EcoSync - Unified Startup Manual

v 1.8.2

EcoSync is a Clean-Tech company helping organisations stop heating empty rooms.

In case of any questions feel free to connect us through https://ecosync.energy or contact@ecosync.energy

This document contains the latest versions of following documents in **use order**:

1) Requirements of the client during the installation
2) Customer IT Requirements - Gateway Quick Startup Guide (IT)
3) How to use a Field Test Device (fm / maintenance)
4) Pre-install steps (fm / maintenance)
5) How to add new valves to floorplans (fm / maintenance)
6) Valve Actuator mounting and enabling (fm / maintenance)
7) Printing QR codes (fm / maintenance)
8) Troubleshooting
9) Data Security (IT)
10) Disclaimer

IMPORTANT NOTICE:
Because of the reduced heat requirements in times with a mostly empty building you might need to adjust the boiler pump settings.

Requirements of the customer during the installation

v 1.3.1

EcoSync is able to maintain a competitive price point by tightly cooperating with the existing facility management team of the customer.
The actual physical installation and creation of the digital twin of the building is done by the facility management / maintenance team.
The help of the local IT department is needed at a point too.
Quick run through of the steps of installation:

1. **Facility management / maintenance** uploads floorplans, room names with room size (square metre) to the EcoSync online system (see "Pre-install steps" section of manual)
2. **Facility management / maintenance** in cooperation with **local IT** places the gateway in the centre of the middle floor of the building in an unobstructed location and enables unrestricted internet access (see "Gateway Quick Startup Guide" section)
3. **Facility management / maintenance** surveys the building with the radio strength tester device and ensures all areas with radiators have good connectivity to the gateway (see "How to use a Field Test Device" section of manual)
4. **Facility management / maintenance** goes into every room of the building and does these 4 quick steps (max 2 minutes / room) in each room.

We recommend **2 installation personnel** to complete the following steps with the following tools:

- internet connected handheld device with camera (Android / iOS)
- spanner
- pen magnet (provided in kit)

Steps:

a. links the valve actuator to the room on a handheld device (ipad/tablet/smartphone) (see "How to add new valves to floorplans" section of manual)
b. fits the valve actuator on the radiator (see "Valve Actuator mounting and enabling" section of manual
c. switches the radiator to operational mode with the pen magnet (shipped together with the valve actuators)
d. places the smartphone thermostat QRs in the rooms (see "Printing QR codes" section")

Customer IT Requirements —
EcoSync Gen2 LoraWan GateWay
Quick Startup Guide

v 2.8

TLDR: **Set up unrestricted internet access (subnetwork or VLAN) **OR** set IPs, ports etc described below for the GateWay mac address on an ethernet cable. GW needs power unless you requested a POE device.**

Introduction

Smart heating controller IOT gateway (HUB) utilising the **LoRaWan** (**Lo**ng **Ra**nge low-power radio **W**ide **A**rea **N**etwork modulation technique)

The GateWay (GW) device EcoSync uses is a version of the MultiTech MTCAP-868-041A LoraWan gateway with significant Software (SW) modifications.

This gateway connects our IOT Valve Actuator devices using low energy long range radio communication to our cloud software stack.

The gateway contains custom configurations, settings and software for EcoSync services.
The gateway cannot be replaced with any other third-party gateway devices.

IMPORTANT: NEVER RESET THE GATEWAY! DO NOT PRESS THE RESET BUTTON!
If you press the reset button the gateway device will lose all the configurations and will not be able to communicate with our servers and the IOT valve actuator devices will not be able to communicate with it.
In case of accidental reset, please get in touch with us ASAP so we can ship you another fully configured gateway device.

How it works:

When the GW is powered on and has access to the internet it automatically does the following:

- creates a **secure VPN connection.** This VPN connection enables us to securely connect to the GW for monitoring and maintenance purposes.
- **connects to our cloud stack** platform automatically and will continue communicating with it continuously throughout its lifespan
- starts accepting communication requests from our IoT valve actuator devices via low-power radio communication (NOT WIFI!)
- start sending sensor data and other network data to and receive user settings from our cloud stack

We ship two versions of our gateway devices:

- ETHERNET & GSM enabled
- ETHERNET & GSM enabled with POE

For more info see next sections...

ETHERNET & GSM enabled gateway devices

Requirements:

- ELECTRICITY (adapter included)
- INTERNET ACCESS (UTP Ethernet cable included)

The Ethernet enabled devices require an Ethernet INTERNET connection to our cloud based stack. The built-in security measures and firewall makes it impossible to access any data or functions on the device. The uniqueness of our SW solution also makes it a very unlikely target for misuse.

This device **will not work** on a restricted IOT **BMS network.**

It needs internet access.

PLEASE MAKE SURE THAT THE ETHERNET SOCKET YOU WILL USE FOR THE DEVICE IS ONLINE AND HAS INTERNET ACCESS.

There are three ways to set up internet access for our devices:

1. If your switch allows, set up a physical **subnetwork** that has no routing to anything else on the network allowing Egress. This is safe because there is no ingress into the GW and there is no connection between the devices on the network and the GW.
2. If your switch does not allow a subnetwork, set up a **VLAN** with similar characteristics.
3. Set up connection to our services through restricting access only to the following devices on the internet:

ONLY ONE MISSING OR NOT BEING SET PROPERLY
WILL CAUSE OUR SERVICES TO FAIL

- MAC address will be provided
- Input/output filters to be set in the firewall:
    - Table gw_t1: Preferred firewall settings
    - Table gw_t2: Backup firewall settings if the firewall is not capable of handling domain names. This is not recommended because third party ip addresses might change any time.

Name	Destination domain	Destination port	Protocol
google_mqtt	mqtt.googleapis.com	443	TCP
clearblade_mqtt	europe-west1-mqtt.clearblade.com	443	TCP
vpn_tcp	vpn.ecosync.energy	443	TCP
vpn_udp	vpn.ecosync.energy	1194	UDP
google_dns1	8.8.8.8	53	UDP
google_dns2	8.8.4.4	53	UDP
room_mt_80	room.mt	80	TCP
room_mt_443	room.mt	443	TCP
time.google.com	time.google.com	123	UDP
time.facebook.com	time.facebook.com	123	UDP
time.apple.com	time.apple.com	123	UDP
time.windows.com	time.windows.com	123	UDP
ds.devicehq.com	ds.devicehq.com	5798	TCP

[gw_t1] Preferred firewall settings for version 3)

Name	Destination IP	Destination port	Protocol
google_mqtt	173.194.76.206	443	TCP
clearblade_mqtt	34.140.42.104	443	TCP
vpn1_tcp	34.77.2.7	443	TCP
vpn1_udp	34.77.2.7	1194	UDP
vpn2_tcp	35.228.208.188	443	TCP
vpn2_udp	35.228.208.188	1194	UDP
vpn3_tcp	34.77.55.211	443	TCP
vpn3_udp	34.77.55.211	1194	UDP
google_dns1	8.8.8.8	53	UDP
google_dns2	8.8.4.4	53	UDP
Ping ICMP	8.8.8.8	7	TCP/UDP
room_mt_80	87.229.69.179	80	TCP
room_mt_443	87.229.69.179	443	TCP
vpn_loadbalancer_tcp	104.199.21.122	443	TCP
vpn_loadbalancer_udp	104.199.21.122	1194	UDP
time.google.com_1	216.239.35.0	123	UDP
time.google.com_2	216.239.35.4	123	UDP
time.google.com_3	216.239.35.12	123	UDP
time.google.com_4	216.239.35.8	123	UDP
time.facebook.com	129.134.26.123	123	UDP
time.apple.com_1	17.253.52.253	123	UDP
time.apple.com_2	17.253.14.253	123	UDP
time.apple.com_3	40.119.148.38	123	UDP
time.windows.com	40.119.148.38	123	UDP
ds.devicehq.com	52.72.160.94	80	TCP
ds.devicehq.com	52.72.160.94	443	TCP
ds.devicehq.com	52.72.160.94	5798	TCP

ds.devicehq.com	52.72.160.94	5799	TCP
ds.devicehq.com	52.201.177.144	80	TCP
ds.devicehq.com	52.201.177.144	443	TCP
ds.devicehq.com	52.201.177.144	5798	TCP
ds.devicehq.com	52.201.177.144	5799	TCP
ds.devicehq.com	52.55.24.204	80	TCP
ds.devicehq.com	52.55.24.204	443	TCP
ds.devicehq.com	52.55.24.204	5798	TCP
ds.devicehq.com	52.55.24.204	5799	TCP

[gw_t1] firewall settings for version without domains 3)[1]

[1] YELLOW: details updated in Feb. 2024

PLEASE INFORM ECOSYNC ABOUT YOUR DECISION ON THE TYPE OF SETUP YOU CHOSE.

Changes may occur, we need to be able to adjust settings.

This GSM data connection can be utilised if one of the following conditions appear:

- There is **no ethernet socket** available in the building to provide **unrestricted internet access**
- The existing ethernet **internet access is unreliable** and loses connectivity from time to time

In the above situations the device will use the built-in sim card and GSM radio to communicate with our cloud stack. The data plan is usually data usage based which means that the **monthly costs** of using such a device **can vary** depending on the time the GSM functionality is used and the amount of data transmitted. The latter can be estimated from the number of EcoSync IOT devices connected to the GW. Please contact us for a quote or assistance.

These devices work **with the local ethernet** cable and can also work **without ethernet** using **ONLY THE GSM network**, which means no ethernet cable connection is required.

We offer the first 30 days of GSM service for free. After the first 30 days, we will be charging for the data use if no Ethernet connection is enabled. Using the GSM only option incurs **additional monthly costs.**

POE enabled devices

Power Over Ethernet capable devices are also available on specific request.

Monitoring, script and Firmware updates

The Gateway establishes a **secure VPN connection.** This VPN connection enables us to securely connect to the GW for monitoring and maintenance purposes.

We utilise a aforementioned VPN connection to facilitate the seamless delivery of updates. In terms of monitoring and management, we have a dual approach. We leverage both the manufacturer's monitoring solution and our in-house system.

Our primary method involves collecting gateway telemetry data from the devices every ten minutes, which is then stored in a database. The gateways collect the telemetry data from multiple sources and send the data to a dedicated API endpoint on a dedicated VPS. This data serves as the foundation for our online HTML-based monitoring platform. Additionally, it empowered us to successfully implement automatic processes, such as reboots in case of malfunctions, as well as automatic notifications through SMS, email, and other channels when needed. One such use of the HTML platform is in the closing section of this document in the Quick start guide and can be reached by scanning the QR sticker on the GW itself.

Placement of the gateway

TLDR: **CENTRE OF THE MIDDLE FLOOR**

Place it in the centre of the middle floor of your building.

The gateway is a radio transmitter / receiver very much like a wifi routers, although using different radio frequencies, it is similar in a way that distance is the enemy of good signal.

Whenever possible, place the gateway in the middle of the building. In a multi floor building choose the middle floor and place the device in the centre of said middle floor.

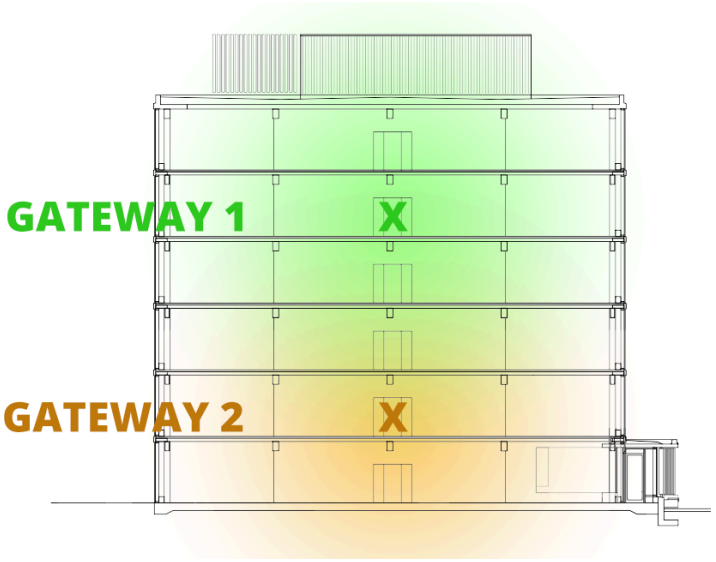
The gateway needs to be out of reach of occupants at all times. We suggest a dedicated power outlet that is out of reach and that will not be used for cleaning equipment or any other purposes. Each gateways come with a wall mount please make sure the device is securely fastened to the wall if need be and is out of reach. Do not place the gateway into a metal cabinet because such a Faraday cage may **hinder the signal.**

The gateway is typically capable of covering 2 floors up and 2 floors down and if placed in the centre of a floor it usually can reach the furthest rooms as well.

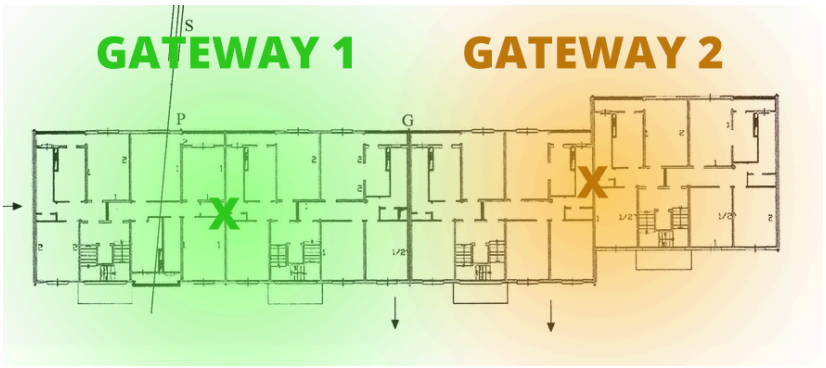
GATEWAY RANGE CHECK

In order to find the best location for your gateway TEST YOUR SIGNAL using the Field Test Device! In buildings made of concrete or in buildings with multiple staircases, or more than 4 floors it might be necessary to use multiple gateways. The gateway location is not acceptable if there is at least one radiator with a wrong reading. In this case consider another location. If you find that you will need multiple gateways, try not using the two ends of the building. Eg. in a building with 6 floors instead of having one gateway on the ground floor and one on the top floor, place one on the first floor and the other on the fourth floor thus creating a more even signal coverage throughout the building. Same goes with horizontally aligned buildings.

Gateway location suggestions:



Suggested GW placement in a multi store building (Vertical segment of a building)



Suggested GW placement in a long building (Horizontal segment of a building)

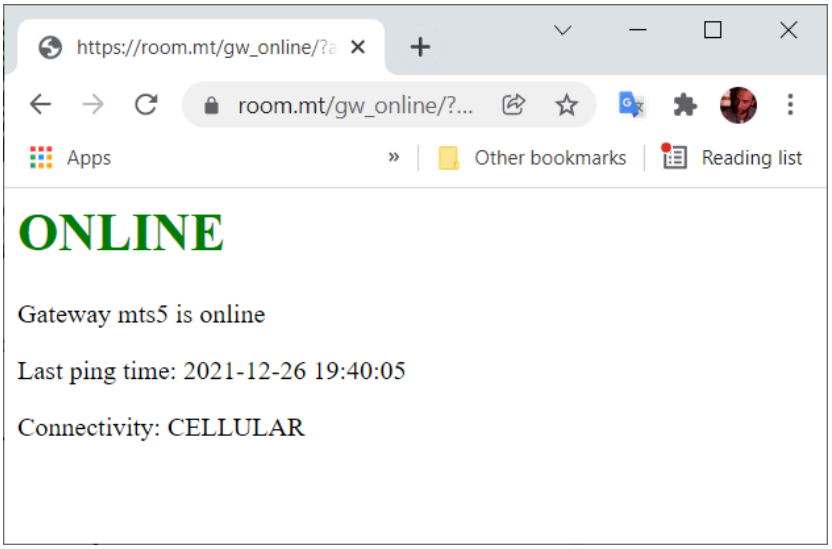
Quick start guide

1. Connect the included antenna to the back of the device.
2. Connect the device using the cables included to the wall sockets for electricity and internet.
   The device will take a few minutes to boot up and connect to the internet.
   Note: **Do not place the device inside a metal cabinet because it may hinder the signal.**
3. To check if the device is indeed connected to the internet scan the QR code on the device.

Note: The gateway may take about 5 minutes to fully boot up.

Example QR:

The connectivity page shows the connection type (**CELLULAR / ETHERNET**), the last pint time and the device ID. Example:



HOW TO use a FIELD TEST DEVICE

v 1.5

Introduction

LoRaWan FIELD TEST DEVICE checks the communication signal strength in your building between the Gateway and the smart radiator valve actuators.

Use this device to test possible gateway positions in a building. The location is not acceptable if there is at least one radiator with a wrong reading. (For further indo see point 6.)

How to use it:

1. Check that FIELD TEST DEVICE is charged. If it does not switch on or shows low battery level, charge it with the included USB cable.
2. Find a suitable safe location for your Gateway (e.g. IT cabinet) and follow the instructions of the Gateway Startup Guide for optimal placement and to put your gateway online. (Make sure it has the antenna connected, power is plugged in. Depending on your preferences you will use a yellow ethernet cable or a gateway with SIM card (4G connection). If you use it with the ethernet cable, make sure that your selected port has unrestricted Ethernet INTERNET connection set up.
3. Wait 3 minutes after plugging in the Gateway. It takes about 3 minutes for the Gateway to start up.
4. Turn on the Field Test device (bottom on/off). It will take up to 5 min for the device to connect to your Gateway.
5. Press the monitor (smaller) button until you see a menu with UL1 867.7 MHZ and DL2 867.9 MHz readings.
6. Walk to the location of the radiator you would like to set up the new controller and press the main (blue) button of the Field Test device. If your last line reading (SF7) has less absolute value than -100 dBm[2] (e.g. -40) then the communication will be strong between the radiator and gateway and you can go ahead with the installation. A device with -110 or more (absolute value) will not connect or lose connectivity.
7. Repeat step 5) for the whole building, making sure to scan all areas
8. Once you check the signal strength, turn the Field Test device off and place it back to the package as you won't need it for the installation steps. Follow the steps of the Magnetic set-up tool document.

[2] Absolute value of -100 is 100. Absolute value of -40 is 40. In this case -40 is a good measurement because abs(-40) < abs(-100)

Pre-install steps
“One Click Installation”

v 1.4.2

Introduction

The One Click Installation empowers the local facility management to add, remove or replace smart radiator valve actuators to the online portal (https://portal.ecosync.energy). In order to do so our system needs to know the building schematics, floor plans, and rooms' locations.

If you did not receive users and passwords for the One Click Installation UI please make sure to fill out this form and connect us through https://ecosync.energy or contact@ecosync.energy

1. **Select the adaptor type - see “Adaptor selection guide”**
2. **Find a suitable location for your GW using the Field Test Device**
3. **One Click Installation UI**
4. **Order stickers** (Pilot kits include 2 sheets for printing.)

One Click Installation User Interface (UI):

https://hotspot.ecosync.energy/

We are always improving our UI. Any suggestions, bug reports are welcome.

In order to add your building’s levels, floor plans and rooms to the system the following steps are required:

1. Log into https://hotspot.ecosync.energy/
2. In the top left corner tap the house icon
3. Select FLOOR PLANS in the purple horizontal menu
4. Click / tap the UPLOAD button on the top right corner
5. Follow the instructions on screen to create a new floor and add the corresponding floor plan image. Please use images larger than 1400px by 1000px and smaller than 2000px by 1500px (width by height).

6. Repeat steps 4 and 5 for all floors of the building. The floors will be displayed in the system in the order of creating

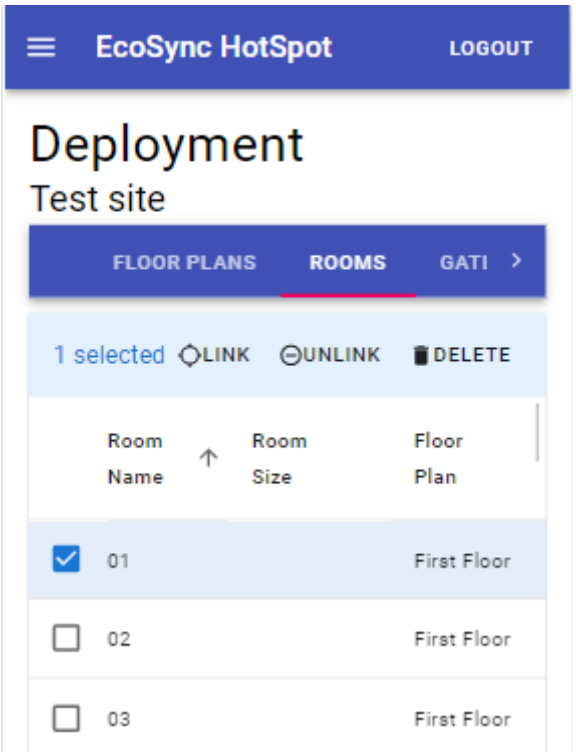
7. Select ROOMS in the purple horizontal menu

8. Click / tap the IMPORT button on the top right corner

9. Add the rooms one by one or upload a CSV file with room names and m^2 sizes (if known) of rooms. Make sure that your rooms have a unique name in the building. Rooms with the exact same name (even if on different floors) will likely cause problems during installation. Add level number into name if necessary.

(The program will be looking for a “Room Name” and a “Room Size” field in the csv’s first line, of which only “Room Name” is required). Editing a room’s name is not possible at this time. You can delete and re-add a room however.

10. To position rooms on the floor plan click/tap on one or more lines in the room list and click/tap on the LINK menu on the right side of the newly appeared light blue menu strip above the room list.



11. You're on the **room linking page**. The floorplan is zoomed in by default, you might need to zoom out with a pinching motion.

12. Zoom in on the room you are looking for if necessary and tap in the middle of the room you're placing. A light blue square with the room name in the middle will appear there.
13. tap finish
14. repeat step 10 and 11 for all rooms.

IMPORTANT:
Please do not try fitting the smart valve actuators without adding them to our system.

During the actual installation you will be using this same One Click Installation (https://hotspot.ecosync.energy) platform to add all the TRV - smart valve actuator devices to the online system. For instructions on how to add the smart valve actuators to the system please refer to the “Valve Actuator mounting and enabling” section of the full manual.

Print QR code stickers[3]

We have arranged delivery of the recommended stickers to the address you had provided in the contact informations form.

If you are a pilot kit user, your pilot kit already includes 2 sheets for printing.

1. **Tell us** when you finished uploading the rooms so we can **send you the QR codes** to print on the stickers.
2. **Receiving the QR PDF**

Once the rooms are all added to the floorplan, we will be able to generate a PDF file with your room thermostat QR coders. Please get in touch with our colleagues on the agreed upon install communication channel (WhatsApp, email etc) **once the upload is finished so we can send you the QR code file.**

3. **Printing the QR codes**

When printing on the label first open the pdf file then follow these settings instructions on your printer:

a. Always use a laser printer for best quality
b. Choose “actual size” or “100% scale”
c. Make sure that “fit to page” is NOT selected
d. Use settings: Print using system Dialog Properties or Preferences Change Paper or Media type to Labels or Cardstock
e. Select A4 and print a test sheet on a plain paper

4. **Ordering more stickers**

We recommend using **Avery** “Heavy duty white labels”, **L4776** (size: 99.1 x 42.3 mm).

You can order them directly from here (Amazon link)

If you have any questions, please email to contact@ecosync.energy

[3] Only applicable for customers who have purchased the "Comfort Package"

HOW TO add new valves to floorplans “One Click Installation”

v 1.1.8

Introduction

The One Click Installation empowers the local facility management to add, remove or replace smart radiator valve actuators to the online portal.

If you did not receive users and passwords for the One Click Installation UI please make sure to connect us through https://ecosync.energy or contact@ecosync.energy

One Click Installation User Interface (UI):

https://hotspot.ecosync.energy/

(For pilot users: password, username provided in the pilot kit)

We're always improving our UI. Any suggestions, bug reports are welcome.

In order to link a valve actuator to the floorplan, the following steps are required:

1. Log into https://hotspot.ecosync.energy/ using a smartphone or a tablet with a camera QR reader
2. In the top left corner tap the house icon
3. Select VALVE ACTUATORS in the purple horizontal menu
4. Tap QR READER
5. Scan the QR code on the valve actuator
   (Please note that some cameras can focus on the SIDE QR better. If neither QRs work, just select the valve actuator from the list. The IDs are printed on the sticker next to the QR code. Tap LINK on the pink menu once selected.)
6. You're on the **valve actuator linking page**. The floorplan is zoomed in by default, you might need to zoom out with a pinching motion.
7. Zoom in on the room you are in and tap on the position where the radiator is that you're working with. An E in a square icon will appear there, for the EcoSync Valve Actuator device.
8. Tap NEXT in the bottom right corner
9. You are now on the **valve actuator to room linking page.** zoom out and tap on the blue square of the room you are in.
10. Tap finish

Valve Actuator mounting and enabling

v 1.9

Contents:

Requirements:

Magnetic set-up/configuration tool (pen magnet) for smart radiator valve actuators:

Smart radiator valve actuators:

How to install an EcoSync Smart Radiator Valve Actuator:

1. Link the EcoSync device to the room on the cloud system (see How to add new valves to floorplans document). No room linking ⇒ No heating control.
2. After linking device unscrew the old TRV from the radiator (use spanner if necessary)
3. If you need to, install the adaptor. With Danfoss adaptors it is possible for the screws to not be sufficiently tightened, which can allow the EcoSync device to pull off the adaptor and automatically switch off. We recommend using Loctite on the adaptor screws.
4. **PUSH IN THE PIN of the valve and make sure it is not stuck!**
5. **CHECK FOR CORRODATION (See "How to fix corroded TRV" section)**
6. Mount EcoSync device onto radiator using a spanner
7. Use the pen magnet tool to switch the valve actuator to operating mode by taping the "micropelt" text for a **very short period** of time. It will
   BEEP ONCE (and flash light) WITH PEN OFF. It will not beep if you keep the magnet there for any period of time.
8. Few seconds after the first initial short beep of touching of the pen magnet the device will **BEEP TWICE** and flash twice (indicating network connection)
9. The device will do a reference run, motor is audible
10. The device will
    BEEP THREE TIMES and flash three times indicating a successful installation. **One long beep means the device has switched off due to an error. (See "Different possible beep sequences indicating error.")**

    IMPORTANT: DO NOT ACTIVATE THE DEVICE IN HAND! ONLY ON THE RADIATOR! It will simply switch off if activated in hand.

    (See "Different possible beep sequences indicating error:")

How to fix a stuck pin on a valve:

1. Take off the Valve Actuator from the radiator using a spanner.
2. **PUSH IN THE PIN of the valve and make sure it is not stuck!**
3. Switch off the Valve Actuator by touching **for 5 seconds** the "micropelt" logo with the pen magnet. The device will beep long. (If it does not beep, it is already off.)
   Note: In some cases, when a remote fix was initiated and the Valve Actuator could not push the pin, the Valve Actuator will already be in OFF / mounting mode.
4. Mount valve actuator back onto radiator using a spanner
5. Use the pen magnet tool to switch the valve actuator to operating mode by **taping** (not hold, not push or press just lightly tap) the "micropelt" text for a very **short period of time**. It will beep (and flashlight) WITH PEN OFF.
6. Few seconds after the first initial short beep of touching of the pen magnet the device will beep and flash twice (indicating network connection)
7. The device will do a reference run, motor is audible
8. The device will beep and flash three times indication a successful installation

Correct beep pattern:

1 short, 2 short, 3 short beep and flashes

Different possible beep sequences indicating error:

When the Valve Actuator is mounted, you will tap (not hold, not push or press just lightly tap)

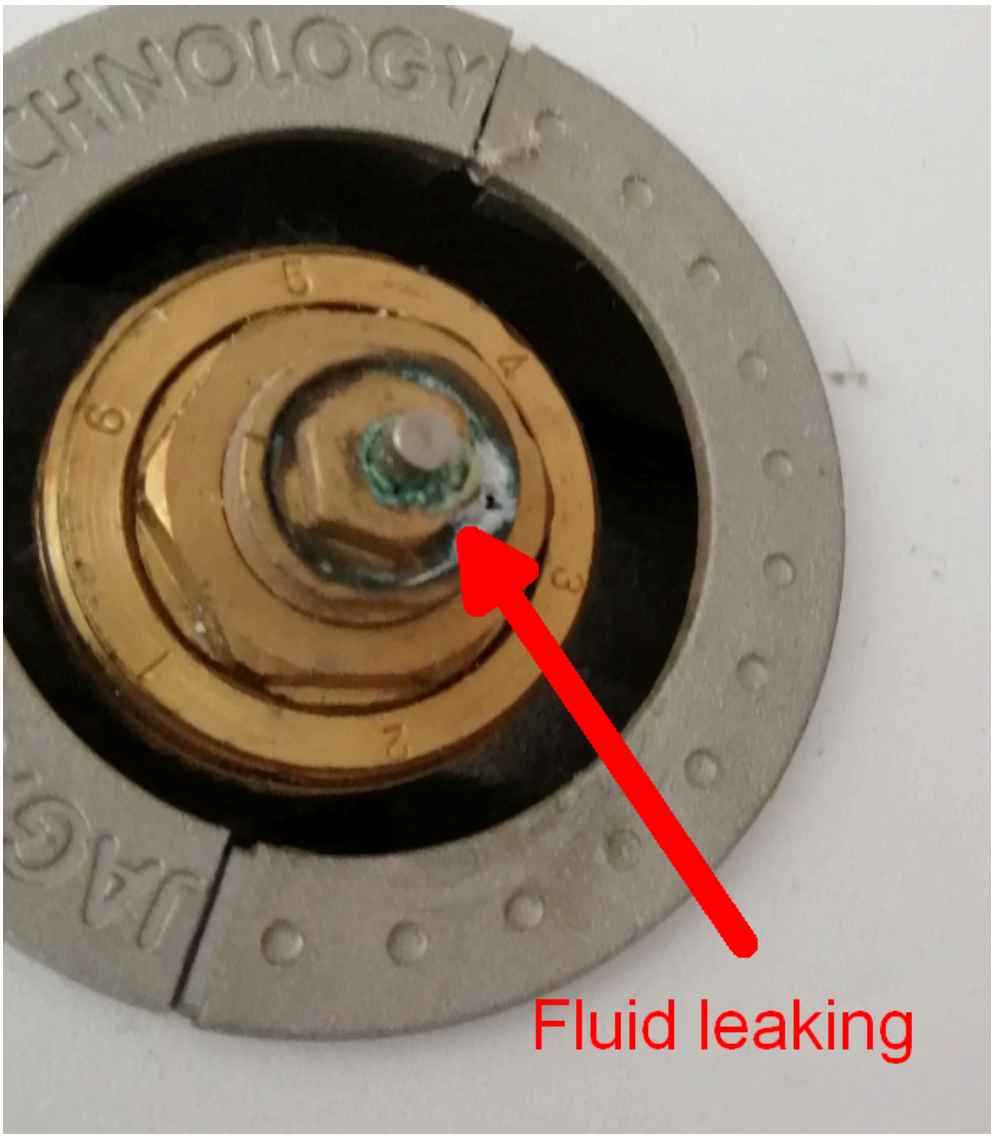
1. No beeps at al:
   - 1.1. Problem: trying a short tap and the device does not answer?
     Answer: Device is already ON, try a long push (5s) to switch off
   - 1.2. Problem: trying a long tap and the device does not answer?
     Answer: Device is off, try a short tap
   - 1.3. Problem: No answer to any type of taps. Please get in touch with us.
2. 1 short, 1 long, 3 short - Device is operational and is mounted on a radiator but does not connect to the gateway.
   Steps to take:
   - 2.1. Please make sure the gateway is powered on and is in reach.
   - 2.2. Switch off the Valve Actuator by keeping the pen magnet to the by touching the "micropelt" text for a 5 seconds. The device will beep long.
   - 2.3. Use the pen magnet tool to switch the valve actuator to operating mode by taping the "micropelt" text for a very short period of time. It will beep (and flashlight) WITH PEN OFF.
3. 1 short, 2 short, 1 long - Device is not mounted on a radiator and therefore switched off. Will only answer to another short tap next time.

How to fix a corroded TRV

If you happen to see corrodation, traces of fluid on the outside of the TRV

DO NOT INSTALL the EcoSync smart radiator valve actuator.

Leaking water will damage the smart radiator valve actuator's electrical components. The TRV needs to be replaced. (This indicates that you will have to depressurize at least that radiator you have the faulty TRV on.)



How to fix “Mechanical error”

Every Valve Actuator device does a “reference run” to inspect whether it is properly sitting on the valve. If a device is loose it will send a message to our systems and switch off. When a device can not successfully finish a reference run that means that it can not control the flow of hot water and therefore it goes back to low energy use mode.

To fix this, please make sure that the device is fitted properly on the valve. Please follow the steps in this document from step 2)

How to restart a smart radiator valve actuator:

IMPORTANT! Restarting a valve actuator is very rarely needed, only when our colleagues ask for a device to be restarted. If you experience a problem with a valve actuator, please first contact EcoSync, the problem is 99% of the time it can be handled remotely.

1. Use the pen magnet tool to restart the Valve Actuator by touching **for 5 seconds** the "micropelt" logo with the pen magnet. The device will flash and **beep once.** Remove the magnet.
2. Few seconds after the first initial short beep the device will flash and **beep twice** (indicating network connection)
3. The device will do a reference run, motor is audible
4. The device will flash and **beep three times** indicating a successful installation. **One long beep means the device has switched off due to an ERROR. (See “Different possible beep sequences indicating error.”)**

How to replace an EcoSync Smart Valve Actuator:

As Murphy’s law states, “Anything that can go wrong will go wrong”. The EcoSync Valve Actuators are no exception. If a device constantly behaves strangely or stops working altogether we will recommend you to replace it with another one. In this case first dismount it from the radiator valve and install its replacement. It is important that you unlink the faulty device from the room as you add the new one to the room. See How to install an EcoSync Smart Radiator Valve Actuator in the beginning of this document.

Printing QR codes (instructions)

v.2.1.1

1. Log in to EcoSync dashboard where you will find a pdf file with the QR codes of your building ready to print under “Manuals”. (https://portal.ecosync.energy/manuals) or use the pdf file provided by EcoSync’s team

2. We recommend using **Avery** “Heavy duty white labels”, **L4776** (size: 99.1 x 42.3 mm). (Pilot kits include 2 sheets for printing.)

You can order them directly from here:

https://www.amazon.co.uk/dp/B0040SOYZ0?tag=avuk085-21&linkCode=ogi&th=1&psc=1&smid=A3JWKAKR8XB7XF

When printing on the label first open the pdf file then follow these settings instructions on your printer:

1. Always use a laser printer for best quality
2. Choose “actual size” or “100% scale”
3. Make sure that “fit to page” is NOT selected
4. Use settings: Print using system Dialog □ Properties or Preferences □ Change Paper or Media type to Labels or Cardstock
5. Select A4 and print a test sheet on a plain paper

Note: There is one QR code per zone, which usually means there is only 1 QR code per room, even for those rooms that have multiple radiators. The smart valve actuators get the same setting and try to reach the set temperature together in the same room. Which also means the number of QRs is the same as the number of rooms and usually less than the number of radiators / TRVs.

If you have any questions, please email to contact@ecosync.energy

Troubleshooting

v 1.0

Contents:

EcoSync Gateway troubleshooting

The gateway will only be able to keep the Valve Actuator devices controlled if it has access to the internet and is plugged into an electric outlet. The EcoSync Gateways connect to the internet via an ethernet cable and with a backup GSP connection. (For further details see Gateway rider and Quick Startup Guide document.) Most failures will be handled either by the system automatically or by the EcoSync tech team remotely. In case the gateway goes offline (most probably because of power outage or being unplugged) the dashboard (https://portal.ecosync.energy) will trigger a warning message. Our tech team will also send out a message on the established installation / support communication channel (eg. WhatSapp group).

The gateways have a QR code on their front for connectivity checks. Keep in mind, it takes about 3-4 minutes for the gateway to boot up after being plugged in, so the QR will only work a few minutes after the gateway has been plugged in.

Possible reasons for a GW to be offline:

- GW is unplugged from the electric wall socket.
  Suggested solution: We recommend placing the GW in a place where it is unlikely that somebody will need the wall socket and disconnect the GW.
- Local IT has disabled or changed settings of the ethernet network / socket and the GW can not revert to the backup GSM connection because the network is available but unfunctional.
  Suggested solution: inform local IT about the problem, tell them the ethernet wall socket number

and direct them to the Gateway rider and Quick Startup Guide. Key words: “unrestricted internet access”

- GW only has a GSM connection and the sim card has been removed or dislocated.

  Suggested solution:

  Make sure the sim card is in it’s slot the right way in:

In any unforeseen circumstances the EcoSync team will do its best to resolve the issue with the contact personnel on site. EcoSync has fully configured gateway devices on stock that can get shipped in a couple of hours.

EcoSync Smart Valve Actuator troubleshooting

(excerpt from HOW TO Valve Actuator mounting and enabling v1.8.2)

How to fix a stuck pin on a valve:

1. Take off the Valve Actuator from the radiator using a spanner.
2. **PUSH IN THE PIN of the valve and make sure it is not stuck!**
3. Switch off the Valve Actuator by touching **for 5 seconds** the "micropelt" logo with the pen magnet. The device will beep long. (If it does not beep, it is already off.)
   Note: In some cases, when a remote fix was initiated and the Valve Actuator could not push the pin, the Valve Actuator will already be in OFF / mounting mode.
4. Mount valve actuator back onto radiator using a spanner
5. Use the pen magnet tool to switch the valve actuator to operating mode by **taping** (not hold, not push or press just lightly tap) the "micropelt" text for a very **short period of time**. It will beep (and flashlight) WITH PEN OFF.
6. Few seconds after the first initial short beep of touching of the pen magnet the device will beep and flash twice (indicating network connection)
7. The device will do a reference run, motor is audible
8. The device will beep and flash three times indication a successful installation

Correct beep pattern:

1 short, 2 short, 3 short beep and flashes

Different possible beep sequences indicating error:

When the Valve Actuator is mounted, you will tap (not hold, not push or press just lightly tap)

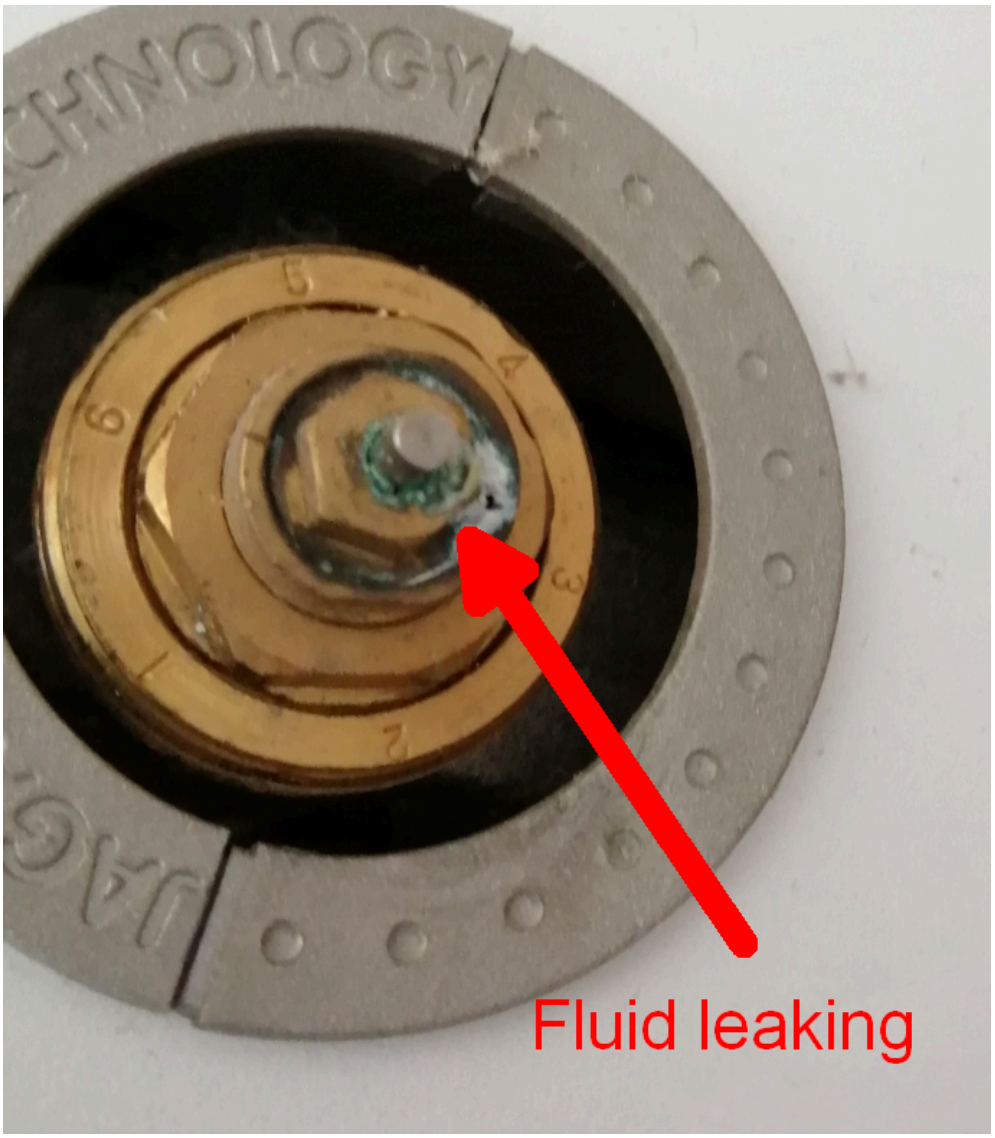
1. No beeps at al:
   - 1.1. Problem: trying a short tap and the device does not answer?
     Answer: Device is already ON, try a long push (5s) to switch off
   - 1.2. Problem: trying a long tap and the device does not answer?
     Answer: Device is off, try a short tap
   - 1.3. Problem: No answer to any type of taps. Please get in touch with us.
2. 1 short, 1 long, 3 short - Device is operational and is mounted on a radiator but does not connect to the gateway.
   Steps to take:
   - 2.1. Please make sure the gateway is powered on and is in reach.
   - 2.2. Switch off the Valve Actuator by keeping the pen magnet to the by touching the "micropelt" text for a 5 seconds. The device will beep long.
   - 2.3. Use the pen magnet tool to switch the valve actuator to operating mode by taping the "micropelt" text for a very short period of time. It will beep (and flashlight) WITH PEN OFF.
3. 1 short, 2 short, 1 long - Device is not mounted on a radiator and therefore switched off. Will only answer to another short tap next time.

How to fix a corroded TRV

If you happen to see corrodation, traces of fluid on the outside of the TRV

DO NOT INSTALL the EcoSync smart radiator valve actuator.

Leaking water will damage the smart radiator valve actuator's electrical components. The TRV needs to be replaced. (This indicates that you will have to depressurize at least that radiator you have the faulty TRV on.)



How to fix “Mechanical error”

Every Valve Actuator device does a “reference run” to inspect whether it is properly sitting on the valve. If a device is loose it will send a message to our systems and switch off. When a device can not successfully finish a reference run that means that it can not control the flow of hot water and therefore it goes back to low energy use mode.

To fix this, please make sure that the device is fitted properly on the valve. Please follow the steps in this document from step 2)

How to restart a smart radiator valve actuator:

IMPORTANT! Restarting a valve actuator is very rarely needed, only when our colleagues ask for a device to be restarted. If you experience a problem with a valve actuator, please first contact EcoSync, the problem is 99% of the time it can be handled remotely.

1. Use the pen magnet tool to restart the Valve Actuator by touching **for 5 seconds** the "micropelt" logo with the pen magnet. The device will flash and **beep once.** Remove the magnet.
2. Few seconds after the first initial short beep the device will flash and **beep twice** (indicating network connection)
3. The device will do a reference run, motor is audible
4. The device will flash and **beep three times** indicating a successful installation. **One long beep means the device has switched off due to an ERROR. (See “Different possible beep sequences indicating error.”)**

How to replace an EcoSync Smart Valve Actuator:

As Murphy’s law states, “Anything that can go wrong will go wrong”. The EcoSync Valve Actuators are no exception. If a device constantly behaves strangely or stops working altogether we will recommend you to replace it with another one. In this case first dismount it from the radiator valve and install its replacement. It is important that you unlink the faulty device from the room as you add the new one to the room. See How to install an EcoSync Smart Radiator Valve Actuator in the beginning of this document.

EcoSync Data Governance and Security Statement

V 3.0

1. Data type

1.1. On site communication

EcoSync receives room temperature data and hot water flow data from the buildings for remote temperature control. Our devices are not equipped with occupancy detection and we do not use sensors for additional data collection.

Data collected and sent by the end devices are:

data	description
ambient sensor failure	**yes / no**
ambient sensor raw value	**room temperature value calculated from 1 byte**
ambient temperature value	**adjusted room temperature value calculated from 1 byte**
average current consumed	**calculated µA value from 1 byte**
average current generated	**calculated µA value from 1 byte**
current valve position	**calculated % value from 1 byte**
energy storage is low	**yes / no**
flow sensor raw value	**flow water temperature value calculated from 1 byte**
flow temperature value	**adjusted flow water temperature value**

data	description
	calculated from 1 byte
gateway EUI	relaying gateway identifier
energy harvesting is active	yes / no (built in battery recharge)
motor failure	yes / no
operating condition	yes / no (no is only present in last package when switching device off)
radio communication failure	yes / no
radio signal strength	yes / no
reference run completed	yes / no
storage charge fully charged	yes / no
storage voltage	V value calculated from 1 byte
valve sensor failure	yes / no

1.2. Room booking

When room booking integration is requested, the local IT provides access data on room statuses (booked/not booked). Local IT controls what the information pulled by EcoSync is. No personal information is reaching EcoSync's cloud.

We do not receive or store personal information.

Generally we use standard calendar ICS files, that can be set up any way the data owner wishes.

1.3. Sensitive Personal Data

EcoSync does not store or handle any data that can be used to identify or follow any occupants and users of the temperature control system.
Users of the management system are created with details provided by the customer.
Online contact forms on EcoSync's services are governed by our Privacy Policy Statement.

2. Cloud data storage:

We use Google cloud servers in the US and the EU. It is possible to deploy location specific versions of our services too if required (for extra requests like this please contact our sales team)

3. Internet access, network security

The controller devices use LoRaWan to communicate with our GateWay devices. The GateWay devices operate on premise and need internet access. GateWay devices are capable of connecting to the internet using a built-in SIM card using LTE when conventional LAN networks are unavailable.
We encourage our customers to use the local network to avoid data fees.

There are three ways to set up internet access for our devices on the local network:

3.1. If your switch allows, set up a physical **subnetwork** that has no routing to anything else on the network allowing Egress. This is safe because there is no ingress into the GW and there is no possibility for a connection to be built between other devices (PCs, IOT devices, mobile phones etc) on the network and the GW.

3.2. If your switch does not allow a subnetwork, set up a **VLAN** with similar characteristics.

3.3. Set up connection of the gateway device to our services through restricting access only to the given domains, IP addresses, ports etc.

For more information visit the manual.

4. Secure Access and Administration Protocols

Our proposed solution ensures secure access and administration through the utilisation of modern, robust protocols and certificate-based authentication. Here are the details of the access and administration security measures in place:

1. **Secure Communication with IoT Devices:**
   The communication between IoT devices and our system is secured using encrypted channels. The LoRaWAN packets are encrypted by default, ensuring data confidentiality during transmission. Moreover, the MQTT communications undergo secure channels provided by GCP IoT Core, adding another layer of security to the data in transit.

2. **Certificate-Based Authentication:**
   We employ certificate-based authentication for secure communication, where devices have to present valid certificates to establish a trusted connection. This certificate-based approach ensures the integrity and confidentiality of the data exchanged between devices and our cloud infrastructure.

3. **Role-Based Access Control (RBAC):**
   Our system utilises role-based access control, where users are assigned roles (e.g., administrator, viewer, porter) with predefined access privileges. This method facilitates the management of user access rights, limiting them to necessary data and functionalities based on their roles, and helps in preventing unauthorised access to sensitive sections of the system.

4. **Secure Administrative Access:**
   Administrative access to the system is safeguarded with strong, complex passwords and SMS two-factor authentication (2FA), creating a robust line of defence against unauthorised access attempts. The system prompts administrators to update their passwords periodically to maintain a high level of security.

5. **Secure Firmware Updates:**
   The firmware updates for the LoRaWAN gateways are managed through a secure cloud solution provided by Multitech, our vendor. This solution ensures the secure and reliable transmission of firmware updates to the gateways, protecting against potential vulnerabilities.

We are committed to maintaining a secure operational environment by continually monitoring and enhancing our security measures in line with industry best practices and standards.

5. Data Retention and Secure Removal Policy

Our standard data retention and removal policy is designed to ensure that personal and operational data are handled responsibly and securely throughout their lifecycle. Below are the details of our policy:

Data Retention:

1. **Defined Retention Periods:**
   Personal Data: Retained for a period that is in compliance with legal and regulatory requirements, generally for the duration of the user's association with our service plus a defined period to address any potential disputes or legal claims.
   Operational Data: This includes heating preferences and related data, which are stored in the Firebase Realtime Database and retained for a duration that enables us to provide seamless service and support to our users. The specific retention period can be determined based on the operational needs and statutory obligations.
2. **Periodic Review:**
   Our team conducts periodic reviews of the data stored in our systems to identify and remove data that is no longer necessary for operational, legal, or regulatory reasons.

Data Removal:

1. **Secure Deletion:**
   Once the data has reached the end of its retention period or if a user requests the removal of their data, we implement secure deletion procedures. This ensures that data is permanently erased from our databases and backups, making it unrecoverable.
2. **User-Requested Data Removal:**
   Users have the right to request the removal of their personal data from our systems. We have mechanisms in place to promptly address such requests, ensuring that the data is securely and permanently deleted in compliance with legal and regulatory requirements.
3. **Documentation and Verification:**
   The data removal process is documented, and the completion of data removal is verified through internal audits to confirm that data has been securely and permanently deleted.
4. **Training and Awareness:**
   Our team is trained in the proper handling of data throughout its lifecycle, including secure data removal procedures, to ensure compliance with our policies and legal requirements.

Through the implementation of this policy, we aim to protect user privacy and maintain the security and integrity of our system by adhering to the principles of data minimisation and secure data handling.
Fur further information please email us at **contact@ecosync.energy**

Disclaimer

v 1.0

Introduction

The EcoSync smart valve actuators come with patented heat harvesting charging technology to generate electricity and recharge the built in battery. In order for the heat harvesting to work the radiators need to be hot.

In each room we support with smart valve actuators a freeze protection temperature is set. Whenever the temperature goes below the set freeze protection temperature the EcoSync smart valve actuator will switch on the heating and keep it on until the measured ambient temperature does not reach the set freeze protection temperature. This means that whenever the heating is on, our smart valve actuators are charging their built in batteries, prolonging their lifespan.

Disclaimer

We retain the option of switching the heating on in rooms that are unheated during the heating season for a maximum of 2 hours a day resulting in a 5 degree celsius rise in the room temperature.

Explanation:

In a room that has other heat sources than the central heating of the building the measured ambient temperature will not fall below the freeze protection temperature, therefore our smart valve actuators will not have the chance to switch the heating on and recharge the built in battery.