TECHNICAL DOCUMENTATION

vibration, sound, ultrasound, temperature and magnetic field sensor with internal signal processing and wired and wireless interface

CL@VE

Device version: 2801

Software version: 00.00.07

Document version: 16.05.2024

office@alitec.pl

Lodz, 2024

1. IMPORTANT USER INFORMATION

Safety symbols used in this manual:

Attention! To use the instrument safely, read the relevant notes and recommendations contained in the manual.

Attention! Risk of electric shock.

ATTENTION: Follow the rules for the safe use of lithium-ion batteries. For safety reasons, the battery should only be replaced by an authorized service center! Failure to follow them can cause skin irritation, severe corrosion damage, chemical burns, fire and/or explosions.

CL@VE has been designed and manufactured in compliance with safety regulations. However, its trouble-free operation and reliability during use can only be ensured by adhering to the general safety rules and specific instructions in this manual.

Use of the device other than for its intended purpose and as described in the operating instructions may endanger or damage it. Read the operating instructions carefully before taking measurements.

Use CL@VE in environmental conditions that do not comply with the specifications may lead to a reduction in safety and performance. In particular, pay attention to the possibility of water vapour condensation if the unit is moved from a cool to a warm environment.

The main applications of the instrument are the measurement of vibrations, ultrasound, temperature and magnetic fields. Use extreme caution when measuring the parameters of equipment supplied with voltages higher than 60 VDC, 30 VACrms or having accessible moving parts.

If the appliance has been damaged, operates in a manner inconsistent with the instructions for use or has been subjected to environmental conditions other than those specified for an extended period of time, it must not be used. Re-use is possible after servicing by the manufacturer.

Do not use the device if any of its components have been damaged.

Do not, under any circumstances, feed into the device signals whose values (including instantaneous values) exceed those specified in its specifications. This provision also applies to the supply voltage.

Before connecting the signal cables to the device, make sure that they are not damaged and have been properly connected to the signal sources.

In no event shall Alitec be liable for any damages whatsoever, in particular: direct, indirect or consequential damages, including loss of profits, additional costs incurred, inability to use the of the product, resulting from the functioning or failure of the device, even in the event that the possibility of their occurrence has been notified.

2. PROTECTION OF THE ENVIRONMENT

The device is subject to the WEEE Directive 2012/19/EU on waste electrical and electronic equipment.

and electronic equipment. The crossed-out wheeled garbage can symbol indicates that the product must be disposed of separately and should be delivered to an appropriate waste collection point. Do not dispose of it together with household waste.

CL@VE is equipped with a 3.7V lithium-ion battery (type INR 18350) with a capacity of 1200mAh. It meets the UN38.3 standard. Dimensions of the battery: diameter: 18.1mm, height: 35mm.

For further information, contact your company representative or local waste management authorities.

3. COMPLIANCE WITH APPLICABLE REGULATIONS

Alitec declares the compliance of the measurement system using CL@VE devices with EU regulations, in particular:

1. Directives:
    a. 2014/53/UE (RED)
    b. 2014/30/UE (EMC)
    c. 2014/35/UE (LVD)
    d. 2015/863/EU (RoHS III)
2. Standards:
    a. PN-EN IEC 62368-1:2020-11
    b. PN-EN IEC 62311:2020-06
    c. PN-ETSI EN 301 489-1 V2.2.3:2020-07
    d. PN-ETSI EN 301 489-17 V3.2.4:2021-05
    e. PN-ETSI EN 300 328 V2.2.2:2020-03
    f. PN-EN IEC 61000-6-4:2019-12
    g. PN-EN IEC 61000-6-2:2019-04
    h. PN-EN 61010-1:2011
    i. EN IEC 63000:2016

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5. WIRELESS VIBRATION SENSOR CL@VE

There are plants where there are no abrupt stops in production lines. This level of reliability is reached by teams who constantly monitor the technical status of machines and detect the earliest signs of growing failure. Repairs are completed during process downtime or maintenance shutdowns. If you want to take control of breakdowns, you'll need a dependable, trusted instrument. In the midst of daily duties, the convenience of use and automation of data gathering and analysis will be critical for you. Given the wide range of equipment and related challenges, you will focus on the solution's versatility and scalability. That's exactly what CL@VE is.

Vibration levels rise when machinery moving parts are damaged or insufficiently greased. Characteristic patterns in the vibration frequency spectrum enable you to identify different types of damage and correlate them with certain machine parts. By observing a rise in diagnostic parameter readings, you may estimate when a machine will stop due to a fault. CL@VE captures the vibration signal using two sensors which have different parameters. Both are low-noise acceleration sensors built with microelectromechanical systems (MEMS) technologies. The basic 3D accelerometer available in CL@VE INDUSTRIAL version is appropriate for evaluating the overall technical condition of machine components. You may readily compare the findings to the criteria outlined in the standards. Measuring systematically will result in a faster growth in the levels of the measured values. It will indicate wear on the monitored machine components. Using a vibration range of ±16 g and a maximum frequency of 6.4 kHz, you may spot typical defects like as:

- unbalance and eccentricity of rotors,
- shaft misalignment,
- mounting clearances and cracks in machine components,
- damage and misalignment of gear wheels and gear belts,
- damage and dirt on turbines and fans,
- electrical damage to motors,
- critical speeds, resonances.

Before investigation, consult the manual. In it, we advise you on the best approach to attach CL@VE and use the omnidirectional sensor.

You can expand your basic version of CL@VE by enabling more options.

The **PRECISION** license allows you to detect more types of damage at an earlier stage of development. Once you activate it, one of the world's top micro-machine sensors will be tasked with monitoring vibrations in the Z direction. You'll look into frequencies up to 15 kHz. Damage to rolling bearings and gears will be easier to detect. With 24-bit signal processing, you can analyze vibrations with very small amplitudes. You will be able to detect unbalance of rotating machine parts at earlier stage. It will also be possible to measure the vibration of structural components of buildings and vibration of the ground. Your CL@VE can monitor really high accelerations reaching ±50g.

The **SOUND** license activates a built-in acoustic transducer with a measurement range of 15 Hz to 51.2 kHz. It can be used in the low-frequency region to measure noise levels and perform vibroacoustic testing. Ultrasonic analysis is said to be the oldest approach for detecting bearing lubrication deterioration or damage. Ultrasonic measurements will help you locate leaks in compressed gas systems. If cavitation is present in your machinery, the **SOUND** option will allow you to determine its severity. This license is worth considering if you need to identify the existence of incomplete discharges in insulators, transformers or drives.

The built-in magnetic flux sensor is highly sensitive. It allows to determine world geographic directions. However, this application was not the most crucial to us. The magnetometer responds to field variations of up to 10 kHz. You can use it to investigate the recurrence of the magnetic flux emitted by the winding of a electric motor or power generator. An uneven distribution suggests its failure or problems with the power circuits. The rotational speed of the drive can be determined on the basis of the magnetic field sensor response. It is incorporated it into the vibration spectrum analysis, when characteristic fault frequencies are searched.

CL@VE as a mobile measurement device for off-line diagnostics. Your smartphone or tablet running mVIDIA or MADI software will then serve as an user interface. Magnetic bases glued to the machine's bearing housings ensure that the sensor is firmly attached and properly aligned in 3D space. You can reach the measurement point defined in the plant structure by scanning a QR code engraved on each magnetic base or NFC tag. A suitable location in the plant structure of the VIDIA.cloud or VIDIA.server environments will receive the measurement results. You just need to make a measurement once at each spot. The software will automatically pick the sensor settings so that all of the required parameters are calculated. You don't have to worry if you forget to perform any analyse. You can easily do it later – all source signals are recorded on your mobile device and transmitted to the cloud in real time. The sensor's built-in Li-Ion rechargeable battery allows you to use it for an average of 8 hours. Advanced power-saving algorithms extend this time to several hours of continuous use when you walk from machine to machine.

If the machine you are examining is operating under changing conditions or symptoms of damage appear randomly, you can leave CL@VE unattended for longer. Keep an eye on the ACQUIRE license, which provides 8 GB of built-in data storage. Once you specify the recording parameters, the sensor will wake up at specified intervals and collect time waveforms from all sensors. If you provide permanent network access, it will send the results to the VIDIA server without your assistance. If there is no network access at the measurement site, take CL@VE with you and connect it to the server via the network available in your office.

In CL@VE autonomous operation, you will certainly find the MONITOR license useful. Upon its activation, the sensor itself will begin to determine the diagnostic parameters you have defined. In this way, the most important objects in the plant are supervised continuously. CL@VE will respond to exceeding alarm thresholds by switching on the built-in relay and will immediately send measurement data to the server. If you use VIDIA.cloud, the system will inform you of the danger via SMS and/or e-mail.

CL@VE with an active MONITOR license will integrate perfectly with the automation systems in your plant, which you are just introducing to the world of Industry 4.0. In addition to the Wi-Fi wireless interface (which you can disable), the sensor is equipped with a wired network card supporting PoE (Power over Ethernet) and Modbus/TCP-compliant communication. After being integrated into the network infrastructure, CL@VE will send the determined parameters to the automation system, assessing the condition of selected machine components. You will display the results obtained, including alarms, on the synoptics screens and use them for even better management of plant operations. Remember that in the case of alarm events, you can still send the measurement results stored in the sensor memory to the VIDIA environment and perform (or have performed) detailed fault diagnostics.

If you monitor equipment operating in multiphase production cycle or non-constant speed, use a rotation or position sensor to trigger and synchronize the measurement. You can connect it to CL@VE digital input.

CL@VE will soon be used in conjunction with a wireless laser shaft angle sensor for multi-plane rotor balancing. We are working now on the dedicated application.

6. TECHNICAL SPECIFICATIONS

Sensor types and measurement ranges	**MEMS 3D vibration acceleration sensor:** • measuring range maximum ±16 g • frequency band 0 ÷ 6.4 kHz • noise level up to 75 µg/√Hz for ±2 g range **MEMS 1D vibration acceleration sensor for Z direction (optional):** • measuring range ±50 g • frequency band 0 ÷ 15 kHz • noise level up to 25 µg/√Hz for ±50 g range **MEMS microphone:** • Frequency bandwidth of at least 15 Hz ÷ 51 kHz • 120 dB SPL (20 Pa) • signal-to-noise interval for the beginning of the ultrasonic band (19 kHz) at least 76 dB **Magnetic field strength sensor:** • measuring range 3T • resolution of 0.01 mT • frequency range 10 kHz **Temperature sensor:** • measuring range -30 ÷ +110 °C
Wireless communication interface	IEEE 802.11b/g/n Wi-Fi, WPA2 Frequency range 2.4 to 2.4835 GHz, maximum transmitted power 19.5 dBm@11b, 16.5 dBm@11g, 15.5 dBm@11n
Wired communication interface	IEEE 802.3af/at Ethernet 10/100Base-TX (PoE)
Communication protocols	Modbus/TCP, ATC MESbus
Software	mVIBE, mVIDIA, datACQUIRE, VIIA.cloud, VIDIA.server Optional: APIs, Matlab control functions, software functions customized to the application
Working and storage conditions	Temperature -10 . +70 °C with Li-Ion battery temperature -20 . +90 °C with Li-SOCl battery$_2$ humidity: 10..100% RH
Degree of protection	IP67, dustproof housing, resistant to immersion in water (with protected microphone channel)
Power supply	replaceable Li-Ion 3.7V/1200mAh battery with integrated 5V/550mA charger Alternatively: Li-SOCl battery$_2$ 3.6V/2100mAh Built-in advanced power saving mechanisms and battery protection against overload or complete discharge
Assembly	with an M6 screw at least 47mm long
Geometric dimensions and weight	40 x 42 x 27 mm (SxWxG), 110 g

Due to the continuous development of our products, the above specifications are subject to change without prior notice.

7. CL@VE SENSOR HOUSING AND ITS COMPONENTS

The sensor is rectangular in shape and has dimensions 40mm x 42mm x 27mm. Its housing is made of anodized hard aluminum alloy. The front of the unit has a keypad with built-in LED indicators that show the state of the unit and the object being supervised (function available from June 2024). A battery compartment lid, a mounting hole and information about the sensor and vibration measuring directions were placed at the top of CL@VE. The sensor rear contains power, peripheral, and Ethernet interface ports.

ATTENTION:

CL@VE rechargeable battery is may not be replaced or removed from the device. It is charged directly by CL@VE after 5 VDC external power supply connection. Use the dedicated M8 to USB A power supply cable.

SENSOR HOUSING

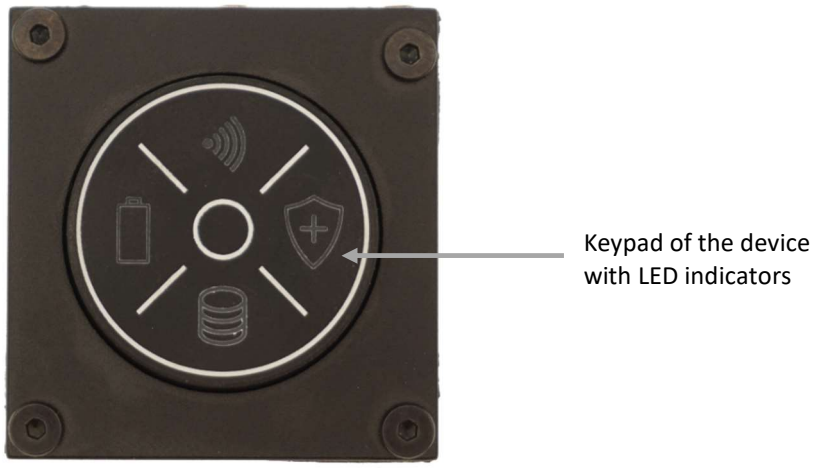


Fig. 1. View of the front panel including the keyboard of the device

Fig. 2. View of the upper part of the device housing

Fig. 3. View of the right side of the device housing

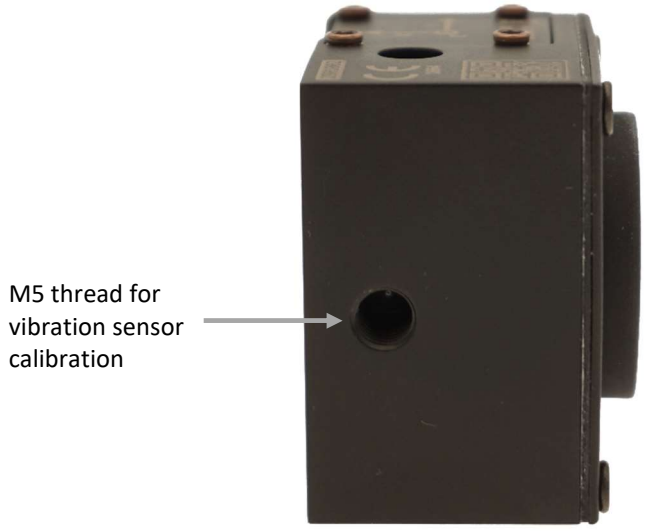


Fig. 4. View of the left side of the device housing

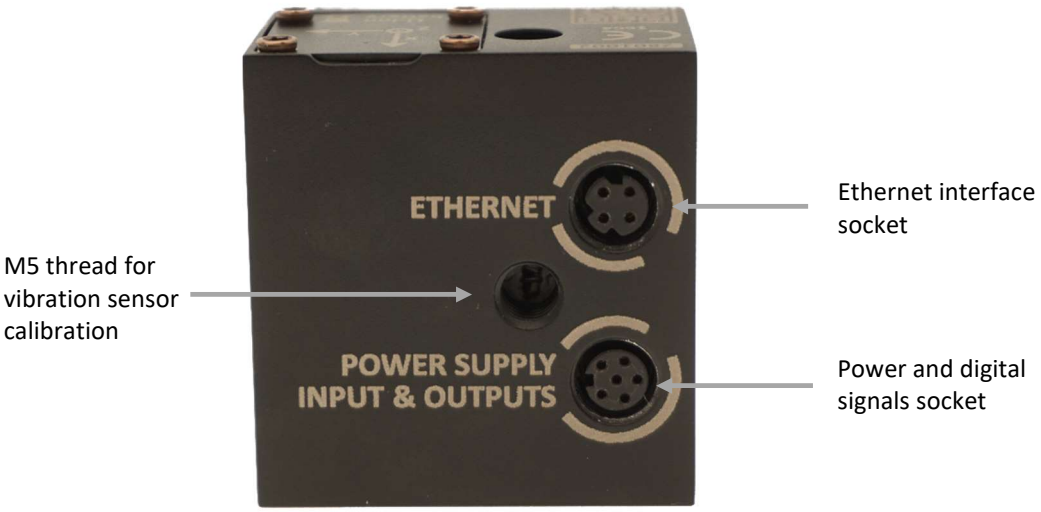


Fig. 5. Rear view of the device

Fig. 6. View of the underside of the device

LED INDICATORS

LED indicators on CL@VE sensor keypad provide information on the current status of the sensor itself, as well as the supervised object.

Fig. 7. View of CL@VE sensor keypad

The meaning of the backlight colors of each indicator is shown below.

	Power status	
	Extinguished	Device without external power source (device powered by battery)
	Red	Connected power from an external source, charging the battery
	Orange	Connected power supply from an external source, battery charged to a level that allows safe use of the sensor
	Green	Connected power supply from an external source, battery fully charged
	Wi-Fi connection status	
	Extinguished	Wi-Fi interface disabled
	Red	Wi-Fi interface on, establishing or not connecting to the access point
	Blue	Wi-Fi interface enabled, valid connections to the access point
	Green	Wi-Fi interface enabled, connection to the app
	Light green	Wi-Fi interface enabled, data transmission
	Status of the supervised object (exceeding the limit threshold of any analysis)[*)]	
	Extinguished	Monitor inactive
	Green	No alarm, monitor active.
	Bright yellow	Alert 1
	Orange	Alert 2

	Red	Alert 3
	Registration status of the connection to the host system for TCP/IP and Modbus/TCP protocol[*)]	
	Extinguished	Autonomous operation mode disabled
	Green	Standalone operation mode enabled (monitor on)
	Light green	Recording signals in internal memory, sending data to server

Fig. 8. Example of operation of LED indicators

(*) Depends on the sensor functions activated.

CONTROL KEYS

DIP switches have been placed under selected LED indicators, performing the functionality described below.

Power supply
A single short press activates the internal power.
A single long press (more than 5 seconds) turns off the sensor (software lock is possible)

Wi-Fi / Ethernet connection
Holding down this key together with down Status Key for more than 5 seconds will restore sensor factory default settings

Status of the supervised machine component (the highest exceedance of any analysis)
Used with Connection Key to restore sensor factory default setting

CONNECTORS

Two M8 connectors have been placed on the rear panel. They are used to connect the Ethernet communication interface, power supply, input signal feed and output signals from the sensor.

The distribution and functions of each contact are shown in the table.

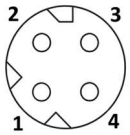
	Contact 1	Tx+	PoE +
	Contact 2	Tx-	
	Contact 3	Rx +	PoE -
	Contact 4	Rx -	

Fig. 9. Ethernet PoE connector and pinout

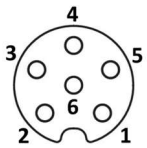
	Contact 1	Phase marker input (2.5 ÷ 30V, input resistance 30k)Ω
	Contact 2	GND of the phase marker and power supply
	Contact 3	Digital output (NO contact for power supply on pin 5)
	Contact 4	Current loop analog output 4-20mA (loop supply from pin 5)
	Contact 5	Power input for current loop and digital output (maximum 28V)
	Contact 6	Two-way power supply: • CL@VE sensor power input 5.0 ÷ 5.5V, current consumption minimum 600 mA • power supply output for external sensors 3.3V, capacity 10 ÷ 70 mA

Fig. 10. Connector for power supply and input and output signals

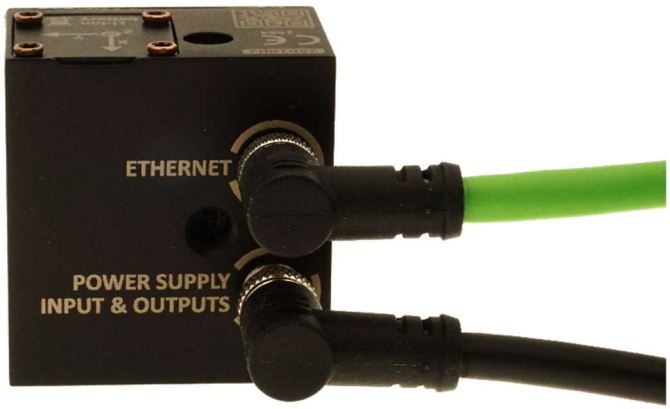


Fig. 11. Example of device connection

8. INSTALLATION OF THE DEVICE

You must position CL@VE on a stationary component of the machine being tested. For this you can use, among others a magnet or screw (47 mm). When doing so, pay attention to the surface of the analyzed device. Ideally, the sensor mounting area should be flat and smooth. If the part of the machine to which you are mounting CL@VE is uneven or rough, you can glue a stand to which you will then attach the sensor (for example, with a magnet). The optimal solution is to plane the mounting point so that you can be sure that the surface of the analyzed machine will be perfectly even. If the site of the machine under study is rounded, then use a special magnet for rounded surfaces, so that CL@VE is firmly attached and does not move. Any uncontrolled movement of the sensor can cause resonance (and thus the measurement result will be wrong!).

When choosing the method of sensor installation, remember to take into account its effect on the limiting frequency band of the measured vibrations, resulting from the phenomenon of resonance of the connection.

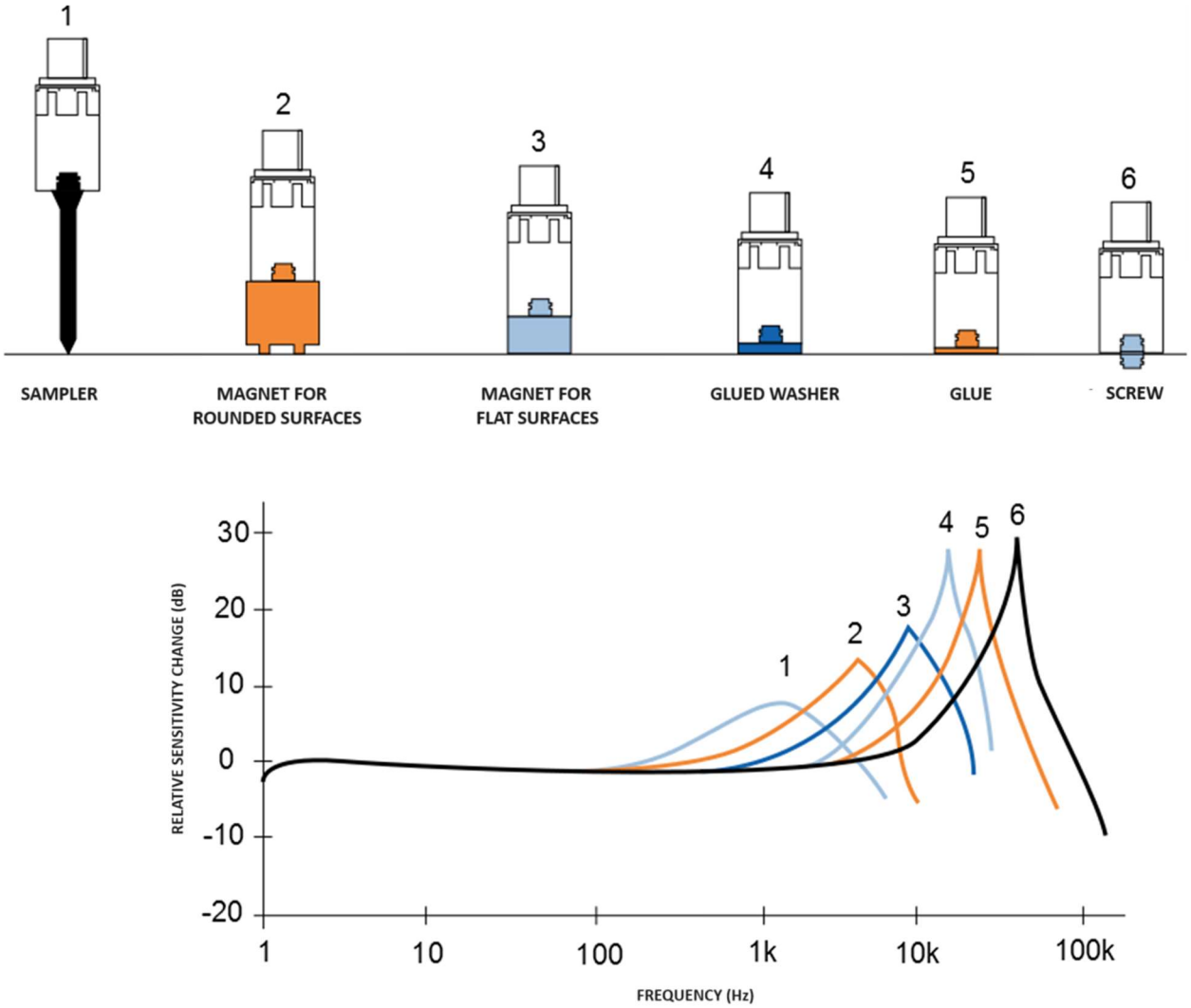


Fig. 12. Effect of sensor mounting method on frequency range

When selecting a sensor direction, it is also crucial to track the direction of forces generated by moving machine components. This direction is determined by both the design of the machine and the type of possible damage. Take measurements in the direction in which the greatest force occurs. In some cases, full diagnostics requires measurements in all possible directions, although the most common focus is on vibrations in the radial direction relative to the axis of rotation of the primary machine shaft.

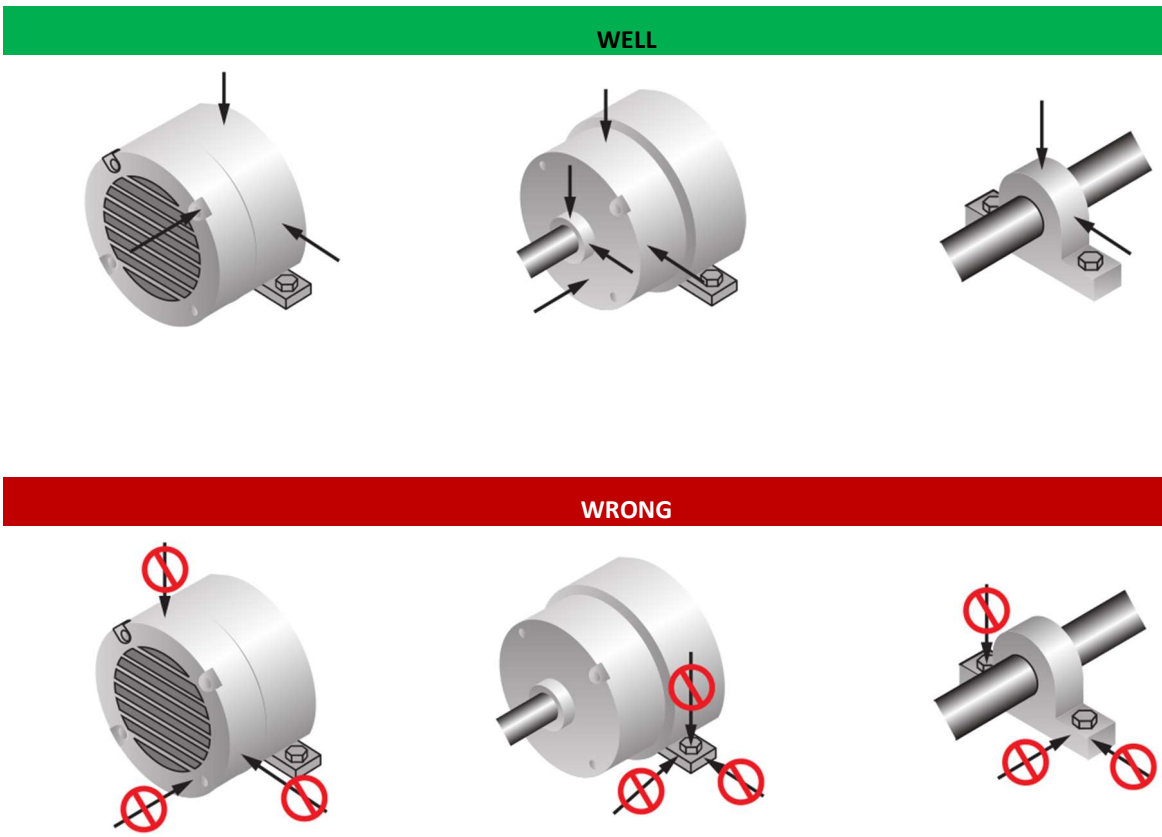


Fig. 13. Installation of the sensor

ATTENTION:

If you are utilizing the PRECISION version of CL@VE, you should align the sensor so that the direction most relevant to your research or the direction with the smallest amplitude of the detected signal coincides with the sensor's Z-axis.

If you use CL@VE mounting with a screw (or a magnet that is screwed with a screw) make sure that it is made of non-magnetic material (such as aluminum). Otherwise, it may affect the magnetic field measurement result.

If you use a magnet to mount CL@VE on rounded surfaces, keep in mind that the acoustic channel will be vulnerable to contamination (e.g., dust) and moisture, as well as external noise sources.

When mounting the sensor on the machine under test, you must ensure that the microphone is not obstructed. If you use various types of mounting kits (such as a magnet), make sure they include a hole that will be an extension of the acoustic channel. At the same time, make sure that the connection between CL@VE and the machine under test is as snug as possible. If necessary, you can seal this connection (for example, using a gasket). Otherwise, the microphone built into the sensor may pick up other sounds and thus affect the analysis.

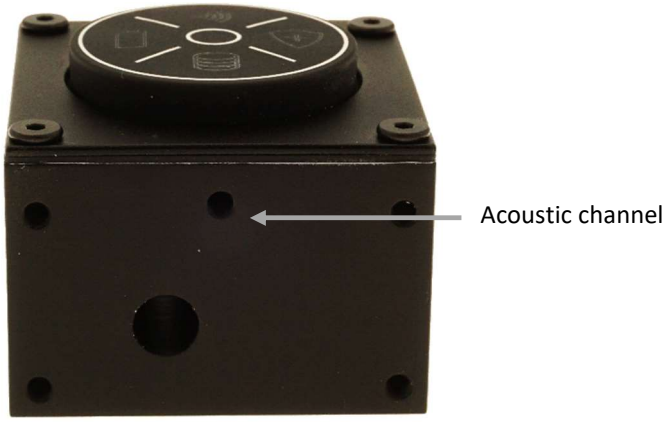


Fig. 14. Acoustic channel

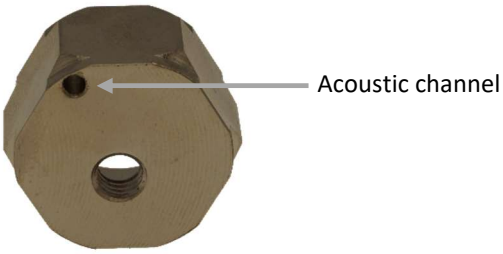


Fig. 15. Magnet with prepared acoustic hole

EXAMPLE OF ATTACHMENT OF THE MAGNET STAND TO THE SENSOR

If you want to use the magnet as a form of attachment of the sensor to the machine under test, you need to properly attach it to CL@VE. To do this:

1. Place CL@VE on the rear panel with the connecting sockets facing downwards
2. Attach the magnet to the sensor in such a way that the acoustic holes overlap
3. Screw the magnet to CL@VE with a non-magnetic screw

1 2 3

Fig. 16. Attaching a magnet holder to the sensor

Below is a QR code with a link to an instructional video showing the correct attachment of the magnet to the sensor.

SECURE MOUNTING OF THE SENSOR TO THE MACHINE USING A MAGNET

Mounting CL@VE with a magnet ensures a strong and permanent connection between the equipment being tested and the sensor. However, a sudden and strong impact (due to magnetic attraction) can cause the instrument to become out of calibration. To prevent this, first apply the sensor with the magnet at an angle (only the edge of the magnet) to the mounting surface (1). Then gently and slowly straighten the sensor to an upright position (2). Disassembly of the device should follow the same procedure, in reverse order.

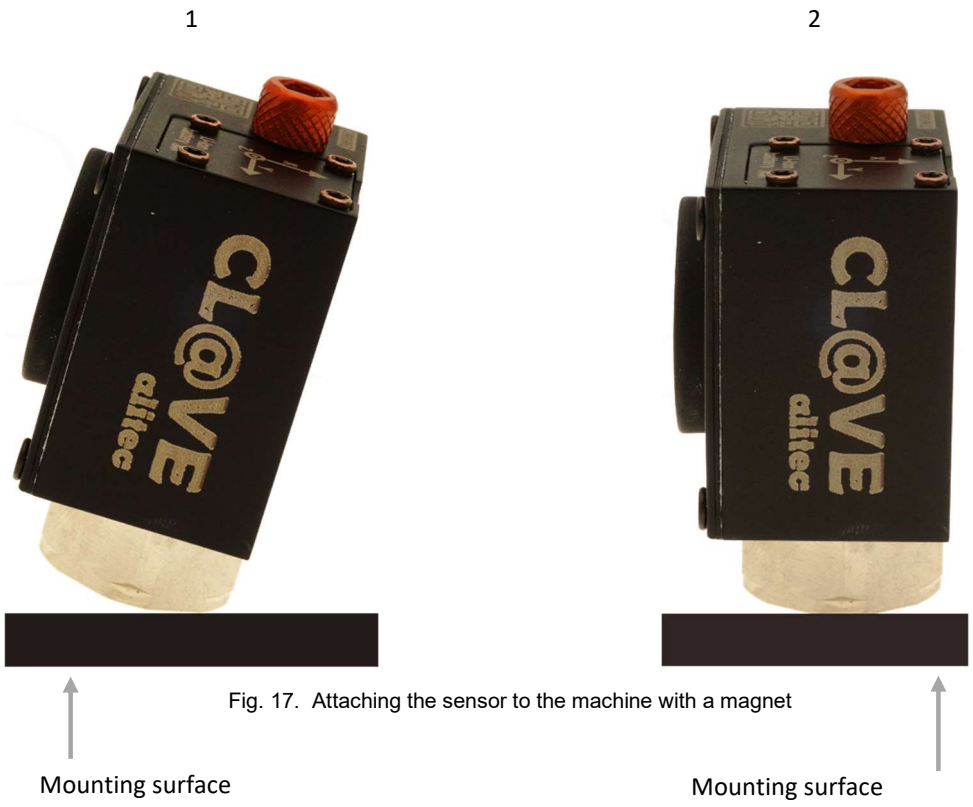


Fig. 17. Attaching the sensor to the machine with a magnet

9. MEASURING TRANSDUCERS

Some applications, do not automatically recognize the type of sensors with which CL@VE is equipped. Assigning a device channel to a measurement point will give you information about the numbers of available channels. In this situation, you will find the following list beneficial.

CHANNEL 1	VIBRATION SENSOR, Z-DIRECTION
CHANNEL 2	VIBRATION SENSOR, Y-DIRECTION
CHANNEL 3	VIBRATION SENSOR, X-DIRECTION
CHANNEL 4	SOUND PRESSURE SENSOR (MICROPHONE)
CHANNEL 5	MAGNETIC FIELD STRENGTH SENSOR, X-DIRECTION
CHANNEL 6	ROTATION SPEED SENSOR

VIBRATION SENSOR

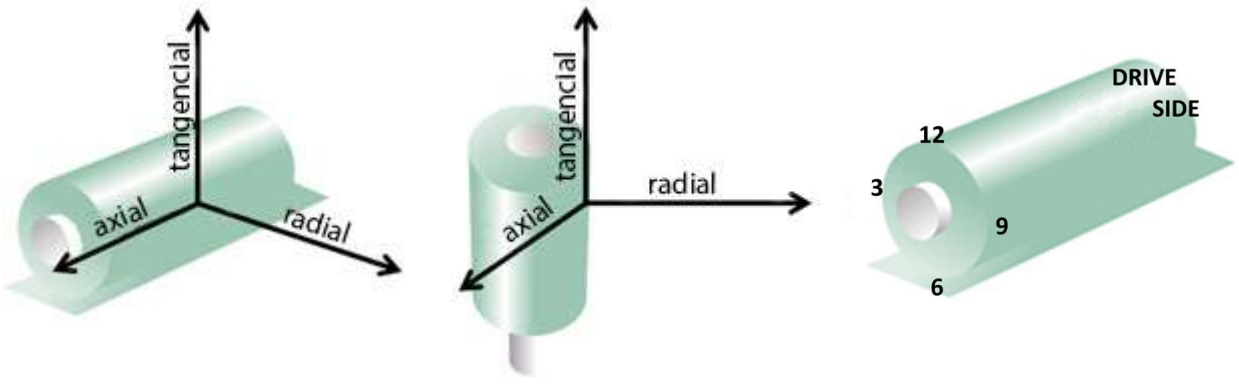
CL@VE is an advanced vibration monitoring device that uses micromachine accelerometers to record motion in three-dimensions. The INDUSTRIAL license, the basic version, has a sensor that can measure vibration acceleration up to ±16 g at frequencies ranging from 0 to 6.4 kHz. For applications requiring vibration analysis with higher amplitudes, up to ±50 g, and over an extended frequency range, from 0 to 15 kHz, and with better dynamics (lower noise floor), we recommend the PRECISION option. This option activates an accurate MEMS sensor that specializes in motion detection along the Z-axis.

You can use the vibration sensor for, among other things:

1. assessment of the technical condition of machinery.
2. analysis of ground vibrations.
3. vibration testing of building structures.

ATTENTION:

Because of the operating characteristics of accelerometers, the DC component depends on temperature.



MACHINE WITH HORIZONTAL AXIS OF ROTATION | MACHINE WITH A VERTICAL AXIS OF ROTATION | HOURLY MARKING OF THE SENSOR MOUNTING LOCATION

Fig. 18. The directions of forces generated by moving machine components

The vibration measurement direction marking including name of each direction was placed on the top surface of the sensor housing.

Fig. 19. Designation of vibration measurement directions

SOUND PRESSURE SENSOR (MICROPHONE)

CL@VE is equipped with an acoustic transducer with a measurement range of 15 Hz to 51.2 kHz. The microphone was placed at the bottom of the sensor housing. For acoustic measurements, the device's aperture should have direct access to the surface of the object or space under test.

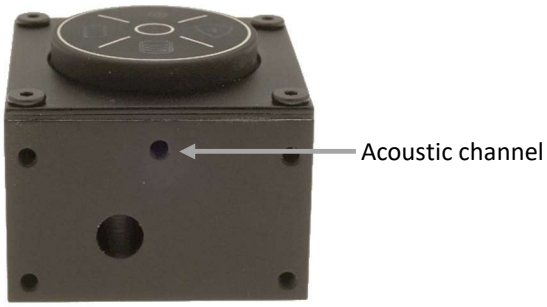


Fig. 20. Acoustic channel in the sensor

You can use the sound pressure sensor for, among other things:

1. Bearing condition assessments.
2. Leakage analysis of structures with compressed gases.
3. Measuring noise in the work environment.

ATTENTION:

Due to the wide range of processed frequencies, the microphone of CL@VE sensor has not been protected against liquid ingress. Its flooding or contamination with dust can lead to permanent damage!

When using the sensor in very humid environments and when exposed to splashing or immersion in liquid, seal the microphone connection to the surface of the test object or secure the microphone opening with a 3 mm long M3 pressure screw.

MAGNETIC FLUX SENSOR

CL@VE is equipped with a magnetic flux sensor that is sensitive to magnetic field changes of up to 10KHz. The high sensitivity makes it possible to determine the sensor's orientation relative to the Earth's geographic directions. The magnetic field strength is measured in the X-axis of the sensor.

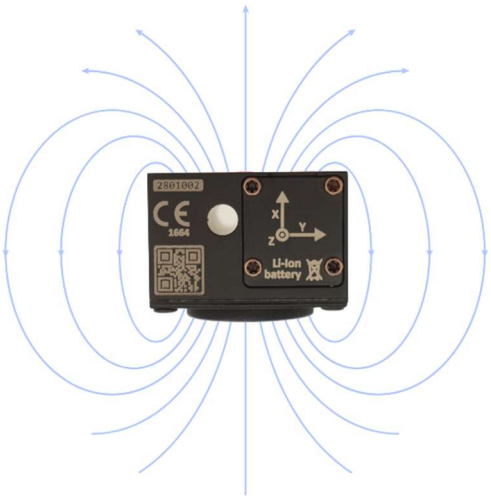


Fig. 21. Direction of magnetic field forces relative to the sensor

You can use the magnetic field strength sensor for, among other things:

1. Engine speed detection.
2. Time waveform analysis to detect damage to motor windings, among other things.
3. Magnetic field measurement.

ATTENTION:

If you are using a magnetic mounting stand, be aware that it can generate a DC component.

Remember that when analyzing the condition of electric drives, you must take into account the number of motor poles.

ROTATIONAL SPEED SENSOR

CL@VE is equipped with an additional measurement channel. You can connect to it an external rotational speed sensor and a proximity sensor that uses laser radiation. With it, you will be able to monitor machines running in variable cycles or at variable speeds. You will connect the external sensor to CL@VE via the power connector (look at page 15).

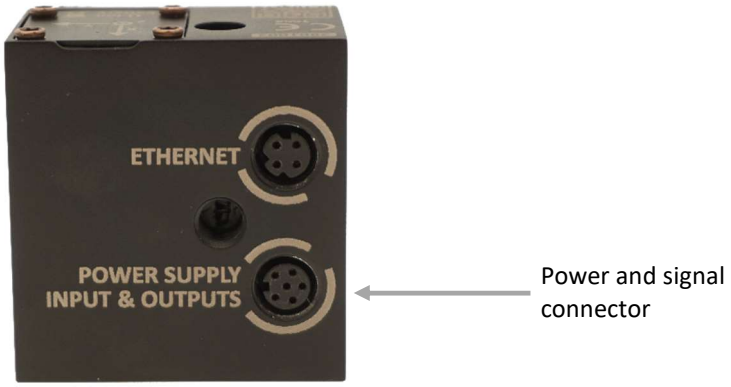


Fig. 22. Power and signal connector

If you want to connect a power cable and an external sensor to CL@VE at the same time, use a special signal splitter. It will allow you to feed several signals to the device at once.

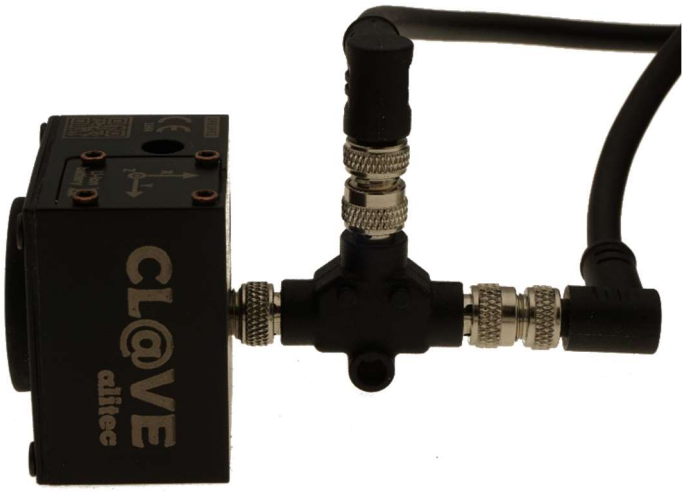


Fig. 23. Example use of signal splitter

The speed sensor is useful for, among other things:

1. Rotational speed measurement.
2. Drive condition assessments.
3. Measurement of static deformation of the shaft.

10. CONNECTING TO THE MAINS AND CHARGING THE BATTERY

CL@VE device is powered by a DC voltage source of +5.0 ÷ +5.5 V, providing a minimum of 3 W.

You can also power the device from an Ethernet switch (switch) that supports the PoE 802.3at/af standard (37 ÷ 57V). The network cable is attached to the M8D connector (female socket).

When you connect external power, the sensor turns on. The charging process is indicated by the light . Red color indicates the charging process. Charging to a level that allows you to use the sensor is indicated by the orange color. When the charging process is complete, the light color changes to green.

Working in continuous mode, the sensor can be connected to power without interruption.

11. SWITCHING ON THE DEVICE

CL@VE the moment you connect it to an external power source, it turns on automatically.

If powered by a built-in rechargeable battery or batteries, you turn the device on by briefly pressing the button

12. CONNECTING CL@VE TO A NETWORK

You will change the configuration of CL@VE network connections, standalone mode settings and machine status monitor using a web browser and a mobile device or computer. You will perform the initial sensor configuration using a wireless connection. All settings, including network settings, are made via the built-in web service. If you want to make changes, you will need to connect CL@VE to a Wi-Fi network and then, on a mobile device or computer that is connected to the same network, open the configuration page.

DEFAULT DEVICE SETTINGS

To use the sensor, you need to connect it to the host device via the Wi-Fi interface. By default, the Ethernet interface is disabled. After powering on, CL@VE will automatically try to connect to a Wi-Fi network with the following settings:

SSID (name): **DiagnosticNet**
Password: **d!@gnost!c**

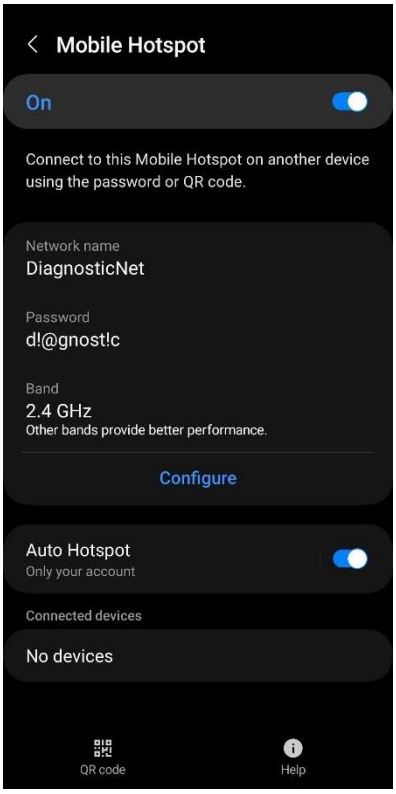
ATTENTION:

Restoring the factory settings for network connections requires pressing the and buttons simultaneously for about 10 seconds.

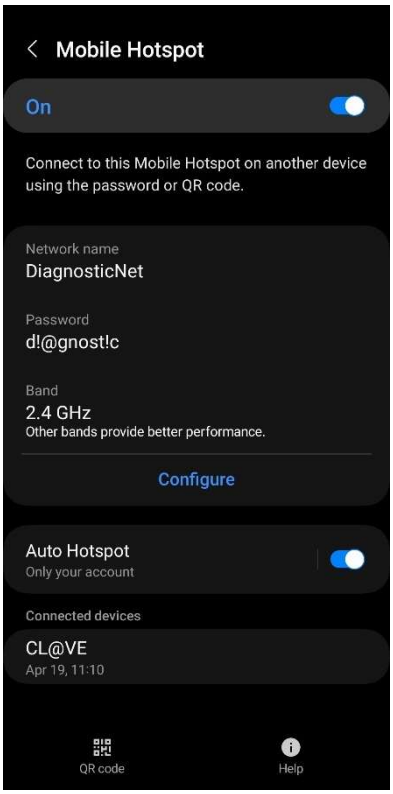
CL@VE CONNECTION VIA WI-FI INTERFACE TO MOBILE DEVICE

The easiest way to make the first connection is to use the Wi-Fi router (access point) built into the smartphone or tablet. To do this, for example, in the settings of your mobile device, configure the Wi-Fi router according to the settings given above and turn it on. You can open CL@VE configuration page on your mobile device.

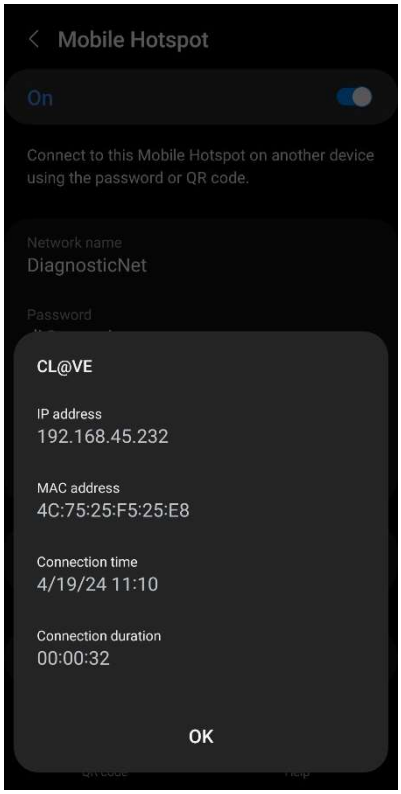
1. In the settings of your mobile device (e.g. smartphone), configure ***the Wi-Fi Router*** according to the settings shown on the screen below and turn on the router.



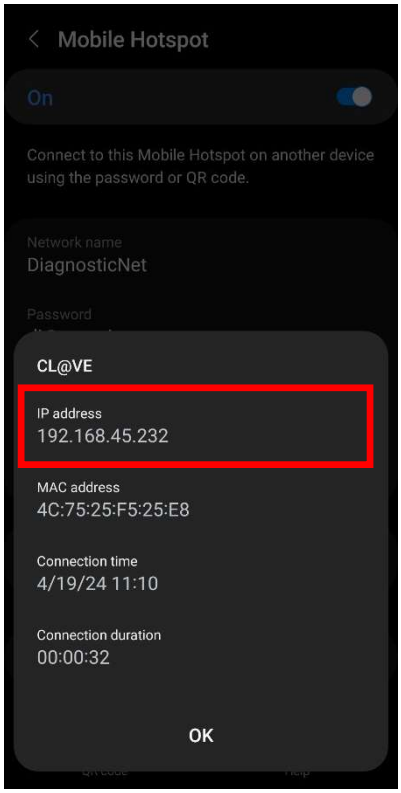
2. Turn on CL@VE and wait until the screen shows the connection with the device. Then enter the settings of the connected sensor.



3. Go to the information section.



4. Make a note of CL@VE IP address, which was assigned by the Wi-Fi router.



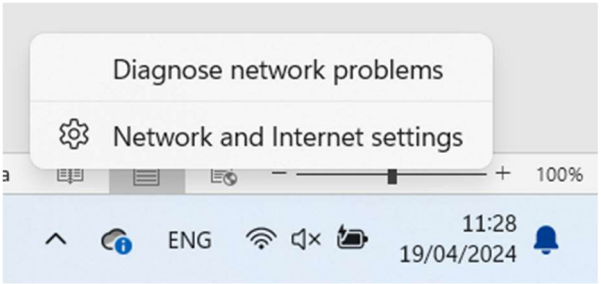
ATTENTION:

The Wi-Fi router (access point) must allow devices to be searched using UDP.

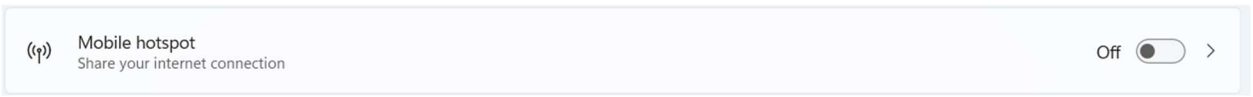
CL@VE CONNECTION VIA WI-FI INTERFACE TO THE COMPUTER

CL@VE can also be connected to a computer via Wi-Fi. To do this:

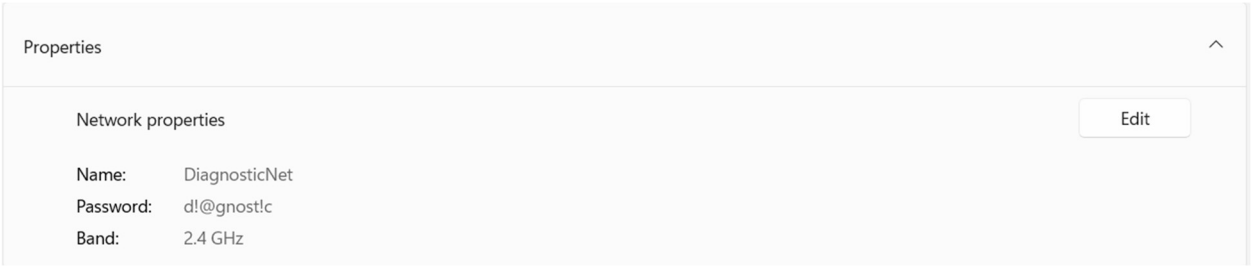
1. On your computer, right-click on the network connection symbol (displayed in the lower right corner of the screen) and select ***Network and Internet Settings***.



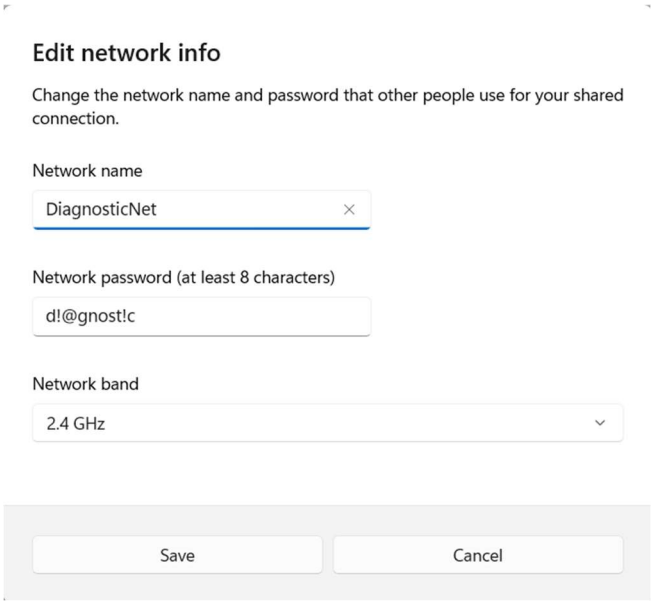
2. Select ***Mobile Hotspot***.



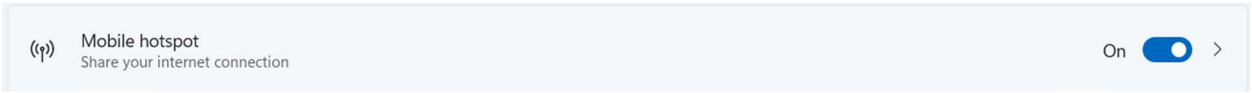
3. In the ***Properties*** section, press the ***Edit*** button.



4. Configure the Wi-Fi router according to the settings shown on the screen below and press ***Save***.



5. Then turn on the ***mobile hotspot***.



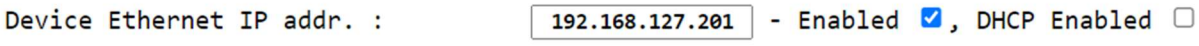
6. Turn on CL@VE and wait for it to connect to the network.

7. Make a note of CL@VE IP address, which was assigned by the Wi-Fi router.

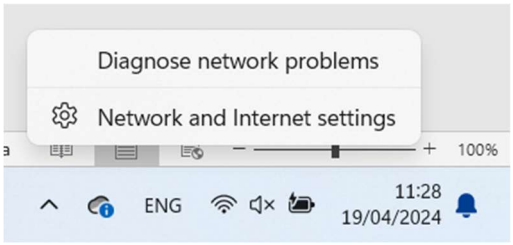
CL@VE CONNECTION VIA ETHERNET INTERFACE TO A COMPUTER

You can also use the Ethernet interface to establish communication between CL@VE and your computer. To do so:

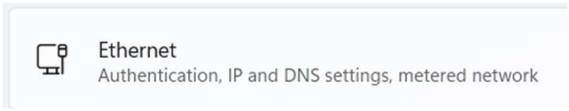
1. Check on the configuration page (see Device Configuration section) if the Ethernet interface is enabled (by default it is disabled. The *Enabled* checkbox next to *Device Ethernet IP addr.* should be checked (see Chapter 14).



2. Connect CL@VE to your computer using an Ethernet cable.
3. Turn on the device.
4. On your computer, right-click on the network connection symbol (displayed in the lower right corner of the screen) and select ***Network and Internet Settings***.

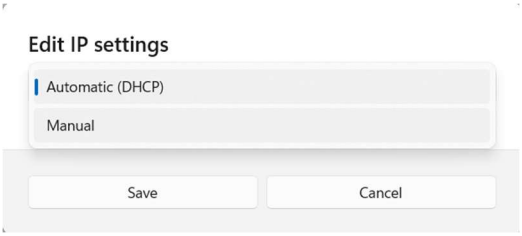


5. Select ***Ethernet.***

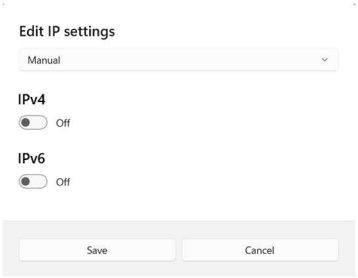


6. In the ***IP address assignment*** column***,*** select ***Edit.***

7. Select ***Manual*** from the drop-down list***.***



8. Enable ***IPv4*** options**.**



9. In the ***IP Address*** field, enter an IP number belonging to the same subnet as the measuring device (e.g., with a number 1 lower, for the default CL@VE network connection configuration, e.g., 192.168.127.200). Then enter the ***Subnet Mask*** (255.255.255.0).

10. After entering the ***IP Address*** and ***Subnet Mask***, confirm your entry with the ***Save*** button**.**

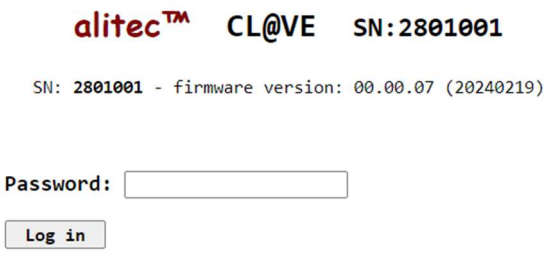
ATTENTION:

When you are done with CL@VE, to restore your computer's connection to an external network (e.g. Internet access), change the option from ***Manual*** to ***Automatic (DHCP)*** in the Ethernet settings.

You can connect CL@VE to an Ethernet network via a Switch.

13. DEVICE CONFIGURATION

You will configure the device through the user panel in the form of a web page, provided by the built-in server. To view it, after connecting the device to the network, open any web browser and enter CL@VE address (you will get the device's IP address in the Wi-Fi router settings, see Chapter 13).



Access to the configuration page has been password-protected.

The default password is the word ***admin***

ATTENTION:

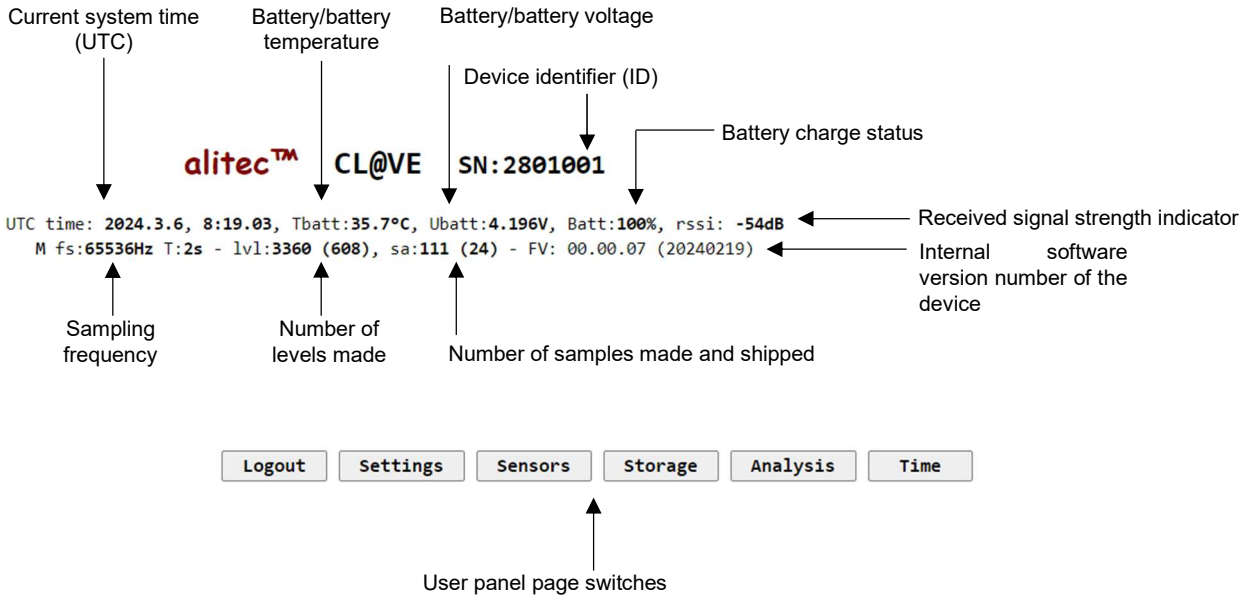
Any changes to the device configuration must be saved by pressing the *Save All* button *located at the bottom of each* system configuration *page*. When doing so, it is required to enter a security PIN code (*Current PIN* field), which protects against unauthorized configuration changes.

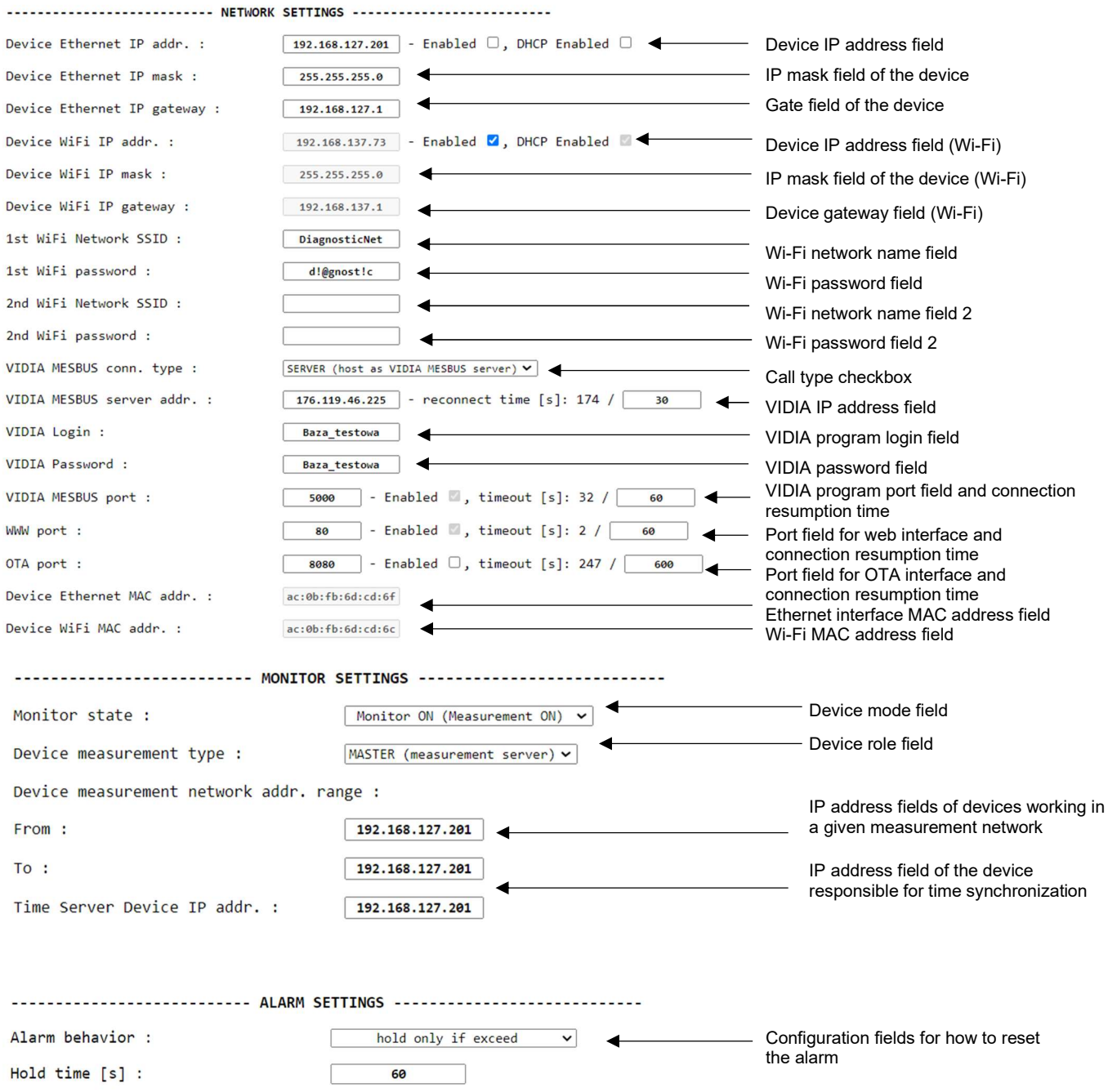
The default PIN code is: 1234.

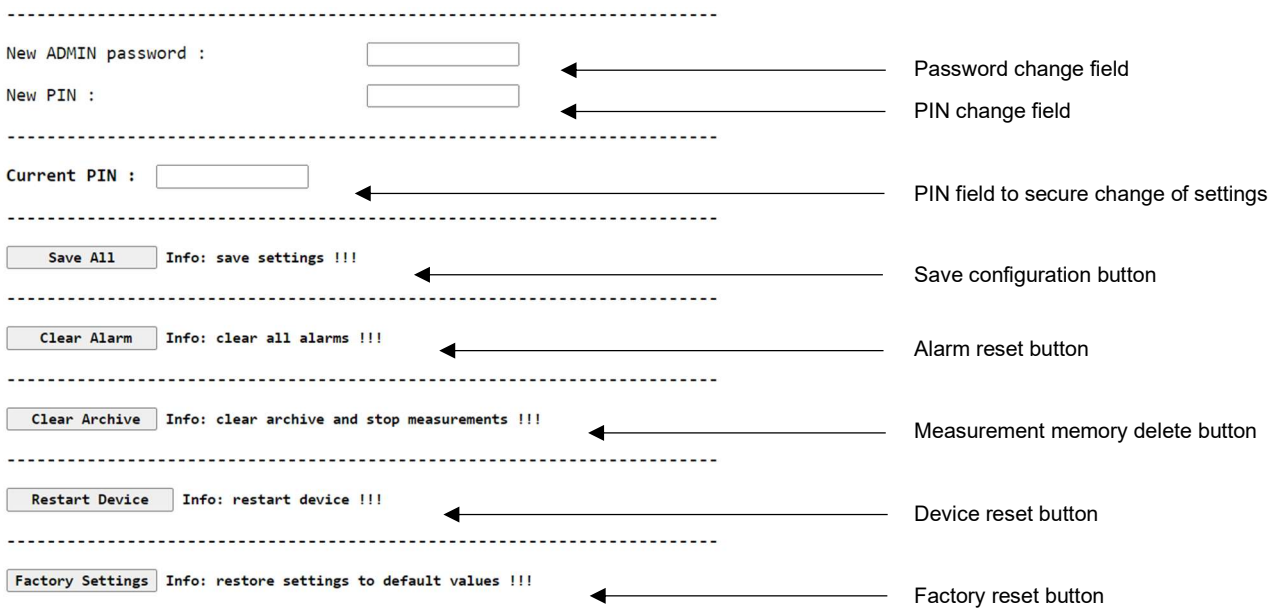
In case you abandon the changes, log out of the Website, without saving the new settings.

SYSTEM SETTINGS (*SETTINGS*)

After logging into the system, you will automatically be taken to the *Settings* tab, which is the first interactive access point. This page is the key configuration element, allowing you to customize the device's basic functions to suit your individual preferences and requirements.



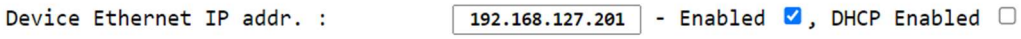

---------- NETWORK SETTINGS ----------
Device Ethernet IP addr. : 192.168.127.201 - Enabled , DHCP Enabled
Device Ethernet IP mask : 255.255.255.0
Device Ethernet IP gateway : 192.168.127.1
Device WiFi IP addr. : 192.168.137.73 - Enabled , DHCP Enabled
Device WiFi IP mask : 255.255.255.0
Device WiFi IP gateway : 192.168.137.1
1st WiFi Network SSID : DiagnosticNet
1st WiFi password : d!@gnost!c
2nd WiFi Network SSID :
2nd WiFi password :
VIDIA MESBUS conn. type : SERVER (host as VIDIA MESBUS server)
VIDIA MESBUS server addr. : 176.119.46.225 - reconnect time [s]: 174 / 30
VIDIA Login : Baza_testowa
VIDIA Password : Baza_testowa
VIDIA MESBUS port : 5000 - Enabled , timeout [s]: 32 / 60
WWW port : 80 - Enabled , timeout [s]: 2 / 60
OTA port : 8080 - Enabled , timeout [s]: 247 / 600
Device Ethernet MAC addr. : ac:0b:fb:6d:cd:6f
Device WiFi MAC addr. : ac:0b:fb:6d:cd:6c
Device IP address field
IP mask field of the device
Gate field of the device
Device IP address field (Wi-Fi)
IP mask field of the device (Wi-Fi)
Device gateway field (Wi-Fi)
Wi-Fi network name field
Wi-Fi password field
Wi-Fi network name field 2
Wi-Fi password field 2
Call type checkbox
VIDIA IP address field
VIDIA program login field
VIDIA password field
VIDIA program port field and connection resumption time
Port field for web interface and connection resumption time
Port field for OTA interface and connection resumption time
Ethernet interface MAC address field
Wi-Fi MAC address field
---------- MONITOR SETTINGS ----------
Monitor state : Monitor ON (Measurement ON)
Device measurement type : MASTER (measurement server)
Device measurement network addr. range :
From : 192.168.127.201
To : 192.168.127.201
Time Server Device IP addr. : 192.168.127.201
Device mode field
Device role field
IP address fields of devices working in a given measurement network
IP address field of the device responsible for time synchronization
---------- ALARM SETTINGS ----------
Alarm behavior : hold only if exceed
Hold time [s] : 60
Configuration fields for how to reset the alarm



CONFIGURING NETWORK CONNECTIONS

In the *Network Settings* section, you can check and configure all available network settings.

You can enable and disable each interface. For a wired link, you can decide whether you use a fixed IP address or whether it should be assigned by a DHCP server. The Wi-Fi network card built into CL@VE always waits for the server to assign an address. The first area of settings is for the wired Ethernet connection.



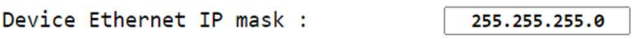
Device Ethernet IP adrr. denotes the field with the IP address of the Ethernet interface. The default is 192.168.127.201. You will need the IP address to connect CL@VE to a diagnostic program (such as mVidia). If you have DHCP enabled for the Ethernet interface, this field will be uneatable.

Enabled is a checkbox for enabling or disabling the wired connection. By default, Ethernet is disabled. If you want to use a wired connection, enable this option.

DHCP Enabled is a checkbox for enabling or disabling DHCP protocol for a wired network. The ability to disable support for the DHCP server, which assigns IP addresses automatically, is provided to allow you to manually assign the required IP address on your existing Ethernet network.

ATTENTION:

When editing the address, make sure that it has a unique IP address in the network to which the measuring device is incorporated.



Device Ethernet IP mask denotes the subnet mask of the Ethernet interface. The default is 255.255.255.0. The netmask allows you to distinguish in the IP address the section responsible for the address of the subnet from the section specifying the address of an individual device (host) in that subnet.

Device Ethernet IP gateway stands for Ethernet interface network gateway. The default is 192.168.127.1. A network gateway is a device that acts as an access point, allowing communication and data flow between different networks.

The next fields concern the configuration of the Wi-Fi interface.

Device Wi-Fi IP adr. denotes the IP address for the wireless network. This field is non-editable. The address will appear only after you have successfully connected to the Wi-Fi network and obtained the address from the DHCP server. You will need the IP address to connect CL@VE to a diagnostic program (such as mVidia).

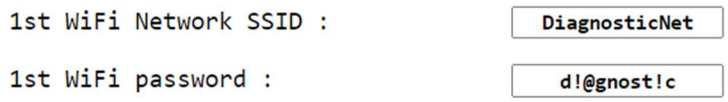
Enabled is a checkbox for enabling or disabling the wireless connection. By default, Wi-Fi is enabled. If you want to use Wi-Fi, leave this option enabled.

DHCP Enabled is a checkbox used to enable or disable the DHCP protocol for the wireless network. In the current software version, this option is permanently enabled and cannot be turned off.

Device Wi-Fi IP mask indicates the subnet mask of the Wi-Fi interface. The default is 255.255.255.0. The netmask allows you to distinguish in the IP address the section responsible for the address of the subnet from the section specifying the address of an individual device (host) in that subnet.

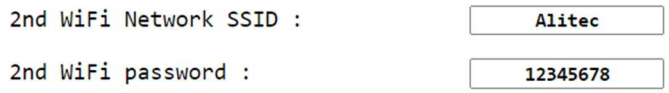
Device Wi-Fi IP gateway stands for Wi-Fi network gateway. The default is 192.168.127.1. A network gateway is a device that acts as an access point, allowing communication and data flow between different networks.

Sometimes, for security reasons, the access password and/or Wi-Fi network name are periodically changed. We have anticipated this. By configuring CL@VE, you can define 2 different networks.



1st Wi-Fi Network SSID indicates the name of the Wi-Fi network that the device will try to connect to first. The default network name is **DiagnosticNet.** You can enter the name of your Wi-Fi network in this field.

1st Wi-Fi password means the password for the Wi-Fi network that the device will try to connect to. The default network password is **D!agnost!c.** You can enter the password for your Wi-Fi network in this field.



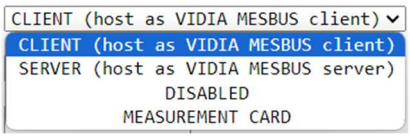
2nd Wi-Fi Network SSID stands for the name of the alternative Wi-Fi network that the device will automatically try to connect to if it fails to connect to the first network. The default name of the second network is **Alitec**

2nd Wi-Fi password refers to the password for an alternative Wi-Fi network that the device will automatically try to connect to if it fails to connect to the first network. The default password for the second network is **12345768**

If you are not using alternative network settings, leave the defining fields blank. CL@VE can send recorded signals directly to a machine health assessment environment running in the cloud (VIDIA.cloud), as well as on a local server (VIDIA.server).

The next fields concern the configuration of communication with master devices.

VIDIA MESBUS conn. type is a drop-down list from which you can choose how the device should communicate with the VIDIA environment server (VIDIA.cloud or VIDIA.server), depending on your needs.

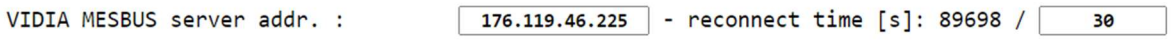


CLIENT (host as VIDIA MESBUS client) in this mode the device is controlled by an external program.

SERVER (host as VIDIA MESBUS server) in this mode, the device independently sends measurement data to the server.

DISABLED in this mode the device does not communicate with the master.

MEASUREMENT CARD in this mode CL@VE only communicates with the mobile application.



VIDIA MESBUS server addr. is a field with the IP address of the VIDIA server with which the device should connect. If you are using VIDIA.cloud it will be 176.119.46.225. If you have decided to use VIDIA.server, you will get the address during server configuration.

Reconnect time [s] is a field with the time (expressed in seconds) after which the connection to the VIDIA server is to be attempted, in case of a previous disconnection.

VIDIA Login refers to the login needed to log in to your VIDIA account.

VIDIA Password stands for the password needed to log in to your VIDIA account.

VIDIA MESBUS port is a field with the port number through which the device communicates with the server. The default port is 5000.

Enabled is a checkbox for enabling or disabling the communication port with the server. In the current version of the software, this field is uneatable.

Timeout [s] is a field with the time (expressed in seconds) after which disconnection from the VIDIA server is to occur in case the device fails to deliver measurement data (or other errors). The automatic disconnection is intended to help reduce the event log when connection problems occur.

WWW port is a field with the port number to the device's configuration page. The default port is 80. If you change the port value, you will have to enter the port number along with the IP address when using the configuration page. Example: if you change the port to 81, then you will have to enter the IP address of the sensor, a colon and 81 (e.g. 192.168.127.109:81) in your web browser to access CL@VE configuration page.

Enabled is a checkbox for enabling or disabling the port for communication with the device's configuration page. In the current software version, this field is non-editable.

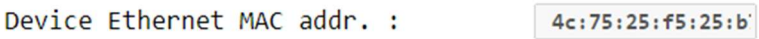
Timeout [s] is a field with a time (expressed in seconds) to disconnect from the configuration page in case of communication problems with the device (or other errors). The automatic disconnection is intended to help reduce the log of events when connection problems occur.

OTA port is a field with a port through which the device communicates with a program that updates the device's embedded software (firmware). The default port is 8000.

Enabled is a checkbox for enabling or disabling the port for the device to communicate with the update program.

Timeout [s] is a field with the time (expressed in seconds) after which the update program is to disconnect in case of communication problems with the device (or other errors). The automatic disconnection is intended to help reduce the log of events when connection problems occur.

At the end of this section are information fields (non-editable).



Device Ethernet MAC addr. is a field with information about the MAC address of the Ethernet interface.

Device Wi-Fi MAC addr. is a field with information about the MAC address of the Wi-Fi interface.

ATTENTION:

For network security reasons, the ability to change the port numbers through which the device communicates with host systems is provided.

CONFIGURATION OF THE DEVICE OPERATION MODE

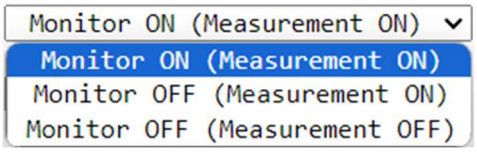
The MONITOR SETTINGS section allows you to configure the operation mode of CL@VE, taking into account the functions performed and its role in systems with multiple devices.

The monitor is the default mode of operation of CL@VE, used in predictive maintenance. In this mode, the device operates autonomously, taking the necessary measurements with sensors. Then, based on the results of the measurements, CL@VE performs parameter calculations. The device in monitor mode continuously compares the determined values with user-declared threshold levels. Exceeding any of the criterion values, triggers an alarm and information about the event is transmitted via the MODBUS/TCP interface to the automation system and ATC Mesbus to the VIDIA server. In this way, CL@VE performs the function of monitoring the drive's technical status.

At the beginning of this section, you can configure the monitor mode.

Monitor state is a field where you can select the operating mode of the device. Depending on your needs and expectations, you can define whether you want CL@VE to act as a monitor or just a meter.

Monitor mode is active if, on the *Settings* page of the user panel, in the *Monitor settings* field, you have selected *Monitor ON*. Confirm the change in settings with the *Save All* button (save data to the device).



MONITOR ON (Measurement ON) means that monitor mode and measurement execution are enabled.

MONITOR OFF (Measurement ON) means that the monitor mode is turned off, but the measurements continue (in this case, the device will act as a meter, not responding to overruns. Thus, the recording of data to internal memory and their transmission to the VIDIA environment database is disabled).

MONITOR OFF (Measurement OFF) means that the monitor mode and measurement taking is turned off.

ATTENTION:

Due to the safety of the process in which machine monitoring is involved, it is not possible to change the configuration related to the processing and analysis of signals of the device actively monitoring the object (***Monitor state*** mode setting***: Monitor ON***). Making changes requires **stopping the device**. Before changing the configuration, select *MONITOR OFF (Measurement OFF)* in the *Monitor settings* section and confirm the change with the *Save All* button.

CL@VE devices index measurement and analysis results using the real-time clock (UTC). The data stored in the internal memory and sent to the database are uniquely labeled and contain information about the exact time of measurement execution. In the case of multiple devices forming a single surveillance system, accurate

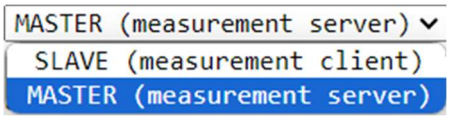
synchronization of the time of measurement execution is possible. In addition, all devices working in the same network can record measurement results in case of an alarm reported by one of them.

ATTENTION:

CL@VE uses Universal Time (UTC), which is a widely accepted time standard around the world. This is key to ensuring time consistency in global communications and making it easier to identify measurements in international organizations. Using UTC eliminates problems associated with time differences and summer/winter time changes.

Next are settings related to communication between devices. These settings are especially important when you are using multiple CL@VE sensors on a single network.

Device measurement type is a drop-down list from which you can select how you want a device or multiple devices to work.



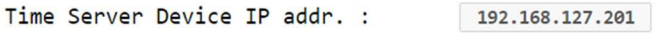
Slave (measurement client) in this mode, CL@VE clock is synchronized by the master device, which can also trigger a measurement, in response to an alarm reported by any other device.

Master (measurement server) CL@VE in this mode synchronizes the other devices and triggers measurement in the defined device network if necessary.

Further configuration depends on what type of device you have set in *Device measurement type.*

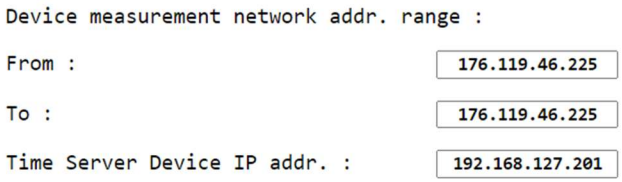
1. ***Slave*** **device configuration**

Measurement Master Device IP addr. is a field with the IP address of the *master* device.



Time Server Device IP addr. is a field with the IP address of the device, which sets and synchronizes the system time in the other devices.

2. ***Master*** **configuration**



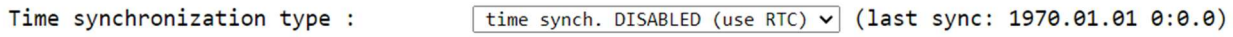
Device measurement network addr. range is a section where you can define the starting and ending address of the IP address space of the other *slave* devices that together form one measurement system

From is the field with the youngest IP address of the device running in the group.

This is the field with the oldest IP address of the device operating in the group.

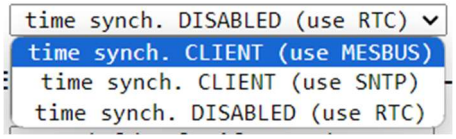
Time Server Device IP addr. is a field with the IP address of the device that sets and synchronizes the system time in the other devices. In order to set identical time on multiple CL@VEs operating in *Slave* mode, for each of them, in the *Time Server Device IP addr.* field, enter the IP address of the device whose time is to be taken as the correct one.

At the end of the section is the settings for synchronization.



Time synchronization type: this is a drop-down list from which you can select how the time should be synchronized for multiple devices on the network. The options will vary depending on whether the device is operating as a *Master* or *Slave*.

1. ***Slave* device configuration**

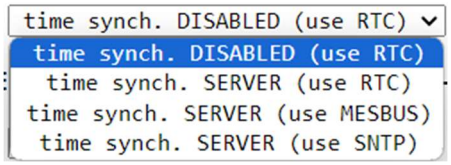


time synch. CLIENT (use MESBUS) means that the device synchronizes time with a master device via the MESBUS interface.

time synch. CLIENT (use SNTP) means that the device synchronizes time with the master via the SNTP interface.

time synch. DISABLED (use RTC) means that CL@VE will not synchronize time with other devices and will use the time from the internal clock.

2. ***Master* configuration**



time synch. DISABLED (use RTC) means that sync is disabled and the device will use time from the internal clock

time synch. SERVER (use RTC) means that CL@VE will synchronize time on slaves using the time from the internal clock.

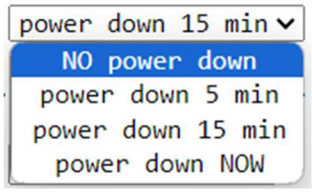
time synch. SERVER (use MESBUS) means that CL@VE will synchronize time on slaves using the MESBUS interface.

time synch. SERVER (use SNTP) means that CL@VE will synchronize time on slaves using the SNTP interface.

ENERGY MANAGEMENT

In this section you can configure options for power and energy management of the device.

Power down device after is a drop-down list from which you can select after what time the device will turn off (in case of no device activity)



No power down means that the device will not shut down.

power down 5 min means that the device will turn off after 5 minutes of inactivity.

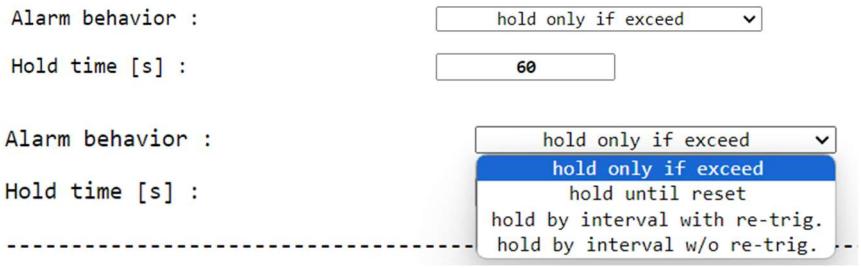
power down 15 min means that the device will turn off after 15 minutes of inactivity.

power down NOW means that the device will turn off immediately (after saving the settings).

ALARM SETTINGS

For each of the determined parameters, CL@VE can inform the host system when the established criterion thresholds are exceeded. The information is transmitted via MODBUS registers.

Alarm settings allow you to specify how alarms for exceeding limit values should behave.



1. *Hold only if exceed* means that the alarm is active only while the limit is being exceeded in progress.
2. *hold until reset* means *holding* the alarm until it is reset (via the Web or using MODBUS registers).
3. *hold by interval with re-tring* means that an alarm will be triggered if the set limit is exceeded. The alarm condition will last for a specified period of time (*Hold time*). If, during this period, the value exceeds the limit threshold again, the *Hold time* is reset to zero and counted anew, and thus the alarm condition is extended by another interval.
4. *Hold by interval w/o re-tring* means that an alarm will be triggered if the set limit is exceeded. The alarm condition will last for the specified time (*hold time*). After this time, the device will check again if the value still exceeds the limit threshold. If so, the alarm condition will be reactivated for another interval (you can set a delay (*Deley*) in the *Analysis* tab before triggering the alarm again). However, if the value no longer exceeds the limit threshold, the alarm will be disabled.

Hold time [s] determines the time interval for the specified alarm action.

CHANGE THE SYSTEM PASSWORD AND PIN CODE

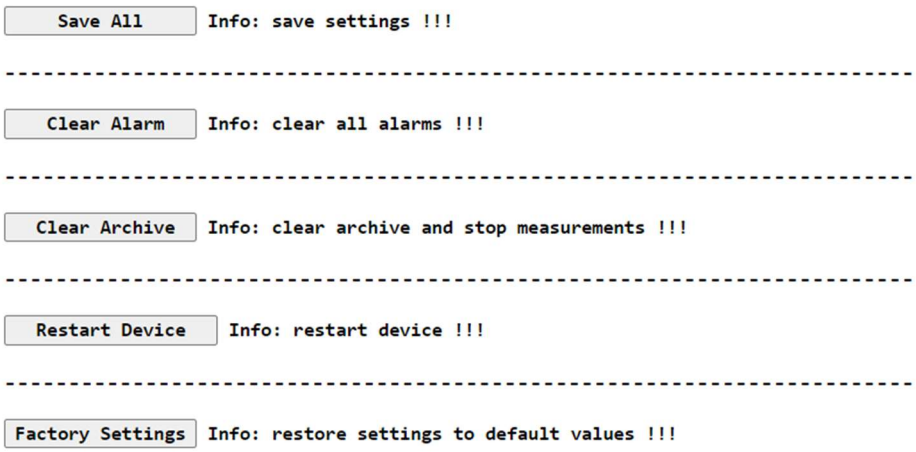
The configuration page is equipped with two-step security. Access to the page requires a password. However, in order to edit and configure individual settings, you must enter a special PIN (default is: 1234).

New ADMIN password is a field where you can set a new password for the configuration page.

New PIN is a field where you can set a new PIN to secure the change of settings.

OTHER FUNCTIONS

Current PIN is the field into which you enter your current PIN to save your settings



Save All is a button that confirms saving the settings.

Clear Alarm is a button that turns off the alarm.

Claer Archive is a button used to delete data and stop measurements.

Reset Device is a button used to reset the device.

Factory Settings is a button used to restore factory settings.

ATTENTION:

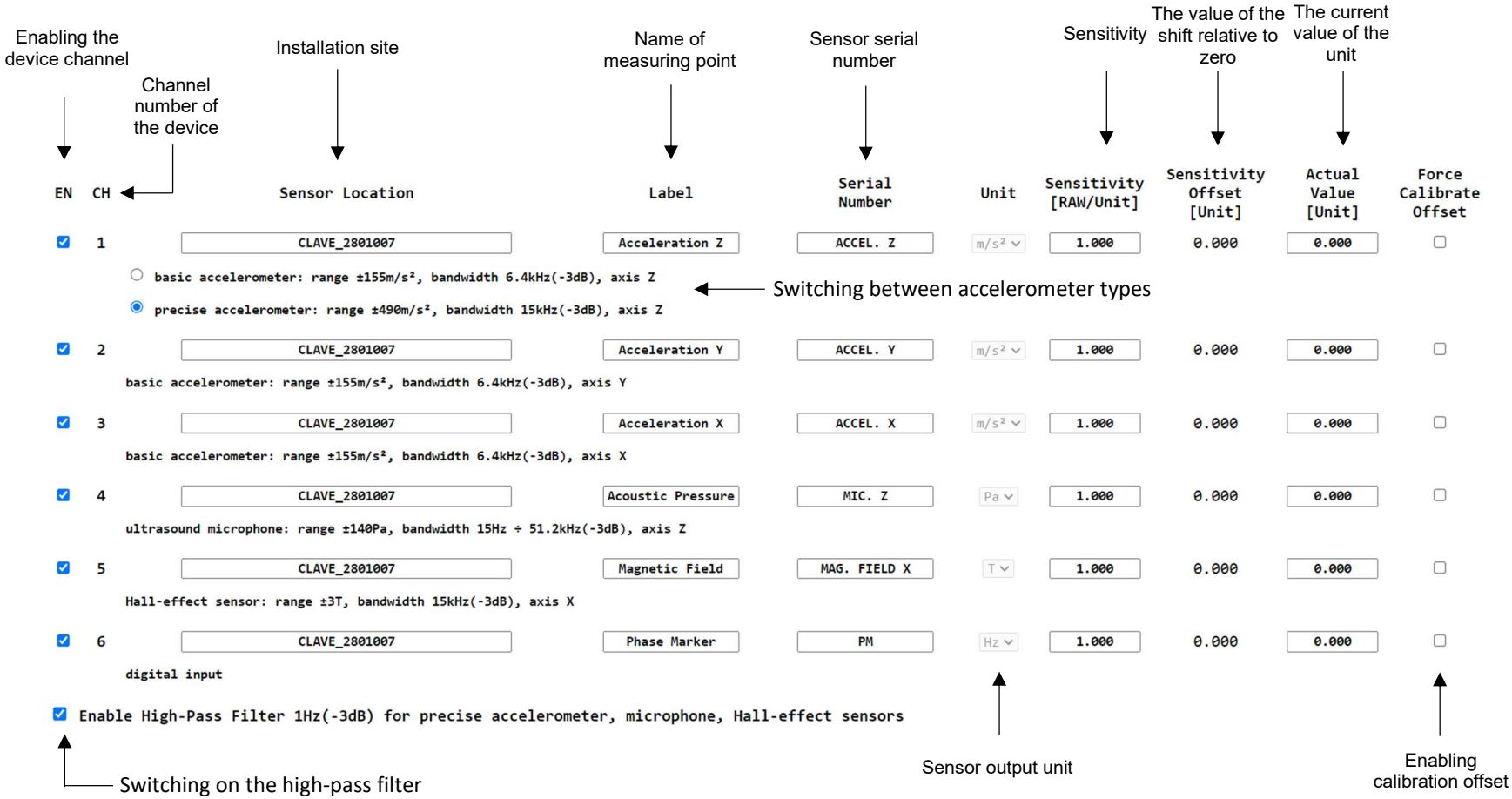
Any setting change or action requires a PIN in the *Current PIN* field.

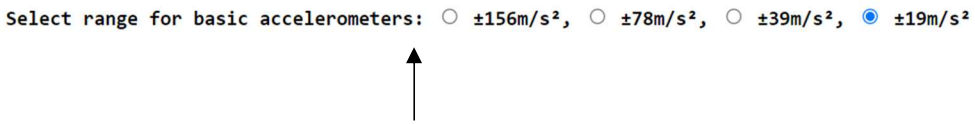
CONFIGURATION OF MEASUREMENT OBJECTIONS

ATTENTION:

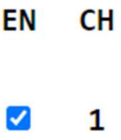
To change the parameters of the measurement circuits in the Monitor *settings* field, on the *Settings* page of the user panel, switch the device to *Measurement STOP* mode. Only then will you be able to change the measurement parameters.

On the *Sensors* page you can configure the sensors connected to the system, taking into account the sensitivity of each sensor.

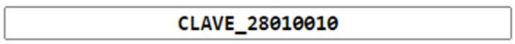




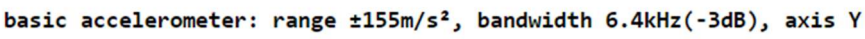
Selection of the operating range of the basic accelerometer



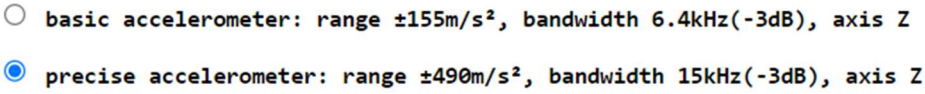
EN is a checkbox where you can enable or disable a specific measurement channel. A disabled channel will not be measured.
CH is the number of a given measurement channel.



Sensor location is a field with the name of the meter location. It contains the ID number of the device. *Sensor location* is also the path for saving data in the VIDIA environment. You can freely modify this field by changing it to any name you want.

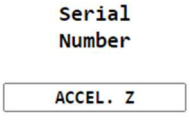


For each measurement channel, information on the measurement parameters is available, including the measurement range, frequency, and which axis the measurement is being performed in.



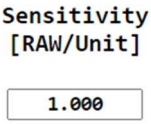
The Z-axis accelerometer has the option to switch between ***basic accelerometer*** and ***precise accelerometer***. The selected option will affect the measurement parameters (range and frequency). Depending on the license you have selected, this choice may not be available.

Label is a field with the marking of the measurement point. It is also an indication of what measurement is taking place in the channel.

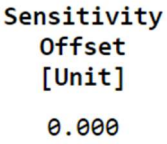


Serial Number is a field with a unique identifier for each measurement point.

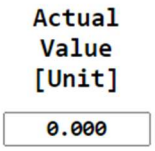
Unit is the place where the units of measurement in which the measurement point takes its measurements are specified. It is an informational (non-editable) field.



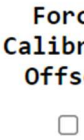
Sensitivity [RAW/Unit] is a field where you can declare the sensitivity at which the measurement should take place. Raw stands for absolute unit (reference point).



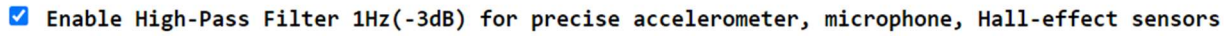
Sensitivity offset [Unit] is a field with the current set calibration offset (relative to zero).



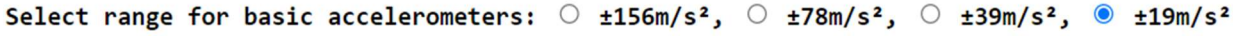
Actual Value [Unit] is a field with the current value of a given measurement unit.



Force Calibrate offset is a checkbox to enable the deviation between the sensor input signal and the expected output value.



The last checkbox is used to enable or disable the high-pass filter. This option, when enabled, removes the DC component from the signal. By default, this function is enabled.



Select range for basic accelerometers is where you can select the operating range of the basic accelerometer. The smaller the set value, the more accurately the measurement signal is presented.

ATTENTION:

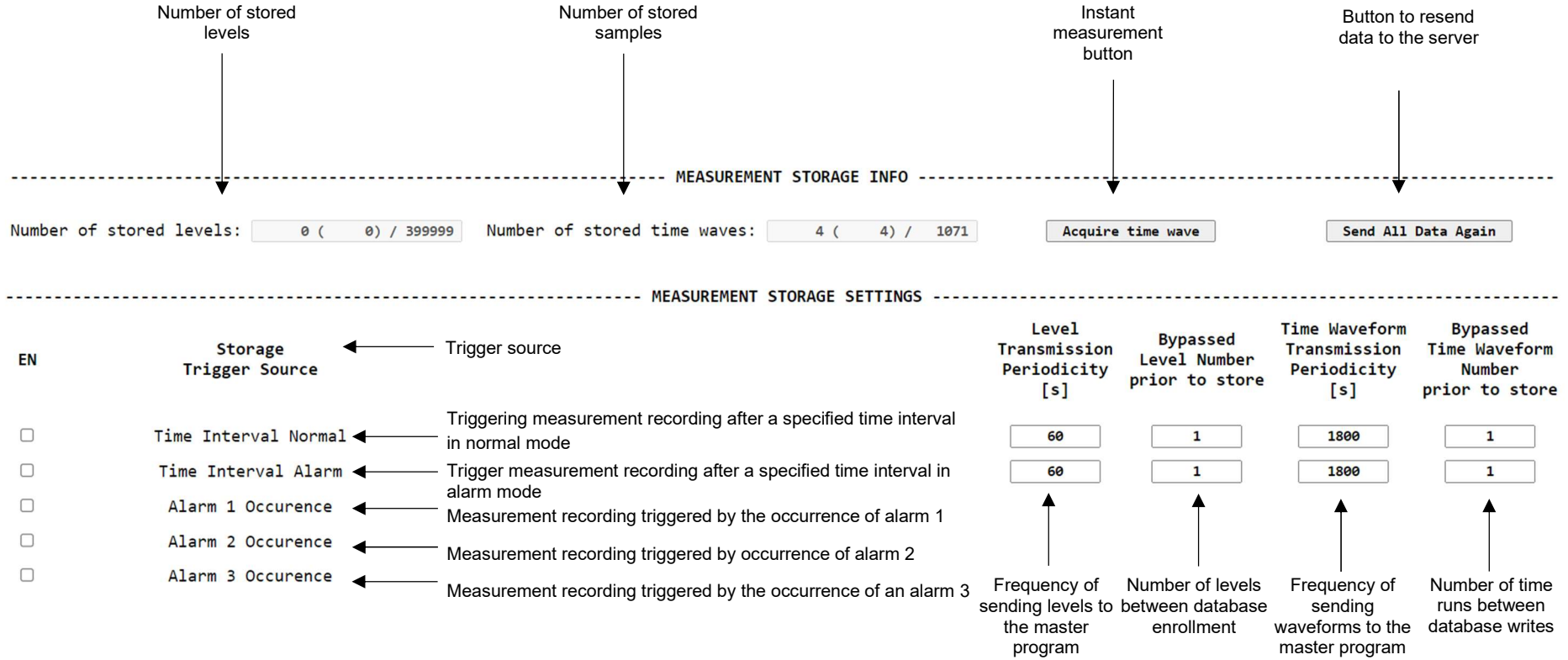
In CL@VE devices, the physical quantities recorded and analyzed by individual measurement circuits have been configured at the factory. It is not possible to change the output unit. The *Unit* field is non-editable.

CONFIGURATION OF MEASUREMENT DATA STORAGE SETTINGS (*STORAGE*)

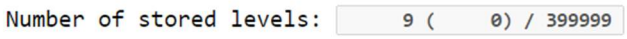
ATTENTION:

To change the data recording settings in the *Monitor settings* field, on the *Settings* page of the user panel, switch the device to *Measurement STOP* mode. Only then will you be able to change the measurement parameters.

On the *Storage* page, you can customize settings related to the recording of measurement data. The criteria for recording the parameters determined by CL@VE (*Levels*) and the time *waveforms* of the input signals (*Time Waveform*) are configured separately.



The first part of the *STORAGE* tab contains information and settings for saving data.



Number of stored levels is a section with information about levels. The first number indicates the number of stored levels. The number in parentheses indicates how much data was sent to the server. The last number is the maximum amount of data in the device's memory.

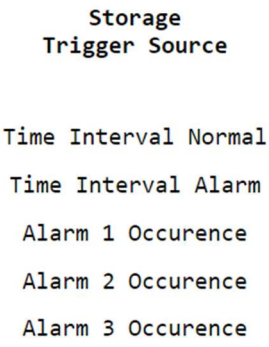
Number of stored time waves is a section with information about samples. The first number indicates the number of stored samples. The number in parentheses indicates how much data was sent to the server. The last number is the maximum amount of data in the device's memory.

Acquire time wave is a button to immediately perform additional measurement. Due to the characteristics of Web browsers, each page refresh will trigger another measurement until the action is changed (e.g., moving to another tab).

Send All Data Again is a button that sends all measurements to the server from scratch. This option can be useful when the database is changed.

The next section is the configuration of the measurement recording frequency (and its trigger)

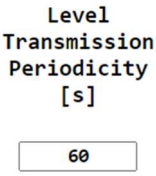
EN is a checkbox where you can enable or disable a specific source for triggering data logging and uploading to the VIDIA environment server.



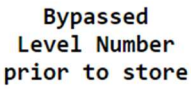
The Storage Trigger Source list lists all possible sources that trigger the writing of results to CL@VE internal memory and cause them to be sent to the VIDIA server (if you use it).
Time Interval Normal means triggering the recording of the measurement in the internal memory and attempting to send to the VIDIA server every specified time (interval), when none of the defined alarms is active.
Time Interval Alarm means changing the time interval for triggering recording and transmission of measurement and analysis results to the server, during the time when any of the alarm conditions selected in this section is active.

Alarm 1 Occurrence means recording the results of measurements and analyses when the result of any active analyses (see below) exceeds 1 criterion threshold.

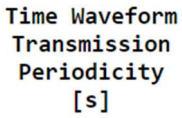
Alarm 2 Occurrence means recording the results of measurements and analyses when the result of any active analyses (see below) exceeds the *criterion* threshold 2
Alarm 3 Occurrence means recording the results of measurements and analyses when the result of any active analyses (see below) exceeds the 3rd criterion threshold.



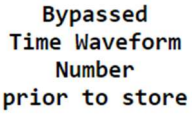
Level Transmission Periodicity [s] is a field where you can determine (in seconds) how often information about the current values of the parameters determined by CL@VE is sent to the VIDIA environment server.



Bypassed Level Number prior to store is a field in which you can determine what designated parameter values will be permanently stored in the device's internal memory and in the VIDIA environment database. This option allows you to keep an eye on the current values of diagnostic parameters on the VIDIA environment status screen, while reducing the amount of data stored on the server's disks.



Time Waveform Transmission Periodicity [s] is a field where you can determine (in seconds) how often time wave*forms* are transmitted to the server.



Bypassed Time Waveform Number prior to store is a field where you can determine what waveforms will be stored in the device memory and the VIDIA environment database. Bypassed time waveforms are lost.

ATTENTION:

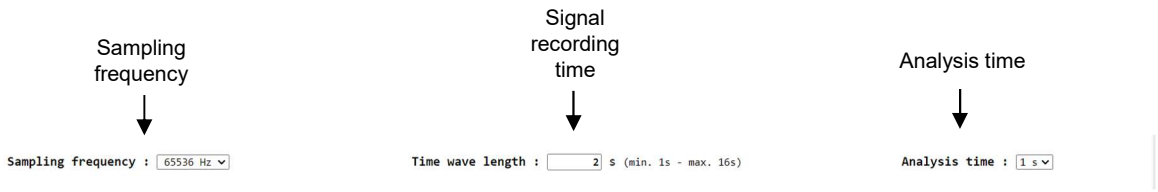
When uploading results to VIDIA.cloud or VIDIA.server, make sure that the communication infrastructure used (in particular, this applies to Wi-Fi networks) and the server infrastructure supporting all working devices are able to process the uploaded data in less time than the upload times of subsequent results defined in the device. Otherwise, some information will be lost!

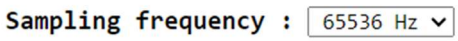
ANALYSIS CONFIGURATION

ATTENTION:

To change the analysis parameters in the *Monitor settings* field, on the *Settings* page of the user panel, switch the device to *Measurement STOP* mode. Only then will you be able to change the measurement parameters.

On the *Analysis* page of the user panel, the conditions for recording signals and the types and properties of parameters determined autonomously by CL@VE device are defined.





Sample frequency is a list that allows you to determine the sampling frequency of the signal. The value of this parameter divided by 2.56 determines the maximum frequency of the signal that you will be able to analyze and for which diagnostic parameters can be determined. Remember that an inappropriate value can cause aliasing (signal distortion). By default, the sampling frequency is set to 65536 Hz.

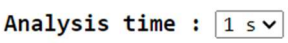
Time wave length is a field that defines the duration of time waveforms stored in CL@VE memory and sent to the VIDIA environment server.

ATTENTION:

Remember to choose the recording time so that the slowest rotating part of the machine, affecting the signals to be analyzed, can make at least one turn (and preferably several turns).

The recording time of the signal affects the frequency resolution of the spectrum, determined from the time wave length. The resolution is the inverse of the recording time, for example, with *Time wave length* equal to 4 seconds you can get a spectrum with the highest frequency resolution of 0.25 Hz.

During the time specified by the *time wave length* parameter, the collected signals should be stationary, i.e. their parameters should not change. It is important to maintain similar operating conditions of the machine from the beginning to the end of recording, such as load, speed, flows, pressures, temperature, etc.



Analysis time is a field that determines the time interval from which the device analyzes signals, determining the values of diagnostic parameters. The specified time determines the frequency of updating the results displayed on the device's configuration page, updating modbus registers and the minimum time for transferring the results to the VIDIA environment database.

Confirm the changes you have made with the *Save All* button, after entering your PIN security code.

CONFIGURE THE SYSTEM TIME (*TIME*)

CL@VE is equipped with a precise real-time clock.

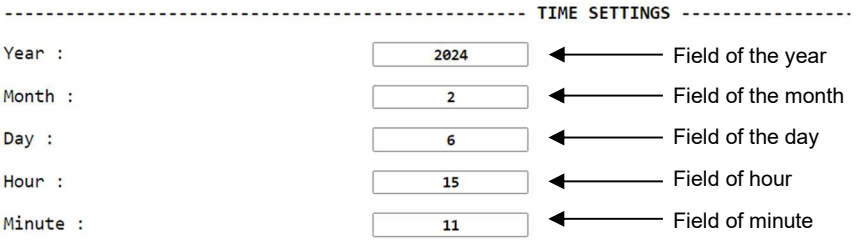
ATTENTION:

When setting CL@VE clock, consider using Universal Time (UTC), which is a widely accepted time standard around the world. It ensures time consistency in global communications and makes it easier to identify measurements in international organizations. Using UTC eliminates problems associated with time differences and summer/winter time changes.

The current CL@VE system time should be set before connecting the sensor to the VIDIA server for the first time.

Remember that the determined parameter values and recorded time waveforms are identified in the VIDIA environment based on the time index. A significant change in the system time can lead to overlapping of recorded results and problems finding them in the list of measurements.

You can modify the current settings on the *Time* page of the user panel.



To change the time settings in the *Monitor settings* field, on the *Settings* page of the user panel, switch the device to *Measurement STOP* mode. Only then will you be able to change the measurement parameters.

Confirm the changes you have made with the *Save All* button, after entering your PIN security code.

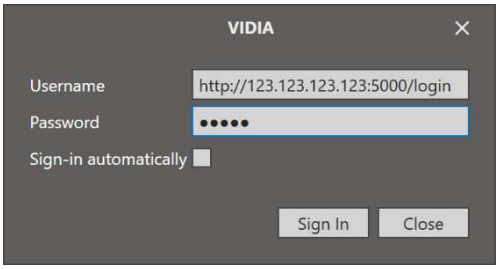
14. CONNECTING THE DEVICE TO THE VIDIA ENVIRONMENT

CL@VE device has built-in integration with the VIDIA diagnostic environment. After correct configuration, it automatically sends the values of determined parameters and recorded time waveforms of measured quantities to the VIDIA.cloud database or the local server of the VIDIA.server environment. The measurement information is processed and analyzed by dedicated services. They determine more advanced diagnostic parameters on an ongoing basis and monitor their maintenance at acceptable levels in an automated manner. Measurement and analysis results are made available to users via the VIDIA.client program.

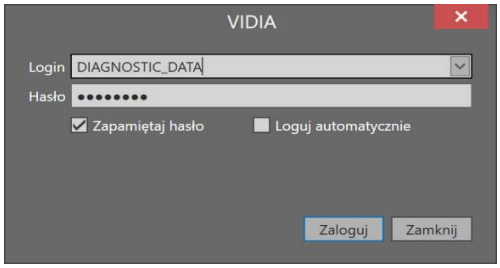
To create and correctly configure the connection to the VIDIA environment service receiving measurement data from CL@VE:

1. Download and install the **VIDIA.client** program on your computer **by** typing http://vidia.cloud (alternatively http:// 176.119.46.225) or the address of your VIDIA server in your web browser:.
2. Log in to **VIDIA.client** with your login and password. If you are using an external server (**VIDIA.server**), enter its IP address, port and "/" before the login. Otherwise, use the login information for **VIDIA.cloud**.

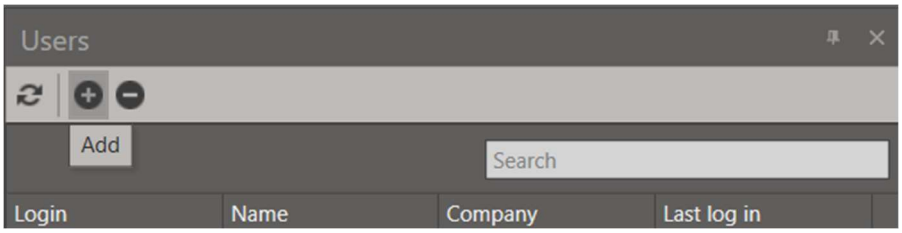
Logging to an external server



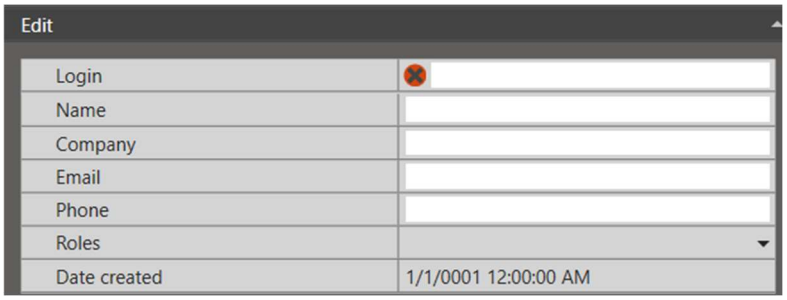
Login to VIDIA.Cloud



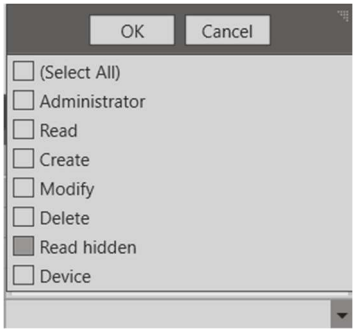
3. After logging in, it is a good idea to add a new user with the appropriate permissions. Using the program's Start menu, open the ***Users panel***. From the panel menu, select the button ⊕



4. Fill in the fields at the bottom of the panel. If you want to receive notifications from VIDIA about alarm events, fill in the ***Email*** and ***Phone*** fields (this feature requires the program to be configured accordingly).

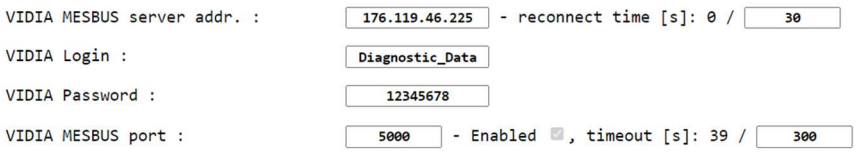


5. Use the ▾ button to expand the list of *Roles* and select what permissions the added user will have. Select at least the ***Device*** permission, and if you want to use automatic creation of structure elements, also ***Create.***

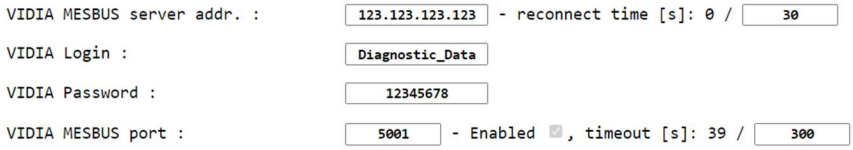


Administrator	Ability to add new users and disable their access to the site (a defined user account cannot be deleted).
Read	Ability to view the contents of the database.
Create	Ability to create structure elements and analysis.
Modify	Ability to edit structure elements and analyses to the extent that the software allows (name, description, alarm thresholds, analysis parameters cannot be edited).
Delete	Ability to delete elements of structure, analysis, analysis results, source data.
Read the hidden	Ability to display analysis parameters hidden when adding it.
Device	VIDIA capability. Ensuring that the device can create new structure elements requires that the **Create** option is also enabled.

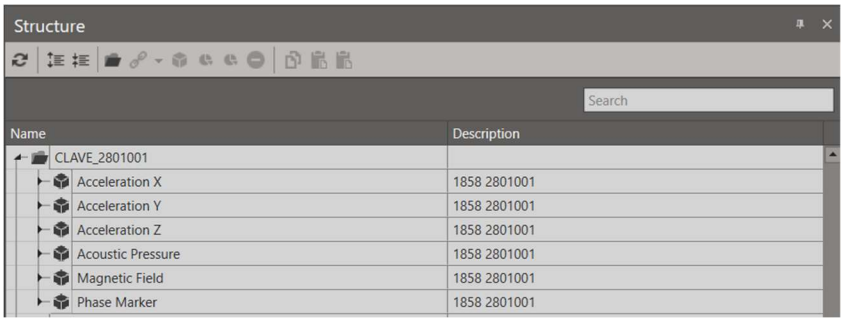
6. Connect the devices to the network to which the server is also connected.
7. Log into the device's configuration panel and configure its network connection and server data. If you are using VIDIA.cloud, enter 176.119.46.225 in the *VIDIA MESBUS server addr.* field, then enter the login and password. Set the port to 5000.



If you are using a local server (VIDIA.server), enter its address in the *VIDIA MESBUS server addr.* field. Then enter the login and password. Set the port to according to the parameters of the server.



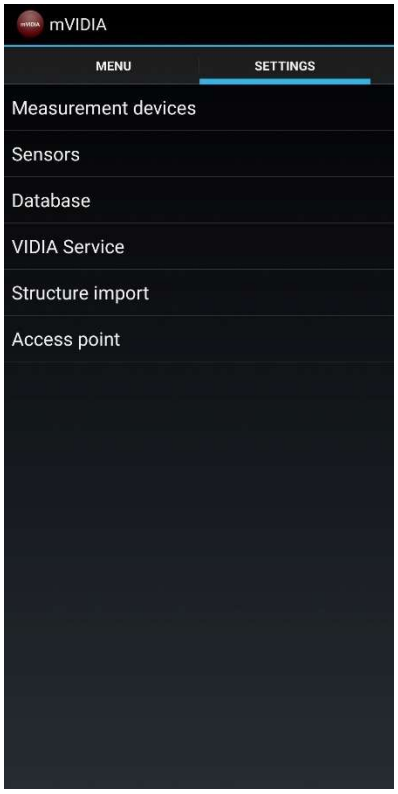
8. Once configured correctly, CL@VE will connect to the VIDIA program. If the procedure went correctly, the added device (*Sensor Location*) will be visible in the *Structure* section.



15. CONNECTING CL@VE TO THE MVIDIA APPLICATION

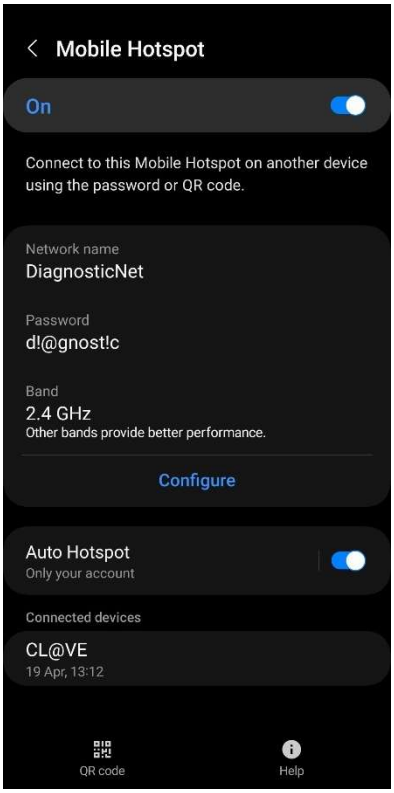
CL@VE is also compatible with the mobile version of VIDIA software - the mVIDIA app. In order to connect the sensor to the application:

1. Go to the ***Settings*** tab.

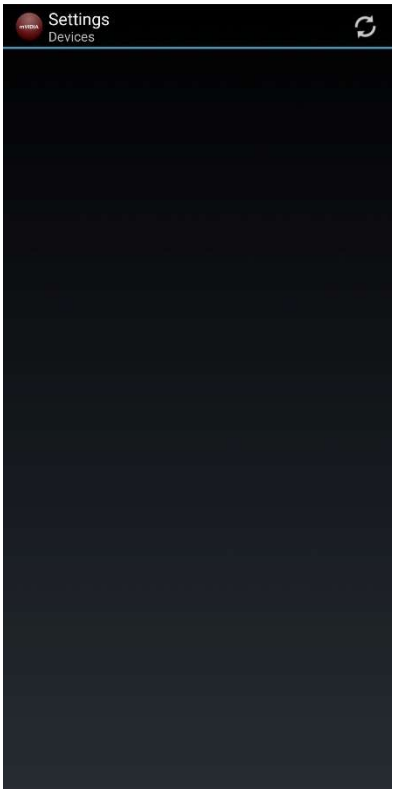


2. Select ***Access Point***.

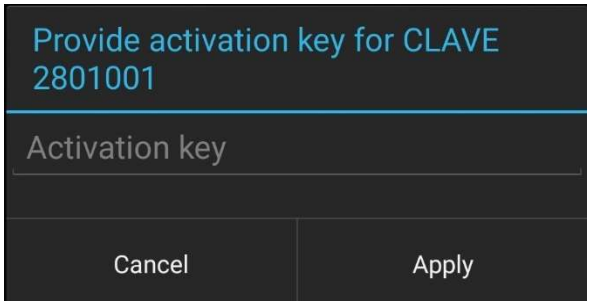
3. Configure the Wi-Fi Router so that CL@VE can connect to the network (by default, the device will connect to the network: **DiagnosticNet** password: **d!@gnos!c**). Then turn on the access point.



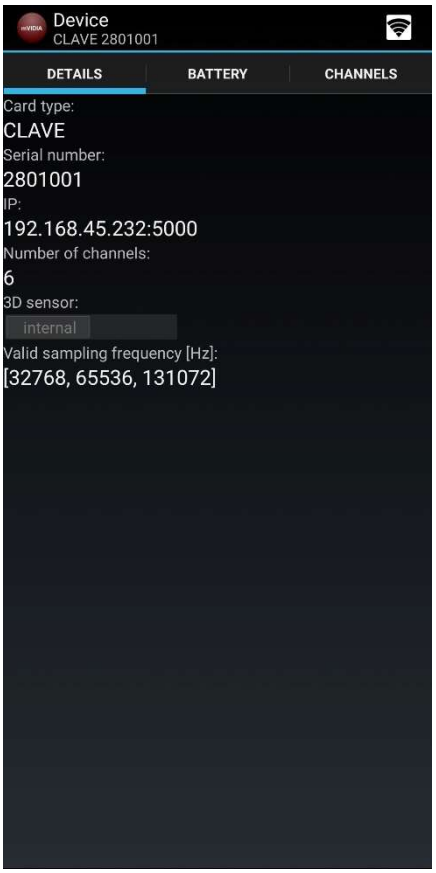
4. Return to the mVIDIA application, go to the ***Settings*** tab and select ***Measuring Devices***.



5. Press  .
6. If CL@VE has correctly connected to the Wi-Fi network, it should ask for the activation key. After entering it, press the ***Apply*** button.



7. Once you have correctly added CL@VE to the application, you will be able to display information about the device parameters.



16. INTERNAL MEMORY FOR MEASUREMENT AND ANALYSIS RESULTS

CL@VE is equipped with an 8GB internal memory that stores measurement and analysis results, including levels and time waveforms. In case of network connection problems, or if the device is operating autonomously, measurement data is accumulated in its memory. When a connection to the server is detected, CL@VE will automatically start transmitting data that has not yet been sent....

If no folders have been defined in the database specifying the location of the sensors such as in the device, they are created automatically.

When the memory is full, the current results replace the oldest measurement data.

ATTENTION:

After changing the parameters of the recorded and analyzed signals and changing the analysis parameters, the internal memory is automatically cleared.

Remember to upload the results recorded in the device's memory to the server before changing settings that require disabling the monitor mode.

17. MAINTENANCE, UPKEEP OF THE DEVICE AND STORAGE

Always follow safety rules when operating the device.

Carry out maintenance work after switching off the power supply voltage to the device!

Proper operation and accuracy of the measurements taken require that CL@VE be kept clean and in good working order.

Keep CL@VE clean. Collecting dust and dirt can adversely affect the correctness of its operation, leading to its damage (deterioration of insulation parameters) and/or obtaining incorrect measurement results. Clean the housing with a damp cloth soaked in an aqueous solution of mild detergent. Clean the power, signal and communication sockets with compressed air. In the case of more serious dirt, the previously mentioned elements, clean using isopropyl alcohol. Carry out the above operations using personal protective equipment: disposable gloves and safety goggles.

Every six months, conduct a visual inspection of the technical condition of the device and the correctness of the electrical connections. During the inspection, check for loose connectors. Correct any irregularities identified, and if damage is found, refer the device to an authorized service center.

Store unused CL@VE under conditions that are consistent with the operating and storage conditions stated in the technical specifications.

18. POSSIBLE PROBLEMS, THEIR CAUSES AND WAYS TO SOLVE THEM

Number	PROBLEM	POSSIBLE CAUSE OF THE MALFUNCTION	POTENTIAL SOLUTION TO THE PROBLEM
1	When the power is turned on, the device does not start	The power cable or connector is damaged	Replace the power cord or connector
		Incorrect supply voltage	Check the supply voltage
2	Device does not wake up when power button is pressed	The battery is discharged	Connect the device to the power supply
		No battery/battery	
3	When the device is connected to the computer, the user panel is unavailable	Missing or incorrect network configuration	Correctly configure the network connection
		Damaged Ethernet cable	Replace the Ethernet cable
4	Device does not connect using Wi-Fi network	Incorrect network configuration	Correctly configure the network connection
		Incorrect Wi-Fi network data	Check the correctness of the entered Wi-Fi network data
5	Lack of configurability of some settings	The device operates in *Measurement ON* mode	Change the operating mode of the device to *Measurement OFF*
6	The devices do not work in a multichannel system	Failure to define *master* and *slave* devices	Set selected master as *master*, others as *slave*
7	When input signals are connected, the device does not perform analysis	The device operates in *Measurement OFF* mode	Change device mode to *Measurement ON*
8	The device does not send data to the server	Server login credentials have changed	Check current server login credentials
		Incorrect server IP address	Check the server's IP address

19. WARRANTY

- CL@VE has a warranty that covers a period of 36 months.
- In the case of a temporary warranty, the warranty period is calculated from the date of purchase specified on the invoice delivered to the customer, and in the case of installation by Alitec, from the date of completion of the installation work confirmed by an acceptance protocol signed by the parties.
- In case of complaints, contact the manufacturer directly:

Alitec Piotr Pietrzak
Al. Kosciuszki 23/25
90-418 Lodz
office@alitec.pl

- The product subject to a claim should be delivered to the company's headquarters together with the warranty card and a copy of the proof of purchase. The product should be delivered with all the equipment that came with the purchase (accessories, cables, data carriers, etc.). It is recommended to deliver the product in its original packaging. In the absence of factory packaging, the risk of damage to the equipment during transport to and from the service point is borne by the Buyer.
- Attach to the claim a written report on the defect AND the circumstances under which it occurred.
- Alitec Piotr Pietrzak is obliged to handle complaints in accordance with the provisions of Polish law.
- The warranty does not cover:
    a) Damage caused by improper or non-compliant use
    b) Damage occurred as a result of activities that the user should perform according to the instructions, such as installing the analyzer.
    c) Damage caused by improper installation.
    d) Damage caused by improper maintenance
    e) Damage caused after the sale due to accidents for which the manufacturer is not responsible, such as damage during transportation.
    f) Damage caused by use in environmental conditions that do not conform to specifications.
    g) Damage caused by making modifications to the equipment itself, as well as to the circuits working with it, as well as independent repairs.
    h) Damage caused by fortuitous phenomena (fire, power surge, electrical discharge, flooding, etc.).
- The warranty also does not cover mechanical damage due to the fault of the user, as well as wear and tear of accessories, consumables and storage media supplied with the device or separately.
- The choice of the form of implementation of the complaint is up to the manufacturer.
- Defects or damages revealed during the warranty period will be repaired free of charge within 14 working days from the date of delivery of the device to the company's headquarters. In justified cases, in particular involving the need to import spare parts from abroad or send the product to a foreign manufacturer, the company reserves the right to extend this period. The repair period will then be determined individually.
- In special situations, the device can be replaced with a new or factory refurbished, free of defects. The decision on how to proceed is made by an Alitec representative and in consultation with the equipment manufacturer.
- In the event that a product covered by the manufacturer's perpetual warranty needs to be repaired, Alitec agrees to cover the cost of transportation to the manufacturer's headquarters for a period of 60 months from the date of purchase listed on the invoice provided to the purchaser or the date of completion of the installation work performed by Alitec.
- In the event of an unfounded complaint (when the damage was not covered by the warranty or the device turned out to be operational), the company reserves the right to charge the warranty holder with the cost of servicing and transportation.

- Alitec shall not be liable in any case for any damages, in particular: direct, indirect or consequential, including loss of profits, incurring additional costs, inability to use the product, resulting from the operation or failure of the supplied equipment, even if information about the possibility of their occurrence has been provided. Alitec's financial liability for any damages to the Customer or other persons or entities shall not exceed the purchase price of the supplied products.
- Due to the nature of the goods offered, Alitec reserves the right to provide operating instructions in English.

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Alitec

Al. Kosciuszki 23/25 90-418 Lodz

mailto:biuro@alitec.com.pl

www.alitec.pl