PISTESARJAT

IceControl Safe

Freeze protection control unit

Product information and user manual

IceControl Safe

General information

IceControl® Safe freeze protection control unit. The system is designed to reliably keep various pipelines ice-free and operational all year round. The pipelines are equipped with dual-secured freeze protection cables and their temperature sensors.
The heat tracing cables and their backup cables are separate systems. This means that the backup cable will automatically take over if the primary freeze protection cable maintaining the pipeline, or any part of its supply system, fails. The system will send an alarm if a cable is broken, there is a sensor error, or if the RCBO is triggered. The alarm can be sent to five different email addresses. The unit can be connected to an upper-level system via a bus connection using either Modbus RTU or Modbus TCP/IP.

IceControl® Safe units are available in four different sizes, with 3, 6, 9 or 12 secured freeze protection cables. In the freeze protection control system, values are set for each cable and its backup cable, including the desired temperature limit, the backup threshold, and the hysteresis. (By default, these are +5ºC and +2ºC, and the hysteresis is 1ºC). Freeze protection will activate if the temperature falls below +5ºC. If the temperature drops below this, i.e., below +2ºC, the backup cable will switch on and an alarm concerning this function may be sent in the desired manner. Each pair of cables (the freeze protection cable and its backup cable) is equipped with its own sensor (NTC10K/NTC12K).

The IceControl® Safe can be connected to the property's own monitoring and control systems via standard system bus connections (Ethernet ja Modbus). The user can also control the system remotely. It is easy to change manual control (on/off), reporting and system settings using the main unit. In addition, the system administrator has access to a web interface that makes initial setup and changing set values easy.

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IceControl Safe

General information

SAFETY

Damage and malfunctions caused by freezing pose a serious risk to critical infrastructure and safety systems. IceControl® Safe is a freeze protection control system designed with a primary focus on safety, which means you can rely on it to keep water supply and sprinkler systems operational. In the freeze protection control system, values are set for each cable and its backup cable, including the desired temperature limit, the backup threshold, and the hysteresis. The parallel backup cable ensures system reliability and reduces the urgency of repairs.

EFFECTIVENESS

The control unit is the smartest freeze protection system on the market, offering an effective solution to ensure the reliability of safety systems in cold conditions. Freeze protection ensures the uninterrupted availability of critical systems and the water supply. The control unit uses precise sensors to detect when a pipe is at risk of freezing and activates the primary or backup heating as necessary. A dedicated sensor is installed for each pair of cables, ensuring that power is only used where it is needed.

CONNECTIVITY

IceControl® Safe can be connected to the property's own monitoring and control systems via standard system bus connections (Ethernet and Modbus). The user can also control the system remotely. It is easy to change manual control (on/off), reporting and system settings using the main unit. In addition, the system administrator has access to a web interface that makes initial setup and changing set values easy.

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General information

	IceControl® Safe standard models			
Type	IC-3T	IC-6T	IC-9T	IC-12T
Electrical number	34 567 16	34 567 17	34 567 18	34 567 19
Main switch (rated current)	32A	63A	125A	125A
Number of contactors 1P 16A	6	12	18	24
RCBO, 30 mA 2C16	3 + 3	6 + 6	9 + 9	12 + 12
Maximum output power (N-L)	9 kW	18 kW	27 kW	36 kW
Supply conductor terminal block size	10 mm^2	35 mm^2	50 mm^2	50 mm^2
Dimensions (mm) (WxHxD)	440 x 640 x 145	600 x 800 x 200	600 x 800 x 200	600 x 1200 x 200
Load terminal block size	2,5 mm^2			
Enclosure class	IP 66			
Cable entryi	Gland			
Mounting	Wall brackets (incl.)			

IceControl® Safe properties	
Product	IceControl Safe control unit
Connectivity	Ethernet, Modbus
Ports	Ethernet, USB, MicroSD
Fuses	6-24 kpl 16A
Energy measurement	Yes, via bus measurement or pulse
Operating temperature	-20... +65 °C

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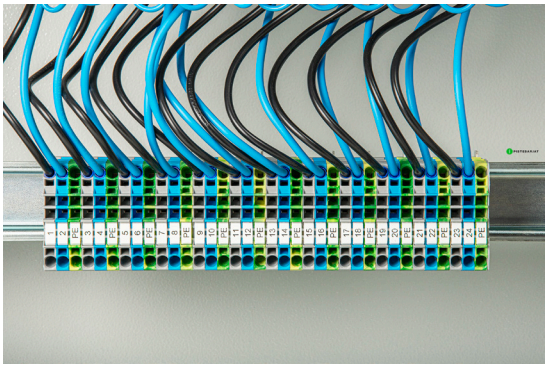
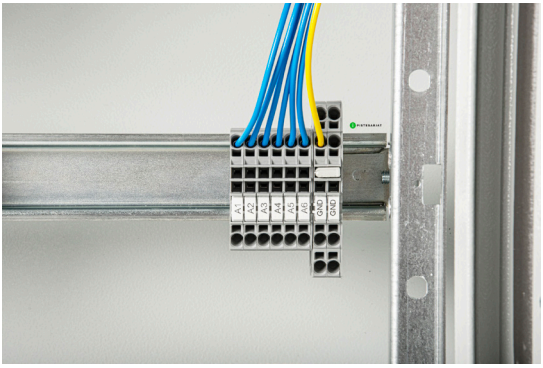
General information

IceControl® Safe system is designed to keep various pipes and pipelines operational in all conditions. Pipes are fitted with primary and backup trace heating cables, with dedicated sensors continuously monitoring their temperature. The Ice Control® trace heating software automatically manages the heating process based on the measurements.

Terminal blocks for load connection:



Terminal blocks for sensor connection:



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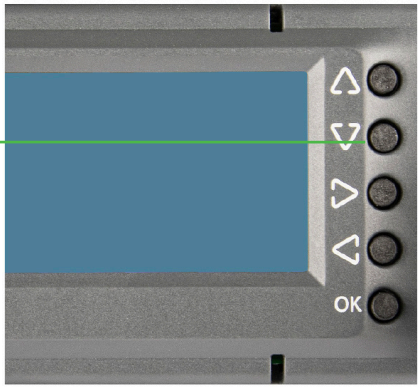
IceControl Safe

Use/HMI

Buttons

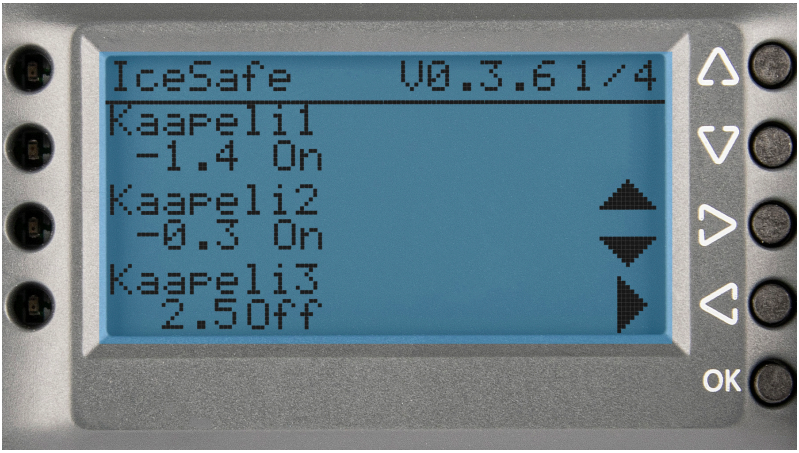
Change field: Up and down arrow buttons
Next: Right arrow button
Back: Left arrow button
Accept selection: OK button



Changing setpoints

Choose the field you wish to change and then press the **OK** button.
Use the right or left arrow buttons to navigate to the desired number and change the value using the up or down arrow buttons, or hold down the up or down arrow to scroll through the numbers. Accept the change by pressing the **OK** button. Fields with a border are manually input setpoints. Fields without a border are measured values.

Basic display



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IceControl Safe

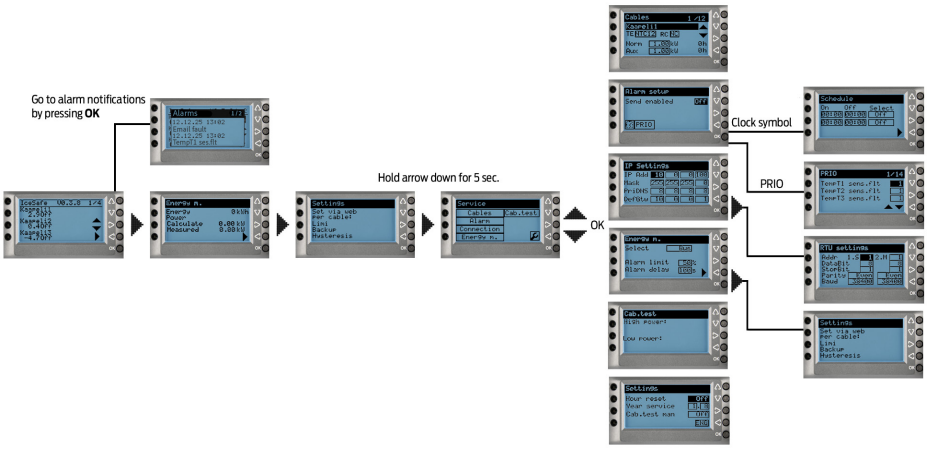
Use/HMI

Page menu

Not all settings can be set using the unit's internal logic and keypad (**HMI**). All settings can be found on the web interface.

Locally, you can configure settings such as the IP address, which allows the web interface to open at the desired address. Alarms can also be checked locally in the alarms window, if they are active. An alarm triangle will be displayed if any alarms are active.

Note! It may take a few minutes to change the IP address. The change of IP address will take immediate effect if the controller is restarted by switching the power off and on again.



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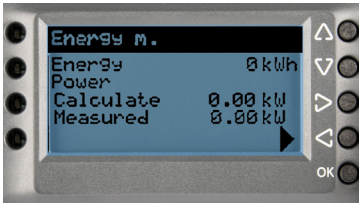
IceControl Safe

Use/HMI

The **front page** opens when the unit starts up. The number of display pages depends on the type of unit. Each page will display 3 cables or backup cables.

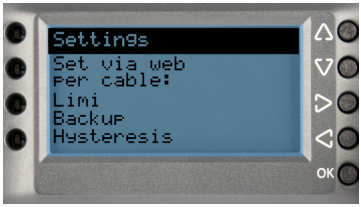
You can change pages using the up and down arrows

Pressing the right arrow while on the front page navigates to the **energy meter page**.



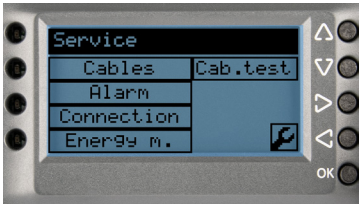
The **Energy meter** page displays the system's overall consumption. Beneath are the calculated and measured power in real time.

Energiamittari-sivulta painettaessa nuolta oikealle, pääsee asetuksiin.



There are no functions on the **Settings** page.

You can navigate from the Settings page to the maintenance page by holding the right arrow down for approx. 5 seconds.



On the **Service** page, you can set cable names, power, types of alarms, connection settings, energy measurement method, annual maintenance, and resets

Use the up and down arrows to navigate through the menu.
Press **OK** to open the desired menu page.

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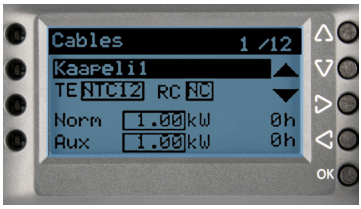
IceControl Safe

Use/HMI

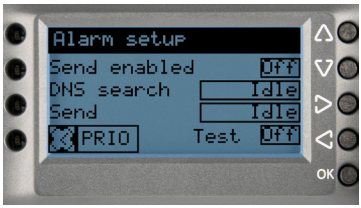


On the **Cables** page, you can assign names to cables, select the sensor type, select the contact type (NO/NC) for the residual current alarm, and set the power levels for the heating and backup cables. The page also shows the operational uptime for each cable. The number of pages corresponds to the type of unit.

Return to the maintenance page by pressing the left arrow.

On the **Alarms** page, you can enable alarms, set time programs, choose how alarms are sent, and set alarm priorities.

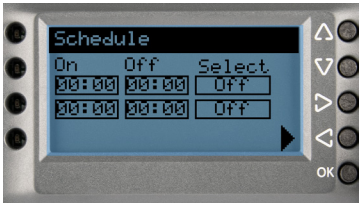
Use the up and down arrows to navigate through the menu.
Press **OK** to open desired menu page.



If alarms are enabled, **DNS search** and **Send** will be displayed. You can test the connection by selecting **Test** and then choosing "**On**".

Press the clock icon to go to the alarm **Schedule** page.

PRIO Press the PRIO box to go to the **priority setting page**.



You can set alarm sending times on the **Schedule** page. Time can be set by time, day, weekend, or week.

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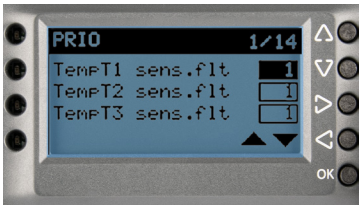

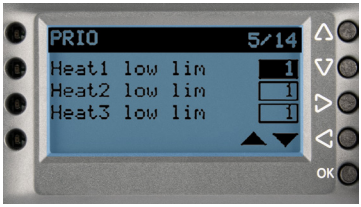

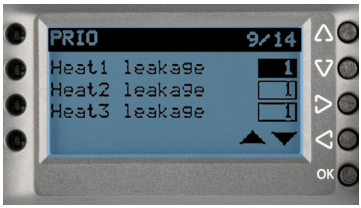

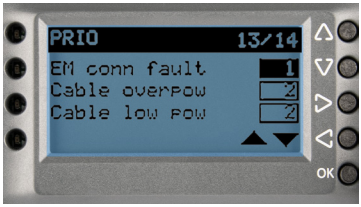

There are 5-14 **PRIO** pages, depending on the type of unit. These example images show **IC-12T**. The mode of operation can be set for all alarms:

- **0** = No alarm sent
- **1** = Alarm always sent
- **2** = Alarm sent according to **Schedule** time program.

Pages 1-4 show cable sensor error alarms.

Pages 5-8 show alarms that are triggered by the temperature falling below the lower temperature limit.

Pages 9-12 show alarms activated when the RCBO triggers.

Page 13 shows alarms activated by an energy meter connection error and by over- or underpower in the cables.

Page 14 shows the annual maintenance alarm and alarms generated by over- or underpower in a cable test.

Use the up and down arrows to navigate through the menu.

Open the field you wish to change by pressing the **OK** button.

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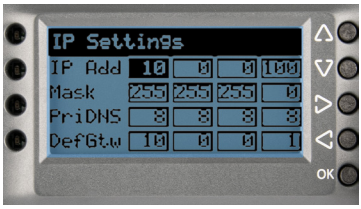
Use/HMI

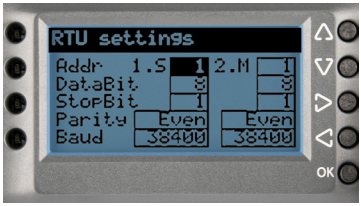


IP Settings page, you can manage the unit's IP address, subnet mask, default gateway, and DNS and DHCP servers.

Use the arrows to navigate through the menu.

Open the field you wish to modify by pressing the **OK** button.

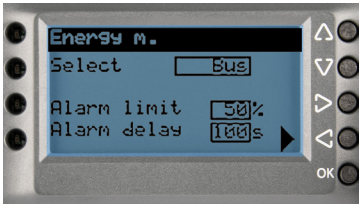
Pressing the right arrow on the **IP Settings** page takes you to the **RTU Settings** page.



In **RTU Settings**, you can manage the unit's Modbus RTU bus settings.

Use the arrows to navigate through the menu.

Open the field you wish to modify by pressing the OK button.



On the **Energy meter** page you can manage the measurement method and the alarm functions for the selected method.

The energy meter can be a bus-based or pulse-output meter.

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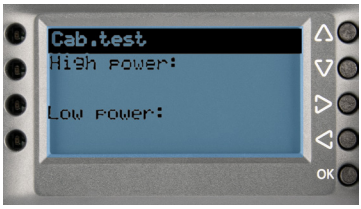
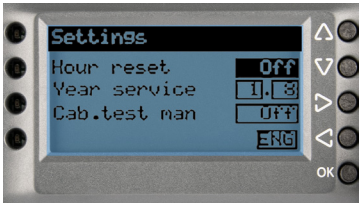
Use/HMI



The **Cable test** page shows any over- or underpower.

Return to the **Service** page by pressing the left arrow.



Pressing the wrench icon on the **Service** page takes you to a **Settings** page where you can reset the cable monitoring hours, set the annual maintenance schedule, and perform a manual cable test.

Use the arrows to navigate through the menu.

Open the field you wish to modify by pressing the **OK** button.

Return to the **Service** page by pressing the left arrow.

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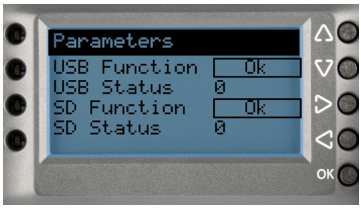
Use/HMI



Pressing the right arrow on the **Service** page opens the **Parameters** page for USB and SD functions.

- **USB** = read / write
- **SD** = Mount / Unmount

Return to the **Service** page by pressing the left arrow.

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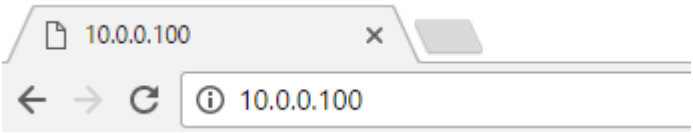
IceControl Safe

Use/WEB

Using the WEB page

Enter the unit's IP address in the browser bar (default address 10.0.0.100).



Then log in.

Enter the username and password (**IceSafe** and **200** by default), and then click "Log in".

Remember to save the username and password so that the browser remembers your password in the future.

IP address and last updated time in the top bar

The user interface has a clear tree-structured menu.

The WEB user interface has the same settings as the control panel.
The WEB user interface shows all setting values and measurements, even if they are not in use.

The green circle indicates which page is open.

Note:

- In the WEB user interface, the **IC-3T** and **IC-6T** units both share the name **ICS6**.
- **IC-9T = ICS9**
- **IC-12T = ICS12**

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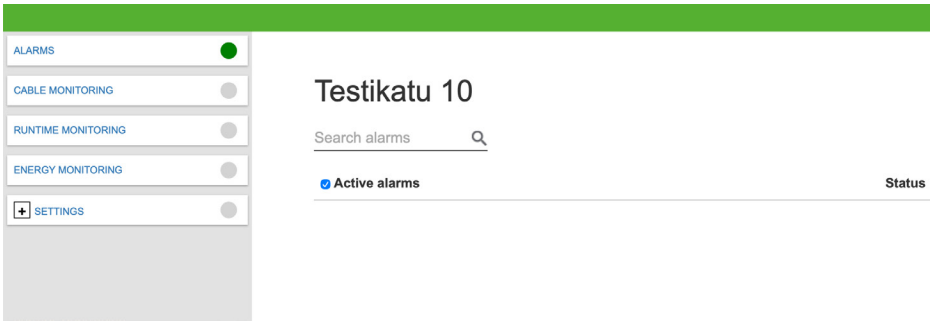
IceControl Safe

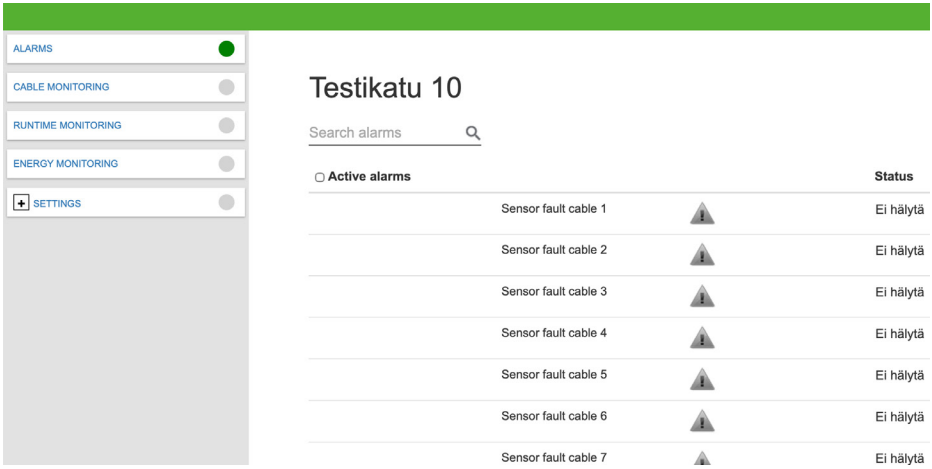
Use/WEB

Alarms

How active alarms are displayed, with filtering on:



Unchecking “Active alarms”, will display all alarms:



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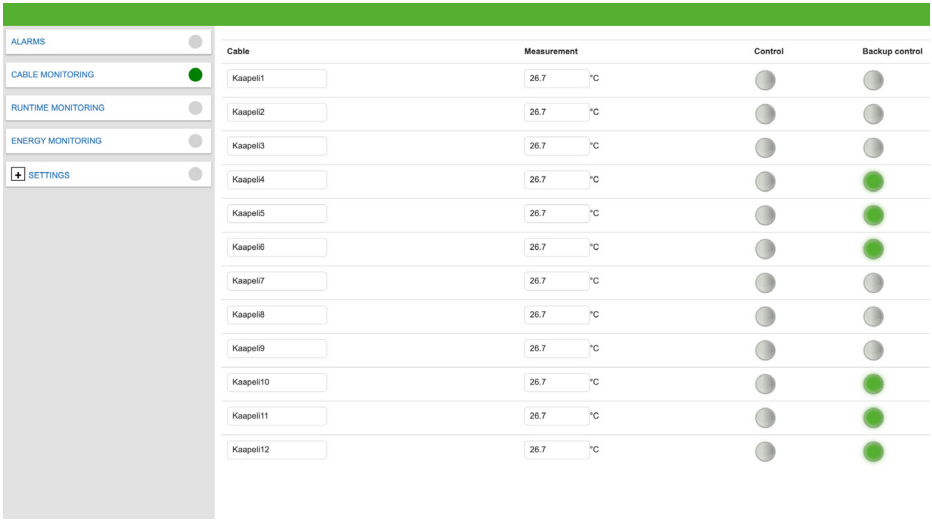
Use/WEB

Cable monitoring

Cables can be given a name, and the relevant temperature measurement and controls will be shown as indicator lights. If the measurement reads ---, then the sensor is faulty or disconnected.



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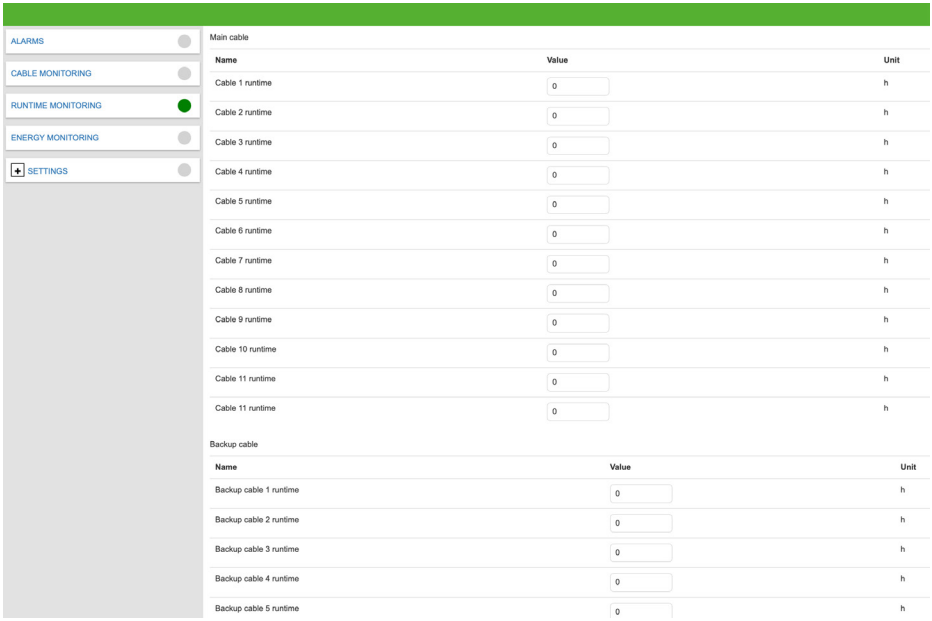
Use/WEB

Runtime monitoring

Runtime monitoring shows the number of hours a specific cable's or backup cable's controls have been active.



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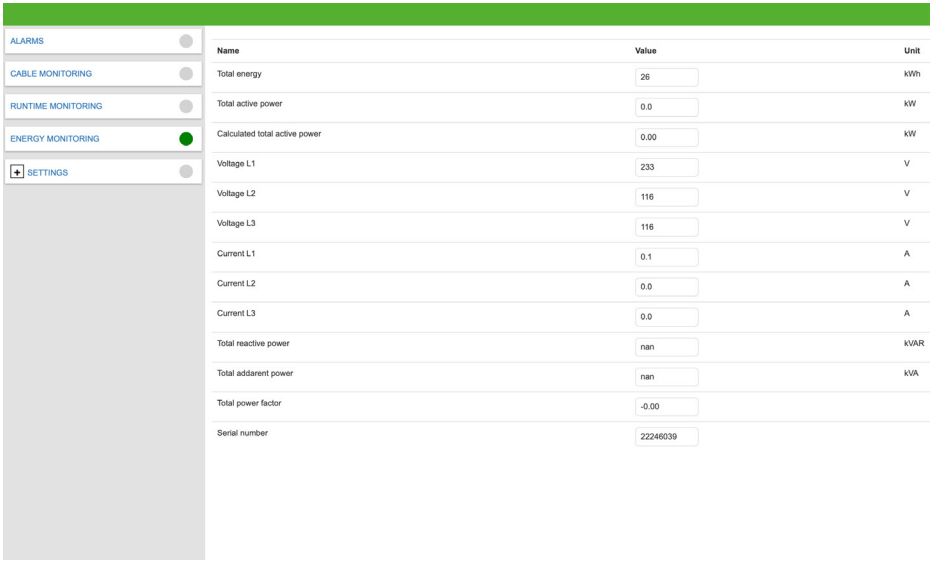
Use/WEB

Energy monitoring

- This page is relevant if a bus-based energy meter is used.

- If you are using a pulse-output energy meter, Total energy will be displayed and other fields will be 0.



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Use/WEB

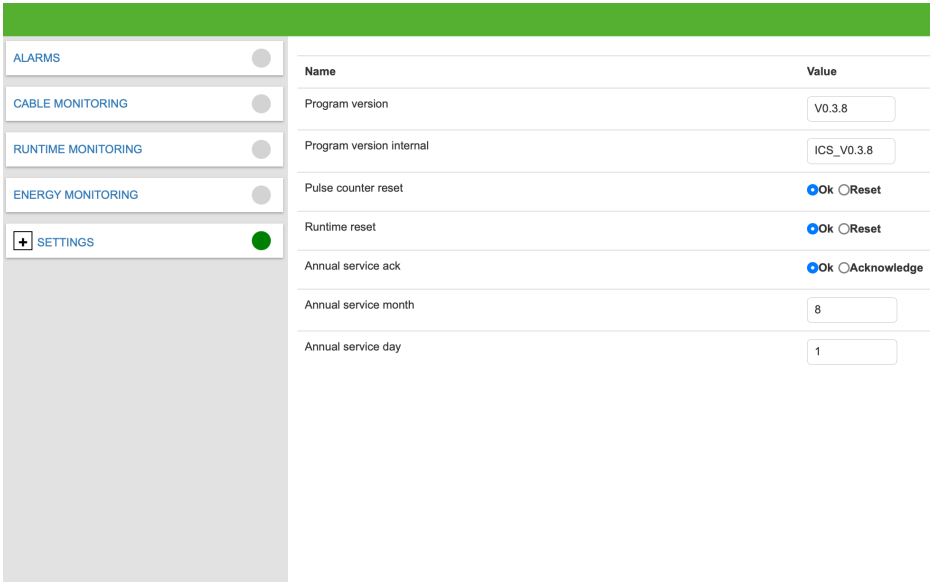
Settings

The annual maintenance month and day determine when the annual maintenance alarm is activated.

Pulse counter reset: Reset the energy meter if the energy meter is set to pulse-counting mode.

Runtime reset: Reset the runtime for cables and backup cables**.**

The input month and day generate an alarm and the alarm can be acknowledged in the **Annual service ack** field.



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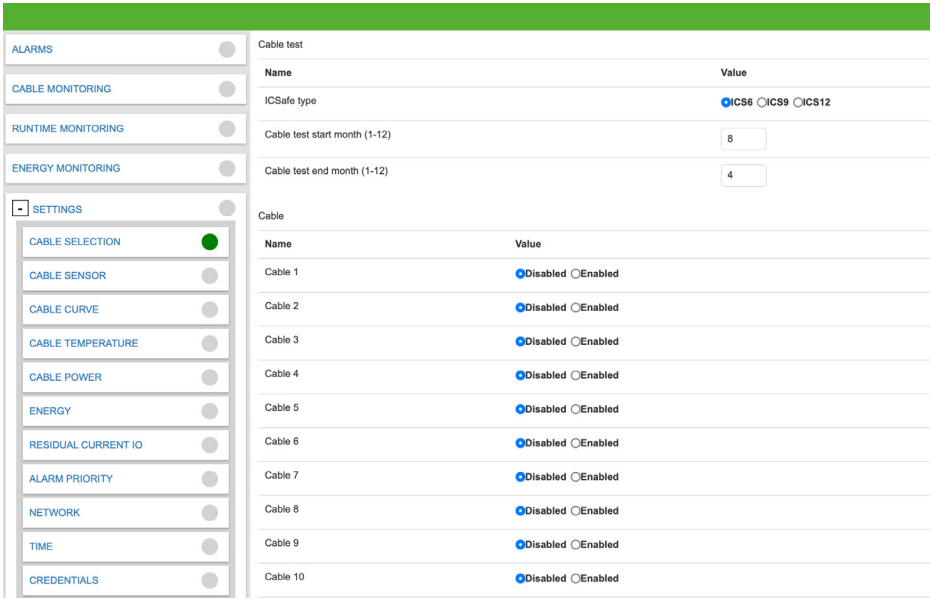
IceControl Safe

Use/WEB

Settings/Cable selection

Note: this is unit-dependent. For **IC-3T** and **IC-6T**, the option is available when the unit configuration includes only a main controller. **IC-9T** requires the unit configuration to include 1 additional I/O-module. **IC-12T** requires the unit configuration to include 2 additional I/O-modules.
IC-3T: Max. 3 cables and 3 backup cables can be selected. (cables 1–3 and backup cables 1–3)
IC-6T: Max. 6 cables and 6 backup cables can be selected. (cables 1–6 and backup cables 1–6)
IC-9T: Max. 9 cables and 9 backup cables can be selected. (cables 1–9 and backup cables 1–9)
IC-12T: Max. 12 cables and 12 backup cables can be selected. (cables 1–12 and backup cables 1–12)
The option will only permit you to choose the specified number of cables and backup cables. If you attempt an invalid selection, the option will revert to a state which is valid.
For example, if you have selected **IC-6T** and you attempt to select cable 7="In use", the option will revert to "Not in use". Backup cables behave in the same way.



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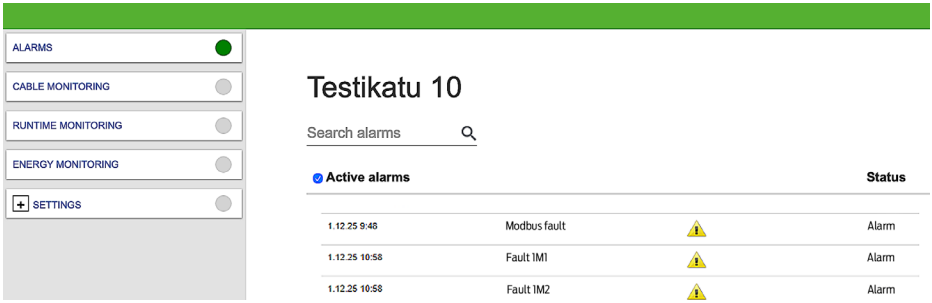
IceControl Safe

Use/WEB

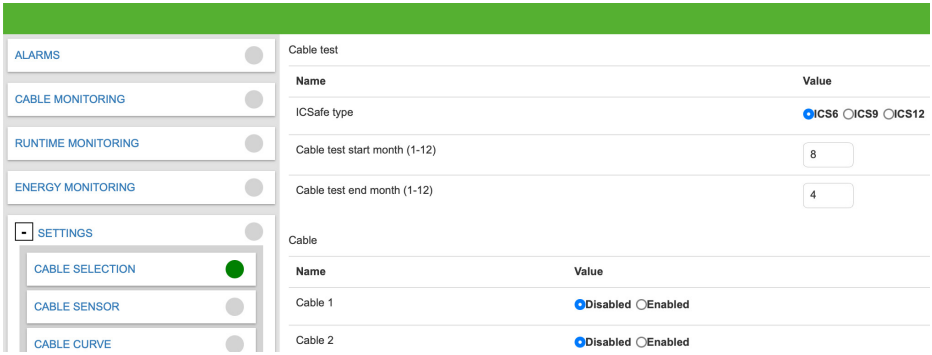
Settings/Cable selection

If you select IC-9T or IC-12T and no additional modules are installed in the unit, an alarm will activate as shown below:



If the unit configuration corresponds to IC-6T, and the IceSafe type="IC-12T" is selected, unit alarms 1M1 and 1M2 will be triggered.

Cable test start and end months: Determine when the cable test is in effect. A cable test is performed on the first day of the month of the selected period. If 9=September is selected as the start month for the cable test, the cable test will be carried out from 1 September and until the date and time determined by the time program. If the first day of the month has already passed when selecting the start month, the next test will be performed on the first day of the following month. The end month 4=April means that the final test will be carried out on the first day of April. In practice, this is used to select the time period in which there may be a risk of freezing. This ensures that the cables are in good working condition at critical points.



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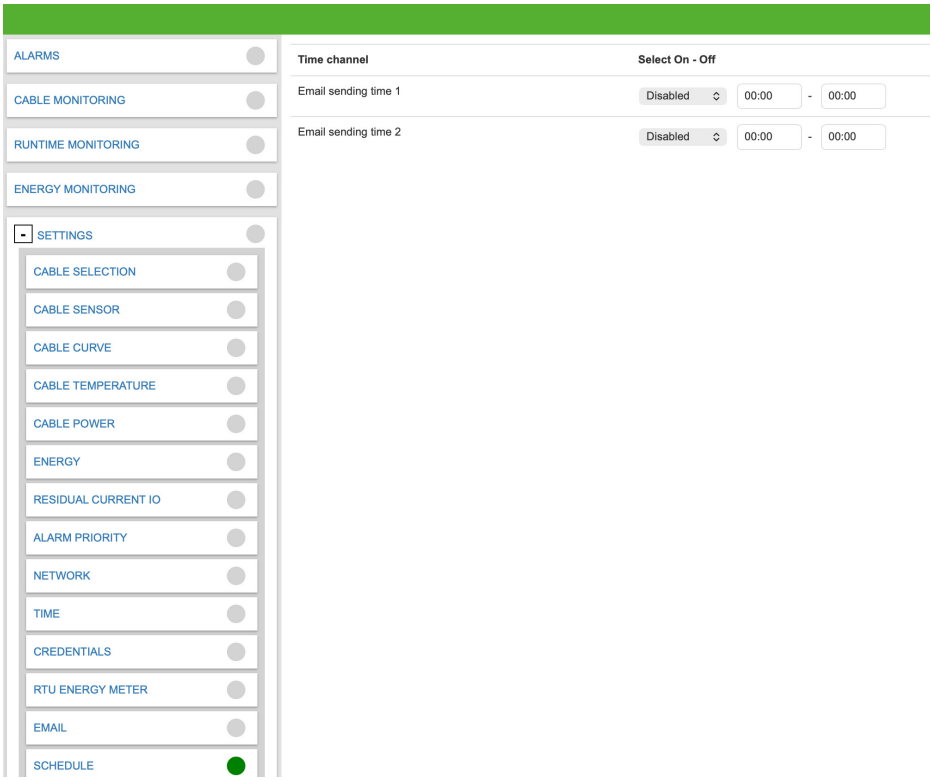
Use/WEB

Settings/Cable selection

Note! The cable test time is determined based on the **Settings/Schedule**

In the example below, the cable test will begin on a weekday between 1:00-2:00am. However, this requires that a cable test was initiated on the first day of the month. After this, the system waits for the scheduled time. If “Monday” were selected, the cable test would initiate on the following Monday and at the chosen time following the first day of the month.



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Use/WEB

Settings/Cable sensor

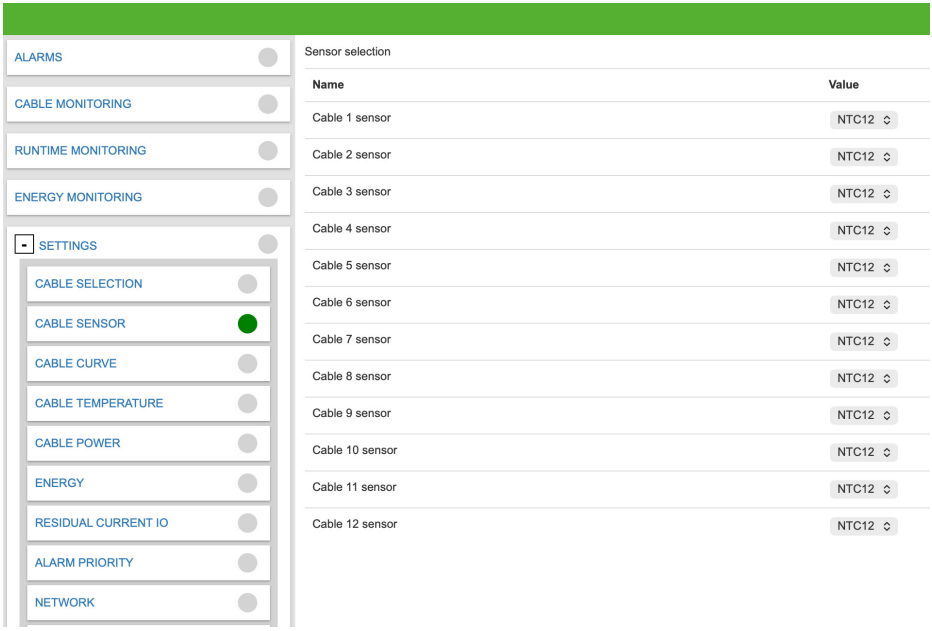
Select the cable's temperature measurement:

- **Off** / temperature sensor **NTC10** or **NTC12**.

If the sensor is **Off**, its measurements will be ignored.

Sensors also have sensor error monitoring. If a sensor is disconnected/broken, or is outside of the range (-100...100°C), a sensor error alarm will activate.

IC-3T only pays attention to sensors 1...3, IC-6T to sensors 1...6, IC-9T to sensors 1...9 and IC-12T sensors to 1...12



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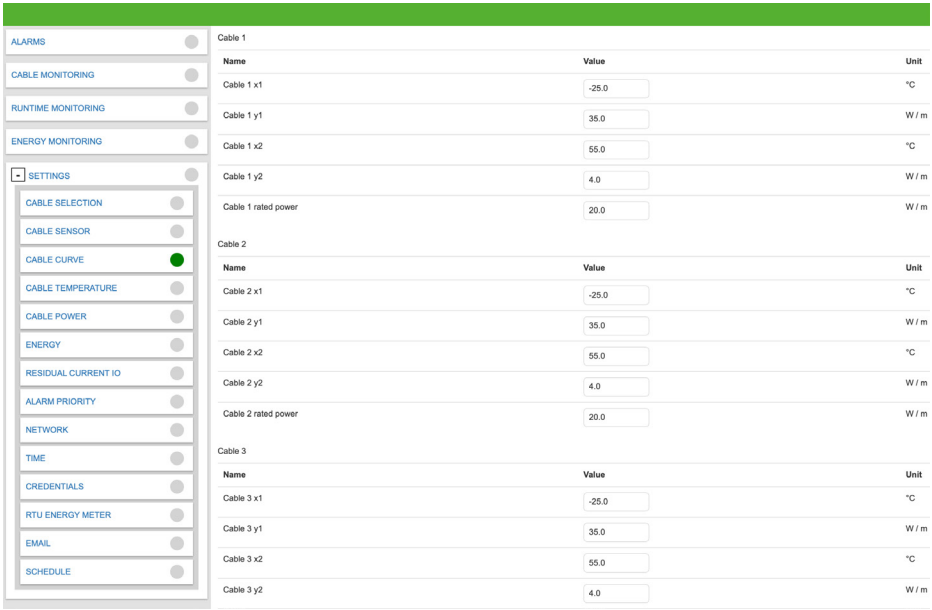
Use/WEB

Settings/Cable curve

Settings are for more precise cable fault measurement. The power output of heating cables typically depends on the temperature. During the cable test, power is supplied to the cable being tested and its power output is measured. The measured power is compared with the specified power, and if this deviates beyond a defined threshold, a cable alarm is triggered. (The set threshold for the cable test electricity alarm threshold can be found in Settings/ Energy).

The cable curve is plotted with the setpoints below:



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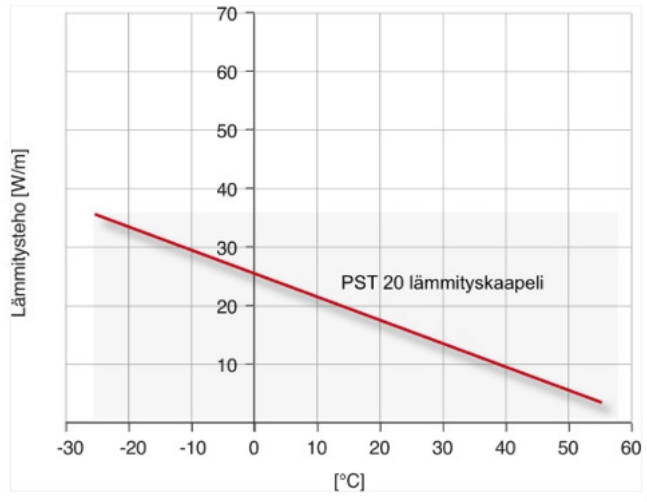
Use/WEB

Settings/Cable curve

For example, PST 20 is configured based on a linear cable curve. Plot the cable's heating power at different temperatures at two separate points.



Cable 1:

x1 = - 25 °C, **y1** = 35 W/m ja **x2** = 55 °C, **y2** = 4 W/m

Nominal power = 20 W/m

Note! If different outputs have different cables, give the corresponding cable curve values.

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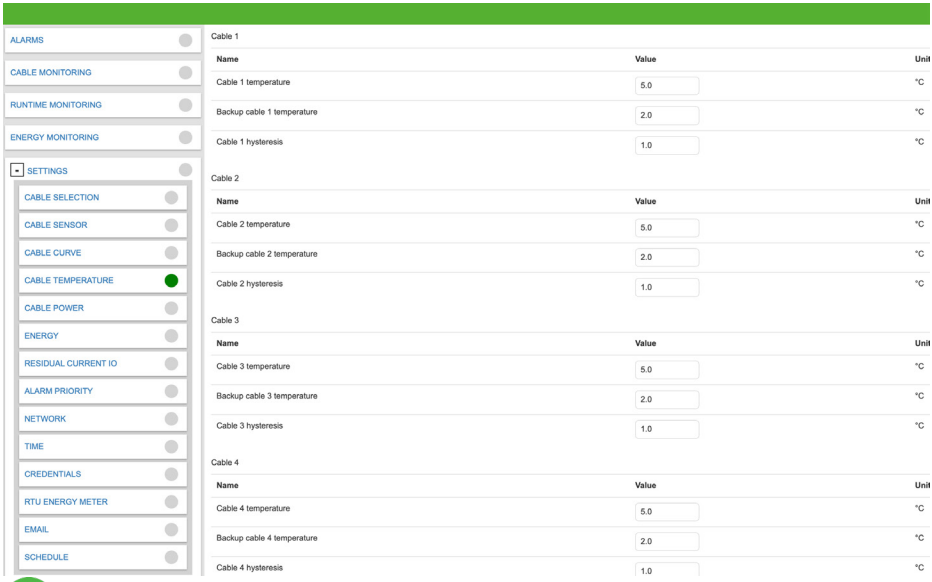
Use/WEB

Settings/Cable temperature

Cable (1-12) **temperature** defines the temperature threshold below which the actual cable heating is activated.
Backup cable (1-12) **temperature** defines the temperature threshold below which the backup cable heating is activated.
If the cable temperature threshold is 5ºC and the backup cable threshold is 2ºC, the situation is as follows:

When the cable sensor's temperature falls below 5ºC, power is supplied to the cable. When the measured temperature is the threshold + hysteresis (5ºC + 1ºC= 6ºC), the cable heating turns off.

If the measured temperature continues to fall despite power being supplied to the cable, the backup cable will turn on at the backup cable temperature threshold, which is 2ºC in the image. At the same time, a lower limit alarm for that cable will be activated. The backup cable control will turn off according to the backup cable threshold and hysteresis.



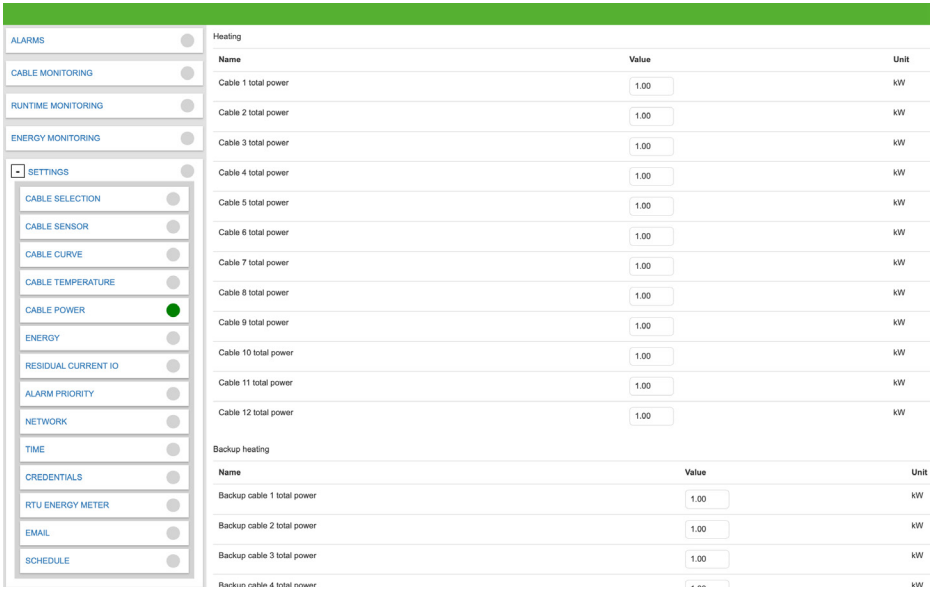
IceControl Safe

Use/WEB

Settings/Cable power

The cable's total power is used for electricity demand alarms. If the defined total power is below the threshold when compared to the energy meter value, a "Heating circuit electricity consumption low" alarm is triggered. This measurement is continuously active. The actual threshold value can be set on the Settings/Energy page (Electricity alarm threshold (deviation %)). If the threshold is, for example, 50%, then a "Heating circuit electricity consumption low" alarm will be triggered once the measured power is 50% below the cables' total power.

This makes it possible to detect e.g. broken or disconnected cables.
If the difference between the total cable power and the energy meter value exceeds the threshold, a "Fault alarm, controller malfunction" is triggered.
The limit by which the value can exceed the threshold is calculated as Total power/(deviation %). For example, 50% means that an alarm will be triggered if the measured power is more than 2 x total power.
This makes it possible to detect e.g. stuck contactors.



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Use/WEB

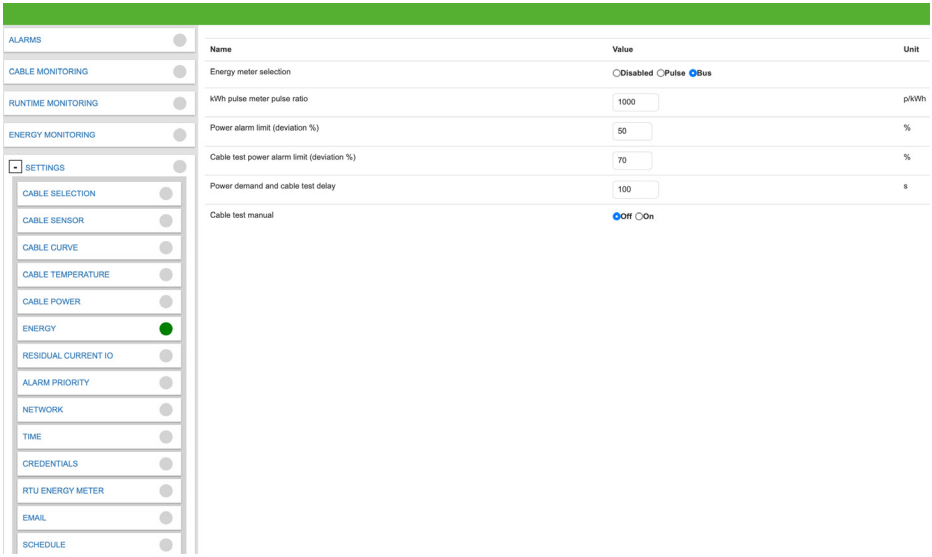
Settings/Energy

An energy meter must be in use in order to receive any alarms concerning electricity demand or cable tests.

The cable test's Electricity alarm threshold (deviation %) can be stricter than the Electricity alarm threshold (deviation %).

The cable test measures an individual cable, taking the cable curve into account. This allows faulty cables to be detected more accurately. If the threshold is 80%, the cable test will send an alarm "Cable x, Power low" if the cable's power in the test is below 0.8*(Energy meter power), taking the cable curve into account.

Correspondingly, if the power in the test is greater than (Energy meter power)/0.8, taking the cable curve into account, then the cable test will trigger a "Cable x, controller fault" alarm.



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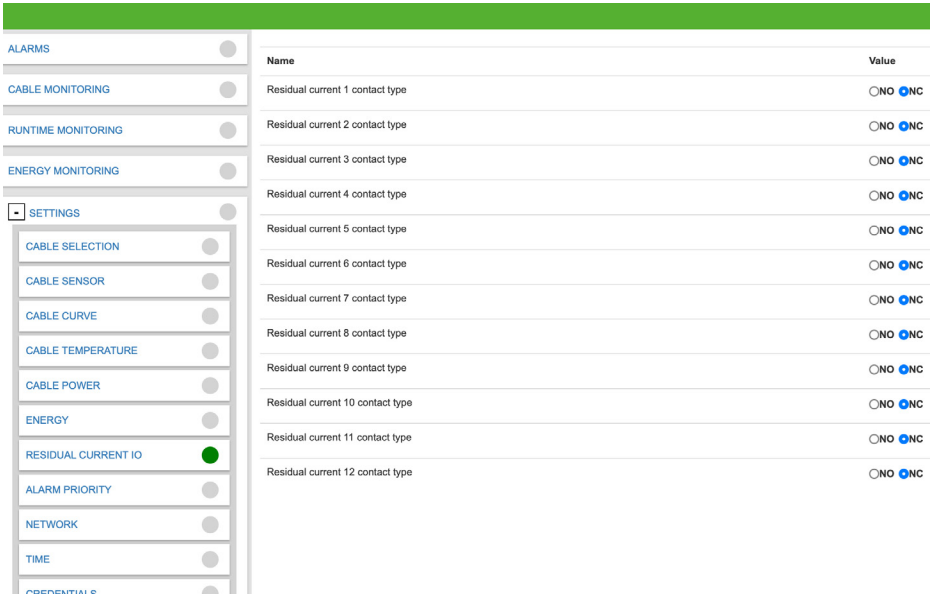
Use/WEB

Settings/Residual current IO

Sets the contact type (NO/NC) for the residual-current alarm. If the cable encounters fault current, a residual-current alarm is generated for the cable (default setting = NC).

If the cable heating is on (below the threshold) and a residual-current alarm is triggered, the backup cable will turn on even if the temperature has not fallen below the backup cable's temperature threshold. This is a precautionary measure.



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IceControl Safe

Use/WEB

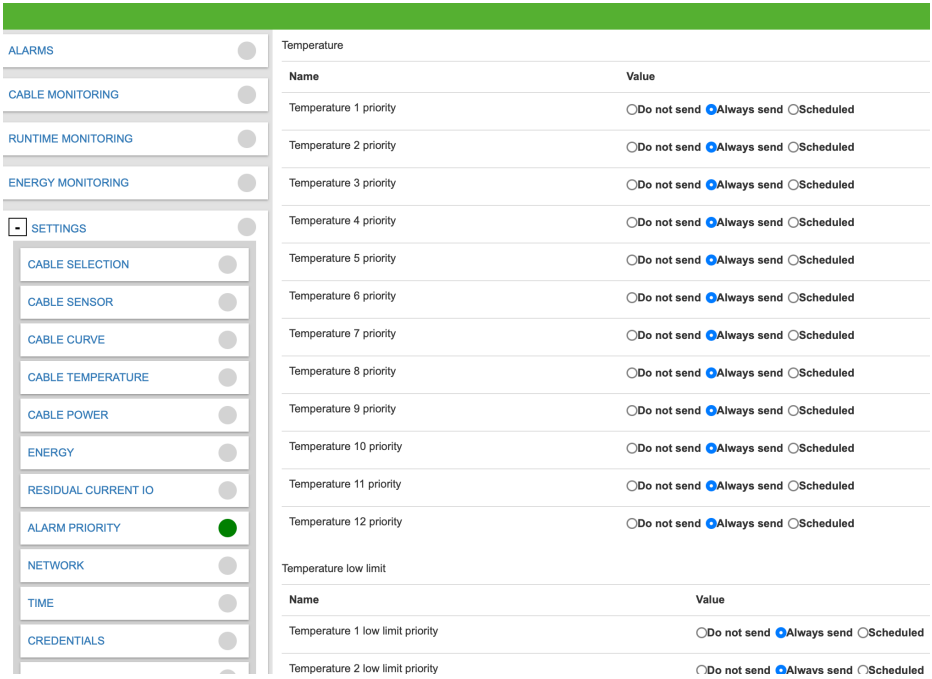
Settings/Alarm priority

An alarm is sent by email to the specified address.

- **No alarms sent** = Alarms are not sent
- **Always sent** = Alarms are always sent, immediately
- **Time program** = Send in accordance with the time defined on the Settings/Time program page

Shown in the image:

- The fault priorities for temperature sensors (Sensor error).
- Lower temperature limit priority (The temperature falls below the backup cable temperature Settings/Cable temperature.



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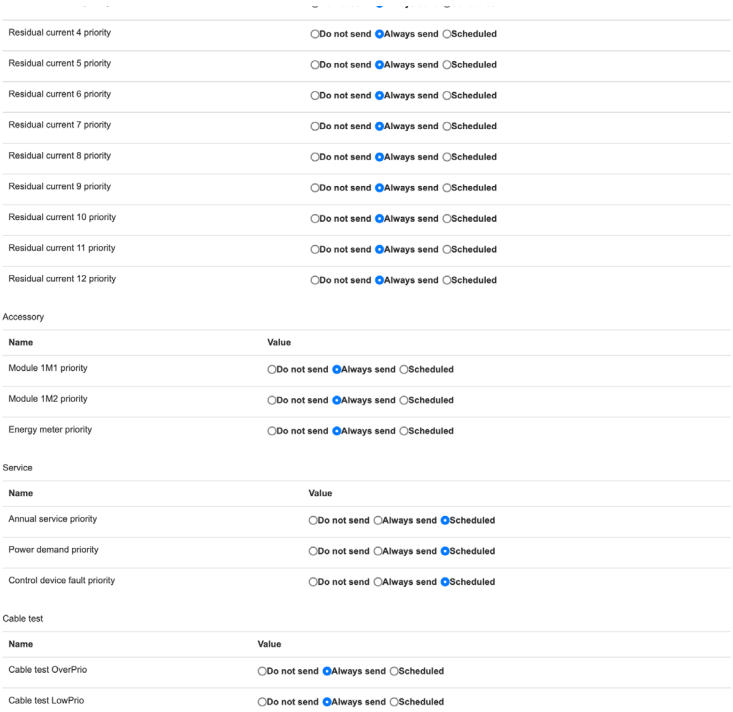
IceControl Safe

Use/WEB

Settings/Alarm priority

Shown in the image

- Residual current priority (Residual current triggered)
- 1M1, 1M2 not communicating (not installed or bus error)
- Energy meter error (Bus error)



Residual current 4 priority	○Do not send ●Always send ○Scheduled
Residual current 5 priority	○Do not send ●Always send ○Scheduled
Residual current 6 priority	○Do not send ●Always send ○Scheduled
Residual current 7 priority	○Do not send ●Always send ○Scheduled
Residual current 8 priority	○Do not send ●Always send ○Scheduled
Residual current 9 priority	○Do not send ●Always send ○Scheduled
Residual current 10 priority	○Do not send ●Always send ○Scheduled
Residual current 11 priority	○Do not send ●Always send ○Scheduled
Residual current 12 priority	○Do not send ●Always send ○Scheduled

Accessory

Name	Value
Module 1M1 priority	○Do not send ●Always send ○Scheduled
Module 1M2 priority	○Do not send ●Always send ○Scheduled
Energy meter priority	○Do not send ●Always send ○Scheduled

Service

Name	Value
Annual service priority	○Do not send ○Always send ●Scheduled
Power demand priority	○Do not send ○Always send ●Scheduled
Control device fault priority	○Do not send ○Always send ●Scheduled

Cable test

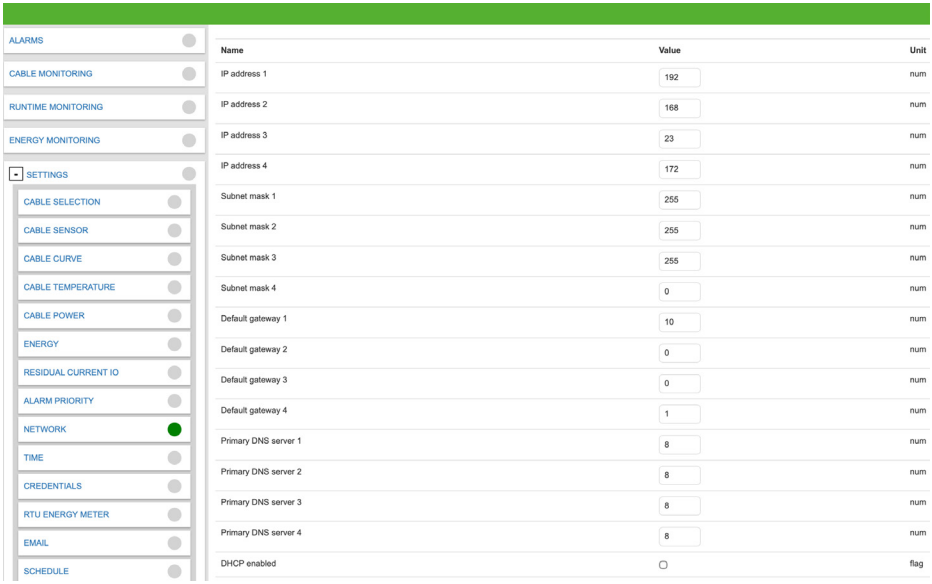
Name	Value
Cable test OverPrio	○Do not send ●Always send ○Scheduled
Cable test LowPrio	○Do not send ●Always send ○Scheduled

IceControl Safe

Use/WEB

Settings/network

The unit's IP address, subnet mask, default gateway, DNS and DHCP. If DHCP is in use, the address given by the server will show as DHCP IP address 1...4.



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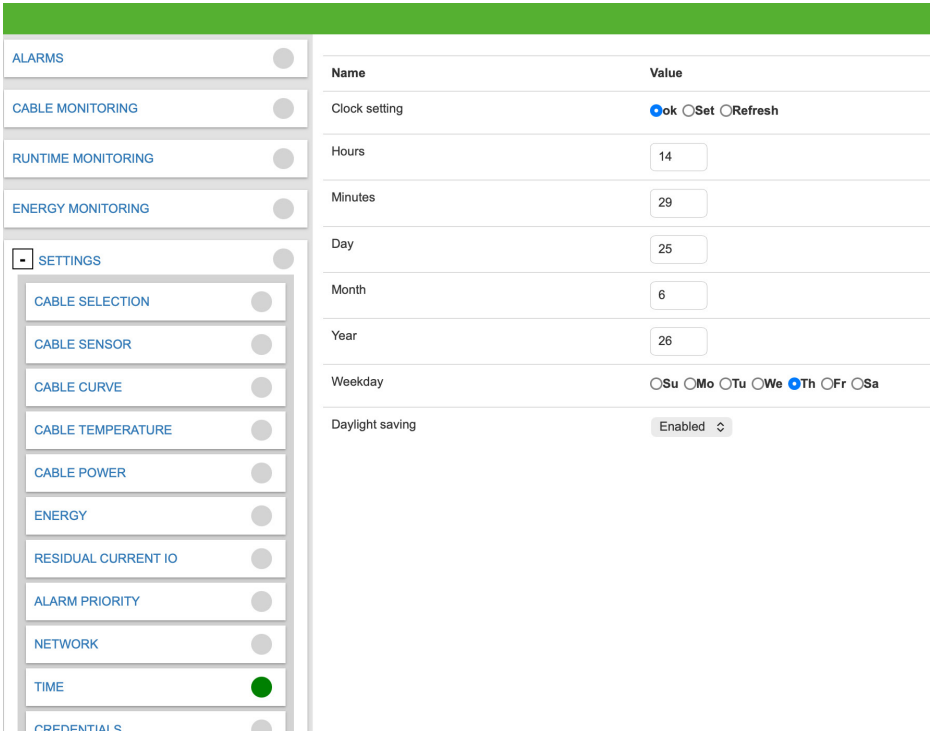
IceControl Safe

Use/WEB

Settings/Time

To set the date and time, select “Aseta (Set)” under “Kellon asetus (Set clock)”. This will allow you to set a new time, date and weekday for the page. After setting the clock, select the “Päivitä (Update)” status, which will modify the set time and “Kellon asetus (Set clock)” will automatically change to the “ok” status. You can also define whether or not to use summer time. If this option is selected, the system will automatically update to summer time/daylight savings time.



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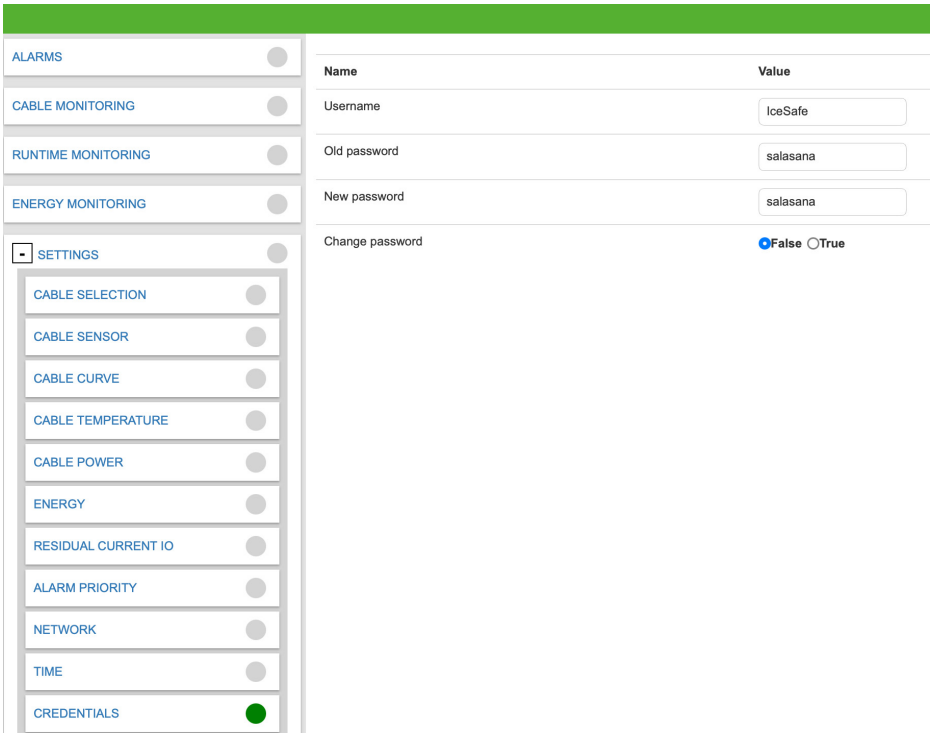
IceControl Safe

Use/WEB

Settings/Credentials

It is possible to set a new password for the web interface on this page. Change the password under “(Change password)” by selecting “True” while the other fields are defined.



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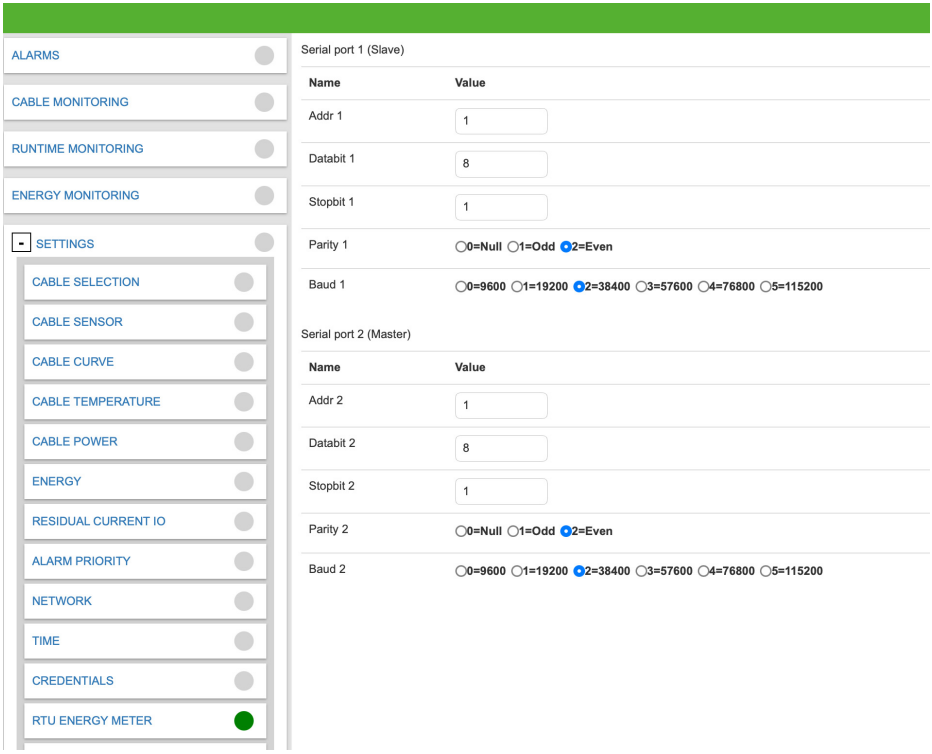
IceControl Safe

Use/WEB

Settings/RTU Energy meter

Serial port 1 is a slave port, and it can be used, for example, to read or write variables and settings defined in the Modbus register table via the Modbus RTU bus.

Serial port 2 is the master and is connected to the energy meter.



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Use/WEB

Settings/Email

DNS search, **Alarm sending** and **Sending in progress** are used to monitor the status of email sending. These cannot be modified.

Test alarm is for testing email alarms, and it will send an email about a test alarm if the settings are correct. The alarm is triggered on the rising edge and cleared on the falling edge.

Email sending must be selected in order for emails to be sent at all. The use of an appropriate address is recommended. An address with a .fi domain is preferable, as servers often filter out .com addresses, particularly when sending from a port.

Recipient address must be correct and recipient must be checked in order for an email to be sent to the recipient.

There may be multiple recipients. **Site address** will be the subject of the email.

Account settings must be correctly configured, and the service provider must support port 25.

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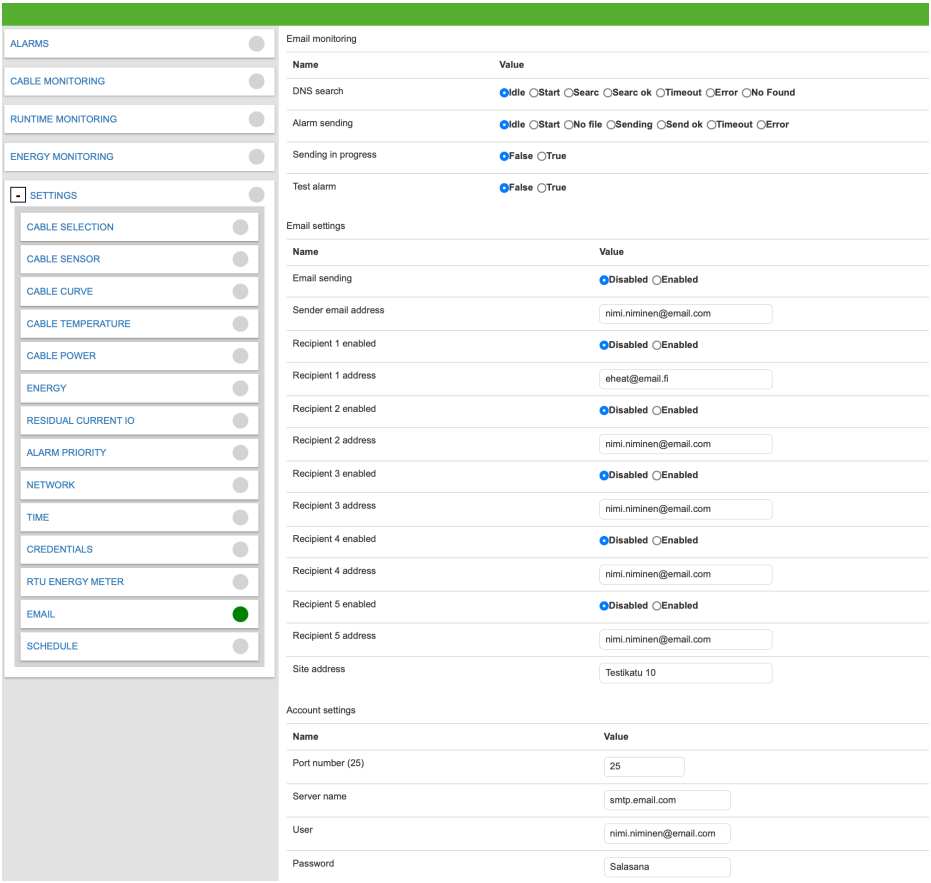
Use/WEB

Settings/Email



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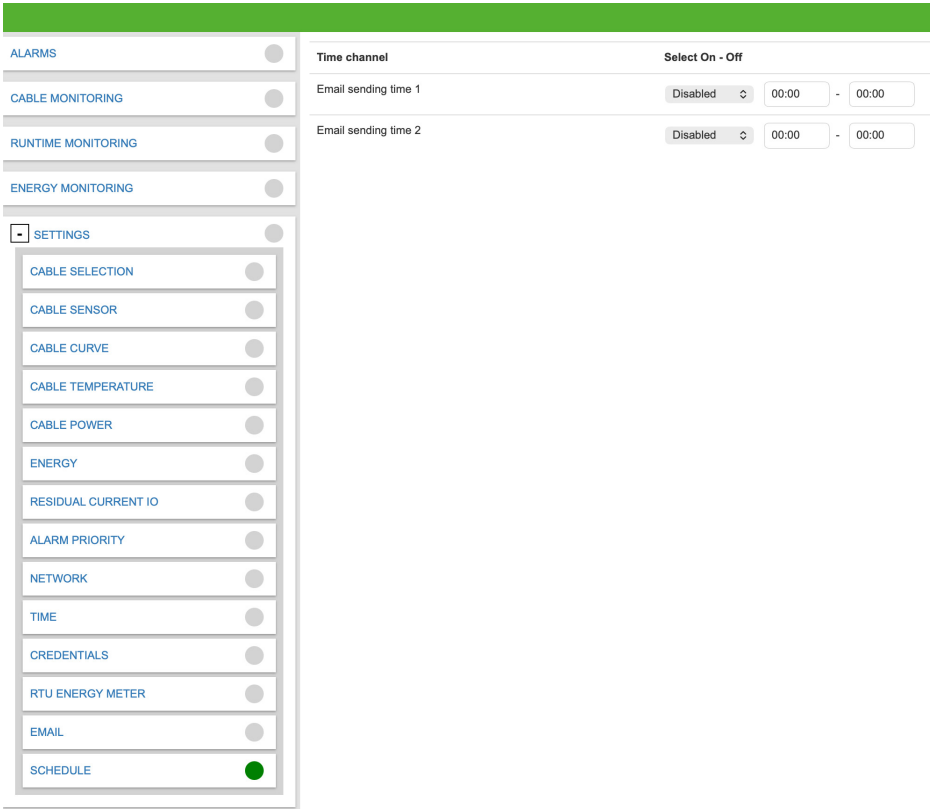
IceControl Safe

Use/WEB

Settings/Schedule

The time program affects the sending of alarms via email and cable tests.



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Pistesarjat warranty

Terms and clarifications

Pistesarjat Oy grants all IceControl freeze protection control units a full two-year warranty. The warranty covers material and manufacturing defects, and takes effect from the date of purchase, subject to the following conditions:

- **The electrical installation was performed by a qualified electrician in compliance with current regulations and the installation instructions provided by Pistesarjat.**
- **If the technical documentation contains a Certificate of Warranty page, it must be carefully completed in connection with installation.**
- **The place of purchase has been informed of any defect.**
- **Pistesarjat has been given the opportunity to troubleshoot the fault to confirm the reason.**
- **Troubleshooting and repair work are not carried out without Pistesarjat's consent.**
- **It must be possible to provide proof of purchase.**

CE

Disposal instructions

Electronic components and devices containing them must NOT be disposed of with household waste. They must be disposed of in the same manner as other electrical and electronic waste, in accordance with local legislation.

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