

TEC2145-2 N2 Networked Thermostat with Single Proportional Output and One-Speed Fan Control

The TEC2145-2 Thermostat is an N2 networked device that provides control of two-pipe fan coils, cabinet unit heaters, or other equipment using a proportional 0 to 10 VDC control input and one-speed fan control. The technologically advanced TEC2145-2 Thermostat features a Building Automation System (BAS) N2 Bus communication capability that enables remote monitoring and programmability for efficient space temperature control.

The TEC2145-2 Thermostat features an intuitive user interface with backlit display that makes setup and operation quick and easy. The thermostat also employs a unique, Proportional-Integral (PI) time-proportioning algorithm that virtually eliminates temperature offset associated with traditional, differential-based thermostats.



Figure 1: TEC2145-2 N2 Networked Thermostat with Single Proportional Output and One-Speed Fan Control

Features and Benefits	
<input type="checkbox"/> BAS N2 Open Communication	Provides compatibility with a proven communication network; N2 Bus is widely accepted by Heating, Ventilating, and Air Conditioning (HVAC) control suppliers
<input type="checkbox"/> Backlit Liquid Crystal Display (LCD)	Offers real-time control status of the environment in easy-to-read, English plain text messages with constant backlight that brightens during user interaction
<input type="checkbox"/> Proportional 0 to 10 VDC Control	Offers additional application flexibility by providing more advanced control signals
<input type="checkbox"/> Override Interface Key	Allows for easy access of temporarily overriding the unoccupied mode
<input type="checkbox"/> Simplified Setpoint Adjustment	Enables the user to change the setpoint by simply pressing the UP/DOWN arrow keys
<input type="checkbox"/> Two Binary Inputs	Provide additional inputs for advanced functions such as remote night setback, service or filter alarms, motion detector, and window status
<input type="checkbox"/> Over 20 Configurable Parameters	Enable the thermostat to adapt to any application, allowing installer parameter access without opening the thermostat cover
<input type="checkbox"/> Discharge Air Sensor	Monitors unit efficiency

Product Overview

The TEC2145-2 Thermostat is specifically designed for networked control of common two-pipe heating and cooling equipment using a proportional control input. In addition to superior temperature control and application flexibility, the TEC2145-2 features BAS N2 Bus communication capability, allowing the user to view operation or make adjustments from a remote workstation. Plain text menus, backlit display, and five interface keys make setup and operation quick and easy.

IMPORTANT: The TEC2145-2 Thermostat is intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the thermostat could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices such as supervisory or alarm systems or safety or limit controls intended to warn of, or protect against, failure or malfunction of the thermostat.

Additional Features

The TEC2145-2 Thermostat offers many other features, including:

- **Adjustable Heating/Cooling Deadband**
Adjusts the minimum heating/cooling deadband from 2.0F°/1.0C° to 4.0F°/2.0C°.
- **Five Easy-to-Use Interface Keys**
Allow for easy commissioning of the thermostat, and eliminates the need for DIP switches.

- **Six Levels of Keypad Lockout**
Provide six levels of keypad lockout that can be set up through the Installer Configuration Menu.
- **Accessible Configuration Parameters**
Allow local access to all configurable parameters while limiting unwanted parameter tampering once the thermostat is set up.
- **Three Light-Emitting Diodes (LEDs)**
Provide fan, heating, and cooling status at a glance.
- **Adjustable Temporary Occupancy Time**
Adjusts the temporary occupancy time from 0 to 24 hours.
- **Auxiliary Contact**
Provides 24 VAC control for reheat, lighting, and other auxiliary functions.
- **Adjustable Heating/Cooling Cycles per Hour**
Configurable for the maximum number of heating and cooling cycles (4 to 8 cycles maximum) in a 1-hour period, balancing temperature control and equipment cycling.
- **Nonvolatile Electrically Erasable Programmable Read-Only Memory (EEPROM)**
Prevents loss of adjusted parameters during a power failure.
- **Remote Access**
Allows the user to read/write and access the parameters of the thermostat via a supervisory controller.

Table 1: Thermostat Model

Code Number	Description	Applications
TEC2145-2	Networked N2 Bus, Two-Pipe, Proportional 0 to 10 VDC Control Output, and One-Speed Fan Control Thermostat	Control of Two-Pipe Fan Coils, Cabinet Unit Heaters, or Other Equipment Using a Proportional 0 to 10 VDC Control Input and One-Speed Fan Control

Table 2: Accessories (Order Separately)

Code Number	Description
TE-6361P-1	Duct Mount Air Temperature Sensor
SEN-600-4*	Indoor Air Temperature Sensor with Occupancy Override and LED
TE-636S-1	Strap-On Temperature Sensor

* Remote indoor air temperature sensing cannot be accomplished using the SEN-600-4 with the TEC2145-2.

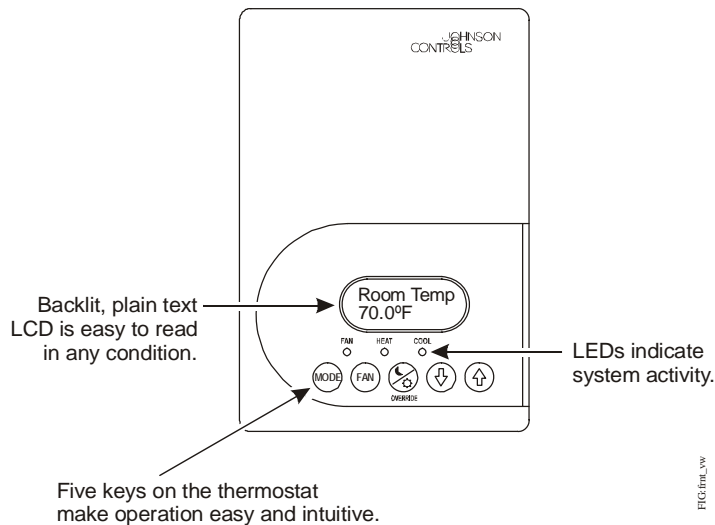


Figure 2: Front Cover of Thermostat

Thermostat User Interface Keys

The TEC2145-2 Thermostat user interface consists of five keys on the front cover (as illustrated in Figure 2). The function of each key is as follows:

- **MODE** key toggles among the system modes available, as defined by selecting the appropriate operation sequence in the Installer Configuration Menu (for example Off, Heat, Cool, Auto).
 - **FAN** key toggles between ON and AUTO for fan control. ON energizes the fan all the time and AUTO operates the fan only on a call for heating or cooling, for both occupied and unoccupied periods.
 - **OVERRIDE** key overrides the unoccupied mode to occupied at the local user interface for the specified TOccTime. (TOccTime is defined by selecting the appropriate time period in the Installer Configuration Menu.) The **OVERRIDE** key also allows access to the Installer Configuration Menu. (See the *Installer Configuration Menu* section.)
- Note:** If one of the binary inputs is configured to operate as a remote override contact, this **OVERRIDE** key is disabled.
- **UP/DOWN** arrow keys change the configuration parameters and activate a setpoint adjustment.

Backlit LCD

The TEC2145-2 Thermostat includes a 2-line, 8-character backlit display. Low-level backlighting is present during normal operation, and it brightens when any user interface key is pressed. The backlight returns to low level when the thermostat is left unattended for 45 seconds.

LEDs

Three LEDs are included to indicate the fan status, call for heat, or call for cooling:

- The **FAN** LED is on when the fan is on.
- The **HEAT** LED is on when heating or reheat is on.
- The **COOL** LED is on when cooling is on.

Menu Overview

There are two menus available to view and configure the TEC 2145-2 Thermostat:

- Status Display Menu
- Installer Configuration Menu

The following sections outline the functions and contents of each menu.

Status Display Menu

The Status Display Menu is displayed during normal thermostat operation. This menu continuously scrolls through the following parameters:

- Room Temperature
- System Mode
- Schedule Status – Occupied/Unoccupied/Override
- Applicable Alarms – The backlight lights up as an alarm condition is displayed.

Note: An option is available within the Installer Configuration Menu to lock out the scrolling display and show only the Room Temperature parameter.

Installer Configuration Menu

The Installer Configuration Menu is used to set up the thermostat for an application-specific operation. To access the menu, press and hold the **VERRIDE** key for approximately 8 seconds.

The Installer Configuration Menu includes the following parameters that are accessed by pressing the same **VERRIDE** key:

- N2 Communication Address
- BI1 and BI2 Input Configuration
- Menu Scroll
- Auto Mode
- °F or °C Temperature Scales
- Six Keypad Lockout Levels
- Sequence of Operation
- Unoccupied Heating Setpoint/Unoccupied Cooling Setpoint

- Maximum Heating Setpoint/Minimum Cooling Setpoint
- Setpoint Type
- Temporary Occupancy Time
- Door Open Time
- Heating/Cooling Deadband
- Room Air Temperature Calibration
- Auxiliary Contact
- Direct/Reverse Acting
- Reheat Time
- UI3 Input Configuration to Locally Monitor Supply Air Temperature or Hot/Cold Water Changeover Switching

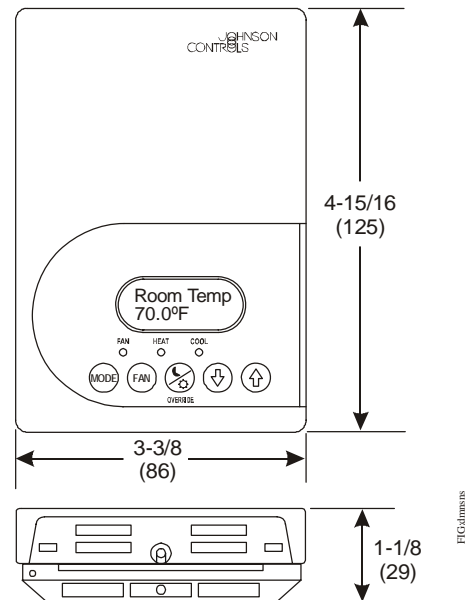


Figure 3: Thermostat Dimensions, in. (mm)

Repair Information

If the TEC2145-2 Thermostat fails to operate within its specifications, replace the unit. For a replacement thermostat, contact the nearest Johnson Controls® representative.

Technical Specifications

Product	TEC2145-2 N2 Networked Thermostat with Single Proportional Output and One-Speed Fan Control	
Power Requirements	19 to 30 VAC, 50/60 Hz, 2 VA (Terminals 4 and 5) at 24 VAC Nominal, Class 2 or Safety Extra-Low Voltage (SELV)	
Analog Output Rating	0 to 10 VDC into 2k ohm Resistance (Minimum)	
Fan Relay Output Rating	30 VAC, 1.0 A Maximum, 3.0 A In-Rush	
Auxiliary Output Rating	Triac Output	30 VAC, 1.0 A Maximum, 3.0 A In-Rush
Digital Inputs	Voltage-Free Contacts Across Terminal Scom to Terminals BI1, BI2, or UI3	
Wire Size	18 AWG (1.0 mm Diameter) Maximum, 22 AWG (0.6 mm Diameter) Recommended	
Thermostat Measurement Range	-40.0°F/-40.0°C to 122.0°F/50.0°C	
Temperature Sensor Type	Local 10k ohm Negative Temperature Coefficient (NTC) Thermistor	
Resolution	±0.2°F/±0.1°C	
Control Accuracy	±0.9°F/±0.5°C at 70.0°F/21.0°C Typical Calibrated	
Control Range	Heating	40.0°F/4.5°C to 90.0°F/32.0°C in 0.5° Increments
	Cooling	54.0°F/12.0°C to 100.0°F/38.0°C in 0.5° Increments
Minimum Deadband	2°F/1°C between Heating and Cooling	
Ambient Conditions	Operating	32 to 122°F (0 to 50°C); 95% RH Maximum, Noncondensing
	Storage	-22 to 122°F (-30 to 50°C); 95% RH Maximum, Noncondensing
Continued on Next Page . . .		

Technical Specifications (Cont.)

Compliance	United States	UL Listed, File E27734, CCN XAPX, Under UL 873, Temperature Indicating and Regulating Equipment FCC Compliant to CFR 47, Part 15, Subpart B, Class A
	Canada	UL Listed, File E27734, CCN XAPX7, Under CAN/CSA C22.2 No. 24, Temperature Indicating and Regulating Equipment Industry Canada, ICES-003
	Europe	CE Mark, EMC Directive 89/336/EEC
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant
Shipping Weight	0.75 lb (0.34 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.

United States Emissions Compliance:

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this 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 Emissions Compliance:

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.



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

Published in U.S.A.
www.johnsoncontrols.com