Stack Gas Analysis System
ENDA-5000

Instruction Manual

CODE:GZ9100497217D

Preface

This manual describes the operation of the Stack Gas Analysis System, ENDA-5000.
Be sure to read this manual before using the product to ensure proper and safe operation of the instrument. Also safely store the manual so it is readily available whenever necessary.

Product specifications and appearance, as well as the contents of this manual are subject to change without notice.

■ Warranty and Responsibility

HORIBA warrants that the Product shall be free from defects in material and workmanship and agrees to repair or replace free of charge, at HORIBA's option, any malfunctioned or damaged Product attributable to HORIBA's responsibility for a period of one (1) year from the delivery unless otherwise agreed with a written agreement. In any one of the following cases, none of the warranties set forth herein shall be extended;

- Any malfunction or damage attributable to improper operation
- Any malfunction attributable to repair or modification by any person not authorized by HORIBA
- Any malfunction or damage attributable to the use in an environment not specified in this manual
- Any malfunction or damage attributable to violation of the instructions in this manual or operations in the manner not specified in this manual
- Any malfunction or damage attributable to any cause or causes beyond the reasonable control of HORIBA such as natural disasters
- Any deterioration in appearance attributable to corrosion, rust, and so on
- Replacement of consumables

HORIBA SHALL NOT BE LIABLE FOR ANY DAMAGES RESULTING FROM ANY MALFUNCTIONS OF THE PRODUCT, ANY ERASURE OF DATA, OR ANY OTHER USES OF THE PRODUCT.

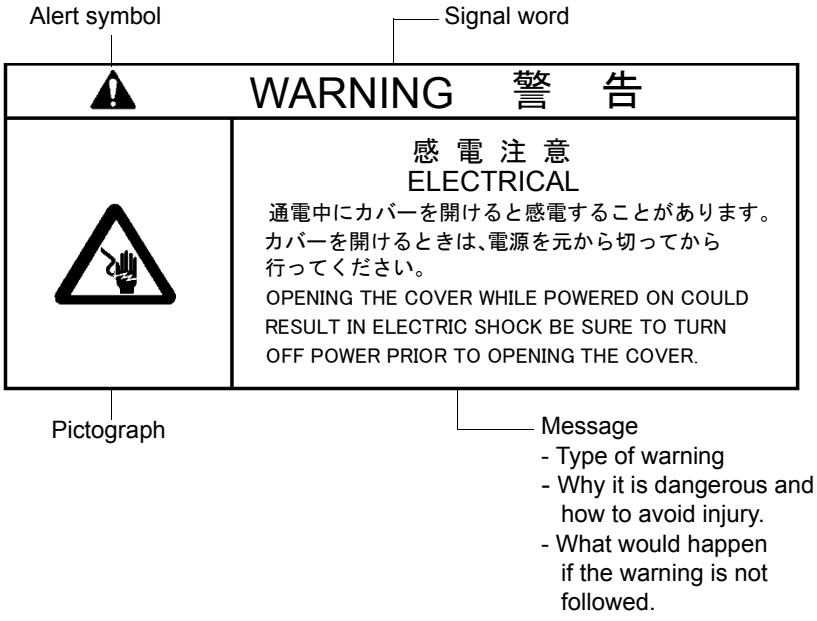
■ Trademarks

Generally, company names and brand names are either registered trademarks or trademarks of the respective companies.

Safety Policy

■ Warnings and Warning Labels

We arrange warning labels on our products, and describe notes and cautions in this manual. Make sure to follow these instructions for your safety.



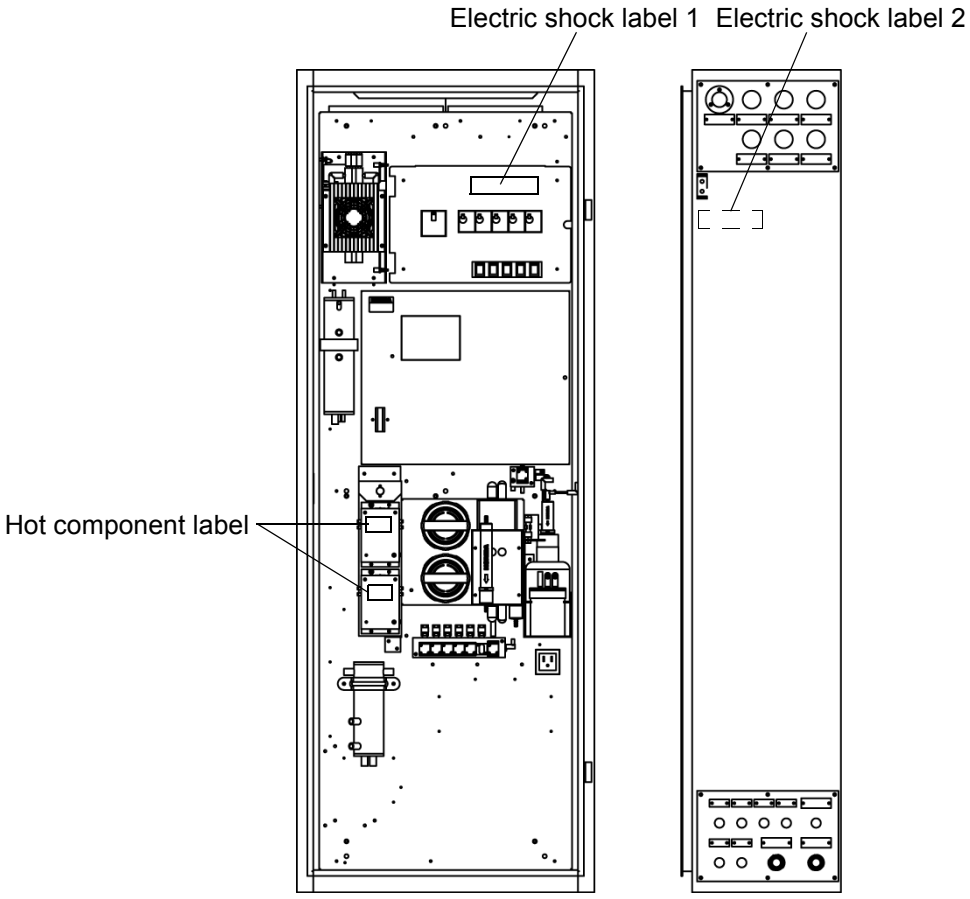
● **The meanings of the signal words are as follows**

- WARNING:
  This indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

- CAUTION:
  This indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

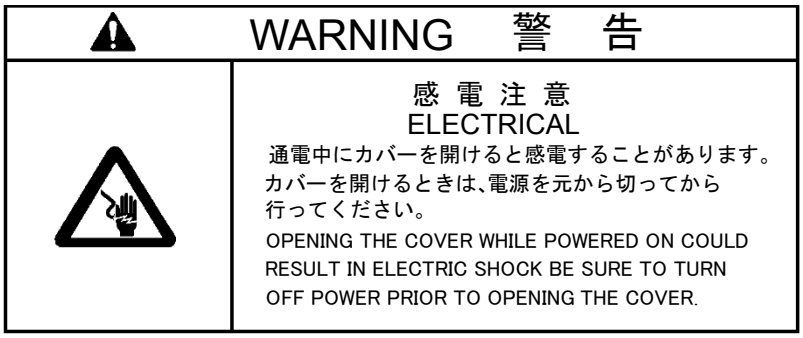
■ Labels and Location

● Label location

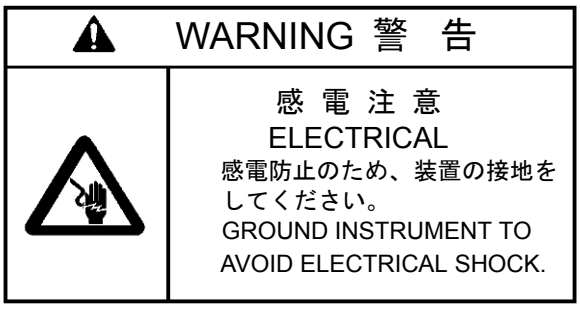


● **Labels**

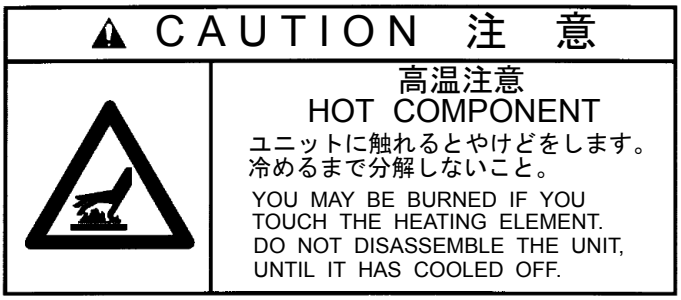
Electric shock label 1



Electric shock label 2



Hot component label



■ Description in this manual

This manual contains the cautionary messages in the following style:

CAUTION

The main power source ELB is applied with high voltage.
Never touch the terminals in turning ON the power.

This product contains a part of high voltage and high temperature that may cause danger in human life or burn injuries.
Fully take care for operation, inspection and adjustment of the product for the safety.

■ Operating precautions

Whenever handling (operating, maintaining, repairing, etc.) this product, you have to follow the general safety precautions mentioned below:

- Ground the product:
  In order to minimize the risk of electric shock
- Shut off the power supply in the operations of product assembling/disassembling:
  In order to prevent electric shock and product damage
  Do not connect the power cable and discharge the internal circuits before operations.
- Use protective equipment:
  Wear protective glasses, gloves, etc., if necessary.

■ Cautionary items against noise

The product is a digital equipment conforming to Class A in EN61326.
The product is designed for a use in an industrial area.
When the product is not used for a place other than industrial area (such as a housing area), adequate counteractions may be necessary to avoid radio frequency interference.

■ Negligence of the instructions and warnings in this manual

Our company does not take any responsibility for any obligations if customers do not follow the warnings made in the various sections in this manual.

■ Reference Documents

ENDA-5000 Installation manual I1002205000

Contents

Figures

1 Introduction

The Stack Gas Analyzer ENDA-5000 series is a measuring instrument that continuously monitors the concentration of NOx, SO_2, CO, CO_2 and O_2 contained in the stack gas of fixed discharge source. It can measure simultaneously up to 5 components.

For the analyzers of NOx, SO_2, CO and CO_2, non-dispersive Infrared ray absorptiometry with cross modulation system (NDIR) is applied to enable excellent stability and accuracy.

For O_2 analyzers, magneto-pneumatic system (MPA) is applied, which is free from cylinder gas as a carrier gas.

The operation unit incorporates touch panel LCD.

As a pollution-monitoring instrument, the approval type of products is available for analyzers NOx, SO_2, CO and O_2.

2 Name of Each Part

2.1 Entire Assembly

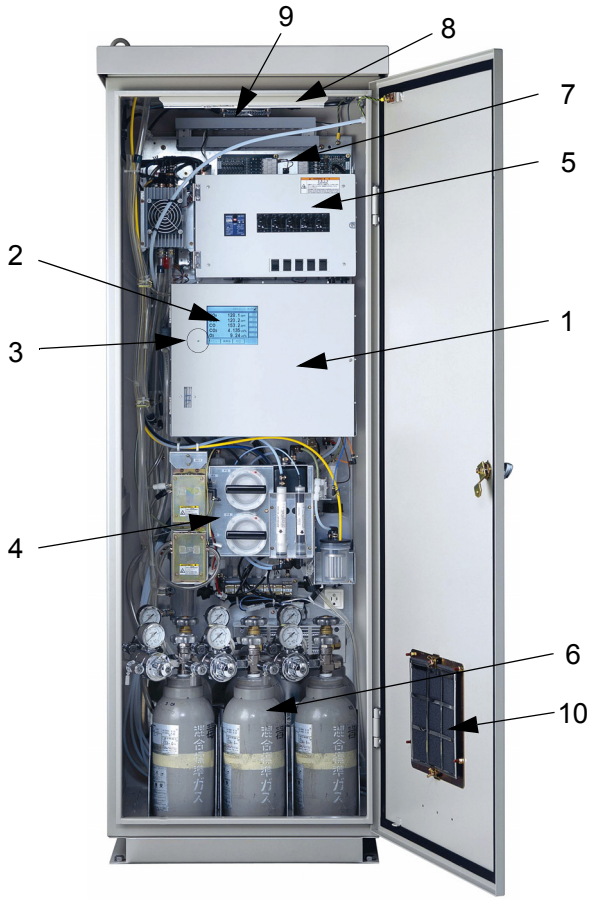


Fig. 1 Entire view of instrument

No.	Name	Description
1	Analyzer cabinet	A cabinet incorporating the optical instrument. The module of 5 components at maximum is incorporated.
2	Operation screen	LCD screen with touch-panel display.
3	Status indicator	Indicates the power ON/OFF state and the operation status of analyzer. Refer to " ● Warm-up and preparation" (page 9).
4	Sampling unit	Introduces sample gas and reference gas into the analyzer. Performs the gas processing: Drain separation → Sulfuric mist processing → NO_2 to NO conversion → Dust removal processing → Cooling
5	Panel switch	Refer to " 2.2 Panel Switch in Cabinet " (page 3).
6	Cylinder container	A space containing high-pressure gas cylinder. Maximum 6 cylinders of 3.4 L can be mounted according to the cabinet size.
7	Input/Output terminal	A connection part of: analyzer power, primary filter heater power, heated tube power (optional).
8	Fluorescent lamp	Illumination inside the cabinet.
9	Ventilation fan	A ventilation fan inside the cabinet.
10	Ventilation filter	A filter to ventilate inside the cabinet. Refer to " 7.3.6 Cleaning the cabinet ventilation filter " (page 66).

2.2 Panel Switch in Cabinet

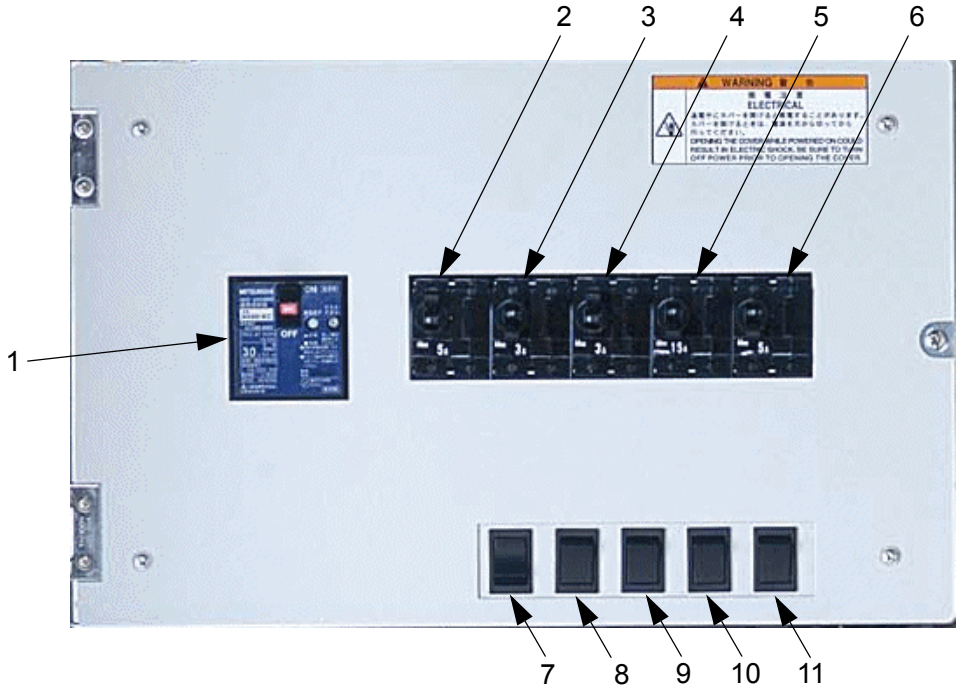


Fig. 2 Panel switch in cabinet

No.	Name	Description
1	Main power ELB	A main power switch (short-circuit breaker) in the analyzer.
2	Meter CP	A protection device (circuit protector) of the sampling unit of analyzer.
3	Utility CP	A fluorescent lamp, ventilation fan, and a protection device (circuit protector) of the plug outlet.
4	Primary filter CP (primary filter switch)	A protection device (circuit protector) of the primary filter heater. Serves also as a power switch of primary filter heater.
5	Heated tube CP (heated tube switch)	A protection device (circuit protector) of the heated tube. Maximum length of the heated tube: 30 m Serves also as a power switch of heated tube.
6	Panel heater CP (panel heater switch)	A protection device (circuit protector) of the panel heater. Serves also as a power switch of panel heater.
7	Analyzer switch	The power switch of analyzer.
8	Pump 1 switch	A power switch for pump 1.
9	Pump 2 switch	A power switch for pump 2.
10	Fluorescent lamp switch	A power switch for the fluorescent lamp.
11	In-maintenance switch	The contact output switch in the maintenance. The concentration signal output is hold according to the specification.

Note

The short circuit breaker, circuit protector, and switch cannot always be attached depending on the specification.

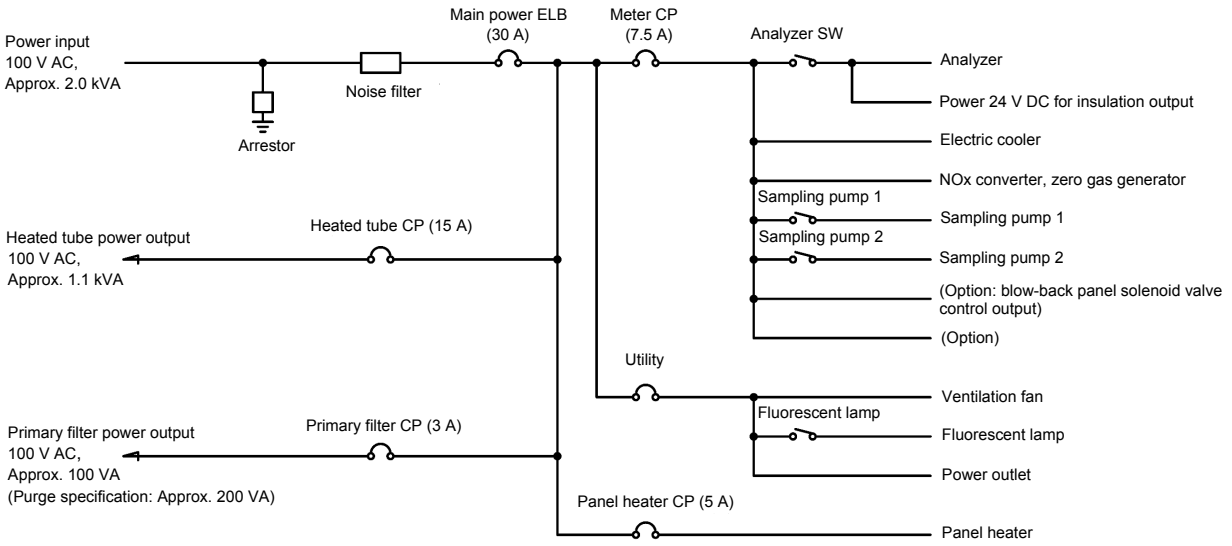


Fig. 3 Standard power system diagram

Note

The actual power system may be different from the above figure according to the specification.

2.3 Cabinet Sampling

The sampling unit collects the stack gas and supplies the sample gas with stable flow to the analyzing unit.
The drain is automatically discharged from the sampling unit.
The following table explains the items shown in numbers described in Fig. 4 and Fig. 5.

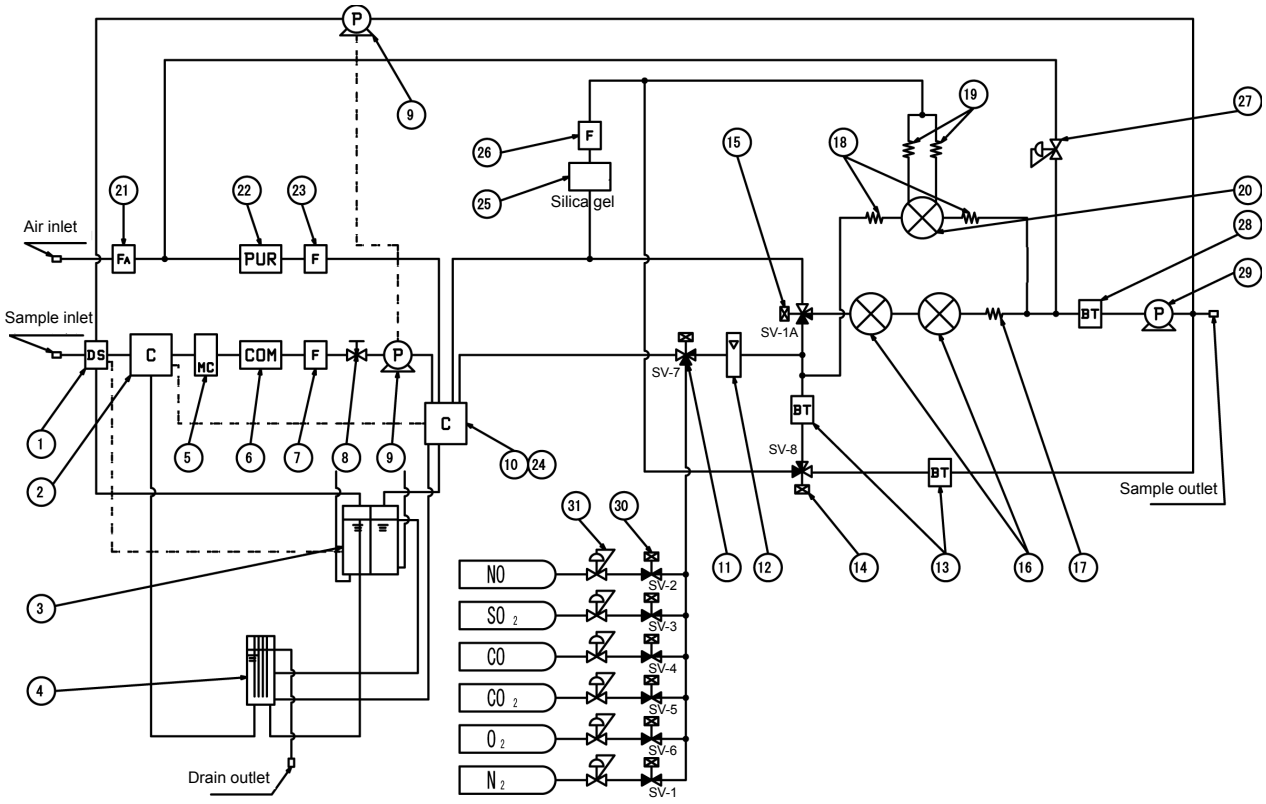


Fig. 4 Sampling flow chart

● Sample gas line flow

No.	Name	Description
1	Drain separator	Decreases the dew point of sample gas introduced into the cabinet to the temperature inside the cabinet to allow drain separation. The removed drain is captured and collected into the drain trap.
2	Electric cooler (Pre-cooler)	Cools down the gas that has reached to the dew point in the cabinet by drain separator. The electric cooler consists of pre-cooler and main cooler. The pre-cooler cools the sample by the temperature lower than that inside the cabinet in 10ºC (when the temperature inside the cabinet is higher than 15ºC), to allow drain separation. The separated drain is collected to the drain trap.
3	Drain trap 1	Collects and discharges the drain separated by drain separator and electric cooler.
4	Drain trap 2	Collects and discharges the drain separated by drain separator and electric cooler.
5	Mist catcher	Collects the sulfuric acid mist in the sample gas.
6	NOx converter	A catalyst unit converting NO_2 in the sample gas into NO.

No.	Name	Description
7	Secondary filter 1	Collects the sample gas dust passed through the primary filter.
8	Needle valve	Controls the sample gas flow.
9	Pump 1	A pump of 2-line type. Performs sample gas suction, compression into analyzer and bypass line discharge.
10	Electric cooler (Main cooler)	Cools the sample gas cooled in pre-cooler down to 5ºC to allow drain separation. The separated drain is collected into the drain trap.
11	Solenoid valve (SV-7)	Blocks the sample gas line when the calibration gas is introduced.
12	Flowmeter	Monitors the sample gas flow. The flow is adjusted to 0.6 L/min ±0.1 L/min by the needle valve (8).
13	Buffer tank	Prevents the pulsation interference caused by pumps in overflow line.
14	Solenoid valve (SV-8) (air zero calibration spec)	Opens at air zero calibration.
15	Solenoid valve (SV-1A)	A solenoid valve for NIDR flow modulation. Turns ON or OFF by 1 Hz.
16	Analyzer 1	Maximum 4 components of NDIR analyzers can be incorporated.
17	Capillary 1	A capillary to control NDIR flow.
18	Capillary 2	A capillary to control MPA sample flow.
19	Capillary 3	A capillary to control MPA carrier gas flow.
20	Analyzer 2	MPA is incorporated.

● Reference gas line flow

No.	Name	Description
21	Air filter	Collects dust in the air for reference gas.
22	Zero gas generator/Scrubber	A catalyst eliminating NOx, SO_2, and CO from the reference gas. “Zero gas generator” can be “Scrubber” depending on the specification.
23	Secondary filter 2	Collects the reference gas dust that passed through the air filter.
24	Electric cooler	Cools the reference gas down to 5ºC to allow drain separation. The separated drain is collected to a drain trap.
25	Silica gel	Eliminates moisture in the MPA carrier gas.
26	Protection filter	Collects powders generated from silica gel.

● Suction pressure control line

No.	Name	Description
27	Regulator	Regulates the suction pressure of the sample gas and the reference gas to -4.9 kPa.
28	Buffer tank	Restricts the suction pump pulsation.
29	Pump 2	Performs suction of the sample gas and the reference gas.

● Calibration gas line

No.	Name	Description
30	Solenoid valve (SV-1 to SV-6)	Solenoid valves for the calibration gas switch.
31	Pressure regulator	Depressurizes the pressure in calibration gas cylinder to approximately 68.6 kPa. The needle valve for flow control is attached.

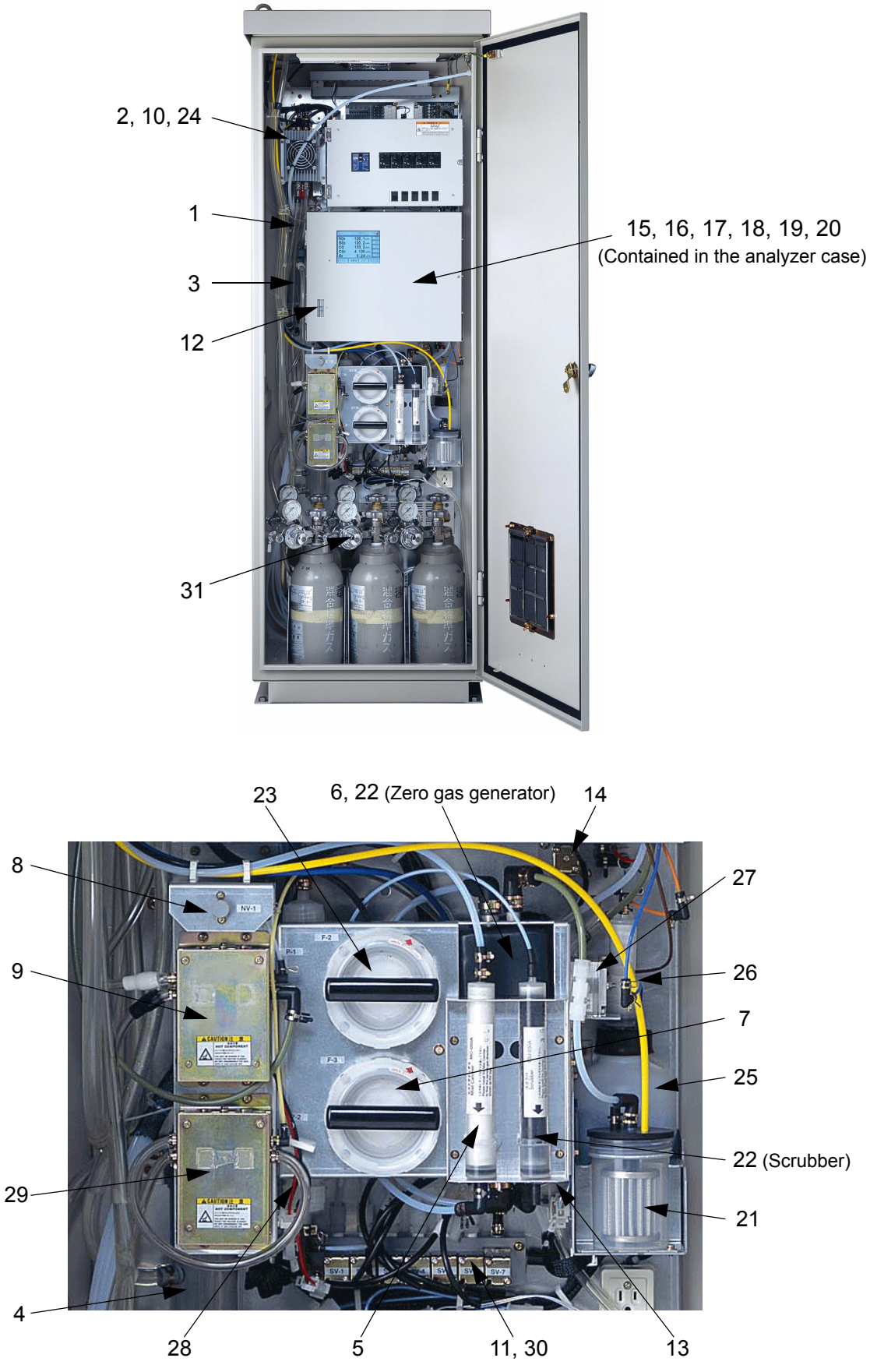


Fig. 5 Parts layout

3 Basic Operation

3.1 Preparation for Operation

- **Wiring check**
  Confirm that the wiring is correctly given according to the separate installation manual.

- **Gas sample/ discharge piping check**
  According to the separate installation manual, confirm that the sample piping has secure connection and the discharge piping is free from malfunction such as bending.

- **Drain trap watering**
  There are 2 tubes requiring watering.
  Connect the attached watering pot to the soft tube of 16 mm O.D. (tube 1 and tube 2 in the figure below) and start watering gradually.
  Continue watering until the water starts being discharged from the drain trap 2 (lower drain trap).

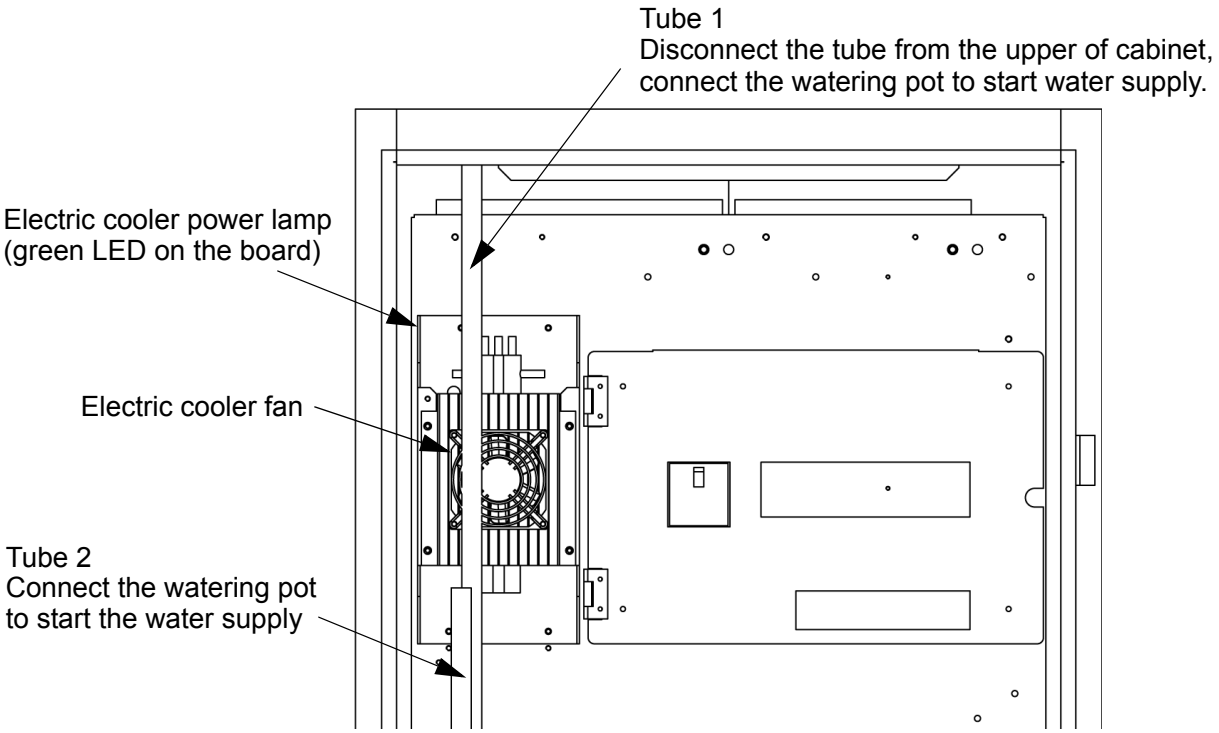


Fig. 6 Drain trap watering

- **Connecting calibration gas cylinder and tubes**
  Connect the standard gas cylinder pressure regulator to the calibration gas cylinder by referring to " 7.3.12 Replacing the gas cylinder (pressure regulator inspection) " (page 72).
  Connect the calibration gas line pipes to the standard gas cylinder pressure regulator.
  Perform leak check by referring to " 7.3.12 Replacing the gas cylinder (pressure regulator inspection) " (page 72).
  After the leak check, close the needle of pressure regulator.

● Warm-up and preparation

1. **Turn ON the main power ELB.**
2. **Turn ON the primary filter CP, heated tube CP and panel heater CP (in winter).**
3. **Turn ON the meter CP, utility CP and analyzer switch.**
   Turning ON the analyzer switch lights up the operation lamp.
   The operation lamp indicates the following operation condition:

Lit (green)	Indicates the analyzer power is ON and is in a normal condition.
Lit (red)	Indicates the analyzer power is ON and is in a warning/caution state or in maintenance.
Extinguished	Indicates that the analyzer power is OFF.

4. **Perform warm-up operation for approximately 1 hour.**

Note

When the panel heater is attached, connect the attached cover to the cabinet ventilation filter in winter.

5. **After confirming the followings on the electric cooler, turn ON the pump 1 switch and 2 switch.**

Item	Confirmation	Reference
Power lamp	Lit	" Fig. 6 Drain trap watering " (page 8)
Fan	Rotated	
Temperature	0ºC to 8ºC (below 15ºC when the temperature inside the cabinet is over 40ºC)	" Fig. 31 ANALOG INPUT 2 screen " (page 36)

6. **Perform the warm-up operation for approximately 3 hours.**
7. **Check if no warning is indicated in the analyzer.**
   When any alarms are indicated, confirm the situation and take a suitable action referring to " 8.1 Alarm Type and Countermeasure " (page 75).

Note

The operation lamp lights up in red for a moment at power ON, and turns green at once.
This happens by hardware check. It is not a sign of abnormality.

8. **Regulate the sample flow into 0.6 L/min ±0.1 L/min by needle valve.**

The operation preparation is now completed.

3.2 Operation Stop

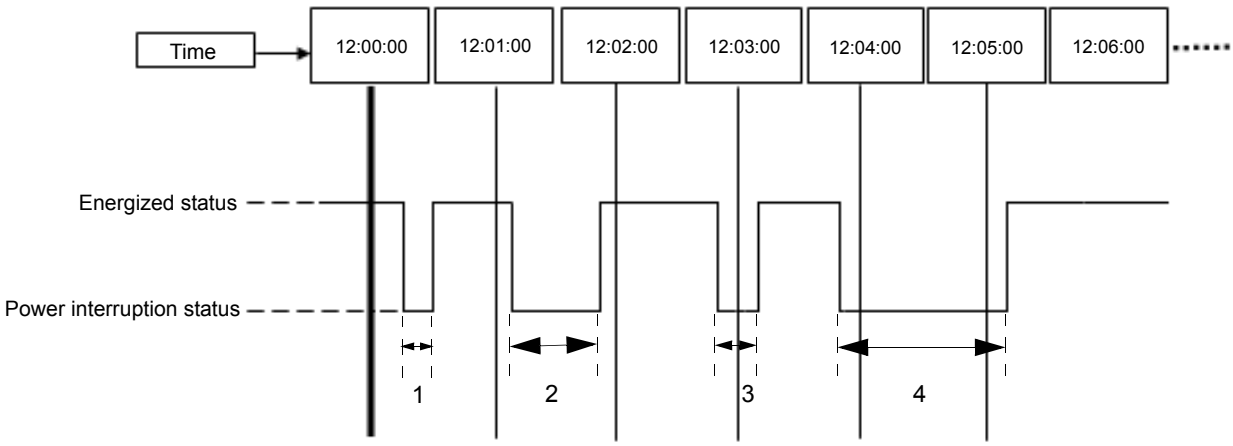
The instrument basically works in a continuous mode. The instrument needs to be powered except for such occasion as not being used for a long time.
To stop the instrument, follow the steps below:

1. **Introduce zero calibration gas, or allow air suction from the sample inlet to purge for 5 minutes or longer.**
2. **Turn OFF the pump 1 switch and 2 switch.**
3. **Turn OFF the analyzer switch.**
4. **Turn OFF the primary filter CP, heated tube CP, and panel heater CP.**
5. **Turn OFF the main power ELB.**
6. **In winter, discharge the water remained in the drain trap.**
   Otherwise, the drain trap may be cracked.

Note

Be careful in handling the water in the drain trap, because it may be strongly acidic depending on the sample condition. If your hand or skin contacts the water in the drain trap, flush away with water completely.

3.3 Power Interruption



1: Momentary power interruption for 0.02 seconds or less (Refer to 3.3.1.)
2: Short power interruption occurring for 59 seconds or less which start and end within the same minute of time (Refer to 3.3.2.)
3: Short power interruption occurring for 59 seconds or less which end at the next minute of time (Refer to 3.3.3.)
4: Long power interruption for more than 59 seconds (Refer to 3.3.3.)

3.3.1 Momentary power interruption

After the power restoration, ENDA-5000 returns to the state just before the power interruption. If AIC or purge (optional) are in progress at the power interruption, AIC or purge continue to start.

3.3.2 Power interruption 1

When AIC or purge (optional) are in progress at the power interruption, AIC or purge start from the beginning of each sequence.
When the automatic calibration start time or purge start time has passed during the power failure, the interval time is added to the start time when power is restored, and the time is corrected into the future time nearest to the restoration time.

3.3.3 Power interruption 2

After the power restoration, the normal measurement condition is restored.

Note

When power failure occurs during "Battery" alarm, the internal clock, AIC start time, and the purge start time is reset to 2090/1/1, 0:00 (initial value) after the power restoration.

3.4 Long-time Storage

When the instrument is not used for more than 1 month, store the instrument by the following procedure:

1. **Stop the instrument.**
2. **Discharge the water from drain trap.**
   When water remains, the internal water corrodes to cause alga or dirt in the trap.
   In winter, the drain trap may be cracked.

Note

Be careful in handling the water in the drain trap, because it may be strongly acidic depending on the sample condition. If your hand or skin contacts the water in the drain trap, flush away with water completely.

3. **When the calibration gas is connected, ensure the main valve is closed.**

Note

To store the instrument in a place other than the installation site, avoid direct sunlight, wind, or rain.
To start the operation after the storage, replace the following parts:

- **Primary filter element**
- **Secondary filter element**
- **Scrubber (reference side)**
- **Mist catcher**
- **Silica gel (when discolored to pink)**

When a vinyl is covered over the instrument, dew condensation may occur inside and cause corrosion.
Do not use a vinyl cover.

4 Measurement Screen (Basic Panel)

● Operation flow

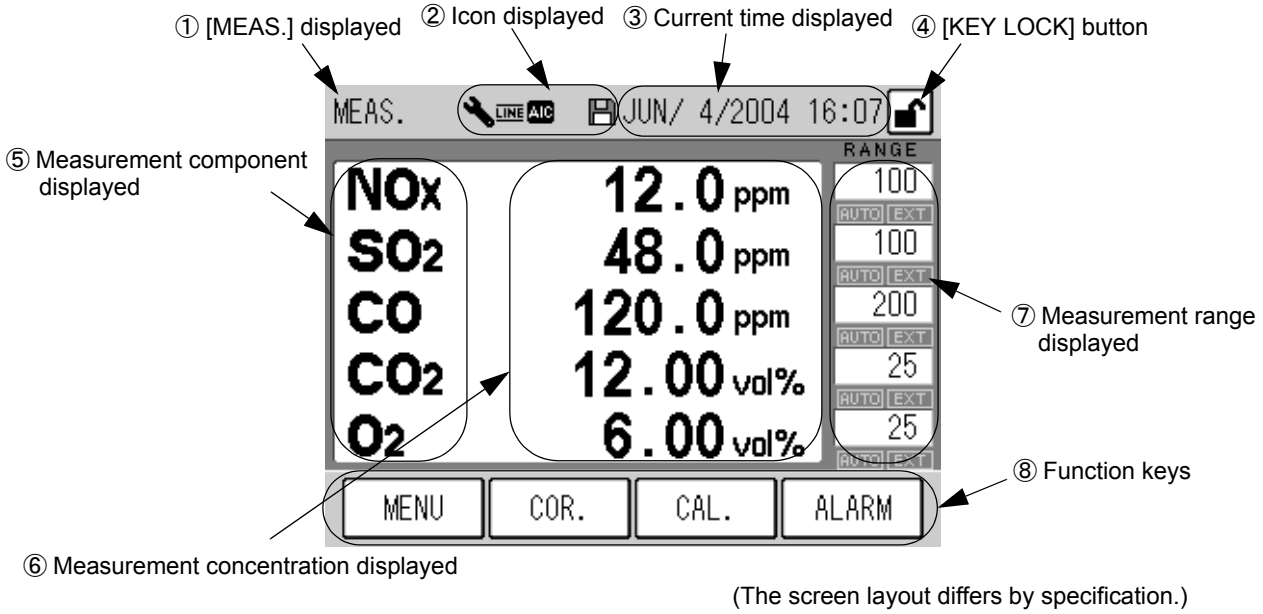
The following chart shows the operation flow from preparation to measurement.

Operation preparation		→	Refer to page 8
↓			
System setting	LCD adjustment	→	Refer to page 46
|	Current time setting	→	Refer to page 48
|	Password setting	→	Refer to page 49
↓			
Calibration preparation	Setting of calibration range and span gas concentration	→	Refer to page 19
|	Setting of automatic calibration items	→	Refer to page 22 to page 26
↓			
Calibration		→	Refer to page 22 to page 30
↓			
Setting of measurement range		→	Refer to page 33
↓			
Measurement			

This chapter explains the measurement screen.

Note

The screen applies a touch panel. Directly press on the screen by the fingers for operation.
Do not use anything having hard or sharp tips like a ball-point-pen nor press the screen too strong.
The screen may be malfunctioned.



(The screen layout differs by specification.)

Fig. 7 MEAS. screen 1 (Measurement value display)

Pressing the [COR.] key (optional) switches the MEAS. screen to the COR. screen.

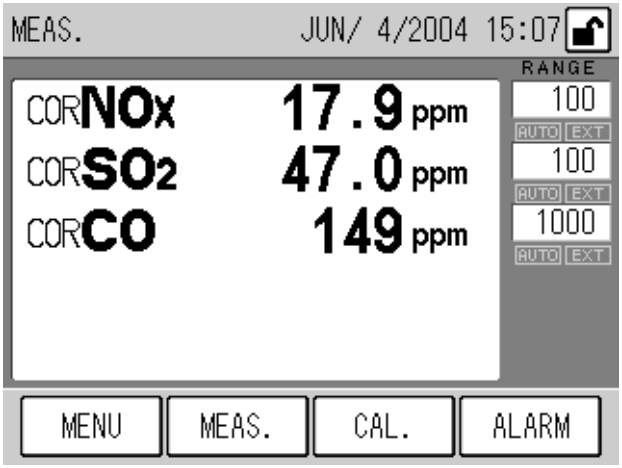


Fig. 8 MEAS. screen 2 (Conversion value display)

① [MEAS.] display

Displayed during the sample gas is measured.
It is not displayed in performing automatic calibration (hereinafter called as “In AIC,” in introducing calibration gas (including at replacement), or in maintenance.

② Icon display

The instrument status is displayed in the following icons:

	In maintenance	Displayed when the maintenance switch is ON. (The concentration signal output is hold according to the specification.)
	Line	Displayed or blinks in the calibration gas introduction and in sample replacement. For calibration, refer to " 5 Calibration " (page 17).
	In AIC	Displayed or blinks in AIC. For automatic calibration, refer to " 5.3 AIC " (page 22).
	In purge (optional)	Displayed or blinks in purge. For purge function, refer to " 10.1 Purge Functions " (page 92).
	In data save	Displayed when the data is being written in ROM. The data is saved in such occasions: a) set values are changed b) at calibration c) at purge d) every 15 minutes of interval after data acquisition.

③ Current time display

The current time is displayed.
For setting the current time, refer to " 6.5.2 Time adjust " (page 48).

④ [KEY LOCK] button

The keylock status is displayed.
Pressing this button also release or set the keylock function.
For operating the button, refer to " 6.6 Key Lock Function " (page 52).

Keylock function ON Keylock function OFF

Fig. 9 [KEY LOCK] button

When the keylock function is set to ON, only the screen confirmation is enabled.
No button operation other than pressing the [KEY UNLOCK] button is available.
This function allows preventing irresponsible setting change due to misoperation.

⑤ Measurement component display

The measurement component currently set is displayed.

⑥ Measurement concentration display

The measurement concentration is displayed.

⑦ Measurement range display

The current measurement range as well as the range status is displayed.

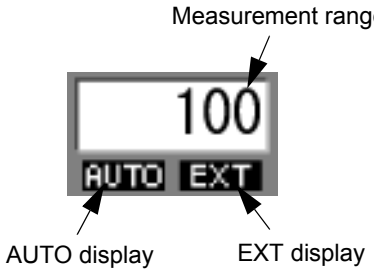


Fig. 10 Range display

Measurement range	The current measurement range is displayed. When the measurement value exceeds the measurement range, the displayed value starts blinking.
AUTO display	Lights when the auto range is set.
EXT display	Lights when the external range switch function is set to ON.

Note

For the measurement range setting, refer to " 6.1.1 Setting measuring range " (page 33).

⑧ Function keys

Pressing each key enables the corresponding functions as follows:

Menu	Displays the MENU 1/5 (OPERATION menu) screen (page 31 Fig. 25).
COR. (optional)	Displays the COR. display in the MEAS. screen 2 (Conversion value display) (page 14 Fig. 8). For O_2 conversion function, refer to " 10.2 O_2 Correction " (page 100).
CAL.	Displays the CAL. screen (page 17 Fig. 11).
ALARM	Displayed when any error occurs. Pressing this key displays the ALARM screen (page 54 Fig. 52), enabling to check the alarms currently occurred.

● Screen backlight protection

The instrument is equipped with the automatic backlight extinguish function.
This allows the LCD backlight to be extinguished automatically when the touch panel key is not pressed during the time set in " 6.5.1 LCD adjust " (page 46).
When touching the screen during the LCD backlight OFF state, the LCD backlight lights up again. When the In-maintenance switch is ON, however, the backlight remains lit.

5 Calibration

For a stable and accurate data acquisition, periodical calibration is necessary.
There are two calibration methods; automatic calibration (AIC) and manual calibration.

Automatic calibration (AIC)
By the set time span or from external contact input, the zero and span calibration is automatically performed. Pressing [AIC] on the touch panel also enables to perform automatic calibration.

Reference

Refer to " 5.3 AIC " (page 22).

Manual calibration
A calibration method given by manual operation with flowing the calibration gas voluntarily.

Reference

Refer to " 5.4 Manual Calibration " (page 28).

Note

In calibration, the concentration output is held according to the specification.

5.1 Calibration Screen (CAL. screen)

The CAL. screen is the basic screen to perform calibration.
Pressing [CAL.] in the MEAS. screen 1 (Measurement value display) (page 14 Fig. 7) displays the CAL. screen.

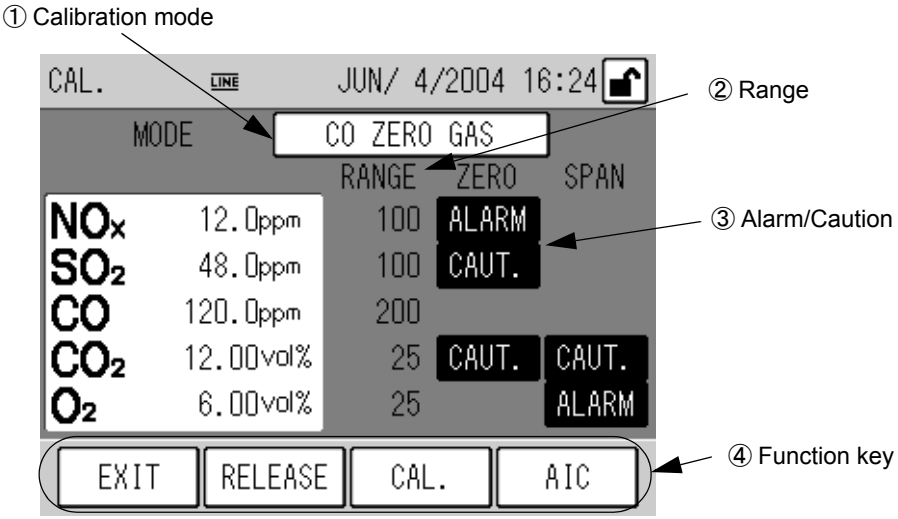


Fig. 11 CAL. screen

① Calibration mode
Displays the selected calibration mode.

② Range
In measurement and in sample replacement, the measuring range is displayed.
In the calibration gas introduction, the set calibration range is displayed.

③ Alarm/Caution
Displays the operation result of calibration coefficient.

ALARM	The calibration coefficient is out of the normal range. The calibration coefficient is not revised but the previous calibration coefficient is used for the concentration operation.
CAUT.	The calibration coefficient is within the normal range, but is close to the range outside. The calibration coefficient is revised to perform the concentration operation.

Reference

When ALARM or CAUT. is displayed, refer to " 8 Troubleshooting " (page 75).

Note

When zero calibration alarm occurs during AIC, the span gas flows though span calibration will not be performed for the components.
In manual calibration, the span calibration will be performed also for the alarmed components of zero calibration.

④ Function keys
Pressing each key enables the corresponding function as follows:

EXIT	Returns to the MEAS. screen 1 (Measurement value display) (page 14 Fig. 7).
RELEASE	When the calibration alarm (ALARM) or calibration caution (CAUT.) occurs, the [RELEASE] key is displayed on the screen. To release the alarm or caution, press this key after checking the cause of problem. Even with ALARM or CAUT. released, the occurrence of ALARM or CAUT. is recorded in the alarm history.
CAL.	The manual calibration is performed. For details, refer to " 5.4 Manual Calibration " (page 28).
AIC	Starts automatic calibration.

5.2 Preparation of Calibration

5.2.1 Gas connection check

Confirm that the gas used for calibration is correctly connected.
For the calibration gas, use a cylinder gas containing gas approximately 90% of the calibration range. Check the residual gas pressure in the calibration gas cylinder, and replace with the new cylinder if the pressure is within approximately 1 MPa.

5.2.2 Setting calibration range and span gas concentration

Set the range for calibration and span gas concentration.

1. **Press the [MENU] key in the MEAS. screen.**
2. **Press the [▶] key twice to display the MENU 3/5 (SETTING menu) screen.**

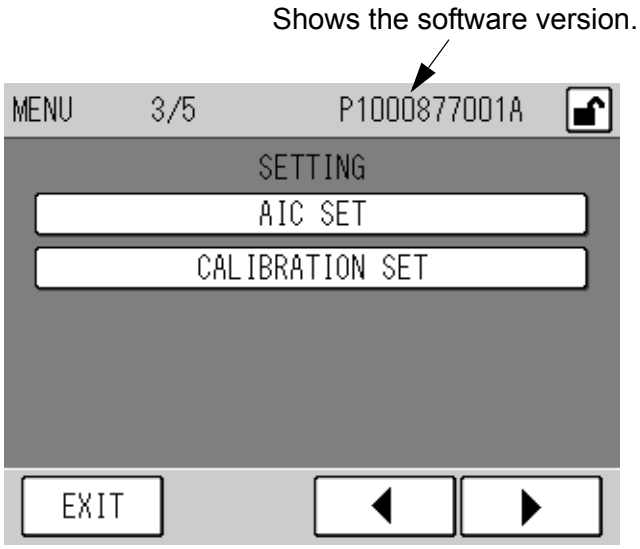


Fig. 12 MENU 3/5 (SETTING menu) screen

3. **Press the [CALIBRATION SET] button. The CALIBRATION SET screen appears.**
   In this screen, the calibration range as well as the span concentration can be set.

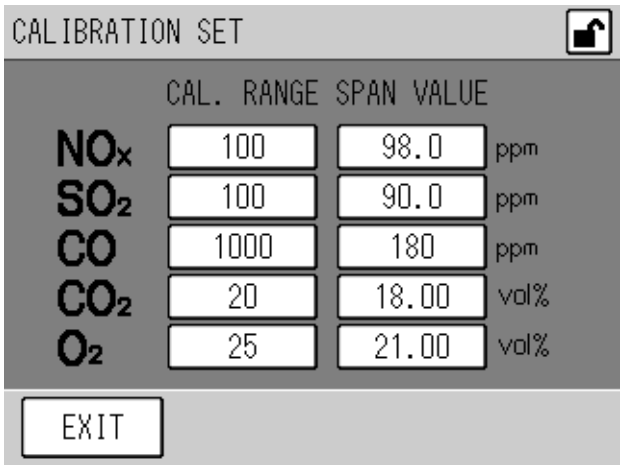


Fig. 13 CALIBRATION SET screen

4. **Press the button corresponding to the item to be set. The setting screen appears.**
   For the detailed information on each setting screen, refer to page 20 to page 21.
5. **Change the setting in each setting screen, and press the [SET] key.**
   The setting is changed and the screen returns to the CALIBRATION SET screen.

Tip

To cancel the changes, press the [CANCEL] key.
The changes are canceled and the screen returns to the CALIBRATION SET screen.

6. **Press the [EXIT] key in the CALIBRATION SET screen.**
   The screen returns to the MENU 3/5 (SETTING menu) screen.

● **Calibration range setting**

Press the calibration range button for the component to be set.
The CALIBRATION RANGE screen appears.

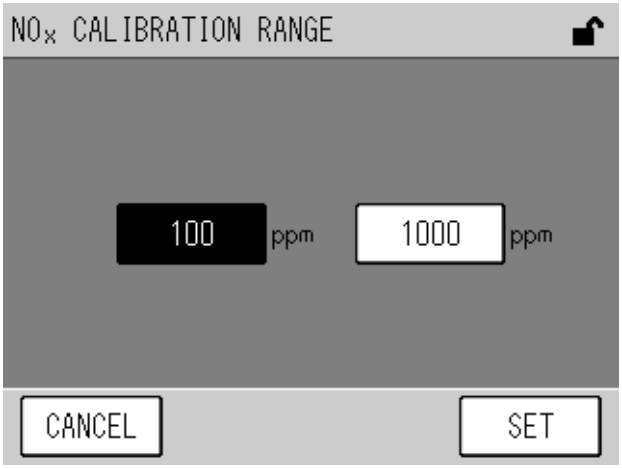


Fig. 14 CALIBRATION RANGE screen

Select the calibration range and press the [SET] key.
The setting is changed and the screen returns to the CALIBRATION SET screen.

● Span gas concentration setting

1. **Press the button of span gas concentration for the component to be set.**
The SPAN VALUE screen appears.

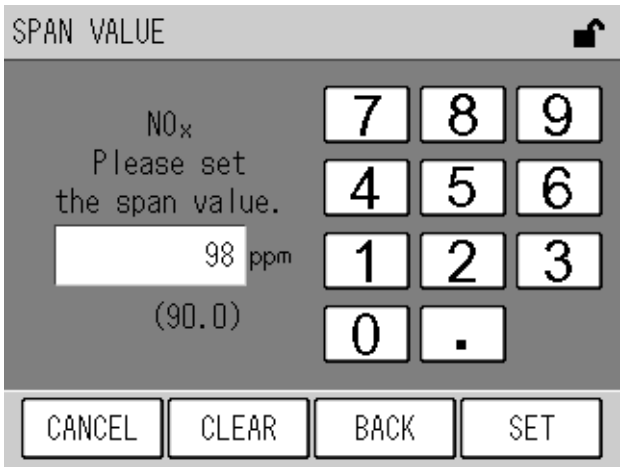


Fig. 15 SPAN VALUE screen

2. **Press the numerical key to input the value.**
Pressing each key to start the operation.

CANCEL	Returns to the CALIBRATION SET screen without changing the setting.
CLEAR	The value input to the editing area is cleared.
BACK	The last digit input is cleared.
SET	Returns to the CALIBRATION SET screen with the setting changed.

3. **Press the [SET] key.**
The setting is changed and the screen returns to the CALIBRATION SET screen.

4. **Press the [EXIT] key twice.**
The screen returns to the MEAS. screen.

Tip

The span concentration value can be set for the calibration range of each measuring component.

Note

If changing the calibration range or the span concentration during AIC, "AIC" appears on the screen and rejects the operation.

5.3 AIC

In the automatic calibration (AIC), the calibration can be automatically started by the internal clock.
The calibration can be started also by the [AIC] key in the CAL. screen or the external contact input. Adjust the calibration gas flow by referring to " ● Calibration gas flow control" (page 30).

5.3.1 AIC setting

Set the AIC conditions in the AIC screen. The AIC conditions are:

- Mode
- Start time
- Interval

1. **Press the [MENU] key in the MEAS. screen.**
Press the [▶] key twice to display the MENU 3/5 (SETTING menu) screen.

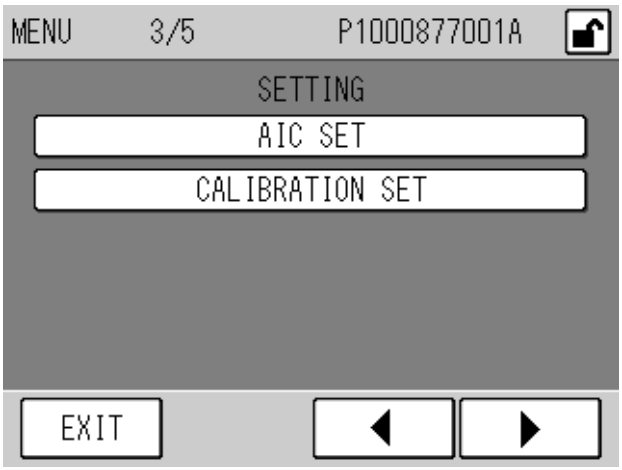


Fig. 16 MENU 3/5 (SETTING menu) screen

2. **Press the [AIC SET] button. The AIC SET screen appears.**

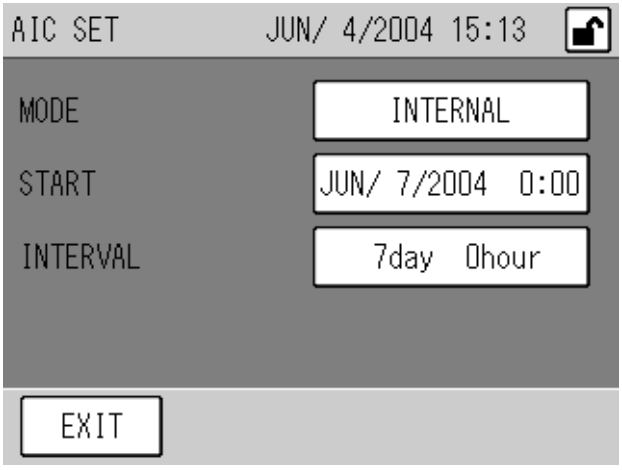


Fig. 17 AIC SET screen

Setting item	Description
Mode	Sets the starting procedure of AIC. Pressing the right button of [MODE] will display the AIC MODE screen (page 24 Fig. 18).
START	Only valid for the time when “INTERNAL” is selected in MODE setting. Pressing the right button of [START] will display the AIC START screen (page 25 Fig. 19).
INTERVAL	Only valid for the time when “INTERNAL” is selected in MODE setting. Pressing the right button of [INTERVAL] will display the AIC INTERVAL screen (page 26 Fig. 20).

3. **Press the button corresponding to the item to be set. The setting screen appears.**
For the detailed information on each setting screen, refer to page 24 to page 26.

4. **Change the setting in each setting screen, and press the [SET] key.**
The setting is changed and the screen returns to the AIC SET screen.

5. **Press the [EXIT] key in the AIC SET screen.**
The screen returns to the MENU 3/5 (SETTING menu) screen.

Note

If changing the AIC setting during AIC, “AIC” appears on the screen and rejects the operation.

● **Mode**

Sets the mode to start AIC.

1. **Pressing the right button of [MODE] in the AIC SET screen will display the AIC MODE screen.**

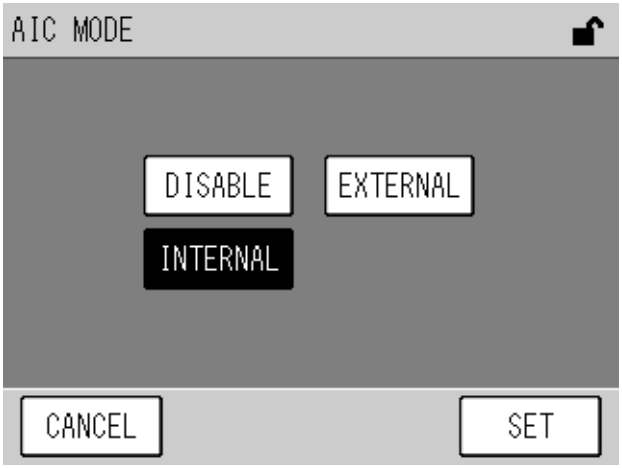


Fig. 18 AIC MODE screen

Setting item	Description
DISABLE	The AIC start is not performed. The manual start from the CAL. screen is only available.
INTERNAL	The calibration starts based on the start time and interval set according to the internal clock.
EXTERNAL	The automatic calibration starts from the external contact input.

2. **Press the button of the item to be set, and press the [SET] key.**

3. **The setting is changed and the screen returns to the AIC SET screen.**

Note

AIC based on the internal clock and AIC from external contact input cannot be set at the same time.

● Start time

Note

In selecting the AIC based on the internal clock, it is required to set the start time.

The following is the procedure to set the next start time.

1. **Pressing the the right button of [START] in the AIC SET screen will display the AIC START screen.**

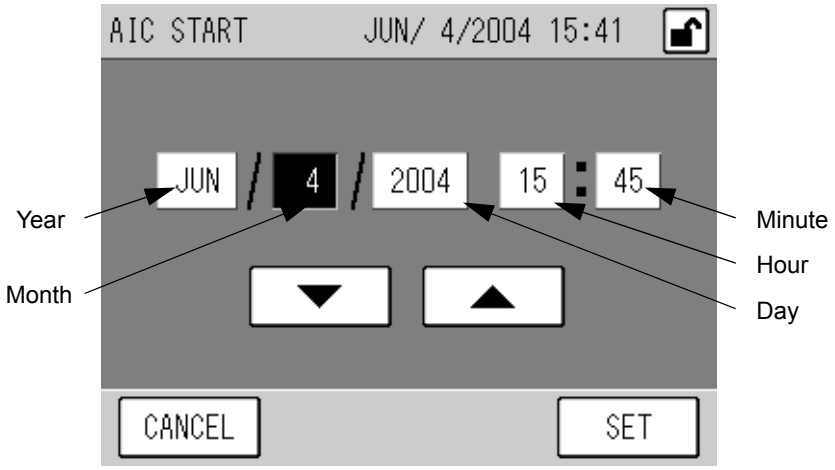


Fig. 19 AIC START screen

Setting item	Setting range
Year	2000 to 2090
Month	1 to 12
Day	1 to 31
Hour	0 to 23
Minute	0 to 59

2. **Pressing the button showing the value to be changed will reverse the display mode. Change the value by the [▼] and [▲] button, and press the [SET] key.**
3. **The instrument changes the setting and the screen returns to the AIC SET screen.**

Note

- **The start time setting is based on the internal clock.**
- **It is not available to change into an impossible date.**
  When this happens, the existing date closest to that before the set date is automatically selected.
- **When the start time previous to the current time is set, the setting value of start time is changed into the minimum value which comes in future by adding multiple number of the interval set values.**
- **When the start time set value becomes a previous time by changing the internal clock setting (refer to " 6.5.2 Time adjust " (page 48)), the start time is changed into the minimum value which comes in future by adding multiple number to the current time set value.**
- **When the AIC start time is set later than 2090/1/1/0:00, the AIC does not start.**
  When the "Battery" alarm occurs, confirm the setting time.

● Interval

Note

When the AIC based on the internal clock is selected, it is required to set an interval.

The following is a setting example of time span interval when AIC is started with a specific time span.

1. **Pressing the right button of [INTERVAL] in the AIC SET screen will display the AIC INTERVAL screen.**

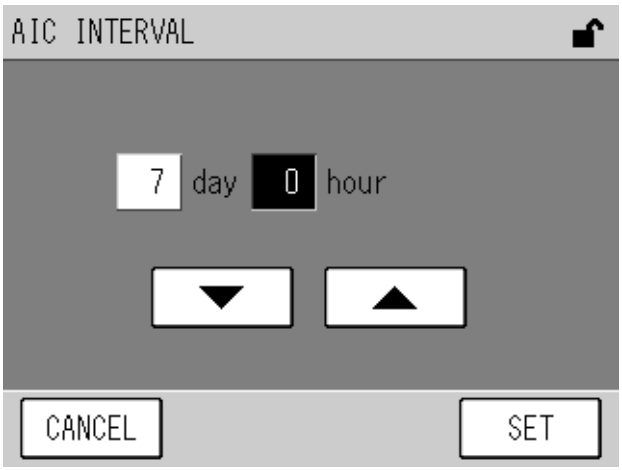


Fig. 20 AIC INTERVAL screen

Setting item	Setting range
Day	0 to 99
Hour	0 to 23

2. **Pressing the button which setting is to be changed will reverse the value display. Change the value by the [▼] and [▲] button and press the [SET] key.**
3. **Change the setting and the screen returns to the AIC SET screen.**

Note

The available interval to set is from " 0 day 1 hour" to "99 day 0 hour."
The recommended interval is "7 day 0 hour."

● AIC gas introduction time

The gas introduction time in AIC is as follows (for ENDA-5800):

Zero gas	3 minutes
NOx span	3 minutes
SO_2 span	3 minutes
CO span	3 minutes
CO_2 span	3 minutes
O_2 span	3 minutes
Replacement	3 minutes

5.3.2 AIC start

● **Automatic start**

1. **Select [INTERNAL] in the AIC MODE screen (page 24 Fig. 18).**
2. **The automatic calibration starts according to the AIC start time interval set in the AIC SET screen (page 22 Fig. 17).**

● **Manual start**

1. **In the MEAS. screen 1 (Measurement value display), press the [CAL.] key. The CAL. screen appears.**

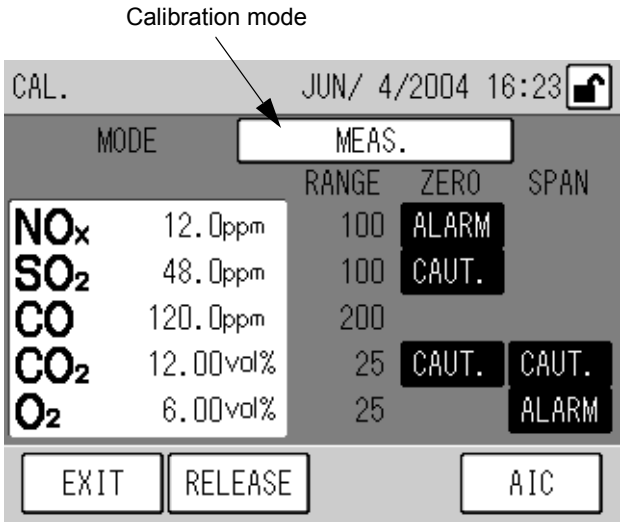


Fig. 21 CAL. screen

2. **Press the [AIC] key. AIC starts.**

Note

Pressing the [AIC] key during the AIC can stop the AIC.

● **Start from external contact input**

1. **Select [EXTERNAL] in the AIC MODE screen (page 24 Fig. 18).**
2. **The automatic calibration starts according to the external contact input.**

Note

The AIC by manual start using the [AIC] key is available except during the purge.
When the AIC command is input by either the internal clock or the external contact input during the manual start AIC, the signal is not received but the AIC by manual start continues.

5.4 Manual Calibration

● **Zero calibration and span calibration**

1. **Pressing the [CAL.] key in the MEAS. screen 1 (Measurement value display) (page 14 Fig. 7) will display the CAL. screen.**

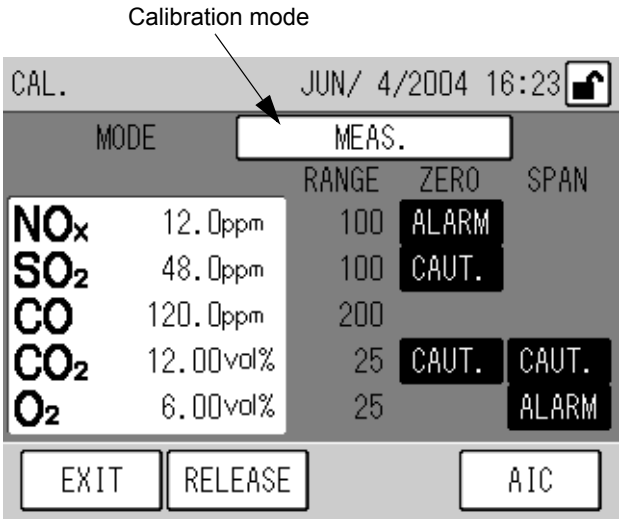


Fig. 22 CAL. screen

2. **Pressing the right button of [MODE] will display the CAL. MODE screen.**

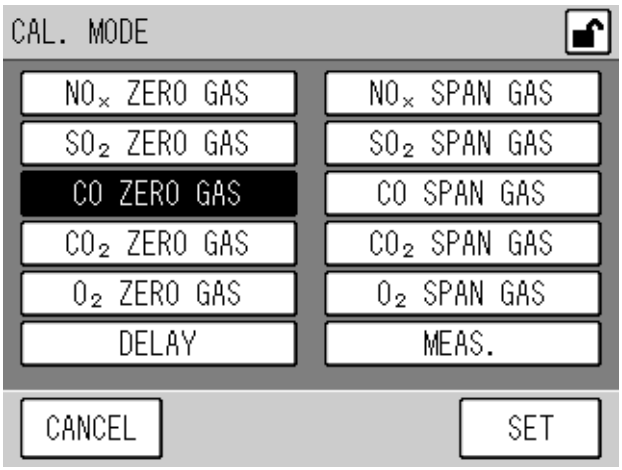


Fig. 23 CAL. MODE screen

3. **Switches the calibration mode.**
Press the button of item to be set and press the [SET] key.
The setting is changed and the screen returns to the CAL. screen.

Setting item	Description
ZERO GAS	Select ZERO to perform zero calibration for each component.
SPAN GAS	Select SPAN to perform span calibration for each component.
MEAS.	Select MEAS. to end the calibration and start the measurement.
DELAY	Select DELAY to replace the calibration gas in tube into the sample gas with the calibrating state. In this occasion, if the “Hold in calibration” is set, the output is hold.

Pressing each key allows the corresponding operation as follows:

CANCEL	Returns to the CALIBRATION SET screen without changing the setting.
SET	Returns to the CALIBRATION SET screen with the setting changed.

4. **The solenoid valve of the selected calibration gas automatically opens, and the calibration gas is introduced into the analyzer.**
On the screen, the LINE icon starts blinking.

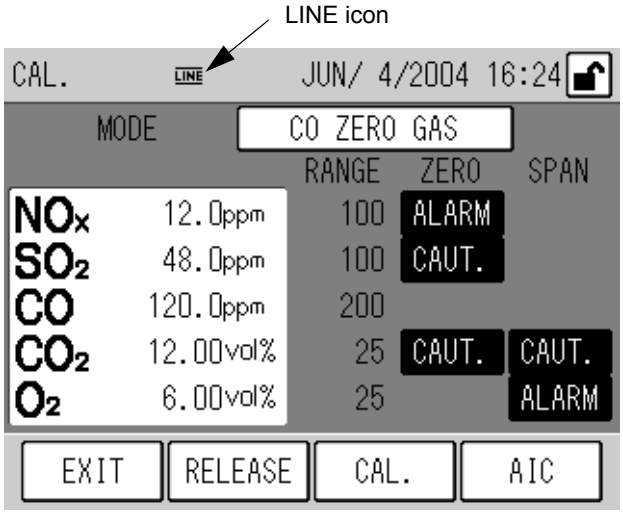


Fig. 24 CAL. screen (at CO zero calibration)

5. **Confirm that the mode on the screen shows the set component and type of calibration.**

6. **When the indication stabilizes, press the [CAL.] key.**
The calibration of set component and type starts.

Note

When any abnormality occurs in calibration to cause a state where the further calibration is not possible, either "ALARM" or "CAUT." is indicated at the "component" and "type" of calibration in the CAL. screen. When either of these signs appears on the screen, the [RELEASE] key also appears on the screen.
For "CAUT." The calibration result is revised, but for "ALARM," the result is not revised.
To release "ALARM" or "CAUT," press the [RELEASE] key.

To finish the calibration and retry the measurement, press the [MEAS.] button in the CAL. MODE screen. The LINE icon is extinguished.
The solenoid valve is actuated, and the sample gas is introduced into the analyzer.

Note

- **Be sure to confirm that the LINE icon is extinguished on the MEAS. screen.**
  When the LINE icon is displayed, it means that the calibration gas is being introduced.
- **When the automatic calibration command either by internal clock, external contact input, or by key input during the calibration through manual gas introduction, the system preferably selects the automatic calibration.**

Calibration gas flow control

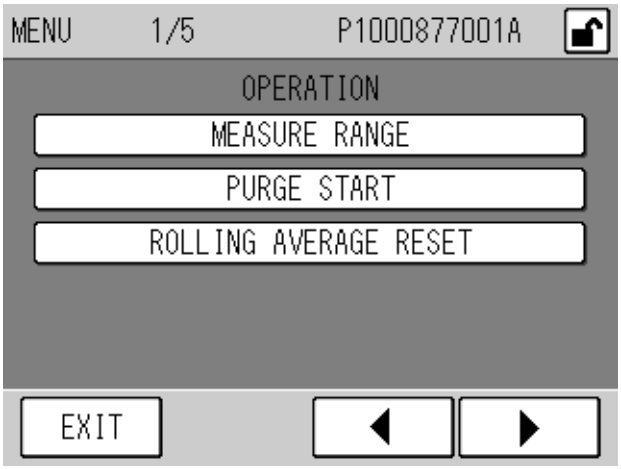
Introduce the calibration gas according to the manual calibration step 1. to 4., and control the flow by the pressure regulator needle to adjust the flowmeter indication on the analyzer front panel is 0.6 L/min ±0.1 L/min.

Note

When the air is used as zero gas (it is span gas for the O_2 analyzer), flow control of zero gas (it is span gas for the O_2 analyzer) is not required.
At air zero calibration (it is span calibration for the O_2 analyzer), the flowmeter indication is 0 L/min.

6 Other Functions

Pressing the [MENU] key in the MEAS. screen allows other various functions as follows:



* Functions of “PURGE START”, “ROLLING AVERAGE RESET” are optional.

Fig. 25 MENU 1/5 (OPERATION menu) screen

The following 5 types of menu screen are available:

- MENU 1/5 [OPERATION] (page 32 Fig. 26)
- MENU 2/5 [MAINTENANCE/DATA] (page 35 Fig. 29)
- MENU 3/5 [SETTING] (page 42 Fig. 37)
- MENU 4/5 [OPTION] (page 43 Fig. 38)
- MENU 5/5 [SYSTEM] (page 45 Fig. 39)

Soon after the MENU screen appears, the OPERATION menu screen is displayed.

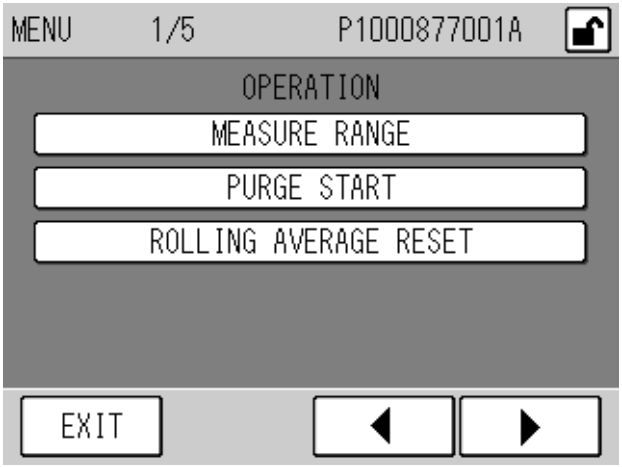
Pressing each key allows the corresponding operation as follows; (common to all MENU screens).

[EXIT]	Returns to the MEAS.screen
[◀]	Press this to display other MENU screens. Displays the previous MENU.
[▶]	Press this to display other MENU screens. Displays the next MENU.

6.1 Operation Menu

The operation menu allows such functions as measure range, purge start, and rolling average reset.

1. **Press the [MENU] key in the MEAS. screen.**
   The OPERATION menu appears on the MENU 1/5 screen.



* Functions of “PURGE START”, “ROLLING AVERAGE RESET” are optional.

Fig. 26 MENU 1/5 (OPERATION menu) screen

2. **Press the button for the item to be set. The setting screen appears or the operation is performed.**
   Pressing each button allows the corresponding operations as follows:

MEASURE RANGE	Displays the MEAS. RANG screen (page 33 Fig. 27).
PURGE START (optional)	Optional function; not displayed in the standard specification. For the operation procedure, refer to " 10.1.3 Purge start " (page 99).
ROLLING AVERAGE RESET (optional)	Optional function; not displayed in the standard specification. For the operation procedure, refer to " 10.3.1 Rolling average time set " (page 106).

3. **When the setting screen is displayed, change the setting and press the [SET] key.**
   Change the setting in each setting screen, and press the [EXIT] key.
   The screen returns to the MENU 1/5 (OPERATION menu) screen.
4. **Press the [EXIT] key in the MENU 1/5 (OPERATION menu) screen.**
   The screen returns to the MEAS. screen.

6.1.1 Setting measuring range

Pressing the [MEASURE RANGE] button in the MENU 1/5 (OPERATION menu) screen displays the MEAS. RANGE screen.
In this screen, the measure range can be confirmed.

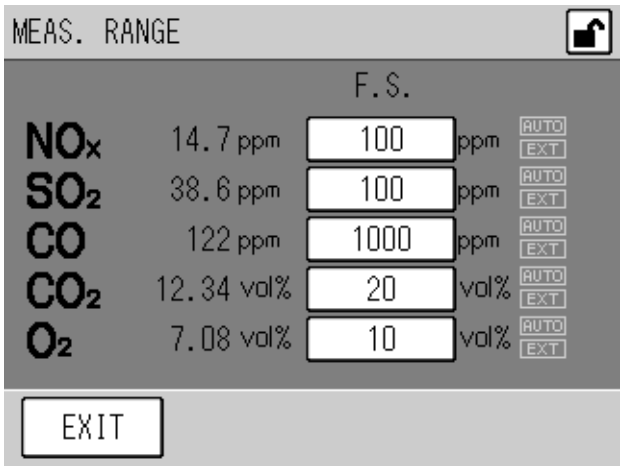


Fig. 27 MEAS. RANGE screen

Press the range button of the component to be set.

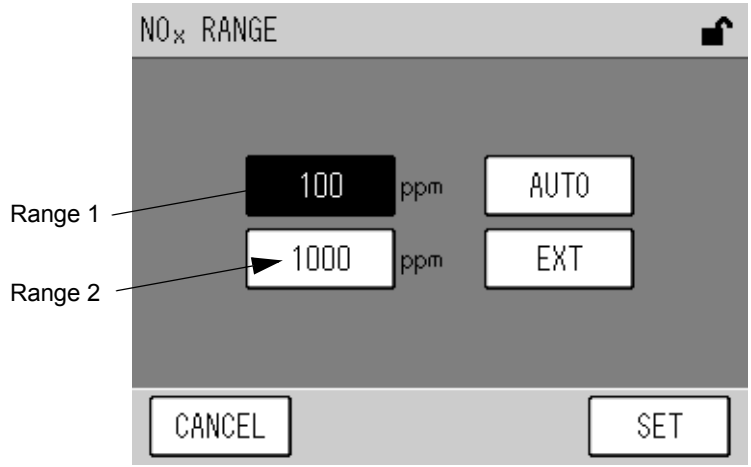


Fig. 28 NOx RANGE screen

Setting item	Description
RANGE 1	Selects RANGE 1.
RANGE 2	Selects RANGE 2.
AUTO	Allows automatic range switching. According to the measurement concentration, automatically switches RANGE 1 and RANGE 2.
EXT	Allows external range switching. By external contact input, RANGE 1 and RANGE 2 is switched.

Press the button of the component to be set as a measurement component, and execute the setting.

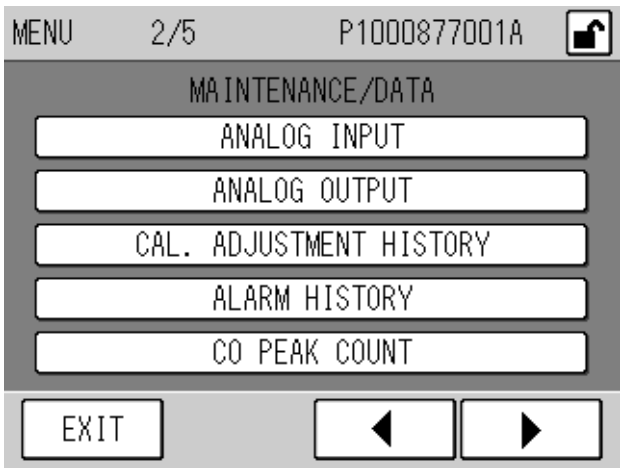
Note

For automatic range switch, the range automatically switches in the following conditions:
RANGE 1 to RANGE 2: At more than 90% of the concentration of RANGE 1
RANGE 2 to RANGE 1: At less than 80% of the concentration of RANGE 1
The concentration output to the external devices is switched at the same time.

6.2 Maintenance/Data Menu

The maintenance/data menu allows such checks as analog input value, analog output value, calibration coefficient history, alarm history and CO peak count (optional).

1. **Press the [MENU] key in the MEAS. screen.**
Press the [▶] key once to display the MENU 2/5 (MAINTENANCE/DATA menu) screen.



* Function of “CO PEAK COUNT” is optional.

Fig. 29 MENU 2/5 (MAINTENANCE/DATA menu) screen

2. **Press the button of the item to be set.**
Pressing each button allows the corresponding operations as follows:

ANALOG INPUT	Displays the ANALOG INPUT screen (page 36 Fig. 30).
ANALOG OUTPUT	Displays the ANALOG OUTPUT screen (page 38 Fig. 32).
CAL. ADJUSTMENT HISTORY	Displays the CALIBRATION HISTORY screen (page 39 Fig. 33).
ALARM HISTORY	Displays the ALARM HISTORY screen (page 40 Fig. 35).
CO PEAK COUNT (optional)	Displays the CO PEAK COUNT screen (page 41 Fig. 36). This is an optional function and not displayed in the standard specification. It is also displayed when the CO PEAK COUNT is set to ON (refer to page 116).

3. **Confirm the situation and press the [EXIT] key in each screen.**
The screen returns to the MENU 2/5 (MAINTENANCE/DATA menu) screen.

Tip

To cancel the change, press the [CANCEL] key. The change is canceled and the screen returns to the MENU 2/5 (MAINTENANCE/DATA menu) screen.

4. **Press the [EXIT] key in the MENU 2/5 (MAINTENANCE/DATA menu) screen.**
The screen returns to the MEAS. screen.

6.2.1 Analog input check

Each analog input voltage before the signals go to the CPU, temperature of each part and air pressure can be checked.
Pressing the [ANALOG INPUT] button in the MENU 2/5 (MAINTENANCE/DATA menu) screen will display the ANALOG INPUT screen. In this screen, the analog input value can be confirmed. (The screen depends on each specification.)

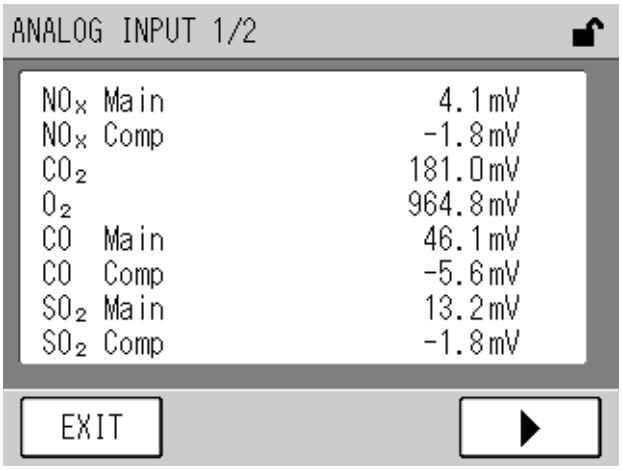


Fig. 30 ANALOG INPUT 1 screen

In the first screen each analog input voltage can be checked.
Pressing the [▶] key displays the next screen. (The screen depends on the specification.)

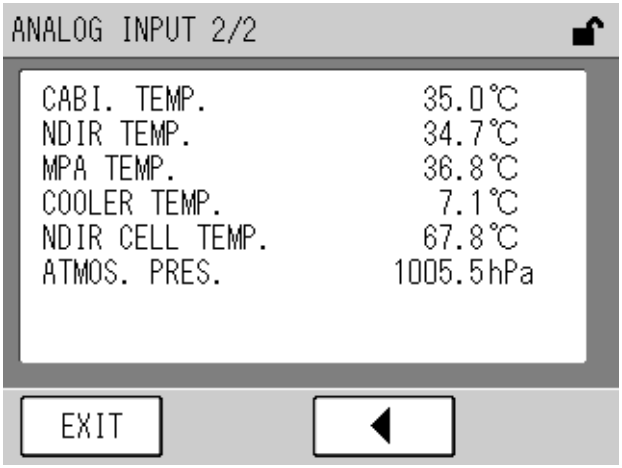


Fig. 31 ANALOG INPUT 2 screen

Displayed item	Description
NOx Main	Displays the analog signal and voltage of the detector for NOx analyzer measurement.
NOx Comp	Displays the analog signal and voltage of the detector for NOx analyzer compensation.
CO_2	Displays the analog signal and voltage for CO_2 analyzer.
O_2	Displays the analog signal and voltage for O_2 analyzer.
CO Main	Displays the analog signal and voltage for CO analyzer measurement.
CO Comp	Displays the analog signal and voltage of the detector for CO analyzer compensation.
SO_2 Main	Displays the analog signal and voltage of the detector for SO_2 analyzer measurement.
SO_2 Comp	Displays the analog signal and voltage of the detector for SO_2 analyzer compensation.
Temperature inside cabinet	Displays the temperature inside the cabinet.
Bench temperature of NDIR	Displays the temperature of the detector of NDIR analyzer.
MPA bench temperature	Displays the temperature of the detector of MPA analyzer.
Temperature of electric cooler	Displays the temperature of heat exchanger of the electric cooler.
NDIR cell temperature	Displays the sample cell temperature of NDIR analyzer.
Air pressure	Displays the air pressure.

After confirmation, press the [EXIT] key twice.
Returns to the MEAS.screen.

Note

When any problem occurs, each value may be required to be reported to solve the problem.

6.2.2 Analog output check

Current output from the analyzer or 0% to 100% full scale of the voltage output can be output by each channel with 10% interval.

Pressing the [ANALOG OUTPUT] button in the MENU 2/5 (MAINTENANCE/DATA menu) screen displays the ANALOG OUTPUT screen.

In this screen the analog output value can be confirmed.

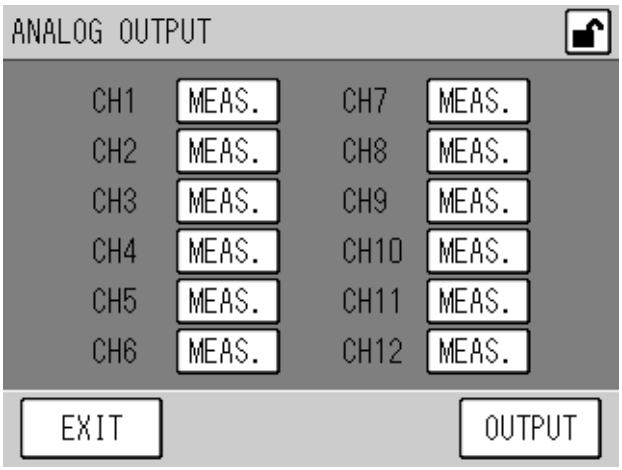


Fig. 32 ANALOG OUTPUT screen

Press the setting part of the channel to be output.

Pressing the set value switches the value in order: 0%→10%→20% to 100%→[MEAS.]→0%. After setting, press the [OUTPUT] key. The set condition is output from each channel.

Note

After the setting, press the [EXIT] key twice to return to the MEAS. screen.
Pressing the [EXIT] key returns the output from all the channels to the [MEAS.] state.
For the configuration of output channel and output terminal, refer to " 9.3 Analog Signal Output " (page 86).
When the analog output needs adjustment, contact us.

6.2.3 Calibration coefficient history check

Pressing the [CAL. ADJUSTMENT HISTORY] button from the MENU 2/5 (MANTENANCE/ DATA menu) screen displays the CALIBRATION HISTORY screen.
In this screen, the calibration coefficient history can be confirmed.

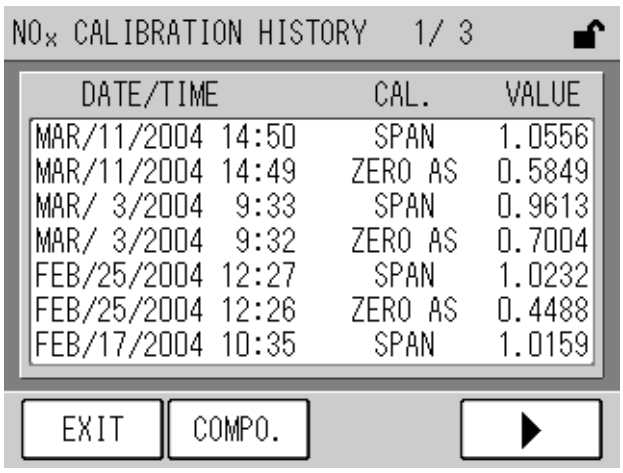


Fig. 33 CALIBRATION HISTORY screen

Maximum 15 records of calibration coefficient history can be memorized for each component.
Pressing the [▶] key will display the next screen.
Press the the [◀] key and [▶] key to switch the screen.
Pressing the [COMPO.] key will display the COMPONENT screen.

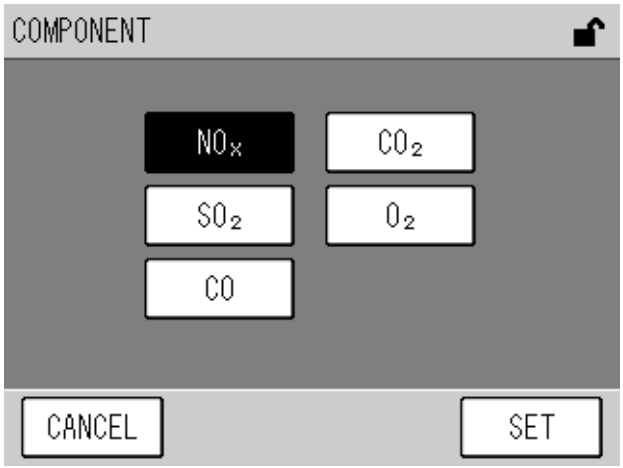


Fig. 34 COMPONENT screen

Press the component button which calibration coefficient history is to be checked, and press the [SET] key.
The displayed component is changed, and the screen returns to the CALIBRATION HISTORY screen for the set component.

6.2.4 Alarm history check

Pressing the [ALARM HISTORY] button in the MENU 2/5 (MANTENANCE/DATA menu) screen will display the ALARM HISTORY screen. In this screen, the alarm history can be confirmed.

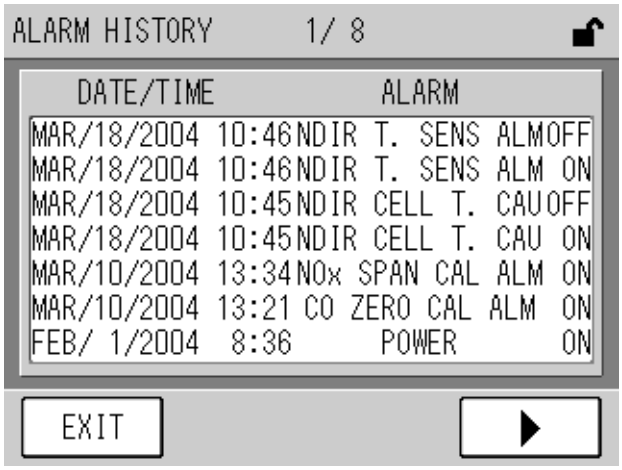


Fig. 35 ALARM HISTORY screen

ON	Indicates that the alarms or cautions have occurred.
OFF	Indicates that the alarms have been released. For the alarms of “POWER,” “CALIBRATION ALARM,” and “CALIBRATION CAUT.”, the indication of “OFF” is not recorded even when they are released.

Maximum 56 alarm histories can be memorized, and are displayed on the screen from the latest record. Press the [◀] key and [▶] key to switch the screen.

Reference

For detailed information of each alarm, refer to " 8.1 Alarm Type and Countermeasure " (page 75).

6.2.5 CO peak count check (optional)

Pressing the [CO PEAK COUNT] button in the MENU 2/5 (MAITENANCE/DATA menu) screen will display the CO PEAK COUNT screen.
In this screen, the number of CO peak count times can be confirmed.

CO PEAK COUNT	Indicates how many times the CO concentration exceeds the set peak value in the last 60 minutes from the current time.

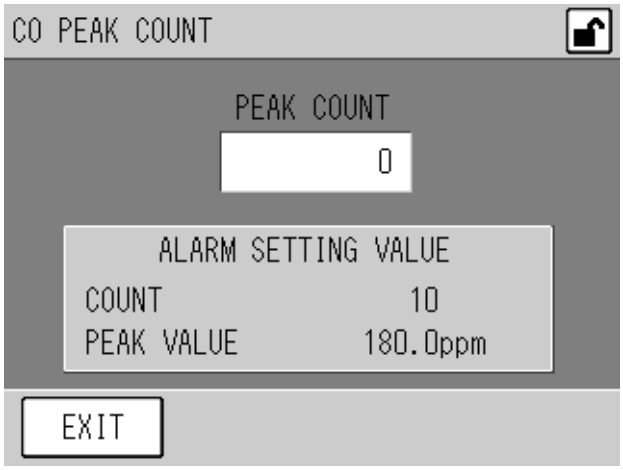


Fig. 36 CO PEAK COUNT screen

Reference

For the peak count setting, refer to " 10.5.1 Peak count set " (page 115).

6.3 Setting Menu

The setting menu allows such functions as AIC set and calibration set.

1. **Press the [MENU] key in the MEAS. screen.**
   Press the [▶] key twice to display the MENU 3/5 (SETTING menu) screen.

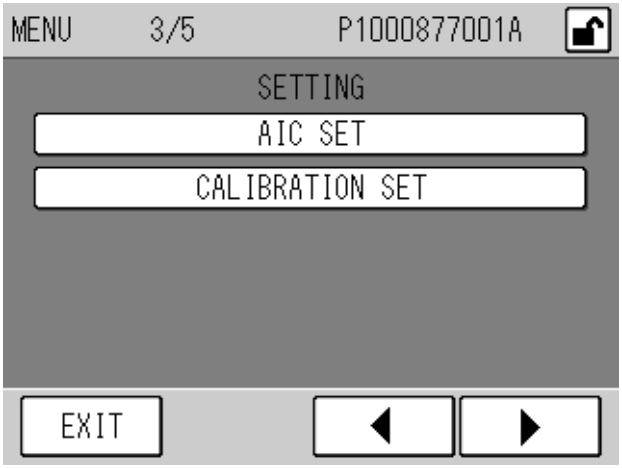


Fig. 37 MENU 3/5 (SETTING menu) screen

2. **Press the button for the item to be set. The SETTING screen appears.**
   Pressing each button allows the corresponding operations as follows:

AIC SET	Displays the AIC SET screen. For details, refer to " 5.3 AIC " (page 22).
CALIBRATION SET	Displays the CALIBRATION SET screen. For details, refer to " 5 Calibration " (page 17).

3. **Change the setting in each setting screen, and press the [EXIT] key.**
   The setting is changed and the screen returns to the MENU 3/5 (SETTING menu) screen.
4. **Press the [EXIT] key in the MENU 3/5 (SETTING menu) screen.**
   The screen returns to the MEAS. screen.

6.4 Option Menu

The option menu allows such functions as O_2 correction set, rolling average time set, purge set, measure value alarm set, and CO peak count alarm set.

1. **Press the [MENU] key in the MEAS. screen.**
Press the [▶] key three times to display the MENU 4/5 (OPTION menu) screen.

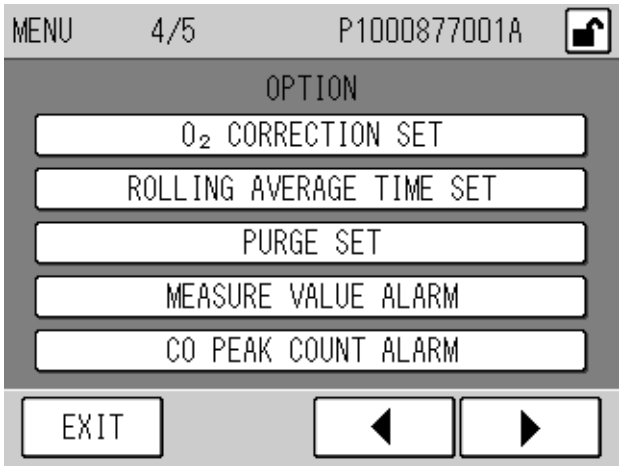


Fig. 38 MENU 4/5 (OPTION menu) screen

2. **Press the button for the item to be set. The setting screen appears.**
Pressing each button allows the corresponding operations as follows:

O_2 CORRECTION SET	Displays the O_2 CORRECTION SET screen. This is the optional function, and not displayed in the standard specification. For the operation procedure, refer to " 10.2 O_2 Correction " (page 100) .
ROLLING AVERAGE TIME SET	Displays the ROLLING AVERAGE TIME SET screen. This is the optional function, and not displayed in the standard specification. For the operation procedure, refer to " 10.3 Rolling Average/ Integration " (page 106).
PURGE SET	Displays the PURGE SET screen. This is the optional function, and not displayed in the standard specification. For the operation procedure, refer to " 10.1 Purge Functions " (page 92).
MEASURE VALUE ALARM	Displays the MEASURE VALUE ALARM screen. This is the optional function, and not displayed in the standard specification. For the operation procedure, refer to " 10.4 Measurement Value Alarm " (page 111).
CO PEAK COUNT ALARM	Displays the CO PEAK COUNT ALARM screen. This is the optional function, and not displayed in the standard specification. For the operation procedure, refer to " 10.5 Peak Count (with CO Analyzer) " (page 115).

3. **Change the setting in each setting screen, and press the [EXIT] key.**
   The setting is changed and the screen returns to the MENU 4/5 (OPTION menu) screen.
4. **Press the [EXIT] key in the MENU 4/5 (OPTION menu) screen.**
   The screen returns to the MEAS. screen.

6.5 System Menu

The system menu allows such functions as LCD adjustment, time set, password set, and touch panel adjustment.

1. **Press the [MENU] key in the MEAS. screen.**
2. **Press the [▶] key four times to display the MENU 5/5 (SYSTEM menu) screen.**

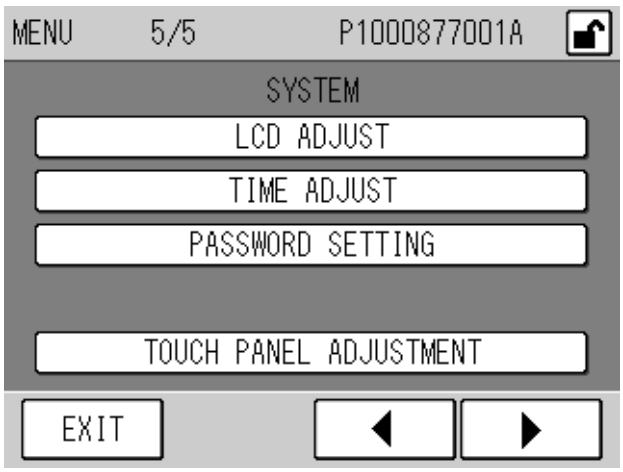


Fig. 39 MENU 5/5 (SYSTEM menu) screen

3. **Press the button for the item to be set. The setting screen appears. Pressing each button allows the corresponding operations as follows:**

LCD ADJUST	Displays the LCD ADJUST screen (page 46 Fig. 40). The setting of LCD backlight time period and brightness adjustment are already set at the factory. Change the setting in this screen as necessary.
TIME ADJUST	Displays the TIME ADJUST screen (page 48 Fig. 42). The time is already set at the factory. Change the setting in this screen as necessary.
PASSWORD SETTING	Displays the PASSWORD SETTING screen (page 49 Fig. 43).
TOUCH PANEL ADJUSTMENT	Displays the TOUCH PANEL ADJUSTMENT screen (page 51 Fig. 46).

4. **Change the setting in each setting screen, and press the [EXIT] key. The setting is changed and the screen returns to the MENU 5/5 (SYSTEM menu) screen.**
5. **Press the [EXIT] key in the MENU 5/5 (SYSTEM menu) screen. The screen returns to the MEAS. screen.**

6.5.1 LCD adjust

Pressing the [LCD ADJUST] button in the MENU 5/5 (SYSTEM menu) screen will display the LCD ADJUST screen.
In this screen the BACK LIGHT TIME PERIOD setting and BRIGHTNESS setting are available.
The BACK LIGHT TIME PERIOD means the duration of time from the last touch panel operation to the automatic light OFF of the LCD backlight. At shipment, it is set to 30 minutes.

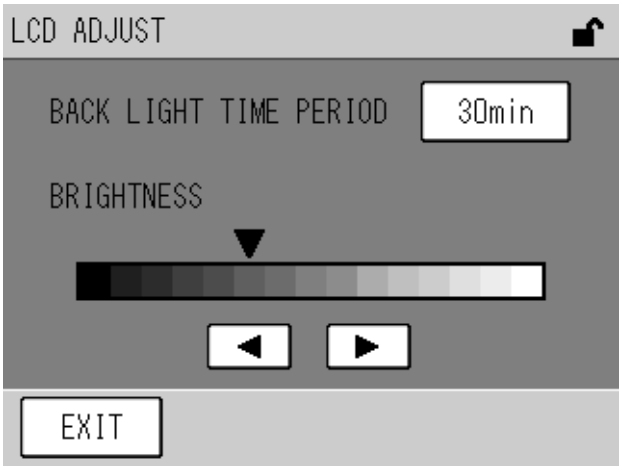


Fig. 40 LCD ADJUST screen

The current BACK LIGHT TIME PERIOD setting is indicated in button configuration.
Pressing the button indicating the BACK LIGHT TIME PERIOD enables to change the time setting (refer to page 47). The current BRIGHTNESS of LCD is indicated in [▼] position.
Pressing each key allows the corresponding operation as follows:

EXIT	Returns to the MENU 5/5 (SYSTEM menu) screen.

● Back light time period

1. **Press the right button of BACK LIGHT TIME PERIOD.**
The BACK LIGHT TIME PERIOD screen is displayed.

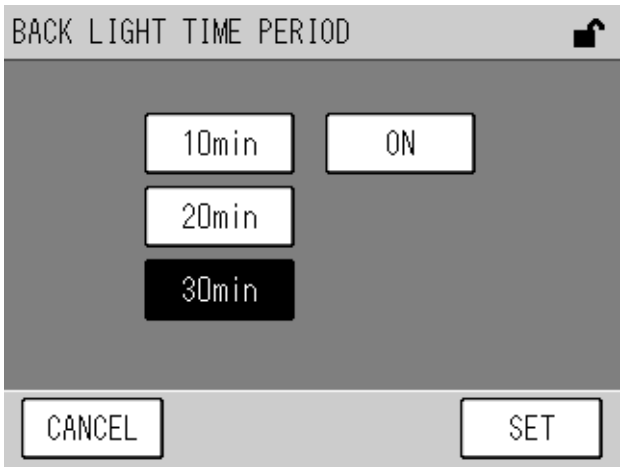


Fig. 41 BACK LIGHT TIME PERIOD screen

Set the time period by pressing the button.
Pressing each key allows the corresponding operation as follows:

CANCEL	Returns to the LCD ADJUST screen without changing the setting.
SET	Returns to the LCD ADJUST screen with the setting changed.

2. **Press the button for the item to be set.**

Setting item	Description
10 min, 20 min, 30 min	The backlight is extinguished after each time period has been elapsed.
ON	The backlight is always lit.

Note

To protect the back light, normally set either to 10 min, 20 min, or 30 min (avoid to set to ON).
Even with time setting, the backlight will be always lit when the In-maintenance switch is ON.

3. **Press the [SET] key.**
The BACK LIGHT PERIOD time is changed and the screen returns to the LCD ADJUST screen.

● Brightness adjustment

Pressing the following buttons enables to adjust BRIGHTNESS.

[◀]	The screen is darkened.
[▶]	The screen is brightened.

6.5.2 Time adjust

Pressing the [TIME ADJUST] button in the MENU 5/5 (SYSTEM menu) screen will display the TIME ADJUST screen. In this screen the internal clock adjustment is available.

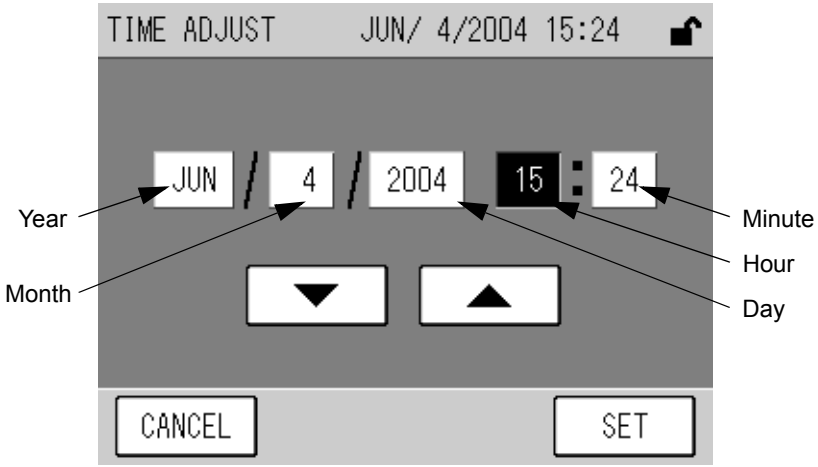


Fig. 42 TIME ADJUST screen

Soon after the screen appears, the current time is indicated in buttons as year, month, day, hour, and minute. Pressing each item button allows to change the corresponding item value. Press the following buttons for changing the value.

[▲]	The value increases.
[▼]	The value decreases.

Setting item	Setting range
Year	2000 to 2090
Month	1 to 12
Day	1 to 31
Hour	0 to 23
Minute	0 to 59

Pressing each key allows the corresponding operation as follows:

CANCEL	Returns to the MENU 5/5 (SYSTEM menu) screen without changing the setting.
SET	Returns to the MENU 5/5 (SYSTEM menu) screen with the setting changed.

Note

- **Pressing the [CANCEL] key during the setting change does not change the time but applies the time before change.**
- **The setting per second is not possible; pressing the [SET] key automatically sets to "00 second."**
- **It is not available to change into an impossible date.**
  When this happens, the existing date closest to that before the set date is automatically selected.
- **During AIC or purge function, it is not possible to change the current time setting.**
  Trying to change the setting is invalid, as the screen only shows "In AIC" or "In Purge."

6.5.3 Password setting

The key lock function requires a password.
Set and change the password in the PASSWORD SETTING screen.
Pressing the [PASSWORD SETTING] button in the MENU 5/5 (SYSTEM menu) screen will display the PASSWORD SETTING screen.

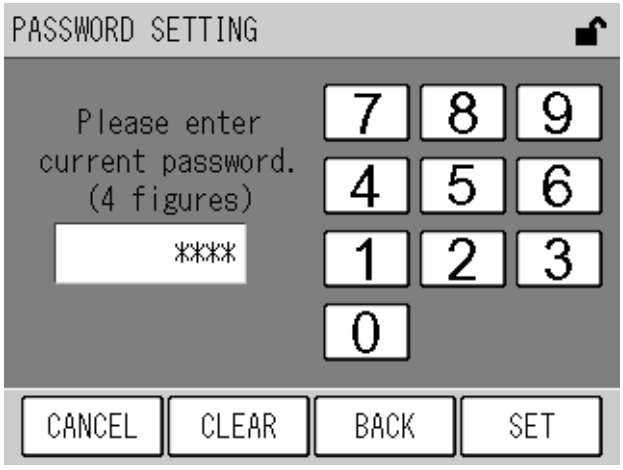


Fig. 43 PASSWORD SETTING screen (current password request)

1. **According to the message on the screen, input the password currently set.**
The screen to input a new password will appear.

Note

The password at shipment is set to "0000."

Pressing each key allows the corresponding operation as follows:

CANCEL	Returns to the MENU 5/5 (SYSTEM menu) screen without changing the setting.
CLEAR	The value input to the editing area is cleared.
BACK	The last digit input is cleared.
SET	Returns to the MENU 5/5 (SYSTEM menu) screen with the setting changed.

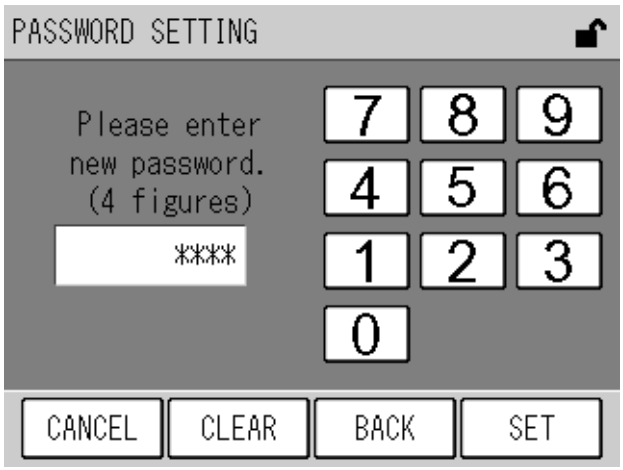


Fig. 44 PASSWORD SETTING screen (new password request)

2. **Input the new password with 4 digits of numerical values.**

Setting item	Setting range
Password	0000 to 9999

3. **After inputting the password, press the [SET] key.**
The confirmation screen appears.

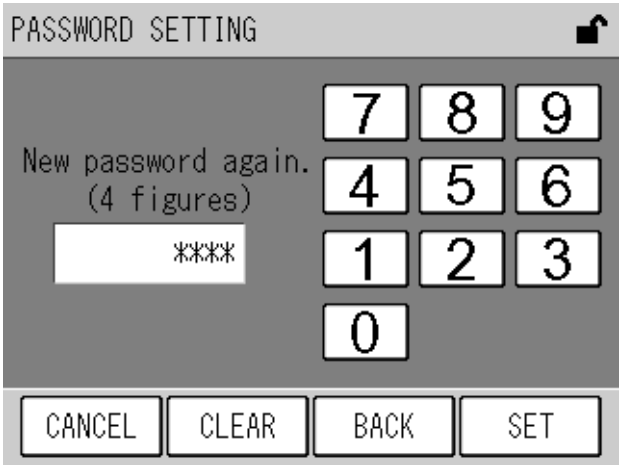


Fig. 45 PASSWORD SETTING screen (new password confirmation)

4. **Input the new password again and press the [SET] key.**
The input password is checked with the new password. When both of them accord each other, the password is changed into a new one and the screen returns to the MENU 5/5 (SYSTEM menu) screen.

Note

When the input password does not accord with the new password, the password change is aborted and the screen returns to the MENU 5/5 (SYSTEM menu) screen.
The password is not changed.

6.5.4 Touch panel adjustment

The touch panel adjustment is necessary when there is a gap between the button displayed position on the screen and the touch position that allows actual response of the button.
When there is no gap, do not perform touch panel adjustment.

Note

The adjustment is given by positioning the touch panel response part closer to the center of ▸▾◂ .
It is not automatically correcting the position gap.

1. **Pressing the [TOUCH PANEL ADJUST] button in the MENU 5/5 (SYSTEM menu) screen will display the TOUCH PANEL ADJUSTMENT screen.**
2. **Touch the part ▸▾◂ on the upper left of screen, and search the position where ▸▾◂ turns to ✳.**

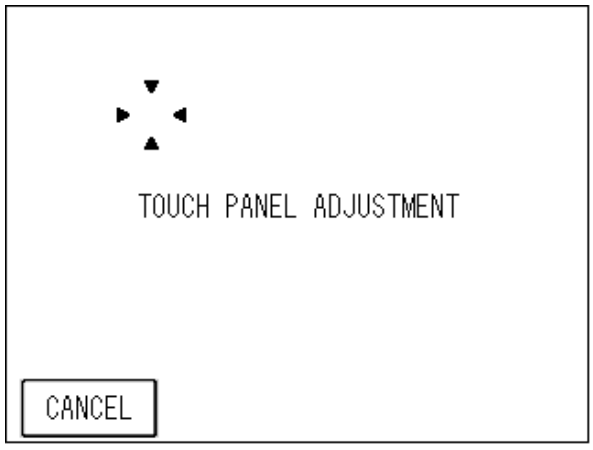


Fig. 46 TOUCH PANEL ADJUSTMENT 1 screen

3. **Keep you finger on the position where ▸▾◂ turns to ✳, and slide the finger to the center of ✳.**
4. **Leave the finger at the center of ✳.**
   If ✳ turns to ▸▾◂ on the way to the center, leave the finger at the ✳ displayed position nearest to the center.

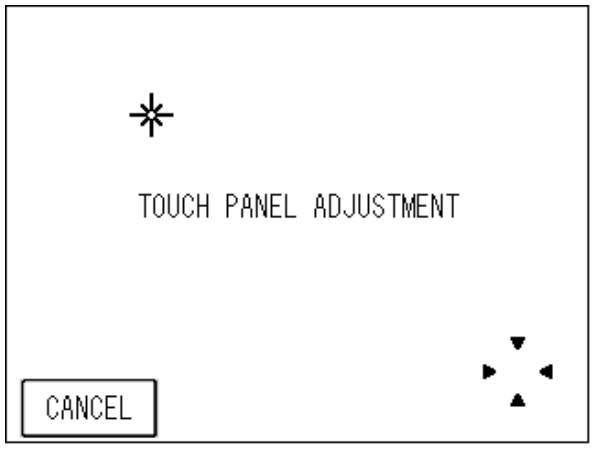


Fig. 47 TOUCH PANEL ADJUSTMENT 2 screen

5. **Perform the adjustment in the same matter for the ▸▾◂ at the lower right of screen.**
6. **If it is hard to slide the finger to the center of ✳, repeat the step 1. to 5. above.**

6.6 Key Lock Function

The key lock function disables the touch panel operation to protect the system from erroneous setting changes.
During the key lock ON, only the setting confirmation is possible. In trying to change the setting, the message “In Key Lock.” appears.

Note

To use the key lock function, the password is required.
Set the password beforehand according to the " 6.5.3 Password setting " (page 49).

1. **Go to the MEAS. screen.**

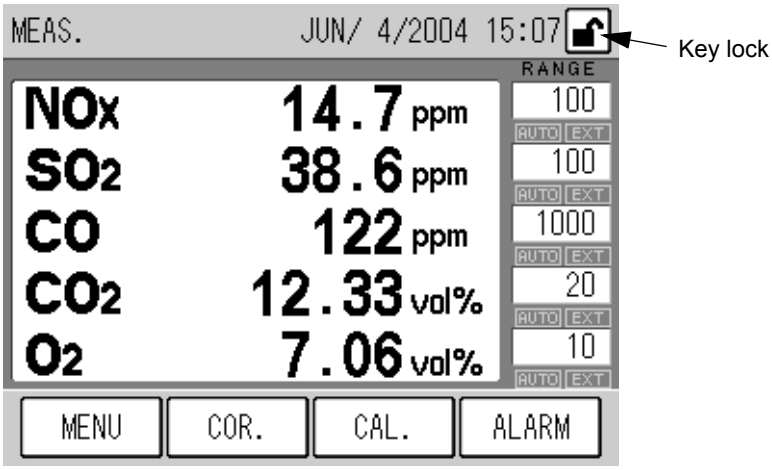


Fig. 48 MEAS. screen

2. **Press the [Key Lock] button from the icon area in the upper of screen. The KEY LOCK screen appears.**

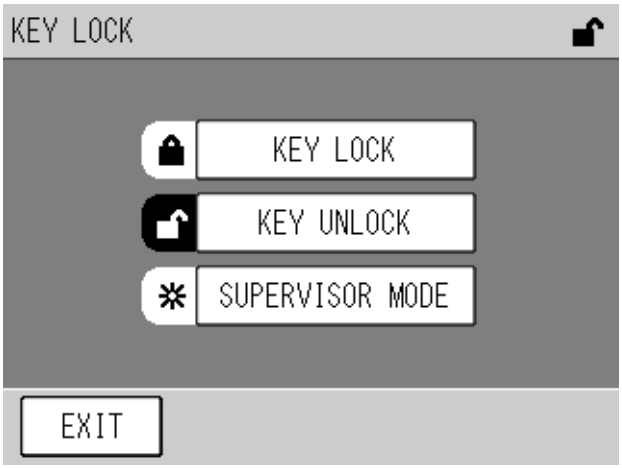


Fig. 49 KEY LOCK screen

3. **Press the button to be set.**
Pressing each button allows the corresponding operations as follows:

KEY LOCK	Enables KEY LOCK ON.
KEY UNLOCK	Disables KEY LOCK. The PASSWORD screen (page 53 Fig. 50) appears.
SUPERVISOR MODE	A button exclusively for service use. Operators cannot operate the button.

4. **Change the setting in each setting screen, and press [SET] key.**
The setting is changed and the screen returns to the KEY LOCK screen .

5. **Press the [EXIT] key in the KEY LOCK screen.**
The screen returns to the MEAS. screen.

● **KEY LOCK**

Press the [KEY LOCK] button. The system is allowed to be KEY LOCK state immediately.

● **KEY UNLOCK**

Press the [KEY UNLOCK] button. The PASSWORD screen appears.

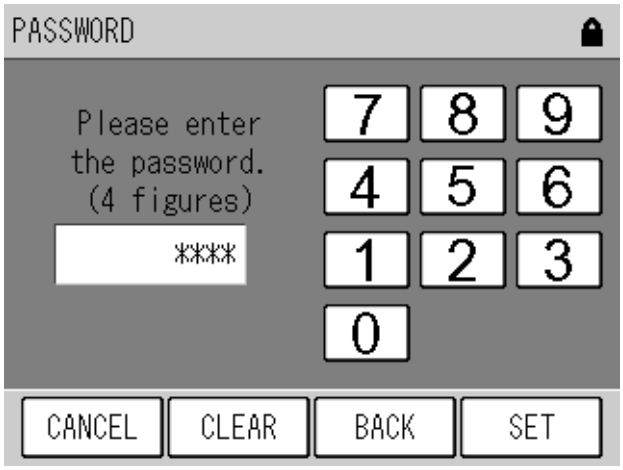


Fig. 50 PASSWORD screen

Input the password currently set.
Pressing each key allows the corresponding operation as follows:

CANCEL	Returns to the KEY LOCK screen without changing the setting.
CLEAR	The value input to the editing area is cleared.
BACK	The last digit input is cleared.
SET	When the input password is correct, the key lock state is released and the screen returns to the previous one. When the password is incorrect, a message “WRONG PASSWORD” appears and the screen returns to the KEYLOCK screen.

Note

The password at shipment is set to “0000.”

6.7 Alarm Check

When the [ALARM] key lights up in the upper right of screen, it is possible to check the alarms currently occur.

Note

For checking the alarm history, refer to " 6.2.4 Alarm history check " (page 40).

1. **Go to the MEAS. screen.**

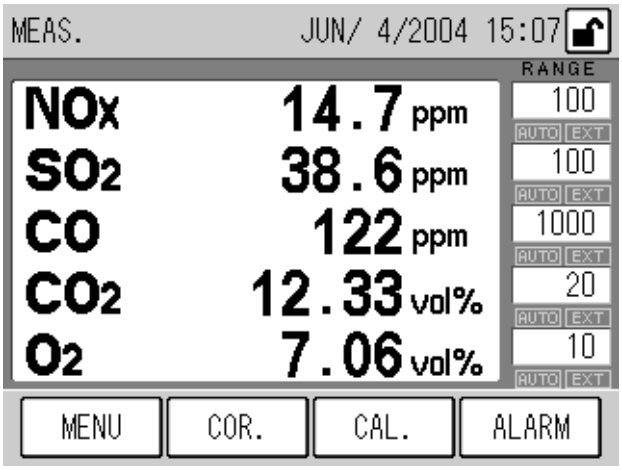


Fig. 51 MEAS. screen

2. **Press the [ALARM] key.**
The ALARM screen appears.

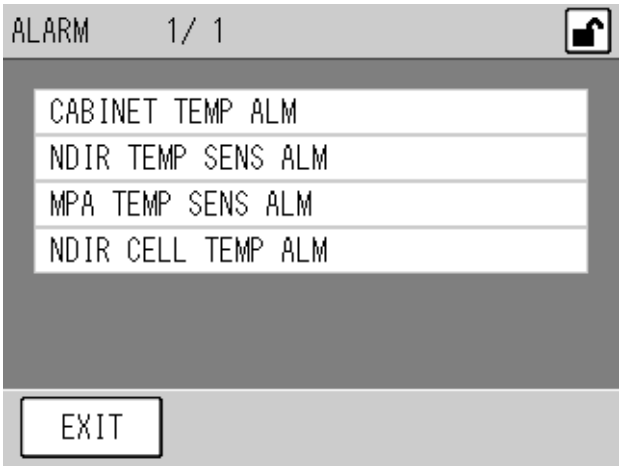


Fig. 52 ALARM screen

Reference

For detailed information of each alarm, refer to " 8.1 Alarm Type and Countermeasure " (page 75).

7 Maintenance

To use the exhaust gas analysis instrument for a long period of time in a good condition, maintenance and inspection are always necessary.
The maintenance interval depends on the using condition as well as on the sample gas property. In the beginning of the operation, follow the recommended interval shown below so that it works also for the pre-maintenance.
After that, economical maintenance/inspection works will be discussed according to the actual operating condition as necessary.

CAUTION

High voltage is being applied to the Electrical Leakage Breaker.
Never touch the terminals when the power is on.

7.1 Daily Inspection

According to the situation, periodically perform the inspection by 1 to 7 days of interval.
At calibration be sure to check if the specified performance is satisfied.

CAUTION

Calibration gas is under high pressure. Handle it carefully.
- Check the installation state of the pressure regulator.
- Check the temperature of installation site.
  (Storage and operating temperature is specified as 40ºC or less based on high-pressure gas regulations.)

● Analyzer

Check item	Contents of inspection	Reference
Sample gas flow	Confirm a flow rate of 0.6 L/min ±0.1 L/min	
Existence of alarm generation	Confirm that the alarm is not generated.	page 54

● Sampling system

Check item	Contents of inspection	Reference
Secondary filter 1, 2	Check for dirt on surface. If dirty, replace it.	page 62
Electronic cooler	Confirm that the temperature of electric cooler is 0ºC to 8ºC (under 15ºC if the temperature inside the cabinet is over 40ºC) in the ANALOG INPUT 2 screen (Fig. 31 page 36). Also confirm the fan rotation.	page 36
Drain trap 1	Replace the primary filter element if the water causes bubbling.	page 61
	If the water level is low, perform watering until the water starts being discharged from the drain trap 2. (The water level might be low by drying the atmosphere in winter.)	page 8
Mist catcher	Check for dirt. If dirty, replace it.	page 64
Calibration gas	If the residual pressure is below approximately 1 MPa, replace the gas.	page 19

Note

For replacement and cleaning of each part, refer to " 7.3 Maintenance of Sampling Devices " (page 61).

7.2 Periodical Inspection

7.2.1 Inspection every 1 to 6 months

CAUTION

The primary filter reaches temperatures as high as 120ºC.
When checking the filter, be sure to use gloves to avoid burns.

CAUTION

The temperature of the heating pipe is adjusted to 120ºC.
Be careful when inspecting the system.

● **Sampling point**

Check item		Inspection cycle	Content of inspection and action	Reference
Primary filter	Filter element	1 month	Replace	page 61
	Holder cap	3 months	Replace	
	O-ring	6 months	Replace after applying Dyflon grease	
Heated tube (piping)		3 months	If clogging is found, clean it by instrumental air. (Be sure to clean it with the inlet tube disconnected.)	
Probe		3 months	Clean the clogging and dirt	

● **Sampling system**

Check item	Inspection cycle	Content of inspection and action	Reference
Secondary filter 1, 2	1 month	Replace	page 62
Halogen scrubber (waste incinerator specification)	1 month	Discoloration check Replace if discolored	page 63
Mist catcher	2 months	Replace	page 63
Pump1, 2	6 months	Replace the diaphragm	page 65
Electronic cooler	6 months	Clean the radiating fin and fan	

● **Cabinet**

Check item	Inspection cycle	Content of inspection and action	Reference
Ventilation filter	3 months	Clean if dirty Replace if deteriorated	page 66

Note

For replacement and cleaning of each part, refer to " 7.3 Maintenance of Sampling Devices " (page 61).

7.2.2 Annual inspection and replacement

CAUTION

The NOx converter is heated up to 190ºC. Be careful during replacement work.

CAUTION

The zero gas purifier is heated up to 190ºC. Be careful during replacement work.

CAUTION

The arrestor and the noise filter are applied with the voltage even when the main power ELB is not charged. At inspection, do not touch the terminal part.

● Analyzer

Check item	Contents of inspection	Reference
Calibration	Perform the calibration and confirm that the zero and span calibration are correctly performed (no alarm or caution occurs).	

Note

For the analyzer inspection, contact HORIBA.

● Sampling system

Check item	Contents of inspection	Reference
NOx converter (for NOx analyzer)	Replace (catalyst element)	page 67
Scrubber	Replace	page 63
Zero gas purifier (for CO analyzer)	Replace (catalyst element)	page 68
Air filter	Replace	page 69
Silica gel (for O_2 analyzer)	Replace	page 70
Protective filter (for O_2 analyzer)	Replace	

● Cabinet

Check item	Contents of inspection	Reference
Arrestor	Measure the insulation resistance with the arrestor individually, and replace if the resistance is below 5 MΩ at 500 V megger.	

CAUTION

Checking Arrestor

In checking the arrestor, the breaker at the user side (or the leak breaker) that supplies power to the analyzer needs to be OFF.
This is a hazardous operation; contact HORIBA.

Note

For replacement and cleaning of each part, refer to " 7.3 Maintenance of Sampling Devices " (page 61).

7.2.3 Inspection with Interval of 3 years or more

The recommended replacing interval is shown in the table below (circle mark).

Note

The replacing interval is a typical example and not the warranty period of each part.
The interval may be shortened depending on the installation environment or measurement gas property.

Category	Part Name	Recommended Replacing Interval		Remarks
		3 years	5 years	
Sample gas collection point	Probe tube		○	Replace when broken
	Primary filter		○	
	Heater	○		
Cabinet peripherals	Ventilation fan	○		
	Door packing		○	
	Panel heater		○	
	Panel heater fan	○		
Panel switch	Leak breaker 30 A	—	—	
	Circuit protector 15 A	—	—	
	Circuit protector 7.5 A	—	—	
	Circuit protector 5 A	—	—	
	Circuit protector 3 A	—	—	
	Relay G2R-1-T	○		
	Solid relay G3NE-205T	—	—	
	Power supply ZWS50AF-24/J	○		With Electrolytic condenser
	Noise filter		○	Replace when broken
	Printed board EN-DAC-03A		○	With Electrolytic condenser
	Printed board EN-PIO-02A		○	

Category	Part Name	Recommended Replacing Interval		Remarks
		3 years	5 years	
Sampling part	Electric cooler	○		Replace when broken
	Electric cooler power unit	○		
	Drain trap 1		○	
	Drain trap 2		○	
	Catalyst tube heating case		○	
	Secondary filter		○	
	Needle valve		○	
	Pump		○	
	Buffer tank		○	
	3-way solenoid valve	○		
	2-way solenoid valve	○		
	Air filter cap	○		
	Air filter pot	○		
	Silica gel cap	○		
	Regulator		○	
	Regulator O-ring		○	
	Regulator spectacle O-ring		○	
	Flowmeter		○	
Analyzer casing	Power ZWS75AF-5/J	○		With Electrolytic condenser
	Power ZWS150AF-24/J	○		
	Solid relay G3R-ODX02SN	—	—	Replace when broken
	With LCD touch panel		○	With Backlight
	Printed board CXA-L0505-NJL		○	Replace when broken
	Printed board AP-TMC-02		○	With Electrolytic condenser
	Printed board AP-CPU-01		○	
	Printed board EN-ADC-02		○	

Category	Part Name	Recommended Replacing Interval		Remarks
		3 years	5 years	
Infrared analyzer	Light source		○	Replace when broken
	Cell (NDIR)	○		
	Heater		○	
	Cell (for CO_2)	○		
	Taper block		○	
	Beam splitter		○	
	Gas cell		○	
	Detector (CO_2)		○	
	Detector (NO)		○	
	Detector (SO_2)		○	
	Detector (CO)		○	
	Printed board AP-PRE-10		○	
	Solenoid valve	○		Replace
	Capillary SA-152-QJ		○	Replace when broken
O_2 analyzer	Detector (O_2)		○	
	Printed board EN-PRE-02		○	
	Cell (O_2)		○	
	Exciting coil		○	
	Capillary SA-131-QJ		○	
	Capillary SA-090-KJ		○	

7.3 Maintenance of Sampling Devices

7.3.1 Replacing the primary filter element

CAUTION

High Temperature

The primary filter is in high temperature of approximately 120ºC.
At filter replacement, be sure to wear the gloves to avoid heated injuries.

1. **Turn OFF the pump 1 and pump 2 switches.**
2. **Loosen the clamp to disconnect it, and pull out the holder.**
3. **Replace the filter element, element cap, holder cap and O-ring set to the holder. Apply the Dyflon grease (standard accessory) to the element cap, holder cap, and the O-ring.**
4. **Attach the holder to the original position.**

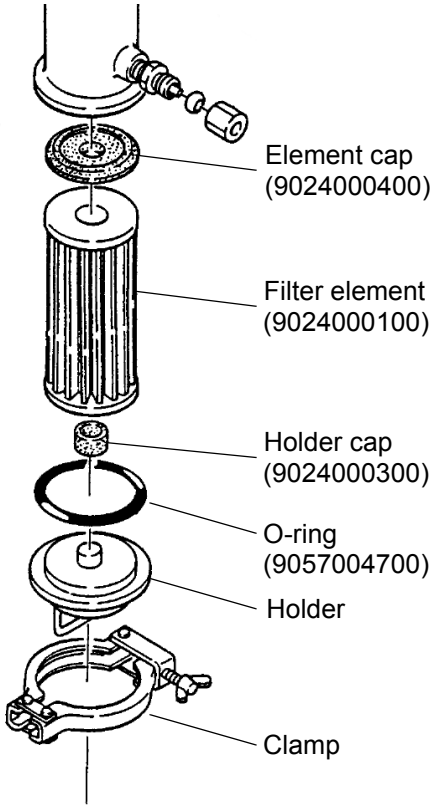
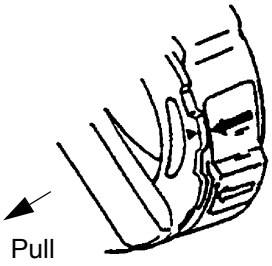


Fig. 53 Replacing the primary filter element

7.3.2 Replacing the secondary element

1. **Turn OFF the pump 1 and pump 2 switches.**
2. **Turn the handle until the arrow marks line up, and pull the element toward you.**



3. **Clean each part.**
4. **When the O-ring or F-packing is broken, replace them.**
   Apply the Dyflon grease (standard accessory) on the O-ring.
5. **Replace the filter element and assemble it by the reversed procedure.**

Note

- **For element, use PA-5L filter when the SO_2 analyzer is included, or use GC-90 filter when the SO_2 analyzer is not included.**
- **Attach the F-packing with the correct orientation facing the surface with groove to the element.**

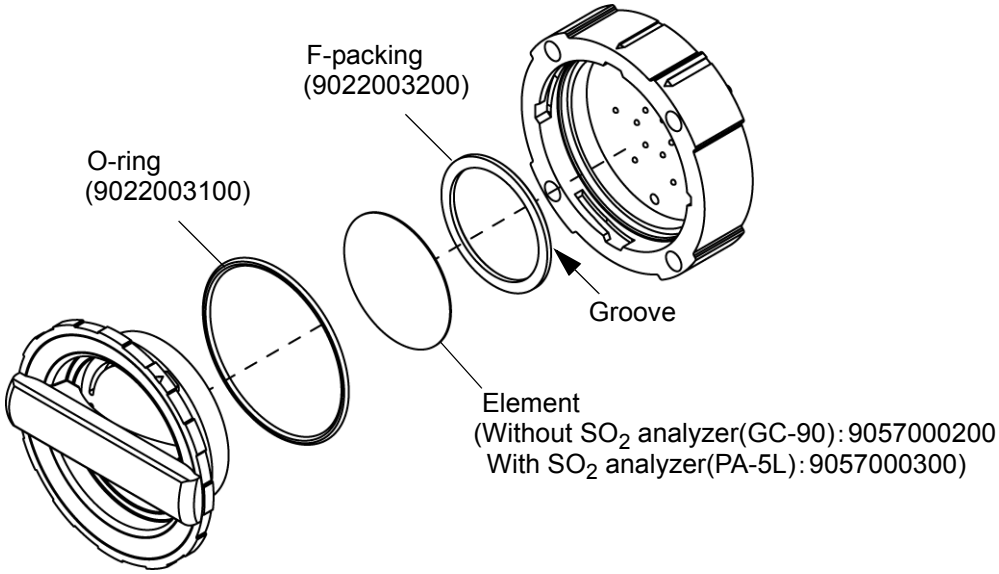


Fig. 54 Replacing the secondary filter element

7.3.3 Replacing the scrubber

1. **Turn OFF the pump 1 and pump 2 switches.**
2. **Disconnect the connected joint.**
3. **Pull up the scrubber a little and pull off to the front.**
4. **Replace the scrubber and assemble it by the reversed procedure.**

Note

Attach the scrubber with the correct orientation so that the arrow mark faces downward.

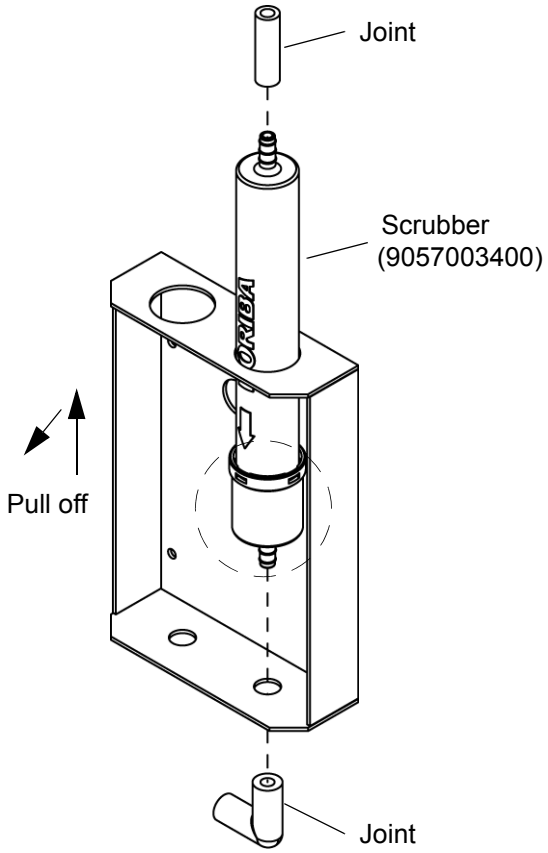


Fig. 55 Replacing the scrubber

7.3.4 Replacing the mist catcher

1. **Turn OFF the pump 1 and pump 2 switches.**
2. **Disconnect the connected joint.**
3. **Pull up the mist catcher a little and pull it off to the front.**
4. **Replace the mist catcher and assemble it by the reversed procedure.**

Note

Attach the mist catcher with the correct orientation so that the arrow mark faces downward.

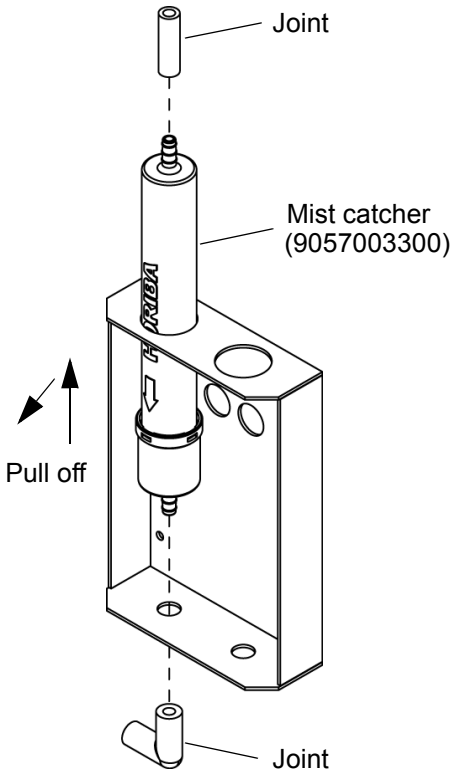


Fig. 56 Replacing the mist catcher

7.3.5 Replacing the pump diaphragm

CAUTION

High Temperature

The pump surface is in a high temperature. Replace the diaphragm at earliest after one hour from power OFF.

1. **Turn OFF the pump 1 and pump 2 switches.**
2. **Disconnect the power connector.**
3. **Remove the connected joint.**
4. **Remove screw 1 (4), to remove the pump from the base.**
5. **Remove screw 2 (4), to remove the cover.**
6. **Remove screw 3 (4), to remove the diaphragm.**
7. **Temporarily attach the new diaphragm using screw 3.**
8. **Put the attached clearance gauge between the oscillation piece and transformer, and adjust the diaphragm position so that the clearance gauge can pass through. After the adjustment, tighten the screw 3.**
9. **Attach the cover and assemble it by the reversed procedure.**

Note

When the temperature is low, it may take time to obtain a stable pump flow.

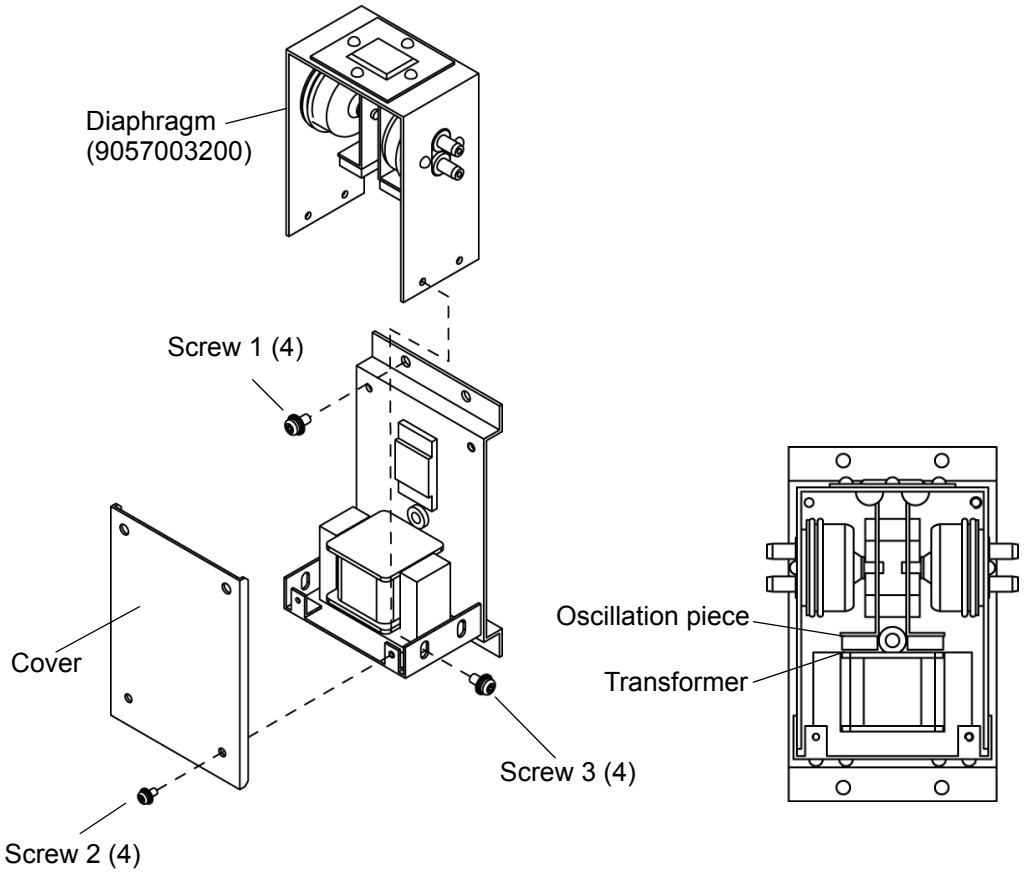


Fig. 57 Replacing the pump diaphragm

7.3.6 Cleaning the cabinet ventilation filter

1. **Remove the wing nut, and remove the metal fitting and a stop frame.**
2. **Clean the filter and assemble it by the reversed procedure.**
   When the filter is deteriorated, replace it.

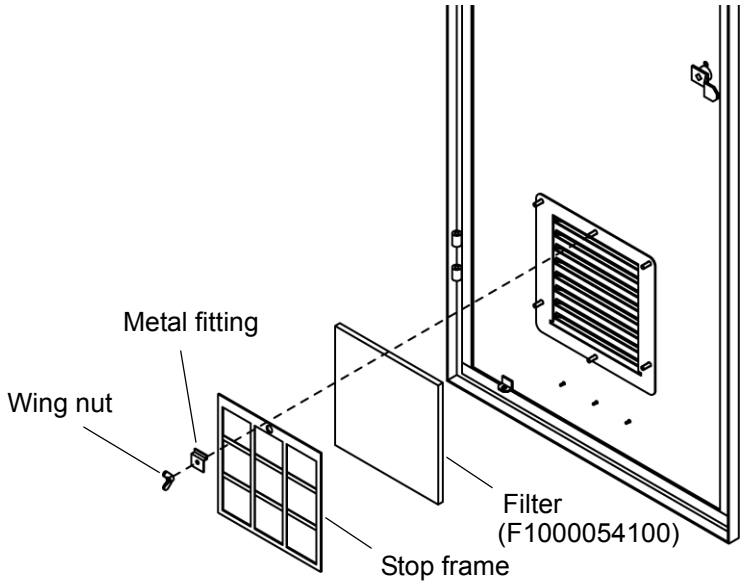


Fig. 58 Cabinet ventilation filter

Note

For the heater inside the panel, attach the cover (included in the accessory) at the ventilation inlet in winter.

7.3.7 Replacing NOx converter element

CAUTION

High Temperature

The catalyst tubes as well as joints are in high temperature. Replace the catalyst tubes at earliest after one hour from power OFF.

1. **Turn OFF the main power ELB.**
2. **Disconnect the power connector.**
3. **Loosen the hose band of joint 1 to remove the joint 1 from the catalyst tube.**
4. **By loosening the hose band of joint 2, pull off the catalyst tube downward.**
5. **When the joint is broken, replace it.**
6. **Replace the catalyst tube and assemble it by the reversed procedure.**
7. **Connect the power connector, and warm it up for approximately 30 minutes.**

Note

Attach the catalyst tube with the correct orientation so that the arrow mark faces downward.

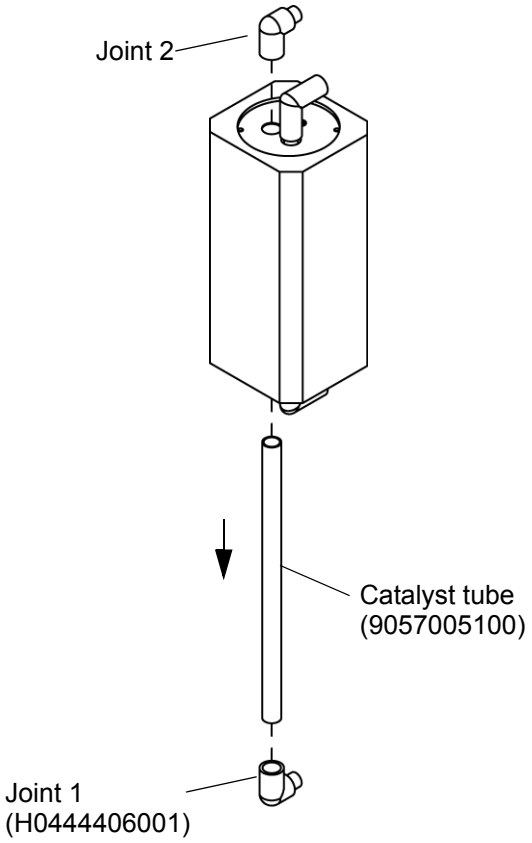


Fig. 59 Replacing NOx converter element

7.3.8 Replacing the zero gas purifier element

CAUTION

High Temperature

The catalyst tubes as well as joints are in high temperature. Replace the catalyst tubes at earliest after one hour from power OFF.

1. **Turn OFF the main power ELB.**
2. **Disconnect the power connector.**
3. **Disconnect the hose band of joint 1 from the catalyst tube.**
4. **By loosening the hose band of joint 2, pull off the catalyst tube downward.**
5. **When the joint is broken, replace it.**
6. **Replace the catalyst tube and assemble it by the reversed procedure.**
7. **Connect the power connector, and warm it up for approximately 30 minutes.**

Note

Attach the catalyst tube with the correct orientation so that the arrow mark faces downward.

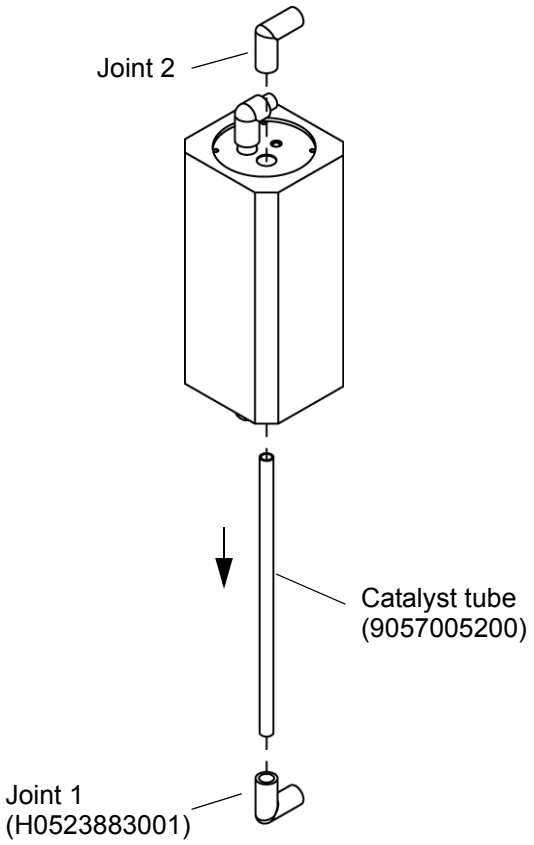


Fig. 60 Replacing the zero gas purifier element

7.3.9 Replacing the air filter

1. **Turn OFF the pump 1 and pump 2 switches.**
2. **Disconnect the tube connected to the cap.**
3. **Remove the cap and take out the air filter.**
4. **Perform cleaning inside the pot.**
5. **Replace the air filter and assemble it by the reversed procedure.**

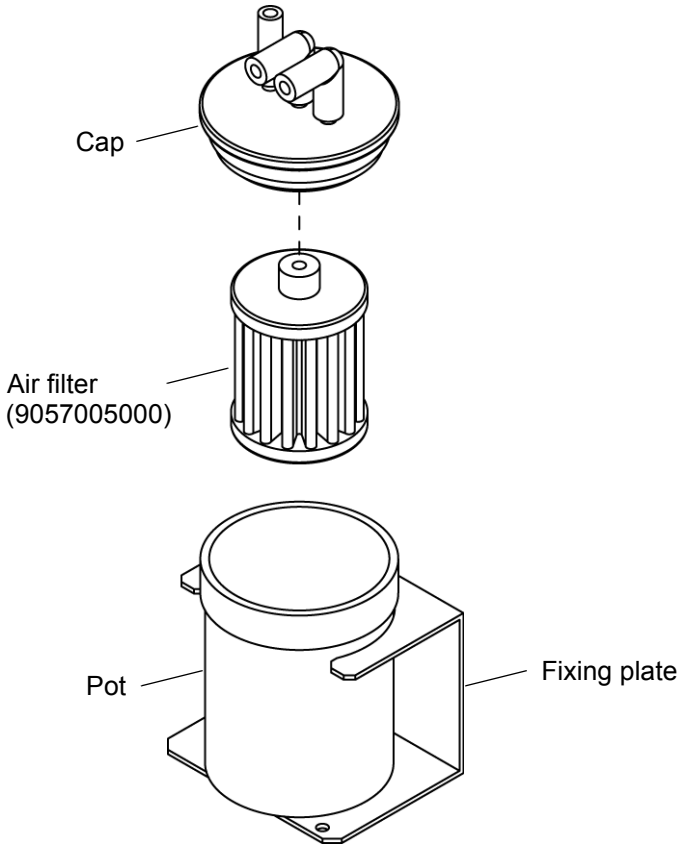


Fig. 61 Replacing the air filter

7.3.10 Replacement of O_2 silica gel and protective filter

1. **Turn OFF the pump 1 and pump 2 switches.**
2. **Remove the air filter together with fixing plate.**
3. **Disconnect the tube connected to the relay joint 2.**
4. **Disconnect the joint connected to the protective filter.**
5. **Take out the silica gel with the protective filter.**
6. **Remove the cap and the protective filter from silica gel.**
7. **Replace the protective filter.**
8. **Replace the silica gel and assemble it by the reversed procedure.**

Note

In inserting the tube into the silica gel, be careful not to break the tube.

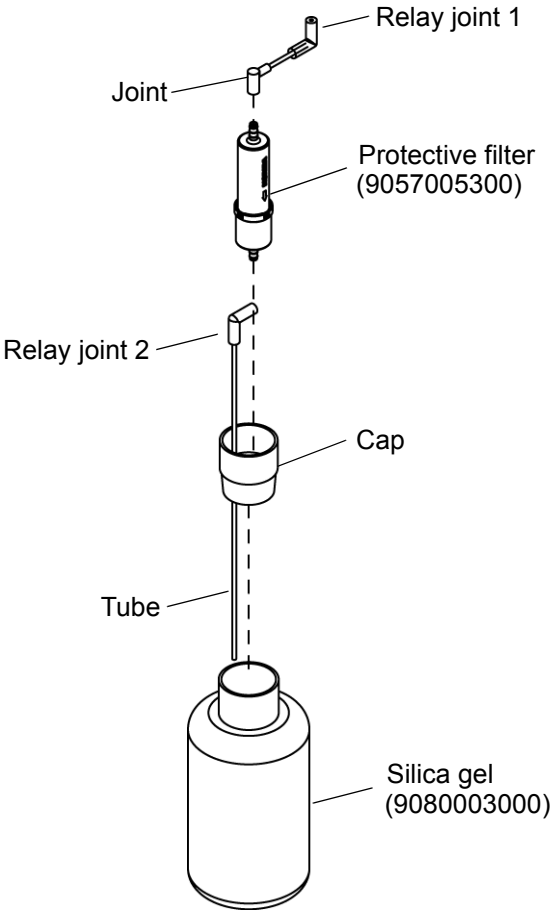


Fig. 62 O_2 silica gel and protective filter

7.3.11 Replacing the halogen scrubber

1. **Check if the grains filled at the outlet of halogen scrubber discolors into black. If the discoloration can be found, replace the halogen scrubber.**
2. **Turn OFF the pump 1 and pump 2 switches.**
3. **Disconnect the connected joint.**
4. **Pull up the halogen scrubber a little and pull off to the front.**
5. **Replace the halogen scrubber and assemble it by the reversed procedure.**

Note

Attach the scrubber with the correct orientation so that the arrow mark faces downward.

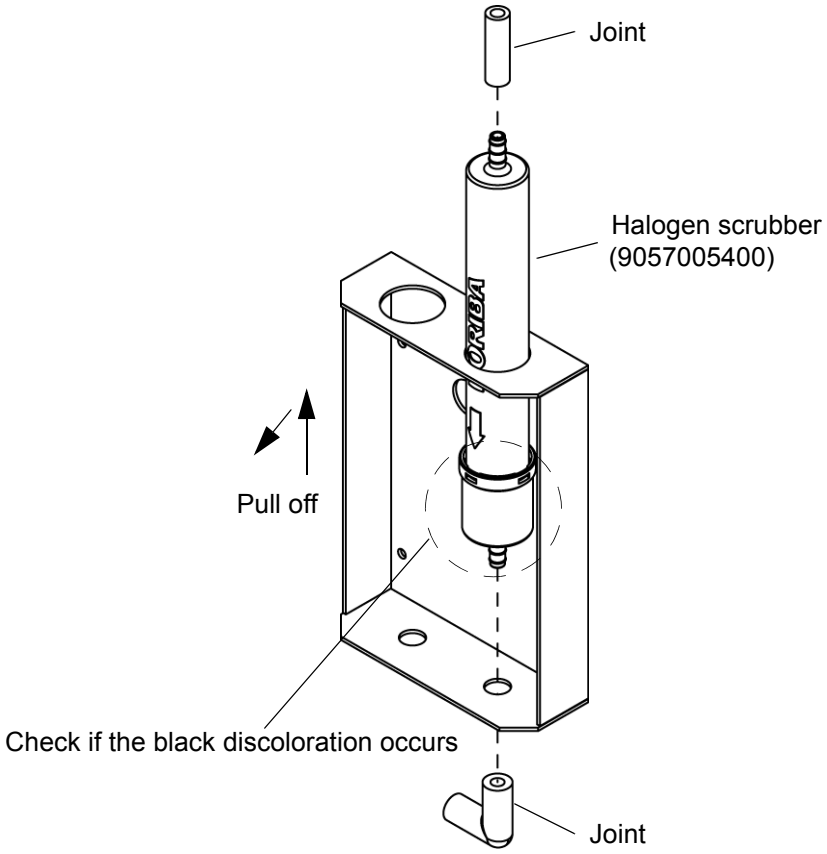


Fig. 63 Replacing the halogen scrubber

7.3.12 Replacing the gas cylinder (pressure regulator inspection)

CAUTION

Calibration gas is under high pressure. Handle it carefully.
- Check the installation state of the pressure regulator.
- Check the temperature of installation site.
  (Storage and operating temperature is specified as 40ºC or less based on high-pressure gas regulations.)

● Precautions before replacing the cylinder

- Make sure there is sufficient ventilation before starting replacement.
- Firmly secure the gas cylinder so that it cannot fall over.
- Make sure that no paint, grease or oil gets on anything.
  Never perform replacement work using oily gloves.
- Check the screw direction of the cylinder valve.
  The valve of combustible gas cylinders turn left.

● Replacing the gas cylinder

When the residual pressure of the cylinder falls to 1 MPa or less, replace the cylinder.

1. **Close the cylinder valve.**
2. **If it is possible to flow the gas remaining in the pipe and gauge to the analyzer's main body, flow the gas to adjust the primary pressure of the pressure regulator to 0.**
3. **For a pressure regulator with a needle valve, close the needle valve.**
   For the secondary pressure variable pressure regulator, turn the secondary pressure adjusting handle counterclockwise as far as it will go.
4. **Replace the pressure regulator.**

Note

Since the gas remaining in the pressure regulator is discharged when removing the cylinder, provide adequate ventilation. When using poisonous gas, use protective gear such as a gas mask.

5. **Replace the old cylinder with a new cylinder.**

Note

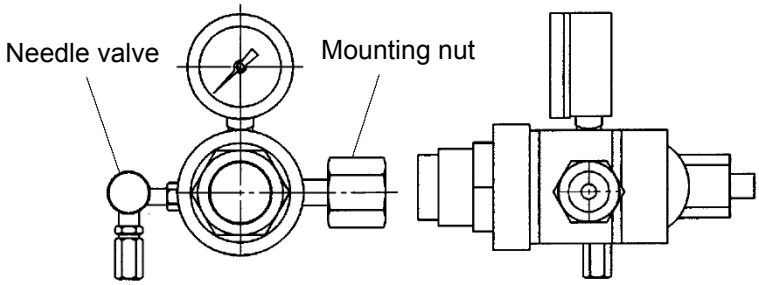
Take care so that the cylinder cannot fall over.

6. **Attach the pressure regulator.**
   When a packing is used at a sealing part of pressure regulator, replace the packing.
   When a gasket with ring is used, replace the gasket with ring periodically.

Note

- **In parts replacement, it is recommended that the gasket with ring to be replaced into the packing without ring.**
- **The packing can be used only once. In replacing the cylinder, use the new packing.**
  The old packing, if continuously used, causes irregularity in sealing surface which easily attracts metal powder to deteriorate the sealing performance.
- **The typical replacing interval of gasket with ring is after 4 to 5 times of tightening.**
  In replacing it, remove a foreign material adhered to the packing or the gasket with ring if any.

7. **Tighten the mounting nut with hands and give it 1/4 or 1/3 turn using the wrench provided.**



8. **Check for leaking.**

● Checking for leaks

For the pressure regulator with needle valve

1. **Close the needle valve.**
2. **Open the valve of the gas cylinder. (Primary pressure is applied.)**
3. **Record the numerical value of the primary pressure at this time.**
4. **Close the valve of the gas cylinder.**
5. **Record the numerical value of the primary pressure after 10 to 15 minutes, and check to see that it has not changed from the value recorded in step 3.**

For the secondary pressure variable pressure regulator

1. **Turn the secondary pressure adjusting handle counterclockwise as far as it will go.**
2. **Open the valve of the gas cylinder. (Primary pressure is applied.)**
3. **Record the numerical value of the primary pressure at this time.**
4. **Close the valve of the gas cylinder.**
5. **Record the numerical value of the primary pressure after 10 to 15 minutes, and check to see that it has not changed from the value recorded in step 3.**

If a leak is detected, check the following items.

Table 1 Causes of pressure regulator leaks

Cause of leak	Countermeasures
Pressure regulator defect	Replace the pressure regulator.
Leak in the cylinder connection	Replace the packing. Tighten the mounting nut more.

Table 2 Replacement parts

Parts No.	Parts name	Specifications	Pressure regulator model
F1000998300	Packing	For WR-11	WR-11-XX
F1000998400	Packing	For WR-13	WR-13-XX

* The packing depends on the pressure regulator model.
In purchasing the packing, be sure to confirm its model.
* In parts replacement, it is recommended that the gasket with ring to be replaced into the packing without ring.

● **Adjusting the flow rate after replacing the gas cylinder**

When the cylinder replacement work is complete, introduce gas into the analyzer to the specified flow. Use the needle of the pressure regulator with a needle valve, or the secondary pressure regulating handle of the secondary pressure variable pressure regulator.

Reference

For introducing gas to the analyzer, refer to " 5.4 Manual Calibration " (page 28).

7.4 Parts Disposal

The parts caused by replacement should be disposed of as an industrial waste.

8 Troubleshooting

8.1 Alarm Type and Countermeasure

Item	Description	Check item	Countermeasure	Reference	Contact output
Power supply	Indicates that the power is charged.	—	—	—	Analyzer alarm (at power OFF)
In Maintenance	Indicates that the in-maintenance switch is ON.	—	—	—	In maintenance
Battery	Indicates that the battery for time saving at power OFF is being consumed.	—	Contact HORIBA.	—	Analyzer caution
Temperature sensor alarm for NDIR *	Indicates that the temperature compensation sensor for NDIR detector has abnormalities such as disconnection or short circuit.	—	Contact HORIBA.	—	Analyzer alarm
NDIR Temperature Sensor Caution *	Indicates that the temperature compensation sensor for NDIR detector is being abnormal.	—	Contact HORIBA.	—	Analyzer caution
MPA Temperature Sensor Alarm *	Indicates that the temperature compensation sensor for MPA detector has abnormalities such as sensor breakage or short circuit.	—	Contact HORIBA.	—	Analyzer alarm
MPA Temperature Sensor Caution *	Indicates that the temperature compensation sensor for MPA detector is being abnormal.	—	Contact HORIBA.	—	Analyzer caution
NDIR Cell Temperature Alarm *	Indicates that the temperature adjustment function for NDIR sample cell has abnormalities such as heater disconnection, temperature sensor disconnection, or short circuit.	—	Contact HORIBA.	—	Analyzer alarm
NDIR Cell Temperature Caution *	Indicates that the temperature adjustment function for NDIR sample cell is being abnormal.	—	Contact HORIBA.	—	Analyzer caution

Item	Description	Check item	Countermeasure	Reference	Contact output
Electric Cooler Temperature Alarm *	Indicates that the electric cooler has abnormalities such as cooling unit deterioration or power supply breakage.	Check that the power lamp of electric cooler is lit and that the cooling fan operates correctly.	If the power lamp is extinguished or the cooling fan stops, contact HORIBA. When the cooling fan or radiation fin is dirty, apply cleaning. If the alarm is not cleared, contact HORIBA.	—	Analyzer alarm
Electric Cooler Temperature Alarm *	Indicates that the electric cooler has abnormalities such as cooling unit deterioration or power supply breakage.	Check that the power lamp of electric cooler is lit and that the cooling fan operates correctly.	If the power lamp is extinguished or the cooling fan stops, contact HORIBA. When the cooling fan or radiation fin is dirty, apply cleaning. If the alarm is not cleared, contact HORIBA.	—	Analyzer caution
Temperature in Cabinet Alarm (optional) *	Indicates that the temperature inside cabinet is out of the specified range due to the temperature fluctuation outside.	Confirm that the temperature at installation part is within the range of -5ºC to 50ºC. If the specification is with the panel heater, confirm that the panel heater CP is ON.	When the temperature is high: Consider counteractions such as a shield installation. When the temperature is low: Contact HORIBA.	—	Analyzer alarm
Caution for Temperature inside Cabinet (optional) *	Indicates that the temperature inside the cabinet is out of the specified range.	Confirm that the temperature at installation part is within the range of -5ºC to 50ºC. If the specification is with the panel heater, confirm that the panel heater CP is ON.	When the temperature is high: Consider counteractions such as a shield installation. When the temperature is low: Contact HORIBA.	—	Analyzer caution
Atmospheric Sensor Alarm	Indicates that the abnormalities have occurred such as atmospheric sensor deterioration.	—	Contact HORIBA.	—	Analyzer alarm
Gas Residual Pressure Decreased (optional)	Indicates that the residual pressure of calibration gas cylinder has been decreased.	Confirm the residual pressure of calibration gas cylinder.	If the residual pressure is within 1 MPa, replace it into a new cylinder.	page 19	Analyzer caution

Item	Description	Check item	Countermeasure	Reference	Contact output
Zero Calibration Alarm	Indicates that the zero calibration has not been correctly performed.	Confirm the gas type of calibration gas cylinder. Confirm that there is enough residual pressure of calibration gas. By the flowmeter of analyzer front panel, confirm that there is the specified flow.	If the wrong gas type is selected, perform the calibration again with the correct gas type. If the residual pressure of calibration gas is within 1 MPa, replace it into a new cylinder and perform the calibration again. Adjust the flow so that it is within the specified level, and perform the calibration again. If the situation is not improved, contact HORIBA.	page 19 page 30	Analyzer alarm
Zero Calibration Caution	Indicates that the coefficient revised at zero calibration starts reaching the outside of specified range.	Confirm the gas type of calibration gas cylinder. Confirm that there is enough residual pressure of calibration gas. By the flowmeter of analyzer front panel, confirm that there is the specified flow.	If the wrong gas type is selected, perform the calibration again with the correct gas type. If the residual pressure of calibration gas is within 1 MPa, replace it into a new cylinder and perform the calibration again. Adjust the flow so that it is within the specified level, and perform the calibration again. If the situation is not improved, contact HORIBA.	page 19 page 30	Analyzer caution
Span Calibration Alarm	Indicates that the span calibration has not been correctly performed.	Confirm the gas type of calibration gas cylinder. Confirm that there is enough residual pressure of calibration gas. By the flowmeter of analyzer front panel, confirm that there is the specified flow.	If the wrong gas type is selected, perform the calibration again with the correct gas type. If the residual pressure of calibration gas is within 1 MPa, replace it into a new cylinder and perform the calibration again. Adjust the flow so that it is within the specified level, and perform the calibration again. If the situation is not improved, contact HORIBA.	page 19 page 30	Analyzer alarm

Item	Description	Check item	Countermeasure	Reference	Contact output
Span Calibration Caution	Indicates that the coefficient revised at the span calibration starts reaching the outside of specified range.	Confirm the gas type of calibration gas cylinder. Confirm that there is enough residual pressure of calibration gas. By the flowmeter of analyzer front panel, confirm that there is the specified flow.	If the wrong gas type is selected, perform the calibration again with the correct gas type. If the residual pressure of calibration gas is within 1 MPa, replace it into a new cylinder and perform the calibration again. Adjust the flow so that it is within the specified level, and perform the calibration again. If the situation is not improved, contact HORIBA.	page 19 page 30	Analyzer caution
I2C COMM ERR IDn (n: 0 to 7)	Indicates that the communication system inside the instrument has abnormalities.	—	Contact HORIBA.	—	—
HI.HI (optional)	Indicates that the measurement concentration value is over the HI HI limit alarm set value.	—	—	—	Concentration HI HI limit
HI (optional)	Indicates that the measurement concentration value is over the HI limit alarm set value.	—	—	—	Concentration upper limit
LO (optional)	Indicates that the measurement concentration value is below the LO limit alarm set value.	—	—	—	Concentration lower limit
CO Peak Count (optional)	Indicates that the peak count is over the set value for CO analyzer.	—	—	—	CO peak count

Note

- **The alarm/caution messages marked by "*" are not output as analyzer alarm/analyzer caution contact output when they occur within 1 hour from power ON.**
  They are not recorded on the alarm history. Only the presence history of alarms/cautions can be confirmed from the screen. Refer to " 6.7 Alarm Check " (page 54).
- **Analyzer Alarm (contact output):**
  Indicates that the analyzer is in the state disabling the measurement or the state hard to maintain the measurement accuracy. Handle it as soon as possible.
- **Analyzer Caution (contact output):**
  Indicates that the measurement accuracy is maintained but starting to be hard to be maintained. Confirm the situation and prepare for the countermeasures.

8.2 Troubleshooting

This chapter describes the troubleshooting mainly for the parts replacement advices and check items for customers.
If these counteractions do not solve the problems, be sure to contact HORIBA.

Note

Before trying the counteractions, check the followings again:

- **Power is connected**
- **Power voltage/capacity meet the specification**
- **Parts replacement is correctly performed**

● No indication

Cause	Check item	Counteraction	Reference
Back light is extinguished	—	Touch the screen.	page 16 page 47
Analyzer power is OFF	Confirm the power switch.	Turn the analyzer power ON.	page 3
Others	—	Contact HORIBA.	—

● No/ low output signals

Cause	Check item	Counteraction	Reference
Analog output mode has been selected	Confirm if the screen is set to analog output mode.	Exit from analog output screen to Meas. mode.	page 38
The output is hold.	Confirm the delivery specification.	—	—
Analyzer power is OFF	Confirm the power switch.	Turn ON the analyzer power.	page 3
Tube is disconnected.	Confirm that the sample tubes are not disconnected or broken.	Adjust and fix the defective tubes.	—
Pump is stopped.	Confirm the flow by the flowmeter on the analyzer front panel. Confirm the pump power switch.	Turn ON the pump power.	page 3
Leakage from primary filter	Confirm that the filter element is correctly attached. Confirm if the O-ring or packing has no deterioration.	Ensure the correct attachment. Replace the O-ring and packing.	page 61
Leakage from mist catcher attachment part	Confirm that the mist catcher is correctly attached. Confirm if there is no crack in the rubber joint.	Attach it again. Replace the rubber joint.	page 64
Leakage from the secondary filter attachment part	Confirm that the secondary filter is correctly attached. Confirm if there is no missing O-ring or packing to be attached.	Attach it again.	page 62
Leakage from NOx converter attachment part (With NOx converter)	Confirm that the NOx converter is correctly attached. Confirm there is no crack in the rubber joint.	Attach it again. Replace the rubber joint.	page 67
Sample outlet is clogged	Check the sample outlet part.	Either release it into air or prepare tubing layout free from backpressure.	—
Specified flow: (0.6 L/min ± 0.1 L/min) is not flowed	Confirm the flow by the flowmeter on the analyzer front panel.	Adjust the flow to the specified rate by the flow adjusting needle valve.	page 30

Cause	Check item	Counteraction	Reference
Inadequate range	Check the displayed concentration value.	Change the measurement range to the specified proper range.	page 33
Calibration is not correctly performed	Confirm the calibration concentration setting value and the cylinder concentration.	Perform the zero/span calibration again.	page 19
Zero calibration gas flows.	Confirm if the calibration mode selects zero gas.	Return the calibration mode setting to MEAS.	page 28
Others	—	Contact HORIBA.	—

● Output is too high.

Cause	Check item	Counteraction	Reference
Inadequate range.	Check the displayed concentration value.	Change the measurement range to the specified proper range.	page 33
Calibration is not correctly performed	Confirm the calibration concentration setting value and the cylinder concentration.	Perform the zero/span calibration again.	page 19
Electric cooler broken	Confirm that the electric cooler power lamp is lit and the cooling fan operation operates correctly. Confirm that the temperature of electric cooler is 0ºC to 8ºC (under 15ºC if the temperature inside the cabinet is over 40ºC).	Confirm that the cooling fan is activated. Perform the cleaning of radiation fin. If the situation is not improved, replace the electric cooler.	page 6
Analog output mode is selected.	Confirm if the screen shows analog output mode.	Exit from the analog output screen to MEAS. condition.	page 38
Span calibration gas flows.	Confirm if the calibration mode selects zero gas.	Return the calibration mode setting to MEAS.	page 28
Others	—	Contact HORIBA.	—

● The O_2 analyzer output is approximately 21 vol%. O_2 analyzer output is high.

Cause	Check item	Counteraction	Reference
Pump is stopped.	Confirm the flow by the flowmeter on the analyzer front panel. Confirm the pump power switch.	Turn ON the pump power.	page 3
Leakage from the primary filter	Check if the filter element is correctly attached. Confirm if the O-ring and packing have no deterioration.	Attach them correctly. Replace the O-ring and packing.	page 61
Leakage from mist catcher attachment part	Confirm that the mist catcher is correctly attached. Confirm if there is no crack in the rubber joint.	Attach it again. Replace the rubber joint.	page 64
Leakage from the secondary filter attachment part	Confirm that the secondary filter is correctly attached. Confirm if there is no missing O-ring or packing to be attached.	Attach it again.	page 62
Leakage from NOx converter attachment part (With NOx converter)	Confirm that the NOx converter is correctly attached. Confirm there is no crack in the rubber joint.	Attach it again. Replace the rubber joint.	page 67
Others	—	Contact HORIBA.	—

● Calibration is not possible

Cause	Check item	Counteraction	Reference
Calibration cylinder is empty.	Confirm the pressure of calibration gas cylinder.	Replace to the new cylinder.	page 72
Wrong calibration gas type is selected	Confirm the calibration gas type.	Set the calibration gas type again.	page 19
The calibration concentration set value and the cylinder concentration value are different.	Confirm the calibration concentration set value and the cylinder concentration indication value.	Set the calibration concentration again and perform the zero/span calibration again.	page 19
Calibration gas flow is little	Confirm the flow by the flowmeter on the analyzer front panel.	Adjust the flow to the specified rate.	page 30
Key-lock state	Confirm the key lock icon display.	Input the password and release the key lock state.	page 15 page 52
Others	—	Contact HORIBA.	—

● Noise is too large

Cause	Check item	Counteraction	Reference
Vibration of the installation site is too large	Confirm the environment of installation site	Install the instrument to the place with little vibration.	—
There is a large vibration source near from the instrument.	Confirm the peripheral equipment and devices.	Avoid any vibration source.	—
Backpressure is applied to the discharge line.	Confirm the condition of discharge line.	Either release it into air or prepare tubing layout free from backpressure.	—
Calibration is not correctly performed.	Confirm the calibration concentration setting value and the cylinder concentration.	Perform the zero/span calibration again.	page 19
Others	—	Contact HORIBA.	—

● Flow is too little

Cause	Check item	Counteraction	Reference
Tubes are clogged.	Confirm the tubes.	Perform the cleaning of tubes.	—
Tubes are bended.	Confirm the tubes.	Adjust/fix the defective tubes and replace them if necessary.	—
Primary filter is clogged.	Confirm the filter element.	Replace the filter element.	page 61
Mist catcher is clogged.	Replace the mist catcher.	If the alarm is cleared, use the replaced mist catcher.	page 64
NOx converter element is clogged.	Replace the NOx converter.	If the alarm is cleared, use the replaced NOx converter.	page 67
Secondary filter is clogged. Drain mist is mixed in.	Check the secondary filter.	Replace the secondary filter and perform cleaning.	page 62
Others	—	Contact HORIBA.	—

● Key operation is not possible

Cause	Check item	Counteraction	Reference
Key lock state	Confirm the key lock icon displayed.	Input the password and release the key lock state.	page 15 page 52
Others	—	Contact HORIBA.	—

9 Technical Data

9.1 Measurement Principle

9.1.1 Measurement principle using cross-modulation type NDIR

The molecular consisting of different atoms absorbs infrared ray of specific wavelength.

The cross-modulation type non-dispersive infrared analyzer detects the gap of infrared absorption caused by alternatively introducing the sample gas and the reference gas by the certain period to the measurement cell using the condenser microphone detector.

This method is free from zero drift. As for maintenance, the optical adjustments are not required because it does not apply a rotation sector, which is quite effective for the stack gas analyzers requiring continuous operation and high measurement accuracy.

Dividing the infrared ray from light source into two categories: reflected light and transmitted light using a beam splitter allows the optical layout of as much as 4 components, realizing the compact, downsizing module.

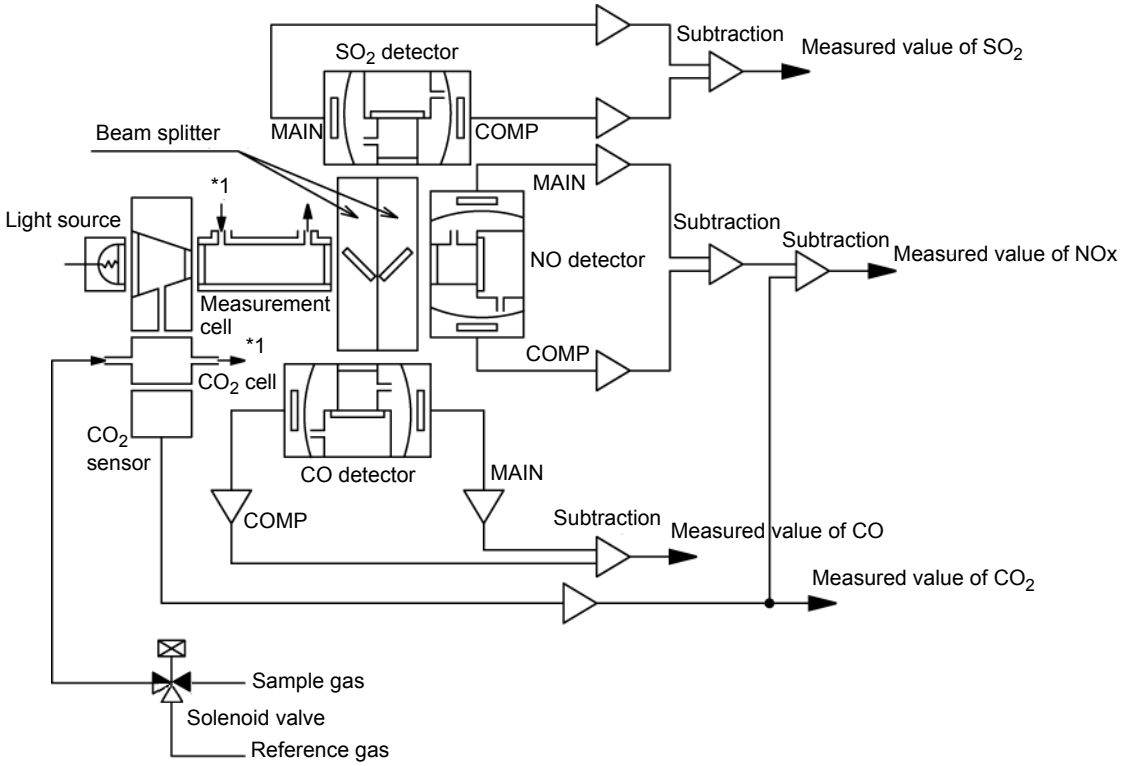


Fig. 64 Schematic diagram of measurement principle for NDIR

9.1.2 Measurement principle for O_2 using magnetic pressure method

If oxygen, which is paramagnetic gas is in an uneven magnetic field, it is attracted to the stronger portion of the magnetic field increasing the pressure in that portion.
Generally, the pressure increase can be shown in the equation below:

$$\triangle P = \frac{1}{2} H^2 \cdot X \cdot C$$

H: Magnetic field strength
X: Magnetization factor of paramagnetic component (O_2)
C: Concentration difference between paramagnetic component (O_2) and carrier gas (O_2)

The pressure increase at this time is taken out from the magnetic field using a non-paramagnetic gas such as nitrogen. It is detected by a capacitor microphone detector and then converted into electric signals.
Carrier gas uses air, which does not require any cylinder gas.
The magnetic field uses electromagnet of AC drive, and the signal is processed as AC signals, contributing to a stable measurement value.

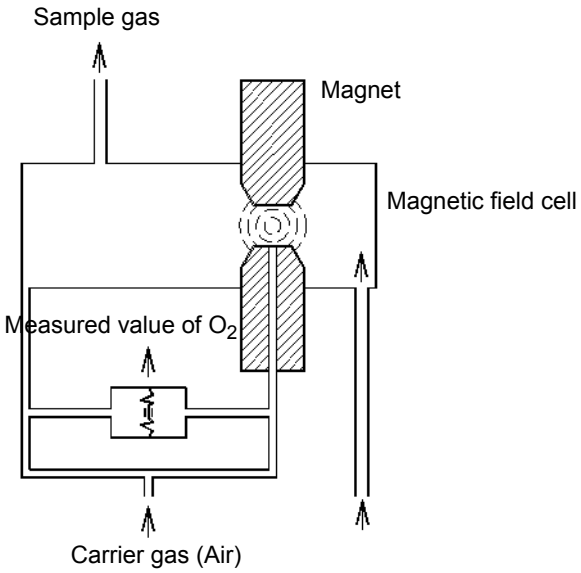


Fig. 65 Schematic diagram of measurement principle for MPA

9.2 Specifications

Model		ENDA-5000				
Measurement target		NOx	SO_2	CO *1	CO_2	O_2 *2
Measuring principle		NDIR	NDIR	NDIR	NDIR	MPA
Range	Standard	200 ppm to 5000 ppm	200 ppm to 5000 ppm	200 ppm to 5000 ppm	5 vol% to 25 vol%	10 vol% to 25 vol%
	Option	100 ppm or more	50 ppm or more	100 ppm or more	—	—
Range ratio		Within 10 times	Within 10 times	Within 10 times	Within 5 times	Within 2.5 times
Repeating accuracy (Repeatability)		±0.5% of full-scale value (±1.0% of full-scale value when any optional range is included or for the O_2 measurement)				
Linearity (Indication error)		±1.0% of full-scale value				
Zero drift		±1.0% of full-scale value per week (within 5ºC in ambient temperature changes, except for air pressure interference) (±2.0% of full-scale value when any optional range is included or for the O_2 measurement)				
Span drift		±2.0% of full-scale value per week (within 5ºC in ambient temperature changes, except for air pressure interference)				
Response speed		T_d+T_{90}=60 s maximum at system inlet (at Sample flow of 0.6 L/min) (240 s maximum for the SO_2 measurement only)				
Interference		±2.0% of full-scale value (within the composition of standard gas in the standard range)				
Display		Touch panel LCD screen (with back light)				
Installation conditions	Ambient temperature	-5ºC to 40ºC without direct sunlight and radiant heat *3				
	Ambient humidity	90% maximum				
	Vibration	100 Hz、0.3 m/s^2 maximum				
	Dust	Less than environmental standard				
Sample conditions	Temperature	250ºC maximum				
	Dust	0.1 g/Nm^3 maximum				
	Standard gas composition *4	NO: 500 ppm maximum NO_2: 15 ppm maximum SO_2: 1000 ppm maximum SO_3: 50 ppm maximum CO: 200 ppm maximum CO_2: 15 vol% maximum H_2O: 20 vol% maximum				
Sampling method		Dehumidified sampling at 5ºC using the electronic cooler				
Flow rate of sample gas		2.5 L/min to 3.0 L/min				
Sample inlet tube		Teflon tube (8 mm O.D./ 6 mm I.D.)				
Pressure of sample gas		±4.9 kPa (3-point selection method) (Without sample gas backpressure)		(1) -1.96 kPa to 4.9 kPa (2) ±3.43 kPa (3) -4.9 kPa to 1.96 kPa		
Pressure control method		Normal pressure control by regulator and pump, depressurized sampling Control pressure: -4.9 kPa				
Concentration output		4 mA to 20 mA DC (Insulation output) (0 mA to 16 mA DC/ 0 V to 1 V DC/ 1 V to 5 V DC is optional) Max. 12 systems output available				
External contact output		Analyzer alarm, analyzer caution, range display, in-calibration, in-maintenance, in-purge (optional) Contact capacity: 30 V DC, 1 A, 250 V AC, 1 A in resistance load				
Calibration method		DRY calibration Automatic calibration (Calibration interval: 7 days (standard), setting available from 1 to 99 days) Manual calibration				

Calibration gas	Zero gas	N_2 or ambient air
	Carrier gas for O_2 measurement	Ambient air
	Span gas	Gas cylinder for measured component
Probe Filter at sampling point	Flange: JIS 10 K, 40 AFF Probe tube length: 1000 mm Material: SUS-316 Element: SUS-304+quartz wool bellows of 2 µm in thickness Electric heating: 100 VA with drip-proof case	
Power voltage	100 V ±15 V AC	
Power frequency	50/60 Hz switchable	
Power consumption	Approximately 800 VA (Including primary filter and service plug outlet) Heated tube 30 m (+1100 VA) and panel heater (+300 VA)	
Dimensions Mass	600 (W) mm x 1770 (H) mm x 300 (D) mm (High-pressure gas cylinder, maximum 3 gas cylinders of 3.4 L are contained.) Approximately 180 kg (Without cylinders) 600 (W) mm x 1770 (H) mm x 500 (D) mm (High-pressure gas cylinder, maximum 6 gas cylinders of 3.4 L are contained.) Approximately 200 kg (Without cylinders)	
Materials exposed to gas	SUS-316, SUS-304, Tefon, polypropylene, polyethylene, fluoro rubber, chloroethene, PVDF, and glass	
Cabinet	Standalone type for outdoor installation Plate thickness: 2.3 mm for steel plates of main unit, door. and top plate, 3.2 mm for channel base Door: Front Connections: Right side	
Color	Munsell 5Y7/1 semi-gloss for inner and outer surfaces	

*1: The analyzer against N_2O interference for CO analyzer applies the standard range of 200 ppm or more (no optional range).

*2: No carrier gas cylinder is necessary.

*3: For the temperature range of -15ºC to 40ºC (cold district) and for the specification of -5ºC to 50ºC, we will separately discuss the design.

*4: When the coexisting gas contains NH_3, NH_3 scrubber is prepared for an optional part.
When CH_4 coexists in the sample gas for SO_2 analyzer, the SO_2 analyzer of CH_4 interference compensation type is prepared.
When N_2O coexists in the sample gas for CO analyzer, the CO analyzer of N_2O interference compensation type is prepared.

9.3 Analog Signal Output

● T4 analog input/output terminal board (terminal screw: M3.5)

Pin No.	Signal name	Pin No.	Signal name
0	CH1 (-)	15	CH1 (+)
1	CH2 (-)	16	CH2 (+)
2	CH3 (-)	17	CH3 (+)
3	CH4 (-)	18	CH4 (+)
4	CH5 (-)	19	CH5 (+)
5	CH6 (-)	20	CH6 (+)
6	GND	21	GND
7	CH7 (-)	22	CH7 (+)
8	CH8 (-)	23	CH8 (+)
9	CH9 (-)	24	CH9 (+)
10	CH10 (-)	25	CH10 (+)
11	CH11 (-)	26	CH11 (+)
12	CH12 (-)	27	CH12 (+)
13	GND	28	GND
14	(OPTION)	29	(OPTION)

9.4 List of Models

Model	Measurable Component 1	Measurable Component 2	Measurable Component 3	Measurable Component 4	Measurable Component 5
ENDA-5120	NOx	—	—	—	—
ENDA-5130	SO_2	—	—	—	—
ENDA-5140	CO_2	—	—	—	—
ENDA-5150	CO	—	—	—	—
ENDA-5160	O_2	—	—	—	—
ENDA-5220	NOx	O_2	—	—	—
ENDA-5230	SO_2	O_2	—	—	—
ENDA-5240	CO_2	O_2	—	—	—
ENDA-5250	CO	O_2	—	—	—
ENDA-5300	NOx	SO_2	—	—	—
ENDA-5310	NOx	CO_2	—	—	—
ENDA-5320	NOx	CO	—	—	—
ENDA-5340	SO_2	CO_2	—	—	—
ENDA-5350	SO_2	CO	—	—	—
ENDA-5370	CO	CO_2	—	—	—
ENDA-5400	NOx	SO_2	O_2	—	—
ENDA-5410	NOx	CO_2	O_2	—	—
ENDA-5420	NOx	CO	O_2	—	—
ENDA-5440	SO_2	CO_2	O_2	—	—
ENDA-5450	SO_2	CO	O_2	—	—
ENDA-5470	CO	CO_2	O_2	—	—
ENDA-5500	NOx	SO_2	CO_2	—	—
ENDA-5510	NOx	SO_2	CO	—	—
ENDA-5520	NOx	CO	CO_2	—	—
ENDA-5530	SO_2	CO	CO_2	—	—
ENDA-5600	NOx	SO_2	CO_2	O_2	—
ENDA-5610	NOx	SO_2	CO	O_2	—
ENDA-5620	NOx	CO	CO_2	O_2	—
ENDA-5630	SO_2	CO	CO_2	O_2	—
ENDA-5700	NOx	SO_2	CO	CO_2	—
ENDA-5800	NOx	SO_2	CO	CO_2	O_2

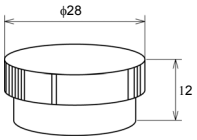
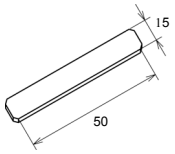
9.5 Accessories and Spare Parts

This chapter describes the accessories/parts of standard specifications. They may have difference from the delivered accessories/parts depending on the specifications.
Refer to the list of accessories/spare parts attached to the delivered product

9.5.1 List of accessories

Note

At test operation and maintenance, the accessories can be used by HORIBA service person.

Parts name	Image (unit: mm)	Q'ty	Remarks
Polyethylene mug		1	for supplying water
Dyflon grease (DG-203)		1	1 g
Clearance gauge		1	for pump

9.5.2 List of spare parts

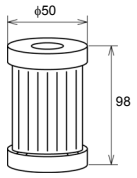
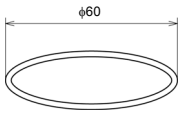
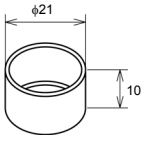
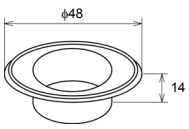
● Standard spare parts (for 3 months)

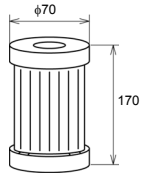
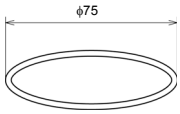
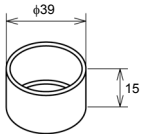
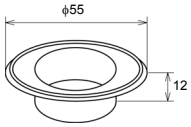
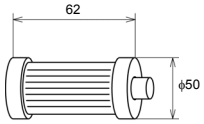
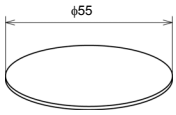
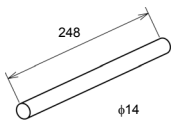
Note

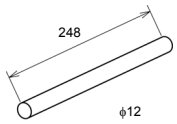
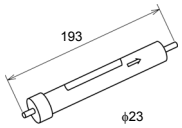
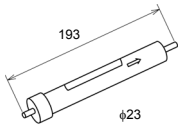
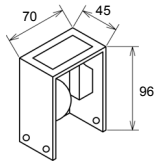
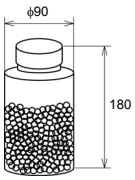
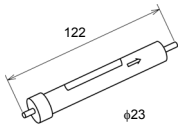
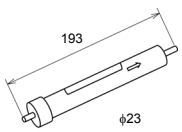
At test operation and maintenance, the accessories can be used by HORIBA service person.

Parts name	Attached Q'ty	Remarks
Primary filter element	3	for SE3
		for LE3
Secondary filter element	10	Without SO_2 analyzer
	5	For sample line including SO_2 analyzer
Mist catcher	1	—

● 1 year consumable parts (optional)

Parts name	Image (unit: mm)	Replacement cycle	Q'ty required annually	Parts No. (sales unit)	Remarks
Primary filter element		1 month	12	9024000100 (12 pcs)	for SE3
Primary filter O-ring		6 months	2	9057004700 (1 pc)	
Primary filter holder cap		3 months	4	9024000300 (10 pcs)	
Primary filter element cap		3 months	4	9024000400 (10 pcs)	

Parts name	Image (unit: mm)	Replacement cycle	Q'ty required annually	Parts No. (sales unit)	Remarks
Primary filter element		1 month	12	9057000400 (1 pc)	for LE3
Primary filter O-ring		6 months	2	9057004800 (1 pc)	
Primary filter holder cap		3 months	4	9057000700 (1 pc)	
Primary filter element cap		3 months	4	9057000600 (1 pc)	
Air filter (3 μm)		1 year	1	9057005000 (1 pc)	
Secondary filter element (GC-90)		1 month	24	9057000200 (50 pcs)	Without SO_2 analyzer
Secondary filter element (PA-5L)		2 months	12	9057000300 (20 pcs)	For sample line including SO_2 analyzer
Converter catalyst tube (COM-50)		1 year	1	9057005100 (1 pc)	With NOx analyzer

Parts name	Image (unit: mm)	Replacement cycle	Q'ty required annually	Parts No. (sales unit)	Remarks
Zero gas purifier catalyst tube (PUR-50)		1 year	1	9057005200 (1 pc)	With high sensitivity analyzer for CO analyzer or with halogen scrubber
Scrubber (ESU-050A)		1 year	1	9057003400 (1 pc)	For other cases than above
Mist catcher (MC-050A)		2 months	6	9057003300 (6 pcs)	
Pump diaphragm assembly		6 months	4	9057003200 (1 pc)	
Silica gel		1 year	1	9080003000 (1 pc)	With O_2 analyzer or for the specification using air as zero gas
Protective filter		1 year	1	9057005300 (1 pc)	With O_2 analyzer or for the specification using air as zero gas
Halogen scrubber		6 months	2	9057005400 (1 pc)	Depending on the sample gas condition

10 Optional Functions

10.1 Purge Functions

When there is a large amount of dusts in the stack gas, the purge function is effective:
the separate blowback instrument enables the backflush of the dusts collected by the primary filter using the purge air.
According to the purge time setting, the periodical purge is available.

10.1.1 Principle of operation

When the stack gas contains dusts of high concentration, suction of sample gas for a long time causes a clogging in the primary filter.
The purge function is a periodical backflush function of the primary filter using purge air through the analyzer signal. When the purge starts, the sample line closes via the solenoid valve signal, and the sampling pump of instrument stops. After approximately 5 seconds, the In-blow line opens to start the in-blow purge of primary filter.
The in-blow line closes after 5 seconds since the set time for in-blow purge is over.
Then the sample line opens, and the sample gas suction starts with the sampling pump operation. In this process, the sample gas replacement is performed as the DELAY (sample gas replacement) state until the set DELAY time is completed. During the purge, the concentration signal output is held, and the contact “in-purge” is output to the external device.
When the automatic calibration (AIC) starts during the purge, the purge sequence is interrupted. After the AIC completes, the sequence starts from the beginning.

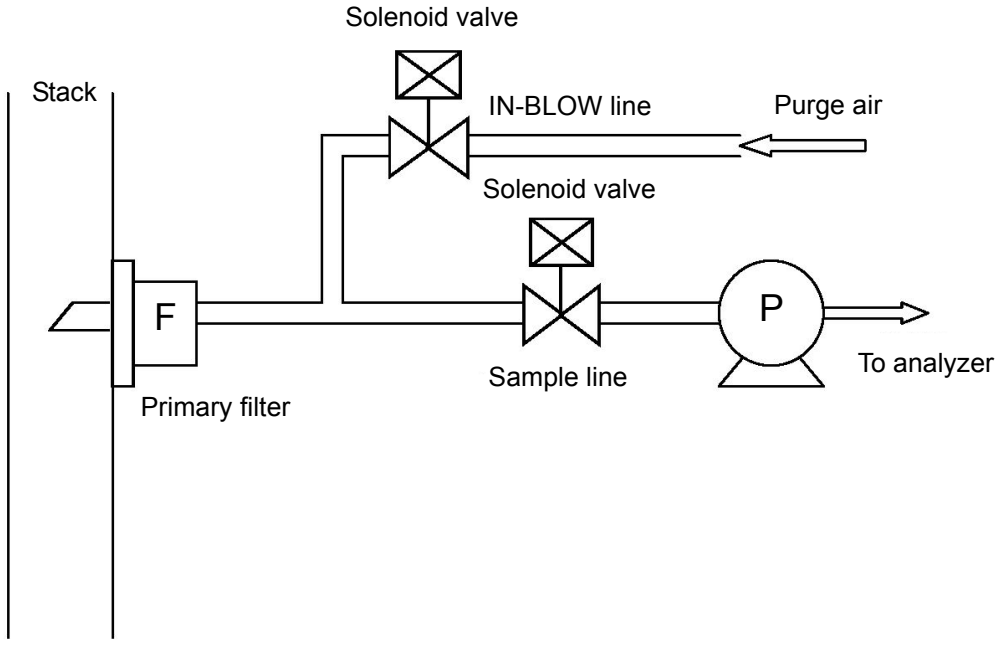


Fig. 66 Principle of operation

10.1.2 Purge setting

This section describes the operation of purge setting.

1. **Press the [MENU] key in the MEAS. screen.**
Press the [▶] key three times and display the MENU 4/5 (OPTION menu) screen.

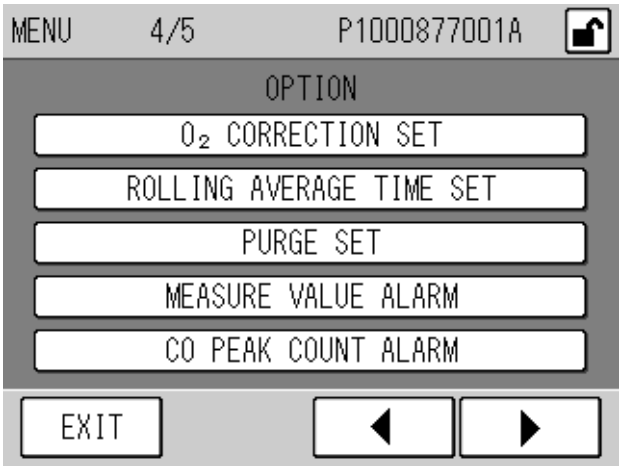


Fig. 67 MENU 4/5 (OPTION menu) screen

2. **Press the [PURGE SET] button.**
The PURGE SET screen is displayed.

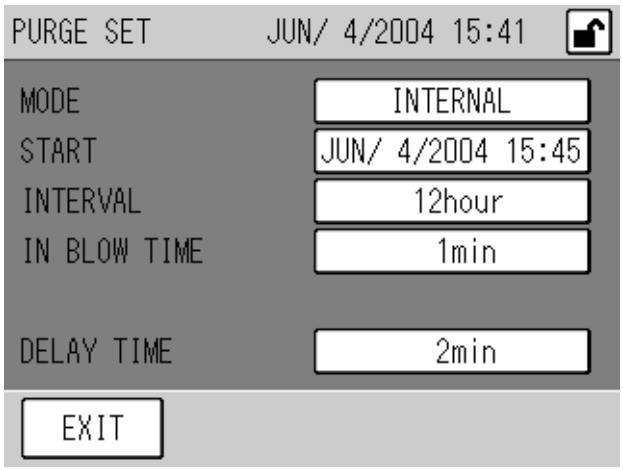


Fig. 68 PURGE SET screen

Setting item	Description
MODE	Sets the purge start mode. Pressing the button at the right of [MODE] displays the PURGE MODE screen (page 95 Fig. 69).
START	Sets the start time of the next purge sequence. Pressing the button at the right of [START] displays the PURGE START screen (page 96 Fig. 70).
INTERVAL	Sets the time span (INTERVAL) for the purge start. Pressing the button at the right of [INTERVAL] displays the PURGE INTERVAL screen (page 97 Fig. 71).
IN BLOW TIME	Sets the purge time for the primary filter. Pressing the button at the right of [IN BLOW TIME] displays the PURGE IN BLOW TIME screen (page 97 Fig. 72).
DELAY TIME	Sets the time in which the sample tube is replaced from the purge gas to the sample gas. Pressing the button at the right of [DELAY TIME] displays the PURGE DELAY TIME screen (page 98 Fig. 73).

3. **Press the button corresponding to the item to be set. The setting screen appears.**
For the detailed information on each setting screen, refer to page 95 to page 98.

4. **Change the setting in each setting screen, and press the [SET] key.**
The setting is changed and the screen returns to the PURGE SET screen.

Tip

To cancel the change, press the [CANCEL] key.
The change is canceled and the screen returns to the PURGE SET screen.

5. **Press the [EXIT] key in the PURGE SET screen.**
The screen returns to the MENU 4/5 (OPTION menu) screen.

6. **Press the [EXIT] key in the MENU 4/5 (OPTION menu) screen.**
The screen returns to the MEAS. screen.

Note

Trying to change the purge setting during the purge is invalid. The screen only shows “IN PURGE.”

● **Purge mode**

Sets the purge start mode.

1. **Pressing the button at the right of [MODE] in the PURGE SET screen displays the PURGE MODE screen.**

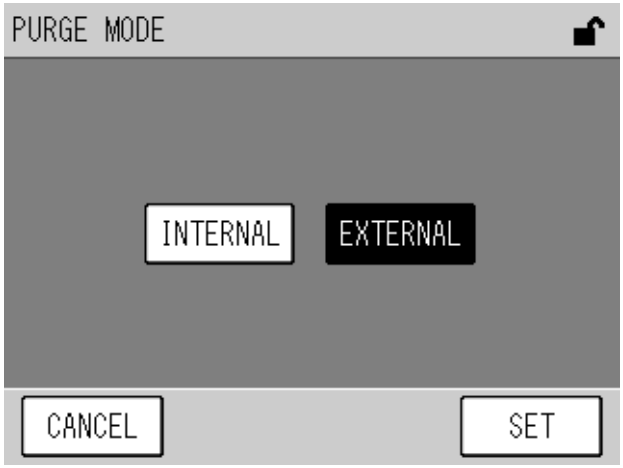


Fig. 69 PURGE MODE screen

Setting item	Description
INTERNAL	Starts the purge with the start time and interval set based on the internal clock. Purge start from the external contact input is also available.
EXTERNAL	Starts the purge from the external contact input.

2. **Press the button for the item to be set and press the [SET] key.**

3. **The setting is changed and the screen returns to the PURGE SET screen.**

● **Start time**

Sets the next purge start time.

1. **Pressing the button at the right of [START] in the PURGE SET screen displays the PURGE START screen.**

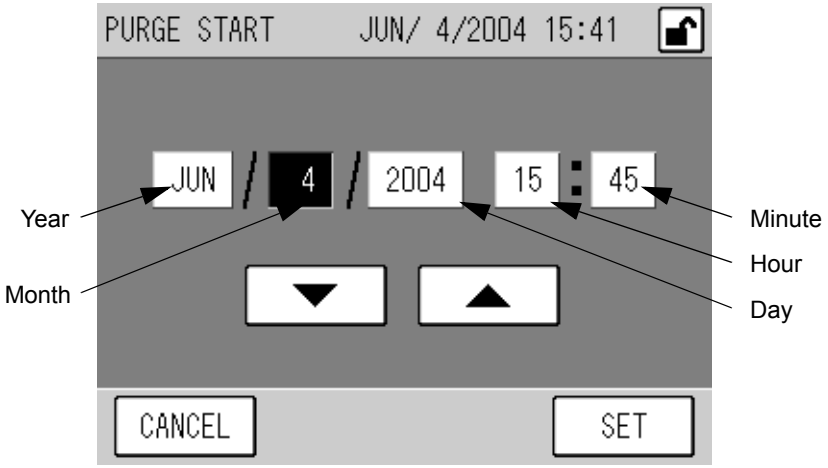


Fig. 70 PURGE START screen

Setting item	Setting range
Year	2000 to 2090
Month	1 to 12
Day	1 to 31
Hour	0 to 23
Minute	0 to 59

2. **Pressing the button which setting is to be changed will reverse the value display. Change the value by the [▼] and [▲] button and press the [SET] key.**

3. **The setting is changed and the screen returns to the PURGE SET screen.**

Note

- **The start time setting is based on the internal clock.**
- **It is not available to change into an impossible date.**
  When this happens, the existing date closest to that before the set date is automatically selected.
- **When the start time previous to the current time is set, the setting value of start time is changed into the minimum value which comes in future by adding multiple number of the interval set values.**
- **When the start time set value becomes a previous time by changing the internal clock setting (refer to " 6.5.2 Time adjust " (page 48)), the start time is changed into the minimum value which comes in future by adding multiple number to the current time set value.**
- **When the AIC start time is set later than 2090/1/1/0:00, the AIC does not start.**
  When the "Battery" alarm occurs, confirm the setting time.

● **Interval**

Sets the time span (interval) for the purge start.

1. **Pressing the button at the right of [INTERVAL] in the PURGE SET screen displays the PURGE INTERVAL screen.**

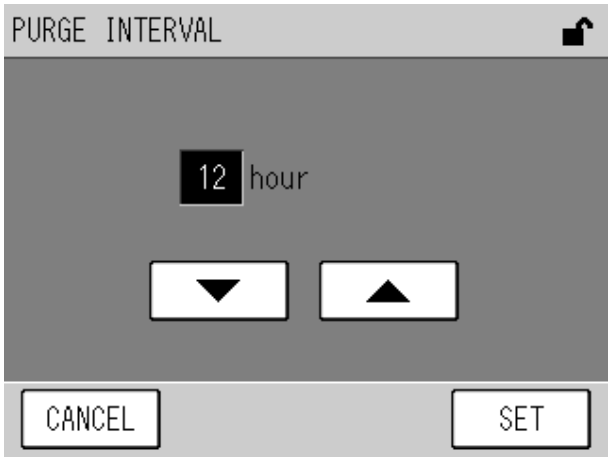


Fig. 71 PURGE INTERVAL screen

Setting item	Setting range
Hour	1 to 99

2. **Pressing the button which setting is to be changed will reverse the value display. Change the value by the [▼] and [▲] button and press the [SET] key.**

3. **The setting is changed, and the screen returns to the PURGE SET screen.**

Note

The recommended purge interval is 12 hours. When the above recommended time does not meet the actual condition, change the setting after confirmation.

● **In blow time**

Set the IN BLOW TIME in purge.

1. **Pressing the button at the right of [IN BLOW TIME] in the PURGE SET screen displays the PURGE IN BLOW TIME screen.**

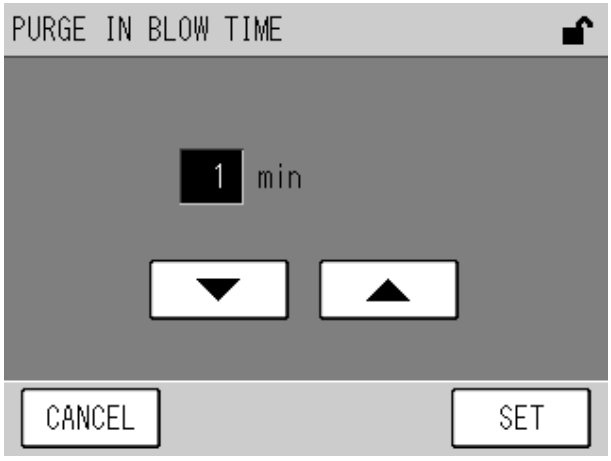


Fig. 72 PURGE IN BLOW TIME screen

Setting item	Setting range
Minute	0 to 10

2. **Pressing the button which setting is to be changed will reverse the value display. Change the value by the [▼] and [▲] button and press the [SET] key.**
3. **The setting is changed, and the screen returns to the PURGE SET screen.**

Note

The recommended purge interval is 1 minute. When the above recommended time does not meet the actual condition, change the setting after confirmation.

● **Delay time**

Sets the purge delay time.

1. **Pressing the button at the right of [DELAY TIME] in the PURGE SET screen displays the PURGE DELAY TIME screen.**

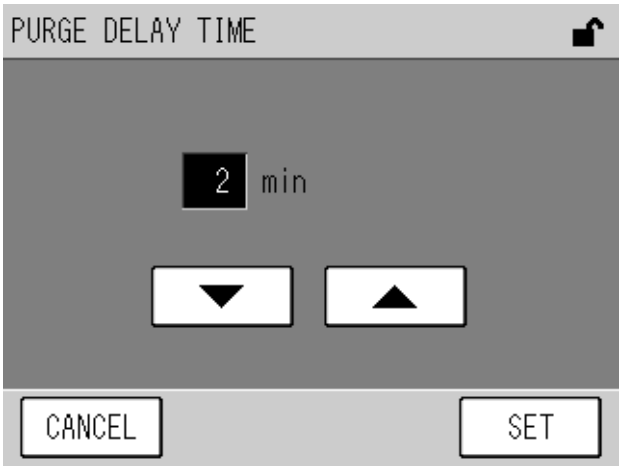


Fig. 73 PURGE DELAY TIME screen

Setting item	Setting range
Minute	0 to 15

2. **Pressing the button which setting is to be changed will reverse the value display. Change the value by [▼] and [▲] button and press the [SET] key.**
3. **The setting is changed, and the screen returns to the PURGE SET screen.**

Note

The purge delay time depends on the tube length. Set the time by actually measure the tube length.

10.1.3 Purge start

● **Automatic start**

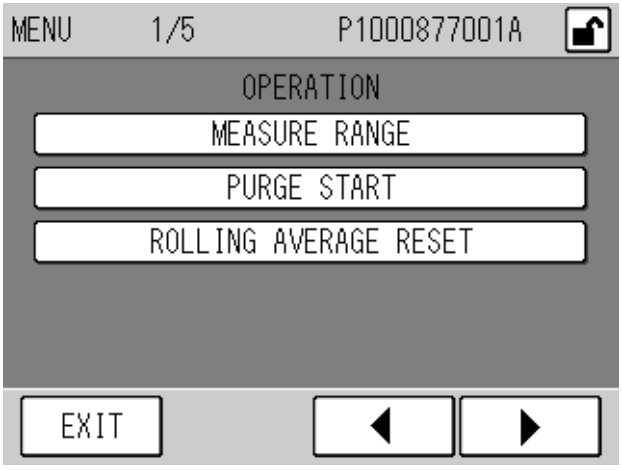
Select [INTERNAL] in the PURGE MODE screen (page 95 Fig. 69).
The purge automatically starts according to the purge start time, purge interval, purge in-blow time, and purge delay time set at " 10.1.2 Purge setting " (page 93).

Note

During the purge, the concentration output is held.

● **Manual start**

1. **Press the [MENU] key in the MEAS. screen.**



* Functions of “PURGE START,” “ROLLING AVERAGE RESET” are optional.

Fig. 74 MENU 1/5 (OPERATION menu) screen

2. **Press the [PURGE START] button.**
The purge starts according to the purge in blow time and purge delay time set at " 10.1.2 Purge setting " (page 93).

Note

When the purge starts, the [PURGE START] button changes into the [PURGE STOP] button.
Pressing the [PURGE STOP] button interrupts the purge.
During the purge interruption, the [PURGE STOP] button changes into the [PURGE START] button.

● **Start from external contact input**

Select [EXTERNAL] in the PURGE MODE screen (page 95 Fig. 69).
The purge starts according to the purge start time, purge interval, purge in-blow time, and purge delay time set at " 10.1.2 Purge setting " (page 93) via external contact input.

Note

The purge by manual start via the [PURGE START] button is available except for during the AIC.
When the purge command is input by the internal clock or via the external contact input during the purge of manual start mode, the signal is not received but the purge by the manual purge continues.

10.2 O_2 Correction

The stack gas from the fixed discharge source, when measured, gives a diluted, low concentration value due to the air mixture amid the stack path.
This is why when measuring the nitrogen oxides from the fixed discharge source, the suitable correction according to the oxygen concentration in the discharged gas is included in the enforcement regulations of Clean Air Act.
For the measurement of carbon monoxide correction for industrial waste incinerator, too, the correction according to the oxygen concentration is required.

The operation for the oxygen correction is as follows:

$$O_2 \text{ corrected concentration} = \frac{21\ (\text{vol\%}) - O_2 \text{ set value (vol\%)}}{21\ (\text{vol\%}) - O_2 \text{ measurement value (vol\%)}} \times \text{measurement value (ppm)}$$

O_2 set value (vol%) is a concentration set depending on the fuel facility as well as fuel type.
Two types of O_2 values can be set.

10.2.1 O_2 conversion correction setting

This section describes the operation of setting O_2 corrected concentration.

1. **Press the [MENU] key in the MEAS. screen.**
Press the [▶] key three times to display the MENU 4/5 (OPTION menu) screen.

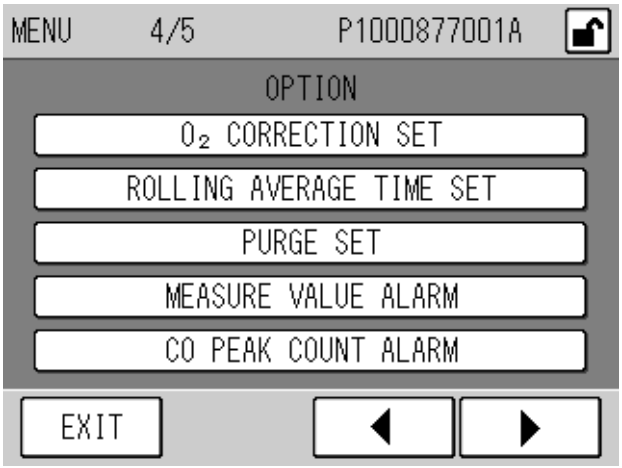


Fig. 75 MENU 4/5 (OPTION menu) screen

2. Press the [O_2 CORRECTION SET] button.
The O_2 CORRECTION SET screen appears.

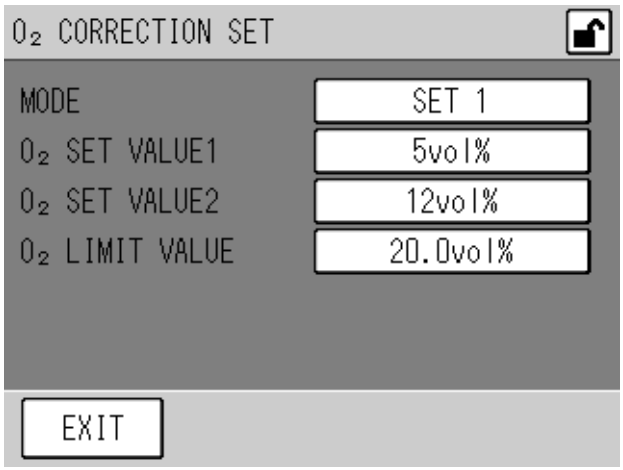


Fig. 76 O_2 CORRECTION SET screen

Setting item	Description
MODE	Two types of O_2 set values: O_2 SET VALUE1 and O_2 SET VALUE2 can be selected. The switchover between two is available via the external contact input. Pressing the button at the right of [MODE] displays the O_2 CORRECTION MODE screen (page 102 Fig. 77).
O_2 SET VALUE 1	Sets the O_2 SET VALUE 1. Pressing the button at the right of [O_2 SET VALUE 1] displays the O_2 SET VALUE 1 screen (page 103 Fig. 78).
O_2 SET VALUE 2	Sets the O_2 SET VALUE 2. Pressing the button at the right of [O_2 SET VALUE 2] displays the O_2 SET VALUE 2 screen (page 104 Fig. 79).
O_2 LIMIT VALUE	The O_2 correction cannot obtain the operation accuracy when the O_2 measurement value is close to 21 vol%. When the value exceeds the set limit value, the O_2 limit value is operated as the O_2 measurement value. Pressing the button at the right of [O_2 LIMIT VALUE] displays the O_2 LIMIT VALUE screen (page 105 Fig. 80).

3. Press the button corresponding to the item to be set. The setting screen appears.
For the detailed information on each setting screen, refer to page 102 to page 105.

4. Change the setting in each setting screen, and press the [SET] key.
The setting is changed and the screen returns to the O_2 CORRECTION SET screen.

Tip

To cancel the change, press the [CANCEL] key. The change is canceled and the screen returns to the O_2 CORRECTION SET screen.

5. Press the [EXIT] key in the O_2 CORRECTION SET screen.
The screen returns to the MENU 4/5 (OPTION menu) screen.

6. Press the [EXIT] key in the MENU 4/5 (OPTION menu) screen.
The screen returns to the MEAS. screen.

● **Mode**

Sets the O_2 correction mode.

Pressing the button at the right of [MODE] in the O_2 CORRECTION SET screen displays the O_2 CORRECTION MODE screen.

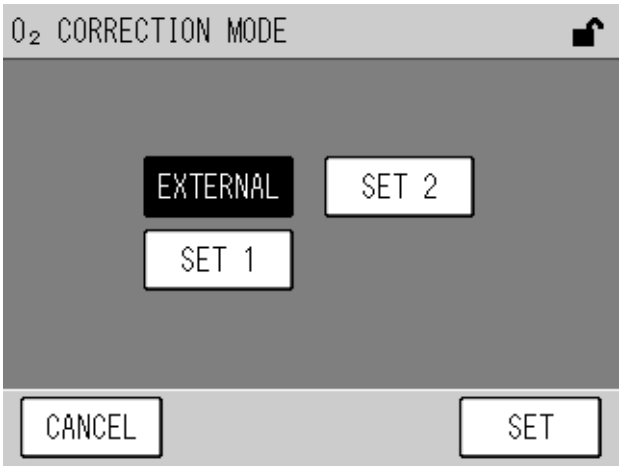


Fig. 77 O_2 CORRECTION MODE screen

Setting item	Description
EXTERNAL	Switches the O2 SET VALUE1 with O_2 SET VALUE 2 via external contact input to perform the O_2 correction operation.
SET 1	Performs the O_2 correction operation using the value set by O_2 SET VALUE 1.
SET 2	Performs the O_2 correction operation using the value set by O_2 SET VALUE 2.

Pressing the button of the item to be set, and press the [SET] key.

The setting is changed, and the screen returns to the O_2 CORRECTION SET screen.

● **O_2 SET VALUE 1**

Pressing the button at the right of [O_2 SET VALUE 1] in the O_2 CORRECTION SET screen displays the O_2 SET VALUE 1 screen.

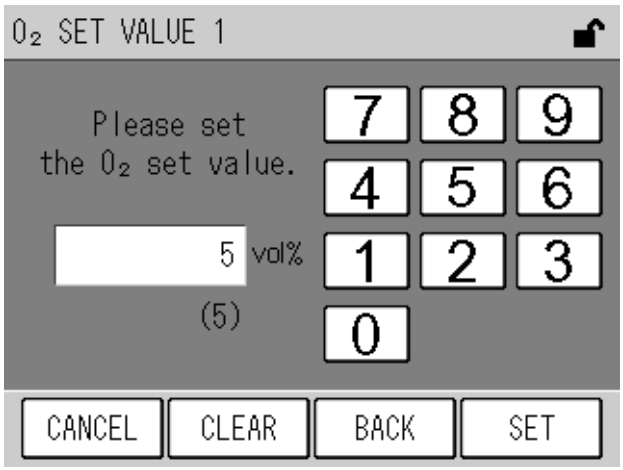


Fig. 78 O_2 SET VALUE 1 screen

Setting item	Setting range
O_2 SET VALUE	0 to 20

Pressing the numerical keypad to input the value.
Pressing each key allows the corresponding operation as follows:

CANCEL	Returns to the O_2 CORRECTION SET screen without changing the setting.
CLEAR	The value input to the editing area is cleared.
BACK	The last digit input is cleared.
SET	Returns to the O_2 CORRECTION SET screen with the setting changed.

● **O_2 SET VALUE 2**

Pressing the button at the right of [O_2 SET VALUE 2] in the O_2 CORRECTION SET screen displays the O_2 SET VALUE 2 screen.

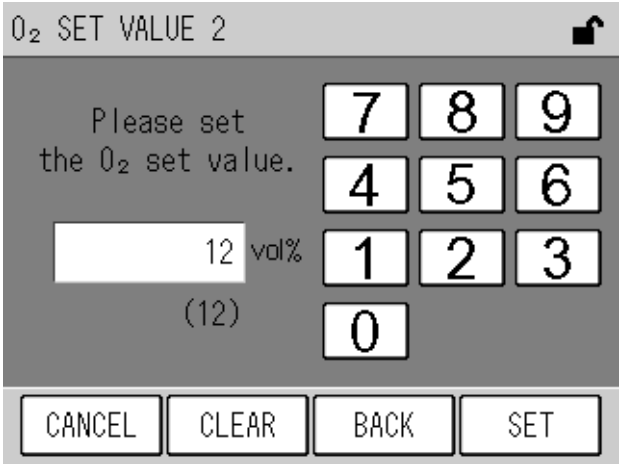


Fig. 79 O_2 SET VALUE 2 screen

Setting item	Setting range
O_2 SET VALUE	0 to 20

Pressing the numerical keypad to input the value.
Pressing each key allows the corresponding operation as follows:

CANCEL	Returns to the O_2 CORRECTION SET screen without changing the setting.
CLEAR	The value input to the editing area is cleared.
BACK	The last digit input is cleared.
SET	Returns to the O_2 CORRECTION SET screen with the setting changed.

● **O_2 Limit value**

Pressing the button at the right of [O_2 LIMIT VALUE] in the O_2 CORRECTION SET screen displays the O_2 LIMIT VALUE screen.

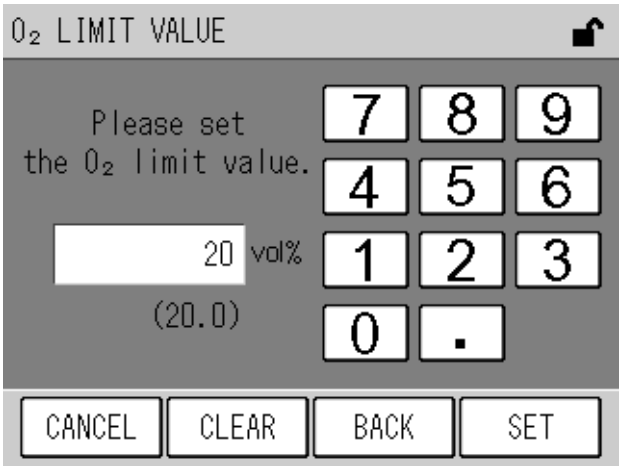


Fig. 80 O_2 LIMIT VALUE screen

Setting item	Setting range
O_2 LIMIT VALUE	1.0 to 21.0

Pressing the numerical keypad to input the value.
Pressing each key allows the corresponding operation as follows:

CANCEL	Returns to the O_2 CORRECTION SET screen without changing the setting.
CLEAR	The value input to the editing area is cleared.
BACK	The last digit input is cleared.
SET	Returns to the O_2 CORRECTION SET screen with the setting changed.

10.3 Rolling Average/ Integration

Rolling average/Integration function is the operation function of the integration value as well as the rolling average value necessary for the comparison and judgment with the environmental standard by the measurement value and O_2 correction value.

10.3.1 Rolling average time set

This section describes the setting operation of the rolling average time.
Two kinds of average times can be set: For corrected CO and Except for the corrected CO.

1. **Press the [MENU] key in the MEAS. screen.**
Press the [▶] key three times to display the MENU 4/5 (OPTION menu) screen.

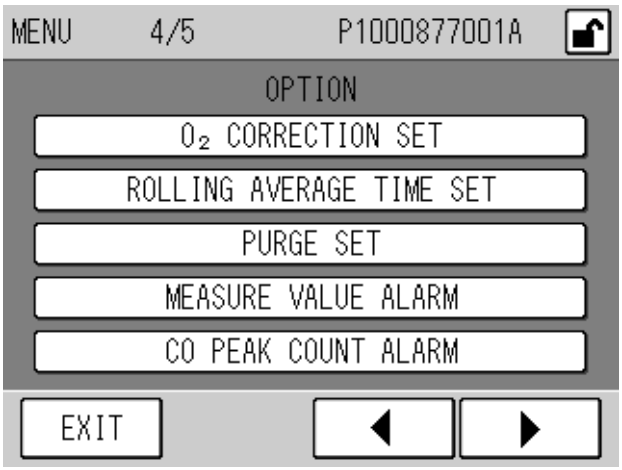


Fig. 81 MENU 4/5 (OPTION menu) screen

2. **Press the [ROLLING AVERAGE TIME SET] button.**
The ROLLING AVERAGE TIME SET screen appears.

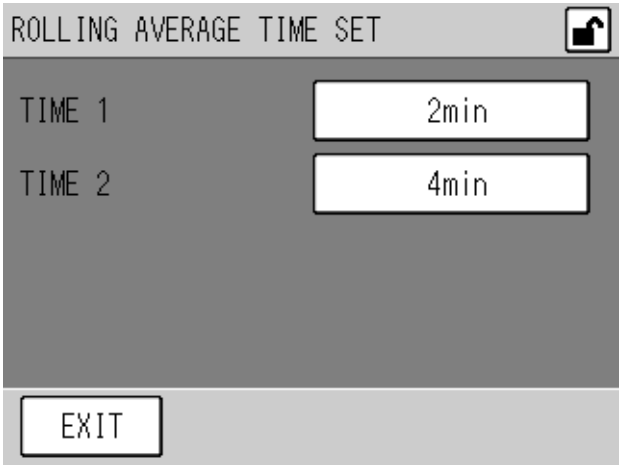


Fig. 82 ROLLING AVERAGE TIME SET screen

Setting item	Description
TIME 1	Sets the rolling average time except for the corrected CO. Pressing the button at the right of [TIME 1] displays the ROLLING AVERAGE TIME SET 1 screen (page 108 Fig. 83).
TIME 2	Sets the rolling average time for the corrected CO. Pressing the button at the right of [TIME 2] displays the ROLLING AVERAGE TIME SET 2 screen (page 109 Fig. 84).

3. **Press the button corresponding to the item to be set. The setting screen appears.**
For the detailed information on each setting screen, refer to page 108 to page 109.

4. **Change the setting in each setting screen, and press the [SET] key.**
The setting is changed and the screen returns to the ROLLING AVERAGE TIME SET screen.

Tip

To cancel the change, press the [CANCEL] key. The change is canceled and screen returns to the ROLLING AVERAGE TIME SET screen.

5. **Press the [EXIT] key in the ROLLING AVERAGE TIME SET screen.**
The screen returns to the MENU 4/5 (OPTION menu) screen.

6. **Press the [EXIT] key in the MENU 4/5 (OPTION menu) screen.**
The screen returns to the MEAS. screen.

● **Time 1**

Pressing the button at the right of [TIME 1] in the ROLLING AVERAGE TIME SET screen displays the ROLLING AVERAGE TIME SET 1 screen.

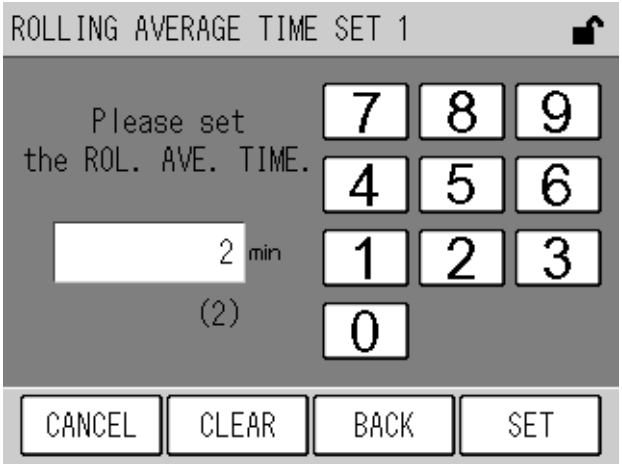


Fig. 83 ROLLING AVERAGE TIME SET 1 screen

Setting item	Setting range
ROLLING AVERAGE TIME	1 to 60

Pressing the numerical keypad to input the value.
Pressing each key allows the corresponding operation as follows:

CANCEL	Returns to the ROLLING AVERAGE TIME SET screen without changing the setting.
CLEAR	The value input to the editing area is cleared.
BACK	The last digit input is cleared.
SET	Returns to the ROLLING AVERAGE TIME SET screen with the setting changed.

Note

Setting the ROLLING AVERAGE TIME 1 more than 60 minutes automatically sets the time to 60 minutes.

● **Time 2**

Pressing the button at the right of [TIME 2] in the ROLLING AVERAGE TIME SET screen displays the ROLLING AVERAGE TIME SET 2 screen.

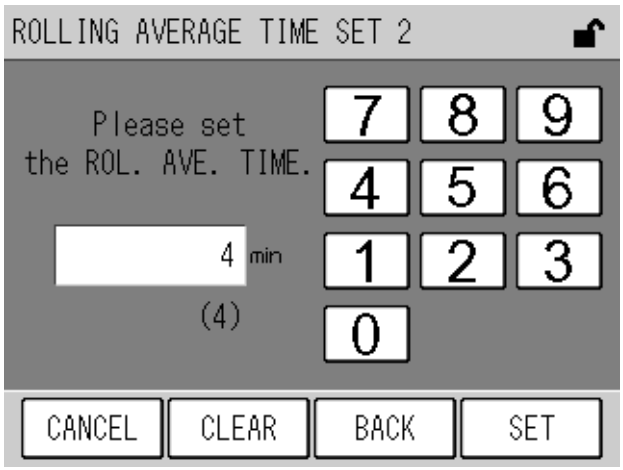


Fig. 84 ROLLING AVERAGE TIME SET 2 screen

Setting item	Setting range
ROLLING AVERAGE TIME	1 to 240

Pressing the numerical keypad to input the value.
Pressing each key allows the corresponding operation as follows:

CANCEL	Returns to the ROLLING AVERAGE TIME SET screen without changing the setting.
CLEAR	The value input to the editing area is cleared.
BACK	The last digit input is cleared.
SET	Returns to the ROLLING AVERAGE TIME SET screen with the setting changed.

Note

Setting the ROLLING AVERAGE TIME 2 more than 240 minutes automatically sets the time to 240 minutes.

10.3.2 Integration time

The integration time for the integration value is fixed to each one hour.
It is reset per hour from power ON or from the integration value is reset.

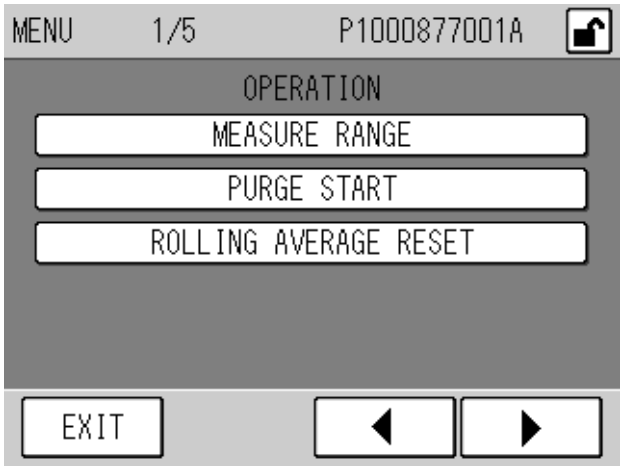
Note

- **In purge, in calibration ,and in maintenance (with the output hold specification), the rolling average time as well as the integration time are accumulated and calculated just before they are held.**
- **In changing the rolling average time, the data before the change is temporarily reset, and the time newly changed is used for the calculation.**

10.3.3 Integration/ rolling average time reset

This is the function to reset the integration value as well as the rolling average time.

1. **Press the [MENU] key in the MEAS. screen.**
The MENU 1/5 (OPERATION menu) screen appears.



* Functions of “PURGE START,” “ROLLING AVERAGE RESET” are optional.

Fig. 85 MENU 1/5 (OPERATION menu) screen

2. **Press the [ROLLING AVERAGE RESET] button.**
The confirmation message appears.

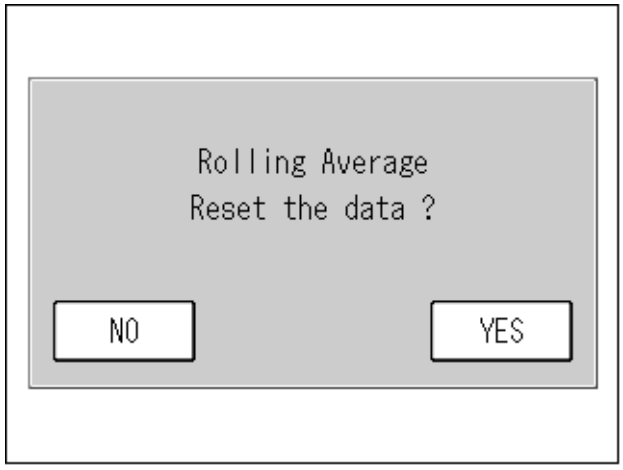


Fig. 86 Data reset confirmation screen

NO	The screen returns to the MENU 1/5 (OPERATION menu) screen without the data reset.
YES	Resets the data and the screen returns to the MENU 1/5 (OPERATION menu) screen.

10.4 Measurement Value Alarm

When the measurement concentration is over or below the set value, the alarm can be triggered.

10.4.1 Measure value alarm

This section describes the setting operation of measure value alarm.
There are three types for setting the alarm: HIGH, H.HIGH and LOW.

1. **Press the [MENU] key in the MEAS. screen.**
Press the [▶] key three times to display the MENU 4/5 (OPTION menu) screen.

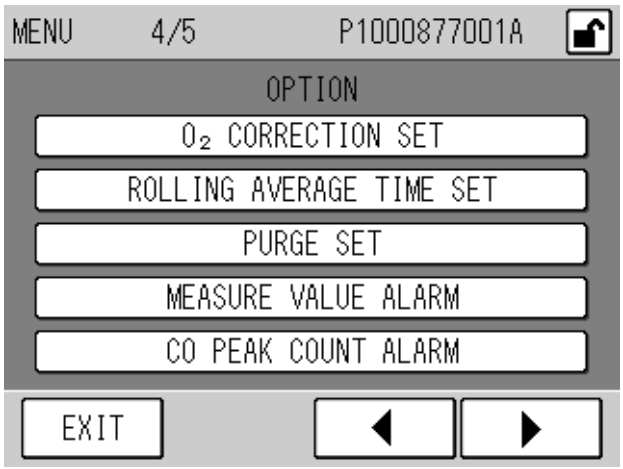


Fig. 87 MENU 4/5 (OPTION menu) screen

2. **Press the [MEASURE VALUE ALARM] button.**
The MEASURE VALUE ALARM screen appears.

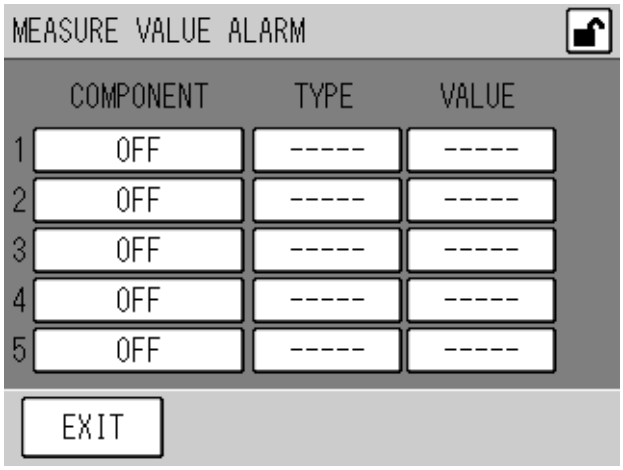


Fig. 88 MEASURE VALUE ALARM screen

Setting item	Description
COMPONENT	Sets the component for which the alarm is output. Pressing the button at the lower of [COMPONENT] displays the COMPONENT screen (page 112 Fig. 89).
TYPE	Sets the HIGH, H.HIGH, and LOW alarm. Pressing the button at the lower of [TYPE] displays the ALARM TYPE screen (page 113 Fig. 91).
VALUE	Sets the concentration regarded as alarm. Pressing the button at the lower of [VALUE] displays the ALARM VALUE screen (page 114 Fig. 92).

3. **Press the button corresponding to the item to be set. The setting screen appears.**
For the detailed information on each setting screen, refer to page 112 to page 114.

4. **Change the setting in each setting screen, and press the [SET] key.**
The setting is changed and the screen returns to the MEASURE VALUE ALARM screen.

Tip

To cancel the change, press the [CANCEL] key. The change is canceled and screen returns to the MEASURE VALUE ALARM screen.

5. **Press the [EXIT] key in the MEASURE VALUE ALARM screen.**
The screen returns to the MENU 4/5 (OPTION menu) screen.

6. **Press the [EXIT] key in the MENU 4/5 (OPTION menu) screen.**
The screen returns to the MEAS. screen.

Note

- **The following state stops the alarm judgment and releases an alarm in occurrence.**
  ・5 minutes from power ON ・In maintenance
- **The following state maintains the condition just before the alarm occurrence.**
  ・In AIC (In introducing the calibration gas) ・In purge

● **Component**

Pressing the button showing the component to be set in the MEASURE VALUE ALARM screen displays the COMPONENT screen.

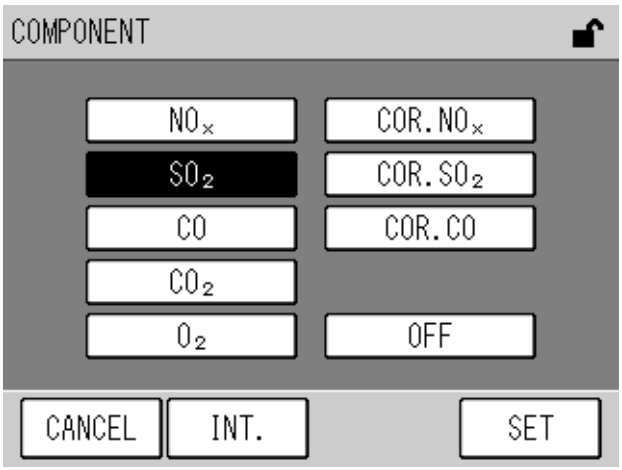


Fig. 89 COMPONENT screen (MEAS. mode)

Press the button of item to be set and press the [SET] key.
The setting is changed and the screen returns to the MEASURE VALUE ALARM screen.
To set the integration value or rolling time average, press the [INT.] key.

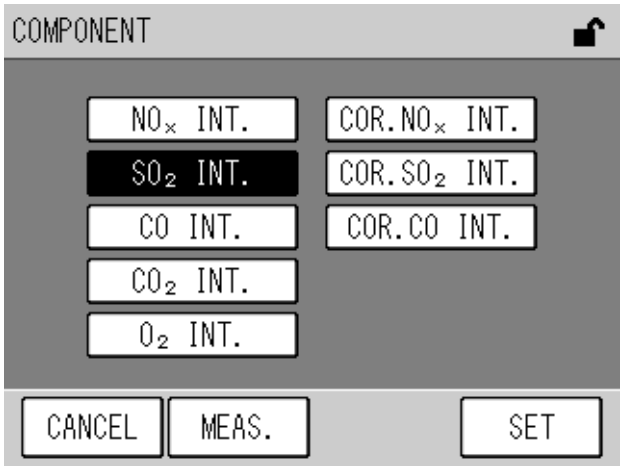


Fig. 90 COMPONENT screen (Integration mode)

Press the button of item to be set as MEASURE VALUE ALARM and press the [SET] key.
The setting is changed and the screen returns to the MEASURE VALUE ALARM screen.

● **Alarm type**

Pressing the button showing the alarm type in the MEASURE VALUE ALARM screen displays the ALARM TYPE screen.

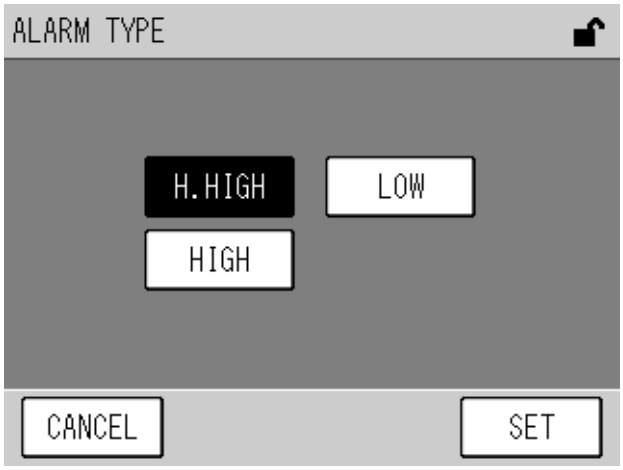


Fig. 91 ALARM TYPE screen

Setting item	Description
H.HIGH	Triggers the alarm when the measurement value exceeds the H.HIGH value.
HIGH	Triggers the alarm when the measurement value exceeds the HIGH value.
LOW	Triggers the alarm when the measurement value is below the LOW value.

Press the button of item to be set and press the [SET] key.
The setting is changed and the screen returns to the MEASURE VALUE ALARM screen.

● **Alarm value**

Pressing the [VALUE] button in the MEASURE VALUE ALARM screen displays the ALARM VALUE screen.

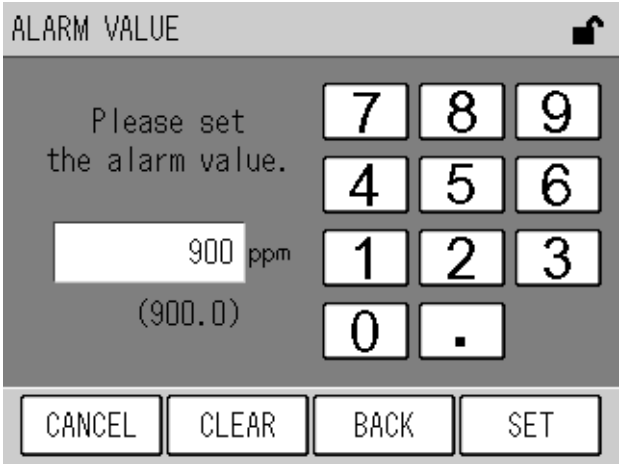


Fig. 92 ALARM VALUE screen

Pressing the numerical keypad to input the value.
Pressing each key allows the corresponding operation as follows:

CANCEL	Returns to the MEASURE VALUE ALARM screen without changing the setting.
CLEAR	The value input to the editing area is cleared.
BACK	The last digit input is cleared.
SET	Returns to the MEASURE VALUE ALARM screen with the setting changed.

Note

- **In the state without selecting COMPONENT cannot set TYPE or ALARM VALUE.**
- **Even without setting the H.HIGH alarm, the H.HIGH alarm can be used.**
  The H.HIGH alarm and HIGH alarm are independent each other.
  At input these alarm values, set so that H.HIGH value is more than HIGH value.

10.5 Peak Count (with CO Analyzer)

The peak count is the function to count the time exceeding the set concentration value. When the peak count per hour exceeds the set times, the alarm is triggered.

10.5.1 Peak count set

This section describes the setting operation of peak count set.

1. **Press the [MENU] key in the MEAS. screen.**
   Press the [▶] key three times to display the MENU 4/5 (OPTION menu) screen.

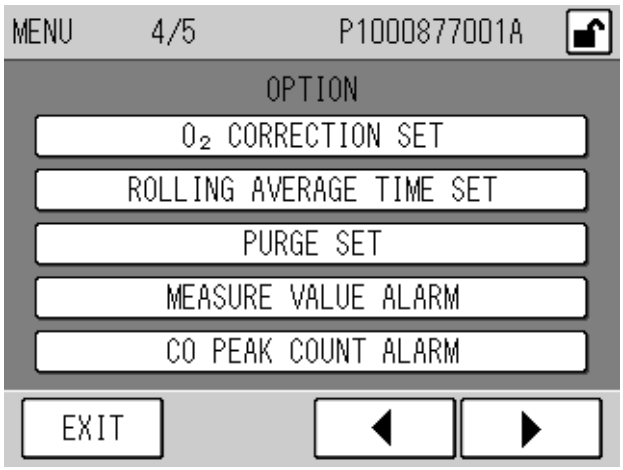


Fig. 93 MENU 4/5 (OPTION menu) screen

2. **Press the [CO PEAK COUNT ALARM] button.**
   The CO PEAK COUNT ALARM screen appears.

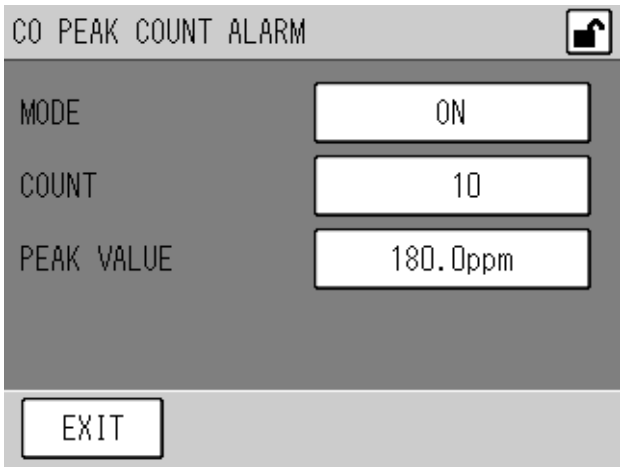


Fig. 94 CO PEAK COUNT ALARM screen

Setting item	Description
MODE	Switches the ON/OFF of CO PEAK COUNT ALARM. Pressing the button at the right of [MODE] displays the CO PEAK COUNT MODE screen (page 116 Fig. 95).
COUNT	Sets the peak count per hour to output the alarm. Pressing the button at the right of [COUNT] displays the COUNTER screen (page 118 Fig. 97).
PEAK VALUE	Sets the CO concentration to count the PEAK VALUE. Pressing the button at the right of [PEAK VALUE] displays the PEAK VALUE screen (page 119 Fig. 98).

3. **Press the button corresponding to the item to be set. The setting screen appears.**
For the detailed information on each setting screen, refer to page 116 to page 119.

4. **Change the setting in each setting screen, and press the [SET] key.**
The setting is changed and the screen returns to the CO PEAK COUNT ALARM screen.

Tip

To cancel the change, press the [CANCEL] key. The change is canceled and screen returns to the CO PEAK COUNT ALARM screen.

5. **Press the [EXIT] key in the CO PEAK COUNT ALARM screen.**
The screen returns to the MENU 4/5 (OPTION menu) screen.

6. **Press the [EXIT] key in the MENU 4/5 (OPTION menu) screen.**
The screen returns to the MEAS. screen.

Note

The following state stops the peak count function.
- **Five (5) minutes from the power ON**
- **In AIC (In introducing the calibration gas)**
- **In purge**
- **In maintenance**

● **Mode**

Pressing the [MODE] button in the CO PEAK COUNT screen displays the CO COUNT MODE screen.

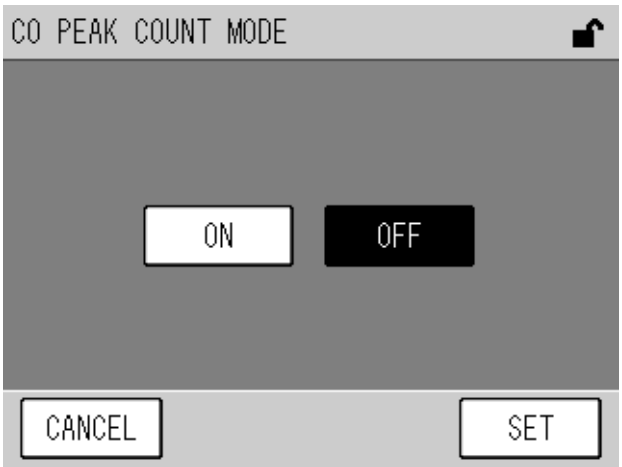


Fig. 95 CO COUNT MODE screen

Select ON/OFF and press the [SET] key.
The setting is changed and the screen returns to the CO PEAK COUNT screen.

Note

- **Operation from [ON] to [OFF] resets the current count value, set count value and the peak value. When CO PEAK COUNT ALARM is output, this operation releases the alarm.**
- **Operation from [OFF] to [ON] starts counting time.**
- **The peak count value counts time by the interval of 1 minute. When 60 minutes are elapsed, the peak count for the first minute (60 minutes ago) is deleted, and the counting continues.**

The following shows the typical image of peak count sequence.
Example: PEAK COUNT ALARM output times: 5 (times)

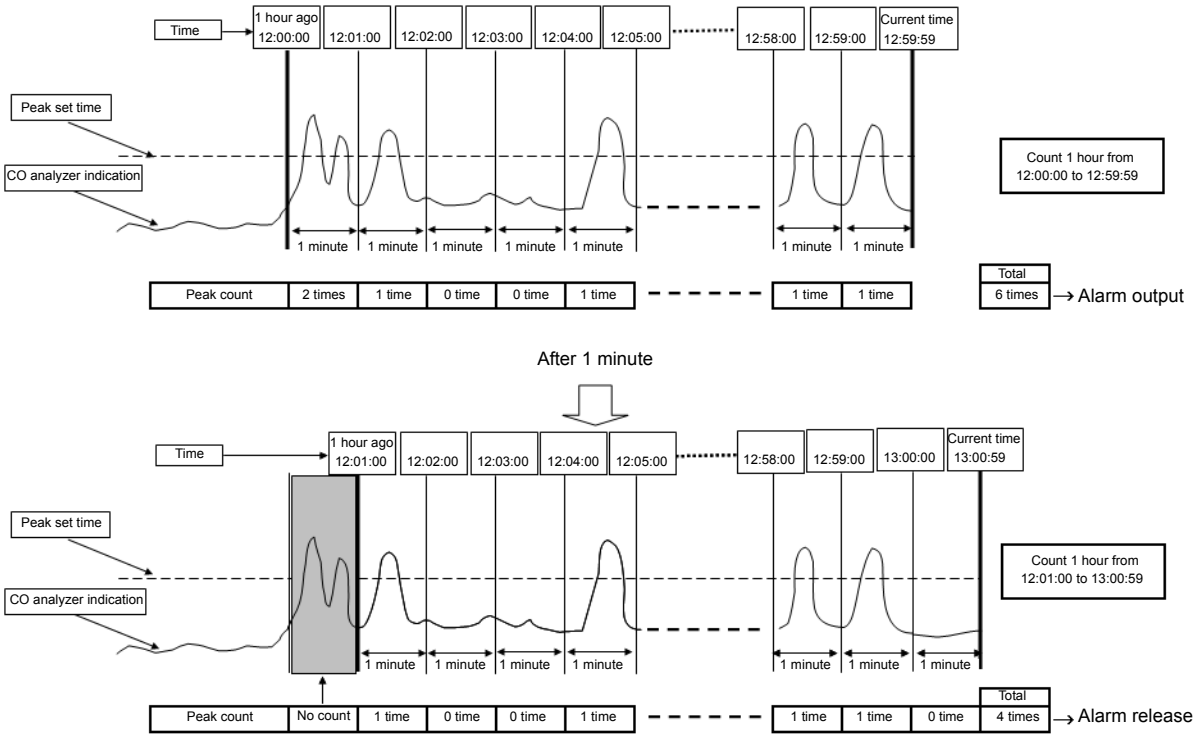


Fig. 96 Peak count operation sequence

Tip

In changing the peak count value, to start the count by resetting the current count value, switch MODE to the following way: ON to OFF to ON.
The current count value can be reset by this operation.

● **Count value**

Pressing the [COUNT] in the CO PEAK COUNT screen displays the COUNTER screen.

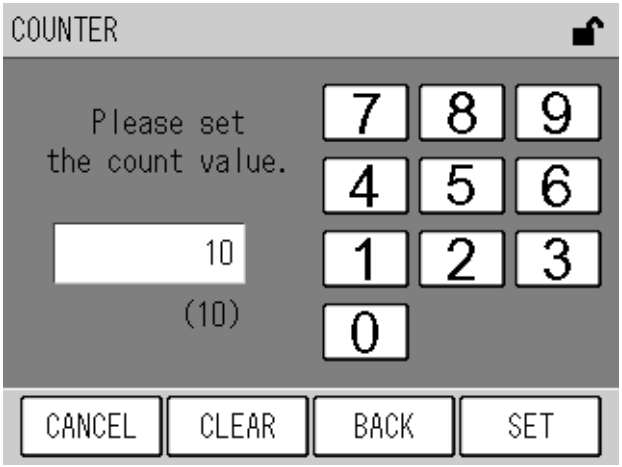


Fig. 97 COUNTER screen

Setting item	Setting range
Count value	1 to 99

Pressing the numerical keypad to input the value.
Pressing each key allows the corresponding operation as follows:

CANCEL	Returns to the CO PEAK COUNT ALARM screen without changing the setting.
CLEAR	The value input to the editing area is cleared.
BACK	The last digit input is cleared.
SET	Returns to the CO PEAK COUNT ALARM screen with the setting changed.

Note

When the CO PEAK COUNT mode is OFF, the count value setting is not available.

● **Peak value**

Pressing the [PEAK VALUE] in the CO PEAK COUNT screen displays the PEAK COUNT VALUE screen.

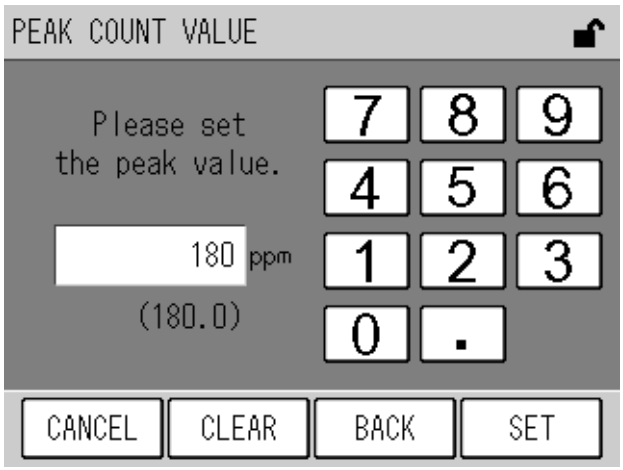


Fig. 98 PEAK COUNT VALUE screen

Pressing the numerical keypad to input the value.
Pressing each key allows the corresponding operation as follows:

CANCEL	Returns to the CO PEAK COUNT ALARM screen without changing the setting.
CLEAR	The value input to the editing area is cleared.
BACK	The last digit input is cleared.
SET	Returns to the CO PEAK COUNT ALARM screen with the setting changed.

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