

# **Instruction Manual**

## **Digital Thermohygrometer Model PC-5500TRH**

**SATO KEIRYOKI MFG. CO., LTD.**

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<https://www.sksato.co.jp/en/>

Thank you for purchasing the digital thermohygrometer PC-5500TRH.

- This product is designed to measure indoor temperature and humidity and indicate absolute humidity or the index of heatstroke (WBGT) by calculating. Do not use it for other purposes.
- Read this manual thoroughly before use. Keep this manual in a safe place for future references.

## 1. Prior to use PC-5500TRH

The PC-5500TRH is designed to help prevent seasonal influenza or heatstroke. The unit displays the absolute humidity as a guideline for preventing seasonal influenza or the WBGT index as a guideline for preventing heatstroke, thus encouraging you to increase the humidity or lower the temperature as necessary.

### Preventing seasonal influenza

Infection with seasonal influenza cannot be prevented only by increasing the humidity in a room. In addition to dry air, various factors cause infection with seasonal influenza such as one's health and contact with an infected person. In addition to creating a comfortable environment by referring to the indication on the PC-5500TRH, please take measures to prevent seasonal influenza such as washing your hands and gargling.

### Preventing heatstroke

Heatstroke cannot be prevented only by lowering the room temperature. In addition to hot air, various factors cause heatstroke such as one's health and being used to a hot environment. In addition to lowering the room temperature by referring to the indication on the PC-5500TRH, please take measures to prevent heatstroke such as resting and drinking enough water.

Please understand the above factors and use the PC-5500TRH as a guideline for preventing seasonal influenza or heatstroke.



### **Warning**

This unit is not explosion-proof. Never use it in an atmosphere containing flammable gases



### **Beware of Explosion!**

There is a risk of explosion. Take extreme care

## 2. Cautions in Use

Be sure to observe the following precautions in order to use this unit correctly.

- Use this unit in a normal atmosphere.
- This is not waterproof type. Do not get wet the unit.
- Be sure to use this unit within the specified measurement range. Using the unit outside the specified measurement range will result in failure or damage.
- Do not drop this unit or apply impact to it. This unit is a precision instrument.
- Never disassemble or modify this unit. Doing so may result in failure.
- Do not use this unit in an environment where electrical noise is generated. Doing so may result in unstable display or larger errors.
- Do not wash or wipe this unit with alcohol, thinner, or other solvents. Also, do not wash it in water.  
If the unit becomes dirty, wipe it with a tightly wrung cloth that has been dipped in warm water with neutral detergent.
- If this unit is not to be used for a long time, always remove the batteries from the unit. Otherwise, the batteries may leak fluid, resulting in failure.
- Keep the batteries out of reach of children. If swallowed accidentally, consult a medical attention immediately.

## 3. Overview

- The unit is a desktop or wall-mounted instrument that measures indoor temperature and humidity.
  - The unit has two measurement modes of influenza and heatstroke. According to the measured temperature and humidity, the absolute humidity is displayed in the influenza mode and the WBGT index is displayed in the heatstroke mode by calculating.
  - As for absolute humidity, the correlation with the seasonal influenza epidemic was studied and it was found that the epidemic starts when the absolute humidity drops below 11 g/m<sup>3</sup>, according to a study by a doctor Shoji (\*). Thus, the absolute humidity displayed on the unit can be used as a guideline for preventing seasonal influenza.
  - The unit calculates the WBGT index from the measured temperature and humidity, in accordance with the "Guidelines to prevent heat disorder in daily life" of the Japanese Society of Biometeorology. The WBGT index is low when the air is cool and low humidity, and is high when the air is hot and high humidity. The risk of heatstroke increases with the WBGT index. Thus, the WBGT index displayed on the unit can be used as a guideline for preventing heatstroke.
  - The unit displays the estimated value to achieve the target value for a comfortable environment. In the influenza mode, the estimated value indicates by how much the humidity (%rh) should be increased; while in the heatstroke mode, it indicates by how much the temperature (°C) should be lowered.
- (\*) Dr. Makoto Shoji of Shoji Internal Medicine and Pediatrics Clinic, Miyagi-Pre., Japan

Note that the target values for a comfortable environment are set as follows; these values cannot be edited.

Influenza mode: Absolute humidity of 10 g/m<sup>3</sup>

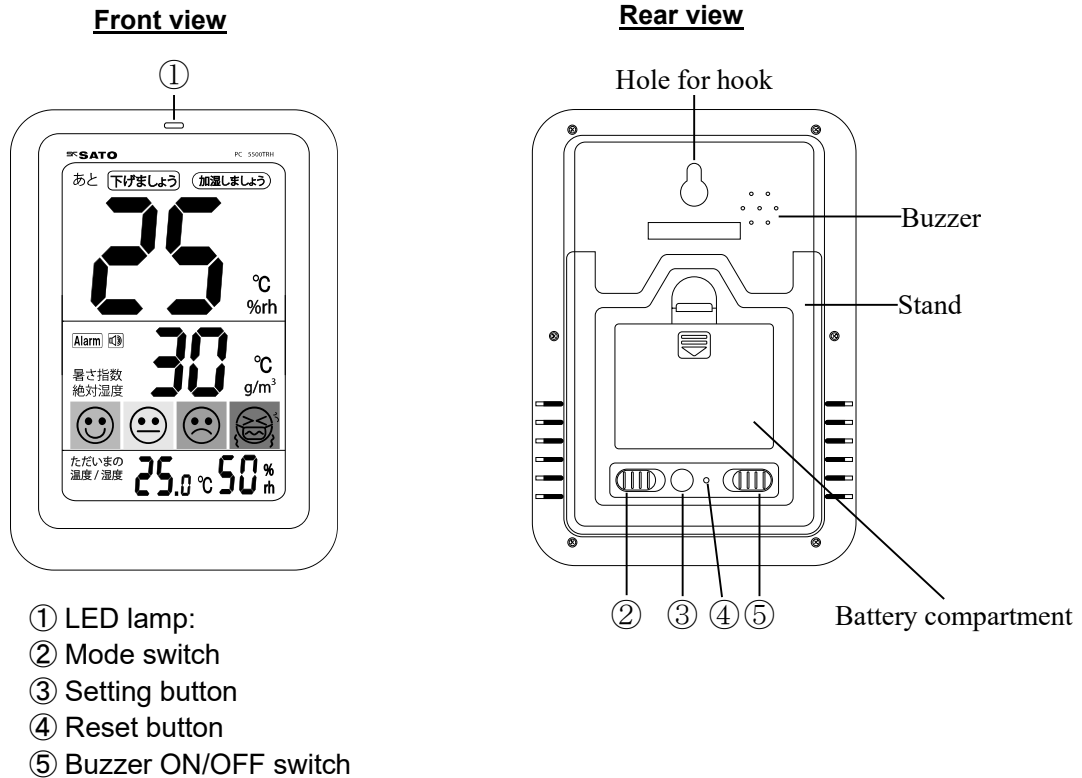
Heatstroke mode: WBGT index of 27°C

#### 4. Features

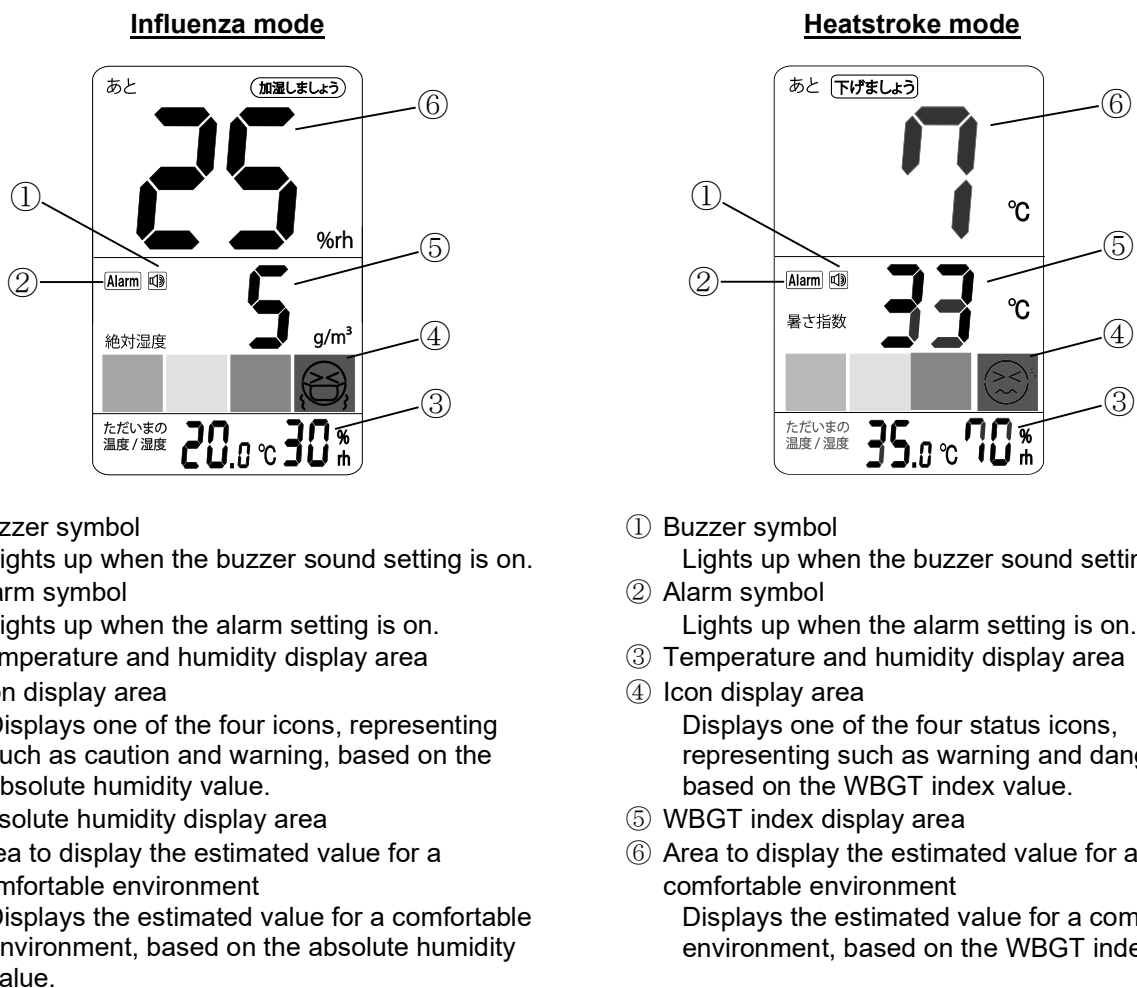
- Guideline for preventing seasonal influenza  
Displays the absolute humidity used as a guideline for preventing seasonal influenza.
- Guideline for preventing heatstroke  
Displays the WBGT index used as a guideline for preventing heatstroke.
- Color icon (face) to show the ambient status at a glance  
Displays an icon (face) representing the ambient status where the unit is being used.
- Estimated value for a comfortable environment  
Displays the estimated value of temperature or humidity to achieve a comfortable environment, indicating by how much the humidity (%rh) should be increased or by how much the temperature (°C) should be lowered.
- Always displays the temperature and humidity.  
The display of temperature and humidity can be used to control the indoor environment.
- Alarm function  
The LED light and the buzzer sound are used to alert the alarm status.
- Two installation methods  
The unit can be installed on a desk or wall.

## 5. Names of Sections

### A. Main unit



### B. Display section



## 6. Installing the batteries

- When using the unit for the first time

① Select a measurement mode by sliding the mode switch on the back of the unit.

- Influenza mode : Displays the absolute humidity and the estimated value (%rh) that indicates by how much the humidity should be increased to achieve a comfortable environment. Use the mode as a guideline for preventing influenza in winter.
- Heatstroke mode : Displays the WBGT index and the estimated value (°C) that indicates by how much the temperature should be lowered to achieve a comfortable environment. Use the mode as a guideline for preventing heatstroke in summer.

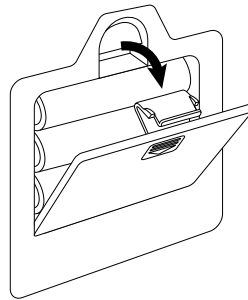
② Remove the transparent insulating tape from the battery compartment.

The unit starts up in the selected measurement mode, and displays the measured and calculated values.

- When replacing the batteries with new ones

When the display is dim or the buzzer sound volume is too low (inaudible), the battery power is likely to be low. Replace the batteries as follows.

① Remove the battery cover as shown in the figure below and take out the old batteries.



② Install the new batteries with the correct polarity (+ or –), and then replace the battery cover.

- After replacing the batteries, the displayed items and alarm setting are reset to the initial state. The measurement mode set and the buzzer sound ON/OFF setting are retained.
- Before installing the batteries, select the desired measurement mode as necessary.



### Warnings

- When the display dims or the volume of sound gets smaller or buzzer does not sound at all, replace batteries immediately.
- Always use new and the same type of batteries for a battery replacement.
- Do not dispose of exhausted batteries in a fire.
- For environmental conservation, dispose of used batteries in compliance with local rules and regulations

## 7. Using the PC-5500TRH

① Install the unit where it is to be used.

\* When using the unit on a desk

: Flip down the stand on the back of the unit and stand the unit up on the desk.

Choose a stable desk or table free of vibration and where there is no risk of dropping.

\* When using the unit hung on the wall

: Use the wall-mount hole on the back of the unit to hang it on a hook.

**NB:** Make sure that the hook is securely mounted on the wall before hanging the unit.

② Leave the unit in the operating environment for at least 30 minutes to adapt to it.

③ The unit displays the measured values of temperature and relative humidity, calculated absolute humidity or WBGT index, icon (face) representing the status (such as danger or safe) based on the measured values and the estimated value to achieve a comfortable environment.

- Absolute humidity : Displays when the influenza mode is selected.

- WBGT index : Displays when the heatstroke mode is selected.

**NB.** - For switching between the influenza and heatstroke modes, refer to the "Selecting the measurement mode" section.

- The unit updates the values (measured and calculated) and the icon at about 30 sec. intervals.



### Warnings

- Do not use the instrument at a place exposed to direct sunlight or near a heater. Doing so may cause deformation of the casing and/or measurement errors.
- When the ambient temperature rapidly changes, the change may make an effect on the measured values. Leave the unit in the ambient temperature sufficiently. Be careful about condensation.

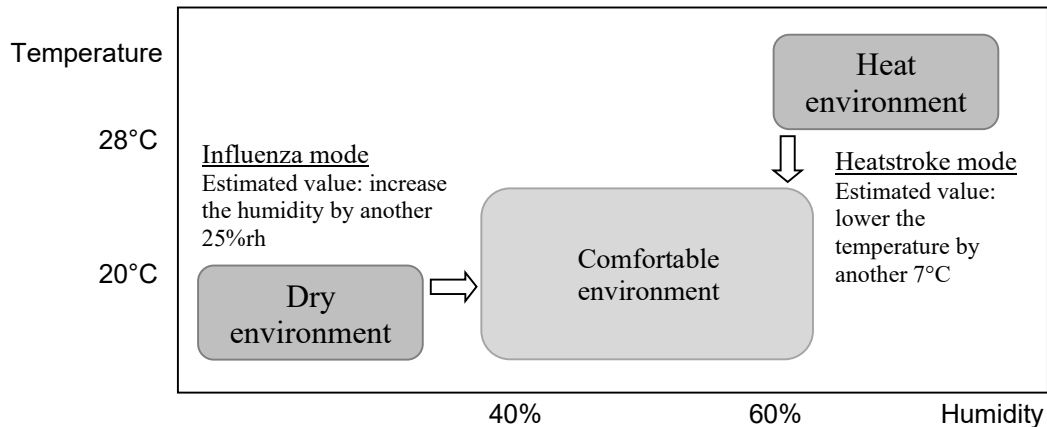
### Icon Representation

The icons (faces) show the warning levels depending on absolute humidity and WBGT index in order to easily recognize the current status.

	Influenza mode			Heatstroke mode		
	Icon	Status	Absolute humidity	Icon	Status	WBGT index
Green		Low risk	17g/m3 or higher		Caution	24°C or lower
Yellow		Low risk	12 to 16g/m3		Alert	25 to 27°C
Orange		Caution	8 to 11g/m3		Warning	28 to 30°C
Red		Alert	7g/m3 or lower		Danger	31°C or higher

### Estimated values in Comfortable ambient

Estimated values to achieve the target value for comfortable ambient are displayed according to the absolute humidity and WBGT index. The following chart is an image about display action. The values in the chart are the representation example.



### Influenza mode

The unit displays by how much the humidity (%rh) should be increased assuming that the temperature is constant, to achieve the target humidity for a comfortable environment.

Example: Measured temperature : 20.0°C  
 Measured relative humidity : 30%rh,  
 Calculated absolute humidity: 5 g/m<sup>3</sup>

Temp.	Current status	Comfortable	
20°C	30%	55%	R. Humidity
	5g/m <sup>3</sup>	10g/m <sup>3</sup>	Absolute Hum.

The unit displays "Increase the humidity by another 25%rh", meaning that the required increase in estimated relative humidity value for a comfortable environment is 25%rh.

- The target value for a comfortable environment is set to 10 g/m<sup>3</sup>, regardless of temperature. The absolute humidity of 10 g/m<sup>3</sup> is in the "Caution" status for influenza. The drawbacks of increasing the humidity include condensation or mold in a room. Use the value as a guideline depending on your application and surrounding.
- If the absolute humidity is 10 g/m<sup>3</sup> or more, the estimated value for a comfortable environment is displayed as 0%rh.

### Heatstroke mode

The unit displays by how much the temperature (°C) should be lowered assuming that the humidity is constant, to achieve the target WBGT index for a comfortable environment.

Example: Measured temperature : 35.5°C  
 Measured relative humidity : 70%rh  
 Calculated WBGT index : 33°C

R. Hum.	Comfortable	Current status	
70%	28°C	35°C	Temperature
	27°C	33°C	WBGT index

The unit displays "Lower the temperature by 7°C", meaning that the required lowering in estimated temperature value for a comfortable environment is 7°C.

- The target WBGT index value for a comfortable environment is set to 27°C, regardless of humidity. The WBGT index of 27°C is in the "Warning" status for heatstroke. When doing vigorous exercise, there is still a risk of heatstroke even in a comfortable environment. Use the value as a guideline depending on your application and surrounding.
- If the WBGT index is 27°C or less, the estimated value for a comfortable environment is displayed as 0°C.

## 8. Selecting the measurement mode

- ① Select a mode by sliding the mode switch on the back of the unit.

Influenza mode ↔ Heatstroke mode

- ② Reset the unit by either of the following ways.

The unit restarts in the selected mode.

- Push the reset button with a thin pointed object such as a straightened paper clip.
- Remove the batteries, and then install them again.

## 9. Alarm function

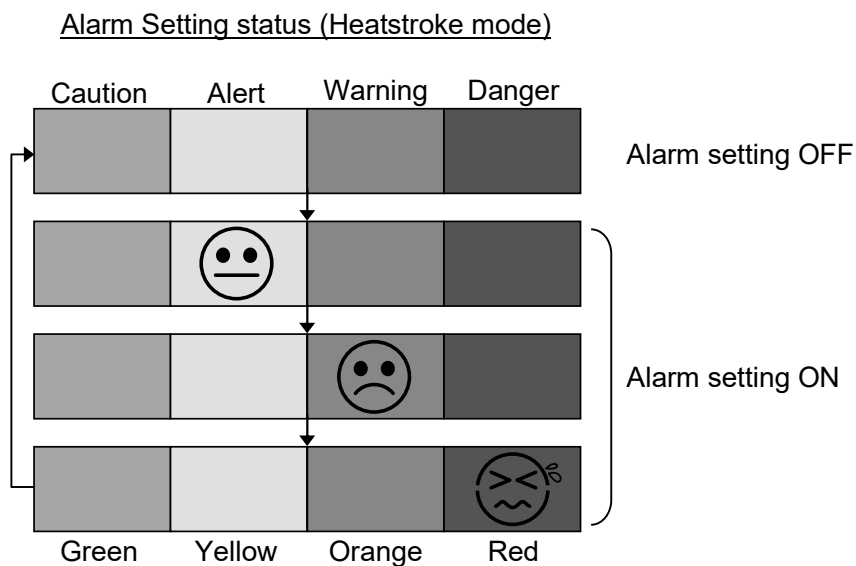
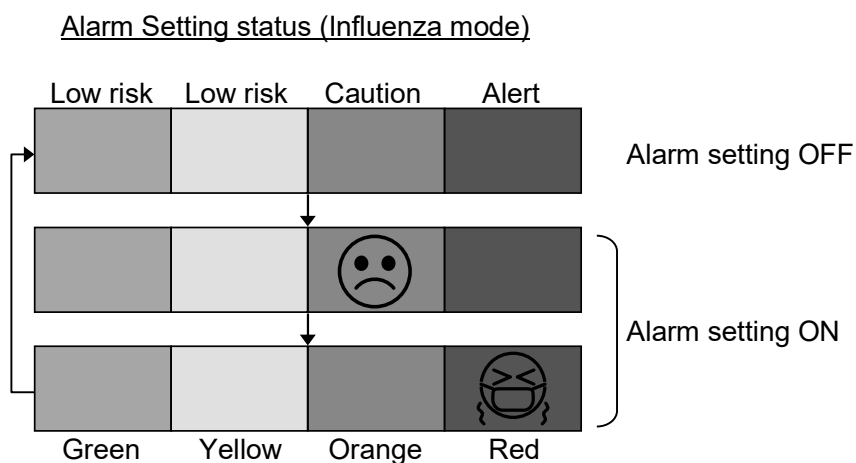
The alarm function in this unit is set against the status icon, not against the measured temperature/humidity value or calculated absolute humidity/WBGT index. For the meanings of the icon, refer to the "● Icon representation" section.

### ● Setting the alarm

- ① Press and hold the Set button at the back of the unit for at least two seconds to enter the alarm setting mode.

Once the unit enters the alarm setting mode, the alarm symbol (**Alarm**) starts flashing.

- ② Press the Set button to select the desired alarm status (icon).





- ③ After selecting the icon, press and hold the Set button for at least two seconds to confirm and return to the measurement mode.

The alarm symbol lights up when the alarm is set to ON.

- Set the alarm to OFF if it is not to be used.

The alarm is set to OFF at the factory, and it is set to OFF once the unit is reset.

If no button is pressed for about 30 seconds in the alarm setting mode, the alarm status (icon) currently selected is confirmed and the unit returns to the measurement mode.

## ● Alarm operation

### ① Initial alarm operation

When the measured value reaches the alarm status (icon) selected, the buzzer sounds for about 30 seconds and the LED light starts flashing to alert.

### ② Continuous alarm operation

When the measured value continues falling in the selected alarm status or in the status beyond it, the buzzer keeps sounding for about two seconds every 30 seconds and the LED keeps flashing.

- When the measured value goes below the alarm status, the continuous alarm operation is reset.


- The buzzer sound can be turned on or off. Refer to the "Setting the buzzer sound" section.

When the buzzer sound is set to OFF, only the LED light comes on in the alarm status.

## 10. Setting the buzzer sound

The buzzer sound used during the alarm operation and the button operation can be turned on or off.

- ① Use the buzzer sound ON/OFF switch on the back of the unit to turn the sound on or off.

- ② Once the buzzer sound is set to ON, the "Beep" sound is heard and the buzzer symbol (  ) lights up in the display area.

## 11. References

### ● Absolute humidity

Absolute humidity is a unit for measuring humidity, which is defined as the mass of water vapor contained in a given volume of moist air.

Low absolute humidity means that the air is dry with low water content, while high absolute humidity means that the air is moist with high water content.

The correlation between absolute humidity and seasonal influenza epidemic was studied, and it was reported that the epidemic starts when the absolute humidity drops below 11 g/m<sup>3</sup>, according to Dr. Makoto Shoji (\*). Thus, the determined absolute humidity can be used as a guideline for preventing seasonal influenza.

#### Relation between absolute humidity and seasonal influenza epidemic

Absolute humidity	Air dryness and seasonal influenza epidemic
7 g/m <sup>3</sup> or lower	Air is extremely dry: Highest risk of seasonal influenza epidemic
8 to 11 g/m <sup>3</sup>	Air is dry: Medium risk of seasonal influenza epidemic
12 to 16 g/m <sup>3</sup>	Air is wet: Low risk of seasonal influenza epidemic
17 g/m <sup>3</sup> or higher	Air is very wet: Lowest risk of seasonal influenza epidemic

Source: "Seasonal influenza epidemic and absolute humidity", by Dr. Makoto Shoji of Shoji Internal Medicine and Pediatrics Clinic, Sendai City, Miyagi Prefecture, Japan (\*)

- Wet bulb globe temperature index

The wet bulb globe temperature (WBGT) index integrates the three factors of air temperature, humidity and radiation heat, each of which greatly affects the heat balance of the human body. The index is normally obtained using the dry, wet and black bulb temperature measurement values.

Measurement of wet or black bulb temperature requires considerable expertise, and the equipment handling and location are limited.

The unit calculates the WBGT index by using the measured temperature and humidity, in accordance with the "Guidelines to prevent heat disorder in daily life" of the Japanese Society of Biometeorology.

The WBGT index is low when the air temperature and humidity are low, while it is high when the air temperature and humidity are high.

The risk of heatstroke increases with the WBGT index. Thus, the determined WBGT index can be used as a guideline for preventing heatstroke.

#### Guideline for preventing heatstroke in daily life

WBGT index	Risk of occurrence in relation to physical activity	Remarks
Danger (31°C or higher)	Risk during any physical activity	Risk of occurrence is high in the elderly, even in the resting state. Avoid going out and stay in a cool room.
Severe warning (28 to 31°C)		Avoid direct sunlight outdoors and watch for any rise in room temperature indoors.
Warning (25 to 28°C)	Risk during moderate to vigorous physical activity	Regularly take adequate rest when exercising or doing vigorous work.
Caution (25°C or lower)	Risk during very vigorous physical activity	Basically low in risk, but high in risk when doing vigorous exercise or heavy labor.

Source: "Guidelines to prevent heat disorder in daily life" of the Japanese Society of Biometeorology

## 12. Error message

. If there is a malfunction detected, one of the following error codes will be displayed.

Indication	Display	Causes	Action
Temperature and humidity display section	Lo	Measured value exceeds the measuring range	Bring the value within the measuring value
	Hi		
	- - -		
	Temperature value is blinking	In flu mode, the measured value is less 11°C or less. (*1)	Raise the temperature in the room or environment
Absolute humidity and WBGT index display section	- - -	Humidity or temperature value exceeds the measuring range. (*2)	Bring the value within the measuring value
Estimated value for achieve the comfortable temperature	- - -	Humidity or temperature value exceeds the measuring range. (*3)	Bring the value within the measuring value
If the problem persists, please contact the store where you purchased it or our Service Network.			

\*1: If the ambient temperature drops below 11°C, the humidity cannot be increased beyond the absolute humidity value of 10 g/m<sup>3</sup>, the target value for a comfortable environment.

\*2: Displayed when the measured temperature/humidity is Hi/Lo or when the measured temperature is below 0°C.

\*3: Displayed when the measured temperature/humidity is Hi/Lo or when the measured temperature/humidity is as follows.

Influenza mode : Measured temperature is below 11°C.

Heatstroke mode : Measured temperature is below 0°C.

### 13. Specifications

Name	: No. 1051-00 Digital Thermohygrometer		
Model	: PC-5500TRH		
Measuring Range	Temperature	:	0.0 to 50.0°C
	Relative Humidity	:	20 to 95%
	Absolute humidity	:	1 to 65g/m <sup>3</sup> (calculated)
	WBGT index	:	0 to 50°C (calculated)
Accuracy	Temperature	:	±1.0°C at 10 to 40°C
		:	±1.5°C at other than above
	Humidity	:	±5%rh at 40 to 70%rh at 20 to 30°C ±8%rh at other than above
Resolution	Temperature	:	0.1°C
	R. Humidity	:	1%
	Absolute humidity	:	1g/m <sup>3</sup>
	WBGT index	:	0.1°C
Sampling time	: Every 30 sec.		
Sensing elements	Temperature	:	Thermistor
	Humidity	:	Electric resistance change type humidity sensor
Operation ambient	: 0 to 50°C, less than 95%rh (no condensing)		
Storage condition	: -10 to 50°C (no condensing)		
Power requirement	: “AA” size battery x 3 pcs.		
Battery life	: about one year (in use of alkaline batteries. one alarm operation per day)		
Dimensions	: 120 (W) × 170 (H) × 25 (D) mm		
Materials	: ABS resin, acryl resin		
Weight	: about 280 g (inclusive a battery)		
Standard accessories	: “AA” manganese battery (P6P) x 3 pcs.		

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