Smatrix Pulse

Installation and Operation Manual

Uponor Smatrix Pulse Installation and Operation Manual
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Foreword

Uponor is dedicated to partnering with professionals to create better human environments. As the leading North American manufacturer of Engel-method crosslinked polyethylene (PEX-a) piping and provider of PP-RCT piping solutions, Uponor is dedicated to offering products, systems, services, support, and solutions to design, install, and operate high-performing piping systems.

As part of this support, Uponor publishes the Smatrix Pulse Installation and Operation Manual for contractors, engineers, architects, building officials, building managers, and other individuals interested in radiant heating and cooling as well as HVAC systems.

Uponor has made reasonable efforts to collect, prepare, and provide quality information and material in this manual. However, system enhancements may result in modification of features or specifications without notice.

Note that Uponor is not liable for installation practices that deviate from this manual or are not acceptable practices within the mechanical trades, codes, or standards of practices. If there are differences between Uponor recommendations and local code, always follow the more-restrictive criteria. For example, where Uponor's recommendations are more restrictive than the local code, follow the Uponor recommendations to ensure the product performs as expected and remains covered under warranty. For warranty information, visit uponor.com and search "warranty".

It is the installer's responsibility to ensure the product, design, and intended installation are acceptable to the local authority having jurisdiction (AHJ). Please direct any questions regarding the suitability of an application to Uponor Technical Services at **888.594.7726** or support.UNA@uponor.com.

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Chapter 1:
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- Is selected, planned, and installed and put into operation by a trained, licensed, and experienced professional in compliance with current (at the time of installation) installation instructions provided by Uponor as well as in compliance with all applicable building and plumbing codes and other requirements and guidelines.
- Has not been (temporarily or continuously) exposed to temperatures, pressure and/or voltages that exceed the limits printed on the products or stated in any instructions supplied by Uponor.
- Remain in its originally installed location and is not repaired, replaced, or interfered with, without prior written consent of Uponor.
- Is connected to potable-water supplies or compatible plumbing, heating, and/or cooling products approved or specified by Uponor.
- Is not connected to or used with non-Uponor products, parts, or components, except for those approved or specified by Uponor; and
- Does not show evidence of tampering, mishandling, insufficient maintenance, improper storage, neglect, or accidental damage before installation and being put into operation.

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Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Note: The grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate the equipment.

Note: 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.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device contains license-exempt transmitter(s)/ receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

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

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

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

FCC ID: V9MSM4NA0 and V9MSM4NA1

IC: 7664A-SM4NA0 and 7664A-SM4NA1

Chapter 2:
Safety Instructions

This installation and operation manual describes how to install and properly setup the components of the Uponor Smatrix Pulse system.

Refer to the following important safety instructions before, during, and after installation of the Smatrix Pulse system.

Symbols

The following symbols are used in Uponor documentation to show special precautions when installing and operating any Uponor equipment.

Warning!

Risk of injury or component damage. Ignoring warnings can cause personal injury or damage to system components.

Caution!

Risk of equipment malfunction. Ignoring cautions can cause system malfunctions.

Note

Important information to the section in the manual.

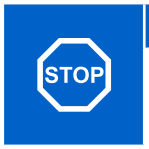
Safety Measures

Conform to the following measures when installing and operating any Uponor equipment.

- Read and follow the instructions in the installation and operation manual.
- Installation must be performed by a trained, licensed, and experienced professional in accordance with local regulations.
- It is prohibited to make changes or modifications not specified in this manual.
- All power supplies must be switched off before starting any wiring work.
- Do not use water to clean Uponor components.
- Do not expose the Uponor components to flammable vapors or gases.

Uponor cannot accept any responsibility for damage or breakdown that can result from ignoring these instructions.

Power



Warning!

The Uponor system uses 115V 60 Hz AC power. In case of emergency, immediately disconnect the power.

Technical Constraints

Caution!

To avoid interference, keep installation/data cables away from power cables of more than 50V.

Limitations for Radio Transmissions

Wireless Uponor products use radio transmission for communication. The frequency used is reserved for similar applications, and the chances of interference from other radio sources are very low.

However, in some rare cases, it might not be possible to establish perfect radio communication. The transmission range is sufficient for most applications, but each building has different construction that may affect radio communication and maximum transmission distance. If communication difficulties exist, Uponor recommends relocating the antenna to a more optimal position and installing Uponor radio sources **at least 16" (41 cm) apart** for solving communication problems.

Disposal

At the end of its working life, do not dispose of any Smatrix Pulse components with other household waste. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources. For proper disposal information, contact local recyclers for environmentally safe recycling.

Chapter 3:
System Description

Smatrix Pulse is a wireless zoning control system designed for radiant heating and cooling installations with the ability to integrate forced-air heating and cooling.

System Overview

The Smatrix Pulse hardware consists of one or multiple controllers, an optional Communication Module, thermostats, actuators, and wireless relays. The Controller manages the operation of the actuators when the thermostats detect a demand for heating and/or cooling.

System optimization and settings (for up to four controllers) is completed through the Smatrix Pulse App (connected via the Communication Module). The system can function without the Communication Module but will reduce the level of system functionality.

Different models of thermostats control heating and cooling operation. Designed for maximum comfort, the thermostats communicate with the controller by radio link. It is possible to mix the different types of Smatrix Pulse thermostats in the same installation.

Wireless relays provide installation flexibility when needing to control other heating and cooling devices when running additional wiring is a challenge.

Hardware Overview

The figure below shows the hardware available for the Uponor Smatrix Pulse system.

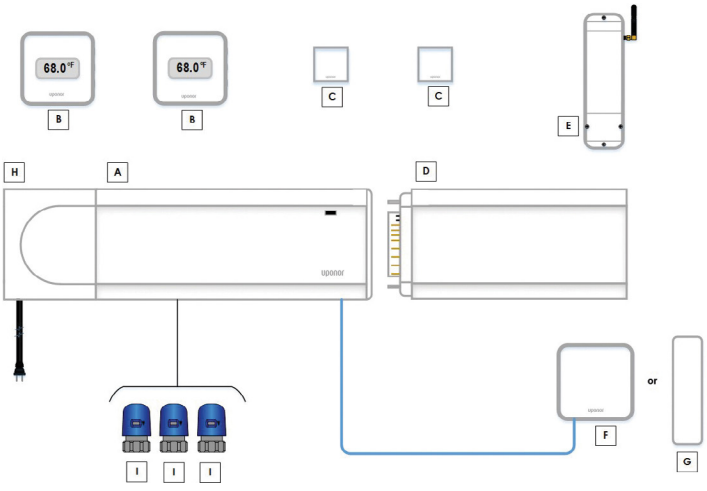


Figure 3-1: Smatrix Pulse hardware

Part Number	Description	Reference	Maximum per System
A380265C	Controller (X-265) with Communication Module (R-208)	A, F, H	1
A380265A	Controller (X-265) with Antenna (A-265)	A, G, H	3
A3800169	Digital Thermostat (T-169)	B	48
A3800161	Mini Sensor (T-161)	C	
A3801262	Expansion Module (M-262)	D	4
A3801263	Relay Module (M-263)	E	16*
A3801208	Communication Module, replacement part	F	N/A
A3801265	Antenna, replacement part	G	N/A
A3850050	Transformer, replacement part	H	N/A
A3030522	Two-wire Thermal Actuator for Uponor EP Heating Manifolds	I	56
A3030523	Two-wire Thermal Actuator for Uponor TruFLOW™ Classic and Jr. Valved Manifolds		
A3030524	Two-wire Thermal Actuator for Uponor Stainless-steel Manifolds		
A3023522	Thermal Actuator, four-wire		

Table 3-1: Smatrix Pulse hardware

*Limit of four (4) A3801263 Relay Modules (M-263) per Controller

Hardware Descriptions

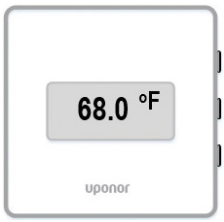


Figure 3-2: A3800169 Digital Thermostat (T-169)

A3800169 Digital Thermostat (T-169)

The Digital Thermostat shows the current room temperature, set temperature, or relative humidity on the display. Temperature settings are adjusted using the buttons on the side of the thermostat.

Main Features

- Power saving e-paper display (updates every 10 minutes)
- Displays Fahrenheit or Celsius
- Operative sensor for increased comfort
- Calibration of displayed room temperature
- Heating/cooling demand as well as low battery indication on display
- Displays Uponor logo and software version during power up sequence
- Setpoint range is 41 – 95°F (5 – 35°C); maximum and minimum setting may be limited by system settings
- Enhanced room temperature control with use of optional floor sensor
- Displays optional temperature sensor values if sensors are connected and relevant functionality is activated
- Switch between Comfort and ECO mode with scheduling (requires Smatrix Pulse App)
- Adjust ECO setback value
- Relative humidity limit alarm indicated in display (requires Communication Module)
- Invert display color
- Communication distances up to 98 ft. (30 m) away from the controller

Included Components

- Digital Thermostat (T-169)
- Wall bracket
- Adhesive tape
- Battery (CR2023 3V)
- Mounting hardware (for wall bracket)

Figure 3-3: A3800161 Mini Sensor (T-161)

A3800161 Mini Sensor (T-161)

The Mini Sensor is a small, simple thermostat with no display or buttons. Use this in rooms for discreet temperature monitoring without the need for local temperature adiustment.

Main Features

- Operative sensor for increased comfort
- Adjust setpoint temperature via the Smatrix Pulse App (requires Communication Module)
- Setpoint range is 41 – 95°F (5 – 35°C); maximum and minimum setting may be limited by system settings
- Optional floor temperature sensor (connected to the thermostat); floor temperature settings (maximum/minimum) only available using the Smatrix Pulse App (requires Communication Module); otherwise, uses system defaults
- Relative humidity limit indicated in Smatrix Pulse App (requires Communication Module)
- Communication distances up to 98 ft. (30 m) away from the controller

Included Components

- Mini Sensor (T-161)
- Wall bracket
- Adhesive tape
- Battery (CR2023 3V)
- Mounting hardware (for wall bracket)

A380265C Controller (X-265) with Communication Module (R-208)

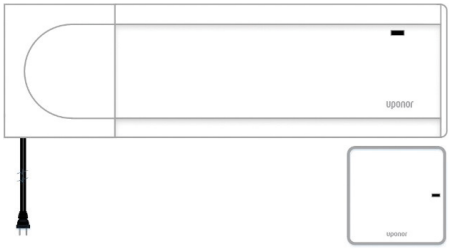


Figure 3-4: A380265C Controller (X-265) with Communication Module (R-208)

Warning!

Per **Table 3-1**, use Uponor 24V actuators to ensure compatibility with the controller.

The Controller operates the actuators, which, in turn, affect the flow of the supply water to change the indoor temperature using information transmitted from registered thermostats and system parameters.

The Controller, which is typically located near the system manifolds, can operate up to six (6) thermostats and eight (8) actuators.

Main Features

- Integrated Dynamic Energy Management functions
  - Autobalancing (default)
  - Comfort setting, room bypass, supply temperature monitoring (requires Smatrix Pulse App and Communication Module)
- Electronic control of 24V actuators
- Connects up to eight (8) actuators
- Two-way communication with up to six (6) thermostats
- Heating/cooling outputs, and/or Comfort/ECO mode switched by dry contact or Smatrix Pulse App (requires Communication Module)
- Separate relays for control of pump and boiler (other control functionality available via Smatrix Pulse App)
- Valve and pump exercise
- Relative humidity control (requires Smatrix Pulse App)
- Control of combined underfloor heating/cooling and ceiling cooling or fan coils (requires Smatrix Pulse App)
- Lower indoor temperature in heating mode or increase indoor temperature in cooling mode with ECO mode; ECO mode activates in all rooms at once using a dry contact or Smatrix Pulse App (requires Communication Module)
- 115V plug-in power cord (42")

Options

- App connectivity via Communication Module (remote connection requires connection to Uponor Cloud services)
- Increase controller functionality by adding an Expansion Module for up to six (6) additional thermostats and up to six (6) additional actuators
- Connect up to four controllers into one system (requires Smatrix Pulse App)
- Modular placement (detachable Transformer)
- Free placement and orientation when installing Controller (except Communication Module)

Included Components

- A380265C Controller (X-265) with Communication Module (R-208)
- Power supply/Transformer (part number A3850050)
- DIN rail
- Mounting hardware
- End cap

A3801262 Expansion Module (M-262)

The Expansion Module will increase the Controller capacity with six (6) additional thermostats along with six (6) more actuators. The Expansion Module operates the actuators, which, in turn, affect the flow of the supply water to change the indoor temperature using information transmitted from registered thermostats and system parameters.

Figure 3-5: A3801262 Expansion Module (M-262)

Main Features

- Electronic control of 24V actuators
- Connects up to six (6) additional actuators
- Two-way communication with up to six (6) additional thermostats
- Plug-in connection with the Controller
- No additional power wiring needed

Included Components

- A3801262 Expansion Module (M-262)

A380265A Controller (X-265) with Antenna (A-265)

Figure 3-6: A380265A Controller (X-265) with Antenna (A-265)

Warning!

Per **Table 3-1**, use Uponor 24V actuators to ensure compatibility with the Controller.

The Controller operates the actuators, which, in turn, affect the flow of the supply water to change the indoor temperature using information transmitted from registered thermostats and system parameters.

The Controller, which is typically located near the system manifolds, operates up to six (6) thermostats and eight (8) actuators.

Note

If using remote access to view and adjust room temperatures along with other smart home settings, the system must include one Communication Module.

Main Features

- Integrated Dynamic Energy Management functions, such as autobalancing (on by default)
- Electronic control of 24V actuators
- Connects up to eight (8) actuators
- Two-way communication with up to six (6) thermostats
- Heating outputs for Boiler and Pump operation
- General purpose input (GPI) for heating/cooling switch over
- Valve and pump exercise
- Control of combined underfloor heating and cooling
- ECO mode provides lower indoor temperature in heating mode and increased indoor temperature in cooling mode; activated in all rooms at once using a dry contact
- Communication distances up to 98 ft. (30 m) away from the controller when used as a sub-Controller
- 115V plug-in power cord (42")

Options

- Increase Controller functionality by adding an Expansion Module that adds six (6) additional thermostats and six (6) additional actuators
- Other functions such as comfort setting, room bypass, and supply temperature monitoring requires (requires Communication Module and Smatrix Pulse App)
- Modular placement (detachable Transformer)
- Free placement and orientation when installing the controller (except the antenna; must be mounted vertical)
- Heating/cooling outputs, and/or Comfort/ECO mode switched by dry contact or Smatrix Pulse App (requires Communication Module)

Included Components

- Controller with Antenna (part number A380265A)
- Power supply/Transformer (part number A3850050)
- DIN rail
- Mounting hardware
- End cap

A3801263 Relay Module (M-263)

Figure 3-7: A3801263 Relay Module (M-263)

The Relay Module adds two extra output relays to the system. These can be setup in different combinations to control heating and cooling operation.

The Relay Module can also be paired with a thermostat to control a fan coil or furnace and air-conditioning combination, along with fan operation. This application uses three (3) relays.

Main Features

- Dry contacts (24 VAC, 5 A)
- Pump control and heating/cooling output function
- Other combinations are available, but require Communication Module and Smatrix Pulse App
- Communication distances up to 98 ft. (30 m) away from Controller

Chapter 4:
System Functionality

The Smatrix Pulse system provides a wide variety of functionality and options to enhance the comfort and operation for residential radiant heating and cooling systems. Some of these features can only be accessed or enabled with the installation of the Communication Module.

Standard Functionality

Feature	Standard Functionality	Smart Home
Actuator Management	✓	✓
Autobalancing	✓	✓
Cloud Service		✓
Comfort and Economy Mode		✓
Cooling Operation		✓
Cooling Options		✓
Cooling – Second Stage		✓
Forced Air/Fan Coils		✓
Heating Cooling Offset		✓
Heating Safeguard	✓	✓
Pump Management	✓	✓
Relative Humidity (RH) Control		✓
Room Bypass		✓
Room Bypass Time limit		✓
System Clock		✓

Table 4-1: Standard Functionality and Smart Home Connectivity Features

Actuator Management

Actuator management prevents too many actuators from being open at the same time. This reduces the peak power needs. Reduce peak current by delaying the opening of some actuators (as they use most current while being opened). Up to eight (8) actuators can be opened at the same time. Additional actuators are queued and opened in order.

Autobalancing

The Uponor Smatrix controller can operate the actuator outputs by either on/off signals or by Autobalancing (on by default), using pulse width modulation (PWM) signals.

Autobalancing is a function where the system calculates the actual energy need of single rooms or zones and adapts the output power of each loop to its length. This means a short loop might get 20% on time while a long loop might get about 60%. The autobalancing continues through the seasons and throughout the changing conditions and usage patterns of the household, removing the need for manual balancing. This gives more even floor temperatures and faster system reaction times with lower energy consumption than standard control systems.

Note

Default for Autobalancing is set to On. Setting this value to Off requires the Communication Module.

Note

Autobalancing can be used in combination with hydronic balancing.

Smart Home Connectivity

Note

Smart home connectivity requires the use of the Communication Module (R-208) and the Uponor Smatrix Pulse App.

Cloud Services

Use the Communication Module to connect to the Uponor Cloud to access system information and settings, including:

- Viewing and adjusting room temperatures
- Setting Home or Away status
- Changing mode of operation (heating/cooling)
- Viewing alarms
- Viewing weather forecast
- Viewing room temperature data (trends)
- Setting up Comfort/ECO profiles and assigning to rooms
- Setting low temperature limits (average)

Comfort and Economy (ECO) Modes

Using the Communication Module and Smatrix Pulse App, it is possible to change the temperature setpoints between two different temperatures. The available modes are Comfort and ECO (economy). Use the Smatrix Pulse App to switch between Comfort and ECO modes and also create a schedule and apply it to one or multiple zones.

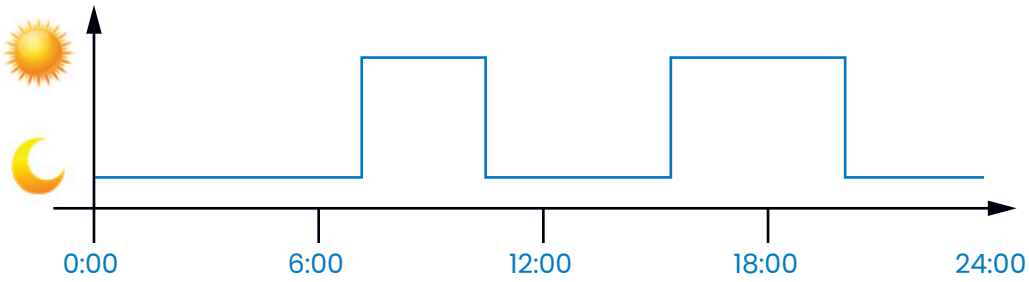


Figure 4-1: Comfort and ECO mode examples

Figure 4-1 shows the system delivers heating in Comfort mode in the morning and late afternoon but enters ECO mode at night and in the middle of the day when the house is normally unoccupied and energy can be conserved.

Caution!

Connecting an external Comfort/ECO switch to the GPI terminals on the Controller will override the time schedules in the Smatrix Pulse App when the switch is closed. This feature will require setup in the app.

Note

Use only one Comfort/ECO switch in the system.

Cooling Operation

The controller can operate underfloor cooling installation based on customer needs. Adjust temperatures with thermostats or by using the Smatrix Pulse App.

As soon as the temperature measured at a thermostat is higher than the setpoint temperature, a demand to cool the room or zone is created and sent to the Controller. The Controller will open the actuators or turn on the cooling terminals on the relay according to the current operating mode and settings. Once the set temperature is reached, the actuators will close, or the air cooling will turn off.

Cooling Options

Use the Smatrix Pulse App to set up the following two cooling methods.

- Underfloor cooling (delivered via hydronic loops in the floor)
- Air cooling (delivered via conventional air conditioning or fan coil units connected to a relay module registered to a room thermostat)

Note

If selecting air cooling as the primary method to cool the room or zone, it is important to turn off the Autobalancing feature.

Cooling – Second Stage

The Smatrix Pulse system can control a second stage of cooling. In rooms where underfloor cooling is installed and a fan coil is also available, underfloor cooling is started when the room temperature rises above setpoint (first stage), and the fan-coil cooling is started or activated depending on how fast the room temperature is increasing. Second-stage cooling will end once the room temperature is at or below the set temperature.

The relay must be registered to a thermostat directly for operation of air-system control. See **page 28** for additional information about registering the thermostat to a relay.

Forced Air/Fan Coils

Use the Relay Module (M-263) (part number A3801263) to control air heating and cooling. The air heating and cooling equipment is wired to a relay module and registered (linked) to a thermostat. The operation is dependent on the settings in the Smatrix Pulse App.

Caution!

Limit of four (4) Relay Modules for forced air systems/fan coils per Controller to ensure system performance.

Caution!

When connecting a Relay Module to control air heating or cooling, make sure an actuator is not connected to the first channel the thermostat is assigned to.

Heating/Cooling Offset

Uponor uses an offset temperature to adjust the setpoints when switching between heating and cooling. This improves the performance of the system and reduces the need for manual setpoint adjustments when switching between heating and cooling. The offset is 4°F (2°C) and is used to increase the setpoints when switching to cooling. When switching back to heating, the value is used to reduce the setpoint.

Heating Protection

If the connection to one thermostat or multiple thermostats is lost (i.e., no longer communicating to a Controller), the Controller activates a safety feature for the affected loop(s) and the actuators are run with a set interval to deliver heating to the room or zone. This function deactivates when the thermostat(s) reconnect or unregister from the Controller.

Pump Management

Each controller includes a pump relay to connect a circulation pump. Default operating mode of the circulation pump is set to **Individual** mode. Use the Smatrix Pulse App (requires Communication Module) to change the setting, if needed. Available settings are **Not Configured**, **Common** and **Individual**.

- **Common mode:** Relay function is set on a system-wide basis. One circulation pump per system is connected to the Primary Controller only or Controller that is connected to the Communication Module. When there is a demand anywhere in the system, the pump wired to the Primary Controller is started.
- **Individual mode:** Relay function is set on a Controller basis. One circulation pump per Controller is connected. When there is a demand to a specific Controller, only the pump connected to that controller is started.
- **Relay module (optional):** When using the relay module to control a pump, the mode of the pump control is set through in the Smatrix Pulse App.

Caution!

Changing operation of the pump control (and/or cooling allowed) in the Smatrix Pulse App will set all relays to **Not Configured**, and they will need to be reconfigured.

Note

In systems with multiple Controllers (Primary/sub-configuration), all relays are initially set to **Not Configured** and require configuration during the installation.

Relative Humidity/Condensation Control

To avoid condensation when operating underfloor cooling, Uponor recommends measuring the relative humidity (RH) in the rooms. The relative humidity is measured with one or more thermostats.

Cooling is shut off on a per-room or zone basis when the RH limit is reached (set in the Smatrix Pulse App, default 75%). If a dehumidifier is installed, one per controller, it will be activated when the dehumidifier start limit is reached.

Cooling will start again, and the dehumidifier is deactivated when the relative humidity falls below a hysteresis set in the Smatrix Pulse App (“dead zone”, default 5%) and has run for a minimum of 30 minutes.

Room Bypass

The system can use up to two rooms (per controller), when in heating mode, as bypass to maintain minimum flow in the system. Rooms can be selected manually or by using the Room Bypass Time Limit function.

Room Bypass Time Limit

The Room Bypass Time Limit function prevents run times shorter than 30 minutes in the system. It does this by analyzing system data (if a room is close to a demand, setpoints, room temperatures, etc.) and chooses suitable rooms to use as bypass.

System Clock

To facilitate accurate log data, scheduling and different timer settings, the Controller receives the correct time and date from Uponor Cloud services. The clock can be set to automatically switch between summer and winter time.

Chapter 5:
Hardware Installation

Installation Procedure

Uponor recommends the following steps to provide the best possible installation results:

- Prepare for Installation (see **page 15**)
- Install Controller(s) (see **page 16**)
- Install Communication Module or Antenna (see **pages 17-18**)
- Install the Relay Module (see **page 18**)
- Install Thermostats (see **page 19**)

After installing the hardware, **Chapter 6: Wiring** will describe how to wire the system components, connect the wireless devices, and finalize setup using the Smatrix Pulse App.

Prepare for Installation

- Verify the contents of the package with the packing list.
- Check whether an external temperature sensor (e.g., floor sensor) is to be installed with a thermostat.
- Review the wiring diagram in the manual or inside the Controller cover.
- Ensure the Controller can be installed near the manifold. Note that each manifold should have its own controller (unless the manifold is a single zone).
- Ensure all Smatrix Pulse components are protected from exposure to water.

Required Tools

Refer to the following list of tools required to install the Smatrix Pulse hardware:

- Wire cutters
- Small Phillips screwdriver
- Flathead screwdriver
- T-10 bit (wiring compartment on the controller)
- Level

Installation Example

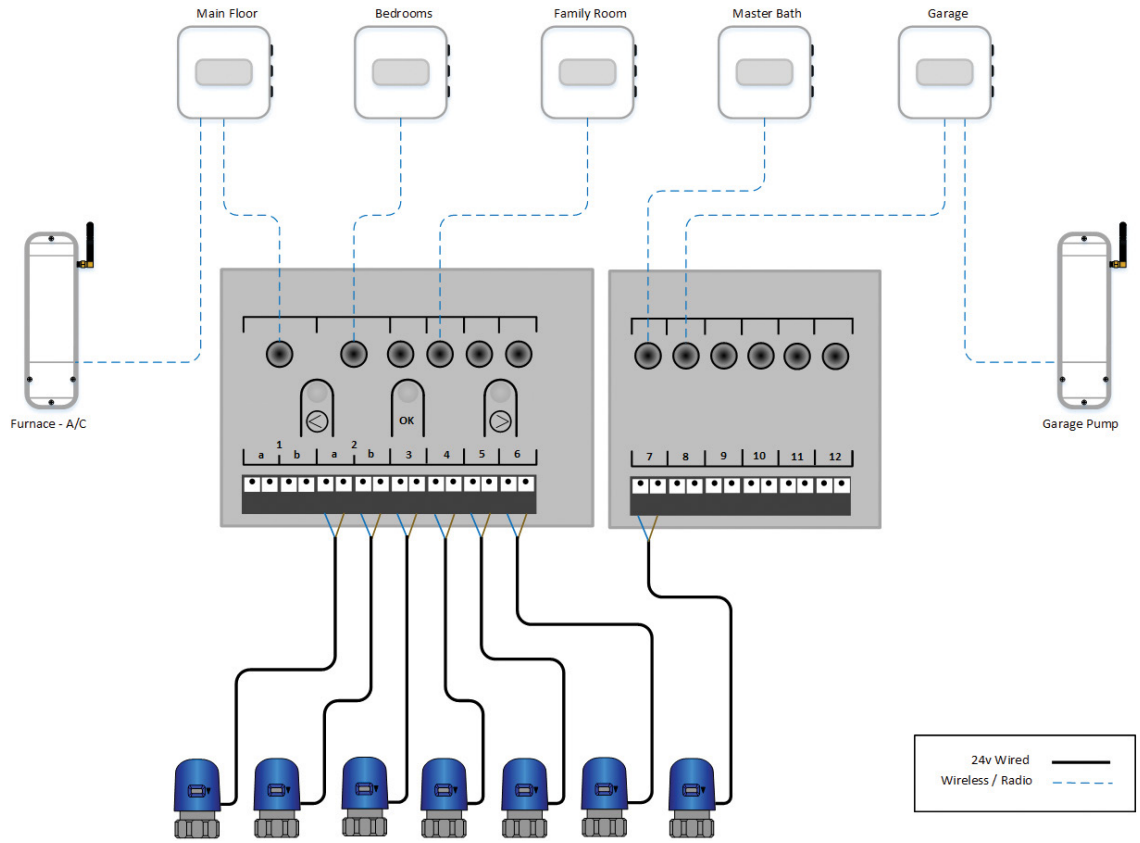


Figure 5-1: Installation example

Installation Overview

- The example system has five (5) heating zones and one (1) cooling zone (Main Floor).
- The Main Floor is registered to Channel 1 but has no actuator(s). This is due to the system controlling forced-air heating and cooling but no radiant. In instances like this, the thermostat needs to be assigned to a channel (in this case, 1) and registered to the relay.
- Bedrooms thermostat is assigned to Channels 2 and 3 and will control actuators connected to 2A, 2B, and 3.
- Family Room heating will open actuators connected to 4 through 6.
- Master Bath heating will open actuators connected to 7.
- Garage thermostat is assigned to Channel 8, but no actuator is connected. The Garage thermostat is also linked to a relay module to operate a zone pump on a call for heating.

Caution!

All thermostats need to be registered to a controller for it to appear in the app

Hardware Handling

- The Primary Controller is the device that is connected to the Communication Module. All others are sub-Controllers.
- A system does not require a Primary Controller, however, system functionality will be limited.
- Sub-Controllers can only be registered to the Primary Controller.
- Relay modules can be registered to both Primary and sub-Controllers.
- The Digital Thermostat (T-169) (part number A3800169) is the only thermostat that can connect to a Relay Module.
- A thermostat can only be linked to one Controller.
- The Controller will time out after 10 minutes of inactivity and revert to normal operation. The timer is reset when a button has been pressed.
- If programmed schedules exist, individual rooms may operate without following a schedule.
- Setting up a system for remote access and connectivity will require a mobile device (e.g., smartphone, tablet, etc.).

A380265C/A380265A Controllers

Controllers are designed for modular installation, meaning the individual parts (Transformer, Controller, Expansion Module, and end cap) easily snap together. However, should the installation require it, the power supply, or Transformer (part number A3850050), can be mounted separately.

Caution!

The Transformer is heavy and might detach if the Controller is held in a vertical position (or upside down) without the cover on.

Caution!

The Expansion Module must be attached by snapping it into place due to connection pins used for connecting to the Controller.

Note

Wires between the Transformer and the Controller must be disconnected prior to detaching the Transformer.

The components can snap on or off without needing to remove the covers or by sliding them into place when the covers are removed.

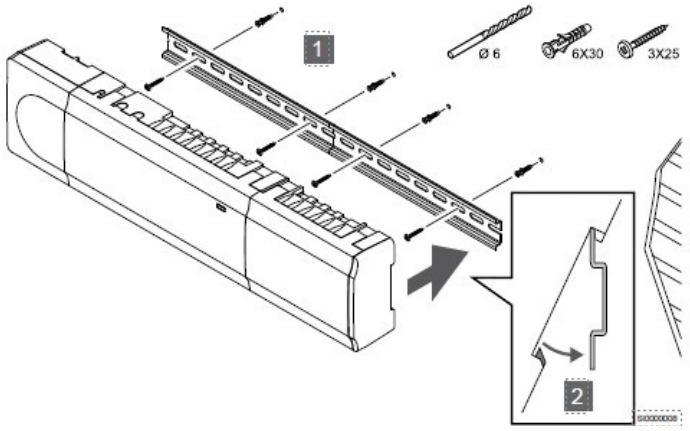


Figure 5-2: Mounting the Controller

Note

Only one Expansion Module is supported per controller.

Mounting the Controller

- Find a suitable location in proximity to the manifold and 115V power supply/outlet.
- Remove the DIN rail from the package and place on the wall and level. Note that the DIN rail included will support both the Controller and the Transformer.
- Mark a minimum of two locations per DIN rail for screw or anchor locations.
- Install the DIN rail onto the wall surface using the necessary hardware.
- Assemble or connect all components prior to installing on to the DIN rail.
- Snap the assembled hardware onto the DIN rail.

Removing the Controller from the DIN Rail

- Looking at the bottom of the controller, locate two black tabs with holes in the center.
- Using a flathead screwdriver, insert the bit into the hole and apply gentle pressure against the case to extend the tab.
- Angle the Controller away from the wall.
- Remove the Controller from the DIN rail.

A3801262 Expansion Module (M-262)

Mounting the Expansion Module

- Remove the DIN rail from the package and place at the end of the rail for the Controller and level.
- Mark a minimum of two locations per DIN rail for screw or anchor locations.
- Install the DIN rail onto the wall surface using the necessary hardware.
- Connect the Expansion Module to the Controller and install on the DIN rail.
- Snap the assembled hardware onto the DIN rail.

Separating the Expansion Module from the Controller

- Insert a flathead screwdriver in the seam (or slot) between the Controller and Expansion Module towards the top.
- Twist the screwdriver until the “snap lock” releases.
- Repeat the same previous steps towards the bottom of the seam.
- Remove the Expansion Module. Use caution not to damage or bend the connector pins.

Removing the Expansion Module from the DIN Rail

- Use the step above to separate the Expansion Module from the Controller
- Looking at the bottom of the Expansion Module, locate the black tab with a hole in the center.
- Using a flathead screwdriver, insert the bit into the hole and apply gentle pressure against the case to extend the tab.
- Angle the Expansion Module away from the wall.
- Remove the Expansion Module from the DIN rail.

Communication Module (R-208)

The Communication Module contains both an antenna for internal connections to thermostats and sub-controller and a local network (LAN) module for Wi-Fi or Ethernet communication.

Mounting the Communication Module

Caution!

Do not install a Communication Module inside a manifold cabinet.

Caution!

Install the Communication Module vertically to ensure the best communication.

- Remove from the packaging and separate the Communication Module from its removable back mount.
- Attach the back mount to the wall using the hardware included in the packaging.
- The back can be attached to the wall using adhesive tape, screws, wall anchors, or DIN rail.
- If using DIN rail, use the extra back mount included in the packaging with the black tab.
- Connect the Communication Module to the Controller prior to reinstalling into the back mount.

Note

Only one Communication Module is needed per system..

Connecting the Communication Module

The communication cable and optional Ethernet cable is routed differently to the Communication Module, depending on which back mount is being used.

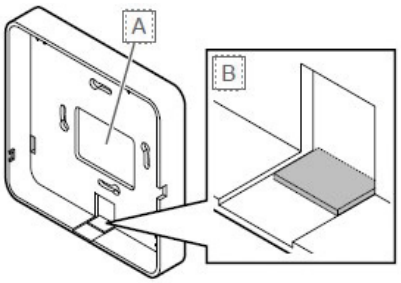


Figure 5-3: Breakout tab

Option 1: Standard Back-Mount Case

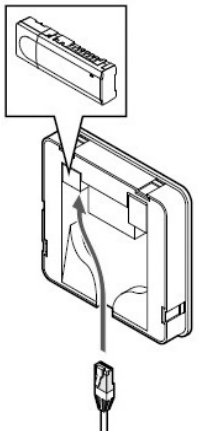
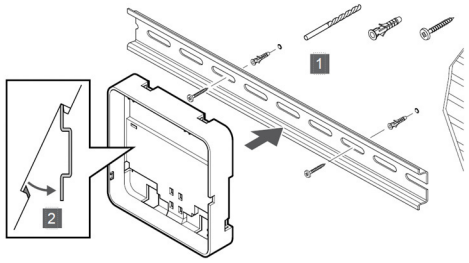


Figure 5-4: Route Ethernet cable

- Remove the breakout tab (B) on the bottom of case (A).
- Attach the back mount to the wall using the hardware (included).
- Insert the Ethernet cable through the opening and connect to the Communication Module.
- There are two connections on the back of the Communication Module. Connect to the port showing the picture of the Controller.
- Install the Communication Module into the back mount.

Option 2: DIN Rail Back-Mount Case



- Attach the DIN rail to the wall using the appropriate hardware.
- Snap the back mount onto the DIN rail.

Figure 5-5: Attaching case to DIN rail

- Route the Ethernet cable through the left opening on the bottom of the case and connect to the Communication Module
- There are two connections on the back of the Communication Module. Connect to the port showing the picture of the Controller.
- Install the Communication Module into the back mount.
- A click should be audible with a completed connection.
- Apply gentle pressure pulling down on the Ethernet cable to ensure the connection is secure.

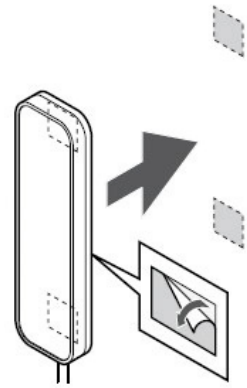


Figure 5-6: Antenna installation

Antenna (A-265)

The Antenna is packaged with a Controller in part number A380265A. The Smatrix Pulse system can be installed with antennas only and no Communication Module, so be aware that system functionality will be limited (see **Chapter 4: System Functionality**). When installing a system solely with antennas, each Controller will operate independently. When installing and linking a Controller in a system with a Controller that is connected to a Communication Module (primary), additional Controllers with Antennas become sub-Controllers.

Caution!

Install the Antenna outside a manifold cabinet.

Caution!

Install the Antenna vertically to ensure the best communication.

Mounting the Antenna

- Attach the Antenna to the wall using the adhesive strips included in the packaging.

Connecting the Antenna

- Route the Ethernet cable attached to the Antenna and plug it into the connection on the bottom right hand of the Controller.
- A click should be audible with a completed connection.
- Apply gentle pressure pulling down on the Ethernet cable to ensure the connection is secure.

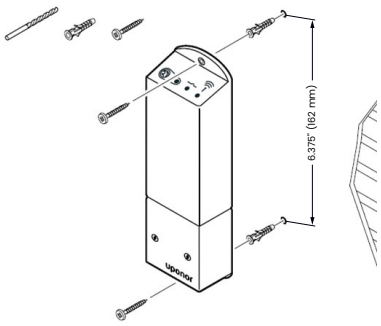


Figure 5-7: Relay Module installation

A3801263 Relay Module (M-263)

Using a Relay Module helps integrate other systems (forced air/ fan coils, etc.), simplifies or reduces wiring complexity, and provides a solution where it is difficult to run wires to activate heating (and cooling) equipment.

Different functionality combinations are available when using the Relay Module. To access these requires the Communication Module.

Placing the Relay Module

Use the following recommendations when determining the location of the Relay Module:

- Locate the Relay Module close to the device it will control.
- Place the Relay Module above the device(s) to avoid potential water damage.
- Ensure the Relay Module is protected from exposure to water.
- Check to make sure the cover can be easily removed (there is proper clearance) and the terminals are easily accessible.

Mounting the Relay Module

- Attach the Relay Module to the wall or surface.
- Use suitable hardware included in the packaging to secure the Relay Module to the determined locations.

Thermostats

Smatrix Pulse thermostats provide information that is transmitted via wireless signal to Controllers and/or Relay Modules. This information is used to determine whether heating or cooling is needed for the individual zones and operate the appropriate devices.

Use the following instructions for both the Digital Thermostat (T-169) (part number A3800169) and the Mini Sensor (T-161) (part number A3800161).

Placing the Thermostats

- Make sure the thermostat is placed within the room or area(s) it will control.
- Select an indoor wall and a position 5 ft. (1.5 m) above the floor or at eye level.
- Ensure the thermostat is away from direct sunlight and unaffected by solar gain.
- Ensure the thermostat is away from any source of heat (television set, electronic equipment, fireplace, spotlights, etc.).
- Ensure the thermostat is away from any sources of water or excessive humidity.
- Ensure the thermostat is positioned at least 16" (40 cm) away from the Controller to avoid interference.

Labeling the Thermostats

Due to the nature of a completely wireless thermostat, it is easy for thermostats to get placed in the wrong room or zone. Uponor recommends labeling the thermostat during installation to alleviate any confusion. If installing multiple Controllers, include a number reference or location for the specific Controller. This will help once it is time to begin the registration process of linking the thermostats to the correct devices.

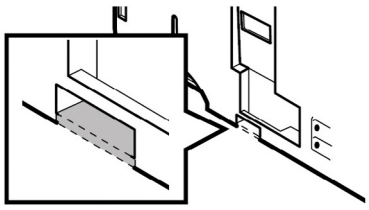


Figure 5-8: Breakout tab

Note

Remove the breakout tab on the thermostat case when installing a floor sensor.

Attaching the Thermostat to a Wall

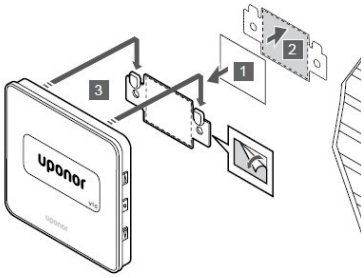


Figure 5-9: Attach thermostat

The thermostat packaging includes hardware for the following three attachment options:

- Wall bracket and anchors
- Wall bracket and adhesive strips
- Directly mounting on the wall

Once all the mounting brackets are in place and mounted to the wall, make sure each thermostat is labeled for identification. Be sure to take the thermostats with you. This will make registering them to the Controller(s) an easier process.

Powering Up the Thermostats

Remove the plastic transportation strip from the battery to start the thermostat.

The thermostat uses a single CR2032 3V button cell lithium battery which provides about two (2) years of battery life if it is positioned within radio range of the controller. Ensure that the battery is correctly inserted in the thermostat.

Figure 5-10: Digital Thermostat (T-169) display at startup

- The Mini Sensor (T-161) (part number A3800161) will perform a self-test for approximately 10 seconds when starting up, and the LED flashes during this period.
- The Digital Thermostat (T-169) (part number A3800169) will perform a self-test for approximately 10 seconds when starting up and will display the current software version.

Chapter 6:
Wiring

This section explains how to wire various hardware components in the Smatrix Pulse system. Before beginning the wiring process, ensure all hardware is mounted and installed per the instructions in **Chapter 5: Installation**.

Controller

Connecting the Actuators

Refer to the following information to properly connect the actuators.

Note

Each thermostat can control one or more channels and will control the associated actuator output. To simplify installation and maintenance, Uponor recommends wiring actuators controlled by the same thermostat in sequence to the channels.

Note

Uponor recommends identifying the thermostat room name or zone number with individual loops to be controlled on the manifold.

1. Remove the cover from the controller (and Expansion Module, if installed).
2. Route the wires from the actuator through the cable entries in the bottom of the Controller case.
3. Ensure the two actuator wires are stripped to approximately ⅜" (9.5 mm).
4. Using a small screwdriver, press and hold the white button on the quick connector.
5. Insert the wire into the opening.
6. Remove the screwdriver from the quick connector.
7. Repeat for the second wire and for the additional actuators.

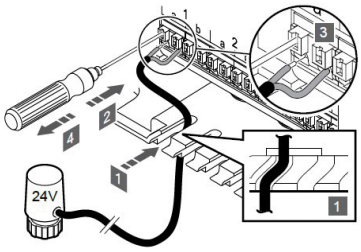


Figure 6-1: Connecting actuators

General Purpose Input (GPI) Switch

The controller includes a set of terminals that can be used to change system operation. The default operation is set for Heating/Cooling switchover. When the switch is open, the system will be in Heating mode. When closed, it switches the system over to Cooling mode. The GPI can also be used to change the system from Comfort to ECO mode (setback) but will require the installation of the Communication Module and the Smatrix Pulse App to change this setting.

Note

In systems where a Communication Module is installed, the functionality of the GPI is selected in the Installer Settings or in the System Settings Menu.

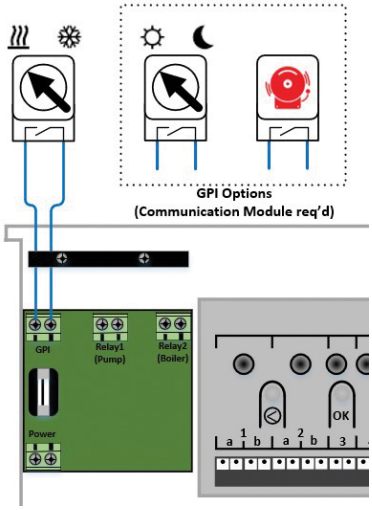


Figure 6-2: GPI wiring

- Ensure the power is disconnected from both the Controller and the Heating/Cooling switch source
- Remove the cover from the Controller.
- Open the wiring compartment using a T-10 bit.
- Route the wires from the Heating/Cooling switch through the cable entry above the contacts.
- Ensure the two actuator wires are stripped to approximately ⅜" (9.5 mm).
- Insert the wires into the terminal blocks and tighten with a small screwdriver.

Caution!

If using the GPI for Comfort/ECO mode, use only one switch for the entire system.

Output Relays

The Controller includes sets of output terminals that can be operated independently to control external equipment, such as a pump or boiler (default). **Table 6-1** shows the various options for these outputs if a Communication Module is installed in the system. This table applies to options for the Primary Controller (connected to the Communication Module).

Primary Controller	
Relay 1	**Relay 2**
Pump (default)[1]	Boiler (default)
Pump[1]	H/C Switch[3]
Pump[1]	Dehumidifier[5]
Chiller[1,3]	Boiler
Pump[1]	Comfort/EC0[6]
Not Configured	Not Configured

Table 6-1: Relay Outputs

Note

A Relay Module can be used in installations where the distance between the device(s) and the Controller makes wiring difficult or if more outputs are needed.

Note

All relays are dry contacts and require a power source.

If a Controller is installed in the system as a sub-Controller (connected to an Antenna), the options for assigning functionality is different and limited.

Sub-Controller	
Relay 1	**Relay 2**
Pump[2]	H/C Switch[4]
Pump[2]	Dehumidifier[5]
Not Configured	Not Configured

Table 6-2: Relay Outputs

Relay Functionality Notes for Tables 6-1 and 6-2

[1]H/C Switch and Chiller is only available when cooling is activated

[2]Function only available when Pump management is set to Individual, otherwise "Not used" is shown in the Smatrix Pulse App.

[3]Function only available when cooling is activated.

[4]Function only available when cooling is activated, otherwise "Not used" is shown in the Smatrix Pulse App.

[5]Function only available during relative humidity control (in cooling, no fan coils).

[6]This function is also used when connecting a ventilation unit.

Relays 1 and 2

Warning!

Risk of electrical shock! Disconnect or remove power prior to making electrical connections.

Note

Additional relay will be required when wiring to a pump or circulator. See wiring schematics.

Note

Chiller relay function requires a Communication Module and must be set in Installer Settings during initial configuration, or in the System Settings Menu.

- Remove the cover from the Controller.
- Open the wiring compartment using a T-10 bit.
- Route the wires from the pump relay through the cable entry above the contacts.
- Ensure wires are stripped to approximately 3/8" (9.5 mm).
- Insert wires into terminal blocks and tighten with a small screwdriver.

Relay 1 can be wired to a pump (default) or chiller as shown in **Figure 6-3** and will require the Communication Module to change the default functionality.

Pump: The output will close (turn on) when there is a demand for heating or cooling. The relay will open when the heating or cooling demand has ended.

Chiller: The output will close (turn on) when the system mode is set to cooling and there is a cooling demand. The relay will open when the cooling demand is met, or the mode is changed to heating.

Relay 2 can be wired to a boiler (default) or other options as shown in **Figure 6-4** and will require the Communication Module to change the default functionality.

Boiler: The output will close (turn on) when there is a heating demand. The relay will open when the heating demand has ended. See Pump Management section on **page 13** for additional information on setting pump operation to Individual or Common.

Heat/Cool: Heating is activated when the relay is open; cooling is activated when the relay is closed.

Dehumidification: The dehumidifier starts (relay closed) when the relative humidity setpoint is reached when in cooling mode. It will open when the minimum run time of 30 minutes has finalized and when the relative humidity has decreased below the defined RH setpoint.

Comfort/ECO: The relay closes when ECO mode is activated and open when the system returns to Comfort mode.

Ventilation: The relay is closed when the system is set to ECO. The ventilation unit must be setup to lower its speed (see manufacturer's specifications) when the input is closed (ECO), and to switch back when the input is opened again (Comfort).

After all actuator and wiring connections are complete, it is now time to power up the controller. Close the wiring compartment and plug the controller into a 115V wall outlet.

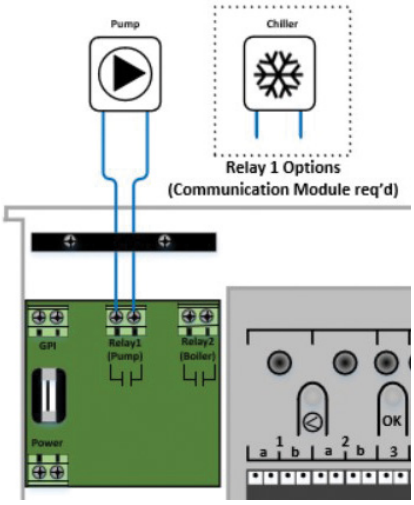


Figure 6-3: Relay 1 options

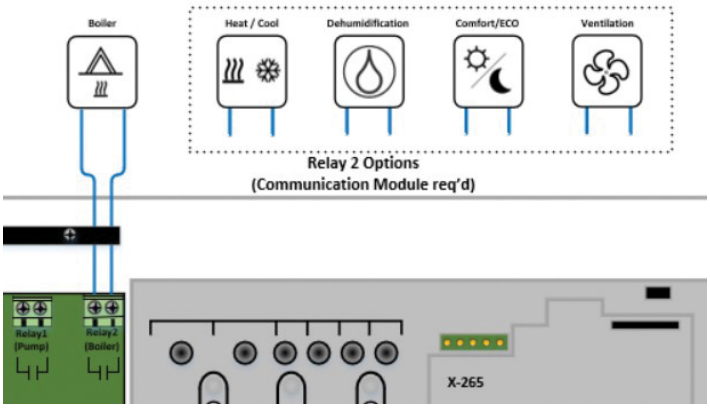


Figure 6-4: Relay 2 options

Relay Module (M-263)

The relay module adds two extra output relays to the controller increasing the total amount of controller output relays to four (4). This presents an option to control remote components (within radio range) otherwise wired to the Controller and/or up to four (4) components by the same Controller.

If more than one Controller is available in the system, one Relay Module per Controller can be used.

If conventional forced-air heating and cooling equipment or fan coils are installed, a maximum of four (4) Relay Modules can be used per Controller.

The function for the Relay Module is set in Installer Settings during setup (requires a Communication Module). The tables below show the available functionality depending on the device it is linked to.

Primary Controller		
Relay 1	**Relay 2**	**Relay 3**
Pump (default)[1]	Boiler (default)	Not Configured
Pump[1]	H/C Switch[2]	Not Configured
Pump[1]	Dehumidifier[5]	Not Configured
Chiller[1, 3]	Boiler	Not Configured
Pump[1]	Comfort/ECO[6]	Not Configured
Not Configured	Not Configured	Not Configured

Table 6-3: Primary Controller Relay outputs

Sub-Controller		
Relay 1	**Relay 2**	**Relay 3**
Pump[2]	H/C Switch[2]	Not Configured
Pump[2]	Dehumidifier[5]	Not Configured
Not Configured	Not Configured	Not Configured

Table 6-4: Sub-Controller Relay outputs

Forced Air/Fan Coils		
Relay 1	**Relay 2**	**Relay 3**
Heating	Cooling	Fan

Table 6-5: Forced Air/Fan Coils Relay outputs

Caution!

Make sure the power is off (or disconnected from the device(s) being wired to the Relay Module.

Note

Additional Relay Module will be required when wiring to a pump or circulator. See wiring schematics.

Note

Chiller relay function requires a Communication Module and must be set in Installer Settings during initial configuration, or in the System Settings Menu.

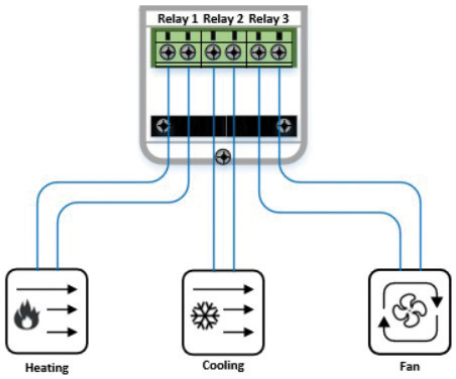


Figure 6-5: Relay Module wiring

- Remove the cover from the relay module using a small flathead or Phillips screwdriver.
- Route the wires from the heating/cooling equipment through the cable entry below the contacts.
- Ensure the two actuator wires are stripped to approximately $^{3}/_{8}$" (9.5 mm).
- Insert the wires into the terminal blocks and tighten.
- Replace the cover.
- Apply 24V power supply to the Relay Module.

The Relay Module can be wired to a furnace/air conditioning system or fan coil unit as shown in **Figure 6-5** and will require the Communication Module to set up this functionality. The Relay Module outputs provide the following operation:

Heating: The output will turn on (close) for forced air heating in Heating mode when the room temperature linked to the Relay Module falls below its set temperature. Activation will depend on the rate that the temperature is falling. The Relay Module will open once the room temperature reaches the desired set temperature.

Cooling: The output will close for forced-air cooling in Cooling mode when the room temperature linked to the Relay Module rises above its set temperature. Activation will depend on the rate that the temperature is rising. The Relay Module will open once the room temperature reaches the desired set temperature.

Fan: This output will close when a need for heating or cooling is active on the Relay Module and open when the active function has ended. If recirculation is needed, the fan operation can be set manually through the Smatrix Pulse App.

When the relay module is successfully powered up, the LED will flash red and then turn solid green to indicate normal run mode. The relay LED will turn red when there is an active call for heating and blue for cooling.

Thermostats

The external temperature sensor input can be used to connect a floor temperature sensor on the Digital Thermostat (T-169) (part number A3800169) and Mini Sensor (T-161) (part number A3800161). This sensor can be used to maintain minimum floor temperatures and protect wood flooring. Minimum and maximum values can be set or modified through the Smatrix Pulse App or on the Digital Thermostat if no Communication Module is installed in the system.

Wiring the Floor Sensor (optional)

Caution!

If more than one hour has passed between startup of the thermostat, and the sensor wires are connected, remove the battery from the thermostat, wait 30 seconds, and reinsert the battery again. The thermostat will now be configured with a floor sensor.

- Remove the breakout plastic on the back of the thermostat.
- Press the push buttons on the connection terminals.
- While pressing the push buttons, insert the two wires from the sensor cable (non-polarized) into the connection terminal.

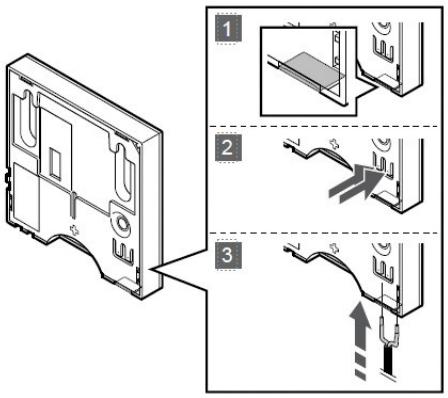


Figure 6-6: Floor sensor wiring

Powering Up the Thermostats

Remove the plastic transportation strip from the battery to start the thermostat.

The thermostat uses a single CR2032 3V button cell lithium battery which provides about two (2) years of battery life if it is positioned within radio range of the controller. Ensure that the battery is correctly inserted in the thermostat.

The A3800169 Digital Thermostat (T-169) will perform a self-test for 10 seconds when the transportation strip or the battery has been inserted. Allow the thermostat to complete the self-test prior to linking to a Controller.

The A3800161 Mini Sensor (T-161) will also perform a self-test for 10 second when the transportation strip or the battery has been inserted. The LED on the front will flash during start up. Allow the sensor to complete the self-test prior to linking to a Controller.

Chapter 7:
Connecting Wireless Devices

After mounting the hardware and wiring the devices, the next step in the installation is connecting the various devices wirelessly.

With the Smatrix Pulse system, the true wireless features make the hardware more flexible and easier to install. This section will take the user through the various options to "link" the devices together given the following options:

- Linking a thermostat to a Controller
- Linking a thermostat to a Relay Module
- Linking a Controller to a Relay Module
- Linking a sub-Controller to a Primary Controller

LED Guide

LED is unlit and dark (no color)

LED is on solid

LED is on flashing

LED is alternating colors

Linking a Thermostat to a Controller

It is necessary to link a thermostat to a Controller so the thermostat can pass information to the Controller about room temperatures, set temperatures, etc. The Controller will process the information and make decisions based on the system configuration and mode to operate the various heating and cooling components.

Note

A thermostat can only be linked to a single Controller.

Note

Thermostats must be linked to a Controller for them to appear on the Smatrix Pulse App.

Use the following steps to link a thermostat to a Controller.

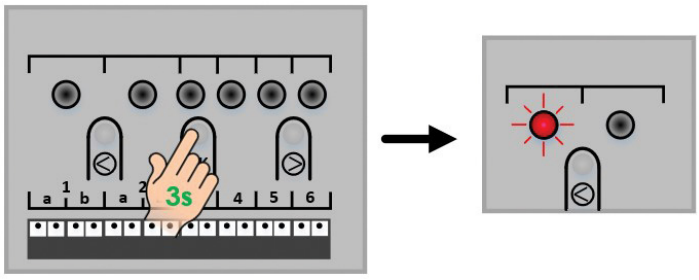


Figure 7-1: Linking a thermostat to a Controller

- Activate the registration mode by pressing the **OK** button on the Controller for three (3) seconds. The Power LED changes from solid green to solid red.
- The Controller is in registration mode when the LED for Channel 1 flashes red. If a thermostat has already been linked, the first channel available will flash red. A previously linked channel will appear solid green.
- If the LED (or channel) flashing is not correct for the actuator the thermostat will control, used the < and > buttons to move the flashing red LED to the preferred channel.

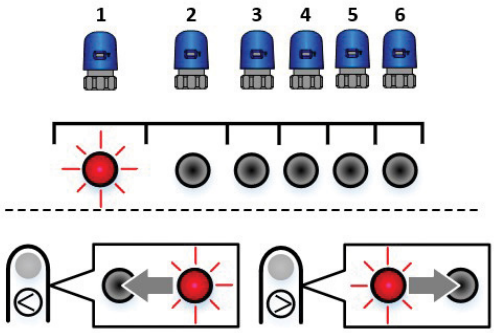


Figure 7-2: Assigning a thermostat

- Press the **OK** button to enter or assign that thermostat. The link will be confirmed with LED turning solid green, and the next available channel LED will begin to flash red.
- If more than one channel will be assigned to a thermostat, select the next channels to be registered to the thermostat and press **OK**. Once all selected channel LEDs are solid green, go to the thermostat.
- Put the thermostat into "pairing" or registration mode:
  - Digital Thermostat: Press and hold the ▲ and ▼ buttons on the side of the thermostat until a symbol for an antenna appears in the display. A check will briefly appear when the registration is complete and then revert to current room temperature.
  - Mini Sensor: Press the button and hold on the back of the thermostat for five (5) seconds. The LED on the front of the stat will begin to flash. The LED will turn off when the registration is complete.
- Once the registration between the thermostat and the Controller is complete, the LED (or LEDs) set up previously will turn solid green, and the next available (or open) channel will flash red.
- Repeat these steps for additional thermostats.

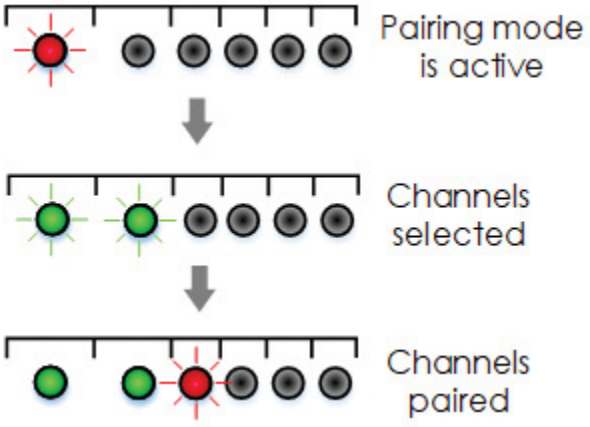


Figure 7-3: Pairing the thermostats

Linking a Thermostat to a Relay Module

The A3800169 Digital Thermostat (T-169) can be linked directly to a Relay Module. This can be useful in installations when the thermostat will control a conventional forced-air system with air conditioning or a fan coil or in instances where getting wiring back to the mechanical room for a zone pump in a garage application is an issue. The Relay Module, depending on the system mode, will turn on the relays required for heating and cooling.

Note

The thermostat should be linked (or registered) to the Controller first, even though it will not control actuators. See the previous step for **Linking a Thermostat to a Controller**.

Before proceeding to linking the devices, familiarize yourself with the various items on the Relay Module and their status/operation:

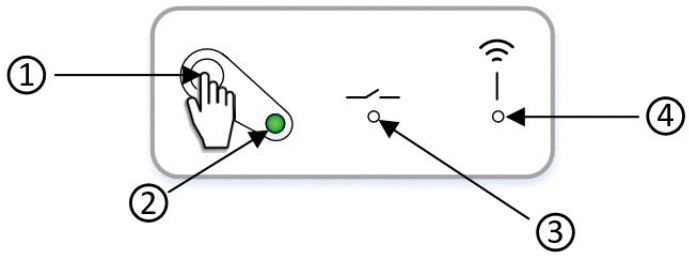


Figure 7-4: Relay Module status items

1. This will be used to place the Relay Module into pairing mode or to clear a link or registration to a thermostat
2. This will show the status of the Relay Module based on the various modes of operation. During power-up, this LED will flash red and green for a short duration. Once the Relay Module is ready for operation, this LED will turn green.
3. During normal operation, a solid red LED will indicate active operation of the heating equipment and the appropriate Relay Module(s) close. A solid blue LED indicates active cooling.
4. This LED is used during the linking process of the thermostat to the Relay Module (along with relay to the Controller). This LED has the following states:
   - **Dark or unlit** – Relay Module is not in the linking (or pairing) mode.
   - **Slow flashing red** – Relay Module is in linking mode.
   - **Fast flashing red** – Relay Module is completing the linking process with the thermostat.

Note

To change the Relay Module operating mode, power down the Relay Module and wait for 10 seconds. Press and hold the button while restoring power and the LED will flash once (normal).

Use the following steps to link a thermostat to a Relay Module:

- Ensure the Relay Module is powered up and the LED is on.
- Activate the registration mode on the Relay Module by pressing the button for three (3) seconds. When done correctly, the linking LED will begin to slow flash red.

Caution!

If no button on the thermostat is pressed for about eight (8) seconds, while in a sub menu, the current values will be saved, and the software exits to the Settings Menu. After 60 seconds, the Relay Module will return to normal run mode.

- Enter the configuration mode on the Digital Thermostat by pressing and holding the middle button for about three (3) seconds.

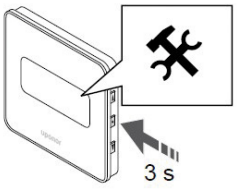


Figure 7-5: Press and hold middle button for three (3) seconds

- Once the menu is activated, press the up (or top) button until 09 is shown in the top right corner.

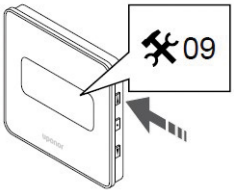


Figure 7-6: Press top button until 09 is shown in right top corner

- Press the middle button and a line will appear under 09.
- Press the top button until "CNF" is displayed in the screen.

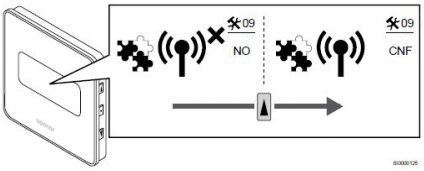


Figure 7-7: Press top button until CNF displays on the screen

- Once successfully paired, the LED will flash quickly on the relay and a check will appear on the thermostat screen.
- Press the **OK** (middle) button to confirm the change.
- Exit the Settings Menu by pressing and holding the **OK** button for three (3) seconds.

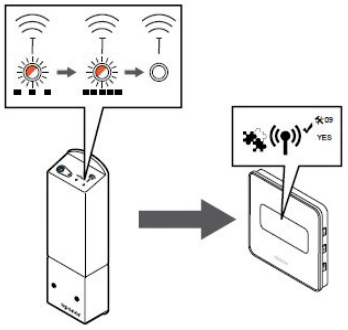


Figure 7-8: Successful pairing

Linking a Relay Module to a Controller

A Relay Module can directly link to a Controller. Each Controller can only have one Relay Module linked to it to mirror or duplicate the pump and boiler outputs. This can be useful in installations when getting wiring back to the mechanical room for a zone pump and/or boiler is an issue in retrofit or remodel applications.

Caution!

When linking a Relay Module to a Controller and using the "second layer" of pairing, other Controllers will pair to Channel 1 and the Relay Module will pair to Channel 2.

Use the following steps to link or register a Relay Module to a Controller:

- Enter the pairing mode. Press and hold the **OK** button on the Controller until the LED for the first available channel begins to flash Red.
- Using the **‹** or **›** buttons, move the flashing LED from the channels to the power LED on the Controller. The LED will begin to flash red. This secondary layer is for linking Relay Modules and other controls to Controllers.
- Press the **OK** button and the LED for Channel 1 will begin to flash red.
- If done correctly, the LED for Channel 1 will begin to flash red and the power LED will start flashing in a pattern (long flash, short unlit flash, long flash, etc.).
- Press the **›** button to move the flashing red LED to Channel 2.

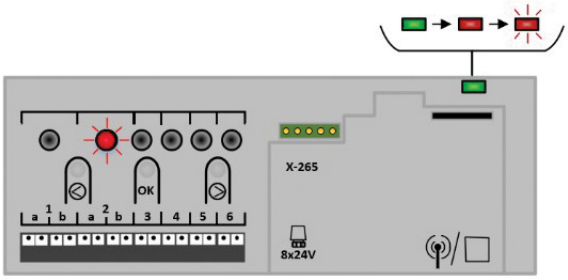


Figure 7-9: Enter pairing mode

Note

The Relay Module will only link to Channel 2 on Controllers.

- Select (or lock) the channel by pressing the **OK** button. The LED should begin to flash green.
- Make sure the Relay Module is powered up and the power LED (2) is on solid green.
- Activate the registration mode on the Relay Module by pressing the registration button (1) for three (3) seconds. When done correctly, the link LED (4) will begin to slow flash red.
- The link LED (4) on the Relay Module will begin to begin flashing faster, and the LED for Channel 2 on the Controller will turn to solid green. At this time, the Relay Module is paired with the Controller.
- Press and hold the **OK** button to exit pairing mode. When done correctly, the power LED will be solid green.

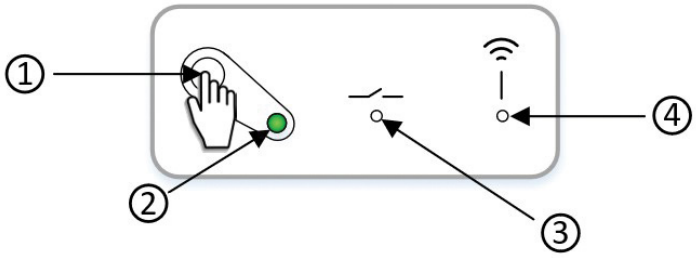


Figure 7-10: Relay Module status items

Linking a Controller to a Sub-Controller

When multiple Controllers are installed in a system, only one can be connected to a Communication Module. This unit is considered the Primary Controller. All other Controllers will connect to Antennas and are considered sub-Controllers.

Caution!

For thermostat information to appear on the Smatrix Pulse App or for Over The Air (OTA) updates to be installed and updated, all sub-Controllers will need to be linked to the Primary Controller.

Caution!

The Controller will time out after about 10 minutes of inactivity and revert to normal operation. The timer will be reset when a button is pressed or if a device has been Registered.

Caution!

If a Controller has been connected to a Communication Module, disconnect the Communication Module, and restore it to the sub-Controller state by performing a factory reset. Existing sub-Controllers in the system must then either reset system device Channel 01 or register to another Primary Controller.

To link a sub-Controller to a Primary Controller, use the following steps:

- Enter the pairing mode on the Primary Controller (one connected to the Communication Module). Press and hold the **OK** button on the Controller until the LED for the first available channel begins to flash red.
- Using the **‹** or **›** buttons, move the flashing LED from the channels to the power LED on the Controller and it will begin to flash red.
- Press the **OK** button.
- If done correctly, the LED for Channel 1 will begin to flash red, and the power LED will start flashing in a pattern (long flash, short flash, long flash, etc.).
- Repeat the steps for the sub-Controller to be paired with Primary Controller.
- Enter the pairing mode on the sub-Controller. Press and hold the **OK** button on the Controller until the LED for the first available channel begins to flash red.
- Using the **‹** or **›** buttons, move the flashing LED from the channels to the power LED on the Controller, and it will begin to flash red.

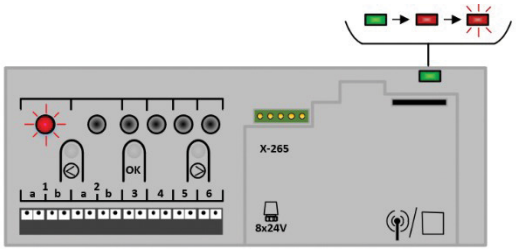


Figure 7-11: Pair a sub-Controller to a Primary Controller

- Press the **OK** button.
- If done correctly, the LED for Channel 1 will begin to flash red, and the power LED will start flashing in a pattern (long flash, short flash, long flash, etc.).
- Select Channel 1 and press **OK** to lock in the channel.
- Channel 1 LED on both the sub-Controllers turns solid green and the registration is complete. Channel 1 LED on the Primary Controller will continue to flash as additional sub-Controllers can be paired during this time.
- Exit the pairing mode by pressing **OK** for three (3) seconds on both controllers.

Note

The next sub-Controller can be registered within 10 minutes without the need to activate Channel 1 on the Primary Controller again. If the registration times out, the process can begin again without overwriting existing sub-Controller registrations.

Chapter 8:
Clearing Setup Information or Resetting Devices

It may be necessary during the installation process to clear portions of the setup and start over. The following section will take the user through the steps needed change the setup or restore the individual parts back to their original factory settings.

Controller

Note

When removing the link between devices (e.g., thermostats and Relay Module), Uponor recommends performing the unpairing process on both pieces of hardware.

Refer to the two options below to remove setup parameters on Controllers that were done incorrectly.

Unpairing a Channel

Use this process when a channel is incorrectly assigned to a thermostat.

- Enter the registration mode by pressing the **OK** button on the Controller for three (3) seconds. The first unassigned channel will begin to flash red.
- LEDs that are solid green are available to be unassigned.
- Using the **‹** or **›** buttons, move the flashing red LED to the channel you wish to remove. The LED will alternate between green and red.
- Press and hold the **‹** and **›** buttons for five (5) seconds.
- When the channel is unregistered, the LED will flash red.
- Press and hold the **OK** button on the Controller until the LEDs turn off. The Controller has returned to normal run mode.
- If unpairing a thermostat, Uponor recommends resetting this device as well.

Clearing All Setup Information

Refer to this procedure to clear all setup information and return the Controller to its factory, or default, state. This will remove links to all devices in the system: Controllers, Relay Modules, thermostats, etc.

Caution!

Resetting the Controller removes all registration information and settings. Registration of thermostats and system devices are once again required.

Caution!

If resetting a sub-Controller, all remaining sub-Controllers must be unregistered from the Primary Controller (system device Channel 1). Register the remaining sub-Controllers to the Primary Controller again when finished.

- Make sure the Controller is in run mode (green LED in upper-right hand corner of the Controller).
- Press and hold the **‹**, **OK**, and **›** buttons for approximately 10 seconds until the power LED flashes and all channel LEDs turn off.
- All parameters and settings are erased, and the Controller will return to run mode.

Removing a Paired Relay Module

- Press and hold the **OK** button on the Controller until the LED for the first available channel begins to flash red to enter the pairing mode on the Controller and the power LED will change from green (normal operation) to red (linking mode).
- Using the **‹** or **›** buttons, move the flashing LED from the channels to the power LED on the Controller, and it will begin to flash red.
- Press the **OK** button.
- If done correctly, the LED for Channel 1 will begin to flash red and the power LED will start flashing in a pattern (long flash, short flash, long flash, etc.).
- Press the **›** button to move to Channel 2 and this LED will begin to flash green.
- Press and hold the **‹**, **OK**, and **›** buttons for approximately 10 seconds until the power LED flashes and Channel 2 LED will turn off.
- Press and hold the **OK** button on the Controller until the power LED returns to green. The controller has returned to normal run mode.

Resetting the Communication Module

Note

Performing this function will not affect the Controller and thermostat-related settings.

This function resets the Communication Module to factory settings and is mostly used when transferring the installed system to a new owner. Some setup information will be reset, such as room names.

- Press the button for about 10 seconds until the function LED turns off.
- Release the button and the Communication Module reboots to factory settings.
- When the LED starts flashing red, unplug and plug in the controller to send installation data to the Communication Module.

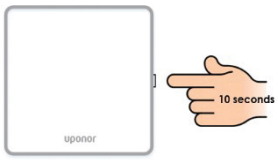


Figure 8-1: Resetting the Communication Module

Resetting the Relay Module

The following procedure will remove any pairing or reset to the factory (default) state.

- Press and hold the registration button (1) until all the LEDs on the Relay Module start flashing.
- Release the button (1) after all LEDs have turned off.
- The Relay Module has now cleared any registrations and is reset to factory values.

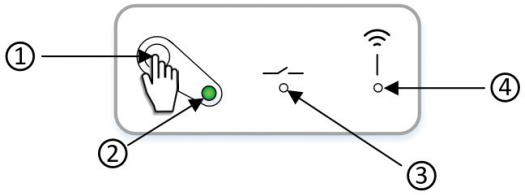


Figure 8-2: Resetting the Communication Module

Resetting the Digital Thermostat (T-169)

- Press and hold all three (3) buttons on the side of the thermostat for five (5) seconds
- The screen will go blank temporarily and restart showing the software version.
- Once this is complete, the screen will show the current room temperature.

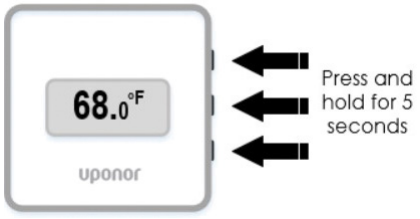


Figure 8-3: Resetting the Digital Thermostat (T-169)

Resetting the Mini Sensor (T-161)

- Remove the thermostat from the wall.
- Remove the battery.
- Press and hold the registration button on the back of the thermostat while re-inserting the battery.
- Release the button after 10 seconds when the LED begins to flash.

Finishing the Installation

Prior to making the system operational, perform a complete review of the installation.

- Ensure the thermostats are working and the batteries are installed. Turn thermostat setpoints to maximum to obtain a heating demand and make sure the actuators are opening.
- Set thermostats to the desired room set temperatures
- Close the covers of the Controller.
- Make sure all thermostats are in the room or space which they will control.
- Print and fill in the “Installation report” (separate downloadable document).
- Provide the manual QR code, app information, and the Installation Report to the end user.

Actuator Test Mode

During the final steps of the installation process, it may be necessary to test or cycle the actuators. Some actuators may ship in a semi-open state to allow easier installation on the manifolds. Failure to fully cycle the actuators could lead to overheating. To enter the Actuator Test Mode, use the following steps:

- Press the **›** button while in run mode (normal operation) to access the Actuator Test Mode. If not in run mode, press and hold the **OK** button for three (3) seconds to exit to run mode
- Select a channel using the **‹** and **›** buttons to move the pointer (LED flashes red) to the preferred channel.
- Press the **OK** button to activate the Actuator Test Mode for the selected actuator.
- To end the Actuator Test Mode, select the active channel and press the **OK** button.

Chapter 9:
System Operation

The Controller operates the underfloor heating/cooling installation according to customer needs. The user adjusts temperatures via thermostats located in each room, or if installed with the Smatrix Pulse App (which requires a Communication Module).

As soon as the temperature measured at a thermostat is lower (heating mode) or higher (cooling mode) than the setpoint temperature, it creates a demand to the Controller to change the room temperature. The Controller opens the actuators according to current operating mode and other settings. Once the thermostats signal that the set temperature is reached, this information is sent to the Controller, and the actuators are closed.

The system supports different types of cooling methods and is setup in the Smatrix Pulse App. Available cooling methods in the Smatrix Pulse App include:

- Underfloor cooling via hydronic radiant loops
- Fan coils or conventional forced-air heating and cooling equipment (connected to a relay module registered to a room thermostat)

Note

Be sure to disable Autobalancing (in Installer Settings) when air cooling or heating is installed and configured.

In rooms where radiant cooling is allowed and a fan coil is installed, radiant cooling is activated depending on the rate the temperature is rising in the room. Second-stage cooling (if installed) will activate based on the rate the room temperature is rising.

Refer to the Smatrix Pulse App for more information about these individual functions.

Normal Operation without using Schedules

When the system is running in normal mode:

- In **Heating** mode, the actuators are open when room temperatures are lower than the temperatures set on the thermostats.
- In **Cooling** mode, the actuators are open when room temperatures are higher than the temperatures set on the thermostats.

Note

If autobalancing is enabled, actuators could be closed during a demand.

Operation with Schedules

Scheduling programs provide an option to switch selected rooms between Comfort and ECO mode using a 7-day program. This optimizes the installation and conserves energy. When in the comfort mode, the rooms / thermostats will control room temperature based on the user defined set temperature. When in ECO mode, all zones or thermostats that are attached or assigned to a schedule, the set temperature will change based on the offset value, or ECO setback.

For example, if the ECO setback is set to 5, and the Comfort set temperature is 68°F, the new room temperature the system will control to is 63°F (68 – 5 = 63°F). In cooling mode, the ECO setback would be added to the cooling room set temperature.

Note

The Communication Module is required to access the Smatrix Pulse App to create and adjust schedules.

Controller LED Status

If not using the Smatrix Pulse App, Uponor recommends occasionally checking the power LED on the Controller for system status and alarms. The power LED flashes continuously for general alarms. Determine which thermostats are issuing alarms by removing the cover. If a channel LED is indicating an error, check the function and batteries of the registered thermostat.

Refer to the following information to determine the LED status of the power (A) and channel LEDs (B) depending on the mode of operation.

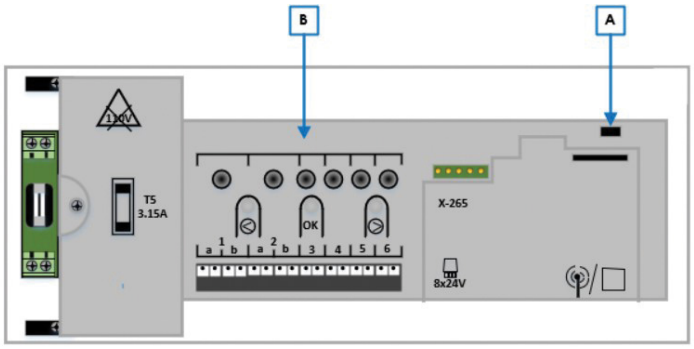


Figure 9-1: Controller LED locations

Controller LED Mode of Operation

Primary Controller					
	LED Status	Description	Run	Registration	Actuator Test
Power LED (A)		Dark (unlit)	No power	–	–
		Solid Green	Controller is powered on	–	Power is On
		Solid Red	–	Registration active for linking thermostats (first layer)	–
		Flashing Red	A problem has occurred (e.g., lost thermostat)	Registration active for linking Controllers or Relay Module (second layer)	–
		Slow Flashing Red	–	Registration ready to link Controllers (Channel 1 LED) or Relay Module (Channel 2 LED)	–
Channel LED(s) (B)		Dark (unlit)	No heating or cooling demand	Selector not pointed at the channel or not registered	Selector is not pointed at the channel or activated
		Solid Green	–	Thermostat is registered to the channel(s)	–
		Flashing Green	–	Channel is available and awaiting for thermostat registration	–
		Solid Red	Actuator is activated	–	The actuator is activated
		Flashing Red	Channel waiting to be activated or thermostat communication	–	Selector is pointed at the channel
		Flashing Green/Red	–	Selector is pointed at a channel that is already registered to a thermostat	–

Table 9-1: Controller LED mode of operation

Communication Module

Like the Controller(s), the Communication Module incorporates an LED that will provide feedback to the status of the Smatrix hardware connecting to the Cloud. Understanding the various colors of the status LED (A) on the Communication Module will be beneficial in troubleshooting issues with remote connectivity.

The following table shows the communication status based on the color and state of the LED (A).

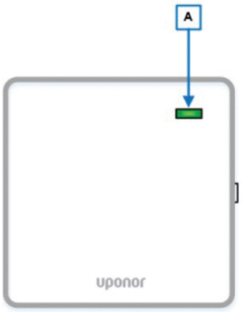


Figure 9-2: Communication Module LED location

Communication Module LED Mode of Operation

	LED Status	Description	Status
Status Indicator (A)		Solid Green	Communication Module cloud connected with the user account created and internet access
		Solid Orange	Wi-Fi (or Ethernet) connection is established to the router with no internet access (no user account created or there is a user account, but no internet access)
		Flashing Orange	The Access Point is open, connected, and communication available connecting phone/tablet via Wi-Fi.
		Solid Red	No connection to the router has been established
		Dark (unlit)	Power is off

Table 9-2: Communication Module LED mode of operation

Digital Thermostat (T-169) Operation

The following are the key parts of the Digital Thermostat (T-169).

Components

Reference	Description
A	Display
B	Buttons
C	Battery (CR 2032V)
D	Sensor terminals (non-polarity sensitive)

Table 9-3: Digital Thermostat (T-169) components

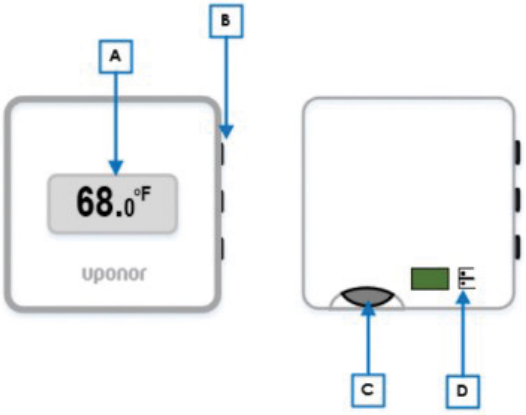


Figure 9-3: Operation components

Button Functions

Button	Function(s)
A	The ▲ and ▼ for the following functions: • Adjust setpoint temperature • Modify settings menu parameters
B	
C	The **OK** button is used to: • Toggle between the current status and the values of available sensors connected to the thermostat • Enter and exit the settings menu • Confirm a setting

Table 9-4: Digital Thermostat (T-169) button functions

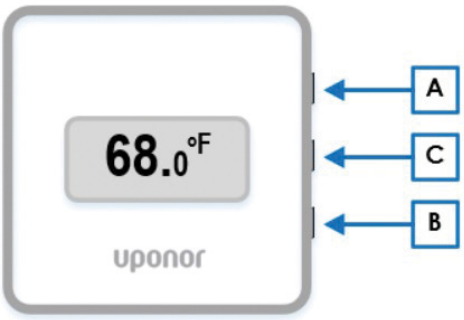


Figure 9-4: Button functions

Display Mode

Figure 9-5 shows the different symbol and characters that can be displayed when the thermostat is in the run mode.

Reference	Description
A	Room temperature
B	Temperature units (°F or °C)
C	Alarm warning

Table 9-5: Display mode

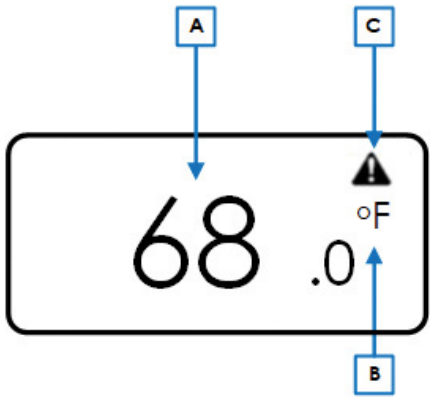


Figure 9-5: Display mode

Changing Temperature Settings

Figure 9-6 shows all the possible symbols and characters that can be shown on the display when changing the desired set temperature.

Reference	Icons	Description
A		Indicates changing the setpoint temperature
B	68	Room set temperature
C		Heating demand
		Cooling demand
D		Comfort mode
		ECO (setback) mode

Table 9-6: Changing temperature settings

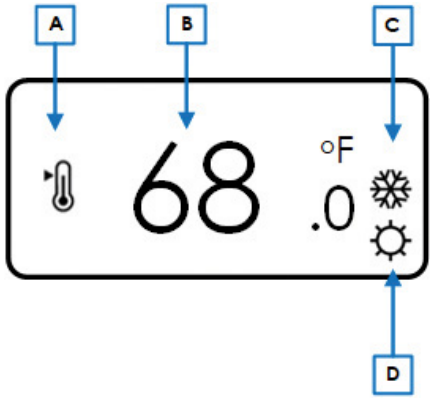


Figure 9-6: Changing temperature settings

Alarms

This figure shows all the possible symbols and characters that can be shown for an alarm on the display along with the cause/meaning.

Icons	Description
	Alarm mode (shown with the following:)
	Faulty indoor sensor
	Faulty floor sensor
	Faulty remote sensor
	Faulty outdoor sensor
	Low battery indicator
	Relative humidity high limit (only shown in cooling mode and if RH control is setup)
	Communication failure

Table 9-7: Alarms

Menus for Digital Thermostat (T-169)

This section shows all the setting options for operating the Digital Thermostat (T-169).

Note

If no button on the thermostat is pressed for about eight (8) seconds, while in a sub menu, the current values will be saved, and the software exits to the Settings menu. About 60 seconds later, it exits to run mode where the current room temperature is displayed.

To enter the Settings menu, use the following steps:

- Press and hold the **OK** button for about three (3) seconds.
- The settings icon and menu number are displayed in the top-right corner of the display.
- Use the **‹** or **›** button to change the numbers to locate a sub menu (see list below).

Menu #	Description
02	Heating/cooling changeover
03	ECO mode setback value
04	Control mode
05	High temperature floor limit
06	Low temperature floor limit
07	Cooling allowed
08	Display units
09	Relay Module integration
11	Room temperature calibration
12	Invert screen

Table 9-8: Digital Thermostat (T-169) menu descriptions

Menu 02: Heating/Cooling Changeover

This menu is not visible if the thermostat is registered to a Controller. Heating/cooling changeover will be controlled by a physical heating/cooling switch or in the Smatrix Pulse App (requires Communication Module).

Menu 03: ECO Mode Setback Value

Default value: 39°F (4°C)
Setting range: 32 – 52°F (0 – 11°C), 1°F (0.5°C) increments

This is the setback temperature for whenever the system is in ECO. The setting adjusts the current setpoint with the set value. In Heating mode, the setpoint is reduced, and in cooling mode it is increased. If the setback temperature is set to 0, the thermostat will remain unaffected if a program sets the system in ECO mode.

This menu is not visible if a Communication Module is connected to the system. The setting is then available in the Smatrix Pulse App.

Menu 04: Control Mode

This menu set the way an external sensor (if attached) is used (remote, outdoor, etc.). If an external sensor is connected to the thermostat, a control mode must be chosen to accommodate the extra functionality of the sensor. Current control mode options are Room Temperature **RT** (default), Room and Floor Temperature **RFT**, Remote Sensor **RS** or Room and Outdoor Sensor **RO**. Refer to the table below for available information based on the control mode selected.

	RT	RFT	RS	RO
				
Room temperature	✓	✓	✓	✓
Alarm (if active)	✓	✓	✓	✓
Floor temperature		✓		
Remote temperature			✓	
Outdoor temperature				✓
ECO/Comfort mode status	✓	✓	✓	✓
Active demand (heating or cooling)	✓	✓	✓	✓
Relative humidity	✓	✓	✓	✓

Table 9-9: Control Mode menu

Menu 05: High Floor Temperature Limitation

Default: 78°F (26°C)
Setting range: 38 – 95°F (20 – 35°C), 1°F (0.5°C) increments

Note

This parameter cannot be set lower than the set value in settings **Menu 06** (low floor temperature limitation).

In this menu, a limit on the highest allowable floor temperature is set. This menu is only visible if control mode RFT is activated in **Menu 04**. For systems with a Communication Module, this menu only shows the set value. Changes are done in the Smatrix Pulse App.

Menu 06: Low Floor Temperature Limitation

Default: 68°F (20°C)
Setting range: 50 - 86°F (10 – 30°C), 1°F (0.5°C) increments

Note

This parameter cannot be set higher than the set value in settings **Menu 05** High floor temperature limitation.

In this menu a limit on the lowest allowable floor temperature is set. This menu is only visible if control mode RFT is activated in **Menu 04**. For systems with a Communication Module, this menu only shows the set value. Changes are done in the Smatrix Pulse App.

Menu 07: Cooling Allowed

This menu sets whether a room will receive cooling or not. This menu is not visible if a Communication Module is connected to the system. The setting is then available in the Smatrix Pulse App.

Menu 08: Display Units

This menu sets the temperature information in °F or °C.

Menu 09: Relay Module Integration

Use this menu to link a thermostat to a Relay Module for controlling a forced-air heating and cooling system or fan coil unit.

Menu 11: Room Temperature Calibration

Default: 0.0
Setting range: -6.0 – 6.0, 0.1 increments

This menu adjusts the temperature in the display if there is a difference between the displayed versus the actual temperature.

Menu 12: Invert Screen

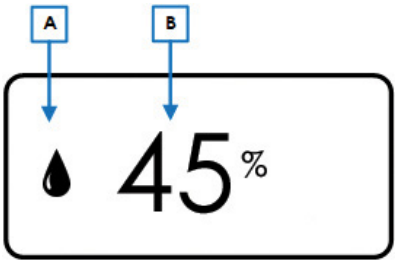
This menu inverts the color in the display. The background is black, and the numbers and icons are white.

Relative Humidity

The Digital Thermostat (T-169) also displays the relative humidity level in the room or space. Pressing the **OK** button three (3) times will display the following information:

Reference	Description
A	Relative humidity
B	Relative humidity reading

Table 9-10: Relative humidity displays



Mini Sensor (T-161) Operation

During normal operation, the thermostat settings and control is performed via the Uponor Smatrix App (requires the Communication Module).

Reference	Description
A	Status LED
B	Registration button
C	Battery CR2032
D	Terminals for external sensor

Table 9-11: Mini Sensor (T-161) components

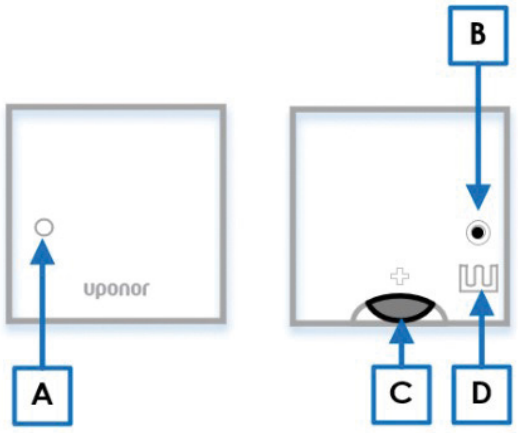


Figure 9-8: Mini Sensor (T-161) operation

Chapter 10:
Maintenance

Replacing Batteries

The Digital Thermostat (T-169) and Mini Sensor (T-161) both use a CR2032V battery to power the display, LED, and wireless communication. These batteries will need to be replaced throughout the life of the Smatrix Pulse system.

- The Digital Thermostat (T-169) will need a new battery when the low-battery icon appears on the display. This will also be displayed in the app.
- The Mini Sensor (T-161) will need a new battery when the LED flashes once every two hours. This will also be displayed in the app.

To replace the batteries:

1. Remove the thermostat from the wall.
2. On the back of the thermostat, there is a slot above the battery compartment to use a pointed object (pen, screwdriver, etc.) to remove the battery.
3. Replace the battery. Insert the new battery with the **+** side facing the back of the thermostat.

Software Updates

Users will be notified when an update is available through the Smatrix Pulse App. This may include system enhancements, app updates, or minor bug fixes. To ensure the highest level of operation, updates should be accepted and installed in a timely manner. History has shown that a high percentage of technical support calls could have been averted if the updates were accepted and installed. This only applies to systems that are connected to the Uponor Cloud, have internet access, and have an account created.

Caution!

It is important that all Controllers are operating with the same version of software. Open the Smatrix Pulse App and click the menu icon (three horizontal lines). Then, select System Settings, and then select System Information.

New versions of software will automatically download when available using Over The Air (OTA) updates. This file will download to the main controller (connected to the Communication Module) and distribute this to other controllers without interrupting system operation. Once the update is fully downloaded to all devices, the user/owner will receive a prompt on the app asking to install the update. Once this is accepted, installing the update will interrupt system operation for 5-10 minutes. Once completed, the system will return to normal operation based on the last mode (heating or cooling).

Alarms

If an alarm is triggered, it will be shown as an alert in the Smatrix Pulse App. Information about the alarm and possible solutions are presented in the app. If connected to Uponor Cloud services, the mobile phone will also receive the alarm as a push notification. Also see **Chapter 12: Troubleshooting** for additional information.

Chapter 11:
System Connectivity

The Smatrix Pulse system can connect to the Uponor Cloud in standard home networks via the mobile app. Due to security concerns, closed ports and firewalls will prevent Smatrix Pulse systems from connecting to the Uponor Cloud in office networks. Please review the list of requirements for both router settings and network requirements needed to successfully connect the Smatrix Pulse system to the Uponor Cloud.

Smatrix Pulse Mobile App

Available for download from the App Store or Google Play, the Smatrix Pulse App extends the flexibility and comfort of an Uponor radiant system by adding remote access to its range of possibilities.

Local access: When near the Communication Module (R-208), the radiant system provides direct access. There is no need for an Internet connection. However, for maximum ease, the system can be accessed via the Smatrix Pulse App.

Remote access: When away, the system can be accessed via the Smatrix Pulse App or website on a smartphone, tablet, or PC.

Router Requirements

- DHCP (IP address assignment) is activated in the router.
- Wi-Fi protected access is setup as WPA2-Personal or WPA/WPA2-Personal.
- Wi-Fi connectivity is set at 802.11 b/g/n @2.4Ghz.
- MAC address is not blocked.

Network Requirements

- Open network without network security.
- SSID is distributed and not hidden.
- Repeaters are turned off during the Uponor Cloud connection process, so the smartphone or tablet does not connect to the repeaters.
- Wi-Fi repeaters should use the same SSID and password of the main Wi-Fi.
- Once the user account is created and the system is connected to the Uponor Cloud, the repeaters can be switched on.

Note

The Communication Module can only communicate with the Wi-Fi router at the 2.4 GHz band. Make sure to connect to a SSID supporting 2.4 GHz or connect using an Ethernet cable. Mobile hotspot 2.4GHz is supported.

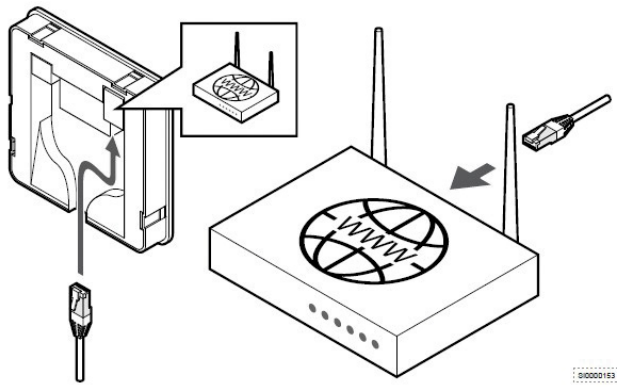


Figure 11-1: Network requirements

- The system requires a minimum signal strength of -60 dBm. For typical connections, two bars will indicate a signal strength in the -60 to -70 dBm range. However, be aware that the signal may not be strong enough for a stable connection. To get an exact dBm number for signal strength, see the technical bulletin for more information.

Network Connectivity

Note

Setting up a system with a Communication Module requires a mobile device (smartphone/ tablet).

Set up and connect the Controller (C) using the Uponor Smatrix Pulse App (A) and Communication Module (B) via multiple connection methods.

Direct Connection (no Wi-Fi)

For installing and setting up a system and during normal operation when there is no Wi-Fi network available, the Uponor Smatrix Pulse App (A) communicates with the room controller (C) via direct connection to the Communication Module (B). The sub-Controller (D) communicates via the Primary Controller (C).

Local Wi-Fi Connection

During normal operation when connected to the same local Wi-Fi network, the Uponor Smatrix Pulse App (A) communicates with the Controller (C) and the mobile device connects to the same Wi-Fi router (E) as the Communication Module (B). The Communication Module (B) and Wi-Fi router (E) connect using either Wi-Fi or Ethernet. The sub-Controller (D) communicates via the Primary Controller (C).

Remote Connection (outside local Wi-Fi network)

During normal operation outside the local Wi-Fi network, the Uponor Smatrix Pulse App (A) communicates with the Controller (C) via a remote connection. The mobile device connects to Uponor Cloud services (F) over internet (via local Wi-Fi or mobile network). Uponor Cloud services (F) connect to the Communication Module (B) via the Wi-Fi router (E). The Communication Module (B) and Wi-Fi router (E) are connected using either Wi-Fi or Ethernet. The sub-Controller (D) communicates via the Primary Controller (C).

Virtual Assistants (Amazon Alexa or Google Home)

Virtual assistants (G) communicate with the Controller (C) via an Application Programming Interface (API) to communicate with Uponor Cloud services (F). Uponor cloud services (F) connect to the Communication Module (B) via the Wi-Fi router (E). The Communication Module (B) and Wi-Fi router (E) are connected using either Wi-Fi or Ethernet. The sub-Controller (D) communicates via the Primary Controller (C).

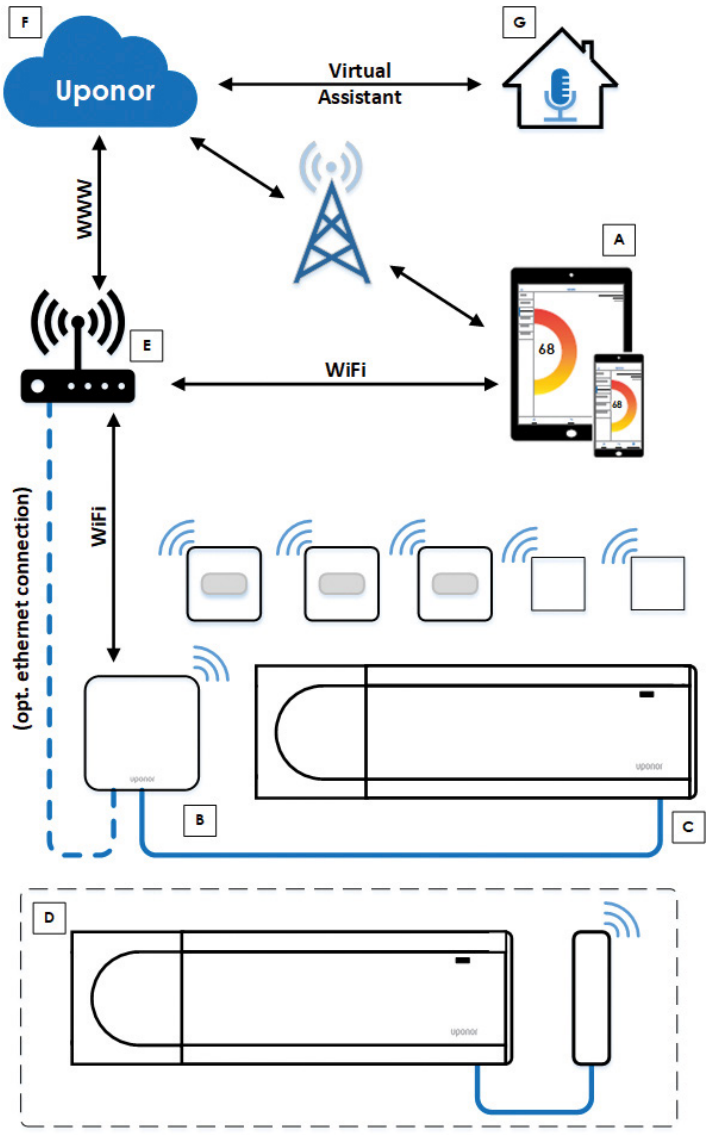


Figure 11-2: Network diagram

Chapter 12:
Troubleshooting

This section covers general issues and alarms that can occur with the Smatrix Pulse system, along with the cause and solutions. A common cause of a problem may be due to improperly installed loops or mixed up or incorrectly installed thermostats.

Alarms

Issue	Cause	Resolution
Reoccurring alarms	The antenna is installed inside a metal cabinet or too close to other shielding objects.	• Change the Antenna location. • If the problem persists, contact the installer.
	The Communication Module is installed inside a metal cabinet or too close to other shielding objects.	• Change the Communication Module location. • If the problem persists, contact the installer.
	Building structure is unfavorable for radio transmission.	• Change the Antenna location. • If the problem persists, contact the installer.
Radio transmission error icon is displayed in the alarm list	The transmitter is working with reduced signal intensity.	• Force the thermostat to transmit by changing the temperature setpoint. • Replace the thermostat.
	The Antenna is installed inside a metal cabinet or too close to other shielding objects.	• Change the Antenna location. • If the problem persists, contact the installer.
	The Communication Module is installed inside a metal cabinet or too close to other shielding objects.	• Change the Communication Module location. • If the problem persists, contact the installer.
	New installations in the building are shielding radio signals (for example, a metal door safe).	• Try to find a new position for the thermostat and/or the Antenna, or, if possible, move the shielding object.
	The transmitter in the thermostat is faulty.	• Force the thermostat to transmit by changing the temperature setpoint. • Replace the thermostat.
Relative humidity icon is displayed in the alarm list	The relative humidity limit is reached.	• Lower the humidity level by increasing the ventilation or activating a dehumidifier.
Floor temperature sensor icon is displayed in the alarm list	Incorrect thermostat control mode or temperature sensor not connected.	• Select the correct thermostat control mode in settings Menu 04.
	There is a faulty temperature sensor.	• Check the connection of the floor sensor. • Disconnect the temperature sensor and check it with an ohmmeter. Make sure the value aligns with the temperature sensor diagram.
Outdoor temperature sensor icon is displayed in the alarm list	Incorrect thermostat control mode or temperature sensor not connected.	• Select the correct thermostat control mode in settings Menu 04.
	There is a faulty temperature sensor.	• Check the connection of the outdoor sensor. • Disconnect the temperature sensor and check it with an ohmmeter. Make sure the value aligns with the temperature sensor diagram.
Indoor temperature sensor icon is displayed in the alarm list	There is a faulty temperature sensor.	• Contact the installer or replace the thermostat.
Remote temperature sensor icon is displayed in the alarm list	Incorrect thermostat control mode or temperature sensor not connected.	• Select the correct thermostat control mode in settings Menu 04.
	There is a faulty temperature sensor.	• Check the connection of the remote sensor. • Disconnect the temperature sensor and check it with an ohmmeter. Make sure the value aligns with the temperature sensor diagram.

Cloud Connectivity

Issue	Cause	Resolution
Connection error during setup	Incorrect Wi-Fi password	• Enter the correct password. • If unknown, reset the router.
	Poor signal strength	• Check that the Communication Module is mounted vertically. • Verify the signal strength meets the minimum requirements (< -60 dBM). • Disconnect any repeaters.
	Error creating user account	• If user account already exists, login and add the new installation. • Verify the smartphone or tablet is connected to the same network as the Communication Module. • Verify the network has internet access.
Communication error connecting to the Uponor Cloud **Important:** For all communication issues, use the Help Wizard in the Smatrix Pulse App to restore the connection	Internet locked down	• Verify network requirements.
	Wi-Fi password change	• Enter the new password.
	Router change	• Change the Uponor Cloud connection in the Smatrix Pulse App.
	No power to the router	• Restore power to the router.
	No power to the Smatrix Pulse hardware	• Restore power to the Smatrix Pulse hardware.

Communication

Issue	Cause	Resolution
No communication or receiving a communication error	Registration is lost between devices.	• Check the status of the Controller. • Contact the installer.
	Controller software versions are incompatible.	• Contact the installer. • Check the software versions of the controllers using the Smatrix Pulse App.
	The antenna is installed inside a metal cabinet or too close to other materials that will shield communication.	• Change the Antenna location. • If the problem persists, contact the installer.
	The thermostat or Relay Module is placed too far from the Communication Module or antenna.	• Change the location of the Communication Module/Antenna, thermostat, thermostatic head, and/or Relay Module. • If the problem persists, contact the installer.
Thermostat lost	The controller is having problems communicating with the thermostat.	Force the thermostat to transmit by changing the temperature setpoint. If the problem persists: • The thermostat is out of range. Try to find a new position for the thermostat and/or the Antenna, or, if possible, move any shielding objects. • New installations in the building are shielding radio signals (for example, a metal door safe). Try to find a new position for the thermostat and/or the Antenna, or, if possible, move the shielding object. • Low radio signal detected (sporadic communication with the connected unit). The transmitter is working with reduced signal intensity. • The transmitter in the thermostat is faulty. Replace the thermostat.
No floor temperature limit settings available for the room where the thermostat is registered (Digital Thermostat T-161 only)	No floor temperature sensor is connected to the thermostat.	1. Connect the floor temperature sensor to the thermostat. 2. Remove the battery from the thermostat. 3. Wait about 30 seconds. 4. Insert the battery again.
	More than one hour has passed between startup of the thermostat and the sensor being inserted.	1. Remove the battery from the thermostat. 2. Wait about 30 seconds. 3. Insert the battery again.
Controller lost (primary)	Communication failure with the controller. The controller LED is flashing red.	• Make sure the controller is powered on. • Make sure the cable between the Communication Module and the Controller is connected and not damaged. • Restart the Controller if a factory reset of the Communication Module was performed (unplug and plug in the Controller from the wall socket). • If none of the above actions remedy the situation, contact the installer.

Communication (continued)

Issue	Cause	Resolution
Controller lost (sub controller)	Communication failure with the controller.	• Make sure the controller is powered on. • Make sure the Antenna is connected to the Controller and not damaged. • Try registering the sub-Controller to the Primary Controller again. • If none of the above actions remedy the situation, contact the installer.
Communication error with Communication Module Software update failed	There is a communication error with the Communication Module. The controller LED is flashing red.	• Restart the Controller and Communication Module (unplug and plug in the Controller from the wall socket) and try again.
The Communication Module has lost communication with Uponor Cloud services. **Note:** This alarm will only be received as a push notification and/or SMS (if activated) to the mobile phone number registered to the customer account in Uponor Cloud services.	There is a communication error between the Communication Module and Uponor Cloud services. The Communication Module LED is fixed red, fixed orange, or flashing orange. Once the communication between the Communication Module and Uponor Cloud services is re-established, the communication module LED is fixed green.	• Make sure the Communication Module is connected to an internet-connected router, via either Wi-Fi or Ethernet. • Make sure the Communication Module is connected to the Controller. • Restart the router, if needed. • Restart the Controller and Communication Module, if needed (unplug and plug in the Controller from the wall socket). • Request help in the Smatrix Pulse App and follow the wizard to determine the root cause.
Software update failed	The Controller software update has failed.	• Make sure all sub-Controllers are within radio range and not shielded by any object. • Restart the Controller (power off and on again). • Contact the installer if the problem persists.
Relay Module lost	Communication failure with the Relay Module.	• Make sure the Relay Module is powered on. • Register the Relay Module again to the Primary Controller. • Contact the installer.
Communication Module does not power up	There is no power to the Communication Module.	• Check the communication cable between the Controller and Communication Module. Make sure it is connected properly. • Replace the communication cable, if needed. • Replace the Communication Module. • Contact the installer.
Bad Wi-Fi connection	The Communication Module loses connection with the Wi-Fi network.	• Connect the Communication Module to the local network using an Ethernet cable. • Refer to the Connect the Communication Module section in **Chapter 5: Installation** for information about connecting the Ethernet cable.

Controller

Issue	Cause	Resolution
Power indicator in the controller is off	There is no AC power to the Controller.	• Check that the Controller is connected to AC power. • Check the wiring in the 24V wiring compartment. • Check that there is 115V power at the wall outlet.
There is no power in the 115V wall outlet	A fuse is blown.	• Reset the circuit breaker or replace the fuse. • Correct the wiring issue.
	There is faulty power supply or connections.	• Replace the Transformer. • Correct the wiring issue inside the 24V wiring compartment.
Channel LEDs in the controller continue flashing	The thermostat is not correctly positioned.	• Check the placement of the thermostat so the signal is not shielded by another object.
	The Antenna is not correctly installed or positioned.	• Check the wiring and Antenna connection. • Make sure the Antenna is mounted in the vertical position.
	The Antenna is installed inside a metal cabinet or too close to other shielding objects.	• Change the Antenna location. • If the problem persists, contact the installer.
	The Communication Module is installed inside a metal cabinet or too close to other shielding objects.	• Change the Communication Module location. • If the problem persists, contact the installer.
Power LED and channel LED on the Controller flashes	The antenna is out of position, or a wire is disconnected.	• Install the Antenna in a correct position with the cable correctly connected.

Room Temperature

Issue	Cause	Resolution
Floor temperature is changing abnormally between hot and cold in heating mode	Supply water temperature is too high.	• Check the mixing control or boiler to verify the temperature is set correctly. • Run a supply diagnostic test from the Smatrix Pulse App.
Room temperature does not match setpoint on thermostat and actuators shut on/off on a fixed interval	Heating Protection function is activated due to lost communication with the thermostat.	• Check thermostat(s) connections. • Check batteries in the thermostat. • Check the Smatrix Pulse App for a thermostat communication error. • Reconnect the lost thermostat.
Room temperature does not match setpoint on thermostat	The thermostat is placed in direct sunlight or close to other heat sources.	• Check placement of the thermostat according to installation instructions and change location, if needed.
	The thermostat is placed in the wrong room.	
The room is too cold (or too warm in cooling mode)	Thermostat setpoint is too low.	• Change the temperature setpoint. • Use maximum and minimum settings in the Smatrix Pulse App to protect the system from consequences of unreasonable temperature settings.
The temperature displayed on the thermostat changes after the thermostat is moved	The thermostat may be influenced by an external heat source.	Change the location of the thermostat.
Installation report and Controller/channel numbering on the thermostat label do not match	The thermostats of individual rooms are incorrectly registered.	Place the thermostat in the correct room or change the thermostat registration in the controller.
All rooms are cold (or warm in cooling mode)	System is in ECO mode.	• Reduce the ECO setback value for the thermostat. • Reduce the General ECO setback value in the Smatrix Pulse App. • Change the ECO profile or assign another profile to the room. • Cancel ECO mode and change to Comfort.
	System is in the wrong operating mode.	• Set the system to correct mode of operation (heating or cooling).
	A mechanical device requires service.	• Call the installer. • Check the boiler and/or pump operation.

System

Issue	Cause	Resolution
Pump is turning on when there is no demand	The system is running the pump in "Exercise" mode.	• No action is required.
System not switching between Comfort and ECO mode	More than one Comfort/ECO switch is connected to the system (to the GPI).	• Select one GPI switch and uninstall the others (only one switch in the system is supported).
High supply temperature (This alarm only displays if Supply Diagnostics is enabled in the Smatrix Pulse App.)	The supply temperature is too high.	• Check the heat source or supply temperature controller to lower the supply temperature. • Contact the installer if the problem persists.
Low supply temperature (This alarm only displays if Supply Diagnostics is enabled in the Smatrix Pulse App.)	The supply temperature is too low.	• Check the heat source or supply temperature controller to increase the supply temperature. • Other potential causes may be too low flow on the supply line or a malfunctioning circulation pump. • Contact the installer if the problem persists.
Loop is warm even after an extended period without heat call	The actuator(s) are not closing.	• Contact the installer. • Check that the actuator is installed correctly. • Replace the actuator.
	The actuator(s) may still be in the initial factory default position (partially open).	• Adjust setpoint temporarily to maximum setting so the actuators fully open (channel LED is red) to deactivate the default position. • Manually cycle the actuator.
Low average temperature	Thermostat setpoints are too low.	• Increase the setpoints on the thermostats in the rooms where the average temperature is calculated.
	The supply temperature is too low.	• Check the heat source or supply temperature controller to increase the supply temperature. • Other possible causes may be too low flow on the supply line or a malfunctioning circulation pump. • Contact the installer if the problem persists.
	The average temperature limit is too low.	• Increase the average temperature limit.
	A window or door is open.	• Close any windows or doors that might affect the measured temperature.

Thermostat

Issue	Cause	Resolution
Setpoint temperature displayed in the room information menu is lower than the temperature set on the thermostat	Incorrect minimum/maximum limitation	• Change the minimum/maximum limitation in the Smatrix Pulse App.
The display for the Digital Thermostat (T-169) is not showing any information	The battery is discharged, or the wrong type of battery is used.	• Replace the battery (CR 2023V).
	The battery is installed incorrectly (reverse polarity).	• Install the battery correctly.
The LED on the Mini Sensor (T-161) flashes every two hours, or low battery alarm displayed in the Smatrix Pulse App	Thermostat battery power is running low.	• Replace the battery.
Thermostat battery level low	The thermostat battery power is running low.	• Replace the battery.
Low radio signal detected (sporadic communication with the connected unit)	The thermostat is out of range.	• Force the thermostat to transmit by changing the temperature setpoint.
	New installations in building shield radio signals (for example, a metal door safe).	• Try to find a new position for the thermostat and/or the Antenna, or, if possible, move the shielding object
	The transmitter is working with reduced signal intensity.	• Replace the thermostat.
	The transmitter in the thermostat faulty.	• Replace the thermostat.
Faulty temperature sensor	An error has been detected with the internal temperature sensor in the thermostat	• Replace the thermostat.
Faulty external temperature sensor	An error has been detected with the external sensor connected to the thermostat.	• Make sure the correct thermostat control mode in settings Menu 04 is set in the Digital Thermostat (T-169). • Check the connection of the external sensor. • Disconnect the external sensor and check it with an ohmmeter. Make sure the value aligns with the temperature sensor diagram. • If the error persists, replace the external sensor.
Faulty relative humidity sensor	An error has been detected with the internal relative humidity sensor in the thermostat.	• Replace the thermostat.
Relative humidity sensor limit	The relative humidity limit is reached.	• Lower the humidity level by starting a dehumidifier or increasing the supply temperature setpoint.

Chapter 13:
Technical Data

Thermostats	
Part numbers	A3800169 Digital Thermostat (T-169) A3800161 Mini Sensor (T-161)
IP	IP20, Class III (IP: degree of inaccessibility to active parts of the product and degree of water)
Maximum ambient RH (relative humidity)	85% at 68°F (20°C)
ERP	IV
Low voltage tests	EN 60730-1* and EN 60730-2-9***
EMC (electromagnetic compatibility requirements) tests	EN 60730-1 and EN 301-489-3
ERM (electromagnetic compatibility and radio spectrum matters) tests	EN 300 220-3
Power supply	1 x CR2032 3V
Voltage	2.4 V to 3.6 V
Rated impulse voltage	0.33 kV, OVC I
Pollution degree	2
Software class	A
Operating temperature	32°F to 113°F (0°C to 45°C)
Storage temperature	14°F to 149°F (-10°C to 65°C)
Radio frequency	912.0 MHz
Transmitter duty cycle	<1%
Connection terminals	18 - 24 AWG

Relay Module	
Part number	A3801263 Relay Module (M-263)
IP	IP20, Class II (IP: degree of inaccessibility to active parts of the product and degree of water)
Maximum ambient RH (relative humidity)	85% at 68°F (20°C)
ERP	IV
Low voltage tests	EN 60730-1* and EN 60730-2-1**
EMC (electromagnetic compatibility requirements) tests	EN 60730-1 and EN 301-489-3
ERM (electromagnetic compatibility and radio spectrum matters) tests	EN 300 220-3
Power supply	24VAC +10/-15%, 50 Hz or 60 Hz
Pollution degree	2
Software class	A
Operating temperature	32°F to 122°F (0°C to 50°C)
Storage temperature	-4°F to 158°F (-20°C to 70°C)
Radio frequency	912.0 MHz
Transmitter duty cycle	<1%
Relay outputs	24VAC +10/-15%, 2.5 A maximum Micro gap, normally open
Power connection	16" XM flexible cord connected to the Relay Module
Connection terminals	18 - 24 AWG

Antenna	
Part number	A3800265 Antenna (A-265) (replacement part)
IP	IP20, Class III (IP: degree of inaccessibility to active parts of the product and degree of water)
Maximum ambient RH (relative humidity)	85% at 68°F (20°C)
Power supply	From Controller
Radio frequency	912.0 MHz
Transmitter duty cycle	<1%
Receiver class	2

Communication Module	
Part number	A3801208 Communication Module (R-208) (replacement part)
IP	IP20, Class III (IP: degree of inaccessibility to active parts of the product and degree of water)
Maximum ambient RH (relative humidity)	85% at 68°F (20°C)
Low voltage tests	EN 60730-1* and EN 60730-2-9***
EMC (electromagnetic compatibility requirements) tests	EN 60730-1 and EN 301-489-3
ERM (electromagnetic compatibility and radio spectrum matters) tests	EN 300 220-3
Power supply	From Controller

Controllers	
Part number	A360265A Controller (X-265) with Antenna (A-265) A360265C Controller (X-265) with Communication Module R-208)
IP	IP20, Class II (IP: degree of inaccessibility to active parts of the product and degree of water)
Maximum ambient RH (relative humidity)	85% at 68°F (20°C)
Low voltage tests	EN 60730-1* and EN 60730-2-9***
EMC (electromagnetic compatibility requirements) tests	EN 60730-1 and EN 301-489-3
ERM (electromagnetic compatibility and radio spectrum matters) tests	EN 300 220-3
Power supply	115 VAC +10/-15%, 50 Hz or 60 Hz
Internal fuse	T5 F3.15AL 250 V, 5x20 3.15A quick acting
Rated impulse voltage	2.5 kV, OVC II
Pollution degree 2	2
Software class A	A
Operating temperature 0°C to +45°C	32°F to 113°F (0°C to 45°C)
Storage temperature -20°C to +70°C	-4°F to 158°F (-20°C to 70°C)
Maximum consumption	45 W
Pump and boiler relay outputs	24 VAC +10/-15%, 8 A maximum Micro gap, normally open
General purpose input (GPI)	Only dry contact
Valve outputs	24 VAC, 0.2 A average, 0.4 A peak
Power connection	XM flexible cord with plug, which is connected to the controller
Connection terminals for pump, GPI, and boiler	18 - 24 AWG
Connection terminals for valve outputs	18 - 24 AWG

* EN 60730-1 Automatic electrical controls for household and similar use -- Part 1: General requirements

** EN 60730-2-1 Automatic electrical controls for household and similar use -- Part 2-1: Particular requirements for electrical controls for electrical household appliances

*** EN 60730-2-9 Automatic electrical controls for household and similar use -- Part 2-9: Particular requirements for temperature sensing controls

Cables	Maximum Length	Wire Gauge/Type
Cable from Controller to antenna	16.4' (5 m)	CAT5e or CAT6, RJ 45 connector
Cable from Controller to Communication Module	16.4' (5 m)	CAT5e or CAT6, RJ 45 connector
Cable from Controller to actuator	65' (20 m)	18 - 24 AWG
External sensor cable to thermostat	16.4' (5 m)	18 - 24 AWG
Floor sensor cable to thermostat	16.4' (5 m)	18 - 24 AWG
Outdoor sensor cable to thermostat	16.4' (5 m)	18 - 24 AWG, twisted pair
Cable from relay switch to Controller GPI input	65' (20 m)	18 - 24 AWG

Product Dimensions

Controller (X-265)

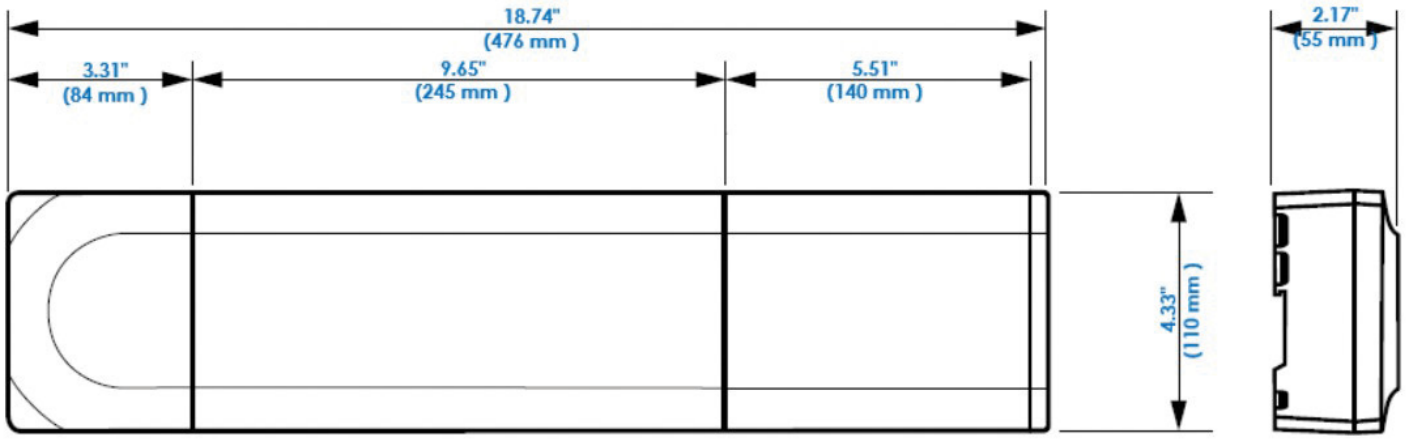


Figure 13-1: Controller (X-265)

Communication Module (R-208)

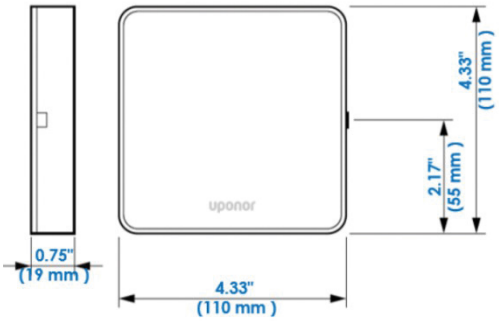


Figure 13-2: Communication Module (R-208)

Digital Thermostat (T-169)

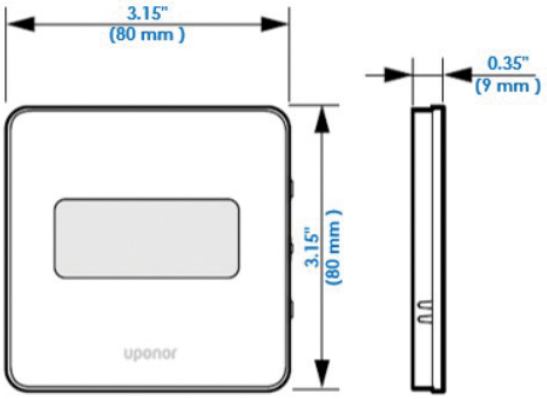


Figure 13-3: Digital Thermostat (T-169)

Mini Sensor (T-161)

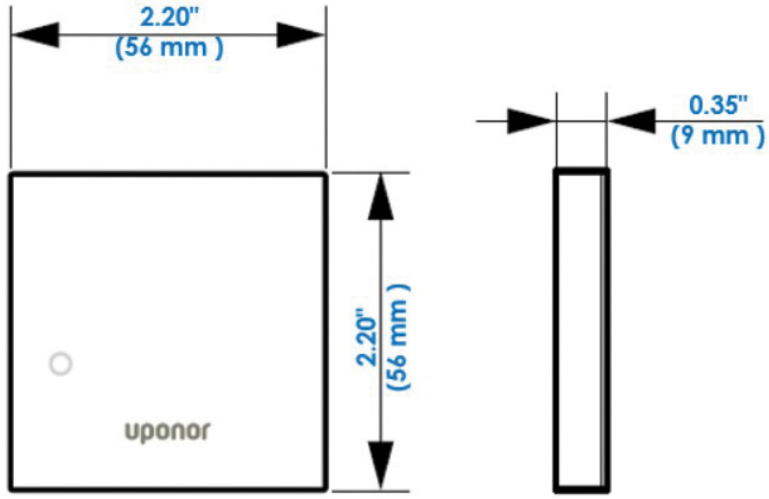


Figure 13-4: Mini Sensor (T-161)

Temperature vs. Resistance

Temperature		Resistance
°F	°C	Ω
-50	-46	490,813
-45	-43	405,710
-40	-40	336,606
-35	-37	280,279
-30	-34	234,196
-25	-32	196,358
-20	-29	165,180
-15	-26	139,402
-10	-23	118,018
-5	-21	100,221
0	-18	85,362
5	-15	72,918
10	-12	62,465
15	-9	53,658
20	-7	46,218
25	-4	39,913
30	-1	34,558
35	2	29,996
40	4	26,099
45	7	22,763
50	10	19,900
55	13	17,436
60	16	15,311
65	18	13,474
70	21	11,883
75	24	10,501
80	27	9,299
85	29	8,250

Temperature		Resistance
°F	°C	Ω
90	32	7,334
95	35	6,532
100	36	5,828
105	41	5,210
110	43	4,665
115	46	4,184
120	49	3,760
125	52	3,383
130	54	3,050
135	57	2,754
140	60	2,490
145	63	2,255
150	66	2,045
155	68	1,857
160	71	1,689
165	74	1,538
170	77	1,403
175	79	1,281
180	82	1,172
185	85	1,073
190	88	983
195	91	903
200	93	829
205	96	763
210	99	703
215	102	648
220	104	598
225	107	553

Notes

Notes

Moving
> Water

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