RIKEN KEIKI

M210-16034

Applications in Automotive Market and Introduction to Gas Detectors and Alarms for Safety and Security

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Document contents

- About Riken Keiki
- Why do we need gas detectors?
  Risks associated with toxic gases
- Applications in automotive market
- Major examples of accidents
- Product information
- International agents

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About Riken Keiki

About Riken Keiki

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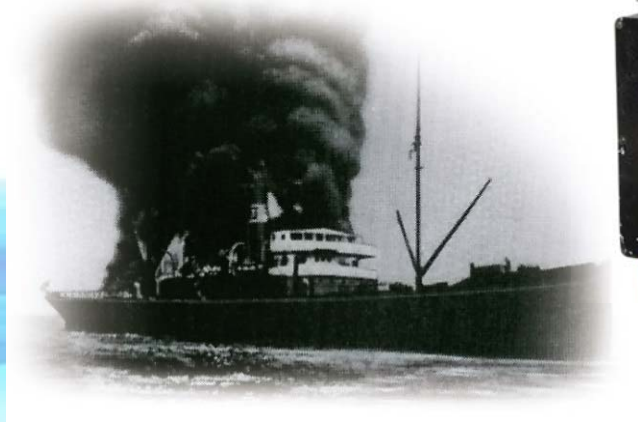
1939

Riken Keiki

Headquarters
To be completed in September 2018 (conceptual drawing)

Riken Keiki was originally established to commercialize and sell detectors for preventing explosions in coal mines and on oil tankers.



About Riken Keiki

Methane gas measurements in coal mine

Optical Gas Indicator Model 3 (1939)

Certification
National heritage of analytical and scientific instruments
2014

Company profile

Company name	Riken Keiki Co., Ltd.	
Established	March 15, 1939	
Location	Headquarters: Development Center:	2-7-6 Azusawa Itabashi-Ku, Tokyo 2-3 Minamisakae-cho, Kasukabe-shi, Saitama
Factories	Hakodate-shi, Hokkaido; Sakurai-shi, Nara (affiliated company)	

Headquarters

To be completed in September 2018 (conceptual drawing)

Development Center

About Riken Keiki

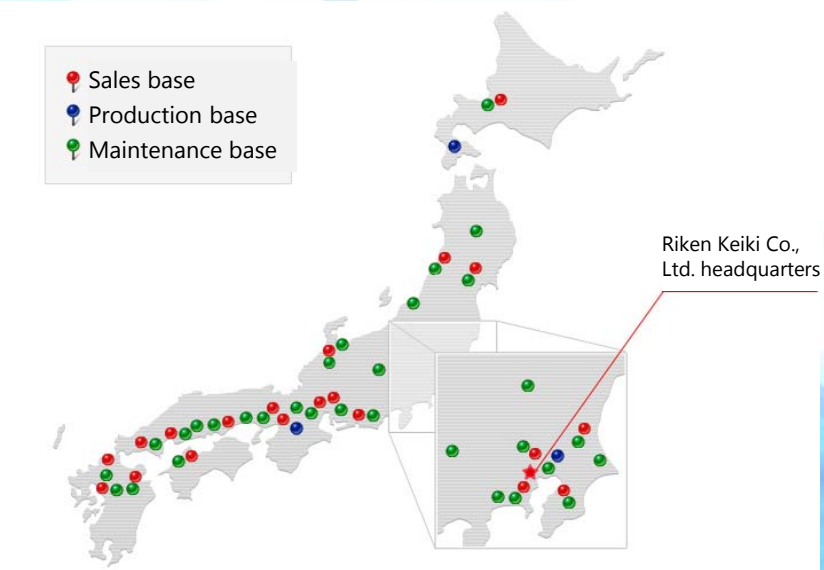
Headquarters
(Itabashi-Ku, Tokyo)

Development Center
(Kasukabe-shi, Saitama)

To be completed in September 2018
(conceptual drawing)

Locations of sales offices

◆Domestic◆



◆Global◆

Company profile

Various bases	Domestic sales and branch offices: 20 locations Service stations: 32 locations Global bases: 7 locations
Major sales items	Combustible gas detectors and alarms Gas detectors and alarms designed to prevent oxygen deficiency accidents Toxic gas detectors and alarms Combined gas detectors and alarms Various measuring instruments for environmental measurements and other instruments
Capital	2,565.5 million yen
Number of employees	965 (non-consolidated), 1,127 (consolidated) * As of September 30, 2017

Hakodate Factory
(Hakodate-shi, Hokkaido)

Nara Factory
(Sakurai-shi, Nara)

Company history

1939	Riken Keiki Co., Ltd. established to produce and sell optical gas detectors, photo-elasticity apparatuses, and other precision instruments invented and developed by RIKEN
1959	Start production and sale of combustible gas alarms and detectors (catalytic combustion type).
1967	Start production and sale of oxygen measuring instruments (OX-1).
1970	Start production and sale of monitoring tape type measuring instruments (FP-200).
1972	Start production and sale of non-dispersive infrared measuring instruments (RI-550).
1975	Start production and sale of electrochemical type measuring instruments (EC-231).
1986	Start production and sale of photoemission yield spectrometers (AC-1).
2009	70th anniversary of founding
2014	Start production and sale of portable X-ray diffractometers equipped with XRF (DF-01).
2015	Start production and sale of portable multi gas detectors (GX-6000), first product of its kind in Japan capable of housing photoionization detectors (PID).

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Why Do We Need Gas Detectors?
Risks Associated with Toxic Gases

Need for gas detectors (combustible gases)

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Criteria set by United Nations' Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

According to the United Nations' Globally Harmonized System of Classification and Labelling of Chemicals (GHS), a combustible gas (or flammable gas) is defined as follows:

A combustible or flammable gas is a gas having an explosive (flammable) range when mixed with air under atmospheric conditions of 20°C and standard pressure of 101.3 kPa.

Gases falling under this definition are further subdivided into the following two categories based on the severity of the associated risk:

Category 1 (Danger: Extremely flammable gas)

Gases capable of igniting at 20°C and standard pressure of 101.3 kPa when occurring in a mixture of 13% or less by volume with air or having an explosive (flammable) range of at least 12% when mixed with air regardless of the lower explosion (flammable) limit

Category 2 (Warning: Flammable gas)

Gases, other than those in Category 1, which are gaseous at 20°C and a standard pressure of 101.3 kPa and have an explosive (flammable) range when mixed with air

We need gas detectors because flammable gas leaks can lead to explosions.

Need for gas detectors (definition of permissible concentration)

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Definition of permissible concentration

Even when workers are exposed to hazardous substances at work sites, no adverse health effects should emerge as long as the airborne concentration of the **hazardous** substance remains below the permissible concentration.

Recommended permissible concentrations have been set by the American Conference of Governmental Industrial Hygienists (ACGIH) and the Japan Society for Occupational Health. We use the **ACGIH** permissible concentrations.

Types of permissible concentrations

- **TWA (Time Weighted Average)**
  Time Weighted Average refers to time-weighted average concentrations over an 8-hour workday and 40-hour workweek of routine work to which workers may be repeatedly exposed without adverse health effects.

- **STEL (Short Term Exposure Limit)**
  Short Term Exposure Limit refers to exposure that does not lead to adverse health effects if each exposure does not exceed 15 minutes, the number of daily exposures does not exceed four, and the exposures are separated by at least one hour.

- **C (Ceiling value)**
  Ceiling Value refers to the upper limit that can never be exceeded.

We need gas detectors because leaks exceeding permissible concentrations can lead to accidents.

How human body reacts to oxygen-deficiency

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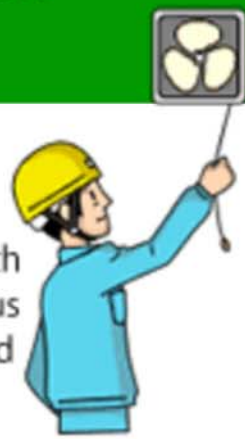
O2 Concentration 21%

Symptoms

Natural air

O2 Concentration 18%



Symptoms

Limit level for not causing serious health problems. Continuous ventilation is required

O2 Concentration 16%-12%

Symptoms

Rapid breathing, Increase in pulse rate, Loss of concentration, Headache, Nausea, Ear ringing

O2 Concentration 14%-9%

Symptoms

Stupor, Headache, Nausea, Cyanosis, Faintness on the entire body

O2 Concentration 10%-6%

Symptoms

Comatose, Loss of consciousness, Muscle spasm on the entire body

O2 Concentration 6% or less

Symptoms

Unconsciousness, Comatose, Cessation of breathing, Cardiac arrest, Die in 6 minutes

Effects of hydrogen sulfide (H_2S) on human body

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Concentration (ppm)	Effects and Toxicity
0.025	Smell vaguely. (It varies according to the individual.)
0.3	Smell clearly.
3 - 5	Smell moderate degree of objectionable odor.
10	Lower-level to irritate eyes' mucus membranes.
20 - 40	A strong odor. Lower-level to irritate lungs' mucous membranes.
100	Sense of smell is impaired in 2 - 15 minutes. Eyes and respiratory tract are irritated in 1 hour. 8 - 48 hours continuous exposure can lead to death.
170 - 300	1 hour exposure is the limit for not causing serious health problems.
400 - 700	Life-threatening exposure in 0.5 - 1 hour.
800 - 900	Bring on loss of consciousness, cessation of breathing and death.
1000	Bring on immediate loss of consciousness and death.

Effects of carbon monoxide (CO) on human body

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Concentration (ppm)	Effects and Toxicity
100	No noticeable effects even after breathing for a few hours.
200	A mild headache in around 1.5 hours.
400 - 500	Headache, nausea and ear ringing in around 1 hour.
600 - 1000	Loss of consciousness in around 1 - 1.5 hours.
1500 - 2000	Headache, vertigo and disabling nausea in around 0.5 - 1 hour, and losing consciousness.
3000 - 6000	Headache, vertigo, disabling nausea...etc. in a few minutes. 10 - 30 minutes exposure can lead to death.
10000	Bring on immediate loss of consciousness and death.

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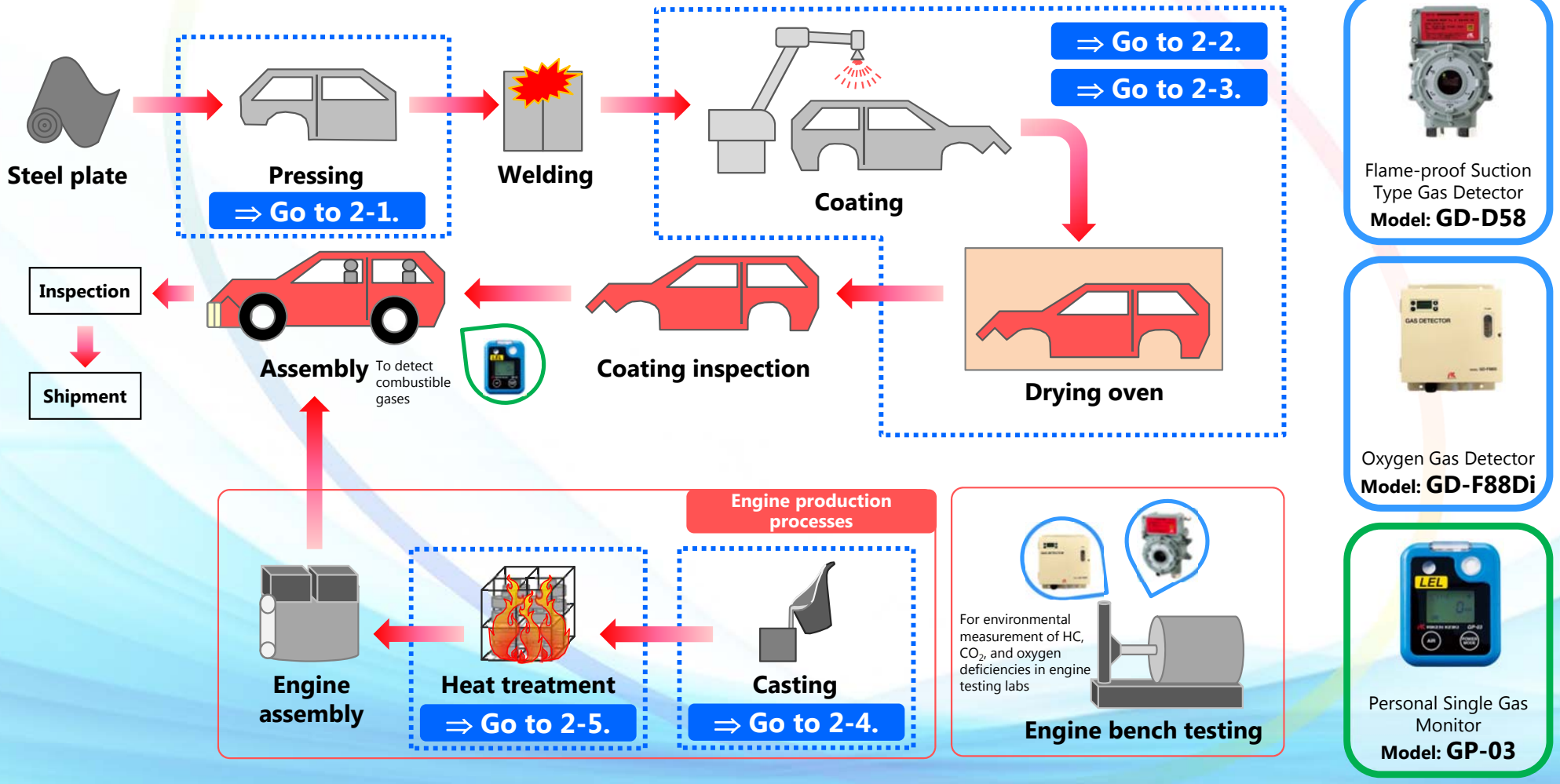
Applications in Automotive Market

Applications in automotive market

1. Entire flow of processes at automobile manufacturing plant
2. Automobile manufacturing processes
   - 2-1: Pressing
   - 2-2: Coating and drying (1)
   - 2-3: Coating and drying (2)
   - 2-4: Casting
   - 2-5: Heat treatment
3. Laboratory
4. Engine laboratory and environmental testing laboratory
5. Vehicle testing laboratory
6. Test bench
7. Lithium battery production
8. Heating furnace

1. Entire flow of processes at automobile manufacturing plant

The figure below shows the risks posed by combustible and toxic gas leaks in automobile manufacturing processes and examples of gas detector and alarm installations.
The following pages discuss the details of each process.



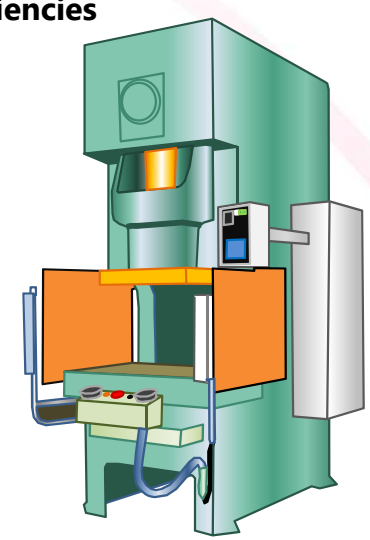
2-1: Pressing

Description: In the pressing process, a large press machine or similar equipment is used to press the body.

Hazardous risks: **Fuel from the press machine may leak and cause oxygen deficiencies or explosions in the underground pit.** ⇒ **Detecting combustible gases to prevent explosions**
Detecting oxygen concentration to prevent oxygen deficiencies

O_2 indicator

Multi-channel Gas Monitoring System
Model: RM-5003



Press machine

Fuel leaks
⇒ Explosions

Detector heads for oxygen deficiencies

Smart Transmitter/Gas Detector
Model: SD-10X

Oxygen Gas Detector Head
Model: GD-F3A-A

Personal gas detector for workers

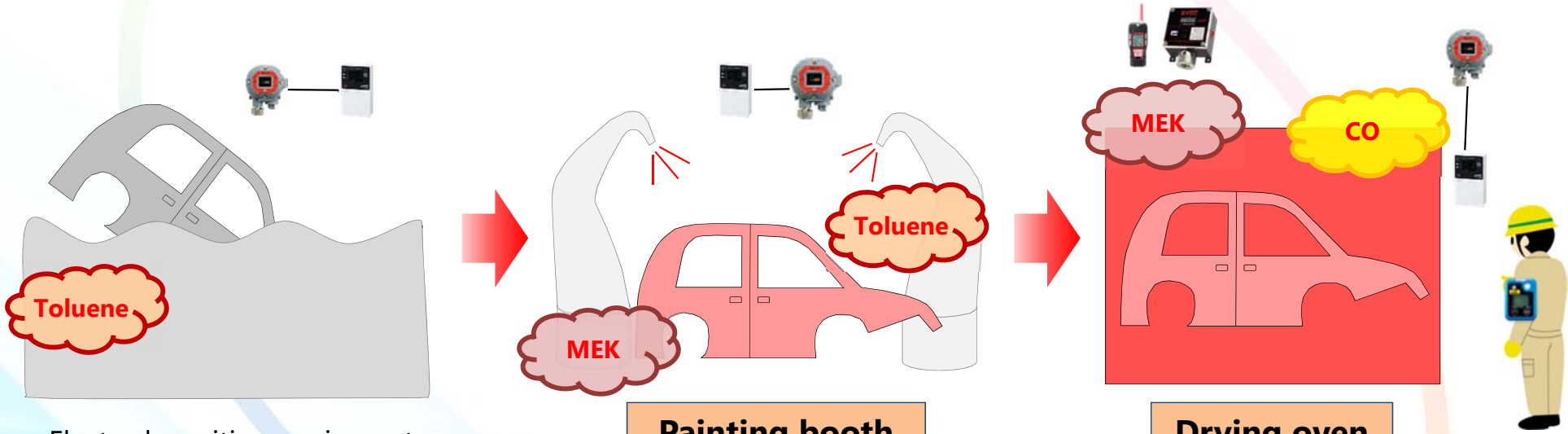
Four Gas Personal Monitor
Model: GX-2009

Underground pit ⇒ oxygen deficiencies and explosions

2-2: Coating and drying (1)

Description: Paint is applied in various ways in coating and drying processes. The body is coated by electrodeposition or spray painting and dried in a drying oven.

Hazardous risks: **Organic solvents used in the electrodeposition equipment and painting booth may cause explosions. CO poisoning may occur in the drying oven.** ⇒ **Detecting combustible gases to prevent explosions Detecting CO to prevent poisoning**



Electrodeposition equipment

Painting booth

Drying oven

To monitor concentrations of VOCs and CO discharged from the drying oven

Smart Transmitter/ Gas Detector
Model: SD-1

Gas Detector
Model: RM-6000

Personal Single Gas Monitor
Model: GP-03

Portable Multi Gas Detector
Model: GX-6000

Fixed PID VOC Monitor
Model: RVOC

2-3: Coating and drying (2)

Description: Paint is applied in various ways in coating and drying processes. The body is coated by electrodeposition or spray painting and dried in a drying oven.

Hazardous risks: **Organic solvents used in the painting booth, drying oven, and deodorizing furnace may result in explosions or poisoning.** ⇒ **Detecting organic solvents to prevent explosions and poisoning**

Detecting solvents in painting booth

Model: **GH-5001-A80V**

Detecting unburnt gas in drying oven (LPG/LNG)

Model: **GP-5001-A80S/D58 + sampling unit**

Detecting burner leaks (LPG/LNG)

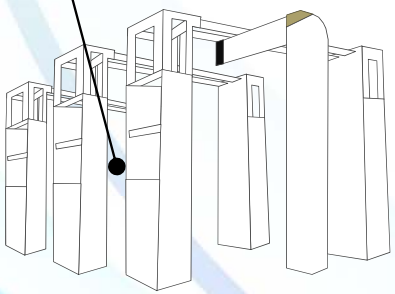
Model: **GP-5001-A80**

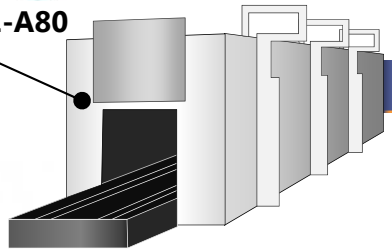
IN side measurement before waste gas combustion treatment

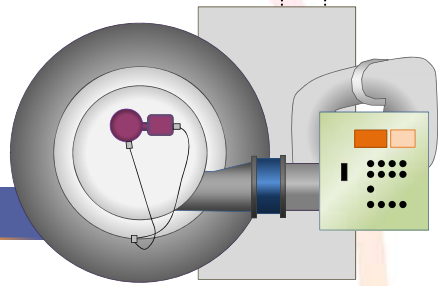
Model: **RM-5003-SD-1RI / FI-800**

OUT side measurement after waste gas combustion treatment

Model: **RM-5003-SD-1RI + sampling unit**







Deodorizing furnace

Painting booth

Drying oven

Environmental measurements before work

Personal gas detector for workers

Multi-channel Gas Monitoring Systems
Model: **RM-5000 series**

* The GD-A80S nameplate is blue.

Combustible/Toxic Gas Detector Heads
Model: **GD-A80 series**

Smart Transmitter/ Gas Detector
Model: **SD-1RI**

Optical Interferometric Gas Analyzer
Model: **FI-800**

Portable Multi Gas Detector
Model: **GX-6000**

Four Gas Personal Monitor
Model: **GX-2009**

2-4: Casting

Description: A casting machine is used to produce engines and other cast products. In a casting machine, fuel is supplied from the gas supply unit to the melting furnace to melt aluminum.

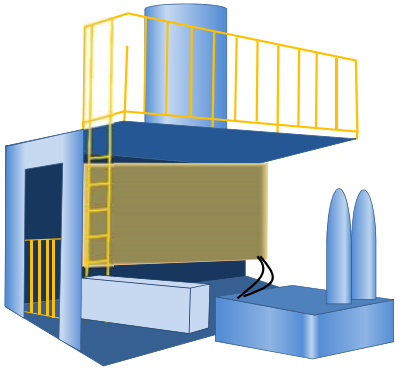
Hazardous risks: **LPG supplied to the casting machine may cause explosions. Oxygen deficiencies may occur in the underground pit.** ⇒ **Detecting organic solvents to prevent explosions and poisoning**

Casting machine control panel

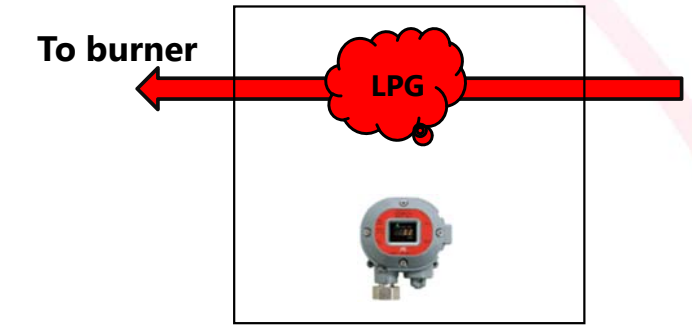
O_2, CO, and LPG indicator

Multi-channel Gas Monitoring System
Model: RM-5003

Casting machine



Gas supply unit



Detector head for oxygen deficiencies

Smart Transmitter/Gas Detector
Model: SD-1OX

Detector head for CO

Smart Transmitter/ Gas Detector
Model: SD-1EC

Detector head for LPG

Smart Transmitter/ Gas Detector
Model: SD-1

Personal gas detector for workers

Four Gas Personal Monitor
Model: GX-2009

Underground pit

2-5: Heat treatment

Description: Automotive parts are heat-treated in the heat treatment process.

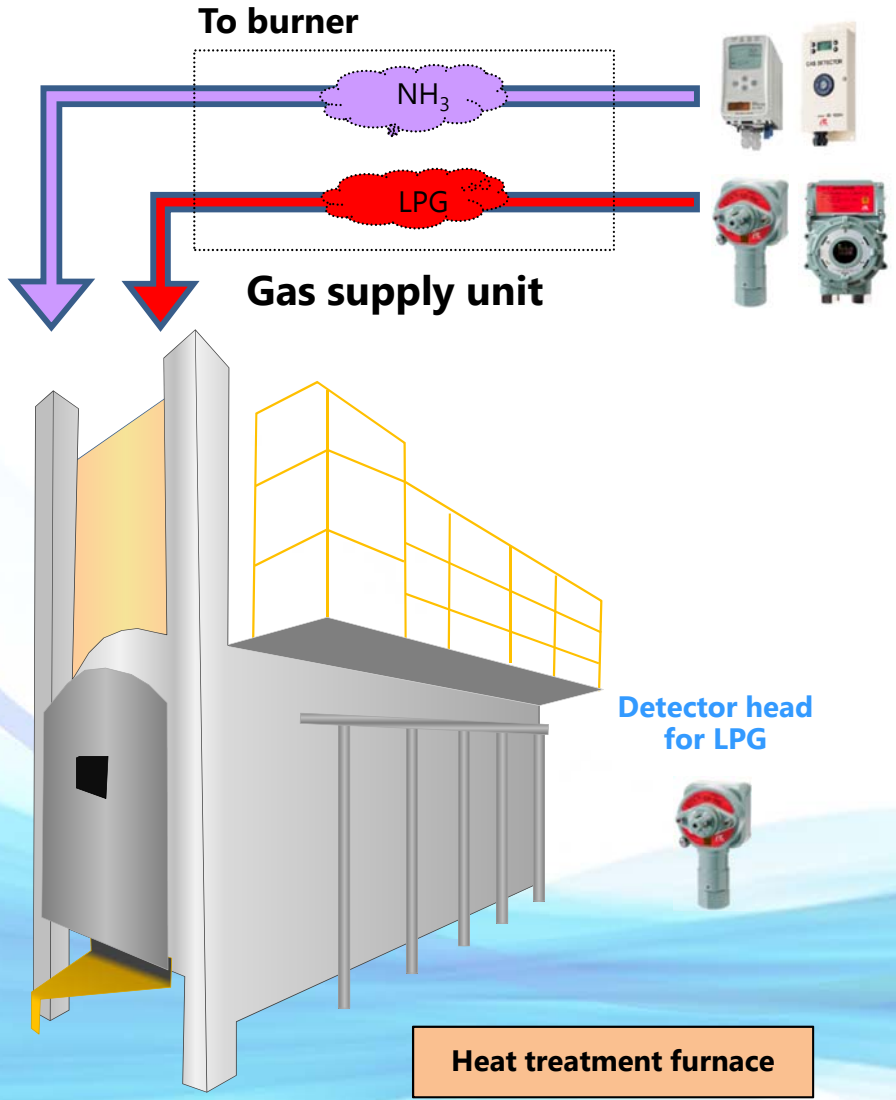
Hazardous risks: **Explosions or poisoning may occur in heat treatment furnaces in which gases including LPG, LNG, and NH_3 are used.** ⇒ **Detecting combustible gases to prevent explosions**
Detecting NH_3 to prevent poisoning

LPG and NH_3 indicators

Multi-channel Gas Monitoring System
Model: GP-5001 (for LPG)
Model: RM-5003 (for NH_3)

Combustible Gas Detector
Model: GP-147

Heat treatment furnace control panel



Heat treatment furnace

Detector heads for NH_3

Smart Transmitter/ Gas Detector
Model: GD-70D

Toxic Gas Detector Head
Model: GD-K88Ai

Detector heads for heat source (LPG/LNG)

Combustible Gas Detector Head
Model: GD-A80

Flame-proof Suction Type Gas Detector
Model: GD-D58

Detector head for LPG

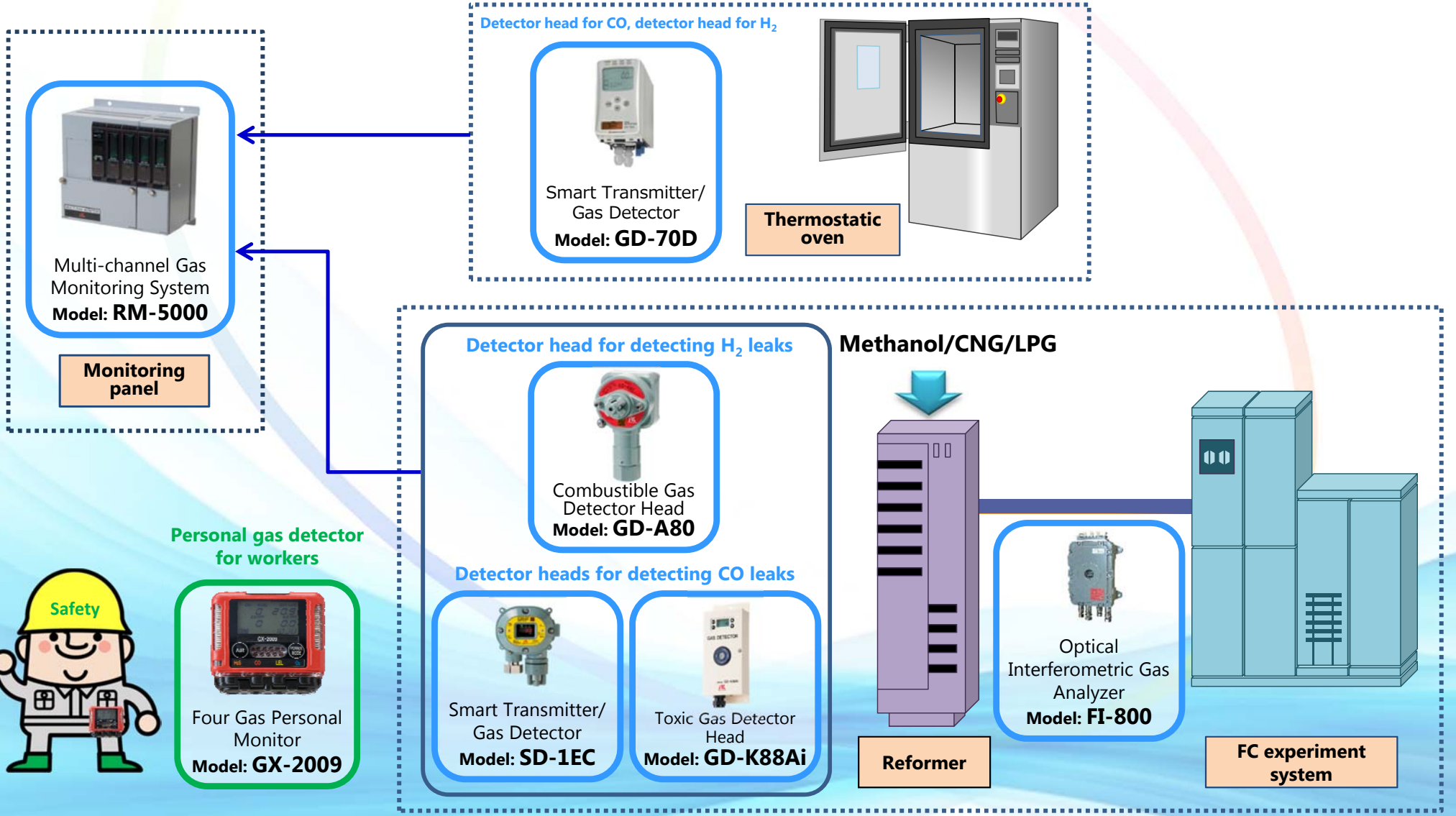
Personal gas detector for workers

Four Gas Personal Monitor
Model: GX-2009

3. Laboratory

Description: In laboratories, various parts are tested in thermostatic ovens and other equipment. FC experiment systems and reformers are also tested.

Hazardous risks: **H_2 and fuel leaks from the FC experiment systems and reformers during experiments may cause explosions. The CO in the exhaust gas may lead to poisoning.** ⇒ **Detecting H_2 and other combustible gases to prevent explosions**
Detecting CO to prevent poisoning



4. Engine laboratory and environmental testing laboratory

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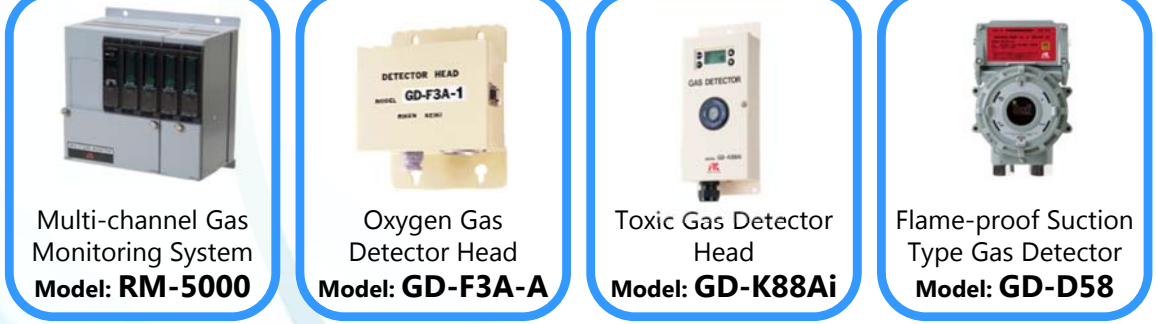
Description: Various tests are performed in engine and environmental testing labs, including engine experiments using actual vehicles and environmental tests.

Hazardous risks: **Fuel leaks from vehicles during tests in engine and environmental testing labs may cause explosions. CO in exhaust gas may lead to poisoning.** ⇒ **Detecting combustible gases to prevent explosions Detecting CO to prevent poisoning**

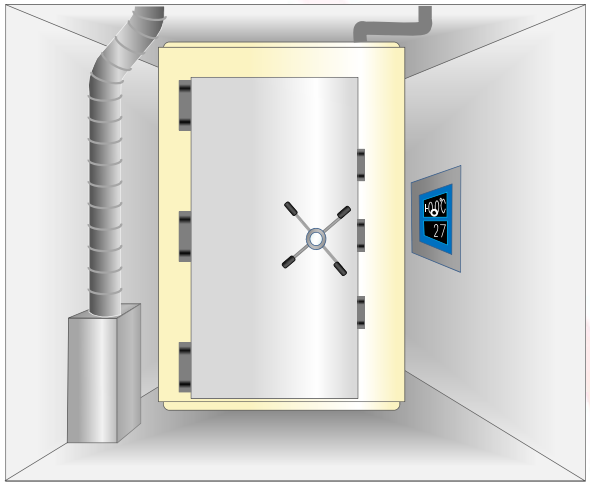


Multi-channel Gas Monitoring System
Model: RM-5000

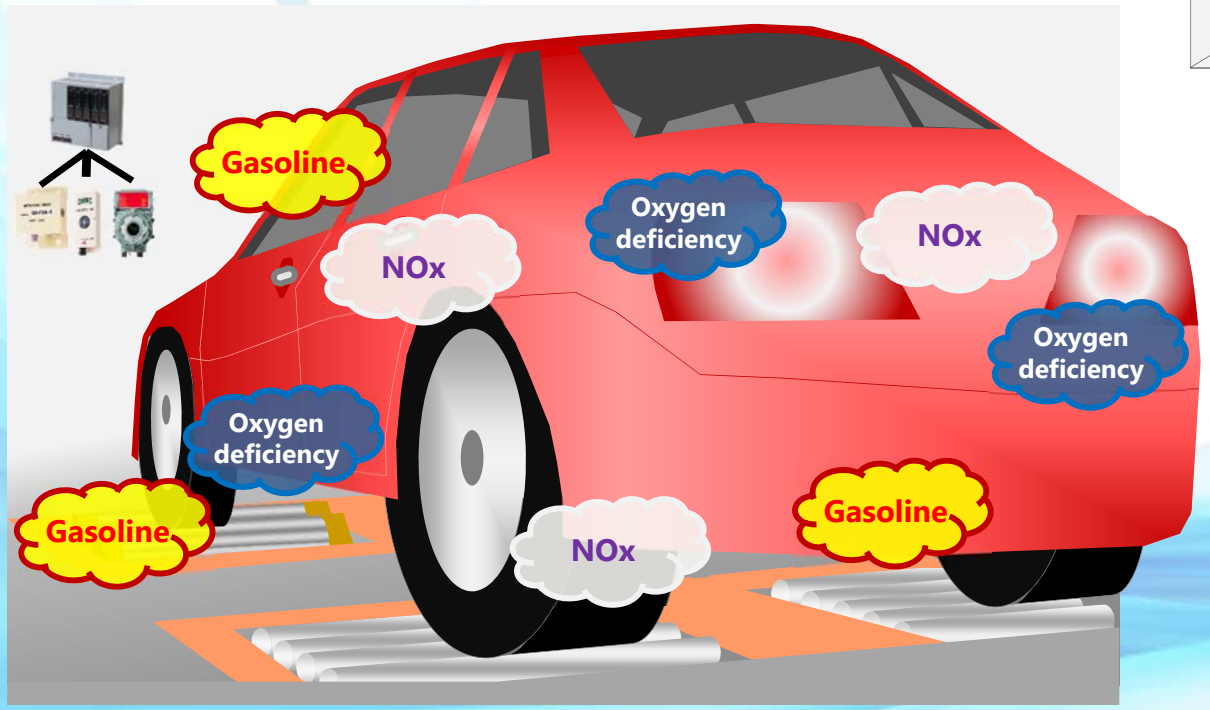
Oxygen Gas Detector Head
Model: GD-F3A-A

Toxic Gas Detector Head
Model: GD-K88Ai

Flame-proof Suction Type Gas Detector
Model: GD-D58



Environmental testing laboratory



To detect gasoline

Portable Combustible Gas Detector
Model: GP-1000

To detect residual gases before entering laboratory

Portable Multi Gas Detector
Model: GX-6000

5. Vehicle testing laboratory

Description: Driving tests are performed in the vehicle testing lab using actual vehicles.

Hazardous risks: **Fuel leaks from the vehicle during tests in the vehicle testing laboratory may cause explosions. CO in the exhaust gas may lead to poisoning.** ⇒ **Detecting combustible gases to prevent explosions Detecting CO to prevent poisoning**

Multi-channel Gas Monitoring System
Model: RM-5000

Monitoring panel

Detector heads for CO

Smart Transmitter/ Gas Detector
Model: SD-1EC

Toxic Gas Detector Head
Model: GD-K88Ai

Detector heads for HC

Combustible Gas Detector Head
Model: GD-A80

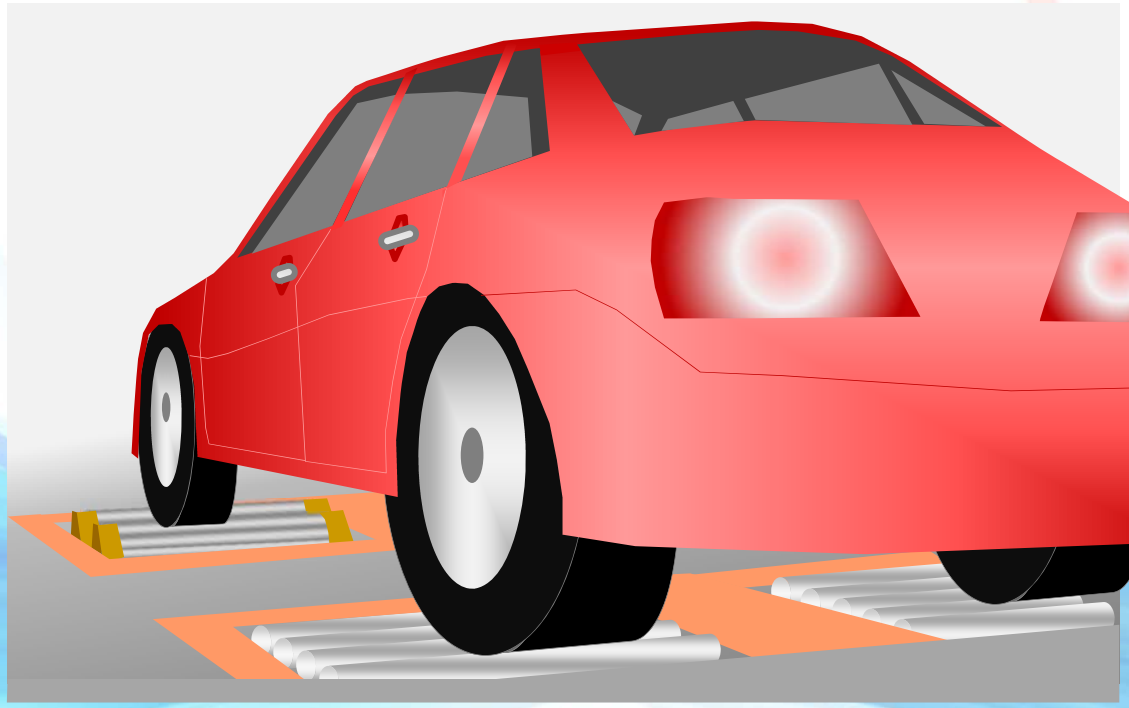
Smart Transmitter/ Gas Detector
Model: SD-1

Detector head for H_2

Flame-proof Suction Type Gas Detector
Model: GD-D58

Personal gas detector for workers

Four Gas Personal Monitor
Model: GX-2009

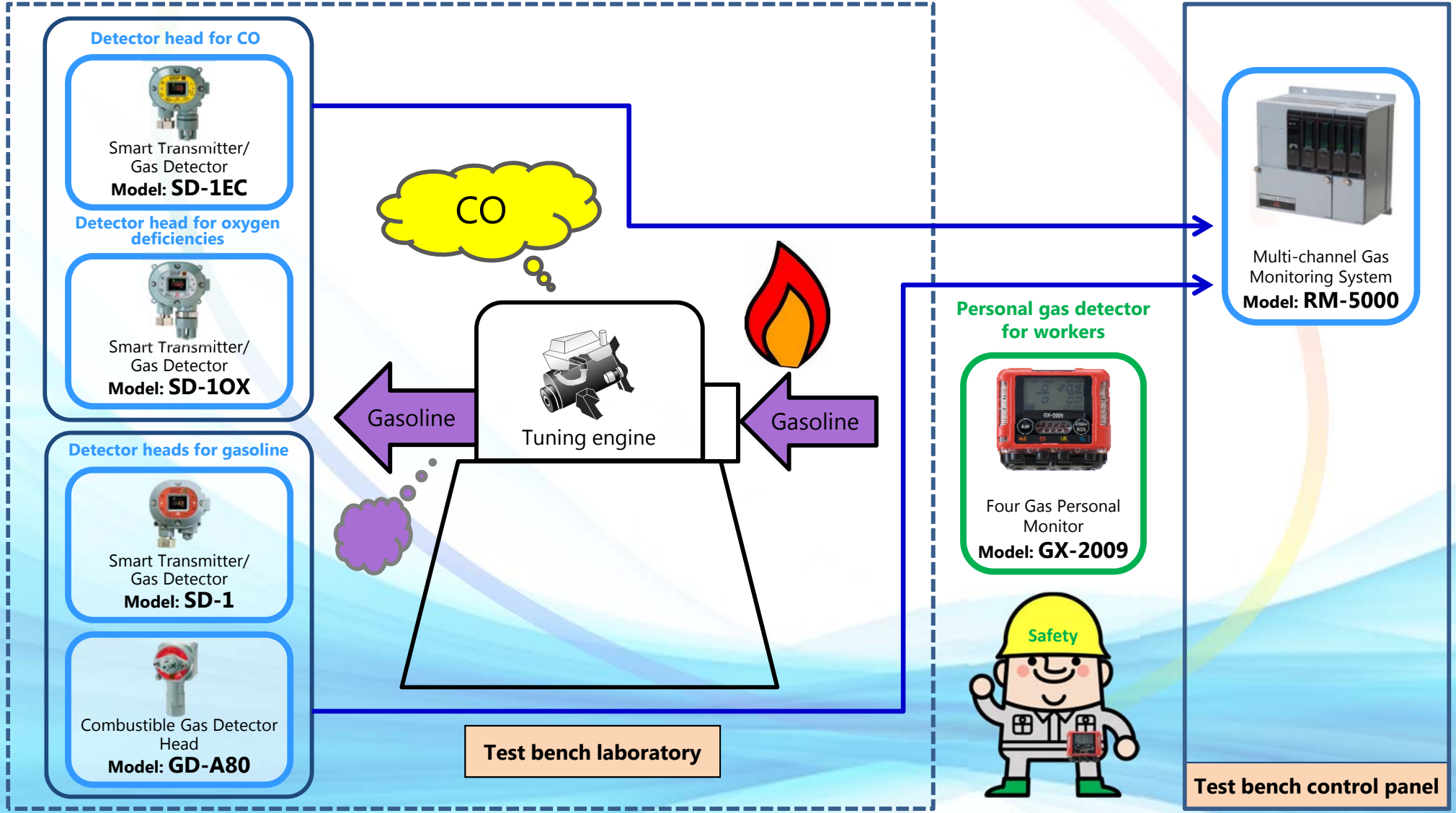


6. Test bench

Description: Performance and durability tests of a tuning engine are performed in the test bench lab.

Hazardous risks: **Engine fuel leaks can generate combustible gases and may cause explosions.**
CO in the exhaust gas from engine combustion may lead to poisoning.
Oxygen deficiencies may occur during work in a closed space (for example, underground pits).

⇒ **Detecting combustible gases to prevent explosions**
Detecting CO to prevent poisoning
Detecting oxygen concentration to prevent oxygen deficiencies



7. Lithium battery production

Description: Lithium battery production processes involve electrode coating and electrolyte injection.

Hazardous risks: **Electrode coating processes can generate explosive NMP (N-methylpyrrolidone). Electrolyte injection processes can generate explosive DMC (dimethyl carbonate). Such gases may explode or generate oxygen deficiencies.**

⇒ **NMP and DMC detectors to prevent explosions**
Measuring oxygen concentration to prevent oxygen deficiencies

Personal gas detector for workers

Four Gas Personal Monitor
Model: GX-2009

Environmental measurements before work

Portable Multi Gas Detector
Model: GX-6000

Detector heads for DMC

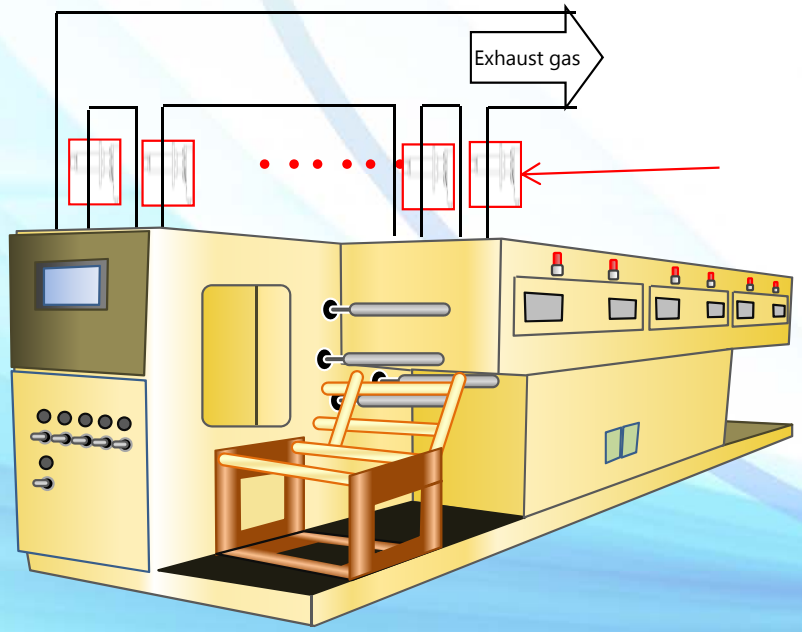
Flame-proof Suction Type Gas Detector
Model: SD-D58

Smart Transmitter/ Gas Detector
Model: SD-1GH

Smart Transmitter/ Gas Detector
Model: SD-1RI

Detector head for O_2

Smart Transmitter/ Gas Detector
Model: SD-1OX



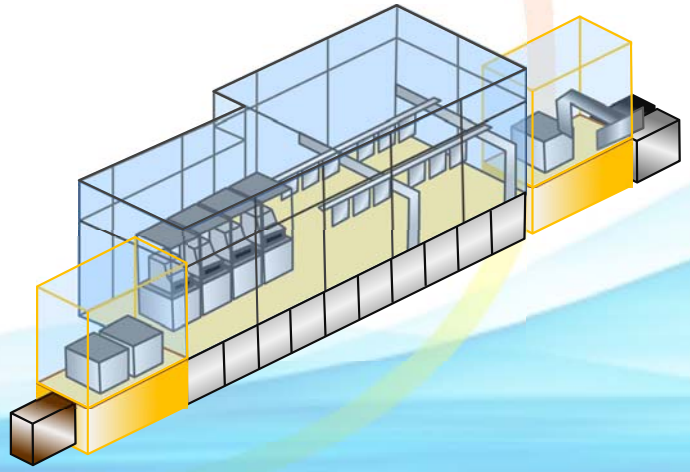
Electrode coating

NMP monitor

Flame-proof Furnace Safety Monitor
Model: SD-2500
Model: GD-A2400

Detector head for NMP

Combustible/Toxic Gas Detector Head
Model: GD-A80V



Electrolyte injection

8. Heating furnace

Description: Heating furnaces are used to heat steel materials in automobile manufacturing.

Hazardous risks: **Since fluctuations in the calorific value of the supplied fuel affect burner performance significantly, the calorific value must be controlled. Fuel (LNG) leaks and CO generation near the heating furnace may lead to explosions or poisoning.**

⇒ **Controlling calorific value with a calorimeter**
Detecting CO to prevent poisoning
Detecting combustible gases to prevent explosions

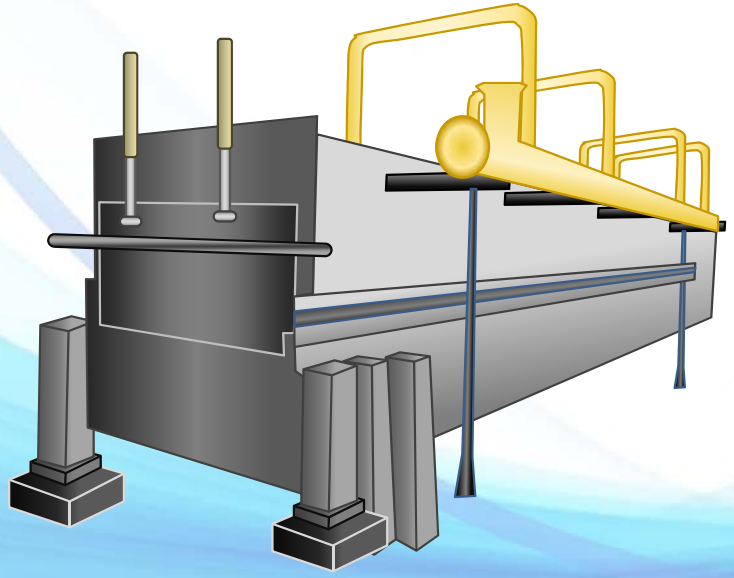
Explosion-proof Calorimeter
Model: OHC-800 (for LNG)

[Background of adoption]
Particularly in countries other than Japan, LNG is purchased from multiple suppliers. Use of shale gas and other fuels is expected to increase in the future. Since fluctuations in calorific value affect burner performance significantly, OHC is also installed in the heating furnace to control calorific value.

Gas supply facility

LNG

To burner



Heating furnace

Heating furnace control panel

Multi-channel Gas Monitoring System
Model: RM-5000 (for CO/LPG)

Combustible Gas Detector
Model: GP-147 (for LNG)

Detector heads for CO around furnace

Smart Transmitter/ Gas Detector
Model: SD-1EC

Toxic Gas Detector Head
Model: GD-K88Ai

Detector heads for LNG around gas supply facility and furnace

Combustible Gas Detector Head
Model: GD-A80

Smart Transmitter/ Gas Detector
Model: SD-1

Flame-proof Suction Type Gas Detector
Model: SD-D58

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Major Examples of Accidents

Prepared by extracting and processing materials from the Safety at Work Site (Ministry of Health, Labour and Welfare: http://anzeninfo.mhlw.go.jp/index.html)

Case of acute organic solvent poisoning during cleaning of degreasing tank with trichloroethylene

[Location of accident]

Trichloroethylene cleaning tank in a factory polishing automotive parts and providing metal surface treatment

[Cause of accident]

A worker who entered the trichloroethylene tank to remove deposits from the inner wall with waste cloth soaked with trichloroethylene was found to have collapsed in a crouching position on the stand in the trichloroethylene tank.

[Damage/injuries]

The worker was rescued immediately and transferred to the hospital. However, he died the next day without regaining consciousness.

Wearing gas detectors on a routine basis enables early detection of toxic gas leaks and improves work safety.

Case of organic solvent poisoning during cleaning of paint film removal/cleaning tank for painting jigs for automotive parts

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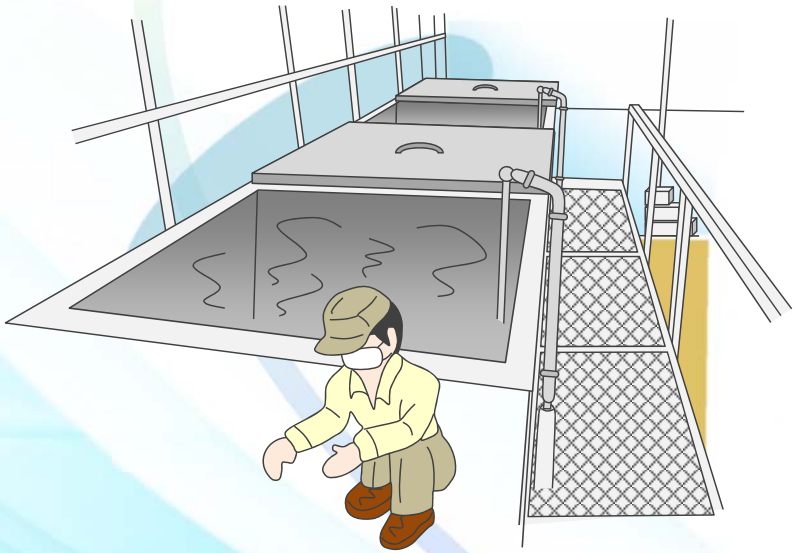


[Location of accident]

Removal/cleaning tank for painting jigs in an automotive parts manufacturing plant

[Cause of accident]

The victim entered the removal/cleaning tank at around 3:30 pm on the day of the accident to remove paint film sludge.
He entered the bottom of the tank and gathered and discharged sediment from the tank. He was poisoned around 4:10 pm after discharging sediment three times.

[Damage/injuries]

When the victim was found, he was found crouching and unconscious in the bottom of the washing tank. He was taken to the hospital by ambulance, treated, and regained consciousness approximately 2 hours and 10 minutes after the incident.

Wearing gas detectors on a routine basis enables early detection of toxic gas leaks and improves work safety.

RIKEN KEIKI

Product Information

RIKEN KEIKI

GP-03 (For combustible gases)

OX-03 (For oxygen)

HS-03 (For hydrogen sulfide)

CO-03 (For carbon monoxide)

Features

- Models for use with rechargeable batteries have been added to the product line.
- Standard protective covers protect the main unit from scratches, dirt, and shock.
- Compact, lightweight design doesn't interfere with work.
- Inherently safe and explosion-proof enclosure is ideal for use in hazardous locations.

Personal Single Gas Monitors

Model: 03 series

RIKEN KEIKI

Features

- Suitable for use as an explosion-proof product, even in a hydrogen/acetylene atmosphere
- IP 67 equivalent protection for safe use in outdoor work
- Three alarm lamps and two alarm buzzers oriented in different directions to alert both the operator and those in surrounding areas
- 95+ dB buzzer audible even in the noisiest surroundings
- Simultaneous display of gas concentrations of four components on large LCD screen
- Also equipped with clock display and data logger functions

Four Gas Personal Monitor

Model: GX-2009

RIKEN KEIKI

Portable Multi Gas Detector

Model: GX-6000

Features

- A single unit can simultaneously display up to six types of gases, including VOCs. This is the first product of its kind from a Japanese manufacturer.
- The PID sensor enables measurements of more than 200 types of chemical substances subject to regulation.
- Ideal for checking the risks and hazards of chemical substances as required under the Industrial Safety and Health Act
- Support for multilingual display (Japanese, English, French, Spanish, etc.)
- Equipped with convenient new functions, including panic alarm and LED flashlight

RIKEN KEIKI

Features

- A single unit with a gas type switching function can detect 25 types of combustible gases.
- The intrinsically safe explosion-proof enclosure (explosion-proof rating: Exia II CT4) enables measurement in Zone 0 Hazardous Areas at continuous risk of explosions.
- Protection rating equivalent to IP 67 ensures secure outdoor work.
- Once a cartridge-type filter (available separately) is attached to the standard probe, the probe can be customized for hydrogen sulfide removal or silicon removal based on the measurement environment.

Portable Combustible Gas Detector

Model: GP-1000

RIKEN KEIKI

GD-A80
(For combustible gases)

GD-A80V
GD-A80S*
(For combustible or toxic gases)
* The GD-A80S nameplate is blue.

Features

- Explosion-proof rating Exd II CT4 allows use in hydrogen and acetylene atmospheres.
- Suction type and aspirator suction type operations are supported.
  (* A pump unit and a power supply [available separately] are required.)
- The GD-A80-70 is also provided as a combustible gas detector head for use in high-temperature environments up to 70°C (normally 53°C).

Combustible/
Toxic Gas Detector Heads

Model:
GD-A80 series

RIKEN KEIKI

SD-1
SD-1RI
(For combustible gases)

SD-1GH
(For combustible/ toxic gases)

SD-1EC
(For carbon monoxide/ hydrogen sulfide)

SD-1OX
(For oxygen)

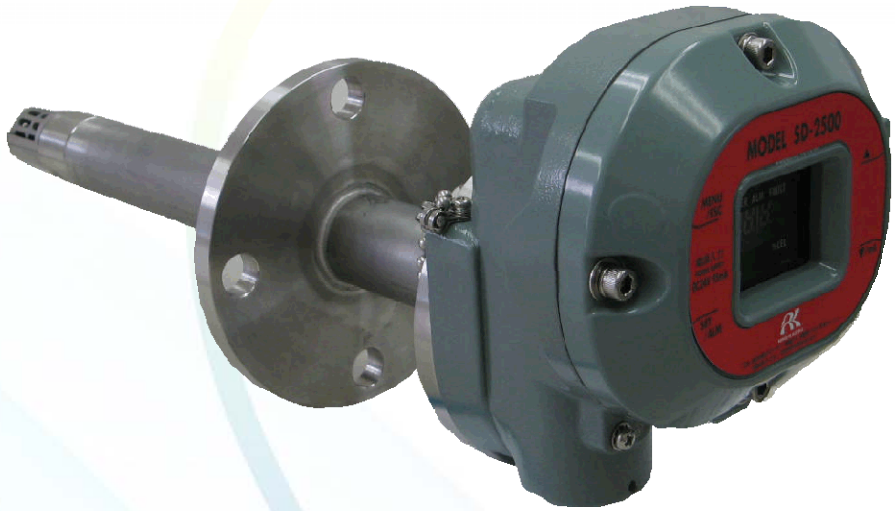
Smart Transmitter/
Gas Detectors

Model: SD-1 series

Features

- Suitable for use as an explosion-proof product, even in a hydrogen/acetylene atmosphere
- Waterproof/dustproof enclosure (IP 65 equivalent) allows deployment in severe environments.
- Supports HART Communication Protocol, allowing transmission of more information over legacy analog 4-20 mA connection.
  * Excluding SD-1 (TYPE NC)
- SD-1RI, SD-1EC, and SD-1OX are SIL 2 certified in all parts of the functional safety standard, marking a first for Japanese manufacturers.
- Using the suction cap for the SD-1 series and connecting the detector to a suction pump or an aspirator unit enables suction type operation.

RIKEN KEIKI



SD-2500
(With concentration display)

GD-A2400
(Without concentration display)

Features

- Detects high-boiling point solvent, N-methyl-2-pyrrolidone (NMP), evaporated in a dry facility.
- Direct insertion into the furnace allows accurate measurements of concentrations at the center of the exhaust duct.
- The furnace insertion section can be used in temperatures ranging from 0°C to + 160°C
- The SD-2500 features an integrated structure combining the main unit and display unit, eliminating the need for a dedicated indicator unit.
- Easy, straightforward operation by applying the control key

Flame-proof Furnace Safety Monitor

Model: SD-2500

Model: GD-A2400

RIKEN KEIKI

SD-D58
(With concentration indicator)

GD-D58
(Without concentration indicator)

Features

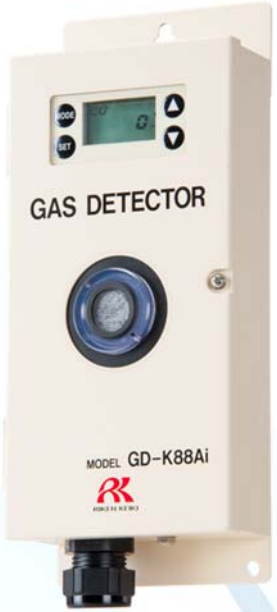
- Suitable for use as an explosion proof product even in hydrogen atmospheres
- Equipped with automatic flow rate abnormality detection function
- Integrated assemblies of replacement parts improve maintainability.
- Dustproof/waterproof enclosure (IP 67 equivalent)
- One-person maintenance possible

Flame-proof Suction Type Gas Detector

Model : SD-D58

Model : GD-D58

RIKEN KEIKI



[Diffusion type]
GD-K88Ai (for toxic gases)
GD-F88Ai (for oxygen)

[Suction type]
GD-K88Di (for toxic gases)
GD-F88Di (for oxygen)

Intrinsically safe explosion-proof enclosure
Oxygen/Toxic Gas Detector Heads

Model: GD-88 series

Features

- Two-wire gas detector head
  Allows direct transmission to the control system.
- Equipped with pressure correction sensor resistant to changes in atmospheric pressure (GD-F88Ai, GD-F88Di)
- Built-in aspirator (optional)
  Conventional external unit replaced by built-in unit
  (GD-K88Ai, GD-K88Di)
- Corrosive gas resistant enclosure
  SUS enclosure available if requested by customer
- Intrinsically safe explosion-proof enclosure combined with barrier

RIKEN KEIKI

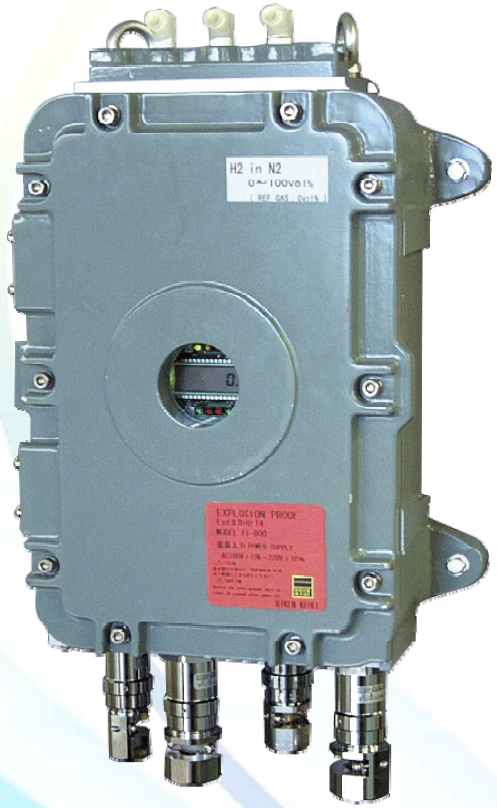
Features

- Compact, lightweight design allows installation anywhere.
- Drip-proof enclosure allows installation outdoors.
- The easily installed GD-F3A-SC-A is equipped with a signal converter for 4 mA to 20 mA transmission. Also allows long-distance transmission (up to 2.0 km).

Oxygen Gas Detector Head

Model: GD-F3A-A

RIKEN KEIKI



Features

- No warmup required
- Fast response
- Long-term stability
- Simple operation with easy-to-read digital display
- No sensitivity degradation in the presence of silicone
- Equipped with temperature and atmospheric pressure correction functions

Optical Interferometric Gas Analyzer

Model: FI-800

RIKEN KEIKI

Explosion-proof Calorimeter

Model: OHC-800

Features

- Incorporates Riken Keiki's unique "optsonic" calculation method (Japanese Patent No. 518483). Resistant to influence from incombustible gases for high-precision measurements
- Fast response at 90% response within 5 seconds
- High repetition accuracy within ±0.02 MJ/m^3
- Hydrogen explosion-proof enclosure (Exd IIB + H_2T4) required for calorimeters allows installation in dangerous areas.
- Excellent temperature characteristics, with temperature change of 0.10 MJ/m^3 or less per day
- Calorific value/specific gravity/Wobbe index switchable with key operation, eliminating troublesome calculations

RIKEN KEIKI

Features

- Adopts universal design independent of detection principle to allow shared use of the main unit.
- Power consumption reduced by 20% compared to past models (for constant potential electrolysis type)
- Reusable parts
- Allows recycling of constituent materials to reduce environmental impact.
- Design complies with various international regulations.
- Complies with CE requirements under RoHS Directive.

Smart Transmitter/Gas Detector

Model: GD-70D

RIKEN KEIKI

Features

- Easy-to-read three-color LCD display recognizable from a distance
- Single-point indicator/alarm unit
- Lock-in specification selectable (optional)
- RS-485 communication support (optional)

Single-Channel Gas Monitors

Model:

RM-6000 series

RIKEN KEIKI

Features

- Option to use a back-up power supply can be selected individually for each detector head.
- Capable of leak monitoring at hydrogen stations
- Capable of early detection of hydrogen leaks (ppm) and explosion prevention (% LEL)
- Improved visibility with green and red two-color LCD and bar meter display
- Gas leaks and failures indicated by voice alarms (optional)

Combustible Gas Detector

Model: GP-147

RIKEN KEIKI

Features

- Many types of gas detector heads available
- Gas concentrations are displayed in two ways: bar meter and digital display
- High-contrast three-color LCD improves visibility of detected state.
- Equipped with RS-485 communication function (optional)

Multi-channel Gas Monitoring Systems

Model:

RM-5000 series

RIKEN KEIKI

Features

- Equipped with photoionization detector (PID) optimum for VOC detection
  Support for three measurement ranges (0-10/100/1,000 ppm)
  Sensor structure resists effects of humidity and keeps foreign materials away from lamp.
  Measurement cycles configurable up to 5 minutes and 50 seconds at intervals of 10 seconds (Default: 1 minute)

- Various functions with high working efficiency
  Easily installed in control system (4-20 mA output)
  Switchable type (RVOC-10s) models are available.

Fixed PID VOC Monitor

Model: RVOC

RIKEN KEIKI

International Agents

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International Agents

North America

South America

Asia and Pacific

Russia and Central Asia

Europe

Middle East

Africa

RIKEN KEIKI

International agents (table of contents)

North America	U.S.A.				
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	Indonesia	Thailand	India	Vietnam	Philippines
	Australia				
Europe	Germany	Greece	THE NETHERLANDS	Norway	Turkey
	U.K.				
Middle East	U.A.E.	Israel			
Africa	South Africa				
Russia and Central Asia	Russia				

RIKEN KEIKI

International agents（U.S.A.）

RKI INSTRUMENTS, INC.

ADDRESS :	33248 CENTRAL AVENUE, UNION CITY, CA94587-2010 U.S.A.
TEL :	+1-510-441-5656
FAX :	+1-510-441-5650
E-MAIL :	bob@rkiinstruments.com, sandra@rkiinstruments.com
PERSON :	MR. BOB PELLISSIER (PRESIDENT) MRS. SANDRA GALLAGHER (VICE PRESIDENT)
WEBSITE :	http://www.rkiinstruments.com/

RIKEN KEIKI

International agents（BRAZIL）

HIDEO NAKAYAMA IMP. EXP. COM. E INDUSTRIA LTDA

ADDRESS :	RUA SANTA AMÉLIA, 33 PRACA DA BANDEIRA RIO DE JANEIRO RJ CEP: 20.260-030 BRAZIL
TEL :	+55-21-2590-3496
FAX :	+55-21-2270-6390
E-MAIL :	hideko@nakayama.com.br
PERSON :	MR. HIDEO NAKAYAMA (PRESIDENT) MS. HIDEKO NAKAYAMA
WEBSITE :	http://www.nakayama.com.br/

RIKEN KEIKI

International agents（ARGENTINA）

Prevent Gas SA

ADDRESS : INCLAN 4185 (C1258ABK) CIUDAD DE BUENOS AIRES, ARGENTINA
TEL : +54-11-4925-6342
FAX : +54-11-4925-6342
E-MAIL : ventas@preventgas.com.ar
PERSON : Mr. German Rosas
WEBSITE : http://preventgas.com.ar/

HUBERG SUDAMÉRICA S.A.

ADDRESS : ERASMO (CALLE 79) 1047 (B1650HOE) VILLA PIAGGIO SAN MARTÍN, BUENOS AIRES, ARGENTINA
TEL : +54-11-4713-6068
FAX : +54-11-4713-6072
E-MAIL : arguello.juan@huberg.com
PERSON : MR. JUAN IGNACIO ARGUELLO
WEBSITE : http://www.huberg.com.ar

RIKEN KEIKI

International agents（PERU）

RESET ELECTRONICA Y SISTEMAS S.R.L.

	Calle Martin de Murua 150 Of. 1004 - 1005
ADDRESS :	Edificio Plexus San Miguel Business Center
	San Miguel - Lima 32, PERU
TEL :	+51-1-6367303
FAX :	
E-MAIL :	enquiries@resetnaval.com
PERSON :	Mr. Max Muñoz Moran
WEBSITE :	http://www.resetnaval.com/

RIKEN KEIKI

International agents（CHILE）

Electronic Marine Ltd

ADDRESS : Uruguay 556 of 404 Valparaiso, CHILE
TEL : 56-32-2220050
FAX : 56-32-2593135
E-MAIL : marketing@electronicmarine.cl
PERSON : Alejandra Palominos (Marketing Manager)
WEBSITE : http://www.electronicmarine.cl

RIKEN KEIKI

International agents（URUGUAY）

microsur

ADDRESS : Carlos María Morales 934, 11200 Montevideo, Uruguay
TEL : 598-2410-1128
FAX : 598-2410-1128
E-MAIL : microsur@microsur.org
PERSON : Dra.Nermys Hernandez
WEBSITE : http://www.microsur.org

RIKEN KEIKI

International agents（CHINA）

RIKEN KEIKI COMMERCIAL(SHANGHAI）CO., LTD.

ADDRESS :	HEAD OFFICE : ROOM4A SHANGHAI WATANABE INTERNATIONAL COMMERCIAL BUILDING NO.55, LINPING N.ROAD, HONGKOU DISTRICT, SHANGHAI, 200086 CHINA SALES DEPARTMENT OFFICE : ROOM1106 DALIAN LEE WAN HOTEL NO.8, MINZHU SQUARE, ZHONGSHAN DISTRICT, DALIAN, LIAONING, 116001 CHINA
TEL :	86-411-8212-3832
FAX :	86-411-8212-3833
E-MAIL :	dl@rkkc.net (Ms. Sun Jun) dl101@rkkc.net (Ms. Qu shuai) dl102@rkkc.net (Ms. Xu fei)
WEBSITE :	http://www.rikenkeiki.asia

RIKEN KEIKI

International agents（KOREA）

RIKEN KEIKI KOREA CO., LTD.

ADDRESS : 23, HWAJEONSANDAN 2-RO 134, GANGSEO-GU, BUSAN, 46741 KOREA

TEL : 82-51-712-9900 FAX : 82-51-518-7736

E-MAIL : master@rikenkeiki.co.kr PERSON : MR.SUN-GU,LEE

WEBSITE :

(KOREAN) http://rikenkeiki.co.kr/bn/

(ENGLISH) http://rikenkeiki.co.kr/bn/english/

HIGH INTEGRATED TECHNOLOGY, INC.

ADDRESS : 72, SEGYOSANDAN-RO, PYEONGTAEK-SI, GYEONGGI-DO, 17843, KOREA

TEL : 82-31-650-7000 FAX : 82-31-650-7007

E-MAIL : info@hitinc.co.kr PERSON : MR.HYUNG-SIL, KIM

WEBSITE :

(KOREAN) http://www.hitinc.co.kr/

(ENGLISH) http://www.hitinc.co.kr/?strMode=company_e/company

RIKEN KEIKI

International agents（TAIWAN）

RIKEN KEIKI TAIWAN CO., LTD. HEAD OFFICE

ADDRESS : NO.87, YANGMING RD., SHANHUA JEN, TAINAN, 741, TAIWAN

TEL : 886-6-581-1224

FAX : 886-6-581-1250

E-MAIL : episys@ms22.hinet.net

PERSON : MR. SEITARO TAKAHASHI (PRESIDENT)

WEBSITE : http://www.rikenkeiki.com.tw/admin/news/front/news.php

RIKEN KEIKI TAIWAN CO., LTD. TAICHUNG BRANCH

ADDRESS : NO.2, ALY.14, LN.150-30, SEC.3, XITUN RD., XITUN DIST., TAICHUNG CITY 407, TAIWAN

TEL : 886-4-2462-5386

FAX : 886-4-2462-5508

E-MAIL : johnny@rikenkeiki.com.tw

PERSON : MR. WU WEN CHENG

RIKEN KEIKI

International agents（SINGAPORE）

R K INSTRUMENTS (S) PTE LTD

ADDRESS :	102F PASIR PANJANG ROAD #03-11, CITILINK WAREHOUSE COMPLEX SINGAPORE 118530
TEL :	65-6275-3398
FAX :	65-6275-3387
E-MAIL :	rk@rkinstruments.com.sg
PERSON :	MR. BERNARD QUEK (PRESIDENT)
WEBSITE :	http://www.rkinstruments.com.sg/

RIKEN KEIKI

International agents（MALAYSIA）

KINETICS SYSTEMS MALAYSIA SDN. BHD.

ADDRESS :	12A, JALAN RINGGIT 23/11 , SECTION 23, 40300 SHAH ALAM, SELANGOR DARUL EHSAN MALAYSIA
TEL :	603-5542-2288
FAX :	603-5542-2289
E-MAIL :	ck.chooi@kinetics.net
PERSON :	MR. CHOOI CHOON KEET (GENERAL MANAGER)
WEBSITE :	http://www.kinetics.net/

RIKEN KEIKI

International agents（INDONESIA）

PT. PRATAMA GRAHA SEMESTA

ADDRESS : KOMPLEKS LODAN CENTER BLOK H-11 JL. LODAN RAYA NO.2 ANCOL - PADEMANGAN JAKARTA UTARA 14430 INDONESIA

TEL : 62-21-6900656

FAX : 62-21-6900657

E-MAIL : sales@ptpgs.co.id

PERSON : MR. FRENGKY TOMBOKAN

PT. CENTRADINDO UNITRAS (FOR PERTAMINA & MARINE SECTOR)

ADDRESS : COMPLEX PERKANTORAN DUTA HARAPAN INDAH JL. KAPUK MUARA RAYA BLOK SS NO.3 JAKARTA UTARA 14460 INDONESIA

TEL : 62-21-6624347

FAX : 62-21-6623594

E-MAIL : centradindo.unitras@gmail.com

PERSON : MR. DJOHAN DAHLIAN (MANAGING DIRECTOR)

RIKEN KEIKI

International agents（THAILAND）

TAIYO GASES CO., LTD.

ADDRESS : 17TH FLOOR SERM-MIT TOWER, 159 SUKHUMVIT 21 ROAD, NORTH KLONGTOEY, WATTANA, BANGKOK 10110 THAILAND

TEL : 66-2-260-2691

FAX : 66-2-260-2690

E-MAIL : hato@taiyogases.th.com

PERSON : MR. KAZUNARI HATO

WEBSITE : http://www.taiyogases.th.com/

RIKEN KEIKI

International agents（INDIA）

TRITECH

ADDRESS :	121,VEENA INDUSTRIAL ESTATE, OPP.FITWELL HOUSE, L.B.S.MARG, VIKHROLI(W) MUMBAI-400 083 INDIA
TEL :	91-22-2577-7288, 6796-9990
FAX :	91-22-6796-9991
E-MAIL :	tritec@vsnl.com
PERSON :	MR. NARESH SHARMA MR. JIGNESH SHAH
WEBSITE :	http://www.tritech.in/

RIKEN KEIKI

International agents（VIETNAM）

VIETNAM GAS DETECTOR ONE MEMBER CO., LTD.

ADDRESS : 79 Ly Chinh Thang St, ward 8, Dist 3, HCMC, Vietnam

TEL : +84-(0)28-35262986 / 35262987

FAX : +84-(0)28-35262980

E-MAIL : info@vina-gasdetector.vn

PERSON : MR. CAO MINH LOI (Director)

WEBSITE : http://vina-gasdetector.vn/

RIKEN KEIKI

International agents（PHILIPPINES）

PILIPINAS TRADE GAS, INC. (PTGI)

ADDRESS : 23RD FLOOR ONE CORPORATE CENTER DONA JULIA VARGAS AVE., CORNER MERALCO AVENUE, ORTIGAS CENTER PASING CITY, PHILIPPINES

TEL : 632-635-7320

FAX : 632-635-7322

E-MAIL : gerry.gueco@yahoo.com.ph

PERSON : MR. S. HARA (PRESIDENT)
MR. GERRY C. GUECO (IN CHARGE)

RIKEN KEIKI

International agents（AUSTRALIA）

CONTROL EQUIPMENT PTY. LTD.

ADDRESS : UNIT 1/3 DEAKIN STREET, BRENDALE QLD 4500, AUSTRALIA

TEL : 61-7-3481-9000

FAX : 61-7-3481-9088

E-MAIL : sales@controlequipment.com.au

PERSON : MR. GREG LOVE (GENERAL MANAGER)

WEBSITE : http://www.controlequipment.com.au/

RIKEN KEIKI

International agents（GERMANY）

RIKEN KEIKI GmbH

ADDRESS : Theodor-Heuss-Allee 112, 60486 Frankfurt am Main, Germany

TEL : +49-6966-7741-460, 461

E-MAIL : s-ono@rikenkeikigmbh.de

PERSON : MR. SHINTARO ONO(Managing Director)

WEBSITE : http://www.rikenkeiki.com/de/

RIKEN KEIKI

International agents（GREECE）

ZERVOUDAKIS MARINE SUPPLIES LTD.

ADDRESS : 31, MILOU STREET, PIRAEUS 18545, GREECE

TEL : +30-210-4623700

FAX : +30-210-4627900

E-MAIL : zerv@otenet.gr

PERSON : MR. JOHN ZERVOUDAKIS

WEBSITE : http://www.zervoudakis.gr/

RIKEN KEIKI

International agents（THE NETHERLANDS）

GMS Instruments B.V.

ADDRESS : Driemanssteeweg 190, 3084 CB, Rotterdam, The Netherlands

TEL : +31102938860

E-MAIL : sales@gms-instruments.nl

PERSON : MR. SEBASTIAN KELDERMAN AND MR. MARKUS FRANK

WEBSITE : http://gms-instruments.nl/

RIKEN KEIKI

International agents（NORWAY）

MARTIN BRUUSGAARD & CO. AS.

ADDRESS :	LOKKETANGEN 20A, 1337 SANDVIKA NORWAY P.O. BOX 3, 1301 SANDVIKA NORWAY
TEL :	+47-6754-9330
FAX :	+47-6754-9331
E-MAIL :	dag@bruusgaard.no
PERSON :	MR. DAG MAARTMANN
WEBSITE :	http://www.bruusgaard.no/

RIKEN KEIKI

International agents（TURKEY）

DOGANAK COLL. CO.

ADDRESS : KARAKOY, OKCUMUSA CADDESI, IPEK CIKMAZI,
BOGAZICI HAN NO:6 KAT:2
34420 ISTANBUL, TURKEY

TEL : +90-212-244-5318 / 245-2512

FAX : +90-212-243-5704

E-MAIL : doganak@doganak.com

PERSON : MR. MEHMET ALI AKYUZ

WEBSITE : http://www.doganak.com/

RIKEN KEIKI

International agents（U.K.）

WEATHERALL EQUIPMENT & INSTRUMENTS LTD.

ADDRESS : UNIT 1 STATION APPROACH, WENDOVER AYLESBURY,
BUCKS HP22 6BN ENGLAND

TEL : +44 1296 622180

FAX : +44 1296 624955

E-MAIL : sales@weatherall-uk.com

PERSON : MR. R.H.C. WORTHINGTON

WEBSITE : http://weatherall-uk.com/

RIKEN KEIKI

International agents（U.A.E.）

METRO　MAC

ADDRESS :	WS 104, DUBAI MARITIME CITY (DMC), DUBAI, U.A.E. P.O.BOX: 13485 DUBAI U.A.E.
TEL :	+971-4-5636100
FAX :	+971-4-5519973
E-MAIL :	sales@metromac.com
PERSON :	MR. K.K. KUTTY (MANAGING DIRECTOR)
WEBSITE :	http://www.metromac.com/

RIKEN KEIKI

International agents（ISRAEL）

MODCON SYSTEMS LTD.

ADDRESS : MODCON HOUSE M. BORNSHTEIN ST.,
SOUTH AKKO INDUSTRIAL PARK, 24222 ISRAEL

TEL : +972-4-9553955

FAX : +972-4-9553956

E-MAIL : gregorys@modcon.co.il

PERSON : MR. GREGORY SHAHNOVSKY

WEBSITE : http://www.modcon-systems.com/

RIKEN KEIKI

International agents（SOUTH AFRICA）

I.S.L. ENTERPRISES (PTY) LTD.

ADDRESS : 29 KLOSSER STREET PAROW 7500 SOUTH AFRICA
P.O.BOX 72 PAROW 7499 SOUTH AFRICA

TEL : +27-21-930-2354

FAX : +27-21-930-2043

E-MAIL : istvanisl@xsinet.co.za

PERSON : MR. I.S. LADANYI

RIKEN KEIKI

International agents（RUSSIA）

TAIRIKU TRADING CO., LTD.

ADDRESS :	Head office in Tokyo, Japan KAJITANI DAIICHI BUILDING, 21-10, SHINKAWA 2-CHOME, CHUO-KU, TOKYO 104-0033, JAPAN
TEL :	+81-3-6222-0194 FAX: +81-3-6222-0201
E-MAIL :	tairiku@tairiku-trading.co.jp
PERSON :	MR. MORITA
WEBSITE :	http://www.tairiku-trading.co.jp/?lang=en

OOO"TAIRIKU MOSCOW LTD."

ADDRESS :	RUSSIAN FEDERATION, 119049, MOSCOW, KOROVY VAL STREET,7, BUILDING 1, FLOOR 2,OFFICE 12
TEL :	+7-495-237-18-82 +7-495-237-19-26
FAX :	+7-495-931-99-47
E-MAIL :	tairiku.alpeev@co.ru, ofistrk@online.ru
PERSON :	MR. ALPEEV M.A., (MANAGER)

RIKEN KEIKI

We are a pioneer in creating safe working environments for workers.