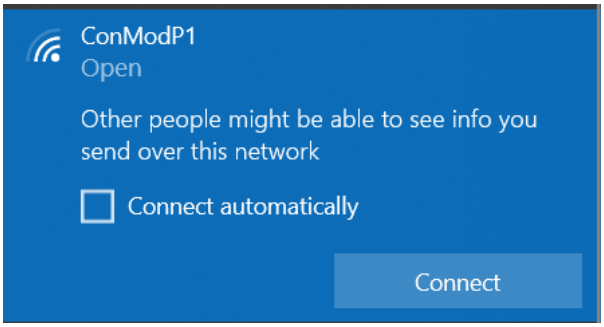
ConMod

ConMod P1Modbus – Meter P1 to Modbus RTU/TCP converter

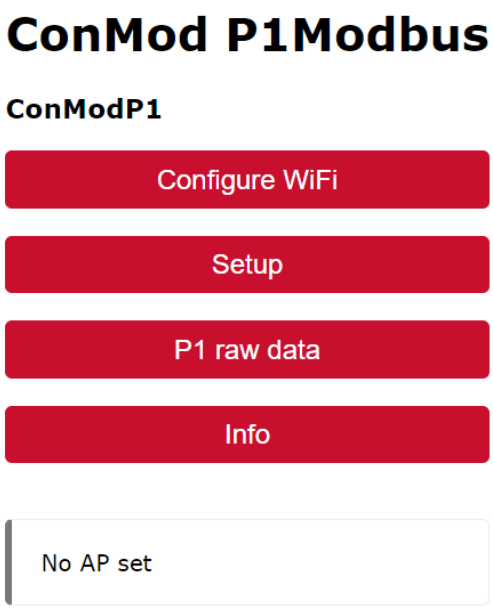
- Firmware Upgrade
- ConMod User Manual 1.0.2
- ConMod User Manual 1.0.3, 1.0.4

Firmware Upgrade

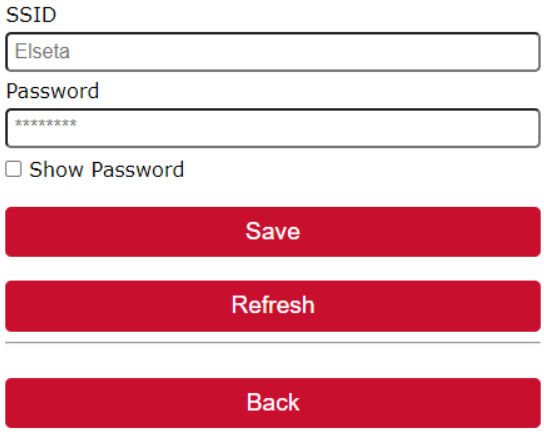
To upgrade firmware in ConMod its interface has to be reachable via the Wi-Fi. To do so, connect the ConMod to the meter, turn it on, or connect it to a power source and turn on the wi-fi switch. ConMod then becomes a Wi-Fi access point. To connect to ConMod click on Wi-Fi settings and connect to a new network – ConModP1:



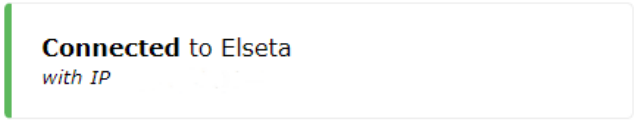
Connection will redirect the user to the main configuration web page:



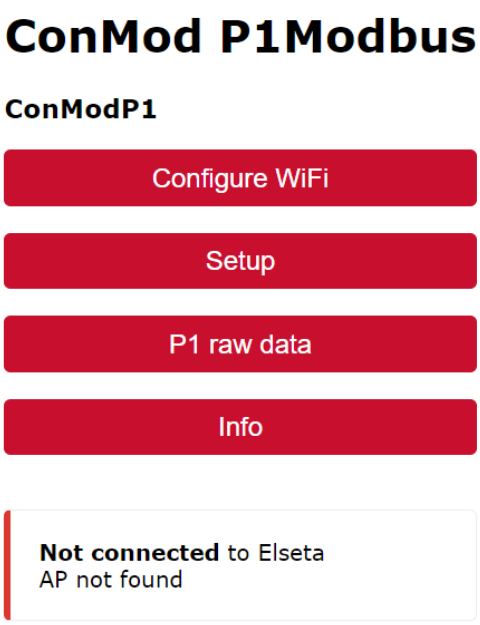
As seen in the image above, there is a message indicating that no AP (access point) is set. This means that the user will have to enter a password. To do so, simply click on Configure Wi-Fi, then select the Wi-Fi you are connecting to and enter the required credentials for this specific access point:



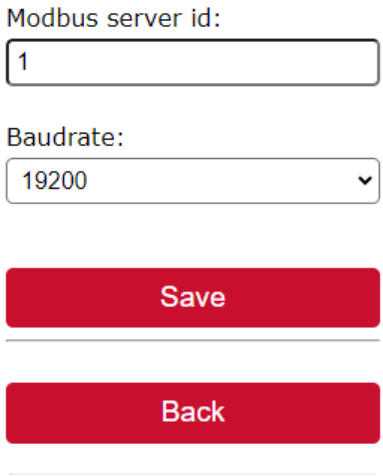
After entering the correct credentials click on save. If the password is correct, the connection will be established. This will be indicated with a message:



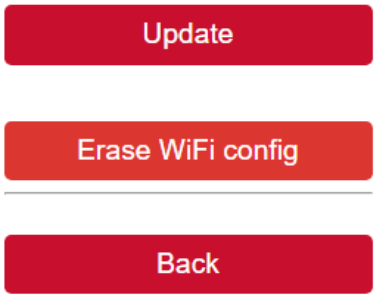
In case of an incorrect password, the message Not connected will appear (like in the picture below) and the connection to the ConModP1 network will be lost. In this case, the user should simply try to reconnect to the network and enter the correct credentials instead.



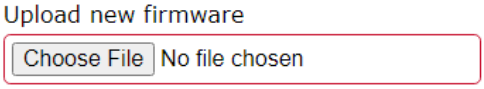
Another way to connect is via web address conmod.local but only after the connection is established. The user interface also allows to setup of Modbus parameters such as slave ID and baud rate:



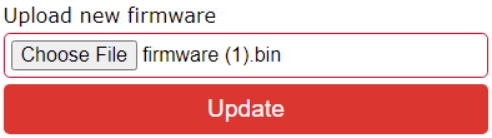
After the connection is established a firmware upgrade can be made. Click on the **Info** button first, it will redirect to a page where a firmware version, Wi-Fi connection and other information can be found. To upgrade firmware, click on **Update** button which can be found at the bottom of this page:



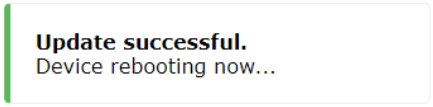
There a firmware file can be uploaded:



After uploading a file, click Update again:



If the firmware upgrade is successful a message will appear:



After a few seconds, try to reconnect to ConMod via conmod.local or the same IP address. Check the info page again to make sure that the new firmware has been uploaded.

ConMod User Manual 1.0.2

Overview

ConMod P1Modbus is a small industrial protocol converter for smart Meters with P1 interface output to convert meter data into industrial standard protocols Modbus RTU and Modbus TCP with interfaces RS485 and Wi-Fi (2,4GHz).

They are designed to convert smart meter data into the most popular industrial protocol – Modbus. The solution perfectly fits integration with energy management systems, remote monitoring, SCADA systems, etc.

ConMod P1Modbus is compatible with the DSMR interface and supports different versions and variations of data formats. Also, ConMod P1Modbus has a menu to show RAW data (P1 telegram) collected from the smart meter to enable comparison with converted data in Modbus registers.

ConMod P1Modbus is designed for industrial applications with cybersecurity in mind to disable Wi-Fi communication and avoid illegal communication over Wi-Fi in critical infrastructure projects.

Features

- Easy configuration using Wi-Fi via mobile phone or a laptop;
- Indication about P1 interface, RS485, and Wi-Fi data on built-in LED’s;
- Both Modbus RTU and Modbus TCP are available at the same time;
- Debug information about P1 telegram available with every data frame from Smart Meter;
- Support different meters with DSMR interfaces like SAGEMCOM and others;
- Easy to change Modbus Slave ID and serial communication speed;
- Built-in switchable terminating resistors for RS485;
- Possibility to provide power for protocol converter from P1 interface as well from external power supply;
- Wide power supply range from 5V to 60VDC;
- External Wi-Fi antenna with SMA connector;
- Wi-Fi on/off switch;
- Reset the device button;
- Communication port RS485, Wi-Fi (2,4GHz B/G/N);
- Modbus RTU, Modbus TCP protocols.

Connection

> It is highly recommended that the RJ12 wire is not longer than 7 meters, otherwise the connection might be unstable.

To connect ConMod to a meter, an RJ12 cable is required. As shown in the picture below, one side of the cable is connected to a ConMod P1 port, and the other one to a meter. After connecting P1 LED will light up. Instructions on how to connect to a Wi-Fi are described below in the paragraph Connection and Configuration over Wi-Fi.

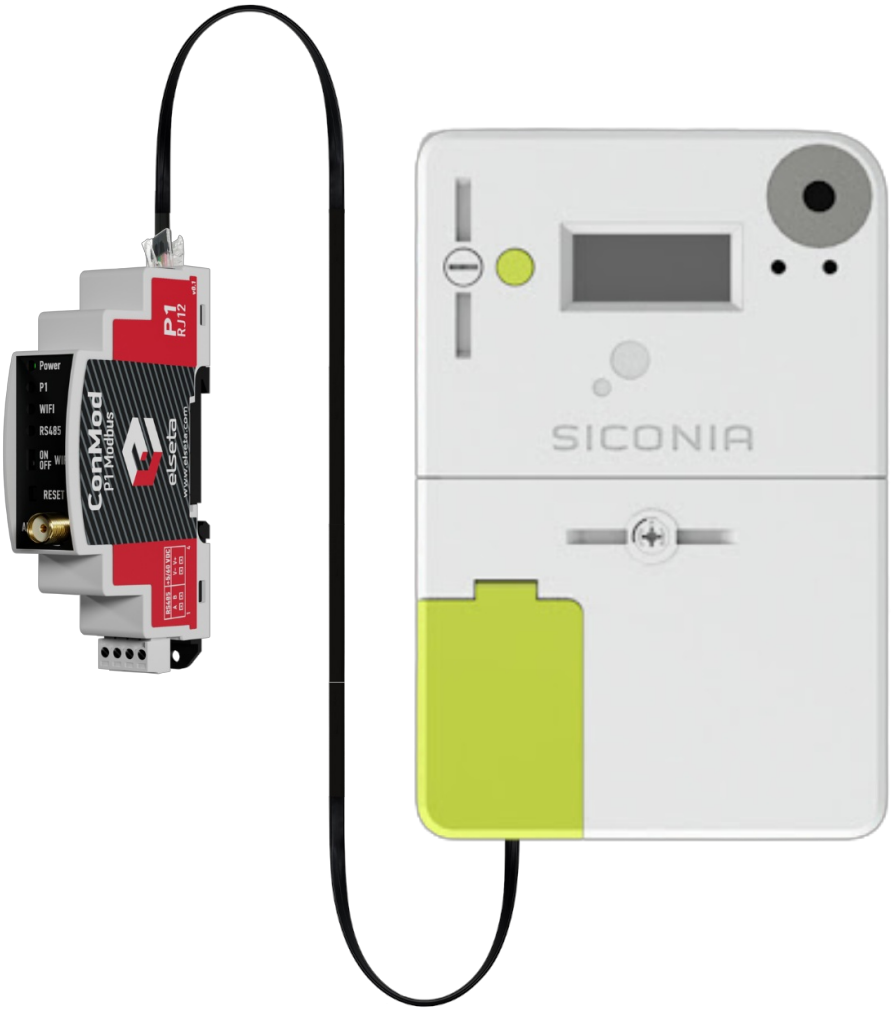


Fig. 1. P1 connection to a smart meter via RJ12 cable

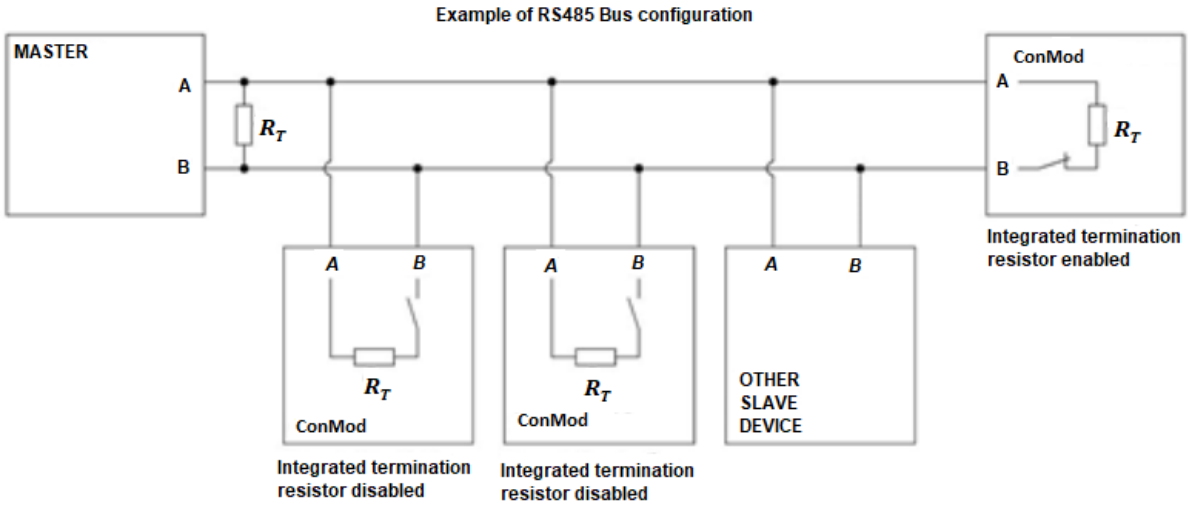


Fig.2. RS485 Bus configuration

Common configuration information

ConMod receives data from meters via the P1 interface and sends data back via Modbus protocol using function 3 (read holding registers). Default serial communication parameters are:

slave id	1

Baud rate	9600
data bits	8
stop bits	1
parity	none

There is a list of signals and their Modbus registers in the table below. The names of the registers might differ.

Name	Units	Modbus register	Length	Number type
serial number	-	1	4	UNSIGNED64
correct data counter	-	5	1	UNSIGNED16
faulty data counter	-	6	1	UNSIGNED16
device error	-	7	1	UNSIGNED16
Active energy import (+A)	Wh	8	2	UNSIGNED32
Reactive energy import (+R) (QI+QII)	varh	10	2	UNSIGNED32
Reactive energy export (-R) (QIII+QIV)	varh	12	2	UNSIGNED32
Active energy import (+A) rate 1	Wh	14	2	UNSIGNED32
Active energy import (+A) rate 2	-	16	2	UNSIGNED32
Active energy import (+A) rate 3	Wh	18	2	UNSIGNED32
Active energy import (+A) rate 4	Wh	20	2	UNSIGNED32
Active energy export (−A) rate 1	Wh	22	2	UNSIGNED32
Active energy export (−A) rate 2	Wh	24	2	UNSIGNED32
Active energy export (−A) rate 3	Wh	26	2	UNSIGNED32
Active energy export (−A) rate 4	Wh	28	2	UNSIGNED32
Reactive energy (+R) rate 1	varh	30	2	UNSIGNED32
Reactive energy (+R) rate 2	varh	32	2	UNSIGNED32
Reactive energy (+R) rate 3	varh	34	2	UNSIGNED32

Reactive energy (+R) rate 4	varh	36	2	UNSIGNED32
Reactive energy (-R) rate 1	varh	38	2	UNSIGNED32
Reactive energy (-R) rate 2	varh	40	2	UNSIGNED32
Reactive energy (-R) rate 3	varh	42	2	UNSIGNED32
Reactive energy (-R) rate 4	varh	44	2	UNSIGNED32
Instantaneous voltage L1	V	46	2	UNSIGNED32
Average voltage L1	V	48	2	UNSIGNED32
Instantaneous current L1	A	50	2	UNSIGNED32
Sliding Average current L1 (for fuse supervision)	A	52	2	UNSIGNED32
Instantaneous voltage L2	V	54	2	UNSIGNED32
Average voltage L2	V	56	2	UNSIGNED32
Instantaneous current L2	A	58	2	UNSIGNED32
Sliding Average current L2 (for fuse supervision)	A	60	2	UNSIGNED32
Instantaneous voltage L3	V	62	2	UNSIGNED32
Average voltage L3	V	64	2	UNSIGNED32
Instantaneous current L3	A	66	2	UNSIGNED32
Sliding Average current L3 (for fuse supervision)	A	68	2	UNSIGNED32
Instantaneous voltage (U) [V]	V	70	2	UNSIGNED32
Instantaneous current [A]	A	72	2	UNSIGNED32
Instantaneous current in neutral [A]	A	74	2	UNSIGNED32
Instantaneous current (sum over all phases)	A	76	2	UNSIGNED32
Instantaneous net frequency; any phase	Hz	78	2	UNSIGNED32
Instantaneous active power (|+A|+|-A|)	W	80	2	UNSIGNED32
Instantaneous active import power (+A) in phase L1 [kW]	W	82	2	UNSIGNED32
Instantaneous active import power (+A) in phase L2 [kW]	W	84	2	UNSIGNED32
Instantaneous active import power (+A) in phase L3 [kW]	W	86	2	UNSIGNED32
Instantaneous active export power (-A) in phase L1 [kW]	W	88	2	UNSIGNED32

Instantaneous active export power (-A) in phase L2 [kW]	W	90	2	UNSIGNED32
Instantaneous active export power (-A) in phase L3 [kW]	W	92	2	UNSIGNED32
Instantaneous reactive import power (+R) in phase L1 [kvar]	var	94	2	UNSIGNED32
Instantaneous reactive import power (+R) in phase L2 [kvar]	var	96	2	UNSIGNED32
Instantaneous reactive import power (+R) in phase L3 [kvar]	var	98	2	UNSIGNED32
Instantaneous reactive export power (-R) in phase L1 [kvar]	var	100	2	UNSIGNED32
Instantaneous reactive export power (-R) in phase L2 [kvar]	var	102	2	UNSIGNED32
Instantaneous reactive export power (-R) in phase L3 [kvar]	var	104	2	UNSIGNED32
Instantaneous apparent import power (+VA)	VA	106	2	UNSIGNED32
Instantaneous apparent import power (+VA) in phase L1	VA	108	2	UNSIGNED32
Instantaneous apparent import power (+VA) in phase L2	VA	110	2	UNSIGNED32
Instantaneous apparent import power (+VA) in phase L3	VA	112	2	UNSIGNED32
Instantaneous apparent export power (-VA)	VA	114	2	UNSIGNED32
Instantaneous apparent export power (-VA) in phase L1	VA	116	2	UNSIGNED32
Instantaneous apparent export power (-VA) in phase L2	VA	118	2	UNSIGNED32
Instantaneous apparent export power (-VA) in phase L3	VA	120	2	UNSIGNED32
Average Import Power (+A)	W	122	2	UNSIGNED32
Average Net Power (|+A|-|-A|)	W	124	2	SIGNED32
Average Total Power (|+A|+|-A|)	W	126	2	UNSIGNED32
Instantaneous Power factor (+A/+VA)	-	128	2	SIGNED32
Instantaneous power factor in phase L1	-	130	2	SIGNED32
Instantaneous power factor in phase L2	-	132	2	SIGNED32
Instantaneous power factor in phase L3	-	134	2	SIGNED32
Minimum Power factor (+A/+VA)	-	136	2	SIGNED32
Measurement Period 3 for Instantaneous values	s	138	2	UNSIGNED32
Demand Register 1 - Active energy import (+A)	W	140	2	UNSIGNED32
Demand Register 2 - Active energy export (−A)	W	142	2	UNSIGNED32

Demand Register 3 - Reactive energy import (+R)	var	144	2	UNSIGNED32
Demand Register 4 - Reactive energy export (-R)	var	146	2	UNSIGNED32
Demand Register 5 - Apparent energy import (+VA)	VA	148	2	UNSIGNED32
Demand Register 6 - Apparent energy export (-VA)	VA	150	2	UNSIGNED32
Last Average Demand Register 1 - Active energy import (+A)	W	152	2	UNSIGNED32
Last Average Demand Register 2 - Active energy export (−A)	W	154	2	UNSIGNED32
Last Average Demand Register 3 - Reactive energy import (+R)	var	156	2	UNSIGNED32
Last Average Demand Register 4 - Reactive energy export (-R)	var	158	2	UNSIGNED32
Last Average Demand Register 5 - Apparent energy import (+VA)	VA	160	2	UNSIGNED32
Last Average Demand Register 6 - Apparent energy export (-VA)	VA	162	2	UNSIGNED32
Duration of last voltage sag in phase L1	s	164	2	UNSIGNED32
Duration of last voltage sag in phase L2	s	166	2	UNSIGNED32
Duration of last voltage sag in phase L3	s	168	2	UNSIGNED32
Magnitude of last voltage sag in phase L1	V	170	2	UNSIGNED32
Magnitude of last voltage sag in phase L2	V	172	2	UNSIGNED32
Magnitude of last voltage sag in phase L3	V	174	2	UNSIGNED32
Duration of last voltage swell in phase L1	s	176	2	UNSIGNED32
Duration of last voltage swell in phase L2	s	178	2	UNSIGNED32
Duration of last voltage swell in phase L3	s	180	2	UNSIGNED32
Magnitude of last voltage swell in phase L1	V	182	2	UNSIGNED32
Magnitude of last voltage swell in phase L2	V	184	2	UNSIGNED32
Magnitude of last voltage swell in phase L3	V	186	2	UNSIGNED32

The number type in the Modbus protocol allows users to read data in different formats. The number type and data from the meter must be compatible. For example, if it takes 16 bits to read data and the sign (+/-) is important, then the user should configure the Modbus register as SIGNED 16. For further explanation of how number type determines data value, see the table below:

Name	**Description**	**Range**
SIGNED16	16-bit signed integer (1 word)	-32768...+32767
UNSIGNED16	16-bit unsigned integer (1 word)	0...65535
SIGNED32	32-bit signed integer (2 words)	-2 147 483 648... + 2 147 483 647

UNSIGNED32	32-bit unsigned integer (2 word)	0... 4 294 967 295

P1 connector circuit in meter

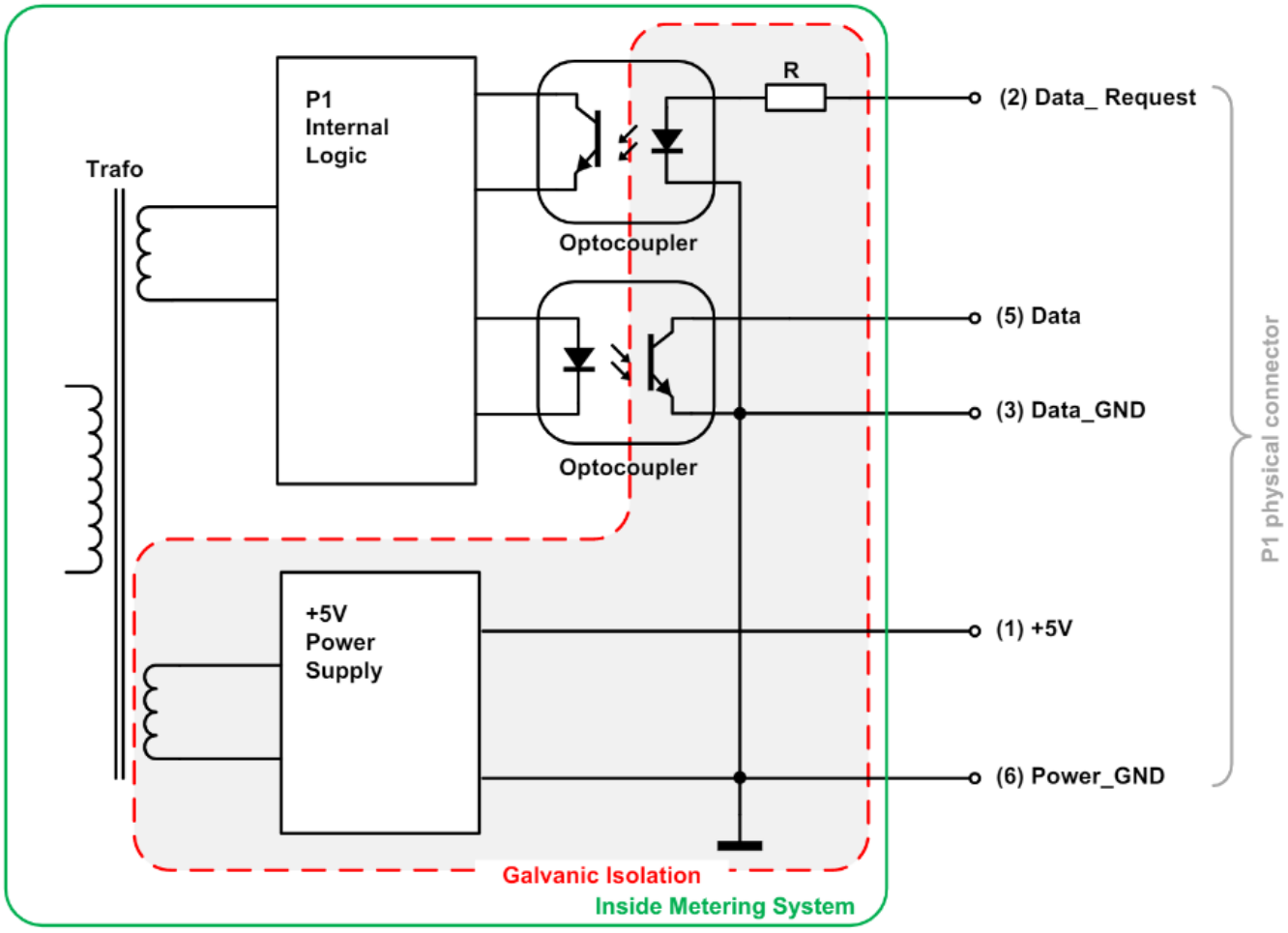


Fig.3. ConMod internal structure and connection diagram

Technical information

System		
1.	Dimension	91 x 18 x 67 mm
2.	Working temperature	-25°C | +55°C
3.	Recommended operating conditions	-25°C | +55°C and >95 %RH (none condensing)
4.	Configuration	Web browser (Laptop and smartphone)
Electrical specifications		

5.	Functions	• P1 interface • Connectivity – 0,5m 6pin cable with RJ12 connectors • Overvoltage protection up to ±65V
Power		
6.	Power Supply	5V to 60V
7.	Current consumption	<200mA @12 VDC

LED status indication and control

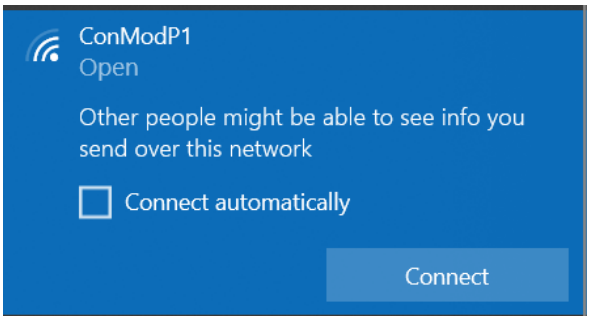
ConMod has LED indications for the P1 interface, RS485, Wi-Fi, a switch for enabling or disabling the Wi-Fi connection, and a reset button.

- The power LED turns green after connecting the ConMod to a power source.
- P1 LED turns on when ConMod receives a data packet from the meter.
- Wi-Fi LED indicates if the Wi-Fi connection is enabled. There is an ON/OFF switch to enable or disable Wi-Fi which can be seen below the LEDs.
- RS485 LED lights up when ConMod receives or sends data from another device via the RS485 interface. This could be either meter or WCC Lite.

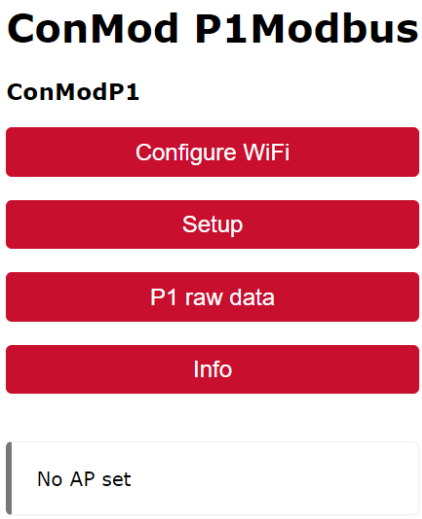
By holding a reset button for ~5s, ConMod resets the Wi-Fi connection and allows it to connect to another network instead.

Connection and configuration over Wi-Fi

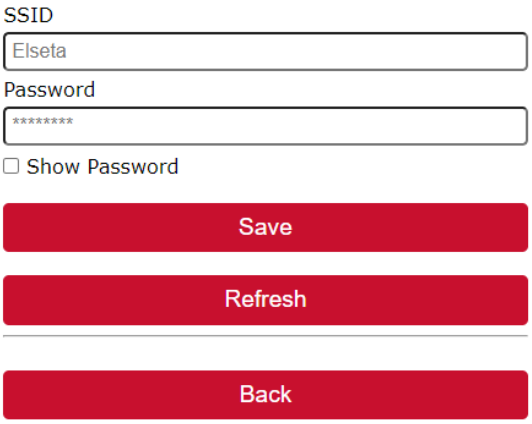
ConMod is compatible with meters that have a DSMR interface. After physically connecting the ConMod to the meter and turning it on, it becomes a Wi-Fi access point. To connect to ConMod click on Wi-Fi settings and connect to a new network – ConModP1:



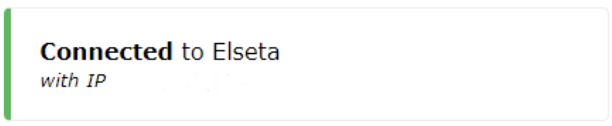
Connection will redirect the user to the main configuration web page:



As seen in the image above, there is a message indicating that no AP (access point) is set. This means that the user will have to enter a password. To do so, simply click on Configure Wi-Fi, then select the Wi-Fi you are connecting to and enter the required credentials for this specific access point:



After entering the correct credentials click on save. If the password is correct, the connection will be established. This will be indicated with a message:



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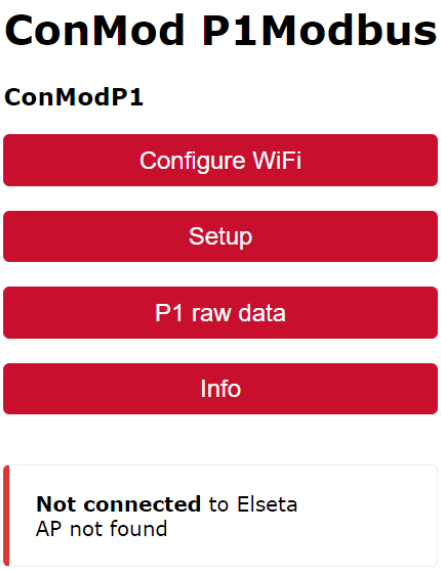

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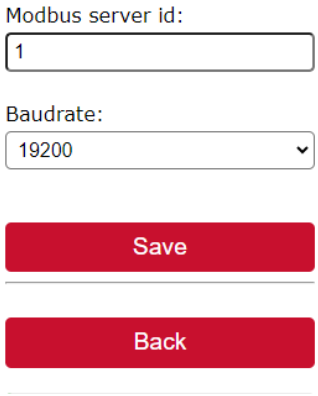

There is also an option to read all the parameters from the meter without connecting ConMod to WCC Lite. Those parameters could also be found on the user interface by clicking on P1 raw data. It will show Obis codes and their corresponding values.

ConMod User Manual 1.0.3, 1.0.4

Overview

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They are designed to convert smart meter data into the most popular industrial protocol – Modbus. The solution perfectly fits integration with energy management systems, remote monitoring, SCADA systems, etc.

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- Built-in switchable terminating resistors for RS485;
- Possibility to provide power for protocol converter from P1 interface as well from external power supply;
- Wide power supply range from 5V to 60VDC;
- External Wi-Fi antenna with SMA connector;
- Wi-Fi on/off switch;
- Reset the device button;
- Communication port RS485, Wi-Fi (2,4GHz B/G/N);
- Modbus RTU, Modbus TCP protocols.

Connection

> It is highly recommended that the RJ12 wire is not longer than 7 meters, otherwise the connection might be unstable.

To connect ConMod to a meter, an RJ12 cable is required. As shown in the picture below, one side of the cable is connected to a ConMod P1 port, and the other one to a meter. After connecting P1 LED will light up. Instructions on how to connect to a Wi-Fi are described below in the paragraph Connection and Configuration over Wi-Fi.

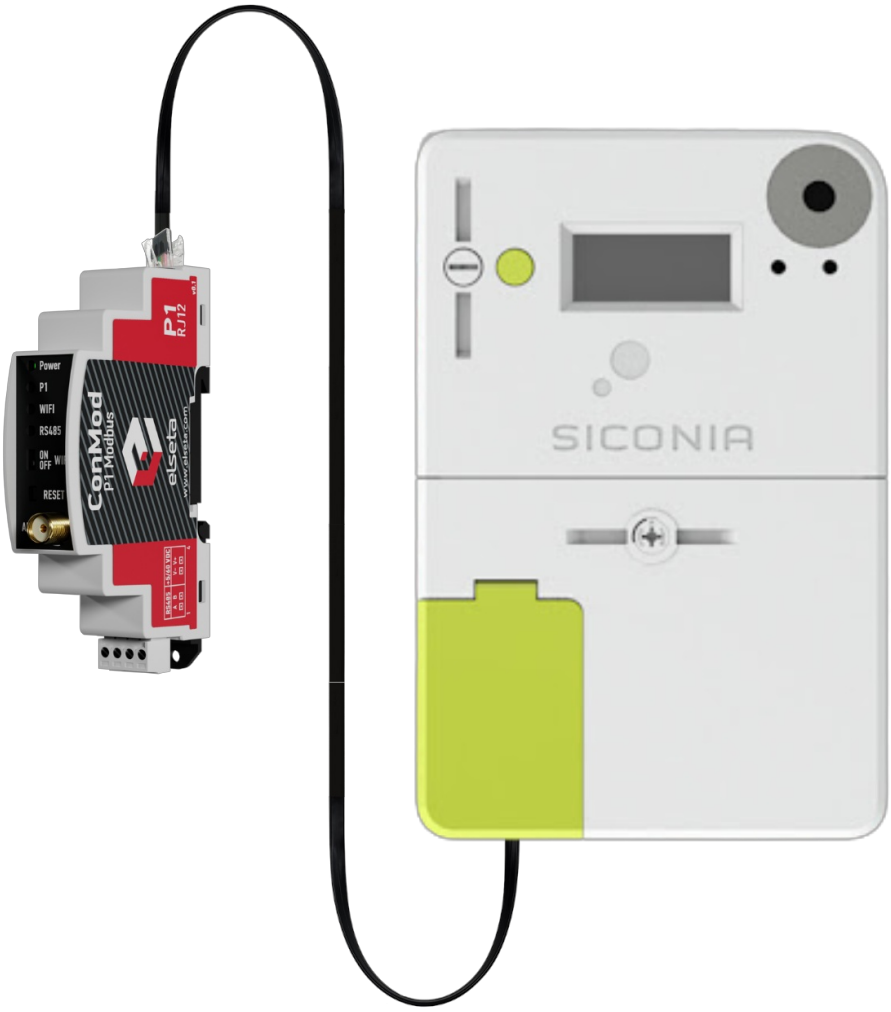

Fig. 1. P1 connection to a smart meter via RJ12 cable

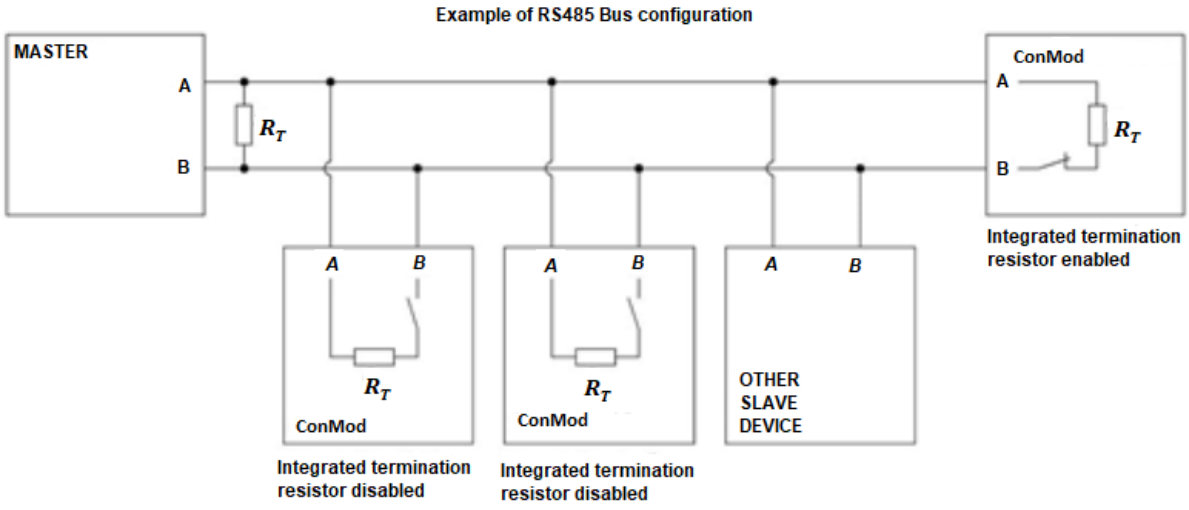

Fig.2. RS485 Bus configuration

Common configuration information

ConMod receives data from meters via the P1 interface and sends data back via Modbus protocol using function 3 (read holding registers). Default serial communication parameters are:

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Baud rate	9600
data bits	8

stop bits	1
parity	none

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Active energy import (+A)	Wh	8	1-0:1.8.0	2	UNSIGNED32
Active energy export (-A)	Wh	10	1-0:2.8.0	2	UNSIGNED32
Reactive energy import (+R) (QI+QII)	varh	12	1-0:3.8.0	2	UNSIGNED32
Reactive energy export (-R) (QIII+QIV)	varh	14	1-0:4.8.0	2	UNSIGNED32
Active energy import (+A) rate 1	Wh	16	1-0:1.8.1	2	UNSIGNED32
Active energy import (+A) rate 2	Wh	18	1-0:1.8.2	2	UNSIGNED32
Active energy import (+A) rate 3	Wh	20	1-0:1.8.3	2	UNSIGNED32
Active energy import (+A) rate 4	Wh	22	1-0:1.8.4	2	UNSIGNED32
Active energy export (−A) rate 1	Wh	24	1-0:2.8.1	2	UNSIGNED32
Active energy export (−A) rate 2	Wh	26	1-0:2.8.2	2	UNSIGNED32
Active energy export (−A) rate 3	Wh	28	1-0:2.8.3	2	UNSIGNED32
Active energy export (−A) rate 4	Wh	30	1-0:2.8.4	2	UNSIGNED32
Reactive energy (+R) rate 1	varh	32	1-0:3.8.1	2	UNSIGNED32
Reactive energy (+R) rate 2	varh	34	1-0:3.8.2	2	UNSIGNED32
Reactive energy (+R) rate 3	varh	36	1-0:3.8.3	2	UNSIGNED32
Reactive energy (+R) rate 4	varh	38	1-0:3.8.4	2	UNSIGNED32
Reactive energy (-R) rate 1	varh	40	1-0:4.8.1	2	UNSIGNED32
Reactive energy (-R) rate 2	varh	42	1-0:4.8.2	2	UNSIGNED32
Reactive energy (-R) rate 3	varh	44	1-0:4.8.3	2	UNSIGNED32
Reactive energy (-R) rate 4	varh	46	1-0:4.8.4	2	UNSIGNED32
Instantaneous active import power (+A)	Wh	48	1-0:1.7.0	2	UNSIGNED32
Instantaneous active export power (-A)	Wh	50	1-0:2.7.0	2	UNSIGNED32
Instantaneous reactive import power (+R)	varh	52	1-0:3.7.0	2	UNSIGNED32

Instantaneous reactive export power (-R)	varh	54	1-0:4.7.0	2	UNSIGNED32
Instantaneous voltage L1	V	56	1-0:32.7.0	2	UNSIGNED32
Average voltage L1	V	58	1-0:32.24.0	2	UNSIGNED32
Instantaneous current L1	A	60	1-0:31.7.0	2	UNSIGNED32
Sliding Average current L1 (for fuse supervision)	A	62	1-0:31.4.0	2	UNSIGNED32
Instantaneous voltage L2	V	64	1-0:52.7.0	2	UNSIGNED32
Average voltage L2	V	66	1-0:52.24.0	2	UNSIGNED32
Instantaneous current L2	A	68	1-0:51.7.0	2	UNSIGNED32
Sliding Average current L2 (for fuse supervision)	A	70	1-0:51.4.0	2	UNSIGNED32
Instantaneous voltage L3	V	72	1-0:72.7.0	2	UNSIGNED32
Average voltage L3	V	74	1-0:72.24.0	2	UNSIGNED32
Instantaneous current L3	A	76	1-0:71.7.0	2	UNSIGNED32
Sliding Average current L3 (for fuse supervision)	A	78	1-0:71.4.0	2	UNSIGNED32
Instantaneous voltage (U) [V]	V	80	1-0:12.7.0	2	UNSIGNED32
Instantaneous current [A]	A	82	1-0:11.7.0	2	UNSIGNED32
Instantaneous current in neutral [A]	A	84	1-0:91.7.0	2	UNSIGNED32
Instantaneous current (sum over all phases)	A	86	1-0:90.7.0	2	UNSIGNED32
Instantaneous net frequency; any phase	Hz	88	1-0:14.7.0	2	UNSIGNED32
Instantaneous active power (|+A|+|-A|)	W	90	1-0:15.7.0	2	UNSIGNED32
Instantaneous active import power (+A) in phase L1 [kW]	W	92	1-0:21.7.0	2	UNSIGNED32
Instantaneous active import power (+A) in phase L2 [kW]	W	94	1-0:41.7.0	2	UNSIGNED32
Instantaneous active import power (+A) in phase L3 [kW]	W	96	1-0:61.7.0	2	UNSIGNED32
Instantaneous active export power (-A) in phase L1 [kW]	W	98	1-0:22.7.0	2	UNSIGNED32
Instantaneous active export power (-A) in phase L2 [kW]	W	100	1-0:42.7.0	2	UNSIGNED32
Instantaneous active export power (-A) in phase L3 [kW]	W	102	1-0:62.7.0	2	UNSIGNED32
Instantaneous reactive import power (+R) in phase L1 [kvar]	var	104	1-0:23.7.0	2	UNSIGNED32
Instantaneous reactive import power (+R) in phase L2 [kvar]	var	106	1-0:43.7.0	2	UNSIGNED32

Instantaneous reactive import power (+R) in phase L3 [kvar]	var	108	1-0:63.7.0	2	UNSIGNED32
Instantaneous reactive export power (-R) in phase L1 [kvar]	var	110	1-0:24.7.0	2	UNSIGNED32
Instantaneous reactive export power (-R) in phase L2 [kvar]	var	112	1-0:44.7.0	2	UNSIGNED32
Instantaneous reactive export power (-R) in phase L3 [kvar]	var	114	1-0:64.7.0	2	UNSIGNED32
Instantaneous apparent import power (+VA)	VA	116	1-0:9.7.0	2	UNSIGNED32
Instantaneous apparent import power (+VA) in phase L1	VA	118	1-0:29.7.0	2	UNSIGNED32
Instantaneous apparent import power (+VA) in phase L2	VA	120	1-0:49.7.0	2	UNSIGNED32
Instantaneous apparent import power (+VA) in phase L3	VA	122	1-0:69.7.0	2	UNSIGNED32
Instantaneous apparent export power (-VA)	VA	124	1-0:10.7.0	2	UNSIGNED32
Instantaneous apparent export power (-VA) in phase L1	VA	126	1-0:30.7.0	2	UNSIGNED32
Instantaneous apparent export power (-VA) in phase L2	VA	128	1-0:50.7.0	2	UNSIGNED32
Instantaneous apparent export power (-VA) in phase L3	VA	130	1-0:70.7.0	2	UNSIGNED32
Average Import Power (+A)	W	132	1-0:1.24.0	2	UNSIGNED32
Average Net Power (|+A|-|-A|)	W	134	1-0:16.24.0	2	SIGNED32
Average Total Power (|+A|+|-A|)	W	136	1-0:15.24.0	2	UNSIGNED32
Instantaneous Power factor (+A/+VA)	-	138	1-0:13.7.0	2	UNSIGNED32
Instantaneous power factor in phase L1	-	140	1-0:33.7.0	2	UNSIGNED32
Instantaneous power factor in phase L2	-	142	1-0:53.7.0	2	UNSIGNED32
Instantaneous power factor in phase L3	-	144	1-0:73.7.0	2	UNSIGNED32
Minimum Power factor (+A/+VA)	-	146	1-0:13.3.0	2	UNSIGNED32
Measurement Period 3 for Instantaneous values	s	148	1-0:0.8.2	2	UNSIGNED32
Demand Register 1 - Active energy import (+A)	W	150	1-0:1.4.0	2	UNSIGNED32
Demand Register 2 - Active energy export (−A)	W	152	1-0:2.4.0	2	UNSIGNED32
Demand Register 3 - Reactive energy import (+R)	var	154	1-0:3.4.0	2	UNSIGNED32

Demand Register 4 - Reactive energy export (-R)	var	156	1-0:4.4.0	2	UNSIGNED32
Demand Register 5 - Apparent energy import (+VA)	VA	158	1-0:9.4.0	2	UNSIGNED32
Demand Register 6 - Apparent energy export (-VA)	VA	160	1-0:10.4.0	2	UNSIGNED32
Last Average Demand Register 1 - Active energy import (+A)	W	162	1-0:1.5.0	2	UNSIGNED32
Last Average Demand Register 2 - Active energy export (−A)	W	164	1-0:2.5.0	2	UNSIGNED32
Last Average Demand Register 3 - Reactive energy import (+R)	var	166	1-0:3.5.0	2	UNSIGNED32
Last Average Demand Register 4 - Reactive energy export (-R)	var	168	1-0:4.5.0	2	UNSIGNED32
Last Average Demand Register 5 - Apparent energy import (+VA)	VA	170	1-0:9.5.0	2	UNSIGNED32
Last Average Demand Register 6 - Apparent energy export (-VA)	VA	172	1-0:10.5.0	2	UNSIGNED32
Number of voltage sags in phase L1	-	174	1-0:32.32.0	2	UNSIGNED32
Number of voltage sags in phase L2	-	176	1-0:52.32.0	2	UNSIGNED32
Number of voltage sags in phase L3	-	178	1-0:72.32.0	2	UNSIGNED32
Duration of last voltage sag in phase L1	s	180	1-0:32.33.0	2	UNSIGNED32
Duration of last voltage sag in phase L2	s	182	1-0:52.33.0	2	UNSIGNED32
Duration of last voltage sag in phase L3	s	184	1-0:72.33.0	2	UNSIGNED32
Magnitude of last voltage sag in phase L1	V	186	1-0:32.34.0	2	UNSIGNED32
Magnitude of last voltage sag in phase L2	V	188	1-0:52.34.0	2	UNSIGNED32
Magnitude of last voltage sag in phase L3	V	190	1-0:72.34.0	2	UNSIGNED32
Number of voltage swells in phase L1	-	192	1-0:32.36.0	2	UNSIGNED32
Number of voltage swells in phase L2	-	194	1-0:52.36.0	2	UNSIGNED32
Number of voltage swells in phase L3	-	196	1-0:72.36.0	2	UNISGNED32
Duration of last voltage swell in phase L1	s	198	1-0:32.37.0	2	UNSIGNED32
Duration of last voltage swell in phase L2	s	200	1-0:52.37.0	2	UNSIGNED32
Duration of last voltage swell in phase L3	s	202	1-0:72.37.0	2	UNSIGNED32
Magnitude of last voltage swell in phase L1	V	204	1-0:32.38.0	2	UNSIGNED32

Magnitude of last voltage swell in phase L2	V	206	1-0:52.38.0	2	UNSIGNED32
Magnitude of last voltage swell in phase L3	V	208	1-0:72.38.0	2	UNSIGNED32
Number of long power failures in any phase	-	210	0-0:96.7.9	2	UNSIGNED32
Number of power failures in any phase	-	212	0-0:96.7.21	2	UNSIGNED32
clock	-	214	0-0:1.0.0	7	TST

The number type in the Modbus protocol allows users to read data in different formats. The number type and data from the meter must be compatible. For example, if it takes 16 bits to read data and the sign (+/-) is important, then the user should configure the Modbus register as SIGNED 16. For further explanation of how number type determines data value, see the table below:

Name	Description	Range
SIGNED16	16-bit signed integer (1 word)	-32768...+32767
UNSIGNED16	16-bit unsigned integer (1 word)	0...65535
SIGNED32	32-bit signed integer (2 words)	-2 147 483 648... + 2 147 483 647
UNSIGNED32	32-bit unsigned integer (2 word)	0... 4 294 967 295

P1 connector circuit in meter

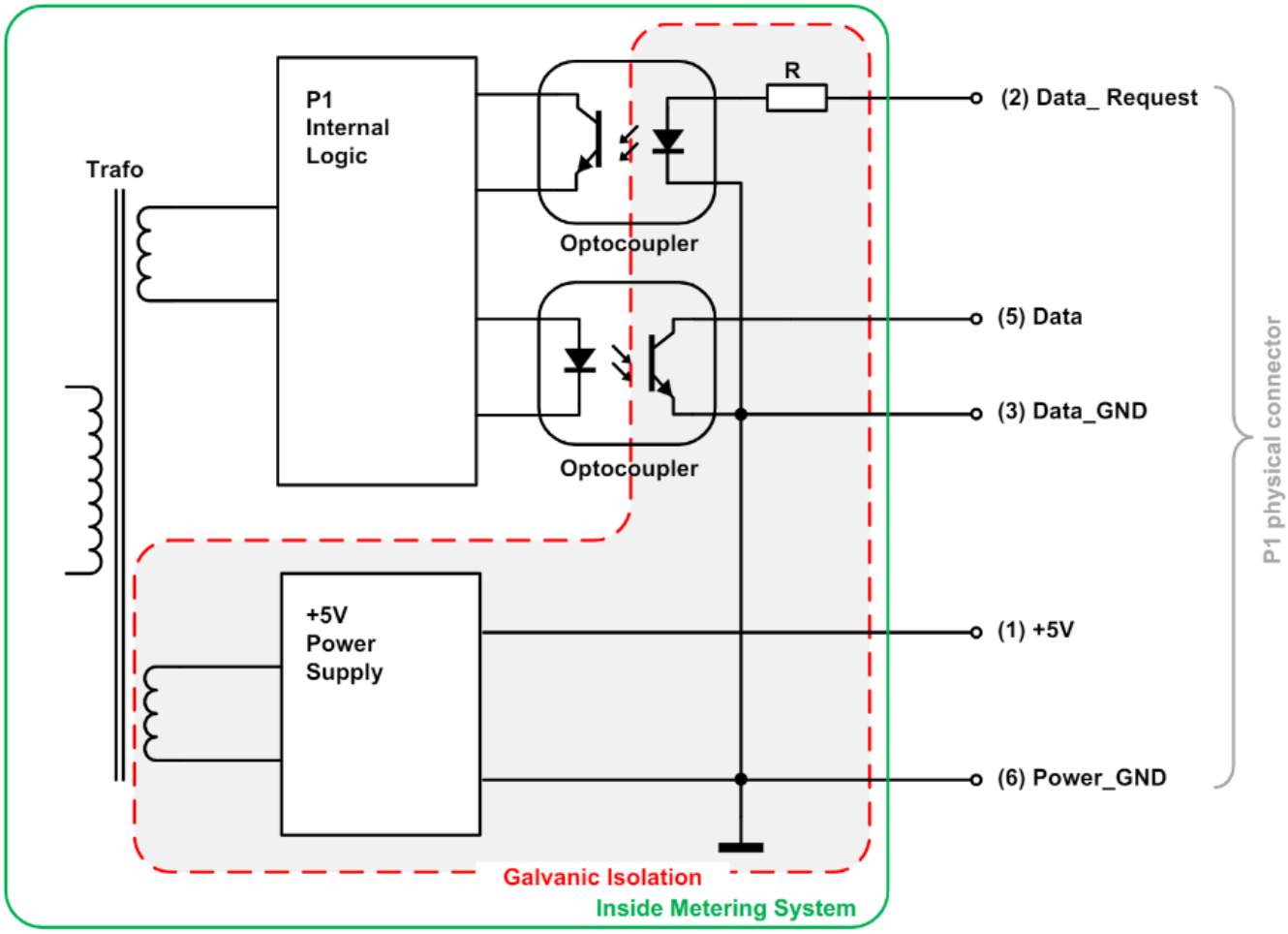


Fig.3. ConMod internal structure and connection diagram

Technical information

	System	
1.	Dimension	91 x 18 x 67 mm
2.	Working temperature	-25°C | +55°C
3.	Recommended operating conditions	-25°C | +55°C and >95 %RH (none condensing)
4.	Configuration	Web browser (Laptop and smartphone)
	Electrical specifications	
5.	Functions	• P1 interface • Connectivity – 0,5m 6pin cable with RJ12 connectors • Overvoltage protection up to ±65V
	Power	
6.	Power Supply	5V to 60V
7.	Current consumption	<200mA @12 VDC

LED status indication and control

ConMod has LED indications for the P1 interface, RS485, Wi-Fi, a switch for enabling or disabling the Wi-Fi connection, and a reset button.

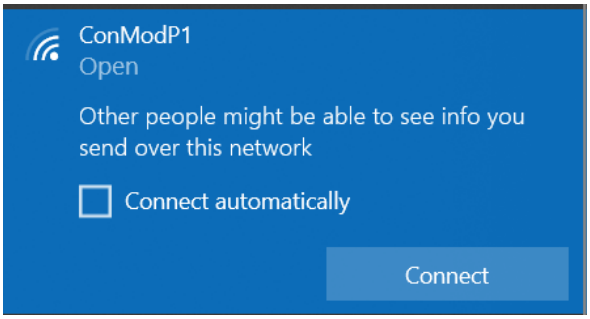
- The power LED turns green after connecting the ConMod to a power source.
- P1 LED turns on when ConMod receives a data packet from the meter.
- Wi-Fi LED indicates if the Wi-Fi connection is enabled. There is an ON/OFF switch to enable or disable Wi-Fi which can be seen below the LEDs.
- RS485 LED lights up when ConMod receives or sends data from another device via the RS485 interface. This could be either meter or WCC Lite.

By holding a reset button for ~5s, ConMod resets the Wi-Fi connection and allows it to connect to another network instead.

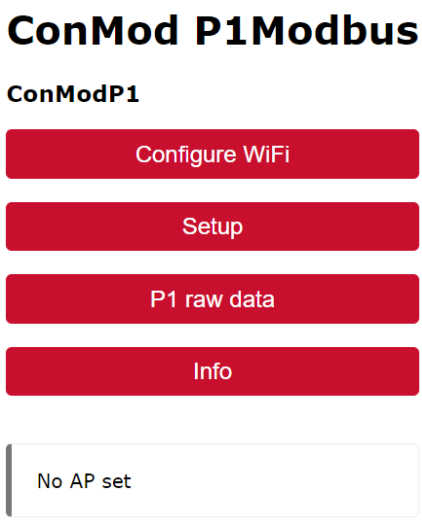
Connection and configuration over Wi-Fi

ConMod is compatible with meters that have a DSMR interface. After physically connecting the ConMod to the meter and turning it on, it becomes a Wi-Fi access point. To connect to ConMod click on Wi-Fi settings and connect to a new

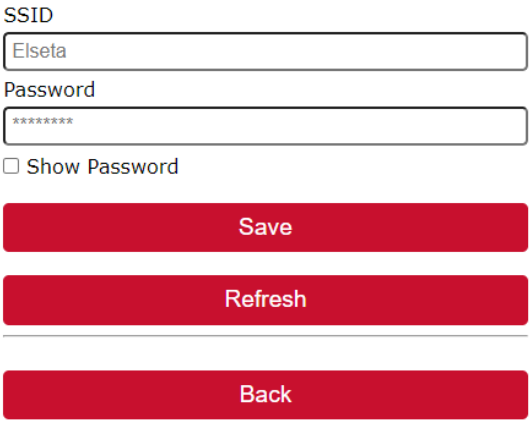
network – ConModP1:



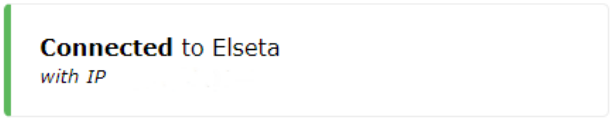
Connection will redirect the user to the main configuration web page:



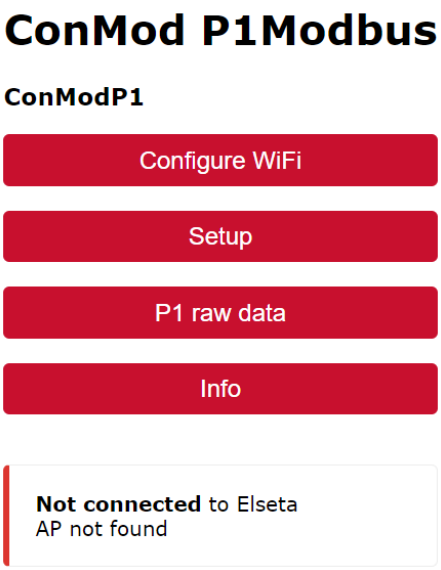
As seen in the image above, there is a message indicating that no AP (access point) is set. This means that the user will have to enter a password. To do so, simply click on Configure Wi-Fi, then select the Wi-Fi you are connecting to and enter the required credentials for this specific access point:



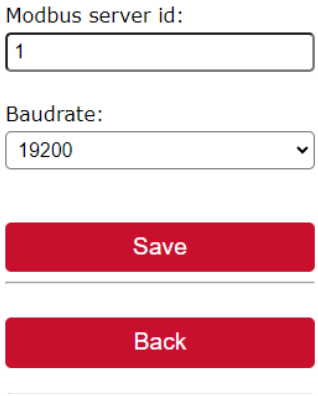
After entering the correct credentials click on save. If the password is correct, the connection will be established. This will be indicated with a message:



In case of an incorrect password, the message Not connected will appear (like in the picture below) and the connection to the ConModP1 network will be lost. In this case, the user should simply try to reconnect to the network and enter the correct credentials instead.



Another way to connect is via web address conmod.local but only after the connection is established. The user interface also allows to setup of Modbus parameters such as slave ID and baud rate:



There is also an option to read all the parameters from the meter without connecting ConMod to WCC Lite. Those parameters could also be found on the user interface by clicking on P1 raw data. It will show Obis codes and their corresponding values.