ELSETA

ConMod P1

User manual

Elseta
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SAFETY REQUIREMENTS

These equipment operating notes must be met for your safety as well as to avoid damage to the equipment. These notes are marked with a warning triangle symbol and the various degrees of risk of falling within signs. All work related to electronic systems design, installation, commissioning, adjustment, and maintenance should be carried out according to the safety requirements.

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ConMod User Manual

Overview

ConMod P1Modbus is a small small-size 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).

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 be able 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.

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.

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_power_to_client_time_integral_1	Wh	8	2	UNSIGNED32
reactive_power_to_client_time_integral_1	varh	10	2	UNSIGNED32
reactive_power_from_client_time_integral_1	varh	12	2	UNSIGNED32
active_power_to_client_time_integral_1_rate_1	Wh	14	2	UNSIGNED32
active_power_to_client_time_integral_1_rate_2	-	16	2	UNSIGNED32
active_power_to_client_time_integral_1_rate_3	Wh	18	2	UNSIGNED32
active_power_to_client_time_integral_1_rate_4	Wh	20	2	UNSIGNED32
active_power_from_client_time_integral_1_rate_1	Wh	22	2	UNSIGNED32
active_power_from_client_time_integral_1_rate_2	Wh	24	2	UNSIGNED32
active_power_from_client_time_integral_1_rate_3	Wh	26	2	UNSIGNED32
active_power_from_client_time_integral_1_rate_4	Wh	28	2	UNSIGNED32
reactive_power_to_client_time_integral_1_rate_1	varh	30	2	UNSIGNED32

reactive_power_to_client_time_integral_1_rate_2	varh	32	2	UNSIGNED32
reactive_power_to_client_time_integral_1_rate_3	varh	34	2	UNSIGNED32
reactive_power_to_client_time_integral_1_rate_4	varh	36	2	UNSIGNED32
reactive_power_from_client_time_integral_1_rate_1	varh	38	2	UNSIGNED32
reactive_power_from_client_time_integral_1_rate_2	varh	40	2	UNSIGNED32
reactive_power_from_client_time_integral_1_rate_3	varh	42	2	UNSIGNED32
reactive_power_from_client_time_integral_1_rate_4	varh	44	2	UNSIGNED32
voltage_l1_instantaneous_ value	V	46	2	UNSIGNED32
voltage_l1_current_averag e_3	V	48	2	UNSIGNED32
current_l1_instantaneous_ value	A	50	2	UNSIGNED32
current_l1_current_averag e_1	A	52	2	UNSIGNED32
voltage_l2_instantaneous_ value	V	54	2	UNSIGNED32
voltage_l2_current_averag e_3	V	56	2	UNSIGNED32
current_l2_instantaneous_ value	A	58	2	UNSIGNED32
current_l2_current_averag e_1	A	60	2	UNSIGNED32
voltage_l3_instantaneous_ value	V	62	2	UNSIGNED32
voltage_l3_current_averag e_3	V	64	2	UNSIGNED32

current_l3_instantaneous_ value	A	66	2	UNSIGNED32
current_l3_current_averag e_1	A	68	2	UNSIGNED32
voltage_any_phase_instantaneous_value	V	70	2	UNSIGNED32
current_any_phase_instantaneous_value	A	72	2	UNSIGNED32
current_l0_instantaneous_ value	A	74	2	UNSIGNED32
some_current	A	76	2	UNSIGNED32
supply_frequency_instantaneous_value	Hz	78	2	UNSIGNED32
active_power_abs_Q1_Q2_ p_abs_Q3_Q4_instantaneous_value	W	80	2	UNSIGNED32
active_power_to_client_l1_instantaneous_value	W	82	2	UNSIGNED32
active_power_to_client_l2_instantaneous_value	W	84	2	UNSIGNED32
active_power_to_client_l3_instantaneous_value	W	86	2	UNSIGNED32
active_power_from_client_l1_instantaneous_value	W	88	2	UNSIGNED32
active_power_from_client_l2_instantaneous_value	W	90	2	UNSIGNED32
active_power_from_client_l3_instantaneous_value	W	92	2	UNSIGNED32
reactive_power_to_client_l1_instantaneous_value	var	94	2	UNSIGNED32
reactive_power_to_client_l2_instantaneous_value	var	96	2	UNSIGNED32
reactive_power_to_client_l3_instantaneous_value	var	98	2	UNSIGNED32
reactive_power_from_client_l1_instantaneous_value	var	100	2	UNSIGNED32
reactive_power_from_client_l2_instantaneous_value	var	102	2	UNSIGNED32
reactive_power_from_client_l3_instantaneous_value	var	104	2	UNSIGNED32
apparent_power_to_client_instantaneous_value	VA	106	2	UNSIGNED32

apparent_power_to_client_l1_instantaneous_value	VA	108	2	UNSIGNED32
apparent_power_to_client_l2_instantaneous_value	VA	110	2	UNSIGNED32
apparent_power_to_client_l3_instantaneous_value	VA	112	2	UNSIGNED32
apparent_power_from_client_instantaneous_value	VA	114	2	UNSIGNED32
apparent_power_from_client_l1_instantaneous_value	VA	116	2	UNSIGNED32
apparent_power_from_client_l2_instantaneous_value	VA	118	2	UNSIGNED32
apparent_power_from_client_l3_instantaneous_value	VA	120	2	UNSIGNED32
active_power_to_client_current_average_3	W	122	2	UNSIGNED32
active_power_abs_Q1_Q2_ n_abs_Q3_Q4_current_aver age_3	W	124	2	SIGNED32
active_power_abs_Q1_Q2_ p_abs_Q3_Q4	W	126	2	UNSIGNED32
power_factor_instantaneous_value	-	128	2	SIGNED32
power_factor_l1_instantaneous_value	-	130	2	SIGNED32
power_factor_l2_instantaneous_value	-	132	2	SIGNED32
power_factor_l3_instantaneous_value	-	134	2	SIGNED32
power_factor_minimum_1	-	136	2	SIGNED32
measurement_period_for_instantaneous	s	138	2	UNSIGNED32
active_power_to_client_current_average_1	W	140	2	UNSIGNED32
active_power_from_client_current_average_1	W	142	2	UNSIGNED32
reactive_power_to_client_current_average_1	var	144	2	UNSIGNED32

reactive_power_from_client_current_average_1	var	146	2	UNSIGNED32
apparent_power_to_client_current_average_1	VA	148	2	UNSIGNED32
apparent_power_from_client	VA	150	2	UNSIGNED32
active_power_to_client_last _average_1	W	152	2	UNSIGNED32
active_power_from_client_last_average_1	W	154	2	UNSIGNED32
reactive_power_to_client_last_average_1	var	156	2	UNSIGNED32
reactive_power_from_client_last_average_1	var	158	2	UNSIGNED32
apparent_power_to_client_last_average_1	VA	160	2	UNSIGNED32
apparent_power_from_client_last_average_1	VA	162	2	UNSIGNED32
voltage_l1_under_limit_duration	s	164	2	UNSIGNED32
voltage_l2_under_limit_duration	s	166	2	UNSIGNED32
voltage_l3_under_limit_duration	s	168	2	UNSIGNED32
voltage_l1_under_limit_magnitude	V	170	2	UNSIGNED32
voltage_l2_under_limit_magnitude	V	172	2	UNSIGNED32
voltage_l3_under_limit_magnitude	V	174	2	UNSIGNED32
voltage_l1_over_limit_duration	s	176	2	UNSIGNED32
voltage_l2_over_limit_duration	s	178	2	UNSIGNED32
voltage_l3_over_limit_duration	s	180	2	UNSIGNED32
voltage_l1_over_limit_magnitude	V	182	2	UNSIGNED32
voltage_l2_over_limit_magnitude	V	184	2	UNSIGNED32
voltage_l3_over_limit_magnitude	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

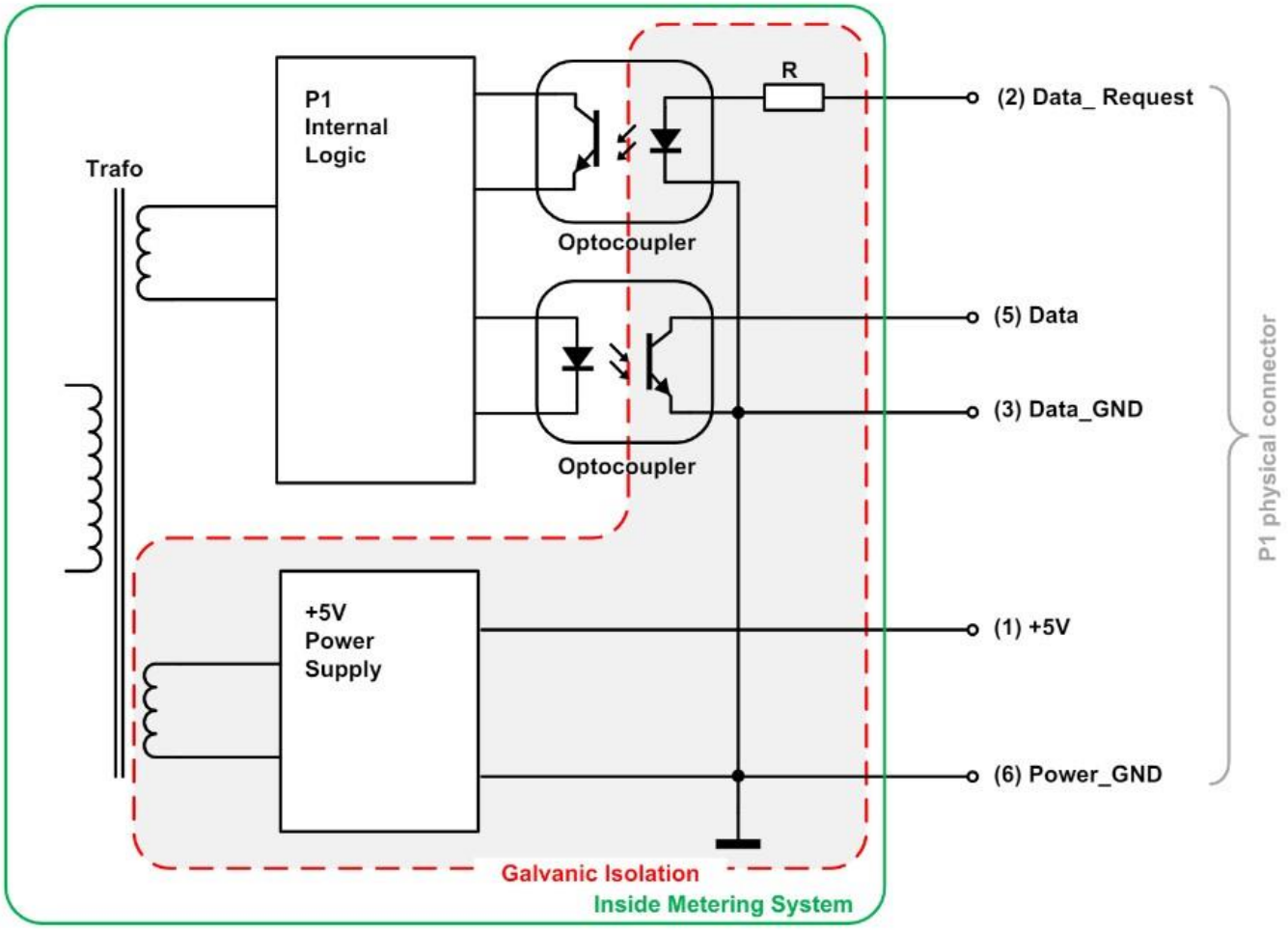


Fig.1. ConMod internal structure and connection diagram

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

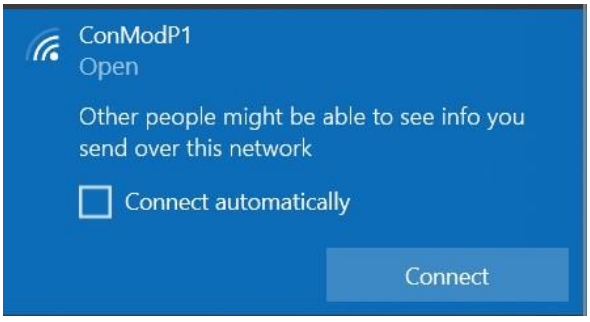
ConMod has LED indications for the P1 interface, RS485, and Wi-Fi, a switch for enabling or disabling the Wi-Fi connection, and a reset button.

- 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.

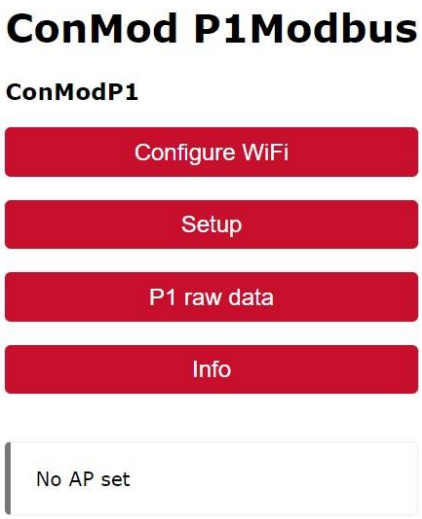
By holding a reset button for ~5s, ConMod resets the Wi-Fi connection and allows it to connect to another network instead.

Connection and configuration over Wi-Fi

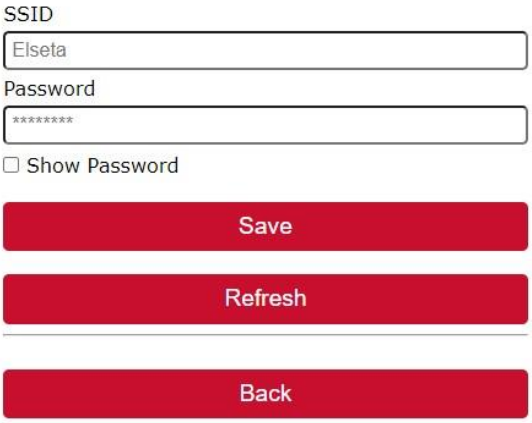
ConMod is compatible with meters that have a DSMR interface. After physically connecting the ConMod to the meter and turning it on, it becomes a Wi-Fi access point. To connect to ConMod click on Wi-Fi settings and connect to a new network – ConModP1:



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

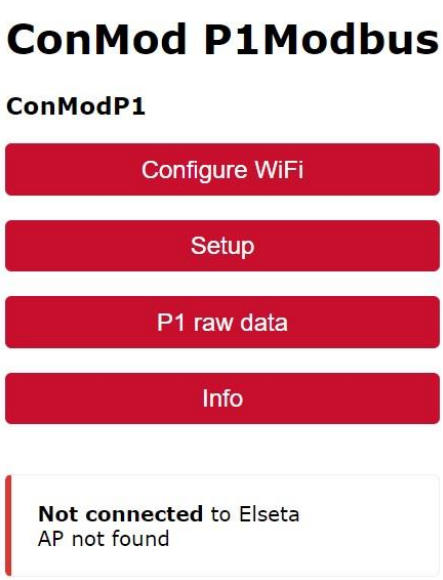


As seen in the image above, there is a message indicating that no AP (access point) is set. This means that the user will have to enter a password. To do so, simply click on Configure Wi-Fi, then select the Wi-Fi you are connecting to and enter the required credentials for this specific access point:

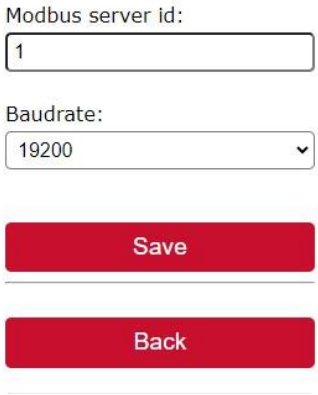


After entering the correct credentials click on save. If the password is correct, the connection will be established. This will be indicated with a message:

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.

Information of the equipment manufacturer

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