**KANOMAX**

IAQ MONITOR
MODEL 2211

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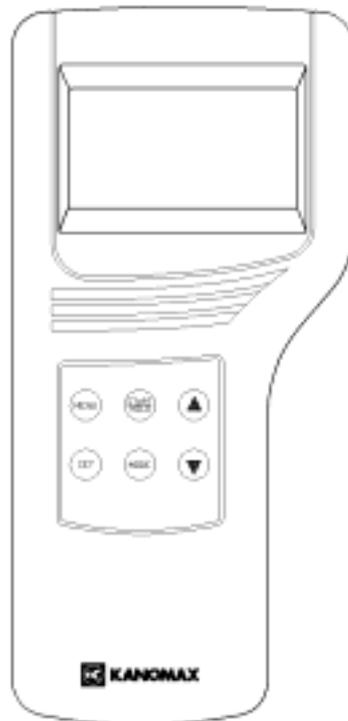
Please use this instrument properly by reading
this user's manual and following the warning instructions.
Keep this manual in a place where it can be accessed quickly.

02001

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

Approx.. 88

Approx. 51

PROBE

Probe Terminal

Display

Analog output
Terminal
(Optional)

DC-OUT RS232C

RS232C
Terminal

DC-IN

DC　　　Input
Terminal

Power Switch

I　　ON

OFF

Approx. 188

Operation
Panel

MENU   START HOLD   ▲

SET   MODE   ▼

IAQ MONITOR

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Battery Box

Approx. 66
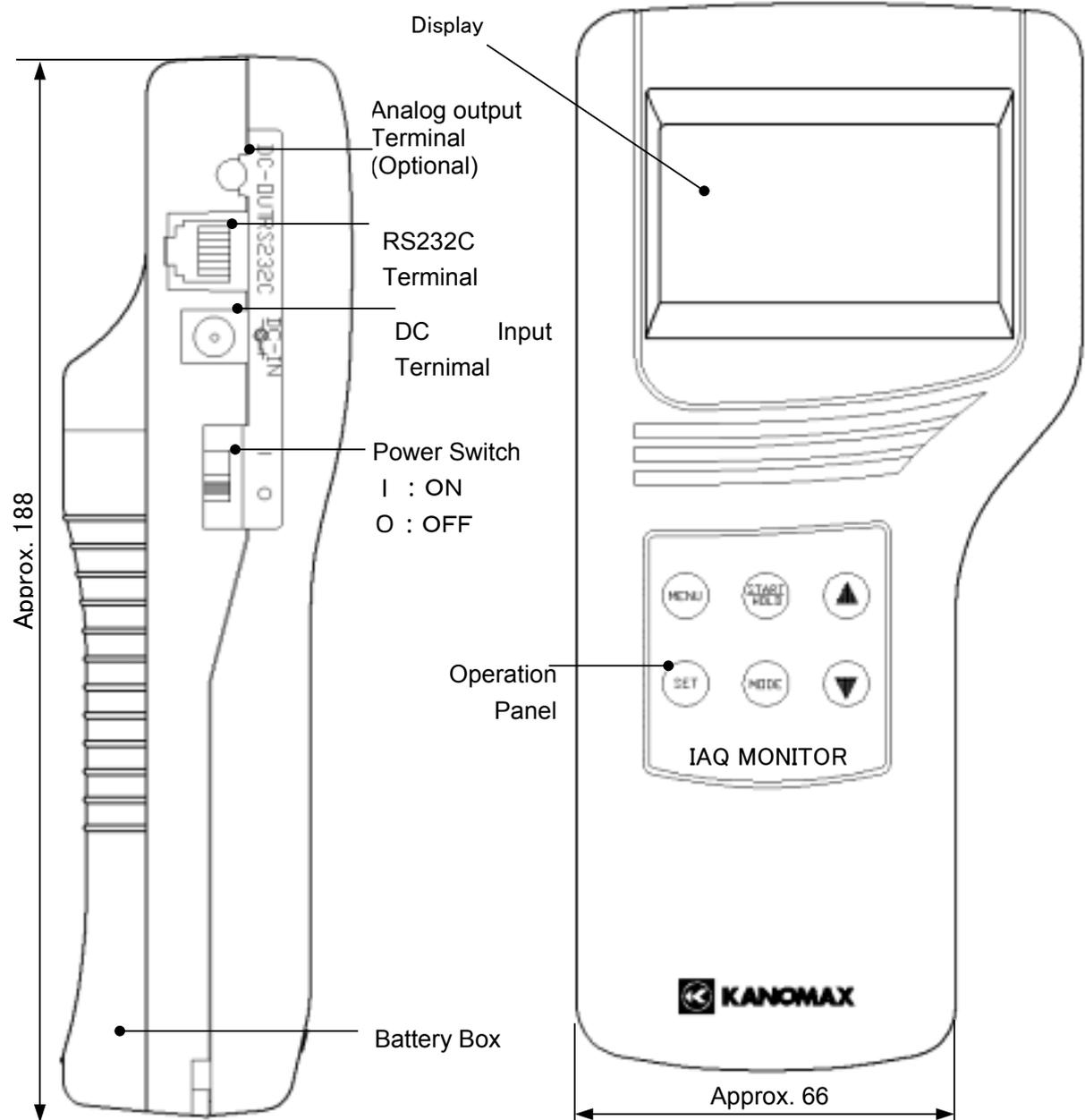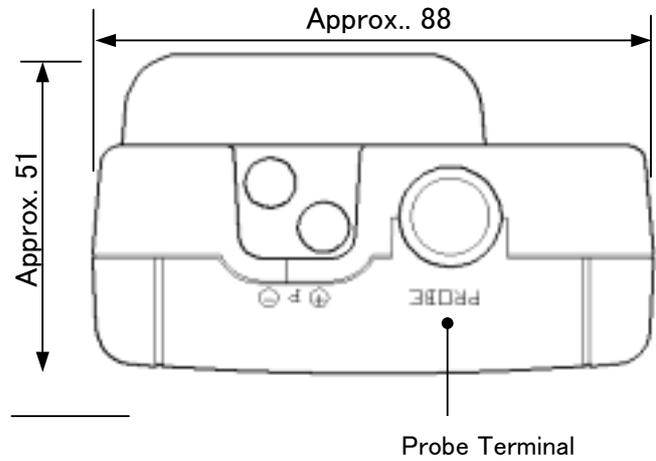
1.2 Operation Panel

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.
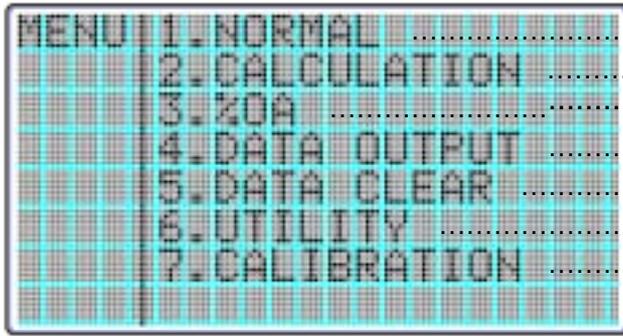
```
MENU 1.NORMAL          ..........................Normal Mode
     2.CALCULATION     ...............Calculation Mode
     3.%OA             .....................·········Ventilation Ratio Mode
     4.DATA OUTPUT     ...............To download data to your PC or printer
     5.DATA CLEAR      ..............To 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.**
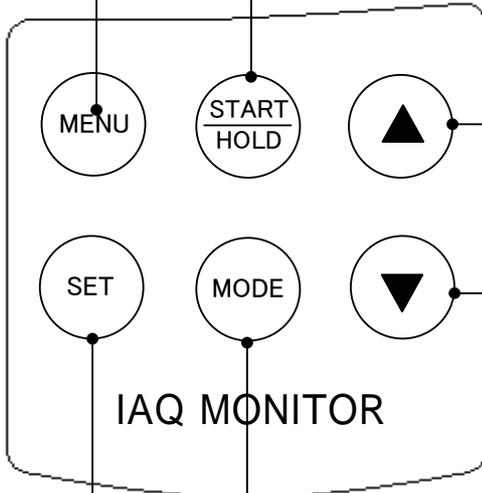
▲、▼ NAVIGATION KEYS

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

IAQ MONITOR

② Press this key to scroll in the desired direction.
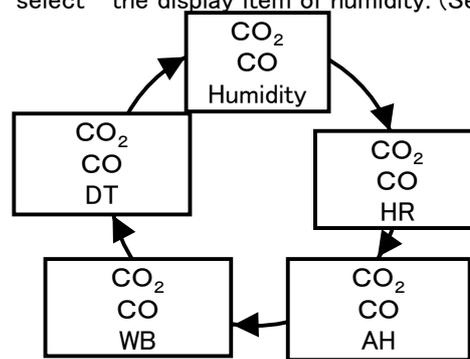
SET KEY

Press the key to execute the selected item.

MODE KEY

You can select the mode accordingly.

1.3 Probe

Unit: mm

CO sensor

Temperature sensor

Humidity sensor

CO_2 sensor

$\phi 25$

169

320

$\phi 32$

Probe number

53

$\phi 15$

43

L=2000
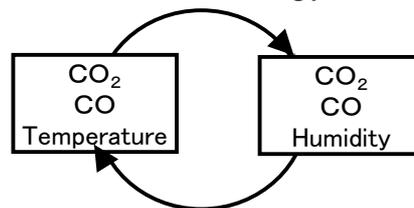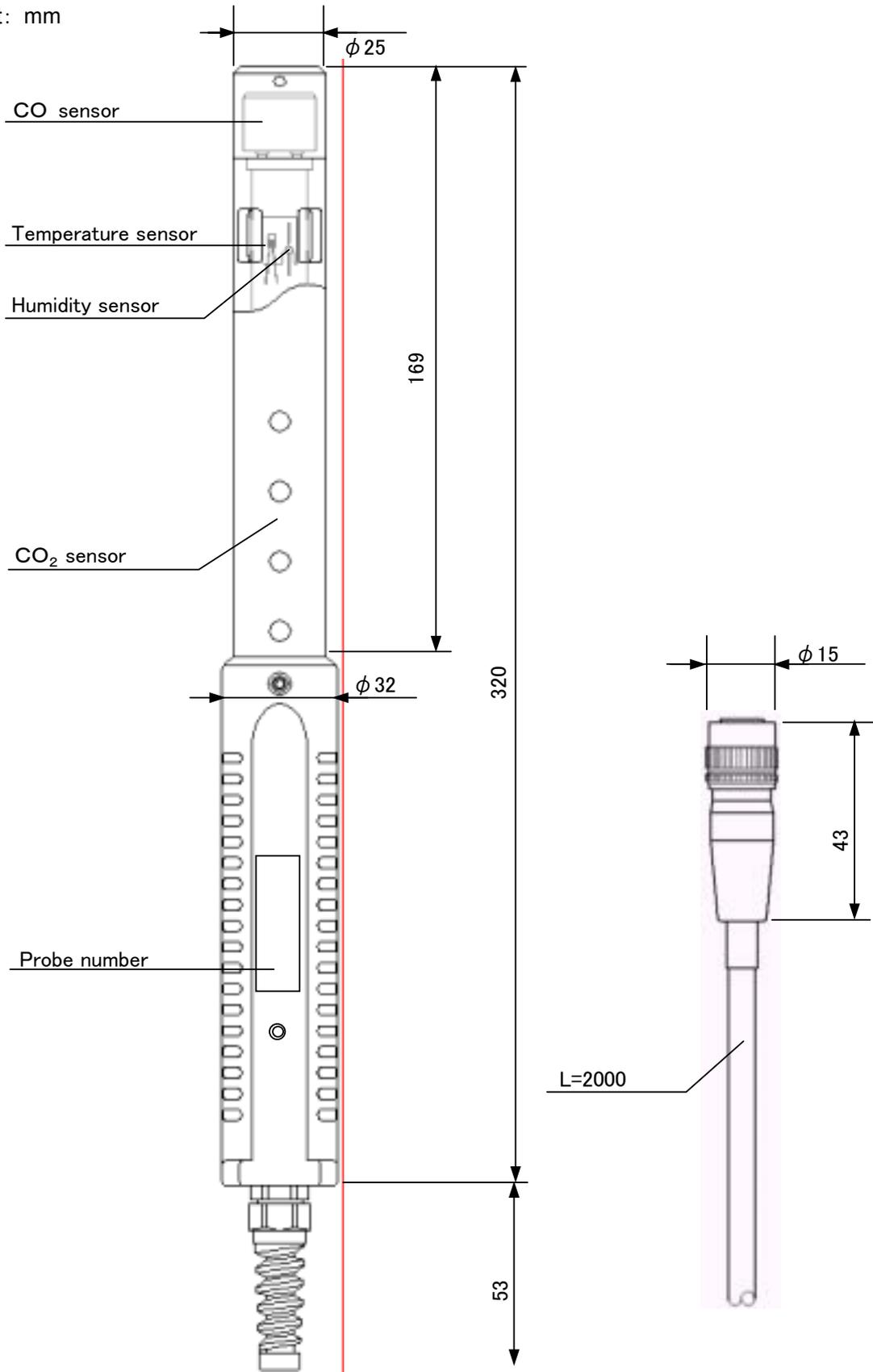
2. Getting Started

2.1 Installing Batteries

Place IAQ Monitor facedown.
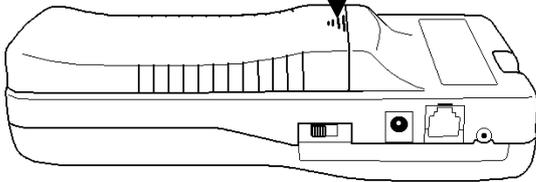
①Press down on the battery cover.
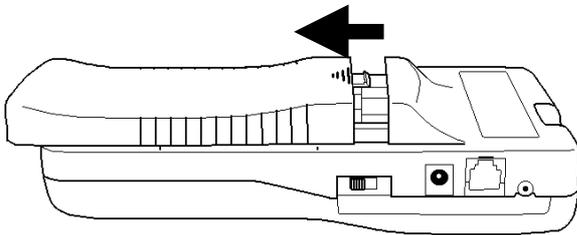
②Slide the cover until it stops.
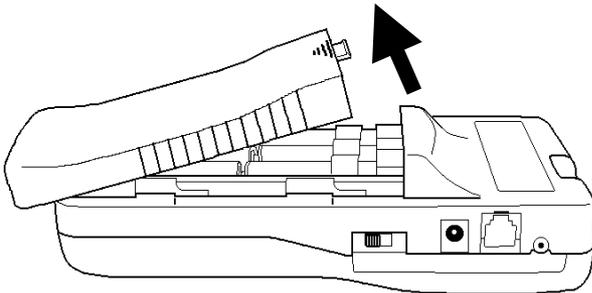
③Lift the cover away from the body.
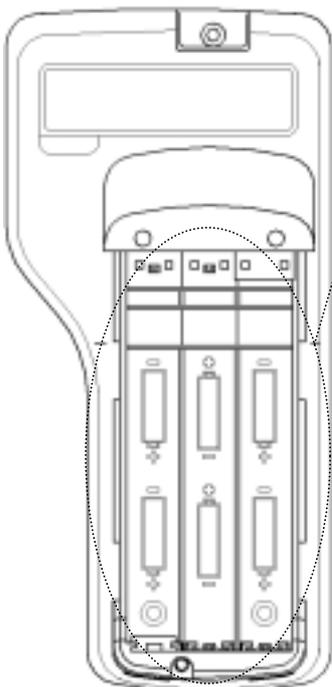
④Insert the battery observing the polarity.　This instrument requires 6 AA size batteries.　Use only AA size Manganese (R6), alkaline (LR6) or Ni-Cd batteries for replacement.
DO NOT mix new batteries with used ones, for it may lead to leakage.
※Batteries CANNOT be recharged by optional AC adapter.

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.

①

Probe Terminal

②
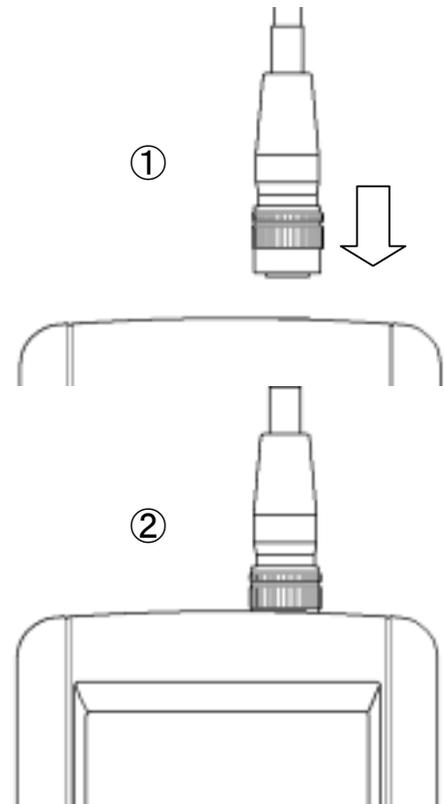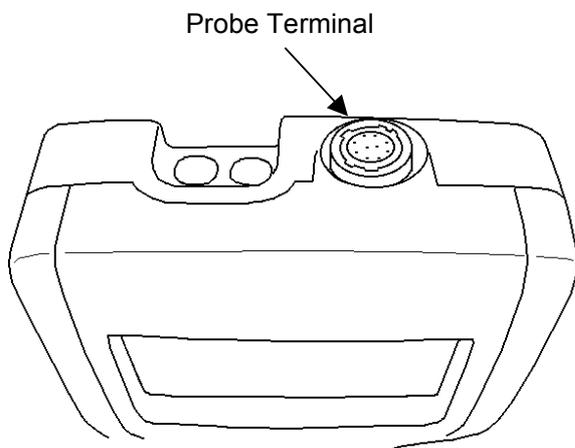
2.3 Disconnecting Probe

※ 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.

①

0001

A

②
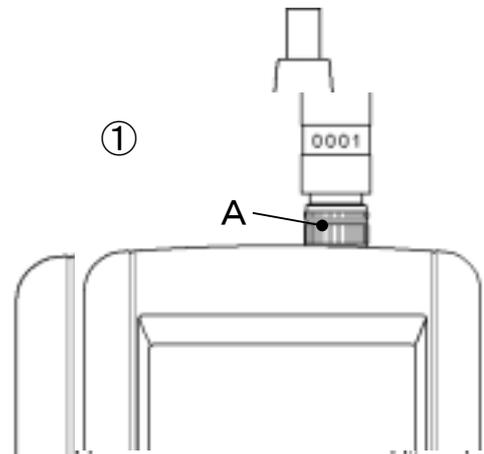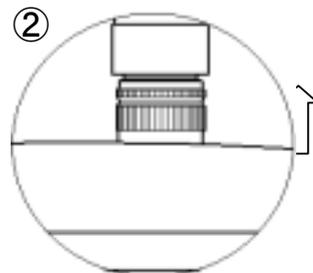
2.4 Powering IAQ Monitor ON/OFF

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.

POWER

I　ON
O　OFF
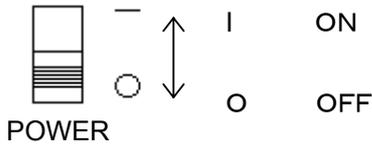
Connect probe to Main body.

Power **ON.**
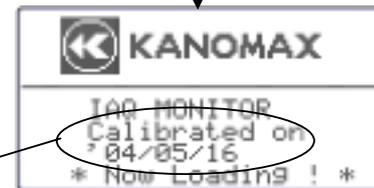
NO PROBE !

CONNECTING PROBE
AND RESTART !

You will see the above warning when Probe is not properly connected or not connected at all.　Turn off the instrument, check Probe connection and try again.

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IAQ MONITOR
Version *.**

* Now Loading ! *

KANOMAX

IAQ MONITOR
Calibrated on
'04/05/16
* Now Loading ! *

Calibrated Day

Display Icons:（see P.10）
　Current Date and Time　　Temperature（Humidity）
　CO_2　　　　　　　　　　Battery Level indicator
　CO

'04/05/12 15:40:23
CO2 523 PPM
CO 1.7 PPM
24.4 °C

Normal Mode

◆ Battery Level Indicator

'04/05/12 15:40:23
CO2 523 PPM
CO 1.7 PPM
24.4 °C
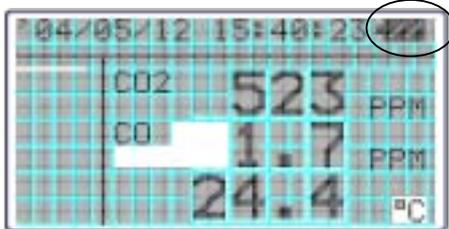
The Battery Level Indicator appears in the upper right corner, and it is difficult to predict the battery life. This "Battery Indicator" gives you the battery status and reminds you the timing for battery replacement.

The indicator changes as you see it below:

（blinks）
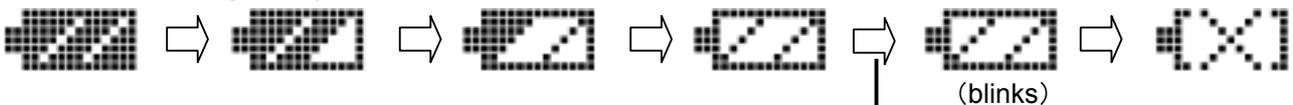
— LOCK —
When 〖X〗 is displayed, every function of the instrument will be locked.　The measurement will stop and data will NOT be saved.
Please pay an attention.

Time to replace batteries

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.

① ②

Holder

Probe Stand

<Compensation>
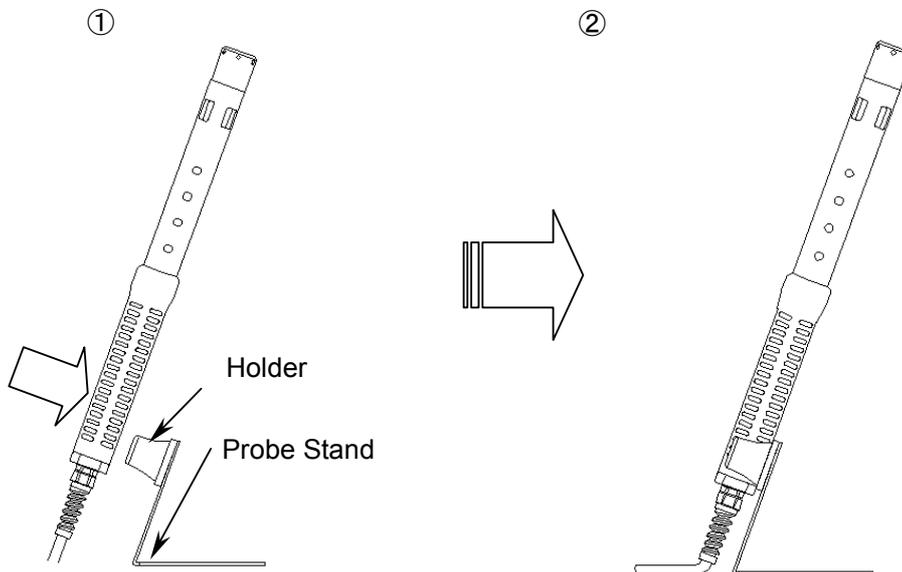
◆ when atmospheric pressure of the place to measure is different from normal atmospheric pressure (such as high altitude), Please follow below steps for Atmospheric pressure setting (Initial value: 1013hPa).

◆ 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
MENU 1.NORMAL 2.CALCULATION 3.%OA 4.DATA OUTPUT 5.DATA CLEAR 6.UTILITY 7.CALIBRATION	Press (MENU) . Use ▼▲ to select [7.CALIBRATION] . press (SET) .
CALIBRATION 1.CO2 ZERO 2.CO ZERO 3.ATMOS. PRESS SET 1013 hPa 4.SAVE INFO	Use ▼▲ to select [3. ATMOS. PRESS SET] press (SET) .
CALIBRATION 1.CO2 ZERO 2.CO ZERO 3.ATMOS. PRESS SET 1013 hPa 4.SAVE INFO	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.
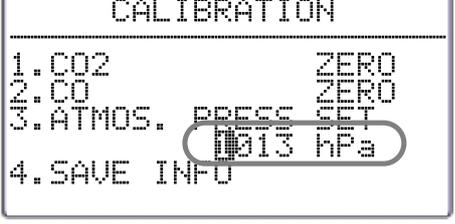
2.5.2 Measuring Temperature and Attentions

◆ 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.

```
MENU 1.NORMAL
     2.CALCULATION
     3.%OA
     4.DATA OUTPUT
     5.DATA CLEAR
     6.UTILITY
     7.CALIBRATION
```

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 `04/05/12 15:40:23` CO2 **523** PPM CO **1.7** PPM **24.4** °C	**\<NORMAL MODE\>** Press (MODE), and display mode moves in order, as shown below. ②CO, CO_2, Temperature→① CO, CO_2, Humidity
② `04/05/12 15:40:23` CO2 **523** PPM CO **1.7** PPM **54.4** %RH	**\<CO₂, 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 CO **1.7** PPM DT **20.1** °C	**\<Due Point Temperature\>**
④ CO **1.7** PPM WB **16.1** °C	**\<Wet-bulb Temperature\>**

⑤

| CO | 1.7 PPM |
| AH | 3.51 g/m³ |

<Absolute Humidity>

⑥

| CO | 1.7 PPM |
| HR | 0.81 g/kg |

<Temperature Ratio>

3.2 Display Hold
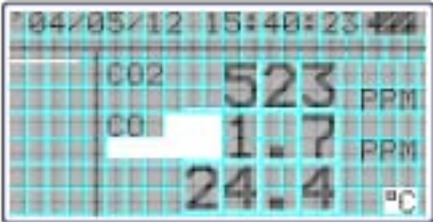
Display	Procedure
`04/05/12 15:40:23` CO2 523 PPM CO 1.7 PPM 24.4 °C	While measuring, Press ⬚ (Also available on Humidity measuring.)
`04/05/12 15:40:23` HOLD CO2 523 PPM CO 1.7 PPM 24.4 °C	"HOLD" indicator appears on the display to indicate that the reading shown is held. Press ⬚ again to release.
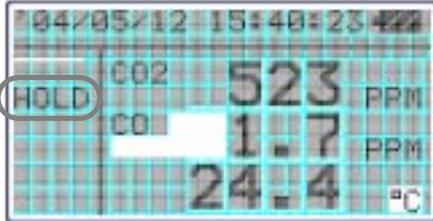
Maximum Hold・・・How to Hold the Maximum Value

Display	Procedure
`04/05/12 15:40:23` CO2 523 PPM CO 1.7 PPM 24.4 °C	While measuring, press and hold ⬚ .
`04/05/12 15:40:23` HOLD CO2 643 PPM CO 1.9 PPM 24.7 °C	"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 ⬚, the reading shown will be frozen. Press ⬚ again to release.
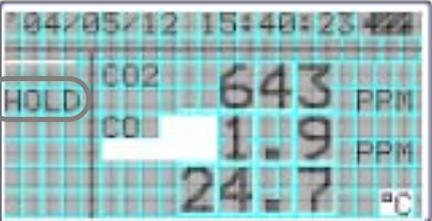
4. Measuring Maximum, Minimum & Mean

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

Display	Procedure

Press (MENU).
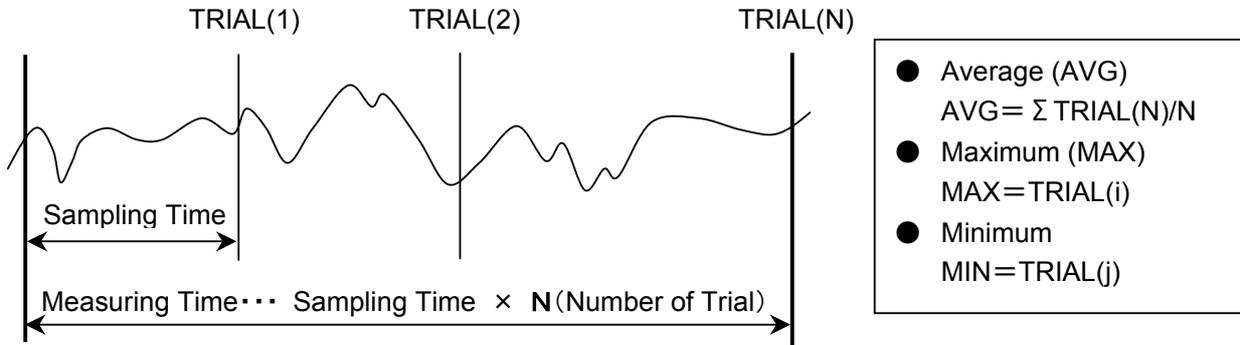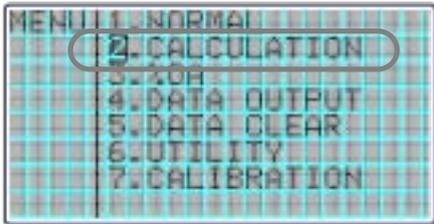
Use (▼)(▲) to select "2. CALCULATION"

Press (SET).

CALCULATION MODE DISPLAY ICONS

Total Memory
Remaining Memory
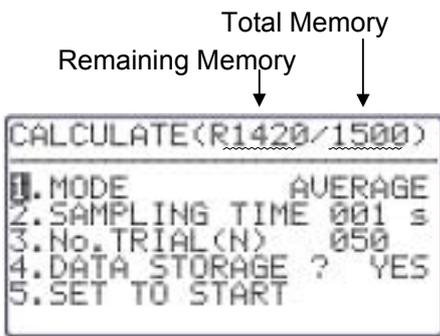
1.CALCULATION MODE

   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
CALCULATE(R1500/1500) 1.MODE　　　　AVERAGE 2.SAMPLING TIME 001 s 3.No.TRIAL(N)　　050 4.DATA STORAGE ?　YES 5.SET TO START	**＜To Set CALCULATION MODE＞** Use ▼▲ and select "1. MODE" Press (SET). Use ▼▲ and select AVERAGE or INSTANT Press (SET).
CALCULATE(R1500/1500) 1.MODE　　　　AVERAGE 2.SAMPLING TIME 001 s 3.No.TRIAL(N)　　050 4.DATA STORAGE ?　YES 5.SET TO START	**＜To Set SAMPLING TIME＞** Use ▼▲ and select "2. SAMPLING TIME" Press (SET). Use ▼▲ and select SAMPLING TIME (1 to 999sec). Press (SET).
CALCULATE(R1500/1500) 1.MODE　　　　AVERAGE 2.SAMPLING TIME 001 s 3.No.TRIAL(N)　　040 4.DATA STORAGE ?　YES 5.SET TO START	**＜To Set No. TRIAL (N)＞** Use ▼▲ and select "3. No. TRIAL(N)" Press (SET). Use ▼▲ and select No. TRIAL （1to 999 times）. Press (SET).
CALCULATE(R1500/1500) 1.MODE　　　　AVERAGE 2.SAMPLING TIME 001 s 3.No.TRIAL(N)　　050 4.DATA STORAGE ?　YES 5.SET TO START	**＜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.）
CALCULATE(R1500/1500) 1.MODE　　　　AVERAGE 2.SAMPLING TIME 001 s 3.No.TRIAL(N)　　050 4.DATA STORAGE ?　YES 5.SET TO START	**＜Save the Settings＞** Use ▼▲ and select "5. SET TO START" Press (SET).
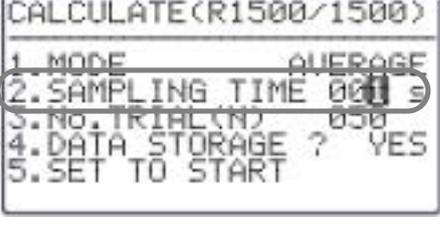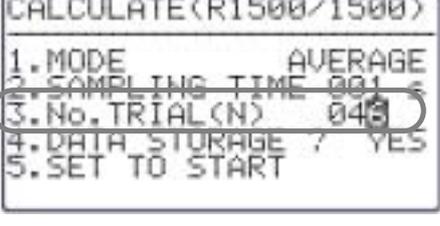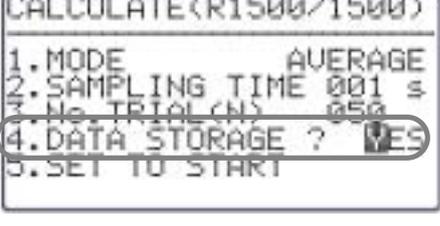
<READY>
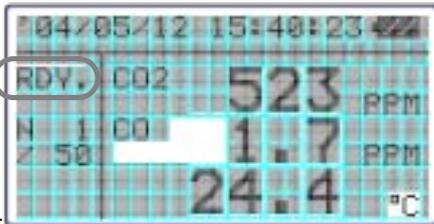
Press 🔘 to start.
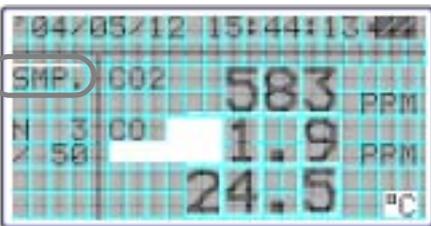
Display	Procedure
	<While Measuring> Press 🔘 to stop. ➢ If you have selected "YES" for "4. DATA STORAGE ?", the measured data will be stored. Press 🔘 can also stop the measurement but this would not store any data.
	<Result> After all the trials are finished, the calculated result will appear in display. 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 🔘 to return to Main MENU. Calculation data will be stored when [4.DATA STORAGE] is set to [YES].
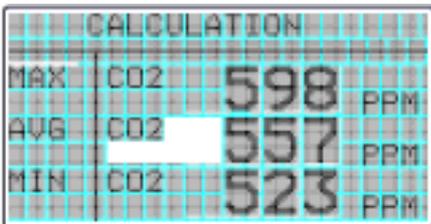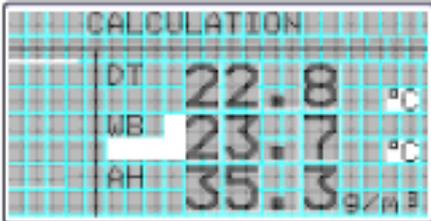
Related Functions:

■ If printer is connected: press 🔘 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 (R_A)   Supplied (S_A)   Open Air (O_A)

TRIAL(1) (2) (3)   (N)   TRIAL(1) (2) (3)   (N)   TRIAL(1) (2) (3)   (N)

Time needed to measure at a point・・・Sampling Time ✕ N（Number of Trial）

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
MENU 1.NORMAL 2.CALCULATION 3.%OA 4.DATA OUTPUT 5.DATA CLEAR 6.UTILITY 7.CALIBRATION	Press (MENU) press (SET) and Select [3.OA%] .
%OA (R1500/1500) 1.MODE TMP. 2.SAMPLING TIME 001 S 3.No.TRIAL(N) 050 4.DATA STORAGE ? YES 5.SET TO START	**<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.

Total Memory

Remaining   Memory

%OA (R1500/1500)
1.MODE   TMP.
2.SAMPLING TIME 001 S
3.No.TRIAL(N)   050
4.DATA STORAGE ?   YES
5.SET TO START

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.

%OA (R1500/1500) 1.MODE TMP. 2.SAMPLING TIME 001 S 3.No.TRIAL(N) 050 4.DATA STORAGE ? YES 5.SET TO START	**<SAMPLING TIME>** Press ▼ ▲ and select [2.SAMPLING TIME] Press (SET). Use ▼ ▲ to set an appropriate number (1-999), Press (SET).
%OA (R1500/1500) 1.MODE TMP. 2.SAMPLING TIME 001 S 3.No.TRIAL(N) 050 4.DATA STORAGE ? YES 5.SET TO START	**<NO.TRIAL>** Press ▼ ▲ and select [3.No.TRIAL], Press (SET). Press ▼ ▲ to select No. TRIAL (1-999), Press (SET) .

Display	Procedure
%OA　(R1500/1500) 1.MODE　　　　　TMP. 2.SAMPLING TIME 001 S 3.No.TRIAL(N)　050 4.DATA STORAGE ?　YES 5.SET TO START	**\<DATA STORAGE\>** Press ▼▲ to select [4.DATA STORAGE], Press SET. Use ▼▲ and select [YES] or [NO], Press SET.
%OA　(R1500/1500) 1.MODE　　　　　TMP. 2.SAMPLING TIME 001 S 3.No.TRIAL(N)　050 4.DATA STORAGE ?　YES 5.SET TO START	**\<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.
^04/05/12 16:25:49 ①RDY.　24.4　R_A ②N　1　　　　　S_A ③/ 50 ④TMP.　　　　　O_A ⑤R_A	**\<Ready\>** Press START 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）
^04/05/12 16:27:43 ①SMP.　24.6　R_A ②N 27　　　　　S_A ③/ 50 ④TMP.　　　　　O_A ⑤R_A	**\<While Measuring\>** Press START to stop. Press START again to resume. ※ Press MENU can also stop the measurement but this would not store any data.
NEXT ①RDY.　24.6　R_A ②N　1　23.1　S_A ③/ 50 ④TMP.　　　　　O_A ⑤S_A	**\<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.
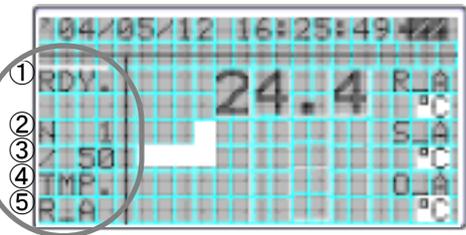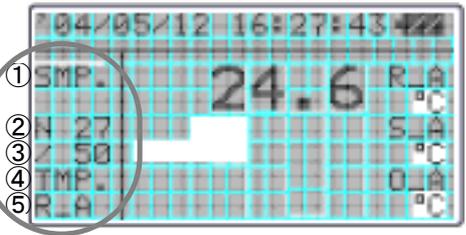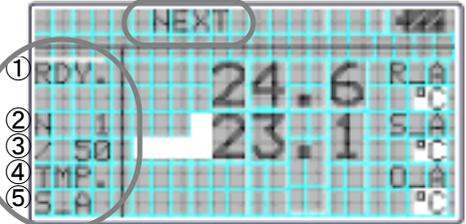
Display	Steps
	<Result> After all the trials are finishied, the calculated result will appear in display.
	Press (▼) to display average values in order of : R_A, S_A, and O_A. Press MENU to return to main MENU. If you have selected [YES] for [DATA STORAGE], the result will be stored.

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
START:001 END:050 NUM.CO2PPM COPPM °C 001 1003 1.1 23.5 002 1001 1.1 23.5 003 1005 1.1 23.6 004 1003 1.0 23.6 005 1006 1.0 23.6 006 1009 1.0 23.6 Data number CO₂ 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) .
START:001 END:050 NUM.PRMRA RPMSA PPMOA 001 1003 623 425 002 1001 626 435 003 1005 653 420 004 1003 663 429 005 1006 639 424 006 1009 629 415 Data number CO₂ CO₂ CO₂	**< Set Calibration 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 the first data, Press(SET) Cursor will move to [END]. Use(▼)(▲) to selet the last data , Press(SET). Press(START HOLD) to start a calculation ※ You cannot select more than one range.
CALCULATION MAX CO2 598 PPM AVG CO2 557 PPM MIN CO2 523 PPM %OA 42% 63.1 %OA TMP.	**< 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.

RS232C Port
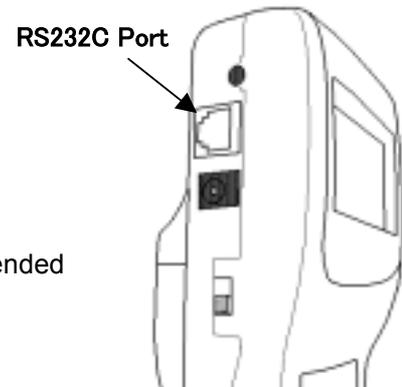
6.3.1 Preparation

<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
```

CO_2 ······ CO_2
CO ······ CO
Temperature ······ Temperature
Humidity ······ Humidity

6.3.3 CALCULATION Mode Print Out
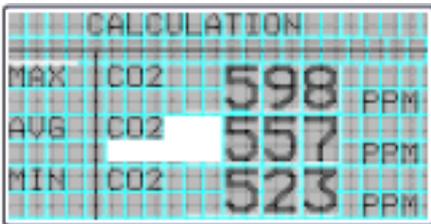
Display	Procedure
	Press ⓂⓄⒹⒺ after the measurement and calculation to print out the result.

6.3.4 %OA Mode Print Out

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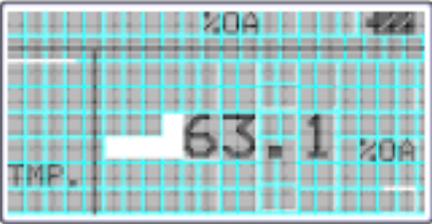
Press (MODE) after %OA measurement and calculation to print out the result.

Examples of Print Out

<CALCULATION Mode>   <%OA Mode>

Condition			
PAGE SET			
PAGE : 004	Stored Location	PAGE : 002	Condition
MODE : CALCULATION(I)	Measurement Mode	MODE : %OA(TMP.)	
DATE : 2004/06/19	Measured Date	DATE : 2004/06/19	
TIME : 17:24:33	Measured Time	TIME : 13:35:23	
ATM : 1013hPa	Atmosphericpressure	ATM : 1013hPa	
DATA : 005	# of Data	DATA : 003	
SAMPLING TIME: 001	Sampling Time	SAMPLING TIME: 001	

Result					
START: 001 END:005	Calculation Range	START: 001 END:003			
MAX 612 PPM CO2		MAX 25.5 C R_A			
AVG 598 PPM CO2	CO_2	AVG 25.4 C R_A			
MIN 567 PPM CO2	E_A	MIN 25.4 C R_A			
MAX 1.2 PPM CO	CO	MAX 24.3 C S_A			
AVG 0.9 PPM CO	S_A	AVG 24.2 C S_A			
MIN 0.7 PPM CO	Temperature	MIN 24.1 C S_A			
MAX 25.6 C	O_A	MAX 23.2 C O_A			
AVG 25.6 C		AVG 23.0 C O_A			
MIN 25.5 C		MIN 22.8 C O_A			
MAX 64.6 %RH	%OA	%OA 85.4 %OA			
AVG 64.5 %RH	Humidity				
MIN 64.4 %RH					
DT 15.4 C	DT				
WB 18.1 C	WB				
AH 7.5 g/m3	AH				
HR 6.4 g/kg	HR				

6.3.5 Stored Data Print Out

Display	Procedure
MENU 1.NORMAL 2.CALCULATION 3.200 4.DATA OUTPUT 5.DATA CLEAR 6.UTILITY 7.CALIBRATION	Press MENU. Use ▼ ▲ to select [4.DATA OUTPUT], Press SET.
DATA OUTPUT 1.DISPLAY 2.PRINTER	Use ▼ ▲ to select [2.PRINTER], Press SET.
PAGE SET PAGE: 001 ········· Page number MODE: CALCULATION(I) ······· Measurement Mode(Calculation (A): AVERAGE, (I): INSTANT) DATE: 2004/05/14 ········· Measured Date (Year / Month / Day) TIME: 15:01:35 ········· Measured Time (Hour : Minute : Second) DATA: 50 ········· Number of Trial/Number of Measuring Point	Use ▼ ▲ to select page that you want to print out, press SET.
START:001 END:050 ······· Calculation Range NUM.CO2PPM COPPM °C 001 1003 1.1 23.5 002 1001 1.1 23.5 003 1005 1.1 23.6 004 1003 1.0 23.6 005 1006 1.0 23.6 006 1009 1.0 23.6	The data you have selected will be displayed. Press ▼ to scroll. **Calculation Range** **Data# CO₂ CO Temperature** If you measured in CALCULATION mode, you can select Temperature or Humidity to be displayed by pressing MODE.
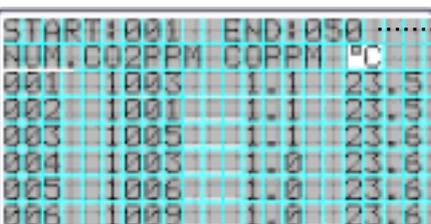
The labels in the PAGE SET display:
- **Page number** — PAGE: 001
- **Measurement Mode(Calculation (A): AVERAGE, (I): INSTANT)** — MODE: CALCULATION(I)
- **Measured Date (Year / Month / Day)** — DATE: 2004/05/14
- **Measured Time (Hour : Minute : Second)** — TIME: 15:01:35
- **Number of Trial/Number of Measuring Point** — DATA: 50

The labels in the data display:
- **Calculation Range** — START:001 END:050
- **Data# CO_2 CO Temperature**

<Set Print Out Range>

You can select the range of calculation.

（If you are not going to change the data range, press ⬜ 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 ⬜ to calculate.

You CANNOT set more than one range.

Press ⬜ 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

<CALCULATION Mode>

```
PAGE SET
PAGE    : 011
MODE    : CALCULATION(I)
DATE    : 2004/06/21
TIME    : 16:23:08
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
NUM PPMCO2  PPMCO   C
001    612    1.2   25.6
002    601    1.0   25.6
003    598    1.0   25.5
004    577    0.7   25.6
005    567    0.7   25.5
```

<%OA Mode>

```
PAGE SET
PAGE    : 002
MODE    : %OA(TMP.)
DATE    : 2004/06/19
TIME    : 13:35:23
ATM     : 1013hPa
DATA    : 010
SAMPLING TIME: 001
START: 001   END: 010
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
NUM   OR_A   OS_A   OO_A
001    25.5   24.3   23.2
002    25.5   24.2   23.1
003    25.5   24.2   23.1
004    25.4   24.2   23.1
005    25.4   24.2   23.0
006    25.4   24.2   23.0
007    25.4   24.2   23.0
008    25.5   24.2   22.9
009    25.4   24.1   22.9
010    25.4   24.1   22.8
```

Condition
(Always printed out)

Calculation Result
(Result)

Stored Data
(DATA)

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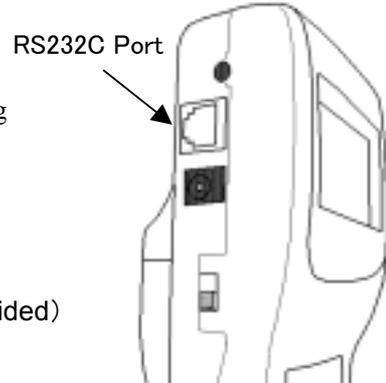
You need to coordinate the data transmission conditions on both Main Body and your PC.

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	③ Number of Data
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**
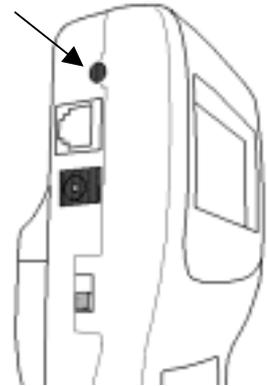
Of the output range, the low end will be set at 0V and the high end will be set at 1V .
Data output interval is always 1 second.

Way To Take In Measured Data（analog output）	Explanation
	Take the data at every 1 second, output the value every 1 second.
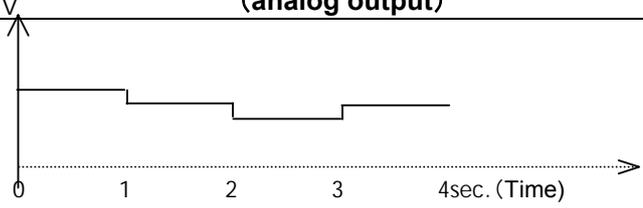
| Display	Procedure
MENU 1.NORMAL 2.CALCULATION 3.%0A 4.DATA OUTPUT 5.DATA CLEAR 6.UTILITY 7.CALIBRATION	Press MENU Use ▼▲ to select [6.UTILITY], Press SET .
UTILITY 1.TIME ADJUST 2.UNIT SELECT 3.ANALOG OUTPUT	Use ▼▲ to select [3.ANALOG OUTPUT]. Press SET .
ANALOG OUTPUT 1.OUTPUT SELECT CO 2.CO 0-50 PPM 3.SAVE INFO	**\<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 .
ANALOG OUTPUT 1.OUTPUT SELECT CO 2.CO 0-50 PPM 3.SAVE INFO	**\<To Set Output Range\>** Use ▼▲ to select [2.] Press SET . Use ▼▲ to select the range Press SET .
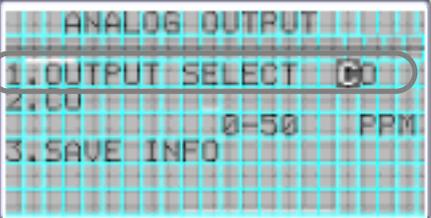
```
 ANALOG OUTPUT
1.OUTPUT SELECT   CO
2.CO
         0-50    PPM
3.SAVE INFO
```

<To save the setting>

Use ▼▲ to select [3.SAVE INFO].

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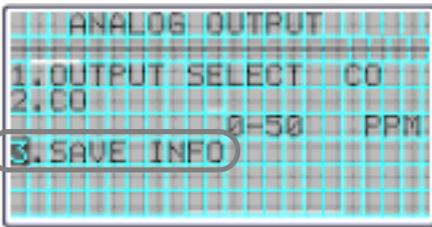
※If you Press MENU before you save, you will return to Main Menu and setting will not be saved.

7. Other Setting

7.1 Date

DISPLAY	PROCEDURE
MENU 1.NORMAL 2.DUCT TYPE 3.CALCULATION 4.FLOW RATE 5.DATA OUTPUT 6.DATA CLEAR 7.UTILITY 8.PRESSURE ZERO	Press MENU. Use ▼▲ to select "7. UTILITY". Press SET.
UTILITY 1.TIME ADJUST 2.UNIT SELECT 3.ANALOG OUTPUT 4.TC(T.H.P) SET	Use ▼▲ to select "1. TIME ADJUST". Press SET.
TIME ADJUST 1.STYLE: JP 2.DATE : 2001/05/28 3.TIME : 14:37:22 4.SAVE INFO	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
TIME ADJUST 1.STYLE: JP 2.DATE : 2001/05/28 3.TIME : 14:37:22 4.SAVE INFO	Use SET to select the desired item. Use ▼▲ to change the setting. Press SET to move the cursor back to "1" or "2".
TIME ADJUST 1.STYLE: JP 2.DATE : 2001/05/28 3.TIME : 14:37:22 4.SAVE INFO	<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.
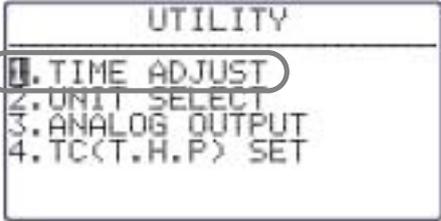
> ※ Date of the output to the display or printer depends on this setting.. But the style of the output to digital port (RS-232C) is fixed as Japanese style.

## 7.2 Units and Baud Rate

＜Units Conversion Table＞

Temperature $T(°F)＝1.8×T(°C)＋32$

Absolute Humidity $1(g/m^3)＝6.24×10^{-5}(lb/ft^3)$

Humidity $1(g/kg)＝9.9999×10^{-4}(lb/lb)$
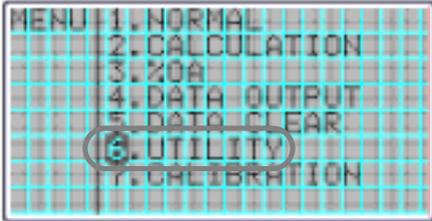
| DISPLAY	PROCEDURE
MENU 1.NORMAL 2.CALCULATION 3.%OA 4.DATA OUTPUT 5.DATA CLEAR 6.UTILITY 7.CALIBRATION	Press MENU. Use ▼▲ to select "6. UTILITY". Press SET.
UTILITY 1.TIME ADJUST 2.UNIT SELECT 3.ANALOG OUTPUT	Use ▼▲ to select "2. UNIT SELECT". Press SET.
UNIT SELECT 1.TEMPERATURE °C 2.ABSOLUTE HUM. g/m³ 3.HUM. MIXING RATIO g/kg 4.BAUD RATE 9600 5.SAVE INFO	Use ▼▲ to select the desired item（1 thru 5）. Press SET. ····Temperature: °C or °F ··· Absolute Humidity: g/m³, lb/ft³ ····Humidity Ratio: g/kg, lb/lb ····Baud Rate: 4800,9600,19200,38400bps
UNIT SELECT 1.TEMPERATURE °C 2.ABSOLUTE HUM. g/m³ 3.HUM. MIXING RATIO g/kg 4.BAUD RATE 9600 5.SAVE INFO	Use ▼▲ to change the setting. Press SET.
UNIT SELECT 1.TEMPERATURE °C 2.ABSOLUTE HUM. g/m³ 3.HUM. MIXING RATIO g/kg 4.BAUD RATE 9600 5.SAVE INFO	**<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.
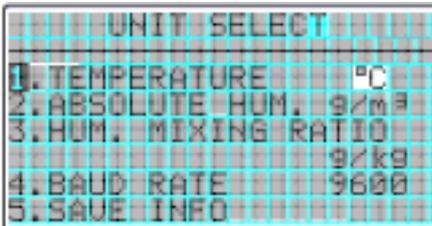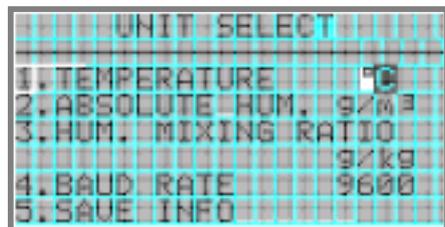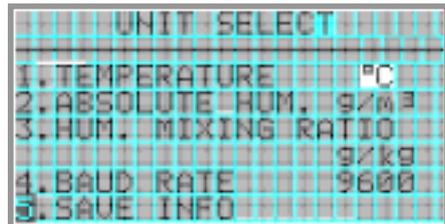
# 7.3 To Delete Data

7. 3. 1 To Delete a Page of Data

DISPLAY	PROCEDURE
MENU 1.NORMAL 2.DUCT TYPE 3.CALCULATION 4.FLOW RATE 5.DATA OUTPUT 6.DATA CLEAR 7.UTILITY 8.PRESSURE ZERO	Press (MENU). Use ▼▲ to select "6. DATA CLEAR". Press (SET).
DATA CLEAR 1.CLEAR START: 0001 ·······Starting Page Number END : 0001 ·······Ending Page Number SET : NO ·······Partial Delete（YES or NO） 2.ALL CLEAR NO ·······All Delete（YES or NO） R1450/1500 ·······Remaining Memory / Total Memory	Use ▼▲ to select "1. CLEAR". Press (SET).
DATA CLEAR 1.CLEAR START: 0001 END : 0001 SET : NO 2.ALL CLEAR NO R1450/1500	Use ▼▲ to select the starting page. Press (SET).
DATA CLEAR 1.CLEAR START: 0001 END : 0006 SET : NO 2.ALL CLEAR NO R1450/1500	Use ▼▲ to select the ending page. Press (SET).
DATA CLEAR 1.CLEAR START: 0001 END : 0006 SET : YES 2.ALL CLEAR NO R1450/1500	Use ▼▲ to select "YES" for partial delete. Press (SET).
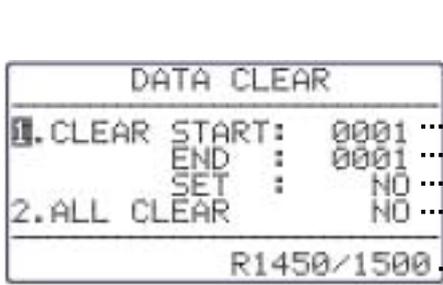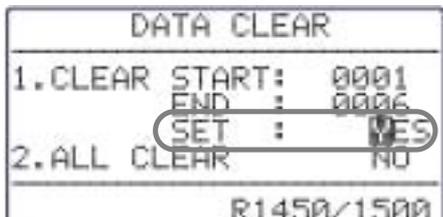
```
        DATA CLEAR
┌─────────────────────────
│1.CLEAR START:   0001
│        END  :   0001
│        SET  :     NO
│2.ALL CLEAR        NO
│          R1470/1500
```

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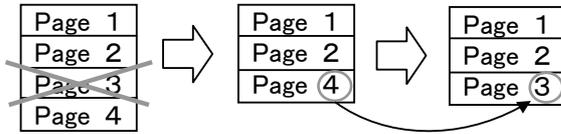
Page Number will change automatically

---

7. 3. 2 To Delete All Data
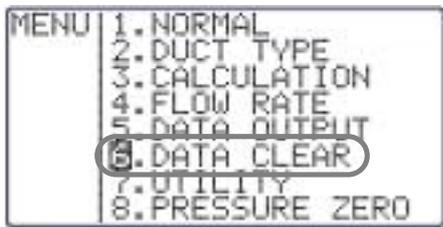
DISPLAY	PROCEDURE
MENU 1.NORMAL 2.DUCT TYPE 3.CALCULATION 4.FLOW RATE 5.DATA OUTPUT 6.DATA CLEAR 7.UTILITY 8.PRESSURE ZERO	Press (MENU) . Use ▼▲ to select "5. DATA CLEAR". Press (SET) .

DATA CLEAR
1.CLEAR START: 0001
        END :   0001
        SET :   NO
2.ALL CLEAR   NO ······ All Delete (YES or NO)
          R1450/1500 ······ Remaining Memory / Total Memory
	Use ▼▲ to select "2. ALL CLEAR".
	
	Press (SET) .

DATA CLEAR
1.CLEAR START: 0001
        END :   0001
        SET :   NO
2.ALL CLEAR   YES
          R1450/1500
	Use ▼▲ to select "YES" to delete.
	
	Press (SET) .

DATA CLEAR
1.CLEAR START: 0001
        END :   0001
        SET :   NO
2.ALL CLEAR   NO
          R1500/1500
	All the data will be deleted and the Remaining Memory will be 1500.

7.4 Contrast Adjustment
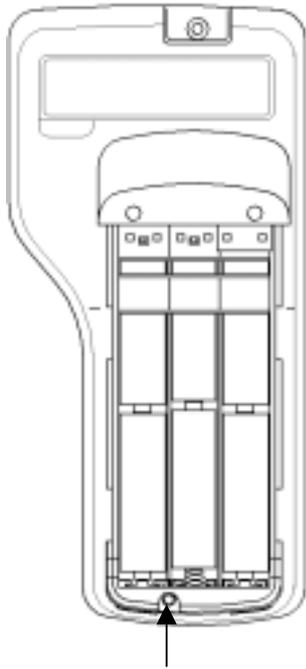
Contrast Adjuster

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.
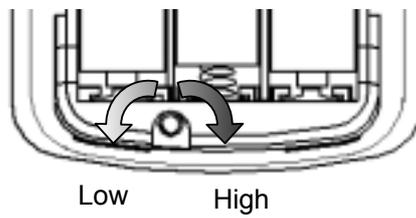
Low   High

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

Valve

Close | Open

Turn to | Turn to
The back | the front
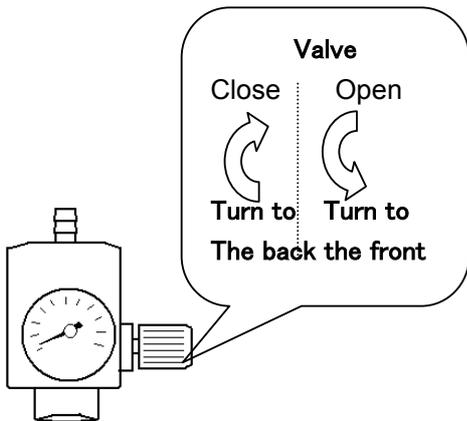
② Attach the regulator to ZERO Gas tank.
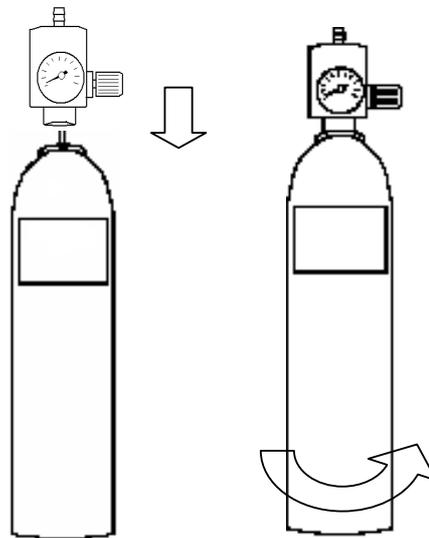
③ Connect regulator to calibration cap by the tube. Connect firmly so that gas does not leak.
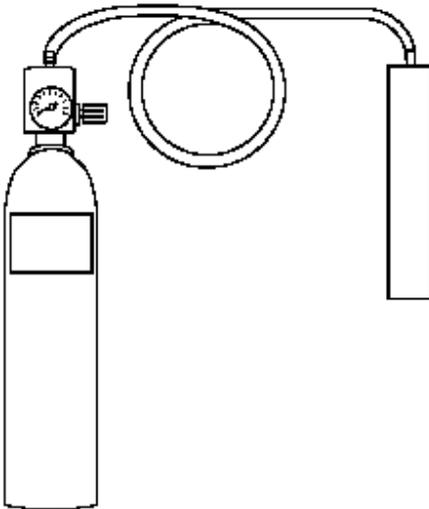
④ Insert the calibration cap into probe.
Insert firmly so that gas does not leak.
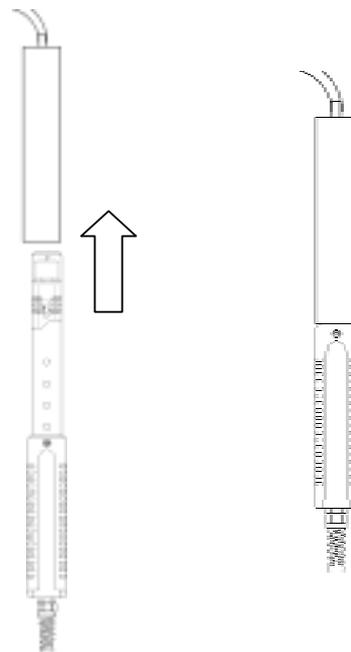
8.2 Calibration Procedure – ZERO Calibration

Display	Procedure
MENU 1.NORMAL 2.CALCULATION 3.%OA 4.DATA OUTPUT 5.DATA CLEAR 6.UTILITY 7.CALIBRATION	Connect ZERO gas tank and IAQ Monitor. Press MENU Use ▼ ▲ to select [7.CALIBRATION] Press SET.
CALIBRATION 1.CO2 ZERO 2.CO ZERO 3.ATMOS. PRESS SET 1013 hPa 4.SAVE INFO	Use ▼ ▲ to select sensor (1.CO2 or 2.CO). Press SET. (CO2 is selected in the example.)
CALIBRATION 1.CO2 ZERO 2.CO ZERO 3.ATMOS. PRESS SET 1013 hPa 4.SAVE INFO	Use ▼ ▲ to select [ZERO]. Press SET.
CALIBRATION CO2 1.ZERO 0000 OD 23 PPM 2.SAVE INFO	Use ▼ ▲ to select [1.ZERO], press SET. ······Currently calibrating sensor（CO or CO2） ······The value before calibration
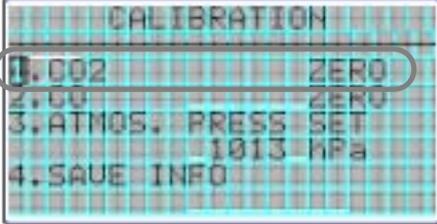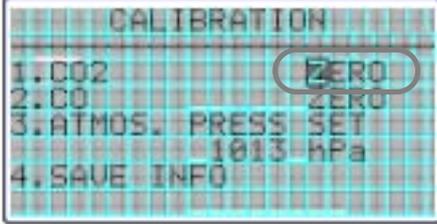
````
CALIBRATION  CO2
―――――――――――――――――
1.ZERO     0000     YES
  RDY.      23  PPM
  120
2.SAVE INFO
````

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  CO2
―――――――――――――――――
1.ZERO     0000     YES
  EMP.      30  PPM
  20
2.SAVE INFO
````
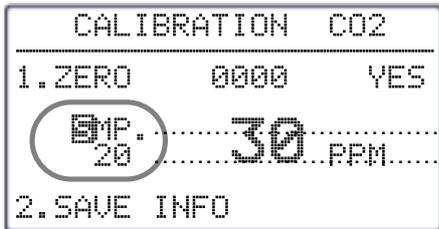
············**Calibration is performing.**
············**The remaining time to a calibration end.**

````
CALIBRATION  CO2
―――――――――――――――――
1.ZERO     0000     NO
  END        0  PPM
  OK
2.SAVE INFO
````
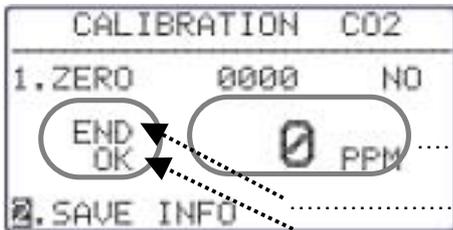
When the calibration result is OK

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   CO2
█.ZERO    0000    NO
   END
   NG    130  PPM
2.SAVE INFO
```
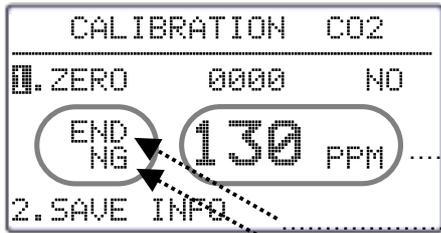
Calibration result is NG

……**The value after calibration**

……**Calibration is completed**
……**Calibration Result**

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

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.

※ 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
``` CALIBRATION 1.CO2 SPAN 2.CO ZERO 3.ATMOS. PRESS SET 1013 hPa 4.SAVE INFO ```	Connect Span gas to IAQ Monitor. Press MENU Use ▼▲ to select [7.CALIBRATION]. Press SET.
``` CALIBRATION 1.CO2 ZERO 2.CO ZERO 3.ATMOS. PRESS SET 1013 hPa 4.SAVE INFO ```	Use ▼▲ to select the sensor for calibration (1.CO2 or 2.CO). Press SET. （CO2 is selected in the example）
``` MENU 1.NORMAL 2.CALCULATION 3.%OA 4.DATA OUTPUT 5.DATA CLEAR 6.UTILITY 7.CALIBRATION ```	To start SPAN gas calibration: Use ▼▲ to select [SPAN], press SET

Range of CO mass: 20-550ppm
Range of CO$_2$ mass: 800-5500ppm

```
   CALIBRATION   CO2
................................
1.SPAN      1000 .....NO.......
      1123 PPM .....
................................
2.SAVE INFO
```

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

```
   CALIBRATION   CO2
................................
1.SPAN      1000    YES
RDY.
120  1123 PPM
................................
2.SAVE INFO
```

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   CO2
................................
1.SPAN      1000    YES
SMP.
20  1045 PPM
................................
2.SAVE INFO
```

Calibration is confirming
The remaining time to a calibration end.
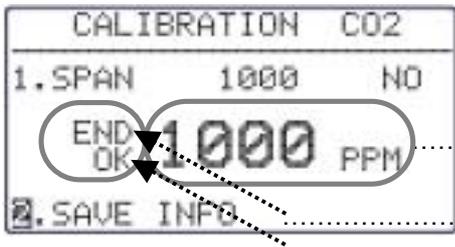
```
CALIBRATION  CO2
1.SPAN     1000    NO
 END
  OK 1000 PPM
2.SAVE INFO
```

Calibration Result is OK

Calibration is completed.

..... **The value after calibration**

.... **Calibration is completed**
..... **Calibration result**

Operation

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

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.

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  CO2
1.SPAN     1000    NO
 END
  NG 1378 PPM
2.SAVE INFO
```
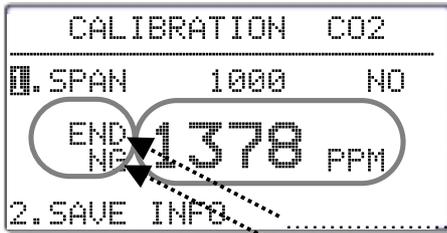
Calibration Result is NG

Calibration is completed successfully.

The value after calibration

Calibration is completed
Calibration Result

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, ^{o}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