CALMS d.o.o.

Operation manual – CAL-EDGE-0 device

Product:	CALMS CAL-EDGE-0 monitoring device
Release date:	August 2025

Contents

1. General notes

1.1 Contact

Central Europe	North America	Nordic Europe
CALMS d.o.o.	CALMS AIR INC.	CALMS Nordic AB
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1000 Ljubljana, Slovenia	SC 29645, USA	413 04 Göteborg, Sweden
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T: +386-41-432-202	T: +1-864-705-2571	T: +46-31-757-15-15

For technical assistance, please, provide the following information when reaching out:

- Serial number (located on the device label, please refer to section 3.2. Nameplate)
- Description of the issue
- Steps already taken to resolve the issue

1.2 Information regarding installation and use of product

Revision history

Revision	Date	Author	Description of change
1.0.0	08.2025	N. Pavlovska	Release of CAL-EDGE-0 user manual
2.0.0	01.2026	N. Pavlovska	Improvement of clarity and ensuring compliance with aplicable standards

The manual must be read attentively before use. It should be stored with the product and kept accessible whenever required. **By installing or using the product, you confirm that you have read, understood, and agreed to follow the instructions provided.**

2. Safety

2.1 Intended use

The CALMS CAL-EDGE-0 monitoring device is a remote data logger used for compressed air systems. The device is designed as »Plug&Play« and is used for remote monitoring and auditing, alarming and reporting, designed and configured for majority of compressors and sensors on the market. The device supports communication protocols such as Modbus RTU/TCP (with the possibility of daisy-chaining and connection of up to 20 sensors), OPC UA.

The device connects directly to CALMS web application and sends the collected data via the MQTT protocol. The CALMS platform then provides real time access to data from any web browser for any end user and their service partner.

Any use of the device other than the use described in this manual is deemed to be non-intended and can cause hazard for the safety of people and the environment.

2.2 Target group and personnel

This manual is intended for the following target groups:

- **Maintenance personnel** responsible for compressed air systems and associated equipment
- **Service technicians** involved in installation, commissioning, and servicing of the device
- **System integrators** responsible for integrating the device into existing monitoring or control systems
- **Qualified technical personnel** with experience in industrial electrical systems and compressed air installations.

The device shall be installed, commissioned, and serviced **only by qualified and trained personnel by CALMS** who are familiar with the devices and its working.

2.3 Safety instructions and notices

When handling, operating, or maintaining this product, authorized personnel must follow safe working practices and comply with all applicable health and safety regulations. If raised platforms are required to provide access to the CAL – EDGE - 0 they must not interfere with normal operation or obstruct access. Platforms and stairs should be of grid or plate construction with safety rails on all open sides. Incorrect operation or maintenance may create dangerous situations and could result in personal injury or equipment damage. The manufacturer cannot foresee every circumstance that may pose a hazard. If users apply procedures, equipment, or methods not specifically recommended by the manufacturer, they are responsible for ensuring that such use does not damage or compromise the product's safety, and that it poses no risk to people or property.

To ensure safe operation and long-term reliability of the device, the following conditions must be met:

- The device should be operating in a dry and electrically safe environment, where the electrical conditions don`t pose a threat to people or equipment present.
- Exposure to moisture, condensation or corosive athmospheres is not permitted.

- The device must **not** be operated or serviced in environments with:
    - Water or high humidity
    - Risk of liquid ingress
    - Electrically conductive or flammable substances
    - Unstable or non-compliant power sources

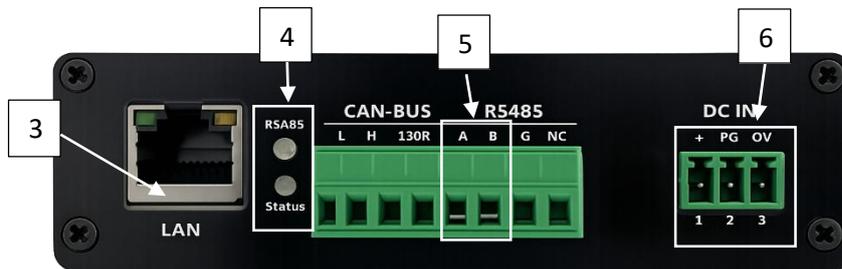⚠️ **Ignoring the warnings can lead to injury and/or cause serious damage to the people involved!**

3. Product overview

3.1 Device overview

Position number	Description
1	Housing of the CAL-EDGE-0 device
2	Sticker of the CAL-EDGE-0 device

Front panel

Position number	Description
3	LAN port
4	RS485 and Status LED
5	RS485 connection terminals
6	Power supply terminal

Back panel

Position number	Description
7	ANT1 SMA connector for external antenna
8	PROG, SERIAL USB ports

3.2 Nameplate
Located on the back of the device

6
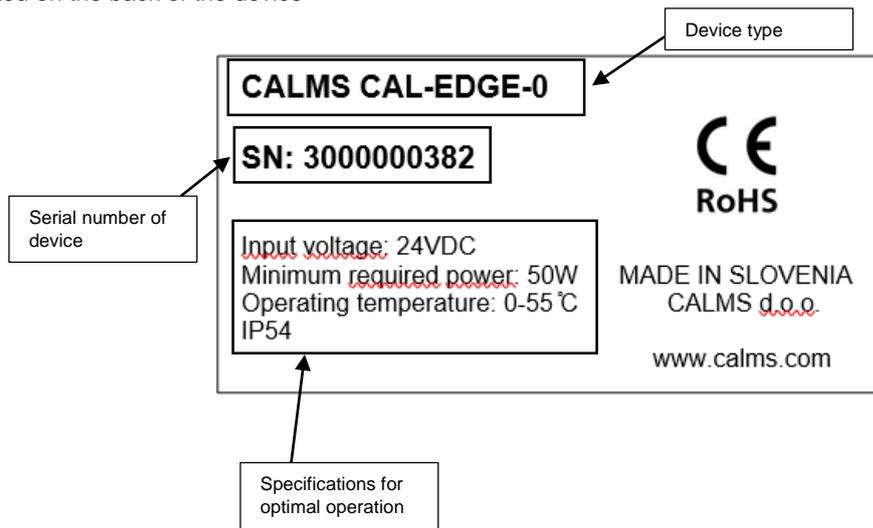
3.3 Scope of supply

Illustration	Number	Description
	1	CAL-EDGE-0 monitoring device
	2	Add-on for DIN rail
	3	Power adapter 24VDC with 3 different type plugs
	4	Antenna
	5	Quick setup guide
	6	Data sheet
	7	Electrical schematic
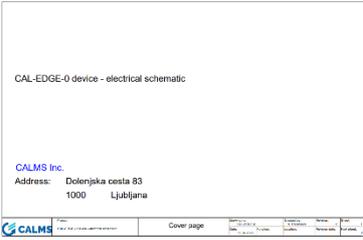
4. Technical data

Description	CAL-EDGE-0	Remarks
Hardware	Quad core Cortex-A53 (ARM v7) 64-bit SoC @ 1.5GHz, 1GB DDR2 RAM	
Protocol	MODBUS RTU, MODBUS TCP/IP, OPC UA	Up to 20 sensor per one device
Interfaces	1x 10/100 Mbps Ethernet adapter	
Analog inputs 4...20mA	0	
RS485	Standard: 1x	2-wire RS485 (half duplex)
WEB management	Yes	
Min. logging interval	1 sec (configurable)	
Data Storage	eMMC 8 GB	
Cloud connection	Mobile 3G/4G / LAN	
Operating Range	-25 – 60 C (-13 F – 140 F)	
Power supply	24VDC	Recommended: 50W. Power supply included
Cellular modem	LTE EG25-G Module	Depends on network coverage
Antenna interface	Standard SMA interface-antenna included	
Size	H 30 x W 110 x L 130 mm H 1.18 x W 4.33 x L 5.12 Inches	
Weight	511 g / 1,13 lbs.	
Materials	Enclosure: Aluminum	
Mounting	DIN rail or wall mounting	
EMC	EN 61000-6-2 EN 61000-6-3	
Approvals	CE / UL / FCC Class A	

5. Transport and storage

The device shall be transported **in its original packaging** or in equivalent protective packaging that provides adequate protection against mechanical shock, vibration, and electrostatic discharge. During transport and storage, the device must be protected from:

- Moisture and condensation
- Dust and dirt
- Direct sunlight
- Corrosive or chemically aggressive environments

The device shall be stored only in **dry, clean, and temperature-controlled indoor environments**.Permissible storage temperature and humidity ranges specified in the technical data must be respected.

6. Mechanical installation

The mechanical installation must be done by authorized personnel trained by CALMS or qualified technical personnel.

The CAL – EDGE – 0 should be mounted in such a location as to allow operational and maintenance access without obstruction or hazard and to allow clear visibility of indicators at all times.

After opening the package the user is able to see the device (connector plugs for electrical connection are included), the add-on for DIN rail mounting, the power adapter with the labeled wires for »24VDC« and »0VDC«, the antenna with screw type connector and the appropriate documentation (data sheet, quick setup guide, electrical schematic of the device and the test certificate).

The CAL-EDGE-0 device when used for testing purposes can be placed on a flat surface. Otherwise it is intended to be mounted on a DIN rail using the add-on provided by CALMS. The device can be installed inside the control cabinets of the compressed air equipment (compressors, dryers etc.)

To attach the add-on:

1. Unpackage the device from the box and using Torx screwdriver unscrew the screws next to the RJ45 socket (see *Figure 1*).

Figure 1 : Unscrewing screws for add-on to be mounted

2. Gently bend the part where we just removed the screws, just enough to insert two screws into the notch at the bottom of the CAL-EDGE-0 (*Figure 2*).

Figure 2 : Adding screws to mount the add-on

3. Screw back in the screws you removed earlier. We can mount the bracket on the screws that are now in the notch at the bottom and secure it with two nuts. Make sure that the bracket is centered and that it is mounted straight (*Figure 3*).

Figure 3 : Add-on properly mounted on device

4. The device can be mounted on a DIN rail. When mounting it make sure the serial number nameplate is still visible. Make sure the device is easily accessible for maintenance or repair, if needed.

7. Electrical installation

Electrical installation must be performed by qualified technical personnel (electricians) or authorized personnel trained by CALMS with understanding of the workings of the CAL-EDGE-0 device.

The device must be operated at the supply voltage for which it is designed. It is powered with 24VDC. If using different source of powering the device, a fused isolation switch must be fitted between the main power supply and the CAL – EDGE – 0 device.

7.1 Powering on the device – procedure

The device has already inserted two green plug type connectors. One is used to power on the device and the other for the RS485 communication.

To power on the device a power adapter is supplied by CALMS. The adapter comes with prepared wires labeled »**+**« and »**-**« and different types of plugs for different power sockets.

Power on the device by firstly connecting the »24VDC« wire labeled »**+**« to the terminal labeled »**+**« on the device. Next, the wire »0VDC« labeled »**-**« to the terminal labeled »**0V**« on the device.

Lastly, plug the power adapter in the socket. After, successfully powered on the device the **Status LED on the front panel** flashes green.

7.2 Powering off the device – procedure

To power off the device, carefully unplug the power adapter from the socket. The LEDs should turn off.

7.3 Restarting the device – procedure

Restarting the device means to perform power cycle. To restart the device make sure the following has been done:

- The device was successfully powered off, as described in the section *7.2. Powering off the device – procedure;*
- Time of 30-40 seconds has passed before powering on the device again.

The device is then powered back on as described in the section *7.1. Powering on the device – procedure.*

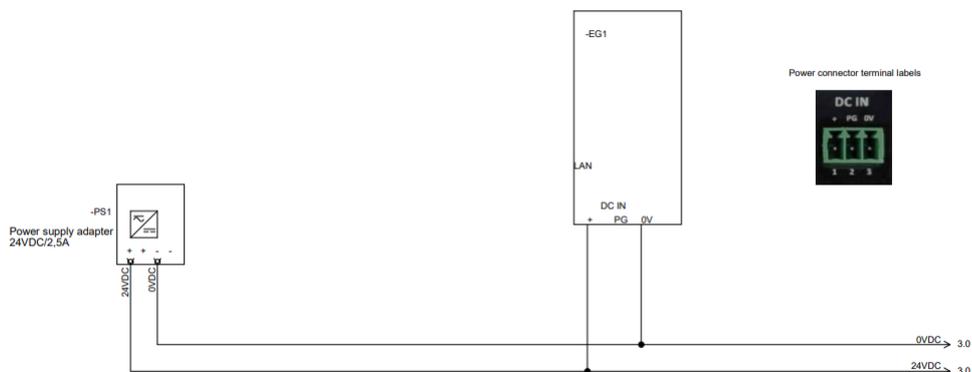The electrical schematic on how to properly wire the power supply wires to the device is shown below on *Figure 4:*

Figure 4 : Power supply for the CAL-EDGE-0 device

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8. Commissioning

8.1 Initial commissioning

Mechanical and electrical installation of the device are complete. User must be sure LTE coverage is available at the installation site of the device. User must make sure the device has been installed according to the installation guidelines mentioned in section *6. Mechanical installation* and *7. Electrical installation.*

8.2 Connecting the device to the Internet

To ensure the data the CAL-EDGE-0 collects is being sent to the CALMS platform, a descent connection must be provided. The device can connect to the Internet in two ways:

1. Using a SIM card provided by CALMS:

The SIM card is already in inserted and enabled in the device. To connect the device to the Internet the antenna provided by CALMS must be connected to the SMA connector labeled "**ANT1**" on the device. The CALMS devices all have cellular modems inside that provide 3G/4G frequencies it can use.

The use of custom SIM card is possible, but is not recommended. CALMS cannot offer support in case of connectivity issues. Also, installing the SIM card will have to be done by the user of the device. For more information, visit the documentation page for the CALMS devices on this link: *CAL-EDGE-0 documentation*

2. Using your own LAN:

An Ethernet cable (**not** provided by CALMS) has to be connected in the port labeled »**LAN**« on the device and in the user`s LAN with DHCP server active.

Once the CAL-EDGE-0 device is successfully connected to the Internet the **Status LED blinks green in longer intervals.**

8.3 LED states description

The LEDs on the device labeled »**Status**« and »**RS485**« show different states of the device. Below are described the different states of the LEDs:

State LED	Description
LED RS485	o LED flashes rapidly **red and green color** – MODBUS devices communicate successfully; o LED flashes **green color** – MODBUS communication searching (devices are not communicating) o LED **not flashing** – MODBUS not connected
LED Status	o On -> continuous voice call state o 125ms ON, 125ms OFF -> Data transmission o 1800ms ON, 200ms OFF -> Idle state o 1800ms OFF, 200ms ON -> Network searching

8.4 Sensors connection to the device

This manual **does not** describe the operating principles of the Modbus RTU and Modbus TCP protocols. It is assumed that the reader has prior knowledge of these protocols and their basic operation.

The CAL-EDGE-0 device supports Modbus RTU and Modbus TCP protocol. Therefore, the sensors connected to the device must support these protocols too. When connecting a new sensor to the device, it must be powered off.

1. Modbus RTU sensors connection:

With Modbus RTU communication it is strongly recommended to use shielded twisted-pair cables, especially on long distances. Appropriate cables are usually provided by the sensors` manufacturers.

In the plug in connector for the RS485 communication, connect the **data A wire** from the sensor to the terminal labeled **A** on the device and the **data B wire** from the sensor to the terminal labeled **B** on the device (see example in *Figure 5*).
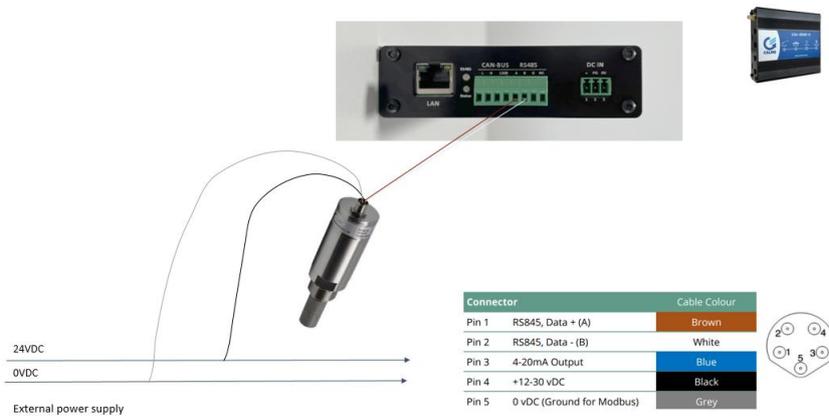

Connector		Cable Colour
Pin 1	RS845, Data + (A)	Brown
Pin 2	RS845, Data - (B)	White
Pin 3	4-20mA Output	Blue
Pin 4	+12-30 vDC	Black
Pin 5	0 vDC (Ground for Modbus)	Grey

Figure 5 : Modbus RTU sensor connection example

The Modbus RTU sensor must be externally power supplied.

After connecting the sensor to the CAL-EDGE-0 device and to an appropriate external source of power, the CAL-EDGE-0 device can be powered back on. To do that follow the procedure described in section *7.1. Powering on the device – procedure*.
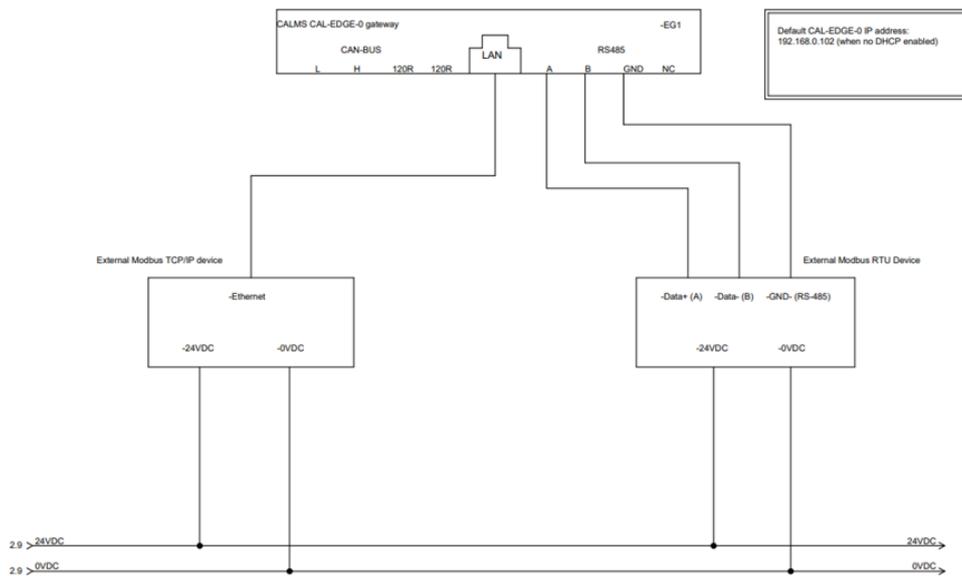

Figure 6 : Electrcial schematic of the CAL-EDGE-0 device

1.1. Daisy-chaining sensors to the CAL-EDGE-0 device:

The CAL-EDGE-0 device can have up to 20 Modbus RTU sensors connected to it in a daisy chain (see *Figure 6*). A proper twisted-paid shielded cable must be used and the maximum length of the cable should be 800 m. A proper configuration of the sensors must be done prior to connecting them in the daisy chain. Proper grounding of the signal must be made on the sensors` side. The CAL-EDGE-0 device **does not have a Modbus ground terminal and wiring it might cause trouble in the communication.**

Its not recommended to run Modbus wires in the same conduit as mains because of the interference present because of the high voltages and currents.

2. Modbus TCP sensors connection:

With Modbus TCP communication a standard Ethernet cable (CAT5 or CAT6, shielded cable) can be used. A connection example is shown in *Figure 8* below.

When connecting a Modbus TCP sensor, use the port labeled »**LAN**« on the device. Additional settings must be made on the sensor:

- Set an IP address in the range from **192.168.0.1** to **192.168.0.254 apart from the address 192.168.0.102.** This is the static IP address reserved for the CAL-EDGE-0 device.
- The TCP port is set to 502.

The Modbus TCP sensor must be externally power supplied.

Figure 7 : Modbus TCP sensor connection example

After connecting the sensor to the CAL-EDGE-0 device and to an appropriate external source of power, the CAL-EDGE-0 device can be powered back on. To do that follow the procedure described in section *7.1. Powering on the device – procedure.*

9. Operation

For proper operation of the device, a configuration procedure must be done on the web interface – CALMS web application. This manual does not provide instructions for operating the application itself. It describes only the configuration and use of the CAL-EDGE-0 device within the application. It is assumed that the reader has basic knowledge of the application's operation.

Every CAL-EDGE-0 device has its own unique serial number, located on the back of the device, refer to the *3.2. Nameplate* section. Once logged in the web application CALMS and creating a system, the CAL-EDGE-0 device has to be added in your system. First, you open your system and navigate to the **Setup** page. There you click on »**Add device**« and choose your device like shown in the *Figure 9* below.

Figure 8 : Adding device in CALMS system

On the **Equipment page** add a sensor on your scheme. To »connect« the sensor to your device you have to again choose your device (serial number) and configure the MODBUS parameters on the CALMS application. The customer is able to change the UnitID of the sensor, the baudrate, parity, data and stop bits so they match with the settings on the sensor that have been previously set (see *Figure 10*).
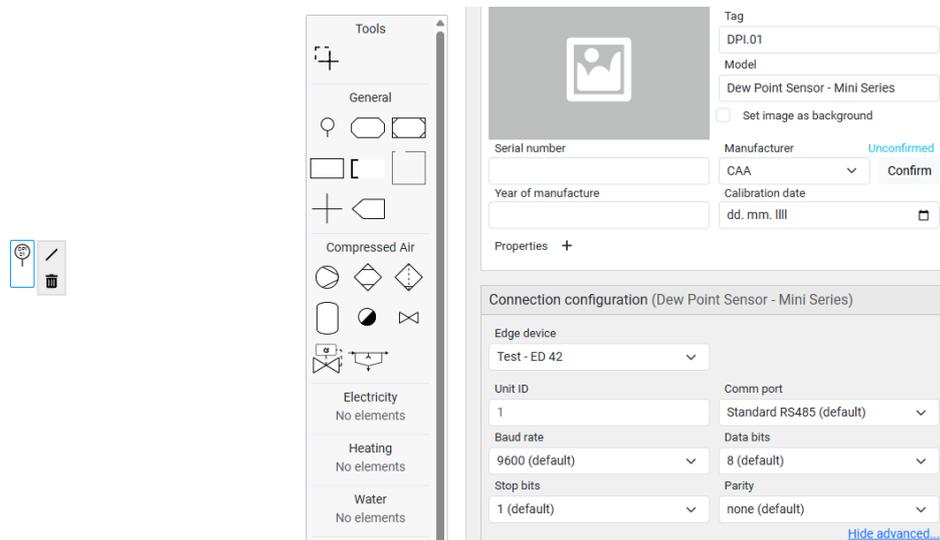

Figure 9 : Sensor configuration on CALMS

If the device is powered on and the sensor is already connected to it and configured on CALMS, the device immediately establishes connection by flashing the **RS485 LED red and green rapidly.** Also, the device already starts sending data to the web application. The customer has the option to view the live values from the sensors as they are changing by navigating to the **Device dashboard page** and **clicking the Live button**, to enable the live monitoring of the data (see *Figure 11*).
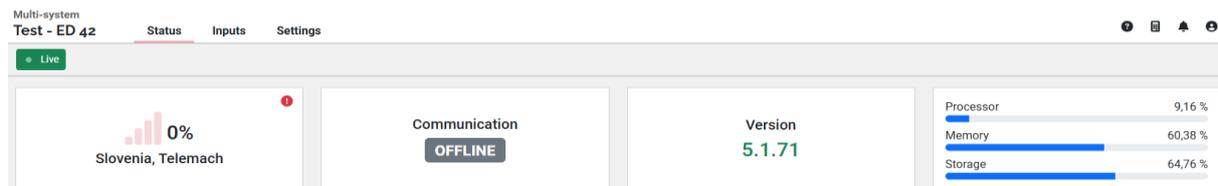

Figure 10 : Device dashboard page

The data collected from the sensor for periods of time can be checked on the **Monitoring page.** There the customer has the option to choose which channels (inputs) to monitor, view them in a graph, choose the inspect period and aggregation (see *Figure 12*).
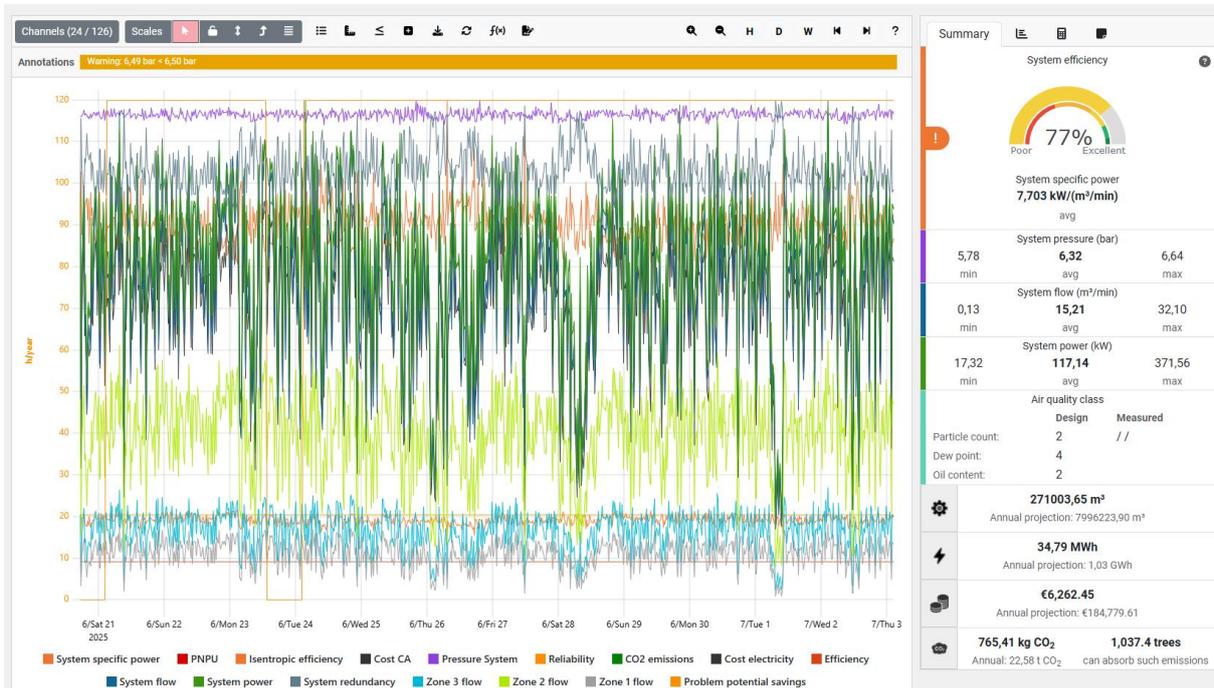

Figure 11 : Monitoring page

10. Maintenance

The proper maintenance procedure for the safe operation and long-term reliability of the device is stated below:

- Before cleaning or maintenance, **disconnect the device from all power sources**.
- Cleaning shall be performed **only with a dry, soft cloth** applied gently to the exterior surfaces.
- **Abrasive materials, solvents, chemicals, or cleaning agents must not be used**, as they may damage the enclosure, markings, or internal components.

Failure to comply with these instructions may result in device malfunction, damage, or safety hazards.

11. Adjustments
The following adjustments can be made to the device:

11.1 Connecting new sensor to the CAL-EDGE-0 device
The device has to be powered off. For the proper procedure refer to the section *7.2. Powering off the device – procedure.* The properly configured Modbus RTU sensor then has to be connected in the daisy chain.

After that a proper configuration process has to be done on CALMS. For this refer to the section *9. Operation.*

Finally, power the device back on. For this refer to the *7.1. Powering on the device – procedure.*

12. Spare parts
The spare parts list is identified with its appropriate number refered to section

The CALMS team requires the following information for ordering spare parts:

- CALMS device name
- Serial number (see nameplate)
- Label number of the spare part to be sent
- Required quantity

The contact of the CALMS support team is listed in the section *1.2. Contact.*

Number	Description
2	Add-on for DIN rail
3	Antenna
4	Power adapter 24VDC

13. Decommissioning
The device must be decommissioned during longer periods of inoperation, for example:

- Maintenance to the product
- System inactivity
- Not used

The appropriate procedure for decommissioning is to firstly, unplug the power adapter from the socket. The user should wait until the LEDs are turned off and the indicator on CALMS for the state of the device is OFFLINE.

14. Disassembly
Ensure the device is powered off (LEDs are turned off). Disconnect the power supply wires from the plug connector. Next, safely power off the sensors connected to the device and disconnect the RS485 wires from the device.

Finally, carefully unscrew the connector of the antenna from the device.

15. Disposal

After decommissioning the device can be disposed of.

Component	Mateial	EU waste code
Whole device	-	20 01 36

16. Troubleshooting

Electrostatic Discharge (ESD) Notice: Internal components are sensitive to electrostatic discharge. Follow standard ESD handling procedures, including grounding yourself and using an ESD-protected workstation, before opening the device.

16.1 Status LED blinks green and is more time OFF than ON:

The device is not connected to any network. For this the device has to be properly opened and examined as instructed below. To safely open the CAL-EDGE-0 device open the following link »Instructions on how to insert SIM card in CAL-EDGE-0 device« and follow the **first two steps**, you should have the result shown in *Figure 13* below:
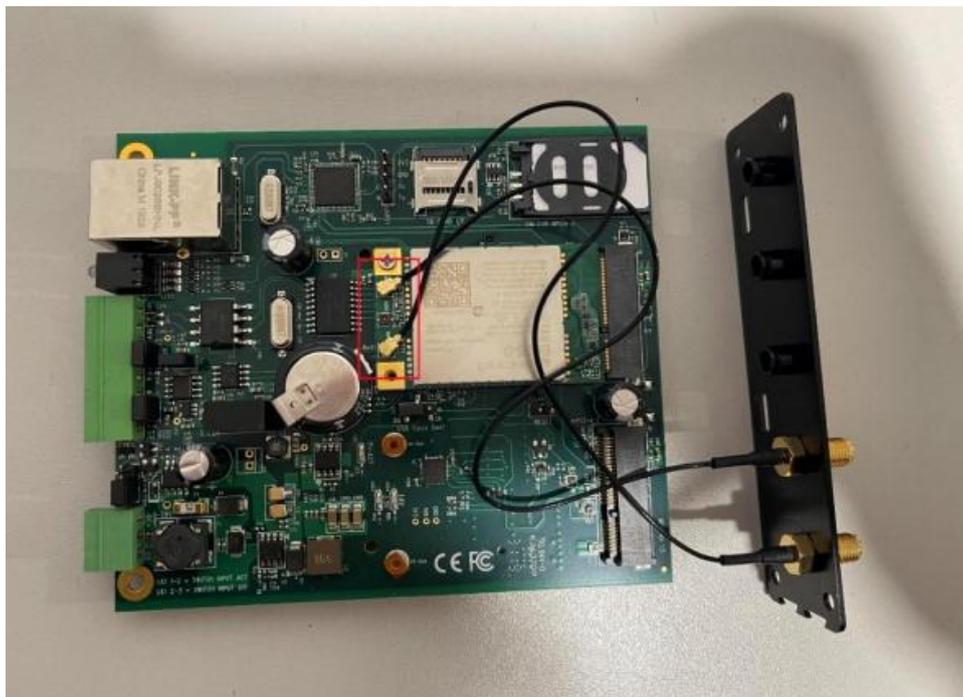

Figure 12 : CAL-EDGE-0 device motherboard

Check that the antenna is firmly connected to the modem (the connector labeled **main**) of the device, make sure the SIM card is inserted in the device and make sure it is enabled.

DISCLAIMER: If the customer uses custom SIM cards, CALMS cannot access the SIM and support in case of bad (or no) connection.

16.2 Status LED blinks green and is more time ON than OFF:

The signal is very weak or non-existant. Check if the external antenna is tightly screwed on the SMA connector, move the antenna to a higher place, or near a window for better signal, restart the device.

16.3 Status LED is constantly OFF:

Check the power supply. The device is powered with 24VDC.

16.4 RS485 LED is flashing green:

A MODBUS slave device has been connected to the master, but they are not communicating. Make sure the MODBUS parameters on CALMS are the same as the slave device (check the manual for the slave device), swap the **Data A** and **Data B wires on the CAL-EDGE-0 device.**

16.5 RS485 LED is constantly OFF:

No MODBUS communication is present. Check the power supply for the slave device. They have to be externally powered on. Check the configuration on CALMS: make sure the correct slave device is added and the correct device (serial number) is assigned to the slave device.

16.6 RS485 LED is constantly red:

Contact the CALMS team. Wrong sensor configuration. Make sure the signal list is the correct one for the particular sensor.

16.7 Can`t find the sensor on CALMS:

Contact the CALMS support team. For a new sensor on CALMS the customer has to inform the CALMS support team beforehand, on what sensor it is and provide the documentation for the sensor so it can be successfully added to the CALMS database.

16.8 CAL-EDGE-0 device is outdated:

Contact the CALMS support team. The device has to be updated. For a successful update the device has to be connected via the ethernet port to LAN during the update.

16.9 CALMS logs:

If a sensor is configured incorrectly on CALMS: check the sensor configuration and MODBUS parameters.

Error	Incompatible Modbus RTU properties: Checkvalidity, Stopbits.	🔴 Aug 5, 2025, 2:18:24 PM

If a device goes OFFLINE: : if that wasn`t supposed to happen check the power supply and **Status LED state.**

Info	Device went offline.	Aug 11, 2025, 8:57:08 AM

16.10 MODBUS sensor connected and configured but still not communicating with CAL-EDGE-0 device:

If a MODBUS sensor is correctly connected to the device and configured on CALMS, but there still isn`t communication established, restart the device. To properly restart the device follow the procedure in section *7.3. Restarting the device – procedure.*

For more information scan the QR code!