



DIGI-LUX™ Electronic Thermostat / Regulator

Installation & Operation Manual

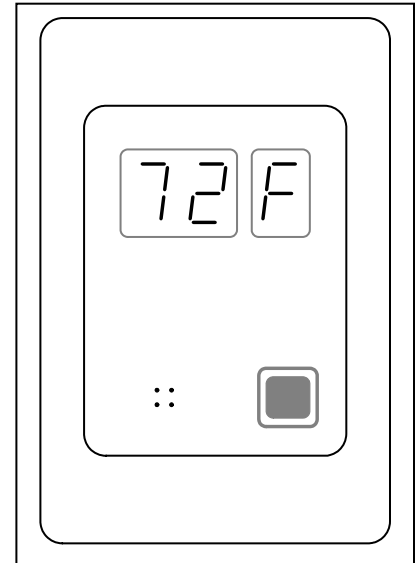
Physical Description

The DIGI-LUX Electronic Thermostat / Regulator is a zone control device specially designed for use with the STEP Warmfloor™ radiant heat system. The DIGI-LUX provides a pulsed output that complements the self-regulating nature of the STEP Warmfloor™ heating elements to offer the homeowner the highest energy efficiency while providing better zoned control over personal comfort.

The DIGI-LUX consists of two pieces (See Figure A):

Thermostat The thermostat is the operator interface for the DIGI-LUX. It is designed to be flush wall mounted in a place that will be most representative of the zone it controls. The thermostat consists of a digital display that indicates the measured air temperature, a button for changing the control set point and the air temperature sensor. Air temperature is measured every 12-15 min. by the thermostat's microprocessor, which determines the amount of pulsing (system on/off) needed for each subsequent interval. This signal controls the regulator, and switches the regulator on/off as needed.

Regulator The regulator is an intelligent switch that enables/disables the line voltage in such a way that switching/pulsing does not harm the transformer(s). It is designed to be surface mounted adjacent to the transformer(s) that it pulses. The regulator consists of a printed circuit board mounted inside of a junction box w/ heat sink. Each regulator is designed to handle up to 2,500W of load.



The thermostat and regulator are connected together using a 20 foot length of 4 conductor cable that is supplied with each regulator. For control of a zone with a load larger than 2,500W, up to 4 regulators can be connected to one thermostat for a total controlled load of 10,000W.

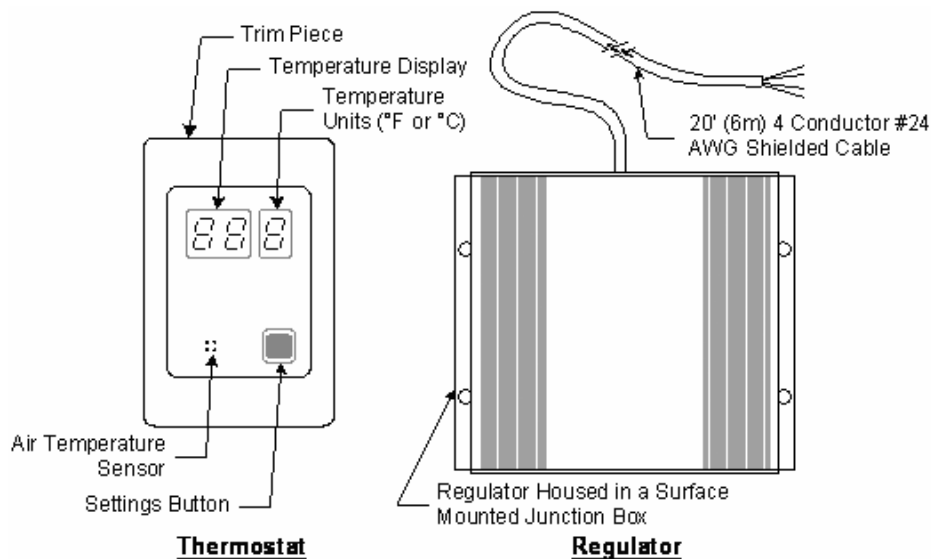


Figure A
Front view of the DIGI-LUX Thermostat and Regulator

Operational Description

The DIGI-LUX is not an on/off control device typical of thermostats used with household heating systems. The DIGI-LUX is designed to pulse the supply voltage to the STEP Warmfloor™ radiant heat system to help closely match the system heat output with the heating needs for that zone and to prevent temperature overshoot typical with other heating systems. This pulsing operation provides you with the maximum level of energy efficiency and highest level of personal comfort possible.

The pulsing operation of the DIGI-LUX is based upon the users programmed set point and the measured ambient temperature. If the ambient temperature is below the set point, the DIGI-LUX will pulse the STEP Warmfloor™ system on to heat up the zone. As the zone temperature begins to approach the programmed set point, the DIGI-LUX will pulse the system on for shorter time periods. Refer to Figure B for a representation of the pulsing operation of the DIGI-LUX.

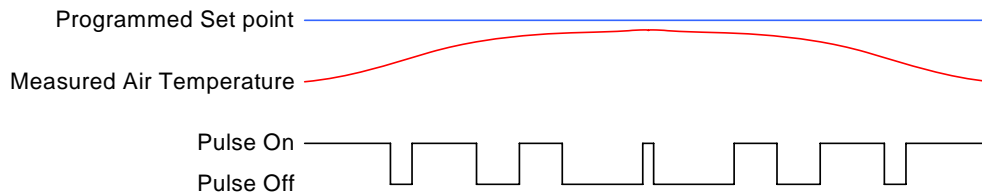


Figure B
DIGI-LUX Pulsing Characteristics

The high energy efficiencies achieved with a STEP Warmfloor™ system controlled by a DIGI-LUX is due to the continuous pulsing operation of the system. This continuous pulsing allows the system to continuously add the right amount of heat to maintain a constant and comfortable environment. With a traditional forced air on/off controlled heat system, the system is on and off for long durations requiring significant heat input each time the thermostat calls for heat. This results in a variable and drafty environment with low energy efficiencies compared to radiant heat.

This pulsing operation of the STEP Warmfloor™ system is designed to prevent overheating of the zone. Also, this pulsing operation prevents the zones air temperature from reaching the programmed set point. The zones maximum air temperature will be a few degrees below the programmed set point as is represented above in Figure B. Adjusting the set point up a few degrees higher than the desired air temperature will compensate for this difference. It is intended that the maximum zone temperature is a few degrees below the set point to prevent the DIGI-LUX from de-energizing the STEP Warmfloor™ system for a long time duration, resulting in a significant drop in radiant energy into the zone and a drop in system efficiency. The DIGI-LUX maximizes the efficiency of the STEP Warmfloor™ system by only requiring the system to gently replace the heat that is lost from the zone.

Important Note for Floor Warming Systems: The DIGI-LUX is designed for total heating applications and only calls for the amount of heat necessary to heat the space. Consequently, the floor may not feel noticeably warm to the touch. If a DIGI-LUX is used to control a floor warming system, it may be necessary to program the DIGI-LUX set point to a temperature that is at least 3 to 5°F higher than the set point on your primary heat system thermostat to prevent your primary heat system from de-energizing the floor warming system for long durations.

Installation

The process of installing the DIGI-LUX involves preplanning of mounting locations and roughing in of the necessary hardware. The installation of the DIGI-LUX typically occurs during new construction or a remodel project where access to the walls is possible for the rough in work. If access to the walls is not possible, as during some remodel projects, the DIGI-LUX installation may require the use of surface mounted raceway products such as those manufactured by Wiremold® (www.wiremold.com).

Plan mounting locations

Thermostat – Locate the thermostat approximately 60" off the floor in a location that is most representative of the zone that it controls. Do not install where exposed to direct sunlight or drafts.

Regulator – The regulator is typically located adjacent to the low-voltage transformer(s) that it controls. The regulator, along with the transformer(s), are air cooled devices and need to be mounted in a well ventilated area.

Rough in

The thermostat is designed to be flush mounted on a single gang junction box. Install such a box at the desired mounting location.

The regulator is supplied mounted to the cover in a surface mounted junction box. Remove the cover with the regulator attached and mount the supplied junction box at the desired mounting location.

Install the supplied 4-conductor cable between the thermostat junction box and the regulator junction box. The cable can be installed in the wall without the use of conduit as it only carries a low voltage signal. If the cable is not long enough, acquire a suitable length of an equivalent cable sufficient to run the full length between the boxes. Do not splice the cable – only use a full new length. If an additional regulator will be connected, install the supplied 4-conductor cable between the regulators.

Regulator

Connect the line voltage wires from the service panel and the transformer(s) to the regulator as shown in Figure C. Use solid or low strand count wire as typically found in NM cable. Terminate the 4-conductor cable to the regulator ensuring that the drain wire from the shield is connected to the line voltage ground. Push the excess wire and cable into the box and install the cover.

Repeat the same process for each additional regulator connected to the same thermostat using the wiring diagram in Figure C.

Thermostat

Terminate the 4-conductor cable to the thermostat as shown in Figure C. Trim back the shield flush with the outer cable jacket and do not ground the drain wire at the thermostat. Only ground the drain wire at the regulator. Remove the trim piece from the Thermostat to expose the mounting holes. Push the excess cable into the box and install the Thermostat using the screws provided. Reinstall the trim piece over the Thermostat.

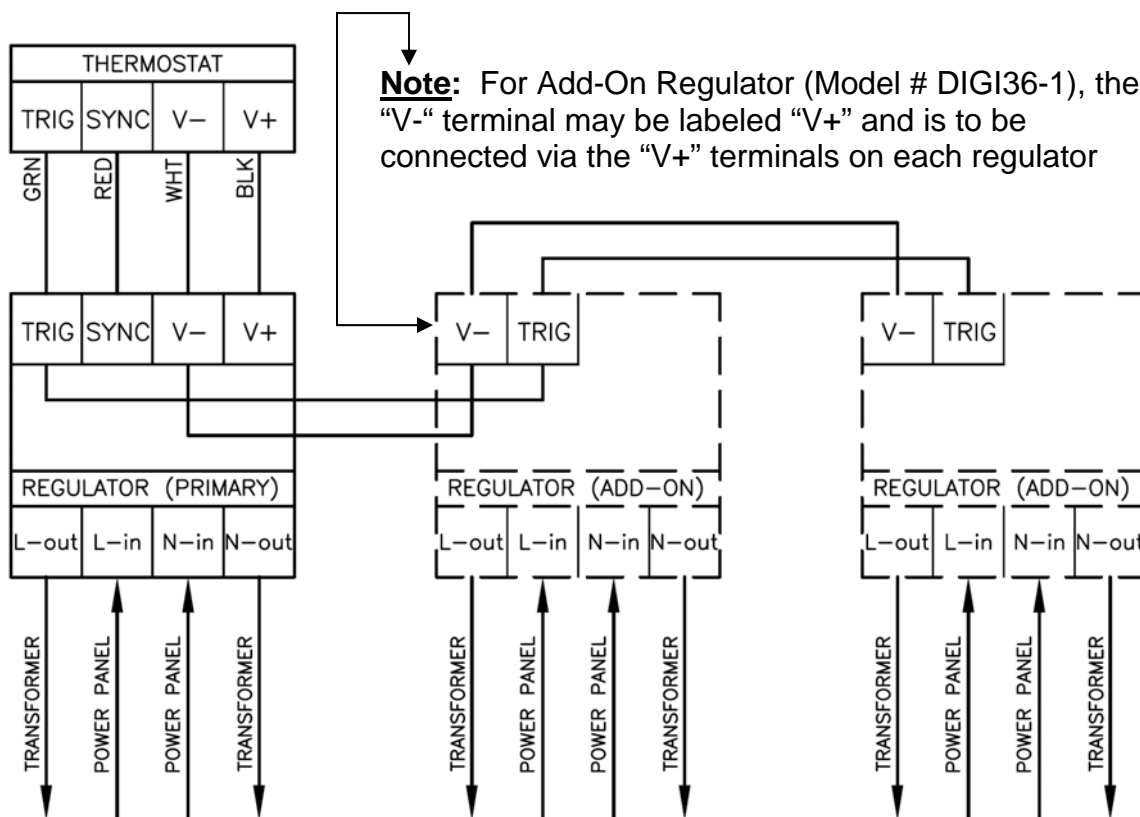


Figure C
DIGI-LUX Wiring Diagram

Operation

Normal Operation	The DIGI-LUX digital display indicates the measured room temperature during normal operation.
Set-point change	The set-point is modified by using the Settings Button (See Figure A) located on the thermostat faceplate. The first press of the Settings Button will cause the digital display intensity to increase and to display the present set-point. The set-point can be changed by repeatedly pressing the Settings Button until you reach the desired setting. The set-point choices are displayed in a scrolling loop that runs from 36°F to 85°F. When you reach 85°F, the loop wraps back around to 36°F. After a few seconds of inactivity, the digital display will dim back to its original intensity and will return to displaying the measured room temperature.
Initial Setup	<p>After the STEP Warmfloor system has been in operation for 2-6 days and the zone temperature has stabilized, it is recommended to verify the displayed air temperature against a trusted air thermometer. The thermostats self generated heat in addition to other influences from its mounting location may cause the displayed temperature to be off by a few degrees.</p> <p>The displayed ambient temperature can be modified up or down 3°C through the use of the Settings Button and a jumper on the back of the thermostat. Turn to the Off Set instructions in the Additional Functions section of this manual for additional information.</p>
Additional Functions	<p>Through the use of the Settings Button and a series of jumpers on the back of the thermostat, additional functions can be accessed. Refer to the Additional Functions section of this manual for a detailed description of these functions.</p> <p><u>Temperature units</u> – allows you to select between °F or °C for the temperature display. The DIGI-LUX is shipped with °F set by default.</p> <p><u>Auto Dim</u> – allows you to increase the digital display intensity to full brightness during normal operation. The DIGI-LUX is shipped with the display dimmed during normal operation.</p> <p><u>Offset</u> – allows you to adjust the displayed temperature up or down 3°C to compensate for the actual conditions at the thermostat installation location.</p>

Additional Functions

The DIGI-LUX is provided with the ability to modify a few additional operating functions besides the set-point. These Additional Functions are accessed through the use of the Settings Button and a series of jumpers on the back of the thermostat. Refer to Figure D for jumper locations.

The additional functions are:

- Temperature units – allows you to select between °F or °C for the temperature display. The DIGI-LUX is shipped with °F set by default. This function is changed using jumper J2.
- Auto Dim – allows you to increase the digital display intensity to full brightness during normal operation. The DIGI-LUX is shipped with the display dimmed during normal operation. This function is changed using jumper J3.
- Off Set – allows you to adjust the displayed temperature up or down 3°C to compensate for the actual conditions at the thermostat installation location. This function is changed using jumper J1.

Jumper J0 has no function other than to serve as a storage location for a jumper removed from one of the other jumper positions.

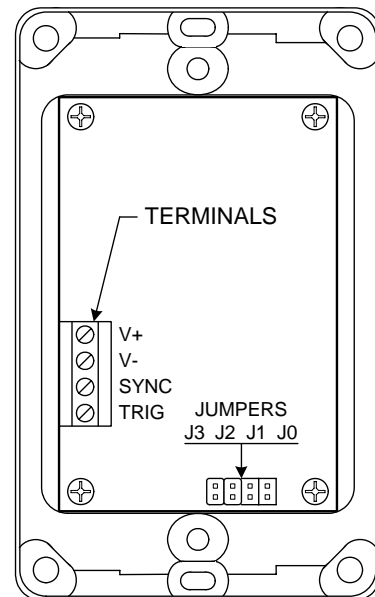


Figure D
Back of DIGI-LUX Thermostat

Temperature Units

The DIGI-LUX is shipped configured to display temperatures in Fahrenheit. If a temperature display in Celsius is desired, remove the jumper installed in position J2. You can store this spare jumper in position J0.

To access the jumper, remove the trim piece around the thermostat to expose the mounting screws. Remove the mounting screws and gently pull the thermostat away from the mounting box. The jumper is located on the back of the thermostat. Refer to Figure D for the exact location of jumper J2.

Upon removal of the jumper, push the excess signal cable into the box and re-install the thermostat using the screws provided. Reinstall the trim piece over the Thermostat.

Auto Dim

The DIGI-LUX is shipped configured for the display intensity to be dimmed during normal operation. The display intensity will increase when the Settings Button is depressed. After a few seconds of inactivity, the digital display will dim back to its original intensity.

The display intensity can be increased to a constant intensity during all operating modes by removing the jumper in position J3. You can store this spare jumper in position J0.

To access the jumper, remove the trim piece around the thermostat to expose the mounting screws. Remove the mounting screws and gently pull the thermostat away from the mounting box. The jumper is located on the back of the thermostat. Refer to Figure D for the exact location of jumper J3.

Upon removal of the jumper, push the excess signal cable into the box and re-install the thermostat using the screws provided. Reinstall the trim piece over the Thermostat.

Offset

After the STEP Warmfloor system has been in operation for 2-6 days and the zone temperature has stabilized, it is recommended to determine the offset between the displayed ambient temperature and the actual room temperature. Due to the installation location (inside wall vs. outside wall, etc.) and the tolerance of the thermostat components, the thermostat's displayed ambient temperature could be a few degrees different from the actual room temperature. Removing this offset from the thermostat will help to ensure the maximum personal comfort in each zone and add to the systems energy efficiency. The displayed ambient temperature can be offset up or down 3°C through the use of the Settings Button and jumper J1 on the back of the thermostat.

Follow these step-by-step instructions to modify the offset of the thermostat.

STEP 1:

Secure a reasonably accurate air measuring thermometer. Place it adjacent to the DIGI-LUX thermostat for about 30 minutes to allow it to reach a steady temperature.

STEP 2:

Record the temperature displayed on the DIGI-LUX thermostat and the air measuring thermometer on the Figure E worksheet. Refer to Chart A to convert the two temperature readings into Celsius. Subtract the DIGI-LUX temperature from the Actual Air temperature and record the result in the °C Offset box. Include a minus sign if this number is a negative number. If the Offset is +/- 1°C or more, then continue on to STEP 3. If the Offset is less than +/-1°C, then adjusting the offset is not necessary so do not continue any further with the offset adjustment procedure.

°F	°C
65	18.3
66	18.9
67	19.4
68	20.0
69	20.6
70	21.1
71	21.7
72	22.2
73	22.8
74	23.3
75	23.9
76	24.4
77	25.0
78	25.6
79	26.1
80	26.7

Chart A

Actual Air		DIGI-LUX	
	°F		°F
Convert to Celsius (Chart A)			
	°C	-	
		°C	=
			°C Offset

Figure E
Offset Calculation Worksheet

STEP 3:

Remove the trim piece around the thermostat to expose the mounting screws. Remove the mounting screws and gently pull the thermostat away from the mounting box.

STEP 4:

Access the offset function by installing a jumper in position J1. Borrow the jumper located in position J3 and install it into position J1. If position J3 does not have a jumper installed, then you should find it stored in position J0. Refer to Figure D for the exact location of jumpers J3, J1 and J0.

Installing the J3 jumper into position J1 will cause the display intensity to increase and change to the offset display to read 00.

PLEASE NOTE: The offset display is a looping display that runs from 0.0 through 3.0 to -0.0 through -3.0 (see Figure F). The decimal point is inferred as it is not displayed. For negative values, the minus sign will appear in the Temperature Unit display window (see Figure A).

STEP 5:

Press the Settings Button to scroll through the offset display until you reach the calculated offset value. Remove the temporary jumper installed in position J1 and return the jumper to its original position (J3 or J0).

STEP 6:

Push the excess signal cable into the box and re-install the thermostat using the screws provided. Reinstall the trim piece over the Thermostat.

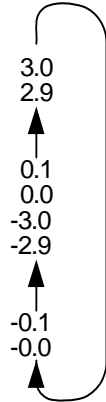


Figure F



Product Specifications

Refer to the DIGI-LUX data sheet for more comprehensive information

Thermostat	
Set point range	36°F to 82°F (2°C to 28°C)
Temperature Display	2-digit LED indicates air temperature in Operating Mode and set point in Program Mode. Single digit LED indicates engineering units (°F or °C)
Faceplate Color	White

Regulator	
Supply Voltage	120 or 240Vac
Load Rating	2,500 Watts
Terminal Wire Sizes	#14 - #10 AWG solid copper or aluminum #8 - #6 AWG stranded copper or aluminum
Enclosure	NEMA 1
Max. Ambient Temperature and Conditions	104°F (40°C), well ventilated space
Signal Cable	4 Conductor #24 AWG Shielded (Belden #9534 or eq.)

Ordering Information		
Description	Model Number	App. Wt.
DIGI-LUX™ Thermostat / Regulator combination, 120Vac, 2,500W	DIGI-LUX-120V	2.8 Lbs.
DIGI-LUX™ Thermostat / Regulator combination, 240Vac, 2,500W	DIGI-LUX-240V	2.8 Lbs.
DIGI-LUX™ Add-on Regulator, 120Vac, 2,500W	DIGI-REGULATOR-120V	2.6 Lbs.
DIGI-LUX™ Add-on Regulator, 240Vac, 2,500W	DIGI-REGULATOR-240V	2.6 Lbs.

Approvals	
	Conforms to ANSI/UL STD 1693 Certified to CAN/CSA-C22.2 No. 217
	EN60335-1: 1995 EN60355-2-30: 1997