T46 Series Fan Coil Thermostats

The T46 Series fan coil thermostats are designed to control line or low voltage heating, cooling, or combination heating and cooling equipment requiring system switches. The T46 thermostats are available in a variety of configurations with Single-Pole Single-Throw (SPST) or Single-Pole Double-Throw (SPDT) contact action, system and fan speed control, and either knob or concealed adjustment.

Typical applications for the T46 include the control of fan coil units, packaged terminal air conditioners, and combination heating and cooling equipment.

Figure 1: T46 Thermostat

Features and Benefits

❑ **Narrow Differential**	Increases versatility of the thermostat, which may be used on heating and/or cooling equipment over a wide range of voltages (24V, 120V, 240V, or 277V)
❑ **Line Voltage Components Switch Box Mounted**	Provides isolation of electrical circuit from sensing element
❑ **Adjustable High/Low Range Stops**	Allows adjustments within a desired range
❑ **Enclosed Pennswitch**	Provides dust protection for contacts

Part No. 24-7664-613, Rev.—
Code No. LIT-125655

Introduction

IMPORTANT: All T46 Series thermostats are designed for use **only** as operating controls. Where an operating control failure would result in personal injury and/or loss of property, it is the responsibility of the installer to add devices (safety, limit controls) or systems (alarm, supervisory systems) that protect against, or warn of, control failure.

The T46 series thermostats provide SPST or SPDT control for use on low or line voltage heating, cooling, or heating and cooling applications. The T46 has a thermoplastic cover with Allen-head locking screw to discourage unauthorized tampering.

The thermostat consists of a liquid-filled sensing element, which has excellent sensitivity to surrounding air temperature changes. Coupled with a highly efficient diaphragm and lever mechanism, the element operates an enclosed narrow differential Pennswitch.

An adjusting knob and easy-to-read dial allow quick selection of the desired setpoint. The standard thermostat is supplied with a thermometer and knob adjustment faceplate installed. Refer to the *Ordering Information* section for optional faceplate selections.

Operating Differential

The operating temperature differential of any self-contained thermostat depends on the following:

- the velocity of air over the thermostat
- the rate of temperature change to which the thermostat is subjected
- the current flowing through the thermostat (amperage load)
- whether the thermostat is operating heating or cooling equipment

Figures 2 and 3 show the operating temperature differentials of the T46 thermostats under various load conditions. The amperage loads are based on the electrical ratings in Table 2. Data are based on an air velocity of 25 ft/min (0.127 m/sec) and a rate of temperature change of 6F° (3.3C°) per hour. For air velocities greater than 25 ft/min and/or rates of temperature change less than 6F° (3.3C°) per hour, the operating differentials will be less than what is shown in Figures 2 and 3.

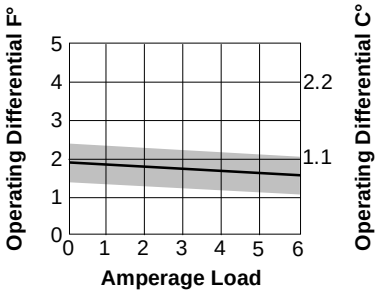

Figure 2: Operating Differentials for T46A and Heating Side of T46S

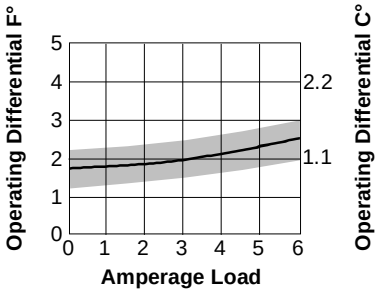

Figure 3: Operating Differential for T46J and Cooling Side of T46S

The heavy lines in Figures 2 and 3 are the nominal operating temperature differential. Production thermostats may vary from the norm as indicated by the shaded areas.

Installation

Supplies Needed

- two gang box or a 4 x 4 in. (102 x 102 mm) junction box with a 2-fixture plaster ring (field supplied)
- screwdriver (slotted standard)
- marking pencil
- wire strippers

Location Considerations

Locate the T46 thermostat as follows:

- on a partitioning interior wall, and approximately 5 ft (1.5 m) above the floor in a location of average temperature
- away from direct sunlight or radiant heat, outside walls or behind doors, air discharge grills, stairwells, or outside doors
- away from steam or water pipes, warm air stacks, or unheated/uncooled areas

Dimensions

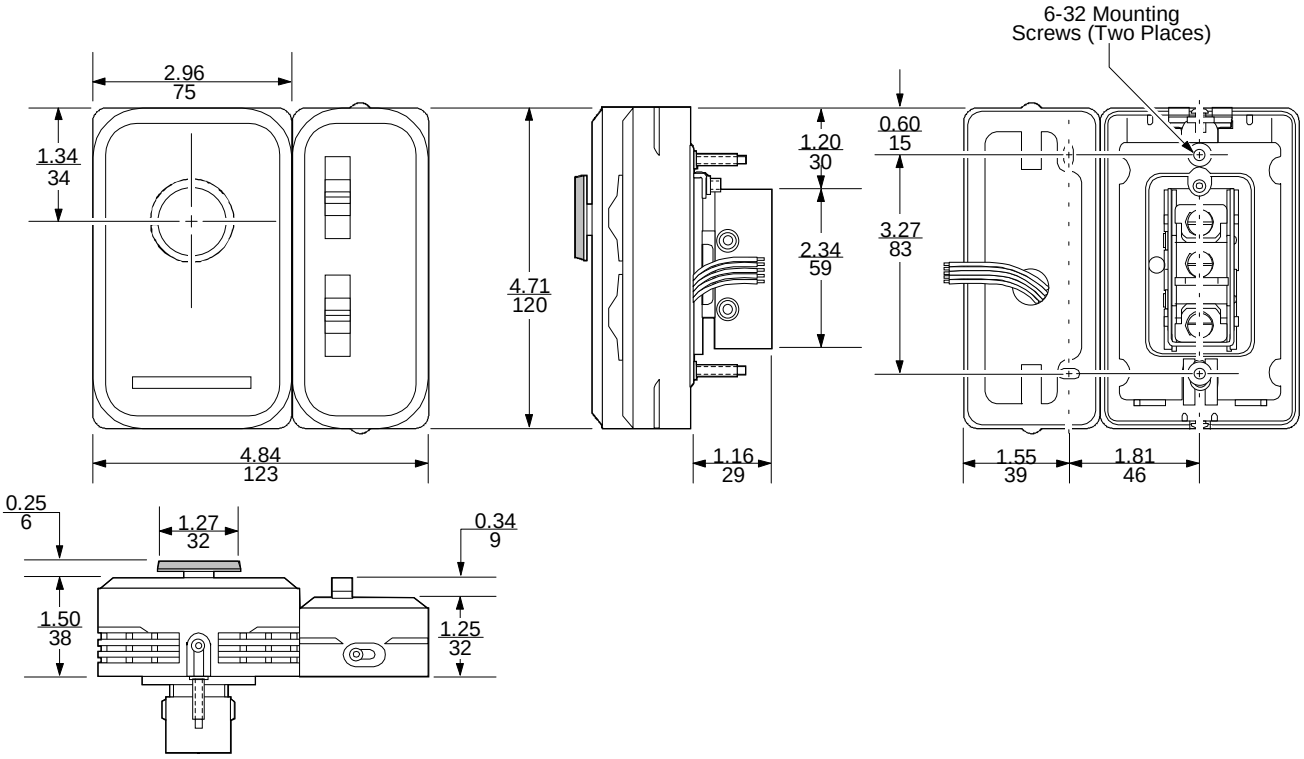

Figure 4: T46 Dimensions (in./mm)

Mounting and Wiring

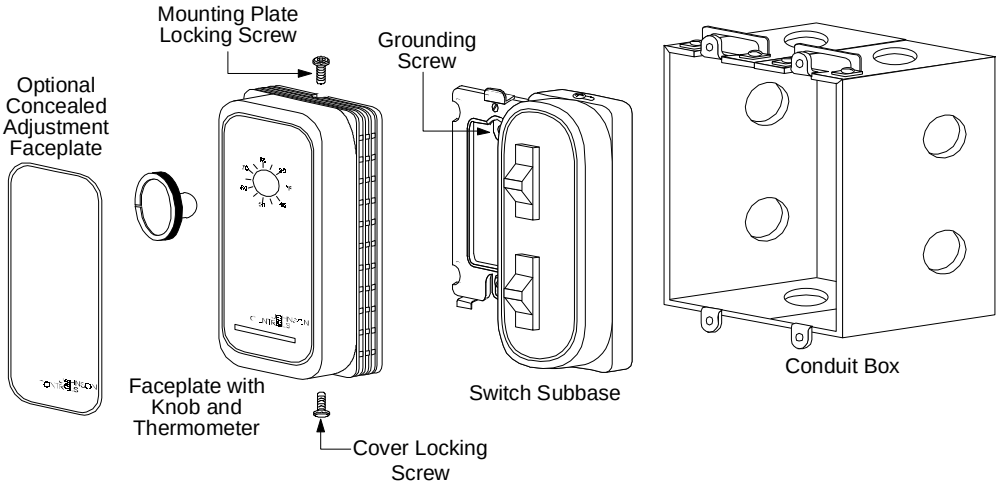

Figure 5: T46 Series Thermostat

IMPORTANT: Do not remove the thermostat cover during installation. The sensing element must be carefully protected against accidental damage. All wiring and mounting can be completed without removing the cover.

CAUTION: **Shock hazard.** Disconnect power supply before wiring connections are made to avoid electrical shock or possible damage to the equipment.

To install the T46 thermostat:

1. Select the proper mounting location (refer to the *Location Considerations* section) and install a two gang or junction box approximately 5 feet (1.2 to 1.5 m) above the floor.
2. Run conduit or cable, as required by national and/or local electric codes, from the junction box to the equipment to be controlled. Leave approximately 6 in. (152 mm) of wire for connection to the thermostat terminals.
3. Remove the subbase by loosening the subbase locking screw (see Figure 5), and lifting and removing the subbase.
4. Pull wires through the subbase and fasten (grounding screw end up) to the junction box with the screws provided.

CAUTION: **Equipment damage hazard.** Unused leads must be individually insulated to avoid shorting to the thermostat, subbase, wiring box, or other leads.

5. Make the necessary wiring connections based on the required color codes in Table 1 and depending on which model is being used. See Figures 6 through 15 for wiring diagrams.

   Note: Use the terminal screws furnished (8-32 x 1/4 in. binder head). Substitution of other screws may cause problems in making proper connections.

6. Ground the thermostat to the branch circuit ground as required by National Electric Code and local regulations. Use the grounding terminal provided.
7. Hook the two slots in the thermostat base over the tabs on the subbase and swing the thermostat into place. Push the wires back flush into the junction box.
8. Securely tighten the subbase locking screw.

Table 1: Wiring Identification

System		Fan		Thermostat	
Black	L1 (Hot)	Orange	High Speed	Gray	Terminal 1
Red	Heating	Yellow	Medium Speed	Violet	Terminal 2
Blue	Cooling	Brown	Low Speed	Light Blue	Terminal 3

Table 2: Electrical Ratings

Thermostat Switch				
Ratings	**120V**	**208V**	**240V**	**277V**
AC Full Load Amperes	6.0	3.5	3.0	
AC Locked Rotor Amperes	36.0	21.0	18.0	
Pilot Duty - 125 VA, 24 to 277 VAC				

Fan and System Switches				
Ratings	**120V**	**208V**	**240V**	**277V**
AC Full Load Amperes	12.0	6.9	6.0	5.2
AC Locked Rotor Amperes	34.8	19.1	17.4	14.4
AC Non-inductive Amperes	6.5	6.5	6.5	—
Pilot Duty - 125 VA, 24 to 277 VAC				

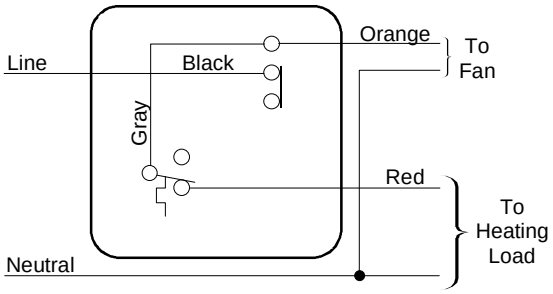

Figure 6: T46ADH Off-Auto Selector Switch with Continuous Fan (Heating Only)

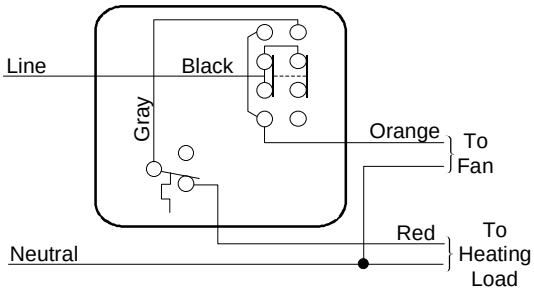

Figure 7: T46ABH Auto-Off-Fan Selector Switch with Continuous Fan (Heating Only)

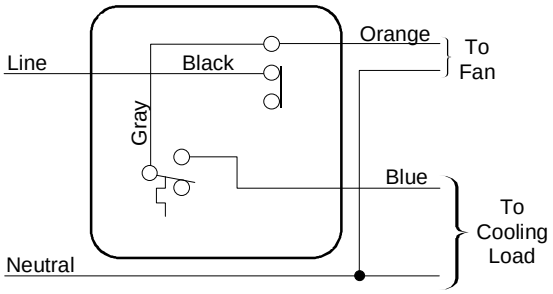

Figure 8: T46JDH Off-Auto Selector Switch with Continuous Fan (Cooling Only)

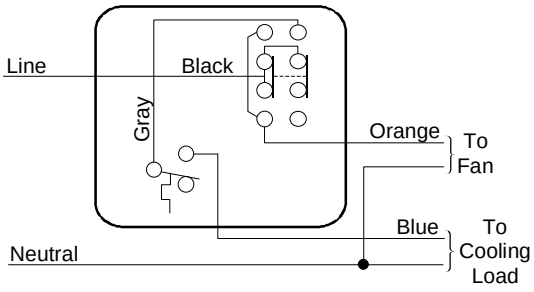

Figure 9: T46JBH Auto-Off-Fan Selector Switch with Continuous Fan (Cooling Only)

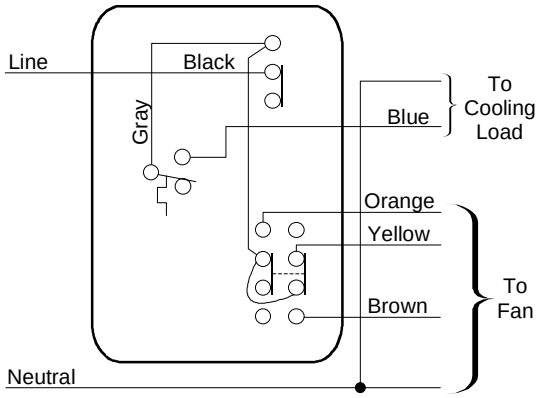

Figure 10: T46JEA On-Off Selector Switch with Fan Speed Control (Cooling Only)

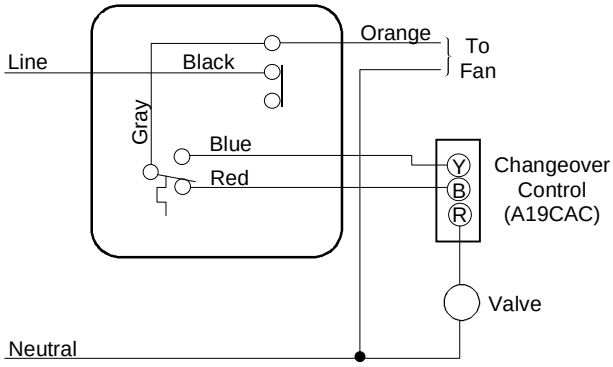

Figure 11: T46SDH Off-Auto Selector Switch Used on Fan Coil Unit with Cycling Valve and Continuous Fan (Heating and Cooling)

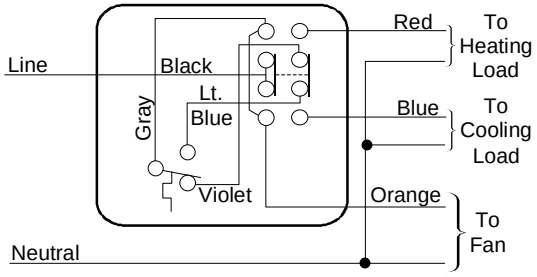

Figure 12: T46SAH Heat-Off-Cool Selector Switch with Continuous Fan (Heating and Cooling)

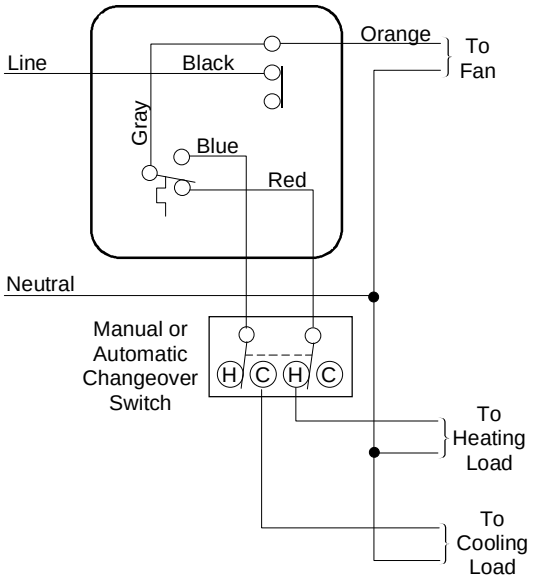

Figure 13: T46SDH Off-Auto Selector Switch with Manual or Automatic Changeover Switch and Continuous Fan (Heating and Cooling)

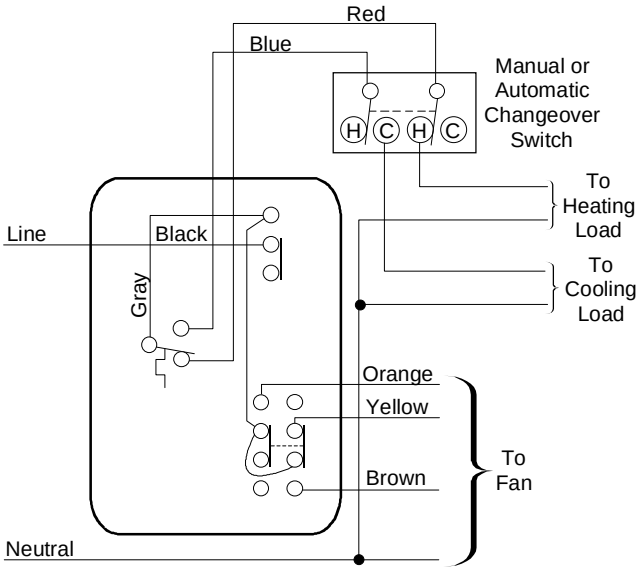

Figure 14: T46SDA Off-Auto Selector Switch with Fan Speed Control and Manual or Automatic Changeover Switch (Heating and Cooling)

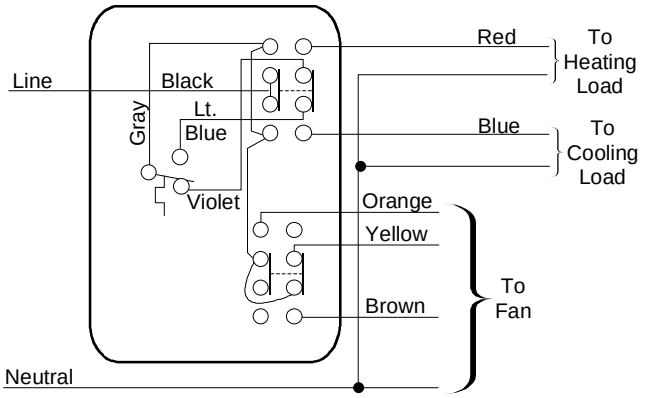

Figure 15: T46SAA Heat-Off-Cool Selector Switch with Fan Speed Control (Heating and Cooling)

Adjustments

Models with an external knob permit thermostat adjustment by rotating the knob. The indicator notch on the knob denotes the dial setting.

For concealed dial models (with cover removed), the desired dial setting should be lined up with the reference mark on the base of the thermostat. (See Figure 16.) This will place the desired setting at the 9 o'clock position when the thermostat is held vertically.

Range Stops

High and low range stops can be field adjusted as desired. Use the following procedures to set the high and low range stops.

High Range Stop

1. Set the adjustment knob to the maximum desired temperature setting.
2. Pull the adjustment knob off the thermostat cover.
3. Loosen the bottom cover screw and remove the cover.
4. While holding the dial firmly in place, keeping the setting in line with the reference mark, depress the tab "A" (see Figure 16) and rotate it clockwise until it is against the stop pin "C".
5. Release the tab making sure it fits into the nearest notch.
6. Replace the thermostat cover, tighten the bottom cover screw, and replace the adjustment knob.
7. Rotate adjustment knob to desired normal operating setpoint.

Low Range Stop

1. Set the adjustment knob to the minimum desired temperature setting.
2. Pull the adjustment knob off the thermostat cover.
3. Loosen the bottom cover screw and remove the cover.
4. While holding the dial firmly in place, keeping the setting in line with the reference mark, depress the tab “B” (see Figure 16) and rotate it counterclockwise until it is against the stop pin “C.”
5. Release the tab making sure it fits into the nearest notch.
6. Replace the thermostat cover, tighten the bottom cover screw, and replace the adjustment knob.
7. Rotate adjustment knob to desired normal operating setpoint.

Dial Lock

The high range stop and low range stop can be set to keep the adjustment knob from rotating. To lock the dial:

1. Set the adjustment knob to the desired temperature setting.
2. Pull the adjustment knob off the thermostat cover.
3. Loosen the bottom cover screw and remove the cover.
4. While holding the dial firmly in place, keeping the setting in line with the reference mark, depress the tab “A” and rotate it clockwise until it is against the stop pin “C.” Depress the tab “B” and rotate it counterclockwise until it is against the stop pin “C.” See Figure 16.
5. Make sure each tab fits into the notch closest to the stop.
6. Replace the thermostat cover, tighten the bottom cover screw, and replace the adjustment knob.

Checkout Procedure

Before applying power, make sure installation and wiring connections are according to job specifications.

After all necessary adjustments and electrical connections have been made, put the system into operation and observe at least three complete operating cycles before leaving the installation.

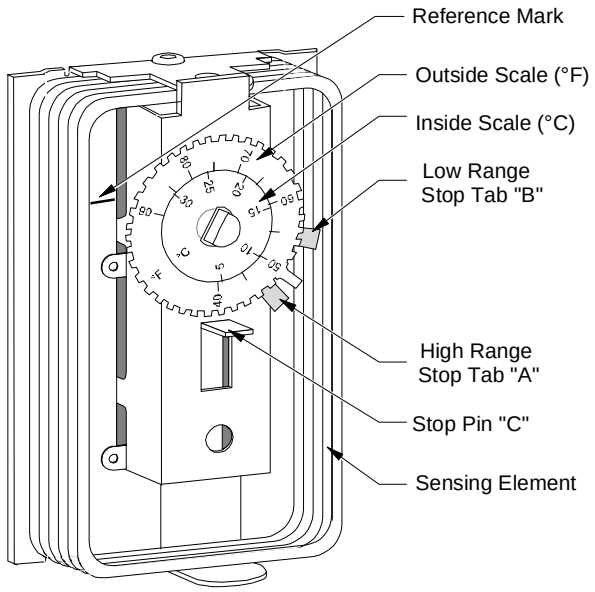

Figure 16: T46 Thermostat Range Tabs and Stop Pin

Repairs and Replacement

Field repairs must not be made except for replacement of the adjustment knob, cover, faceplate, or mounting plate. Refer to *Table 5: Replacement Parts* for replacement part ordering information. For a replacement T46, contact the nearest Johnson Controls representative.

Ordering Information

Table 3: Series Part Number Information

Series Part Number	System Switch	Fan Switch
T46ABH (Heating Only)	Auto-Off-Fan	None
T46ADH (Heating Only)	Off-Auto	None
T46JBH (Cooling Only)	Auto-Off-Fan	None
T46JDH (Cooling Only)	Off-Auto	None
T46JEA (Cooling Only)	On-Off	Low-Med-High
T46SAA (Heating and Cooling)	Heat-Off-Cool	Low-Med-High
T46SAH (Heating and Cooling)	Heat-Off-Cool	None
T46SDA (Heating and Cooling)	Off-Auto	Low-Med-High
T46SDH (Heating and Cooling)	Off-Auto	None

Faceplates

Faceplates are available in separate kits for on-the-job installation. All plates have peel-off backing strips. Faceplates must be ordered in quantities of ten.

Table 4: Faceplate Ordering Information

Kit Number	Adjustment Type	Thermometer Cutout Temperature Scale
PLT333-1R	Knob	Fahrenheit
PLT333-3R	Concealed	Fahrenheit
PLT333-5R	Knob	Celsius
PLT333-12R	Concealed	–

Replacement Parts

Table 5: Replacement Parts

Item	Product Code Number
Cover Assembly for Knob Adjustment Models with Thermometer, °F Scale	CVR88A-600R
Thermoplastic Push On Adjustment Knob	KNB26A-600R
Switch Buttons	BTN22-1R
Mounting Plate for Thermostat and Selector Switch	BKT48A-600R

Specifications

Product	T46 Series Fan Coil Thermostats
Contact Ratings	See Table 2.
Range	Thermostat: 40 to 90°F (4 to 32°C) Thermometer: 50 to 90°F (10 to 32°C)
Differential	Mechanical: Approximately 0.7F° (0.4C°) Operating: See Figures 2 and 3.
Ambient Operating Temperatures	0 to 105°F (-18 to 41°C)
Sensing Element	Liquid Filled
Thermometer	Bi-metal Type
Switch	Snap-acting Contacts in a Dust-protected Enclosure
Material	Base: 0.050 in. (1.27 mm) Cold Rolled Steel Cover: Beige Thermoplastic
Finish	Base: Zinc Plate Coating Cover: Brown Markings on Gold Anodized Aluminum
Mounting	Two Gang Switch Box or 4 x 4 in. (102 x 102 mm) Wall Box
Wiring Connections	Color-coded 16 AWG Wires, 8 in. (203 mm) Long
Agency Listings	UL Guide No. XAPX; File E6688 CSA Class No. 4813 02; File LR 948
Dimensions (H x W x D)	4.71 x 4.84 x 2.91 in. (120 x 123 x 74 mm)
Shipping Weight	1.0 lb (0.45 kg)

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.

JOHNSON CONTROLS

Controls Group
507 E. Michigan Street
P.O. Box 423
Milwaukee, WI 53201

FAN 125
Master Catalog
Printed in U.S.A.