INTELLIPLANT CLIVET

USER MANUAL

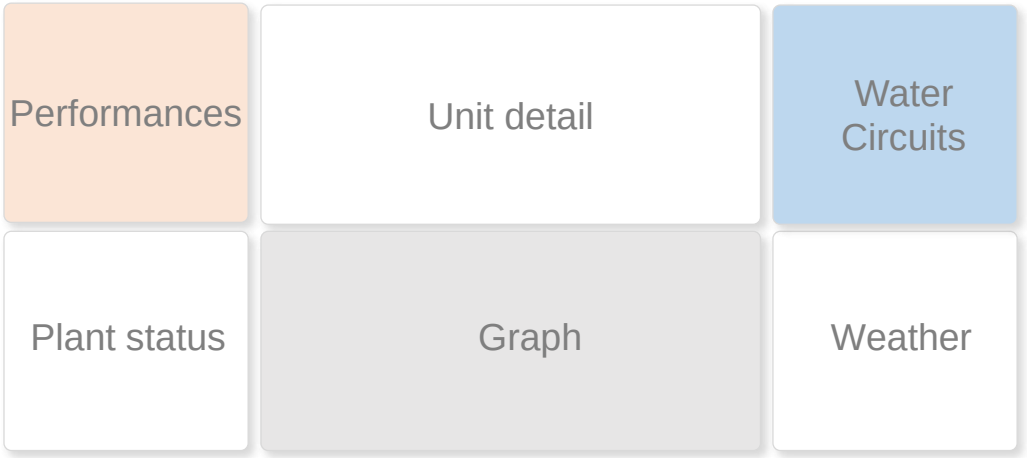
Main start-up page

Intelliplant is displayed on a touch screen platform inside the electrical cabinet.

When logging in for the first time, you are asked to enter your user name and password: there is a default account.

Once the user and password have been entered, the main start-up page, which is the “Plant Dashboard”, opens and provides a global view of the plant status.

The “Plant Dashboard” consists of 6 sections containing the information of a specific function.



From the “Plant Dashboard” you can access the other graphic pages by clicking the specific section.

If the specific section does not open, you must enable navigation via the App (see next section).

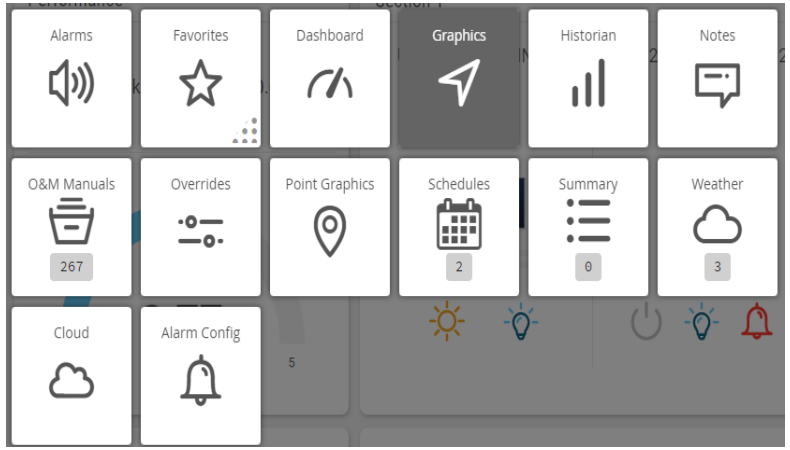
Accessing graphic pages via the App

Intelliplant's graphic user interface functions can also be accessed with “home” consisting of clickable buttons (apps) with specific functions.

The available apps can be accessed by clicking on the icon in the top left corner.

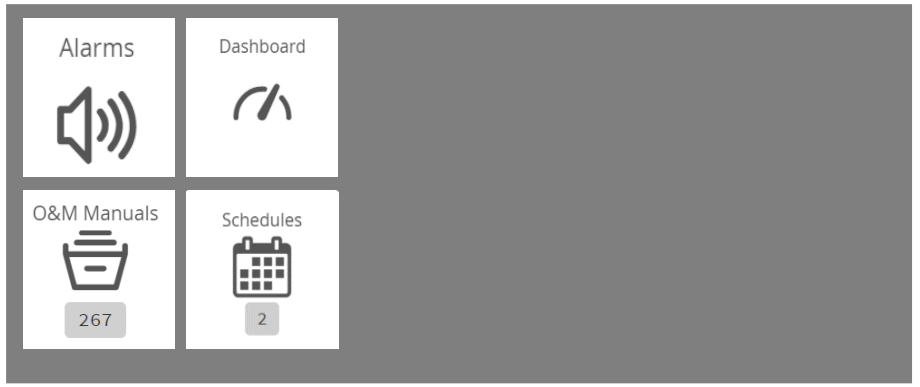
The apps are divided into 2 categories:

Plant Room



Allows you to access the plant operation status screens

End User Apps



Allows you to access the auxiliary functions

Notes

The “Energy”, “Maintenance”,“Plant Schematics”, “Elfo Control”, “UTA” apps are optional.
The apps available depend on the type of user and the plant’s functions. Depending on the permissions assigned to the user, certain apps will be visible.
The next page details the permissions of the intended users.

User management

This table shows the permissions of each user on the Apps (R = read, R / W = read / write).

There are 2 categories of users used in the plant:

- Operator (Designer, Energy Manager)
- Administrator (Facility Manager, Plant Manager, Maintenance Head, Maintenance Operator)

The Operator has read-only permissions, while the Administrator has read/write permissions.

USER / PAGE	Designer	Energy Manager	Facility Manager	Plant Manager	Maintenance Head	Maintenance Operator
Plant Dashboard	R	R	R/W	R/W	R/W	R/W
Plant Schematic	R	R	R	R	R	R
Units	R	R	R/W	R/W	R/W	R/W
Energy	R	R	R	R	R	R
Maintenance	---	R	R	R	R	R
Alarms	---	R	R	R / W	R / W	R / W
Emergency	---	---	---	R / W	R / W	R / W
Settings	---	---	---	R	R / W	R / W
Devices	---	R	R	R	R	R
Parameters	---	R	R	R / W	R / W	R / W
Tools	---	R	R	R / W	R / W	R / W
Elfo Control	---	R	R	R	R	R
UTA	---	R	R	R	R	R

Plant Dashboard

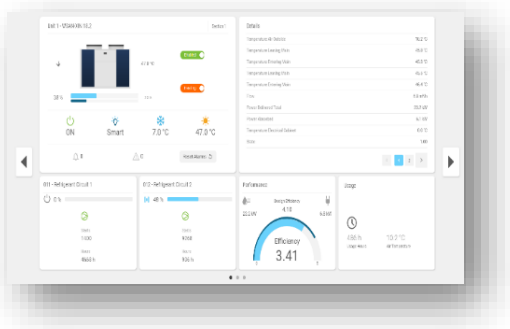
Plant Dashboard

General display of plant parameters:

- Plant and unit performance
- Plant control
- Performance of the main plant variables over the last 12 hours
- Water temperature for the different circuits or for domestic hot water
- Weather

Units

Units

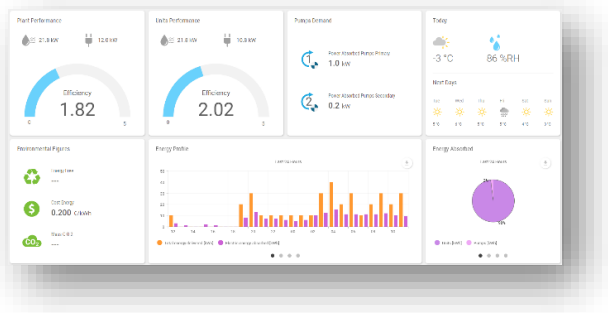


Displays the operation status of each unit and allows the main controls to be set:

- Unit settings (manual, smart, heating/cooling setpoint, unit enabling/disabling, unit cooling/heating)
- Main operation data of the refrigeration circuits
- Individual unit performance
- Complete operation statuses
- Hours of operation
- Status and load of compressors for each circuit and power output in percentage

Energy

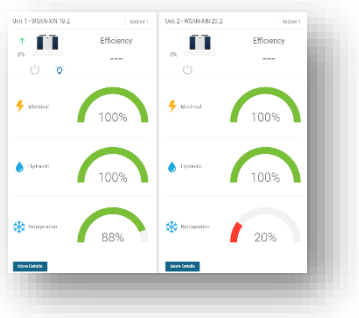
Energy



Shows the plant's energy consumption, specifically:

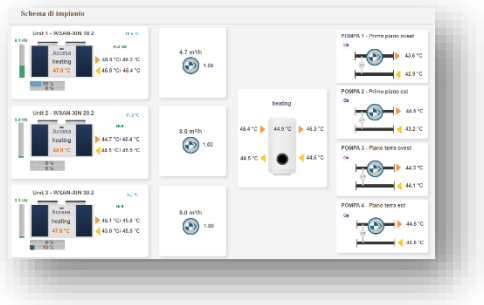
- Plant performance
- Performance of units only
- Weather
- Environmental indices
- Pump absorption
- Energy profile

Maintenance



Provides information about the wear of the units by evaluating the operational status in 3 areas: electrical, hydraulic, refrigeration.

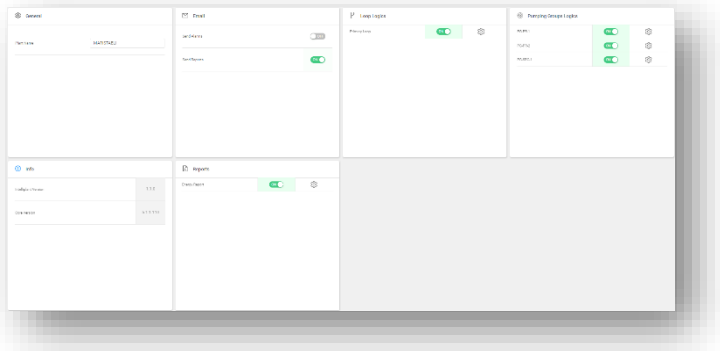
Plant Schematic



Schematically displays the plant composition.
The devices can be heat pumps, pumping groups, primary/secondary circuit pumps, primary/secondary circuit valves, storage tank, temperature probes, pressure gauges. The diagram displayed varies according to the plant composition.

Notes
The app is available in both desktop and mobile versions

Settings

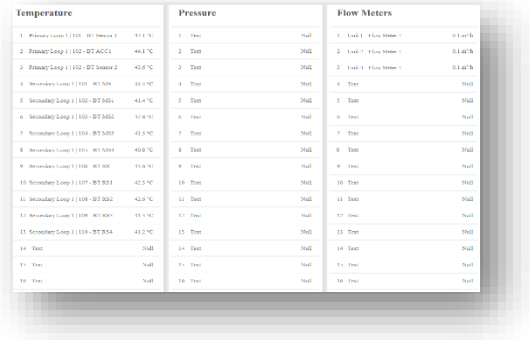


Allows you to modify the general plant settings such as:

- Plant name
- Plant controller version and software version
- Modbus communication settings
- Sending emails about reports and alarms
- Specific control logics
- Logic activation of loops and pumping groups
- Section containing reports in PDF format

Devices

Devices

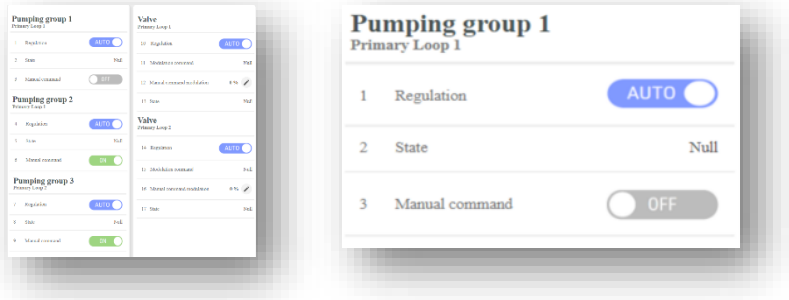


Plant device statuses and unit statuses are displayed such as:

- Temperature detected by temperature sensors in the plant
- Flow rates measured by flow meters
- Pressure measured by pressure gauges

Emergency

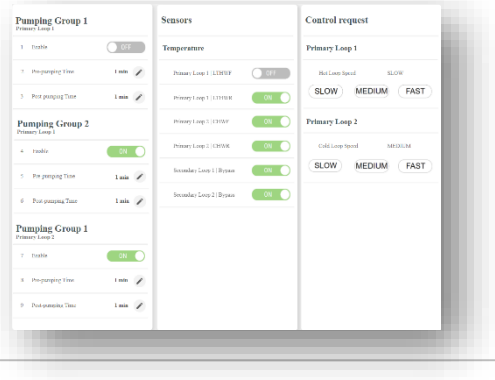
Emergency



Allows you to promptly intervene on pumps, pumping groups and valves in case of emergency and/or danger and switches everything to manual control.

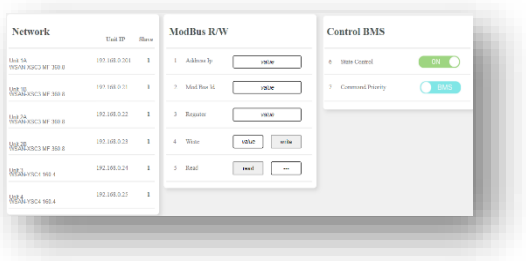
Parameters

Parameters



Allows you to change setting parameters concerning the operation of pumping groups, plant devices such as temperature sensors, flow meters and pressure gauges and specific plant control parameters.

Tools



Contains diagnostics tools:

- Readout of main information directly from the built-in controller
- Modbus verification tool
- Controller activation by the BMS

Elfo Control

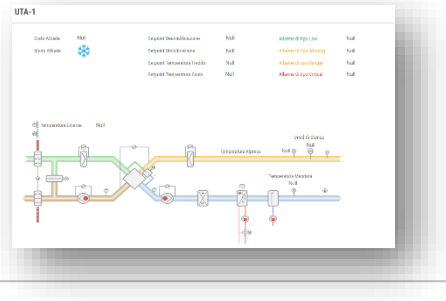
Displays information about:

- Plant State
- Plant Mode
- External Temperature
- Active zone and in which mode (heating / cooling / ECO / Comfort mode)
- Elf Fresh in operation and in which mode (heating/cooling)

Notes

The application is not present if the Elfo Control system is not required.

UTA

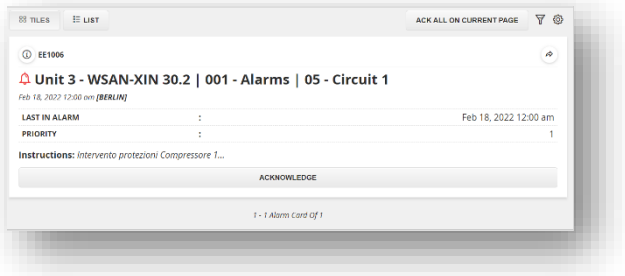


It contains information about Air Handler Units like states, alarms, temperatures, setpoint.

Notes

The application is not present if Air Handler Units aren’t used in the plant.

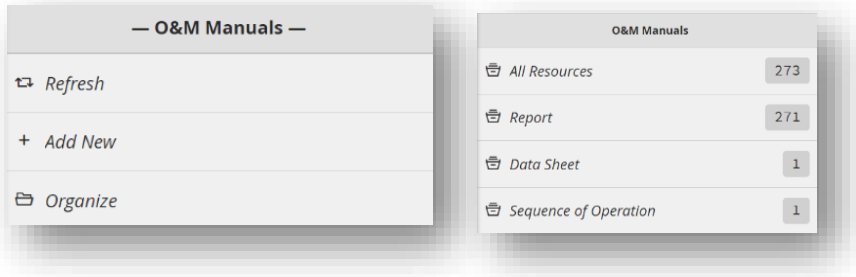
Alarms



Displays high priority shutdown alarms and/or warnings.
The information given is:

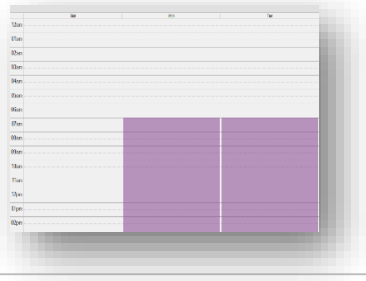
- Alarm code
- Alarm description (unit that generated it)
- Date and time of last event
- Priority
- Alarm description

O&M Manuals



Contains documents that are useful in the plant, such as technical manuals, wiring diagrams and so on.

Schedules



Allows you to create a weekly time schedule for the plant, such as switching the plant on/off, operation modes.

Notes
The app is not present unless an hourly schedule of the plant is required.

Pages in detail

After logging in, the first page to be displayed is the “Plant Dashboard” and is common to all users.

Unit status

Plant performance

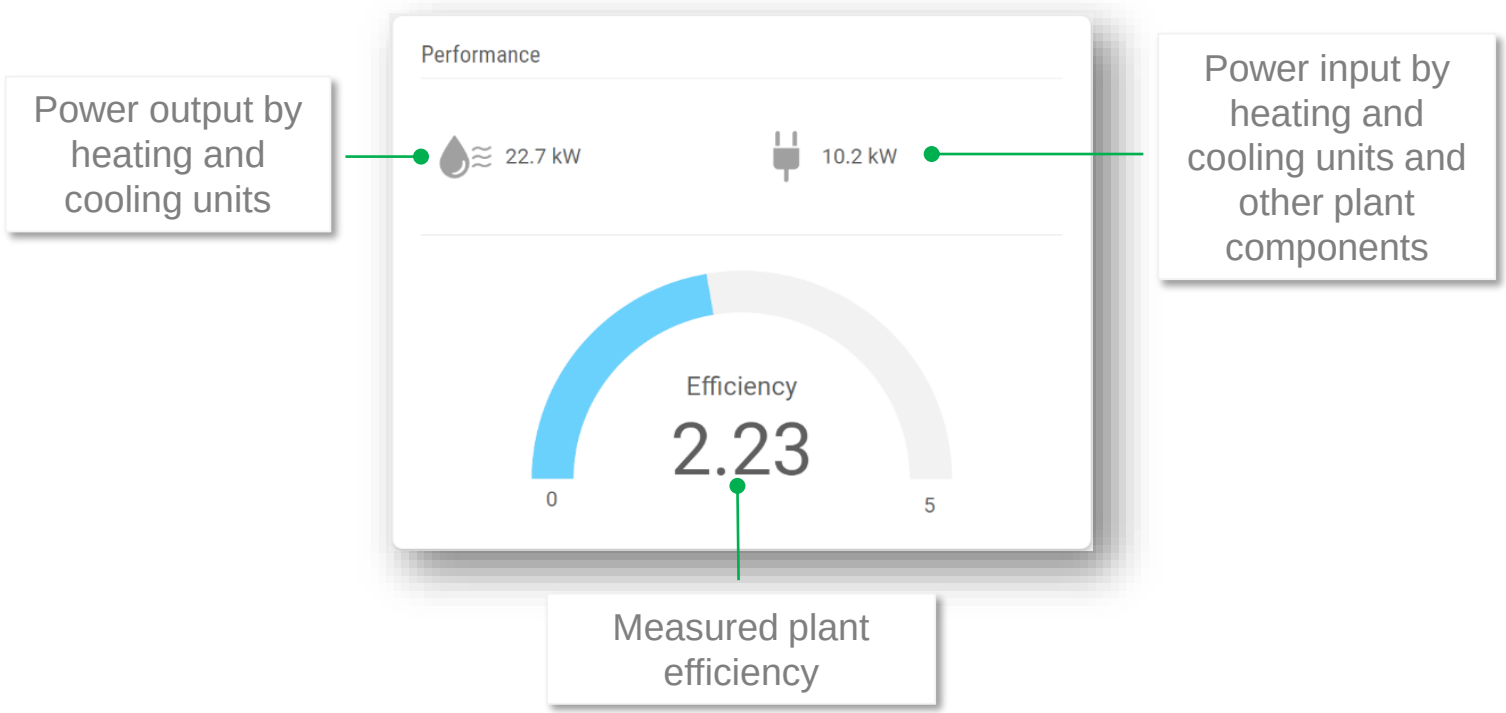
Water temperature information and settings for the primary circuit

Plant control

Atmospheric conditions

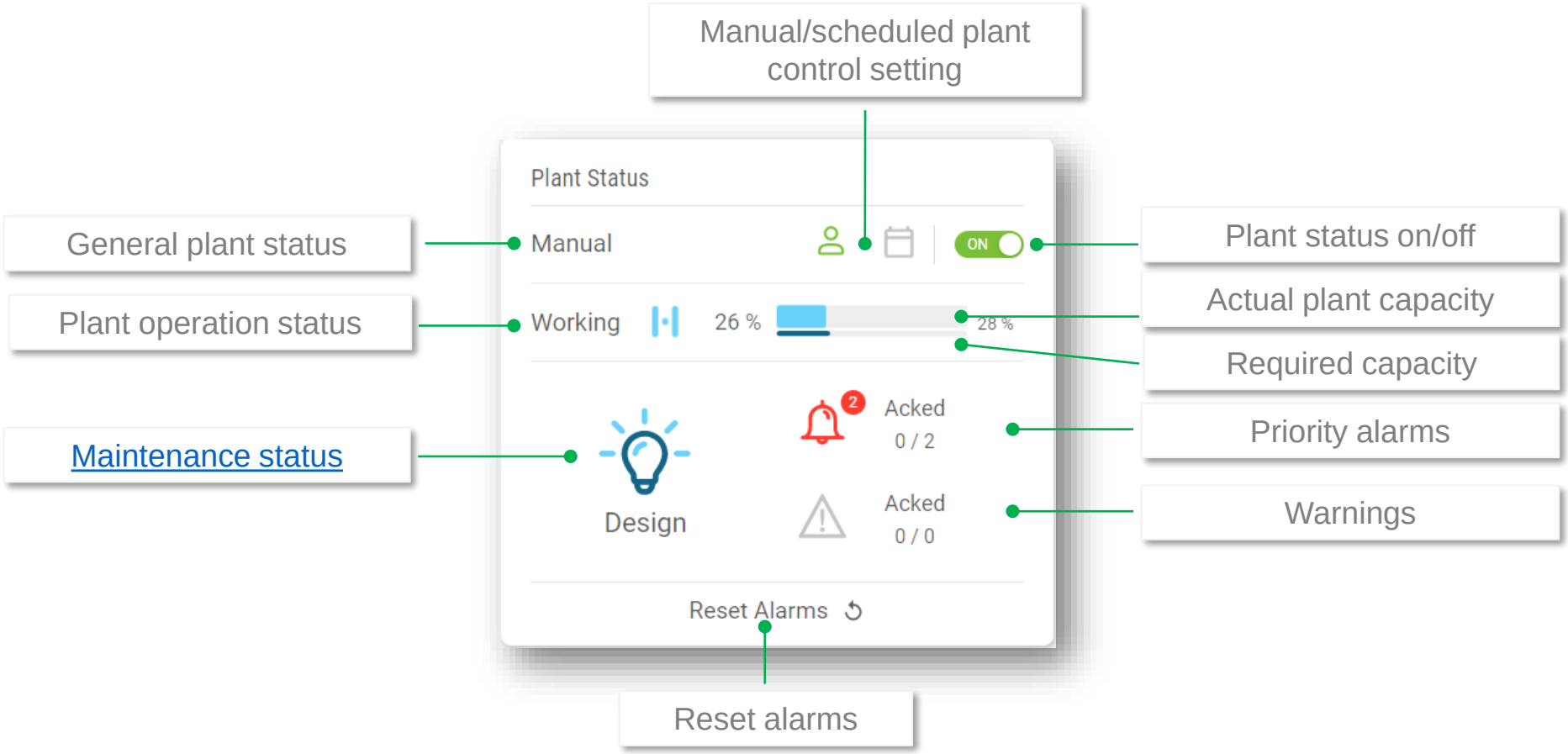
Trend of the working conditions over the last 12 hours

Plant Performance



Displays the electricity consumption of all controlled users including primary, secondary and source pumps (if present), the power produced by the units and the plant efficiency (updated every 10 seconds).

Plant Status



Represents the general operation status of the plant through graphic elements and icons.

Additional information

- The general status can either be manual or scheduled:

  if you choose “scheduled”, you must create a scheduler in the “Schedules” app in the “End User Apps” section;

  if you choose manual, the plant can be controlled in local manual or remote manual.

  If you choose local manual, the “State Control” parameter must be disabled on the “Tools” page in the “Control BMS” section and controlled from the “Plant Status” card in the “Plant Dashboard”.

  If, on the other hand, you choose remote manual, the “State Control” parameter must be enabled on the “Tools” page in the “Control BMS” section and manual control from the “Plant Status” card in the “Plant Dashboard” will not work because the BMS will control the plant.

- The plant operation status can have 5 different values:

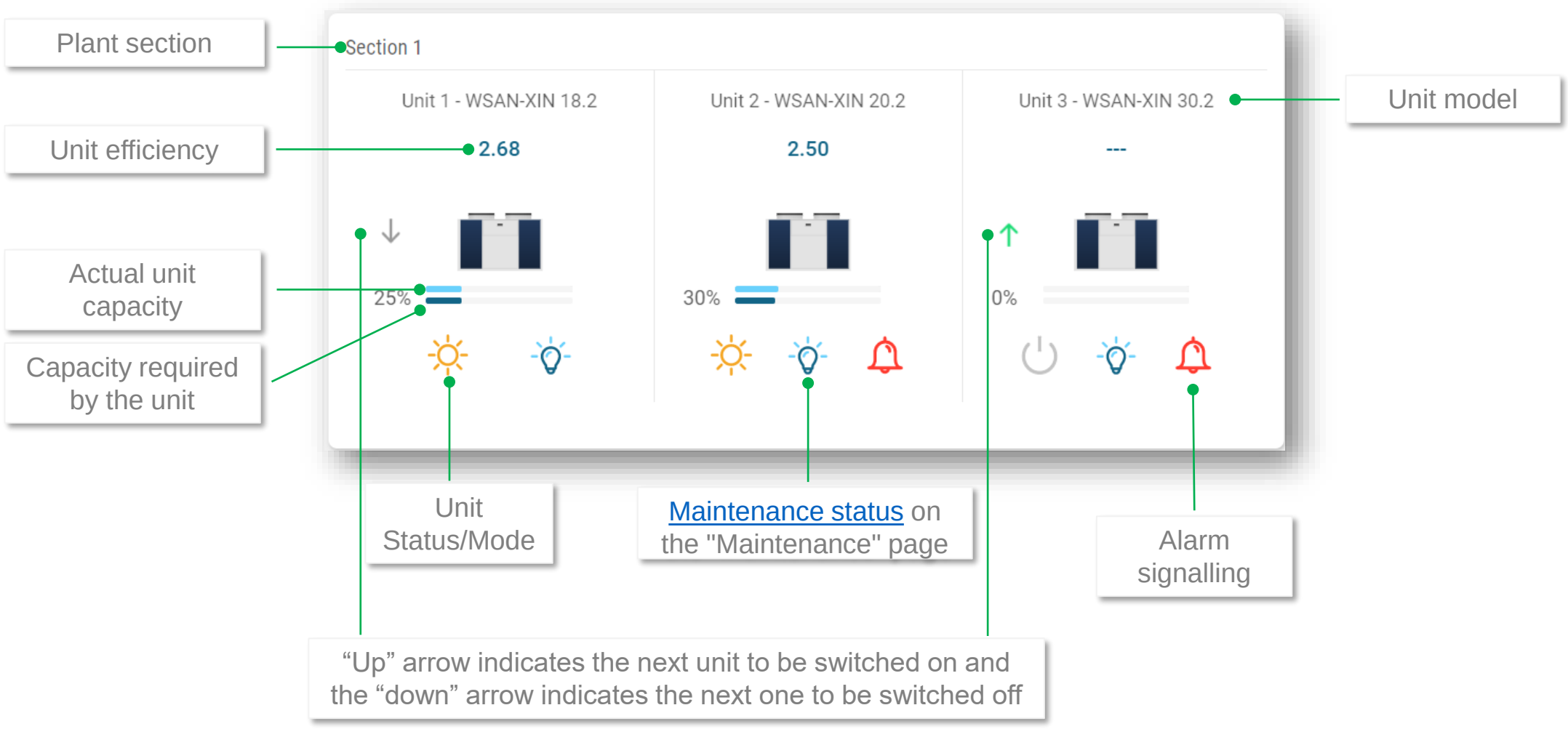
  Starting... : the plant has just been switched "ON" and there are no compressors on in the units

  Stopping.. : the plant switches from "ON" to "OFF"

  Working : the plant is "ON" and at least one compressor is on

  Idle : the plant is "ON" and there are no compressors on

  OFF : the plant is switched off



Unit operation conditions.

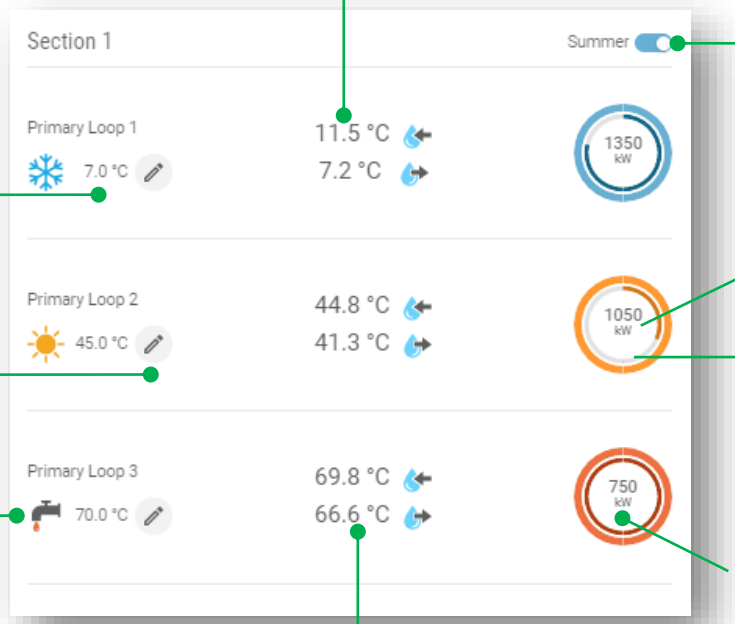
Additional information

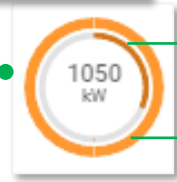
- If the unit is next to be switched on, it will show one or at most 2 of these icons:
  - Loop DHW (domestic hot water)
  - Loop Hot
  - Loop Cold
  - Loop Recovery
  - Loop Reversible
- If the unit is next to be switched off, the icon is:
  - Unit off
- The unit status/mode is an indicator of its operation status/mode and can have the following values:

OFF	Cooling Only	Cooling Only in a 4-pipe system	Defrost
Pump On	DHW	Cooling + Heating in a 4-pipe system	Heating + Recovery
Heating Only	Heating Only in a 4-pipe system	Free Cooling	Intellifrost

Additional information

- If the unit is disconnected, it is shown as follows:





Circuit return temperature

Plant section mode

Set circuit temperature

If no energy meters are present

Setting control

Load required by the plant

Power output in relation to maximum power output

Type of loop

Actual power output

Circuit supply temperature

Cool reversible circuit

Heat reversible circuit

Cool only circuit

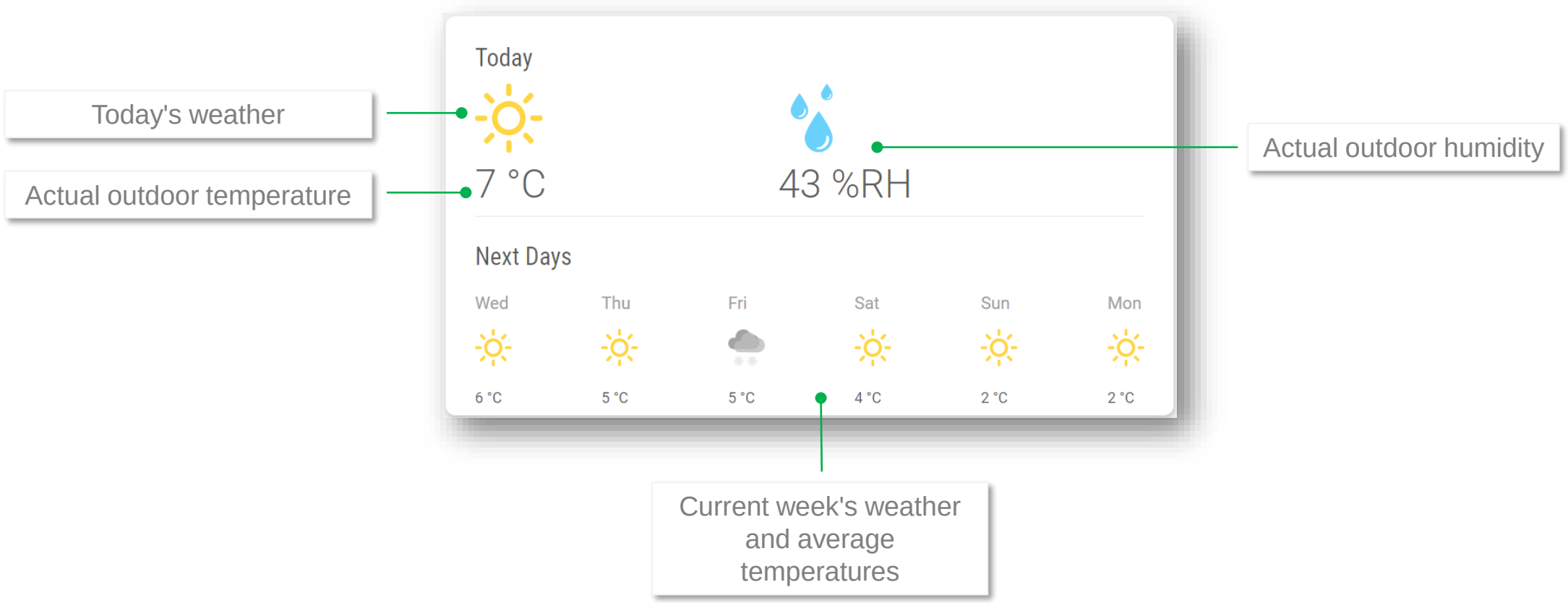
Heat only circuit

Domestic hot water

Notes

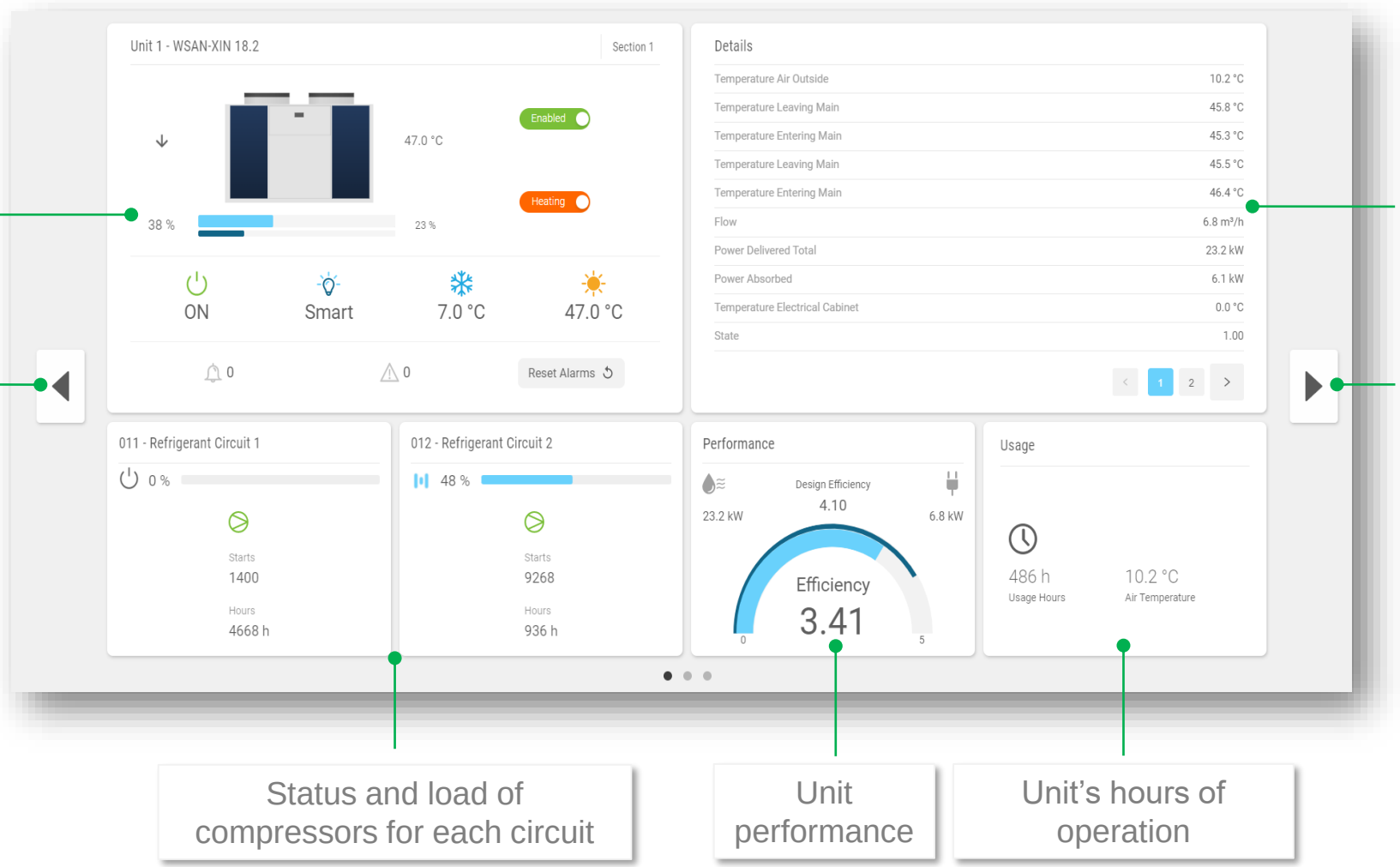
If the unit is switched off, the icons turn grey and the section mode cannot be changed if the plant is controlled by BMS.

It shows the operation setpoints and the common supply and return temperatures of the primary loops, as well as the power output in real time.



This card shows the actual outdoor weather conditions, and the predicted weather is provided by online services and is updated on an hourly basis.

Units



Unit settings

Link to the previous unit

Main unit data

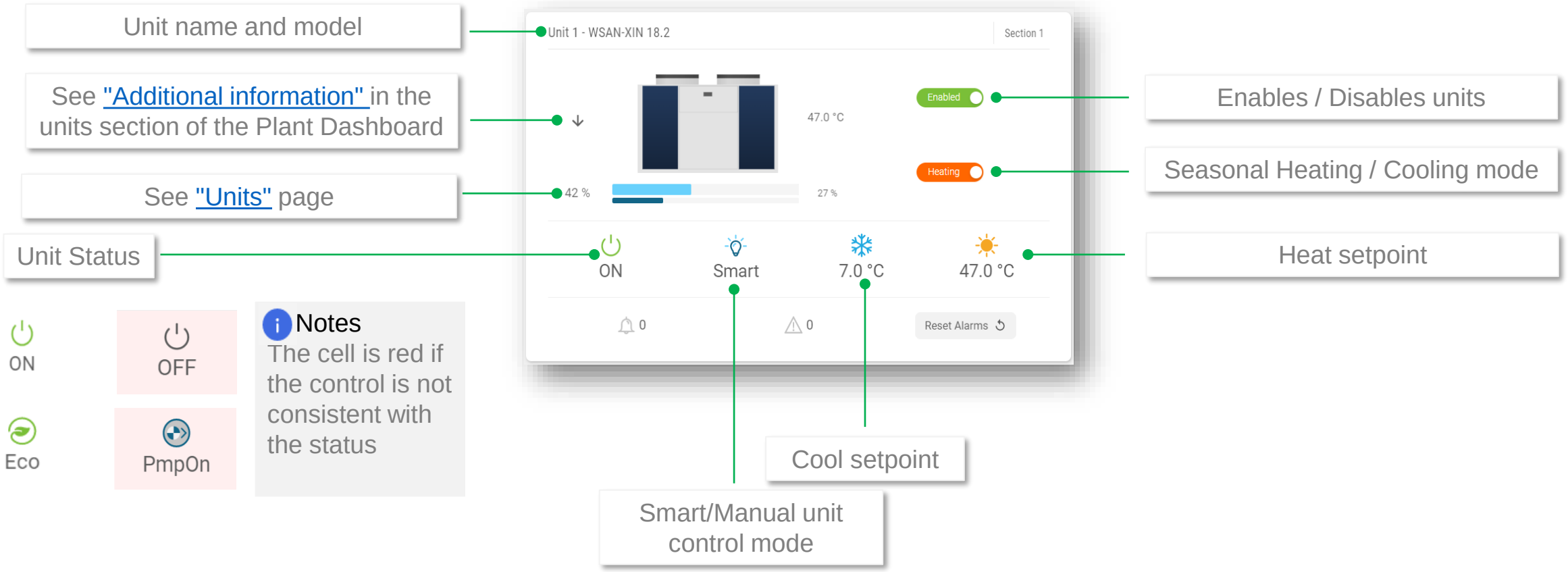
Link to the next unit

Status and load of compressors for each circuit

Unit performance

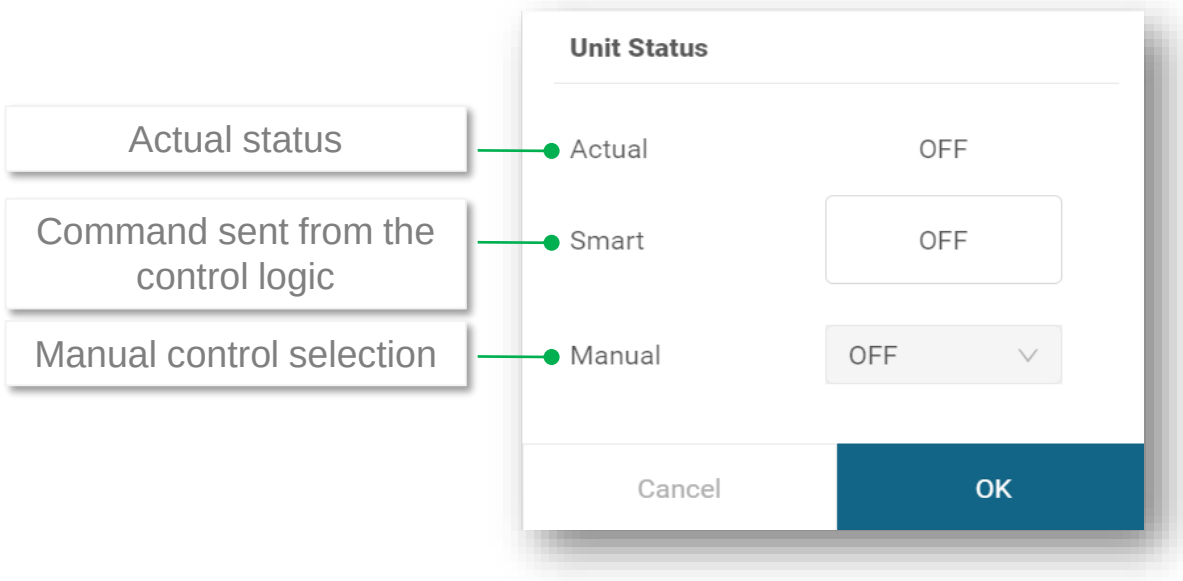
Unit's hours of operation

Page containing the unit's details, such as actual status with dedicated settings, circuit details, list of main unit values, performance and hours of operation, and it is also possible to scroll through the units.

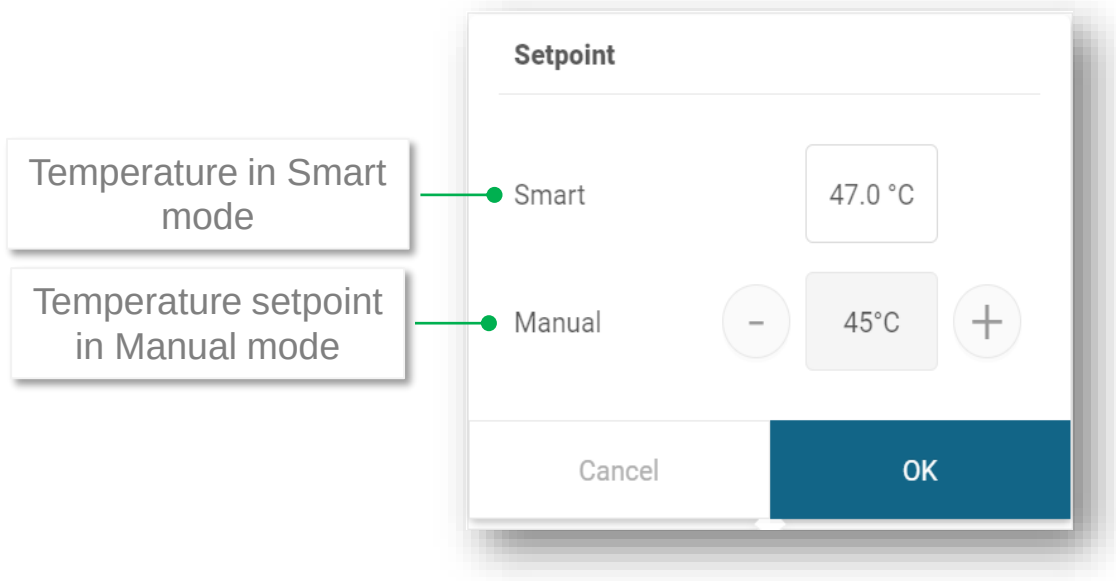


This card is dedicated to the unit's details with related settings such as status, control mode, heating/cooling setpoint, unit enabling/disabling and the signalling of any serious alarms or warnings.

Unit status and heating/cooling setpoint



Card dedicated to controlling the unit, where the choice is between "Smart" or "Manual".
If you choose "Smart", this means that the unit responds to the control logic commands.
The field for the “Smart” parameter is always read-only.

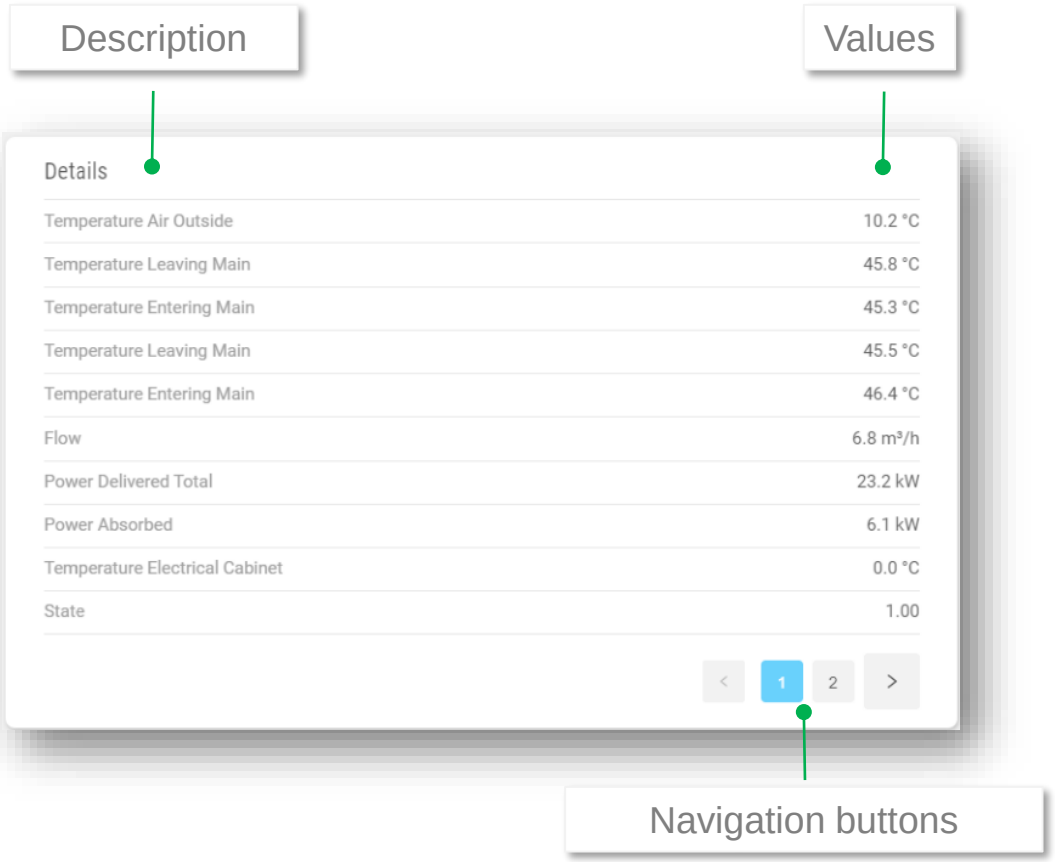


Card dedicated to the unit’s heating or cooling setpoint.
The setpoint can only be changed in manual mode, because in Smart mode the control logic takes care of the heating/cooling setpoint.

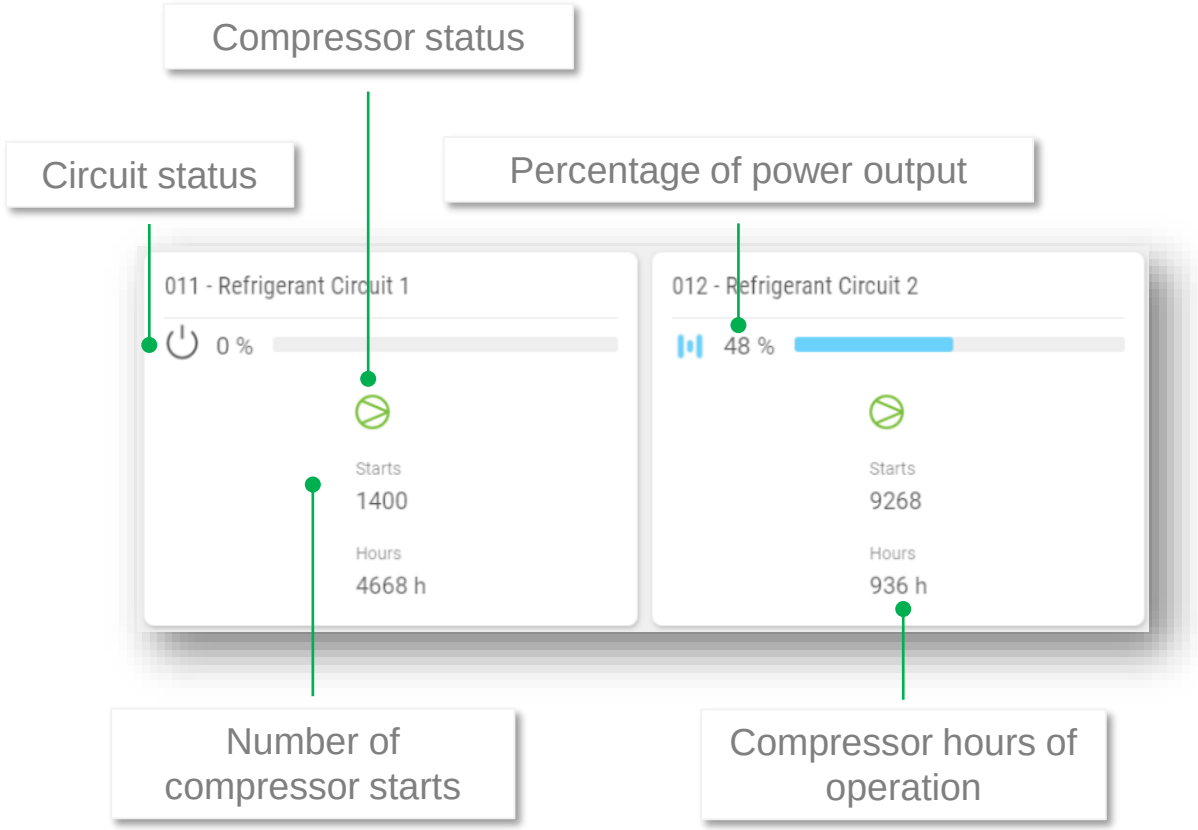
Notes

For dual units there is a Master unit which is controlled by Intelliplant and configurable from the graphic interface, and a Slave unit which is controlled by the unit’s ecoshare and therefore configuration from the graphic interface is disabled.

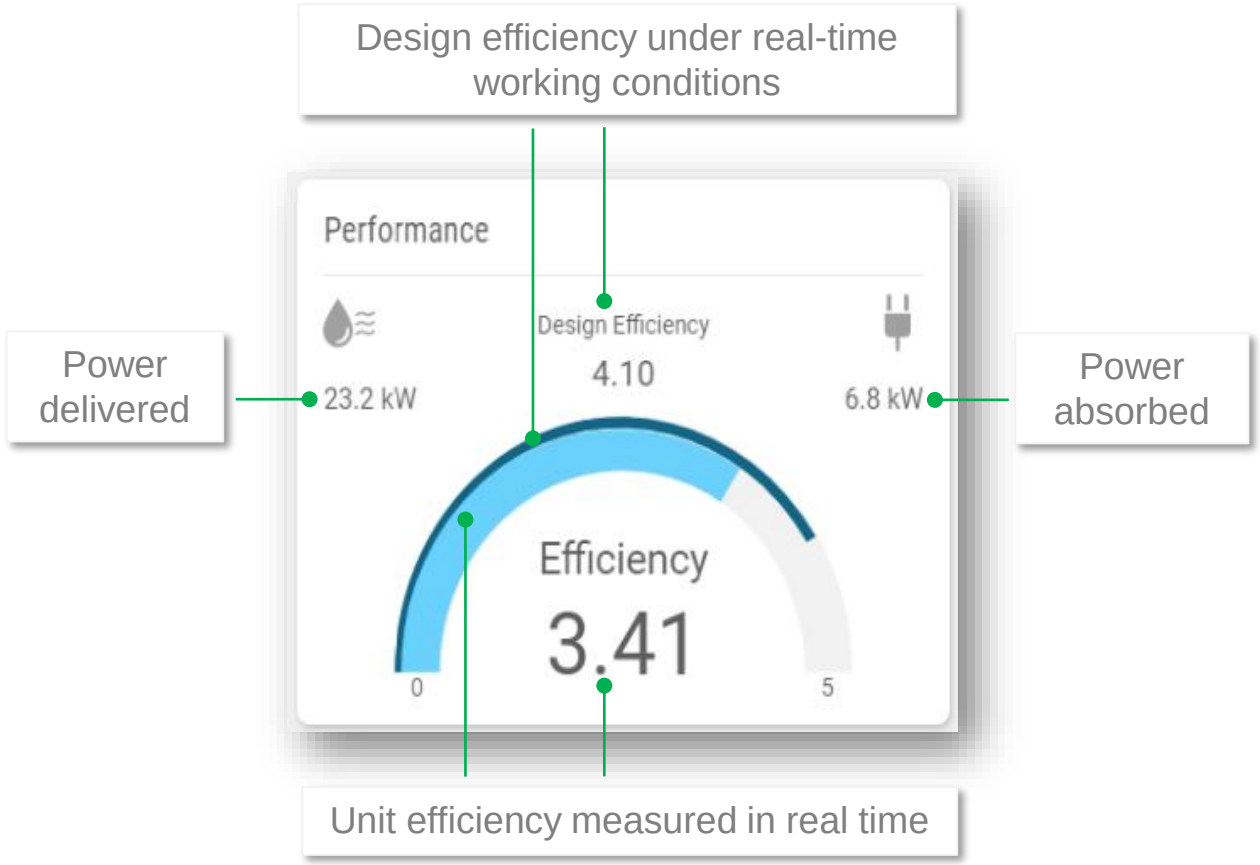
Unit details and circuit information



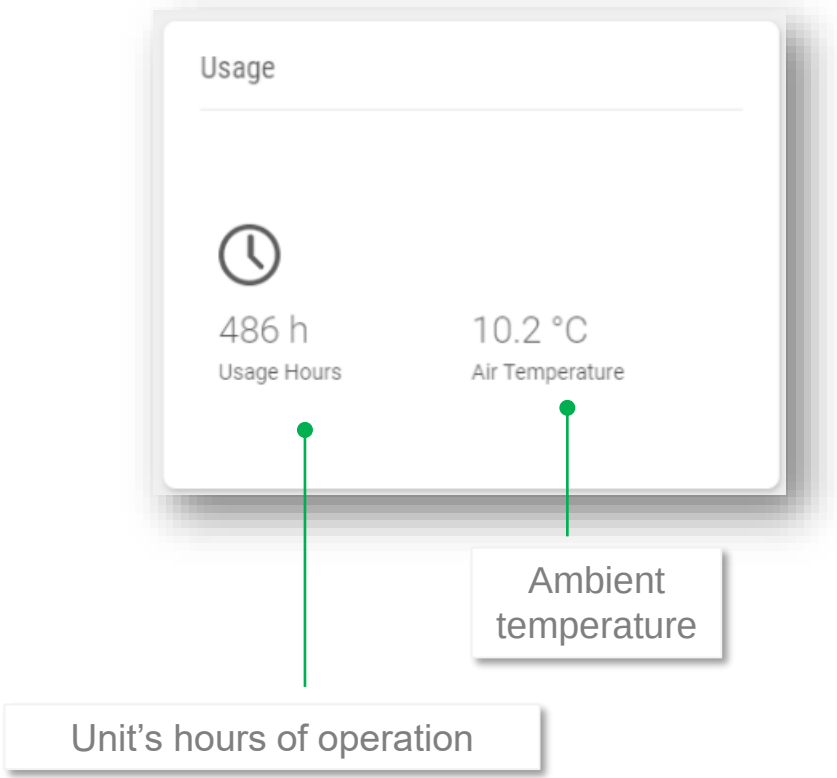
Card that displays the unit's operation values in real time



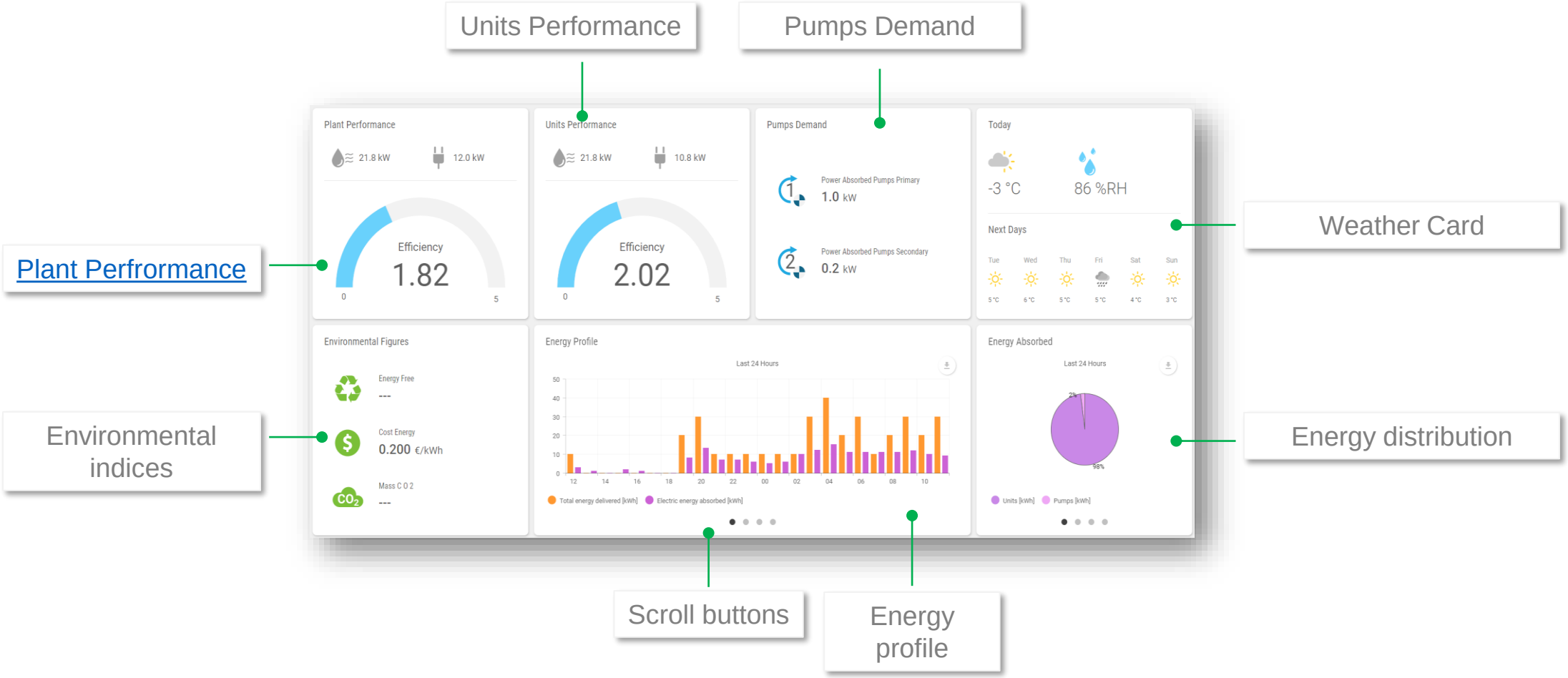
The status of each circuit is shown and can either be switched off (Refrigerant Circuit 1) or working (Refrigerant Circuit 2), while the compressor status can be switched on or off



Card displaying unit performance: unit efficiency is calculated every 10 seconds by the ratio of power output to power input and is compared with the design efficiency. If the unit efficiency is much lower than the design efficiency, there is a drop in unit performance and therefore a unit intervention is recommended.

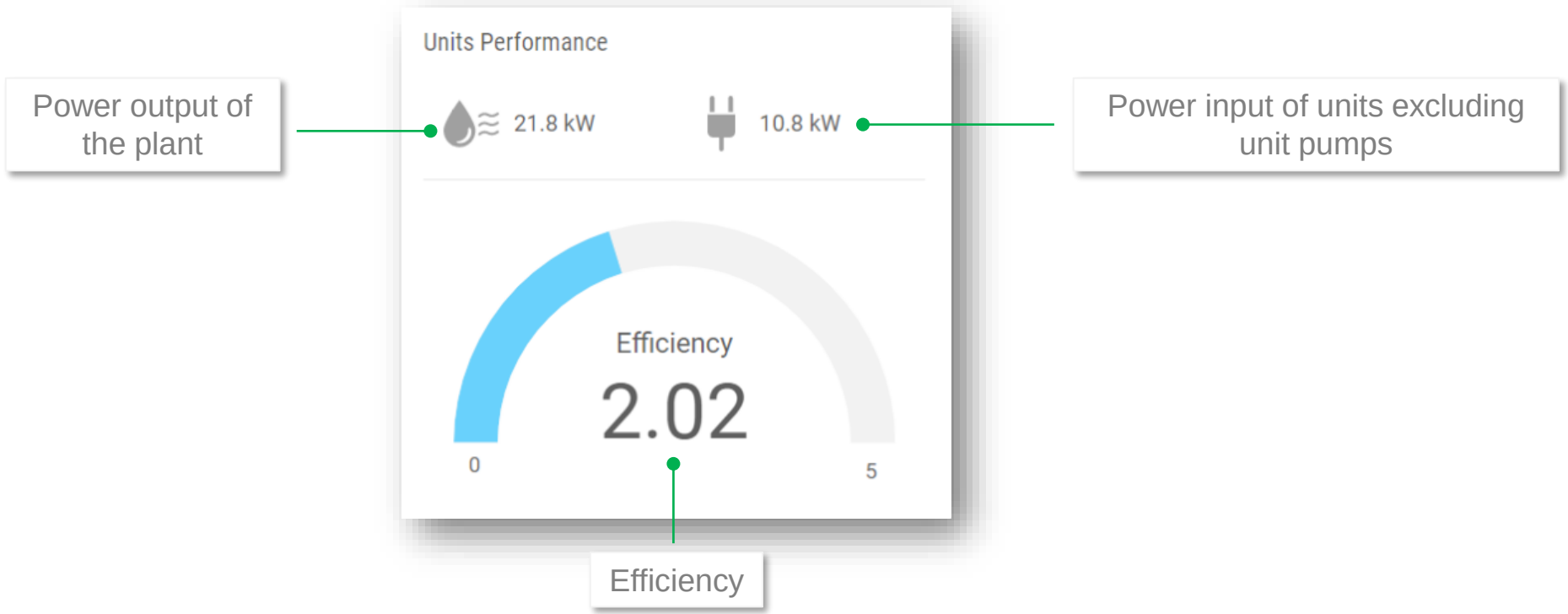


Displays unit's hours of operation and outdoor air temperature. The hours of operation are important in determining the wear of the unit and preventing it from breaking down as a result.

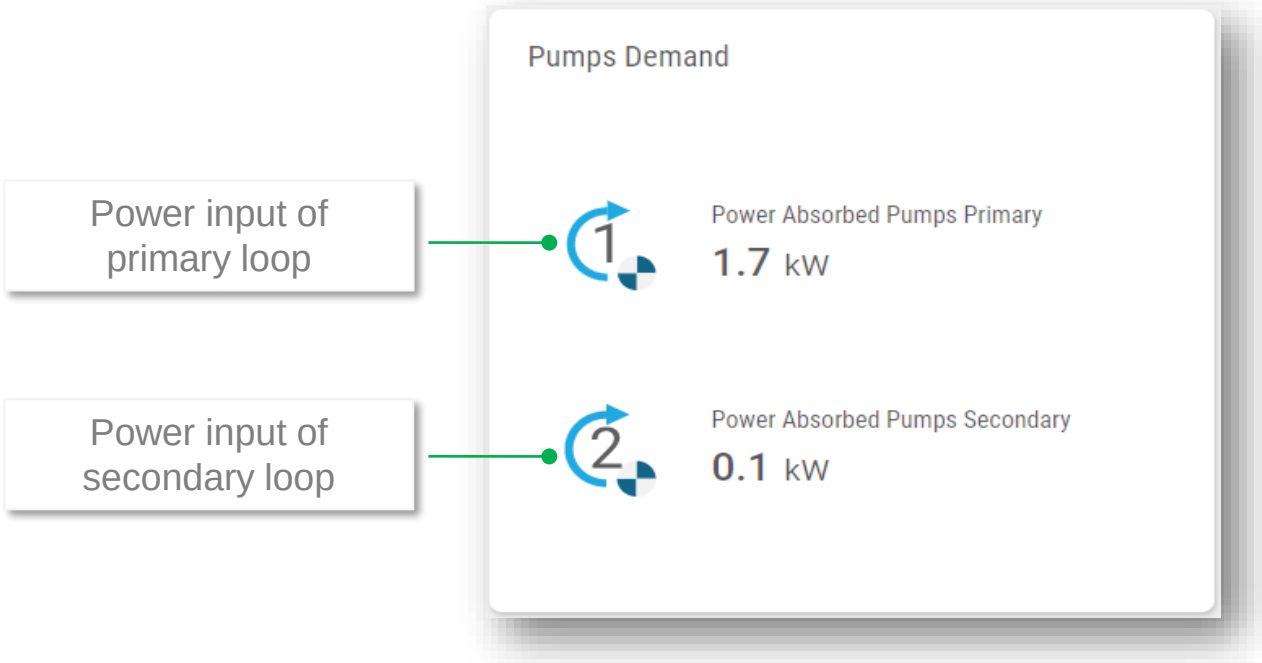


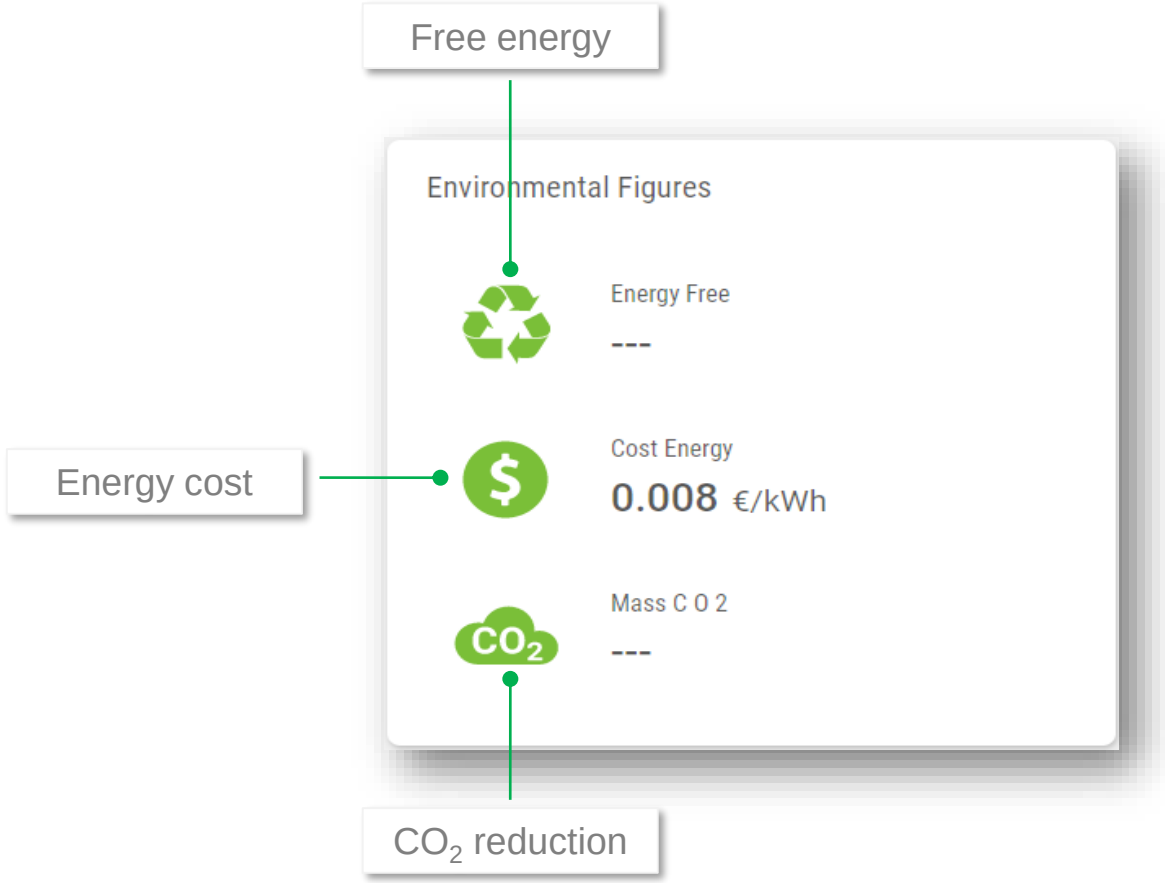
Page dedicated to consulting the energy profile of the plant

Units Performance



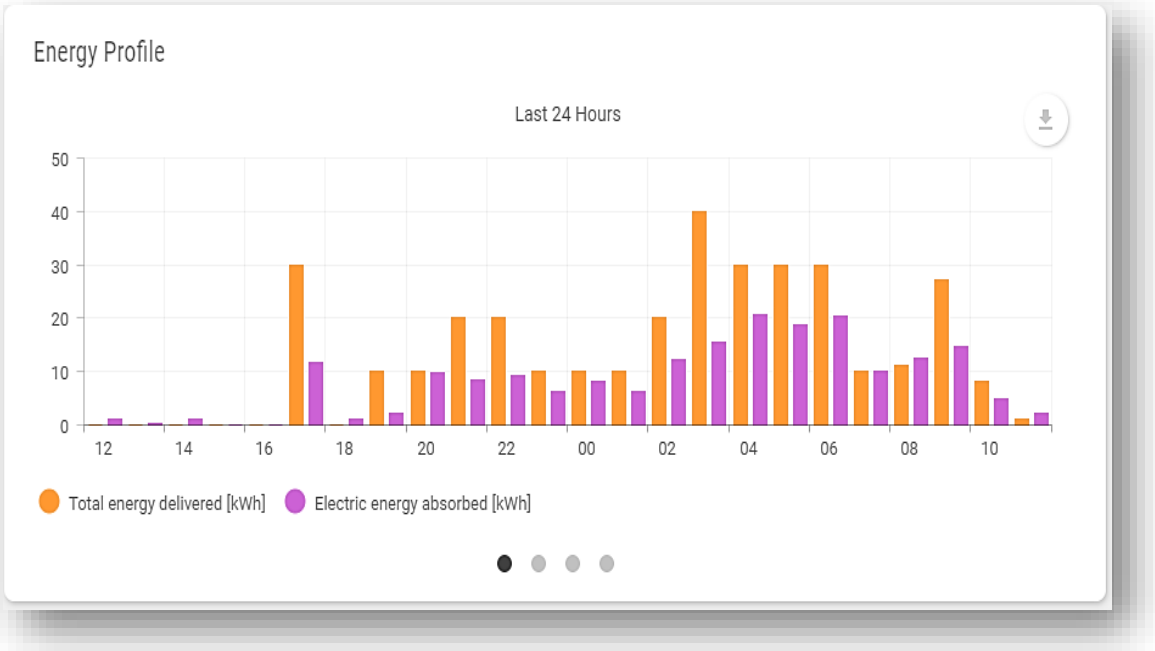
Displays the electricity consumption and performance of the units, the power output of the plant, the power input of the units and the plant efficiency (updated every 10 seconds).



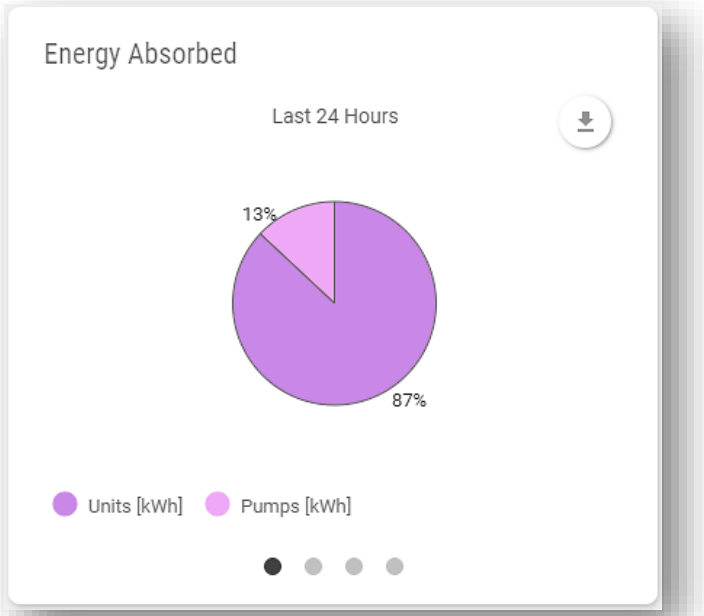


Card showing consumption by the pumps of the primary, secondary and source circuits (if present).

Energy Profile and Energy Absorbed



The heating and cooling energy produced in cooling (Total energy delivered = light blue) or heating (Total energy delivered = orange) conditions and the energy absorbed are graphically described and updated every hour. There is a scroll bar because data is available on a daily, weekly, monthly and yearly basis.



The card shows the breakdown of the energy absorbed by the units and pumping groups and is available on a daily, weekly, monthly and yearly basis.

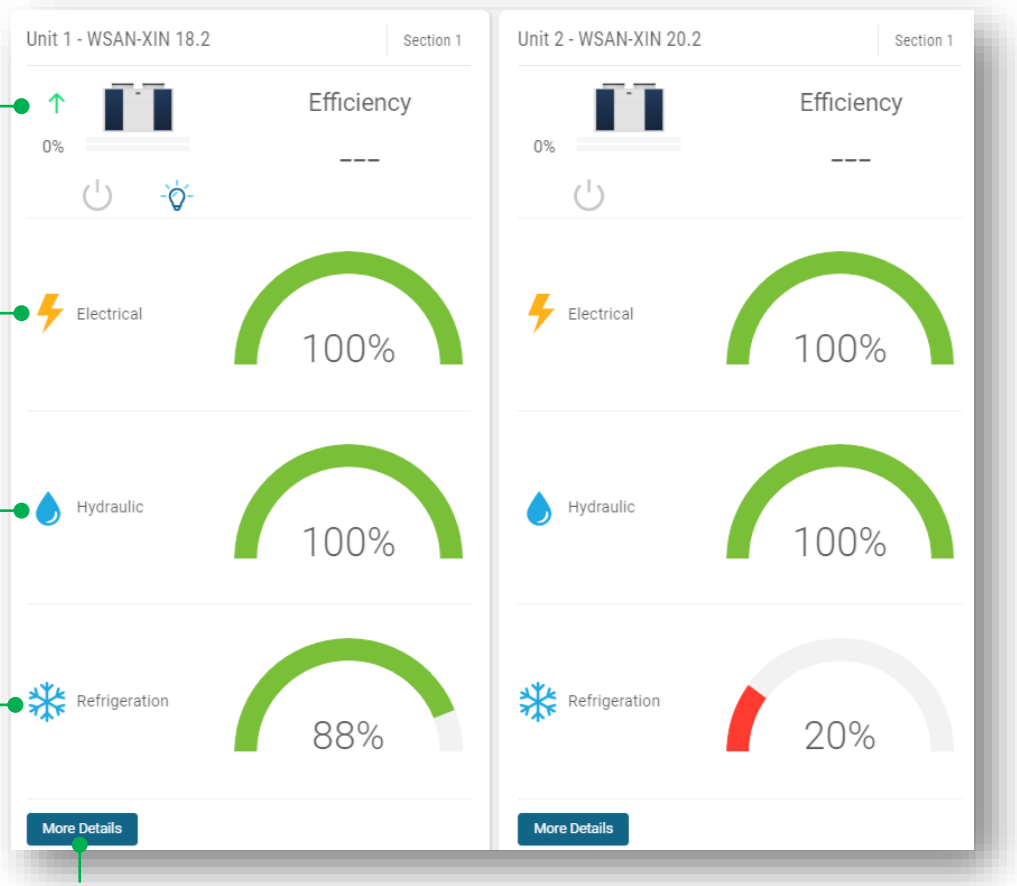
Maintenance

See "Units" and "Additional information" page

Electrical section
Diagnostics concern the electrical components of the plant and units such as sensors, transducers, etc.

Hydraulic section
Diagnostics concern the pumping groups, water flow and temperature and the Δt at the ends of the exchangers

Refrigeration section
Diagnostics concern the refrigeration circuit and the status of the exchangers.



Section details

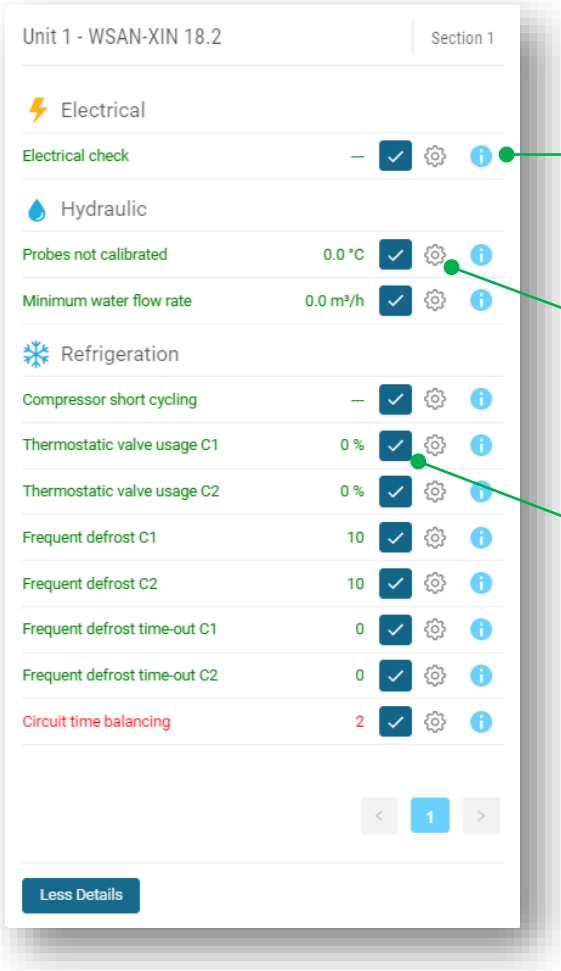
indicates that no action is required as only warnings are present.
The following conditions have been verified:

- Project conditions
- Efficiency measured in real time is in line with theoretical efficiency

indicates that medium and/or serious faults are present, requiring intervention by specialised personnel.
This happens because the conditions mentioned above have not been completely fulfilled.

The gauge next to each section is coloured according to the percentage of error out of the total number of possible malfunctions in each section.
0% = grey
1% to 33% = red
33% to 66% = yellow
66% to 100% = green

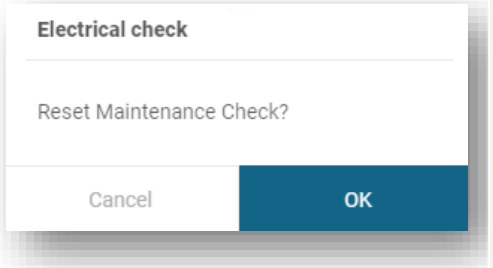
The page covers predictive maintenance of the individual units and of the entire plant: based on events, it is possible to prevent breakdowns or intervene in time on possible malfunctions, in this case electrical, hydraulic and/or refrigeration malfunctions.



Info describing the prediction and in case of malfunction, possible solutions are suggested

Settings

Reset Maintenance Check



Notes

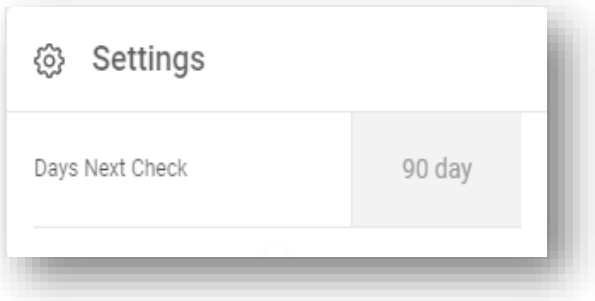
Based on how many prediction are in reporting state, in «Plant Dashboard» page in «Plant Status» section there is the icon with the predictions number next to it or the icon always with next to the predictions number in reporting state.
The state is «inspect» or «design» based on percentage of prediction in reporting state, on the total :

- 0% - 50% = design
- > 50% = inspect

For example in the first case, the icon that will appear is

Pressing the "More Details" button takes you to a card like this one. It should be noted that the text of the section element and the parameter that generates the signal are now coloured: green indicates correct operation, yellow indicates pre-alarm and lastly red indicates alarm. Next to each one is the icon to reset the Maintenance Check, which must be carried out after any intervention, and the icon to set the section elements.

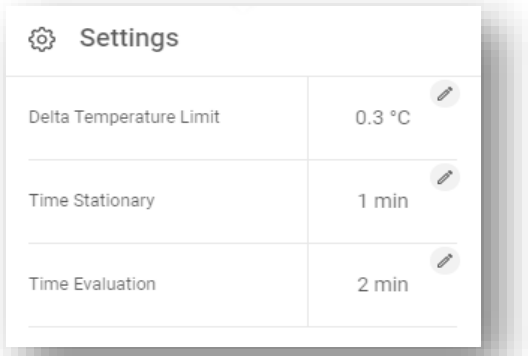
Electrical



Electrical check

"Days Next Check" is a field where you can indicate how often the electrical part should be checked. This should be done after maintenance has been carried out. The main purpose of the Electrical check is to check for malfunctions concerning the status of temperature sensors, pressure gauges, energy meters, general status of the control box and terminal closures.

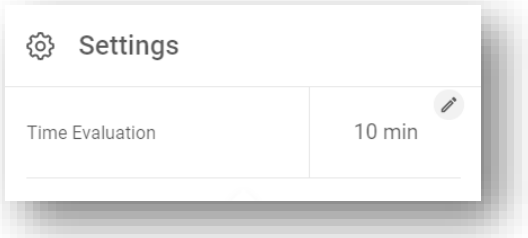
Hydraulic



Probes not calibrated

In this case the probes are checked to ensure that they are not incorrectly calibrated. In order to say that the probes are correctly calibrated, there are 2 conditions to check:

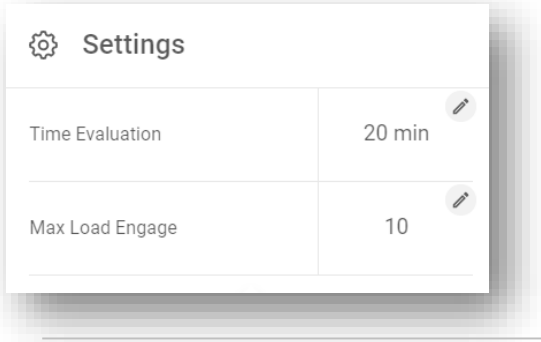
- The difference between the temperatures of the probes measured at the ends of the exchangers must be less than or equal to the "Delta Temperature Limit" and must not be the same for a given time ("Time Evaluation")
- Compressors must be switched off and pumps switched on for a certain time ("Time Stationary").



Minimum water flow rate

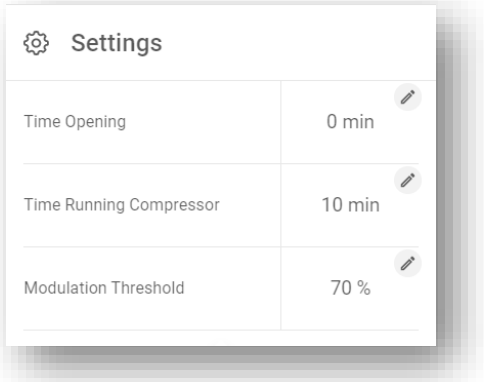
It is reported if the flow rate of the unit falls below the minimum flow rate for a certain period of time "Time Evaluation“.

Refrigeration



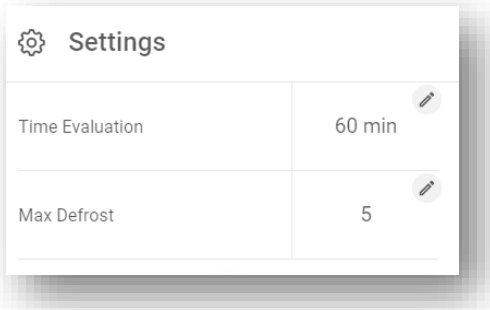
Compressor short cycling

With the plant switched on, a check is made on how many times the compressor is engaged in a given period of time «Time Evaluation». If engagements number excceds the «Max Load Engage» limit, the reporting apears.



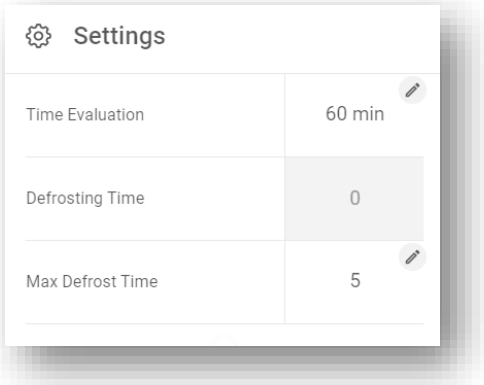
Thermostatic valve usage

Here an abnormal functioning problem of the thermostatic valve is found. In each circuit, the opening percentage of the thermostatic valve is compared with the «Modulation threshold». If the compressors are on for a «Time Running Compressor» time and the valve has a greater opening than the «Modulation Threshold» for a «Time Opening» time, a malfunction of the thermostatic valve is detected.



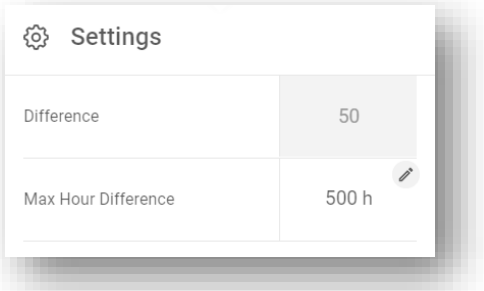
Frequent defrost

For each circuit, it is checked that a maximum defrost limit, given by the «Max Defrost» parameter, is not exceeded in a given «Time Evaluation» time. When the maximum limit is exceeded, it is reported on the page.



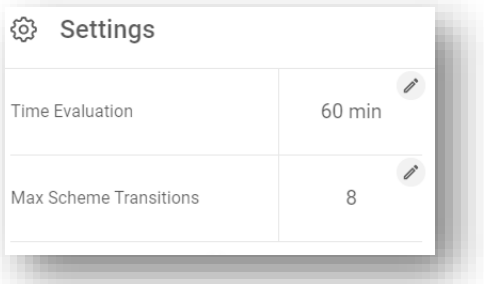
Frequent defrost time-out

A check is carried out on the number of defrosts that occurred in a given «Time Evaluation» time and ended due to time - out. The maximum time that a defrost can last is given by the "Defrosting Time" parameter. If the number of defrosts is greater than the maximum «Max Defrost Time» limit, it is indicated.



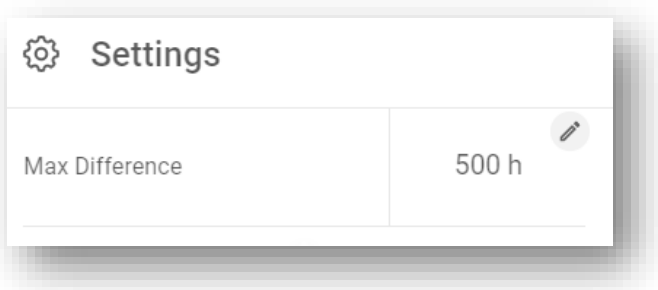
Circuit time balancing

A check is made on the usage time of the circuits present in the units. If the difference between the hours of the circuit that has the least number of hours and the hours of the circuit that has the greatest number of hours is greater than the maximum limit given by "Max hour Difference", it is indicated by indicating the hours and the circuit in question .



Frequent scheme transitions

The number of scheme transitions for each circuit in a given time «Time Evaluation» is checked. If the maximum number of “Max Scheme Transitions” is exceeded, it is shown on the corresponding unit card.

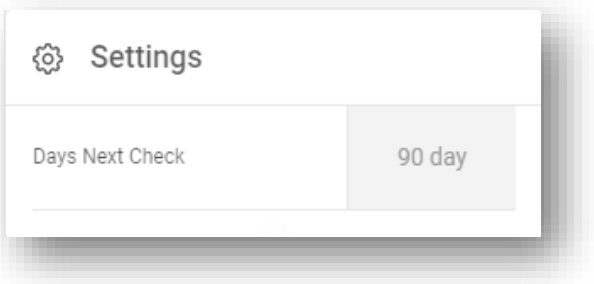


Compressors time balancing

For each circuit, the hours of use of the compressors present are checked: if the difference in the hours of use of 2 compressors exceeds the limit indicated by the "Max Difference" parameter, it is signaled by indicating the compressor with the highest value of hours of use and the hours of use.

With regard to the plant there are other predictions divided in the same way as the units:

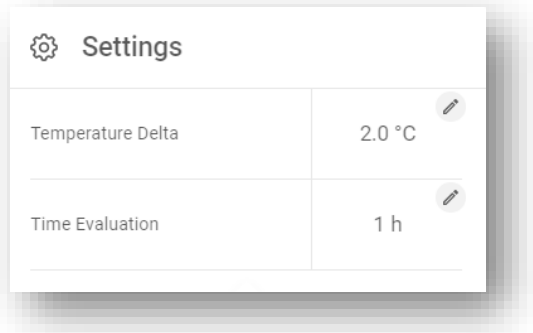
Electrical



Electrical check

"Days Next Check" is a field in which to indicate how often to check the electrical part of the entire plant. It is an operation that must be done after carrying out maintenance. The main purpose of the electrical check is to verify malfunctions regarding the status of temperature sensors, pressure meters, energy meters, general state of the electrical panel, closure of terminal closures.

Hydraulic

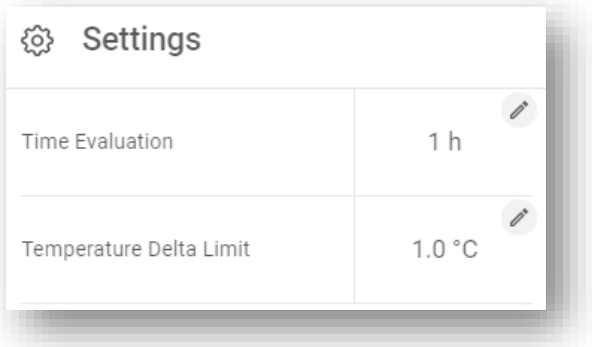


Low delta-T syndrome

A check is made on the entering and leaving temperature of the secondary loop, if the difference between 2 temperatures is grater than «Temperature Delta» for a «Time Evaluation» time, it is indicated.

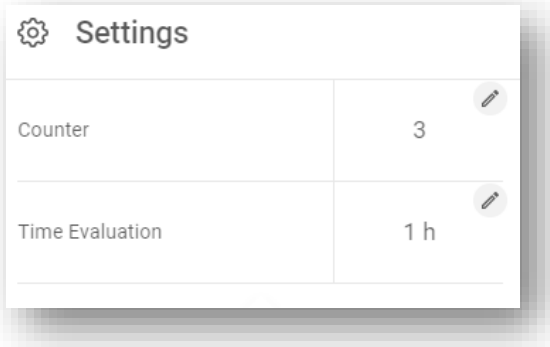
Temperature sensor failure loop N

If the temperature sensor isn’t available, present some failure, INTELLIPLANT adjusts the load according to the average of temperatures and not according to the temperature actually detected. This problem is indicated.



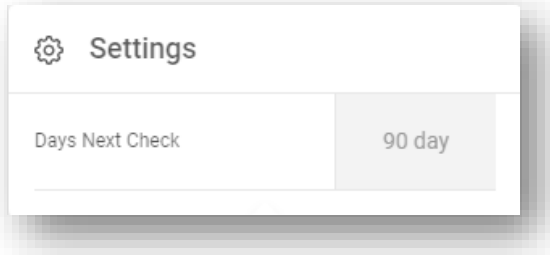
Leaving water temperature

A check is made to the leaving temperature of the primary loop and to the entering temperature of the secondary loop : if the difference between 2 temperatures is grater than the parameter “Temperature Delta Limit ” for a “Time Evaluation” time, it is segnalated.



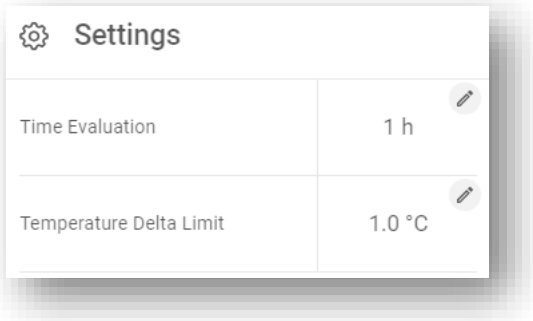
Plant short cycling

It is checked if the units present in the plant, carry out frequent ignitions/ shutdowns in a certain time «Time Evaluation». If the limit of ignitions/ shutdowns is exceeded «Counter», the number of ignitions/ shutdowns and the corresponding unit are indicated.



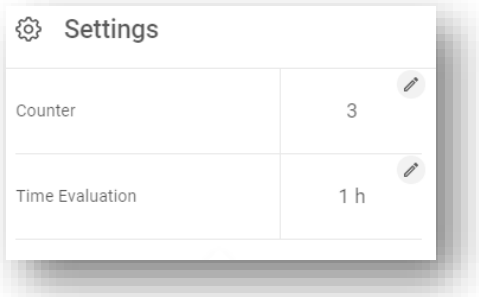
Filter Condition

Every few days «Days Next Check» is carried out a check on the degradation status of filters, cleaning.



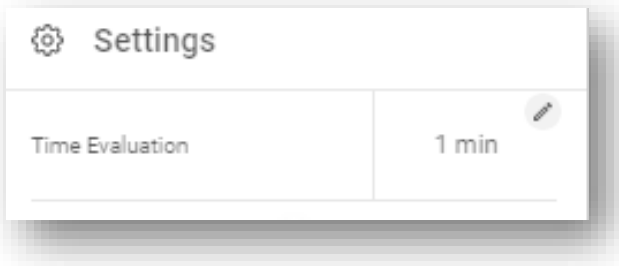
Leaving water temperature

A control is carried out on the output temperature to the primary circuit and on the input temperature to the secondary circuit: if the difference between the 2 temperatures, is higher than the parameter «Temperature Delta Limit» for a time «Time Evaluation» is reported.



Plant short cycling

It is checked if the units present in the plant, carry out frequent ignitions/ shutdowns in a certain time «Time Evaluation». If the limit of ignitions/ shutdowns is exceeded «Counter», the number of ignitions/ shutdowns and the corresponding unit are indicated.



Bypass control loop N (Temperature sensor)

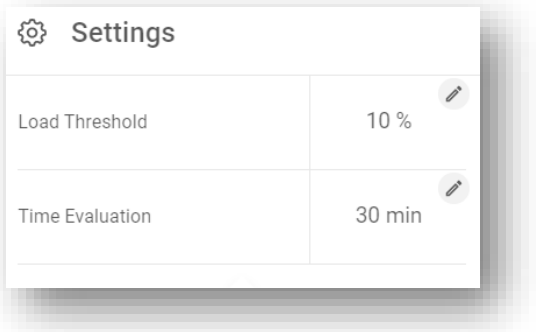
It carries out a control on the temperature of the bypass compared to the delivery and return temperature of the primary circuit. If the bypass temperature is closer to the temperature of the secondary circuit, a signal is sent

Bypass control loop N (Flow Meter)

It deals with making a control on the direction of flow in the primary and secondary circuit: if the value of the direction is a positive value, it means that the flow is in the primary circuit, if negative the flow is in the secondary circuit. If the value of the direction of flow, was the second case, the prediction is in the state of signaling.

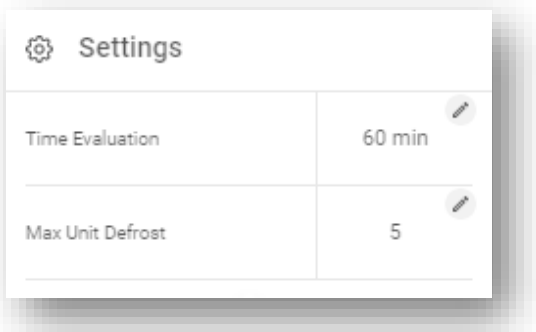
HVAC Equipment

Unlike the units that have the «Refrigeration» section, in the plant we find the «HVAC Equipment» section that deals with HVAC devices .



Low plant load

In the event that the plant works below a load percentage «Load Threshold» for a time «Time Evaluation», the reporting takes place and the percentage of load is indicated.

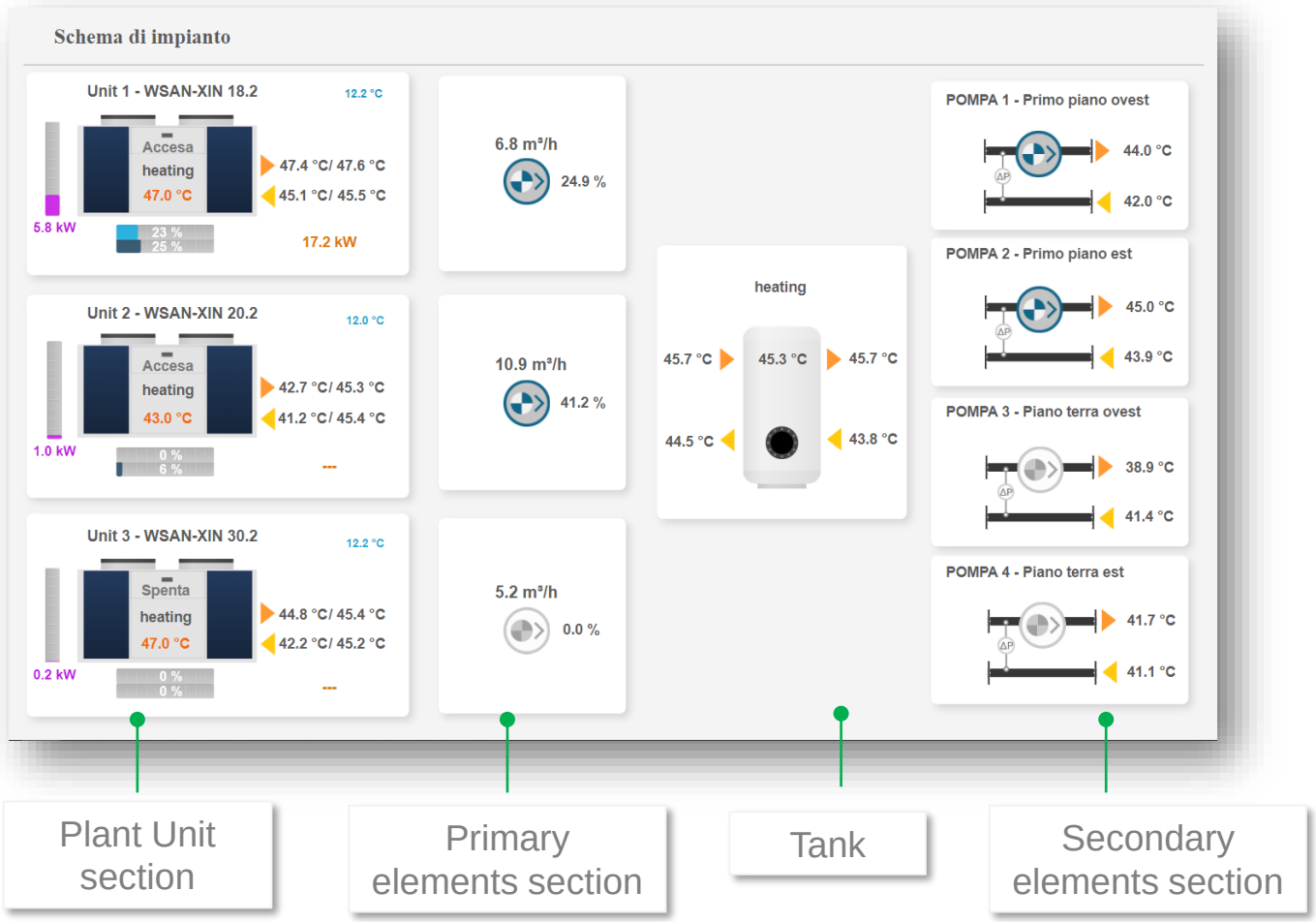


Defrosting operation

It is checked how many units are defrosting at the same time: if the maximum limit of units in the defrosting phase «Max Unit Defrost» is exceeded in a given time «Time Evaluation» is reported indicating the number of units in defrosting.

Plant Schematic

Page dedicated to the plant composition, which may vary according to the specific application.

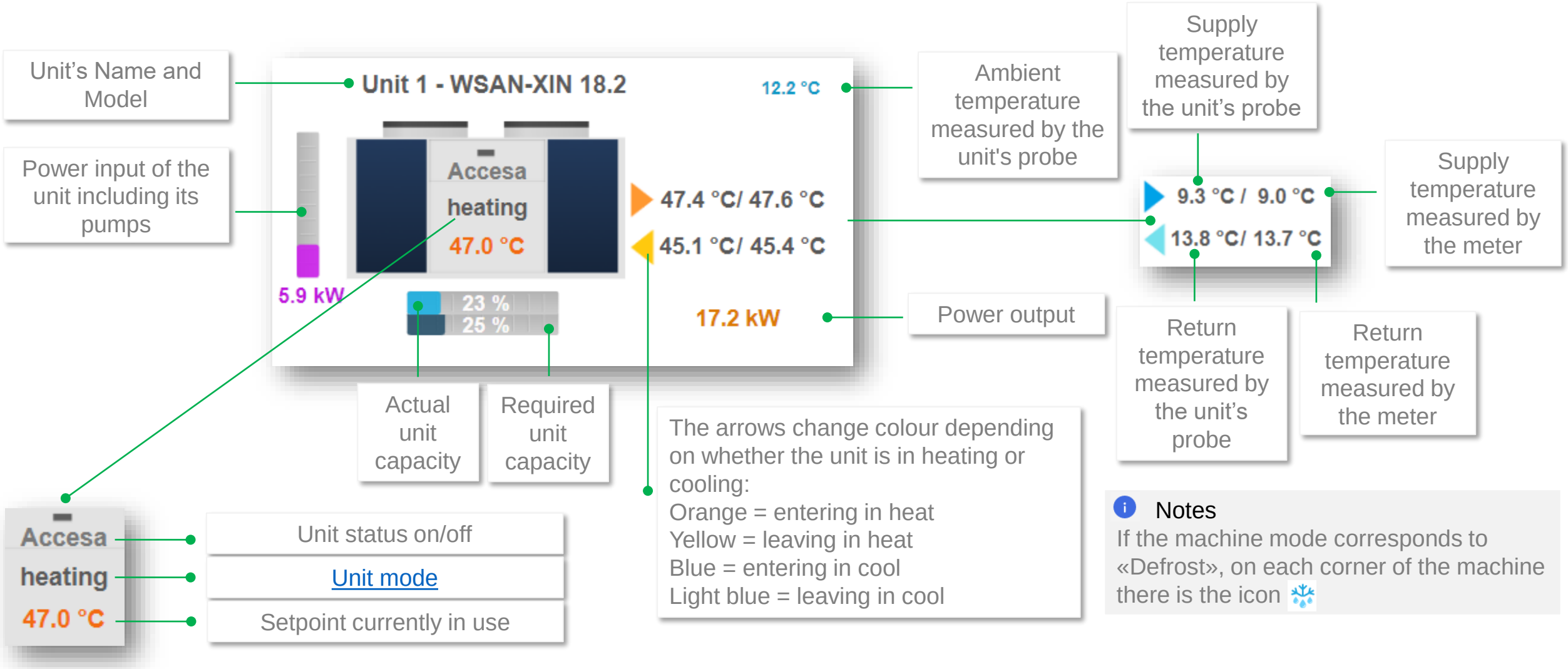


Notes

The figure above is an example of a specific case.
The elements of the "Primary Elements Section", the elements of the "Secondary Elements Section" such as the Storage Tank may vary due to the presence of the elements and whether or not they are controlled by Intelliplant.

Unit section

Section in which the units in the plant are listed with associated information.



Notes

If the machine mode corresponds to «Defrost», on each corner of the machine there is the icon ❄

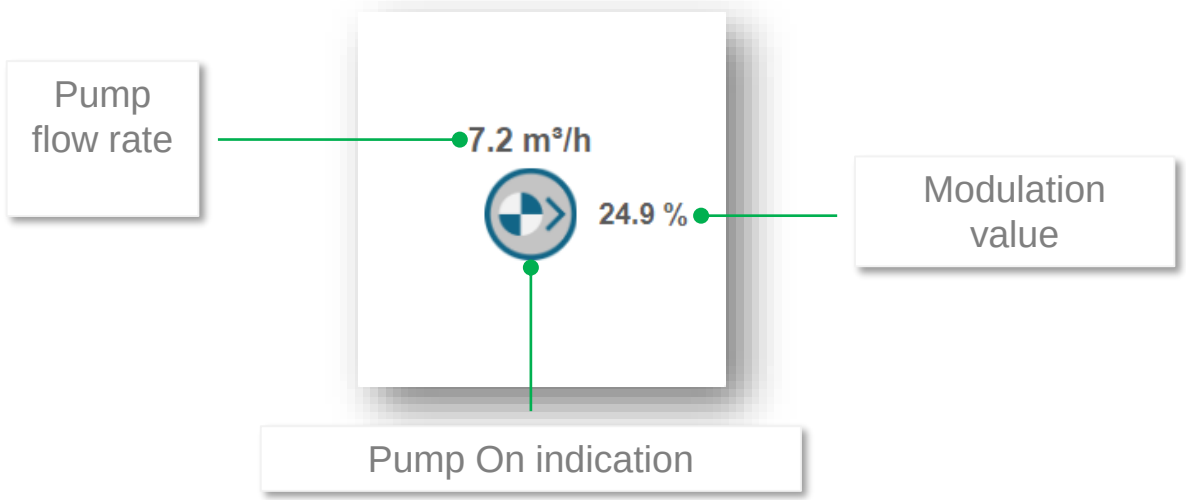
Notes

Temperatures measured by the meters may not be displayed if meters are not provided for the specific application.

Primary elements section and Secondary elements section

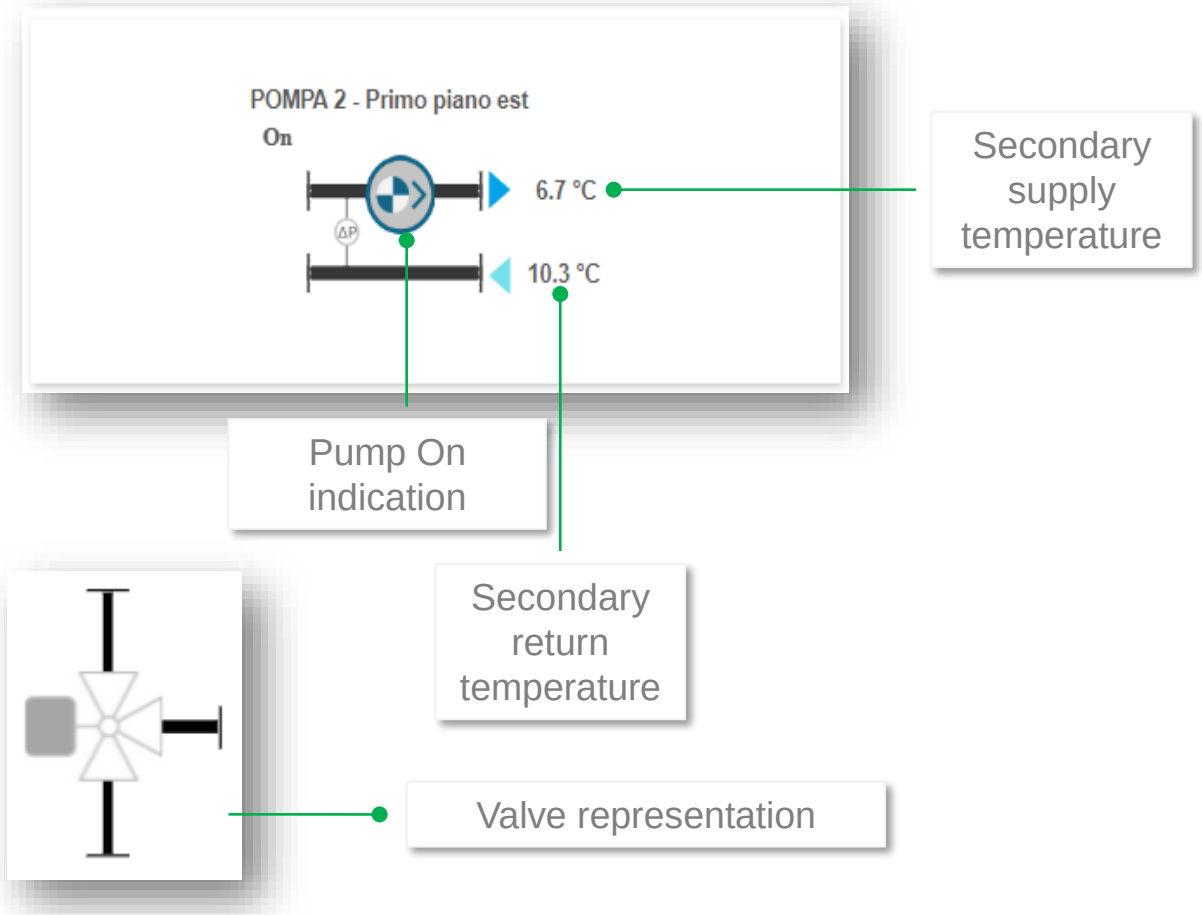
These 2 sections show the primary and secondary elements.

Primary elements section



In the "Primary elements section" in this case the pump is shown with the main data: pump status represented by the icon, flow rate and, as an inverter pump, also the modulation value.

Secondary elements section



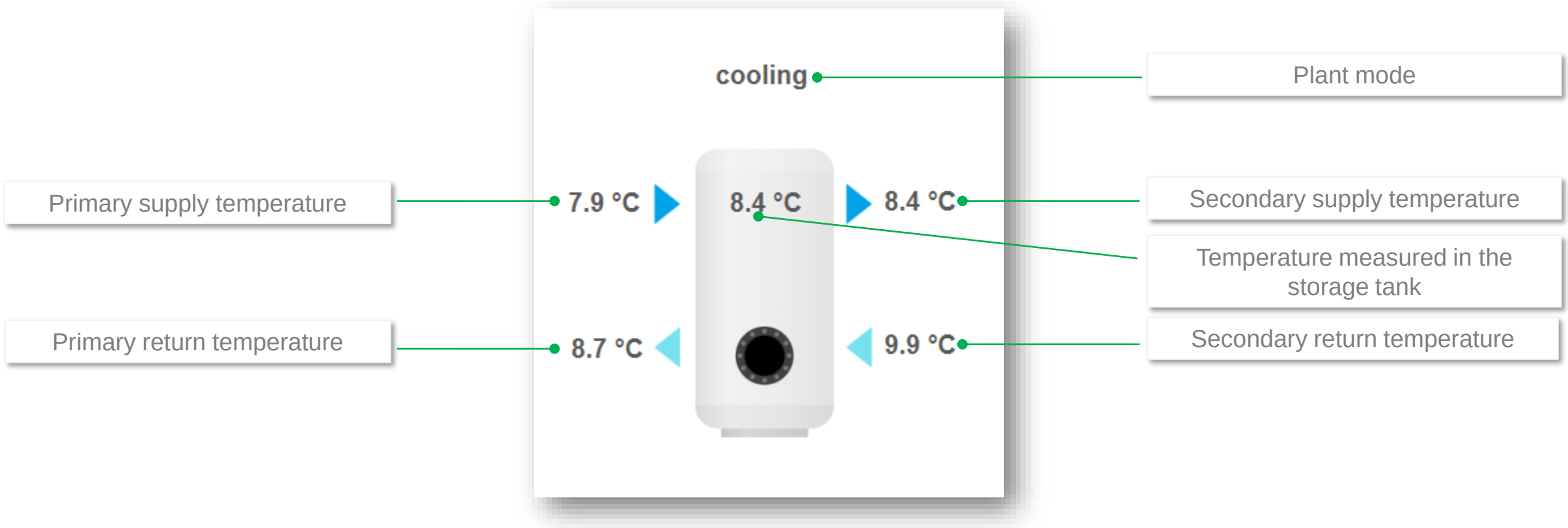
Notes

If the pump is not in use the icon is 

If the pump is an inverter type or the valve is modulating, the modulation is indicated.

Storage tank

The main temperatures measured by the storage tank temperature probes are indicated



Notes

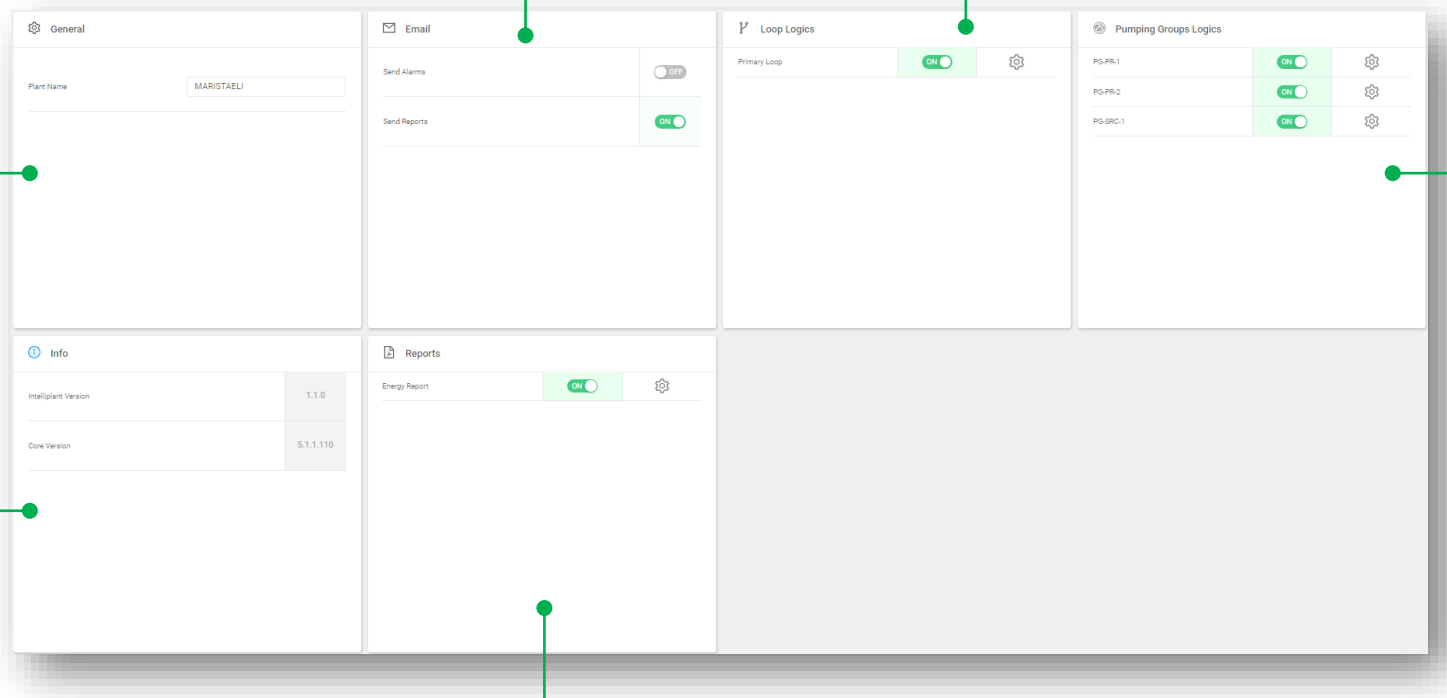
This element is not present in the Plant Schematic if it is not controlled by Intelliplant.
The temperature measured in the storage tank may not be indicated if there is no temperature sensor.

Settings

On/Off for sending emails regarding Alarms and Reports

Enabling/disabling logic in primary circuits

General info about the plant



On/Off of logic in pumping units

System controller version and FIN version

Enable/disable receiving reports as energy reports

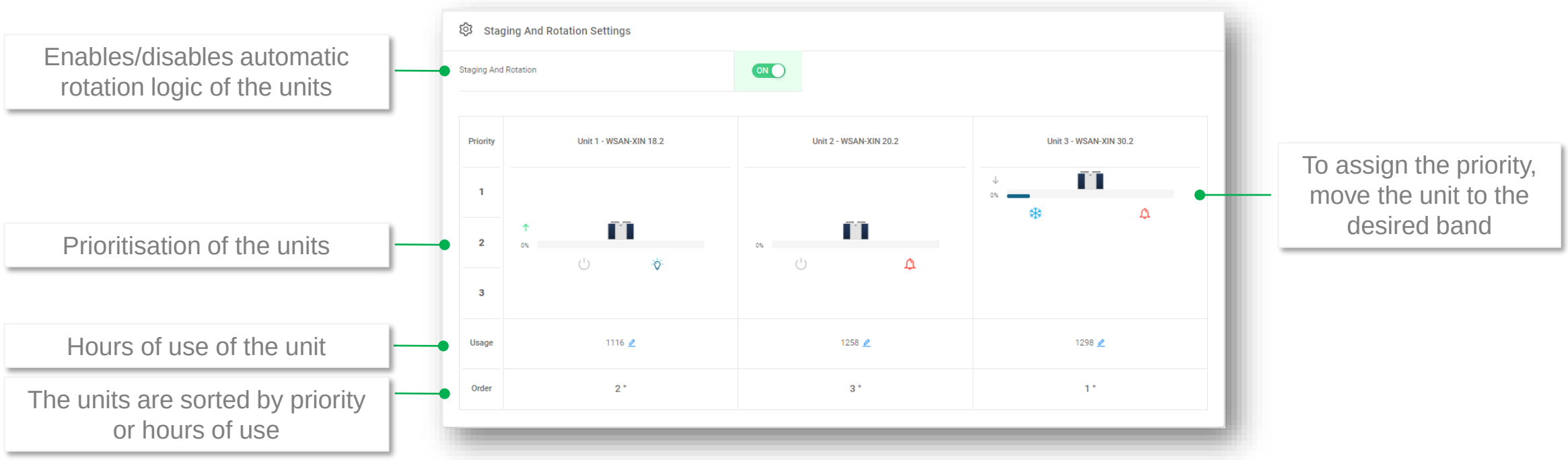
Page dedicated to editing the main plant parameters

Loop Logics Settings

Pressing the icon, in the "Loop Logics" section, opens the configuration page of the units' automatic rotation logic. It can be used for different types of devices such as hydronic units, pumps.

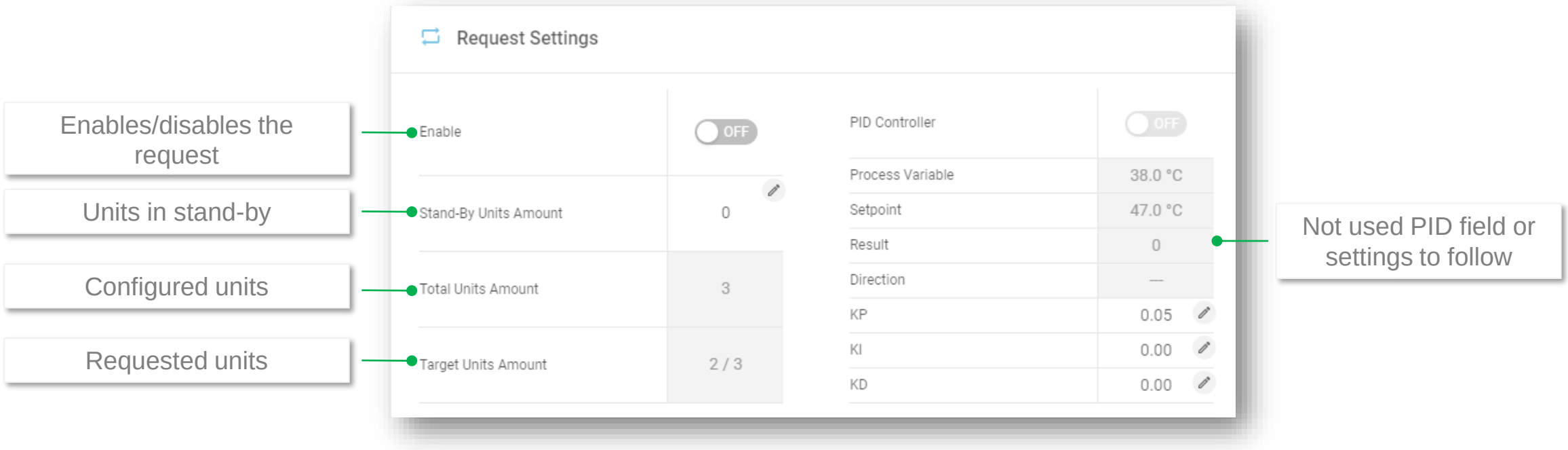
The same screen also appears for the settings of the "Pumping Group Logics" card. The priority allocation is then used by the logic to always start the unit with the highest priority.

If all units have the same priority, the unit's hours of operation are taken into account and in this case the unit with the least hours of operation will start. If the rotation logic is not enabled, the units will be started following the order given in the "Order" field, calculated on the basis of priorities if different, otherwise the hours of operation are taken into account. The unit with the highest order is the first to switch on and the last to switch off.

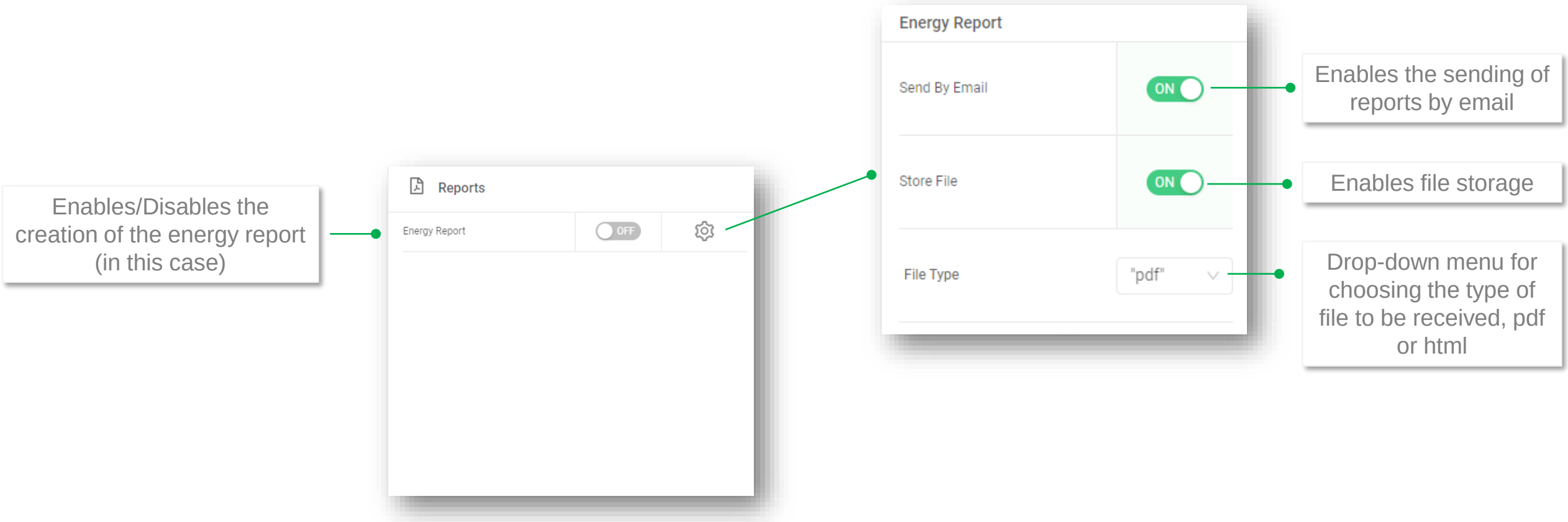


Request Settings

Next to "Staging and Rotation settings" is the "Request Settings" card, which decides when to switch a unit on or off according to the units' request logic.



Card containing all reports that can be enabled

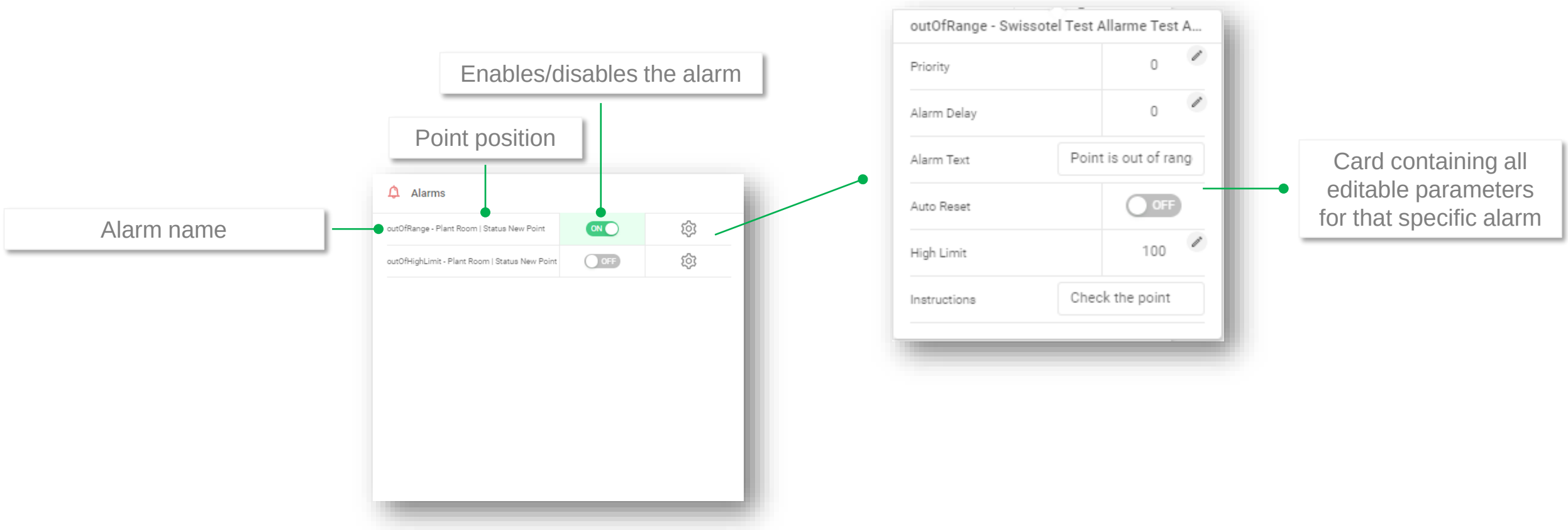


Notes

The card may not contain any elements if no specific reports have been requested in the application.
To make the sending of emails work correctly, the parameter «Send Reports» must also be enabled on the «Email» card on the same page.

Alarms

Card dedicated to configurable alarms for the specific plant application to which specific control logics have been applied and then be applied to stitches.



Notes

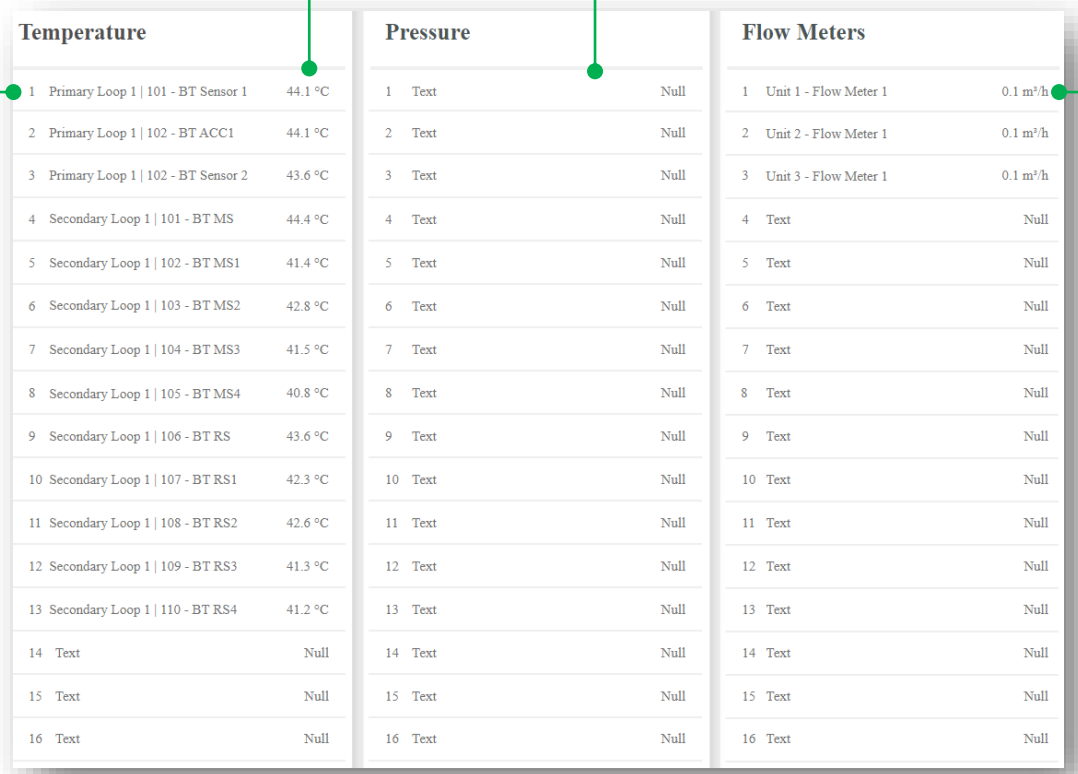
Card is not present if configurable alarms are not used.

Temperature read by the temperature sensor

Column for any pressure gauges

Temperature sensor name

Flow rate measured by the flow meter



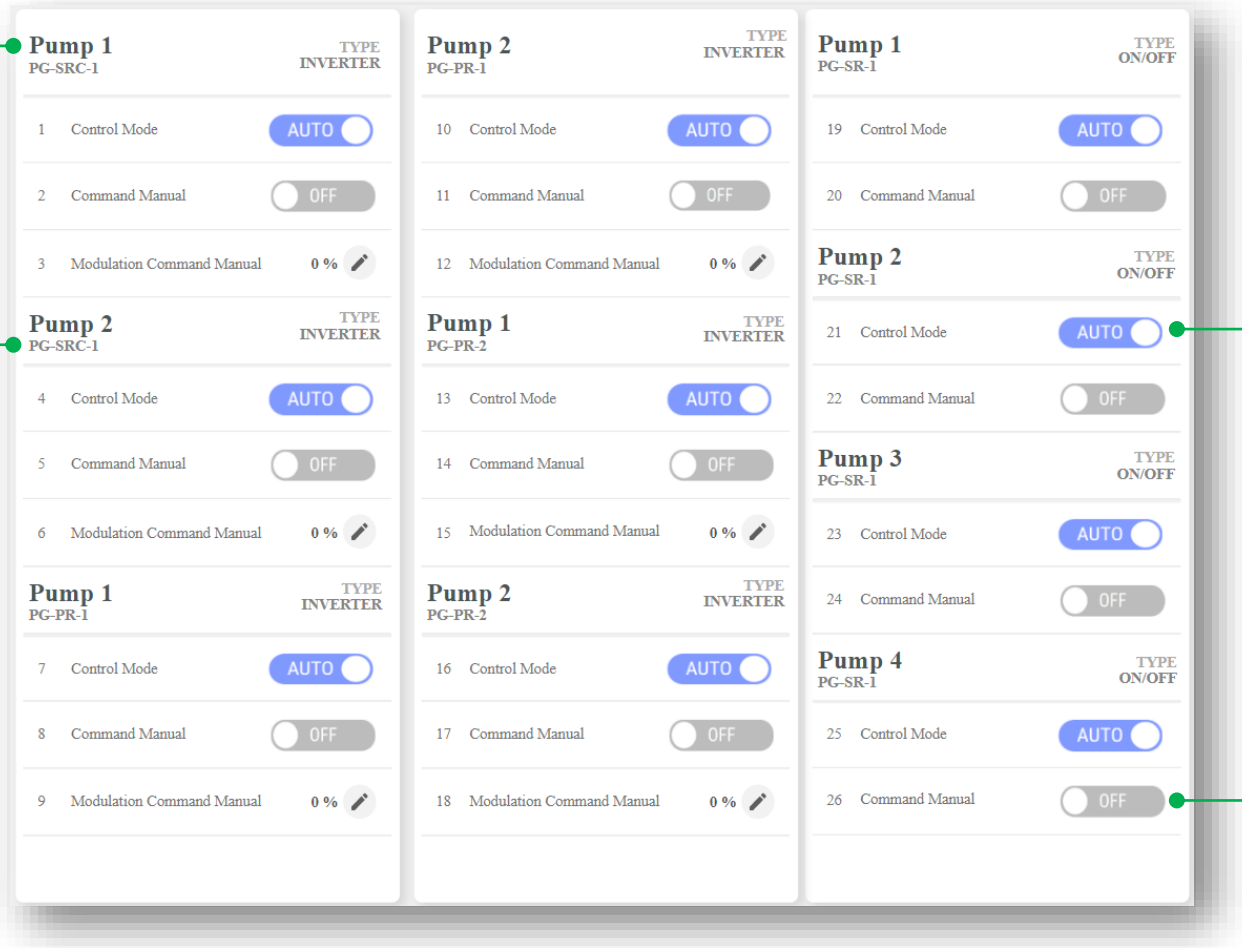
Temperature			Pressure			Flow Meters		
1	Primary Loop 1 | 101 - BT Sensor 1	44.1 °C	1	Text	Null	1	Unit 1 - Flow Meter 1	0.1 m³/h
2	Primary Loop 1 | 102 - BT ACC1	44.1 °C	2	Text	Null	2	Unit 2 - Flow Meter 1	0.1 m³/h
3	Primary Loop 1 | 102 - BT Sensor 2	43.6 °C	3	Text	Null	3	Unit 3 - Flow Meter 1	0.1 m³/h
4	Secondary Loop 1 | 101 - BT MS	44.4 °C	4	Text	Null	4	Text	Null
5	Secondary Loop 1 | 102 - BT MS1	41.4 °C	5	Text	Null	5	Text	Null
6	Secondary Loop 1 | 103 - BT MS2	42.8 °C	6	Text	Null	6	Text	Null
7	Secondary Loop 1 | 104 - BT MS3	41.5 °C	7	Text	Null	7	Text	Null
8	Secondary Loop 1 | 105 - BT MS4	40.8 °C	8	Text	Null	8	Text	Null
9	Secondary Loop 1 | 106 - BT RS	43.6 °C	9	Text	Null	9	Text	Null
10	Secondary Loop 1 | 107 - BT RS1	42.3 °C	10	Text	Null	10	Text	Null
11	Secondary Loop 1 | 108 - BT RS2	42.6 °C	11	Text	Null	11	Text	Null
12	Secondary Loop 1 | 109 - BT RS3	41.3 °C	12	Text	Null	12	Text	Null
13	Secondary Loop 1 | 110 - BT RS4	41.2 °C	13	Text	Null	13	Text	Null
14	Text	Null	14	Text	Null	14	Text	Null
15	Text	Null	15	Text	Null	15	Text	Null
16	Text	Null	16	Text	Null	16	Text	Null

In the figure are shown in reading only the essential data regarding temperature sensors, pressure and flow meters if any, are also present data regarding the units, pumps or pumping groups.

Emergency

Pump name

Pumping unit belonging (PG-...-1) and loop belonging (SRC = Source)



Automatic / manual adjustment mode

Command manual On / Off only if «Control Mode»is set to manual

Notes

The nomenclature of pumps, pumping units, as of valves if any, is provisional.
It will be modified according to the specific application.

Page dedicated to timely intervention on pumps, pumping groups, valves in case of emergency and/or danger.
If one or both of the above situations should occur, all devices can be given manual control.

Parameters

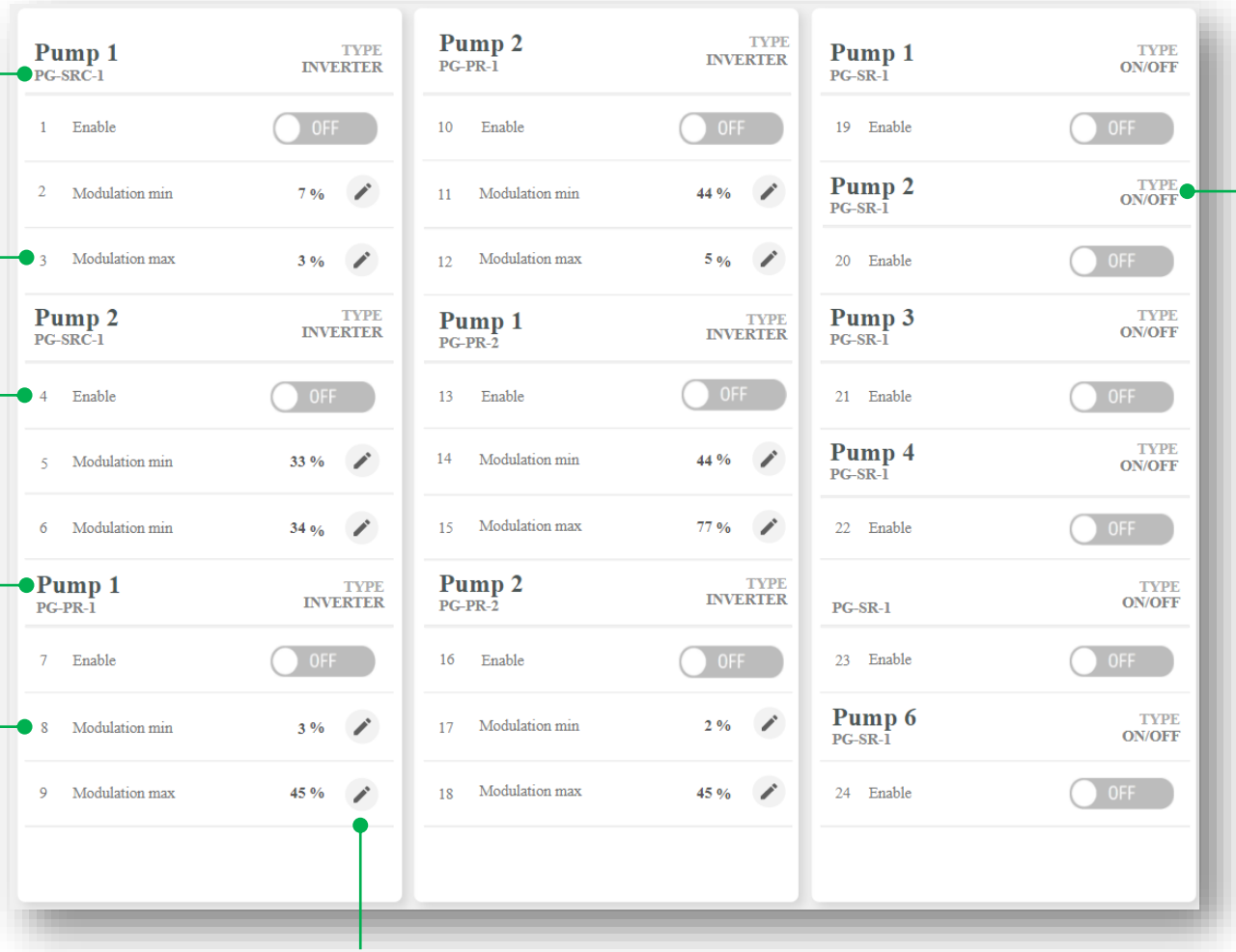
Pumping group name (PG - ... - 1) and loop membership (SRC = Source, PR = Primary Reversible,...)

Maximum modulation if inverter pump

Enable / Disable of pump

Pump name

Minimum modulation if inverter pump



Button for setting numerical parameters

Tipology of pump

Notes

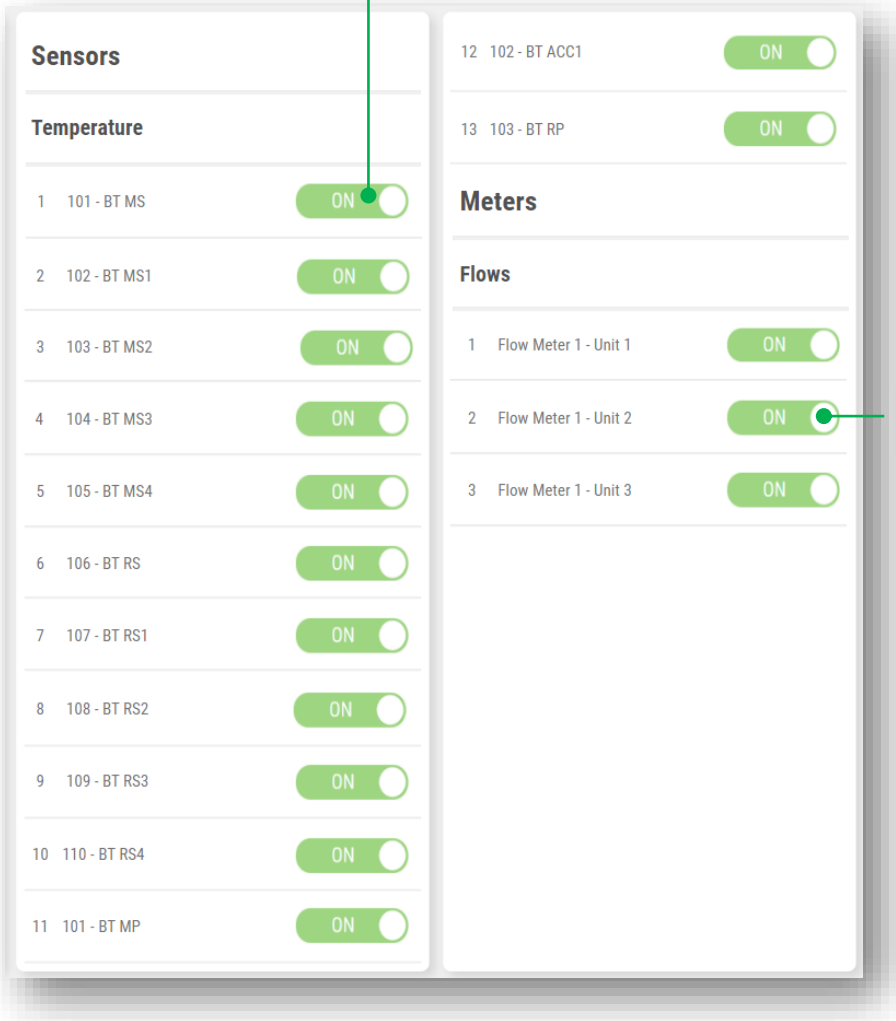
The nomenclature of pumps, pumping units, as of valves if any, is provisional.
It will be modified according to the specific application.

Parameter setting page

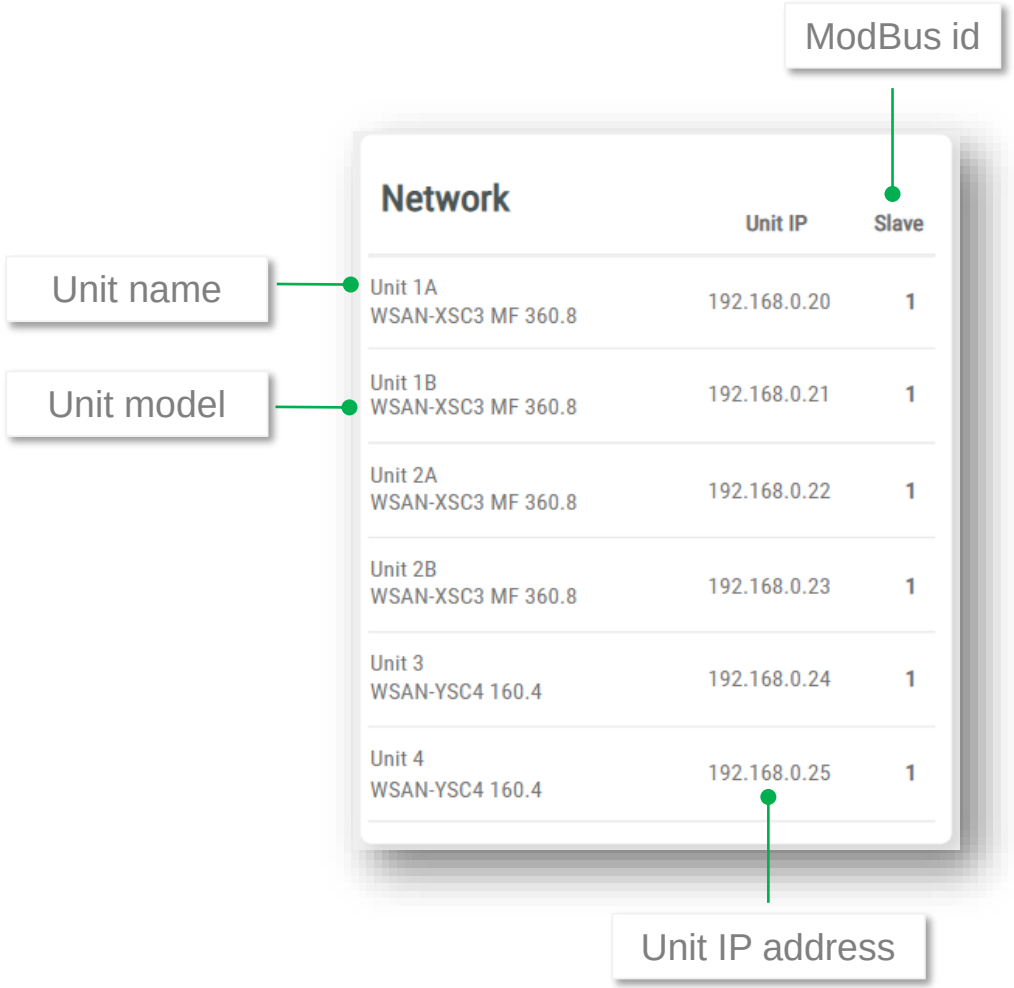
Notes

The nomenclature of temperature sensors, pressure meters, flow meters is provisional. It will be modified according to the specific application.

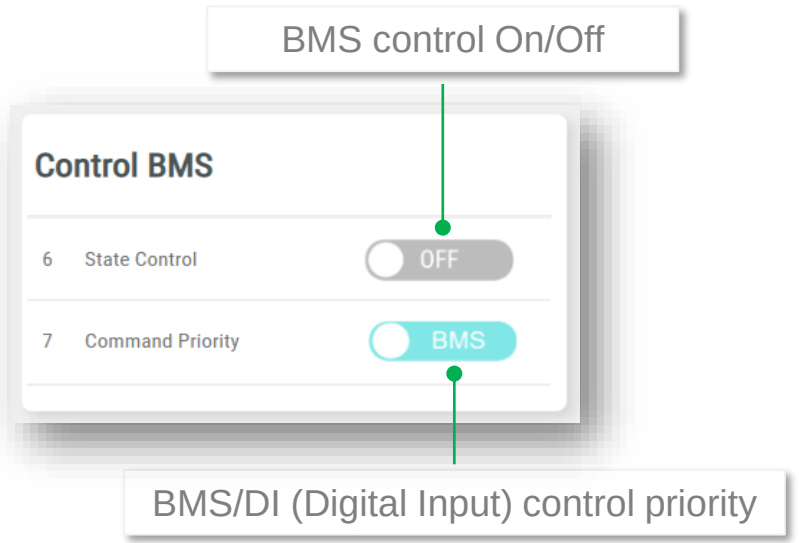
Enable / Disable of temperature sensor



Enable / Disable of flow meter

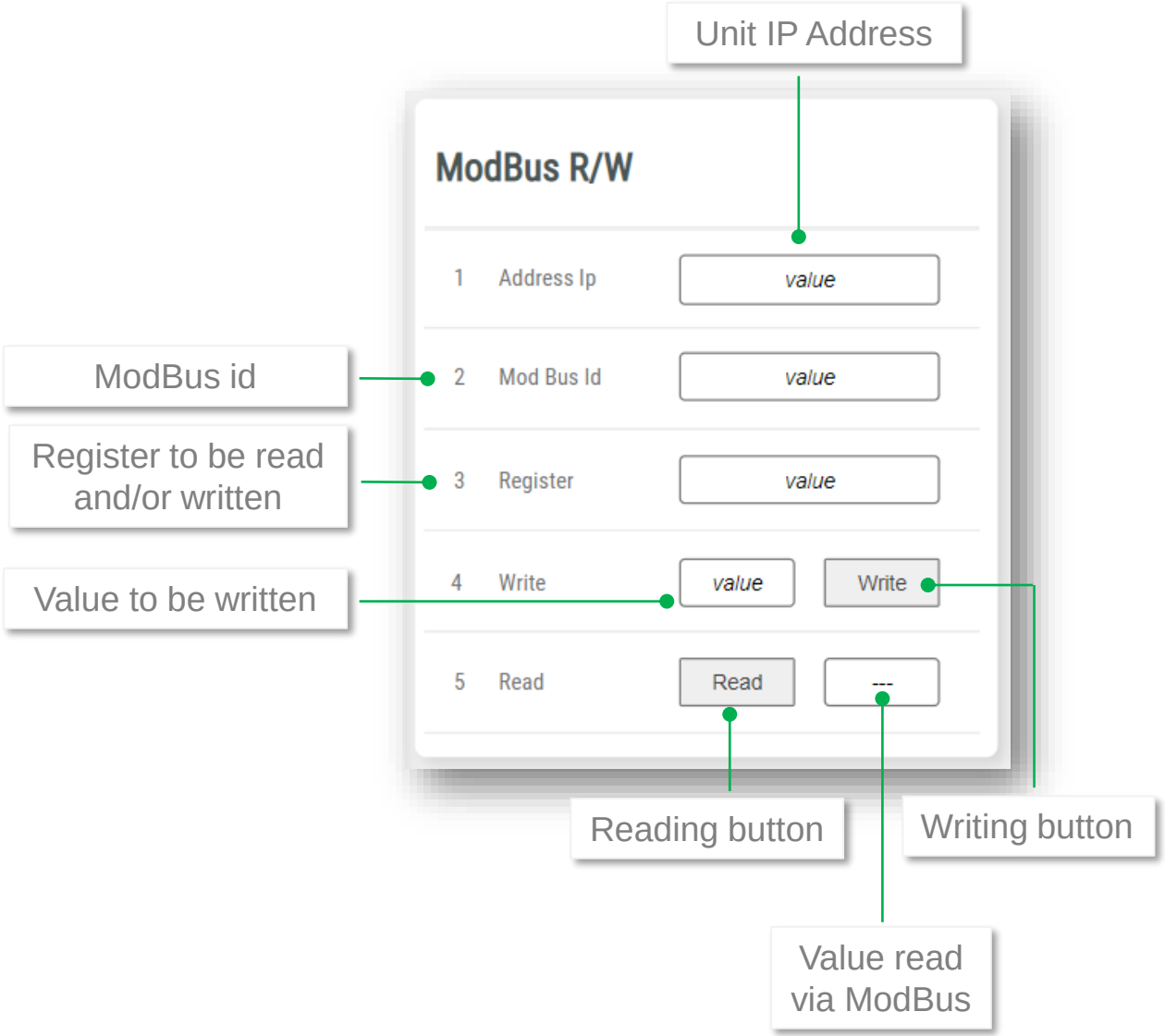


Card to read the main values, from the network point of view, of the units which are name, unit model, IP address and ModBus Id.

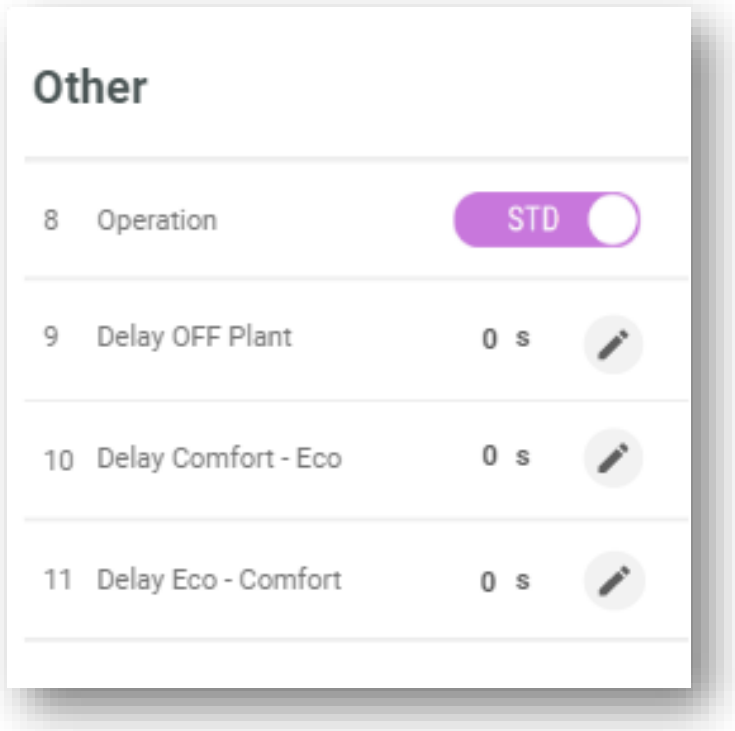


The "Control BMS" card controls Intelliplant via BMS and therefore remotely. This is enabled via the "State control" parameter and priority can be given to either the BMS or the Digital Input, which corresponds to the control box connectors.
Giving higher priority to the BMS means that the data that the BMS sends to the Intelliplant PC is sent as a Modbus signal and converted for reading.
If, on the other hand, priority has been given to Digital Input, there are cables physically connected from the BMS to the terminal block in the control box and the data sent arrives “clean” without the need for conversion.
If the BMS control is enabled, selecting manual control ON or Off from the "Plant Status" card on the "Plant Dashboard" has no effect as the remote control is on.

ModBus R/W and «Other» section



Tool for reading/writing a register via ModBus



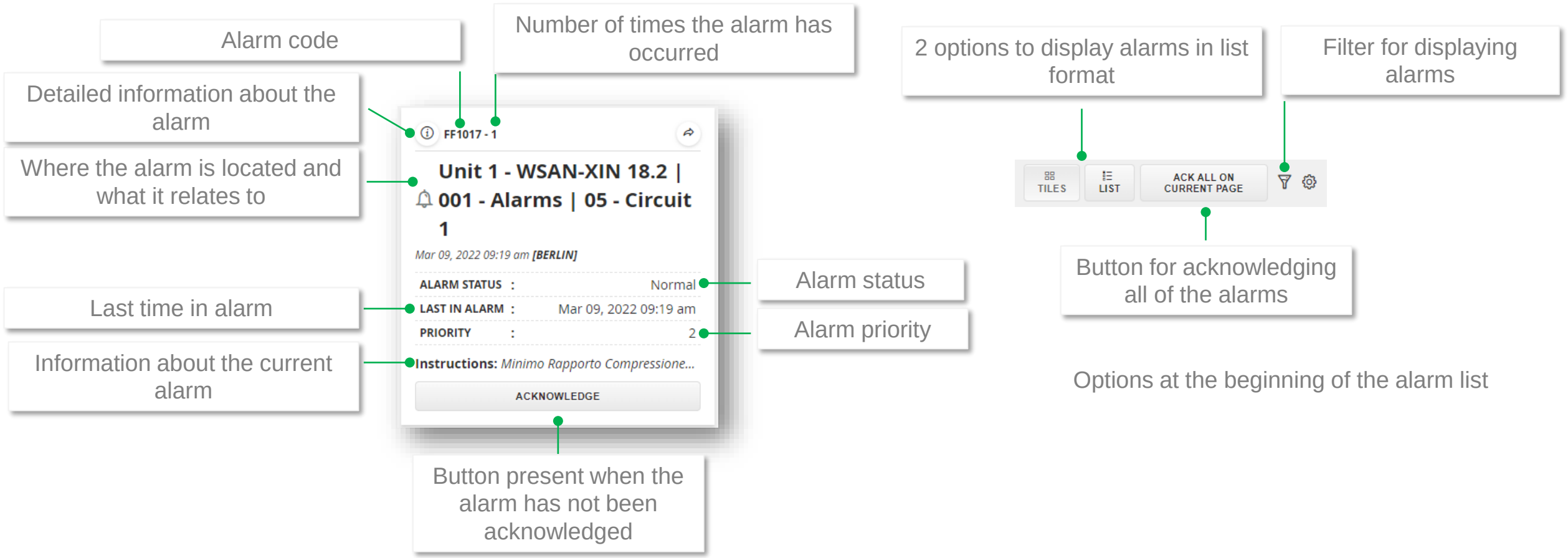
The «Other» section is devoted to specific functions created for the specific plant.

Notes

The operation of plant-specific functions, are described in detail in the plant "Application Note".

Alarms

Opening this app displays the list of active alarms and cleared alarms .



Notes

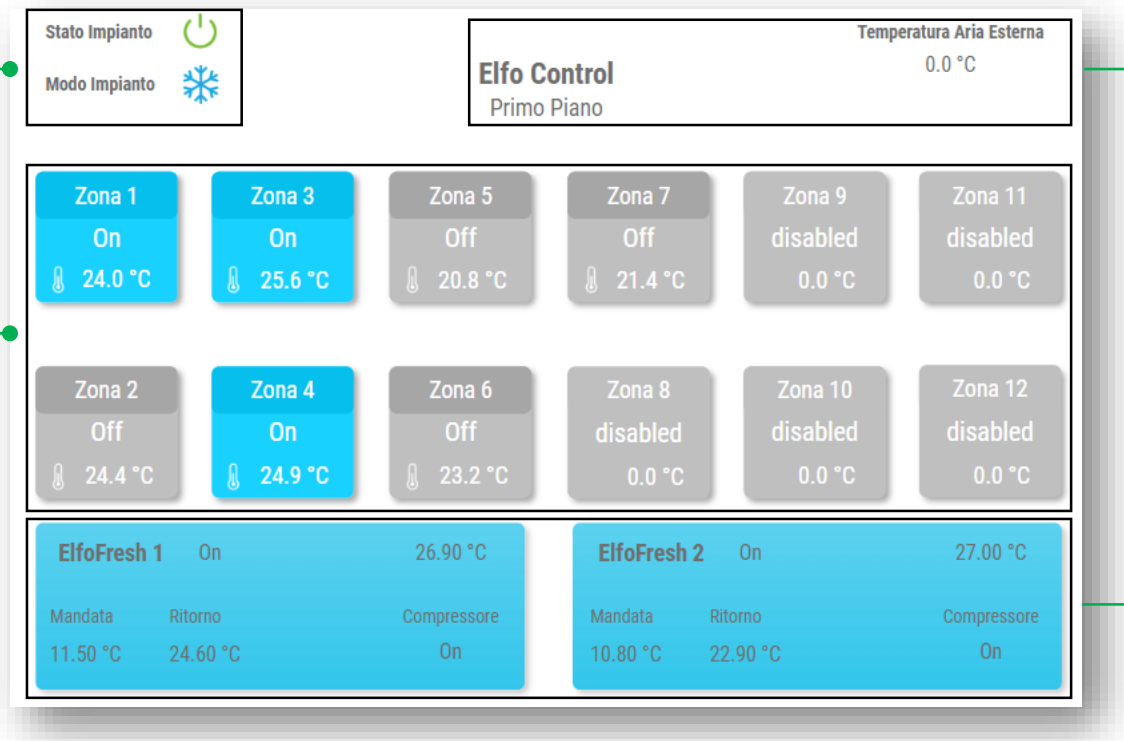
If the alarm has been displayed, the message "Acknowledged" will be shown.
The number of times a given alarm has occurred is reset daily.
"Alarm Status" is given as "Normal" if the alarm has been cleared, and "Alarm" if the alarm is still active.

Elfo Control

Elfo Control is the representative application of the Elfo Control system and is composed as follows :

Dedicated section to plant information

Zones of the plan are depicted with relevant information



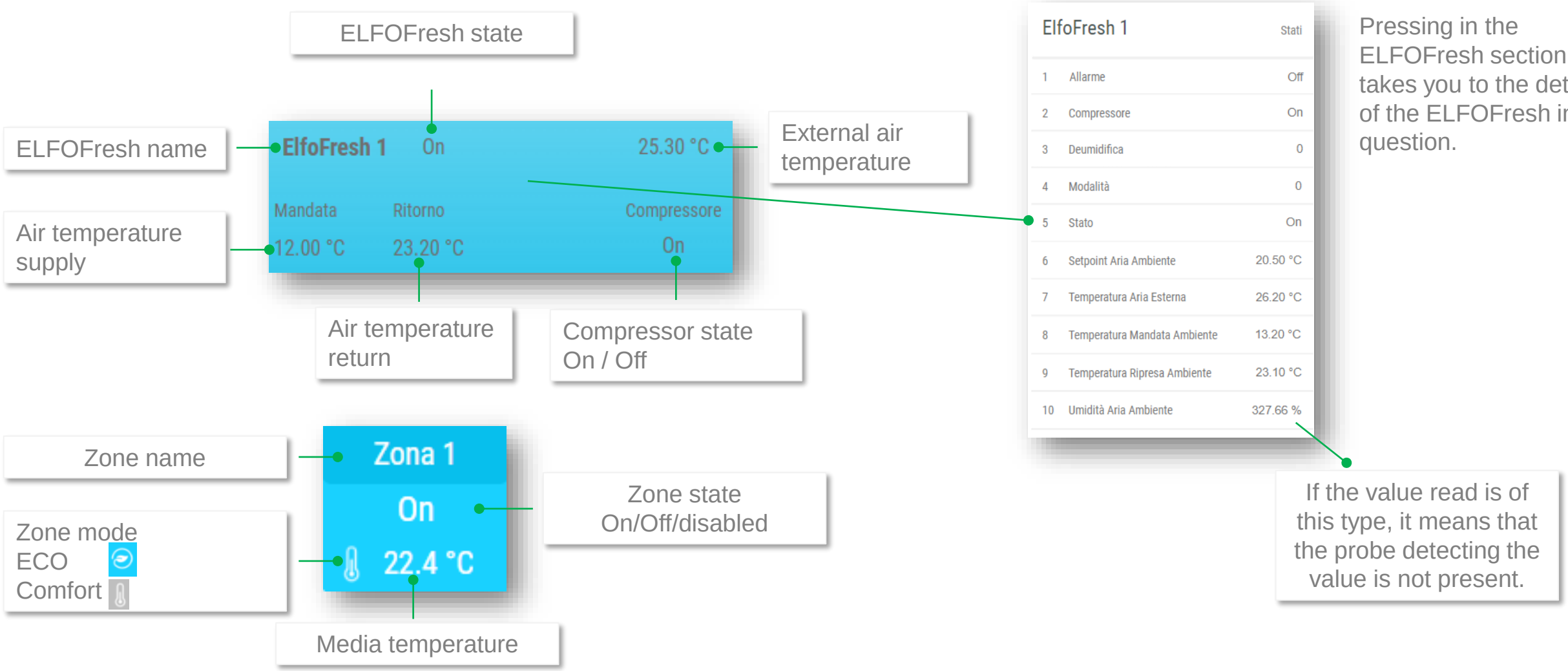
Contains information about the plan in which the Elfo Control system is used.

Dedicated section to ELFOFresh representing the main information

Notes

If the use of Elfo Fresh is not provided in the specific application, the section is not present.

Zone and ELFOfresh information



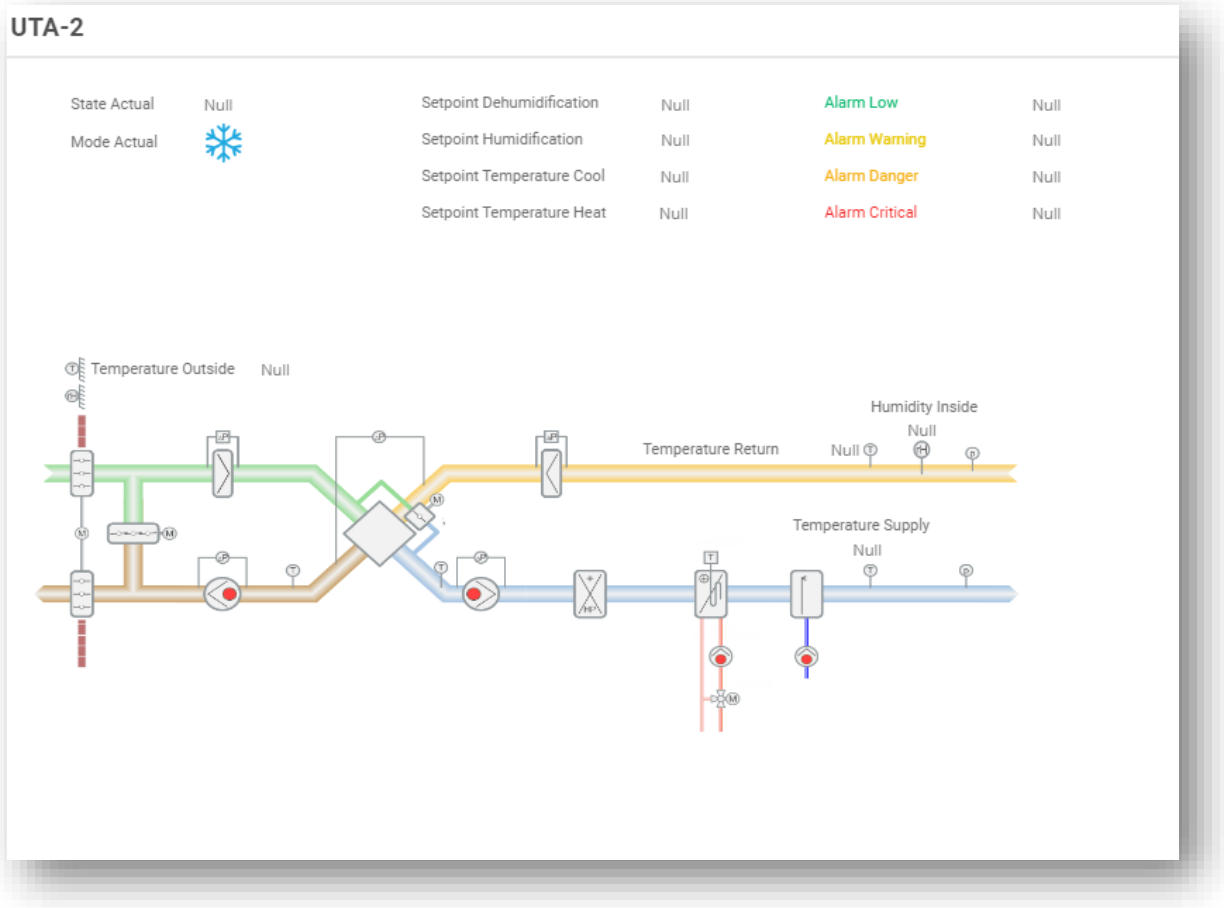
Notes

In case ELFOFresh is heating, the container rectangle of the inherent information turns orange.
It behaves the same way the zone when it is heating.
In case the zone is disabled, the zone is gray in color and from Elfo Control's specification, there are a maximum of 12 zones.

UTA

UTA takes care of showing the main parameters regarding air handling units such as machine status, machine mode, machine setpoints and alarms.

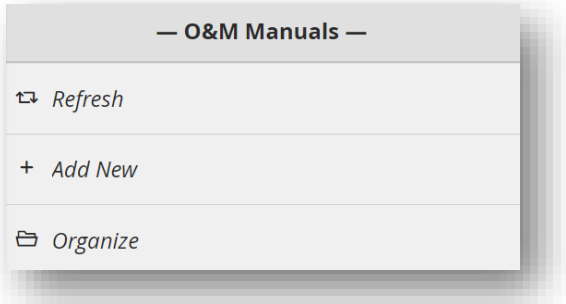
For this reason, the app is only present in the case of using air units in the system.



O&M Manuals

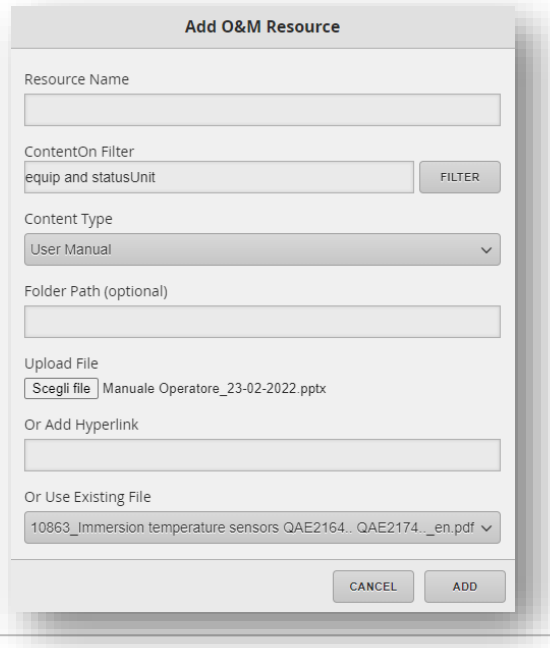
O&M Manuals is a useful app for those working on the plant as it can contain manuals, plant diagrams, wiring diagrams and useful documentation for implementing the plant.

When you click on the app, the screen looks like this:

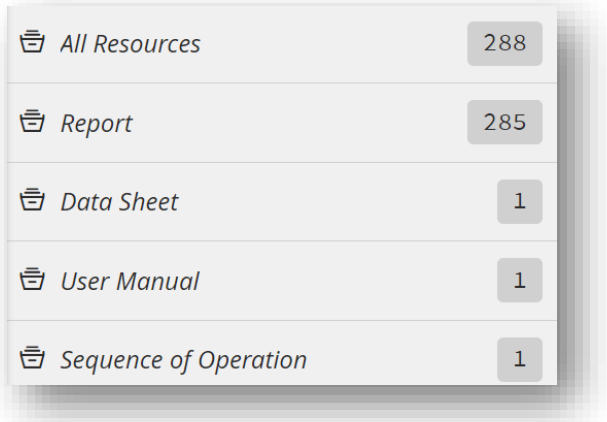


In the "Add New" section, you can add new documentation and so on.
"Organise" allows you to organise files into folders.
"Refresh" updates files and folders after a new entry.

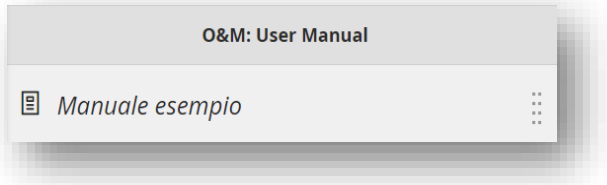
If you have chosen to enter a new document such as a manual, it must first be added in PDF format. The screen that appears will look like this:



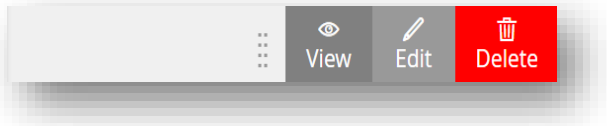
There are 3 mandatory fields to be completed: "Resource Name" where you indicate the name to be displayed when that particular file is searched for, "Content type" where you indicate the category in which the file will be put. The example is with a manual, so the category to choose is User Manual. The last mandatory parameter is the "Upload file" field where you indicate the path of the file to be uploaded.
Once these 3 fields are completed, press "add" and update the files in the "Refresh" section.



On the side you can see that the "User Manual" category has been added if the category was not present, otherwise it just adds an item to the category.



If you click on the corresponding category, you will find the file uploaded therein, in this case "Example manual".



If you click on the file, you have the choice between "View" which allows you to have a read-only view of the file or you can view the file in PDF format and then download it with the "Reports Download" option.
"Edit" allows you to modify the 3 mandatory settings mentioned above and other optional settings.
"Delete" allows you to delete the file from the desired category.

Unit request algorithm and unit rotation algorithm

The control logics which control the hydronic units, pumps and pumping groups are explained below.
Two separate algorithms are used to control the hydronic units: the unit request algorithm and the unit rotation algorithm.

Unit request algorithm

It decides when to switch a unit on or off.
There are also conditions that the algorithm has to check before it can start working:

- The plant is switched ON
- The water circuit has a request

A unit is switched on if 2 conditions are met:

- The control temperature does not exceed the return temperature setpoint of the hydronic circuit
- Switched-on units have maintained the maximum required capacity for a parameterised time

Whereas the unit is switched off for a parameter time if:

- The control temperature has met the return temperature setpoint of the hydronic circuit
- The capacity requested can be met by the units switched on except for the unit selected to be switched off by the unit rotation algorithm.

When the plant is switched off, all units are switched off at the same time.
When a unit has been switched on or off, the algorithm waits for a parameterised time before switching on or off the next unit.

Unit rotation algorithm

It decides which unit will be switched on next and which unit will be switched off next.
There are also conditions that the algorithm has to check before it can start working:

- Circuit type and mode
- Type of unit
- Maximum capacity required by a single unit on the user side and recovery side
- Unit availability
- Unit’s capacity to deliver power
- Priority

These conditions are verified if the plant consists of both multi-function and 2-pipe units.
Once these conditions have been verified, a score is given to the individual units and the algorithm sorts the units according to priority in decreasing order.
For the next switch-on, the available and not switched-on unit with the highest priority is selected, while for the switch-off, the available and switched-on unit with the lowest priority is selected.
If the plant consists only of either multi-function or 2-pipe units, the rotation logic only takes into account:

- Priority
- Wear
- Order

Control of pumps and pumping groups

The pumps and pumping groups are controlled based on the type of pumps and whether they are single pumps or pumping groups, thus enabling:

- On/Off of pumps belonging to pumping groups or single pumps
- Inverter pumps belonging to pumping groups or single pumps
- Inverter controlling a pump group
- Mixed pumping groups with both On/Off and inverter pumps

In the control the single pump is treated as a pumping group consisting of a single pump and the inverter pumps are controlled with fixed percentages.

The control of the pumps also depends on whether the units are controlled automatically or manually:

Automatic control

The configuration is done in the "Settings" in the "Pumping Group Logics" card by pressing to open th umping group settings", assigning the priority to the units in the "Priority" section and deciding the switch-on sequence of the pumps of each pumping group according to the priority and wear of each pump.

The units are switched on as follows:

- The control logic sends a switch-on request to the unit
- This command is sent to the corresponding pumping group, the pump is selected and switched on
- The pre-pumping time is then started, when it has elapsed the unit is switched on

The units are switched off as follows:

- The control logic sends a switch-off request to the unit
- The unit shuts down and the post-pumping time is started
- After this time has elapsed, the shut down command is sent to the corresponding pump.

Manual control

If the unit is controlled in manual mode, the corresponding pumps must also be controlled in manual mode.

Notes

- If all available pumps are in alarm, the control logic excludes, for the purpose of unit rotation, the units to which they are connected.
- If the pump goes into alarm during the pre-pumping time or the pump receives the On command but is not switched On at the end of the pre-pumping time, the pumping group logic selects the first available pump. If there are no pumps available, the unit is switched off.
- If, during operation, the corresponding pump goes into alarm, the unit is switched off.

Inverter control of pumping groups

Each unit is associated with one or more pump controllers (inverters) depending on the plant configuration. The inverters are controlled in different ways depending on whether the connected units are controlled automatically or manually.

Automatic control

If in automatic mode, the units are switched on as follows:
The control logic sends a switch-on request to the unit. The switch-on command is sent to the corresponding inverter. Once this is done, the pre-pumping time starts and once it has elapsed, the switch-on command is actually sent to the unit.
The units are switched off as follows:
The control logic sends a switch-off request to the unit.
Once the unit shuts down, the post-pumping time is started. The inverter performs in 2 different ways depending on the unit status:

- It is off if the units connected to it are off
- It stays on if the units connected to it are on

Manual control

If the unit is controlled in manual mode, the corresponding inverters must also be controlled in manual mode.

Notes

- If the inverter is in alarm, and for the purpose of unit rotation, the control logic excludes the units to which it is connected.
- If the inverter goes into alarm during the pre-pumping time or the inverter receives the On command but is not switched On at the end of the pre-pumping time, the unit is switched off.
- If the inverter goes into alarm during operation, the connected units are switched off.

Notes

In the case of multi-function units with hydraulic connection to two pumping groups, the sequence of operations is carried out simultaneously on the user side and recovery side.
The presence of a single inverter or pump alarm is sufficient to:

- exclude the unit from unit rotation
- prevent switch-on
- force switch-off

depending on the control phase.

Difference between single pump control and inverter

In a single pump, it can be said that there is a "1:1" relationship between pump and unit:

- The pump is switched off → the unit is switched off
- The pump is switched on → the unit is switched on

In the case of inverter control, the relationship is "1:N" as there is usually 1 inverter and N units:

- If you want to switch on a unit and it is the first one, both the inverter and the unit will be switched on
- If you want to switch on a unit and it is the second one, only the unit will be switched on but not the inverter as it is already switched on
- If you choose to switch off a unit and it is the first to be switched off, the unit will be switched off but not the inverter because it has other units connected to it
- If you want to switch off a unit and it is the last one, the unit will be switched off, but so will the inverter as no other units are switched on.

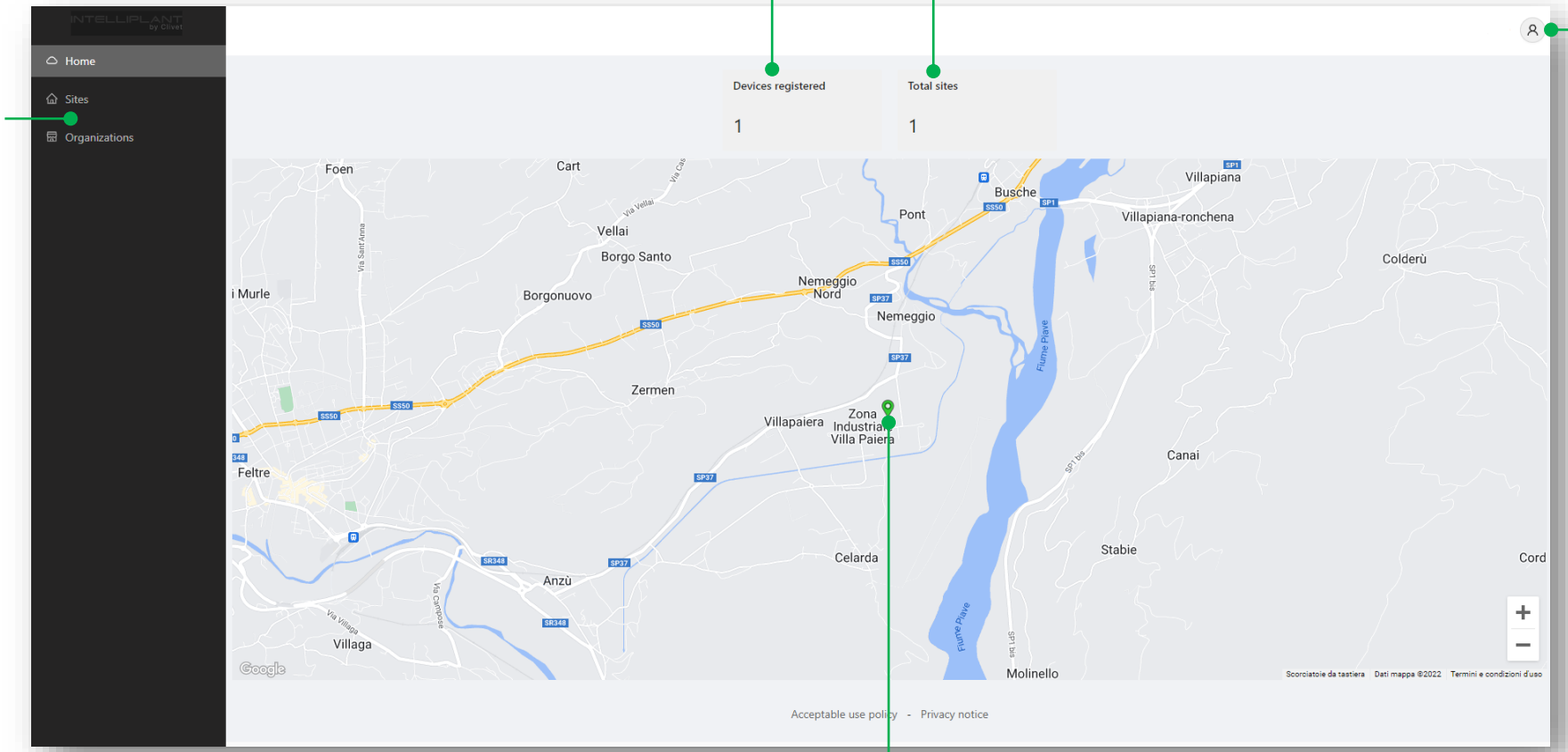
In the 3 previous pages in which the algorithm of unit request, the algorithm of unit rotation, the control of pumps and pumping units, the control of inverter of pumping units are described refer to standard installations/applications.
Any design variation, specific customer requests or any restriction prior to or during the installation and commissioning phase of the system can modify the regulation and supervision of the cooling units considered.
The final logic of plant control are designed and implemented by the field personnel in charge of the activities of "Development and start-up" (Execution & Commissioning Engineers) and may differ from what is stated in this document based on specific requests received during start-up.

Cloud access and remote plant control

To be able to control a plant remotely, you need to be registered with the cloud.
A new user can register as follows:

- The new user is asked by a Clivet employee for a valid email and telephone number
- The employee then registers the new user to the cloud
- The new user will then receive an email containing a temporary password and will be asked to complete registration as follows:
  - Access the cloud by entering the temporary password, usable only for the first login
  - The user is then prompted to enter a new complex password
  - The user is logged in and must press the registration button
  - The user is then asked to accept the policy/terms and conditions of use by scrolling to the end and enabling the "Accept" button
  - After accepting, the user presses continue
  - The user will then be moved to the portal and can start using the plant

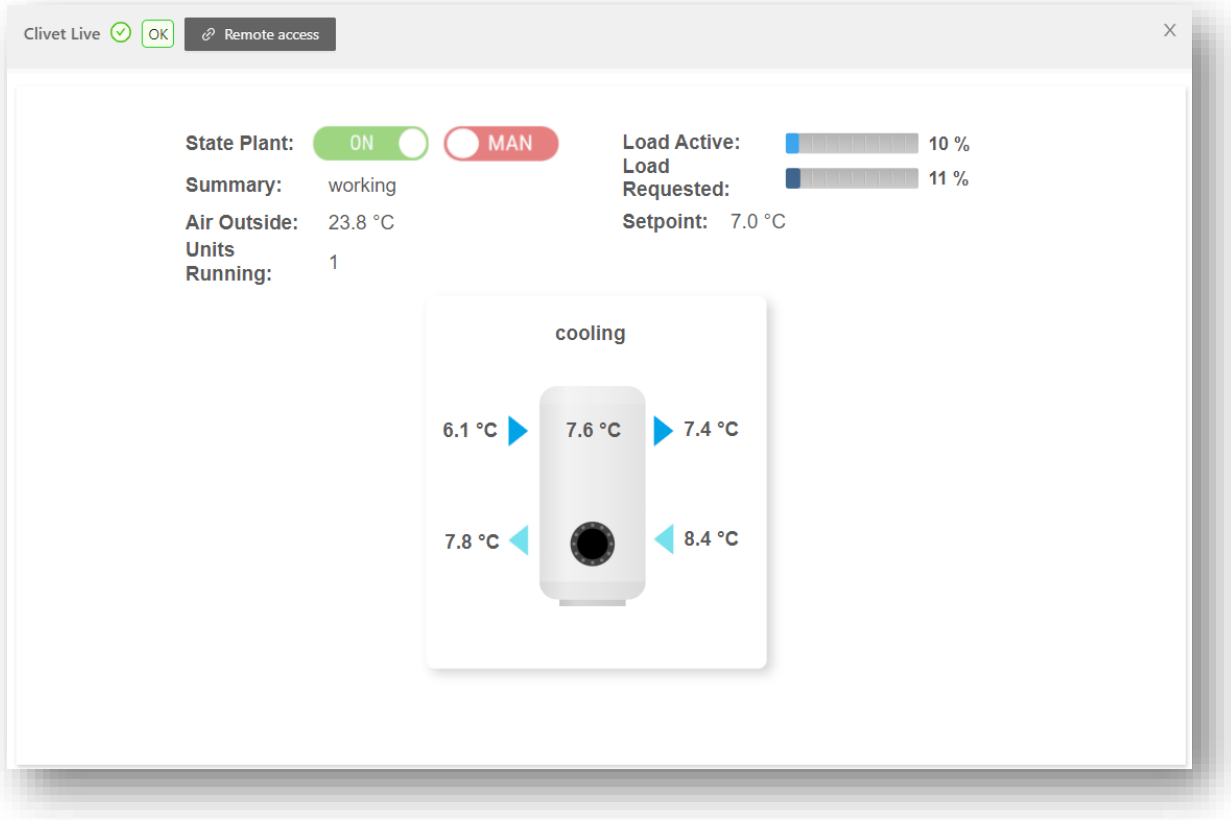
Portal composition: Home



Page that shows all the sites available to that specific user in the system and is the first page to be displayed after the first login

Additional information

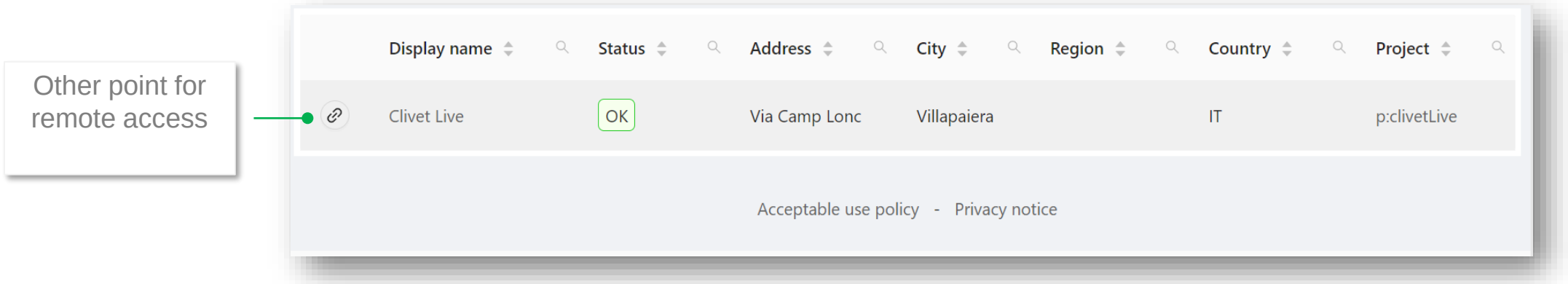
Clicking on the indicator takes you to a dashboard containing a graphic of the site and there is a button Remote access which allows remote access to the device (plant).
The connection status of the device to the cloud is also indicated, which in this case is “OK” and green to indicate that it is connected.



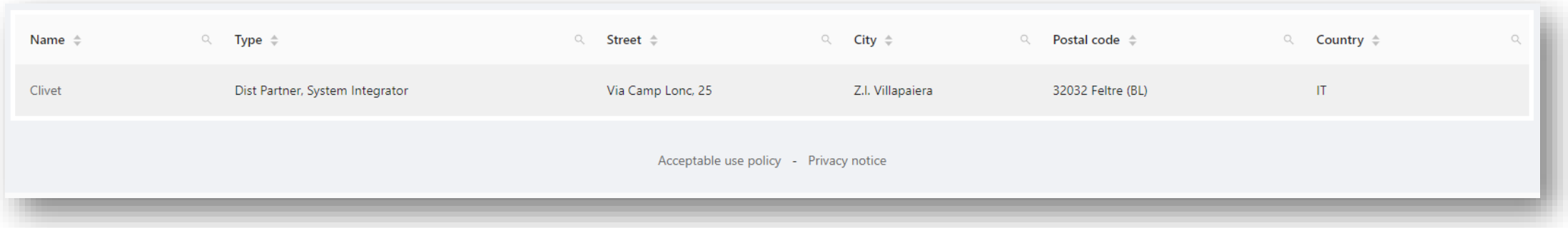
Notes

The graphics shown may vary, those above are examples only

Sites and organisations



Page showing all sites with the location of the plant registered on the portal next to it, to which the user has access. Clicking on the icon provides another way to access the system remotely. The connection status of the device to the portal is then indicated again.



This page shows all the companies registered in the system and are called "Organisations" Users and devices are grouped together in each organisation.

To actually control the plant from the cloud you need to press either this button Remote access or this icon in order to connect to the desired plant: the page that is generally displayed is the Intelliplant "Devices" page.
Once connected, you can navigate exactly as you do locally (see previous pages).

Notes

If the user has been assigned read-only permissions on the project logged into remotely, or if the user attempts to assign any settings, the symbol will appear or the setting will have no effect.

www.clivet.com

CLIVET S.p.A.
Via Camp Lonc 25, Z.I. Villapaiera
32032 Feltre (BL) - Italy
Tel. +39 0439 3131 - info@clivet.it

CLIVET GMBH
Hummelsbütteler Steindamm 84,
22851 Norderstedt, Germany
Tel. +49 40 325957-0 - info.de@clivet.com

Clivet Group UK LTD
Units F5 & F6 Railway Triangle,
Portsmouth, Hampshire PO6 1TG
Tel. +44 02392 381235 -
Enquiries@Clivetgroup.co.uk

CLIVET LLC
Office 508-511, Elektozavodskaya st. 24,
Moscow, Russian Federation, 107023
Tel. +7495 6462009 - info.ru@clivet.com

CLIVET MIDEAST FZCO
Dubai Silicon Oasis (DSO), High Bay Complex,
Office No 20, PO BOX 342009, Dubai, UAE
Tel. +971 (0) 45015840 - info@clivet.ae

Clivet South East Europe
Jaruščica 9b
10000, Zagreb, Croatia
Tel. +385916065691 – info,see@clivet.com

Clivet Airconditioning Systems Pvt Ltd
Office No.501 & 502,5th Floor, Commercial -I,
Kohinoor City, Old Premier Compound, Off LBS Marg, Kirol Road, Kurla West, Mumbai
Maharashtra 400070, India
Tel. +91 22 30930200 - sales.india@clivet.com