Appendix for Ingeteam inverters – Modbus TCP

WebdynSun

The monitoring gateway for your solar installation

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1 Introduction

This appendix describes all the specific considerations involved in the protocol governing communication with Ingeteam inverters under Modbus TCP. It complements the chapter “Inverter management” of the WebdynSun User’s Manual MU_WebdynSun, available for download from our site http://www.webdynsun.com.

2 Connecting the gateway to the inverters

- All wiring must be carried out only by a specialised qualified electrician.
- Prior to installation, all equipment connected to the corresponding communications bus must be disconnected on both sides (DC and AC).
- Respect all safety recommendations appearing in inverter documentation.

The Modbus-TCP protocol requires that the WebdynSun be linked to the inverter network via a 100 Mbps Ethernet switch/hub. The link to the Ethernet switch is made by connecting an Ethernet RJ45 cable to the LAN port of the unit. The gateway can handle a maximum of 100 inverters.

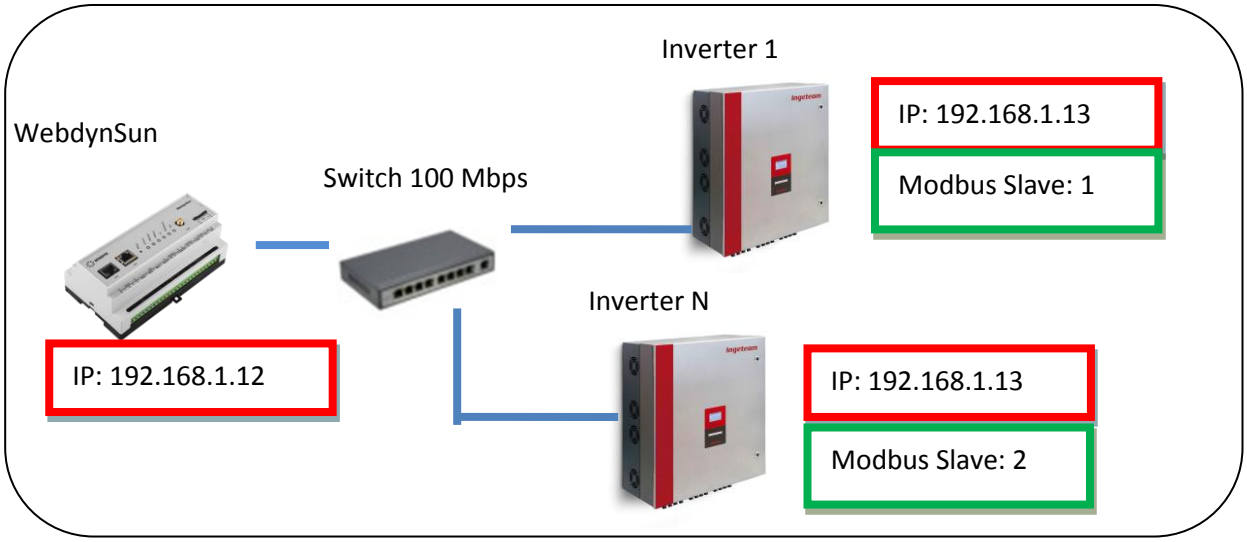
The TCP port used by the WebdynSun is port 512. Each inverter must have a unique pairing of IP address/Modbus slave identifier on the network.

Please refer to the inverter manufacturer’s documentation to see how to configure your Ingeteam devices under Modbus TCP before installing the WebdynSun on the Ethernet network.

As the WebdynSun must be placed on the same IP network as the inverters, it is essential to know their IP addresses.

In the interests of convenience, and as far as possible, it is desirable to use a Class C IP configuration with a subnet mask equal to 255.255.255.0. This enables the WebdynSun to discover all the devices connected, on demand.

Example:



3 Configuring and declaring inverters

Check that the parameter "INV_Type" in the configuration file *prefixID*_config.ini is correctly set before carrying out any configuration operations involving the inverters. It should have the value 16, to select the "Ingeteam - Modbus TCP" inverter protocol.

3.1 Discovering inverters

Inverter discovery is possible using the Modbus-TCP protocol on condition that the inverters have contiguous IP addresses and Modbus slave identifiers. It is performed via the built-in Web server on the WebdynSun, or using a command file. See the WebdynSun User's Manual for further details.

The *prefixID*_INV.ini and *prefixID*_daq.ini files, and the definition files for the devices discovered will be uploaded to the remote server at the next FTP connection, on condition that they are not already present on the server.

If inverter discovery does not work, the inverters must be declared manually as shown in the following section.

3.2 Manual declaration of inverters

Manual declaration of the inverters is carried out via the configuration file *prefixID*_daq.ini. To do this, you must first obtain the following information:

- Serial numbers of the inverters connected;
- IP address of each inverter;
- Modbus slave identifier of each inverter.

This information must be placed in the file *prefixID*_daq.ini as shown below:

INV_SN[*index*]=*inverterSerialNumber*
INV_FileDefName[*index*]=*prefixID*_INV_*firmwareVersion*.ini
INV_INFO[*index*]=*inverterIPAddress*:*inverterTCPPort*:*inverterModbusSlaveID*

Where:

index: Index of the INV device being declared (0 to 99).
inverterSerialNumber: Serial number of the inverter.
firmwareVersion: Firmware version on the inverter.
inverterIPAddress: IP address of the inverter.
inverterTCPPort: TCP port used for the Modbus connection: 502 by default.
InverterUnitID: Modbus-TCP identification number of the inverter (3 to 247).

Example:

INV_SN[0]=500110326R70
INV_FileDefName[0]=*prefixID*_INV_AAV1400AA.ini
INV_INFO[0]=192.168.1.11:502:1
INV_SN[1]=500110326R71
INV_FileDefName[1]=*prefixID*_INV_AAV1400AA.ini
INV_INFO[1]=192.168.1.11:502:2
INV_SN[2]=500110326R74
INV_FileDefName[2]=*prefixID*_INV_AAV1400AA.ini
INV_INFO[2]=192.168.1.11:502:3

On its next connection, the gateway will download its *prefixID*_daq.ini and *prefixID*_INV_*firmwareVersion*.ini files and begin collecting data.

3.3 Definition file

Each inverter is characterised by its definition file. These files are generated automatically by the WebdynSun during the inverter discovery process. They are uploaded by the gateway to the remote FTP server at the following connection to the server. They can be modified by the user as required.

Every parameter or variable to be collected is defined in the definition file in accordance with the following format:

index;reserved(*);*requestType*(*);*modbusRegister*(*);*name*;*unit*;*coefA*;*coefB*;*action*

Where:

index: Index of the variable to be collected.
reserved: Reserved for future use.
requestType: Type of Modbus-TCP request, format of the Modbus variable to be collected.
modbusRegister: Address of the Modbus register.
name: Name of the variable to be captured.
Unit: Units of the variable to be captured.
coefA and *coefB*: Scaling coefficients (Ax + B).
action: Action to be performed on the variable

- ***0***: Variable not collected.
- ***1***: Variable treated as read-only parameter.
- ***2***: Min/max/avg values.
- ***4***: Instantaneous value.
- ***8***: Variable treated as an alarm.

(*) Parameter not user modifiable.

The file generated by default is:

***prefixID*_INV_*firmwareVersion*.ini**

```
1;0;00043301;0000;Total-Energy;kWh;1;0;4
2;0;00043301;0002;HoursUpAndRunning;h;1;0;4
3;0;00043301;0004;NumberOfConnectionToGrid;-;1;0;4
4;0;00042301;0007;Alarms;-;1;0;8
5;0;00042301;0008;Vdc;V;1;0;2
6;0;00042301;0009;Idc;A;0.01;0;2
7;0;00042301;000A;Vac1;V;1;0;2
8;0;00042301;000B;Vac2;V;1;0;2
9;0;00042301;000C;Vac3;V;1;0;2
10;0;00042301;000D;Iac1;A;0.01;0;2
11;0;00042301;000E;Iac2;A;0.01;0;2
12;0;00042301;000F;Iac3;A;0.01;0;2
13;0;00042301;0010;Cos(phi);-;0.001;0;2
14;0;00042301;0011;SignOfSin(phi));-;1;0;2
15;0;00042301;0012;Power;W;10;0;2
16;0;00042301;0013;Grid_Frequency;Hz;0.01;0;2
17;0;00042301;0014;Current_year;-;1;0;4
18;0;00042301;0015;Current_month;-;1;0;4
19;0;00042301;0016;Current_day;-;1;0;4
20;0;00042301;0017;Current_hour;h;1;0;4
21;0;00042301;0018;Current_minute;min;1;0;4
22;0;00042301;0019;Current_sec;s;1;0;4
```

4 Using inverter data

4.1 Data files

Ingeteam inverter data files comply with the format described in the WebdynSun User's Manual.

4.2 Parameter files

Ingeteam inverter parameter files comply with the format described in the WebdynSun User's Manual.

4.3 Alarm files

Ingeteam inverter alarm files comply with the format described in the WebdynSun User's Manual.

Mechanism for censoring alarms

For status variables configured as alarms, it is possible to specify, in the definition file, which values are to be censored, i.e. for which an alarm report should not be uploaded, even though the action code is 8.

This mechanism means that an alarm is not uploaded if the value taken by a variable with an action code of 8 has been declared in the list of values to be ignored.

The list of values to be ignored is specific to each variable declared in the definition file with the action code Alarm (8), and is written in the field following that containing the Alarm action code.

The values to be censored are separated by the pipe symbol "|".