UCS2	Universal Character Set
UDI	Unrestricted Digital Information
UDP	User Datagram Protocol
UI	Unnumbered Information
UICC	Universal Integrated Circuit Card
UIH	Unnumbered Information with header Check
UL	Up-link (Transmission)
UMTS	Universal Mobile Telecommunications System
URC	Unsolicited Result Code
USB	Universal Serial Bus (power domain)
USIM	UMTS Subscriber Identity Module
UTC	Universal Time Clock
UTRAN	Universal Terrestrial Radio Access Network
UUS1	User-to-User Signalling Supplementary Service 1
VSWR	Voltage Stationary Wave Ratio
WCDMA	Wideband Code Division Multiple Access

erco&gener

L'esprit Modem

DECLARATION OF CONFORMITY

Manufacturer : ERCOGENER

Address : 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 325e Family : 1103A4
Type : Modem

Complies with :

Radio

- R&TTE 1999/5/EC Directive
- EN 301 511: v9.0.2
- EN 300 440-1 V1.6.1
- EN 300 440-2 V1.4.1
- EN 301 908-1: 2011-05 V5.2.1

EMC

- EN 301 489-1: 2011 V1.9.2
- EN 301 489-3: 2013 V1.6.1
- EN 301 489-7: 2005 V1.3.1
- EN 301 489-24: 2010 V1.5.1

EMF

- EN 50385 : 2002 and EN 50383 : 2010

Electrical Safety

- EN 60950-1:2006/A11:2009/A1:2010/A12 :2011/A2 :2013

Environmental

- ROHS Compliant : Directive 2011/65/EU
- REACH N°1907/2006 SVHC163

The corresponding markings appear under the appliance.

CE

Saumur, February, 19th, 2016

Eric GUENEUGUES
Quality Manager