INSITE ENERGY MANAGEMENT SYSTEM

SCU200

User manual

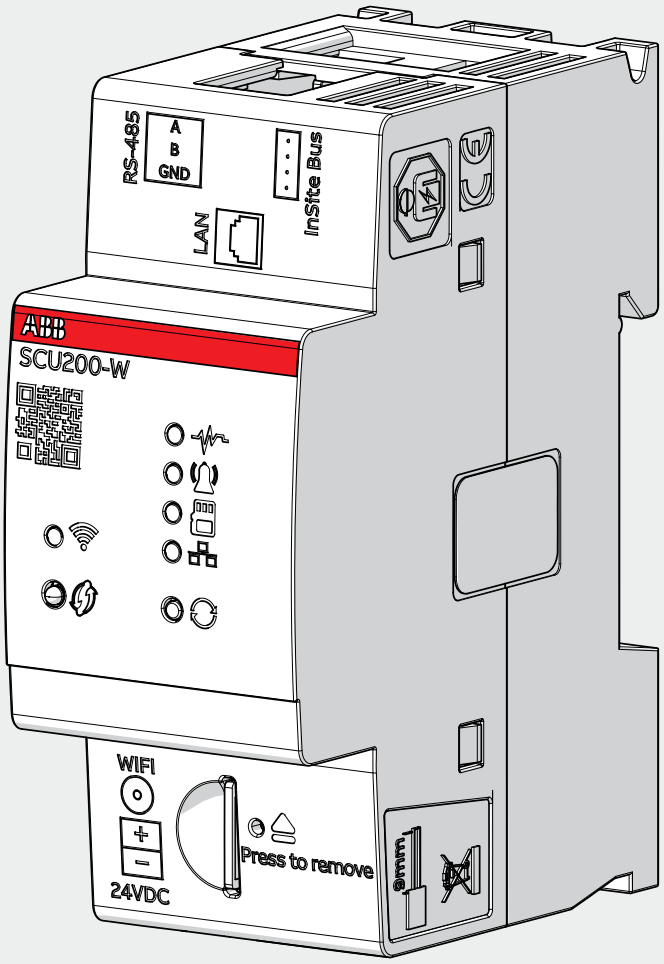


Table of Contents

1.General Information

This manual contains all the safety information, the technical aspects and the operating necessary to ensure the correct use of the device and maintain it in safe conditions.

1.1.Use and Storage of the manual

1.1.1.Storing

The manual must be stored close to the device; safe from liquids and anything else which may compromise its legibility. The manual and the declaration of conformity are both an integral part of the device until it is dismantled. If the manual is lost or illegible please request a copy from the manufacturer.

1.1.2.Copyright

1.1.3.Liability disclaimer

1.1.4.Brand

1.1.5.Meaning of symbols

	Warning – can result in death or serious personal injury		Non-safety related, but useful and important information
	CE conformity mark		Torque
	Observe the accompanying documents		Disposal
	Installation, electrotechnical expertise		Equipment protected throughout by reinforced insulation

1.2.Cleaning

Use a dry cloth.

1.3.Installation to mains

Installation of device to mains shall include a switch or circuit breaker for the connection to mains. The switch or circuit breaker must be suitably located and easily reachable and must be marked as the disconnecting device for the device.

1.4.Disconnection from mains or connections to mains

Switch off circuit breaker or switch before disconnecting from the mains supply or connecting to the mains supply. Same applies for all other connections (L1, L2, L3, N).

1.5.Safety warnings

Attention: Non-adherence to the following points can lead to serious injury or death. Use the suitable personal protection devices and adhere to the current regulations governing electrical safety.

This device must be installed exclusively by qualified personnel who have read all of the information relative to the installation. This devices was designed for indoor use.

Check that the voltage on the main side is compatible with the range permitted by the device.

Ensure that all current and voltage supplies are disconnected prior to carrying out any controls, visual inspections and tests on the device.

Always assume that all circuits are under voltage until they are completely disconnected, subjected to tests and labelled.

Disconnect all of the power supply prior to working on the device.

Always use a suitable voltage detection device to check that the supply is interrupted.

Pay attention to any dangers and carefully check the work area ensuring that no instruments or foreign objects have been left inside the compartment in which the device is housed.

The correct use of this device depends on a correct manipulation, installation and use. The device counts with a grade of mechanical protection IK06.

Failure to adhere to the basic installation information can lead to injuries as well as damage to the electric instruments or to any other product.

The tests carried out at a high voltage can damage the device’s electronic components.

1.6.Disposal

Defective devices must be disposed of as special waste at the appropriate collection points set up for this purpose. National or regional regulations on the disposal of special waste must be followed.

1.7.Service and maintenance

The device undergoes several safety assessments before shipment and will be sealed. If a device is opened, the safety assessments have to be repeated. A warranty will be provided for unopened devices only.

1.8.Cyber Security disclaimer

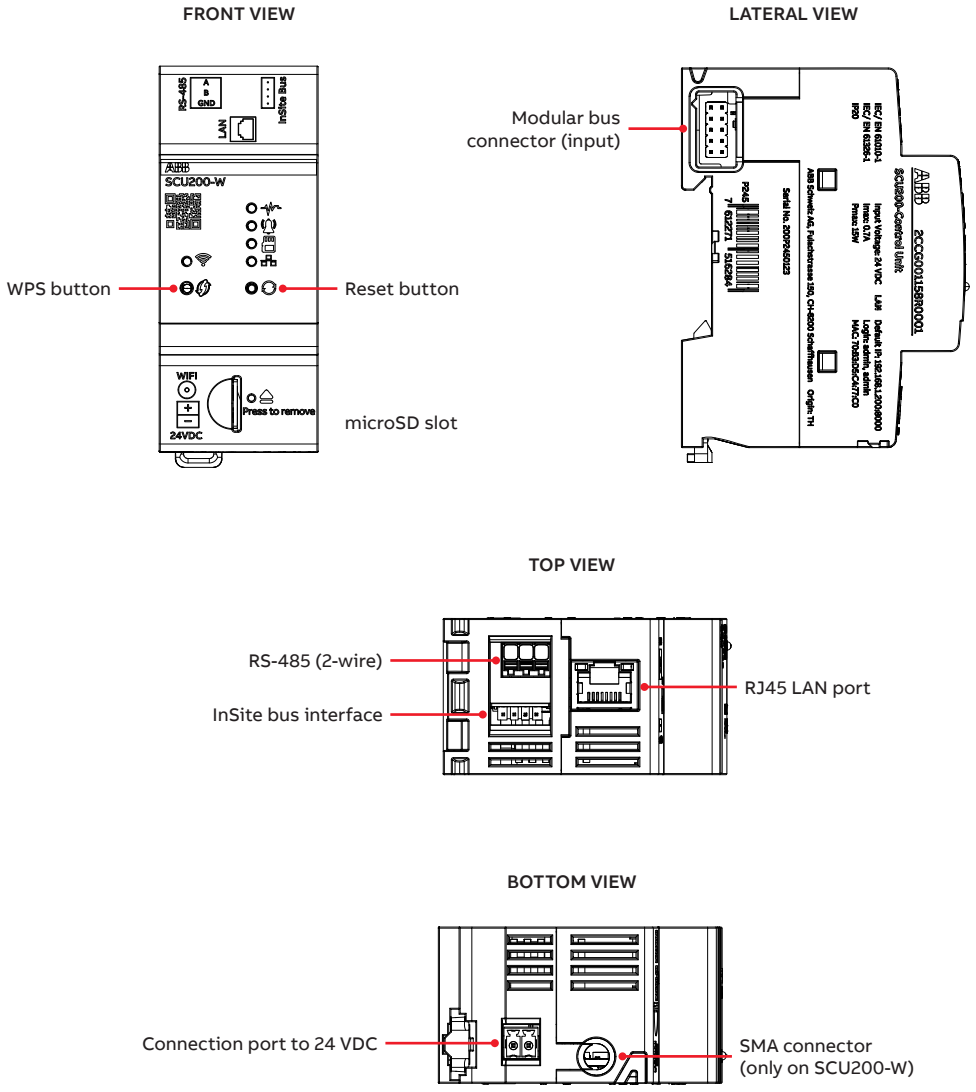
Sub-distribution Control Unit SCU200 is designed to be connected and to communicate information and data via a network interface, which should be connected to a secure network. It is your sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be) and to establish and maintain appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the Sub-distribution Control Unit SCU200 product, the network, its system and interfaces against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB S.p.A. and its affiliates are not liable for damages and/ or losses related to such security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Although ABB S.p.A. provides functionality testing on the products and updates that we release, you should institute your own testing program for any product updates or other major system updates (to include but not limited to code changes, configuration file changes, third party software updates or patches, hardware change out, etc.) to ensure that the security measures that you have implemented have not been compromised and system functionality in your environment is as expected.

2.System overview

InSite energy management system is a monitoring system which brings complete overview of the system performances and enables energy and asset management. The system consists of a Control Unit (SCU200) and different modules easily connected through a mechanical coupling to the control unit: energy meter module (INS-E3), power supply module (INS-PS-1), Wireless M-Bus module (INS-WM), and smart auxiliary and signal module (INS-S/H). The input measurements and data from meters are transmitted via Modbus RTU, Modbus TCP and Wireless M-Bus communication protocols. The input measurements and information from current sensors and I/O modules are transmitted through a flat cable, the InSite bus. All gathered data can be displayed or analyzed via LAN interface with the integrated web server through Modbus TCP or SNMP protocols and/or via RS485 interface through Modbus RTU.

2.1.Control Unit



• **LED Wi-Fi**

Display	Function
Red	Not connected to any Wi-Fi network
Red blinking slowly	Connection error
Orange	Access Point enabled
Orange blinking slowly	Access Point WPS is active
Green	Connected to the Wi-Fi network
Green blinking slowly	Wi-Fi client WPS is active
Off	No connectivity

• **LED Status**

Display	Function
Off	Device is off
Green on	Device is on
Green flashing slowly	Firmware is ready, Webserver is loading
Orange flashing slowly	Firmware updates ongoing
Orange on	Booting
Red on	Booting error
Red flashing	System error (e.g., lack of communication)

• **LED Alarm**

Display	Function
Off	Alarm acknowledged
Red on	Alarm (also for rest API)

• **LED SD card**

Display	Function
Off	Card can be removed because it's unmounted
Green on	Card mounted
Green flashing fast	Ongoing unmounting

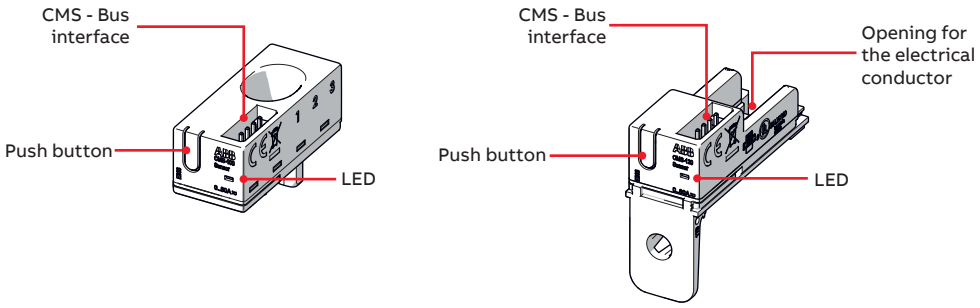
• **LED LAN**

Display	Function
Off	Disconnected
Green on	Connected
Green flashing fast	Data traffic

• **Buttons**

Button	Function
WPS	By pressing the button once, WPS function is activated and then can be connected to a home access point directly (more details on 5.1.3). This button can also be used to change the static IP of the SCU to dynamic (more details 5.1.2).
Reset button	After pressing and holding it for 10 seconds, the factory reset will be started. The button should be held until the status diode blinks orange. After successful operation, reboot will start automatically. Pressing the button for 3 seconds, but less than 10 seconds causes the SCU200 to reboot.

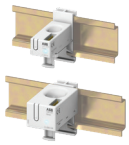
2.2.Current sensors



- **Current sensors LED Status**

Display	Function
On	Sensor is online and in measurement mode. There is a feature in the configuration to switch off the LED of all the sensors after a specified time.
Off	Sensor is not connected to InSite Bus or LED is switched off in the configuration.
Flashing slow (1Hz)	Sensor is not assigned.
Flashing fast (2Hz)	Sensor in assign process or in “setting/branches” mode. This sensor is the sensor corresponding to the yellow-marked row on the screen for webserver settings.

2.2.1.Sensors overview

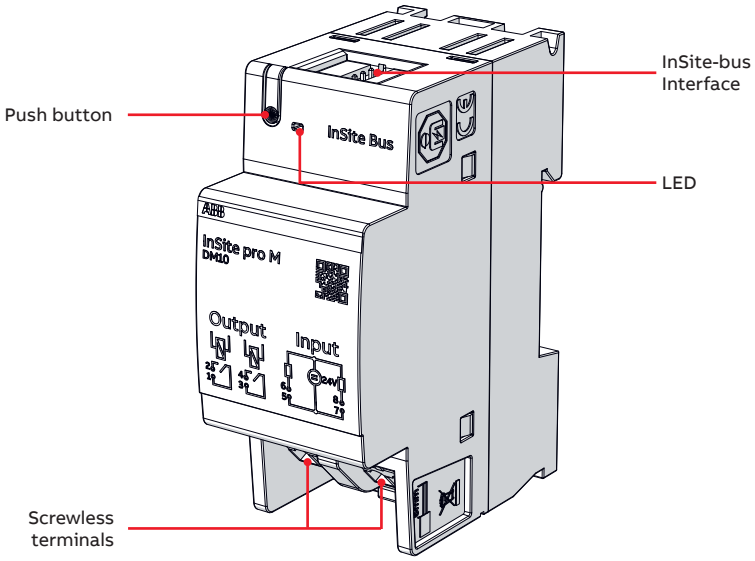
		InSite energy management system, SMISSLINE		S800	DIN rail	Cable tie
						
Mounting method	for all MCBs, RCDs, RCBOs with twin terminals	for MCBs (S200, SMISSLINE) and RCBOs (SMISSLINE)	for fuse holders E90 (1000VDC)	for all S800 devices with cage terminals	universally usable	universally usable
Open-core sensors						
AC accuracy* of ≤ ± 1.0% The laying method influences the accuracy.						
18-mm overall width						
CMS-120xx (80 A)	CMS-120PS	CMS-120LA	-		CMS-120DR	CMS-120CA
CMS-121xx (40 A)	CMS-121PS	CMS-121LA	CMS-121FH		CMS-121DR	CMS-121CA
CMS-122xx (20 A)	CMS-122PS	CMS-122LA	CMS-122FH		CMS-122DR	CMS-122CA
Solid-core sensors						
AC accuracy* of ≤ ± 0.5%						
18-mm overall width						
CMS-100xx (80 A)	CMS-100PS			CMS-100S8	CMS-100DR	CMS-100CA
CMS-101xx (40 A)	CMS-101PS			CMS-101S8	CMS-101DR	CMS-101CA
CMS-102xx (20 A)	CMS-102PS			CMS-102S8	CMS-102DR	CMS-102CA
25-mm overall width						
CMS-200xx (160 A)				CMS-200S8	CMS-200DR	CMS-200CA
CMS-201xx (80 A)				CMS-201S8	CMS-201DR	CMS-201CA
CMS-202xx (40 A)				CMS-202S8	CMS-202DR	CMS-202CA

* All accuracy specifications refer to the relevant full scale value and apply to 25°C

2.3.I/O modules

The range of I/O modules is composed of:

- Input Module with 4 inputs
- Output Module with 4 outputs
- Input and Output Module with 2 inputs and 2 outputs



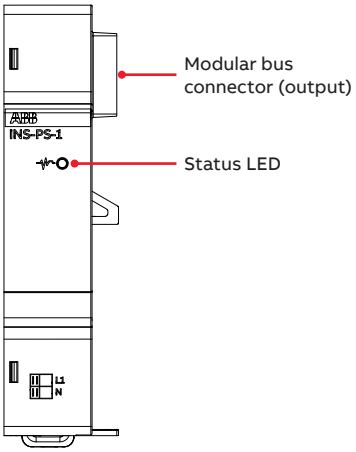
- **Module LED Status:**

Display	Function
On	Module is online and in normal operation mode. There is a feature in the configuration to switch off the LED after a specified time.
Off	Module is not connected to InSite Bus or LED is switched off in the configuration.
Flashing slow (1Hz)	Module is not assigned.
Flashing fast (2Hz)	Module in assign process or in “setting/I/O module” mode. This module is the module corresponding to the yellow-marked row on the screen for webserver configuration.

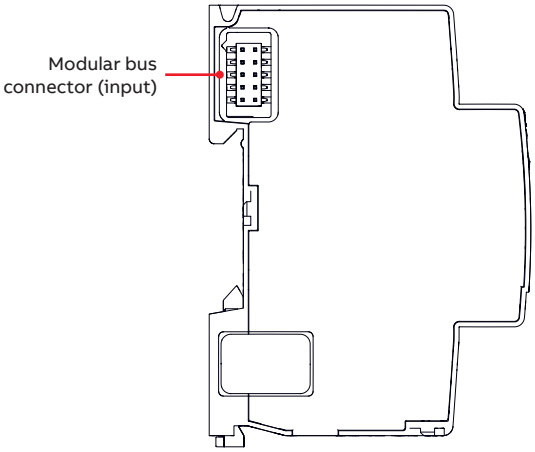
Warning: All I/O modules with version V3 or above are compatible SCU 200 (check on the left side code OXXX or above).

2.4.Power supply modules

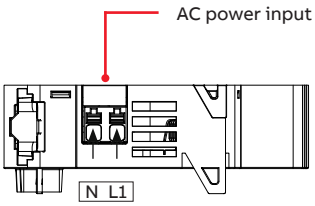
FRONT VIEW



LATERAL VIEW



TOP VIEW

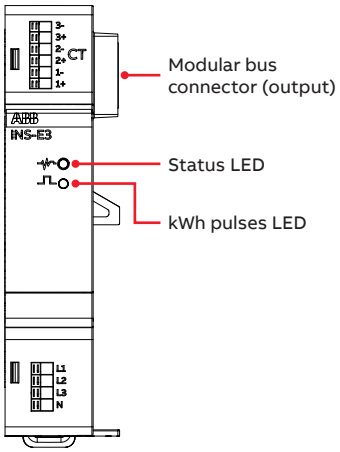


- **LED**

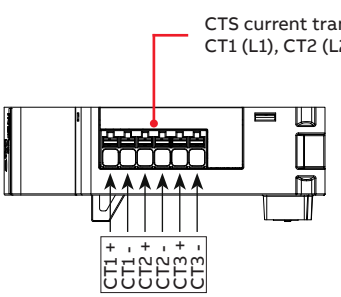
Display	Function
Off	Device is off
Green on	Device is on
Green flashing fast	N/A
Green flashing slowly	N/A

2.5.Energy meter module

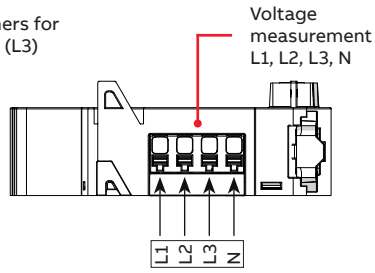
FRONT VIEW



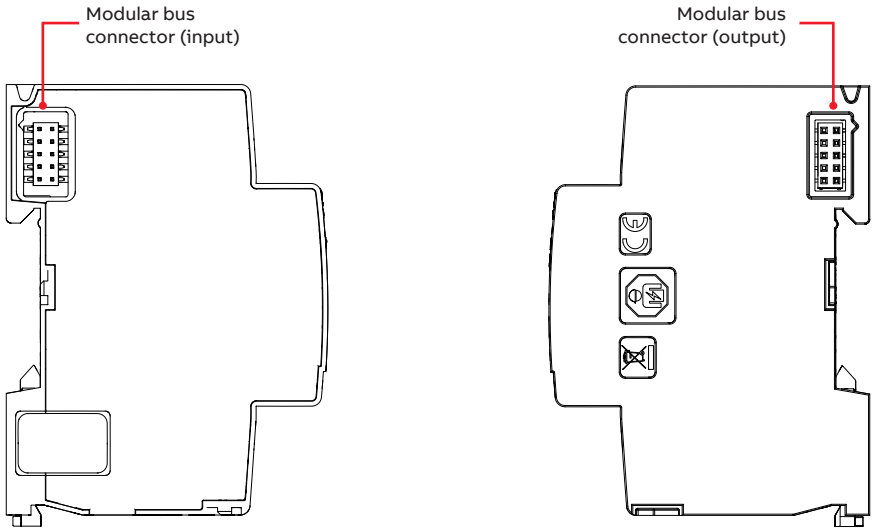
TOP VIEW



BOTTOM VIEW



LATERAL VIEWS



- **LED status**

Display	Function
Green on	Device is on, Modbus id assigned
Green flashing fast	Data traffic with SCU200
Green flashing slowly	No Modbus ID assigned
Orange flashing fast	N/A
Orange flashing slowly	Firmware updates ongoing
Orange on	Booting
Red on	System or booting error
Red on flashing	Bootloader mode

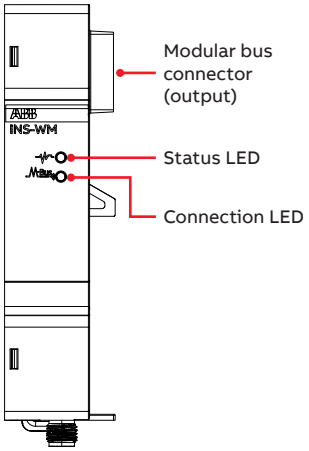
- **LED EM**

Display	Function
Green flashing fast	1kWh pulse blinking

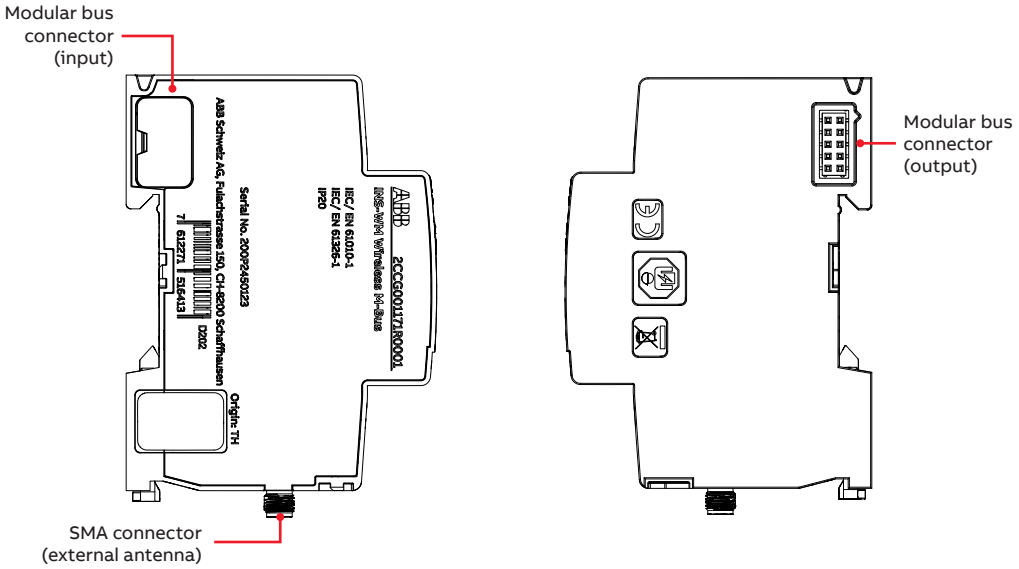
2.6.Communication modules

2.6.1.Wireless M-Bus module

FRONT VIEW



LATERAL VIEWS



- **LED status**

Display	Function
Off	Device is off
Green on	Device is on, modbus id assigned
Green flashing fast	Data traffic with SCU200
Green flashing slowly	No ModbusID assigned
Orange flashing slowly	Firmware update ongoing
Orange on	Booting
Red on	System or booting error
Red on flashing	Bootloader mode

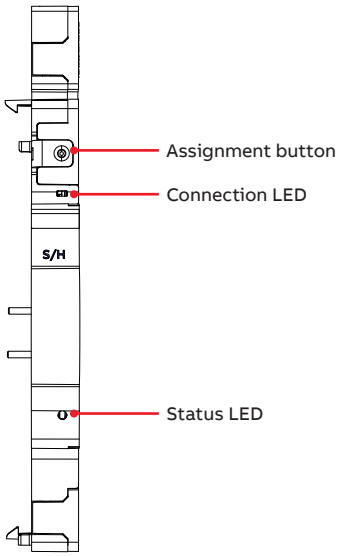
- **LED EM**

Display	Function
Green flashing fast	Data traffic on wireless interface

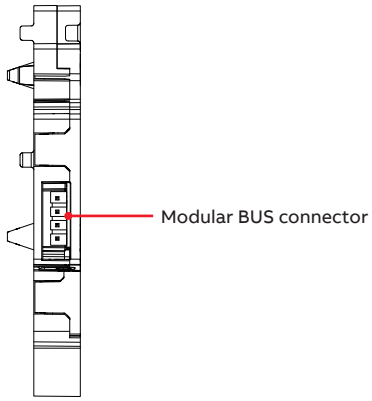
2.7.Smart accessories

2.7.1.Smart signal/auxiliary contact

FRONT VIEW



TOP VIEW



- **LED status**

Display	Function
Blue on	Assignment ok
Off	No power supply
Slow blinking	Normal mode, no Modbus assigned
Fast blinking	Query function

- **LED Connection**

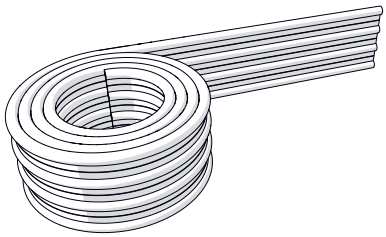
Display	Function
Orange on	Main device tripped
Off	Main device normal or toggle switch
Slow blinking	Normal function on

2.8.InSite accessories

• InSite Flat Cable

The INS105 flat cable is a 4-pin cable for connecting multiple sensors and I/O modules to one control unit.

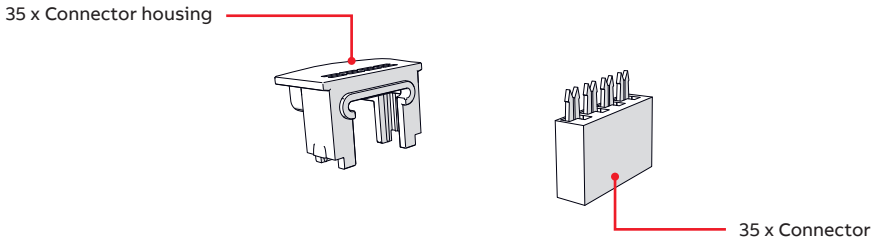
Please take into account that possible cable length of the InSite flat cable depends on the number and shape of sensors, and on the number of I/O modules connected.



- Do not exceed a total flat cable length of 32m for each InSite-Bus lines of each control unit.
- Flat cables longer than approx. 15m could require a 120Ω terminating resistor between the two inner wires at the far end.
- For the flat cable, please consider:
- Use within closed housings only.
- Keep a distance of min. 5.5 mm to uninsulated live parts.
- Where necessary, additional protection against mechanical stress or UV radiation must be ensured.

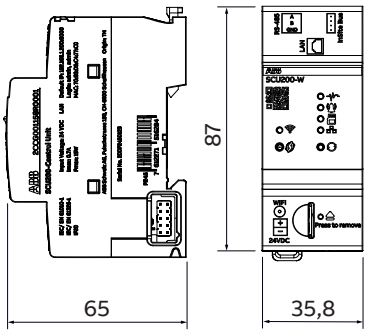
• Connector set

The INS135 connector set contains connector housings and connectors to connect the flat cable to the sensors.



3.Technical characteristics / specifications

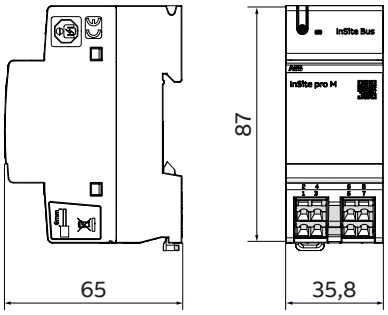
3.1.Technical data - control unit



Technical feature	Unit	Description
Supply voltage	[VDC]	24 +/- 10%
Current	[A]	Max 0.7
Connection		InSite modular bus
Power consumption	[W]	2.5 ... 15 (depending on the CPU load, interfaces and InSite bus load)
Refresh time		1 sec / 30 sec (depending on type of data)
Data storage and export		Integrated data storage (expandable through microSD card, no max. limit)
		Automatic CSV data export
Communication protocols		Modbus TCP/IP
		Rest API
		DHCP
		HTTPS
		NTP
Communication ports	[Mbit/s]	Ethernet, 10/100
		RS485 (120Ω termination default)
		WiFi 2.4 GHz IEEE 802.11 b/g/n*
		InSite bus
External antenna port		Female SMA / 50Ω / 2.4 GHz*
Data rate of Modbus RTU		RS485 2- wire, 2400 ... 115200
External antenna (not included)		Male SMA / 50 Ohm / 2.4 GHz max 4.7 dBi*
Power supply 24 VDC connection		
Conductor cross section solid/flexible	[mm^2]	0.2 ... 1
AWG	[AWG]	28-17
Strip length	[mm]	10
RS485 port connection		
Conductor cross section solid/flexible	[mm^2]	0.14 ... 1.5
AWG solid conductor	[AWG]	28-16
AWG flexible conductor	[AWG]	26-14
Strip length	[mm]	8 ... 9
Connected devices		Up to 32 CMS sensors/digital channels/ smart accessories
		Up to 16 Modbus TCP and 16 Modbus RTU devices
Mounting method		35mm DIN rail (DIN 5022)
Degree of protection		IP20
Dimensions	[mm]	35.8x87x64.9 (2M)
Weight	[g]	105
Operating temperature	[°C]	-25... +55
Storage temperature	[°C]	-40... +85
Operating altitude	[m]	0... 2000
Standards		IEC61010-1
		IEC61326-1

*available only in SCU200-W

3.2.Overall dimensions and technical data I/O modules



	Input module DM11	Output module DM00	Input and Output module DM10
Number of digital channels	4 Input	4 Output	2 Input + 2 Output
Voltage*	active input: 22-26 VDC	relay output: 24VDC-240 VAC	active input: 22-26 VDC relay output: 24VDC-240 VAC
Current*	active input: 4mA	relay output: 5mA-2.5A Max 4.5A (<5sec)	active input: 4mA Relay output: 5mA-2.5A Max 4.5A (<5sec)
Pulse minimum duration** [ms]	5	n/a	5
Pulse frequency** [Hz]	100	n/a	100
Screwless terminals cross section [mm^2]	0,08...2,5	0,08...2,5	0,08...2,5
Using ferrules [mm^2]	0,25...1,5	0,25...1,5	0,25...1,5
Stripping length [mm]	5 ... 6	5 ... 6	5 ... 6
Operating temperature [°C]			-25…+60
Bearing temperature [°C]			-40…+85
Mounting method	35 mm DIN rail (DIN 50022) or SMISSLINE TP plug base		
Dimensions [mm]	36x88x65	36x88x65	36x88x65
Overvoltage category			II acc. to (IEC61010-1)
Pollution degree			2
Altitude m			2000
Safety class			IP20
IK code			IK06(1J)
Standards compliance			IEC 61010
EMC			IEC 61326-1

* relay output values reported are applicable to resistive load.
For the DC supply cable connection to SCU 200, the maximum permissible distance is 3m and for data source cable (I/O modules, RTU, TCP devices. etc.,), the permissible distance is 30m.

** applicable only to active inputs

Every active input is protect by 400V silicon diodes with fuse resistor against misunderstanding in connections like connecting 230Vac mains instead relays/transistor output of meter.

There is one fuse per 2 active input channels.

Do not operate the equipment outside the specified technical data and not intended use.

3.2.1.Compatible devices

Devices compatible with I/O Modules include Molded Case Circuit Breakers (MCCBs), accessories of DIN-Rail protection devices, overvoltage Protection devices and meters pulse output.

• **ABB ranges compatible with I/O Modules are:**

Molded Case Circuit Breaker
Tmax XT

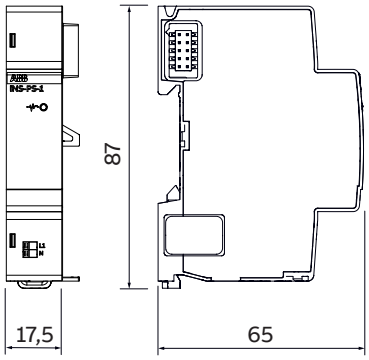
Miniature Circuit Breakers	**Residual Current Devices**
S 200	RCCBs – F 200
SN 201	RCD-blocks – DDA 200, DDA 800
S200 80-100A	RCBOs – DS 201, DS 202, DS 203, DS 200, DS800
S 750 DR	eRCBOs – DSE, DSN
S 700	
S 800	

3.2.2.I/O modules allow to:

- read contacts status of MCCBs via input channels
- read contacts status of OVRs with integrated auxiliary contact via input channels
- to read contacts status of accessories for Miniature Circuit Breakers (MCBs) and Residual Current Devices (RCDs) via input channels
- to switch accessories for Miniature Circuit Breakers (MCBs) and Residual Current Devices (RCDs) via output channels
- to switch contactors via output channels

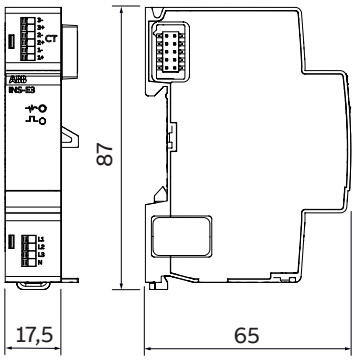
3.3.Overall dimensions and technical data - InSite modules

3.3.1.Power supply module



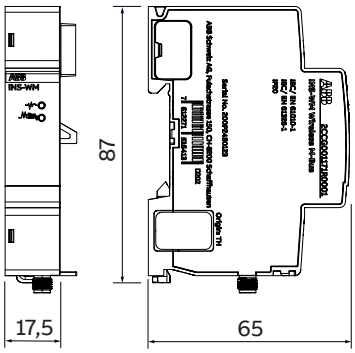
Technical feature	Unit	Description
Supply voltage	[V]	100...240 VAC +/-10% 110...350 VDC (tolerance included)
Connection		
Solid conductor	[mm²]	0.14 ... 1.5
AWG solid conductor	[AWG]	28-16
Fine-stranded conductor	[mm²]	0.14 ... 1.5
AWG fine-stranded conductor	[AWG]	26-14
Fine-stranded conductor with insulated ferrule	[mm²]	0.25 ... 0.75
Fine-stranded conductor with uninsulated ferrule	[mm²]	0.25 ... 1.5
Strip length	[mm]	8 ... 9
Connection type		Screwless
Power output	[W]	10 nominal / 15 boost
External fuse	[A]	10 A (curve B)
Max input Current	[mA]	180
Frequency	[Hz]	50/60 ± 5%
Power input (L1-N)	[W]	35 max
Mounting method		35mm DIN rail (DIN 5022)
Degree of protection		IP20
Class of protection		II
Dimensions	[mm]	17.5x87.0x64.9 (1M)
Impact test		IK06
Weight	[g]	77
Operating temperature	[°C]	- 25... + 60
Storage temperature	[°C]	- 40... + 85
Operating altitude	[m]	0... 2000
Standards		IEC 61010-1
		IEC 61326-1
Declarations		CE, UKCA

3.3.2.Energy meter module



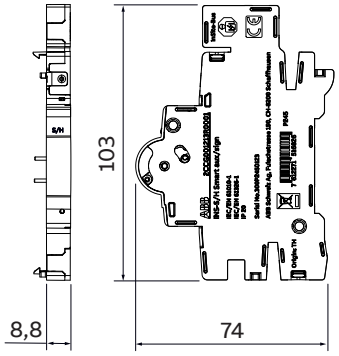
Technical feature	Unit	Description
Supply voltage	[VDC]	Supplied by the InSite modular bus
Connection		InSite modular bus
Power consumption	[W]	0,7
Network type		Three phase + N
Voltage input connection		Screwless terminal block
Voltage specified measurement range (full accuracy)	[VAC]	80-240 (L1,2,3-N)
Voltage limit range of operation	[VAC]	0 - 277
Frequency	[Hz]	50 / 60
Current transformer supported secondary side	[mA]	nom.: 0 - 40 max.: 48
Current specified measurement range (full accuracy)	[mA]	1 - 40
Accuracy - INS-E3 (@25 °C, PF=1)	Active Energy	0.5%
Accuracy - CTS-1-XX		Class 1 (EN 61869-2)
Conductor cross-section		
Solid/fine-stranded conductor	[mm^2]	0.14…1.5
AWG solid conductor	[AWG]	28-16
AWG fine-stranded conductor	[AWG]	26-14
Fine-stranded conductor with insulated ferrule	[mm^2]	0.25 … 0.75
Fine-stranded conductor with uninsulated ferrule	[mm^2]	0.25 … 1.5
Strip length	[mm]	8…9
CTS cable length	[m]	0,5
Mounting method		35mm DIN rail (DIN 5022)
Degree of protection		IP20
Dimensions	[mm]	17.5x87.0x64.9 (1M)
Weight	[g]	~52
Oparting temperature	[°C]	-25... +60
Storage temperature	[°C]	-40... +85
Operating altitude	[m]	0… 2000
Standards		IEC61010-1
		IEC 61326-1

3.3.3.Wireless M-Bus module



Technical feature	Unit	Description
Supply voltage	[VDC]	Supplied by the InSite modular bus
Connection		InSite modular bus
Power consumption	[W]	0,5
Communication protocol		Wireless M-Bus
RF mode		C1 and T1
Frequency band	[MHz]	868.95
Max RF output power		RF mode – receiver only
Max RF input power	[dBm]	10
External antenna (not included)		Male SMA / 50 Ohm / 868.95MHz
Mounting method		35mm DIN rail (DIN 5022)
Degree of protection		IP20
Dimensions	[mm]	17,5x87x64,9 (1M)
Weight	[g]	~ 50
Operating temperature	[°C]	-25... +60
Storage temperature	[°C]	-40... +85
Operating altitude	[m]	0… 2000
Standards		IEC 61010-1
		IEC 61326-1

3.3.4.Smart auxiliary and signal contact



Technical feature	Unit	Description SSD
Supply voltage	[VDC]	Supplied by the InSite modular bus
Connection		InSite modular bus
Power loss	[W]	0,1
Mounting Position		Right
Pluggable accessories		S2CHR (x2)
		S2C-S/HR (x2)
Suitable for Product Class		Miniature Circuit Breaker Residual Current Device Arc Fault Detetcions Devices
Suitable For		MCBs S200 series, S300P
		RCDs F200, DS201
		AFDDs S-ARC1, DS-ARC1
		Switch disconnectors SD200
Mounting method		35mm DIN rail (DIN 5022)
Degree of protection		IP20
Dimensions	[mm]	8.8x103x74 (0.5M)
Weight	[g]	30
Operating temperature	[°C]	-25... +60
Storage temperature	[°C]	-40... +85
Operating altitude	[m]	0… 2000
Standards		IEC61010-1
		IEC 61326-1
		IEC 60068
		IEC / EN 62019 for Main functionality
		IEC 60947-5-1 for Main functionality
		IEC61009 for RCDs compatibility
		EN 60898-1 for MCBs compatibility

3.3.5.Smart auxiliary and signal contact allow to:

- Read contacts status of the MCCBs, MCBs or RCDs connected and communicate through flat cable.
- Detect change of status (trip indication) of the MCCBs, MCBs or RCDs connected and communicate through flat cable.
- Measure internal temperature of the MCCBs, MCBs or RCDs connected and communicate through flat cable.

4.Installation and wiring

• **Warranty**

Safe operation is ensured if assembly work has been carried out according to these user instructions. Furthermore, the instructions in the manual must be observed.

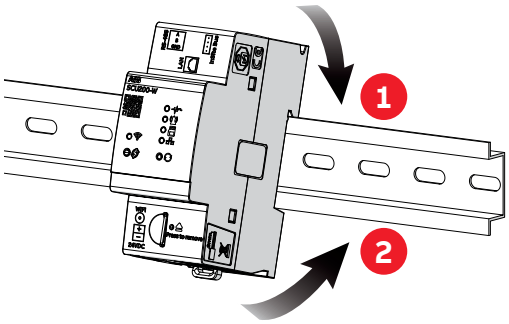
• **Authorized Personnel**

Assembly, connection, and removal work should only be carried out by authorized and qualified personnel.

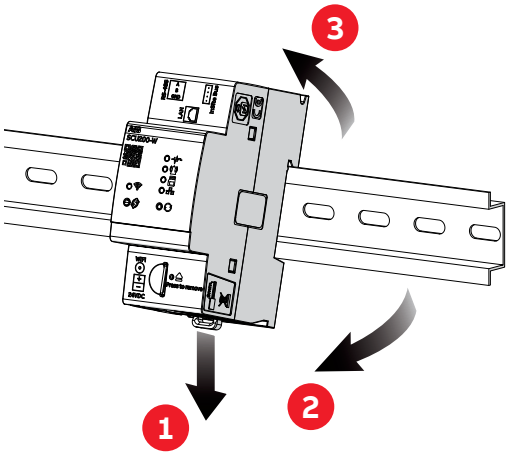
4.1.Control unit

• **Assembly on 35mm DIN-Rail**

To assemble the control unit, perform steps 1 and 2.



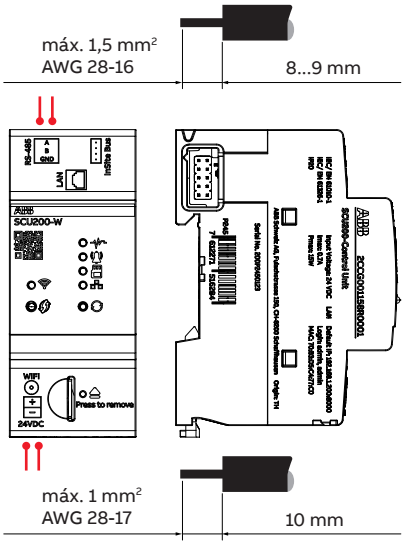
To disassemble, perform steps 1,2 and 3.



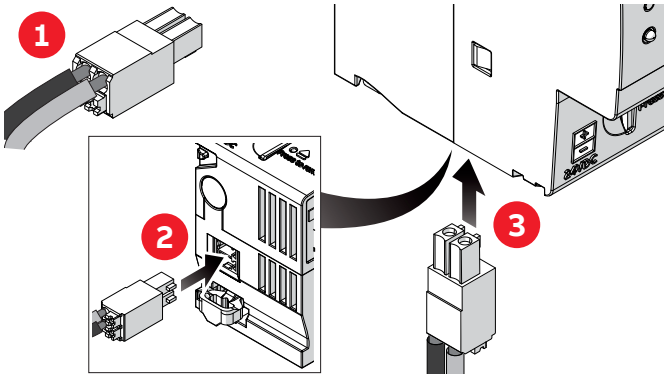
- **Wiring**

Connection of SCU200 is based on the type of electric line available.

In case of DC network, connect the correspondent cables to the 24 VDC input. Otherwise, in case of AC network, INS-PS-1 must be coupled to power SCU200.

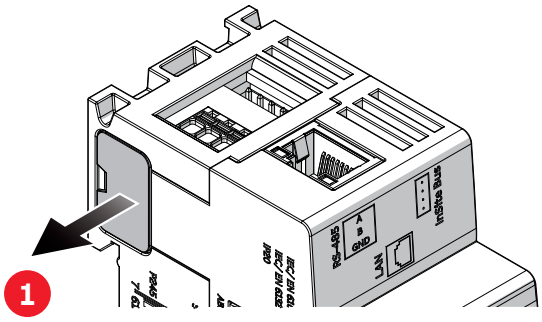


To supply the SCU200 with 24 VDC, first connect the cables to the adapter and then plug this is in the connection port to 24 VDC of the SCU200.

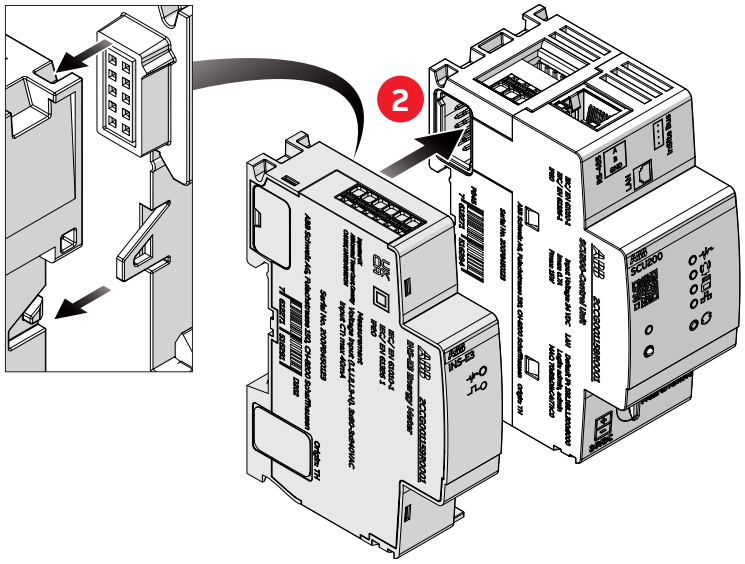


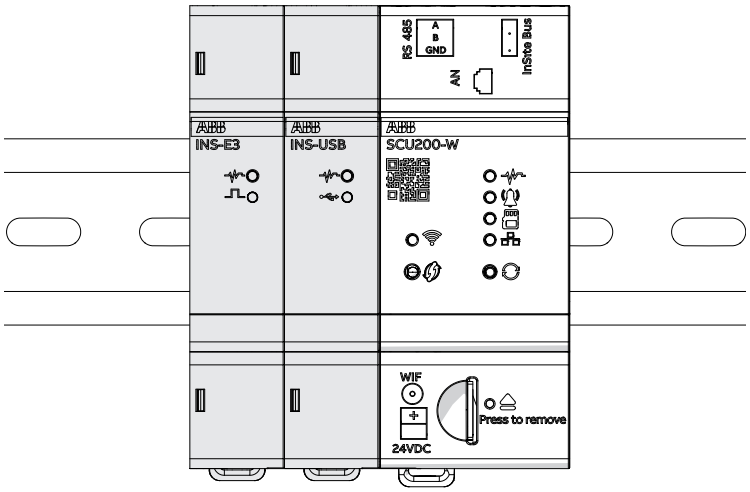
• **Connection to InSite expansion modules**

To connect expansion modules, remove the flap covering the input connectors of SCU200



and insert the connector plug placed on the right side of the InSite expansion module. Put attention to the correct interlocking between modules.





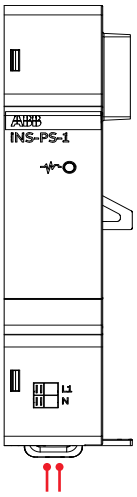
Attention: In case one or more expansion modules have to be added to SCU200 / SCU200-W plug them all first before assemblying on DIN-Rail bar.

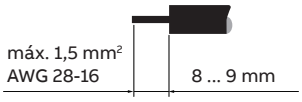
Attention: Multiple power supply modules can be utilized within a single installation. Each INS-PS-1 is designed to supply power exclusively to devices situated to their right until encountering another power supply module.

4.2.Power supply module

• Wiring

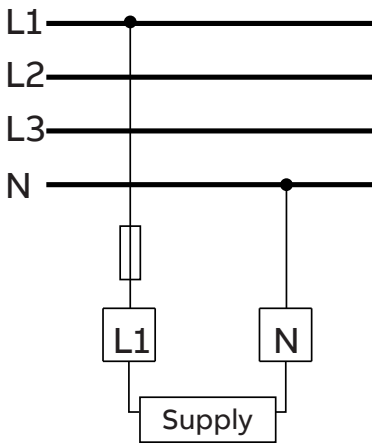
After mounting the modules on DIN RAIL, proceed with the connection of the cables. Supply voltage must not exceed 240 VAC and 350 VDC.





• Connection diagram

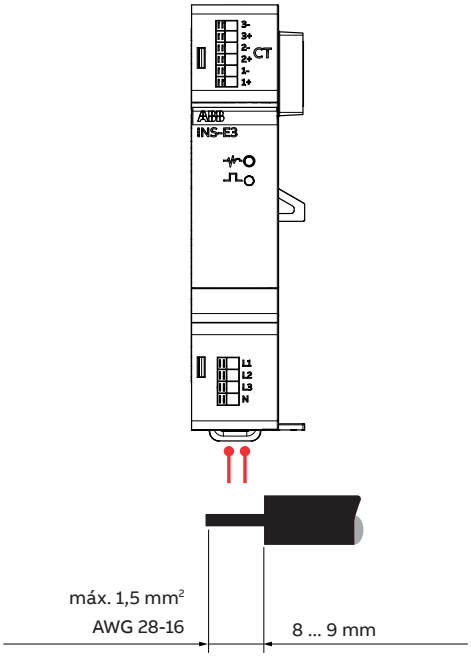
Single phase neutral connection



4.3.Energy meter module

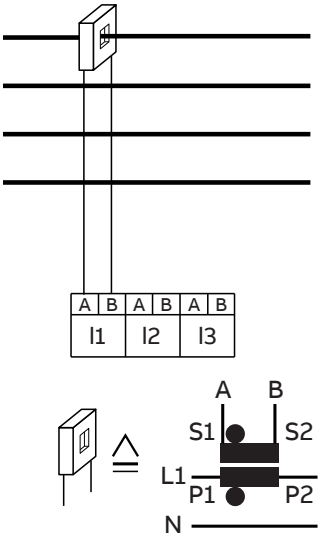
• **Wiring**

Connect the number of phases desired to the voltage measurement inputs. It is desirable to use L1 & N for one phase network and L1, L2, L3 & N for three phase with neutral network.

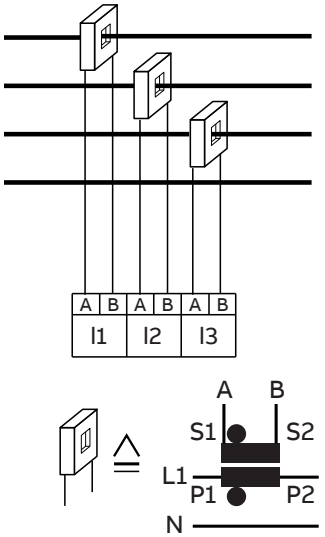


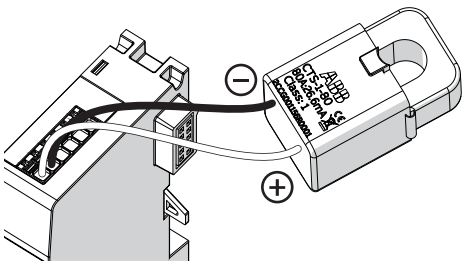
• **Connection diagram**

Single phase neutral connection



Three phase neutral connection





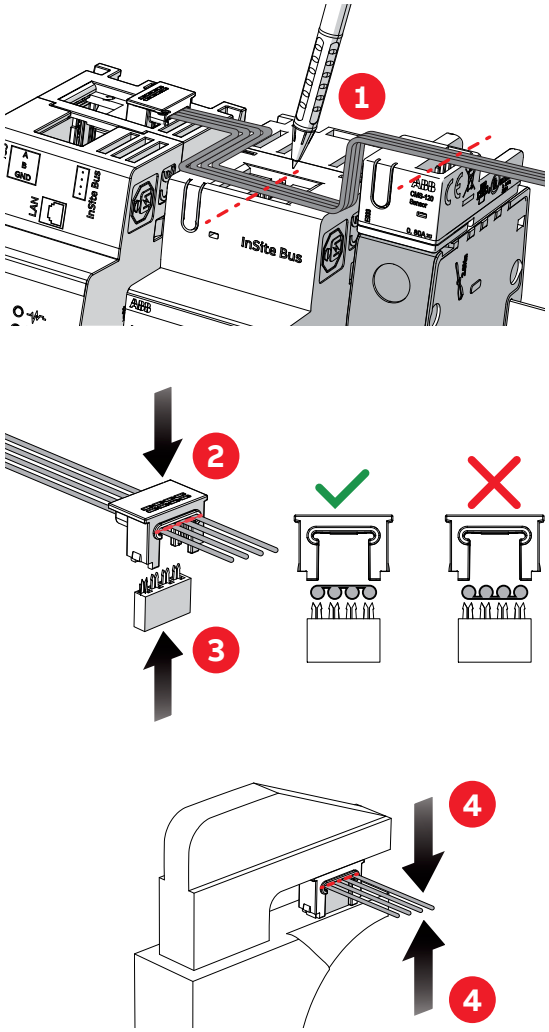
Attention: Ensure correct cable placement of the current transformer by connecting the black cable to the '-' terminal and the white cable to the '+' terminal.

4.4.Assembly of connectors, current sensors, I/O modules and smart accessories.

• Assembly of connectors

Use the connectors only once.

Use the connectors only once.
Connect up to 32 current sensors, or 8 I/O modules (one module corresponds to 4 sensors), or a combination of current sensors and I/O modules, to each InSite Bus interface of the control unit.
Consider the maximum flat cable length.
Flat cable should not exert force on the sensor, otherwise measuring errors may occur.
Keep a distance of 5.5mm minimum between the flat cable and uninsulated live parts.

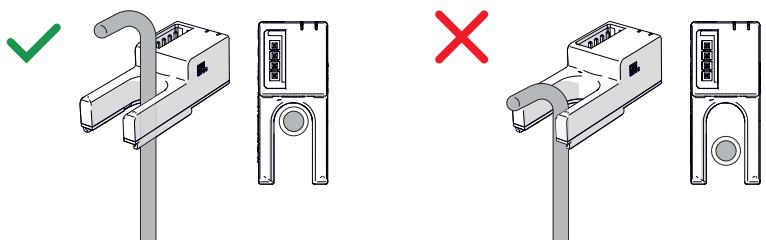


1. Mark the desired placement of the connector with a pen.
2. Press the flat cable into the cable duct of the connector housing.
3. Insert the connector into the connector housing at the marked position.
4. Press together using parallel pliers. Repeat the process at all other marks.

Attention: In case one or more expansion modules have to be added to SCU200 / SCU200-W plug them all first before assemblying on DIN-Rail bar.

4.4.1.Assembly of current sensors

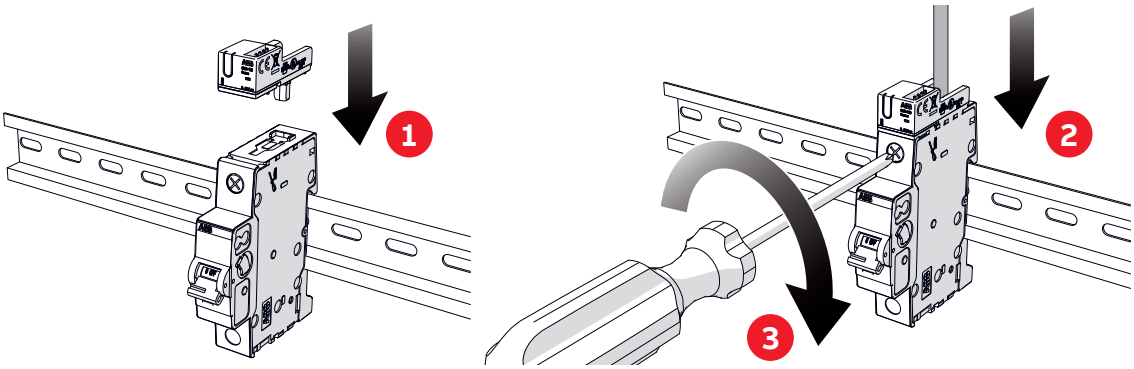
- **Position of the cable for current sensors**



The cable must not bend directly above the sensor. If you use open-core sensors, make sure the cable is at the correct position, otherwise measuring errors may occur.

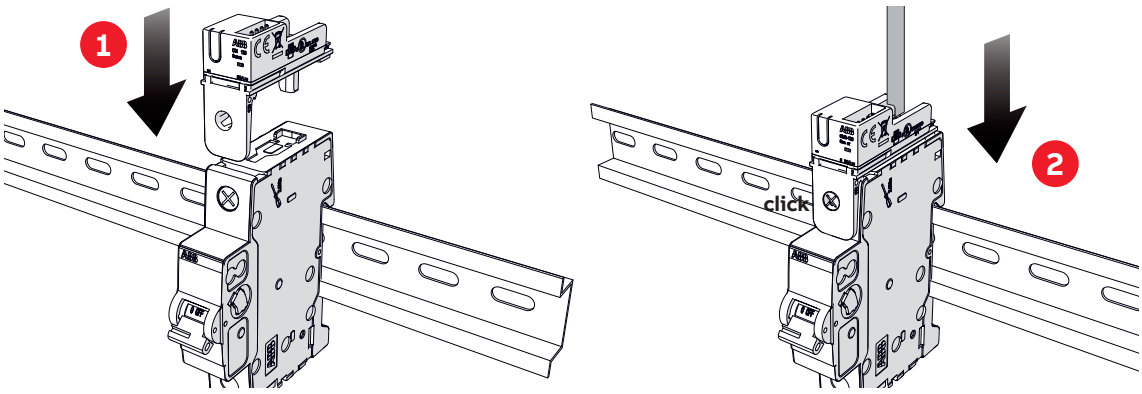
- **Mounting of InSite energy management system and SMISSLINE Sensors**

Sensors fit to all ABB installation devices with twin terminals.
Flat cable should not exert force on the sensor, otherwise measuring errors may occur.



1. Unscrew the terminal of the installation device. Plug in the metal pin of the sensor into rear terminal connection.
2. Put the cable through the opening of the sensor into the installed device. The cable has to be insulated within the sensor!
3. Then tighten the screw.

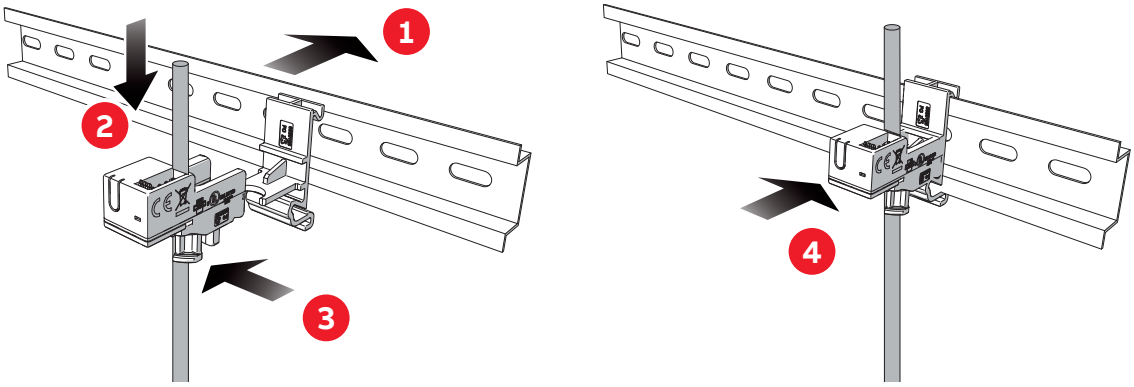
Sensors fit ABB MCBs (S200, SMISSLINE) and RCBOs (SMISSLINE).
Flat cable should not exert force on the sensor, otherwise measuring errors may occur.



1. Insert the sensor on the existing device, in order to have the cable passing through the opening of the sensor.
2. Snap the adapter of the sensor on the upper screw hole of the already installed device.

- **Mounting Sensors on DIN-Rails**

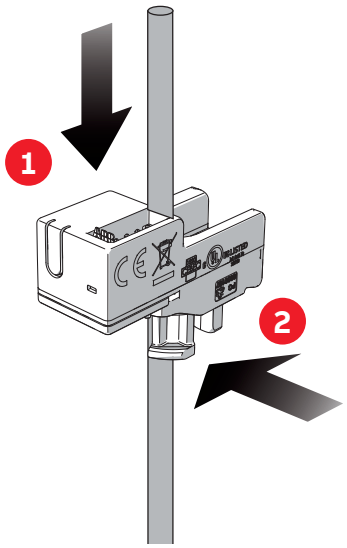
Sensors can be mounted on all 35-mm DIN-Rails (DIN50022).
The cable should not exert force on the sensor, otherwise measuring errors may occur.



1. Snap in the bracket on the DIN-rail.
2. Insert the cable into the installed device through the opening on the sensor. The cable has to be insulated within the sensor.
3. Fix the cable with a cable tie.
4. Snap in the sensor on the bracket.

- **Mounting of cable tie sensors**

The cable should not exert force on the sensor, otherwise measuring errors may occur.

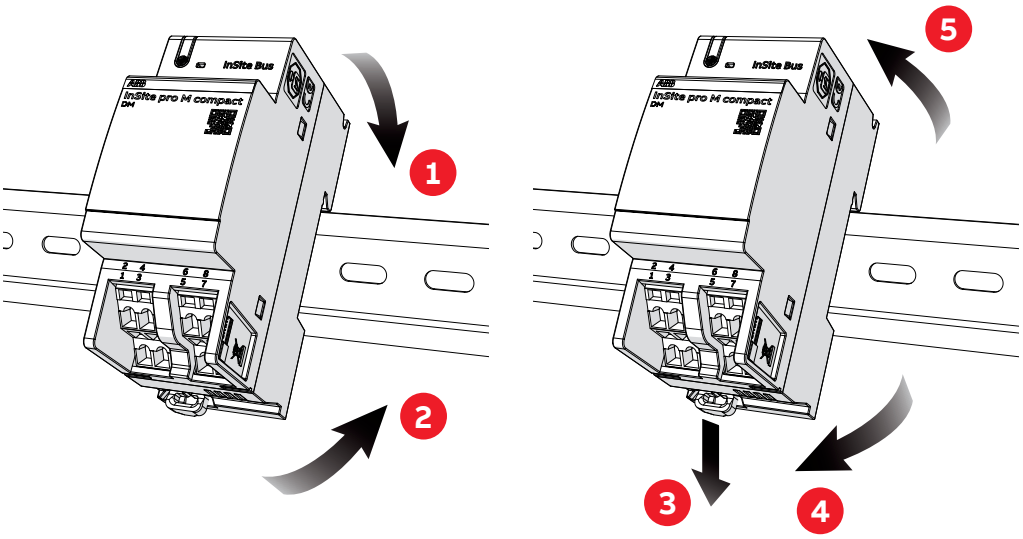


1. Insert the cable into the installed device through the opening on the sensor.
2. Fix the cable with a cable tie.

4.4.2.I/O Modules

• Assembly on 35mm DIN-Rail

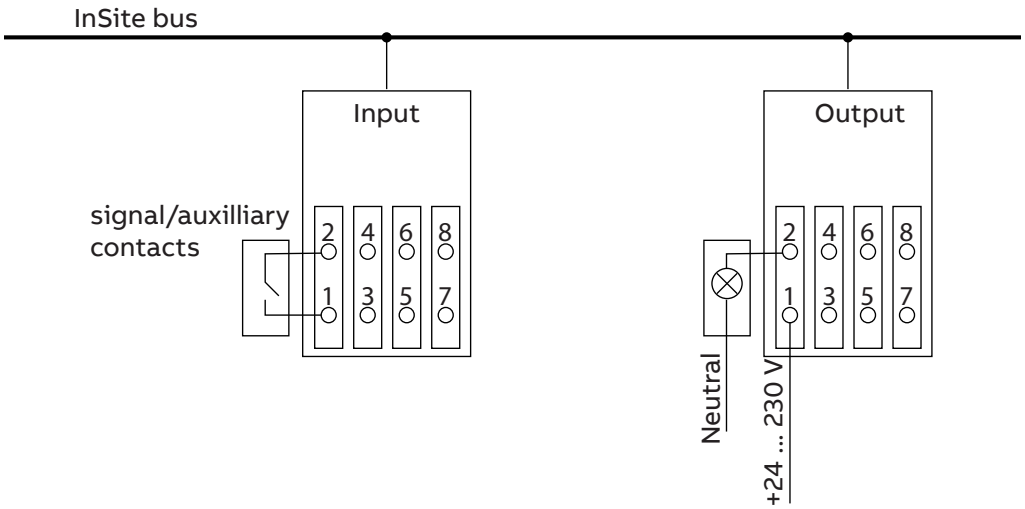
To assemble of the control unit, perform steps 1 and 2. The device can be mounted horizontally or vertically. To disconnect, perform steps 3, 4 and 5.



• Wiring

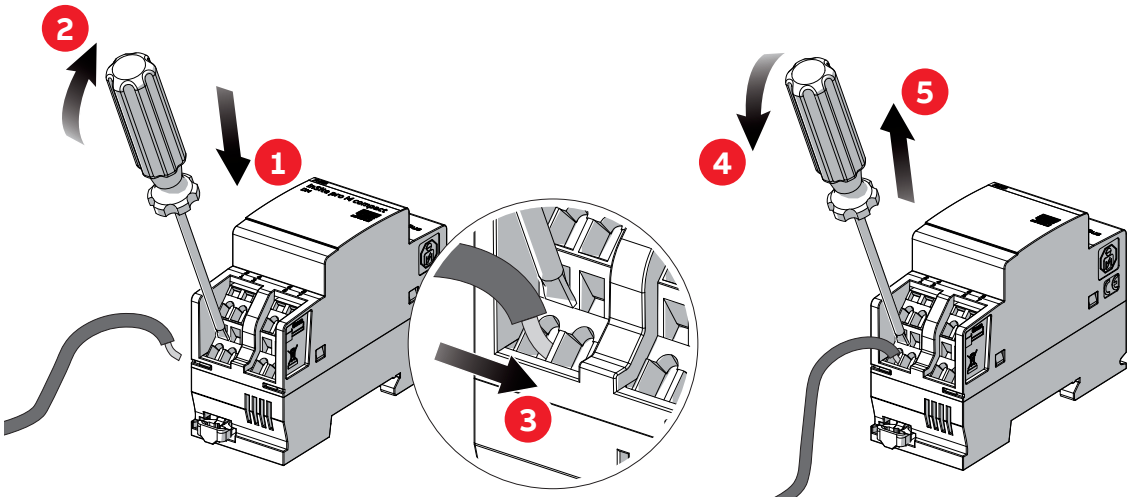
Connection of input and output channels to accessories and external devices is represented in the figure below.

For sake of representation, connection to signal/auxiliary contacts and to loads is shown.



For output channels external power supply with overcurrent protection (by fuse or internal functionality) is required.
- 24VDC is maximum value of DC, can also be lower.
- 230VAC is maximum value of AC, can also be lower.

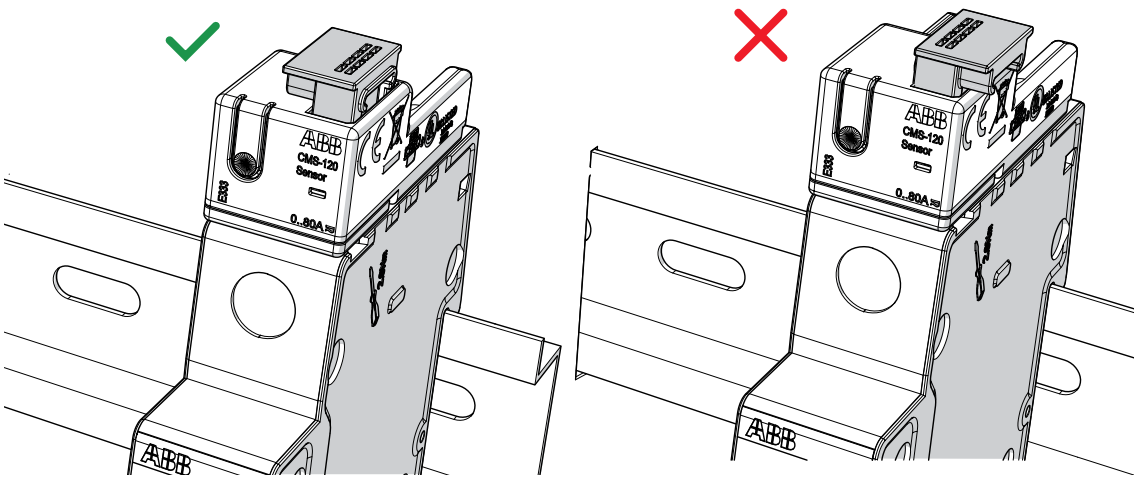
Do not connect AC to DC to the input terminal: no external supply of input is allowed, it will permanently damage the device.



4.4.3.Final connection

Finally, connect the current sensors and the I/O modules to the control unit.

Plug in the cable, check the correct connection direction. (Picture to the right)



Attention: When plugging in the InSite flat cable on the sensors and I/O modules, check the correct connection direction.

4.5.Meters connection

Connect up to 32 energy and/or power meters (Up to 16 Modbus RTU and 16 Modbus TCP). Meters shall be connected in daisy chain configuration.

5.Access to control unit and configuration wizard

5.1.Network connection

The following sections show the steps needed to set up the SCU200 control unit.

The control unit can be used in different operating modes:

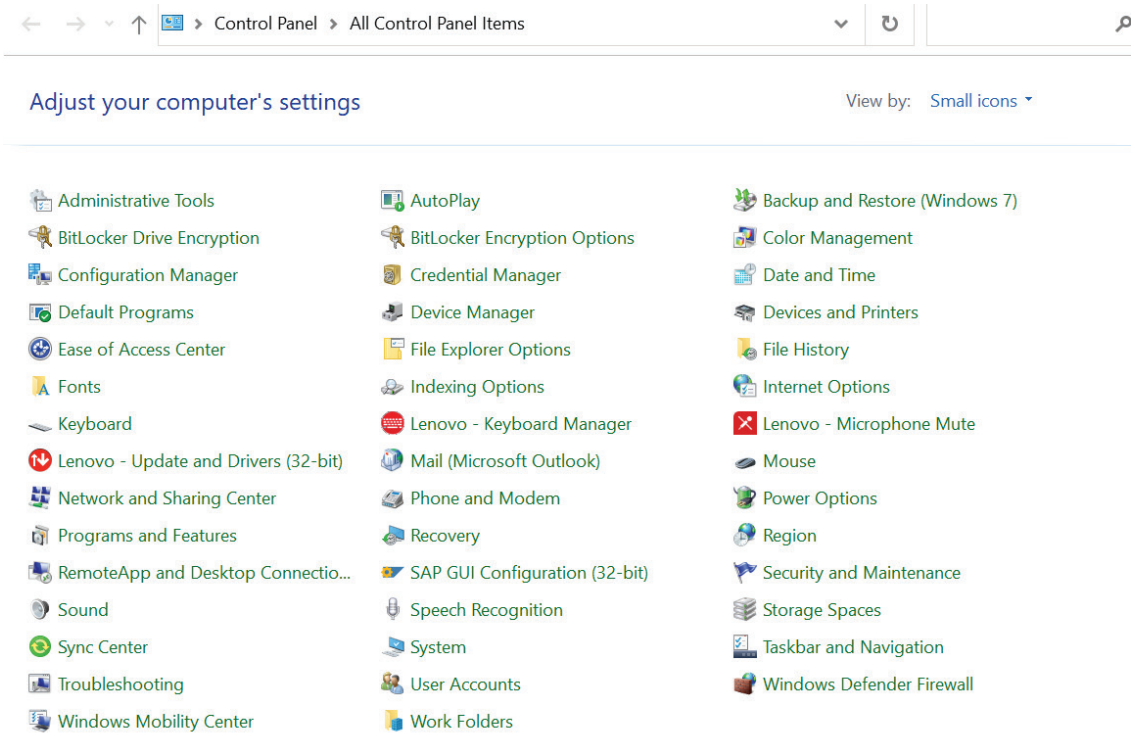
- Direct LAN connection
- LAN connection via router
- WiFi
- Additionally, data are available through serial port Modbus RTU (RS485). For further information, consult the dedicated document.

5.1.1.Direct LAN connection

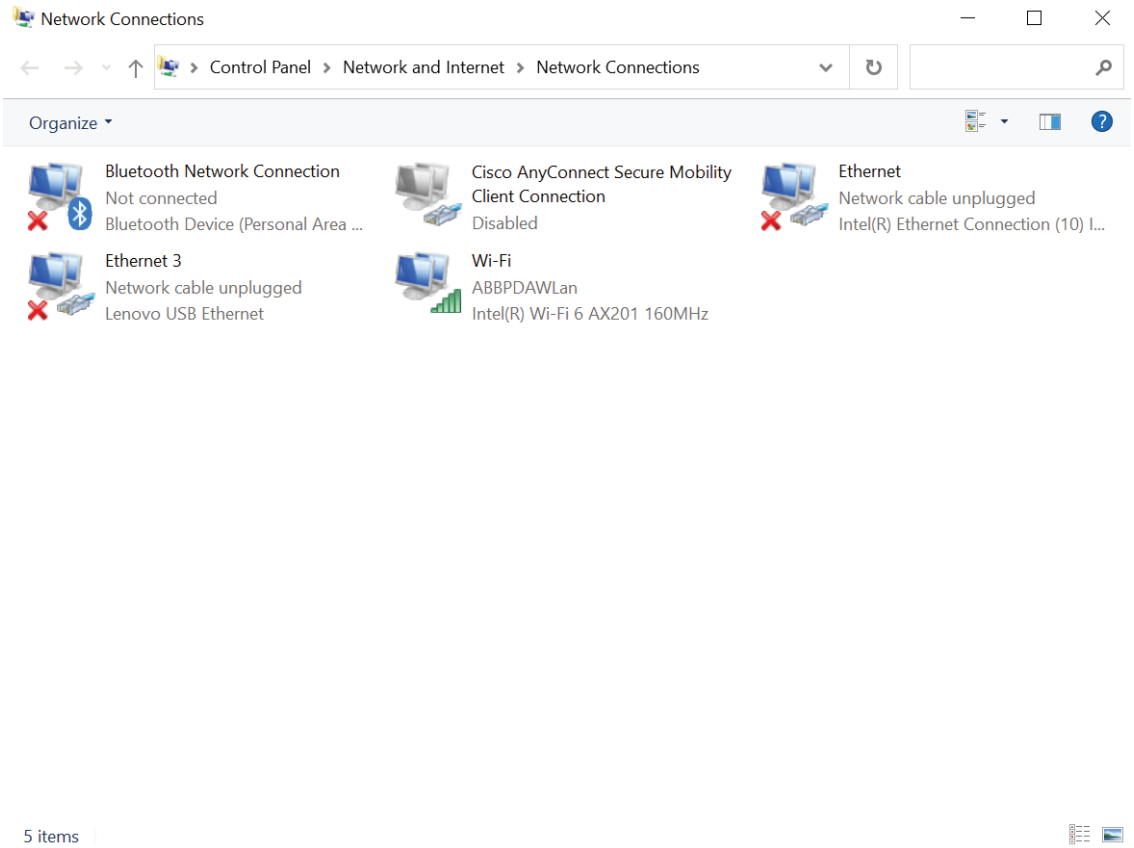
For network connection, an access with static address may be necessary in the first step. IP Address: HTTPS://192.168.1.200:8000 / Subnet Mask: 255.255.255.0

The control unit is set up using a web interface. To connect a PC or laptop to the SCU200 without DHCP, you need to configure the LAN interface with a static IP address. Using the example of Windows, the following shows the configuration steps.

Select Control Panel → Network and Sharing Center →



→ Change adapter settings (on the left) → Ethernet



→ With right click select Properties → double click Internet Protocol Version 4 (TCP/IPv4)

→ Enter IP Address: 192.168.1.5 and Subnet Mask: 255.255.255.0 and confirm with OK.

Make sure that the IP address on the LAN is not already taken. In case it is taken, adjustments are necessary. (192.168.1.x; x = 2…199, 201…255).

Now connect your device to the SCU200 control unit.

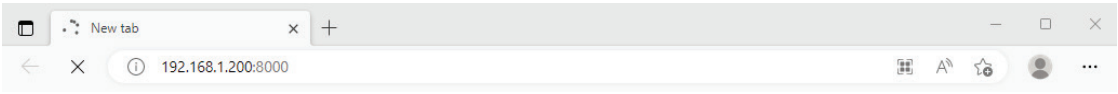
5.1.2.LAN connection via router

For connecting SCU to a home router, the addresses of the home network must be identi-fied (XXX.XXX.XXX.XXX), then the user must access the SCU initially via LAN cable and modi-fy the IP address, if starting through wizard by selecting the ethernet option “use ethernet connection>>IP mode: static>>IP address – to the selected static one. It is further possible to change the IP address later in the system setup segment of the webserver. System set up>>communication>>IP>>IP mode: static >>IP address. After this step by adding the SCU to the router, the user can access the webserver through the IP address set by him.

The SCU200 control unit is connected to the router using a RJ45 cable (network).

- **Accessing the Web UI via IP address**

Port 8000 and https:// to be added to the IP address XX.XXX.XXX.XXX to define the port number (e.g. 192.168.1.200:8000) to access your web browser. It is important to direct the request to https. Also, access is not possible without defining the port number.



Alternatively, the customer can use the DHCP functionality. By connecting initially via LAN cable to the SCU, user can choose DHCP. If starting through wizard by selecting the ether-net option “use ethernet connection>>IP mode: DHCP. It is further possible to select DHCP through the webserver in the system setup segment. System set up>>communication>>IP>>IP mode: DHCP. I**n this case, the system administrator can di-rectly read the IP address assigned to the SCU200 device on the router.**

It is even possible to change an IP address of the SCU to DHCP using the WPS button on the front. By pressing and holding it for 10s (precondition: SCU turned on, status LED: constant green) the status LED will blink 3 times faster and it will change the mode to DHCP, similarly if it is pressed again for 10s, the led will blink slowly for 3 times, changing the mode to static IP.

5.1.3.WiFi

The user can also access the webserver using the Wi-Fi. When the Wi-Fi led is blinking green user can access the webserver using the following address: https://192.168.2.1:8000, while accessing through the WI-FI of the device, there is no needed to change any network details on the PC.

SCU200 can also be connected to a wireless Wi-Fi network. To do this, go to the System setup >> Communication >> Wifi tab, turn on the Wi-Fi network interface and connect to the selected network. For a secured network, you must also enter the password.

As with the wired Ethernet network interface, you can select between two modes for the wireless Wi-Fi network interface - static and DHCP. The default mode is DHCP. After connecting to the network, in the WebUI we can check what IP ad-dress has been assigned to the device and through this address we can get to the web server. Of course, keep in mind that we must also be on the same Wi-Fi net-work to do this.

The SCU200 can also be connected to a Wi-Fi network using the WPS button lo-cated on the housing. To do this, an access point (usually a home router) must also have such functionality and we must have physical access to it. To connect to such a network in an easy way, you need to turn on the Wi-Fi interface on the SCU200 and click the WPS button. Then the Wi-Fi LED will start blinking green and a time window will open for 2 minutes, during which we must press the WPS button on the access point. When successfully connected, the Wi-Fi LED will turn green and the SCU200 will be connected without even entering a password.

Attention: In the SCU200 system, currently there are 3 different network interfaces - wired Ethernet, Access Point and client mode Wi-Fi. Each of them has own IP address and corresponding other settings like a sub-net mask or a gateway. The standard case of using SCU200 for example can be as following:

Network interface	IP address	Subnet mask
wired Ethernet	192.168.1.200	255.255.255.0 (/24)
Access Point	192.168.2.1	255.255.255.0 (/24)
client mode Wi-Fi	192.168.3.1	255.255.255.0 (/24)

In this scenario there is no problem with reaching the SCU200 using any network. It's because there are 3 different networks: 192.168.1.0/24, 192.168.2.0/24 and 192.168.3.0/24. Since the networks are distinct the device can be accessible always.

However in some cases there might be collision of addresses UNDER THE SAME MASK as following:

Network interface	IP address	Subnet mask
wired Ethernet	192.168.1.200	255.255.255.0 (/24)
Access Point	192.168.2.1	255.255.255.0 (/24)
client mode Wi-Fi	192.168.1.103	255.255.255.0 (/24)

In SCU 200, to avoid loss of interface with the device because of this network overlapping issue the highest priority was given to a wired Ethernet connection, then Access Point and finally client mode Wi-Fi. It means that in this scenario user won't lose an access to his device, because wired Ethernet connection has a higher priority than client mode Wi-Fi. It would also mean that the device won't be accessible through the Wi-Fi network unless he disconnects the LAN cable from the SCU200.

However, in Scenarios where the subnet masking is different, for example following:

Network interface	IP address	Subnet mask
wired Ethernet	192.168.1.200	255.255.255.0 (/24)
Access Point	192.168.2.1	255.255.255.0 (/24)
client mode Wi-Fi	192.168.1.2	255.255.255.0 (/25)

Since 25 is a bigger network, the whole traffic is transported to this network. It means that nearly every traffic from wired Ethernet network interface will be routed to client mode Wi-Fi. SCU200 won't be accessible through a LAN cable, but only via the Wi-Fi network.

5.2.Control unit login

The web user interface is designed for use on browser-based devices. The recommended web browser is Google Chrome, other supported web browsers are Safari, Firefox, Opera, Internet Explorer.

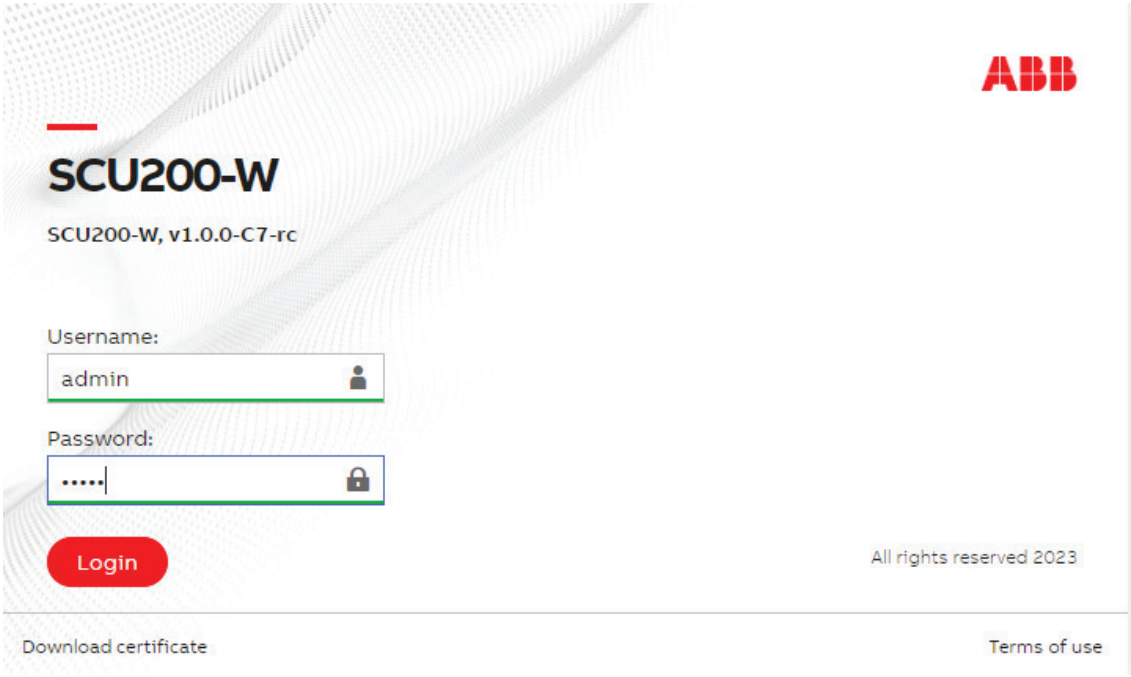
Start screen (login)

Insert the IP address of the device in the browser address bar.

To access the web browser, it is also important to define port number 8000.

Factory settings with:

- Default IP: https://192.168.1.200:8000
- Default login → username: admin, password: admin



Please note that the control unit uses a secure **https:// connection and port 8000**.

First, it is necessary to confirm the secure connection. Later on you won't be asked to confirm it provided that you upload the SSL Certificate as described in the dedicated section.

At first login, user will be prompted to change the administrator login data. It is highly recommended to change the administrator login password to improve cyber security. The new password must contain minimum 8 characters, at least one uppercase letter and one number.

5.3.Wizard

During Wizard configuration it is possible to do basic configuration of SCU and assign connected devices.

To enter the wizard, it is required to login to WebUI.

1. Credentials - The first mandatory step is to set new credentials. The new password must contain a minimum of 8 characters, at least one uppercase letter and one number.
2. Time configuration – During this step it is recommended to set the correct device time.
3. Firmware update – It is recommended to update firmware to the newest version before proceeding with the next steps.
4. Storage – Select where historical data will be stored. It is possible to select and store historical data on external SD card.
5. Region and language – Select proper language, currency and timezone that will be used in the system.
6. Network connection – Configure how the device will be connected to your network. It is possible to connect SCU200 through Ethernet cable or WiFi network.

Depending on selected configuration and type of current connection (through ethernet or Access Point), after configuration user will be instructed with few steps how to connect to WebUI on new or same IP address.

After network configuration and connecting device to your network the next wizard steps will allow you to configure Contracts/Tariffs and Scan/Add devices that are connected to the SCU. This configuration can be skipped and configured later.

1. Start wizard – start or skip wizard for preliminary configurations.
2. Tariffs - In this preliminary phase, you can create contractd and tariffs based on time slots, costs and consumption. For more details, please check chapter 6.3.2 Contracts.
3. Scanning – In this step it is possible to select which type of devices should be scanned.

RS485 - Modbus RTU devices – It is required to setup correct baudrate, bytesize, parity and stop bits for scanner. The connected RTU devices must have set Modbus ID between 33-48 to be automatically detected/scanned. Only devices that respond to report slave id will be automatically detected. Based on that response the device model will be selected or device will be added as unknown, and it will be possible to configure it manually.

Wireless M-Bus – Connected Wireless M-bus modules are automatically detected during system startup. After scanning step, it will be possible to assign detected Wireless M-Bus Meters to Wireless M-bus modules.

INS-E3 – Connected INS-E3 are automatically detected during system startup. After scanning step, it will be possible to configure CTS sensors and Type of network for each INS-E3.

InSite Bus – The devices connected to Insite Bus will have Modbus IDs assigned between 1-32. Maximum no. Devices connected is 32 (I/O module count as 4 devices).

The I/O modules and INS-S/H devices will be auto assigned automatically and listed after scanning step.

The current sensors must be added manually after scanning step.

Modbus TCP devices - must be added manually

4. Setup – In this step it is possible to make additional configuration for scanned/added devices and select correct Contracts and device categories for them.
5. End – The configuration is finished; it is possible to go back to Scan devices or go to the system dashboard.

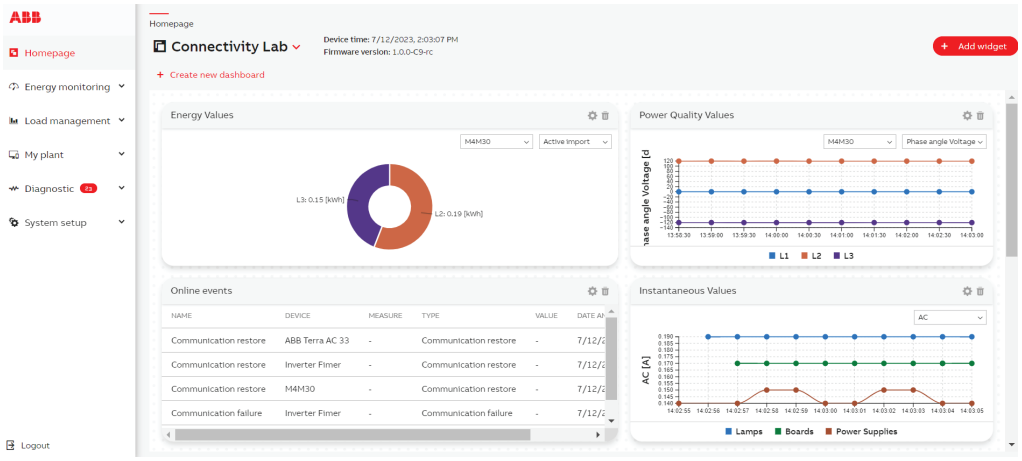
6.WebUI

6.1.Structure

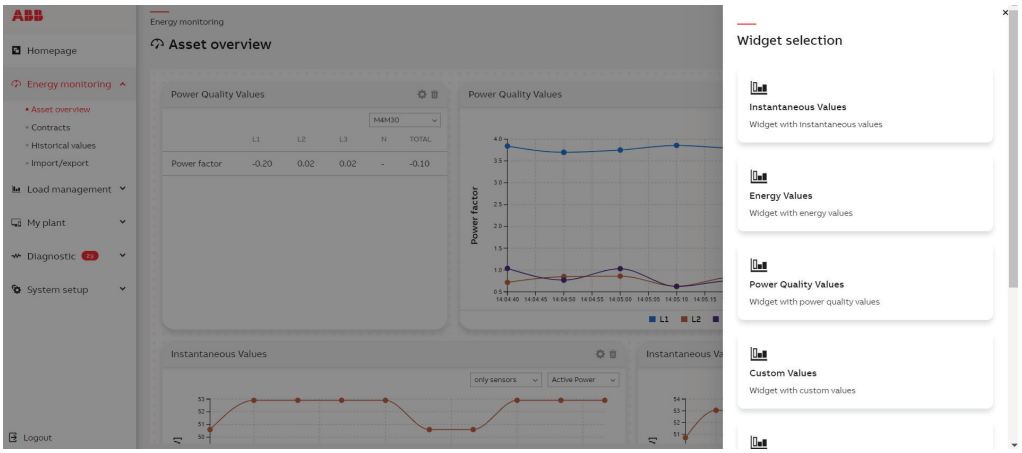
1. Homepage		
2. Energy monitoring	A. Asset overview	
	B. Contracts	
	C. Historical values	
	D. Import/export	a. Import
		b. Export
3. Load management	A. Control	a. I/O modules
	B. Automations	
4. My plant	A. Devices	a. Current sensors
		b. I/O modules
		c. INS-S/H
		d. Modbus RTU devices
		e. Modbus TCP devices
		f. Wireless M-Bus
		g. INS-E3
		h. Digital SPD – eOVR
	B. Groups	
5. Diagnostic	A. Events log	
	B. Alarms	a. Inbox
		b. Acknowledged
	C. Configuration	
6. System setup	A. General	a. Time
		b. Session
		c. System
		d. Storage
		e. Region
		f. UI aspect themes
	B. Communication	a. IP
		b. Wifi
		c. DNS
		d. Rest API
		e. Email
		f. Modbus
	C. Users	
	D. SSL certificate	a. Upload
		b. Generate
	E. Firmware update	a. Control unit
		b. INS-S/H
		c. Wireless M-Bus

6.2.Homepage

In the Homepage section it is possible to create and customize different dashboards in order to have an immediate and easily visible summary of the desired set of measurement data. This data can be displayed in various forms depending on the selected widget, it can be in the form of a table or a graphical chart. It's possible to create multiple dashboards: to create a new one clicks on "Create new dashboard". To edit/delete dashboard - expand the list of dashboards by clicking the arrow next to dashboard name and click on the edit icon/bin icon.



To add a new widget to the dashboard, click on "Add widget" then select desired type of widget and configure it.



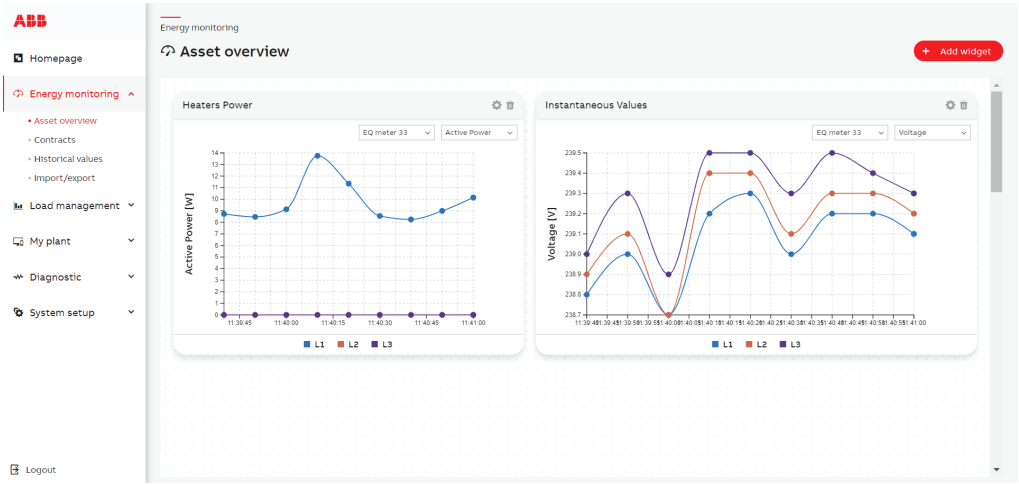
Once the widget has been created it is possible to move it to the desired area of the dashboard and modify its size.

6.3.Energy monitoring

6.3.1.Asset overview

In the Asset overview section, it is possible to customize a single dashboard in order to have an immediate and easily visible summary of the desired set of measurement data. This data can be displayed in various forms depending on the selected widget, it can be in the form of a table or a graphical chart. To add a new widget to the dashboard, click on “Add widget” then select desired type of widget and configure it.

Once the widget has been created it is possible to move it to the desired area of the dashboard and modify its size.



6.3.2.Contracts

- **Configuration**

This page allows you to create or remove Contracts and Tariffs. By clicking on “Add new contract”, it is possible to create a new contract. One contract can be assigned to single tag related to: energy, water or gas (water and gas only for contract type: virtual)

It is possible to select Contract type:

Meter managed – Available only for meters which are supporting tariffs on their own, No. Tariff is number of configuration slot that represents this tariff on meter side

Virtual – For virtual contracts it is possible to configure time slots for each tariff along with cost. Time slots can’t overlap within a single contract. Costs will be calculated only during configured timeslots according to configured cost.

Tag Functionality:

It is possible to highlight the register related to the contract by using Tag function while adding register of 3 rd party devices. For example if there are 100 registers in 3rd party device, the register that should be considered for the contract can be highlighted. The tags available are:

Tag with corresponding Unit:

activeEnergyImportL1|kWh		apparentEnergyExportL1|kVAh
activeEnergyImportL2|kWh		apparentEnergyExportL2|kVAh
activeEnergyImportL3|kWh	reactiveEnergyImportTotal|kvarh	apparentEnergyExportL3|kVAh
activeEnergyImportTotal|kWh	reactiveEnergyExportL1|kvarh	apparentEnergyExportTotal|kVAh
activeEnergyExportL1|kWh	reactiveEnergyExportL2|kvarh	apparentEnergyNetL1|kVAh
activeEnergyExportL2|kWh	reactiveEnergyExportL3|kvarh	apparentEnergyNetL2|kVAh
activeEnergyExportL3|kWh	reactiveEnergyExportTotal|kvarh	apparentEnergyNetL3|kVAh
activeEnergyExportTotal|kWh	reactiveEnergyNetL1|kvarh	apparentEnergyNetTotal|kVAh
activeEnergyNetL1|kWh	reactiveEnergyNetL2|kvarh	apparentPowerL1|VA

activeEnergyNetL2|kWh	reactiveEnergyNetL3|kvarh	apparentPowerL2|VA
activeEnergyNetL3|kWh	reactiveEnergyNetTotal|kvarh	apparentPowerL3|VA
activeEnergyNetTotal|kWh	reactivePowerL1|var	apparentPowerTotal|VA
activePowerL1|W	reactivePowerL2|var	currentL1|A
activePowerL2|W	reactivePowerL3|var	currentL2|A
activePowerL3|W	reactivePowerTotal|var	currentL3|A
activePowerTotal|W	apparentEnergyImportL1|kVAh	currentN|A
reactiveEnergyImportL1|kvarh	apparentEnergyImportL2|kVAh	threePhaseSystemCurrent|A
reactiveEnergyImportL2|kvarh	apparentEnergyImportL3|kVAh	waterConsumption|m3
reactiveEnergyImportL3|kvtarh	apparentEnergyImportTotal|kVAh	gasConsumption|m3

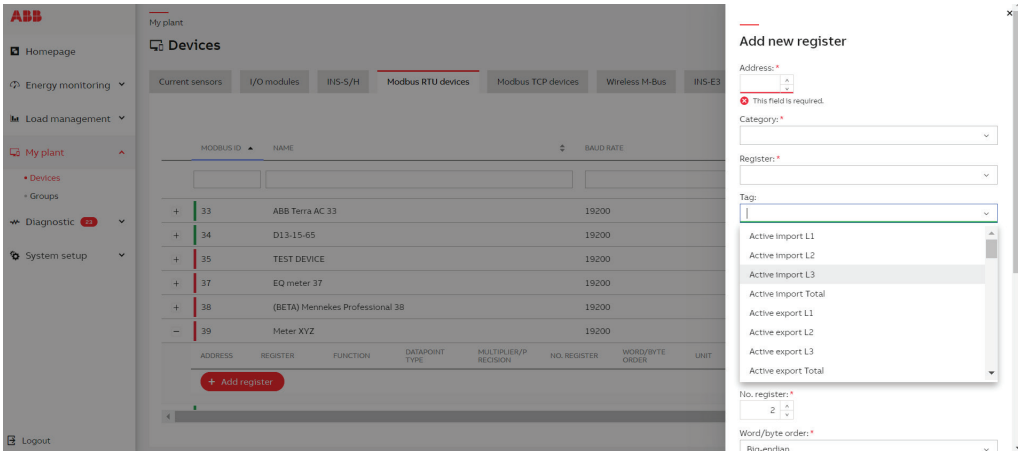
This tag functionality can also be used in groups. For example if certain registers are highlighted with tags predefined,while creating widgets for groups, these registers are automatically summed up and presented.

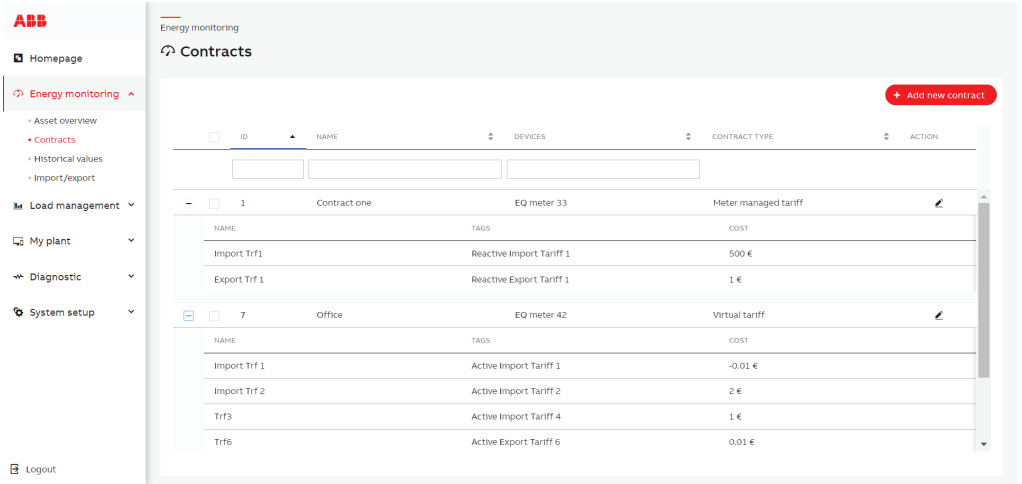
For each contract it is possible to associate one or more Tariffs by clicking button “Add tariff” and configuring it.

One device can be assigned to multiple contracts.

By clicking on the pencil icon “Edit” it is possible to edit all the fields of the selected contract. By clicking on checkbox and then on button “Remove”, the selected contracts will be deleted.

The values from devices in one contract are summed by tags (for Modbus RTU/TCP devices tags can be configured per register) and they can be presented on dashboard widget or in historical values.





• **Total Costs**

This functionality can be used to aggregate the costs of separate contracts. The table presented under this tab contains following columns:

Name – Total Cost object name.

Formula – Defines how the total cost is computed from different Contracts cost in terms of addition and subtraction.

Action – Upon clicking on the button, one may edit the existing Total Cost object.

“Add new Total Cost” button can be pressed to create new configuration. Following parameters must be supplied:

Name – New Total Cost object name.

Formula “+” – Allows adding existing Contract to Total Cost configuration. For the second and subsequent Contr acts added it must be defined using the “operator” configuration whether the contract cost is added (+) or subtracted (-) from the Total Cost.

Total cost data is available via dashboard Energy Monitoring → Cost analysis. “Add widget” button can be pressed to create add new Total Cost widget. Following parameters must be supplied:

Data source – data can be sourced from local control units or from one of the slave control units.

Title – Title displayed at the top of the widget.

Total Cost – Selection of one of the configured total cost objects.

Period – Selects if the widget displays hourly, daily, or monthly value of the total cost increment.

The widget shows total cost calculated on certain time window and an icon that visualizes different contract mediums which cost are included (electricity/water/gas).

6.3.3.Historical values

Here it is possible to visualize the “Historical values” of different measurements according to the category or group selected. Data type resolution depends on the device and it binds the maximum time interval that can be shown.

All the devices have to be first assigned and configured (please refer to My plant → Devices).

In case of DC current sensors measurement, please refer to “My plant → Devices → Current sensors” and configure “Phase” as DC.

After selecting the parameter, the resolution and the reference time frame, the “Export” button allows the user to carry out direct data export as .CSV file.

At a glance, we can visualize about 1000 values, so depending upon resolution, the maximum time frames can be selected.

6.3.4.Import/Export

- **Export**

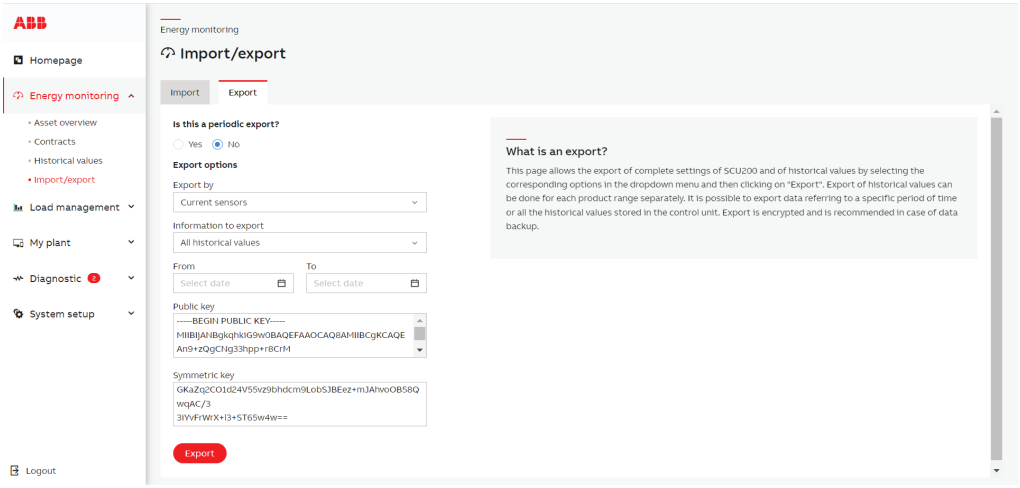
This page allows the export of complete settings of configuration and of historical values.

For settings export it is possible to select if export should include also device configuration of IP, DNS, WiFi and Access Point configuration.

For historical values it is possible to select if export should include also historical events. For each selected device separated files will be created.

If SD card is inserted and it is not used for external storage, it is possible to store exported files on SD card by selecting “Export to SD card”.

The import/export is encrypted and can`t be preview by user. Export/import functionality should be only used in case of device replacement. For each export there will be generated two files: *.enc and *.signature. Both files along with public key and symmetric key are needed to import files.

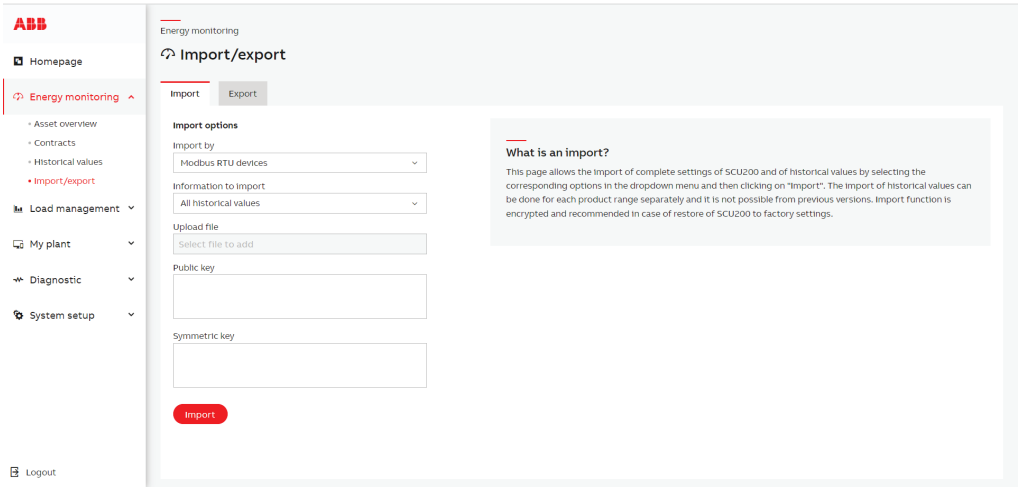


• **Import**

This page allows the import of settings and of historical values. To import, load same Public key and Symmetric key and *.enc and *.signature which were used/generated during export.

To import historical values first please select correct device. Device type must match the device type for which file was generated.

If SD card is inserted and it is not used for external storage, it is possible to select “File to import” and “Signature file” from SD card. Only files with correct extension are displayed.



• **Data export**

In order to carry out data export via email, FTP and/or SD card, contact data for email and FTP server need to be configured and /or SD card mounted (see System setup → Communication → Email, FTP, System setup → General → Storage). Exports are done periodically, but user can also trigger export at any time. A maximum of 16 data exports can be defined.

Here you can export and/or download measurement and/or historical alarms of the configured devices and edit data export settings:

Name – export name.

Type – type of device included in data export. You can choose from current sensors, I/O modules, INS-S/H, MOD & AR, Modbus RTU devices, Modbus TCP devices, Wireless M-bus meters and INS-E3.

Device – select one or more devices of previously determined type that you want export data from.

Format – currently exports are done into .csv files.

Export type – select if you want to export historical data or events data.

Values – if historical data export is selected, here you can select which data you want to include in export. You can choose one or more datapoints.

Frequency – export frequency. Here you can choose if export should be done daily, weekly, monthly or yearly (first day of every week will trigger on Sunday).

Export time – set the time export should be triggered.

Export last days – set the amount of days data should be exported from

Resolution – select granularity of exported history. You can choose from 30s, 15min, 1h, 1d, 1m stack. If at least one value stored in 15min resolution is selected for export, 30s resolution export is not available. 30s resolution export is available only for values stored every 30s.

Export via email – if selected, data will be exported as csv file by email. Please note that email configuration is needed.

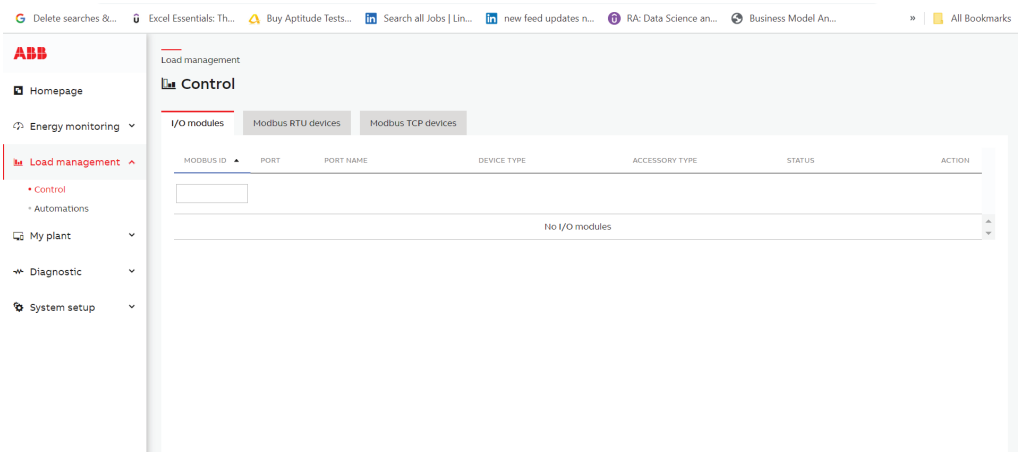
Export via FTP – if selected, data will be exported as csv file by FTP. Please note that FTP configuration is needed.

Export to SD card – if selected, data will be exported as csv file to SD card. Please note that SD card should be mounted.

6.4.Load management

6.4.1.Control

Here it is possible to change the status (open/close) of each single output port of the active I/O modules. A confirmation message is shown before completing the action.

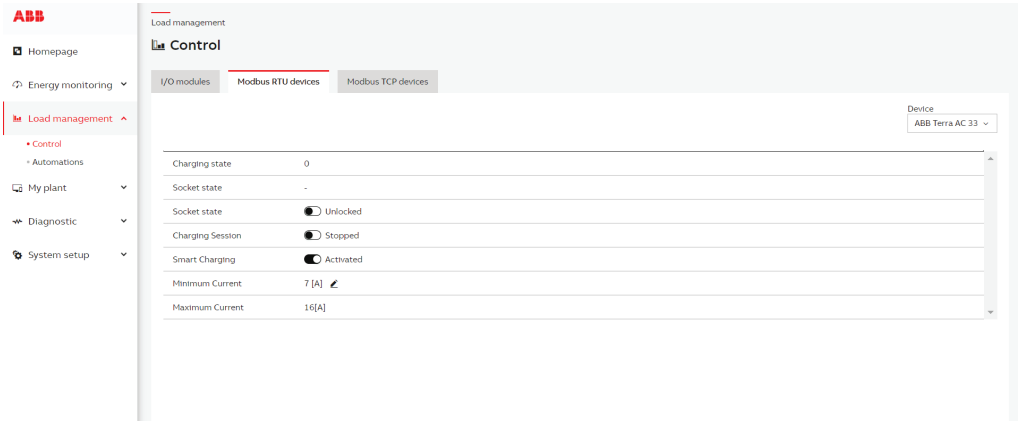


6.4.2.Enhanced Smart Charging with ABB Terra AC Chargers

Incorporating ABB TERRA AC chargers with Modbus protocols into your Smart Charg-ing Unit (SCU) has become more streamlined and efficient. This section outlines the key features and prerequisites for maximizing the benefits of this integration.

- **ABB TERRA AC Integration**

The integration of ABB TERRA AC chargers, utilizing Modbus protocols, has now been seamlessly integrated into the Smart Charging Unit (SCU). If your charger is connected via Modbus RTU/TCP, you'll find an additional tab under the control section, as illustrated below:



Attention: It is currently not possible to lock / unlock the socket of the charger using modbus interface.

• Monitoring Charging Status

From this newly added tab, you gain access to a range of functionalities:

1. Charging Status: You can monitor the real-time charging status of the charger. It provides essential information:
   - 0 (Available): The charger is ready and waiting for a vehicle to connect.
   - 1 (Charging): The charger is actively charging a connected vehicle.
2. Control Variables: You can manage key control variables such as the socket state, ongoing charging sessions, and the activation of the Smart Charging feature.
3. Smart Charging Activation: You can activate the Smart Charging feature from this tab. Smart Charging is an intelligent functionality that allows users to opti-mize the use of solar energy for charging their electric vehicle.

• Leveraging Solar Energy

Once the charging session is started, you can activate the smart charging feature.

The Smart Charging feature empowers users to harness solar energy efficiently for their electric vehicle charging needs.

Smart Charging offers a flexible approach to electric vehicle charging. When SCU recognizes solar energy flowing outside the house, it will automatically adjust the charging current. (The charging current limit set by SCU = minimum current set by the user + extra solar current exported). This enables the installation to capture in-house the full potential of the generated solar energy:

- Charging via Solar Power: To charge your vehicle exclusively using solar power, set the minimum current in this section to zero. With the Smart Charging feature enabled, the system periodically checks the system periodically checks surplus solar power production at the main meter and directs this energy to the EV Charger.
- Minimum Current Assurance: Alternatively, you can set a specific minimum current value. Since ABB Terra AC the minimum current value to keep the charger in Charging mode is at least 6A for single / three phase, if the current sent is less than 6A, the charger will be on temporary halt. To avoid this situation while using Smart charging feature, you can set a default value of lower current which ensures constant charging with out spikes.

• Pre-requisites for Smart Charging

Before optimizing your electric vehicle charging with Smart Charging, there are a few pre-requisites.

1. Main Meter Registration: Ensure that the main meter is properly configured to record the following registers:
   - Phase Current
   - Phase Power Factor (for three-phase meters, the total power factor should also be mapped).
2. ABB Terra AC EV Charger: When adding the ABB Terra AC EV charger to your system, it is crucial to select the “max solar” option under Load Management > Devices > Modbus RTU/TCP > EVCHARGER.

For 1 phase charger, the surplus power production information is taken only from the one phase – the phase which is configured in the EV charger settings (that’s why it is important to set it correctly). Whereas, for 3 phase charger (if it is set as 3 phase charger in the EV charger settings), the surplus power production information is calculated as an **average** from all phases, regardless if it is consumed or produced. It means that, if at phase 1 and 2 there is a X power **produced** each, but at phase 3 there is a 2*X power **consumed**, the smart charging feature will set the minimum charging current limit which is the value of configured “Minimum current value”.

6.4.3.Automations

This page allows to set automatic actions on selected devices in response to defined conditions are met or according to a specified schedule.

There are three types of automations available:

- **Always**. This triggers an action when specific logical conditions are fulfilled. Conditions can be combined using “AND” or “OR” logical operators. It is possible to add up to three conditions per single automation. For three condition automation, only the same logical operator can be selected so it is possible to create automations:
  Example1: Condition1 OR Condition2 OR Condition3.

  Example2: Condition1 AND Condition2 AND Condition3.

- **On selected period**. This type of automation operates identically to the previous one (Always), except is active only within defined time intervals.

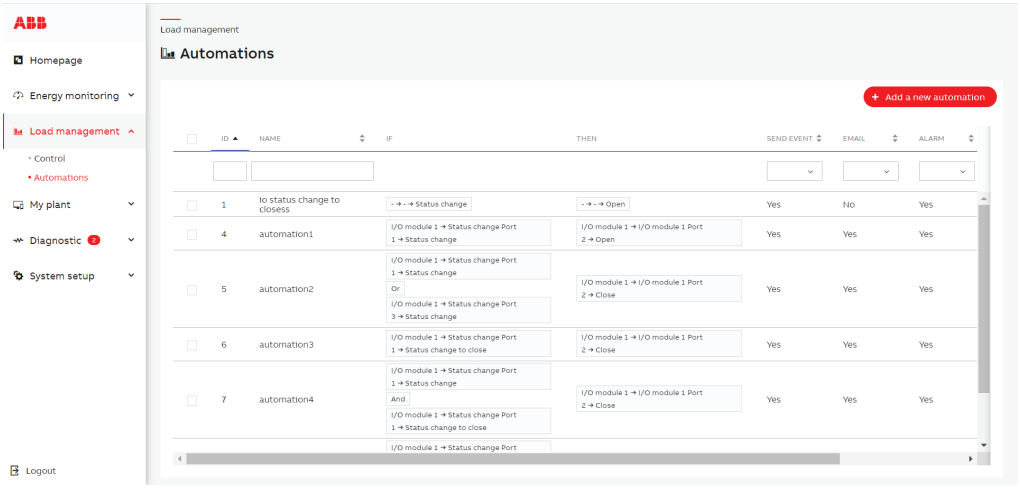
- **Scheduled**. Action is executed automatically at predefined times and days.

Schedulers operate based on the system time, which is set according to the time zone specified in the system’s regional setting before configuring automation tasks (page 64). If the time zone is not set, they default to operating in accordance with UTC.

The automatic action can be set for:

- I/O modules which have output channels already configured in “My plant– Devices – I/O modules”
- ABB Meters that have I/O ports configured to “Communication output”
- Any Third Party RTU/TCP devices that have configured writable registers

Email notification configuration can be set to following values: - Dedicated: the email is sent immediately after each automation occurrence.



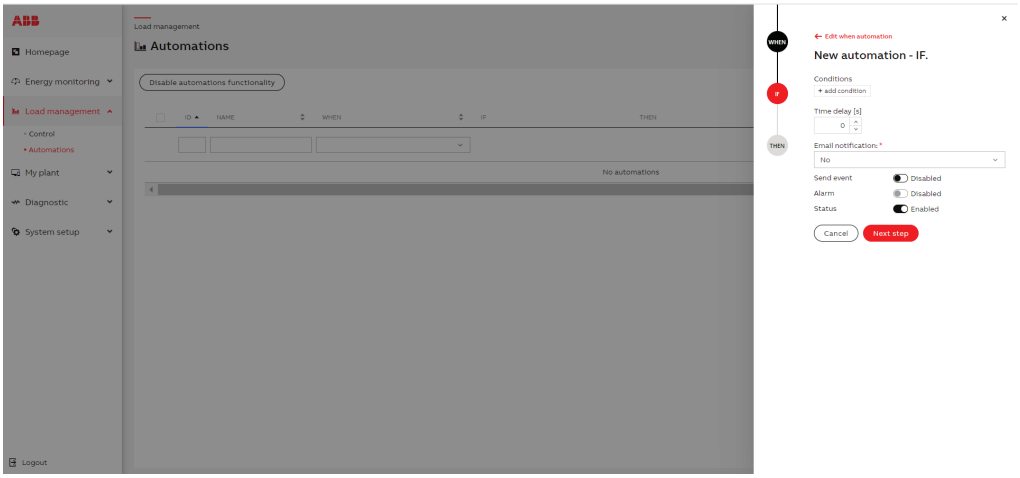
When adding or editing an automation, please set the following:

Name	Set the name of automation
Trigger	Select the type of the automation's trigger

If the user selects "Scheduled", then they can set the execution time for the automation by selecting the month, days, weekdays, hours, and minutes.

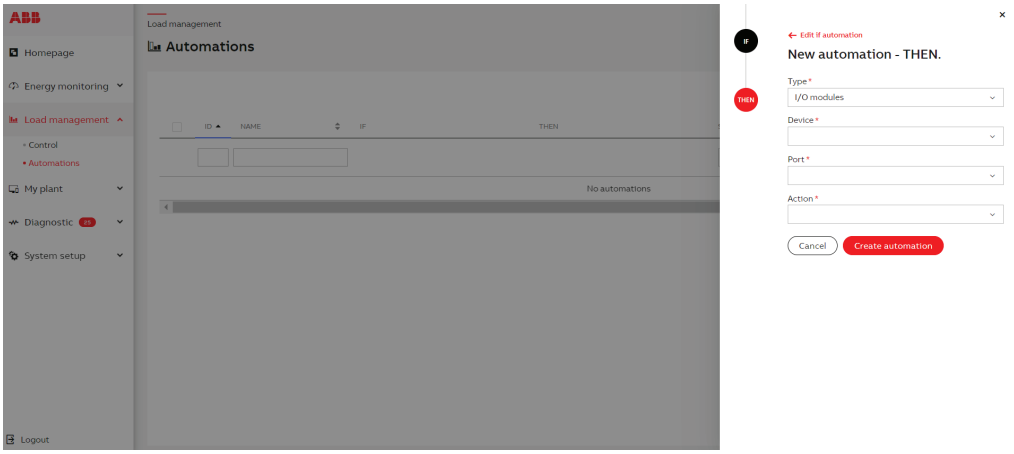
If the user chooses "On selected period", then they can specify the time intervals during in which the automation should operate.

IF Step	
Time delay	Define the duration for which conditions must be satisfied before an action is executed (Always, On selected period).
Email notification	Select if an email ntification should be sent to the dedicated email address.
Send event	If enabled, then "Automation success" event will be shown in events log. "Automation failure" event will always be shown in events log.
Alarm	Only when Send event is enabled - If enabled, then event will be shown in alarms log.
Status	Status of configured automation, if disabled then automation is not active and won't be performed.



Conditions	
Logical	Select logical operator (only for multiple conditions)
Device type	Select the type of the device
Device	Select the device already defined in “My plant - Devices” according to the Device type selected
Type	“Cross-up”, “Cross-down”, “Communication failure” and “Communication restore”. “Status change”, “Status change to close”, “Status change to open” only in case of I/O modules or INS-S/H devices
Category/Measure	Set the specific measure to monitor according to the device selected
Threshold	Threshold of selected measure

Then	
Device	Select the I/O module with output channels already defined in “Configuration – Devices” or any other devices that have configured writable registers
Port (for I/O Module	Select the output channel of the I/O Module already selected
Action (for I/O module)	Set the action to be performed: (open/close) for I/O ports, set provided value for other writable registers
Register (for other devices)	Select the register of the device
Value (for other devices)	Set the value of the register that should be set



For ABB Terra AC, with the predefined descriptors, it is possible to add in automations three registers namely: set charging limit, lock unlock socket, start stop charging. The set charging limit can be set between 0 to X (in Amperes), for lock unlock socket, the value can be 0/1 (0 = Unlock the socket, 1 = Lock the socket), similarly for start stop charging, the value can be 0/1 (0 = Start the charging session, 1 = stop the charging session).

6.5.My plant

6.5.1.Devices

For each added device the status is presented as dot indicator colors with proper tooltip

• **Green**	Device is assigned/configured and fully operational
• **Red**	Device is unassigned or not responding
• **Orange**	Device is assigned and operational, but only partially responding, it might be caused by device not fully responded for all expected values in time or for the sensors by removing device from which Voltage or PF source was previously selected. In this situation only electric current is being measured
• **Gray**	Waiting for first data from device

The Modbus ID pool for Current sensors, I/O modules, INS-S/H, MOD & AR is 1-32. The maximum no. those devices connected is 32 (I/O module count as 4 devices).

The Modbus ID pool for Modbus RTU devices is 33-48.

The Modbus ID pool for Wireless M-Bus modules is 49-64

• **Current sensors**

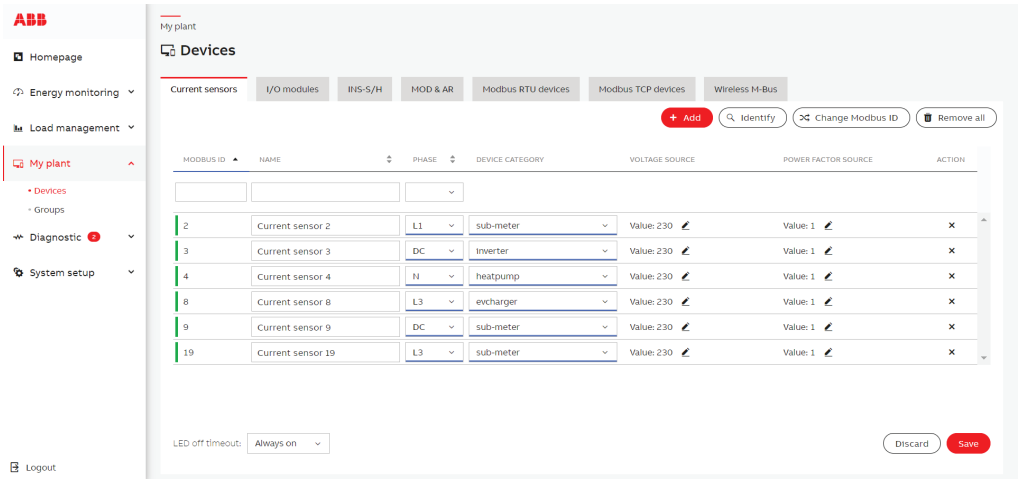
Add	Add and assign new current sensor	Create a new sensor Modbus ID and then assign it to the physical sensor by clicking the pushbutton of the sensor (Note: Wait for confirmation before assigning the next sensor).
	Assign current sensor (already added)	If a sensor ID has already been created but is unassigned, it is possible to assign it to the physical sensor by clicking the pushbutton of the sensor.
	Add new current sensor (no assigning)	Create a new sensor ID without assigning it to the physical sensor.
Identify	Clicking the pushbutton of the current sensor allows to display the sensor Modbus ID number.	
Change MODBUS ID	Select the current Modbus ID number of the current sensor and define the new Modbus ID number of it.	
Remove all	Remove all sensors and their settings. To remove one single sensor, click on the “X” symbol under the Action column.	

Sensors Definitions

Modbus ID	Sensor identification number.
Name	Defines the name of the sensor.
Phase	Selects the corresponding sensor phase for the calculation of sensor active power and energy. It is possible to choose: - L1, L2, L3, N, for AC phase to phase measurements - DC for direct current measurements.
Device category	Defines the category of the device
Energy sensors	Defines the flow of energy
Voltage source	Defines voltage source for DC power and energy calculation. This option can be configured by clicking on the pen icon. It is possible to set the constant value or select a register from another device that is already connected.
Power Factor source	Defines power factor source for AC power and energy calculation, it allows to user predefined or external source of power factor. It is possible to set the constant value or select a register from another device that is already connected.

[Click a row] By clicking a row, the row is highlighted in light blue. Additionally, the LED of the selected sensor will start to blink.

Make sure to select the correct phase on which the current sensor is installed in the phase column. If needed, change the Power Factor source to a value corresponding to the PF of the measured load.



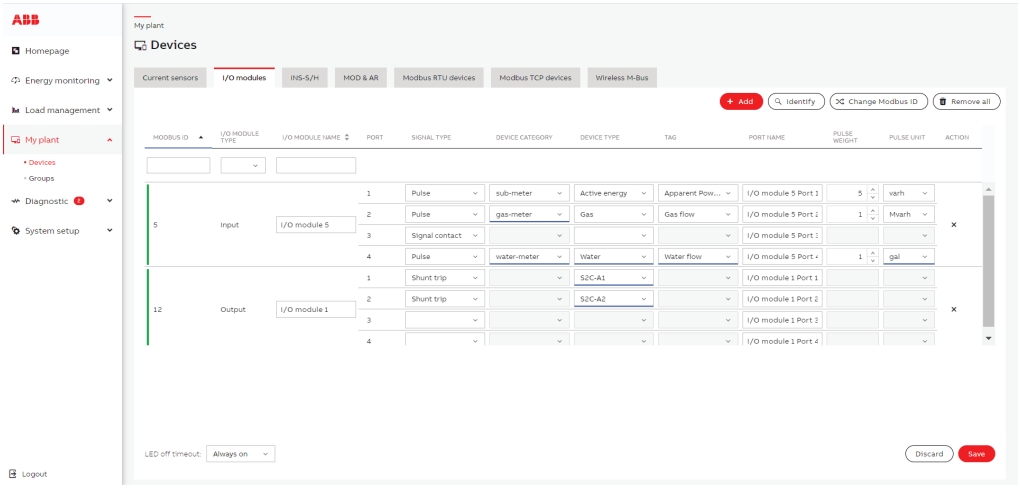
- **I/O modules**

Add	Add and assign new I/O module	Create a new I/O module Modbus ID and then assign it to the physical module by clicking the pushbutton of the I/O module (Note: Wait for confirmation before assigning the next I/O module).
	Add new I/O Modules (automatically)	Create a new I/O Module Modbus ID by automatically assigning it to the physical module randomly (Note: wait for confirmation pop-up window before configuring the modules detected).
	Assign I/O module (already added)	If a I/O module ID has already been created but is unassigned, it is possible to assign it to the physical I/O module by clicking the pushbutton of the I/O module.
	Add new I/O module (no assigning)	Create a new I/O module ID without assigning it to the physical I/O module.
Identify	Clicking the pushbutton of the current I/O module allows to display the I/O module Modbus ID number.	
Change ID	Select the current Modbus ID number of the current I/O module and define the new Modbus ID number of it.	
Remove all	Remove all I/O modules and their settings. To remove one single I/O module, click on the “X” symbol under the Action column.	

I/O Modules Definitions

Modbus ID	I/O module identification number
I/O module type	It is automatically recognized when the module is added and assigned.
I/O module name	It is possible to define the module name
Port	Port number from 1 to 4
Signal type	It is possible to select the channel type from dropdown menu
Device category	Defines the category of the pulse input device.
Device type	It is possible to select the device type from the dropdown menu.
Tag	It is possible to select the pulse input tag for groups calculations
Port name	It is possible to define the port name
Pulse weight	In case of pulse input signal it is possible to define the weight for the received pulses. The number must be between –9999 to 9999
Pulse unit	In case of pulse input signal it is possible to select the unit of measurement from the dropdown menu
Action Remove	Removes the single I/O module

[Click a row] By clicking a row, the row is highlighted in light blue. Additionally, the LED of the selected I/O module will start to blink.



MOD/AR

Meter -operating devices (MOD) are devices which can open or close the corresponding breaker up on external commands, Auto-reclosing units (AR) are used to automatically operate the reclosing of the associated circuit breaker in case of unexpected trip. Basic AR (former ARI) is different from MOD as it automatically tries to reclose after the fault (trip) for 3 times. In case of no success, it goes to blocked status and somebody must act locally to check the installation.

SCU 200 is compatible with the new range of MOD/ARs launched from ELSB. 2CS5201998RO033

2CS5202998R0033

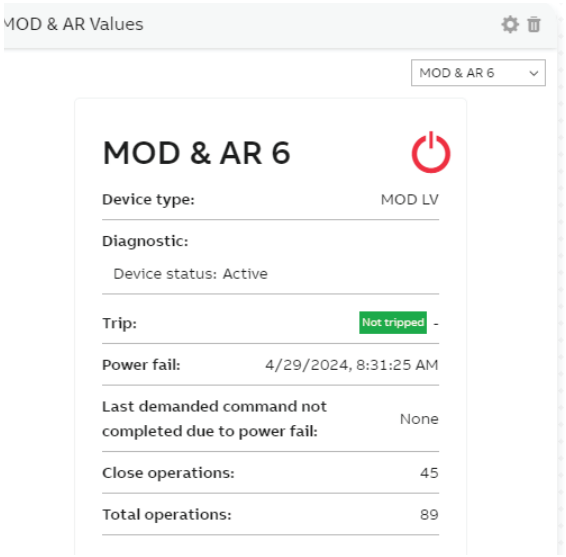
2CSF201998R0034

2CSF202998R0034

2CSF203998R0034

These devices communicate with SCU 200 over flat cable, (communication module*2CS5201998R0036) is mandatory and like any other flat cable device, MOD/AR takes one unit ID on the flat cable, so a maximum of 32 devices can be connected.

A separate dedicated widget is available in the main dashboard for MOD/AR devices. See attached picture.

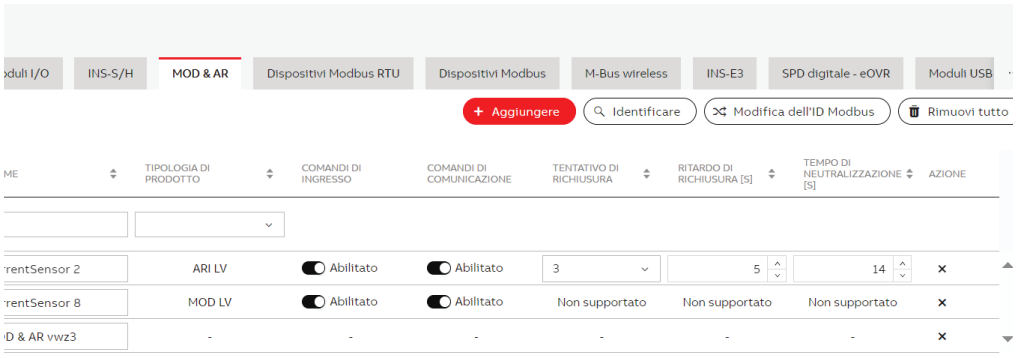


Both these devices can be added to the automations. Control possibility is also available.

These devices can be controlled directly from the control section besides I/O modules. Like I/O modules these devices can be open/closed remotely from the webserver. However, for AR we cannot command it after it has reached the blocked status.

Also, if we command the opening of the associated protection device, auto reclosing is disabled.

Both the devices are automatically assigned and ID by SCU 200, in ARI, it is possible to configure the reclosing attempt, reclosing delay and neutralization times.



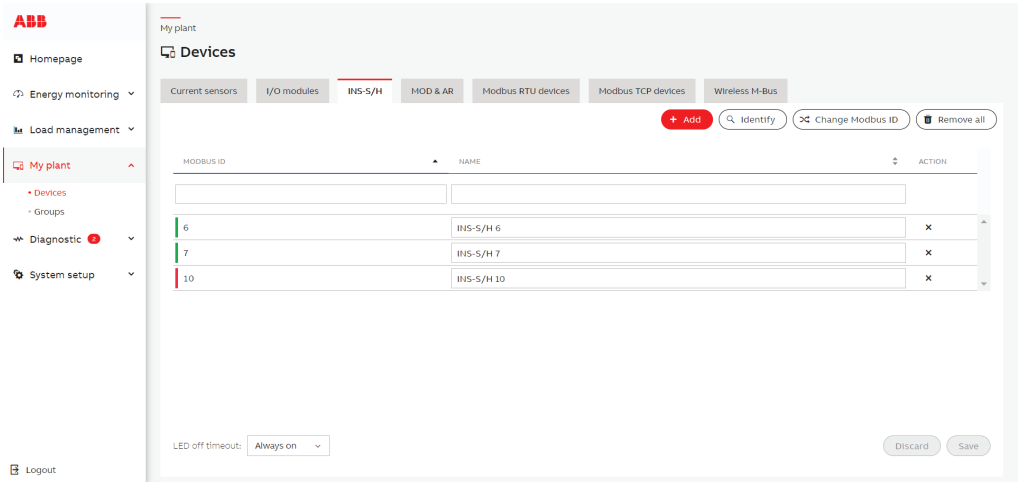
• **INS-S/H**

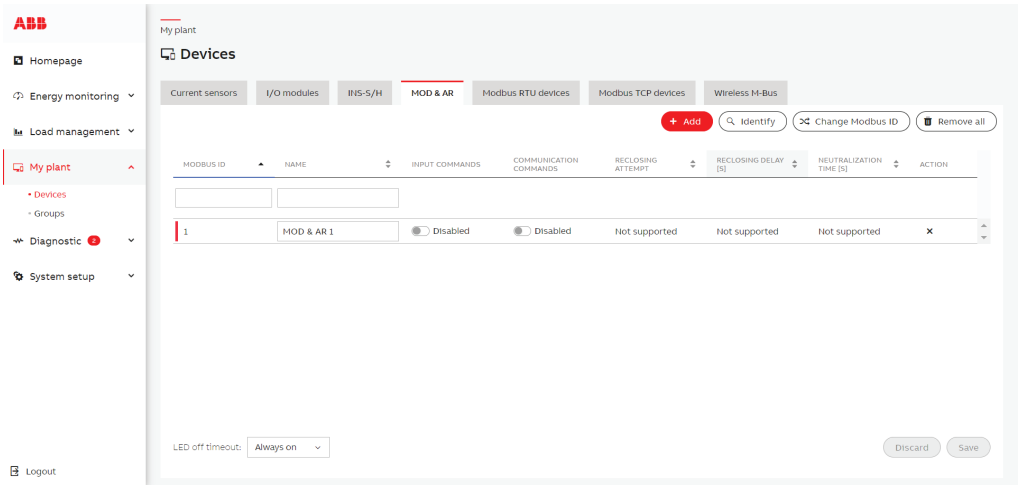
Add	Add and assign new INS-S/H	Create a new INS-S/H Modbus ID and then assign it to the physical module by clicking the pushbutton of the INS-S/H (Note: Wait for confirmation before assigning the next INS-S/H).
	Add new INS-S/H (automatically)	Create a new INS-S/H Modbus ID by automatically assigning it to the physical module randomly (Note: wait for confirmation pop-up window before configuring the modules detected).
	Assign INS-S/H (already added)	If an INS-S/H ID has already been created but is unassigned, it is possible to assign it to the physical INS-S/H by clicking the pushbutton of the INS-S/H.
	Add new INS-S/H (no assigning)	Create a new INS-S/H ID without assigning it to the physical INS-S/H.
Identify	Clicking the pushbutton of the current INS-S/H allows to display the INS-S/H Modbus ID number.	
Change ID	Select the current Modbus ID number of the current INS-S/H and define the new Modbus ID number of it.	
Remove all	Remove all INS-S/H and their settings. To remove one single INS-S/H, click on the “X” symbol under the Action column	

INS-S/H Definitions

Modbus ID	INS-S/H identification number
Name	It is possible to define the INS-S/H name
Action Remove	Removes the single INS-S/H

[Click a row] By clicking a row, the row is highlighted in light blue, the LED of the selected INS-S/H will start to blink.



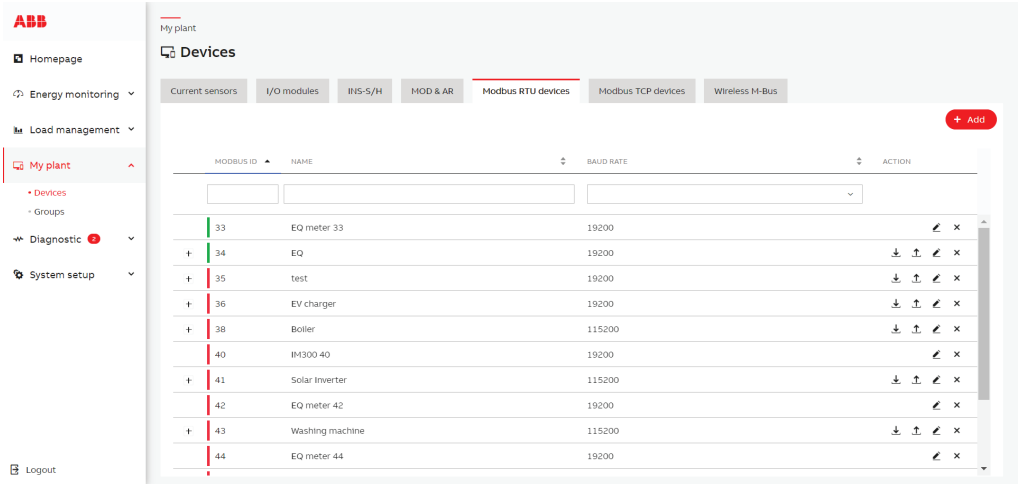


- **Modbus RTU devices**

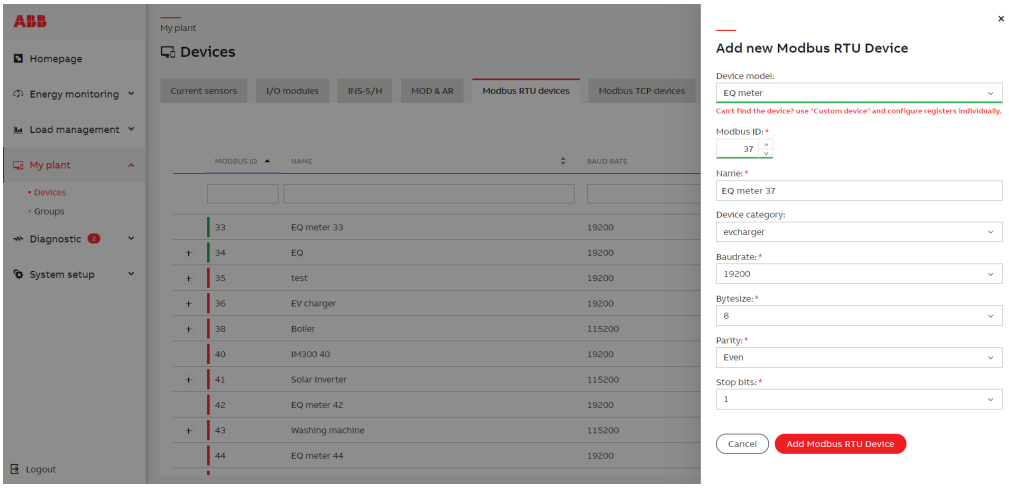
In this section it is possible to add Modbus RTU devices connected to the SCU200.

It is possible to download device descriptor with registers that was configured or upload previously prepared/configured descriptor.

Maximum no. Registers per single device is 128. The maximum length of register (variable) name is 128. Only ASCII characters are allowed.



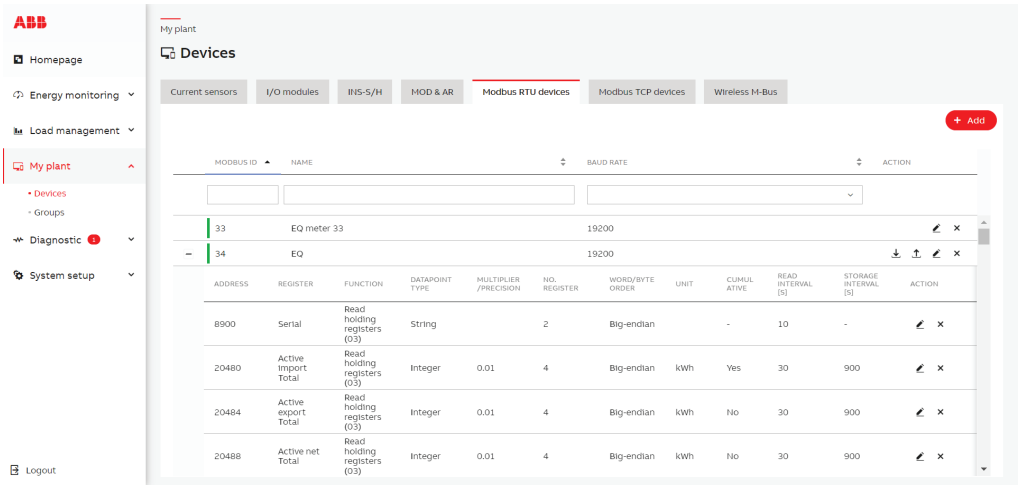
Add	Device model	Select the predefined device model, select “Custom device” to configure registers manually. For predefined device models it is not possible to edit registers or upload descriptor.
	Modbus ID	Set the Modbus ID of the device (between 33 and 48)
	Name	Set the name of the device
	Device category	Defines the category of the device.
	Baud rate	Select the baud rate among the ratings (from 1200 to 115200)
	Byte size	Select the Byte size among the ones available (4, 6, 7 or 8)
	Parity	Select the parity among the ones available (None, Odd, Even)
	Stop bits	Select the Stop bit among the ones available (1 or 2)



Modbus RTU Definitions

Address	Assign register address (between 0 and 65535).
Category	Select the predefined category of the register or add new.
Value	Select the predefined register or add new. For predefined registers some fields are already filled and can't be changed.
Tag	It is possible to select the tag for groups calculations.
Function	Select Modbus function that is using for polling this register (“Read Coil Status (01)”, “Read input status (02)”, “Read holding registers (03)”, “Read input registers (04)”).
Data type	Set the data type of register among the ones available (Integer, Float, Boolean, String).
Signedness	(Only for integer) Set the signedness of register among the ones available (Unsigned integer, Signed integer).
Multiplier/Precision	Set the multiplier (or precision for float values) of the register among the ones available (1, 0.1, 0.01, 0.001).
No. registers	Set the number of registers.
Word/byte order	Select the word/byte order among the ones available (Big-endian, Little-endian, Big-endian byte swap, Little-endian byte swap).
Unit	Select the unit of the register or add new.
Writable	Select if the register is writable (writable registers can be used e.g. in automation action).
Cumulative	Select if the value read from register is cumulative (cumulative values are presented differently in WebUI).
Read interval	Select the resolution how often register will be read (possible resolution 10s, 30s, 900s).
Storage interval	Select the resolution how often register will be stored in historical values (possible resolution 30s, 900s). Leave empty if you don’t want to store values for this register. Storing is disabled for String values.

For detailed explanation on how to add third party RTU devices using the J.son descriptor file, refer to 7.1.6.

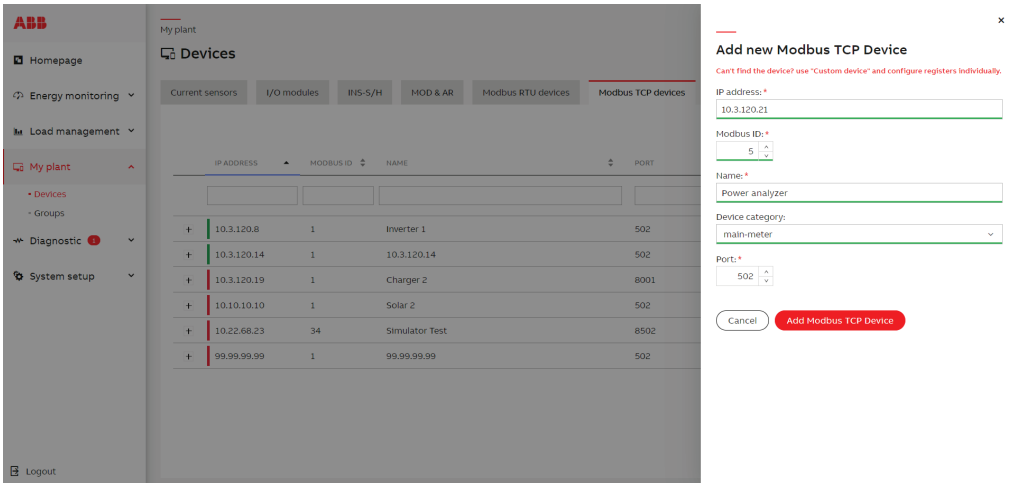


- **Modbus TCP devices**

In this section it is possible to add Modbus TCP devices connected to the SCU200.

It is possible to download device descriptor with registers that was configured or upload previously prepared/configured descriptor.

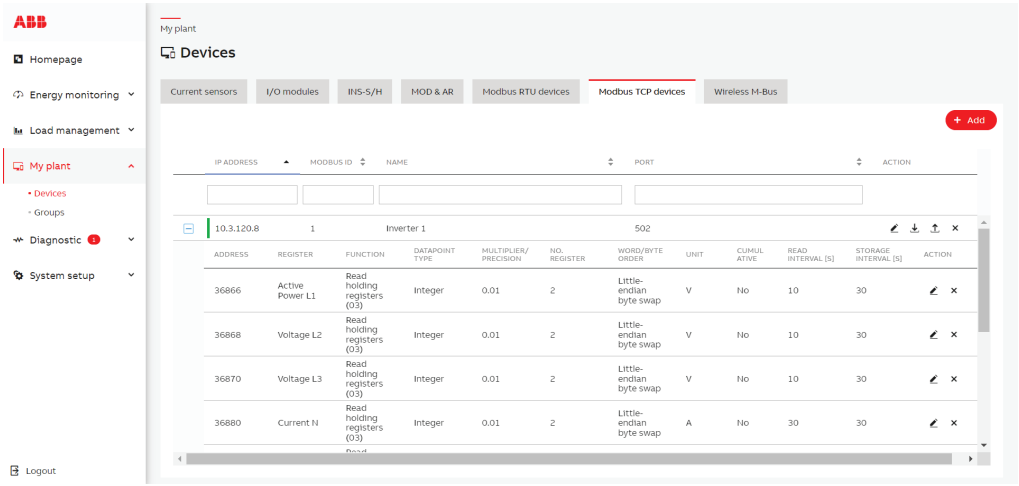
Add	Device model	Select the predefined device model, if it is not selected it will be possible to configure registers manually.
	IP address	Set the IP address of the device.
	Modbus ID	Set the Modbus ID address of the device.
	Name	Set the name of the device.
	Device category	Defines the category of the device.
	Port	Set the port of the device.



Modbus TCP devices Definitions

Address	Assign register address (between 0 and 65535).
Category	Select the predefined category of the register or add new.
Value	Select the predefined register or add new. For predefined registers some fields are already filled and can't be changed.
Tag	It is possible to select the tag for groups calculations.
Function	Select modbus function that is using for polling this register (“Read Coil Status (01)”, “Read input status (02)”, “Read holding registers (03)”, “Read input registers (04)”).
Data type	Set the data type of register among the ones available (Integer, Float, Boolean, String).
Signedness	(Only for integer) Set the signedness of register among the ones available (Unsigned integer, Signed integer).
Multiplier/ Precision	Set the multiplier (or precision for float values) of the register among the ones available (1, 0.1, 0.01, 0.001).
No. registers	Set the number of registers.
Word/byte order	Select the word/byte order among the ones available (Big-endian, Little-endian, Big-endian byte swap, Little-endian byte swap).
Unit	Select the unit of the register or add new.
Writable	Select if the register is writable (writable registers can be used e.g. in automation action).
Cumulative	Select if the value read from register is cumulative (cumulative values are presented differently in WebUI).
Read interval	Select the resolution how often register will be read (possible resolution 10s, 30s, 900s).
Storage interval	Select the resolution how often register will be stored in historical values (possible resolution 30s, 900s). Leave empty if you don’t want to store values for this register. Storing is disabled for String values.

For detailed explanation on how to add third party TCP devices using the J.son descriptor file, refer to 7.1.6.



• **Wireless M-Bus**

Wireless M-Bus modules that are connected to SCU200 are automatically autoassigned during system startup.

It is possible to clear Modbus IDs of devices that are already assigned, then confirmation of device reboot needed is displayed. After reboot all Wireless M-Bus modules will be autoassigned.

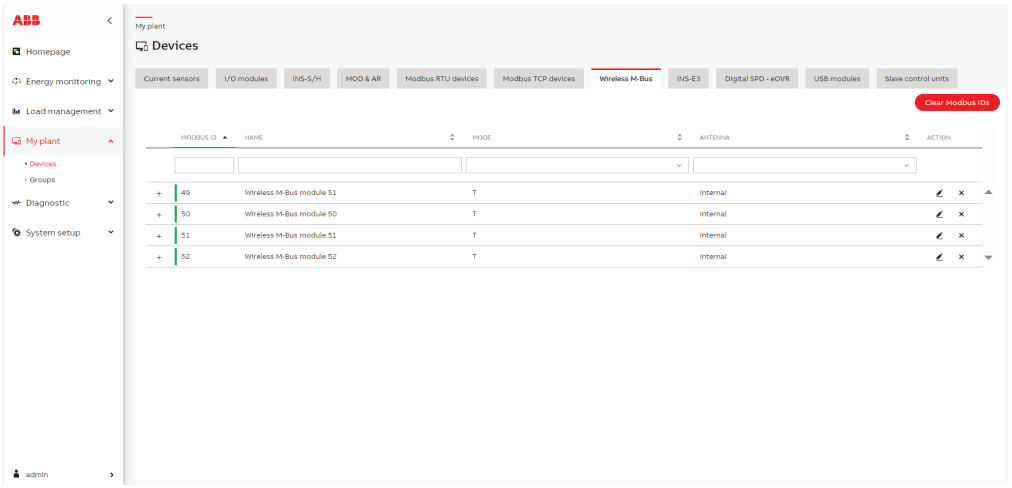
It is possible to edit or remove autodetected Wireless M-Bus module.

Name	Set the name of the device.
Mode	Select the Mode among the ones available (C or T).
Antenna	Select the Antenna among the ones available (Internal or External).

It is possible to add detected Wireless M-Bus meter to Wireless M-Bus module. Available meters appear depending on defined data sending frequency.

To add meter use button “Add wireless M-Bus meter” under expanded row with desired Wireless M-Bus module.

Detected meter	List of automatically detected Wireless M-Bus meters by Wireless M-Bus module. If the meter is not yet detected, cancel the add procedure and start it again after a moment.
ID	Filled automatically based on selection of detected meter.
Manufacturer	Filled automatically based on selection of detected meter.
Name	Set the name of the device.
Device category	Defines the category of the device.
Key	Set the Wireless M-Bus meter key, 32character in HEX format.
Use predefined descriptor	It is possible to use predefined descriptor for Wireless M-Bus meter or select and upload prepared descriptor file in .json format. Step by Step procedure for developing the descriptor file is described in SCU 200 Communication Interfaces section under wireless M-Bus.



• **INS E-3**

INS-E3 that are connected to SCU200 are automatically auto assigned during system startup.

It is possible to clear Modbus IDs of devices that are already assigned, then confirmation of device reboot needed is displayed. After rebooting all INS-E3 will be auto assigned.

It is possible to edit or remove autodetected INS-E3.

Name Set the name of the device.

Device category Defines the category of the device.

CTS sensors Select the CTS sensors among the ones available (CTS-1-20, CTS-1-50 or CTS-1-80).

Type of network Select the type of network among the ones available (3ph 4w 3CT, 3ph 3w 3CT, 3ph 3w 2CT or 1ph 2w 1CT).

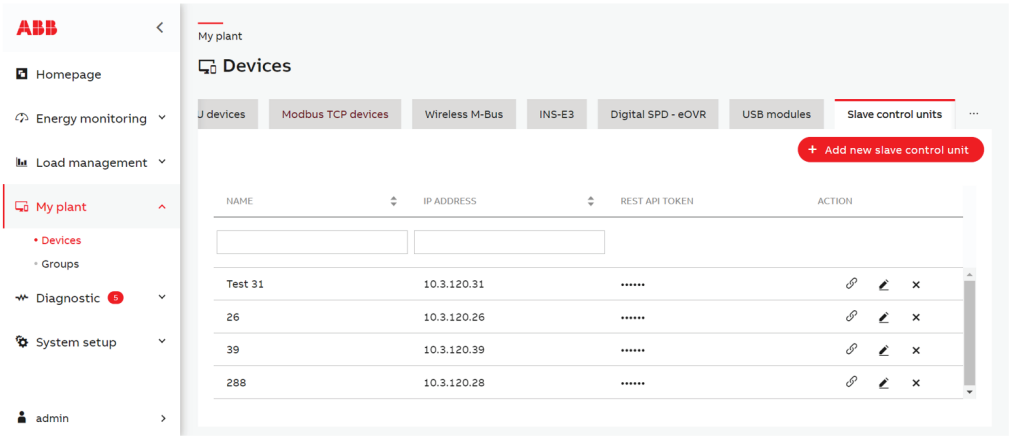
- **Slave control units**

In this section it is possible to add slave control units.

REST API must be enabled in slave control unit and the REST API Authorization token must be provided.

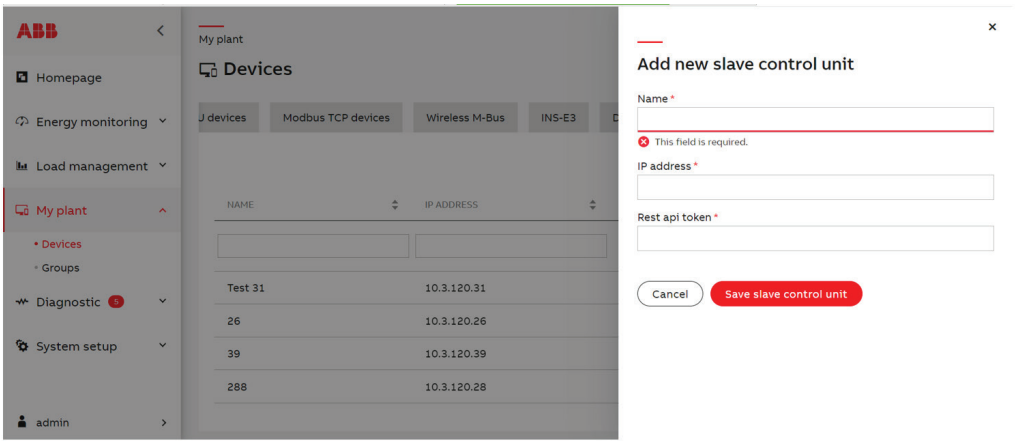
Data from slave control unit can be selected and presented in each dashboard widgets.

Up to 12 slave control units can be added.



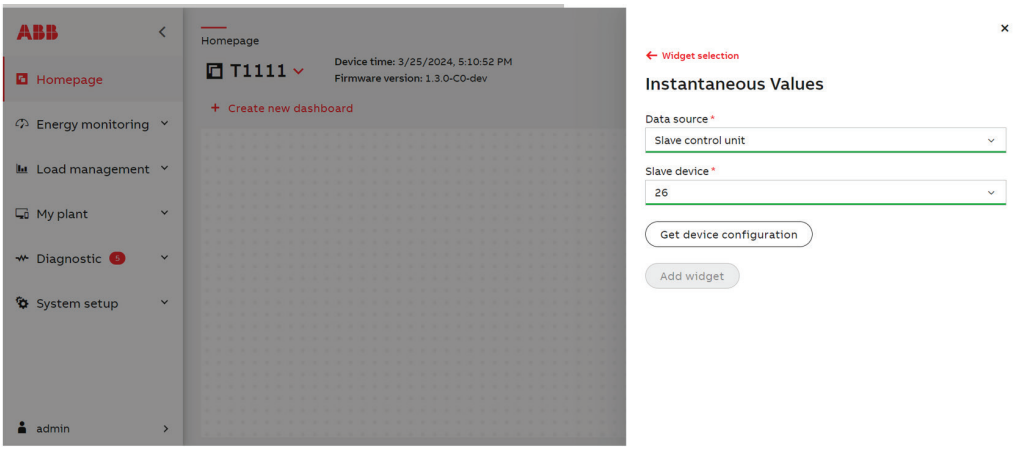
When adding or editing a slave control unit, please set the following:

Add	Name	Set the name of the slave control unit.
	IP address	Set the IP address of the slave control unit.
	Authorization token	Set the Authorization token of the slave control unit (REST API must be enabled).



Configured slave control units can be selected as source of the data for each dashboard widget.

During widget configuration It is required to select “Data source” – “Slave control unit” and get slave control unit configuration by clicking on “Get device configuration”.



After device configuration is received, the rest of widget configuration is similar as it is for Local control unit.

When creating a new dashboard, it is possible to copy existing dashboard configuration from slave control unit.

To do this select slave device, get device dashboards and select dashboard. This will make the copy of selected dashboard configuration. During the process dashboard configuration is copied to local control unit. After the process both local and original dashboard can be configured separately without impact to another.

- **SPD eOVR**

SPD eOVR device definitions

ModbusID	Modbus address of the SPD eOVR device
Name	Set the name of the device
Model	SPD eOVR device model information
Type	Phase configuration of the device.
Serial Number	Serial number of the device

Add new device

Click **Add new Digital SPD – eOVR** and provide actual ModbusID of the SPD device. If device is connected and responding on provided address – it will be discovered and information will be filled automatically.

SPD eOVR widget device readings

- SPD life status

Represents percentage life status of each cartridge for each available phase.

- Number of surge event

Shows number of surge events occurred from each available phase plus total surge events count from all phases.

- Voltage quality

Shows actual measurements of voltage on each available phase.

- Ambient temperature

Displays actual device ambient temperature in Celsius degrees.

- Signal status

SPD connected to network	**Display actual connection status – online data reading from SPD**
Back-up MCB operational	Display status of backup MCB
Earth sensor	Display status of grounding connection

- Surge event record

Displays last events records with date and time when surge event occurred and peak current of surge event.

- Network event record

Displays last network events records date and time – it indicates when network status changes in past.

- Maintenance recommendations

Displays descriptions of maintenance recommendations to do with SPD eOVR device.

- **USB modules**

In the “USB modules” tab, the user has the ability to configure USB hubs and view the statuses of individual ports. The maximum number of connected USB hubs is 5, each HUB is divided into two upper and lower ports. USB hubs are automatically detected upon CU startup, after removing the hub - if it is still connected, to add it again, you need to perform a reboot of the system. The user can edit the name and delete a selected hub.

After disconnecting the hub from the device and performing a reboot, the hub will still be visible in the list - in its place you can connect another hub or remove the existing one from the configuration

Table:

Expanding a given row in the configuration table allows the user to view port statuses:

- Device connection status.
- Overcurrent – information about whether an overcurrent state has occurred.
- Locked status.

The user also has the option to manually unlock a port, to do this, click on the “Unlock” switch of the specific port. This operation may take a few seconds.

In case of an overcurrent state, a popup should appear on the screen with information about the occurrence and a list of hubs and ports for which it occurred.

USB port, on which overcurrent has occurred, will be tried to be locked. An appropriate event will also be logged in the system. In case of an overcurrent without locked port, an alarm will be triggered.

6.5.2.Pre-defined devices

Currently the following devices are pre-defined in SCU 200 both via Modbus RTU, TCP (If available)

Device name	Model type
ABB TERRA AC	FW: 1.6.9 (for all MID & CE Versions)
M4M	All models
M1M	All models
M2M	All models
DMTME	All models
IM300	All models
EV METERS	All models
EQMETERS	All models

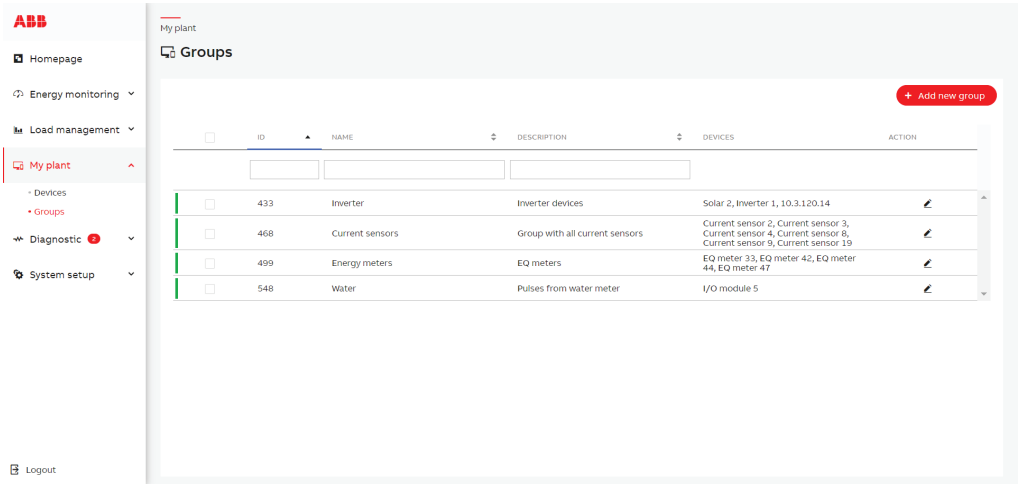
6.5.3.Groups

This page allows you to create or remove groups of devices. By clicking on “Add new group”, it is possible to create a new group by selecting the type of devices.

Once a group type has been selected, it is required to type the name of the group and add a description. For each group it is possible to associate one or more items. One device can be assigned to multiple groups.

By clicking on the pencil icon “Edit” it is possible to edit all the fields of the selected group. By clicking on checkbox and then on button “Remove”, the selected groups will be deleted.

The values from devices in one group are summed by tags (for Modbus RTU/TCP devices tags can be configured per register) and they can be presented on dashboard widget or in historical values.



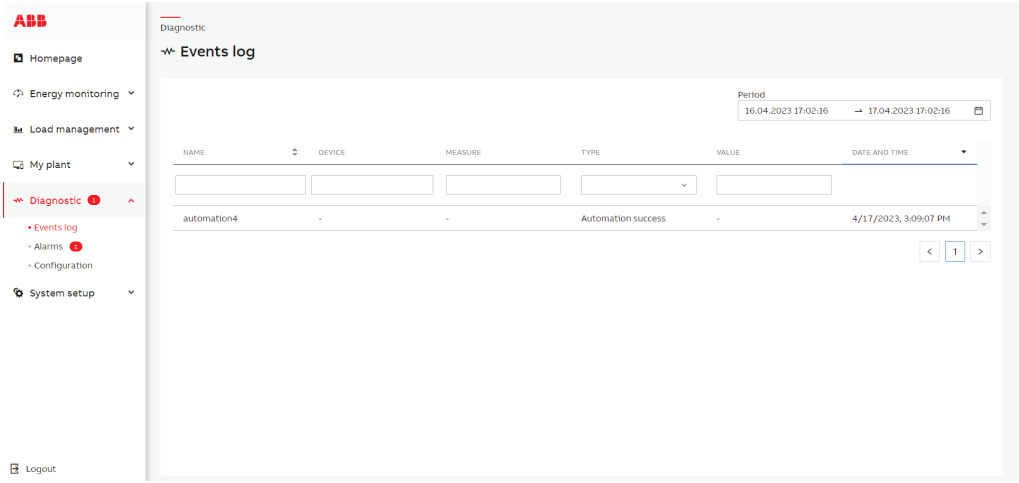
6.6.Diagnostic

6.6.1.Events log

Here it is possible to show all the events that occurred in the paginated table. Rows can be sorted and/or filtered by clicking headers and selecting desired value from drop-down lists.

Events must previously be set in the “Diagnostic -> Configuration” page.

It is possible to visualize a table according to user-defined start and end date/time.



6.6.2.Alarms

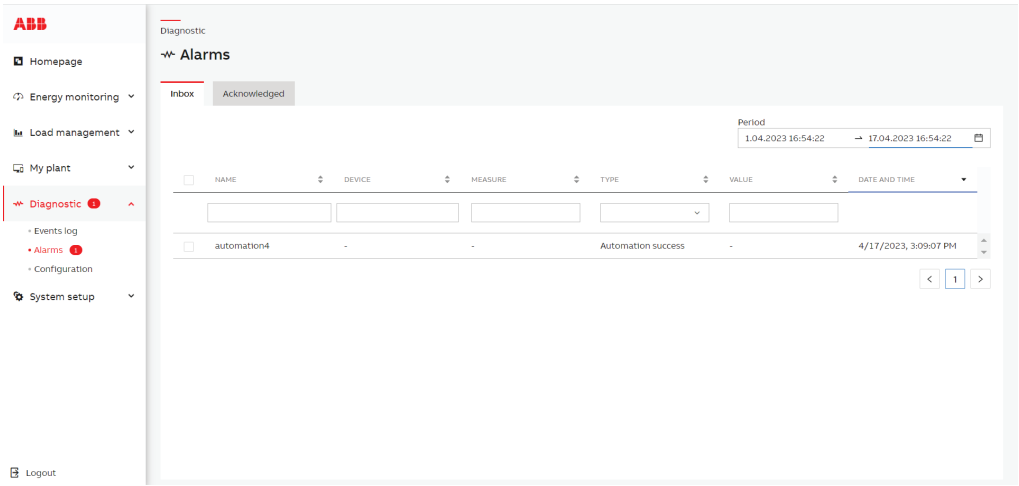
Here it is possible to show all the alarms that occurred in the paginated table. Rows can be sorted and/or filtered by clicking headers and selecting desired value from drop-down lists.

Events must previously be set in the “Diagnostic → Configuration” page.

It is possible to visualize a table according to user-defined start and end date/time.

It is possible to mark alarms as acknowledged.

Alarms are stored only in the device’s temporary memory, each time device is restarted this list is cleared.



6.6.3.Configuration

This page allows you to set events. When a new device is added the events “Communication failure” and “Communication restore” are automatically configured in order to monitor the connection status for that device. If an event occurs, it is shown in the “Diagnostic – Events log” section. An event can occur after exceeding the selected threshold values (cross-up), after measuring values lower than the selected threshold values (cross-down) for a determined period (time delay) or if a certain status change (status change, status change to open, status change to close).

Email notification configuration can be set to following values:

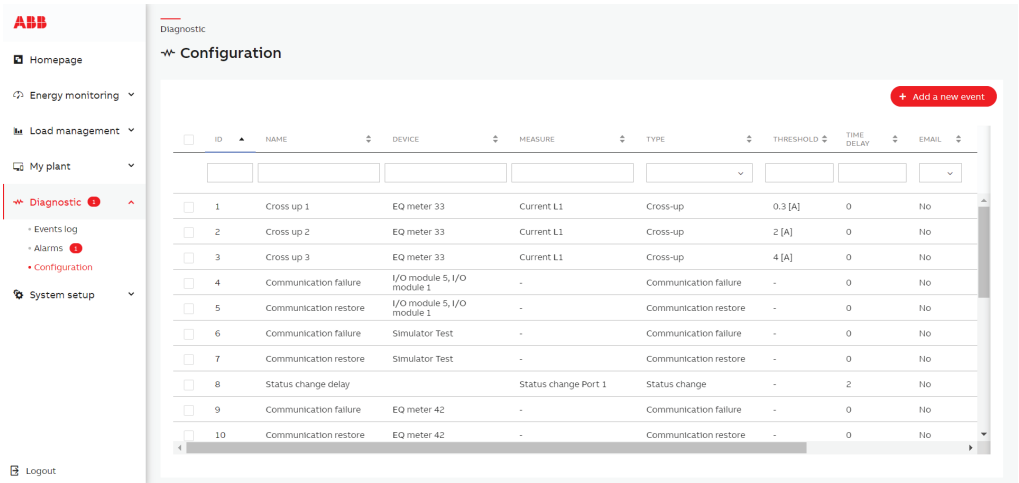
- **Cumulative**: the email report is sent X minute (X -configured first period at System setup – Communication – Email) after the first event occurrence and consists of all events that occurred in this period. The next report can only be sent after at least Y minutes (Y -configured next period) since the first alarm occurrence and only in case event conditions are still ongoing
- **Dedicated**: the email is sent immediately after each event occurrence
- **Both**: cumulative and dedicated options are active

When adding or editing an event, please set the following:

Name	Set the name of the event.
Device type	Select the type of the device.
Device	Select the devices already defined in “My plant - Devices” according to the Device type selected.
Event type	Type of event: “Cross-up”, “Cross-down”, “Communication failure” and “Communication restore”. “Status change”, “Status change to close”, “Status change to open” only in case of I/O modules or INS-S/H devices.
Category/Measure	Set the specific measure to monitor according to the device selected.
Threshold	Threshold of selected measure.
Time delay	Define for how long the event criteria should be fulfilled in order to consider the occurrence as an event.
Alarm	Only when Send event is enabled - If enabled, then event will be shown in alarms log.
Email notification	If the box is selected, an email will be sent when an event occurs. The email address has to be defined in “System setup – Communication - Email”.
Status	Status of configured event, if disabled then event is not active and won’t be triggered.

The maximum number of events logged for single device per minute is 12, if the value is exceeded additional event “Events overflow” will be visible in “Events log”

Occurred events are stored in the database, up to 1000 events are stored for single device (if the value is exceeded, the oldest events will be removed).



6.7.System setup

6.7.1.General

- **Time**

Time settings

It is possible to synchronize the time to compare the time of the device and the one on the web browser. Synchronization is mandatory to correctly visualize and store data. By clicking on “Synchronize” button, the Control Unit will synchronize with the web browser time.

Set time manually

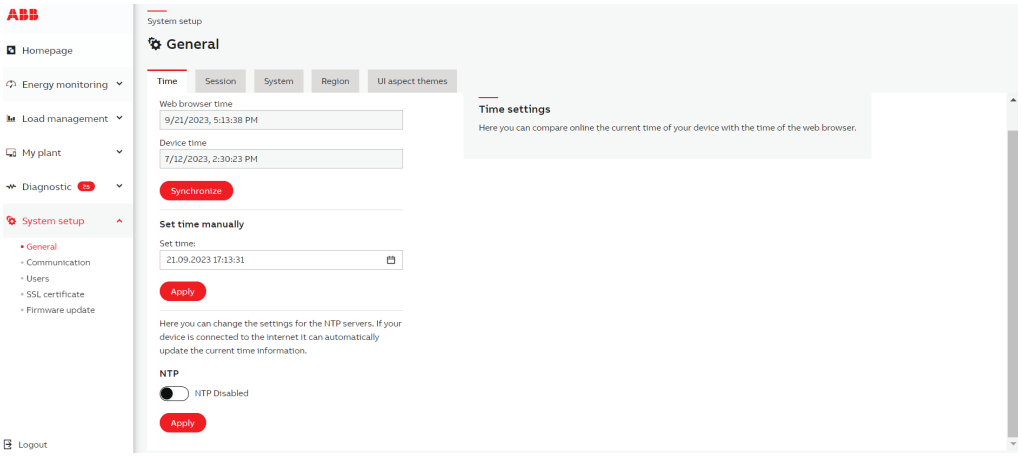
It is also possible to manually set the time. Please select date and time using calendar and clock icons.

NTP

If an NTP Server is available you can set the IP address (Time Server 1, Time Server 2) for automatic time synchronization. In this case, the synchronization procedure can take up to 10 minutes. Please make sure that no firewall will block the NTP server.

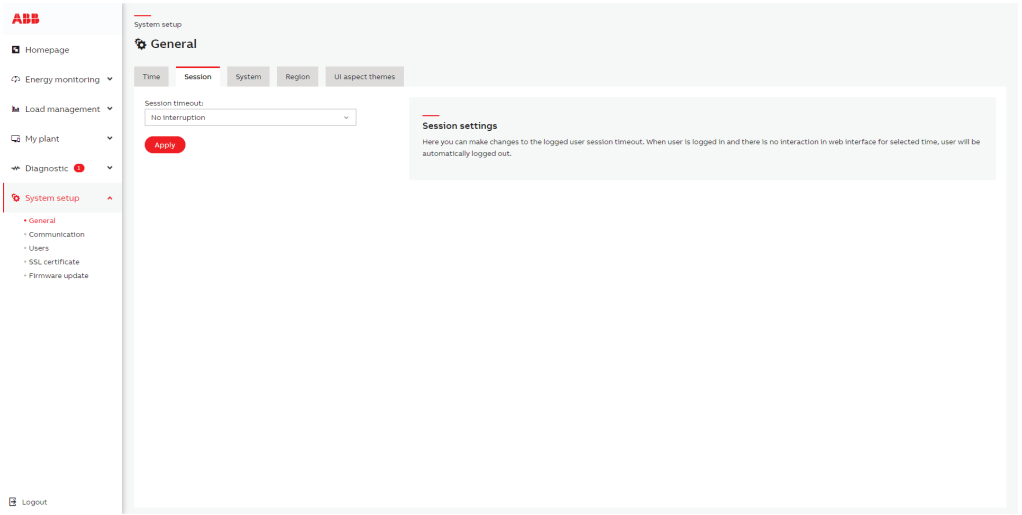
Check the internal time of the device to guarantee correct operation of the SCU200. If it is incorrect, it must be set manually. Please keep attention: incorrect date and time settings may cause device malfunction.

Attention: NTP server is used to keeping the time accurate, even if sudden power outages occurs. It wouldn’t affect time of the device. The time zones can be changed from the section of Region. In case a problem arises to fix the NTP server, please check the DNS values in the section system set up > communication > DNS, DNS mode: Static, DNS Server 1: 8.8.8.8, DNS Server 2: 8.8.4.4.



- **Session**

This page allows to change the logged user session timeout. Select the desired session timeout from the dropdown list and then click “Apply” to save the changes.



- **System**

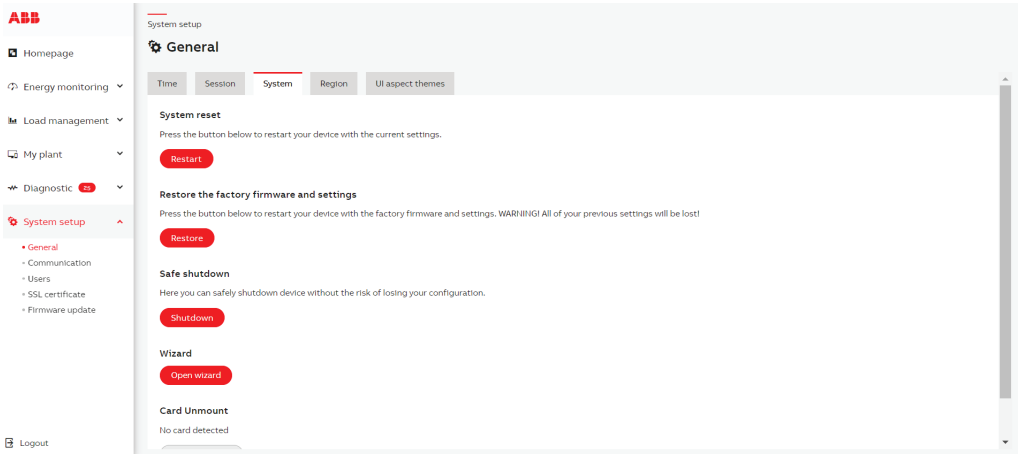
Through this system, you can restart the device with the current setting or restore to factory settings.

Safe shutdown: The SCU200 should be switched off using “Shutdown” button available on the WebUI page System setup/General/System. It guarantees that all the measurements data and configuration are saved properly on the internal memory. All the sudden power outages are counted and after reaching 32 unsafe shutdowns with time less than 4 hours in between them, device will be blocked. To unlock it, SCU200 must be turned on for at least 4 hours and then restarted.

Click on “Open wizard” to open configuration wizard again.

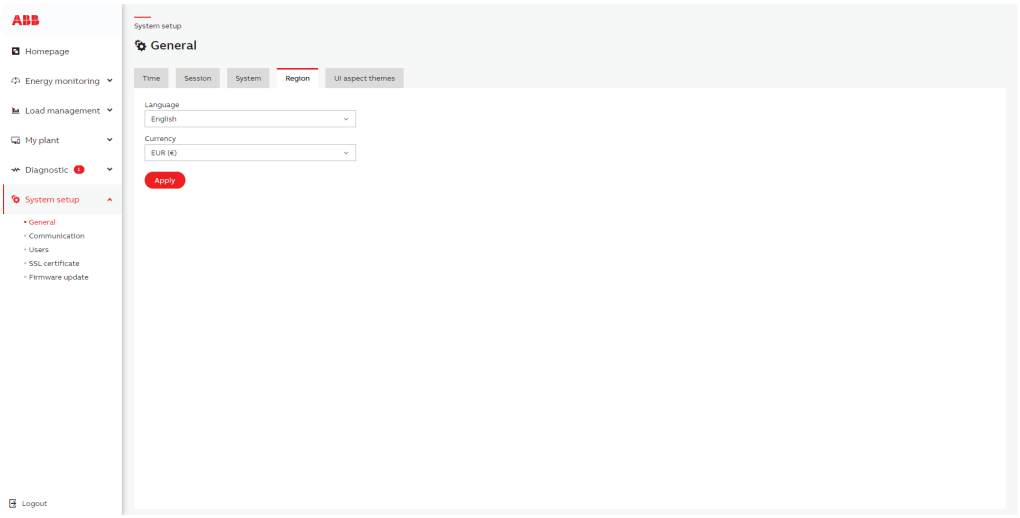
On this tab it is also possible to unmount the SD card. Removing an SD card without unmounting it can damage the card as well as any data stored on it. Unmounting an SD card ensures that all of its data is saved before you remove it from SCU200. The SD card can also be unmounted by pressing the Unmount button on the housing.

The card can be physically removed only when the SD card LED is off. The blinking LED indicates that the unmount process is in progress.



- **Region**

In this section it is possible to change the language and currency settings.



In the updated versions you can also find the tab for setting the timezone.The correct time zone setting is required for Contracts/Tariffs calculations. This setting will not affect the time displayed by the system on the webserver. All the events happening will be displayed according to the local times set on the web server. However if some automation s were set they will happen according to the time zones. For example if an automation was set 3PM -6PM using the chronological scheduler function (available from 1.2FW), they will happen at 3PM

- **Storage**

Storage configuration:

In this section it is possible to select where historical data will be stored.

Internal: Data by default is stored in internal device storage. This storage is limited to 3GB of historical data.

External: Data can be stored on external SD card, SD cards up to 128GB are supported.

If external storage will be selected, SD card will be formatted and encrypted and card will be used only for storing historical data. It will not be possible to export files to encrypted SD card.

The current historical data already stored on internal storage will still be available on Historical values page with an additional selection of storage option.

Encrypted SD card will only work on this SCU200 where it was encrypted. If you want to use this card on another SCU200 it must be formatted and encrypted again on another SCU200 and all data will be lost.

To use encrypted SD card again as storage for exported files, please select “Internal” storage, unmount SD card, remove it from the slot and format it on your PC or other device. Then put SD card in the slot again.

SD card which is formatted using fat/fat32/vfat/exfat file system and is not used as external storage, can be used as storage for files that can be imported or exported from SCU200.

It is possible to select correct file for Firmware updates from SD card, also files for exported settings/ historical values (file to import and signature file data) can be selected from SD card.

Export of settings/historical values/data exports can be exported to SD card with selecting option “Export to SD card”.

Warning: If external storage is selected and encrypted card was removed from the slot, the historical data will not be stored anywhere, and proper warning will be displayed after entering WebUI.

Internal/External storage:

Information about Internal storage capacity and external capacity (if SD card is inserted) is displayed.

Card Unmount:

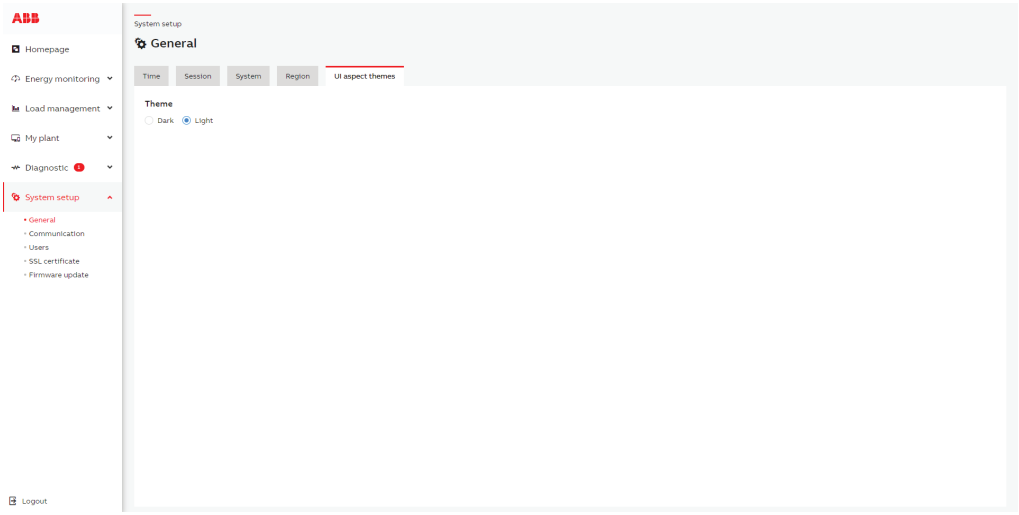
It is possible to safely unmount SD card in this section. Please always unmount SD card before removing it from working device.

Storage capacity calculator:

Calculations of how many days can be stored for internal or external storage can be done with downloaded spreadsheet “Storage capacity calculator”. The description of usage of this calculator is included in the file – tab “Usage”.

- **UI aspect themes**

In this section it is possible to change the appearance of the WebUI - you can set a light or dark theme



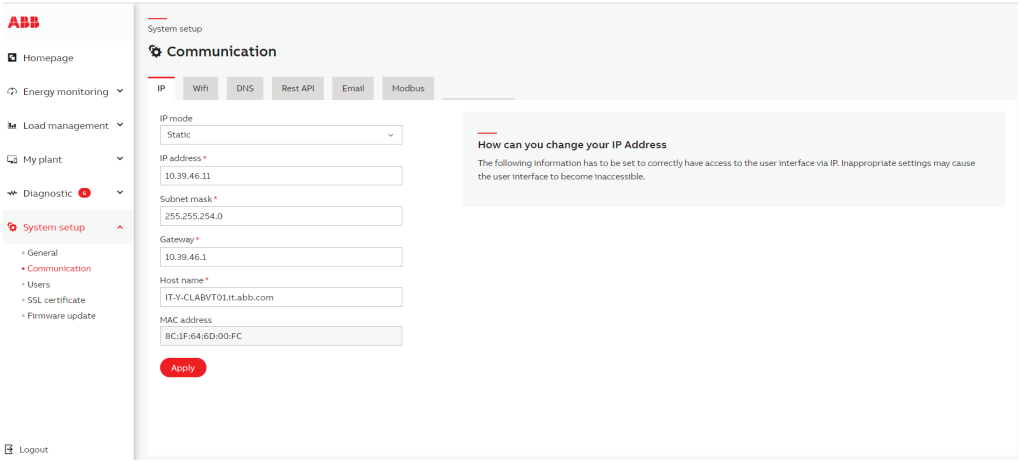
6.7.2.Communication

- **IP**

The following information have to be set to correctly have access to the user interface via IP:

IP Mode	DHCP or static (Note: With DHCP you can find and define an IP address via the router by MAC address or device/host name - scu200hs) The fallback IP address is: https://192.168.1.200:8000
IP Address	Current IP address of device or possibility to define a new IP address
Subnet Mask	Current Subnet Mask or possibility to define another Subnet Mask
Gateway	Current Gateway or possibility to define another Gateway Address
Host name	scu200hs or possibility to define another Host Name
MAC Address	Shows the MAC Address of the device
Apply	By clicking the Apply pushbutton changes are stored

Inappropriate settings may cause the user interface to become inaccessible. In order to be able to restore device access to the fallback IP, please use the reset button.



- **WIFI**

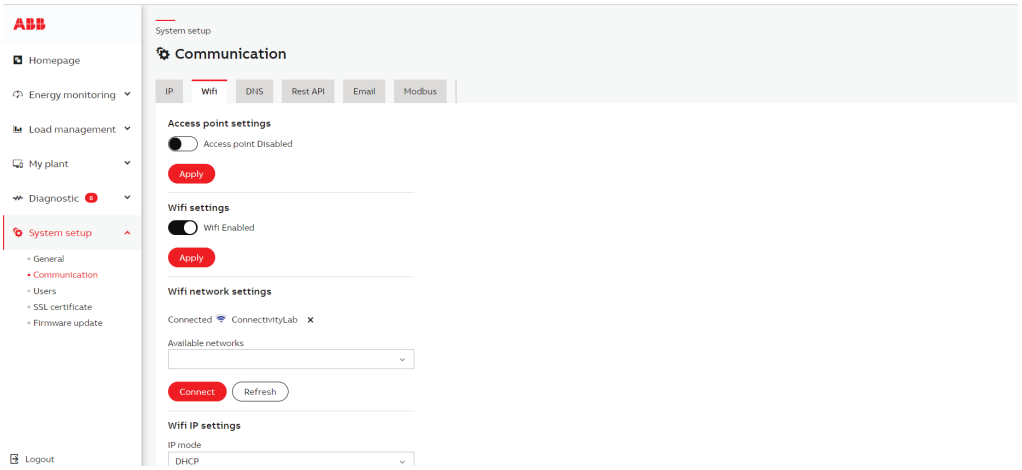
With SCU200-W versions it is possible to allocate SCU to your internal network over wi-Fi with out any wired connections. You can manage the access point and WI-fi settings through this tab. Here you can manage Access Point and WiFi Settings. It is possible to Enable/Disable Access point and WPS for access point.

If the access point mode is enabled, it implies the SCU200 is a wifi server which provides Wi-Fi, by connecting to which a user can log into the webserver of SCU200 using default IP address https://192.168.2.1:8000 and 255.255.255.0 netmask. The SSID, password and IP address of the access point can be changed. Devices connected to the SCU200 are receiving IP addresses from the DHCP server on the SCU200 which pool can be modified on this tab.

By enabling the Wi-Fi client mode, the device can be connected to other Wi-Fi networks available.

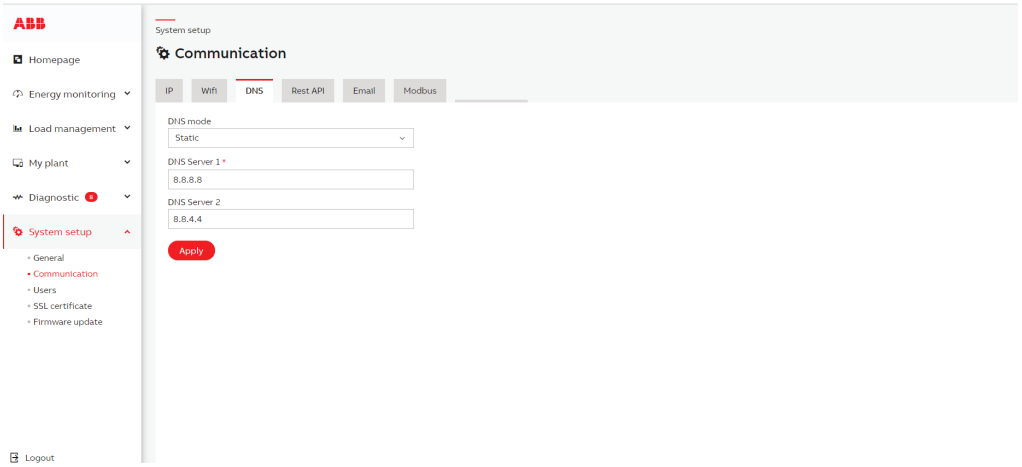
With Enabled WiFi it is possible to select WiFi network, then provide password if it is needed. Also, configuration of WiFi IP address is possible and change of antenna selection (internal/external).

There is a support for WPS button for both client and access point modes, but it can be disabled only for access point mode. When both modes are activated, the WPS button is used only in client mode. To use WPS button in access point mode, client mode (WiFi) has to be disabled.



- **DNS**

Here you can make changes to the DNS settings, field DNS Server1 is obligatory (default 8.8.8.8.), the second one is optional.



• **REST API**

Rest API allows user to get online/historical values directly from Control Unit without accessing to the WebUI. It can be disabled/enabled by administrator in this section: to access data through Rest API an authorization token must be provided in Authorization header in every request. The token has to be generated on this page or administrator credentials can be used.

The highest number that can be get properly via Rest API is 2^{53}-1 (9007199254740991)

Warning: The REST API is enabled by default, if you are not using it, it can be disabled.

AUTHORIZATION HEADER MUST BE SENT FOR EACH REST API REQUEST.

Authorization: <restApiToken>

or

Authorization: Basic YWRtaW46YWRtaW4=

(YWRtaW46YWRtaW4= it encoded token from admin credentials - base64 username:password)

AVAILABLE REST API ENDPOINTS:

GET

/api/v1/system-information

Endpoint returns system information which can be used for diagnosis purpose

Response:

```
{
  “softwareVersion”: “1.0.0”,
  “ip”: “192.168.1.200”,
  “hostname”: “scu200hs”,
  “deviceTime”: 1669793245
}
```

GET

/api/v1/alarms

Endpoint returns number of active alarms (not acknowledged) with list of those alarms

Response:

{
“ip”: “192.168.1.200”,
“id”: “scu200hs”,
“activeAlarms”: 2,
“alarms”: [
{
“acknowledged”: false,
“name”: “Alarm name”,
“object_id”: 1,
“type”: “Cross-up”,
“timestamp”: 1699437516,
“device_name”: “Current sensor 1”,
“variable”: “currentTrms”,
“value”: 0.11
}, {
“acknowledged”: false,
“name”: “Communication failure”,
“object_id”: 1,
“type”: “Communication failure”,
“timestamp”: 1699432580,
“device_name”: “ Current sensor 1”
}]
}

GET

/api/v1/metadata

or

/api/v1/metadata?object_id=X

For getting metadata for single device

Endpoint returns system devices metadata which contains all configured devices with available registers.

POST

/api/v1/data

The endpoint allows you to get online and historical data from SCU200.

Variables must be provided in a JSON body of a POST request. Variables can be read from device descriptors or metadata endpoint. Object ids can be read from metadata endpoint.

{
//”data”: array of objects, it is possible to query at once for multiple data
“data”: [
{

```
    //"type": online or historical
    "type": "online",
    "values": {
     // object_id: [variables]
     "415": ["currentTrms", "currentAc", "currentDc"],
     "389": ["voltageL1"]
    },
    //"begin_timestamp": only for historical
    "begin_timestamp": 1663231649,
    //"end_timestamp": only for historical
    "end_timestamp": 1663318059,
    //"resolution": only for historical, possible values '30s', '15min', '1h', '1d', '1m', maximum date range is 1000 samples per period (or 12 for 1m)
    "resolution": "1h"
   }
 ]
}
```


Online values e.g.


```
{
 "data": [
  {
   "type": "online",
   "values": {
    "415": ["currentTrms", "currentAc", "currentDc"],
    "389": ["voltageL1"]
   }
  }
 ]
}
```


Response:


```
{
 "id": "scu200hs",
 "ip": "192.168.1.200",
 "data": [
   {
     "timestamp": 1669794027,
     "values": {
       "389": {
         "voltageL1": 243.9
       },
       "415": {
         "currentTrms": 0.11,
         "currentAc": 0.07,
         "currentDc": 0.08
       }
```

```
        }
      }
   ]
}
```


Historical values e.g.


```
{
  “data”: [
     {
       “values”: {
       “415”: [“currentTrms”, “currentAc”, “currentDc”],
       “389”: [“voltageL1”]
       },
       “type”: “historical”,
       “begin_timestamp”: 1669770000,
       “end_timestamp”: 1669794623,
       “resolution”: “1h”
     }
   ]
}
```


Response:


```
{
  “id”: “scu200hs”,
  “ip”: “192.168.1.200”,
  “data”: [
     {
        “timestamp”: 1669791600,
        “values”: {
           “389”: {
              “voltageL1”: “-”
           },
           “415”: {
              “currentTrms”: “-”,
              “currentAc”: “-”,
              “currentDc”: “-”
           }
        }
     },
     {
        “timestamp”: 1669788000,
        “values”: {
           “389”: {
              “voltageL1”: 245.02139282226562
           },
           “415”: {
              “currentTrms”: 0.11546389013528824,
```

```
        “currentAc”: 0.07456666976213455,
        “currentDc”: 0.08336666971445084
      }
    }
  },
  {
    “timestamp”: 1669784400,
    “values”: {
      “389”: {
        “voltageL1”: 246.45889282226562
      },
      “415”: {
        “currentTrms”: 0.11598055809736252,
        “currentAc”: 0.07455277442932129,
        “currentDc”: 0.08405833691358566
      }
    }
  },
  {
    “timestamp”: 1669780800,
    “values”: {
      “389”: {
        “voltageL1”: 247.96444702148438
      },
      “415”: {
        “currentTrms”: 0.11795832961797714,
        “currentAc”: 0.07485000044107437,
        “currentDc”: 0.08624166995286942
      }
    }
  },
  {
    “timestamp”: 1669777200,
    “values”: {
      “389”: {
        “voltageL1”: 248.6405487060547
      },
      “415”: {
        “currentTrms”: 0.11619167029857635,
        “currentAc”: 0.0750138908624649,
        “currentDc”: 0.08397778123617172
      }
    }
  },
  {
    “timestamp”: 1669773600,
```

```
      "values": {
        "389": {
          "voltageL1": 249.10472106933594
        },
        "415": {
          "currentTrms": 0.11900000274181366,
          "currentAc": 0.07471388578414917,
          "currentDc": 0.0877000018954277
        }
      }
    },
    {
      "timestamp": 1669770000,
      "values": {
        "389": {
          "voltageL1": 249.11721801757812
        },
        "415": {
          "currentTrms": 0.11949722468852997,
          "currentAc": 0.07449444383382797,
          "currentDc": 0.08879444748163223
        }
      }
    }
 ]
}
```


POST

/api/v1/write

The endpoint allows you to write values directly to device registers (variables) which are configured as writable registers.

Variables must be provided in a JSON body of a POST request. Variables can be read from device descriptors or metadata endpoint. Object ids can be read from metadata endpoint.

It is possible to write only numeric registers with maximum register size 1 or 2.

The status in response indicates response from device. 1 – Success, -1 Fail.

e.g.


```
{
 "data": [
  {
   "object_id": 389,

   "variable": "output1",

   "value": 1
  },
  {
```

```
    “object_id”: 567,

    “variable”: “CT ratio L1L2L3”,

    “value”: 7
  }
 ]
}
```

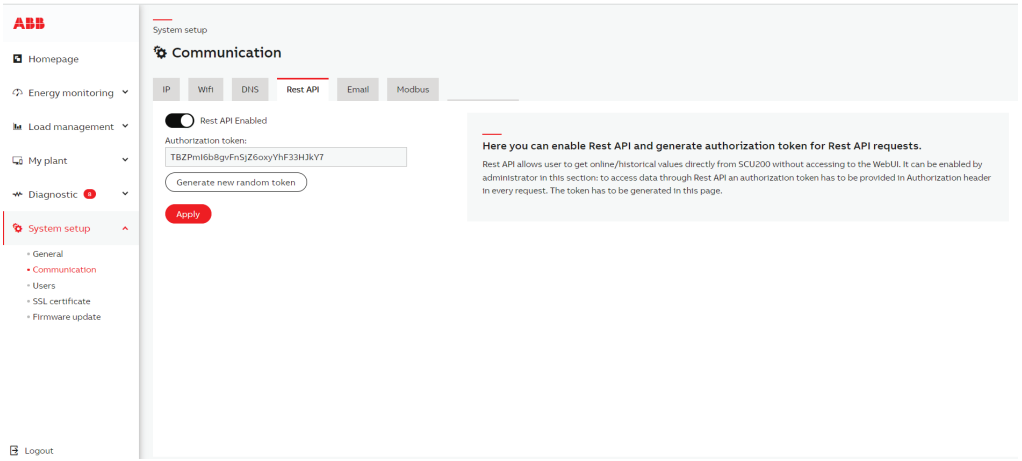

Response:


```
{
 “id”: “scu200hs”,
 “ip”: “192.168.1.200”,
 “data”: [
    {
      “variable”: “ output1”,
      “value”: 1,
      “object_id”: 389,
      “status”: -1
    }, {
      “variable”: “CT ratio L1L2L3”,
      “value”: 7,
      “object_id”: 567,
      “status”: 1
    }]
}
```


GET

/api/v1/certificate

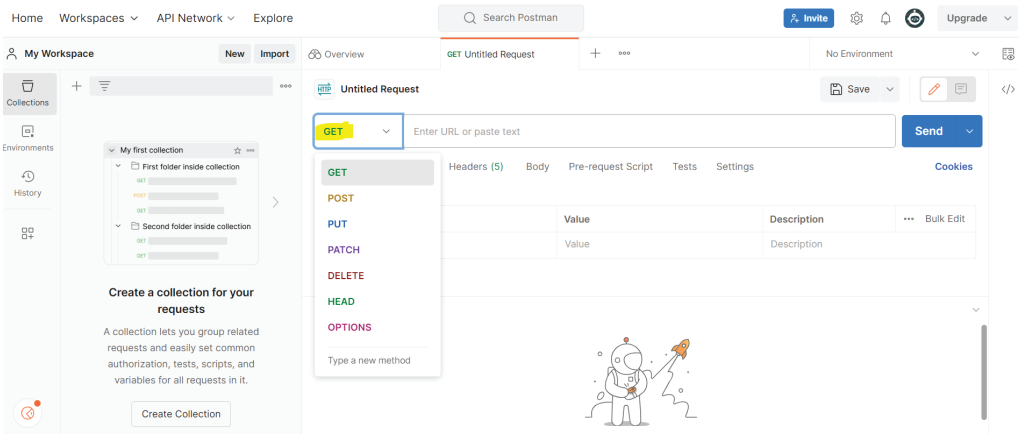
Get current ssl certificate in response body.



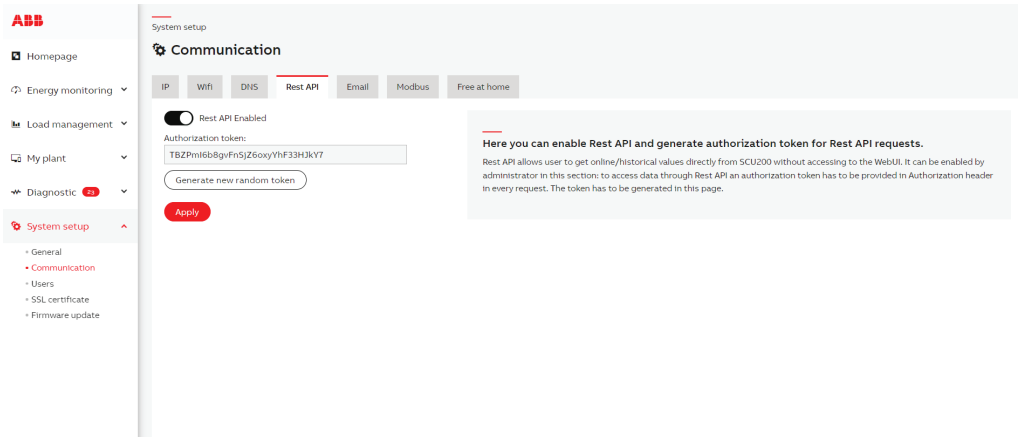
- **Retrieving the device data using REST API**

SCU inherently has no static registers to store the information from the integrated devices downstream, SCU thus acts a router directing the requests to the devices. Hence the inte-grator should have the maps of all attached devices. The Id, register addresses of all con-nected devices to SCU for integrating them can be retrieved using REST API. This chapter explains in detail step by step procedure to download the register address, details (all the meta-data) using rest api.

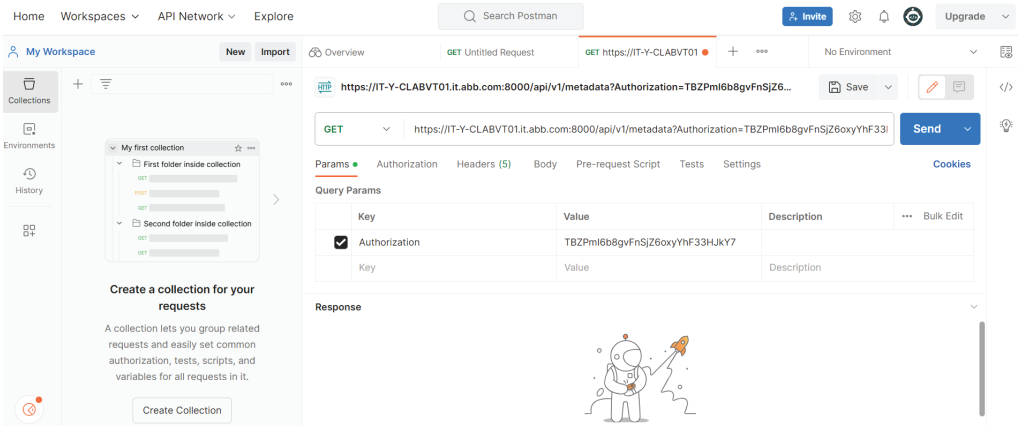
1. A free application like postman (downloaded not via webserver) https://www.postman.com/ for example: or similar is required to initiate the data query using rest API.
2. Inside the application workspaces: under the Headers section user can initiate using the GET request.



3. In the URL: the user must mention https://(IP ADDRESS OF THE DEVICE):8000/api/v1/metadata.
4. As a next step, inside the headers section: user is supposed to fill the details of the key and value as follows:
   - Key: Authorization
   - Value: Token generated from the webserver.
   - To generate the token inside SCU webserver, navigate to system set up>communication>rest api, copy the token and paste it in the value section of the post-man/any other application. To get the token inside SCU web server, navigate to System setup>Communication>Rest API, copy the token and paste it in the value section of the post-man/any other application. If you generate a new token ID it must be saved by pressing button “Apply” and then only new token can be used for querying the data.



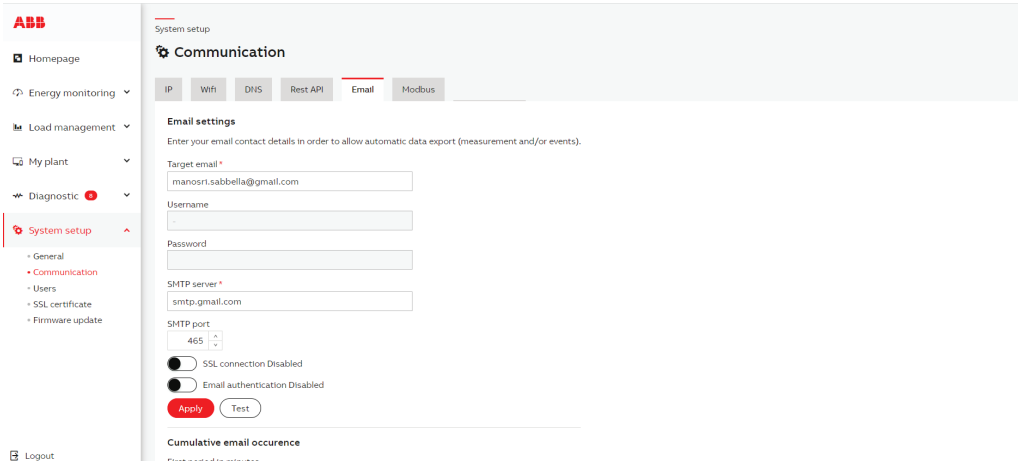
5. By using these details, you can query SCU200 Rest API endpoint. The response from each endpoint is in JSON format, it is possible to copy or save the response for further processing. Reading devices from metadata endpoint is needed to know exact object_id for each device, which can be used further to query online/historical values or write to specific device register.



Email

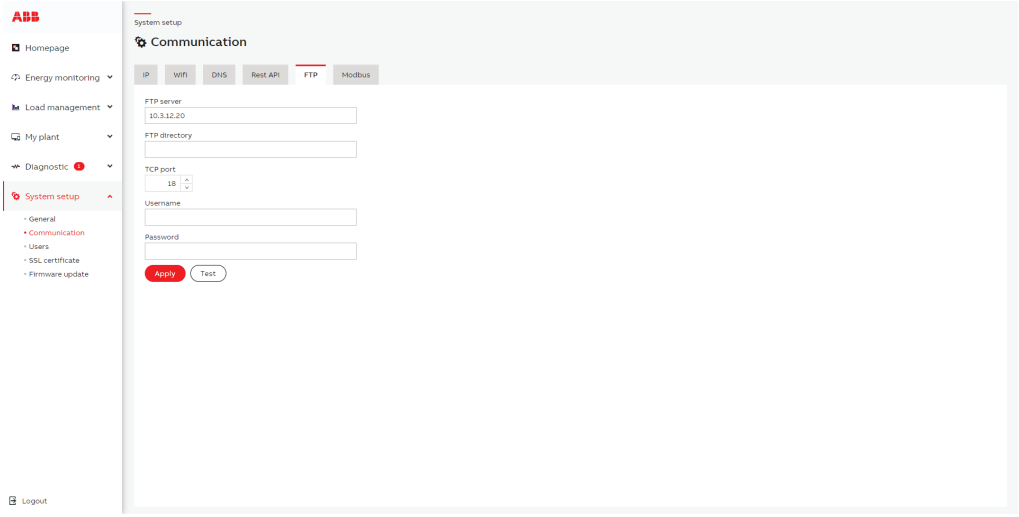
Email settings are needed in order to carry out email data export

Make sure communication on SMTP port 587 or 465 (SSL) is allowed in your network.



- **FTP**
  (available from 1.2FW)

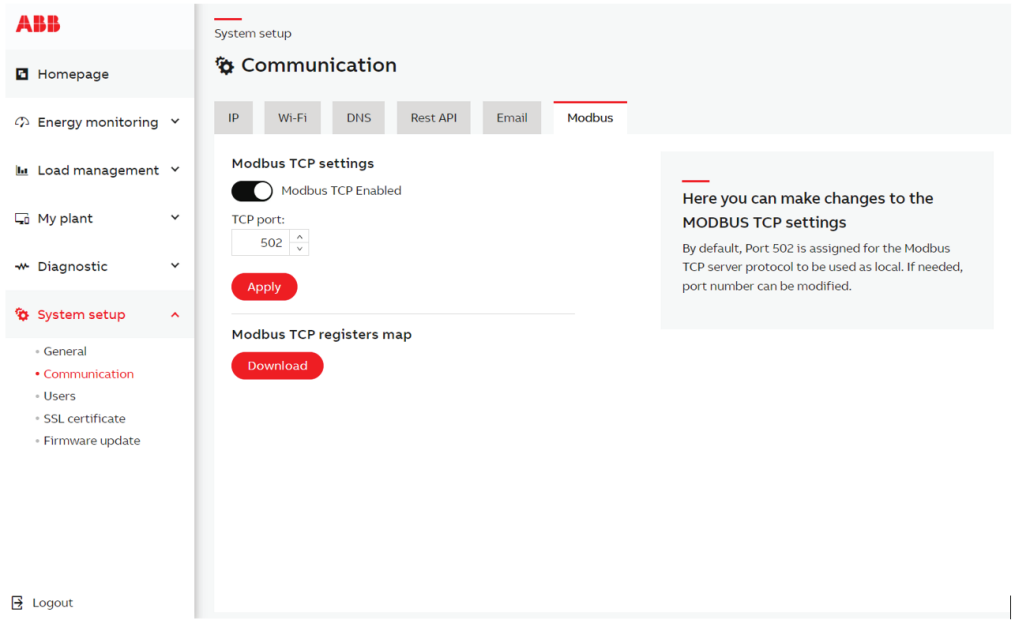
You can fill the fields with server details (credentials) in order to allow automatic data export. FTP settings are needed in order to carry out FTP data export. Please make sure that no firewall will block the export.



• **MODBUS**

SCU200 unit acts as a Modbus router instead of typical Modbus server. It means there's no static register map or Modbus ID assigned to SCU200 and requests are being relayed directly to the end device connected to control unit. Modbus IDs and registers addresses that are available to end user are corresponding these available on devices connected to the SCU.

In order to correctly connect to Modbus server, it should be enabled in webserver System setup → Communication → Modbus by enabling "Modbus TCP Enabled" switch. Server is available under SCU200 IP address and port as set in "TCP port".



Dynamic registers map for current configuration could be downloaded under System setup → Communication → Modbus → Modbus TCP registers map. The list is .xlsx Excel file containing all supported datapoints including Modbus ID assigned to specific end device, variable name, register/coil address and size, data type, information if datapoint is writable, function used to read/write specific datapoint, refresh interval and section of invalid values.

Example 1.

Request parameters for reading currentTrms on current sensor (modbus ID 6) should contain:

- Modbus ID: 6
- Function: 3
- Address: 9
- Size: 1

Request: 06 03 00 09 00 01 55 BF

Retrieved data precision is two decimal points (0.01), so value 230,17V is represented as 23017.

Example 2.

Request parameters for reading port 1 coil on IO module (modbus ID 2) should contain:

- Modbus ID: 1
- Function: 1
- Address: 0
- Size: 1

Request: 01 01 00 00 00 01 FD CA

Example 3.

Request parameters for writing value 1 into port 4 coil on IO module (modbus ID 4) should contain:

- Modbus ID: 4
- Function: 5
- Address: 3
- Value: 1

Request: 04 05 00 03 FF 00 7C 6F

By analogy all read/write requests for coils and registers apply to every device currently connected to the SCU.

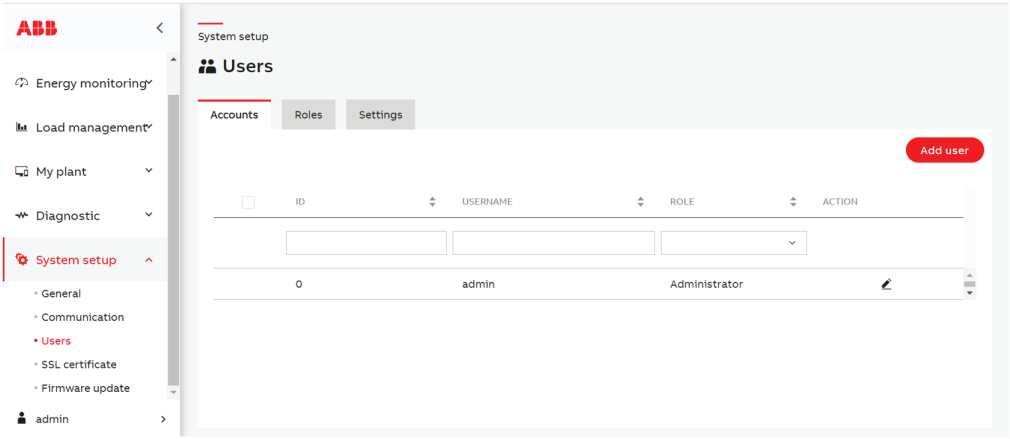
Keep in mind that correctly supported datapoints are the ones mentioned in dynamic registers map downloadable from webserver. If datapoint in device descriptor could not be read for any reason if cannot be guaranteed that it will be available in SCU200 Modbus.

Virtual registers

Datapoints which values are dynamically calculated instead of read directly on device (called virtual registers) could also be supported by SCU200 Modbus. It applies for example to current sensors' active power or active energy. SCU200 calculates these values on the fly assigns virtual address which is included in dynamic registers map and can be read as plain datapoint.

6.7.3.Users

This page allows the "Administrator" to manage his account. By clicking on the pencil-icon, it is possible to edit the "Administrator" user, changing password and/or username. While editing the sole administrator profile, it is required to insert the administrator current password.



• **Users & Roles:**

This page allows the creation of new accounts with assigned roles (Administrator, Operator, Guest). Each role has specific permissions that grant access to selected WebUI resources. By clicking on the "Add new" button, the user has the option to create a new user account and grant permissions by selecting one of the three roles.

There is always one main administrator (id=0 - there is no option to remove this account, who can create, modify, or delete other administrators, other administrators (id =/= 0) can create users and operators, can also modify their own credentials, but can't create or modify other administrators.

Operator can create and modify accounts with the Guest role and modify their own credentials.

To create a new account, the user needs to click on the "Add new" button. After that, a new drawer should appear. When adding or editing user please set the following:

Username – login of the new account

Role – role of creating/editing user.

Password – password used to log in.

Confirm password – password confirmation.

When editing the administrator with id = 0 account, it is required to enter the current administrator's password

If the user has the appropriate permissions, they are able to delete accounts. To do this, they need to check the box on the left, next to the username. The "Remove" button will then appear, and after confirming the operation, the account or accounts will be deleted.

You also cannot delete an account that is currently logged in.

Apart from the global administrator (id=0), you can create an infinite number of user accounts and give them appropriate permissions. Thanks to these permissions, we limit access and visibility of individual elements of the website. The table below shows access depending on the assigned role.

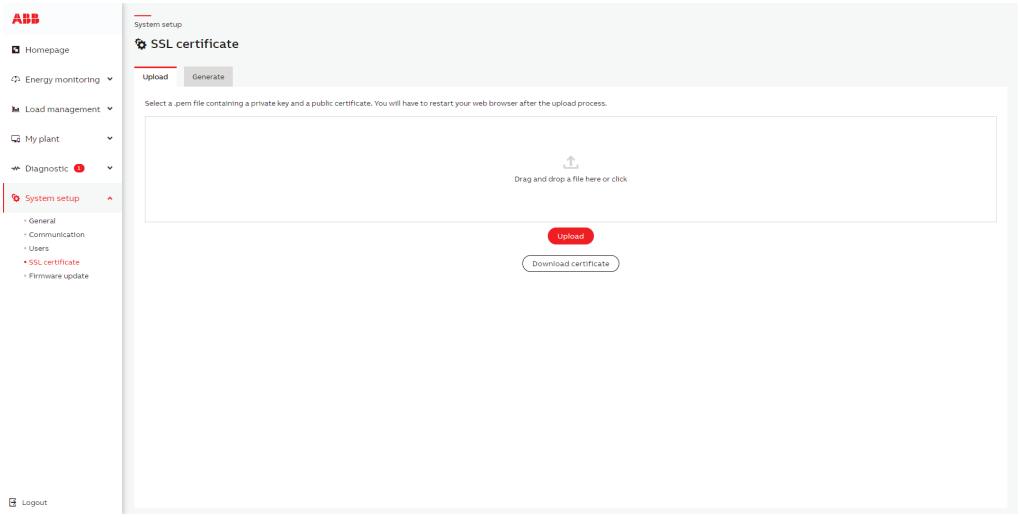
Menu item	Submenu	Administrator	Operator	Guest
		View	View	View
Homepage		✓	✓	✓
Energy monitoring				
	Assets overview	✓	✓	✓
	Contracts	✓	✓	X
	Historical Values	✓	✓	✓
	Import/Export	✓	Partially (Data/ Export)	X
Load management				
	Control	✓	X	X
	Automations	✓	X	X
My plant				
	Devices	✓	✓	X
	Groups	✓	✓	X
Diagnostic				
	Events log	✓	✓	X
	Alarms	✓	Partially (without editing Inbox)	X
	Configuration	✓	✓	X
System setup				
	General	✓	Partially (Ui aspect themes)	Partially (Ui aspect themes)
	Communication	✓	X	X
	Users	✓	✓	X
	Ssl certificate	✓	X	X
	Firmware update	✓	✓	X

6.7.4.SSL certificate

In this section it is possible to upload or generate a .pem file containing a private key and a public certificate in order to provide a secure connection via the web browser.

- **Upload**

Upload It is possible to browse, upload or download the currently in place certificate. For this purpose, please drag and drop the .pem file to the browser or click to browse, then push the upload button and wait for the uploading to finish. After a successful uploading process, the web server reboots. It is also possible to download a currently used certificate by clicking download certificate.



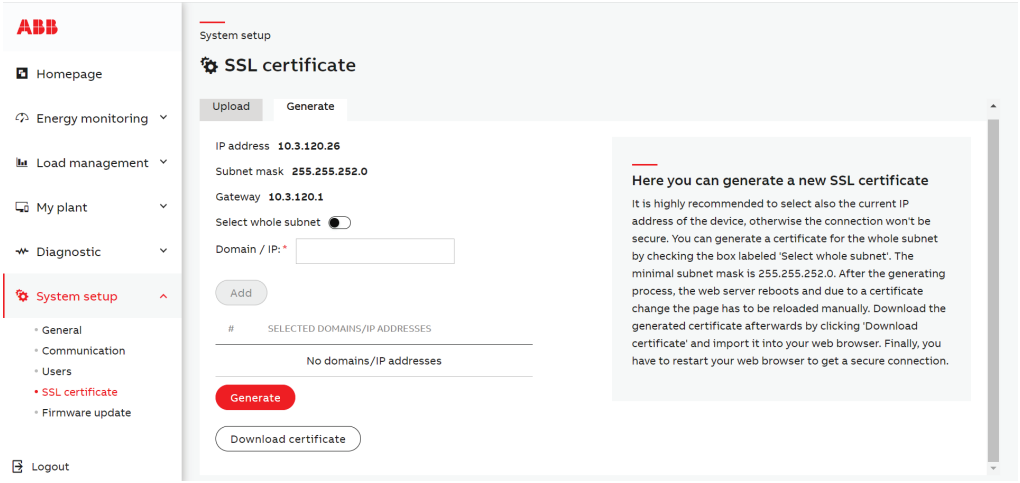
- **Generate**

IP address	Indicates your currently configured IP address on the device
Subnet mask	Indicates your currently configured subnet mask on the device
Gateway	Indicates your currently configured gateway on the device
Select whole subnet	If checked, you can generate a certificate for the whole subnet. The minimal subnet mask is 255.255.252.0
Domain / IP	You can manually type in IP addresses and insert them to the table with the Add button

After configuration of domains/IP addresses table, please click the Generate button. When the generating process finishes, the web server reboots and due to a certificate change the page has to be reloaded manually. Follow the passages reported below to import the downloaded certificate into your web browser.

Certificate Import Wizard

It is necessary at first to open the Certificate Import Wizard according to the browser you are using and then to install the certificate



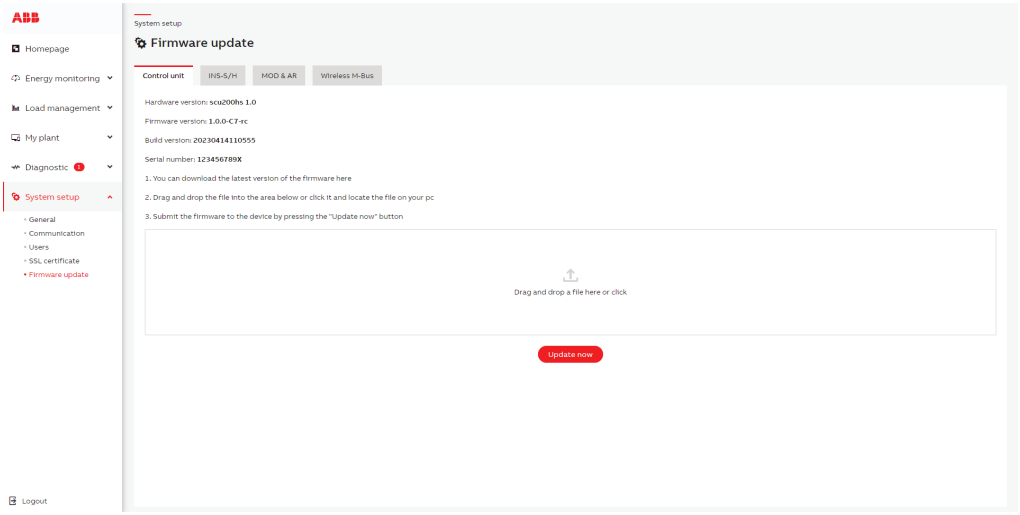
6.7.5.Firmware update

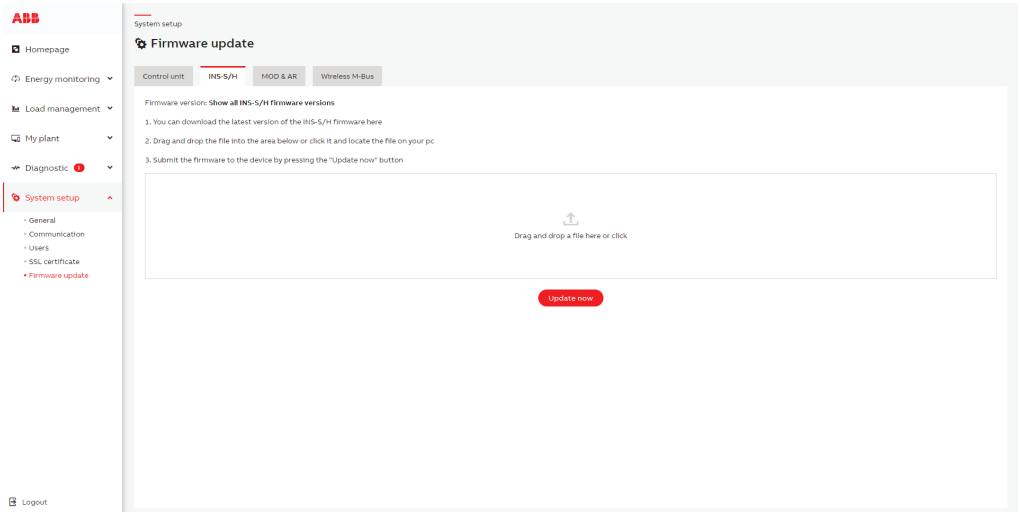
Here you can update the firmware of the Control unit and devices like INS-S/H and Wireless M-Bus modules.

It is highly recommended to update the firmware to the latest version for security and functionality reasons. Please check the ABB website for current SW revision and download the latest version of the firmware. After browsing the downloaded file, please use the “Update file” button to submit the new firmware to the device.

If SD card is inserted and it is not used for external storage, it is possible to select Firmware file from SD card. Only files with correct extension are displayed.

Here you can also find the information about the current version of the software installed for all types of devices.





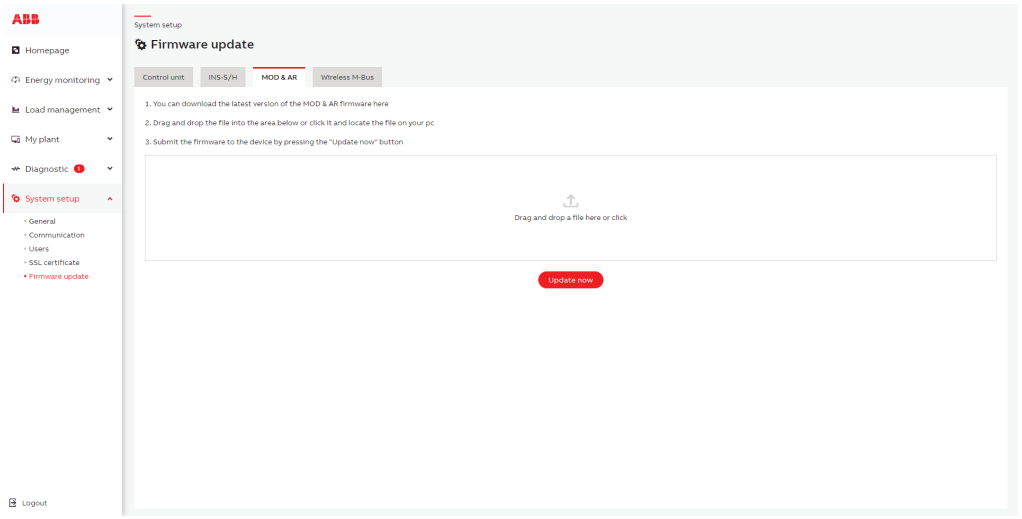


ABB
Homepage
Energy monitoring
Load management
My plant
Diagnostic
System setup
General
Communication
Users
SSL certificate
Firmware update
Logout
System setup
Firmware update
Control unit
INS-S/H
MOD & AR
Wireless M-Bus
1. You can download the latest version of the MOD & AR firmware here
2. Drag and drop the file into the area below or click it and locate the file on your pc
3. Submit the firmware to the device by pressing the "Update now" button
Drag and drop a file here or click
Update now

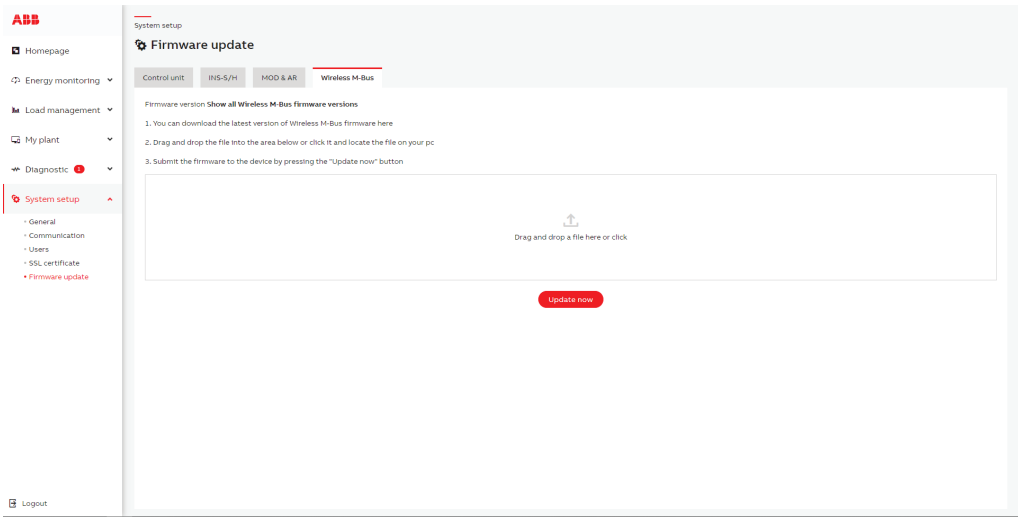


ABB
Homepage
Energy monitoring
Load management
My plant
Diagnostic
System setup
General
Communication
Users
SSL certificate
Firmware update
Logout
System setup
Firmware update
Control unit
INS-S/H
MOD & AR
Wireless M-Bus
Firmware version Show all Wireless M-Bus firmware versions
1. You can download the latest version of Wireless M-Bus firmware here
2. Drag and drop the file into the area below or click it and locate the file on your pc
3. Submit the firmware to the device by pressing the "Update now" button
Drag and drop a file here or click
Update now

7.SCU200 communication interfaces

7.1.Modbus TCP/RTU readings

• Introducing MODBUS protocol

The Modbus serial line protocol is a Master-Slaves protocol. This means that only one master and one or more slave nodes (max. 247) can be connected to the same serial bus. A Modbus communication is always initiated by the master and there is only one transaction at the same time. For further information: www.modbus.org If you intend to use Modbus, you should only use ASCII characters in the Web UI. Unicode characters will not be displayed in Modbus.

Address	PDU Frame		Error Check
Address Field	Function Code	Data	CRC
1 byte	1 byte	0 - 252 bytes	2 bytes CRCL, CRCH

ADU	Application Data
PDU	Protocol Data Unit
Stopbit	1
Address Field	contains the slave address
Function Code:	indicates what kind of action to perform
Data	contains request and response parameters
CRC	contains the value generated by the cyclic redundancy check (standard CRC-16 defined by CCITT)

The maximum size for a Modbus RTU frame is 256 bytes.

In RTU mode, message frames are separated by a silent interval of at least 3.5-character times. The entire message frame must be transmitted as a continuous string of characters. If a silent interval of more than 1.5-character times occurs between two characters, the message frame is declared as incomplete and should be discarded by the receiver.

Modbus Data Encoding Modbus uses a big-endian allocation for addresses and data items. This means that, when a numerical quantity larger than a single byte is transmitted, the most significant byte is sent first. Example: 1234h → first 12h then 34h.

• Physical Interface RS-485

To communicate with the SCU200 from an upper system, all devices (masters & slaves) must have the same data rate and data format. These settings are defined over the Web UI, as described in the dedicated chapter.

Parameter	Values	Default Values
Data rate	2400, 4800, 9600, 19200, 38400, 57600, 115200 Bit/s	19200 Bit/s
Data format	even parity, odd parity, without parity	even parity

• Control unit's MODBUS-ID

You can connect up to 247 control units to one Modbus RTU line. Each control unit must have a unique Modbus ID (address).

• Function Code

- Read operation on registers with access code "R" or "RW" is defined by function 03h "Read Holding Registers".
- Write operation on registers with access code "W" or "RW" is defined by function 06h "Write Single Register".

Do not apply functions other than those specified.

• Error Codes

Modbus protocol defines a common way of error reporting. Every request (read or write) sent in unicast mode is expected to return a value in packet of the same structure. In case of a message delivery error (not a CRC problem but a message execution problem), the generated response contains a function code with MSB (80h) set and a single byte representing the error code, called “exception code”.

The following default exception codes are available:

Code	Name	Description
01h	Illegal function	Function is not supported
02h	Illegal data address	Register address is out of control unit’s range, or trying to write into a read only register
03h	Illegal data value	Value is out of range
04h	Slave device failure	Unrecoverable error occurred while the control unit was attempting to perform the requested action, for example, time-out
06h	Slave device busy	Control unit is currently in User Interface Configuration Mode. Unable to execute the requested action

• Data and Control Registers

A register is always a two-byte (16-bit) value, which can be interpreted as either signed or unsigned values or which has a special format.

In case of data represented in more than one register the concatenated registers will contain information with MSB in the lowest address and LSB in the highest address within concatenated addresses.

Do not use registers other than those specified.

Format of one-word register for current values

unsigned = 16-bit unsigned integer notation, resolution 0.01 A

signed = 6-bit signed integer notation, resolution 0.01 A

0000h…7FEFh = 0.00 … 327.51 A

8000h…FFFFh = -327.66 … -0.01 A

7.1.1.CMS current sensor readings

SCU 200 allows to connect to 32 current sensors on the flat cable. They can be assigned to Modbus ID from 1 to 32 and can be read/control using web UI and Modbus TCP/RTU protocols.

For direct reading using Modbus protocol, the sensors datapoints are provided as follows, additionally this table also provides an overview of the variables available different mediums.

Please note for variables exposable over Modbus TCP, Rest API, Historical Rest API, web UI, they are indicated with 1, and 0 if they are not exposed over these mediums.

Data	Size	Access	DEC address	Code Function	Modbus TCP	Rest API Variable	Rest API	IO module storage	Web UI
SW Version	48-bit	R	0	03	1		1	0	0
			1		1		1	0	0
			2		1		1	0	0
HW Version	32-bit	R	3 4	03	1		1	0	0
Serial-Number	64-bit	R	5 6 7 8	03	1		1	0	0
RMS Value	16-bit	R	9	03	1	"currentTrms"	1	1	1
AC Value	16-bit	R	10	03	1	"currentAc"	1	1	1
DC Value	16-bit	R	11	03	1	"currentDc"	1	1	1
CMM Status	16-bit	R	22	03	1		0	0	0
						"activePowerTotal"	1	1	1
						"activeEnergyTotal"	1	1	1

SW Version register The Software Version registers is set up during manufacturing and is not expected to be changed at regular operation. Software version is a 6-byte value where the several bits have the following format: SSSSSSSS – 32-bit value representing the num-ber of embedded software MM – 8 bit value representing the major revision NN – 8 bit value representing the minor revision. The software number is 0x10010500. The software revision is 0x0001 (for example), 0x00 is the major and 0x01 is the minor rev.

HW Version register The Hardware Version registers is set up during manufacturing and is not expected to be changed at regular operation. Hardware version is a 4-byte value where the several bits have the following format: HHHH – 16 bit value representing the number of hardware board (PCBA) MM – 8 bit value representing the PCBA version NN – 8 bit value rep-resenting the PCBA revision. The PCBA version is 0x2070. The PCBA revision is 0x0101.

Serial Number register Serial number register provides global unique ID the sensor. The situation that two devices have the same serial ID is forbidden.

Serial number is a 8 byte value where the several bits have the following format:

TRRR YYYY MMDD SSSS

T – 4 bit value representing device type.

0x0 for regular devices
0x8 for debugging devices

RRR – 12 bit value reserved for further use. 0x001 by default

YYYY – 16 bit value representing manufacturing year

MM – 8 bit value representing manufacturing month

DD – 8 bit value representing manufacturing day

SSSS – 16 bit value representing device number manufactured during the day

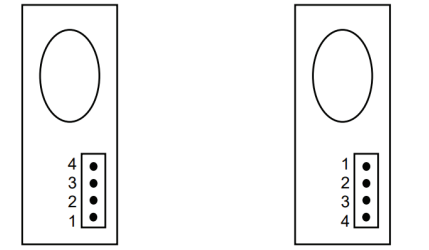
Example: 0001 2012 0109 0001 means regular device, type 1, produced 2012-01-09, first device on this day.

• **Current Sensor Status registers**

CMM status register shows status of CMM module. The individual bits of the status register indicate errors, warnings, or other condition.

Bit	Behaviour	Comment
0	check ASIC_VOUT > 4V75	ASIC device failure
1	check ASIC_VOUT < 0V25	ASIC device failure
2	check ASIC_VREF > 3V00	ASIC device failure
3	check ASIC_VREF < 2V00	ASIC device failure
4	Bus polarity mode (0: freeze, 1: auto detection)	
5	Bus polarity status (0: inverted; 1: direct)	0: UART normal polarity 1: UART inverted polarity
6	Push Button pressed	Reset by power cycle or command
7	MCU failure	A/D read error

As the behavior of the device allows error states which may prevent device to operate in proper way, the status register may be acknowledged by writing Status Register acknowledge value. To prevent unexpected, acknowledge, the 0xA5A5 value must be written.



Certain special values can be reverted in these variables for some specific situations, their meaning can be checked from the following table:

• **Values with special meanings**

Special values (hex)	Special values (dec)	Meaning
7FF0	32'752	Data pending, acquisition in progress
7FF1 … 7FFB	32'753 … 32'763	Reserved
7FFC	32'764	The sensor is known but not accessible at the moment
7FFD	32'765	Data type TrueRMS / AC / DC is disabled
7FFE	32'766	Overload (beyond full range)
7FFF	32'767	Forbidden (no sensor with ID xx)

Format of double-word register for branch power and energy values

unsigned = 32-bit unsigned integer notation,

signed = 32-bit signed integer notation

7.1.2.Energy meter module readings

INS-E3, alternatively called Metering Module or Connectivity Meter is a device belonging to both families of Electricity Meters and Connectivity expansion modules. It can measure electrical parameters of the low voltage AC grid and read it via Modbus communication. To one SCU, a maximum of 16 metering modules can be connected.

• Meter configuration

Meter shall be configured according to its connection to the measured AC grid via proper Modbus registers as described in modbus maps. Parameters to be set include current transformer ratio (primary and secondary side) and wires configuration as listed below:

- 1 – 3 Phases, 4 Wires, 3 Current Measurements
- 2 – 3 Phases, 3 Wires, 3 Current Measurements
- 3 – 3 Phases, 3 Wires, 2 Current Measurements
- 5 – 1 Phase, 2 Wires, 1 Current Measurement

Each change in the configuration parameters update accessibility of Modbus registers and Energy Accumulators accordingly.

• Meter readings

External Modbus port operates on RS485 physical layer with galvanic insulation. Default configuration of the produced Meter is:

Baudrate 115200 baud/s, Parity Even, One stop bit, One start bit.

The following data is available for the external Modbus:

Category	Quantity	External Modbus data type	Start Address	Size	R/W	Unit	Multi-plier
Device information	FW_VERSION	String	0	3	R		
Device information	HW_VERSION	String	3	2	R		
Device information	SERIAL_ID	Hex	5	4	R		
Device information	DEVICE_STATUS	Enum	18	1	R		
Device configuration	ENERGY_E XCHANGE_MAP	Bitmap	32	8	R		
Installation settings	WIRES_CONFI-GURATION	Enum	48	1	R/W		
Installation settings	CT_PRIMARY	Unsigned	50	2	R/W		
Installation settings	CT_SECONDARY	Unsigned	52	2	R/W		
Instantaneous Values	PHASE_ VOLTAGE	Unsigned	512	2	R	UNIT_V	0,1
Instantaneous Values	PHASE_TO_ PHASE_ VOLTAGE	Unsigned	518	2	R	UNIT_V	0,1
Instantaneous Values	PHASE_ CURRENT	Unsigned	524	2	R	UNIT_A	0,01
Instantaneous Values	NEUTRAL_ CURRENT	Unsigned	530	2	R	UNIT_A	0,01
Instantaneous Values	ACTIVE_POWER	Signed	532	2	R	UNIT_W	0,01
Instantaneous Values	REACTIVE_ POWER	Signed	540	2	R	UNIT_VAR	0,01
Instantaneous Values	APPARENT_ POWER	Unsigned	548	2	R	UNIT_VA	0,01
Instantaneous Values	FREQUENCY	Unsigned	556	1	R	UNIT_HZ	0,01
Instantaneous Values	POWER_ FACTOR	Signed	570	1	R		0,0001

Instantaneous Values	QUADRANT	Unsigned	574	1	R	
Instantaneous Values	COSINE_PHI	Signed	584	1	R	0,0001
FW upgrade	FIRMWARE_ UPGRADE	Byte Stream	1024	64	W	

- **Modbus ID assignment**

0x69 – SID request

This special Modbus function is implemented to be used during autoassignment process of Mod-bus ID. The device shall send a broadcast respond after a random delay within specified maxi-mum time if all conditions below are fulfilled:

- Device type matches, for the INS-E3 it is 225
- Current Device's Modbus ID is equal to default value of 247
- No other communication has been detected since the request was received

Only the device with shortest picked delay shall send the response. All with longer delays shall detect the soonest response on the bus and abort their own responses awaiting to be sent out.

The response provides Device's serial ID that can be used by the master device for targeting oth-er Assignment requests to slave device.

Direction	Frames	Comment
		Requested device type should respond with 0x64 special function code after random delay (max delay time = DELAY)
M → B	0x00	Broadcast
	0x69	Function code
	0x00	Device type MSB
	0xD7	Device type LSB
	DELAYMSB	Max response delay time
	DELAYLSB	Max response delay time
	CRCLSB, CRCMSB	CRC
B → M	0x00	Device respond with 0x64 custom function code
	0x64	Function code
	SIDMSB	Serial number MSB
	SID	
	SID	
	SID	
	SID	
	SID	
	SID	
	SIDLSB	Serial Number LSB
	CRCLSB, CRCMSB	CRC

- **Assign Modbus ID**

This function is used to manually assign Modbus ID to specified device. Device that match the requested serial number should set Modbus ID to value requested by master.

Direction	Frames	Comment
M → B	0x00	Broadcast
	0x65	Function code
	SIDMSB	Serial number MSB
	SID	
	SID	
	SID	
	SID	
	SID	
	SID	
	SIDLSB	Serial Number LSB
	0x00	
	MID	New Modbus ID
	CRCLSB, CRCMSB	CRC
B → M	-	No response

• **Reset Modbus ID**

This function is used to perform reset of the assigned Modbus ID device to default value of 247.

Direction	Frames	Comment
M → B	0x00	Broadcast
	0x67	Function code
	0x00	Device type MSB
	0xD7	Device type LSB
	CRCLSB, CRCMSB	CRC
B → M	-	No response

• **Get Modbus ID**

This function is implemented to obtain current Modbus ID of device with specified serial number.

Direction	Frames	Comment
M → B	0x00	Broadcast
	0x66	Function code
	SIDMSB	Serial number MSB
	SID	
	SID	
	SID	
	SID	
	SID	
	SID	
	SIDLSB	Serial Number LSB
	CRCLSB, CRCMSB	CRC
B → M	0x00	Broadcast
	0x65	Set Modbus ID function code in response
	SIDMSB	Serial number MSB
	SID	
	SID	
	SID	
	SID	
	SID	
	SID	
	SIDLSB	Serial Number LSB
	0x00	
	MID	Current Modbus ID
	CRCLSB, CRCMSB	CRC

• **LEDS**

The Meter has two LEDs, the first one indicates status, the second one is Energy pulse output.

Status LED

This LED indicates device status according to definition below:

- Green constant – Device OK
- Green blinking fast – Communication pending
- Green blinking slow – Modbus ID not assigned
- Green/orange blinking slow – FW upgrade pending
- Orange constant – Device in bootloader mode
- Orange blinking fast – Bootloader mode, communication pending
- Red constant – Device error
- Red blinking – Bootloader mode, no firmware to run
- Red/orange blinking slow – Bootloader mode, FW upgrade pending

Status can be read via Modbus Communication in proper Modbus register.

Pulse out LED

This LED indicates the energy incrementation according to the configuration below:

- Energy source: Active Energy Total
- Pulse frequency: 1000 pulses/kWh
- Pulse length: 2ms
- CT: pulses measured on primary side

7.1.3.I/O modules readings

• I/O modules readings

SCU 200 allows to connect up to 8 I/O modules (in the case no other device is connected – maximum device count is 32 and one I/O module counts as 8 devices). I/O modules can be assigned to Modbus ID from 1 to 32 and can be read/control using web UI and Modbus TCP/RTU protocols.

For direct reading using Modbus protocol, IO module registers map is provided below.

Please note that addresses 0-3 (status contacts) could be read using Modbus function 01 (read coils) as well as function 03 (read holding registers). All other registers are being read with function 03.

Address Dec	Number	Access	Description	Mem type
0	3	R	SW version	Non volatile
3	2	R, W^{(1)}	HW version	Non volatile
5	4	R, W^{(1)}	Serial number (SID)	Non volatile
18	1	R	IOM status	Volatile
28	1	R	IOM device type	Non volatile
256	1	R	IOM status	Volatile
257	1	RW	I/O Configuration	
258	2	R/W^{(4)}	Port 0 Pulse counter/ Port 0 I/O Coils	Volatile
260	2	R/W^{(4)}	Port 1 Pulse counter/ Port 1 I/O Coils	Volatile
262	2	R/W^{(4)}	Port 2 Pulse counter/ Port 2 I/O Coils	Volatile
264	2	R/W^{(4)}	Port 3 Pulse counter/ Port 3 I/O Coils	Volatile

(1) Available in production mode (4) depends on IO Configuration.

- **SW version**

In this register a firmware version is stored.

0xXXMMmm where:

XX – reserved

MM – major number

mm – minor number

- **HW version**

In this register a hardware version is stored.

0xMMmm where:

MM – major number

mm – minor number

• **Serial number (SID)**

In this register a serial ID is stored. It is important that every device should have unique SID. It is defined based on device type and manufacturing date.

0xTRRR YYYY MMDD SSSS where:

T – 4 bit value representing device type:

0x0 for regular devices;

0x8 for debugging devices.

RRR – 12 bit value representing module type:

901 – 4xInput module;

902 – 4xOutput module;

903 – 2xIn_2xOut module.

YYYY – 16 bit value representing manufacturing year.

MM – 8 bit value representing manufacturing month.

DD – 8 bit value representing manufacturing day.

SSSS – 16 bit value representing device number manufactured during the day.

• **IOM status**

Bit offset	Description	Set Flag	Clear Flag
0	Reset	startup	read status
1	CRC mismatch	startup	-
2	Unidentified hardware	startup	-
3	Low bus voltage warning	occurrence	read status
4	High temp. warning	occurrence	read status
5	Fault state	occurrence	fault state exit
6	Input disabled	occurrence	Enable input
12	Pulse Merge port 1	occurrence	read status and no occurrence
13	Pulse Merge port 2	occurrence	read status and no occurrence
14	Pulse Merge port 3	occurrence	read status and no occurrence
15	Pulse Merge port 4	occurrence	read status and no occurrence

- **Reset**

Signalizes that device was turned off recently.

- **CRC mismatch**

Flash CRC check sum calculated at the end of manufacturing process is different from the one calculated on startup. This means that firmware might be corrupted.

- **Unidentified hardware**

Hardware was not identified. No IO operation is possible.

- **Low bus voltage warning**

Voltage on the CMS bus supply line is low. This may cause malfunction of the device.
High temp. warning
Temperature of the microprocessor is too high. Hardware fault might have occurred.

- **Fault state**

I/O operation are disabled due to too high temperature or dangerously small supply voltage. This happened to protect CMS bus's power supply lines against short circuiting or overload.

- **Input disabled**

This status informs about Inputs being disabled. This happens always after startup and when fault event occurs.

- **Pulse Merge port**

This status inform about input being held up when port is configured to pulse counter.

- **I/O Configuration**

Port configuration is set with this register. Configuration for ports is set on 4 bits with spe-cific offset:

Offset	Description
0	Port 1
4	Port 2
8	Port 3
12	Port 4

Depending on the type of the device available configuration are:

Value	Description
1	Digital input
2	Pulse input
3	Digital output

- **Pulse counter**

These registers allow to read out the number of pulses that were collected. This is volatile data that will be lost on every reset of the device. It shows number of pulses counted since last read out of the register. When input is configured as digital input reading register will result in exception “slave device failure”. However, when register is read inside a range of registers, it will return 0xffff.

- **Coils:**

For digital operation device provides coil table:

Adr. Coil	Access	Description	Memory type
0	R,W^{(2)}	Port 0 I/O Coils	Volatile
1	R,W^{(2)}	Port 1 I/O Coils	Volatile
2	R,W^{(2)}	Port 2 I/O Coils	Volatile
3	R,W^{(2)}	Port 3 I/O Coils	Volatile

(2) Available only for output modules

I/O Coils:

This coil shows state of digital I/O of the port.

In case of output ports, it is possible to read and write the state.

In case of input ports, it is read only. When port is configures as pulse counter reading of the coil will result in exception “slave device failure”. I case when coli is read in range of address-es, it will read 0.

This table provides the detailed overview of the variables that can be available over different mediums for I/O modules:

Please note for variables exposable over Modbus TCP, Rest API, Historical Rest API, web UI, they are indicated with 1, and 0 if they are not exposed over these mediums.

Variables Read	Modbus TCP	Rest API	Rest API historical	WebUI
softwareVersion	1	0	0	0
port1StateCoil	1	1	0	1
port2StateCoil	1	1	0	1
port3StateCoil	1	1	0	1
port4StateCoil	1	1	0	1
hardwareVersion	1	0	0	0
serialNumber	1	0	0	0
resetStatus	1	1	0	1
crcMismatchStatus	1	1	0	1
unidentifiedHwStatus	1	1	0	1
lowBusVoltageStatus	1	1	0	1
highTempStatus	1	1	0	1
faultStateStatus	1	1	1	1
inputDisabledStatus	1	1	1	1
pulseMergeP1Status	1	1	0	1
pulseMergeP2Status	1	1	0	1
pulseMergeP3Status	1	1	0	1
pulseMergeP4Status	1	1	0	1
deviceType	1	0	0	0
port1Config	1	0	0	0
port2Config	1	0	0	0
port3Config	1	0	0	0
port4Config	1	0	0	0
port1	1	1	0	1
port2	1	1	0	1
port3	1	1	0	1
port4	1	1	0	1
port1State	0	1	0	1
port2State	0	1	0	1
port3State	0	1	0	1
port4State	0	1	1	1
port1PulseCounterAccumulated	0	1	1	1
port2PulseCounterAccumulated	0	1	1	1
port3PulseCounterAccumulated	0	1	1	1
port4PulseCounterAccumulated	0	1	1	1
port1PulseCounterAccumulatedValue	0	1	1	1
port2PulseCounterAccumulatedValue	0	1	1	1
port3PulseCounterAccumulatedValue	0	1	1	1
port4PulseCounterAccumulatedValue	0	1	1	1
port1StatusChangeCounter	0	1	1	1
port2StatusChangeCounter	0	1	1	1
port3StatusChangeCounter	0	1	1	1
port4StatusChangeCounter	0	1	1	1

7.1.4.Smart Auxiliary readings

For the smart Auxiliary, the communication is also via Modbus through Flat cable.

The following registers are used in Modbus RTU.

Register name	Register address	Function	Description
SID	5	READ only	Serial number. Stored during production and locked for another writing.
FW VERSION	1	READ only	Firmware version.
HW VERSION	3	READ only	Hardware version. Stored during production and locked for another writing.
SWITCHES STATUS	32	READ only	Trip and toggle switches status: BIT1: toggle switch status, BIT2: trip switch status.
TEMPERATURE 1	33	READ only	Temperature read from sensor 1.
INPUT VOLTAGE	37	READ only	Input voltage value.

All the registers are also available over Rest API. On web UI, it is only possible to visualize the voltage, temperature, Status of the switches.

7.1.5.ABB meters readings

SCU200 allows connecting to 16 RTU and 16 TCP devices including meters with RS-485 interface/ by Modbus TCP. Currently Supported meter types are ABB M4M/M1M, M2M, DMTME, IM300, EV meters and EQ meters. Each meter can be assigned to Modbus ID from 33 to 48 if by Modbus RTU, for TCP no specific ID required.

The devices can be selected from the pre-defined list in the Load management, corresponding tab in the devices section.

After adding RTU/TCP device with specific type, the device is scanned for responding registers. In case if 3rd party device is added outside of known device models, user should upload own device descriptor which will be used by SCU200 for creating device registers map.

In case of RTU devices don't have to have uniform Modbus configuration. SCU200 will adapt readout configura-tion in case if different devices have different baud rates, parities etc. If a device stops responding (disconnects, encounters fault or because of any other reason), it will be excluded from readout queue for an hour. After an hour another readout attempt will be made and once responds correctly, it will be read as usual.

7.1.6.Modbus TCP/RTU readings

SCU200 offers read/write operations on added peripheral RTU devices via external Modbus TCP connection.

Modbus TCP configuration page is available under System setup → Communication → Modbus. In order to enable communication user should enable Modbus TCP Disabled/Enabled switch and adjust TCP port number if necessary. Port 502 is used by default.

SCU200 acts as Modbus RTU router and has neither static registers map nor its own modbus ID. In order to query a device, user should use connection parameters, IDs, functions and addresses exactly as it would be used in case of querying a device directly.

For example, in order to read configuration of IO module with modbus ID 3, user should send request using function 03 (read holding registers), slave ID 3, address 40 and size 1.

Similarly, reading Voltages L1, L2 and L3 in EQ meter with modbus ID 35, user should send request using function 03 (read holding registers), slave ID 35, address 23269 and size 6.

By analogy, in order to query any other RTU device user should look up registers map in queried device manual.

There's no possibility to query multiple device with one request.

SCU200 supports following Modbus function codes:

01 – Read coils

03 – Read holding registers

05 – write single coil

06 – Write single register

15 – Write multiple coils

16 - Write multiple registers

When connection is idle, meaning, Modbus client is connected to SCU200 but no requests are exchanged, SCU200 will drop such a connection after 60s. The connection could be reestablished normal.

Adding 3rd party RTU/TCP devices step by step instructions.

The registers for 3rd party devices can be added one by one or can be uploaded all at once by filling the Json descriptor file in the prescribed format. The steps can be defined as follows:

1. Add the device as custom device and download the empty descriptor file.
2. Inside the descriptor file, user can see the sample data model for a register.


```
{
  “model”: “abb.ability.device”,
  “typeId”: “abb. ability. scu200.devices.3rdPartyTHIRDPARTYRTU”,
  “version”: “0.0.1”,
  “name”: “THIRDPARTYRTU Device”,
  “properties”: {},
  “variables”: {}
}
```


Here is an example to add a sample register of the device:

The variables were embedded from “properties”: {

An example as follows:


```
“properties”: {
```

“currentTransformerRatio”:	Variable names as visible on the web UI.
“category”: “Settings”	Any category can be used, but by including the categories: • Instantaneous Values • Energy Values • Power Quality Values Those values will be displayed on corresponding widget, other-wise in “Custom Values” widget
“description”: **“Current transformer ratio”**	Description of the variable
“dataType”: “integer”	The datatypes accepted in SCU 200: • integer • number • string • boolean
“modbusDataType”: **“Un-signed long”,**	Unsigned integer Signed integer
“address”: 4512	Address always in decimal format
“Unit”:mA	The unit variable
“Tag”:”Activepower”	Variables with same tag will be used in group/contracts calcula-tions
“size”: 2	the size of the register
“writable”: true	If the register is writable, please select true if not false
“Readable”:false	If variable is writable only, set this to “false”
“function”: 3	The numbers and its significance: 1,2,3,4 1. Read coil status 2. Read input status 3. Read holding register 4. Read input register
“writeFunction”: 16	If register is writable, possible options: 5,15,6,16 5. Write single coil. 15. Write multiple coils 6. Write single register 16. Write multiple registers
“readInterval”: 0	The polling time, the user can also customize the times between 10sec, 30 sec, 900 sec. 0 means it will be read once when process starts or reload (on configuration change)
“dbWriteInterval”: 0	The writing time to the historical database: 0 - Not written to the historical data base (not stored at all) 30 - written for every 30 sec 900 -Written for every 900 sec.
“invalidValues”: [	Here you have to put invalid values in HEX, those values will be filtered e.g., some registers response with FFFFFFFF when device does not support them, this value will be filtered and not displayed/stored anywhere
“multiplier”: 1	The property is multiplier or precision for float (datatype: num-ber) values
“endianness”: “ABCD”	Can be verified from the Modbus mapping of the devices. • ABCD – Big endian • DCBA – Little endian • BADC – Big endian byte swap • CDAB – Little endian byte swap

7.2.Wireless M-Bus

7.2.1.Wireless M-bus devices readings

SCU200 allows to connect up to 16 INS-WM modules (in case of no INS-E3 modules are connected). They can be addressed using Modbus ID from range 49-63.

Each module can be configured to listen on Wireless MBus mode **C1** or **T1**. They are fixed to operate on **868.95MHz radio frequency**.

In addition, each module have selectable antenna port (internal is default).

Modules can securely store Wireless MBus encryption key with meter ID and manufacturer identification. Supported security modes are **mode 5** and **mode 7**. Also unencrypted data from meters are supported.

At this moment only **Carlo Gavazzi EM24** meters are integrated as pre-defined devices.

You can add up to a maximum of 64 meters to each module., with a maximum distance of 100m (this distance was measured considering no obstacles in between).

Procedure to add the meters:

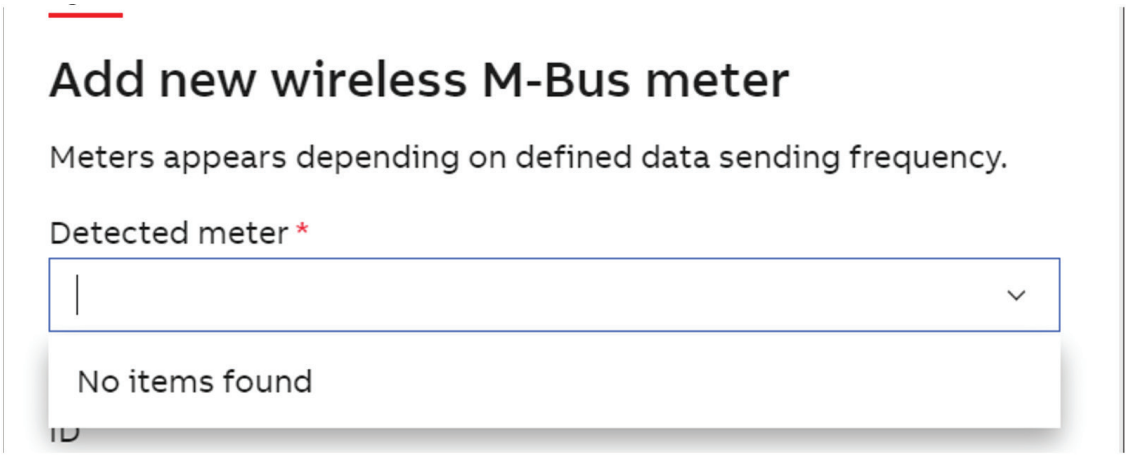
Step 1: A descriptor file must be prepared initially.

As explained in the section Adding 3rd party RTU/TCP devices step by step instructions, the de-scriptor file can be developed with the following variables and corresponding mandatory data.

activeEnergyImportTotal": {	Name of the variable : The same name appears in the webserver
"category": "Energy Values"	Any category can be used, but by including the categories: • Instantaneous Values • Energy Values • Power Quality Values Those values will be displayed on corresponding widget, other-wise in “Custom Values” widget
"description": "Total imported active energy"	Any variable name you would like to call / the variable name in the maps of the meter
"tag": "activeEnergyImportTotal"	Variables with same tag will be used in group/contracts calcula-tions
"unit": "kWh"	The Unit Variabe
"multiplier": 01	If you want to change the unit from Kwh to wh etc you have to add the multiplier otherwise skipped
"dbWriteInterval": 900	900 constant
"dataType": "integer"	depends on your map
"readInterval": 1	1sec (Constant)
"dif":	"Mandatory Value to be filled in from the Meter Modbus Map"
"vif":	"Mandatory Value to be filled in from the Meter Modbus Map"

STEP 2 : Once the descriptor file is ready, you can go to the webserver and fill in the details.

1. Wireless m bus meters communicate on radio signals so whenever the meter is available SCU recognizes and show it in here:



2. Then once the meter is recognized, it automatically fills ID and manufacturer.
3. Then the name of device can be registered and the key that was received along with the meter must be entered.
4. By uploading the descriptor file, the meter is now integrated.

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