

elausys INV-KNX Gateway for Fronius Inverters User Manual

	User Manual	Doc.Ref : INV-KNX-FR-UM
	KNX Gateway for Fronius Inverters	Revision : 2.00

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**ELAUSYS
INV-KNX**

KNX Gateway for Fronius Inverters

User Manual



1. INTRODUCTION

The KNX gateway for Fronius inverters provides a simple solution to transfer all relevant data from the inverters to KNX.

It allows integrators to take advantage of a fully integrated solar panel inverter, the data can be used to optimize energy consumption, monitoring, trending or to trigger specific action in the KNX installation.

Main features:

- KNX Interface for Fronius inverters serie
- Monitoring of Energy, Power, current, voltage, frequency, temperature, ...
- Connected to the inverter over Ethernet
- Galvanic insulation from the KNX bus
- Configurable refresh rate of inverter data
- DIN rail mounted
- Auxiliary power supply 12-30VDC
- KNX logic module including logic gates, sequences, triggers, math operation and weekly calendar events.

2. OVERVIEW

2.1 USAGE & LIMITATION

This gateway is intended to be used with an Fronius inverter compatible with the SMA SunSpec modbus interface definition. The inverter is connected to the ethernet network on the same router as the KNX gateway.

All Fronius inverters with SetApp configuration are SunSpec-supported. Fronius inverters with the LCD that have Firmware version 3.xxxx and above only are SunSpec-supported.

2.1 SOFTWARE

The KNX Interface is configured using the ETS tool, the free ETS Demo version can be [downloaded](#) from the

website of KNX Association. The free version allows to configure up to 5 KNX modules in a project, the KNX gateway is only one module, all devices can be configured using this version.

2.2 CONNECTION DIAGRAM

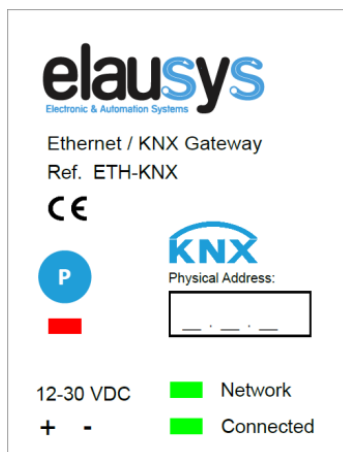
The KNX bus is connected on the top side of the gateway.

An external power supply 12-30VDC is required and connected on the bottom side of the module, beside the RJ45 connector for the ethernet cable.



1. **12-30VDC**
2. **RJ45 Ethernet**

2.3 FRONT PANEL



The front panel is equipped with two green status LED:

Network: Physical connection to the ethernet network is established.

Connected: Communication with the inverter is established.

Button “P” : KNX Programming mode button

Red LED : KNX Programming status LED

3. PARAMETERS

The KNX interface parameters are defined in the “parameters” tab of the device, in the ETS project.

3.1 INVERTER SETTINGS

The following parameters are defined in the inverter settings section of the parameters:

PARAMETER	VALUES	DESCRIPTION
AC Network	• Single phase (default) • Tri-Phase	Type of AC network
Number of PV Circuits	• 1 ... 4	NOT APPLICABLE for this type of inverters
Inverter model	• 0...255	3 = Fronius Inverters
Refresh rate (min)	• 0...255	Cyclic rate of data polling from the inverter.
Battery 1	• Not Used / Used	Display group objects to monitor the status of battery 1
Battery 2	• Not Used / Used	Display group objects to monitor the status of battery 2 (NOT USED for this inverter)
Powermeter	• Not Used / Used	Display group objects to monitor the powermeter value (NOT USED for this inverter)
Timezone	• UTC-11... UTC+14	Timezone where the device is installed. It is used for logic functions based on the weekly calendar.
Daylight saving time	• Not Used / Used	Set if daylight saving is used where the device is installed. It is used for logic functions based on the weekly calendar.
Device Options	• Text string	Device options are not available on this device.

4. LOGIC FUNCTIONS

The KNX logic module is a virtual extension module that is part of the ETS application on the inverters gateways. Each logic module includes 8 logic functions including logic gates, sequences, triggers, math operation and weekly calendar events.

- Up to **64 logic functions** using extension modules
- **Logic Gate** with 8 inputs, configurable output delay and inversion
- **Sequence** with 4 steps, configurable outputs delays and datatypes
- **Trigger** with inputs logic, delays and weekly calendar events
- **Math** operations with configurable objects type and delays

Refer to the KNX Logic Module manual for more details on each function.

5. COMMUNICATION OBJECTS

5.1 GENERAL

General communication objects of the device.

G O	NAME	DESCRIPTION
1	Module status	Sends 0 when the module is operating normally, sends an error code when applicable.
2	Firmware version	Returns the firmware version of the device when the object is read.

5.2 INVERTERS OBJECTS

GO	NAME	DESCRIPTION
3	AC Current	AC Total Current value
4	AC Current A	AC Current phase A
5	AC Current B	AC Current phase B
6	AC Current C	AC Current phase C
7	AC Voltage	AC Total Voltage (NOT USED)
8	AC Voltage AB	AC Voltage phase AB
9	AC Voltage BC	AC Voltage phase BC

10	AC Voltage CA	AC Voltage phase CA
11	AC Voltage AN	AC Voltage phase AN
12	AC Voltage BN	AC Voltage phase BN
13	AC Voltage CN	AC Voltage phase CN
14	DC Current	DC Total Current value (NOT USED)
15	DC Voltage	DC Total Voltage (NOT USED)
16	PV1 Voltage	PV1 Voltage
17	PV1 Current	PV1 Current
18	PV2 Voltage	PV2 Voltage
19	PV2 Current	PV2 Current
20	PV3 Voltage	PV3 Voltage (NOT USED)
21	PV3 Current	PV3 Current (NOT USED)
22	PV4 Voltage	PV4 Voltage (NOT USED)
23	PV4 Current	PV4 Current (NOT USED)
24	AC Power	AC Power
25	DC Power	DC Power (NOT USED)
26	AC Frequency	AC Frequency

27	AC VA	AC Apparent power
28	AC VAR	AC Reactive power
29	AC PF	Power factor
30	AC Energy	Total AC Energy
31	Efficiency	Inverter efficiency (NOT USED)
32	Insulation	Insulation resistance (NOT USED)
33	Temperature	Cabinet temperature (NOT USED)
40	Daily Energy Yield	(NOT USED)
41	Battery 1 Running Status	0: OFF 1: EMPTY 6: DISCHAGING 7: CHARGING 9: FULL 10: HOLDING 11: TESTING
42	Battery 1 power	(NOT USED)
43	Battery 1 SOC	Battery's state of capacity
44	Battery 1 current day charge	(NOT USED)
45	Battery 1 current day discharge	(NOT USED)
46	Battery 1 total charge	(NOT USED)
47	Battery 1 total discharge	(NOT USED)
48	Battery 2 Running Status	(NOT USED)

49	Battery 2 power	(NOT USED)
50	Battery 2 SOC	(NOT USED)
51	Battery 2 current day charge	(NOT USED)
52	Battery 2 current day discharge	(NOT USED)
53	Battery 2 total charge	(NOT USED)
54	Battery 2 total discharge	(NOT USED)
55	Powermeter	(NOT USED)

5.3 GROUP OBJECT LIST

G O	Name	Function	Size	Flags	Type ID	Type Name	Description
1	Module status	Status code	1 byte	C R – T –	20.01 1	DPT_ErrorClass_System	Device status
2	Firmware version	Text String	14 bytes	C R – T –	16.00 0	Character string	Firmware version of the device
3	AC Current	Actual value	4 bytes	C R – T –	14.01 9	Electric current (A)	AC Total Current value
4	AC Current A	Actual value	4 bytes	C R – T –	14.01 9	Electric current (A)	AC Current phase A
5	AC Current B	Actual value	4 bytes	C R – T –	14.01 9	Electric current (A)	AC Current phase B
6	AC current C	Actual value	4 bytes	C R – T –	14.01 9	Electric current (A)	AC Current phase C
7	AC Voltage	Actual value	4 bytes	C R – T –	14.02 7	Electric potential (V)	AC Total Voltage
8	AC Voltage AB	Actual value	4 bytes	C R – T –	14.02 7	Electric potential (V)	AC Voltage Phase AB value

9	AC Voltage BC	Actual v alue	4 bytes	C R – T –	14.02 7	Electric potential (V)	AC Voltage Phase BC value
1 0	AC Voltage CA	Actual v alue	4 bytes	C R – T –	14.02 7	Electric potential (V)	AC Voltage Phase CA v alue
1 1	AC Voltage AN	Actual v alue	4 bytes	C R – T –	14.02 7	Electric potential (V)	AC Voltage Phase AN value
1 2	AC Voltage BN	Actual v alue	4 bytes	C R – T –	14.02 7	Electric potential (V)	AC Voltage Phase BN value
1 3	AC Voltage CN	Actual v alue	4 bytes	C R – T –	14.02 7	Electric potential (V)	AC Voltage Phase CN value
1 4	DC Current	Actual v alue	4 bytes	C R – T –	14.01 9	Electric current (A)	DC Total Current value
1 5	DC Voltage	Actual v alue	4 bytes	C R – T –	14.02 7	Electric potential (V)	DC Total Voltage
1 6	PV1 Voltage	Actual v alue	4 bytes	C R – T –	14.02 7	Electric potential (V)	PV1 Voltage
1 7	PV1 Current	Actual v alue	4 bytes	C R – T –	14.01 9	Electric current (A)	PV1 Current
1 8	PV2 Voltage	Actual v alue	4 bytes	C R – T –	14.02 7	Electric potential (V)	PV2 Voltage
1 9	PV2 Current	Actual v alue	4 bytes	C R – T –	14.01 9	Electric current (A)	PV2 Current
2 0	PV3 Voltage	Actual v alue	4 bytes	C R – T –	14.02 7	Electric potential (V)	PV3 Voltage
2 1	PV3 Current	Actual v alue	4 bytes	C R – T –	14.01 9	Electric current (A)	PV3 Current
2 2	PV4 Voltage	Actual v alue	4 bytes	C R – T –	14.02 7	Electric potential (V)	PV4 Voltage

2 3	PV4 Current	Actual value	4 bytes	C R – T –	14.01 9	Electric current (A)	PV4 Current
2 4	AC Power	Actual value	4 bytes	C R – T –	14.05 6	Power (W)	AC Power
2 5	DC Power	Actual value	4 bytes	C R – T –	14.05 6	Power (W)	DC Power
2 6	AC Frequency	Actual value	4 bytes	C R – T –	14.03 3	Frequency (Hz)	AC Frequency
2 7	AC VA	Actual value	4 bytes	C R – T –	14.05 6	Power (W)	AC Apparent power
2 8	AC VAR	Actual value	4 bytes	C R – T –	14.05 6	Power (W)	AC Reactive power
2 9	AC PF	Actual value	4 bytes	C R – T –	14.05 7	Power factor (cos phi)	Power factor
3 0	AC Energy	Actual value	4 bytes	C R – T –	13.01 3	Active energy (kWh)	Total AC Energy
3 1	Efficiency	Actual value	2 bytes	C R – T –	8.010	Percentage (%)	Inverter efficiency
3 2	Insulation	Actual value	4 bytes	C R – T –	14.05 6	Resistance (Ohm)	Insulation resistance
3 3	Temperature	Actual value	2 bytes	C R – T –	9.001	Temperature (°C)	Cabinet temperature
4 0	Daily Energy Yield	Actual value	4 bytes	C R – T –	13.01 3	Energy (kWh)	

41	Battery 1 Running Status	Actual value	2 bytes	C R – T –	–	–	Status code
42	Battery 1 power	Actual value	4 bytes	C R – T –	14.056	Power (W)	
43	Battery 1 SOC	Actual value	1 byte	C R – T –	5.001	Percentage (%)	State of charge (%)
44	Battery 1 current day charge	Actual value	4 bytes	C R – T –	13.013	Energy (kWh)	
45	Battery 1 current day discharge	Actual value	4 bytes	C R – T –	13.013	Energy (kWh)	
46	Battery 1 total charge	Actual value	4 bytes	C R – T –	13.013	Energy (kWh)	
47	Battery 1 total discharge	Actual value	4 bytes	C R – T –	13.013	Energy (kWh)	
48	Battery 2 Running Status	Actual value	2 bytes	C R – T –	–	–	Status code
49	Battery 2 power	Actual value	4 bytes	C R – T –	14.056	Power (W)	
50	Battery 2 SOC	Actual value	1 byte	C R – T –	5.001	Percentage (%)	State of charge (%)
51	Battery 2 current day charge	Actual value	4 bytes	C R – T –	13.013	Energy (kWh)	
52	Battery 2 current day discharge	Actual value	4 bytes	C R – T –	13.013	Energy (kWh)	
53	Battery 2 total charge	Actual value	4 bytes	C R – T –	13.013	Energy (kWh)	

54	Battery 2 total discharge	Actual value	4 bytes	C R – T –	13.013	Energy (kWh)	
55	Powermeter	Actual value	4 bytes	C R – T –	14.056	Power (W)	

6. CONFIGURATION

6.1 NETWORK CONFIGURATION

By default, the IP address of the KNX gateway is set to **192.168.1.51**

Using a laptop connected to the gateway, open a web browser and navigate to the IP address of the gateway.

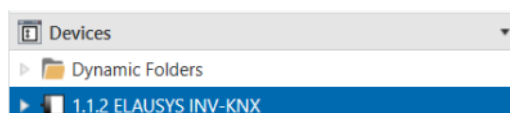
Set a fixed IP address of your choice for the KNX gateway and configure the modbus TCP settings as below:

- Mode : Connect
- IP : IP Address of the inverter
- Server Port : 502
- Uni Id : 1

6.2 KNX PHYSICAL DEVICE

ELAUSYS devices are configured using the ETS tool. You should first download and install the free version of ETS tool before you continue.

The INV-KNX Interface must be assigned a physical address on the KNX network. Assign a free address to the module, in our example we choose 1.1.2.



6.3 ETS PARAMETERS

Once a KNX physical address is set, open the parameter tab to configure the interface.

1.1.30 ELAUSYS INV-KNX > General

General AC Network ☐ Single-phase ☒ Tri-phase

Number of PV circuits 2

Inverter model 0

Refresh rate (min) 1

Battery 1 ☐ Not used ☒ Used

Battery 2 ☐ Not used ☒ Used

Powermeter ☐ Not used ☒ Used

Device options :

Select the type of AC network (single phase or tri-phase).

Set the inverter model to 3 for Fronius inverters.

Choose the refresh rate (min) for the complete set of data.

Select if battery 1 is available on the inverter.

Device options should remain empty.

6.4 ETS GROUP OBJECTS

A group address (GA) must be assigned to each group object (GO) needed by the application. Open the Group Objects tab of the device and assign a GA to the objects as needed.

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
1	Module status	Status code	Status	0/0/1	1 byte	C	R	-	T	-	system err...	Low
2	Firmware version	Text string	FW	0/0/2	14 bytes	C	R	-	T	-	Character...	Low
3	AC Total Current	Actual value	Value	1/0/0	4 bytes	C	R	-	T	-	electric cur...	Low
7	AC Total voltage	Actual value	Value	1/0/1	4 bytes	C	R	-	T	-	electric po...	Low
14	DC Total Current	Actual value	Value	1/0/2	4 bytes	C	R	-	T	-	electric cur...	Low
15	DC Total voltage	Actual value	Value	1/0/3	4 bytes	C	R	-	T	-	electric po...	Low
16	PV1 Voltage	Actual value	Value	1/0/4	4 bytes	C	R	-	T	-	electric po...	Low
17	PV1 Current	Actual value	Value	1/0/5	4 bytes	C	R	-	T	-	electric cur...	Low
24	AC Power	Actual value	Value	1/0/6	4 bytes	C	R	-	T	-	power (W)	Low
25	DC Power	Actual value	Value	1/0/7	4 bytes	C	R	-	T	-	power (W)	Low
26	AC Frequency	Actual value	Value	1/0/8	4 bytes	C	R	-	T	-	frequency...	Low
27	AC Apparent power	Actual value	Value	1/0/9	4 bytes	C	R	-	T	-	power (W)	Low
28	AC Reactive power	Actual value	Value	1/0/10	4 bytes	C	R	-	T	-	power (W)	Low
29	AC power factor	Actual value	Value	1/0/11	4 bytes	C	R	-	T	-	power fact...	Low
30	AC Energy	Actual value	Value	1/0/12	4 bytes	C	R	-	T	-	active ener...	Low
31	Inverter efficiency	Actual value	Value	1/0/13	2 bytes	C	R	-	T	-	percentag...	Low
32	Inverter resistance	Actual value	Value	1/0/14	4 bytes	C	R	-	T	-		Low
33	Cabinet Temperature	Actual value	Value	1/0/15	2 bytes	C	R	-	T	-	temperatu...	Low
34	Manufacturer specific status code	Status code	Value	1/0/16	2 bytes	C	R	-	T	-		Low
35	Manufacturer specific status code	Status code	Value	1/0/17	2 bytes	C	R	-	T	-		Low
36	Manufacturer specific status code	Status code	Value	1/0/18	2 bytes	C	R	-	T	-		Low
37	Manufacturer specific status code	Status code	Value	1/0/19	2 bytes	C	R	-	T	-		Low
38	Manufacturer specific status code	Status code	Value	1/0/20	2 bytes	C	R	-	T	-		Low
39	Manufacturer specific status code	Status code	Value	1/0/21	2 bytes	C	R	-	T	-		Low

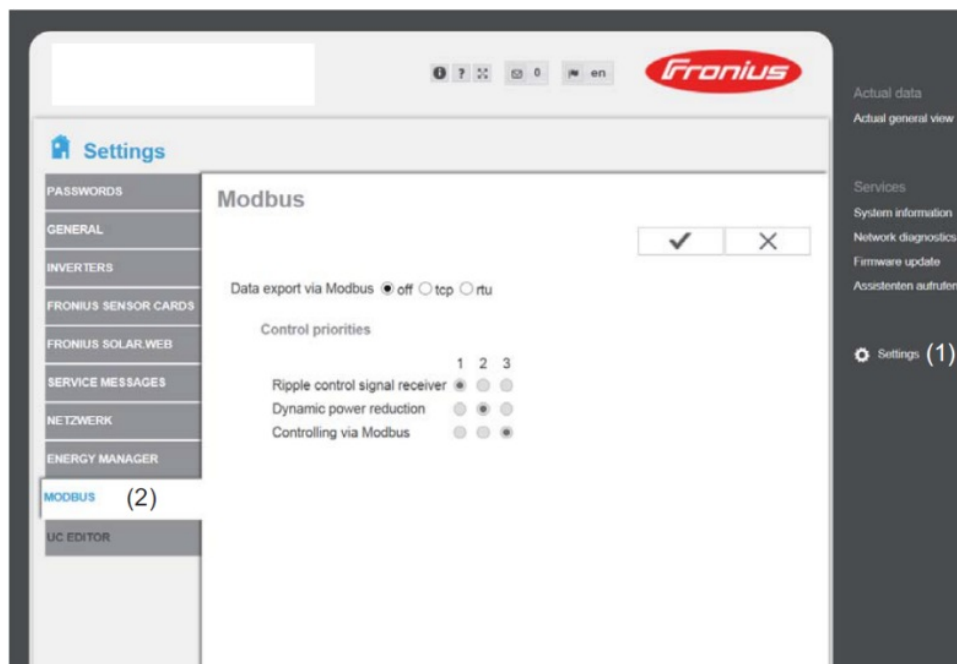
When GO and parameters are all configured, download the KNX Interface application to the device. The first download requires to press the programming button on the device to set the device in KNX programming mode then perform a full download.

6.5 INVERTER CONFIGURATION

MODBUS over TCP Support

MODBUS TCP function- is disabled by default.

- Install Fronius Datamanager (=> see the Fronius Datamanager operating instructions.)
- Open Internet browser
- Enter the following in the address field of the Internet browser:
 - the IP address of the Fronius Datamanager (can be accessed via System Information)
 - or host name and domain name of the Fronius Datamanager.
 - The web interface's start page is displayed.
- Select the “Settings” section (1).
- Open the “Modbus” section (2).



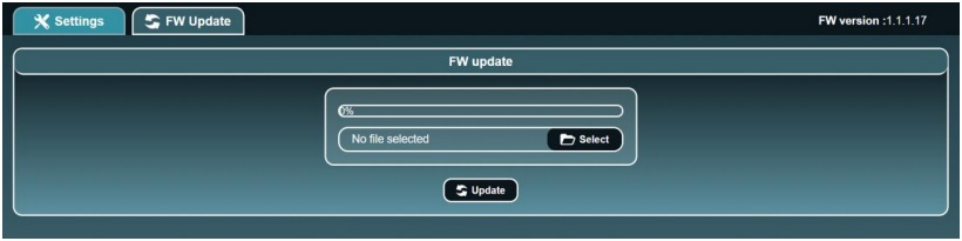
- Select data export : tcp
- Set modbus port : 502
- Set Sunspec model type: int+SF



7. FIRMWARE VERSION

This user manual and related ETS application is valid for firmware versions V2.2.0.0 and above.
The firmware version can be read from the gateway webpage using a web browser.

It is displayed on the top right of the page.



In case an updated firmware would be available, the device can be updated from the FW Update page, the binary file should be selected before pressing the Update button.

8. DATASHEET

TECHNICAL DATA	VALUE
Auxiliary power supply terminal	Screw terminal 12-30VDC / GND
Power consumption KNX bus typ.	< 16 mA @ 29VDC
Operating temperature	+5°C to + 45°C
Enclosure Dimensions (Space Units)	2 SU
Mounting	DIN RAIL
KNX terminal	Pluggable micro terminal, Red/Black, 4 pole PUSH WIRE for solid conductor wire 0.6-0.8 mm²
KNX bus voltage	29 VDC

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References

- [Die von Ihnen aufgerufene Seite existiert nicht â€“ KNX Association \[Official website\]](#)
- [User Manual](#)