Labkotec DOC002142-EN-1 Ice Warning Light User Guide

Contents

Labkotec DOC002142-EN-1 Ice Warning Light

Labkotec Ice Warning Lights

Specifications

- **Product Name:** Labkotec Ice Warning Lights
- **Model Number:** DOC002142-EN-1
- **Date:** 11/15/2023

FAQ

- **Q:** What should I do if the warning lights are not functioning properly?
- **A:** If you encounter any issues with the functionality of the warning lights, immediately stop using them and contact a trained professional for inspection and repair.

General information about this guide

This user guide contains instructions for the installation, commissioning and use of the Labkotec Ice Warning Lights.

Labkotec products are designed to be safe when used as described in this user guide. The safety of this product cannot be guaranteed if it is used in any other way than that described in this user guide.

Used Symbols
Safety-related Signs and Symbols

DANGER!

-  This symb ol indicates a warning about a possible fault or danger. In case of ignoring the consequences may range from personal injury to death.

WARNING!

-  This symbol indicates a warning about a possible fault or danger. In case of ignoring the consequences may cause personal injury or damage to the property.

CAUTION!

-  This symbol warns of a possible fault. In case of ignoring the device any connected facilities or systems may be interrupted or fail to complete.

Informative Symbols

Note!

-  This symbol brings important information to your attention.
-  This mark means that special attention must be paid to the installation, especially in potentially explosive atmospheres.
-  This mark means that the device is protected by double or reinforced insulation.
-  This marker indicates an action by the user.

Safety and the Environment

General safety instructions

- The plant owner is responsible for the planning, installation, commissioning, operation, maintenance and disassembly at the location.
- Installation and commissioning of the device may be performed by a trained professional only.

- Protection of operating personnel and the system is not ensured if the product is not used for its intended purpose.
- Laws and regulations applicable to the usage or the intended purpose must be observed.
- The device has been approved for the intended purpose of use only. Neglecting these instructions will void any warranty and absolve the manufacturer from any liability.
- All installation work must be carried out without voltage.
- Appropriate tools and protective equipment must be used during installation.
- Other risks at the installation site must be taken into account as appropriate.

Intended use

- The Labkotec Ice Warning Lights are an alarm system designed to warn about the possibility of ice throwing and ice falling in a wind farm.
- A more specific description of the product's operation, installation and use is provided later in this guide.
- The device must be used under the instructions provided in this document.
- Other use is counter to the product's purpose of use. Labkotec cannot be held liable for any damage caused by using the device in violation of its purpose of use.

Transport and storage

- Check the packaging and its contents for any possible damage.
- Ensure that you have received all the ordered products and that they are as intended. Keep the original package. Always store and transport the device in the original packaging.
- Store the device in a clean and dry space. Observe the permitted storage temperatures. If the storage temperatures have not been presented separately, the products must be stored in conditions that are within the operating temperature range.

Installation and Commissioning
Only trained and qualified personnel may carry out the fixing, installation, commissioning, operation, maintenance and dismantling of the system. This manual must be read and understood.

Repair
The device may not be repaired or modified without the manufacturer's permission. If the device exhibits a fault, it must be delivered to the manufacturer and replaced with a new device or one repaired by the manufacturer.

Decommissioning and disposal
The device must be decommissioned and disposed of in compliance with local laws and regulations.

System description

- The ice warning light system includes a base station, the required number of sub-stations to be installed near access routes and work areas, and the LabkoNet service.
- The warning light receives ice alarms from Labkotec ice detectors or a third-party system.
- The flashing light warns anyone entering or present in the area of the risk of ice throw and ice fall.
- The ice warning light system is a weatherproof system operating in mobile network coverage areas. The LabkoNet service allows the different statuses of the ice warning light system to be displayed on the site's page

remotely.

- The ice warning light system is easy to install at new and existing sites. The system is easy to use thanks to the real-time LabkoNet service, which monitors and records alarms and notifies you when necessary. The LabkoNet service includes alarm control and can be supplemented by a replacement device service for an extra charge if required.

How the system works

- The ice warning light system receives the ice alarm as relay data to the digital input of the base station’s Labcom communication unit. The base station transmits the alarm to the LabkoNet service by using the communication unit. LabkoNet service then broadcasts the alarm to all sub-station communication units programmed for the wind farm or a part of it.
- When a substation receives an alarm, the relay output of its communication unit is activated, switching on the flashing LED of the substation. LabkoNet service keeps the alarm active as long as the digital input of the base station keeps receiving the alarm data.
- In addition to the alarm data, the LabkoNet service monitors the functioning of the substation. It securely reads the relay output of the Labcom communication unit to ensure that the alarm data has reached its destination. The reliability of the LabkoNet service is ensured by the fact that the communication unit resets itself when it detects that it has lost its mobile network connection. This does not affect the status of the alarm at substations.
- The LabkoNet SaaS service also enables the collection of statistical data on the number and duration of ice alarms in the wind farm area.

System Components

The system includes the base station, the substation and the LabkoNet service, which hosts the communication and control system.
Table 1 . System components.

Name	Description
Base station (230 VAC)	Enclosure (wall mounting) Warning light with 1 m cable (optional) Warning light mounting arm (wall or pole mounting) External antenna with 3 m cable
Substation (230 VAC)	Warning light mounting arm (wall or pole mounting) Warning light with 1 m cable Enclosure (pole mounting) Fixed antenna mounted on the enclosure
LabkoNet service	Communication and control system Operates on a mobile network and is based on the Labcom communication unit Remote monitoring of the system, including active ice alarms, number and duration of ice alarms, alarm transfers, etc.

Dimensions

- Dimensions of the base station and substation:
- Figure 13 Composition of the base station.
- Figure 14 Composition of the substation.
- Dimensions of the ice warning light and mounting arm:
- Figure 16 Main dimensions of the ice warning light.

Installation

- Please read the ‘General safety instructions’ section before installation. The installation is described below.

Installation of the base station

- Mount the base station to a wall by using the lugs of the enclosure. The base station is typically installed either in the turbine’s nacelle or the electrical switchboard at a location where the equipment receives the ice alarm. The mounting must be strong enough to withstand the weight of the enclosure.
- Cut holes for 3 x M12 sleeves for the base station’s relay output, digital input and antenna cable into the bottom of the enclosure. Similarly, to connect the supply voltage, cut a hole for 1 x M25 sleeve into the bottom of the enclosure.
- After cutting the holes, run the cables through the sleeves to the terminal strip. Tighten the sleeves and press the cable conductors into the spring-loaded terminal strip, see Figure 1.
- Next, mount the warning light and its mounting arm near the enclosure. The standard delivery includes the components needed to mount the support on a Ø 60 mm pipe. Figures 17, 18 and 19 show different mounting methods.

Note! The base station warning light and mounting arm are supplied as optional accessories.
Note! The base station includes both a vandalism antenna and a magnetic antenna with a fixed cable. The antenna can be mounted freely.
Note! If the base station is placed indoors, mobile network coverage must be ensured by suitable positioning of the antenna, e.g. outside the building.

Installation of the substation

- Mount the substation to a pipe with the pole bracket supplied with the enclosure. Figure 15 shows the instructions for Rittal pole mounting 2584.100.
- To connect the substation's supply voltage, cut a hole for 1 x M25 sleeve into the bottom of the enclosure.
- Next, mount the warning light and mounting arm to the pipe above the enclosure. The standard delivery includes the components needed to mount the support structure on a Ø 60 mm pipe. Figure 17 shows different mounting methods.
- The substation includes a fixed vandalism antenna attached to the side of the enclosure.

Note! A sign explaining the operation of the substation and warning light is an optional accessory, the supply of which must be agreed upon separately.

LabkoNet service installation

The LabkoNet service controls and monitors the ice warning system. Communication and control are based on Labcom communication units operating on a mobile network.
The units are delivered preconfigured to the LabkoNet system. Upon installation, the user provides Labkotec Oy with the serial numbers and installation locations of the installed devices. LabkoNet administrators finalise the LabkoNet site and connect the base station and substations into a functional system based on the information provided.

Connections

- Please read the 'General safety instructions' section before installation.
- All installation work must be carried out without voltage.
- The connection diagrams and connections are described below.

Connection diagrams

The necessary connections are made to the terminal strip through the holes made into the bottom of the enclosure (see section INSTALLATION) or to the connection point at the bottom of the outer surface of the enclosure.
The base station has six (6) points to connect:

1. supply voltage
2. digital input
3. relay output
4. antenna (connector inside the communication unit)
5. protective earth (earthing point at the bottom of the outer surface of the enclosure)
6. light (connector at the bottom of the outer surface of the enclosure)

Figure 1 . Base station connections.

The substation has three (3) points to connect:

1. supply voltage
2. protective earth (earthing point at the bottom of the enclosure)
3. light (connector at the bottom of the enclosure)

Base station relay output

The potential-free relay output of the base station can be used to transmit ice alarm data to external systems.
Relay output data:
1 pc, SPDT, 250 V AC/5A/500VA, potential-free relay output Connect the external (forwarded) ice alarm data to the relay output of the base station, see Figure 1.

Base station digital input

- The ice alarm data, which controls the ice warning lights through the system, is connected to the digital input of

the base station.
- The substation supplies 24 VDC, which returns when the customer’s potential-free changeover contact relay closes, causing an ice alarm.

Digital input data:

- 1 pc, 24 VDC
- Connect the ice alarm data to the digital output of the base station, see Figure 1.

Base station and substation antennas

- The base station’s antenna can be mounted freely. The antenna cable’s connector is plugged into the communication unit.
- Antenna data:
- Vandalism or magnetic antenna.
- Connect the antenna cable to the base station’s communication unit, see Figure 1.
- The substation has a fixed antenna. The antenna and antenna cable are pre-connected.

Base station and sub-station warning lights

- The base station and substation include a connector for the light. The connector is located on the outer surface at the bottom of the enclosure.
- Connector data:
- Screw-on multi-pole connector.
- Connect the light cable connector to the bottom of the outer surface of the base station and substation enclosures, see Figure 1 and Figure 2.

Base station and substation protective earthing

The base station and substation have an earthing point at the bottom of the outer surface, to which the protective earthing is connected.
Earthing point data

- M8 threaded pin, washers and nuts.
- Connect the protective earthing to the earthing point at the bottom of the base station and substation, see Figure 1 and Figure 2.

Base station and substation supply voltage

The supply voltage cable for the base station and substation is connected through the M25 sleeve to the terminal strip.
Connection point data:

- Push-in terminal strip. Markings and colours: L (grey), N (blue), PE (yellow-green).
- Connect the supply voltage cable to the base station and substation, see Figure 1 and Figure 2.

Commissioning

The commissioning process consists of the following steps:

1. Power up all sites.
2. Check the LabkoNet service to see that the sites are connected.
   Service user credentials will be provided with your order.
   The LabkoNet service is available at **https://app.labkonet.com/**.
3. Activate the ice alarm from the base station's ice alarm input.
4. Check the LabkoNet service to ensure that the base station's ice alarm and the lights of each substation are activated.
5. Visit the sites to check that the warning lights are working.
6. Deactivate the ice alarm from the base station's ice alarm input.
7. Check the LabkoNet service to ensure that the base station's test mode and the lights of each substation are deactivated.
8. Turn on the test switch from the base station, see Figure 3.
9. Check the LabkoNet service to ensure that the base station's test mode and the lights of each substation are activated.
10. Turn off the test switch from the base station.
11. Check the LabkoNet service to ensure that the base station's test mode and the lights of each substation are deactivated.
12. The commissioning process is complete.

Figure 3 . Location of the test switch in the base station.

Operation

- After installation and commissioning, the system functions entirely independently and does not require constant monitoring.
- The operation of the system can be monitored in the LabkoNet service. Service user credentials will be provided with your order.
- The LabkoNet service is available at **https://app.labkonet.com/**.

LabkoNet site icon explanations

The LabkoNet service's warning light application uses two LabkoNet site types: Warninglight BASE and Warninglight SUB. There are several icon options for these sites, depending on the status of what is being measured, see Tables 2 and 3.
Table 2. Base station icons and explanations.

Icon	Site type	Explanation
	BASE	The ice alarm is on and there are other unacknowledged alarms (line not disconnected).
	BASE	The ice alarm is on and there are other alarms active. All alarms have been acknowledged.
	BASE	The ice alarm is not active, there are other alarms active, but all alarms have been acknowledged.
	BASE	The ice alarm is not active but there are other alarms active, at least one of which is unacknowledged.
	BASE	The ice alarm is active, there are no other active alarms.
	BASE	Neither the ice alarm nor other alarms are active.
	BASE	The test alarm is active.

Table 3 . Sub-station icons and explanations.

Icon	Site type	Explanation
	SUB	The warning light is on and the site has one or more unacknowledged alarms active.
	SUB	The warning light is not on, there are no active alarms.
	SUB	The warning light is not on, there are active alarms, all of which have been acknowledged.
	SUB	The warning light is not on, there are active unacknowledged alarms.
	SUB	The warning light is on, there are no active alarms.
	SUB	The warning light is on and there are active alarms, all of which have been acknowledged.

Line disconnected

If the Line Disconnected alarm is on, the site icon is replaced by the disconnection icon. There are three options for the icon, see Table 4.

Table 4 . Line disconnected icons and explanations.

Icon	Explanation
	The site is ‘In use’ and the disconnection alarm has not been acknowledged.
	The site is ‘In use’ and the disconnection alarm has been acknowledged.
	The site is ‘Not in use’ and the disconnection alarm is active.

System status

- The system statuses are ice alarm and fault mode. They are described in more detail below.
- The sites are displayed on the map of the LabkoNet service. On the map, the site’s symbol changes when the site has an active alarm, see Figure 4.

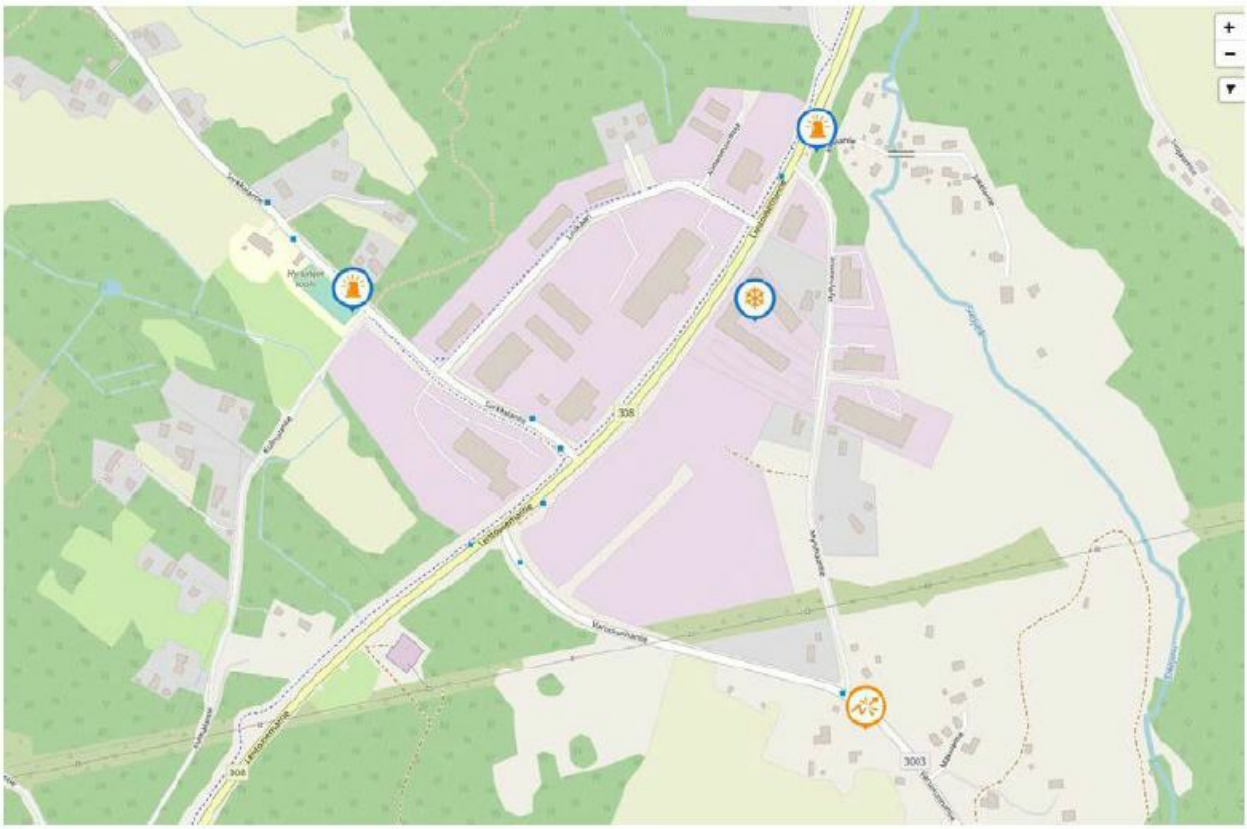


Figure 4 . An example of the sites on the map displayed in the LabkoNet service. The site's symbol changes when the site has an active alarm.

- Clicking on a map item on the left-hand side of the map opens the item's details in a concise format.

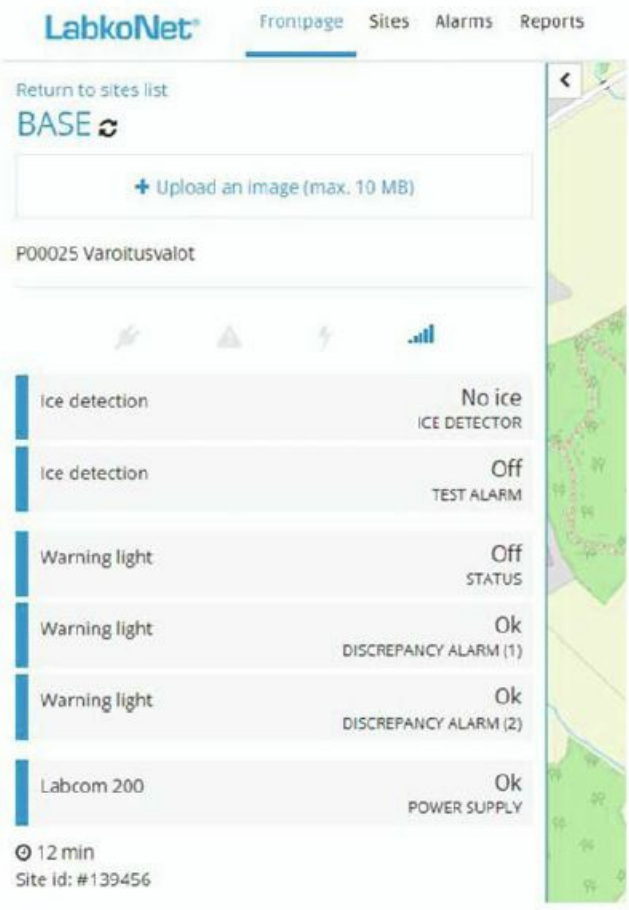


Figure 5 . Site information when selecting from the map.

In addition to this, each site has its own site page in the LabkoNet service, detailing current and past statuses. Figure 6 shows the base station site page and Figure 7 shows the sub station site page. The site page shows the latest measurement values for the selected site. If there is an active alarm in one of the site's measurements, the text in question is displayed in red.

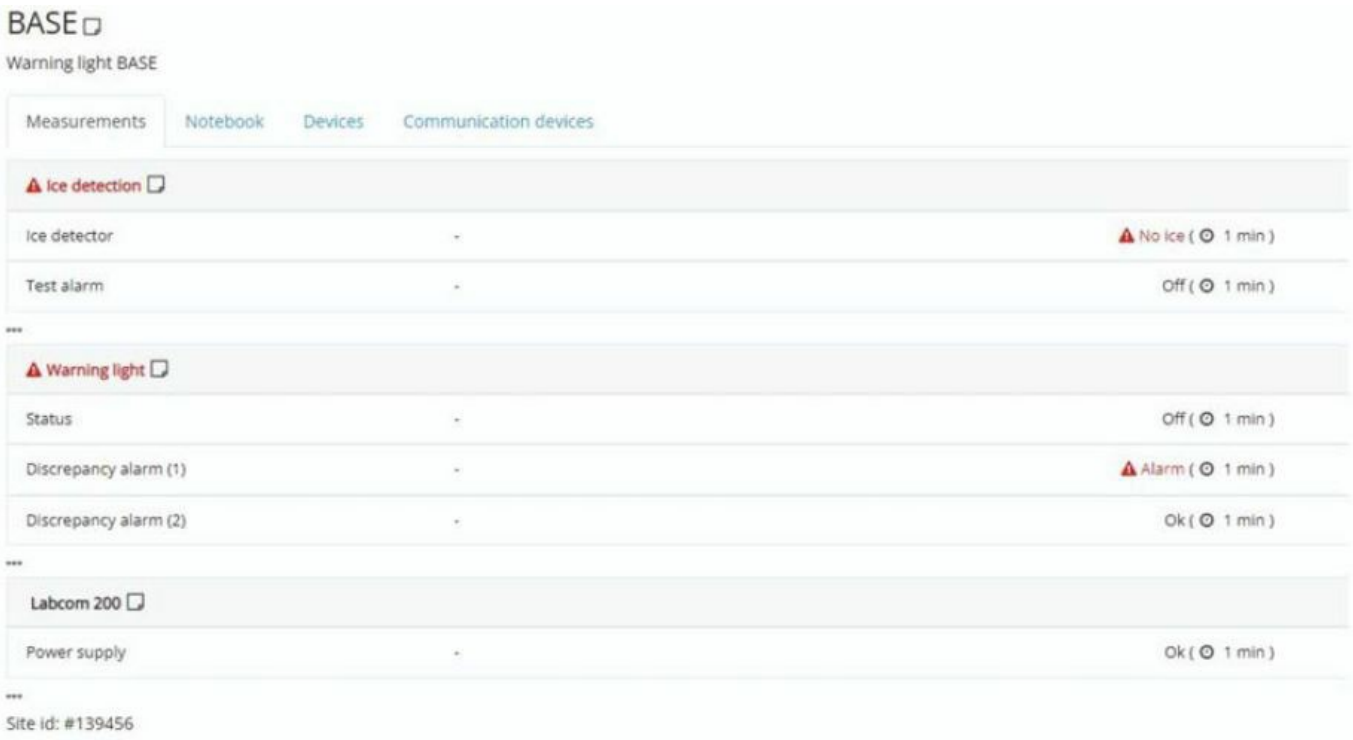


Figure 6 . An example of the base station site page. The site page shows the latest measurement values for the selected site. If there is an active alarm in one of the site's measurements, the text in question is displayed in red. In the example site, the Ice detection and Warning light texts are in red because ice has been detected and discrepancy 1 has been notified.

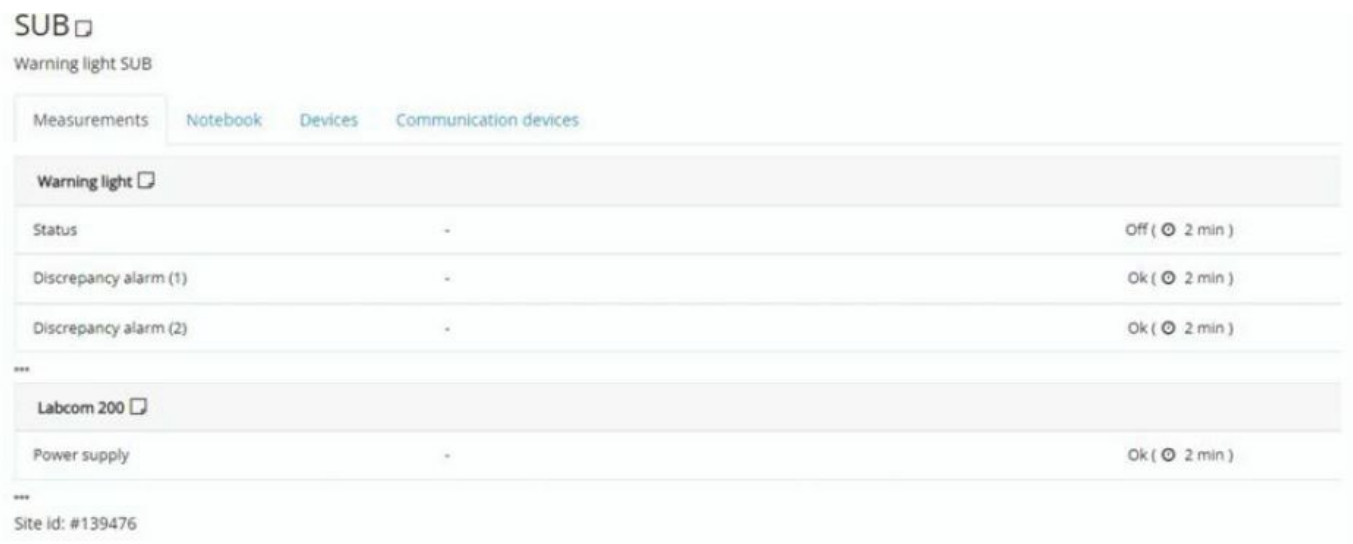


Figure 7 . An example of the sub-station site page. The site page shows that there is no ice alarm or fault mode active and the measurement results have been updated
2 minutes ago.

Ice alarms

- The LabkoNet service keeps the ice alarm active as long as the base station's alarm input remains active.
- The LabkoNet service sends ice alarms by SMS or email to the agreed-upon recipients under the agreement in

force.

The alarms are detailed in table 5 . Table 5 . Ice alarms.

Ice alarm on	yes/no
Number of alarms	total number
Duration of alarms	total hours
Test alarm	yes/no

Fault modes

- The warning light system has comprehensive self-diagnostics and can detect malfunctions. The LabkoNet server monitors the state of the communication link between the base station and sub stations and generates disconnection alarms in the event of a communication failure. The sub stations monitor the status of the lights and generate a discrepancy alarm if a light stays on or does not light up in accordance with the status of the ice alarm.
- The LabkoNet service sends an SMS or email about the fault to the agreed upon recipients in accordance with the agreement in force.
- The fault modes are detailed in table 6 .

Table 6 . Fault modes.

Fault mode on	yes/no
Line disconnected	indicates the affected device
Warning light is not on	indicates the affected device
Discrepancy alarm	indicates the affected device
Power outage alarm 	indicates the affected device

There is a battery backup inside the communication unit. During a power cut, the ice warning light and the system will run on a full backup battery for about an hour.

Maintenance

The operation of the ice warning light system must be checked annually. This includes an annual test and visual inspection.
The LabkoNet service remote monitoring system provides real-time information on the status of the system, including information such as warning light malfunctions.

Local operation test

1. Turn on the test switch from the base station, see figure 3 .
2. Check the LabkoNet service to ensure that the base station’s test mode and the warning lights of each sub

station are activated.

3. Turn off the test switch from the base station.
4. Check the LabkoNet service to ensure that the base station's test mode and the lights of each sub station are deactivated.
5. The local operation test is complete.

System operation test

- The operation of the system can be monitored in the LabkoNet service. Service user credentials will be provided with your order.
- The LabkoNet service is available at
- **https://app.labkonet.com/**.
- Figures 8 – 9 show the normal situation of the base station and sub station with no alarm. Figures 10 – 11 show the situation of the base station and sub station with the ice alarm on.

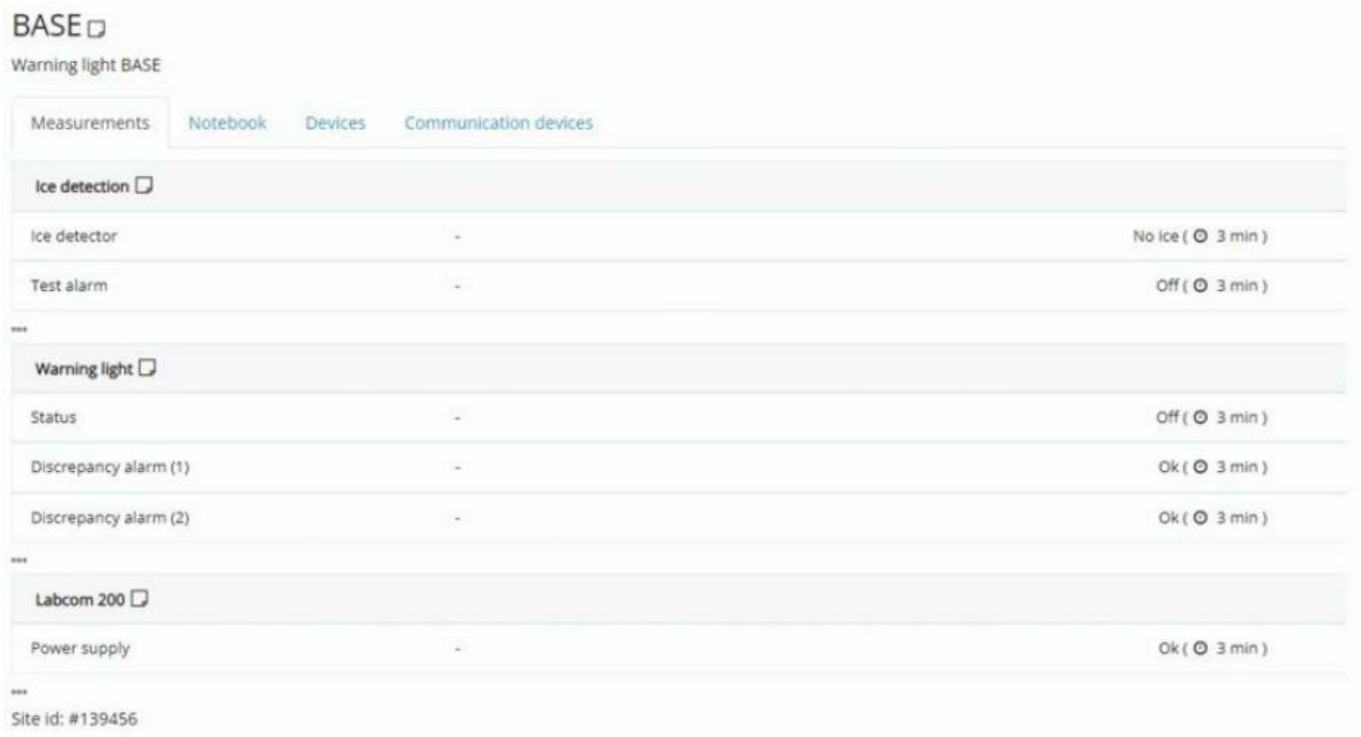


Figure 8 . An example of the base station site page. Normal situation with no ice alarm.

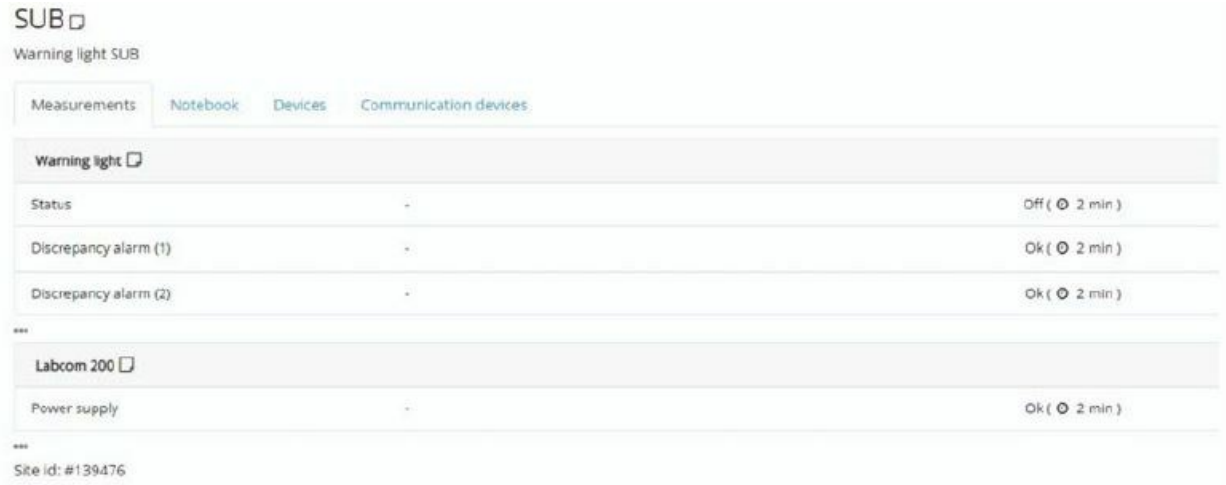


Figure 9 . An example of the sub station site page. Normal situation with no ice alarm.

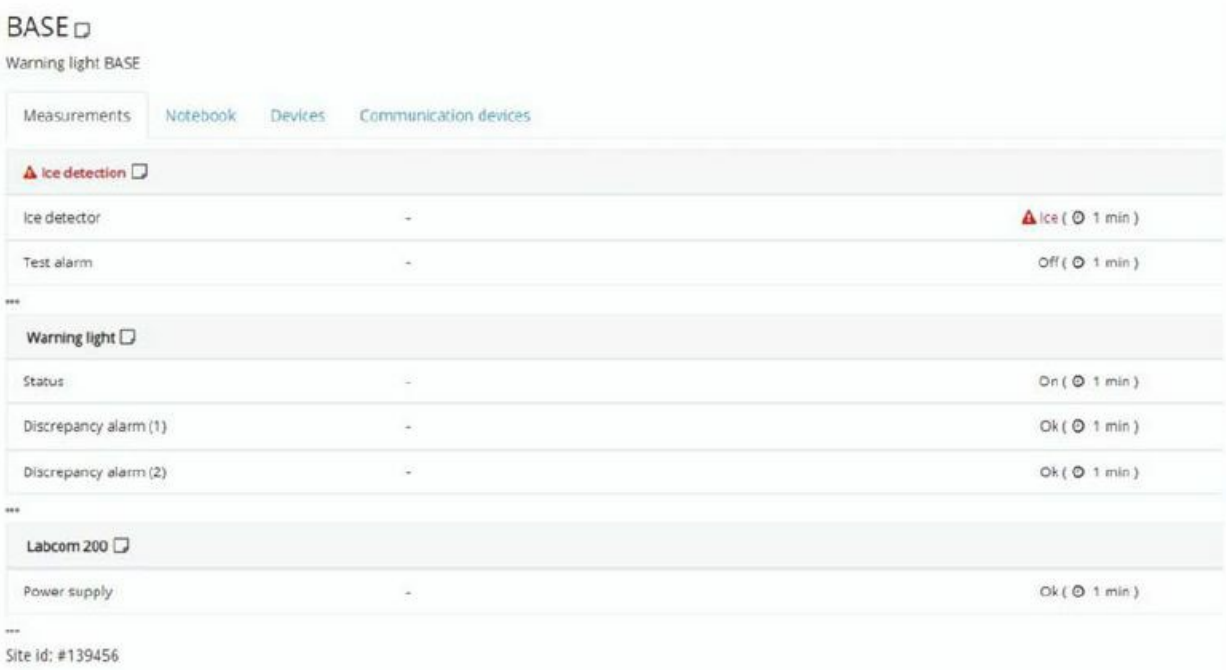


Figure 10 . An example of the base station site page. The situation with the ice alarm on.

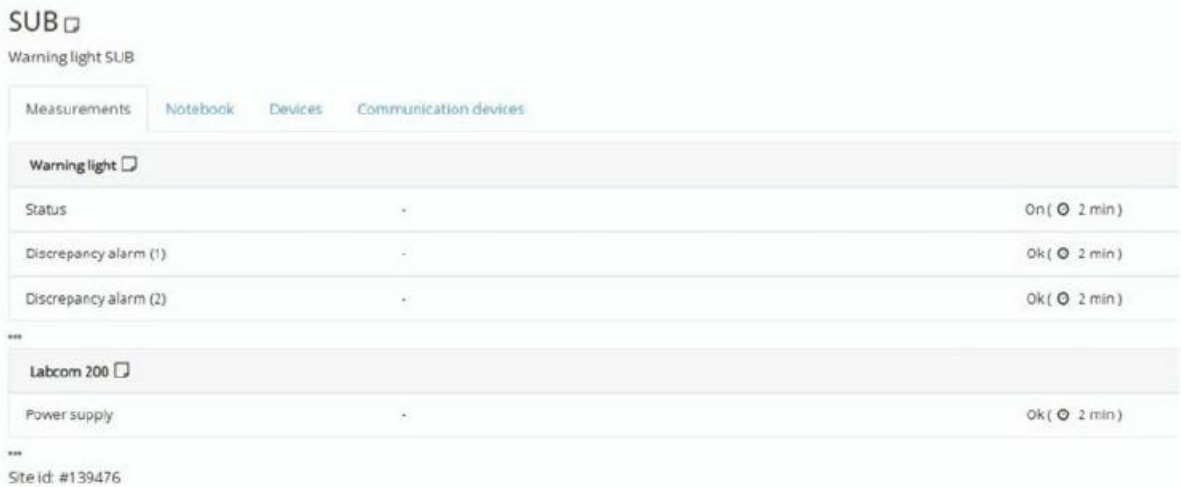


Figure 11 . An example of the sub station site page. The situation with the ice alarm and warning light on.

More information is available on the site page by clicking on the three dots. For example, clicking on the three dots of the Labcom 200 section brings up a menu showing the backup battery voltage and mobile network field strength, see figure 12.

Figure 12 . Clicking on the three dots of the Labcom 200 section brings up a menu showing the backup battery voltage and mobile network field strength.

Maintenance measures

- A visual inspection of the base station and sub stations is carried out annually and backup battery inspection after every five (5) years.
- For further information, see document D04162CE Communication Unit Installation and User's Guide (230 VAC).

Troubleshooting

DANGER OF ELECTRICAL SHOCK!

Follow the electrical safety regulations!

PROBLEM: The site fails to connect to the LabkoNet service.

Explanation: The SIM card of the Labcom communication unit is not properly inserted, the antenna connector is loose or the unit is not in the mobile network or its coverage area.
Action:
Log in to the LabkoNet service, see section 'System operation test', check that the site is within the coverage area of the mobile network and that the field strength is between 12 and 31, see figure 12 .

Note! If all or several sites are disconnected, the problem is with the mobile network or the LabkoNet service, in which case please contact LabkoNet customer support.

1. Disconnect and restore the power supply to the site, disconnect the 230 VAC power supply from the main switch at Q1, figure 14 , point 11 and at the same time disconnect and connect the battery backup connector in the top right corner, figure 21 .
2. Check that the antenna cable and SIM card are firmly attached.

PROBLEM: The site's ice warning light is not flashing.

Explanation: The warning light cable is not properly connected, the warning light is damaged, the Labcom communication unit has not received a control command or the unit is broken.
Action

1. Check that the warning light cable is firmly connected, the light is not damaged and the glass fuse of the warning light is intact at F100, figure 14 , point 17.
2. Log in to the LabkoNet service, see section ‘System operation test’, check that the ice alarm is activated and that there is no disconnection or discrepancy alarm, figures 10 and 11 .

PROBLEM: The voltage supply indicator light is not on.

Explanation: The Labcom communication unit is not receiving voltage, the voltage is too low or the unit is broken.
Action:

1. Check that the supply voltage to the enclosure is 220–240 VAC from terminals N and L and that the automatic fuses of the enclosure are on at F1 and F2, figure 14 , points 10, 14 and 15.
2. Check the supply voltage to the communication unit from terminals N and L1 and check that the glass tube fuse of the unit is intact at FUSE 160 mAT, figure 20 , points 1 and 2.

PROBLEM: The battery backup is not working.

Explanation: The battery backup has depleted during a power cut and is no longer charging to its full capacity.
Action:

1. Wait a few days after a power cut to allow the battery to charge to its full capacity, the voltage should be around 14 V, see figure 12 .
2. If the battery is no longer charging to its full capacity, replace it with a new one.
3. Disconnect the power for the duration of the battery replacement from the main switch at Q1, figure 14 , point 11.
4. Remove the old battery from the cover, disconnect the connector from the top corner of the circuit board and install the new battery, figure 21 .

For more information, please contact Labkotec Oy’s customer support.

Technical specifications

Technical specifications: base station (BASE) and sub station (SUB)

Enclosure	External dimensions 380 x 380 x 210 mm (W x H x D)
	Wall or pole mounting Ø 40…170 mm Equipped with a lockable door Weight max 14 kg
IP code	IP55 Condensate drainage
Materials	Enclosure: powder-coated steel cabinet for outdoor use Rain cover and pipe mounting: stai nless steel Warning light (beacon): polycarbonate

Operating environment	Operating temperature: -40 ºC…+50 ºC Relative humidity (RH) 0…100% Suitable for outdoor use
Supply voltage	230 VAC +-10%, 50/60 Hz, circuit breaker 10…16 A Supplied with M25 sleeve gland, suitable for 8…17 mm thick input cable. Maximum conductor surface 6 mm2.
Power consumption	Normally 12 VA (230 VAC / 50 mA) Max. 69 VA (230 VAC / 300 mA) with enclosure heating and ice warning light on.
Relay outputs	1 pc, SPDT, 250 V AC/5A/500VA The base station has an optional single potential-free relay output for external (forward) ice alarm.
Digital inputs	1 pc, 24 VDC In the base station. The customer provides the ice alarm data, which controls the ice warning lights via the system.
Data transfer	The base station and sub station include a Labcom communication unit. The base station comes with the antennas required for the equipment. The base station includes a fixed vandalism antenna attached to the side of the enclosure. **Note**. If the base station is placed indoors, mobile network coverage must be ensured by suitable positioning of the antenna, e.g. outside the building.
Measurement and data transfer interval	The ice warning lights turn on and the system receives a start confirmation message within a few minutes.
Electrical safety	EN 61010-1, Class II, CAT II/III
EMC	EN 61000-6-3 (emissions), EN 61000-6-2 (immunity)
Warning light	Flashing LED light Red light (standard) and yellow light (optional) Luminous intensity 10.5 cd LED light service time >50,000 h
Backup battery	During a power cut, the ice warning light and the system will run on a full backup battery for about an hour.
System testing	The system can be tested locally. The base station has a separate test switch. The test is typically activated within a few minutes.

Number of warning lights	The number of sub stations is not limited and sub stations can be added afterwards.
Installation height for warning lights	Recommended at 2.5 m above ground level so that the light is visible to anyone on the road and in the area.
Maintenance	Information about a possible broken warning light is provided via LabkoNet service. An annual visual inspection of the base station and sub stations.

Appendices

Composition of the base station

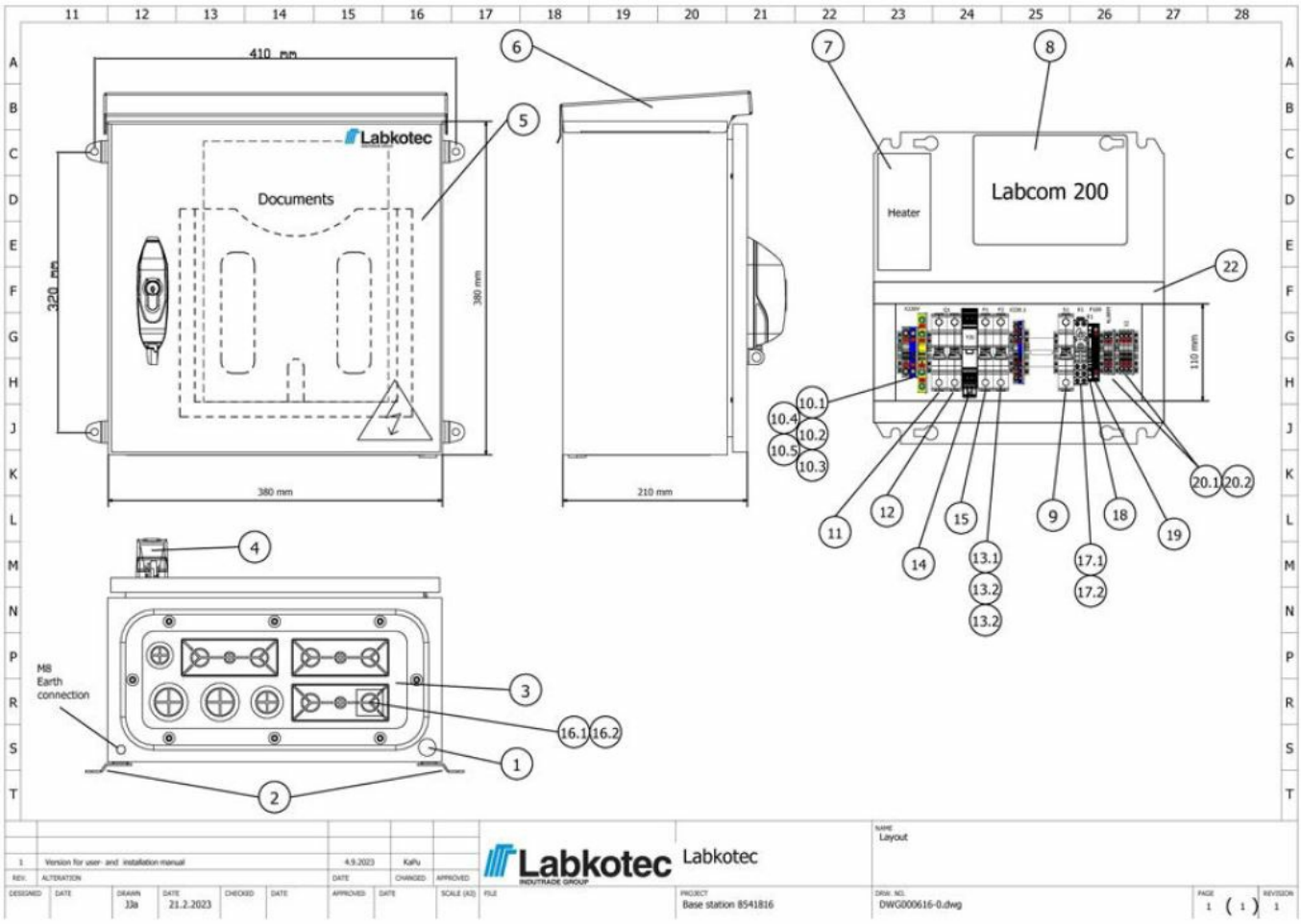


Figure 13 . Composition of the base station.

Composition of the sub station

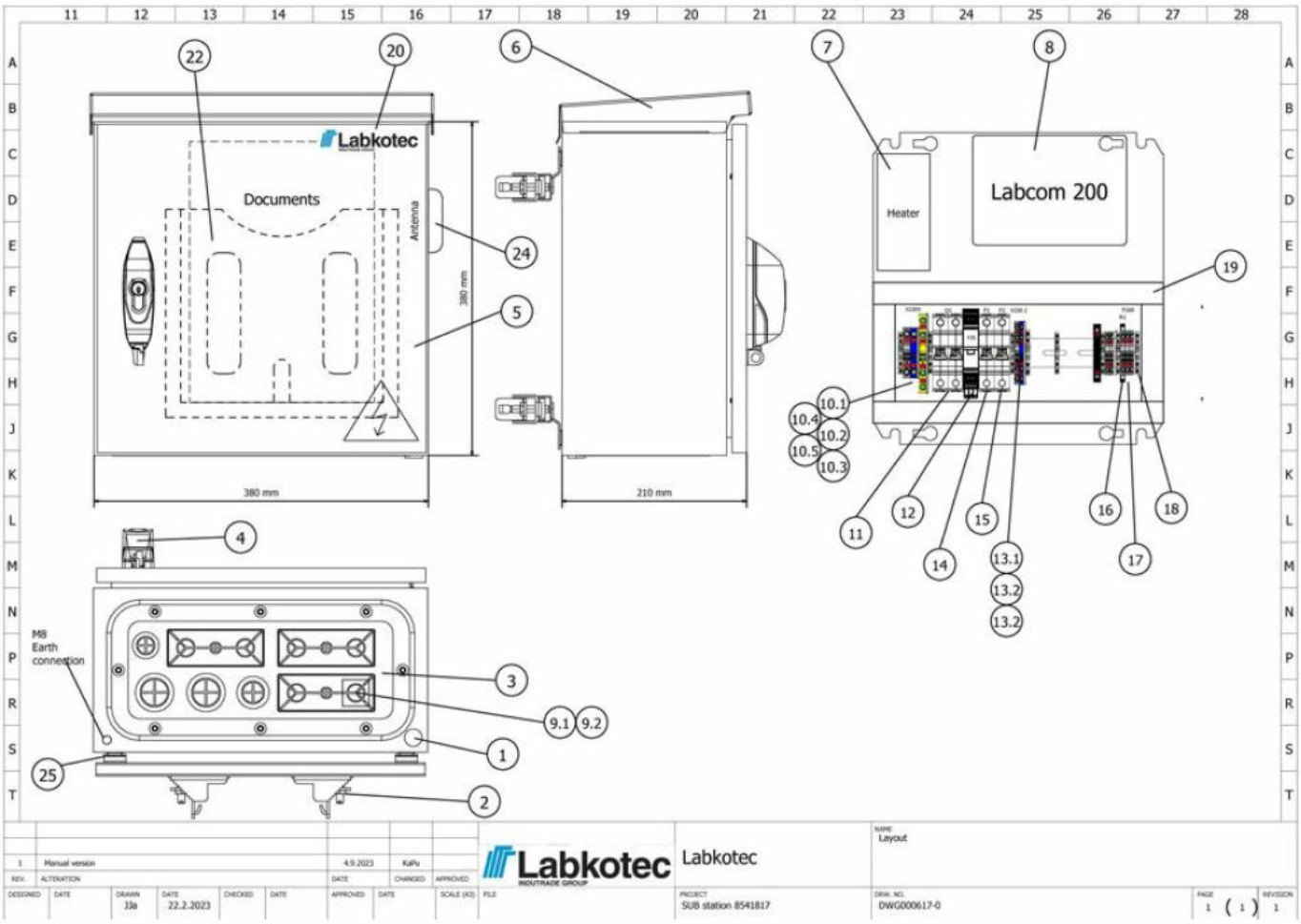
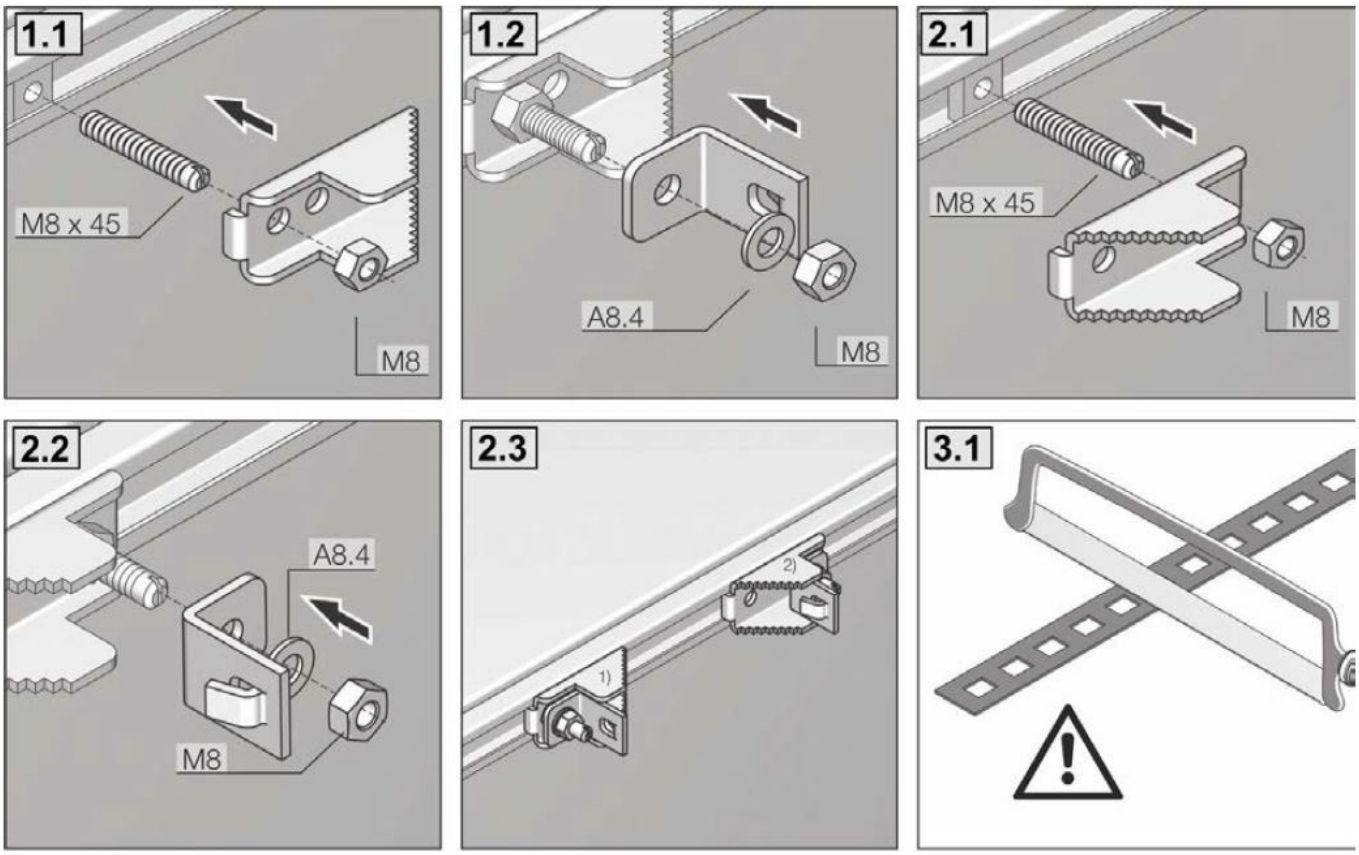


Figure 14 . Composition of the sub station.

Rittal pole mounting instructions



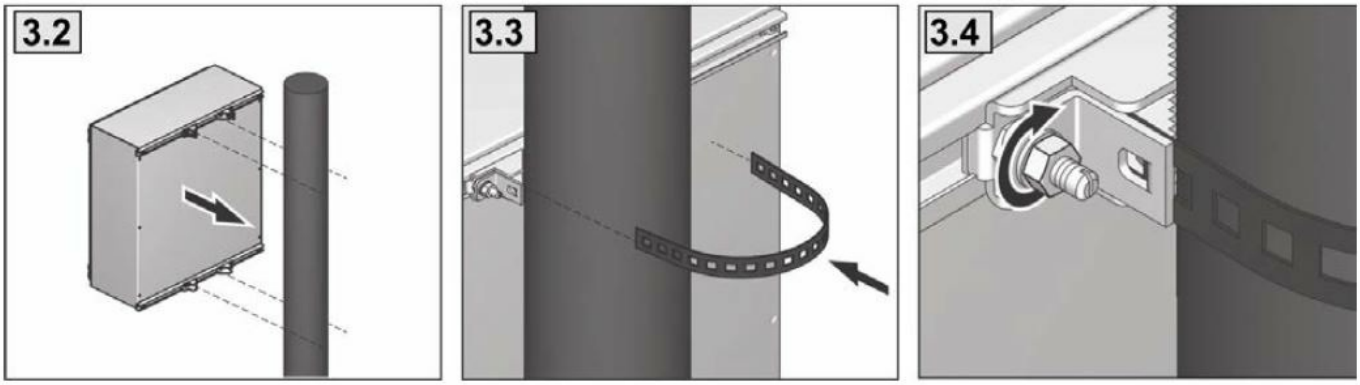


Figure 15 . Rittal pole mounting instructions.

Main dimensions of the ice warning light

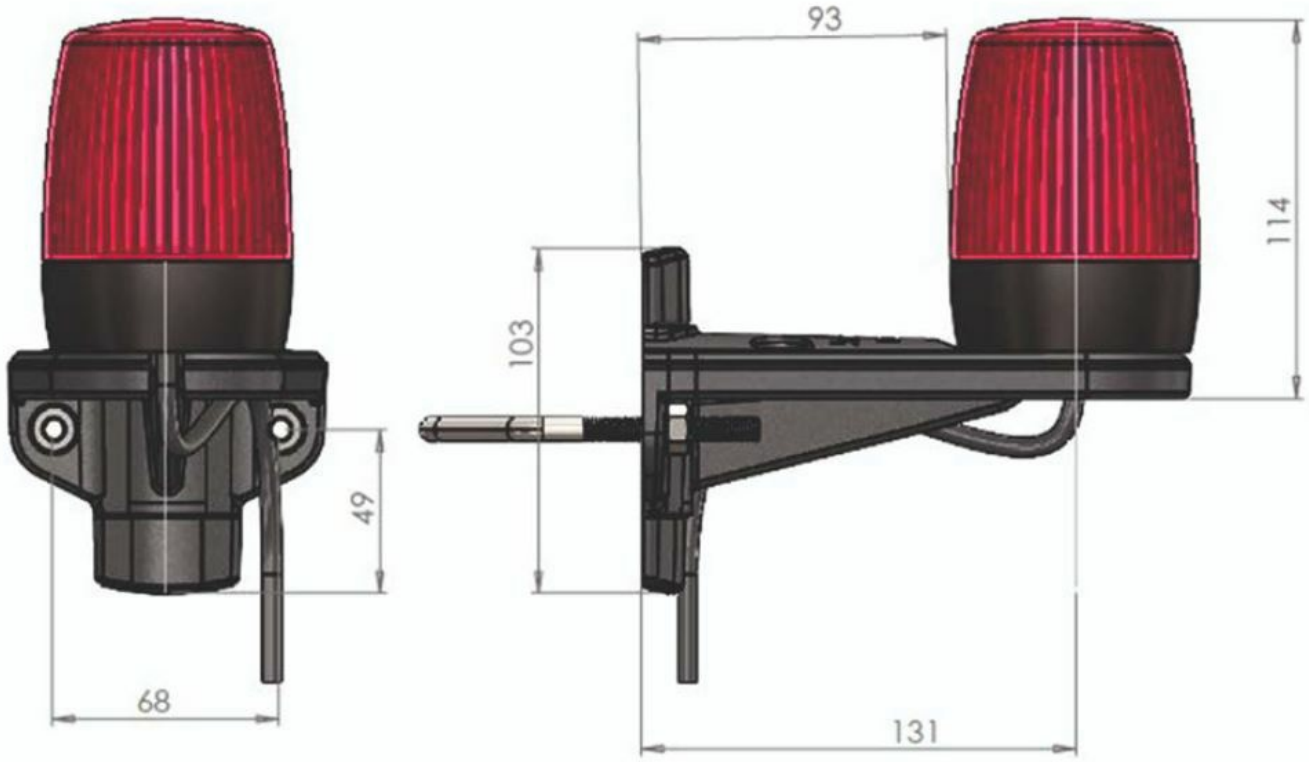


Figure 16 . Main dimensions of the ice warning light. The diameter of the LED light is 75 mm.

Ice warning light mounting options

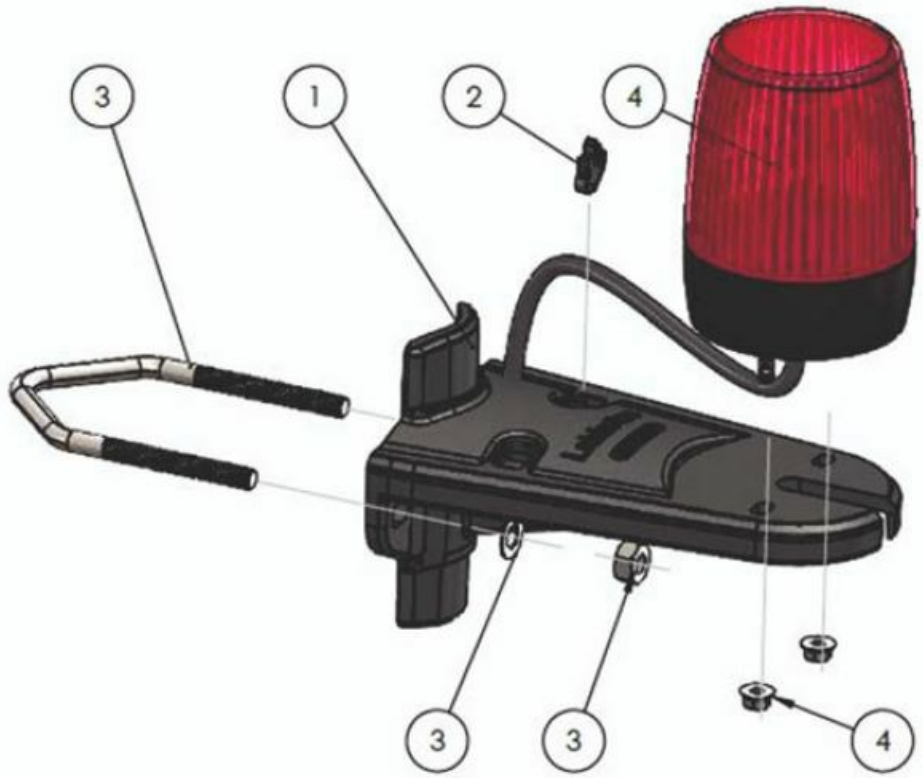


Figure 17 . Mounting option #1. Pole Ø 60 mm (typical mounting).

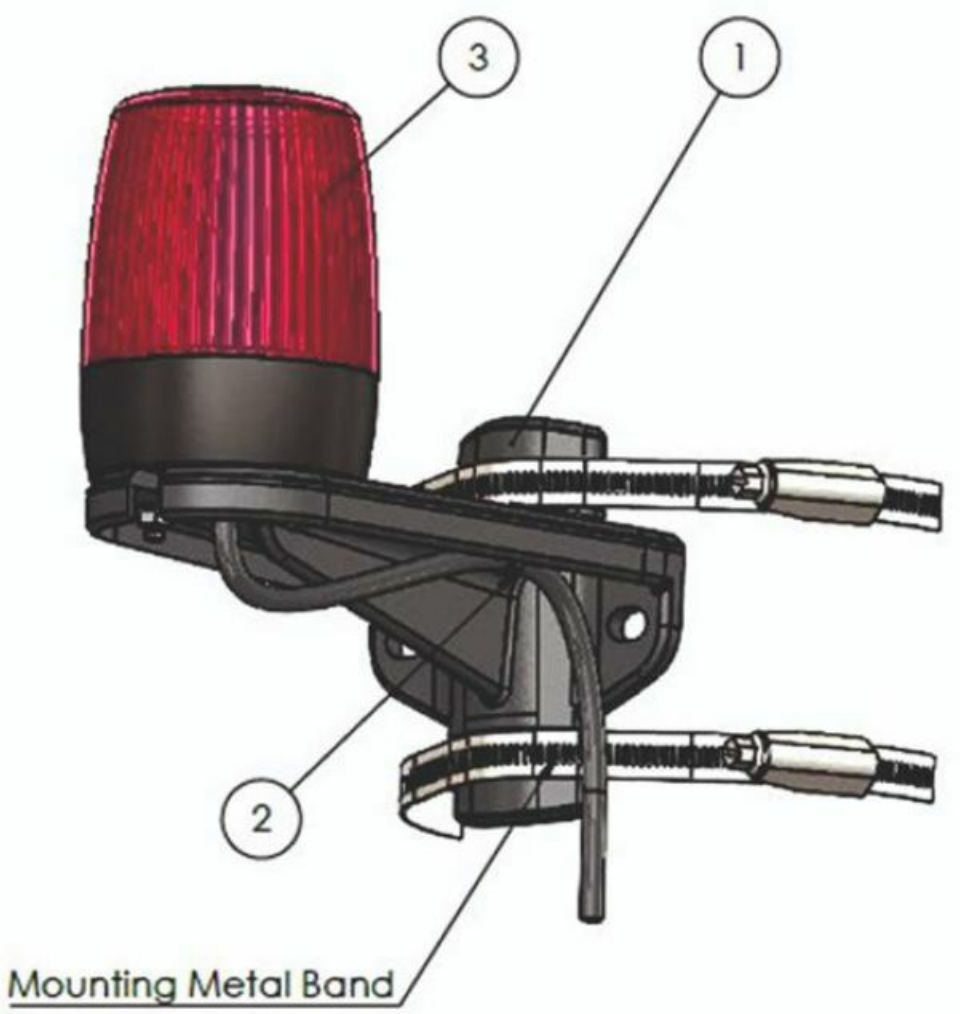


Figure 18 . Mounting option #2, band.

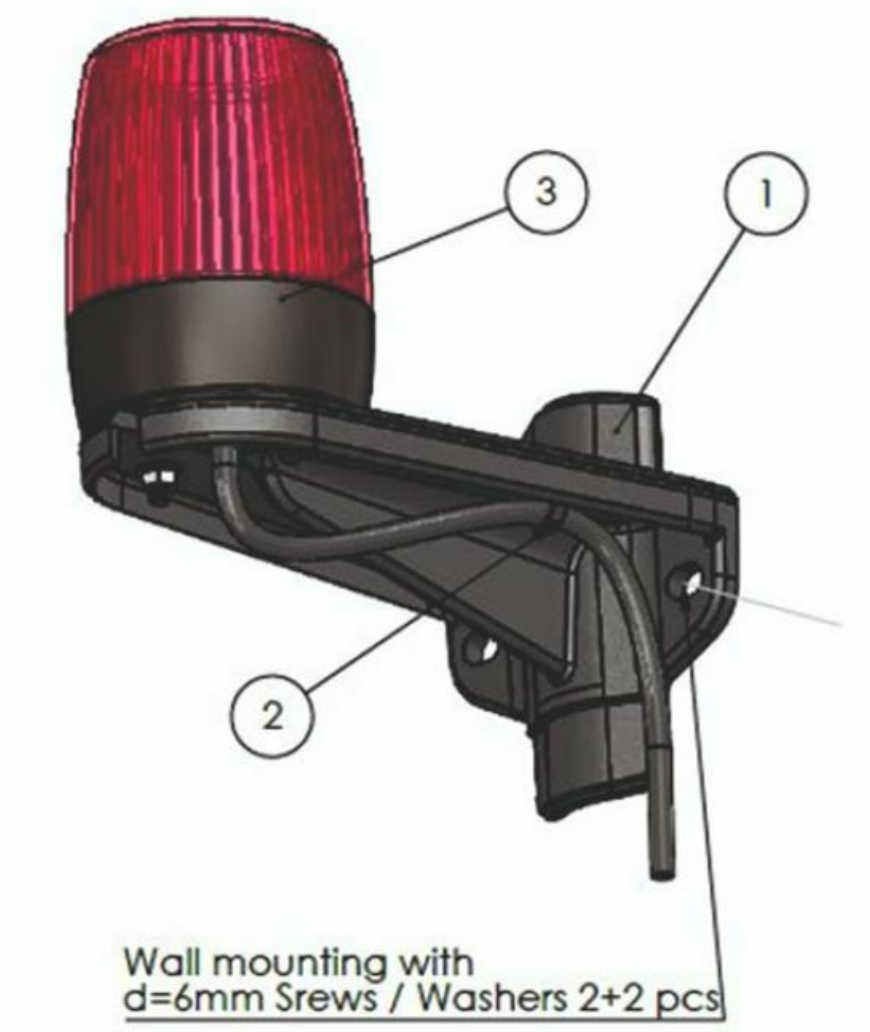


Figure 19 . Mounting option #3, wall mounting.

Labcom 200 communication unit

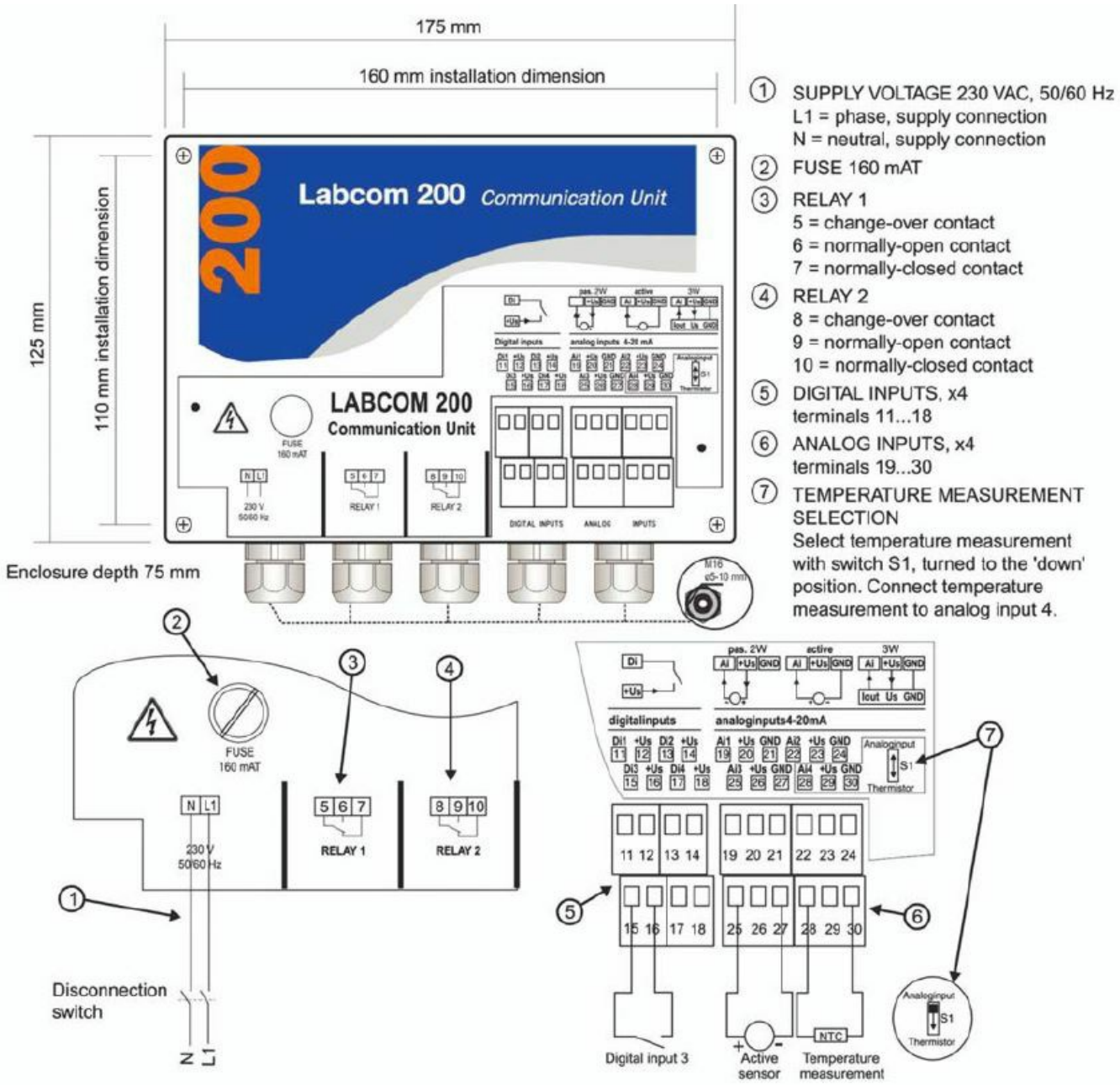


Figure 20 . Labcom 200 structure and connections.

Figure 21 . Connecting the Labcom 200 battery backup.

Documents / Resources

	Labkotec DOC002142-EN-1 Ice Warning Light [pdf] User Guide DOC002142-EN-1 Ice Warning Light, DOC002142-EN-1, Ice Warning Light, Warning Light, Light

References

- LabkoNet
- User Manual