Single-Point Gas Alarm System
NV-120 series
Instruction Manual for Installation

Keep this manual for easy reference.
Prior to use, carefully read this manual as well as NV-120 series instruction manual for operation (separate document) for correct use.
This manual describes the standard model. If your unit has end-user-specific options, this manual will be superseded by your delivery specifications.

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NEW COSMOS ELECTRIC CO., LTD.

Related Manuals

The following documents have been prepared to guide your installation and use of this product.

(1) NV-120 series Instruction Manual for Installation (this document), No. GAE-153-xx

This document is intended for your supervisors and service personnel who are concerned with the installation of this product. It also provides the following information to ensure correct installation of the product:

- Safety precautions
- Unit dimensions and components and precautions for unpacking
- Installation precautions

One manual is provided per order, not per unit.

(2) NV-120 series Instruction Manual for Operation, No. GAE-154-xx

This document is intended for your supervisors, operators and service personnel who are concerned with the operation and maintenance of this product. It provides the following information to ensure the safe use of the product:

- Unit dimensions and components, power on/off, troubleshooting
- Basic construction and component names/functions
- Operation modes and on-screen menus
- Maintenance procedure and consumable replacement

One manual is provided per order, not per unit.

(3) NV-120 series wiring diagram with gas detector, No. GAE-158-xx

This document shows typical wiring configurations when connected with a gas detector and provide supplement information for the installation.

One manual is provided per order, not per unit.

Introduction

Thank you for purchasing the New Cosmos NV-120 series single-point gas alarm system ("product" or "unit" hereafter).

Prior to use, please read this manual as well as NV-120 series instruction manual for operation (No. GAE-154-xx) and follow the instructions provided for correct use.

Periodic maintenance is essential to maintain the reliability of the product. Perform periodic maintenance checks in the manner described in this document.
Keep this manual in a safe place for easy reference.

This unit is used in connection with a gas detector (or gas detector head) that can detect a variety of combustible/toxic gases at the site (one target gas at one detector/time). Install the gas detector at a location where it is necessary to detect the target gas. Install the unit at a location convenient for monitoring the gas concentration.

This unit shows the gas concentration detected by the corresponding gas detector on its bar graph display. In case the detector detects a leak of the target gas that exceeds a preset limit or reduction of concentration to a level below a preset limit in the case of oxygen, the unit produces audio-visual alarms (e.g., LED, beep sound, voice message), thus helping prevent incidents such as low oxygen, gas poisoning and explosion.

There are various types of NV-120 series units. They are divided into four groups according to the gas detector types they are used with, and they are further divided into the following seven models according to the gas sensor types. The wiring, adjustments and other unit-related items can vary from group to group. This manual clearly specifies the name of the applicable group/model and shows that the information or instruction provided applies to a certain group/model only.

CE marking specification is applied to Group 3, which uses 24 VDC power supply. Refer to the "EU Declaration of Conformity" (separate document) for more information on the CE marking unit.

Group	Model Variation
Group 1	NV-120Hv
	NV-120Cv
Group 2	NV-120Sx
	NV-120Dx
Group 3 (24 VDC power supply CE marking specification)	NV-120Mx
Group 4	NV-120Hi
	NV-120Ci

A few acts are prohibited without the prior consent of New Cosmos. Please note that use of this product will be treated as your acceptance of these terms. If you do not agree to these terms, do not use this product and immediately consult your local sales representative. The aforementioned acts are the following:
- Modification of this product and its related components
- Reverse-engineering of this product and its related components
- Analysis of this product and its related components including disassembly and reverse compilation
- Transfer of this product and its related components to a third party
- Third party use of this product and its related components for any reason, including lease and licensing

Precautions

Unauthorized copying and replication of the contents of this manual, in whole or in part, are strictly prohibited.
The contents of this manual are subject to change without notice.
This manual has been prepared with the utmost care. If any incorrect description comes to your notice, please contact us for correction.

Symbols Used in this Instruction Manual

Symbols for Danger Levels

Operators' safety has been put first in designing this product. However, there exist some unavoidable risks due to the system characteristics. In this manual, safety symbols are divided into three categories, Danger, Warning and Caution, depending on the severity and magnitude of the risks. Carefully read the contents related to the precautions before operation and maintenance work.

This manual uses Danger, Warning, Caution and Notice symbols to draw attention to procedures, materials, methods and processes that 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.

NOTICE
Indicates a hazardous situation that will not result in injury but may cause a product, facility, or related equipment damage or failure.

Other Signs and Symbols

This manual also uses the following signs and symbols.

NOTE   Provides supplemental or useful information on product handling.

Ref.   Details the related information or procedure.

🚫	**Don'ts** Indicates a prohibited action.
❗	**Mandatory** Indicates an action that must be done.
⚡	**Electrical hazard** Warns of risk of electric shock under a certain condition.
💥	**Explosive hazard** Warns of a risk of explosion while handling explosive items.
⚠	**Corrosive hazard** May cause burn or loss of sight if skin or eye comes into contact.

Quick Index

This page lists parts that may be often referenced.

Prior to use, please read the precautions in "1 General Precautions".

Unit Dimensions and Components
Pages 8 to 13
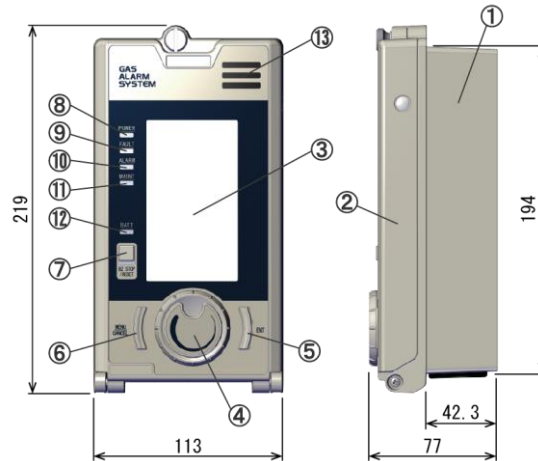
Non-backup power type

Installation
Pages 16 to 21
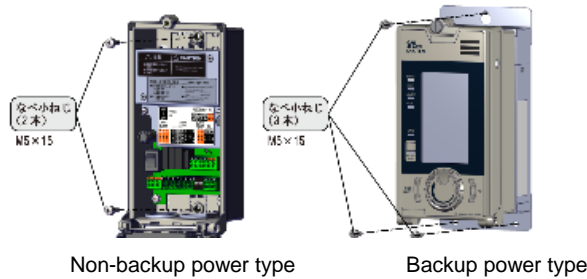
Non-backup power type   Backup power type

Wiring and Connection
Pages 22 to 29

NV-120

Power source
100-240 VAC
(24 VDC)

Alarm contacts

External devices

Analog outputs

Power source
100 VAC

Recorder, etc.

Diffusion gas detector   OR   Extractive gas detector   OR   100 VAC gas detector

Table of Contents

1   General Precautions

1.1   Before Work

In order to ensure safe use, carefully read the precautions in this manual before turning on this product to prevent unexpected accidents. New Cosmos is not responsible for the cost incurred or any damage resulting from any usage other than that outlined in this document.

This chapter "General Precautions" provides a general description of methods of safely using this product as well as safety information and cautions related to this product.

1.2   Safety Precautions

Carefully read the following precautions for correct use.
Use this product in accordance with the applicable laws and regulations.
Wiring and installation should only be performed by a qualified electrician with knowledge of wiring/installation procedures in accordance with the applicable technical standards.

⚠ DANGER
• Operation check using actual gas is extremely dangerous and requires a special attention, because combustible gas may have a risk of explosion and toxic gas may be harmful to human health. It must be performed by qualified personnel or a New Cosmos authorized technician. • In the event of a gas alarm, take necessary actions to prevent gas poisoning. • This product is not explosion-proof and should not be installed in a hazardous area.

⚠ WARNING
• Do not use organic solvents for cleaning the product. Organic solvents may negatively affect the product's exterior as well as internal components.

⚠ WARNING
• Ground the product to prevent electric shocks. • In the event of a gas leak alarm, follow safety procedures in accordance with your company's regulations.

⚠ CAUTION
• Do no use radio wave-emitting devices (e.g., cell phones, wireless devices)   30 cm of the product. • Do not disassemble, modify, or alter the structure of the product or its electrical circuits. Doing so may compromise product performance.

⚠ CAUTION

	• Wiring and installation should only be performed by a qualified electrician with knowledge of wiring/installation procedures, in accordance with the applicable technical standards. • New Cosmos is not responsible for the cost incurred or any damage resulting from controlling external equipment (e.g., interlock) by using the product's outputs (e.g., analog output, alarm relay contact output). • Only use this product in accordance with the applicable laws and regulations. • This product is not drip-proof and should be kept away from splashing water or rain.

1.3   Warning and Caution Labels Affixed to Product

Warning and Caution labels are affixed to the areas or surrounding parts that are potentially dangerous and require a special attention.

⚠ WARNING

	• To ensure safety, check the locations of the Warning and Caution labels and carefully read them prior to operation. • If Warning and Caution labels are missing, damaged or illegible, please contact us for replacement.

Warning and Caution labels use size and color that are appropriate to draw the attention of the operator and provide the risk levels with symbols.

- Refer to "1.3.1 Warning and Caution Labels Affixed to Product" for information on the labels affixed to the product. Read the labels to be alert to possible dangers and their locations and meet the requirements provided by the labels.
- Do not remove or damage the Warning and Caution labels.
- It is very dangerous to leave the Warning and Caution labels dirty or obscured. Please contact New Cosmos or its authorized representative for new labels.

1.3.1   Warning and Caution Labels Affixed to Product

⚠ WARNING
🚫 Do not relocate the Warning and Caution labels affixed to the product.

Carefully read the contents of the labels prior to use.
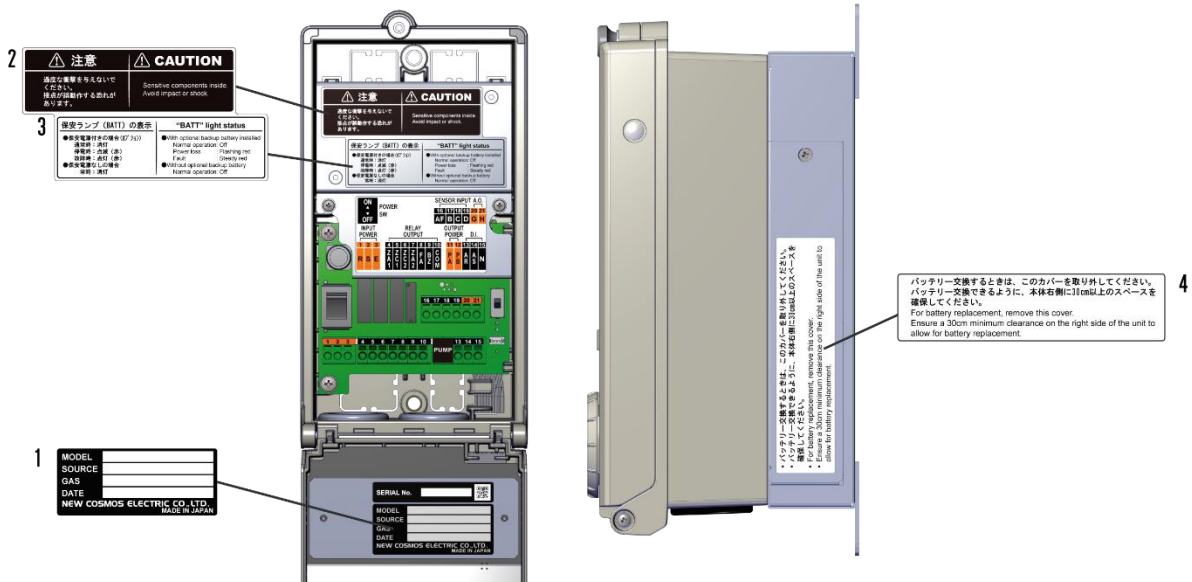
Item	Description
1	**Power rating label** Indicates the model, power source, target gas, and manufacturing date.
2	**Caution label** Indicates the cautions to be adopted while handling this product.
3	**BATT light status label** Describes the backup battery status that the BATT LED indicates.
4	**Caution label for battery replacement (only for backup power type unit)** Indicates cautions for installation space and battery replacement.

1.4   Working Clothes and Protective Equipment

⚠ WARNING
❗ • Wear your company-specified working clothes and use protective equipment while working around the unit. • Wear the right size working clothes that do not interfere with the work.

1.5   Batteries

This product uses two lead storage batteries (when the unit is backup power type).
The batteries need to be replaced periodically.
The battery life varies depending on the frequency of use and environment conditions.
Follow the precautions below for proper operation.

⚠ WARNING
Batteries may short-circuit resulting in electric shock or burns. Follow the precautions listed below: • Avoid thermal, electrical and mechanical impact on the batteries. • Do not disassemble the batteries. Do not insert external metal in the connections on the product's power or signal cable. Doing so may cause electric shock, heat, ignition or injury. • In order to prevent rapid battery discharge, protect the battery's electrode from direct contact with other electrolytes or metal objects. Battery discharge may cause heat or battery leak. • Store batteries in a clean and dry place at a temperature of 30°C or lower to prevent degradation. • Do not place tools or other metal objects on the batteries.

⚠ CAUTION
• Do not mix new and old batteries. • Use the specified batteries. Unspecified batteries may cause device failure.

⚠ CAUTION
• Dispose of batteries in accordance with the applicable laws and regulations. • If abnormal odor, noise or smoke is observed during operation, cease the operation immediately and disconnect the power plug. Continued operation under such circumstances may cause a fire. • Replace the batteries periodically. Using expired batteries may cause a battery leak, which will then result in a secondary disaster such as an electric leak, electric shock, smoke or ignition.

1.5.1 Battery Location

Item	Description
1	Battery x 2 pcs

1.5.2 Battery Replacement Procedure

Refer to "6.1.2 Battery Replacement" of the NV-120 series instruction manual for operation.

1.5.3 Battery Life

If this product is to be kept unused or stored for an extended period of time, the batteries must be removed. Leaving the batteries inside while the product is not in use or being stored for an extended period of time may impair/shorten the performance/life of the batteries and cause their terminal corrosion.

The battery life is about two years from the month of manufacture. After two years, replace the batteries even if they pass the battery voltage test.

"Two years" is only an estimate, and no guarantee is provided. The battery life may vary depending on several factors including frequency of use, temperature and usage or storage conditions.

⚠ DANGER
🛈 In order to prevent serious secondary disasters such as a broken battery case or ignition, replace the batteries periodically.

⚠ CAUTION
🛈 Using expired batteries will cause internal battery degradation, which may disable the unit to operate for designed hours with the backup batteries after power outage, or may cause an abnormal appearance such as a swollen battery case, battery leak or electric leak.

1.5.4   Battery Disposal

Used batteries must be disposed of as hazardous waste in accordance with the applicable laws and regulations,

⚠ WARNING
Do not heat or throw batteries into a fire. Improper handling may lead to explosion.

⚠ WARNING
Do not open or disassemble batteries. Electrolyte is harmful, and its contact with eyes and skin is dangerous.

1.6   Product Disposal

Dispose of the used product in accordance with the applicable laws and regulations.

1.7   Service Life

The service life of this product is 10 years. The unit can operate for up to 10 years with standard installation and operation in accordance with the NV-120 series instruction manuals for installation and operation. When the service life has expired, replacement is essential for continued reliable performance and other purposes.

1.8   Definition of Supervisor/Operator/Service Personnel

This manual is intended for personnel concerned with this product, and the personnel are divided into three categories according to safety level, skills and experience. This manual clearly specifies the name of the applicable category and shows that the information or instruction given applies to that category only.

Supervisor	Manages the product operation.
	Fully understands the product operation method, entire gas alarm facility, and gas/fault alarm clearance method.
	Should carefully read this manual and be familiar with the system characteristics and relevant work activities.
Operator	Operates the product.
	Understands the product operation method, the way to address gas/fault alarms, and daily work activities for the product under the supervisor's instruction.
Service personnel	Carries out installation, failure cause investigation, maintenance and repair work for the product.
	Requires special knowledge and skills.
	Acts as New Cosmos authorized technician in principle.

2 Unit Structure

2.1 Package Contents

A standard package consists of the following items. If any items are missing or damaged, please contact New Cosmos or its authorized representative for replacement.

Non-backup power type (Unit with no backup batteries)

Item	Qty.	Description
NV-120 unit	1	
Replacement fuse	1*3	250 V 2 A Φ5.2 × 20mm
Wall-mounting kit	1*1	Mounting screws (M5 × 15), pan-head x 2 pcs
Panel-mounting kit	1*2	Mounting bracket S x 1 pc Mounting screws (M5 × 15) x 2 pcs Pan-head, used for attaching bracket to unit Tension screw (M6 × 40) x 2 pcs Pan-head, used for attaching bracket to panel
Flat-head screwdriver	1*3	Used to open/close the terminal plugs
NV-120 series instruction manual set	1*3	Instruction manual for installation (GAE-153-xx) x 1 pc Instruction manual for operation (GAE-154-xx) x 1 pc
NV-120 series wiring diagram	1*3	Wiring diagram with gas detector (GAE-158-xx) x 1 pc
Inspection certificate	1	
Ferrite core	2	Protect the unit from electrical noise.
Cable tie	2	Used to secure the ferrite core.

Backup power type (Unit with backup batteries)

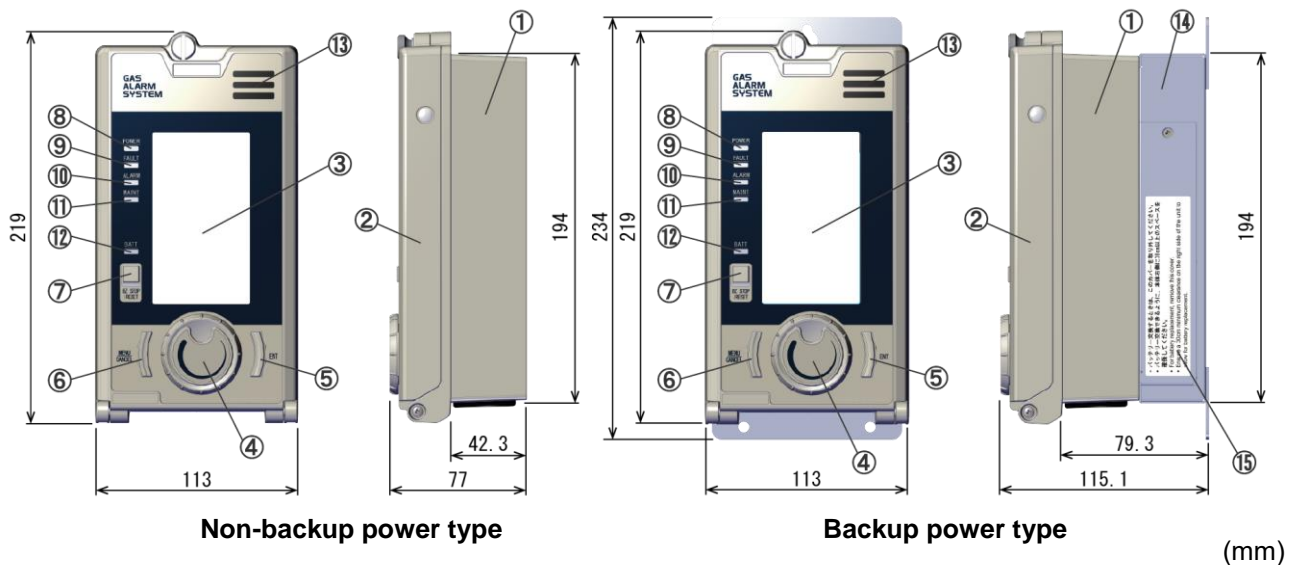| Item	Qty.	Description
NV-120 unit	1	
Replacement fuse	1	250 V 2 A Φ5.2 × 20mm
Wall-mounting kit	1*1	Mounting screws (M5 × 15), pan-head x 3 pcs Upper mounting plate x 1 pc Lower mounting plate x 1 pc Mounting screw (M3 × 6) x 4 pcs Flat-head, used for attaching mounting plates to unit
Panel-mounting kit	1*2	Mounting bracket B x 1 pc Mounting screws (M5 × 8) x 2 pcs Pan-head, used for attaching bracket to unit Tension screw (M6 × 40) x 2 pcs Pan-head, used for attaching bracket to panel
Flat-head screwdriver	1*3	Used to open/close the terminal plugs
NV-120 instruction manual	1*3	Instruction manual for installation x 1 pc Instruction manual for operation (this document) x 1 pc
Inspection certificate	1	
Ferrite core	2	Protect the unit from electrical noise.
Cable tie	2	Used to secure the ferrite core.

*1. Provided when "wall-mounting" was specified at the time of order.
*2. Provided when "panel-mounting" was specified at the time of order.
*3. One screwdriver/manual is provided per order, not per unit.

2.2   Unit Dimensions and Components

2.2.1   Main Unit (Exterior Appearance)

Non-backup power type   **Backup power type**

(mm)

Item	Component	Description
1	Case	–
2	Cover	–
3	LCD	Shows gas concentration on the display. Refer to "2.2.3 LCD" for details.
4	Jog dial	Turn to select item or increase/decrease the parameter value.
5	ENT button	Press and hold to confirm the selection or setting. Press to increase/decrease the parameter value.
6	MENU/CANCEL button	Press to switch to the menu, return to the previous menu or cancel the current operation.
7	BZ STOP/RESET button	Its LED flashes when a gas alarm activates. BZ STOP: Press to mute the audio alarm (beep sound and voice message). The flashing LED will become steadily lit. RESET: Press and hold to clear the peak hold indication and visual gas alarm. The LED will turn off. The RESET operation is enabled after the audio alarm is muted.
8	Green POWER LED	Indicates the operation status. Not lit when the unit is off. Flashes when the warm-up is in progress. Lit when the unit is operating normally.
9	Amber FAULT LED	Indicates the operation status. Not lit when the unit is operating normally. Flashes when a fault has been detected.
10	Red ALARM LED	Indicates the alarm operation status. Not lit when the warm-up is in progress or unit operates normally. Flashes when 1st stage gas alarm activates. Flashes rapidly when 2nd stage gas alarm activates.

Item	Component	Description
11	Red MAINT LED	Indicates the maintenance mode status. Not lit when it is not in the maintenance mode but in normal operation. Flashes when the unit is in maintenance mode 1. Lit when the unit is in maintenance mode 2.
12	Red BATT LED	Indicates the backup power status. Off indicates normal operation. Backup batteries are not used. Flashing indicates that backup batteries are being used. On indicates that backup battery failure has been detected. *This LED is always off when the unit is non-backup power type.
13	Audio opening	Opening or audio. Gas leak or device fault alarm will be issued by beep sound and voice message. Refer to "4.5 Audio Alarms" of NV-120 series instruction manual for operation.
14	Battery case	Comprise a backup power supply unit (backup battery x 2 pcs)
15	Battery lid	

2.2.2   Main Unit (Interior Appearance)

⚠ CAUTION
🚫 Do not touch the jumper pins inside. They are for device setting.
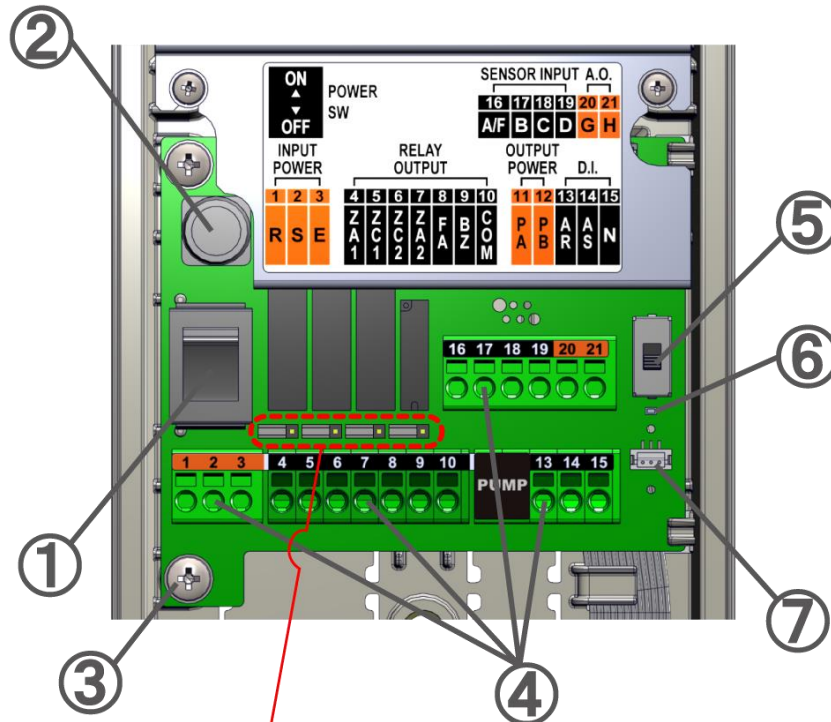
Do NOT touch these pin sockets to set the jumper pins inside

Item	Component	Description
1	Power switch	Press to turn on/off the unit.
2	Fuse holder	Houses a 2A fuse.
3	Earth terminal	Used for grounding the unit. Thread size: M4
4	Terminal block (4 places)	Used for external wiring.
5	Backup power switch	Turns on/off the backup power supply unit. *Only available for backup power type unit.
6	Backup power LED	Lit when the backup power switch is in the on position.
7	Analog output connector	Used for checking the analog output. Applicable connector: ZHR-3 (J.S.T.)

2.2.3   LCD
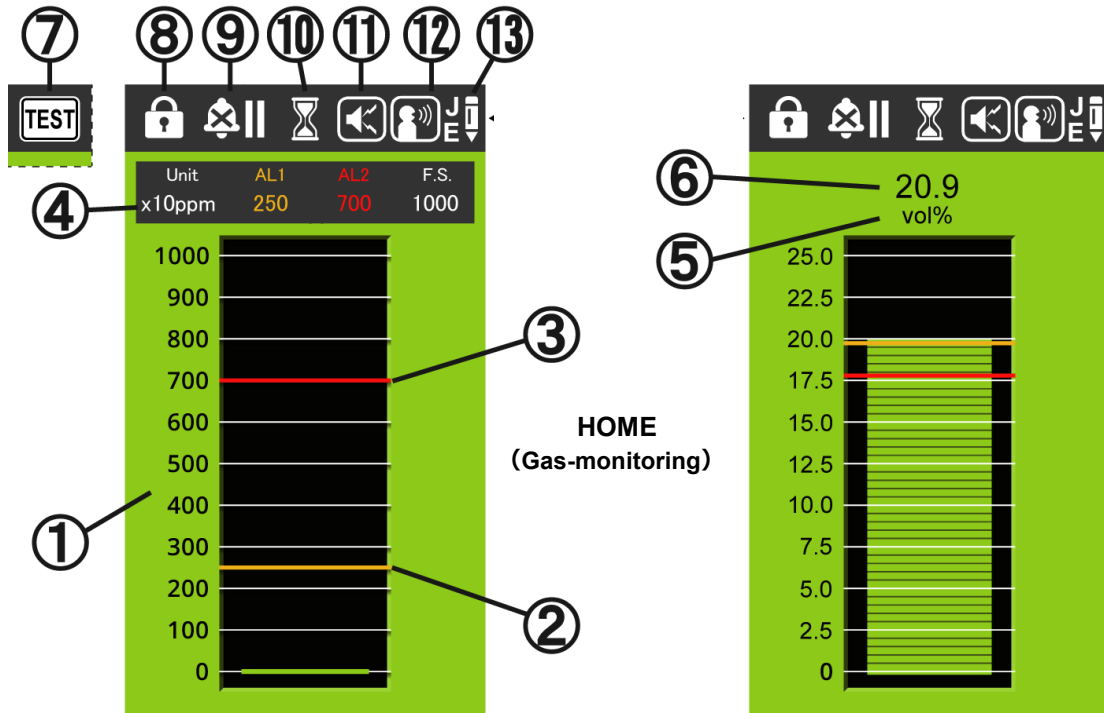
Target gas: Gas other than oxygen   **Target gas: Oxygen**

HOME
（Gas-monitoring）

Item	Component		Description
1	Gas concentration bar graph		Displays the gas concentration and alarm set values.
2	1st stage gas alarm set value		Displays the 1st stage gas alarm set value with orange line.
3	2nd stage gas alarm set value		Displays the 2nd stage gas alarm set value with red line.
4	Unit (unit of measurement)		Displays the unit of measurement for the gas concentration. Note: "x10" is displayed when the largest value is greater than the four-digit limit. E.g., If the largest value is 10,000 ppm, then "1000" is displayed for the bar graph with "x10".
	AL1 (1st stage gas alarm set value)		Displays the 1st stage gas alarm set value.
	AL2 (2nd stage gas alarm set value)		Displays the 2nd stage gas alarm set value.
	F.S. (full scale value)		Displays the full scale value.
5	Unit of measurement		Displays the unit of measurement for oxygen concentration.
6	Gas concentration		Displays the oxygen concentration. Note: This is displayed only when the target gas is oxygen.
7	TEST	Test icon	This icon is present when the unit is in test mode. It replaces the lock icon during the test mode.
8	🔒	Lock icon	This icon is present when the button/dial operation is locked.
9	⊠❙ / ⊠❙❙	Maintenance icon	This icon is present when the unit is in maintenance mode 1 or 2.
10	⌛	Warm-up icon	This icon is present when the unit is in warm-up cycle.
11	🔊 / 🔇	Speaker icon	This icon is present when the audio alarm is unmuted/muted.
12	/	Voice icon	This icon is present when the voice message is unmuted/muted.

Item	Component		Description
13		ENT icon	Press and hold the ENT button for confirmation.

2.2.4   Terminal Blocks
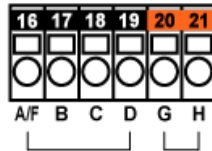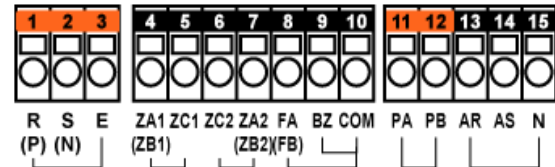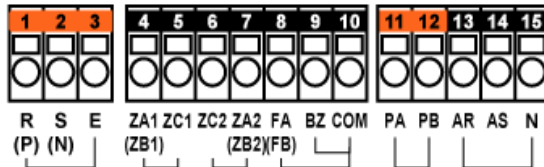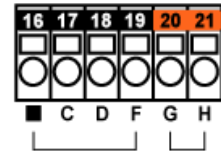
Terminal	Identifier	Description
Power (Input)	R (P)	AC type: 100 to 240 VAC DC type: 24 VDC (+)
	S (N)	AC type: 100 to 240 VAC DC type: 24 VDC (-)
	E	Earth
(Earth terminal)	⏚	Earth Thread size: M4
AL1 (1st stage gas alarm)	ZA1 (ZB1)	1st stage gas alarm contact output Normally-open or Normally-closed[1]
	ZC1	Common for ZA1 (ZB1)[2]
AL2 (2nd stage gas alarm)	ZC2	Common for ZA2 (ZB2)[2]
	ZA2 (ZB2)	2nd stage gas alarm contact output Normally-open or Normally-closed[1]
Fault (Fault alarm)	FA (FB)	Fault contact output Normally-open or Normally-closed[1]
Buzzer (Alarm sound)	BZ	Alarm sound contact output
Common	COM	Common for Fault and Buzzer contact outputs[2]
Detector (Power output for pump)	PA	24 VDC (+)
	PB	24 VDC (-)
External switch	AR	External switch (button) input
	AS	
	N	
Detector	A/F	Gas detector[1]
	B, C	
	C, D	
	D, F	
4-20mA OUT (Analog output)	G	Analog output signal (+)
	H	Analog output signal (-)

*1. As per delivery specifications.

*2. These common terminals are not connected (individual-common) by default, unless otherwise specified at the time of order. To connect them (to short-circuit the common lines: shared-common), refer to the attached wiring diagram (GAE-158-xx).

Contact Outputs

Outputs to external devices (e.g., signal towers, alarm horns, etc.) are referred as "contact outputs".

NOTICE
• Contacts use mechanical relays, which can activate on exposure to magnet force. Install the product in a place free from a magnetic field. Do not use a magnet in the vicinity of the product. • Contacts use mechanical relays, which can activate on exposure to excessive shock or vibration. Install the product in a place free from shock and vibration. Set a delay time greater than one second for external devices connected to the product. • Use the product in a place where the rated load is not exceeded.

3   System Configuration

This NV-120 unit is paired with a gas detector (sold separately) to form a gas detection system. All the parts are connected with cables. The unit displays the gas concentration detected by the connected gas detector and produces audio-visual alarm if the concentration reaches a present limit.
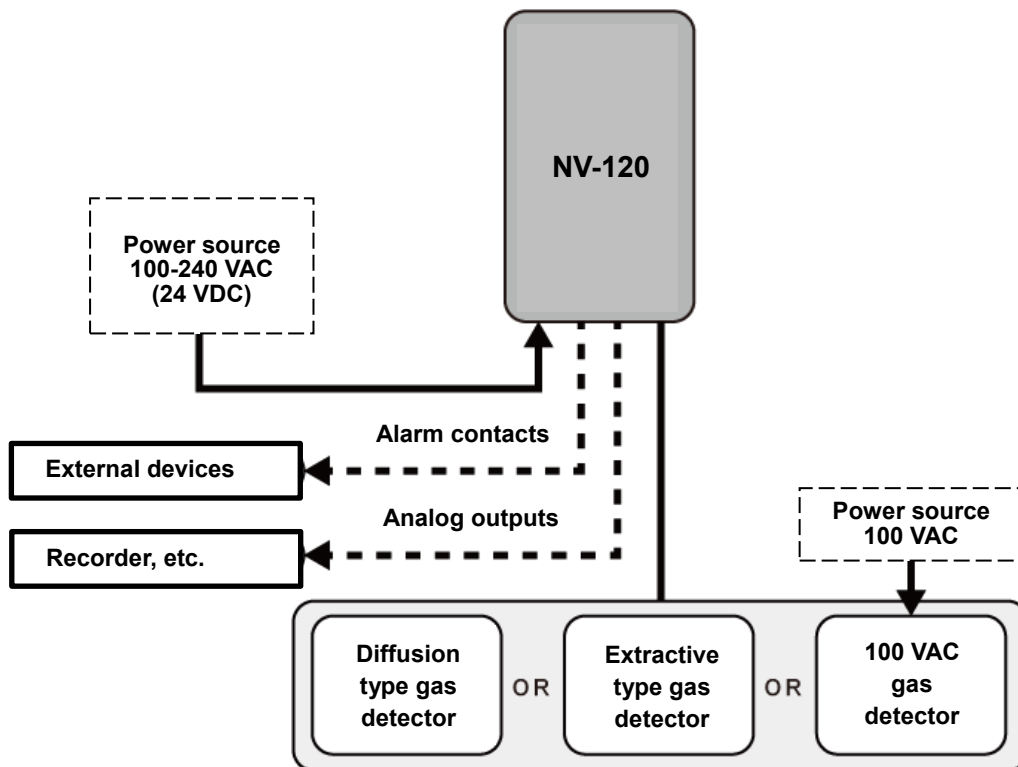
Typical System Configuration

NOTE	• One gas detector, diffusion or extractive type, can be connected to each NV-120 unit. Use a protective cover (sold separately) for the gas detector for outdoor installation. Refer to the gas detector's instruction manual for details. • Wiring differs depending on a connected gas detector.

4   Preparation

4.1   Tools Required

The user will require the following tools for installation:

- Phillips screwdriver (#2) for M3 and M5 screws;
- Phillips screwdriver (#3) for M6 screw;
- Flat-bladed screwdriver (6mm) for knurled screw.
- Flat-bladed screwdriver (3.5mm)* used for wiring terminal blocks;
  *One screwdriver is provided per order, not per unit.

4.2   Disposal of Packing Materials

The packing materials (for instance, cardboard boxes and plastic bags) used to enclose the product and optional items should be disposed of in accordance with the applicable laws and regulations.

5   Installation

Ensure proper installation in accordance with the given specifications.

Installation Flow

5.1. Installation Location	5.1.1 Installation Conditions
5.2. Product Installation	5.2.1. Wall-Mounting
	5.2.2. Panel-Mounting
5.3. Wiring and Connection	5.3.1. Wiring
	5.3.2. Connecting Power and Signal Lines
	5.3.3. Grounding
	5.3.4. Connection to Gas Detector
	5.3.5. Connection to External Devices
5.4. Operation Check	

⚠ WARNING
🚫 Do not use organic solvents for cleaning the product. Organic solvents may negatively affect the product's exterior as well as internal components.

⚠ WARNING
❗ • This product is not explosion-proof and must not be installed in a hazardous area. • Ground the product to prevent electric shocks. • In the event of a gas alarm, follow the safety procedures in accordance with your company's regulations. • Avoid using the product in an environment where it will be exposed to vibration, electric noise, corrosive gas, high temperature, and high humidity, since such factors may result in damage or malfunctioning of the product. • Contacts use mechanical relays, which can be activated if exposed to excessive shock or vibration. Install the product in a place free from shock and vibration. Set a delay time greater than one second for external devices connected to the product. • Do not install the product in the vicinity of equipment that can generate high frequencies or a magnetic field, since such factors may result in malfunctioning of the product.

⚠ CAUTION
● Be careful not to damage the product during installation. ● Install the product in a place where it can be easily accessed for maintenance or inspection. ● Do not install the product in a place exposed to direct sunlight. Exposure to direct sunlight will cause sudden temperature change inside the product, which may impair its performance. ● This product is not drip-proof and must be installed indoors to keep away from splashing water. ● Install the product at a height safe and convenient for maintenance and inspection. ● Do not install the product in the following conditions: 　- Ambient temperature beyond the specified operating temperature range; 　- Condensation-prone areas; 　- Exposure to sudden temperature/humidity change; 　- Exposure to water spray; 　- Presence of corrosive gas; 　- In the vicinity of equipment that can generate high frequencies or a magnetic field; 　- Near to a heat source; 　- Vibration-prone areas; 　- In the presence of an ignition source; 　- On a ceiling.

NOTE For the installation of the gas detector, refer to its instruction manual (separate document).

5.1   Installation Location

5.1.1   Installation conditions

Install the product in a highly visible position, so that in the event of an emergency, the alarm can be easily alerted and addressed.

When installing the product, ensure that there is enough space below, above, and on each side of the product to allow for easy installation activity, as explained below.

Space required for product installation

Front: Maintain a distance of 50 cm or more between the front part of the product and any other object. The product needs to be operated from the front during maintenance and inspection.

Side: For the backup power type unit, maintain a distance of 30 cm or more from the right side of the product to allow for battery replacement.

Below: Maintain a distance of 30 cm or more from the bottom of the product to allow for maintenance and cover opening/closing.

Non-backup power type

**Backup-power type
(backup batteries included)**
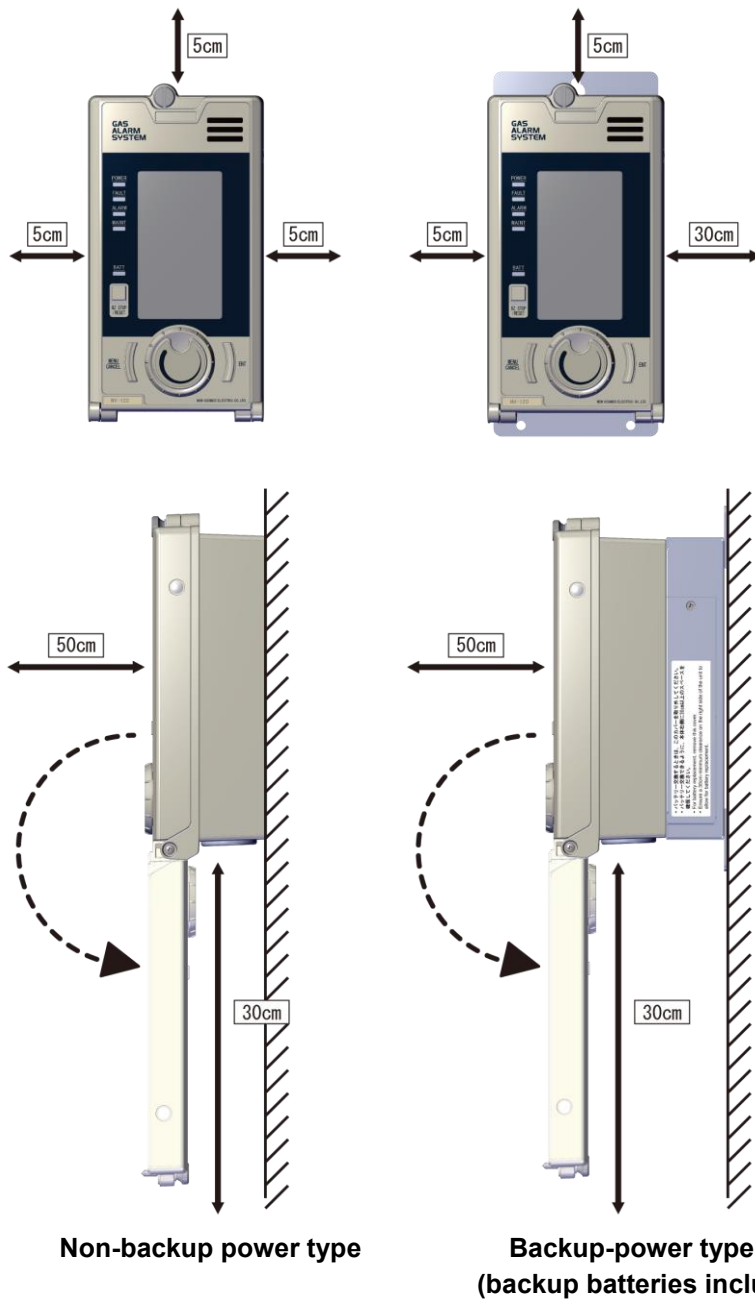
NOTE The installation spaces can change depending on the power type, whether backup or non-backup. For the correct installation space of the gas detector, refer to its instruction manual.

Installation at a raised position

When installing the product at a high location, ensure that enough space is left below the product to allow for inspection or maintenance using a stepladder, among others.

NOTE
- Do not install the product at a high location that cannot be accessed by a stepladder or the like.
- Leave enough space below the product to allow for maintenance and inspection using a stepladder or the like.

5.2   Product Installation

There are two installation methods for the product: wall-mounting and panel-mounting.

⚠ **WARNING**
❗ Turn off the power switch before installation. Installing the product with the power switch on may cause device failure.

NOTICE
❗ The installation location changes depending on the power type, whether backup or non-backup. Refer to "5.1 Installation Location".

5.2.1   Wall-Mounting

NOTICE
The mounting hole size changes depending on the power type, whether backup or non-backup.

Installation procedure

1   **Cut mounting holes — two for non-backup power type and three for backup power type — in the wall as shown below:**
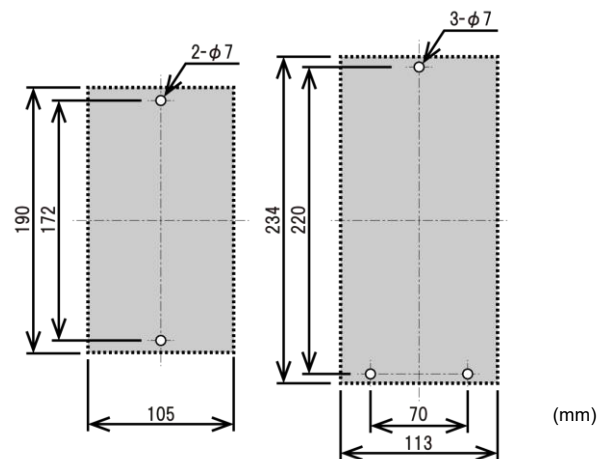
Cut two holes for
non-backup power type

Cut three holes for
backup power type

2   **For the backup power type, install the upper and lower mounting plates (provided) at the back of the unit using four screws.**

Upper mounting plate

M3x6
Flat-head screw (4 places)

Lower mounting plate
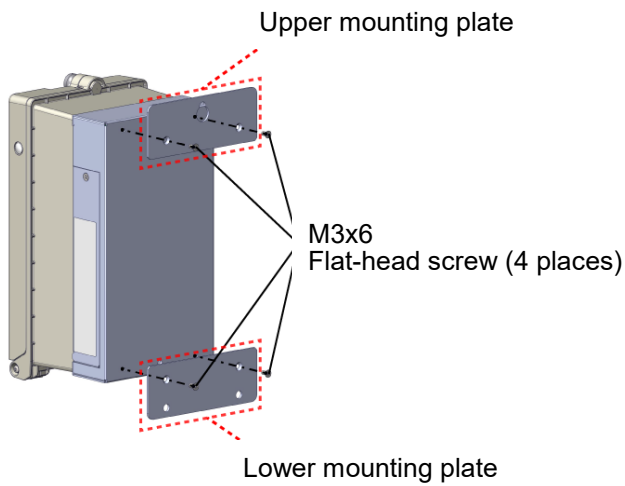
3   **Install wall anchors into each of the mounting holes.**
4   **For the non-backup power type, turn the knurled screw counterclockwise and loosen it.**

Knurled screw

5   **First, tighten the upper screw, and then the lower screw(s).**

M5x15
Pan-head screw
(2 places)

M5x15 Pan-
head screw
(3 places)

Non-backup power type   **Backup power type**
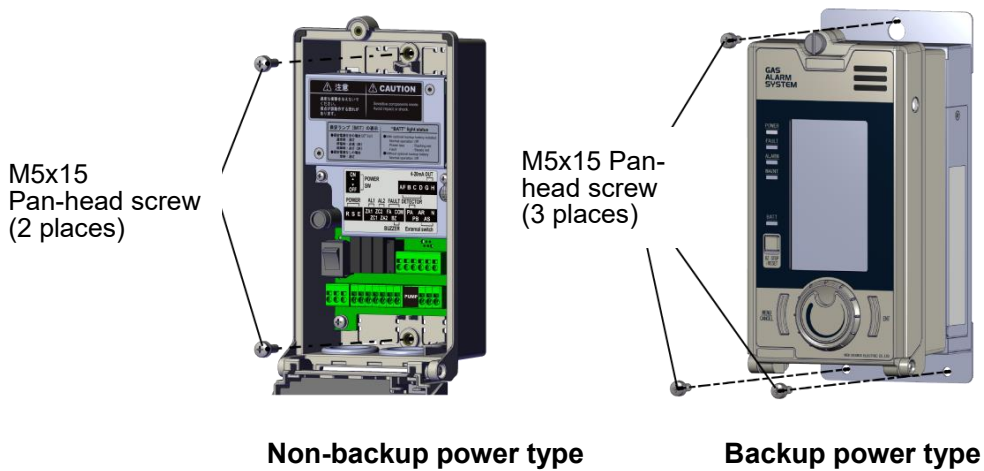
5.2.2   Panel-Mounting

<u>**Installation procedure**</u>

1   **Remove the two grommets from the bottom of the unit.**
2   **Make a square cutout in the panel as depicted below.**

Panel cutout size (mm)
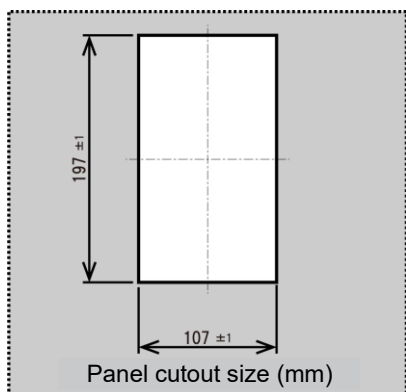
3   **Insert the unit through the square cutout. Attach the mounting bracket S/B to the back of the unit using the two mounting screws. Attach the unit to the panel using the two tension screws.**

  ● The unit can be installed on a 1.6mm to 6mm thick panel.
  ● For the non-backup power type, open the cover and secure the mounting bracket S using the two mounting screws.

Recommended tightening torque

Thread	Recommended tightening torque
M5	100 N·m
M6	50 N·m
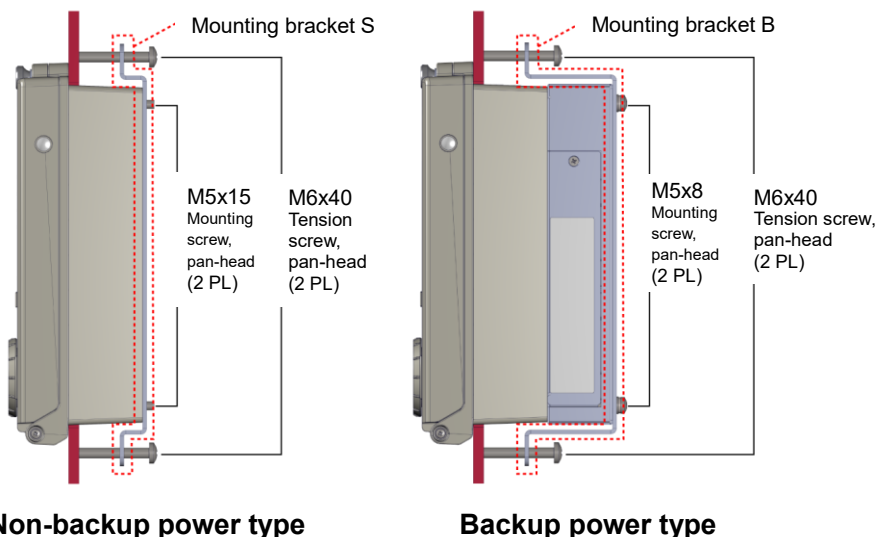
Non-backup power type   **Backup power type**

⚠ CAUTION
● Tighten the screws according to the recommended tightening torque. Tightening screws with excessive torque may deform the case or damage the mounting bracket.   ● For the backup power type unit, install the unit at a place where the unit itself can be easily detached, or maintain a distance of 30 cm or more from the right side of the product to allow for battery replacement.

NOTE   There are a total of six cable entries: four on the back and two on the bottom. Cables can be hidden if fed through the back side. For the backup power type unit, only the

cable entries on the bottom can be used.

5.3   Wiring and Connection

5.3.1   Wiring

Be careful not to damage the cables during installation.
Sheath all cables in a protective casing, such as a metal conduit or carbon steel pipe, as needed.
Other protective structures, such as metal or concrete ducts are also acceptable.

⚠ WARNING
● To prevent electric shocks, turn off the power switch before installation. ● Both the product and the gas detector should be grounded.

⚠ CAUTION
● Connect the wires to their corresponding terminals by referring to the identifiers marked on both the product and the gas detector. ● Keep the connection cables (power and signal lines of the product) away from other power lines. ● For wiring of the gas detector, refer to its instruction manual. ● While performing the wiring, do not stress the cables excessively.

Connectable cable List

Terminal	Identifier	Recommended cable
Power (Input)	R (P)	CVV (0.75mm^2 to 2.00mm^2)
	S (N)	
	E	
AL1 (1st stage gas alarm)	ZA1 (ZB1)	CVV (0.75mm^2 to 2.00mm^2)
	ZC1	
AL2 (2nd stage gas alarm)	ZC2	
	ZA2 (ZB2)	
Fault (Fault alarm)	FA (FB)	
Buzzer (Alarm sound)	BZ	
Common	COM	
Detector (Power output for pump)	PA	Refer to the gas detector's instruction manual.
	PB	
External switch	AR	CVV (0.75mm^2 to 2.00mm^2)
	AS	
	N	
Detector	A/F	Refer to the gas detector's instruction manual.
	B, C	
	C, D	
	D, F	
4-20mA OUT (Analog output)	G	CVVS (0.75mm^2 to 2.00mm^2)
	H	

5.3.2   Connecting Power and Signal Lines

- If needed, use a dedicated breaker for the power line going towards the product.
- Ensure that the power voltage supplied to the product is within the specifications.
- Ensure that the load resistance of the signal line, including the resistance of the wire, is 300 ohm or less.

Terminal block specifications

- Solid and stranded wires can be connected to the terminal blocks without wire ferrules, but It is recommended to use terminal block wire ferrules to prevent unraveled or stray wires.
  Recommended wire ferrule with sleeve: Phoenix Contact AI 0,75 – 8 GY
  Phoenix Contact AI 1 – 8 RD
  Phoenix Contact AI 1, 5 – 8 BK

- Prepare wires/pins that meet the following cable specifications:
  Wire cross section (solid wire): $0.2mm^2$ to $4.0mm^2$
  Wire cross section (stranded wire): $0.2mm^2$ to $2.5mm^2$
  Wire ferrule with no sleeve: $0.25mm^2$ to $2.5mm^2$
  Wire ferrule with sleeve: $0.25mm^2$ to $1.5mm^2$
  Striped wire length: 10mm
  Wire ferrule rod length: 8mm

Stripped wire length   **Wire ferrules rod length**

Wiring for a terminal block

- Recommended tool: Provided flat-bladed screwdriver
  *Use a screwdriver with a 3.5 mm-wide head when using a commercially available one.

1   **Fully insert the flat-head screw driver into the square slot on the terminal block to open the corresponding round slot.**

2   **Fully insert the tip of each wire into the round slot.**
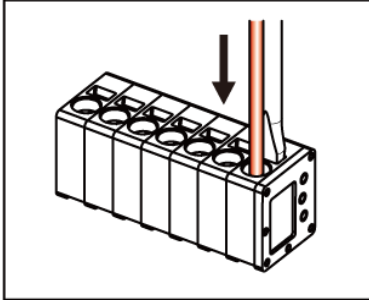
3   **While holding the wire, remove the screwdriver from the square slot. This will securely connect the wire to the terminal.**
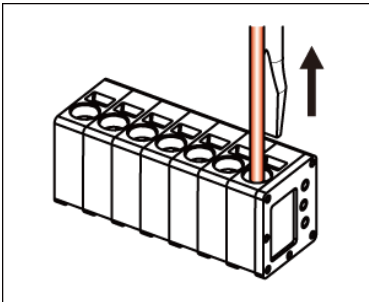
4   **Slightly pull the wire to ensure that it is secure in the terminal.**
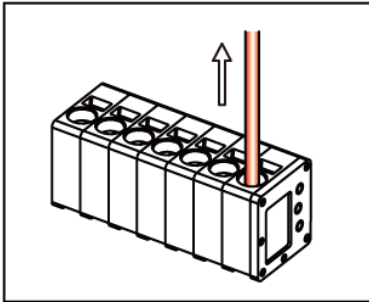
To remove the wire from the terminal
Insert the screwdriver into the square slot to open its corresponding round slot. In this way, the wire will be released.

Hint for wiring
Be careful not to let the wires stray beyond the surface A. The cover cannot be closed properly if they stray beyond.

Surface A

5.3.3   Grounding

⚠ CAUTION
● Wiring and installation must be only performed by a qualified electrician with knowledge of wiring/installation procedures in accordance with the applicable technical standards. ● For wiring of the gas detector, refer to its instruction manual.

（1）　Typical wiring when the shield is grounded on the external device's side

NOTE Single-point grounding is mandatory. Do not ground the shield cable to the ground terminal (⏚) located inside the gas detector when the shield from the product is grounded on the external device (e.g. signal tower, alarm horn). This will create two-point grounding.
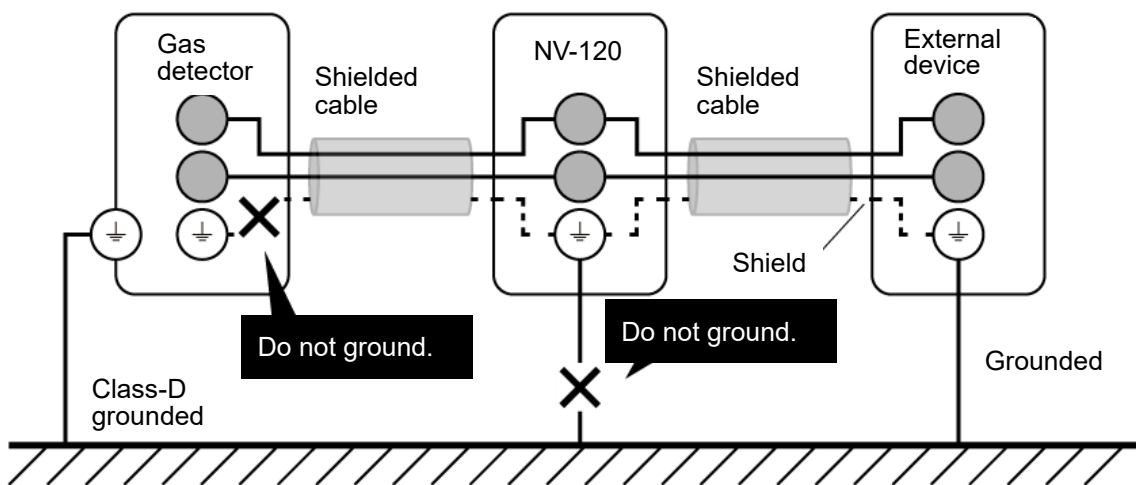
（2）　Typical wiring when the shield is not grounded on the external device's side

5.3.4   Connecting to Gas Detector

The wiring configuration changes depending on the given specifications. Check the group/model variation of your unit (page ii) prior to wiring.

⚠ CAUTION
● Connect the wires to their corresponding terminals by referring to the identifiers marked on both the product and the gas detector. ● Keep the connection cables (power and signal lines of the product) away from other power lines. ● For wiring of the gas detector, refer to its instruction manual.

NOTE   For cable length, refer to the gas detector's instruction manual.

Typical configuration for Group 1 (NV-120Cv / NV-120Hv)

Diffusion type gas detector **Extractive-type gas detector** **Extractive-type gas detector with flow sensor**
                                 (Pump power: 24 VDC)   **(Pump power: 24 VDC)**

Typical configuration for Group 2 (NV-120Sx / NV-120Dx)

Diffusion type gas detector **Extractive-type gas detector** **Intrinsically-safe gas detector**
                                 (Pump power: 24 VDC)

*G: Grounded

*F: Flow sensor; use the F terminal for the low flow rate signal output.

Typical configuration for Group 3 (NV-120Mx)

Diffusion type gas detector

Extractive-type gas detector (Pump power: 24 VDC)

Diffusion/extractive-type gas detector (Power: 100 VAC)
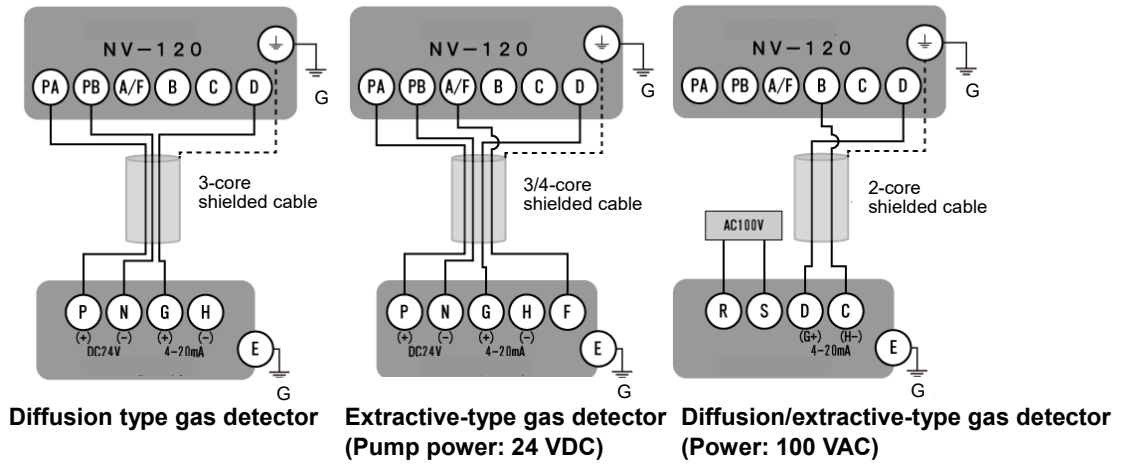
Typical configuration for Group 4 (NV-120Ci / NV-120Hi)

Diffusion type gas detector

Extractive-type gas detector (Pump power: 24 CDC)
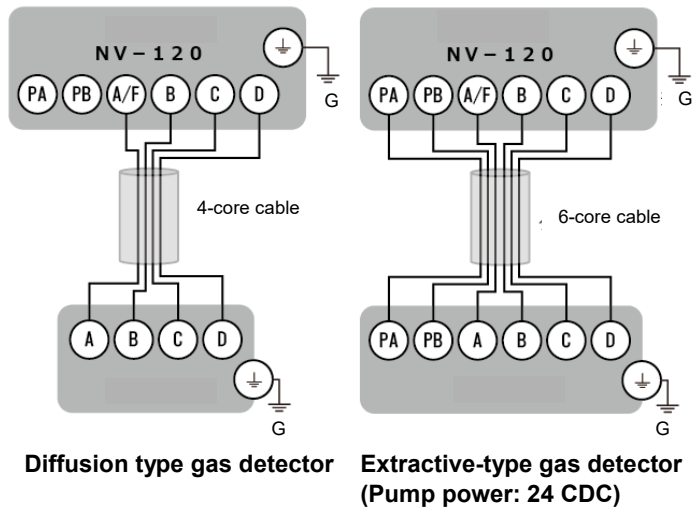
*G: Grounded.

*F: Flow sensor; use the F terminal for the low flow rate signal output.
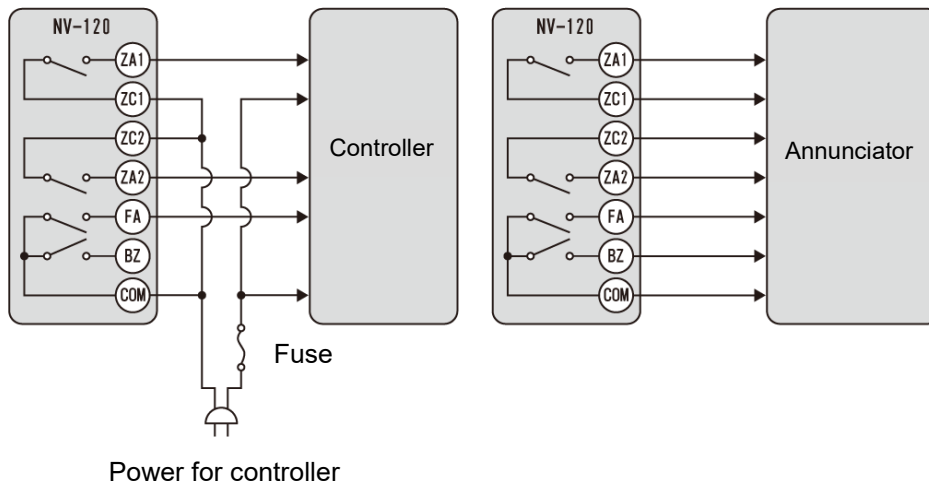
5.3.5 Connecting to External Devices

（1） Connecting to an external controller or annunciator

Normally open or closed dry contacts are turned on/off for activating/deactivating a 1st stage gas alarm, 2nd stage gas alarm, and fault alarm.

⚠ CAUTION
🚫 New Cosmos is not responsible for the costs incurred or any damage resulting from controlling external equipment (e.g. interlock) by using the product's contact outputs (e.g. analog output, alarm relay contact output).

⚠ CAUTION
❗ • The external alarm relay contacts should be used for external devices (e.g. signal towers and alarm horns) only. • Load current and voltage should not exceed each contact's capacity.

Typical connection to an external controller or annunciator (in case of normally open contact)

Power for controller

（2） Connecting to an external alarm horn

The normally open dry contact (BZ) is turned on/off for activating/deactivating external sound devices (e.g. alarm horn).
When using an electromagnetic horn (inductive load), the horn capacity should not exceed half of the contact capacity (Figure B).
Use a fuse in the horn's electrical circuit.

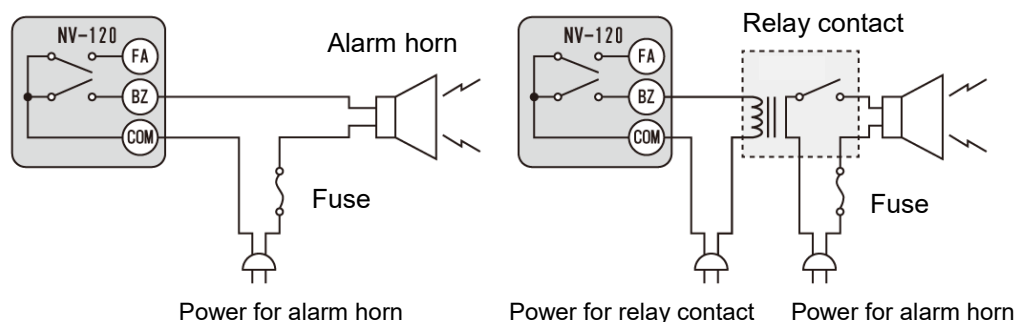**Typical connection to an external alarm horn**

Figure A. Connection with small-capacity alarm horn　　Figure B. Connection with large-capacity horn

（3） **Connection to external switch terminals**

There are two external switch terminals: "AR" and "AS".

To use the unit as semi-lock type, connect the panel's alarm reset button to the "AS" terminal. This enables to reset an alarm from both the external device and the unit.

To use the unit as full-lock type, connect the audio alarm mute button to the "AS' terminal and connect the alarm reset button to the "AR" terminal.

> ⚠ **CAUTION**
>
> 🛈 For an alarm reset button, use a dedicated contact completely independent from other circuits.

Typical connection to an external reset terminal

Semi-lock type　　　　**Full-lock type**
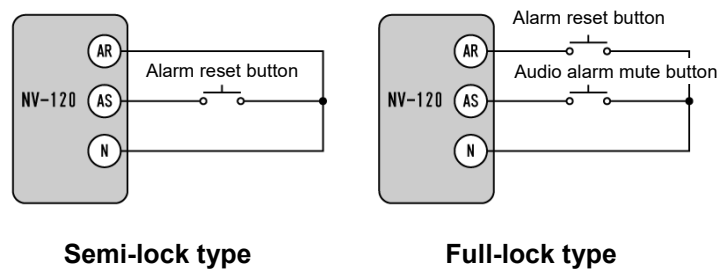
（4） **Connection to an analog output**

Analog signals corresponding to the gas concentrations (4-20mA or 1-5 V) are outputs from the "G" and "H" terminals.

As required, a recorder or PLC, among others, can be connected to the said analog output terminals.

> ⚠ **CAUTION**
>
> 🛈
> - When connecting to a PLC, separate the power source for the PLC from the one for the product, and use a noise filter next to the power source for the PLC.
> - Ensure that the load resistance of the signal line, including the resistance of the wire, is 300 ohm or less.

Typical connection to analog output terminals
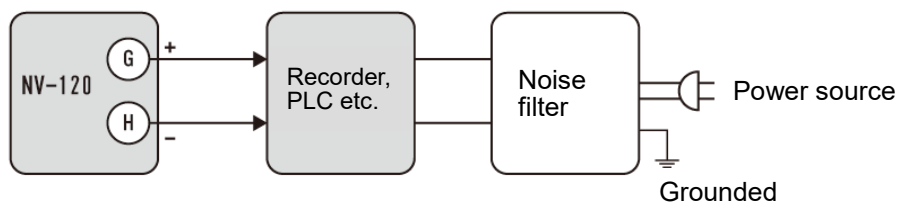
5.4   Operation Check

Once the installation process is completed, check if the product turns on normally.
Take the following steps to check the operation.

⚠ CAUTION
🚫	• Load exceeding the mentioned load capacity should not be connected to external alarm contacts. • When checking the input voltage with a digital multimeter, do not fully insert its test lead tips into the square slots on the terminal block. Doing so may disconnect the wiring.

⚠ CAUTION
❗	• Check that all the wiring is correct before powering-up, especially between the gas detector and the product.

1   **Insert the digital multimeter's test lead tips into the square slots (Nos. 1 and 2: power input terminals).**
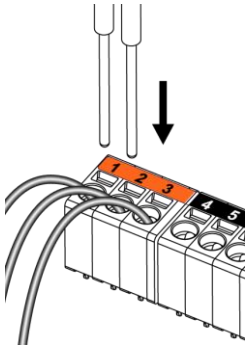
2   **Measure the input voltage to check that the value is within the specification.**
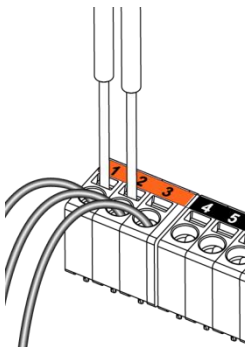
3   **Set the power switch to the on position. Check the unit turns on normally.**

Power switch
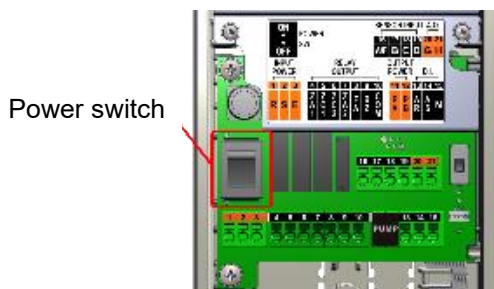
Ref.	Refer to "4. Operation" of the NV-120 series instruction manual for operation (separate document) for more information.

6　Glossary

Term	Definition
Alarm unit	Device that indicates the gas concentration and activates an alarm according to the signals received from a connected gas detector.
Backup power supply unit	Battery unit that provides emergency power to the product when the input power source or main power fails.
Backup power type and non-backup power type	There are NV-120 units with and without backup batteries attached. They are called "Backup power type" and "non-backup power type" respectively.
Gas detector (or gas detector head)	Device used to detect the presence of a target gas and to give its concentration in the form of an electrical signal.
Diffusion type	Gas sampling method using convective diffusion while placing a gas detector at a detection point.
Extractive type	Gas sampling method using a pump.
Target gas	Specific gas to be detected, concentration displayed, and used to trigger alarms.
Alarm set value	A gas concentration value that is set on a gas detector for alarm activation.
Detection range	A range of target gas concentrations that can be displayed and trigger alarms.
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.
Operating temperature/ humidity range	Ambient temperature/humidity range in which the gas detection and alarm system can operate normally.
Maintenance and inspection	Tasks performed to ensure that equipment operates normally and correctly.
Hazardous area	An area in which an explosive atmosphere is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of electrical apparatus.
Non-hazardous area	An area in which an explosive atmosphere is not expected to be present in quantities such as to require special precautions for the construction, installation and use of electrical apparatus.
Explosive atmosphere	Mixture of air and flammable substances in the form of dust or vapor which are within their explosive limits.
LEL (or LFL)	Lower Explosive Limit (or Lower Flammable Level). Lowest concentration (percentage) of a gas or vapor in air capable of producing a flash fire, or explosion in the presence of an ignition source like arc, flame or heat.
%LEL	Concentrations of combustible gas given in terms of percent of the lower explosion limit.
vol%	Gas concentrations given in terms of percent of cubic volume.
ppm	Gas concentrations given in terms of millionth part of cubic volume.
Zero suppression (or 20.9 suppression for oxygen detection)	For indicator units with a zero suppression (or 20.9 suppression) function, the bar graph display will continue to indicate "0" (or 20.9 vol%) until the target gas concentration detected by the detector exceeds the pre-set value. The pre-set value is given in the delivery specifications.

Clean air or normal air	Standard atmosphere which contains 20.9 to 21.0% oxygen in dry condition or atmosphere without target gas or interference gases.

Term	Definition
Auto-resetting	After an alarm has been triggered, and a target gas concentration falls below the gas alarm set value minus 2% of the full-scale value, the ALARM lights and relevant gas alarm contacts will automatically return to their normal positions.
Manual-resetting	Even if a target gas concentration falls below the gas alarm set value after an alarm has been triggered, the ALARM lights and relevant gas alarm contacts will not automatically return to their normal positions. Manual-resetting is only possible when the gas concentration is below the gas alarm set value.
Full-lock type (or Latching type)	Alarm unit type. After an alarm is activated and muted, the alarm status (ALARM light and output are active) will be maintained even if the gas concentration falls below the alarm set value. To clear the alarm, manual operation is needed (e.g., pressing the reset button.)
Semi-lock type (or Non-latching type)	Alarm unit type. After an alarm is activated and muted, the alarm status will be automatically cleared when the gas concentration falls below the alarm set value.

Revision History

Document No.	Date	Revision
GAE-153-00	December 2019	0 (Initial issue)
GAE-153-01	February 2020	1
GAE-153-02	December 2020	2
GAE-153-03	September 2022	3

Additional copies of this instruction manual may be purchased.
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