TNEAT

THERMONEAT
Digital Thermostat   Model: TN-S211-Series

USER MANUAL

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Please read this manual carefully before using the device.

- Check the power supply voltage before connecting to the device.
- All wiring operation must performed under the power off status.
- Consider the maximum output current of the relay contact (15A (0.75hp)/30A (2hp)). Make sure the relay is not overloaded.
- Be careful when connecting wires of sensor, load and supply input. Improper connection will seriously damage the device.
- Do not expose the device to water or moisture. Turn it off and disconnect the fridge power supply before cleaning.
- Ensure that wires of sensor, load and power supply are far enough from each other.
- Don't drop, hit or shake the device.
- Do not install the device in very hot, cold or humid environments.
- Do not attempt to open and service the device yourself.
- This device is designed based on the specifications of its dedicated temperature sensor. using other sensors will reduce the accuracy of temperature measurement.

General Description

TN-S211 digital thermostat series are microcontroller-based devices suitable for cooling or heating control applications. they utilize a relay to drive a compressor or a heater. They use an NTC type sensor to measure the temperature value. They are fully configurable through defined parameters in the settings menu which can be set via keypad.

Various models of these series and their features are summarized in the following table.

Model \ Feature	Power Supply	Relay Contact Current
TN-S211AA0	220V AC	15A
TN-S211AD0	12V DC	15A
TN-S211BA0	220V AC	30A
TN-S211BD0	12V DC	30A

TN-S211Bx0 Models are able to drive up to 2hp compressors directly.

In 12V DC powered models, the polarity of the power supply does not matter.

Main features

- Accurate temperature measurement
- Can be used as a cooling or heating controller by setting the application mode
- Output delay protection at startup
- Compressor delay protection
- Sensor calibration
- Two access levels for setting the parameters with two separate passwords
- Output rest time, with adjustable cycle Intervals and duration time
- Temperature setting range limitation for end users
- Displaying status of the output
- Displaying compressor rest time activation
- Displaying temperature value with decimal point (-10 <T< +10°C)
- Configurable smart function in sensor failure condition
- Keypad lock function

Technical Specifications

- **Power supply:**
 - **TN-S211xA0:** 220V AC ±20%, 50~60HZ
  - **TN-S211xD0:** 12V DC ±20%
- **Output relay absolute maximum rating:**
  - **TN-S211Ax0:** 15A / 0.75hp
  - **TN-S211Bx0:** 30A / 2hp
- **Power consumption:** < 2w
- **Sensor Type:** NTC 10KΩ at 25°C. Stainless steel tip and waterproof probe
- **Temperature measurement and regulation range:** -40 ~ +99 °C
- **Resolution:** 0.1°C (-10 < T < +10°C), 1°C [-10 ≥ T ≥ +10°C]
- **Accuracy:** ±0.5°C
- **Index of Protection:** IP20
- **Front panel index of protection:** IP54
- **Operating temperature:** -20 ~ +70 °C
- **Storage temperature:** -40 ~ +85 °C
- **Operating humidity:** 20% ~ 85%
- **Connector:** screw terminals

Dimensions and Weight

- **Installing hole size:** 71 (L) x 29 (W)
- **Front panel size:** 77 (L) x 34.5 (W)
- **Product size:** 77 (L) x 34.5 (W) x 62 (D)
- **Sensor wire length:** 2 meters
- **Net Weight (including sensor):**

TN-S211AA0: 165g	**TN-S211BA0:** 176g
TN-S211AD0: 95g	**TN-S211BD0:** 106g
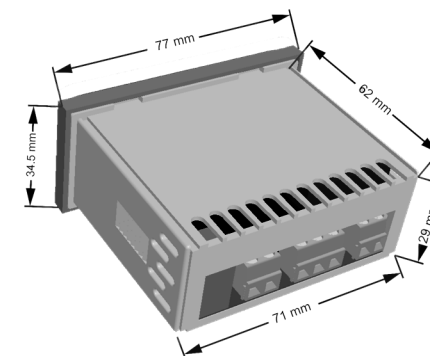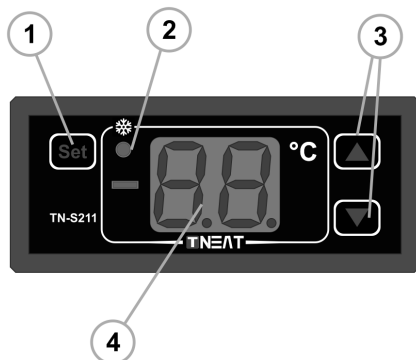
1. **SET Key:** Used In order to enter the device parameters settings and confirm the desired values.

2. **Output Relay Activation Indicator**

3. **UP and DOWN Keys:** Changing the Set Point and Browsing through Menu Parameters and their values.

4. **Two digit seven segment LED Display**

View and change set point

1. by pressing $\blacktriangle$ or $\blacktriangledown$ keys once, set point will be displayed.

2. Select the desired value by pressing $\blacktriangle$ or $\blacktriangledown$ keys.

3. Press Set key to apply and save the selected value as a new temperature set point.

♦ To cancel the operation, don't press any key for a few seconds in steps 1 or 2.

View and change Parameters

1. Press Set key for a few seconds until "PS" appears on the screen. After a while the device is ready to get the password by displaying the number 0.

2. Use $\blacktriangle$ and $\blacktriangledown$ keys to scroll the numbers to find and select the default password, then press Set key. Entering the predefined high access level password, number 24, allows the technician to view and change all parameters while entering the low access level password, number 7, allows the end user to view parameters only. (changing the r0~r2, dt and LC parameters are allowed.)

TN-S211 series menu parameters

Item	Description	Unit	Min	Max	Def
C0	The temperature difference between the set point and temperature value in which output relay will be switched off[1]	°C	1.0	10.0	2.0
C1	Cabinet temperature sensor calibration[2]	°C	-10.0	10.0	0.0
C2	Moving average filter size associated with sampling the temperature sensor[3]	—	1	10	8
C3	Selecting between cooling or heating application (0: Heating, 1: Cooling)	—	0	1	1
t0	Activation of main relay output delay at startup	minutes	1	10	3
t1	Minimum main relay OFF time between two consecutive ON states	minutes	0	10	4
t2	Main relay ON Time in sensor failure conditions[4]	minutes	5	99	15
t3	Main relay OFF Time in sensor failure conditions[4]	minutes	5	99	10
A0	Maximum set point temperature that can be set by end users	°C	A1 + 1	99	20
A1	Minimum set point temperature that can be set by end users	°C	-40	A0 - 1	-20
r0	The period between the intervals of the rest function[5] (r0=0, Rest function is disabled)	10 minutes	0	99	0
r1	Rest function duration value[5]	minutes	0	99	10
r2	Activation of displaying "rS" during the rest time(r2 = 1, "rS" will be displayed)	—	0	1	1
dt	Activation or deactivation of the decimal point in displaying the temperature	—	0	1	1
LC	Locking the keypad[6] (LC= 1, Keypad is locked)	—	0	1	0

1– Application mode (C3), set point and Temperature difference (C0) together, specify the temperature values in which relay will be toggled. the relay contact will be opened at the set point temperature and will be closed at a calculated temperature according to C3, C0 and set point values.

> **Example1 (heating)**: C3= 0, C0= 2 and Set Point= 37, The relay will turn on at 35°C and turn off at 37°C.

> **Example2 (cooling)**: C3= 1, C0= 2 and Set Point= 5, The relay will turn on at 7°C and turn off at 5°C.

2- It is highly recommended not to change this parameter. Any change will affect the accuracy of measurement unless in the case of calibrating the device with a more accurate instrument by an expert in a laboratory.
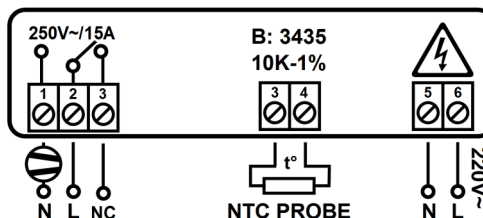
3- Low values assigned to this parameter Increases the fastness of the sensor response to temperature variations but the measured values become more sensitive to noise. High values slowing down the sensor response. However It will provide a more stable and accurate measurement.

4- If any temperature sensor failure occurs, the device will turn the output relay on and off according to t2 and t3 parameters value.

5– For example in cooling application it can be used in cases when the compressor can not reach the desired temperature despite continuous activation. It can protect the compressor from possible damages. Example: r0= 36, r1= 20, the relay output will be turned off every 6 hours (36x10 minutes= 360 minutes), for 20 minutes.

6- when LC is set to 1, by pressing any keys, set point will only be displayed and it will no longer possible to change the set point.

Typical Wiring Diagram


```
250V~/15A        B: 3435
                 10K-1%
 ⟦1⟧⟦2⟧⟦3⟧      ⟦3⟧⟦4⟧      ⟦5⟧⟦6⟧
  N  L  NC      NTC PROBE    N  L
                              220V~
```

Device Errors

E1: Sensor failure, Interruption or problem in temperature sensor Signal.

Read more about this product on website

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