



elausys INV-KNX Gateway SMA Inverters User Manual

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Product Information

Specifications

- Product: KNX Gateway for SMA Inverters
- Doc.Ref: INV-KNX-SMA-UM
- Revision: 2.01
- Page: 1 of 17

Introduction

The KNX gateway for SMA SUNNY BOY / SUNNY TRIPOWER 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.

Overview

Usage & Limitation

This gateway is intended to be used with an SMA 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.

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.

Parameters

Inverter Settings

To configure the settings of the inverter, refer to the user manual provided with the SMA inverter. The KNX gateway will transfer these settings to the KNX installation.

Logic Functions

The KNX gateway supports various logic functions to enable optimized energy consumption and automation. These functions can be configured using the ETS tool.

Communication Objects

General

The KNX gateway supports communication objects that allow for the transfer of data between the inverter and the KNX installation. These communication objects can be configured using the ETS tool.

Inverter Objects

The KNX gateway provides specific communication objects for the inverter, allowing for the transfer of inverter-related data such as power output, status, and fault codes.

Group Object List

The group object list contains all the communication objects available for configuration within the KNX installation. This list can be accessed and modified using the ETS tool.

Configuration

Network Configuration

To configure the network settings of the KNX gateway, refer to the user manual provided with the gateway. It will provide step-by-step instructions on how to connect the gateway to the ethernet network.

KNX Physical Device

The KNX physical device configuration is done using the ETS tool. Follow the instructions provided in the ETS tool documentation to configure the physical device settings.

INTRODUCTION

The KNX gateway for SMA SUNNY BOY / SUNNY TRIPOWER 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 SMA SUNNY BOY / SUNNY TRIPOWER 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.

OVERVIEW

USAGE & LIMITATION

This gateway is intended to be used with an SMA 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.

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.

CONNECTION DIAGRAM

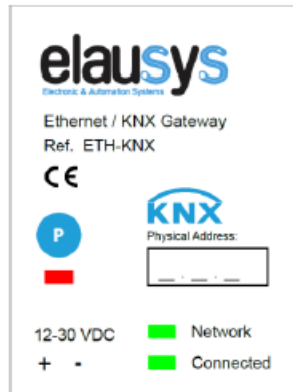
The KNX bus is connected on the top side of the gateway. An external power supply 12-30VDC is required and connected on the bottom side of the module, beside the RJ45 connector for the ethernet cable.



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



PARAMETERS

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

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	PV Circuits 1 or 2 applicable for this type of i nverters
Inverter model	§ 0...255	1 = SMA 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 o f battery 1
Battery 2	§ Not Used / Used	Display group objects to monitor the status o f battery 2 (NOT USED for this inverter)

Powermeter	§ Not Used / Used	Display group objects to monitor the power meter 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.

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.

COMMUNICATION OBJECTS

GENERAL

General communication objects of the device.

GO	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.

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 (NOT USED)
29	AC PF	Power factor
30	AC Energy	Total AC Energy
31	Efficiency	Inverter efficiency (NOT USED)
32	Insulation	Insulation resistance
33	Temperature	Cabinet temperature
40	Daily Energy Yield	(NOT USED)
41	Battery 1 Running Status	0 = Off 6 = Discharging 7 = Charging 8 = Float charge
42	Battery 1 power	(NOT USED)
43	Battery 1 SOC	Battery state of charge
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)

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 value	4 bytes	C R – T –	14.02 7	Electric potential (V)	AC Voltage Phase BC value
10	AC Voltage CA	Actual value	4 bytes	C R – T –	14.02 7	Electric potential (V)	AC Voltage Phase CA value

11	AC Voltage AN	Actual value	4 bytes	C R – T –	14.02 7	Electric potential (V)	AC Voltage Phase AN value
12	AC Voltage BN	Actual value	4 bytes	C R – T –	14.02 7	Electric potential (V)	AC Voltage Phase BN value
13	AC Voltage CN	Actual value	4 bytes	C R – T –	14.02 7	Electric potential (V)	AC Voltage Phase CN value
14	DC Current	Actual value	4 bytes	C R – T –	14.01 9	Electric current (A)	DC Total Current value
15	DC Voltage	Actual value	4 bytes	C R – T –	14.02 7	Electric potential (V)	DC Total Voltage
16	PV1 Voltage	Actual value	4 bytes	C R – T –	14.02 7	Electric potential (V)	PV1 Voltage
17	PV1 Current	Actual value	4 bytes	C R – T –	14.01 9	Electric current (A)	PV1 Current
18	PV2 Voltage	Actual value	4 bytes	C R – T –	14.02 7	Electric potential (V)	PV2 Voltage
19	PV2 Current	Actual value	4 bytes	C R – T –	14.01 9	Electric current (A)	PV2 Current

20	PV3 Voltage	Actual value	4 bytes	C R – T –	14.02 7	Electric potential (V)	PV3 Voltage
21	PV3 Current	Actual value	4 bytes	C R – T –	14.01 9	Electric current (A)	PV3 Current
22	PV4 Voltage	Actual value	4 bytes	C R – T –	14.02 7	Electric potential (V)	PV4 Voltage
23	PV4 Current	Actual value	4 bytes	C R – T –	14.01 9	Electric current (A)	PV4 Current
24	AC Power	Actual value	4 bytes	C R – T –	14.05 6	Power (W)	AC Power
25	DC Power	Actual value	4 bytes	C R – T –	14.05 6	Power (W)	DC Power

26	AC Frequency	Actual value	4 bytes	C R – T –	14.03 3	Frequency (Hz)	AC Frequency
27	AC VA	Actual value	4 bytes	C R – T –	14.05 6	Power (W)	AC Apparent power
28	AC VAR	Actual value	4 bytes	C R – T –	14.05 6	Power (W)	AC Reactive power
29	AC PF	Actual value	4 bytes	C R – T –	14.05 7	Power factor (cos phi)	Power factor
30	AC Energy	Actual value	4 bytes	C R – T –	13.01 3	Active energy (kWh)	Total AC Energy
31	Efficiency	Actual value	2 bytes	C R – T –	8.010	Percentage (%)	Inverter efficiency
32	Insulation	Actual value	4 bytes	C R – T –	14.05 6	Resistance (Ohm)	Insulation resistance
33	Temperature	Actual value	2 bytes	C R – T –	9.001	Temperature (°C)	Cabinet temperature
40	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 –	14.05 6	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 –	13.01 3	Energy (kWh)	
45	Battery 1 current day discharge	Actual value	4 bytes	C R – T –	13.01 3	Energy (kWh)	
46	Battery 1 total charge	Actual value	4 bytes	C R – T –	13.01 3	Energy (kWh)	

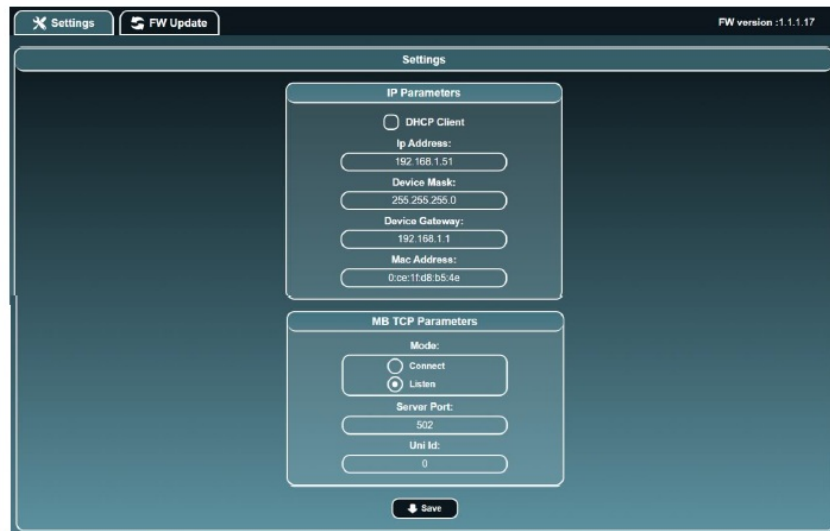
47	Battery 1 total discharge	Actual value	4 bytes	C R – T –	13.01 3	Energy (kWh)	
48	Battery 2 Running Status	Actual value	2 bytes	C R – T –	–	–	Status code

49	Battery 2 power	Actual value	4 bytes	C R – T –	14.05 6	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 –	13.01 3	Energy (kWh)	
52	Battery 2 current day discharge	Actual value	4 bytes	C R – T –	13.01 3	Energy (kWh)	
53	Battery 2 total charge	Actual value	4 bytes	C R – T –	13.01 3	Energy (kWh)	
54	Battery 2 total discharge	Actual value	4 bytes	C R – T –	13.01 3	Energy (kWh)	
55	Powermeter	Actual value	4 bytes	C R – T –	14.05 6	Power (W)	

CONFIGURATION

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.



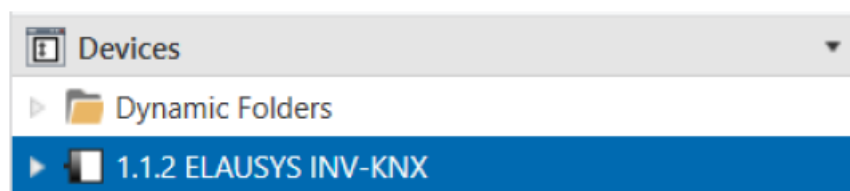
Set a fixed IP address of your choice for the KNX gateway and configure the modbus TCP settings as below:

- Mode: Connect
- IP: IP Address of the inverter
- Server Port: 502
- Uni Id: 126 (See note below)

NOTE: SMA Inverter Unit ID must be set to 3 on the inverter to be accessible using Unit id 126 on the gateway ! There is an offset of +123 from the ID set on the inverter.

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.



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 1 for SMA inverters
- Choose the refresh rate (min) for the complete set of data.
- Choose if battery 1 is available on the inverter.
- Device options should remain empty.

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

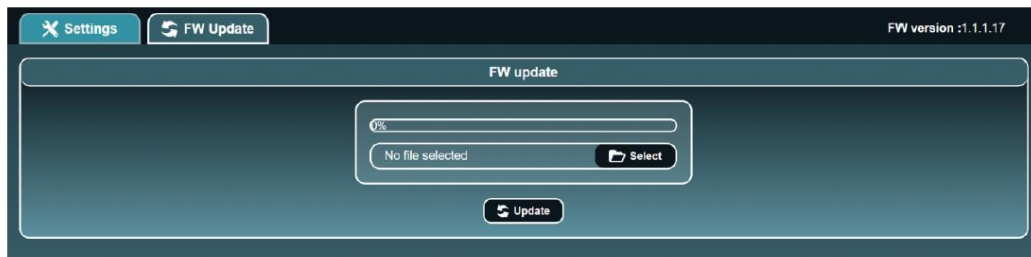
When GO and parameters are all configured, download the KNX Interface application to the device. The first download requires to press the programming button on the device to set the device in KNX programming mode then perform a full download.

INVERTER CONFIGURATION

1. Start Sunny Explorer on the computer and create a Speedwire system (see Sunny Explorer user manual).
2. Log into the Speedwire system as Installer.
3. Select the SMA inverter to be configured in the system tree.
4. Select the tab Settings.
5. Select the parameter group External Communication.
6. Select [Edit].
 1. You will see the categories TCP Server and UDP Server under the parameter group Modbus.
7. To activate the TCP server, make the following settings in the group Modbus > TCP Server:
 1. In the Activated drop-down list, select the entry Yes.
8. If necessary, change the port in the Port field (default setting: 502).
9. Select [Save].

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.

DATASHEET

TECHNICAL DATA	VALUE
Auxiliary power supply teminal	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 mm ²
KNX bus voltage	29 VDC

Documents / Resources

	elausys INV-KNX Gateway SMA Inverters [pdf] User Manual INV-KNX Gateway SMA Inverters, INV-KNX, Gateway SMA Inverters, SMA Inverters, Inverters
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References

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

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