WK0600 - DISPLAY OPTIONS

Add	**Modbus Device Address (1-254, 254)** This is the modbus address of the tstat. It is the address to which the stat will respond when receiving serial communication
CAL	**Calibration of the Selected Temperature Sensor (0-1000, 500)** To calibrate the temperature shown on the tstat display you will need a handheld mercury thermometer or digital thermometer. Hold the meter close to the thermostat and allow it to come to equilibrium. Use the keypad to get into the menu mode until CAL is shown on the display. Now you can adjust the display using the up and down buttons till the temperature shown matches the handheld meter. When you are done, just let the display time out to normal operation, the display will stop flashing and will show the current room temperature. You can repeat this sequence if necessary till the readings on the thermostat and meter agree. The thermostat will store the calibration figures even through extended power outages and should not need to be adjusted for many years. The main point to keep in mind when calibrating is to let everything come to equilibrium. The thermostat should be powered up for 5 minutes prior to any calibration and the thermometer should be left near the thermostat for about the same amount of time. The calibration value is centered around 500 (50.0°) This means that anything above 500 will be added on to the raw temperature and anything below 500 will be subtracted from the raw temperature. Calibration units are in increments of 0.1° (i.e. 500 means 50.0°) and are in the same units (C or F) as the thermostat. Some calibration tips: • The main error in calibration comes from not waiting long enough for the handheld thermometer to come to equilibrium. • Calibrate using the customer’s thermometer, even if it is not an accurate one so that all subsequent measurements are compared to the same benchmark. • The sensor inside the thermostat is a digital chip capable of resolving down to 0.06°C so the weak link in calibrating is usually the procedure used rather than the tstat accuracy. • Make sure the tstat is mounted in a location free of drafts.
tSS	**Temperature Sensor Select (0-3, 0)** The tstat has an extra input for use with an external temp sensor. tSS = 0: The tstat will use the internal temperature sensor IC for the display and PID calculations tSS = 1: The tstat will use an external thermistor which is shown on the display and used for PID calculations. tSS = 2: The tstat will use an internal thermistor which is shown on the display and used for PID calculations. tSS = 3: The tstat will use an average of internal thermistor and external thermistor which is shown on the display and used for PID calculations.
FIL	**Temperature Sensor Filter (0-10, 5)** Filter used for the raw temperature being read by the sensor. This configures the weighted average used when filtering the raw temperature. 0 corresponds to no filter. 10 corresponds to a high level of filtering. If you do not want the temperature on the tstat to change quickly, set this value high. If you want the temperature to respond quickly to changes in temperature set this value low.
AI1	**Analog Input 1 Range (0-4, 1)** This register controls the range of analog input 1. Default setting is 1: 10K thermistor. Actual value of analog data stored in register 180. AI1 = 0: The analog input is configured as raw 10-bit data AI1 = 1: The analog input is configured as a temperature governed by the 10K thermistor curve AI1 = 2: The analog input is configured as a percentage figure, varying from 0 to 100 over the 0-5VDC range. AI1 = 3: The analog input is configured as an on/off 1 or 0 value. AI1 = 4: The analog input is configured as a custom sensor with values calculated using the custom-built lookup table.
AI2	**Analog Input 2 Range (0-4, 0)** This register controls the range of analog input 2. Default setting is 0: raw data. Actual value of analog data is stored in register 181. AI2 = 0: The analog input is configured as raw 10-bit data AI2 = 1: The analog input is configured as a temperature governed by the 10K thermistor curve AI2 = 2: The analog input is configured as a percentage figure, varying from 0 to 100 over the 0-5VDC range. AI2 = 3: The analog input is configured as an on/off 1 or 0 value. AI2 = 4: The analog input is configured as a custom sensor with values calculated using the custom-built lookup table.

dI1	**Digital Input 1 Function(0-5, 0)** The tstat has an extra digital input that can be used to trigger occupancy mode. dI1 = 0: The tstat will not respond to any signals on the digital input dI1 = 1:Freeze protect mode.The tstat will heat room when the ambient temperature less than freeze setpoint. dI1 = 2:Occupency sensor input.Any event from this input will reset the override timer. dI1 = 3: Use dI1 as sweep off, the tstat will go into unoccupied mode whenever this contact is closed. This is an edge triggered event so that the user can still override the time clock input at the keypad anytime after the clock contact closes. The clock input can only initiate unoccupied mode, it will not put the room into occupied mode. Only the user can put the room into occupied mode from the keypad. dI1 = 4: Use dI1 as a clock input, the tstat will go into unoccupied mode whenever this contact is closed. The tstat will return to occupied mode whenever this contact is opened. Pressing a button on the keypad will override unoccupied mode for the duration of the ORT. However, the occupancy mode itself cannot be overriden. dI1 = 5: Use dI1 as a heating/cooling mode controller.First should config the register 214 to the corresponding mode.
Ort	**Unoccupied Override Timer (0-255, 0)** This register controls the amount of time for which the unoccupied state will be overridden if a user presses a button on the tstat. It is in units of minutes. If Ort is set to 0, this means the user cannot override the unoccupied state. This function is ignored if DI1 is set to 1.
dAC	**'Digital to analog converter' analog output calibration (0-255, 100)** This feature allows the on board 'digital to analog converter' or DAC to be calibrated. It is calibrated at the factory and is not normally adjusted in the field. To calibrate the DAC, connect a meter to analog output#1, normally associated with the cooling output signal of the thermostat or relay card. Get into the 'menu mode' and hit the up down arrow keys until "DAC" is displayed. After the first hit of the up or down keys, the analog output signal will switch from normal operation to the full scale value of 10VDC. Use the up/down keys until the meter on the output signal reads 10VDC. When the thermostat times out to normal mode, the output signal wil switch back to normal operation.
bAu	**Baud Rate (0-1, 1)** This is the rate of serial communication. It can be set to either 9.6 kb/s or 19.2 kb/s.
dSC	**Short Cycle Delay (0-20, 0)** This parameter adjusts the delay between cycling of the mode of operation. It is the number of minutes after entering coasting mode until the tstat can re-enter the mode it came from. For example, if the tstat is in Cooling1 mode, and then enters Coasting mode, it will take a delay, dSC minutes, until it can re-enter into Cooling1 mode. This value is in increments of 1 min.
dCH	**Changover Delay (0-200, 0)** This parameter adjusts the delay between switching from a heating mode of operation to a cooling mode of operation or vice versa. It is the number of minutes after leaving cooling or heating mode before the tstat can enter the opposite mode. This value is in increments of 1 min.
PPr	**Proportional Term (10-255, 20)** The proportional term is the 'P' term of the familiar PID control strategy and determines how fast a valve will react to a deviation from setpoint at a particular instant in time. The default value of 2.0° (C or F) is fine for most applications, where a 2.0° deviation is required to make the valve respond 100%. For example, with the PPr term set to 2.0 (°C) and the cooling setpoint is set to 20°C, the valve will be open 100% by the time the room hits 22°C. A larger PPr term will make the valve lazy since the deviation from setpoint will have to be greater before it opens 100%. A smaller value makes the valve respond more quickly. The factory setting of 2.0° (C or F) is fine where the thermostat is located out of the direct airflow in an office size room. For a smaller room or if the thermostat is located directly under the air vent, a slower acting valve is required to avoid short cycling, so set the value of PPr to 3.0° or 4.0°. The PPr term acts in cooperation with the PIn term which is described next. The P value is in increments of 0.1° (i.e. 20 means 2.0°) and is in the same units (C or F) as the thermostat.

PIn	**Integral Term (0-255, 50)** The integral term is the ‘I’ term of the familiar PID control strategy and determines how fast a valve will react to a deviation from setpoint over time. For example with the room slightly above setpoint, the ‘P’ term may be basically satisfied, but a small deviation still exists. This deviation is summed up or ‘Integrated’ over time and the I term will gradually open the valve to make up the final small deviation from setpoint. The default value of 5.0 (%/Deg minute) is fine for most applications and will cause the valve to open 5% for one degree (C or F) of error per minute. For example, when the PIn term set to the default of 5.0 (%/Deg minute), the cooling setpoint is set to 20°C, and the room temperature is 21°C, the valve will be open partially due to the “P” term described earlier but the condition continues and we would like the valve to be opening up slowly to make up the final temperature error. If this situation of 1.0°C error continues for one minute, the error accumulates and the I term nudges the valve open an additional 5%. If the previous explanation is not clear, a couple of helpful reminders are as follows: -think of the I term as the opposite of the P term, -”a bigger I means faster valve, smaller I means lazier valve”. -The default value of 5% will work fine for most applications. -If the valve is short cycling, make the I term lazier (smaller). The I value is in increments of 0.1 %/°min (i.e. 50 means 5.0%/°min) and is in the same units (C or F) as the tstat.
SOP	**Sequence of Operations (0-2, 1)** The Sequence of operation is normally set at the factory and does not need to be adjusted. The thermostat supports field adjustment of the operation to suit different variations of mechanical equipment. Setting this value to a different value will cause the thermostat to stop working properly, so be careful not to adjust this value unless you are familiar with the various sequences. Standard Operation: When SOP is set to 1, the sequence of operations is stored in a table that allows for basically any arbitrary sequence of operation, for example the tstat could be set up to control 5 stages of cooling, 5 stages of heating, or anything in between. Each output is individually assigned to be active in any particular section of the cooling or heating cycle. There are 7 discreet steps, Heat3, Heat2, Heat1, Coasting, Cool1, Cool2 and Cool3. So the table is a 5 outputs x 7 steps spreadsheet arrangement and you fill in the blanks to suit the application. The settings can be stored in an external text file that is easily read and modified in a text editor. The “Tstat Factory” software utility on our website (http://www.temcocontrols.com/ftp/tstat5software.zip) allows you to send your favorite sequence of operations table to a new tstat speeding up the configuration process. Transducer Mode: Setting SOP to 2, puts the Tstat into transducer mode. In this mode, the cooling analog output corresponds directly to the room temperature in degrees C (i.e. at 25°C, the output would be 2.5V). The heating analog output corresponds directly to the setpoint in degrees C. And relay1 corresponds to the occupied/unoccupied mode (occupied = relay1 ON, unoccupied = relay1 OFF). Test Mode: A special sequence of operations is embedded in the tstat that assists in commissioning of the installation and testing of the tstats. When SOP is set to ‘0’ this is the testing sequence and the unit will cycle the relay outputs on and off in a slow rotation. The analog outputs are also cycled in a slow ramp, the cooling goes from 0-10V while the heating goes in reverse from 10 to 0V. The duty cycle of this rotation is approximately 20 seconds, be sure the mechanical system is able to handle this sort of cycling before using this feature.
HC	**Heating Cooling Mode Configuration (0-5, 0)** **This item configures the method by which the tstat determines the heating or cooling mode.** **HC = 0: mode is controlled automatically by the PID. PID > 52 is heating mode, PID < 48 is cooling mode.** **HC = 1: mode is controlled by the keypad or serial communication. This is for keypad configurations in which the user or serial com can** **manually set heating or cooling.** **HC = 2: mode is controlled by the active *high* digital input. High is heating, low is cooling.** **HC = 3: mode is controlled by the active *low* digital input. High is cooling, low is heating.** **HC = 4: mode is controlled by difference in temperature of setpoint and analog in1 sensor. If the temperature of the sensor is greater** **than the setpoint, the tstat will be in cooling mode, and if the temperature of the sensor is less than the setpoint, the tstat will be** **in heating mode. This is primarily used for 2-pipe systems.** **HC = 5: same as mode 4, but using the analog in2 sensor instead of analog in1.**

Hdb Cdb	**Heating & Cooling Deadbands (1-200, 10)** If there is one setpoint, the heating setpoint follows the cooling setpoint and is calculated by: Heating Setpoint = Setpoint - Heating Deadband. Cooling Setpoint = Setpoint + Cooling Deadband If there are two setpoints, heating and cooling are separately adjusted. The setpoints are calculated as follows: Heating Setpoint = Max(Cooling Setpoint + Cooling Deadband , Heating Setpoint) Cooling Setpoint = Min(Cooling Setpoint, Heating Setpoint - Cooling Deadband) The min value for Cdb is 1.0° (C or F) to ensure that simultaneous heating and cooling is never allowed. The maximum value is arbitrarily set to 20.0°. The deadband values are in increments of 0.1° (i.e. 20 means 2.0°) and are in the same units (C or F) as the tstat.
C_F	**Degrees C/Degrees F (0-1, -)** The display can be switched to show Degrees C or Degrees F. 0 = C, 1 = F.
FAn	**Number of Fan Speeds to show on the display (0-3, 3)** The number of fan speeds allowed. Fan = 3, user will see “Off, -1-, -2-, -3-, Aut” Fan = 2, user will see “Off, -1-, -2-, Aut” Fan = 1, user will see “Off, -1- , Aut” , Fan = 0, user will see “Off, On”
nHd nCd	**Night Heating Deadband (0-35, 10) for deg C, (0-95, 10) for deg F** **Night Cooling Deadband (0-99, 10) for deg C and F** When the tstat is in unoccupied mode, and APP is set to 0, the heating setpoint is adjusted downwards by the amount of the nHd. The cooling setpoint is adjusted upwareds by the amount of nCd. The night deadband values are in increments of 1° (i.e. 10 means 10°) and are in the same units (C or F) as the thermostat. Note: The night heating setpoint is prevented through an internal software interlock from being set below 5°C, regardless of the user heating setpoint and the value stored in NHS.
nHS nCS	**Night Heating Setpoint (0-255, 15) for deg C, (0-255, 65) for deg F** **Night Cooling Setpoint (0-255, 30) for deg C, (0-255, 80) for deg F** When the tstat is in unoccupied mode, and APP is set to 1, the heating and cooling setpoints are changed to these values. The night setpoint values are in increments of 1° (i.e. 20 means 20°) and are in the same units (C or F) as the tstat.
APP	**Application (0-1, 0)** 0 - OFFICE applications mode The night time setpoints are specified value Night Heating Setpoint = nHS value. Night Cooling Setpoint = nCS value. 1 - HOTEL or RESIDENTIAL applications mode The night time setpoints are a specified deadband in relation with the day time setpoints Night Heating Setpoint = Cooling Setpoint - nHd value. Night Cooling Setpoint = Cooling Setpoint + nCd value.
POS	**Power on setpoint (0-255, 20) for deg C, (0-255, 68) for deg F** Certain applications require the thermostat to power up with a known setpoint that is stored through a power outage. This feature is useful in some of the transducer modes where the central DDC controller can cycle the power to the thermostats to reset the room setpoints to a known value every day. The power on setpoint value is in increments of 1° (i.e. 20 means 20°) and is in the same units (C or F) as the thermostat.
POn	**Power on Mode (0-3, 3)** This setting allows the thermostat to power up in one of three modes: 0 = power off, 1 = power up in on mode, 2 = last value (default), 3 = auto mode. The on and off settings are self explanatory and are useful in certain DDC applications where the central controller can cycle the power to each thermostat to sweep them off each evening for example. The default value is “last value” and will cause the thermostat to power up in whatever state it was in before the power outage.
PAd	**Number of buttons on the keypad (0-5, 1)** The keypad has up to six buttons. The setting is not normally adjusted in the field, but it does offer some flexibility to adjust the configuration to accommodate changes in the project specifications or possibly to use a tstat from one project on another in an emergency. BUT=2a(0) sets the keypad to only one pair of buttons which are used for adjustng the setpoint. BUT=2b(5) similiar to 2, except that in the 2b configuration, cooling and heating mode can only be changed via the serial interface. BUT=4a(1) sets two buttons for fan speed, and 2 for the setpoint. BUT=4b(4) sets the lower left button for cool/heat mode, the lower right button for fan speed, and the 2 middle buttons for setpoint. BUT=6A(2) sets 2 buttons for fan speed, 2 for setpoint and 2 for heating/cooling mode. BUT=6b(3) sets 2 buttons for fan speed, 2 for cooling setpoint and 2 for heating setpoint.

Aut	**Auto mode only (0-2, 0)** This setting allows the manual modes to be locked out to duplicate the operation of an auto only thermostat. Set this to “0” and the fan will be allowed to go into manual speeds. The user will see “Off, -1-, -2-, -3-, Aut”. Set this to ‘1’ to force the tstat into auto mode when switched on. The user will see “Off, On” The default setting is “0” to allow manual modes for the fan. Set this to ‘2’ to force the tstat into DDC mode,The user can not adjust setpoint and fan speed from keypad,but can adjust them from serial port.
Ou1 Ou2	**Output settings (0-4, 0)** Sets the full-scale voltage of the analog outputs. Ou1 sets analog out 1 (Cooling). Ou2 sets analog out 2 (Heating). This setting is used to match the analog outputs to various types of actuators, transducers or other controllers. For example, by setting the output range to act over a 5VDC scale you can set the tstat up as a transducer to interface into a master DDC controller. Or perhaps you have a valve that operates over the 2-10VDC range, this ‘output’ type setting lets you tailor the thermostat to the particular application. OuX = 0, the output will act in on/off mode. • There are 4 types of tstats. Only the Tstat5A and Tstat5CM have analog output capability. • For Tstat5B and Tstat5C, the firmware recognizes the relays and this will be permanently set to 0 and is not adjustable. • For Tstat5A and Tstat5CM with analog outputs, the output will be 0V when OFF and 10V when ON. This is useful only if you happen to have a Tstat5A or 5CM and need a couple of extra on/off outputs OuX = 1, the outputs will modulate from 0V to 10V over the 0-100% range of any particular stage of heating or cooling. OuX = 2, same as the ‘1’ setting but the output modulates over the 0-5V scale OuX = 3, same as the ‘1’ setting but the output modulates over the 2-10V full scale OuX = 4, same as the ‘1’ setting but the output modulates in reverse i.e. 10V-0V Note: For a 4-20ma actuator it is simple to convert the 2-10VDC signal to a 4-20ma signal by tying in a 250 ohm resistor in series with the output and making sure the grounds of the actuator and tstat are common.
SLO SHI	**Setpoint Minimum (0-255, 15) for deg C, (0-255, 55) for deg F** **Setpoint Maximum (0-255, 50) for deg C, (0-255, 99) for deg F** Rev24: The maximum and minimum allowable user setpoint settings. The occupants cannot adjust the setpoint above or below these settings. The min and max setpoint values are in increments of 1° (i.e. 20 means 20°) and are in the same units (C or F) as the tstat. Note: the heating and cooling deadbands act in a way that reduces these settings by the amount of the deadband. For example, if the highest setpoint allowed is ‘SHI’ = 30°C and the heating deadband ‘Hdb’ = 2°C, heating will actually only be active up to 28°C. Similarly, if the ‘Cdb’ cooling deadband parameter is at 2°C and the minimum setpoint is at 20°C, then cooling takes place only as low as 22°C.
LOC	**Keypad lockout (0-3, 0)** Rev25 only: This setting is useful to keep the building occupants from experimenting in the menu system. When the LOC parameter is set to ‘1’ the keypad will be locked out from all menu operations. The normal operation of the keypad is not affected; the fan and setpoint buttons work as usual. When the LOC parameter is set to ‘2’ the keypad will be locked out from partial menu operations allowing maintenance personnel to access some of the less critical menu parameters while maintaining a LOC on functions reserved for the primary administrator. This option allows access to calibration of the internal and external temperature sensor (CAL and CAE) and the override time parameter (ORT). LOC = 3,The user can not do anything from keypad except enter menu mode.In menu mode,the user can set setpoint ,fan speed,calibration and override timer. When the menu system is locked out, the only way to adjust the tstat parameters is through the network port or through the communications jack at the bottom of the tstat. The parameter can be set back to ‘0’ only though the communications ports as well

dIS	**Display Setting (0-6, 0)** This allows the display to be configured in a few different modes. 0 = display the room temperature. 1 = display the setpoint. 2 = blank display. 3 = display pid2 value. 4 = display pid2 setpoint. 5 = display by manually. 6 = dispaly nothing except keypad pressed.
VTT	**Valve Transient Time (10-255, 0)** This setting allows the user to adjust the valve transient time from fully open to fully closed. Value ranges from 10 (10s) to 255 (255s)
DEF	**Accept Default Setting (0-1, 0)** This allows the user to define the current Tstat configuration as the new FACtory default. Look below in Factory Default for greater details.
FAC	**Factory Defaults (0-1, 0)** This is a special variable that allows the commissioning agent to set all the settings back to the factory default settings. The factory defaults are a good starting point if the thermostat is not behaving as you'd expect, or if you are just not sure about some of the settings. When this 'FAC' setting is displayed, the up and down keys will toggle the display between "no" and "yes". Simply set the value to "yes" and leave the thermostat alone till the display stops flashing. At this point, the settings are all re-set to the factory default values and the thermostat will reset itself. Note: There are a few exceptions to this Factory Defaults restoration, the "SOP" or sequence of operations setting is not restored and also the CAL and CAE calibration values for internal and external sensors are not affected. Note: Firmware Rev24 version tstats store the sequence of operations in a separate table and this table is also not affected.