

# TCN-890x Electronic Room Thermostats

## Installation

Install the TCN-890x where the occupant can read and adjust the setpoint dial selector easily. Situate the module where the temperature is representative of the general room conditions. Avoid installing the TCN-890x near cold or warm air drafts, radiant heat, or direct sunlight.

**IMPORTANT:** The TCN-8900 Series electronic room thermostats are intended to control equipment under normal operating conditions. Where failure or malfunction of the TCN-890x thermostat could lead to an abnormal operating condition that could cause personal injury or damage to the equipment or other property, other devices (limit or safety controls) or systems (alarm or supervisory) intended to warn of, or protect against, failure or malfunction of the TCN-890x thermostat must be incorporated into and maintained as part of the control system.

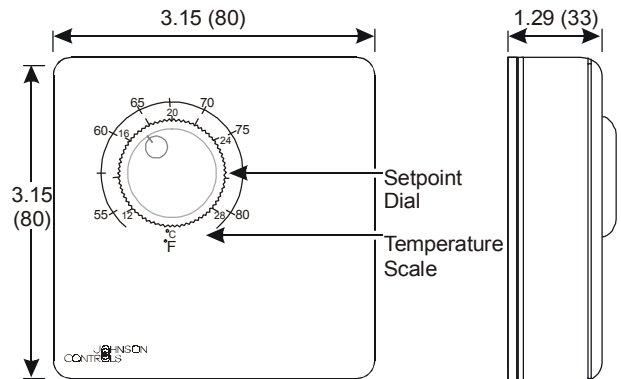
**IMPORTANT:** Do not mount the module on an exterior wall. Make all wiring connections in accordance with the National Electrical Code and all local regulations.

## Parts Included

- TCN-890x electronic room thermostat with attached surface mount base
- U.S. wallbox mounting base
- endcaps (2)
- plastic wall anchors (2)
- No. 8 x 1-1/4 in. slotted pan-head thread-forming screws (2)
- No. 6-32 x 1 in. flat-head machine screws (2)

## Dimensions

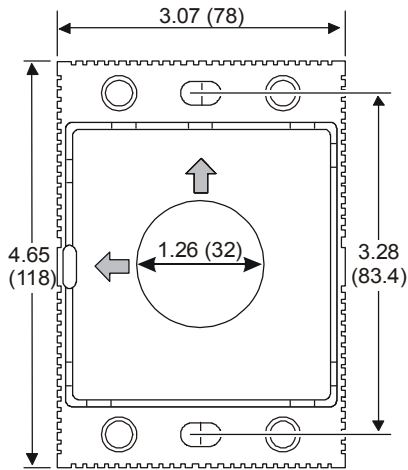
For TCN-890x thermostat dimensions, refer to Figure 1, Figure 2, and Figure 3.



**Figure 1: TCN-890x-2161 Cover Dimensions, in. (mm)**



**Figure 2: TCN-890x Surface Mount Base Dimensions, in. (mm)**



**Figure 3: TCN-890x Wallplate Dimensions, in. (mm)**

### Mounting

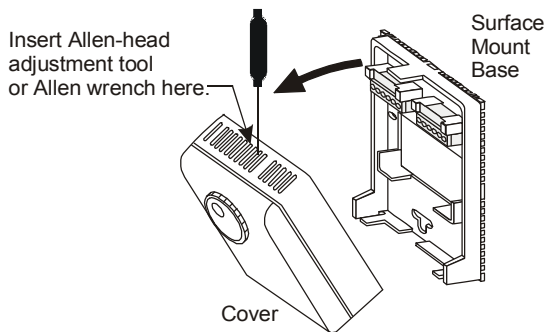
The TCN-890x thermostat can be either surface or wallbox mounted.

Follow the instructions for removing the cover and proceed to either the *Surface Mounting* section or the *Wallbox Mounting* section.

Note: All TCN-890x models include a U.S. wallbox mounting base kit. Do not use the kit if surface mounting the module.

### Removing the Cover

To remove the cover from the base, insert a 1/16 in. (1.5 mm) Allen wrench or T-4000-119 Allen-head Adjustment Tool into the small hole located in the center of the top of the cover. While pressing down gently on the tool, pull the cover away from the base until it is free. (See Figure 4.)



**Figure 4: Removing the Cover from the Base**

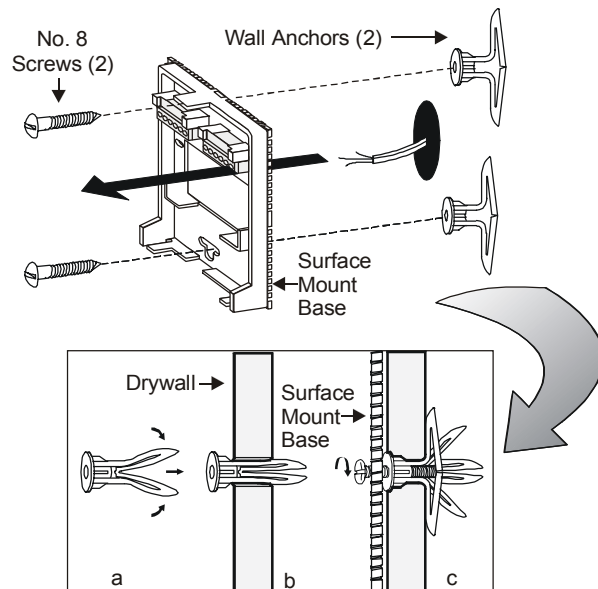
### Surface Mounting

To surface mount the TCN-890x:

1. Pull the wiring through the wall. (Figure 5.)
2. Place the surface mount base against the wall, and mark the screw holes using the base as a template.
3. To attach the base to the wall:
  - a. drill two 5/16 in. (8 mm) holes
  - b. insert the plastic wall anchors
  - c. position the surface mount base
  - d. drive the screws

**IMPORTANT:** Use an ACC-INSL-1 Foam Pad Kit to help reduce drafts entering the unit. Drafts can result in false temperature readings.

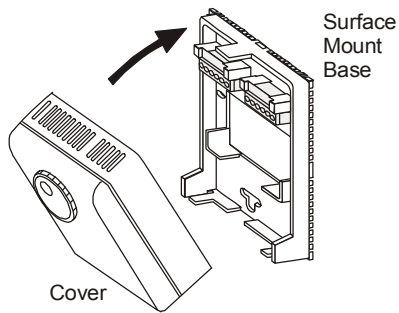
1. Wire to appropriate terminals as described in the *Wiring* section.
2. Set the potentiometers and Reverse Acting/Direct Acting (RA/DA) outputs before reassembling the thermostat. Follow the procedures in the *Setup and Adjustments* section.



**Figure 5: Installing a Surface-Mounted TCN-890x**

### Reassembling the Surface-Mounted TCN-890x

To reassemble the TCN-890x, place the cover against the bottom edge of the surface mount base, and push the upper part of the cover until it clicks firmly into place. (See Figure 6.)



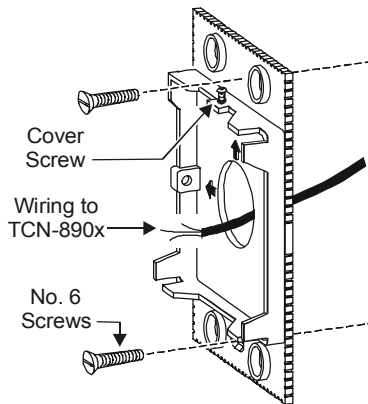
**Figure 6: Reattaching the Cover to the Surface Mount Base**

### Wallbox Mounting

To mount the TCN-890x on a standard 2 x 4 in. [51 x 102 mm] U.S. wallbox:

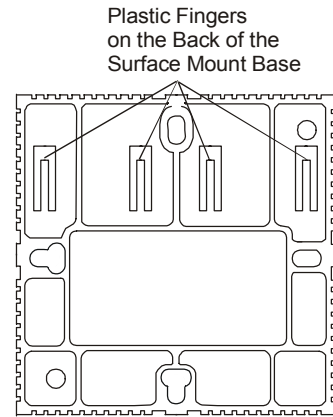
1. Loosen the cover screw installed in the wallbox mounting base.
2. Pull the wiring through the wallbox.
3. Rotate the base so one of the arrows on its surface points up.
4. Fasten the base to the wallbox using the No. 6 screws provided. (See Figure 7.)

**IMPORTANT:** Use an ACC-INSL-0 Foam Pad Kit to help reduce drafts entering the unit. Drafts can result in false temperature readings.



**Figure 7: Installing a TCN-890x Using the Wallbox Mounting Base**

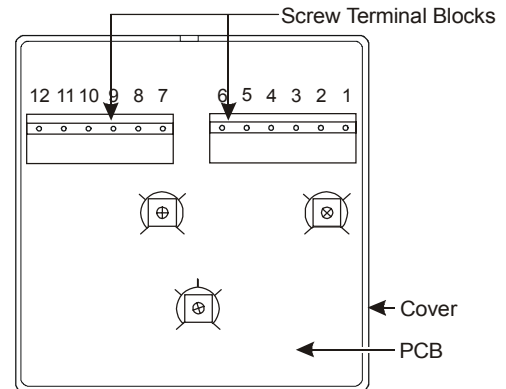
5. Remove the terminal blocks from the surface mount base by lifting the plastic fingers on the back of the base and sliding the terminal block down and out of the retainer. (See Figure 8.) Do not use the surface mounting base for wallbox mounting.



**Figure 8: Removing the Terminal Blocks from the Surface Mounting Base**

6. Proceed to the Wiring section before mounting the screw terminal blocks to the Printed Circuit Board (PCB).
7. To set the potentiometers, refer to the Potentiometer Adjustments.
8. Push the terminal blocks onto the pins located on the PCB inside the TCN-890x cover with the screw heads toward the PCB, and the wire leads exiting the terminal blocks from the bottom. (See Figure 9.)

Note: When viewing the screw terminals remounted to the PCB inside the TCN-890x cover (see Figure 9), the numbered terminals appear to be in reversed relative position to the numbers marked on the base (shown in Figure 2). Terminal 1 is located in the farthest right position of the right terminal after the screw terminals have been repositioned for wallbox mounting.

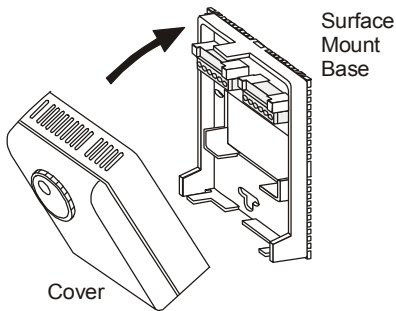


**Figure 9: TCN-890x Terminal Blocks Positioned on PCB for Wallbox Mounting**

### Reassembling the Wallbox-Mounted TCN-890x

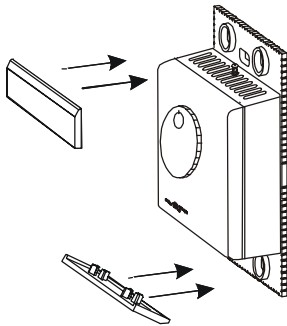
To replace the TCN-890x cover onto the installed wallbox mounting base:

1. Place the bottom edge of the cover against the lower edge of the base.
2. Fit the cover onto the wallbox mounting base, and tighten the cover screw using the Allen-head tool or Allen wrench. (See Figure 9.)



**Figure 10: Reattaching the Cover to the Wallplate**

3. Install the endcaps provided by snapping them onto the wallbox mounting base. (See Figure 11.)



**Figure 11: Installing Wallbox Base Endcaps**

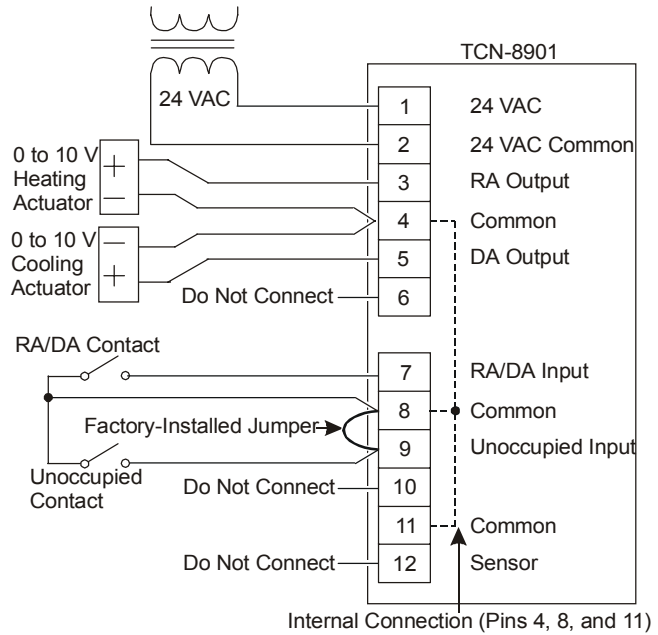
### Wiring

**WARNING: Risk of Electrical Shock.** Disconnect the power supply before making wiring connections to avoid electrical shock.

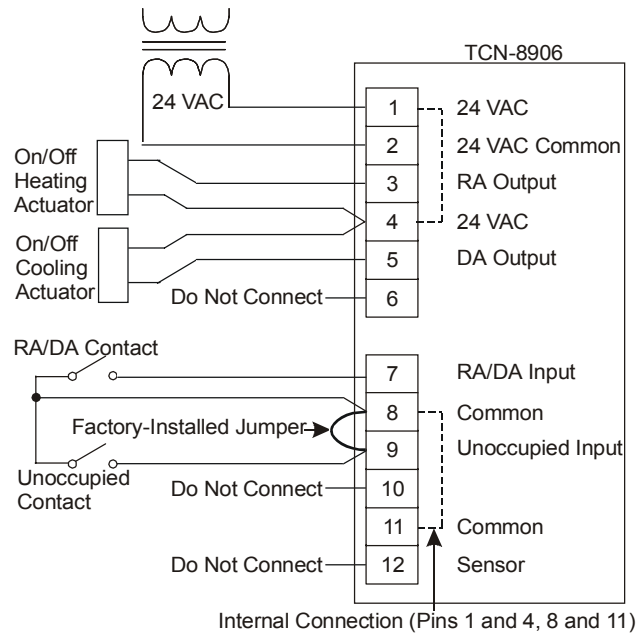
**CAUTION: Risk of Equipment Damage.** Disconnect the power supply before making wiring connections to avoid possible equipment damage.

Make wiring connections to the TCN-890x terminal blocks using 24 to 14 AWG wire. Follow one of the wiring diagrams shown in Figure 12 and Figure 13.

**IMPORTANT:** All wiring to the thermostat is low voltage (Class 2) and must be separated from the power line voltage wiring. Do not run wiring close to transformers or high-frequency generating equipment. Complete and verify all wiring connections before applying power to the unit.



**Figure 12: Wiring the TCN-8901, 0 to 10 V**



**Figure 13: Wiring the TCN-8906, On/Off**

## Setup and Adjustments

To prepare the unit for operation, perform the following procedures as needed.

### Potentiometer Adjustments

Before connecting the cover to the base, adjust the potentiometers, located on the PCB, as needed (see Figure 14 and Figure 15). Refer to Figure 16 or Figure 17, and to Table 1 and either Table 2 or Table 3.

**IMPORTANT:** The potentiometer scales are labeled in Kelvin (K).

### Table 1: Dead Band (DB) Adjustment

Kelvin (K)	Fahrenheit (F°)	Celsius (C°)
0 to 2	0 to 3.6	0 to 2

Note: Applied equally to RA and DA outputs

### Table 2: TCN-8901 Proportional Band (PB) Adjustment

Kelvin (K)	Fahrenheit (F°)	Celsius (C°)
1 to 4	1.8 to 7.2	1 to 4

Note: Separate adjustment for each output

On the TCN-8901 Thermostat:

- the PB/RA potentiometer controls the proportional adjustment to the RA output, Terminal 3 (Heating)
- the PB/DA potentiometer controls the proportional adjustment to the DA output, Terminal 5 (Cooling)

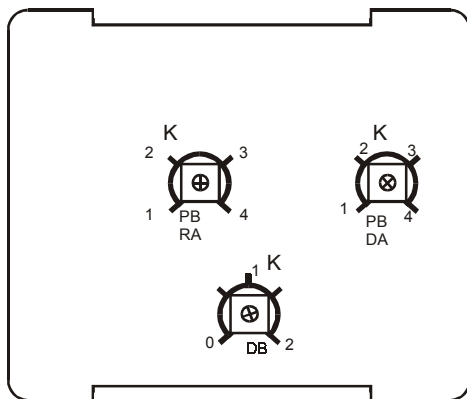


Figure 14: TCN-8901 PCB with Potentiometers

### Table 3: TCN-8906 Differential (DIF) Adjustment

Kelvin (K)	Fahrenheit (F°)	Celsius (C°)
0.2 to 2	0.4 to 3.6	0.2 to 2

Note: Separate adjustment for each output

On the TCN-8906 Thermostat:

- the DIF/RA potentiometer controls the differential adjustment to the RA output, Terminal 3 (Heating)
- the DIF/DA potentiometer controls the differential adjustment to the DA output, Terminal 5 (Cooling)

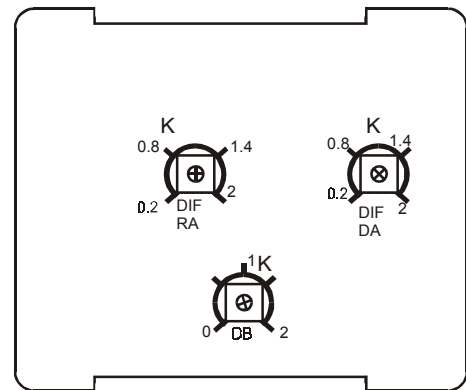


Figure 15: TCN-8906 PCB with Potentiometers

## Reverse Acting (RA) and Direct Acting (DA) Outputs

All TCN-890x thermostats provide two outputs for applications using separate heating or cooling actuators. Refer to Figure 12 or Figure 13, and connect the heating actuator to the RA output, Terminal 3, and connect the cooling actuator to the DA output, Terminal 5. Seasonal changeover of the thermostat is not required.

- **For TCN-890x operation with two actuators,** open the RA/DA input, Terminal 7, shown in Figure 12 and Figure 13.
- **For TCN-890x operation with one actuator for heating and cooling with a changeover control,** refer to Figure 12 or Figure 13 and:
  - connect the actuator to the RA output, Terminal 3 and Terminal 4
  - connect the seasonal changeover control to terminal 7 and Terminal 8

Note: RA/DA input activation reverses Terminal 3 and Terminal 5 output functions. In RA (Reverse) mode Terminal 3 is the heating (RA) output and Terminal 5 is the cooling (DA) output. In DA (direct) mode, Terminal 3 is the cooling (DA) output and Terminal 5 is the heating (RA) output. The PB/RA or DIF/RA potentiometer (Figure 14 or Figure 15) always adjusts the Terminal 3 output, and the PB/DA or DIF/DA potentiometer always adjusts the Terminal 5 output.

- open the contact of the changeover control to set the unit for RA (Heating) operation
- close the contact of the changeover control to set the unit for DA (Cooling) operation

## Setpoint Dial

Adjust the setpoint dial to the desired temperature, (see Figure 1). If limiting the setpoint range is desirable, order and install the Dial Stop Screw Kit accessory, TM-9100-8901.

## Occupied Mode

The thermostat will maintain the setpoint temperature when in the Occupied Mode. (See Figure 16 and Figure 17.)

**When the Occupied Mode is enabled** the thermostat controls at the setpoint.

## Unoccupied Mode

In the TCN-890x, the Unoccupied Mode offsets the setpoint by 9F° (5C°). (See Figure 16 and Figure 17.) The setpoint is decreased for the RA (heating) output and increased for the DA (cooling) output.

**To use the Unoccupied Mode,** refer to the appropriate wiring diagram (Figure 12 or Figure 13) and:

- remove the factory-installed jumper connecting Terminal 8 and Terminal 9 on the screw terminals
- connect the unoccupied control or timer across Terminal 8 and Terminal 9

**When the unoccupied control contact at terminal 9 is open,** the Unoccupied Mode is enabled, and:

- the thermostat controls at the offset to the setpoint
- on startup, the thermostat will start in the Unoccupied Mode

**When the unoccupied control contact at terminal 9 is closed,** the Unoccupied Mode is disabled and the thermostat controls temperature at the setpoint.

## Compliance Statements

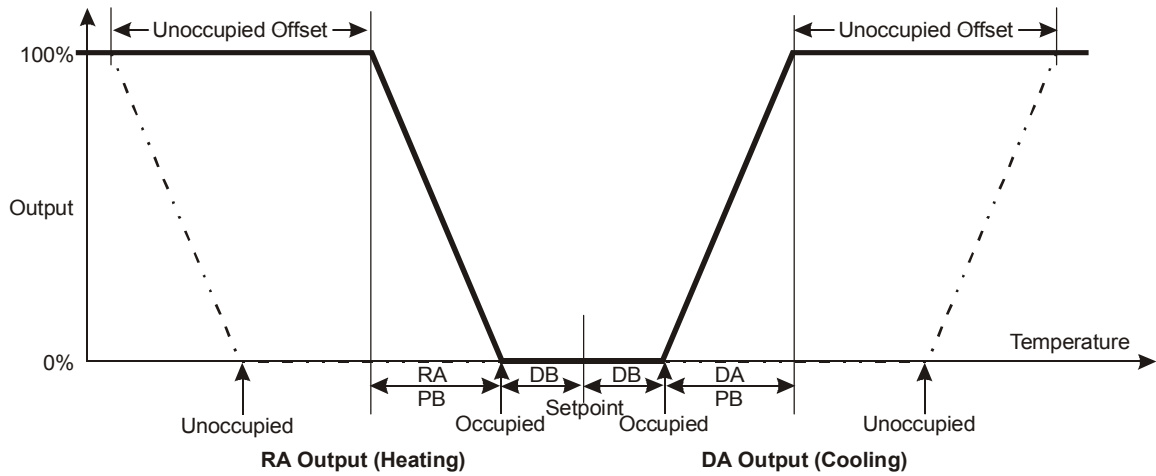
### FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

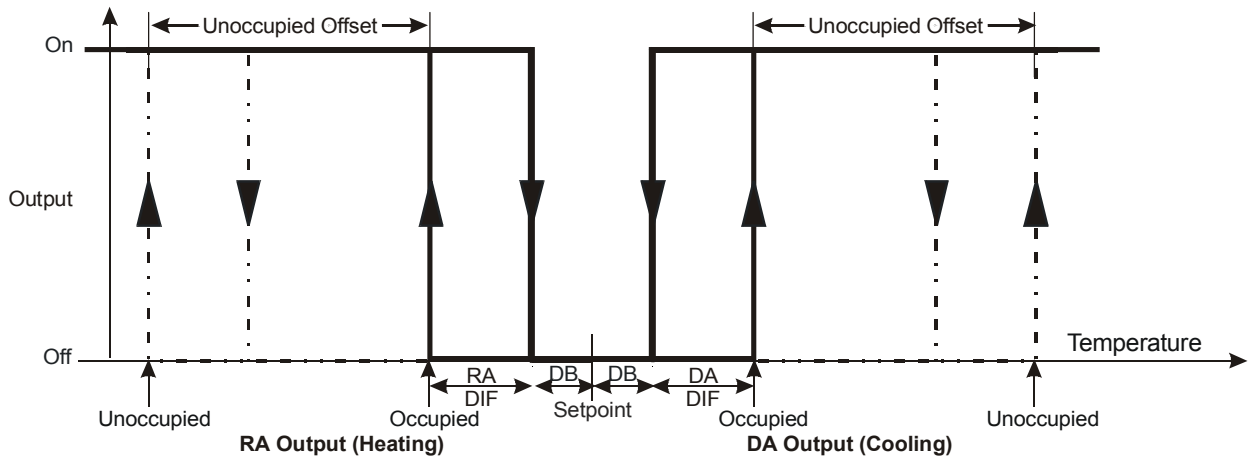
### Canadian Compliance Statement

This Class (A) digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.



**Figure 16: TCN-8901 0 to 10 VDC Control Sequence**



**Figure 17: TCN-8906 On/Off Control Sequence**

## Technical Specifications

<b>Product</b>	TCN-890x Electronic Room Thermostat	
<b>Power Requirements</b>	24 VAC ±15% at 50/60 Hz, Class 2	
<b>Power Consumption</b>	1.5 VA with No Load	
<b>Inputs</b>	Unoccupied Input:	Remove Factory-Installed Jumper on Screw Terminal Block; Fixed F° (5C°) Nominal Offset
	RA/DA:	Remote Contact
<b>Adjustments</b>	Set Point	54 to 82°F (12 to 28°C)
	Dead Band:	0 to 4F° (0 to 2C°)
	Differential:	(Model TCN-8906 Only) 0.4 to 4F° (0.2 to 2C°); Independent Adjustments for RA and DA Outputs
	Proportional Band:	(Model TCN-8901 Only) 2 to 7F° (1 to 4C°); Independent Adjustments for RA and DA Outputs
<b>Output</b>	TCN-8901:	Analog, 0 to 10 VDC, 10 mA Maximum; Output Normal State is Off
	TCN-8906:	On/Off, Triac 24 VAC, 0.5 A Maximum; Output Normal State is Off
<b>Field Connections</b>	Screw Terminals for 24 to 14 AWG Wire	
<b>Mounting</b>	Standard Bases for Surface or U.S. Wallbox Mounting, Including Hardware	
<b>Housing</b>	White Plastic Cover with Dark Gray Plastic Mounting Base	
<b>Protection</b>	NEMA 1, IP30 (IEC 60529)	
<b>Ambient Operating Conditions</b>	32 to 122°F (0 to 50°C) 10 to 95% RH (Noncondensing)	
<b>Ambient Storage Conditions</b>	-4 to 158°F; (-20 to 70°C) 10 to 90% RH (Noncondensing)	
<b>Dimensions (H x W x D)</b>	3.15 x 3.15 x 1.30 in. (80 x 80 x 33 mm)	
<b>Shipping Weight</b>	0.50 lb (0.23 kg)	
<b>Agency Listings</b>	CE Compliance: EMC (89/336 EEC) According to the Standard EN 50081-1 and EN 50082-1; FCC and DOC Compliant	

*The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.*



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