Manual
Data Logger
PCE-WB 20SD

SD card real time datalogger

HEAT INDEX WBGT METER
Model : PCE-WB 20SD

Your purchase of this HEAT INDEX WBGT METER with SD CARD DATALOGGER marks a step forward for you into the field of precision measurement. Although this DATALOGGER is a complex and delicate instrument, its durable structure will allow many years of use if proper operating techniques are developed. Please read the following instructions carefully and always keep this manual within easy reach.

OPERATION MANUAL

TABLE OF CONTENTS

1. FEATURES

* Introduction :
  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 situation It is suggested in the international
  standard ISO 7243, OSHA (US Occupation Safety),
  Japan Society for Occupational Health and the SMA (
  Sports Medicine Australia) in establishing the
  permissible heat exposure limits in health , sports or
  other physical activities.
* Measurement : WBGT value (Indoor/Outdoor Wet bulb
  globe temperature), Black globe temperature, Humidity,
  Air temperature, Wet bulb temperature, Dew point Temp..
* Adjustable WBGT alarm setting, if the WBGT value over
  the alarm threshold, the buzzer will sound along with
  the flashing Display.
* Using to control and monitor of physical activity in hot
  environment to limit the danger of heat related
  injuries.
* Globe temperature measurement use the Pt sensor,
  high accuracy.
* Fast humidity measuring response time.
* Direct measurement of the radiation effect with
  a brass black ball in 75 mm dia.
* Sensor protecting mechanism.
* Real time SD memory card Datalogger, it Built-in Clock
  and Calendar, real time data recorder , sampling time set
  from 1 second to 3600 seconds.
* Manual datalogger is available (set the sampling
  time to 0), during execute the manual datalogger
  function, it can set the different position (location) No.
  (position 1 to position 99).

* Innovation and easy operation, computer is not need to setup extra software, after execute datalogger, just take away the SD card from the meter and plug in the SD card into the computer, it can down load the all the measured value with the time information (year/month/date/hour/minute/second) to the Excel directly, then user can make the further data or graphic analysis by themselves.
* SD card capacity : 1 GB to 16 GB.
* LCD with green light backlight, easy reading.
* Can default auto power off or manual power off.
* Data hold, record max. and min. reading.
* Microcomputer circuit, high accuracy.
* Power by UM3/AA (1.5 V) x 6 batteries or DC 9V adapter.
* RS232/USB PC COMPUTER interface.

2. SPECIFICATIONS

2-1 General Specifications

Circuit	Custom one-chip of microprocessor LSI circuit.
Display	LCD size : 52 mm x 38 mm LCD with green backlight (ON/OFF).
Measurement	* Wet bulb globe temperature (WBGT) @ Indoor/Outdoor * Black globe temperature (TG) * Air temperature (TA) * Wet bulb temperature (WB) * Humidity * Dew point temperature
WBGT formula * Wet bulb globe Temp.	Indoor/Outdoor and no sun : WBGT = (0.7 x WB) + (0.3 x TG) Outdoor and full sun : WBGT = (0.7 x WB) + (0.2 x TG) + (0.1 x TA)

WBGT alarm setting	Adjustable WBGT alarm setting, if the WBGT value over the alarm threshold, the buzzer will sound along with the flashing Display.	
Datalogger Sampling Time Setting range	Auto	1 second to 3600 seconds *@ Sampling time can set to 1 second, but memory data may loss.*
	Manual	Push the data logger button once will save data one time. *@ Set the sampling time to 0 second.* *@ Manual mode, can also select the 1 to 99 position (Location) no.*
Data error no.	0.1% of total saved data max.	
Memory Card	SD memory card. 1 GB to 16 GB	
Advanced setting	* Set clock time (Year/Month/Date, Hour/Minute/ Second) * Set WBGT alarm value * Decimal point of SD card setting * Auto power OFF management * Set beep Sound ON/OFF * Select the temperature unit to ℃ or ℉. * Set sampling time * SD memory card Format	
Data Hold	Freeze the display reading.	
Memory Recall	Maximum & Minimum value.	
Sampling Time of Display	Approx. 1 second.	
Data Output	RS 232/USB PC computer interface. * Connect the optional RS232 cable UPCB-02 will get the RS232 plug.* * Connect the optional USB cable USB-01 will get the USB plug.*	
Operating Temperature	0 to 50 ℃.	

Operating Humidity	Less than 85% R.H.	
Power Supply	*.Alkaline or heavy duty DC 1.5 V battery (UM3, AA) x 6 PCs, or equivalent.	
	*.DC 9V adapter input. (AC/DC power adapter is optional).	
Power Current	Normal operation (w/o SD card save data and LCD Backlight is OFF) : *Approx. DC 5 mA.*	
	When SD card save the data but and LCD Backlight is OFF) : *Approx. DC 25 mA.*	
	*.*If LCD backlight on, the power consumption will increase approx. 11 mA.*	
Weight	489 g/1.08 LB.	
Dimension	Meter	177 x 68 x 45 mm
	Black brass ball	(7.0 x 2.7x 1.9 inch) Round, 75 mm dia
Standard Accessories Included	* Instruction manual.......................1 PC * Black brass ball (with sensor)......1 PC * Soft carrying case, CA-05B............1 PC	
Optional Accessories	* SD Card (2 GB) * AC to DC 9V adapter. * USB cable, USB-01. * RS232 cable, UPCB-02. * Data Acquisition software,SW-U801-WIN. * Hard carrying case, CA-08, Size : 370 x 310 x 115 mm.	

1

2-2 Electrical Specifications (23± 5 ℃)

Wet bulb globe temperature (WBGT)			
Range	℃	Indoor	0 ℃ to 59 ℃
		Outdoor	0 ℃ to 56 ℃
	℉	Indoor	32 to 138 ℉
		Outdoor	32 to 132 ℉
Accuracy * Indoor	℃	± 1 ℃ (15 to 59 ℃) ± 1.5 ℃ (Others)	
	℉	± 1.8 ℉ (59 to 138 ℉) ± 2.7 ℉ (Others)	
Accuracy * Outdoor	℃	± 1.5 ℃ (15 to 56 ℃) ± 2 ℃ (Others)	
	℉	± 2.7 ℉ (59 to 132 ℉) ± 3.6 ℉ (Others)	

WBGT Formula :

Indoor (Outdoor and no sun)	WBGT= 0.7WB + 0.3TG
Outdoor (Outdoor and full sun)	WBGT= 0.7WB + 0.2TG + 0.1TA

Air temperature (TA)		
Range	℃	0 to 50 ℃
	℉	32 to 122 ℉.
Resolution	℃	0.1 ℃
	℉	0.1 ℉
Accuracy @ 15 to 40 ℃	℃	± 0.8 ℃
	℉	± 1.5 ℉

Black globe temperature（TG）		
Range	℃	0 to 80 ℃
	℉	32 to 176 ℉.
Resolution	℃	0.1 ℃
	℉	0.1 ℉
Accuracy	℃	± 0.6 ℃
@ 15 to 40 ℃	℉	± 1.1 ℉

Humidity	
Range	5 % to 95 % R.H.
Resolution	0.1 % R.H.

Accuracy	≧70% RH :
	    ± (3% reading + 1% RH).
	< 70% RH :
	    ± 3% RH.

Dew Point Temp.		
℃	Range	-25.3 ℃ to 48.9 ℃
	Resolution	0.1 ℃
℉	Range	-13.5 ℉ to 120.1 ℉.
	Resolution	0.1 ℉.
Remark :	* Dew Point Temp. value is calculated from the Humidity/Air Temp. measurement automatically. * The Dew Point Temp. accuracy is sum accuracy value of Humidity & Air Temperature measurement..	

Wet bulb Temp.		
℃	Range	-21.6 ℃ to 50.0 ℃
	Resolution	0.1 ℃
℉	Range	-6.9 ℉ to 122.0 ℉.
	Resolution	0.1 ℉.
Remark :	* Wet bulb display value is calculated from the Humidity/Air Temp. measurement automatically. * The Dew Point accuracy is sum accuracy value of Humidity & Air temperature measurement..	

*@ Above specification tests under the environment RF Field Strength
 less than 3 V/M & frequency less than 30 MHz only.*

3. FRONT PANEL DESCRIPTION
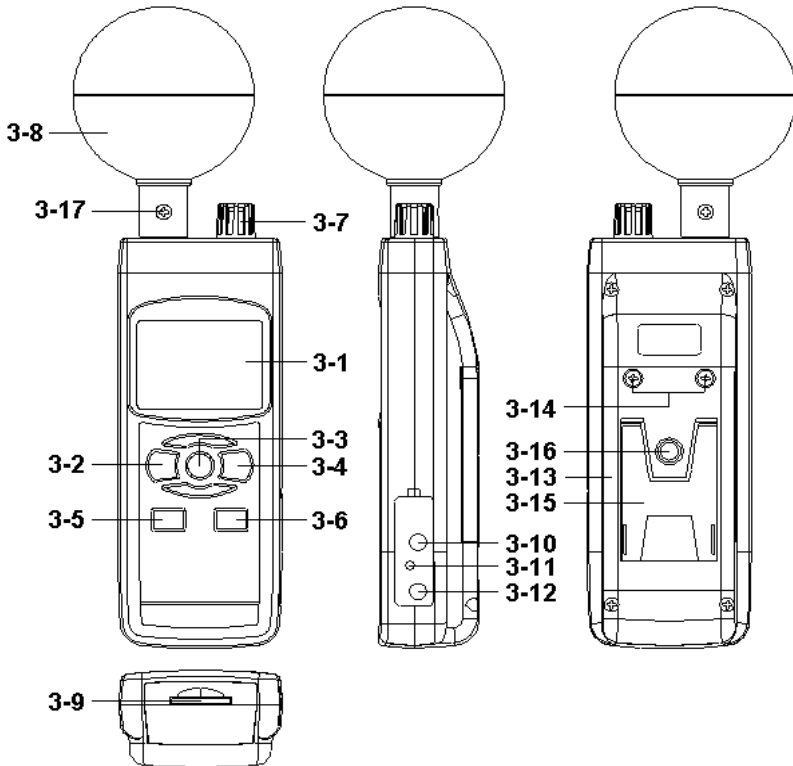
Fig. 1

3-1 Display
3-2 Power Button (ESC, Backlight Button)
3-3 Hold Button (Function, Next Button)
3-4 REC Button (Enter Button, in/Outdoor Button)
3-5 SET Button (▼ Button, Time check Button)
3-6 Logger Button (▲ Button, Sampling time check Button)
3-7 Humidity sensor, Air Temp. sensor (TA sensor)
3-8 Black ball (Black globe Temp. sensor)
3-9 SD card socket
3-10 RS-232 Output Terminal
3-11 Reset Button
3-12 DC 9V Power Adapter Input Socket
3-13 Battery Compartment/Cover
3-14 Battery Cover Screws
3-15 Stand
3-16 Tripod Fix Nut
3-17 Black ball fix screw

7

4. MEASURING PROCEDURE

4-1 Function selection

1) Turn on the meter by pressing the " Power Button " (3-2, Fig. 1) momentarily.

   * *Pressing the " Power Button " (3-2, Fig. 1) continuously and > 2 seconds again will turn off the meter.*

2) The meter can select 6 kind function as :

   1. Wet bulb globe Temp. (WBGT)
   2. Wet bulb Temp. (WB)
   3. Dew point Temp.
   4. Humidity and Air Temp. (TA)
   5. Black globe Temp. (TG)

Pressing the " Function Button " (3-3, Fig. 1) continuously (not release the button), the Display will show the following text in sequence :

_bgt	**Wet bulb globe Temp. (WBGT)** *in = Indoor/Outdoor and no sun* *out = outdoor and full sun*
_b	**Wet bulb Temp. (WB)**
dP	**Dew point Temp.**
tg	**Black globe Temp. (TG)**
rH	**Humidity**
tA	**Air Temp. (TA)**

Until the Display show the desired mode (Function), just release the " Function Button " (3-3, Fig. 1), the meter will execute this function with default.

8

**The meter Temp. display unit is defaulted to " ℃ "
If intend to let the meter's temperature unit
default to " ℉ " , then please refer chapter 7-6,
page 21).**

Wet bulb globe Temp. （WBGT）measurement

1) Power on the meter by pressing the " Power Button "
   (3-2, Fig. 1).
   *After power on, then press the " Power Button "
   (3-2, Fig. 1) > 2 seconds will power off.*
2) Function select to " Wet bulb globe Temp. " measurement.
   * The upper Display will show the WBGT value.
   * The lower Display will show the text " _bgt in " or
     -bgt out "
     @ in = Indoor/Outdoor and no sun
     @ out = Outdoor and full sun
   * During make the WBGT measurement, if pressing
     the " in/Outdoor Button " (3-4, Fig. 1) continuously
     will select the " indoor WBGT " or " outdoor WBGT "
     function.

3) **It can set the WBGT alarm value, if the
   measurement value ≧ alarm setting value, the
   buzzer will sound for warning along with the
   flashing Display.**
   *The alarm value setting procedures, please refer
   chapter 7-2 (page 19).*

Wet bulb Temp. （WB） measurement

1) Power on the meter by pressing the " Power Button "
   (3-2, Fig. 1).
2) Function select to " Wet bulb Temp. " measurement.
   * The upper Display will show the Wet bulb Temp. value.
   * The lower Display will show the text " _b ".

Dew point Temp. measurement

1) Power on the meter by pressing the " Power Button "
   (3-2, Fig. 1).
2) Function select to " Dew point Temp. " measurement.
   * The upper Display will show the Dew point Temp. value.
   * The lower Display will show the text " dP ".

Humidity and air Temp. (TA) measurement

1) Power on the meter by pressing the " Power Button "
   (3-2, Fig. 1).
2) Function select to " Humidity and Air Temp. " measurement.
   * The upper Display will show the Humidity value.
   * The lower Display will show the Air Temp. (TA) value.
3) The humidity sensor and the air sensor is locate on the
   3-7, Fig. 1.

Black globe Temp. measurement

1) Power on the meter by pressing the " Power Button "
   (3-2, Fig. 1).
2) Function select to " Black globe Temp. " measurement.
   * The upper Display will show the Black globe Temp. value.
   * The lower Display will show the text " tg ".
3) The Black globe sensor is locate into the center of
   Black ball, 3-8, Fig. 1.

4-2 Data Hold

During the measurement, press the " Hold Button " (3-3,
Fig. 1) once will hold the measured value & the LCD will
display a " HOLD " symbol.
Press the " Hold Button " once again will release the data
hold function.

4-3 Data Record (Max., Min. reading)

1) The data record function records the maximum and minimum readings. Press the " REC Button " (3-4, Fig. 1) once to start the Data Record function and there will be a " REC " symbol on the display.

2) With the " REC " symbol on the display :

 a) Press the " REC Button " (3-4, Fig. 1) once, the " REC MAX " symbol along with the maximum value will appear on the display.
 If intend to delete the maximum value, just press the " Hold Button " (3-3, Fig. 1) once, then the display will show the " REC " symbol only & execute the memory function continuously.

 b) Press the " REC Button " (3-4, Fig. 1) again, the " REC MIN " symbol along with the minimum value will appear on the display.
 If intend to delete the minimum value, just press the " Hold Button " (3-3, Fig. 1) once, then the display will show the " REC " symbol only and execute the memory function continuously.

 c) To exit the memory record function, just press the " REC " button for 2 seconds at least. The display will revert to the current reading.

4-4 LCD Backlight ON/OFF

After power ON, the " LCD Backlight " will light automatically. During the measurement, press the " Backlight Button " (3-2, Fig. 1) once will turn OFF the " LCD Backlight ".
Press the " Backlight Button " once again will turn ON the " LCD Backlight " again.

5. DATALOGGER

5-1 Preparation before execute datalogger function

a. Insert the SD card
Prepare a " SD memory card " (1 GB to 16 GB, optional),
insert the SD card into the " SD card socket " (3-9, Fig. 1).
The front panel of the SD card should face against the
the down case.

 * It recommend use memory card's capacity is $\leqq$ 4 GB.

b. SD card Format
If SD card just the first time use into the meter, it
recommend to make the " SD card Format " at first. ,
please refer chapter 7-8 (page 21).

 * It recommend strongly, do not use memory cards that have been
   formatted by other meter or by other installation (such as camera...)
   Reformat the memory card with your meter.
 * If the SD memory card exist the trouble during format by the meter,
   use the Computer to reformat again can fix the problem.

c. Time setting
If the meter is used at first time, it should to adjust the
clock time exactly, please refer chapter 7-1 (page 18).

d. Decimal format setting

The numerical data structure of SD card is
default used the " . " as the decimal, for
example "20.6" "1000.53" . But in certain
countries   (Europe ...) is used the " , " as the
decimal point, for example " 20, 6 "
"1000,53". Under such situation, it should
change the Decimal character at first, details
of setting the Decimal point, refer to Chapter
7-3, page 19.

5-2 Auto Datalogger (Set sampling time ≧ 1 second)

| a. Start the datalogger |

Press the " REC Button (3-4, Fig. 1) once , the LCD will show the text " REC ", then press the " Logger Button " (3-6, Fig. 1), the " REC " will flashing, at the same time the measuring data along the time information will be saved into the memory circuit.

Remark :
  *How to set the sampling time, refer to Chapter 7-7,
   page 21.*
  *How to set the beeper sound is enable, refer to
   Chapter 7-5, page 20.*

| b. Pause the datalogger |

During execute the Datalogger function , if press the " Logger Button " (3-6, Fig. 1) once will pause the Datalogger function (stop to save the measuring data into the memory circuit temporally). In the same time the text of " REC " will stop flashing.

Remark :
If press the " Logger Button " (3-6, Fig. 1) once again will execute the Datalogger again, the text of " REC " will flashing .

| c.. Finish the Datalogger |

During pause the Datalogger, press the " REC Button " (3-4, Fig. 1) continuously at least two seconds, the " REC " indication will be disappeared and finish the Datalogger.

5-3 Manual Datalogger (Set sampling time = 0 second)

a. Set sampling time is to 0 second

Press the " REC Button (3-4, Fig. 1) once , the LCD will show the text " REC ", then press the " Logger Button " (3-6, Fig. 1) once, the " REC " will flashing once and Beeper will sound once, at the same time the measuring data along the time information will be saved into the memory circuit. The lower Display will show the Position (Location) no. and saved into the SD card too.

Remark :
During execute the Manual Datalogger, press the " ▼ Button " (3-5, Fig, 1) the lower no. (position no.) will flashing. It can use the " ▲ Button " (3-6, Fig. 1) or " ▼ Button " (3-5, Fig. 1) to set the measuring position (1 to 99, for example room 1 to room 99) to identify the measurement location , the lower Display will show P x (x = 1 to 99). After the position no. is selected, press the " Enter Button " (3-4, Fig. 1) to confirm.

b. Finish the Datalogger

Press the " REC Button " (3-4, Fig. 1) continuously at least two seconds, the " REC " indication will be disappeared and finish the Datalogger.

5-4 Check time information
During the normal measurement (not execute the Datalogger), If press " Time check Button " (3-5, Fig. 1) once , the lower LCD display will present the time information of Year, Month/Date, Hour/Minute

14

5-5 Check sampling time information

During the normal measurement (not execute the Datalogger), If press " Sampling Button " (3-6, Fig. 1) once , the lower LCD display will present the Sampling time information in second unit.

5-6 SD Card Data structure

1) When the first time, the SD card is used into the meter, the SD card will generate a folder :

   WBA01

2) If the first time to execute the Datalogger, under the route WBA01\, will generate a new file name WBA01001.XLS. After exist the Datalogger, then execute again, the data will save to the WBA01001.XLS until Data column reach to 30,000 columns, then will generate a new file, for example WBA01002.XLS

3) Under the folder WBA01\, if the total files more than 99 files, will generate anew route, such as WBA02\ ....

4) The file's route structure :
   WBA01\
      WBA01001.XLS
      WBA01002.XLS

      …………………
      WBA01099.XLS
   WBA02\
      WBA02001.XLS
      WBA02002.XLS

      …………………
      WBA02099.XLS
   WBAXX\

      …………………
   Remark :
   XX : Max. value is 10.

6. Saving data from the SD card to the computer (EXCEL software)

1) After execute the Data Logger function, take away the SD card out from the " SD card socket " (3-9, Fig. 1).
2) Plug in the SD card into the Computer's SD card slot (if your computer build in this installation) or insert the SD card into the " SD card adapter ". then connect the " SD card adapter " into the computer.
3) Power ON the computer and run the " EXCEL software ". Down load the saving data file (for example the file name : WBA01001.XLS, WBA01002.XLS) from the SD card to the computer. The saving data will present into the EXCEL software screen (for example as following EXCEL data screens) , then user can use those EXCEL data to make the further Data or Graphic analysis usefully.

EXCEL data screen (for example)

	B2			fx	2009/12/28											
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Place	Date	Time	Value	Unit	Value	Unit	Value	Unit	Value	Unit	Value	Unit	Value	Unit	
2	1	2009/12/28	16:36:15	19.5	WBGT Temp C	46.9	%RH C	26.6	TA Temp C	21.3	TG Temp C	18.5	WET Temp C	14.3	DP Temp C	
3	2	2009/12/28	16:36:17	19.4	WBGT Temp C	47.2	%RH C	26.6	TA Temp C	21.3	TG Temp C	18.6	WET Temp C	14.4	DP Temp C	
4	3	2009/12/28	16:36:19	19.4	WBGT Temp C	47.2	%RH C	26.6	TA Temp C	21.2	TG Temp C	18.6	WET Temp C	14.4	DP Temp C	
5	4	2009/12/28	16:36:21	19.3	WBGT Temp C	47.2	%RH C	26.6	TA Temp C	21.3	TG Temp C	18.6	WET Temp C	14.4	DP Temp C	
6	5	2009/12/28	16:36:23	19.3	WBGT Temp C	47.5	%RH C	26.6	TA Temp C	21.3	TG Temp C	18.6	WET Temp C	14.5	DP Temp C	
7	6	2009/12/28	16:36:25	19.3	WBGT Temp C	47.5	%RH C	26.6	TA Temp C	21.4	TG Temp C	18.6	WET Temp C	14.5	DP Temp C	
8	7	2009/12/28	16:36:27	19.3	WBGT Temp C	47.7	%RH C	26.5	TA Temp C	21.3	TG Temp C	18.6	WET Temp C	14.5	DP Temp C	
9	8	2009/12/28	16:36:29	19.4	WBGT Temp C	47.5	%RH C	26.5	TA Temp C	21.2	TG Temp C	18.6	WET Temp C	14.4	DP Temp C	
10	9	2009/12/28	16:36:31	19.4	WBGT Temp C	47.6	%RH C	26.5	TA Temp C	21.2	TG Temp C	18.6	WET Temp C	14.4	DP Temp C	
11	10	2009/12/28	16:36:33	19.3	WBGT Temp C	48	%RH C	26.5	TA Temp C	21.3	TG Temp C	18.6	WET Temp C	14.5	DP Temp C	
12	11	2009/12/28	16:36:35	19.3	WBGT Temp C	48.4	%RH C	26.4	TA Temp C	21.2	TG Temp C	18.6	WET Temp C	14.6	DP Temp C	
13	12	2009/12/28	16:36:37	19.3	WBGT Temp C	48.8	%RH C	26.5	TA Temp C	21.2	TG Temp C	18.7	WET Temp C	14.7	DP Temp C	
14	13	2009/12/28	16:36:39	19.3	WBGT Temp C	49.9	%RH C	26.5	TA Temp C	21.2	TG Temp C	19	WET Temp C	15.2	DP Temp C	
15	14	2009/12/28	16:36:41	19.4	WBGT Temp C	49.9	%RH C	26.4	TA Temp C	21.1	TG Temp C	19	WET Temp C	15.2	DP Temp C	
16	15	2009/12/28	16:36:43	19.4	WBGT Temp C	49	%RH C	26.4	TA Temp C	21	TG Temp C	18.7	WET Temp C	14.8	DP Temp C	
17	16	2009/12/28	16:36:45	19.4	WBGT Temp C	48.6	%RH C	26.3	TA Temp C	21	TG Temp C	18.7	WET Temp C	14.6	DP Temp C	
18	17	2009/12/28	16:36:47	19.4	WBGT Temp C	48	%RH C	26.3	TA Temp C	20.9	TG Temp C	18.5	WET Temp C	14.4	DP Temp C	
19	18	2009/12/28	16:36:49	19.2	WBGT Temp C	47.8	%RH C	26.3	TA Temp C	20.9	TG Temp C	18.5	WET Temp C	14.3	DP Temp C	
20	19	2009/12/28	16:36:51	19.2	WBGT Temp C	47.7	%RH C	26.3	TA Temp C	20.8	TG Temp C	18.4	WET Temp C	14.3	DP Temp C	
21	20	2009/12/28	16:36:53	19.1	WBGT Temp C	47.8	%RH C	26.2	TA Temp C	20.9	TG Temp C	18.5	WET Temp C	14.3	DP Temp C	
22	21	2009/12/28	16:36:55	19.1	WBGT Temp C	48.5	%RH C	26.3	TA Temp C	20.9	TG Temp C	18.6	WET Temp C	14.5	DP Temp C	
23	22	2009/12/28	16:36:57	19.1	WBGT Temp C	48.7	%RH C	26.3	TA Temp C	21	TG Temp C	18.5	WET Temp C	14.5	DP Temp C	
24	23	2009/12/28	16:36:59	19.1	WBGT Temp C	49.2	%RH C	26.3	TA Temp C	20.9	TG Temp C	18.7	WET Temp C	14.7	DP Temp C	
25	24	2009/12/28	16:37:01	19.2	WBGT Temp C	49.1	%RH C	26.2	TA Temp C	20.9	TG Temp C	18.6	WET Temp C	14.6	DP Temp C	
26	25	2009/12/28	16:37:03	19.2	WBGT Temp C	48.9	%RH C	26.2	TA Temp C	20.7	TG Temp C	18.6	WET Temp C	14.6	DP Temp C	
27	26	2009/12/28	16:37:05	19.2	WBGT Temp C	48.6	%RH C	26.1	TA Temp C	20.7	TG Temp C	18.4	WET Temp C	14.4	DP Temp C	
28	27	2009/12/28	16:37:07	19.1	WBGT Temp C	48.2	%RH C	26.1	TA Temp C	20.8	TG Temp C	18.4	WET Temp C	14.2	DP Temp C	

WBA01001

EXCEL graphic screen （for example）

WBGT

7. ADVANCED SETTING

Under do not execute the Datalogger function,
press the " SET Button " (3-5, Fig. 1) continuously at
least two seconds will enter the " Advanced Setting " mode.
then press the " Next Button " (3-3, Fig. 1) once a while
in sequence to select the eight main function, the lower
display will show :

dAtE.......Set clock time (Year/Month/Date, Hour/Minute/
Second)
AL......... Set WBGT alarm value
dEC....... Set SD card Decimal character
PoFF..... Auto power OFF management
bEEP..... Set beeper sound ON/OFF
t-CF...... Select the Temp. unit to ℃ or ℉
SP-t...... Set sampling time
Sd F..... SD memory card Format

17

Remark :
During execute the " Advanced Setting " function,
if press " Esc Button " (3-2, Fig. 1) once will exit
the " Advanced Setting " function, the LCD will
return to normal screen.

7-1 Set clock time (Year/Month/Date,
Hour/Minute/ Second)

When the lower display show " dAtE "

1) Press the " Enter Button " (3-4, Fig. 1) once,
   Use the " ▲ Button " (3-6, Fig. 1) or " ▼ Button "
   (3-5, Fig. 1) to adjust the value (Setting start from
   Year value). After the desired value is set, press the
   " Enter Button " (3-4, Fig. 1) once will going to
   next value adjustment (for example, first setting
   value is Year then next to adjust Month, Date, Hour,
   Minute, Second value).

2) After set all the time value (Year, Month, Date, Hour,
   Minute, Second), the screen will jump to " Set WBGT
   alarm value " setting screen (Chapter 7-2).

   Remark :
   After the time value is setting, the internal clock will
   run precisely even Power off if the battery is under
   normal condition (No low battery power).

7-2 Set WBGT alarm value

When the lower display show " AL "

1) Use the " ▲ Button " (3-6, Fig. 1) or " ▼ Button " (3-5, Fig. 1) to adjust the WBGT alarm value.
2) After the WBGT alarm value is selected, press the " Enter Button " (3-4, Fig. 1) will save the setting function with default.
   If the WBGT measurement value over the alarm setting value, the buzzer will sound for warning.

7-3 Decimal point of SD card setting

The numerical data structure of SD card is default used the " . " as the decimal, for example "20.6" "1000.53" . But in certain countries   (Europe ...) is used the " , " as the decimal point, for example " 20,6 " "1000,53". Under such situation, it should change the Decimal character at first.

When the lower display show " dEC "

1) Use the " ▲ Button " (3-6, Fig. 1) or " ▼ Button " (3-5, Fig. 1) to select the upper value to " bASIC " or " Euro ".

   **bASIC - Use " . " as the Decimal point with default.
   Euro - Use " , " as the Decimal point with default.**

2) After select the upper text to " bASIC " or " Euro ", press the " Enter Button " (3-4, Fig. 1) will save the setting function with default.

7-4 Auto power OFF management

When the lower display show " PoFF "

1) Use the " ▲ Button " (3-6, Fig. 1) or " ▼ Button "
   (3-5, Fig. 1) to select the upper value to " yES " or
   " no ".

   yES - Auto Power Off management will enable.
   no - Auto Power Off management will disable.

2) After select the upper text to " yES " or " no ", press the
   " Enter Button " (3-4, Fig. 1) will save the setting
   function with default.

7-5 Set beeper sound ON/OFF

When the lower display show " bEEP "

1) Use the " ▲ Button " (3-6, Fig. 1) or " ▼ Button "
   (3-5, Fig. 1) to select the upper value to " yES " or
   " no ".

   yES - Meter's beep sound will be ON with default.
   no - Meter's beep sound will be OFF with default.
   **   is power ON.**

2) After select the upper text to " yES " or " no ", press the
   " Enter Button " (3-4, Fig. 1) will save the setting
   function with default.

7-6 Select the Temp. unit to ℃ or ℉

> When the lower display show " t-CF "

1) Use the " ▲ Button " (3-6, Fig. 1) or " ▼ Button " (3-5, Fig. 1) to select the upper Display text to " C " or " F ".

   C - Temperature unit is ℃
   F - Temperature unit is ℉

2) After Display unit is selected to " C " or " F ", press the " Enter Button " (3-4, Fig. 1) will save the setting function with default.

7-7 Set sampling time (seconds)

> When the lower display show " SP-t "

1) Use the " ▲ Button " (3-6, Fig. 1) or " ▼ Button " (3-5, Fig. 1) to adjust the value (1, 2, 5, 10, 30,60, 120, 300, 600, 1800,3600 seconds).
2) After the Sampling value is selected, press the " Enter Button " (3-4, Fig. 1) will save the setting function with default.

7-8 SD memory card Format

> When the lower display show " Sd F "

1) Use the " ▲ Button " (3-6, Fig. 1) or " ▼ Button " (3-5, Fig. 1) to select the upper value to " yES " or " no ".

   yES - Intend to format the SD memory card
   no - Not execute the SD memory card format

2) If select the upper to " yES ", press the " Enter Button
   " (3-4, Fig. 1) once again, the Display will show text
   " yES Enter " to confirm again, if make sure to do the
   SD memory card format, then press " Enter Button "
   once will format the SD memory clear all the existing
   data that already saving into the SD card.

8. POWER SUPPLY from DC ADAPTER

The meter also can supply the power supply from the
DC 9V Power Adapter (optional). Insert the plug of
Power Adapter into " DC 9V Power Adapter Input Socket
" (3-12, Fig. 1). The meter will permanent power ON
when use the DC ADAPTER power supply (The power
Button function is disable).

9. BATTERY REPLACEMENT

1) When the left corner of LCD display show "   ", it
   is necessary to replace the battery. However, in-spec.
   measurement may still be made for several hours after
   low battery indicator appears before the instrument
   become inaccurate.
2) Loose the screws of the " Battery Cover Screws " (3-14,
   Fig. 1) and take away the " Battery Cover " (3-13, Fig. 1)
    from the instrument and remove the battery.
3) Replace with DC 1.5 V battery (UM3, AA,
   Alkaline/heavy duty) x 6 PCs, and reinstate the cover.
4) Make sure the battery cover is secured after changing
   the battery.

10. SYSTEM RESET

If the meter happen the troubles such as :

CPU system is hold (for example, the key button can not be operated...).

Then make the system RESET will fix the problem. The system RESET procedures will be either following method :

During the power on, use a pin to press the " Reset Button " (3-11, Fig. 1) once a while will reset the circuit system.

11. RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via a 3.5 mm terminal (3-10, Fig. 1).

The data output is a 16 digit stream which can be utilized for user's specific application.

A RS232 lead with the following connection will be required to link the instrument with the PC serial port.
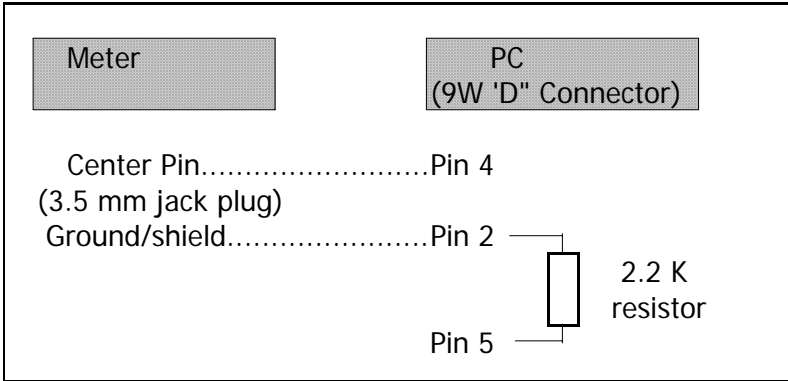
The 16 digits data stream will be displayed in the following format :

D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0

Each digit indicates the following status :

D15	Start Word		
D14	4		
D13	When send the WBGT display data = 1		
	When send the Humidity display data = 2		
	When send the TA display data = 3		
	When send the TG display data = 4		
	When send the WB display data = 5		
	When send the Dew point display data = 6		
D12, D11	Annunciator for Display		
	℃ = 01	℉ = 02	% RH = 04
D10	Polarity 0 = Positive 1 = Negative		
D9	Decimal Point(DP), position from right to the left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP		
D8 to D1	Display reading, D1 = LSD, D8 = MSD For example : If the display reading is 1234, then D8 to D1 is : 00001234		
D0	End Word		

RS232 FORMAT : 9600, N, 8, 1

Baud rate	9600
Parity	No parity
Data bit no.	8 Data bits
Stop bit	1 Stop bit

12. APPENDIX

Recommendations to heat exposure level for working and physical activity.
(Permissible heat exposure threshold limit)

Work/rest regimen (Each hour)	Light	Moderate	Heavy
Continuous work	30 ℃ (86 ℉)	26.7 ℃ (80 ℉)	25 ℃ (77 ℉)
75% work, 25% rest	30.6 ℃ (87 ℉)	28 ℃ (82 ℉)	25.9 ℃ (78 ℉)
50% work, 50% rest	31.4 ℃ (89 ℉)	29.4 ℃ (85 ℉)	27.9 ℃ (82 ℉)
25% work, 75% rest	32.2 ℃ (90 ℉)	31.1 ℃ (88 ℉)	30 ℃ (86 ℉)
Source : AGGIH 1992 (The American Conference of Governmental Industrial Hygienists)			

WBGT INDEX and PHYSICAL EXERCISE

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

13. PATENT

The meter (SD card structure) already
get patent or patent pending in following
countries :

Germany	Nr. 20 2008 016 337.4
JAPAN	3151214
TAIWAN	M 358970 M 359043
CHINA	ZL 2008 2 0189918.5 ZL 2008 2 0189917.0
USA	Patent pending