

# Gaseous Fire Extinguishing Systems Product Range Guide



**GAS DISCHARGING  
DANGER / DO NOT ENTER**



**NITTAN**



# GLOBAL LIFE SAFETY SOLUTIONS

## BUSINESS OVERVIEW

Since founded, the Nittan Group has dedicated itself to this foremost mission through and through. Our motto today is "Closest to Our Customer," which reflects our intent to engage with our feet planted even firmer to the ground. As our commitment to forging a safe and secure society, we have established the following management fundamentals:

Take action from the customer' s perspective

Improve quality in all products and services

Provide products sought by the customer and consideration of global environment preservation

Optimize Nittan Group organization to enable rapid response

We joined Secom Group in April 2012, and intend to take up the challenge of building new business models while further solidifying our industry-renowned brand image. For our future domain, we envision the merger of our previous fire protection business—with vigilance over residential and commercial building fires—to monitoring that can prevent disasters and crime. Our engagement will go further in proactive responses to environmental issues, energy conservation, and aging societies, as we reach beyond national borders and expand globally.

Beneath a mantle founded on safety and security, I personally promise you Nittan Group' s willingness to challenge all matters positively for the future in creating a comfortable, pleasant society. Thank you for your continued support to Nittan.

# FIRE EXTINGUISHING SYSTEMS



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In addition and as a completion to the fire protection solutions listed in this catalogue, NITTAN offers also a complete selection of advanced products.

For further information, please contact NITTAN overseas business division from:

<http://www.nittan.com>

# Gerbera (FK-5-1-12 Fire EXtinguishing System)

## Environmentally Friendly Fire Extinguishing System

### Features

- Gerbera—FK-5-1-12 Fire Extinguishing System—is a fire extinguishing system using a gaseous fire extinguishing agent of FK-5-1-12.
- It has an excellent environmental capability, i.e. Ozone Depletion Potential (ODP) is zero and Global Warming Potential for 100-year time horizon (GWP) is less than one.
- A necessary quantity of storage cylinder is almost same as that of the halogenated fire extinguishing system since the extinguishing concentration is low, hence cylinder space can be effectively utilized.
- Electrical insulation is high and no residual material remains after discharging fire extinguishing agent. This minimizes damage to delicate equipment furnished in the room.



### Applications

Gerbera is adapted to applications requiring the solution that is safe for people and the environment, as well as that is fast and efficient to critical equipment in the room.

- Telecommunication Facilities
- Generator Rooms (excluding Gas Turbine Room), Electric Rooms
- Server Rooms, Data Centers etc.

\* The system shall be installed in the place or a part thereof where the protected area is less than 1,000 m<sup>2</sup> and less than 3,000 m<sup>3</sup> and people do not stay at all times.

### Physicality Comparison Table

Fire Extinguishing Agent	Halogenated Agents			Inert Gas	
	HFC -23	Halon 1301	<b>FK-5-1-12</b>	Nitrogen	Carbon Dioxide
Molecular Formula	CHF <sub>3</sub>	CF <sub>3</sub> Br	CF <sub>3</sub> CF <sub>2</sub> C(O)CF(CF <sub>3</sub> ) <sub>2</sub>	N <sub>2</sub>	CO <sub>2</sub>
Molecular Weight	70	149	316	28	44
ODP	0	10	<b>0</b>	0	0
GWP	9100	4900	<b>Less than 1</b>	0	1
Design Concentration	16.2 %	5.0 %	<b>5.8 %</b>	40.3 %	34.0 %
Comparison of Cylinder Q'ty	1.6	1.0	<b>2.0</b>	4.0	2.6
Storage Cylinder Size	68 L	68 L	68 L	83 L	68 L
Pipe Type	Sch80	Sch40	Sch40	Sch80	Sch80

### Design Specification

Design Concentration	5.8 -10 %
Minimum Design Q'ty	0.84 kg/m <sup>3</sup>
Storage Cylinder Size	68 L (43 -95kg)
Filling Ratio	0.7 -1.6 L/kg
Pipe Type	JIS Sch40
Discharge Time	10 sec.

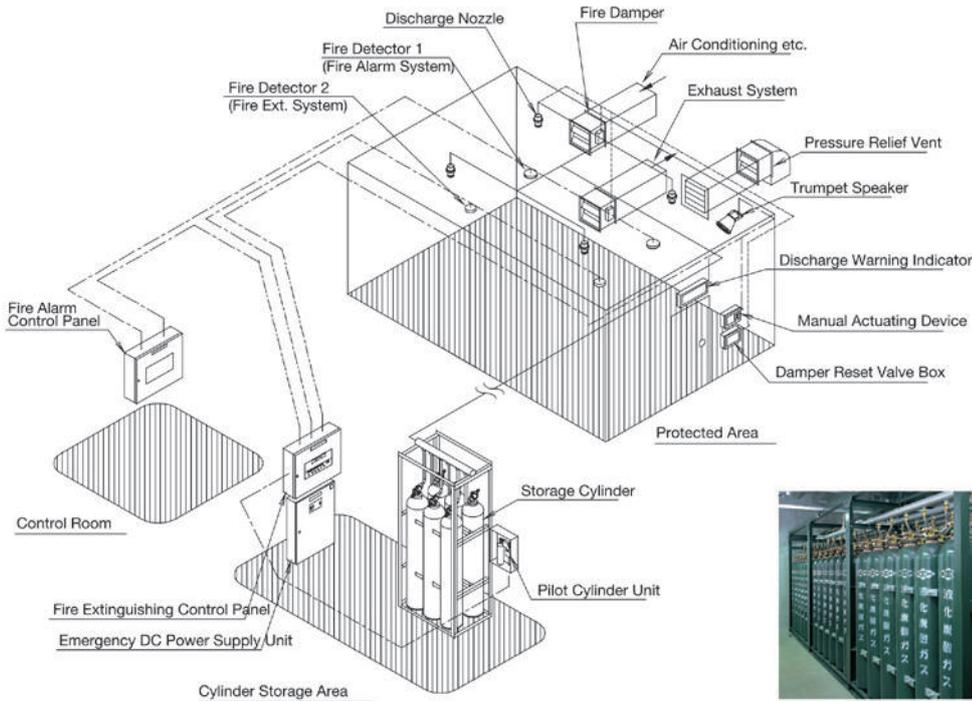
### Typical Physicality

Molecular Formula	CF <sub>3</sub> CF <sub>2</sub> C(O)CF(CF <sub>3</sub> ) <sub>2</sub>
Molecular Weight	316
Boiling Point	49 °C @ 1 atm
Freezing Point	-108 °C
Liquid Density	1616 kg/m <sup>3</sup>
Heat of Vaporization @ Boiling Point	88 kJ/kg

\* Typical physicality is measured at 25°C (except boiling point, freezing point and vaporization point)

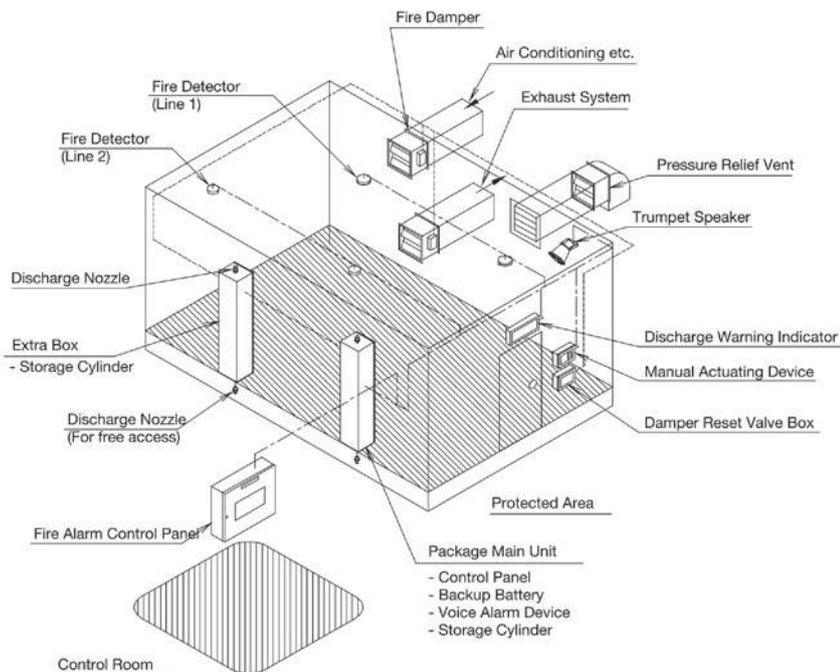
## Fixed System

Fixed systems are commonly used to protect large compartments and multiple partitions. The system is usually operated in automatic mode and activates if the fire extinguishing control panel receives two different signals from fire detectors. The pressure relief vent is required in a protected area in order to prevent a rise of internal pressure in excess of a specified value at the time of discharging.



## Package System

Package systems are commonly used to protect small compartments like a server room. The package has a built-in extinguishing agent and a control unit so that the installation become easy. Package units are equipped in the protected area. When the extinguishing agent with one main unit is short for the area, extra boxes are available to make up for the defect.



## Typical System Layout

• Following drawing shows typical gas suppression system configuration. Before designing system, the following differences are concerned;

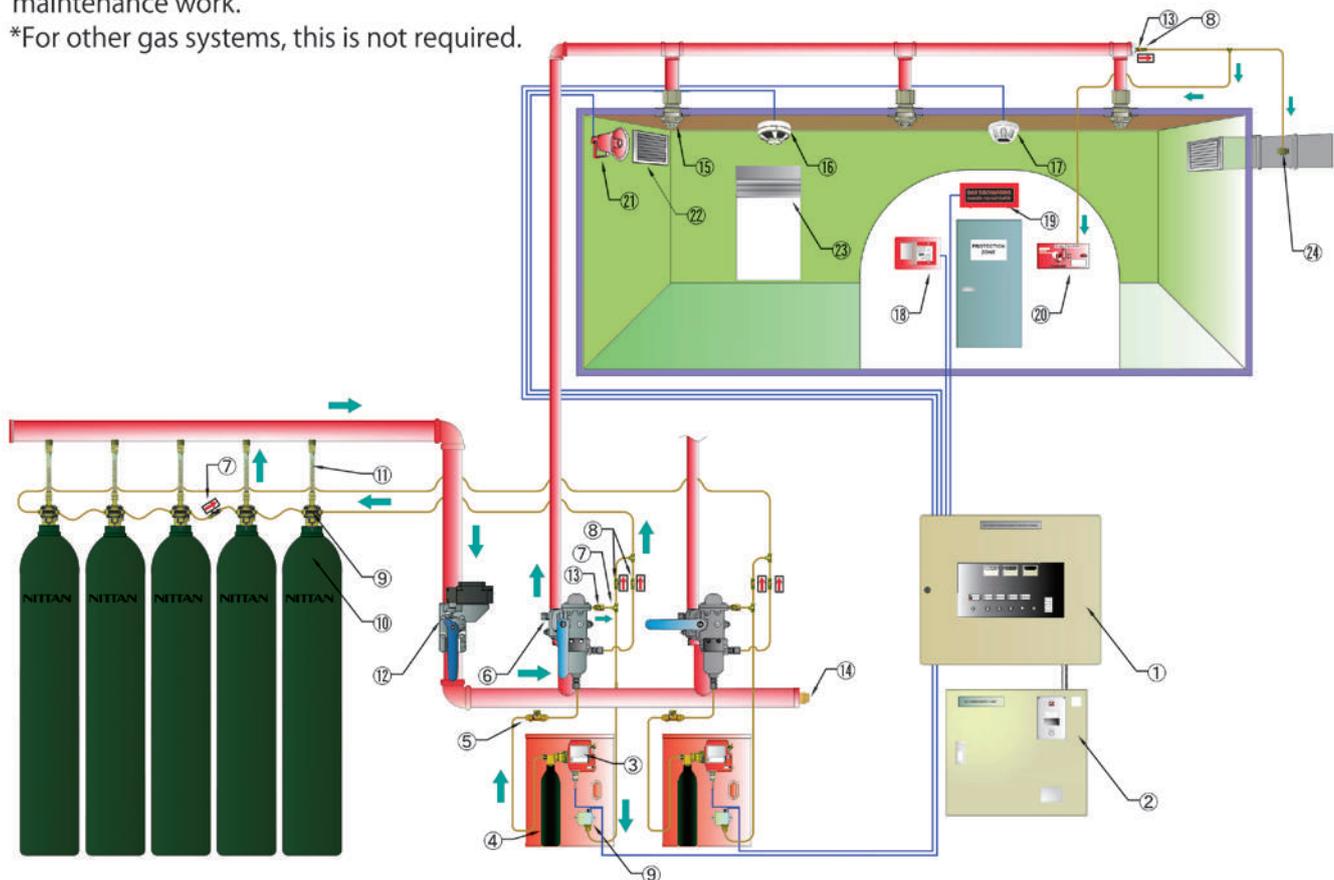
### 1. Pressure relief vent

For high pressure systems typified by N<sub>2</sub>, HFC-227ea, HFC-23 and FK-5-1-12, installation of pressure relief vent is required for prevention from demolition of components like wall, ceiling and door in protection zone.

### 2. Shut-off valve

CO<sub>2</sub> fire suppression system has higher harmful risk to human health due to principal of fire suppression is reducing Oxygen level. For more safety to operate CO<sub>2</sub> gas suppression system, we suggest customer to install "Shut-off valve" for prevention from unexpected CO<sub>2</sub> gas discharging and accident of suffocation on maintenance work.

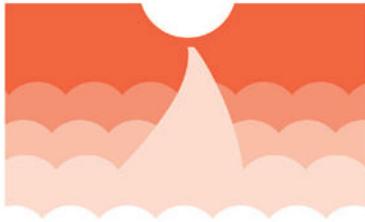
\*For other gas systems, this is not required.



## Typical System Components

1	Control panel
2	DC power supply unit
3	Cylinder valve releaser / 1L pilot cylinder
4	1L pilot cylinder
5	Relief valve
6	Selection valve
7	Three ways joint
8	Check valve
9	Cylinder valve releaser /Main cylinder
10	Cylinder
11	Guide pipe
12	Shut-off valve

13	Strainer
14	Safety valve
15	Discharge nozzle
16	Smoke detector
17	Heat detector
18	Manual Actuating Device
19	Gas discharge warning indicator
20	Damper Reset box
21	Speaker
22	Pressure releaf vent
23	Automatic shutter
24	Damper



# Gaseous Fire Extinguishing System

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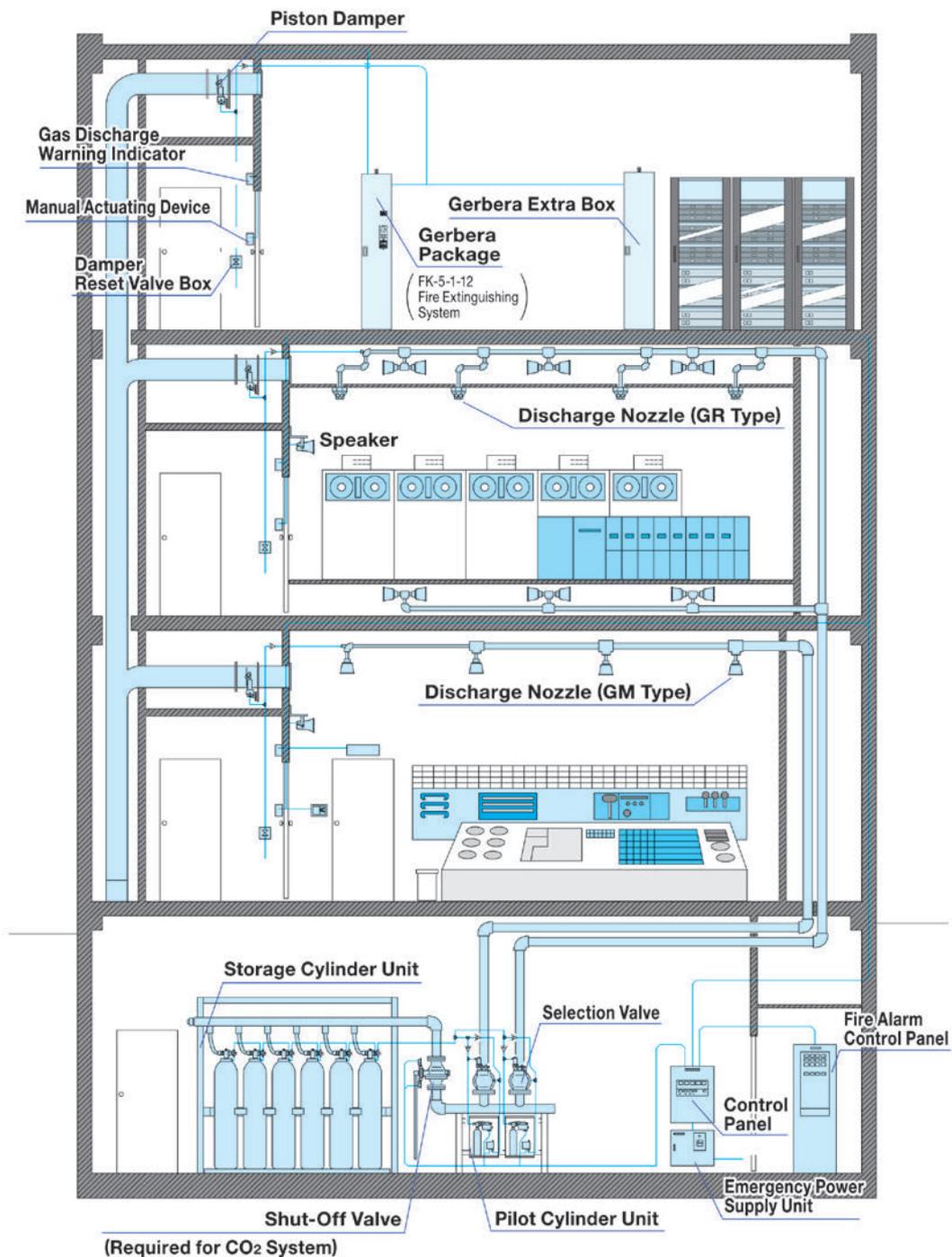
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# Gaseous Fire Extinguishing System

## System Configuration

Nittan gaseous fire extinguishing system consists of the gas storage cylinder unit, selection valves (to be installed where there are two or more discharge zones), shut-off valves (to be installed in case of CO<sub>2</sub> system), pilot cylinder units, manual actuating devices, discharge nozzles, discharge warning indicators, speakers, fire detectors, control panel (for electric control), emergency power supply unit, high pressure piping and electric wiring.

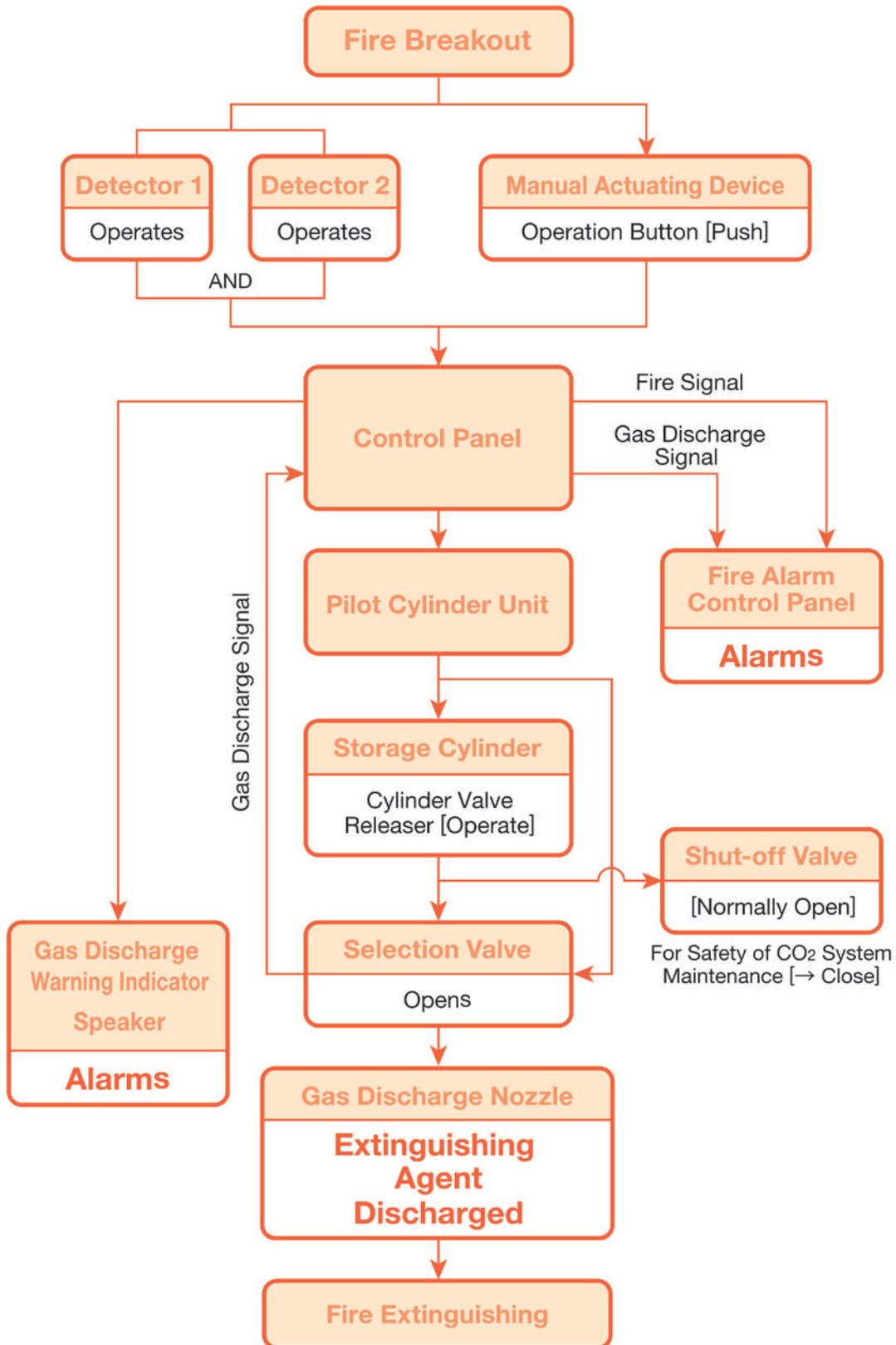
### ■ Gaseous Fire Extinguishing System



# Gaseous Fire Extinguishing System

## Operation Flow Chart

### ■ Gaseous Fire Extinguishing System



# Gaseous Fire Extinguishing System

## Comparison of Fire Extinguishing Agent

The gaseous fire extinguishing system has been used to protect the facilities where quick recovery and less damage must be required, such as electric rooms, art museums, precision machineries, telecommunication rooms, etc. It is classified roughly into an inert gas fire extinguishing system and a halogenated agent fire extinguishing system.

Nittan company deals in N<sub>2</sub> and CO<sub>2</sub> system as an inert gas system, and HFC-23, HFC-227ea and FK-5-1-12 as a halogenated agent system.



Storage Cylinder Unit



Control Panel / Emergency Power Supply Unit



Selection Valve / Manifold Pipe / Pilot Cylinder Unit

## Comparison Table

Specification	Inert Gas		Halogenated Agents			
	CO <sub>2</sub>	N <sub>2</sub>	Halon1301	FK-5-1-12	HFC-23	HFC-227ea
Molecular Formula	CO <sub>2</sub>	N <sub>2</sub>	CF <sub>3</sub> Br	CF <sub>3</sub> CF <sub>2</sub> C(O)CF(CF <sub>3</sub> ) <sub>2</sub>	CHF <sub>3</sub>	CF <sub>3</sub> CHFCF <sub>3</sub>
Molecular Weight	44	28	148.93	316	70.01	170.03
Boiling Point	-78.5°C	-195.8°C	-57.8°C	49.0°C	-82.0°C	-16.4°C
Specific Volume (m <sup>3</sup> /kg)	0.56	0.85	0.16	0.0719	0.34	0.138
Fire Extinguishing Principle	Oxygen dilution, Cooling	Oxygen dilution	Restraint for combustion chain reactions	Restraint for combustion chain reactions, Cooling	Restraint for combustion chain reactions	Restraint for combustion chain reactions
Extinguishing Concentration Against Flame	20.0 %	33.6 %	3.5 %	4.8 %	12.4 %	6.4 %
Design Concentration	34.0 %	40.3 %	5.0 %	5.8 %	16.2 %	7.3 %
Min. Design Q'ty (kg/m <sup>3</sup> )	0.75-1.0	0.516 (m <sup>3</sup> /m <sup>3</sup> )	0.32	0.84	0.52	0.55
Max. Design Concentration *1	-	52.0 %	10.0 %	10.0 %	23.8 %	9.5 %
Oxygen Concentration *2	12.0 %	10.0 %	18.9 %	19.8 %	16.0 %	19.0 %
ODP	0	0	10	0	0	0
GWP	1	0	4900	< 1	9100	4300
NOAEL	-	43.0 %	5.0 %	10.0 %	50.0 %	9.0 %
LOAEL	-	52.0 %	7.5 %	> 10.0 %	> 50.0 %	10.5 %
LC50	-	-	> 80.0 %	> 10.0 %	> 65.0 %	> 80.0 %
Max. Applicable Pressure	10.8 MPa	10.8 MPa	5.2 MPa	4.2 MPa	10.2 MPa	4.8 MPa
Pipe Type	Sch80	Sch80	Sch40	Sch40	Sch80	Sch40
Discharge Time	60 sec.	60 sec.	10-30 sec.	10 sec.	10 sec.	10 sec.
Filling Ratio (L/kg)	1.5-1.9	30 (MPa)	0.9-1.6	0.7-1.6	1.2-1.5	0.9-1.6
Storing Condition	Liquid	Vapor	Liquid (N <sub>2</sub> pressurizing)	Liquid (N <sub>2</sub> pressurizing)	Liquid	Liquid (N <sub>2</sub> pressurizing)
Comparison of Cylinder Q'ty	2.6	4.0	1.0	2.0	1.6	1.7
Human Safety	Hazardous	Safe	Safe	Safe	Safe	Safe

\*1 Max. Design Concentration : To be designed up to this agent density.

\*2 Oxygen Concentration: Oxygen concentration in Max. Design Concentration

# Gaseous Fire Extinguishing System

## Features

### CO2 System

- By releasing carbon dioxide, it extinguishes fires primarily with the mechanism of lowering the level of oxygen that supports combustion in a protected area.
- It needs alarms by voice message or siren to evacuate people in the protected area before discharging carbon dioxide.
- It needs to display off-limit on the warning indicators not to let people come into the protected area while discharging carbon dioxide.
- In case of the installation of the CO2 fire extinguishing system, the ventilation equipment may be necessary to exhaust carbon dioxide after the fire extinguishing.

### N2 System

- By releasing nitrogen, which is a natural component of the air with a concentration of 78 %, it extinguishes fires primarily with the mechanism of lowering the level of oxygen that supports combustion in a protected area.
- Nitrogen is non-toxic. It has excellent safety for human exposure.
- Nitrogen does not cause any influence to deplete the ozone layer because of its [Zero] ozone depletion potential.
- Nitrogen is environmentally friendly fire extinguishing agent that does not bring about any global warming.
- In case of the installation of the nitrogen fire extinguishing system, the ventilation equipment may be necessary to exhaust nitrogen after the fire extinguishing.

### Halon1301 System

- By releasing Halon1301, it extinguishes fires primarily with the mechanism of breaking the chain reaction of the combustion by chemically disrupting combustion.
- Halon1301 is non-toxic. It has excellent safety for human exposure.
- Halon1301 has good electrical insulating characteristics and is effective on electrical fires.
- It is the safe extinguishing equipment which is able to minimize pollution in fire extinguishing and damage of the supercooling
- In case of the installation of the Halon1301 fire extinguishing system, the ventilation equipment may be necessary to exhaust nitrogen after the fire extinguishing.
- Halon1301 causes an influence to deplete the ozone layer.

### FK-5-1-12 System

- By releasing FK-5-1-12, it extinguishes fires primarily with the mechanism of breaking the chain reaction of the combustion by chemically disrupting combustion.
- FK-5-1-12 is very friendly to the environment, minimizing environmental load in [Zero] ozone depletion potential and [Less Than 1] global warming potential.
- FK-5-1-12 is able to more minimize the amount of fire extinguishing agent necessary for the protected area in comparison to the inert gas system, because of its lower density against flame.
- FK-5-1-12 has good electrical insulating characteristics and is effective on electrical fires.
- It has a low discharge pressure and is able to employ the pipe size of schedule 40.
- In case of the installation of the FK-5-1-12 fire extinguishing system, the ventilation equipment may be necessary to exhaust extinguishing agent and combustion gas after the fire extinguishing.

### HFC-23 System

- By releasing HFC-23, it extinguishes fires primarily with the mechanism of breaking the chain reaction of the combustion by chemically disrupting combustion.
- HFC-23 is non-toxic. It has excellent safety for human exposure.
- HFC-23 does not cause any influence to deplete the ozone layer because of its [Zero] ozone depletion potential. But it has a high rate of global warming potential.
- HFC-23 does not require the nitrogen pressurizing because of the high gas pressure.
- In case of the installation of the HFC-23 fire extinguishing system, the ventilation equipment may be necessary to exhaust the trifluoromethane after the fire extinguishing.

### HFC-227ea System

- By releasing HFC-227ea, it extinguishes fires primarily with the mechanism of breaking the chain reaction of the combustion by chemically disrupting combustion.
- HFC-227ea is non-toxic. It has excellent safety for human exposure.
- HFC-227ea does not cause any influence to deplete the ozone layer because of its [Zero] ozone depletion potential. But it has a high rate of global warming potential.
- HFC-227ea has good electrical insulating characteristics and is effective on electrical fires.
- HFC-227ea is a colorless and almost odorless gas.
- It has a low discharge pressure and is able to employ the pipe size of schedule 40.
- In case of the installation of the HFC-227ea fire extinguishing system, the ventilation equipment may be necessary to exhaust the heptafluoropropane after the fire extinguishing.

# Gaseous Fire Extinguishing System

## Storage Cylinder

The storage cylinder contains the extinguishing agent within the filling ratio specified. An adaptable cylinder valve and guide pipe shall be used corresponding to each storage cylinder.

### Cylinder



CO<sub>2</sub> (68L)

N<sub>2</sub> (83L)

FK-5-1-12 (68L)

HFC-23 (20L)

HFC-227ea (68L)

### Specification

Fire Extinguishing Agent	Water Capacity	Supply Volume	Filling Ratio (L / kg)	Cylinder Valve	Option		
					Cylinder Valve Releaser	Guide Pipe	
Inert Gas	CO <sub>2</sub>	82.5 L	44-55 kg	1.5-1.9	15C1	GNC-PM-2	GFT-400
		68 L	36-45 kg	1.5-1.9	15C1	GNC-PM-2	GFT-400
	N <sub>2</sub>	83 L	20.3 m <sup>3</sup>	30 MPa (at 35°C)	15N	GNC-PM-N	GFT-420
		83 L	14.6 m <sup>3</sup>	20 MPa (at 35°C)	15N	GNC-PM-NV	GFT-400
Halogenide	FK-5-1-12	68 L	43-97 kg	0.7-1.6	32HA	GNC-P-32	HFL-375
		41 L	26-58 kg	0.7-1.6	32HA	GNC-P-32	HFL-375
		24 L	15-34 kg	0.7-1.6	32HA	GNC-P-32	HFL-375
	HFC-23	68 L	46-56 kg	1.2-1.5	32HA	GNC-P-32	HFL-375
		41 L	28-34 kg	1.2-1.5	32HA	GNC-P-32	HFL-375
		24 L	16-20 kg	1.2-1.5	15C1	GNC-PM-2	GFT-400
		20 L	14-16 kg	1.2-1.5	15C1	GNC-PM-2	GFT-400
		14 L	10-12 kg	1.2-1.5	15C1	GNC-PM-2	GFT-400
	HFC-227ea	68 L	43-75 kg	0.9-1.6	32HA	GNC-P-32	HFL-375
		41 L	26-45 kg	0.9-1.6	32HA	GNC-P-32	HFL-375
		24 L	15-26 kg	0.9-1.6	15C1	GNC-PM-2	GFT-400
		14 L	9-15 kg	0.9-1.6	15C1	GNC-PM-2	GFT-400

# Gaseous Fire Extinguishing System

## Storage Cylinder Unit

Category	Model	Description	Specification
N <sub>2</sub> Storage Cylinder Unit 1 Line	N20102	1 Line x 2 Cylinders	<b>Components:</b> - 83L Cylinder *1 - Cylinder Valve Releaser - Cylinder Rack *2 - Manifold Pipe - Control Pipe - Guide Pipe - Reducing Valve  *1 Filled with 20.3 m <sup>3</sup> of N <sub>2</sub> / 1 Cylinder *2 Quake -Proof: Horizontal=0.6G / Vertical=0.3G)
	N20103	1 Line x 3 Cylinders	
	N20104	1 Line x 4 Cylinders	
	N20105	1 Line x 5 Cylinders	
	N20106	1 Line x 6 Cylinders	
	N20107	1 Line x 7 Cylinders	
N <sub>2</sub> Storage Cylinder Unit 2 Lines	N20204	2 Lines x 4 Cylinders	<b>Components:</b> - 83L Cylinder *1 - Cylinder Valve Releaser - Cylinder Rack *2 - Manifold Pipe - Control Pipe - Guide Pipe - Reducing Valve  *1 Filled with 20.3 m <sup>3</sup> of N <sub>2</sub> / 1 Cylinder *2 Quake -Proof: Horizontal=0.6G / Vertical=0.3G)
	N20205	2 Lines x 5 Cylinders	
	N20206	2 Lines x 6 Cylinders	
	N20207	2 Lines x 7 Cylinders	
	N20208	2 Lines x 8 Cylinders	
	N20209	2 Lines x 9 Cylinders	
	N20210	2 Lines x 10 Cylinders	
	N20211	2 Lines x 11 Cylinders	
	N20212	2 Lines x 12 Cylinders	
	N20213	2 Lines x 13 Cylinders	
N20214	2 Lines x 14 Cylinders		
Cylinder Valve	15C1	Cylinder Valve for Cylinders of CO <sub>2</sub> , HFC -23 and HFC-227ea	Applicable Guide Pipe: GFT -400, φ 15
	15N	Cylinder Valve for 83 L Cylinder of N <sub>2</sub>	Applicable Guide Pipe: GFT -420, φ 15
	32HA	Cylinder Valve for Cylinders of FK-5-1-12, 68L/4IL HFC-23 and 68L/4IL HFC-227ea	Applicable Guide Pipe: HFL -375, φ 32
Cylinder Valve Releaser	*See Page 13,14,23		
Control Pipe	CUT300L	Control Pipe	L=300 mm
	CUT500L	Control Pipe	L=500 mm
Guide Pipe	GFT -400	Guide Pipe	φ 15, L=400 mm
	GFT -420	Guide Pipe	φ 15, L=420 mm for 83L N <sub>2</sub> Cylinder
	HFL -375	Guide Pipe	φ 32, L=375 mm
Reducing Valve	15RG	Reducing Valve for 15N	Max. Adjustable Pressure: Less than 10.8 MPa
	TG12	Reducing Valve for 15N (Small Pressure -Relief -Opening Type)	Max. Adjustable Pressure: Less than 5.6 MPa

## Cylinder Valve Releaser

Specification	Cylinder Valve Releaser								
	GNC -1(E)	GNC -3	GNC -4	GNC -5	GNC -M	GNC -P-32	GNC -PM-2	GNC -PM-N	GNC -PM-NV
Operating Method	Elec. / Manu.	Elec. / Manu.	Elec. / Manu.	Elec. / Manu.	Manu.	Gas	Gas / Manu.	Gas / Manu.	Gas / Manu.
Rating	DC24V / 1.67A	DC24V / 1.67A	DC24V / 3.33A	DC24V / 1.67A	N/A	N/A	N/A	N/A	N/A
Compatible Cylinder Valve	C4-EM-1	15C1	32HA	15N	C4-EM-1	32HA	15C1	15N (30Mpa)	15N (20Mpa)
Weight	1.6 kg	1.6 kg	1.6 kg	1.6 kg	1.6 kg	1.1 kg	0.3 kg	0.4 kg	0.4 kg

# Gaseous Fire Extinguishing System

## Piping Components

### Cylinder Valve Releaser



GNC-PM-NV

### Damper Reset Valve & Box



NDR-2R

### Bursting Type Safety Valve



CSV-10 / HSV-10

### Relief Valve $\phi 4$



GLV-41

### Check Valve $\phi 4$



GCV-4

### Copper Tube



Copper Tube

### Copper Tube Joint Two Way



2 Way

### Copper Tube Joint Three Way



3 Way

# Gaseous Fire Extinguishing System

## Piping Components

Category	Model	Description	Specification
Pilot Cylinder Unit	GASB-EM	1L Pilot Cylinder Unit	Components: 1L Cylinder, Cylinder Valve Releaser, Pressure Switch, Box
	GASB-EM-2	2L Pilot Cylinder Unit	Components: 2L Cylinder, Cylinder Valve Releaser, Pressure Switch, Box
		1L Pilot Cylinder Unit Box	Cabinet: SPG, Color: 7.5R4/14 (Red)
		2L Pilot Cylinder Unit Box	Cabinet: SPG, Color: 7.5R4/14 (Red)
		1L Pilot Cylinder	Agent: CO <sub>2</sub> , Color: Green, Capacity:1L
		2L Pilot Cylinder	Agent: CO <sub>2</sub> , Color: Green, Capacity:2L
Pressure Switch	GPS-1	Pressure switch	Contact Capacity: 5A@AC125V/ 5A@DC30V
Damper Reset Valve Box	NDR-2R	Damper Reset Valve and Box (Surface Type)	Cabinet: SPCC, Color: 7.5R4/14 (Red)
	NDR-2U	Damper Reset Valve and Box (Recessed Type)	Cabinet: SPCC, Color: 7.5R4/14 (Red)
Check Valve / Relief / Safety Valve	CSV-10	Safety Valve for CO <sub>2</sub> , N <sub>2</sub> and HFC-23 System, Bursting Type	Operating Pressure: 10.8-16.2 MPa
	HSV-10	Safety Valve for HFC-227ea, FK-5-1-12 System	Operating Pressure: 5.7-7.8 MPa
	GLV-41	Relief Valve $\phi$ 4	Operating Pressure: Less than 0.25MPa
	GF-04	Strainer	$\phi$ 4
	GCV-4	Check Valve $\phi$ 4	For $\phi$ 4 Copper Tube
	GCV-15-2	Check Valve $\phi$ 15	For $\phi$ 15 Guide Pipe
	Copper Tube	High Pressure Copper Tube	$\phi$ 4 x $\phi$ 6 (20m/1 Lot) with PVC coating
	2 Way	Copper Tube Joint	2 Way
	3 Way	Copper Tube Joint	3 Way

# Gaseous Fire Extinguishing System

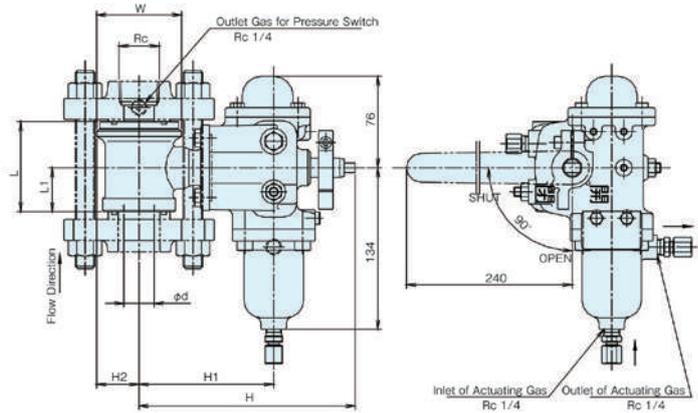
## Selection Valve

In case of protecting multiple protected areas using a common cylinder bank, Selection Valves are used to select the protected area where gas is released. Our selection valves are the gas releasing type by gas pressure of Pilot Cylinder. There are various sizes from 25A to 150A. In case of emergency, you can release gas manually by using manual operation lever.

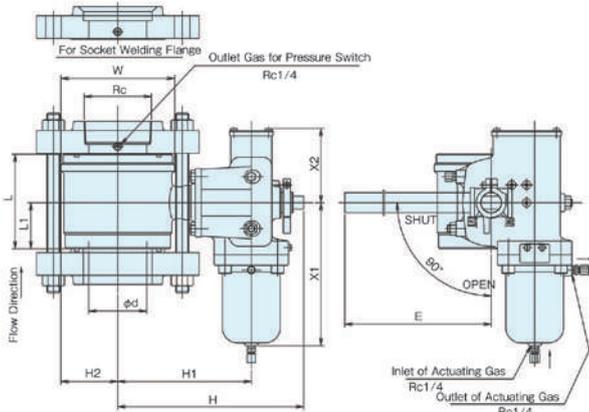
## Selection Valve



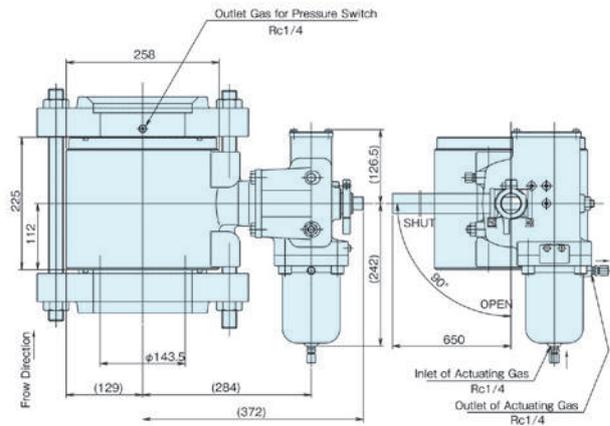
GF14 Series



GF14 25A-50A



GF14 65A-125A



GF14 150A

(mm)

## Dimensions

Model	Dimensions (mm)												Equivalent Length (m)		Mass (kg)
	Size	Rc	d	W	L	L1	(H)	(H1)	(H2)	(X1)	(X2)	E	Sch40	Sch80	
GF14-25A	25A	1	25	70	75	36.5	178	111	35	134	76	240	0.2	0.2	5.5
GF14-32A	32A	1-1/4	32	80	80	36.5	183.5	116.5	40	134	76	240	0.3	0.3	6.0
GF14-40A	40A	1-1/2	38	93	90	40	194	127	46.5	134	76	240	0.4	0.4	7.0
GF14-50A	50A	2	51	108	100	49	210	143	54	134	76	240	0.5	0.5	9.0
GF14-65A	65A	2-1/2	64	128	120	56	238	163	64	180	86.5	350	0.7	0.6	15.0
GF14-80A	80A	3	74	146	125	61	245	170	73	180	86.5	350	0.8	0.8	17.5
GF14-100A	100A	N/A	97.5	191	160	78	312	224	95.5	242	126.5	650	1.2	1.1	39.0
GF14-125A	125A	N/A	121	238	190	95	354	266	119	242	126.5	650	1.5	1.4	55.0
GF14-150A	150A	N/A	143.5	258	225	112	372	284	129	242	126.5	650	1.9	1.8	79.0

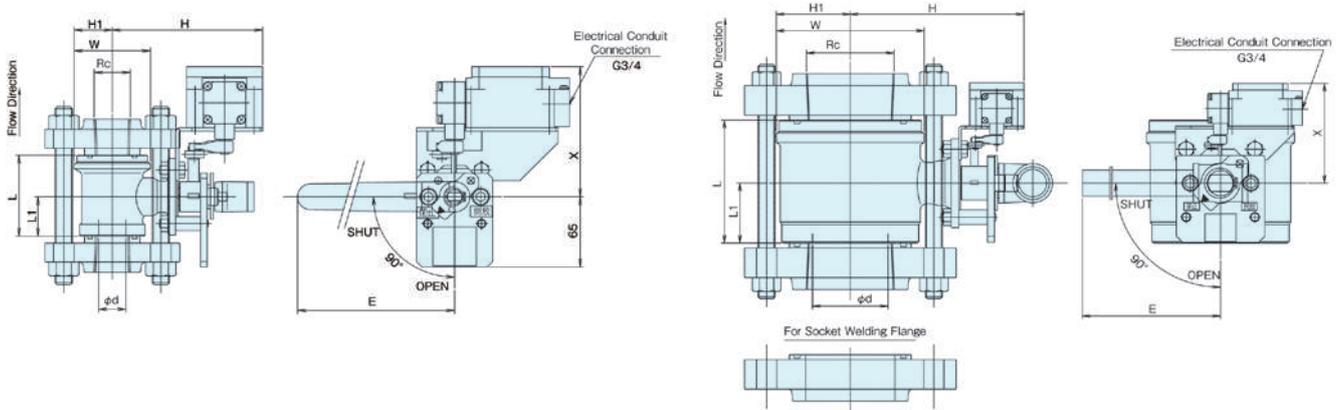
## Shut-Off Valve

The shut-off valves are devices used to isolate the CO<sub>2</sub> fire extinguishing system when personnel are required to enter a protected area for maintenance works. If the shut-off valve is closed, an extinguishing agent is not released in the protected area even if the system happened to start for some reason. In order to prevent from forgetting to reopen the valve after maintenance works, the shut-off valve enable a control panel and manual actuating devices to display open/close conditions.

## Shut-Off Valve



HGF14 Series



HGF14 25A-50A

HGF14 65A-150A

(mm)

## Dimensions

Model	Dimensions (mm)										Mass (kg)
	Size	Rc	d	W	L	L1	(H)	(H1)	X	E	
HGF14-25A	25A	1	25	70	75	36.5	138	35	119	240	3.5
HGF14-32A	32A	1-1/4	32	80	80	36.5	144	40	119	240	4.0
HGF14-40A	40A	1-1/2	38	93	90	40	154	46.5	119	240	5.0
HGF14-50A	50A	2	51	108	100	49	170	54	119	240	7.0
HGF14-65A	65A	2-1/2	64	128	120	56	183	64	119	350	10.5
HGF14-80A	80A	3	74	146	125	61	190	73	119	350	13.0
HGF14-100A	100A	4	97.5	191	160	78	224	95	130	650	24.0
HGF14-125A	125A	5	121	238	190	95	266	119	130	650	40.0
HGF14-150A	150A	6	143.5	258	225	112	284	129	130	650	64.0

# Gaseous Fire Extinguishing System

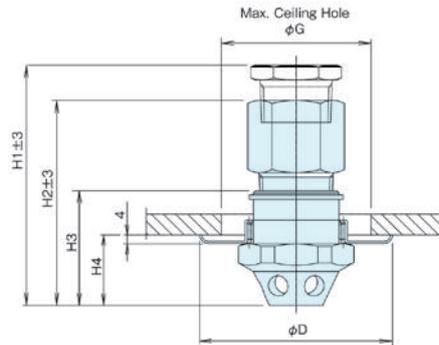
## Discharge Nozzle

Discharge nozzles are so arranged that the extinguishing agent will be uniformly and promptly distributed over the zone to be protected.

### Discharge Nozzle, Ceiling Mount Type (for CO<sub>2</sub>, N<sub>2</sub>, HFC-23, HFC-227ea)



GR type



#### Dimensions

Model	M.S.S.	φ D	H1	H2	H3	H4	φ G
GR15	Rc 1/2	90	(121) 75	100	54	33-43	70
GR20	Rc 3/4	90	(121) 75	100	54	33-43	70
GR25	Rc1	90		100	54	33-43	70
GR32	Rc1 1/4	100			65	39-52	75
GR40	Rc1 1/2	110			75	46-60	80

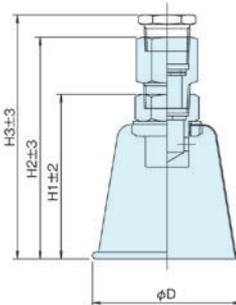
\*M.S.S. Mounting Screw Size

(mm)

### Discharge Nozzle, Surface Mount Type (for CO<sub>2</sub>, N<sub>2</sub>, HFC-23, HFC-227ea)



GM type



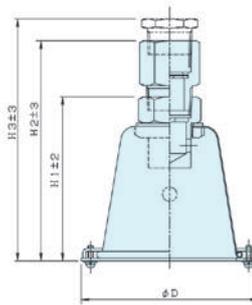
#### Dimensions

Model	M.S.S.	φ D	H1	H2	H3
GM15	Rc 1/2	110	123.3	169.3	(189.3) 143.3
GM20	Rc 3/4	110	123.3	169.3	(189.3) 143.3
GM25	Rc1	110	123.3	169.3	
GM32	Rc1 1/4	130	141.3		
GM40	Rc1 1/2	130	140.3		

\*M.S.S. Mounting Screw Size

(mm)

### Discharge Nozzle, Encapsulated Type (for CO<sub>2</sub>, N<sub>2</sub>, HFC-23, HFC-227ea)



GMC type

#### Dimensions

Model	M.S.S.	φ D	H1	H2	H3
GMC15	Rc1 1/2	133	125.6	171.6	(191.6) 145.6
GMC20	Rc1 3/4	133	125.6	171.6	(191.6) 145.6
GMC25	Rc1	133	125.6	171.6	
GMC32	Rc1 1/4	153	143.6		
GMC40	Rc1 1/2	153	142.6		

\*M.S.S. Mounting Screw Size

(mm)

Specification	GR / GRA						GM				
	GR15	GR20	GR25	GR32	GR40	GRA	GM15	GM20	GM25	GM32	GM40
Mounting Pipe Size	15A	20A	25A	32A	40A	32A	15A	20A	25A	32A	40A
Code No. / Sch40	10-45	10-50	10-50	20-58	30-60	20-48	10-45	10-50	10-50	20-58	30-60
Code No. / Sch80	10-42	10-48	10-50	20-58	30-60	N/A	10-42	10-48	10-50	20-58	30-60
E.A. / Sch40	2.54-137	2.54-254	2.54-254	7.79-616	24.6-779	7.79-201	2.54-137	2.54-254	2.54-254	7.79-616	24.6-779
E.A. / Sch80	2.54-109	2.54-201	2.54-254	7.79-616	24.6-779	N/A	2.54-109	2.54-201	2.54-254	7.79-616	24.6-779
Weight (kg)	0.77-0.46	0.8-0.51	0.36-0.34	0.57-0.54	0.81-0.77	0.6	0.88-0.58	0.83-0.53	0.44-0.43	0.83-0.79	1.27-1.23
Color	Main Body : Nikkel Half Luster Coating Dressing Plate : Colored Alumite Coating						7.5R4/14 (Red)				

\*E.A. Equivalent Orifice Area (mm<sup>2</sup>)

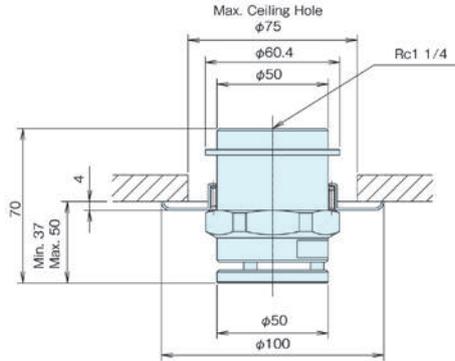
# Gaseous Fire Extinguishing System

## Discharge Nozzle

### Discharge Nozzle, Ceiling Mount Type (for FK-5-1-12)



GRA type



#### Orifice Code

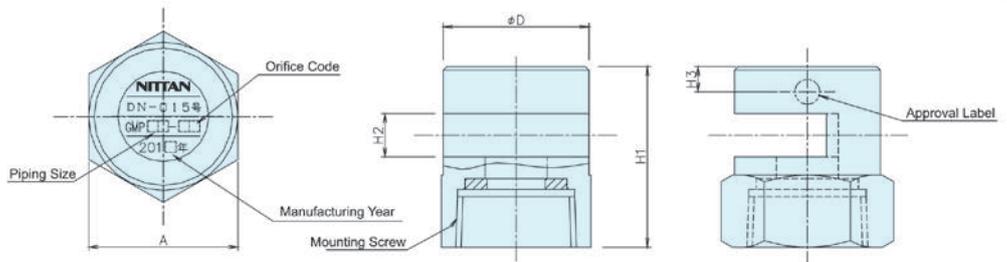
Code No.	E.A. (mm)	Code No.	E.A. (mm)
20	7.79	35	44.2
21	8.81	36	50.3
22	9.90	37	56.7
23	11.0	38	63.6
24	12.6	39	70.9
25	14.2	40	78.5
26	15.9	41	88.2
27	17.7	42	98.5
28	19.6	43	109.0
29	22.1	44	123.0
30	24.6	45	137.0
31	28.3	46	154.0
32	31.2	47	177.0
33	35.3	48	201.0
34	39.6		

\*E.A. Equivalent Orifice Area

### Discharge Nozzle, 180°Angle Type (for FK-5-1-12)



GMP type



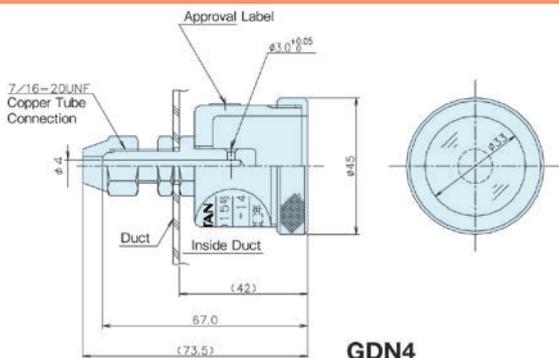
#### Dimensions

Model	M.S.S.	A	φD	H1	H2	H3
GMP25	Rc1	41	40	50	12	7
GMP32	Rc1 1/4	50	49	60	15	8

\*M.S.S. Mounting Screw Size

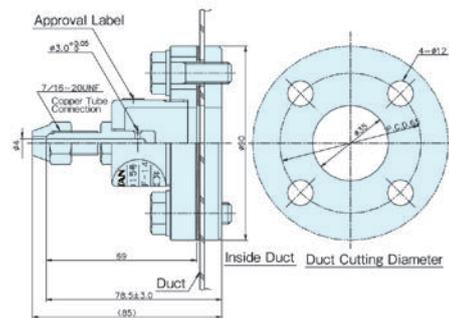
(mm)

### Duct Nozzle



GDN4

(mm)



GDN4F

(mm)

Specification	GMC					GMP		GDN	
	GMC15	GMC20	GMC25	GMC32	GMC40	GMP25	GMP32	GDN4	GDN4F
Mounting Pipe Size	15A	20A	25A	32A	40A	25A	32A	φ4	φ4
Code No. / Sch40	10-45	10-50	10-50	20-58	30-60	15-45	20-49	w/o Flange, E.A.* 3.94	c/w Flange, E.A.* 3.94
Code No. / Sch80	10-42	10-48	10-50	20-58	30-60	15-45	20-49		
E.A.* / Sch40	2.54-137	2.54-254	2.54-254	7.79-616	24.6-779	4.37-137	7.79-227		
E.A.* / Sch80	2.54-109	2.54-201	2.54-254	7.79-616	24.6-779	4.37-137	7.79-227		
Weight (kg)	1.20-0.72	0.98-0.68	0.88-0.58	0.98-0.94	1.71-1.67	0.355-0.350	0.59-0.58		
Color	7.5R4/14 (Red)					Nikkel Half Luster Coating			

\*E.A. Equivalent Orifice Area (mm<sup>2</sup>)

# Gaseous Fire Extinguishing System

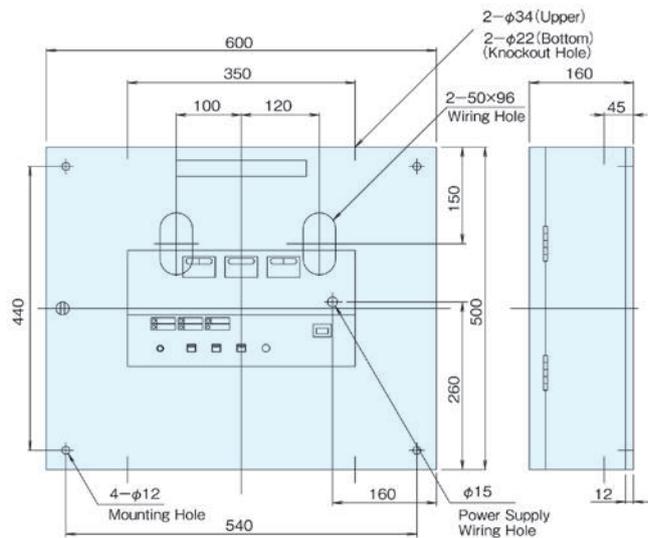
## Control Panel

CO<sub>2</sub> / N<sub>2</sub> / Halon1301 / HFC-23 / HFC-227ea / FK-5-1-12

## Gaseous Fire Extinguishing System Control Panel



5C Type



(mm)

\*The photo and the drawing are examples of 3L type.

## Control Panel Combination

Model Name	Max Zones	Agents						Operation Method			Functions			
		CO <sub>2</sub>	N <sub>2</sub>	Halon 1301	HFC-23	HFC-227ea	FK-5-1-12	Manual	Auto / Manual Total	Individual	Shut-Off Valve	CO <sub>2</sub> Monitoring	Tamper Proof	Multiple Zones Discharge
5C-nL	20	⊙	○	○	○	○	○	○	×	×	○	×	×	×
5CA-nL	20	⊙	○	○	○	○	○	×	○	×	○	×	×	×
5CA-K-nL	20	⊙	○	○	○	○	○	×	×	○	○	×	×	×
5C-nLN	20	⊙	×	×	×	×	×	○	×	×	○	○	×	×
5CA-nLN	20	⊙	×	×	×	×	×	×	○	×	○	○	×	×
5CA-K-nLN	20	⊙	×	×	×	×	×	×	×	○	○	○	×	×
5C-nLI	20	⊙	○	○	○	○	○	○	×	×	○	×	○	×
5CA-nLI	20	⊙	○	○	○	○	○	×	○	×	○	×	○	×
5CA-K-nLI	20	⊙	○	○	○	○	○	×	×	○	○	×	○	×
5C-L-nL	20	⊙	○	○	○	○	○	○	×	×	○	×	×	○
5CA-L-nL	20	⊙	○	○	○	○	○	×	○	×	○	×	×	○
5CA-LK-nL	20	⊙	○	○	○	○	○	×	×	○	○	×	×	○
5C-L-nLN	20	⊙	×	×	×	×	×	○	×	×	○	○	×	○
5CA-L-nLN	20	⊙	×	×	×	×	×	×	○	×	○	○	×	○
5CA-LK-nLN	20	⊙	×	×	×	×	×	×	×	○	○	○	×	○
5H-nL	20	×	⊙	⊙	⊙	⊙	⊙	○	×	×	×	×	×	×
5HA-nL	20	×	⊙	⊙	⊙	⊙	⊙	×	○	×	×	×	×	×
5HA-K-nL	20	×	⊙	⊙	⊙	⊙	⊙	×	×	○	×	×	×	×
5H-nLI	20	×	⊙	⊙	⊙	⊙	⊙	○	×	×	×	×	○	×
5HA-nLI	20	×	⊙	⊙	⊙	⊙	⊙	×	○	×	×	×	○	×
5HA-K-nLI	20	×	⊙	⊙	⊙	⊙	⊙	×	×	○	×	×	○	×
5H-L-nL	20	×	⊙	⊙	⊙	⊙	⊙	○	×	×	×	×	×	○
5HA-L-nL	20	×	⊙	⊙	⊙	⊙	⊙	×	○	×	×	×	×	○
5HA-LK-nL	20	×	⊙	⊙	⊙	⊙	⊙	×	×	○	×	×	×	○

⊙ Recommended    ○ Available    × Not Available

# Gaseous Fire Extinguishing System

## Types/Functions

### Manual type

The type of control panels that start discharging fire-extinguishing agents only by manual operation of start button

### Individual zone exchange type (manual / automatic)

The type of control panels that can individually set the operation mode of each zone. If turn the key switch on each manual actuating device, corresponding zone will be individually changed to the required mode. If turn the key switch on the control panel, it causes the total changeover of all zones.

### Auto / Manual Total Changeover type

The type of control panels that can change over the operation mode of starting discharging fire-extinguishing agents to manual mode or to automatic mode at the same time in all zones. If turn the key switch on the control panel or on each manual actuating device, all zones will be changed to the required mode.

### Tamper-Proof function

The function of control panels that prevents false discharge of fire-extinguishing agents caused by such as mischiefs. When the starting method is set at 'AUTO' (or 'UNMANNED' when the control panel is the manual type), the control panel does not enable fire-extinguishing agents discharge even if the actuating button on the manual actuating device is pushed, as long as at least one detector is not activated.

### Multiple Zone Discharge function

The function of control panels that enables gas discharge to multiple zones at the same time when multiple storage cylinders are equipped corresponding to each zone.

### CO<sub>2</sub> Gas Monitoring function

The function of control panels that prevents people from false entering into the protected area after discharging in the interest of safety by means of keeping blinking the Discharge Warning Indicator while the dangerous density of CO<sub>2</sub> is detected by the CO<sub>2</sub> detector installed in the area even if the system is recovered.

Specification	Gaseous Fire Extinguishing System Control Panel	
	5C type	5H type
Shut -Off Valve Monitoring	Available	N/A
Shut -Off Valve Indicator Lamp	Red LED :Close    Green LED: Open	N/A
Gas Repletion Indication	Available in CO <sub>2</sub> Gas Monitoring type only	N/A
Mounting Style	Wall Mount Type	
Zones	1, 3, 5, 10, 15, 20	
Power Supply	DC24V	
Main Alarm	Buzzer	
Zone Alarm	Voice Alarm	
Earth Fault Monitoring	Available (Signal Transfer Lines)	
Open Circuit Monitoring	Available (Detector Lines, Actuating Lines)	
Short Circuit Monitoring	Available (Actuating Lines)	
Connectable Devices	Cylinder Valve Releaser, Fire Detector, Manual Call Point, Manual Actuating Device, Shut -Off Valve, Pressure Switch, Gas Discharge Warning Indicator, Sound Device etc.	
External Signal Transfer Contact Capacity	2A @ DC24V	
External Signal Transfer	Operation Signal (B, BC)	
	Discharge Signal (K, KC)	
	Auto/Manual Exchange Signal Auto/Manual Total Changeover type (STA, STM, STC) Auto/Manual Zone Changeover type (STA1,STC1-STAn, STC.)	
	Fire Alarm Local Signal (A1- An, AC)	
	Trouble Signal (ER, ERC)	
	Interlock Signal (RQ1-RQn, RQC)	

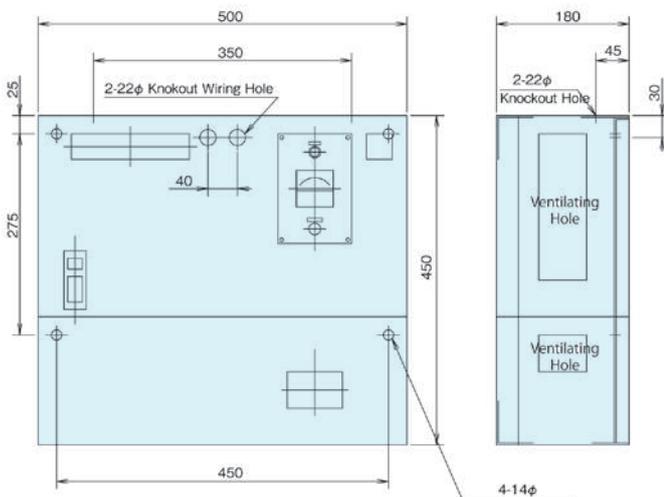
## DC Power Supply Unit

The DC power supply unit is provided with the storage battery which is to be used as an emergency power supply. The unit is supplied with 100/200 VAC, and supplies 24 VDC to the fire extinguishing system control panel.

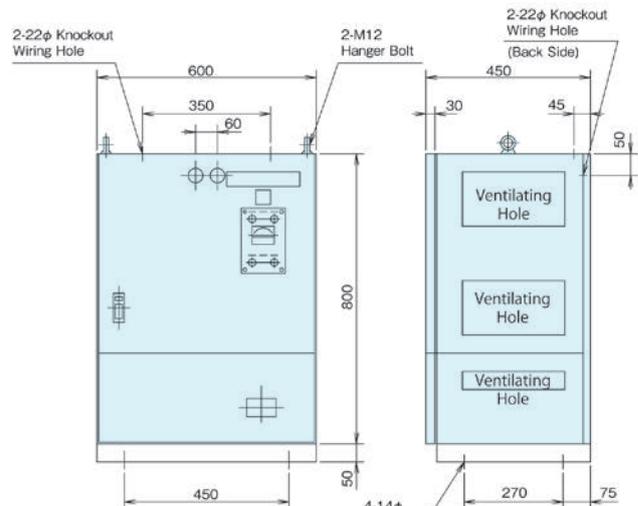
## DC Power Supply Unit



NHS1-24 Series



NHS1-24 3.5 Ah-10.0 Ah



NHS1-24 12.0 Ah-30.0 Ah

(mm)

## Specification

Model	Output		Battery			Mass (kg)	Mounting
	Voltage	Current	Model	Capacity	Type		
NHS1-24-0.14A	DC24V	3 A	20-D3.5	3.5 Ah	Ni-Cd	25 kg	Wall
NHS1-24-0.24A	DC24V	5 A	20-F6.0	6.0 Ah	Ni-Cd	26 kg	Wall
NHS1-24-0.32A	DC24V	6 A	20-M8.0	8.0 Ah	Ni-Cd	29 kg	Wall
NHS1-24-0.4A	DC24V	8 A	20-M10.0	10.0 Ah	Ni-Cd	30 kg	Wall
NHS1-24-2x0.24A	DC24V	10 A	20-F6.0×2P	12.0 Ah	Ni-Cd	91 kg	Floor
NHS1-24-2x0.32A	DC24V	12 A	20-M8.0×2P	16.0 Ah	Ni-Cd	98 kg	Floor
NHS1-24-2x0.4A	DC24V	15 A	20-M10.0×2P	20.0 Ah	Ni-Cd	100 kg	Floor
NHS1-24-3x0.4A	DC24V	20 A	20-M10.0×3P	30.0 Ah	Ni-Cd	120 kg	Floor

# Gaseous Fire Extinguishing System

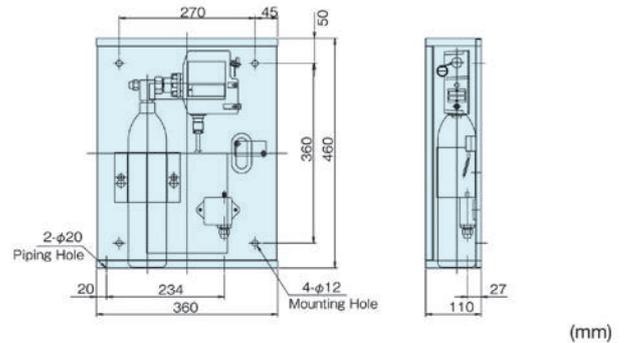
## Pilot Cylinder Unit

The pilot cylinder unit incorporates one actuating gas cylinder of 1 or 2 liters in volume, one cylinder valve releaser (electromagnetic solenoid) and one pressure switch.

### Pilot Cylinder Unit



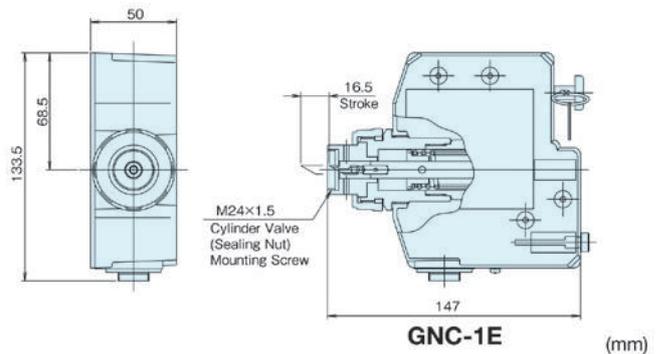
**GASB-EM**



### Cylinder Valve Releaser (Electric Style)



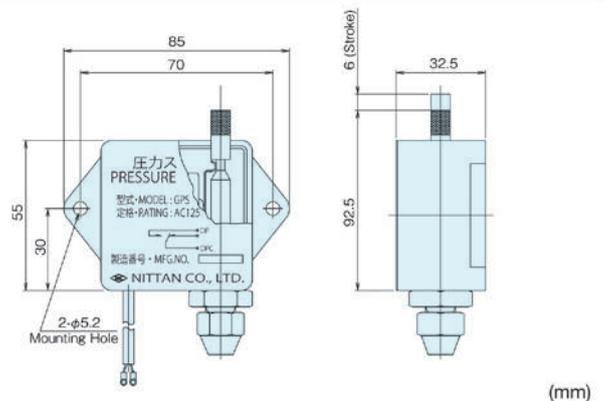
**GNC-1E**



### Pressure Switch



**GPS-1**



Specification	Pilot Cylinder Unit	
	GASB - EM	GASB - EM-2
Cylinder	1 L CO <sub>2</sub> Cylinder	2 L CO <sub>2</sub> Cylinder
Cylinder Valve Releaser	GNC-1E (Rating:DC24V/1.67A)	GNC-1E (Rating:DC24V/1.67A)
Pressure Switch	GPS-1	GPS-1
Cabinet	SPG, 7.5R4/14 (Red)	SPG, 7.5R4/14 (Red)

# Gaseous Fire Extinguishing System

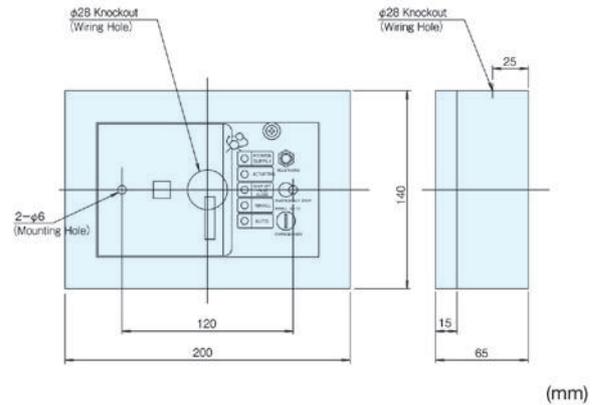
## Manual Actuating Device

The manual actuating device of fire extinguishing system is used to manually start the gas release in a fire emergency. It is installed at the easy-to-find position on the wall by the entrance door on the outside of the protected area. There are two types of a surface mount type and a flush mount type. In addition, we have prepared various lineups, which are compatible with Auto/Manual changeover function, Tamper proof function and Countdown function according to the control panel types.

### Manual Actuating Device



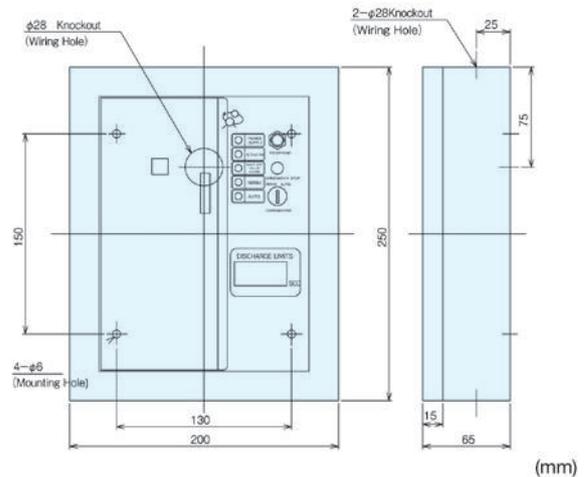
NRSA-2A



### Manual Actuating Device (Countdown Timer Type)



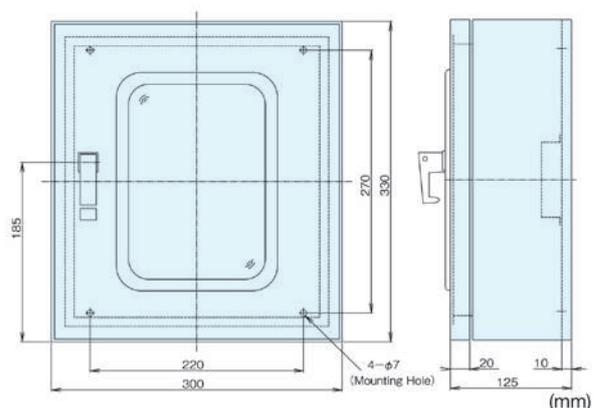
NRSA-3



### Outdoor Box (for NRS-3 Series)



NRS-3-W



Gaseous Fire Extinguishing System

# Gaseous Fire Extinguishing System

## Manual Actuating Device

### Specification

Specification	Manual Actuating Device	
	NRS-2 Series	NRS-3 Series
Countdown Timer Function	N/A	Available
Rated Voltage	DC24V	DC24V
Rated Current	30 mA	100 mA
Surface Mount Box	DB-1	NRS-3-R
Recessed Mount Box	NRS-2A-U Box	NRS-3-U
Outdoor Box	NRS-2-W	NRS-3-W

### Available Functions

Model Name	Available Functions			
	Countdown Timer	Auto / Manual Changeover	Shut -Off Valve Indicator	Tamper Proof
NRS -2A	×	×	○	×
NRS -2HA	×	×	×	×
NRSA -2A	×	○	○	×
NRSA -2HA	×	○	×	×
NRS -2AI	×	×	○	○
NRS -2HAI	×	×	×	○
NRS -3	○	×	○	×
NRS -3H	○	×	×	×
NRSA -3	○	○	○	×
NRSA -3H	○	○	×	×
NRS -3I	○	×	○	○
NRS -3HI	○	×	×	○

○ Available × Not Available

### Compatible Control Panels

Control Panels	Manual Actuating Devices											
	NRS-2A	NRS-2HA	NRSA-2A	NRSA-2HA	NRS-2AI	NRS-2HAI	NRS-3	NRS-3H	NRSA-3	NRSA-3H	NRS-3I	NRS-3HI
5C-nL	○	×	×	×	×	×	○	×	×	×	×	×
5CA-nL	○	×	○	×	×	×	○	×	○	×	×	×
5CA-K-nL	×	×	○	×	×	×	×	×	○	×	×	×
5C-nLN	○	×	×	×	×	×	○	×	×	×	×	×
5CA-nLN	○	×	○	×	×	×	○	×	○	×	×	×
5CA-K-nLN	×	×	○	×	×	×	×	×	○	×	×	×
5C-nLI	×	×	×	×	○	×	×	×	×	×	○	×
5CA-nLI	○	×	○	×	×	×	○	×	○	×	×	×
5CA-K-nLI	×	×	○	×	×	×	×	×	○	×	×	×
5C-L-nL	○	×	×	×	×	×	○	×	×	×	×	×
5CA-L-nL	○	×	○	×	×	×	○	×	○	×	×	×
5CA-LK-nL	×	×	○	×	×	×	×	×	○	×	×	×
5C-L-nLN	○	×	×	×	×	×	○	×	×	×	×	×
5CA-L-nLN	×	×	○	×	×	×	×	×	○	×	×	×
5CA-LK-nLN	×	×	○	×	×	×	×	×	○	×	×	×
5H-nL	×	○	×	×	×	×	×	○	×	×	×	×
5HA-nL	×	○	×	○	×	×	×	○	×	○	×	×
5HA-K-nL	×	×	×	○	×	×	×	×	×	○	×	×
5H-nLI	×	×	×	×	×	○	×	×	×	×	×	○
5HA-nLI	×	○	×	○	×	×	×	○	×	○	×	×
5HA-K-nLI	×	×	×	○	×	×	×	×	×	○	×	×
5H-L-nL	×	○	×	×	×	×	×	○	×	×	×	×
5HA-L-nL	×	○	×	○	×	×	×	○	×	○	×	×
5HA-LK-nL	×	×	×	○	×	×	×	×	×	○	×	×

○ Compatible × Not Compatible

# Gaseous Fire Extinguishing System

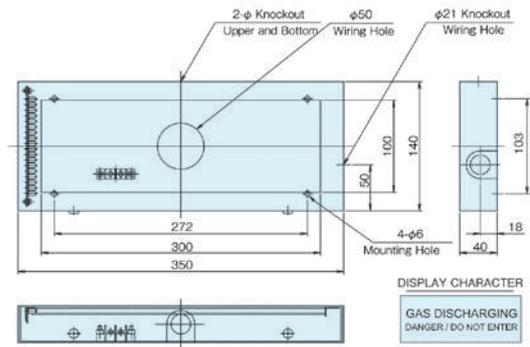
## Warning Device

The warning devices flicker or light when the extinguishing agent is discharged so that no people will enter the area where the agent has been discharged.

### Gas Discharge Warning Indicator



ST-S

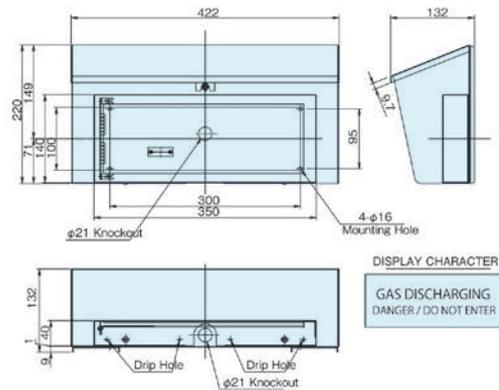


(mm)

### Gas Discharge Warning Indicator (Outdoor Type)



ST-L

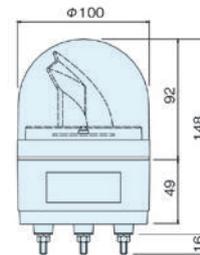


(mm)

### Rotating Lamp



RHE Series



(mm)

Specification	Discharge Indicator			Rotating Lamp	
	ST-S	ST-L	TPL-5	RHE-24-R	RHE-24-Y
Installation Location	Indoor	Outdoor	Explosion Proof	Indoor (IP23)	Indoor (IP23)
Rated Voltage	DC24V	DC24V	DC24V	DC24V	DC24V
Power Consumption	1.2 W	1.2 W	25 W		
Current Consumption				0.16 A	0.16 A
Color	Red	Red	Red	Red	Yellow
Weight	1.5 kg	1.5 kg	16 kg	0.4 kg	0.4 kg

# Gaseous Fire Extinguishing System

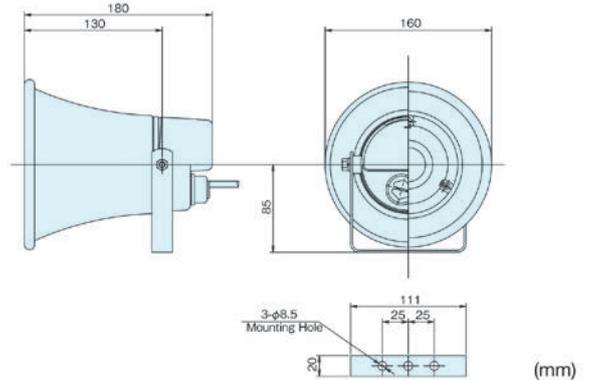
## Speaker/Bell

Speakers and Bells are used to urge the occupants within the protected area to evacuate themselves before the extinguishing agent is discharged into the area.

### Trumpet Speaker (High impedance type)



NK-305T

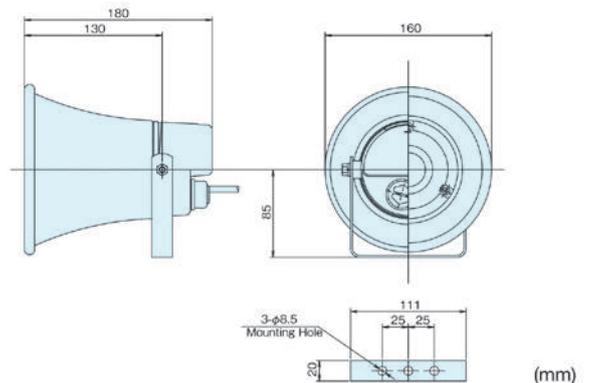


(mm)

### Trumpet Speaker (Low impedance type for Package System)



NK-105

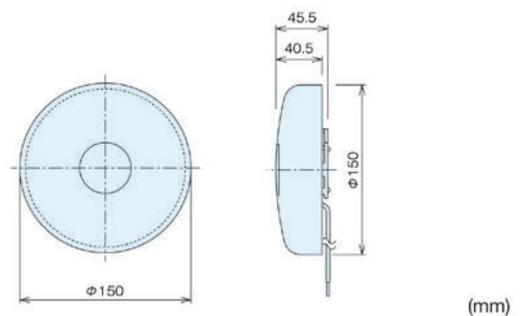


(mm)

### Alarm Bell



BD-6-24-11



(mm)

Specification	Speaker		Bell
	NK-305T	NK-105	BD-6-24-11
Rated Voltage	N/A	N/A	DC 24V
Power Consumption	N/A	N/A	10mA
Rated Input	5 W	5 W	N/A
Impedance	2k, 3.3k, 5k, 10k Ω	8 Ω	N/A
Sound Pressure Level	≥104 dB	≥104 dB	90 dB
Weight	1.6 kg	0.85 kg	0.45 kg
Others	High impedance	Low impedance	Red

# Package Fire Extinguishing System

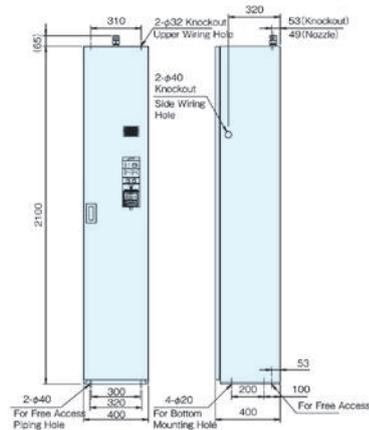
## N2 Package System

The N2 Package System uses nitrogen fire extinguishing agent. Therefore, there are following advantages:  
 Minimizing environmental effects; Clear visibility for evacuation during discharge; Harmless to the human body;  
 Long-remaining effects; Easy acquisition of the extinguishing agent

### N2 Package



NP-N



(mm)

### Specification

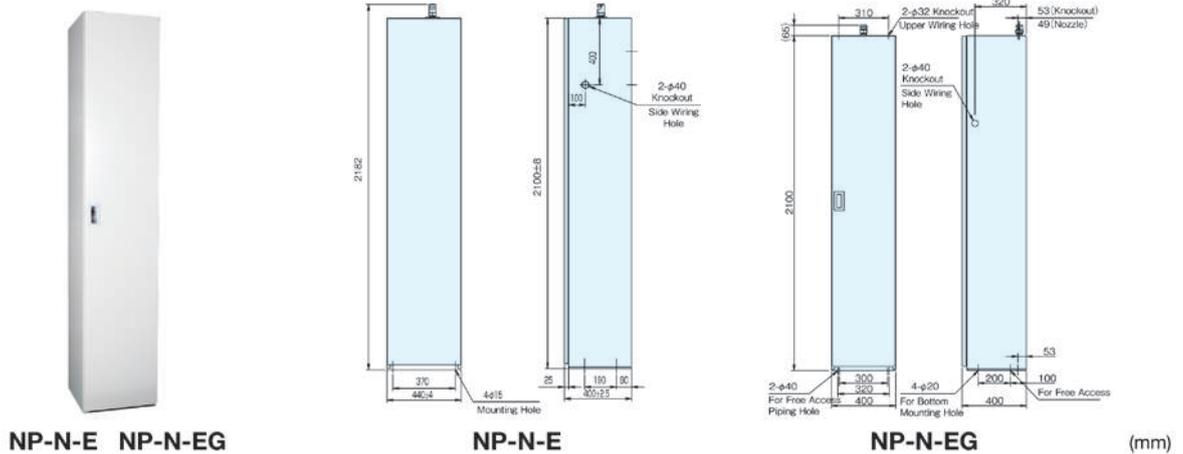
Specification	N2 Package Main Unit	
	NP-N	
Agent	Nitrogen	
Storage Cylinder	83L / 20.3 m <sup>3</sup> (30MPa)	
Input Power Source	AC220V ±10% 50/60 Hz	
Circuit Voltage	DC24V	
Emergency Power Source	DC24V 3.5Ah/5Hr Ni-Cd Battery (Optionally available 6.0Ah)	
Designed Discharge Time	60 sec. or less	
Discharge Delay Time in Default Setting(Alterable)	Auto. Operation : 5 sec. Manu. Operation : 5 sec.	
Operating Temperature Range	0 – 40°C	
Body(Case) Material	SPCC t1.6 mm	
Dimensions	H2100 x W400 x D400 mm	
Weight	Approx. 80 kg (excluding cylinder)	
Discharge Method	Standard	Front Discharge (Discharge outlet not provided)
	Option	1. Front Discharge + Free Access(Discharge beneath the floor) 2. Led from upper piping
Accessory	Main Unit	Control Part, Voice Alarm Device, Manual Actuating Button, Manu./Auto Changeover Key Switch, External Signal Transfer Contact, Discharge Nozzle
	Cylinder	Cylinder Valve, Cylinder Valve Releaser, Extinguishing Agent
Extra Box	Electric type : 25 units max. Gas Pressure type : 50 units max.	
Accessories	Terminator CRE, End-of-line resistor 20 kΩ 1/4, Spare fuses	

# Package Fire Extinguishing System

## N2 Package Extra box

Installed to increase the amount of fire extinguishing agent according to the size of the protected area. Contains one set of extinguishing gas storage cylinder. No control section provided. Interlocked with package operation.

### N2 Package Extra Box



### ■ Specification

Specification	N2 Package Extra Box	
	NP-N-E	NP-N-EG
Agent	Nitrogen	
Storage Cylinder	83L / 20.3 m <sup>3</sup> (30MPa)	
Actuating Method	Electric	Gas Pressure
Designed Discharge Time	60 sec. or less	
Operating Temperature Range	0 - 40°C	
Body(Case) Material	SPCC t1.6 mm	
Dimensions	H2100 x W400 x D400 mm	
Weight	Approx. 75 kg (excluding cylinder)	
Discharge Method	Standard	Front Discharge ( Discharge outlet not provided)
	Option	1. Front Discharge + Free Access(Discharge beneath the floor) 2. Led from upper piping
Accessory	Main Unit	Discharge Nozzle
	Cylinder	Cylinder Valve, Cylinder Valve Releaser, Extinguishing Agent

### ■ Connectable Device (Optional)

Device	Model	Max. Number
Manual Actuating Device	NRSA-2HB, NRSA-3HB	5
Smoke Detector	Conventional Photoelectric type 2KH2-LS, 2KW-P, etc.	20
Heat Detector	Conventional Fixed Temperature type TCC-60-L, 1CC2-70-LW, 1CD-70-LS, etc.	As required
Discharge Indicator	ST-S (Indoor), ST-L (Outdoor)	20
Speaker	NK-305T, PS-302	Up to 20W

# Package Fire Extinguishing System

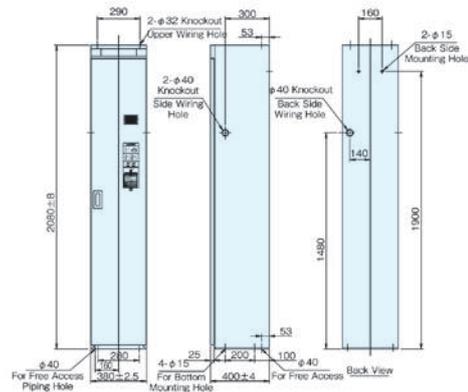
## HFC-23 Package System

HFC-23 Package System uses HFC-23 fire extinguishing agent. Therefore, there are following advantages: Ozone-depletion potential (ODP) of zero; Low toxicity; Harmless to the human body

### HFC-23 Package



NP-F



(mm)

### ■ Specification

Specification		HFC-23 Package Main Unit
		NP-F
Agent		HFC-23
Storage Cylinder		68L, 41L, 24L, 20L, 14L
Input Power Source		AC220V ±10% 50/60 Hz
Circuit Voltage		DC24V
Emergency Power Source		DC24V 3.5Ah/5Hr Ni-Cd Battery (Optionally available 6.0Ah)
Designed Discharge Time		10 sec. or less
Discharge Delay Time in Default Setting(Alterable)		Auto. Operation : 5 sec. Manu. Operation : 5 sec.
Operating Temperature Range		0 – 40°C
Body(Case) Material		SPCC t1.6 mm
Dimensions		H2080 x W380 x D400 mm
Weight		Approx. 80 kg (excluding cylinder)
Discharge Method	Standard	Front Discharge (Discharge outlet provided)
	Option	1. Front Discharge + Free Access (Discharge beneath the floor) 2. Led from upper piping 3. Led from upper piping + Free Access (Discharge beneath the floor) 4. Exclusive for Free Access
Accessory	Main Unit	Control Part, Voice Alarm Device, Manual Actuating Button, Manu./Auto Changeover Key Switch, External Signal Transfer Contacts, Discharge Nozzle
	Cylinder	Cylinder Valve, Cylinder Valve Releaser, Extinguishing Agent
Extra Box		Electric type : 25 units max. Gas Pressure type : 50 units max.
Accessories		Terminator CRE, End-of-line resistor 20 kΩ 1/4, Spare fuses

# Package Fire Extinguishing System

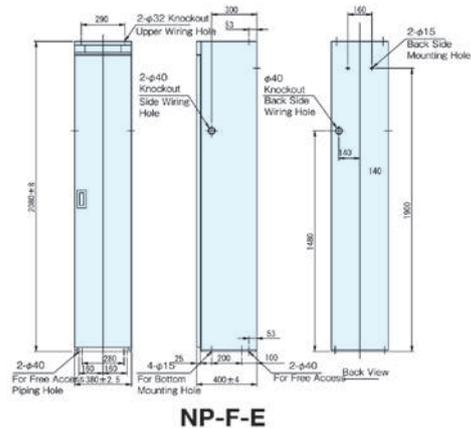
## HFC-23 Package Extra box

Installed to increase the amount of fire extinguishing agent according to the size of the protected area. Contains one set of extinguishing gas storage cylinder. No control section provided. Interlocked with package operation.

### HFC-23 Package Extra Box



NP-F-E NP-F-EG



NP-F-E (mm)

### Specification

Specification	HFC-23 Package Extra Box	
	NP-F-E	NP-F-EG
Agent	HFC-23	
Storage Cylinder	68L, 41L, 24L, 20L, 14L	
Actuating Method	Electric	Gas Pressure
Designed Discharge Time	10 sec. or less	
Operating Temperature Range	0 – 40°C	
Body(Case) Material	SPCC t1.6 mm	
Dimensions	H2080 x W380 x D400 mm	
Weight	Approx. 75 kg (excluding cylinder)	
Discharge Method	Standard	Front Discharge (Discharge outlet not provided)
	Option	1. Front Discharge + Free Access(Discharge beneath the floor) 2. Led from upper piping 3. Led from upper piping + Free Access (Discharge beneath the floor) 4. Exclusive for Free Access
Accessory	Extra Unit	Discharge Nozzle
	Cylinder	Cylinder Valve, Cylinder Valve Releaser, Extinguishing Agent

### Connectable Device (Optional)

Device	Model	Max. Number
Manual Actuating Device	NRSA-2HB, NRSA-3HB	5
Smoke Detector	Conventional Photoelectric type 2KH2-LS, 2KW-P, etc.	20
Heat Detector	Conventional Fixed Temperature type TCC-60-L, 1CC2-70-LW, 1CD-70-LS, etc.	As required
Discharge Indicator	ST-S (Indoor), ST-L (Outdoor)	20
Speaker	NK-305T, PS-302	Up to 20W

# Package Fire Extinguishing System

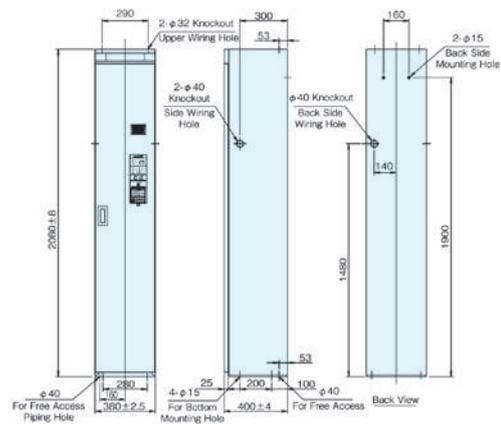
## HFC-227ea Package System

HFC-227ea Package System uses HFC-227ea fire extinguishing agent. Therefore, there are following advantages: Ozone-depletion potential (ODP) of zero; Low toxicity; Harmless to the human body

### HFC-227ea Package



NP-E



(mm)

### Specification

Specification		HFC-227ea Package Main Unit
		NP-E
Agent		HFC-227ea
Storage Cylinder		68L, 41L, 24L, 14L
Input Power Source		AC220V ±10% 50/60 Hz
Circuit Voltage		DC24V
Emergency Power Source		DC24V 3.5Ah/5Hr Ni-Cd Battery (Optionally available 6.0Ah)
Designed Discharge Time		10 sec. or less
Discharge Delay Time in Default Setting(Alterable)		Auto. Operation : 5 sec. Manu. Operation : 5 sec.
Operating Temperature Range		0 – 40°C
Body(Case) Material		SPCC t1.6 mm
Dimensions		H2080 x W380 x D400 mm
Weight		Approx. 80 kg (excluding cylinder)
Discharge Method	Standard	Front Discharge (Discharge outlet provided)
	Option	1. Front Discharge + Free Access (Discharge beneath the floor) 2. Led from upper piping 3. Led from upper piping + Free Access (Discharge beneath the floor) 4. Exclusive for Free Access
Accessory	Main Unit	Control Part, Voice Alarm Device, Manual Actuating Button, Manu./Auto Changeover Key Switch, External Signal Transfer Contacts, Discharge Nozzle
	Cylinder	Cylinder Valve, Cylinder Valve Releaser, Extinguishing Agent
Extra Box		Electric type : 25 units max. Gas Pressure type : 50 units max.
Accessories		Terminator CRE, End-of-line resistor 20 kΩ 1/4, Spare fuses



# Package Fire Extinguishing System

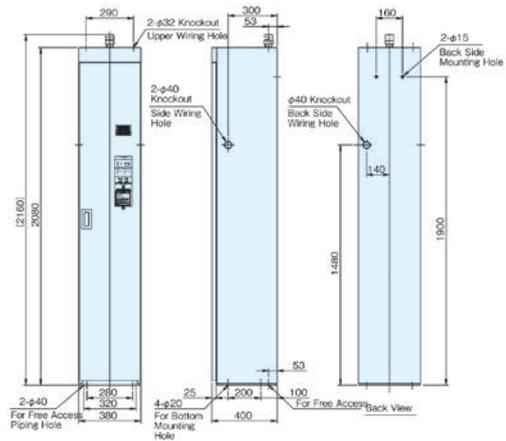
## Gerbera (FK-5-1-12) Package System

Gerbera Package System uses FK-5-1-12 fire extinguishing agent. Therefore, there are following advantages: Excellent electrical insulation and suitable for electrical fire; Minimizing environmental effects; Ozone-depletion potential (ODP) of Zero; Less than 1 of Global Warming Potential Value (GWP); Harmless to the human body;

### FK-5-1-12 Package



NP-K



(mm)

### ■ Specification

Specification		FK-5-1-12 Package Main Unit
		NP-K
Agent		FK-5-1-12
Storage Cylinder		68L, 41L, 24L
Input Power Source		AC100V 50/60 Hz
Circuit Voltage		DC24V
Emergency Power Source		DC24V 6.0Ah Ni-Cd Battery
Designed Discharge Time		10 sec. or less
Discharge Delay Time in Default Setting(Alterable)		Auto. Operation : 5 sec. Manu. Operation : 5 sec.
Operating Temperature Range		0 – 40°C
Body(Case) Material		SPCC t1.6 mm
Dimensions		H2160 x W380 x D400 mm (68L, 41L) H1380 x W380 x D400 mm (24L)
Weight		Approx. 86 kg (excluding cylinder)
Discharge Method	Standard	Front Discharge with Nozzle
	Option	1. Front Discharge + Free Access with external piping (Discharge beneath the floor) 2. Led from upper piping 3. Led from upper piping + Free Access with external piping (Discharge beneath the floor)
Accessory	Main Unit	Control Part, Voice Alarm Device, Manual Actuating Button, Manu./Auto Changeover Key Switch, External Signal Transfer Contact, Discharge Nozzle
	Cylinder	Cylinder Valve, Cylinder Valve Releaser, Extinguishing Agent
Extra Box		50 units max.
Accessories		Terminator CRE, End-of-line resistor 20 kΩ 1/4, Spare fuses

# Package Fire Extinguishing System

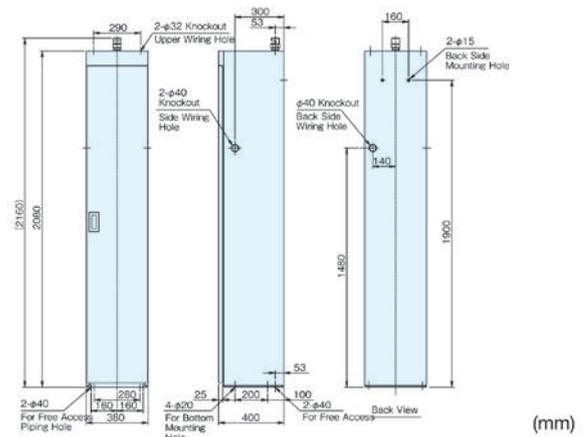
## Gerbera (FK-5-1-12) Package Extra box

Installed to increase the amount of fire extinguishing agent according to the size of the protected area. Contains one set of extinguishing gas storage cylinder. No control section provided. Interlocked with package operation.

### FK-5-1-12 Package Extra Box



NP-K-EG



### Specification

Specification		FK-5-1-12 Package Extra Box	
		NP-K-EG	
Agent		FK-5-1-12	
Storage Cylinder		68L, 41L	
Actuating Method		Gas Pressure	
Designed Discharge Time		10 sec. or less	
Operating Temperature Range		0 – 40°C	
Body(Case) Material		SPCC t1.6 mm	
Dimensions		H2160 x W380 x D400 mm (68L, 41L)	
Weight		Approx. 68 kg (excluding cylinder)	
Discharge Method	Standard	Front Discharge with Nozzle	
	Option	1. Front Discharge + Free Access (Discharge beneath the floor) 2. Led from upper piping 3. Led from upper piping + Free Access (Discharge beneath the floor) 4. Exclusive for Free Access	
Accessory	Extra Unit	Discharge Nozzle	
	Cylinder	Cylinder Valve, Cylinder Valve Releaser, Extinguishing Agent	

### Connectable Device (Optional)

Device	Model	Max. Number
Manual Actuating Device	NRSA-2HB, NRSA-3HB	5
Smoke Detector	Conventional Photoelectric type 2KH2-LS, 2KW-P, etc.	20
Heat Detector	Conventional Fixed Temperature type TCC-60-L, 1CC2-70-LW, 1CD-70-LS, etc.	As required
Discharge Indicator	ST-S (Indoor), ST-L (Outdoor)	20
Speaker	NK-305T, PS-302	Up to 20W



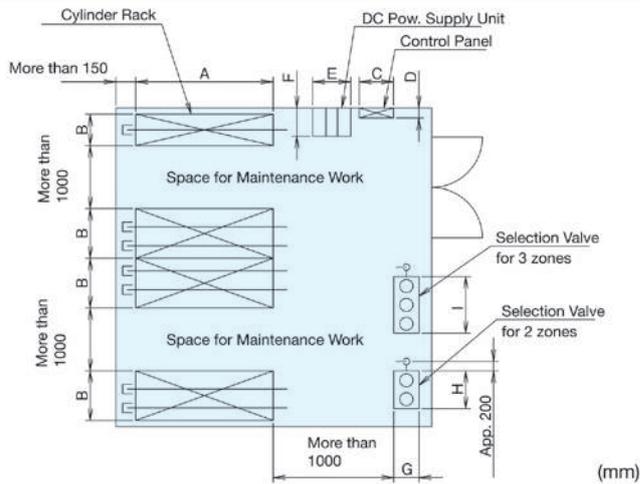
## References

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Pressure-Relief-Opening Area Calculation	40

# Installation Space for Gaseous System

## Installation Space for Gaseous Fire Extinguishing System



### Dimensions

N2 Cylinder Rack			
Cylinder	A	B	Height
<b>One line, One side open</b>			
2	670	500	2335
3	970	500	2335
4	1270	500	2335
5	1570	500	2335
6	1870	500	2335
7	2170	500	2335
<b>Two lines, One side open</b>			
4	670	790	2335
6	970	790	2335
8	1270	790	2335
10	1570	790	2335
12	1870	790	2335
14	2170	790	2335

FK-5-1-12 Cylinder Rack			
Cylinder	A	B	Height
<b>One line, One side open</b>			
2	670	510	2255
3	970	510	2255
4	1270	510	2255
5	1570	510	2255
6	1870	510	2255
7	2170	510	2255
<b>Two lines, One side open</b>			
4	670	790	2255
6	970	790	2255
8	1270	790	2255
10	1570	790	2255
12	1870	790	2255
14	2170	790	2255

Control Panel			
Zone	C	D	Height
1	540	160	500
3	540	160	500
5	540	160	500
10	540	160	780
15	540	160	1500
20	540	160	1500

DC Pow. Supply Unit			
Capacity	E	F	Height
3.5Ah	510	180	450
5.0Ah	510	180	450
8.0Ah	510	180	450
10.0Ah	510	180	450
12.0Ah	600	450	750
16.0Ah	600	450	750
20.0Ah	600	450	750
30.0Ah	600	450	750

Selection Valve for 2 zones(reference)			
Size	G	H	Height
25A	328	970	More than 800
32A	334	970	
40A	344	970	
50A	360	1020	
65A	388	1020	
80A	395	1020	Less than 1500
100A	462	1020	
125A	504	1070	
150A	524	1070	

Selection Valve for 3 zones(reference)			
Size	G	I	Height
25A	328	1340	More than 800
32A	334	1340	
40A	344	1340	
50A	360	1390	
65A	388	1390	
80A	395	1390	Less than 1500
100A	462	1390	
125A	504	1440	
150A	524	1440	

# Gaseous Agent Quantity Calculation

## Calculation Method of Required Agent Quantity

### Required Quantity of Gaseous Fire Extinguishing Agent

$$G \text{ (kg)} = V \text{ (m}^3\text{)} \times K \text{ (kg/m}^3\text{)}$$

- G : Required quantity of gaseous fire extinguishing agent (kg) or (m<sup>3</sup>) \*1  
 V\*2 : The volume of protected area (m<sup>3</sup>) \*3  
 K : **Design coefficient** (kg/m<sup>3</sup>) or (m<sup>3</sup>/m<sup>3</sup>) \*1

\*1 The unit symbol of (m<sup>3</sup>) or (m<sup>3</sup>/m<sup>3</sup>) is applied to Nitrogen.

\*2 In case where there is any airtight structure made of incombustible material fixed to the space, its volume is to be subtracted from that of protected area.

\*3 All openings are to be closed before discharge of fire extinguishing agent. (No opening to be allowed.)

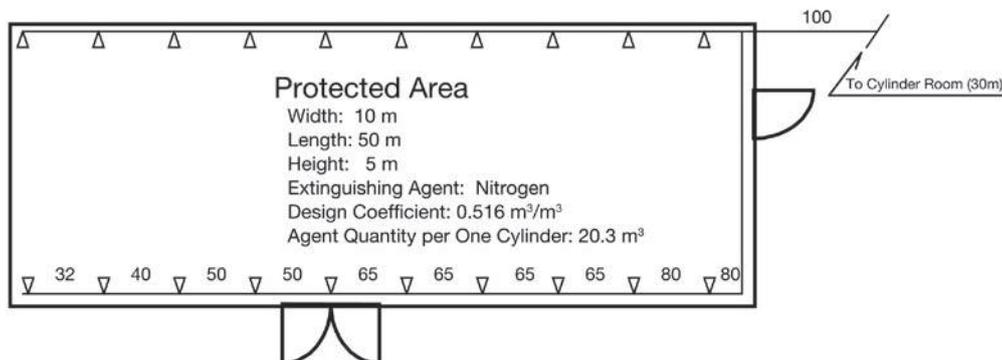
### Required Number of Storage Cylinders

$$N \text{ (Qty)} = G \text{ (kg)} \div Q \text{ (kg)}$$

- N : Required number of storage cylinders (Qty)  
 G : Required quantity of gaseous fire extinguishing agent (kg) or (m<sup>3</sup>) \*1  
 Q : **Quantity of agent per one cylinder** (kg) or (m<sup>3</sup>) \*1

\*1 The unit symbol of (m<sup>3</sup>) is applied to Nitrogen.

### Calculation Example



- (1) The volume of the protected area = 10 m × 50 m × 5 m = **2500 m<sup>3</sup>**  
 (2) Required quantity of the agent = 2500 m<sup>3</sup> × **0.516 m<sup>3</sup>/m<sup>3</sup>** = **1290 m<sup>3</sup>**  
 (3) The number of cylinders = 1290 m<sup>3</sup> ÷ **20.3 m<sup>3</sup>** = 63.55 ≙ **64 (Qty)**

### Design Coefficient and One Cylinder Quantity

Specification	Inert Gas		Halogenated Agent		
	CO2	N2	FK-5-1-12	HFC-23	HFC-227ea
Design Coefficient (kg/m <sup>3</sup> )	0.75-1.0	0.516 (m <sup>3</sup> /m <sup>3</sup> )	0.84	0.52	0.55
Max. Agent Qty per One Cylinder	83 L	-	20.3 m <sup>3</sup>	-	-
	82.5 L	55 kg	-	-	-
	68 L	45 kg	-	97 kg	56 kg
	41 L	-	-	58 kg	34 kg
	24 L	-	-	34 kg	20 kg
	20 L	13 kg	-	-	16 kg
14 L	-	-	-	12 kg	15 kg

## Pressure-Relief-Opening Area Calculation

### Calculation Method of Pressure-Relief-Opening Area

Pressure relief openings appropriate for the protected area are required to release excessive pressure caused by the fire extinguishing agent discharge.

The area of the opening is obtained by the following formulas:

#### Nitrogen Fire Extinguishing system

$$A = 134 \times \frac{Q}{\sqrt{P - \Delta P - P_u}} \quad Q = N \times 20.3 \times \alpha$$

$$P_u = 0.5 \times 1.20 \times V_a^2$$

A : Area of pressure relief opening (cm<sup>2</sup>)

P : Permissible pressure within the protected area (Pa)

$\Delta P$  : Pressure loss caused by the duct (Pa)

$P_u$  : Outside wind pressure (Pa) \*1

$V_a$  : Outside wind speed (m/s) \*2

Q : Max flow rate of fire extinguishing agent (m<sup>3</sup>/min), at the time of agent discharge

N : Total number of cylinders (Qty.)

$\alpha$  : Coefficient to calculate the max flow rate

[ Reducing Valve TG12:  $\alpha = 1.2$   
Reducing Valve 15RG:  $\alpha = 1.6$

#### FK-5-1-12 Fire Extinguishing system

$$A = 580 \times \frac{Q}{\sqrt{P - \Delta P - P_u}} \quad Q = N \times M \div 10$$

$$P_u = 0.5 \times 1.20 \times V_a^2$$

A : Area of pressure relief opening (cm<sup>2</sup>)

P : Permissible pressure within the protected area (Pa)

$\Delta P$  : Pressure loss caused by the duct (Pa)

$P_u$  : Outside wind pressure (Pa) \*1

$V_a$  : Outside wind speed (m/s) \*2

Q : Flow rate of fire extinguishing agent (kg/sec), at the time of agent discharge

N : Total number of cylinders (Qty.)

M : Filling quantity per one cylinder (kg)

\*1 In cases of some facilities ignorable the wind speed, such as the exhaust chambers and exhaust stacks, the outside wind pressure can be equated to zero.

\*2 The wind speed level that the authorities observed in the applicable area, which is usually adopted the maximum wind speed level for the past 10 years.

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