Submittal Data #148 E
Electronic Thermostat
Three-phase
Contactor version

This state of the art three-phase electronic thermostat is designed to control heating loads up to 600 Vac having a total current draw not exceeding 60 A. It can be fitted with up to three temperature sensors as required by the application. Because separate temperature sensors are used, they may be installed on the pipe during the initial installation phase while the controller itself may only be installed at a later date.

Features include:

- 208, 480 or 600 Vac operation as specified for the use.
- Choice of 3-pole circuit breaker sized for the application (15 to 60A).
- Internal ground fault detection circuitry eliminating the need for an external ground fault device. “Alarm only” or “alarm and trip” is activated when ground fault condition is present.
- Three temperature sensor inputs: TS1 for pipe temperature control, TS2 (when enabled) for pipe temperature control at second location on the piping system and TS3 (when enabled) to serve as a high temperature limit for plastic piping protection. An alarm is activated when an enabled “open” or “shorted” sensor is detected.
- Low temperature alarm on both controlling sensors TS1 and TS2. Alarm level is factory set at dedicated level for each sensor. Feature is enabled at customer request.
- On-off control with a 1^0C *(1.8^0F)* temperature deadband for accurate control of piping systems. This close tolerance control can save thousands of kilowatt-hours of power consumption and is deal to control electric tracing systems in locations where power is costly.
- Override input (factory programmable): timed between 1-48 hours or non-timed. This feature forces “on” or “off” the output to suit the application.
- it can be used to force “off” the heating system during normal recirculation of the piping network.
- Auto-cycle function (when enabled) momentarily turns on heating cable at 24 hours interval to monitor ground fault condition of the load.
- One three-color LED indicator lamp mounted on the door of the controller operates as follows:
  - **Green:** When illuminated, the power supply to the controller is ”on” and the pipe temperature at the sensor is above the setpoint. When extinguished, the power supply is”off”.
  - **Amber:** When illuminated, the temperature controller is calling for heat.
  - **Red:** When illuminated, this indicates that one of the alarms has been triggered. Controller is not calling for heat.
  - **Amber and Red (alternating):** This indicates that one of the alarms has been triggered. Controller is calling for heat.
- Non-volatile memory retains all programmed parameters in the event of a power outage.

Sensor type:
This temperature controller can be factory programmed to operate with one two different types of temperature sensor. By default the controller is programmed for 100 ohms platinum RTD sensor(s). It can also be programmed for 2 252ohms thermistor(s) on special request. The last two digits of the controller’s catalogue number indicate the programming code. Control program codes for 01 to 49 are for use with RTDs and codes for 51 to 99 are for thermistors. Ensure that the proper type of temperature sensor is used with the controller.

Numbering sequence: UTC-V3AA-xx
‘V’ in the catalog number denotes voltage, i.e. : 2 for 208, 4 for 480 or 6 for 600. It also indicates the control transformer’s voltage i.e. : 208/120, 480/120 or 600/120.
‘3’ in the catalog number denotes the number of poles on the circuit breaker.
‘AA’ in the catalog number denotes the amperage of the circuit breaker, i.e. :15, 20, 25, 30,35, 40, 45, 50 or 60.
‘xx’ in the catalog number denotes the control program code as listed in tables 5 and 6.

For example:

- Model number UTC-6320-01 would depict a 600 volts controller with a 3-pole, 20 A circuit breaker and programmed for control on plastic piping using one controlling sensor and one high limit sensor.
- Model number UTC-6345-31 would depict a 600 volts controller with a 3-pole, 45 A circuit breaker and programmed for control on metal piping using two controlling sensors.

Possible combinations:

volts	15 amp	20 amp	25 amp	30 amp	35 amp	40 amp	45 amp	50 amp	60 amp
208 V	2315	2320	2325	2330	2335	2340	2345	2350	2360
480 V	4315	4320	4325	4330	4335	4340	4345	4350	4360
600 V	6315	6320	6325	6330	6335	6340	6345	6350	6360

Three-phase contactor version UTC specifications:
Alarm output: 1A max, 240 Vac max. 50/60 Hz, SPDT (form C) relay output configured for 'fail-safe' operation.
Approvals: CSA "C" – "US" for ordinary locations.
Enclosure: Nema 4, grey painted steel with clips.
Indicator light: Nema 4 multi-function three color LED.
Input voltage range: 208, 480 or 600 Vac, 50/60 Hz, 3-phase / 4-wire as specified.
Monitoring and alarming: The electronics monitor low temperature, ground fault current, open / shorted temperature sensor(s) and high cable temperature.
Operating ambient: -40 to +40^{0}C *(-40 to +104^{0}F).*
Power output: 3-pole contactor output rated 60A-600 Vac.
Terminal blocks:
Power in terminals; L1, L2 and L3: #14 to #4 AWG
Heater terminals; H1, H2, and H3 #14 to #3 AWG
Neutral terminals: #14 to #6 AWG
Spring loaded signal terminals for #28 to #12 AWG
Sensors:TS1: #1- 2 –3 –4, TS2: #5- 6- 7 –8, TS3: #12- 13- 14- 15.
Alarm relay: #9- 10 –11, Alarm reset: #16-17, Override input: #18-19.
Valid temperature range:-40 to +100^{0}C *(-40 to +212^{0}F).*

Factory programmable:
Note: You can use the default settings of the following features by selecting the appropriate program code.
Auto-cycle: When the temperature controller is energized, and then at 24 hours intervals, the controller performs an auto-cycle test by turning on the load to measure the ground fault leakage current. If the measured ground fault current is above the set level, the ground fault current alarm is activated. Can be disabled at the factory upon special request.
Ground fault detection:
Factory adjustable to trip and alarm or alarm only. Setting @ 30 or 100 ma.
Remote override:
The user may force the unit on/off via a remote dry contact. Factory adjustable to operate in timed (1-48 hours) or continuous mode.
Temperature control:
Three 3-wire 100 Ω @ 0^{0}C Platinum RTD (alpha = 0,00385 Ω/Ω/^{0}C), lead compensated to 20 Ω per lead. OR three 2-wire 2 252 Ω@ 25^{0}C NTC Thermistor.
Deadband: 1 t0 5^{0}C *(1.8 to 9^{0}F).*
Control temperature setpoint range: -5 to 75^{0}C *(23 to 167^{0}F*).
Low temperature alarm: Feature can be enabled to provide low temperature alarm on TS1 and TS2.
Low temperature setpoint range: -10 to 75^{0}C *(14 to 167^{0}F).*
High cable temperature: The third temperature sensor (referred to as TS3) is used as a high cable temperature limit for plastic piping system protection. When TS3 is enabled, the high limit feature will override demand for heat and shut off the load when a high cable temperature condition is reached.
High temperature setpoint range: 25 to +100^{0}C *(77 to +212^{0}F).*

Installation:

- The wide ambient operating temperature range of the temperature controller allows installation in any convenient location. Considerations should include exposure to weather elements and accessibility for maintenance and testing.
- Backplate should be removed from the enclosure before any holes are drilled or cut to prevent damage due to flying debris.
- Conduit/cable entries should be made on the bottom of the enclosure to reduce the possibility of water entry. Avoid having holes drilled on the sides adjacent to the electronic components.

Wiring:

- A wiring diagram for the controllers is should this sentence be here?:?????????
- Use only 90^{0}C rated power cable.
- Use shielded, twisted, three-conductor wire for the extension of the RTD leads.
- Use shielded, twisted, two-conductor wire for the extension of the thermistor leads.
- Grounding terminals are provided for connection of system ground leads. Proper system grounding is required for safe and correct operation of the controllers protection feature.
- Shields on the temperature sensor wiring should be grounded only at the controller end using the appropriate terminals provided (#4, 8 and 5).
- To minimize the risk of damages to the controller due to a cable fault, the integrity of the heating cable should be verified by:
  - Performing a high voltage insulation test.
  - Measuring the load resistance with an ohmmeter.
  - In both cases, the results should be recorded for future reference. (refer to Urecon's commissioning log).

Temperature sensor location:

- Install the temperature sensor(s) on the pipe wall and cover with aluminum foil tape to enhance heat transfer.
- The controlling sensor(s) is (are) to be taped directly to the pipe wall, 180^0 away from the heating cable.
- The controlling sensor(s) TS1 and TS2 (when enabled) should be located at the expected coldest point(s) or the piping system.
- If controlling a pipe which enters a heated building, the sensor(s) must be located at least 3m *(10ft)* away from the outside wall to inaccurate temperature sensing.

- The high cable temperature sensor (TS3) is to be taped to an active heating zone of the heating cable (not to the cold lead) within the heat trace channel.
- Loop resistance should not exceed 40 ohms.
- Verify that the temperature sensor(s) is (are) wired correctly. Refer to the wiring diagram.
- Ensure that the temperature sensor extension wire (when used) is grounded at one end only, normally at the controller terminal.

Note: Accurate sensor identification and positioning is essential for an efficient and safe operation of the system.

Control setpoint selection:
As a general rule, program codes 01 for plastic pipe and 21 for metal pipe are used for freeze protection in remote locations where the cost of generated power is high. The low maintain temperature setting of 3^0C shown in those program codes are normally used to reduce power consumption to a minimum. Different program codes having higher temperature settings or different parameter configurations should be specified depending of the specifics of the application such as:

- Impossible to locate the temperature sensor on the expected coldest point of the piping system (ex:code 03,05,23 or 25).
- Stagnant system like a fire water network (ex:code 05 or 25).
- Piping containing chemicals that require higher maintain temperature (ex:code 07 or 27).
- Above/below ground piping network requiring two control sensors i.e.: one in each environment (ex: code13,15, 23 or 35).

Certain applications might also require having a low temperature alarm triggered by the controller. Some standard program codes have a low temperature alarm setting. Refer to tables 5 and 6.

Program codes:
Because the Urecon Temperature Controller is microprocessor based, it can be programmed in a number of different configurations to suit the application. On pages 30-31 of this catalogue you will find a list of standard program codes that are already defined.

It is also possible to have a custom configuration made for special applications. In this case, a photocopy of the special configuration sheet has to be completed and provided to Urecon at time of order.

Examples of some special applications are:

- Specific control setpoint and /or alarm setpoint.
- Enable the timed output to force on the heat; sometimes required to thaw the pipe's content.
- Select the override output state depending on the application (can be used to force off the heat when pipe is flowing).
- Different ground fault detection setting (for very long cicuits.

The selected program code is added at the end of the electronic thermostat catalogue number (suffix) at time of specification so that a thermostat with proper operating parameters can be supplied to the customer. They are listed in two different tables corresponding to the type of temperature sensor used. The standard temperature sensor used is a 100 ohms @0^0C platinum RTD. The electronic thermostat can also be used as a retrofit unit for applications having the 2 252 ohms @25^0C NTC thermistor as used on our previous line of electronic thermostats.

When providing a custom configuration sheet, the thermostat mode number as to be entered and identification of the project name has to be shown. Urecon would then provide a project number that would be referred to in-lieu of the program code.

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