

BASEBOARD CONTROLLER MODULE INSTALLATION GUIDE



Overview

This guide covers model number ERM-FBU equipped with a 902 MHz radio.

The ERM-FBU baseboard controller is intended for indoor use only.

The baseboard controller uses wireless technology to monitor a room's state eliminating sensor wiring normally required for temperature control applications. Wireless energy harvesting sensors monitor temperature, room occupancy and window or patio door state to provide feedback to the controller on the appropriate operating mode. This translates into more consistent and comfortable temperature control for occupants with energy saving and allows a quick retrofit project for building operators.

Temperature Control Operation

The controller operates with electric baseboard heaters, controlling when the baseboard is active to maintain a consistent temperature in the room based on the temperature set point.

Room temperature is provided by a wireless wall mount temperature sensor with an optional set point knob. Adjustment of the room temperature set point is much easier on a wall sensor eliminating an occupant having to crouch down to access a knob on the heater. For larger rooms, adding additional temperature sensors for averaging temperature control is easy.

Room occupancy state also has an effect on controller operation. A wireless occupancy sensor provides updates on the room occupancy so the heater is not outputting the same heat when vacant. A proximity switch can also indicate when a window or patio door has been left open so the heater is not trying to heat the outdoors.

Baseboard heaters in hospitality applications can use keycard switches which allows an occupant to use the front door keycard to indicate when they're in the suite.

All the switches and sensors implement energy harvesting and do not require any wires. This permits a quick installation so adding automated temperature control becomes much easier.

Normal Operating Mode

Normal operating mode is the controllers default sequence of operation. The controller will try to maintain a temperature defined by the base temperature set point, default 20C°/68F°. If a temperature sensor that includes a set point adjustment has been linked, then the user adjusted set point value is added or subtracted from the base set point to derive the operating set point per the equation below. The full scale of the set point is $\pm 3\text{C}^\circ/5\text{F}^\circ$, $6\text{C}^\circ/10\text{F}^\circ$ total. Both the base set point and set point range can be changed using the Garibaldi configuration software.

$$\text{Operating Set Point} = \text{Base Set Point} \pm \text{User Adjusted Set Point}$$

The controller will operate in normal operating temperature control mode when:

- Condition 1. Only temperature sensor(s) are linked to the controller.
- Condition 2. Condition 1 plus an occupancy sensor is linked and the room is occupied.
- Condition 3. Condition 1 plus a keycard switch is linked and the room key is in the keycard switch.
- Condition 4. Conditions 1, 2, or 3 plus a window or patio door proximity switch are linked and the switch is in the closed state.

Setback Operating Mode

Setback mode is an energy saving operating mode. When the controller is in this mode, the operating set point is lowered per the equation below.

$$\text{Operating Set Point} = \text{Base Set Point} \pm \text{User Adjusted Set Point} - \text{Set Back Value}$$

The setback values for the occupancy sensor or keycard switch and the proximity switch are configurable values that can be changed using Garibaldi software.

The controller operates in setback mode when:

1. The room is unoccupied indicated by a linked occupancy sensor
2. The room is unoccupied indicated by a linked keycard switch
3. A linked window or patio door switch is open.

Occupancy Sensor Application

A linked occupancy sensor will monitor the room occupancy state and transmit to the controller. If the room is vacant and becomes occupied, the sensor will transmit the occupancy state immediately. If the room is occupied and becomes vacant, a timer will count down and when expired, the controller will enter into setback mode. The timer default is a 15 minutes. This value can be changed using the Garibaldi configuration software or Simple Tap.

When multiple sensors are linked to one controller, if any sensor indicates occupancy, the controller will remain in normal operating mode. All sensors must report vacancy before the controller enters into setback mode.

Keycard Application

The keycard switch is common in hospitality applications for indicating when the room is occupied by a guest. The keycard used to unlock the door is inserted into the switch, the controller receives the update and enters into normal operating mode. When the guest leaves and the card is removed from the switch, a timer will expire and the controller will operate in setback mode. The timer default is 30 seconds. This value can be changed using the Garibaldi configuration software.

When multiple keycards are used with one controller and any switch is active with a card inserted then the controller will remain in normal operating mode. All linked switches must be inactive before the controller enters setback mode.

NOTE: When linking a keycard to the controller, activate the switch three times in succession with the controller in LEARN mode.

Window Switch or Patio Door Application

The window/door switch is a proximity (reed) switch that can be mounted on windows or patio doors to monitor when they are left open. As with the occupancy sensor and keycard switch, once the switch is open a timer will count down and when expired, the controller will enter into setback mode. The timer default is a 30 seconds. This value can be changed using the Garibaldi configuration software or Simple Tap.

NOTE: Using the switch in this application, link the switch to the controller with the magnet apart from the switch.

Room Occupancy State Latch Application

The proximity switch can be used on an entry door to trigger a door open-close event. Used together with a linked wireless occupancy sensor, the door event triggers a latch of the room occupancy state. The controller will latch the room occupancy state once the trigger has been reset and the sensor transmits the room state.

After the room has been latched as occupied, only another door event can clear the latched state. If the room is latched vacant and an occupied telegram is received from the sensor, the room state will latch occupied.

This is an alternate solution to the keycard application for dormitory or hospitality projects for defining room occupancy state.

NOTE: To learn the door switch as an entry door occupancy trigger, link the switch to the controller with the magnet in place next to the switch.

Using Central Commands

The base board controller supports switching and basic set point central commands. The centralized control device or gateway where the command originates must be linked to the controller.

Switching command: This command engages the controller relay open or closed. If the lock bit is set, the command will override any linked devices to the controller for the time period defined within the command. If the lock bit is cleared and the time period is 0 seconds, the command clears the override and the controller will reset to the last state before the override.

Set Point command: This command overwrites the basic set point value in the controller. It can be combined with a switching command to provide lock and time period features.

Contact Echoflex for more information on the use of central commands.

Radio Range Confirmation

The base board controllers includes patent pending technology that interfaces with specific sensors to indicate the radio strength of the sensor signal received at the controller.

To evaluate the radio signal strength, the sensor must also support the test and be linked to the controller. Do not have any repeaters in the controllers vicinity enabled during the test.

Sensors supporting the radio range confirmation test include:

- Occupancy sensors - All Echoflex occupancy sensors

- Window/Door switches - all MC-21 models

The range confirmation test is invoked at the sensor and sends unique telegrams to the controller. The controller will evaluate the signal strength from the sensor and send back a unique telegram containing the strongest signal value received. This value is displayed at the sensor using color LEDs.

Consult the sensor installation guide for more details.

Preparing to Install the Controller

The controller is mounted inside the electrical base board heater. The controller must be mounted where the line voltage wires enter the base board housing, at one end of the heater away from the heating element.

The controller is for indoor use only.

You will require hand tools to gain access to the electrical connections inside the heater. Remove the cover plate or other hardware to expose the wiring.

IMPORTANT SAFETY INSTRUCTIONS

WARNING:

ELECTRICAL SHOCK HAZARD - THE CONTROLLER USES HIGH VOLTAGE AND SHOULD ONLY BE INSTALLED BY A QUALIFIED INSTALLER OR ELECTRICIAN. FOLLOW ALL APPLICABLE ELECTRICAL CODES IN THE COUNTRY OF INSTALLATION. FOR INDOOR USE ONLY.

Installing the Controller

Review these instructions completely before installing the controller. Consult your electrical code requirements.

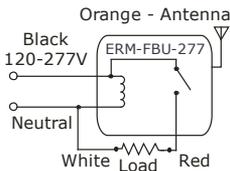


1. Locate the circuit breaker panel and turn off the power to the heater.
2. Remove the baseboard cover or faceplate and other hardware so you can access the high voltage wires.
3. The controller is mounted inside the heater. Try to locate the controller as far away from the heating element as possible.
4. Refer to the wiring diagram to connect the controller to the line power, neutral and load wires. Use wire nuts on all connections and cap any bare wires.
5. Restore power to the circuit.
6. Refer to the section in this guide titled LEARN Button to assign sensors to the controller.
7. Replace the baseboard cover or faceplate.

Wiring Instructions

Power to the controller is connected between the White (Neutral) and the Black (120V-277V) Line power. The controller has an orange external antenna. Do not cut, cap or connect this wire.

Use only approved wire. Cap off all unused wires except the antenna wire.



Connection	Color	Specification
LOAD	Red	14AWG, 600V
Neutral	White	18AWG
Line 120-277VAC	Black	14AWG, 600V

Diagnostic LED's and buttons

LEARN button

The LEARN button is used to link switches or sensors to the controller.

1. Press the button marked LEARN for a half second. In link mode the green LEARN LED will stay ON and the red POWER LED will toggle every 2 seconds.
2. Press the sensors TEACH button. The LEARN LED will remain lit for 4 seconds while it links the new device. It will resume toggling allowing you to link another device up to a total of 20 devices.

NOTE: Linking a switch or sensor that is already linked to a controller, will remove or un-link it from the controller.

3. To exit link mode, press the LEARN button on the controller again for a half

second. Link mode will also time out after no activity in 30 seconds.

CLEAR button

The CLEAR button erases all devices linked to the controller and resets the controller to default settings.

1. Press the CLEAR button (approximately 5 seconds) until the green LEARN blinks on.

LED Blink Codes and Operation

The table below describes the LED activity & associated mode of the controller.

Description	Learn LED	Power LED	Relay
LINK mode	ON	Toggle 2 sec.	Toggle
Storing ID	ON	ON 4 sec.	ON 4 seconds
Clearing ID	ON	OFF 4 sec.	OFF 4 seconds
CLEAR mode	ON 1 Sec	N/A	ON 1 second

Configuring the Controller

There are a few methods of configuring parameters in the controller. Simple Tap is a quick method of changing a parameters setting, one at a time. For accessing the complete set of configuration parameters, use the Garibaldi commissioning software, not covered in this guide.

Description	Learn LED	Power LED
Factory Default	OFF	ON Solid
Temperature value	OFF	1 long blink followed by short blinks counting sensors repeatedly
Occupancy sensor(s)	OFF	2 long blinks followed by short blinks counting sensors repeatedly
Temperature set point	OFF	3 long blinks followed by short blinks counting sensors repeatedly
Keycard switch	OFF	4 long blinks followed by short blinks counting switches repeatedly
Door switch	OFF	5 long blinks followed by short blinks counting switches repeatedly
Entry door trigger	OFF	6 long blinks followed by short blinks counting switches repeatedly
Central command	OFF	7 long blinks followed by short blinks counting devices repeatedly

Simple Tap Instructions

Simple Tap uses the sensors that are linked to the controller to set the associated configuration parameters. You must be able to access the sensors teach button to perform the simple tap process.

Simple Tap allows you to:

- Adjust the occupancy sensor timer

- Adjust the window switch timer
- Adjust the base temperature set point

Adjust the Occupancy Sensor Timer

Tap the occupancy sensors TEACH button to reset the timer period. There are 6 possible settings and the number of taps on the button counts the number according to the time period, see the table below. Level 1 (time out 0 seconds - demo mode) is set by tapping 3 times, consecutive taps up to a maximum of 8 taps is Level 6 (time out 25 minutes). The relay/light will blink once on the third tap and then begin counting the level set after 3 seconds.

Taps	Occ. Sensor Timer	Light Blinks
3 taps*	0 Sec.	1 blink
4 taps	5 min.	2 blinks
5 taps	10 min.	3 blinks
6 taps	15 min. - Default	4 blinks
7 taps	20 min.	5 blinks
8 taps	25 min.	6 blinks

* for demonstration purposes only

Once the relay has completed responding by counting the level set, press the TEACH button on the sensor once more to confirm and exit Simple Tap.

Adjust the Window/Door Switch Timer

Tap the window/door switches TEACH button to reset the timer period. There are 6 possible settings and the number of taps on the button counts the number according to the time period, see the table below. Level 1 (time out = 0 seconds) is set by tapping 3 times, consecutive taps up to a maximum of 8 taps is Level 6 (time out 2.5 minutes).The relay/light will blink once on the third tap and then begin counting the level set after 3 seconds.

Adjusting the Base Set Point Value

Tap the linked temperature sensors TEACH button to set the base set point value of the controller. There are 7 possible settings and the number of taps on the button moves down the table above. Level 1 (base set point = 19°C) is set by tapping 3 times, consecutive taps up to a maximum of 9 taps is Level 7 (base set point = 23°C).The relay/light will blink once on the third tap and then begin counting the level set after 3 seconds.

Taps	Door Switch Timer	Light Blinks	Taps	Temperature	Light Blinks
3 taps*	0 Sec.	1 blink	3 taps*	19	1 blink
4 taps	30 sec.	2 blinks	4 taps	20	2 blinks
5 taps	1 min.	3 blinks	5 taps	20.5	3 blinks
6 taps	1.5 min. - Default	4 blinks	6 taps	21	4 blinks
7 taps	2 min.	5 blinks	7 taps	21.5	5 blinks
8 taps	2.5 min.	6 blinks	8 taps	22	6 blinks
			9 taps	23	7 blinks

Status Telegram

The controller can broadcast a status telegram per EEP A5-11-01. The telegram will broadcast every 100 seconds. The status telegram can be enabled/disabled by accessing the controller buttons.

1. Press the Learn button and hold, press the Clear button once to disable, twice to enable (this sends the learn telegram).
2. Release the Learn button. The learn LED will blink once when disabling, twice when enabling this telegram.

Repeater Function

Repeats any telegram within range. The repeater function can be enabled/disabled by accessing the controller buttons.

1. Press the Clear button and hold then quickly press the Learn button once to disable, twice to enable single hop and three times to enable dual hop repeating. The learn LED will blink the corresponding value of the button press.
2. Release the Clear button.

THIS CONCLUDES THE CONFIGURATION DIRECTIONS FOR THE CONTROLLER

Default Settings for Controller

Repeater	Disabled
Status	Disabled

Time-outs

Motion Sensor	15 minutes
Keycard Switch	30 seconds
Window Switch	30 seconds

Listings and Certifications

ETL Listed Component
Conforms to UL Standard 508
Certified to CAN/CSA Std. C22.2 No.14

FCC and IC Certifications

Contains FCC ID: SZV-TCM320U

The enclosed device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (i.) this device may not cause harmful interference and
- (ii.) this device must accept any interference received, including interference that may cause undesired operation.

IC RSS-210

Contains IC: 5713A-TCM320U



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