

# CELLULAR INTEGRATION FOR FRONIUS INVERTER APPLICATION GUIDE

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## **1 INTRODUCTION**

This document contains an overview of the application options for a cellular gateway in combination with Fronius inverters as well as a summary of the hardware requirements and details of the expected data volume. Fronius accepts no liability for the actual data volume.

In the following, Fronius describes the options for connecting to a cellular gateway. Fronius is not liable for costs which may arise from data transmission by the user via the mobile networks. Furthermore, Fronius is not responsible for the security of the data transmission via the mobile networks and is not liable for any damages which may occur therefrom.

### 1.1 Validity

This white paper covers the following inverter generations:

- / GEN24 inverter
- / Tauro inverter
- / SnapINverter generation (web server)
- / Symo Hybrid
- / Datamanager Box

## **2 HARDWARE**

The gateway can be powered by the inverter (Primo GEN24, Symo GEN24 and Tauro) if it meets the following criteria:

- / Supply voltage: 12 V
- / Power consumption <= 6 W

An external power supply (Fronius power supply unit for Datcom and Datamanager Box) is recommended for devices with a Datamanager Card. If additional loads are connected (signal lamps, relays, etc.), their consumption must be taken into account in the performance measurement.

The communication between the gateway and inverter takes place via the LAN interface (Ethernet). Attention: no communication via USB!

To guarantee reception, the antenna needs to be positioned outside the inverter. Depending on the gateway, a corresponding antenna cable extension may be necessary. It is important that there is a distance of at least 30 cm between the antenna and the metal housings.

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Fronius has tested a range of gateways (the Teltonika TRB 140 gateway is used in the following as an example of a gateway that has passed all tests and is recommended by Fronius):

- / Ethernet interface
- / LTE Cat 4 with speeds of up to 150 Mbps
- / 9-30 VDC voltage input
- / Open VPN and IPsec
- / Embedded firewall
- / Mini SIM (2FF)
- / Management: RMS, FORA, SSH, CLI, SMS (status/configuration)
- / Operating temperature of -40 °C to 75 °C
- / Size (L x W x H): 70 x 60 x 18 mm
- / Weight: approx. 134 grams

The gateway is powered via the IO connector on the inverter at terminals "V+" and "GND". Communication is established via a CAT5 cable between the "Ethernet port" gateway and "Ethernet port" inverter ("LAN 1"). The figure below depicts the cabling of a gateway with a GEN24 inverter.



#### IMPORTANT!

If the total output (6 W) is exceeded, the inverter switches off the entire external power supply.



(1) Power limitation

The gateway can be installed both within the inverter's connection area and outside of it (the specification of the gateway manufacturer's must be taken into account!)

The installation process is similar when a gateway is being used with a SnaplNverter – the LAN port of the inverter/Datamanager (LAN) is connected to the Ethernet port of the gateway. The power supply is provided via the terminals (+ / -). Further details can be found in the Fronius Datamanager 2.0 operating manuals.

## **3 SOFTWARE / CONFIGURATION**

The configuration of the gateway at the inverter is identical to the network set-up of a "conventional" LAN connection::

### 3.1 For the GEN24/Tauro inverter

 Open the access point of the inverter by actuating the sensor → right LED flashes blue



- 2. Connect to the access point
- 3. Open the browser and call up the user interface of the inverter by entering the IP 192.168.250.181
- 4. In the Communication tab of the user interface of the inverter -> go to the tab network

GEN24		GEN24
Device Configuration	>	← Communication
() Energy Management	>	Network
🗘 System	>	Modbus
Communication	>	Remote control
★ Safety and Grid Regulations	>	
Overview		

- 5. Click on LAN and apply the settings
- 6. Complete the configuration by clicking "Connect"

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	IP Address 192.168.1.180
	Subnet Mask
	255.255.255.0
	DNS 192.168.1.1
	Gateway
	192.168.1.1

### 3.2 For the SnaplNverter (web server), Symo Hybrid and Datamanager Box

1. Activate access points



- 2. Connect to the access point
- 3. Open the browser and call up the Datamanager user interface of the inverter by entering the IP 192.168.250.181 in the address line.
- 4. Go to the Settings section of the user interface of the inverter → Click on Network

Settings	
GENERAL	Network interfaces
PASSWORDS	✓ ×
NETWORK	Connection mode
FRONIUS SOLAR.WEB	Internet via ULAN     Internet via LAN
IO MAPPING	
LOAD MANAGEMENT	
PUSH SERVICE	Local Network via Access-Point
MODBUS	
INVERTERS	

- 5. Click on Internet via LAN
- 6. Complete configuration under LAN settings.

MODBUS	U 🔲 🌒	
FRONIUS SENSOR CARDS	LAN Settings	
METER	Get address	🔿 static 💿 dynamic
DNO EDITOR	Host name	datcom-city
	IP address	192.168.1.180
	Subnet mask	255.255.255.0
	Gateway	192.168.1.1
	DNS server	192.168.1.1

7. Click on  $\checkmark$  to save the applied settings.

#### \_\_\_\_\_

## 3.3 Configuration TRB140

#### 3.3.1 Login/password

Before the gateway is connected to the inverter, the configuration of the inverter has to be finalised in order to have internet connection during the setup process.

To configure the gateway, connect it to the network port of a computer. Then insert following data:

Gateway website: <u>http://192.168.2.1</u> Standard login user: admin Password: admin01

Info: A new password must then be created:



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	Password requirements: 8-32 characters, at least one uppercase letter, one lowercase letter and one number.						
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## 3.3.2 Gateway configuration

Set time zone and confirm LAN settings.

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The next step involves setting the right APN for the grid operator. SIM card PIN protection should also be activated. This prevents the SIM card from being used elsewhere.

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Authentication Type	PAP V						
Username	ppp@A1plus.at						
Password	©						
PIN	1881						
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The setup wizard can now be closed.

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#### 3.3.3 Auto reboot (optional but recommended)

Since there are always malfunctions in the cellular network, it is recommended that the gateway should be set to reboot every day. In the example here, the daily reboot is set for 01:00 in the morning. This can be found in the user interface of the inverter under "SERVICES" → "AUTO REBOOT" → "REBOOT SCHEDULER"

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#### 3.3.4 Testing the data connection

If the previous steps have been carried out correctly, there should now be a data connection. This can be checked by visiting a website. If it is not possible to connect, additional steps may be necessary; see Point (3.3.5). If there is a data connection, the gateway can be disconnected from the computer and connected to the "LAN1" port of the inverter.

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	TELTONIKA   Networks	MODE USER FW VERSION Advanced Admin Trb1_R_00.02.06.1 Logou
STATUS	SYSTEM 1 24.50% CI	PU load
<u>514105</u>	ROUTER UPTIME	DATA CONNECTION
OUTPUTTU	0h 16m 25s	Connected
UVERVIEW	LOCAL DEVICE TIME	STATE
SYSTEM	2021-06-28, 11:00:39	Registered (home); A1; 4G (LTE)
ROUTES	MEMURY USAGE RAM: 74.6996 FLASH: 0.6896	SIM CARD INFO Ready
ALD HOLES		BYTES RECEIVED / SENT
Cloud Solutions	TRB1 R 00.02.06.1	233.7 KB / 365.8 KB
Mobile Utilities	and the approximates	
Auto Reboot		
NTP	LAN 🔳	MOB1S1A1 (MAIN) 🔳
Input/Output	TYPE	TYPE
VPN	Wired (br-lan)	Mobile
MODBUS	IP ADDRESS	IP ADDRESS
Data to Server	192.168.2.1/24 🕐	100.105.253.252/32
Web Filter		
Dynamic DNS		
Events Reporting	REGENI SYSTEM EVENTS	REGENI NETWURK EVENIS
Traffic Logging	2021-06-28 10:43:16	2021-06-28 10:56-27
MQTT	Reboot: Request from UART	DHCP: Leased 192.168.2.158 IP address for client 3c:e1:a1:bf:d3:d6 - PF146Z7P in LAN
SNMP	2020-12-09 18:13:04 Rebord: Other	2021-06-28 10:45:23
CLI	2020 11 11 10:40:00	Mobile Data: Mobile data connected (internal modem)
Wake on LAN	Reboot: Request from UART	2021-06-28 10:45:23
Package Manager	2020-05-05 20:49:39	Network Type: Joined WCDMA network (internal modern)
	Reboot: Other	2021-06-28 10:45:23

#### 3.3.5 Activating data roaming

If a data connection is yet to be established, it may be necessary to activate the "Data Roaming" function, depending on the mobile network operator. However, it is important to make sure that the gateway does not connect to third-party cellular networks, which can result in extra costs, particularly in areas close to a national border.

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#### 3.3.6 Software update

An online software update can be initiated for the gateway as soon as its online connection has been established. It is important to keep in mind that the update includes two parts: the software for the gateway and the device software.

				ADVANCED	ADMIN	TRB1_R_00.02.05	5.2 LOGOUT
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-	TOTEM	Firmware version TRB1_R_00	0.02.05.2 F	mware version		TRB1	_R_00.02.06.1
A	DMINISTRATION	Firmware build date 2020-11-19 1	15:30:10 N	lodem firmware sision	New	wet version installed	on the device
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	FOTA CONFIGURATION	Kernel version 3.18.	.20-msm				
B	RACKUP	◇ FLASH NEW FIRMWARE IMAGE					
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## 3.4 One gateway for several inverters

If a single gateway needs to be used for more than one inverter, a suitable network switch is required because the inverter and gateway only have one network port each. It is important to make sure that the gateway and switch are not connected to the same inverter and that an additional power supply is used. Simultaneous supply of both components via one inverter would result in an excessively large load and would deactivate the power supply.

## **4 DATA VOLUME / PROVIDER**

### 4.1 GEN24/Tauro & SnaplNverter Generation (Datamanager) data volume

#### GEN24/Tauro

We recommend a data plan with a data volume of at least 2 GB per month for a gateway with a Fronius GEN24/Tauro inverter. Data consumption varies widely according to the design of the installation (inverter, Smart Meter and/or battery, as well as service messages on the inverter). An update requires a data volume of approx. 120 MB (up to four update files may be released per year).

If more than one GEN24 or Tauro needs to be connected with a single gateway, the data volume must be increased accordingly.

#### SnaplNverter, Symo Hybrid, Datamanager:

Data consumption varies very widely according to the installation design (inverter, inverter with Smart Meter, inverter with battery and Smart Meter as well as AFCI function and service messages on the inverter). An update requires a data volume of approx. 100 MB (up to four update files may be released per year). For SnapIN generation inverters, Fronius recommends a data volume of at least 1 GB per month. If additional inverters are operated within the Solar Net ring, the data volume needs to be increased accordingly.

It is possible to adjust the settings regarding data logging, service messages and the transfer of current and archive data via the inverter web interface (Datamanager) under "FRONIUS SOLAR.WEB" to reduce the resulting data volume (see figure below).



If necessary, the expected data volume can be reduced by applying the following settings:

- / Extend the inverter query cycle (>15 min)
- / Deactivate immediate dispatch of service messages (service messages are all sent together when log data is uploaded)
- / Deactivate the transfer of current data
- / Daily transfer of archive data

An overview of the data volume reduction can be found in the Datamanager 2.0 operating manuals.

### 4.2 Choosing a provider

Before you choose a provider and purchase a SIM card, the on-site reception situation (installation site of the gateway) must be checked. This enables you to ensure that the signal quality is sufficient for data transfer, that the connection is stable and that the gateway is working correctly.

/ Furthermore, you must check that the right size of SIM card is used (the requirements can be taken from the gateway which is used. The following SIM card (Mini SIM (2FF) is required for the Teltonika gateway)

## **5 SECURITY SETTINGS**

For the admin password, use a secure password that contains letters, symbols and numbers. Moreover we also suggest to change it on a regular basis.

If you are using a router with a WLAN connection, position it such that the signal is strong enough and can guarantee a stable connection.

It is also recommended that you choose a password that contains letters, symbols and numbers to prevent unwanted access to the WLAN network.

In the course of router/gateway updates, follow the recommendations of the router/gateway manufacturer

Activate the gateway's firewall settings to protect the local network. It is not recommended to forward the network port of the web interface to the WAN interface. Please use Fronius Solar.web to make the data from your inverter or photovoltaic system accessible via the Internet.