

**boss**

Local supervisor for medium and large systems



USER MANUAL

**boss**

+0300088EN - ENG

Up to date version available on

www.carel.com

WARNING

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- Not allow the electronic circuits getting wet. Rain, humidity and all types of liquids or condensate contain corrosive mineral substances that can damage the electrical circuits. In any case, the product should be used and stored in environments that respect the temperature and humidity limits specified in the manual;
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- Not to drop, hit or shake the device, because the internal circuits and mechanisms could suffer irreparable damage;
- Not to use corrosive chemical products, aggressive solvents or detergents to clean the device;
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DISPOSAL**INFORMATION FOR USERS ON THE CORRECT HANDLING OF WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)**

With reference to European Parliament and Council Directive 2002/96/EC issued on 27 January 2003 and the related national implementation legislation, please note that:

- WEEE cannot be disposed of as municipal waste, said waste must be collected separately;
- the public or private waste collection systems defined by local legislation must be used. Moreover, the equipment can be returned to the distributor at the end of its working life when buying new equipment;
- this equipment may contain dangerous substances: improper use or incorrect disposal of such may have negative effects on human health and on the environment;
- the symbol (crossed-out wheeled bin) shown on the product or on the packaging and on the instruction sheet indicates that the equipment has been introduced onto the market after 13 August 2005 and that it must be disposed of separately;
- in the event of illegal disposal of electrical and electronic waste, the penalties are specified by local waste disposal legislation.

Materials warranty: 2 years (from the date of production, excluding consumables).

Type-approval: the quality and safety of CAREL S.P.A. products are guaranteed by the design system and ISO 9001 certified production.



WARNING: separate the probe cables and the digital input cables as much as possible from the inductive load and power cables to prevent possible electro- magnetic interference. Never introduce power cables and signal cables (including those of electric control board) into the same cable troughs.

HACCP: CAUTION



The Food Safety programs based on HACCP procedures and on certain national standards, require that the devices used for food preservation are periodically checked to make sure that the measuring errors are within the allowed limits of the application of use.

Carel recommends compliance with the indications of European standard "Temperature recorders and thermometers for transport, storage and distribution of chilled, frozen, deep-frozen/ quick- frozen food and ice cream – PERIODIC VERIFICATION ", EN 13486 - 2001 (or subsequent updates) or similar standards and prescriptions applicable in the country of use.

The manual contains further indications regarding technical feature, proper installation and configuration of the product.



HACCP International Food Safety Certification Systems "Food Safe Equipment Material and Services" Certificato I-PE-705-CIS-RG-01b (valid until 31/12/2015) <http://www.haccp-international.com/>

This product is approved for the use in food preservation applications in compliance with the strictest standards in the sector.

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1. About this guide

1.0.1 About this guide

In this online help you can find a description of boss and instructions on how to configure and use it. See the "What's new" on page 70 section to keep tracks of updates.

1.0.2 Supplied documentation

The following documentations is supplied with boss:

Manual	Addressee	Date	Publication type
User Manual boss +0300088EN (this manual)	End user System administrator Installer Service personnel	21.01.2019	online help

2. Getting started

2.0.1 What is boss?

boss is a web based supervision system designed for the HVAC/R market to monitor and supervise different types of sites (buildings, plants, shopping center, and so on) . It allows its users to decide how alarms from the field are managed and which actions are scheduled or triggered.

Devices can be monitored on several levels (global, group or single device levels) and in different modes (with synoptic maps, device summaries, and full device list). Performance can be displayed in graphs, and supervision activities can be customized.

Alarms are easy to consult and can be associated to actions to guarantee notification and immediate intervention in the event of faults.

boss is available as a standard version and as a boss mini version. The boss mini version has the same features and functionalities as the standard version, where not otherwise specified.

2.0.2 How to use it?

The simple, intuitive and responsive interface, allows you to work with boss and use all its features both from a desktop environment and from mobile.

2.0.3 Main features

boss includes a Setup Wizard to allow fast and easy plant configuration and immediate monitoring of system status.

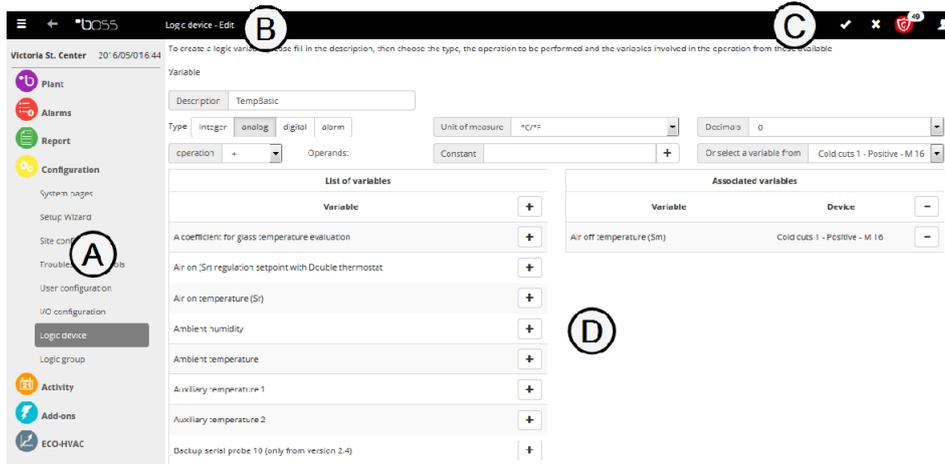
Not only physical variables can be monitored, but also logical variables, devices and groups, in order to control and maintain complex systems requiring the application of algorithms and data calculation. An additional component, Guardian, supervises system performance and guarantees reliability in terms of software and hardware faults.

boss also provides an automatic login function which allows a specific user to be always logged into the system and have a constant view of the plant status (see "Using the automatic login function" on page 10).

2.0.4 Addressees

Addressee	Activity	Skills
User	<ul style="list-style-type: none"> ▫ views device status and alarm notifications ▫ monitors performance ▫ prints reports 	-
Service personnel	Performs all User tasks and sets up parameters	technical knowledge of the installed devices and supervision algorithms
Installer	Performs all Service personnel tasks and: <ul style="list-style-type: none"> ▫ sets up site and devices ▫ creates users ▫ configures plug-ins ▫ loads site maps 	technical knowledge of HVAC/R algorithms and devices
System administrator	Performs all Installer tasks and: <ul style="list-style-type: none"> ▫ creates user profiles ▫ sets up network connections ▫ performs system configuration tasks 	-

2.1 The user interface



Area	Description	Area	Description
A	Responsive side navigation, showing all available menus	B	Buttons to show/hide menus and go back to the previous page. Customized home page link and navigation path.
C	Command bar including buttons specific for the active page, alarm notification and user's functions	D	Active page

2.1.1 Command bar buttons

The following buttons are shown in the command bar, some of them only if the command is available in the active page:

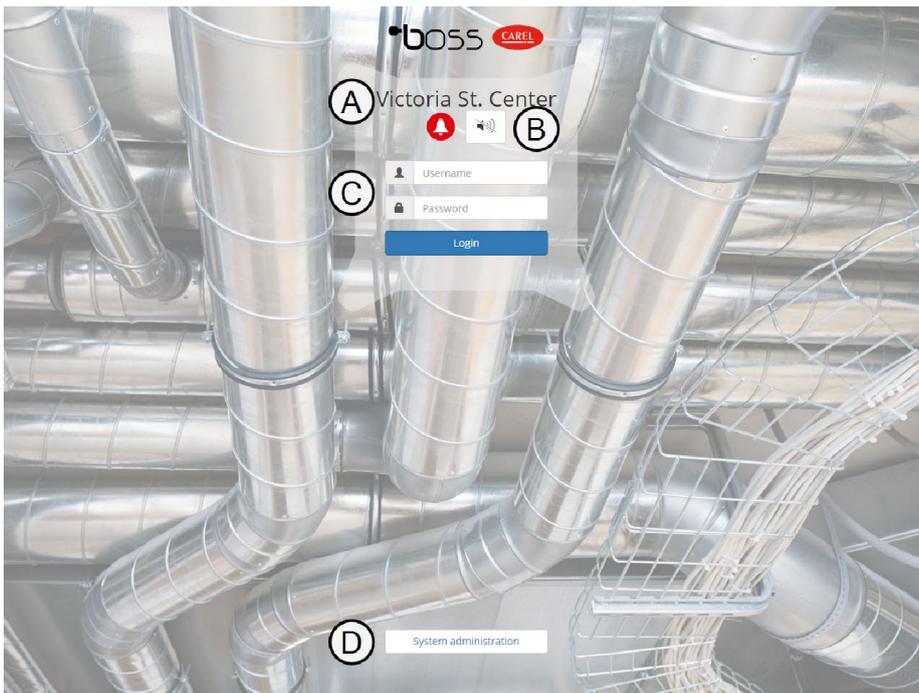
Button	Function	Button	Function
	Shows/hides the responsive side navigation		Returns to the previous page, if available
	Returns to the customized home page		Adds an item (line, device, user, and so on)
	Restores default settings		Refresh page contents Restarts engine
	Displays information on the current task, if available.		Displays hidden options
	Indicates that no alarm or Guardian notification are present		Displays currently logged user and user's functions
	Notifies the presence of site alarms, if any, and opens the Site safety page		Notifies the presence of Guardian notifications, if any and opens the Site safety page

2.1.2 Common actions

The following buttons may be displayed in different pages to perform actions common to different functions:

Button	Function
	Displays hidden options
	Opens device configuration page
	Adds/removes an item

2.2 Login page



Element	Description	Element	Description
A	Site identification	B	Alarms or Guardian notifications warning and snooze button
C	Login information	D	Access to the System Administration tool

2.3 Configuring boss

2.3.1 Configuring boss through a wizard

Main boss configuration activities are easily carried out using the Setup Wizard (see "Using the Setup Wizard" on page 18).

This wizard will guide you through the main steps of boss configuration:

1. "Managing your boss license" on the facing page
2. "Setting up a site" on page 14
3. "Setting up alarms management" on page 18
4. "Setting up reports management" on page 18
5. "Setting up Guardian" on page 33

This wizard includes only a minimum set of configuration tasks that will allow you to start working with boss. To fine tune boss functionalities, perform other secondary configuration steps as needed.

2.3.2 Configuring boss step by step

boss configuration requires a few steps that can be performed individually.

Main configuration steps:

1. Register your boss license (see "Managing your boss license" on the facing page).
2. Configure your plant and the devices installed on each line (see "Setting up a site" on page 14).
3. Define alarms and event management (see "Configuring alarms" on page 23).
4. Prepare report templates to produce templates with the collected data (see "Configuring reports" on page 35).
5. Configure Guardian behavior (see "Setting up Guardian" on page 33).

Secondary configuration steps:

- ▮ Create users who can access boss and assign them the proper privileges (see "Managing users" on page 12).
- ▮ Create a calendar for scheduled tasks (see "Managing the plant calendar" on page 22).
- ▮ Configure activities to be triggered by alarms (see "Configuring activities" on page 29).

2.3.3 Using the automatic login function

You can enable a single user to be always logged into boss and have a constant and updated view of the plant. When this user is logged in, no timeout is applied, and a predefined page, typically the plant map page, is always displayed.

This function is only available locally, that is on the monitor physically connected to the video output of boss.

⚠ Important: Make sure that the user enabled for this function has read-only privileges.

To use this function you need to:

- ▮ Create and configure a dedicated user profile (see "Setting up a user profile" on the next page)
- ▮ Enable the function for this dedicated user (see "Enable the automatic login function" on the next page)

2.4 Managing your boss license

2.4.1 Introduction

boss is a license protected product that requires no registration. You buy serial numbers from CAREL INDUSTRIES S.p.A., you activate them from the CAREL web site and receive a number of credits that you can then use to activate plug-ins.

2.4.2 How to manage credits and plug-ins

1. "Requesting an activation code" below
2. "Activating your credits" below
3. "Activating a plug-in" below

2.4.3 Requesting an activation code

Configuration > System pages > Information
Configuration > Setup Wizard > Registration

1. Note down your **MAC address**.
2. From the CAREL web site www.carel.com, go to the **Services > Activations** page.
3. Choose boss plug-in from the **Product type** list.
4. Enter the **Serial Number** you bought and **MAC address** and all other requested information: you will receive an email containing your **Activation code**.

2.4.4 Activating your credits

Configuration > System pages > Information
Configuration > Setup Wizard > Registration

1. In the **License Registration** section of this page click : the **Registration** dialog is displayed.
2. Select your license and enter **Serial number** and **Activation code**.

2.4.5 Activating a plug-in

Configuration > System pages > Information
Configuration > Setup Wizard > Registration

In the **Registration** section of this page, select the plug-in from the **Available plugin** list: the selected plug-in will be added to the **Installed plug-ins** list.

🔍 Note: Each plug-in activation requires one credit and cannot be deactivated.

2.5 Managing accounts

2.5.1 Introduction

To protect system access you can enable a safe account policy that applies some limitations to accounts management. In particular you can set an expiration date for accounts and set a limit to the login attempts allowed.

You can also enable remote access to boss for maintenance and service purposes.

🔍 Note: Account policy settings are valid for all users.

⚠ Important: This feature is safety-critical and should only be kept active for the time strictly necessary for service operations.

2.5.2 Defining a safe account policy

Configuration > User configuration > Users

1. Select the **Safe account policy** option.
2. Set an expiration date for all accounts.
3. Set a limit for login retries: when this limit is reached the account will be blocked.

2.5.3 Enabling remote support

Configuration > User configuration > Users

Enable the **Remote support** option: service personnel will be able to access boss remotely.

2.6 Managing users

2.6.1 Introduction

Create a user profile to define a set of privileges to be granted to all the users belonging to the group. Add users to groups to allow access to boss to individuals.

2.6.2 Setting up a user profile

Configuration > User configuration > Profiles

1. Add a profile and assign a name to it, or modify an existing one.
2. Use the **Parameters filter** option to display/set only or service or also manufacturer parameters.
3. Disable the **Show menu** option to hide the side navigation for this profile.
4. In the **Page access** section, check the pages that will be displayed for this profile.
5. In the **Page access** section, expand each page to display in the **Actions** column all the actions that can be executed, click on each action you want to enable.
6. In the **Groups** table, enable the groups of devices that will be displayed for this profile.

 **Note:** Modify an existing user profile to change the privileges of all the users belonging to the group at once.

2.6.3 Adding users

Configuration > User configuration > Users

Add a user, assign a name and a password to it and associate it to one of the existing user profiles.

 **Note:** The *admin* user cannot be deleted.

For setting account passwords, it is recommended to provide for the use of complex passwords, namely:

- length of at least 8 characters,
- made up of a combination of uppercase letters, lowercase letters, numbers and symbols.
- do not use common words, names of people, products or organizations.

It is also recommended to store them securely in order to prevent them from being lost or compromised.

2.6.4 Enable the automatic login function

Configuration > System pages > System

In **Local Auto-Login**, select the user that will be enabled for the automatic login function.

 **Important:** Make sure that this user has read-only privileges.

2.7 Safety management

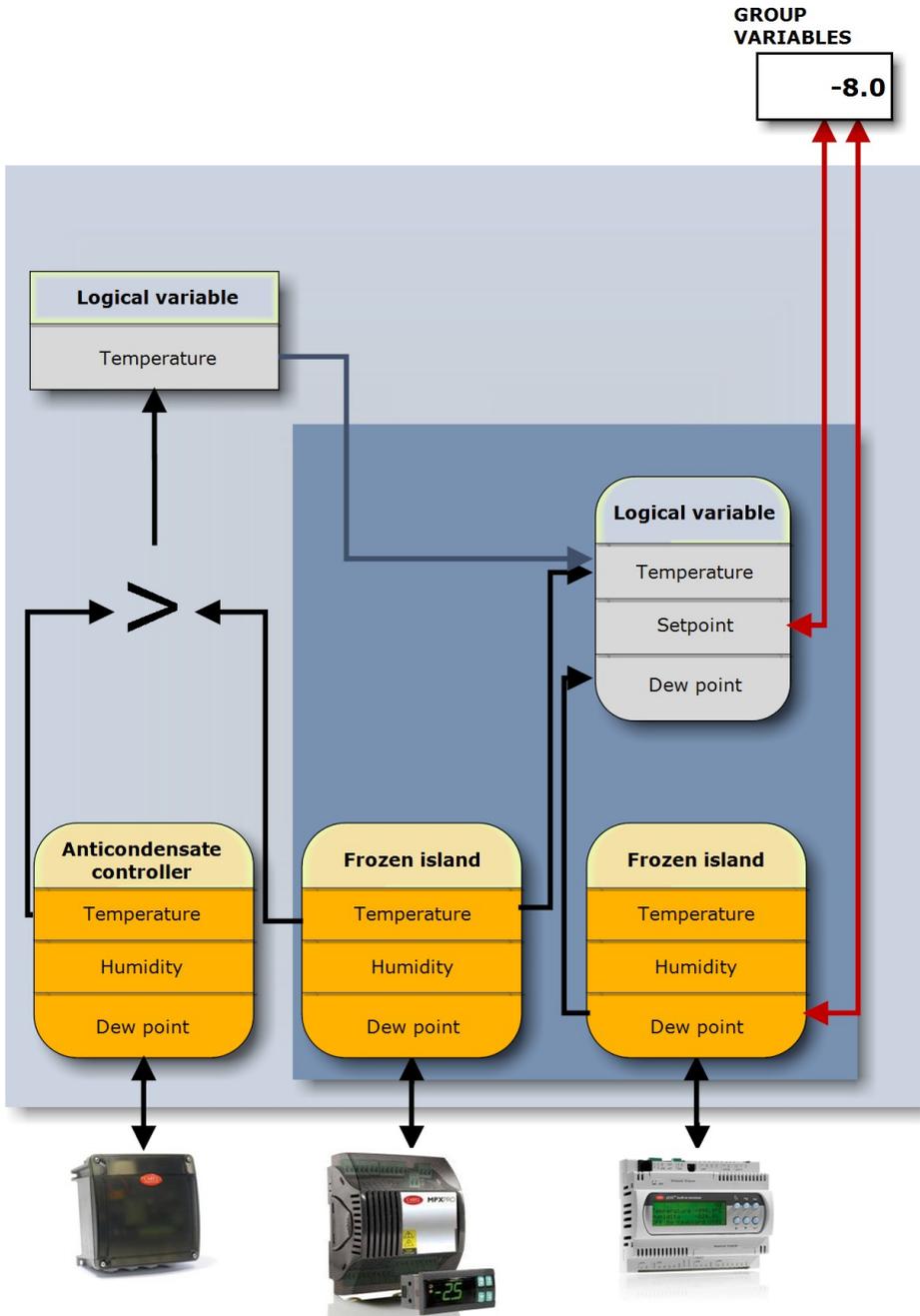
In order to use the products of the boss family following the best safety practices, and to know the countermeasures and processes used to maintain high levels of safety in the family of bosses Supervisors, please refer to the document + 0500191IE - Best practices for securing boss range.

Carel configures and designs its devices following internationally recognized safety standards and best practices. For more information on the safety aspects of CAREL products, please contact Carel through the official channels made available by the company.

3. Site configuration

3.1 boss setup: basic concepts

3.1.1 boss logical diagram



3.1.2 Setup elements

boss uses the following database elements to monitor the field:

Devices	<p>Physical devices, derived from standard CAREL templates (also referred to as "models") or custom templates, connected to boss via serial line with proprietary, BACnet or Modbus protocols. In the setup phase, boss presents a list of device templates. Standard CAREL templates include their factory device setup, custom templates have their setups created in Device Creator.</p> <p>Data in both setups include:</p> <ul style="list-style-type: none"> ▫ parameters, ▫ alarm variables with set priorities, ▫ log and HACCP variables with recording modes, ▫ monitoring page with status, probes, and so on, ▫ relays with reset modes. <p>A device derived by a standard or custom template is therefore ready for monitoring as soon as it is connected to the serial line and added to a line in boss.</p>
Custom devices	Devices obtained from models created with Device Creator which, once imported in boss, appear in the device model list.
Lines	Groups of physical devices that communicate with boss via the same protocol and are connected to the same serial port or an IP address.
Variables/parameters	Variable/parameter properties are contained in device templates.
Logical variables	Variables that contain the result of logical-mathematical functions between two or more physical device variables/parameters and constants. The purpose of a logical variable is to monitor complex situations (for example arithmetic averages, maximum value, and so on).
Logical devices	Group of physical variables/parameters and/or logical variables. The purpose of a logical device is to combine variables (physical or logical) that have a certain pertinence (for example, dairy temperatures) and that should be controlled in the same way as a physical device. In fact, a logical device is similar to a physical device, with the same data.
Virtual devices	Group of free internal boss variables that are not associated to any field device. To these variables you can assign values and use them to trigger specific behaviors according to custom algorithms. Virtual devices are not physical devices but can be treated as such in all boss pages (for example, maps).
Groups	<p>Groups of physical and/or logical devices. The purpose of a group is to group devices:</p> <ul style="list-style-type: none"> ▫ with the same features (for example, all MPXPRO) ▫ that share the same purpose (for example, dairy counter, air conditioning, room lights, and so on) <p>Groups appear in Global.</p> <p>A group lets the user:</p> <ul style="list-style-type: none"> ▫ display only group alarms, ▫ set up group HACCP and log graphs, ▫ set the same value on several parameters by using group variables ▫ provide specialized user access to certain device groups (for example, for maintenance). <p> Note: A physical or logical device can belong only to one group.</p>
Group variables	Device group parameters (physical and logical) that can be set with a single command.

3.2 Setting up a site

3.2.1 Introduction

Devices to be monitored can be added to the system either through a manual procedure or using an automatic function, if the communication protocol supports it.

3.2.2 How to set up a site

1. "Entering site information" on the facing page

2. "Creating a line of devices" below
3. "Setting up devices" below
4. "Setting up logical devices" below
5. "Setting up logical groups" on the next page
6. "Creating group variables" on the next page
7. "Creating virtual devices" on the next page

3.2.3 Entering site information

Configuration > System pages > Information
Configuration > Setup Wizard > Registration

In the **Site information** section, enter a **Name** and a reference **Telephone** number for the site.

3.2.4 Creating a line of devices

Configuration > Site configuration
Site Configuration > Setup Wizard > Lines configuration

 **Note:** Modbus and BACnet protocols support TCP/IP communication, while the CAREL protocol can only use serial communication.

1. Add a line.
 2. For each line configure the **Connection** parameters.
 3. If you use a USB/485 converter to identify the correct serial port, unplug the device from the USB port then use the **Detect USB** function.
 4. In **Devices**, select the type of device, specify how many addresses will be occupied and add them to the list.
 5. If you have devices that use CAREL or BACnet protocols, use the **Auto Detect** function to automatically identify the connected devices.
 6. Click **Save**: lines where no communication port has yet been set are displayed in red.
- To delete a line, select it and click **Delete**: all the devices connected to it are deleted from the database.

3.2.5 Setting up devices

Configuration > Site configuration
Site
Configuration > Setup Wizard > Lines configuration

You can customize a standard physical device configuration.

1. Select the line including the devices you want to configure and click **Modify**.
 2. For each device listed on the line, click  to open the device configuration pages.
 3. In **Main**, enable or disable management for scheduled alarms (see "Managing alarms" on page 24), enter a description and select the images for the device.
 4. In **Alarm variables**, enable all the alarm variables to be checked and set the check frequency. Assign a priority to the alarm generated by each variable.
 5. In **Log configuration**, for each variable set if and how it should be recorded.
-  **Note:** Variables recorded for HACCP purposes are treated according to HACCP regulations.
6. In **Description list**, add a short and a more detailed description of the variable and select the correct unit of measure. In the **Unit of measure** section of this page, you can add additional descriptions for units of measure that will be available for association to other variables.
 7. In **Main variables**, click **Go to selection page** to select the variables to be displayed:
 - in the **Probes, status, input/output** section assign main variables to a monitoring page section.
 - in the **Parameters and command** section select the variables that will be displayed in the device main page.
 8. In **Main variables**, click **Go to sort page** to modify the order in which the variables will be displayed.
 9. In **Notes**, add any useful information on the current device or line setup.

 **Note:** Notes can only be edited or deleted by their owner.

3.2.6 Setting up logical devices

Configuration > Logic device

Create logical devices to group different logical and physical variables and monitor complex situations that require logical-mathematic calculations.

1. In **Logic variables**, add a logical variable and enter a **Description** for it.
 2. Select one or more existing variables and set all the parameters (type, unit of measure, operation and operands) to create the logical relation.
-  **Note:** Calculations may be made between two or more physical variables from different devices or between a variable and a constant.
3. Click **Save**: the newly created logical variable is added to the list.
 4. In **Logic devices**, add a device and enter a **Description** for it.

5. When importing physical variables, select a device and choose which variables and of which type: the selected variables are moved from the **List of variables** to the **Associated variables** list.
6. When importing logical variables, choose which variables and of which type: the selected variables are moved from the **List of variables** list to the **Associated variables** list.
7. Click **Save**: the newly created logical device is added to the list.
8. Click  to open the configuration pages for the newly created logical device and modify some of its settings.

3.2.7 Setting up logical groups

Configuration > Logic groups

Create logical groups of devices to deal with a set of devices at once.

1. Add a new group and enter a **Description** for it.
 2. In the **Devices** section of the page, associate to the group all the required devices.
-  **Note:** Since a device can only belong to one logical group, create logical devices to include the variables of the same physical device in several groups.
-  **Note:** When a logical group is deleted all group variables are deleted from the database and all the devices that were part of the group are made available to be associated to other groups.

3.2.8 Creating group variables

Configuration > Logic groups

Create group variables to set similar variable values on devices in the same group with a single command, for example temperature set point.

1. Select the logical group you want to create a variable for and click **Modify**.
 2. In **Group variables**, add a variable and enter a **Description** for it.
 3. In the **Variables** section of the page, set the type of variable and the unit of measure for the group variable.
 4. For each device associated to the group associate the desired variables.
-  **Caution:** boss does not check for unit of measure consistency, make sure that the same unit is used by the devices and the group variable.
5. In **Notes**, add any useful information on the current logic group or variable setup.
-  **Note:** Notes can only be edited or deleted by their owner.

3.2.9 Creating virtual devices

Configuration > Virtual Devices

Create a virtual device to associate more internal variables to obtain specific behaviors.

1. Click **Add** and assign a name to the virtual device.
 2. Assign an address so that the virtual device can be also used in maps.
 3. Select the type of variable to be added to the device.
 4. Enter all information for the specific variable you are adding.
-  **Note:** The name you enter as **Variable description** will be displayed in the boss pages.
1. Click **+** to add another variable.
 2. Click **Save**: the newly created virtual device is displayed in the **Virtual Devices** page and can be managed as any other physical device.
 3. Click  to open the configuration pages for the newly created virtual device and modify some of its settings.

3.3 Managing a site

3.3.1 Copying configuration data

Configuration > Site configuration > Copy config.

You can copy configuration from one master device to other similar slave devices.

-  **Caution:** boss does not check for data consistency, make sure the template configuration is complete, consistent and valid.
-  **Note:** Devices must be enabled but can be disconnected.

1. In **Source selection**, from **local device configuration**, choose the device whose configurations you want to copy.
2. From **Cross device configuration copy**, choose which configurations (alarms, logs, descriptions, and so on) you want to copy.
3. In the **Device slave** list select the devices on which you want to copy configuration setting.
4. In **Cross profile graph set copy**, choose from which profile you want to copy the graphics settings: in **source profile** select the user profile from where graph settings are to be copied, in **Target profile** select the profiles for which they will be made available.
5. Click **Copy**:the selected configuration data is copied on the slave devices.

3.3.2 Exporting/exporting configuration data

Configuration > Site configuration > Copy config.

You can copy configuration information to a configuration file that can be later imported. To export configuration data to a file:

1. Select the device to import from in **local device configuration**.
2. Click **Export**: the configuration data is saved into a .DCFG file.

To import configuration data from a file:

1. Select the configuration file to import from in **Import configuration**.
2. In the **Device slave** list select the devices on which you want to copy configuration data.
3. Click  :the configuration data is copied on the selected devices.

3.3.3 Disabling a device

*Configuration > Site configuration > Site
Configuration > Setup Wizard > Lines configuration*

You can disable a device so that no alarm will be notified from it (see "Managing alarms" on page 24).

3.3.4 Checking devices dependencies

Configuration > Site configuration > Dependencies

For each one of the connected devices you can check how its variables are used in reports, actions, rules and so on.

From **Device used in report/actions/rules/plugins** add the desired devices to the **Device to check** list: the **Configuration dependencies** list below will display all the variables from the selected devices and where they are used in the system.

3.3.5 Monitoring site status



In **Site safety** check the following:

- redundancy level of notification channels

 **Note:** Notification channels need to be configured and tested to be valid.

- Guardian notifications
- the 10 most recent alarms

3.4 Site setup: main data

Configuration > Site configuration > Copy config. > section Cross device configuration copy

Field	Description
Alarms configuration	Alarm variables, their priorities and enabling and control frequency.
Log configuration	Log variables and recording parameters.
Descriptions	Variable descriptions, codes and units of measure.
Variables display	Device monitoring page layout with indications of which variables are displayed.
Graph configuration	Parameters for displaying the graphs, colors, scales and range.
HACCP configuration	HACCP variables recording parameters.

Configuration > Site configuration > device configuration > Log configuration
 Configuration > Setup Wizard > Lines configuration > device configuration > Log configuration

Field	Description
HACCP	The variable is saved every 15 minutes for 13 months and appears in HACCP reports
Log	The variable will appear in log reports
Log depth	Recording logs length. When the limit is reached, the oldest data is overwritten.
Minimum variation	⚠ Caution: Values recorded at the set frequency that do not exceed this variation are not recorded.
Frequency	Recording frequency ⚠ Caution: Recording frequency sets the time when the system checks whether the condition is true to run the action in an event activity.

3.5 Using the Setup Wizard

3.5.1 Introduction

The Setup Wizard provides a sequence of tasks to be performed to rapidly set up the site. Operations need to be executed in the listed order.

3.5.2 How to set up a site using the Setup Wizard

1. "Managing your boss license" on page 11
2. "Setting up a site" on page 14
3. "Setting up alarms management" below
4. "Setting up reports management" below
5. "Setting up Guardian" on page 33

3.5.3 Setting up alarms management

Configuration > Setup Wizard > Alarms management

Define the basic settings of alarms management.

1. In the **Conditions** section, define if all alarm conditions or only alarms of the specified priority will be notified.
2. In the **E-mail** section, edit the parameters for sending email alarm notification and add all the recipients addresses.
3. In the **Relay** section, enable the connected relays and activate/deactivate them.

3.5.4 Setting up reports management

Configuration > Setup Wizard > Report

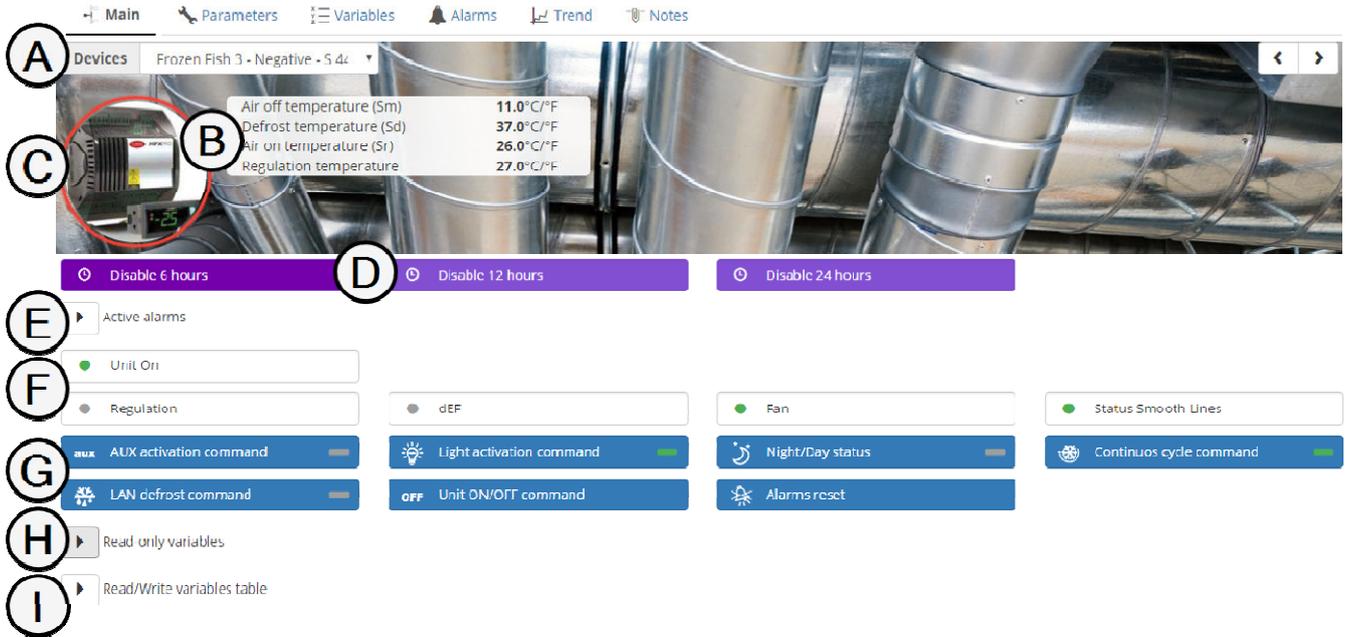
1. Enter a name for the report and enable its creation.
2. Define creation time and printer.
3. Add all the recipients that will receive the report by email.

4. Site monitoring

4.1 Device main page

Plant > Devices

Click on a device to display its **Main** page: for each type of device different relevant information is displayed.

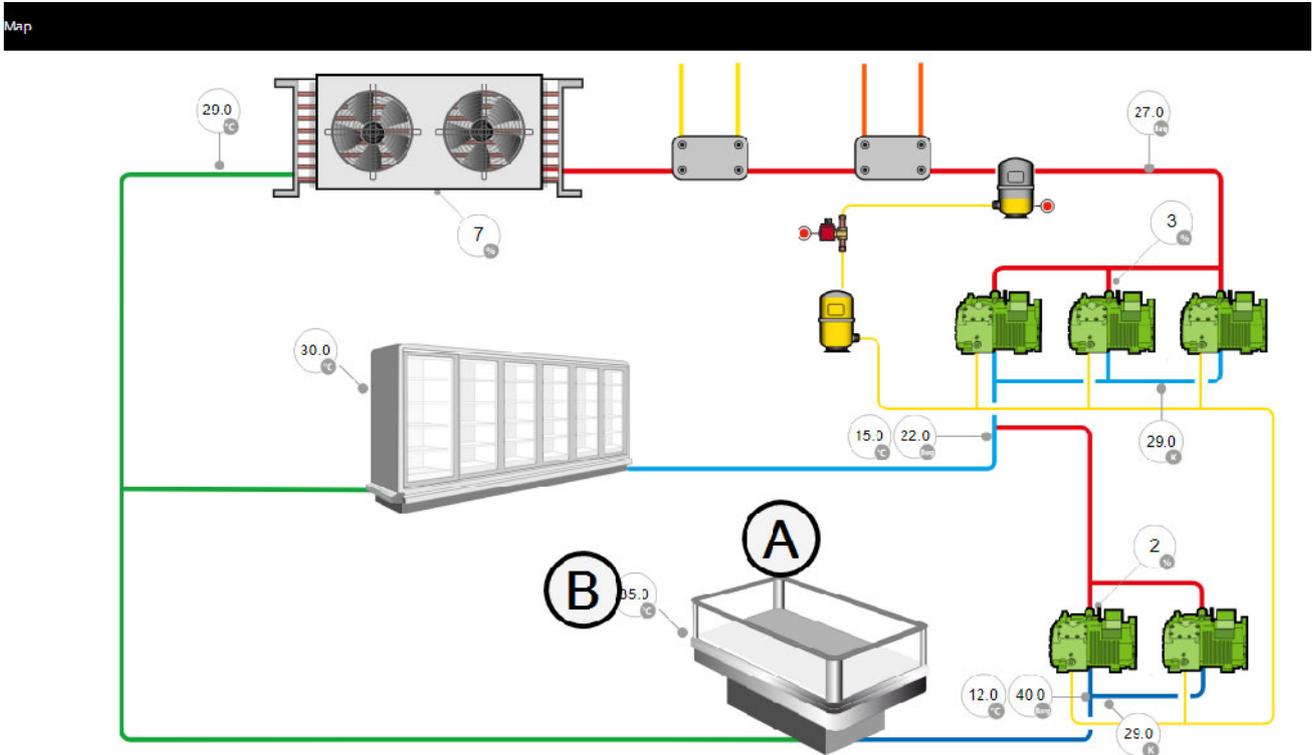


Element	Description	Element	Description
A	Device name	B	Main information on the device
C	Device image	D	Temporary alarms disable options
E	Information on the alarms active for the device	F	Information on the device status (where available)
G	Command to be sent to the device (where available)	H	Value and description of variables read from the device
I	Current value and description of the variables read from and written to the device	-	-

4.2 Map main page

Plant > Map

The map page displays a graphic description of the plant, the devices monitored and the most significant values read.



Element	Description	Element	Description
A	Device representation (in the example a refrigerated counter)	B	Device data

4.3 Site monitoring

4.3.1 Viewing devices information

Plant > Devices

- From **Group** select which devices to display.
- Filter devices by name or by status (**All, Online, Alarm, Offline, Disabled** or **TempDisabled**).
- List the devices by **Address** or in alphabetical order.
- Click on a device to display detailed information: the device main page is displayed.

Note: From a device main page you can navigate to the main page of any other device.

4.3.2 Viewing devices on a map

Plant > Map

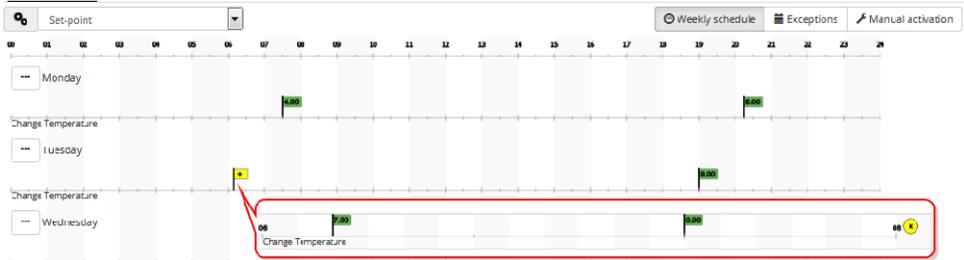
The map displays data collected from the devices in real time.

Click the device data to display more detailed information.

5. Plant calendar

5.1 The plant calendar

Activity > Plant Calendar > Scheduler



Button	Function
	Deletes all scheduling except the selected one, if any.
	Copies the settings from the day.
	Pastes the copied settings to the day.
	Displays more settings in a small time interval.

5.2 Setting up the plant calendar

5.2.1 Introduction

With the plant calendar you can:

- schedule digital, integer and analog variable settings on a weekly basis,
- manually set digital, integer and analog values on variables.

Scheduling can be enabled and disabled.

5.2.2 Description

To do this you need to create a category of variables of the same type (for example temperatures, switches and so on), define a group of devices to be regulated for the category and setting values for analog and integer variables (that is set points) or on/off period for digital variables. These rules are applied in the same way to all variables in a category (for example lighting) while they can be differentiated for different device groups (for example showcase-lighting or closet-lighting).

5.2.3 How to set up a calendar

- "Creating variable categories" below
- "Creating device groups" on the next page
- "Setting up the weekly schedule" on the next page

5.2.4 Creating variable categories

Activity > Plant Calendar

⚠ Caution: Categories can also be imported and exported from this page, but importing categories will overwrite all group, category and calendar settings.

In **Categories** add a category of variables of the same type and assign a name and a symbol to it (up to 10 categories). Select a **Device model**, select the desired variables and configure them.

5.2.5 Creating device groups

Activity > Plant Calendar

In **Groups**, add a group of similar devices, associate a category and assign a name to it (up to 10 groups for each category). Select the devices to be included in the group.

5.2.6 Setting up the weekly schedule

Activity > Plant Calendar > Scheduler

Up to 10 intervals can be set for each group in one day. Overlapping intervals will be unified in one.

In **Weekly schedule**, select a category. For each day of the week, double-click on the time line and enter the time information and variable value.

 **Note:** You can copy and paste a schedule or move it along the time line.

5.3 Managing the plant calendar

5.3.1 Creating exceptions

Activity > Plant Calendar > Scheduler

Exceptions can be created and repeated with priority over the standard calendar. Other days with scheduled exceptions are displayed in the calendar.

1. In **Exceptions**, select the date when the scheduling will not apply.
2. Specify if the exception is occasional or will be repeated every year.

5.3.2 Manually setting a variable

Activity > Plant Calendar > Scheduler

The manual activation function allows you to ignore the scheduling in the calendar and force a variable setting for a specific category.

1. In **Manual activation**, select a category of variables.
2. For each group of devices the category applies to, set command and parameter value (if available).
3. Disable the scheduler to execute the action.
4. Click Save.

 **Note:** Manual activations can be set up and enabled by disabling the scheduler only when needed.

5.4 Plant calendar: main data

Activity > Plant Calendar > Categories

Field	Description
Autoreset	For special regulations. It indicates that the variable will always be forced to 0 before being set to 1.

6. Alarms and events

6.1 Alarms and events: basic concepts

6.1.1 Alarm management

Alarm status management policies must be linked to each priority. A maximum time must be set after which Guardian will intervene if an alarm is not cleared. It must also be set which alarms in which priority level can be acknowledged by the user.

6.1.2 Alarm organization

All alarms are displayed in the **Alarms list** page, while in the **Devices** page alarms are filtered by device group.

An alarm action can be inhibited by the user in the **Alarm detail** page.

 **Note:** Actions that use notification channels may be set to perform several attempts.

The device is marked as red (●) if at least one variable (regardless of the priority) is in alarm.

When the alarm variable returns to normal status, or when the user clears the alarm, the system turns the active alarm into a cleared alarm.

 **Note:** Alarms and events can be searched, isolating events from certain contexts (groups, devices). Active and cleared alarms, on the Global, group or device levels, can be printed.

RemotePRO regularly acquires all alarm data.

6.1.3 Alarm disabling

Alarms can be disabled to perform maintenance activities. You can either fully disable a device, leaving only data recording active, in this case the device is marked as blue (●). You can also disable a device temporarily so that it will not send alarms for a period of time but automatically return active after the set interval. In this case the device is marked as purple (●) and the time remaining before the device returns active is displayed.

 **Important:** Currently active alarms at the time of temporary disabling are automatically reset.

6.1.4 Event types and categories

Recorded events are classified into three types:

: information on system intervention (for example, parameter changes or logon).

: warning on situation to be monitored since it might cause an error event (for example, alarm acquisition stopped).

: fault situation that requires intervention to restore correct operation (for example, notification on text message channel rejected).

To make event search easier, events are also classified into categories of similar events (for example configuration, data transfer, heartbeat, energy, and so on).

6.2 Configuring alarms

6.2.1 Introduction

Alarms are triggered by alarm variables relating to single devices, to groups of devices or to the entire plant. They indicate possible problem situations that may require intervention. Alarm variables are checked by the system at set intervals and unattended alarms are notified.

Settings made at device level can be propagated from one device to another of the same type (see "Managing a site" on page 16).

Devices are normally already setup to manage alarm monitoring, however default configurations can be modified to satisfy different monitoring needs.

6.2.2 How to configure alarms

1. "Setting up alarm variables" on the next page
2. "Setting up alarm management" on the next page
3. "Setting up alarm notification retries" on the next page
4. "Configuring temporary disable intervals" on the next page

6.2.3 Setting up alarm variables

Configuration > Site configuration > Site

For each device set which alarms variables will be checked and how.

1. Select the line the device belongs to and click **Modify**: the **Site configuration Edit** page is displayed.
2. Select the device whose alarm variable you want to set and click **🔗**: the **Main** page for the device is displayed.
3. In the **Alarm variables** page:
 - set **frequency** of alarm-checking for all alarm variables
 - enable/disable **checking** for individual alarm variables
 - set **priority** for each alarm variable

6.2.4 Setting up alarm management

Configuration > Site configuration > Alarms safety

You need to define which priority alarms can be acknowledged by the user, and for how long they can stay active before they trigger a notification from Guardian.

1. For each alarm priority:
 - set the time (in minutes) after which a notification from Guardian is triggered,
 - define if the related alarms can be acknowledged by the user,
 - define if a note must be automatically added to the alarm upon acknowledgment and enter a text for it.
2. Enable the **Persistent alarms** option to display alarms cleared from the field in the **Active alarms** page until acknowledged by the user.

Note: Only the alarms of priority set to "On" here can be acknowledged from the **Alarm list** page.

To restore default settings click **Default**.

6.2.5 Setting up alarm notification retries

Configuration > Site configuration > Alarms safety

In **Alarm notification resend** enable the function and define how often and for how long the system will try to notify alarms of the specified priorities.

Enable the **Action** option to send an email at each retry.

6.2.6 Configuring temporary disable intervals

Configuration > Site configuration > Alarms safety

1. In **Temporary disabling** set to **On** all the **Timeouts** intervals you want to create.
2. Set the number of minutes for the disabling interval.

6.3 Managing alarms

6.3.1 Monitoring all active sites alarms

Alarms > Alarms list > Active alarms

You can view all **Active alarms** for all physical site devices.

1. Click on the columns header to order the alarms by **Priority**, **Date**, **Device** or **Description**.
2. Click on the alarm **Description** to display more information on the alarm and to add notes to it.
3. Click on the **Device** which triggered the alarm to display more information on the device itself (see "Device main page" on page 19).

6.3.2 Monitoring active group alarms

Plant > Devices > Alarms > Active alarms

You can view **Active alarms** grouped by the device group. Here only physical and logical group device alarms are listed.

1. Select the **Group** of devices whose alarms you want to view.
2. Click on the columns header to order the alarms by **Priority**, **Date**, **Device** or **Description**.
3. Click on the alarm **Description** to display more information on the alarm and add notes to it.
4. Click on the **Device** which triggered the alarm to display more information on the device itself (see "Device main page" on page 19).

6.3.3 Monitoring reset alarms

Alarms > Alarms list > Reset alarms
Plant > Devices > Alarms > Reset alarms

The list displays alarms managed by the user and cleared from the field.

6.3.4 Acknowledging and resetting alarms

Alarms > Alarms list

Only alarms whose priority has been enabled for acknowledgment during alarm setup can be acknowledged (see "Configuring alarms" on page 23).

1. To acknowledge all alarms at once, click **Acknowledge**: all alarms are marked as acknowledged.

 **Note:** If a mandatory note is required for an alarm, a warning message is displayed and the alarm cannot be acknowledged until a note is added to it.

 **Note:** Mandatory notes for alarms are set during alarms management configuration (see "Configuring alarms" on page 23).

2. To acknowledge a single alarm, select its description, add a note if requested and click **Acknowledge**: the alarm is marked as acknowledged in the **Alarms list** page.
3. To reset all alarms at once, click **Inhibition**: all acknowledged alarms disappear and are displayed in the **Reset alarms** page.
4. To reset a single acknowledged alarm, select its row and click **Inhibition**: the alarm disappears and is displayed in the **Reset alarms** page.

6.3.5 Stopping actions triggered by alarms

Alarms > Alarms list

Actions triggered by alarms are automatically canceled when the alarm is acknowledged and reset. They can be however stopped individually.

1. Acknowledge the alarm for which you want to stop related actions.
2. Click **Delete**: the alarm will be marked for canceled actions.

6.3.6 Adding notes to alarms

Alarms > Alarms list

Notes can be added both to active and to reset alarms.

1. Click on the alarm **Description** to display more information on the alarm.
2. In the **Notes** page, add a note or edit an existing one.

 **Note:** Notes can only be edited or deleted by their owner.

A predefined note can be added automatically on acknowledgment (see "Configuring alarms" on page 23).

6.3.7 Disabling alarm notification

Configuration > Site configuration > Site
Configuration > Setup Wizard > Lines configuration

You can stop alarms being notified from a specific device.

1. Select the line the device is part of and click **Modify**: the **Edit** page is displayed.
2. Disable the device: all notification activities for actions triggered by device alarms and events are disabled.

 **Caution:** If the device to be disabled is a Master with propagation on Slave values (see chapter "Dew Point Broadcast: basic concepts" on page 54), disable the Master-Slave group.

6.3.8 Temporarily disable alarm notification

Plant > Devices

1. Select the device from which you want to temporarily disable alarm notification.
2. Click on the desired timeout interval: the **Re-enable** button and an active timer of the remaining timeout are displayed.

To return the device to its active status before the timeout expires, click the **Re-enable** button.

6.3.9 Printing alarms

You can print the alarms displayed in the **Alarms list** by producing an HTML page or a PDF document. Use the **HTML** or **PDF** options in the command bar.

Alarms can also be printed in specifically configured alarm reports (see "Configuring reports" on page 35).

6.4 Managing events

6.4.1 Introduction

Events include information on **system events** sent by the devices, the I/O peripherals or the system (such as system start or peripheral load), and **user events** (such as logon and alarm acknowledgment).

6.4.2 Monitoring events

Alarms > Events

1. Click on the columns header to order the alarms by **Date, Description, Category, User** or **Type**.
2. Click on the event **Description** to display more information on the event.

 **Note:** Events remain in the Event list until cleared (see System pages: administration tasks).

6.4.3 Adding notes to events

Alarms > Events

1. Click on the event **Description** to display more information on the event.
2. In the **Notes** page, add a note or edit an existing one.

 **Note:** Notes can only be edited or deleted by their owner.

6.4.4 Printing events

You can print the events displayed in the **Events list** by producing an HTML page or a PDF document. Use the **HTML** or **PDF** options in the command bar.

Events can also be printed in specifically configured reports (see "Managing reports" on page 35).

7. Notification channels

7.1 Notification channels: basic concepts

7.1.1 Default actions

A default action is automatically created when you set up communication channels and will send a specific notification to all the contacts in the address book for alarm and event activities.

This default action automatically:

- ▮ creates the action MAILACTIONTECH in **Actions**,
- ▮ enables the **Always/Sempre/Toujours/Immer** time range in **Time Ranges**,
- ▮ creates a generic alarm condition for all devices in **Condition**
- ▮ generates and enables a rule including all the above in **Rules**

The default action can be modified and the consequent rule can be disabled.

7.2 Setting up notification channels

7.2.1 Introduction

You need to configure notification channels for sending warnings for alarms, events, system faults signaled by Guardian or service calls. Only after configuring the notification channel it is possible to setup the activities to execute the action and define the address book.

⚠ Important: Peripherals must be set in boss before you set up notification channels.

7.2.2 Setting up email notification

Configuration > I/O configuration > E-mail

1. Define **Configuration** parameters.
2. Enter a reference to be added to the **Address book**.
3. Click **Test** to verify the configuration : this will send a test email to one of the references in the Address book.

7.2.3 Setting up printing tasks

Configuration > I/O configuration > Printer

1. Enable and setup report printing.
2. Enable and setup alarms printing.
3. Click **Test** to verify the setup: this will send a test page to the selected printer.

📌 Note: Report templates must be previously created in the report setup (see "Configuring reports" on page 35).

7.2.4 Setting up remote connections

Configuration > I/O configuration > RemotePRO

1. Define **Configuration** parameters.
2. Enable alarm synchronization with RemotePRO.
3. Enter a reference to be added to the **Address book**.
4. Specify the IP address for the RemotePRO connection.
5. Click **Test** to verify the configuration: this will send a test message to one of the references in the Address book.

7.3 Notification channels: main data

Configuration > I/O configuration > Relay

Field	Description
Active status	<p>0: LED off / contact C-NC closed, contact C-NO open. Relay is commuted by the user (manual action or scheduled actions).</p> <p>1: LED on / contact C-NC open, contact C-NO closed. Relay is commuted by the user (manual action or scheduled actions).</p> <p>Safe mode: safe relay, used to warn about supervisor stops. It works as a relay type 0 (contact C-NC closed, contact C-NO open) and is set to zero when boss is not active. When boss become active the previous relay status is restored.</p>
Reset type	<p>Manual: when the operator acknowledges the alarm.</p> <p>Automatic: when the alarm is called off.</p> <p>Timed: at the end of Reset time</p>

8. Activities

8.1 Activities: basic concepts

8.1.1 Action types

Actions are single tasks performed to complete an activity. These tasks are:

- ▮ send an email
- ▮ call a remote supervisor
- ▮ set a variable to a value
- ▮ turn a relay on or off
- ▮ print a HACCP or a log report (scheduled activities only)
- ▮ print the alarm (scheduled activities only)

8.1.2 Alarm conditions

The system periodically checks for alarms. If the alarm is linked to an activity with zero delay, the associated action is immediately run. If a delay was set, periodically the system checks whether the delay was exceeded to run the action.

⚠ Caution: An alarm action can be run before or after the set delay. But if the alarm is clear at the next check the action is not run. Thus only actions on persistent alarms are run.

8.1.3 Event conditions

Condition variables are log variables whose values are sampled at the frequency indicated in the device **Log** setup page. The system checks whether the condition is true at the end of the smallest sample period.

If the condition is true and the rule has zero delay time, the associated action is immediately run. If a delay was set, the system check whether the condition is true at the next sample to run the action

⚠ Caution: An event action can be run before or after the sampling according to the set delay. If the condition is no longer true at the next sample, the action is not run. Thus only actions whose conditions are still true are run.

To guarantee correct event management, conditions and variable sampling times must be correctly set. Before setting event activities, set sampling frequencies for the variables involved. The shortest frequency will be the interval used by the system to check the conditions. If sampling frequency changes, rewrite the condition.

8.2 Configuring activities

8.2.1 Introduction

Activities can be scheduled or triggered by the occurrence of alarms or events. Each activity has an action (notification or field action) that will be executed on a certain condition (for example, an alarm) and within a time range.

8.2.2 How to configure activities

1. "Setting up notification channels used by peripherals" below
2. "Setting up relay behavior" on the next page
3. "Creating time ranges" on the next page
4. "Creating scheduled activities" on the next page or "Creating alarm and event activities" on the next page
5. "Testing activities configuration" on the next page

8.2.3 Setting up notification channels used by peripherals

Configuration > I/O configuration

1. Set communication parameters for each channel (email, printer, RemotePRO).
2. For email and RemotePRO, define an address book of potential contacts.

🔍 Note: Always include a channel test contact. Each notification channel is set up individually, see "Setting up notification channels" on page 27

8.2.4 Setting up relay behavior

Configuration > I/O configuration > Relay

1. In **Active status**, set the signal value.

 **Note:** Relays set to safe mode will act as safety relays to signal interruptions from the supervisor. Their value will be set to 0 as long as the system is not active and will then return to their previous state. Relays set to safe mode can still be controlled by user defined actions.

2. For timed relays, specify the **Reset time**.
3. Specify the relays that will be displayed in the **Relays reset** page and will therefore be available for manual reset.

 **Note:** Relays must be active (see "Managing activities" below).

8.2.5 Creating time ranges

Activity > Activities scheduler

Activity > Alarm and event management

Define time intervals for recurring or occasional events.

 **Note:** For scheduled activities, only the time range start time is considered.

8.2.6 Creating scheduled activities

Activity > Activities scheduler

1. In **Actions**, add an action and assign a name to it. Select and configure the task that the action will perform (send an email, write a variable and so on).
2. In **Time ranges**, check the available time ranges, if none satisfies your needs, create a new one for the action to be executed and assign a name to it.
3. In **Rules**, create a new rule to associate action and time range, assign a name to it and enable it: in **Dashboard** the newly created activity appears.

8.2.7 Creating alarm and event activities

Activity > Alarms and event management

1. In **Actions**, add an action and assign a name to it. Select and configure the task that the action will perform (send an email, write a variable, create a report and so on).
2. In **Time ranges**, check the available time ranges, if none satisfies your needs, create a new one for the action to be executed and assign a name to it.
3. In **Event conditions** or **Alarm conditions**, add and configure a new condition.
4. In **Rules**, create a new rule to associate action, condition and time range, assign a name to it and enable it: in **Dashboard** the newly created activity appears.

8.2.8 Testing activities configuration

Configuration > I/O configuration

Test all set notification channels and relays behavior with the **Test** button.

 **Caution:** Always test the communication channels used for scheduled activities. Untested channels are marked with a red dot in the **Dashboard** page in the **Alarm and event management** or **Activities scheduler** menu.

8.3 Managing activities

8.3.1 Disabling alarm and event activities

Configuration > Site configurations

You can disable all the activities triggered by alarms and events related to a specific device.

1. Select a line.
2. Edit its settings: disable the address for the device from which you do not want to receive any alarm. The device continues to operate as usual.

8.3.2 Resetting internal relays manually

Alarms > Relay reset

During maintenance you may need to deactivate one or more internal relays.

- ▮ Deactivate the relay and click **Save**: the deactivated relay will be marked as de-energized.

9. Data transfer

9.1 Managing data transfer

9.1.1 Introduction

Variables can be displayed to RemotePRO and BMS supervisors, you need to specify which variables will be exported to each destination.

9.1.2 Setting up variable display for RemotePRO

Activity > Data transfer

1. In **RemotePRO**, select the device or the device model.
2. Select the variables to be sent to RemotePRO.

 **Note:** Log variable files are deleted after transfer. Data alignment is scheduled by RemotePRO.

9.1.3 Setting up variable display for BMS supervisors

Activity > Data transfer

1. In **Modbus slave** or in **BACnet server**, according to the protocol used by the supervisor, select and set up the connection mode.
2. Assign a name to the set of variables that will be displayed and select an address from those available.
3. Add a device or device model.
4. Select the variable to be sent to the supervisors.
5. Enable the Read-only option to avoid boss variables to be overwritten by an external BMS.

 **Note:** For Modbus slaves, the total counter appears in **Configured variables** and cannot exceed the value indicated in **Supported variables**.

 **Note:** For BACnet servers, up to 1024 variables can be set.

10. Guardian

10.1 Guardian: basic concepts

10.1.1 The purpose of Guardian

Guardian is fully independent of boss and is used to increase overall system reliability. Always on, it checks system architecture component operations, indicating faults through notifications.

10.1.2 Monitored system components

Guardian constantly checks the following essential boss technical aspects:

- ▮ **Error events:** errors may occur due to boss actions (not to be confused with field alarms). These errors, found by Guardian, trigger emergency actions.
- ▮ **Supervisor on:** checks that boss responds, simulating a user consultation request.
- ▮ **Database on:** checks that the database is running to make sure all data is saved, including log variables.
- ▮ **CPU use:** checks that CPU use does not exceed a set limit to prevent the system from slowing down.
- ▮ **RAM use:** checks that RAM memory use does not exceed a set limit for a certain band of time to prevent the system from slowing down.
- ▮ **Disk use:** checks that hard disk space use does not exceed a set limit to make sure data is saved.

When enabled by the user, Guardian checks two important boss functions:

- ▮ **Active alarms:** indicates alarms that persist over a certain period of time or those alarms that have not yet be acknowledged by the user or not yet automatically canceled. The maximum time period must be set on the alarm priority level.
- ▮ **Probe variation:** checks for natural variable variations in the field. It indicates variables whose values remain the same over a certain period of time. The list of variables to be checked can be customized.

10.1.3 Control modes

Guardian is always on and constantly checks system status:

- ▮ if the first probe control is negative, Guardian repeats it several times after a certain period of time. If the following attempts all fail, then a notification is sent
- ▮ for certain critical conditions, Guardian repeats a second test cycle. If this is still negative, a second notification is sent.

10.1.4 Control effects

Operating faults detected by Guardian are signaled through events, notifications and computer reboot. These actions can be combined together. For example, if boss does not run an action, Guardian creates a new event, sends a text message and reboots the computer.

⚠ Caution: To guarantee maximum reliability, notifications must be sent on privileged redundant channels.

🔄 Note: Guardian can also be set for partial operations. Simply disable notifications and the optional controls in the **Guardian System** pages. Guardian will continue its control activity generating events or rebooting the computer in the event of system instability.

10.1.5 Guardian notification

These warnings are independently sent by Guardian, on both channels used for alarm notifications and on dedicated channels, emails.

Channels dedicated to Guardian notifications can guarantee notification reception even in the event of standard channel malfunctions.

Guardian and faults to be controlled must be enabled and notification recipients must be defined (see "Setting up Guardian" below).

10.1.6 Guardian alarms

Guardian can send active alarms or critical messages. A message area with important information appears for some critical messages.

10.2 Setting up Guardian

10.2.1 Introduction

Guardian regularly checks the correct functioning of the system, it can be disabled for a certain period of time, for example during maintenance, and the recipients of notifications can be customized.

Guardian can work effectively only if boss communication channels have been properly configured (see "Setting up notification channels" on page 27) and alarm time management has been defined (see "Configuring alarms" on page 23).

⚠ Caution: Guardian notifications warns the user of malfunctions and faults that jeopardize entire system operations. If notifications are disabled, Guardian will continue its control activity but can only run events or reboot the system where applicable.

Note: System status controls are always on, even if Guardian is disabled for several days. Temporarily disabling Guardian effects Guardian notifications following negative results: check results are saved in the Guardian log but new events, notifications or reboots are not run.

10.2.2 Enabling Guardian

Configuration > System pages > Guardian
Configuration > Setup Wizard > Guardian

In **Status:**

1. Enable Guardian (option **Off**).
2. Enable the verification of active alarms (option **On**).

Note: By enabling the verification of active alarms, you can track alarms that have not been managed by boss within the set time interval.

In **Notifications configuration:**

1. Enable notification.
2. Select the recipients that will receive a notification email.

In **Variables configuration:**

1. Enable verification of probe variation.
2. Set the verification frequency and the number of unchanged values that will trigger the notification.
3. Select a device at a time and all the variables to be verified.

Note: Each time the Guardian settings are modified, you will have to restart the engine.

10.2.3 Disabling Guardian functions

Configuration > System pages > Guardian
Configuration > Setup Wizard > Guardian

While keeping Guardian running, you can disable some of its functions.

In **Status:**

Disable the verification of active alarms.

In **Notifications configuration:**

Disable notification.

In **Variables configuration:**

Disable verification of probe variation.

10.2.4 Disabling Guardian

Configuration > System pages > Guardian
Configuration > Setup Wizard > Guardian

You can completely disable Guardian so that none of its functions will be executed.

In **Status:**

1. Disable Guardian (option **On**).
2. Specify the number of days for which it will stay disabled.

Caution: If the Guardian service is disabled, intercepting any internal faults that jeopardize alarm signaling will be impossible. In fact, Guardian makes sure that all current alarms are managed within a certain time limit. System malfunctions are always displayed in the Events list.

10.3 Managing Guardian notifications

10.3.1 Introduction

Guardian notifications are displayed and can be dealt with separately from other alarms.

10.3.2 Dealing with Guardian notifications

Configuration > System pages > Site safety 

To silence the notifications click **Snooze**.

11. Reports

11.1 Report: basic concepts

11.1.1 Complete report and printout list

boss can print:

- | log/HACCP reports for scheduled activities, with current, daily, weekly or monthly data
- | Log/HACCP reports on demand with current, daily, weekly, monthly or time band data specified by the user
- | all site active/cleared alarms and events
- | active/cleared group alarms
- | active/cleared device alarms
- | active/cleared alarms that meet search criteria
- | alarm row as alarm or event activity action
- | log/HACCP graphs

11.1.2 Report settings

Reports are exclusively based on physical or logical device variables declared as "logs" in Device configuration, Log Configuration (see "Setting up a site" on page 14).

Variables can be recorded based on parameters set by the user (log report) or on read-only parameters based on HACCP regulations (HACCP report).

For log report variables you can set:

- | recording length, used, for example, to keep a single device under control for a given time band.
- | minimum variable variation, used, for example, to reject useless samples and obtain a more accentuated curve.
- | high minimum variation will reject several samples and therefore the curve will be less accentuated.
- | sampling frequency, used to increase the number of samples and obtain a more precise curve.

For HACCP report variables, refer to the pertinent regulation.

11.2 Configuring reports

11.2.1 Introduction

Instantaneous reports, log reports and HACCP reports must be configured in order to be printed or exported by the user or automatically by scheduled activities.

11.2.2 Creating a report template selecting specific devices

Report > Report management

1. In **Template**, add a template and enter a name, select interval, layout, sampling frequency, output format and whether HACCP or not.
2. Select the device and add the variables to be included in the report.

11.2.3 Creating a report template selecting devices of the same model

Report > Report management

1. In **Template**, add a template and enter a name, select interval, layout, sampling frequency, output format and whether HACCP or not.
2. Select the device model and the device names.
3. Add the variables of selected devices to be included in the report.

11.3 Managing reports

Note: A report template cannot be deleted if used as a printout action in a scheduled activity.

11.3.1 Setting up .csv setting

Report > Report management > Setting

Set up the parameters used for .CSV reports.

11.4 Print a commissioning report

11.4.1 Introduction

A commissioning report exports all real-time values of all site parameters in .CSV format (input device variables) and is typically run at the end of site configuration. You can print in .PDF or export some site selected parameters to .CSV format.

You can set up a customized report, selecting which parameters should be added and print/export their values, or you can open a default report created by CAREL and print/export values.

⚠ Caution: If a default action is performed, customized settings are lost.

11.4.2 Creating and printing a custom report

Report > Commissioning Report

1. Select a **Device** or a **Device model**, select the desired variables, add them to the commissioning report and click **Save**.
2. Select the export format (PDF, CSV).

11.4.3 Restoring the default report

Report > Commissioning Report

Click **Default**: the settings in the displayed custom report are lost.

11.4.4 Exporting real-time values for all site parameters to an Excel file

Report > Commissioning Report

Click **ⓘ** and select **Export all**.

11.5 Reports: main data

Report > Report management > Template

Field	Description
Time range	<ul style="list-style-type: none"> Instantaneous: the printed values will be those read at printout. For variables of any type. Daily: printed values are those read in the last 24 hours. Only for log or HACCP variables. Weekly: printed values are those read in the last 7 days. Only for log or HACCP variables. Custom: printed values are those read in the interval set when printing is requested. Only for log or HACCP variables and only for reports printed by the user.
Frequency	Custom: only for Daily, Weekly and Custom reports. You can indicate different times when variable values are read.

Report > Report management > Settings

Field	Description
Midnight mode for daily report	<p>On: all Daily reports include log data recorded between midnight of the set day and midnight of the following day.</p> <p>Off: all Daily reports include log data recorded in the 24 hours preceding the report execution.</p>

12. Debugging

12.1 Debugging: basic concepts

12.1.1 Introduction

This tool allows you to debug serial lines and thermodynamics. Debug can be run on a subset of installed devices. When the debug is started, the devices that were not selected will not be queried.

Apply a timeout according to the time needed to acquire diagnostic data. At the end of timeout, or on manual stop, the debug is automatically ended and the normal communication with all the devices is restored.

12.2 Debugging procedures

12.2.1 Check device communication for Carel protocol

Tools > Troubleshooting tools > 485 Debug

1. Select devices to be debugged.
2. In **Timeout** set the debug time after which the debug will end automatically.
3. In **Refresh** set the polling frequency to query the selected devices.
4. Click **Start**: the debug mode is started.

12.2.2 Check thermodynamics parameters

Tools > Troubleshooting tools > Thermo Debug

In **Refresh** set the page refresh frequency.

12.2.3 Check device communication for Modbus protocol

Tools > Troubleshooting tools > Modbus Debug

In Debug level, select the type of logging you want to perform.

12.3 Debugging: main data

12.3.1 Device communication debugging data

Tools > Troubleshooting tools > 485 Debug

Data	Description
Device Type	Link to device main page and status LED.
<red>	The value has exceeded the critical limit.
<yellow>	The value has exceeded the warning limit.

12.3.2 Thermodynamics parameters debugging data

Tools > Troubleshooting tools > Thermo Debug

Data	Description
Device Type	Link to device main page and status LED.
<red>	The value has exceeded the highest limit.
<yellow>	The value has exceeded the lowest limit.

13. The System Administration tool

13.1 System Administration tool: basic concepts

13.1.1 Introduction

The System Administration tool allows you to access, using your browser, various operating system functions.



The use of this tool is restricted to authorized and properly trained users.

13.1.2 Available functions

Three different user profiles are designed to use this tool with decreasing privileges:

- Administrator
- Maintainer
- User

 **Note:** Passwords for these users are set at installation.

The System Administration tool makes available specific functions to each user profile.

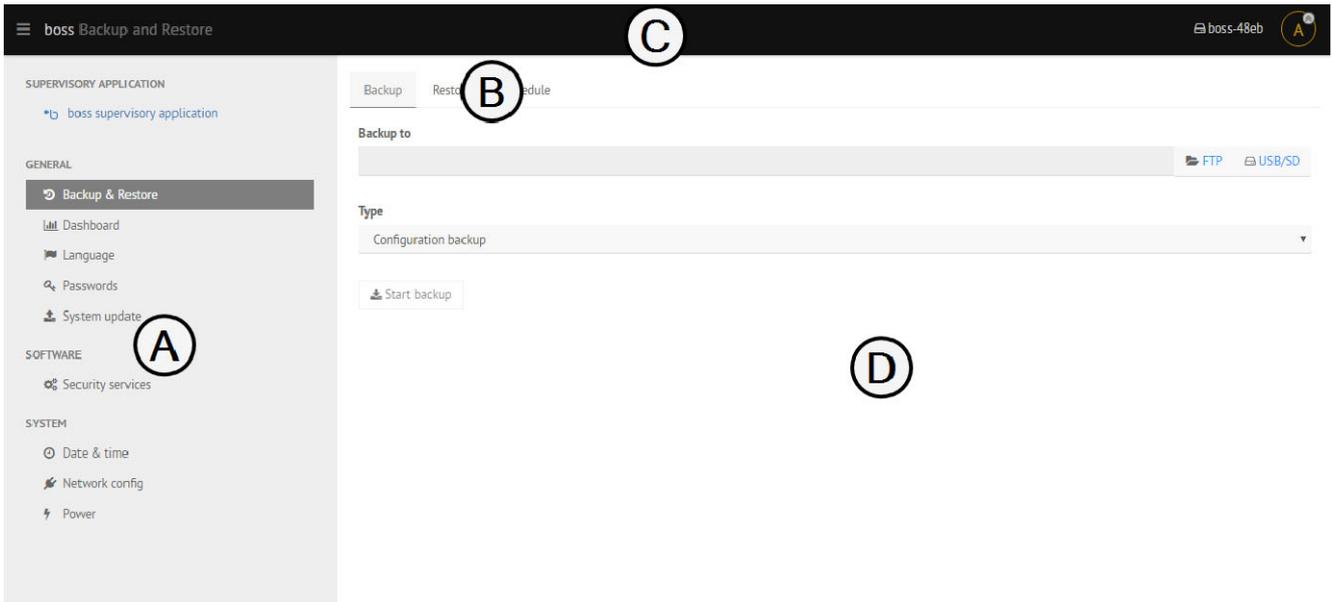
Function	Administrator	Maintainer	User	Description
Backup & Restore	x	x	x	Schedule, create and restore system or configuration backups.
Dashboard	x	x	x	View system overview information.
Language	x	x	x	Modify the language used by the System Administration tool.
Password	x	x	x	Modify password of current user.  Note: High level users can also change the passwords of lower level users.
System update	x	x		Load service packs and perform system updates.
Security services	x			<ul style="list-style-type: none"> ▪ Start and stop the Firewall.  (*) ▪ Enable and disable Ping response. ▪ Start and stop the VPN.  (*)
Date & time	x	x	x	Select time zone and set current system date and time.
Network configuration	x			Display and adjust network settings and define access parameters.
Power	x	x	x	Shutdown or reboot the host machine where boss is installed.  Important: When boss is shutdown from this page, the machine needs to be physically restarted.
Printers	x	x	x	Add and configure local and network printers.

(*) Firewall: turning off the firewall is protected by a password request and is strongly discouraged. In a device without this functionality the security level is strongly compromised.

Ping: enabling this function could make the machine more easily traceable on the network, enabling it only for the time strictly necessary for the IT operations that require it.

VPN: Using custom settings for VPN connections can alter the default network behavior, or cause connectivity problems and device malfunctions and / or reduce its security level.

13.2 The System Administration tool



Area	Description	Area	Description
A	Responsive side navigation, showing all available menus	B	Buttons to navigate each section (if any)
C	Command bar including user's functions	D	Active page

13.3 Network configuration procedures

13.3.1 Configure communication ports

SYSTEM > Network config > Network

Define, for each port, if dynamic or static addressing is used.

13.3.2 Set up Wi-Fi communication

SYSTEM > Network config > Wi-Fi

- ▮ Enable or disable Wi-Fi communication.
- ▮ Enable or disable password protection.

13.3.3 Add a DNS server

SYSTEM > Network config > DNS

Enter the DNS server address and click **Add**.

13.4 System backup procedures

13.4.1 Scheduling a complete backup

GENERAL > Backup & Restore

1. In **Schedule** select the frequency or date for backups execution and the remote target folder.
2. Click **Apply schedule**.

13.4.2 Starting a backup

GENERAL > Backup & Restore

1. In **Backup** select the remote target folder
2. Select the type of backup to create:
 - **Full backup**: full machine copy, used to create a machine clone.
 - **Configuration backup**: backups the site and rules without log data.
 - **Service backup**: reserved to service personnel.
3. Click **Start backup** to start the procedure.

13.4.3 Restoring backup data

GENERAL > Backup & Restore

1. In **Restore** select the backup file.
2. Make sure versions match.
3. Click **Start Restore** to restore a complete backup.

14. Plug-in: Geo-Lighting

14.1 Geo-Lighting: basic concepts

14.1.1 Operating principle

This module allows you to automatically turn lights in the building on and off to guarantee energy savings. It operates based on the sunrise and sunset times at the site's latitude and longitude: it automatically turns off lights when day (sunrise) is detected, and turns them back on automatically when night (sunset) is detected.

Sunrise and sunset times calculated by Geo-Lighting can also be used to automatically detect the end of the free cooling in Smart Night Purge (see "Configuring Smart Night Purge" on page 43).

14.2 Geo-Lighting: setup and activation

14.2.1 Setting up light on/off control

ECO-HVAC > Geo-Lighting > Configuration

1. Manually enter data for **Latitude** and **Longitude**,
2. or click **Auto-detect** to automatically enter your current position,
3. or select a city from the **City** list.
4. Select the desired device for both **Day variable** and **Night variable**.
5. Select the variable associated with the required controls.
6. Click **Save**.

 **Note:** You can edit its settings also when Geo-Lighting is running.

14.2.2 Starting/stopping the Geo-Lighting control

ECO-HVAC > Geo-Lighting > Dashboard

Click **Start** to start the function.

Click **Stop** to stop the function.

14.3 Geo-Lighting: main data

14.3.1 Trend data

ECO-HVAC > Geo-Lighting > Dashboard

Element	Description
Sunrise time	Time of sunrise and, consequently, time when lights are turned off
Sunset time	Time of sunset and, consequently, time when lights are turned on
Current status	Current GeoLighting status (night or day)
Day variable	On/Off status of the variable that turns indoor/outdoor lights off/on
Night variable	On/Off status of the variable that turns indoor/outdoor lights on/off
Year	Trends based on a year divided into weeks with average values.
Report	Daily sunrise and sunset times during the current week/month/year

14.3.2 Configuration data

ECO-HVAC > Geo-Lighting > Configuration

Field	Description
Latitude/Longitude	Building latitude and longitude
Day variable	Variable associated with indoor/outdoor light on/off command
Night variable	Variable associated with indoor/outdoor light on/off command

15. Plug-in: Smart Night Purge

15.1 Smart Night Purge: basic concepts

15.1.1 Introduction

This module runs an enthalpy free cooling system to reduce the operating time of the summer climate control system at night using outdoor fresh air.

15.1.2 Operating principle

Free cooling starts in the hours before sunrise and only during those seasons requiring cooling. Smart Night Purge can manage free cooling for a maximum of five building areas. It interfaces with a master conditioning unit, typically connected to temperature sensors on which the algorithm is based, and up to three slave conditioners. Smart Night Purge is based on a self-adapting algorithm: it checks the average values of the last three days and uses the result to create corrective actions on future algorithm applications.

15.2 Configuring Smart Night Purge

15.2.1 Introduction

To set up the Smart Night Purge correctly, you need to define:

- ▮ master and slave conditioner data
- ▮ indoor and outdoor temperatures required for Smart Night Purge operations
- ▮ other data required to optimize consumption

15.2.2 How to configure Smart Night Purge

1. "Customize free cooling for building areas" below
2. "Set night free cooling " below

15.2.3 Customize free cooling for building areas

ECO-HVAC > Smart Night Purge > Configuration

1. Click **Add**: the fields are set to default values for a new customization.
2. Enter the custom name in the **Algorithm name** text box.
3. Specify the number of slave conditioners.
4. Click **Select** to choose devices and related variables.
5. Set all required parameters.
In the absence of an indoor/outdoor humidity probes, set relevant fields to 50. This enables free cooling for temperature values and not enthalpy.
6. Choose whether the cooling action should be stopped at a specific time or at the time automatically calculated by the Geo-Lighting plug in.
7. Click **Save**: the new algorithm is now listed in the **Algorithm list**.

 **Note:** Customizations that are not saved are automatically deleted when the function is closed.

15.2.4 Set night free cooling

ECO-HVAC > Smart Night Purge > Configuration

1. Select the desired algorithm from the **Algorithm list**.
2. Adjust all necessary parameters.
In the absence of an indoor/outdoor humidity probes, set relevant fields to 50. This enables free cooling for temperature values and not enthalpy.
3. Click **Save**.

 **Note:** Customizations that are not saved are automatically deleted when the function is closed.

 **Note:** You can edit its settings also when Smart Night Purge is running.

15.3 Analyzing Smart Night Purge trends

15.3.1 Introduction

You can view and analyze Smart Night Purge log trends on a weekly, monthly or yearly basis, or read real-time trends and status.

15.3.2 How to display Smart Night Purge data

- ▮ "Enabling/disabling Smart Night Purge" below
- ▮ "Viewing real-time information" below
- ▮ "Viewing trends" below

15.3.3 Enabling/disabling Smart Night Purge

ECO-HVAC > Smart Night Purge > Dashboard

Click **Start** to enable the free cooling function: the function starts when all set conditions occur.

⚠ Important: Smart Night Purge can be started at any time but will only run during the period between **Plug-in enable date** and **Plug-in disable date**. When not running, a warning message is displayed.

Click **Stop** to disable the free cooling function.

15.3.4 Viewing real-time information

ECO-HVAC > Smart Night Purge > Dashboard

1. Select the desired algorithm.
2. Click **Refresh**: the page displays current data on devices variables and Smart Night Purge functioning.

15.3.5 Viewing trends

ECO-HVAC > Smart Night Purge > Graph

1. Select the desired algorithm.
2. Select the required period.
3. Click **Plot** to update data: the **Graph** section displays data on enthalpy and free cooling duration in form of a graphic (**Chart**) and of a table (**Report**).

15.4 Smart Night Purge: main data

15.4.1 Smart Night Purge real-time data

ECO-HVAC > Smart Night Purge > Dashboard

Data	Description
Estimated time ON	Time calculated to start free cooling.
Freecooling end time	Time when free cooling ends. The icon  is displayed if this time is automatically calculated by the Geo-Lighting application.
°C	Outdoor and indoor enthalpy trend on each day in the last week.
Minutes	Actual length of free cooling on each day in the last week.

15.4.2 Smart Night Purge trend data

ECO-HVAC > Smart Night Purge > Graph

Data	Description
Weekly	Displays data based on a week divided into days and with real-time values.
Monthly	Displays data based on a month divided into days and with real-time values.
Yearly	Displays data based on a year divided into weeks with average values.

Data	Description
Report	Data on the duration of free cooling and indoor/outdoor temperature, humidity and enthalpy. Data is displayed as weekly averages in the yearly report.
Chart	Two graphs: <ul style="list-style-type: none"> ▫ KJ/kg - indoor and outdoor enthalpy trend. ▫ Minutes - free cooling length in minutes.

15.4.3 Algorithm parameters

ECO-HVAC > Smart Night Purge > Configuration

Parameter	Description
MASTER - Unit status	Variable that manages master conditioner on/off status
MASTER - Unit ON/OFF control	Variable that manages master conditioner on/off control
Number of slaves	Number of slave conditioners (from 1 to 3)
SLAVE 1/2/3 - Unit status	Variable that manages slave conditioner 1, 2, 3 on/off status
SLAVE 1/2/3 - Unit ON/OFF control	Variable that manages slave conditioner 1, 2, 3 on/off control
Internal temperature	Variables that read internal temperature
External temperature	Variable that reads outside temperature
Internal humidity	Percent internal humidity (manually entered or selected by the variable)
Outdoor humidity	Percent outdoor humidity (manually entered or selected by the variable)
Temperature set point	Internal temperature set point (manually entered or selected by the variable)
Humidity set point	Internal humidity set point (manually entered or selected by the variable)
Temperature deadband	Margin of tolerance from set point
Humidity deadband	Margin of tolerance from set point
Maximum unit pre-start time	Maximum free cooling length, from sunrise
Fan consumption (freecooling mode)	Master and relevant Slave conditioning unit energy consumption in free cooling mode (inferred from factory default value)
Fan air flow	Fan capacity (inferred from factory default value)
Plug-in enable date	Date of action/service start in Smart Night Purge
Plug-in disable date	Date of action/service end in Smart Night Purge
Free-cooling end time action	Maximum free cooling end time, meaning sunrise (manually entered automatically read by Geo-Lighting)

16. Plug-in: HVAC Smart Start

16.1 HVAC Smart Start: basic concepts

16.1.1 Operating principle

This module optimizes the climate control system based on the weekly building opening and closing hours calendar and a predefined set point. An algorithm calculates system inertia time, constantly reading indoor and outdoor temperature values to reach this set point.

16.1.2 Working hours

For this function to work you need to set building opening and closing hours in a weekly calendar. The climate control system must reach the set point within these hours and HVAC Smart Start must start working to optimize consumption.

Exceptions can be created to take precedence over the standard calendar behavior (for example, during holidays).

16.2 The HVAC Smart Start scheduler

ECO-HVAC > HVACSmart Start > Schedule



Button	Function
	Deletes all scheduling except the selected one, if any.
	Copies the settings from the day.
	Pastes the copied settings to the day.

16.3 Configuring HVAC Smart Start

16.3.1 Customize optimal conditioning for building areas

ECO-HVAC > HVACSmart Start > Configuration

1. Click **Add**: the fields are set to default values for a new customization.
2. Enter the custom name in the **Algorithm name** text box.
3. Specify the number of slave conditioners.
4. Click **Select** to choose devices and related variables.
5. Set all required parameters.
6. Click **Save**: the new algorithm is now listed in the **Algorithm list**.

 **Note:** Customizations that are not saved are automatically deleted when the function is closed.

16.3.2 Set optimal conditioning parameters

ECO-HVAC > HVACSmart Start > Configuration

1. Click **Select**: the **Variable list** appears.
2. Select **Devices** to view the list of all devices,
3. or select **Device models** to view the template list: the list of the selected device variables appears.
4. Select the variable associated with the required controls.
5. Click **Set**.
6. Click **Save**: you can now enable HVAC Smart Start to start whenever the set conditions occur (see "Scheduling HVAC Smart Start activities" on the next page).

 **Note:** You can edit its settings also when HVAC Smart Start is running.

16.4 Analyzing HVAC Smart Start trends

16.4.1 Introduction

You can view and analyze HVAC Smart Start log trends on a weekly, monthly or yearly basis, or read real-time trends and status.

16.4.2 How to display HVAC Smart Start data

- "Enabling/disabling HVAC Smart Start" below
- "Viewing current week information" below
- "Viewing trends" below

16.4.3 Enabling/disabling HVAC Smart Start

ECO-HVAC > HVACSmart Start > Dashboard

Click **Start** to enable the conditioning optimization function: the function starts when all set conditions occur.

Click **Stop** to disable the conditioning optimization function.

16.4.4 Viewing current week information

ECO-HVAC > HVACSmart Start > Dashboard

1. Select the desired algorithm.
2. Click **Refresh**: the page displays data on devices variables and HVAC Smart Start functioning and status for the current week.

16.4.5 Viewing trends

ECO-HVAC > HVACSmart Start > Graph

1. Select the desired algorithm.
2. Select the required period.
3. Click **Plot** to update data: the **Graph** section displays data on HVAC Smart Start activities in form of a graphic (**Chart**) and of a table (**Report**).

16.5 Scheduling HVAC Smart Start activities

16.5.1 Set the weekly calendar

ECO-HVAC > HVACSmart Start > Schedule

To add a time interval:

1. Click on a time line then click **Modify**.
2. Set the time interval then click **OK**.
3. Repeat for each day of the week: the HVAC Smart Start function is enabled for all the time intervals you set.

You can also modify a time interval by clicking and dragging it to adjust start/stop time and length.

To delete a time interval:

1. Click on a time interval then click **Modify**.
2. Click **Delete**: the time interval is removed from the schedule.

16.5.2 Creating exceptions

ECO-HVAC > HVACSmart Start > Schedule

Exceptions can be created and repeated with priority over the standard calendar. Other days with scheduled exceptions are displayed in the calendar.

1. In **Exceptions**, select the date when the scheduling will not apply.
2. Specify if the exception is occasional or will be repeated every year.

16.6 HVAC Smart Start: main data

16.6.1 HVAC Smart Start current week data

ECO-HVAC > HVACSmart Start > Dashboard

Data	Description
Time balance	Difference between the early climate control system off minutes (compared to building closing time) and early climate control system on minutes (compared to building opening time) calculated for the last seven days (for example, 5 h 7 min (green) = savings, -1h 20 min (red)= loss). The date of last reset is also indicated.
Estimated time ON	Time calculated when the climate control system turns on.
End free-cooling time	Time calculated when the climate control system to turn off. The icon  is displayed if the function is still calculating the estimated time.
°C	Indoor and outdoor temperature logged on each day when the climate control system turned on and off.
Minutes	<ul style="list-style-type: none"> Red: minutes running until the set point is reached at building opening time. Green: minutes before the climate control system turns off to keep the set point at building closing.

16.6.2 HVAC Smart Start trend data

ECO-HVAC > HVACSmart Start > Graph

Data	Description
Weekly	Displays data based on a week divided into days and with real-time values.
Monthly	Displays data based on a month divided into days and with real-time values.
Yearly	Displays data based on a year divided into weeks with average values.

Data	Description
Report	Minutes on before building opening, indoor and outdoor temperature when climate control system was turned on, minutes on after the building closed, indoor and outdoor temperature when the climate control system was turned off.
Chart	Two graphs: <ul style="list-style-type: none"> ▫ °C - indoor and outdoor temperature logged on each day when the climate control system was turned on and off. ▫ Minutes - minutes the climate control system was on before the building opened and after it closed.

16.6.3 Algorithm parameters

ECO-HVAC > HVACSmart Start > Configuration

Parameter	Description
MASTER - Unit status	Variable that manages master conditioner on/off status
MASTER - Unit ON/OFF command	Variable that manages master conditioner on/off control
Number of slaves	Number of slave conditioners (from 1 to 3)
SLAVE 1//2/3 – Unit status	Variable that manages slave conditioner 1, 2, 3 on/off status.
SLAVE 1/2/3 - Unit ON/OFF control	Variable that manages slave conditioner 1, 2, 3 on/off control
Internal temperature	Variable that reads internal temperature
External temperature	Variable that reads outside temperature
Temperature setpoint	Internal temperature set point (manually entered or selected by the variable)
Summer/Winter	Variable defining the current season. If set to Auto , the variable is not read. During summer internal temperature is decreased of 3 °C, during winter is increased of 3 °C.
Summer/Winter reverse logic	Apply inverse values to summer and winter variables.
START Temperature setpoint differential	Margin of tolerance (over or under) to the set point value when calculating pre-start (deadband).
STOP Temperature setpoint differential	Margin of tolerance (over or under) to the set point value when calculating pre-stop (deadband).
Minimum pre-start time	Minimum early climate control system on time (min) from building opening time (for example, for the climate control system to turn on minimum ten minutes early, enter 10).
Maximum pre-start time	Maximum early climate control system on time (min) from building opening time (for example, for the climate control system to turn on maximum two hours early, enter 120).
Minimum pre-stop time	Minimum early climate control system off time (min) from building closing time (for example, for the climate control system to turn off minimum ten minutes early, enter 10).
Maximum pre-stop time	Maximum early climate control system off time (min) from building closing time (for example, for the climate control system to turn off maximum two hours early, enter 120).

17. Plug-in: Energy

17.1 Energy: basic concepts

17.1.1 Operating principle

This module allows you to monitor electrical consumption and relevant costs, CO₂ emission and optimize consumption. It analyzes real-time consumption values in kW and kWh returned by field meters (power analyzers, energy meters or simply suitably programmed pCO devices) and links them to the relevant costs, even variable, by time slot and period.

17.1.2 Meter models and variables

Various energy meter models are supported and new one can be added by defining their relevant power and energy variables.

The following models are currently supported:

- ▮ CAREL emeter1
- ▮ CAREL emeter3
- ▮ Ducati energia smart più
- ▮ Gavazzi CPT-DIN Basic - WM14-DIN Basic - WM14-96 Basic
- ▮ IME ContoD4
- ▮ IME Nemo96HD
- ▮ IME Nemod4

and all programmable devices that have output variables expressed in Kw and Kwh (for example, pLoads).

17.1.3 Meter groups

To make the analysis more precise and to indicate any areas where consumption is optimized, *groups* of meters that can represent homogeneous utilities (for example, refrigerator counters) or utilities found in a certain site area (for example, warehouses) can be created.

 **Note:** For the standard boss version, up to 50 groups can be set in a site and each group can include up to 20 meters. This for up to a total of 200 meters. For the boss mini version, up to 10 groups can be set and each group can include up to 5 meters. The maximum total number of meters is then 25 meters.

17.1.4 Consumption by utilities not connected to meters

To calculate the consumption by utilities not connected to meters, one or more site meters can be connected upstream of the entire plant. These site meters must be linked to the Global group and therefore measure the total plant consumption. Energy will calculate the consumption by utilities not connected to the plant by subtracting all groups' consumption from the Global group consumption.

17.1.5 Fixed cost/time slots

Energy consumption can be monitored for a fixed cost (**Fixed cost** settings) or for a cost category by time slot (**Time Slot** settings).

When switching from fixed cost to time slot settings and vice versa, all data collected until that time is saved but only current settings data can be viewed and updated.

For time slot monitoring, the maximum settings are:

- ▮ eight cost categories per kWh
- ▮ 12 slots with cost categories linked to each hour of the day and day, time or date exceptions

17.1.6 Consumption monitoring

The **Dashboard** page allows you to monitor the following values:

- ▮ current and previous months' consumption (kWh)
- ▮ current and previous weeks' consumption (kWh)
- ▮ the cost category and relevant active costs (if monitoring is set for time slots)
- ▮ the amount of CO₂ emitted in the current month and week (Kg per kWh)

17.1.7 Consumption data analysis

The **Graph** page displays consumption statistics and time trends for a given period. The available values are at the plant, group or single meter levels:

- ▮ current year consumption or previous year consumption, with monthly details
- ▮ monthly consumption in the current year, with daily details
- ▮ weekly consumption in the current year with daily details

17.1.8 Consumption data export

Log data used for statistics can be exported in .csv format to be imported, for example, in an Excel file. Data can be on the entire plant (as the sum of set groups), a single meter group or even single meter. The period can be set by the user within the limits shown in the **Dashboard** page. The detail level can be monthly, daily or hourly.

17.1.9 Programming utility start/stop

The consumption analysis will let the user find consumption that can be reduced by turning off unused utilities (for example, warehouse lights).

To do this, connect a control meter upstream of each group that can turn off power.

Start/stop is programmed using the plant calendar (see "Setting up the plant calendar" on page 21).

17.2 Setting up Energy meters

17.2.1 Checking existing energy meters configuration

Add-ons > Energy > Metermodels

The table lists all configured energy meters and the selected power and active energy variables.

17.2.2 Modifying energy meters configuration

Add-ons > Energy > Metermodels

1. Select the desired energy meter then click **Modify**.
2. Make all the changes you need then click **Save**.

17.2.3 Adding an energy meter

Add-ons > Energy > Metermodels

1. Stop Energy (see "Stopping Energy" on the next page).
2. Click **Add**.
3. Enter a name for the new energy meter.
4. Select the desired device model, then assign power and active energy variables to be monitored.
5. Click **Save**: the new energy meter is now listed in the table.

To delete an energy meter, select it in the table then click **Delete**.

17.2.4 Configuring fixed cost monitoring

Add-ons > Energy > Configuration

1. Enter data for report heading and footer.
2. Adjust currency and CO₂ emission parameters, if needed.
3. Select **Fixed**.
4. Set cost per kWh for cost calculation.

17.2.5 Configuring time slot monitoring

Add-ons > Energy > Configuration

1. Enter data for report heading and footer.
2. Adjust currency and CO₂ emission parameters, if needed.
3. Select **Time slot**.
4. In **Time slot cost** enter the relevant cost per kWh for one or more time slots (**T1** to **T8**).
5. In **Time period** set start and end of the time period (up to 12 different time periods).
6. Assign a time slot to all the hours of all the days of the typical week for each time period.

To	Then
Assign the same time slot to an entire day	Click  in the day column and select the desired time slot.
Assign the same time slot to an entire week	Click  in the hours column and select the desired time slot.
Copy the time slot assignment from a day to another	<ol style="list-style-type: none"> 1. Click  in the source day column and select . 2. Click  in the destination day column and select .
Copy the time slot assignment from a week to another	<ol style="list-style-type: none"> 1. Click  in the hours column of the source week and select . 2. Select the destination time period. 3. Click  in the hours column of the source week and select .

7. In **Exceptions** indicate time slots that are to be applied in exceptional days.
8. In **Exception days** select the days when the exceptions defined above are applied.

17.2.6 Creating and managing meter groups

Add-ons > Energy > Groups

To create a new group:

1. Click **Add** and enter a name for the new group.
2. Select the meter model and add all the desired meters to the group.

To modify a group:

1. Select it in the table and click **Modify**.
2. Enable or disable the group.
3. Make the changes you need then click **Save**.

⚠ Important: Save previously recorded data before you remove and replace a meter.

Disable the entire group and not just a single meter during maintenance. Incorrect values read from a meter during maintenance could invalidate data for the entire group.

17.3 Monitoring consumption data

17.3.1 Introduction

From the dashboard page of this module you can view consumption and costs information of each group of meters and their percentage of total site consumption.

In order to start monitoring from zero in terms of consumption and costs you need to reset group reading. This operation does not physically delete meter counters but only the data collected by Energy.

17.3.2 How to monitor consumption

- ▮ "Stopping Energy" below
- ▮ "Starting Energy" below
- ▮ "Clearing meter data" on the facing page

17.3.3 Stopping Energy

Add-ons > Energy > Dashboard

⚠ Important: Stop Energy before you create or delete a meter group.

Click **Stop**: Energy pauses statistic analysis.

17.3.4 Starting Energy

Add-ons > Energy > Dashboard

Click **Start**: Energy analyzes data read in real-time by boss and displays them.

⚠ Important: If a meter was just added to a group, it may not have recorded values yet. Wait several minutes (for example, 15 minutes) to have a good number of valid readings.

17.3.5 Clearing meter data

Add-ons > Energy > Dashboard

Select the meters or groups to be cleared and set the **Reset** column to **On**.

If you reset a group, all related meters are reset.

To reset all groups at once, set to **On** the button on the **Groups total** row.

17.4 Analyzing consumption data

17.4.1 Analyzing consumption data based on fixed costs

Add-ons > Energy > Graph

1. Select the site, group or single meter.
2. Select **Weekly** or **Monthly** to display total consumption for each cost category with daily detail.
3. Select **Yearly** to display total consumption for each cost category with monthly detail.
4. Select the time interval.
5. Click **Group** to display data on percent consumption, power, energy, costs and corresponding CO₂.
6. Click **kW** to display data on consumption average in kW.
7. Click **kWh** to display data on consumption in kWh.

17.4.2 Analyzing consumption data based on time slots

Add-ons > Energy > Graph

1. Select the site, group or single meter.
2. Select **Weekly** or **Monthly** to display total consumption for each cost category with daily detail.
3. Select **Yearly** to display total consumption for each cost category with monthly detail.
4. Select the time interval.
5. Click **Group** to display data on percent consumption, power, energy, costs and corresponding CO₂.
6. Click **kW** to display data on consumption average in kW.
7. Click **kWh** to display data on consumption in kWh.
8. Click **Time slot** to display data on percent consumption, power, energy, costs and corresponding CO₂ for each time slot.
9. Click **kWh/Time slot** to display data on consumption average in kW for each time slot.
10. Click **Time slot/kWh** to display data on consumption in kWh for each time slot.

17.4.3 Enlarging or printing graphs

Add-ons > Energy > Graph

Pie and line graphs can be enlarged and printed.

- ▮ Click **Preview** to enlarge the graph.
- ▮ Click **Print** to print the displayed graph or all graphs.
- ▮ Click **PDF** to save the displayed graph as a PDF file.

17.4.4 Exporting consumption data to a .csv file

Add-ons > Energy > Export

1. Select start and end date for the time interval.
2. In **Step**, select the detail level (hour, day, month).
3. Set to **On** the consumption data you want to export.
4. Select the analysis level (site, group).
5. If you choose to analyze data at group level, select a group.
6. Click **Export**: a .csv file is created and can be imported in Excel.

18. Plug-in: Dew Point Broadcast

18.1 Dew Point Broadcast: basic concepts

18.1.1 Introduction

This module lets you update the values of three to six variables in slave devices with values coming from a master device. Each master and slaves association is called a *group*. A master may be included in only one group.

18.1.2 Variables preset for broadcast

The following three default variables are preset for all CAREL templates with master-slave architecture:

- ▮ **Tamb** (room temperature)
- ▮ **rH%** (percent humidity)
- ▮ **Tdew** (dew point temperature)

Variables limits and safety values can be customized. The default configuration already differentiates between:

- ▮ templates only used as masters (for which only source variables are indicated)
- ▮ templates only used as slaves (for which only target variables are indicated)
- ▮ templates used both as master and slave (for which source and target variables are indicated)

18.1.3 New template configuration

To radically change a template configuration, for example, changing variables or using extra variables for special applications, you must indicate:

- ▮ source master variables (if the template is only used as a master or as master and slave)
- ▮ target slave variables (if the template is only used as a slave or as master and slave)
- ▮ any additional variables to be monitored
- ▮ any variables supporting those devices that do not recognize repeated writes of the same value and, therefore, could signal an erroneous offline alarm
- ▮ extra variables (optional)

18.1.4 Data broadcast principles

After setting which devices are masters and which are slaves, manually run broadcast. The source variable value can be cyclically propagated.

This happens if each source variable has:

- ▮ a value in the indicated range
- ▮ valid values (for example, the master device is online and on)
- ▮ no active alarm

 **Note:** If the source value exceeds the set limits, the safety value is sent to the target variables.

18.1.5 Heartbeat management

Some programmable devices base their online status on status changes of variables dedicated to the supervisor. If the supervisor repeatedly writes the same value in the variable, the device does not intercept writing and erroneously signals an offline status.

With heartbeat on a digital variable and, upon request, even on an analog variable, writing from master to its slaves occurs at regular intervals to indicate that the supervisor is on.

18.2 Dew Point broadcast procedures

18.2.1 Introduction

With this procedure you choose which devices are used as masters and define control values for the variables to be propagated. You set the rules for variable propagation, set the interval between updates and start the function.

18.2.2 How to work with Dew Point broadcast

1. "Setting up master devices" on the next page
2. "Setting up slave devices" on the next page
3. "Setting custom broadcast rules for masters and slaves" on the next page
4. "Checking broadcast" on the next page

18.2.3 Setting up master devices

Add-ons > Dew Point Broadcast > MASTER selection

1. Set to **On** the devices that have master function.
2. If necessary adjust the three safety values.
3. Click **Save**.

18.2.4 Setting up slave devices

Add-ons > Dew Point Broadcast > SLAVE association

1. Indicate to which group each slave device belongs to.
2. To exclude a slave device from propagation, set it to **N/A**.
3. Enable the groups.

Disable a group when maintenance on a master device is performed.

4. Set the slave update interval.
5. Click **Save**: the Dew Point Broadcast standard function is now running.

 **Note:** A saved setup can be used the next time line cables are connected.

18.2.5 Setting custom broadcast rules for masters and slaves

Add-ons > Dew Point Broadcast > Models config.

1. For the desired device type indicate master and slave settings.
2. Define control variables.
3. Select the variable to be used as heartbeat and its safe value.
4. Click **Save**.

18.2.6 Checking broadcast

Add-ons > Dew Point Broadcast > Dashboard

A summary on the data updated on the slaves is displayed, click on a group to display detailed information.

18.3 Creating templates

18.3.1 Introduction

With this procedure you can customize the variable propagation modes from a master to its slaves.

 **Important:** This procedure can only be used to create templates that support master-slave architecture.

18.3.2 How to create a template

18.3.3 Setting up a template for dew point broadcast

Add-ons > Dew Point Broadcast > Models config.

1. Select a master-slave type template (for example, MPXPRO): the list of required settings is displayed.
2. If the template is used as a master, indicate the three source variables.
3. If the template is used as a slave, indicate the target variables.
4. If required, indicate the variables to be monitored.
5. Click **Save**.

18.3.4 Setting up a template to propagate six custom variables

Add-ons > Dew Point Broadcast > Models config.

1. Enable extra variables.
2. Click **Save**.
3. Select a master-slave type template (for example, MPXPRO): the list of required settings is displayed.
4. If the template is used as a master, indicate the three source variables.
5. If the template is used as a slave, indicate the target variables.
6. If required, indicate the variables to be monitored.
7. Select and set the three extra source and target variables.
8. Click **Save**.

18.3.5 Setting up a template for heartbeat management

Add-ons > Dew Point Broadcast > Models config.

1. Indicate a digital variable to which the master sends the value "1" at each propagation.
2. Indicate, if necessary, an analog variable and the value to be written at each propagation.
3. Click **Save**.

 **Note:** If necessary, reset the variable in the slave devices.

18.4 Dew Point Broadcast: main data

Add-ons > Dew Point Broadcast > Models config.

18.4.1 Master setting variables

Field	Description
Variables to read if the model acts as MASTER	Variable name (for example, Probe B2).
Alarm variables	Linked alarm variable (for example, Probe B2 fault).
Min Max	Variable validity interval. If the value exceeds the limits, it is not propagated.
Safe	Safety value, to be propagated if the source value exceeds the limits.

18.4.2 Control variables

Field	Description
<control variable>	Variable name (for example, Glass temperature).

18.4.3 Slave setting variables

Field	Description
<variable to be written>	Variable name (for example, Probe B2).

19. Plug-in: Safe Restore

19.1 Safe Restore: basic concepts

19.1.1 Introduction

The Safe Restore function allows you to put slave devices in safe conditions in the event of master alarm or offline. For example, in the event of a refrigerant leak alarm on a master, you may need to close the valves connected to slaves in a certain area.

19.1.2 Operating principle

Safe Restore checks the master variable value (typically an alarm) on master devices and whether they are offline. If the master variable and set value match, Safe Restore sets safe values (*Safe mode*) in the slave device variables.

If the alarm conditions are cleared in the master devices, it sets other values on the slave devices (*Running mode*).

Safe Restore lets you associate slave devices into *groups* that can represent homogeneous utility functions (for example, refrigerator counters) or features (for example, average temperatures).

 **Note:** Safe Restore displays all master devices, slave devices and preset site variables that can be monitored.

19.1.3 Master status and actions on slaves

Safe Restore indicates the status of each monitored master and consequently applies the programmed settings.

Master devices can take one of the following status.

Status	Description	Action on slave
Off	Master is off.	Slaves are not monitored.
Safe	An alarm was triggered on the master.	Safe Restore propagates safe values on the connected slaves.
Offline	Master is not running or the line is down. Safe Restore cannot communicate with the master.	Safe Restore propagates safe values on the connected slaves.
Running	Master was reset after an alarm.	Safe Restore sends running values to the connected slaves (<i>Running</i>)

19.1.4 Status switches in the event of an alarm

When an alarm occurs, groups are put into safety conditions. When the alarm is cleared, the groups are brought back to running status with a delay not to overload the system.

19.1.5 Status switches in offline conditions

A second backup line can be connected between the supervisor and a master. In the event of connection error on the first line, you can check whether the connection is up on the second line. This lets you define whether a line fault or a master fault occurred.

To establish whether the master device is offline, you can also set a condition on another device (on the physical primary line or other physical line). If the master goes offline you can select whether the slave devices should be put in safe conditions (*Safe*), or if the running value should be sent to them (*Running*) or if devices should be left in the status prior to offline condition (*Current*).

19.2 Safe Restore procedures

1. "Enabling the masters to be monitored" on the next page
2. "Creating slave groups" on the next page
3. "Adding devices to a slave group" on the next page
4. "Linking one or more slave groups to each master" on the next page
5. "Setting a backup supervision line to determine offline status" on the next page
6. "Setting safe parameters and the required status in the event of offline" on the next page
7. "Viewing monitored master status" on the next page
8. "Starting/stopping the Safe Restore function" on the next page
9. "Importing/exporting variables" on page 59

19.2.1 Enabling the masters to be monitored

Add-on > Safe Restore > Racks

1. Enable the masters to be monitored.
2. Click **Save**.

19.2.2 Creating slave groups

Add-on > Safe Restore > Groups

1. Click **Add** to create a new group of slave devices.
2. Assign a name to the group and add all the desired slave devices to it.
3. Click **Save**.

19.2.3 Adding devices to a slave group

Add-on > Safe Restore > Groups

1. Select the group to which you want to add a slave device.
2. Click **Modify**, then add the new devices.
3. Click **Save**.

19.2.4 Linking one or more slave groups to each master

Add-on > Safe Restore > Association

1. Select a master, then click **Edit**.
2. Associate one or more slave groups to it.
3. Click **Save**.
4. Repeat from step 1 for all masters.

19.2.5 Setting a backup supervision line to determine offline status

Add-on > Safe Restore > Backup cfg.

1. Select a master.
2. Click **Edit**, the offline backup condition list is displayed.
3. Select **Offline** or select a variable that signals offline status and set the value to be compared.
4. Click **Save**.

19.2.6 Setting safe parameters and the required status in the event of offline

Add-on > Safe Restore > Cfg. Devices

1. In **Algorithm settings** set:
 - the time after which Safe Restore should consider a master offline
 - the delay between setting running values to each group
2. In **Action to be performed when the master device is offline** select the type of values to be sent to slaves in the event of master offline.
3. For each master variable select the value that, if read, causes safe values to be sent to slaves.
4. For each master variable set the safe value.
5. For each slave device set the safe and running values for each variable.
6. Click **Save**.

19.2.7 Viewing monitored master status

Add-on > Safe Restore > Dashboard

The status of the monitored master-slave groups is displayed.

19.2.8 Starting/stopping the Safe Restore function

Add-on > Safe Restore > Dashboard

Click **Start** to start the monitoring on the master-slave groups.

Click **Stop** to stop monitoring.

Click **Quick running** to force the function in safe or unknown status to start without waiting the set timeout.

19.2.9 Importing/exporting variables

Add-on > Safe Restore > Racks

⚠ Important: This task is reserved to expert users.

Click **Export** to create an .XML file containing all the variables used for standard devices.

Click **Import** to load an .XML file containing variables defined for customized devices.

20. Plug-in: Floating Suction Pressure

20.1 Floating Suction Pressure optimization: basic concepts

20.1.1 Operating principle

The Floating Suction Pressure plug in allows you to reduce showcase energy consumption. To do this, it periodically analyzes showcase operations connected to the enabled refrigeration racks and automatically changes the rack set point based on:

- ▮ percent work values (duty cycle) calculated for each showcase (**Floating suction** algorithm)
- ▮ showcase status at sampling (**Smooth lines** algorithm)

This behavior minimizes the delivery of refrigerant liquid and consequently reduces power consumption in the medium and long term. Floating Suction Pressure only involves the devices that manage showcases or refrigeration units and, for these devices only, displays pressure control parameters. The parameters of the two algorithms are already set in the factory but can be customized.

20.1.2 Floating Suction details analysis

Floating suction details indicate which showcase requires adjustment.

For example, if all rack showcases have duty cycles under the maximum duty cycle set for the showcase (or are in regulation request conditions for less than the set maximum), the algorithm lowers the rack set point value.

If at least one showcase has a duty cycle over the set maximum, on the other hand, the algorithm increases the rack set point value.

20.1.3 Smooth lines algorithm operating principle

This algorithm compares the amount of samples acquired in a certain status (for example, yellow led = warning) with set parameters indicating optimal operation (for example, maximum three yellow LEDs in a sample). Based on the comparison, the rack set point is adjusted as follows:

When at last sample [T]...	The rackset point it...
All LEDs are green	reduced
Number of yellow or orange LEDs < Maximum set number	maintained
Number of yellow or orange LEDs >= Maximum set number	
Number of red LEDs < Maximum set number	increased
Number of red LEDs >= Maximum set number	
At least one LED N/A	reduced

20.1.4 When to change algorithm parameters

In some cases, rack parameters must be changed if, for example, there are several showcases in a rack and the maximum number of offline showcases needs to be increased. Alternatively, if the installation has network problems, the maximum offline time may need to be increased.

If, looking at the data in the **Details** page and the recorded duty cycle values are higher than the set duty cycle maximum, single showcase operations must be checked and the set duty cycle maximum may need to be increased.

20.2 The Floating Suction Pressure monitoring

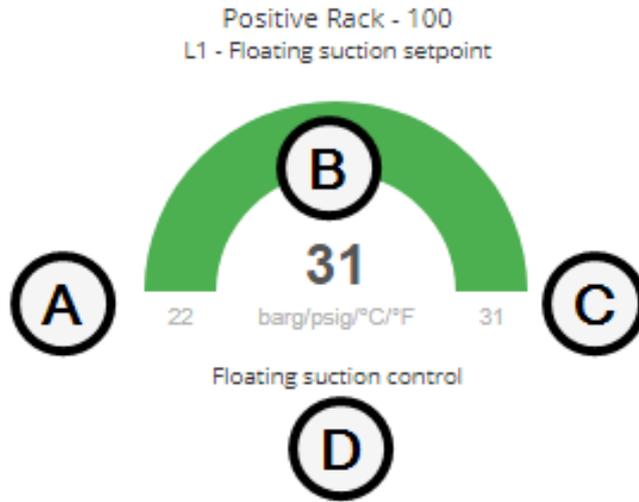
Add-on > Floating Suction Pressure > Main

For each enabled rack the following monitoring information is displayed.

Floating Suction Pressure

- Main
- Association
- Racks

Plugin status: FSP - Suction pressure optimization running



Element	Description
A	Minimum value available for the set point variable on the rack
B	Current rack set point variable value. The graph is green if the current value is higher than the minimum value.
C	Maximum value available for the set point variable on the rack
D	Running algorithm

20.3 Configuring Floating Suction Pressure

20.3.1 What you can do

The Floating Suction Pressure plug in is set with standard parameters that manage its operations, however you can modify:

- some of the compressor rack parameters,
- maximum duty cycle of a showcase.

If the Smooth lines algorithm is enabled, you can also modify:

- time interval between samples,
- number of altered states (yellow, orange, red) when the plug-in intervenes.

The custom parameters are always saved in the database, even after disabling the compressor rack.

⚠ Important: To make changes operational, restart the plug in after you modify rack or showcase parameters.

20.3.2 How to configure Floating Suction Pressure monitoring

- "Modifying set points" on the next page
- "Enabling the racks" on the next page
- "Associating devices to a rack" on the next page
- "Enabling Smooth line control" on the next page
- "Importing/exporting variables" on the next page

20.3.3 Modifying set points

Add-on > Floating Suction Pressure > Main

1. Click on the desired rack: the rack detail page is displayed.
2. Click **Parameters**, then modify any set point that needs adjustment.
3. Click **Save**.

20.3.4 Enabling the racks

Add-on > Floating Suction Pressure > Racks

1. Enable all the racks you want to be optimized by the plug in.
2. Click **Save**.

 **Note:** A maximum of eight racks can be enabled.

20.3.5 Associating devices to a rack

Add-on > Floating Suction Pressure > Association

1. Select the rack you want to configure then click **Modify**: the association page is displayed.
2. Add all the devices that you want to monitor to the **Rack devices** column, then click **Save**.

 **Note:** Only showcases compatible with the plug in are listed.

20.3.6 Enabling Smooth line control

Add-on > Floating Suction Pressure > Association

1. Select the rack you want to configure then click **Modify**: the association page is displayed.
2. Make sure all showcases that you want to monitor are linked to the rack: all devices in the **Rack devices** column are linked.
3. Enable Smooth line control, then click **Save**.

20.3.7 Importing/exporting variables

Add-on > Floating Suction Pressure > Racks

 **Important:** This task is reserved to expert users.

Click **Export** to create an .XML file containing all the variables used for standard devices.

Click **Import** to load an .XML file containing variables defined for customized devices.

20.4 Monitoring Floating Suction Pressure

20.4.1 Viewing set point trends

Add-on > Floating Suction Pressure > Main

The trend of the set point on each enabled rack is displayed in a graph with an indication of the control algorithm: **Floating suction** or **Smooth lines**.

20.4.2 Viewing rack details

Add-on > Floating Suction Pressure > Main

Click on a graph to display detail information on racks, devices, set points, duty cycles and sampling.

20.4.3 Resetting duty cycles

Add-on > Floating Suction Pressure > Main

1. Click on the Floating Suction control graph of the desired rack: the detail page for the rack is displayed.
2. In the **Device** section, click **RESET** for each duty cycle you want to reset.

Click the **RESET** button at the top of the table to reset all duty cycles at once.

20.4.4 Resetting counters

Add-on > Floating Suction Pressure > Main

1. Click on the Smooth Line control graph of the desired rack: the detail page for the rack is displayed.
2. In the **Device** section, click **RESET** to reset all counters and delete completed sampling data: all LEDs turn to gray.

20.4.5 Starting the Floating Suction Pressure control

Add-on > Floating Suction Pressure > Main

Click **Start**:

- the first duty cycle is calculated for each showcase,
- if the Smooth lines algorithm is enabled, the first sample is taken to check the status of each showcase.

⚠ Important: To make any change operational, you need to stop and restart the plug in.

20.5 Floating Suction Pressure: main data

20.5.1 Floating suction algorithm parameters

Add-ons > Floating Suction Pressure > Rack detail

Field	Description	Default
Current set point	Current value of the set point variable on the rack.	-
Minimum set point	Minimum value available for the set point variable.	-
Maximum set point	Maximum value available for the set point variable.	-
Gradient	It sets how the set point variable value will be increased or decreased following duty cycle calculations on showcases.	-
Time window for DC calculation	Indicates how long the data corresponding to the solenoid on each individual showcase is saved in the memory. The duty cycle will be calculated based on these data; once the window is full, each new value will overwrite the oldest value. The value may vary from 10 to 180 minutes.	12 minutes
Frequency for DC calculation	Indicates how often the duty cycle must be calculated for rack showcases and, consequently, the set point changed if necessary. The value may vary from 10 to 180 minutes.	30 minutes
Maximum offline time	Maximum percentage of failed acquisitions for each showcase associated with the rack. If this percentage is exceeded, the showcase is considered offline.	30%
Maximum number of offline devices	If when the duty cycle is calculated the showcases that are offline exceed this number, the set point is not changed on the rack.	3

20.5.2 Smooth lines algorithm parameters

Add-ons > Floating Suction Pressure > Rack detail

Field	Description	Default
Current set point	Current value of the set point variable on the rack	-
Gradient	Sets how much the set point will be increased or decreased based on the configuration.	-
Last sampling	Time of the last completed sample.	-
Maximum critical devices (orange)	Number of admitted orange LEDs in a sample.	-
Maximum overloaded devices (red)	Number of admitted red LEDs in a sample.	-
Maximum set point	Maximum value available for the set point variable.	-

Field	Description	Default
Maximum warning devices (yellow)	Number of admitted yellow LEDs in a sample.	-
Minimum set point	Minimum value available for the set point variable.	-
Number of configured devices	Number of showcases linked to the rack.	-
Sample period	Time interval between two samples.	10 minutes
Samples number	Minimum number of samples required to show the showcase and rack status trend.	3
Time window	Minimum time period to show the showcase and rack status trend.	30 minutes

20.5.3 Rack and linked showcase status

Add-ons > Floating Suction Pressure > Rack detail

Led color	Rack or showcase status
 (green)	Showcase <i>OK</i> . The showcase is correctly operating from the Smooth lines algorithm standpoint: the rack set point can be increased.
 (yellow)	First warning: the showcase has switched from <i>OK</i> (green led) to <i>NOTOK</i> .
 (orange)	Second warning: the showcase remains in <i>NOTOK</i> status for 2 consecutive samples (the led was yellow at the last sample).
 (red)	Third warning: the showcase remains in <i>NOTOK</i> status for 3 consecutive samples (the led was orange at the last sample).
 (black)	Offline: the plug-in cannot read the showcase or rack set point value.
N/A	<p>The showcase does not support the Smooth lines algorithm: the plug-in cannot read the showcase set point variable value.</p> <p> Note: If this condition persists, the showcase should be eliminated from the group. In fact, the rack is forced to constantly work in safety conditions, at minimum set point, when the Smooth lines algorithm is not supported.</p>

21. Plug-in: Parameter Control

21.1 Parameter Control: basic concepts

21.1.1 Introduction

This plug in allows you to register and notify unauthorized critical parameter changes. Critical parameters are typically used to optimize the system (for example, reduce energy consumption). These parameters are rarely changed and it may be important for the site manager to be notified of any unauthorized changes.

Changes may be made by personnel using field device keyboards or directly via boss. Each single change is recorded in a log. Notifications may occur for a single change (for each parameter changed) or for more changes (one for all parameters changed within a set control interval).

21.1.2 What you can do

The user in charge monitors changes and for each unauthorized change may:

- ▮ restore default values (values compared to values read from the field at control),
- ▮ leave values changed (to become default values for next control).

An history table displays the values routinely read from the field. The following registrations appear in the log:

- ▮ changes to single parameters due to unauthorized changes,
- ▮ changes to single parameters due to restored default values,
- ▮ default value readings.

21.1.3 Parameter Control status

Parameter Control can be in one of the following status.

Status	Description	Purpose
Disabled	Parameters are not controlled, changes are not recorded and no notification is sent. No warning is displayed.	Permanently exclude parameter control operations.
Enabled but stopped	Parameters are not controlled, changes are not recorded and no notification is sent.	Temporarily exclude parameter control operations, for example, during maintenance.
Enabled, started with notifications disabled	Parameters are controlled and changes are recorded, but no notification is sent. No warning is displayed.	Temporarily exclude notifications, for example, for repeated faults in repair.
Enabled, started, with notifications enabled	Parameters are controlled, changes are recorded, and notification is sent.	Parameter control operating regime.

21.2 Configuring Parameter Control

21.2.1 Introduction

To work with Parameter Control you need to define which parameters are to be considered critical and therefore monitored. You also need to indicate which users will be notified of any changes and which user profiles can make changes that will not generate a notification.

You also need to define *default values* for critical parameters that can be compared with the values read cyclically.

 **Note:** If there is no default value for a parameter, the first reading is used as default for all subsequent readings.

Values read from the field are displayed in the **Dashboard**, each registration overwrites previous default values.

21.2.2 How to configure Parameter Control

1. "Setting the list of critical parameters" on the next page
2. "Setting check frequency" on the next page
3. "Setting notification modes" on the next page
4. "Enabling/disabling notification" on the next page
5. "Reading default values" on the next page

21.2.3 Setting the list of critical parameters

Add-ons > Parameter Control > Parameters

1. To set parameters for a single device, click **Devices** then select a device from the list: all variables that can be monitored appear in the variable list.
2. To select parameters for all devices of a certain type, click **Device models** : all devices of the selected model are displayed and all variables that can be monitored appear in the variable list.
3. Select the desired device then click **OK**.
4. Click **+** to add variables to the list of monitored variables.
5. Click **Save** to save the list.

To select adjacent variables, hold down the SHIFT key and select the first and last variables in the selection.

To select several variables, hold down the CTRL key. To delete a variable, click **Delete**.

21.2.4 Setting check frequency

Add-ons > Parameter Control > Notifications

1. Select the appropriate interval between checks.
2. Click **Save** to save the setting.

21.2.5 Setting notification modes

Add-ons > Parametercontrol > Notifications

1. Enter a name for the device keyboard.
2. Specify the type of notification, one for each change or a cumulative one for all changes in the interval.

 **Note:** Registrations always concern a single variable.

3. Click **+** to add one or more addressees to the notification list.
4. Click **+** to add one or more boss user profiles to the list of authorized profiles.

 **Important:** Changes made by these profile users do not generate any registration or notification.

5. Click **Save** to save the settings.

21.2.6 Enabling/disabling notification

Add-ons > Parametercontrol > Notifications

1. Set **Enable notifications** to **On** or **Off**.
2. Click **Save** to save the settings.

 **Important:** Enabling only effects notifications. To temporarily disable parameter control, for example during maintenance, you must stop it (see "Working with Parameter Control" below). A permanent warning is displayed to remind Service that parameter control is disabled.

21.2.7 Reading default values

Add-ons > Parameter Control > Dashboard

 **Note:** Stop Parameter Control to perform the first reading. Later readings can be done with the function running.

1. Click **Snapshot**: the values read from the field are saved as *default values*.
2. A **Snapshot** registration is added to the **History** page.

21.3 Working with Parameter Control

21.3.1 Introduction

Once set up, Parameter Control must be enabled and started. When it is running, field values are read at the end of the interval and the **Dashboard** page is updated. Any unauthorized change to the parameters or default values restoration is recorded in the **History** page. All default value readings are also recorded.

21.3.2 How to work with Parameter Control

- ▮ "Starting Parameter Control" on the facing page
- ▮ "Stopping Parameter Control" on the facing page
- ▮ "Monitoring field values" on the facing page
- ▮ "Monitoring changes" on the facing page
- ▮ "Restoring default values" on the facing page

21.3.3 Starting Parameter Control

Add-ons > Parameter Control > Dashboard

1. Set **Enable Parameters Control plugin** to **On**.
2. Click **Start**: Parameter Control reads field data and updates the list with current values.

The control is repeated at the end of the set checking interval.

Note: If there is no default value for a parameter, the first reading is used as default reading for all subsequent readings.

21.3.4 Stopping Parameter Control

Add-ons > Parameter Control > Dashboard

Click **Stop**: Parameter Control stops its cyclic checks.

21.3.5 Monitoring field values

Add-ons > Parameter Control > Dashboard

For each parameter read the current value.

21.3.6 Monitoring changes

Add-ons > Parameter Control > History

Select the device for which to display changes.

21.3.7 Restoring default values

Add-ons > Parameter Control > History

1. Select the device for which to restore default values.
2. Click for the value to be restored to its default value: the current value is overwritten, a new registration is recorded, and the icon disappears.

Note: No notification is generated when default values are restored.

21.4 Parameter Control: main data

Add-ons > Parameter Control > History

Date time	Field value read time
Username	Unauthorized boss user or generic name assigned to the device keyboard during parameter control setup. For default value readings, the name of the user who requested reading is listed.
Type	Default: default value reading registration. Change: unauthorized change registration. Snapshot: registration of default values.
Device	Device name
Variable	Variable name
Initial value	Initial default value or value previously changed and not restored.
Final value	Current value read from the field
Restore	Empty cell in the Snapshot registration. to restore the initial value for a value that was changed.

22. Plug-in: performance indicators

22.1 Performance indicators: basic concepts

22.1.1 Introduction

Performance indicators allow you to check device group performance using screen reports or reports generated by the user in Excel format. Using these reports you can verify the effective device regulation capacity, indicating:

- ▮ when variable data is over and under a limit,
- ▮ when a value remains under the minimum limit or over the maximum limit for an excessive period of time.

Calculations are made considering the period set by the user that can take into account any defrost or non regulation periods (for example, when the device is off).

22.1.2 Groups of devices

Devices can be grouped. The variables to be checked are set for each device template.

Groups devices whose variables are to be checked can share the same minimum and maximum limits. A device can belong to several groups and can therefore have different variables monitored in different groups.

22.2 Configuring performance indicators

22.2.1 Introduction

For each device template you need to select:

- ▮ the variable to be checked
- ▮ the defrost variable (optional)
- ▮ the regulation variable (optional)

For the variable to be checked, set the defaults for optimal value limits and value duration limits above or under limits.

22.2.2 How to configure performance indicators

1. "Creating a group of devices" below
2. "Setting up group variables" below

22.2.3 Creating a group of devices

Add-ons > KPI > Groups creation

1. Name the group (for example, low temperature banks). The group name is the same for all languages.
2. In the **Devices** section, in the **GR<groupNumber>** column, select the devices to be checked for a group.
3. To exclude a device from all groups, uncheck all checked boxes.
4. Click **Save** to confirm: the newly created group is now listed in the **Groups config** page.

22.2.4 Setting up group variables

Add-ons > KPI > Groups config.

For each group, indicate variables for each device template and the limits.

22.3 Generating performance reports

22.3.1 Introduction

Reports allow you to optimize maintenance, highlighting devices whose performance values are out of set optimal work ranges.

They are set to display checked variable performance indicators in the set analysis period, and, if requested, to ignore defrost and non regulation periods.

Note: Defrost and non regulation periods can only be excluded from reports if the relevant variables (defrost start/end, regulation start/end) were indicated in the report setup.

22.3.2 Generating a report

Add-ons > KPI > Dashboard

1. Click the group for which you want to generate a report: the report page is displayed.
2. Enter period data, thresholds and any relevant option.
3. Exclude, if necessary, defrost and non regulation periods.
4. Click **Compute**: the report is displayed and it highlights all out of range values.
5. Click **Export** to convert report data in Excel format (.csv).

22.4 Performance indicators: main data

22.4.1 Report fields

Add-ons > KPI > Dashboard

Field	Description
Field	Description
Total time	Analysis period actually used for calculations. Total time = Period - (Sum of defrost time) - (Sum of non regulation time).
Time under	Variable duration under the Min limit.
% time under	% duration under the limit. The field has a blue background if the value is under the Min % limit.
Time over	Variable duration over the Max limit.
% time over	% duration over the limit. The field has a red background if the value is over the Max % limit.
Average	Variable average calculated over Total time .
Time defrost	Total defrost period duration.
% defrost time	% defrost periods of Total time .
ON time	Total regulation period duration.
% duty cycle	% regulation periods of Total time . % duty cycle = ON time / (Total time - Time defrost)

23. References

23.1 Technical support

23.1.1 Useful contacts

Send your requests for licenses, technical support and after sales to pvcustomer@carel.com

23.1.2 Knowledge base

Find the dedicated section in the **KSA** (knowledge sharing area) within the boss section of the **Supervisory** community: <http://ksa.carel.com>.

23.1.3 What's new

Our documentation is continually updated with new topics or corrections or clarifications to existing content. This change log lists the major updates.

2016, May - sw version 1.0.0

New topics	Updated topics
First publication	-

2018, April- sw version 1.2.0

New topics	Updated topics
"Plug-in: Dew Point Broadcast" on page 54 "Plug-in: Energy" on page 50 "Plug-in: Floating Suction Pressure" on page 60 "Plug-in: Geo-Lighting" on page 41 "Plug-in: HVAC Smart Start" on page 46 "Plug-in: Parameter Control" on page 65 "Plug-in: performance indicators" on page 68 "Plug-in: Safe Restore" on page 57 "Plug-in: Smart Night Purge" on page 43 "The System Administration tool" on page 38	"boss setup: basic concepts" on page 13 Added virtual devices description. "Configuring boss" on page 10 Added the Auto-Login function description. "Managing alarms" on page 24 Added the temporary alarm disabling function.

2019, January - sw version 1.2.0

New topics	Updated topics
-	"What is boss?" on page 8 Added reference to boss mini version. "Energy: basic concepts" on page 50 Added limitations for boss mini version.

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