

How to set up Export Limiting Using the Fronius Smart Meter*

*Single phase or 3-phase Energy Meter



Application Guide

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1. GENERAL

So called "export limiting" is where the Utility or network operator restricts the amount of energy from PV system that goes into the grid. I.e. excess energy that is not consumed on the site. In order for the end user to gain the maximum amount of energy from the system without exceeding the export limit, the inverter output needs to be able to follow the site load.

With Fronius Datamanager 2.0 integrated SnaplNverter and GEN24 inverter it is possible to limit the inverter output power dynamically and therefore to control and limit the amount of energy which is exported into the grid in accordance to the consumption of the loads.

The Datamanager Card 2.0 and the GEN24 inverter offer the following options to control the power output of the inverter:

- Modbus RTU
- Modbus TCP
- digital inputs
- Dynamic Power Reduction using the Fronius Smart Meter

Therefore there are two possible ways to achieve export limiting with Fronius Inverters:

- Using the Fronius Smart Meter to allow the inbuilt Dynamic Power Reduction.
- 3rd party controller issuing commands to the inverter.

The simplest and most cost effective way to achieve export control with Fronius inverters is to use the Fronius Smart Meter. The meter measures the amount of energy imported to or exported from the grid and the Datamanager 2.0/GEN24 uses these values to calculate the appropriate output power of the inverter to limit the export to the grid.

This document describes how to set up export control using the single phase or 3-phase Fronius Smart Meter.

1.1 Location of the Fronius Smart Meter

With the Fronius Smart Meter there are 2 possible energy paths / locations where it can be installed. The <u>feed-in point</u> or the <u>consumption path.</u>

Feed-in point – bi-directional energy measurement possible. Feed-in of surplus energy/consumption from the grid is measured.

Consumption path – single direction energy measurement. Load is measured directly.

Due to NET metering and the common way installations are done in some countries, in almost all cases, the Fronius Smart Meter will be installed at the **feed-in point**. This is also the default setting on the inverter WebInterface.

/ Feed-in point

In this position the solar & the loads are in parallel. The solar is connected to the "load" side of the Fronius Smart Meter.





/ Consumption path

In this position the solar & the loads are separated by the meter. The solar is connected to the "grid" side of the Fronius Smart Meter.



1.2 Requirements

Important! The Fronius Datamanager 2.0 needs a software version of **3.16.x-x** or greater. It can be downloaded from the Fronius Website under *Solar Energy / Info center / installer support* or click here: https://www.fronius.com/en/photovoltaics/infocentre/tech-support?

Within the *Installer Support Area* on the Fronius Website you can also find a more detailed document/guide on how to update your Datamanager 2.0.



2. EXPORT CONTROL USING A FRONIUS SMART METER

2.1 Smart Meter type overview

Fronius Smart Meters or the Fronius Smart Meters TS (single phase or 3-phase) are energy meters with ModBus RTU / RS 485 communication. It is needed for measuring the load and energy fed into the grid.

The Smart Meter needs to be connected to the Fronius inverter. If a SnaplNverter is used a Fronius Datamanager 2.0 is necessary. This communication card comes built-in in SnaplNverters Galvo, Primo, Symo and Eco and can be retrofitted to all other Fronius inverters.



Fronius Smart Meter 63A-3



Fronius Smart Meter 63A-1



Fronius Smart Meter 50kA-3



Fronius Smart Meter TS 65A-3



Fronius Smart Meter TS 100A-1



Fronius Smart Meter TS 5kA-3

2.2 Schematics and Wiring

The following schematics shows the system configuration



Fronius Smart Meter





Fronius Smart Meter

Please note:

- / Cables of type CAT5 or a higher maybe used for data wiring between Meter and inverter.
- / Use a shielded twisted pair cable and connect the shield to ground on one side to avoid interference.
- / Use twisted cable pair for the data lines (D+ and D- or M1+ and M1-)
- / Maximum distance: 300 m (980 feet)

Meter connection on the inverter

The meter needs to be connected to the terminal block on the Datamanager 2.0/within the GEN24 inverter.





GEN24 – connection on the communication card

Wiring detail for Single Phase Fronius Smart Meter 63A-1





Wiring detail for Single Phase Fronius Smart Meter TS 100A-1



Contact "T": 120 Ohm terminating resistor has to be bridged at the end of the Modbus line.

Wiring detail for 3-Phase Fronius Smart Meter 63A-3



Wiring detail for 3-Phase Fronius Smart Meter TS 65A-3



Contact T: 120 Ohm terminating resistor has to be bridged at the end of the Modbus line.



Wiring detail for 3-Phase Fronius Smart Meter 50kA-3





* The 120 Ohm terminating resistor is enclosed with the meter

Wiring detail for 3-Phase Fronius Smart Meter TS 5kA-3



Contact T: 120 Ohm terminating resistor has to be bridged at the end of the Modbus line.

Modbus termination on the inverter

The internal bus termination 120-Ohm resistance (for Modbus RTU) must be switched *ON* at the first and last device in an RS-485 bus connection.





CT ratio programming on the Fronius Smart Meter 50kA-3

Only the transmission ratio has to be set!



*) ratio **Primary nominal current** / secondary nominal current Example: Primary nominal current 100 A / secondary nominal current 5 A = Transmission ratio <u>20</u>

CT ratio programming on the Fronius Smart Meter TS 5kA-3

Primary nominal current 200 A / secondary nominal current 5 A = Transmission ratio 20 Primary nominal current 200 A / secondary nominal current 5 A = Transmission ratio 40

E.g. If your CT ratio is 20 you need to set "Ct 0020"

SMART METER (1) PR55 (2) (3) (4) Frontus Imp

- Press and hold "Enter" for 2 seconds long.
- Go to Page P1 with "Up" or "Down" buttons.
- Enter the password "2633" with "Up" and "Down" and confirm every single value with "Enter".
-) Note the password.

Important! Password can not be reset.



- Go to Page P4 with "Up" or "Down" buttons.
- Press and hold "Enter" for 2 seconds long.
- Set the correct Ct ratio and confirm every single value with "Enter".
- Go to Page P18 with "Up". Press and hold "Enter" for 2 seconds long to save and leave the settings.

2.3 Activating the Fronius Smart Meter on the inverter

2.3.1 Meter activation on the Datamanager 2.0 Web interface

The Datamanager Web interface can be accessed in two ways:

- 1. Via the Wi-Fi Access Point:
 - Activate the Wi-Fi Access Point on the Datamanager card (inverter) or Datamanager Box 2.0
 - Connect your computer/table/smart phone to the "Fronius_240.XXXXXX" Wi-Fi network
 - Open a web browser and go to <u>http://192.168.250.181</u>.

2. Via the LAN Port:

- Connect your computer to the Datamanager via LAN cable
- Switch the Datamanager IP Switch to Position 'A'
- Open a web browser and go to http://169.254.0.180

For information of how to set up the Fronius Datamanager please see the manual of the Fronius inverter or the Fronius Datamanager (for Fronius Galvo/Symo/Primo/Eco): http://www.fronius.com/cps/rde/xbcr/SID-791F3201-

8338B17C/fronius_international/42_0426_0191_EA_388899_snapshot.pdf

				Actual general view
 System overview 	100% —			
Actual	90% -			Services System information
				Network diagnostics
	80% —			Firmware update
501 10				Start assistant
501 10	70% —		Go to 'Settings'.	
ŭŭ ŭ ŝŭŝ kWb	E			Settings
734-848	0076			
	50% —			
5				
Day	40%			
Energy 810 Wh				
Yield 0.38	30% -			
Year	20% —			
Energy 3710.23 kWh				
Yield 1,743.81	10% -			
Inverter				
N. Concora	· · ·	1	1	

Before it is possible to enter the *METER* settings a service password is required. If no service password has been set, it needs to be created first!

Test Prime	0 3.0 0 7 2 0 0 1 en Franius	Current data
Settings		Current general view
GENERAL PASSWORDS INVERTERS FRONIUS SENSOR CARDS	Meter settings If no service password has been set: Choose a service password under <i>PASSWORDS</i> .	Services System information Network diegnostics Firmware update Start assistant
FRONIUS SOLAR WEB SERVICE MESSAGES NETWORK ENERGY MANAGER	Click here for circuit diagrams of the meter instantion	Settings
PUSH SERVICE MODBUS METER DNO EDITOR	Go to ' <i>METER</i> ' to do the relevant settings.	

Choose the type of meter.

Test Prime	o 3.0			Fronius	
Settings					Current general view
GENERAL	Meter settings				
PASSWORDS		V X			System information Network diagnostics
INVERTERS					Firmware update
FRONIUS SENSOR CARDS	Meter: Fronius Smart Meter None selected				Start assistant
FRONIUS SOLAR.WEB	Click h Fronius Smart Meter S0 inverter 1	Select 'Fronius	Smart Meter'		🔅 Settings
SERVICE MESSAGES					
NETWORK					

Choose location.

For further explanations on feed-in point and consumption path see chapter 1.1 Location of the energy meter

Test Prime	o 3.0		Franius	Current data
Settings				Current general view
GENERAL	Meter settings			Services
PASSWORDS	✓ ×			Network diagnostics
INVERTERS				Firmware update
FRONIUS SENSOR CARDS	Meter: Fronius Smart Meter			
FRONIUS SOLAR.WEB	Click have for elevent discourse of the materiatellation			🔅 Settings
SERVICE MESSAGES	Circk here for circuit diagrams of the meter instantation Select	whether the meter is	or in	
NETWORK	Notification: when using the Frontus Smart Meter, the query of system data was woodous RTU is not IOCALEO	sumption path		
ENERGY MANAGER	uie con	Sumption path		

The meter is activated once you get the following message.

2.3.2 Activation on the GEN24 Web interface

The Web interface of GEN24 inverters can be accessed in two ways:

- 1. Via the Wi-Fi Access Point:
 - Open access point with one quick push on the inverter
 - Connect to the inverter network
 - Name: FRONIUS_Pilot serial number
 - o Password: 12345678
 - Enter IP-adress 192.168.250.181 into the address bar of your browser
- 2. Via the LAN Port:
 - Connect to inverter via network cable
 - Use LAN 1 interface on the pilot
 - Enter IP-adress 169.254.0.180 into the address bar of your browser

Entering the Dashboard you have to unlock the submenus with the Technician password if you haven't done this in the commissioning yet.

Enter the Submenu "Device Configuration" and go to "Components". There you are able to "add a component".

GEN24 GEN24 Device Configuration	Components	Select whether the meter is
Components	Components	the consumption path
Functions and I/Os	Primary meter	
Inverter	Type * Fronius Smart Meter (RTU) Modbus address 1	Position * Grid connection point
	X Cancel	Load branch
	i) Note	Grid connection point
	No entries yet!	

2.4 Set up Limit Export on the inverter

2.4.1 Set up Limit Export on Datamanager 2.0

Dynamic power reduction has the capability to control the inverter's output power according to the site's load and the export limitation. The export limit can be set on the web interface of the Fronius Datamanager as shown in the following picture.

Go to the tab 'DNO EDITOR' under the Datamanager's settings.

Fronius Australia Settings	Go to 'DNO E	ditor'.	0?X00 en	Current data Current general view
GENERAL DNO ed PASSWORDS INVERTERS FROMIUS SENSOR CARDS Ripple	control signal re		101 pm	Senfos System information Network diagnostica Firmware update Start assistant
FRONUS SOLAR WEB UNDOWN	not applicable	Activate power reduction choosing <i>'limit for e</i>	uction by ntire system'	⊘ Settings
DNO EDITOR Dyna Pow total Maxi	mic power reduction er limit © No limit @ limit for entire system DC power of the system: 6000 Wp mum grid feed-in power: 1500 W ♥	Fill in the to connected peak.	x otal DC Power of the PV generator in Watt	
Cont Ripp Dyn Cont Legend 1hig 2ne	rolling priority 1 2 3 le control signal receiver 0 0 0 mic power reduction 0 0 rolling via Modbus 0 rest priority sim priority	Fill-in the max power v illowed to be fed into either in Watts or in %	× what's the grid	
3 Jow	est priority	Important: power redu	Select 'Dynamic ction' as No.1 priority	

Once you **saved** your settings by selecting the ✓ in the Dynamic power reduction field, the set-up of the export limit is completed.

If the system comprises multiple inverters, all inverters which are connected in the SolarNet ring to the Datamanager will be equally power limited to achieve the set output limit.

2.4.2 Set up Limit Export on GEN24 inverter

Entering the Dashboard you have to unlock the submenus with the Technician password if you haven't done this in the commissioning yet.

GEN24					Technician
Device Configuration	>		GENERAL AD	VANCED	\mathbf{X}
() Energy Management	>	Current Power	Energy Output		
🗘 System	>		Current Power		
⇄ Communication	>		0.00 W	(Technician
去 Safety and Grid Regulations	>		Device State		
Overview			Inverter	Change User	en
			Ohmpilot	User	
		0 W		Technician	
		Utilization 0 %		Logout	0
				Change Password	

Enter the submenu "Safety and Grid Regulations"

Device Configuration	>		GENERAL ADVANCED	
() Energy Management	>	Current Power	Eperav Output	
System	>	ouncillit ower	Energy output	
2 Communication	>		0.00 W	© 0.00 Wh
去 Safety and Grid Regulations	>		Device State	
Overview			Inverter	stopped
			Dhmpilot	disconnected
		0 W		
		Utilization 0 %		

Enter "Export Limitation" and set the parameters "Total DC power of the entire system" and "maximum allowed feed-in power of the inverter" in % or Watt.

(Fronius) GEN24		Technician 😔-
← Safety and Grid Regulations	Export Limitation	uction
🏦 Country Setup 🔒 >	Limit for Entire System	
Export Limitation	Total DC power of the Entire System *	Maximum Permissible Output Power of Inverter *
I/O Power Management		
Autotest (CEI 0-21)	Fill in the total DC Power of the connected PV generator in Watt peak.	Fill-in the max power what's allowed to be fed into the grid either in Watts or in %