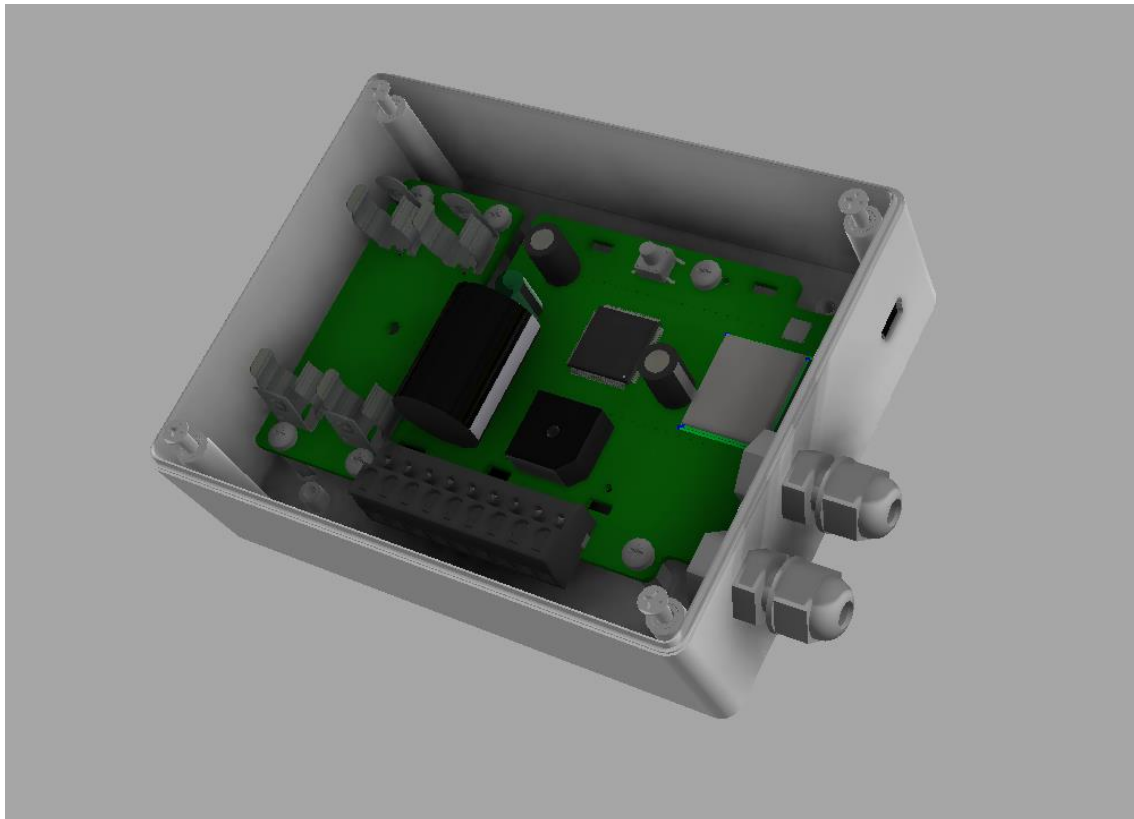
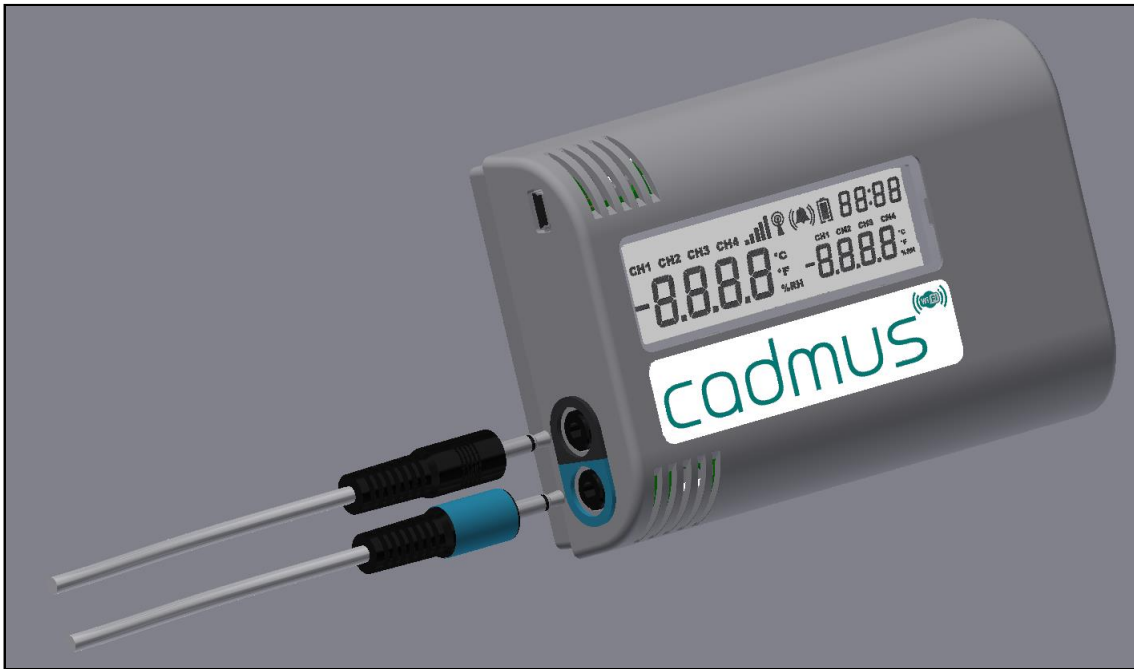


Cadmus & Ratifi Operating Manual.



The Ultimate Cloud Based Data Logging System

Contents

GENERAL	4
1.1 OVERVIEW	4
1.1.1 <i>About Signatrol</i>	4
1.1.2 <i>The System</i>	4
1.1.3 <i>The Manual</i>	4
1.2 THE ADMINISTRATOR/USER MODEL	5
1.3 SECURITY	5
1.3.1 <i>Introduction</i>	5
1.3.2 <i>Wi-Fi Connection</i>	5
1.3.3 <i>Data Security</i>	5
INSTALLATION GUIDE	6
1.4 RECEIVING AND UNPACKING	6
1.5 CREATE RATIFI.CLOUD ACCOUNT	7
1.6 CREATE/ADD CLOUD PROJECT	9
1.7 ADDING THE DEVICE TO THE CLOUD	10
1.8 SETUP DEVICE CONFIGURATION	11
1.9 CONFIGURATION WIZARD	12
1.9.1 <i>Main Tab.</i>	12
1.9.2 <i>Channel 1 (Internal Temperature).</i>	13
1.9.3 <i>Channel 2 (Internal Relative Humidity) (CTX-213 only)</i>	14
1.9.4 <i>Channel 3 and 4 (External Temperatures, Pt1000 sensor)</i>	15
1.9.5 <i>Channel 5 and 6 (Discrete Input)</i>	16
1.9.6 <i>LCD Display (CTX-203 and CTX-213 models only)</i>	18
1.10 OPENING THE DEVICE ENCLOSURE.	19
1.10.1 <i>CTX-203 and CTX-213</i>	19
1.10.2 <i>CTX-303</i>	19
1.11 CONNECT EXTERNAL SENSORS	20
1.11.1 <i>Connecting Pt1000 temperature sensors.</i>	20
1.11.2 <i>Connecting external digital output to discrete channels.</i>	21
1.12 SETUP POWER SOURCE	22
1.13 USB CONFIGURATION VIA CADMUS-CONFIG	23
1.13.1 <i>Installing Cadmus-Config</i>	23
1.13.2 <i>Loading Cadmus-Config</i>	23
1.13.3 <i>Connecting your device to the computer</i>	23
1.13.4 <i>Cadmus-Config basics</i>	24
1.13.5 <i>Cadmus-Config Information screen</i>	25
1.13.6 <i>Configuring Cadmus Security and Device Pin.</i>	25
1.13.7 <i>Cadmus-Config Settings Tab</i>	27
1.13.8 <i>External Temperature Sensor Tab</i>	28
1.13.9 <i>Battery Tab</i>	28
1.13.10 <i>Real Time Clock</i>	29
1.13.11 <i>Wi-Fi Connection</i>	30
1.13.12 <i>Wi-Fi Connection Wizard</i>	31
1.13.13 <i>WPA2- Personal Connection – Network Settings</i>	33
1.13.14 <i>WPA2-Enterprise Connection (EAP-TLS) – Network Settings.</i>	35
1.14 PRODUCT POSITIONING	38
1.15 DEVICE AND CLOUD INTERACTION	39
1.16 ENTERING YOU COMPANY DETAILS.	39
1.17 ADD CLOUD USERS	40

1.18	RATIFI CREDITS	41
	RATIFI	43
1.19	RATIFI OVERVIEW	43
1.20	ADMINISTRATOR FUNCTIONS NOT ALREADY COVERED EARLIER.	44
	1.20.1 Options	44
	1.20.2 Automatic Reports	45
	1.20.3 Auxiliary Admin email List	45
	1.20.4 Audit Trails	46
1.21	EVENTS	46
2	USER FUNCTIONS	47
	2.1.1 Project Selection.	47
	2.1.2 Overview	48
	2.1.3 Devices	49
	2.1.4 Health	50
	2.1.5 Graph	51
	2.1.6 Sensor Alarms	53
	2.1.7 System Alarms	54
	2.1.8 Export	54
	2.1.9 Table Data	55
	2.1.10 PDF Report	56
3	HARDWARE SPECIFICATIONS@ 25°C	57
	TROUBLE SHOOTING.	61
3.1	LCD ERROR MESSAGES	61
	USEFUL INFORMATION	62
3.2	FIREWALLS	62
3.3	LOSS OF COMMUNICATION	62
3.4	LATE ALARMS	62
4	REGULATORY INFORMATION RELATED TO WI-FI TRANSCEIVER.	63
4.1	RF FUNCTION AND FREQUENCY RANGE	63
4.2	EC	63
4.3	FCC AND IC CERTIFICATION.	64
	4.3.1 FCC	64
	4.3.2 CAN ICES-3(B) and NMB03(B) Certification and Statement	65
4.4	MIC CERTIFICATION (JAPAN)	65
4.5	SRRC CERTIFICATION AND STATEMENT (CHINA)	65
5	SUPPORT AND CONTACTS	66

General

1.1 Overview

1.1.1 About Signatrol

Signatrol is a UK based company who are experts in data logging solution with over 20 years of experience in the design, manufacture and sales of Data Loggers and Data Logging systems, primarily for the food and pharmaceutical industries.

Our temperature data loggers are used in manufacture, storage, distribution and built environments to keep track of processes or comfort conditions in buildings, offices and schools.

1.1.2 The System

The Cadmus is a Cloud Based Data Logging and Alarm Monitoring system. WI-FI enabled transmitters send data back to a cloud based operating platform where the data are:

- Stored for subsequent analysis.
- Checked for alarm events
- Any alarm events are annunciated locally and sent, via email, to nominated people.

The system is essentially divided into three parts:

- Cadmus-Config, the Windows based configuration software to enable Cadmus devices to be configured and connected to the appropriate WI-FI access point.
- Cadmus, the generic name of the WI-FI enabled data logging devices and related primarily to the hardware.
- Ratifi, the cloud based software that collects the data from one or more Cadmus devices, stores it in encrypted form, generates automatic alarm event messages and allows the user to view and display the data in numerical or graphical form and the status of any current alarms or events.

1.1.3 The Manual

Because of the power and scope of a Cadmus system this manual can, at first glance, seem a little daunting but the software has been designed to be intuitive and therefore you should find setting up and operation quite straightforward. We are happy to provide telephone assistance and regularly run Cadmus training sessions. Contact the office for details.

1.2 The Administrator/User Model

Ratifi.cloud uses an Administrator/User model whereby the Administrator is the 'Responsible Person' within your organisation. He or she has sole control of the system and sets up all the functionality. They can add and block users and enter all relevant data, alarm settings etc.

The user receives alarm messages (as determined by the Administrator) and can access the data but cannot implement any changes.

In addition to the administrator screens, the administrator can also access the user screens.

1.3 Security

1.3.1 Introduction

All data are stored in encrypted form that cannot be accessed by un-authorized persons. All data in the Cadmus/Ratifi cloud based data logging system are protected to the highest standards and, rest assured, that whatever your security requirements we have a fully functional application to suit your needs as follows:

1.3.2 WI-FI Connection

The WIFI connection is established using a variety of security protocols.

We recommend WPA2 Personal or, for the more demanding applications, WPA2 Enterprise.

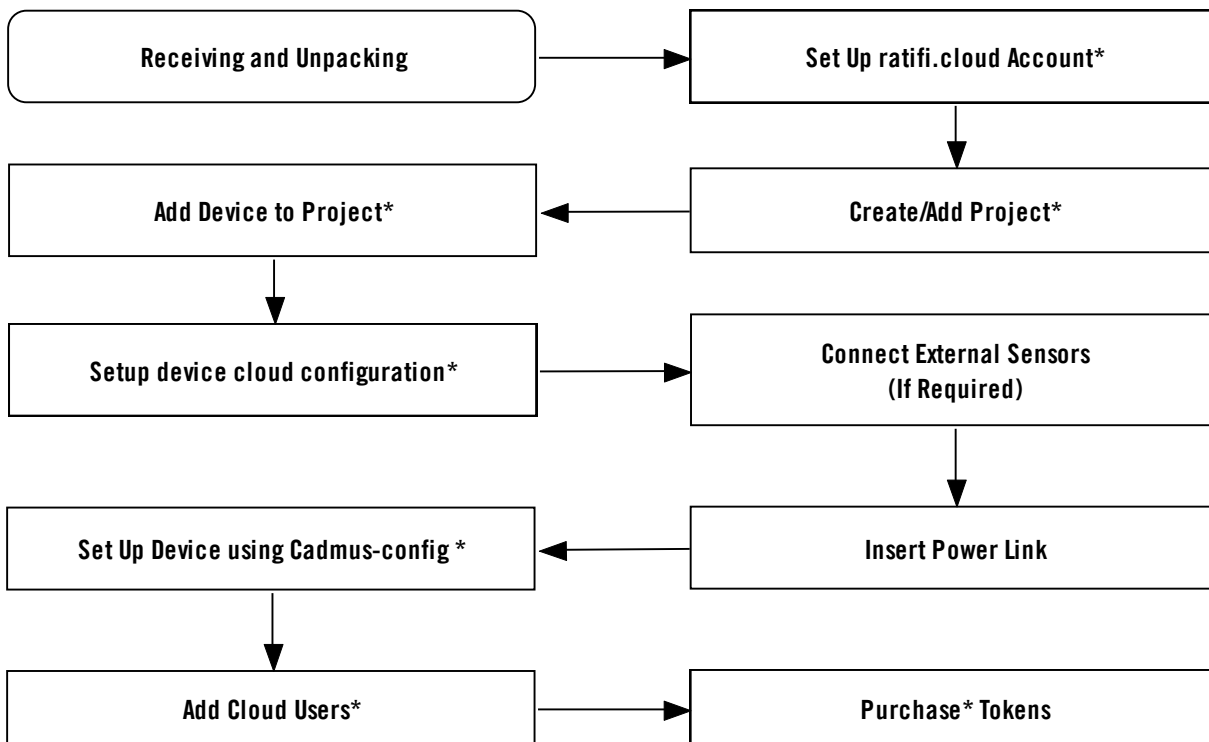
1.3.3 Data Security

The data stored on the Ratifi cloud uses AES-256-CBC as the encryption method

The following data are encrypted:

First Name, Last Name, Contact Number, Email, Company Name, Department Name, VAT Number, Address

Installation Guide



* Available In Administrator Role.

1.4 Receiving and Unpacking

Congratulations you have just purchased the most comprehensive WI-FI enabled data logging and alarm monitoring system available today. Please check the unit to ensure that it has arrived without damage. If there is any sign of damage, please contact your supplier. Cadmus is the product name of the data logging hardware. Cadmus devices will always be used with our Cloud based software platform, Ratifi.

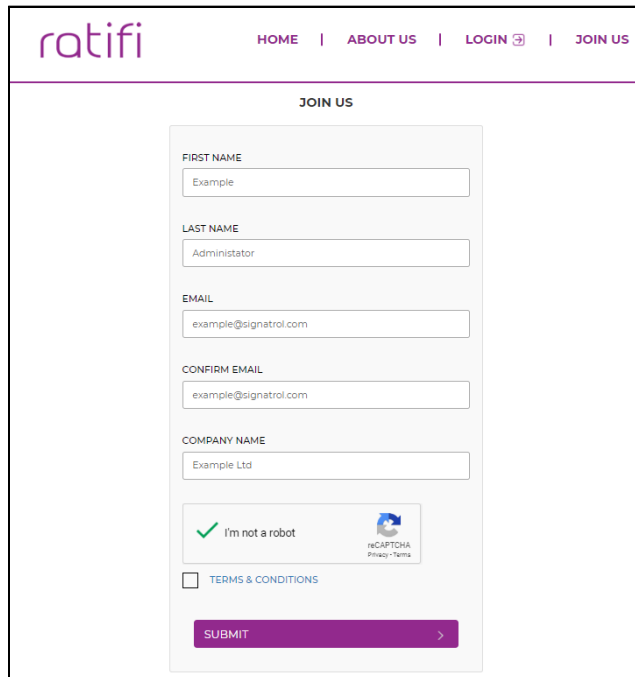
The packaging will contain the following:

- Cadmus device with pre-installed batteries, and in a powered down state.
- Quick-start information guide.

1.5 Create ratifi.cloud account

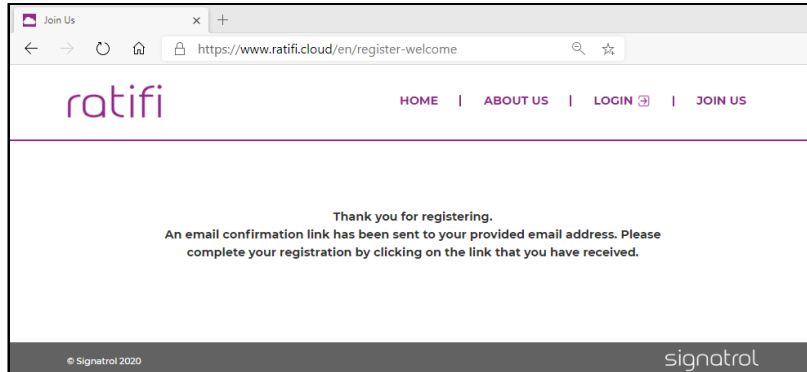
Before setting up your device, you must first create a ratifi.cloud account.

Using your preferred web browser, go to URL: <https://www.ratifi.cloud> and then select "JOIN US". Your email address will be used to validate the new account.



The screenshot shows the 'JOIN US' registration form on the ratifi website. The form includes the following fields: FIRST NAME (Example), LAST NAME (Administrator), EMAIL (example@signalrol.com), CONFIRM EMAIL (example@signalrol.com), and COMPANY NAME (Example Ltd). Below the fields is a reCAPTCHA widget with the text 'I'm not a robot' and a 'TERMS & CONDITIONS' checkbox. A purple 'SUBMIT' button is at the bottom of the form.

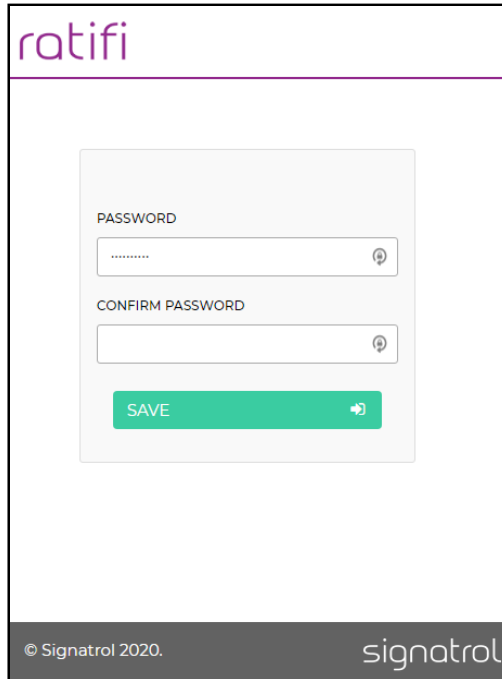
Complete the form and then select "SUBMIT".



Once the form has been submitted the administrator will receive an email.

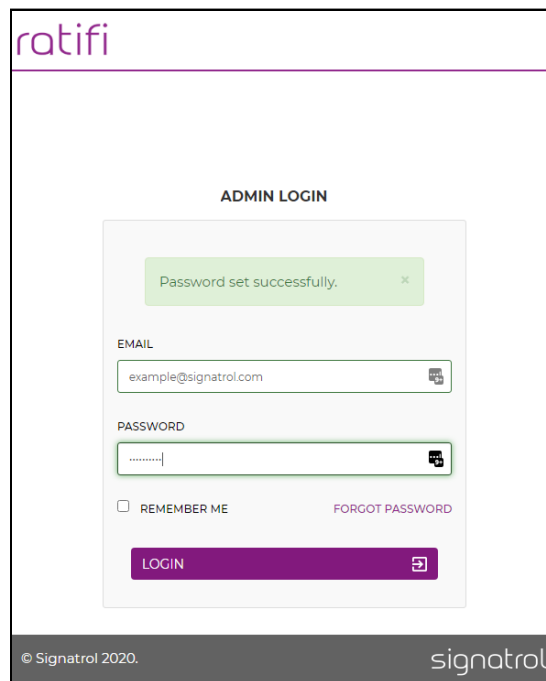


Click the link within the email and ratifi.cloud will open in your web browser. Create and enter your new password and then select "SAVE".



The screenshot shows the 'ratifi' logo at the top left. Below it is a form with two input fields: 'PASSWORD' and 'CONFIRM PASSWORD'. Each field has a small eye icon to its right. Below the second field is a green 'SAVE' button with a right-pointing arrow. At the bottom of the page, there is a dark grey footer with '© Signatrol 2020.' on the left and the 'signatrol' logo on the right.

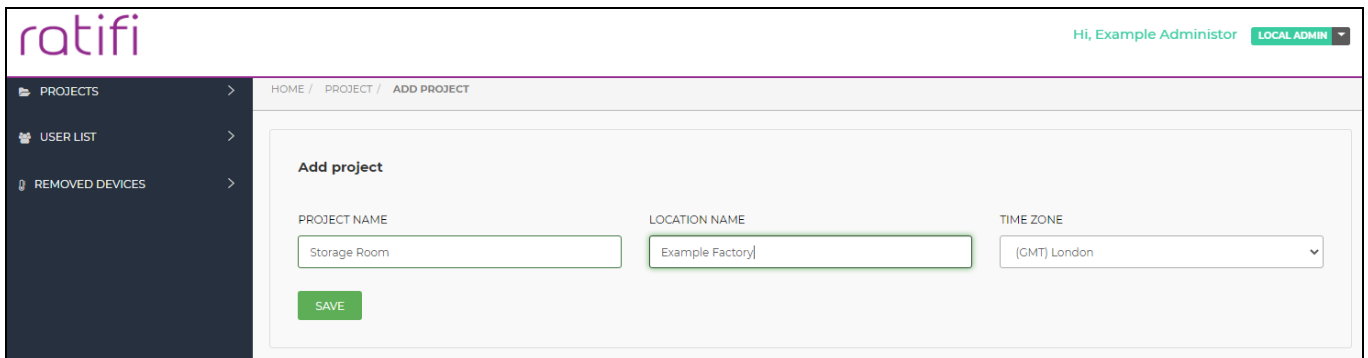
Once the password has been set, Login to the administer section using your credentials.




The screenshot shows the 'ratifi' logo at the top left. Below it is a form titled 'ADMIN LOGIN'. At the top of the form is a green notification box that says 'Password set successfully.' with a close 'x' icon. Below this are two input fields: 'EMAIL' (containing 'example@signatrol.com') and 'PASSWORD'. Below the password field are two links: 'REMEMBER ME' (with an unchecked checkbox) and 'FORGOT PASSWORD'. At the bottom of the form is a purple 'LOGIN' button with a right-pointing arrow. At the bottom of the page, there is a dark grey footer with '© Signatrol 2020.' on the left and the 'signatrol' logo on the right.

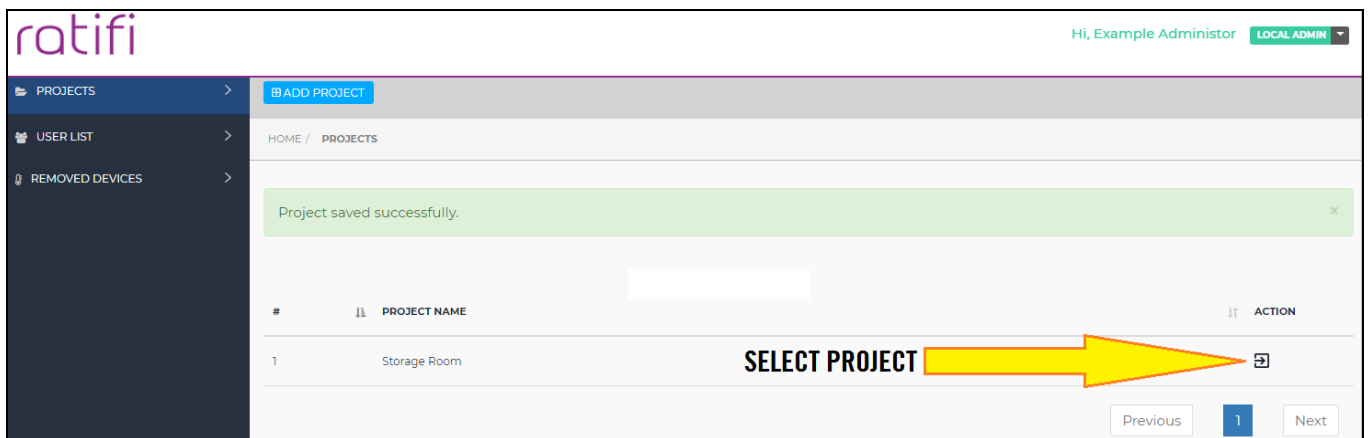
1.6 Create/Add Cloud Project

Under "PROJECTS" enter the new project details in the form as shown below.




The screenshot shows the 'Add project' form in the Ratifi interface. The form includes three input fields: 'PROJECT NAME' with the value 'Storage Room', 'LOCATION NAME' with the value 'Example Factory', and 'TIME ZONE' with the value '(GMT) London'. A green 'SAVE' button is located below the input fields. The breadcrumb navigation shows 'HOME / PROJECT / ADD PROJECT'. The user is logged in as 'Hi, Example Administrator' with 'LOCAL ADMIN' permissions.

Once the project has been created, click on the  on the project line.



The screenshot shows the 'PROJECTS' page in the Ratifi interface. A green notification bar at the top states 'Project saved successfully.'. Below the notification is a table with the following structure:

#	PROJECT NAME	ACTION
1	Storage Room	


A yellow arrow points to the external link icon in the 'ACTION' column of the first row. The text 'SELECT PROJECT' is written above the arrow. The table has pagination controls at the bottom: 'Previous', '1', and 'Next'.

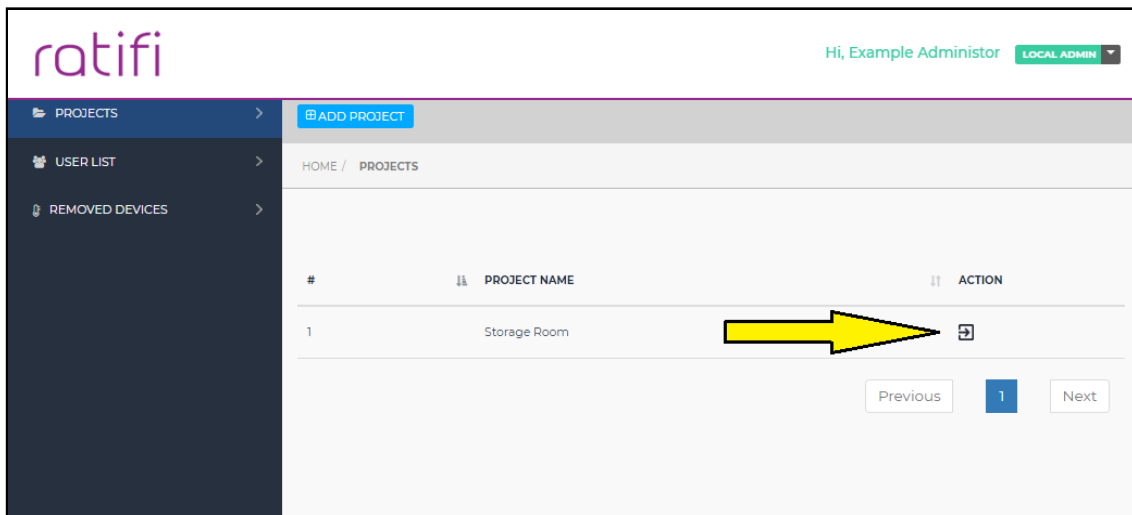
1.7 Adding the device to the Cloud

Each Cadmus device is supplied with a registration card, which allows the administrator to register the device against their project. The project will be credited (Free of Charge) 1 credit for each device registered. 1 credit will allow access for 1 device/month. The administrator will receive email notification when your credits are running low. The registration card is only required once and can be disposed of after registration.

It is not required for the device to be connected to the Wi-Fi when the device configuration is setup. The cloud will store the configuration, and the device will download the configuration as soon as it connects.



Enter the newly created project by selecting .

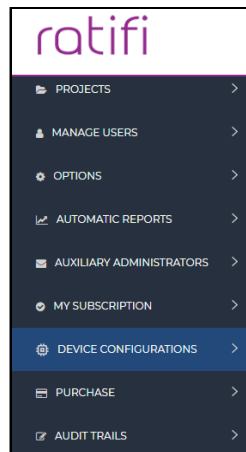


The “Add Devices” form will appear. Enter the serial number and device code into the boxes provided, and then select “SAVE”.

Note: Once the device code can only be used once. When removing a device from a project, the device will be automatically given a new device code under “Removed Devices”.

1.8 Setup Device Configuration

Select the “DEVICE CONFIGURATION” from the left hand menu (shown below).



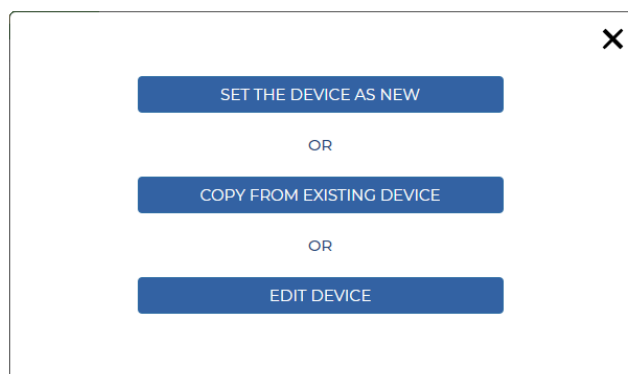
The list of current devices allocated to the project will display. Select “Edit” (as shown below).

#	DEVICE	TYPE	SERIAL NUMBER	LOCATION NAME	EDIT	PDF DOWNLOAD	MAC ADDRESS	REMOVE
1	Enabled	CTX-213	00000003-001	Demo Unit	<input type="button" value="Edit"/>	PDF Download	D4-36-39-AB-D6-C4	<input type="button" value="Remove"/>

Note: Do not select “Remove”. Removing a device will remove the device from the current project. Refer to moving devices to another project in this manual.

Select from the pop-up how to configure your device.

SET DEVICE AS NEW	Load default settings into configuration wizard
COPY FROM EXISTING DEVICE	Load settings from another device into configuration wizard. Only available if more than 1 device is present in the project.
EDIT DEVICE	Load current settings into configuration wizard.



If you are configuring a new device select “SET THE DEVICE AS NEW”.

1.9 Configuration Wizard

1.9.1 Main Tab.

The main tab contains parameters related to the general functionality of the Cadmus device.

Parameter Name	Description	Options
ENABLE/DISABLE	Changes the state of the Cadmus device	ON = Active Monitoring State , OFF = NAP mode (device is sleeping) In NAP mode the device will connect every 90 minutes to check if a new configuration packet has been queued for the device on the cloud.
LOCATION	Location description text.	Maximum 32 characters. (e.g. Kitchen, Warehouse 1, Pharmacy, etc)
SERIAL NUMBER	Unique Factory set serial number.	Read Only.
MAC ADDRESS	Unique MAC address associated to the WiFi hardware within the device.	Read Only.
STORE RATE	Determines how often the device stores the sensor inputs to on-board memory. Default value = 10 minutes. The device has a fixed sample rate of 1 minute. If a sensor alarm occurs the device will store the input within 60 seconds and force an upload, before returning to the configured store rate. So irrespective of store rate, alarms will be notified within 60 seconds.	Available Settings. 1, 2, 3, 5, 10, 15, 30, 45, 50, 60 minutes.
UPLOAD RATE	Determines how often the device makes connection to a WiFi network and uploads its data to the cloud. Default value = 30 minutes. If a sensor alarm occurs the device will connect within 60 seconds of the alarm occurring, make its upload and then return to the configured upload rate. Note. Ratifi has a built-in late alarm, which triggers if a device is not received. The default late alarm period is 120 minutes. When configuring a device will a "UPLOAD RATE" >= 120 minutes. The "LATE ALARM TRIGGER" should be extended. See section 1.20.1.	Available Settings. 5, 15, 30, 45, 60, 90, 120, 180, 360, 720, 1440 minutes.
CALIBRATION PERIOD	All devices contain the last calibration date. The device will automatically send reminders via the cloud when calibration is less than 30 days away, and when the calibration expires.	Available Settings. OFF, 6, 12, 18, 24, 36 months. Setting OFF will disable all warnings.
AUDIBLE ANNUNCIATOR	When a sensor alarm is active the device will beep an internal bleeper twice every 15 seconds.	OFF = bleeper disabled. ON = bleeper active on sensor alarm.
RESET BATTERY LIFE INDICATOR	All devices contain the date the internal batteries were last changed. Due to the battery technology used it is not possible to monitor battery life based on the battery voltage, so a coulomb counting method is implemented. For this method to accurately determine the battery state, the user must inform the device when the batteries have been replaced.	NO = Do not send battery reset to device. YES = Reset battery information and set battery replaced date. If a device is externally powered the device will ignore the reset.

1.9.1.1 Battery Life Considerations.

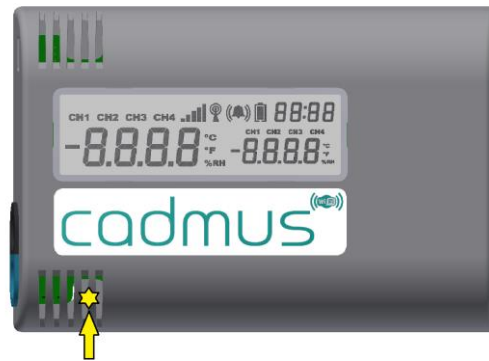
The tables below give an estimated battery based on "Store Rate and Upload Rate" settings from +10 to +40°C ambient temperature for the device enclosure. Low battery indicator email will trigger when 20% capacity has been reached. Note. Battery life will be reduced below the values stated before if the Wi-Fi network has poor connection or there are a high number of sensor alarms occurring. Values below are only accurate when the device is fitted with new CADMUS-ACC-01 batteries only.

Store Rate	Upload Rate	Battery Life	Store Rate	Upload Rate	Battery Life	Store Rate	Upload Rate	Battery Life
1 min	5 mins	0.28 years	5 mins	60 mins	1.79 years	30 mins	30 mins	2.12 years
1 min	15 mins	0.45 years	10 mins	30 mins	1.75 years	30 mins	60 mins	3.22 years
1 min	30 mins	0.52 years	10 mins	60 mins	2.44 years	30 mins	120 mins	4.35 years
5 mins	5 mins	0.43 years	15 mins	15mins	1.18 years	45 mins	45 mins	2.87 years
5 mins	15 mins	0.96 years	15 mins	30 mins	1.92 years	45 mins	90 mins	4.16 years
5 mins	30 mins	1.39 years	15 mins	60 mins	2.77 years	60 mins	60 mins	3.50 years

1.9.2 Channel 1 (Internal Temperature).

The Channel 1 tab contains parameters related to the internal temperature channel only.

On the CTX-203 and CTX-213 this sensor is mounted under the lower vents as shown to the right. This channel is ideally suited to monitoring ambient office and warehouse temperatures, which are slow changing. The CTX-303 also has an internal temperature sensor but this is sealed within the enclosure and has a slower response time.



Parameter Name	Description	Options
TYPE	Internal Temperature	Read only.
CHANNEL NAME	Channel descriptor text.	16 Characters maximum.
ENABLE	Enable or Disable the channel.	ON or OFF

Sensor Alarms

The internal channel has 4 associated sensor alarms. 2 high alarms and 2 low alarms. The high high and low low alarm are given a higher priority in ratifi when active, otherwise high high is handled the same as high, and low low is handled the same a low. Each of the 4 sensor alarms can be individually enabled or disabled, with its own Setpoint. The channel has a hysteresis and alarm delay value which is common to all 4 sensor alarms.

Parameter Name	Description	Options
X ALARM ENABLE	Sensor alarm enabled or disabled.	ON or OFF
SETPOINT	Setpoint Temperature	Decimal value

X = HIGH HIGH, HIGH, LOW or LOW LOW.

High and High High Sensor Alarms.

Alarm active when last read value > Setpoint, alarm clears when last read value < (Setpoint - Hysteresis).

Low and Low Low Sensor Alarms.

Alarm active when last read value < Setpoint, alarm clears when last read value > (Setpoint + Hysteresis).

Hysteresis

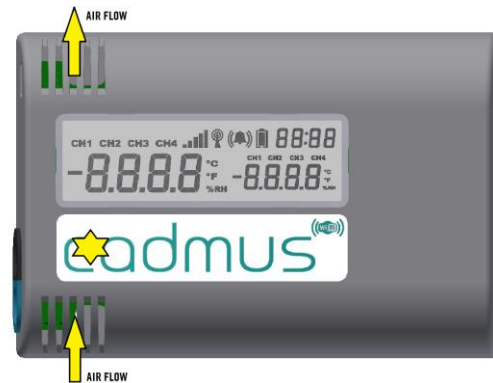
Where the sensor alarm Setpoint determines when an alarm is raised, the hysteresis determines when an alarm clears. Using hysteresis reduces continuous alarming when a sensor measurement is very close to the Setpoint value. The hysteresis can be set to 0.2, 0.5 or 1.0°C. For more information on hysteresis refer to the hysteresis section. Recommended setting is 0.5°C.

Alarm Delay

The channel is sampled every 60 seconds, independent of the store rate. This gives a worse can alarm response < 60 seconds. The alarm delay maybe configured to delay the alarm from triggering for up to 10 minutes. When an alarm is delayed the measurement must be continuously above/below the Setpoint for the indicated time before the alarm triggered. If the measurement drops below / above the Setpoint before the indicated time the alarm will not be raised. This function is useful on fridges or freezers where opening the door may cause a very short spike in air temperature.

1.9.3 Channel 2 (Internal Relative Humidity) (CTX-213 only)

The Channel 2 tab contains parameters related to the internal humidity channel only. This optional sensor is mounted within the enclosure, approximately at the position of the star. When mounted on a wall, air will enter the enclosure as shown in the image to the right. This channel is ideally suited to monitoring ambient office and warehouse humidity, which are slow changing.



Parameter Name	Description	Options
TYPE	Internal Humidity	Read only.
CHANNEL NAME	Channel descriptor text.	16 Characters maximum.
ENABLE	Enable or Disable the channel.	ON or OFF

Sensor Alarms

The internal channel has 4 associated sensor alarms. 2 high alarms and 2 low alarms. The high high and low low alarm are given a higher priority in ratifi when active, otherwise high high is handled the same as high, and low low is handled the same a low. Each of the 4 sensor alarms can be individually enabled or disabled, with its own Setpoint. The channel has a hysteresis and alarm delay value which is common to all 4 sensor alarms.

Parameter Name	Description	Options
X ALARM ENABLE	Sensor alarm enabled or disabled.	ON or OFF
SETPOINT	Setpoint % Relative Humidity	Decimal value

X = HIGH HIGH, HIGH, LOW or LOW LOW.

High and High High Sensor Alarms.

Alarm active when last read value > Setpoint, alarm clears when last read value < (Setpoint - Hysteresis).

Low and Low Low Sensor Alarms.

Alarm active when last read value < Setpoint, alarm clears when last read value > (Setpoint + Hysteresis).

Hysteresis

Where the sensor alarm Setpoint determines when an alarm is raised, the hysteresis determines when an alarm clears. Using hysteresis reduces continuous alarming when a sensor measurement is very close to the Setpoint value. The hysteresis can be set to 0.2%, 0.5% or 1.0% RH. For more information on hysteresis refer to the hysteresis section. Recommended setting is 1.0% RH.

Alarm Delay

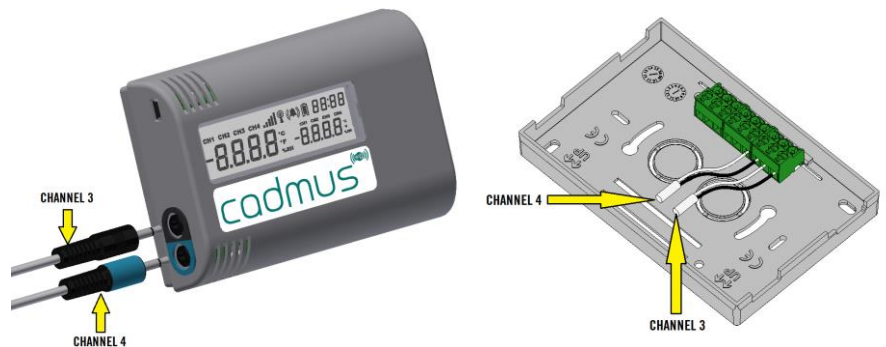
The channel is sampled every 60 seconds, independent of the store rate. This gives a worse can alarm response < 60 seconds. The alarm delay maybe configured to delay the alarm from triggering for up to 10 minutes. When an alarm is delayed the measurement must be continuously above/below the Setpoint for the indicated time before the alarm triggered. If the measurement drops below/above the Setpoint before the indicated time the alarm will not be raised.

1.9.4 Channel 3 and 4 (External Temperatures, Pt1000 sensor)

The screenshot shows the configuration screen for Channel 3. At the top, there are tabs for MAIN, CHANNEL 1, CHANNEL 2, CHANNEL 3 (selected), CHANNEL 4, CHANNEL 5, CHANNEL 6, and LCD DISPLAY. The main area is divided into several sections: TYPE (External Temperature), CHANNEL NAME (Fridge Air), and ENABLE (ON). Below these are four alarm enable sections: HIGH HIGH ALARM ENABLE (ON, Set Point 10), HIGH ALARM ENABLE (ON, Set Point 8), LOW ALARM ENABLE (ON, Set Point 2), and LOW LOW ALARM ENABLE (ON, Set Point 0). At the bottom, there are Hysteresis (0.5) and Alarm Delay (Immediate) settings, along with NEXT and PREVIOUS buttons.

The Channel 3 and 4 tab contains parameters related to external temperature channels only. Channel 3 and Channel 4 are designed for RTD (Resistance Temperature Detectors), type Pt1000 (Platinum, 1000 ohms at 0°C, linearised to EN60751). The connection is 2 wire, and the connection is made via the side Jacks or base terminals. Lead resistance compensation can be applied via the USB Cadmus-Config software. Various probe assemblies are available from Signatrol to cover the range -200 to +400°C, with varying cable types and lengths.

Image shown are for CTX-203 and CTX-213, refer to section 1.11.1 for more information and connecting to CTX-303.



Parameter Name	Description	Options
TYPE	External Temperature	Read only.
CHANNEL NAME	Channel descriptor text.	16 Characters maximum.
ENABLE	Enable or Disable the channel.	ON or OFF

Sensor Alarms

The internal channel has 4 associated sensor alarms. 2 high alarms and 2 low alarms. The high high and low low alarm are given a higher priority in ratifi when active, otherwise high high is handled the same as high, and low low is handled the same a low. Each of the 4 sensor alarms can be individually enabled or disabled, with its own Setpoint. The channel has a hysteresis and alarm delay value which is common to all 4 sensor alarms.

Parameter Name	Description	Options
X ALARM ENABLE	Sensor alarm enabled or disabled.	ON or OFF
SETPOINT	Setpoint % Relative Humidity	Decimal value

X = HIGH HIGH, HIGH, LOW or LOW LOW.

High and High High Sensor Alarms.

Alarm active when last read value > Setpoint, alarm clears when last read value < (Setpoint - Hysteresis).

Low and Low Low Sensor Alarms.

Alarm active when last read value < Setpoint, alarm clears when last read value > (Setpoint + Hysteresis).

Hysteresis

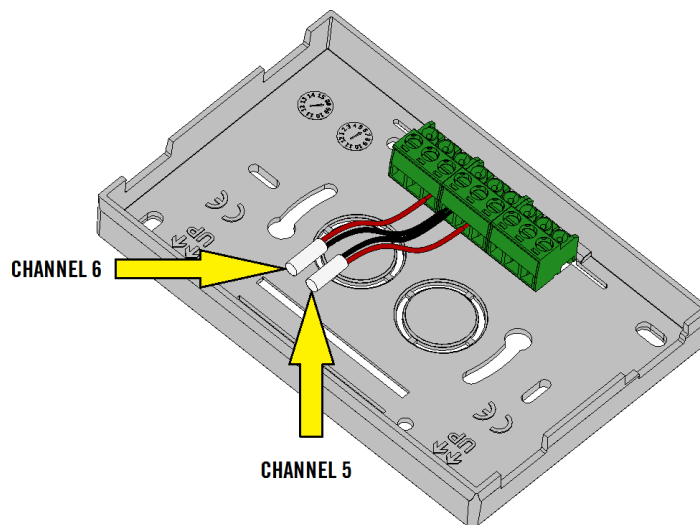
Where the sensor alarm Setpoint determines when an alarm is raised, the hysteresis determines when an alarm clears. Using hysteresis reduces continuous alarming when a sensor measurement is very close to the Setpoint value. The hysteresis can be set to 0.2°C, 0.5°C or 1.0°C. For more information on hysteresis refer to the hysteresis section. Recommended setting is 0.5°C.

Alarm Delay

The channel is sampled every 60 seconds, independent of the store rate. This gives a worse can alarm response < 60 seconds. The alarm delay maybe configured to delay the alarm from triggering for up to 10 minutes. When an alarm is delayed the measurement must be continuously above/below the Setpoint for the indicated time before the alarm triggered. If the measurement drops below/above the Setpoint before the indicated time the alarm will not be raised.

1.9.5 Channel 5 and 6 (Discrete Input)

Parameter Name	Description	Options
TYPE	discrete Interrupt/Counter	Read only.
CHANNEL NAME	Channel descriptor text.	16 Characters maximum.
CONFIG	Select channel mode	OFF, Discrete or Counter.



Channels 5 and 6 can function in two different modes.

- Counter mode
The device will count pulses applied to the input connection. The device will then scale the counts into engineering units (example kWh) and store the scaled value. The scaled unit is based on the total counts per "store rate" period. If the requirement is to monitor energy using in kWh, the store rate should be set to 60 minutes.
- Discrete mode
The device will monitor the input as either a high or low state. The status of the input is sampled when the other sensor inputs are sampled (this mode is called polling), if the setting "INTERRUPT FORCES READ AND UPLOAD" is enabled, it will force the device to instantly store the changed state and upload to the cloud. When the setting is disabled the input works as a polled input. When polled any changes on the input condition where occur when the device is not sampling (once every 60 seconds) will be missed. Generally polled input is only useful when the status of the input is slow changing and stays in the same state for more than 60 seconds, an advantage of this mode is the device remains in low power mode longer and this improves battery life. When the discrete input is set to "INTERRUPT FORCES READ AND UPLOAD" an additional setting allows the setting of the interrupt edge type.

Example: If a magnetic door switch is fitted to a fridge, and the interrupt set to both edges. The device will read and upload when the door is opened and closed.

Note: The interrupt event does not re-sample the sensor inputs (channels 1 to 4). If it has been > 30 seconds since the last sensor read, the system will wake and update channels 1 to 4 (as appropriate) before uploading; otherwise the previous channels values will be used. If an interrupt occurs a few seconds before a scheduled sample the upload will be delayed by a few seconds to get the latest sensor inputs values.

There are no alarms available on channels 5 and 6.

For full electrical specification of the discrete input see the hardware specification.

1.9.5.1 Counter Mode Configuration

Parameter Name	Description	Options
ELECTRICAL HIGH	Maximum counts per "Store Rate" period.	0 to 65535, integer value. ^{*note 1}
ELECTRICAL LOW	Minimum counts per "Store Rate" period.	0 to 65535, integer value ^{*note 1}
ENGINEERING HIGH	Engineering value equating to "ELECTRICAL HIGH" counts.	Decimal number.
ENGINEERING LOW	Engineering value equating to "ELECTRICAL LOW" count.	Decimal number.
ENGINEERING UNITS	Unit associated with the engineering value. e.g. kWh	Maximum 5 characters.

*Note 1: Maximum input frequency 1kHz.

When selecting the "store rate" for the device ensure, the electrical counts do not exceed 65535, and the maximum frequency does not exceed 1kHz.

Example: To monitor power consumption, if the "store rate" is set to 60 minutes, this means the counts cannot exceed 65535 counts in 60 minutes.

1.9.5.2 Interrupt Mode Configuration

Parameter Name	Description	Options
INTERRUPT FORCES UPLOAD	When OFF discrete is sampled every 60 seconds. When ON discrete is sample every 60 seconds, and forces upload then interrupt status is changed.	OFF, ON
INTERRUPT EDGE	Only visible when "INTERRUPT FORCES READ AND UPLOAD" = ON. Determines what interrupt states cause upload.	FALLING EDGE, RISING EDGE, BOTH EDGES.

1.9.6 LCD Display (CTX-203 and CTX-213 models only)

MAIN
CHANNEL 1
CHANNEL 2
CHANNEL 3
CHANNEL 4
CHANNEL 5
CHANNEL 6
LCD DISPLAY
✕

MAIN DISPLAY

CH 1
OFF ON

CH 2
OFF ON

CH 3
OFF ON

CH 4
OFF ON

SUB DISPLAY

CH 1
OFF ON

CH 2
OFF ON

CH 3
OFF ON

CH 4
OFF ON

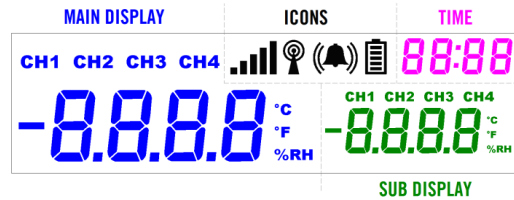
TIME

Current Time ▾

SAVE
PREVIOUS

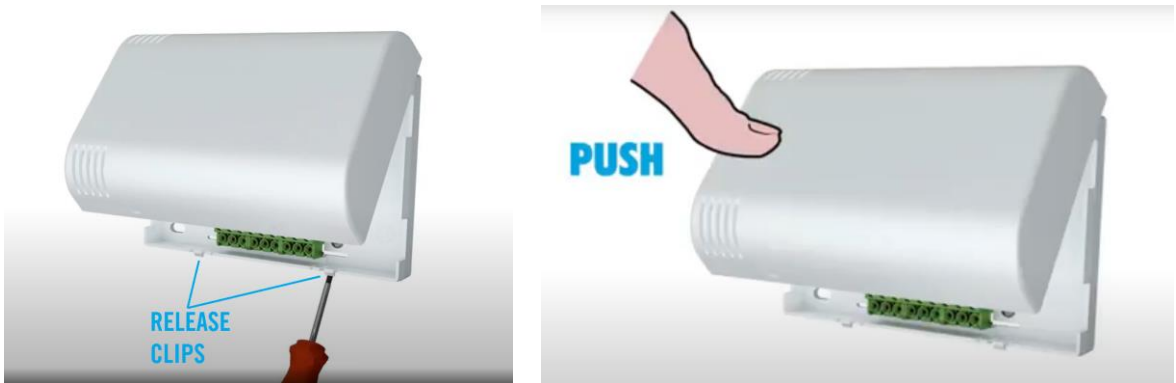


Devices fitted with displays can be configured to display channels 1 to 4. The configuration wizard will only allow enabled channels to be shown on the main or sub displays. If more than 1 channel is enabled, the device will automatically scan the selected channels. The time zone will show current local time or time to next upload.



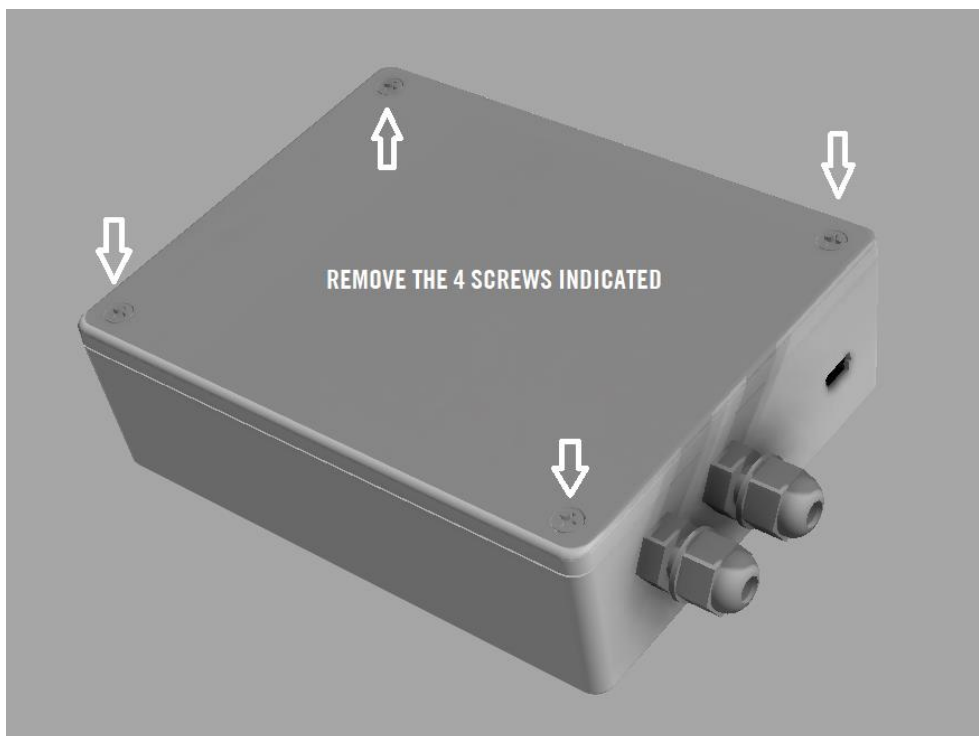
1.10 Opening the device enclosure.

1.10.1 CTX-203 and CTX-213



To open the device enclosure, use a narrow flat screwdriver to release the two clips shown above. To close the enclosure, locate the top edge of the enclosure over the base and then push down.

1.10.2 CTX-303



1.11 Connect External Sensors

Base Connections

1.11.1 Connecting Pt1000 temperature sensors.

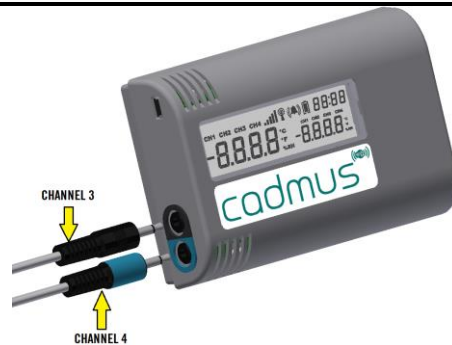
Channels 3 and 4 are designed for 2-wire Pt1000 sensors. These sensors can be purchased directly from Signatrol Ltd. There are two connection methods for Pt1000 sensors show below. Pt1000 sensor are non-polarised and be connected either way around. If a sensor is disconnected or becomes open-circuit the channel will indicate +400°C (+752°F), if a sensor becomes short-circuit the channel will indicate -200°C (-328°F). Sensors should be connected via the Jack or the Terminal strip, but not to both at the same time on the same channel. Otherwise incorrect readings will be obtained.

CTX-203 and CTX-213 models

Connection via 3.5mm jack plugs.

Channel 3 = Black (Upper) socket.
Channel 4 = Turquoise (Lower) socket.

Sensors supplied with jack connectors will be supplied with a loose Turquoise cover label, this should be applied if the sensor is connected to Channel 4.

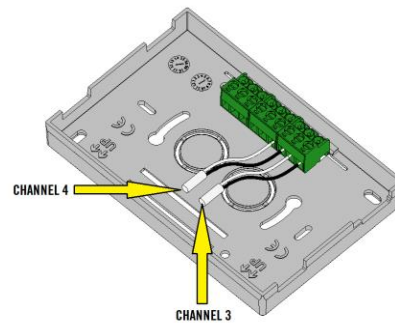


Connection via enclosure base terminal strip.

Channel 3 should be connected to pins 1 & 2.
Channel 4 should be connected to pins 3 & 4.

Wire colours are only a guide. Wire colours may change depending on manufacturer.

PIN	9	8	7	6	5	4	3	2	1
	EXTERNAL POWER +	POWER GROUND	CHANNEL 6 DISCRETE	DIGITAL GROUND	CHANNEL 5 DISCRETE	CHANNEL 4 Pt1000		CHANNEL 3 Pt1000	



CTX-303 model

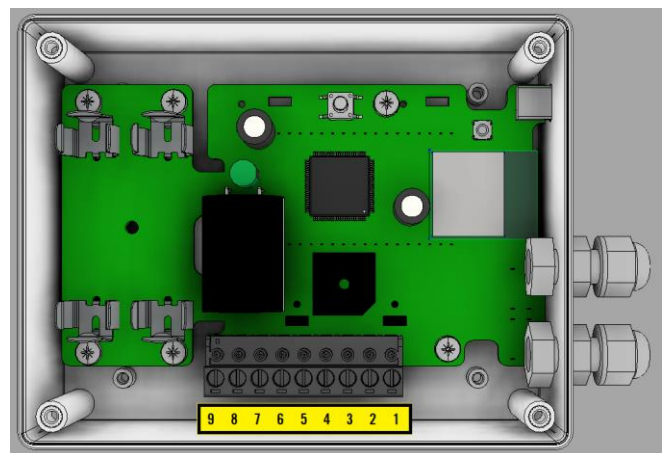
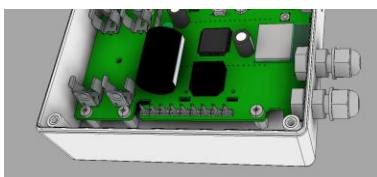
Connection via enclosure base terminal strip.

Channel 3 should be connected to pins 1 & 2.
Channel 4 should be connected to pins 3 & 4.

Wire colours are only a guide. Wire colours may change depending on manufacturer.

PIN	9	8	7	6	5	4	3	2	1
	EXTERNAL POWER +	POWER GROUND	CHANNEL 6 DISCRETE	DIGITAL GROUND	CHANNEL 5 DISCRETE	CHANNEL 4 Pt1000		CHANNEL 3 Pt1000	

Connector lifts off pin header for easy connection.



1.11.2 Connecting external digital output to discrete channels.

Channels 5 and 6 are designed for external voltage signals and dry contacts. Please refer to the hardware specification for voltage specifications. Both channels are capable of measuring counts or logic levels.

CTX-203 and CTX-213 models

Connection via enclosure base terminal strip.

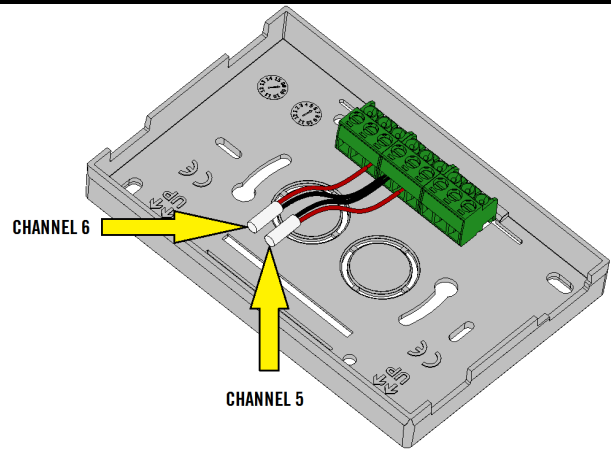
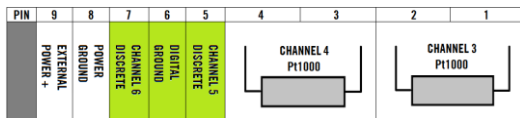
Channel 5 should be connected as follows:

Pin 5 = Signal positive. (35Vdc max) (1kHz max)
Pin 6 = Signal Ground

Channel 6 should be connected as follows:

Pin 7 = Signal positive. (35Vdc max) (1kHz max)
Pin 6 = Signal Ground

Signal ground (Pin 6) is common to both channels.



CTX-303

Connection via enclosure base terminal strip.

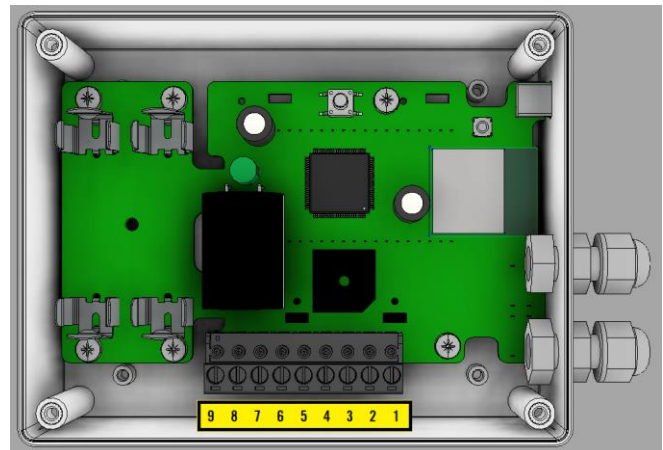
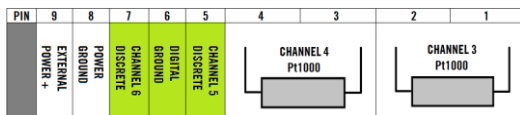
Channel 5 should be connected as follows:

Pin 5 = Signal positive. (35Vdc max) (1kHz max)
Pin 6 = Signal Ground

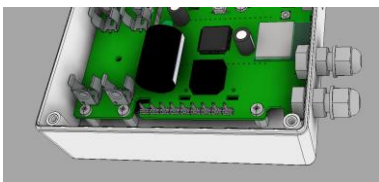
Channel 6 should be connected as follows:

Pin 7 = Signal positive. (35Vdc max) (1kHz max)
Pin 6 = Signal Ground

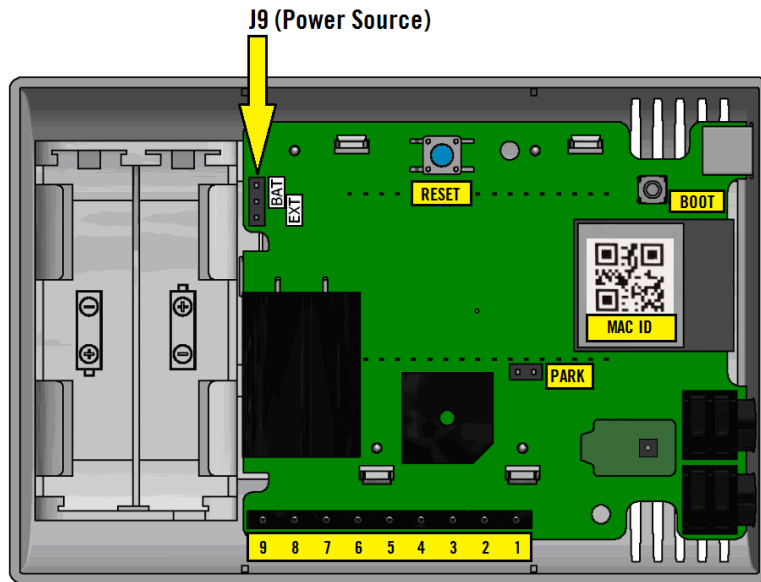
Signal ground (Pin 6) is common to both channels.



Connector lifts off pin header for easy connection.



1.12 Setup Power Source



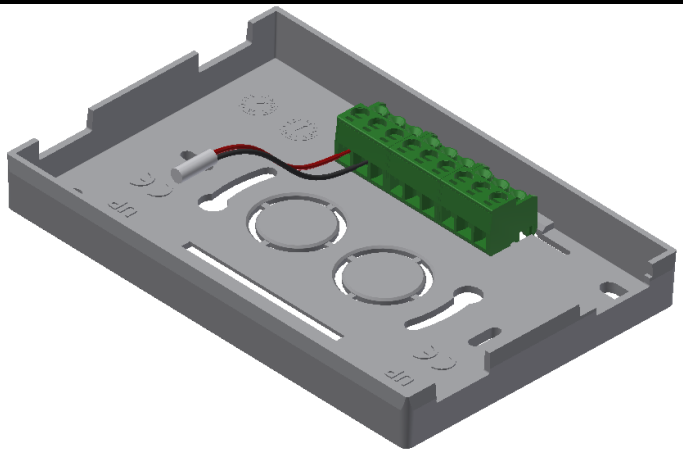
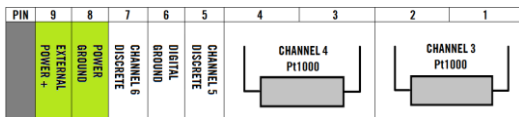
The unit arrives with the batteries pre-installed and power off (Jumper link fitted in PARK position). Moving the jumper link from the PARK position to J9 will select the required power source.

J9 (Power Source)	Operation
BAT	Device powered by internal batteries
EXT	Device power by external dc power source,

Connection via enclosure base terminal strip.

Pin 8 = Supply Ground

Pin 9 = Supply +, 9 to 24Vdc (2.5 Watt Max)

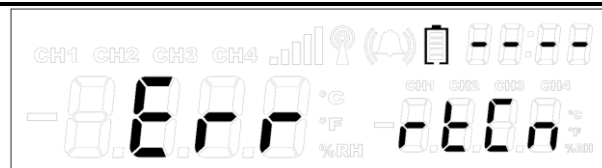


The device can be powered down at any time by removing the link from J9.

Note 1: Never link the BAT and EXT positions together, as this could cause device damage.

Note 2: The battery life starts from the moment the link is fitted. If there is any delay in completing installation, J9 should be removed until you are ready to use the device.

It is normal for the device to show the “Err rtCn” if the device is powered down for more than 30 minutes, as the device requires an accurate real time clock to operate. Cadmus-Config will set the clock during device configuration.



1.13 USB Configuration via Cadmus-Config

1.13.1 Installing Cadmus-Config

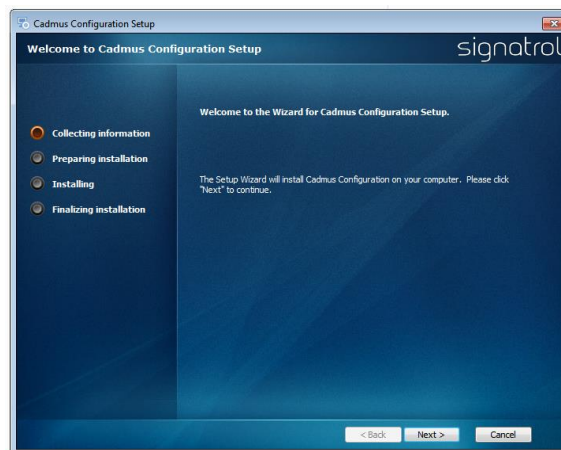
The Cadmus device requires the Cadmus-Config application to carry out basic configuration required to connect the device to the Wi-Fi network.

Computer Requirements:

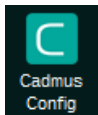
- Microsoft Windows 7, 8 or 10 Computer.
- Unused USB port.
- 20MB hard disk storage.
- Administrator rights to install the application.
- USB Cable with Mini-B connection to Device.

Cadmus Config can be downloaded from the following link: <http://www.ratifi.cloud/user-shared/cadmus-config.exe>

Run the downloaded installer, you will require administrator rights to install the application. Follow the on-screen instructions to complete installation.



1.13.2 Loading Cadmus-Config

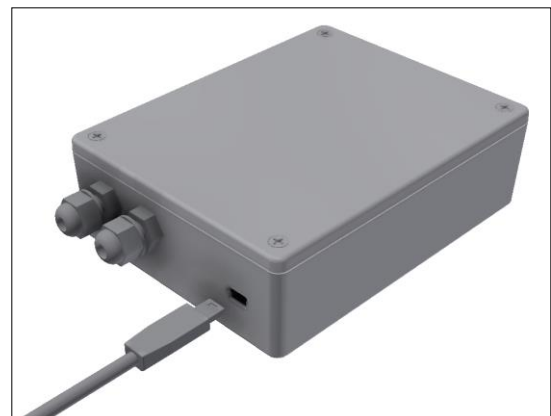


Launch Cadmus-Config from the start menu. The application maybe pinned to your start menu, or located in applications under "Signatrol Ltd".

When opening Cadmus-Config the application will connect to the cloud to check the applications version.

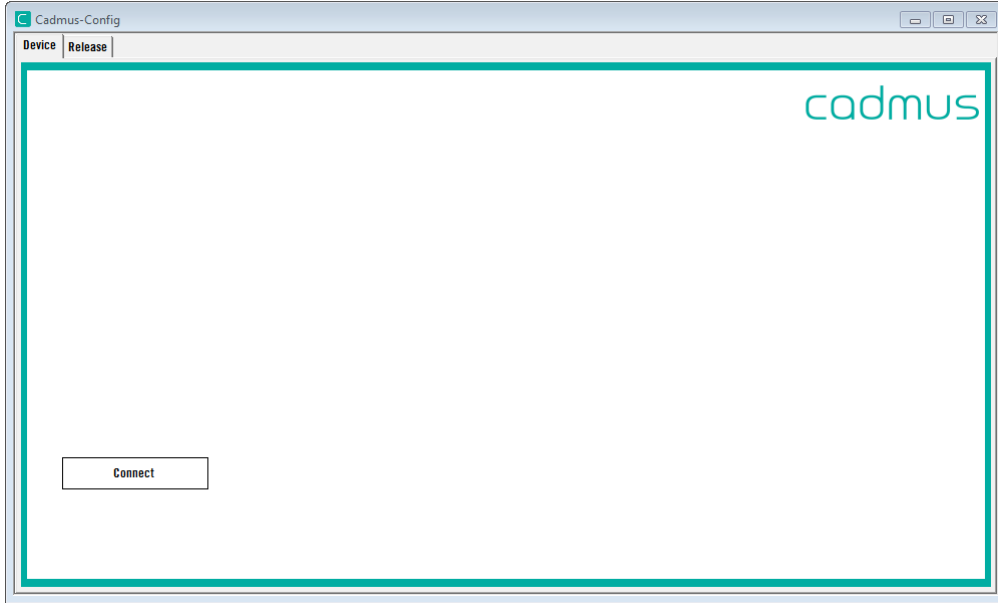
1.13.3 Connecting your device to the computer

The device uses standard windows drivers to operate. There are no additional driver files required. The first time you connect a device to your computer, windows may show a message that it is searching for a driver. Allow the computer to continue searching. If the message suggests that Windows is looking online for a driver, click the message to skip the online search. This will speed up the process.



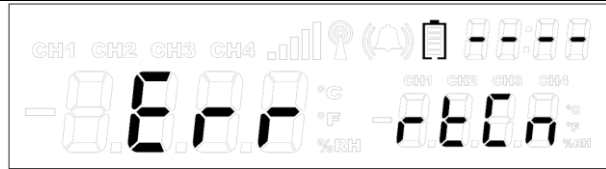
1.13.4 Cadmus-Config basics

Opening Cadmus-Config will present you with the screen below. Only two tabs are available, Device and Release. Release shows information about the current application version. Device is used to make connection to the device.

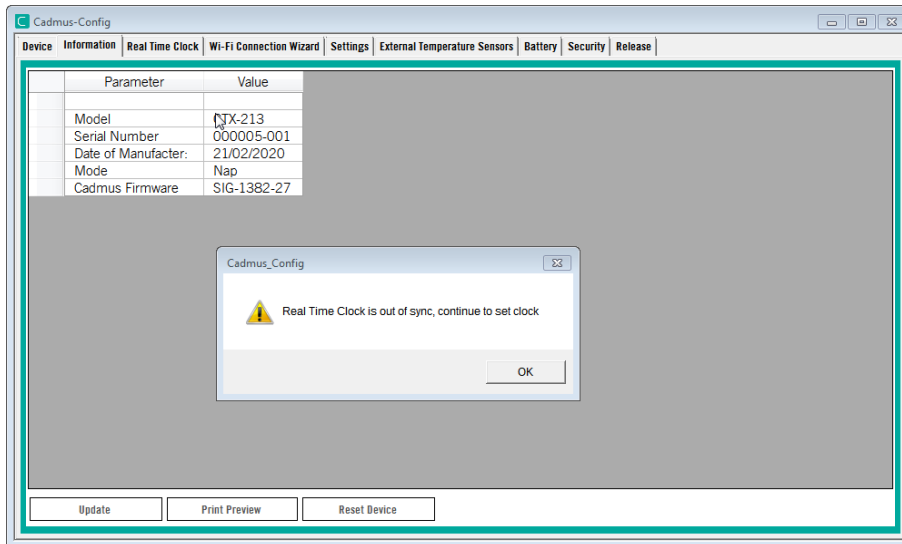


Select "Connect" to make the USB connection active. Note: connection may fail if Windows is currently installing the default driver; in this case you just need to wait a few moments until Windows has completed the task.

If your device display matches the image to the right. The real time clock is not currently set. Cadmus-Config will display the warning "Real Time Clock is out of sync, continue to set clock". Select "OK" and the clock will automatically set and the device re-booted. You will be taken back to the "Connect" screen. Please press "Connect" again.

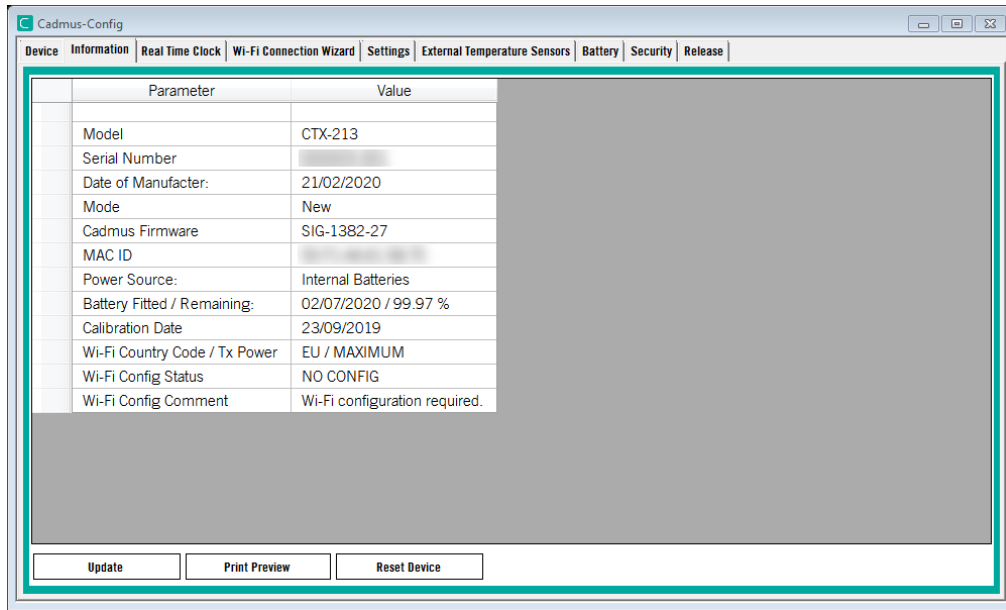


This normally only occurs when a device is new and has been without power. The device will keep the real time clock running for up to 30 minutes with no power connected, for when battery replacements are required.



1.13.5 Cadmus-Config Information screen

The information screen automatically loads information from the device after the connection has been made. This screen gives information on the all the basic device parameters and status information on the battery and Wi-Fi connection status. Additional information is added to the screen once the Wi-Fi network has been configured.



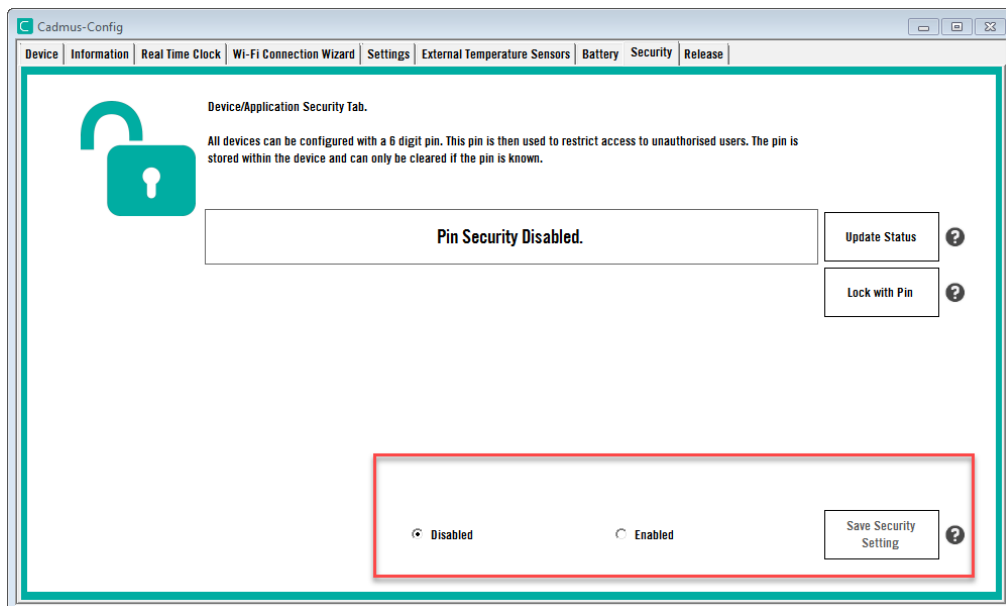
Button	Function
Update	Updates screen from with latest device information.
Print Preview.	Print Information on screen.
Reset Device	Will force the device to reset (re-start)

1.13.6 Configuring Cadmus Security and Device Pin.

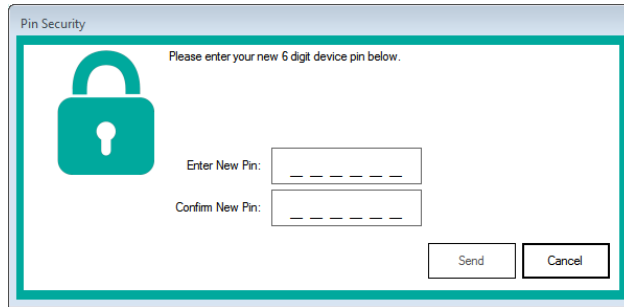
All Cadmus devices can be protected using a 6 digit pin code. To make use of the pin security you must first enable the security feature in Cadmus-Config. Go to the Security tab (a device must be connected). At the bottom of the tab (as shown by the red box), select “Disabled” or “Enabled” and then click “Save Security Settings”. By default, the security is disabled. If you choose to keep security disabled, the application will not prompt to create a pin when a factory new device is connected. But devices already programmed with a pin, will still prompt for their pin number to be entered when changing any configuration.

If the application security is enabled, when any factory new devices are connected to Cadmus-Config, the application will prompt to create a new pin when carrying out configuration changes.

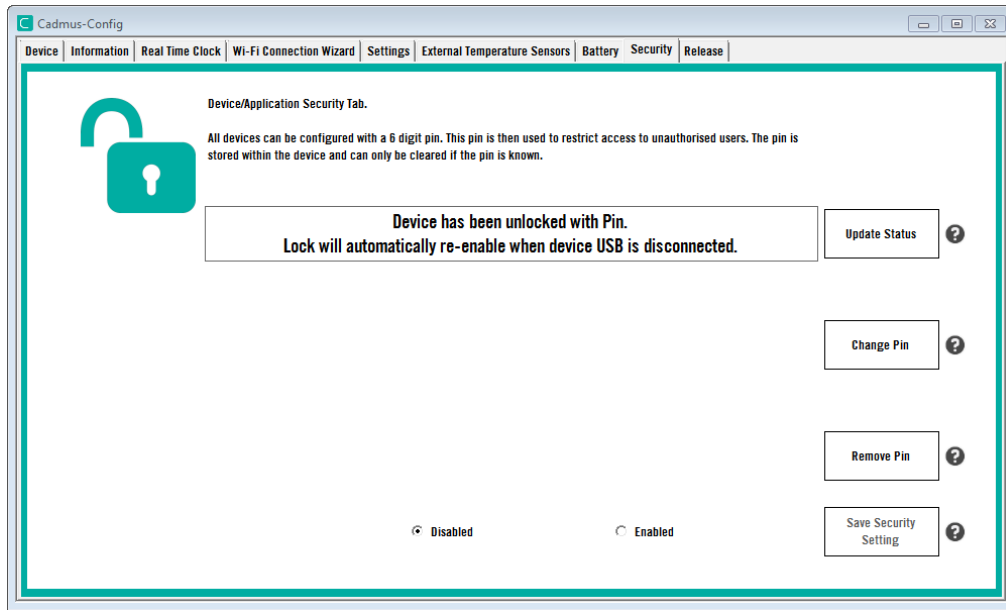
Devices can have their pin disabled or enabled at any time, regardless of the application security settings. The pin can also be changed if the original pin is known. If the pin number is forgotten, please contact your supplier.



When prompted to create a new pin the following popup will appear.



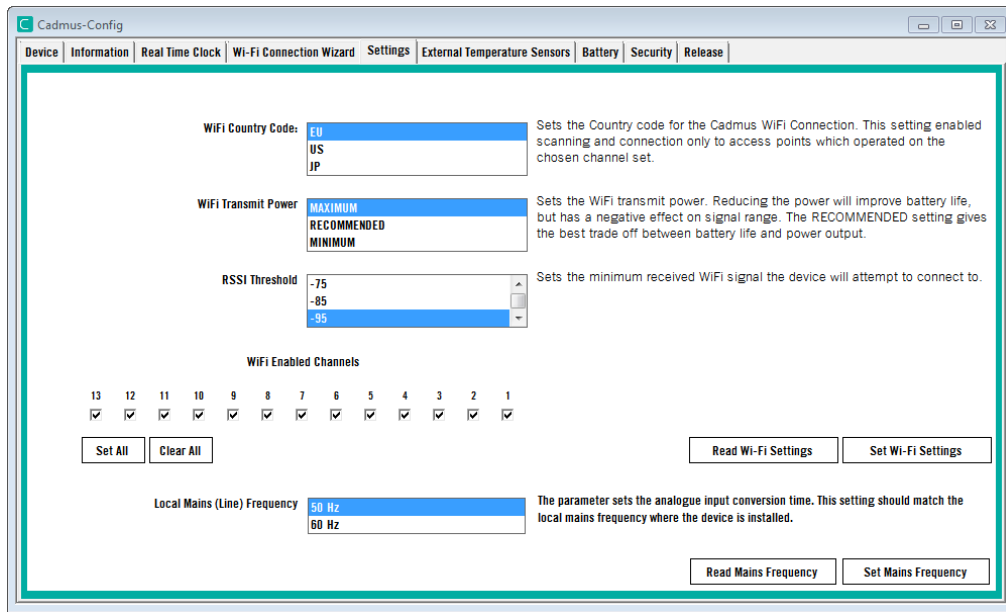
Once the device has been locked with a pin, the status of the device security can always be viewed from the Security tab.



Depending on the pin status, various functions will be available. Either to set, change or remove the current pin.

1.13.7 Cadmus-Config Settings Tab

The Settings Tab contains groups of parameters which can be configured based on your locale. These settings should be checked before configuring your Wi-Fi network.



1.13.7.1 Wi-Fi Settings.

Amend your Wi-Fi settings and the click “Set Wi-Fi Settings”.

Parameter Name	Description	Options
WiFi Country Code	Determines which WiFi Frequency channels are available based on your global locale.	EU = Europe US = United States JP = Japan
WiFi Transmit Power	Determines the transmit power of the WiFi connection. This setting has an effect on battery life. The recommend setting gives the best trade-off between battery life and output power.	MAXIMUM = Ideally used for externally powered devices. RECOMMENDED = Default Setting MINIMUM = Best battery life but may cause communication issues if low signal areas.
RSSI Threshold	Determines the signal floor. Below the set value, the device will not attempt to connection to networks will signal below this leave. The lower the number, the more sensitive the WiFi receiver will be. -95 (dBm) is the most sensitive.	-65 (least sensitive) -75 -85 -95 (Default) (most sensitive)
WiFi Enabled Channels	Sets the channels which will be scanned by the WiFi receiver. Channels disabled will be ignored by the device. WiFi country code US has reduced channels.	Channel 1 to 13. (US = Channel 1 to 11).

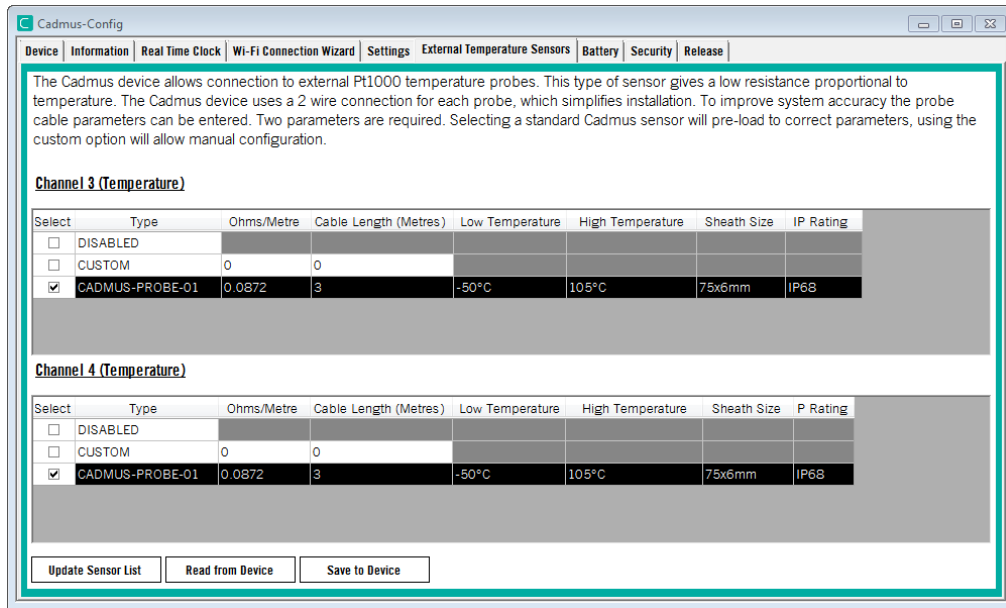
RSSI = Received Signal Strength Indicator.

1.13.7.2 Mains (Line) Frequency

The Cadmus device contains sensitive sampling electronics, to achieve maximum performance the mains (line) frequency should be set to the correct frequency. The mains (line) frequency varies from country to country. Generally, Europe uses 50Hz and America uses 60Hz. The device will function with incorrect settings, but may be more sensitive to noise if the sensor wiring if mounted close to mains wiring.

1.13.8 External Temperature Sensor Tab

External temperature channels 3 and 4 on the device are RTD Pt1000 type sensors, which are connected using 2 wires. It is possible to compensate for the lead resistance of the cable lengths to the sensor element using the screen below. Generally, there is a change of approximately $3.8\Omega/^{\circ}\text{C}$ for this type of element, and sensor cables are normally about a 40th of this. Therefore an error of $+0.02^{\circ}\text{C}$ could be associated with the cable lengths per metre. For maximum accuracy select the type of sensor supplied with the device. This will automatically remove any cabling errors. For customer probe assemblies the raw cable parameters can be entered.



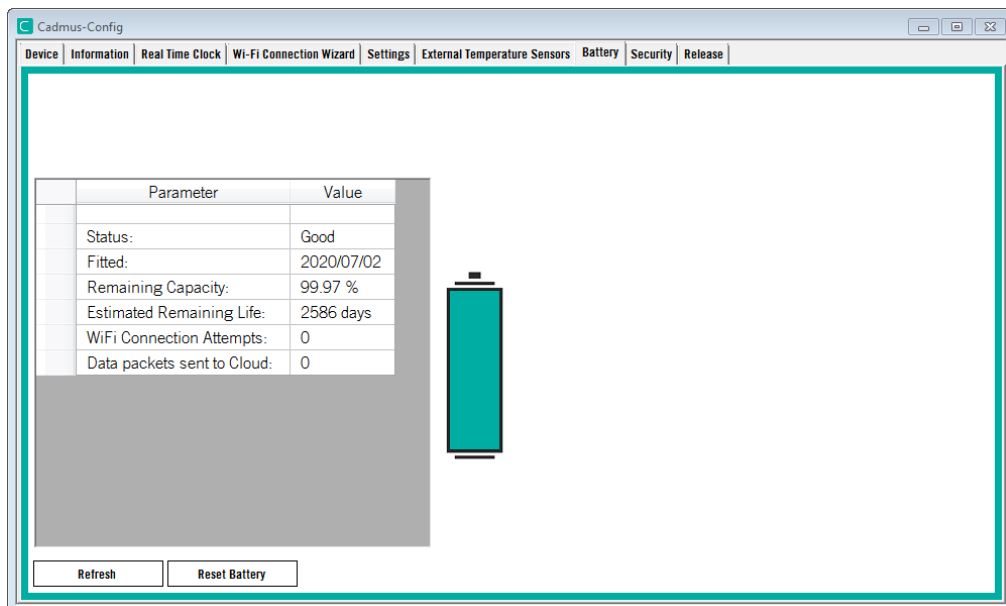
The “Update Sensor List” function will query the cloud for the most up-to-date list of probe assemblies.

1.13.9 Battery Tab

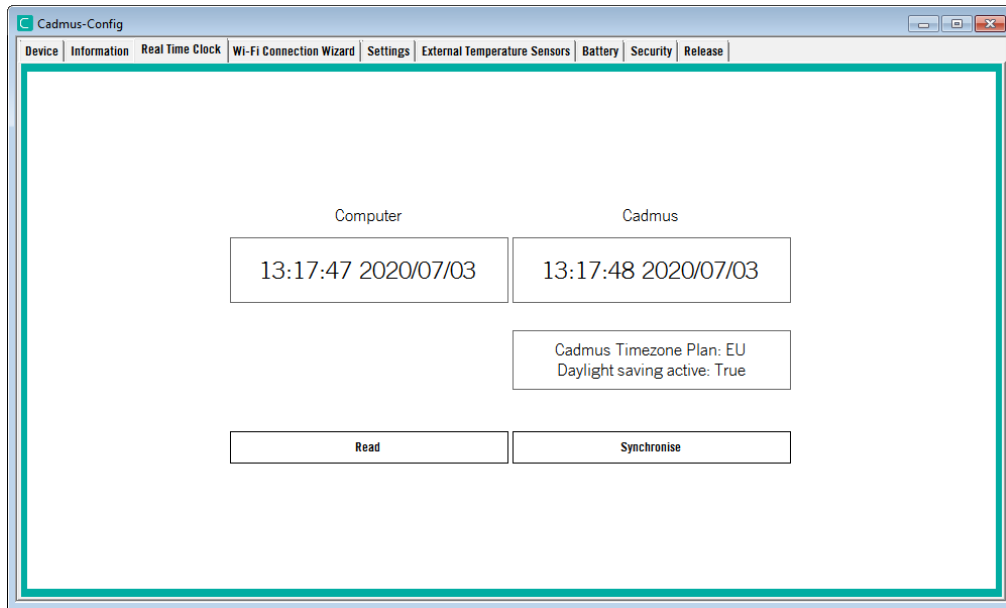
The battery tab gives information on the current battery status. This includes the date the batteries were fitted, capacity remaining and estimated life. In the image below, the device is new and not yet connected to a Wi-Fi network. As previously mentioned in the manual, the battery life cannot be determined by measuring the battery voltage, so a coulomb counting technique is used. To ensure maximum accuracy, you must only replace batteries with new stock. The battery calculation is based on the characteristics of the CADMUS-ACC-01 battery. Other batteries may not give the life indicated by the application.

Once new batteries have been fitted, the user must reset the battery information within the device. This can be done in the window below, or via the “Configuration Wizard” in ratifi.cloud (Admin Screen).

Failing to reset the battery information will result in incorrect battery life warnings.

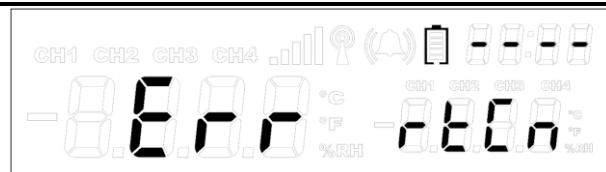


This screen shows the current time within the device, including the time-zone and daylight saving status. The device has an accurate crystal real time clock, but in addition to this the device automatically keeps in sync with a very accurate clock located on the ratifi.cloud. So there is no need for periodic re-syncing of the clock. But the clock must be accurately set before first use, as some enterprise networks which use digital certificates require date validation.



The device is designed to keep the real time clock running for 30 minutes with the power removed. This allows time to change the battery without requiring the use of Cadmus-Config to reset the clock.

If you see the error to the right at any time. The real time clock has cleared and will need resetting using Cadmus-Config.



1.13.11.1 Preparing your Wi-Fi connection

The Cadmus device supports the following connection methods.

- Open
- WEP
- WPA or WPA2 Personal
- WPA2 Enterprise

1.13.11.2 Using Personal Networks

Using Personal Networks you will only need the following:

- SSID (name of your Wi-Fi network).
- Your network KEY.

1.13.11.3 Using Enterprise Networks:

WPA2-Enterprise networks can be complex to set up, please consult you IT department before installation.

The Cadmus device supports multiple EAP (Extensible Authentication Protocol) methods when using WPA2 Enterprise networks. Below is a list of supported methods.

- | | | |
|-----------------|-----------------------|-----------------|
| • EAP-TLS | | |
| • EAP-TTLS-TLS | • EAP-TTLS-MSCHAPv2 | • EAP-TTLS-PSK |
| • EAP-PEAP0-TLS | • EAP-PEAP0-MSCHAPv2 | • EAP-PEAP0-PSK |
| • EAP-PEAP1-TLS | • EAP-PEAP1-MSCHAP-v2 | • EAP-PEAP1-PSK |

Depending on the chosen method, you will require some of the following.

- SSID (name of your Wi-Fi network).
- Username (username may require domain name: e.g. "domain\user" or "user@domain")
- Password
- Root Certificate
- Client Certificate
- Client Key

Generally, the following applies:

- EAP-TLS requires a Username, Root Certificate, Client Certificate and Client Key.
- EAP-PEAP0-MSCHAPv2 requires a Username, Password and Root Certificate.

The certificates are normally generated by the certificate authority and the user management via a Radius server. Configuration for the radius would be made within the customer's access point.

Root Certificate, Client Certificate and Client key should be in X-509 PEM format. PEM format refers to an ASCII (Base64) encoded certificate, prefixed with "-----BEGIN CERTIFICATE-----" and suffixed with "-----END CERTIFICATE-----". The certificate transfer mechanism is unidirectional, to the device only. Certificates cannot be off-loaded from the device or viewed once loaded.

The following ciphers are compatible.

- | | | |
|---|----------|-------------|
| • RSA (MAX 2048 bit) (4096 bit coming soon) | | |
| • SHA1 | • SHA256 | • SHA384 |
| • SHA512 | • MD5 | • POLY 1305 |
| • DHE | • ECDSA | • ECDHE |

The Cadmus device will automatically send alarms 30 days before the certificates expire. Providing a Wi-Fi connection is possible.

1.13.11.4 Ports

The Cadmus device communicates with the cloud using UDP packets, using Port 49152 (Bi-Directional). The device will also use port 53 for DNS lookup.

1.13.11.5 IP Addresses

The ratifi.cloud is hosted on 2 independent servers. Both servers are located in the UK, and both at different geographic locations. The address of each server is listed below.

- 3.8.223.231
- 35.177.84.149

The device will make a DNS lookup to determine which of the 2 addresses to use.

1.13.11.6 Health & Social Care Network (HSCN) and BT N3 Firewalls.

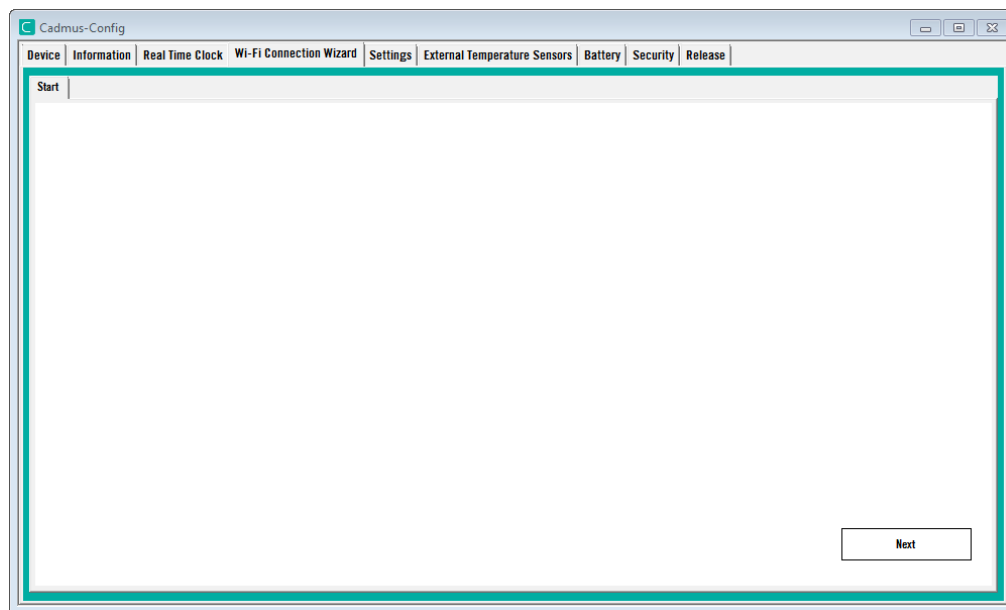
The British NHS operates on 2 different national firewall platforms. The BT N3 will soon be replaced with HSCN.

National NHS Firewalls	Implementation Date
BT N3	July 2019
HSCN*1	July 2019

1*: HSCN = Health & Social Care Network.

1.13.12 Wi-Fi Connection Wizard

Select the Wi-Fi Connection Wizard tab, and then select "Next" (bottom right). The device will initiate a network scan. This will take a couple of seconds to complete.

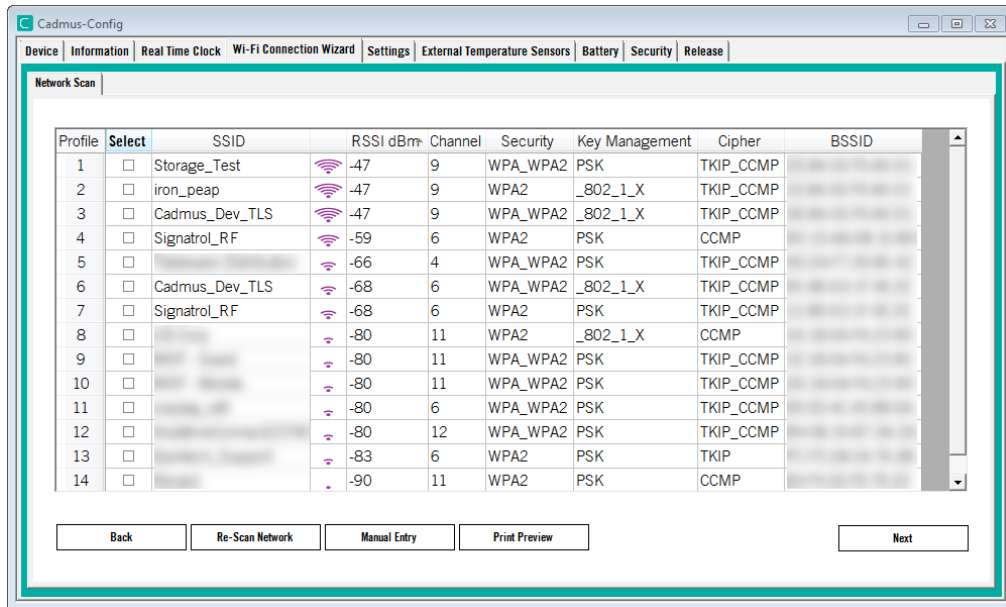


1.13.12.1 Network Scan

Once the network scan has completed, Cadmus-Config will display a list of available access points. On the image below sensitive information has been blurred for confidentiality purposes. The device will scan up to 30 profiles. The list is sorted with the highest signal strengths are the top of the screen. The BSSID number is the MAC Address of the access point advertising the network. If you have multiple access points with the same SSID, they will appear on separate lines.

Note: When selecting a network. The BSSID is not used, it BSSID is shown for reference purposes only. When a network with multiple access points is selected, the Cadmus device automatically re-scans the network before each connection. If more than 1 access point is available with the same SSID, the device will select the access point with the highest signal strength (RSSI) and make a connection using the BSSID.

Note: Signal strength may vary if repositioning the device after Wi-Fi setup. Wi-Fi signal strength can be confirmed within the cloud application.



If you are unable to see your SSID listed, then select “Re-Scan Network”. If your SSID is still not listed, ensure you have not de-selected the channel your SSID is present on.

Once you have selected your SSID, select next.

This manual will focus on WPA2-Personal and WPA2-Enterprise (EAP-TLS). The other settings are very much a similar process.

For WPA2-Personal go to 1.13.13

For WPA2-Enterprise (EAP-TLS) go to 1.13.14

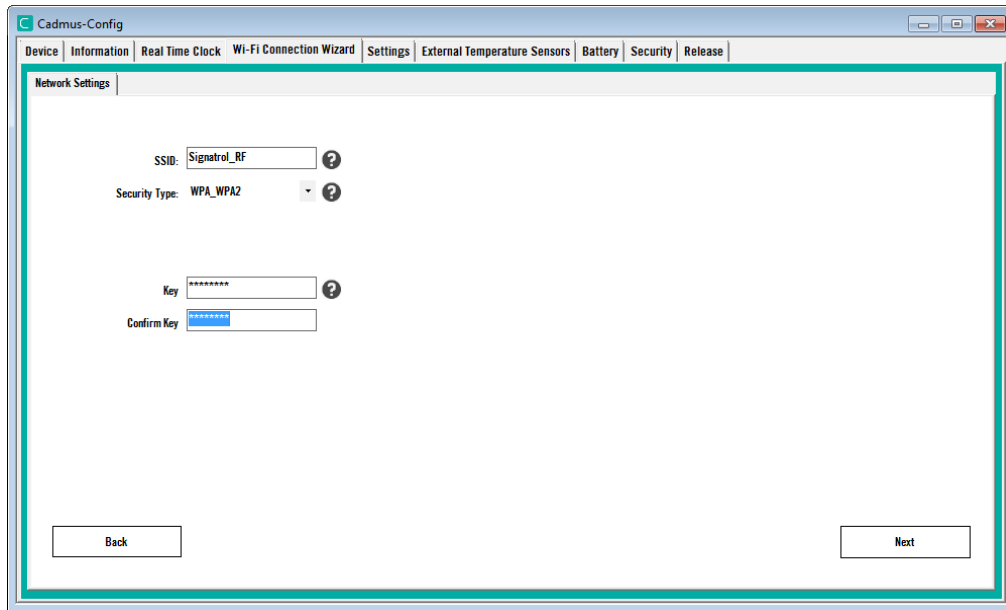
Column Name	Description
Profile	Index of profile (Maximum 30 profiles can be displayed).
SSID	SSID = “Service Set Identifier”. The name of the Wi-Fi network broadcast by your access point.
ICON	Image indicating received signal strength.
RSSI dBm	RSSI = “Received Signal Strength Indicator”, measured in dBm.
Channel	Frequency channel the profile is located on.
Security	Security type set within the access point.
Key Management	Key management type. “_802_1_X” indicates a Enterprise network.
Cipher	Cipher type.
BSSID	MAC Address for access point.

Guide to RSSI.

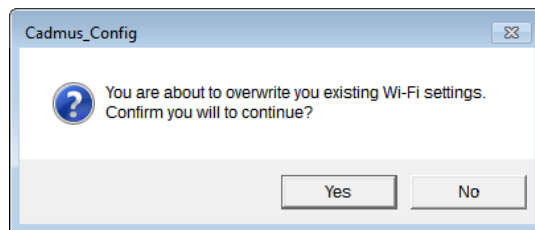
RSSI dBm	Note.
-30 dBm	Maximum achievable signal strength. The device will be a few feet from the access point.
-65 dBm	Reliable and timely connections.
-70 dBm	Minimum signal strength for reliable connections.
-80 dBm	Communications maybe unreliable.
-90 dBm	Approaching noise floor. Communication will be highly unlikely.

1.13.13 WPA2- Personal Connection – Network Settings

The WPA2-Personal connection only requires a network key. Enter the key twice as shown.

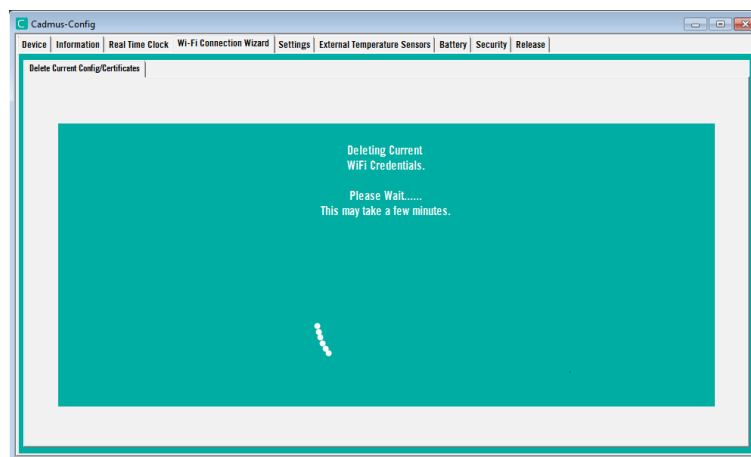


The application will confirm you wish you continue. At this point the old Wi-Fi settings (if present) will be deleted.



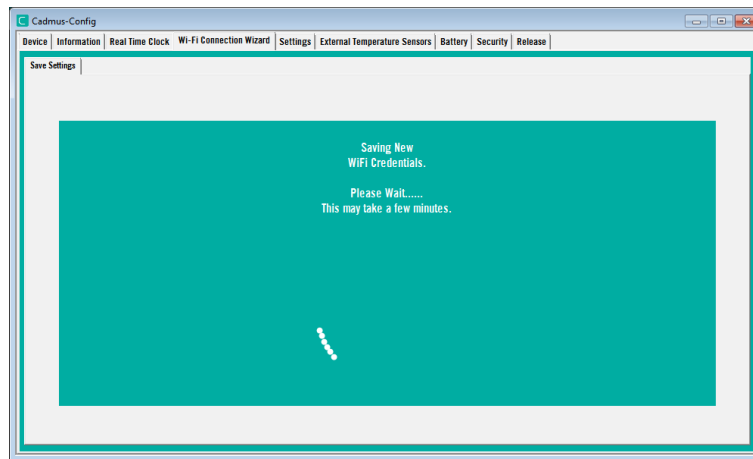
The application will now transfer all the new settings to the device and test the Wi-Fi connection. The whole process takes approximately 30 seconds.

Deleting current settings.....

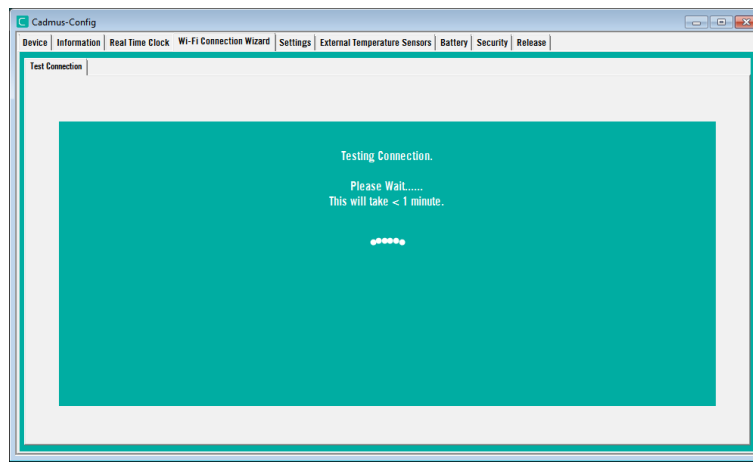


Continues over the page...

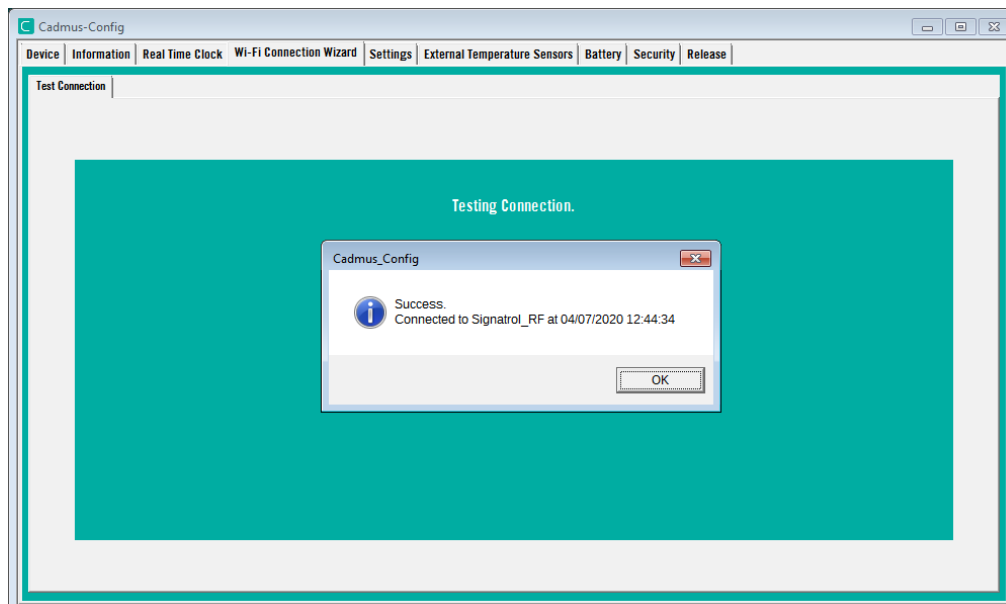
Saving new settings.....



Testing connection....



Connected.

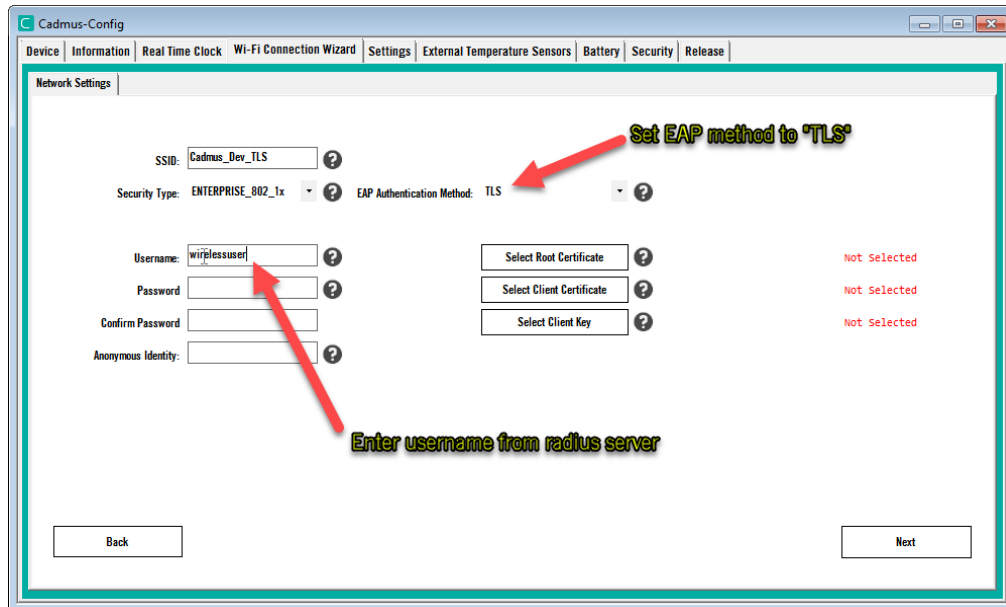


If your device will not connect. Please check all your settings. If the application reports the device is being actively refused. It is most probable that the password is being incorrectly entered.

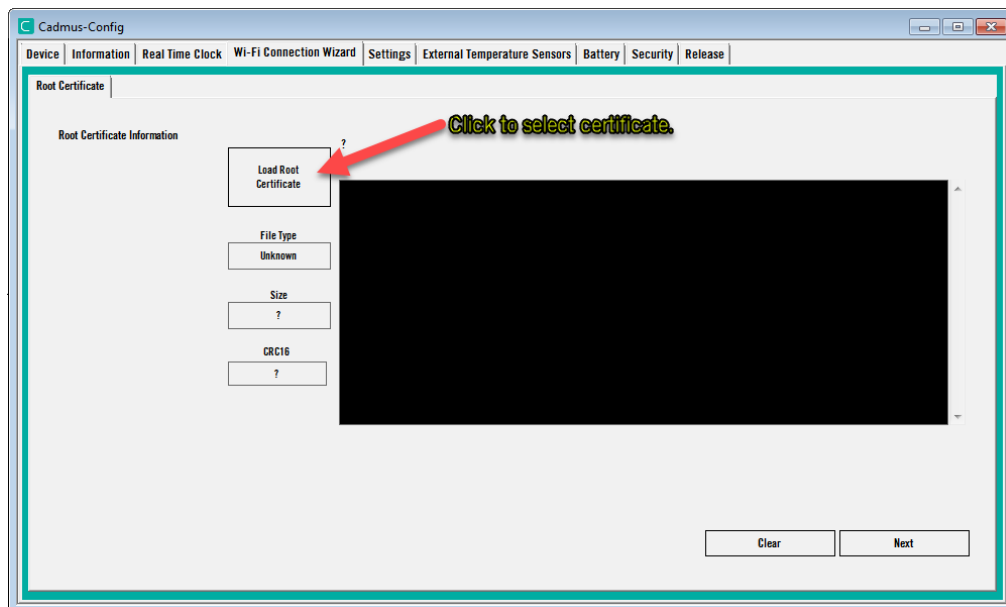
Your device is now connected to the WiFi network, please close Cadmus-Config and move on to section 1.14

1.13.14 WPA2-Enterprise Connection (EAP-TLS) – Network Settings.

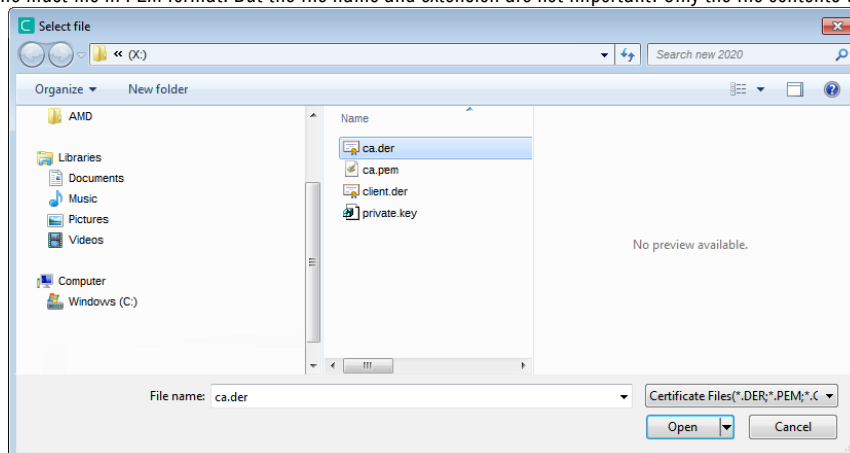
Ensure the EAP type is set to the correct type. In this case we are using TLS. Then enter your username.



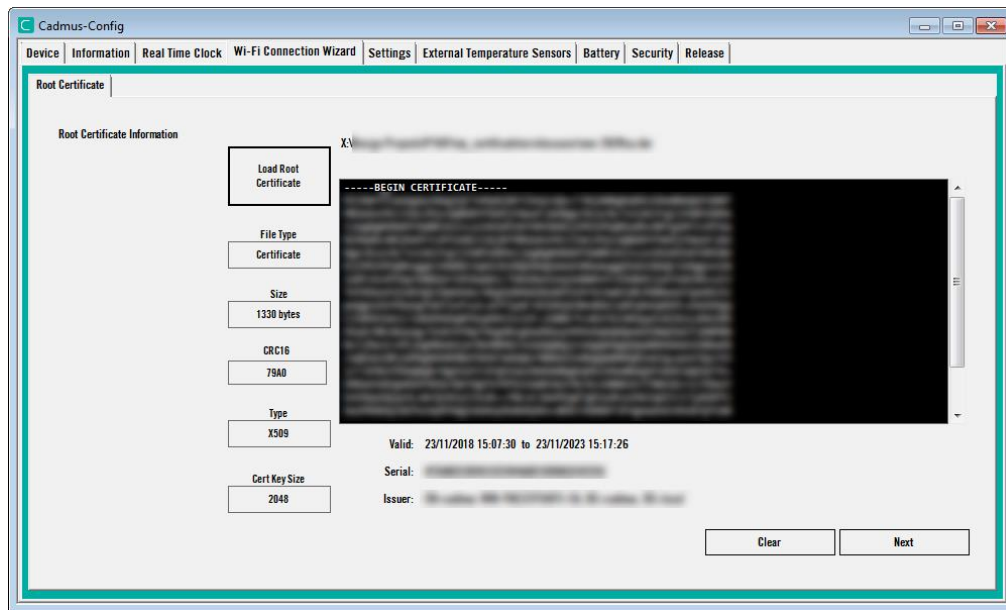
Then click “Select Root Certificate”



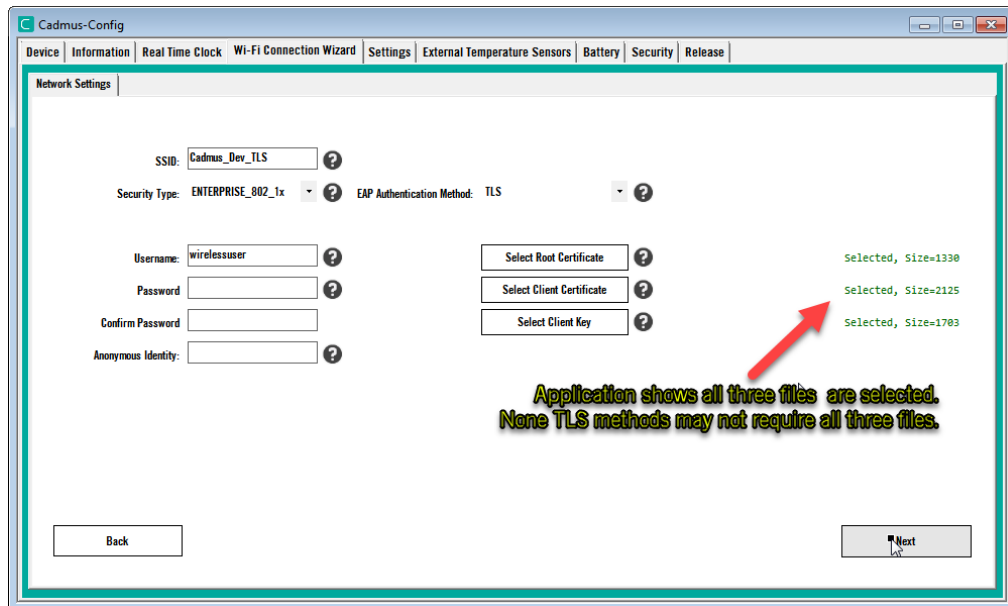
The file browser will open. The file must be in PEM format. But the file name and extension are not important. Only the file contents will be used.



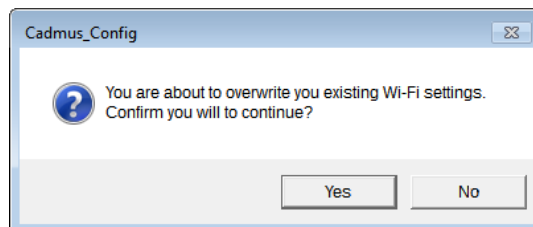
The application will validate the file is valid X509 format. The valid from and valid to dates are clearly shown. The application will refuse files which are currently not valid. It will also display a warning if a certificate will expire in less than 60 days. Select next to return to the previous screen.



Repeat the procedure for the client certificate and the client key. You should then see all three files have been selected, as shown below. Select "Next" to continue.



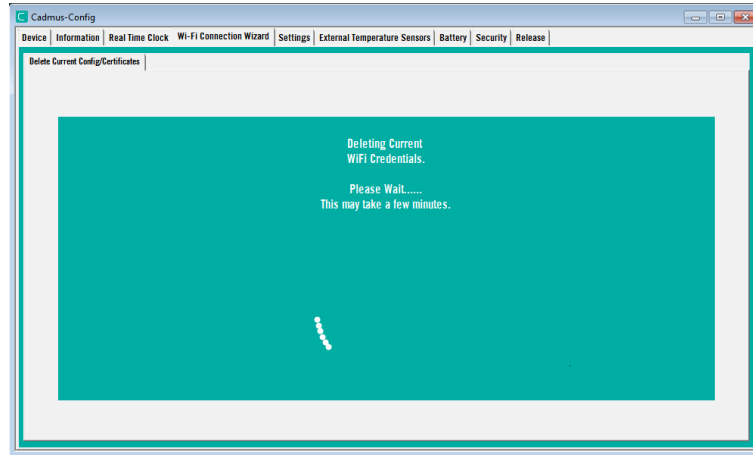
The application will confirm you wish you continue. At this point the old Wi-Fi settings (if present) will be deleted.



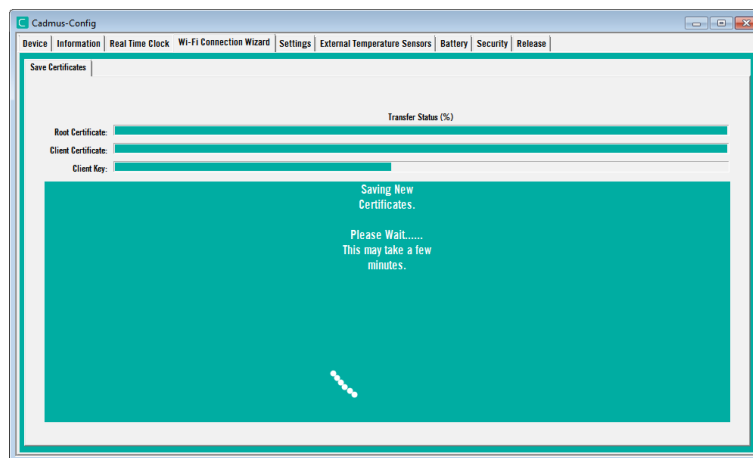
Continues over the page...

The application will now transfer all the new settings and certificates to the device and test the Wi-Fi connection. The whole process takes approximately 3 minutes.

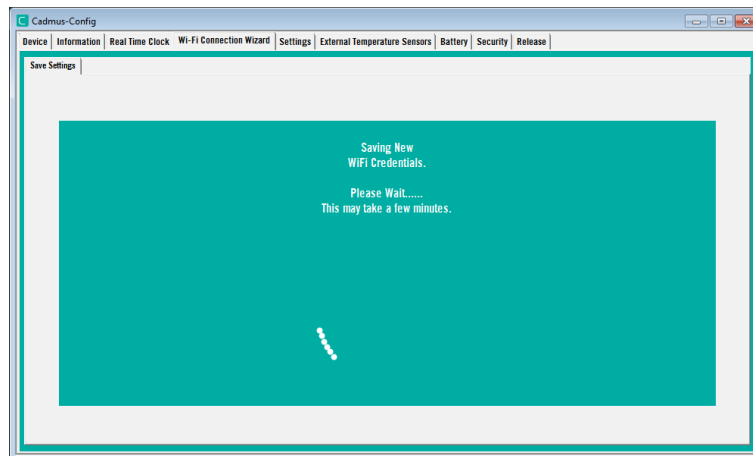
Deleting current settings.....



Transferring certificate files to the device.

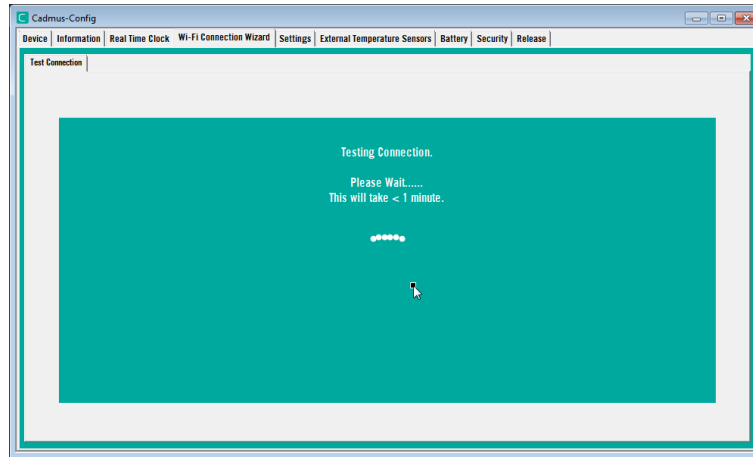


Saving new settings.....

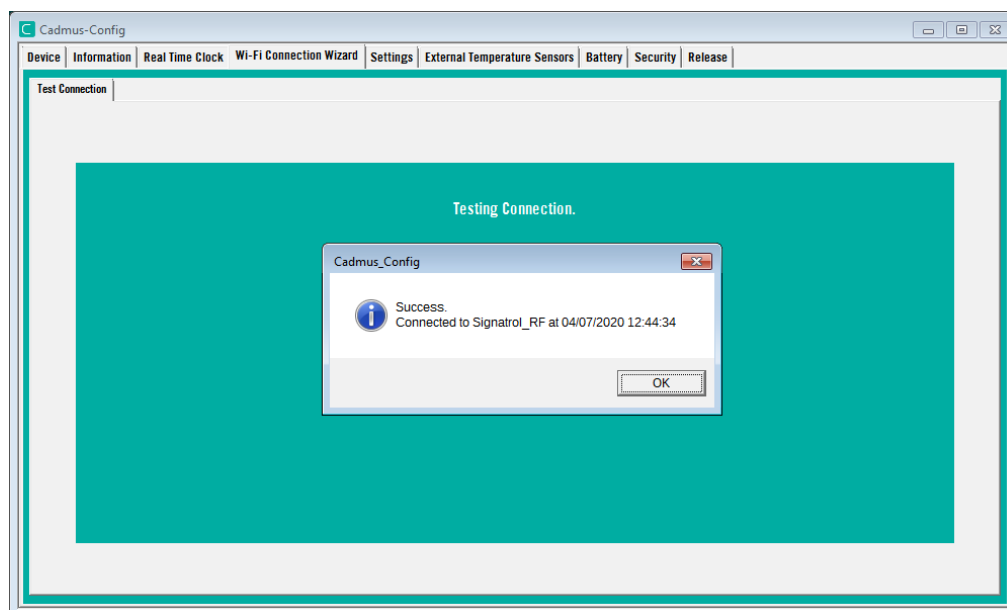


Continues over the page...

Testing connection....



Connected.



If your device will not connect. Please check all your settings.

Your device is now connected to the Wi-Fi network; please close Cadmus-Config and move on to section 1.14

1.14 Product Positioning

The Cadmus product has a wide range of applications and some simple guidelines will help the installer achieved the best from the device.

Guidelines:

- When monitoring fridges and freezers, if the internal (ambient) temperature channel is required, make sure the device is not placed close or above the fridge/freezers compressor as this radiates heat.
- External temperature channels have 2 connection options, either through the side Jack Sockets in the device lid, or via the screw terminals in the product base.
- For the Wi-Fi connection to operate correctly the device must not be completely enclosed within a shielded (metal) box. Ideally the device should be mounted at least 12cm above ground level. The device should have a clear signal path to the Wi-Fi access point, if the clear path is not available. Make sure that no metal objects are positioned close to the device in the direction of the access point, as this will allow the signals to propagate around the device.
- During the installation periodically check the Wi-Fi Signal strength (RSSI) in the Cadmus-Config application, and confirm the signal strength again with the user screen table view. Each block of data sent to the cloud contains signal strength information.
- If a device is showing poor signal strength, sometimes it might be a simple case of rotating the orientation of the Cadmus device or the Access point to improve connectivity.
- If the device is unable to obtain good quality Wi-Fi signal, the device will do its best to send its data by retrying the connection after a variable short delay. This has a negative impact on battery life and to achieve the best battery life a good quality Wi-Fi signal is required.

1.15 Device and Cloud interaction

Once the device has been successfully setup with a valid Wi-Fi configuration. The device will be in either of the following states.

- NAP (Sleep)
- Monitoring (Active)

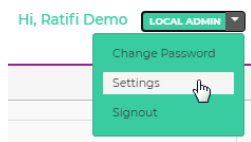
The initial cloud configuration is created in section 1.8. The cloud will be waiting for the device to connect. Once the connection is made the cloud configuration will be downloaded to the device. On receipt of the configuration the device will re-boot. If device configuration is set to enable the device, the device will change to Monitoring (Active) state. If the configuration is set to disable the device, the device will change to NAP (Sleep) state.

When in NAP state the device will not monitor or store any data. The device will attempt to connect to the cloud once every 90 minutes to check if a new configuration packet is available. This mode will extend battery life when the device is not required. In this state the display will indicate "nAP"

When in Monitor state the device will sample all enabled channels every 60 seconds. Data will be stored to memory based on the "Store Rate". The device will upload to the cloud based on the "Upload Rate". If alarms have been enabled, when a sensor alarm changes state this is over-ride the current settings and upload immediately.

1.16 Entering you Company Details.

Using your preferred web browser, go to www.ratifi.cloud and log in as Administrator. Select the drop down at the top right-hand side of the screen. Then select "Settings"



The following screen will appear. Enter your Company details, including VAT number if known. Then purchasing credits, the company location and VAT number will be used to determine if VAT is applicable.

Edit Company

Company

COMPANY NAME

Local Admin

FIRST NAME

LAST NAME

CONTACT NUMBER

Address

ADDRESS 1

ADDRESS 2

STATE

PINCODE

COUNTRY

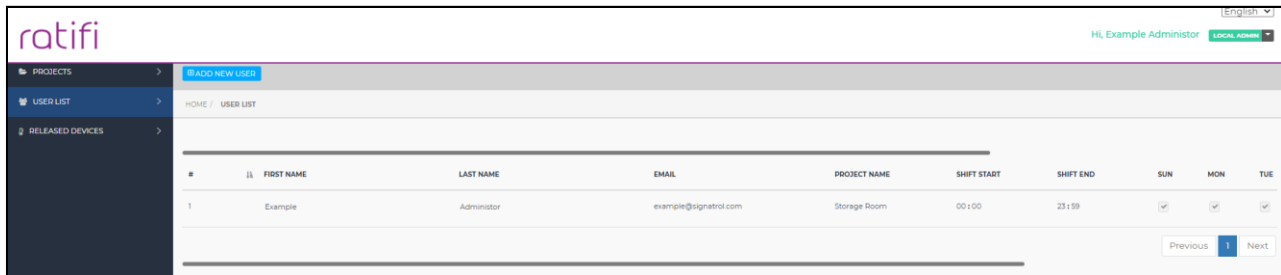
LOCATION

VAT NUMBER

SAVE

1.17 Add cloud users

You have already created an Administrator for your account, which has access to Admin and User areas. It is now time to create User accounts. Login via the Administrator login and select "User List" from the left-hand menu.



Select "ADD NEW USER" and the windows below will appear.

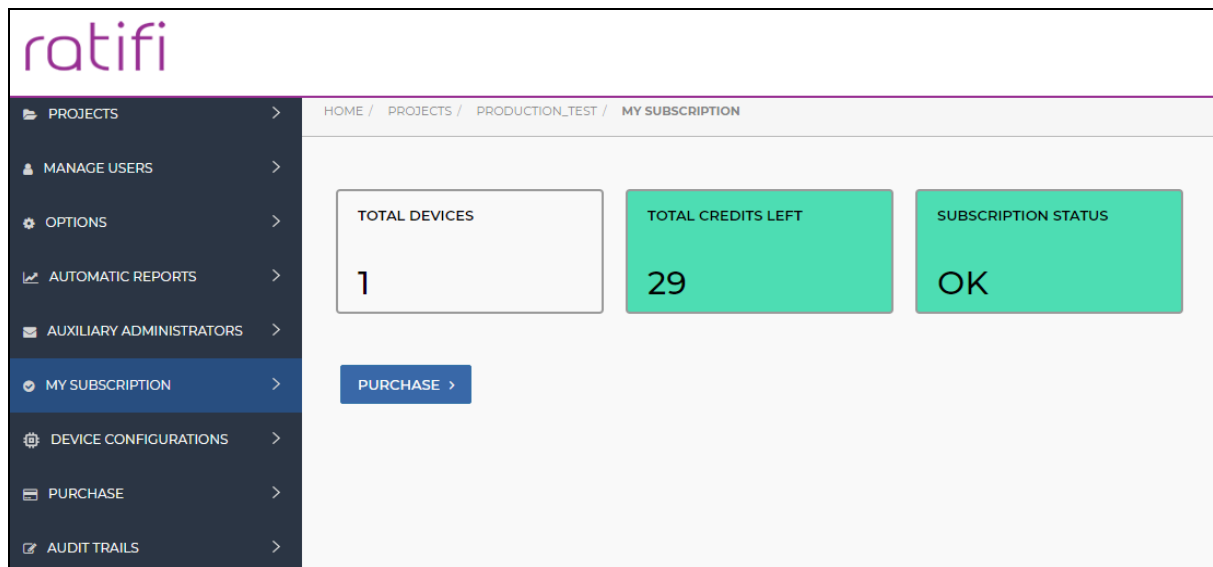
Parameter Name	Description
FIRST NAME	Users Christian / given name.
LAST NAME	Users surname / family name.
EMAIL	User email address. This will be used by the user to login.
DEPARTMENT	Text field for information only.
CONTACT NUMBER	User contact number. For information only.
PROJECT	Project which user has access to. Users can be added to other projects later.
SHIFT START	These three parameters are used to determine if the user is available to receive Alarm emails from the system. If a user requires Alarms at any time or day. They should complete as follows: Shift Start 0:00, Shift End 23:59 Weekdays: Check all 7 days.
SHIFT END	
WEEKDAYS	

Selecting Save will automatically send an email to the User. The User should then open the link within the email to generate their own password.

1.18 Ratifi Credits

When adding a new device to Ratifi, the cloud will automatically credit the project with 1 credit. The project requires 1 credit per device / Month to operate. Credits are decremented on the 1st of each new month, based on the number of devices available to the project.

The credit balance for each project can be found in the administrator login. Select the required project and go to "MY SUBSCRIPTION".



The screen will give information on the current number of devices on the project and the total number of credits available. The subscription status has four possible states.

Subscription State	Description
OK	This is the normal active state. The number of credits give more than 30 days of operation.
LOW	The project is in credit for the current month but will fall into arrears next month. Administrator will be sent a warning email every week, to check the credit balance.
ARREARS	The project is in arrears, user access will be suspended at the end of the current month. The Administrator will be sent a warning email every day, to purchase new credits. The system will continue to store all data and send alarm emails.
SUSPENDED	The project is suspended. No user access is available. Administrator will be sent a warning email every week, to check the credit balance. The system will continue to store all data, but any sensor alarm emails or automatic reports will stop. All user access will be suspended. The administrator will only have access to the admin screen to purchase the required credits.

If a device is no longer required for a project, the device should be removed. Removed devices are no longer associated to a project, and waiting for the administrator to associate to a new project. Removed devices do not decrement credits.

1.18.1.1 Purchasing Credits

Credit can be purchased in one of two ways.

- Instant purchase using Credit or Debit Card via a PayPal Portal.
- Raise a purchase order, which will be manually invoiced. This method will not be instant, please allow 2~3 working days for the credits to appear.

PURCHASE CREDIT

Purchase instantly via Credit or Debit card Raise a Purchase Order (PO)

CREDIT QUANTITY

Rate : £ 1.43
Total : £ 35.75

SUBMIT

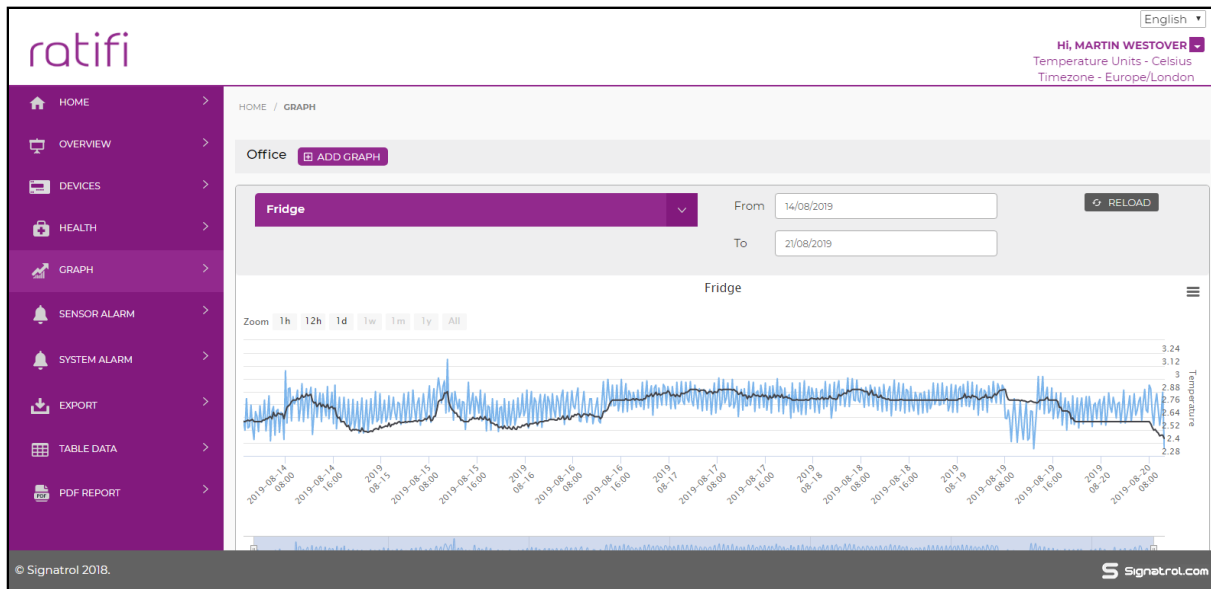
LOW	HIGH	UNIT PRICE	DISCOUNT
5	24	1.50	0.00 %
25	49	1.43	5.00 %
50	99	1.28	15.00 %
100	249	1.13	25.00 %
250	499	0.98	35.00 %

The credit unit price is based upon the number of credits purchased at one time. Credits can be purchased at any time. Credits are locked to the project where the credit was purchased under. Credits are not transferable between projects.

During the purchase the VAT will be calculated based on the details entered into the company details settings window. See section 1.16.

Ratifi

Ratifi is a cloud-based operating system that runs on multiple servers so that you will never lose any of your important data. Ratifi can be accessed via the internet from anywhere in the world with the appropriate log in details.



1.19 Ratifi Overview

The Ratifi software is our premium software platform; it is cloud based and offers the following features:

- Monitor the various Cadmus channels
- Set up alarm limits (Hi Hi, Hi, Lo and Lo Lo)
- Display stored values in graphic or tabular form
- Manage system requirements (Battery replacement, re-calibrations etc)
- Set up shift planning. i.e send email alerts to the right people at the right time.
- Configure the input channels.
- Add or remove users
- Manage your Ratifi-cloud account
- Simple Audit facility

1.20 Administrator Functions Not Already Covered Earlier.

1.20.1 Options

Once logged into the administrator screen, select a project, and then select “Options” from the menu on the left.

Parameter Name	Description	Options
TEMPERATURE UNITS	Temperature units for screens, emails and reports.	Celsius, Fahrenheit and Kelvin
AUTOMATIC REPORT SETTINGS		
REPORT DAY	Determines which day the weekly report is sent.	Days, Sunday to Saturday (Default: Monday).
NEW REPORT TIME	Determines what time daily and weekly reports are sent.	Set time is HH:MM. (Default 00:00 (Midnight))
LATE ALARM TRIGGER		
LATE ALARM TRIGGER	Ratifi has an internal function which checks all devices connect at regular intervals. If a device fails to connection within this period, it will cause a “Late Alarm” to trigger and an email set to the administrator. The default period is 120 minutes. The devices connect every “UPLOAD RATE” minutes. If a device is in NAP state, it will connect every 90 minutes.	30 to 2880 minutes. (Default: 120 minutes)
	When a device “UPLOAD RATE” is configured to 120 minutes or more. The administrator should increase the “LATE ALARM TRIGGER” period to be greater than the upload rate.	
LATE ALARM EMAIL REPETITION	Once a late alarm is triggered, this setting determines how often the Administrator is emailed a reminder that the alarm condition is still present.	1 to 24 Hours. (Default: 12 hours. If the alarm is not cleared a reminder will be emailed every 12 hours).

1.20.2 Automatic Reports

Automatic reports can be generated to email users with PDF report every Day/Week or Month. The type of report that is run and who receives them is set below.

ENABLE	TYPE	ADMIN/USER	
<input type="checkbox"/>	daily	<input type="checkbox"/> Demo User <input type="checkbox"/> Ratifi Demo	Update
<input type="checkbox"/>	weekly	<input type="checkbox"/> Demo User <input type="checkbox"/> Ratifi Demo	Update
<input checked="" type="checkbox"/>	monthly	<input checked="" type="checkbox"/> Demo User <input type="checkbox"/> Ratifi Demo	Update

- Daily reports are sent every 24 hours, at the Report Time. See section 1.20.1.
- Weekly reports are sent every 7 days, at the Report Time and Report Day. See section 1.20.1.
- Monthly reports are sent on the first day of a new calendar month. A few minutes into the new month.

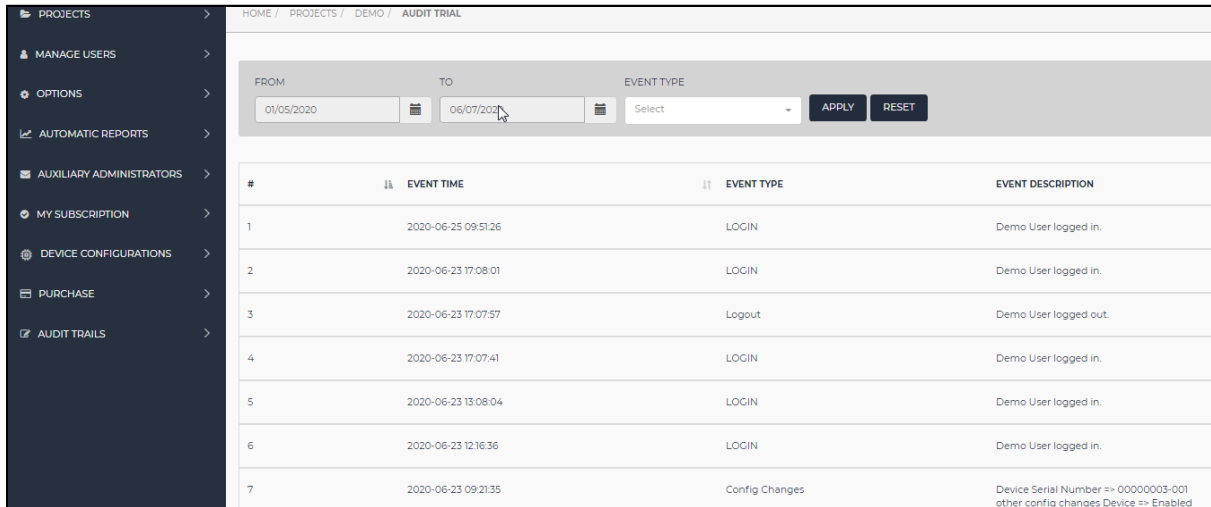
1.20.3 Auxiliary Admin email List

Here is where you add your emails for Auxiliary Administrators i.e people that can receive duplicate Administrator emails but have no other authority on the system:

#	NAME	EMAIL ADDRESS	EDIT	DELETE	DISABLE
1	Spare Admin	spare_admin@signatrol.com	EDIT	DELETE	<input checked="" type="checkbox"/>

1.20.4 Audit Trails

This page can be used to provide a complete Audit Trail of all activity and events over a particular period.



#	EVENT TIME	EVENT TYPE	EVENT DESCRIPTION
1	2020-06-25 09:51:26	LOGIN	Demo User logged in.
2	2020-06-23 17:08:01	LOGIN	Demo User logged in.
3	2020-06-23 17:07:57	Logout	Demo User logged out.
4	2020-06-23 17:07:41	LOGIN	Demo User logged in.
5	2020-06-23 13:08:04	LOGIN	Demo User logged in.
6	2020-06-23 12:16:36	LOGIN	Demo User logged in.
7	2020-06-23 09:21:35	Config Changes	Device Serial Number => 00000003-001 other config changes Device => Enabled

Items available within the Audit Trail:

- Login/Logout – this report captures every project user login and logout time.
- Configuration Changes – this report captures the device configuration changes time and what was changed, what was the configuration before and what was it changed to
- Change Password – when a user changes their password it records the date time
- New User – when a new user is added by the Administrator in the project, the user's name and date time is recorded
- New Device – When a new device is added, device's name and date/time is recorded.
- Removed – When a device is disabled or transferred, device's name and date/time is recorded.

1.21 Events

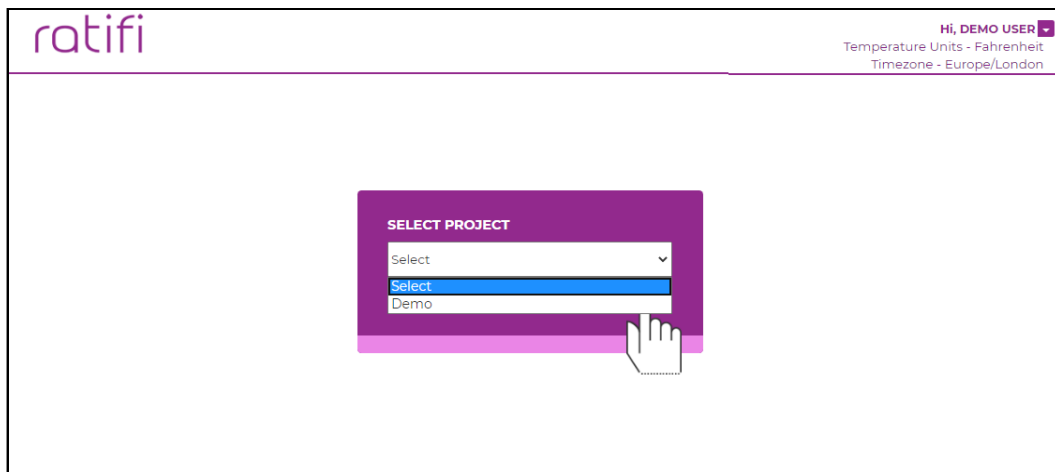
There are two types of events: Sensor alarms and System Alarms:

- Sensor Alarms: Sensor Alarms are generated when measured parameters go outside the pre-determined limits set by the Administrator.
- System Alarms: System alarms are generated when a fault with the operating system is determined. This could be low batteries, no data from a device (Late Alarm), Calibration due soon or overdue. WPA2-Enterprise Certificates expiring soon.

2 User Functions

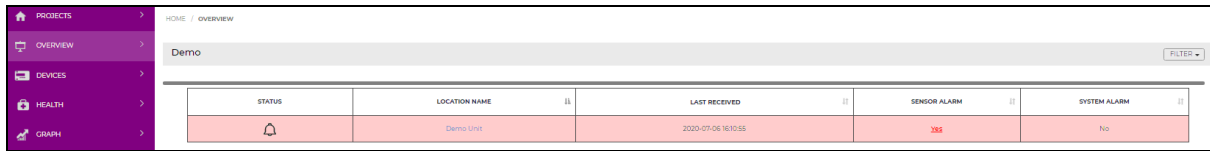
2.1.1 Project Selection.

After login, the user will be prompted to select a project. Only projects allocated by the Administrator will be visible to the user.



2.1.2 Overview

Once logged in, the Overview screen will be loaded. The Overview screen gives the most simplified view of your devices, without showing too much detail.



STATUS	LOCATION NAME	LAST RECEIVED	SENSOR ALARM	SYSTEM ALARM
	Demo	2020-07-06 16:50:55	Yes	No

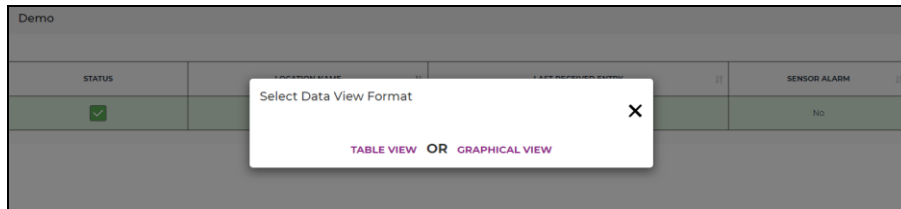
Each device will be allocated a row in the table. Any devices in an alarm state will appear with a pink background colour.

The following parameters are displayed:

Column Name	Description	Column Sortable.
STATUS	Bell displayed if either a sensor alarm or system alarm is present.	NO
LOCATION NAME	Administrator defined text string associated with the device location or ID.	YES
LAST RECEIVED	Date/Time was cloud last received data from the device.	YES
SENSOR ALARM	Current Sensor Alarm Status (Any alarms on channels 1 to 4)	YES
SYSTEM ALARM	Current System Alarm Status (Low Battery, Calibration and Late alarms).	YES

If there are a large number of devices associated with the project, use the dropdown "FILTER" option to reduce the number of devices displayed.

The "LOCATION NAME" is an active link, when selected the "Select Data View Format" popup will appear (shown below).



- Select "TABLE VIEW" will display a table with data only from the selected device.
- Select "GRAPHICAL VIEW" will display a graph with data only from the selected device.

Use the "GRAPH" option on the left-hand menu to select a graph with multiple devices.

2.1.3 Devices

The Devices screen shows the latest readings per channel. Displayed channels will display “N/A” (Not applicable).

STATUS	LOCATION	LAST RECEIVED	CH 1	CH 2	CH 3	CH 4	CH 5
✓	Demo Unit	2020-07-08 11:21:55	22.8°C	61.8%	2.4°C	3°C	0.000

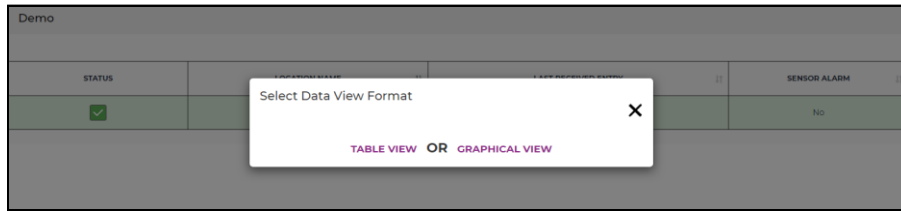
Each device will be allocated a row in the table. Any devices in an alarm state will appear with a pink background colour.

The following parameters are displayed:

Column Name	Description	Column Sort able.
STATUS	Bell displayed if either a sensor alarm or system alarm is present.	NO
LOCATION NAME	Administrator defined text string associated with the device location or ID.	YES
LAST RECEIVED	Date/Time was cloud last received data from the device.	YES
CH1	Internal Temperature, displayed in the temperature using set by the Administrator.	NO
CH2	Internal relative humidity, displayed in %RH.	NO
CH3	External Temperature, displayed in the temperature units set by the Administrator.	NO
CH4	External Temperature, displayed in the temperature units set by the Administrator.	NO
CH5	Counter/Discrete	NO
CH6	Counter/Discrete	NO

If there are a large number of devices associated with the project, use the dropdown “FILTER” option to reduce the number of devices displayed.

The “LOCATION NAME” is an active link, when selected the “Select Data View Format” popup will appear (shown below).



- Select “TABLE VIEW” will display a table with data only from the selected device.
- Select “GRAPHICAL VIEW” will display a graph with data only from the selected device.

Use the “GRAPH” option on the left-hand menu to select a graph with multiple devices.

2.1.4 Health

The Health screen shows information on the status of the calibration, battery level and battery status. All of these parameters are updated each time the cloud receives new information from the device.

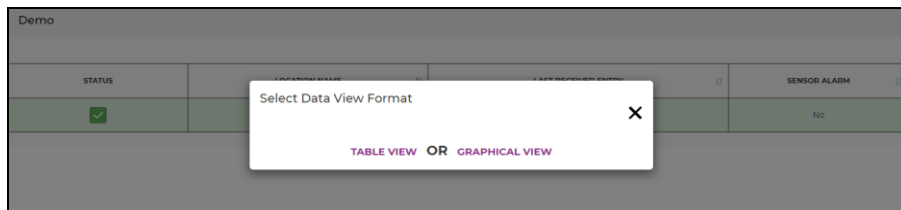
STATUS	LOCATION NAME	SERIAL NUMBER	LAST RECEIVED	CALIBRATION DATE	CALIBRATION STATUS	BATTERY STATUS	WIFI SIGNAL
OK	Demo Limit	00000003-001	2020-07-08 11:55:55	2019-12-06	OK		

The following parameters are displayed:

Column Name	Description	Column Sort able.
STATUS	Bell displayed if either a sensor alarm or system alarm is present.	NO
LOCATION NAME	Administrator defined text string associated with the device location or ID.	YES
LAST RECEIVED	Date/Time was cloud last received data from the device.	YES
CALIBRATION DATE	Date of last calibration	YES
CALIBRATION STATUS	This can either be OK, DUE SOON or OVERVIEW, based on the calibration period set by the Administrator.	YES
BATTERY STATUS	Displays the estimated remaining capacity of the internal batteries. Externally power devices will display 100%. Each bar indicates 20% capacity.	NO
WIFI SIGNAL	Indicates the Wi-Fi signal strength received by the device when uploading its latest data.	NO

If there are a large number of devices associated with the project, use the dropdown "FILTER" option to reduce the number of devices displayed.

The "LOCATION NAME" is an active link, when selected the "Select Data View Format" popup will appear (shown below).



- Select "TABLE VIEW" will display a table with data only from the selected device.
- Select "GRAPHICAL VIEW" will display a graph with data only from the selected device.

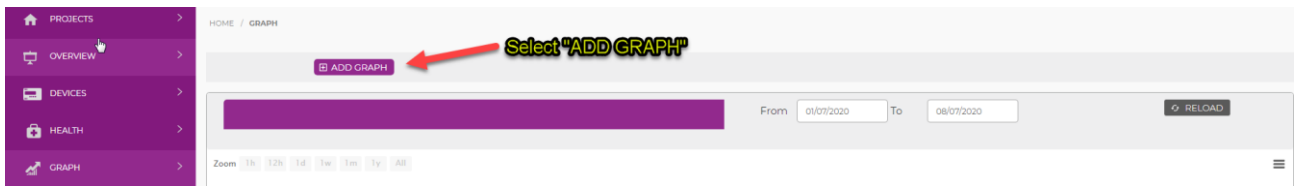
Use the "GRAPH" option on the left-hand menu to select a graph with multiple devices.

2.1.5 Graph

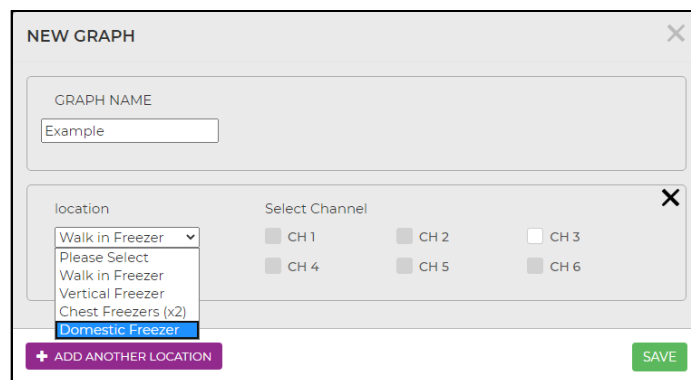
Previously it has been shown how to generate a graphs or tables via the “LOCATION” link in OVERVIEW/DEVICES or HEALTH. The Graph screen allows the user to save preconfigured graphs, where multiple device and/or channels can be overlaid on the same graph.

2.1.5.1 Add Graph

Select “ADD GRAPH” using the button indicated below.

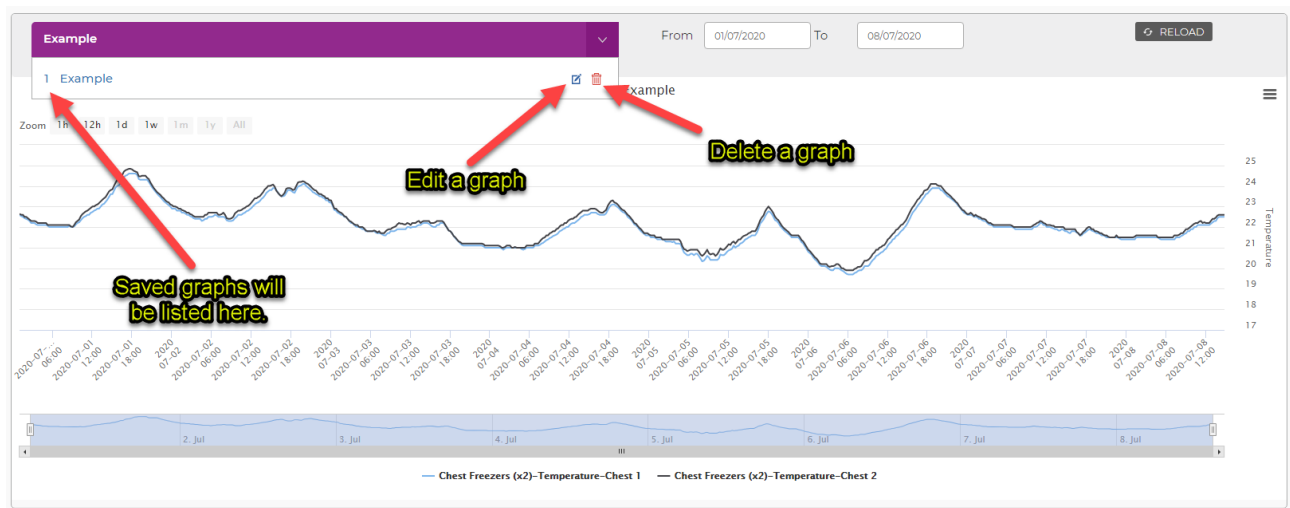


The “NEW GRAPH” window will appear. Give the graph a name and then select the device you wish to graph from the drop down list. Only devices enabled on your system will be displayed in the list. Once the device is selected, the window will update so you can select any enabled channels on the selected device. Additional devices can be added to the same graph by selecting “ADD NOTHER LOCATION” and repeating the sequence.



2.1.5.2 Selecting a Graph

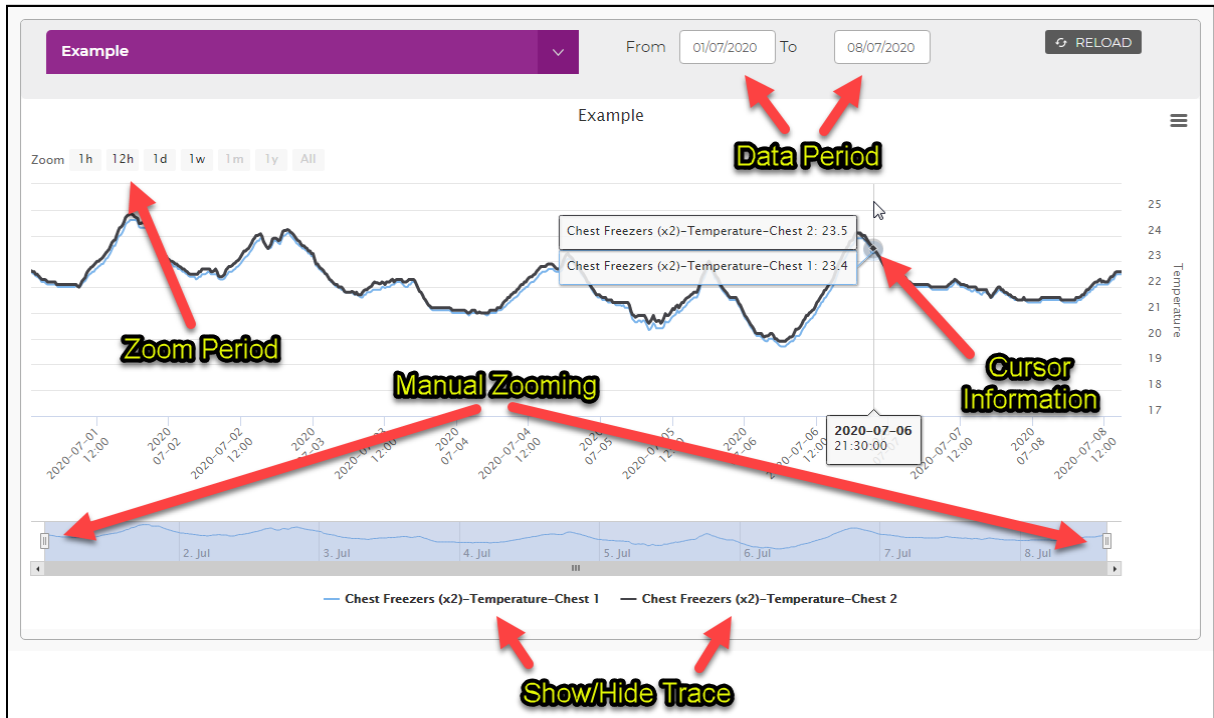
Once you have one or more graphs configured on the system. A graph will automatically load when the graph screen is selected. If more than one graph is configured using the drop down to select which graph you wish to view, and then select “RELOAD”. The drop down also allows the user to edit or delete a graph configuration.




2.1.5.3 Using the graph

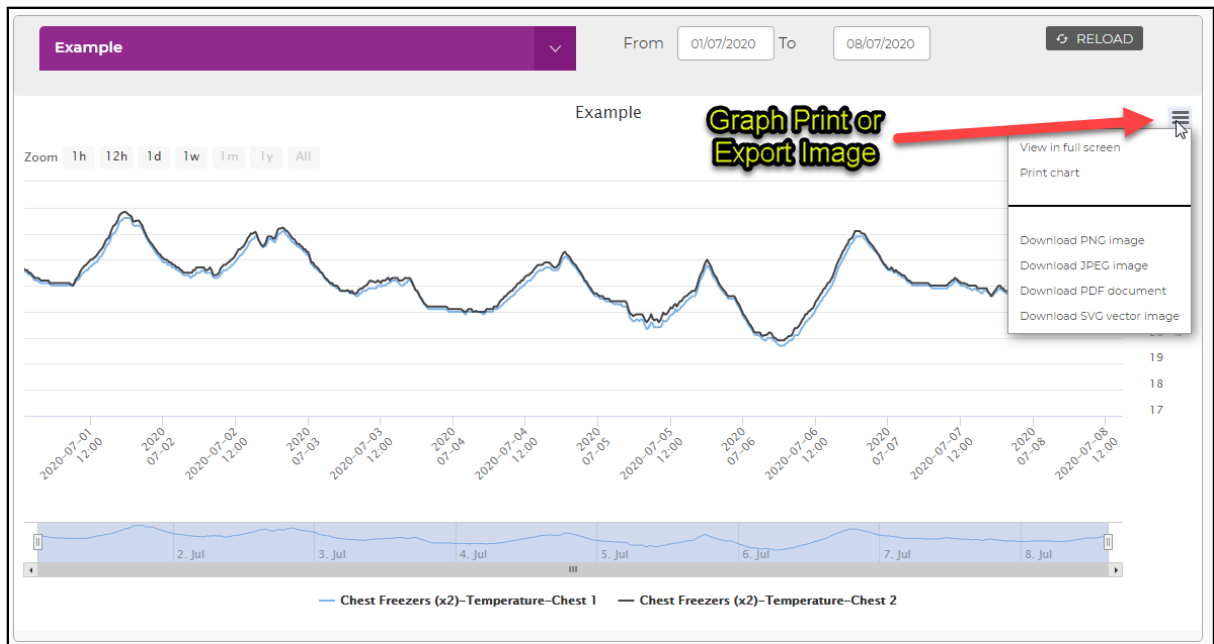
By default the graph will load with the last 7 days data. If you wish to see data period outside the last 7 days, you must amend the “Data Period” and then select “RELOAD”. The graph allows the user to zoom into the data by using the “Zoom Period” buttons or the “Manual Zooming” slider below the main graph.

As the mouse position moves over the graph, popup information windows will appear showing when data was received from a device. Traces can be temporarily hidden or show by selecting the trace name at the bottom of the graph.



2.1.5.4 Graph Printing/Export Image

Select the hamburger icon  to the top right of the graph to print or export an image.



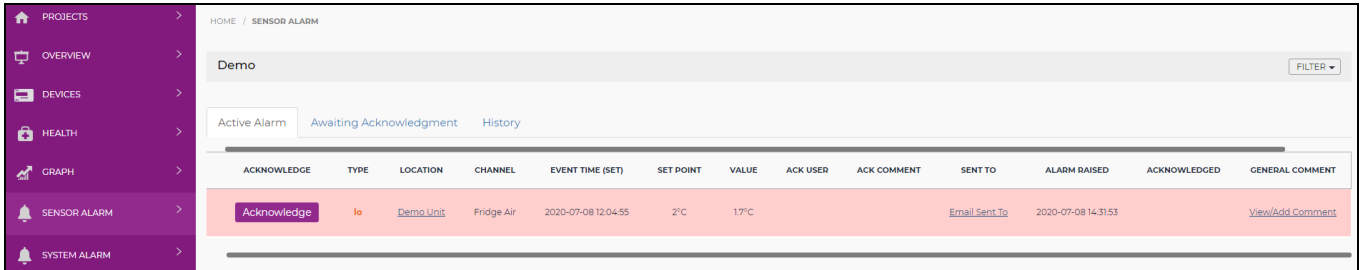
2.1.6 Sensor Alarms

Sensor alarms are alarms generated by the device when an input being monitors goes above or below an alarm limit. The Cadmus devices support the following 4 alarm types per channel (Channels 1 to 4): “Hi Hi”, “Hi”, “Lo” and “Lo Lo”.

“Hi Hi” and “Lo Lo” alarms are given higher priority than the “Hi” and “Lo” alarms.

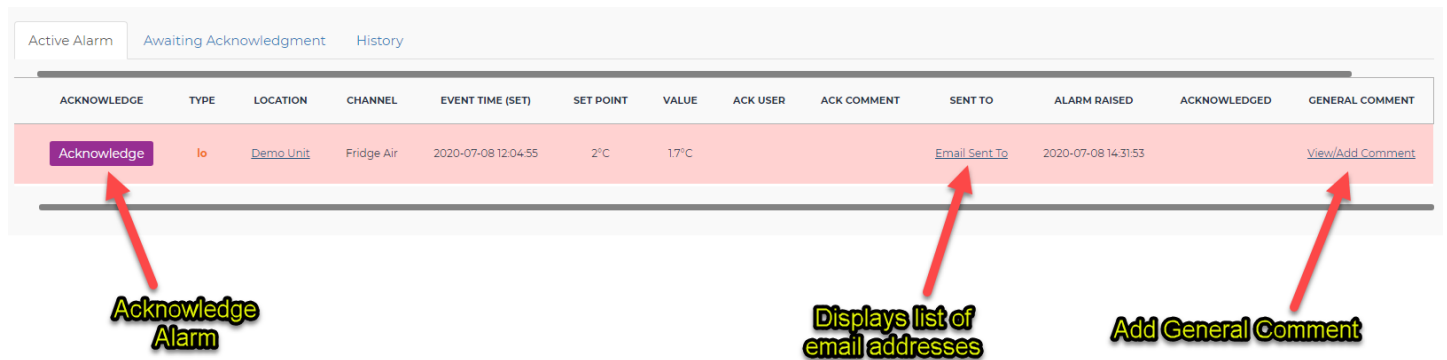
The Sensor Alarm screen is split into three tabs.

- Active Alarm
- Awaiting Acknowledgment
- History

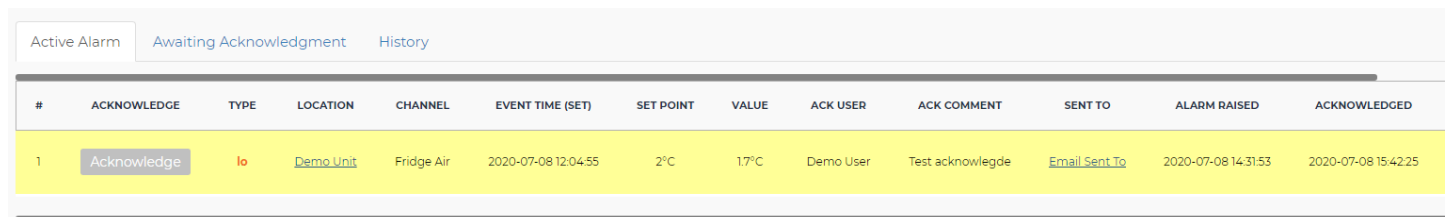


2.1.6.1 Active Sensor Alarms

When an alarm is raised it will initially be displayed in the “Active Alarm” tab. It will remain in this tab until the alarm has cleared on the device. Each alarm is allocated one row. Alarms will display with a pink background colour if they have not yet been acknowledged. “Hi Hi” and “Lo Lo” alarms will be listed closest to the top, and then “Hi” and “Lo” alarms.



When acknowledging an alarm, a popup window will appear to give a comment. The alarm background colour will then turn yellow. It will also be pushed down the list, below any non-acknowledged alarms. Additional information will show who acknowledged the alarm and when the alarm was acknowledged.



Alarms will only remain in this tab while the alarm is active. If the alarm clears, but has not yet been acknowledged it will move to the “Awaiting Acknowledgement” Tab, otherwise acknowledged alarm will move to the “History” tab.

When the system has a large number of alarms present, use the FILTER dropdown about the table to filter down the number of records shown.

2.1.7 System Alarms

System alarms are alarm generated on the device or via the cloud. These cover the following triggers:

- Calibration Due or Overdue.
- Low Battery
- Late Alarms (Cloud have not received data within a specified time).
- Wi-Fi Certificate Expiry (WPA2-Enterprise Connections Only).

The system alarms are split into two groups. “Active Alarm” and “History”. There is no acknowledgement for system alarms, but a user can make a comment at any time.

#	LOCATION	TYPE	EVENT TIME (SET)	EVENT TIME (CLEAR)	GENERAL COMMENT
1	Demo Unit	LATE DATA	2020-03-28 12:55:03	2020-04-02 16:15:04	View/Add Comment

2.1.8 Export

Export allows the user to load device data (and alarms) into a non-secure text file. This can be subsequently loaded into another application, for example a spreadsheet application.

By default, the file export will export the current days data, but this can be easily extended using the two date pickers. The user should then select if they wish to include alarms in the export.

The “FILE DELIMITER” is used to define how the data within the file is separated. When using spreadsheets the spreadsheet application may prompt you to specify the delimiter character when opening the file created. If in the UK, select “Comma” otherwise select “TAB” or “SEMICOLON”. The “FILE EXTENSION” should be set to “CSV” if you wish to open the file in a spreadsheet application.

The screen will then list all the active devices within your project. You must select which devices to export; clicking the “Select All” checkbox will select all the devices available.

08/07/2020 08/07/2020 INCLUDE SENSOR ALARMS INCLUDE SYSTEM ALARMS

FILE DELIMITER: COMMA TAB SEMICOLON FILE EXTENSION: CSV TXT

Select All

LOCATION	SELECT CHANNEL
<input type="checkbox"/> Demo Unit	<input type="checkbox"/> AMBIENT TEMP <input type="checkbox"/> AMBIENT RH <input type="checkbox"/> FRIDGE AIR <input type="checkbox"/> FRIDGE CORE <input type="checkbox"/> DOOR SWITCH <input type="checkbox"/> NOT USED











[Export](#) [Export All](#)

2.1.9 Table Data

The table data screen shows all data since the project was created, with the newest data at the top. The screen below has been modified to fit this document; the screen is normally very wide and will require left or right scrolling.

The table may also have many rows. So data can be followed through using the pagination numbers at the base of the table, there is also a "FILTER" button above the table to reduce the amount of data loaded.

In addition to the normal data shown elsewhere in the cloud, the last column shows the Wi-Fi signal strength when each reading was uploaded to the cloud.

#	LOCATION	DATE STAMP	CH 1	READING	CH 2	READING	CH 3	READING	CH 4	READING	CH 5	READING	CH 6	READING	WIFI SIGNAL
1	Demo Unit	2020-07-08 16:07:55	Ambient Temp	23.3°C	Ambient Rh	63.1%	Fridge Air	3.8°C	Fridge Core	3°C	Door Switch	0.000	Not Used	n/a	
2	Demo Unit	2020-07-08 15:57:55	Ambient Temp	23.3°C	Ambient Rh	63%	Fridge Air	3.3°C	Fridge Core	3°C	Door Switch	0.000	Not Used	n/a	
3	Demo Unit	2020-07-08 15:47:55	Ambient Temp	23.3°C	Ambient Rh	62.9%	Fridge Air	2.7°C	Fridge Core	3°C	Door Switch	0.000	Not Used	n/a	
4	Demo Unit	2020-07-08 15:37:55	Ambient Temp	23.2°C	Ambient Rh	62.9%	Fridge Air	2.2°C	Fridge Core	3°C	Door Switch	0.000	Not Used	n/a	
5	Demo Unit	2020-07-08 15:27:55	Ambient Temp	23.2°C	Ambient Rh	62.9%	Fridge Air	2.2°C	Fridge Core	3°C	Door Switch	0.000	Not Used	n/a	
6	Demo Unit	2020-07-08 15:17:55	Ambient Temp	23.3°C	Ambient Rh	62.6%	Fridge Air	2.5°C	Fridge Core	3°C	Door Switch	0.000	Not Used	n/a	
7	Demo Unit	2020-07-08 15:07:55	Ambient Temp	23.3°C	Ambient Rh	62.6%	Fridge Air	2.7°C	Fridge Core	3°C	Door Switch	0.000	Not Used	n/a	
8	Demo Unit	2020-07-08 14:57:55	Ambient Temp	23.3°C	Ambient Rh	62.5%	Fridge Air	2.9°C	Fridge Core	3°C	Door Switch	0.000	Not Used	n/a	
9	Demo Unit	2020-07-08 14:47:55	Ambient Temp	23.2°C	Ambient Rh	62.3%	Fridge Air	3.1°C	Fridge Core	3°C	Door Switch	0.000	Not Used	n/a	
10	Demo Unit	2020-07-08 14:37:55	Ambient Temp	23.2°C	Ambient Rh	62.3%	Fridge Air	3.3°C	Fridge Core	3°C	Door Switch	0.000	Not Used	n/a	

1 2 3 4 5 6 7 8 ... 6155 6156 >

2.1.10 PDF Report

This screen generates an instant pdf report based on the parameters selected. The user is limited to a maximum 30 day period for the report contents, this is due to the amount of data generated.



The report generated will contain a summary of the measurements taken over the report period, and list any sensor alarms which have occurred.

No.		CH1			CH2			CH3			CH4			CH5			CH6		
min	avg	max	min	avg	max	min	avg	max	min	avg	max	min	avg	max	min	avg	max		
1	Demo Unit	23°C	23.6°C	24.8°C	57.7%	63.1%	65.2%	1.5°C	2.1°C	4.8°C	2.5°C	2.6°C	2.6°C	0	0.01	1	n/a	n/a	n/a

-- End of table --

Page 1/12

Created by RATIFI, A product of Signatrol Ltd.

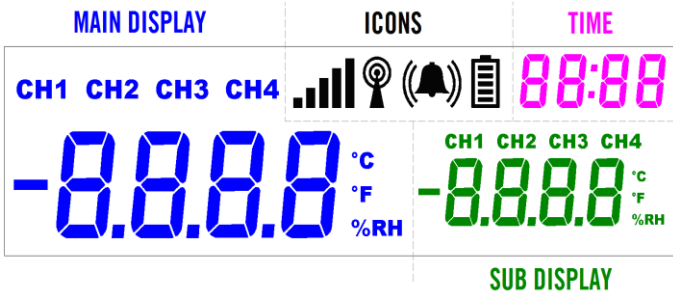
© Signatrol 2020

3 Hardware Specifications@ 25°C

Model Number	CTX-203	CTX-213	CTX-303
WI-FI COMMUNICATION	<p>Connection Type: Wi-Fi 2.4GHz, Station Mode Wireless Lan Standards: IEEE 802.11 b/g/n & IEEE 802.1X Supported Encryption Methods: WEP/WPA/WPA2/WPA2 Enterprise Supported Enterprise Networks: EAP-TLS/EAP-TTLS-TLS/EAP-TTLS-MSCHAPv2/EAP-TTLS-PSK/EAP-PEAP0-TLS/EAP-PEAP0-MSCHAPv2/EAP-PEAP0-PSK/EAP-PEAP1-TLS/EAP-PEAP1-MSCHAPv2/EAP-PEAP1-PSK</p> <p>Data Packet: UDP, Port 49152 (Bi-directional) Firewall: The Cadmus device requires connection to the following Cloud IP address using UDP Port 49152.</p> <p>Server 1: 3.8.223.231 Server 2: 35.177.84.149</p>		
AMBIENT OPERATING RANGE	0 to +50°C, 5 to 95% RH (non-condensing)		
TEMPERATURE CHANNELS	3 (1 Internal, 2 External)		
HUMIDITY CHANNEL	✘	✔	✘
COUNTER/DISCRETE CHANNELS	2		
CHANNEL 1 INTERNAL TEMPERATURE ACCURACY Range: -20°C to +50°C	<p style="text-align: center;">Standard Version: ±0.3°C (Meets EN12830: 2018 Class 0.5) "A" Version: ±0.2°C (Meets EN12830: 2018 Class 0.2)</p>		
CHANNEL 2 INTERNAL HUMIDITY ACCURACY Range: 0 to 100% RH	N/A	<p style="text-align: center;">Standard Version: ±3.5% RH Maximum (20 to 80% RH) "A" Version: ±2.0% RH Maximum (20 to 80% RH)</p>	N/A

Model Number	CTX-203	CTX-213	CTX-303
CHANNELS 3 & 4. EXTERNAL TEMPERATURE ACCURACY	$\pm 0.1^{\circ}\text{C} \pm 0.05\%$ of Reading (Electronics Only) Range: -200 to +400°C		
CHANNELS 3 & 4. EXTERNAL TEMPERATURE SYSTEM ACCURACY	<p style="text-align: center;"> SYSTEM ACCURACY STANDARD $\pm 0.25^{\circ}\text{C} \pm 0.25\%$ of Reading (Meets EN12830: 2018 Class 0.5) SYSTEM ACCURACY "A" VERSION $\pm 0.1^{\circ}\text{C} \pm 0.15\%$ of Reading (Meets EN12830: 2018 Class 0.2) </p>		
RESOLUTION (TEMPERATURE & HUMIDITY) CHANNELS 1 to 4.	0.1°C or 0.1% RH		
CHANNEL 5 & 6. COUNTER INPUT	Frequency Maximum: 1kHz Counter Maximum: 65535 / Store Rate Period Minimum Pulse Width: 100 micro Seconds Dry Contact Compatible: ✓ TTL Compatible: ✓ Maximum Voltage: 35Vdc Input Voltage (Lo) < 0.7 Volts (provisional) Input Voltage (Hi) > 1.5 Volts (provisional) Trigger Negative Edge		
CHANNEL 5 & 6. DISCRETE INPUT (DOOR CONTACT)	Polled or Interrupt driven. Cloud configurable Positive or Negative Edge Triggered (When configured as interrupt) After edge trigger, signal must hold to > 100mS. (When configured as interrupt) Digital Pulse forces instant upload. (When configured as interrupt)		
AUDIO ALARM / BLEEPER	✓		
ALARMS	Ratifi Cloud Configured Alarms (4 per Channel: Hi Hi, Hi, Lo, Lo Lo) Alarms are raised within 1 minute of occurring, irrespective of store rate or upload rate.		
DEVICE STORAGE CAPACITY	Total No. of Readings - 124,000 Readings per Channel 86 Days @ 1 min Store Rate 430 Days @ 5 Min Store Rate		
DEVICE ALARM STORAGE CAPACITY	Total No. of Alarms - 2048		
READ RATE (SAMPLE RATE)	1 Minute (Fixed)		
STORE RATE	Fully Programmable via Ratifi Cloud - From 1 Minute to 60 Minutes (Recommended: 10 Min)		
UPLOAD RATE	Fully Programmable via Ratifi Cloud - From 5 Minutes to 24 Hours (Recommended; 60 Min)		

Model Number	CTX-203	CTX-213	CTX-303
TYPICAL BATTERY LIFE @ 20°C	29 Months @ 10 Minute Store Rate & 60 Minute Upload Rate 16 Months @ 5 Minute Store & 30 Minute Upload Rate (CADMUS-ACC-01 Batterties only)		

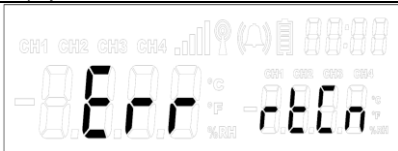
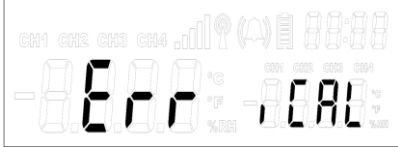

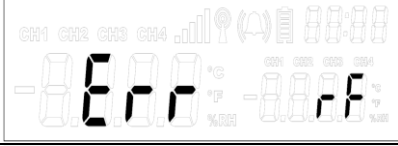
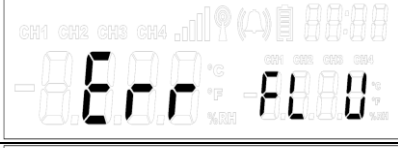
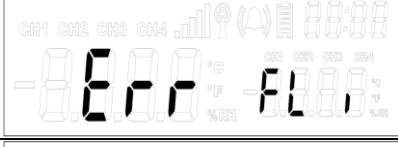

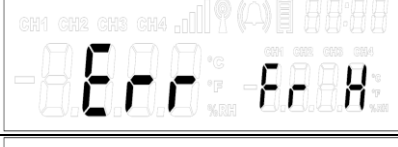


Model Number	CTX-203	CTX-213	CTX-303
REAL TIME CLOCK	Automatic Synchronisation with Cloud Time Sync Service on each connection. When Wi-Fi connection not available, internal clock drift < 60 Seconds / Month		
BATTERY TYPE	2 x (3.6V @ 2.6h) AA Size Pulse Current 250mA, Continuous Current 50mA Lithium Thionyl Chloride Battery (User Replaceable) To ensure correct battery life calculation, only replace with Signatrol Part: CADMUS-ACC-01		
LOCAL CONFIGURATION	Connector Type USB Mini-B	Function Required to set device clock, Wi-Fi Credentials, Enterprise Certificates (if required), Battery reset and Cable compensation.	
SENSOR CONNECTIONS	Side Mounted 3.5mm Jacks Internal 9 Way Terminal	External Temperature Channel Connection, channels 3 & 4 only. Connections Mirrored with Internal 9 Way Connector. Base Mounted so device can be removed without Having to disconnect any wiring. Mirrored connections for External Temperature, channels 3 & 4. Counter/Discrete Inputs, channels 5 & 6. External Power supply connection.	
LCD DISPLAY	 <p>MAIN DISPLAY</p> <p>CH1 CH2 CH3 CH4</p> <p>-8.8.8.8 °C °F %RH</p> <p>ICONS</p> <p>Signal strength, Wi-Fi, Alarm, Battery</p> <p>TIME</p> <p>88:88</p> <p>SUB DISPLAY</p> <p>CH1 CH2 CH3 CH4</p> <p>-8.8.8.8 °C °F %RH</p> <p>Main and Sub areas display Temperature and Humidity Channels. The device will automatically scan the selected channels if more than one channel is selected for an area. Temperature displayed as °C or °F.</p> <p>Time display either the local time or the HH:MM to the next upload</p>		N/A
EXTERNALLY POWER	9 to 24V DC (Optional) 2.5 Watt (MAX)		
ENCLOSURE	Self-extinguishing ABS		
IP RATING	IP40		
DIMENSIONS	120 x 80 x 35mm		123 x 96 x 39mm (excluding glands) 140 x 96 x 39mm (including glands)
WEIGHT	170 grams		240 grams
WARRANTY	3 Years (excluding Batteries)	3 Years (excluding Batteries and internal humidity sensor)	3 Years (excluding Batteries)

Trouble Shooting.

3.1 LCD Error messages

(CTX-203 and CXT-213 only)

Cadmus devices have an internal self test routine and models fitted with LCD will show any self test failures as below.

Displayed Value	Error Type	Action
	Err rtCn Real Time Clock Error. Real time clock not set. The clock will continue to function for 15 minutes with the batteries removed. If batteries are removed or go flat for longer than this period the clock requires resetting.	Reset clock using Cadmus Configuration software via the USB connection.
	Err iCAL Initial Factory calibration error. Calibration data has been corrupted.	Reset device by placing using Cadmus-Config or holding the reset button for 6 seconds. If problem persists return to supplier for investigation.
	Err rtCE Real Time Clock Hardware Error. Real time clock communications error.	Check battery level and replace as required. If problem persists return to supplier for investigation.
	Err rF WiFi Hardware Error. Communications error with WiFi hardware.	Check battery level and replace as required. If problem persists return to supplier for investigation.
	Err FLU Serial Flash Hardware Error. Communications error or unknown device found.	Check battery level and replace as required. If problem persists return to supplier for investigation.
	Err FLi Serial Flash Error Invalid Security ID.	Check battery level and replace as required. If problem persists return to supplier for investigation.
	Err FrL Fram Hardware Error. Communications error with fram low bank.	Check battery level and replace as required. If problem persists return to supplier for investigation.
	Err FrH Fram Hardware Error. Communications error with fram high bank.	Check battery level and replace as required. If problem persists return to supplier for investigation.
	Err USB USB Hardware Error.	Return to supplier for investigation.
	Err FACT Factory Configuration Error.	Check battery level and replace as required. If problem persists return to supplier for investigation.

Useful Information

3.2 Firewalls

Cadmus communicates with the cloud using the following IP address and port.

UDP Port	49152 (bi-directional)
Server 1	3.8.223.231
Server 2	35.177.84.149

The device will also make a DNS lookup to determine which of the 2 addresses above to use.

National NHS Firewalls	Implementation Date
BT N3	July 2019
HSCN ^{*1}	July 2019

1*: HSCN = Health & Social Care Network.

3.3 Loss of Communication

In the event of loss of communication between the Cadmus device and the cloud, the device will attempt to re-connect in a short period of time after the connection was broken. This re-try connection will continue to be re-tried until the connection is re-stored, but to extended battery life the device will increase the time between connections. The system is set to re-attempt connection after 1, 2, 3, 4, 5, 10, 20, 30, 40, 50 and 60 minutes. The re-attempt will not exceed the upload rate. The system will reset the re-try mechanism to 1minute after a successful connection and receipt of a valid packet from the cloud. If the upload rate is 30 minutes, the maximum retry period will also be 30 minutes. This process will continue until the re-attempt period \geq upload rate.

3.4 Late Alarms

In the event that a device does not connect to the Cloud for more than 2 hours. The cloud will mark the Cadmus device late. The Cadmus user screens will give a clear indication of this, and in addition the cloud will email the administrator to inform them of the loss of connection. The email alarm will be repeated every 12 hours, until such time as the uploaded data is back within 2 hours of the current time. The Cadmus device will continue to hold logged data in its non-volatile memory and upload the data when the connection is re-made. Late alarms are not triggered by disabled (NAP) Cadmus devices.

The 2 hour late alarm timeout and the email repetition period are configurable via the administrator screens.

4 Regulatory Information related to Wi-Fi transceiver.

4.1 RF Function and Frequency Range

The device is designed to operate in the WLAN 2.4-GHz band, and supports the following channels dependent on the region of operation:

- FCC and IC: Channels 1 through 11 (2142 MHz to 2462 MHz)
- EU: Channels 1 through 13 (2142 MHz to 2472 MHz)
- JP: Channels 1 through 13 (2142 MHz to 2472 MHz)

Note. You must use the Cadmus-Config setting screen to set the appropriate locale.

NOTE: The maximum RF power transmitted in each WLAN 2.4-GHz band is 18 dBm.

4.2 EC

CAUTION	
CE RF Radiation Exposure Statement:	
This device has been tested and meets applicable limits for Radio Frequency (RF) exposure. To comply with the RF expose requirements, the device must be installed and operated with a minimum distant of 20cm between the radiator and your body.	

Device conforms to Radio Equipment Directive (RED) 2014/53/EU

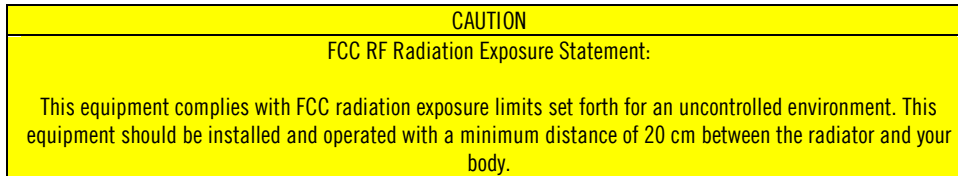
The following standard and technical specifications has been applied.

EN 301 489-1 V2.1.1	Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of the Directive 2014/53/EU and the essential requirements of article 6 of the Directive 2014/30/EU;
EN 301 489-17 V3.1.1	Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
EN 300 328 V2.1.1	Wideband transmission systems; Data transmission equipment operating in the 2.4GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU
EN 62311:2008	Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz to 300 GHz)
EN 60950 – 1:2006 + A11: 2009 + A1: 2010 + A12: 2011 + A2: 2013	Information Technology Equipment – Safety-Part 1: General Requirements
EN 50581:2012	Technical documentation of the assessment of electrical and electronic products with respect to the restrictions of hazardous substances.

4.3 FCC and IC Certification.

The device must be installed so 20cm of space is maintained between antenna and users.

4.3.1 FCC



This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Consult the dealer or an experienced radio or TV technician for help.

4.3.2 CAN ICES-3(B) and NMB03(B) Certification and Statement

The device contains a TI CC3220MODA module which is certified for IC as a single-modular transmitter. The TI CC3220MODA modules meet IC modular approval and labelling requirements.

The IC follows the same testing and rules as the FCC regarding certified modules in authorized equipment. This device complies with Industry Canada license-exempt RSS standards.

Operation is subject to the following two conditions:

- This device may not cause interference.
- This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- L'appareil ne doit pas produire de brouillage.
- L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

CAUTION
IC RF Radiation Exposure Statement:
This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.
Déclaration d'exposition aux radiations:
Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

This device containing radio transmitter (4511-CC3120MOD) has been approved by Industry Canada

4.4 MIC Certification (JAPAN)

This module is designed to comply with the JP statement, 201-170386.

The CC3220MODAx module from TI are MIC certified against article 49-20 and the relevant articles of the Ordinance Regulating Radio Equipment.

Operation is subject to the following condition:

- The host system does not contain a wireless wide area network (WWAN) device.

4.5 SRRC Certification and Statement (CHINA)

CMIIT: full modular SRRC grant ID: 2017DJ3121

The CC3220MODAx modules from TI comply with the rules and regulations of the SRRC for a full modular approval (FMA).

Operation is subject to the following condition:

- The host system does not contain a WWAN device.

In addition, the host system using an approved FMA radio requires the following:

- The host system does not require a new SRRC certificate for the combined system.
- The host system must be affixed with the MIIT ID of the FMA following the SRRC labelling requirements.

5 Support and contacts

For additional support or help, please contact Signatrol Ltd using the details below.

Web Page: <https://www.signatrol.com>

Email Sales: sales@signatrol.com

Email Support: support@signatrol.com

Telephone: +44 (0)1684 299 399

Registered Office:

Signatrol Ltd.
Unit E2, Green Lane Business Park,
Tewkesbury,
Gloucestershire,
GL20 8SJ
United Kingdom.