Simultaneously measure and control temperature and humidity with the Series THC Temperature/Humidity Switch.

The unit offers a 3-digit red display for temperature indication and a 3-digit green display indicating humidity. The Series THC is equipped with four independent relays, two for temperature control and two relays for humidity control.

The unit offers 61 programmable parameters for temperature and humidity control including set point, differential, direct/reverse acting, cycle time, alarm clock time, and decimal point adjustment. In the event of a probe error, the default operating of the relays can be set to open or close. The THC features error or alarm messaging and password protection.

The THC Temperature/Humidity Switch accepts up to two temperature probe inputs and a humidity sensor. A humidity sensor with 0-1V, 0-3V, or 4-20mA output can be used with the Series THC.

INTRODUCTION
Humidity and temperature control all in one unit. This unit features 2 temperature outlets and 2 humidity outlets. Separate temperature and humidity displays.

Temperature Control
3 control options are available: ON-OFF, Neutral and Refrigeration Temperature is controlled by a PTC1000 sensor and a second sensor can be added as a thermostat for defrosting time out control.

Humidity control
2 control options are available: ON-OFF and Neutral. It can use any one of 3 humidity sensors (0-1V, CRPH03, 4-20mA) all of which can be programmed by parameter.

OPERATING INSTRUCTIONS
Temperature setpoints (ST1 and ST2)
- Press SET and let go. Actual setpoint1 (ST1) appears flashing.
  Led Out1 will flash indicating ST1.
- Press UP or DOWN to increase or decrease setpoint value.

- Press SET to confirm new setpoint and actual setpoint 2 (ST2) will appear flashing.
  Led Out2 will flash indicating it is ST2.
- Press UP or DOWN to increase or decrease setpoint value.
- Press SET to confirm new setpoint and exit.

Setpoints for ST1 can vary between a maximum of rt4 and a minimum of rt6 while setpoints for ST2 can vary between a maximum of rt5 and a minimum of rt7. If the setpoint desired is outside this range, change the values of rt4, rt5, rt6 and rt7. Values are changed in the same manner as the other parameters.

Humidity setpoints (SH1 and SH2)
- Press SET H and let go. Actual setpoint 1 (SH1) appears flashing.
  Led Out3 flashes indicating SH1.
- Press UP or DOWN to increase or decrease setpoint value.
- Press SET H to confirm new setpoint and actual setpoint 2 (SH2) will appear flashing.
  Led Out4 will flash, indicating SH2.
- Press UP or DOWN to increase or decrease setpoint value.
Press SET H to confirm new setpoint and exit.

Setpoints for Sh1 can vary between a maximum of rt4 and a minimum of rt6 while setpoints for Sh2 can vary between a maximum of rt5 and a minimum of rt7. If the setpoints desired are outside this range, change the values of rt4, rt5, rt6, and rt7. Values are changed in the same manner as other parameters.

Temperature parameter settings
- Press SET for 8 seconds. 0 will appear flashing
- Use UP and DOWN to introduce code (default setting 0)
- Press SET to confirm. If correct, the first parameter label will appear.
- Use UP and DOWN to go to the desired parameter.
- Press SET to see actual setpoint.
- Use UP and DOWN to change to desired setpoint.
- Press SET to confirm and exit to list of parameters.
- Press SET+DOWN to exit or wait 1 minute (Keypad TIME OUT).

If after changing a parameter, you desire to go directly to 0, press SET+DOWN or 0 on remote control.

Humidity parameter settings
Follow the same steps as when adjusting temperature parameters but using the SET H key.

General parameters (H0, H1, H2, H3) can be adjusted by entering from temperature or humidity parameters.

Save default settings
- Access parameter H0 as explained in adjusting temperature and humidity settings. 0 will appear.
- Press SET or SET H for 8 seconds. Pro will appear on the display if the setpoint is correct and Epr will appear if it is not correct.
- Press SET+DOWN or SET H+DOWN to exit or wait 1 minute (Keypad TIME OUT).

How to visualize secondary temperature sensor
- Press SET+UP on keypad or SENSOR on remote control.

Setpoint will appear on display alternating with message indicating sensor.

Silencing alarm output
- Press UP+DOWN or CLEAR on remote control.

The alarm will reactivate after check time has run out if the state of alarm persists. For memory and sensor failures, the initial check time is 0 followed by 1 hour, once the alarm has been silenced.

Setting the keypad code to 0.
The keypad code can be set to 0 by disconnecting the unit and connecting it again to the power supply while pressing the SET key.

Keypad Protection
The keypad features a parameter which permits keypad entry blocking, so that St1, St2, Sh1, or Sh2 cannot be changed. To momentarily unblock this protection, press SET for 8 seconds and introduce the code in the same way as is done when entering parameters. Press SET+DOWN and exit the parameter settings. Settings can be changed during the following 1 minute time period, even though the keypad protection is activated.

2. Display Indicators

Normal operation.
Under normal operation, the red display will show the sensor 1 temperature setpoint. The green display will show the humidity sensor.

Led out1 indicates relay 1
Led out2 indicates relay 2
Led out3 indicates relay 3
Led out4 indicates relay 4

The furthest digit to the right on the red display flashes on receiving infrared signal.

Display flashing.
When we are introducing a new setpoint for St1, St2, Sh1, or Sh2, and when we are changing a setpoint or when the thermostat is waiting for code from the keypad, the display will flash indicating that it is waiting for confirmation of the setpoint.

If the display flashes immediately after confirmation, a memory input failure is indicated.

Led's flashing.
- Led out1 flashes when programming St1.
- Led out2 flashes when programming St2.
- Led out3 flashes when programming Sh1.
- Led out4 flashes when programming Sh2.

Error and alarm messages.
When an error or alarm message appears on the display, it is alternated with the temperature setpoint in the sensor.
- Err Memory reading error.
- ErP Error in temperature sensor that is not displayed.
3. Temperature control process

**Independent ON/OFF control**

Parameter \( r8 = 0 \) and \( r0 = \text{ind} \). Each relay is associated to a particular Set. \( St1 \) controls relay 1 and \( St2 \) controls relay 2, both for temperature sensor 1.

As an example, direct or reverse relay connection can be selected using parameter \( Ct1 \). In direct connection mode (\( Ct1 = \text{dir} \)), relay 1 will connect when \( TS1 >= St1 + rt1 \), with \( TS1 \) (temperature sensor 1) and will disconnect when \( TS1 <= St1 + rt1 \). \( Rt1 \) is the differential relay for \( St1 \) and will use different temperature setpoints to connect or disconnect relay.

**Dependent ON/OFF control.**

Parameter \( r8 = \text{ON} \) and \( r0 = \text{dep} \). In this case, relay 1 association is the same as in the previous case, but relay 2 uses the sum of \( St1 \) and \( St2 \) setpoints, instead of only using the \( St2 \) setpoint.

In direct connection mode (\( Ct3 = \text{dir} \)), relay 2 connects when \( TS1 >= (St1 + St2) + rt2 \), for \( TS1 \) (temperature sensor 1) and disconnects when \( TS1 <= (St1 + St2) \).

**Cooling control**

Parameter \( r8 = \text{Ref} \). Temperature can be adjusted using relay 1 and sensor 1, while defrosting is triggered by relay 2.

**Defrosting**

Three defrosting methods are available.

- Switching off the compressor. The defrosting relay is disconnected.
- Switching off the compressor and connecting a heat resistor to the defrosting relay.
- Switching on the compressor and connecting an electro-valve to the defrosting relay to reverse the cycle.

To choose the type of defrosting desired. For the first two options, \( dt0 = \text{re} \) and for the third \( dt0 = \text{in} \).

Defrosting should be carried out at time periods indicated by \( dt3 \). If \( dt3 \) is zero, defrosting will not be carried out periodically. First defrosting will occur one \( dt3 \) period after starting up.

Defrosting can be activated and deactivated from the keypad. When defrosting is activated from the keypad, the instructions are introduced between previous programming.
Defrosting cannot be activated if:
- A continuous cold cycle is activated.
- The unit is in auxiliary adjustment mode (due to memory failure).
- Defrosting is already activated.
- TS2 ≥ dt1.
- Maximum defrosting time dt2 is zero.

Defrosting is deactivated when:
- Dt1 temperature is reached.
- Maximum defrosting time dt2 is reached.
- An end defrost order is received from the keypad or remote control.

During and after defrosting, the initial defrosting temperature can be displayed if desired by selecting this option with dt4. This option is available as long as the initial defrosting temperature has not been reached, or an hour has gone by since deactivation.

Continuous cold cycle
A continuous cold cycle. This maintains the compressor in operation for a period of time ct6. These cycles are activated from the keypad and end when the time period is finished or an order is given from the keypad.

The cycle will not commence if:
- The unit is in heat adjusting mode.
- The unit is in auxiliary adjusting mode (due to memory failure).
- Defrosting is activated.

Sensor 2 failure
This will only affect the defrost function. In this case the sensor value is used only to determine how long defrost has been in progress, not when it ends.

Sensor 1 failure
Relays will remain connected, as indicated in parameters Ct4 and Ct5. If Ct4 = oPn, relay 1 will remain open, but if Ct4 = Cl0, it will remain closed. The same applies to relay 2 with parameter Ct5.

ON/OFF2 mode will only affect relay 2, which will remain as indicated in Ct5.

Temperature alarms
If TS1 ≥ St1 + At1, the thermostat will indicate maximum temperature alarm for sensor 1 (Aht) and the alarm will remain activated until temperature TS1 ≤ St1 + (At1 - At0).

If TS1 ≤ St1 - At3, the thermostat will activate minimum temperature alarm for sensor 1 (ALt), and it will remain activated until temperature TS1 ≥ St1 - (At3 - At0) (TS1 temperature sensor 1)

Program At3 to indicate the time lapse between alarm event and indication of an alarm event. At3 is therefore the alarm check time. The alarm is indicated by a message on the display and activating the alarm output if there is one.

St1 and St2 range limits
St1 or setpoint 1 can only range between rt4 as minimum and rt6 as maximum.
St2 or setpoint 2 can only range between rt5 minimum and rt7 maximum.

Temperature range
Pt2 allows for Celsius or Fahrenheit temperature reading.

Sensor calibration
Add the value of Pt0 to the calculated value of sensor 1. The result is the value the thermostat will work with and display as sensor 1 value.

Decimal point.
Parameter Pt1 allows for introducing or deleting decimal points on display. Parameters will always include decimal points.

Number of sensors.
Pt3 allows for choosing 1 or 2 sensors.
4. Humidity control process

**Independent ON/OFF control.**
Parameter rh8 = ON and rh0 = ind. The adjustment of each relay is carried out in association with a given Set. Relay 3 is associated with Sh1 and relay 4 is associated with Sh2 for humidity sensor 3.

As an example, we can choose between direct or reverse connection for relay 3 by using parameter Ch1. In direct connection mode (Ch1 = dir), relay 1 will connect when HS3 >= Sh1 + rh1, with HS3 (humidity sensor 3) and will disconnect when HS3 <= Sh1. Rh1 is the differential relay for Sh1 and it will use different humidity setpoints to connect and disconnect the relay.

![Diagram of relay 3 connection modes](https://via.placeholder.com/150)

Ch0 is the time delay relay. Once it disconnects, it does not connect again until ch0 is over.

In reverse connection mode (Ch2 = inv), relay 3 connects when HS3 <= Sh1 - rh1 and disconnects when HS3 >= Sh1.

![Diagram of relay 3 connection modes](https://via.placeholder.com/150)

Relay 4 functions in the same manner, but is controlled by setpoint Sh2, using rh2 as the differential relay and Ch3 as indicator of direct or reversed connection. Time delay is Ch1.

**Dependent ON/OFF control.**
Parameter rh8 = ON and rh0 = dep. In this case, relay 1 association is the same as in the previous case, but relay 4 uses the sum of setpoints St1 and St2 instead of only using setpoint Sh2.

In direct connection mode (Ch3 = dir) relay 4 connects when HS3 >= (Sh1+Sh2) + rh2, with HS3 (humidity sensor 3) and disconnects when HS3 <= (Sh1+Sh2).

![Diagram of relay 4 connection modes](https://via.placeholder.com/150)

In reverse connection mode (Ch3 = inv) relay 4 connects when HS3 <= Sh1 + Sh2 - rh2 and disconnects when HS3 >= (Sh1+Sh2).

**Neutral zone control**
Parameter rh8 = Neu. Adjustment is carried out in association with Sh1 and with humidity sensor 3 (HS3). When HS3 >= Sh1 + rh3, relay 3 connects, and does not disconnect until HS3 <= Sh1. When HS3 <= Sh1 - rh3, relay 4 connects and does not disconnect until HS3 >= Sh1.

![Diagram of neutral zone control](https://via.placeholder.com/150)

**Sensor 3 failure**
Relays will remain connected, as indicated in parameters Ch4 and Ch5. If Ch4 = oPn, relay 3 will remain open, and if Ch4 = Clo, it will remain closed. The same applies for relay 4 with parameter Ch5.

**Humidity alarms.**
If HS3 >= Sh1 + Ah1, the thermostat will indicate maximum humidity alarm for sensor 3 (AHH) and the alarm will remain active until HS3 <= Sh1 + (Ah1 - Ah0). If HS3 <= Sh1 - Ah3, the thermostat will indicate minimum humidity alarm for sensor 3 (ALH) and the alarm will remain active until HS3 >= Sh3 - (Ah3 - Ah0) (HS humidity sensor 3).

Program Ah3 to indicate the time lapse between alarm event and indication of alarm event. Ah3 is therefore the alarm time check. Alarm is indicated by a display message and activating the alarm output if there is one.

![Diagram of humidity alarms](https://via.placeholder.com/150)

**Other options.**

**Sh1 and Sh2 range limits.**
Sh1 or humidity setpoint 1 can only be set between minimum value rh4 and maximum value rh6. Sh2 or humidity setpoint 2 can only be set between minimum value rh5 and maximum value rh7.

**Calibrating the sensors.**
The value of Ph0 must be added to the calculated value of sensor 3. The result is the value of sensor 3, which the thermostat works with and displays.
Decimal point
Program Ph1 to indicate whether you want to display sensor readings with or without decimal points. Parameters will always have decimal points.

Humidity sensor type
Ph2 allows a choice of 3 types of humidity sensors.
- IV: 0-1 volt output sensor, with OV = 0% H and 1V = 100% H.
- 3V: Electric sensor with 0-3 Volt output.
- 420: 4-20 mA sensor. Use Ph3 and Ph4 to choose this sensor. Ph3 for humidity value for 4mA and Ph4 for humidity value for 20mA.

TECHNICAL CHARACTERISTICS
Power Supply 230 VAC
Mounting imbedded in 120 x 100mm opening with 60 mm depth
Range of Operation 0 °C to 70 °C
Storage -20 °C to 80 °C
Sensor Range Temperature -50.0°C to 150°C
Humidity 0-100% Accuracy Best at 0.5% from bottom of scale
Resolution 0.1 °C
Display 3,3 digit displays plus sign
Sensors Temperature: PTC models CRPTC05, CRPTC20
Humidity: 0-1V, CRPH03, 4-20mA
Inlets - Temperature sensor 1 - Temperature sensor 2 - Humidity sensor 3
Outlets - Relay 1 SPDT Imax=8A res. (3A ind.) Vac max=250V - Relay 2 SPST Imax=8A res. (3A ind.) Vac max=250V - Relay 3 Imax=8A res. (3A ind.) Vac max=250V - Relay 4 Imax=8A res. (3A ind.) Vac max=250V
Connections Screw terminals for 1.5mm² maximum section wire leads
Operation Keypad or infrared remote control (ref. CRIR)
Front Protection IP65

WIRING DIAGRAM

GENERAL OPTIONS
1. Keypad protection
Use H1 to block Set1 and Set2 ranges. This option is only available for the thermostat keypad, and not for the remote control.

2. Communication set-up
Parameter H2. Enter communications settings here.

Parameter H3. This code must be introduced in order to change parameters. This code can be set to zero when starting up if Set key is pressed at the same time.

4. Memory failure.
If a memory failure occurs, the thermostat will leave all the relays open

5. Alarms caused by sensor or memory failures
As soon as sensor1, sensor2 or sensor3 fail, a display message will indicate an alarm. Press UP+DOWN to erase message. If the situation remains unchanged one hour later, the message will reappear.

6. Parameter list
Parameters are divided into temperature parameters and humidity parameters. There are 4 general parameters (H0 to H3) which are the same for both charts.

7. Temperature Parameters

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8. Humidity Parameters

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