

G a s A l a r m

Installation Manual

~For Gas Dealers and Building Facilities Designers (8th Revision)~



June 2022

GKK (Gas Alarm Industries Association Of Japan)

On Publication of Revision

In recent years, large-scale earthquakes such as the Northern Osaka Earthquake and Hokkaido Eastern Ibari Earthquake, as well as heavy storms caused by large-scale typhoons, have caused serious damage to social lifelines such as gas and electricity. There has been a growing need in various fields to protect against natural disasters. In addition, the aging of workers involved in security, increase in foreign labor, aging population and lower birth rate, and structural changes due to innovations in electricity and gas systems are all expected to progress in the future. The environment surrounding energy faces very harsh circumstances.

In this environment, in order for gas-based energy to continue to be selected by consumers as household energy, it is essential to improve the safety of gas consumers and advance security (improve quality). It is thought that the spread of gas alarm devices that can quickly detect signs of gas leaks will become even more important into the future. As such, it is critical to develop countermeasures against CO poisoning accidents, which cause grave damage to human bodies. The installation of CO alarm devices is considered one effective countermeasure.

This installation manual is primarily aimed at gas-related business operators and gas dealers. However, the authors strove to make it easy to understand and helpful to other persons installing these systems and persons at building/facility design offices. As the number of users accessing the Gas Alarm Industries Association of Japan website to view this installation manual is always high, it appears that many people use this manual. The association hopes that users will deepen their understanding of proper installation techniques for gas alarms and create an environment in which alarms function most effectively. It is our duty to achieve this and contribute to the prevention of gas-related accidents.

Since the first version of this installation manual was published in August 1981, it has been revised eight times, including this revision. Five years have passed since the last revision. In that time, the environment surrounding gas alarms has changed drastically on a daily basis, including standardization of provisions of LPG equipment performance, the full opening of the gas retail market by the revision of the Gas Business Act, and beginning the development of next-generation gas safety advancement plans and next-generation safety countermeasures policy (action plan) etc.

Based on these developments, the Gas Alarm Industries Association of Japan established the Gas Alarm Installation Manual Revision Working Group and began deliberations. In the future, we aim to add information about newest technology and law revisions to further enhance the content of this manual. Please give your frank opinions and requests regarding this installation manual.

Finally, we would like to express our deep appreciation for all the committee members who worked hard in deliberating the revision of this installation manual.

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[May 2020]

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The demand for preventative measures for fires and explosions caused by gas leaks has increased corresponding with the rising demand for liquified petroleum gas (LPG) and City Gas as household energy sources. As such, residents have been proposed to install gas alarms and voluntary certification/inspection systems have been introduced for LPG in 1975 and City Gas in 1980. The enhancement of these systems and development of quality management technology has led to increased rates of gas alarm installation. As a result, gas leak accidents are now in steady decline, showing that these alarms are fulfilling their role as gas safety devices. In terms of laws related to gas alarms, Japan has enacted the Act on the Securing of Safety and the Optimization of Transaction of Liquefied Petroleum Gas (hereinafter the “LPG Act”), the Gas Business Act, Fire Services Act, and Building Standards Act. The LPG Act was enacted in 1967 behind a backdrop of sudden popularization of LPG in households, an increase in LPG accidents due to this popularization, and rising clarification of LPG transaction conditions.

Gas alarms were considered highly effective safety products to prevent gas leak accidents. LPG alarms were designated as “No. 2 LPG devices, etc.” in March 1979. Gas alarm manufacturers and importers were required to submit notification upon starting business and had to manufacture, import, and sale products that complied with technological standards. Technological standards related to LPG alarms were established in the Ministerial Ordinance for LPG Device Technological Standards. In February, 1981 Article 44 of the Enforcement Regulations and Article 35-5 of the LPG Act required the installation of gas alarms in certain facilities and buildings, including designated underground shopping centers with combustors, designated basements, shared residences, schools, hospitals, and restaurants, etc. On the other hand, the Public Notice Establishing Details of Technological Standards, etc. Related to Gas Supply Equipment, Combustors, and Designated Supply Equipment established combustors that do not require alarms installed. Also, Article 5 of the Public Notice Establishing Details of Installation, etc. of Security Equipment Related to LPG Dealer Certification set the expiry of gas alarms as five years

from the manufacturing date.

For City Gas alarms, the installation of gas leak alarm equipment must comply with the standards established in Article 108, Paragraphs 8 and 10 of the Enforcement Regulations of the Gas Business Act of January 1981. Also, Article 21-2 of the Enforcement Order for the Fire Services Act established technological standards for the installation and maintenance of gas leak fire alarm equipment and required installation in designated underground shopping centers and designated basements, etc. The Fire Services Act requires installation of alarms in underground shopping centers and quasi-underground shopping centers that supply City Gas. Both underground shopping centers and quasi-underground shopping centers are required to install alarms based on both the Fire Services Act and the Gas Business Act. Also, Article 129-2-5, Paragraph 1, Item 8 of the Enforcement Order of the Building Standards Act stipulates that the Minister of the Ministry of Land, Infrastructure, Transport and Tourism will establish standards related to gas pipe equipment installed in buildings with shared residential units on the third or higher floor. Such buildings are not subject to these gas valve structure standards when a gas leak alarm is installed.

The Certified LPG Dealer system, based on the LPG Act, aims to be a legal mechanism to incentivize the installation of gas alarms. Dealers can enjoy loosened inspection frequency and emergency response based on the rate of installing concentrated monitoring systems. In particular, No. 1 Certified LPG Dealers are granted further benefits if they fulfill additional conditions (installation of CO alarms, CO alarm-linked shutdowns, etc.).

On the other hand, Article 86 of the Enforcement Regulations of the LPG Act also established the facilities, etc. that must install LPG alarms and sets punishment for those who violate this. Specifically, if a designated facility has not installed LPG alarms, the prefectural governor will issue an order to comply with Article 35-5 of the LPG Act. If the party does not comply, they will be fined a maximum of 300,000 yen for a violation to Article 100-2 of the same act. The punishment is applied to the occupant or owner of the gas-consuming equipment.

Chart 1. Standard names of gas alarms

Name	Past names (examples)	Functionality
Gas alarms	Gas leak alarm, gas leak sensor, etc.	Detect gas leaks and trigger alarm
CO alarms	Carbon monoxide alarm, incomplete combustion alarm, etc.	Detect incomplete combustion gas and trigger alarm
Gas/CO alarms	Gas/CO compound alarm, etc.	Detect gas leaks and incomplete combustion gas and trigger alarm
Commercial ventilation alarms	Commercial ventilation sensor, commercial CO alarm, etc.	Detect carbon monoxide from incomplete combustion gas and trigger alarm with COHb concentration
Residential fire/CO alarms		Detect fire and incomplete combustion gas, and trigger alarm
Residential fire/gas/CO alarms		Detect fire, gas leaks and incomplete combustion gas, and trigger alarm

The Certified LPG Dealer system, based on the LPG Act, aims to be a legal mechanism to incentivize the installation of gas alarms. Dealers can enjoy loosened inspection frequency and emergency response based on the rate of installing concentrated monitoring systems. In particular, No. 1 Certified LPG Dealers are granted further benefits if they fulfill additional conditions (installation of CO alarms, CO alarm-linked shutdowns, etc.).

On the other hand, Article 86 of the Enforcement Regulations of the LPG Act also established the facilities, etc. that must install LPG alarms and sets punishment for those who violate this. Specifically, if a designated facility has not installed LPG alarms, the prefectural governor will issue an order to comply with Article 35-5 of the LPG Act. If the party does not comply, they will be fined a maximum of 300,000 yen for a violation to Article 100-2 of the same act. The punishment is applied to the occupant or owner of the gas-consuming equipment.

Gas dealers have a duty to notify occupants or owners of the gas-consuming equipment about facilities that require gas alarms. If they fail to notify, they may be punished for violating this notification requirement.

In terms of security policies and fire services policies related to gas alarms, the Housing Quality Assurance Act, enacted in April 2000, established the Housing Performance Indication System. One performance indicator is “items related to security during fires” and grades were established based on detection alarm mechanism installation. This indicator evaluates the installation of mechanisms that can detect fires early on in residential buildings. After this, the installation of

residential fire alarms was made mandatory for all residential building as of the revision of the Fire Services Act in 2004.

The Fire and Disaster Management Agency recommends equipment with additional functionality for residential fire alarms (specifically, alarms for fire/gas/carbon monoxide) because approximately 40 percent of deaths in building fires are a result of carbon monoxide poisoning or asphyxiation.

In terms of gas, Japan started to open up retail gas markets from April 2017. According to the revision of the Gas Business Act, gas retailers are responsible for security operations related to spreading awareness of dangerous situations and gas equipment surveys while general gas pipeline service providers are responsible for security operations related to gas pipeline leak surveys and emergency response. It is necessary to heed the information from the service provider installing the gas alarms.

An overview chart summarizing all items required to install gas alarms and related equipment based on recent laws is display in Chat 2. Also, please refer to the specific gas alarm installation manual for the device you wish to install for signal line colors, meaning of terminal numbers, and specific techniques, such as connecting signal lines to the concentrated monitoring board.

Please refer to the attached documents after page 40 for a summary of the laws that are quoted in this manual. The names of gas alarms used in this manual use terminology established by laws and those in Chart 1, which are standardized by the Gas Alarm Industries Association of Japan and related organizations.



Chart 2. Overview of Gas Alarm-Related Laws

Gas type	Regulatory Law	Installation Target		Types of alarms	Alarm quality (alarm concentration)	Installation position of detection function ⁴
		Facilities required to have alarms installed ²	Facilities recommended to have alarms installed ³			
LPG	LPG Gas Act ¹	- Designated underground shopping centers, etc. - Designated basements, etc. - Other basements - Facilities/buildings in Article 86 of the Enforcement Regulations, such as shared residences, restaurants, schools, hospitals, etc. excluded in Public Notice ⁵	- Individual residences - Other facilities/buildings	Integrated unit alarms Segmented unit alarms Gas/CO alarms External alarms ○ Concentrated monitoring alarms CO alarms Bulk gas leak detectors	Designated by government ordinance as LPG equipment, etc. For LPG, triggers alarm when Lower Explosive Limit is 1/100 or more, but 1/4 or less; does not trigger at less than 1/100 Independently certified by the High Pressure Gas Safety Institute of Japan	Positioned within 4m horizontal distance from combustor and within 30cm from ground
		- Designated underground shopping centers, etc. - Designated basements, etc. - Super high-rise structures - Designated large-scale structures - Buildings with medium pressure combustors	- Facilities/buildings other than those required to install alarms, such as restaurants and other cooking facilities, etc.	Gas alarms Gas/CO alarms ○ Gas leak alarm equipment CO alarms (alarms that detect LP gas based on the LPG Act)	For City Gas, triggers alarm when Lower Explosive Limit is 1/4 or more; does not trigger at 1/200 or less. Alarms are voluntarily inspected by the Japan Gas Appliances Inspection Association (Public Interest) Relays and receivers are certified by the Japan Fire Equipment Inspection Institute	In case that gas is heavier than air Positioned within 4m horizontal distance from combustor and within 30cm from ground In case that gas is lighter than air Positioned within 8m horizontal distance from combustor and within 30cm from ceiling
City Gas	Gas Business Act	- Designated underground shopping centers, etc. - Designated basements, etc. - Super high-rise structures - Designated large-scale structures - Buildings with medium pressure combustors	- Facilities/buildings other than those required to install alarms, such as restaurants and other cooking facilities, etc.	Gas alarms Gas/CO alarms ○ Gas leak alarm equipment CO alarms (alarms that detect LP gas based on the LPG Act)	For City Gas, triggers alarm when Lower Explosive Limit is 1/4 or more; does not trigger at 1/200 or less. Alarms are voluntarily inspected by the Japan Gas Appliances Inspection Association (Public Interest) Relays and receivers are certified by the Japan Fire Equipment Inspection Institute	In case that gas is heavier than air Positioned within 4m horizontal distance from combustor and within 30cm from ground In case that gas is lighter than air Positioned within 8m horizontal distance from combustor and within 30cm from ceiling
	Fire Services Act	- Underground shopping centers - Quasi-underground shopping centers		○ Gas leak fire alarm equipment (alarms that detect LP gas based on the LPG Act)	Detectors ⁶ are voluntarily inspected by the Japan Gas Appliances Inspection Association (Public Interest) Relays and receivers are certified by the Japan Fire Equipment Inspection Institute	Same as Gas Business Act
LPG/City Gas	Building Standards Act	Share residences on third floor or higher (with conditions)		External alarm or concentrated monitoring device		Same as Gas Business Act However, horizontal distance is measured from gas valve
	Act on Promoting Quality Assurance in Public Works (grades 2, 3, 4)		Individual residences Shared residences	Residential fire/gas/CO alarms Residential fire alarms	The fire detection function of alarms is certified by the Japan Fire Equipment Inspection Institute The gas detection function is voluntarily inspected by the Japan Gas Appliances Inspection Association (Public Interest) and the High Pressure Gas Safety Institute of Japan	15-30 cm from ceiling (if wall-mounted) Within 8m horizontal distance from combustor (City Gas) Within 4m horizontal distance from combustor (LPG) Residential fire alarms are on ceiling or 15 cm or more, but within 50 cm of ceiling if on wall
	Fire Services Act ⁷	Individual residences Shared residences (May not be mandatory based on conditions)		Residential fire alarms Residential fire/CO alarms Residential fire/gas/CO alarms	The fire detection function of alarms is certified by the Japan Fire Equipment Inspection Institute The gas detection function is voluntarily inspected by the Japan Gas Appliances Inspection Association (Public Interest) and the High Pressure Gas Safety Institute of Japan	15-30 cm from ceiling (if wall-mounted) Within 8m horizontal distance from combustor (City Gas) Within 4m horizontal distance from combustor (LPG) Residential fire alarms are on ceiling or 15 cm or more, but within 50 cm of ceiling if on wall
Notes				Install types with ○ mark for designated underground shopping centers, etc. and designated basements.		

Notes. 1: LPG Act ... Abbreviation for Act on the Securing of Safety and the Optimization of Transaction of Liquefied Petroleum Gas

2: Facilities and buildings that require the installation of alarms by law

3: Facilities and buildings that are recommended to install to the extent possible in order to secure the safety of consumers

4: General name of detection function for integrated unit alarms and segmented unit alarms

5: Combustors that do not require alarms installed are designated in Article 12 of the LPG Act "Public Notice Establishing Details of Technological Standards related to Supply/Consumption and Special Residential Supply Equipment"

6: The Fire Services Act defines detectors as gas alarms

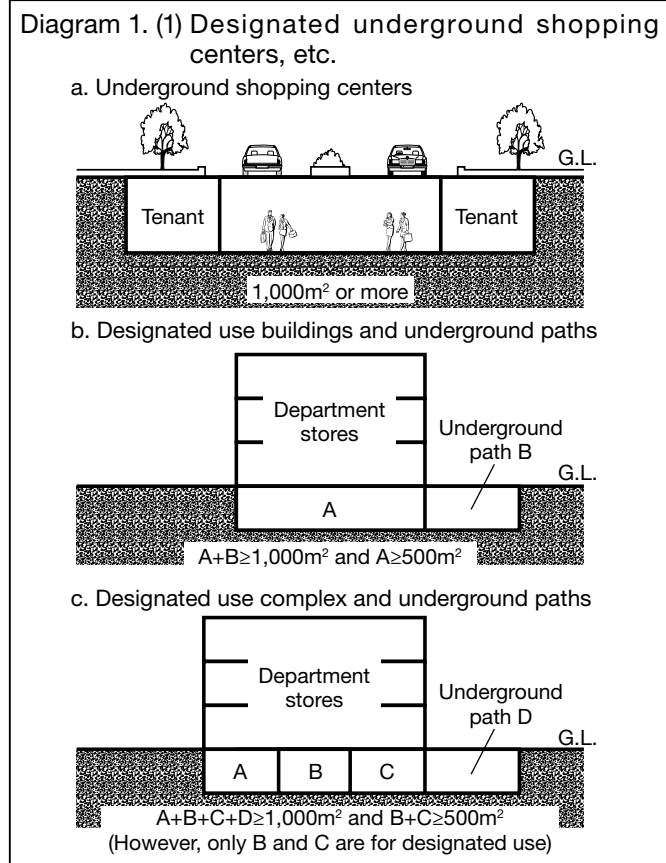
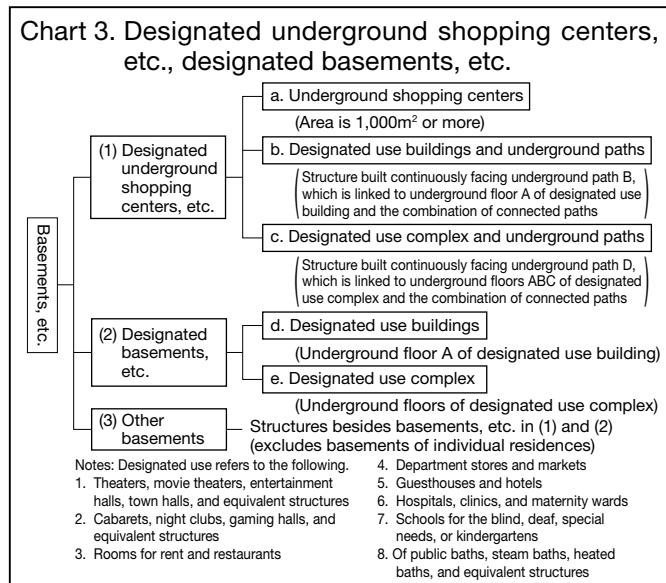
7: The Fire Services Act requires the installation of residential fire alarms

1. Facilities required to have alarms installed

Gas alarms are required to be installed in rooms with combustors in the following facilities and buildings according to gas types within the legal frameworks of the LPG Act, Gas Business Act, Fire Services Act, and Building Standards Act. These facilities/buildings that are subject to installation are referred to as “Mandatory Installation Facilities.”

(1) Designated underground shopping centers, etc. and designated basements, etc. (LPG, City Gas)

In the LPG Act, Article 3 of the “Public Notice Establishing Details of Technological Standards related to Supply/



Consumption and Special Residential Supply Equipment” establishes provisions as displayed in the following Chart 3, Diagram 1, and Diagram 2.

In laws besides the LPG Act, the following provisions are also enacted, but are roughly equivalent with the LPG Act.

(1) Designated underground shopping center, etc. and designated basement, etc. established in Article 1 of the Public Notice for building categories* of Gas Business Act

(2) Fire Services Act Enforcement Order Article 6 Attached table 1, 16-2 Underground shopping center, 16-3 Quasi-underground shopping center
Further, installed alarms must be concentrated monitoring types (reference on page 9).

* Public Notice Establishing Building Categories that Use Gas in the Gas Business Act (November 1985 Ministry of Economy, Trade and Industry Public Notice No. 461)

(2) Other basements (LPG)

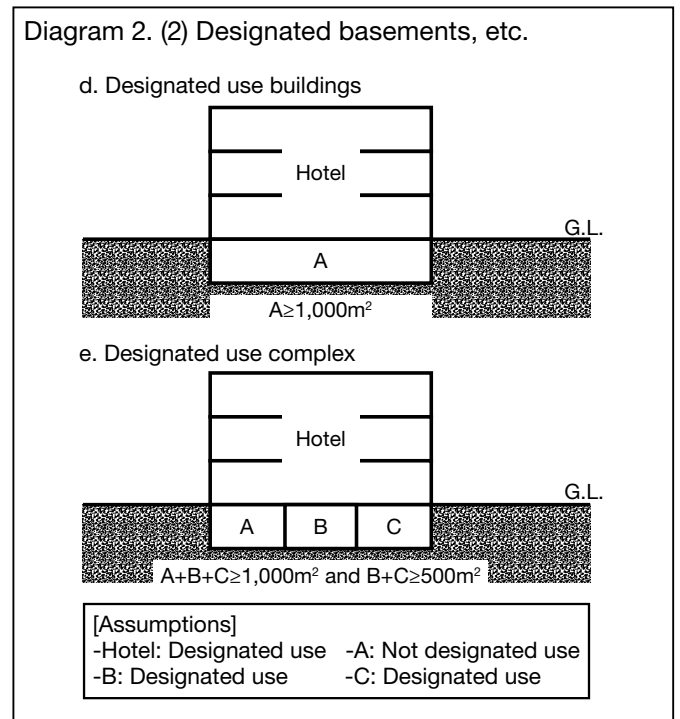
Small basements and underground facilities, etc. that do not reach the scale of designated underground shopping centers and designated basements from the previous paragraph.

The types of installed alarms are not determined by law. However, concentrated monitoring alarms connected to Class 2 receiver are often installed.

In the case of City Gas, installation of alarms is not mandated by laws and regulations. However, it is recommended that alarms be installed in basements where it is difficult for gas to disperse.

(3) Shared residences (LPG)

According to the operating interpretation guide for the Enforcement Regulations of the LPG Act, “shared residences are housing complexes such as apartments or condominiums where at least three households reside in the same structure. Floor space area, materials (wood,



etc.), and frame (steel frame, etc.) do not impact this definition.”

In general, concentrated monitoring systems are installed in large-scale shared residences while external alarms (linked to outside buzzer)

are installed in small-scale shared residences.

Shared residences provided LPG by a gas retailer (community gas business*) based on the Gas Business Act are not Mandatory Installation Facilities. However, the government will provide guidance to install LPG alarms.

*Business that provides gas (mainly LPG) to at least 70 units in a housing complex through gas lines

(4) Commercial buildings such as restaurants, etc. (LPG)

Defined as the following buildings in Article 86 of the Enforcement Regulations of the LPG Act:

1. Theaters, movie theaters, entertainment halls, town halls, and equivalent facilities
2. Cabarets, night clubs, gaming halls, and equivalent facilities
3. Rooms for rent and restaurants
4. Department stores and markets
5. Guesthouses, hotels, accommodations, and shared residences (see (3))
6. Hospitals, clinics, and maternity wards
7. Elementary schools, junior high schools, high schools, vocational schools, universities, schools for the deaf and blind, special needs schools, kindergartens, schools
8. Libraries, museums, and art galleries
9. Public baths
10. Train stations, ship ports, and airports (limited to buildings where passengers depart/arrive and corresponding waiting spaces)
11. Shrine, temple, church, and equivalent facilities
12. Offices with total floor area of 1,000m² or more

(5) Designated buildings based on building category (City Gas)

Defined as the following buildings in Article 108 of the Enforcement Regulations of the Gas Business Act:

1. High-rise buildings established in building categories (buildings exceeding 60m in height) (portion used for residences limited to cooking spaces)

Also, if air ventilation is not possible in high-rise buildings, there may be guidance to install gas alarms in gas shutdown valve rooms, gas meter rooms, vertical pipeline shafts, etc. based on fire services guidance standards in particular regions.

((e.g.) Tokyo Fire Department established and went into effect the “Operating Standards to Prevent Fires in High-rise Buildings” in October 1, 2015)

Please check the fire department in your area for details.

Also, when installing gas alarms in closed-off vertical pipeline shafts, etc., one must be cautious of the deterioration of gas sensors due to silicon, etc. used in caulking.

2. Designated large buildings established in building categories (facilities where a large number of unspecified persons enter and exit, such as theaters)

(6) Gas pipeline led through exterior wall (City Gas)

(Refer to Diagram 3.)

Article 74 of the Ministerial Order Established Technological Standards for Gas Facilities

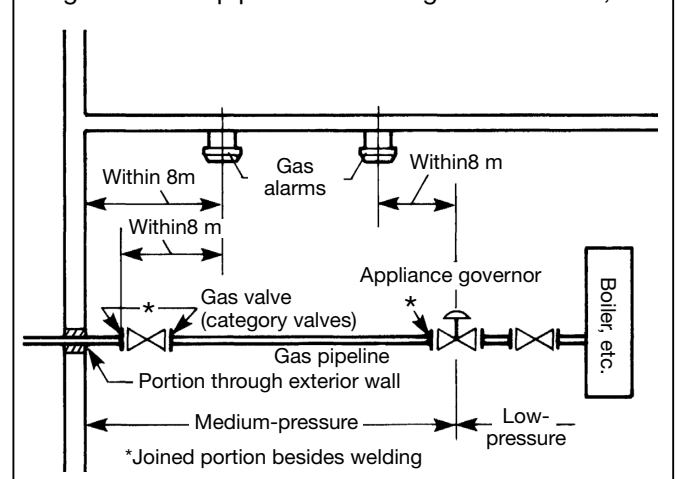
provides provisions on City Gas pipelines while Article 108 of the Enforcement Regulations for the Gas Business Act provides provisions on medium-pressure combustors. Such provisions are as follows:

1. Gas pipelines into designated underground shopping centers, etc. and designated basements, etc. must be installed to go through exterior walls within the detection zone of the gas leak alarm equipment.
2. Gas pipelines (excluding pipelines into factories, etc.) with a maximum usable pressure of medium-pressure (0.1MPa or more, but less than 1.0MPa) must be installed to go through exterior walls of the building within the detection zone of the gas alarm or automatic gas shutdown device.

Also, any joining besides welding inside these buildings must be done within the detection zone.

3. Combustors that provide gas of medium-pressure or more must be installed in detection zones for gas alarms or automatic shutdown devices.

Diagram 3. Gas pipeline led through exterior wall, etc.



(7) Buildings that have shared residences on the 3rd or higher floor (LPG, City Gas)

Gas pipelines are defined as any of the following based on the standards for gas pipeline equipment (No. 1925 Public Notice of Ministry of Construction on November 14, 1987) corresponding with Article 129-2-5 of the Enforcement Order of the Building Standards Act: *Depends on 1. or 2.

1. Equipment that uses gas, or metal pipe, metal flexible tube connected to equipment, or powerful gas hoses, and items connected by screws.
2. Equipment that is designed to automatically stop gas outflow when gas flows excessively, such as an excessive flow safety valve.
3. 1. and 2. do not apply when equipment that detects gas leaks and triggers an alarm is installed to meet certain installation standards based on the gas type.

*1. and 2. do not apply when conducting 3

2. Facilities recommended to have alarms installed

Facilities or buildings that are not mandated to install alarms according to the LPG Act, but are recommended to install in rooms with combustors to the extent possible in order to secure the safety of consumers are called “Installation Recommended Facilities.”

(1) Individual residences

General residences besides shared residences, regardless of floor area, materials (wood, etc.) or steel concrete framework.

(2) Commercial facilities besides mandatory facilities

Facilities and buildings that use combustors in stores besides Mandatory Installation Facilities. For example, hair salons, laundry centers, and other offices with floor area less than 1,000m².

3. Combustors that do not require alarms installed

Even in facilities required to have alarms installed that use LPG, the following combustors do not require installation of alarms. (Article 12 of the “Public Notice Establishing Details of Technological Standards related to Supply/Consumption and Special Residential Supply Equipment”)

- (1) Bath tubs, water supply installed outdoors, etc.
- (2) Facilities connected to terminal gas valves by methods determined in Article 10 and combustors with extinguishing safety devices
- (3) Non-permanent facilities However, alarms are mandatory for combustors used in designated use commercial facilities, such as basements, etc. included in Article 3.
- (4) Bath tub, water heater, etc. in bathroom

4. Facilities required to have residential fire/gas/CO alarms installed

With the revision of the Fire Services Act, installation of residential fire alarms is mandatory across Japan in order to reduce the victims of house fires.

(Enforced June 1, 2006)

If the installation of residential fire alarms is mandated for kitchens based on municipality ordinance, residential fire/gas/CO alarms or residential fire alarms must be installed.

Reference (from Fire and Disaster Management Agency of the Ministry of Internal Affairs and Communications Notice on December 15, 2004/Fire Safety No.227):

Take efforts to install residential fire alarms, etc. in parts of residences considered at significant risk of fire, including bedrooms and kitchens, in order to promote prevention of fires in residences.

Places required to install residential fire alarms by the government standards aim to prevent fatalities. Therefore, alarms are installed in bedrooms to detect the occurrence of fires while residents are sleeping. In addition, they must be installed in stairways and halls based on conditions.

Further, the government has only strongly encouraged installing residential fire alarms in kitchens.

However, looking at cases of fires, many causes of residential fires are from stove fires, including tempura oil fires. Therefore, like the living room, the kitchen is a place with a high risk of fire in the residence. Also, the number of injured is significantly higher when fires occur in the kitchen. Therefore, it is possible to reduce the number of fires and minimize the damage in the even of a fire by early detection of fires by mandating installation of alarms in kitchens. During fires, evacuation must begin as quickly as possible.

Therefore, the three major cities of Tokyo, Osaka, and Nagoya have mandated the installation of residential fire alarms in kitchens, which is expected to significantly contribute to the safe living of all citizens in the future.

In order to acquire grade 2 or 3 in “Items Related to Safety During Fires” in the Housing Quality Assurance Act, installation of residential fire/gas/CO alarms or residential fire alarms in kitchens and installation of residential fire alarms in stairways and living rooms are required.

According to the Fire Services Act (Enforced June 1, 2006), the following places are required to install residential fire/gas/CO alarms or residential fire alarms.

(1) Bedroom

Install in room usually used for sleep.

Children’s rooms and elderly persons’ rooms are also subject if used for sleeping.

(2) Stairway

Install at the highest point of the stairway on the floor where the bedroom is (excluding floors where there is an exit to evacuate outside).

(3) Kitchen

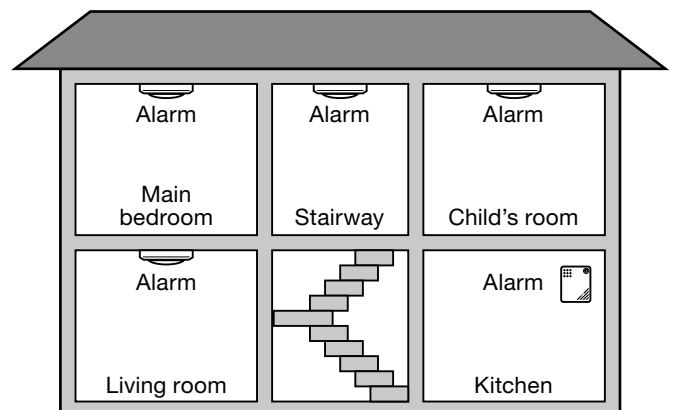
Install in cases when installation in kitchens is mandated by municipal ordinance. (Refer to P44)

Even if not mandated, installation is highly recommended because alarms are very effective at early detection of tempura fires, etc.

(4) Living room (living space)

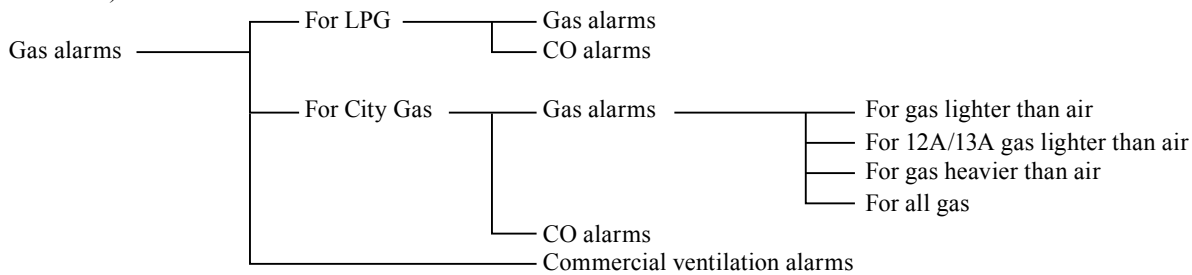
Install in cases when installation in living room (living space) is mandated by municipal ordinance. ←23 wards of Tokyo, etc.

There are also municipalities where installation is not mandatory, but is recommended. ←Kyoto city, Kobe city, etc.



1. Types based on detectable gas

Most City Gas is converted to natural gas. Gas alarms that are for “12A/13A lighter than air” are installed. Other types include for “gas lighter than air,” “gas heavier than air,” and “all gas” that can support all types of gas. Also, LPG alarms are installed for LPG (including simple gas, same hereinafter).



2. Gas sensor types

Use physical and chemical mechanisms for the presence of gas to be detected by sensor. The following are some representative sensors used in gas alarms.

(1) Semiconductor-based sensor

Semiconductor-based sensors function as the resistance value of sensors declines in the presence of combustible gas. That change responds to gas concentration. As a feature, these sensors have a durable structure and operate stably for long periods.

(2) Hot-wire semiconductor-based sensor

Hot-wire semiconductor-based sensors function by the same principles as semiconductor-based sensors: the relationship between changes in resistance value and gas concentration. As a feature, they consume a small amount of electricity and can be customized for specific gases.

(3) Catalytic combustor sensor

Catalytic combustor sensors contain combustible gas on

the surface of the sensor that will combust by catalytic reaction, raising the temperature of the sensor. The temperature change corresponds with gas concentration. As a feature, these sensors are hardly impacted by surrounding heat and humidity and are highly accurate alarms.

(4) Electrochemical sensors

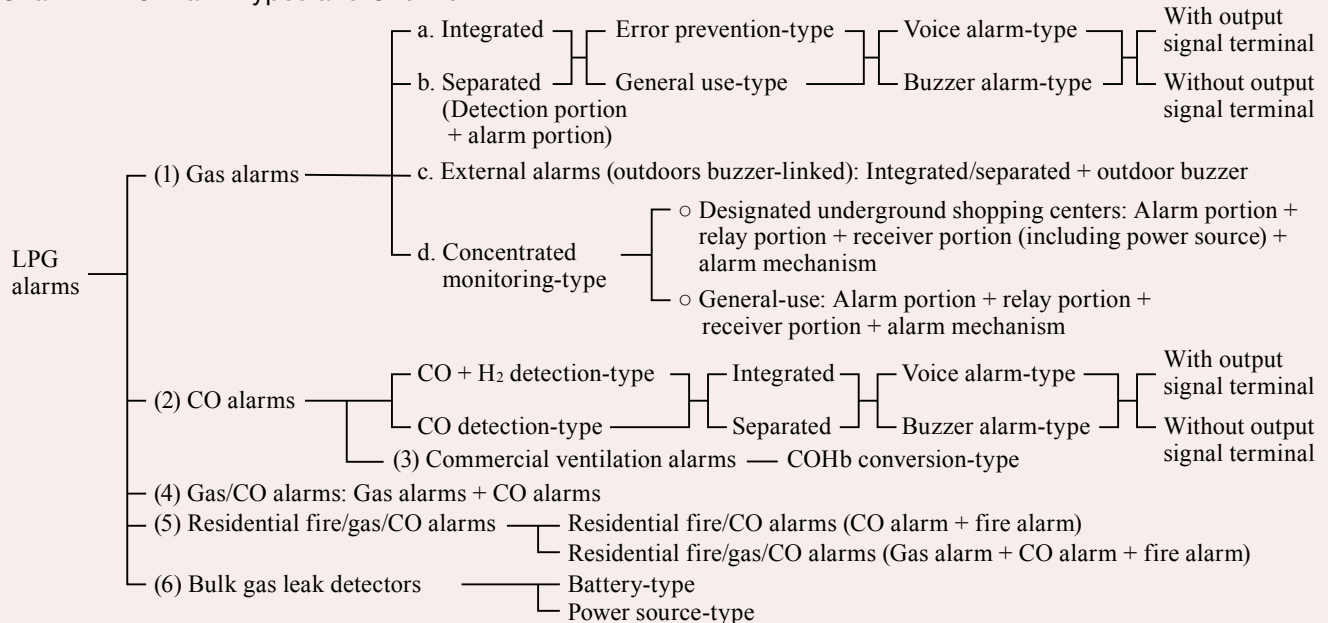
Electrochemical sensors detect the electric current generated by the chemical reaction of gas on designated electrodes. As a feature, these sensors can detect gas selectively by extremely low energy consumption and extract currents that change linearly according to gas concentration.

3. LPG alarms

(1) Overview of types (Refer to Chart 4.)

For LPG alarms, there are types for each use, including gas alarms, CO alarms, and gas/CO alarms.

Chart 4. LPG Alarm Types and Overview



(2) Types of LPG Alarms

1. Gas alarms

a. Integrated unit alarms (Refer to Diagram 4.)

Integrated unit alarms have both the gas sensor portion and alarm portion incorporated in the same case. These alarms are easy to attach and are recommended for individual residences and small commercial facilities, etc.

Error prevention-type alarms have also been developed and are used to avoid false alarms due to sprays, etc.

Units with output signal terminals can be linked to shutdown valves, outdoor buzzers, and microcomputer gas meters, etc.

When installing microcomputer gas meters, the government recommends to link or install along with integrated alarm units in the room with a combustor in order to further enhance safety.

In terms of alarm types, in addition to normal buzzer types, there are voice types that state “Is gas leaking?” and alarms with flashing lights. In addition to gas leak alarms, some alarms have functions that notify performance anomalies and exchange dates by sound or light.

Additional functions of newest alarms include functions to notify about heat stroke and dryness, or night light functions where brightness can be adjusted.

b. Segmented unit alarms (Refer to Diagram 5.)

Gas sensor and alarm buzzer are in separate cases. Gas sensor portion is called the detector and alarm buzzer portion is the alarm portion. They are used by a detector wire connecting them.

The detector is constructed to withstand moisture and water, so it can be installed in commercial kitchens where water may splash, bathrooms, or floor pits.

Units with output signal terminals may be linked with shutdown valves, etc.

c. External alarms (linked to outdoor buzzers)

(Refer to Diagram 6)

By linking an outdoor buzzer (external alarm portion) to an integrated unit alarm (with external output), the outdoor buzzer can be used with intercom systems. If the indoor alarm rings for a set period of time (about 20-60 seconds), the outdoor buzzer will ring to let others know about the gas leak.

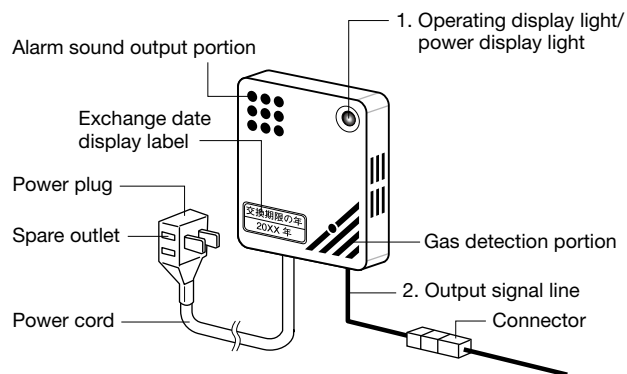
There is also an electric signal light on the outdoor buzzer. If the alarm becomes unplugged inside, this light will flash to let others know the alarm was unplugged. This is installed in individual residences and small apartments, etc.

d. Concentrated monitoring system (Refer to Diagram 7.)

Concentrated monitoring board (called "Receiver portion" in LPG Act, "Receiver" in Gas Business Act, and Fire Services Act) installed in manager's office is linked by output signal lines to multiple integrated unit alarms and segmented unit alarms. The installation of this type of alarm is mandatory for designated underground shopping centers, etc. and designated basements, etc.

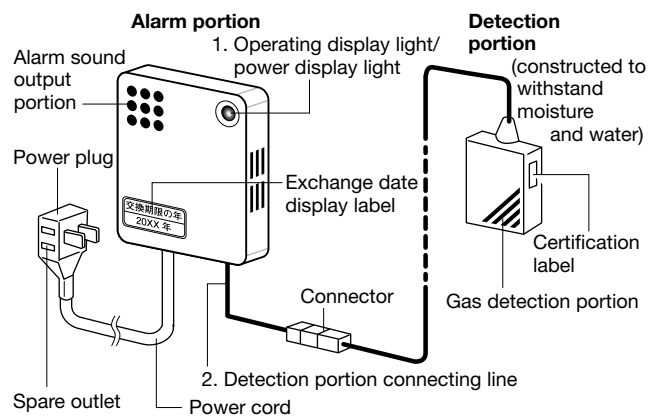
The concentrated monitoring board may be connected

Diagram 4. Integrated unit alarms examples



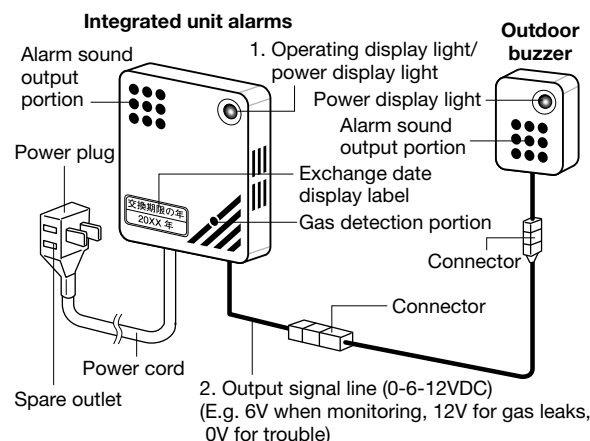
Notes: 1. Some units split up the operating display light and power display light.
2. Some output signal lines are connected to terminal blocks.

Diagram 5. Segmented unit alarms examples



Notes: 1. Some units split up the operating display light and power display light.
2. Some detection portion connection lines are connected to terminal blocks.

Diagram 6. External alarms (linked to outdoor buzzer) examples



Notes: 1. Some units split up the operating display light and power display light.
2. Some output signal lines are connected to terminal blocks.

directly to the terminal alarm or by a relay.

If the alarm detects gas and rings for a set amount of time (about 20-60 seconds), the gas leak alarm will ring at the concentrated monitoring board and display the location of the gas leak. Also, a warning alarm will ring if the alarm is unplugged and display the location of the unplugged alarm.

Concentrated monitoring boards installed in designated underground shopping centers, etc. and designated basements, etc. are grade 1 receiver portions with spare energy sources.

Also, emergency power sources, detection zone alarm devices and gas leak display lights must be installed.

2. CO alarms

Alarms that detect carbon monoxide (CO) in exhaust gas emitted by incomplete combustion and trigger an alarm. There are integrated units, where the gas sensor and alarm portion are incorporated in the same case, and separated units, where each component is incorporated in separate cases. There are two types of gas sensors, those CO high selection devices that selectively detect carbon monoxide (CO) from incomplete combustion, and general detection devices that detect carbon monoxide (CO) and hydrogen (H₂). There are also those with output signal terminals for security systems and microcomputer-linked systems.

3. Commercial ventilation alarms

Alarms developed to prevent CO poisoning in commercial kitchens. Converts CO concentration and time elapsed into COHb (CO hemoglobin in the blood) value when CO is generated. Alarm is triggered if the COHb value goes above a set value. See details on page 12.

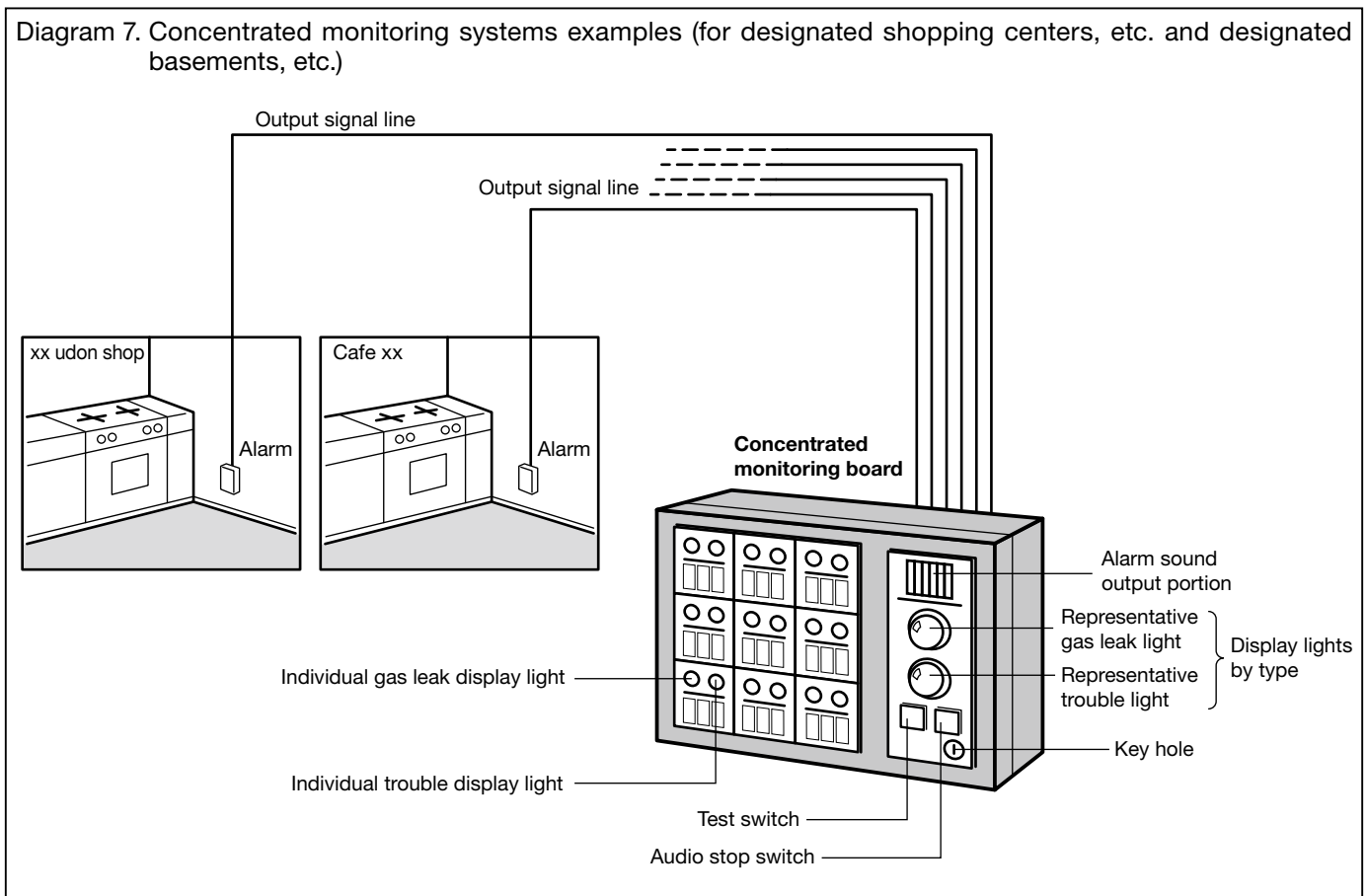
4. Gas/CO alarms

A combination of gas and CO alarms. Because LPG is heavier than air, the sensor to detect LPG is installed close to the floor. However, the CO detection sensor is installed near the ceiling. Therefore, all alarms of this type are separated types.

5. Residential fire/gas/CO alarms

Residential fire/CO alarms are CO alarms with fire detection functionality that can trigger an alarm after detecting a fire. Integrated units are installed near the ceiling and have output signal terminals for CO alarms and fire alarms.

Residential fire/gas/CO alarms are Gas/CO alarms (as in 4) with added fire detection functionality. Therefore, they trigger alarms for gas leaks, CO, and fires. They are separated units, like Gas/CO alarms (as in 4).

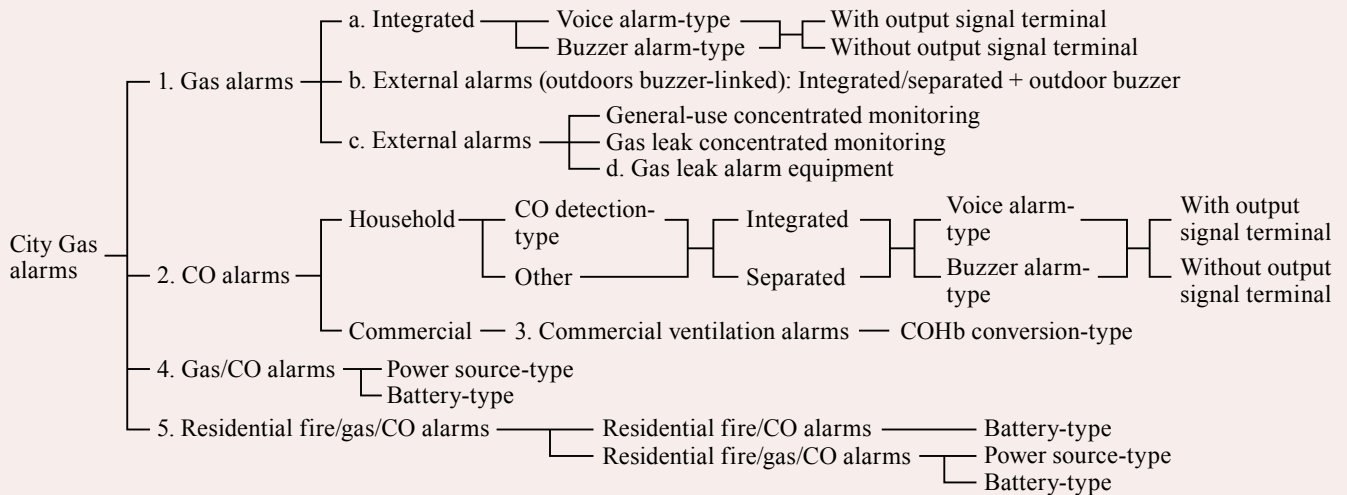


4. City Gas alarms

(1) Overview of types (Refer to Chart 5.)

Different types of City Gas alarms are sold according to purpose, including gas alarms and gas leak alarms.

Chart 5. City Gas Alarm Types and Overview



1. There are general household and commercial gas alarms.
2. There are CO alarms for the bathroom and non-bathroom (kitchen, etc.).

(2) Types of City Gas Alarms

1. Gas alarms

a. Integrated unit alarms (Refer to Diagram 8.)

Both the gas sensor portion and alarm portion incorporated in the same case.

According to the Gas Business Act, gas alarms are integrated units and used as detectors for gas leak alarm equipment.

Some alarms have hidden wires to attach directly to the ceiling.

The most common alarm type currently emits a voice asking “Is gas leaking?” In addition to gas leak alarms, some alarms have functions that notify performance anomalies and exchange dates by sound or light.

Newest alarms include battery-operated alarms, those with functions to notify about heat stroke and dryness, night light functions where brightness can be adjusted, and those with additional functions such as emergency lights that can be used during power outages.

b. External alarms (linked to outdoor buzzers)

Gas alarms (integrated unit alarms) linked to outdoor buzzers with the same function, characteristics, and purpose as LPG external alarms.

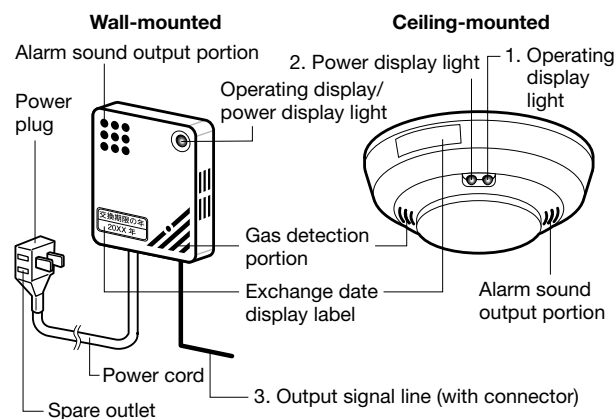
c. External alarms

Largely divided into concentrated monitoring and gas leak alarms, concentrated monitoring alarms have the same structure as concentrated monitoring systems for designated underground shopping centers, etc. in the LPG Act framework. Technological standards and standards for installation and maintenance of gas leak alarms are established in the Gas Business Act.

d. Gas leak alarm equipment

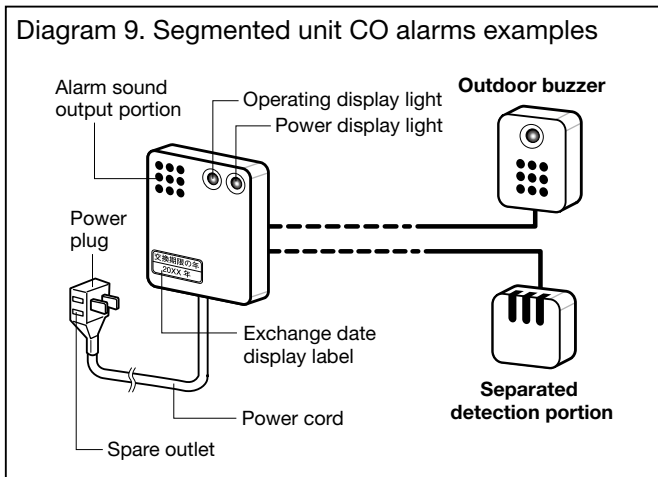
Technological standards and standards for installation and maintenance of gas leak alarm equipment within the Gas Business Act framework are established in the Fire Services Act framework.

Diagram 8. City Gas alarms (integrated unit alarms) examples



- Note:
1. Some do not have this.
 2. Some also have a operating display light that flashes and changes color.
 3. Some output signal lines are connected to terminal blocks.

2. CO alarms (CO detection-types) (Refer to Diagram 9)
Alarms that selectively detect carbon monoxide (CO) in exhaust gas emitted by incomplete combustion and trigger an alarm. There are integrated units, where the gas sensor and alarm portion are incorporated in the same case, and separated units, where each component is incorporated in separate cases.



3. Gas/CO alarms
A combination of gas and CO alarms. Integrated unit alarms have both the gas leak and incomplete combustion gas sensor and alarm portion incorporated in the same case.
4. Residential fire/gas/CO alarms
Residential fire/gas/CO alarms are gas/CO alarms with fire detection functionality that can trigger an alarm for not only gas leaks and CO, but also after detecting heat or smoke from a fire.
They are mainly installed in kitchen areas in the residence. They may be mandatory to install depending on municipality ordinance. In order to acquire grade 2 or higher for detection alarm devices (for fires in one's residence) in "Items Related to Safety During Fires" in the Housing Quality Assurance Act, installation of residential fire alarms (including fire/gas/CO alarms) in kitchens is required.

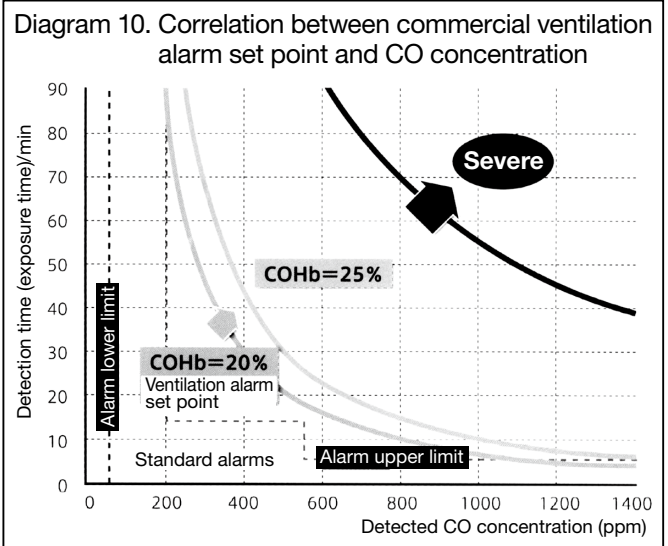
5. Commercial ventilation alarms

(Refer to Diagram 10.)

Commercial ventilation alarms selectively detect CO that occurs due to incomplete combustion in commercial kitchen equipment and triggers an alarm.

Carbon monoxide (CO) is easily and firmly linked to hemoglobin (Hb) in the blood as COHb. If the COHb concentration in the blood rises, the body may struggle to deliver oxygen to vital organs, harming the body.

Commercial ventilation alarms convert CO concentration and time elapsed into COHb value. Alarm is triggered if the COHb value goes above a set value.



What are "commercial kitchens"?

Commercial kitchens are kitchens at restaurants or cafeterias, or kitchens that prepare boxed lunches and side dishes for super markets and boxed lunch shops. Because they are included as "restaurants" by law, alarm installation is mandatory for LPG (LPG Act) and recommended for City Gas. (Refer to P4 Chart 2 Overview of Gas Alarms)

Also, installation of commercial gas alarms that are resistant to high heat, humidity, and alcohol-based steam are recommended for commercial kitchens etc.

6. Bulk gas leak detectors

Based on Article 19-5 of the Enforcement Regulations of the LPG Act, gas leak detectors must be installed inside bulk containers and bulk tank protectors in the location established by Public Notice and linked to a system that continuously monitors LPG leak information, etc. Technological standards are established by Article 15 of the Public Notice Establishing Details of Technological Standards related to Bulk Supply and Replenishment Equipment (Ministerial Ordinance No. 127 of the Ministry of International Trade and Industry on March 17, 1997).

Bulk gas leak detectors are detectors used specifically in LPG bulk supply tanks. Bulk supply tanks are large containers with more storage capacity than standard containers (gas cylinders) that can replenish LPG on site with a bulk tank truck.

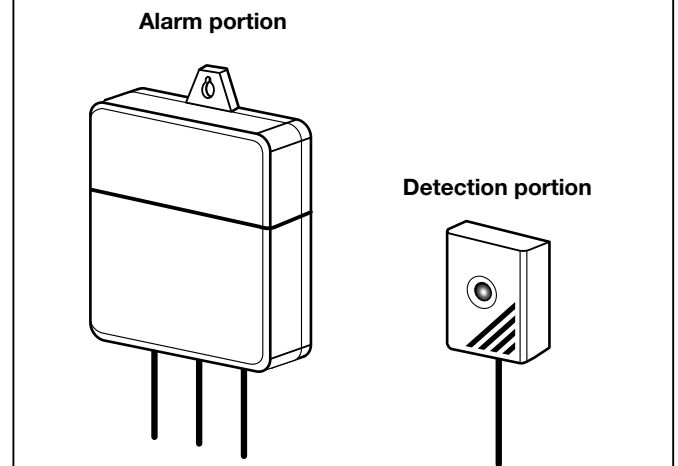
Tanks with less than 1,000kg of gas are common.

Bulk containers are transportable while bulk tanks are fixed. This regulation does not apply to detectors if there is a safety mechanism to block flames within 2m of the exterior of the bulk container and it is placed outdoors.

Most detectors are separated units comprised of the detection portion and alarm portion (Refer to Diagram 11.). The detection portion is installed inside the protector, where gas is drawn from the bulk container. They are water resistant as they are installed outdoors.

The alarm portion is installed away from the bulk container and linked to a concentrated monitoring system. It should be installed near the transmission device (NCU). (Refer to Diagram 12.)

Diagram 11. Bulk gas leak detectors

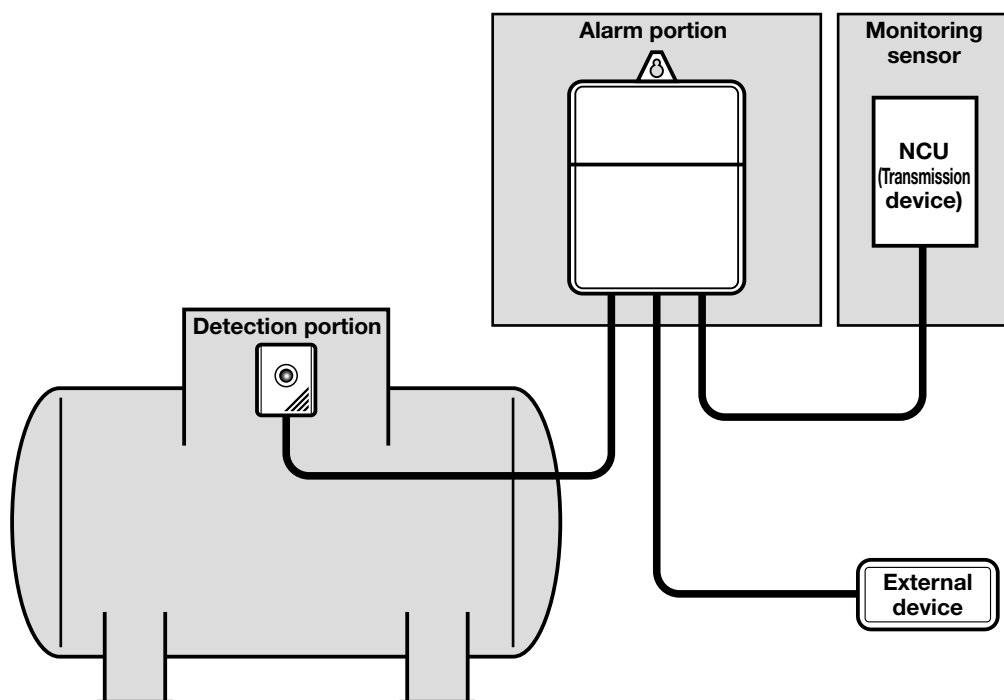


There are both power source-type and battery-type bulk gas leak detectors because they are installed outdoors.

The alarm portion must be connected to a concentrated monitoring system because there is no alarm sound with just the external signal.

It is also possible to link an external device, such as a buzzer or light, to the manager's office to notify about accidents or malfunctions.

Diagram 12. Bulk gas leak detector installation



7. Alarm-linked security systems

(1) Types of alarm output signals

The following output signals are in alarms used in alarm-

linked security systems. When selecting an alarm, one must select it based on the linked security system after inquiring with the systems manufacturer.

	Types of output signals (examples)	Signal format	Use/linkage example
1	Voltage DC 0-6-12V	12V for gas leak alarm, 6V for monitoring, 0V for power shutdown	Concentrated monitoring board, relay portion, control portion, outdoor buzzer, residential information board, automatic reporting device
2	Voltage DC 0-6-12-18V	18V for CO alarm, 12V for gas leak alarm, 6V for monitoring, 0V for power shutdown	Residential information board, relay portion
3	Voltage shutdown pulse	Voltage pulse	Shutdown valve
4	Non-voltage contact (photocoupler relay)	ON when gas leak type, ON-OFF type or OFF type	Microcomputer gas meter (excluding S-type, E-type), contact input equipment
5	S-type/E-type safety gas meter response non-voltage contact (photocoupler relay)	S-type/E-type safety gas meter interface* Output each signal of gas leak, power supply answer signal and power supply unplugging with different ON-OFF time length and cycles.	S-type/E-type safety gas meters
6	Combination of above	-	-

* When connecting with S-type/E-type safety gas meters, the below signal is transmitted between the alarm and meter and operates based on each status.

	Signal types	Details
Alarm output	Gas leak alarm signal	Alarm detects gas leaks, and outputs the ON/OFF gas leak alarm signal to the meter.
	Power source answer signal	Responds to the power source answer request signal from the meter and outputs the monitored signal to the meter.
	Power source unplugged signal*	Alarm detects that power source is unplugged (severed) and outputs the unplugged signal to the meter.
Meter output	Power source answer request signal	Outputs signal to alarm that checks if the alarm is monitoring power status.
	Alarm unconnected detection signal	Meter outputs signal that disconnection is detected and determines the connection of the alarm.
	Meter status signal (answer signal)	Emits voice or buzzer in alarm portion after meter transmits shutdown signal etc. to alarm.

* This function is only for "S-type/E-type alarms with unplug detection functionality."

(2) Voice-style gas alarm integrated message

1. The alarm message of LPG voice-style gas alarms connected to S-type and E-type microcomputer gas meters is standardized as follows by the Gas Alarm Industries Association of Japan.

	Status	Message:
1	During gas leak	"Is gas leaking?"
2	During meter shutdown	"Gas (meter) has stopped"
3	Shutdown warning	"Are you using gas too long? (please stop)"
4	During confirmation of safety recovery	"(Confirming safety) Please wait a moment"
5	Confirmation of safety recovery completed	"Gas can be used"

Optional message in ().

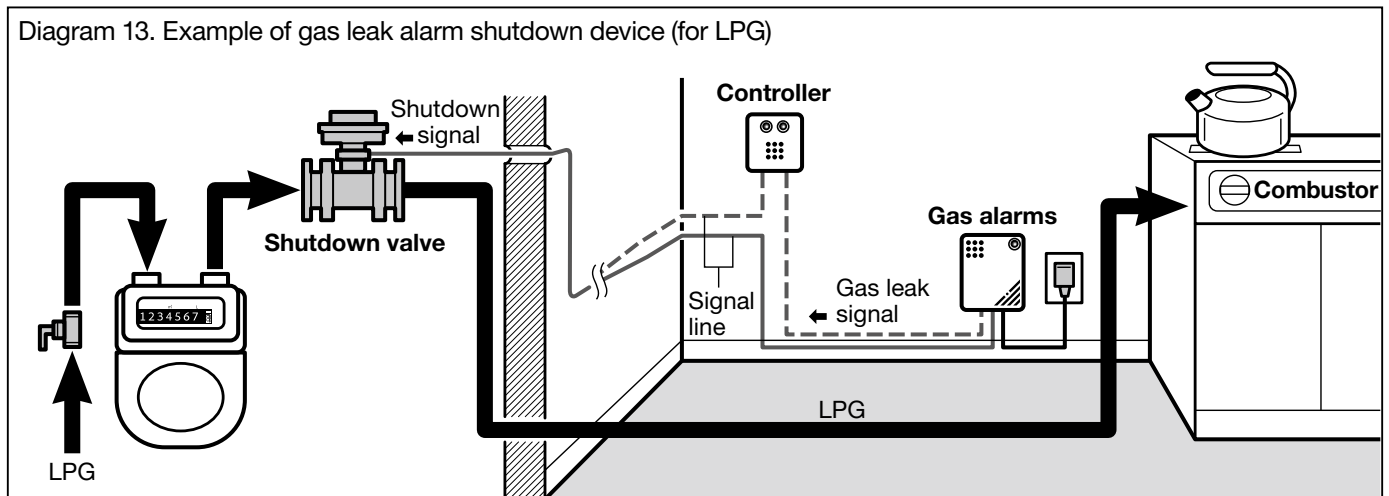
2. Incomplete combustion warning: "Air is contaminated and dangerous. Please open a window and ventilate the space."

(3) Gas leak alarm shutdown device (automatic gas shutdown device)* (Refer to Diagram 13.)

Device that is comprised of the alarm, controller, and shutdown valve. If the alarm rings for 25 to 60 seconds, the controller will determine there is a gas leak and send a signal to the shutdown valve to stop the flow of gas. Some controllers are included inside the alarm case.

Some shutdown valves are incorporated inside the gas meter while others are connected outside the meter.

* An automatic gas shutdown device includes a device to detect abnormalities in gas flow and pressure and automatically shuts down the gas, in addition to gas leak alarm shutdown device.



(4) Residential information board (Refer to Diagram 14.)

Device that adds lifestyle information reporting functions, such as bathroom sensors, and security functions, such as emergencies alarms, crime alarms, fire notification, and gas leak alarms to an interphone that is often used to communicate to visitors or with other rooms. This board displays all of these alarms and information by sound and lights.

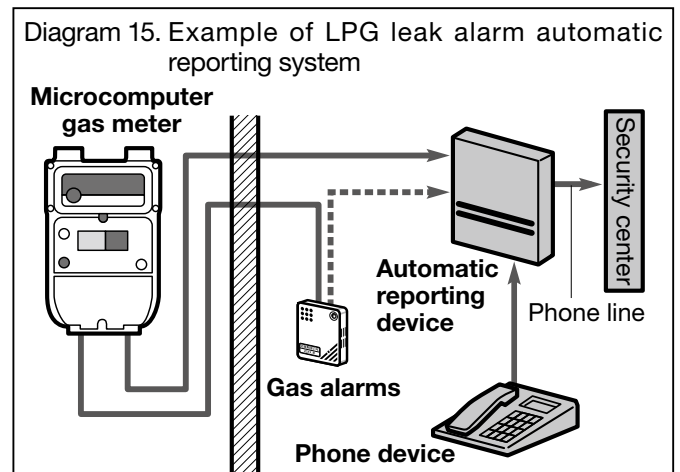
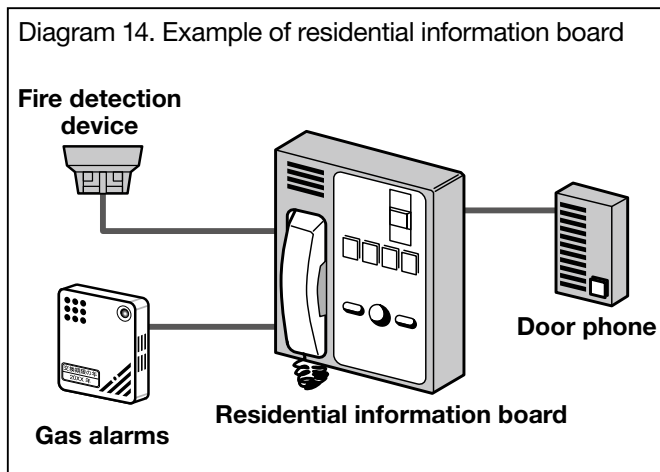
Boards with fire alarms are classified as shared residence automatic fire notification equipment (for residential use) or GP-type grade 3 receivers in the Enforcement Regulations of the Fire Services Act. Their quality and installation are established by law and regulation.

(5) Gas leak alarm automatic reporting system (Telemeter system) (Refer to Diagram 15.)

System that reports gas leaks by an automatic reporting device using a subscribed phone line to the security center or concentrated monitoring center. Emergency response is possible by the security center when contacted by the security system, even if the resident is not home. These systems are also commonly combined with automatic meter reading and container supply management, etc.

There are two types of systems: device transmission types and dual direction transmission types.

Some systems also communicate with the security center by wireless lines, such as LTE lines, without relying on wired communication networks for phone lines etc.



The inspection and certification systems of gas alarms were introduced for the purpose of securing the safety of consumers by providing gas alarms that a third party had checked that the manufacturer of the gas alarm produced it in a factory within a certain level of quality management structure and that the alarm meets certain technological standards.

1. Inspection/certification

LPG alarms are sold as products that meet the certification provisions set by the High Pressure Gas Safety Institute of Japan. For LPG alarms, the “LPG alarm certification provisions/bulk gas leak detection device certification standards (basic standards)” and for CO alarms, the “LPG incomplete combustion alarm certification standards” were enacted and partially revised in June 2015. Also, in terms of technological standards of alarms, the “KHKS0747 LPG leak alarm standards” and “KHKS0748 LPG incomplete combustion alarm standards” were newly developed in June 2016.

For the fire detection function in residential fire/gas/CO alarms, there are products sold that meet the model testing and model fitness certification conducted by the Fire Equipment Inspection Institute. After the revision to the Fire Services Act, from April 2014 residential fire alarms became the subject of national certification. The previous certification system was terminated and now certification labels are attached. There are two fire detection methods: photoelectric method that detects smoke during fires and fixed temperature method that detects the heat during fires.

On the other hand, for City Gas alarms, there are products sold that meet the inspection standards of the Japan Gas Appliances Inspection Association. A revision of inspection standards was conducted in July 1999 that combined gas alarms and CO alarms. In February 2015, the “City Gas battery gas alarm inspection standards JIA F 047-15” were newly enacted for battery gas alarms and the “City Gas alarm inspection standards JIA E 001-15” were revised.

Also, apart from CO alarm standards that envision installation in general household environments, the “Commercial kitchen incomplete combustion alarm sensor inspection standards [Tentative] JIA F 038-06” were newly enacted for the purpose of notifying if the environment has worsened significantly in a commercial kitchen due to poor ventilation or forgetting ventilation. Also, the JIA F 038-10 was revised in April 2010. With the popularization of this alarm, the naming was standardized in April 2012 to be called commercial ventilation alarms. Commercial ventilation alarms adopt an alarm transmission pattern that use accumulated converted COHb to prevent early alarms while securing safety.

2. Characteristics of gas alarms

(1) Voice in alarm sounds

During early development, there were no issues because there were few devices that used electronic buzzers in general households besides gas alarm. However, nowadays most electronic devices will emit a beeping sound. There were cases of people mistaking the sound with another sound in the unattended home and reporting cases.

Therefore, development of alarms that were discernable from other devices was needed.

As such, the voice-type gas alarm was developed in 1986. Now, most products use voice alarms. The message in voice alarms has been standardized by the Gas Alarm Industries Association of Japan. All voices ask: “Is gas leaking?”

(2) Measures against miscellaneous gases

Previous gas sensors respond even to flammable gas that is not targeted. Therefore, they may trigger even for alcohol-based gases during cooking, called miscellaneous gas. If there are multiple false alarms, the user may unplug it, and it will be unable to function as an alarm. To solve these issues, a selective sensor was developed that responds to only gas that is targeted by the devices. This technology is currently in use.

In order to prevent false alarms in alarms “for 12A/13A gas lighter than air” installed near the ceiling, an alcohol filter was developed for alarms to be sold that are more reliable by using this.

On the other hand, LPG sensors are installed near the flooring and may have false alarms due to the use of sprays such as insecticides, etc. In particular, improvement was needed as such false alarms could significantly impact concentrated monitoring systems, etc. In April 1994, the High Pressure Gas Safety Institute of Japan was the central player in preparing standards for LPG alarms that prevent false alarms. Compared to previous devices, products were developed to limit alarms by use of sprays, etc. and sold as anti-false alarm types.

(3) Promotion of spread of CO alarms

Currently sold CO gas detection-type CO alarms selectively detect carbon monoxide that occurs due to incomplete combustion by combustor equipment.

As buildings continue to become more air tight, the further expansion of CO alarms is needed.

(4) Residential fire/gas/CO alarms

These devices are CO alarms that detect the presence of CO or gas/CO alarms that detect the presence of gas leaks and CO that have added heat or smoke detection function. They are sold as residential fire/gas/CO alarms that can prevent fires caused by many sources, and accidents caused by incomplete burn.

(5) Simplification of inspection when installing City Gas alarms

City Gas alarms with labels stating “Automatic initial inspection functionality” or “Initial switch inspection functionality” can easily be inspected without spraying gas during installation as the lamp and sound notify the user about any alarm abnormalities according to self-check results when a power source is plugged in or the device switched on.

(Notes) This inspection method is not applicable for legally mandated gas alarm inspections for gas leak and fire alarms established in the Fire Services Act. (Refer to page 38 for legally mandated gas alarm inspections for gas leak and fire alarms established in the Fire Services Act)

(6) High reliability measures

Alarms must have a high level of reliability as they are safety devices that need to operate properly in moments

of emergency. By conducting regular self-checks of the gas detection portion and circuits, etc., it is possible to enhance reliability by including a function to notify users about malfunctions.

(7) Promotion of spread of battery-type alarms

The sale of City Gas battery-type gas alarms began in 2015. The further spread of gas alarms is expected through battery-type alarms that are easy to use and highly attractive.



1. LPG alarms

For the alarm quality, alarm manufacturers are mandated to comply with technological standards established in Ministerial Ordinance for LPG Device Technological Standards in the LPG Act.

The LPG Act was revised in August 1999 with the Act on Consolidation and Streamlining of Standards and Certification Systems Relating to the Ministry of International Trade and Industry (Act No. 121). In this law revision, LPG equipment designated by government regulations (11 items other than gas alarms) were required to comply with standards (inspection, preparation and saving of inspection records) and receive a label (PS mark). These rules were submitted to manufacturers and must be complied with in order for products to be sold or displayed for the purpose of selling.

Installation of alarms in some facilities and buildings are also mandated in the Enforcement Guidelines of the LPG Act.

General consumer alarms are different from industrial detection alarms that are regularly inspected and adjusted by experts. They must maintain performance over a long period without maintenance. Therefore, the High Pressure Gas Safety Institute of Japan conducts inspections to check that each alarm complies with the technological standards set in the Ministerial Ordinance and will maintain long-term stable performance. Certified products receive a label or laser etching to mark that it complies.

Specifically, the first inspection is for the structure, materials, various functionality such as alarm performance, durability, and duration characteristics. The second inspection certifies each production lot in terms of importance, factory inspections that check the management structure of manufacturing factories and production lines of factories. After clearing these two inspections, an inspection certificate can be attached.

Certificates are attached to each product and are effective for five years after manufacturing.

For residential fire/gas/CO alarms, inspections of the LPG alarm and CO alarm functions are performed based on the standards established by the High Pressure Gas Safety Institute of Japan. Inspection on the fire alarm function is conducted based on model testing and model fitness certification conducted by the Fire Equipment Inspection Institute.

2. City Gas alarms

In the Gas Business Act, the installation of City Gas alarms is mandated as gas leak alarm equipment, gas alarm or automatic gas shutdown mechanism for certain facilities or buildings with combustors, such as designated underground shopping centers, etc. and areas where gas pipelines enter through the wall. Technological standards are established in Article 2 of “Matters Establishing Installation Techniques and Standards for Gas Leak Alarms” and Article 2 of “Public Notice Establishing Installation Techniques and Standards for Gas Leak Alarm Equipment” in the Public Notice of the Gas Business Act.

Installation and technological standards of gas leak and fire alarm equipment are also established in the Enforcement Guidelines and Public Notice of the Fire Services Act.

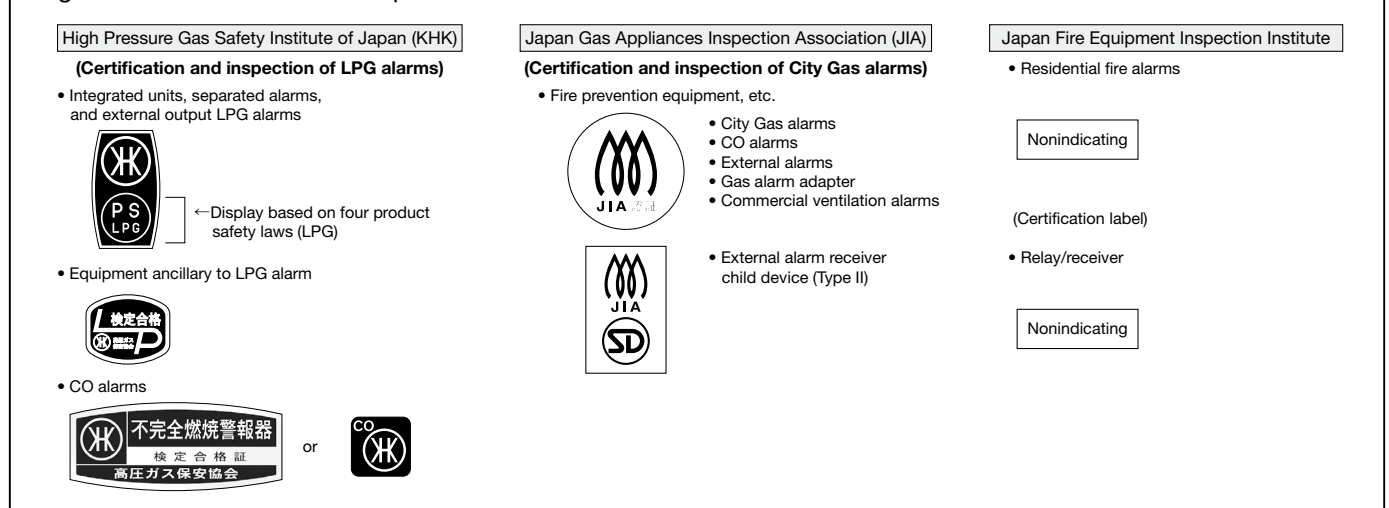
The Japan Gas Appliances Inspection Association ensures that devices have stable long-term performance and that technological standards meet laws and regulations for detectors in gas leak alarm equipment and gas leak/fire alarm equipment, as well as gas alarms. The Japan Fire Equipment Inspection Institute does the same for relays and receivers while the Japan Gas Appliances Inspection Association and the Japan Fire Equipment Inspection Institute does the same for residential fire/gas/CO alarms. The method of inspection is generally the same as certification by the High Pressure Gas Safety Institute of Japan.

Certifications on City Gas alarms are effective for five years after installation. However, as alarms are safety devices and gas sensors can change during the period in inventory, the standard inventory period is within one year from manufacturer shipment.

3. Commercial ventilation alarms

Inspections for commercial ventilation alarms check whether they have stable long-term performance and if devices comply with the technological standards established by the Japan Fire Equipment Inspection Institute. These alarms detect carbon monoxide, convert to COHb, and emit an alarm. Certification is effective for five year from installation.

Diagram 16. Certification and inspection for each alarm



1. LPG alarms, etc.

(1) Duty to spread awareness to gas consumers

Based on Article 27 of the LPG Act, LPG dealers are required to spread awareness of damage prevention related to LPG to gas consumers. According to Article 27 of the Enforcement Guidelines, dealers are required to spread awareness of the need for proper gas usage methods, the potential for gas leak accidents, and alarm safety devices to consumers installing gas alarm.

Regarding the text to spread this awareness, dealers are instructed to include a column that includes matters related to accident prevention measures, such as introducing PR and press releases to promote the spread of safety equipment, such as gas alarms, etc.

(2) Survey requirements for gas consumption equipment, etc.

LPG dealers are mandated to conduct surveys of gas consumption equipment according to Article 27 of the LPG Act and Article 37 of the Enforcement Guidelines. They are required to check at the beginning of providing gas and at least once every four years that equipment complies with technological standards established in Article 44 of the Enforcement Guidelines.

In other words, dealers will check that the required number of alarms that have not exceeded the expiration date are installed in the positions required by standards in spaces with combustors in shared residences and other facilities required to have alarms installed.

If the consumption equipment is confirmed that it does not comply with technological standards as a result of this survey, the dealer must notify the consumer and conduct another survey within five months as stated in Article 27 of this law.

2. City Gas alarms, etc.

(1) Duty to spread awareness to gas consumers

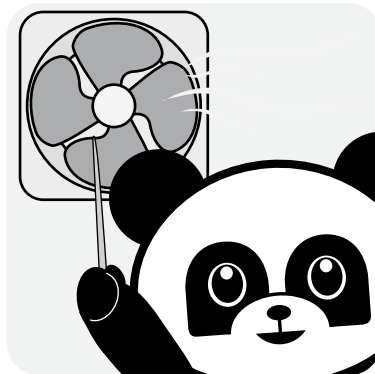
Gas dealers are mandated to spread awareness of required items in order to prevent dangerous incidents that correspond with the use of gas to gas consumers according to Article 159 of the Gas Business Act. In other words, according Article 197 of the Enforcement Guidelines, dealers must, upon receiving an application to use gas or once a year, spread awareness of matters related to prevention of dangers corresponding with gas usage and management and inspection of consumption equipment, and aptitude of consumption equipment for supplying gas to gas consumers at facilities required to install automatic shutdown gas mechanisms, gas leak alarm equipment, or gas alarms.

(2) Survey requirements for gas consumption equipment, etc.

According to Article 200 of the Enforcement Guidelines, gas dealers are required to check whether consumption equipment complies with technological standards established in Article 202 of the Enforcement Guidelines when receiving an application for gas usage or at least once every four years.

If the consumption equipment is confirmed that it does not comply with technological standards as a result of this survey, dealers must immediately notify gas consumers about the measures they need to comply with standards and the consequences of not taking such measures, and subsequently review again within five months.

If City Gas alarms are installed in designated underground shopping centers or designated basements, etc. established by the Gas Business Act or Fire Services Act, please refer to “Chapter 12. Verification/Inspection/Maintenance & Management when Completing Gas Alarm Installation” for testing, inspection, maintenance, and management of this equipment (gas leak alarm equipment or gas leak/fire alarm equipment).



1. LPG alarms

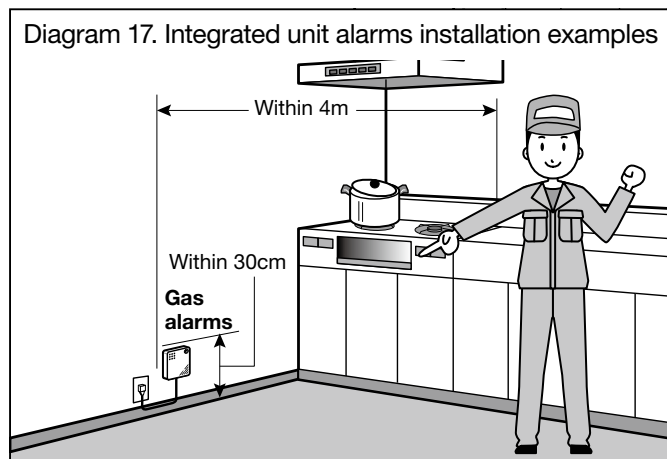
The method of installing LPG alarms is established in the Ministerial Ordinance “Enforcement Guidelines for Act on the Securing of Safety and the Optimization of Transaction of Liquefied Petroleum Gas” (No. 11 Ministerial Ordinance of Ministry of International Trade and Industry in March 10, 1997) and “Article 13 of the Public Notice Establishing Details of Technological Standards related to Supply/Consumption and Special Residential Supply Equipment.”

(1) Integrated unit alarms

1. Installation location (Refer to Diagram 17)

Alarm shall be installed within 4m horizontal distance from the combustor (gas alliance or place farthest from stopcock) on a wall within a room where a combustor is installed so that the distance between the floor and the top of the alarm and detection portion is within 30cm high.

Please firmly install alarm on the wall. Do not place it on the floor.

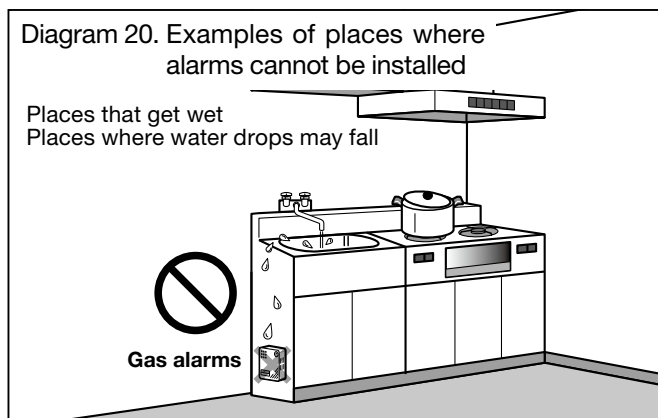
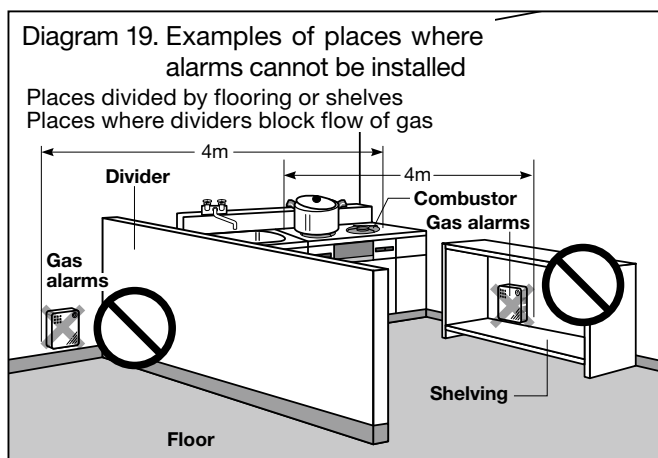
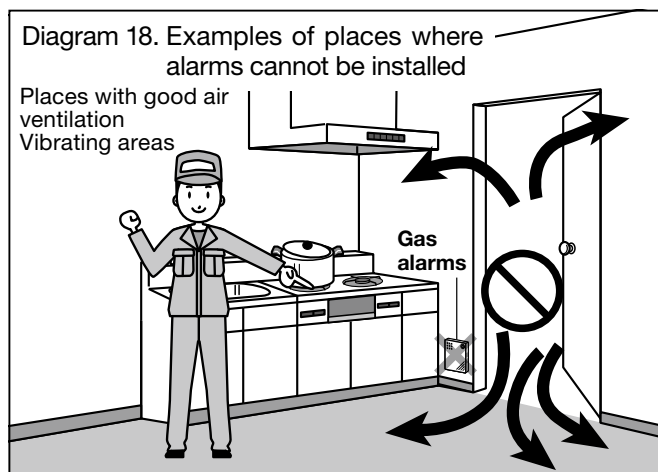


2. Places where it cannot be installed

Alarms cannot be installed in places where it can not effectively detect gas leaks.

- 2-1. Places with outside air flow within 1.5m of ventilation air exhausts or near entrances/exits. (Refer to Diagram 18.)
 - 2-2. Places with high floors where gas combustor is in lower area with a difference of 20cm or more in floor level.
 - 2-3. Places with dividers that may block the flow of leaked gas between gas combustors and the alarm, or walls that are segmented by flooring and shelves, etc. (Refer to Diagram 19.)
 - 2-4. Places that may experience surrounding temperatures of -10°C or lower, or 40°C or higher.
 - 2-5. Places that may splatter water or bathrooms when using AC100V as power source. (Refer to Diagram 20.)
3. For method of fixing, after inserting the mounting bracket into the wall, fix the alarm by aligning this protruding part of the bracket with the hole in the back of the alarm.

In cases when the mounting bracket cannot be screwed into the wall, fully remove dust and oil from the wall, remove the film over the double-sided tape on the



bracket, and push it firmly against the wall to attach the bracket. Also, use plasterboard pins in cases when the wall is plasterboard.

(2) Segmented unit alarms (Refer to Diagram 21.)

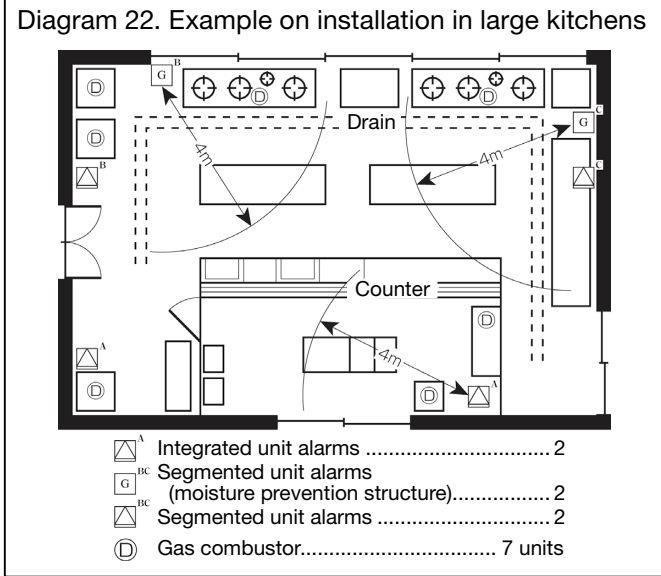
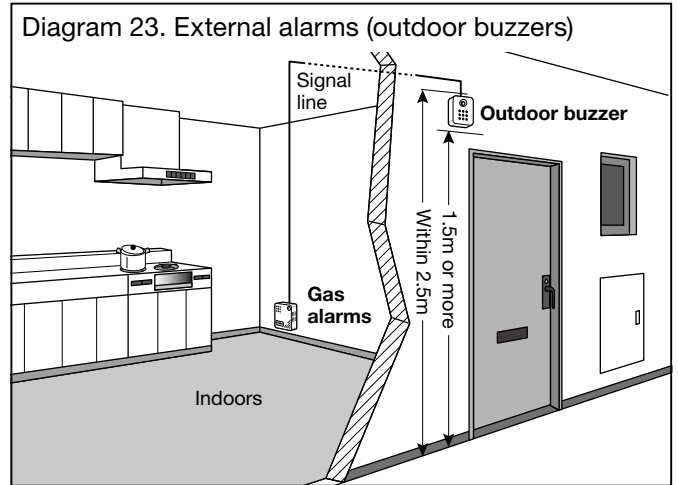
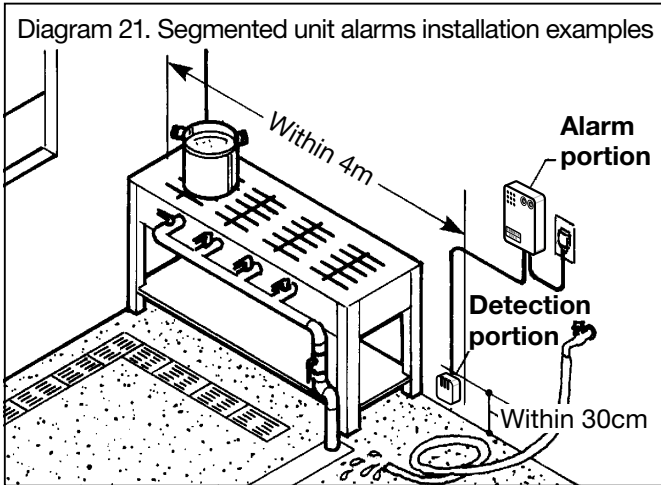
Mainly commercial LPG alarms

1. Places to install detection portion

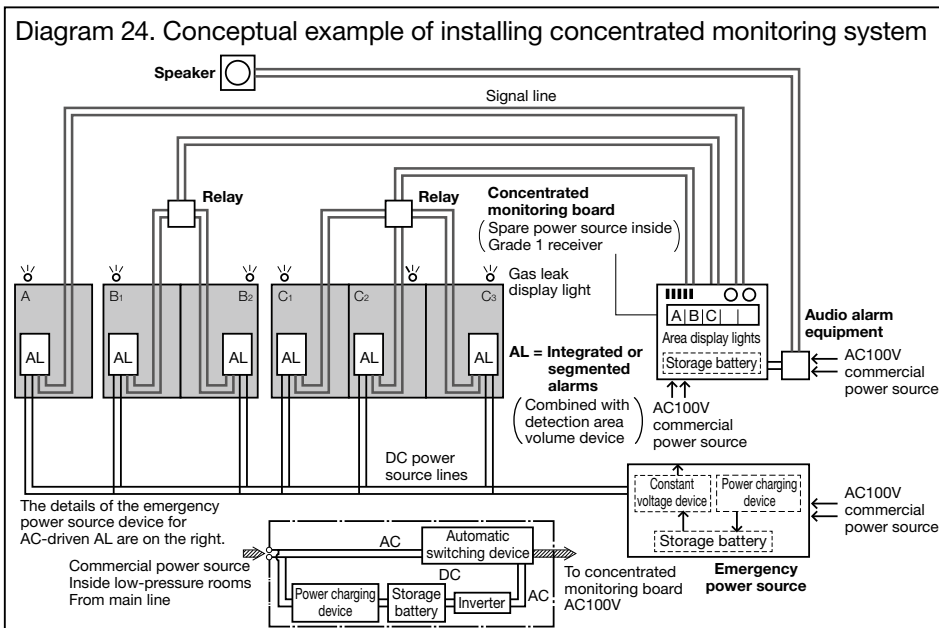
The installation position of the detection function for segmented unit alarms is the same as integrated unit alarms. However, they can be placed in places where water splashes, such as bathrooms and commercial kitchens etc. They can also be installed under floors or pits to prevent them from accidentally being buried.

2. Places to install alarms

Alarms are installed in positions where the alarm can be easily checked.



3. Installation in large-scale kitchens
Wide kitchens that use multiple gas combustors, such as restaurants and guesthouses are required to have



two or more detection portions. (Refer to Diagram 22.) Also, when using gas combustors in multiple rooms, such as guesthouses, etc., one must install detectors in each room.

(3) External alarms (linked to outdoor buzzers)

(Refer to Diagram 23.) Outdoor buzzers must be installed in positions where it is easy to check the alarm and easy to hear the gas leak alarm, such as the outdoor entrance. However, they cannot be installed in places directly hit by rain, constantly exposed to sunlight, or where the surrounding temperature may be -10°C or less or 40°C or more.

(4) Concentrated monitoring system

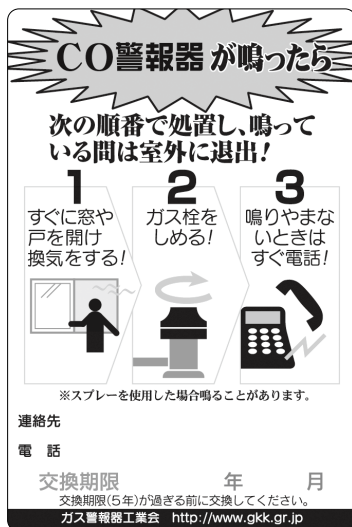
(Refer to Diagram 24.) The concentrated monitoring board (receiver) is installed in a position that is convenient for maintenance and where the alarm can easily be checked in the manager's office or disaster prevention center. Receivers installed in designated underground shopping centers, etc. and designated basements, etc. must be grade 1 receivers. AC power source of grade 1 receivers must be independent of power source for other equipment. Also, emergency power source of the designated power capacity must be installed. (Refer to P27 on wiring

methods) When installing in designated underground shopping centers, etc. and designated basements, etc., relays must be installed in positions convenient for inspections, with mechanisms effective at preventing fires, such as wiring covered in conduit pipes or devices placed in steel cases. For places where grade 1 receivers are installed, one must also install voice-type alarms that will notify users and related persons that a gas leak has occurred as well as display a list of the detection zones connected with detection portion of devices.

The total latency between the time the detection portion detects gas and the time the receiver triggers the alarm must be within 60 seconds.

(5) Gas alarm trigger sticker

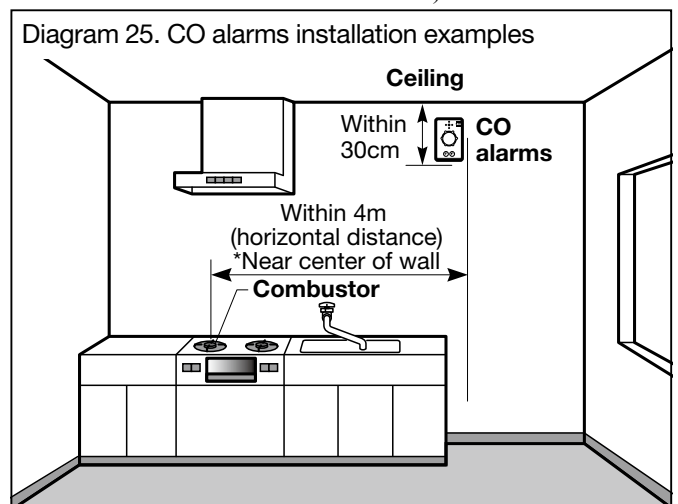
Please attach these below stickers, which are packaged with the gas alarm, in a position where it is easy to see from the installation location.



(6) CO alarm (Refer to Diagram 25)

1. CO alarms must be installed in the same room where the combustor is installed, within 4m from the center of the farthest burner that is the target of incomplete combustion detection. Alarms must be installed in places where exhaust gas often collects, within 30cm from the ceiling, and in positions where it is easy to check the display when the alarm is triggered.
2. Places where it cannot be installed
 - 2-1. Directly above combustors and places where exhaust, steam, and oil may hit.
 - 2-2. Place where it is difficult for exhaust gas to flow, such as behind cooking equipment and furniture.
 - 2-3. Place where exhaust gas is likely to be lighter due to constant outside exposure, such as near supply exhausts, etc.
 - 2-4. Place where the surrounding temperature or temperature of the outside of CO alarm due to radiation is likely to be 50°C or higher, or 0°C or lower.
 - 2-5. Bathrooms (excluding those constructed to withstand moisture and water)

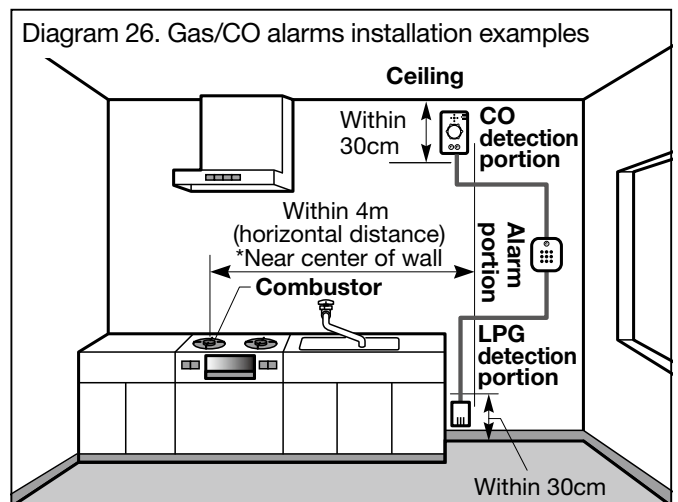
Diagram 25. CO alarms installation examples



(7) Gas/CO alarms (separated units) (Refer to Diagram 26)

Usage of gas/CO alarms should be spread as a redundant safety measure and used along with positioning of installation of integrated units and CO alarms.

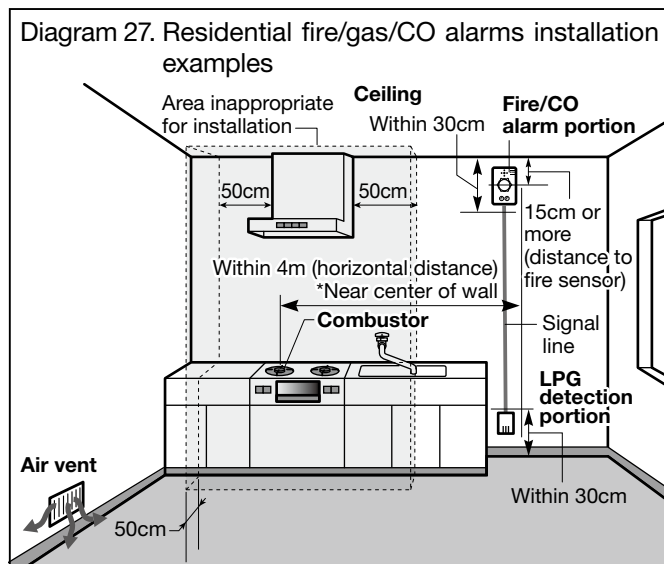
Diagram 26. Gas/CO alarms installation examples



(8) Residential fire/gas/CO alarms (Refer to Diagram 27.)

Residential fire/gas/CO alarms are alarms that have residential fire alarm, CO alarm, and gas/CO alarm functionality. They are installed in positions depending on their function. When attached to walls, they are installed in the center of the wall, within 15-30cm of the ceiling. However, they cannot be installed within 1.5m of the air exhaust of a vent. They also cannot be installed if there is a risk of surrounding temperatures falling 0°C or below, or 40°C or higher. If the fire detection function is constant temperature-type (heat-type), alarms should be installed and maintained in locations where they can effectively detect stove fires, beside in places that may constantly reach high temperatures due to regular cooking (places right above the stove). For smoke-type, alarms should be installed where there is no risk of smoke or steam from regular cooking.

The gas detection portion should be installed based on the installation standards for LPG alarms.

**2. City Gas alarms**

The method of installing City Gas alarms is established in Article 3 of the “Public Notice Establishing Installation Techniques and Standards for Gas Leak Alarm Equipment” in the Gas Business Act. The installation method of CO alarms is based on the detectors of gas leak alarm equipment.

(1) Integrated unit alarms (detectors) (Refer to Diagram 28.)

1. Alarms for gas lighter than air are to be installed on walls or the ceiling in the same room as the gas device within 8m horizontal from gas devices (or within 8m of the center of the farthest burner from the alarm if there are more than one burner).

The bottom of the alarm must be installed within 30cm from the ceiling.

(For gas that is heavier than air, alarms are installed in the same position as LPG alarms)

If the ceiling is divided by beams, etc. at least 60cm in length, alarms must be installed on the side of beam where the gas device is located.

If there are intake vents (*legal term) near the ceiling in the room with the gas device, alarms are to be installed near the intake vent nearest the gas device.

*In legal terms, the vent that exhausts air.

Also, please refer to Diagram 3 on page 6 for the method of installing gas alarms for medium-pressure combustors or when gas pipelines enter the exterior wall.

2. Places where alarms cannot be installed (Refer Diagram 29.)

- 2-1. Places directly exposed to exhaust, steam, or oil smoke from a gas device.
- 2-2. Places with good air ventilation, such as near a door.
- 2-3. Places that may experience surrounding temperatures of -10°C or lower, or 50°C or higher.

Relationship of microcomputer gas meters and LPG alarms

In order to enhance the effectiveness to prevent LPG accidents, it is desirable to combine use or link LPG alarm* when installing microcomputer gas meter.

Microcomputer gas meter S/S4.....	Combined use/link
Microcomputer gas meter E/E4.....	Combined use/link
Microcomputer gas meter SB (commercial).....	Link
Microcomputer gas meter EB.....	Link

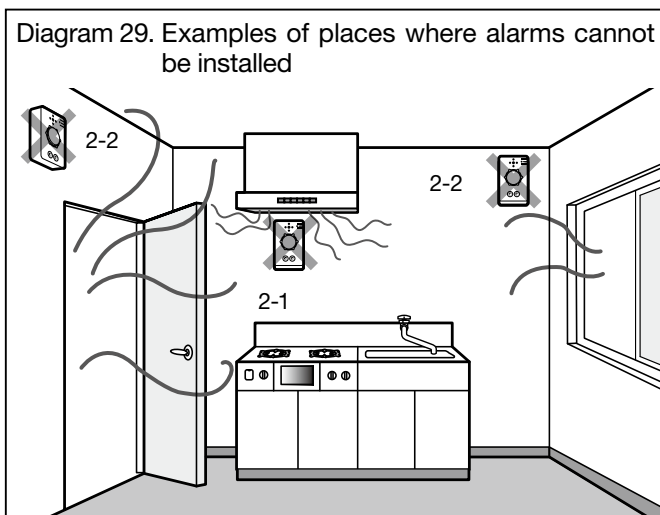
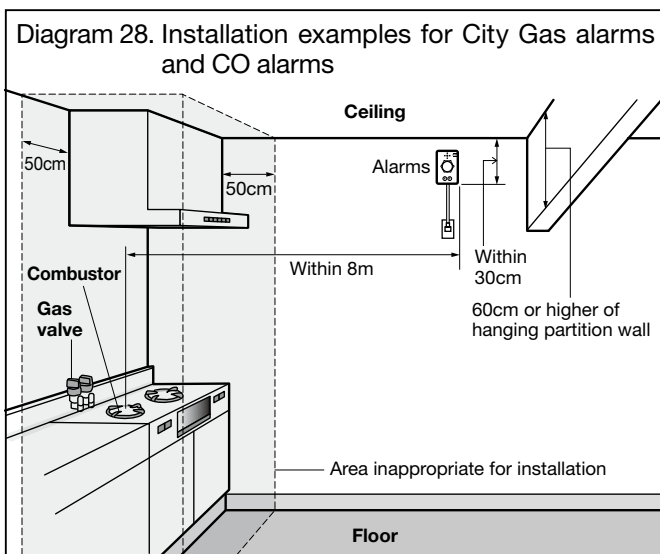
Microcomputer gas meter SB/EB have an “alarm disconnection detection function” that will close the shutdown valve to prevent use of gas when the alarm is disconnected. Also, when an alarm is disconnected, the microcomputer gas meter S/S4/E/E4 makes sure the time of gas usage is limited.

The alarm output signal linked to the microcomputer gas meter is a 0-6-12V voltage signal (requires adapter) and an ON-OFF non-voltage signal. However, the later signal is becoming more common.

* Combined use: Install alarm in room (kitchen, etc.) with combustor in the building that installed the microcomputer gas meter.

Link: If the alarm rings for a set period of time, a signal will connect the two equipment and the microcomputer gas meter will shut off the gas.

- 2-4. Places that may splatter water or bathrooms when using AC100V as power source.
3. Based on the legal ordinances in the Building Standards Act, the following provisions must be followed when installing alarms.
 - 3-1. The type of alarm to install is limited to external alarm or concentrated monitoring type.
 - 3-2. Integrated unit alarms or detectors use special screws so they cannot be easily removed by normal people.
 - 3-3. External alarms (outdoor buzzers) are installed in shared corridors and staircases and concentrated monitoring boards in administrative offices and security rooms, etc. They can confirm spaces where gas leaks have occurred.
 - 3-4. Power lines are helpful to prevent suicides as follows (excluding cases with power severance alarms).
 - a. Connect to ON-OFF switch to shut down all routes in residence.
 - b. Wires are installed in pipes and behind the ceiling to make them difficult for normal people to sever; there are no switches installed mid-way.



(2) Segmented unit alarms

- (1) The installation position of the detection function for segmented unit alarms is the same as integrated unit alarms.
- (2) Alarms are installed in positions where the alarm can be easily checked.

(3) Gas leak alarm equipment

Equivalent of LPG concentrated monitoring system, refer to the method of installing LPG concentrated monitoring alarms for the installation method and wiring method for relays and receivers.

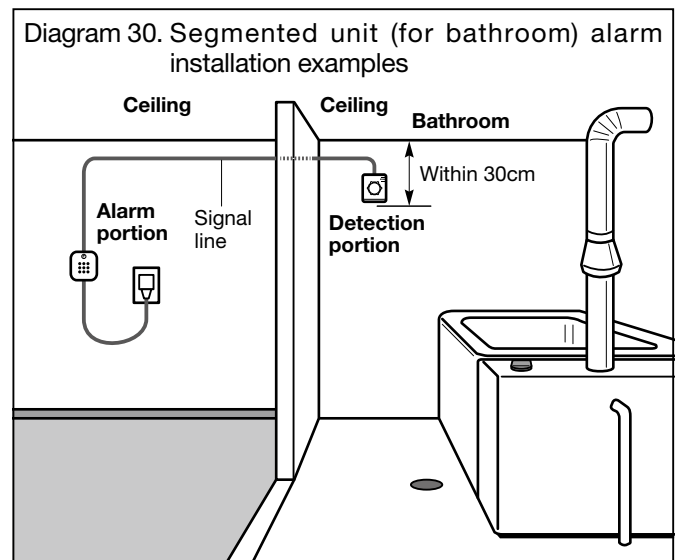
On the use of gas/CO alarms (gas leaks + incomplete combustion), one must be aware of the output signal. Select the appropriate signal matching after consulting with systems manufacturers.

(4) Gas leak fire alarm equipment

Installation method is the same as gas leak alarm equipment and established in Article 24-2-3 of the Enforcement Regulations of the Fire Services Act.

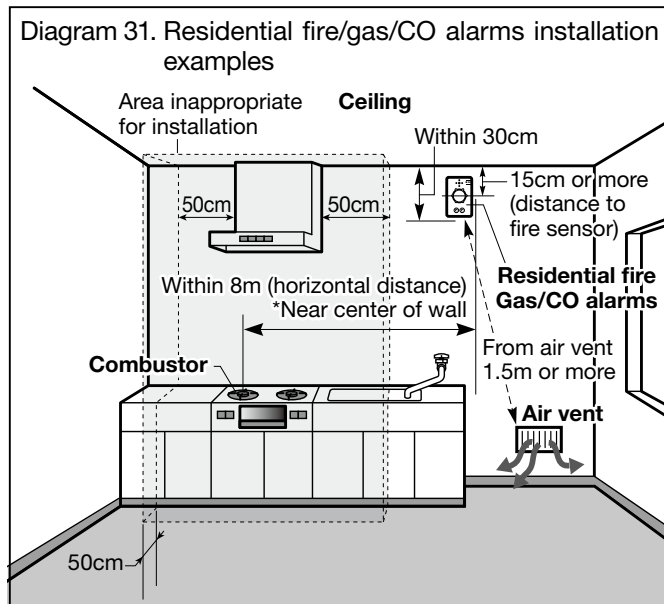
(5) CO alarms (CO detection-types)

1. Segmented unit (for bathroom) (Refer to Diagram 30.)
 - 1-1. Detection portion must be installed within 30cm from the ceiling in bathrooms to detect for exhaust gas due to incomplete combustion. However, do not install in places where water hits directly, places with good air ventilation (near windows), or places with high temperatures, such as near exhaust pipes. They also cannot be installed if there is a risk of surrounding temperatures falling 0°C or below, or 50°C or higher.
 - 1-2. Alarms are installed in positions where the alarm sound can be easily checked outside the bathroom. They cannot be installed if there is a risk of surrounding temperatures falling -10°C or below, or 50°C or higher.
2. Integrated unit (for kitchen) alarm
Same installation method as City Gas integrated alarms (detectors)
3. Battery-type CO alarms
Integrated alarms operated by battery can be used in combination for bathroom and non-bathroom types.



Installation method is the same as City Gas integrated unit alarms (detection portion).

- (6) **Residential fire/gas/CO alarms** (Refer to Diagram 31.) Residential fire/gas/CO alarms are alarms that have residential fire alarm, gas alarm (integrated), and gas/CO alarm functionality. They are installed in positions depending on their function. When attached to walls, they are installed in the center of the wall, within 15-30cm of the ceiling. However, they cannot be installed within 1.5m of the air exhaust of a vent (including air vents). They also cannot be installed if there is a risk of surrounding temperatures falling 0°C or below, or 40°C or higher. If the fire detection function is constant temperature-type (heat-type), alarms should be installed and maintained in locations where they can effectively detect stove fires, beside in places that may constantly reach high temperatures due to regular cooking (places right above the stove). For smoke-type, alarms should be installed where there is no risk of smoke or steam from regular cooking.



- (7) **Area inappropriate for installation (recommended)**
Please install CO alarms and residential fire alarms on walls at least 50cm or more distance from combustors or range hoods.
There is a risk of false alarm due to exhausts from range hoods or steam/oil smoke from cooking.
Also, when installing gas alarms in closed-off vertical pipeline shafts, etc., one must be cautious of the deterioration of gas sensors due to silicon, used in caulking etc.

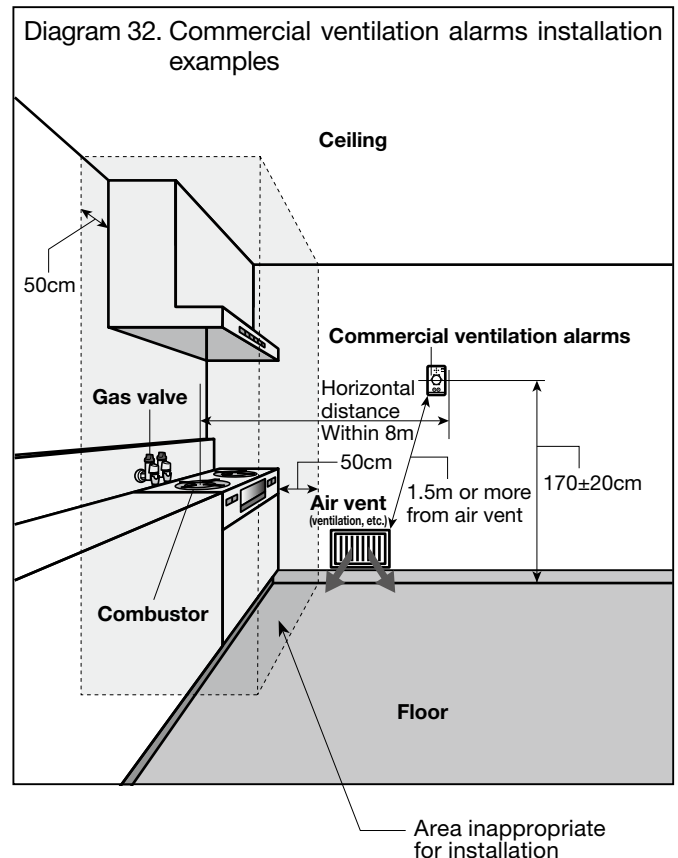
3. Commercial ventilation alarms

- (1) **Installation location** (Refer to Diagram 32.)

Commercial ventilation alarms should be installed in the same room as combustors in a location from 50cm-8m horizontal distance from the combustor and 170cm (plus-minus 20cm) from the floor, in a position where it is easy for the alarm display light to be confirmed.

- (2) **Places where it cannot be installed**

1. Within 1.5m of air conditioners and the air exhaust of a vent (including air vents)
2. In places directly exposed to exhaust from combustors, steam, and oil smoke, and cooking alcohol steam.
3. Places that get wet
4. Places where surrounding temperatures may be 0°C or below or 50°C or higher during use of cooking appliances
5. Places with intense vibration or shock



4. Alarm-linked security systems

(1) Gas leak alarm shutdown device (automatic gas shutdown device)

Alarms should be installed according to the previous paragraphs 1 (1)-(3) or 2 (1)-(2) based on their type.

The controller should be installed in a position where it is easy to hear the alarm sound and see the flashing light when the shutdown valve is closed.

Please select shutdown valves of the diameter that fits the pipe dimensions. The shutdown valve is connected near to the gas meter. The shutdown valve and gas meter with built-in shutoff valve must be installed by a certified LPG technician for LPG.

Connection of signal lines for the alarm, controller, and shutdown valve should be conducted strictly by the manufacturer installation manual.

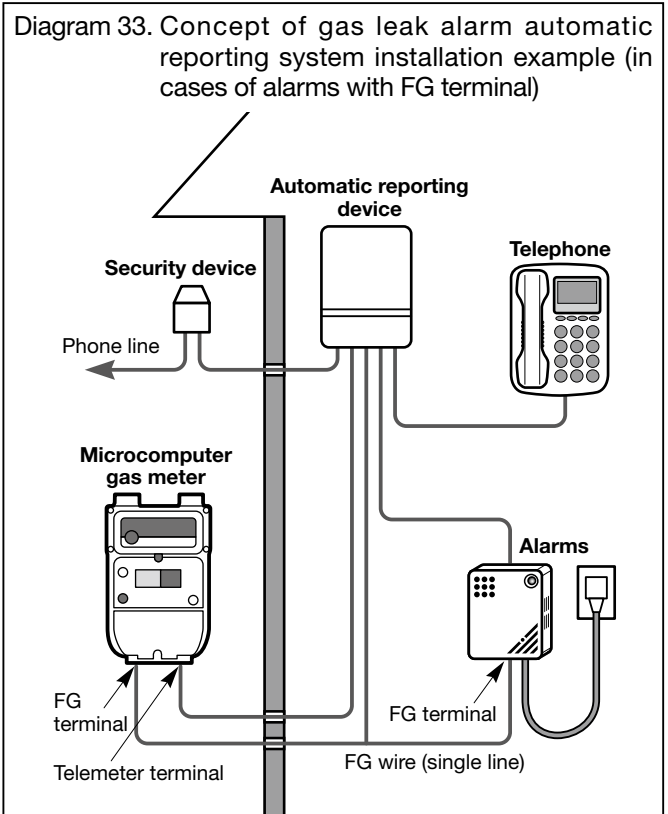
(2) Gas leak alarm automatic reporting system (Telemeter system) (Refer to Diagram 33.)

The connection of telephone lines must be conducted by certified technicians (Analog class-3 or higher). The equipment comprising this system includes indoor and outdoor equipment. Even for outdoor equipment, select places that are not directly exposed to sunlight or rain, and use outdoor types for wiring materials (for example, cab-tire cables).

For indoor wiring, use products designated by manufacturers and pay close attention to plus-minus polarity. For areas with high impact of lightning surges, installation of FG lines (common lines) is required to reduce the impact of lightning surges on system equipment that may strike power sources for electric wiring and gas alarms. FG wires are always connected to

FG terminals in each equipment and cannot be used in combination with other grounding. Also, do not lay along with other wires.

Consult with the system manufacturer when installing FG wiring.



1. LPG alarms

(1) Initial use inspection

When plugging the power cord in the first time, an initial timer will go off and a power display lamp will flash. Confirm that the light switches from flashing to lit to ensure the alarm is operating correctly. Some alarms also emit a voice message stating “Operating properly.”

(2) Inspection of gas alarm functions

- (2)-1 Use inspection tools attached to the alarm.
- (2)-2 Inspection by gas lighter (retail products)

2. City Gas alarms

In January 2008, the Gas Alarm Industries Association of Japan organized the following two points to simplify the inspection when installing City Gas alarms.


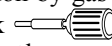
(1) Inspection by inspection switch and automatic initial inspection function

In the past, an initiation inspection was conducted by inspection gas when installing gas alarms. This is based on the idea that ensuring “gas alarms as security devices don’t have any issues in their important functions.” However, with recent improvements in gas alarm technology, equipment now has gas leak detection function, CO detection, and fire detection. There has been confusion on the ground as each device has a different technique for initial inspection. Considering this situation, the Gas Alarm Industries Association of Japan decided on specifications of gas alarms that could perform initial inspection upon installation by an automatic initial inspection function and inspection switch in order to reduce the burden when installing gas alarms by simplifying the inspection process for alarms that meet certain requirements. Also, equipment that could perform initial inspection upon installation by an automatic initial inspection function and inspection switch has a label stating “automatic initial inspection functionality” or “switch initial inspection functionality” on the alarm unit. Alarms with these labels can be inspected initially in the same way as the initial inspection by inspection gas by using a sensor automatic inspection function inside the alarm established by the Gas Alarm Industries Association of Japan.

The above two methods of inspection unified here are related to the initial self-inspection of gas alarms installed in facilities recommended to have alarms installed. The legally mandated inspection technique for gas alarms in facilities required to have alarms installed according to the Fire Services Act remains the inspection technique established by past laws and regulations (Refer to Page 38).

(2) Dropper inspection


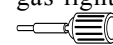
In order to enhance the long-term reliability of gas alarms, as the filter performance of gas sensors have been improved, a problem has occurred in which when conducting initial inspection with lighter gas (butane gas) for new gas/CO alarms, the alarm will not ring or stop ringing when exposing it to lighter gas to test the ring function, temporarily deteriorating the filter function. The Gas Alarm Industries Association of Japan decided

on common rules for a “dropper inspection technique” as a new initial inspection technique that does not harm filter performance when triggering the gas alarm. Equipment that supports this new dropper inspection method has a label stating that inspection by gas lighters is prohibited  or the dropper mark  on the alarm unit. Be cautious not to use the gas lighter inspection method for equipment with this label.

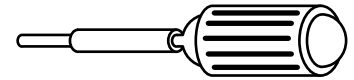
(3) Dropper inspection method for City Gas alarms

Conduct operation inspection by the following method and check the operation of the alarm sound and lamp.

1. Preparation before inspection

- 1) Check that there is a label stating that inspection by gas lighters is prohibited  or the dropper mark  on the gas alarm.
- 2) Prepare the item to extract inspection gas from flames, such as gas extractor, gas lighter or gas stove.

Example of gas extractor



If the inspection by gas lighters prohibited label on the gas alarm or dropper mark is on the gas alarm, do not directly emit the gas from a lighter.

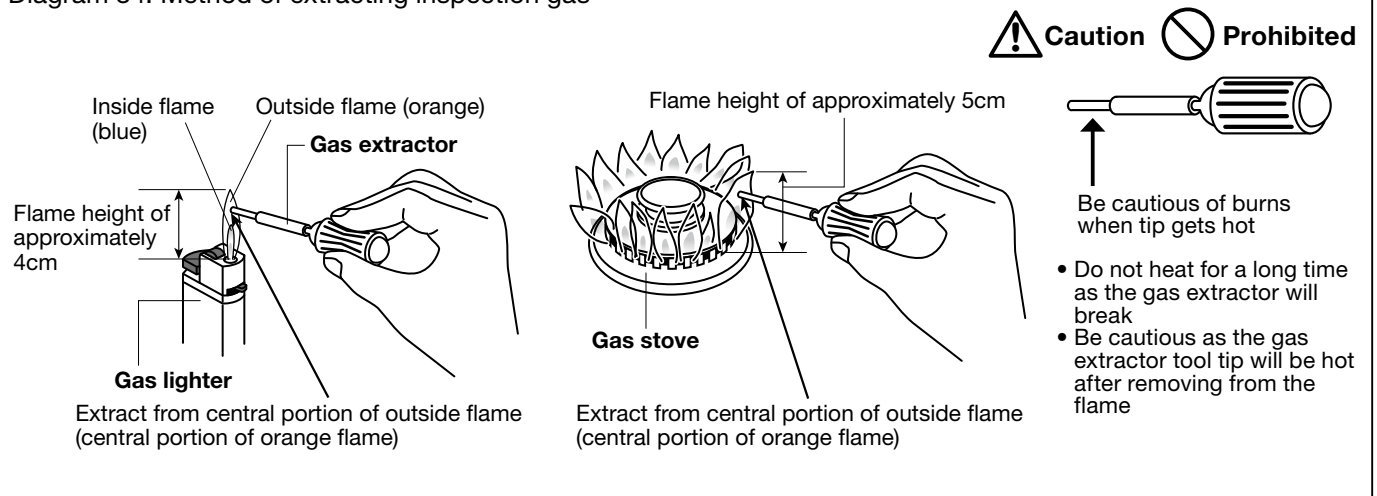
2. Method of extracting inspection gas (Refer to Diagram 34.)

- 1) Light the gas light or gas stove and adjust height of flame approximately 5cm.
(It becomes difficult to extract inspection gas the smaller the flame. If you cannot adjust the flame to a height of 5cm due to the type of gas stove, increase output to maximum available)
- 2) Compress the gas extractor tool (dropper) and place the end in the center of outside flame (center of orange flame)
- 3) For around two seconds, slowly suck in the gas from the center of the flame (inspection gas)
- 4) Wait until the temperature of the end of the gas extractor tool cools off (approximately 30 seconds).
(Do not place near alarm while still hot. It may damage or distort the alarm.)

3. Timing for inspection gas (Refer to Diagram 35.)

- 1) Turn on the gas alarm
- 2) After the gas alarm is stable (initial timer completed), insert the inspection gas in the sensor portion of the gas alarm within four minutes of inserting power.
Please refer to the user manual for each alarm for when the alarm stabilization ends and the position of the sensor portion.
 - 2)-1 Confirm that the temperature of the end of the gas extractor tool has decreased sufficiently.
 - 2)-2 Place the end of gas extractor tool near the sensor.
 - 2)-3 Slowly squeeze the gas extractor tool and insert the extracted inspection gas (take approximately two seconds).

Diagram 34. Method of extracting inspection gas



4. Confirm lamp operation during inspection and alarm for gas (City Gas) or CO (incomplete combustion)

- 1) Confirm that the gas leak alarm and CO alarm (gas/CO alarm) trigger when inserting inspection gas. If the alarm does not trigger immediately after inserting the inspection gas, please wait 30 seconds after inserting.
- 2) For gas leak alarms, confirm the red alarm light turns on and the alarm sound is set off (for voice-type alarms: "Beep beep beep. Is gas leaking?").
- 3) Also confirm CO alarm for gas/CO alarms. For CO alarms, confirm the yellow alarm light turns on and the alarm sound is set off (for voice-type alarms: "Beep beep beep. Air is contaminated and dangerous. Please open a window and ventilate the space"). Refer to the user manuals for each alarm on details of confirmation methods. If the green light does not stop flashing, refer to the user manual of each alarm as it may be broken.

5. If one insertion of inspection gas does not trigger alarm

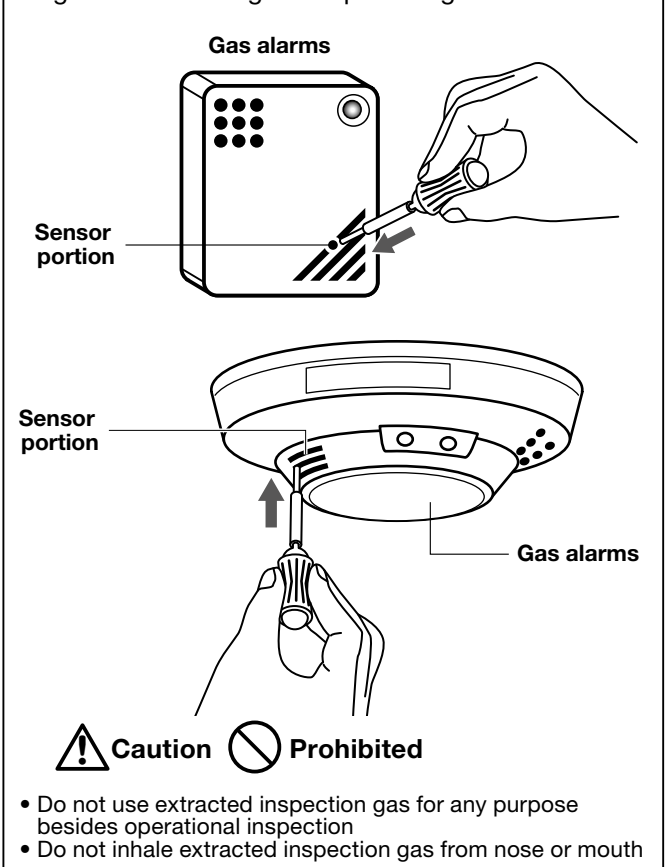
- 1) After inserting the inspection gas, if the above alarms do not trigger after 30 seconds, extract inspection gas again and conduct an operational inspection by the same method.
- 2) If four minutes pass from turning on power supply and the alarm does not trigger, try turning on power supply on the alarm again and conduct an operational inspection after confirming the inspection gas extraction method.

6. Other precautions

- 1) If the sensor part of a gas/CO alarm is split into two places, insert inspection gas in each sensor portion.

- 2) Refer to the user manual of each alarm for the method of inspecting the link with external alarms.
- 3) This inspection method is not applicable for legally mandated gas alarm inspections for gas leak and fire alarms established in the Fire Services Act.

Diagram 35. Pointing for inspection gas



(4) Initial inspection during installation by inspection switch and automatic initial inspection function

Conduct an operational inspection by the following method when installing City Gas alarms with a label stating “automatic initial inspection functionality” or “switch initial inspection functionality.”

1. Automatic initial inspection functionality example

- 1) Turn on the gas alarm. The green power light will flash slowly (initial timer).
- 2) After device is stable (initial timer complete), the green power light will change to remain on constantly.
- 3) Alarm will start automatic inspection. There are some alarms that operate like 2-4 after inspection, so check by lights and sounds.

2. Switch initial inspection functionality example

(Refer to Diagram 36.)

- 1) Turn on the gas alarm. The green power light will flash slowly (initial timer).
- 2) After device is stable (initial timer complete), the green power light will change to remain on constantly.
- 3) Press the inspection switch for the alarm to begin the inspection of functionality.
There are some alarms that operate as follows during inspection, so check by lights and sounds.
- 4) Operational inspection results
 - 4)-1 If the light turns on as described in the user manual, the alarm sound triggers, or a voice alarm stating “Operating properly” is heard, the alarm is operating properly.
 - 4)-2 If there are anomalies in the alarm, the green power light will flash quickly to indicate this. For voice alarms, they will emit a message to notify of the anomaly, such as “Malfunction.”

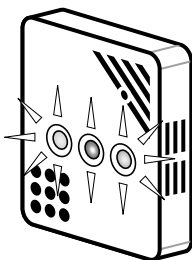
3. Other precautions

- 1) Label stating “automatic initial inspection functionality” or “switch initial inspection functionality” is displayed on alarm unit itself, the user manual, and packaging, etc. The above inspection method cannot be used when there is no such label. In this case, check the user manual for the alarm for inspection method.
- 2) This inspection method is not applicable for legally mandated gas alarm inspections for gas leak and fire alarms established in the Fire Services Act.

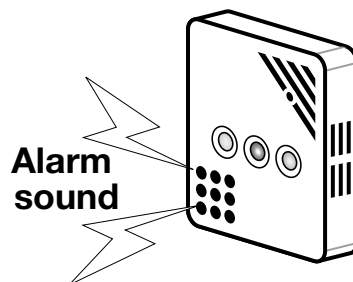


Diagram 36. Example of operation on alarm inspection for alarms with switch initial inspection functionality

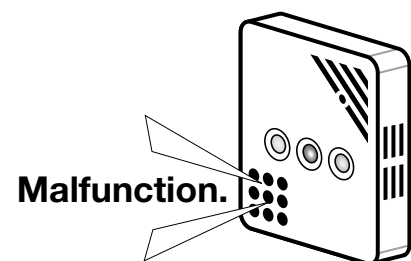
- Lights turn on, flash



- Alarm sounds go off



- Message stating “Malfunction”, etc. notifies of anomalies.



Note) Refer to the user manuals for each alarm on details of inspection operations

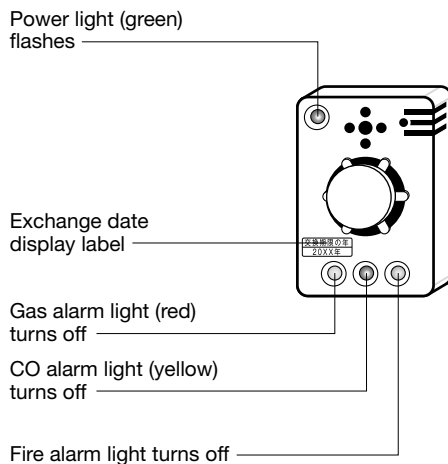
1. Automatic initial inspection functionality

Initial timer starts when entering power for alarm. After the timer is complete, a voice message will state “Operating properly” or “Alarm operating properly.” (Refer to Diagram 37A., Diagram 37B.)

Diagram 37A. Initial operation inspection functionality

1. Plug supply plug into outlet.

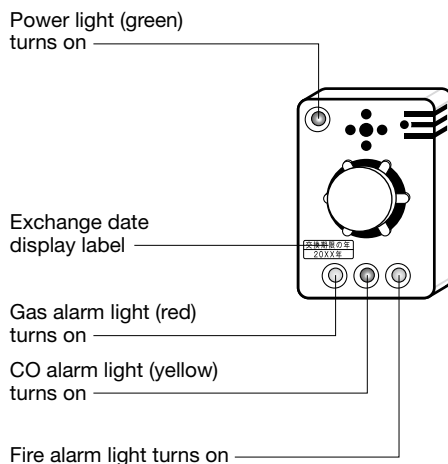
Power light (green) will flash as the alarm prepares to enter monitoring mode.



2. Approximately 30 seconds after connecting to power, all lights will turn off after turning on.

(If alarm triggered in past ten days)

Lights associated with cause of alarm that was last triggered will turn on for approximately one second. (due to alarm trigger cause display function)



Alarm also triggers when power recovers from power outage

Diagram 37B. Initial operation inspection functionality

3. States “Operating properly,” power light (green) turns on, and enters monitoring state.

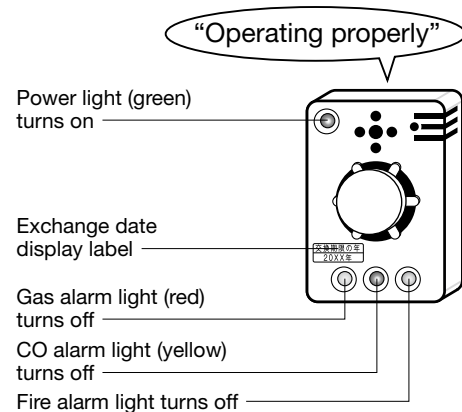
When malfunctioning

When malfunction occurs, voice message of “Malfunction” plays once and the power light (green) flashes at high speed.

It will continue to beep every minute and emit the “Malfunction” message every ten minutes.

After, it will repeat the same alarm.

*Please refer to the user manual for the alarm sound.



2. Alarm stop switch

(1) If alarm triggered

1-1 Gas alarms

It is possible to stop the gas alarm once using the alarm stop switch.

Five minutes after stopping alarm, the alarm will trigger again if alarm conditions met.

1-2 CO alarms

There are two types of CO alarms, low concentration warnings and high concentration alarms.

It is possible to stop the warning once with an alarm stop switch.

Five minutes after stopping alarm, the alarm will trigger again if alarm conditions met.

1-3 Fire alarms

It is possible to stop the fire alarm with an alarm stop switch.

Five minutes after stopping alarm, the alarm will trigger again if alarm conditions met. It is possible to stop the alarm as many times as needed.

However, after stopping the alarm and the alarm conditions being removed, if alarm conditions are once again met, the alarm will be triggered even if five minutes have not passed.

(2) If malfunction alarm triggered (Refer to Diagram 38.)

Diagram 38. If malfunction alarm triggered

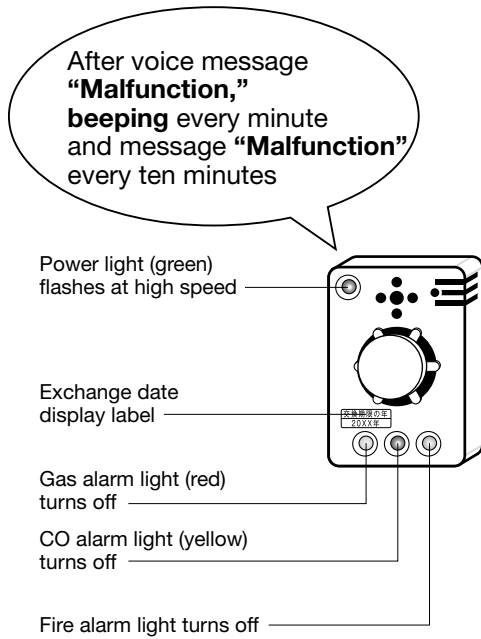
When malfunctioning

When malfunction occurs, voice message of “Malfunction” plays once and the power light (green) flashes at high speed.

It will continue to beep every minute and emit the “Malfunction” message every ten minutes.

After, it will repeat the same alarm.

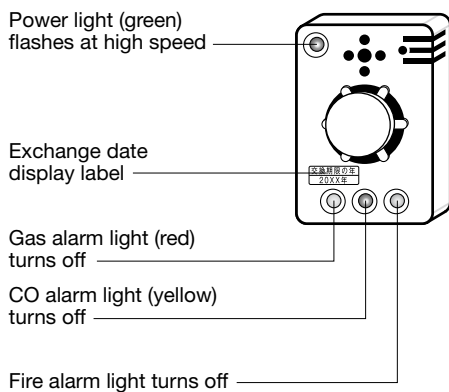
*Please refer to the user manual for the alarm sound.



*There are also alarms that the “Malfunction” voice can be stopped by pressing the alarm stop switch. Please refer to the user manual for details. However, the alarm sound will stop for approximately 36 hours if you press the alarm stop switch. Some alarm sounds do not play again. The quick flashing of the power light (green) does not stop.

*Please contact the dealer.

*If linked with an external device, the alarm stop switch will also turn off the external device while the alarm sound is stopped.



3. Expiration date

Some alarms have a function to count the expiration date. Alarms have an expiration date of five years after beginning use.

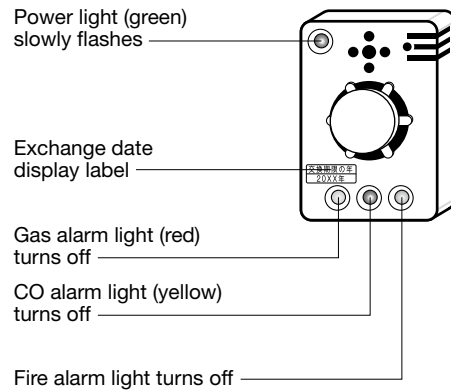
After approximately 5.5 years pass, the light will begin flashing. Or the following message will be stated when pressing the inspection switch: “Expiration date has passed. Please contact a dealer.” (Refer to Diagram 39.)

Diagram 39. Alarm expiration date

If the expiration date has passed

If six months or more pass beyond the expiration date, the power light (green) will flash slowly.

*Please contact the dealer.



1. Certifications required for electric wiring installation

Public certifications are required for the following tasks. Certified technicians required by affiliated laws.

Task name	Certification name	Affiliated laws	Notes
Commercial power source installation Grounding	Electrical technician (Class 2 or higher)	Electricity Business Act Electrician Act	Excludes power source installation by AC power removal by outlets or DC24-driven alarms
Gas leak fire alarm equipment	Grade A No. 4 Type fire equipment technician	Fire Services Act	In cases of underground shopping centers, etc. and basements, etc. that use City Gas
Automatic reporting device (telephone line)	Person in charge of installation (Analog Class 3 or higher)	Telecommunications Business Act Wire Telecommunications Act	In cases of automatic reporting of gas leaks

2. Laws related to electric wiring installation

Wiring tasks must be conducted in compliance with the following laws.

Task name	Affiliated laws	Details
Commercial power source, signal lines	Electricity Technical Interpretation No. 5 Article 146	Wires used for low voltage indoor wiring
	Electricity Technical Interpretation No. 5 Articles 158, 159, 164	Details related to compound resin wires, metal pipe installation, and cable installation
	Electricity Technical Interpretation No. 5 Article 167	Intertwining or connect with pipes, or low voltage indoor wiring or low electric current wires
	Electricity Technical Interpretation No. 5 Article 171	Facilities with low voltage indoor transportable wires
	Electricity Technical Interpretation No. 5 Article 181, Indoor Wiring Regulations No. 5 3560-3	Facilities with low power circuits
	Indoor Wiring Regulations No. 2 3202-2.4.5, 3203-1 to 8	Prohibition of fixing cords, etc. (power cords for alarms)
Gas leak fire alarm equipment	Local Government Ministerial Ordinance No. 6 Enforcement Guidelines of Fire Services Act Article 24 2-3	Details of standards related to gas leak alarm equipment
Alarm equipment for City Gas shared residences	Public Ordinance of Ministry of Construction No. 1099	Specialty wiring, etc. (attached to power severance alarm)

Note: "Electricity Technical Interpretation" is an abbreviation of the Interpretation of the Ministerial Ordinance Establishing Technological Standards related to Electricity Equipment (Ministry of Economy, Trade and Industry Public Notice No. 52 of 1997, amended in October, 2008).

3. Models (examples) of cables used

Task type	Name	JIS	Symbol	Thickness	Affiliated laws
Commercial power source	Insulated wire 600V vinyl insulated wire 600V type two (heat resistant) vinyl insulated wire	C3307 C3317	IV HIV	∅1.6 or more	Electricity Technical Interpretation Article 146 Article 158
	Low voltage cable 600V vinyl insulated vinyl sheathed cable (flat) 600V vinyl insulated vinyl sheathed cable (round)	C3342	VVF VVR	∅1.6 or more	
Signal line	600V vinyl insulated wire 600V vinyl insulated vinyl cable Automatic fire report alarm polyethylene insulated vinyl sheathed wire City polyethylene insulated vinyl sheathed cable	C3307 C3312	IV VCT AE. OP. YP CPEV	∅1.0 (1.2) or more 0.5mm ² or more ∅0.8 (0.9) or more ∅0.8 (0.9) or more	Electricity Technical Interpretation Article 167 Article 181

Obtainable size is in ()

4. Rules in wiring installation (examples of common installation errors)

Do not install wiring in following ways.

- (1) Fix power cords for alarms with staples
- (2) Sever power cords for alarms and try to connect by a pressurized sleeve, etc.
- (3) Install the power line and signal line in the same pipe or box (when using a wire that does not serve to insulate)

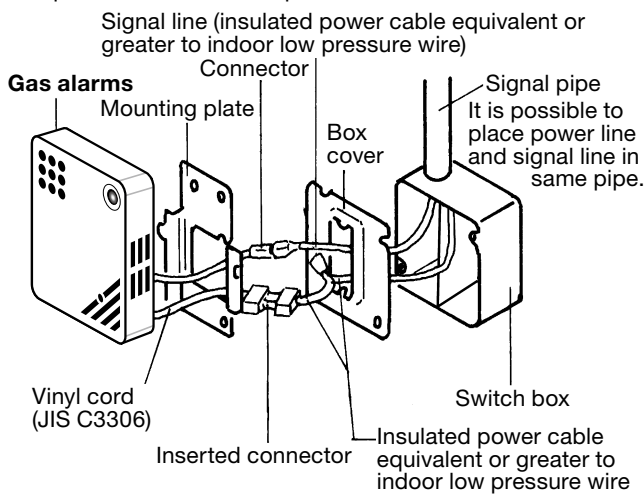
- (4) Allow external output signal line of alarm and gas pipe to come into contact
- (5) Insert external output signal line of alarm into closed space, such as pipe shaft, where gas may collect

5. Examples of wiring installation

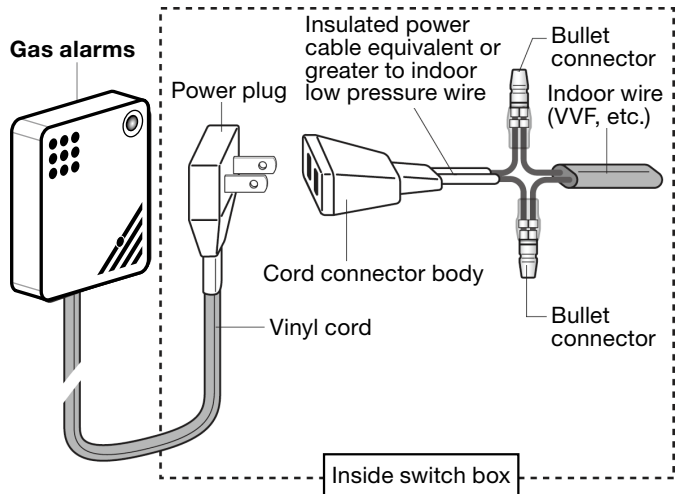
(1) For alarms hung on walls (Refer to Diagram 40.)

Diagram 40. Examples of wiring installation for alarms hung on walls (when using inserted connector)

- When installing signal line by insulated power cable equivalent to indoor low pressure wires



- Example of connecting inserted connection device

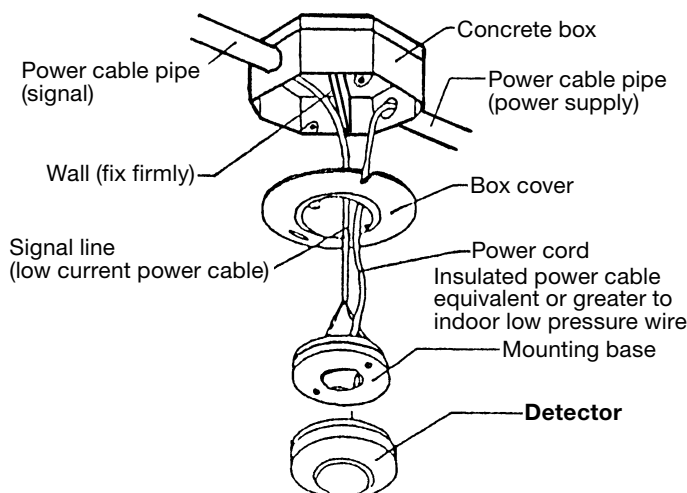


- Notes
- 1) Electrician certification is required to install electric wiring.
 - 2) You cannot sever the power cord of the alarm (portable power cable) and connect it inside a pressurized sleeve, etc. in the switch box. (Use inserted connector)

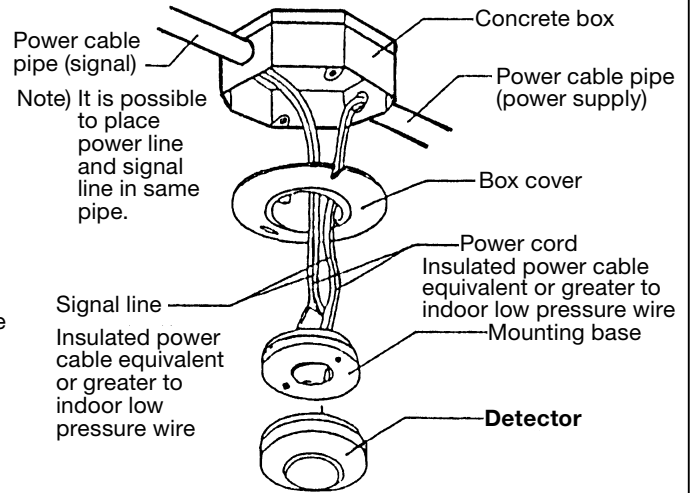
(2) For alarms hung on ceilings (Refer to Diagram 41.)

Diagram 41. Example of wiring for alarms (AC100V power supply) hung on ceilings (for direct connections)

- When installing signal line by low current power cable



- When installing signal line by insulated power cable equivalent to indoor low pressure wires



- Notes
- Electrician certification is required to install electric wiring. (Certification not required for installing power cable of DC24V-driven alarm)

Q Why are gas alarms required?

A Most gas leak accidents are caused by people intending to turn on the gas, intending to turn off the gas valve, or intending to return right away. If gas alarms are properly installed and appropriately used, they will warn about these accidents caused by human error.

Q I want to buy a gas alarm, but what type should I buy?

A There are many options, including residential fire alarms, gas alarms, CO alarms, and a combination of residential fire alarms and other alarms. While it varies by purpose, it is a good idea to consult the nearest gas dealer or gas alarm manufacturer.

Q I can attach a gas alarm myself. Why can't I do this?

A The attachment of gas alarms do not require special certification. However, the installation location varies based on the type of gas. It is necessary to attach the alarm in the proper position in order for it to operate properly. Therefore, it is best to consult with a gas dealer. In particular, it is important to be aware that the installation location of gas sensors varies for City Gas alarms and LPG alarms since the weight of gas varies.

Q I moved. Can I use the gas alarm I used before?

A Please consult with the gas dealer used at your new home as there are many possible factors, such as different types of gas used at your old and new home.

Q Is it better to clean gas alarms like cleaning oil from stovetops or ventilation fans?

A We do recommend maintenance if the alarm is dirty. Please be sure to remove the power cable before cleaning. Please soak a cloth with water and soap, wring it out, and then wipe away the stains. In this case, please be careful that water does not penetrate inside the gas alarm. Please do not use detergent, chlorine bleach, Benzene, paint thinner, or alcohol. If you use inappropriate cleaning materials, etc., the surface may be damaged or it may not function properly (if the alarm is connected to an external device, such as an intercom, the alarm may be triggered for the external alarm).

Q I've heard that installing a microcomputer meter will trigger an alarm in the case of gas leaks.

A Microcomputer meters will trigger an alarm if a small gas leak continues for a long period (for example, thirty days). However, because this displays on the unit itself, you cannot see it from being inside the house. In case of emergency, it is possible for gas alarms to trigger the buzzer or voice alarm inside. If microcomputer meters and gas alarms are connected when installed, it is safer because they will trigger an alarm and stop the gas in case of gas leaks.

Q Is it okay to use spray pesticides?

A When using spray pesticides, please cover the gas alarm with a plastic bag because there are cases when the gas alarm will emit an alarm. (After spraying and ventilating the space, please remember to remove the plastic bag.)

Q I want to install a gas alarm. What points should I consider when selecting a product?

A For gas alarms and CO alarms, please purchase products with a KHK mark or JIA mark. When purchasing with a gas dealer (gas company or LPG dealer), it is best as they can install and inspect the device.

Q Can you adjust the audio volume of the gas alarm?

A The volume of the audio alarm is set as the same as a wake-up alarm, at 70db or more, so that it can be heard in the day or at night. It is not possible to adjust the volume of the alarm.

Q The expiration date has passed for the gas alarm that was installed when I moved into this residence. Who can replace it?

A In the case of home owners installing a gas alarm, it is possible for the resident to install it themselves. Please confirm with the management company or landlord.

Q I was recommended to lease the gas alarm, but is it possible to purchase this device?

A It is also possible to purchase. Please consult with a gas dealer. Even when purchasing, please exchange the alarm before the expiration date.

Q What are CO alarms?

A CO is a powerfully toxic gas that occurs during incomplete combustion of objects or gases. Because it is colorless and odorless, it is impossible to detect that CO has been emitted. CO alarms are safety devices that can detect CO that humans cannot and quickly notify surrounding people about the danger. Accidents caused by CO poisoning occur each year. Please consider the alarm as a protection against danger.

Q Where can I purchase CO alarms?

A You can purchase from the LPG dealer or City Gas service shop that currently provides you gas. Please confirm the type of gas.

Q Are there battery-type alarms?

A Depending on the purpose, there are battery-type alarms. There are both alarms for City Gas and LPG. Please inquire with the LPG dealer or City Gas service shop that is currently providing your gas for details.

Q Is installation of CO alarms mandatory?

A There are no legal requirements to install CO alarms. However, they are recommended in cases of combustors being indoors as it can be difficult to notice CO leaks as the gas is colorless and odorless.

Q What should I do if the CO alarm is triggered?

A Stop using gas devices, open a window, and ventilate the space. Please contact the gas company or gas dealer if it does not stop ringing.

Q Is it possible to use CO alarms with overseas certifications in Japan?

A It is possible to use such alarms because there are no legal requirements to install CO alarms. However, when using an alarm in Japan, it is recommended to use one with a green label (product certified by High Pressure Gas Safety Institute of Japan) or JIA certificate (product certified by Japan Gas Appliances Inspection Association).

Q What is the difference between CO (carbon monoxide) and carbon dioxide?

A Carbon dioxide normally exists in the air and is a very stable gas chemically. However, high concentrations can cause poisoning and may be fatal depending on the circumstances. On the other hand, CO (carbon monoxide) is a chemically unstable gas that occurs by incomplete combustion of combustors, etc. It easily adheres to the hemoglobin in the blood and can cause lack of oxygen in the body. Therefore, it can be fatal even in low concentrations.

Q Is CO (carbon monoxide) lighter than air?

A It is around the same specific gravity as air. However, combustion exhaust gas CO is light due to its high temperature, so it tends to accumulate near the ceiling.

Q How do you prevent CO (carbon monoxide) poisoning?

A When using gas devices, please be sure to use the ventilation fan. Also, install effective CO equipment for preventing accidents and clean and regularly inspect gas devices and exhaust ducts, etc.

Q Is the responsibility of handling expired alarms on the gas dealer?

A In the case of a customer owning the alarm, the ultimate responsibility lies on the customer. However, gas dealers have a duty to spread information to customers upon beginning to provide service, and at least once every 1-2 years. This information should include basic precautions related to management and inspection of gas consumption equipment. Also, the notice should include information about installation location of gas alarms and confirming expiration dates.

LPG Act Enforcement Guidelines Article 27 (Details of Spreading Awareness) 2.

Basic precautions related to management and inspection of gas consumption equipment
LPG Act Notice (related to guidelines) Article 27 (Details of Spreading Awareness) (12)

(4) Confirm that gas alarms are not yet expired.

Q For general residences (houses), are gas alarm devices mandatory to install?

A Installation of gas alarms in basements, etc. and shared (group) residences are mandatory under the guidelines of the LPG Act. However, installation is not mandatory in general residences (houses), although many are installed as part of voluntary safety activities by gas dealers. Even without legal requirement, the use of gas alarms have spread to reach nearly 100% of houses by 1998. However, since that time, the rate of spread has declined, perhaps as fears were eased. Currently, installation of gas alarms is once again being urged.

Q Is installation of gas alarm mandatory at shared (group) residences?

A In principle, installation is mandatory as a facility in Article 86 (See page 6) of the Enforcement Guidelines of the LPG Act.

Q What should be watched during new construction?

A Please position power outlets for gas alarms from the planning stage in an appropriate location in the kitchen.

Q Is there any equipment that do not require installation of gas alarms?

A In principle, facilities included in Article 86 of Enforcement Guidelines of the LPG Act (See page 6) are required to install gas alarms. However, there are cases when installation is not required, such as outdoor facilities or certain connection methods. Please see Article 12 of the Public Notice Establishing Details of Technological Standards related to Supply/Consumption and Special Residential Supply Equipment (Public Notice No. 123) of the LPG Act for details.

Q What will happen if you continue use of alarms after expiration date?

A Gas sensors that detect gases vary from unit to unit. However, some will deteriorate with age and have increased false alarms. Therefore, we recommend regular exchanges every five years.

Q Installation of residential fire alarms is mandatory. Why aren't gas alarms mandatory?

A Residential fires occur over 10,000 times each year. As aging population progresses, the number of fatalities due to fires was 1,000 or more. Since 2006, the installation of residential fire alarms has been mandatory in order to protect lives and property from fires. On the other hand, gas alarms have maintained a high rate of adoption through everyone's hard work. Consumers tend to select energy based on convenience and costs. Installation of gas alarms are not mandatory because there are many options such as City Gas and electricity. However, for LPG, the installation of gas alarms are, in principle, mandatory in public buildings, etc.

Q I am a gas dealer. Why must we recommend the installation of gas alarms?

A The LPG Act, which regulates the sale of gas and sale/production of equipment for general consumers, requires dealers to recommend installation to improve public welfare by preventing disasters. The Ministry of Economy, Trade and Industry aims to construct a regulatory system that encourages voluntary improvements to safety while limiting the number of regulations as much as possible. This is more clearly expressed in the "LPG Dealer Safety Guidelines" published each year. In this, the spread of gas alarms is recommended for being effective in preventing gas accidents.

1. Verification, etc. when completing installation

Verification, etc. when completing installation or inspecting gas leak fire alarm equipment required to be installed by the Fire Services Act/Gas Business Act is categorized as either exterior verification and functionality verification. The verification items, categories, methods, and clearance standards are based on the following laws and ordinances.

“Public Notice Establishing Specifications of Verification Reports for Fire Safety Equipment”

- Verification standards are based on appendix 12 of the Public Notice.
- The verification results report is based on attached form No. 12 of the Public Notice. (P39)
- Inspection (verification) is, in principle, conducted by or in the presence of a fire safety equipment technician (Grade A No. 4 Type fire equipment technician) during installation of fire safety equipment.
- Tasks considering installing or maintaining gas leak fire equipment are the following performed by a Grade A No. 4 Type fire equipment technician. However, installation or maintenance does not include power source operations.
 - (1) Installation of detector (alarm)
 - (2) Installation of relay
 - (3) Installation of receiver
 - (4) Connection of detector, relay, and receiver, etc.
 - (5) Repair and performance adjustments on equipment
 - (6) Exchange of parts

Further, Grade B No. 4 fire equipment technicians can also perform (5) and (6).

2. Inspection

Inspections confirm whether the fire safety equipment, etc. meets the technological standards of the Fire Services Act. There are (1) exterior inspections, (2) functionality inspections, (3) comprehensive inspections. Inspection standards and inspection details, etc. are based on the following laws and ordinances.

Attached form 11-2 of the “Specifications of inspection forms attached to fire safety equipment, etc. inspection results report and inspection standards for fire safety equipment, etc.”, “Inspection details for fire safety equipment”, and “Public notice establishing inspection for attached to inspection results report and inspection standards for gas leak/fire alarm equipment”

- Technicians who can inspect this equipment include Grade A No. 4 Type and Grade B No. 4 Type fire equipment technicians and No. 2 type fire equipment technicians.
- The inspection period is within the following periods based on the details of the inspection and the method category.
 - (1) Exterior inspection and functionality inspection (6 months)
 - (2) Comprehensive inspection (1 year)
- For the report to the fire safety institution, the person affiliated with the protected facility must record the inspection results on the maintenance register and report them to the fire department chief or fire commissioner once a year for designated facilities and once every three years for other facilities. (Article 31-6 of the Enforcement Guidelines of Fire Services Act)

3. Maintenance & management

The daily maintenance and management of all gas leak alarm equipment is the most important means of preventing accidents beforehand. There are exchange dates for alarms. Exchanging expired alarms is the central pillar to maintenance and management. (Exchange date is displayed on the unit)



Form for verification
results report

*Example of form
used in Japan

Attached form No. 12 ①

Gas leak fire alarm equipment verification results report

Verification date Date:

Verification executor

Address

Name Seal

Purpose	() Page	Number of stories	Basement	Floor		
Total area of basement		m ²				
Receiver	Spare power source	Format	V AH	Rated voltage	AC V	DC V
	Number of lines					
Relay device	Line	Power cord	Custom type Receiver provision type	Spare power source	V	AH
	Other types					
Detector	Detected gas	For City Gas	Gas lighter than air		Units	
			Gas heavier than air		Units	
	Other types					
Alarm device	Voice alarm Device	Amplifier	Rated voltage		Rated output	
			AC V	DC V	W	
		Speaker	Phone-type (W)	Cone-type (W)	Other (W)	
	Units		Units	Units		
	Gas leak Display light	Relay peripherals		Other types		
		Units		Units		
Detection zone Alarm device	Detector peripherals		Other types			
	Units		Units			

Gas leak fire alarm equipment ②				
	Verification item	Model/capacity, etc. details	Results	
Exterior verification	Alarm zone	Setting alarm zone	_____	
	Receiver	Installation location	_____	_____
		Surroundings/operationality	_____	_____
		Installation status	_____	_____
		Composition/performance	_____	_____
		Operations portion	Height from floor	m
	Relay device	Installation location, etc.	_____	_____
		Composition/performance	_____	_____
		Spare items, etc.	_____	_____
	Power cord	Standard power source	V	_____
Emergency power source type		Self-power generation equipment/ storage battery equipment/fuel cell equipment	_____	
Detector	Monitoring status		_____	
	Installation status	Relative weight of detected gas against air is less than 1	_____	
		Relative weight of detected gas against air is 1 or more	_____	
	Composition/performance		_____	
Alarm device	Voice alarm Device	Amplifier	Installation location, etc. _____ Structure _____	
		Speaker	Installation location, etc. _____ Structure _____	
	Gas leak Display light	Installation location, etc. _____		
		Structure _____		
	Detection zone Alarm device	Installation location, etc. _____ Structure _____		
Functionality verification	Wire	Transmission wire Verification	Verification line - 1 _____ Verification line - 2 _____ Verification line - 3 _____	
		Receiver	Gas leak light	_____
			Zone display device operation status	_____
		Main sound device ringing status	_____	

Gas leak fire alarm equipment ③				
	Verification item	Model/capacity, etc. details	Results	
Functionality verification	Receiver	Gas leak Display verification	Operational status of other lines during verification	_____
		Circuit conduction verification	Circuit conduction status	_____
			Operational status of other lines during verification	_____
		Simultaneous operation verification		_____
		Spare power source verification	Power automatic switching functionality	_____
	Terminal voltage/capacity		V AH	
	Trouble display verification	Emergency power source verification	Power automatic switching functionality	_____
			Status of fuse severance for circuits that provide electricity to external loads of relay devices	_____
		Status of power severance of main power source of relay by another item		_____
		Status of detector power severance		_____
Peripheral device verification		_____		
Mutual operation verification	Mutual communication status		_____	
	Voice alarm device audio status		_____	
Relay device	Circuit conduction verification		_____	
Alarm device	Alarm zone			
	Detector operation verification			
	Voice alarm device			
	Gas leak display light			
Notes	Detection zone alarm device (dB)			

Notes 1. The size of this paper is A4 for Japanese industry standards.
 2. Circle the appropriate item in the columns with options.
 3. Enter passage or failure into the results column
 4. Attach verification results report for emergency power (besides internal units) and wiring.
 5. Attach verification results report on operations board if installed.

Please confirm with the main text when installing alarms because the articles of affiliated laws are article summaries.

1. LPG Act-related

Law LPG Act

(Act No. 149, December 1967, Revised Act No. 37, June 2019)

Article 27 (Duties of safety operators) = • Gas dealers shall survey whether gas consumption equipment (including alarms) meets the technological standards established by Ministerial Ordinance and spread awareness to consumers of required items to prevent accidents

Article 39 (Sales restrictions) = • Parties that manufacture, import, or sell LPG devices, etc. (manufacturers, etc.) are prohibited from selling or displaying products besides those with a label as in Article 48

Article 46 (Duty to comply with standards, etc.) = • Reporting businesses must comply with the technological standards established in the Ministerial Ordinance. • Reporting businesses must survey LPG devices, etc. that are manufactured and prepare and save a survey record

Article 48 (Label) = • Reporting businesses are able to attach labels that indicate they fulfilled the regulations in Article 46

Cabinet Order Enforcement Order for LPG Act

(Cabinet Order No. 14, February 1968, Revised Cabinet Order No. 183, December 2019)

Article 3 Appendix 1 No. 10 Alarms designated as LPG devices, etc.

Ministerial Order Enforcement Guidelines of the LPG Act

(Ministry of Economy, Trade and Industry Ministerial Order No. 11, March 1997, Revised Ministerial Order No. 36, September 2019)

Article 27 (Details of Spreading Awareness)= • Items related to the applicability of combustors to be used to LPG and basic precautions related to management and inspection of gas consumption equipment

Notice Interpretation notice related to Article 27 of the Enforcement Guidelines of the LPG Act

“Operation of functionality standards for LPG Act (NISA, No. 6 of 7/25/2007)”

(12) Confirm and be aware of the following items related to LPG leak alarms:

1. Confirm the alarm is installed in an appropriate position
2. Insert power plug of alarm into standard outlet at all times
3. Do not place objects around the alarm
4. Confirm that the alarm is not yet expired

Article 37 (Method of gas consumption equipment survey) = • Survey the installation status of alarms at least once every four years

Article 44 (Technological standards for gas consumption equipment) = • Combustors are to be used in the detection zone of the alarm. • Alarms shall be installed in rooms with combustors in the basements, etc. and buildings/facilities in the following article as established by the Public Notice

Article 86 (Designation of facilities/buildings subject to installation) = • 1: Theaters, film theaters, public halls/ • 2-4: Cabarets, restaurants, department stores • 5: Shared residences, guesthouses, hotels, accommodations. • 6-8:

Schools, hospitals, libraries. • 9-11: Public baths, stations, shrines, churches. • 12: Offices where total area is 1000 square meters or more

Ministerial Order Ministerial Order related to technological standards of LPG devices, etc.

(Ministry of Economy, Trade and Industry Ministerial Order No. 23, March 1968, Revised Ministerial Order No. 17, July 2019)

Article 11 (Technological standards of alarms) Appendix 3 = • Triggers when concentration of LPG is within a scope of 1/100 to 1/4 of the Lower Explosive Limit (LEL). Does not trigger when less than 1/100 of LEL. Alarm triggers within 60 seconds of exposure to triggering concentration of LPG

Public Notice Public Notice Establishing Details of Technological Standards related to Supply/Consumption and Special Residential Supply Equipment

(Ministry of Economy, Trade and Industry Public Notice No. 123, March 13, 1997, Revised Public Notice No. 86, March 2017)

Article 3 (Scope of basements, etc.) = • Underground shopping centers (total area 1,000square meters or more) or structures facing underground paths that are continuous with the underground floors of buildings that designated use (designated underground shopping centers, etc.).

• Underground floors of designated use buildings with a total floor area of 1,000 square meters (underground basements, etc.). • Facilities other than No. 2 above (other basements)

Article 10 (Means of connecting terminal gas valve with combustor) = • The terminal gas valve (excluding the following items) and portable combustors are connected by a, b, or c below.

Article 12 (Combustors that do not require alarms installed) = • Items installed outdoors. • Items connected to terminal gas valve by the methods listed in Article 10, and those with extinguisher safety devices. • Non-permanent facilities (facilities included in Article 3 No. 1 a-h; excluding items installed in buildings). • Combustors installed in bathrooms

Article 13 (Method of installing combustor/alarm) = • Detection portions of integrated unit alarms and segmented unit alarms shall be installed within 4m horizontal distance from combustors and the top edge of the detection portion should be installed within 30cm of the floor. • Method of installing relay. • Method of installing Grade 1 receivers. • Method of installing gas leak display lights. • Method of installing detection zone alarm device. • Method of wiring. • Power. • Emergency power. • Standard latency time is within 60 seconds. • Regulations for gas leak display. • Alarm zone is 600 square meters or less, etc.

Notice Operation and interpretation of Enforcement Guidelines

(Article 43 No. 151, February 1968; Revised April 2000, No. 12, Agency Proposal No. 2, April 17 2000) • Shared residences interpretation

2. Gas Business Act-related

Law Gas Business Act

(Act No. 51, December 1954, Revised Act No. 41, May 2017)

Article 159-2 (Spreading Awareness and Surveys related to Gas Consumption Equipment)

Cabinet Order Gas Business Act Enforcement Order

(Cabinet Order No. 68, April 1954, Revised Cabinet Order No. 40, March 2017)

Ministerial Order Gas Business Act Enforcement Principles

(Ministry of International Trade and Industry Ministerial Order No. 97, October 1970, Revised Ministerial Order No. 17, July 2019)

Article 202 (Technological Standards of Gas Consumption Equipment) = • No. 8: Gas leak alarm equipment complying with standards established in the Public Notice shall be installed by the method established in the Public Notice in designated underground shopping centers, etc. or designated basements, etc. established by the building categories that have combustors. • No. 10: Automatic gas shutdown devices or gas leak alarms shall be installed by the method established in the Public Notice in the following cases where combustors are present. (a. Install in super high rise buildings as established by building categories (cooking space in residential portions) b. Install in designated large-scale structures)

Ministerial Order Ministerial Order Establishing Technological Standards for Gas Devices

(Ministry of International Trade and Industry Ministerial Order No. 111, May 1937, Revised Ministerial Order No. 8, March 2018)

Article 52 (Location of installing pipeline) = • Item 2: Install pipeline that delivers gas to designated underground shopping centers, etc. and designated basements, etc. through the exterior wall in the detection zone of appropriate gas leak alarm equipment installed by appropriate methods • Item 3: Pipelines in which the maximum used pressure was mid-pressure shall be installed to penetrate the exterior wall of the building in the detection zone of automatic gas shutdown devices or gas leak alarms. In addition, if the pipeline has a connecting joint besides welding in the subject building, the connecting joint must be within the detection zone.

Public Notice Public Notice Establishing Installation Method and Certification of Gas Leak Alarm Equipment, etc.

(Ministry of International Trade and Industry Public Notice No. 263, June 1981, Revised Public Notice No. 46, July 2019)

Article 2 (Gas Leak Alarm Equipment Standards) = • No. 1: Detector standards → Detector triggers reliably at 1/4 or higher Lower Explosive Limit of gas concentration and does not trigger at 1/200 or lower. Also, equipment must trigger signal within 60 seconds when exposed to gas concentration that triggers the signal. • No. 2: LPG detector • No. 3: Relay device standards • No. 4: Receiver standards

Article 3 (Installation method for gas leak alarm equipment) = • No. 1: Installation method for detector → Within 8m horizontal distance from combustor, bottom of detector installed in a position within 30cm from the ceiling. In case that gas is heavier than air, the top edge of the detector within 4m horizontal distance from the combustor shall be installed within 30cm from the floor • No. 2: Installation method of relay device • No. 3: Installation method of relay • No. 4: Installation method of alarm equipment • No. 5: Wiring • No. 6: Power source • No. 7: Emergency power source • No. 8: The total standard latency of detectors and receivers for alarms shall be within 60 seconds • No. 9: Displays of alarm equipment • No. 10: Alarm zone

Public Notice Items Establishing Standards and Installation Methods of Gas Leak Alarms

(Ministry of International Trade and Industry Public Notice No. 578, September 2000, Revised Public Notice No. 46, July 2019)

Article 2 (Standards of Gas Leak Alarms) = • No. 25: Detector triggers reliably at 1/4 or higher Lower Explosive Limit of gas concentration and does not trigger at 1/200 or lower

Article 3 (Standards of LPG alarms) = • Complies with technological standards established in Article 46-1 of the Ministerial Order of the Ministry of Economy, Trade and Industry for the Act on the Securing of Safety and the Optimization of Transaction of Liquefied Petroleum Gas

Article 4 (Installation Method for Gas Leak Alarms) = • No. 1: Installed within 8m horizontal distance of the combustor with the lower edge of the gas detector installed within 30cm of the ceiling • No. 2: In case that gas is heavier than air, install within 4m horizontal distance from the combustor so that the upper edge of the portion that detects gas is installed within 30cm of the floor

Public Notice Item Establishing Categories for Buildings Using Gas

(Ministry of International Trade and Industry Public Notice No. 461, November 1985, Ministry of International Trade and Industry Public Notice No. 238, June 2003)

Article 1 = • No. 1: Designated underground shopping centers, etc. • No. 2: Designated basements, etc. • No. 3: Super high-rise buildings. • No. 4: High rise buildings • No. 5: Designated large-scale buildings • No. 6-11: Omitted

3. Fire Services Act-related

Law Fire Services Act

(Act No. 186, July 1948, Revised Act No. 34, May 2009)

Article 17 (Installation and Maintenance of Fire Safety Equipment, etc.)

Article 17-2 (Exceptions of Existing Protected Facilities)

Article 17-3-3 (Inspection of and Reporting on Fire Safety Equipment, etc.)

Article 17-5 (Work, etc. Restrictions of Persons Without Fire Equipment Technician's License)

Article 21-2 (Inspection of Equipment, etc. Subject to Certification)

Cabinet Order Enforcement Order of Fire Services Act

(Cabinet Order No. 37, March 1961, Revised Cabinet Order No. 183, December 2019)

Article 6 (Designation of Protected Facilities) Appendix 1. Protected Facilities 16-2, 16-3, etc.

Article 7 (Types of Fire Safety Equipment, etc.) Gas leak fire alarm equipment, etc.

Article 21-2 (Standards related to gas leak alarm equipment)

Article 35 (Protected Facilities, etc. that Require Fire Defense Institution Inspection)

Article 36-2 (Work and Tasks that Cannot be Performed By Persons Who Are Not Fire Equipment Technicians)

Article 37 (Scope of Machinery and Equipment Subject to Certification) Gas leak fire alarm equipment, etc.

Ministerial Order Enforcement Order of Fire Services Act

(Local Government Ministerial Order No. 6, April 1961, Revised Ministerial Order No. 63, December 2019)

Article 24-2-2 (Protected facilities, etc. that do not require installation of gas leak fire alarm equipment)

Article 24-2-3 (Details of Standards Related to Gas Leak Fire Alarm Equipment) Installation method of detector, relay, receiver, and alarm device

Article 24-2-4 (Maintenance Standards of Gas Leak Fire Equipment)

Article 31-3 (Notification and Inspection of Fire Safety Equipment, etc.)

Article 31-4 (Inspection and Report of Fire Defense Equipment, etc.)

Article 33-3 (Types of Construction and Equipment Based on Types of Licenses)

Construction and Installation for Gas Leak Fire Alarm Equipment - Class A No. 4 Type Fire Equipment Technician
Maintenance of Gas Leak Fire Alarm Equipment - Class A No. 4 Type Fire Equipment Technician

Ministerial Order Technological standards of relays

(Local Government Ministerial Order No. 18, June 1981, Revised Ministerial Order No. 19, June 2019)

Ministerial Order Technological standards of receivers

(GP Type Class 3 Receiver, etc.) (Local Government Ministerial Order No. 19, June 1981, Revised Ministerial Order No. 19, June 2019)

Article 6 (Gas leak display) Gas leak lights on G, GP, and

GR types are yellow

Article 11 (Function of G-type receiver) = • No. 1: Gas leak display verification function • No. 2: Signal circuit conductive verification function • No. 3: Simultaneous display of gas leak signal from second line • No. 4: Trouble display light • No. 5: Within 60 seconds to gas leak display

Ministerial Order Ministerial Order Related to Fire Defense Equipment, etc. With Fire Safety Functionality Required in Designated Shared Residences

(Ministry of Internal Affairs and Communications No. 40, March 2005) Revised Ministerial Order No. 34, June 2018

As the legal framework of the Shared Residences No. 220 Special Notification, some of the installation overview and technological standards are displayed for “sprinkler facilities for shared residences,” “automatic fire reporting equipment for shared residences,” and “residential automatic fire reporting equipment and emergency alarm equipment for shared residences.” The fire safety equipment, etc. that is exempted based on the structure and number of floors of the residence.

Public Notice Types of Fire Defense Equipment, etc. that Fire Defense Equipment Technicians or Certificated Technicians Inspect

(Fire and Disaster Management Agency Public Notice No. 10, May 2004, Revised Public Notice No. 16, April 2014)

Public Notice Standards of Relays and Receivers in Gas Leak Fire Alarm Equipment that Detects LPG and Gas Leak Detectors

(Fire and Disaster Management Agency Public Notice No. 2, June 1981, Revised Public Notice No. 42, June 2019)= • No.1 Purpose • No. 2: Detector structure and performance; Triggers reliably alarm when Lower Explosive Limit is 1/4 or more; does not trigger at 1/200 or less, etc.

Public Notice Specifications of Verification Reports for Fire Safety Equipment

(Fire and Disaster Management Agency Public Notice No. 4, December 1989, Revised Public Notice No. 2, June 2019)

Public Notice Specifications of Inspection Forms Attached to Inspection Results Reports and Inspection Standards of Fire Safety Equipment, etc.

(Fire and Disaster Management Agency Public Notice No. 14, October 1975, Revised Public Notice No. 5, April 2019)

4. Overview of legal structure related to preventing residential fires

○ Law

Law Revising Portion of Act on the Prevention of Disaster in Petroleum Industrial Complexes and Other Petroleum Facilities (Act No. 65 2004)

Overview	<ul style="list-style-type: none"> ○ Duties of persons affiliated with residence for installation and maintenance of residential disaster prevention equipment ○ Standards related to installation and maintenance of residential disaster prevention equipment are established by local municipality ordinance based on standards established by Cabinet Order
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Cabinet Order Cabinet Order related to Establishment of Related Cabinet Orders Corresponding with Portion of Laws that Revise part of the Act on the Prevention of Disaster in Petroleum Industrial Complexes and Other Petroleum Facilities

(Cabinet Order No. 325 2004) etc.

Overview

- Establish residential disaster prevention equipment mandatory of persons affiliated with residences (Required to comply with technological standards established by Ministry of Internal Affairs and Communications)
- Residential disaster alarm (i.e. residential fire alarm)
- Residential disaster reporting equipment (i.e. residential fire reporting equipment)
- The areas of residences where residential fire alarms or residential fire reporting equipment should be placed are as follows
 - (1) Room used for sleep

(2) Stairway of floor containing (1) (excludes if (1) is on an evacuation floor)

(3) Other areas deemed required (based on Ministerial Order)

- * Residents with automatic fire reporting equipment, etc. already, such as shared residences are exempt
- * It is possible for Fire Commissioner to exempt application based on position, structure, and equipment of residence
- * It is possible to add installation and maintenance standards of residential disaster prevention equipment in ordinances based on municipality climate and habitat
- Execution date is June 1, 2006 (Execution date for existing residences is delegated to ordinances)
- Added Fire Services Act Article 9-2 to construction standards related provisions (Enforcement Order of Building Standards Act)

○ Ministerial Order

Ministerial Order Establishing Standards Related to Enactment of Ordinance Related to Installation and Maintenance of Residential Disaster Prevention Equipment (Ministry of Internal Affairs and Communications Ministerial Order No.138, 2004, Revised Ministerial Order No. 11, February 2019)

Overview	<ul style="list-style-type: none"> ○ Regulates the areas of residences where residential fire alarms or residential fire reporting equipment should be placed is the first floor stairway if residents only sleep on third floor ○ Regulates details, etc. of installation methods for residential fire alarms and residential fire reporting equipment ○ Installation is exempted in cases of installing sprinkler equipment or automatic fire reporting equipment based on standards (includes shared residence equipment in each situation)
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Ministerial Order Establishing Technological Standards for Residential Fire Alarms and Residential Fire Reporting Equipment (Ministry of Internal Affairs and Communications Ministerial Order No. 11, January 2005) Revised Ministerial Order No. 35, August 2019

Overview	○ Regulates structure, performance, etc. of residential fire equipment and residential fire reporting equipment
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Ministerial Order Revising a Portion of the Ministerial Order Establishing Technological Standards for Residential Fire Alarms and Residential Fire Reporting Equipment (Ministry of Internal Affairs and Communications Ministerial Order No. 25, 2013)

Overview	○ Regulations were established corresponding with residential fire alarm being added to items subject of certifications
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○ Ordinance (example)

Partial revision of fire defense ordinance (example) (Fire Safety Ordinance No. 227 of December 15, 2004, Fire Safety Ordinance No. 50 of March 22, 2005)

Overview	<ul style="list-style-type: none"> ○ Comprehensively regulates standards of laws, Cabinet Orders, and Ministerial Orders (excluding standard Ministerial Orders) ○ Mandates efforts to install residential fire alarms in areas with significant risk of fire, such as kitchens, etc. ○ Exempts installation if shared residence sprinkler equipment, shared residence automatic reporting equipment, or residential automatic fire reporting equipment is installed
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○ **Technology guidelines**

Technology guidelines related to constant heat residential fire alarms (Fire Safety Ordinance No. 17, January 2005)	
Overview	Technology guidelines related to constant heat residential fire alarms and educational guidelines for the installation/maintenance of residential fire alarms in kitchens
Partial revision of technology guidelines related to residential fire alarms and residential sprinkler equipment (Fire Ordinance No. 17 and Fire Safety Ordinance No. 32 of January 2005)	
Overview	Partial revision of past guidelines for March 1991 Revoked “Certification of residential fire alarms” (Fire Ordinance No. 110, May 1991) and “Wall installation of residential fire alarms (items that possess heat sensors, etc.)” (Fire Ordinance No. 180, July 1999)

5. Housing Quality Assurance Promotion Act

Law Housing Quality Assurance Promotion Act
(Act No. 81, June 1999) Revised Act June 2019
Article 3 (Japan Housing Performance Display Standards)
Article 5 (Housing Performance Evaluation)

Public Notice Japan Housing Performance Display Standards
(Public Notice No. 1346, August 2001, Revised Public Notice No. 1, June 2019)
Appendix 1 (Items that should be displayed on new construction residences)
Appendix 2-1 (Items that should be displayed on existing residences)

Public Notice Evaluation method standards
(Public Notice No. 1347, July 2000, Revised Public Notice No. 781, November 2019)
No. 5 Evaluation method standards
2. Items related to safety during fires




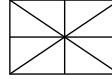





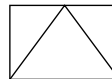
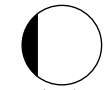


6. Damage insurance

Based on industrial damage insurance enrolled by each member company of Gas Alarm Industries Association of Japan










*List of municipalities where residential fire alarms are required to be installed in kitchens

Hokkaido prefecture	Sapporo-shi, Ebetsu-shi, Chitose-shi, Eniwa-shi, Kitahiroshima-shi, Ishikari-shi, Tobetsu-cho, Shinshinotsu-mura
Miyagi prefecture	(All regions)
Chiba prefecture	Katsuura-shi, Otaki-machi, Onjuku-machi, Isumi-shi, Funabashi-shi, Matsudo-shi, Mobarashi, Ichinomiya-machi, Mutsuzawa-machi, Chosei-mura, Shirako-machi, Nagara-machi, Togane-shi, Kujukuri-machi, Oamishirasato-shi, Sammu-shi, Ishikawa-shi, Urayasu-shi, Chiba-shi, Chonan-machi, Shibayama-machi
Tokyo prefecture	Tokyo wards, Tabe region, Mitaku-mura, Oshima-machi, Hachijo-machi
Kanagawa prefecture	Yokohama-shi, Kawasaki-shi, Yokosuka-shi, Zushi-shi, Kamakura-shi, Sagami-hara-shi, Miura-shi, Hadano-shi, Hayama-machi
Aichi prefecture	Nagoya-shi, Toyohashi-shi, Okazaki-shi, Kasugai-shi, Toyokawa-shi, Toyota-shi, Nishio-shi, Konan-shi, Tahara-shi, Nisshin-shi, Togo-cho, Miyoshi-shi, Hekinan-shi, Kariya-shi, Anjo-shi, Chiryu-shi, Takahama-shi
Shiga prefecture	Kusatsu-shi, Moriyama-shi, Ritto-shi, Yasu-shi
Kyoto prefecture	(All regions)
Osaka prefecture	Osaka-shi
Hyogo prefecture	Kobe-shi, Nishinomiya-shi, Takarazuka-shi, Miki-shi, Sayo-cho, Aioi-shi, Tatsuno-shi, Taishi-cho/Shiso-shi, parts of Kamigori-cho



■ ガス漏れ警報器及び関連機器の図記号例

 ガス警報器 一体型・分離型	 検知器	 中継部	 受信部	 ガス漏れ表示灯	 制御部
 プザー、ランプ内蔵型 警報器	 検知器壁掛型	 中継器	 受信部	 表示灯	 ガス警報器連動遮断弁
	 検知器分離型	(1) 複数個で一体のものは、 個数を傍記する。 (2) ガス漏れ表示灯の中継器 にあってはLを記入する。			

■ 住宅用火災警報器の記号と名称

記号	名称
	住宅用火災警報器(煙式)
	住宅用火災警報器(熱式)
	住宅用火災(煙式)・ガス・CO警報器
	住宅用火災(熱式)・ガス・CO警報器
	住宅用火災警報器(煙式) 注)CO警報付きの場合に使用
	住宅用火災警報器(熱式) 注)CO警報付きの場合に使用
	住宅用火災警報器(煙式) 注)特記事項付きの場合に使用
	住宅用火災警報器(熱式) 注)特記事項付きの場合に使用
	補助警報装置

適応用途
寝室・階段・台所・居間・廊下
台所・車庫
台所・居間
台所
台所・居間
台所

壁付けを区別する場合は、 →  のように一部を太くする。




埋込型を区別する場合は、 →  のように  を入れる。

■ 備考

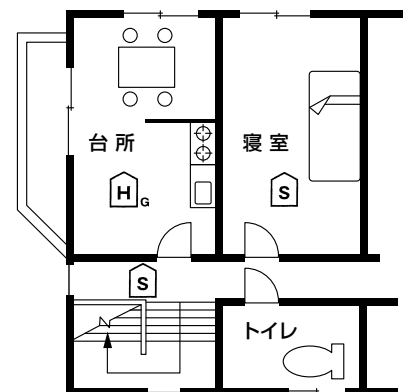
凡例の備考欄に下記から該当する項目を記入してください。


- ・電池式
- ・LPガス用
- ・100V式
- ・CO警報付き
- ・都市ガス用
- ・特記事項付きの場合はその内容(例 連動型)

■ 凡例の記載例

凡例		
記号	名称	備考
	住宅用火災警報器(煙式)	100V式 連動型
	住宅用火災(熱式)・ ガス・CO警報器	100V式 都市ガス用 連動型
	補助警報装置	100V式

■ 平面図例



凡例		
記号	名称	備考
	住宅用火災警報器(煙式)	電池式

•Please make inquires about gas alarms to the following:
(April 2022)

Corporation Name	URL
Aichi Tokei Denki Co.,Ltd.	www.aichitokei.co.jp/
AIPHONE CO.,LTD.	www.aiphone.co.jp/
Azbil Kimmon Co.,Ltd	ak.azbil.com/
Iwatani Corporation	www.iwatani.co.jp/
Katsura. Co.,Ltd.	www.katsuraseiki.co.jp/
NEW COSMOS ELECTRIC CO.,LTD	www.new-cosmos.co.jp/
Nissha FIS, Inc.	https://www.fisinc.co.jp/en/
NITTAN COMPANY, LIMITED	www.nittan.com/
NEMOTO SENSOR ENGINEERING CO.,LTD.	www.nemoto.co.jp
NOHMI BOSAI LTD.	www.nohmi.co.jp/
Panasonic Corporation	www.panasonic.co.jp/ew/
Figaro Engineering Inc.	www.figaro.co.jp/
HOCHIKI CORPORATION	https://www.hochiki.co.jp/global/
MSK Technologies Co.,Ltd	www.msk.co.jp/
YAZAKI Energy System Corporation	www.yazaki-group.com/
RIKEN KEIKI Co.,Ltd.	www.rikenkeiki.co.jp/english
RICOH ELEMEX CORPORATION	www.ricohelemex.co.jp/



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