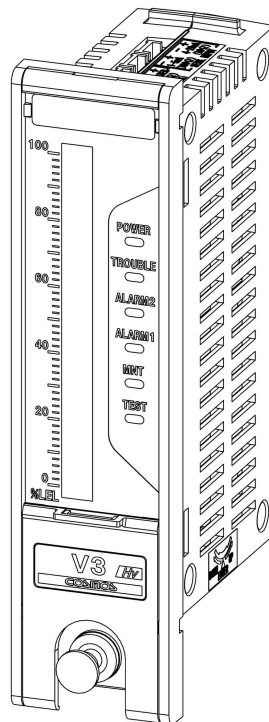# V3 Series
Indicator Unit
Instruction Manual

CE UK CA

- Keep this manual for easy reference.
- Carefully read this manual prior to use.
- This manual describes the standard model. If your unit has end-user-specific options, this manual will be superseded by your delivery specifications.

NEW COSMOS ELECTRIC CO.,LTD.

Table of Contents

1. Introduction

Thank you for purchasing the New Cosmos V3 series indicator unit.

Prior to use, please read this instruction manual to ensure safe and reliable operation and to prevent accidents.

The indicator unit is used in connection with a gas detector which can detect a variety of gases including combustible gases. Install the gas detector at a location where detection of the target gas is necessary. Install the indicator unit at a location convenient for monitoring gas concentrations. Detector-indicator unit combinations can be used in conjunction with one alarm unit (Model VAS or VAL) to form a gas detection and alarm system.

The indicator unit displays the gas concentration detected by the corresponding gas detector on its bar graph display. If the gas detector detects a leak of the target gas that is higher than a preset limit or, in the case of a reduction in oxygen concentration to a level below a preset limit, the alarm unit produces audio-visual alarms.

Periodic maintenance and inspection are essential to maintain the reliability of the product. Perform periodic maintenance and inspection in accordance with the instructions given in this manual.

There are various types of V3 series indicator units. They are divided according to the gas detector types they are used with, and these types are divided into the following five groups.

Group 1	Group 2	Group 3	Group 4	Group 5
Type Hv	Type O	Type M	Type Hi	Type Zn
Type Cv	Type D	(CE marking*)	Type Ci	
Type Tv			Type Ti	

For type selection, please contact New Cosmos or its authorized representative.
CE marking specification is specified upon placing an order.
The wiring, adjustments and other unit-related items can vary from group to group. In such cases, this manual clearly specifies the name of the applicable group, and shows that the information or instruction given applies to that group only.

*The following combinations can comply with CE marking. Refer to the separate "EU Declaration of Conformity" for more information.
  - Type M indicator unit solo
  - Type M indicator unit with VAS alarm unit
  - Type M indicator unit with RST-01 reset relay terminal
  - Type M indicator unit with VAS alarm unit and RST-01 reset relay terminal
  Note: Type M indicator is paired with a V-SC-4B or V-SC-4B(S) metal housing and VAS alarm unit is paired with a V-SC-A or V-SC-A(S) metal housing.

Symbols Used in this Manual

This manual uses Danger, Warning, Caution and Note symbols to draw attention to procedures, materials, methods, and processes, which require particular attention.

⚠**DANGER**	Indicates an imminently hazardous situation that can result in death or serious injury.
⚠**WARNING**	Indicates a potentially hazardous situation that may result in death or serious injury.
⚠**CAUTION**	Indicates a hazardous situation that may result in minor injury or property damage.
NOTE	Provides information on product handling.

2. Precautions

• To ensure safe operation, follow the precautions below.
• Only use this product in accordance with applicable laws and regulations.

⚠ WARNING

● Ground the detector to prevent electric shocks.
● In the event of a gas leak alarm, follow safety procedures in accordance with your company's regulations.
● This product is not explosion-proof and should not be installed in a hazardous area.

⚠ CAUTION

● Wiring and installation should only be performed by a qualified electrician with knowledge of wiring/installation procedures.
● Do not disassemble, modify or alter the structure of this unit or its electrical circuits. Doing so may compromise the performance of the product.
● This product is not drip-proof and should be kept away from splashing water.
● Only use this product in accordance with applicable laws and regulations.

---

3. Package Contents

The following items are included in a standard package. If any items are missing or damaged, please contact New Cosmos or its authorized representative for replacement.

Standard Contents

Item	Qty.
Indicator unit	1
Replacement fuse, 1.0 A	1
Instruction manual (this document)	1 [*1]

*1. One manual is provided per order and not per indicator unit.

Metal Housing (Optional)

Item	Qty.
Metal housing	1
Mounting bracket with two tension screws	2

Accessories for Metal Housing (Optional)

Item	Qty.
Partition board [*2]	As per system configuration
Clamp with two fixing screws[*2]	As per system configuration
Flat cable assembly [*3]	As per system configuration
Reset relay terminal, RST-01 [*4] with ferrite core	As per system configuration

*2. Necessary when multiple metal housings are installed side by side.

*3. Dedicated cable for connection between indicator units, alarm unit, and/or reset relay terminal.

*4. Necessary for clearing a gas alarm without using an alarm unit.

4. System Configurations

(1) Typical System Configuration for Group 1 (Type: Hv/Cv/Tv)

Figure 1. Typical System Configuration for Group 1

| NOTE | A VAS or V3 unit and a metal housing are always paired. |

(2) Typical System Configuration for Group 2 (Type: O/D)

Figure 2. Typical System Configuration for Group 2

| NOTE | A VAS or V3 unit and a metal housing are always paired. |

(3) Typical System Configuration for Group 3 (Type: M)
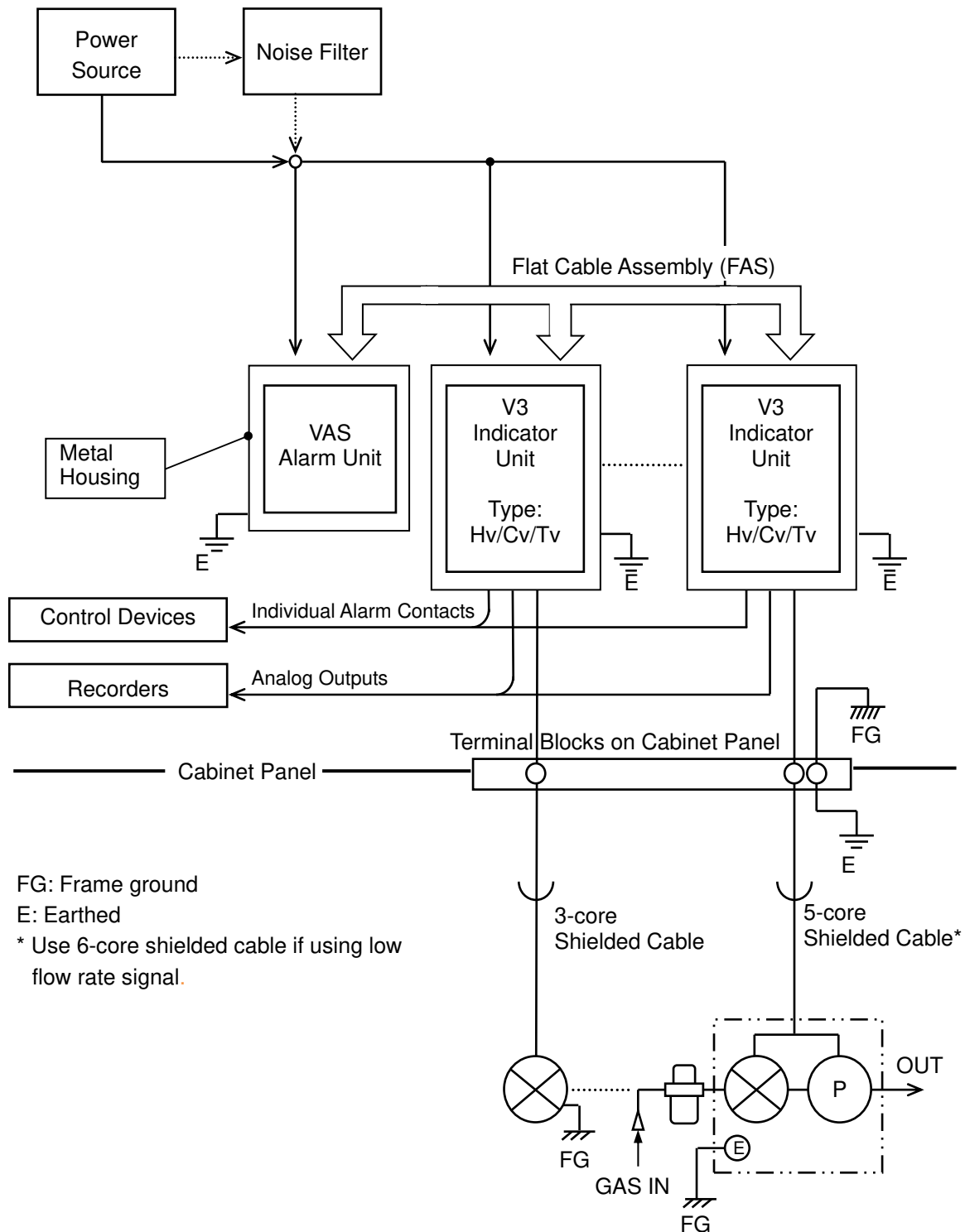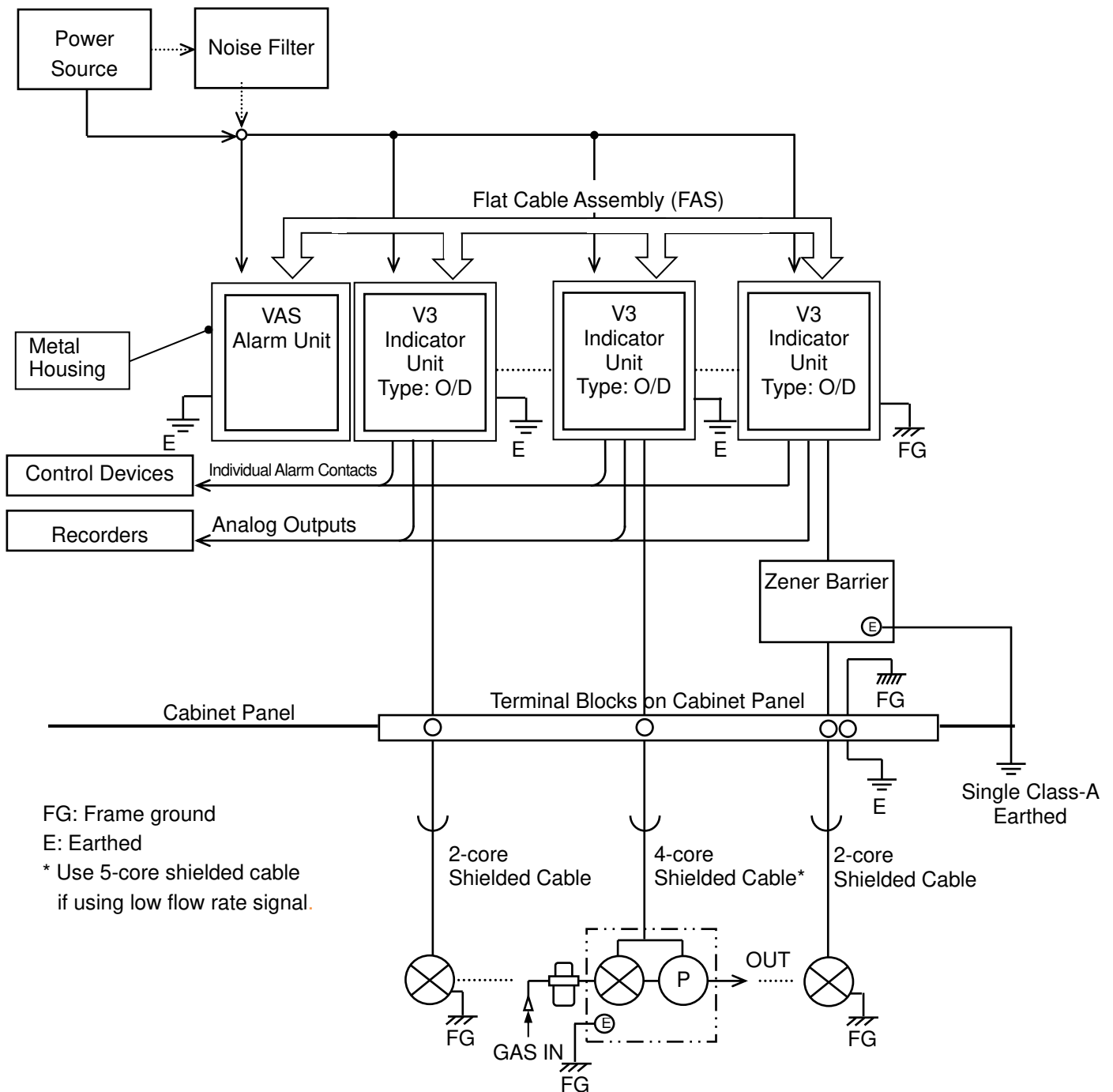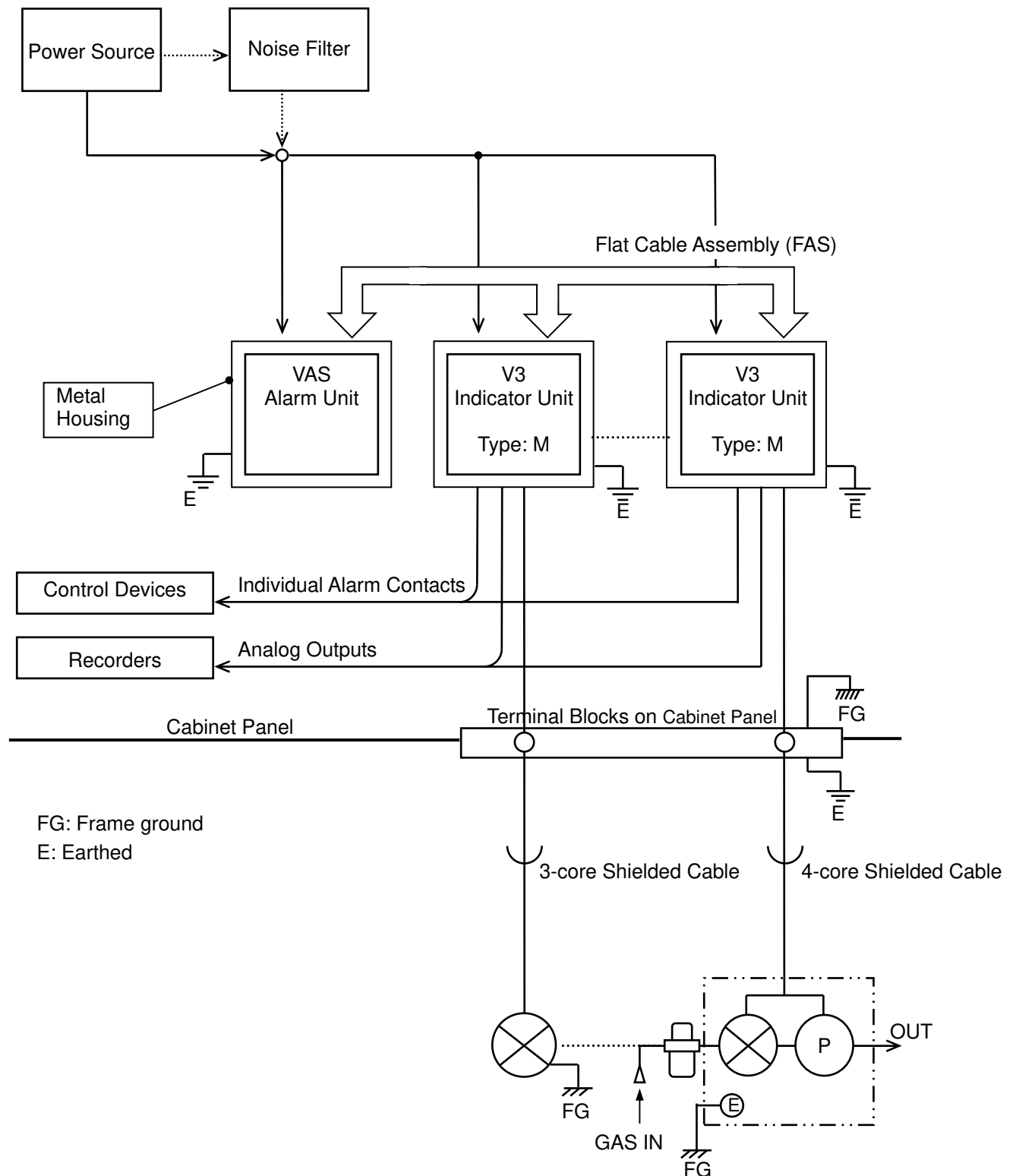

Figure 3. Typical System Configuration for Group 3

| NOTE | A VAS or V3 unit and a metal housing are always paired. |

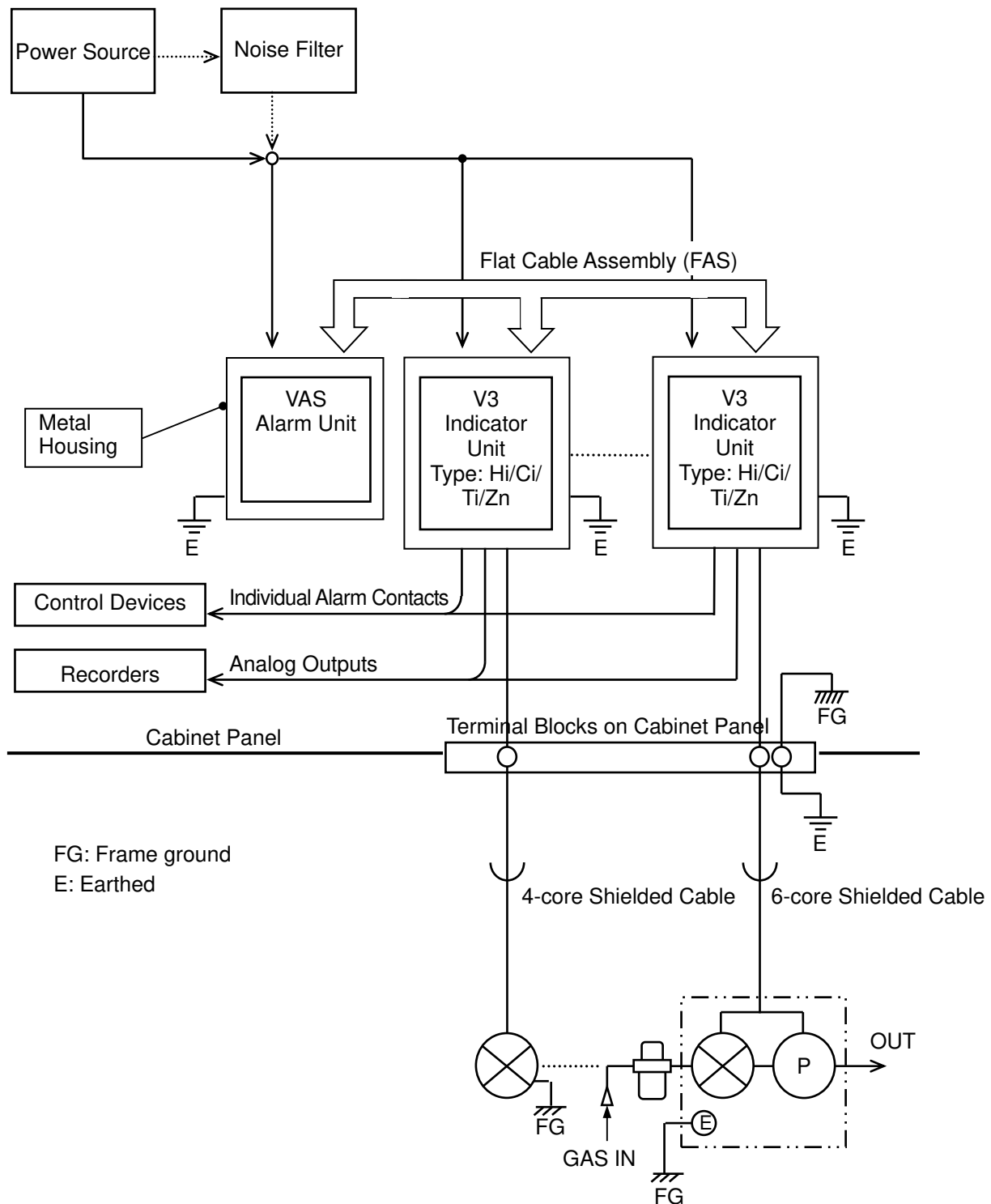(4) Typical System Configuration for Group 4 (Type: Hi/Ci/Ti) or Group 5 (Type: Zn)

Figure 4. Typical System Configuration for Group 4/5

| NOTE | A VAS or V3 unit and a metal housing are always paired. |

- 7 -

(5) Typical System Configuration for V-NET (Groups 1-5)
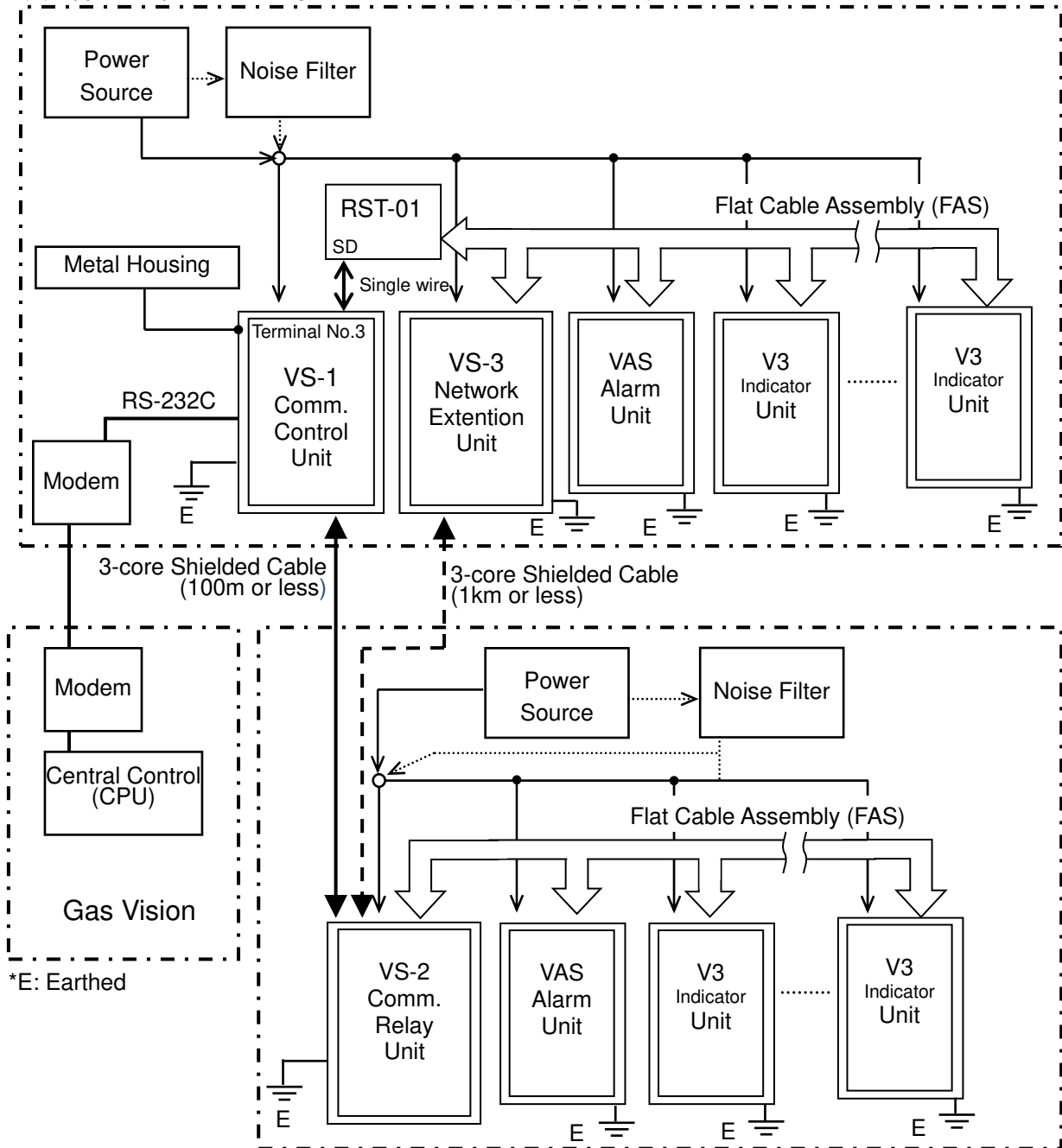
Figure 5. Typical System Configuration for V-NET

NOTE	VS-1: Communication control unit for a V-NET system. It sends RS-232C signals and can receive signals directly from the indicator units.

VS-1: Communication control unit for a V-NET system. It sends RS-232C signals and can receive signals directly from the indicator units.

VS-2: Communication relay unit for relaying signals. It plays a supplementary role for VS-1. VS-2 is installed with a group of indicator units which are installed separately from a group of indicator units installed with VS-1. VS-2 and VS-1 are interconnected by a digital communication cable. The distance between VS-1 and VS-2 shall be less than 100m. If the distance is longer than 100m, VS-3 is required to be installed between VS-1 and VS-2.

VS-3: Network extention unit is used for extending the communication relay and plays a supplementary role for VS-1. The VS-2 and VS-3 are interconnected by a digital communication cable. The distance between VS-2 and VS-3 shall be less than 1 km.

- Refer to 7-1 "Connection with Gas Detectors" for connecting an indicator unit and a gas detector.
- A maximum of 254 indicator units can be connected to VS-1 and VS-2 in a V-NET system.
- A metal housing and a VAS, V3, VS-1, VS-2, or VS-3 unit are paired.

5. Unit Dimensions and Components
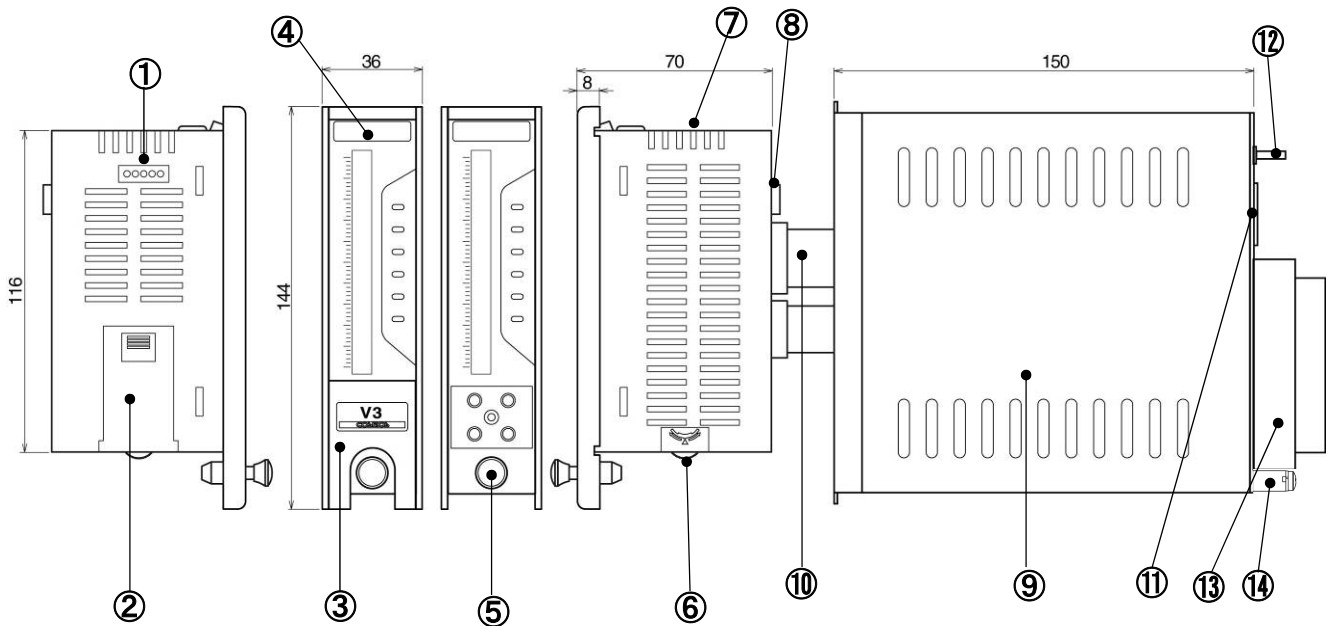
(Dimensions are in mm)

Figure 6. Exterior Appearance of Indicator Unit (with Metal Housing)

Item	Component	Description/Function
1	Mode LEDs 1 to 5 (5 LEDs)	When a mode is selected, the corresponding LED is lit
2	Side cover	Remove this cover to replace the external EEPROM
3	Front cover	Open this cover to access the operation buttons
4	Tag number plate	Used to fill in the name or number of the detection location
5	Panel lock knob	Push in the knob to install the indicator unit to the metal housing/cabinet panel, and pull the knob to remove the indicator unit from the metal housing/cabinet panel
6	Setting wheel	Scroll the wheel back/forward (UP/DOWN) to select the mode or increase/decrease the parameter, or press and hold the wheel up to confirm a selection (ENTER)
7	Connector terminal (3 places)	Used to check the heater current and sensor input (4-20mA or 1-5mA)
8	Fuse	Dia.5.2 x 20L, 1.0A
9	Metal housing	Case dedicated to house a single indicator unit
10	Connector A	Used to internally connect with a metal housing
11	Connector B	Used to connect with an alarm unit
12	Power switch	Toggle switch located on the rear of the metal housing Turns on/off the indicator unit
13	Terminal block	8-way double row terminal block used for external wiring
14	Earth terminal	Spacer for grounding the frame
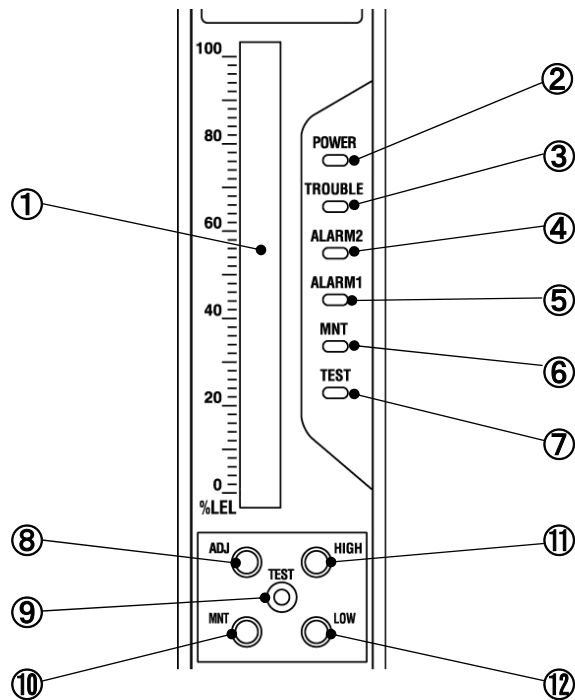
Figure 7. Operation Panel of Indicator Unit

Item	Component	Description/Function
1	Gas concentration bar graph display	Displays the gas concentration and alarm set values
2	Green POWER LED	Lit when the indicator unit is on
3	Amber TROUBLE LED	Flashes when a device failure (of a connected gas detector or indicator unit itself) is detected
4	Red ALARM2 LED	Flashes when the gas concentration exceeds the 2nd stage alarm set value
5	Red ALARM1 LED	Flashes when the gas concentration exceeds the 1st stage alarm set value
6	Red MNT LED	Lit or flashing when the maintenance mode is on
7	Red TEST LED	Flashes when the test mode is on Plays a role as an indicator for zero positioning when performing a zero adjustment on Group 4 or 5, Refer to "(3-B) Coarse Zero Adjustment for Groups 4 and 5" on page 32
8	ADJ button	Press to perform a one-touch zero adjustment Refer to "(2) One-touch Zero Adjustment" on page 31
9	TEST button (recessed)	Press to test the gas alarm function. Use a rounded pin for pressing this button
10	MNT button	Press to enter the maintenance mode
11	HIGH button	Increases the simulated gas concentration for test mode
12	LOW button	Decreases the simulated gas concentration for test mode

6. Installation

⚠ WARNING

- This product is not explosion-proof and should not be installed in a hazardous area.

⚠ CAUTION

- Install the product in plain view where it can be constantly monitored by an attendant, and convenient enough for taking emergency procedures or giving instructions in the event of an alarm.
- Install the product at a location free of vibration, electrical interference, and high humidity.
- Do not install the product in the vicinity of devices emitting radio frequencies.

(1) When you prepare a panel for the mounting of metal housings with indicator/alarm units by yourself, take the following steps:

Prepare a panel (1.6 to 6 mm thick) and cut a square cutout in it. Refer to the drawing below for the cutout size.

$38.5 \times n + d$

$137 {}^{+1}_{-0}$
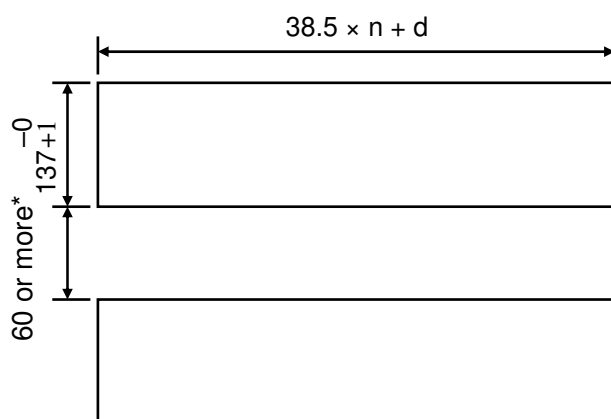
60 or more*

n: Number of alarm/indicator units to be mounted.

d: Allowable tolerance.

n = 1 to 10	d = 3
n = 11 to 15	d = 4
n = 16 to 20	d = 5
n = 21 to 25	d = 6
n = 26 to 30	d = 7

(Measurements are in mm)

* For two-stage installation, keep 60mm or more space between the two square cutouts.

Panel cutout size

(2) Loosely install a clamp on each end of the square cutout with two fixing screws.

Fixing screws (two per clamp)

Clamp
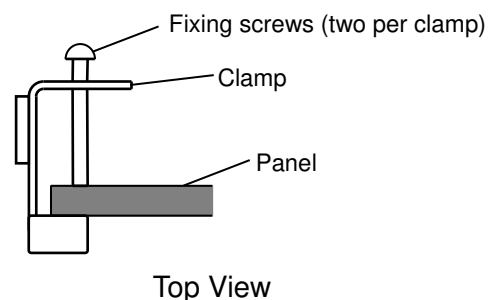
Panel

Top View

(3) Insert a metal housing from the front of the panel, through the square cutout. When installing multiple metal housings, insert a partition board between each pair of metal housings.
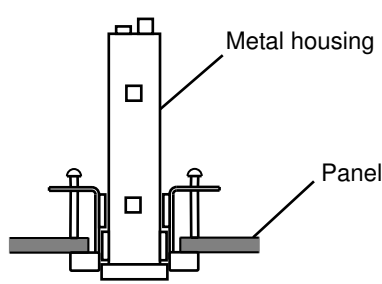
Installation of a single metal housing
Top View
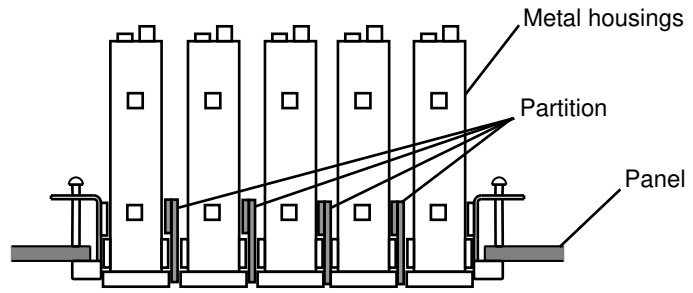
Installation of multiple metal housings
Top View

(4) Install the two mounting brackets for each metal housing (top and bottom). Secure the metal housing to the panel by tightening the tension screws with a flat-bladed screwdriver as shown in the drawing below.
When installing multiple metal housings, center the metal housing in the cutout, and tighten the tension screws until there is no gap between the adjacent metal housing and partition board.
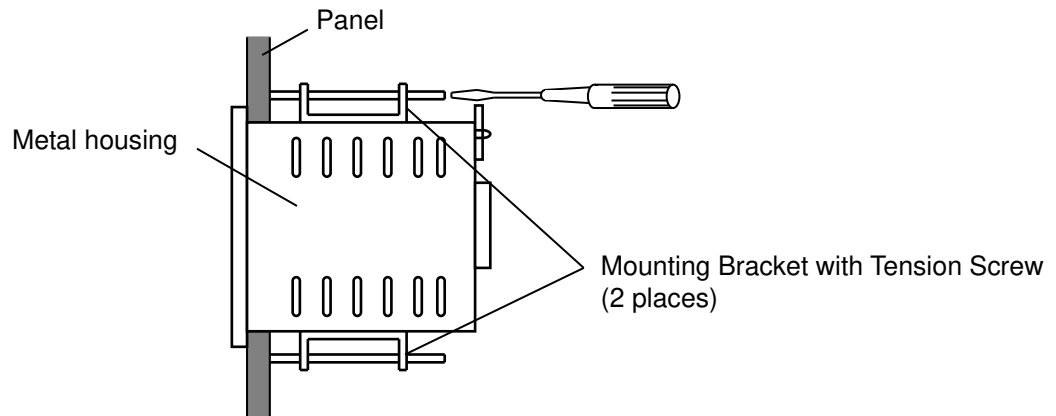
Side View

(5) Adjust the position of the clamps and firmly tighten the fixing screws to the panel until there is no gap between the metal housings and the clamps.

NOTE	Evenly and firmly tighten the fixing screws for mounting clamps and tension screws for mouting brackets.

7. Wiring and Connections

On the back side of the metal housing there are an 8-way double row terminal block and a connector (Connector B). Use this terminal block to connect the indicator unit to a gas detector, power source, and external devices. Note that this terminal block is compact in size (M3-size round solderless terminals, outer dia. 6.4mm or less) and is therefore not suitable for direct external wiring. Do not directly connect external wiring with this terminal. To accommodate external wiring, use a separate terminal block between. To connect the indicator unit to an alarm unit, use a Connector B and an optional flat cable assembly.

To alarm unit

1−AT
2−Z2
3−AS
4−AR
5−BZ
6−Z1
7−SD*
8−

Connector B

Connector B

8-way double row terminal block

Earth terminal

V-SC-6/6(S) metal housing only

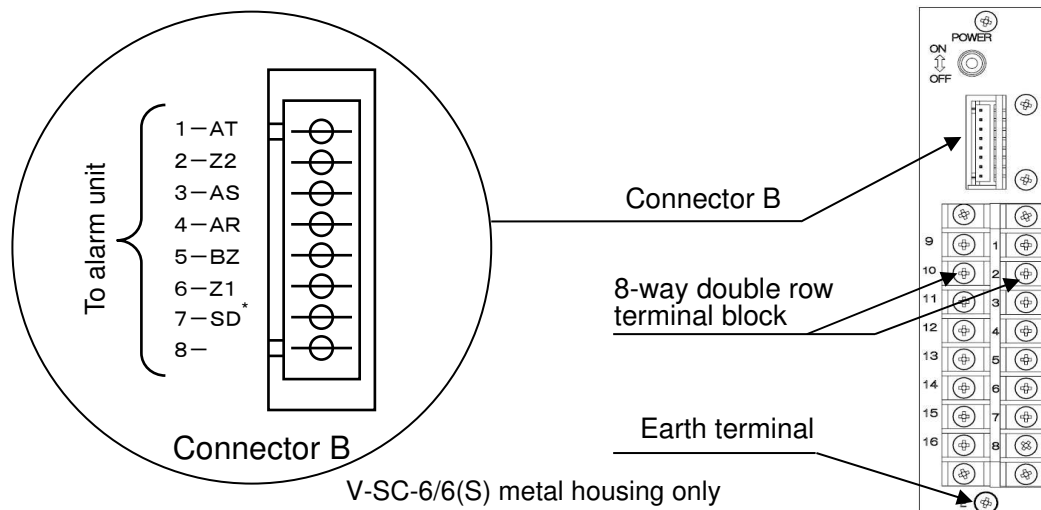| Terminal No.	V-SC-4B/V-SC-4B(S) metal housing			V-SC-1, V-SC-1(S), V-SC-6 or V-SC-6(S) metal housing		
1	P (+)	Input power 24 VDC		P (+)	Input power 24 VDC	
2	N (−)			N (−)		
3	PA (+)	Pump power output 24 VDC		PA (+)	Pump power output 24 VDC	
4	PB (−)			PB (−)		
5	A (F)	Gas detector		A (F)	Gas detector	
6	B			B		
7	C			C		
8	D			D		
9	ZC2	2nd stage alarm NO or NC*	Contact output 100 VAC, 1A 24 VDC, 1A	ZC	Common	Contact output 100 VAC, 1A 24 VDC, 1A
10	ZA2			ZA2	2nd stage alarm NO-C-NC contact	
11	ZC1	1st stage alarm NO or NC*		ZB2		
12	ZA1			ZA1	1st stage alarm NO-C-NC contact	
13	TC	Trouble alarm NO or NC*		ZB1		
14	TZ			TZ	Trouble alarm NO contact	
15	G (+)	Analog output		G (+)	Analog output	
16	H (−)			H (−)		
-	E	Earth terminal		E	Earth terminal	

* As per the metal housing's specifications.   NO: Normally open; NC: Normally closed; C: Common

Figure 8. Terminal Block and Connector Pin Assignment

NOTE	・Pump power output terminals (Nos.3 and 4) are only used for connecting an extractive-type gas detector with a built-in 24 VDC pump and NOT a 100 VAC pump. ・Do not use the pump power output for any purpose other than supplying power to an extractive-type gas detector.

7-1. Connection with Gas Detectors

> ⚠ **CAUTION**
>
> - Refer to the markings to ensure that the cables are correctly connected between a metal housing (which houses an indicator unit) and a gas detector.
> - Keep the connection cables (power/signal lines to gas detectors/indicator units/alarm unit) away from other power lines.
> - When installing a gas detector at a hazardous location, use explosion-proof wiring. Refer to the explosion-proof wiring insturctions of the gas detector's instruction manual.

Figures 9 to 12 show the connections between metal housings and gas detectors. Ensure that the number on the tag number plate of the indicator unit matches the number on the loop number label of the gas detector before connecting.

Connect a power cable to the pump of an extractive-type gas detector (pump power 24 VDC) with terminals PA (+) and PB (-) (Terminal Nos.3 and 4).

> **NOTE**   Refer to the gas detector's instruction manual for specific information on cable length.

(1) Typical Wiring Connection for Group 1 (Type: Hv/Cv/Tv) Indicator Units and Gas Detectors

Figure 9. Wiring Connection for Group 1 Indicator Units and Gas Detectors

(2) Typical Wiring Connection for Group 2 (Type: O/D) Indicator Units and Gas Detectors

Figure 10. Wiring Connection for Group 2 Indicator Units and Gas Detectors

"F" is used for a gas detector with a built-in flow sensor.
FG: Frame ground

NOTE	Electrical leakage may damage the unit. When a zener barrier is used, add a fuse (1 A, Type B, sold separately) at the location marked with "I" in Figure 10, as needed.

(3) Typical Wiring Connection for Group 3 (Type: M) Indicator Units and Gas Detectors

Indicator Units

Cabinet Panel

Cabinet Panel's Terminal Blocks

3-core Shielded Cable

4-core Shielded Cable

Gas Detectors

Diffusion-type Gas Detector

Extractive-type Gas Detector

"F" is used for a gas detector with a built-in flow sensor.

FG: Frame ground

P-N: Gas detector power 24 VDC

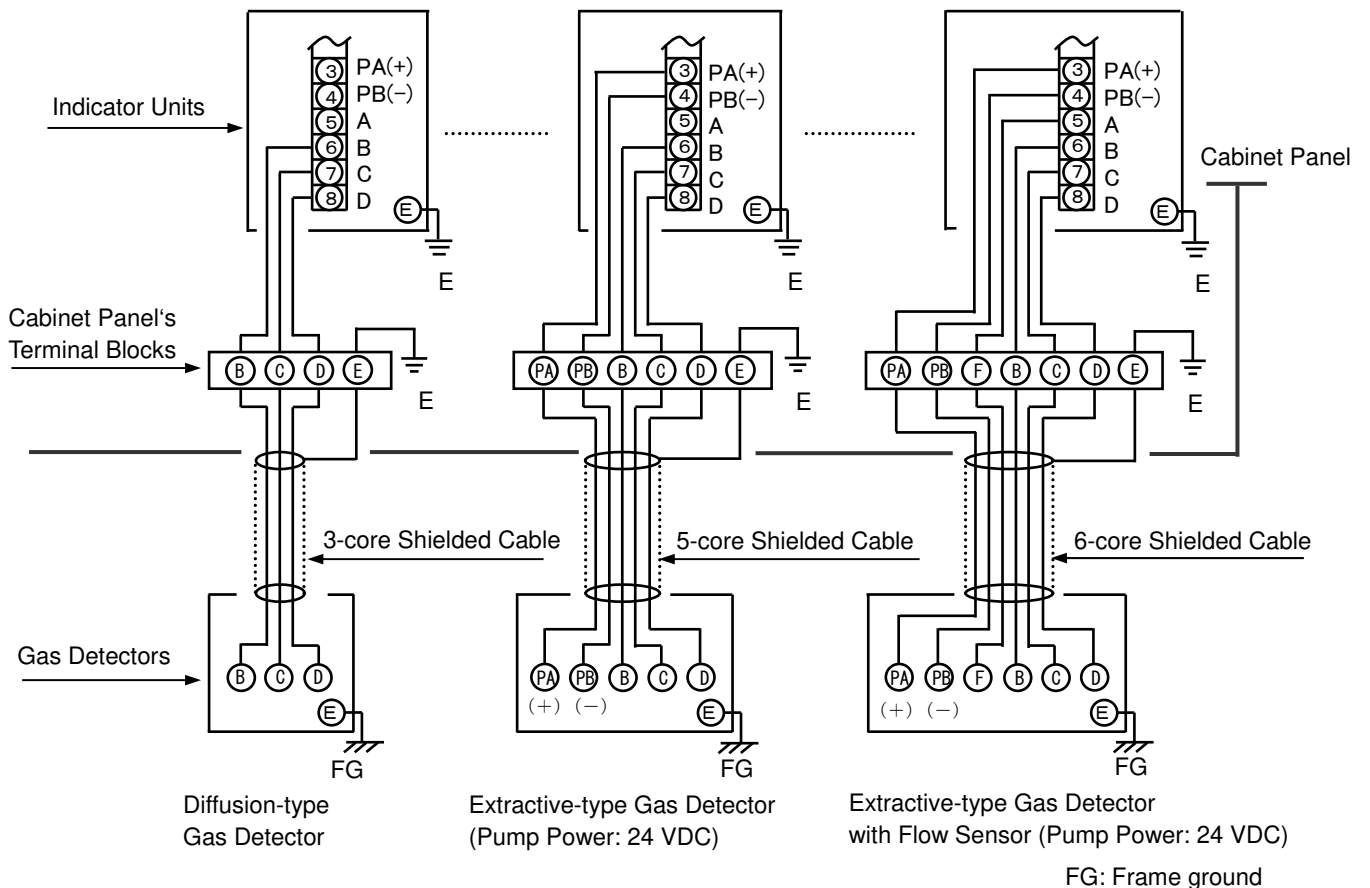G-H: Gas detector analog output (4-20mA)

Figure 11. Wiring Connection for Group 3 Indicator Units and Gas Detectors

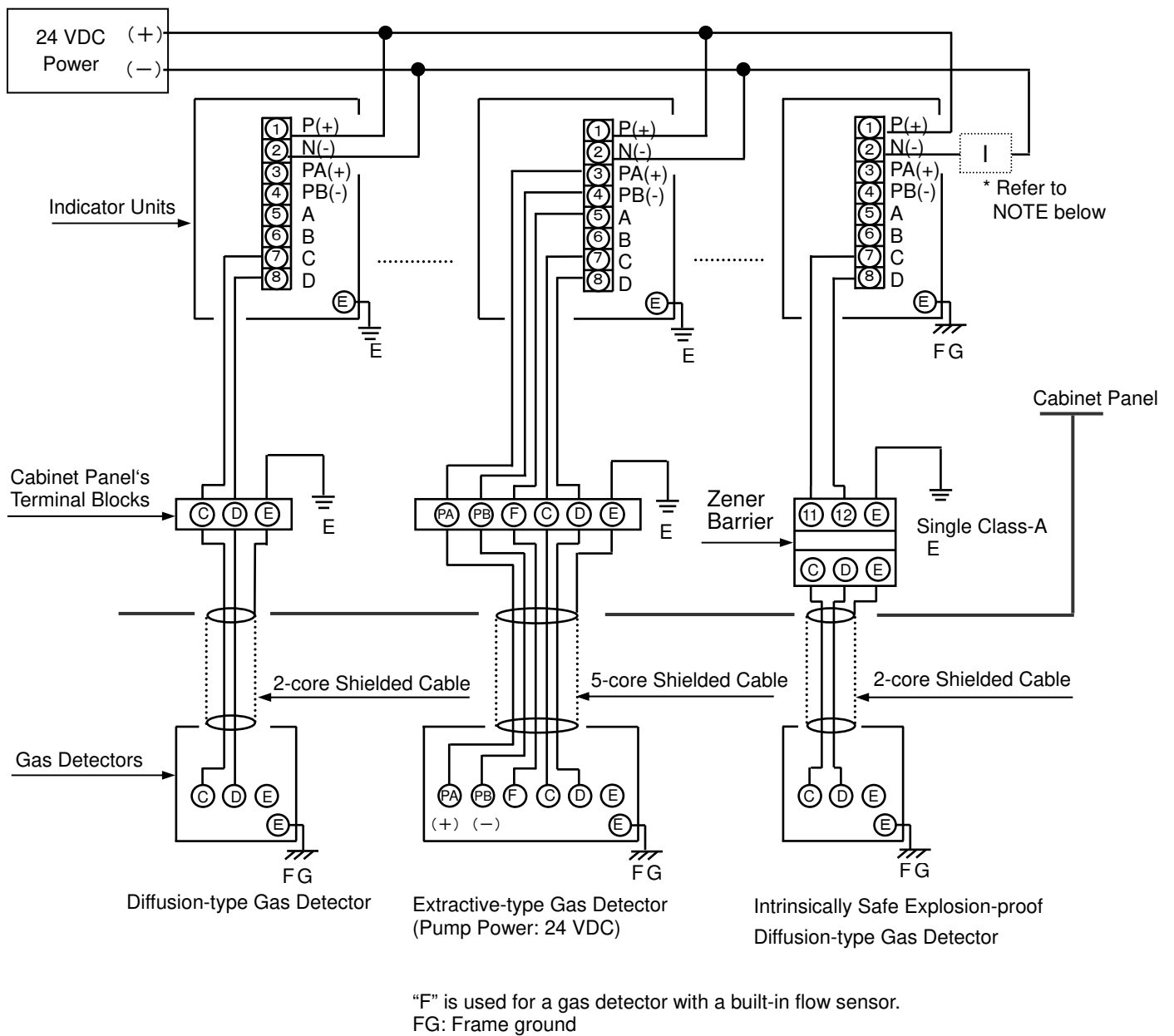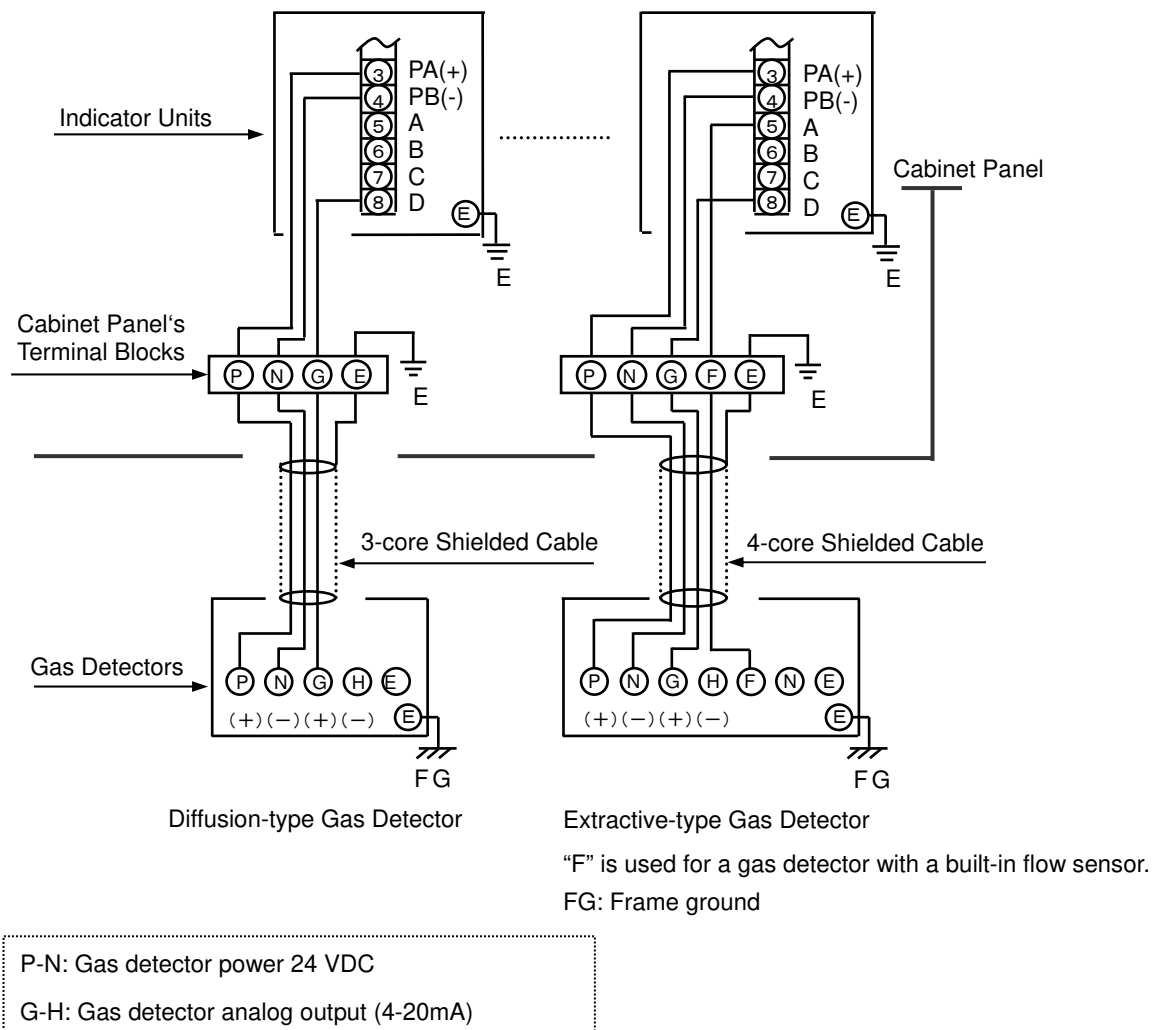(4) Typical Wiring Connection for Group 4/5 (Type: Hi/Ci/Ti/Zn) Indicator Units and Gas Detectors

Diffusion-type Gas Detector

Extractive-type Gas Detector
(Pump Power: 24 VDC)

FG: Frame ground
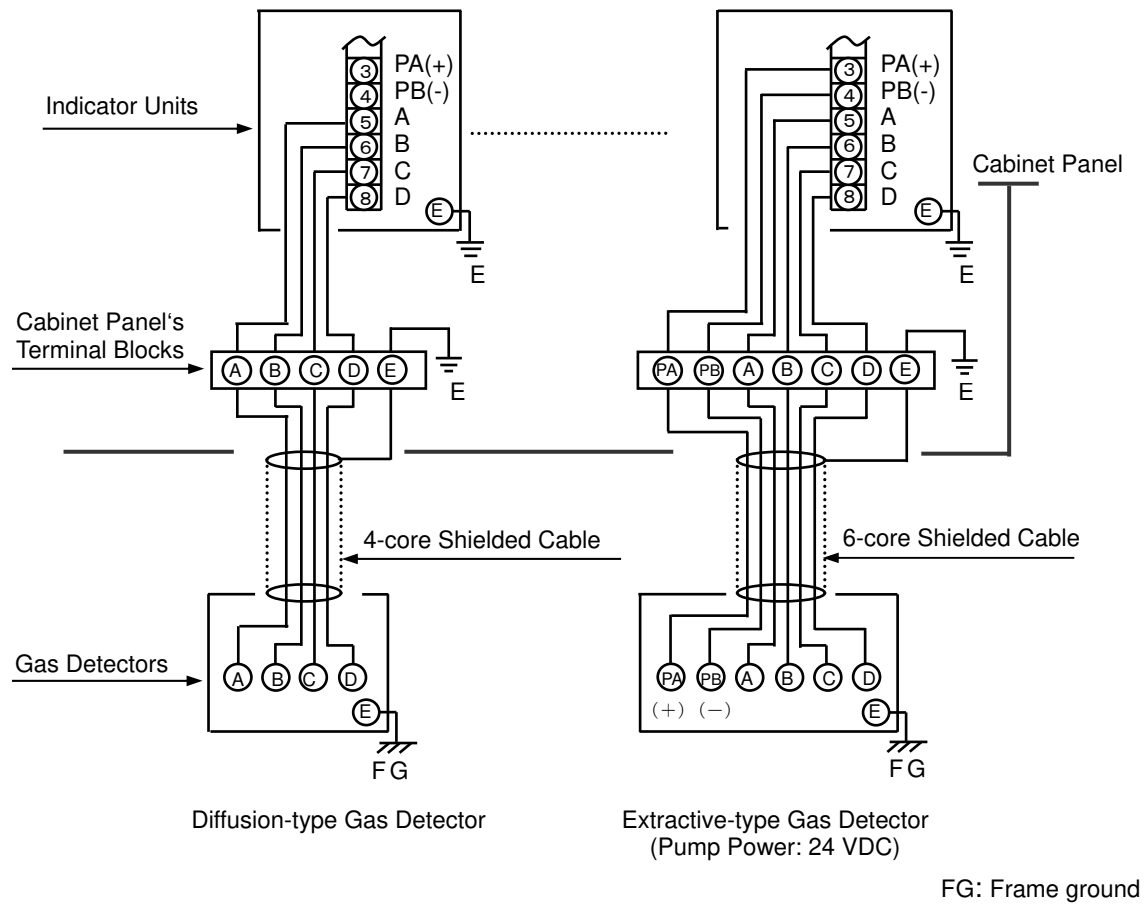
Figure 12. Wiring Connection for Group 4/5 Indicator Units and Gas Detectors

7-2. Connection with Alarm Unit

Connect indicator units to an alarm unit by using optional flat cable assemblies.

The number of connectors needed on the flat cable assembly (FAS-1) is equal to the total number of indicator units plus an alarm unit. Attach them to their corresponding connectors (Connectors B) on the rear of the metal housings.

When indicator units are mounted in two stages, a flat cable assembly (FAS-2) with two flat cable assembly connectors (FAS-3) is required to connect the top and bottom stages. In this case, the number of connectors needed on a flat cable assembly (FAS-1) is equal to the total number of metal housings plus one for each stage.

1st stage of indicator units

Connectors B

Rear of alarm unit

Rear of indicator units

Flat cable assembly (FAS-1) on 1st stage

(FAS-1)

Flat cable assembly

(FAS-2)

Flat cable assembly connector (2 places)

(FAS-3)

To flat cable assembly (FAS-1) on 2nd stage.
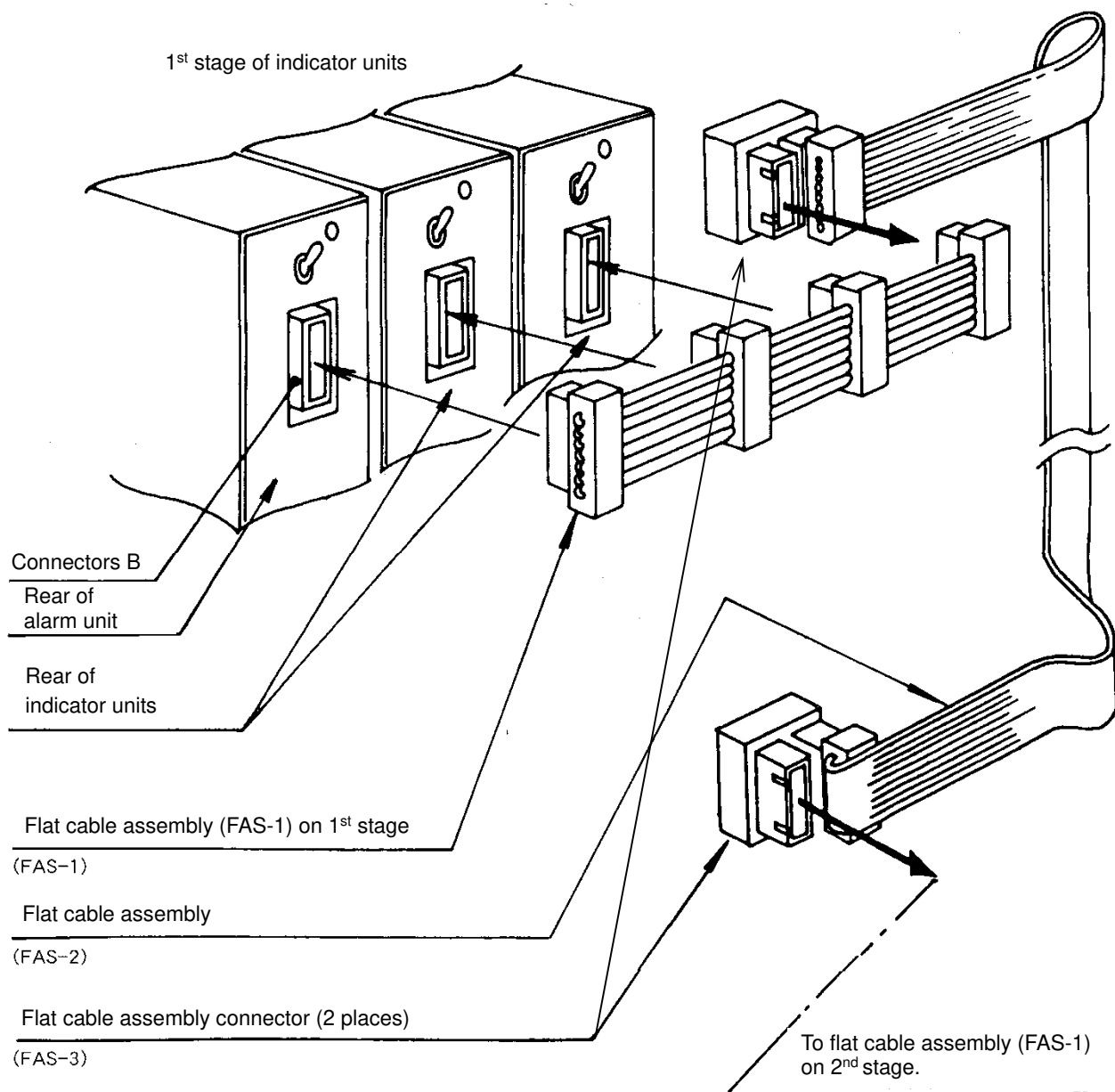
Figure 13. Wiring Connection with Alarm Unit

7-3. Connecting Power Source

24 VDC power needs to be supplied between terminals P (+) and N (-) (Terminal Nos.1 and 2).

If 24 VDC is not available, use a VPW-type power source unit (sold separately) for use with a 100 VAC commercially available power source.

⚠ **CAUTION**

● When multiple units are to be employed, the amp ratings and voltage drops should be considered before wiring.

● Ensure that the polarities are correct.

7-4. Connection with External Devices or Annunciators

The terminal assignment changes according to the model of the metal housing. For example, when using a metal housing, Model: V-SC-1 or V-SC-1(S), the terminals Nos. 9 to 13 (dry NO-C-NC contacts) are assigned to the 1st and 2nd stage alarms as shown in the drawing below. The terminal No. 9 is a common terminal.
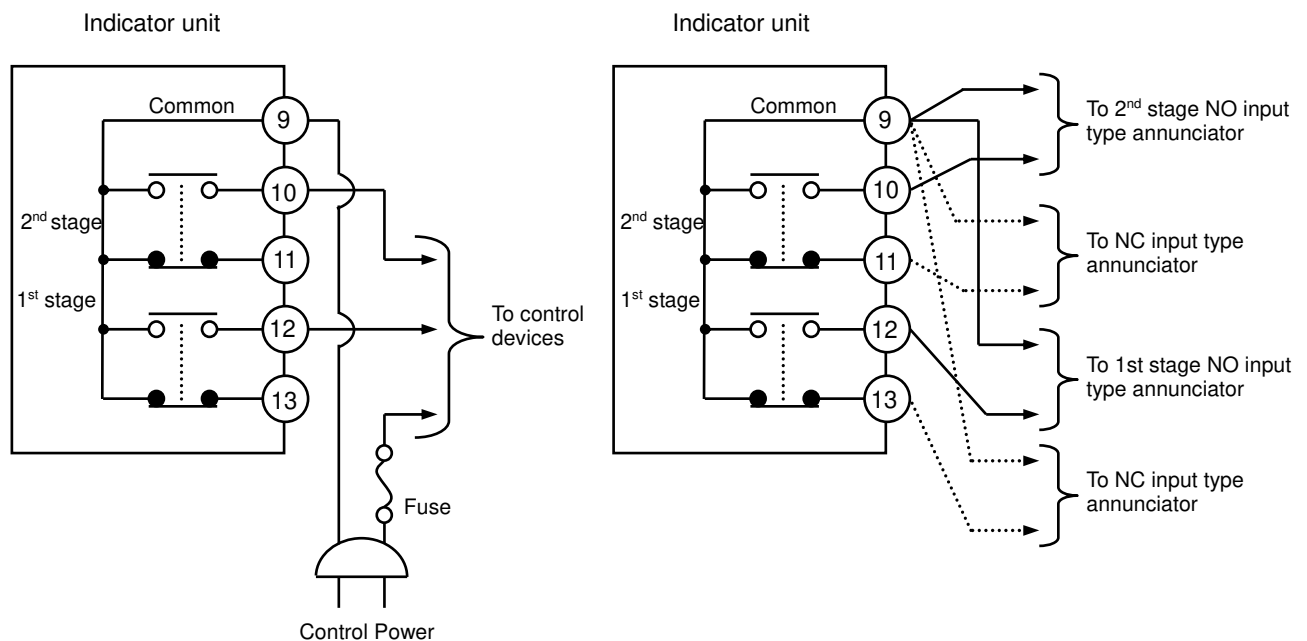
Figure 14. Wiring Connection for Alarm Contact Output Terminals

7-5. Connection for Analog Output

The 4-20mA analog signal corresponding to the detected gas concentration is output from the metal housing's analog output terminals (Terminal Nos. 15 ad 16). The polarities (Nos. 15 and 16) are + and – respectively.

A recorder or PLC can be connected to these analog output terminals, as necessary.
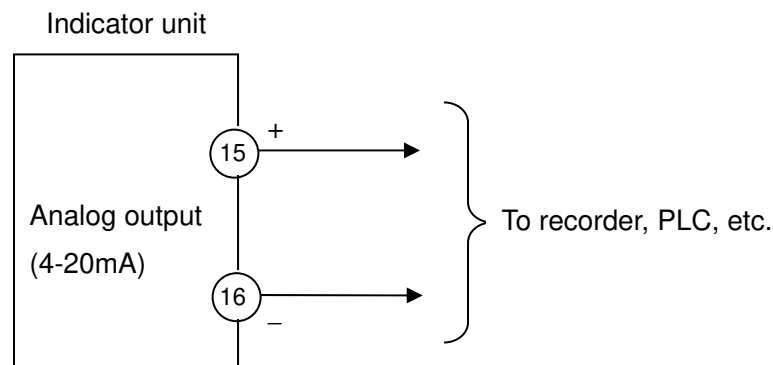
Figure 15. Wiring Connection for Analog Output Terminals

7-6. Connecting Cabinet Panel Reset Switch

Both optional flat cable assembly (FAS-1) and reset relay terminal (RST-01) are required to relay reset signals to the reset switch on the cabinet panel without using an alarm unit.

To install the reset relay terminal, remove the two screws from the rear of the metal housing on far right. The number of connectors needed on the flat cable assembly (FAS-1) is equal to the number of indicator units plus one. Attach the flat cable assembly between the connectors B on the rear of the metal housings and the reset relay terminal.


NOTE	・For performing an external reset using the alarm unit, refer to the alarm unit's instruction manual.

・For the CE marking specification, add a ferrite core (provided with RST-01) to the cable by wrapping the cable around the ferrite core (one loop) and securing the core to the cable with a tie wrap as shown in Figure 16.

・When the reset relay terminal is added, only the following combinations comply with the CE marking requrements.

- Indicator unit (Type M) with reset relay terminal (RST-01)

- Indicator unit (Type M) with reset relay terminal (RST-01) and alarm unit (VAS)

・Cable: No special requirments apply.

Connector B

Flat cable assembly (FAS-1)

Metal housing on far right

Remove the two screws, then install the reset relay terminal

Reset relay terminal (RST-01)

Tie wrap

Ferrite core

Looped cable

- Ferrite core is needed for CE marking
- Should be installed within 10cm from RST-01

N

Clamp

To reset switch

RESET

AS

AR

N

To power source terminal N

a) Semi-lock type

BZ.STOP

AS

AR

RESET

N

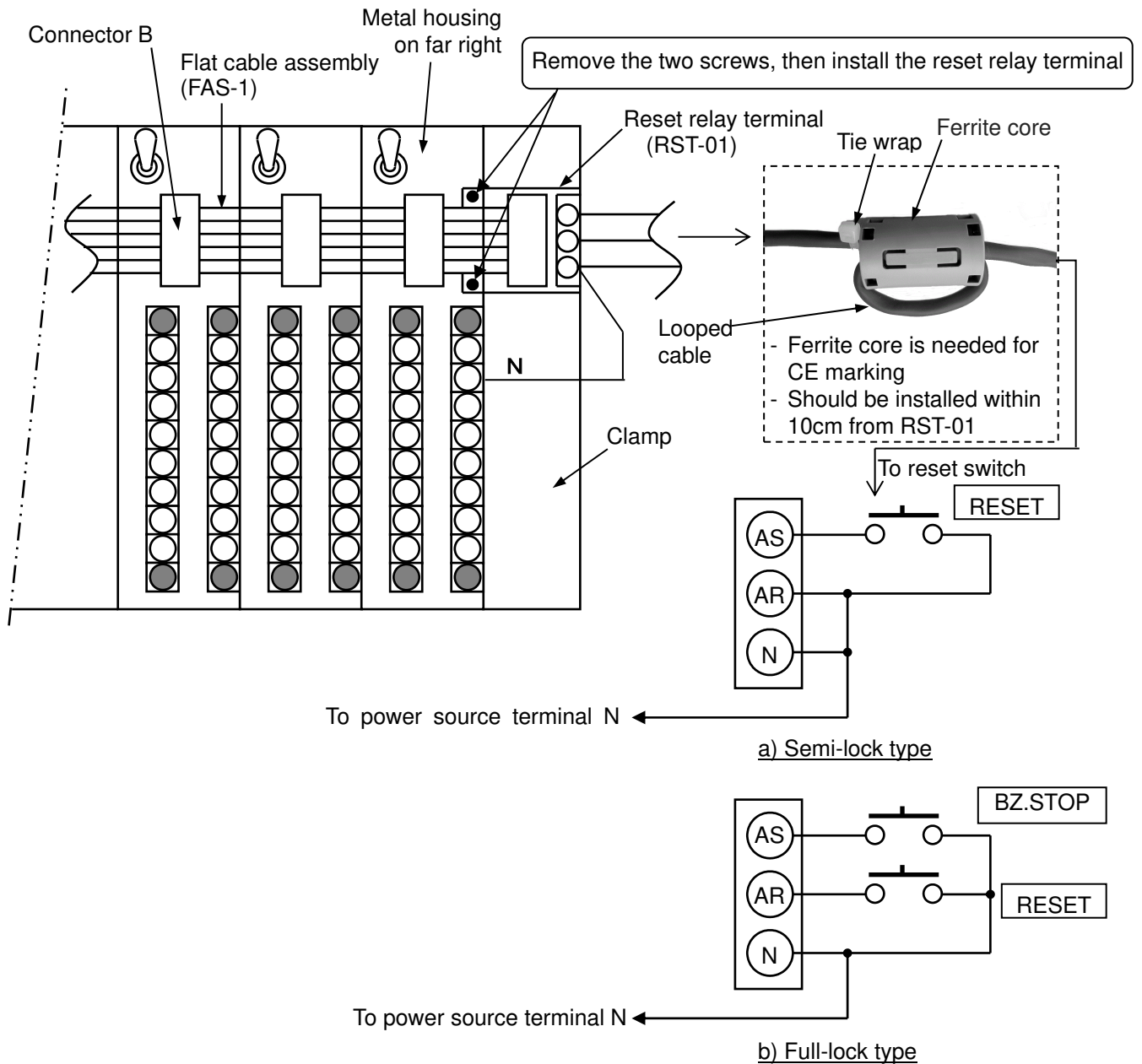To power source terminal N

b) Full-lock type

Figure 16. Wiring Connection for Cabinet Panel Reset Switch

8. Operation

8-1. Start-up

Important

Start-up operation can be extremely dangerous because it uses actual gas (e.g., combustible gas, toxic gas). It is highly recommended that New Cosmos or an authorized representative should be contacted to perform the initial start-up. The accuracy of the checks and adjustments made during start-up (e.g., zero/span adjustments, operation checks using actual gas) is crucial to ensure the reliability of the gas detection and alarm system. Start-up operation should only be performed by authorized personnel.


⚠ CAUTION

- Before turning on the unit, refer to 7 "Wiring and Connections" to check that all the components are connected correctly. Also check your delivery specifications, if your unit has end-user-specific options.

After making sure that the power source voltage and the wiring are correct, take the following steps to operate the indicator unit:

(1) Power-on
Set the power switch to the on position. The green POWER
LED will start flashing and the warm-up cycle will start.
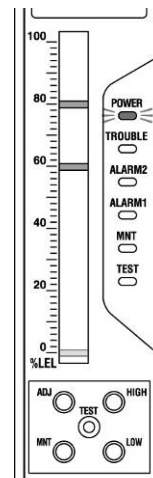
(2) Warm-up
Once the warm-up cycle is completed, the green flashing POWER LED will become steady. Normal operation will then start. The time required for warm-up cycle differs depending on the sensor's detection principle. Refer to 15. "Sensor Stabilization Warm-up Duration" for more information.

NOTE Before zero/span adjustment or gas sensitivity check (gas concentration adjustment), fully stabilize the sensor by energizing the detector for a recommended period of time given in Table 2 "Recommended Sensor Stabilization Warm-up Duration" on page 52.

Once the warm-up cycle is completed, the indicator unit is ready for normal operation.
If further adjustment is necessary, refer to 8-2 "Maintenance Mode" and 8-3 "Adjustment Procedures".

8-2. Maintenance Mode

Maintenance mode is used to deactivate the alarm contact outputs of the indicator unit and the alarm notification of the alarm unit. Set the indicator unit to the maintenance mode when performing adjustments, alarm operation check using the TEST button, or operation check using actual gas.

This indicator unit has two types of maintenance modes: Maintenance Mode 1 and Maintenance Mode 2. The differences between them are described in the table below:

Indicator Unit during Maintenance Mode

	Maintenance Mode 1	Maintenance Mode 2
Gas alarm contacts	Disabled	Disabled
Trouble alarm contact	Enabled	Disabled
Analog output	Output corresponding to gas concentration	Output set while in Mode 2-4 (Page 36)
Bar graph display	Displays gas concentration	Displays gas concentration

Alarm Unit during Maintenance Mode

	Maintenance Mode 1	Maintenance Mode 2
Red ALARM LED	Off	Off
Alarm audio	Beeps for three seconds in the event of a gas alarm.	Muted
Amber TROUBLE LED	On during faults	Off during faults

How to enter/exit maintenance mode

1. Open the front cover.
2. Press the MNT button once to enter Maintenance Mode 1. Press the MNT button for about three seconds to enter Maintenance Mode 2.
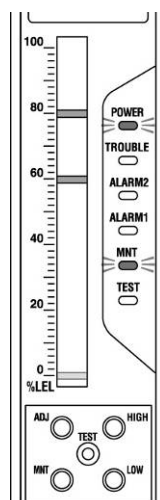
MNT LED flashes during Maintenance Mode 1, and is steady during Maintenance Mode 2

3. To exit the maintenance mode, press and hold the MNT button until the red MNT LED turns off.

8-3. Adjustment Procedures

8-3-1. Flow Rate Adjustment

When an extractive-type gas detector is connected, make sure that the center of the sphere of the gas detector's flow meter aligns with the red line. If not, adjust the flow with the gas detector. For details on the adjustment, refer to the gas detector's instruction manual.

8-3-2. Modes

(1) Mode Lock Deactivation

Before starting a zero/span/other adjustment using Modes 1 to 5, deactivate the mode lock.

> **How to deactivate mode lock**
>
> 1. Press the HIGH button (for at least three seconds).
> 2. Press the ADJ button.
> 3. Press the LOW button.
> 4. Press the HIGH button.

When the mode lock is deactivated, the steady green POWER LED will start flashing rapidly.
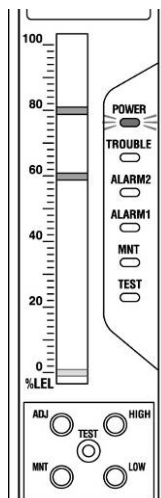
When mode lock is deactivated, steady POWER LED will start flashing rapidly

NOTE	The mode lock cannot be deactivated while in the test mode (page 37). Exit the test mode before deactivating the mode lock.

⚠ CAUTION

- Entering Modes 1 to 5 resets an alarm. Do not enter any of these modes while an alarm is active (e.g., alarm set off by gas leak). Before starting an inspection or adjustment, make sure that the indicator unit has returned to normal gas monitoring operation (no active alarm), then deactivate the mode lock.

- After changing any set value while in Modes 1 to 5, press and hold the setting wheel up to save the change. Unsaved value changes will not be reflected in the product.

(2) Mode Selection
- Deactivating the mode lock enables mode selection. Take the steps below to select a mode.
- Pull and remove the indicator unit from the metal housing and locate the five LEDs (Nos.1 to 5) on the left side of the indicator unit. Each LED is numbered to represent its corresponding mode (1 to 5). Only one LED is lit at a time.

How to select the mode

1. Select the desired mode by scrolling the setting wheel. The lit LED moves in relation to how the setting wheel is scrolled backward/forward.

Light in the LED indicator moves in relation to the wheel

Scroll the setting wheel backward or forward
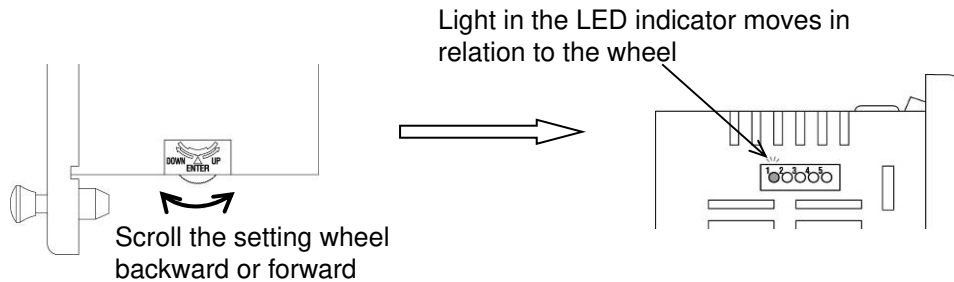
2. Press and hold the setting wheel up to confirm the mode selection.

Press the setting wheel up

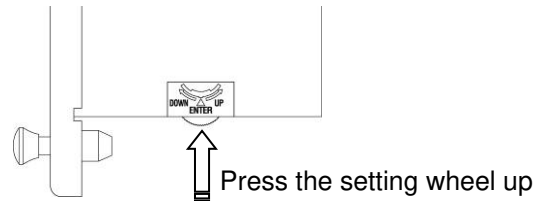3. The five LEDs on the front (TROUBLE, ALARM2, ALARM1, MNT and TEST) represent their corresponding sub-modes (x-1 to x-5), and turn on when selected. Only one LED is on at a time except during Mode 1-6, in which the amber TROUBLE and red ALARM2 LEDs are on. Refer to Table 1 on next page for all combinations. Example: When the mode is set to 1 and TROUBLE LED is on, Mode 1-1 is selected.

TROUBLE, ALARM2, ALARM1, MNT and TEST LEDs correspond to sub-modes (x-1 to x-5)

When Mode 1-6 is selected, TROUBLE and ALARM2 LEDs are lit
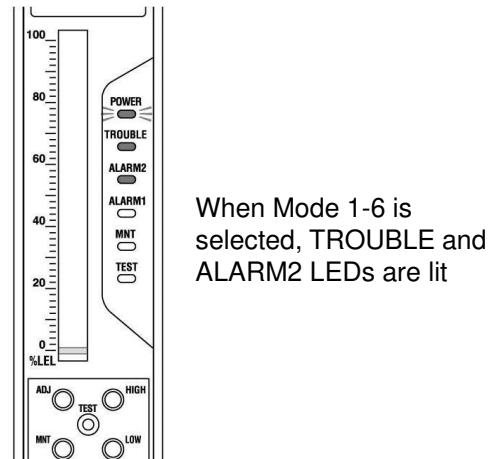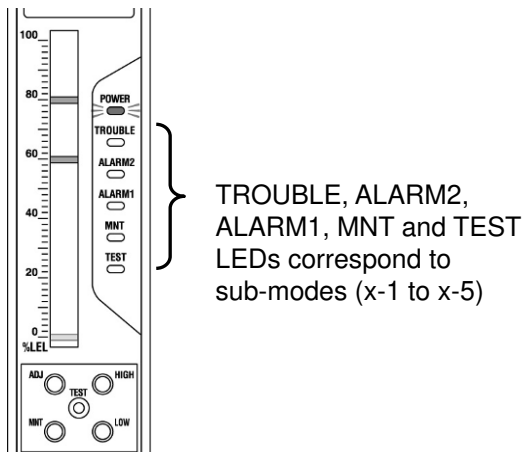
4. Press the setting wheel up to change the sub-mode. Refer to Table 1 on next page for information on the modes and sub-modes.

NOTE	· To perform a setup or adjustment in a different mode, press the LOW button on the front of the indicator unit. The current mode will end and another mode can be selected.
	· To cancel the value being adjusted in any mode (before saving the adjusted value by pressing and holding the wheel up), either press the setting wheel up once or press the LOW button.
	· To end the adjustment, press and hold the HIGH button. This will activate the mode lock and the unit will return to normal gas monitoring operation.

The table below lists the modes and sub-modes that can be selected. Refer to the following pages for their use and adjustment procedures.

Table 1. Modes/Sub-modes List

To confirm (save) the currently selected setting, press and hold the setting wheel up.

Mode	Function		Sub-mode	Group	LED Status
1	Input adjustment	1	Coarse zero adjustment	1, 3, 4, 5	Amber TROUBLE LED is on.
		2	Fine zero adjustment	1, 3, 4, 5	Red ALARM2 LED is on.
		3	Span adjustment	1, 2, 3	Red ALARM1 LED is on.
			Coarse span adjustment	4, 5	
		4	One-man maintenance span adjustment	1, 2, 3	Red MNT LED is on.
			Fine span adjustment	4, 5	
		5 *	One-touch zero adjustment	1, 2 (D),3	Red TEST LED is on.
			One-touch 21.0 vol.% adjustment	2 (O)	
		6	Heater current adjustment	1, 4, 5	Amber TROUBLE LED and red ALARM2 LED are on.
2	Analog output adjustment	1	Zero adjustment	All	Amber TROUBLE LED is on.
		2	Span adjustment	All	Red ALARM2 LED is on.
		3	———— (For manufacturer use only)		————
		4	Analog output adjustment for Maintenance Mode 2	All	Red MNT LED is on.
		5	Analog output adjustment for initial delay	All	Red TEST LED is on.
3	(For manufacturer use only)	1	————		————
		2	————		————
		3	————		————
		4	————		————
		5	————		————
4	Other adjustment	1	Set alarm value	All	Amber TROUBLE LED is on.
		2	————		————
		3	Switch brightness of LED bar graph display (high/low)	All	Red ALARM1 LED is on.
		4	Display linear data (for reference only)	All	Red MNT LED is on.
		5	————		————
5	(For manufacturer use only)	1	————		————
		2	————		————
		3	————		————
		4	————		————
		5	————		————

*One-touch zero adjustment is not available for units in Groups 4/5.

8-3-3. Check and Adjustment of Sensor Heater Current (for Groups 1, 4 and 5)

1. Pull the panel lock knob to remove the indicator unit from the metal housing.
2. Connect a voltmeter having a high internal resistance (min.100 kΩ) to the heater current test terminals located at the top of the indicator unit. Measure the heater current. A standard resistor (1Ω) is installed in between the (+) and (-) test terminals. Therefore, for example, if the measured voltage is 180 mV, it means the current is 180mA.
3. A heater current label is on the right side of the indicator unit. Check that the measured current is equal to or ±2mA of the value as specified on the label.

Heater current label

Heater current test terminals

Voltmeter

Pull to remove the indicator unit from the metal housing
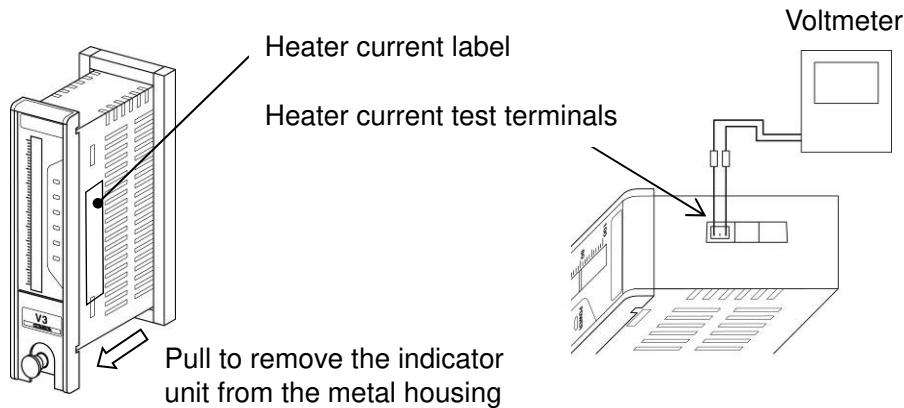
4. If the measured current is out of the specified range, it is necessary to adjust the heater current by following the adjustment procedure below.
5. Deactivate the mode lock (page 24).
6. Select Mode 1-6 for heater current adjustment (pages 25 and 26).

Scroll the setting wheel until the LED for Mode 1 is on
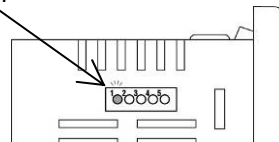
Side View
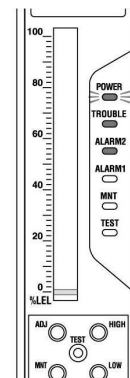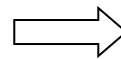
7. Scroll the setting wheel to adjust the heater current to the current value shown on the heater current label.
8. To save the setting, press and hold the setting wheel up until all the bar graph segments are lit green. Always save a new setting after each adjustment.

8-3-4. Zero (or 21.0 vol.%) Check and Adjustment of Gas Detector

- If the bar graph display does not read zero after the warm-up cycle, introduce clean air into the gas detector and perform a zero adjustment at the gas detector. Refer to the gas detector's instruction manual for adjustment procedure.
- For oxygen detection, there are two types of specifications, oxygen leak and low oxygen detections (the zero value is set to 0 vol.% or 21.0 vol.%). Refer to the delivery specifications for your indicator unit to find out which specification yours is. For adjustment procedure, refer to the gas detector's instruction manual.

8-3-5. Zero and Span Adjustments of Indicator Unit

NOTE	· If the gas detector has not been powered for a long period of time (i.e. between shipment and initial energization), it may take longer for the bar graph display reading to stabilize.

· For Types M, O, and D, perform zero (or 21.0 vol.%) and span adjustments at the connected gas detector. If the indicator unit contiunues to not read zero (or 21.0 vol.%), perform a span adjustment at the indicator unit.

Some detector models (e.g., KD-5D) do not have a zero/span adjustment function. In this case, perform zero or span adjustment at the indicator unit.

If the bar graph display on the indicator unit does not read zero (or 21.0 vol.%) after an operation check of the gas detector using its test mode, perform zero and span adjustments on the indicator unit by taking the following steps.

Note: A different zero/span adjustment method needs to be used to adjust an indicator unit that has linearizer and/or zero suppression function. Contact New Cosmos or its authorized representative for details.

⚠ CAUTION

● Perform a zero adjustment in clean air. Proper adjustment is not possible in an atmosphere that may contain target or interfering gases.

Zero Suppression Function

For indicator units with a zero suppression function, the bar graph dislay continues to indicate "0" until the target gas concentration detected by the detector exceeds the pre-set value. The pre-set zero suppression value is given in the delivery specifications.

---

(1) Zero/span Adjustment Flowchart

Follow the sequence shown in the flow chart below to perform adjustments.

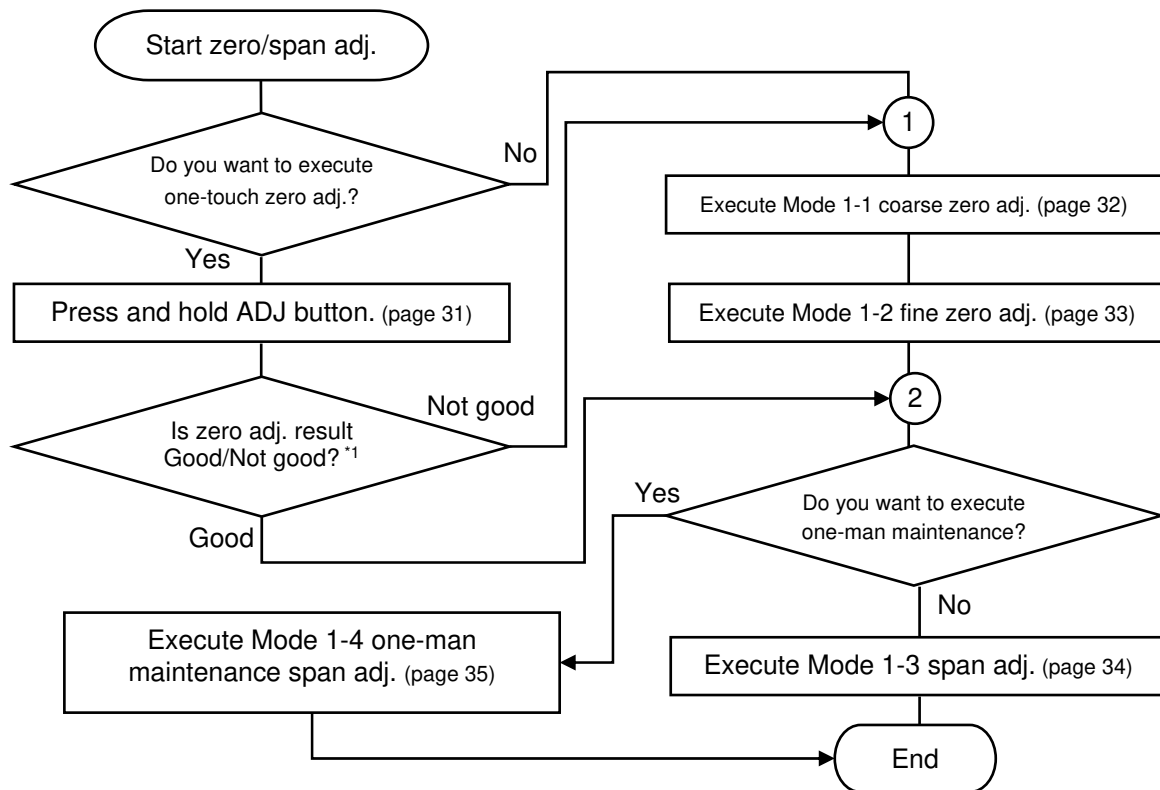**Zero/Span Adjustment Flowchart for Groups 1, 2 (Type D) and 3**

Figure 17. Zero/Span Adjustment Flowchart for Group 1/2 (Type D)/3

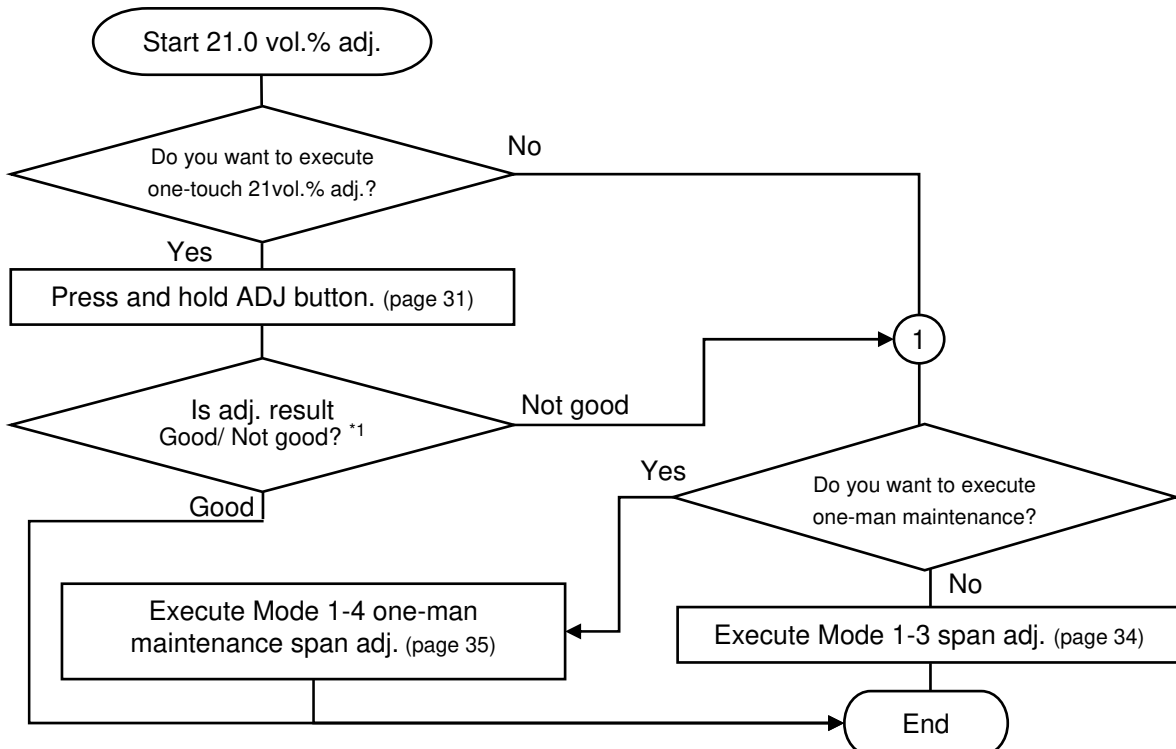**21.0 vol.% Adjustment Flowchart for Group 2 (Type O)**

Figure 18. 21.0 vol.% Adjustment Flowchart for Group 2 (Type O)
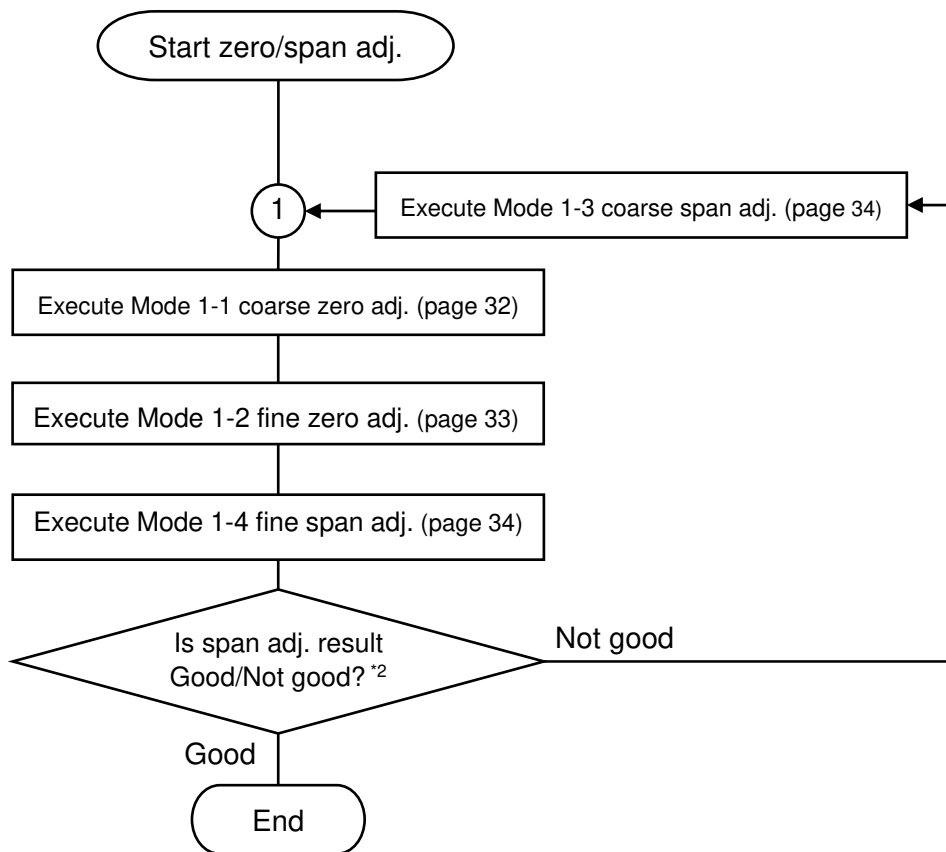
Zero/Span Adjustment Flowchart for Groups 4 and 5

```
                    ┌─────────────────────────┐
                    │   Start zero/span adj.   │
                    └─────────────────────────┘
                                 │
                                 │
            ┌───┐       ┌──────────────────────────────────────────┐
            │ 1 │◄──────│ Execute Mode 1-3 coarse span adj. (page 34) │◄────┐
            └───┘       └──────────────────────────────────────────┘      │
                                 │                                         │
            ┌──────────────────────────────────────────┐                  │
            │ Execute Mode 1-1 coarse zero adj. (page 32) │                │
            └──────────────────────────────────────────┘                  │
                                 │                                         │
            ┌──────────────────────────────────────────┐                  │
            │ Execute Mode 1-2 fine zero adj. (page 33)  │                 │
            └──────────────────────────────────────────┘                  │
                                 │                                         │
            ┌──────────────────────────────────────────┐                  │
            │ Execute Mode 1-4 fine span adj. (page 34)  │                 │
            └──────────────────────────────────────────┘                  │
                                 │                                         │
                          ╱──────────────╲         Not good               │
                         ╱ Is span adj. result╲────────────────────────────┘
                         ╲ Good/Not good? *2   ╱
                          ╲──────────────╱
                                 │ Good
                    ┌─────────────────────────┐
                    │           End            │
                    └─────────────────────────┘
```

Figure 19. Zero/Span Adjustment Flowchart for Group 4/5

| NOTE	*1. Good/Not good criteria for zero/21.0 vol.% adjustment

*1. Good/Not good criteria for zero/21.0 vol.% adjustment
    Good: All the bar graph segments are lit green.
    Not good: Green POWER LED flashes three times.
*2. Good/Not good criteria for span adjustment
    Good: All the bar graph segments are lit green.
    Not good: Cannot adjust to the calibration gas concentration value.
*adj.: adjustment

(2) One-touch Zero Adjustment (or 21.0 vol.% Adjustment)
(2-A) One-touch Zero Adjustment for Groups 1, 2 (Type D) and 3
1. Check that the air around the gas detector is free of target/interfering gases. Press and hold the ADJ button on the front panel until the green POWER LED turns off.
2. The POWER LED turns off temporarily, and then the zero adjustment will start.
3. Once the adjustment is completed, the POWER LED flashes once.
4. If the adjustment is unsuccessful, the POWER LED slowly flashes three times.
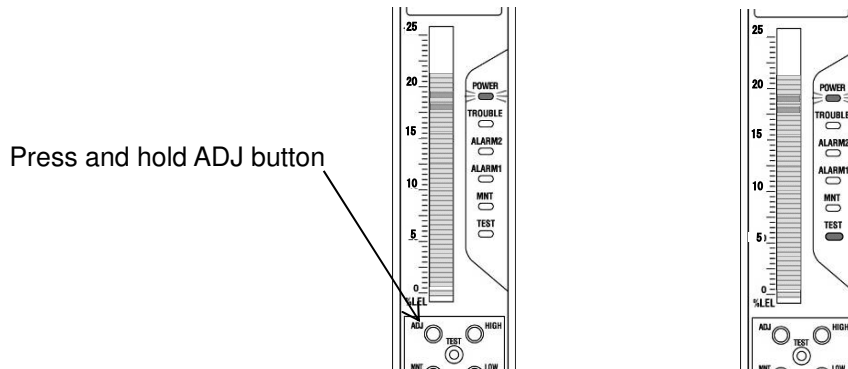5. If unsuccessful, perform a coarse zero adjustment (3-A).

Press and hold ADJ button
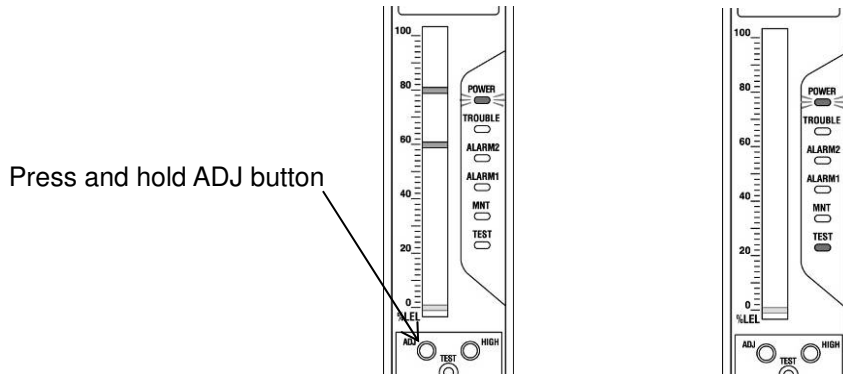
Adjustment during Normal Operation   Adjustment using Mode 1-5

NOTE	・ One-touch zero adjustment can also be performed in Mode 1-5. Set the mode to Mode 1-5, then press and hold the setting wheel up to execute a one-touch zero adjustment. ・ One-touch zero adjustment is not available for Type O units in Group 2. ・ One-touch zero adjustment is not available for units in Group 4/5. Perform a zero adjustment by taking the steps shown in Figure 19.

(2-B) One-touch 21.0 vol.% Adjustment for Group 2 (Type O)
1. Check that the air around the gas detector is free of target/interfering gases. Press and hold the ADJ button on the front panel until the green POWER LED turns off.
2. The POWER LED turns off temporarily, and then the 21.0 vol.% adjustment will start.
3. Once the adjustment is completed, the POWER LED flashes once.
4. If the adjustment is unsuccessful, the POWER LED slowly flashes three times.
5. If unsuccessful, perform a span adjustment (5-A).

Press and hold ADJ button

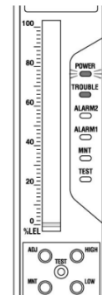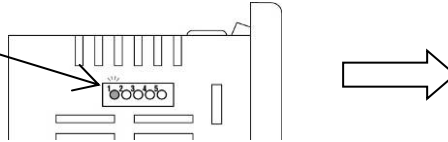Adjustment during Normal Operation   Adjustment using Mode 1-5

NOTE	・ One-touch 21.0 vol.% adjustment can also be performed in Mode 1-5. Set the mode to Mode 1-5, then press and hold the setting wheel up to execute a one-touch adjustment. ・ One-touch zero adjustment is not available for Type O units in Group 2.

(3) Coarse Zero Adjustment
(3-A) Coarse Zero Adjustment for Groups 1, 2 (Type D) and 3
1. Deactivate the mode lock (page 24).
2. Select Mode 1-1 (coarse zero adjustment, pages 25 and 26).
   (Ensure that a zero adjustment is done before a span adjustment.)

Scroll the setting wheel until the LED for Mode 1 turns on

3. Check that the air around the gas detector is free of target/interfering gases. Scroll the setting wheel to make the bar graph display read zero.

> **NOTE** Linearizer is deactivated while in Mode 1-1 or 1-2.
> To temporarily activate it, press and hold the ADJ button while in Mode 1-1 or 1-2.

4. To save the setting, press and hold the setting wheel up until all the bar graph segments are lit green. Always save a new setting after each adjustment.
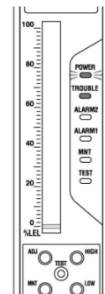5. Proceed to (4) below to perform a fine zero adjustment.

> **NOTE** Always perform a fine zero adjustment (4) after performing a coarse zero adjustment.

(3-B) Coarse Zero Adjustment for Groups 4 and 5
1. Deactivate the mode lock (page 24).
2. Select Mode 1-1 (coarse zero adjustment, pages 25 and 26).
   (Ensure that a zero adjustment is done before a span adjustment.)

Scroll the setting wheel until the LED for Mode 1 turns on

3. Check that the air around the gas detector is free of target/interfering gases. Scroll the setting wheel to move up or down the bar graph until the TEST LED is on.

> **NOTE** · The TEST LED does not always turn on when the bar graph display reads zero. Move the bar graph up or down to find the zone at which the TEST LED will turn on.
> · Linearizer is deactivated while in Mode 1-1 or 1-2.
> To temporarily activate it, press and hold the ADJ button while in Mode 1-1 or 1-2.

4. To save the setting, press and hold the setting wheel up until all the bar graph segments are lit green. Always save a new setting after each adjustment.
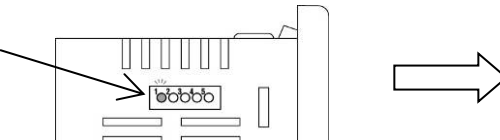5. Proceed to (4) below to perform a fine zero adjustment.

> **NOTE** Always perform a fine zero adjustment (4) after performing a coarse zero adjustment.

(4) Fine Zero Adjustment for all groups except Group 2 (Type O)

1. Deactivate the mode lock (page 24).
2. Select Mode 1-2 (fine zero adjustment, pages 25 and 26).
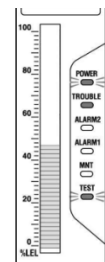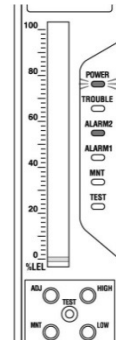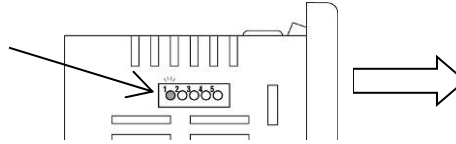   (Ensure that a zero adjustment is done before a span adjustment.)

Scroll the setting wheel until the LED for Mode 1 turns on

3. Check that the air around the gas detector is free of target/interfering gases. Scroll the setting wheel to make the bar graph display read zero.

| NOTE | Linearizer is deactivated while in Mode 1-1 or 1-2. |
| | To temporarily activate it, press and hold the ADJ button while in Mode 1-1 or 1-2. |

4. To save the setting, press and hold the setting wheel up until all the bar graph segments are lit green. Always save a new setting after each adjustment.
5. To perform a subsequent span adjustment, go to (5-A) "Span Adjustment" on the next page.

NOTE	・ Refer to the gas detector's instruction manual for zero/span adustment procedure for the gas detector
	・ For Types M, O, and D, perform zero (or 21.0 vol.%) and span adjustments at the connected gas detector. If the indicator unit contiunues to not read zero (or 21.0 vol.%), perform the adjustments at the indicator unit.
	Some detector models (e.g., KD-5D) do not have a zero/span adjustment function. In this case, perform zero or span adjustment at the indicator unit.

(5) Span Adjustment

(5-A) Span Adjustment for Groups 1 to 3
 1. Deactivate the mode lock (page 24).
 2. Select Mode 1-3 (span adjustment, pages 25 and 26).
 3. Apply the calibration gas to the gas detector. Wait until the bar graph display stabilizes.
 4. Make the bar graph display read the calibration gas concentration value by scrolling the setting wheel. (Refer to the gas detector's instruction manual for instructions on how to apply gas to the gas detector.)
 5. To save the setting, press and hold the setting wheel up until all the bar graph segments are lit green. Always save a new setting after each adjustment.
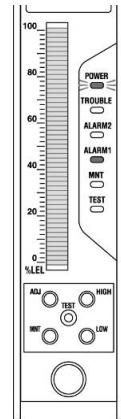
(5-B) Fine Span Adjustment for Groups 4 and 5
 1. Deactivate the mode lock (page 24).
 2. Select Mode 1-4 (fine span adjustment, pages 25 and 26).
 3. Apply the calibration gas to the gas detector. Wait until the bar graph display stabilizes.
 4. Make the bar graph display read the calibration gas concentration value by scrolling the setting wheel. (Refer to the gas detector's instruction manual for instructions on how to apply gas to the gas detector.)
 5. To save the setting, press and hold the setting wheel up until all the bar graph segments are lit green. Always save a new setting after each adjustment.
 6. If the span adjustment is unsuccessful (bar graph display fails to show the calibration concentration value), perform a coarse span adjustment (6) below.

(6) Coarse Span Adjustment for Groups 4 and 5
If a preceding fine span adjustment (5-B) is unsuccessful, perform a coarse span adjustment by taking the following steps:
 1. Deactivate the mode lock (page 24).
 2. Select Mode 1-3 (coarse span adjustment, pages 25 and 26).
 3. Apply the calibration gas to the gas detector. Wait until the bar graph display stabilizes.
 4. Make the bar graph display read the calibration gas concentration value by scrolling the setting wheel. (Refer to the gas detector's instruction manual for instructions on how to apply gas to the gas detector.)
 5. To save the setting, press and hold the setting wheel up until all the bar graph segments are lit green. Always save a new setting after each adjustment.

| NOTE	After performing a coarse span adjustment, always perform coarse and fine zero adjustments, then perform a fine span adjustment.

(7) One-man Maintenance Span Adjustment for Groups 1 to 3

One-man maintenance span adjustment is a function that enables one operator to perform a span adjustment by using the peak hold function. The procedure is given below.

1. Enter the maintenance mode (page 23). Deactivate the mode lock (page 24).
2. Select Mode 1-4 (one-man maintenance span adjustment, pages 25 and 26).
3. Move the red segment on the bar graph display to your target peak value by scrolling the setting wheel. To save the setting, press and hold the setting wheel up until all the bar graph segments are lit green.

Red segment

Move the red segment to the target value. Press and hold the setting wheel up to save the setting
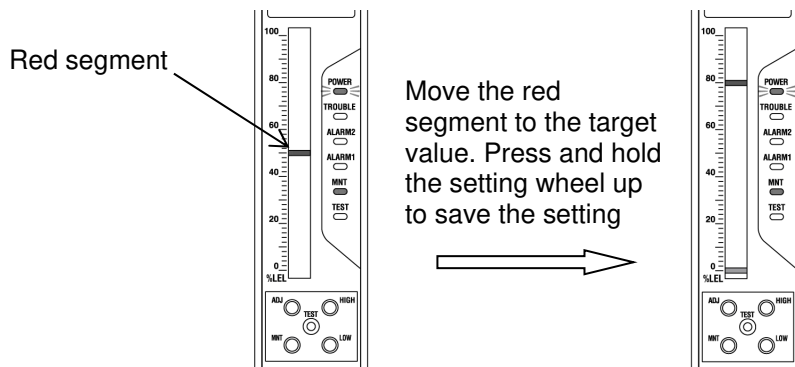
4. Once the setting is saved, the bar graph display displays the current gas concentration and the target peak value (red segment) from step 3 above. The current concentration is displayed by green segments with one amber segment on the top. Apply enough calibration gas (concentration equal to the target peak value) to the gas detector so that the target concentration is displayed on the bar graph. As the concentration falls, the green segments indicating the concentration level also fall. The amber segment (peak value) remains in its peak position.

Red segment

Amber segment

Green segments

Amber segment remains in its peak position

Green segments fall

Gas applied   Gas stopped
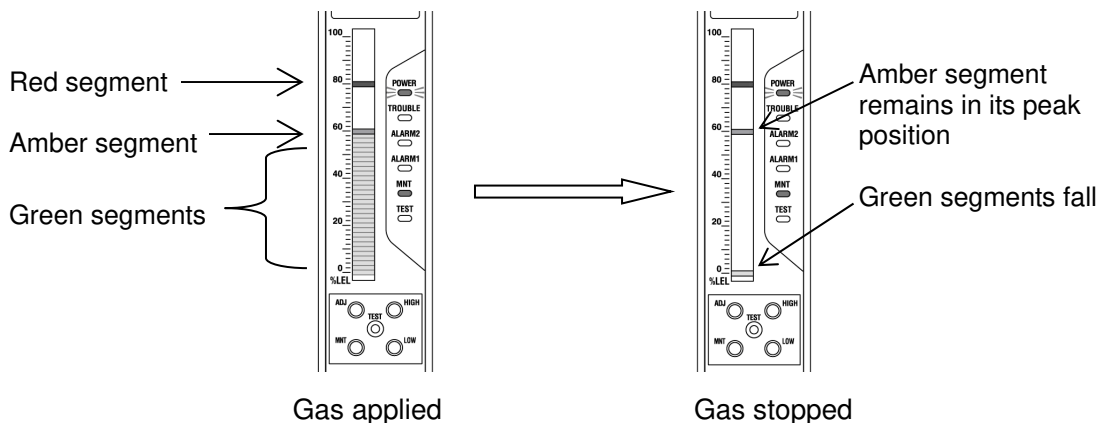
5. If the red and amber segments are not aligned, press and hold the setting wheel up until the all the segments are lit green. The red segment will then turn amber, indicating that the span adjustment is completed.

Red segment turns amber
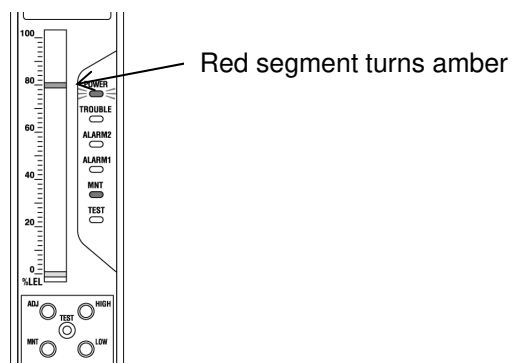
8-3-6. Zero and Span Adjustments of Analog Output

1. Deactivate the mode lock (page 24).
2. Select Mode 2-1 for zero adjustment, or select Mode 2-2 for span adjustment (pages 25 and 26).
3. Connect a tester to the terminals (Nos.15 and 16) on the rear of the metal housing.
4. Once Mode 2-1 or 2-2 is selected, the analog output under the zero or span adjustment is shown on the tester. If the reading is not 4mA or 20mA, adjust it to 4mA or 20mA by scrolling the setting wheel.
5. To save the setting, press and hold the setting wheel up until all the bar graph segments are lit green. Always save a new setting after each adjustment.

8-3-7. Analog Output Adjustment while in Maintenance Mode 2

The analog current output for Maintenance Mode 2 can be adjusted.

1. Deactivate the mode lock (page 24).
2. Select Mode 2-4 (pages 25 and 26).
3. Connect a tester to the terminals (Nos.15 and 16) on the rear of the metal housing.
4. Once Mode 2-4 is selected, the analog output for the maintenance mode is shown on the tester. If the reading is not 4mA, adjust it to 4mA by scrolling the setting wheel.
5. To save the setting, press and hold the setting wheel up until all the bar graph segments are lit green. Always save a new setting after each adjustment.

8-3-8. Gas Alarm Operation Check using TEST Button (Test Mode)

1. Press the MNT button to enter the maintenance mode (Refer to 8-2 "Maintenance Mode").
2. Using a rounded pin, press the TEST button to enter the test mode.
   Once the test mode is entered, the bar graph display switches to the test level display. To change the test level (simulated gas concentration value), increase/decrease the value using the HIGH or LOW button.
3. Check the gas alarm operation (e.g., gas alarm contact output, analog output).
4. Before exiting the test mode, set the test level below the alarm set value. Failure to do so may cause an alarm when the test mode is entered again, since the previous test level will be saved. Press the TEST button to exit the test mode. If the unit is left idle for more than10 minutes, the unit will automatically exit the test mode.
5. If the maintenance mode is activated, press and hold the MNT button untill the red MNT LED turns off. This ends the maintenance mode and returns to normal operation.

TEST button (recessed)

Increase/decrease test level using HIGH/LOW button
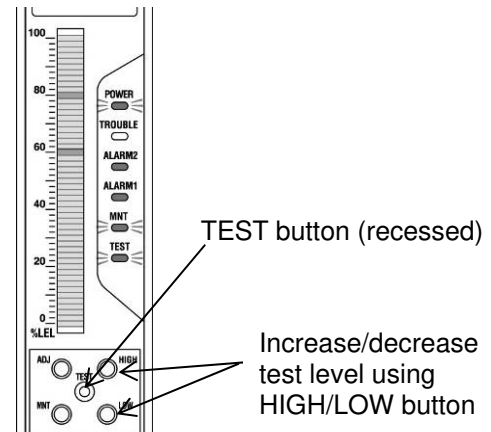
⚠ DANGER

- Exit the maintenance mode after an operation check using the test mode. Failure to do so will result in the alarm contact outputs and the output to the alarm unit not being activated even if the gas detector detects the target gas concentration in excess of alarm set value.

⚠ CAUTION

- Performing an alarm operation check using the test mode activates the analog output, alarm contact output, and output to the alarm unit. If the alarm contact output is used to interlock external devices, set the indicator unit to the maintenance mode and release the interlocks of the external devices beforehand, as needed, to prevent possible activation of the interlocks during the operation check.

  To disable the alarm contact output and the output to the alarm unit, set the unit to the maintenance mode by referring to 8-2 "Maintenance Mode".

- Notify those concerned before starting a gas alarm operation check.

- Entering Modes 1 to 5 resets an alarm. Do not enter any of these modes while an alarm is active (e.g., alarm set off by gas leak). Before starting an inspection or adjustment, make sure that the indicator unit has returned to normal gas monitoring operation (no active alarm) before deactivating the mode lock.

8-3-9. Gas Alarm Setting (Gas Alarm Set Values)

Check that the bar graph displays the alarm set values specified in the delivery specifications. Alarm setting is normally done at the time of shipment. If the specified values are not displayed, take the following steps for adjustment:

1. Deactivate the mode lock (page 24).
2. Select Mode 4-1 (pages 25 and 26). When Mode 4-1 is entered, the amber segment, which indicates the 1st stage alarm set value, starts flashing on the bar graph.
3. Adjust the amber segment to the specified alarm set value by scrolling the setting wheel.
4. Press and hold the setting wheel up for about three seconds. The green POWER LED will flash then turn off and all the bar graph segments will turn green, indicating that the 1st stage alarm is set. Now the red segment, indicating the 2nd stage alarm set value, starts flashing.

Red segment

Amber segment

1st stage alarm setting   2nd stage alarm setting
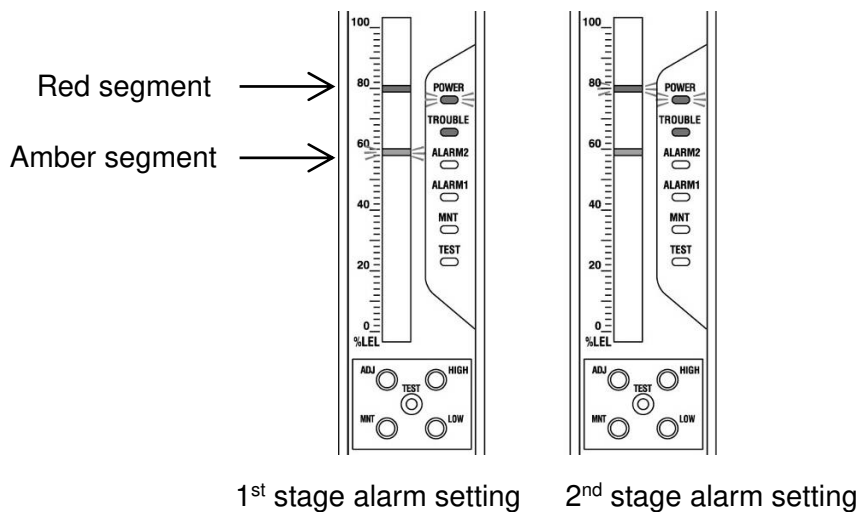
5. Adjust the red segment to the specified alarm set value by scrolling the setting wheel.
6. To save the setting, press and hold the setting wheel up until all the bar graph segments are lit green. Always save a new setting after each adjustment.

8-3-10. Trouble Alarm Operation Check

(1) For Groups 1 to 3

Check that the trouble alarm will activate by disconnecting the wire from the terminal No.8 (wired to the terminal No. D or G on the gas detector) on the rear of the metal housing. To end the trouble alarm, connect the wire back to the terminal.
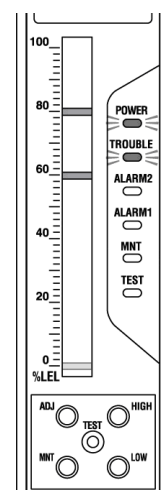Refer to pages 14 to 16 for typical system configurations.

(2) For Groups 4 and 5

Check that the trouble alarm will activate by disconnecting the wire from the terminal No.6 (wired to the terminal No. B on the gas detector) on the rear of the metal housing. To end the trouble alarm, connect the wire back to the terminal.
Refer to page 17 for a typical system configuration.

Trouble alarm activated

<div style="border: 2px solid black;">

⚠ CAUTION

- A trouble alarm check is performed while powered on. To prevent electrical shocks, do not perform a trouble alarm check. This check has been done at the time of shipment.

- Entering Modes 1 to 5 resets an alarm. Do not enter any of these modes while an alarm is active (e.g., alarm set off by gas leak). Before starting an inspection or adjustment, make sure that the indicator unit has returned to normal gas monitoring operation (no active alarm) before deactivating the mode lock.

</div>

8-3-11. Operation Check Using Actual Gas

Apply the calibration gas to the gas detector, and check that the bar graph display indicates the correct gas concentration value and that the alarm operates correctly.

<div style="border: 2px solid black;">

⚠ DANGER

- When performing an operation check using actual gas, such as combustible gas which may have a risk of explosion or toxic gas which may be harmful to human health, incorrect handling is extremely dangerous. It should be performed by qualified personnel, or a New Cosmos authorized technician.

</div>

8-3-12. Brightness of LED Bar Graph Display

It is possible to switch the brightness of the bar graph display between high and low by scrolling the setting wheel while in Mode 4-3.

<div style="border: 2px solid black;">

⚠ CAUTION

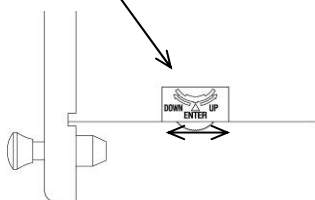- The high-brightness option consumes more electricity. Set the brightness to high or low depending on your facilities.

</div>

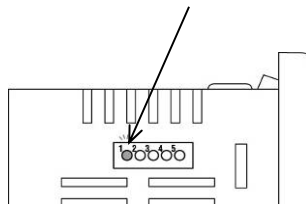### 8-3-13. Zero Suppression Deactivation and Linearizer Display

(1) Zero Suppression Deactivation
 1. Deactivate the mode lock (page 24).
 2. Select Mode 1 (pages 25 and 26). The zero suppression is deactivated while in Mode 1.

Setting wheel

Scroll the setting wheel until the LED for Mode 1 turns on

(2) Linearizer Display
1. Deactivate the mode lock (page 24).
2. Select Mode 1-1 or 1-2 (pages 25 and 26).
3. To temporarily activate linearizer, press and hold the ADJ button while in Mode 1-1 or 1-2.
   The linearized bar graph reading is shown.

Scroll the setting wheel until
the LED for Mode 1 is on

Select
Mode 1-1 or 1-2
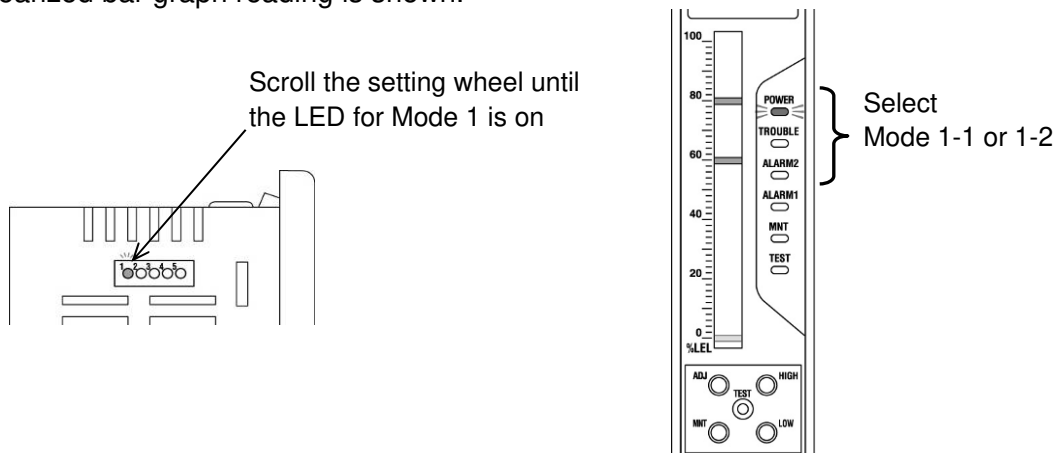
| NOTE | Linearizer is deactivated while in Mode 1-1 or 1-2. |

8-3-14. V-NET Address Setup (for V-NET type only)

A node address can be set up using the rotary switches located on the back of the indicator unit.

High

Low
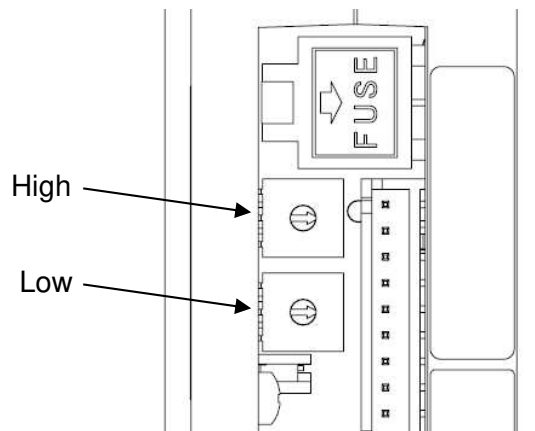
| NOTE | · To set a node address, convert your desired address number from decimal to hex notation. Then input the first digit of the hex value using High switch, and the second digit using Low switch.
  Examples: From 16_{DEC} to 10_{HEX}
           From 200_{DEC} to $C8_{HEX}$
· The hghest node address is $254_{DEC.}$ |

Hex

High   Low

8-4. Gas Alarm

(1) 1st Stage Alarm
When the bar graph reading exceeds the 1st stage alarm set value (or falls below it in case of lower limit detection, e.g., oxygen detection), the bar graph display will turn amber. The red ALARM1 LED will start flashing and the 1st stage alarm contact output will be activated.

> Alarm unit operation during the 1st stage alarm
> The alarm unit operates in conjunction with the indicator units. When it receives an alarm signal from one of the indicator units, the alarm unit starts beeping and its red ALARM1 LED turns on.
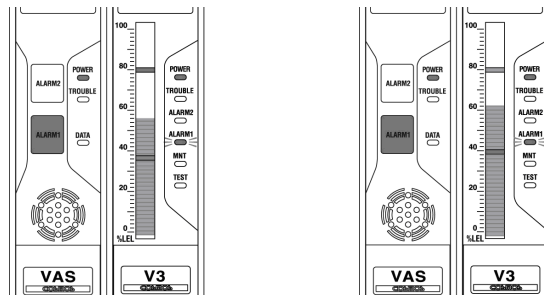
Upper Limit Detection   Lower Limit Detection (e.g., O$_2$ detection)

(2) 2nd Stage Alarm
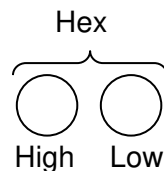When the bar graph reading exceeds the 2nd stage alarm set value (or falls below it in case of the lower limit detection, e.g., oxygen detection), the bar graph will turn red. Both red ALARM1 and ALARM2 LEDs will start flashing, and both 1st and 2nd stage alarm contact outputs will be activated.

> Alarm unit operation during the 2nd stage alarm
> The alarm unit operates in conjunction with the indicator units. When it receives an alarm signal from one of the indicator units, the alarm unit starts beeping and its red ALARM1 and ALARM2 LEDs turn on.

Upper Limit Detection   Lower Limit Detection (e.g., O2 detection)

⚠ DANGER

● When a gas alarm activates, stay calm and check that there is no fire in the vicinity. Do not touch any power switches under any circumstances. Any sparks caused by turning the switch on or off may lead to ignition.
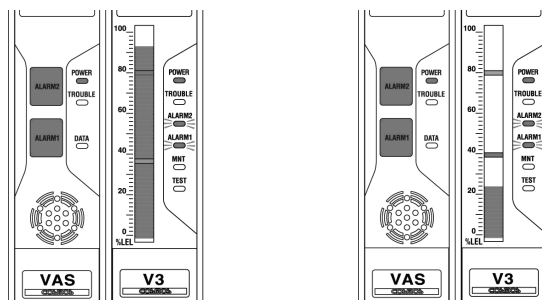
⚠ WARNING

● If the indicator unit issues an alarm, take the necessary measures specified by your company.

(3) Dual-range Type Indicator Units (Type M only)
The dual-range type indicator unit monitors gas concentrations in both high and low ranges. The unit displays the gas concentration for low range (0 to 10%LEL) and for high range (0 to 100%LEL).

The unit normally displays a low range concentration. When the gas concentration reaches the maximum threshold value (full scale value) of the low range, the TEST/RANGEx10 LED will turn on and the unit will automatically adjust to display the high range concentration. When the gas concentration drops below the maximum value (full scale value) of the low range, the TEST/RANGEx10 LED will turn off and the unit will automatically return to displaying the low range concentration.

Dual-range indication is only available with Type M units, and must be specified upon placing an order.

When the TEST button is pressed, the test mode will be started and the TEST/RANGEx10 LED will start flashing.

Normal Operation   Low Range   High Range
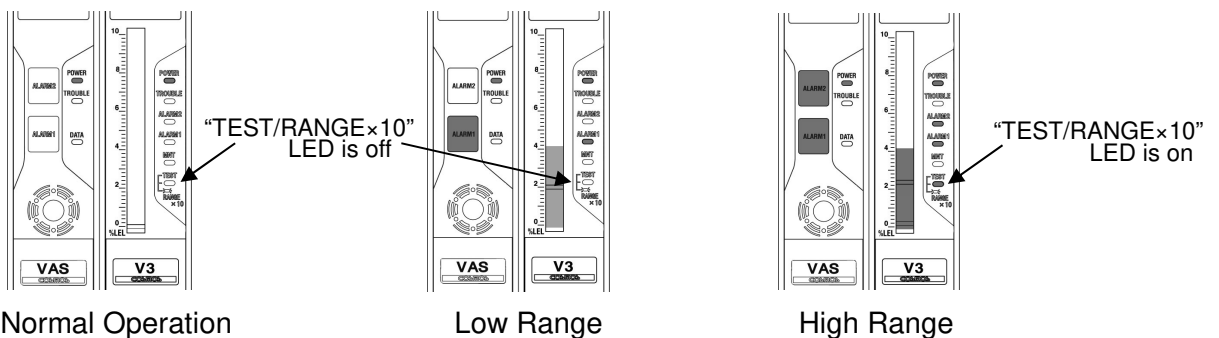
Dual-range Type Indicator Unit with Alarm Unit

8-5. Cancel a Gas Alarm

Use the RESET or BZ.STOP button on the alarm unit or cabinet panel to cancel a gas alarm. Note that the procedure to cancel an alarm varies depending on the system; therefore, refer to the delivery specifications for your system for detailed information on the alarm mode.

(1) For a combination of a manual-resetting type indicator unit and a full-lock type alarm unit

1. Press the BZ.STOP button on the alarm unit or cabinet panel. The red flashing ALARM1/ALARM2 LED on the indicator unit will become steady.
2. When the bar graph reading falls below the alarm set value, press the RESET button on the alarm unit or cabinet panel. The bar graph will turn green, indicating that the 1st/2nd stage alarm is canceled. The red ALARM1/ALARM2 LED on the indicator unit will turn off and the alarm contact output will be deactivated.

Alarm indication/ Contact Operation	Indicator unit ALARM1/ALARM2 LED (red)	Indicator unit Alarm contact output	Alarm unit ALARM1/ALARM2 LED (red)	Alarm unit Alarm audio
Gas alarm is active	Flashing	Activated	On	Beeping
BZ.STOP button is pressed, and reading still exceeds the alarm set value	On	Activated	On	Muted
Reading falls below the alarm set value	On	Activated	On	Muted
RESET button is pressed (alarm is canceled)	Off	Not activated	Off	Muted

(2) For a combination of a manual-resetting type indicator unit and a semi-lock type alarm unit

1. Press the RESET button on the alarm unit or cabinet panel. The red flashing ALARM1/ALARM2 LED on the indicator unit will become steady.
2. When the bar graph reading falls below the alarm set value, the bar graph will automatically turn green, indicating that the 1st/2nd stage alarm is canceled. The red ALARM1/ALARM2 LED will turn off and the alarm contact output will be deactivated.

Alarm indication/ Contact Operation	Indicator unit ALARM1/ALARM2 LED (red)	Indicator unit Alarm contact output	Alarm unit ALARM1/ALARM2 LED (red)	Alarm unit Alarm audio
Gas alarm is active	Flashing	Activated	On	Beeping
RESET button is pressed, and reading still exceeds the alarm set value	On	Activated	On	Muted
Reading falls below the alarm set value (alarm is canceled)	Off	Not activated	Off	Muted

(3) For an auto-resetting type indicator unit

1. Once the reading on the bar graph display falls below the alarm set value, the bar graph will automatically turn green, indicating that the 1st / 2nd stage alarm is canceled. The red ALARM 1/ALARM 2 LED will turn off and the alarm contact output will be deactivated.
2. To mute the alarm audio while an alarm is active, press the BZ.STOP button on the alarm unit or cabinet panel. When the alarm audio is muted, the red flashing ALARM1/ALARM2 LED of the indicator unit will become steady as long as the alarm is present.

Alarm indication/ Contact Operation	Indicator unit ALARM1/ALARM2 LED (red)	Indicator unit Alarm contact output	Alarm unit ALARM1/ALARM2 LED (red)	Alarm unit Alarm audio
Gas alarm is active	Flashing	Activated	On	Beeping
BZ.STOP button is pressed, and reading still exceeds the alarm set value	On	Activated	On	Muted
Reading falls below the alarm set value (alarm is canceled)	Off	Not activated	Off	Muted

8-6. Trouble Alarm

A trouble alarm will be indicated by the amber flashing TROUBLE LED and the trouble alarm output will be activated when a problem is detected. Some examples are, gas concentration input from the gas detector is too low or the flow rate of the extractive-type gas detector with a flow sensor is too low. Check the cause of the problem and take necessary actions.

The alarm unit emits a steady tone while a trouble alarm is active. Press the BZ.STOP button on the alarm unit (or RESET button if your alarm unit is semi-lock type) to mute the alarm audio.

Alarm indication/ Contact Operation	Indicator unit POWER LED (green)	Indicator unit TROUBLE LED (amber)	Indicator unit Trouble alarm contact output	Alarm unit TROUBLE LED (amber)	Alarm unit Alarm audio
Trouble alarm is active	On	Flashing	Activated	On	Steady tone
BZ.STOP (or RESET) button is pressed and problem is still present	On	Flashing	Activated	On	Muted
Problem has been solved	Flashes at start of warm-up cycle, then turns steady once the cycle is over, or immediately turns on if the problem was insufficient flow rate.	Off	Not activated	Off	Muted

Trouble Alarm Causes and Actions

First step is to always remove the fuse from the fuse holder and check it. If it is not blown then investigate for other causes and take appropriate steps. If the product does not reset to normal operation after taking the steps shown in the table below or if your problem is not listed in the table, please contact New Cosmos or its authorized representative.

Location of problem	Possible cause	LED status of indicator unit	Steps
Indicator unit	Blown fuse	All LEDs: Off	Remove the fuse from the fuse holder. Remove the cause of excessive current, then replace the fuse with a new one. Refer to 5 "Unit Dimensions and Components".
	Drop in power voltage	Green POWER LED: On Amber TROUBLE LED: Flashing	If the power voltage falls to 18 V or less, a trouble alarm will activate. Ensure that the power voltage is maintained at 24 V±10%.
	Internal EEPROM failure	Gas concentration bar graph display: Off Amber TROUBLE LED: Flashing Red ALARM2 LED: Flashing	Setting data needs to be initialized. Contact New Cosmos or its authorized representative for support.
	External EEPROM failure		
Indicator unit or gas detector	Broken cable between indicator unit and gas detector	Green POWER LED: On Amber TROUBLE LED: Flashing	If no break in the cable is found, check that all wiring is correct and that the connection is secure (e.g., loosening of terminal screws). Refer to 7 "Wiring and Connections".
Gas detector	Low flow rate of extractive-type gas detector *	Green POWER LED: On Amber TROUBLE LED: Flashing	Remove clogs in the inlet port or piping of gas detector. If the filter in the flow checker is dirty, replace it with a new one. Refer to the gas detector's instruction manual.
	Broken wire of sensor	Green POWER LED: On Amber TROUBLE LED: Flashing	Contact New Cosmos or its authorized representative for sensor replacement.
	Sensor failure		

* Applicable only to an extractive-type gas detector with a flow sensor that outputs low flow rate signals.

9. Maintenance

Routine Check

Perform a routine check given in the table below.

	Frequency	Description
Routine Check (to be performed by user)	Daily	・Green POWER LED Check that the POWER LED turns on and that the indicator unit works.
		・Indication of bar graph display Check that the indication/reading of the bar graph display shows normal operation.
	Monthly	・Alarm operation check using TEST button Press the TEST button to check that the gas alarm is functional.

Important Notice for Scheduled Inspection

In order to ensure the reliability of the gas detection and alarm system, it is vital to perform periodic maintenance and inspections. It is highly recommended that a maintenance contract with a local New Cosmos representative be made for the performance of scheduled inspections.

Installation, inspection, maintenance, calibration, and proof testing shall only be performed by trained personnel.

⚠ CAUTION

● Performing an alarm operation check using the test mode activates the analog output, alarm contact output, and output to the alarm unit. If the alarm contact output is used to interlock external devices, set the indicator unit to the maintenance mode and release the interlocks of the external devices beforehand, as needed, to prevent possible activation of the interlocks during the operation check.

● Notify those concerned before starting a gas alarm operation check.

● Perform maintenance inspections in accordance with applicable laws and regulations of the country where the unit is used. For example, if used in Japan, circuitry tests (using the TEST button) related to alarm functions must be performed at least once a month, and detection and alarm tests must be performed at least once a year as specified by the Japanese liquefied petroleum gas safety act and high pressure gas safety act.

10. Troubleshooting

Before requesting repair, please refer to the table below. If the unit does not return to normal operation after performing the corresponding steps in the table, or if your issue is not found in the table, contact New Cosmos or its authorized representative.

Problem	Possible cause	Steps	Reference
Powering-up does not turn on the green POWER LED	Power switch is set to the off position	Set the power switch to the on position.	8-1. Start-up (page 22)
	Incorrect or loose wiring	Check and rewire. Retighten terminal screws.	7. Wiring and Connections (page 13)
	Blown fuse	Replace the fuse with a new one.	Trouble Alarm Causes and Actions (page 46)
The amber TROUBLE LED on the indicator unit is flashing. The amber TROUBLE LED on the alarm unit is on, and a steady tone is heard.	Broken cable between indicator unit and gas detector, or incorrect wiring	Check for broken wire and rewire.	8-6. Trouble Alarm (page 45)
	Broken sensor wire	Replace the sensor with a new one.	
	Flow rate of extractive-type gas detector is too low	Check that inlet and piping of extractive type gas detector are free of clogging.	
	Power voltage is 18 V or less	Adjust power voltage to 24 V±10%.	

11. Specifications

Product Name	V3 series indicator unit
Metal housing	V-SC-1, V-SC-1(S), V-SC-4B[*1], V-SC-4B(S)[*1], V-SC-6[*2], and V-SC-6(S)[*2]
Detection principle	As per specifications of gas detector
Number of alarm stages	2 stages
Indicator	3-colored LED (red, amber, green) bar graph display (50 segments)
Target gas	As per specifications of gas detector
Indication range	As per delivery specifications
Alarm set range	As per delivery specifications
Alarm accuracy	・Combustible gas: ±25% of alarm set value under identical conditions ・Toxic gas: ±30% of alarm set value under identical conditions
Alarm delay	・Combustible gas: Less than 30 seconds with a gas concentration that is 1.6 times higher than the alarm set concentration ・Toxic gas: Less than 60 seconds with a gas concentration that is 1.6 times higher than the alarm set concentration Note: Delay time caused by piping length excluded
Alarm	・Gas alarm in 2 stages: 1st stage, red ALARM1 LED flashes; 2nd stage, both ALARM1/2 LEDs flash; and steadily lit if reset as long as alarm is active ・Auto-resetting or manual-resetting (must be specified upon placing an order) ・Trouble alarm: Amber TROUBLE LED flashes when a device failure (of a connected gas detector or indicator unit itself) is detected
Alarm contacts	1st stage, 2nd stage, and trouble, dry contact outputs Normally open or closed, and normally energized or non-energized as per delivery specifications. Max load: 100 VAC at 1A, 24 VDC 1A (resistive load)
Analog output	4-20mA (standard) or 1-5 V (must be specified upon placing an order)
Compliance[*1]	EMC directive (2014/30/EU/SI 2016 No.1091) and RoHS directive (2011/65/EU+(EU)2015/863/SI 2012 No.3032)
Power source	24 VDC ± 10% (24 VDC ± 6 V depending on the gas detector connected)
Power consumption	Approx. 5.0 W (when connected to gas detector with 24V power source and low-brightness display mode and compatible with V2 series (Groups 1, 2, 3 & 5). Approx. 4.0 W (when connected to gas detector with 24V power source and low-brightness display mode and compatible with V1 series (Group 4). Approx. 7.0 W (when connected to gas detector with 24V+6V power source and high-brightness display mode and compatible with V2 series (Groups 1, 2, 3 & 5) Approx. 5.0 W (when connected to gas detector with 24V+6V power source and high-brightness display mode and compatible with V1 series (Group 4).
Dimensions	W36 x H144 x D70mm (excluding metal housing and protrusions)
Mass	Approx.150g (excluding metal housing)
Operating conditions	Operating temperature: -10 to +40°C Operating humidity: 10 to 90%RH No sudden temperature/humidity change. No condensation.
Connection method	Connected by cable connectors
Installation method	To be installed into metal housing or wall-mounted cabinet.
Degree of protection	IP2X when installed.

* The above specifications are subject to change without notice due to product improvement.
* End-user-specific delivery specifications, if available, supersede the standard specifications above.
*1. CE marking specification option must be specified upon placing an order. The following combinations comply with CE marking. Refer to the separate EU Declaration of Conformity.
      Type M indicator unit solo
      Type M indicator unit with VAS alarm unit
      Type M indicator unit with RST-01 reset relay terminal
      Type M indicator unit with VAS alarm unit and RST-01 reset relay terminal
   Note: Type M indicator is paired with a V-SC-4B or V-SC-4B(S) metal housing and VAS alarm unit is paired with a V-SC-A or V-SC-A(S) metal housing.
*2. Dedicated to use in V-NET system and must be specified upon placing an order.

12. Warranty

The warranty period is one (1) year from the date of purchase.
The purchaser is entitled to the limited warranty, if the product malfunctions due to a manufacturing defect during normal use in accordance with the instruction manual, specifications and labels.

1. Warranty Scope

If the product fails or is found to be damaged due to a manufacturing defect during the warranty period, and used in accordance with the instruction manual and specifications, we will provide a free replacement and repair service. This warranty covers the New Cosmos product/parts only and not third party product/parts.

2. Warranty Exclusions
   (The following will be repaired at the cost of customer even during the warranty period.)
(1) Failures and damages incurred by incorrect use, deliberate acts or negligence of the user.
(2) Failures and damages caused by disaster, earthquake, storm and flood, lightning, extreme climate, abnormal power supply voltage, excessive electromagnetic interferences, or other acts of God.
(3) Failures and damages resulting from repair and/or modification by non-New Cosmos certified technicians.
(4) Consumables and failures and damages resulting from improper consumable replacement.
(5) Other failures and damages not attributable to the manufacturer.

13. Life Expectancy

The design life expectancy of this product is ten (10) years, which is only estimation, under normal environmental conditions. The design life expectancy also assumes that the calibration is performed properly and periodically, but does not imply that the product will operate correctly until the design life expectancy expires. Thus, no warranty will be given after the one year warranty period is over. Please also note that even if the product is calibrated, it may fail to operate correctly before the next calibration.

14. Glossary

Term	Definition
Gas detector	Device used to detect the presence of a target gas and to give its concentration in the form of an electrical signal.
Target gas	Specific gas to be detected, concentration displayed, and used to trigger alarms.
Detection range	A range of target gas concentrations that can be displayed and trigger alarms.
Linearizer	A function that coverts the output of a hot-wire semiconductor sensor to make its input-output relationship linear so that the gas concentration can be displayed as a graph/meter that has a linear scale for direct reading.
Zero suppression	For indicator units with a zero suppression function, the bar graph dislay continues to indicate "0" until the target gas concentration detected by the detector exceeds the pre-set value. The pre-set zero suppression value is given in the delivery specifications.
Alarm accuracy	Difference between the alarm set value and the detected gas concentration that activates the alarms. It may also be expressed as a % with respect to the alarm set value.
Alarm delay	The length of time a gas detector takes to activate an alarm after it is exposed to a target gas concentration higher than the alarm set value or to some other specified conditions.
Operating temperature and humidity ranges	Ambient temperature and humidity ranges in which the gas detection and alarm system can operate normally.
Explosion-proof enclosure	Enclosure in which the parts which can ignite an explosive atmosphere are placed. This enclosure can withstand the pressure created during an internal explosion of an explosive mixture, and prevent the ignition of an explosive atmosphere outside the enclosure.
Calibration gas (test gas)	Gas specifically prepared to calibrate the gas detection and alarm system.
Alarm set value	A gas concentration value that is set on a gas detector for alarm activation.
Maintenance and inspection	Activities performed to ensure that equipment operates normally and correctly.
Self-resetting or auto-resetting	When the gas concentration falls below the gas alarm set value after an alarm has been signaled, the ALARM LEDs, relevant gas alarm contacts will automatically return to their normal positions/statuses.
Manual-resetting or self-holding	Even if the gas concentration falls below the gas alarm set value after an alarm has been signaled, the ALARM LEDs, relevant gas alarm contacts will not automatically return to their normal positions/statuses. Manual operation is only possible when the gas concentration is below the gas alarm set value.

15. Sensor Stabilization Warm-up Duration

NOTE	Before zero/span adjustment or gas sensitivity check (gas concentration adjustment), the sensor output must be stable. To fully stabilize the sensor output of the connected detector, energize the detector for the recommended period of time. See Table 2 below. The recommended warm-up duration (energized time) of the detector varies depending on the sensor detection principle and non-energized period.

Table 2. Recommended Sensor Stabilization Warm-up Duration

Type: Hi, Hv (Hot-wire semiconductor sensor)

Non-energized period	Warm-up duration
< 12 hours	1 hour or more
< 24 hours	3 hours or more
< 14 days	More than half of non-energized period
1 month ≤	7 days or more

Type: Zn (O3 type semiconductor sensor)

Non-energized period	Warm-up duration
< 12 hours	1 hour or more
< 24 hours	3 hours or more
< 14 days	More than half of non-energized period
< 1 month	7 days or more
< 3 months	10 days or more
3 months ≤	14 days or more

Type: Ti, Tv (Thermal conductivivy sensor)

Non-energized period	Warm-up duration
< 1 year	1 hour or more
1 year ≤	24 hours or more

Type: Ci , Cv (Catalytic sensor)

Non-energized period	Warm-up duration
< 1 year	1 hour or more
1 year ≤	24 hours or more

Type: D (Electrochemical sensor)

Non-energized period	Warm-up duration
< 6 months	24 hours or more
Recommended for sensors stored less than 6 months.	

Type: O (Galvanic cell sensor)

Non-energized period	Warm-up duration
< 2 months	30 minutes or more
Recommended for sensors stored less than 2 months.	

 * For Type M, the recommended warm-up cycle varies depending on the gas detector conneccted. Refer to the gas detector's instruction manual, or contact us.
 * The recommended warm-up cycle in the tables above is subject to change due to product improvement.
 * Non-energized period is the duration until the unit is energized again.

This page intentionally left blank

Revision History

Edition	Date	Revision
GAE-041-00	May 2012	00 (Initial issue)
GAE-041-01	July 2020	01
GAE-041-02	October 2021	02
GAE-041-03	September 2022	03

Additional copies of this instruction manual may be purchased.
Contact New Cosmos or its authorized representative for ordering
The contents of this manual are subject to change without notice.

Authorized representative: **Manufacturer:**

NEW COSMOS ELECTRIC CO., LTD.

2-5-4 Mitsuya-naka, Yodogawa-ku,
Osaka 532-0036, Japan
https://www.newcosmos-global.com

NEW COSMOS ELECTRIC CO.,LTD.