

## TEC2100 Series Networked Thermostats

The TEC2100 Series of thermostats is a family of highly advanced thermostats specifically designed for control of equipment such as rooftop units (with and without economizers), heat pumps, and single and multi-stage heating/cooling equipment. The TEC2100 features Metasys® system N2 Bus communication capability that enables remote monitoring and programmability for efficient space control. The TEC2100 used an intuitive, plain text, menu driven backlit display that makes setup and operation quick and easy.

The TEC Series includes four models: Single-stage (TEC2101-1), Heat Pump (TEC2102-1), Multi-stage (TEC2103-1), and Economizer (TEC2104-1). All thermostats use a unique proportional control algorithm that virtually eliminates temperature offset associated with traditional differential-based thermostats.



**Figure 1: TEC2100 Series Thermostat**

<b>Features and Benefits</b>	
<input type="checkbox"/> <b>Metasys N2 Open Communication</b>	Provides compatibility with a proven communication network; N2 Bus is widely accepted by Heating, Ventilating, and Air Conditioning (HVAC) control suppliers
<input type="checkbox"/> <b>Liquid Crystal Display (LCD)</b>	Provides real-time control status of the environment in easy-to-read plain text messages
<input type="checkbox"/> <b>Backlit Display</b>	Incorporates a low level back light during normal operation which brightens during user interaction
<input type="checkbox"/> <b>Five Easy-to-Use Interface Keys</b>	Allow for easy adjustment of the thermostat's many options (eliminates the need for dipswitches)
<input type="checkbox"/> <b>Two Digital Inputs</b>	Provides additional inputs for service or filter alarms
<input type="checkbox"/> <b>Over Twenty Configurable Parameters</b>	Enables the thermostat to adapt to any installation
<input type="checkbox"/> <b>Economizer Output (TEC2104-1)</b>	Controls economizer operation for single and multi-stage unitary rooftop equipment

## Product Overview

The TEC2100 Series of thermostats are specifically designed for networked control of the most common commercial heating and cooling equipment. In addition to superior temperature control and application flexibility, the TEC2100 provides the advantage of the Metasys N2 Network communication, so the user can view operation or make adjustments at the thermostat or from a remote workstation. For local interface, the plain text menus, backlit display, and five interface keys make setup and operation of the thermostat extremely simple.

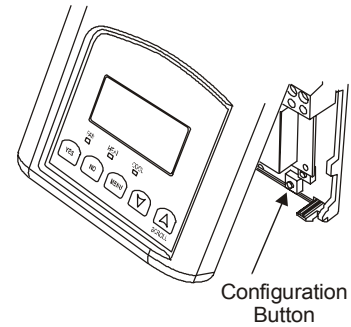
**IMPORTANT:** Use this TEC2100 Series networked thermostats only as an operating control. Where failure or malfunction of these thermostats could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the system. Incorporate 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 TEC2100 Series thermostats.

## Additional Features

The TEC2100 Series also offers many other features:

- **Menu Driven Options**  
Eliminates the need for dipswitches, setup of all configurable parameters are menu driven.
- **Two Configurable Digital Inputs**  
Provides additional inputs, configurable for service or filter alarms at the thermostat. These inputs can also be user defined at the workstation for other functions.
- **Adjustable Heating/Cooling Deadband**  
Adjusts the minimum heating/cooling deadband from 2 to 4F° (1 to 2C°).
- **Remote Indoor and Outdoor Sensing**  
Accommodates remote indoor and outdoor sensors. Up to three indoor sensors can be average.
- **Adjustable Anti-Short Cycling Timer**  
Adjusts the minimum on and off times for the equipment from 0 to 5 minutes.
- **Three Levels of Keypad Lockout**  
Provides three different levels of keypad lockout that can be set up through the menu and interface keys.
- **Concealed Key to Access Configuration Parameters**  
Enables access to all configurable parameters while limiting unwanted parameter tampering once the thermostat is set up.
- **Three Light-Emitting Diodes (LEDs)**  
Provides fan, heating, and cooling status at a glance.
- **Adjustable Temporary Occupancy Time**  
Adjusts the temporary occupancy time from 0 to 12 hours.
- **Frost Protection**  
Turns the heat on when the zone temperature drops below 42°F (5.5°C) regardless of the thermostat's mode.
- **Dry Bulb Economizer Function (TEC2104-1)**  
Provides a 0-10 VDC output for economizer control. Economizer functions include dry bulb changeover, minimum damper position, mixed air temperature setpoint, and control of how mechanical cooling interacts with economizer function.
- **Adjustable Heating/Cooling Cycles per Hour**  
Configurable for the number of heating and cooling cycles in a one-hour period, balancing temperature control and equipment cycling.
- **High and Low Balance Point Adjustments (TEC2102-1)**  
Enables more precise control of heat pump operation based on outside air temperature.
- **System Mode Lockout**  
Allows the heating and cooling modes to be locked out based on outdoor air temperature when an outdoor air sensor is connected.
- **Non-Volatile EEPROM Memory**  
Prevents loss of adjusted parameters during power failure.
- **Network Addressing and Viewing**  
Allows network addressing through the menu driven user interface. Additionally, for quick viewing of the N2 address, pressing the YES and NO keys simultaneously on the user interface displays the N2 address of the TEC.

- **Remote Access**  
Allows the user to read and access TEC2100 parameters from an Operator Workstation or through the N2 Dialer Module (NDM). Binary inputs or the temperature alarm causes the NDM to connect to the workstation upon Change-of-State (COS).
- **Heating and Cooling Stage Enable/Disable (TEC2102-1, TEC2103-1, and TEC2104-1)**  
Allows operation of the second-stage heating or cooling to be disabled, reverting the thermostat to single-stage operation, on heat pump and multi-stage thermostats.



**Figure 2: Configuration Key Location**

### Thermostat Interface Keys

The TEC2100 interface consists of five keys on the front cover and one configuration key (see Figure 2) that can be accessed by removing the front cover. The functions of the keys are as follows. Use the:

- YES key to confirm a selection and move onto the next menu item
- NO key when you do not desire a parameter change, and to advance to the next menu item
- MENU key to access the Main User Menu or exit the menu
- DOWN arrow key to scroll through menu selections or adjust values
- UP arrow/SCROLL key to:
  - scroll through menu selections or adjust values
  - stop the Status Display Menu from scrolling and to manually scroll to the next parameter on the menu. When left unattended for 45 seconds, the display resumes scrolling.

### Backlit LCD

The TEC2100 uses a two-line, eight-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 the lower level when the thermostat is left unattended for 45 seconds.

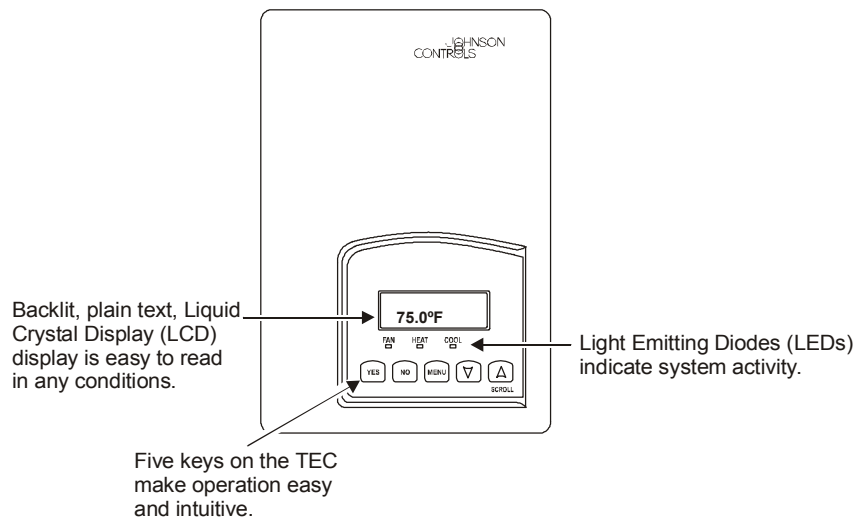
### Light-Emitting Diodes (LED)s

Three LEDs are used to indicate the status of the fan, call for heat, or call for cooling on the TEC2101-1, TEC2103-1, and TEC2104-1. When:

- the fan is on, the FAN LED lights up
- heating is on, the HEAT LED lights up
- cooling is on, the COOL LED lights up

On the TEC2102-1, the three LEDs indicate heat pump operation. When:

- the fan is on, the FAN LED lights up.
- the auxiliary heat is on, the AUX HEAT LED lights up.
- the heat-pump compressor is on, the HEAT-PUMP LED lights up.



**Figure 3: TEC2100 Front Cover**

## Menu Overview

There are three menus used to view, program, and configure the TEC2100 Series thermostats. The menus are:

- Status Display Menu
- Main User 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. The menu continually scrolls through the following parameters:

- Room Temperature
- System Mode
- Schedule Status
- Outdoor Temperature (requires outdoor air temperature sensor)
- Applicable Alarms

Press the up arrow/SCROLL key to temporarily stop the scrolling.

### Main User Menu

The Main User Menu is used to access and change the thermostat's basic operating parameters. The Main User Menu is accessed by pressing the MENU key during normal thermostat operation. This menu is most commonly used by the zone occupant and is comprised of the following parameters:

- Temperature Setpoints
- System Mode
- Fan Mode

The Main User Menu uses Auto Help. Auto Help is displayed automatically in the Main User Menu when there is a pause in programming activity.

### Installer Configuration Menu

The Installer Configuration Menu is used to set up the thermostat for application specific operation. The menu is accessed by removing the front cover and pressing the configuration key, labeled CONFIG (see Figure 2).

This Installer configuration Menu is used by the installer/commissioning technician and contains the following parameters:

- Digital Input Configuration
- Keypad Lockout Levels
- Power Delay on Power-up
- Frost Protection
- Maximum Heating Setpoint/Minimum Cooling Setpoint
- Anti-Short Cycle Timings
- Heating Stages Cycles per Hour
- Cooling Stages Cycles per Hour
- Minimum Deadband
- Heating Fan Control
- End of Cycle Fan Delay
- Temporary Occupancy Time
- Room Sensor Calibration
- Outdoor Air Sensor Calibration
- Number of Heating Stages (TEC2103-1 and TEC2104-1 only)
- Number of Cooling Stages (TEC2103-1 or TEC2104-1) Number of Heat Pump Stages (TEC2102-1)
- Outdoor Air Temperature Heating Lockout
- Outdoor Air Temperature Mechanical Cooling

**The following parameters are for the TEC2102-1 only:**

- Low Balance Point
- High Balance Point
- Comfort/Economy Heat Pump Operation
- Reversing Valve Operation
- Compressor/Auxiliary Interlock

**The following parameters are for the TEC2104-1 only:**

- Outdoor Air Changeover Setpoint
- Outdoor Air Damper Minimum Position
- Mechanical Cooling Enable/Disable with Economizer Operation
- Mixed Air Temperature Setpoint
- Mixed Air Temperature Display

## Dimensions

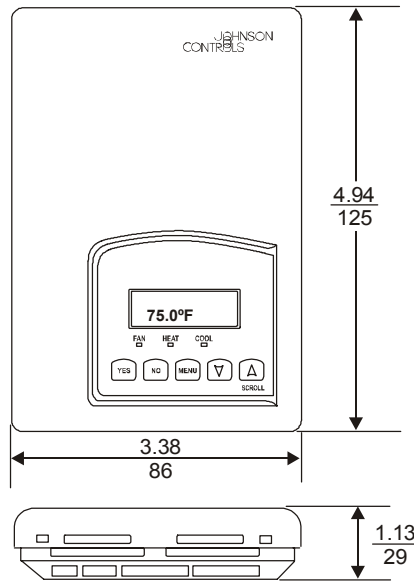


Figure 4: TEC2100 Dimensions (in./mm)

## Ordering Information

Code Number	Description	Applications
TEC2101-1	Networked Single-Stage Thermostat	Fan Coil Unit, Unit Heaters, and Single-Stage Packaged Heating/Cooling Equipment
TEC2102-1	Networked Heat Pump Thermostat	Heat Pump with up to 3 Heating/2 Cooling Stages
TEC2103-1	Networked Multi-Stage Thermostat	Multi-staged Packaged Heating/Cooling Equipment
TEC2104-1	Networked Multi-Stage, Economizer Thermostat	Packaged Rooftop Units with Economizers

## Accessories

Code Number	Description
SEN-600-1	Remote Indoor Temperature Sensor
SEN-600-2	Outdoor Air Temperature Sensor
SEN-600-3	Duct Mount Temperature Sensor

## Technical Specifications

<b>Product</b>	TEC2101-1	Thermostat with N2 Bus, Single-Stage
	TEC2102-1	Thermostat with N2 Bus, Heat Pump
	TEC2103-1	Thermostat with N2 Bus, Multi-Stage
	TEC2104-1	Thermostat with N2 Bus, Multi-Stage with Economizer Control
<b>Power Requirements</b>	20-30 VAC, 50/60 Hz, 24 VAC nominal, Class 2	
<b>Relay Contact Rating Maximum Inductive</b>	1 ampere with in-rush surges up to 3 amperes, 30 VAC maximum, Class 2	
<b>Digital Inputs</b>	Relay dry contact only across the C terminal to DI1 and DI2	
<b>Economizer Output</b>	0 to 10 VDC into 2K ohm resistance minimum (TEC2104-1 only)	
<b>Recommended Wire Size</b>	18 gauge maximum, 22 gauge recommended	
<b>Thermostat Measurement Range</b>	-40 to 122°F (-40 to 50°C)	
<b>Sensor Type:</b>	Local 10K ohm NTC thermistor	
<b>Resolution:</b>	± 0.2F° (± 0.1C°)	
<b>Control Accuracy</b>	± 0.9F° (± 0.5C°) @ 70°F (21°C) typical calibrated	
<b>Outdoor Air Temperature Indication Range</b>	-40 to 122°F (-40 to 50°C)	
<b>Control Range</b>	Cooling: 54 to 100°F (12 to 37.5°C) in 1/2 degree increments Heating: 40 to 90°F (4.5 to 32°C) in 1/2 degree increments	
<b>Minimum Deadband</b>	(Between heating and cooling) 2F° or 1C°	
<b>Ambient Operating Conditions</b>	32 to 122°F (0 to 50°C); 0 to 95% RH noncondensing	
<b>Ambient Storage Conditions</b>	-22 to 122°F (-30 to 50°C); 0% to 95% RH noncondensing	
<b>Dimensions (H x W x D)</b>	4.94 x 3.38 x 1.13 in. (125 x 86 x 29 mm)	
<b>Shipping Weight</b>	0.75 lb (0.34 kg)	
<b>UL and cUL Listing</b>	File E27734 with CCN's XAPX (US, UL 873) and XAPX7 (Canada, CSA C22.2 No. 24)	
<b>CE Compliance</b>	CE Directives EN50091-1: 1992 EMC Emissions; EN50082-2 EMC Immunity (Pending)	
<b>FCC Compliance</b>	This equipment has been tested and found to comply with the limits for a Class A digital device and verified to Class B 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.	

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.

This device complies with Class A Part 15 of the FCC rules. It was also verified to Class B. Operation is subject to the following two conditions:  
 (1) This device may not cause harmful interference.  
 (2) This device must accept any interference received, including interference that may cause undesired operation.  
 This Class A digital apparatus meets all of the 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.



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