TERMINAL CONTROL UNIT

The Terminal Control Unit (TCU) is a microprocessor-based controller for variable air volume (VAV) air terminals. The retrofit TCU can be installed on units manufactured by Carrier or others to provide pressure-independent VAV control. The TCU communicates with Carrier's supervisory controller, the Terminal System Manager II (TSM II), to provide distributed processing in a Digital Air Volume (DAV) system.

The TCU can also operate as a stand-alone controller in a cooling mode when the TSM II is unavailable.

A DAV system is an HVAC system that uses the Carrier Comfort Network (CCN) family of controllers. All communications between the TCU and other devices in the DAV system take place on a CCN Communication Bus.

The TCU is available in three models, each corresponding to a type of air terminal:

- Single duct
- Series fan powered
- Parallel fan powered

Each model of the TCU can be used for cooling-only operation or cooling with heat. The TCU has outputs for the control of auxiliary heat. The auxiliary heat source may be part of the air terminal (duct mounted) or it may be a separate device such as a perimeter heater. Duct mounted heat types include staged electric (up to three stages), two-position hot water, or proportional (floating) hot water. Perimeter heat types can be single stage electric or two-position hot water.

The TCU mounts on the air terminal it controls, positioned on the damper actuator shaft. It is connected to the following inputs:

- Airflow pickup (or pair of pickups) inserted in the duct leaving the air terminal
- Wall-mounted space temperature sensor (SPT)
- Space temperature sensor's setpoint adjustment
- Leaving air temperature (LAT) sensor in the duct leaving the air terminal
- Wall mounted space carbon dioxide sensor (CO₂) for demand controlled ventilation, or relative humidity sensor (RH) (with TSM II Plus only)

The TCU monitors differential pressure from the airflow pickup and compares the resulting signal to a cfm setpoint provided by the TSM II in order to determine correct damper position and provide pressure-independent control of the air passing through the terminal. The accuracy with which the TCU can control airflow output is proportional to the accuracy of the field-supplied airflow pickup(s). The SPT sensor enables the TCU to monitor zone temperature changes in order to satisfy zone demand. The space temperature sensor's setpoint adjustment (optional) provides a method for a user to adjust the setpoint from a wall mounted thermostat (T-56). The LAT sensor monitors the temperature of the air delivered by the air terminal to ensure that the maximum air temperature limit is not exceeded while the unit is in heating mode. A CO₂ sensor is used by the TSM II Plus to monitor the ventilation rate and adjust the minimum damper position to ensure an adequate supply of outside air without overventilation. A RH sensor is used to monitor the relative humidity of the zone. The TSM II Plus uses this sensor reading to control the airflow and heating at the TCU in order to maintain the zone's relative humidity level at the user selected setpoint.
Carrier’s Network Service Tool III can be connected to the system at the SPT sensor. The Network Service Tool III can be used to adjust setpoints and operating parameters for the TCU or any device on the system.

**TCU SPECIFICATIONS**

**Power Supply Voltage**
- 24 Vac (+6, -4)

**Frequency**
- 50/60 Hz

**Power Requirement**
- Cooling-only: 40 VA
- Cooling with auxiliary heat: 50 VA

**Actuator Shaft Size**
- 0.5 or 0.375 inches (1.3 or 0.95 cm)

**Required Damper Shaft Protrusion from Unit**
- 2.75 to 5.0 inches (6.99 to 14.7 cm)

**Torque**
- Running: 35 in-lb (3.95 N-m)
- Stalled: 45 in-lb (5.08 N-m)

**Selectable Timing**
- 45°, 60°, 90° stroke in either CW or CCW direction, 1° per second drive time

**Condition Limits**
- Shipping and Storage: Temperature: -40 to 185°F (-40 to 85.1°C), Humidity: 10 to 95%, non-condensing
- Operating: Temperature: 32 to 130°F (0 to 54.5°C), Humidity: 10 to 90%, non-condensing
- Nominal cfm Range: 200 to 4000 cfm
- Enclosure: 20 gauge galvanized steel
- Weight: 7 lbs (3.15 kg)
- Dimensions: 11.5 in (H) x 10.0 in (W) x 5.5 in (D), 29.2 cm (H) x 25.4 cm (W) x 13.8 cm (D)

**Leaving Air Temperature Sensor**
- Range: -10 to 150°F (-23.3 to 65.5°C)

**Airflow Pickup Sensor (field-supplied)**
- Sensor type: differential pressure, Operating range: 0 to 2 in wc (0 to 0.38 cm-Hg), Accuracy: ± 5%

**Airflow Pickup Tubing (field-supplied)**
- Tubing types: FRPE poly, 1/4 in O.D. (6.4 mm), Tygon®, 1/8 in I.D. (3.2 mm)
- Maximum length: 5 ft (1.5 m)
- Connection: barbed fitting

**Fan Input Status**
- NO dry contact, rated 24 Vac, pilot duty

**Filter Maintenance Alarm**
- NO dry contact, rated 24 Vac, pilot duty

**CO₂ Sensor**
- 4 wire, externally powered 4-20 mA w/ 250 Ω field supplied resistor

**Relative Humidity**
- 2 wire, 4-20 mA w/ 250 Ω field supplied resistor

**OUTPUT SPECIFICATIONS**

**Fan Starter Relay (not used in single duct TCU)**
- Relay type: single pole double throw (SPDT)
- Coil voltage rating: 24 Vac
- Contact type: normally open
- Contact voltage rating: 24 Vac
- Power requirement: Not to exceed 7 VA
- Inrush current: Not to exceed 2.5 A

**Electric Heat Staging Relays**
- Relay type: single pole single throw (SPST)
- Coil voltage rating: 24 Vac
- Contact type: normally open
- Contact voltage rating: 24 Vac
- Power requirement: Not to exceed 7 VA
- Inrush current: Not to exceed 2.5 A

**Hot Water Valves (field-supplied) — Two-Position or Proportional (floating)**
- Voltage: 24 Vac
- Power requirement: Not to exceed 7 VA
- Inrush current: Not to exceed 2.5 A

**Field Wiring Terminals**
- Screw terminals accept #20 AWG wire. Use copper conductors only.