



Link

User and installation guide

GC315^{Link} - GC400^{Link}
GC400^{Mains+Link}



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1 Preface

This document is valid from the software version 01.43 (GC315^{Link}) and 2.05 (GC400^{Link}) controllers.

The new GC315^{Link} e GC400^{Link} controllers are equipped with a LTE Cat M1 and NB-IoT Multimode module and quad-band 2G fallback (GPRS/EDGE) with multi-regional coverage.

They embed also a Global Navigation Satellite System (GNSS) receiver, using GPS, GLONASS, GALILEO or BeiDou system, to provide and reliable positioning information with a high accuracy and performance.

The flexibility extends further with dynamic system selection as Cat M1, NB-IoT, and 2G in single mode or as a preferred connection that does not require a module reboot to switch between modes. They provide a solution for applications that require broad geographic coverage, even in areas where LTE Cat M1 and NB-IoT are not widely available yet.

New LINK devices deployed in the field today, can then be activated on existing 2G networks and still leverage the benefits of LTE Cat M1 and NB-IoT technology once it becomes available.


The system can be used for different purposes:

- For using Si.Mo.Ne. SICES system
- To remotely connect to the device via internet, i.e. using the SicesSupervisor program
- To enter the programming of the remote parameter via internet
- To receive SMS* messages in case of alarms or information about the plant status.
- To send commands to the plant through SMS* messages
- To possibly update the FW by remote by using SICES program SicesSupervisor
- To receive status or signalling message via email using the Si.Mo.Ne. platform.

It 'also present a system for detecting displacements composed of an accelerometer and a gyroscope.

If the generator is improperly moved the device will send a series of warning messages and coordinates acquired from the navigation system (GNSS) to the Si.Mo.Ne system so you can track the route on a map.

The devices can also be equipped, in option, with internal lithium battery, which guarantees several operation hours to the SMS* sending system, and to the position and status data of Si.Mo.Ne. system even in case the device main supply is removed. The battery is automatically recharged and does not need to be periodically replaced.

 **Note:** Module is able to make and receive SMS*, make GPRS/EDGE/LTE traffic but is unable to make and receive voice calls.


***SMS:** the networks on which cellular narrowband is deployed, do not always SMS services over LTE NB-IoT or LTE Cat M1. Several operators have yet not deployed the SMS functionality for these two new technologies. Contact your network provider for details.

2 Operating condition

The device must be installed and operated only on the frontal door of a closed electric panel that cannot be open without proper tools. The ambiental operating temperature is -20°C to +50°C.

NOTE: the temperature inside the panel can rise up to 60°C.

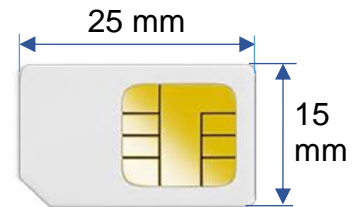
3 Initial procedure

 **WARNING!:** Each operation of insertion/extraction of the SIM must be performed when the device is switched off, that is with no external supply and with the selector of the internal battery in NO BATTERY position (only with optional internal battery present). The access lid must be removed solely in absence of the genset and main/bus voltage.

4 The SIM Card

The device necessarily requires a SIM for its operation.

If you wish to use the packet data functions (communicate with the device through TCP/IP, use of “**Si.Mo.Ne**” system etc.) a SIM with an internet connection active plan is required. The SIM card in the device determines whether the device supports **GSM/GPRS/EDGE**, **LTE Cat M1** and **NB-IoT** or all these connections.



Make sure that your SIM supports the packet data network type you want to use.

- i.e. if you want to use the module in **LTE Cat M1** network you have to confirm with the operator that the particular SIM card supports **LTE Cat M1** network.

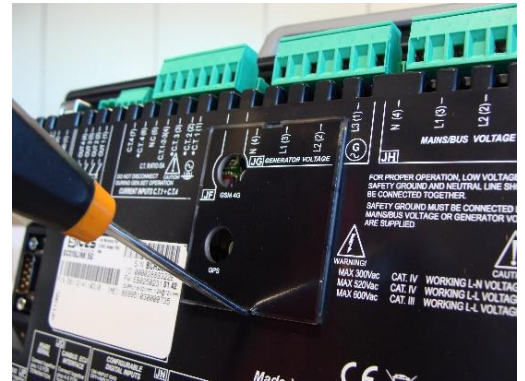
SIM Type: standard SIM Card type **Mini-SIM** (or **PLUG-IN**).

5 SIM Holder

i INFORMATION: Make sure SIM card does not require PIN code. If it does, it is possible to disable it in any common network unlocked mobile telephone.

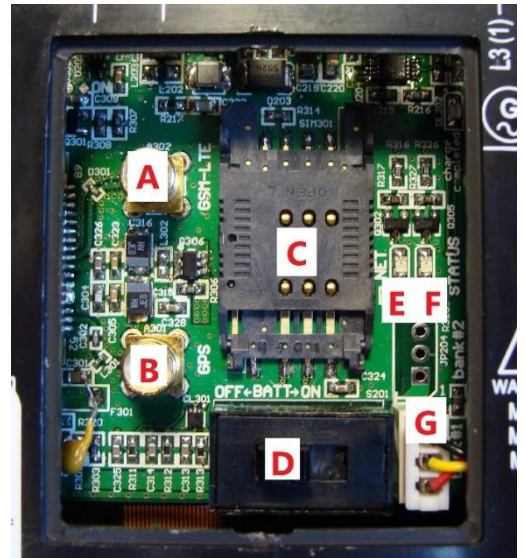
Ensure the device is powered off, then remove the back cover from the device.

Remove the access cover that encloses the SIM holder, the antenna connectors and the battery switch. Insert a small screwdriver in the little retention hooks and make a slight leverage to remove the panel.



After opening the cover, you will see the following parts his picture shows the inner part;

- A. SMA FEMALE connector for GSM - LTE antenna.
- B. SMA FEMALE connector for GNSS antenna.
- C. SIMcard holder slide.
- D. Switch for internal optional battery (inserted/not inserted).
- E. Yellow LED: indicator for Network Status (NET).
- F. Green LED: indicator for Module power on/off status (STATUS).
- G. Internal Battery connector



5.1 SIM insertion

- 1) Pull back the upper cover, it clicks as it unlocks. (fig.1).
- 2) Open the SIM card holder, it hinges towards you (fig.2).
- 3) Slide in the SIM card, ensuring the “edge cutout” is as shown (fig.3).
- 4) Close the cover, press it down and slide it as shown until it clicks into place (fig.4).
- 5) Insert the antenna connectors into the holes of the access cover and gently screw them to the relevant receptacles (fig.5).
- 6) Move the switch to the right in “BATTERY ON” position (see fig. 6 and notes below).

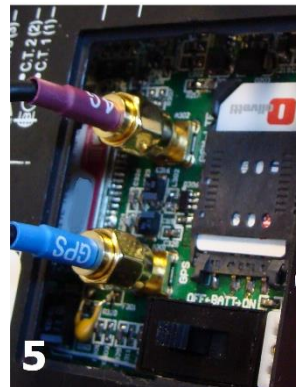


- 7) Close the access cover by pressing in the vicinity of the latches (fig.7).

It is now possible supplying auxiliary circuits and MAINS/GENERATOR voltages

i **INFORMATION :** Leave the switch on BATTERY OFF when the device does not have the main power supply (JD) and should not be used for a long time: this allows you not to unnecessarily discharge the internal battery.

! **WARNING:** In the internal battery operating state and in the absence of the main power supply (JD), the device is not able to manage the operation of the genset. It must be left in OFF/RESET mode.

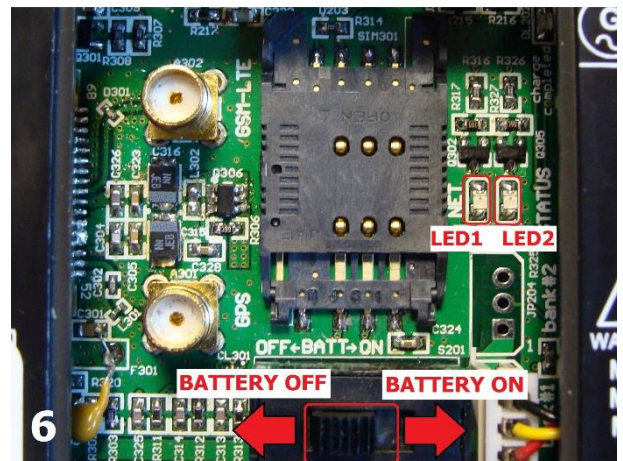


5.2 LED indicator

Controller LINK have two LEDs indicating modem's operating states (Fig.6).

LED light work's behaviour as below:

- **LED1 (Net):** yellow LED flashes with different modalities according to the connection status with the mobile network.
 - 64ms ON and 800ms OFF:** modem not registered to the mobile network.
 - 64ms ON and 3000ms OFF:** modem registered to the mobile network.
 - 64ms ON and 300ms OFF:** modem is exchanging data on the mobile network.
 - **LED2 (Status):** green LED indicates whether the module is on and ready to use.
- Both OFF:** the modem is off or in Power Save Mode.



5.3 Lithium Ion internal Battery

The **GC315Link** e **GC400Link** controllers can be supplied optionally with a Lithium Ion internal rechargeable battery, which is able to ensure only its data transmission and localization for some hours in case of lack of the main supply. The recharge happens automatically by supplying the device; the full charge requires approximately 12 hours, after which the battery is in permanent buffer charge.

The device operation time depends on several factors, such as the environment temperature, the data sending frequency and the mobile network signal intensity. The duration of the battery can be highly increase by activating one of the two types of energy saving. The battery is activated/deactivated through the switch **D** (fig.6).. The internal battery can be recharged only when the device temperature is between 0°C and +50°C. If the battery deactivates the recharge cycle, the monitoring is carried out anyway. Leave the switch on **BATTERY OFF** when the device does not have the main power supply and should not be used for a long time: this allows you not to unnecessarily discharge the internal battery.

6 Communications

6.1 SMS

The **GC315Link** e **GC400Link** controllers can send alerts directly to a mobile phone via SMS (mobile originated SMS); to do so, the device can need to be programmed to send SMS to a specific phone. For the SMS you can receive and for the commands you can send see the document **EAAS0341xx Serial Communication and SMS protocol**.

The networks on which cellular narrowband is deployed, support SMS services over GSM network but do not always over **LTE NB-IoT** or **LTE Cat M1**. Several operators have yet not deployed the SMS functionality for Narrowband. Contact your network provider for details.

6.2 Mobile Network Configuration.

To use the communication on data network mobile it is necessary to configure some parameters.

If you wish to use the GPRS/LTE functions (communicate with the device through TCP/IP, use of “**Si.Mo.Ne**” system etc.) a SIM with an internet connection active plan is required (as the SIM used in the Smartphones). For the data exchange through TCP/IP protocol, the IP address is assigned to the controller directly from the mobile network and the controller will then be contactable using this IP address. It is not possible, instead, to join the controller using the name configured with the parameter **P.0456**. Page S.04 (GC315x) or S.05 (GC400x) shows the IP address given to the controller by the data mobile network. It is also possible to interrogate the controller via **SMS*** to know the current IP address.

If you are using “**Si.Mo.Ne.**” system, the controller periodically sends messages to “**Si.Mo.Ne.**” server: the server thus repeatedly memorizes the IP address given to the controller by the mobile data network. If you are using SicesSupervisor 3.0, it is possible to connect to the plant in any moment by setting the section dedicated to the connection between the “**Si.Mo.Ne.**” server.

Some mobile companies use a NAT (“Network Translation Address”) system also for SIM cards, therefore the IP address received by “Si.Mo.Ne” server is not usable for the connection with the plant. It is necessary to explicitly ask the network operator not to use the NAT on the SIM.

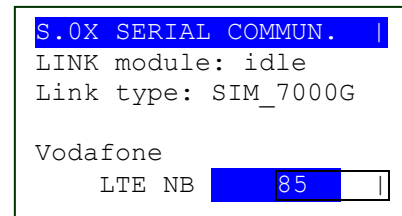
These parameters can be modified on the controller through the relative programming menu, with the BoardPrg3xx and also through the web service in the appropriate configuration page of the device:

Parameter	Name	Default
P.0570	Mobile network mode	1-GSM/GPRS
P.0571	LTE category	2-CAT M and NB-IoT
P.0551	APN primary (access Point Name)	
P.0552	APN primary username (optional)	
P.0553	APN primary password (optional)	
P.0554	APN primary (access Point Name)	
P.0555	APN primary username (optional)	
P.0556	APN primary password (optional)	
P.0557	Connection mode	1-Stay connected
P.0558	Modbus/TCP enable	0-No
P.0559	Modbus/TCP port	502

- **P.0570** parameter configures the preferred Network Mode to:
 - **0 (“Automatic”)**: automatic connection between GSM/GPRS/EDGE or LTE network. In this mode, the module will do the network searching with following priority for the first time: CAT-M > NB-IOT > GSM/GPRS/EDGE.
Search time depends on signal strength and active mobile networks detect.
 - **1 (“GSM/GPRS”)**: connection to the GSM/GPRS/EDGE network only
 - **2 (“LTE”)**: connection to the LTE network only (CAT-M or NB-IoT network)
- **P.0571** parameter configures the preferred LTE network mode to:
 - **0 (“CAT-M”)**: connection to the CAT-M network only.
 - **1 (“NB-IoT”)**: connection to the NB-IoT network only.
 - **2 (“CAT-M and NB-IoT”)**: automatic connection between CAT-M or NB-IoT network.
- **P.0551** parameter configures the APN (Access Point Name) of the mobile operator used. Some operators require access credentials (username e password) to access the APN: in this case use the parameters **P.0552** and **P.0553** to configure username and password. If access credentials are not required (standard), leave **P.0552** and **P.0553** empty.
- **P.0557** parameter configures how the controller has to connect to the data mobile network:
 - **0 (“Disconnect every time”)**. In this mode the controller connects to the data mobile network every time it has to send data to “**Si.Mo.Ne.**” server and disconnects as soon as it has sent the data. If this mode is used, the data exchange with the Modbus/TCP protocol with the controller is not possible.
 - **1 (“Stay connected”)**. This mode is suggested: the controller connects to the data mobile network as soon as possible and remains connected until it is possible. In this mode the data exchange with the Modbus/TCP protocol with the controller is possible (BoardPrg3, SicesSupervisor3).
- **P.0558** parameter activate/deactivate the data exchange with the protocol Modbus/TCP on the mobile network: when it is enabled, the parameter **P.0559** configures the TCP port on which the controller is able to communicate.

Page S.03 (**GC315**^{Link}) or S.04 (**GC400**^{Link}) shows:

- the active connection type GSM, EDGE, LTE NB-IoT or LTE CAT-M1.
- the Mobile Network Operator (MNO) currently connected (Vodafone, TIM....). If the SIM card does not return the full name the Mobile Country Code (MCC) + Mobile Network Code (MNC) is shown.
- the mobile network signal intensity.



6.3 GNSS Receiver

To use the Global Navigation Satellite System (**GNSS**) internal receiver, using **GPS**, **GLONASS**, **GALILEO** or **BeiDou** system, the internal module has to be enabled with the parameter **P.0580** (GPS module enable). Connect also the GNSS antenna. The purpose of this module is to detect the controller position (latitude/longitude). Once detected, the position coordinates can be asked via **SMS*** and it can be used to pinpoint the genset on a map (many business sites allow this operation).

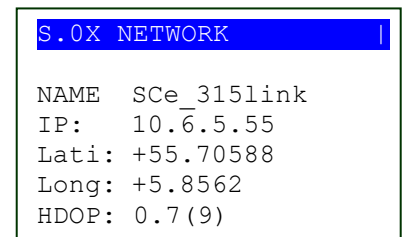
The position becomes most important in the use with “**Si.Mo.Ne.**” system. Directly from the WEB interface it is possible to display the position of a genset on a map, and it is also possible to display the tracking of a rented genset in a period of time: both these functions are useful for rented gensets, but can also be used as antitheft system. If you use the **GNSS** module, it is possible to configure the controller to send messages to “**Si.Mo.Ne.**” server if any movement is detected:

- **P.0583**: configures the minimum movement (in meters), beyond which the controller sends a message to “**Si.Mo.Ne.**” server.
- **P.0584**: configures a minimum interval for the issue of position messages to “**Si.Mo.Ne.**” server (at most the controller sends a message in the configured interval).

The controller displays the **GNSS** coordinates on page S.04 (**GC315**^{Link}) or S.05 (**GC400**^{Link}).

The coordinates flash if the **GNSS** module is not able in that moment to determine the position (therefore the last position detected is shown). It also shows the **HDOP** value: it is a precision indicator (the lower it is, the sharper the position). Finally, it the number of used satellites in every instant.

If there is no need of automatic localization or Tracking, it is possible to disable the module and it is still possible to manually set the latitude (**P.0581**) and longitude (**P.0582**) of the generator set.



6.4 GSM/LTE and GNSS antenna

GSM/LTE antenna (700-960/1710-2655 MHz) must be connected to the LTE SMA plug on the Link device; use only omnidirectional antennas. The maximum gain allowed to antenna and its cable is 3 dB. The impedance of the antenna must be 50 ohm. It is not allowed to connect the antenna directly on the plug but a minimum of 3 m of proper coaxial cable is required.

GPS antenna or GPS+GLONASS antenna must be connected to the GNSS SMA plug on the link device. Use only active antennas with impedance of 50 ohm. The plug of the Link device provides automatically the power supply required (Max 35mA@3,3Vdc).

It is possible to use a combined antenna GSM/LTE+GPS/GLONASS or GSM/LTE+GPS antennas. Both integrating GPS/GLONASS and GSM/LTE antennas in just one body; they can be provided on request together with the Link devices.

Frequency Range	Bands used*	Max Transmit Power EIRP
824~849 MHz	GSM850	26,31dBm
1710~1785 MHz	DCS1800	25,91dBm
1920~1980 Mhz	LTE B1	22,30dBm
1710~1785 Mhz	LTE B3	22,81dBm
880~915 Mhz	LTE B8	22,54dBm
832~862 Mhz	LTE B20	22,40dBm
703~748 Mhz	LTE B28	23,87dBm
1574.4~1576.44 MHz	GPS L1 (RX)	-
1598~1606 MHz	GLONASS (RX)	-

* Bands used for RED certification



WARNING: A separation distance of at least 30 cm (11.81 inches) between the GSM/LTE antenna and the body of the user and other persons must be maintained at all times.



WARNING: The maximum gain allowed to antenna and its cable is 3 dB. It is not allowed to connect the antenna directly on the plug but a minimum of 3 m of proper coaxial cable is required.

7 “Si.Mo.Ne.” system

“Si.Mo.Ne.” system is a centralized system of data collection: such data are then consultable through a WEB interface. Controllers can communicate with “Si.Mo.Ne.” system both through Ethernet port and through GPRS/LTE modem. These parameters can be modified on the controller through the relative programming menu, with the BoardPrg3xx and through the web service in the appropriate configuration page of the device:

Parameter	Name	Default
P.0530	Abilitation to connection and issue “Si.Mo.Ne.” packet	0-No
P.0531	IP address or “Si.Mo.Ne.” primary server name	
P.0532	“Si.Mo.Ne.” primary server port	0
P.0533	IP address or “Si.Mo.Ne.” secondary server name	
P.0534	Si.Mo.Ne. secondary server port	0
P.0535	Time for sending data with engine running	900
P.0536	Time for sending data with engine off	3600
P.0537	Time for sending “Keep Alive Network” packet	0
P.0539	Communication events	0000
P.0542	Type of genset voltage	0-Phase to phase

- **P.0530** parameter set to value “1-Yes” enables the data issue towards “Si.Mo.Ne.” server.
- **P.0531** parameter configures the IP address or the name of “Si.Mo.Ne.” primary server, while parameter **P.0533** the one of the secondary server. It is possible to set the IP address in text format or the server name in full (i.e. “simone.sices.eu”) which will be converted by the controller into IP address using the DNS server (suitably configured or automatic on GPRS). It is possible to disable the connection towards the primary/secondary server setting the empty string.
- **P.0532** parameter configures “Si.Mo.Ne.” primary server port, while **P.0534** parameter that of the secondary server. By setting the port address to zero the connection to the primary/secondary server is disabled. The default port is 53052 (check with SICES).
- **P.0535** parameter configures the interval of time to send periodic data to the server with engine is running.
- **P.0536** parameter configures the interval of time to send periodic data to the server with the engine is off.
- **P.0537** parameter configures the interval of time in minutes to send the special packet “Keep Alive Network”, used to indicate a minimum of activity to the server.
- **P.0539** parameter configures in which cases the device has to spontaneously send the communication events to the server:

Bit	Value (hex) P.0539	Description
0	0001	For alarms and deactivations
1	0002	For warning
2	0004	For engine started
3	0008	For engine stopped
4	0010	For mains mailur
5	0020	For mains presence
6	0040	For board operation mode
14	4000	For energy saving
16	8000	For diagnostic

```
S.20 SIMONE
Name: GC315x_001
Serv: 192.168.1.140
Status: ok
      15/09 12.10.55
      3550 sec
```

- **P.0542** parameter allows to choose if to send to server the connected voltage or phase measures. The parameters used and the status information for the communication with “Si.Mo.Ne.” are displayed on page S.20 (GC315x) or S06 (GC400x). In details:
- **Name:** Identifies the name of the plant (which would normally correspond to the one assigned on “Si.Mo.Ne.” to allow easy identification of the device in the “Si.Mo.Ne.” web page).
- **Server:** identifies the IP address of the server to which the data are sent. In case of connection on GPRS/LTE network, the server name is displayed
- **Status:** indicates the status, the date and the time of the last connection and the time left before the next data issue. The status can be:

Status	Description
Stand-by	No connection
In process	Connection to server in process
Ok	Connection to server correctly performed
Error	Connection to server failed
No answer	No answer from server (that is device not registered on “Si.Mo.Ne.”)

Keeping ENTER+ESC keys pressed for at least 5 sec the data issue is forced.

The writing “DATA ISSUED” is displayed and via web “REQUIRED DATA (AUX)” event appears. For details about communication with “Si.Mo.Ne.” server. see doc. **EAAM0410xx**.

RED Declaration of Conformity

Hereby, **SICES SRL** declares that the radio equipment type **GC400^{Link}**, **GC400^{Mains Link}**, **GC315^{Link}** is in compliance with **Directive 2014/53/UE**.

The full text of the EU declaration of conformity is available at the following internet address:
<http://www.sices.eu/download/declarations-of-conformity#>



The technical documentation of the device is available in the “Download Area” of our website www.sices.eu

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