

One-point Type Gas Detection & Alarm System

NV-100M

Instruction Manual

- Keep this instruction manual where it is readily accessible.
- Read this instruction manual and thoroughly understand the information before using the product.



NEW COSMOS ELECTRIC CO., LTD.

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1. Introduction

Thank you for purchasing an NV-100M Single-point Gas Detection/Alarm System. The NV-100M is used to continuously detect gas leaks in order to prevent accidents caused by gas leakage. The System continuously monitors for gas leaks, and indicates when an alarm set value has been exceeded by lighting an Alarm Lamp and playing back a verbal alarm message. Thoroughly read this Instruction Manual before using the NV-100M so you can use the System correctly.

Symbols

The following symbols are used to indicate safety information:

-  **DANGER** : Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
-  **WARNING** : Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.
-  **CAUTION** : Indicates a potentially hazardous situation which, if not avoided, may result in minor injury or moderate injury. It may also be used to alert against unsafe practices.
- MEMO** : Indicates operational advice and or instructions.

2. Safety Precautions

Carefully read the following precautions so you can use the NV-100M correctly. Read and understand all applicable laws and regulations and ensure that you are in complete compliance with all applicable laws and regulation before installing or operating the NV-100M. Installing, wiring, and other work performed on the NV-100M must be carried out by qualified persons, following all applicable federal, state, and local health and safety laws and regulations, including those of OSHA.

 **DANGER**

Operation checks using actual gas are very dangerous because combustible gas may explode and toxic gas is harmful. An inspection must be carried out beforehand by persons with sufficient expertise or by New Cosmos service staff.

 **WARNING**

- Ground the NV-100M in order to prevent electric shock.
- If an alarm occurs, perform your predetermined measures for gas leakage.
- The NV-100M does not have an explosion-proof structure. Install it in a non-hazardous area.

 **CAUTION**

- Do not disassemble or alter the NV-100M, or change the structure or electric circuits of the NV-100M. Doing so may affect the performance of the NV-100M.
- New Cosmos is not responsible for any injuries or damages that result from using the NV-100M's output signals to control interlocks with external equipment or for other applications of the output signals.
- The NV-100M does not have a drip-proof structure.
- Install it in a location where it will not get wet.
- Do not use any equipment that generates electrical noises, such as cell phones or radio communications, within 30 cm of the Indicator and Alarm Panel.

3. Unpacking

The following components are packed together. Carefully check the contents against this list when you unpack the NV-100M. If any components are missing or damaged, please contact New Cosmos.

NV-100M Indicator and Alarm Unit		1
Gas Detector Head		1
Fuses, 1 A	Model without a backup power supply	1
	Model with a backup power supply	2
Parts for embedding in a panel (for panel-embedded model only)		1set
NV-100M Instruction Manual (this manual)		1
Test results		1
Warranty		1

4. System Configuration

The NV-100M consists of a Gas Detector Head, which detects gas, and an Indicator and Alarm Unit, which indicates the gas concentration and sets off alarms. The parts are connected by cables.

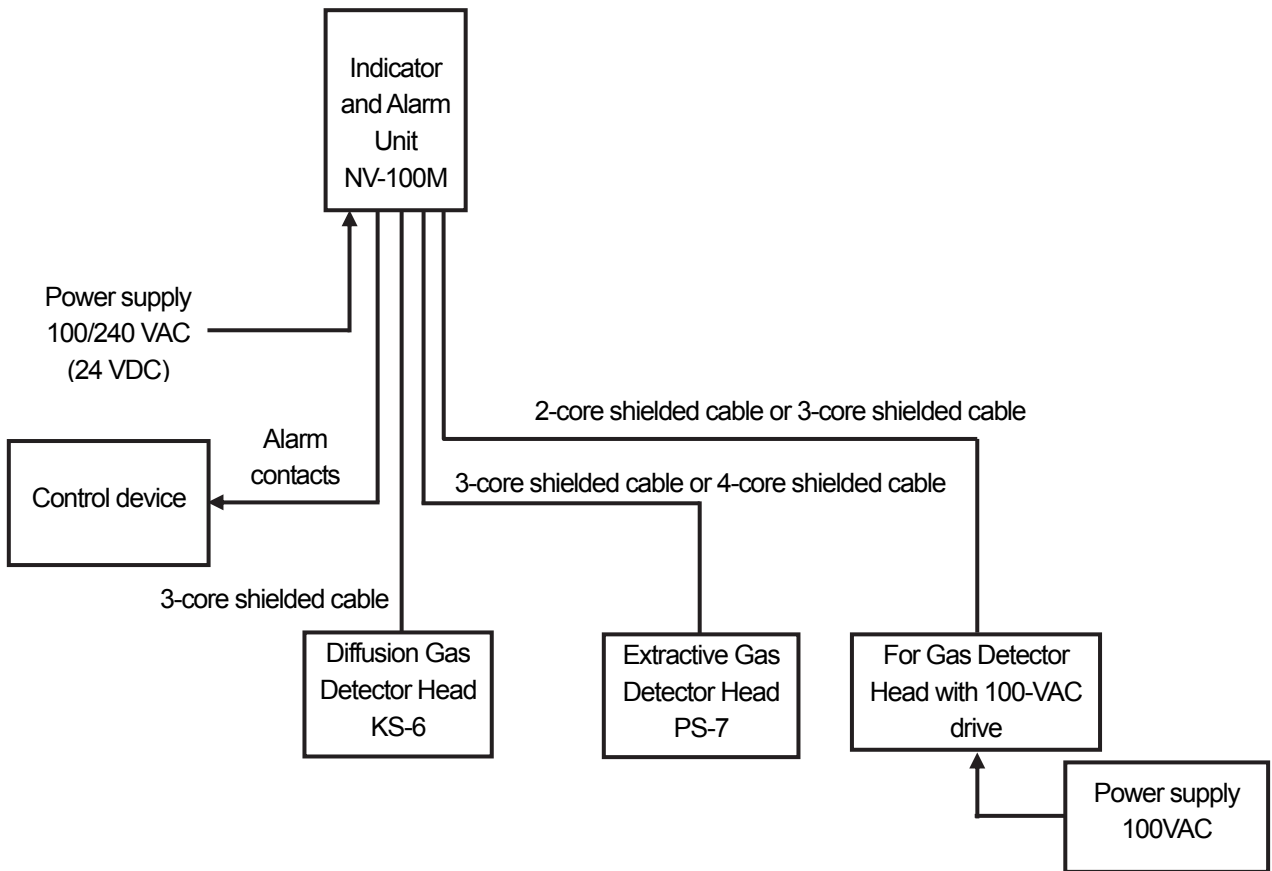


Figure 1 System Configuration

WARNING

The Indicator and Alarm Unit does not have an explosion-proof structure. Install it in a non-hazardous area.

MEMO

- One Gas Detector Head can be connected. It can be either a Diffusion or Extractive Gas Detector Head. Use a Rainproof Cover (optional) if you install the NV-100M outdoors.
- The number of cores in the cable depends on the type of Gas Detector Head that is connected.

5. Dimensions and Part Names

5-1 Indicator and Alarm Unit

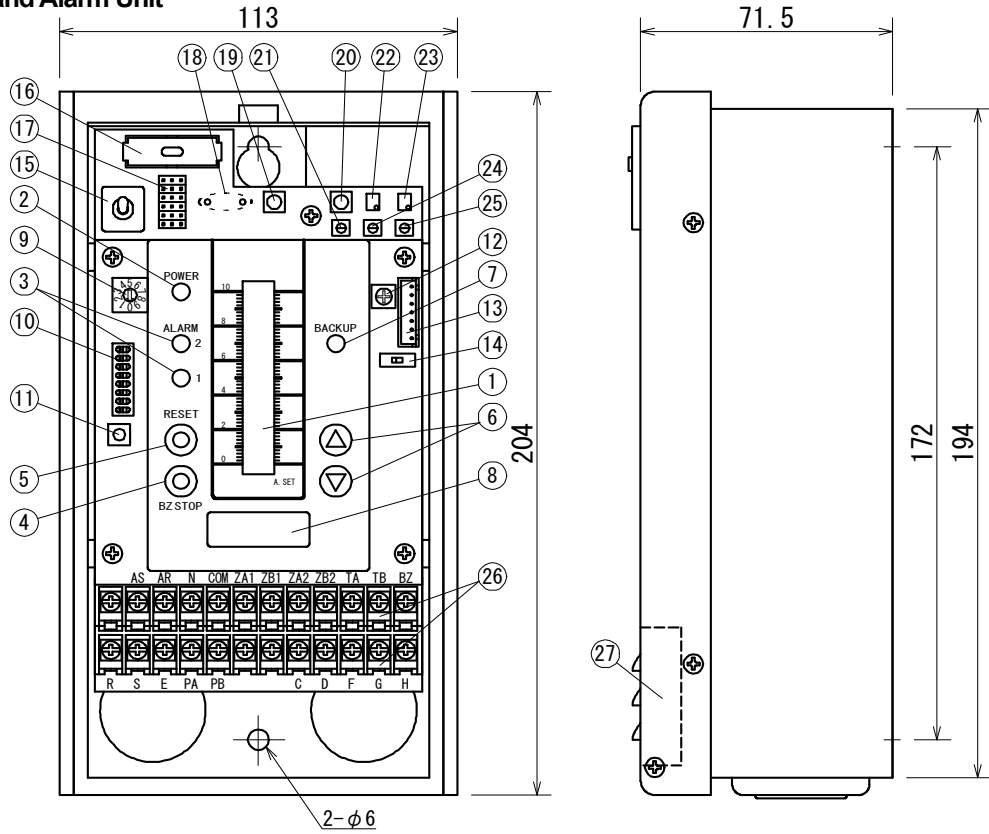


Figure 2 Dimensions of the Indicator and Alarm Unit without a Backup Power Supply

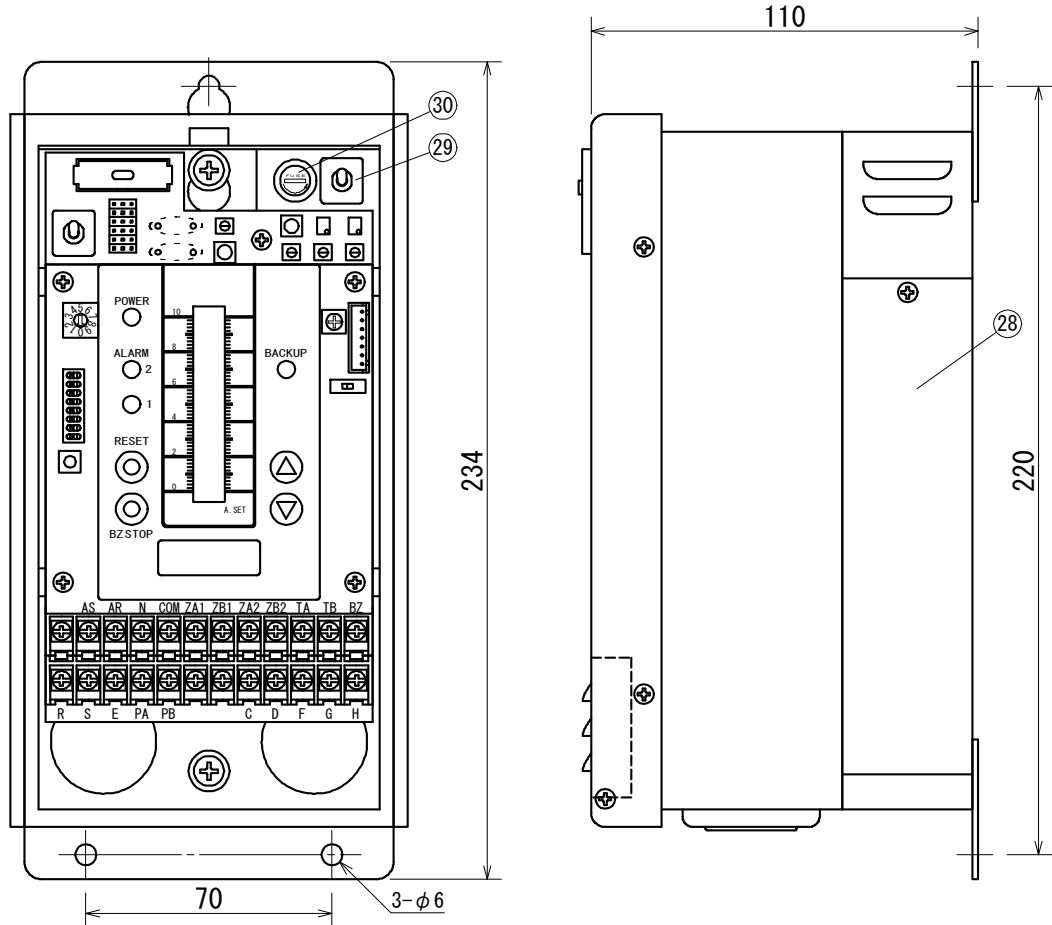


Figure 3 Dimensions of the Indicator and Alarm Unit with a Backup Power Supply

No.	Name	Function
1	Gas Concentration Indicator	This LCD bar graph meter with a backlight indicates the gas concentration and the alarm set values. The peak value continues to flash even after the reading goes down after an alarm.
2	Power Lamp (POWER)	This lamp is lit green during normal operation and orange when there is a sensor failure. It flashes green when the NV-100M is turned ON or after a failure has been eliminated to show that the NV-100M is warming up.
3	Alarm Lamp (ALARM)	This lamp flashes red to indicate a gas leak and lights when the buzzer stops.
4	Buzzer Stop Key (BZ STOP)	When this key is pressed, the alarm buzzer stops and the flashing Alarm Lamp stops flashing but remains lit.
5	Reset Key (RESET)	When this key is pressed after the buzzer stops and the reading goes down, the Alarm Lamp and Peak Hold Indication go OFF.
6	Alarm Setting Keys (Δ ∇)	Use these keys to change the alarm set values. Press Δ to increase the current set value and press ∇ to decrease it.
7	Backup Lamp (BACKUP)	This lamp is normally OFF. On a model with an optional backup power supply, it flashes red during a power failure.
8	Message Window	This window displays message during operation.
9	Mode Switch	Use this switch to set the mode, e.g., to maintenance mode 1 or 2.
1 0	Function Switch	Use this switch to set functions.
1 1	Enter Key	Use this key to set functions.
1 2	SOUND Volume Control	Use this control to adjust the alarm buzzer volume.
1 3	Program Connector	Use this connector to write the program. Normally, it is not necessary to use this connector.
1 4	Program Switch	Use this switch when you write the program. Normally, leave the switch set to the left side.
1 5	Power Switch	This switch turns the NV-100M's power supply ON and OFF.
1 6	AC Power Supply Fuse	5.2 dia. X 20 long, 1-A glass fuse
1 7	Jumper Pins	These pins are used for various settings. There are no settings that are made by the user.
1 8	Analog Check Terminals	These terminals are used to inspect the analog input signal (4 to 20 mA) from the Detector Head. When the Test Button is pressed, these terminals switch to an analog output signal that matches the test output.
1 9	Battery Test Switch (B.TEST)	Use this switch to check the Battery life. This key cannot be used if the NV-100M does not have a backup power supply.
2 0	Test Button (TEST)	Use this button to test performance.
2 1	Test Control (TEST)	Use this control to adjust what the indicator shows when the Test Button is pressed. It is normally adjusted so the full scale value is indicated.
2 2	Zero Adjustment Control	Use this control to adjust the 4mA analog input.
2 3	Span Adjustment Control	Use this control to adjust the 20mA analog input.
2 4	Low Analog Output Adjustment Control	Use this control to adjust the 4mA or 1V analog output.
2 5	High Analog Output Adjustment Control	Use this control to adjust the 20mA or 5V analog output.
2 6	Terminal Block	Use this terminal block to connect external devices.
2 7	Speaker	The speaker outputs the alarm buzzer.
2 8	Backup Power Supply Unit	This Unit supplies power from the built-in Batteries in the event of a power failure.
2 9	Battery Switch	Use this switch to turn ON/OFF the Batteries for the optional backup power supply.
3 0	Battery Fuse	5.2 dia. X 20 long, 1-A glass fuse

5 – 2 Gas Detector Head

Refer to the Gas Detector Head Instruction Manual for the dimensions of the Gas Detector Head.

6. Installation and Wiring

6-1 Installing the Indicator and Alarm Unit

You can install the NV-100M on the wall or embed it in a panel.

⚠ WARNING

The Indicator and Alarm Unit does not have an explosion-proof structure. Install it in a non-hazardous area.

⚠ CAUTION

- The Indicator and Alarm Unit must be installed in a readily visible location where someone is always present and where it is possible to take appropriate measures and notify others in case of an alarm.
- Do not install the Indicator and Alarm Unit in a location subject to vibration, electric noise, or corrosive gas. Also, do not install it in a location subject to high temperatures or high humidity.

MEMO

Refer to the Gas Detector Head Instruction Manual for detailed information on the Gas Detector Head.

(1) Installing the NV-100M on a Wall

- ① Make holes in the wall as shown in Figure 4.
- ② If the NV-100M has a backup power supply, attach the two mounting plates to the top and bottom of the NV-100M.
- ③ Align the anchors with the holes, and then insert a bolt into the upper hole.
- ④ Hook the hole on the top of the NV-100M on the top bolt, insert the bolt into the bottom hole, and then tighten both bolts.

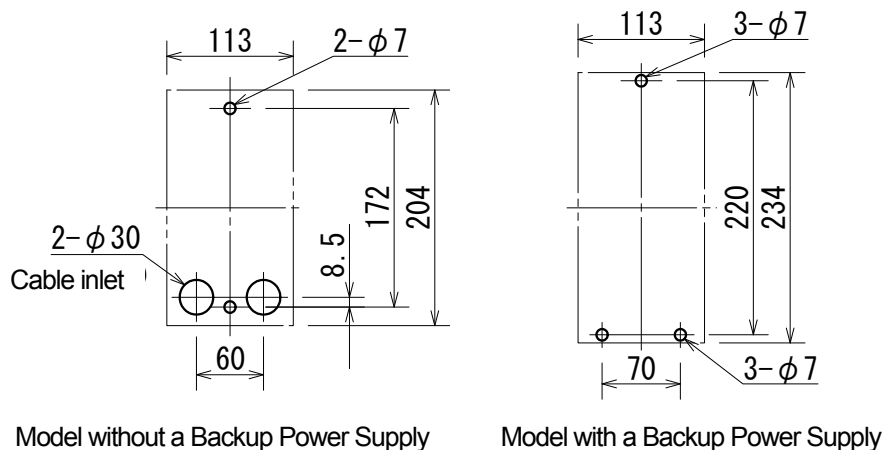


Figure 4 Dimensions for Installing the NV-100M on a Wall

MEMO

- The size of the mounting holes depends on whether the NV-100M has a backup power supply.
- If the NV-100M has no backup power supply, the cables can be connected from the back and bottom of the NV-100M. If you install the cables from the back, they will be hidden from view. If the NV-100M has a backup power supply, the cables can be connected only from the bottom.
- Leave a space of 30 cm under the NV-100M Indicator and Alarm Unit for maintenance work. If the NV-100M has a backup power supply, also leave a 30 cm space on the right side of the NV-100M for changing the Batteries.

(2) Embedding the NV-100M in a Panel

- ① Cut out a rectangular opening in the panel as shown in Figure 5.

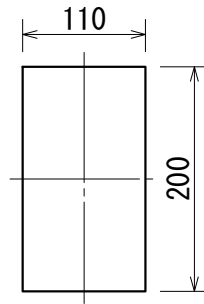


Figure 5 Panel Cutout Dimensions

- ② Insert the NV-100M into the opening from the front.
Attach the Backplate to back of the NV-100M using the attaching screws as shown in Figure 6. Then, fasten the Backplate to the panel with mounting screws.
The NV-100M can be embedded in a panel with a thickness of 1.6 to 6 mm.

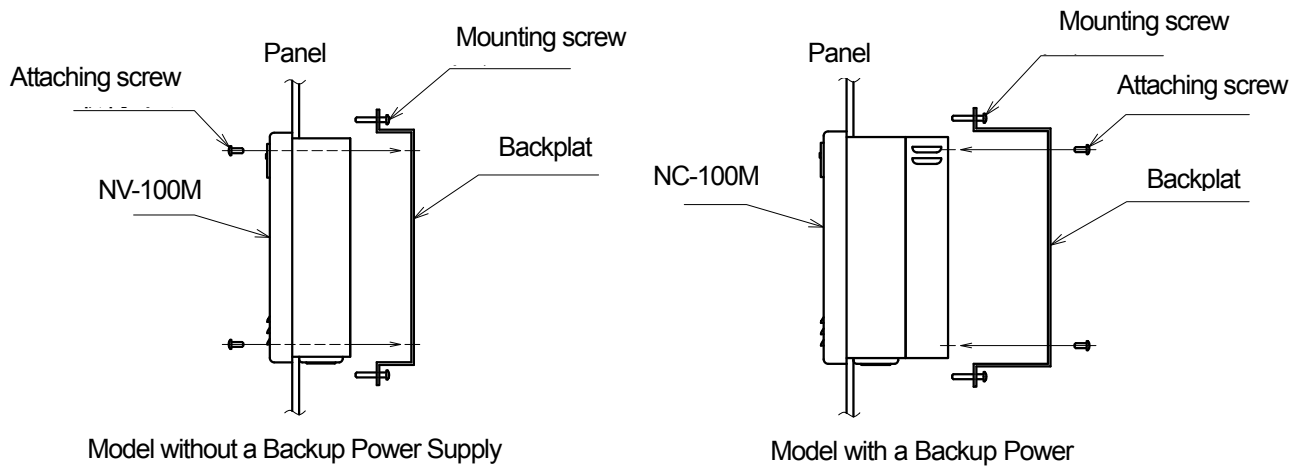


Figure 6 Embedding the NV-100M in a Panel

MEMO

Leave a space of 30 cm under the NV-100M Indicator and Alarm Unit for maintenance work. If the NV-100M has a backup power supply, also leave a 30 cm space on the right side of the NV-100M for changing the Batteries.

6 – 2 Installing the Gas Detector Head

Refer to the Gas Detector Head Instruction Manual.

6-3 Wiring Method

Refer the Gas Detector Head Instruction Manual as well.

⚠ WARNING

- Turn OFF the power to the Indicator and Alarm Unit before opening the cover of the Gas Detector Head. Opening the cover when the power is ON may cause a fire.
- Ground the NV-100M Indicator and Alarm Unit and Gas Detector Head.

⚠ CAUTION

- Make sure that you perform all wiring correctly according to the terminal codes on the Indicator and Alarm Unit and Gas Detector Head.
- Use shielded cables and separate them from the power lines as much as possible.

(1) Wiring the Power Supply

Install a circuit breaker in the wiring that connects the power supply to the Indicator and Alarm Unit.

(2) Connecting the Gas Detector Head

Make sure that you perform all wiring correctly according to the terminal codes on the Indicator and Alarm Unit and Gas Detector Head.

Use shielded cables and separate them from the power lines as much as possible.

(3) Connecting the External Alarm Contacts

⚠ CAUTION

- Make sure that the load current and voltage do not exceed the contact capacity.
- New Cosmos is not responsible for any injuries or damages that result from using the NV-100M's external alarm contacts to control interlocks with external equipment or for other applications of the output signals.

Alarm 1 contacts	No-voltage SPDT contacts (100 VAC 2 A resistive load)	COM	ZA1	ZB1
Alarm 2 contacts	No-voltage SPDT contacts (100 VAC 2 A resistive load)	COM	ZA2	ZB2
Fault alarm contacts	No-voltage SPDT contacts (100 VAC 2 A resistive load)	COM	TA	TB
Buzzer contacts	No-voltage SPST contacts (100 VAC 2 A resistive load)	COM	BZ	
External alarm stop (AS) and external reset (AR) terminals		AS	AR	N

An alarm can be stopped or reset externally by connecting an external switch.

(4) Connecting the Analog Output Terminals

The gas concentration around the Gas Detector Head can be continuously monitored and recorded by connecting a recorder to the analog output terminals. G(+) and H(-) terminals are provided on the terminal block. The standard output is 4 to 20 mA. The input resistance of the recorder must be 500 Ω or less.

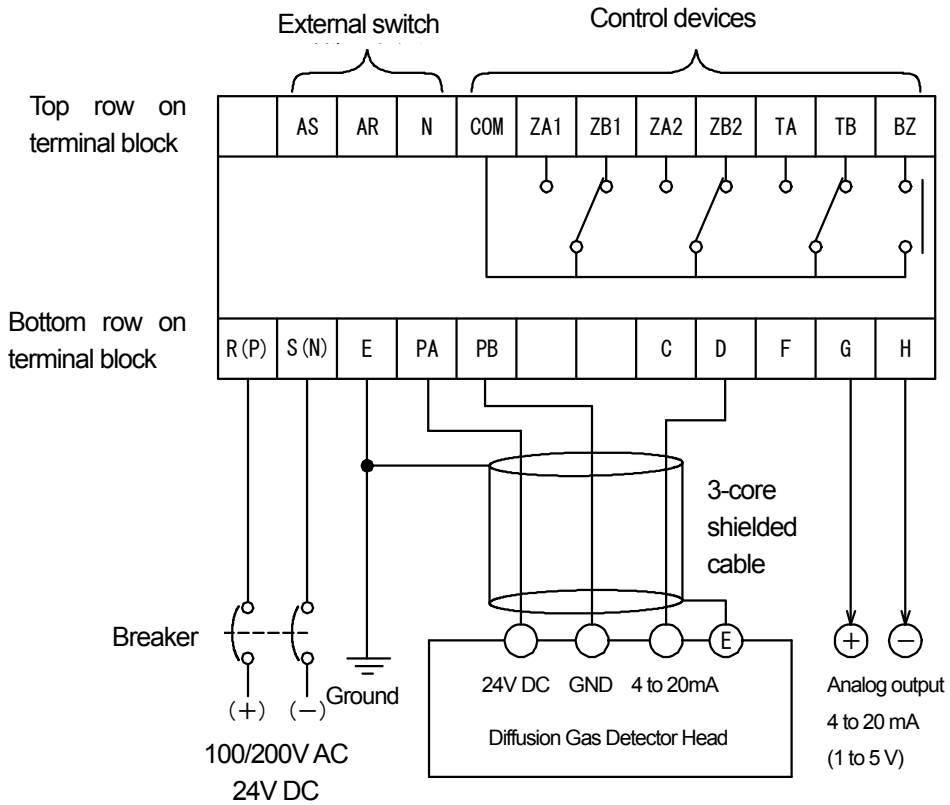
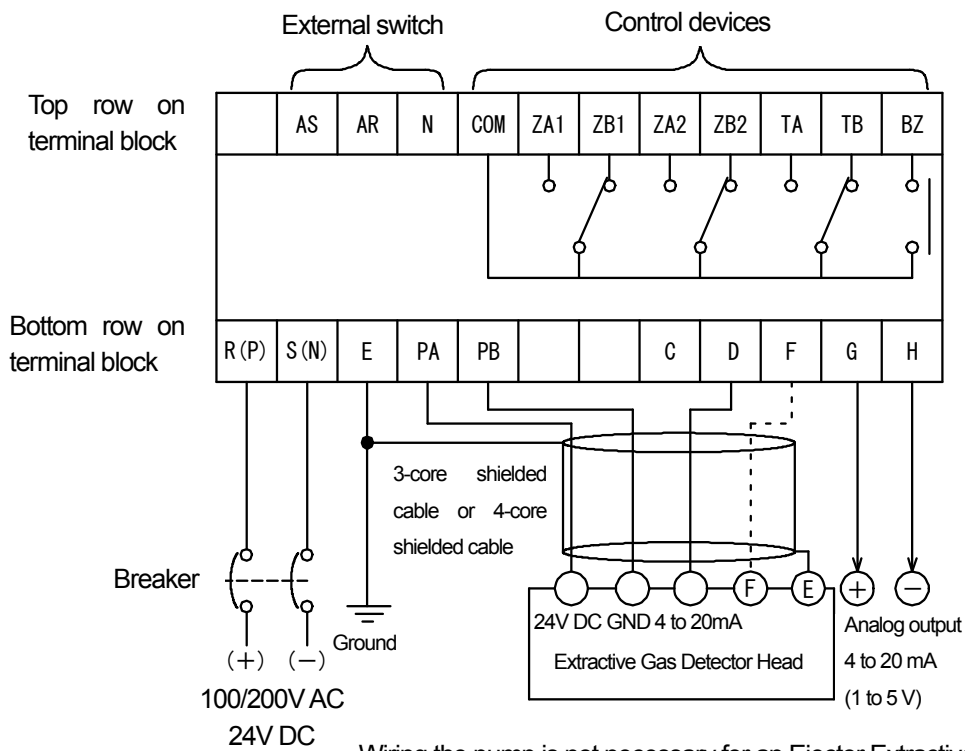
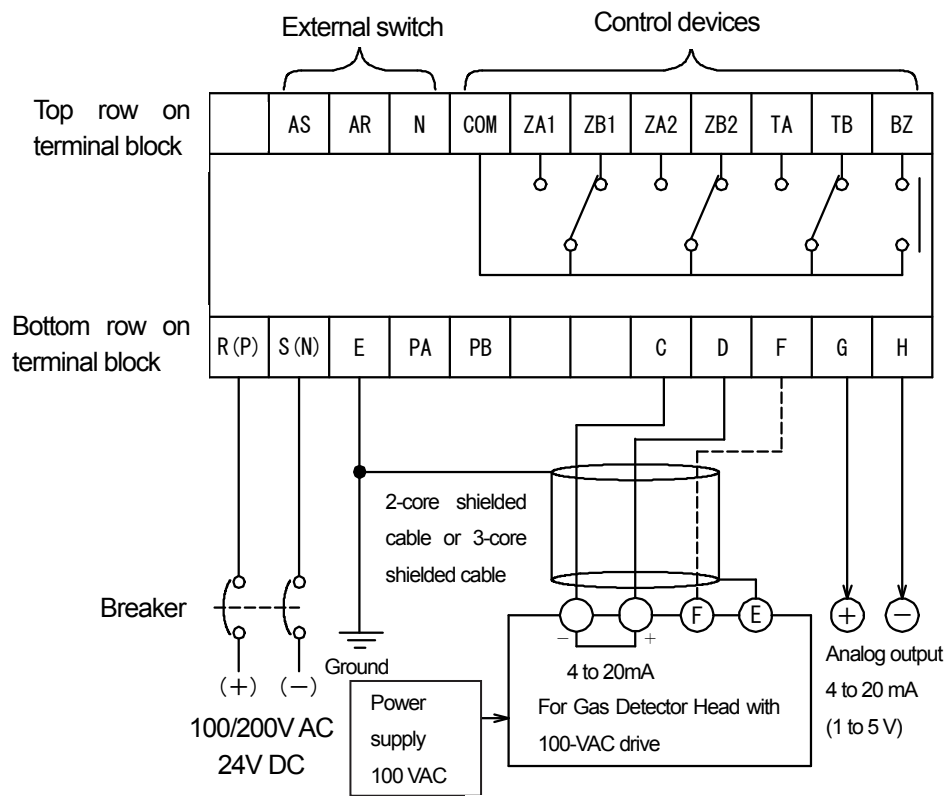


Figure 7 Circuit Diagram of Diffusion Gas Detector Head



Wiring the pump is not necessary for an Ejector Extractive Gas Detector Head.

Figure 8 Circuit Diagram of an Extractive Gas Detector Head



If you connect terminal F, you can use a flow rate decline alarm. To do so, set pin 8 on the function switch on the Indicator and Alarm Unit to OFF to enable the alarm.

Figure 9 Circuit Diagram of a Gas Detector Head with a 100V AC Drive

7. Operating Instructions

7-1 Precautions

 CAUTION

- Make sure that all parts are correctly connected before you turn ON the power. Check the terminals on the Gas Detector Head and Indicator and Alarm Unit and make sure that they are correctly connected.
- Do not connect a load to the external alarm contacts that exceeds the rated capacity.

7-2 Procedures

(1) Turning ON the Power

- ① Turn ON the Power Switch. If the NV-100M has a backup power supply, turn ON the Battery Switch as well.
- ② The Gas Concentration Indicator will display the gas concentration and the alarm 1 and alarm 2 set values. The Power Lamp will flash green to show that the NV-100M is warming up.
- ③ The Power Lamp will stop flashing and light green, and then normal operation will start. Warming up takes about thirty seconds.
- ④ After the initial warmup period, perform warmup operation for about 10 minutes until the reading stabilizes.

(2) Zero/Span Adjustment

The zero and span of the NV-100M are adjusted at the factory. There is normally no need to adjust them again.

If the zero of the NV-100M (21.0vol%) is not correct when you check operation with the Test Switch on the Gas Detector Head, use the following procedure to adjust the zero and span.

- ① Connect a voltmeter with high internal resistance (100 k Ω or higher) to the analog output check terminals. There is a reference resistance of 10 Ω built in between the positive and negative terminals, so for example, a voltage of 40 mV between the terminals would indicate a current of 4 mA.
- ② Turn the Test Control while pressing the Test Button and adjust the reading on the voltmeter to 40 mV. At the same time, use the Zero Adjustment Control to adjust the bar graph to 0.
When the Test Button is pressed, the analog output check terminals switch to an analog output signal that matches the test output.
- ③ Turn the Test Control while pressing the Test Button and adjust the reading on the voltmeter to 200 mV. At the same time, adjust the bar graph to the full scale value.
When the Test Button is pressed, the analog output check terminals switch to an analog output signal that matches the test output.

 CAUTION

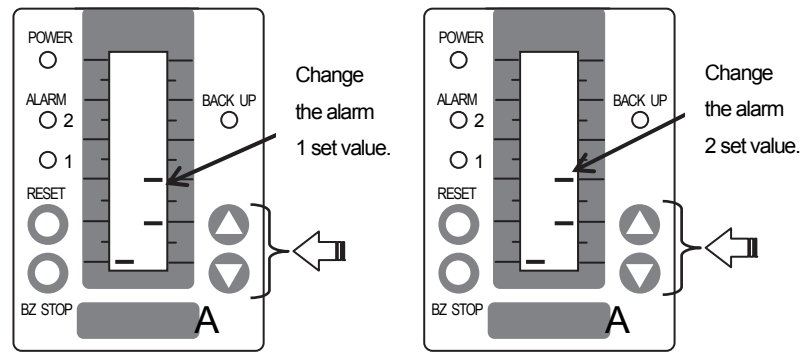
- The zero and span compensations and the analog zero and analog span adjustments can be made with the automatic zero adjustment function of the NV-100M. However, we do not recommend using this function because there can be discrepancies in the displays, analog output, and alarm set values between the NV-100M and the Gas Detector Head.
Perform the zero and span adjustments on the Gas Detector Head.

(3) Setting the Alarms

The alarms are set to the specified set values at the time of delivery. If you want to change the set values, use the following procedure.

- ① Confirm that normal mode (Mode Switch pin 0) is selected, and then press the Enter Key.
- ② The Message Window will display A P 1 . Use the Alarm Setting Keys ($\Delta \nabla$) to change the alarm 1 set value.
- ③ Press the Enter Key. The Message Window will display A P 2 . Use the Alarm Setting Keys ($\Delta \nabla$) to change the alarm 2 set value.

- ④ Press the Enter Key again to complete changing the alarm set value. The Message Window display disappears and normal operation starts.



(4) Model with a Backup Power Supply

Check the Battery life with an NV-100M with a backup power supply. There is no problem if the range is indicated from 24.0 to 25.0 VDC after the switch operation of battery test.

MEMO

- Check the Battery life with the NV-100M. Use this function during monthly inspections.
- The Battery test is only a simple test. To find out the actual remaining life of the Batteries, turn OFF the Power Switch and perform a discharge test.
- Replace the Batteries every three years.
- The Battery Test Switch cannot be used in maintenance mode 1 or 2. Use the switch in the normal mode.

(6) Checking the Analog Output

Terminals **G** and **H** on the terminal block can output 4 to 20 mA or 1 to 5 V.

- ① Connect a tester to terminals **G** and **H** on the terminal block. Adjust the indicated value to 0 using the Test Control while holding down the Test Button. Check the output on the tester. You do not need to adjust the value if the reading is 4 mA or 1 V. If the value is not correct, adjust it by turning Low Analog Output Adjustment Control.
- ② At the same time, adjust the indicated value to the full scale value using the Test Control while holding down the Test Button. Check the output on the tester. You do not need to adjust the value if the reading is 20 mA or 5 V. If the value is not correct, adjust it by turning High Analog Output Adjustment Control.
- ③ Repeat steps ① and ② several times until the reading is 4 to 20 mA, or 1 to 5 V.

7 – 3 Operation of the NV-100M

(1) When Gas Is Detected

When gas concentration around the gas detector becomes high and the reading of the gas concentration indicating bar graph exceeds the first preset alarm value, the first Alarm lamp blinks and an alarm sound (four short beeps) is heard. When the reading exceeds the second preset alarm value, the second alarm lamp blinks. At the same time, the peak hold value blinks on the indicator.

(2) When the Buzzer Stop (BZ STOP) Key Is Pressed

The alarm buzzer stops and the flashing Alarm Lamp on the Indicator Unit stops flashing but remains lit. The Peak Hold Indication continues in this state. You can use external alarm stop terminals to stop the buzzer using an external switch.

(3) When the Reset Key Is Pressed

If the Reset Key is pressed after the buzzer is stopped and the reading has gone below the alarm set value, the Alarm Lamp and Peak Hold Indication go out. You can use external reset terminals to reset the Unit using an external switch.

MEMO

Reset does not work by pressing the Reset Key until before operating the BZ STOP Key.

(4) In the case of failures

1) When the Gas Detector Head Is Out of Order

The Power lamp lights up orange, an alarm sound (four short beeps) is heard, and message window displays the type of the failure.

(Failure E: Sensor failure, H: Sensor heater wire failure, F: Flow decline)

2) When the Buzzer Stop (BZ STOP) key is pressed.

When the BZ STOP key is pressed, the alarm sound stops.

3) After the Failure Has Been Fixed

The Power Lamp changes from orange to flashing green and the NV-100M goes into the warming up state. After warming up, it returns to the normal state.

(5) Model with a Backup Power Supply

1) When a Power Failure Occurs

When a power failure occurs, the Backup Lamp flashes red and the Batteries start supplying power to the NV-100M so that the NV-100M can continue monitoring for gas leaks.

2) When the Battery Voltage Drops Below the Final Voltage

If the Battery voltage drops too far, the Batteries will automatically stop discharging power and the NV-100M will stop entirely.

3) When Power Is Recovered

When power is recovered, the Backup Lamp goes out and the NV-100M returns to normal operation. If power is recovered after the NV-100M stops because of over-discharge, the NV-100M will start operating from the warming up state.

(6) Function Switch

 **CAUTION**

If you change the setting of a pin on the Function Switch, the NV-100M may not be able to function properly. For example, an alarm may not go off even when there is a gas leak. Do not change any setting unless you completely understand the functions of the Function Switch.

The Function Switch on the NV-100M provides the functions given in the following table. (The Function Switch is part 10 on dimensions diagram in 5-1 Indicator and Alarm Unit.)

Function Switch pin number	Function	OFF	ON
1	Alarm sound	N/A	Always ON
2	Alarm sound ON/OFF	ON	OFF
3	10 second alarm delay ON/OFF	OFF	ON
4	Zero suppression ON/OFF	OFF	ON
5	Self-latching/Auto-restore	Self-latching	Auto-restore
6	Fault alarm: Normally open/normally closed	Normally open	Normally closed
7	Heater disconnection alarm ON/OFF	N/A	Always ON
8	Flow rate decline alarm enable/disable	Enable	Disable

7 – 4 When an Alarm Occurs

 **WARNING**

If an alarm occurs, perform your predetermined measures for gas leakage.

MEMO

- If there is a gas leak indoors, open the windows and doors for ventilation.
- Use a New Cosmos Gas Leak Detector to efficiently find where the gas is leaking from.

7 – 5 Replacing the Batteries for the NV-100M with a Backup Power Supply

⚠ CAUTION

- Replace both Batteries at the same time.
- Do not pinch the harnesses with the cover when you attach the Battery cover.

- ① Detach the Battery cover on the right side of the Backup Power Supply Unit.
- ② Disconnect the Battery connectors and remove the Batteries.
- ③ Insert new Batteries and attach the connectors.
- ④ Put the Battery cover back on.

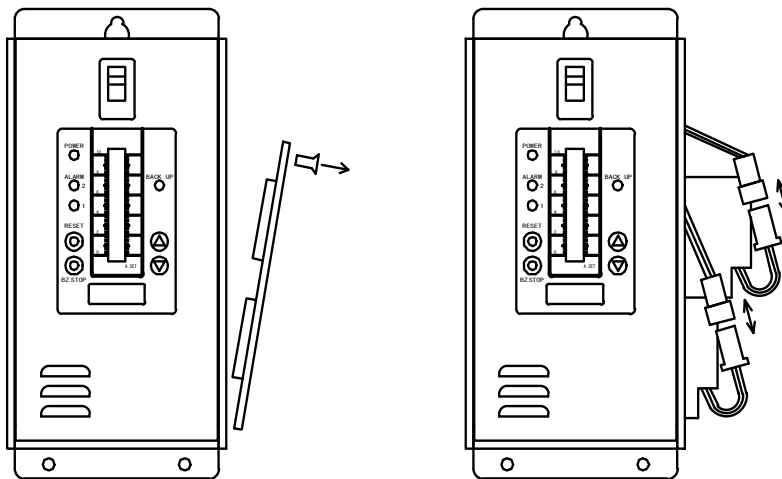


Figure 11 Replacing the Batteries

7 – 6 Maintenance

 **WARNING**

- After you finish making adjustments in a maintenance mode, always set the Mode Switch to 0 to return to the normal mode. If the switch is left set to any other mode, the NV-100M will not provide alarms for gas leaks correctly.
- The set value and “_____” are displayed alternately in the Message Window during any maintenance mode to prevent you from forgetting to return to the normal mode after you finish making adjustments.
- Do not change the settings for modes 3 to 9. If a setting is changed, the NV-100M will no longer be able to properly provide alarms for gas leaks.

NV-100M provides maintenance mode functions. Select a mode with the Mode Switch to use the functions. The functions of modes are described in the following table.

 **CAUTION**

- The zero and span compensations and the analog zero and analog span adjustments can be made with the automatic zero adjustment function of the NV-100M. However, we do not recommend using this function because there can be discrepancies in the displays, analog output, and alarm set values between the NV-100M and the Gas Detector Head. Perform the zero and span adjustments on the Gas Detector Head.

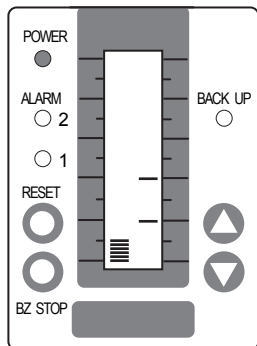
Mode Switch number	Mode name	Function	Remarks
0	Normal mode	This is the normal state to monitor for gas leaks.	<ul style="list-style-type: none"> • Use the NV-100M in this mode.
1	Maintenance mode 1	The alarm contacts and buzzer contacts will not operate. (This mode is used for automatic zero and automatic span adjustments.)	<ul style="list-style-type: none"> • Press the button to adjust the zero point and span automatically. • Use this adjustment for minor zero point and sensitivity corrections.
2	Maintenance mode 2	The alarm contacts and buzzer contacts will not operate. (This mode is used for analog zero and analog span adjustments.)	<ul style="list-style-type: none"> • Turn the controls to adjust the zero point and span. • Automatic zero and span adjustments are canceled. • Zero suppression is canceled.
3 to 9	—	These modes are used only for adjustments at the factory.	<ul style="list-style-type: none"> • Do not use them.

The procedures for automatic zero and automatic span adjustments in maintenance mode 1 and analog zero and analog span adjustments in maintenance mode 2 are provided as reference on the following pages.

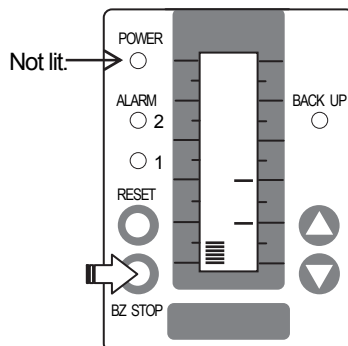
(1) Automatic Zero and Span Adjustment in Maintenance Mode 1 (Reference Procedure)

1) Automatic Zero Adjustment

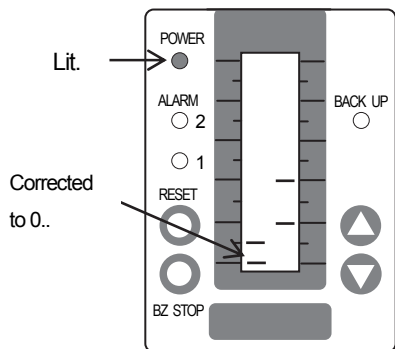
① Set the Mode Switch to 1 to select maintenance mode 1.



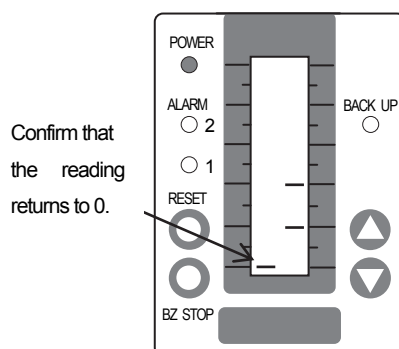
② Make sure that there is no gas around the Gas Detector Head and then hold down the BZ STOP Key until the Power Lamp goes out.



③ The Power Lamp will light again and the indicated value will be automatically corrected to 0.



④ Set the Mode Switch to 0 to return to the normal mode.

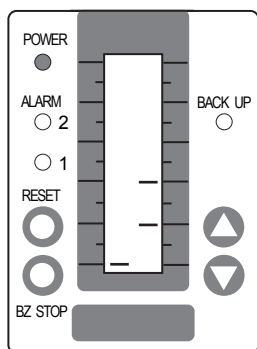


MEMO

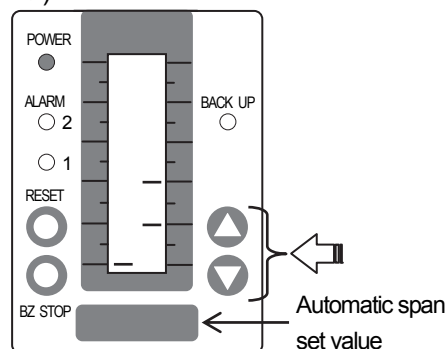
If the indicated value is outside the automatic span adjustment range when the BZ STOP Key is pressed, the Message Window will display a flashing "Err" and automatic zero adjustment will not be possible. If this occurs, perform analog zero adjustment in maintenance mode 2.

2) Automatic Span Adjustment

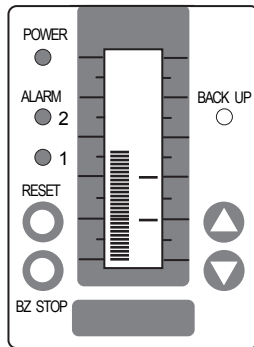
① Set the Mode Switch to 1 to select maintenance mode 1.



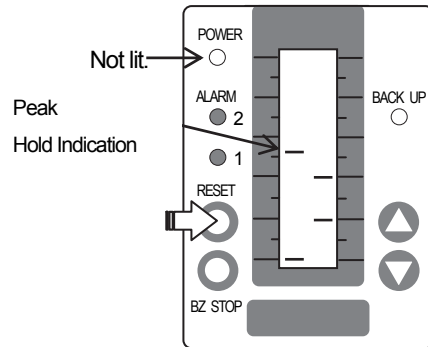
② Set the automatic span set value (any number between 10 and 100) using the Alarm Setting Keys (Δ ∇).



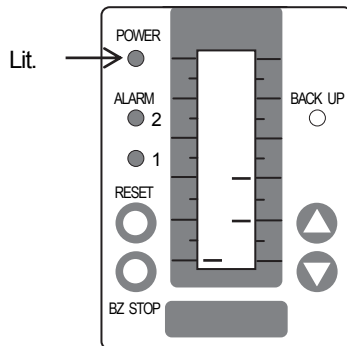
- ③ Confirm that the zero point is at 0 and apply calibration gas to the Gas Detector Head for 1 minute.



- ④ If the peak hold value does not match the calibration gas concentration, hold down the Reset Key until the Power Lamp goes out.

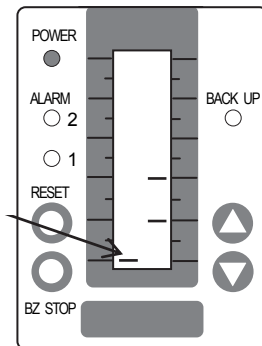


- ⑤ The Power Lamp will light again and the peak hold value will be automatically corrected to the automatic span set value.

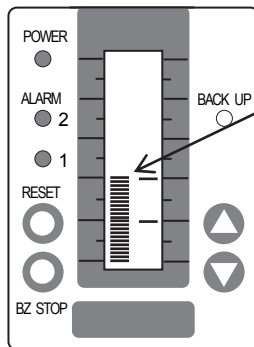


- ⑥ Set the Mode Switch to 0 to return to the normal mode.

Make sure there is no gas around the Gas Detector Head and confirm that the indicator reads 0.



- ⑦ Finally apply the calibration gas and confirm that the calibration concentration is indicated correctly.



CAUTION

A gas leak alarm and external output will occur when the calibration gas is applied in the normal mode.

MEMO

If the indicated value is outside the automatic zero adjustment range when the Reset Key is pressed, the Message Window will display a flashing "Err" and automatic zero adjustment will not be possible. If this occurs, perform analog span adjustment in maintenance mode 2.

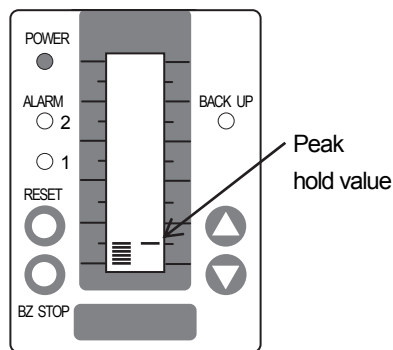
(2) Analog Zero and Analog Span Adjustments in Maintenance Mode 2 (Reference Procedure)

MEMO

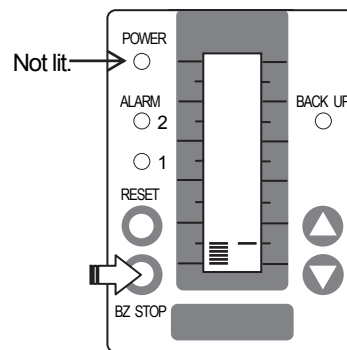
- In maintenance mode 2, indications are displayed with the automatic zero adjustment, automatic span adjustment, and zero suppression canceled. Therefore, the indicated values in this mode may differ from those in the normal mode.
- Always refresh the automatic zero and automatic span adjustment values during analog zero or span adjustment. If you fail to do so, zero and span adjustments cannot be carried out correctly.
- A precision screwdriver with a 1.3-mm face width is required to adjust the Zero and Span Adjustment Controls.

1) Analog Zero Adjustment

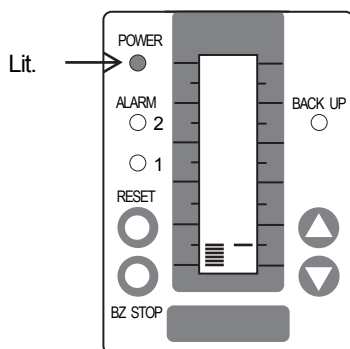
① Set the Mode Switch to 2 to select maintenance mode 2.



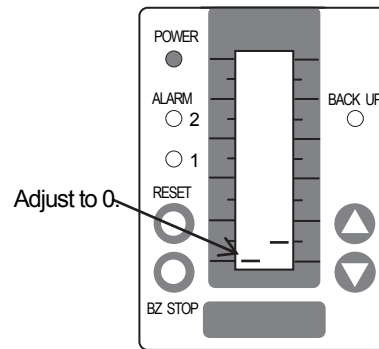
② Hold down the BZ STOP Key until the Power Lamp goes out.



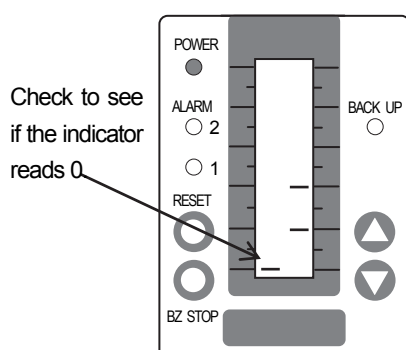
③ The Power Lamp will light again and the automatic zero adjustment value will be reset.



④ Make sure that there is no gas around the Gas Detector Head, and then press the Enter Key and simultaneously turn the Zero Adjustment Control (ZERO) to set the indicated value to 0.



⑤ Set the Mode Switch to 0 to return to the normal mode.

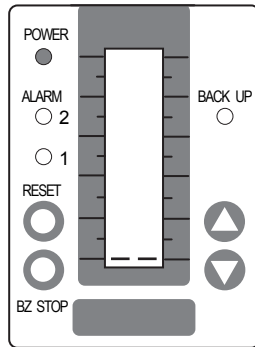


2) Analog Span Adjustment

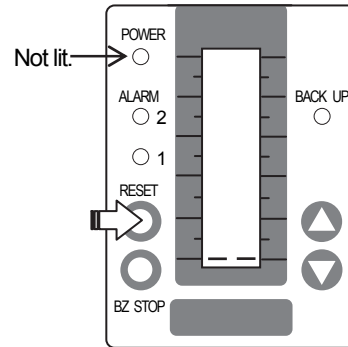
⚠ CAUTION

Always perform analog zero adjustment before you perform the analog span adjustment. Otherwise the span cannot be adjusted properly when the analog span adjustment is performed.

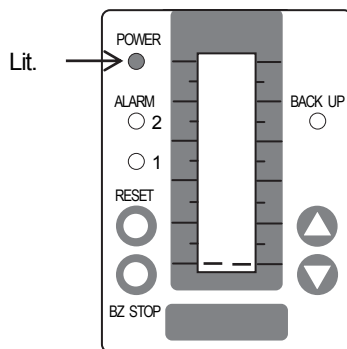
- ① Set the Mode Switch to 2 to select maintenance mode 2.



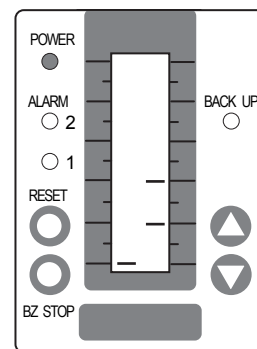
- ② Hold down the Reset Key until the Power Lamp goes out.



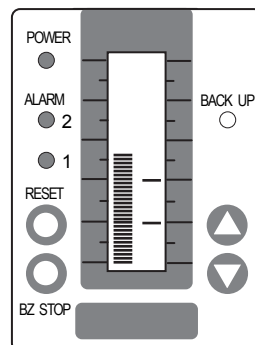
- ③ The Power Lamp will light again and the automatic span adjustment value will be reset.



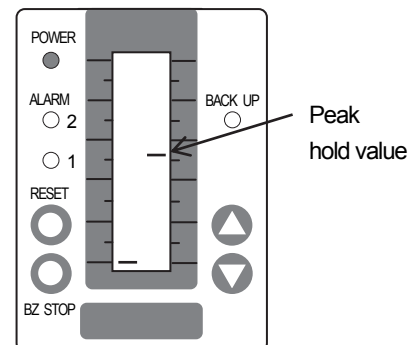
- ④ Set the Mode Switch to 1 to select maintenance mode 1.



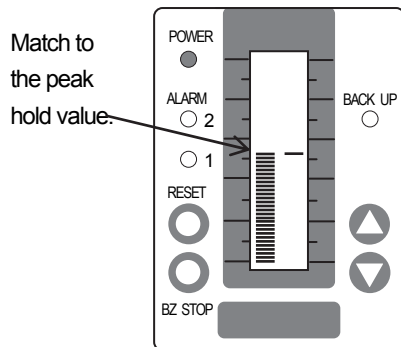
- ⑤ Confirm that the zero point is at 0 and apply calibration gas to the Gas Detector Head for 1 minute.



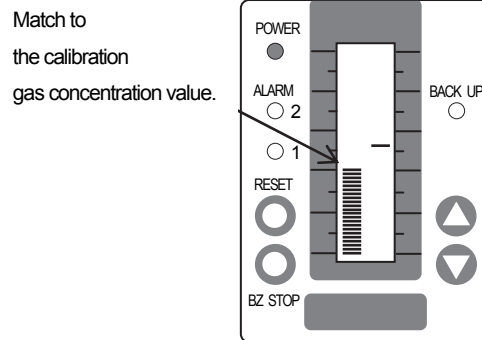
- ⑥ Set the Mode Switch to 2 to select maintenance mode 2.



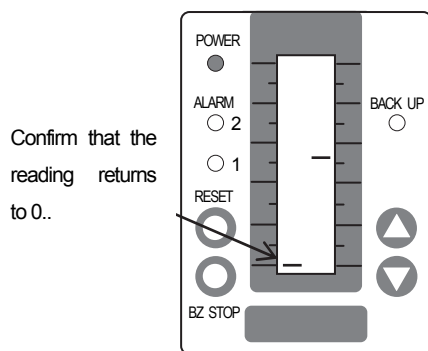
- ⑦ Turn the Test Control while holding down the Test Button to match the indicated value to the peak hold value.



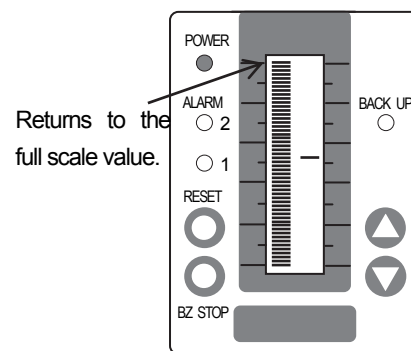
- ⑧ Then, turn the Span Adjustment Control (SPAN) to match the indicated value to the calibration gas concentration value.



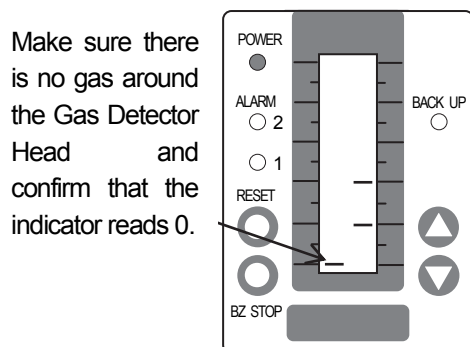
- ⑨ Release the Test Button and confirm that the indicated value returns to 0.



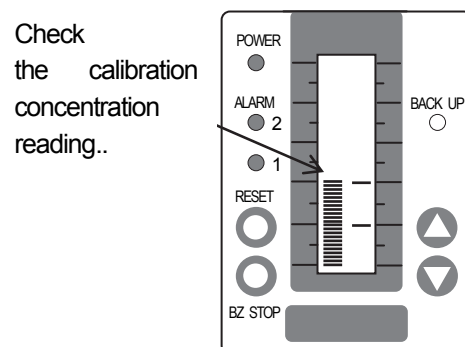
- ⑩ Turn the Test Control while holding down the Test Button to return the indicated value to the full scale value.



- ⑪ Set the Mode Switch to 0 to return to the normal mode.



- ⑫ Finally, apply the calibration gas and confirm that the calibration concentration is indicated correctly.



CAUTION

A gas leak alarm and external output will occur when the calibration gas is applied in the normal mode.

8. Maintenance and Inspections

Maintenance and inspections are very important for the NV-100M because the purpose of the NV-100M is to ensure safety. Maintenance and inspections are your responsibility. We can provide regular inspections if you make a maintenance contract with us. (Contact your New Cosmos sales representative for detailed information.)

Refer to the Gas Detector Head Instruction Manual for maintenance and inspection information for the Gas Detector Head.

8 – 1 Regular Inspections (Inspections for Which the User Is Responsible)

Items to Be Inspected Regularly and Inspection Methods

Frequency	Item to be inspected	Inspection method
Inspections performed about once a day	① Zero point check	• Make sure that there is no gas around the Gas Detector Head then confirm that the bar graph on the indicator indicates 0.
	② Power Lamp check	• Confirm that the Power Lamp (green) on the Indicator Unit is lit.
	③ Flow rate check (for Extractive Gas Detector Head only)	• Check the reading on the flow meter and adjust the flow rate if it has dropped. If the flow rate remains low even if you try to adjust it, inspect the filter to see if it is clogged.
Inspections performed at least once a month	④ Performance test by pressing the Test Button	<ul style="list-style-type: none"> Press the Test Button on the Indicator Unit and confirm that the bar graph on the Indicator Unit operates, the Alarm Lamp flashes, and a buzzer is heard from the Alarm Unit. <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>⚠ CAUTION</p> <p>Any externally connected alarm or alarm indicator will be activated when the Test Button on the indicator Unit is pressed.</p> </div>
	⑤ Backup power supply device inspection (Model with a backup power supply device only)	• Refer to 7-2 (5) Checking the Battery Life and check the battery life.
Inspections performed at least once every 2 or 3 months	⑥ Performance test using actual gas	• Refer to the Gas Detector Head Instruction Manual.
	⑦ Visual inspection	Check the following items visually. <ul style="list-style-type: none"> Corrosion of the Gas Detector Head Corrosion of fittings
	⑧ Conditions around the Gas Detector Head	• Check to see if there is anything blocking the Diffusion or Extractive Gas Detector Head that might hinder the detection of gas.

8 – 2 Periodic Inspection

Have the following inspection performed at least once a year.

REQUEST

Maintenance and inspections are extremely important to maintaining the reliability of a gas detection and alarm system. Also, extreme care is required to perform inspections and calibration with actual gases such as combustible gases or toxic gases. It is for these reasons that we ask you to form a contract with New Cosmos for periodic inspections.

9. Troubleshooting

Check the following before requesting repair work.

Symptom	Cause	Action	Section to refer to
The Power Lamp does not light even after the Power Switch is turned ON.	Wires are not correctly connected.	Correct the wiring.	→ Refer to 6-3.
	Wires are not connected completely.	Retighten the terminals.	
	Commercial power supply fuse has burned out.	Replace the fuse.	
Although the Power Lamp lights when the Power Switch is turned ON, the gas concentration is not displayed.	The Mode Switch is not set to 0.	Set the Mode Switch to 0.	→ Refer to 7-6.
“___” is flashing in the Message Window.	A maintenance mode has been entered.	Set the Mode Switch to 0 to return to the normal mode.	→ Refer to 7-6.
The Power Lamp lights orange.	The Indicator and Alarm Unit and the Gas Detector Head are not properly connected.	Check the wiring and retighten the terminals.	→ Refer to 6-3.
The Battery voltage is low.	The NV-100M has not been used for a long period of time.	Turn ON the power and wait until the Battery voltage becomes 24 V or higher.	→ Refer to 7-2 (5).

1 0. Specifications

1 0 – 1 Indicator and Alarm Unit

Detection principle	Depends on the specifications of the Detector Head (4 to 20 mA DC analog signal input).
Target detection gas	Depends on the specifications of the Detector Head.
Indication range	Depends on the specifications of the Detector Head.
Gas Concentration Indicator	LCD bar graph meter with backlight
Alarm set values	As specified. (The values can be adjusted within the measurement range.)
Alarm accuracy	Depends on the specifications of the Detector Head.
Response time	Depends on the specifications of the Detector Head.
Alarm indications	First alarm: First alarm blinks red and a buzzer is indicated. Second alarm: First and second alarm lamps blink red and a buzzer is heard.
Trouble indication	Power lamps lights up orange and the content of the failure is indicated.
Alarm output terminals	Alarm 1 contacts: No-voltage SPDT contacts (Contact capacity: 100 VAC 2 A, resistive load) Alarm 2 contacts: No-voltage SPDT contacts (Contact capacity: 100 VAC 2 A, resistive load) Fault contacts: No-voltage SPDT contacts (Contact capacity: 100 VAC 2 A, resistive load) Buzzer contacts: No-voltage SPST contacts (Contact capacity: 100 VAC 2 A, resistive load) The same common terminal is used.
External reset terminals	Terminals for external alarm stop and reset
Analog output	4 to 20 mA (standard) or 1 to 5 V (optional)
Alarm delay	Delay mode can be set. (Delay time: About 10 seconds) There may also be a delay function in the connected Detector Head. Care is required.
Zero suppression	A zero suppression mode can be set ($\pm 5\%$ F.S.). There may also be a zero suppression function in the connected Detector Head. Care is required.
Power supply	100 to 240 VAC 50/60 Hz (standard) 24 VDC $\pm 10\%$ (optional)
Power consumption	With AC power supply: 12VA/17VA (without backup power supply/ with backup power supply) With DC power supply: 3.5 W (The power consumption for an AC power supply is given for 100 VAC when there is no alarm. The power for the Detector Head is not included for either an AC or DC power supply.)
Backup power source (Model without a Backup Power Supply)	Battery: Gastight lead battery (12V0.8Ahx2) Backup time: 60minutes or more Function to prevent over discharge: Stop discharging at the battery's final voltage. Charge time: About 12hours
Maintenance functions	Maintenance mode 1 The alarm contacts and buzzer contacts will not operate. The alarm sound operates Maintenance mode 2 The alarm contacts and buzzer contacts will not operate. Zero suppression is canceled. Automatic zero and automatic span adjustments are canceled. The zero suppression, automatic zero adjustment, and automatic span adjustment are canceled only when they are set on the Indicator and Alarm Unit. The functions are not canceled on the Detector Head.
Operating temperature range	0 to 40°C
Installation	Wall mounted or embedded in a panel
Coating color	Munsell 2.5PB7.0/1.0
Dimensions	Model without a Backup Power Supply : W113×D71.5×H204mm 約 1.5kg Model with a Backup Power Supply: W113×D110×H234mm 約 3kg
Remarks	Do not use any equipment that generates electrical noises, such as cell phones or radio communications, within 30 cm of the Indicator and Alarm Unit.

1 0 – 2 Gas Detector Head

Refer to the *Gas Detector Head Instruction Manual*.

1 1. Consumable Parts and Spare Parts

Contact your New Cosmos sales representative when you need consumable parts or spare parts for the NV-100M.

1 2. Warranty

New Cosmos Electric Co., Ltd. warrants its gas detection products against any defects in materials and workmanship under normal use and operating conditions, for a period of one year from the date of purchase. All obligations and liabilities under this product warranty are limited to repairing or replacing at the manufacture's option of the allegedly defective items returned to us, with carrier charges prepaid. All repairs and replacements are made subject to our factory inspection of the returned items.

No liability is accepted for the consequential damages or reinstallation labor. Defects as defined in the above shall not include decomposition by chemical reaction (including corrosion).

New Cosmos Electric Co., Ltd. shall not assume responsibility for contingent liability arising from alleged failure of any of its products and accessories.

1 3. Service Life

The service life of the NV-100M is 7 years when the NV-100M is installed and used as described in the Installation Instructions and Instruction Manual. Replace the NV-100M with a new one after 7 years to ensure proper performance.

1 4. Glossary

Indicator and Alarm Unit: A unit that receives signals from the Gas Detector Head and indicates the gas concentration and alarms.

Detector Head: The unit that detects the gas concentration and converts it into an electrical signal.

Backup power source device: A device that supplies power to the gas detector, indicator /alarm unit in order to maintain its performance during a power failure.

Flow meter: A meter to measure air flow in a gas sampling pipe.

Gas collector: A gas collecting probe that enhances gas collection efficiency and blocks water and dust.

Diffusion sampling: A method to detect gas by utilizing convection and diffusion of gas.

Explosion-proof structure: A totally enclosed structure. If gas explodes in the container, the container can resist the pressure and prevent the ignition of explosive gases outside of it.

Alarm set value: The set value for the gas concentration at which to activate an alarm.

Gas to be detected: The gas that is detected and indicated and that determines if an alarm is activated.

Detection range: The range of the gas concentration that can be indicated and set off an alarm.

Alarm accuracy: The difference between the alarm set value and gas concentration or the percentage of the difference compared to the alarm set value when an alarm actually occurs.

Response time: The time required from when the Gas Detector Head is exposed to a gas with a concentration that is higher or lower than the alarm set value until the alarm goes off.

Operating temperature range: The range of temperature within which the Gas Detection/Alarm System can perform its functions.

Maintenance and inspections: The work that is required for the NV-100M to perform its required functions.

Calibration gas: The gas that is used to calibrate the scale of the Gas Detection/Alarm System.

Peak hold: A function to constantly update and hold the peak value of an input signal.

Hazardous area: An area in a plant or facility with a dangerous atmosphere where explosive gases may mix with air and explode or start a fire. An area where gas may be present.

Non-hazardous area: An area containing electric device that has no potential to create a hazardous atmosphere during the normal state or during a malfunction.

Dangerous atmosphere: An atmosphere where explosive gas and air are mixed within the explosive limits.

LEL: An abbreviation for the lower explosive limit. The lowest concentration of combustible gas mixed with air that will ignite and explode.

(Definitions were translated from the gas detection system glossary and gas detector tube measurement system glossary of the Industrial Gas Detectors and Monitors Manufacturer's Association.)

Manual Revision History

Edition No.	Date	Revisions
GAE-049	October 2013	0

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