

Explosion-Proof Process Gas Analyzer TIA-51d/EIA-51d

Instruction Manual

CODE:GZ0000193748

Preface

This manual describes the operation of the Explosion-Proof Process Gas Analyzer, TIA-51d/EIA-51d.

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, Ltd. warrants that the Product shall be free from defects in material and workmanship and agrees to repair or replace free of charge, at option of HORIBA, Ltd., any malfunctioned or damaged Product attributable to responsibility of HORIBA, Ltd. 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, Ltd.
- 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, Ltd. such as natural disasters
- Any deterioration in appearance attributable to corrosion, rust, and so on
- Replacement of consumables

HORIBA, LTD. 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.

Regulations

Conformable Directive

This equipment conforms to the following directives and standards:



Directives: the EMC Directive 2004/108/EC
the Low Voltage Directive 2006/95/EC
Standards: [the EMC Directive]
EN61326-1: 2006 Class A, industry
[the Low Voltage Directive] EN61010-1: 2001

■ Installation Environment

This product is designed for the following environment.

- Installation Categories II
- Pollution degree 2

■ Information on Disposal of Electrical and Electronic Equipment and Disposal of Batteries and Accumulators

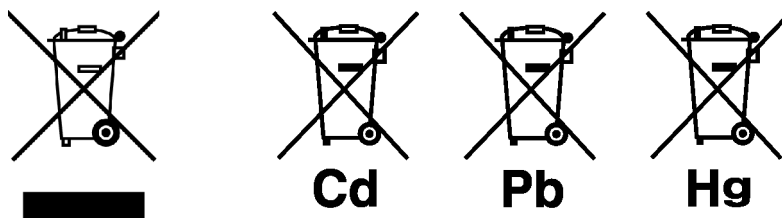
The crossed out wheeled bin symbol with underbar shown on the product or accompanying documents indicates the product requires appropriate treatment, collection and recycle for waste electrical and electronic equipment (WEEE) under the Directive 2002/96/EC, and/or waste batteries and accumulators under the Directive 2006/66/EC in the European Union.

The symbol might be put with one of the chemical symbols below. In this case, it satisfies the requirements of the Directive 2006/66/EC for the object chemical.

This product should not be disposed of as unsorted household waste.

Your correct disposal of WEEE, waste batteries and accumulators will contribute to reducing wasteful consumption of natural resources, and protecting human health and the environment from potential negative effects caused by hazardous substance in products.

Contact your supplier for information on applicable disposal methods.



FCC Rules

Any changes or modifications not expressly approved by the party responsible for compliance shall void the user's authority to operate the equipment.

■ **WARNING**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

For Your Safety

Hazard Classification and Warning Symbols

Warning messages are described in the following manner. Read the messages and follow the instructions carefully.

● Hazard classification



This indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.



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



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.

Without safety alert indication of hazardous situation which, if not avoided, could result in property damage.

● Warning symbols



Description of what should be done, or what should be followed



Description of what should never be done, or what is prohibited

Safety Precautions

This section provides precautions to enable you to use the product safely and correctly and to prevent injury and damage. The terms of DANGER, WARNING, and CAUTION indicate the degree of imminency and hazardous situation. Read the precautions carefully as it contains important safety messages.

 WARNING	
	Risk of explosion • Do not replace the mounted cable glands with other cable glands. • Only use specified cables. The use of other cables cannot guarantee the explosion-proof performance and can create a risk of explosion.
	Risk of explosion Do not open the enclosure while the power is ON. Do not open the enclosure if there is a risk of explosive gas in the vicinity of the unit even when the power is OFF.
	Risk of hazardous gas Sample gas, including explosive and toxic gas, is discharged from the sample gas outlet. Connect the piping and discharge to a location with a safe atmospheric pressure level.
	Risk of electric shock Ground the unit to prevent electric shock. Never ground the unit to a gas pipe or other hazardous location.
 CAUTION	
	Heavy load The unit weighs more than 50 kg. Be careful when removing the analyzer section from the frame before moving the unit.

Product Handling Information

Operational Precautions

Use of the equipment in a manner not specified by the manufacturer may impair the protection provided by the equipment. And it may also reduce equipment performance.

Exercise the following precautions:

- Do not disassemble or modify the instrument by yourself unless explicitly indicated in this manual.
- Do not give a shock or large vibrations to the products. To move the PD to another location, contact our service or sales office.
- Check that the enclosure cover is closed and the power source is proper before power is ON.
- High-pressure gas is used on calibration.
 - Be well-ventilated place.
 - Take care to handle high pressure gas.
- Exercise the following precautions on operation, maintenance and repairment.
 - Be certain that the instrument is grounded.
Do not turn ON the instrument unless grounding.
 - Never disassemble or assemble the instrument when the power is ON, or when it is plugged in.
Do not open the cover while turning ON the instrument. Make sure there is no explosive gas around and main power, communication and contact output voltage is OFF.
 - Wear safety equipment.
Wear safety glasses and gloves when necessary.
 - Take care to handle high pressure gas.
Be certain that the attachment and removal of pressure regulator are performed.
Be secure the cylinder.
- Do not open the cover except the terminal cover for using external wiring.
 - Handling covers of the enclosure except the terminal cover is determined for service personnel.
 - Do not use the attached cover opening and closing jig for otherwise purpose.

Disposal of the Product

When disposing of the product, follow the related laws and/or regulations of your country for disposal of the product.

Manual Information

Description in This Manual

Note

This interprets the necessary points for correct operation and notifies the important points for handling the unit.

Reference

This indicates the part of where to refer the information.

Tip

This indicates reference information.

Contents

Overview	1
Explosion-Proof Electrical Equipment	2
Hazardous areas and explosion-proof construction	2
Explosion-proof construction of this electrical equipment.	3
Description of Parts	4
Exterior	4
Terminal interface	6
Display unit and operation keys	8
Operations	11
Starting the unit	11
Display operation	13
Calibration	19
Measurement	30
Daily checks and management	37
Other functions	41
List of codes	56
Installation and Storage	58
Installation	58
Storing for a long period of time	65
Maintenance	66
Daily checks	67
Regular inspection	68
Parts replacement	69
Troubleshooting	70
Alarm types and determination conditions	70

Troubleshooting alarms	72
General troubleshooting	73
Reference Information	76
Measurement principle	76
Specifications	78
Supplied accessories	80

Overview

The 51 Series Explosion-Proof Process Gas Analyzer provides long-term, stable gas analysis for environments that require the use of explosion-proof electrical equipment.

Protection is provided by two types of explosion-proof constructions: flame-proof construction or pressurized construction. Note that in pressurized constructions, not all components require pressurization protection. The two tables below indicate the protection used for each analyzer.

● Flame-proof construction type

Model	Code	Measurement principle	Notes
EIA-51d	ExdIIB+H ₂ T4	Non-dispersive infrared absorption method	–
TIA-51d			High sensitivity-type
MPA-51d		Magnetic pressure method (pressure detecting magnetic force method)	–
PMA-51d		Magnetic dumbbell method (dumbbell-shaped magnetic force method)	–
TCA-51d		Heat-conductivity method	–

● Pressurized construction type

Model	Code	Measurement principle	Notes
EIA-51p	ExpXIIT4X	Non-dispersive infrared absorption method	–
TIA-51p			High sensitivity-type
MPA-51p	ExpdIICT4X	Magnetic pressure method (pressure detecting magnetic force method)	–
TCA-51p		Heat-conductivity method	–

Explosion-Proof Electrical Equipment

Hazardous areas and explosion-proof construction

This analyzer is manufactured based on the "Explosion Prevention Guidelines for Industrial Electrical Equipment" technical guide.

Electrical machinery and devices for use in hazardous areas must use a construction with an explosion-proof performance according to the type of hazardous area where used as well as the type of explosive gas used and the concentration of gas at which an explosion can occur.

Table 1 Types of hazardous areas

Special hazardous area	An area where a concentration of an explosive gas or vapor is continuously present, present for long periods, or frequently present
First category hazardous area	An area where a concentration of an explosive gas or vapor may be present; however only under abnormal conditions.
Second category hazardous area	An area where a concentration of explosive gas or vapor is not likely to occur under normal conditions, and if it occurs will only exist for a short time

Table 2 Types of explosion-proof construction that can be used for each hazardous area

Type of explosion-proof construction	Code	Special hazardous area	First category hazardous area	Second category hazardous area
Intrinsically safe explosion-proof construction	ia	✓	✓	✓
Intrinsically safe explosion-proof construction	ib		✓	✓
Resin-filled explosion-proof construction	ma	✓	✓	✓
Resin-filled explosion-proof construction	mb		✓	✓
Flame-proof construction	d		✓	✓
Pressurized construction	p		✓	✓
Semi-explosion-proof construction	e		✓	✓
Oil-injected explosion-proof construction	o		✓	✓
Non-igniting explosion-proof construction	n			✓

Explosion-proof construction of this electrical equipment

This analyzer conforms to "Exd II B+H₂ T4" explosion-proof construction.

The following are the descriptions of this code.

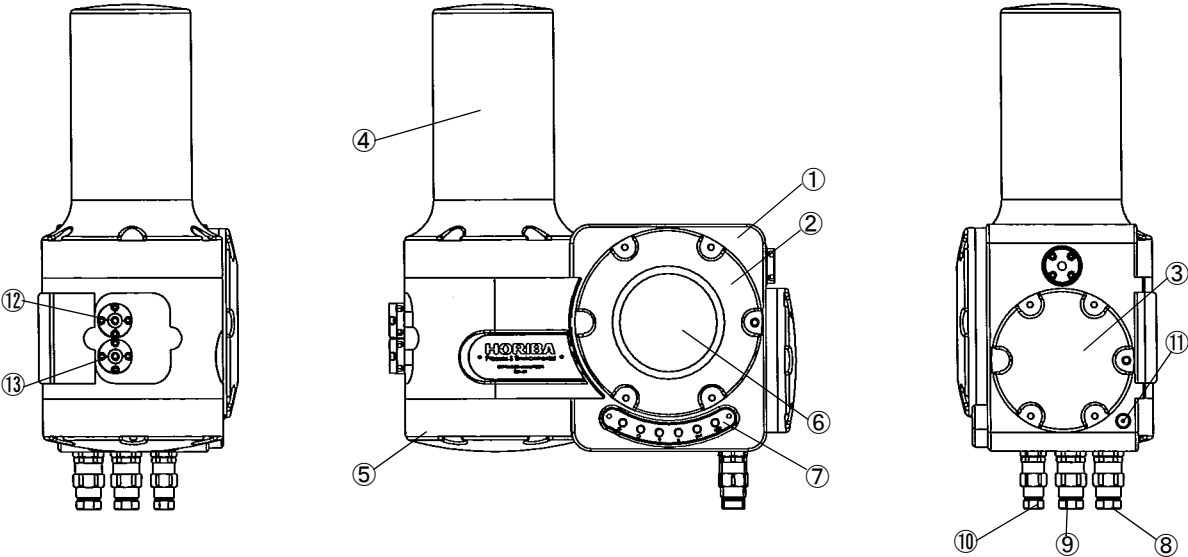
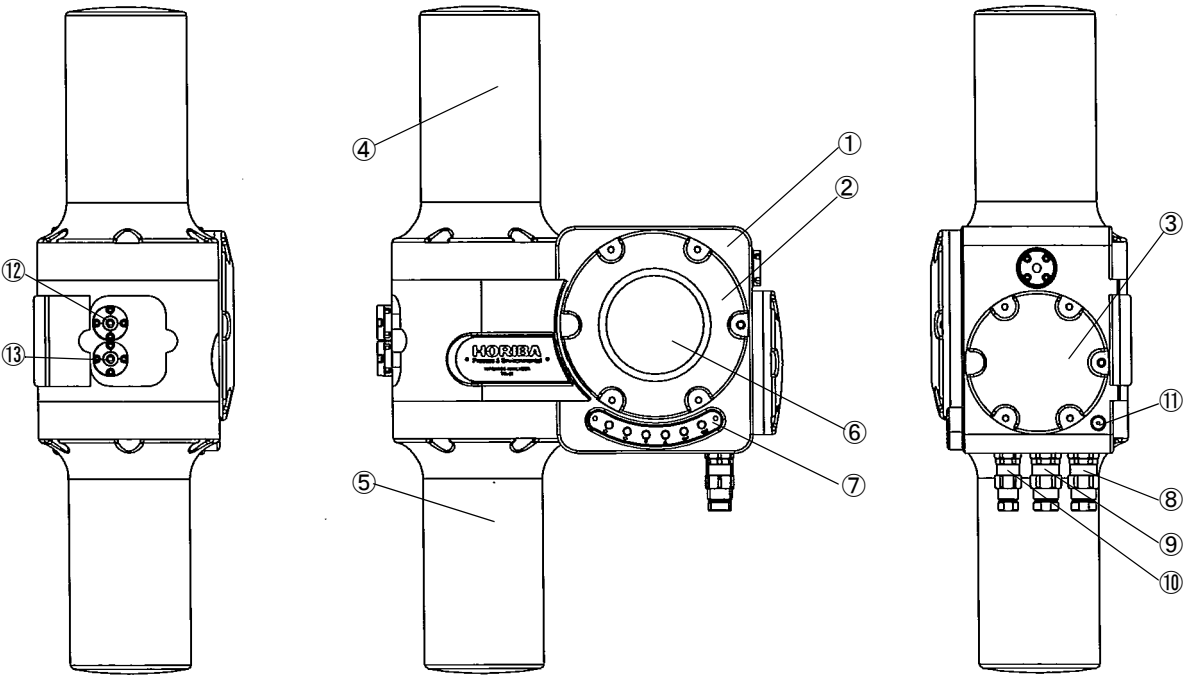
- Ex: Indicates conformance with explosion-proof construction.
- d: Indicates that this is a flame-proof construction.
- II B+H₂: Indicates that this is an electrical equipment group.
 - II A: Type A explosive gas for industrial or commercial use
 - II B: Type B explosive gas for industrial or commercial use
 - II B+H₂: Type B explosive gas for industrial or commercial use and hydrogen
 - II C: Type C explosive gas for industrial or commercial use
- T4: Indicates category of maximum surface temperature (temperature class).
 - T1: Maximum surface temperature of 450°C
 - T2: Maximum surface temperature of 300°C
 - T3: Maximum surface temperature of 200°C
 - T4: Maximum surface temperature of 135°C
 - T5: Maximum surface temperature of 100°C
 - T6: Maximum surface temperature of 85°C

A flame-proof construction is defined as "a system with a fully-closed construction, and in the case of explosive gas entering the enclosure and generating an explosion, the enclosure withstands explosive pressure and the explosive flame does not ignite gas or vapor outside the enclosure".

To ensure the explosion-proof performance, the surfaces of the joined parts of the enclosure have precise spacing and depth. If the enclosure must be opened, be careful not to scratch the surfaces of the joined parts.

Description of Parts

Exterior



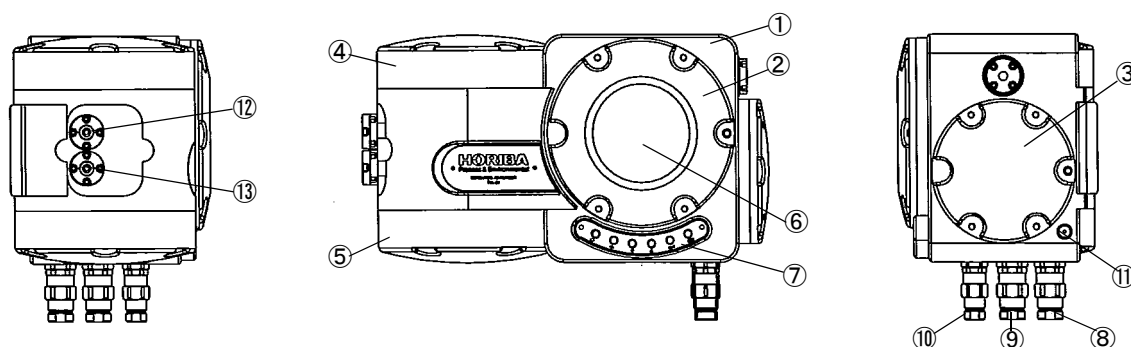


Fig. 3 Exterior of EIA-51d (2)

Table 3 Description of analyzer parts

No.	Part name		Description
1	Enclosure	Main unit	The enclosure comprises (1) the main unit, (2) display unit cover, (3) terminal cover, (4) detector top cover, and (5) detector bottom cover. Do not open any of these except the terminal cover.
2		Display unit cover	
3		Terminal cover	
4		Detector top cover	
5		Detector bottom cover	
6	Display unit		Displays the measured value and other information. See "Display unit" (p. 8) for details.
7	Operation keys		Use the ←, →, ▽, △, ENT, and ESC keys to operate the display and configure the settings.
8	Wire inlets		These are the inlets for the wires. See “ Wiring ” (page 61) for details. The provided cable glands (with seals) are used to ensure the explosion-proof performance of the inlets, so these cannot be replaced with other cable glands.
9			
10			
11	Protective earth terminal		This is a protective earth terminal (M5 screw). A protective earth (PE) terminal is also provided inside the enclosure. Connect either terminal to an earth terminal that is grounded with the resistance of 100 Ω or less. See “ External protective earth terminal ” (page 64) for details.
12	Piping connections	Sample gas inlet	See “ Piping ” (page 65) for details.
13		Sample gas outlet	Flame arresters are provided on the sample gas inlet and outlet. A flame arrester cannot be used in place of a filter to prevent foreign matter contamination, so be sure to provide a filter prior to the sample gas inlet.

Terminal interface

This section describes the terminal interface of the analyzer.

● Terminal assembly

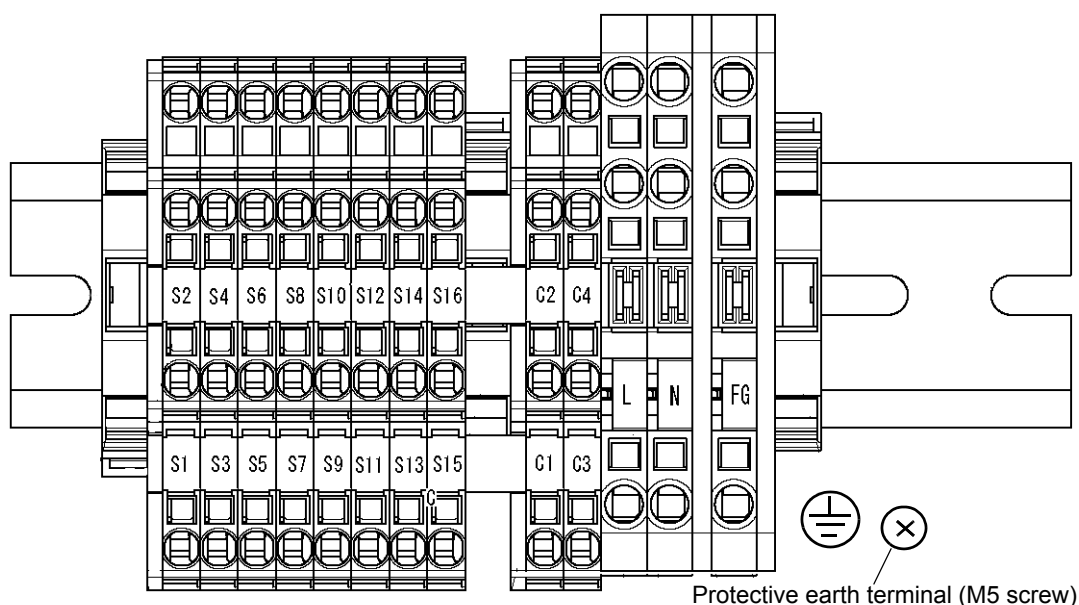


Fig. 4 Terminal block

Table 4 Terminals and their functions

Display	Terminal name	Function	Notes
	Protective earth terminal inside enclosure	Provides protective earth terminal for the analyzer. Connect this terminal (M5 screw) or the protective earth terminal (M5 screw) provided on the outside of the analyzer enclosure to a terminal that is grounded with the resistance of 100 Ω or less.	
L	Mains power (L)	Mains power terminal of the analyzer. Connect this to a power supply that conforms to the rated voltage, frequency, and current consumption of the analyzer.	
N	Mains power (N)		
FG	Internal earth terminal	Earth terminal for internal parts. No wiring is required.	
C1	Sample gas/calibration gas switching solenoid valve output	Switch between sample gas and calibration gas for automatic calibration specifications. Output is set to ON when flowing calibration gas. The same voltage of the power voltage (1100 V to 120 V AC/200 V to 240 V AC, L phase) is output.	A separate terminal block is required when using a calibration solenoid valve.
C2	Zero gas/span gas solenoid valve output	Switch between zero gas and span gas for automatic calibration specifications. Output is set to ON when flowing span gas. The same voltage of the power voltage (1100 V to 120 V AC/200 V to 240 V AC, L phase) is output.	
C3	NC	—	
C4	Solenoid valve output COM	Common terminal for solenoid valve output. The same voltage of the power voltage (1100 V to 120 V AC/200 V to 240 V AC) is output.	
S1	Shield ground	Functional earth terminal of the signal shield wire.	
S2	Shield ground		

Display	Terminal name	Function	Notes
S3	Measured value output (+)	Analog voltage/current output terminal.	Only for analog output specifications. Be sure to wire with shield wire.
S4	Measured value output (−)		
S5	Shield ground	Functional earth terminal of the signal shield wire.	
S6	Shield ground		
S7	Alarm contact output	Alarm contact output terminal. Output is set to ON (contact closed) when an alarm occurs.	Only for PIO and communication specifications. Be sure to wire with shield wire. If neither of the specifications apply, these terminals are set to "NC".
	DATA(+)	RS-485 data (+) terminal.	
S8	Caution contact output	Caution contact output terminal. Output is set to ON (contact closed) when a caution occurs.	
	DATA(−)	This is the RS-485 data (−) terminal.	
S9	Calibration/maintenance contact output	Maintenance/calibration contact output terminal. Output is set to ON (contact closed) during calibration or in management mode.	
	Calibration/maintenance contact output	Maintenance/calibration contact output terminal. Output is set to ON (contact closed) during calibration or in management mode.	
S10	Range bit 0 contact output	Outputs the measurement range and calibration range with a BCD code. See Table 5 for the relationship between the range and BCD code.	
S11	Range bit 1 contact output		
	COM	RS-485 COM terminal (communication specifications). This is not connected when connecting to equipment without a COM terminal.	
S12	Contact output COM	Common terminal for contact output.	
S13	Measurement range bit 0 contact input	Switches the measurement range with a BCD code when switched to an external range. See Table 5 for the relationship between the range and BCD code.	
S14	Measurement range bit 1 contact input		
S15	Automatic calibration start contact input	Starts automatic calibration with a closed contact pulse input of between 0.5 and 1 second for automatic calibration specifications.	
S16	Contact input COM	Common terminal for contact input.	

Table 5 Range and BCD code

Range	BCD code	
	bit 0	bit 1
1	0	0
2	1	0
3	0	1
4	1	1

0: Contact open or input OFF

1: Contact closed or input ON

Display unit and operation keys

This section describes the display unit and operation keys of the analyzer.

● **Display unit**

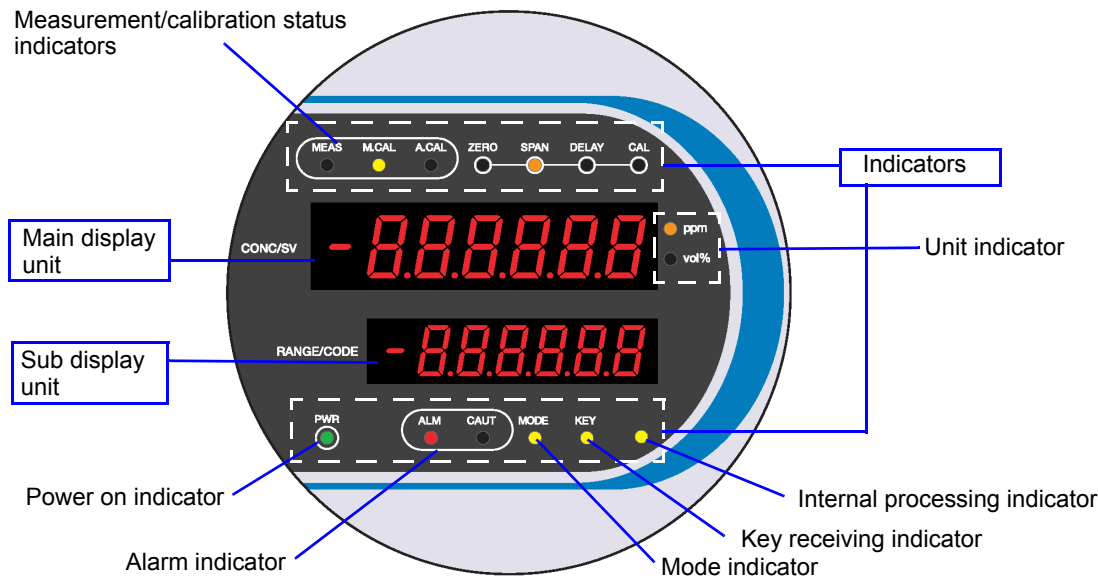


Fig. 5 Display unit

Table 6 Description of display unit

Display unit	Label	Function
Main display unit	CONC/SV	Displays the measured value and setting value.
Sub display unit	RANGE/ CODE	Displays the measurement range and menu code (some setting values).

Display unit		Label	Function	
Indicators	Measurement/ calibration status indicators	MEAS	Lights during measurement.	
		M.CAL	Lights during manual calibration.	
		A.CAL	Lights during automatic calibration (optional).	
		ZERO	During calibration	Lights when zero calibration is selected or during zero gas introduction.
			During calibration factor history display	Lights during display of zero calibration factor.
		SPAN	During calibration	Lights when span calibration is selected or during span gas introduction.
			During calibration factor history display	Lights during display of span calibration factor.
		DELAY	Lights during sample gas replacement.	
		CAL	Lights during calculation of zero/span calibration.	
	Unit indicator	ppm	Lights when the measurement range unit is ppm.	
		vol%	Lights when the measurement range unit is vol%.	
	Power on indicator	PWR	Lights when power is supplied to the analyzer.	
	Alarm indicator	ALM	Lights when an alarm occurs.	
		CAUT	Lights when a caution occurs.	
	Mode indicator	MODE	During operation mode	OFF
			During management mode	ON
	Key receiving indicator	KEY	Lights when a key operation is confirmed.	
	Internal processing indicator	(Blank)	Indicates that internal processing is being performed. Do not turn off the power when this LED is lit.	

● Operation keys

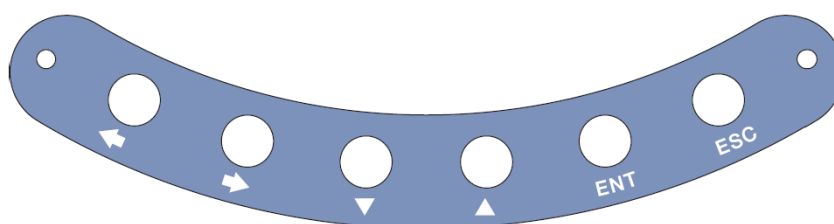


Fig. 6 Operation keys

Table 7 Description of operation keys

Operation key	Function
←/→	● Moves the cursor (flashing digit on the display) left or right. ● Switches the type of calibration during manual calibration.
▽/△	● Increases or decreases the value. ● Switches from the measurement display to the current date and time display.
ENT	● Enter, sets the changed setting. ● Switches the display in the following order: measurement display → menu code display → operation/confirmation display.

Description of Parts

Operation key	Function
ESC	• Escape, discards the changed setting. • Press and hold during the measurement display to call the mode switching display. • Switches the display in the following order: operation/confirmation display → menu code display → measurement display.
ENT/ESC	Simultaneously pressing ENT and ESC returns display from Mode switching to Measurement displays.

Operations

This chapter describes the operations required for operation, calibration, and maintenance of the analyzer.

Starting the unit

This section describes how to turn ON the power of the analyzer and introduce the sample gas.



WARNING



Risk of explosion

Do not open the enclosure while the power is ON.

Do not open the enclosure if there is a risk of explosive gas in the vicinity of the unit even when the power is OFF.

● Pre-start checklist

Check the following items before turning on the power and introducing the sample gas.

Reference

See the operation manual, supplementary descriptions, and diagrams provided separately for specifications of the sampling unit.

- Check for any loose piping joint parts, piping attaching defects, or connection faults, including the sampling piping connection, part of inlet and outlet analyzer.
- Check that all sample gas piping, calibration gas piping, and bleeding gas piping are connected to the specified interface ports, and that there are no confused or incorrect connections.
- Check that the protective earth terminal is connected to an earth terminal with a grounding resistance of 100 Ω or less.
- Check that the mains power is supplied from a sufficient main power supply with regard to the maximum power capacity of the analyzer, and that an overcurrent (leakage) with appropriate rating and interrupting capacity is supplied via a protective device.
- Check that all power and signal cables are connected to the specified terminals and that there are no confused or incorrect connections.
- Check that the power and signal cables are introduced from specified cable glands and that the cables are secured with seals to prevent air infiltration or bleeding of internal gas.
- Check that the enclosure cover is closed.
- Check that the required rating is met for the power voltage, frequency, and capacity.

● Start-up

1. Turn ON the mains power .

All LED indicators light for about three seconds, and then the LED unit switches to the measurement display.

Note

- When turning the power of the analyzer off and then on again, wait 10 seconds before turning on the power.
 - This analyzer is not equipped with a power switch. Set a power switch in power line.
-

● Warm-up

After turning on the power, allow the unit to warm up for at least four hours.

Note

- Do not flow sample gas until the warm-up operation is completed.
If sample gas is flown while the sample cell is still cold, condensation may form inside the cell or gas absorption may occur.
 - When the power is turned on after the unit has not been turned on for a long time, a temperature alarm occurs because the sample cell, the detector and other parts have not yet reached the specified temperature.
To prevent this alarm from occurring, the alarm determination can be stopped one hour after the power is turned on (" Stop temperature alarm determination when power is turned on (menu code 061) " (page 47)).
-

Display operation

Use the various displays on the analyzer to display the measured values and settings and to check and operate the commands and settings of the analyzer.
This section describes how to switch the display.

Note

The display images described in this operation manual are example displays and may differ from the actual displays of the analyzer.

● Operation flow

This shows an overview of the operations for switching the display.

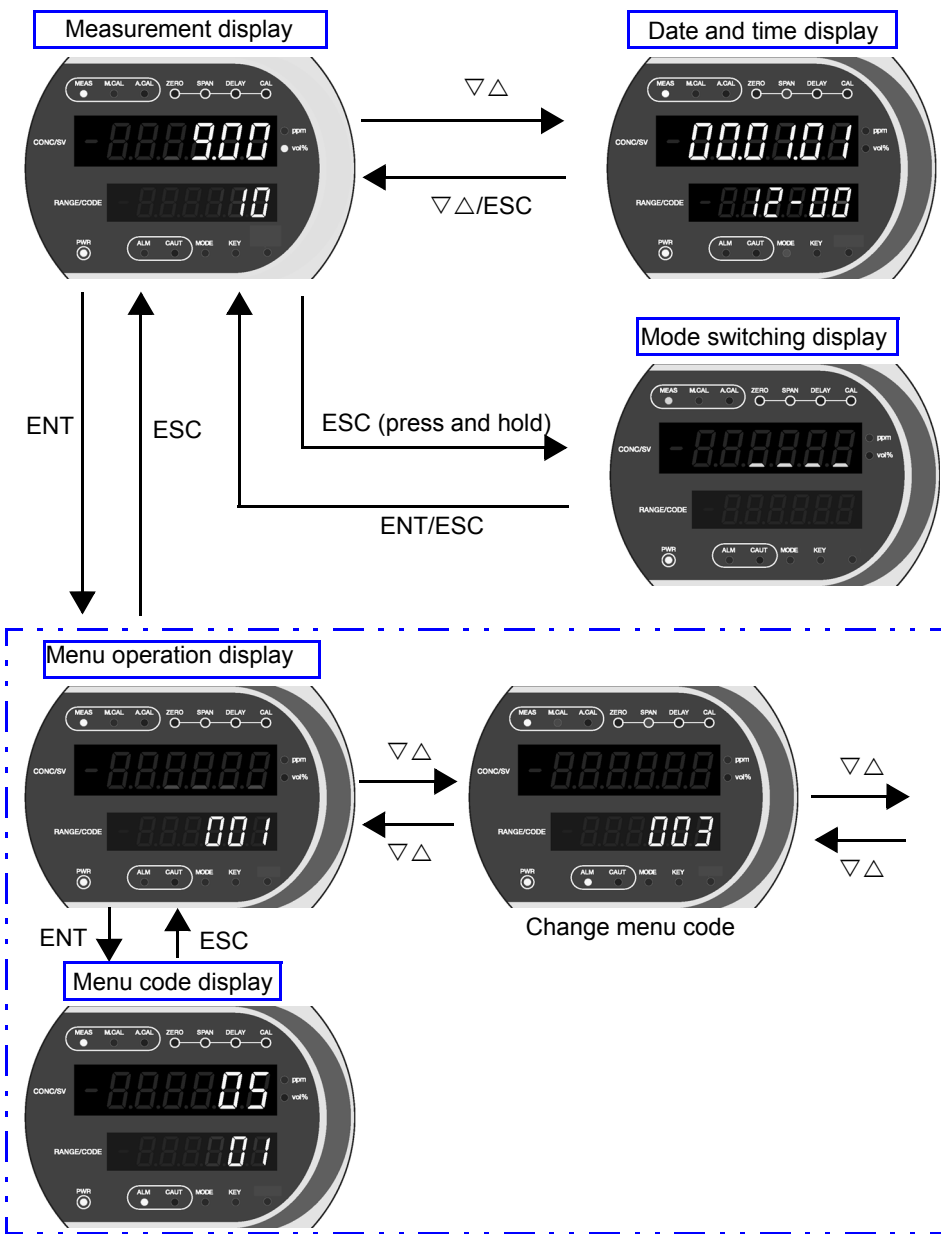


Fig. 7 Operation flow

Table 8 Displays

Display	Description
Measurement display	Displays the current measured concentration, measurement range, and whether an alarm occurred. Press the ESC key to return to this display from the menu code display or when switching from management mode to operation mode. Main display unit: Measured value Sub display unit: Range
Mode switching display	Switches between operation mode and management mode.
Date and time display	Displays and sets the internal clock.
Menu code display	Selects the menu code. The menu codes are used to define specific menu operations.

● Flashing values

Slowly flashing: This indicates that the value can be changed with the $\nabla \Delta$ and $\leftarrow \rightarrow$ keys.

Quickly flashing: This indicates that the measured value exceeds the measurement range.

● Operation and management modes

This analyzer has an operation mode that can be used to check the status during display of a measured value and a management mode that can be used to perform a calibration and change the settings.

Operation mode: This can be used to check the current measured value, measurement range, and alarm status. It cannot be used to change the operations or settings of the analyzer.

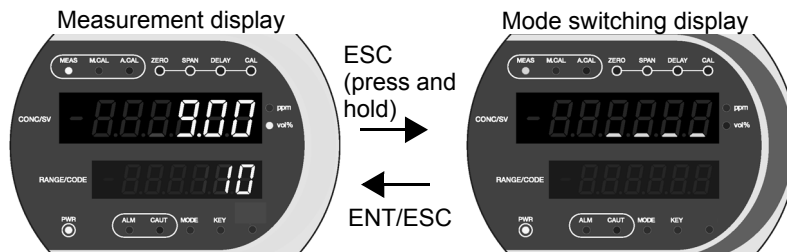
Management mode: This can be used to change the operations and settings of the analyzer for the items visible in operation mode.

Contact input cannot be received in this mode. If no keys are operated for one hour, the unit returns to operation mode automatically.

● Switching from operation mode to management mode

1. Press and hold the ESC key (for at least two seconds) while the measurement display is shown.

The mode switching display appears.



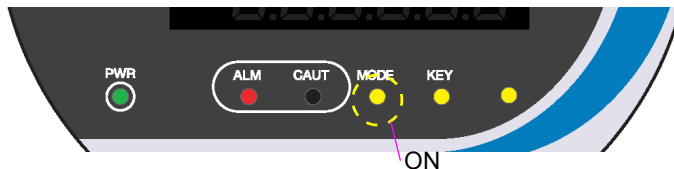
2. On the main display unit, use the ← → keys to move the cursor to the desired digit, and use the ▽△ keys to enter the management mode password.

Reference

- The default password is "1234".
- See "Change management mode password (menu code 071)" (page 53) for details on setting the password.

3. Press the ENT key.

If the entered password is correct, the management mode display appears and the MODE indicator lights.



Tip

If the password is set to "0000", you can press and hold the ESC key and then press the ENT key to switch between operation and management modes.

● **Switching from management mode to operation mode**

1. **Press and hold the ESC key (for at least two seconds) while the measurement display is shown.**

The mode switching display appears.

2. **Press the ENT key without entering anything.**

The operation mode display appears.

Note

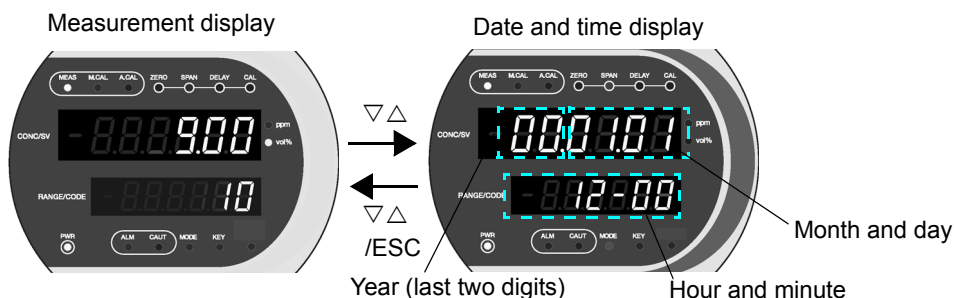
- When the power is turned on, the unit starts up in operation mode regardless of the status when the power was last turned off.
 - If no keys are operated for one hour in management mode, the unit returns to operation mode automatically.
-

● Setting the date and time

Operation mode	Management mode	Mode switching
No (disabled)	Yes (enabled)	"Switching from operation mode to management mode" (page 15)

Set the date and time of the internal clock.

1. Check that management mode is displayed, and then use the ∇/Δ keys while the measurement display is shown to display the date and time.



2. Press and hold the ESC key (for at least two seconds). The year display slowly flashes.
3. Use the ∇/Δ keys to set the year (last two digits).



4. Press the $\rightarrow$ key to move the cursor (slowly flashing digit) to the right, and then set the month and day.



5. Press the $\rightarrow$ key to move the cursor (slowly flashing digit) to the right, and then set the month and day.



6. Set the hour and minute, and then press the ENT key to start the clock.

Note

Note that clock setting is in the 24 hour format. For example, 1:00 pm is 13:00.

● **Using the menu codes**

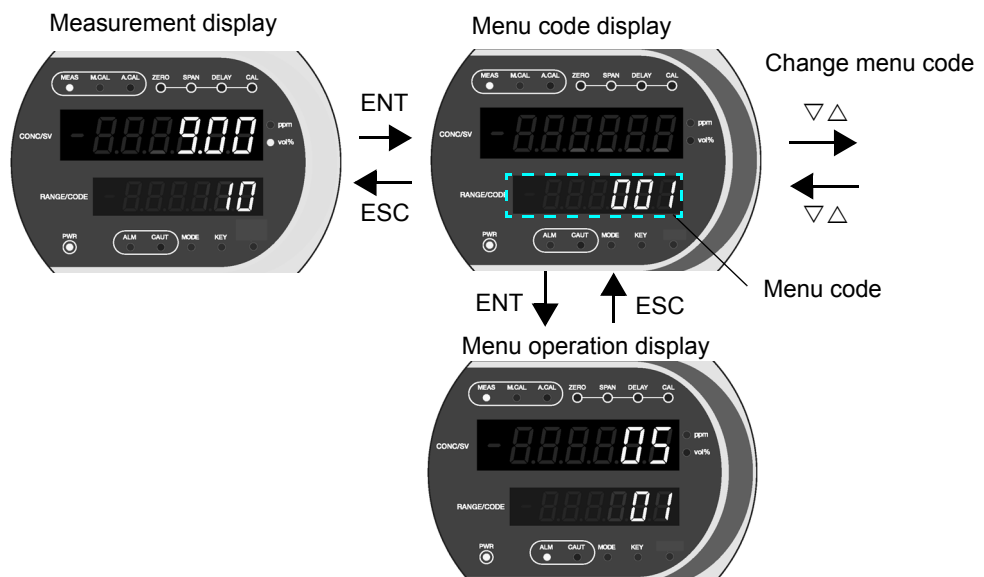
This section describes how to display the menu codes and operate the menu.

● **Displaying menu codes**

1. Press the ENT key while the measurement display is shown. The menu code display appears.

The menu code appears on the sub display unit. The menu code slowly flashes at this time.

2. Use the ∇/Δ keys to display the desired menu code.



Reference

See “ List of menu codes ” (page 56) for the menu codes.

Calibration

● Calibration gas preparations

This section describes the calibration gas and the settings required to perform a calibration.

● Calibration gas

Note

Supply the calibration gas to the analyzer using the same conditions (pressure and flow rate) for the sample gas.

Zero gas

Use an inert gas, such as nitrogen, that will not be affected by the substance to be measured.

Span gas

Use the gas to be measured at a concentration of 90 to 100% of the calibration range. Use the same zero gas (nitrogen, etc.) for the base gas.

Note

Calibration may be performed even at a concentration less than 90% of the calibration range. Because measurement errors may occur.

● Calibration settings

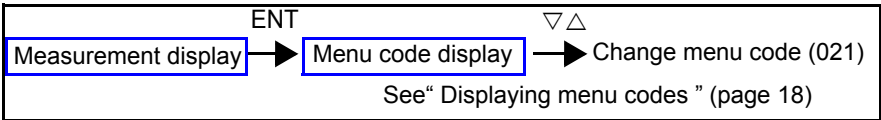
This section describes the items of the analyzer to be set for calibration.

● Set calibration range (menu code 021)

Operation mode	Management mode	Mode switching
No (disabled)	Yes (enabled)	" Switching from operation mode to management mode " (page 15)

- If there are multiple measurement ranges, the range to be used for calibration must be specified.
- If the range used for calibration is the same as the range used for measurement, more accurate measurements may be obtained.
- If there is a single range, this menu code does not appear.

Operations



1. Use the ▽△ keys to display menu code "021".



2. Press the ENT key to display the menu operation display.

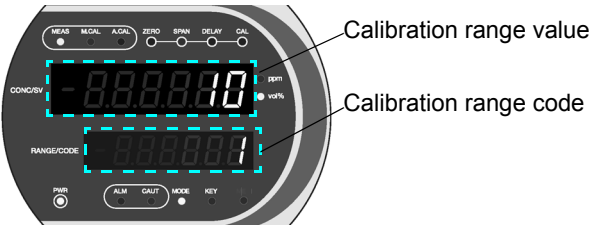
The following information appears on the menu operation display.

Main display unit: Displays the selected calibration range.

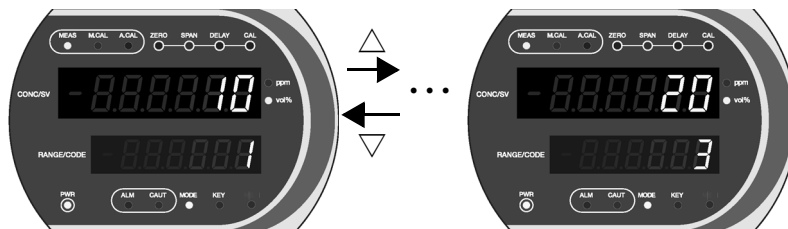
Sub display unit: Calibration range code

- 1: Select range 1.
- 2: Select range 2.
- 3: Select range 3*.
- 4: Select range 4*.

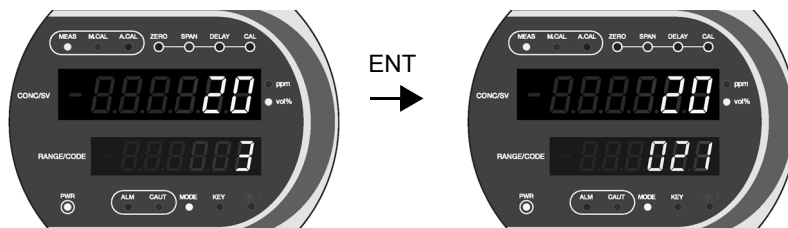
* Ranges not set are not displayed.



3. Use the ∇/Δ keys to change the calibration range code.



4. Press the ENT key to set the changes and return to the menu code display.
5. Press the ESC key to discard the changes and return to the menu code display.

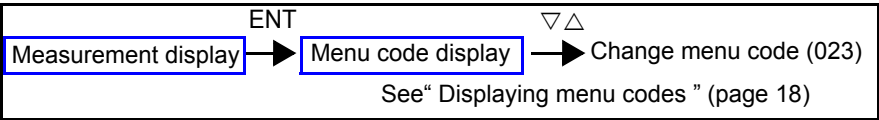


● Set span gas concentration value (menu code 023)

Operation mode	Management mode	Mode switching
No (disabled)	Yes (enabled)	" Switching from operation mode to management mode " (page 15)

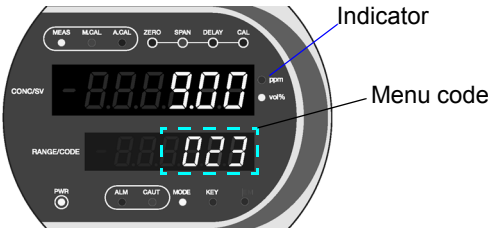
- See "Calibration gas" (p. 18) for details on determining the span gas concentration.
- Set the prepared calibration gas concentration in the analyzer.

Operations



1. Use the ▽△ keys to display menu code "023".

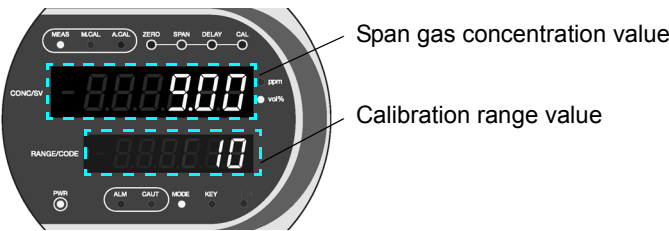
- Indicators: Unit
- ppm: Indicates that the unit of the set gas concentration is ppm.
- vol%: Indicates that the unit of the set gas concentration is vol%.



2. Press the ENT key to display the menu operation display.

The following information appears on the menu operation display.

- Main display unit: Span gas concentration value
- Sub display unit: Span gas concentration value



3. Use the ← → keys to move the cursor to the desired digit.

Note

When the cursor is moved to a digit that does not display a value, "_" (underbar) appears.

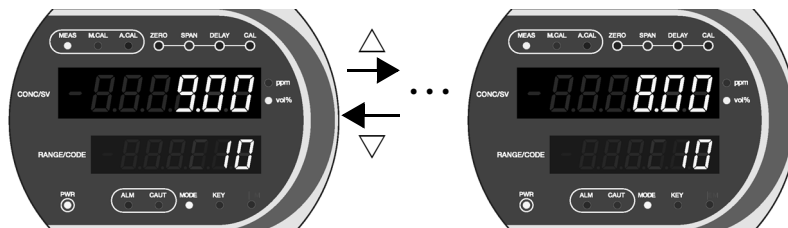
4. Use the ∇/Δ keys to change the setting value.

The display changes in the following numerical order: 1, 2, 3,...9, 0, 1...

The display of the blank digit immediately to the left of the value changes in the following order: _ (underbar), 1, 2, 3,...9, - (minus sign), _ (underbar), 1...

Note

The unit cannot be changed.

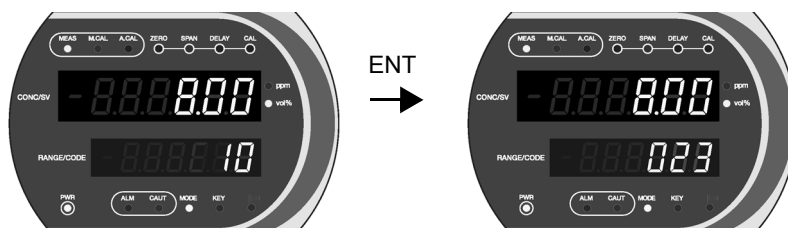


Note

If an invalid value, such as a negative value, is entered, "-" appears for all digits on the main display unit and sub display unit, indicating that the value cannot be set.

5. Press the ENT key to set the changes and return to the menu code display.

6. Press the ESC key to discard the changes and return to the menu code display.

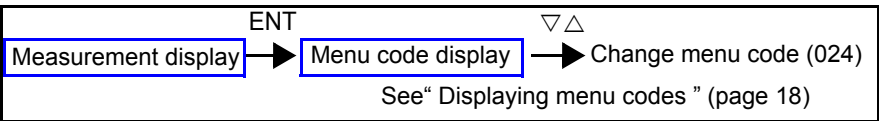


● Set analog output status during calibration (menu code 024)

Operation mode	Management mode	Mode switching
No (disabled)	Yes (enabled)	" Switching from operation mode to management mode " (page 15)

- The analog output during calibration outputs the calibration gas concentration value.
- If there is a problem with outputting the calibration gas concentration value, this can be output while holding the sample gas concentration just before calibration is started.

Operations



1. Use the ▽△ keys to display menu code "024".

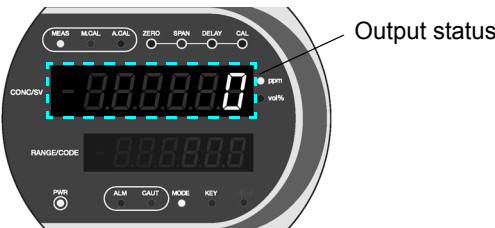


2. Press the ENT key to display the menu operation display.

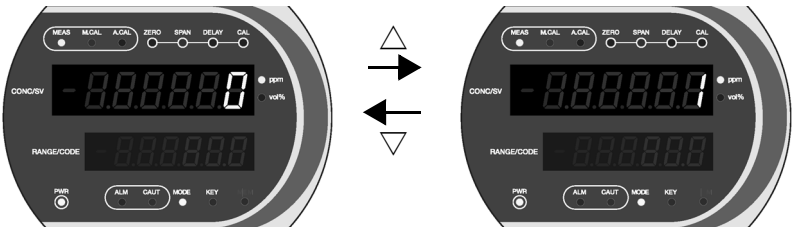
The following information appears on the menu operation display.

Main display unit: Output status

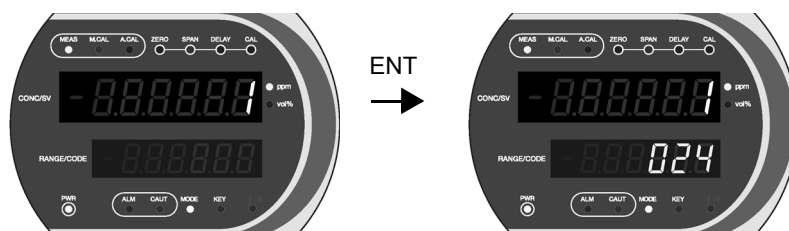
- 0: Output the constant and instantaneous value during calibration.
- 1: Output while holding the instantaneous value at the start of calibration.



3. Use the ▽△ keys to change the setting value.



-
4. Press the ENT key to set the changes and return to the menu code display.
Press the ESC key to discard the changes and return to the menu code display.



● **Performing a manual calibration**

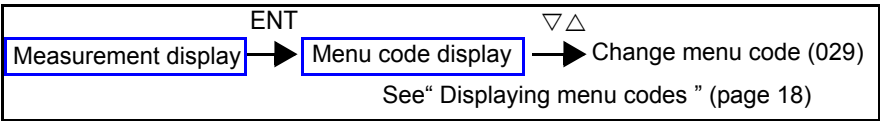
This section describes how to perform a manual calibration.

● **Perform manual calibration (menu code 029)**

Operation mode	Management mode	Mode switching
No (disabled)	Yes (enabled)	" Switching from operation mode to management mode " (page 15)

Perform a manual calibration of the analyzer.

Operations



1. Use the ▽△ keys to display menu code "029".

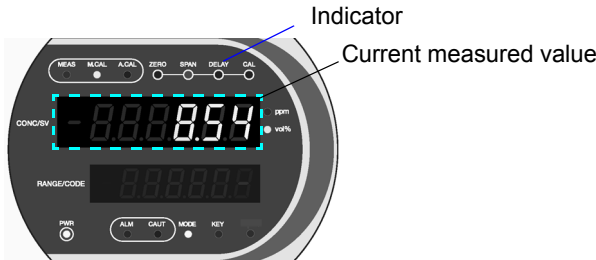


2. Press the ENT key to display the menu operation display.

The following information appears on the menu operation display.

Main display unit: Displays the current measured value.

- Indicators:
- Status display
 - M.CAL: Indicates that manual calibration is being performed.
 - ZERO: Indicates that zero calibration has been selected.
 - SPAN: Indicates that span calibration has been selected.
 - DELAY: Indicates that gas replacement has been selected.
 - CAL: Indicates that calibration calculations are being performed.



3. Use the ← → keys to select the ZERO, SPAN, or DELAY indicator and switch the type of calibration.

The M.CAL indicator blinks during selection. The indicator lights when the selection is completed.

- When the ZERO or SPAN indicator is lit, the measured value of the calibration range is displayed.
- When the DELAY indicator is lit, the measured value of the measurement range is displayed.



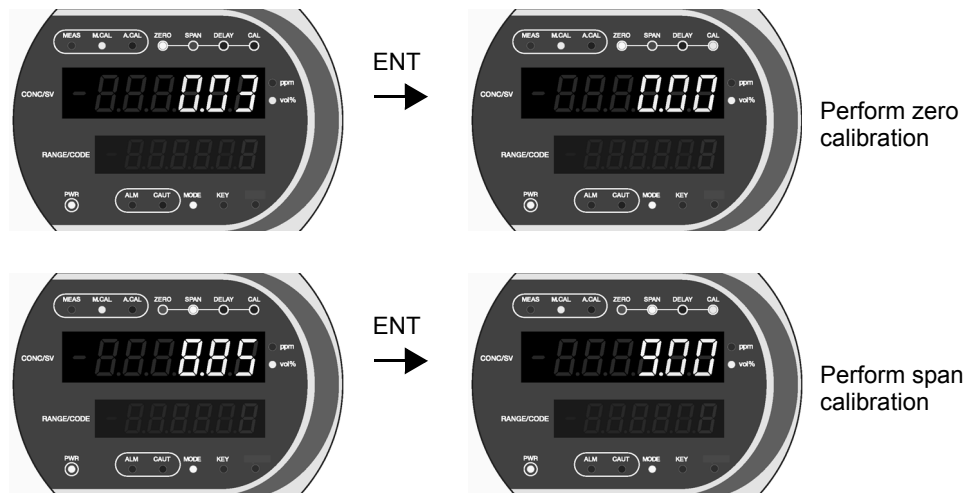
4. Operate the valve and cock of the calibration gas to flow the calibration gas according to the type of calibration (ZERO or SPAN).

Note

Under automatic calibration specifications (optional), gas is supplied according to the selected type of calibration (ZERO or SPAN).

5. Confirm that the instructions of the main display unit are thoroughly stable, and then press the ENT key to start calibration.

The CAL indicator lights while calibration calculations are being performed.



6. When calibration is completed, operate the valve and cock of the calibration gas to switch to the sample gas, and then press the ESC key to return to the menu code display.

The M.CAL and ZERO or SPAN indicators turn off and the MEAS indicator lights.

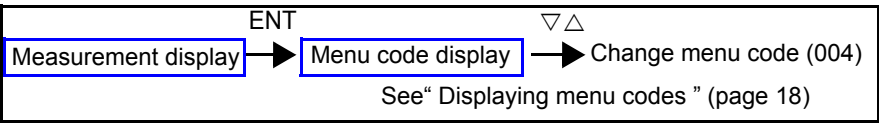
● **Checking the calibration factor history**

● **Display calibration factor history (menu code 004)**

Operation mode	Management mode	Mode switching
Yes (enabled)	Yes (enabled)	" Switching from operation mode to management mode " (page 15)

- Up to 99 items are displayed on the calibration factor history beginning with the latest item.
- If a calibration has not been performed, "....." appears.

Operations



1. Use the ▽△ keys to display menu code "004".



2. Press the ENT key to display the menu operation display.

The following information appears on the menu operation display.

Main display unit: Displays the calibration factor.

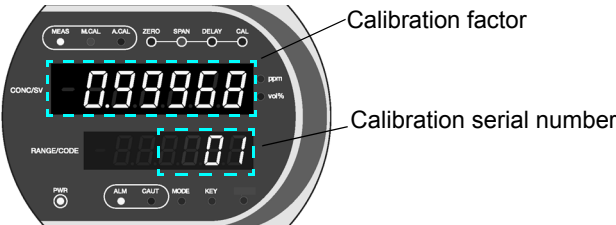
Sub display unit: A calibration serial number is assigned to each calibration in order. The first calibration factor is "01".

Indicators: Status display

ZERO (lit): Indicates that this is the zero calibration factor of the measurement detector.

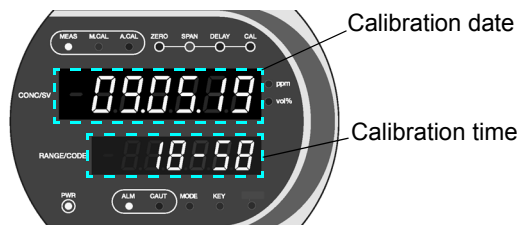
ZERO (blinking): Indicates that this is the zero calibration factor of the interference correction detector. (Only when using an interference correction detector.)

SPAN: Indicates that this is the span calibration factor.



3. Use the ▽△ keys to change the calibration serial number to view the desired calibration factor.

-
4. Press the ENT key to display the calibration date (on the main display unit) and calibration time (on the sub display unit).
Press the ESC key to return to the calibration factor/calibration serial number display.



5. Press the ESC key on the calibration factor/calibration serial number display to return to the menu code display.

Measurement

● Measurement preparations

Use the following procedure to prepare the analyzer for measurement.

Note

The procedure may vary for specifications with a sampling unit. See the operation manual, supplementary descriptions, and diagrams provided separately.

1. After the unit has warmed up, calibrate the analyzer.

Reference

See “ Calibration ” (page 19) for details on performing a calibration.

2. Check that the gas flow path is the flow path of the sample gas.

See the diagram (flow sheet) for the specified flow rate.

3. Check that the MEAS indicator is lit.

4. Select the measurement range with the “ Select measurement range (menu code 011) ” (page 31). (Only when there are multiple ranges.)

Measurement is started.

Reference

See “ Select measurement range (menu code 011) ” (page 31).

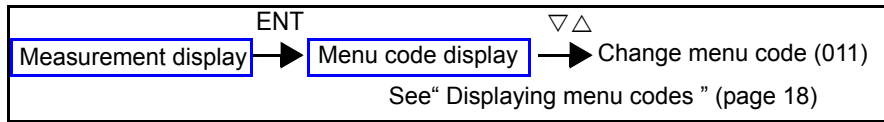
● Measurement range

● Select measurement range (menu code 011)

Operation mode	Management mode	Mode switching
No (disabled)	Yes (enabled)	" Switching from operation mode to management mode " (page 15)

This is not displayed for single range specifications.
Select the range to be used for measurement.

Operations



1. Use the ∇△ keys to display menu code "011".



2. Press the ENT key to display the menu operation display.

The following information appears on the menu operation display.

Main display unit: Selected measurement range value

Displays "E" when switched to an external range.

Sub display unit: Range code

0: Select an external range. In this case, the measurement range is switched by the contact input.

1: Select measurement range 1.

2: Select measurement range 2.

3: Select measurement range 3*.

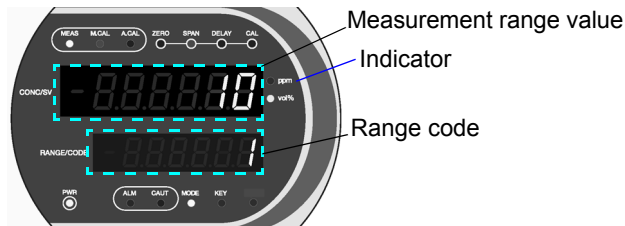
4: Select measurement range 4*.

* Ranges not set are not displayed.

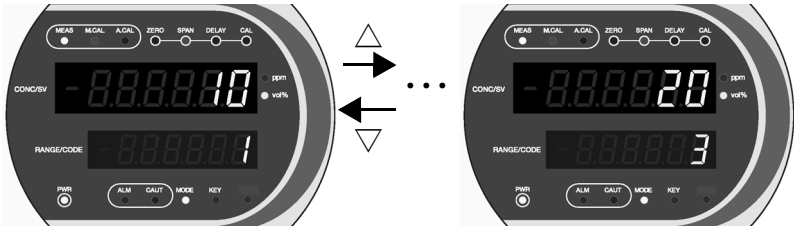
Indicators: Displays measurement range unit.

ppm: Indicates that the unit of the measurement

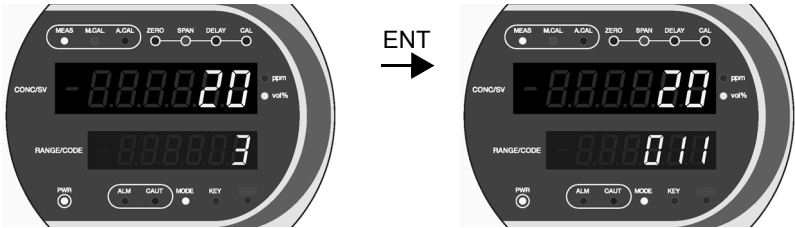
vol%: Indicates that the unit of the measurement range is vol%.



3. Use the ∇/Δ keys to select the measurement range.



4. Press the ENT key to set the setting and return to the menu code display.
Press the ESC key to discard the setting and return to the menu code display.



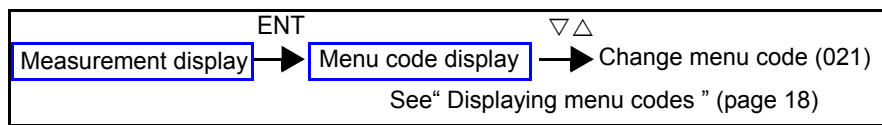
● Zero point and span width correction during measurement

● Set zero point correction value during measurement (menu code 052)

Operation mode	Management mode	Mode switching
No (disabled)	Yes (enabled)	" Switching from operation mode to management mode " (page 15)

- Set the value for correcting the zero point of the measured value.
Corrected value = (value before correction + zero point correction value during measurement) × span width correction value during measurement
- Corrections cannot be made during calibration when the ZERO or SPAN indicator is lit.

Operations



1. Use the ∇△ keys to display menu code "052".

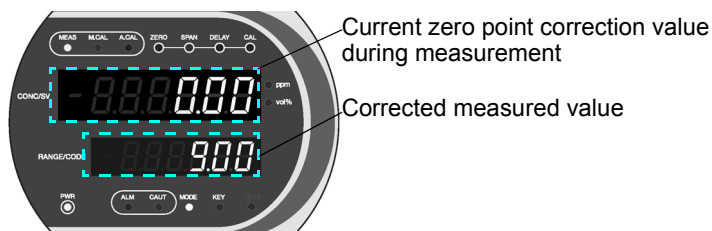


2. Press the ENT key to display the menu operation display.

The following information appears on the menu operation display.

Main display unit: Current correction value

Sub display unit: Corrected measured value

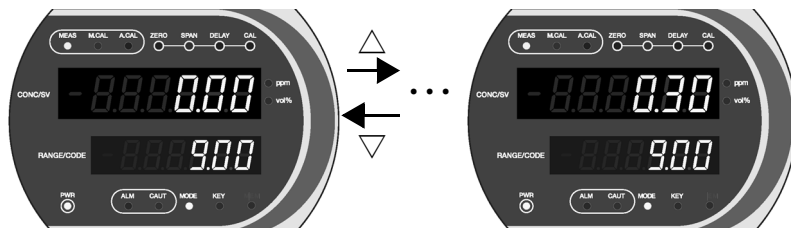


3. Use the ← → keys to move the cursor to the desired digit.

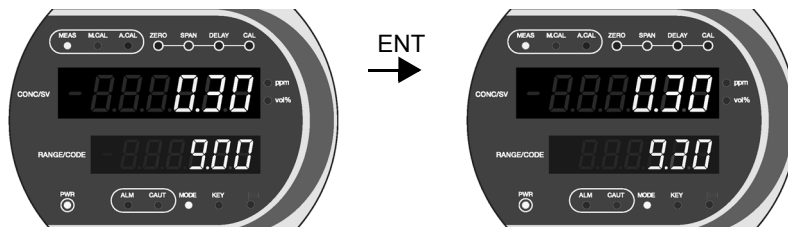
4. Use the ∇△ keys to change the setting value.

The display changes in the following numerical order: 1, 2, 3,...9, 0, 1...

The display of the blank digit immediately to the left of the value changes in the following order: _ (underbar), 1, 2, 3,...9, - (minus sign), _ (underbar), 1...



5. Press the ENT key to set the correction value and display the corrected measured value. To return to the menu code display, press the ESC key. Pressing the ESC key before the ENT key is pressed discards the entered information and returns to the menu code display.

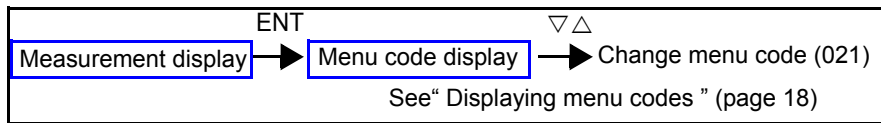


● Set span width correction value during measurement (menu code 053)

Operation mode	Management mode	Mode switching
No (disabled)	Yes (enabled)	" Switching from operation mode to management mode " (page 15)

- Set the value for correcting the span width for the measured value.
Corrected value = (value before correction + zero point correction value during measurement) × span width correction value during measurement
- Corrections cannot be made during calibration when the ZERO or SPAN indicator is lit.

Operations



1. Use the ∇△ keys to display menu code "053".

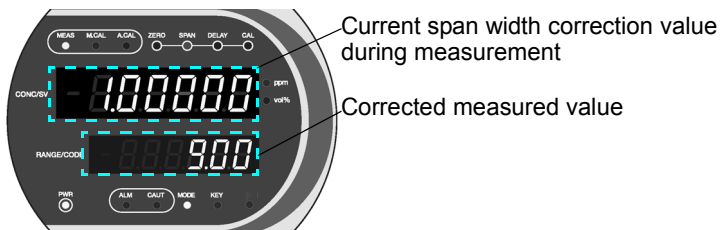


2. Press the ENT key to display the menu operation display.

The following information appears on the menu operation display.

Main display unit: Current correction value

Sub display unit: Corrected measured value

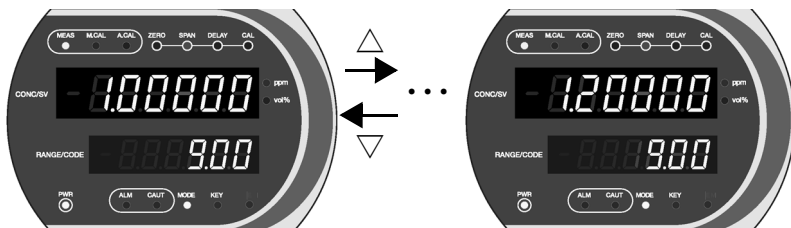


3. Use the ← → keys to move the cursor to the desired digit.

4. Use the ∇△ keys to change the setting value.

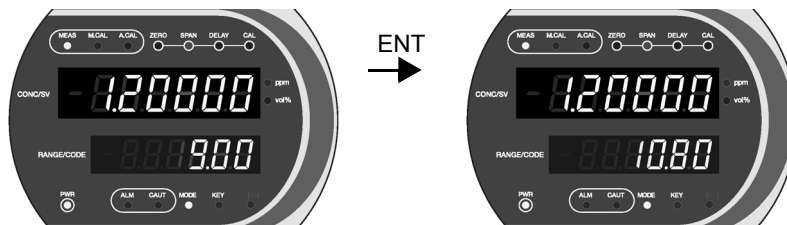
The display changes in the following numerical order: 1, 2, 3,...9, 0, 1...

The display of the blank digit immediately to the left of the value changes in the following order: _ (underbar), 1, 2, 3,...9, - (minus sign), _ (underbar), 1...



5. Press the ENT key to set the correction value and display the corrected measured value. To return to the menu code display, press the ESC key.

Pressing the ESC key before the ENT key is pressed discards the entered information and returns to the menu code display.



Note

If an invalid value, such as a negative value, is entered, "-" appears for all digits on the main display unit and sub display unit, indicating that the value cannot be set.

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