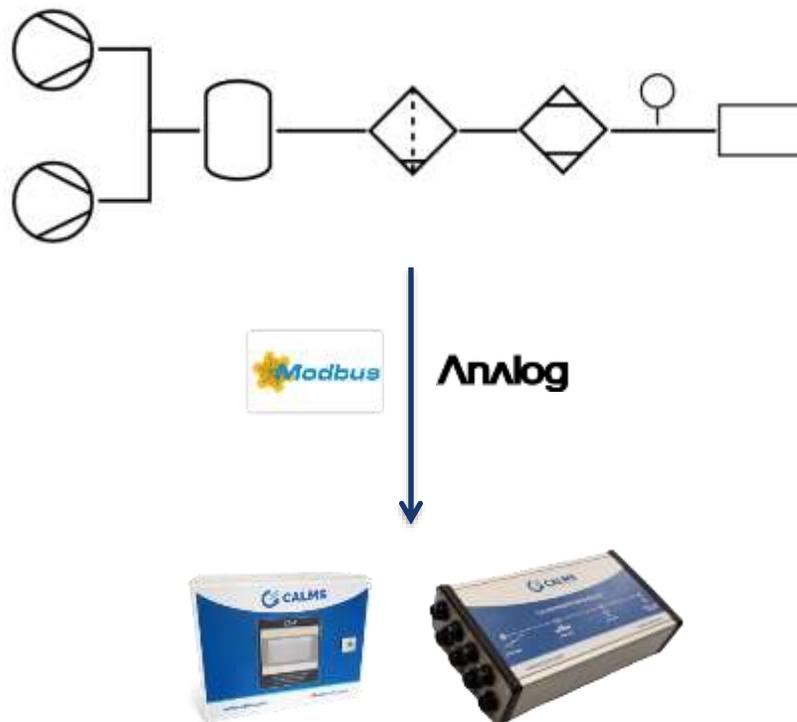


CALMS SENSOR SETUP CHECKLIST

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Connecting sensors, transmitters, master controllers and equipment controllers to CALMS device can be done with many different connection.

Standard supported

- Hardwire analog 4-20mA
- Modbus RTU – 485
- Modbus TCP via network switch
- ADS
- OPC ...



Installing sensors network requires in-depth knowledge !
Please leave the installation to professional contractors.
Not following the specifications can result in incorrect communications and equipment damage!

CALMS devices that are supported in this manual are:

- CAL-PM-x - permanent monitoring and control device
- CAL-EDGE-0 - edge gateway
- CAL-EDGE-8 - audit temporary measurement device

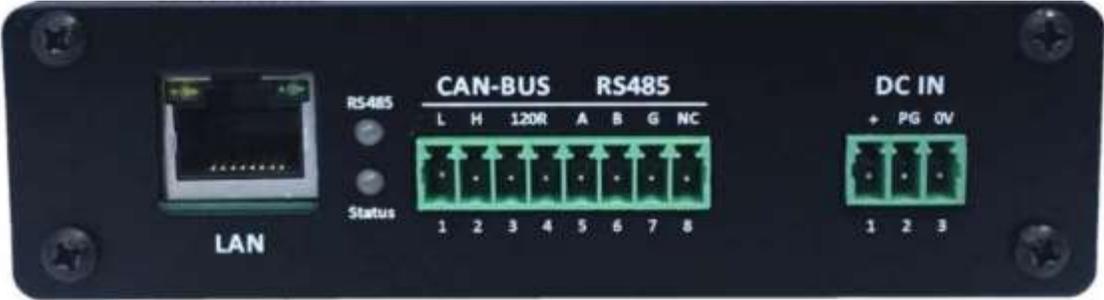
On CALMS cloud application follow CALMS Setup documentation to create new system, start with general information about the system, where you must select and add edge device or more of them to the system.

Next Setup step is to create PI&D schematic of equipment and instrumentation used in the system. CALMS platform has integrated many standard sensors, compressor controllers and master controllers with predefined addresses and registers used in compressed air systems.

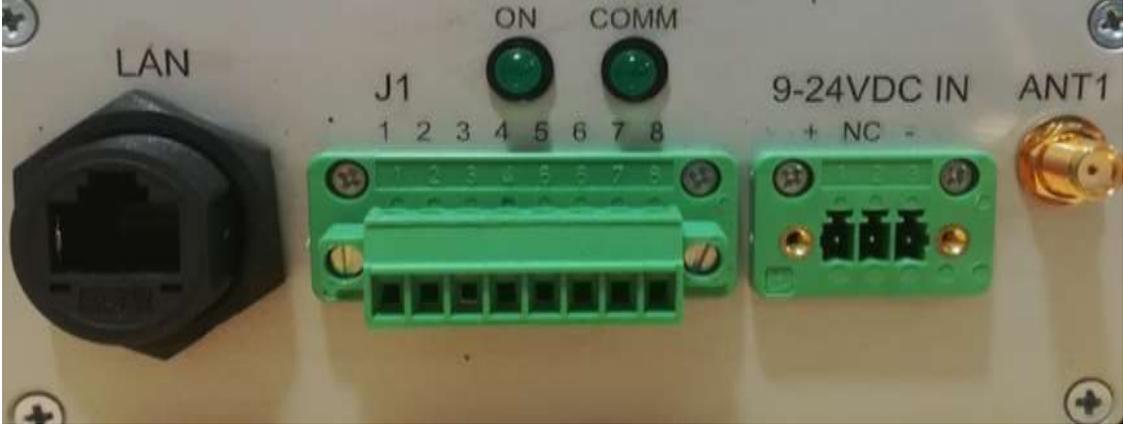


In case sensor is not available to select please contact CALMS support@calms.com with sensor model name, communication type and all comm settings together with sensor manual to verify settings.

CAL-EDGE-0 gateway



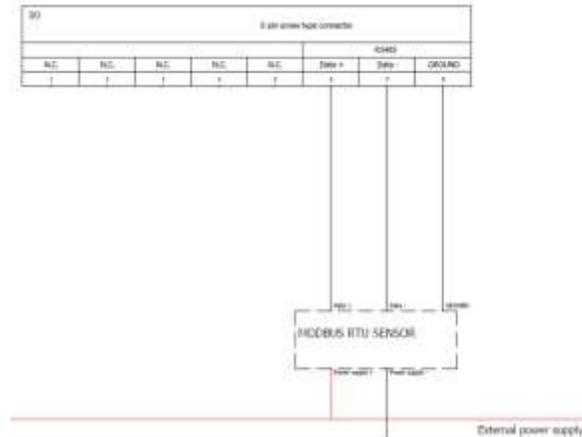
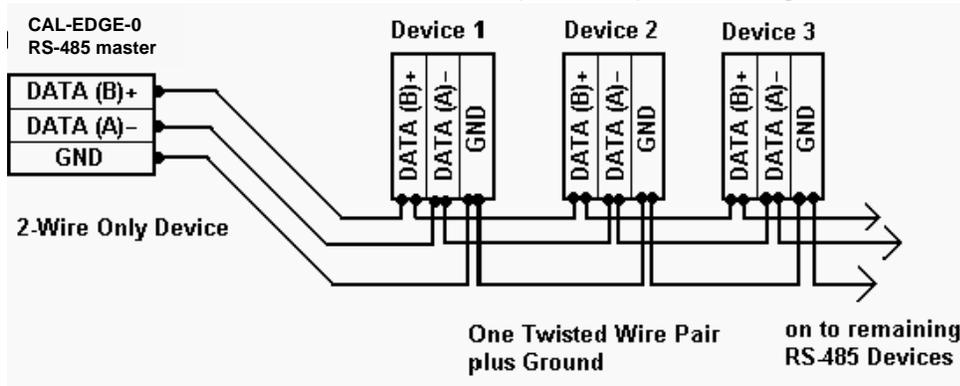
CAL-EDGE-8



MODBUS RTU – RS485 SENSOR CONNECTION

RS485 is a differential balanced line over twisted pair. It can span a relatively large distance up to 1200m | 4000 feet. However, you will have to be aware of the voltage drop: The power at the end of the line is not the same as at the beginning. It depends on the specific cable resistance and the power consumption of each sensor

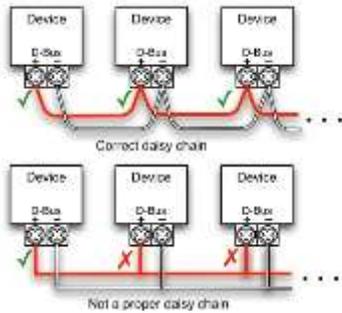
The wires should be connected in a point-to-point configuration, called a daisy chain.



Do not install a star or ring network. This may cause reflections of the signals.

- The main cable goes from the Master to all sensors. It contains **three wires**: the twisted pair wires (A = DATA- and B = DATA+) which carry the digital signal and the GND or “common” wire, which is absolutely essential for providing a proper reference to the Modbus transceivers.
- The main cable is **shielded**. Ideally, the shield is separated from the 0 Volt line, but it may be combined when you are absolutely sure that the shield is clean of voltage fluctuations.

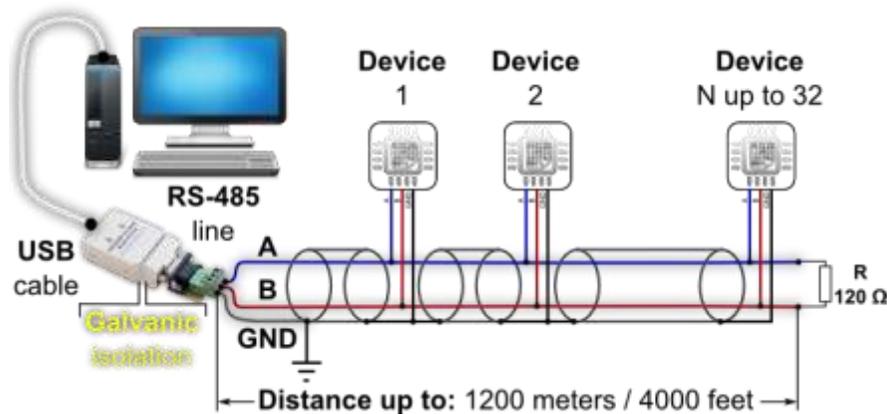
When the line is longer than 10m use termination resistor. In case of an RS485 twisted pair cable this termination is typically between 120 and 130 Ω , between DATA- and DATA+.



The connection must be taken all the way to the screw terminals on the back of the instrument. "T" connection will result reflection, causing corrupted communication.

TEST SENSOR CONNECTION WITH COMPUTER - LAPTOP

When all sensors are connected in daisy chain check that all device ID and comm parameters, wiring is correct with laptop with Modbus test software. You can use free software like CAS scanner modbus <http://freemodbus.com/download/> or <https://www.simplymodbus.ca/RTUmaster.htm> and USB to RS485 converter like DSD TECH SH-U11 USB to RS485.



MODBUS RTU – 485 Checklist

- Install sensor and connect power supply (check sensor manual), confirm that sensor is showing correct measurement on its local display (if provided)
- In case of multiple sensors, use RS485 daisy chain connection
- On each connected sensor in the daisy chain set the correct communication settings. Each sensor must have assigned unique Unit ID (MODBUS ID) and all sensors must have same communication parameters (Baudrate, Data bits, Stop bits, Parity)
- Prepare IQ (Instrumentation Qualification) table with signal names and all MODBUS communication settings (template can be found on www.docs.calms.com)
- Connect daisy chain to PC (use RS485 to USB converter) and test MODBUS readings of all sensors and confirm receiving proper values by filling IQ table
- If there are no readings or wrong values on PC MODBUS tester, double check communication parameters and wiring connection (try swapping A and B wires). In case readings are still not available contact sensor supplier.
- When all the readings on the PC are correct connect daisy chain to master CAL-EDGE device and follow the CALMS setup procedure with correct sensor setup – use IQ table.
- Verify all readings with CALMS and sensors and confirm receiving proper values by filling IQ table.
- [If there are no charts and values in CALMS inspect page please send email to \[support@calms.com\]\(mailto:support@calms.com\) with system name and add support user the system. Attached photos of sensors setup page and connection connector with attached signal list and sensor manual.](#)



If you request assistance from the CALMS before completing the final checkbox steps, we will charge you the hourly rate for support. Support costs are published in the CALMS price list.

MODBUS TCP IP ETHERNET SENSOR CONNECTION

CAL-EDGE has one standard RJ45 port used to implement TCP/IP connection. Supported protocols so far are: MODBUS TCP/IP, ADS and OPC UA. CAL-EDGE device has pre-configured fixed IP (192.168.0.102) in case there are not any DHCP servers in the network. If DHCP server is present in the network CAL-EDGE device will obtain IP from DHCP server.

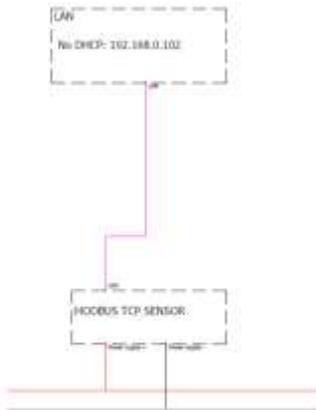


This port can also be used to connect device to the internet in case of 4G modem failure or low signal strength.



For ethernet connection use sensor supplier cables or when creating your own cable make sure that shielded twisted pair (STP) is used
Max length for all Ethernet cables: 100 meters.

For connecting multiple sensors to one CAL-EDGE use industrial routers .



MODBUS TCP/IP - Checklist

- Install sensor and connect power supply (check sensor manual), confirm that sensor is showing correct measurement on its local display (if provided)
- In case of multiple sensors, use industrial switches to establish a network of devices
- On each connected sensor in the network set the correct IP address. Each sensor must have assigned unique IP address
- Prepare IQ (Instrumentation Qualification) table with signal names and all MODBUS communication settings (template can be found on www.docs.calms.com)
- Connect PC to a network and test MODBUS readings of all sensors and confirm receiving proper values by filling IQ table
- If there are no readings or wrong values on PC MODBUS tester, double check communication settings and ethernet cables. In case readings are still not available contact sensor supplier.
- When all the readings on the PC are correct connect CAL-EDGE device to a network and follow the CALMS setup procedure with correct sensor setup – use IQ table.
- Verify all readings with CALMS and sensors and confirm receiving proper values by filling IQ table.
- [If there are no charts and values in CALMS inspect page please send email to \[support@calms.com\]\(mailto:support@calms.com\) with system name and add support user the system. Attached photos of sensors setup page and connection connector with attached signal list and sensor manual.](#)



If you request assistance from the CALMS before completing the final checkbox steps , we will charge you based on hourly support rate. Support costs are published in the CALMS price list.