# User Guide

## GenPro 354e

L'esprit Modem

http://www.ercogener.com

Dct_427_02

# Document History

| Rev. | Modifications | Author | Date | Validation | Date |
|------|---------------|--------|------|------------|------|
| 000 | Creation | YST | 08/06/2015 | PBR | 10/08/15 |
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|  |  |  |  |  |  |

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

Dct_427_02

# TABLE OF CONTENTS

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Dct_427_02

**Index of Tables**

Dct_427_02

**Index of Figures**

# Presentation

Entirely dedicated to embedded data services, the modem GenPro 354e combines the GSM / GPRS / HSPA functions in the same robust casing.

The modem is Quad-Bands (850/900/1800/1900 MHz) GSM/GPRS Class 12.

The modem is six bands (I, II, IV, V, VI, VIII) in UMTS/HSPA.

The GenPro 354e 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_GenPro354e_1040_AN_xxx_yy
- Release Note                  EG_GenPro354e_1040_RL_xxx_yy
- Client Support (Hot-Line)

# Warning

- ERCOGENER recommends to read carefully all documents linked to the product GenPro 354e (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 354e.
  - The problems due to a wrong configuration
  - The problems due to a wrong use of an embedded software application developed or supplied by a third party.
  - The dysfunctions due to the absence or a bad coverage of the GSM, GPRS networks.
  - The dysfunctions if the product is used for the watching of physical persons where human life is engaged.
- ERCOGENER reserves the right to modify the functions of its products "GenPro 354e" 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 354e** must be returned to the factory for any repair.
- The **GenPro 354e** 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 354e** must not be connected directly to the mains supply; a voltage adapter must be used.

SCRAP THE WORN BATTERIES ACCORDING TO INSTRUCTIONS.

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Dct_427_02

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Dct_427_02

# 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

Dct_427_02

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

Restrictions of use of radio 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 GSM 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 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.
- The modem must be used at more than 20cm from the human body.

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

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Dct_427_02

## 1.2   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 linked with the use of cellular telephones in vehicles. Road safety is always a priority.

An incorrect installation of the GSM modem in a vehicle could cause an incorrect functioning of the vehicle's electronics. To avoid such problems, 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.

## 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.

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Dct_427_02

# 2 Presentation

## 2.1 Content

The GenPro 354e is supplied with:

- a GenPro 354e cardboard packaging,
- a modem GenPro 354e,
- 2 fixing brackets,
- a 4-wire power supply cable, input/output (Red/Black/Yellow/Brown) stripped with fuse.
- a 14-wire stripped cable equipped with a 14-pin connector, Inputs/Outputs stripped.
- a 14-wire cable equipped with a 16-pin connector, with a Sub- D 9 pins and stripped wires.
- a technical sheet (Instructions Sheet).

**Figure 1 : Content**



## 2.2 Modem packaging

The external dimensions of the modem packaging are:

- Width .................: 160 mm,
- Height ................: 280 mm,
- Length ...............: 64 mm.
- Weight ...............: 785 g

Dct_427_02

## 2.3 Mechanical characteristics

**Table 1 : Mechanical characteristics**

| | |
|---|---|
| **Dimensions** | 95 x 92 x 40 mm (connectors excluded) |
| **Complete dimensions** | 104 x 92 x 40 mm |
| **Weight** | ≈ 206 grams (modem only) <br> < 618 grams (modem + brackets + cables) |
| **Volume** | ≈ 382 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**
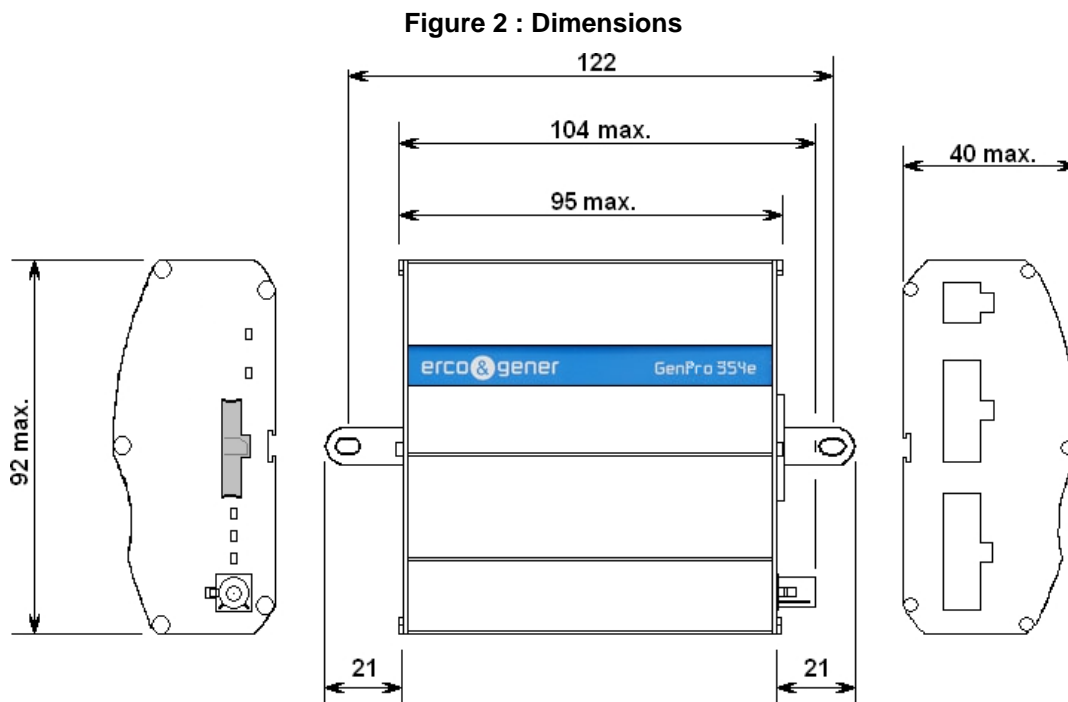


### 2.3.1 Fixing brackets

2 brackets to fix the modem on a support.

**Figure 3 : Back side**



Fixing brackets

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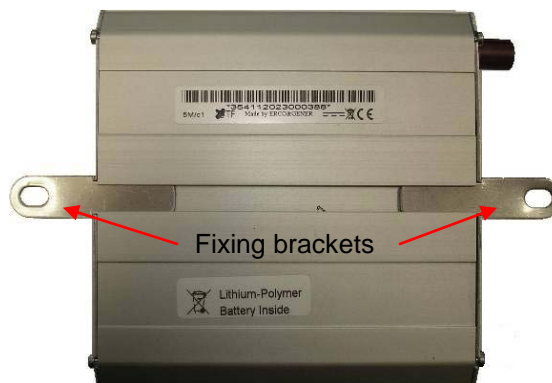
## 2.4 Characteristics and Services

### 2.4.1 Services

The GenPro 354e is made:

- A GSM/GPRS/EDGE/UMTS modem class12 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**

| Fonctions 3G UMTS / HSPA  - 2G GSM / GPRS / EDGE | | |
|---|---|---|
| • UMTS/HSPA | 800/850/900/1700/1900/2100 MHz<br>3GPP Release 7 (HSPA+) | (Bands I, II, IV, V, VI, VIII) |
| • GSM | 4 band 850 / 900 / 1800 / 1900 MHz<br>3GPP Release 7<br>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<br>WCDMA up to 64 kb/s | |
| • SMS | MT/MO/CB     PDU/Text mode   SMS over PSD or CSD | |
| • WCDMA/HSDPA/HSUPA | Power Class 3 | (24 dBm) |
| • GSM / GPRS | Power Class 4<br>Power Class 1 | (33 dBm) for GSM/E-GSM bands<br>(30 dBm) for DCS/PCS bands |
| • EDGE | Power Class E2<br>Power Class E2 | (27 dBm) for GSM/E-GSM bands<br>(26 dBm) for DCS/PCS bands |
| • Sensibilité | GSM850/E-GSM900 @ 25 °C<br>DCS1800/PCS1900 @ 25 °C<br>UMTS 800 (band VI)<br>UMTS 850 (band V)<br>UMTS 900 (band VIII)<br>UMTS 1700 (band IV)<br>UMTS 1900 (band II)<br>UMTS 2100 (band I) | -110 dBm, Downlink RF level @ BER Class II < 2.4 %<br>-109 dBm, Downlink RF level @ BER Class II < 2.4 %<br>-111 dBm, Downlink RF level for RMC @ BER < 0.1 %<br>-112 dBm, Downlink RF level for RMC @ BER < 0.1 %<br>-111 dBm, Downlink RF level for RMC @ BER < 0.1 %<br>-111 dBm, Downlink RF level for RMC @ BER < 0.1 %<br>-111 dBm, Downlink RF level for RMC @ BER < 0.1 %<br>-111 dBm, Downlink RF level for RMC @ BER < 0.1 % |
| Packet Switched Data Rate | | |
|  | HSUPA category 6, up to 5.76 Mb/s<br>HSDPA category 8, up to 7.2 Mb/s<br>WCDMA data up to 384 kb/s DL/UL | |
| SIM Toolkit | | |

Dct_427_02

**Interfaces**

• GSM antenna: connector FAKRA-D

• Power supply: +8 to +32 $V_{DC}$ (4-pin micro-FIT connector)

• 1 serial port RS232_0  (300 to 115200bds) Sub-D 9 pins female

• 1 serial port RS232_1  (300 to 115200bds)

• 1 serial port RS232_2  (300 to 115200bds)

• AT commands : GSM 07.05 and 07.07

- SIM reader (SIM 3V – 1,8V)

• 3 opto-coupled inputs
• 2 isolated opto-coupled inputs
• 3 open collector outputs
• 2 analog inputs (0 – 10 Volts)

• 1 power supply output $V_{POWER}$ controllable (16-pin connector micro-FIT)

• Inhibition of the battery charge

• 1 Buzzer output (connector 14 pins micro-FIT)

• Backup battery

• 1 port ONE_WIRE

• Power supply output $V_{BAT}$

• 3-axis accelerometer


**Options / Additional accessories ***

| | |
|---|---|
| • Bus CAN MCP2515 | S0467D (See **Figure 7 : Architecture of optional serial ports**) |
| • ONE WIRE Multi slaves | S0470D |
| • Double SIM reader | S0471D |
| • 2 analog inputs (4 – 20 mA) | S0475D |
| • 1 serial port RS485 | S0520B |

• 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** )

Dct_427_02

## 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 | |
|---|---|
| **Battery charging** | 0 °C to +45 °C |
| **Battery discharging** | -20 °C to +45 °C |
| **Storage temperature range** | 1 year of storage between      -20°C  to + 35°C<br>3 months of storage between    -20°C  to + 45°C<br>1 month of storage between      -20°C  to + 60°C |
| **Relative humidity** | 65 ±20% |
| **Atmospheric pressure** | 700 hPa to 1060 hPa  (-400 m to 3000 m) |

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

Dct_427_02

# 3   Interfaces

## 3.1   Front side

**Figure 4 : Front side**



Connector
Micro-FIT 4pts/M

Connector
Micro-FIT 16pts/M

Connector
Micro-FIT 14pts/M

See ANNEX 1 – 4-pin Micro-FIT cable , ANNEX 2 - 14-pin Micro-FIT cable (Inputs/Outputs), ANNEX 4 – 16-pin Micro-FIT cable (16 wire, Serial links, Boot and Reset) and ANNEX 4 – 16-pin Micro-FIT cable (16 wire, Serial links, Boot and Reset) for the wiring of the different connectors.

**Table 4 : Front side connection**
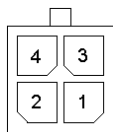


| | Micro Fit 4 pins |
|---|---|
| 1 | OUTPUT 1 (S1) |
| 2 | INPUT 1 (E1) |
| 3 | GND |
| 4 | $+V_{DC}$ |

| | Micro Fit 14 pins |
|---|---|
| 1 | ONE_WIRE |
| 2 | ANA2 |
| 3 | E5- |
| 4 | E5+ |
| 5 | E4 |
| 6 | S3 |
| 7 | $V_{BAT}$ |
| 8 | GND |
| 9 | ANA1 |
| 10 | E3- |
| 11 | E3+ |
| 12 | E2 |
| 13 | S2 |
| 14 | BUZZER |

| | Micro Fit 16 pins |
|---|---|
| 1 | GND |
| 2 | -- |
| 3 | -- |
| 4 | GND |
| 5 | CTS_1 |
| 6 | Compatible K-Line |
| 7 | TX_1 |
| 8 | RX_1 |
| 9 | POWER_OUT |
| 10 | RESET |
| 11 | BOOT |
| 12 | GND |
| 13 | CTS_0 |
| 14 | RTS_0 |
| 15 | TX_0 |
| 16 | RX_0 |
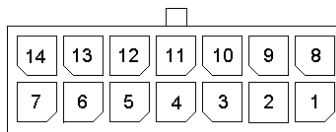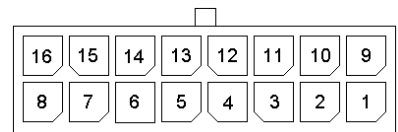
Dct_427_02

## 3.2   Back side

**Figure 5 : Back side**



Connector
FAKRA-D for
GSM antenna

GSM LED

LED 3

LED 4

SIM card cover

LED 5

LED 6

Dct_427_02
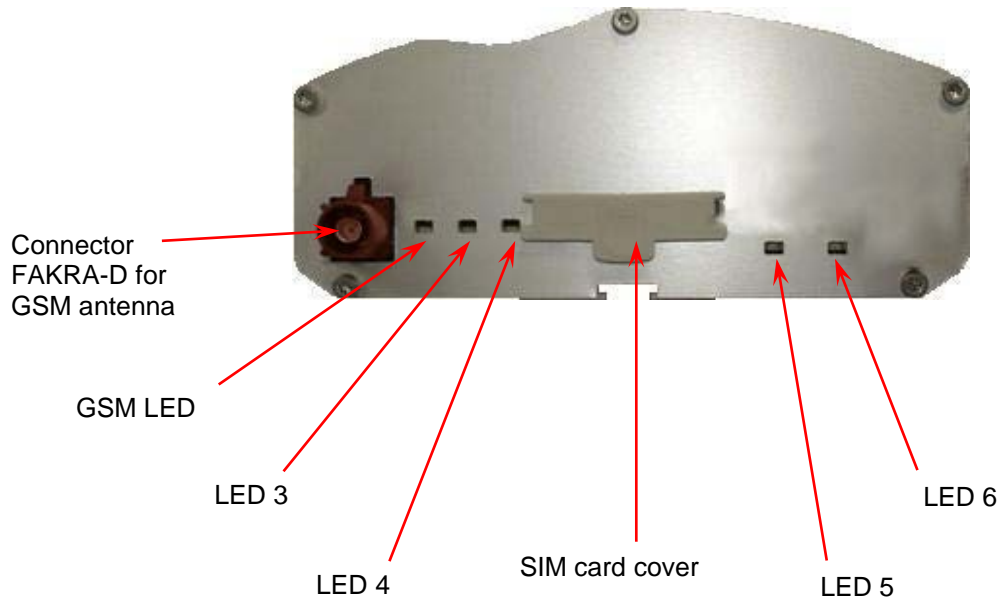
## 3.3 Functional architecture

### 3.3.1 General

**Figure 6 : Functional architecture**
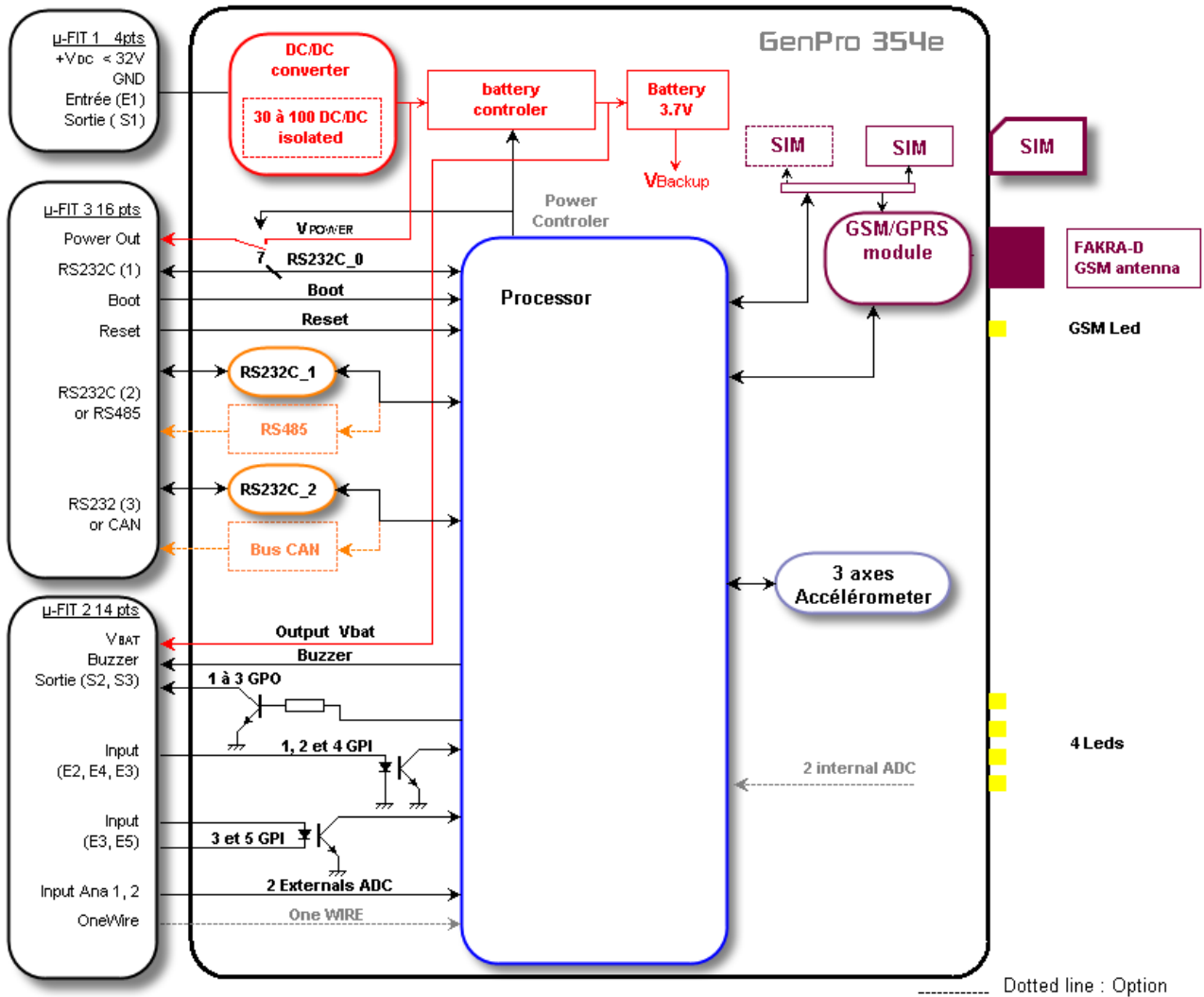


### 3.3.2 Functional architecture of optional serial ports

Contact us for the setting of the different options.

**Figure 7 : Architecture of optional serial ports**
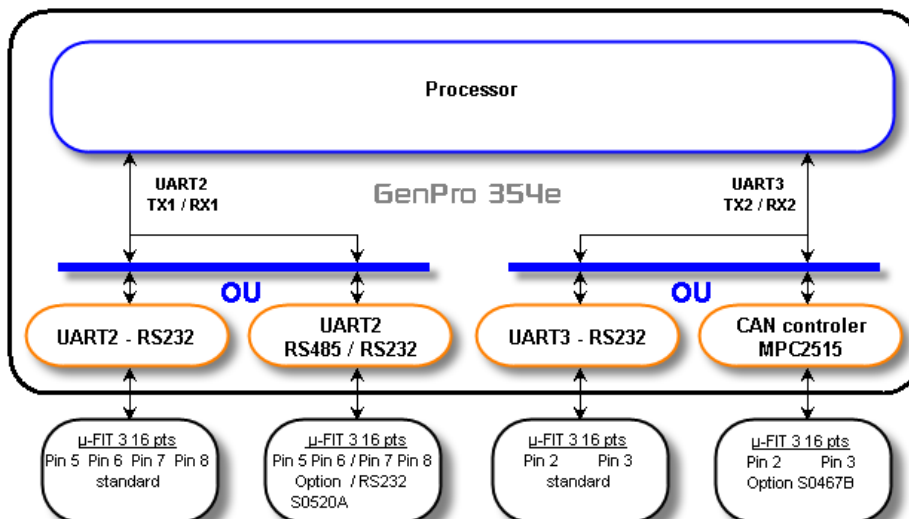


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Dct_427_02

## 3.4   Power supply

⚠️ If the battery 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: 4402304215). (See ANNEX 1 – 4-pin Micro-FIT cable (Power supply))

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

⚠️ The power cable supplied with the modem must be absolutely used; without this cable, the modem will not be protected.
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).

The modem must be powered by an external DC voltage between +8$V_{DC}$ and +32$V_{DC}$.

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.

### 3.4.2   Power supply 8 – 32$V_{DC}$

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

**Table 5 : Effects of power supply defect**

|  | **Then:** |
|---|---|
| ▪ Voltage falls below 8V | ▪ The functioning and the GSM communication are not guaranteed when the remaining capacity of the battery is not sufficient. |
| ▪ Voltage above 32V (Punctual peaks) | ▪ The modem guarantees its own protection. |
| ▪ Voltage above 32V (Continuous overvoltage) | ▪ The modem is protected by the fuse assembled on the power supply cable. |

### 3.4.2.1 Internal battery

This battery allows to maintain the operation of the GenPro 354e 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 30 mn 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 and the mode of use of the GenPro 354e (attachment in GSM/GPRS, Inputs/Outputs, RS232 connected...).

As an information, the autonomy is around in the case where the software management of the battery guarantees that the voltage $V_{BAT}$ does not fall below 3.45V :
- 40 mn with the following conditions GPRS communication 3Rx / 2TX, serial link not connected, no Input Output connected, power max.
- 20 mn with the following conditions WCDMA Band I communication 3Rx / 2TX, serial link not connected, no Input Output connected, power max.
- 14 h with the following conditions GSM attached to GPRS network without data transfer, serial link not connected, no Input Output connected.

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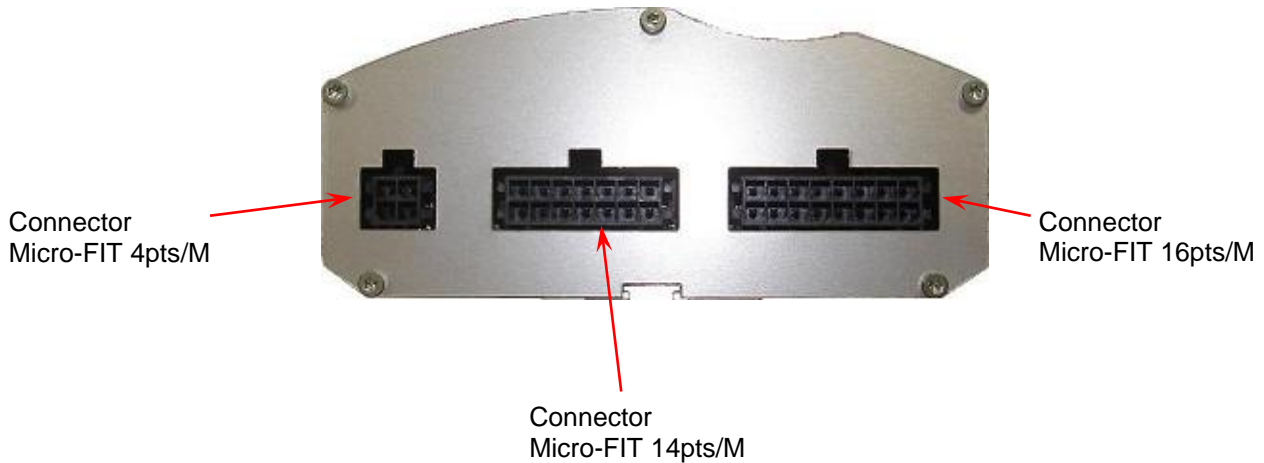
When the temperature exceeds 45 °C inside the box, the protection of the battery management triggers. The battery will not be charged.

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 6 : Characteristics of the polymer lithium battery**

| | |
|---|---|
| **Voltage (max.)** | 4.2V |
| **Type** | Lithium Polymer (LiPolymère) |
| **Capacity** | 1000 mA/h typical |
| **Exp. cycle time** | >300 cycles> 70% of the initial capacity |
| **Temperature range** | Charge : 0°C to +45°C        Discharge : -20°C to +60°C |
| **Protection (Resettable fuse)** | Discharge voltage : 2.30V ±0.058V<br>Maximum discharge current : 2A to 4A (1.0±0.3s) |

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 the fire.

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Dct_427_02

### 3.4.2.2 Consumption of the GenPro 354e

**Table 7 : Power supply range**

| Power supply range | 8 $V_{DC}$ to 32$V_{DC}$ |
|---|---|

**Table 8: Consumption in Low Power mode @ 25 °C without battery charging**

| Low Power | Average I nominal | | | | Unit. |
|---|---|---|---|---|---|
| $V_{IN}$ | 8 | 12 | 24 | 32 | V |
| $I_{MOY\ MAX}$ | 15 | 10 | 6 | 5 | mA |

Le GenPro 354e is in Low Power mode with the command *AT+EGLOP=1,xx*.

> This Low Power mode is only used with *EasePro*.

**Tableau 9 : Consumption in attached mode @ 25 °C without battery charging**

| Mode attaché | $I_{MOY\ MAX.}$ | | | | Unit. |
|---|---|---|---|---|---|
| $V_{IN}$ | 8 | 12 | 24 | 32 | V |
| GSM 900 / 1 800 MHz | 50 | 30 | 65 | 50 | mA |
| GPRS / EDGE | 50 | 30 | 65 | 50 | mA |
| 3G UMTS / HSPA | 55 | 35 | 20 | 16 | mA |

The GenPro 354e is attached to the network.

**Tableau 10 : Consumption in data transfer @ 25 °C without battery charging**

| | | | | | | | Unit |
|---|---|---|---|---|---|---|---|
| $V_{IN}$ | | | 8 | 12 | 24 | 32 | V |
| GSM | 900[1] | $I_{MOY\ MAX}$ | 240 | 130 | 70 | 50 | mA |
| | | $I_{PIC\ MAX}$ | 1750 | 750 | 370 | 280 | mA |
| | 1 800[2] | $I_{MOY\ MAX}$ | 180 | 100 | 55 | 40 | mA |
| | | $I_{PIC\ MAX}$ | 1150 | 630 | 310 | 240 | mA |
| GPRS | 4 Rx / 1 Tx | 900[1] | $I_{MOY\ MAX}$ | 250 | 135 | 65 | 55 | mA |
| | | | $I_{PIC\ MAX}$ | 1750 | 750 | 370 | 290 | mA |
| | | 1 800[2] | $I_{MOY\ MAX}$ | 190 | 105 | 55 | 45 | mA |
| | | | $I_{PIC\ MAX}$ | 1160 | 615 | 310 | 240 | mA |
| | 3 Rx / 2 Tx | 900[1] | $I_{MOY\ MAX}$ | 430 | 235 | 115 | 90 | mA |
| | | | $I_{PIC\ MAX}$ | 1860 | 770 | 375 | 290 | mA |
| | | 1 800[2] | $I_{MOY\ MAX}$ | 320 | 180 | 90 | 70 | mA |
| | | | $I_{PIC\ MAX}$ | 1170 | 635 | 315 | 240 | mA |
| EDGE | 4 Rx / 1 Tx | 900[3] | $I_{MOY\ MAX}$ | 250 | 135 | 65 | 55 | mA |
| | | | $I_{PIC\ MAX}$ | 1750 | 750 | 370 | 290 | mA |
| | | 1 800[4] | $I_{MOY\ MAX}$ | 200 | 115 | 60 | 45 | mA |
| | | | $I_{PIC\ MAX}$ | 1210 | 660 | 320 | 250 | mA |
| | 3 Rx / 2 Tx | 900[3] | $I_{MOY\ MAX}$ | 430 | 235 | 115 | 90 | mA |
| | | | $I_{PIC\ MAX}$ | 1860 | 770 | 375 | 290 | mA |
| | | 1 800[4] | $I_{MOY\ MAX}$ | 335 | 190 | 95 | 75 | mA |
| | | | $I_{PIC\ MAX}$ | 1200 | 660 | 330 | 260 | mA |

Dct_427_02

**Tableau 11 : Consumption in data transfer @ 25 °C without battery charging**

| | | | 8 | 12 | 24 | 32 | Unit V |
|---|---|---|---|---|---|---|---|
| $V_{IN}$ | | | 8 | 12 | 24 | 32 | V |
| **3G UMTS / HSPA**[5] | Band I | $I_{MOY\ MAX}$ | 405 | 240 | 125 | 100 | mA |
| | | $I_{PIC\ MAX}$ | 430 | 270 | 150 | 115 | mA |
| | Band II | $I_{MOY\ MAX}$ | 480 | 290 | 150 | 115 | mA |
| | | $I_{PIC\ MAX}$ | 510 | 320 | 170 | 135 | mA |
| | Band IV | $I_{MOY\ MAX}$ | 450 | 270 | 140 | 110 | mA |
| | | $I_{PIC\ MAX}$ | 475 | 290 | 155 | 130 | mA |
| | Band V | $I_{MOY\ MAX}$ | 350 | 210 | 110 | 85 | mA |
| | | $I_{PIC\ MAX}$ | 370 | 225 | 130 | 100 | mA |
| | Band VIII | $I_{MOY\ MAX}$ | 370 | 220 | 115 | 90 | mA |
| | | $I_{PIC\ MAX}$ | 410 | 250 | 135 | 110 | mA |

[1]   adapted antenna, RF power max. 33dBm.
[2]   adapted antenna, RF power max. 30dBm.
[3]   adapted antenna, RF power max. 27dBm.
[4]   adapted antenna, RF power max. 26dBm.
[5]   adapted antenna, RF power max. 24dBm.

**Table 12: Consumption of the battery charge @ 25 °C**

| Battery charge | Average I nominal | | | | Unit. |
|---|---|---|---|---|---|
| $V_{IN}$ | 8 | 12 | 24 | 32 | V |
| | 185 | 110 | 50 | 40 | mA |

### 3.4.2.3 Power Dimensioning

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

**Figure 8 : Consumption max**
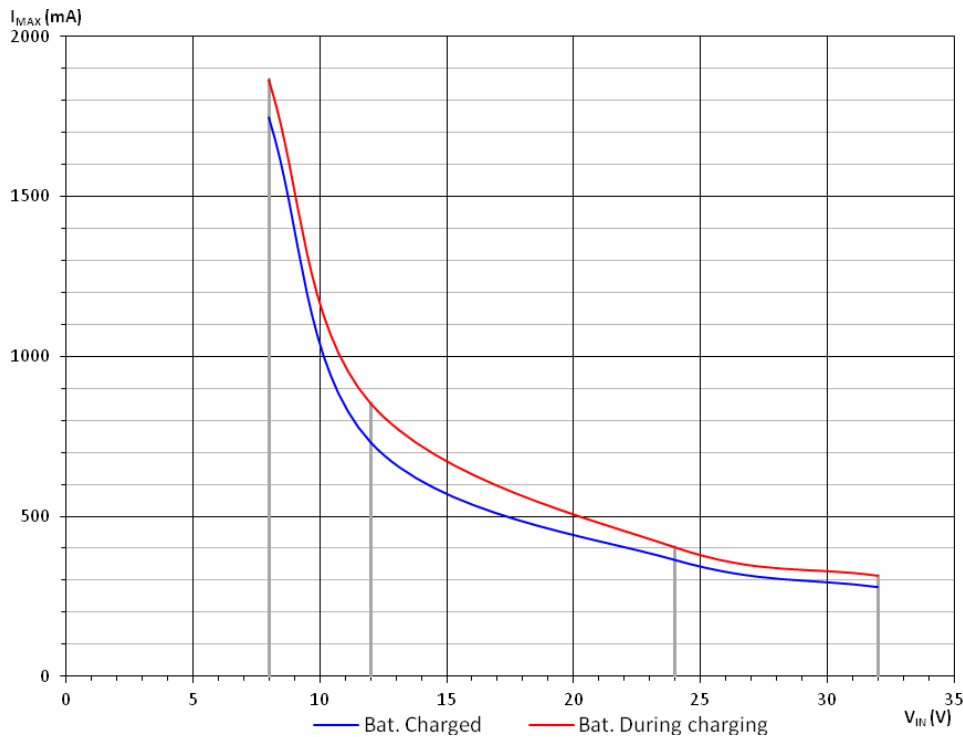


This consumption is not permanent. It corresponds to the burst consumption during GSM communications.

Dct_427_02

## 3.5  One Wire Bus

### 3.5.1  One Wire Bus

By default, the One Wire Bus is managed by the processor and only manages « serial number » interface in read-only mode 64 bits.

**Table 13: One Wire Bus description**

| Signal | 14-pin connector Pins N° | I/O | Kind of I/O | Description |
|---|---|---|---|---|
| Bus One Wire | 1 | I/O | | One Wire Bus |
| GND | 8 | | Analog | |
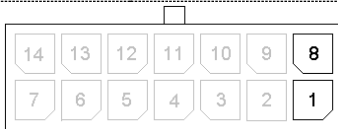
Corresponds to wires
White/green      for One Wire Bus
Black                for GND
see ANNEX 2 - 14-pin Micro-FIT cable (Inputs/Outputs)

**Table 14 : One Wire Bus – Electrical characteristics**

| Characteristics | Symbols | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Input Voltage – Low | $V_{IL}$ | | -0.3 | | 0.8 | $V_{DC}$ |
| Input Voltage – High | $V_{IH}$ | | 2 | | 3.5 | $V_{DC}$ |
| Hysteresis Voltage | $V_{Hys}$ | | 0.4 | | 0.7 | $V_{DC}$ |
| Input Leakage Current | $I_{LEAK}$ | | -4 | | 38 | $\mu A_{DC}$ |
| Input capacitance | $C_{IN}$ | | | | 14 | pF |
| Output Low-level Voltage | $V_{OL}$ | | | | 0.4 | $V_{DC}$ |
| Output High-level Voltage | $V_{OH}$ | | 2.8 | | | $V_{DC}$ |
| Output Current | $I_o$ | | | | ±16 | $mA_{DC}$ |

**Figure 9 : Internal electrical scheme of the One Wire bus**
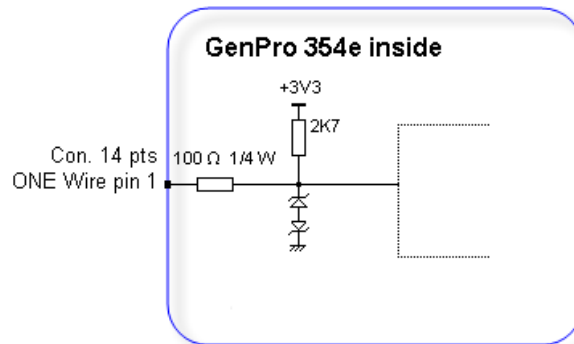
Assembly working with identification keys DS1990 iButton® from the MAXIM manufacturer.

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

Dct_427_02

### 3.5.2 Option Multi 1- Wire Bus S0470D

This **Multi 1-Wire** option, reference **S0470D,** allows the reading of all 1-wire devices with the possibility to have several devices on the same bus.

> This option Multi 1-wire is used wih **EGM** library.
> Conact us for used with **EasePro** application.

#### Table 15 : Multi 1- Wire Bus description

| Signal | 14-pin connector Pins N° | I/O | Kind of I/O | Description |
|---|---|---|---|---|
| Bus One Wire | 1 | I/O | | Bus Multi 1- Wire |
| GND | 8 | | Analog | |
| | | | Corresponds to wires<br>White/green for One Wire Bus<br>Black for GND<br>see ANNEX 2 - 14-pin Micro-FIT cable (Inputs/Outputs) | |

#### Table 16 : Multi 1- Wire 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 | $\mu A_{DC}$ |
| 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 | $V_{DC}$ |
| Active Pullup On Time [4, 5] | $t_{APUOT}$ | | 2.3 | 2.5 | 2.7 | $\mu s$ |
| Pulldown Slew Rate [6]) | $P_{DSRC}$ | | 1 | | 4.2 | $V/\mu s$ |
| Pullup Slew Rate [6]) | $P_{USRC}$ | | 0.8 | | 4 | $V/\mu s$ |
| Power-On Reset Trip Point | $V_{POR}$ | | | | 2.2 | V |
| Write-One/Read Low Time | $t_{W1L}$ | | 7.6 | 8 | 8.4 | $\mu s$ |
| Read Sample Time | $t_{MSR}$ | | 13.3 | 14 | 15 | $\mu s$ |
| 1-Wire Time Slot | $t_{SLOT}$ | | 65.8 | 69.3 | 72.8 | $\mu s$ |
| Fall Time High-to-Low [6, 7] | $t_{F1}$ | | 0.54 | | 3.0 | $\mu s$ |
| Write-Zero Low Time | $t_{W0L}$ | | 60 | 64 | 68 | $\mu s$ |
| Write-Zero Recovery Time | $t_{REC0}$ | | 5.0 | 5.3 | 5.6 | $\mu s$ |
| Reset Low Time | $t_{RSTL}$ | | 570 | 600 | 630 | $\mu s$ |
| Presence-Detect Sample Time | $t_{MSP}$ | | 66.5 | 70 | 73.5 | $\mu s$ |
| Sampling for Short and Interrupt | $t_{SI}$ | | 7.6 | 8 | 8.4 | $\mu s$ |
| Reset High Time | $t_{RSTH}$ | | 554.8 | 584 | 613.2 | $\mu s$ |

[4] Active or resistive pullup choice is configurable.

[5] Except for $t_{F1}$, all 1-Wire timing specifications and $t_{APUOT}$ are derived from the same timing circuit. Therefore, if one of these parameters is found to be off the typical value, it is safe to assume that all these parameters deviate from their typical value in the same direction and by the same degree.

[6] These values apply at full load, i.e., 1nF at standard speed and 0.3nF at overdrive speed. For reduced load, the pulldown slew rate is slightly faster.

[7] Fall time high-to-low ($t_{F1}$) is derived from $P_{DSRC}$, referenced from 2.97 $V_{DC}$ to 0.33 $V_{DC}$.

**See Figure 9 : Internal electrical scheme of the One Wire bus**

## 3.6   Analog inputs ANA1 and ANA2

### 3.6.1   Analog inputs 0 – 10 $V_{DC}$

**Table 17 : Description of analog inputs 0 – 10 V**

| Signal | 14-pin connector Pins N° | I/O | Kind of I/O | Description |
|---|---|---|---|---|
| ANA1 | 9 | I | | Analog input 0 – 10V |
| ANA2 | 2 | | Analog | |
| GND | 8 | | | |
| | 14 13 12 11 10 9 8 / 7 6 5 4 3 2 1 | | Corresponds to wires<br>Violet    for ANA1<br>Grey    for ANA2<br>Black    for GND<br>see ANNEX 2 - 14-pin Micro-FIT cable (Inputs/Outputs) | |
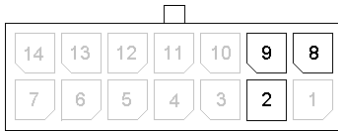
**Table 18 : Characteristics of analog inputs 0 – 10 V**

| Characteristics | Symbols | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Analog input | ANA1 / 2 | | -0.3 | | 12.8 | $V_{DC}$ |
| Conversion range | | | 1.3 µ | | 10.33 | $V_{DC}$ |
| Polarization current | | From 1.3 µV to 10.33 V | 0.064 | | 345 | $µA_{DC}$ |
| Resolution | | | | 10 | | bits |
| Linearity | | | | ±2 | | LSB |

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

**Figure 10 : Internal electrical scheme of analog input 0 – 10 V**
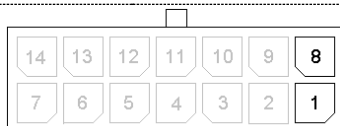


GenPro 354e inside

Con. 14 pts
ANA1 pin 9
ANA2 pin 2

0 - 10 V max.
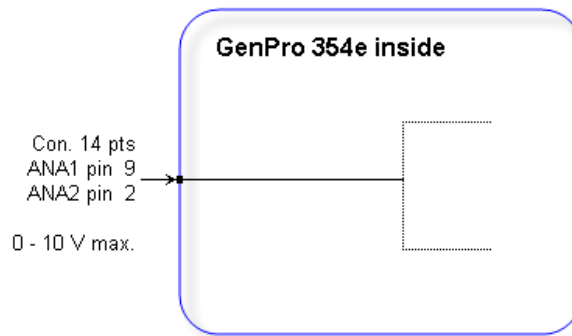
### 3.6.2 Option analog inputs 4 – 20 mA S0475D

This option *ANA 4-20mA* reference *S0475D* allows to have a current input.

**Table 19 : Description of analog inputs 4 – 20 mA**

| Signal | 14-pin connector Pins N° | I/O | Kind of I/O | Description |
|---|---|---|---|---|
| ANA1 | 9 | I | | |
| ANA2 | 2 | | Analog | Analog input4 – 20mA |
| GND | 8 | | | |

| | |
|---|---|
| 14 13 12 11 10 **9** **8** 7 6 5 4 3 **2** 1 | Corresponds to wires<br>Violet  for ANA1<br>Grey    for ANA2<br>Black   for GND<br>see ANNEX 2 - 14-pin Micro-FIT cable (Inputs/Outputs) |
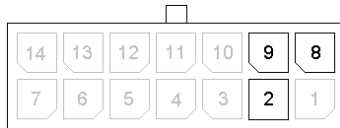
**Table 20 : Characteristics of analog inputs 4 – 20 mA**

| Characteristics | Symbols | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Analog input | ANA1 / 2 | | -0.3 | | 3.8 | $V_{DC}$ |
| Conversion range | | | 0 | | 22 | $mA_{DC}$ |
| Polarization current | | | | 20 | 200 | $nA_{DC}$ |
| Resolution | | | | 10 | | bits |
| Linearity | | | | ±2 | | LSB |

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

**Figure 11 : Internal electrical scheme of analog input 4 – 20 mA**

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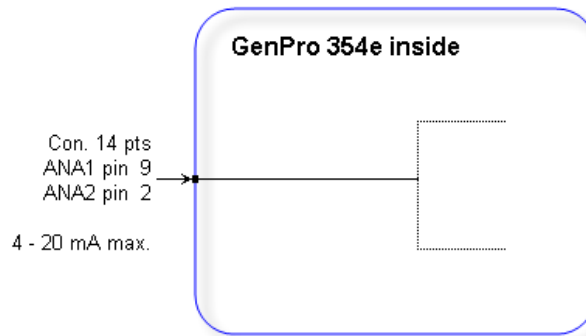
## 3.7 Opto-coupled inputs

**Table 21 : Description of opto-coupled inputs**

| Signal | Connector Pins N° | I/O | Description |
|---|---|---|---|
| E1 | 2 Connector 4 pins | | |
| GND | 3 Connector 4 pins | | |
| E2 | 12 Connector 14 pins | I | Digital Inputs 0 – 35 V |
| E4 | 5 Connector 14 pins | | |
| GND | 8 Connector 14 pins | | |
|  | | | Corresponds to wires<br>Yellow   for E2<br>Black     for GND<br>See ANNEX 1 – 4-pin Micro-FIT cable (Power supply) |
|  | | | Corresponds to wires<br>Brown   for E2<br>Green    for E4<br>Black     for GND<br>See ANNEX 2 - 14-pin Micro-FIT cable (Inputs/Outputs) |
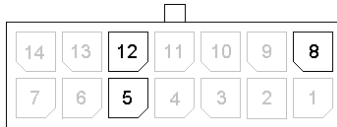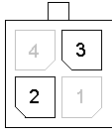
**Table 22 : Characteristics of opto-coupled inputs**

| 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 12 : Internal electrical scheme of opto-coupled inputs**
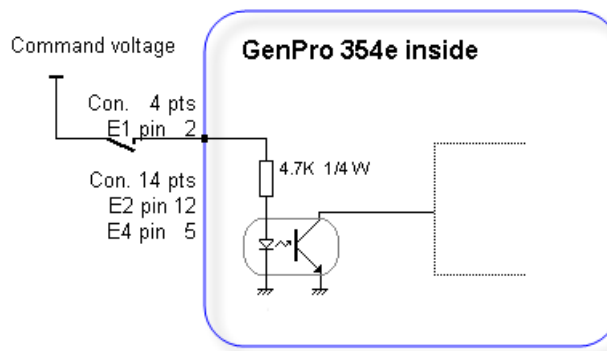


The minimum command voltage for the detection is: **3.5 V**

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

Dct_427_02

## 3.8 Isolated opto-coupled inputs

To allow any kind of connection, the inputs E3 and E5 have no electrical reference with the board. This allows a more flexible control compared with the different configurations encountered.

**Table 23 : Description of isolated opto-coupled inputs**

| Signal | 14-pin connector Pins N° | I/O | Description |
|---|---|---|---|
| E3+ | 11 | | |
| E3- | 10 | I | Isolated digital inputs |
| E5+ | 4 | | 0 – 35 V |
| E5- | 3 | | |
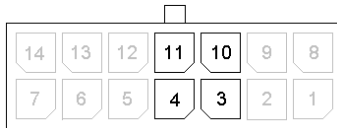
Corresponds to wires
Yellow for E3+
Black for E3-
Blue for E5+
Black for E5-
see ANNEX 2 - 14-pin Micro-FIT cable (Inputs/Outputs)

**Table 24 : Characteristics of isolated opto-coupled inputs**

The electrical characteristics are the same as in paragraph 3.7 Opto-coupled inputs .
See Table 21 : Characteristics of opto-coupled inputs

**Figure 13 : Internal electrical scheme of isolated inputs**

Control via plus

Control via grounding
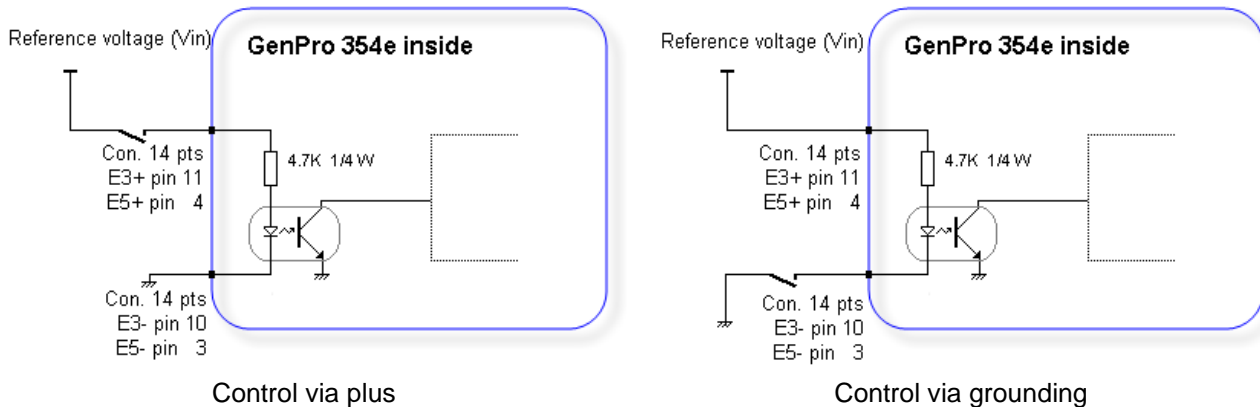
## 3.9 Digital outputs

**Table 25 : Description of digital outputs**
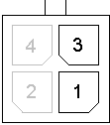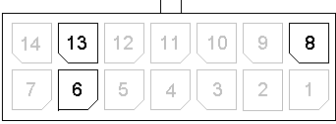
| Signal | Connector Pins N° | I/O | Description |
|---|---|---|---|
| S1 | 1 Connector 4 pins | | |
| S2 | 13 Connector 14 pins | O | Open collector output |
| S3 | 6 Connector 14 pins | | |
| GND | 8 Connector 14 pins | | |
|  | | Corresponds to wires<br>Brown for S2<br>Noir for GND<br>See ANNEX 1 – 4-pin Micro-FIT cable (Power supply) | |
|  | | Corresponds to wires<br>White/Brown for S2<br>White/Yellow for S3<br>Black for GND<br>see ANNEX 2 - 14-pin Micro-FIT cable (Inputs/Outputs) | |

**Table 26 : Characteristics of open collector output**

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

**Figure 14 : Internal electrical scheme of the output**
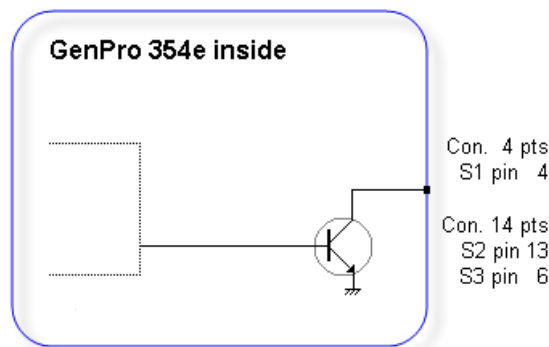


⚠ No protection is ensured. The user must respect the values of the table below.

**Figure 15 : Example of relay control**
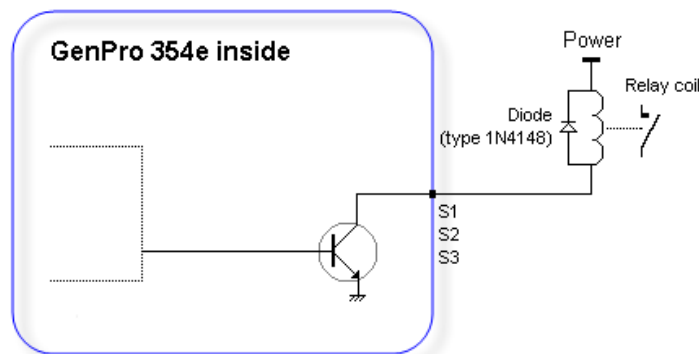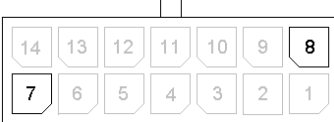


Descriptions and non-contractual illustrations in this document are given as an indication only.
ERCOGENER reserves the right to make any modifications.

Dct_427_02

## 3.10 Power supply output $V_{BAT}$

**Table 27 : Description of the power supply $V_{BAT}$**

| Signal | 14-pin connector Pins N° | I/O | Kind of I/O | Description |
|---|---|---|---|---|
| $V_{BAT}$ <br> GND | 7 <br> 8 | O | Analog | Output voltage <br> $3.45\ V_{DC} \leq V_{BAT} \leq 4.5\ V_{DC}$. |
| |  | | | Corresponds to wires <br> Orange for $V_{BAT}$ <br> Black for GND <br> see ANNEX 2 - 14-pin Micro-FIT cable (Inputs/Outputs) |

**Table 28 : Conditions of use of the power supply output $V_{BAT}$**

| Parameters | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| $V_{OUT}$ | Without power supply [1] | 3.45 | | 4.0 | $V_{DC}$ |
| | With power supply 8V - 32V | 4.2 | | 4.4 | $V_{DC}$ |
| $I_{OUT}$ | Max. | | | 100 [2] | $mA_{DC}$ |

[1] The GenPro 354e works with its battery only. In the case where the voltage $V_{BAT}$ falls below 3.45V, the product cannot communicate anymore via the network.

[2] In the case where the software management of the battery guarantees that the voltage $V_{BAT}$ does not fall below 3.45V. In case of low battery ($V_{BAT} < 3.45V$) or high discharge ($V_{BAT} = 2.8V$), and in order to guarantee a restart of the product, the consumption on this output must not exceed 50 mA.

> 2.8V is the self-protection limit of the battery. From this moment, the battery puts itself under protection, and the output voltage becomes null.
> When the battery is not connected, the output voltage is $4.2V \leq V_{OUT} \leq 4.4\ V$ as long as the power supply $+V_{DC}$ is present.

Dct_427_02

## 3.11 Buzzer

By default, the GenPro 354e provides a Buzzer output on the output 14 of the 14-pin connector. This PWM output provides a frequency; it is then dedicated to drive a **Transducer**.

**Table 29 : Description of buzzer output**

| Signal | 14-pin connector Pins N° | I/O | Kind of I/O | Description |
|---|---|---|---|---|
| BUZZER GND | 14 8 | O | Analog | Buzzer output |



Corresponds to wires
Red     for BUZZER
Black    for GND
see ANNEX 2 - 14-pin Micro-FIT cable (Inputs/Outputs)

**Table 30 : Characteristics of buzzer output**

| Characteristics | Symbols | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| collector-base voltage | $V_{CB0}$ | Transmitter open | | | 48 | $V_{DC}$ |
| collector-emitter voltage | $V_{CE0}$ | Open base | | | 40 | $V_{DC}$ |
| collector current (DC) | $I_C$ | | | | 600 | $mA_{DC}$ |
| peak collector current | $I_{CM}$ | | | | 800 | $mA_{DC}$ |
| Collector Cutoff Current | $I_{CB0}$ | IE = 0; VCB = 60 V; Tj = 25 °C | | | 10 | $nA_{DC}$ |
| | | IE = 0; VCB = 60 V; Tj = 125 °C | | | 10 | $\mu A_{DC}$ |
| collector-emitter saturation voltage | $V_{CEsat}$ | IC = 150 mA; IB = 15 mA * | | | 300 | $mV_{DC}$ |
| | | IC = 500 mA; IB = 50 mA * | | | 1 | $V_{DC}$ |
| transition frequency | $f_T$ | IC = 20 mA; VCE = 20 V; f = 100 MHz | | | 300 | MHz |
| collector capacitance | $C_C$ | $I_E = I_e = 0$; VCB = 10 V; f = 1 MHz | | | 8 | pF |
| total power dissipation | $P_{Ttot}$ | $T_{amb} \leq 25$ °C | | | 225 | mW |

* Pulse test: tp ≤ 300 µs; δ ≤ 0.02.

**Table 31 : Example of Transducer tested with the GenPro 354e**

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

**Figure 16 : Example of Transducer tested with the GenPro 354e**
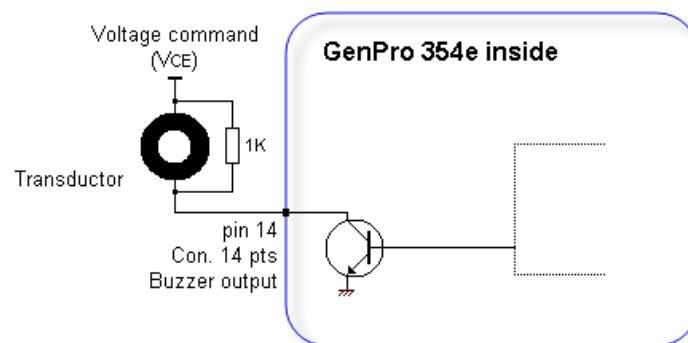
## 3.12 Serial link RS232_0

**Table 32 : Pins description of serial link RS232_0**

| Signal | 16-pin Micro FIT connector Pins N° | I/O | RS232 Standards | Description | 9-pin Sub D connector Pins N° |
|---|---|---|---|---|---|
| CT103 / TX_0 | 15 | I | TX | Data transmission | 3 |
| CT104 / RX_0 | 16 | O | RX | Data reception | 2 |
| CT105 / RTS_0 | 14 | I | RTS | Request to send | 7 |
| CT106 / CTS_0 | 13 | O | CTS | Ready to send | 8 |
| GND | 12 | | | Ground | 5 |
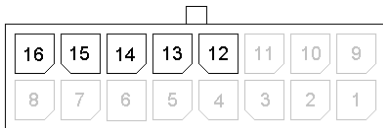


Corresponds to wires
Green   for TX
Blue    for RX
Yellow  for RTS
Brown   for CTS
Black   for GND
see ANNEX 3 – 16-pin Micro-FIT cable (14 wire, Serial links)

**Table 33 : Characteristics of serial link RS232_0**

| 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 |

**Figure 17 : Standards signals of serial link RS232_0**

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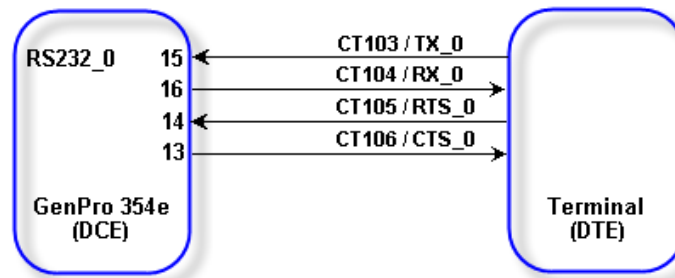
## 3.13 Serial link RS232_1 / RS485

### 3.13.1 Serial Link RS232_1 standard

**Table 34 : Pins description of serial link RS232_1**

| Signal | 16-pin Micro FIT connector Pins N° | I/O | RS232 Standards | Description |
|---|---|---|---|---|
| CT103 / TX_1 | 7 | I | TX | Data transmission |
| CT104 / RX_1 | 8 | O | RX | Data reception |
| CT105 /RTS_1 | 6 | I | RTS | Request to send |
| CT106 / CTS_1 | 5 | O | CTS | Ready to send |
| GND | 4 | | | Ground |
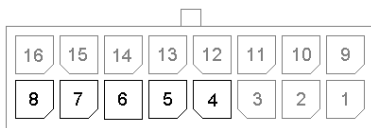
Corresponds to wires
White/Green     for TX
White/Blue      for RX
White/Yellow    for RTS
White/Brown     for CTS
Black           for GND

 see ANNEX 3 – 16-pin Micro-FIT cable (14 wire, Serial links)

**Table 35 : Characteristics of serial link RS232_1**

| Characteristics | Symbols | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| See Table 32 : Characteristics of serial link RS232_0 | | | | | | |

**Figure 18 : Standards signals of serial link RS232_1**
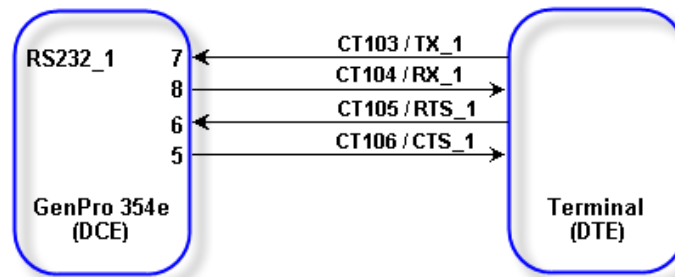


When the S0520B option (RS485) is present the RTS and CTS signals are not available.

**Figure 19 : Normalized signals of serial link standard RS232_1 with S0520B option**

Dct_427_02
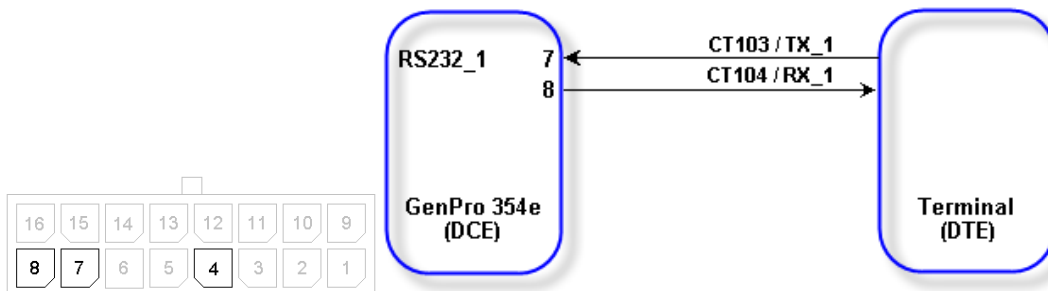
### 3.13.2 RS485 option S0520B

**Table 36 : Description of pins of serial link RS485 option S0520B**

| Signal | Connector Micro FIT 16 points Pin number | I/O | Norme RS485 | Description |
|--------|------------------------------------------|-----|-------------|-------------|
| A+ | 6 | I/O | A/Y | I/O no inverted |
| B- | 5 | I/O | B/Z | I/O inverted |
| GND | 4 | | | Ground |

| 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
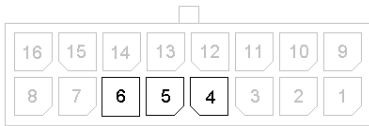
Wire color
White /Yellow    for A+
White/Brown    for B-
Black    for GND
See ANNEX 3 – 16-pin Micro-FIT cable (14 wire, Serial links)

**Tableau 37 : Characteristics of serial link RS485 option S0520B**

| Characteristics | Symbols | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|---------|------------|------|------|------|------|
| Interface voltage (A or B) | $V_{IO}$ | | -8 | | 13 | $V_{DC}$ |
| Differential Voltage (A or B) | $\Delta V_{IO}$ | | -5 | | +5 | $V_{DC}$ |
| **Driver** | | | | | | |
| Differential Output Voltage | $V_{OD}$ | | 1,5 | 2,2 | 3 | $V_{DC}$ |
| Differential Output Voltage for Complementary Output States | $\Delta V_{OD}$ | | | | 0,2 | $V_{DC}$ |
| Driver Common Mode Output | $V_{OC}$ | | | 2 | 3 | $V_{DC}$ |
| Common Mode Output Voltage for Complementary Output States | $\Delta V_{OC}$ | | | | 0,2 | $V_{DC}$ |
| Short-Circuit Current | $I_{OSD}$ | $-7V \leq$ (A or B) $\leq 12V$ | | | ±250 | mA |
| **Receiver** | | | | | | |
| Input Current (A, B) | $I_{IN}$ | $-7V \leq (V_{IN}) \leq 12V$ | -100 | | 125 | µA |
| Differential Input Threshold Voltage | $V_{TH}$ | $-7V \leq (V_{IN}) \leq 12V$ | | | ±0,2 | $V_{DC}$ |
| Input Hysteresis | $\Delta V_{TH}$ | B = 0V | | 15 | | $mV_{DC}$ |
| Output High Voltage | $V_{OH}$ | $I_O = -4mA$, A-B = 200mV | | 2,4 | | $V_{DC}$ |
| Output Low Voltage | $V_{OL}$ | | | | 0,4 | $V_{DC}$ |

**Figure 20 : Length of Serial Link RS485 cable option S0520B**
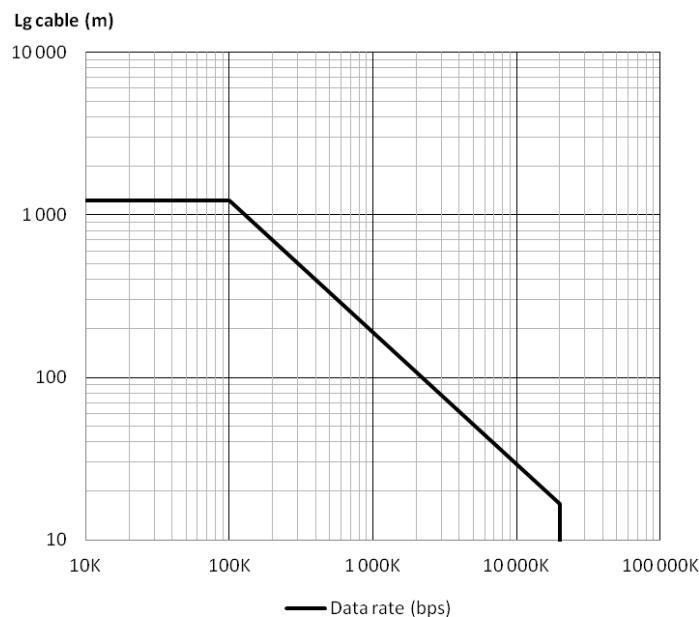
Dct_427_02

**Figure 21 : Normalized signals of serial link RS485 option S0520B**

Dct_427_02
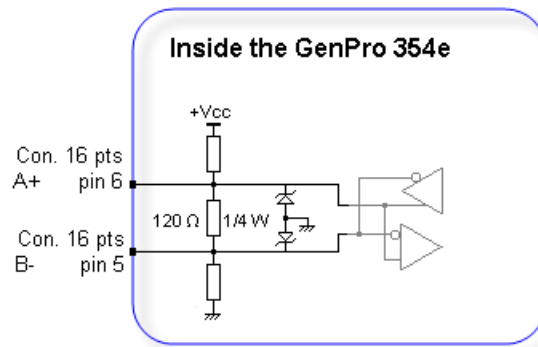
## 3.14 Serial link RS232_2 / Bus CAN

This third serial link is

- RS232c - *standard*.

- CAN Bus - Option *MCP2515 CAN Bus*, reference *S0467D*.

> These 2 options cannot be installed simultaneously.

### 3.14.1 Serial link RS232_2

**Table 38 : Pins description of serial link RS232_2**

| Signal | 16-pin Micro FIT connector Pins N° | I/O | RS232 Standards | Description |
|---|---|---|---|---|
| CT103 / TX_2 | 2 | I | TX | Data transmission |
| CT104 / RX_2 | 3 | O | RX | Data reception |
| GND | 1 | | | Ground |

|  |  |
|---|---|
| 16 15 14 13 12 11 10 9<br>8 7 6 5 4 **3 2 1** | Corresponds to wires<br>Violet        for TX<br>White/Violet    for RX<br>Black         for GND<br>  see ANNEX 3 – 16-pin Micro-FIT cable (14 wire, Serial links) |

**Table 39 : Characteristics of serial link RS232_2**

| Characteristics | Symbols | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| See Table 32 : Characteristics of serial link RS232_0 | | | | | | |

**Figure 22 : Standards signals of serial link RS232_2**

Dct_427_02
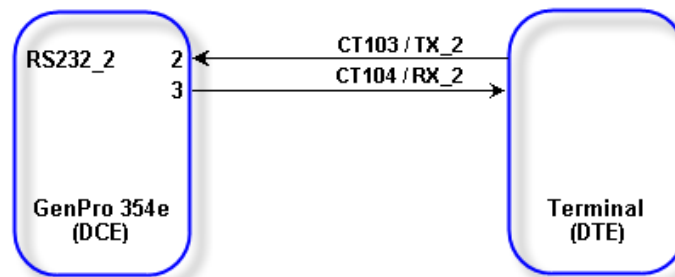
### 3.14.2 Bus CAN MCP2515 option S0467D

The data transmission is done on a differential wired pair. The line is made up of 2 wires.

**Table 40 : Pins description of the link Bus CAN option S0467D**

| Signal | 16-pin Micro FIT connector Pins N° | I/O | CAN Standards | Description |
|--------|-------------------------------------|-----|---------------|-------------|
| CANH | 2 | I/O | CAN High | Positive differential line |
| CANL | 3 | O/O | CAN Low | Negative differential line |
| GND | 1 | | | Ground |

| 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |
|----|----|----|----|----|----|----|---|
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
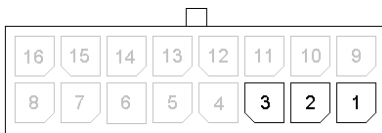
Corresponds to wires
Violet       for CANH
White/Violet    for CANL
Black       for GND
see ANNEX 3 – 16-pin Micro-FIT cable (14 wire, Serial links)

**Table 41 : Characteristics of serial link Bus CAN MCP2515 option S0467D**

| Characteristics | Symbols | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|---------|------------|------|------|------|------|
| Input Voltage – Low | $V_{IL}$ | Input Voltage – Low | 0.6 | 1.1 | | $V_{DC}$ |
| Input Voltage – High | $V_{IH}$ | Input Voltage – High | | 1.5 | 3.3 | $V_{DC}$ |
| Input Hysteresis | $V_{Hys}$ | Input Hysteresis | | 0.1 | | $V_{DC}$ |
| Leak current | $I_L$ | | ±30 | | | µA |
| Output Short-Circuit Current | $I_{OS}$ | | | | ±250 | mA |
| Output voltage | $V_{OH}$ | CANH Dominant | 2.45 | | 3.3 | $V_{DC}$ |
| | | CANL Dominant | 0.5 | | 1.25 | $V_{DC}$ |
| | $V_{OL}$ | CANH Recessive | | 2.3 | | $V_{DC}$ |
| | | CANL Recessive | | 2.3 | | $V_{DC}$ |

**Figure 23 : Output signal of bus CAN MCP2515 option S0467D**
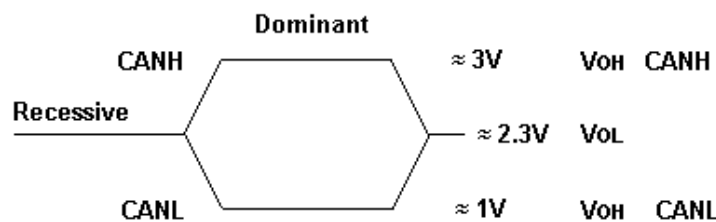


**Figure 24 : Standards signals of link Bus CAN MCP2515 option S0467D**
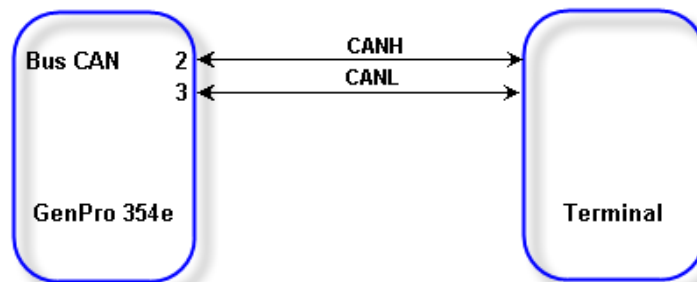
## 3.15 Power supply Power_Out

This power supply Power_Out is controlled by software

**Table 42 : Description of Power_Out**

| Signal | 16-pin connector Pins N° | I/O | Kind of I/O | Description |
|---|---|---|---|---|
| Power_Out<br>GND | 9<br>12 | O | Analog | |
| | | | | Corresponds to wires<br>White      Power_Out<br>Black       for GND<br>see ANNEX 3 – 16-pin Micro-FIT cable (14 wire, Serial links) |

**Table 43 : Characteristics of Power_Out**

| Parameters | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| $V_{OUT}$ | With power supply | 6.2 | | 30.5 | $V_{DC}$ |
| $R_{OUT}$ | 8V - 32V @ 1A | | 45 | 70 | $m\Omega$ |
| $I_{OUT}$ | | | | 1 | A |

**Figure 25 : Internal electrical scheme of Power_Out**
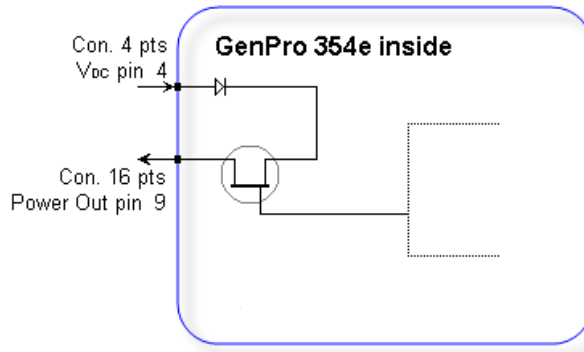
The graph below shows a drop of voltage due to the serial diode and the transistor.

**Figure 26 : Drop of voltage**
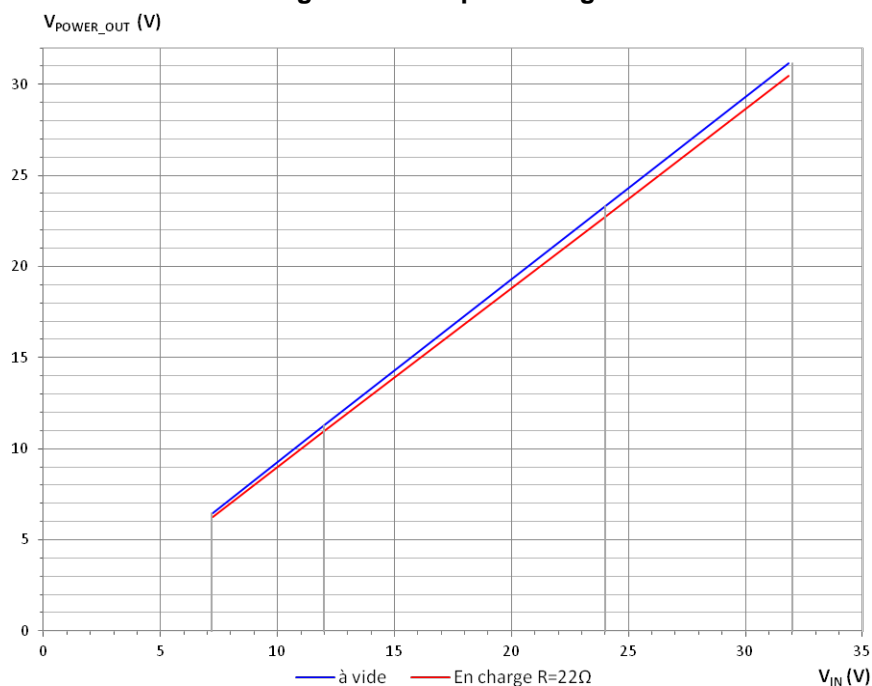
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## 3.16 BOOT

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

**Table 44 : Description of BOOT input**

| Signal | 16-pin connector Pins N° | I/O | Kind of I/O | Description |
|---|---|---|---|---|
| BOOT | 11 | I | SCHMITT | Boot modem |
| GND | 4 | | | |
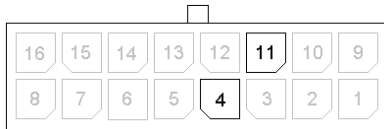


Corresponds to wires
Green    for BOOT
Black    for GND
see ANNEX 4 – 16-pin Micro-FIT cable (16 wire, Serial links, Boot and Reset)

**Table 45 : Conditions of use of BOOT signal**

| Parameters | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| $V_{IL}$ | Input Voltage – Low | -0.3 | | 0.8 | $V_{DC}$ |
| $V_{IH}$ | Input Voltage – High | 2 | | 3.3 | $V_{DC}$ |
| RIPU | Internal Pull-Up Resistor | | 5.38K | | $\Omega$ |

**Figure 27 : Internal electrical scheme of BOOT**
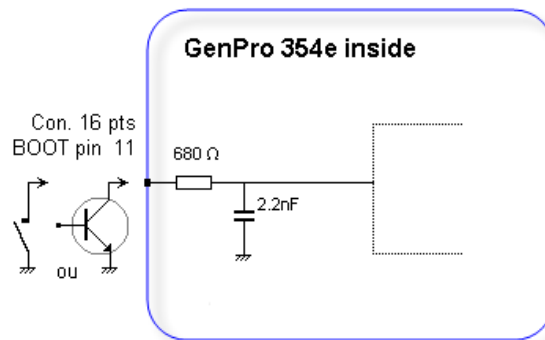


⚠️ The use of the BOOT signal must be done through a transistor assembly or via dry contact. The integrator has the responsibility to protect the input from electrical perturbations and to respect the functioning parameters values.

Dct_427_02

## 3.17 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 46 : Description of RESET input**

| Signal | 16-pin connector Pins N° | I/O | Kind of I/O | Description |
|---|---|---|---|---|
| RESET | 10 | I | SCHMITT | Reset modem |
| GND | 4 | | | |
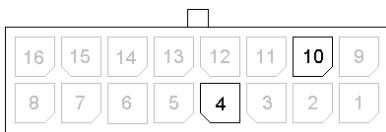


Corresponds to wires
Orange   for RESET
Black     for GND
see ANNEX 4 – 16-pin Micro-FIT cable (16 wire, Serial links, Boot and Reset)

**Table 47 : Conditions of use of RESET signal**

| Parameters | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| V$_{IL}$ | Input Voltage – Low | -0.3 | | 0.8 | V$_{DC}$ |
| V$_{IH}$ | Input Voltage – High | 2 | | 3.3 | V$_{DC}$ |
| RIPU | Internal Pull-Up Resistor | | 5.38K | | Ω |

**Figure 28 : Internal electrical scheme of RESET**
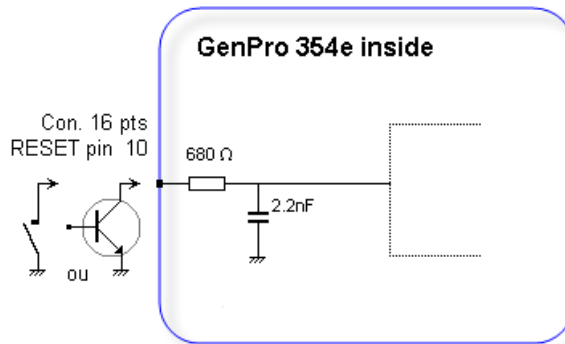


⚠️ The use of the RESET signal must be done through a transistor assembly or via dry contact .
The integrator has the responsibility to protect the input from electrical perturbations and to respect the functioning parameters values.

**Figure 29 : Chronogram of RESET signal**

Dct_427_02
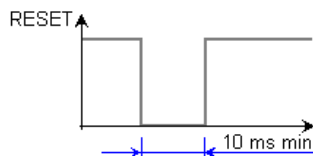
## 3.18 Accelerometer

The GenPro 354e provides an accelerometer with 3 axis of sensitivity ±2G or ±8G controllable by software.

**Figure 30 :** Positioning of the accelerometer axis
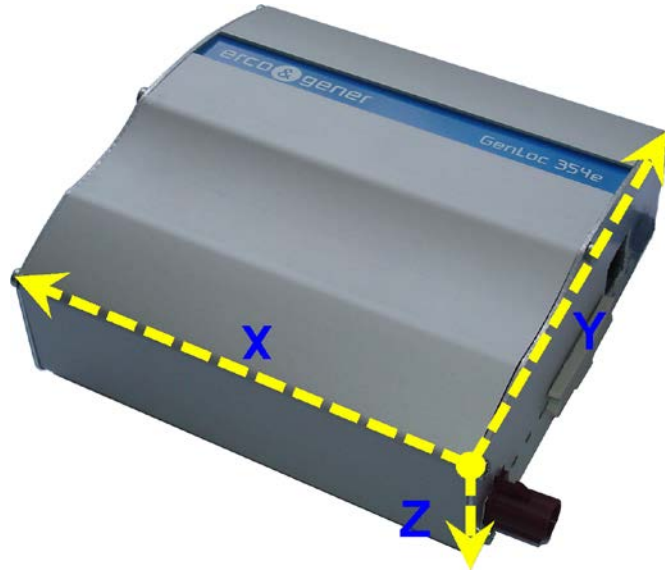
## 3.19 SIM card

**Table 48: Characteristics of the SIM card power voltage**

| SIM card | 3 V or 1.8 V |
|---|---|

## 3.20 Dual SIM option S0471C

As an option it is possible to have a 2^(nd) SIM reader.

- Option *DUAL SIM* reference *S0471C*.

> This SIM card is internal only.
> The access can be done after removing the rear panel.
> See Information Note EG_GenLocPro54e_1040_IN000_xxx_yy.

**Table 49: Characteristics of the 2^(nd) SIM card power voltage**

| SIM card | 3 V or 1.8 V |
|---|---|

Descriptions and non-contractual illustrations in this document are given as an indication only.
ERCOGENER reserves the right to make any modifications.

Dct_427_02

## 3.21 Leds of the modem

**Figure 31 : Back side Leds**
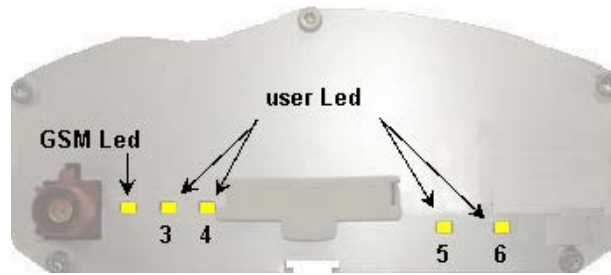


### 3.21.1 GSM Led

#### 3.21.1.1 Without application

The GenPro 354e does not contain any application. The Led is OFF.

#### 3.21.1.2 With standard library

The GenPro 354e contains the standard library. The Led is OFF.

#### 3.21.1.3 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 50: 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. |

#### 3.21.1.4 Owner application

The GenPro 354e contains your application. The Led status depends on your parameters.

Descriptions and non-contractual illustrations in this document are given as an indication only.
ERCOGENER reserves the right to make any modifications.

Dct_427_02

### 3.21.2 User Led

These Leds are free. They are left at the disposal of the user.

If the GenPro 354e has the standard EGM library (see the documents "EG_EGM_CL_xxx_yy" of ERCOGENER), they can be controlled via AT command.

|  | n | AT+GPIOEXTSET=n,1 | AT+GPIOEXTSET=n,0 |
|---|---|---|---|
| **Led 3** | 57 |  |  |
| **Led 4** | 56 | Led ON | Led OFF |
| **Led 5** | 55 |  |  |
| **Led 6** | 54 |  |  |

Example    AT+GPIOEXTSET=56,1 to turn ON the Led 4
               AT+GPIOEXTSET=56,0 to turn OFF the Led4

# 4　GSM

## 4.1　GSM external antenna

The GSM external antenna is connected to the modem via the FAKRA-D connector.

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

**Figure 32 : GSM external antenna**



**Table 51 : Characteristics of GSM external antenna**

| Frequency band | |
|---|---|
| **900** | 880..960 MHz |
| **1800** | 1710..1880 MHz |
| **2100** | 1920..2170 MHz |
| **Impedance** | 50 Ohms nominal |
| **Input power** | > 2 W peak |
| **Gain** | < 4.25 dBi for   850 MHz<br>< 7.55 dBi for 1700 MHz<br>< 2.74 bBi for 1900 MHz |
| **VSWR** | < 2:1 recommended　　　　< 3:1 acceptable |
| **Return Loss** | $S_{11}$<-10 dB  recommended　　$S_{11}$<-6 dB acceptable |

See § 5.9 Recommended accessories, for the GSM antennas recommended by ERCOGENER.

# 5  Use of the modem

In the following examples, the listed commands correspond to the EGM standard library.

(See the documents "EG_EGM_CL_xxx_yy" of ERCOGENER)

## 5.1  Specific recommendations for the use of the modem in vehicles

⚠️ The power supply connector of the modem GenPro 354e 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 33 : Recommended connection on the battery of a truck**
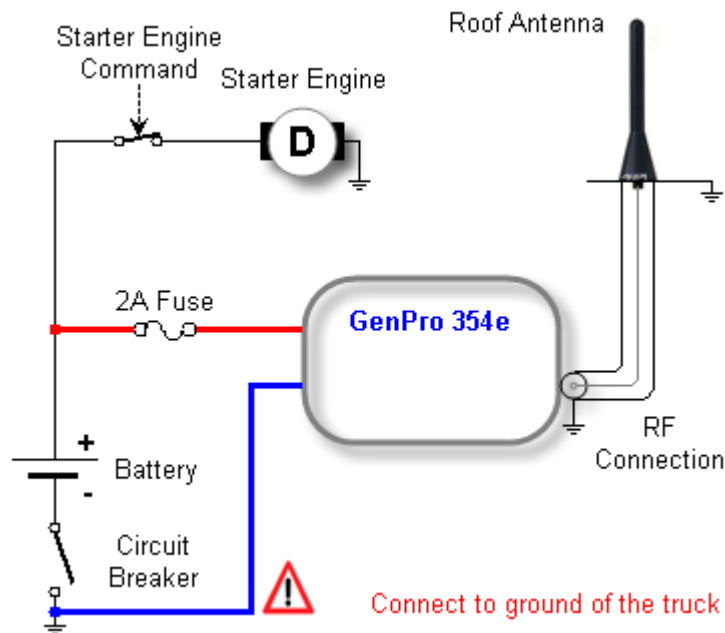


The scheme above shows a recommended power connection where the connection of the modem ground is not directly connected to the battery, but connected after the circuit breaker (on the ground of the truck or in the fuse box).

⚠️ 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.

Dct_427_02

## 5.2 Turning the modem OFF

It is strongly advised to un-register from the network with the command **AT+COPS=2**

⚠️

When the battery is present, a mechanism allows to stop completely the application if the external power supply is unplugged, and also to prepare the modem for storage or transport, 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 has 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 V4.09 GL54 UA Gener Ublox (HWF1 rev D/E)
GSM voltage = 4330 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.

Dct_427_02

## 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 34 : Mounting the modem**
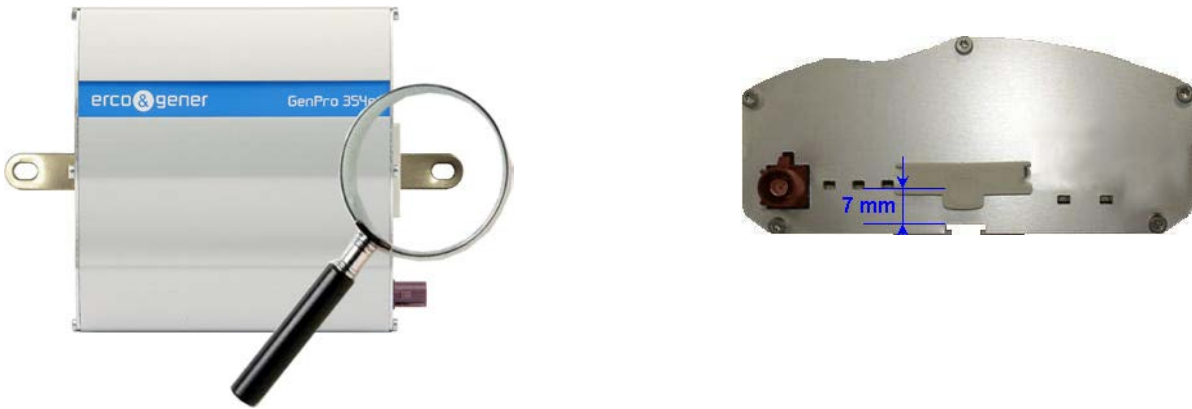


- Must be fixed on a flat surface
- Max. height of the screw head: 7 mm

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 35 : Installation of the modem**



Direction of insertion of the SIM card

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

Dct_427_02

## 5.4    Use of the modem

- Install the SIM card.

- Connect the GSM antenna to the FAKRA-D connector (burgundy / purple).

- For the connection to the DTE, connect the V24 link via the 9-pin Sub D cable.

- 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 ....................: Sans,
  ▪ Stop Bits ................: 1,
  ▪ Flow control ...........: none.

### 5.4.1    Checking the communication with the modem

#### 5.4.1.1  Without application

The GenPro 354e 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 V4.09 GL54 UA Gener Ublox (HWF1 rev D/E)
GSM voltage = 4325 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 Standard Library

The GenPro 354e contains the standard library.

Example of display when the standard library is present inside the equipment

```
************************************************************
00:00:00  flash_start_flash: new Flash handle - WAIT
00:00:00  EGM_INIT_SOFTWARE_RESET
00:00:00  Ext2: EGM_FCM_EVENT_FLOW_OPENNED
00:00:00  READY
00:00:00  Gprs_Call_State : GPRS_CALL_INIT
00:00:00  UTC Time field not valid
00:00:00  Date field not valid
00:00:01  Supply status: External supply connected
00:00:02  Analog input 3 State H
00:00:02  sim inserted
00:00:02  PIN code not required
00:00:02  GSM Ready
00:00:03  +CCLK: "12/07/30,09:29:45+00"
00:00:03  Got GSM clock info
00:00:03   *** IMEI: 358696048201787, product: "GenPro354e"
EasePro V300b2_EGM403b24 - GenPro354e - LEON-G100-06S-00 - Thu Jun 21 09:18:01
2012
00:00:03  PHB Ready
00:00:03  sim ready
00:00:07  SMS Ready
00:00:09  Network ready
00:00:09  network_gprs_state: 1
00:00:23  CREG OK : 1
```

Send the command AT+EGM3

The modem returns the version of the library

```
+EGM3: genapi V4.04, Date: Thu Nov 15 13:57:42    2012
```

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_EGM_CL_xxx_yy" of ERCOGENER.

### 5.4.1.3 The application ERCOGENER EasePro_Vx

The GenPro 354e contains the application EasePro_Vx.

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

```
EasePro V300b2_EGM403b24 - GenPro354e - LEON-G100-06S-00 - Thu Jun 21 09:18:01
2012
```

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

The GenPro 354e 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 354e according to your own characteristics.

## 5.5   Checking the quality of the GSM reception signal

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 is in 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 52 : 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 |

The GSM modem works normally with a minimum **<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 the AT commands, see the document "EG_EGM_CL_xxx_yy" of ERCOGENER.

## 5.6  Verification of the PIN code

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 53 : 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 the modem registration on GSM network

1. Make sure that a valid SIM card is inserted in the SIM card reader of the modem.

2. Use a communication 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 will be of the following format: **+CREG** *: <mode>, <stat>* with:

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

   *<Stat>* = registration status.

3. Check the registration status according to the value returned in the table below.

**Table 54 : Verification of modem registration on GSM network**

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

If the modem is not registered: check the connection between the modem and the antenna or the reception level of the signal (cf. paragraph 5.5 Checking the quality of the GSM reception signal ).

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Dct_427_02

## 5.8 Verification of the modem registration on GPRS network

1. Make sure that a valid SIM card is inserted in the SIM card reader of the modem.

2. With a communication software like Hyperterminal, enter the following AT commands:

   a. ***AT+CPIN="xxxx"*** to enter the PIN code. The user has only 3 attempts to enter the PIN code. After the third attempt, only a second code (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 will be of the following format: +***CGREG** : <**mode**>, <**stat**>* with:

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

   *<**Stat**>* = registration status.

3. Check the registration status according to the value returned in the table below.

**Table 55 : Verification of the 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.

## 5.9 Recommended accessories

The accessories recommended by ERCOGENER for the modem GenPro 354e are described on our website in the section Products/Accessories. For more information, please contact our sales department.

# 6 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-pins Micro-FIT cable (Power supply)

(ERCOGENER reference: 4402304215)

Fuse F2A/32V
(Mini BLADE)

3mm tinned
stripped wire
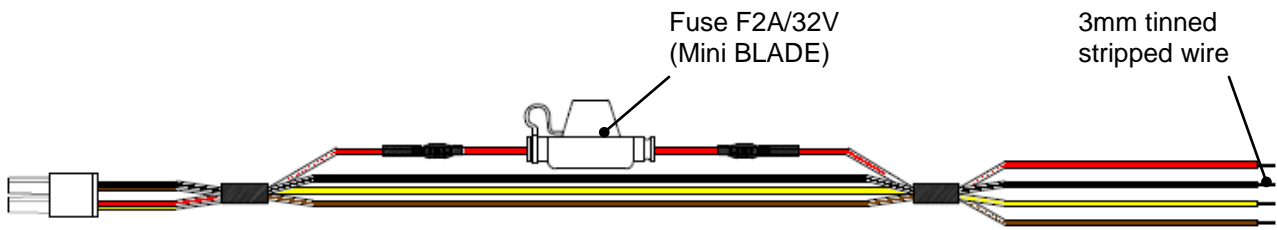
**Figure 36 : 4-wires Micro-FIT cable**
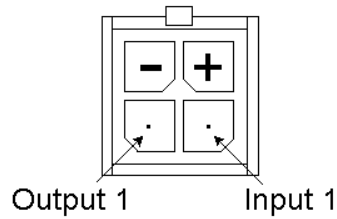
Output 1          Input 1

**Table 56 : Characteristics of power supply cable**

| Component | Characteristics |
|---|---|
| 4-pin connector | |
| Cable | Length ≈ 1.5m |
| Wire | Section : 0.75 mm² |
| Fuse | FK2A - 32V |

| Signal | Color |
|---|---|
| +$V_{DC}$ | Red |
| GND | Black |
| INPUT 1 (E1) | Yellow |
| OUTPUT 1 (S1) | Brown |

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

**Figure 37 : Fuse Mini Blade**

11.9max.          3.8

16.2          1.7max.

7.6

2.8          5.2          0.83          2.4

3

Dct_427_02
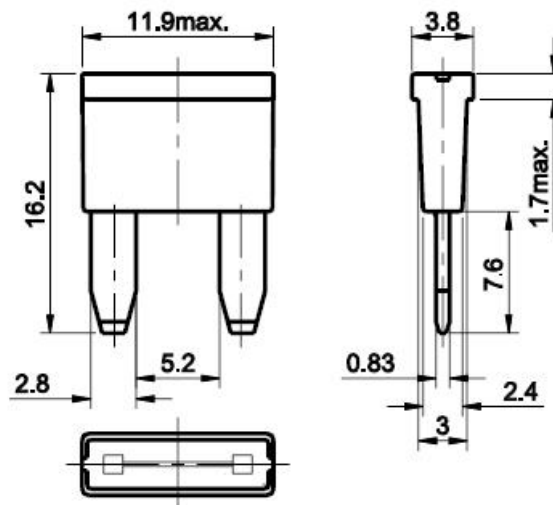
# ANNEX 2 - 14-pins Micro-FIT cable (Inputs/Outputs)

(ERCOGENER reference: 4402314215)

3mm tinned stripped wire
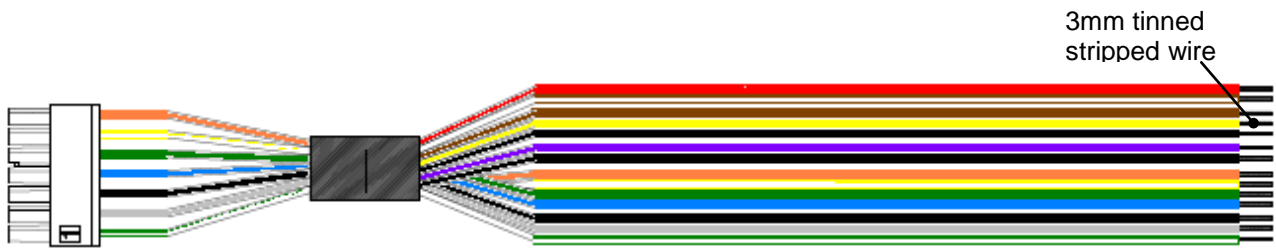
**Figure 38 : 14-pins Micro-FIT cable (Inputs/Outputs)**

Side view of cable

8 ... 14

1 ... 7
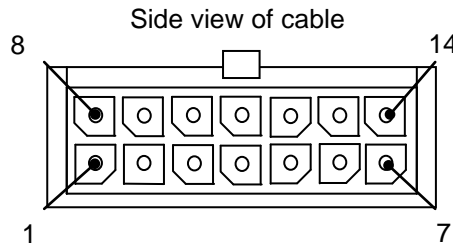
**Table 57 : Characteristics of 14-wires inputs/outputs cable**

| Component | Characteristics |
|---|---|
| 14-pin connector | |
| Cable | Length ≈ 1.5m |
| Wire | Section : 0.5 mm² |

**Table 58 : Wiring of the 14-wire inputs/outputs cable**

| Pin N° | Signal | Color |
|---|---|---|
| 1 | ONE_WIRE | White/Green |
| 2 | ANA2 | Grey |
| 3 | E5- | Black |
| 4 | E5+ | Blue |
| 5 | E4 | Green |
| 6 | S3 | White/Yellow |
| 7 | $V_{BAT}$ | Orange |
| 8 | GND | Black |
| 9 | ANA1 | Violet |
| 10 | E3- | Black |
| 11 | E3+ | Yellow |
| 12 | E2 | Brown |
| 13 | S2 | White/Brown |
| 14 | BUZZER | Red |

Dct_427_02

## ANNEX 3 – 16-pins Micro-FIT cable (14 wires, Serial links)

(ERCOGENER reference: 4404314215)

3mm tinned
stripped wire
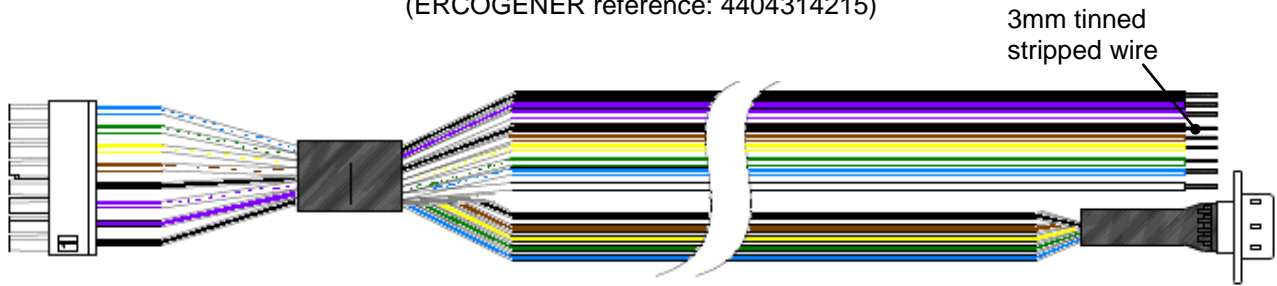
**Figure 39 : 14-pins Micro-FIT cable (Serial links)**

Side view of cable

9         16

1         8
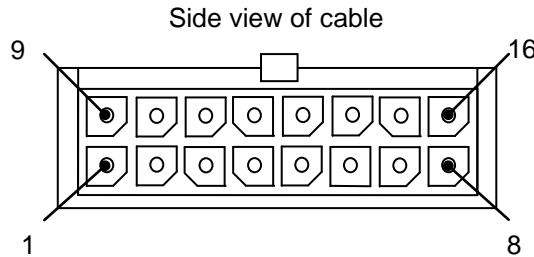
**Table 59 : Characteristics of 14-wires serial links cable**

| Component | Characteristics |
|---|---|
| 16-pin connector | |
| Cable | Length ≈ 1.5m |
| Wire | Section : 0.5 mm² |
| Sub D 9 pin female | |

**Table 60 : Wiring of 14-wire serial links cable**

| Pin N° | Signal | Color | Sub D 9 pin |
|---|---|---|---|
| 1 | GND | Black | --- |
| 2 | TX_2 or CANH | Violet | --- |
| 3 | RX_2 or CANL | White/Violet | --- |
| 4 | GND | Black | --- |
| 5 | CTS_1 | White/Brown | --- |
| 6 | RTS_1 | White/Yellow | --- |
| 7 | TX_1 | White/Green | --- |
| 8 | RX_1 | White/Blue | --- |
| 9 | POWER_OUT | White | --- |
| 10 | RESET | --- | --- |
| 11 | BOOT | --- | --- |
| 12 | GND | Black | 5 |
| 13 | CTS_0 | Brown | 8 |
| 14 | RTS_0 | Yellow | 7 |
| 15 | TX_0 | Green | 3 |
| 16 | RX_0 | Blue | 2 |
| --- | --- | --- | 9 |
| --- | --- | --- | 6 |
| --- | --- | --- | 4 |
| --- | --- | --- | 1 |

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Dct_427_02

# ANNEX 4 – 16-pins Micro-FIT cable (16 wires, Serial links, Boot and Reset)

(ERCOGENER reference: 4402316215)

As an option, a 16-wire cable can be provided. It is the same as the previous one but provides also the "Boot" and "Reset" inputs. These cables have a 30 cm length.

This cable is already included with the EGM development kits.

**Figure 40 : 16-wire Micro-FIT cable (Serial links, Boot and Reset)**
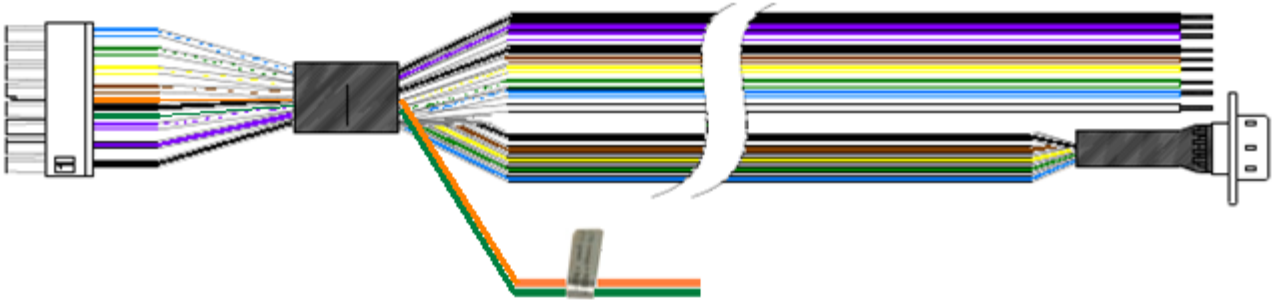


**Table 61 : Characteristics of the 16-pins serial links cable (Boot + Reset)**

| Component | Characteristics |
|---|---|
| 16-pin connector | |
| Cable | Length ≈ 0.3m |
| Wire | Section : 0.5 mm² |

**Table 62 : Wiring of the 16-wires serial links cable (Boot + Reset)**

| Pin N° | Signal | Color | Sub D 9 pin |
|---|---|---|---|
| 10 | RESET | Orange | --- |
| 11 | BOOT | Green | --- |

Dct_427_02

# ANNEX 5 - 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 |
| APN | Access Point Name |
| ASCII | American Standard Code for Information Interchange |
| AT | AT Command Interpreter Software Subsystem, or attention |
| BER | Bit Error Rate |
| BL | Black List |
| BSD | Berkley Standard Distribution |
| BTS | Base Transceiver Station |
| CB | Cell Broadcast |
| CBM | Cell Broadcast Message |
| 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 |
| CSD | Circuit-Switched Data |
| CTS | Clear To Send |
| CUG | Closed User Group |
| DA | Destination Address |
| 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 |
| DRX | Discontinuous Reception |
| DSR | Data Set Ready |
| DTE | Data Terminal Equipment |
| DTMF | Dual Tone Multi-Frequency |
| DTR | Data Terminal Ready |
| 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 |

Dct_427_02

| | |
|---|---|
| E-GSM | Extended GSM |
| EMC | ElectroMagnetic Compatibility |
| EMI | ElectroMagnetic Interference |
| ESD | ElectroStatic Discharges |
| ETSI | European Telecommunications Standards Institute |
| E-UTRAN | Evolved UTRAN |
| 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 |
| 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 |
| HPLMN | Home PLMN |
| 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 |
| 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 |
| ISP | Internet Service Provider |
| IVS | In-Vehicle System (eCall related) |
| 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 |
| MCC | Mobile Country Code |
| ME | Mobile Equipment |
| MIC | MICrophone |

Dct_427_02

| | |
|---|---|
| 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 |
| 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 |
| NITZ | Network Identity and Time Zone |
| NOM | NOMinal |
| 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 |
| P-CID | Physical Cell Id |
| PCL | Power Control Level |
| PCN | Personal Communication Network |
| PCN / IN | Product Change Notification / Information Note |
| 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 |
| PSAP | Public Safety Answering Point (eCall related) |
| PSD | Packet-Switched Data |
| PU | Pull-Up |
| PUK | Personal Unblocking Key |
| QoS | Quality of Service |
| 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 |
| RTC | Real Time Clock |
| RTP | Real-time Transport Protocol |
| RTS | Request To Send |
| Rx | Receiver |
| SAP | SIM Access Profile |
| SC | Service Centre |
| SI | SIM Application Part Software Subsystem |

Dct_427_02

| | |
|---|---|
| SIM | Subscriber Identity Module |
| SIP | Session Initiation Protocol |
| SMA | SubMiniature version A RF connector |
| SMB | SubMiniature version B RF connector |
| 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 RAM |
| 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 |
| 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 |

Dct_427_02

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 354e     Family :     1040R
Type : Modem

**Complies with :**
- R&TTE 1999/5/EC Directive,
- EN301489-1:V1.8.1
- EN301489-7:V1.3.1
- Compliant with the requirements of the ECE R10 rev4
- EN 301 511 v9.0.2
- EN 60950-1:2006 + A11:2009
- EN50385 :2002
- ROHS Compliant : Directive 2011/65/EU.
- REACH N°1907/2006 SVHC163

$$C\epsilon$$

The corresponding markings appear under the appliance.

Saumur, October, 20th 2015

Eric GUÉNEUGUÈS
Quality Manager

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