LoRaWAN®

MClimate Fan Coil Thermostat LoRaWAN®
User manual

Scan the QR Code to access MClimate Fan Coil Thermostat LoRaWAN® extended documentation

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За да разберете как се инсталира MClimate Fan Coil Thermostat LoRaWAN®, сканирайте QR кода или посетете линка до него.

Czech
Chcete-li zjistit, jak nainstalovat MClimate Fan Coil Thermostat LoRaWAN®, prohlédněte si kód QR nebo navštivte odkaz vedle něj.

Finnish
Tutustu MClimate Fan Coil Thermostat LoRaWAN® -laitteen asentamiseen, skannaa QR-koodi tai vieraila sen vieressä olevassa linkissä.

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För att ta reda på hur du installerar MClimate Fan Coil Thermostat LoRaWAN®, skanna QR-koden eller besök länken bredvid den.

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Um herauszufinden, wie man MClimate Fan Coil Thermostat LoRaWAN® installiert, scannen Sie den QR-Code oder besuchen Sie den Link daneben.

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Pour savoir comment installer MClimate Fan Coil Thermostat LoRaWAN®, scannez le code QR ou visitez le lien à côté de celui-ci.

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lorawan-support@mclimate.eu

📞 **00359 800 3 1010**
Monday-Friday 09:00 - 18:00

📍 **Sofia, Bulgaria**
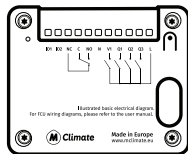Sofia Tech Park, Labs Building, 111J Tsarigradsko Shose
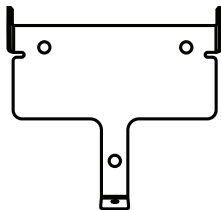
1

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What's inside the box?

MClimate Fan Coil Thermostat
LoRaWAN®

Power module

Wall mounting plate

Secure bolt
T5 torx

Introduction

Overview of the product

The Fan Coil Thermostat (FCT) is a LoRaWAN Thermostat for 2- and 4-pipe Fan Coil Units, accommodating 1-3 speed or ECM fans. Ideal for building retrofitting, it enables room-by-room monitoring and control, enhances energy efficiency and has great potential to reduce heating/cooling expenses significantly. With its 4.2" e-ink fast refresh display it allows the end-users to change the target temperature and see current indoor conditions. Its fully open and transparent communication protocol allows seamless integration into different systems including MClimate Enterprise platform.

The MClimate FCT is a Class C LoRaWAN device, available for EU868, US915, AS923 and AU915 regions. This means that there's real-time communication between the FCT and the LoRaWAN network - commands can be sent to the FCT and it will respond as soon as possible.

MClimate's ultimate aim is to help decarbonize buildings. The Fan Coil Thermostat unlocks great retrofitting opportunities - one can gain quick access to control and monitoring on a room-by-room basis in the building.

MClimate FCT can be integrated into existing BMS and BAS systems. Please visit MClimate's website to learn more about this.

The MClimate Fan Coil Thermostat (FCT) can be used with the following FCU configurations:

FCU	Valve(s) type	FAN type	Configuration
2-pipe	ON/OFF (220VAC)	1-3 speeds	00
2-pipe	3-wire ON/OFF (220VAC)	1-3 speeds	01
4-pipe	ON/OFF (220VAC)	1-3 speeds	02
4-pipe	ON/OFF (220VAC)	ECM	03
2-pipe	ON/OFF (220VAC)	ECM	04
2-pipe	3-wire ON/OFF (220VAC)	ECM	05

Technical wiring diagrams for the different configurations are available further in the document.

The MClimate Fan Coil Thermostat (FCT) also supports the following additional inputs/outputs:
- Room occupancy/Key card input (opened/closed circuit)
- Auto-changeover external temperature sensor (10k NTC, max 3m length)
- Dew point sensor (opened/closed circuit)
- Filter alarm (opened/closed circuit)

Functions

- Maintenance of room temperature via built-in temperature sensor or external room temperature/return air temperature sensor
- Automatic or manual changeover between heating and cooling mode
- Selection of operating mode via the operating mode button on the thermostat
- 1-speed, 3-speed or DC 0...10 V fan control (automatic or manual)
- Display of current room temperature or setpoint in °C
- Minimum and maximum setpoint limitation
- Buttons lock
- 1 digital input, freely selectable for:
    - Occupancy mode contact (keycard)
    - Automatic heating/cooling changeover 10k NTC
    - Dew-point sensor
    - Fault input
- Advanced fan control function, e.g. fan kick, selectable fan operation (enable, disable or depending on heating or cooling mode)
- Installer's menu for setting the desired wiring configuration and further settings.

Technical specifications

Designed and manufactured by MClimate™ in the EU.
SKU: MC-LW-FCT-01
Dimensions: 105 x 115 x 23mm
Weight: 220gr
Materials: ABS, PC, Stainless steel
Radio frequency range: 863÷870MHz / 902-928MHz
Radio technology: LoRaWAN Class C, EU868, US915, AS923 and AU915
Power supply: 110-240VAC, 50/60Hz, 50mA
Outputs:
Output (1-4): 5(2)A
Output 5NA, 5NC: 5A
⚠ **No internal fuse. External preliminary protection with max. current 10A circuit breaker required in all cases.**
Fan Control (1-3 speed fans): Q1, Q2, Q3 - 100-240VAC
Rating min, max, resistive (inductive): 5(2)A
Fan Control (ECM fans): IO1 and IO2, control signal between 0VDC and 10VDC
Fans must NOT be connected in parallel! Connect one fan directly, for additional fans, one relay for each speed.
Control outputs V1, Q1-Q3: 100-240VAC; 5A resistive load, 2A reactive load (cosϱ > 0,4)
Control output V2: 100-240VAC, resistive load only, max 5A 3A fast microfuse, cannot be exchanged
Multifunctional analogue/digital input/output IO1 and IO2:
Operation: Selectable through downlink. Available options are auto change-over NTC, ECM FAN, filter alarm contact, dew point sensor contact, occupancy (keycard) contact.
Change-Over temperature sensor:
Type: 10k NTC (10k at 25 degrees C)
Temperature range: 0 to 125 degrees C
Maximum cable length: 50m at 1.31mm2 (AWG 16).
Connection terminals: Solid wire or prepared stranded wire, 0.05mm2 - 1.31mm2 (AWG 24 to AWG 16)
Based on EU Regulation 813/2013(Eco design directive) and 811/2013 (Labeling directive) concerning space heaters, combination heaters ,the following classes apply:
Application with On / Off operation of a heater Class I value 1.0% PWM (TPI) room thermostat, for use with Class IV value 2.0% On/Off output heaters. Application with On / Off operation of a heater Class I value 1.0%

Sensors: Temperature & Humidity
Operating conditions:
Operating temperature: 0°C to +50°C
Operating humidity: 0-80% RH (non-condensing)
Storage & Transport conditions: As per IEC 60721-3-1
Temperature: −25...65 °C
Humidity: <95% r.h.
IP rating: IP31 (EN60529)
Mounting options: Screws and dowels on a wall or screws only on an electrical box; Anti-theft bracket with secure screw (T5 Torx).

⚠ Safety Instructions

Environmental conditions in which the device is intended to operate:
- Indoor use only;
- for altitude up to 2000m;
- for an ambient temperature: 0°C to +50°C;
- for maximum relative humidity of 80% for temperature up to 31°C, decreasing linearly to 25% relative humidity at temperature 50°C;
- for an environment with a degree of contamination 2 (PD2).
The device is a thermostat - it's used for controlling purposes only and it is not meant to serve as protection.

Legal Notices

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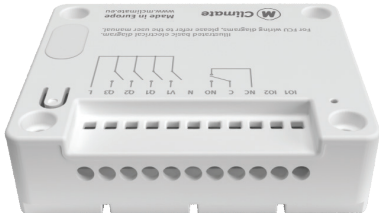
Installation Guide

Tools required (not exhaustive, depends on what thermostat you are replacing):

- T5 torx screwdriver (used on secure bolt on mounting plate).
- Small flat screwdriver (used for connecting wires to the terminal block).

⚠️ Before you install the device, we highly recommend that you first commission it on your LNS. Once the device is powered, it'll initiate a LoRaWAN join-procedure using SF12. Please, make sure you enable ADR in your LNS and/or mark the device as static. The lower the spreading factor, the better the communication interval from the FCT to the LoRaWAN gateway will be.

1 Open your LoRaWAN® Network provider access panel and add the device using the supplied Serial Number, DevEUI, AppEUI (JoinEUI) and AppKey.

2 Continue the Installation with the instructions of your LoRaWAN® Network provider.

Device ID: 9X7_____

DevEUI: 70B3D25D_____

AppEUI: 70B3D25_____

AppKey: A0658DFAE7213_____

Register

⚠️ The data is example. Do not use.

MClimate_LoRaWAN_51177

Serial Number	DevEui	AppEui	AppKey
GV_____	70I_____	70B3_____	5fc3_____

📋 You can get DevEUI, AppEUI (JoinEUI) & AppKey information from the LoRaWAN® credentials .csv file we sent you with the fulfillment confirmation.

Installation Guide

⚠ High voltage, danger of electrocution!

The removal of the device from the metal mounting bracket exposes parts which carry mains voltage. The unit should be opened only by a qualified electrician or by the manufacturer's service personnel. Before starting any work on the electrical connections, separate the unit from the mains power supply. To prevent access by unqualified persons and, in particular, children, do not leave the opened unit unattended. Do not insert any objects, or allow any objects to fall, into the housing's slits. Disconnect any damaged devices from the mains power supply.

⚠ Danger - Electrical voltage!

Contact with components carrying dangerous voltages, an ungrounded thermostat as well as uninsulated, unsecured cables can cause electric shock and result in property damage, serious injury, or death.
- Disconnect the device from the power supply before making any electrical connections.
- Insulate and secure all unused cables and wires before applying voltage to the thermostat.
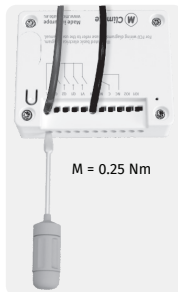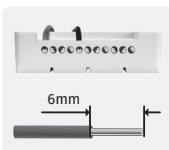
The following conditions must be met or observed during the installation:
- Connection may only be performed when the system is disconnected from the electrical supply.
- The unit must be protected against contact.
- There must be an external primary isolating facility.
- The device must not be installed in vibrating systems (e.g. means of transport such as ships) because the vibrations can cause micro-interruptions in the relays.
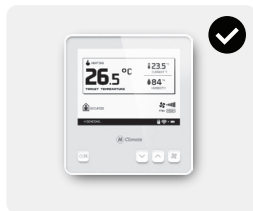- The plant devices are connected via screw terminals with the appropriate 0.25N torques.

IC1 IO2 NC C NO   N V1 Q1 Q2 Q3 L

Illustrated basic electrical diagram.
For FCU wiring diagrams, please refer to the user manual.

Ⓜ Climate

Made in Europe
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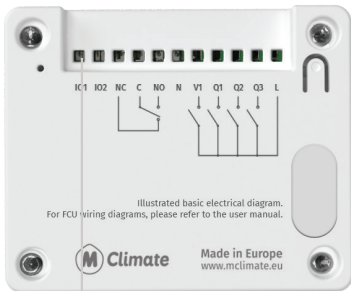
Rigid wiring
0.05mm² - 1.31mm²

6mm

M = 0.25 Nm

Mounting

The room thermostat must be mounted in a clean, dry indoor place and must not be exposed to drip or splash water.

Warning!
Do not mount the device on a metallic surface.

Comply with local regulations to wire and protect the thermostat.

Use only valve actuators rated for 100-240VAC

Warning!
No internal line protection for supply lines to external consumers (Q1, Q2, Q3, V1 and V2) It is recommended to use 6A circuit breaker for each one. Risk of fire and injury due to short-circuits!

Disconnect power supply before removing the thermostat from the mounting plate!

150cm
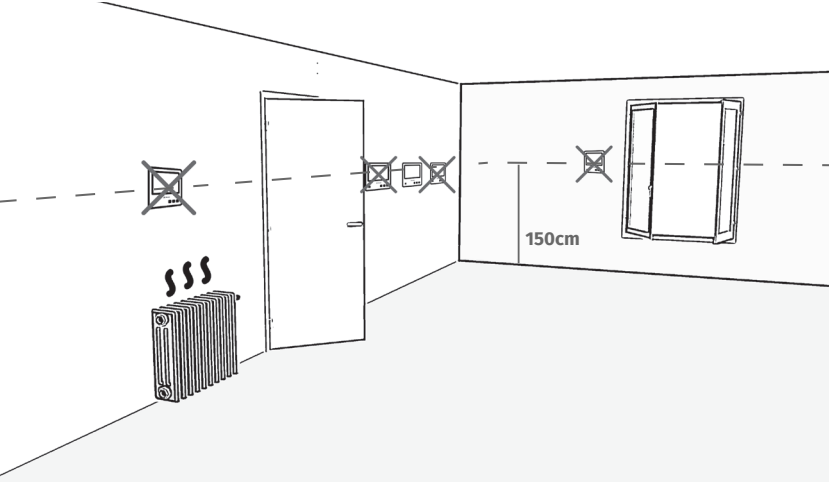
Adapt the line diameters as per local regulations to the rated value of the installed overcurrent protection device.

Inputs IO1 and IO2 carry mains potential. If the sensor's cables are extended, they must be suited for mains voltage.

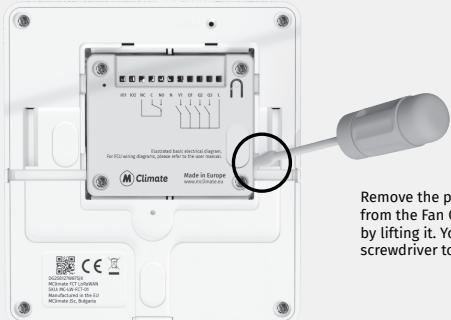The 100-240VAC mains line must have a circuit breaker with a rated current of no more than 10 A.

Properly size the cables to the thermostat, fan and valve actuators for 100-240VAC mains voltage.

1 ⚠ Turn off the power supply to the existing thermostat and remove the thermostat WITHOUT disconnecting the cables. They can help you with the next step.

2

IO1 IO2 NC C NO   N V1 Q1 Q2 Q3 L

Find out what is the correct wiring diagram.
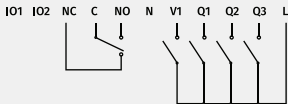
Further in this document, you'll find wiring diagrams for different types of Fan Coil Units, compatible with the Fan Coil Thermostat. You have to determine which wiring diagram is your FCU using and later wire the terminals accordingly. Correctly identifying the wiring diagram of paramount importance for the correct working of the Fan Coil Thermostat.

3

Remove the power module from the Fan Coil Thermostat by lifting it. You can use a flat screwdriver to remove it.

4 ⚠ When connecting any wires to the FCT terminals, please do not leave any stranded wires or exposed wire metal not fully in the terminal.
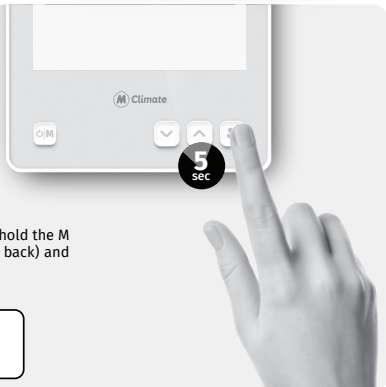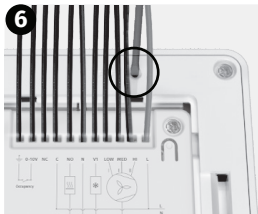
5

⚠️

Connect the wires according to the chosen Wiring Diagram in Step 2.

Then re-insert the power module into the FCT and restore the power using the breaker.

6

5 sec
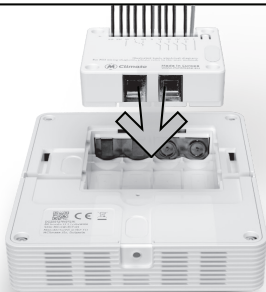
Enter the Installer's menu by turning the device off first (hold the M button for 3 second), then hold the reset button (on the back) and the fan speed button for 5s
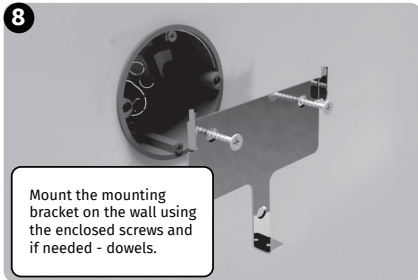
⚠️ Check the connections in every 6 month and tighten them again if needed!

Once you enter the Installer's menu, select the correct wiring diagram for your application.
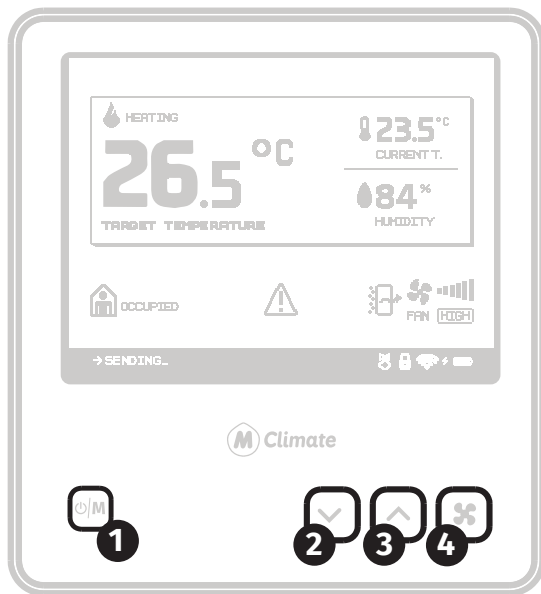

SET APPLICATION

00	2-PIPE ON/OFF, 3-SPEED FAN. OPTIONAL OCCUPANCY
01	2-PIPE ON/OFF, 3-SPEED FAN, 3-WIRE VALVE (220VAC) OPTIONAL OCCUPANCY
02	4-PIPE ON/OFF, 3-SPEED FAN. OPTIONAL OCCUPANCY
03	4-PIPE ON/OFF ECM FAN
04	2-PIPE ON/OFF, ECM FAN
05	2-PIPE ON/OFF, ECM FAN, 3-WIRE VALVE (220VAC)

M BACK   ∨∧ SCROLL   ✿ SET

→SENDING...

(M) Climate

7 Validate that the Fan Coil Unit is reacting to adjusting the modes, fan speed and target temperature through the FCT.

8

Mount the mounting bracket on the wall using the enclosed screws and if needed - dowels.

9 ⚠ Do not use non-flat head screws for the mounting bracket.

10

Slide the FCT on the mounting bracket and tighten the security screw on the bottom.

User Interface Guide

Physical buttons
The device has 4 visible physical buttons.

Assembled MClimate Fan Coil Thermostat
LoRaWAN®, top view

#	Button	Function
❶	ON/OFF/MODE	**When device is OFF:** Short press turns the thermostat ON. **When device is ON:** Short press changes between different operational modes (heating/cooling/ventilation) Long press 3 seconds turns the thermostat OFF.
❷	Down arrow	Decreases target temperature Navigates items in Installer's menu
❸	Up arrow	Increases target temperature Navigates items in Installer's menu
❹	Fan	Changes the fan speed according to the allowed fan speeds.

User interface

The device has a simple and intuitive user interface.

Assembled MClimate Fan Coil Thermostat
LoRaWAN®, top view

#	Section	Meaning
1	Modes selection	Shows the current selected operational mode - heating/cooling/ventilation
2	Current temperature	Indicates the current temperature measured in the room.
3	Humidity	Indicates the current relative humidity measured in the room.
4	Target temperature	Shows the current target temperature of the thermostat
5	Fan speed	Shows the selected fan speed.
6	Occupancy	Occupied/not occupied. Determined by an additional sensor wired to IO1 and IO2 or set through a downlink.
7	LoRaWAN signal	Indicates the current spreading factor 📶 SF7 & SF8　📶 SF9　📶 SF10, SF11, SF12
8	Valve status	Indicates if any of the valves are currently open or closed. Only 1 valve can be opened at a time.
9	Messages	Various messages displayed - Join Request/Join Accept/Join Failed/Sending, indicating the radio activity of the device.
10	Lock	Shows in case some of the buttons are locked
11	Filter alarm	Shows in case a filter alarm is connected to the IO1 and IO2 terminals.

Temperature adjustment

Use the up and down button to adjust the target temperature.
The target temperature cannot be adjusted while in Ventilation mode.

If you want to change the step of increase/decrease of the target temperature, you can further configure it via a downlink.

Turning the thermostat ON/OFF

The button on the far left of the thermostat serves two functions - turn it on and off and switch between modes.
If the thermostat is currently off (screen is blank), a short press of the ON/OFF/MODE button will turn it on. The device should show more information, incl. measured temperature & relative humidity, fan speed and target temperature if the selected mode is heating or cooling.

If you want to turn the thermostat OFF, hold the ON/OFF/MODE button for 3s.
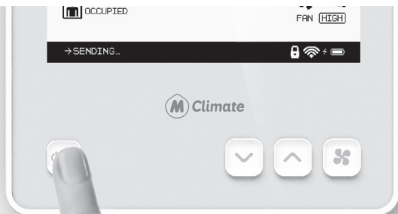
Fan Speed

If you want to change the fan speed, you can click the FAN button. You will be able to change the fan speed based on the allowed fan speeds in your wiring diagram (e.g. ECM fans have 6 speeds).

Further, **using a downlink,** you can limit the selection of the fan speed - e.g. make it so that only the first and second speed can be used.

Mode selection

By default, the device supports 3 operating modes - heating/cooling/ventilation. Depending on the wiring diagram of the Fan Coil Unit, some modes might be disabled by default. E.g. if you are using a 2-pipe fan coil unit, it can either heat or cool, it cannot do both throughout the whole year. In this case, short-pressing the ON/OFF/MODE button will switch between heating/ventilation or cooling/ventilation, depending on the current allowed operational modes. If you are using a 10k NTC connected to IO1 and IO2, the FCT will determine the allowed operational modes independently based on whether the system is circulating hot or cold water.
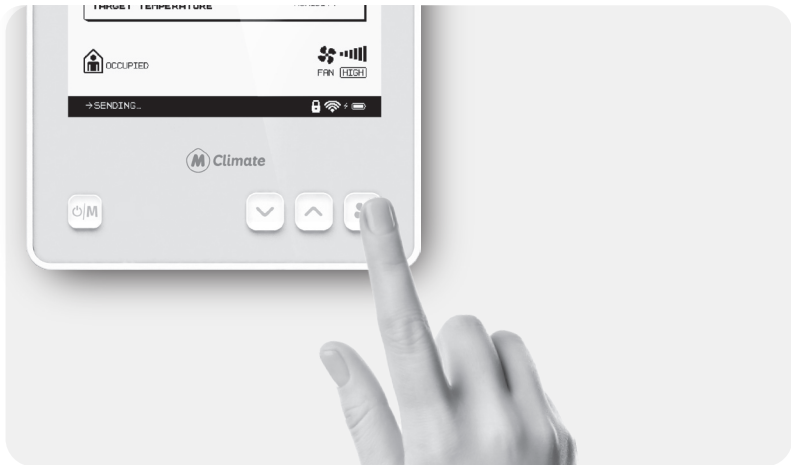
Connectivity and Smart Building Features
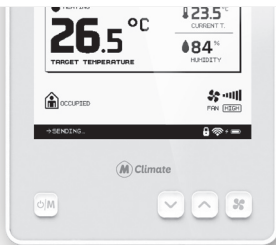
LoRaWAN

Explanation of LoRaWAN Class C connectivity

LoRaWAN Class C enables devices to constantly listen for commands from the gateways. It means that the device will send information only on the keepalive interval, or any change in the target temp/mode/fan speed selection occurs, but unlike Class A devices, the FCT is able to receive commands from the Application/Network server in real-time.

(M) Enterprise
by MClimate

Integration with MClimate Enterprise

The device is compatible with our Building Management Software MClimate Enterprise, which unlocks monitoring and controlling capabilities using MClimate devices. For further instructions on how to add your MClimate FCT to the Enterprise, please refer to the available documentation on our website.
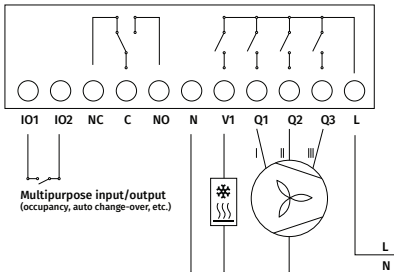

Integration with Building Management Systems (BMS) and Building Automation Systems (BAS)

In case you want to integrate the MClimate FCT into an existing BMS/BAS system, that's possible when using a special gateway that translates the signal from LoRaWAN and exposes the device's points as e.g. Modbus or BACnet objects for further processing. Refer to our website for up-to-date information on available LoRaWAN <> BMS gateways.
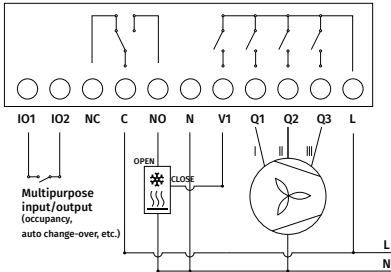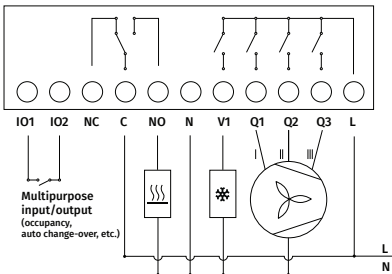
Wiring diagrams

Heating and cooling with 3-speed fan

00 2-pipe ON/OFF (220VAC);
1-3 speeds fan;

IO1 IO2 NC C NO N V1 Q1 Q2 Q3 L

Multipurpose input/output
(occupancy, auto change-over, etc.)

L
N

01 2-pipe ON/OFF 3-wire valve (220VAC);
1-3 speeds fan;

IO1 IO2 NC C NO N V1 Q1 Q2 Q3 L

Multipurpose input/output
(occupancy, auto change-over, etc.)

OPEN
CLOSE

L
N

02 4-pipe ON/OFF (220VAC);
1-3 speeds fan;

IO1 IO2 NC C NO N V1 Q1 Q2 Q3 L

Multipurpose input/output
(occupancy, auto change-over, etc.)

L
N

Heating and cooling with ECM Fan

03 4-pipe ON/OFF (220VAC);
ECM FAN;

| IO1 | IO2 | NC | C | NO | N | V1 | Q1 | Q2 | Q3 | L |

F-ON

L
N

04 2-pipe ON/OFF (220VAC);
ECM FAN;

| IO1 | IO2 | NC | C | NO | N | V1 | Q1 | Q2 | Q3 | L |

F-ON

L
N

05 2-pipe 3-wire ON/OFF (220VAC);
ECM FAN;

| IO1 | IO2 | NC | C | NO | N | V1 | Q1 | Q2 | Q3 | L |

OPEN   CLOSE

F-ON

L
N
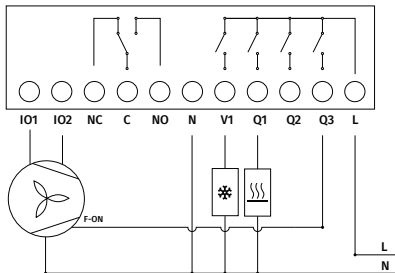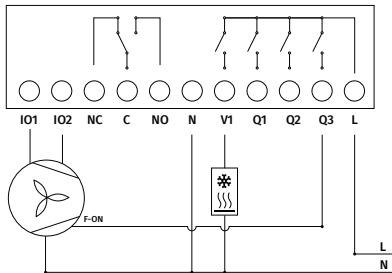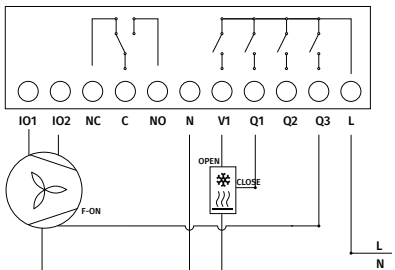
Climate

We
make any
building
smart.

www.mclimate.eu

Designed & Manufactured by MClimate in Europe.

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