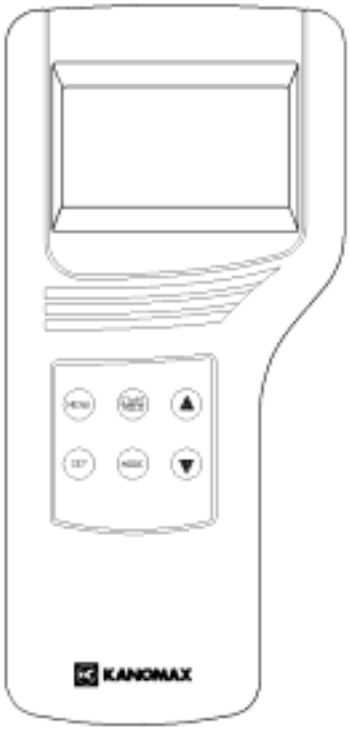
KANOMAX

IAQ MONITOR

MODEL 2211

Operation Manual



Please use this instrument properly by reading
this user's manual and following the warning instructions.
Keep this manual in a place where it can be accessed quickly.

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04. 11

Thank you for purchasing Kanomax product. Please use this instrument properly by reading this operation manual and following the warning instructions.

List of Components

■ Standard

Items	MODEL	Qty.	Functions
Main Body	2211-00	1	–
Probe	2211-01	1	CO, CO_2, temperature, humidity sensor
Carrying case	2211-02	1	Hard case
Probe stand	2211-03	1	Probe fixture
Gas Calibration cap	2211-04	1	Gas calibration
Tubing	–	1	Connecting to gas tank
Operation Manual	–	1	–
Mn Batteries	–	6	–
Software	S221-00	1	Data Processing Software (Windows)
RS232C Cable	6000-02	1	For the connection of Main body and PC

■ Optional

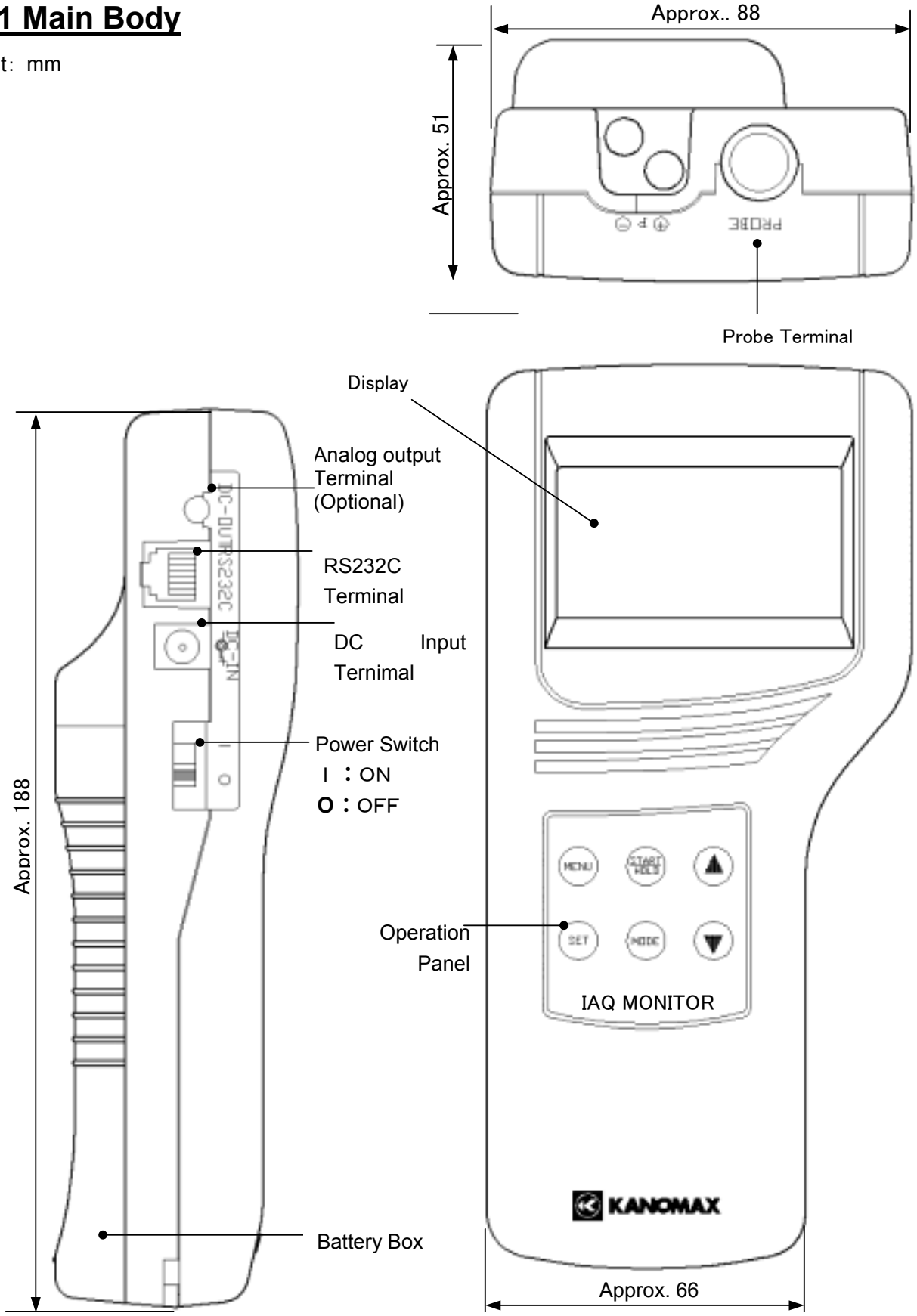
Items	MODEL	Functions
ZERO gas	2211-05	Zero point calibration for CO and CO_2
CO Span gas	2211-06	CO span calibration（approx. 35ppm）
CO_2 Span gas	2211-07	CO_2 span calibration (approx. 1000ppm）
Gas valve	2211-08	Valve for gas tank
Spare probe	2211-01	The probe for reserves
Analog output	2211-09	Analog output terminal
AC adapter	6000-05 (AUT-09-0660)	Power supply
Printer (Recommended)	DPU-H245	To print out all calculation result and etc.
Printer cable	6000-03	For the connection of main body and printer

Table of Contents

1. IAQ Monitor Anatomy

1.1 Main Body

Unit: mm



1.2 Operation Panel

MENU KEY

Press once to access the main menu..

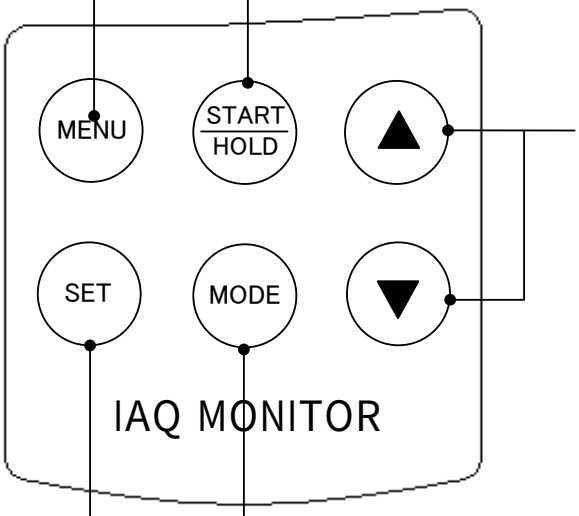
※ If you press this key while measuring or setting, this key will work as **CANCEL** and bring you back to the main menu.

- 1.NORMAL ……Normal Mode
- 2.CALCULATION ……Calculation Mode
- 3.ΣOA ……Ventilation Ratio Mode
- 4.DATA OUTPUT ……**To download data to your PC or printer**
- 5.DATA CLEAR ……To delete data or Printer
- 6.UTILITY …… **To set date, time and unit**
- 7.CALIBRATION ……Calibration Mode

START/HOLD KEY

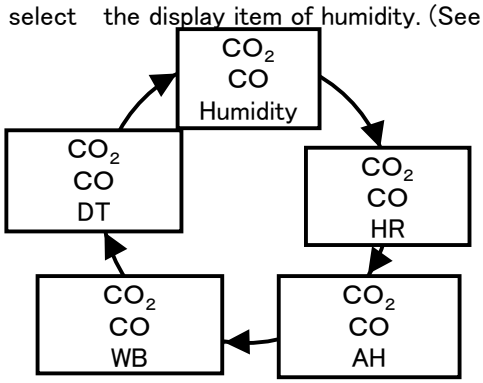
This key will start and stop the calculation and/or measurement.

Also works as a **hold key.**



▲、▼ NAVIGATION KEYS

① In the Normal Mode, this key would allow you to select the display item of humidity. (See P.41)



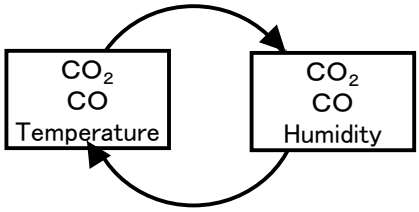
② Press this key to scroll in the desired direction.

SET KEY

Press the key to execute the selected item.

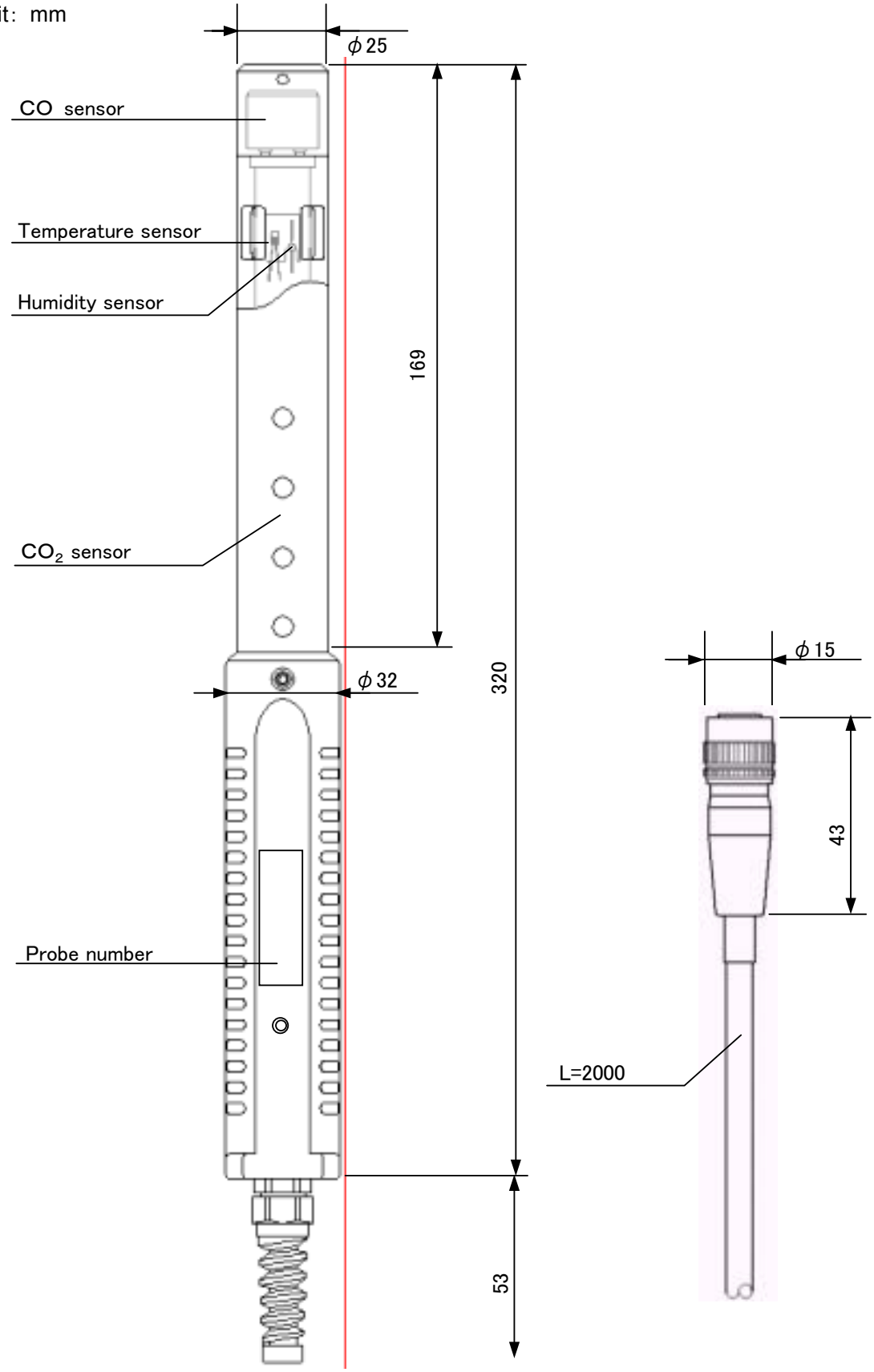
MODE KEY

You can select the mode accordingly.



1.3 Probe

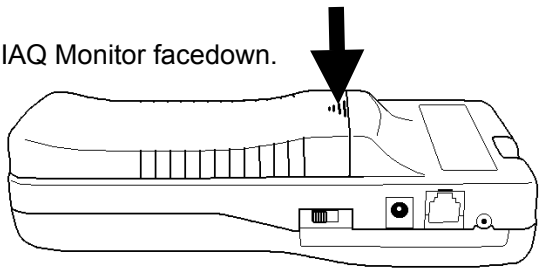
Unit: mm



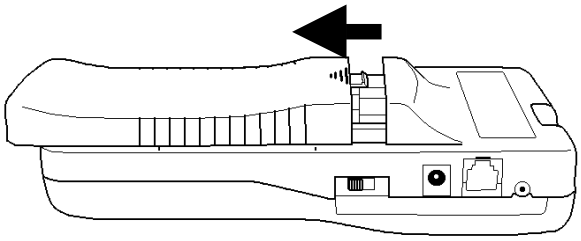
2. Getting Started

2.1 Installing Batteries

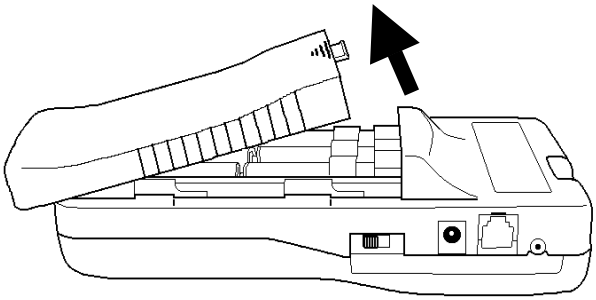
Place IAQ Monitor facedown.



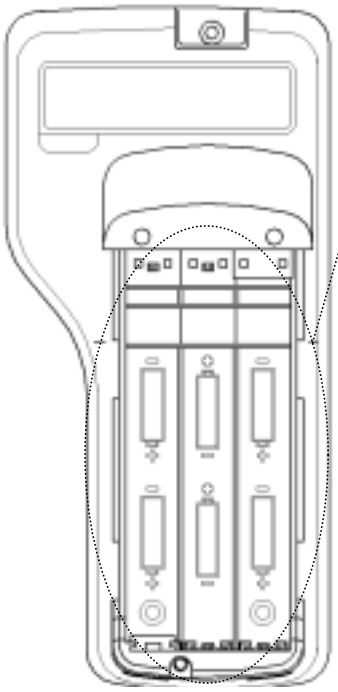
①Press down on the battery cover.



②Slide the cover until it stops.



③Lift the cover away from the body.



④Insert the battery observing the polarity. This instrument requires 6 AA size batteries. Use only AA size Manganese (R6), alkaline (LR6) or Ni-Cd batteries for replacement.
DO NOT mix new batteries with used ones, for it may lead to leakage.
※Batteries CANNOT be recharged by optional AC adapter.

The batteries that can be used

・Manganese (AA)
・Alkaline (AA)
・Ni-MH (AA)

⑤ Put the cover back on by reversing the procedure ②, ③.

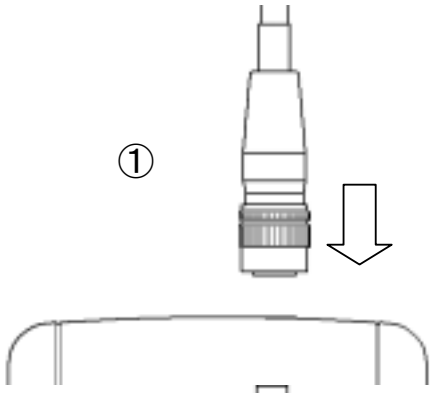
2.2 Connecting Probe

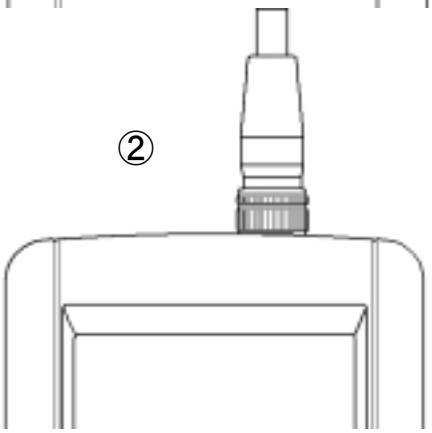
※ Make sure that the power is OFF when connecting or Disconnecting Probe/Probe cable.

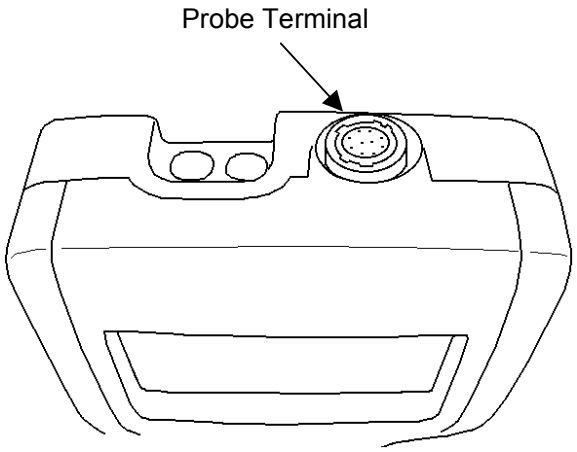
① Main Body connector and probe connector only fit one way.

②Push-in the connector until you hear click.

※ DO NOT FORCE to connect Probe, it may cause a serious damage to the instrument.







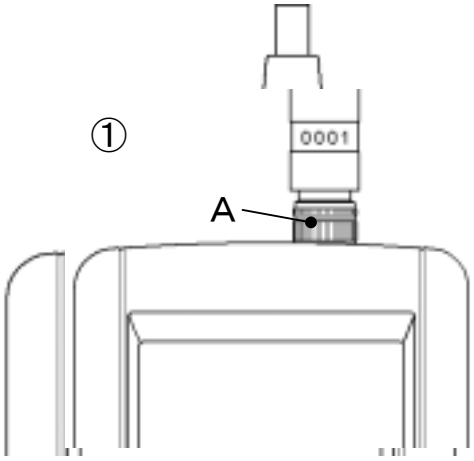
2.3 Disconnecting Probe

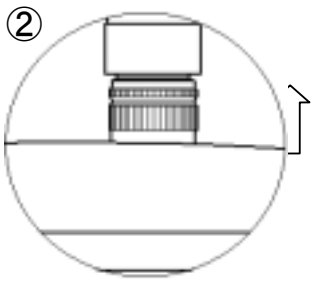
※ Make sure that the power is OFF when connecting or disconnecting.

①Pull up the lock ring of Probe.(see chart ①-A)

②Pull out Probe from Main Body with the lock ring up (see chart ②).

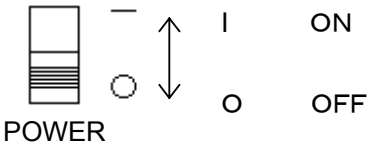
※ DO NOT rotate Probe while connected, it may cause a serious damage to the instrument.





2.4 Powering IAQ Monitor ON/OFF

You can turn ON and OFF the IAQ Monitor by flicking the switch on the side. When you turn on the power after connecting Probe , Manufacturer's logo, model name and its software version appear on the display for a few seconds.



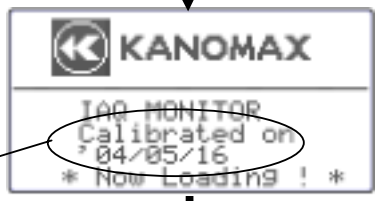
Connect probe to Main body.

↓

Power **ON.**

↓

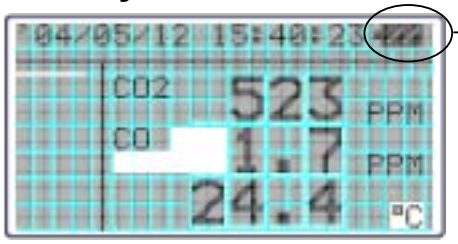
↓



Calibrated Day

↓

Normal Mode



Display Icons: (see P.10)

① Current Date and Time ④ Temperature (Humidity)

② CO_2 ⑤ Battery Level indicator

③ CO

◆ Battery Level Indicator

The Battery Level Indicator appears in the upper right corner, and it is difficult to predict the battery life. This "Battery Indicator" gives you the battery status and reminds you the timing for battery replacement.

The indicator changes as you see it below:

(blinks)

Time to replace batteries

— LOCK —

When  is displayed, every function of the instrument will be locked. The measurement will stop and data will NOT be saved.

2.5 How to make measurement

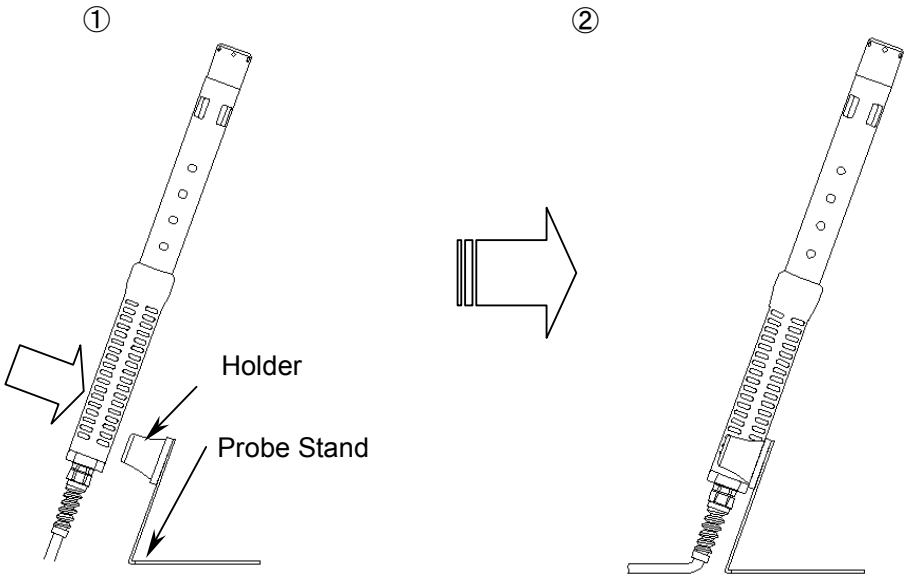
2.5.1 Measuring CO and CO_2 and Attentions

- The diffusion state of the air(State of flow) affects response time of CO and CO_2 sensor. In order to obtain an exact measurement result, please measure in the place which has the flow of air as much as possible.
- Mechanism of CO and **CO_2** sensor has a limitation in accuracy when measurement takes place under drastic thermal change. When a sensor and measuring object have apparent thermal discrepancy, leave a probe in open air for at least 20 minutes before you start a measurement.
- After turning a POWER ON, sensor circuit requires 5 minutes to warm-up. For an accurate measurement result, please wait for 5 minutes after turn the Power ON.
- Keep this sensor away from expiratory air; exhaled air contain more than 10,000ppm of **CO_2** and exhaled cigarette smoke contains a few ppm of **CO**. We recommend you to place a probe on the provided probe stand.

<How to use a Probe Stand>

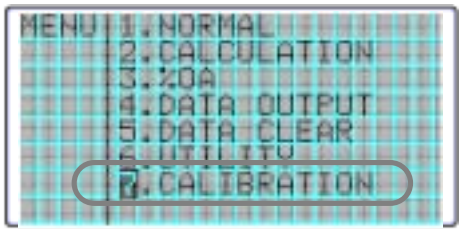
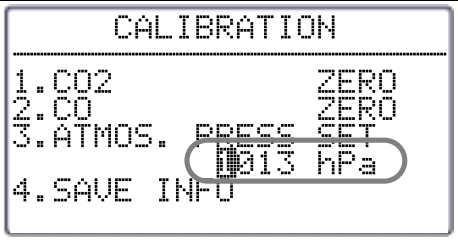
Lightly push grip part of probe into holder of probe stand.

※ Be sure to place the probe stand on the horizontal and stabilized stand. Unstable place may cause probe stand to fall and damage the probe.



<Compensation>

- when atmospheric pressure of the place to measure is different from normal atmospheric pressure (such as high altitude), Please follow below steps for Atmospheric pressure setting (Initial value: 1013hPa).
- Since the change of weather does not significantly affect the atmospheric pressure as long as the place to measure is same (Exclude the case of typhoon), you need to set Atmospheric Pressure only 1 time.

Display	Procedure
	Press MENU . Use ▼ ▲ to select [7.CALIBRATION] . press SET .
	Use ▼ ▲ to select [3. ATMOS. PRESS SET] press SET .
	Use ▼ ▲ to set Atmospheric Pressure value. Press SET . Use ▼ ▲ to select Select [4. SAVE INFO.]. Press SET . ※This will complete the setting and you are back in Main Menu.

2.5.2 Measuring Temperature and Attentions

- Responsiveness of the temperature measurement is proportional to the speed of airflow. We recommend for you to use the displayed value when reading becomes stabilized.
- With no airflow is present, temperature reading value may be slightly higher than actual temperature due to the heat generated by this sensor. For accurate temperature reading, we recommend for you to use at least 0.1m/s of airflow.

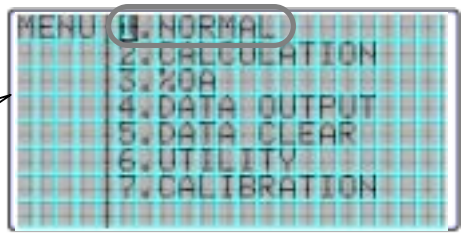
2.5.3 Measuring Humidity and Attensions

- High humidity or rapid temperature change in atmosphere may cause humidity reading value to be exceedingly high because of the condensation occurred on this sensor. Incase of the condensation, leave a probe under atmosphere of less than 40%RH for 24 hours to dry.

  Comparison: Assman Aspirated Psychrometer
  The quality and accuracy of IAQ Monitor humidity measurement function is ensured by strict calibration with traceability in Japanese National Standards of JEMIC (Japan Electric Meters Inspection Corporation). This instrument provides stable measurement as an electronic hygrometer, can be used as a replacement of conventional Assman Aspirated Psychrometer. Assman Aspirated Psychrometer often reads higher humidity when comparison is made with IAQ Monitor. Handling and condition, such as wrapping and dust, drastically affect Assman Aspirated Psychrometer, so that such handling must be done in caution.
  For more information on proper handling of your Assman Psychrometer, please fere to the Japanese Industrial Standard (JIS-Z8806 “Measuring Method for Humidity”).

3. NORMAL Measurement

This is the mode that you will be in, when you first turn on the instrument. In this mode you cannot save any data. The display will be updated every 1 second.

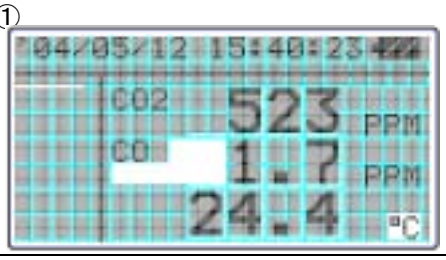
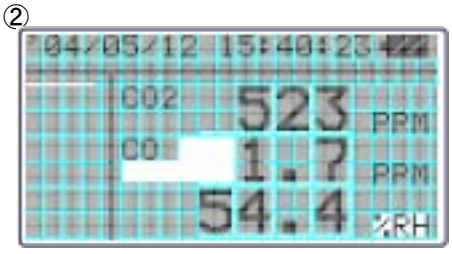
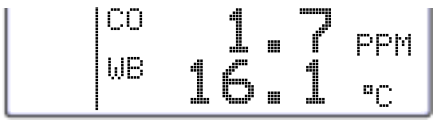


To move to NORMAL Mode from other measuring mode,

Press MENU.

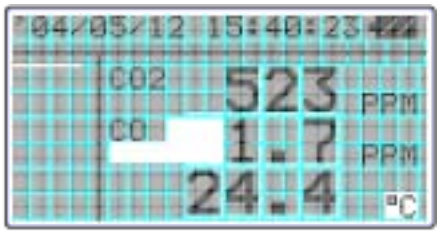
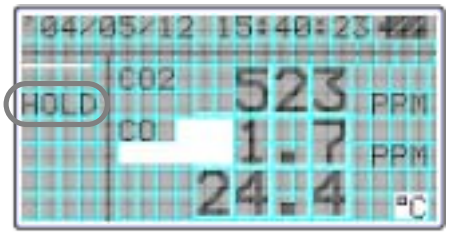
Use ▼▲ to select "1. NORMAL".

3.1 Selecting the Measuring Parameters

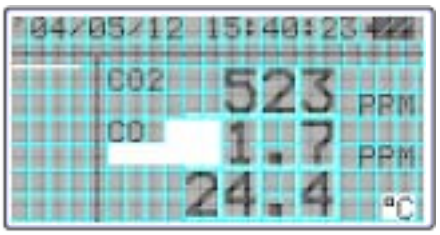
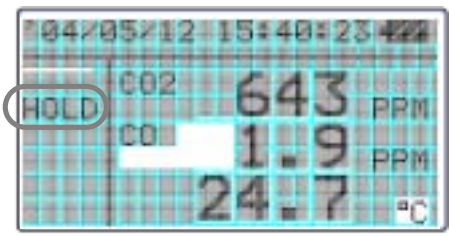
Display	Procedure
① 	**<NORMAL MODE>** Press MODE, and display mode moves in order, as shown below. ②CO, CO_2, Temperature→① CO, CO_2, Humidity
② 	**<CO_2, CO Humidity Measuring>** Press ▼▲, and display mode moves in order, as shown below, Humidity, Dew Point Temperature [DT], Wet-bulb Temperature [WB], Absolute Humidity [AH], and Humidity Ratio [HR]).See P.45 for detailed information for each item.
③ 	**<Due Point Temperature>**
④ 	**<Wet-bulb Temperature>**

⑤ 	**<Absolute Humidity>**
⑥ 	**<Temperature Ratio>**

3.2 Display Hold

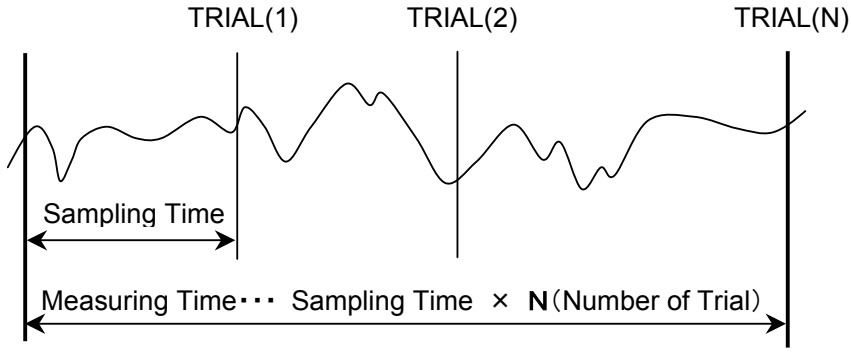
Display	Procedure
	While measuring, Press (START/HOLD) (Also available on Humidity measuring.)
	"HOLD" indicator appears on the display to indicate that the reading shown is held. Press (START/HOLD) again to release.

Maximum Hold･･･How to Hold the Maximum Value

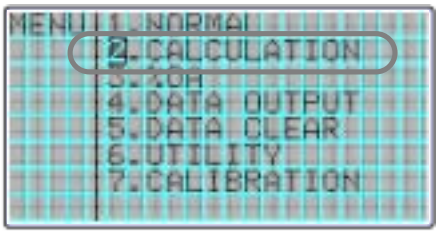
Display	Procedure
	While measuring, press and hold (START/HOLD) .
	"HOLD" indicator appears on the display and you can hold the maximum value of each parameter (CO, CO_2、 temperature or humidity). When you release (START/HOLD), the reading shown will be frozen. Press (START/HOLD) again to release.

4. Measuring Maximum, Minimum & Mean

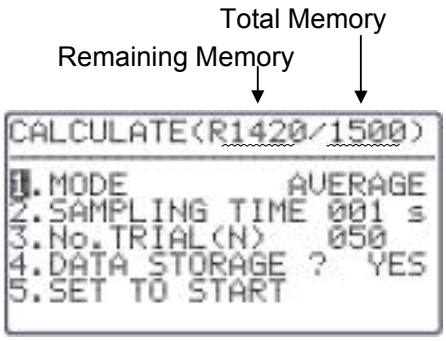
Calculation Mode will automatically calculate the maximum, minimum and mean of measured data.



- Average (AVG)
  AVG＝ Σ TRIAL(N)/N
- Maximum (MAX)
  MAX＝TRIAL(i)
- Minimum
  MIN＝TRIAL(j)

Display	Procedure
	Press MENU. Use ▼ ▲ to select "2. CALCULATION" Press SET.

CALCULATION MODE DISPLAY ICONS



1.CALCULATION MODE

AVERAGE: Take the average of each second within sampling time and count it as a 1 measured data.

INSTANT: Make the measurement at the last second of the sampling time, and count it as a 1 measured data.

2. SAMPLING TIME（1 – 999 sec.）

To set the length of sampling time of measurement.

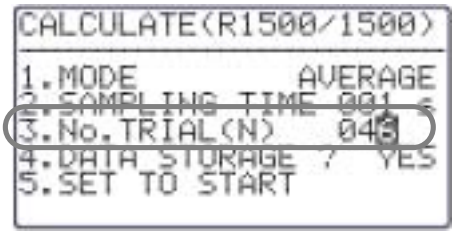
3. No. TRIAL（1 – 999）

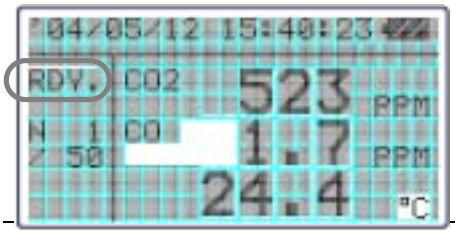
To set the number of trials (data) needed of desired sampling time.

4. DATA STRORAGE（YES or NO）

5. SET TO START

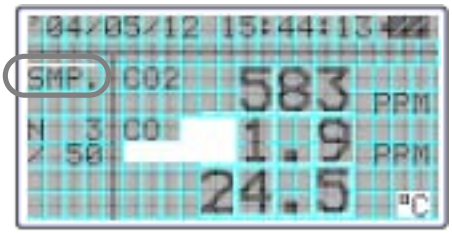
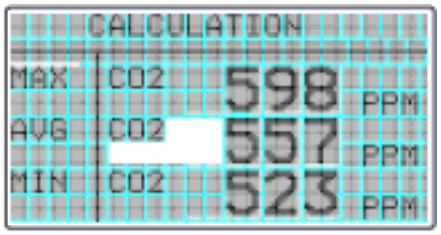
Save the setting and return to standby.

Display	Procedure
	**＜To Set CALCULATION MODE＞** Use ▼▲ and select "1. MODE" Press SET. Use ▼▲ and select AVERAGE or INSTANT Press SET.
	**＜To Set SAMPLING TIME＞** Use ▼▲ and select "2. SAMPLING TIME" Press SET. Use ▼▲ and select SAMPLING TIME (1 to 999sec). Press SET.
	**＜To Set No. TRIAL (N)＞** Use ▼▲ and select "3. No. TRIAL(N)" Press SET. Use ▼▲ and select No. TRIAL (1to 999 times). Press SET.
	**＜DATA STORAGE＞** Use ▼▲ and select "4. DATA STORAGE ?" Press SET. Use ▼▲ and select YES or NO. Press SET. ※You CANNOT store more than what's left in the memory. If you set the number more than the number of remaining data locations, it automatically adjusts to the amount of remaining memory locations. (Ex: if there is R0020/1500 remaining, you can only measure 20 times even if you set the No. TRIAL more than 20.)
	**＜Save the Settings＞** Use ▼▲ and select "5. SET TO START" Press SET.



<READY>

Press START/HOLD to start.

Display	Procedure
	**<While Measuring>** Press START/HOLD to stop. ➢ If you have selected " YES " for " 4. DATA STORAGE ?", the measured data will be stored. Press MENU can also stop the measurement but this would not store any data.
	**<Result>** After all the trials are finished, the calculated result will appear in display. Press ▼▲ to check each parameter in order of CO_2, CO, Temperature, Humidity, DP, WB, AH, and HR.
	In the case of DP, WB, AH, and HR, only mean values are displayed. Press MENU to return to Main MENU. Calculation data will be stored when [4.DATA STORAGE] is set to [YES].

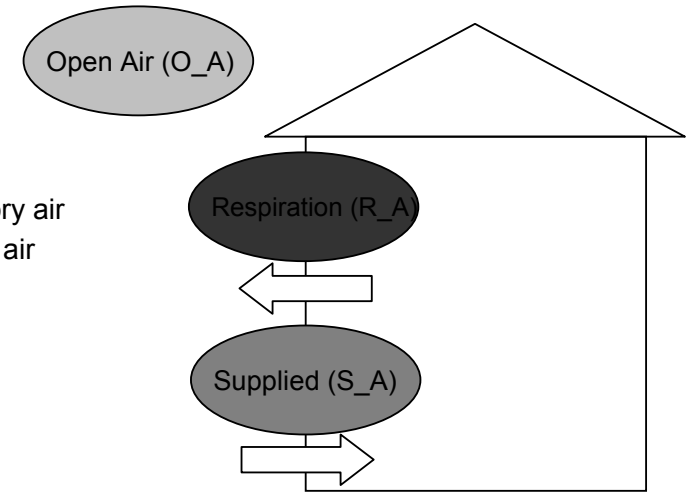
Related Functions:

- If printer is connected: press MODE to print out the result.
- To recall stored data → P.19
- Print Out -- P.21
- What is DT, WB, AH, HR -- P.45,46,47

5. %OA Mode

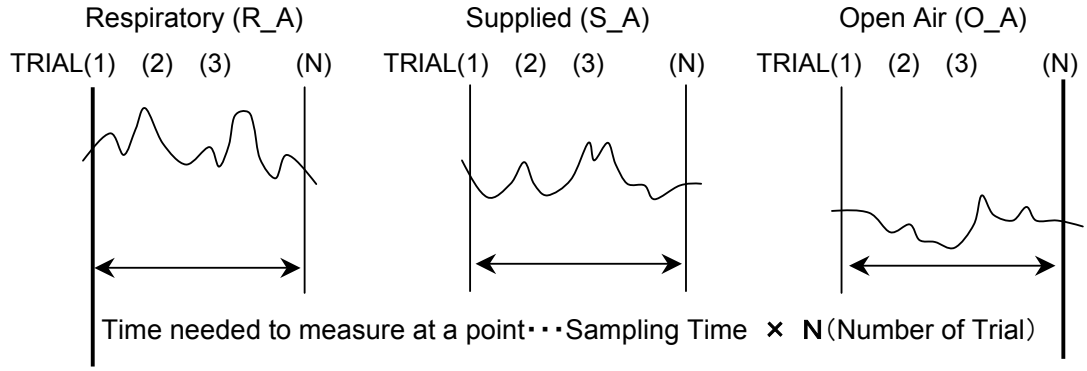
%OA MODE is to provide calculation of ventilation ratio with temperature or CO_2.
Calculation is based on below formula:

%OA＝(R_A - S_A)／(R_A – O_A)×100



* %OA：Ventilation Ratio
R_A：Temperature and CO_2 in respiratory air
S_A：Temperature and CO_2 in supplied air
O_A：Temperature and CO_2 in open air

Measurements take place in order of :
Respiratory Air – Supplied Air- Open Air



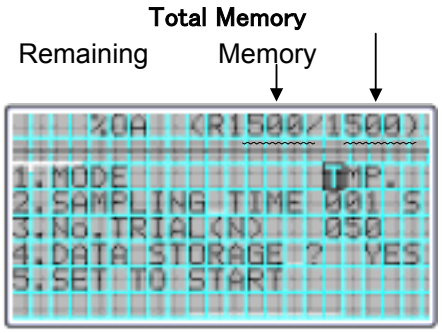
Respiratory Air: R_A= Σ TRIAL(N)/N
Supplied Air: S_A= Σ TRIAL(N)/N
Open Air: O_A= Σ TRIAL(N)/N

<Result>
** Ventilation Ratio（%OA）
%OA = (R_A - S_A) / (R_A - O_A) x 100

The average value in each point is used for the calculation of ventiltation ratio..
Temperature or CO_2 concentration velue of each point（TRIAL(1)～TRIAL(N)）will be stored in the memory.

Display	Procedure
	Press MENU press SET and Select [3.OA%] .
	**<To Set Sampling Time >** Use ▼▲ to Select [1.MODE] Press SET . Use ▼▲ to Select [TEMP.] or [CO2] Press SET .

%OA MODE (Ventilation Ratio Measurement) Display Icons



1. Calculation MODE

TMP.： To calculate by taking in temperature value.

CO2：To calculate by taking in **CO_2** concentration.

2. SAMPLING TIME（1-999 sec.）

To Set the length of sampling time of measurement.

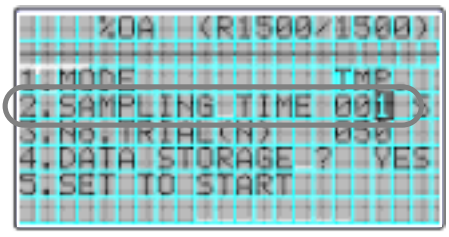
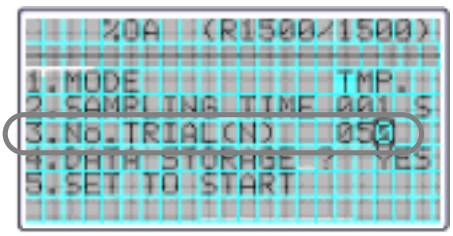
3. No. TRIAL(N)（1-999times）

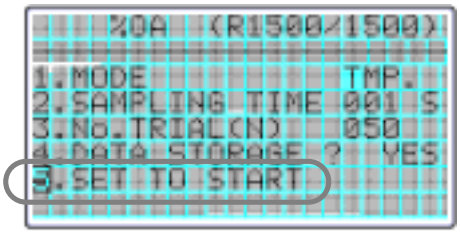
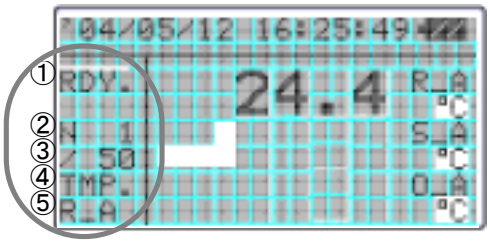
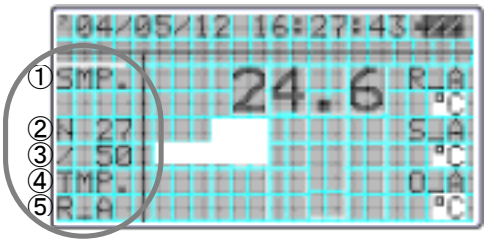
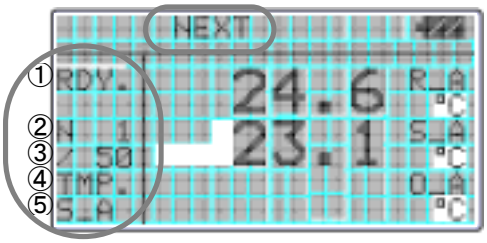
To set the number of trials(data) needed of desired Sampling time.

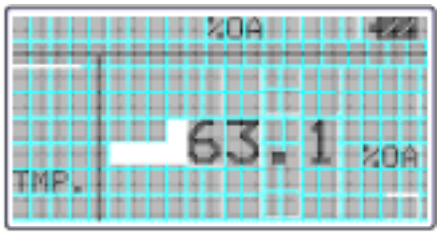
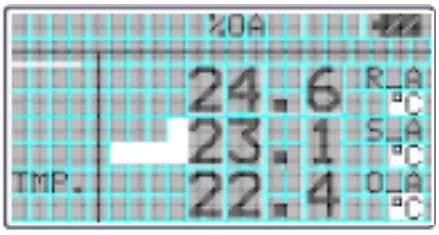
4. DATA STORAGE（YES/NO）

5. SET TO START

Save the setting and return to standby.

	**<SAMPLING TIME>** Press ▼▲ and select [2.SAMPLING TIME] Press SET. Use ▼▲ to set an appropriate number (1-999), Press SET.
	**<NO.TRIAL>** Press ▼▲ and select [3.No.TRIAL], Press SET. Press ▼▲ to select No. TRIAL (1-999), Press SET .

Display	Procedure
	**<DATA STORAGE>** Press ▼ ▲ to select [4.DATA STORAGE], Press SET. Use ▼ ▲ and select [YES] or [NO], Press SET .
	**<SET TO START>** Use ▼ ▲ and select [5.SET TO START], Press SET. ※ If you press MENU before saving the settings it will return you back to Main Menu.
	**<Ready>** Press START/HOLD to start. Display Icons: ①RDY.: Current Status (READY/SAMPLE) ②N 1: Number of data measured including current ③/ 50: Total number of data to be measured ④TMP.: Calculation Mode (TEMP. = temperature) ([CO2] appears for CO_2 Mode) ⑤R_A: Measuring point (R_A: Respiratory Air, S_A: Supplied Air, O_A: Open Air)
	**<While Measuring>** Press START/HOLD to stop. Press START/HOLD again to resume. ※ Press MENU can also stop the measurement but this would not store any data.
	**<Ready for the Next Measurement Point>** After completing R_A mode measurement, [NEXT] appears to indicate the standby status for the S_A mode measurement. Then, S_A mode and O_A mode follows respectively.

Display	Steps
	**<Result>** After all the trials are finishied, the calculated result will appear in display.
	Press ▼ to display average values in order of : R_A, S_A, and O_A. Press MENU to return to main MENU. If you have selected [YES] for [DATA STORAGE], the result will be stored.

Related Functions:

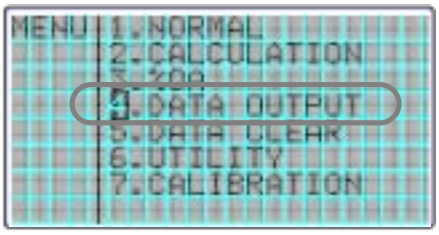
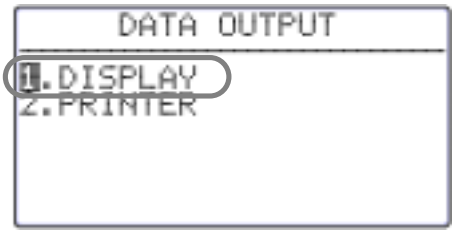
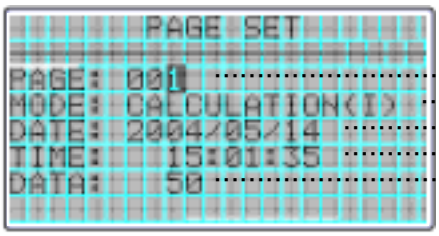
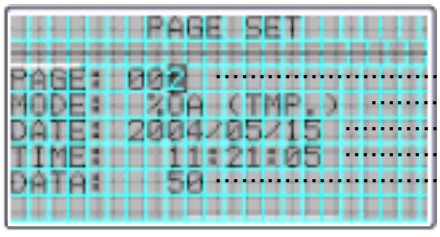
- If printer is connected, press MODE to print out the result.
- To recall stored data – P.19
- Print Out – P.21

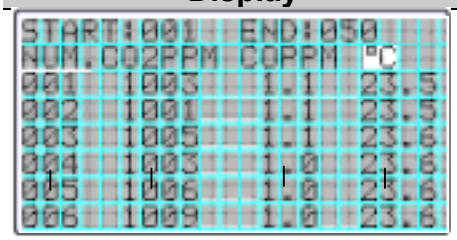
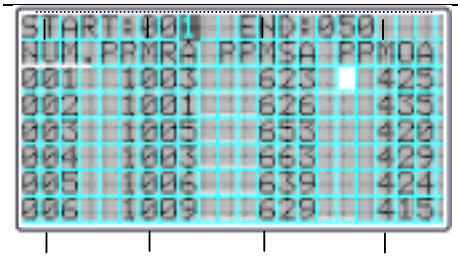
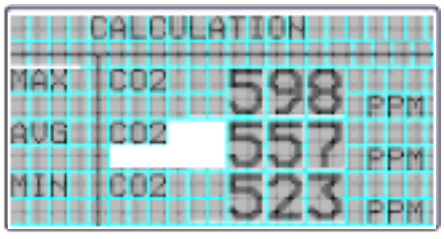
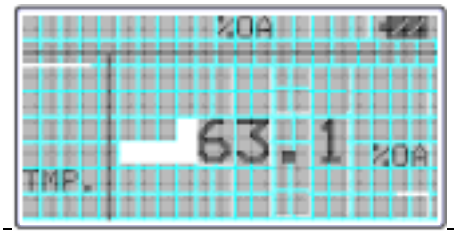
6. DATA OUTPUT

6.1 What can be Stored ?

Measuring	Display	Stored Parameters
CALCULATION Mode	All	CO_2, CO, temperature, humidity (including the items of humidity)
%OA Mode	Temp.	%OA; R_A, S_A, and O_A temperature
	CO_2	%OA; R_A, S_A, and O_A CO_2 concentration

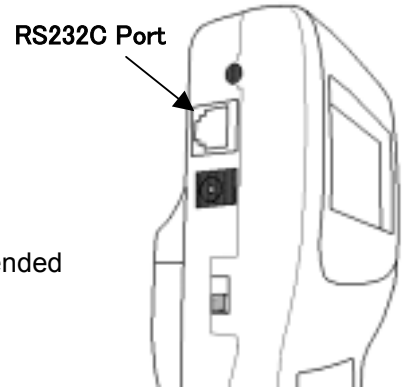
6.2 To Recall Stored Data

Display	Procedure
	Press MENU Use ▼ ▲ to select [4.DATA OUTPUT], press SET.
	Use ▼ ▲ to select [1.DISPLAY], Press SET.
	**<To Set Page>** Use ▼ ▲ to select the page that you want to recall Press SET. Page number Mode(Calculation (A): AVERAGE/(I): INSTANT) Measured Date (Year/Month/Day) Time (Hour/Munite/Second) Number of Trial
	Page number Mode (%OA(TMP.):temperature or (CO2): CO_2) Measured Date (Year/Month/Day) Time (Hour/Munite/Second) Number of Trial

Display	Procedure
 Data number CO_2 CO TEMP.	**<Recalled Data>** Recalled data will be displayed. Use ▼▲ for scroll. If you measured in calculation mode, you can select Temperature or Humidity to be displayed by pressing MODE .
 Data number CO_2 CO_2 CO_2	**< Set Calibration Range>** You can select the range of calculation. （If you are not going to change the data range, Press START/RCL to calculate the entire data.） Press SET cursor will appear on [START]. Use ▼▲ to select the first data, Press SET Cursor will move to [END]. Use ▼▲ to selet the last data , Press SET. Press START/RCL to start a calculation ※ You cannot select more than one range.
 	**< In Calculation Mode >** Press ▼ to select the calculation result in order of CO_2 > CO > temperature > humidity > **DT** > WB > AH > HR. Only everage value is displayed on **DT**, WB, AH, and HR. **< In %OA Mode >** %OA Mode: Press ▼ to shift the average value of each point in order of %OA > R_A > S_A > O_A. Press SET to return to page set. Press MENU to return to MAIN MENU .

6.3 Print Out

You can connect IAQ Monitor to a printer using an RC232C cable for data printout.



6.3.1 Preparation

<Need to have>

- Printer (optional)…….. DPU-H245 (Seiko Instruments) - recommended
- Printer Cable（optional）

<Check the Baud Rate >

You need to coordinate the baud rate and data transmission conditions on both Main Body and the printer.

The factory setting of Main Body is as follows:

Data-bit length	**8-bit**
Parity	**None**
Stop Bit	**1**
Delimiter	**CRLF**
Baud Rate	**Base on setting value**

※ To change the BAUD RATE, refer to P.34 “Units and Baut Rate”.

For the setting of printer, refer to printer’s operation manual.

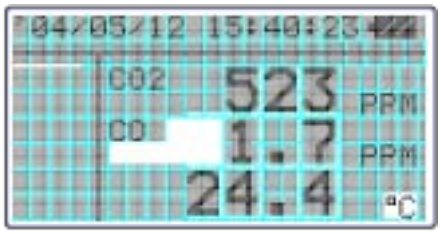
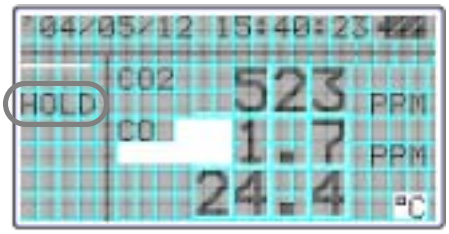
<Connecting Printer>

① Connect printer to Main Body using an RS-232C cable.

② Turn ON the IAQ Monitor first, and then turn ON the printer.

③ Make sure that the IAQ Monitor is displaying NORMAL Mode.

6.3.2 NORMAL Mode Print Out

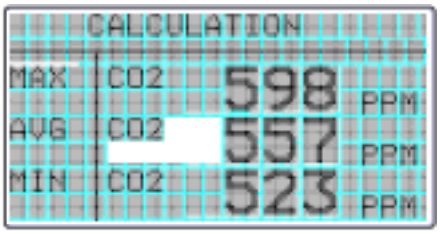
Display	Procedure
	Press START/HOLD to HOLD the display.
	Press MODE to print out. If printer is not connected properly, you will find “PERR” in lower left side of the display.

Examples of Print Out

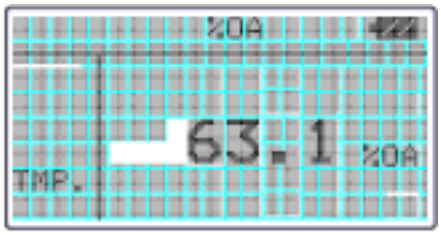
<NORMAL Mode>

```
2004/05/12 15:40:45
CO2       523    PPM        ·····CO2
CO        1.7    PPM        ·····CO
Temperature   24.4 ° C       ·····Temperature
Humidity      52.7 %RH       ·····Humidity
```

6.3.3 CALCULATION Mode Print Out

Display	Procedure
	Press MODE after the measurement and calculation to print out the result.

6.3.4 %OA Mode Print Out

Display	Procedure
	Press MODE after %OA measurement and calculation to print out the result.

Examples of Print Out

<CALCULATION Mode>

```
PAGE SET
PAGE  :004
MODE  :CALCULATION(I)
DATE  :2004/06/19
TIME  :17:24:33
ATM.  :1013hPa
DATA  :005
SAMPLING TIME:001
START:001  END:005
MAX    612  PPM  CO2
AVG    598  PPM  CO2
MIN    567  PPM  CO2
MAX      1.2 PPM  CO
AVG      0.9 PPM  CO
MIN      0.7 PPM  CO
MAX    25.6  °C
AVG    25.6  °C
MIN    25.5  °C
MAX    64.6  %RH
AVG    64.5  %RH
MIN    64.4  %RH
DT     15.4  °C
WB     18.1  °C
AH      7.5  g/m3
HR      6.4  g/kg
```

Condition

Result

Stored Location
Measurement Mode
Measured Date
Measured Time
Atmosphericpressure
# of Data
Sampling Time
Calculation Range
CO_2
E_A
CO
S_A
Temperature
O_A
%OA
Humidity
DT
WB
AH
HR

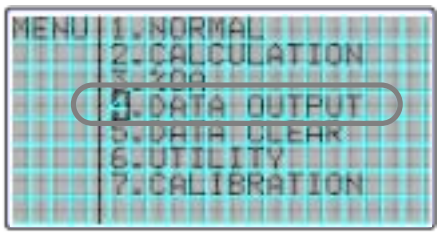
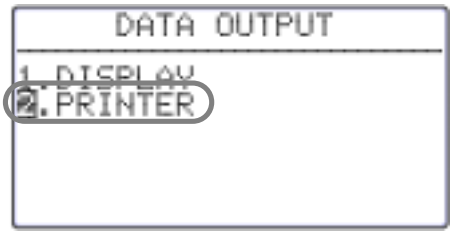
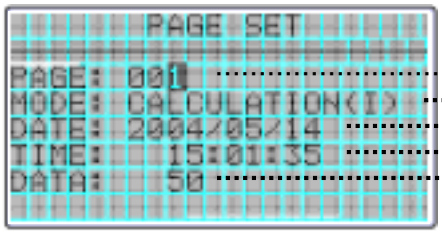
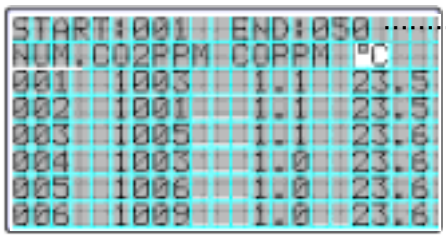
<%OA Mode>

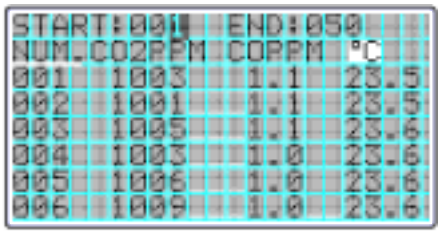
```
PAGE SET
PAGE  :002
MODE  :%OA(TMP.)
DATE  :2004/06/19
TIME  :13:35:23
ATM.  :1013hPa
DATA  :003
SAMPLING TIME:001
START:001  END:003
MAX    25.5 °C    R_A
AVG    25.4 °C    R_A
MIN    25.4 °C    R_A
MAX    24.3 °C    S_A
AVG    24.2 °C    S_A
MIN    24.1 °C    S_A
MAX    23.2 °C    O_A
AVG    23.0 °C    O_A
MIN    22.8 °C    O_A
%OA    85.4 %OA
```

Condition

Result

6.3.5 Stored Data Print Out

Display	Procedure
	Press MENU. Use ▼ ▲ to select [4.DATA OUTPUT], Press SET.
	Use ▼ ▲ to select [2.PRINTER], Press SET.
	Use ▼ ▲ to select page that you want to print out, press SET. **Page number** **Measurement Mode(Calculation (A): AVERAGE, (I): INSTANT)** **Measured Date (Year / Month / Day)** **Measured Time (Hour : Minute : Second)** **Number of Trial/Number of Measuring Point**
	The data you have selected will be displayed. Press ▼ to scroll. **Calculation Range** **Data# CO_2 CO Temperature** If you measured in CALCULATION mode, you can select Temperature or Humidity to be displayed by pressing MODE.



<Set Print Out Range>

You can select the range of calculation.

（If you are not going to change the data range, press START/HOLD to calculate the entire data.）

Press SET.

Cursor will appear on “START”

Use ▼▲ to select starting point.

Press SET.

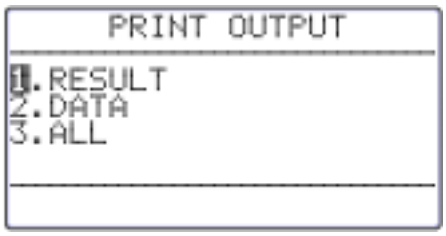
Cursor will move to “END”

Use ▼▲ to select l.

Press SET.

Press START/HOLD to calculate.

You CANNOT set more than one range.



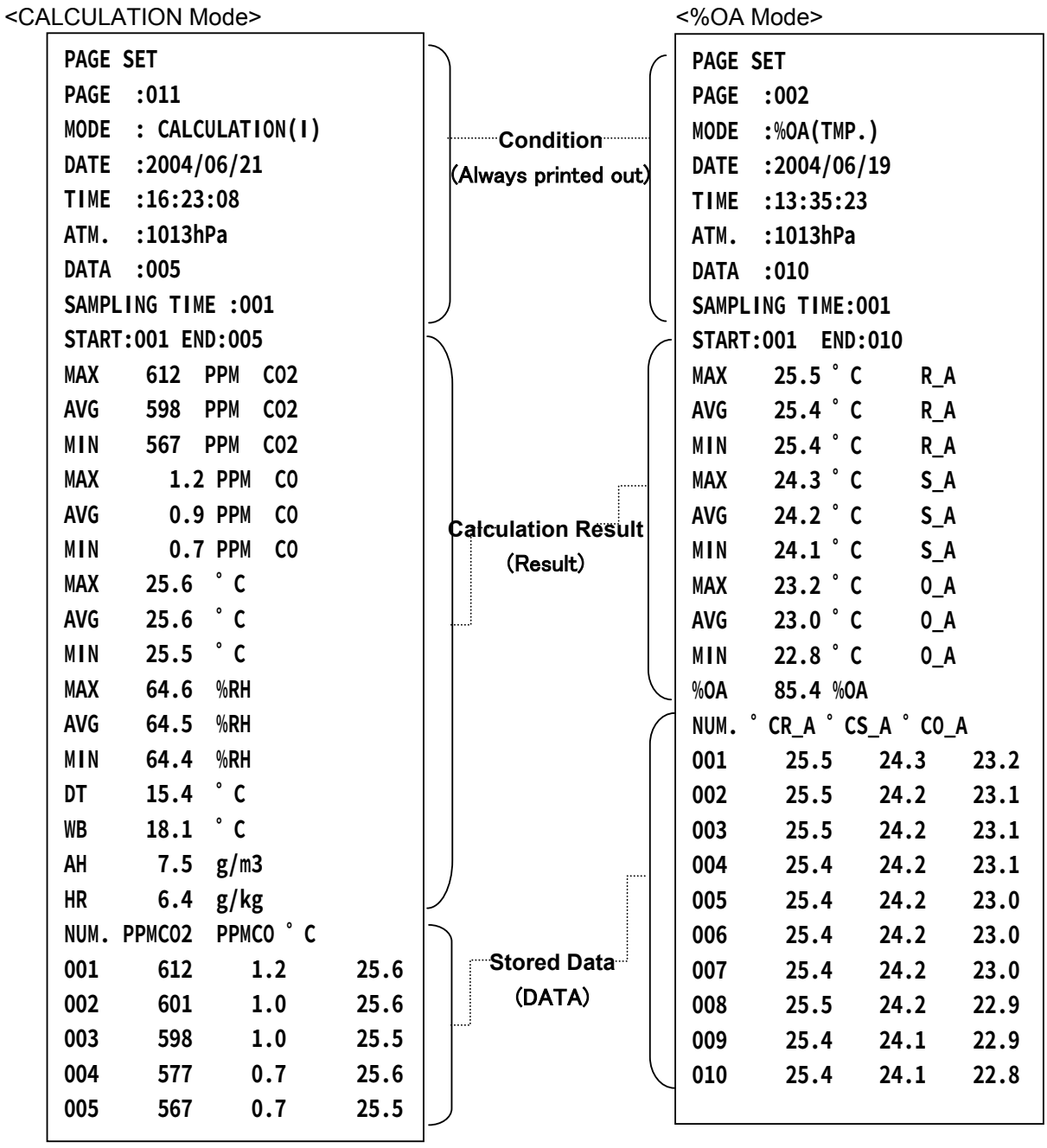
Press START/HOLD to select the content of the Print Out.

Use ▼▲ to select.

Press SET to print out.

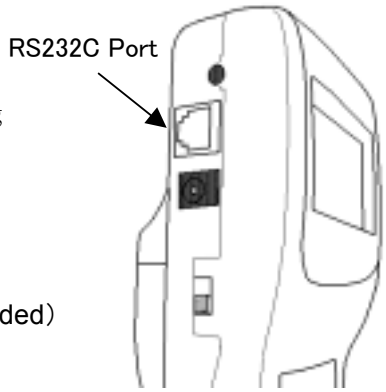
1. RESULT……Condition and Calculation Result
2. DATA……Condition and Stored Data
3. ALL……Condition, Calculation Result and Stored Data

Example of Print Out



6.4 Digital Output

6.4.1 Preparation



You can download the data stored in IAQ Monitor to your PC, by connecting IAQ Monitor and your PC with the RC232C cable.

<Need to Have>

- Computer
- RS-232C cable (provided)
- Data Processing Software（Software for Windows DC-ROM is provided）

<Check the Baud Rate >

You need to coordinate the data transmission conditions on both Main Body and your PC.

The factory setting of Main Body is as follows:

Data Bit Length	**8 bits**
Parity	**None**
Stop Bit	**1**
Delimiter	**CRLF**
Baud Rate	**Bace on the setting**

※ **To change the BAUD RATE, refer p.34 “Units and Baud Rate”.**

For setting your PC, refer to the operation manual of your PC

＜Connecting PC＞

① Connect PC to Main Body using an RS-232C cable.

② Turn ON the IAQ Monitor.

③ Make sure that the IAQ Monitor is displaying NORMAL Mode.

Make sure that the IAQ Monitor is displaying NORMAL Mode.

RS232C Cable Wiring Diagram

PC (D-Sub9 pin)		Connection	IAQ Monitor（MODEL2211）			
Signal	Pin No.		Pin No.	Signal	Purpose	Direction
NC	1		1	GND	Ground	
RXD	2		2	TXD	Transmitting	Output
TXD	3		3	RXD	Receiving	Input
NC	4		4	CTS	Transmission Approval	Input
GND	5		5	RTS	Transmission Request	Output
NC	6		6	NC		
RTS	7					
CTS	8					
NC	9					

6.5 To Access From Your PC

To connect IAQ Monitor to your PC, please refer to p.27.

———Icons and its Meaning———

␣: Space

↵: Return or Press Enter

*: A Number

※Please input all commands with a capital letter.

Command	Function
D＊＊＊＊↵	Number of Downloading Data
N↵	Cancel
S↵	Output of Measuring Condition (of On-Time Data)
U↵	Output of Measuring Units
K↵	Output of Duct Shape/Size
P↵	Output of Page Number
T＊＊＊＊↵	Output of Stored Data
M＊＊＊＊↵	Output of Measuring Condition (of Stored Data)
B↵	Output of Measuring Condition of All Pages

6.5.1 Transmission of On-Time data

Display	Procedure
Example: Measuring Model and typed Entered [D0005↵]. AD↵ ␣␣␣␣0.9;␣␣␣␣576;␣␣␣23.4;␣␣␣63.4↵ ␣␣␣␣0.8;␣␣␣␣556;␣␣␣23.4;␣␣␣63.3↵ ␣␣␣␣0.8;␣␣␣␣534;␣␣␣23.5;␣␣␣63.2↵ ␣␣␣␣0.9;␣␣␣␣540;␣␣␣23.5;␣␣␣63.2↵ ␣␣␣␣0.9;␣␣␣␣561;␣␣␣23.4;␣␣␣63.3↵	**<Set Number of Data Needed>** **Press "D＊＊＊＊↵"** (※Must type in 4 digits) After "AD", the data will be displayed. Each data represent 1sec of measurement. If you ask for 20 data, it takes approximately 20sec to display. The maximum number that can be set is 999. If you need more, re-send the command. **<Output Content>** CO; CO2; Temperature; Humidity
AN↵	**<To Cancel>** **Press "N↵"**

Display	Procedure
AS↵ CTH;00;00;1013↵	**<To Download Measuring Conditions>** Press **[S ↵]** After "AS", the data will be displayed. **Contents** CTH；CO range; temperature range; atmosphere pressure CO range -- 00: 0-50PPM, 01: 0-500PPM Temperature range – 00: 0-60℃, **01: -20-60℃**

Display	Procedure
AU↵ ppm;ppm;° C;%RH;° C;° C;g/m3;g/kg;%↵	**<To Download Measuring Units >** Press **[U ↵]** After "AU", the data will be displayed. **Output** CO Unit; CO_2 Unit; temperature Unit; humidity Unit ; DT Unit; WB Unit; AH Unit; HR Unit; OA% Unit

6.5.2 Transmission of Stored Memory

Display	Procedure
AF↵	**<Enable humidity data output>** Press **[F ↵]** , after [AF] , Humidity related data (such as DT, WB, AH, and HR) will be displayed.
Display	**Procedure**
AG↵	**<To release humidity >** Press **[G ↵]** , after [AG] Humidity related data (such as DT, WB, AH, and HR) will be displayed.
Display	**Procedure**
AP↵ P0011↵	**<To Download Page Number >** Press **[P ↵]** , after [AP] Number of stored page will be displayed.
Display	**Procedure**
AT↵ 2004/05/19;13:32:26↵ 001;␣␣␣␣0.9;␣␣␣␣576;␣␣␣23.4;␣␣␣63.4↵ 002;␣␣␣␣0.8;␣␣␣␣556;␣␣␣23.4;␣␣␣63.3↵ 003;␣␣␣␣0.8;␣␣␣␣534;␣␣␣23.5;␣␣␣63.2↵ 004;␣␣␣␣0.9;␣␣␣␣540;␣␣␣23.5;␣␣␣63.2↵ 005;␣␣␣␣0.9;␣␣␣␣561;␣␣␣23.4;␣␣␣63.3↵	**<To Download Stored Data >** **Press "T＊＊＊＊↵"** (※Must type in 4 digits) Type in the desired page number after "T". After "AT", the data will be displayed. ※ The numbers will be displayed in currently selected units. NOT in units of at saving the data. (As for %OA, only the average value in a page is outputted) ※ Calculated data will not be downloaded.

Output

- CALCULATION Mode (pre [F] command)
  Data#; CO; CO_2; temperature; humidity
- CALCULATION Mode (post [F] command)
  Data#; CO; CO_2; temperature; humidity; DT; WB; AH; HR
- %OA Mode:
  Data#; %OA; R_A; S_A; O_A

＊ **Data setting of IAQ Monitor does not affect the data setting: date format is fixed to YY/MM/DD.**

Display	Procedure
AM↵ CTH;000;001;003;AVG;1013↵ ① ② ③ ④ ⑤	**<To download measurement condition>** **Press "M＊＊＊＊↵"** (※Must type in 4 digits) Type in the desired page number after "AM".

Contents

① Measuring Mode
000: CALCULATION Mode
001: %OA Mode

② Sampling Time

③ Number of Data

④ Calculation setting
CALCULATION -- AVG: average, INS: Instant
%OA -- TMP: temperature CO2; CO_2

⑤ Atmosphere pressure

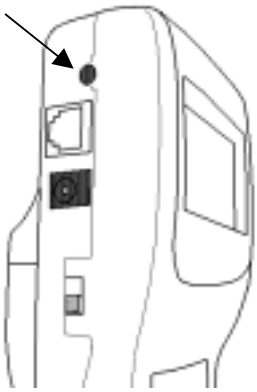
Display	Procedure
AB↵ CTH;000;001;003;AVG;1013↵ CTH;001;001;005;TMP;1013↵	**<To download measurement conditions of all pages>** Press **[B ↵]** , after[AB] The data will be displayed.

Display	Procedure
ED↵	**<Error Message>** "ED" will be returned if the number of pages etc. is incorrect-inputted.

6.6 Analog Output (Optional)

① Data Update Interval ·····1 second
② Load Impedance····· Above 5KΩ
④ Output Current·····DC 0-1V

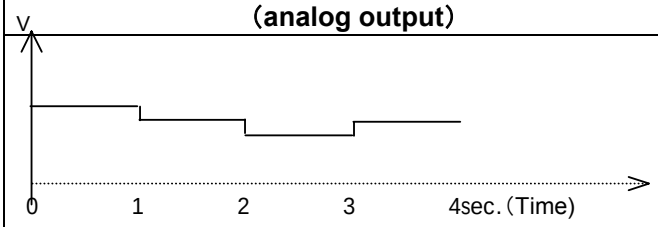
Analog Output Port

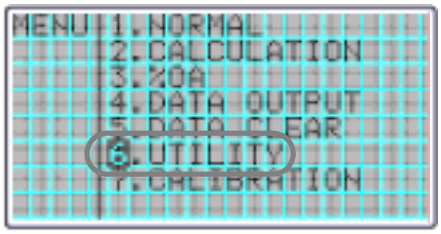
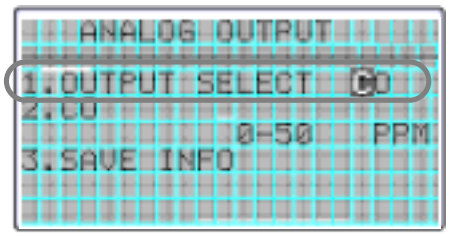
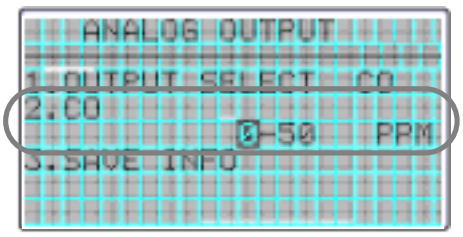


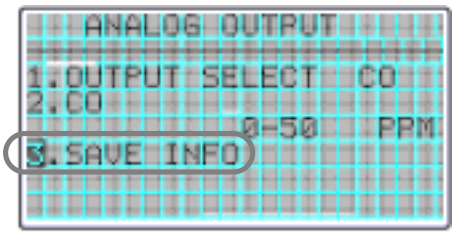
For the analog output, you must select one setting from the table below.

	Output Range	Conversion Formula (Voltage: V)
CO (C)	0 – 50 ppm	C = 50 x V ppm
	0 – 100 ppm	C = 100 x V ppm
	0 – 250 ppm	C = 250 x V ppm
	0 – 500 ppm	C = 500 x V ppm
CO_2 (M)	0 – 500 ppm	M = 500 x V ppm
	0 – 1000 ppm	M = 1000 x V ppm
	0 – 2500 ppm	M = 2500 x V ppm
	0 – 5000 ppm	M = 5000 x V ppm
Temperature(T)	0 – 50 ℃	T = 50 x V ℃
	0 –100 ℃	T = 100 x V ℃
	-20 – 30 ℃	T = 50 x V – 20 ℃
	-20 – 80 ℃	T = 100 x V – 20 ℃
Temperature(F)	32 – 122 °F	F = 90 x V + 32 °F
	32 – 212 °F	F = 180 x V + 32 °F
	-4 – 86 °F	F = 90 x V – 4 °F
	-4 – 176 °F	F = 180 x V – 4 °F
Humidity (H)	0 – 50 %RH	H = 50 x V %RH
	0 – 100 %RH	H = 100 x V %RH

Of the output range, the low end will be set at 0V and the high end will be set at 1V .
Data output interval is always 1 second.

Way To Take In Measured Data (analog output)	Explanation
	**Take the data at every 1 second, output the value every 1 second.**

Display	Procedure
	Press MENU Use ▼ ▲ to select [6.UTILITY], Press SET.
	Use ▼ ▲ to select [3.ANALOG OUTPUT]. Press SET.
	**<To Select Data >** Use ▼ ▲ to Select [1.OUTPUT SELECT], press SET Use ▼ ▲ to select CO, CO2 (CO_2), TMP.（temperature）, and HUM.（humidity）. Select the data Press SET.
	**<To Set Output Range>** Use ▼ ▲ to select [2.] Press SET. Use ▼ ▲ to select the range Press SET.



<To save the setting>

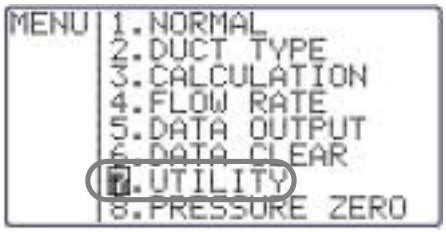
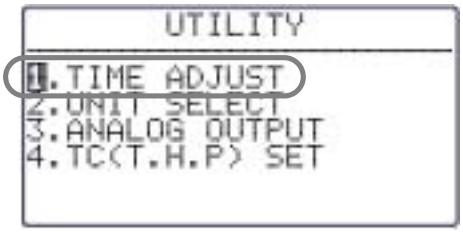
Use ▼▲ to select [3.SAVE INFO].

Press SET

※If you Press MENU before you save, you will return to Main Menu and setting will not be saved.

7. Other Setting

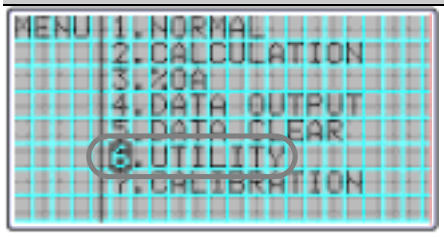
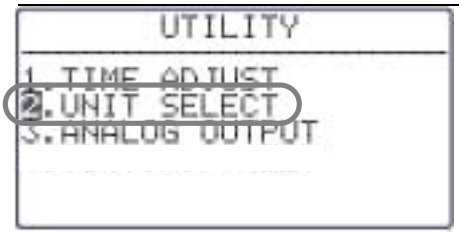
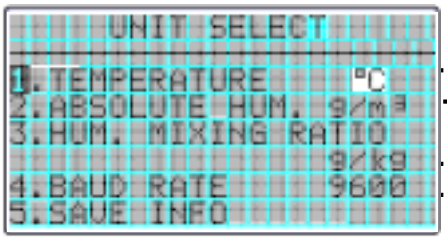
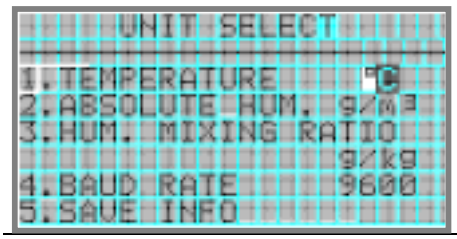
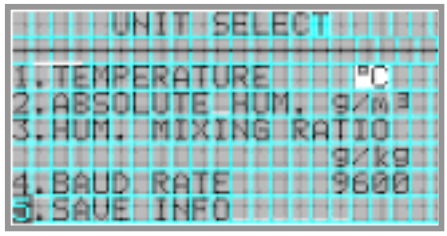
7.1 Date

DISPLAY	PROCEDURE
	Press MENU. Use ▼▲ to select “7. UTILITY”. Press SET.
	Use ▼▲ to select “1. TIME ADJUST”. Press SET.
	Use ▼▲ to select "1.STYLE" or "2.DATE". Press SET. 1.STYLE: Select JP,US or EU Japanese style(JP) YYYY/MM/DD US style(US) MM/DD/YYYY EU style(EU) DD/MM/YYYY 2.DATE: Date 3.TIME: hour/minute/sec
	Use SET to select the desired item. Use ▼▲ to change the setting. Press SET to move the cursor back to “1” or “2”.
	**<To Save the Setting>** Use ▼▲ to select “3. SAVE INFO”. Press SET. ※If you press MENU before you save, you will return to Main Menu and the setting will not be saved.

※ Date of the output to the display or printer depends on this setting.. But the style of the output to digital port (RS-232C) is fixed as Japanese style.

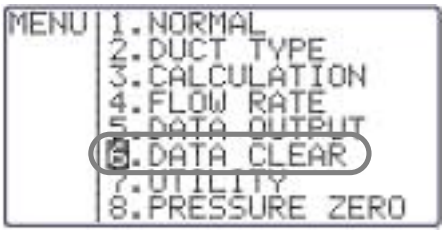
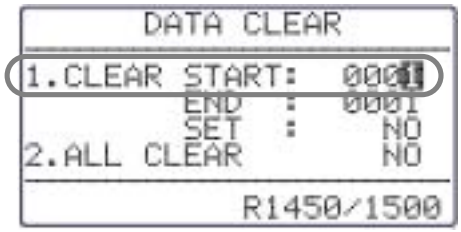
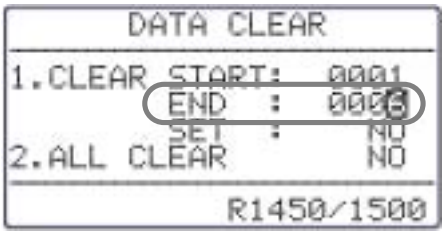
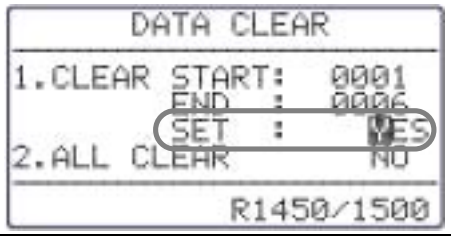
7.2 Units and Baud Rate

＜Units Conversion Table＞
Temperature T(°F)＝1.8×T(℃)＋32
Absolute Humidity 1(g/m³)＝6.24×10⁻⁵(lb/ft³)
Humidity 1(g/kg)＝9.9999×10⁻⁴(lb/lb)

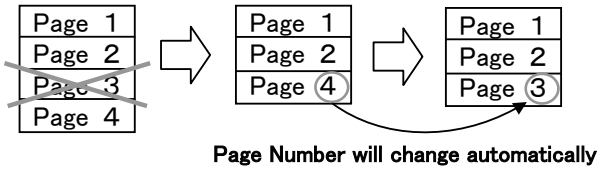
DISPLAY	PROCEDURE
	Press MENU. Use ▼▲ to select "6. UTILITY". Press SET.
	Use ▼▲ to select "2. UNIT SELECT". Press SET.
	Use ▼▲ to select the desired item (1 thru 5). Press SET. ·····Temperature: ℃ or °F ··· Absolute Humidity: g/m³, lb/ft³ ·····Humidity Ratio: g/kg, lb/lb ·····Baud Rate: 4800,9600,19200,38400bps
	Use ▼▲ to change the setting. Press SET.
	**<To Save the Setting>** Use ▼▲ to select "5. SAVE INFO". Press SET. ※ If you press MENU before you save, you will return to Main Menu and the setting will not be saved.

7.3 To Delete Data

7. 3. 1 To Delete a Page of Data

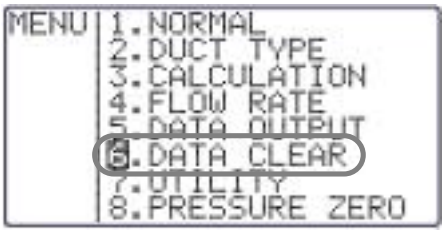
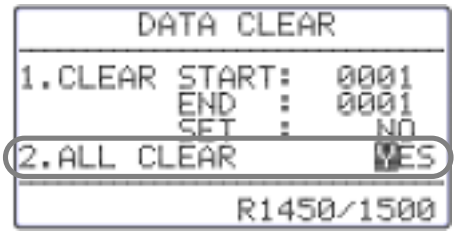
DISPLAY	PROCEDURE
	Press MENU. Use ▼▲ to select "6. DATA CLEAR". Press SET.
	Use ▼▲ to select "1. CLEAR". Press SET. ·····Starting Page Number ·····Ending Page Number ·····Partial Delete (YES or NO) ·····All Delete (YES or NO) ·····Remaining Memory / Total Memory
	Use ▼▲ to select the starting page. Press SET.
	Use ▼▲ to select the ending page. Press SET.
	Use ▼▲ to select "YES" for partial delete. Press SET.

Selected page will be deleted and the remaining data will shift up.
(See diagram below)

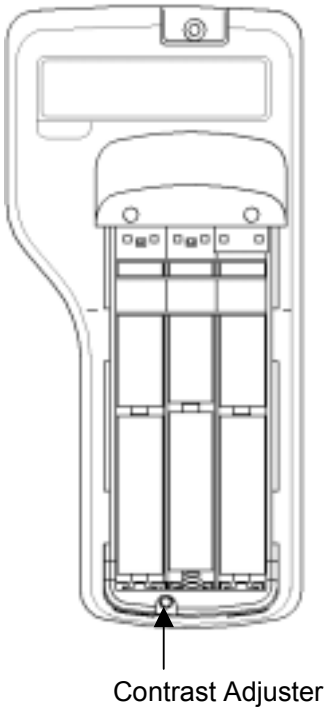


Page Number will change automatically

7. 3. 2 To Delete All Data

DISPLAY	PROCEDURE
	Press MENU. Use ▼▲ to select "5. DATA CLEAR". Press SET.
	Use ▼▲ to select "2. ALL CLEAR". Press SET. **·····All Delete (YES or NO)** **·····Remaining Memory / Total Memory**
	Use ▼▲ to select "YES" to delete. Press SET.
	All the data will be deleted and the Remaining Memory will be 1500.

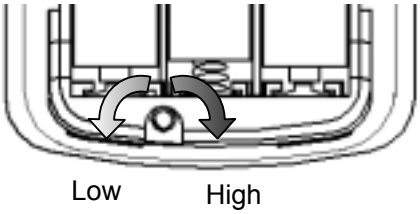
7.4 Contrast Adjustment



In case you find the LCD display of Main Body too dark or too light, there is an adjusting volume at the back, bottom of Main Body, inside the battery cover.

You can adjust by using a precision driver (-)（0.9～1.5mm）.

Turn it clockwise to darken and vice versa.

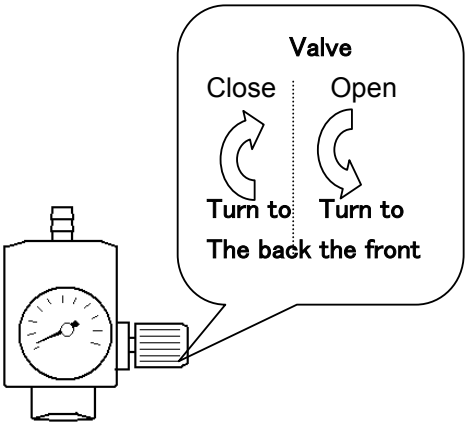


8. Calibrating CO/CO_2 Sensor

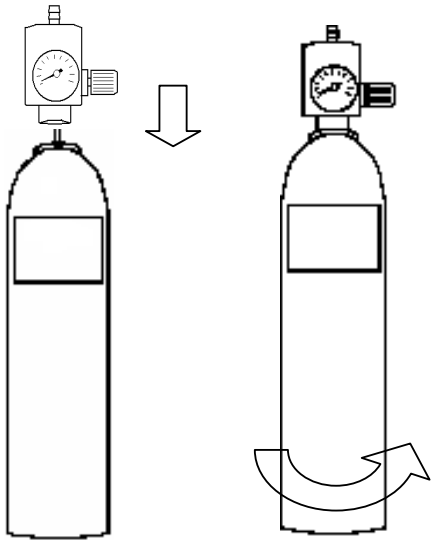
8.1 Preparation

Please turn on the main unit to fully warm up (about 10 minutes) before calibration.
In general, calibrate in order of ZERO gas prior to Span gas (The calibration of only either ZERO gas or Span gas is possible).

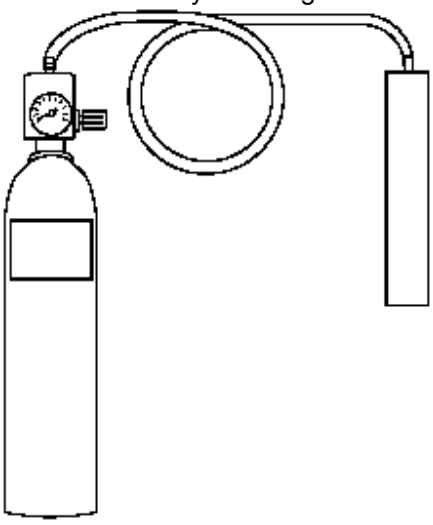
① **Please check the valve of regulator is closed**



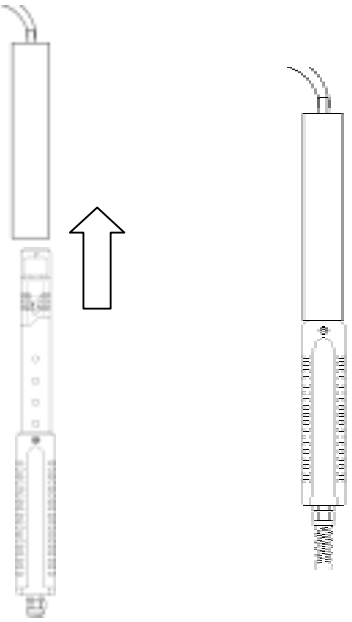
② Attach the regulator to ZERO Gas tank.



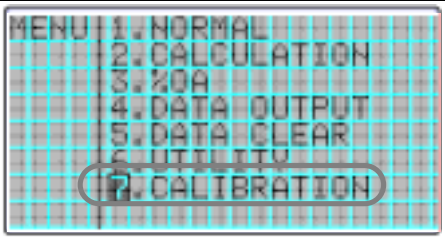
③ Connect regulator to calibration cap by the tube. Connect firmly so that gas does not leak.



④ Insert the calibration cap into probe. Insert firmly so that gas does not leak.



8.2 Calibration Procedure – ZERO Calibration

Display	Procedure
	Connect ZERO gas tank and IAQ Monitor. Press MENU Use ▼ ▲ to select [7.CALIBRATION] Press SET.
	Use ▼ ▲ to select sensor (1.CO2 or 2.CO). Press SET. (CO2 is selected in the example.)
	Use ▼ ▲ to select [ZERO]. Press SET.
	Use ▼ ▲ to select [1.ZERO], press SET. ……Currently calibrating sensor（CO or CO2） ……The value before calibration

‘‘‘‘

Standby screen:

The initial value of countdown is displayed.

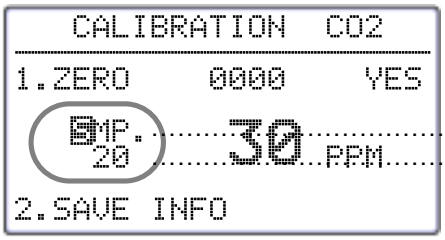
Unit: Second.

Use ▼▲ to select [YES].

Press SET to start calibration.

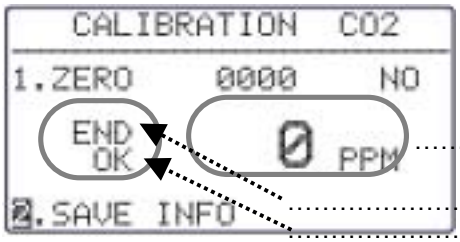
Fully open the regulator valve to pour the gas flow,

Press START/HOLD to start calibration.



Calibration is performing.

The remaining time to a calibration end.



<u>When the calibration result is OK</u>

Calibration is completed.

The value after calibration

Calibration is completed

Calibration result is OK

Result of ZERO Calibration:

CO calibration fails when…

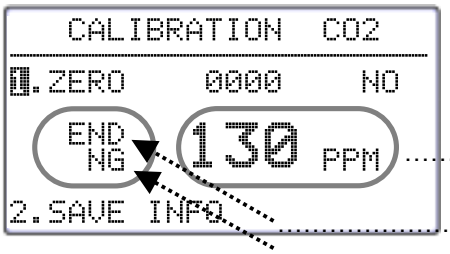
- CO concentration maintains above 10ppm for more than 30 seconds.
- Value does not fall within 6ppm of pre-calibration value, which is taken 20 second before calibration.

Operation

If [END] is displayed, the valve of regulator will be closed And gas will be stopped.

Press SET to save all datas and return to MENU.

If you press MENU before you save, you will return to Main Menu and the setting will not be saved.



Calibration result is NG

……**The value after calibration**

……**Calibration is completed**

……**Calibration Result**

Result of ZERO Calibration:

CO2 calibration fails when…

- CO2 concentration maintains above 200ppm for more than 30 seconds.
- Calibration value does not fall within 100ppm of pre-calibration value, which is taken 20 second before calibration.

Operation

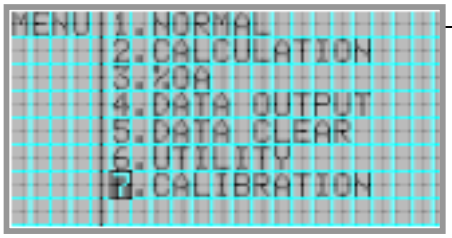
If [END] is displayed, the valve of regulator will be closed and Gas will be stopped.

※ If [2.SAVE INFO] will not be able to be selected, the result is NG.
Select [YES] to retry the calibration.

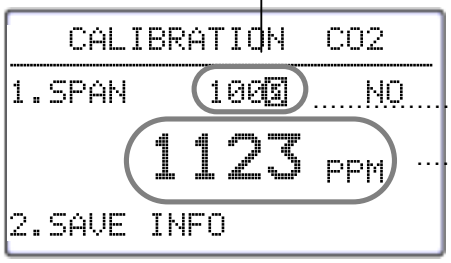
Press MENU to open MENU screen.

※ If [--ERR--] is displayed, please check, return to MENU for retrying the calibration.

8.3 Calibration Procedure – SPAN Calibration

Display	Procedure
	Connect Span gas to IAQ Monitor. Press MENU Use ▼ ▲ to select [7.CALIBRATION]. Press SET.
	Use ▼ ▲ to select the sensor for calibration (1.CO2 or 2.CO). Press SET. （CO2 is selected in the example）
	To start SPAN gas calibration: Use ▼ ▲ to select [SPAN], press SET

Range of CO mass: 20-550ppm
Range of CO_2 mass: 800-5500ppm



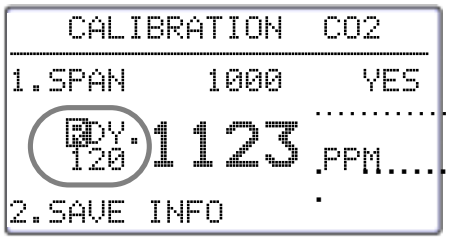
Use ▼ ▲ to select [1.SPAN].

Press SET to display a cursor.

Use ▼ ▲ to enter a concentration value displayed on a gas tank, Press SET .

Concentration value displayed on gas tank

The valve before calibration



Use ▼ ▲ to select [YES]. Press SET

Standby display

Shows countdown default value in second.

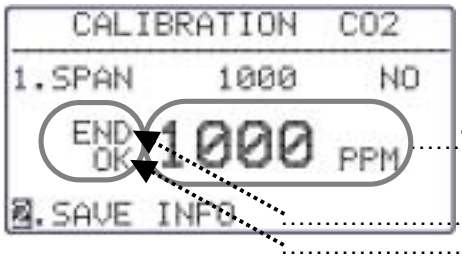
(CO Calibration:90sec/CO2 Calibration:120sec)

Operation

Replace ZERO gas cylinder with SPAN gas tank:
Fully open the regulator valve to pass the gas flow, press START HOLD to start a calibration.

Calibration is confirming

The remaining time to a calibration end.



Calibration Result is OK

Calibration is completed.

Result of SPAN Calibration:

CO calibration fails when…

- CO concentration maintains below 60% of standard value for more than 30 seconds.
- Value does not fall within 6ppm pre-calibration value taken 20 second before calibration or 6% of standard value.

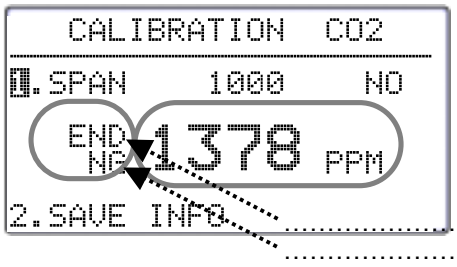
Operation

If [END] is displayed, the valve of regulator will be closed and Gas will be stopped.

Use ▼▲ to select [2.SAVE INFO].

Press SET to save all datas, return to MENU .

If you press MENU before you save, you will return to Main Menu and the setting will not be saved.



Calibration Result is NG

Calibration is completed successfully.

The value after calibration

Result of SPAN Calibration:

CO2 calibration fails when…

- CO2 concentration maintains below 60% of standard value for more than 30 seconds.
- Value does not fall within 6ppm pre-calibration value taken 20 second before calibration or 6% of standard value.

Operation

If [END] is displayed, the valve of regulator will be closed and Gas will be stopped.

※ If [2.SAVE INFO] will not be able to be selected, the result is NG.
Select [YES] to retry the calibration.

Press MENU to open MENU screen.

※ If [--ERR--] is displayed, please check,
return to MENU for retrying the calibration.

9. Specification

Product		IAQ Monitor
Model		2211
Object		Clean air flow
CO	Method	Electrochemical
	Range	0.0-50.0 ppm（0.0~500 ppm*）
	Resolution	0.0-99.9ppm:0.1ppm,100-500ppm:1ppm
	Accuracy	±3% of displayed value or ±3ppm; whichever that is larger（@20℃）
	Compensation: Temp	±0.125 %FS/℃（within -20-40℃: standard is 20℃）
	Compensation: Air Pressure	±0.02 %FS/hPa（within 700-1200hPa: standard is 1013hPa）
	Response Time	Approx. 60sec.（90%responsive, with calibration cover）
CO2	Method	NDIR (Non-Distributed Infrared)
	Range	0~5000 ppm
	Resolution	1ppm
	Accuracy	±3% of displayed value or ±50ppm; whichever that is larger（@20℃）
	Compensation: Temp	±0.34%FS/℃（within -20-40℃: standard is 20℃）
	Compensation: Air Pressure	±0.02%FS/hPa（within 700~1200hPa: standard is 1013hPa）
	Response Time	Approx. 45sec.（90%responsive, calibration cover）
Temp.	Method	Platinum Temperature Measuring Resistive Element
	Range	0.0~60.0°C（-20.0~60.0℃）
	Resolution	0.1 °C
	Accuracy	±0.5 °C
	Response Time	Less than 60sec.（velocity:1m/s, 90% responsive）
Humidity	Method	Electrostatic Capacity
	Range	2.0~98.0 %RH
	Resolution	0.1 %RH
	Accuracy	2~80%RH:±2.0%RH,80~98%RH:±3.0%RH
	Response Time	Approx. 45sec.(90%responsive)
Function		Measured/Max value HOLD, Battery Indicator (5-level), Time/date, Barometer comp., Unit selection（Temp/DT/WB: °C or °F, AH:g/m^3 or lb/ft^3, OA%:g/kg or lb/lb）, Max/Min/Average (interval: 1~999sec., retry: 1~999, Max memory: 1500data）, OA%, Gas calibration
Output Function		Digital output: RS－232C（baud rate:4800,9600,19200,38400bps）for printer and/or PC Analog Output: DC0~1V（CO, CO2, temperature, or humidity）
Power Supply		6x AA Batteries, AC Adaptor*: AC100~240V(50/60Hz）
Battery Life		Approx. 10hours （20℃, alkaline batteries, no RS－232C connection）
Condition	Main Body	5~40 ℃（no condensation）
	Probe	-20~60 ℃（no condensation）
	Storage	-20~60 ℃（no condensation）
Weight		Main body: Approx. 400g（including batteries）Probe: Approx. 250g
Standard Kits		Carrying case, Operation manual, AA batteries x6, Calibration cover and tube, Probe stand, Data processing software for Windows, RS232C cable
Optional Accesories		Spare probe, analog output, printer, ZERO gas, SPAN gas for CO/CO2, flow control valve, AC adaptor

10. Calculation Result: DT, WB, AH, and HR

10.1 What is DT

DT -- Dew Point Temperature

Air with higher temperature contains more water vapor, and the air reaches a saturation point as temperature lowered（Relative humidity: 100%）. Then continuously lowered temperature causes water vapor to start condensing -- this temperature is called Dew Point Temperature.

There are many formulas to calculate the Dew Point Temperature; however, this manual uses calculation in conformity with JIS standard Z8806.

$$\ln(e_w) = -6096.9385 \times T^{-1} + 21.2409642 - 2.711193 \times (10^{-2}) \times T + 1.673952 \times (10^{-5}) \times T^2 + 2.433502 \times \ln(T)$$

$$e = U/100 \times e_w$$

$$y = \ln(e / 611.213)$$

When $y \geqq 0$;

$$td = 13.715 \times y + 8.4262 \times (10^{-1}) \times y^2 + 1.9048 \times (10^{-2}) \times y^3 + 7.8158 \times (10^{-3}) \times y^4$$

When $y < 0$;

$$td = 13.7204 \times y + 7.36631 \times (10^{-1}) \times y^2 + 3.32136 \times (10^{-2}) \times y^3 + 7.78591 \times (10^{-3}) \times y^4$$

e_w: Saturated water vapor pressure（Pa）

T: Absolute temperature（K）＝t(℃) + 273.15

T: Dry bulb temperature（℃）

E: Water vapor pressure（Pa）

U: Relative humidity

Td: Dew point temperature（℃）

10.2 What is WB

Wet Bulb Temperature -- WB

Wet-bulb temperature is measured with a wet-bulb thermometer, which is a regular thermometer with a wet muslin wick cover.

To calculate wet-bulb temperature without using a wet-bulb thermometer, existing dry-bulb temperature and relative temperature are used on the aspirated psychrometer humidity table that is JIS standard Z8806 compliant. In this manual; however, we uses Newtonian approximation based on the assumption of a temperature measured on a wet-bulb thermometer being lower than a dry-bulb thermometer.

$\ln(e_{tw}) = -6096.9385 \times T_w^{-1} + 21.2409642 - 2.711193 \times (10^{-2}) \times T_w$
$+ 1.673952 \times (10^{-5}) \times T_w^{2} + 2.433502 \times \ln(T_w)$

$A = e_{tw}$

$f'(tw) = 4030.183/((235+tw)^2) \times A + P/2/755$

$tw1 = tw - (A - P \times (t-tw)/2/755 - E \times U/100)/f'(tw)$

tw: Wet bulb temperature (℃)

e_{tw}: Saturated water vapor pressure at tw (Pa)

T_w: Absolute temperature (k) = (tw + 273.15)

P: Barometric pressure (Pa)

E: Saturated water vapor pressure at t (Pa)

U: Relative humidity

T: Dry bulb temperature (℃)

10.3 What is AH

Absolute Humidity -- AH

Absolute humidity represents an amount of water vapor contents per 1kg of dry air.

To calculate absolute humidity, apply temperature and relative humidity on below formula.

$\ln(e_w) = -6096.9385 \times T^{-1} + 21.2409642 - 2.711193 \times (10^{-2}) \times T$
$+ 1.673952 \times (10^{-5}) \times T^2 + 2.433502 \times \ln(T)$

$e = U/100 \times eW$

$D(g/m3) = 0.794 \times (10^{-2}) \times e/(1 + 0.00366 \times t)$

e_w: Saturated water vapor pressure (Pa)

T: Absolute temperature (K) = t(℃) + 273.15

t: Dry bulb temperature (℃)

e: Water vapor pressure (Pa)

U: Relative humidity

D: Absolute humidity (g/m3)

10.4 What is HR

Humidity Mixture Ratio -- -HR

Humidity Ratio (mixture ratio) is the proportion of masses between water vapor and dry air.

Temperature and relative humidity are used on below formula. Society of Heating, Air-conditioning and Sanitary Engineers of Japan

$r = \varepsilon \times e/(p-e) \times 1000$

ε : Molar mass ratio = 0.62198

e: Water vapor（Pa）

p: Barometric pressure (Pa)

r: Humidity ratio (g/kg)

Reference:

“Understanding Aero-diagram” by Society of Heating, Air-conditioning and Sanitary Engineers of Japan

“Humidity and Vaporization” by Masafumi Ueda

11. Troubleshooting

11.1 Battery Check

Problem	Possible Cause(s) / Solution(s)	Refer To (Page No.)
IAQ Monitor will not turn ON	The battery is defective. →Turn OFF the power and replace the batteries.	4,6
Nothing appears on the display	Contrast is not set properly. →Adjust the contrast volume switch.	37
"  " flashes.	The batteries are low. →Turn OFF the power and replace the batteries.	4,6

11.2 Initial Operation Check

Problem	Possible Cause(s) / Solution(s)	Refer To (Page No.)
Display is too dark/light	Screen contrast may need adjustment. →Ajust contrast by turning Contrast Adjuster.	37
"NO PROBE" is displayed.	Probe is not connected. →Turn OFF the power and connect Probe.	5
Measurement unit is not appropriate.	Set appropriate unit of temperature (C, °F), absolute humidity (g/m^3, lb/ft^3), and humidity ratio (g/kg, lb/lb).	34

11.3 Check During Measurement

Problem	Possible Cause(s) / Solution(s)	Refer To (Page No.)
"**.*" is displayed for measured value.	IAQ Monitor will show "**.*" for the over-the-range measurement. It must be used within the range to take the measurement.	44
" - - - - " is displayed for measured value.	Probe is not connected property. →Check the connection.	5
	Probe may be damaged. →Contact your local Kanomax Office or service center.	
IAQ Monitor is not displaying the right speed.	Probe sensor may be too close to expiratory air. Keep a sensor away from expiratory air as much as possible.	7
Higher temperature is displayed.	Theoretically, IAQ Monitorcan not mesure temperature in no-wind environment. →Gently move probe	8
Humidity reading is lower than Assman psychrometer.	Assman psychrometer is an intricate instrument and condition sensitive. Refer to operation manual of the psychrometer.	9

11.4 Printer Check

Problem	Possible Cause(s) / Solution(s)	Refer To (Page No.)
Unable to printout.	Printer is not connected properly. →Check the connection. Re-connect if necessary.	21
	The Baud Rate is not set properly. →Check both, CLIMOMASTER and printer, settings.	21
	Printer may not be compatible (DPU-H245 and DPU-201GS are recommended). Check your printer type.	21
	Printer connection procedure may not be followed properly. After a connection is established, you need to turn the IAQ Monitor power ON, then a printer.	21
Unable to printout the display.	Display is not frozen. →①Press START/HOLD to hold the display. ②Press MODE to print out.	21
Unable to cancel the print out.	You cannot cancel the print out.	21

11.5 Digital Output Check

Problem	Possible Cause(s) / Solution(s)	Refer To (Page No.)
Unable to output data	Cable may not be connected properly. Requires RS-232C cable.	27
	Baud rate may not be set properly. Check baud rate setting on IAQ Monitor and printer.	27
	Communication command may not be correct.	27

11.6 Analog Output Check

Problem	Possible Cause(s) / Solution(s)	Refer To (Page No.)
Unable to output data.	Polarity of output terminal may be incorrect.	30
	Measured value may be in HOLD status.	30
Output appears in tiered pattern.	Output is set per second.	30
Output data is incorrect.	Analog output setting may be incorrect.	30
	Output value range setting may be incorrect.	30
	Load impedance may be lower than standard value (more than 5kΩ).	30

11.7 Calibration Check

Problem	Possible Cause(s) / Solution(s)	Refer To (Page No.)
[-ERR] appears during the CO SPAN calibration.	Output level of CO sensor may be abnormal or the sensor is damaged. Contact a distributor near you. (Although SPAN calibration is not available, you can use existing calibration value when output level is low.)	41
[-ERR] appears during the CO_2 SPAN calibration.	Output level of CO_2 sensor may be abnormal or the sensor is damaged. Contact a distributor near you. (Although SPAN calibration is not available, you can use existing calibration value when output level is low.)	41

12. Warranty and After Service

Kanomax Limited Warranty

The limited warranty set below is given by KANOMAX JAPAN, Inc. (hereafter referred to as "KJI") with respect to the KANOMAX brand IAQ Monitor, its attachment parts including Probe and other accessories (hereafter referred to as "PRODUCT") that you have purchased. PRODUCT you have purchased shall be the only one that the limited warranty stated herein applies to.

Your PRODUCT, when delivered to you in new condition in its original container, is warranted against defects in materials or workmanship as follows: for a period of one (1) year from the date of original purchase, defective parts or a defective PRODUCT returned to KJI, as applicable, and proven to be defective upon inspection, will be exchanged for a new or comparable rebuilt parts, or a refurbished PRODUCT as determined by KJI. Warranty for such replacements shall not extend the original warranty period of the defective PRODUCT.

This limited warranty covers all defects encountered in normal use of the PRODUCT, and does not apply to the following cases:

(1) Use of parts or supplies other than the PRODUCT sold by KJI, which cause damage to the PRODUCT or cause abnormally frequent service calls or service problems.
(2) If any PRODUCT has its serial number or date altered or removed.
(3) Loss of damage to the PRODUCT due to abuse, mishandling, improper packaging by the owner, alteration, accident, electrical current fluctuations, failure to follow operating, maintenance or environmental instructions prescribed in the PRODUCT's instruction manual provided by KJI, or service performed by other than KJI.

NO IMPLIED WARRANTY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, APPLIES TO THE PRODUCT AFTER THE APPLICABLE PERIOD OF THE EXPRESS LIMITED WARRANTY STATED ABOVE, AND NO OTHER EXPRESS WARRANTY OR GUARANTY, EXCEPT AS MENTIONED ABOVE, GIVEN BY ANY PERSON OR ENTITY WITH RESPECT TO THE PRODUCT SHALL BIND KJI. KJI SHALL NOT BE LIABLE FOR LOSS OF STORAGE CHARGES, LOSS OR CORRUPTION OF DATA, OR ANY OTHER SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES CAUSED BY THE USE OR MISUSE OF, OR INABILITY TO USE, THE PRODUCT, REGARDLESS OF THE LEGAL THEORY ON WHICH THE CLAIM IS BASED, AND EVEN IF KJI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL RECOVERY OF ANY KIND AGAINST KJI BE GREATER IN AMOUNT THAN THE PURCHASE PRICE OF THE PRODUCT SOLD BY KJI AND CAUSING THE ALLEGED DAMAGE. WITHOUT LIMITING THE FOREGOING, THE OWNER ASSUMES ALL RISK AND LIABILITY FOR LOSS, DAMAGE OF, OR INJURY TO THE OWNER AND THE OWNER'S PROPERTY AND TO OTHERS AND THEIR PROPERTY ARISING OUT OF USE OR MISUSE OF, OR INABILITY TO USE, THE PRODUCT NOT CAUSED DIRECTLY BY THE NEGLIGENCE OF KJI. THIS LIMITED WARRANTY SHALL NOT EXTEND TO ANYONE OTHER THAN THE ORIGINAL PURCHASER OF THE PRODUCT, OR THE PERSON FOR WHOM IT WAS PURCHASED AS A GIFT, AND STATES THE PURCHASER'S EXCLUSIVE REMEDY.

After Service

Whenever the PRODUCT is malfunctioning, please check with “Troubleshooting” to find possible cause first.

Repair parts are retained for a minimum period of five (5) years after production cessation of the PRODUCT. This storage period of repair parts is considered as the period during which KJI can provide repair service.

For more information, please contact your local distributor, or call us at KJI’s service desk from 9:00 a.m. to 5:00 p.m. JST on weekdays excluding holidays. When you make a call, please have the following information of your PRODUCT at hand:

(1) PRODUCT name;
(2) Model number;
(3) Serial number;
(4) Probe number;
(5) Description of Symptom, and;
(6) Date of purchase