



## ETM Control Settings and Defaults

### Description

Electronic Thermostat Modules (ETMs) are dedicated digital controllers that manage rooftop or unitary HVAC equipment and are often used to upgrade from a conventional thermostat to a device that offers fully distributed digital control. The ETM-1010 is generally installed in the same location as a standard thermostat within the controlled space. The other modules are mounted in the HVAC unit. The basic ETM configuration consists of internal temperature sensors and schedule override buttons.

Like thermostats, ETMs provide primary closed-loop control of multi-staged HVAC equipment. Unlike thermostats, ETMs use advanced, adaptive algorithms to control setpoints, resulting in precise control, making them more energy efficient than conventional thermostats.

ETMs provide advanced control strategies that include:

- Timed local setback override.
- Outdoor temperature lockout.
- Automatic heating/cooling switch-over.
- Adaptive setpoint anticipation to eliminate setpoint overshoot/undershoot.

The following models are available.

MODEL	APPLICATION
ETM-1010	Used with general staged HVAC packaged units, makeup-air heaters, staged single-zone fan coil units, etc.
ETM-2020	Used with staged HVAC system applications that require a second temperature sensor, dirty filter indication, outside damper enthalpy lockout, and remote mounting indoors or outdoors.
ETM-2024	Used for staged HVAC systems that require the features of an ETM-2020 plus a night damper relay to close an outside damper during unoccupied periods.
ETM-2040	Used with staged HVAC system applications that require a second temperature sensor (typically discharge air or second zone), dirty filter indication, and outside damper enthalpy lockout.
ETM-2051	Use to meet the specifications of an original equipment manufacturer (OEM).

ETM-3010	Used for packaged HVAC units, unit and make-up air heaters, and staged single-zone fan coils.
ETM-3010D	Used for packaged HVAC heat pump units.
ETM-3051 ETM-3051T	Used in environments (such as schools or warehouses) where the space temperature sensor might be abused.
TR-10	Trane® RTU System Enhancer

## ETM Control Settings and Parameters

An explanation of the ETM parameters and the options offered for each follows. These control settings are identical for all ETM models plus the TR-10 with the exception of the ETM-3051 and ETM-3051T which behave somewhat differently as described later in this document.

### **Cool Setpoint**

This parameter establishes the cool setpoint temperature for scheduled on periods. The Cool Setpoint must be at least 1°F higher than the economizer and heat setpoint.

- Default: Fixed; 74°F
- Range: Fixed: 46°F to 95°F; Reset: 46°F to 95°F

Heat and cool setpoints may be entered as low as 1°F dead band, dependent upon differentials. Stage 1 heat and cool differentials must be less than or equal to 1°F.

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### **Cool Setpoint: Reset**

When the cool setpoint is set to **Reset**, this parameter establishes the cool setpoint reset range for the ETM-2024 and Standard with Reset models.

- Default: Inactive if Cool Setpoint is set to Fixed; 0°F–0°F if Cool Setpoint is set to Reset.
  - Range: 0°F to 99°F
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### **Heat Setpoint**

This parameter establishes the heat setpoint temperature during scheduled on periods. The maximum setting must be one degree below the cool setpoint.

- Default: 70°F
  - Range: 45°F to one degree less than the Cool Setpoint value
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### **Cool Setback**

This parameter establishes the cool setback temperature during scheduled off periods.

- Default: 85°F
  - Range: One degree above the Heat Setback value to 127°F
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### **Heat Setback**

This parameter establishes the heat setback temperature during scheduled off periods.

- Default: 60°F
  - Range: 45°F to one degree less than the Cool Setback value
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***Fan Operation (Scheduled On)***

This parameter selects the mode of operation for the fan.

- Default: Auto
- Range: Continuous or Auto

Select **Auto** to cycle the fan only when heat or cool is needed. Select **Continuous** to keep the fan on during periods when the ETM is scheduled on.

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### ***Fan Operation (Scheduled Off)***

This parameter selects the mode of operation for the fan during the scheduled off mode.

- Default: Auto
- Range: Continuous or Auto

Select **Auto** to cycle the fan only when heat or cool is needed. Select **Continuous** to keep the fan on during periods when the ETM is scheduled off.

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### ***Cool Stage 1 Setpoint Differential***

This parameter specifies the temperature change that must take place before the ETM cooling function recycles.

- Default: 1.0°F
- Range: 0.5°F to 3°F

The Cool Stage 1 differential value is split half above and half below the Cooling setpoint.

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### ***Cool Stage 2 Setpoint Differential***

This parameter specifies the number of degrees the temperature must rise above the cooling setpoint before ETM activates the second cooling stage.

- Default: Inactive
- Range: 0.5°F to 5.0°F (0°F = Inactive); 0–20 minutes interstate sequence delay

The interstate sequence delay determines how long the ETM is to wait after activating Cool Stage 1 before it activates Cool Stage 2.

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### ***Heat Stage 1 Setpoint Differential***

This parameter specifies the temperature change that must take place beyond the specified heat setpoint before the ETM heating function recycles.

- Default: 1.0°F
- Range: 0.5°F to 3°F

The Heat Stage 1 differential value is split half above and half below the Heat setpoint.

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### **Heat Stage 2 Setpoint Differential**

This parameter specifies the number of degrees the temperature must drop below the heat setpoint before the ETM activates the second stage of heating.

- Default: Inactive
- Range: 0.5°F to 5°F (0° = Inactive), 0 to 20 minutes (interstate sequence delay)

The interstate sequence delay determines how long the ETM is to wait after activating the first stage of heating before it activates the second stage. When a temperature is set, the interstate sequence delay parameter is enabled.

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### **Heat Stage 3 Setpoint Differential**

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**NOTE!** When Heat 3 is enabled, Damper Control cannot be used.

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This parameter specifies how many degrees below the heat setpoint the temperature must go before the ETM activates the third stage of heating.

- Default: Inactive
- Range: 2°F to 9.5°F (0 = Inactive), 0 to 20 minutes (interstate sequence delay)

The interstate sequence delay determines how long the ETM is to wait after activating the second stage of heating before it activates the third stage of heating.

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### **Damper Control**

This parameter defines HVAC damper operation.

- Default: Inactive
- Range: Active, Inactive, or Economizer

Selecting **Active** cycles the damper with fan operation. Selecting **Inactive** uses the damper output point for Heat Stage 3. Selecting **Economizer** enables the damper when the ETM is in cooling mode and is within a specified outside temperature range.

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### **OSA Temp (high) Limit (less than)**

This parameter specifies the outdoor temperature below which the damper output is enabled when the damper control is set to Economizer.

- Default: Inactive
  - Range: 31°F to 95°F
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**OSA Temp (low) Limit (greater than)**

This parameter specifies the outdoor temperature above which the damper output is enabled when the damper control is set to Economizer.

- Default: Inactive
- Range: -31°F to n°F

“n°F” is the temperature specified in the OSA Temp (high) Limit (less than) field.

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**System Enthalpy Lockout**

This parameter allows dampers to operate (if selected as Economizer with correct economizer limits) when a specified IOM output is on. A global enthalpy load must be selected from the executive module’s setup screen.

- Default: Inactive
- Range: Active or Inactive

The enthalpy output is normally on, signaling that the outside air can be used for economizer cooling.

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**Active Cool Mode?**

This parameter activates or deactivates the ETM’s cooling function.

- Default: Yes
  - Range: Yes or No
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**Active Heat Mode?**

This parameter activates or deactivates the ETM’s heating function and specifies the type of heating (gas or electric).

- Default: Yes - Electric
- Range: Yes (electric) or No (Gas)

Gas or electric can be selected when the heating function is activated or deactivated. **Electric** will turn on the fan output on a call for heating if auto fan is selected.

Gas will not turn on the fan output on a call for heating if auto fan is selected. The internal function of the unit should turn on the blower fan.

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**OSA Temp Cool Lockout (less than)**

This parameter specifies the outdoor temperature below which cooling is locked out.

- Default: Inactive
  - Range: 0°F to 99°F (0°F = inactive)
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## **Demand Control**

This parameter activates or deactivates the ETM's participation in the system's demand control function.

- Default: Inactive
- Range: Active or Inactive

Selecting **Active** opens a Demand Shed Register screen that prompts the user to select Register A or Register B. Load shedding is subject to the constraints of the control settings and parameters for each individual load. If a load has been included in one of the shed registers listed under demand control and demand control is changed to inactive at a later date, the ETM disregards shedding instructions from the demand control routine.

For more information about Demand Shed, refer to Novar's *EXECUTIVE CONTROLLER Programming Manual* (available in the Documents folder on the Novar Software Package CD).

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## **Demand Active in Cool Mode**

This parameter determines if demand control is active during cooling mode.

- Default: No
  - Range: Yes or No
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## **Demand Active in Heat Mode**

This parameter determines if demand control is active during heating mode.

- Default: No
  - Range: Yes or No
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## **Demand Period Continuous Fan**

This parameter determines if the fan should operate continuously during demand shed periods.

- Default: No
  - Range: Yes or No
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**NOTE!** Selecting **Yes** does not bring on the fan output if the module is in a "Zero Energy Band" (that is, if the fan is not already commanded on).

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### ***Demand Setpoint Adjust***

This parameter determines if the ETM turns off or only alters its setpoints by a specified amount during demand shed periods.

- Default: 0°F
- Range: Load Shed Off or Setpoint Adjust

Selecting **Setpoint Adjust** prompts the user to enter a setpoint adjust temperature between 0°F and 9°F. If the zone temperature exceeds the control setpoint plus the setpoint adjust, demand shed will be ignored.

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### ***Optimized Start/Stop***

This parameter enables or disables the optimized start/stop function for the equipment controlled by the ETM and specifies the allowable drift temperature during optimized stop. This allows the module to try to meet the control setpoint by the scheduled on time.

- Default: Inactive
- Range: Active or Inactive

The optimized start/stop function must have a primary schedule established before this parameter can be enabled.

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### ***Airflow Input***

This parameter activates or deactivates the ETM's confirming airflow switch input. If it is set to **Active** and airflow is not detected, the fan and all outputs are de-energized.

- Default: Inactive
  - Range: Active or Inactive
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### ***Drift Limit Alarm***

This parameter activates or deactivates an ETM drift limit alarm if the ETM is unable to come within 3°F of its heating or cooling setpoint. The alarm is automatically inhibited as long as the space temperature is approaching the setpoint by at least 0.5°F per 10 minutes.

- Default: Inactive
- Range: Active or Inactive

Selecting **Active** displays the drift limit alarm if the ETM is unable to achieve the heating or cooling setpoint. The alarm condition is reported to EXECUTIVE CONTROLLER.

Selecting **Inactive** displays the drift limit alarm if the ETM is unable to achieve the heating or cooling setpoint. The alarm condition is not reported to EXECUTIVE CONTROLLER.

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### ***Site Emergency***

This parameter determines if the ETM should be turned off when the executive module detects a site emergency.

- Default: Inactive
- Range: Active or Inactive

Network Emergency is part of the Site Emergency parameter. It is set as active or inactive, based on the options selected in a monitoring alarm.

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### ***Timed Override Period***

This parameter specifies how long the ETM is to operate if the override button on the ETM is pressed during a scheduled off period.

- Default: Inactive
- Range: 0 hrs, 0 min to 4 hrs 13 minutes

Setting the period to 0 hours, 0 minutes inactivates the override. Setting it to 4 hours, 14 minutes results in continuous operation. A remote user can force an override via EXECUTIVE CONTROLLER.

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### **ETM Auxiliary Sensor**

This parameter applies to the ETM-2020, ETM-2024, ETM-2040, ETM-2051, and ETM-3051. It establishes a temperature range that the ETM uses in conjunction with the primary sensor for control (see “Control To” below).

- Default: Inactive
  - Range: Dependent upon the module type
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### **Control To**

This parameter applies to the ETM-2020, ETM-2024, ETM-2040, ETM-2051, and ETM-3051. It bases the ETM’s control on its auxiliary sensor input and/or its temperature sensor input.

- Default: Depends on ETM type.
- Range: Zone temperature sensor, Average of two sensors , and Highest/lowest

Selecting **Zone temperature sensor** causes control to be based on the temperature sensor input only. Selecting **Average of two sensors** causes control to be based on the average of the auxiliary sensor input and zone temperature sensor inputs. Selecting **Highest/lowest** causes the ETM to control cooling or heating to the highest or lowest sensor readings.

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### **OSA Temp Heat Lockout (greater than)**

This parameter applies to the ETM-2020, ETM-2024, ETM-2051, ETM-3010, and ETM-3051. It establishes the outdoor temperature at or above which heating stages are locked out.

- Default: Inactive
  - Range: 0°F to 99°F (0°F = Inactive)
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## **ETM Type**

This parameter is used to select the type of ETM used.

- Default: The ETM type selected when the load was created.
- Range: Standard, ETM-2020, Heat Pump, Standard with Reset, ETM-3010, ETM-2024, ETM-2051, ETM-3051

The Phase Loss, ETM Auxiliary Sensor, Control To, and OSA Temp Heat Lockout (greater than) parameters are activated, depending on the ETM type selected.

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## **Heat Pump Compressor Delay**

This parameter applies to the ETM-3010D. It specifies how long the compressor is to be kept off during a call for cooling so that network sequence can turn on another system load (such as the loop pump) before energizing the compressor.

- Default: Inactive
  - Range: 0–20 minutes
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## **Sensor Failure Control Mode**

This parameter defines the sensor failure default mode.

- Default: Default
  - Range: Cool (force cooling on), Heat (force heating on), Default (fan off)
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## **Night Mode Relay**

This parameter allows you to reverse the contacts of the Night Mode relay, also referred to in EXECUTIVE CONTROLLER as the Ventilation Relay.

The relay is intended to be wired in series with the damper minimum position potentiometer. “Normal” means that during occupied times, the relay contact is closed, enabling the minimum position potentiometer to maintain minimum position. During unoccupied times, the relay is open, breaking the circuit of the minimum position potentiometer and allowing the damper to go fully closed. By setting this to **Reverse**, the relay will be open during occupied times and closed during unoccupied times.

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**NOTE!** On the ETM-3051T, the nite mode relay can also be used with the demand ventilation function. Reversing the contacts of the night mode relay also reverses the contacts for the demand ventilation function. The ability to reverse these contacts with the demand ventilation function requires ETM-3051T firmware Version 8.5 or greater.

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## **Setpoint Adjust Mode**

This parameter enables local heating and cooling setpoint adjustments.

- Default: Inactive
- Range: Inactive, Active Always, and Active Schedule Mode Sensitive

Selecting **Inactive** disables the setpoint adjust mode.

Selecting **Active Always** activates the setpoint adjust mode auxiliary input during the scheduled on times.

Selecting **Active—Schedule Mode Sensitive** requires the occupant to push the timed override button prior to adjusting the setpoint adjust dial on the auxiliary input during scheduled on times. The adjustment automatically cancels when the unit schedules off. During the scheduled off mode, it is not active. During a timed override mode, it is always active.

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### ***IMC State***

This parameter applies to the ETM-2051 only. It allows communication to the original manufacturer's equipment to retrieve error codes.

Default: Inactive

Range: Active or Inactive

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### ***Alternate Zone Control Mode***

This parameter applies to the ETM 2051 and ETM-3051 only.

- Default: Standard
- Range: Standard, Fall Back, and Control To

If **Standard** is selected, the module controls to the normally wired ETM-2051 zone sensor. The zone sensor fault alarm applies to this input only.

If **Fall Back** is selected, the module controls to the enhanced zone sensor, which when used is wired to the setpoint adjust (POT) input. If this sensor fails, control reverts back to the normally wired zone sensor. The zone sensor fault alarm applies to both inputs.

If **Control To** is selected, the module controls to the normally wired zone sensor. The zone sensor fault alarm applies to both inputs.

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### ***Demand Ventilation***

The ETM-3051T contains a demand ventilation feature that can be used to monitor the CO<sub>2</sub> level in the zone and open the damper when a defined CO<sub>2</sub> limit is exceeded. It does this by using the ETM-3051T's Ventilation Output (also referred to as the Night Mode Relay).

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### ***CO<sub>2</sub> Input***

This parameter applies to the ETM-3051T only. It is used to define the system input that is used to monitor the CO<sub>2</sub> level in the zone to be controlled.

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### ***CO<sub>2</sub> Setpoint***

This parameter applies to the ETM-3051T only. It is used to define the CO<sub>2</sub> level that must be exceeded before the ventilation relay (also known as the night mode relay) is activated. Different ETMs can have different setpoints, allowing common areas to have staggered setpoints to gradually increase the amount of ventilation as the CO<sub>2</sub> level increases.

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## Special Considerations for setting ETM-3051 and 3051T differentials

For all Novar ETMs, the C1 differential is split evenly above and below the cooling setpoint. After a 20 minute time delay the C2 differential is applied if the first stage cooling cannot reach the desired setpoint.

For ETM-3051 and 3051T the C2 differential works somewhat differently.

For ETM-3051 and 3051T, the C2 differential uses the low end of the C1 differential as its low end.

For example, a setpoint of 74°F with a 2°F differential means the first stage differential is split above and below 74°F so the low end of the C1 differential is 73°F. This means C1 turns on at 75°F and off at 73°F: the same as all other ETMs.

However, for ETM-3051 and 3051T, C2 turns on at its high end differential setpoint which is determined relative to the low end of the C1 differential. C2 will then turn off at 75°F which is the high end of C1 differential.

So in our example, C2 turns on at 76°F and then turns off at 75°F.

Important Note: If the differentials for both stages are equal, then C2 will turn on and off at the same temperature thereby never coming on. This is a unique behavior of the 3051 and 3051T ETMs.

