

# OPERATION MANUAL

## WBGT METER w/Wind Speed



CE

Model: ■ 87785

## INTRODUCTION

Thank you for purchasing this WBGT meter. The handy meter measures wind speed, air temperature, globe temp. and humidity to give heat stress index WBGT for using in control of physical activity in hot environment to limit the danger of heat-related injuries

WBGT (wet-bulb globe temperature) was developed as a monitoring basis at US military training camps and became widespread for the use in workplaces and sports situations. It is suggested in an international standard ISO 7243 and many governments such as OSHA (US Occupational Safety & Health Administration), SMA(Sports Medicine Australia)and Japan Society for Occupational Health in establishing the permissible heat exposure limits in occupational health, sports or other physical activities.

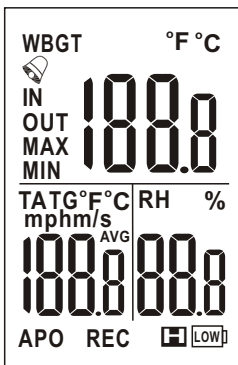
The applications of the heat index can be in construction, iron and steel foundries, bricks-firing plants, glass facilities, boiler rooms, mining sites, army training, marathon, beach activities and so on.

### **Features:**




- Direct measurement of the radiation effect with a brass black ball.
- Adjustable and audible WBGT alarm threshold monitoring
- Sensor protecting mechanism
- Backlight indicator function (Red, Yellow and Green )
- Easy self calibration for humidity
- PC connect for data analysis
- Wind speed measuring included

# CONTROLS AND INDICATORS






## LCD display



## Symbol indication


WBGT	Wet Bulb Globe Temperature
TG	Black Globe Temperature
TA	Air Temperature
mph	Wind speed (mile per hour)
m/s	Wind speed ( meter per second)
AVG	Average wind speed
RH/%	Relative Humidity
°C/°F	Celsius/Fahrenheit
IN	Indoor (no sun)
OUT	Outdoor (full sun)
APO	Auto Power Off
REC	Recording ( <i>invalid in 87785</i> )
MAX	Maximum
MIN	Minimum
FULL	Memory Full ( <i>invalid in 87785</i> )
	Low battery indicator
	Alarm buzzer indicator
	Hold Function

## Function Keys

-  -Press power key to turn on/off the meter. When meter is powered on, APO displayed on LCD.  
-Press  +  key to turn on the meter in non-APO mode. NO APO on LCD.  
-You will see the firmware version on the LCD for 2 seconds while power on.
  
-  -In normal mode, press TA/TG key to switch the displayed temperature from TA ->TG->current wind speed -> average wind speed
  
-  -In normal mode, press MAX/MIN key to switch the displayed parameter to max/min and then return to normal. The value is counted from power on. If you want to reset the value, power off the meter. (Note: Max/Min value will be show on LCD for 60 seconds then return to normal mode automatically).  
-In setup mode, press this key to exit from setup and return to normal mode.



-In normal mode, long press SET key to enter setting mode.

-In setup mode, followings are programmable.  Key is used for setting / save.



-In normal mode, press IN/OUT key to switch the WBGT mode as Indoor or Outdoor.


-In setup mode, press this key to increase the value.



-Press HOLD key to freeze current reading  appears on LCD. Press again to release.

-In Setup Mode, press this key to decrease the value.

-While press HOLD to freeze the reading, it also activate the back light. The back light color was change with WBGT value. See below.

Press  key again to release and turn off the back light.

Above 32.2°C: Flashing Red

31~32.2°C: Red light


29.4~31°C: Yellow light

26.7~29.4°C: Green light

Below 26.7°C: No back light

# OPERATING INSTRUCTIONS

## 1. POWER ON/OFF

Press  to turn on and turn off the meter. All indicators are shown on the LCD when power on, and then enter measuring mode. You will see the firmware version on the LCD for 2 second while power on.

## 2. MEASUREMENT

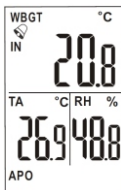
### Wind Cup

Wind cup can measure wind from all direction. There is a tripod hole on the bottle of device. You may use tripod to hold the device vertically for long term use.




### Display mode

The meter measures TA (Air Temp), TG (Globe Temp), Wind Speed, average wind speed, RH (Relative Humidity), and calculates WBGT will be shows on the LCD. (Fig. A)




### IN/OUT switch

To measure WBGT without or with direct sun exposure under IN/OUT modes, press  to switch.

### 3. ALARM / UNIT SETTING

#### P1.0 WBGT alarm setting

##### P1.1 alarm buzzer ON/OFF

In normal mode, long press  key to enter setup mode.

When alarm buzzer is set up as

ON,  appears on

LCD. No matter

buzzer is ON or

OFF, when WBGT

is out of range, the

displayed WBGT

value should blink.

When the WBGT

value is out of

range and buzzer is ON, the 

icon and WBGT temp will flash &

buzzer beep every second until

the alarm is dismissal. However,

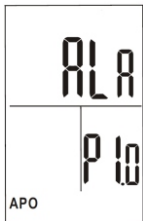
user can short press  key to

mute the buzzer, then it beeps

once per minute. Though buzzer

is mute,  icon will flash until the


WBGT value return to normal.



##### P1.2 alarm threshold

The default is setting as 31°C.


The adjustment range is

20°C~50°C. Press  or  key

to adjust and press  key to

confirm. Note : 0.5 °C per step

When in normal mode, press

 key can cease the buzzer


but bell icon remain flashing

until the measured WBGT is


returned to normal.

## P2.0 Unit setting

### P2.1 unit °C m/s or °F mph switch



Press up/down key to switch between °C m/s and °F mph and then press  key to confirm.

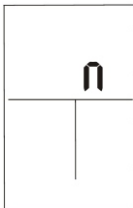
## 4. BATTERY REPLACEMENT

 appears on the LCD when battery voltage gets low. Please replace battery by opening the compartment on the rear of the meter.

## 5. AUTO POWER OFF

The meter turns off automatically after 20 minutes non operation.

To override the function, hold down  and  for 2 seconds to turn on the meter. The LCD will display “n” and then enter measuring mode. (Fig. C)



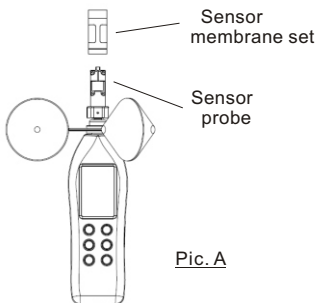
## 6. TRIPOD MOUNTING

The meter can fit on a tripod for long time monitoring. A built-in thread is on the bottom side of the meter.



## Humidity Calibration




The meter can be calibrated on the humidity by end users with 33% and 75% salt solution. The ambient condition is recommended to be at  $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$  and stable humidity. Users can terminate the calibration anytime by turning off the meter.

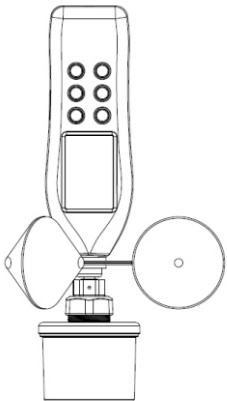


Pic. A

Unscrew the black globe and remove it. There is a dust free membrane to protect the humidity sensor, please remove it as well before calibration(Pic A). Reverse way to install the membrane and globe set after calibration.

### **33% calibration**

Plug the sensor probe into 33% salt bottle(Pic. A1), hold down  +  and  buttons for 3 seconds to power on the meter until blinking 3X.X% appears. Meter is now calibrating, and will finish in about 60 minutes.



### **75% calibration**

After 33% calibration, plug the sensor probe into 75% salt bottle, then press "SET" for 2 seconds to start. The blinking 7X.X% shows on the screen and meter is now calibrating. Wait about 60 minutes until blinking stops, it means the calibration is completed and meter returns to measuring mode.

### **Note:**

The RH value difference between the meter display and calibration standard should be within +/-0.3%, otherwise it is a failed calibration.

### **Note:**

Strongly recommend to use one hand to press one button, and use two fingers of the other hand to press two buttons simultaneously. This is easier for you to operate 3 keys.

## Error message on the display

Code	Problem	Solution
E2	1. The value is under range. 2. Improper sensor installation.	Check whether the sensor is installation correct. Put the meter in room temp. for 30 minutes. If the error messages still appear, send back for repair.
E3	The Value is over range.	Put the meter in room temp. for 30 minutes. If the error messages still appear, send back for repair.
E4	1. The value is in error because of the original data. 2. Improper sensor installation.	Put the meter in regular room temp. for 30 minutes. If the error messages still appear, send back for repair.
E11	RH Calibration error.	<ul style="list-style-type: none"> <li>- Do the calibration again.</li> <li>- Check the battery voltage or replace with new batteries.</li> <li>- Check whether the sensor is well plugged into the salt bottle and no air comes in.</li> <li>- Check ambient condition.</li> </ul>
E31 / E33	Circuit error. Power on but no display.	<ul style="list-style-type: none"> <li>- Check whether the batteries are in good contact and correct polarity, or take out the batteries for one minutes and restall and retry.</li> <li>- Return to the vendor for repair or replacement.</li> </ul>

Note:

For TA, E02 is below  $-2^{\circ}\text{C}$ , E03 is above  $62^{\circ}\text{C}$

For TG, E02 is below  $-2^{\circ}\text{C}$ , E03 is above  $82^{\circ}\text{C}$

## RS232 INTERFACE

The meter can do PC link for on-line logging and data analysis via Rs232 interface and software. The protocol is as follows.

**A.9600 bps, 8 data bits, no parity.**

**B.Format**

(Transmitting ASCII code by every second while meter is on.)

Wxxx.xC: Txxx.xC: Txxx.xC: Hxx.x% :  
Vxx.xm/s LRC

Note: The 1st value is WBGT, the 2nd is TA, the 3rd is TG, and the 4th is RH and the last value is wind speed.

## SPECIFICATION

Model	87785
Windspeed range	0.5~10 m/s
Windspeed Acc.	+/- (2% of reading +0.2) m/s
Temp. range	0~50°C
Temp. resolution	0.1°C/°F
Temp. accuracy	+/-0.6°C
Humidity. range	0%~100%RH
Humidity resolution	0.1%RH
Humidity accuracy	+/-3%RH (at 25°C, 10~90%RH,others +/-5%RH)
Globe Temp. (inside black ball)	0~80°C
Globe Temp. Acc.	<small>Indoor:</small> +/-1 °C(at 15~40°C),others 1, 5 °C <small>outdoor:</small> +/-1.5 °C(at 15~40°C),others 2 °C
WBGT temp. range	0~50°C
WBGT Alarm Range	20~50°C
Black ball size(mm)	Dia. 75, height:75
Stabilization time	15 ~25 minutes typical
RH% Self calibration	YES
Battery life	~100hour
LCD size (mm)	50(H)x32(W)
Operation temp.	0~50°C
Operation RH%	Humidity < 80%
Storage temp.	-20~50°C
Storage RH%	Humidity < 90%
Dimension(mm)	310(H)x91(diameter, windcup)
Weight	~300g
Battery	AAA x4pcs
Standard Package	Meter/Battery/Manual/Hard carry case

## **MATERIALS SUPPLIED**

This package contains :

- Meter x 1 pc
- AAA Size Batteries x 4 pcs
- Operation manual x 1 pc
- Hard carry case x 1 pc

Optional accessory

- 33% calibration salt (VZHR33AZ)
- 75% calibration salt (VZHR75AZ)
- USB Cable and Software (VZUSBAZM)

## **WARRANTY**

The meter is warranted to be free from defects in material and workmanship for a period of one year from the date of purchase. This warranty covers normal operation and does not cover misuse, abuse, alteration, neglect, improper maintenance, or damage resulting from leaking batteries. Proof of purchase is required for warranty repairs. Warranty is void if the meter has been opened.

## **RETURN AUTHORIZATION**

Authorization must be obtained from the supplier before returning items for any reason. When requiring a RA (Return Authorization), please include data regarding the defective reason, the meters are to be returned along with good packing to prevent any damage in delivery and insured against possible damage or loss.

## APPENDIX

### PERMISSIBLE HEAT EXPOSURE THRESHOLD LIMIT

Source: ACGIH 1992(*The American Conference of Governmental Industrial Hygienists*)

### WBGT INDEX AND PHYSICAL EXERCISE

Value: WBGT

Recommendations to heat exposure level for working and physical

Activity WBGT	Flag	Activity Intensity
< 26.7°C (< 80°F)	White	Normal activity. Caution should be taken.
26.7-29.4°C (80-84.9°F)	Green	Discretion is required in planning intense physical activity.
29.4-31°C (85-87.9°F)	Yellow	Intense activity for new and unacclimatized persons should be curtailed.
31-32.2°C (88-89.9°F)	Red	Intense exercise must be curtailed for those with less than 12 weeks training in hot weather. Be on high alert
> 32.2°C (> 90°F)	Black	Cancel all outdoor exercise.

Source: *Manual of Naval Preventive Medicine (NAVMED P-5010)*

Work/rest regimen (Each hour)	Light	Moderate	Heavy
Continuous work	30°C /86°F	26.7°C /80°F	25°C /77°F
75% work, 25% rest	30.6°C /87°F	28°C /82°F	25.9°C /78°F
50% work, 50% rest	31.4°C /89°F	29.4°C /85°F	27.9°C /82°F
25% work, 75% rest	32.2°C /90°F	31.1°C /88°F	30°C /86°F

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Anemometer  
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Infrared Thermometer  
K type Thermometer  
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K.J.T.R.S.E. type Thermometer  
pH Meter  
Conductivity Meter  
T.D.S. Meter  
D.O. Meter  
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