# CALMS BASIC AUDIT GUIDE



CALMS D.O.O. / CALMS USA / CALMS NORDIC AB



- Device CAL-EDGE-8 with LTE 4G modem,
- Ethernet,
- Modbus RTU RS485,
- Modbus TCP/IP,
- 8x analog inputs 4-20mA,
- Explorer case CA,
- 4x CT Rogowski coil for 4 compressors (500A / 20mA),
- 1x Pressure transmitter (SML-10),
- 5x AI extension cable (10m),
- 3x ope n end short cable (0,5m) with connector for 4-20mA
- Optional accessories also available.







# Recommended equipment:

- Personal safety gears (helmet, googles, ear muffs, shoes, gloves...),
- Personal hand tool,
- Smart phone with assessment app and photo,
- Multi-meter and current clamp meter,
- Pipe diameter measuring tape.



# **1. CONNECT YOUR CAL-EDGE DEVICE**

- 1.1. Connect the antenna to CAL-EDGE device.
- 1.2. Connect the device to power supply. When device is successfully connected two LED lights will turn on (ON&COMM).



**LAN**: LAN port is used to connect device to any other TCP/IP protocol capable device (MODBUS, ADS, OPC UA...). Port is also used to connect device on internet when communication through mobile network is not working. For connecting device to the internet through LAN port, a DHPC server must be installed in the network.

**ANT1**: Used for antenna connection with SMA connector. Mount antenna on the place with best signal reception possible!

**DC IN**: Power supply terminal. Device accepts voltage 9-24VDC. To properly connect power supply please check the electrical scheme.

**LED ON**: LED is green if device boots up properly. Green color should appear in approximately 10 seconds after device is power supplied.

**LED COMM**: LED becomes green when device gets connection to the internet. It may take a few minutes (depending on signal strength). Device is in normal condition when both LEDs are green.

**J1**: Terminal is used to connect RS485 fieldbus. To properly connect sensors to RS485 please check the electrical scheme. Be careful when wiring sensors to device. Improper connection may lead to device damage. Always make sure to screw plug to the header to avoid unintentional disconnection!

**A1-A8**: Connectors used for field sensors connection. When using open-end cable (CAB-SENSOR) double check the connection. Improper connection can damage the device. Power supply voltage also powers connected sensors. Choose input voltage (VDC IN) required by sensors: commonly it's 24VDC.



Device supports: analog 4-20mA sensors, MODBUS RTU and MODBUS TCP sensors.

## Analog 4-20mA sensors

Step 1.

Connect cables on white dots.



Step 2. Tighten the cable with nut.



We recommend that you connect the individual sensors as follows:

- A1 Wet Pressure A2 Dry Pressure A3 Compressor Current C0.1 A4 Compressor Current C0.2 A5 Compressor Current C0.3
- A6 Compressor Current C0.4
- A7 Option Flow
- A8 Option Dew point -



NOTE: If you do not have a specific sensor, leave the analog input empty.

# MODBUS RTU and MODBUS TCP IP sensor

To connect sensors to the device please check electrical scheme





# 3. SETTING UP CALMS SYSTEM ON THE CALMS PLATFORM

- 1. Open CALMS https://app.calms.com/ and login with your account.
- 2. Set up your account.

CALMS	■ My account ■ Settings			
System -	Sove			
Multi-system Admin menu	Locale (language, date	and time format)		
My account	English (Other)			~
Settings Account	Display unit sele	ection		
Notifications	Apply predefined profile *	kwh		
	Flow	m²/min		
	Length	m		
	Mass	kg	*	
	Mass flow	kg/s	~	>

3. Create new system on the CALMS platform and start with setup.

			Manager m	nenu					
			- 5ystem 1.	3					
	System -	Π	Create new sys	tem Export all I	pages				
	Multi-system								
	Manager menu		0 Demo CAS Nordic	CALMS Air Inc.	95	3*	5	3	
	My account			71 05140	-1				2.
=	Systems		1 DEMO /bar sp. z o.o. SP	/bar DEMO	95 95	5	1.	1.	System name
**	Users		1 Demo CAS	CALMS Air Inc.	75	1•	1•	1•	
	Companies		Europe						Company
-	Billing		2 Demo CAS	CALMS Air Inc.	ಕ	6•	5	5	Select New
			USA						Utility
									Compressed air
	2.1.1	Type sy	stem name				Compressed air		
	2.2.	Create	new company of	or select existing	) one, if it's alread		Electricity		
	2.3.	Select	utility				Heating		
	2.4.	Click o	on the CREATE button to complete system creation.						Water
									Air cooling
									Gas

When you create a new system, you are immediately redirected to the setup page of the system you created. The other pages are locked until you choose a subscription plan.



L. Choose your subscription plan, enter subscription duration and confirm it. Subscription plan provides various options based on the number of measured channels that are stored in the system. For more information about subscription plan click on button.

Subscription plan		
urrent subscription plan: Disabled		
easurement channels: 0/0 Julit: Deabled		
Control C	← Subscription plan details × Duration 1 ① years	
Subscription plan F Utility/tect - Adven only Subscription plan 8	Please other subscription duation New subscription period 9 Mar 2023 - 9 Mar 2024	
Aust Subscription plan XS 15 diameter-Permanent monitoring. Audit	Cancel CONFIRM	
Subscription plan S 33 discussi: Permisent monitoring -Audit		
Subscription plan M		

3.2. Fill in all data on the General page. Some information is crucial for the calculations. Use CALMS calculator to calculate compressed air cost.

General page			
CALMS = Setup	CAS Nordic - General Equipment Target	Channels	Permissions
his page contains basic system informat	ion.		
lystem name	Company	Utility	
Demo CAS Nordic	CALMS Air Inc.	Compressed air	*
efault currency	Timezone	Geo location	
EUR (Euro)	Europe/Ljubljana	46,032668	° 14,530163 °
compressed air cost Enter valid CA cost. 0,015 €/m² 🖬	Electricity cost Enter the valid electricity cost Unconfirmed 0,15 €/kWh Confirm		
rcommended compressed air cost: Europe 0.025 €/m³, USA 0.0067 ft²	Compressed air cost calculator		
Please check which value is         Unconfirmed           002 emission         relevant for your country.         Unconfirmed           0,022 kg/kWh         Confirm	Annual operating hours This value is important for different calculati	ons inside the system.	
lue dot means system data are not confi	med. Red dot means essential data is missin	g.	
General • Equipment •			

4. Add the device you will use to audit the system.

Device	Serial number		+ Add device
			†
CALMS Presentation device	300000214		H \$
			Click on Add device button     Select the device from the pop up window:
Select edge device		×	
CAL-EDGE-8 Demo		1910000068	



### 5. Draw P&ID scheme

5.1. Add compressors and air treatment equipment to the scheme and fill all compressors and equipments data.

4. EQUIPI	<b>1ENT PAG</b>	E - D	raw P&ID scheme - a	add compressor and	other equipment an	d sensors
	55		4.1. Use toolbar o	on the right side of th	e page	
	'+		1. Add compressor(s	) to the scheme.	Data sheet or measurement 🚱	÷
C.01		*	<ol><li>2. 2. Fill all compress</li></ol>	ors data	* Insert from equipment data sheet: Op	erating pressure at which the Max flow
$\frown$	$\bigcirc$ $\bowtie$		Compressor	🛢 Fill data 🛛 Images	<ul> <li>(capacity) and Full load power (electric datasheet.</li> </ul>	al consumption) were measured in the
( )	~			Тад	Operating pressure *	
$\langle \mathcal{A} \rangle$				C.01	bar	
$\sim$				Model	Full load power *	Max flow (FAD) *
	~ ^				KW Min load newer t	m*/min
	9				kW	m³/min
	~		Manufacturer	Year of manufacture	Power at zero flow *	
	AP		•		kW	
	$\lor$ $\bowtie$		Туре	Control type	Cos(fi) full load	Cos(fi) unload
			\$	\$		
	()		Cooling		voitage	
			•	Newladersen	· · ·	
	1 A 1 A		kw	har	NOTE: Compressor data is	s particularly important if you want to
	ΨΨ				calculate the nower, flow	and digital states of the compressor
			Data sheet or measurement 🚱	~		and argital states of the sompressor
					(running, loaded, alarm).	
			Add-on options	~	You can find them in the	compressor data sheet or you need to
			Properties +		make test measurements t	o obtain them.

5.2. Add sensors to the scheme and configure it.

You can add analog (4-20mA) sensors, MODBUS RTU (RS485) and MODBUS TCP/IP sensors.

+	1. Add sensor 2. Select quan 3. Select sens	to the scheme. Itity Ior model	
) 🖂	Select sensor model		×
-/0	Search	Quantity Manufacturer           Quantity         Manufacturer           Pressure         v         -all-         v         € 1 2	Page size
	Manufacturer	* Model	\$
$\checkmark$	CAA	Dew Point Sensor - ADC Series	
× •••	CAA	Flow meter - FLP Series	
	CAA	Dew Point Sensor - K Series	
	CAA	Pressure sensor - PRE11 Series	
	CAA	Dew Point Sensor - Q Series	
	Comate	PTF-500 Pitot tube	
	Comate	PTF-520 Pitot tube	
	CS Instruments	Flow meter - VA500	
	Eyc-tech	FTM06 - Series Velocity Flow Transmitter	
	FCI Fluid Components	Flow meter FCI ST80	
_	FCI Fluid Components	Flow meter FCI ST51	
	MOXA	MOXA R1210 (Event Counter)	
	MOXA	MOXA R1210 (Event Counter) (INTEGRAL)	

#### EQUIPMENT PAGE - Add sensors to the scheme

## 5.2.1. Configuration of analog sensor

#### Configuration of analog (4-20mA) sensor

Meritve HPE-101	\$	Sensor is conner Meritve H	ected to device HPE-101	
PI.01 Standard4-20mA			System pressure	
Use as	Custom labe	el		
System pressure 🔶	System pre	essure		
Unit Custom				
bar 🗸				
Input	8	Select correct this is the innu	analog input - t where you	
	×	have to connec	t sensor.	
A2 -			State strategies and	
A2		Output max		

After selecting quantity you need to select sensor model. There are many sensors available in the pop-up window that can measure the selected quantity.

ou can add analog (4-20mA) sensors or MODBUS TU or MODBUS TCP/IP sensors.

NOTE: If you have analog sensor which is not on the list select Standard 4-20mA sensor<sup>\*</sup> and configure it manually. Configuration instruction can be found below. If you have MODBUS sensor which is no on the list please contact CALMS technical support and they will add it to the 2ALMS database. Prepare a user manual with modbus registers of the sensor and send it to us.

Use as: Select what that measure will represent in your system. For example: If pressure transducer measures system pressure, this channel(measured value) will have system pressure 'label.\* If pressure transducer measures the pressure before dryer, this

channel will have the label "wet pressure".

Custom label: self explanatory.

Unit: self explanatory.

Input: Select on which analog input sensor is connected. Output min / Output max: range of the sensor.





5.2.2. Configuration of MODBUS RTU sensor

Edge device				Comm port, baud rate, data bits, stop bits and parity are
Meritve HPE-101	\$			modbus communication parameters:
Unit ID		Comm port		Modbus address and modbus communication parameters
1		Standard RS485 (default)	~	must be exactly the same as on the sensor. This
Baud rate		Data bits		information can be found in sensor's user manual or in the
38400 (default)	~	8 (default)	~	settings of the sensor.
Stop bits		Parity		
1 (default)	~	none (default)	~	

#### Configuration of MODBUS RTU (RS 485) sensor

# 5.2.3. Configuration of MODBUS TCP sensor

Configuration of MODBUS TCP/IP sensor							
Connection configuration	n (VPFlowScope M)		Enter the host IP address and port.				
Edge device							
Meritve HPE-101	\$						
Unit ID	Host						
1							
Port							

6. Check device dashboard and make sure you are receiving signals from sensors.

To access the device dashboard, follow these steps:

Setup – General page – Device – click on \* button. You will be automatically redirected to device dashboard.

Status tab – general device information: signal strength, communication, version, latest device logs.

Settings tab – device's name, users of the device and system/s in which device is added.

Device	Serial number	+ Add device
CALMS Presentation	300000214	II 🗢



Device dashboard - inputs

• Ure									
Sensor	Channel	Input	Last value	ſ					
0 Demo CAS Nordic			Number of enabled inputs: 14						
C.01 Compair160 - CH160	C.01 Loaded	StandardDigitalInput	0						
C.01 Compair160 - CH160	C.01 Running	StandardDigitalInput	0						
C.01 Compair160 - CH160	K.01 Alarm	StandardDigitalInput	0						
C.02 IR R110 - R110-7-AC	C.02 Running	StandardDigitalInput	0						
C.02 IR R110 - R110-7-AC	C.02 loaded	StandardDigitalInput	0						
C.02 IR R110 - R110-7-AC	K.02 Alarm	StandardDigitalInput	0						
C.03 Compair 132 - CM132	K.03 Alarm	StandardDigitalInput	0						
C.04 Kaeser 132 - DSD 200 - 125 psig / 460V/3ph/60Hz	K.04 Alarm	StandardDigitalInput	0						
FT-01 System Flow.01.01 - Standard 4-20mA sensor	System flow	Standard4-20mA	23,73 m³/min						
JI.01 - Standard 4-20mA sensor	Power C.01	Standard4-20mA	0,58 kW						
JI.02 - Standard 4-20mA sensor	C.02 Power	Standard4-20mA	1,42 kW						
JI.03 - Standard 4-20mA sensor	C.03 Power	Standard4-20mA	128,09 kW						
JI.04 - Standard 4-20mA sensor	C.04 Power	Standard4-20mA	0,69 kW						
PT.01.01 - Standard 4-20mA sensor	Pressure System	Standard4-20mA	6,98 bar						

# 4. ELECTRICAL SCHEMATICS

# 4.1. Power supply wiring scheme



## 4.2. RTU-485 wiring scheme





MODBUS TCP wiring scheme



# 4.4. CONNECTING ACTIVE AND PASSIVE SENSORS USING OPEN-END CABLE

Open-end cable (CAB-SENSOR) is used to connect custom 4-20mA sensors to the CAL-EDGE-8 device. When using open-end cable to connect a custom sensor, double check the connection. Improper connection can damage the device.

Passive (2-wire) sensors are powered through a current loop. Active sensors (3-wire or 4-wire) are powered separetely. Please, check the table below before wiring.

Color coded wire on the open-	Number coded wire on the open-	Description
end cable	end cable	
Brown	1	24VDC
White	2	OVDC
Yellow	3	4-20mA signal
Green	4	Not used





# 5. CAL-EDGE-8 device went offline - TROUBLESHOOTING

Please reference the below for troubleshooting when your device is offline:

- 1. Check if the device is powered on,
- 2. Check the Status LED make sure that LED is rapidly flashing,
- 3. Try restarting the device, wait at least 10sec before the device go online and then observe status of the device.

If your device continues to drop offline, please contact support team for further assistance and inform us of the serial number of the device, which you can find on the back side of the device.

Contact: <a href="mailto:support@calms.com">support@calms.com</a>

