



Annex

KACO

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KACO

1. Supported equipment

KACO inverters are compatible with the following protocols implemented in the WebDynSunPM:

Inverter protocol	Physical interface	Specifications
KACO	RS485 2 wires	32 max
Modbus RTU	RS485 2 wires	32 max for interface
SunSpec Modbus TCP	Ethernet	100 max



The maximum number of supported devices may be influenced by the number of variables to be communicated.



On the same RS485 physical interface, the connected inverters must have the same protocol and serial configuration.

The communication protocols are available depending on the inverter module. (see table below)

Inverters	KACO (RS485)	Modbus RTU	SunSpec Modbus TCP
Powador 2500xi / 3600xi / 4000xi / 4500xi / 5000xi	X		
Powador 4000 supreme	X		
Powador 2002 / 3002 / 4202 / 5002 / 6002	X		
Powador 6400xi / 6650xi / 7200xi / 8000xi	X		
Powador 6400 / 6650 / 7200 / 8000 supreme	X		
Powador 10.0 TL3 / 12.0 TL3 / 14.0 TL3	X		X
Powador 25000xi / 30000xi / 33000xi / Park	X		
Powador 30.0 TL3 / 37.5 TL3 / 39.0 TL3 / 72.0 TL3	X		X
Powador 12.0 TR3 / 14.0 TR3 / 18.0 TR3	X		X
Powador XP100-HV / XP200-HV / XP250-HV	X		X
Powador XP200-HV TL / XP250-HV TL / XP350-HV TL	X		X
Blueplanet 3.0 TL3 – 10.0TL3			X
Blueplanet NX1	X		
Blueplanet NX3	X		X
Blueplanet 3.0 – 5.0 NX1 M2		X (owner)	
Blueplanet 3.0 – 20.0 NX3 M2	X	X (SunSpec)	X
Blueplanet 25.0 – 33.0 NX3 M3	X	X (SunSpec)	X

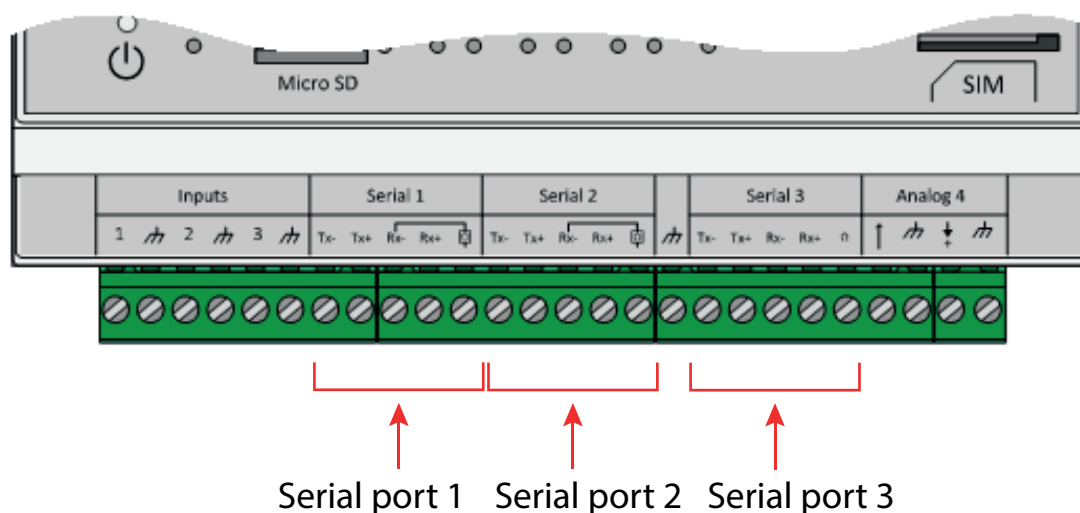
Inverters	KACO (RS485)	Modbus RTU	SunSpec Modbus TCP
Blueplanet Gridsave 50.0 – 137 TL3			X
Blueplanet Hybrid 10.0 TL3	contact us		



The inverter lists are partial and subject to change. Please check compatibility on the Kaco website: <https://kaco-newenergy.com>

2. Connection of the gateway to KACO inverters using an RS485 bus

The KACO inverters are connected to one of the WebdynSunPM's three RS485 communication buses. The gateway can be at the end of the RS485 communication bus or in the middle.



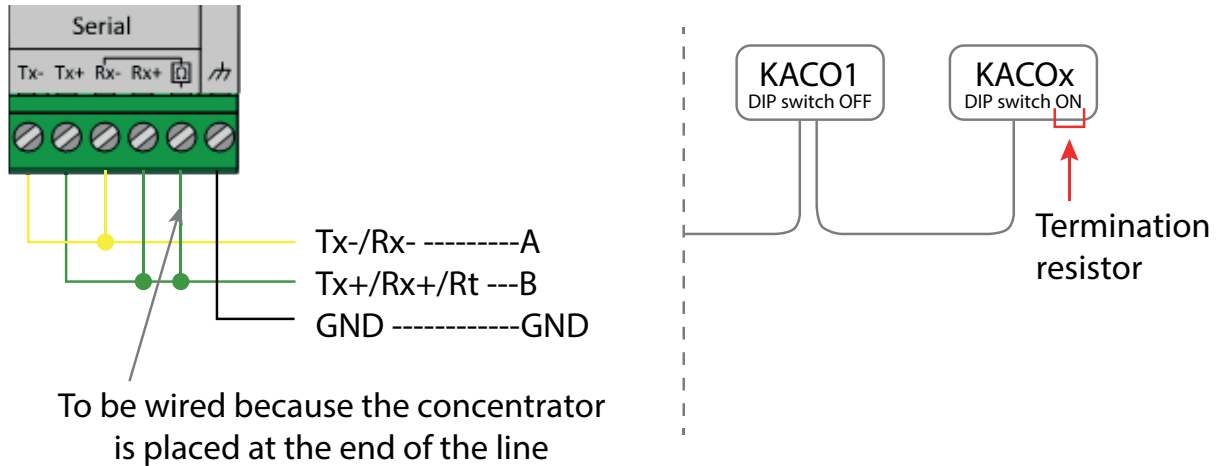
All wiring work must be carried out by a specialised qualified electrician. Before installation, all devices connected to the corresponding communication bus must be disconnected on both sides (DC and AC). Please follow all the safety instructions featured in the inverter documentation.

For more details, please refer to the WebdynSunPM user manual.

2.1 KACO inverter 2-wire RS485 wiring (Half-Duplex)

For the RS485 wiring, refer to the KACO inverter manual.

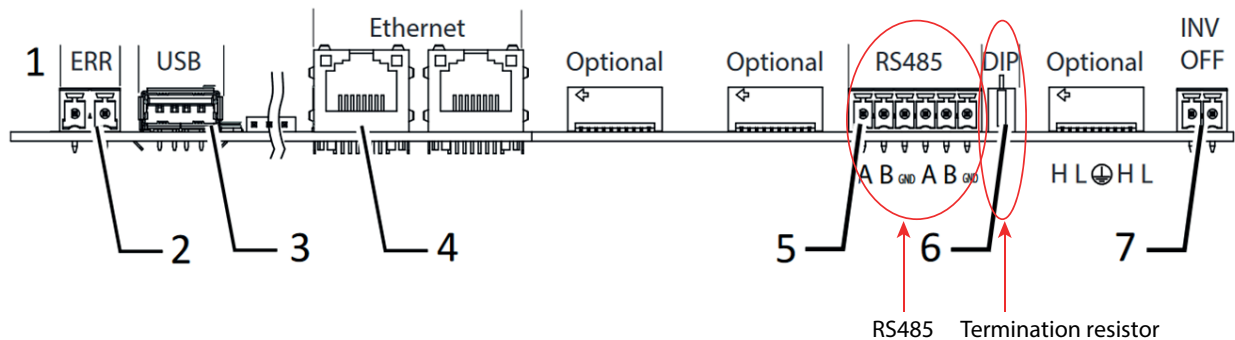
Wiring example



The explanations on KACO communication boards are below:

2.1.1 Communication board

Wiring:

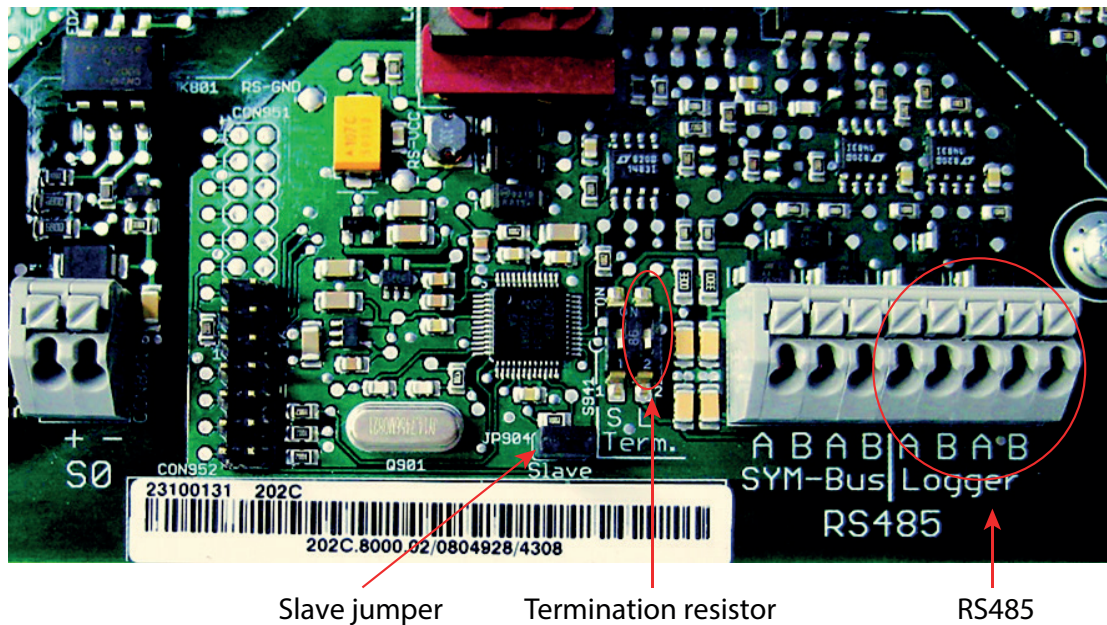


Termination resistor:

A 120Ω termination resistor must be activated by moving the DIP switch to ON on the inverter placed at the end of the line.

2.1.2 Powador 6400xi / 6650xi / 7200xi / 8000xi_inverter

Wiring:



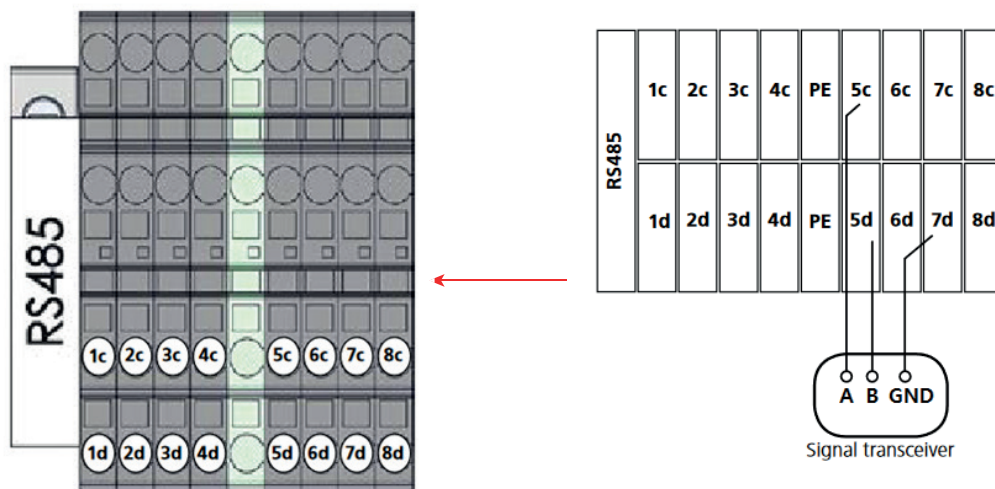
The Slave jumper must be inserted.

Termination resistor:

A 120Ω termination resistor must be activated by moving DIP switch 2 “L” to ON on the inverter placed at the end of the line.

2.1.3 Blueplanet 1000/875/750 TL3 inverter

Wiring:



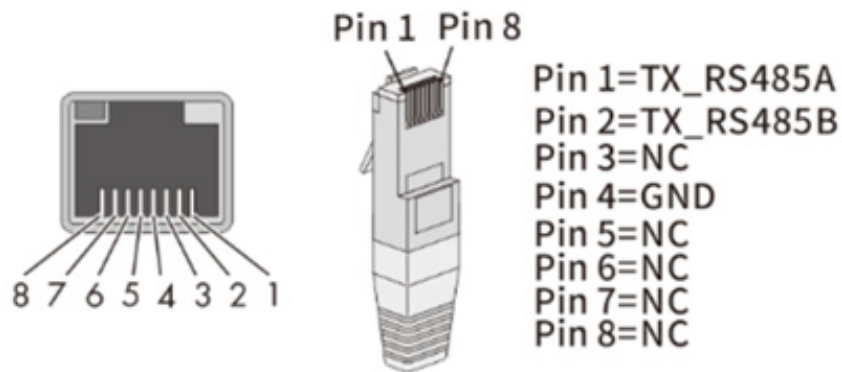
Terminal number	Terminal designation	Specification	Wire cross-section
5c	RS485 A2	RS485 signal A2	AWG22 (0.326mm ²)
5d	RS485 B2	RS485 signal B2	
7c	RS485 C2	Terminator resistor terminal	
7d	RS485 G2	RS485 data transmission GND 2	

Termination resistor:

A 120Ω termination resistor must be activated by shunting terminal “5d” and terminal “7c” on the RS485 terminal block on the inverter placed at the end of the line.

Blueplanet NX3 inverter (3.0 --20.0):

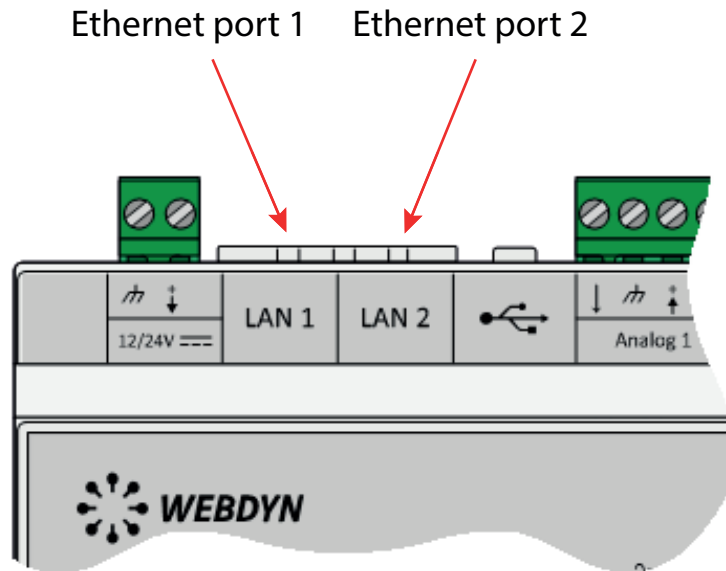
Wiring:



Connection to the RJ45 socket requires at least a Cat 5E network cable.

3. Connection of the gateway to the inverters using SunSpec Modbus TCP via Ethernet

The connection of the inverters using SunSpec Modbus TCP uses one of the two WebdynSunPM Ethernet interfaces (LAN1 or LAN2).



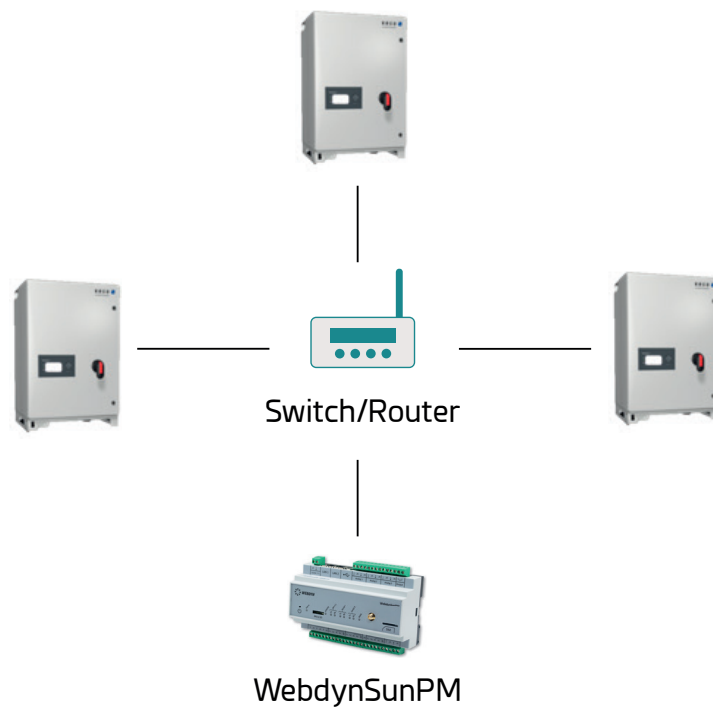
For more details, please refer to the WebdynSunPM user manual.

3.1.1 Star topology wiring

Only for inverters that have 2 network sockets.



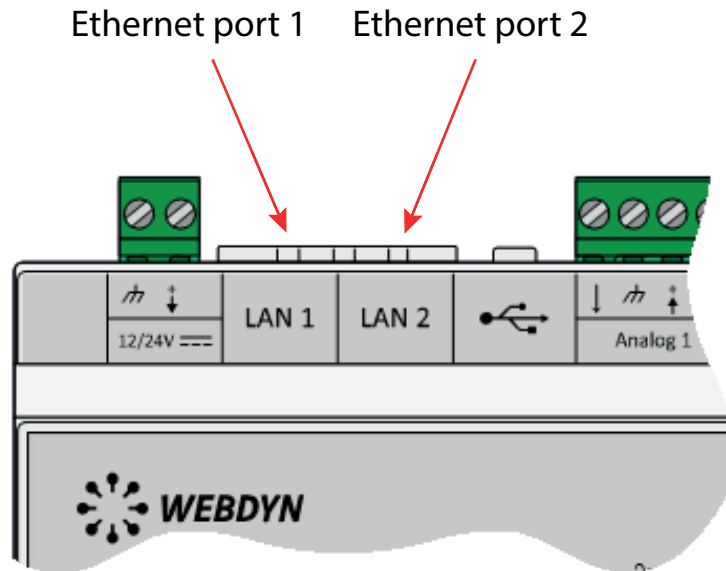
3.1.2 Star topology wiring:



The maximum cable length between two network participants is also referred to as the "end-to-end connection". The maximum end-to-end connection length depends on the cable type. If rigid cable is used (installation cables), the maximum length is 100 metres.

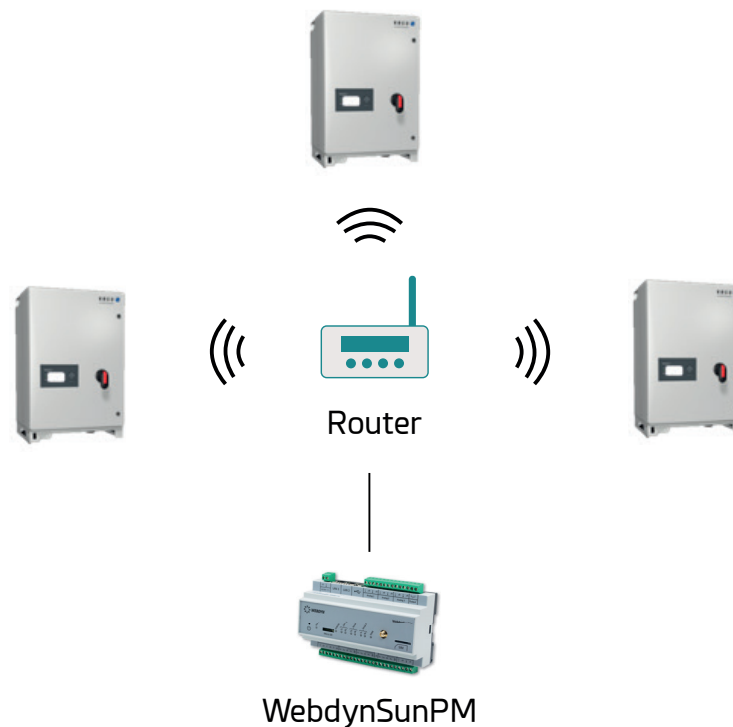
4. Connection of the Gateway to the Inverters in SunSpec Modbus TCP via WiFi

The connection of the inverters in SunSpec Modbus TCP is done on one of the two Ethernet interfaces (LAN1 or LAN2) of the WebdynSunPM.



For more details, please refer to the webdynSunPM user manual.

4.1.1 Wiring in star topology:



The maximum length between the WebdynSunPM and the WiFi router depends on the type of cable. When using a rigid cable (installation cables), the maximum length is 100 meters.

KACO inverters must be equipped with a USB WiFi dongle (KACO accessory, type: WLAN adapter Digitus 150 N micro article no.: 3013222).



5. Serial port configuration

No configuration is required for the serial port on KACO inverters as it is fixed. Check that the serial identifier is different on each KACO device connected on the site. (refer to the Solarmax manufacturer manual).

The serial port can be configured using the WebdynSunPM web interface using the "Settings" tab.

The “serial” part is used to configure 3 RS485/422 serial ports which have their own settings and output.

Serial ports

Serial 1

Serial 2

Serial 3

Serial ports

Serial 2

Protocol

KACO

Mode

RS485 2 wires

Baudrate

9600

Data bits

8

Parity

None

Stop bits

1

InterFrame(ms)

0

Forwarded TCP port

Apply modifications

Cancel

Parameters of the selected serial port

The possible parameters for KACO inverters in KACO mode for each serial port are:

Web interface	<uid>_daq.csv parameter	Description
Protocol	protocol	The protocol type for the serial interface: KACO: serial port configured in KACO mode

Web interface	<uid>_daq.csv parameter	Description
Mode	wires	Serial interface mode: RS485 2 wires: Half-Duplex (2 wires) RS485 serial connection
Baudrate	baudrate	Serial connection speed in bauds: 9600
Data bits	data_bits	Number of data bits: 8
Parity	parity	Serial connection parity: None: no parity
Stop bits	stop_bits	Number of stop bits: 1
InterFrame	interframe	Waiting time between 2 frames exchanged on the serial port. This time is expressed in ms. See the explanation in the WebdynSunPM user manual. 0: (recommended value)
Forwarded TCP port	forwarded_port	Forwarded TCP port. If there is a value in this field, the concentrator opens a modbusTCP port on the entered port number. When modbusTCP devices connect to this port, all sent requests are directly forwarded to the modbusRTU bus and the response is returned to the connected device using this modbusTCP port. This option is used to create a communication tunnel between modbusTCP devices and the local modbusRTU network. The requests are slotted between the concentrator's internal monitoring requests. Leave the field blank. (recommended value)

This configuration can be accessed remotely in the “<uid>_daq.csv” file stored in the CONFIG directory of the remote server. (see WebdynSunPM user manual)

6. Ethernet port configuration

An IP address must be assigned to each inverter, the address must be unique and on the same subnet as the WebdynSunPM. (refer to the KACO manufacturer manual).

The Ethernet port can be configured using the WebdynSunPM web interface using the "Network" tab.

The "Network" part is used to configure 2 Ethernet interfaces (LAN1 and LAN2) each of which each have their own configuration and output.

The WebdynSunPM default Ethernet port configuration is as follows:

Parameters	LAN1	LAN2
IP address	192.168.1.12	192.168.2.12
Subnet mask	255.255.255.0	255.255.255.0



If you want to connect several IP devices to the same network, the devices must have different IP addresses but belong to the same subnet. Never use the same IP address twice.

The 2 Ethernet interface settings are:

Web interface	<uid>_daq.csv parameter	Description
IP	ip	IP address at which the concentrator is accessible using the Ethernet network.
Netmask	mask	Your Ethernet network subnet mask. This mask limits the Ethernet network to defined IP addresses and separates the network ranges from each other.

Web interface	<uid>_daq.csv parameter	Description
Gateway	gateway	Your Ethernet network gateway address. The gateway address is the IP address for the device that connects to the internet. The address entered here is usually your ADSL/fibre router address.
DNS 1	dns1	DNS 1 server. DNS (Domain Name System) servers translate explicit internet addresses (for example, www.webdyn.com) into their corresponding IP addresses. Enter the DNS server addresses you received from your internet service provider (ISP) here. You can also enter your router IP address. You can also use the google DNS: "8.8.8.8"
DNS 2	dns2	DNS 2 server. If the DNS1 server fails.
IP	ip	IP address at which the concentrator is accessible using the Ethernet network.
Netmask	mask	Your Ethernet network subnet mask. This mask limits the Ethernet network to defined IP addresses and separates the network ranges from each other.
Gateway	gateway	Your Ethernet network gateway address. The gateway address is the IP address for the device that connects to the internet. The address entered here is usually your ADSL/fibre router address.

This configuration can be accessed remotely in the "<uid>_daq.csv" file stored in the CONFIG directory of the remote server. (see WebdynSunPM user manual)



If your local network is managed by a network administrator, contact them before including the WebdynSunPM gateway in your network.

7. Automatic device detection

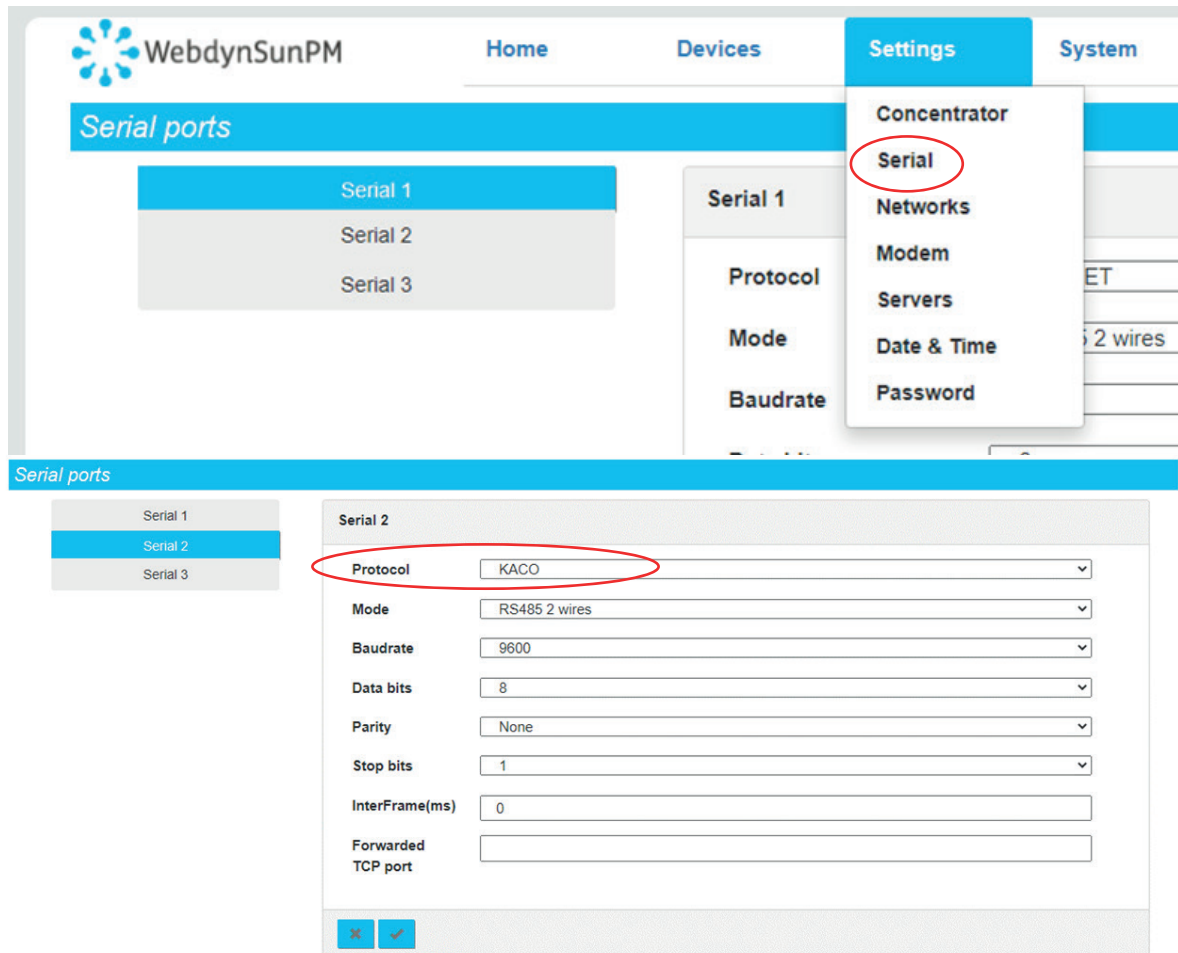
The concentrator can detect KACO inverters automatically depending on the protocol implemented in the model being used (see list below):

- KACO: The devices responding to the KACO protocol
- SunSpec Modbus RTU: Equipment responding to the SunSpec protocol in RS485
- SunSpec Modbus TCP: The devices responding to the SunSpec protocol in IP

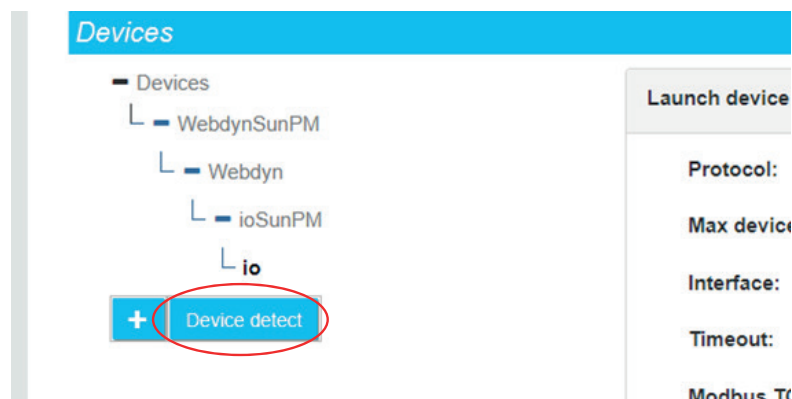
8. KACO device detection

The automatic detection of a KACO device requires the following steps:

- Connect the device to the concentrator using a serial connection configured as explained below.
- Configure the serial connection on the configuration page indicating the required communication speed and the protocol type. Indicate “KACO”:



- Go to the device page and click the “Device detect” button:



- The detection page is displayed:

- Select the KACO protocol from the drop-down list on the first “Protocol” field.
- Enter the number of devices to detect in the “Number of devices” field. The default value is “100”.
- Select the serial port configured in the “Interface” field. For the serial connection to be selectable, it must first be configured by going to the "Settings" tab, then "Serial" and selecting the "KACO" protocol.
- The timeout indicates the KACO device response time. By default it is set to 10000 ms.
- Next click the “Start detection” button to launch the detection. The progress window below is displayed:

As detection progresses it is displayed on the web page:

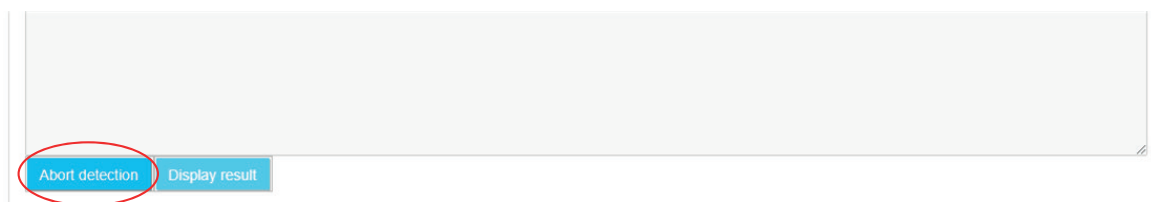
- “Start KACO search” means KACO scan has begun.
- As the detection progresses, the screen displays the detected devices with their index, serial number, model and address on the bus:

```
Device idx: 0, serial: ADDR1, model: 10k1, Address: 0x1 detected
```

- On completion of the detection, the page displays the number of detected devices:

found 6 devices
Search KACO finished

- It is always possible to interrupt detection by clicking the “Abort detection” button.



- On completion of the KACO detection, the last detection page is used to view all detected inverters and, eventually, add them to the configuration.

Add detected inverters						
Manufacturer	Model	Serial number	Address	Def file	Reg.cap?	Add?
KAC	10k1	ADDR1	1	WPM00C73F_	<input type="checkbox"/>	<input checked="" type="checkbox"/>
KAC	100kTR	ADDR2	2	WPM00C73F_	<input type="checkbox"/>	<input checked="" type="checkbox"/>
KAC	100TL	ADDR3	3	WPM00C73F_	<input type="checkbox"/>	<input checked="" type="checkbox"/>
KAC	300TL	ADDR4	4	WPM00C73F_	<input type="checkbox"/>	<input checked="" type="checkbox"/>
KAC	100kTR	ADDR5	5	WPM00C73F_	<input type="checkbox"/>	<input checked="" type="checkbox"/>
KAC	50kH4P	ADDR6	6	WPM00C73F_	<input type="checkbox"/>	<input checked="" type="checkbox"/>
KAC	125N16	ADDR7	7	WPM00C73F_	<input type="checkbox"/>	<input checked="" type="checkbox"/>
KAC	160TR	ADDR8	8	WPM00C73F_	<input type="checkbox"/>	<input checked="" type="checkbox"/>
KAC	5000xi	ADDR9	9	WPM00C73F_	<input type="checkbox"/>	<input checked="" type="checkbox"/>
KAC	5000xi	ADDR10	10	WPM00C73F_	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Accept	Cancel					Alt?

- This screen therefore displays all the detected devices, as well as a certain number of data read from the KACO device tables (model, serial number, address, manufacturer)

There is also a checkbox at the right to select the devices to add to the configuration. Note that if the detected device is already part of the configuration, the checkbox is not checked by default. Otherwise the checkbox is checked for automatic addition.

Once the devices have been selected, clicking the “Accept” button imports the new configuration to the concentrator and the device appears in the configured devices.

- When the user clicks the “Accept” button, the device import starts by reading the different frames to completely create the devices. The import progress is displayed in the import window:

Device detection status

Create devices...

Create template for device idx: 9, serial: ADDR10, model: 5000xi, Address: 0xa

Create template for device idx: 8, serial: ADDR9, model: 5000xi, Address: 0x9

Create template for device idx: 7, serial: ADDR8, model: 160TR, Address: 0x8

Create template for device idx: 6, serial: ADDR7, model: 125N16, Address: 0x7

Create template for device idx: 5, serial: ADDR6, model: 50kH4P, Address: 0x6

Abort detection

Display result

Note that if the device already existed in the configuration and the user forces a new import, the previous device is not overwritten. A new device is created in addition to the pre-existing device.

Automatic detection is used to create the definition files needed for the inverters to run. These files are stored and accessible in the DEF directory on the remote server. (see WebdynSunPM user manual)

9. KACO definition file

KACO protocol file names are composed as follows:

<uid>_KAC_Inverter_KAC_<Model>.csv

Where:

- <uid>: Concentrator identifier
- < Model>: is generated automatically from the KACO protocol “Model” information

The action to be performed on the variables can be modified according to your needs. (see WebdynSunPM manual chapter 3.1.2.2.2: “Content of the definition file”).

Definition file content:

Field	Description
Info1	Canal: The channel number for the variable to be collected. This information is specific to the inverter and should not be modified.

Field	Description
Info2	Variable Type: type of variable to be collected (analogue, digital, etc.). This information is specific to the inverter and should not be modified.
Info3	KACO Variable format. The authorised formats are the following: <ul style="list-style-type: none"> • U32: 32 bit unsigned integer (4 bytes, or 2 registers) • F32: 32 bit floating (4 bytes, or 2 registers) • String: the variable is a character string. In that case the “Address_Size” notation should be used for the “Info2” field
Info4	Not used

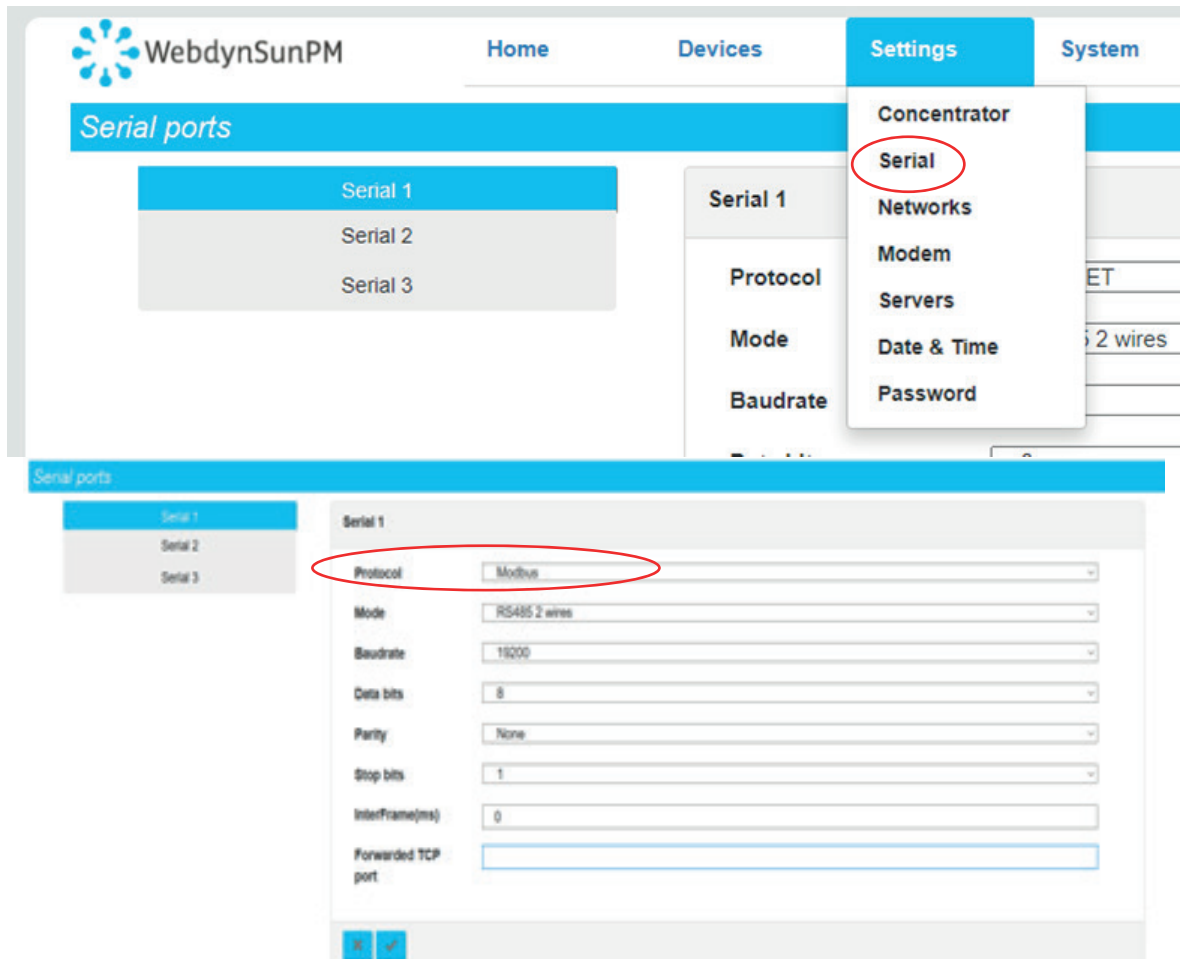
Example of a definition file for a KACO 10k1 inverter in KACO mode:

```
KACO;Inverter;KAC;10k1
1;1;0;U32;;Status L1;;1.000000;0.000000;-;8
2;1;1;U32;;Generator Voltage L1;;1.000000;0.000000;V;2
3;1;2;F32;;Generator Current L1;;1.000000;0.000000;A;2
4;1;3;F32;;Generator Power L1;;1.000000;0.000000;W;2
5;1;4;U32;;Grid Voltage L1;;1.000000;0.000000;V;2
6;1;5;F32;;Grid Current L1;;1.000000;0.000000;A;2
7;1;6;F32;;Grid Power L1;;1.000000;0.000000;W;2
8;1;7;U32;;Inverter Temperature L1;;1.000000;0.000000;°C;2
9;1;8;U32;;Daily Energy L1;;1.000000;0.000000;Wh;4
10;1;9;STRING;;Inverter type L1;;1.000000;0.000000;-;1
11;2;0;U32;;Status L2;;1.000000;0.000000;-;4
12;2;1;U32;;Generator Voltage L2;;1.000000;0.000000;V;2
13;2;2;F32;;Generator Current L2;;1.000000;0.000000;A;2
14;2;3;F32;;Generator Power L2;;1.000000;0.000000;W;2
15;2;4;U32;;Grid Voltage L2;;1.000000;0.000000;V;2
16;2;5;F32;;Grid Current L2;;1.000000;0.000000;A;2
17;2;6;F32;;Grid Power L2;;1.000000;0.000000;W;2
18;2;7;U32;;Inverter Temperature L2;;1.000000;0.000000;°C;2
19;2;8;U32;;Daily Energy L2;;1.000000;0.000000;Wh;4
20;2;9;STRING;;Inverter type L2;;1.000000;0.000000;-;1
21;3;0;U32;;Status L3;;1.000000;0.000000;-;4
22;3;1;U32;;Generator Voltage L3;;1.000000;0.000000;V;2
23;3;2;F32;;Generator Current L3;;1.000000;0.000000;A;2
24;3;3;F32;;Generator Power L3;;1.000000;0.000000;W;2
25;3;4;U32;;Grid Voltage L3;;1.000000;0.000000;V;2
26;3;5;F32;;Grid Current L3;;1.000000;0.000000;A;2
27;3;6;F32;;Grid Power L3;;1.000000;0.000000;W;2
28;3;7;U32;;Inverter Temperature L3;;1.000000;0.000000;°C;2
29;3;8;U32;;Daily Energy L3;;1.000000;0.000000;Wh;4
30;3;9;STRING;;Inverter type L3;;1.000000;0.000000;-;1
31;100;0;F32;;Grid Power Total;;1.000000;0.000000;W;4
32;100;1;U32;;Daily Energy Total;;1.000000;0.000000;Wh;4
```

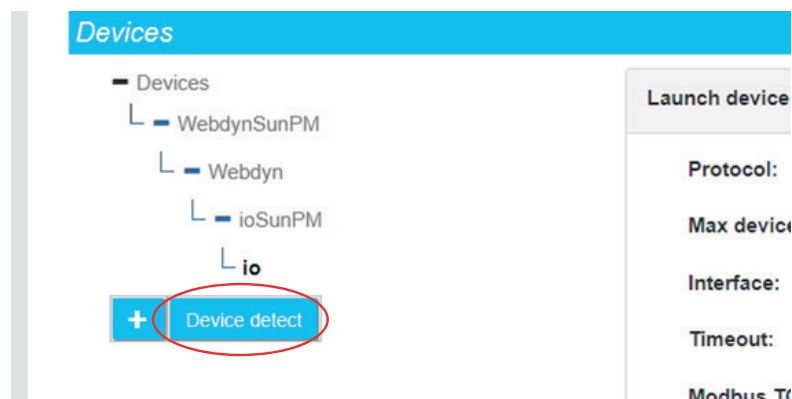
10. Detection of a SunSpec Modbus RTU Device

Automatic detection of a Kaco SunSpec Modbus RTU device requires the following steps:

- Connect the equipment to the hub using a serial link configured as below.
- Configure the serial link in the configuration page by specifying the desired communication speed as well as the type of protocol. Specify “Modbus”:



- Go to the equipment page and click on the “Device detect” button:



- The detection page is then displayed:

- Choose the Sunspec protocol from the drop-down list in the first “Protocol” field.
- In the “Number of devices” field, enter the number of devices to be detected. The default value is “100”.
- Select the configured serial port in the “Interface” field. For the serial link to be selectable, you must first configure the serial link in the “Settings” tab then “Serial” and choose the “Modbus” protocol.
- The timeout indicates the response time of the Kaco SunSpec equipment. By default, it is set to 2000 ms.
- Then click on the “Start detection” button to start the detection. The following progress window is then displayed:

As the detection proceeds, the progress will be displayed in the web page:

- “SunSpec detection start” means SunSpec scan is started.
- “NON SUNSPEC device found” means that a modbus device but not SunSpec has been detected at the specified modbus address:

```
2021-12-24 09:56:10:NON SUNSPEC device found at @1.
```

Means that a modbus device that does not meet SunSpec specifications was found at modbus address 1.

- “SunSpec device found” means that a modbus device meeting SunSpec specifications has been detected at the specified modbus address:

```
2021-12-24 09:56:21: SunSpec device found at @126.
```

Means that a device conforming to SunSpec specifications has been detected at modbus address “126”.

- “Found table” means that a SunSpec table has been detected on the device. The information line then indicates the identifier of the table, its size claimed by the device, as well as technical information on the device and the starting modbus register number of the table:

```
2021-12-24 09:56:21:Found table 1:66 at 40002@126
```

Means that the table with identifier “1” and size “66” registers has been detected on the modbus equipment at register “40002” and the modbus address “126”

- the screen displays the devices detected with their Modbus tables and their address on the bus:

```
SunSpec device found at @126.  
Found table 1:66 at 40002@126  
Found table 11:13 at 40070@126  
Found table 12:98 at 40085@126  
Found table 101:50 at 40185@126  
Found table 120:26 at 40237@126  
Found table 121:30 at 40265@126  
Found table 122:44 at 40297@126  
Found table 123:24 at 40343@126  
Found table 124:24 at 40369@126  
Found table 126:64 at 40395@126  
Found table 127:10 at 40461@126  
Found table 128:14 at 40473@126  
Found table 131:64 at 40489@126  
Found table 132:64 at 40555@126  
Found table 160:128 at 40621@126  
Found table 129:60 at 40751@126  
Found table 130:60 at 40813@126
```

- “End of SunSpec detection” means SunSpec detection is complete. The line indicates the number of devices detected:

```
2021-12-24 09:56:53: End of SunSpec detection on serial1. 1 devices found.
```

SunSpec discovery completed successfully on serial interface 1. A device has therefore been detected.

- During the detection, it is always possible to interrupt at any time by clicking on the “Abort detection” button. But this is not recommended, as Kaco inverters can be disturbed if detection is stopped in the middle of a discovery.



- At the end of the Kaco SunSpec detection, the following page appears to view all the devices that have been detected and, if necessary, to add them to the configuration:

Add detected inverters						
Manufacturer	Model	Serial number	Address	Def file	Reg.cap?	Add?
KACO	Solar Inverter	1930159978	1	00B9FC_KACO ▾	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Accept	Cancel					All?

This screen therefore displays all detected, as well as a certain amount of information read in the Kaco SunSpec equipment tables (model, serial number, address, manufacturer)

There is also a checkbox on the far right that allows you to choose the equipment to add to the configuration. Note that if the device detected is already part of the configuration, the box is unchecked by default. Otherwise the box is checked for an automatic addition.

Once the equipment has been selected, clicking on the “Accept” button imports the new configuration into the concentrator and the device appears in the configured equipment.

The variables for this new device will be generated based on the detected SunSpec tables. Thus, for each detected SunSpec table, the following variables will be created:

- `<idTable>_tableId`: this variable will contain the identifier of the table in numeric form, as a 16-bit integer
- `<idTable>_tableSize`: this variable contains the size of the table in number of registers, as a 16-bit integer
- `<idTable>_<variableName>`: for each table variable declared in the SunSpec standards, a corresponding variable will be associated with the device. The variable name will consist of the table identifier, followed by the variable name
- `<idTable>_<repeatBlock>_<variableName>`: in the case of variables that come from a repeating block, the variables are created using the table identifier, the repetition number, as well as the name of the variable, so that the generated name is unique.

The variables generated are, by default, of the “Parameter” type and will therefore have the “Action” code 1, with the exception of the variables of tables 101, 102, 103, 111, 112, 113, 123, 160 and 401 which will be created with the “Immediate” type, i.e. code 4.

It should also be noted that the following variables will have an automatically applied tag used for the regulation scripts (see the specific application notes) and which are:

- WMaxLimPct of table 123 receives the tag “cmdPwrPercent”

- WMaxLimPct_RmpTms of table 123 receives the tag “WMaxLimPct_RmpTms”
- WMaxLimPct_Ena of table 123 receives the tag “WMaxLimPct_Ena”
- VarPct_Mod of table 123 receives the tag “VArPct_Mod”

Note that if the equipment already existed in the configuration and the user forces a new import, the previous equipment is not overwritten. New equipment is created in addition to pre-existing equipment.

If the user clicks on the “Cancel” button, this list is erased, and the page displays the detection type selection screen again.

Automatic detection makes it possible to create the definition files necessary for the operation of the inverters. These files are deposited and accessible in the DEF directory on the remote server. (see WebdynSunPM user manual)

11. SunSpec Modbus RTU Definition File

The names of the files for the SunSpec Modbus RTU protocol are made up as follows: <uid>_SunSpec_inverter_<Manufacturer>_<Model>_ModbusRTU.csv

With :

- <uid>: Concentrator ID
- <Manufacturer>: automatically generated from the “Manufacturer” information of the SunSpec protocol
- <Model>: automatically generated from the “Model” information of the SunSpec protocol

The action to be performed on the variables can be modified according to your needs. (see WebdynSunPM manual chapter 3.1.2.2.2: “Content of the definition file”)

Content of the definition file: (See the WebdynSunPM manual chapter 3.1.2.2.2: “Modbus”).

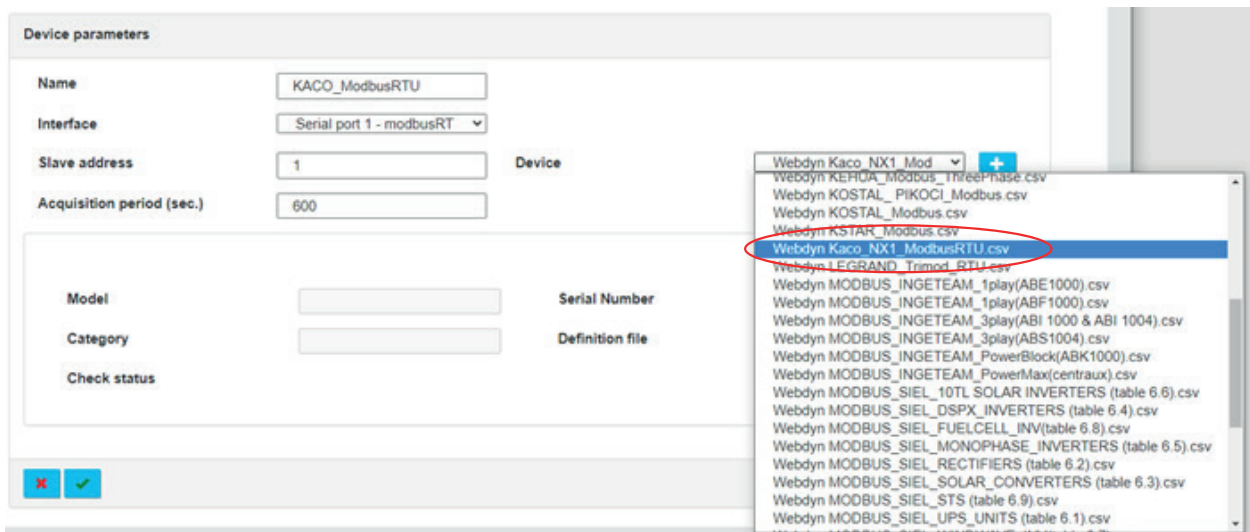
12. Manual Addition of a Modbus RTU Device (proprietary)

Adding a KACO Modbus RTU (proprietary) device requires the following steps:

- Connect the equipment to the concentrator using a serial link (see below the connection part in Modbus RTU via RS485 bus)
- Go to the equipment page and click on the “+” button:



- The add equipment page is then displayed:






- Select the Serial interface (modbusRTU).
- Fill in the following fields:
 - Name: free field to choose the name of the inverter to add
 - Slave address: slave address of the inverter is: 1 (see inverter manual)
 - Acquisition period (sec): Desired acquisition period for interrogating the inverter
- Select in Device, the “Webdyn Kaco_NX1_ModbusRTU.csv” protocol

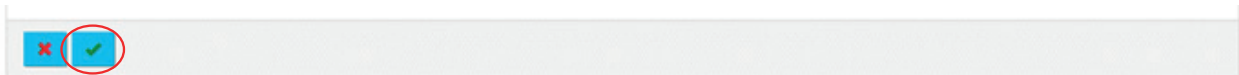
- Press the “Check” button
- Check information and status:

Detect type	Kaco-Sunspec	<input type="button" value="Detect"/>	
Model	10k1	Serial Number	ADDR1
Category	Inverter	Definition file	ModbusTCP_Inverter_KAC
Check status			

- If the “Check status” is:

	the inverter has been found and the current configuration is functional
	The inverter was found, but one or more variables in the definition file are not functional
	the inverter was not found or the current configuration is not functional

- Validate the addition of the equipment by clicking on the checkmark at the bottom of the page:



13. KACO Modbus RTU Definition File (proprietary)

The names of the files for the Modbus RTU protocol (proprietary) are made up as follows:
 <uid>_<Manufacturer>_<Model>_ModbusRTU.csv

With :

- <uid>: Concentrator ID
- <Manufacturer>: generated automatically from the “Manufacturer” information
- <Model>: automatically generated from the “Model” information

The action to be performed on the variables can be modified according to your needs. (see WebdynSunPM manual chapter 3.1.2.2.2: “Content of the definition file”).

Contents of the definition file:

Field	Description
Info1	Channel: channel number of the variable to collect. This information is specific to the inverter and should therefore not be modified.
Info2	Variable type: type of variable to collect (analog, digital, etc.). This information is specific to the inverter and should therefore not be modified.
Info3	<p>Modbus Variable format. The allowed formats are:</p> <ul style="list-style-type: none"> • U8: unsigned integer on 8 bits (1 byte) • U16: 16-bit unsigned integer (2 bytes, or 1 register) • U32: 32-bit unsigned integer (4 bytes, or 2 registers) • U64: 64-bit unsigned integer (8 bytes, or 4 registers) • I8: 8-bit signed integer (1 byte) • I16: 16-bit signed integer (2 bytes, or 1 register) • I32: 32-bit signed integer (4 bytes, or 2 registers) • I64: 64-bit signed integer (8 bytes, or 4 registers) • F32: floating on 32 bits (4 bytes, or 2 registers) • F64: floating on 64 bits (8 bytes, or 4 registers) • String: the variable is a character string. It is then necessary to use the notation “Address_Size” for the field “Info2” • Bits: the variable is of the bit field type. You must then use the notation “Address_1st bit_Number of bits” for the “Info2” field • IP: the variable is of the IP V4 address type and is therefore coded on 4 bytes (2 registers) • IPV6: the variable is of the IP V6 address type and is therefore coded on 16 bytes (8 registers) • MAC: the variable is of the MAC address type, in “EUI48” format. It is therefore coded on 6 bytes (3 registers) <p>It should be noted that it is possible to modify the whole types by adding a suffix. The allowed modifiers are:</p> <ul style="list-style-type: none"> • _W: the words are exchanged, i.e. the contents of the variable registers are exchanged in blocks of 2 bytes • _B: the bytes are exchanged, i.e. the contents of the variable registers are exchanged at byte level, one by one • _WB: the words AND the bytes are exchanged. The 2 modifiers above are applied. <p>So, for example, the notation “I32_W” indicates that it is a variable so bytes 1 and 2 will be exchanged with bytes 3 and 4.</p> <p>Similarly, the notation “U16_B” indicates that bytes 1 and 2 of the variable will be exchanged. This corresponds to a “Little Endian/Big Endian” conversion.</p>
Info4	Not used

Example of a definition file for a KACO inverter in Modbus RTU mode (proprietary):

```
ModbusRTU;Inverter;Kaco;NX1 Series;;;;;
1;4;31001;1;STRING;;Device Type: 1=Single phase / 3=Three phase;;1;0;;4
2;4;31002;U16;;Modbus address?Default as 3;;1;0;;4
3;4;31003;16;STRING;;Serial Number;;1;0;;4
4;4;31019;8;STRING;;Machine type;;1;0;;4
5;4;31027;U16;;Current grid code: refer to Section 3.5;;1;0;;4
6;4;31028;U32;;Rated Power;;1;0;W;4
7;4;31030;7;STRING;;Software Version;;1;0;;4
8;4;31044;7;STRING;;Safety Version;;1;0;;4
9;4;31057;8;STRING;;Manufacturer's name;;1;0;;4
10;4;31065;8;STRING;;Brand name: for example;;1;0;;4
11;4;31301;U16;;Grid rated voltage;;0.1;0;V;4
12;4;31302;U16;;Grid rated frequency;;0.01;0;Hz;4
13;4;31303;U32;;E-Today of inverter;;0.1;0;kWh;4
14;4;31305;U32;;E-Total of inverter;;0.1;0;kWh;4
15;4;31307;U32;;H-Total;;1;0;H;4
16;4;31309;U16;;Device State: 0 = Wait 1 = Normal 2 = Fault 4 = Checking;;1;0;;4
17;4;31310;U16;;Connect time;;1;0;s;4
18;4;31311;I16;;Air temperature;;0.1;0;C;4
19;4;31312;I16;;Inverter U phase temperature;;0.1;0;C;4
20;4;31313;I16;;Inverter V phase temperature;;0.1;0;C;4
21;4;31314;I16;;Inverter W phase temperature;;0.1;0;C;4
22;4;31315;I16;;Boost temperature;;0.1;0;C;4
23;4;31317;U16;;Bus voltage;;0.1;0;V;4
24;4;31319;U16;;PV1 voltage;;0.1;0;V;4
25;4;31320;U16;;PV1 current;;0.01;0;A;4
26;4;31321;U16;;PV2 voltage;;0.1;0;V;4
27;4;31322;U16;;PV2 current;;0.01;0;A;4
28;4;31323;U16;;PV3 voltage;;0.1;0;V;4
29;4;31324;U16;;PV3 current;;0.01;0;A;4
30;4;31325;U16;;PV4 voltage;;0.1;0;V;4
31;4;31326;U16;;PV4 current;;0.01;0;A;4
32;4;31339;U16;;String 1 current;;0.1;0;A;4
33;4;31340;U16;;String 2 current;;0.1;0;A;4
34;4;31341;U16;;String 3 current;;0.1;0;A;4
35;4;31342;U16;;String 4 current;;0.1;0;A;4
36;4;31343;U16;;String 5 current;;0.1;0;A;4
37;4;31344;U16;;String 6 current;;0.1;0;A;4
38;4;31345;U16;;String 7 current;;0.1;0;A;4
39;4;31346;U16;;String 8 current;;0.1;0;A;4
40;4;31359;U16;;L1 Phase voltage;;0.1;0;V;4
41;4;31360;U16;;L1 Phase current;;0.1;0;A;4
42;4;31361;U16;;L2 Phase voltage;;0.1;0;V;4
43;4;31362;U16;;L2 Phase current;;0.1;0;A;4
44;4;31363;U16;;L3 Phase voltage;;0.1;0;V;4
45;4;31364;U16;;L3 Phase current;;0.1;0;A;4
46;4;31365;U16;;RS Line voltage;;0.1;0;V;4
47;4;31366;U16;;RT Line voltage;;0.1;0;V;4
48;4;31367;U16;;ST Line voltage;;0.1;0;V;4
49;4;31368;U16;;Grid frequency;;0.01;0;Hz;4
50;4;31369;U32;;Apparent power;;1;0;VA;4
51;4;31371;U32;;Active power;;1;0;W;4
52;4;31373;I32;;Reactive power;;1;0;Var;4
53;4;31375;I16;;Power factor;;0.01;0;;4
54;4;31378;U16;;Error message:please refer to section 3.4;;1;0;;4
55;4;31379;U16;;Warning message:please refer to section 3.4;;1;0;;4
56;3;40201;U16;;Remote switch command: 0 = POWER OFF 1 = POWER ON;;1;0;;4
57;3;41001;U16;;RTC:Year;;1;0;;4
58;3;41002;U16;;RTC:Month;;1;0;;4
59;3;41003;U16;;RTC:Day;;1;0;;4
60;3;41004;U16;;RTC:Hour;;1;0;;4
61;3;41005;U16;;RTC:Minute;;1;0;;4
62;3;41006;U16;;RTC:Seconds;;1;0;;4
63;3;44001;U16;;Active power control function? 0 = Disable 1 = Enable;;1;0;;4
```

```

64;3;44002;U16;;EEG control function? 0 = Disable 1 = Enable;;1;0;;4
65;3;44003;U16;;Slope load function? 0 = Disable 1 = Enable;;1;0;;4
66;3;44004;U16;;Overvoltage reduce power function? 0 = Disable 1 = Enable;;1;0;;4
67;3;44005;U16;;Overfrequency reduce power function? 0 = Disable 1 = Enable;;1;0;;4
68;3;44006;U16;;Reactive power control function? 0 = Disable 1 = Enable;;1;0;;4
69;3;44007;U16;;LVRT Function? 0 = Disable 1 = Enable;;1;0;;4
70;3;44009;U16;;10 Minutes Average Overvoltage protect function 0 = Disable 1 =
Enable;;1;0;;4
71;3;44010;U16;;Islanding protect function? 0 = Disable 1 = Enable;;1;0;;4
72;3;44012;U16;;PE connection check function? 0 = Disable 1 = Enable;;1;0;;4
73;3;44017;U16;;Overload function? 0 = Disable 1 = Enable;;1;0;;4
74;3;44025;U16;;Shadow MPPT function: 0 = Disable 1 = Enable;;1;0;;4
75;3;45201;U16;;Grid code?please refer to section 3.5;;1;0;;4
76;3;45202;U16;;Overvoltage protection value of the first grid connection;;0.1;0;V;4
77;3;45203;U16;;Overvoltage protection value of the first grid
connection 1;;0.1;0;V;4
78;3;45204;U16;;Overvoltage protection value of the first grid
connection 2;;0.01;0;Hz;4
79;3;45205;U16;;Underfrequency protection value for first grid
connection;;0.01;0;Hz;4
80;3;45206;U16;;Grid Voltage High Limit3;;0.1;0;V;4
81;3;45207;U32;;Grid Voltage High Limit Time3;;1;0;ms;4
82;3;45209;U16;;Grid Voltage High Limit2;;0.1;0;V;4
83;3;45210;U32;;Grid Voltage High Limit Time2;;1;0;ms;4
84;3;45212;U16;;Grid Voltage High Limit1;;0.1;0;V;4
85;3;45213;U32;;Grid Voltage High Limit Time1;;1;0;ms;4
86;3;45215;U16;;Grid Voltage Low Limit3;;0.1;0;V;4
87;3;45216;U32;;Grid Voltage Low Limit Time3;;1;0;ms;4
88;3;45218;U16;;Grid Voltage Low Limit2;;0.1;0;V;4
89;3;45219;U32;;Grid Voltage Low Limit Time2;;1;0;ms;4
90;3;45221;U16;;Grid Voltage Low Limit1;;0.1;0;V;4
91;3;45222;U32;;Grid Voltage Low Limit Time1;;1;0;ms;4
92;3;45224;U16;;10 Minutes Average Overvoltage Threshold;;0.1;0;V;4
93;3;45225;U16;;10 Minutes Average Overvoltage Portect Time;;1;0;ms;4
94;3;45226;U16;;Overvoltage recover value;;0.1;0;V;4
95;3;45227;U16;;Undervoltage recover value;;0.1;0;V;4
96;3;45228;U16;;Grid Frequency High Limit3;;0.01;0;Hz;4
97;3;45229;U32;;Grid Frequency High Limit Time3;;1;0;ms;4
98;3;45231;U16;;Grid Frequency High Limit2;;0.01;0;Hz;4
99;3;45232;U32;;Grid Frequency High Limit Time2;;1;0;ms;4
100;3;45234;U16;;Grid Frequency High Limit1;;0.01;0;Hz;4
101;3;45235;U32;;Grid Frequency High Limit Time1;;1;0;ms;4
102;3;45237;U16;;Grid Frequency Low Limit3;;0.01;0;Hz;4
103;3;45238;U32;;Grid Frequency Low Limit Time3;;1;0;ms;4
104;3;45240;U16;;Grid Frequency Low Limit2;;0.01;0;Hz;4
105;3;45241;U32;;Grid Frequency Low Limit Time2;;1;0;ms;4
106;3;45243;U16;;Grid Frequency Low Limit1;;0.01;0;Hz;4
107;3;45244;U32;;Grid Frequency Low Limit Time1;;1;0;ms;4
108;3;45246;U16;;Vary rate of Frequecny protect value;;0.01;0;Hz/s;4
109;3;45247;U32;;Vary rate of Frequecny protect time;;1;0;ms;4
110;3;45249;U16;;Overfrequency recover value;;0.01;0;Hz;4
111;3;45250;U16;;Underfrequency recover value;;0.01;0;Hz;4
112;3;45251;U16;;Time of first connection to grid;;1;0;s;4
113;3;45252;U16;;Time of re-connection to grid;;1;0;s;4
114;3;45253;U16;;ISO protect threshold;;1;0;kOhm;4
115;3;45254;U16;;DCI protect threshold;;1;0;mA;4
116;3;45255;U16;;DCI protect time;;1;0;ms;4
117;3;45401;U16;;Load rate of first connection to grid;;1;0;%Pn/min;4
118;3;45402;U16;;Load rate of re-connection to grid;;1;0;%Pn/min;4
119;3;45403;U16;;Active Power Set;;0.01;0;%Pn;4
120;3;45404;U16;;Increase rate of active power;;0.01;0;%Pn/min;4
121;3;45405;U16;;Decrease rate of active power;;0.01;0;%Pn/min;4
122;3;45408;U16;;Over frequency reduce power mode? 0 = None 1 = Fixed reduction
ratio, non ? hysteresis 2 = Fixed reduction ratio, hysteresis 3 = Not fixed reduction

```

ratio, non ? hysteresis 4 = Not fixed reduction ratio, hysteresis;;1;0;;4
123;3;45409;U16;;Over frequency reduce power: Start frequency;;0.01;0;Hz;4
124;3;45410;U16;;Over frequency reduce power: Stop frequency;;0.01;0;Hz;4
125;3;45411;U16;;Over frequency reduce power: Back frequency;;0.01;0;Hz;4
126;3;45412;U16;;The reduce ratio of over frequency reduce power;;0.01;0;%Pnor%Pm;4
127;3;45413;U16;;Over frequency reduce power:reduce power delay time;;0.1;0;s;4
128;3;45414;U16;;Over frequency reduce power:recover power delay time;;0.1;0;s;4
129;3;45416;U16;;Speed of Over frequency recover to Pn;;0.01;0;%Pn/min;4
130;3;45419;U16;;Over voltage reduce power mode? 0 = None 1 = Not fixed reduction ratio, non ? hysteresis 2 = Not fixed reduction ratio, hysteresis 3 = Fixed reduction ratio, non ? hysteresis 4 = Fixed reduction ratio, hysteresis;;1;0;;4
131;3;45420;U16;;Over voltage reduce power: Start voltage;;0.01;0;%Un;4
132;3;45422;U16;;Over voltage reduce power: Stop voltage;;0.01;0;%Un;4
133;3;45424;U16;;Over voltage reduce power: Back voltage;;0.01;0;%Un;4
134;3;45426;U16;;The reduce ratio of over voltage reduce power;;0.01;0;%Pnor%Pm;4
135;3;45427;U16;;Over voltage reduce power delay time;;0.1;0;s;4
136;3;45428;U16;;Over voltage recover power delay time;;0.1;0;s;4
137;3;45429;U16;;Speed of Over voltage recover to Pn;;0.01;0;%Pn/min;4
138;3;45432;U16;;Under frequency increase power mode? 0 = None 1 = Fixed reduction ratio, non ? hysteresis 2 = Fixed reduction ratio, hysteresis 3 = Not fixed reduction ratio, non ? hysteresis 4 = Not fixed reduction ratio, hysteresis;;1;0;;4
139;3;45433;U16;;Under frequency increase power: Start frequency;;0.01;0;Hz;4
140;3;45434;U16;;Under frequency increase power: Stop frequency;;0.01;0;Hz;4
141;3;45435;U16;;Under frequency increase power: Back frequency;;0.01;0;Hz;4
142;3;45436;U16;;The increase ratio of under frequency increase power;;0.01;0;%Pnor%Pm;4
143;3;45437;U16;;Under frequency increase power delay time;;0.1;0;s;4
144;3;45438;U16;;Under frequency recover power delay time;;0.1;0;s;4
145;3;45440;U16;;Speed of Under frequency recover to Pn;;0.01;0;%Pn/min;4
146;3;45441;U16;;Under frequency increase power 0 power frequency point;;0.01;0;Hz;4
147;3;45443;U16;;Under voltage increase power mode? 0 = None 1 = Fixed increase ratio, non ? hysteresis 2 = Fixed increase ratio, hysteresis 3 = Not fixed increase ratio, non ? hysteresis 4 = Not fixed increase ratio, hysteresis;;1;0;;4
148;3;45444;U16;;Under voltage increase power: Start voltage;;0.01;0;%Un;4
149;3;45445;U16;;Under voltage increase power: Stop voltage;;0.01;0;%Un;4
150;3;45446;U16;;Under voltage increase power: Back voltage;;0.01;0;%Un;4
151;3;45447;U16;;The increase ratio of under voltage increase power;;0.01;0;%Pnor%Pm;4
152;3;45448;U16;;Under voltage increase power delay time;;0.1;0;s;4
153;3;45449;U16;;Under voltage increase power delay time_1;;0.1;0;s;4
154;3;45450;U16;;Speed of under voltage recover to Pn;;0.01;0;%Pn/min;4
155;3;45451;I16;;Pav;;0.01;0;%Pn;4
156;3;45452;U16;;DRMs Pval;;0.01;0;%Pn;4
157;3;45501;U16;;Reactive power control mode? 0 = None 1 = Fixed power factor 2 = cos phi(P) curve 3 = Fixed Q value 4 = Fixed Q value of AU DRMs 5 = Linear Q(U) curve 6 = Hysteresis Q(U) curve;;1;0;;4
158;3;45502;U16;;Time constant of reactive power curve;;1;0;s;4
159;3;45503;I16;;Power factor_1;;0.0001;0;;4
160;3;45504;U16;;cos phi(P) curve? Active power of the first point;;0.01;0;%Pn;4
161;3;45505;I16;;cos phi(P) curve? cos phi of the first point;;0.0001;0;;4
162;3;45506;U16;;cos phi(P) curve? Active power of the second point;;0.01;0;%Pn;4
163;3;45507;I16;;cos phi(P) curve? cos phi of the second point;;0.0001;0;;4
164;3;45508;U16;;cos phi(P) curve? Active power of the third point;;0.01;0;%Pn;4
165;3;45509;I16;;cos phi(P) curve? cos phi of the third point;;0.0001;0;;4
166;3;45510;U16;;cos phi(P) curve? Active power of the fourth point;;0.01;0;%Pn;4
167;3;45511;I16;;cos phi(P) curve? cos phi of the fourth point;;0.0001;0;;4
168;3;45512;U16;;Lock in voltage (for cos phi(P) curve?;;0.01;0;%Un;4
169;3;45513;U16;;Lock out voltage (for cos phi(P) curve);;0.01;0;%Un;4
170;3;45516;I16;;Q Set Value;;0.01;0;%Sn;4
171;3;45518;U16;;Q(U) curve? U of the first point;;0.01;0;%Un;4
172;3;45519;I16;;Q(U) curve? Q of the first point;;0.01;0;%Sn;4
173;3;45520;U16;;Q(U) curve? U of the second point;;0.01;0;%Un;4
174;3;45521;I16;;Q(U) curve? Q of the second point;;0.01;0;%Sn;4
175;3;45522;U16;;Q(U) curve? U of the third point;;0.01;0;%Un;4


```

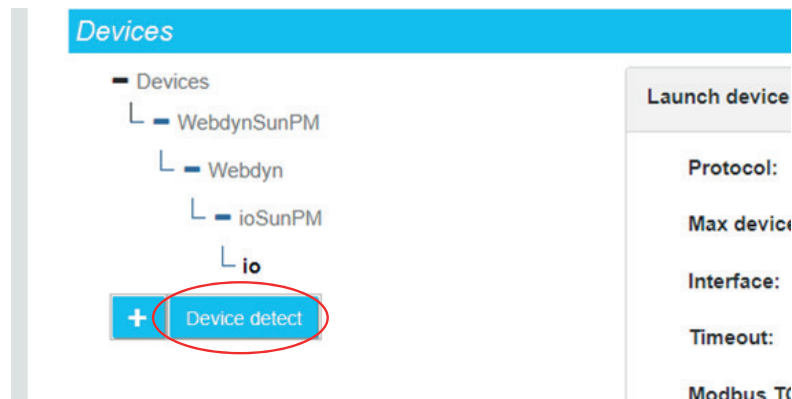
176;3;45523;I16;;Q(U) curve? Q of the third point;;0.01;0;%Sn;4
177;3;45524;U16;;Q(U) curve? U of the fourth point;;0.01;0;%Un;4
178;3;45525;I16;;Q(U) curve? Q of the fourth point;;0.01;0;%Sn;4
179;3;45526;U16;;Lock in power?for Q(U) curve?;;0.01;0;%Pn;4
180;3;45527;U16;;Lock outpower?for Q(U) curve?;;0.01;0;%Pn;4
181;3;45606;U16;;LVRT Trigger voltage;;0.01;0;%Un;4
182;3;45609;U16;;LVRT active power limit mode? 0 = None 1 = Limit (Default as limit
to 0) 2 = Limit to 0;;1;0;;4

```

14. SunSpec Modbus TCP device detection

The automatic detection of SunSpec Modbus TCP devices requires the following steps:

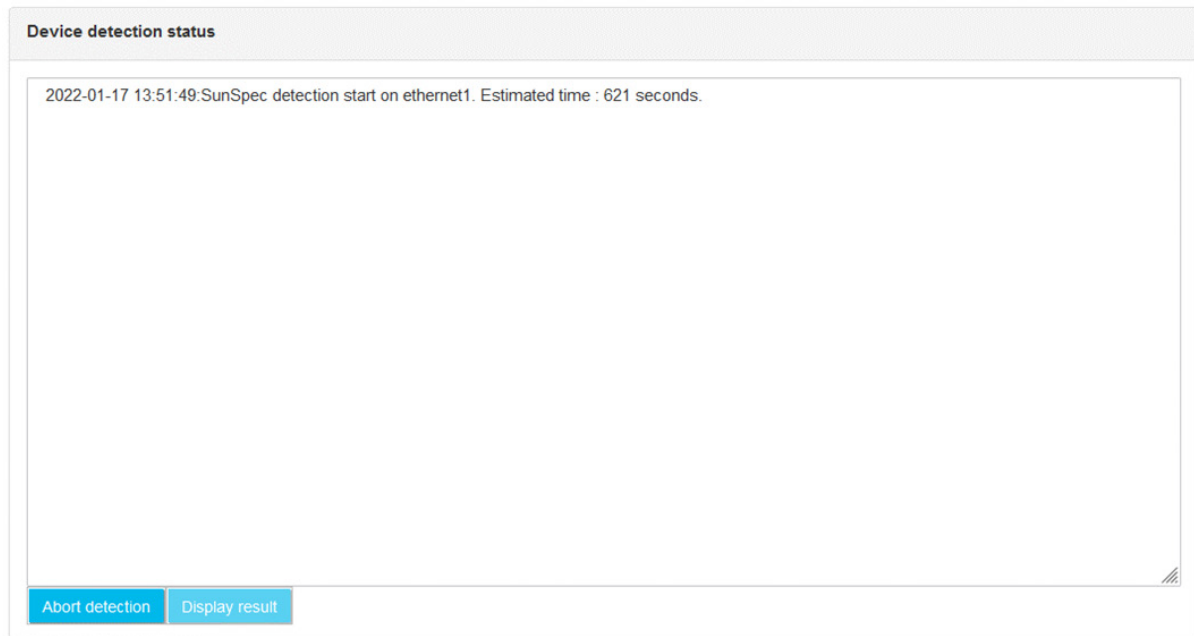
- Connect the equipment to the concentrator using an Ethernet connection configured on the same sub-network (see the SunSpec Modbus TCP connection part below)
- Go to the device page and click the “Device detect” button:



- The detection page is displayed:

- Select the SunSpec protocol from the drop-down list on the first “Protocol” field.
- Enter the number of devices to detect in the “Number of devices” field. This can speed up the total detection time. By leaving the default value (1), all the devices will be polled and all detectable devices will be detected.
- Select the configured Ethernet port in the “Interface” field

- The timeout indicates the Sunspec device response time. By default it is set to 2000 ms.
- Enter the port to be used in the "The Modbus TCP port" field. By default, it is set to 502.
- Next click the "Start detection" button to launch the detection. The progress window below is displayed:



- As detection progresses it is displayed on the web page:
 - "SunSpec detection start on Ethernet" means that the SunSpec scan has started.
 - "NON SUNSPEC device found" means that a non SunSpec modbus device was detected at the indicated modbus address:

```
2021-12-24 09:56:10:NON SUNSPEC device found at @1 192.168.2.21:502
```

This means that a modbus device that does not meet SunSpec specifications was found at modbus address 1.

- "SunSpec device found" means that a modbus device meeting SunSpec specifications was detected at the indicated modbus address:

```
2021-12-24 09:56:21: SunSpec device found at @126 192.168.2.23:502
```

This means that a device that meets SunSpec specifications was detected at modbus address "126".

- "Found table" means that a SunSpec table was detected on the device. The information line then indicates the table identifier, its size claimed by the device as well as technical information on the device and the modbus start register for the table:

```
2021-12-24 09:56:21:Found table 1:66 at 40002@126 192.168.2.23:502
```


Means that table identifier “1” of size “66” registers was detected on the modbus device at register “40002” and modbus address “126” on IP “192.168.2.53” and on port “502”

- the screen shows the detected devices with their Modbus tables and their address on the bus:

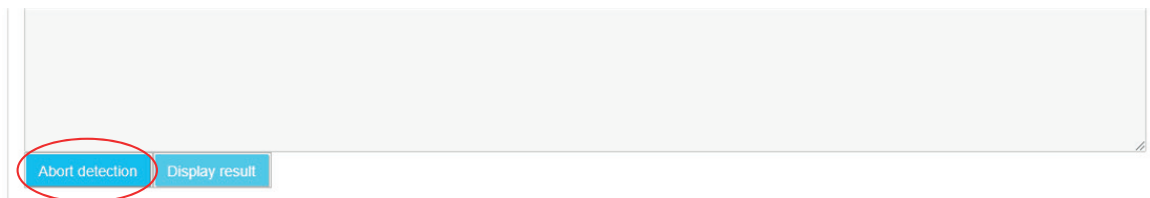
```
SunSpec device found at @126 192.168.2.23:502
Found table 1:66 at 40002@126 192.168.2.23:502
Found table 11:13 at 40070@126 192.168.2.23:502
Found table 12:98 at 40085@126 192.168.2.23:502
Found table 101:50 at 40185@126 192.168.2.23:502
Found table 120:26 at 40237@126 192.168.2.23:502
Found table 121:30 at 40265@126 192.168.2.23:502
Found table 122:44 at 40297@126 192.168.2.23:502
Found table 123:24 at 40343@126 192.168.2.23:502
Found table 124:24 at 40369@126 192.168.2.23:502
Found table 126:64 at 40395@126 192.168.2.23:502
Found table 127:10 at 40461@126 192.168.2.23:502
Found table 128:14 at 40473@126 192.168.2.23:502
Found table 131:64 at 40489@126 192.168.2.23:502
Found table 132:64 at 40555@126 192.168.2.23:502
Found table 160:128 at 40621@126 192.168.2.23:502
Found table 129:60 at 40751@126 192.168.2.23:502
Found table 130:60 at 40813@126 192.168.2.23:502
```

- “End of SunSpec detection” means that SunSpec detection is complete. The line indicates the number of detected devices:

```
2021-12-24 09:56:53: End of SunSpec detection on ethernet1. 1 devices found.
```

SunSpec detection successfully completed on Ethernet interface 1. One device was therefore detected.

- It is always possible to interrupt detection by clicking the “Abort detection” button.



- On completion of the SunSpec detection, the last detection page is used to view all detected devices and, eventually, add them to the configuration.

SunSpec detection add						
Manufacturer	Model	Serial number	IP address/modbus	Def file	Reg.cap?	Add?
KAC	10k1	ADDR1	192.168.2.23/1	WPM00C73F_	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="button" value="Accept"/>	<input type="button" value="Cancel"/>					<input type="button" value="All?"/>

This screen therefore displays all the detected devices, as well as a certain number of data read from the Sunspec device tables (model, serial number, address, manufacturer) as well as the associated definition file name.

There is also a checkbox at the right to select the devices to add to the configuration. Note

that if the detected device is already part of the configuration, the checkbox is not checked by default. Otherwise the checkbox is checked for automatic addition.

Once the devices have been selected, clicking the “Accept” button imports the new configuration to the concentrator and the device appears in the configured devices.

- When the user clicks the “Accept” button, the device import starts by reading the different frames to completely create the devices.

Note that if the device already existed in the configuration and the user forces a new import, the previous device is not overwritten. A new device is created in addition to the pre-existing device.

Automatic detection is used to create the definition files needed for the inverters to run. These files are stored in and accessible in the DEF directory on the remote server. (see WebdynSunPM user manual)

15. SunSpec Modbus TCP definition file

The SunSpec Modbus TCP protocol file names are composed as follows:

`<uid>_SunSpec_inverter_<Manufacturer>_<Model>_ModbusTCP.csv`

Where:

- `<uid>`: Concentrator identifier
- `< Manufacturer>`: is generated automatically from the Sunspec protocol “Manufacturer” information
- `< Model>`: is generated automatically from the SunSpec protocol “Model” information

The action to be performed on the variables can be modified according to your needs. (see WebdynSunPM manual chapter 3.1.2.2.2: “Content of the definition file”).

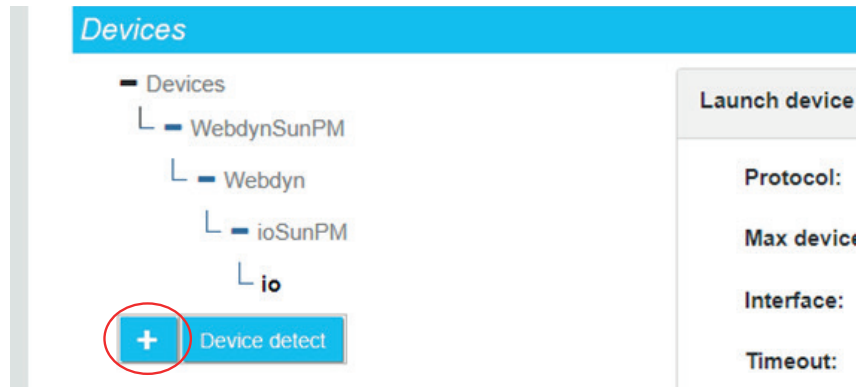
Definition file content:

(See the WebdynSunPM manual chapter 3.1.2.2.2.2: “Modbus”)

16. Adding a SunSpec Modbus TCP device manually

Adding a KACO SunSpec Modbus TCP device requires the following steps:

- Connect the device to the concentrator using an Ethernet connection configured on the same sub-network (see the SunSpec Modbus TCP connection using Ethernet part below)
- Go to the device page and click the “+” button:



- The add device page is displayed:

- Select the Ethernet interface.
- Enter the following fields:
 - Name: free entry for the name of the inverter to be added
 - IP address: IP of the inverter to be added (see inverter manual)
 - IP port: inverter port number, default value: 502 (see inverter manual)
 - Slave address: the inverter’s slave address is: 1 (see inverter manual)

- Acquisition period (sec): Required acquisition time to poll the inverter
- In Device, select “ - Detect device “

- The inverter can be detected by pressing the "Detect" button
- Check the information and status:

- If the "Check status" is:

	the inverter has been found or the current configuration is operational
	The inverter has been found, but one or more variables in the definition file are not operational
	the inverter has not been found or the current configuration is not operational

- Validate the addition of the device by clicking the check box at the bottom of the page: