PT5E-0732

RIKEN KEIKI

Multi-Point Toxic Gas Detection System

FPM-80A

Operating Manual

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Contents

1

Product Overview

1-1 Introduction

Thank you for purchasing the FPM-80A Multi-Point Toxic Gas Detection System (“the product” hereinafter).
This operating manual describes product operating procedures and specifications. It provides information essential to correct use of the product.
Make sure you have read and fully understood the contents of this manual before using the product.
Keep this operating manual on hand to allow ready reference during use.
The contents of this manual are subject to change without notice to allow product improvements. Any duplication or reproduction of this manual without permission is prohibited, whether in whole or in part.

RIKEN KEIKI accepts no liability for accidents or damage resulting from use of the product, whether within or outside the warranty period.
Review the warranty policy indicated on the warranty.

<Models covered by this operating manual>

Before using the product, please confirm that the model of the product you purchased matches the model of the product covered by this operating manual.

- FPM-80A

1-2 Intended use and product functions

1-2-1 Intended use

The product is a detection tape type multi-point toxic gas detection system capable of detecting toxic gases, such as phosphine (PH_3) and silane (SiH_4) in the air.
Special material gases such as phosphine (PH_3) and silane (SiH_4) used in large quantities in semiconductor manufacturing processes are all extremely toxic. Any leakage of these gases poses a danger to human health. Facilities using these gases must install gas detection alarm systems.
The gas detectors used to monitor continuously for even minute leaks from gas cylinder storage areas or production lines must be highly reliable and provide stable performance over the long term.
The product offers high reliability in detecting low concentrations of gas and ensures excellent long-term stability by resetting the zero level after each detection.
Note that the detection results provided by the product do not constitute a guarantee with respect to life or safety.
Check the specifications before use to detect gas correctly in accordance with the intended purpose.

1-2-2 Product functions and features

The product has the following functions and features:

- The product uses a built-in pump to draw in gas for detection. It is capable of detecting gas in up to 80 different locations.
- The product uses a two-step alarm system with a first alarm and a second alarm.
- When the detection target gas drawn in by the pump comes into contact with the detection tape, a color reaction corresponding to the gas concentration occurs. The gas concentration is determined by detecting the rate of change in color (changes in light reflectance) on the tape before and after contact with gas.
- The colored marks on the gas detection tape are automatically captured, allowing the gas detection status to be easily checked on the touch panel.
- The detection cassette tape system makes replacement easy.
- The specified performance can be maintained by replacing the detection cassette tape at intervals of up to 180 days (depending on the tape model and replacement interval for the gas group).
- Due to the detection principle, the product is virtually unaffected by alcohol, hydrogen, and other interference gases.

1-3 DANGER, WARNING, and NOTE

This operating manual uses the following categories to indicate potential damage/hazards if the user disregards the information provided and uses the product incorrectly:

 DANGER	This indicates situations in which improper handling may result in fatal or serious injury or significant property damage.
 WARNING	This indicates situations in which improper handling may result in serious injury or significant property damage.
 CAUTION	This indicates situations in which improper handling may result in minor injury or minor property damage.

Additionally, usage recommendations are indicated as follows:

NOTE	This indicates items that will be helpful to know when using the product.

2

Important Safety Information

To maintain the performance of the product and to ensure safe use, always observe the following DANGER, WARNING, and CAUTION instructions.

2-1 Danger information

DANGER

Overheating, smoke, abnormal sound, or abnormal odors

- If any abnormalities occur during use, stop using the product immediately and turn off the power. Continuing to use the product may cause electric shock or fire.

Using the product in hot, humid, or dusty locations

- Do not use or store the product in hot, humid, or dusty locations. Doing so may cause malfunctions, electric shock, or fire. Use the product within the specified operating temperature and humidity range.

Ground cable connection

- To prevent electric shock, connect the ground cable to the ground terminal. Failure to connect the ground cable may cause electric shock.

Handling the power supply cable

- Do not place objects on top of the power supply cable, or pull, squeeze, bend, or process the cable. Doing so may damage the power supply cable and cause electric shock or fire.

Power supply

- Do not use the product with a power supply voltage other than that specified. Doing so may damage the product or cause electric shock or fire.

Foreign object ingress

- Keep metal or combustible foreign matter from entering the product when replacing the gas detection cassette tape. Continuing to use the product in this state may cause malfunctioning, electric shock, or fire.
- Do not place small metal objects such as pins and clips on top of the product. Using the product with metal objects inside may damage the product or cause electric shock or fire.
- Do not remove the grommets attached to the external output connectors on the rear of the product. Touching parts inside the product may result in electric shock. Also, continuing to use the product with foreign matter inside may result in damage to the product.

Relocation and installation

- The product is heavy. Take great care when relocating or installing it. When installing the product, be sure to use anchor bolts or similar and secure the product to the floor with the anchor brackets provided. The product may topple over if the detection rack is pulled out before the product is secured to the floor with anchor bolts or similar.

- Condensation may form on the outside or interior of the product when it is moved to a location with a large temperature difference, such as when moving from a hot location to a cold location. Correct detection will not be possible if the product is used in this state. It may also result in malfunctions.
  If the product is moved, allow it to stand for several hours in the location in which it is to be used to enable it to adjust to the surrounding temperature before use.

Use in unstable locations

- Install the product on a level surface.
  Using it on an uneven surface may cause it to topple over, resulting in injury or damage to the product.

2-2 Warnings

WARNING

Pulling out the detection rack

- Avoid placing a load or heavy objects on the top surface of the detection rack when it is pulled out from the product.
  Doing so may damage the drawer rails and cause the detection rack to fall.

Using gas detection cassette tape

- Do not use gas detection cassette tape that has passed its usage start due date.
  If cassette tape past its usage start due date is installed in the product, an error will occur, and gas detection will not be possible.
- Do not use gas detection cassette tape that has been dropped or otherwise subjected to impact.
  Doing so may damage the gas detection cassette tape or aluminum package and prevent the product from operating correctly or detecting gas correctly.

2-3 Precautions

CAUTION

Locations where obstacles are present

- Do not install in locations where obstacles are present.
  Do not install the product in locations where it would be difficult to operate the touch panel, so that the product can be easily operated in an emergency power off response or when maintenance is carried out by RIKEN KEIKI maintenance personnel.

Using gas detection cassette tape

- Never touch the detection tape.
  The detection tape is coated with a special reagent. If you accidentally touch the tape, rinse thoroughly with plenty of water. Touching the detection tape may also reduce its detection sensitivity or cause the tape to tear.
- Use the specified model of gas detection cassette tape.
  The gas detection cassette tape model differs depending on the detection target gas. An error message will be displayed if the model of the gas detection cassette tape installed differs from the model specified. Check the model and install the correct gas detection cassette tape.
  If incorrect gas detection cassette tape is installed, wipe the surfaces of the sensor head and plunger with alcohol or similar before installing the correct cassette.
  Otherwise, reagent from the initially installed detection tape may transfer to the subsequently installed detection tape, causing discoloration and preventing correct gas detection.
- Check the display on the touch panel regularly and replace the gas detection cassette tape when required.
- Do not install the gas detection cassette tape into any device other than that specified.
  The gas detection cassette tape is designed specifically for use with RIKEN KEIKI gas monitors. Do not attempt to install it in other devices. Do not rewind and reuse the detection tape. Doing so may result in malfunctions.
- Do not apply force to the detection tape or pull it.
  Doing so may break the detection tape.
- Depending on the type of detection tape and the storage conditions, some discoloration or traces of color (from internal product inspections) may be visible when the cassette is unpacked. This will not affect gas sensitivity. The gas detection cassette tape should pose no problems if no error message appears when it is installed.

Miscellaneous

- Do not disassemble or modify the product or alter the settings unnecessarily.
  Product performance cannot be guaranteed if the product is disassembled or modified. Altering the settings unnecessarily without a proper understanding of the details may prevent the alarm from operating correctly. Use the product correctly in accordance with this operating manual.

2-4 Warning labels

The following warning labels are affixed to the product, providing information on important safety precautions to prevent accidents.
When performing installation, operation, and maintenance work, pay close attention to and comply with these labels in conjunction with the danger, warning, and caution safety precautions provided in this manual.

Warning label	Warning	Warning details
	CAUTION: ELECTRIC SHOCK	Indicates the risk of electric shock if you remove the grommets on the rear of the product and touch interior parts. Labels are affixed near the grommets on the rear.
	CAUTION: HOT	Indicates that surfaces may be dangerously hot. Labels are affixed near areas where the interior is hot.
	CAUTION: PINCHING	Indicates the risk of accidentally pinching hands or fingers when operating the doors or internal units of the product. Labels are affixed to the doors and rack units.

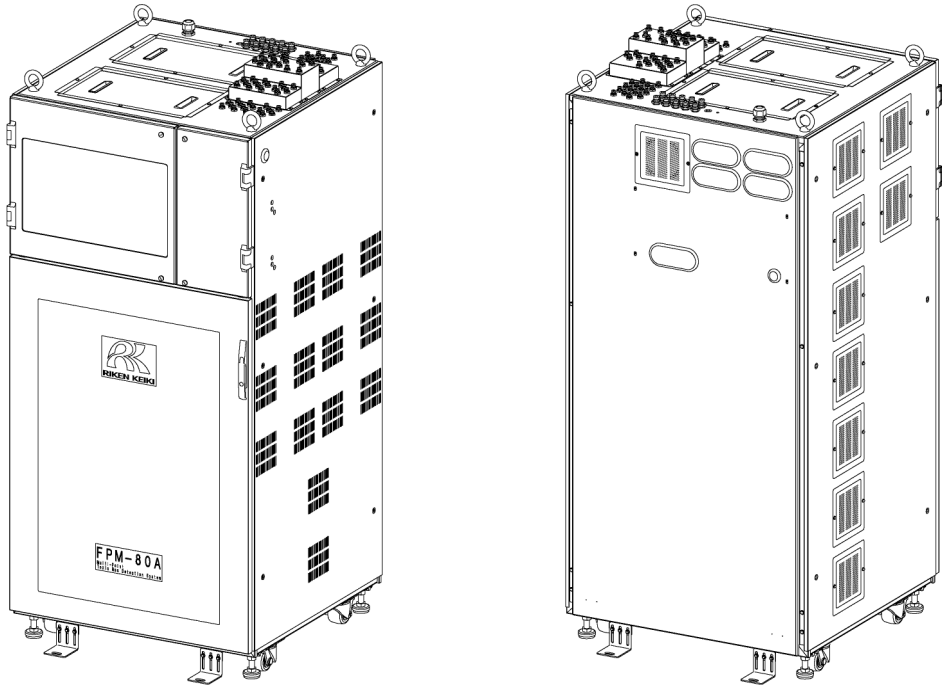
3

Product Configuration

3-1 Main unit and accessories

Check the main unit and accessories.
If any accessories are missing, contact RIKEN KEIKI.

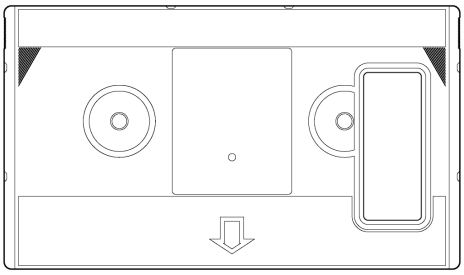
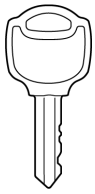
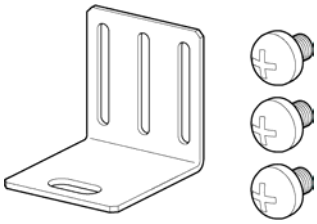
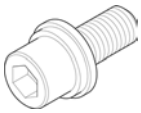
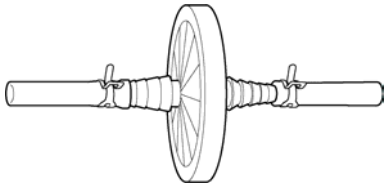
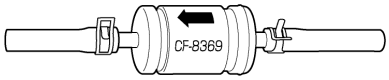
3-1-1 Main unit



NOTE

- For information on the names and functions of product parts, refer to '3-2 Part names and functions'.

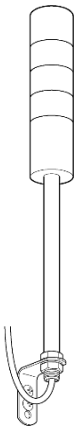
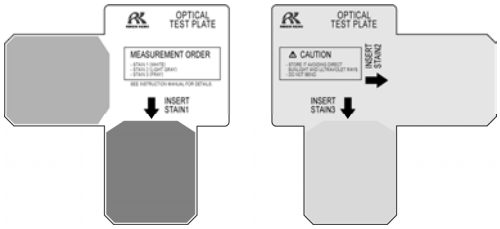
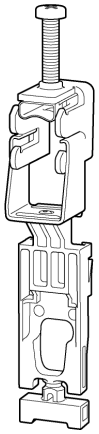
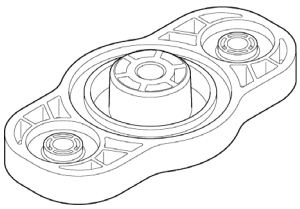
3-1-2 Accessories

Name		Quantity	Part No.
	Gas detection cassette tape	As many as required[*1]	Differs depending on the gas detection cassette tape model[*2]
	Product door key	×2	0800 2468 10
	Anchor bracket Cross-recessed double SEMS machine screws M6 × 10 (× 3)	4 sets	9112 6203 40
	Anchor bracket hex socket bolt	×4	1956 0687 30
	Dust filter A	As many as required	1670 3313 20
	Dust filter B	As many as required	1670 3340 80
	Operating Manual	×1	

*1: One per eight (8) detection points

*2: The gas detection cassette tape part numbers are as follows. Code in parentheses is the product code.
FML-202E: 4096 0090 60 (4096 09)
FM-015: 4096 0100 80 (4096 10)
FM-106: 4096 0110 70 (4096 11)
FM-024E: 4096 0130 50 (4096 13)
FM-025E: 4096 0170 10 (4096 17)

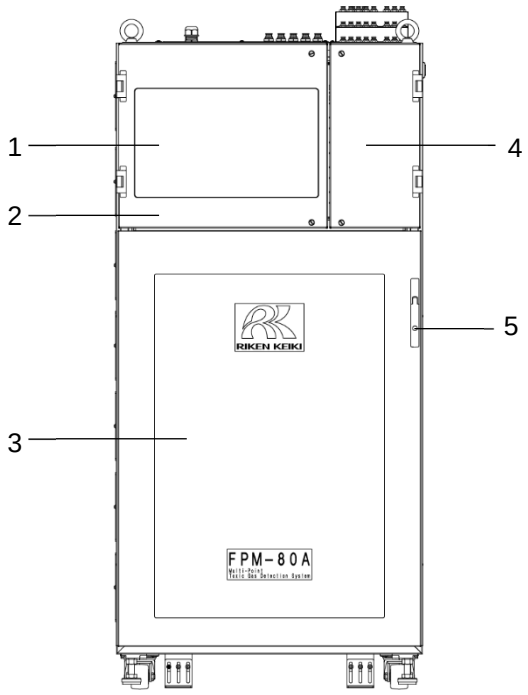
3-1-3 Optional accessories

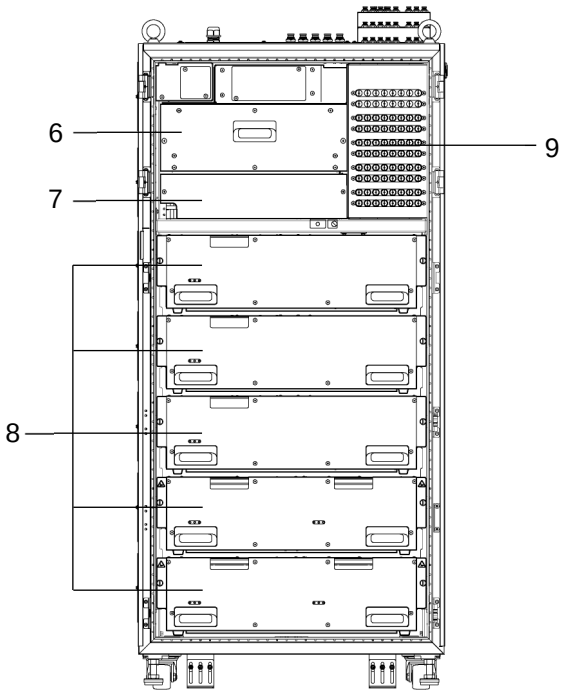
Name		Quantity	Part No.
	Signal tower	×1	9112 6152 90
Front Back 	Optical checking color plate	×1	9112 9630 60
	Anti-noise accessory	×1	2032 0136 20
	Duct mounting adapter	×1	9112 9635 20 (for sampling) 9112 9636 00 (for exhaust)

3-2 Part names and functions

3-2-1 Main unit part names and functions

<Front>



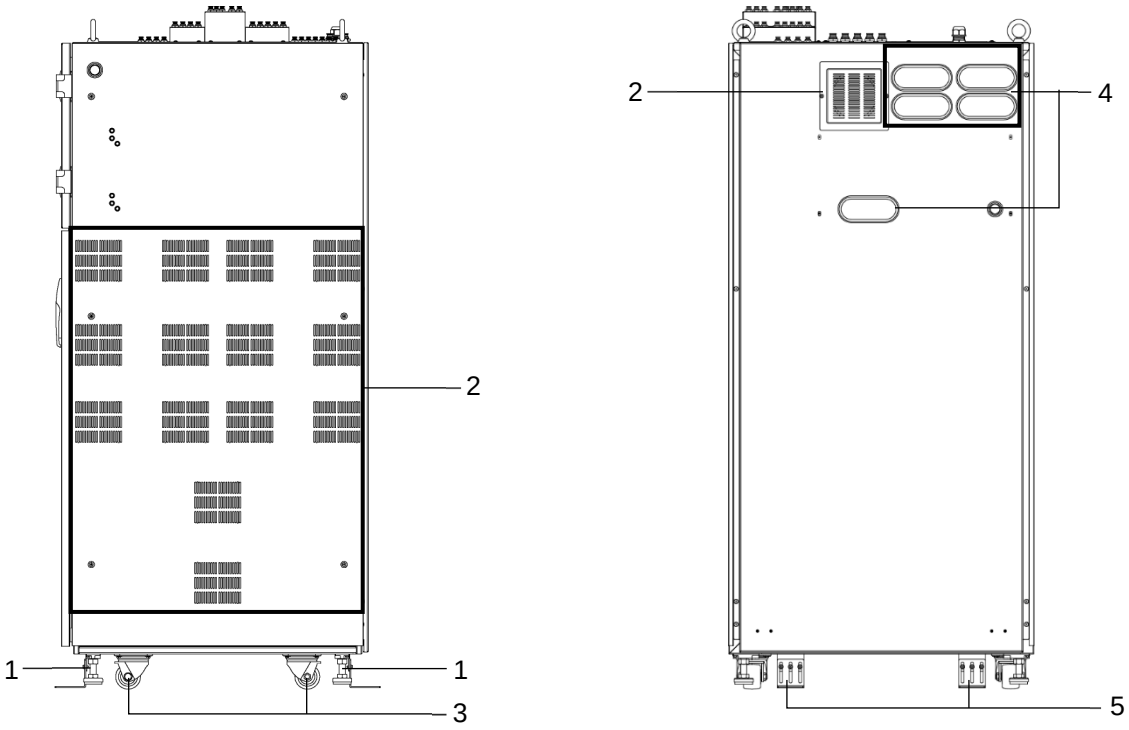


* The diagram on the right shows the main unit with the power supply unit cover, needle cover, and front door removed.

No.	Name	Function
1	Touch panel	Screen used to operate the product Touch the display items and buttons on the screen to perform various gas detection operations and check the monitoring status.
2	Power supply unit cover	Cover for the power supply unit and pump rack
3	Front door	Front door for the product Opening the door reveals the detection racks.
4	Needle cover	Cover for the flow adjustment needles
5	Front door keyhole	Keyhole for the front door Allows the front door to be locked using the front door key provided.
6	Power supply unit	Unit supplying power to the product Non-redundant and redundant power supply unit specifications are available. (See ‘3-2-2 Power supply unit part names and functions’.)
7	Pump rack	Rack containing the backup pump and the internal PC used for data collection Non-redundant and redundant internal PC specifications are available.

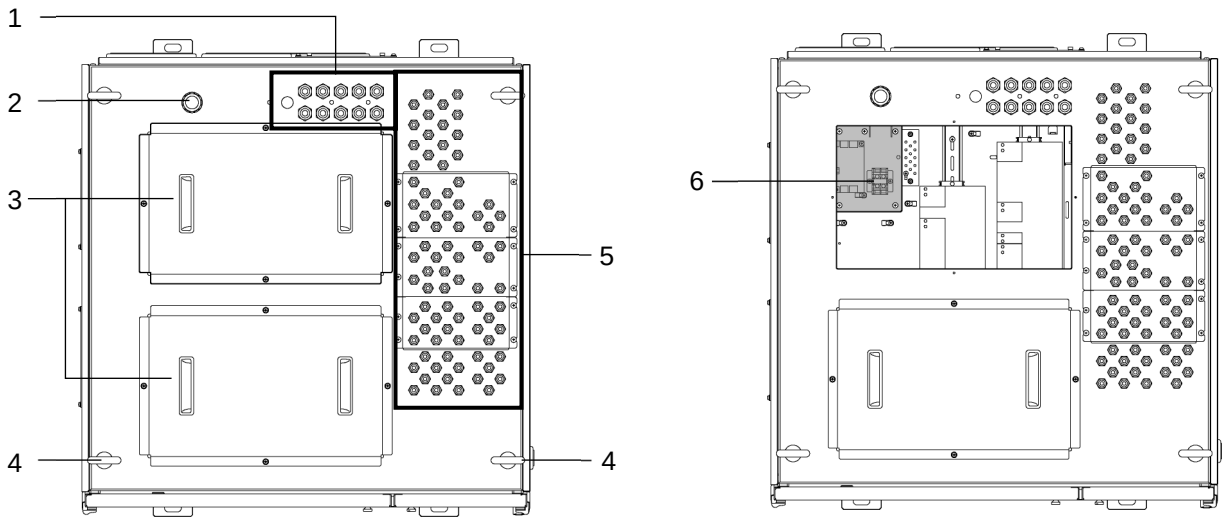
No.	Name	Function
8	Detection racks	Racks containing the decks in which the gas detection cassette tape is installed The racks are either 16-point racks or pyrolyzer unit racks. (See '3-2-3 Detection rack part names and functions'.) Each 16-point rack is capable of detecting gas in up to 16 different locations. Each pyrolyzer unit rack contains a pyrolyzer unit capable of detecting gas in up to eight different locations.
9	Flow adjustment needles	Used to adjust the flow rate of the sample gas at each detection point (See '8-2 Sample gas flow rate adjustment (FLOW screen)'.)

<Right side and rear>



No.	Name	Function
1	Adjusters	Used to adjust the height of the product during installation
2	Fan outlets	Outlets for the internal cooling fan
3	Casters	Used when moving the product
4	External output connectors	Connectors for external output terminals Never remove the grommets attached to prevent electric shock or foreign matter ingress.
5	Anchor brackets	Used to secure the product to the floor

<Top>

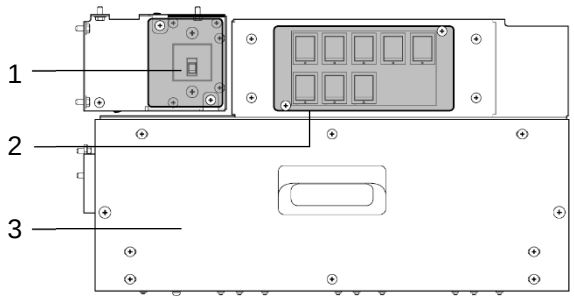


* The diagram on the right shows the product with the upper top panel in the left diagram removed.

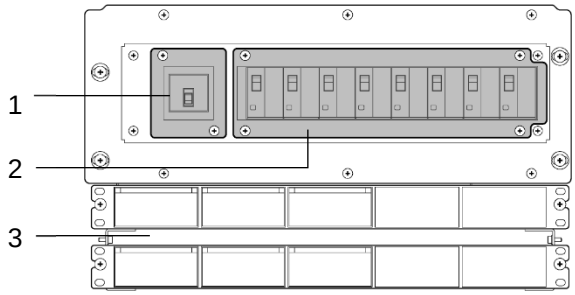
No.	Name	Function
1	GAS OUT unions	Outlet for discharging gas drawn in Used for connecting 10 mm outer diameter PTFE tubes (See ‘4-5 Piping’.)
2	Power supply input cable gland	Hole for the cable supplying power to the product
3	Top panels	Covers for the power supply input terminals and the gateway for PLC and upstream communication
4	Eyebolts	Used when lifting the product with a crane (See ‘4-3-1 Crane transportation’.)
5	GAS IN unions	Inlet for drawing in gas Used for connecting 6.35 mm (1/4 inch) outer diameter PTFE tubes (See ‘4-5 Piping’.)
6	Power supply input terminals	Terminals for the power supply input (See ‘4-6 Wiring’.)

3-2-2 Power supply unit part names and functions

<Non-redundant power supply configuration>



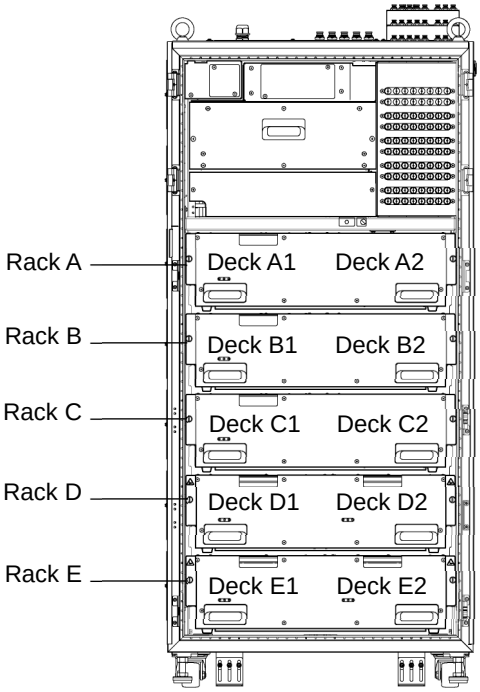
<Redundant power supply configuration (option)>



No.	Name	Function
1	Main power supply circuit breaker	Switch for turning the entire system power supply on and off
2	Rack switches	Switches for turning the individual detection rack power on and off
3	Power supply rack	Rack containing the power supply unit(s)

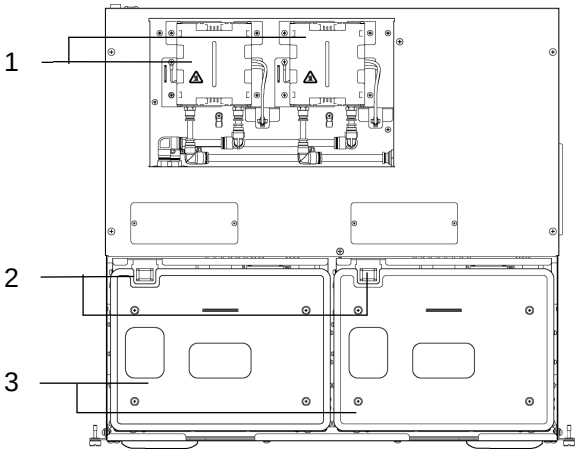
3-2-3 Detection rack part names and functions

The detection racks are either 16-point racks or pyrolyzer unit racks.
The specifications for each rack vary depending on the detection target gas.

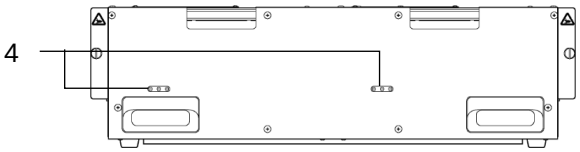


<16-point rack>

Top view

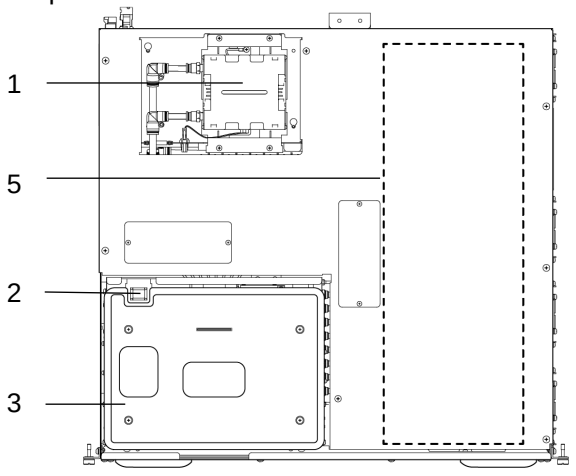


Front view

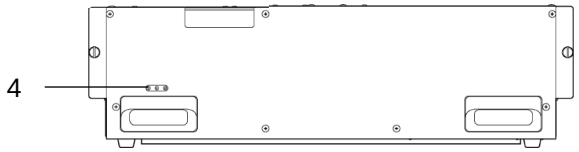


<Pyrolyzer unit rack>

Top view



Front view

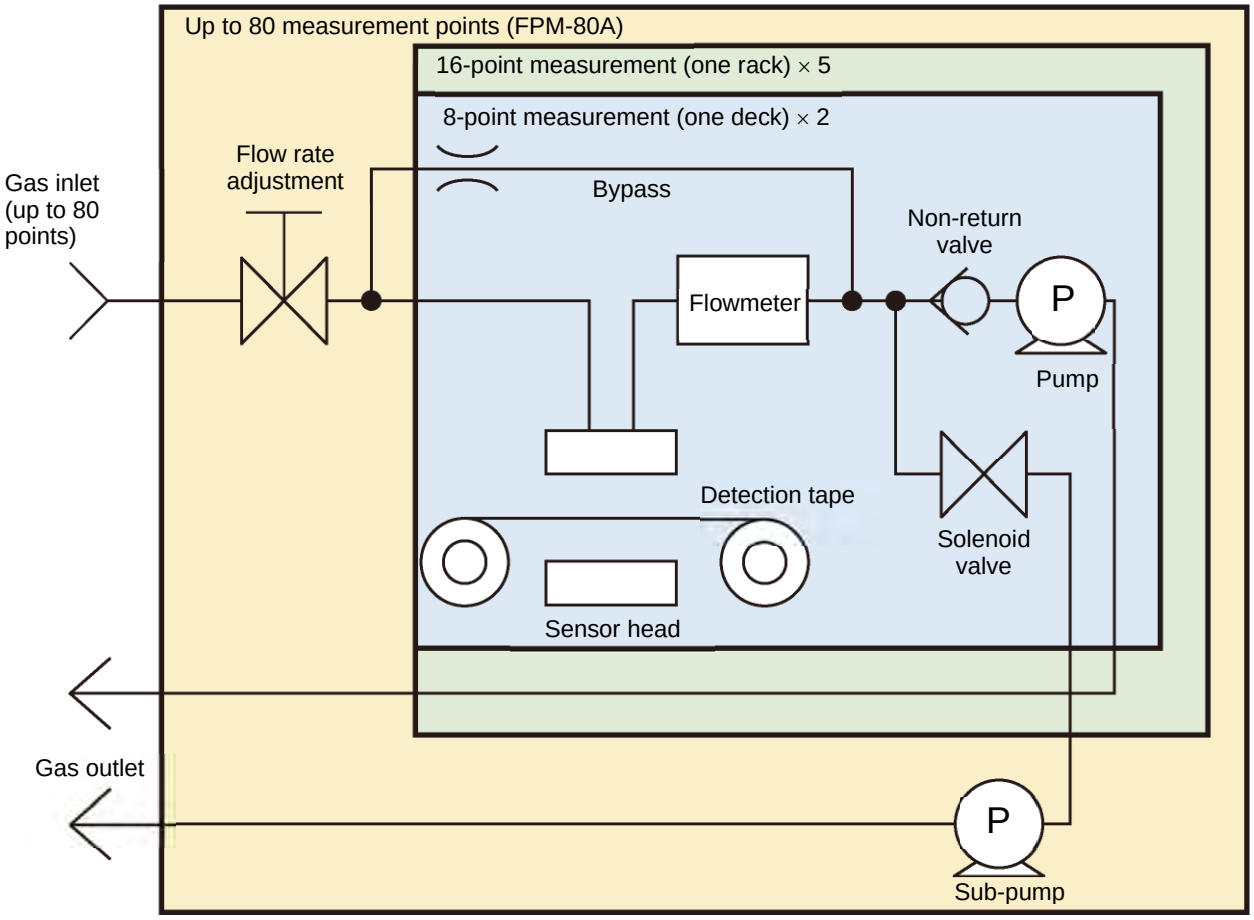


No.	Name	Function
1	Pump	Gas suction pump. Each deck contains one pump.
2	Push switch	Switch for opening the deck tray Used when removing or installing gas detection cassette tape
3	Deck	Unit in which the gas detection cassette tape is installed Each 16-point rack contains two decks. Each pyrolyzer unit rack contains one deck.
4	LED lamps	Lamps indicating the deck operation status Green lamp: Lights up when operating normally. Flashes in maintenance mode. Red lamp: Lights up when a first alarm occurs and flashes when a second alarm occurs. Yellow lamp: Lights up when an abnormality occurs in a unit or detection point. Flashes when a unit or detection point is malfunctioning.
5	Pyrolyzer unit	Heats the detection target gas to high temperatures, decomposing it into highly reactive substances. The gas generated after decomposition is then detected to measure the concentration of the detection target gas. One pyrolyzer is provided for each detection point.

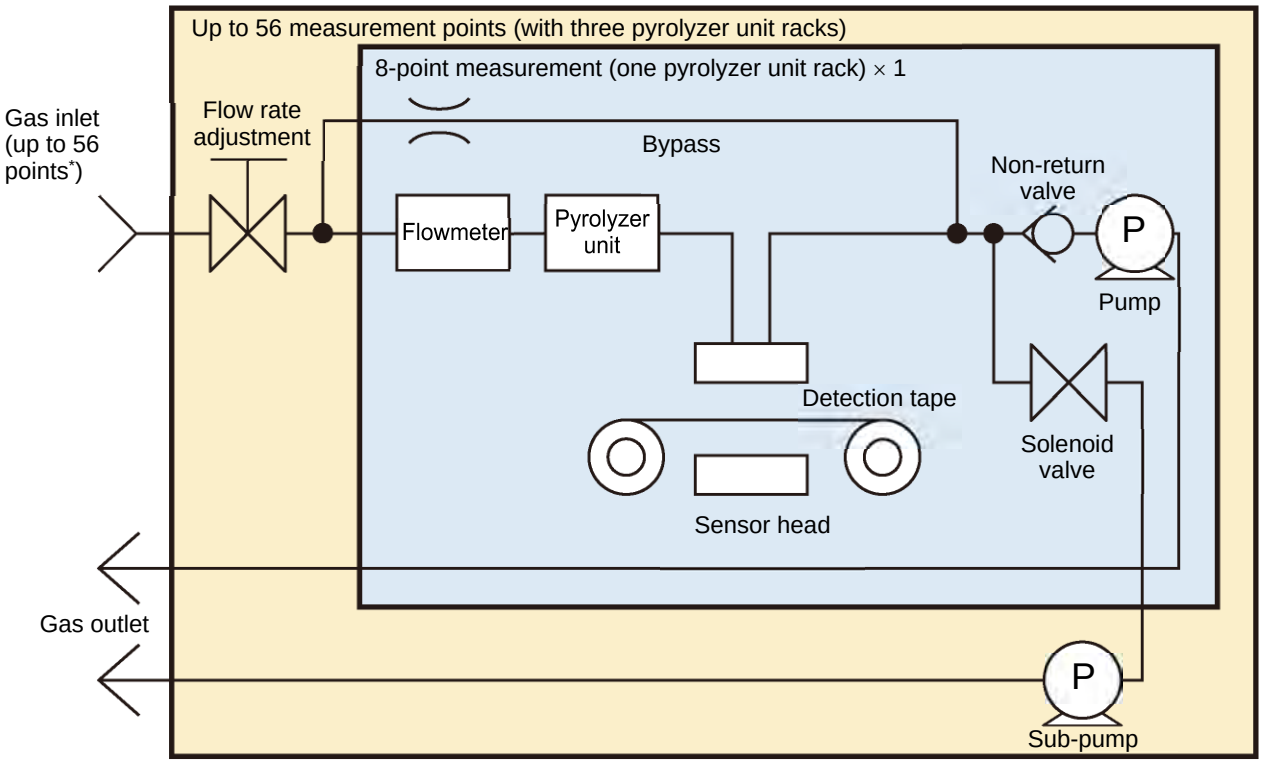
3-3 Block diagrams

3-3-1 Piping diagrams

<16-point rack>

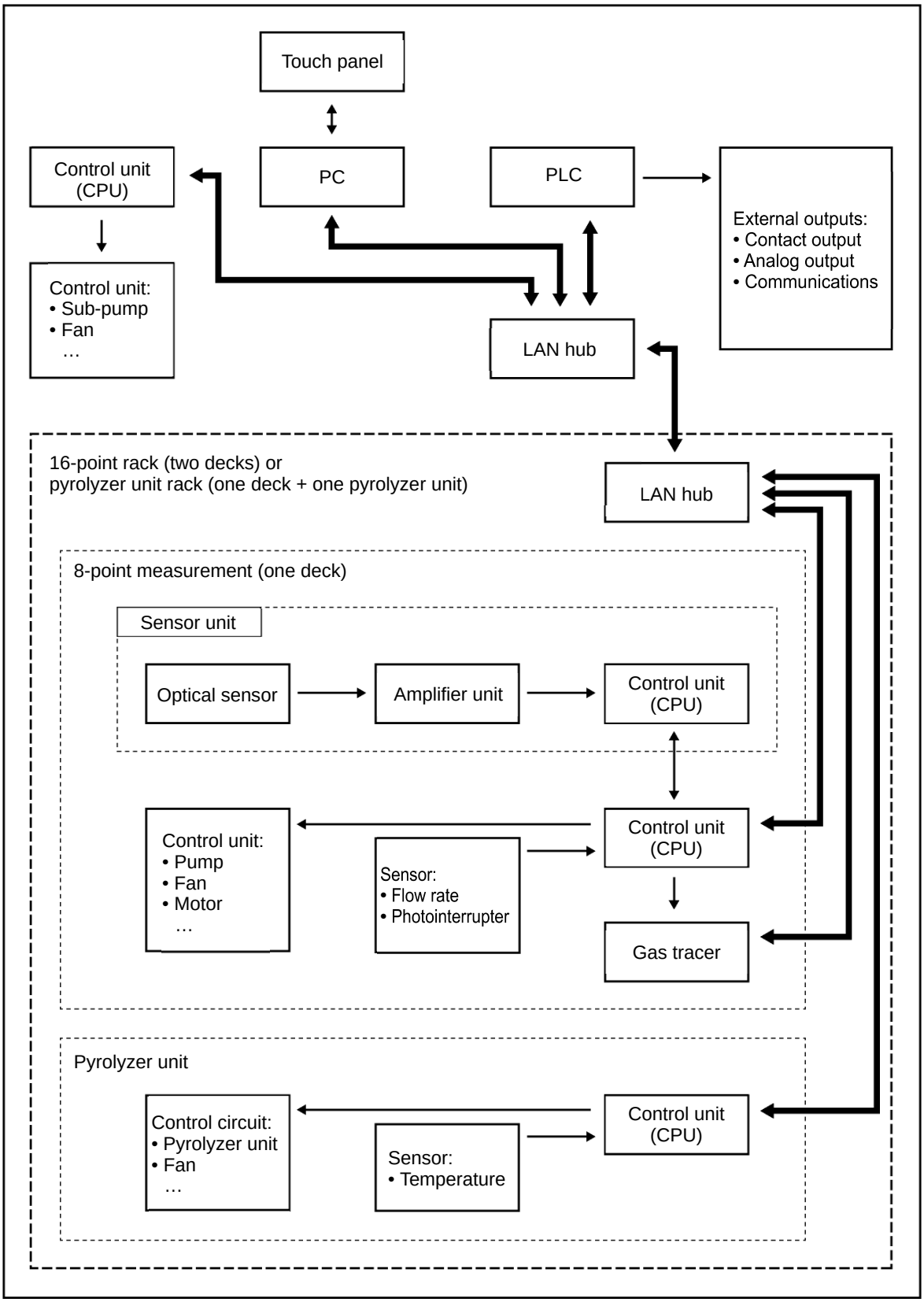


<Pyrolyzer unit rack>



* With three pyrolyzer unit racks

3-3-2 Electrical system diagram



4

Installation

4-1 Installation precautions

Be sure to observe the following precautions when performing installation work.
Failure to observe these precautions may result in product failure and/or inability to detect gas correctly.

DANGER

- Do not place small metal objects such as pins and clips on top of the product.
  Using the product with metal objects inside may damage the product or cause electric shock or fire.
- Do not use or store the product in hot, humid, or dusty locations.
  Doing so may cause malfunctions, electric shock, or fire.
- The total weight of the product can be up to approximately 400 kg (881 lbs). Check the load capacity of the floor before determining where to install the product.
- Do not install the product in unstable locations, such as on inclined surfaces, in confined locations, or in locations subject to vibration.

CAUTION

- Use the product only in environments in which the power supply is protected by a current leakage circuit breaker or fuse.

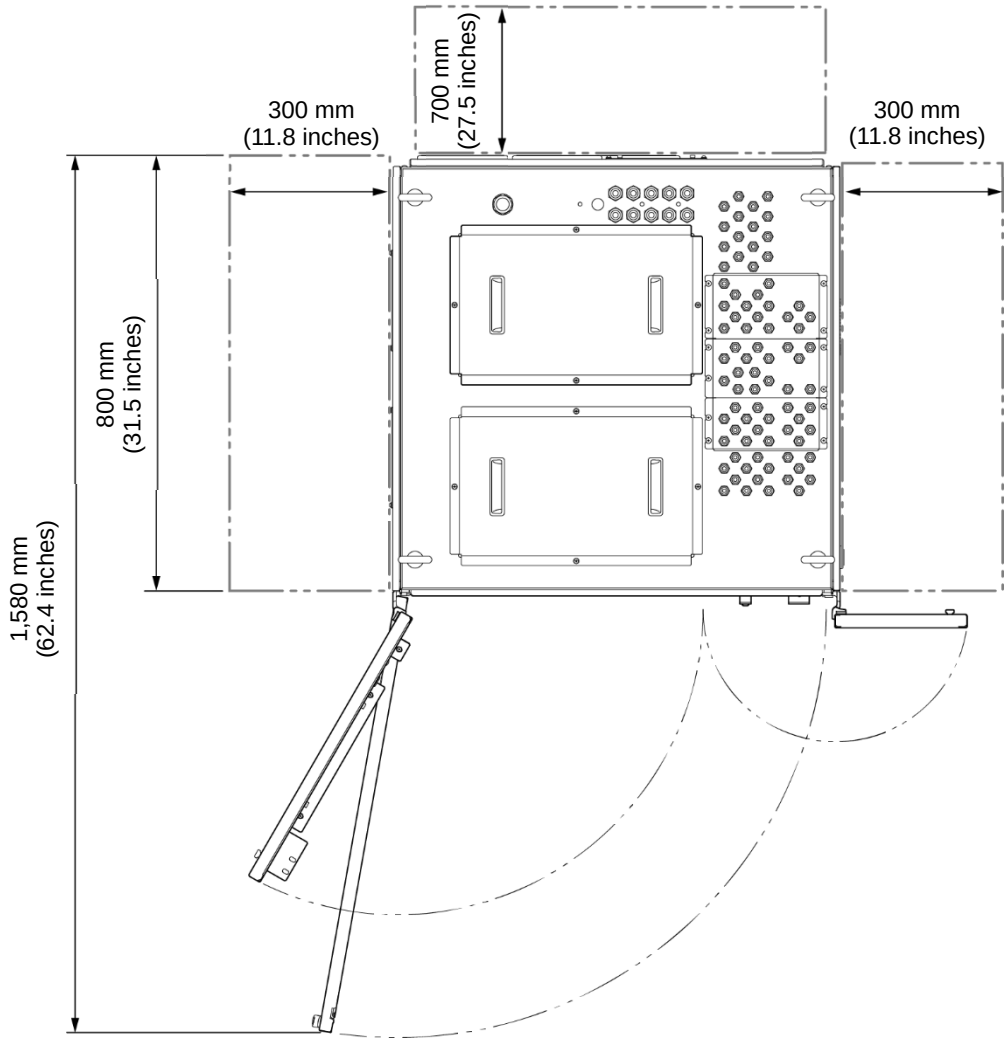
Note the following precautions when installing the product:

- Install the product in a location that meets the following conditions:
  - Where it can be checked when an alarm is triggered
  - Where the touch panel is easy to read
  - Where the gas detection cassette tape can be easily replaced
  - Where maintenance and flow rate adjustment can be easily performed
- Do not install the product in the following locations. Doing so may result in malfunctions or accidents.
  - Locations subject to direct sunlight
  - Dusty or humid locations
  - Locations subject to direct drafts
  - Locations subject to vibration
  - Inclined surfaces
  - Outdoors or in locations exposed to water droplets
- Do not use walkie-talkies near the product.
  Radio waves from walkie-talkies or other radio transmitters near the product may affect readings. If walkie-talkies or other radio wave transmitting devices are used, these must be used away from the product where they do not affect operation.
- Do not use the product near devices that emit strong electromagnetic radiation (high-frequency or high-voltage devices).

- The product is configured to connect piping and wiring from the top of the main unit. Make sure the installation location provides enough space to allow piping and wiring to be connected from above without difficulty.
- For overcurrent protection, install a dedicated circuit breaker for the product on the distribution panel. To ensure safety, avoid using circuit breakers exceeding 30 A (for 100 V systems) or 15 A (for 200 V systems).

4-2 Installation area

When installing the product, make sure that space is provided for gas outlet and for maintenance.



4-3 Product transportation

DANGER

- To prevent scratches and damage during transportation, do not remove the protective tape before transporting the product. Do not remove or discard the cable ties attached to the detection racks and the pumps inside the pump racks.

4-3-1 Crane transportation

Use the eyebolts to lift and move the product with a crane.

DANGER

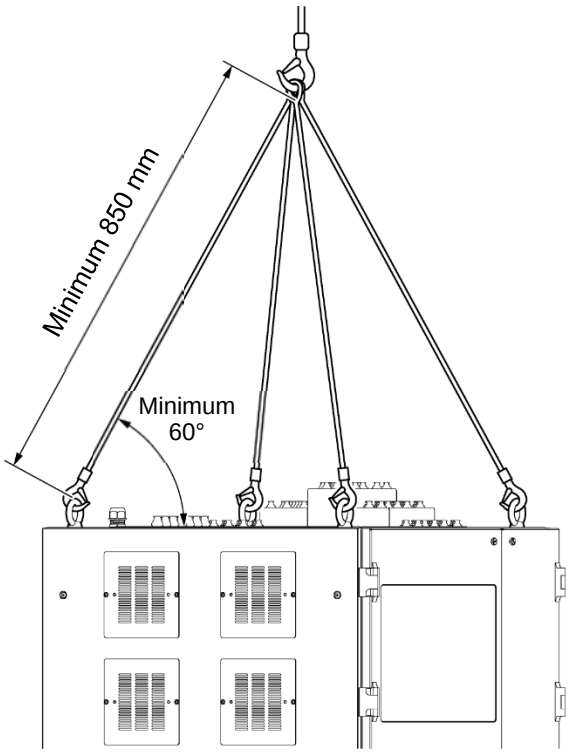
- When lifting the product with a crane, use the four eyebolts to ensure safety. Observe the stipulated lifting wire attachment dimensions.
- Check to confirm that the eyebolts are securely tightened before lifting.

NOTE

▶ Do not remove the eyebolts after installation. Leave them attached when using the product.

1 **Attach lifting wires to the four eyebolts located on the top of the product.**

2 **Attach the four lifting wires to the crane hook, then lift the product.**



4-3-2 Moving using casters

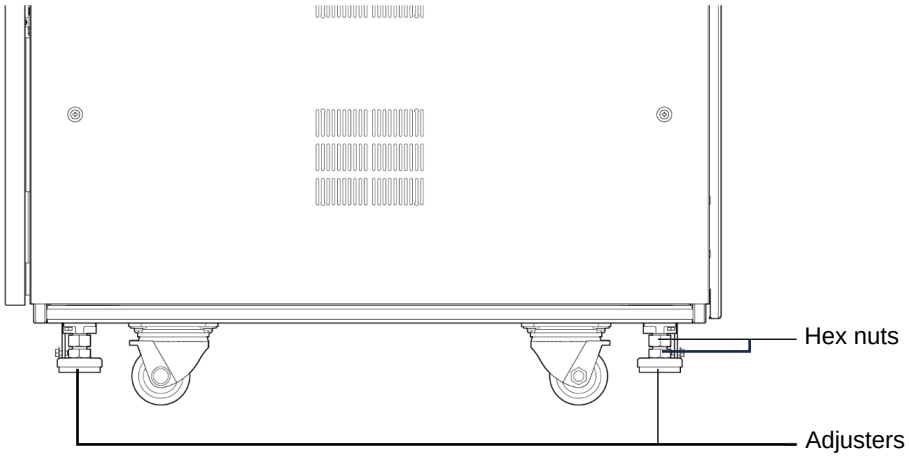
The product can be moved using the casters on the underside of it.

DANGER

- The total weight of the product is up to approximately 400 kg. Check the load capacity of the floor on which the product is to be moved.
- Check to confirm that there are no large steps or depressions on the path along which the product will move.

1 **Raise the four adjusters on the underside of the product off the floor by screwing them upward.**
Loosen the upper hex nut on the adjuster, then rotate the lower hex nut with a wrench (24 mm across flats) to adjust the height.
Be careful not to tilt the chassis here.

2 **Lock the four adjusters in position.**
Rotate the upper hex nut on the adjuster with a wrench (24 mm across flats) to lock the adjuster.



3 **Lay down protective mats on the path along which the product will move.**
Lay down protective mats to prevent scratches and indentation of the floor surface.

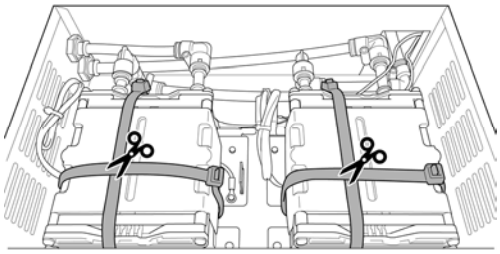
4 **Push the product to the installation location.**

4-4 Product installation

Once the product has moved to the installation location, attach the anchor brackets provided, and secure the product to the floor to prevent toppling.

NOTE

- After installing the product, remove the protective tape applied to prevent scratches and damage during transportation. Also remove and discard the cable ties attached to the detection racks and the pumps inside the pump racks.



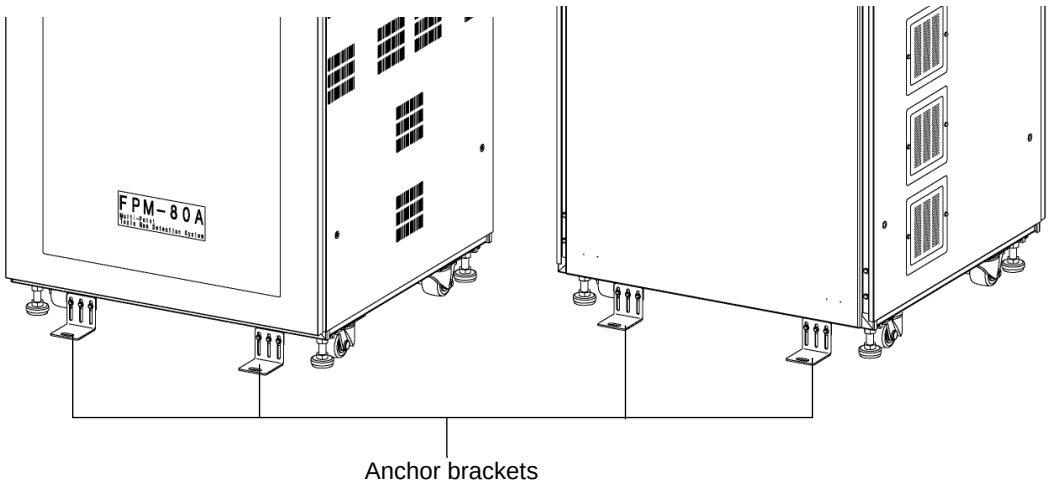
<Tools used>

- Wrench (24 mm across flats)
- Hex wrench (10 mm across flats)
- Phillips screwdriver (+2)

1 Temporarily attach the four anchor brackets provided to the underside of the product with three cross-recessed double SEMS machine screws (M6) each.

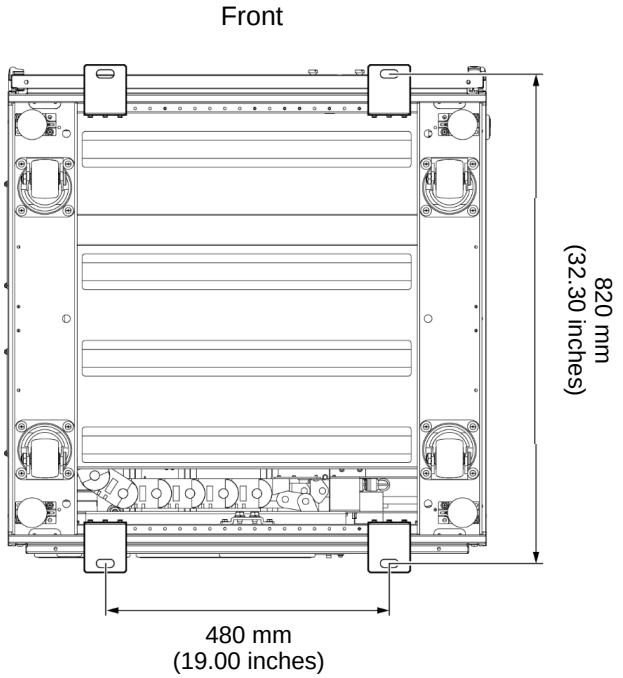
Attach two anchor brackets to the underside at the front and two to the underside at the rear.

Front Rear



2 Adjust the installation position of the product, then temporarily secure the four anchor brackets to the floor with one hex socket bolt (M12) each.

For the positions of the anchor brackets on the underside at the front and rear, refer to the diagram below.



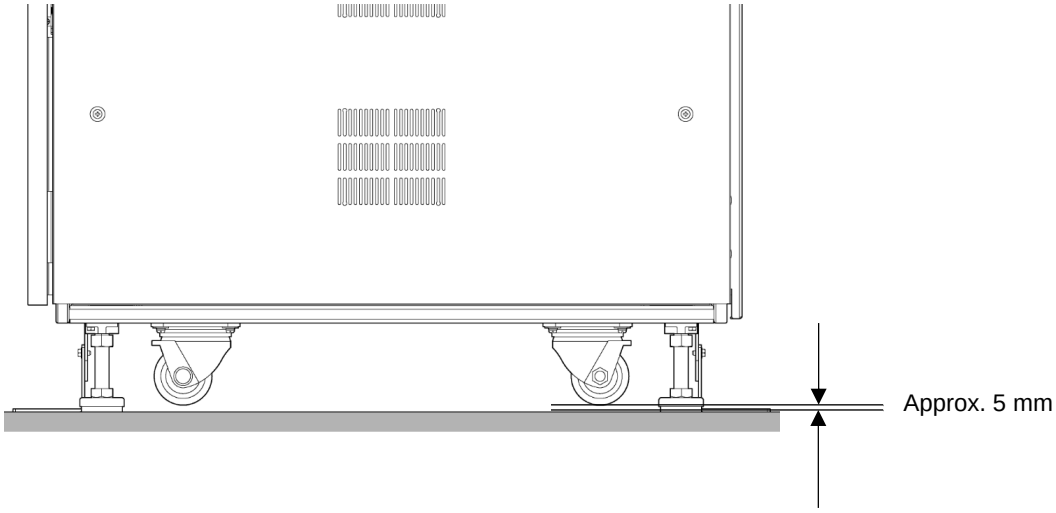
3 Extend the four adjusters so that the casters under the product are raised approximately 5 mm off the floor.

Loosen the upper hex nut on the adjuster, then rotate the lower hex nut with a wrench (24 mm across flats) to adjust the height.

Be careful not to tilt the chassis here.

4 Lock the four adjusters in position.

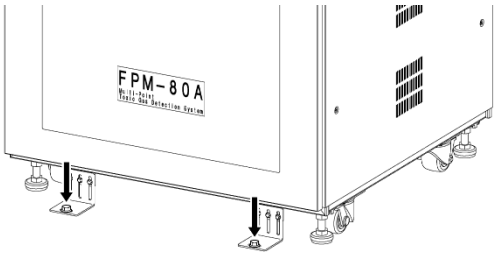
Rotate the upper hex nut on the adjuster with a wrench (24 mm across flats) to lock the adjuster.



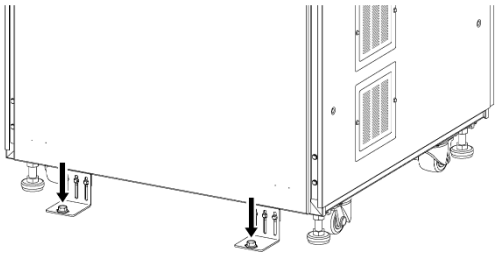
5 Fully tighten all of the hex socket bolts on the four anchor brackets.

Fully tighten the three cross-recessed double SEMS machine screws (M6) on the product side and the single hex socket bolt (M12) on the floor side to firmly secure the product in place.

Front



Rear



4-5 Piping

WARNING

- The union marked “SUB” on the GAS OUT side is connected to the backup pump. Be sure to also connect a PTFE tube to the union marked “SUB”.
  If the product is operated without connecting the exhaust line for the backup pump, the pump may switch over automatically, discharging the drawn gas around the main unit.

WARNING

- The product is designed to draw in gas at atmospheric pressure.
  There is a danger that gas may leak from inside the product if an excessive pressure is applied to the gas inlet (GAS IN) or outlet (GAS OUT) of the product. Be careful to avoid applying excessive pressure.

CAUTION

- When installing the piping, be sure to use the specified tubes (material and size). Using piping other than that specified may affect detection response rate and flow rate adjustment.
- Make the piping on the gas inlet (GAS IN) side as short as possible.
  The longer the piping on the GAS IN side, the more time it will take for the gas to arrive. Additionally, depending on the gas, the effects of absorption may increase, causing delays in response or readings indicating lower values.
- Make sure no condensation occurs while installing the pipes.
  High humidity in the sampling source area may result in condensation within the piping. For gases that become more corrosive when dissolved in water (e.g., highly acidic gases), consequences may include impaired capacity to detect gases and corrosive damage to internal parts.
- Do not lay piping that includes U or V shaped angles.
- Choose the position of the sampling inlet for the sampling gas after carefully considering gas flow inside the sampling gas pipe, gas generation process, and other factors.
- Fit the supplied dust filters to those gas inlets (GAS IN) not used for gas detection to protect them from dust ingress. For information on how to attach and replace dust filters, refer to ‘8-6-2 Replacing dust filters’.

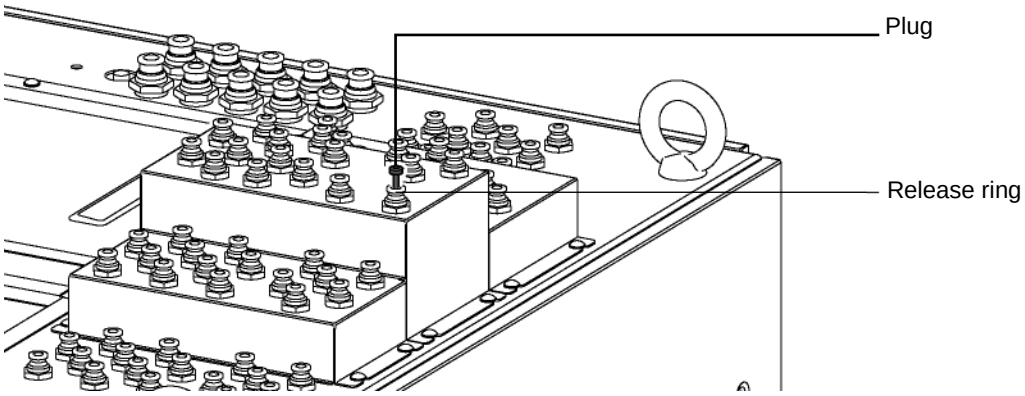
Connect PTFE tubes to the gas inlet (GAS IN) and gas outlet (GAS OUT) on the product.
<PTFE tube for gas inlet (GAS IN)>
- Outer diameter: 6.35 mm (1/4 inch); inner diameter: 4.35 mm
- Length: 120 m (400 ft) maximum

<PTFE tube for gas outlet (GAS OUT)>
- Outer diameter: 10.0 mm; inner diameter 8.0 mm
- Length: 15 m (49 ft) maximum

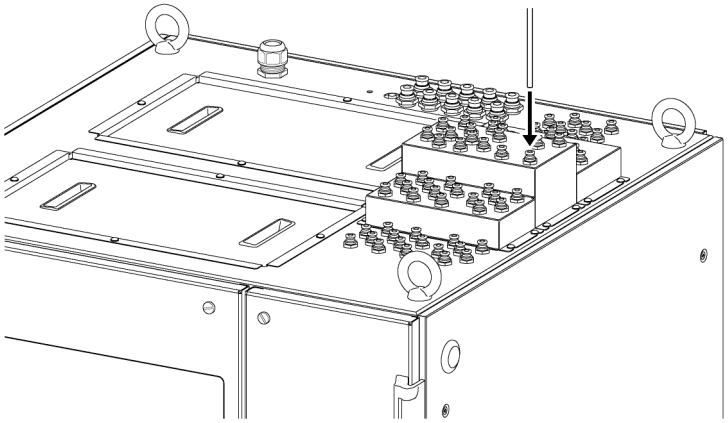
NOTE

- For information on the correspondence between the unions for the gas inlet (GAS IN) and gas outlet (GAS OUT) and the decks, refer to '<GAS IN/GAS OUT detail diagram>'.

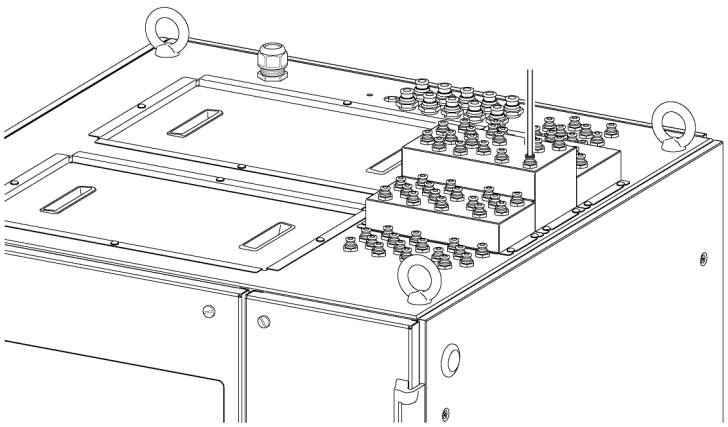
1 **Remove the plug attached to the union on the gas inlet (GAS IN).**
Pull the plug straight out while pressing the release ring of the connector fitting evenly all the way in. It may not be possible to remove the plug unless the release ring is pressed in all the way. Forcing the plug out may cause debris from the plug to enter the flow path, which may cause abnormal flow or prevent correct gas detection.



2 **Insert the specified PTFE tube into the union on the gas inlet (GAS IN) on the top of the product.**
Insert the tube straight on and firmly to the back of the fitting.
Refer to '<GAS IN/GAS OUT detail diagram>' and insert the tube into the port union corresponding to each sampling point.

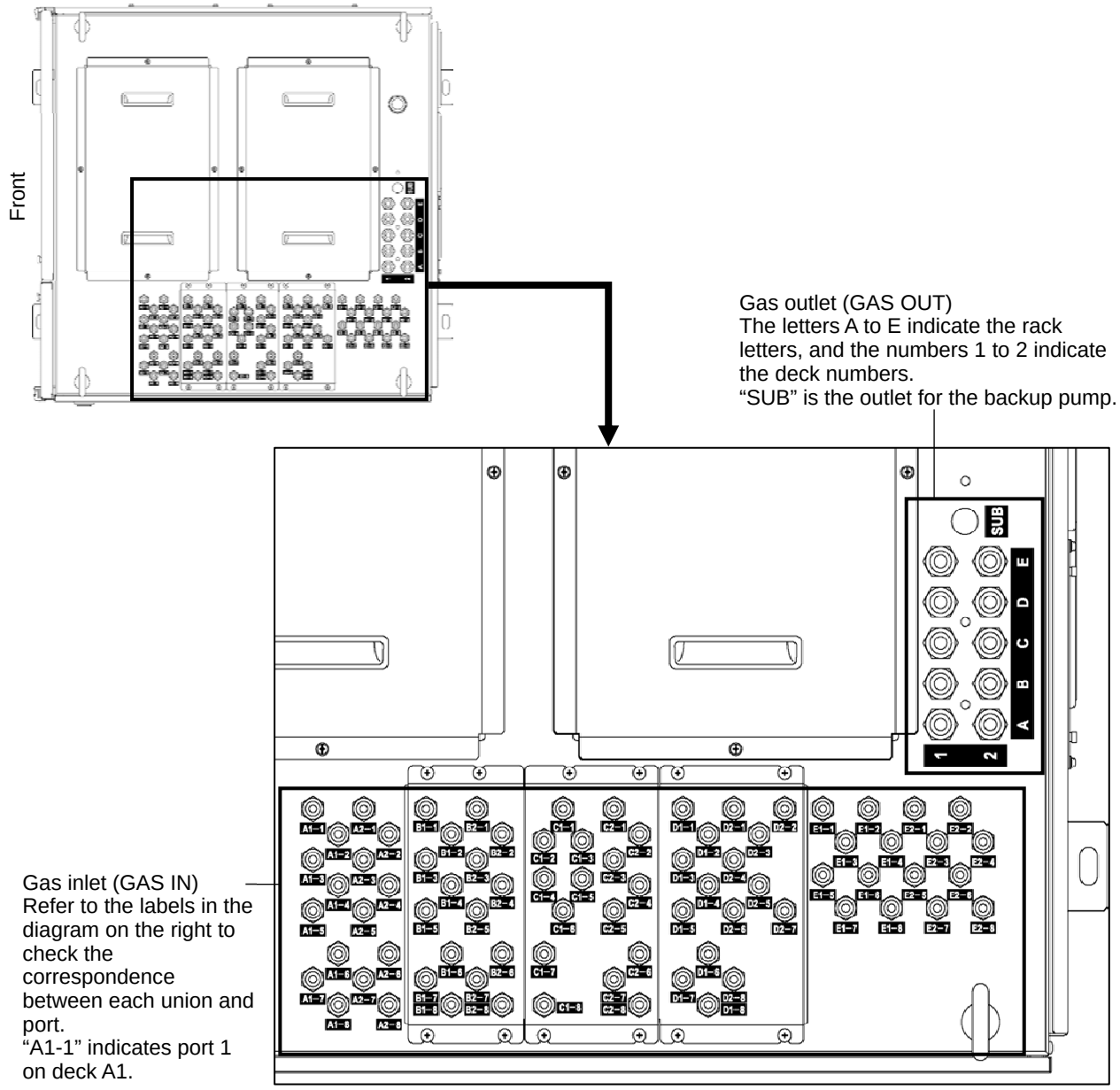


3 **Pull gently on the tube to confirm that it does not come loose.**



4 Insert the specified PTFE tube into the union on the gas outlet (GAS OUT) on the product in the same way as in steps 2 and 3.
Insert the tube straight on and firmly to the back of the fitting.
Ensure that the piping on the GAS OUT side discharges into the specified outlet duct.

<GAS IN/GAS OUT detail diagram>



NOTE

- If pressure fluctuations are likely at the GAS IN side piping connections (sampling locations), refer to the table below and adjust the length of one pipe on each rack as needed. Adjusting the pipe to the specified length will help minimize the impact of flow rate fluctuations caused by pressure fluctuations at the piping connections.
  Use a different piping connection port if pressure fluctuations of ±1.0 kPa (0.15 psi) or more are expected.

Sampling point pressure fluctuation	Minimum pipe length
±0.1 kPa (0.015 psi) or less	No specification
±0.2 kPa (0.029 psi) or less	Minimum 30 m (98 ft)
±0.5 kPa (0.073 psi) or less	Minimum 50 m (164 ft)
±0.7 kPa (0.102 psi) or less	Minimum 100 m (328 ft)
±1.0 kPa (0.15 psi) or less	120 m (400 ft)
Over ±1.0 kPa (0.15 psi)	Cannot be connected

- When detaching a tube, pull the tube straight out while pressing the release ring of the connector fitting evenly all the way in. It may not be possible to remove the tube unless the release ring is fully pressed in. Forcing the tube out may cause debris from the tube to enter the flow path, which may cause abnormal flow or prevent correct gas detection.

4-6 Wiring

DANGER

- To prevent electric shock, be sure to ground the ground cable. Failure to ground the product may cause electric shock.

WARNING

- Turn off the power supply circuit breaker and the power switch (to the ○ position) before performing wiring work. Performing wiring work while the power is on may cause short circuits when connecting wires and resulting damage to the product.

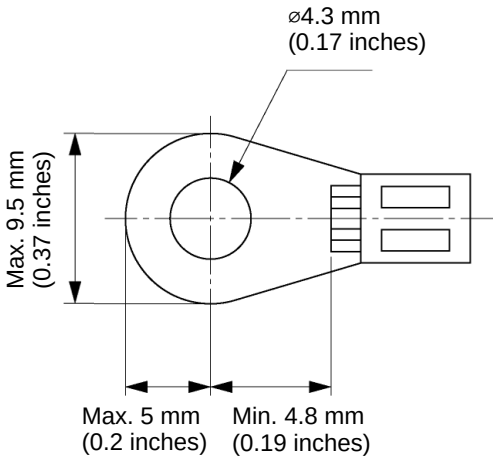
NOTE

- Use crimping terminals with insulating caps for the terminal plate and grounding PE.
- For signal lines such as analog output lines, use shielded cables (e.g., CVVS cables) to minimize the effects of electrical noise.

<Terminal plate specifications>

Item	Specifications
Input voltage	100 to 240 V AC, single-phase grounded
Cable	Finished outer diameter: 10.5 to 16 mm Conductor cross-sectional area: AWG10 (5.5 mm^2) or larger for 100 V AC AWG14 (2.0 mm^2) or larger for 240 V AC

<Compatible crimping terminal>

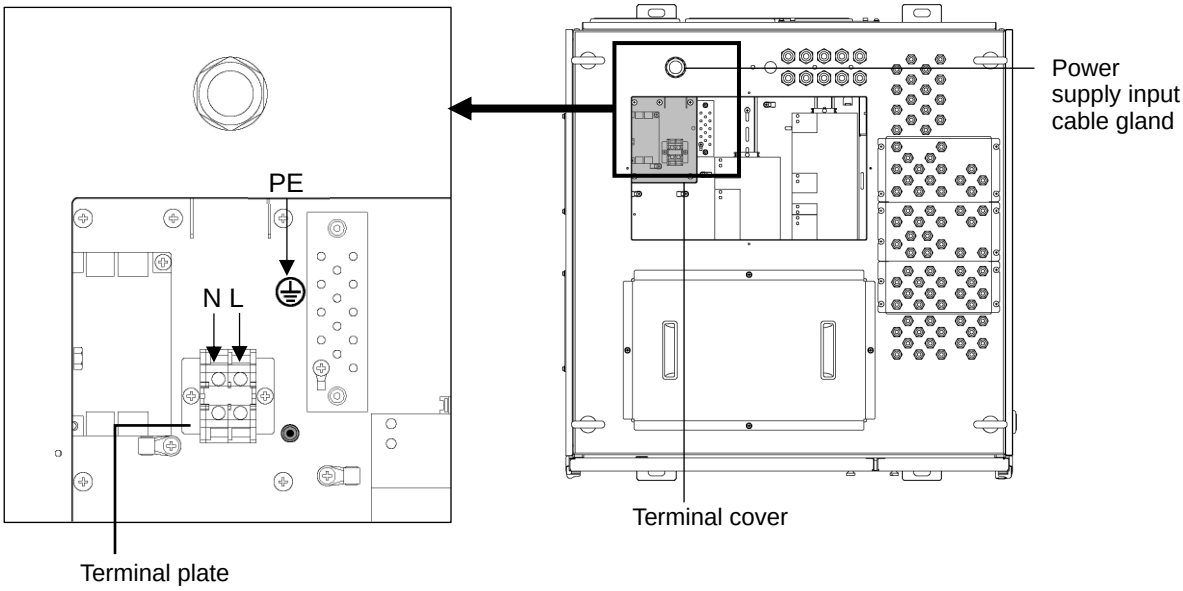


1 **Remove the top panel from the product.**
Loosen the four bolts securing the top panel, then remove the top panel.

2 **Remove the terminal cover.**
Loosen the five bolts securing the terminal panel, then remove the terminal cover.

3 **Loosen the power supply input cable gland.**
Rotate the power supply input cable gland to loosen it until the cable can be fed through.

4 **Connect crimping terminals to each terminal (N and L) on the terminal plate and the grounding PE.**
Make sure that the wire connected to the grounding PE is slack. When using a 3-wire cable, make sure the PE wire is longer than the N and L wires so that the grounding PE wire is slack.



5 **Tighten the power supply input cable gland.**
Rotate the power supply input cable gland to secure the cable in place.

6 **Reattach the terminal cover.**
Retighten the five bolts to secure the terminal cover.

7 **Reattach the top panel to the product.**
Retighten the four bolts to secure the top panel.

5

Usage Instructions

5-1 Usage notes

Observe all usage precautions when using the product.
Ignoring these precautions may damage the product and result in inaccurate gas detection.
Check the following before using the product:

- The piping materials used are appropriate. The pipes are of the correct lengths.
- All external output connections are correct.

Also check the following before supplying power to the product:

- The input power supply voltage matches the voltage indicated on the product.
- The main power supply circuit breaker and rack switches are turned off (to the ○ position).

DANGER

- To prevent electric shock, be sure to ground the ground cable. Failure to ground the product may cause electric shock.
- Never remove the grommets attached to the external output connectors on the rear of the product. Removing the grommets may result in electric shock or foreign matter ingress.

WARNING

- Do not use the product with a power supply voltage other than that specified. Doing so may damage the product or cause electric shock or fire.
- In an emergency, turn off the main power supply circuit breaker (to the ○ position) to shut off the power to the product.

NOTE

- Use a power supply separate from large motors or other equipment that consume large amounts of power.
- Take care to avoid damaging the power supply cable. Also take care to avoid subjecting the power supply cable to excessive force, such as by bending it or pulling it.

5-2 Turning on the power

Turn on the power to the product.
When the power is turned on, the ANALYSIS screen appears on the touch panel.

NOTE

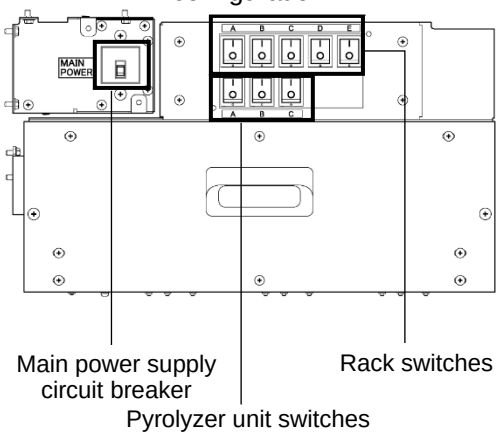
- Turning on the power feeds the gas detection cassette tape. Do not turn the power on and off unnecessarily while gas detection cassette tape is installed. Doing so may shorten the replacement interval of the gas detection cassette tape.
- If a high concentration of gas is drawn in immediately after the power is turned on with gas detection cassette tape installed, an alarm will be triggered even before the product enters detection mode. However, the concentration reading may not be accurate, since the product is not yet in detection mode.
- If the product is in operation standby state (gas detection cassette tape installed, tube length set, flow rate adjusted), it will enter detection mode within approximately three minutes.
- If a pyrolyzer unit rack is installed, the product will switch to detection mode once the pyrolyzer unit warms up (approximately 30 minutes).

1 **Check to confirm that the main power supply circuit breaker and rack switches are turned off (to the ○ position).**

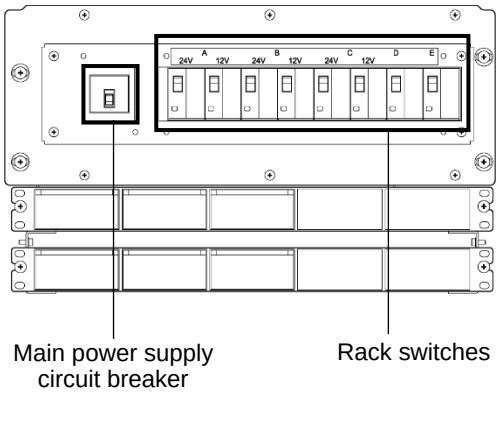
2 **Turn on the main power supply circuit breaker (to the | position).**

3 **Turn on the rack switch of the letter corresponding to the rack to be used (to the | position).**
If using a non-redundant power supply configuration, also turn on the pyrolyzer unit switch of the corresponding rack letter (to the | position).
If using a redundant power supply configuration, turn on both the 24 V and 12 V switches simultaneously (to the | position).

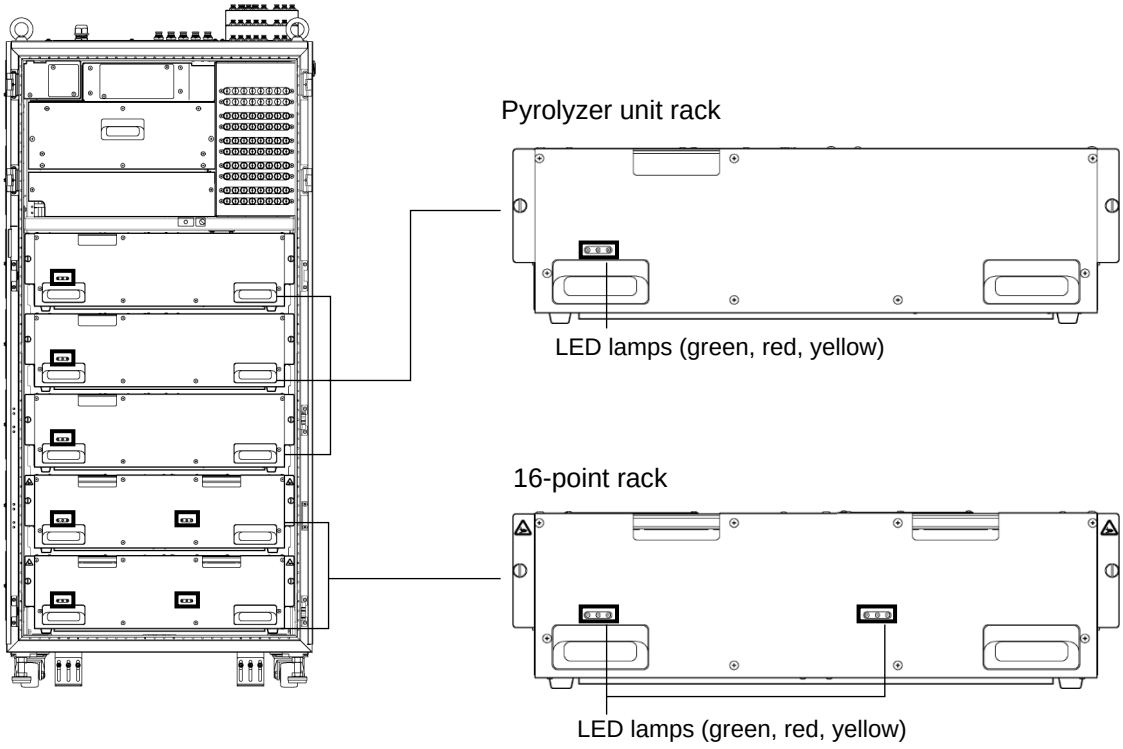
<Non-redundant power supply configuration>



<Redundant power supply configuration (option)>



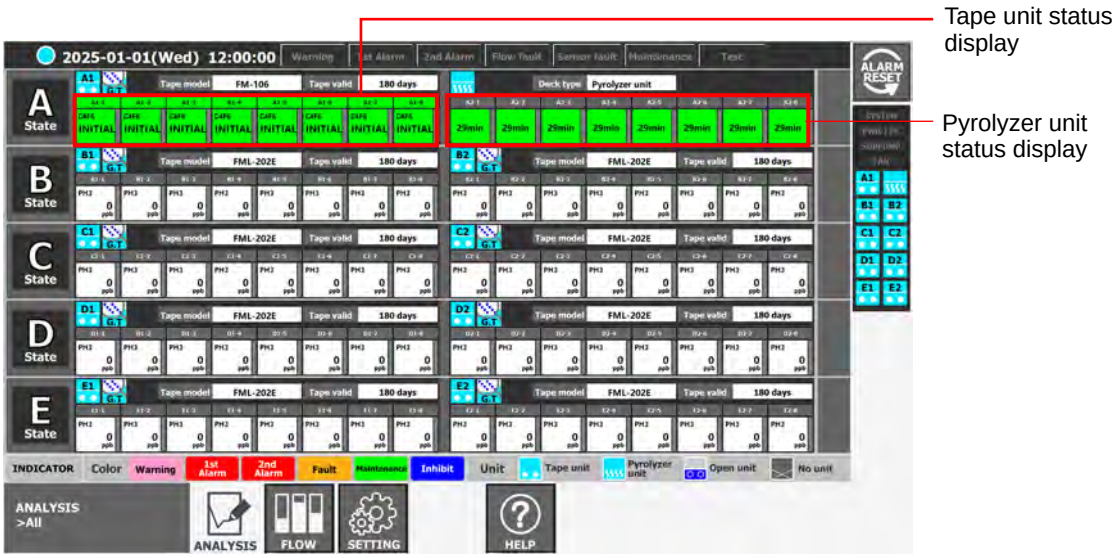
The LED lamps (green, red, yellow) on the front of the detection rack all light up for three seconds, after which the green lamp remains lit.



* The type of detection rack used differs depending on the usage environment and target gas type.

The RIKEN KEIKI logo appears on the touch panel, after which the ANALYSIS screen appears. (See '5-5 Checking the product status (ANALYSIS screen)'.)
The tape units enter detection mode once the initializing display disappears.
The pyrolyzer units display the time (in minutes) remaining until the warmup is complete, and enter detection mode once the warmup is complete.

<ANALYSIS screen during initialization>



<ANALYSIS screen in detection mode>

5-3 Changing the initial password

You must log in with an account that has the required access permissions for product screen operations and gas detection settings.
The product is initially configured with two accounts, Administrator and User, each assigned a temporary initial password.
Be sure to change the passwords for both accounts after logging in for the first time.

Account name	Initial password	Description
Administrator	Admin_1111	This account has all configurable access permissions. This is the only account permitted to manage all other accounts.
User	User1_1111	This account has no access permissions assigned.

CAUTION

- Be sure to change the initial passwords after logging in for the first time.
  If the initial passwords are not changed, no operations other than changing the passwords can be performed. Additionally, you will be forcibly logged out even if you navigate to another screen.

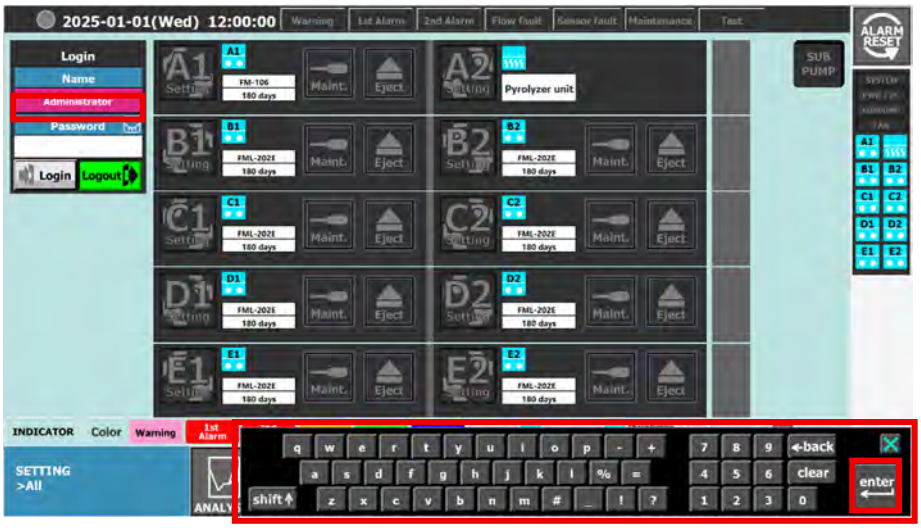
NOTE

- Passwords must be at least 10 characters (and up to 20 characters) long and include at least one uppercase letter, one lowercase letter, one number, and one symbol. Passwords that do not meet these requirements are invalid.
- Accounts can be added, deleted, and edited. Note that the Administrator account's access permissions cannot be edited or deleted. (See '6-2 Account settings'.)

1 Touch the [SETTING] button.

2 Touch the [Name] input box for [Login].
The keyboard screen is displayed.

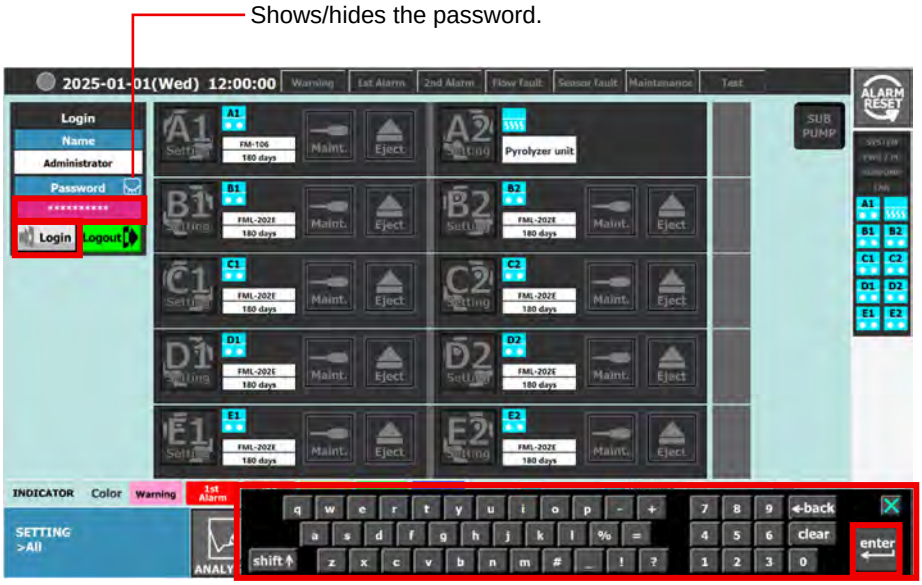
3 Enter “Administrator” using the keyboard displayed, then touch the [enter] key.



4 Touch the [Password] input box.
The keyboard screen is displayed.

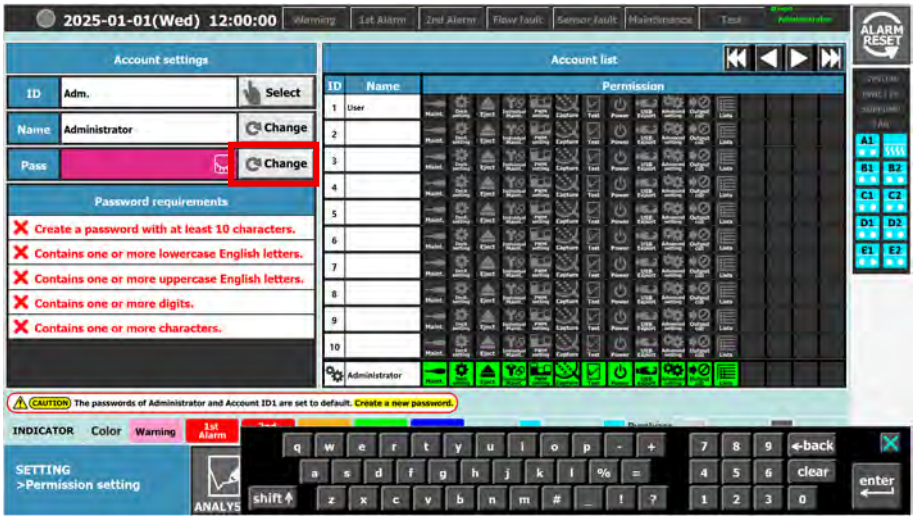
5 Enter “Admin_1111” using the keyboard displayed, then touch the [enter] key.
Touching the eye icon for [Password] shows or hides the password entered.

6 Touch the [Login] button.

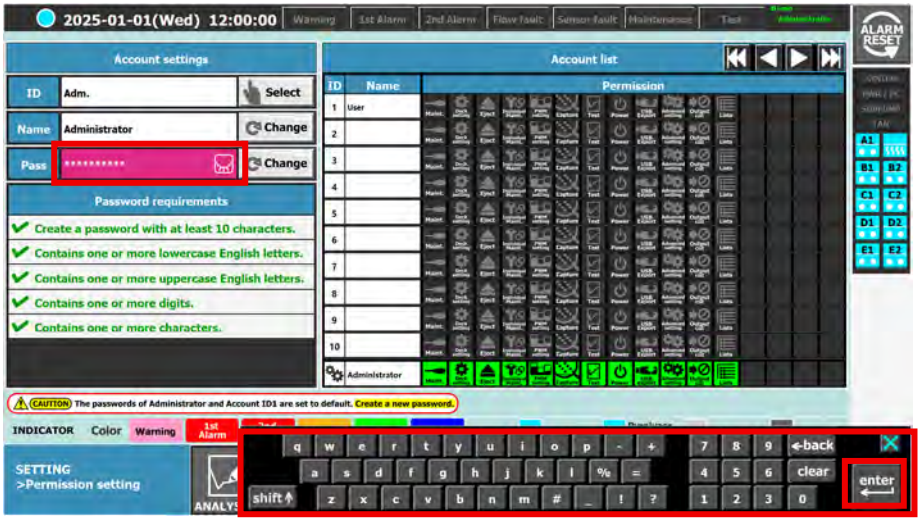


When you log in with the initial password, you are in a temporary login state, and [Administrator] appears at the top right of the screen. The display switches to the Permission setting screen upon login.
A caution message appears at the bottom of the screen if the initial password has not yet been changed.

7 Touch the [Change] button for [Pass].
The keyboard screen is displayed.



8 Enter a new password using the keyboard displayed, then touch the [enter] key.



9 Change the initial password for the user account(s) in the same way as Steps 2 to 8.
You are now formally logged in with the Administrator account.

5-4 Preparations for operation

Install the gas detection cassette tape in the product, then set the tube length and flow rate.

5-4-1 Installing gas detection cassette tape

Install the gas detection cassette tape models to suit the gas types to be detected.
Once the gas detection cassette tape has been installed (cassette trays closed) and self-diagnostic is complete, detection starts if the results are normal.
For information on how to install the gas detection cassette tape, refer to ‘8-5 Gas detection cassette tape replacement’.

NOTE

- Once gas detection cassette tape is installed, the tape is fed. Do not install or remove the gas detection cassette tape unnecessarily. Doing so may shorten the replacement interval of the gas detection cassette tape.
- If a high concentration of gas is drawn in immediately after installation of gas detection cassette tape, an alarm will be triggered even before the product enters detection mode. However, the concentration reading is not accurate, since the product is not yet in detection mode.

5-4-2 Tube length setting

For detection target gas types whose indication accuracy is significantly affected by the length of the tube (target gases: F_2 and NF_3), the sampling tube length should be set for each port.
Adjusting the length of the tube from the sampling location ensures accurate gas detection.
For more information on setting the tube length, refer to ‘6-5-5 Setting the tube length’.

NOTE

- The tube length can be set only for detection target gas types whose indication accuracy is significantly affected by the length of the tube (target gases: F_2 and NF_3).

5-4-3 Flow rate adjustment

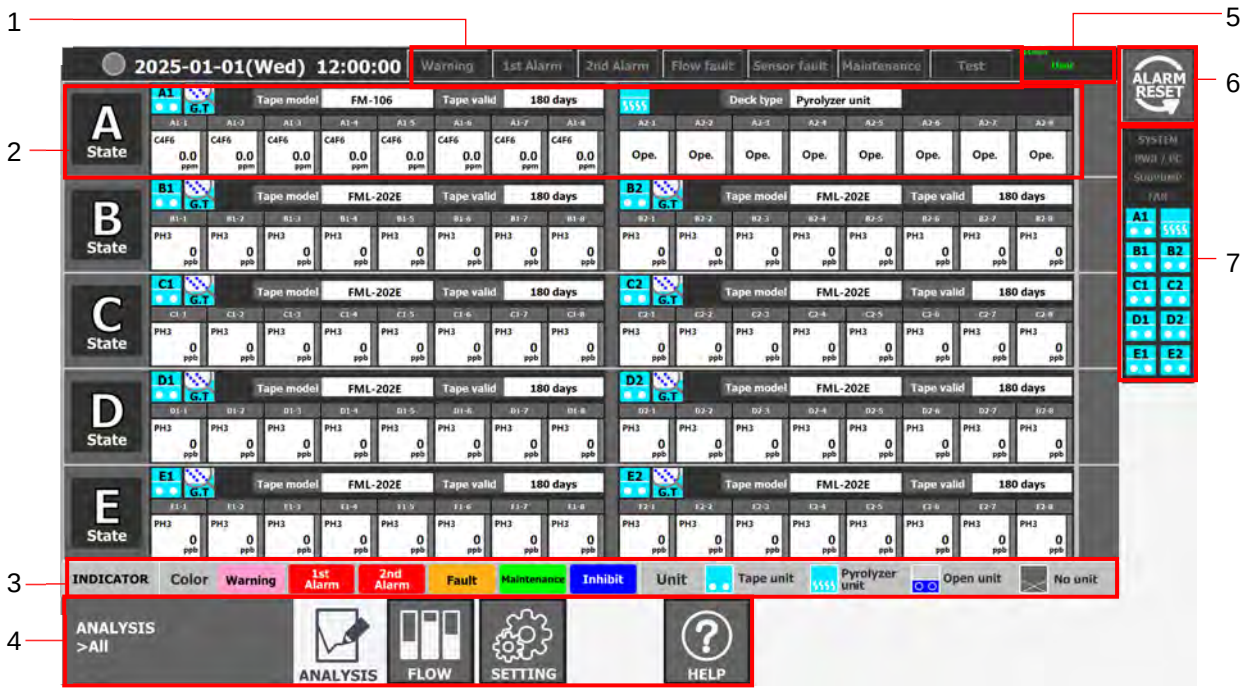
Once the piping work is complete, adjust the flow rate.
For information on how to adjust the flow rate, refer to ‘8-2 Sample gas flow rate adjustment (FLOW screen)’.

NOTE

- If tubes are connected after the flow rate has been adjusted, the flow rate is reduced by the load from the tube, requiring readjustment. Adjust the flow rate after connecting a tube.

5-5 Checking the product status (ANALYSIS screen)

The gas detection status and individual rack status can be checked using the ANALYSIS screen displayed on the touch panel.



No.	Name	Function
1	System status row	Displays the current abnormality status and the product status. [Warning]: Indicates that an abnormality has occurred in one of the ports or in the main unit. Lights up pink when an abnormality occurs. [1st Alarm]: Indicates that a first alarm has occurred in one of the ports. Lights up/flashes red when a first alarm occurs. [2nd Alarm]: Indicates that a second alarm has occurred in one of the ports. Lights up/flashes red when a second alarm occurs. [Flow fault]: Indicates that a flow rate abnormality has occurred in one of the ports. Lights up/flashes yellow when a flow rate abnormality occurs. [Sensor fault]: Indicates that a fault has occurred in a detector. Lights up/flashes yellow when a fault occurs. [Maintenance]: Indicates that one of the ports is in maintenance mode. Lights up green when in maintenance mode. [Test]: Indicates that one of the ports is in alarm test mode. Flashes dark pink when in alarm test mode.

No.	Name		Function
2	Rack status row		Indicates the status of the individual racks. The details displayed differ between the 16-point racks and pyrolyzer unit racks.
		16-point racks	Displays the status for two tape units. Deck type: Displays the tape unit icon and deck number. Gas tracer function: The icon is displayed when the gas tracer function is enabled. [Tape model]: Displays the gas detection cassette tape model. [Tape valid]: Displays the number of remaining days for the detection tape. Port status row: Displays the individual port tag name, detection target gas, current gas concentration, and units for ports 1 to 8. These are displayed in a color whose meaning is explained in [INDICATOR] depending on the port operation status.
		Pyrolyzer unit racks	Displays the status for one tape unit and one pyrolyzer unit. The tape unit display details are the same as for the 16-point rack. Deck type: Displays the pyrolyzer unit icon. [Deck type]: Displays the pyrolyzer unit deck type ([Pyrolyzer unit]). Port status row: Displays the pyrolyzer status for each port. [Ope.] is displayed while the pyrolyzer is operating. The fault details are displayed when a fault occurs.
3	[INDICATOR]		Indicates the meanings of the different display colors and icons.
4	Screen selection buttons		Touch a button to go to the corresponding screen. The buttons displayed differ depending on the currently logged in account.
5	Account name display area		Displays the currently logged in account. When blank, this indicates no account is logged in. No account is initially logged in when the power is turned on. (See ‘6-1-1 Logging in’.)
6	[ALARM RESET] button		Button used to reset the alarm This is not used when the alarm mode is set to auto reset.
7	Status section		Indicates the product fault status and the status of racks A to E. Product fault status (Lights up yellow when a fault occurs.) [SYSTEM]: Indicates that a system fault has occurred. [PWR / PC]: Indicates that a power supply or PC fault has occurred. [SUBPUMP]: Indicates that a sub-pump fault has occurred. [FAN]: Indicates that an internal fan fault has occurred. Status of racks A to E • Normal: Light blue • Fault: Yellow • Maintenance: Green • Tape tray open: Blue Grayed out when no rack is set.

5-6 Checking the sample gas flow rate (FLOW screen)

The sample gas flow rate for each port can be checked on the FLOW screen.

NOTE

- The flow rate is not displayed while the gas detection cassette tape is being fed because the air inside the pipes is shut off.
- The proper flow rate values are shown below. Adjust the flow rate if it falls outside the proper range. (See '8-2 Sample gas flow rate adjustment (FLOW screen)'.)
  Note that a warning will be issued if the flow rate falls outside the range allowing accurate gas detection.

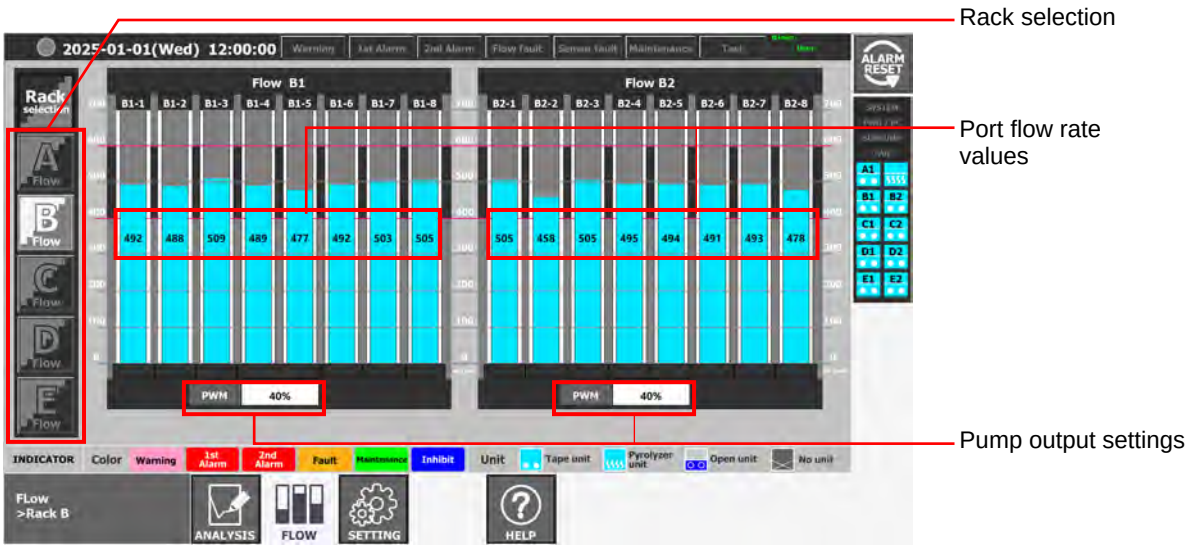
	Flow rate range for accurate gas detection	Proper flow rate
16-point racks	400 to 600 mL/min	500 ± 50 mL/min
Pyrolyzer unit racks	150 to 400 mL/min	300 ± 50 mL/min

1 Touch the [FLOW] button.

The FLOW screen is displayed.

2 Select the rack letter button for the port to be checked.

Touch one of the available buttons in [Rack selection]: [A Flow], [B Flow], ... or [E Flow].
The flow rates (in mL/min) for all ports in the rack selected are displayed for each deck.
[PWM] displays the pump output setting for each deck.



5-7 Checking individual deck settings

NOTE

- To check individual deck settings, log in with an account that has the [Deck setting], [Individual Maint.], and [Capture] access permissions enabled. (See '6-1-1 Logging in', '6-2-2 Access permissions', and '13-1 Access permissions required to operate the product'.)

5-7-1 Checking deck settings (SETTING-Deck screen)

You can check the settings for each deck in detection racks A to E on the SETTING-Deck screen.

1 Touch the [SETTING] button.

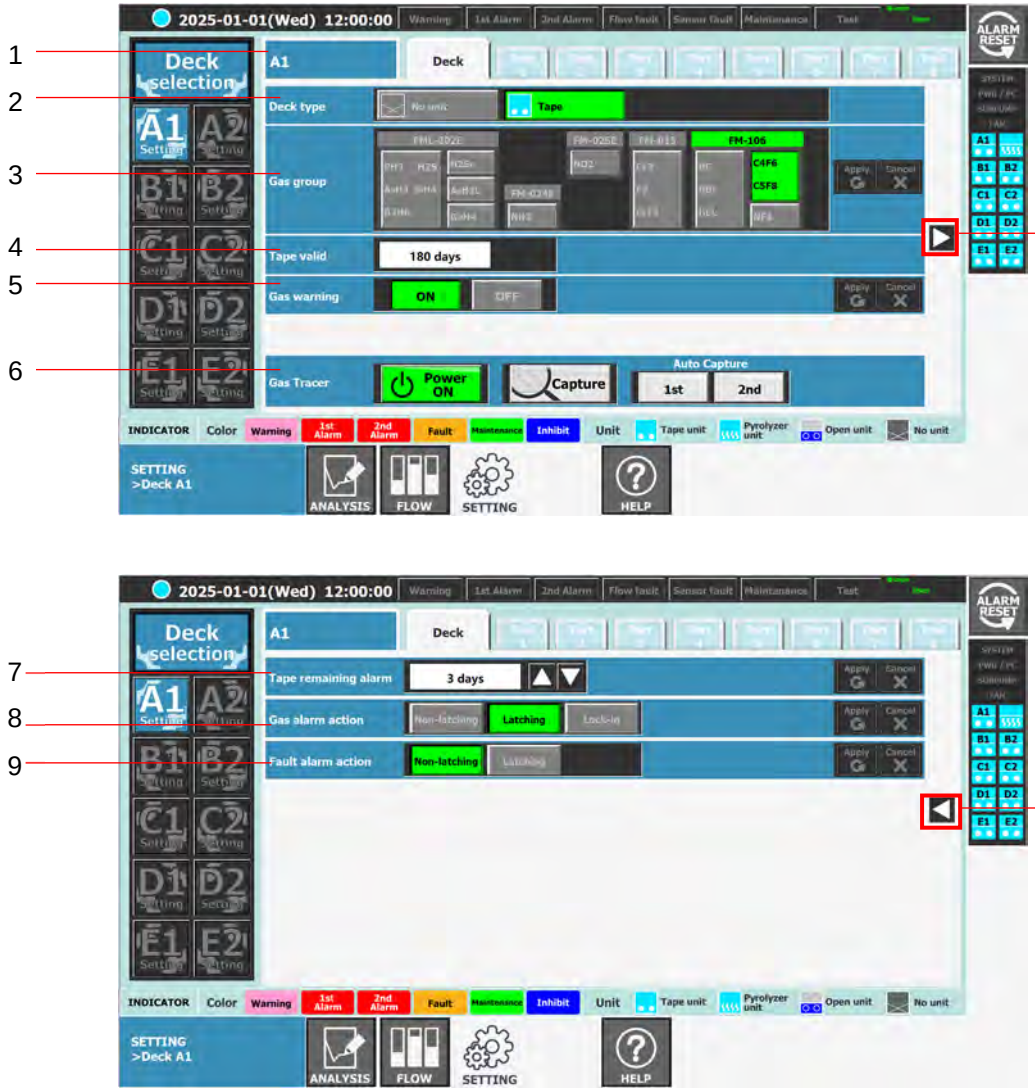
The SETTING screen is displayed.

2 Select the button for the deck to be checked.

Touch one of the available buttons: [A1 Setting], [A2 Setting], ... or [E2 Setting].

Settings for the deck selected are displayed.

<For tape units>



No.	Item	Setting details
1	Deck number	Displays the deck number currently displayed.
2	[Deck type]	Displays the deck type. This will be [Tape] for tape units, or [No unit] if not used.
3	[Gas group]	Displays the model and gas group for the gas detection cassette tape installed in the deck.
4	[Tape valid]	Displays the number of remaining days for the detection tape.
5	[Gas warning]	Displays whether the gas warning function is enabled or disabled.
6	[Gas Tracer]*	Displays the detection tape capture function on/off button, manual capture button, and auto capture timing buttons.
7	[Tape remaining alarm]	Displays the number of remaining days for the detection tape at which an alarm is issued.
8	[GAS alarm action]	Displays the deck gas alarm pattern.

No.	Item	Setting details
9	[Fault alarm action]	Displays the deck fault alarm pattern.

* Displayed when logged in with an account that has the [Capture] access permission.

<For pyrolyzer units>

No.	Item	Setting details
1	Deck number	Displays the deck number currently displayed.
2	[Deck type]	Displays the deck type. This will be [Pyrolyzer] for pyrolyzer units, or [No unit] if not used.
3	[Fault alarm action]	Displays the pyrolyzer unit fault alarm pattern.

NOTE

- For information on the tape unit deck settings, refer to ‘6-4 Deck settings (tape unit)’.
- For information on the pyrolyzer unit settings, refer to ‘6-6 Deck settings (pyrolyzer unit)’.

5-7-2 Checking individual deck port settings (SETTING-Deck-Port screen)

You can check the settings for each deck port on the SETTING-Deck-Port screen.

1 Touch the [SETTING] button.

The SETTING screen is displayed.

2 Select the button for the deck to be checked.

Touch one of the available buttons: [A1 Setting], [A2 Setting], ... or [E2 Setting].

The SETTING-Deck screen is displayed.

3 Touch the tab for the port number to be checked.

Touch one of the available tabs: [Port 1], [Port 2], ... or [Port 8].

Settings for the port selected are displayed.

<For tape units>

No.	Setting item	Description
1	Port number	Displays the port number currently displayed.
2	[Gas]	Displays the detection target gas for the port.
3	[Gas alarm]	Displays the alarm setpoints for the detection target gas. [Range]: Displays the detection range. [Level 1]: Displays the first alarm setpoint. [Level 2]: Displays the second alarm setpoint.
4	[Suppression]	Displays the zero suppression value.
5	[Maint.]*	Displays whether maintenance mode is enabled or disabled for the port currently displayed.
6	[Inhibit]*	Displays whether inhibit mode is enabled or disabled for the port currently displayed.

* Displayed when logged in with an account that has the [Individual Maint.] access permission enabled.

NOTE

- The items displayed vary depending on the access permissions for the logged in account and the detection target gas.

<For pyrolyzer units>

No.	Setting item	Description
1	Port number	Displays the port number currently displayed.
2	[Temperature]	Displays the operation status of the pyrolyzer unit.
3	[Set temperature]	Displays the temperature setting for the pyrolyzer unit.
4	[Pyrolyzer heater]	Displays whether the pyrolyzer unit heater is on or off.
5	[Pyrolyzer aging]	Displays whether the pyrolyzer unit aging function is enabled or disabled.

NOTE

- For information on the individual tape unit port settings, refer to ‘6-5 Port settings (tape unit)’.
- For information on the individual pyrolyzer unit port settings, refer to ‘6-7 Port settings (pyrolyzer unit)’.

5-8 Stopping operation

Shut down the product operation.

NOTE

- To stop operation, log in with an account that has the [Power] access permission enabled. (See '6-1-1 Logging in', '6-2-2 Access permissions', and '13-1 Access permissions required to operate the product'.)

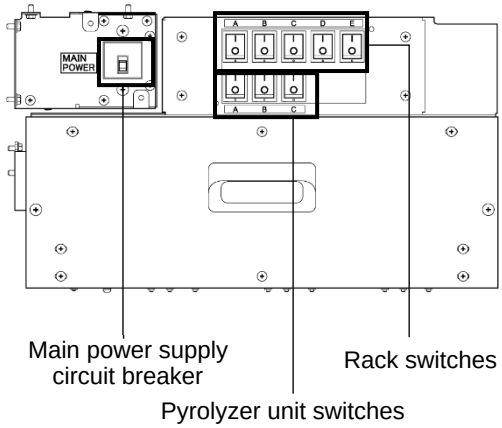
1 **Touch the [SHUT DOWN] button.**
A confirmation message appears. Touch the [Yes] button.

The system shuts down.

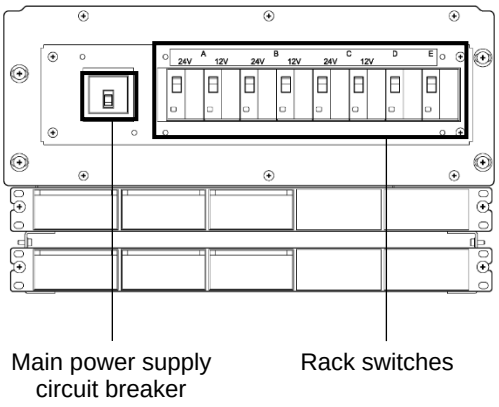
2 **Turn off all rack switches and pyrolyzer unit switches (to the ○ position).**
If using a non-redundant power supply configuration, also turn off the pyrolyzer unit switches for the corresponding rack letters (to the ○ position).
If using a redundant power supply configuration, turn off both the 24 V and 12 V switches (to the ○ position).

3 **Turn off the main power supply circuit breaker (to the ○ position).**

<Non-redundant power supply configuration>



<Redundant power supply configuration (option)>



NOTE

- To stop the operation of individual racks, do not shut down the system. Instead turn off the corresponding rack switch (to the ○ position). Also, leave the main power supply circuit breaker turned on (to the | position).

CAUTION

- If the product will not be used for extended periods, do not store with the gas detection cassette tape left inside. The detection tape may deteriorate and may not be able to detect gas correctly the next time it is used. It may also cause contamination of the detector units.
  For information on how to handle the gas detection cassette tape removed from the product, refer to '9-1-2 Storing gas detection cassette tape'.
- Do not store the product in the following locations. Doing so may result in malfunctions or accidents.
  • Locations subject to direct sunlight
  • Dusty or humid locations
  • Locations subject to direct drafts
  • Locations subject to vibration
  • On unstable platforms or inclined surfaces
  • Outdoors or in locations exposed to water droplets

6

Settings

6-1 Login procedure

6-1-1 Logging in

Before starting product operation, log in with an account that has the required access permissions for screen operations and gas detection settings.

NOTE

- If you log in with an account that does not have access permissions for screen operations or gas detection settings, you cannot configure relevant functions, view the related icons, or check the corresponding settings. (See ‘6-2-2 Access permissions’.)

1 Touch the [SETTING] button.

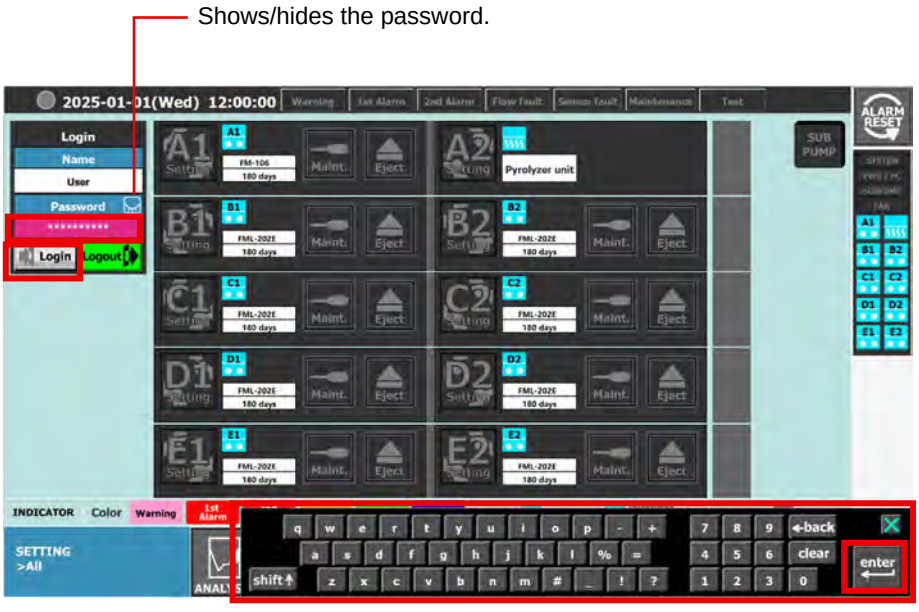
2 Touch the [Name] input box for [Login].
The keyboard screen is displayed.

3 Enter the account name using the keyboard displayed, then touch the [enter] key.

4 Touch the [Password] input box.
The keyboard screen is displayed.

5 Enter the password using the keyboard displayed, then touch the [enter] key.
Touching the eye icon for [Password] shows or hides the password entered.

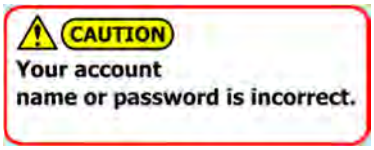
6 Touch the [Login] button.



If login is successful, the account name will appear at the top right of the screen.

NOTE

- If the login is unsuccessful, the warning message shown on the right will appear.
  Check the account name and password, then try logging in once again.



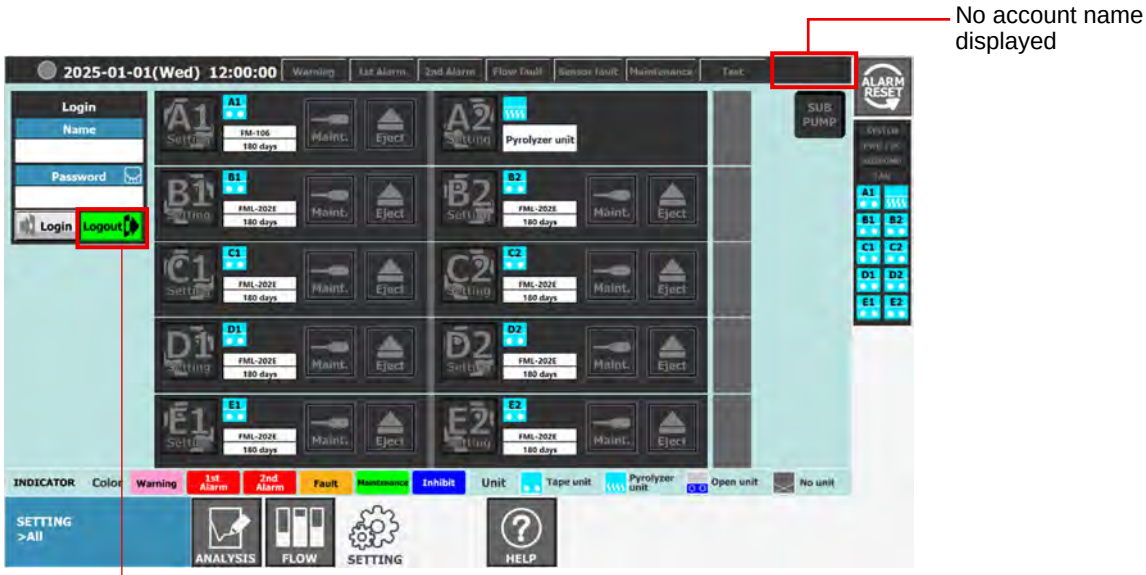
- Contact RIKEN KEIKI if you lose or forget the password for the Administrator account.

6-1-2 Logging out

1 Touch the [SETTING] button.

2 Touch the [Logout] button.

Once logged out, the account name at the top right of the screen is no longer displayed.



NOTE

- You can check the login/logout history on the Summary screen. (See ‘7-2-1 Checking the operation history’.)

Date	Status	Tag No.	Target	Value	Unit	Remark
2025-12-22 10:12:31	3rd Conf.	SYSTEM	Information	LOGIN		Administrator
2025-12-22 10:12:31	Normal	SYSTEM	Information	LOGOUT		User
2025-12-22 10:11:34	3rd Conf.	SYSTEM	Information	LOGIN		User
2025-12-22 10:09:45	Normal	SYSTEM	Information	LOGOUT		Administrator

- You will be automatically logged out if the screen remains unchanged for 120 minutes.

6-2 Account settings

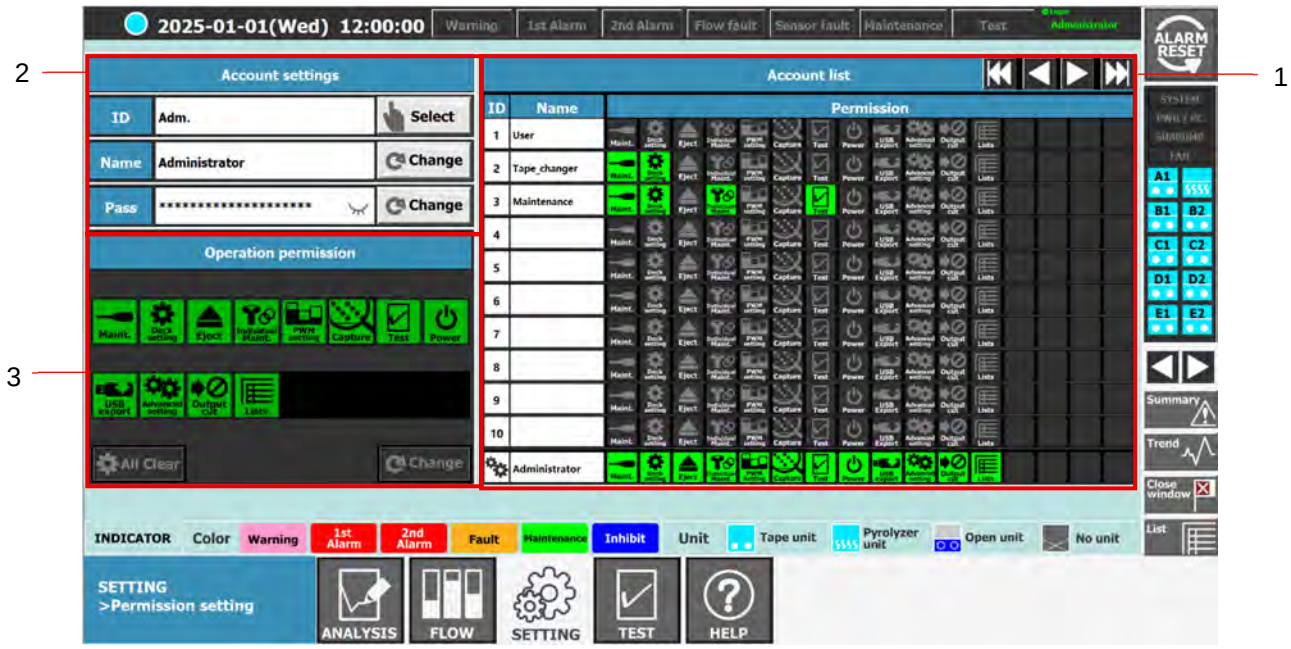
6-2-1 About account settings

An account must be made available with the required access permissions for screen operations and gas detection settings.
The product is initially configured with two accounts, Administrator and User. (See ‘5-3 Changing the initial password’.)
Add, edit, or delete accounts as necessary. Accounts can be added, edited, and deleted only by the Administrator account.

NOTE

- Account names must be at least four characters (and up to 20 characters) long.
- Passwords must be at least 10 characters (and up to 20 characters) long and include at least one uppercase letter, one lowercase letter, one number, and one symbol. Passwords that do not meet these requirements are invalid.
- Two accounts cannot have identical names.
- If an account is set with the same name as the initial account, the initial password must be changed once again.
  (See ‘5-3 Changing the initial password’.)
- Up to 100 accounts can be set.
- The Administrator account’s access permissions cannot be edited or deleted.
- The initial User account can be renamed, have its access permissions edited, and be deleted.

The account settings are configured on the Permission setting screen.
You can access the Permission setting only when logged in as Administrator.



No.	Item	Description
1	[Account list]	Lists the account names set for the product together with the corresponding access permissions. Up to 10 account names are displayed on a single screen. (Up to 100 accounts can be set.) Touch the [◀] and [▶] buttons to scroll between the different screens. Touch the [⏮] or [⏭] button to jump to the first or last screen, respectively.
2	[Account settings]	Displays the ID, name, and password for the account selected in [Account list]. Touching the eye icon for [Pass] shows or hides the password.
3	[Operation permission]	Displays the access permissions set for the account displayed in [Account settings].

6-2-2 Access permissions

The product features the following access permissions for individual functions.
Set the required access permissions for each account.

NOTE

- For more information on the relationship between access permissions and specific operations, see '13-1 Access permissions required to operate the product'.
- If you log in with an account that does not have access permissions for screen operations or gas detection settings, you cannot configure relevant functions, view the related icons, or check the corresponding settings.

Display	Access permission	Description
	[Maint.]	Access permission related to deck maintenance This access permission is required to change product settings.
	[Deck setting]	Access permission required to check and configure individual deck settings
	[Eject]	Access permission required to eject gas detection cassette tape
	[Individual Maint.]	Access permission required to check and configure individual port maintenance related settings
	[PWM setting]	Access permission required to set the sample gas flow rate (PWM value)
	[Capture]	Access permission required to check and configure the gas tracer function settings
	[Test]	Access permission required to view the TEST and Optical Verification screens and to perform alarm tests and optical checking
	[Power]	Access permission related to power supply operations This access permission is required to stop operation.
	[USB export]	Access permission required to check settings for outputting data to a USB flash drive and for outputting data
	[Advanced setting]	Access permission related to upstream communication setting operations This access permission is required to check and configure IP address and gateway settings.
	[Output cut]	Access permission related to external output settings This access permission is required to cut off the contact output from the PLC.
	[Lists]	Access permission required to view the Summary and Trend screens and to check operation history and trend information

6-2-3 Adding/editing an account

You can add accounts and edit account settings.
Log in as Administrator to add or edit accounts.

NOTE

- The Administrator account's access permissions cannot be edited or deleted. (You can only rename the Administrator account.)
- Up to 100 accounts can be set.

1 Log in as Administrator. (See '6-1-1 Logging in'.)

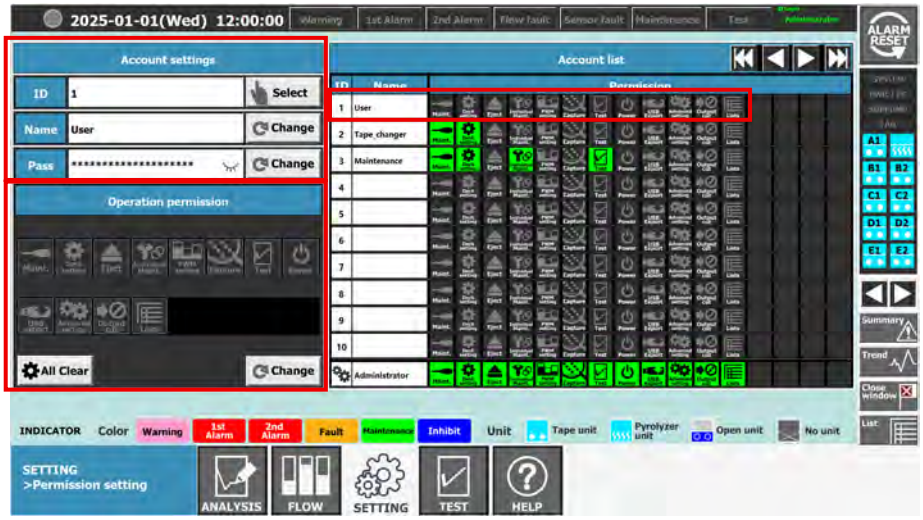
2 Touch the [Permission setting] button on the SETTING screen.

The Permission setting screen is displayed.

3 Touch the ID number button in [Account list] for the account to be added or edited.
To add an account, touch the number button for an ID to which no account has been set.
The account for the touched ID number is selected.

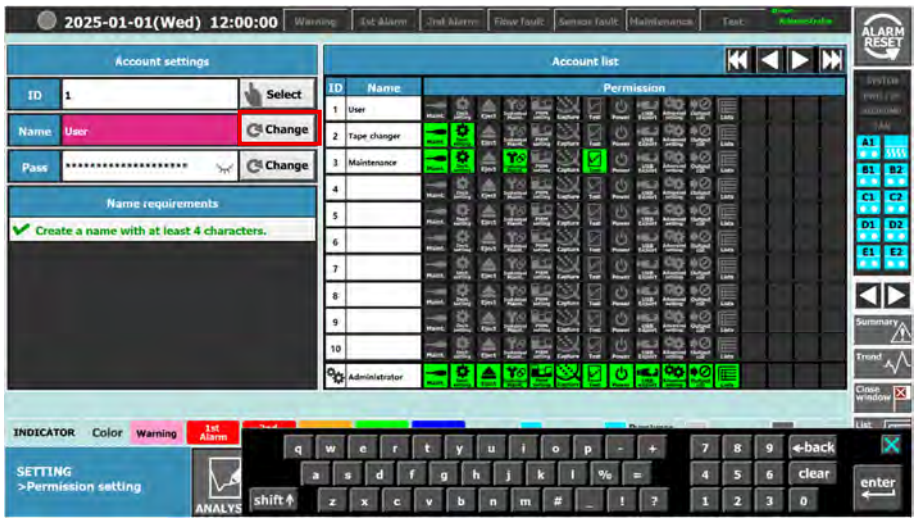
4 Touch the [Select] button for [ID] in [Account settings].

The information for the selected account is displayed in the [Account settings] and [Operation permission] panes.



5 Set the account name.

Touch the [Change] button for [Name].
The keyboard screen is displayed.



6 Enter the account name using the keyboard displayed, then touch the [enter] key.

Account names must be at least four characters (and up to 20 characters) long. Also, two accounts cannot have identical names.

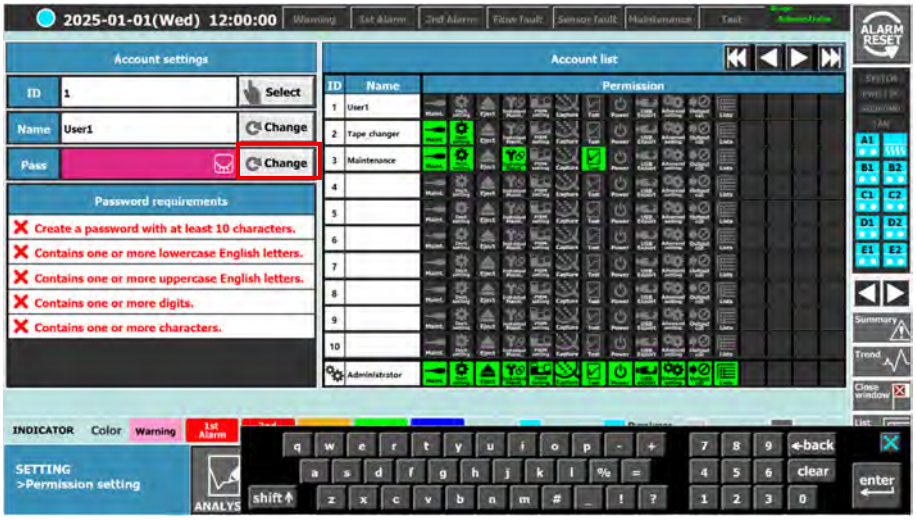
7 Touch the [Apply] button.

The account name entered is set and displayed in the [Account list] pane.

8 Set the password.

Touch the [Change] button for [Pass].

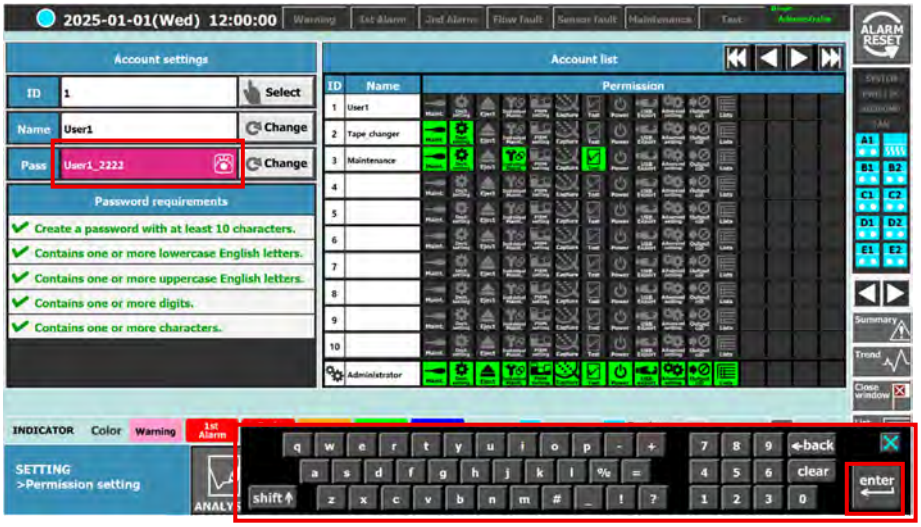
The keyboard screen is displayed.



9 Enter the password using the keyboard displayed, then touch the [enter] key.

Passwords must be at least 10 characters (and up to 20 characters) long and include at least one uppercase letter, one lowercase letter, one number, and one symbol.

Touching the eye icon for [Pass] shows or hides the password entered.



10 Touch the [Apply] button.

If the password entered does not meet the requirements, it will not become valid even when you touch the [Apply] button. Touch the [Cancel] button, then reenter the password.

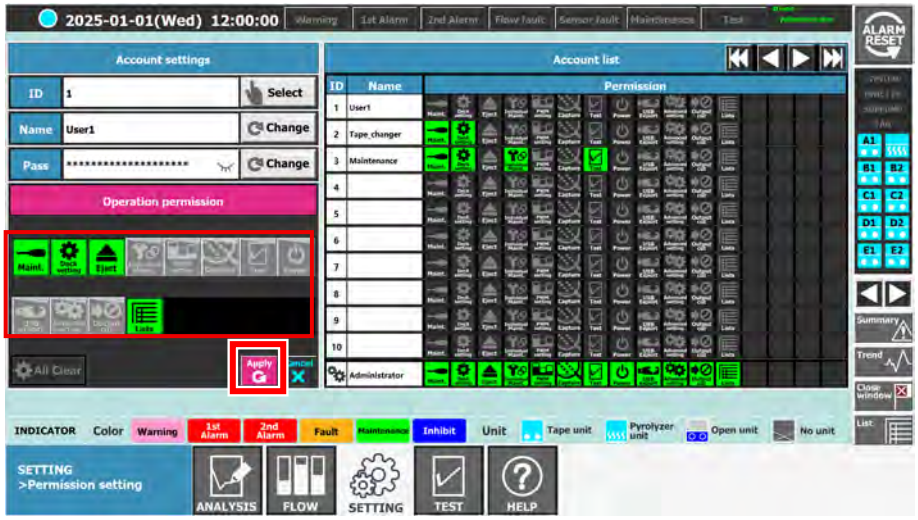
The password is set.

11 Set the access permissions.

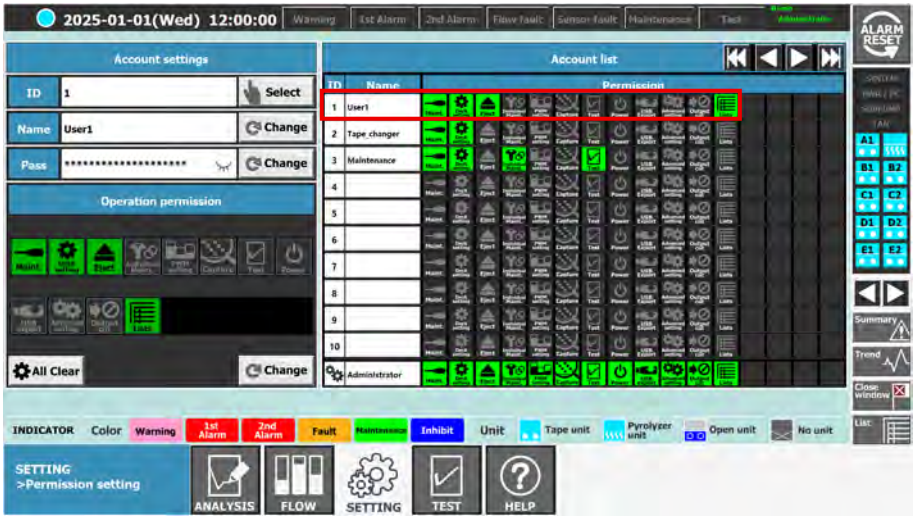
Touch the [Change] button for [Operation permission].

12 Touch the buttons for the access permissions to be enabled. (Multiple selections permitted)

13 Touch the [Apply] button.



The access permissions are set and displayed in the [Account list] pane.



6-2-4 Deleting an account

You can delete accounts.

NOTE

- The Administrator account cannot be deleted.

1 **Log in as Administrator. (See '6-1-1 Logging in'.)**

2 **Touch the [Permission setting] button on the SETTING screen.**

The Permission setting screen is displayed.

3 **Touch the ID number button in [Account list] for the account to be deleted.**

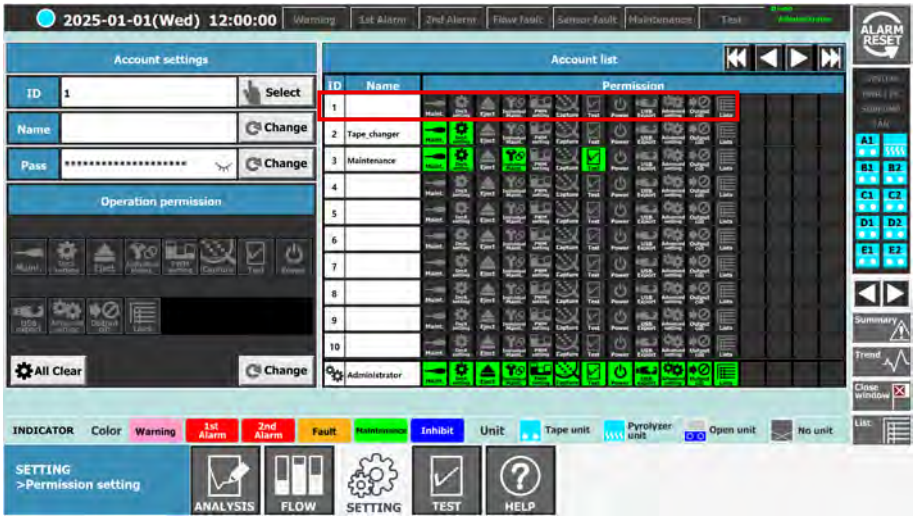
4 **Touch the [Select] button for [ID] in [Account settings].**

The information for the selected account is displayed in the [Account settings] and [Operation permission] panes.

5 Touch the [All Clear] button.

6 Touch the [Apply] button.

The account is deleted.



6-3 Deck and port settings

6-3-1 Settings lists

The following settings can be configured for tape unit and pyrolyzer unit decks and ports.

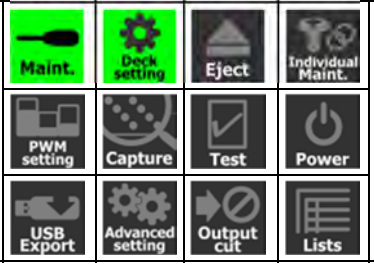
NOTE

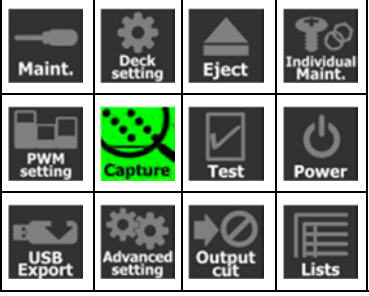
- The items that can be set vary depending on the access permissions for the logged in account and the operation status.
- In most cases, you can use the default settings for the decks and ports without modification. Change the settings as necessary.

<Tape unit settings list>

■ **Deck settings**

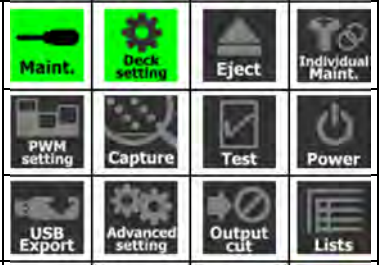
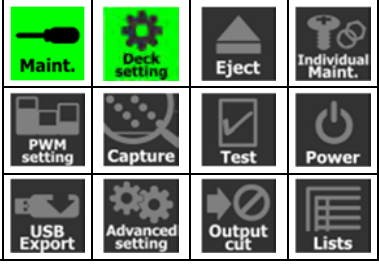
(○: Can be set, ×: Cannot be set)

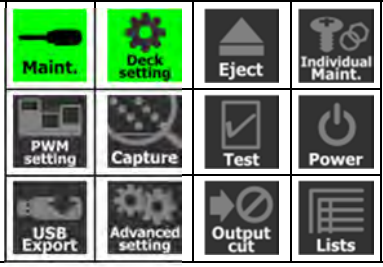
Setting item	Description	Required access permission (icon lit up green)	Operation status	
			Detection status	Maintenance mode
[Deck type]	Displays the deck type.		-	-
[Gas group]	Sets a gas group.		×	○
[Tape valid]	Displays the number of remaining days for the detection tape.		-	-
[Gas warning]	Enables or disables the gas warning function.		×	○

Setting item	Description	Required access permission (icon lit up green)	Operation status	
			Detection status	Maintenance mode
[Tape remaining alarm]	Sets the number of remaining days alarm for the detection tape.		×	○
[GAS alarm action]	Sets the gas alarm pattern.		×	○
[Fault alarm action]	Sets the fault alarm pattern.		×	○
[Gas Tracer]				
[Power ON]	Enables or disables the detection tape capture function.		○	○
[Capture]	Executes manual detection tape capture.		○	○
[Auto Capture]	Selects the timing for automatic detection tape capture. Can be selected for the first alarm ([1st]) and/or second alarm ([2nd]). (Multiple selections permitted)		○	○

■ **Port settings**

(○: Can be set, ×: Cannot be set)

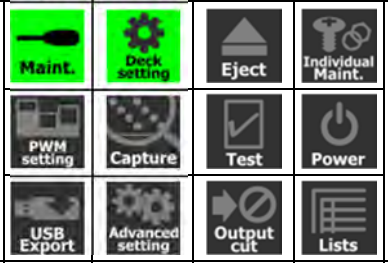
Setting item	Description	Required access permission (icon lit up green)	Operation status	
			Detection status	Maintenance mode
[Gas]	Sets the detection target gas for the port.		×	○
[Gas alarm]	Sets the alarm setpoints for the first and second alarms.		×	○
[Suppression]	Displays the zero suppression value.		-	-
[Maint.]	Switches the selected port to maintenance mode.		○	-
[Inhibit]	Switches the selected port to inhibit mode.		○	-
[Tubing length]	Sets the tube length. (For specific gases)		×	○

Setting item	Description	Required access permission (icon lit up green)	Operation status	
			Detection status	Maintenance mode
[Copy settings Port1 to Port2-8]	Copies port 1 settings to ports 2 to 8.		×	○

<Pyrolyzer unit settings list>

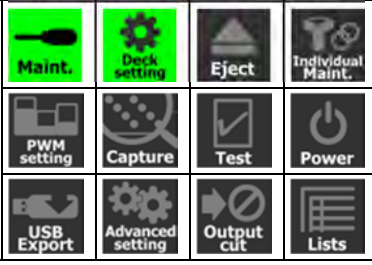
■ **Deck settings**

(○: Can be set, ×: Cannot be set)

Setting item	Description	Required access permission (icon lit up green)	Operation status	
			Detection status	Maintenance mode
[Deck type]	Displays the deck type.		-	-
[Fault alarm action]	Sets the fault alarm pattern.		×	○

■ **Port settings**

(○: Can be set, ×: Cannot be set)

Setting item	Description	Required access permission (icon lit up green)	Operation status	
			Detection status	Maintenance mode
[Temperature]	Displays the operation status of the pyrolyzer unit.		-	-
[Set temperature]	Sets the temperature for the pyrolyzer unit.		×	○
[Pyrolyzer heater]	Turns the pyrolyzer unit heater on or off.		×	○
[Pyrolyzer aging]	Enables or disables the pyrolyzer unit aging function.		×	○

6-3-2 Displaying the SETTING-Deck screen

The deck settings are configured on the SETTING-Deck screen.
Display the SETTING-Deck screen for the deck to be set.

NOTE

- To configure the deck settings on the SETTING-Deck screen, log in with an account that has the [Maint.], [Deck setting], and [Capture] access permissions enabled. (See '6-1-1 Logging in', '6-2-2 Access permissions', and '13-1 Access permissions required to operate the product'.)

1 Touch the [SETTING] button.

The SETTING screen is displayed.

2 Touch the button for the deck to be set.

Touch one of the available buttons: [A1 Setting], [A2 Setting], ... or [E2 Setting].

Icon indicating a pyrolyzer unit is installed

Icon indicating a tape unit is installed

NOTE

- Unused decks are indicated as [No unit].

The SETTING-Deck screen is displayed for the deck selected.

<For tape units>

<For pyrolyzer units>

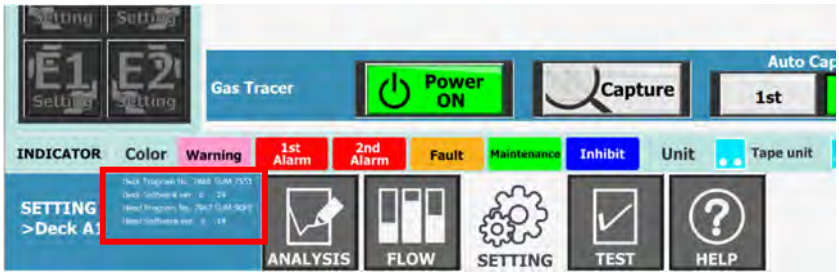
NOTE

- For information on the tape unit deck settings, refer to ‘6-4 Deck settings (tape unit)’.
- For information on the pyrolyzer unit settings, refer to ‘6-6 Deck settings (pyrolyzer unit)’.

NOTE

- When logged in as Administrator, the individual software version information can be checked on the SETTING-Deck screen.
  This is displayed at the bottom left of the SETTING-Deck screen.

  <For tape units>



- Deck Program No.: Deck PCB software program number
- Deck Software ver.: Deck PCB software version
- Head Program No.: Head PCB software program number
- Head Software ver.: Head PCB software version

  <For pyrolyzer units>

- Pyro Program No.: Pyrolyzer unit PCB software program number
- Pyro Software ver.: Pyrolyzer unit PCB software version

6-3-3 Displaying the SETTING-Deck-Port screen

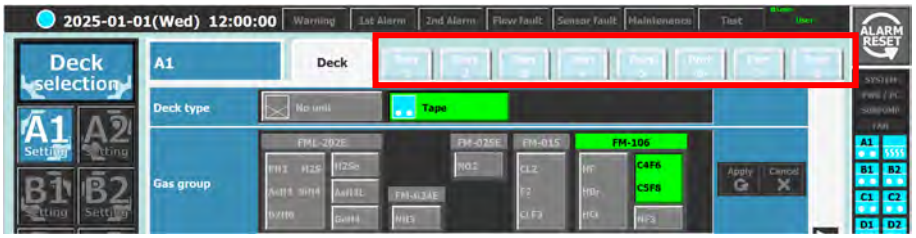
The port settings are configured on the SETTING-Deck-Port screen.
Display the SETTING-Deck-Port screen for the port to be set.

NOTE

- To configure the port settings on the SETTING-Deck-Port screen, log in with an account that has the [Maint.], [Deck setting], and [Individual Maint.] access permissions enabled. (See '6-1-1 Logging in', '6-2-2 Access permissions', and '13-1 Access permissions required to operate the product'.)

1 **Display the SETTING-Deck screen containing the port to be set. (See '6-3-2 Displaying the SETTING-Deck screen'.)**

2 **Touch the tab for the port to be set.**
Touch one of the available tabs: [Port 1], [Port 2], ... or [Port 8].



The SETTING-Deck-Port screen is displayed for the port selected.

<For tape units>

<For pyrolyzer units>

NOTE

- For information on the individual tape unit port settings, refer to ‘6-5 Port settings (tape unit)’.
- For information on the individual pyrolyzer unit port settings, refer to ‘6-7 Port settings (pyrolyzer unit)’.

6-4 Deck settings (tape unit)

The gas groups and gas detection cassette tape models can be set for the tape units mounted in the detection racks.
The tape unit settings are configured on the SETTING-Deck screen.

NOTE

- To configure the tape unit deck settings, log in with an account that has the [Maint.], [Deck setting], and [Capture] access permissions enabled. (See '6-1-1 Logging in', '6-2-2 Access permissions', and '13-1 Access permissions required to operate the product'.)
- To set a pyrolyzer unit mounted in a detection rack, refer to '6-6 Deck settings (pyrolyzer unit)'.

6-4-1 Switching to maintenance mode

Switch all ports on the selected deck to maintenance mode.
Switching to maintenance mode stops the gas detection function.

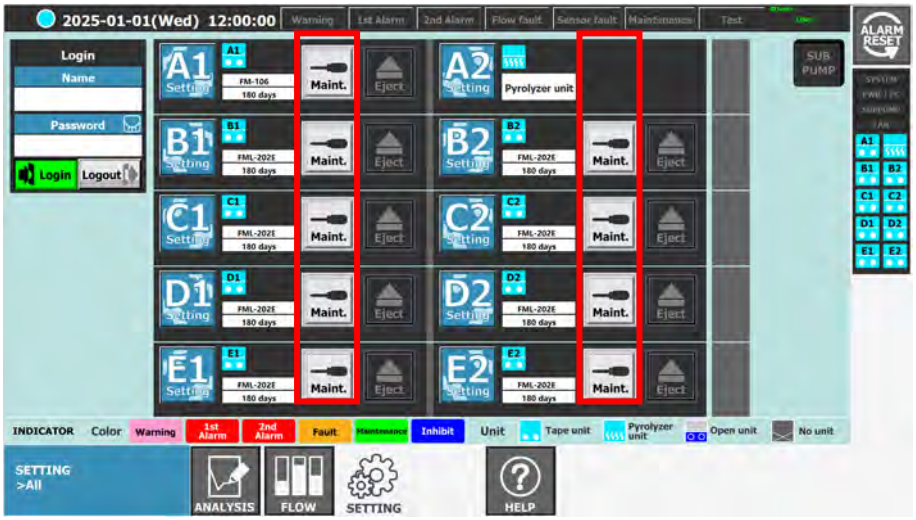
WARNING

- Be sure to return to detection mode once the setting operation is complete.
  The product will not detect gas while in maintenance mode. If left in maintenance mode, the product will automatically return to detection mode after 10 hours, but this is dangerous because no monitoring occurs during this time.

NOTE

- Ports can be switched to maintenance mode individually. (See '6-5-3 Switching individual ports to maintenance mode'.)

1 Touch the [Maint.] button for the deck to switch to maintenance mode.



2 A confirmation message appears. Touch the [YES] button.

[Maintenance] lights up green in the system status row, and all ports for the selected deck switch to maintenance mode.

NOTE

- To exit maintenance mode for the deck, touch the [Maint.] button once again on the SETTING screen. The deck will return to detection mode.

6-4-2 Setting the gas group

Set the detection target gas group or gas types for each deck.
The detection target gas types vary depending on the gas detection cassette tape model.
The following settings are available for each gas detection cassette tape model:

Gas detection cassette tape model	Gas group	Gas name
FML-202E	Hydride-1	PH_3
		H_2S
		AsH_3
		SiH_4
		B_2H_6
	Hydride-2	AsH_3 (Low range)
	Hydride-3	H_2Se
	Hydride-4	GeH_4
FM-024E	Ammonia	NH_3
FM-106	Mineral Acid	HF
		HBr
		HCl
FM-015	Oxidizer	Cl_2
		F_2
		ClF_3
FM-106	Pyrolyzer-1	NF_3
	Pyrolyzer-2	C_5F_8
		C_4F_6
FM-025E	NO2	NO_2

NOTE

- The gas detection cassette tape is fitted with an RFID (Radio Frequency IDentification) tag. An RFID tag stores the gas detection cassette tape model, lot number, usage start due date, and number of remaining days. An error message will be displayed if the gas detection cassette tape model differs from the gas group or gas types set for the deck in the product.
- Changing the gas group settings will initialize various settings, including the alarm concentration for each port.

1 **Switch the deck to be set to maintenance mode. (See '6-4-1 Switching to maintenance mode'.)**

2 **Display the SETTING-Deck screen for the deck to be set. (See '6-3-2 Displaying the SETTING-Deck screen'.)**

3 Touch the gas group or gas type button for [Gas group].

The button selected turns dark pink.

4 Touch the [Apply] button.

The gas group setting is changed for the deck selected.

NOTE

- To cancel the setting operation, touch the [Cancel] button in Step 4.
- Exit maintenance mode once the setting operation is complete.

6-4-3 Enabling/disabling the gas warning function

Enable or disable the warning function that issues an alert when the reading rises.
If enabled, the gas warning function will notify of an abnormality when the reading rises.
The default setting is [ON].

NOTE

- Gas sensors are affected by environmental factors such as temperature and humidity. They are also substantially affected by the interference of the detection target gas. Environmental and interference effects may cause the product reading to fluctuate around zero.

1 **Switch the deck to be set to maintenance mode. (See '6-4-1 Switching to maintenance mode'.)**

2 **Display the SETTING-Deck screen for the deck to be set. (See '6-3-2 Displaying the SETTING-Deck screen'.)**

3 **Touch the [ON] or [OFF] button for [Gas warning].**

The button selected turns dark pink.

4 **Touch the [Apply] button.**

The gas warning function setting is changed for the deck selected.

NOTE

- To cancel the setting operation, touch the [Cancel] button in Step 4.
- Exit maintenance mode once the setting operation is complete.

6-4-4 Setting the number of remaining days alarm for the detection tape

Set the number of remaining days for the detection tape at which an alarm will be triggered.
The default setting is two days.

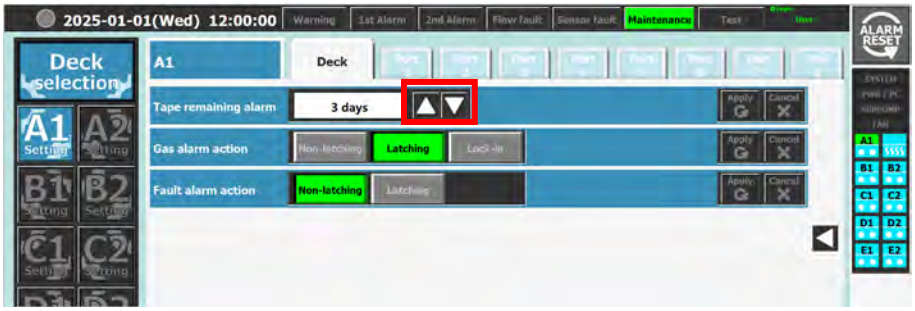
1 **Switch the deck to be set to maintenance mode. (See '6-4-1 Switching to maintenance mode'.)**

2 **Display the SETTING-Deck screen for the deck to be set. (See '6-3-2 Displaying the SETTING-Deck screen'.)**

3 **Touch the [▶] button.**

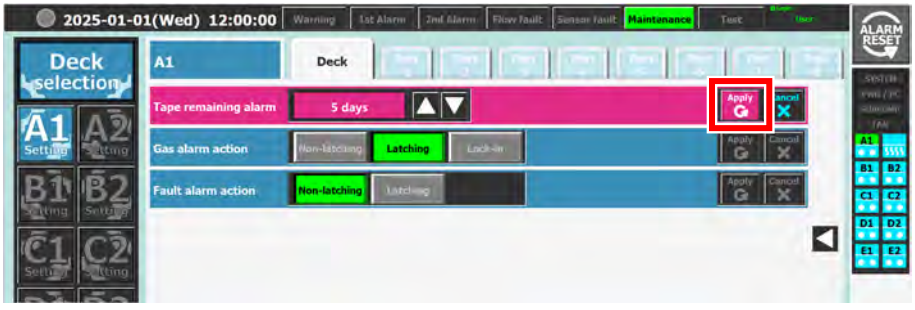
The next SETTING-Deck screen is displayed.

4 **Touch the [▲] or [▼] button for [Tape remaining alarm] to set the number of days at which the detection tape remaining days alarm will be triggered.**



The [Tape remaining alarm] input box turns dark pink.

5 **Touch the [Apply] button.**



The detection tape remaining days alarm setting is changed for the deck selected.

NOTE

- To cancel the setting operation, touch the [Cancel] button in Step 4.
- Exit maintenance mode once the setting operation is complete.

6-4-5 Setting the gas alarm pattern

Set the gas alarm pattern for a selected deck.
The alarm pattern can be set to [Non-latching] (auto reset), [Latching] (self-latching), or [Lock-in].
The default setting is [Latching] (self-latching).

- [Non-latching] (auto reset): The alarm is automatically canceled when the gas concentration falls below the first alarm setpoint.
- [Latching] (self-latching): The alarm is not automatically canceled, even when the gas concentration falls below the first alarm setpoint.
  The alarm is canceled when the gas concentration falls below the first alarm setpoint after alarm resetting.
- [Lock-in]: The alarm is not automatically canceled, even when the gas concentration falls below the first alarm setpoint.
  The alarm is canceled by resetting the alarm after the gas concentration has fallen below the first alarm setpoint.

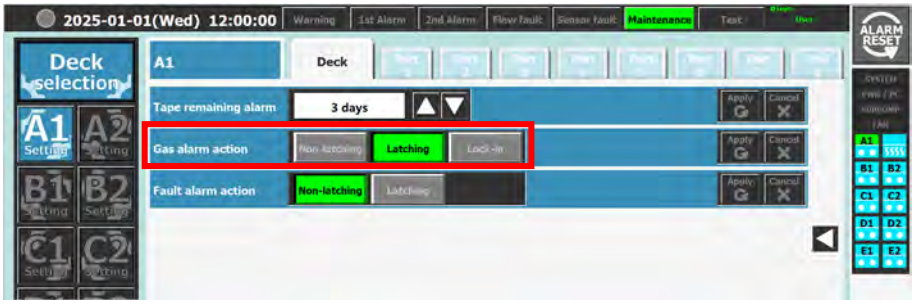
1 Switch the deck to be set to maintenance mode. (See '6-4-1 Switching to maintenance mode'.)

2 Display the SETTING-Deck screen for the deck to be set. (See '6-3-2 Displaying the SETTING-Deck screen'.)

3 Touch the [▶] button.

The next SETTING-Deck screen is displayed.

4 Touch the [Non-latching], [Latching], or [Lock-in] button for [Gas alarm action].



The button selected turns dark pink.

5 Touch the [Apply] button.

The gas alarm pattern is changed for the deck selected.

NOTE

- To cancel the setting operation, touch the [Cancel] button in Step 5.
- Exit maintenance mode once the setting operation is complete.

6-4-6 Setting the fault alarm pattern

Set the fault alarm pattern for a selected deck.
The fault alarm pattern can be set to [Non-latching] (auto reset) or [Latching] (self-latching).
The default setting is [Non-latching] (auto reset).

- [Non-latching] (auto reset): The alarm is automatically canceled when the deck returns to normal.
- [Latching] (self-latching): The alarm is not automatically canceled, even when the deck returns to normal.
  The alarm is canceled when the deck returns to normal after alarm resetting.

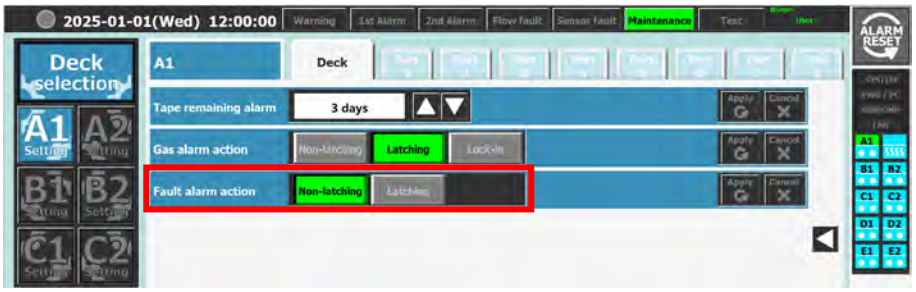
1 Switch the deck to be set to maintenance mode. (See '6-4-1 Switching to maintenance mode'.)

2 Display the SETTING-Deck screen for the deck to be set. (See '6-3-2 Displaying the SETTING-Deck screen'.)

3 Touch the [▶] button.

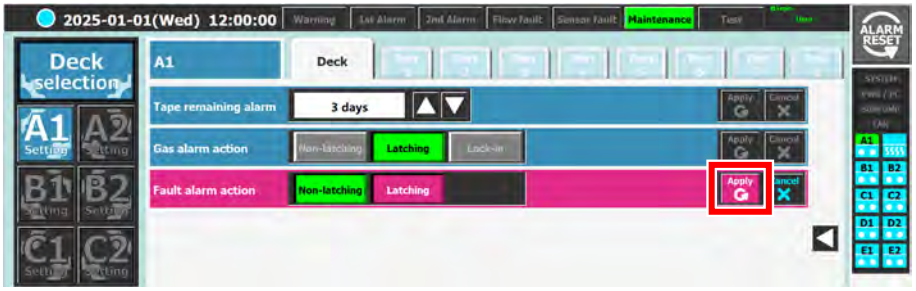
The next SETTING-Deck screen is displayed.

4 Touch the [Non-latching] or [Latching] button for [Fault alarm action].



The button selected turns dark pink.

5 Touch the [Apply] button.



The fault alarm pattern is changed for the deck selected.

NOTE

- To cancel the setting operation, touch the [Cancel] button in Step 5.
- Exit maintenance mode once the setting operation is complete.

6-4-7 Setting the gas tracer function

The product features a gas tracer function that automatically captures the colored marks on the detection tape if an abnormality is detected during gas detection.
If the gas tracer function is enabled, the colored marks on the detection tape will be captured automatically when a first alarm or second alarm occurs.

NOTE

- The images captured by the gas tracer function can be checked on the Summary screen. (See '7-1-2 Checking colored marks on the detection tape'.)
- Colored marks may be difficult to visually confirm if the alarm setpoint concentration has been lowered, or due to external factors such as temperature and humidity.

1 **Display the SETTING-Deck screen for the deck to be set. (See '6-3-2 Displaying the SETTING-Deck screen'.)**

2 **Touch the [Power ON] button for [Gas Tracer].**
The [Power ON] button changes to green, and the gas tracer function starts up.

3 **To set automatic capture at the first alarm, touch the [1st] button for [Auto Capture]. To set automatic capture at the second alarm, touch the [2nd] button.**
The button(s) touched turn(s) green.
Both buttons can be selected together.

NOTE

- If [Power ON] is enabled for the gas tracer function, the detection tape surface can be captured manually, even in detection mode. Manual capture is possible when logged in with an account that has the [Capture] access permission enabled.
  Note that since the detection tape is fed each time manual capture is executed, executing manual capture multiple times will shorten the usage period of the detection tape.
  1. Display the SETTING-Deck screen for the deck for manual capture.
  2. Check to confirm that the [Power ON] button is green.
  3. Touch the [Capture] button.
     Captures the detection tape surface.
     Gas detection is interrupted here to feed detection tape.

6-5 Port settings (tape unit)

Set the gas type and alarm setpoints for each port on the tape units mounted in the detection racks.
The individual tape unit port settings are configured on the SETTING-Deck-Port screen.

NOTE

- To configure the tape unit port settings, log in with an account that has the [Maint.], [Deck setting], and [Individual Maint.] access permissions enabled. (See '6-1-1 Logging in', '6-2-2 Access permissions', and '13-1 Access permissions required to operate the product'.)
- To configure the port settings for a pyrolyzer unit mounted in a detection rack, refer to '6-7 Port settings (pyrolyzer unit)'.

6-5-1 Setting the detection target gas type

Set the detection target gas type for each port.
The gas types that can be set vary depending on the gas detection cassette tape model installed in the deck. (See '6-4-2 Setting the gas group'.)

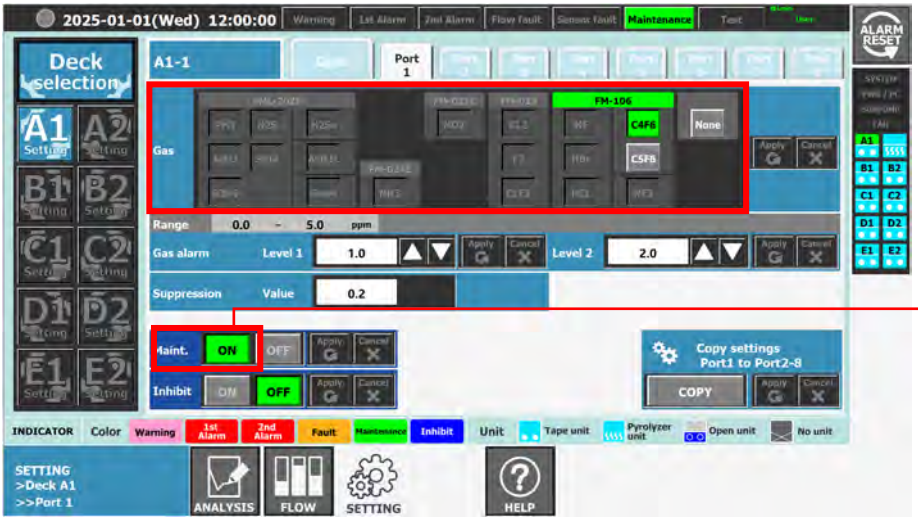
NOTE

- Changing the detection target gas type initializes the settings such as alarm concentration.

1 **Display the SETTING-Deck-Port screen for the port to be set. (See '6-3-3 Displaying the SETTING-Deck-Port screen'.)**

2 **Switch the port to be set to maintenance mode. (See '6-5-3 Switching individual ports to maintenance mode'.)**
This step is not required if the deck containing the port to be set is already in maintenance mode.

3 **Touch the detection target gas type button for [Gas].**
The gas types that can be set vary depending on the gas detection cassette tape model installed in the deck.
If the port is not used, select [None].



[ON] lights up green if the port is in maintenance mode.

The button selected turns dark pink.

4 Touch the [Apply] button.

The detection target gas type is changed.

NOTE

- To cancel the setting operation, touch the [Cancel] button in Step 4.
- Exit maintenance mode once the setting operation is complete.

6-5-2 Setting gas alarm setpoints

Set the gas alarm setpoints (first alarm setpoint and second alarm setpoint) for each port.
The gas type set for each port can be checked in [Gas] on the SETTING-Deck-Port screen.

NOTE

- Set the alarm setpoints as follows: First alarm ≤ Second alarm.
- Alarm setpoints can be set in units of the resolution.

Tape model	Gas group	Gas name	Display units	Alarm setpoint lower limit	First alarm initial value	Second alarm initial value	Resolution
FML-202E	Hydride-1	PH_3	ppb	30	300	600	1
		H_2S	ppm	0.2	1.0	2.0	0.1
		AsH_3	ppb	6	50	100	1
		SiH_4	ppm	0.2	5.0	10.0	0.1
		B_2H_6	ppb	20	100	200	10
	Hydride-2	AsH_3 (Low range)	ppb	1.4	5.0	10.0	0.1
	Hydride-3	H_2Se	ppb	15	50	100	1
	Hydride-4	GeH_4	ppb	20	200	400	10
FM-024E	Ammonia	NH_3	ppm	5	25	50	0.1
FM-106	Mineral Acid	HF	ppm	0.4	3.0	6.0	0.1
		HBr	ppm	0.3	2.0	4.0	0.1
		HCl	ppm	0.2	2.0	4.0	0.1
FM-015	Oxidizer	Cl_2	ppb	30	500	1000	10
		F_2	ppb	40	500	1000	10
		ClF_3	ppb	60	500	1000	10
FM-106	Pyrolyzer-1	NF_3	ppm	0.5	10.0	20.0	0.1
	Pyrolyzer-2	C_5F_8	ppm	0.2	2.0	4.0	0.1
		C_4F_6	ppm	0.2	2.0	4.0	0.1
FM-025E	NO2	NO_2	ppm	0.1	3.0	6.0	0.1

1 Display the SETTING-Deck-Port screen for the port to be set. (See '6-3-3 Displaying the SETTING-Deck-Port screen'.)

2 Switch the port to be set to maintenance mode. (See '6-5-3 Switching individual ports to maintenance mode'.)
This step is not required if the deck containing the port to be set is already in maintenance mode.

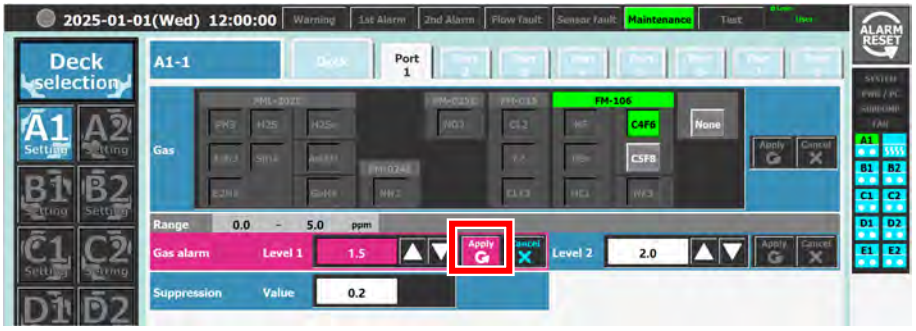
3 Touch the [▲] or [▼] button for [Level 1] in [Gas alarm] to set the first alarm setpoint.

Touching the [▲] or [▼] button changes the value in units of the resolution for the gas being set.

[ON] lights up green if the port is in maintenance mode.

The [Level 1] input box turns dark pink.

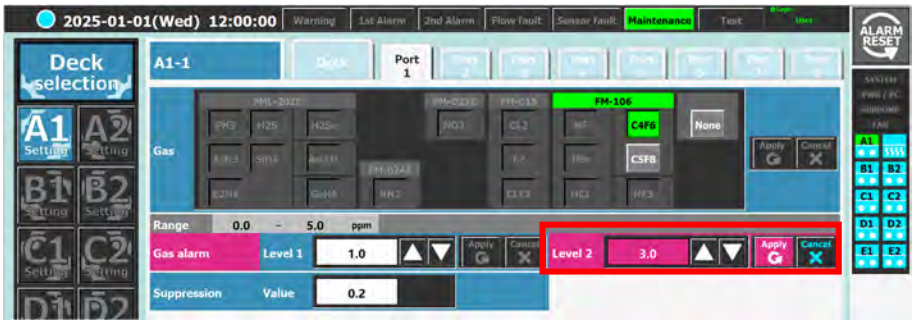
4 Touch the [Apply] button.



The first alarm setpoint is changed.

5 Set the second alarm setpoint in the same way as in Steps 3 and 4.

Touch the [▲] or [▼] button for [Level 2] in [Gas alarm] to set the second alarm setpoint, then touch the [Apply] button.



The second alarm setpoint is changed.

NOTE

- To cancel the setting operation, touch the [Cancel] button in Step 4 or 5.
- Exit maintenance mode once the setting operation is complete.

6-5-3 Switching individual ports to maintenance mode

Switch the selected port to maintenance mode.
Switching to maintenance mode stops the gas detection function.
Switch to maintenance mode when configuring port settings.

WARNING

- Be sure to return to detection mode once the setting operation is complete.
  The product will not detect gas while in maintenance mode. If left in maintenance mode, the product will automatically return to detection mode after 10 hours, but this is dangerous because no monitoring occurs during this time.

NOTE

- All ports on a selected deck can be switched to maintenance mode. (See ‘6-4-1 Switching to maintenance mode’.)

1 Display the SETTING-Deck-Port screen for the port to be set. (See ‘6-3-3 Displaying the SETTING-Deck-Port screen’.)

2 Touch the [ON] button for [Maint.].

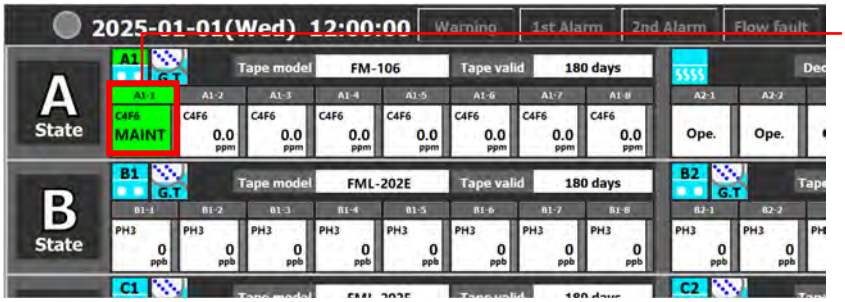
The button selected turns dark pink.

3 Touch the [Apply] button.

The selected port is switched to maintenance mode.

NOTE

- To cancel the setting operation, touch the [Cancel] button in Step 3.
- To exit maintenance mode for a port, touch the [OFF] button for [Maint.], then touch the [Apply] button.
- The operation status of each port can also be checked on the ANALYSIS screen. When in maintenance mode, [MAINT] lights up green in the rack status row.



Lights up green when port is in maintenance mode.

6-5-4 Switching individual ports to inhibit mode

Switch the selected port to inhibit mode.
Switching to inhibit mode stops the gas detection function.
Unused ports can be switched to inhibit mode.

NOTE

- The product will not return automatically to detection mode if left in inhibit mode.

1 Display the SETTING-Deck-Port screen for the port to be set. (See '6-3-3 Displaying the SETTING-Deck-Port screen'.)

2 Touch the [ON] button for [Inhibit].

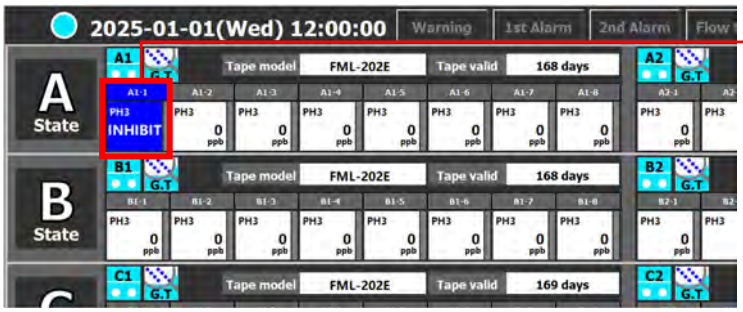
The button selected turns dark pink.

3 Touch the [Apply] button.

The selected port is switched to inhibit mode.

NOTE

- To cancel the setting operation, touch the [Cancel] button in Step 3.
- To exit inhibit mode for a port, touch the [OFF] button for [Inhibit], then touch the [Apply] button.
- The operation status of each port can also be checked on the ANALYSIS screen. When in inhibit mode, [INHIBIT] lights up blue in the rack status row.



6-5-5 Setting the tube length

For gas types whose indication accuracy is significantly affected by the tube length (target gas types: F_2 and NF_3), if the length of the tube from the gas sampling point to the GAS IN inlet on the product has been altered, change the tube length setting on the SETTING-Deck-Port screen accordingly.
The length can be set in the range from 0 to 120 m.
Adjusting the tube length correctly will ensure accurate gas detection.

NOTE

- The tube length setting is displayed on the SETTING-Deck-Port screen only for gas types whose indication accuracy is significantly affected by the tube length (target gas types: F_2 and NF_3).

1 **Display the SETTING-Deck-Port screen for the port to be set. (See '6-3-3 Displaying the SETTING-Deck-Port screen'.)**

2 **Switch the port to be set to maintenance mode. (See '6-5-3 Switching individual ports to maintenance mode'.)**
This step is not required if the deck containing the port to be set is already in maintenance mode.

3 **Touch the [▲] or [▼] button for [Tubing length] to set the tube length.**
Set the maximum tube length from the gas sampling point to the GAS IN inlet on the product in the range from 0 to 120 m.

[ON] lights up green if the port is in maintenance mode.

The [Tubing length] input box turns dark pink.

4 Touch the [Apply] button.

The tube length is changed.

NOTE

- To cancel the setting operation, touch the [Cancel] button in Step 4.
- Exit maintenance mode once the setting operation is complete.

6-5-6 Copying port settings

Copy the port 1 settings to ports 2 to 8.

1 **Switch the deck for which the settings are to be copied to maintenance mode. (See '6-4-1 Switching to maintenance mode'.)**

2 **Display the SETTING-Deck-Port screen for [Port 1]. (See '6-3-3 Displaying the SETTING-Deck-Port screen'.)**
[Copy settings Port1 to Port2-8] is displayed only on the [Port 1] settings screen.

3 **Touch the [COPY] button for [Copy settings Port1 to Port2-8].**

The button selected turns dark pink.

4 **Touch the [Apply] button.**

The port 1 settings are copied to ports 2 to 8.

NOTE

- To cancel the setting operation, touch the [Cancel] button in Step 4.
- Exit maintenance mode once the setting operation is complete.

6-6 Deck settings (pyrolyzer unit)

Set the fault alarm pattern for each pyrolyzer unit mounted in the detection racks.
The pyrolyzer unit settings are configured on the SETTING-Deck screen.

NOTE

- To configure the pyrolyzer unit deck settings, log in with an account that has the [Maint.] and [Deck setting] access permissions enabled. (See '6-1-1 Logging in', '6-2-2 Access permissions', and '13-1 Access permissions required to operate the product'.)
- To set a tape unit mounted in a detection rack, refer to '6-4 Deck settings (tape unit)'.

6-6-1 Setting the fault alarm pattern

Set the fault alarm pattern for a selected pyrolyzer unit.
The fault alarm pattern can be set to [Non-latching] (auto reset) or [Latching] (self-latching).
The default setting is [Non-latching] (auto reset).

- [Non-latching] (auto reset): The alarm is automatically canceled when the deck returns to normal.
- [Latching] (self-latching): The alarm is not automatically canceled, even when the deck returns to normal.
  The alarm is canceled when the deck returns to normal after alarm resetting.

1 **Switch the deck in the pyrolyzer unit rack to be set to maintenance mode. (See '6-4-1 Switching to maintenance mode'.)**
For example, to set the pyrolyzer unit at [A2], switch deck [A1] to maintenance mode.

2 **Display the SETTING-Deck screen for the pyrolyzer unit to be set. (See '6-3-2 Displaying the SETTING-Deck screen'.)**

3 **Touch the [▶] button.**

The next SETTING-Deck screen is displayed.

4 Touch the [Non-latching] or [Latching] button for [Fault alarm action].

The button selected turns dark pink.

5 Touch the [Apply] button.

The fault alarm pattern is changed for the pyrolyzer unit selected.

NOTE

- To cancel the setting operation, touch the [Cancel] button in Step 5.
- Exit maintenance mode once the setting operation is complete.

6-7 Port settings (pyrolyzer unit)

Set the pyrolyzer temperature, catalyst aging function, and other settings for each port mounted in the detection racks.
The individual port settings are configured on the SETTING-Deck-Port screen.

NOTE

- To configure the pyrolyzer unit port settings, log in with an account that has the [Maint.] and [Deck setting] access permissions enabled. (See '6-1-1 Logging in', '6-2-2 Access permissions', and '13-1 Access permissions required to operate the product'.)
- To set the ports for a tape unit mounted in a detection rack, refer to '6-5 Port settings (tape unit)'.

6-7-1 Setting the pyrolyzer temperature

Set the pyrolyzer temperature for each port to suit the gas type.
The target gas types are C_4F_6, C_5F_8, and NF_3.

NOTE

- The pyrolyzer temperature can be set for the selected port when the gas type is C_4F_6, C_5F_8, or NF_3.
- Select [C4F6,C5F8 Set 2] only if the gas type is C_4F_6 or C_5F_8 and the maintenance results indicate catalyst reactivity has declined.

1 **Switch the deck in the pyrolyzer unit rack to be set to maintenance mode. (See '6-4-1 Switching to maintenance mode'.)**
For example, to set the pyrolyzer unit at [A2] of rack A, switch deck [A1] to maintenance mode.

2 **Display the SETTING-Deck-Port screen for the port of the pyrolyzer to be set. (See '6-3-3 Displaying the SETTING-Deck-Port screen'.)**

3 **Touch the [C4F6,C5F8 Set 1] or [NF3] button for [Set temperature].**
The buttons displayed vary depending on the detection target gas.
If the gas type is C_4F_6 or C_5F_8, touch the [C4F6,C5F8 Set 1]. If the gas type is NF_3, touch the [NF3] button.

The button selected turns dark pink.

4 Touch the [Apply] button.

The pyrolyzer temperature setting is changed for the port selected.

NOTE

- To cancel the setting operation, touch the [Cancel] button in Step 4.
- Exit maintenance mode once the setting operation is complete.

6-7-2 Turning the heater on/off

Turn on and off the pyrolyzer unit heater.
This setting is normally left on.

1 **Switch the deck in the pyrolyzer unit rack to be set to maintenance mode. (See '6-4-1 Switching to maintenance mode'.)**
For example, to set the pyrolyzer unit at [A2] of rack A, switch deck [A1] to maintenance mode.

2 **Display the SETTING-Deck-Port screen for the port of the pyrolyzer to be set. (See '6-3-3 Displaying the SETTING-Deck-Port screen'.)**

3 **Touch the [ON] or [OFF] button for [Pyrolyzer heater].**

The button selected turns dark pink.

4 **Touch the [Apply] button.**

The pyrolyzer heater setting is changed for the port selected.

NOTE

- To cancel the setting operation, touch the [Cancel] button in Step 4.
- Exit maintenance mode once the setting operation is complete.

6-7-3 Starting/stopping the catalyst aging function

Start or stop the pyrolyzer catalyst aging function.
If you start the catalyst aging function, you can reduce the time required for the catalyst to stabilize by raising the pyrolyzer temperature setting.

NOTE

- Start the catalyst aging function only if the power has been turned off for an extended period.
- It takes approximately four hours to complete the process after the catalyst aging function is started.

1 **Switch the deck in the pyrolyzer unit rack to be set to maintenance mode. (See '6-4-1 Switching to maintenance mode'.)**
For example, to set the pyrolyzer unit at [A2] of rack A, switch deck [A1] to maintenance mode.

2 **Display the SETTING-Deck-Port screen for the port of the pyrolyzer to be set. (See '6-3-3 Displaying the SETTING-Deck-Port screen'.)**

3 **Touch the [Stop] or [Start] button for [Pyrolyzer aging].**

The button selected turns dark pink.

4 **Touch the [Apply] button.**

The pyrolyzer catalyst aging function starts or stops for the port selected.

NOTE

- To cancel the setting operation, touch the [Cancel] button in Step 4.
- Exit maintenance mode once the setting operation is complete.

7

Other Functions

7-1 Gas detection

7-1-1 Alarm operation

<Gas alarm display>

A gas alarm is triggered if the detected gas concentration reaches or exceeds an alarm setpoint.
When a gas alarm occurs, [1st Alarm] or [2nd Alarm] in the system status row lights up/flashes red, indicating that the first or second alarm has occurred at one of the detection points.
The detection point at which the alarm has occurred can be identified by the corresponding port in the rack status row lit up/flashing red.

<First alarm triggered>

<Second alarm triggered>

WARNING

- A gas alarm indicates the presence of extreme danger. The user must take appropriate action after taking appropriate steps to ensure safety.

NOTE

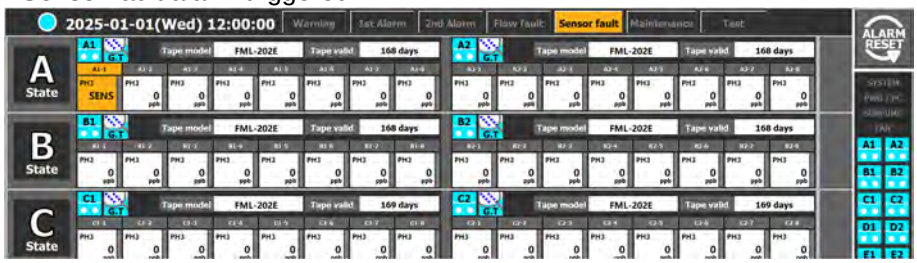
- If the gas alarm pattern is set to self-latching, the alarm is not automatically canceled, even when the gas concentration falls below the first alarm setpoint. The alarm is canceled when the gas concentration falls below the first alarm setpoint after alarm resetting.
  If auto reset is selected, the alarm is automatically canceled when the gas concentration falls below the first alarm setpoint.
  If lock-in is selected, the alarm is not automatically canceled, even when the gas concentration falls below the first alarm setpoint. The alarm is canceled by resetting the alarm after the gas concentration has fallen below the first alarm setpoint.

<Fault alarm display>

A fault alarm is triggered if an abnormality is detected in the product.
When a fault alarm occurs, the [Flow fault] or [Sensor fault] in the system status row lights up/flashes yellow, indicating that a fault alarm or sensor fault has occurred at one of the detection points.
The detection point where the alarm has occurred can be identified by the corresponding port in the rack status row lit up/flashing yellow.
The following shows fault alarm display examples:

<Fault alarm triggered>

<Sensor fault alarm triggered>



CAUTION

- If a fault alarm occurs, determine the cause and take appropriate action. If the problem lies with the product and the fault occurs repeatedly, contact RIKEN KEIKI immediately.

NOTE

- For more information on malfunctions, refer to ‘10 Troubleshooting’.
- If the fault alarm pattern is set to self-latching, the alarm is not automatically canceled, even when the product returns to normal. The alarm is canceled when the product returns to normal after alarm resetting.
  If auto reset is selected, the alarm is automatically canceled when the product returns to normal.

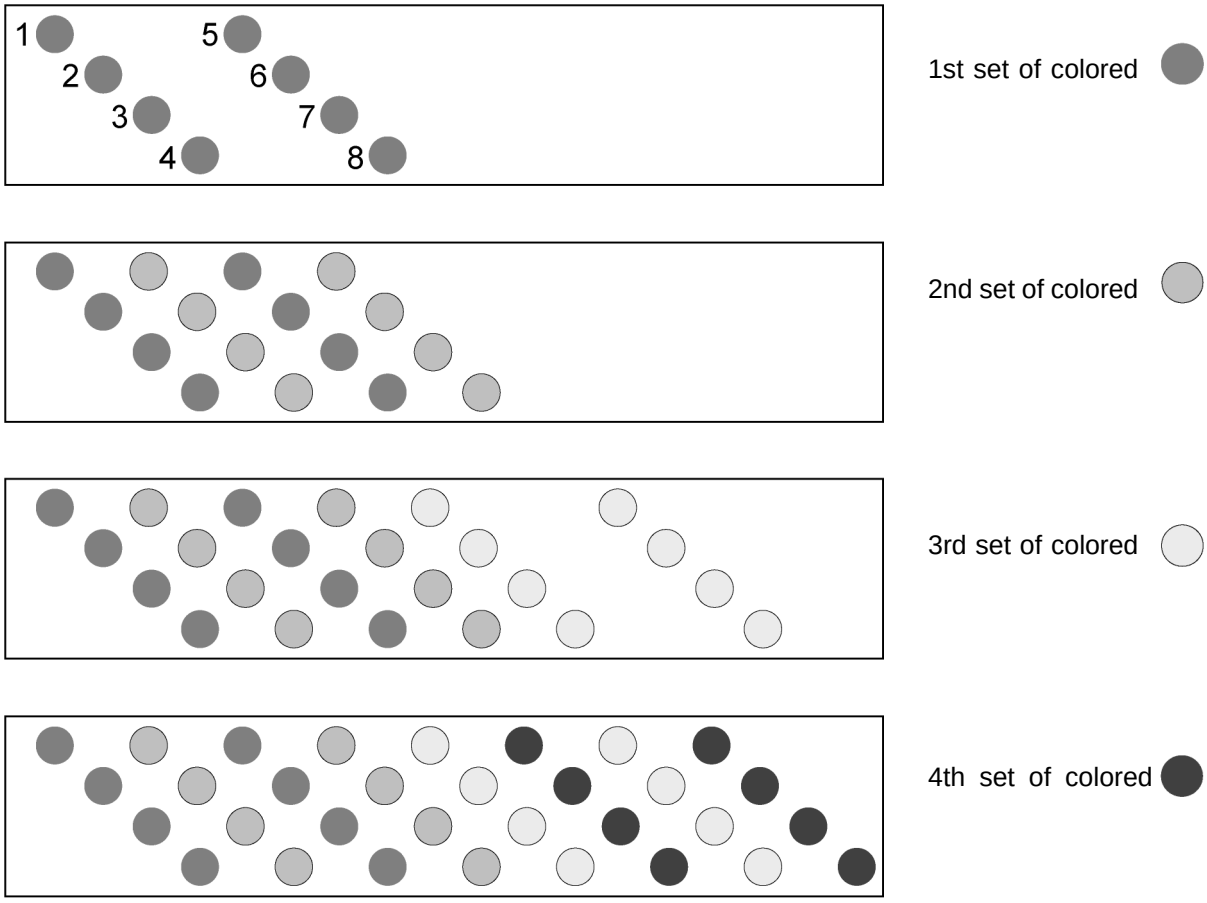
7-1-2 Checking colored marks on the detection tape

When the detection target gas comes into contact with the detection tape, a color reaction corresponding to the gas concentration occurs for each port.
The product allows you to automatically or manually capture the colored marks on the detection tape and check them on the touch panel.

NOTE

- To check the detection tape colored marks, log in with an account that has the [Lists] access permission enabled. (See '6-1-1 Logging in', '6-2-2 Access permissions', and '13-1 Access permissions required to operate the product'.)

The patterns of the colored marks when gas has been detected are as shown below.
The numbers indicate the port numbers.



NOTE

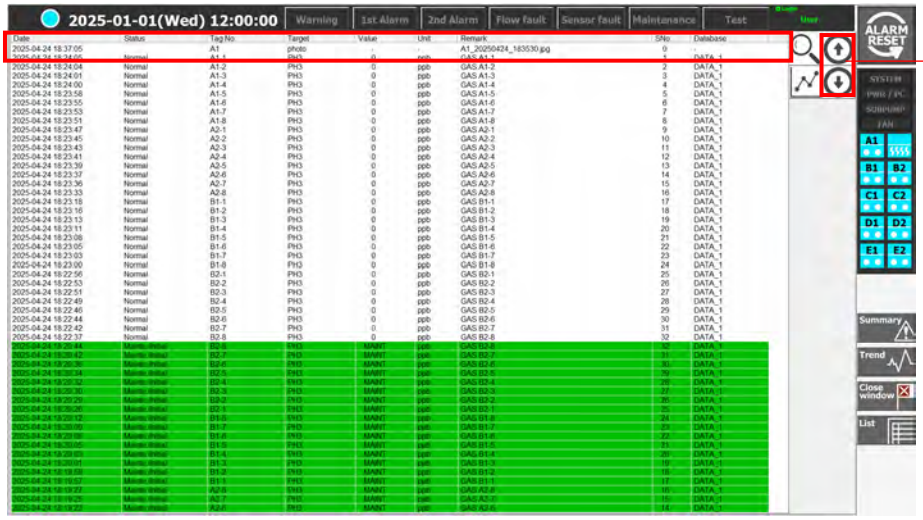
- The colored marks are all one color. The figure above uses different shades for explanatory purposes.
  The figure above also shows colored marks for all port numbers. In practice, color reactions occur on the detection tape only when gas has been detected.
- Colored marks may be difficult to visually confirm if the alarm setpoint concentration has been lowered, or due to external factors such as temperature and humidity.

1 Touch the [Summary] button.

The Summary screen is displayed.

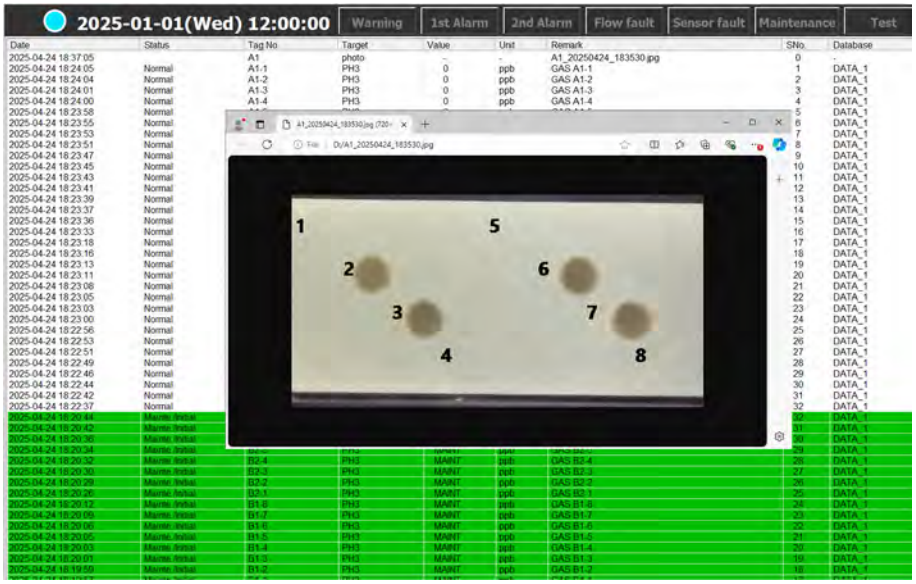
2 Check the capture date and time together with the tag name, then touch the corresponding row.

The captured image files are assigned names in the format “tag name_capture date_capture time”.



Select the row above or below the currently selected row.

The viewer launches, and the captured detection tape image is displayed.



7-2 Checking the operation history (Summary screen)

You can check the gas detection operation history on the Summary screen.
You can check the following history items:

- [Date]: Date and time
- [Status]: Abnormality status, product operation status
- [Tag No.]: Tag name
- [Target]: Detection target gas
- [Value]: Gas concentration, login/logout information
- [Unit]: Gas concentration units
- [Remark]: Remarks, file name of image captured, account name for login/logout
- [SNo.]: System management number
- [Database]: Name of database in which the operation history data is stored

NOTE

- To check the operation history, log in with an account that has the [Lists] access permission enabled. (See ‘6-1-1 Logging in’, ‘6-2-2 Access permissions’, and ‘13-1 Access permissions required to operate the product’.)

7-2-1 Checking the operation history

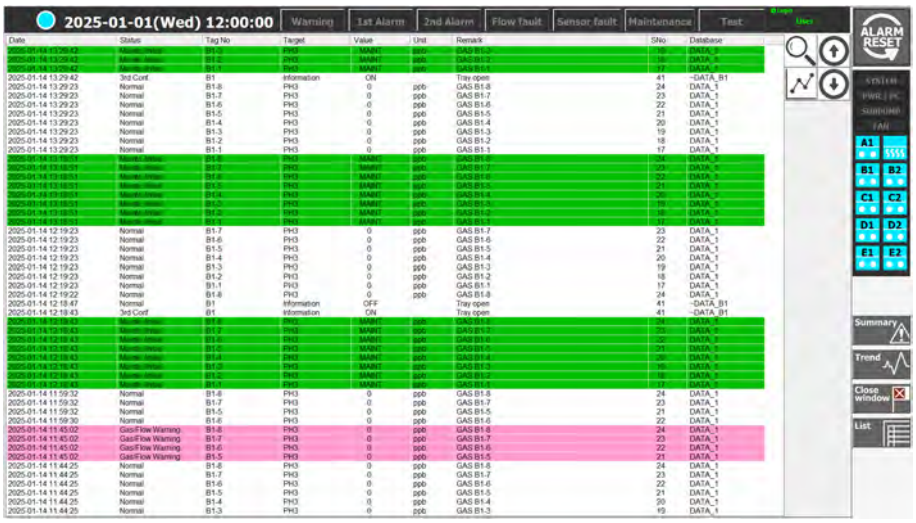
1 Touch the [Summary] button.

The Summary screen is displayed.

2 Check the operation history.

The operation history items are color-coded based on the details displayed in [Status].

- [Warning]: Pink
- [1st Alarm], [2nd Alarm]: Red
- [Fault]: Yellow
- [Maintenance]: Green
- [Inhibit]: Blue



NOTE

- If an image file name is displayed in the [Remark] column, touch the corresponding row to display the captured image of the detection tape. (See ‘7-1-2 Checking colored marks on the detection tape’.)
- Touch the [Trend] button to display the trend information of the history data selected on the Summary screen. (See ‘7-3 Checking operation history trend information (Trend screen)’.)

7-2-2 Searching the operation history

You can search the operation history by specifying a date and time range and keywords.

- [Time]: Searches for operation history data within the date and time range specified.
- [Key words]: Searches for operation history data containing the specified words.

1 Touch the [Summary] button.

The Summary screen is displayed.

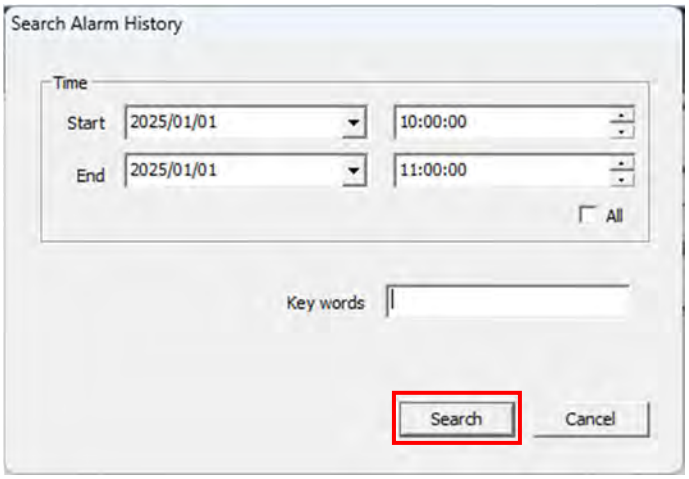
2 Touch the search button.

The Search Alarm History screen is displayed.

3 Enter dates/times and/or keywords for searching.

- Searching by date and time
  Specify the date and time range to search by entering dates and times for [Start] and [End] in [Time].
  To search the entire range, check the [All] box.
- Searching by keywords
  Enter the keywords to be searched for in [Key words].

4 Touch the [Search] button.



The operation history data found is displayed on the Summary screen.

7-3 Checking operation history trend information (Trend screen)

You can check trend information for the operation history.
You can view multiple sets of past operation history data in graph form for comparison.

NOTE

- To check the operation history trend information, log in with an account that has the [Lists] access permission enabled. (See ‘6-1-1 Logging in’, ‘6-2-2 Access permissions’, and ‘13-1 Access permissions required to operate the product’.)

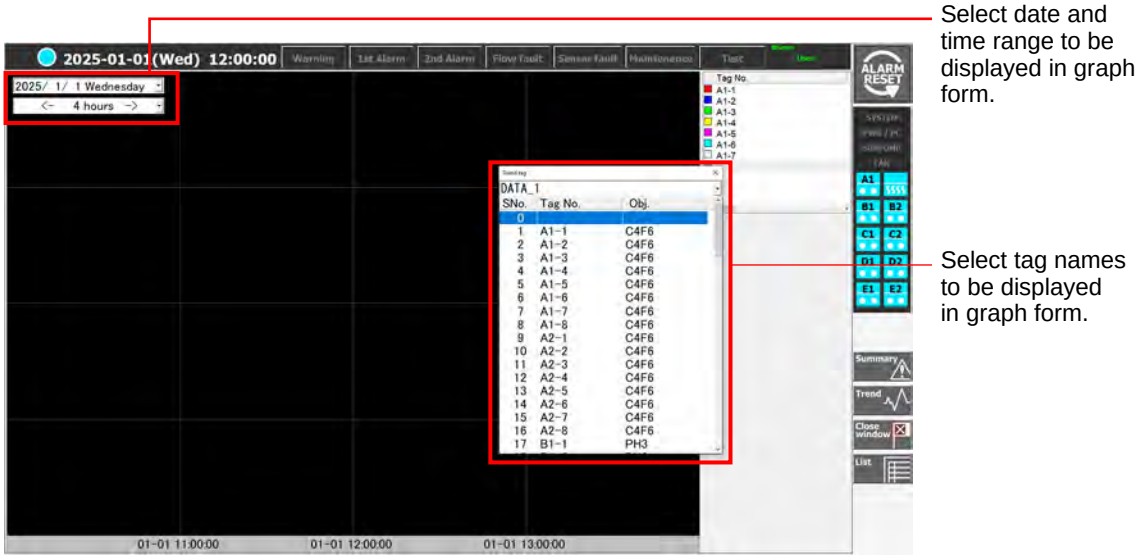
Specify the date/time and tag name to select the operation history data to display.

1 Touch the [Trend] button.

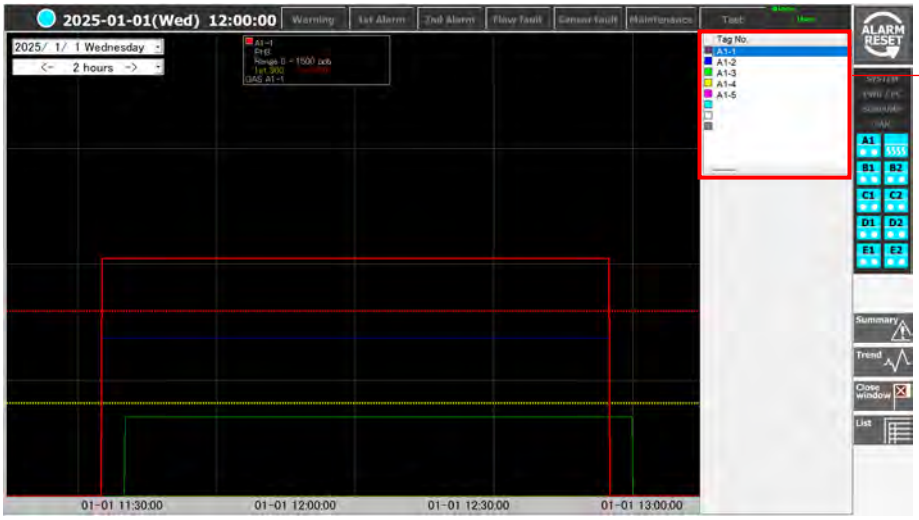
The Trend screen is displayed.

2 Select the date and time range for the operation history to be displayed.
Touch each of the [▼] buttons at the top left of the screen to select the date and time range for the operation history to be displayed in graph form.

3 Select the tag names for the operation history to be displayed.
Touch a [Tag No.] color on the right side of the screen and select the tag names to be displayed in graph form from the tag name list.



The gas concentration history is displayed in graph form for the tag names within the selected date and time range.



Tag names corresponding to graph line colors are displayed.

NOTE

- You can also view the selected operation history on the Trend screen by selecting the operation history on the Summary screen and touching the [Trend] button.

7-4 Tag name settings

You can set a tag name for each port.
Set names, such as detection point names, so that users can easily identify them.

NOTE

- To set port tag names, log in with an account that has the [Advanced setting] and [Lists] access permissions enabled. (See ‘6-1-1 Logging in’, ‘6-2-2 Access permissions’, and ‘13-1 Access permissions required to operate the product’.)

7-4-1 Setting individual tag names

You can set tag names individually on the List screen.
You can check the tag name and other information for each port by displaying the List screen.

1 Touch the [List] button.

The List screen is displayed at the bottom of the screen.

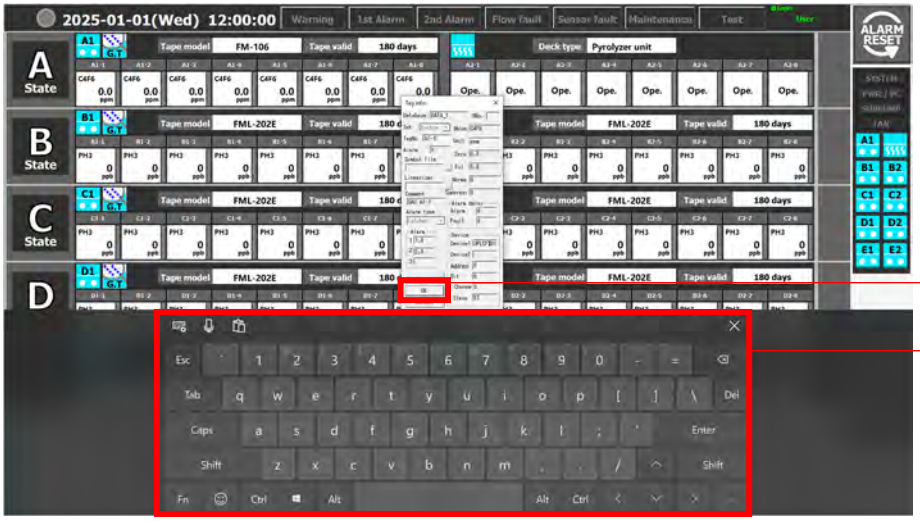
2 Touch the tag name to be changed on the List screen, then touch [Tag property] in the menu displayed.

The Tag info. screen is displayed.

3 Touch the [TagNo] input box.

The keyboard screen is displayed.

4 Use the keyboard to enter the desired tag name, then touch the [OK] button.



The tag name is changed.

NOTE

- When the List screen is displayed on the ANALYSIS screen, selecting [- Area] in [Display conditions] on the right side of the List screen lists the port gases for up to 80 points currently displayed.
  To display the List screen from a screen other than the ANALYSIS screen, select [- Database] in [Display conditions], then specify the database name to be displayed.

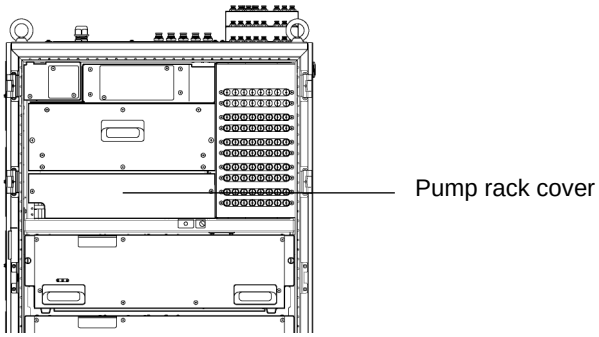
7-4-2 Setting all tag names at once

Tag information data can be exported in CSV format and copied to a separate PC to change the tag names.
After changing the tag names, import the file into the product internal data collection PC or redundant data collection PC to apply the changes.

NOTE

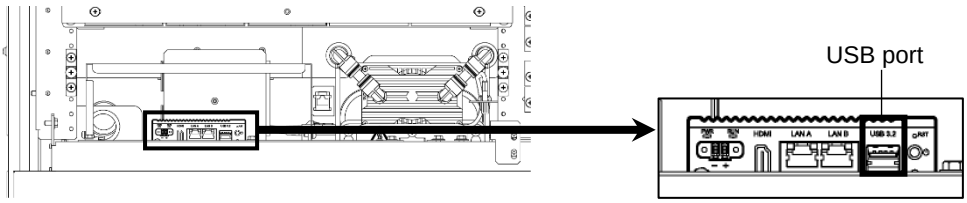
- The only tag information that can be changed is the tag name.

1 **Open the power supply unit cover on the front of the product, then remove the pump rack cover.**
Remove the two bolts on the left and right of the cover, then remove the cover.

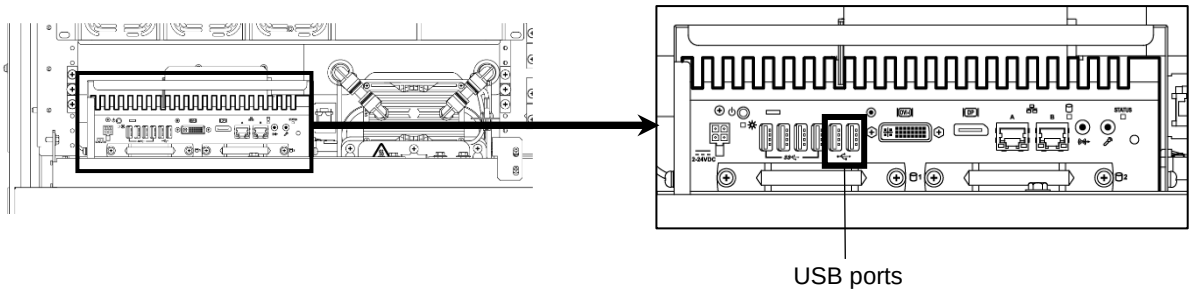


2 **Connect a USB flash drive to the internal data collection PC or redundant data collection PC.**

<Internal data collection PC>



<Redundant data collection PC>



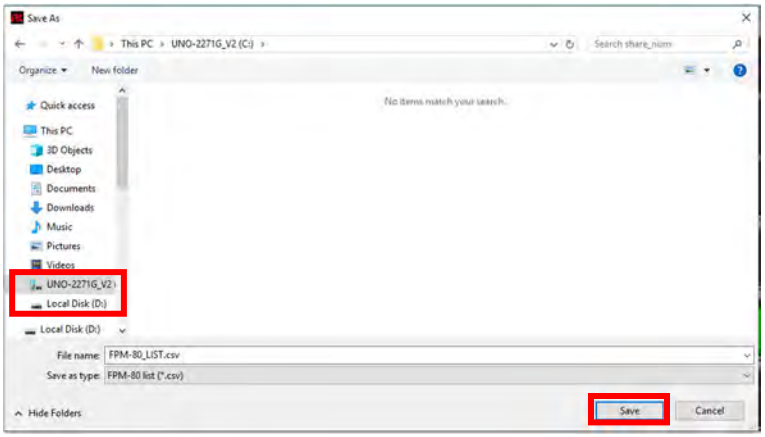
3 Touch the [Advanced setting] button on the SETTING screen.

The ADVANCED SETTING screen is displayed.

4 Touch the [Export] button for [Tag name bulk change].

The Save As screen is displayed.

5 Select the USB flash drive as the save destination, then touch the [Save] button.

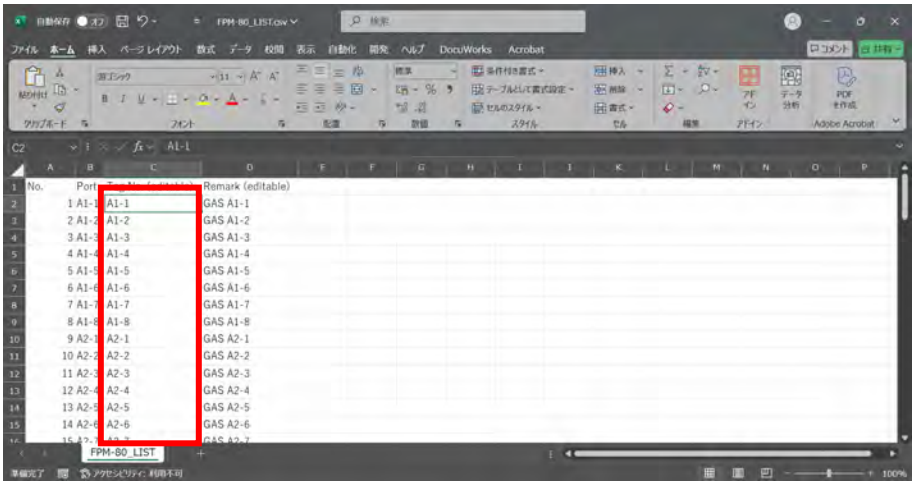


A CSV file is saved to the USB flash drive.

6 Remove the USB flash drive safely, then connect it to a separate PC.

7 Open the CSV file saved on the USB flash drive in Excel®.

8 Edit the names shown in the [Tag No. (editable)] column as desired, then save the changes.

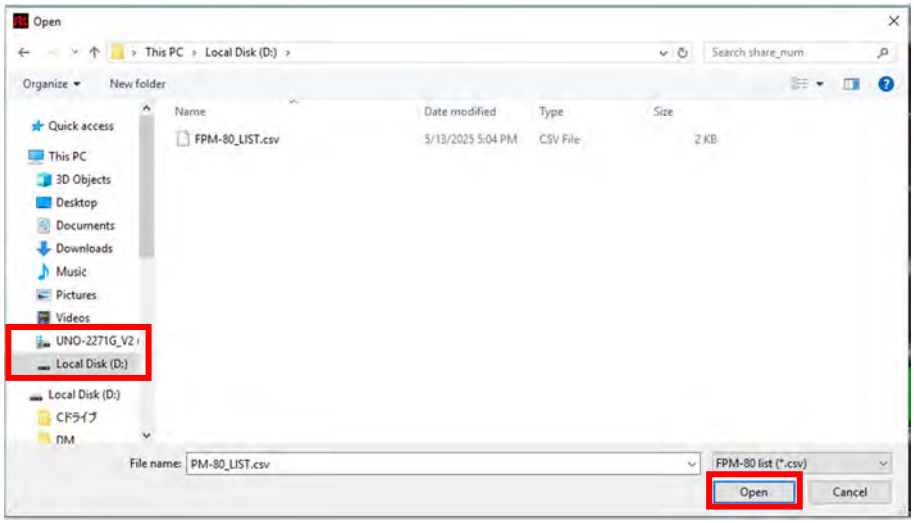


9 Remove the USB flash drive safely, then connect it to the internal data collection PC or redundant data collection PC.

10 Touch the [Import] button for [Tag name bulk change].

The Open screen is displayed.

11 Select the file saved on the USB flash drive in Step 8, then touch the [Open] button.



12 Display the ANALYSIS screen to check that the tag names have changed.

Touch the [ANALYSIS] button on the ADVANCED SETTING screen to display the ANALYSIS screen. Check that the tag names of individual ports have changed.

8

Maintenance

8-1 Daily maintenance

The product should be maintained regularly to ensure product performance.
Perform the following daily maintenance before using the product.

- Number of remaining days for the detection tape
  Check the number of remaining days for the gas detection cassette tape.
  The number of remaining days for the detection tape is indicated by [Tape valid] on the ANALYSIS screen.
  If the gas detection cassette tape needs to be replaced, replace it referring to ‘8-5 Gas detection cassette tape replacement’.
- Sample gas flow rate
  Check the sample gas flow rate.
  If the flow rate is outside the proper range, adjust the flow rate referring to ‘8-2 Sample gas flow rate adjustment (FLOW screen)’.
  Note that a warning will be issued if the flow rate falls outside the range allowing accurate gas detection.

	Flow rate range for accurate gas detection	Proper flow rate
16-point racks	400 to 600 mL/min	500 ± 50 mL/min
Pyrolyzer unit racks	150 to 400 mL/min	300 ± 50 mL/min

- Fault alarms
  Check to confirm that no fault alarms are present.
  If there are any fault alarms, refer to ‘10. Troubleshooting’ to resolve the issue.

8-2 Sample gas flow rate adjustment (FLOW screen)

Adjust the sample gas flow rate for each deck.
Adjust the flow rates for all ports 1 to 8 to the proper ranges specified below:

- 16-point racks: 500 ± 50 mL/min
- Pyrolyzer unit racks: 300 ± 50 mL/min

NOTE

- To adjust the sample gas flow rate, log in with an account that has the [Maint.] and [PWM Setting] access permissions enabled. (See ‘6-1-1 Logging in’, ‘6-2-2 Access permissions’, and ‘13-1 Access permissions required to operate the product’.)
- The flow rate range for accurate gas detection is 400 to 600 mL/min for 16-point racks and 150 to 400 mL/min for pyrolyzer unit racks.
  A warning will be issued if the flow rate falls outside this range.
  Note that, when setting flow rates, they should ideally be adjusted to the proper ranges specified above.
- If you change the flow rate, set the new PWM value for the backup pump so that the flow rate remains the same when switching to the backup pump.
- The flow rate is not displayed while the gas detection cassette tape is being fed because the air inside the pipes is shut off.

1 Switch the deck for which the flow rate is to be adjusted to maintenance mode. (See ‘6-4-1 Switching to maintenance mode’.)

2 Touch the [FLOW] button.

The FLOW screen is displayed.

3 Select the rack to be adjusted.

Touch one of the available buttons in [Rack selection]: [A Flow], [B Flow], ... or [E Flow].
The flow rates for all ports in the rack selected are displayed.

4 Adjust the flow rates for all ports in each deck to the proper range.

- To fine adjust the flow rates for all ports
  Touch the [▲] or [▼] button for [PWM] until the flow rates for all ports are within the proper range.
- If the flow rates for all ports depart significantly from the proper range
  Touch the [Pump cal.] button to adjust the flow rates for all ports automatically to the proper range.
- If the flow rates for certain ports depart significantly from the proper range
  Turn the needle corresponding to the port in question to the left or right to adjust the flow rate.
  Turn to the left to increase the flow rate. Turn to the right to reduce the flow rate. For information on the correspondence between the ports and needles, refer to '<Correspondence between ports and needles>'.
  After adjusting with the needles, touch the [Pump cal.] button.

NOTE

- If the gas type is NF_3, set the PWM value in the range of 45 % to 100 %.
  A caution message will be displayed if a PWM value outside this range is set.

5 Touch the [Set to sub pump] button.

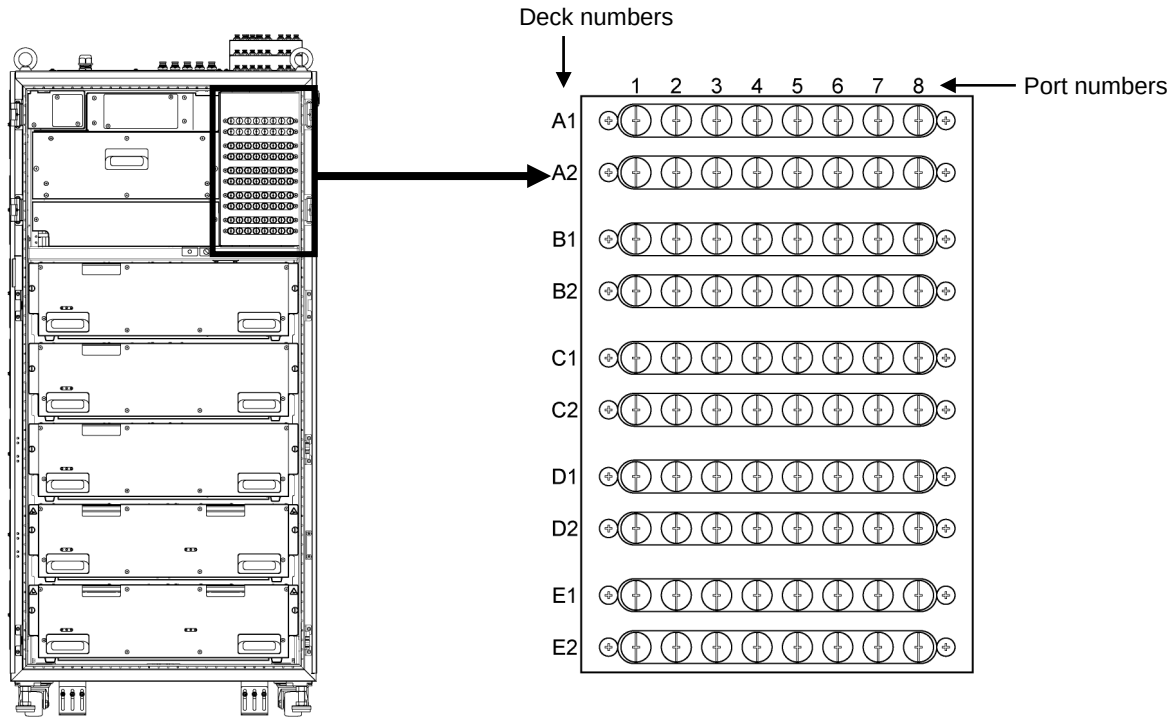
Changing the flow rate setting causes the [Set to sub pump] button to flash. Touch the [Set to sub pump] button to set the new PWM value to the backup pump.

NOTE

- Exit maintenance mode once flow rate adjustment is complete.

<Correspondence between ports and needles>

To operate the needles, open the needle cover on the front of the product.



8-3 Performing alarm tests (TEST screen)

Test alarm operation for each port.
The following alarm operation can be tested:

- [▲]/[▼]: Gas concentration
- [1st]: First alarm
- [2nd]: Second alarm
- [Over]: Full-scale over value output
- [Fault]: Fault alarm (Critical fault)

NOTE

- To perform alarm tests, log in with an account that has the [Maint.] (or [Individual Maint.]) and [Test] access permissions enabled. (See ‘6-1-1 Logging in’, ‘6-2-2 Access permissions’, and ‘13-1 Access permissions required to operate the product’.)

CAUTION

- An external signal or upstream signal corresponding to the specified alarm type will be output during alarm testing. Before performing alarm testing, be aware of the impact this may have externally. Notify any departments that may be affected before testing alarm operation. Take all necessary precautionary measures. For more information on the external outputs, refer to ‘12-4 External output settings for output units (option)’.

1 **Switch the deck for alarm testing to maintenance mode. (See ‘6-4-1 Switching to maintenance mode’.)**
Ports can be switched to maintenance mode individually for alarm testing. (See ‘6-5-3 Switching individual ports to maintenance mode’.)

2 **Touch the [TEST] button.**

The TEST screen is displayed.

3 Select the rack for alarm testing.

Touch one of the available buttons in [Rack selection]: [A Test], [B Test], ... or [E Test].

4 Perform alarm tests.

■ Performing alarm tests for user-specified gas concentrations

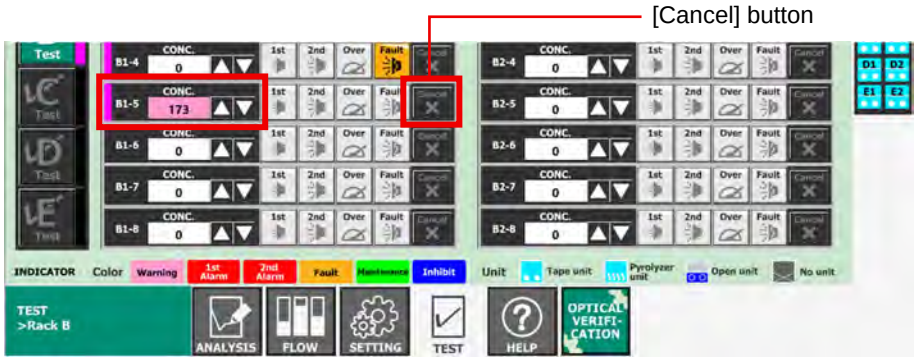
Touch the [▲] or [▼] button for each port to set the desired gas concentration.

The gas concentration set is displayed for [CONC.].

If the gas warning function is enabled and a gas concentration value is set, the background color for [CONC.] changes to pink.

An alarm is triggered when the gas concentration set exceeds the first alarm, second alarm, or Over alarm setpoint.

When an alarm is triggered, the background color for [CONC.] changes to red (for alarm).

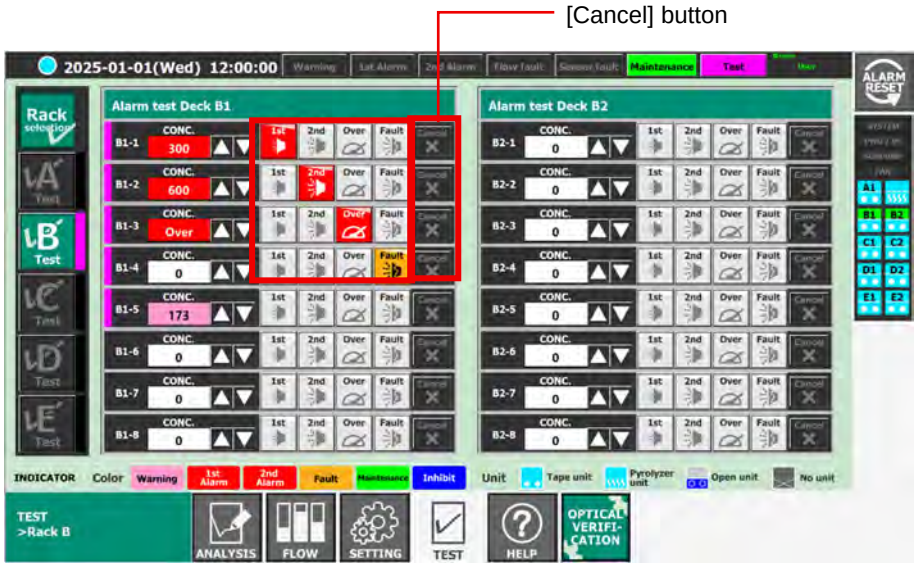


■ Performing alarm tests for [1st], [2nd], [Over], and [Fault]

Touch the [1st], [2nd], [Over], or [Fault] button for each port.

When an alarm is triggered, the display changes as follows:

- [1st]: The background color for [CONC.] changes to red (alarm), and the first alarm value is displayed.
- [2nd]: The background color for [CONC.] changes to red (alarm), and the second alarm value is displayed.
- [Over]: The background color for [CONC.] changes to red (alarm), and [Over] is displayed.
- [Fault]: No change



5 Once the alarm test is complete, touch the [Cancel] button.

The alarm is canceled.

NOTE

- The background color for [CONC.] will not change when alarm tests are performed for user-specified gas concentrations with the gas warning function disabled. (See ‘6-4-3 Enabling/disabling the gas warning function’.)
  However, the background color for [CONC.] changes to red (for alarm) if the gas concentration set exceeds the first alarm, second alarm, or Over alarm setpoint.
- Exit maintenance mode once alarm testing is complete. You cannot exit maintenance mode until alarm testing is complete.

8-4 Optical checking (Optical Verification screen)

Using the optical checking color plate provided, check to confirm the proper optical operation of the deck on the detection rack mounted in the product.

NOTE

- To perform optical checking, log in with an account that has the [Maint.] and [Test] access permissions enabled. (See ‘6-1-1 Logging in’, ‘6-2-2 Access permissions’, and ‘13-1 Access permissions required to operate the product’.)
- Remove the gas detection cassette tape before performing optical checking. (See ‘8-5-2 Replacing gas detection cassette tape’.)
- Other screens cannot be selected while optical checking is in progress.

1 Switch the deck to be optically checked to maintenance mode. (See ‘6-4-1 Switching to maintenance mode’.)

2 Touch the [TEST] button.

The TEST screen is displayed.

3 Touch the [OPTICAL VERIFICATION] button.

The Optical Verification screen is displayed.

4 Select the rack to perform optical checking.

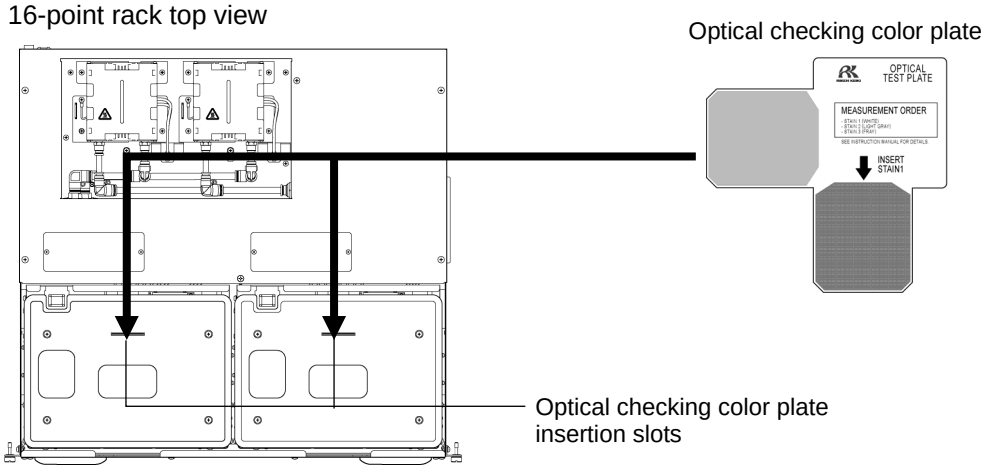
Touch one of the available buttons in [Rack selection]: [A Color], [B Color], ... or [E Color].

5 Touch the [Start Checking] button for the deck to perform optical checking.

6 Insert the face of the optical checking color plate marked "↓ INSERT STAIN1" into each optical checking color plate insertion slot on the top of the detection rack.

Insert in the direction indicated by the arrow printed on the optical checking color plate.

16-point rack top view

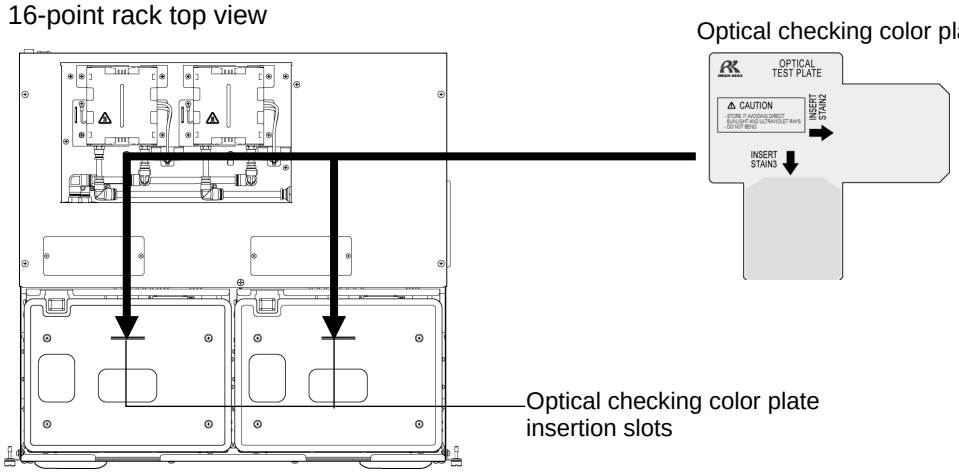


7 Touch the [Start] button for [1 Insert a test plate (STAIN1). Press “start” after insertion.].

Checking starts. Once checking is complete, the [Start] button changes to [Complete].

8 As in Steps 6 and 7, insert the face of the optical checking color plate marked “↓ INSERT STAIN2” and “INSERT STAIN3 ↓” into each optical checking color plate insertion slot on the detection rack and perform optical checking.

16-point rack top view



9 Once checking is complete in all directions, remove the optical checking color plate from the detection rack.

10 Touch the [OK] button for [Unplug the test plate.].

11 Touch the [View results] button for [finish].

The optical check results are displayed.

12 After checking the results, touch the [Return] button.

NOTE

- If the optical check result is [NG], wipe the surface of the optical checking color plate and repeat the optical check, or clean the sensor head.

NOTE

Handling the optical checking color plates

- To prevent discoloration due to ultraviolet exposure, store in the aluminum pouch provided.
- Do not store in hot or humid locations or in direct sunlight.
- Do not write on the surface with marker pens.
- Wipe off any dirt with a soft cloth. Do not use organic solvents like alcohol or benzine or commercially available cleaners. Replace the plate if dirt cannot be wiped off.
- Do not apply force or bend the plate.
- Replace the plate if it is damaged or scratched.
- To ensure accurate optical system testing, replace the plate after three years from the start of use.
- Do not use the plate with equipment other than RIKEN KEIKI products.

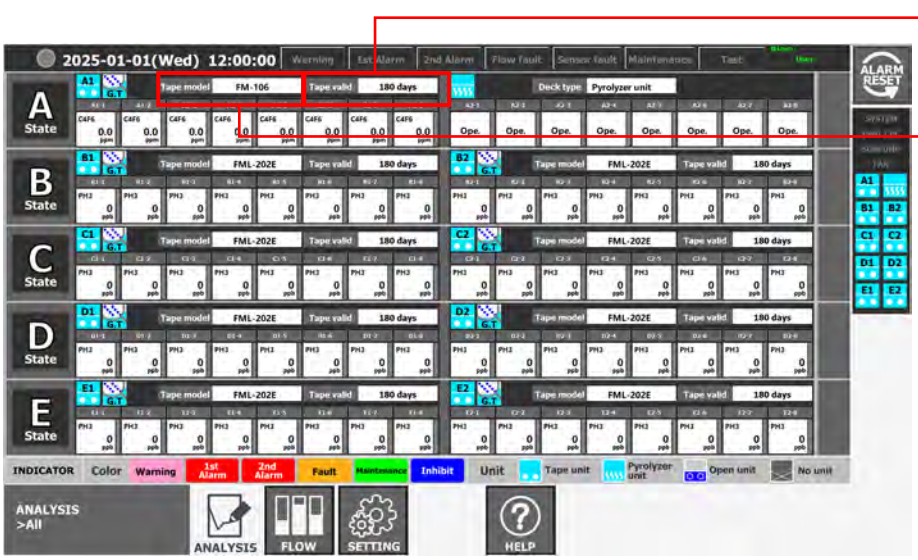
8-5 Gas detection cassette tape replacement

Replace the gas detection cassette tape installed in the decks.
You can install the gas detection cassette tape in the same way.

NOTE

- To replace gas detection cassette tape, log in with an account that has the [Eject] access permission enabled. (See ‘6-1-1 Logging in’, ‘6-2-2 Access permissions’, and ‘13-1 Access permissions required to operate the product’.)

Be sure to replace the gas detection cassette tape before the number of remaining days reaches zero. The number of remaining days for the detection tape can be checked by [Tape valid] on the ANALYSIS screen. Check the compatible gas detection cassette tape model by [Tape model].

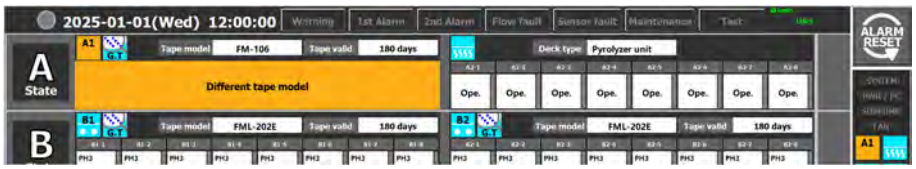


WARNING

- You cannot use gas detection cassette tape that has passed its usage start due date.
  If tape past its usage start due date is installed in the product, an error will occur, and gas detection will not be possible.
- Do not use gas detection cassette tape that has been dropped or otherwise subjected to impact.
  Doing so may damage the gas detection cassette tape or aluminum package and prevent the product from operating correctly or detecting gas correctly.

CAUTION

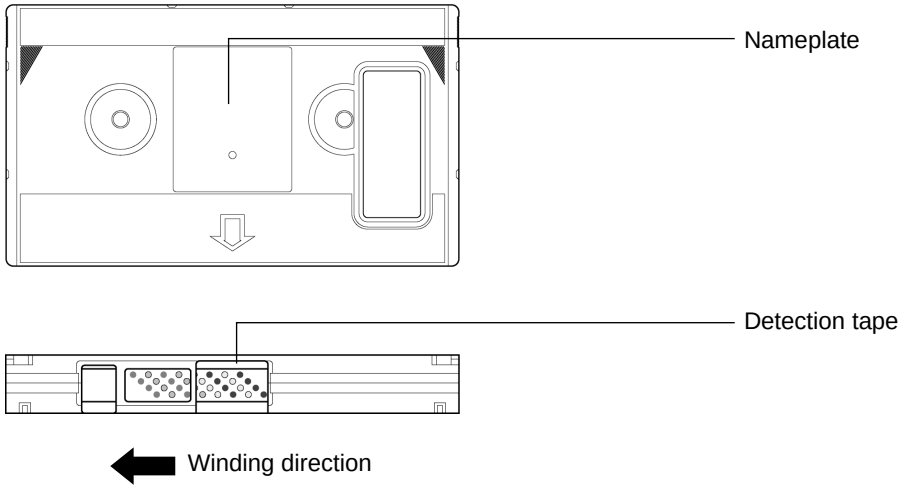
- Never touch the detection tape.
  The detection tape is coated with a special reagent. If you accidentally touch the tape, rinse thoroughly with plenty of water. Touching the detection tape may also reduce its detection sensitivity or cause the tape to tear.
- Use the specified model of gas detection cassette tape.
  The gas detection cassette tape model differs depending on the detection target gas. An error message will be displayed if the model of the gas detection cassette tape installed differs from the model specified. Check the model and insert the correct gas detection cassette tape.



  If incorrect gas detection cassette tape is installed, wipe the surfaces of the sensor head and plunger with alcohol or similar before installing the correct cassette.
  Otherwise, reagent from the initially installed detection tape may transfer to the subsequently installed detection tape, causing discoloration and preventing correct gas detection.
- Check the display on the touch panel regularly and replace the gas detection cassette tape when required.
- Do not install the gas detection cassette tape into any device other than that specified.
  The gas detection cassette tape is designed specifically for use with RIKEN KEIKI gas monitors. Do not attempt to install it in other devices. Do not rewind and reuse the detection tape. Doing so may result in malfunctions.
- Do not apply force to the detection tape or pull it.
  Doing so may break the detection tape.
- Depending on the type of detection tape and the storage conditions, some discoloration or traces of color (from internal product inspections) may be visible when the cassette is unpacked. This will not affect gas sensitivity. The gas detection cassette tape should pose no problems if no error message appears when it is installed.

8-5-1 Checking the gas detection cassette tape model

Check the gas detection cassette tape model.
The nameplate affixed to the top face of the gas detection cassette tape indicates the model and usage start due date.



NOTE

- The figure above shows the gas detection cassette tape removed from its aluminum package.
- The gas detection cassette tape is fitted with an RFID (Radio Frequency IDentification) tag. An RFID tag stores the gas detection cassette tape model, lot number, usage start due date, and number of remaining days. An error message will be displayed if the gas detection cassette tape model differs from the gas group or gas types set for the deck in the product.

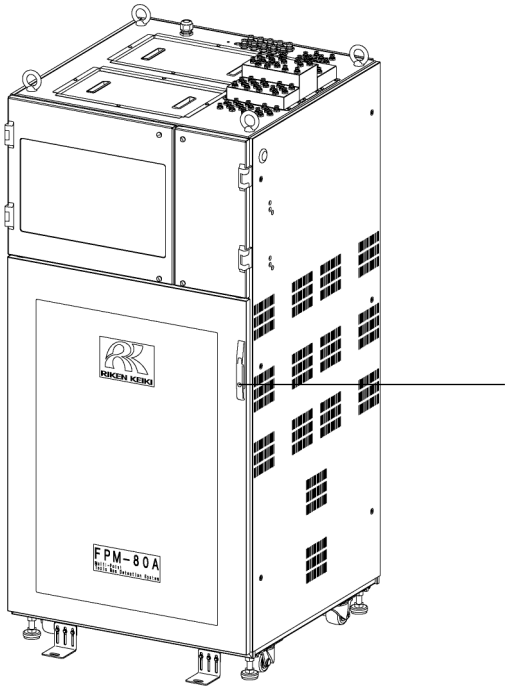
8-5-2 Replacing gas detection cassette tape

Replace the gas detection cassette tape.
Install the same gas detection cassette tape model as the model indicated on the SETTING screen.

NOTE

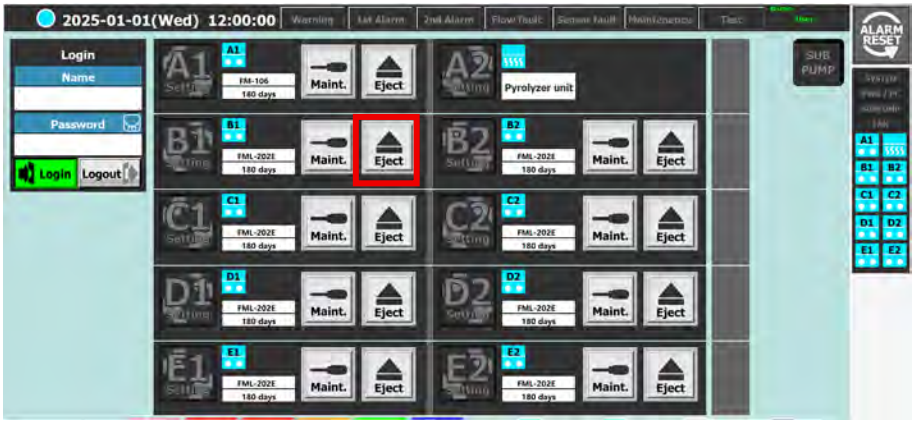
- The maximum replacement interval for the gas detection cassette tape is 180 days without target gas detection (depending on the tape model and replacement interval for the gas group).
  The replacement interval will be shorter if gas is detected, as this causes the tape to be fed.
  Removing or installing a cassette midway and turning the power on and off also consumes the tape and may shorten the replacement interval. Where possible, try to use new gas detection cassette tape and use it up until the end.
- Repeatedly removing and reinstalling gas detection cassette tape may result in inaccurate indications of number of days remaining.
- When the number of remaining days for a detection tape reaches two days (initial setting), [Tape valid] on the ANALYSIS screen changes from [** days] to [Replace tape soon], prompting the user to replace the detection tape. An error message will be displayed when [Tape valid] reaches [0 day]. Replace the gas detection cassette tape promptly.
- If a high concentration of gas is drawn in immediately after installation of gas detection cassette tape, an alarm will be triggered even before the product enters detection mode. However, the concentration reading is not accurate, since the product is not yet in detection mode.
- To prevent condensation, allow gas detection cassette tape recently removed from refrigeration to acclimatize to ambient temperatures for at least two hours before opening the aluminum package.

1 **Open the front door.**
If the door is locked, unlock it using the front door key provided.



2 **Pull out the detection rack for the deck containing the gas detection cassette tape to be replaced.**
Remove the two bolts on the left and right of the detection rack, then pull out the detection rack forward.

3 Touch the [Eject] button on the SETTING screen for the deck containing the gas detection cassette tape to be replaced.



4 A confirmation message appears. Touch the [YES] button.

The push switch on the deck on the detection rack flashes green, and the tape is fed.

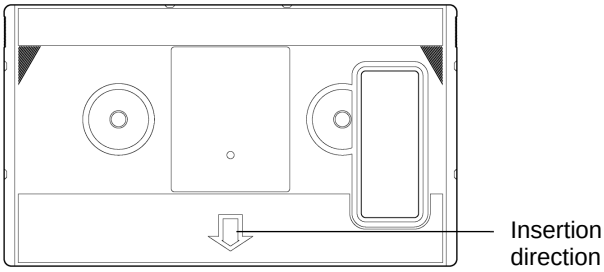
5 Press the push switch when it lights up green.

The gas detection cassette tape tray opens.

6 Remove the used gas detection cassette tape, then place the new gas detection cassette tape in the tray.

Check that the cassette tape is inserted in the correct direction, then push it in fully.

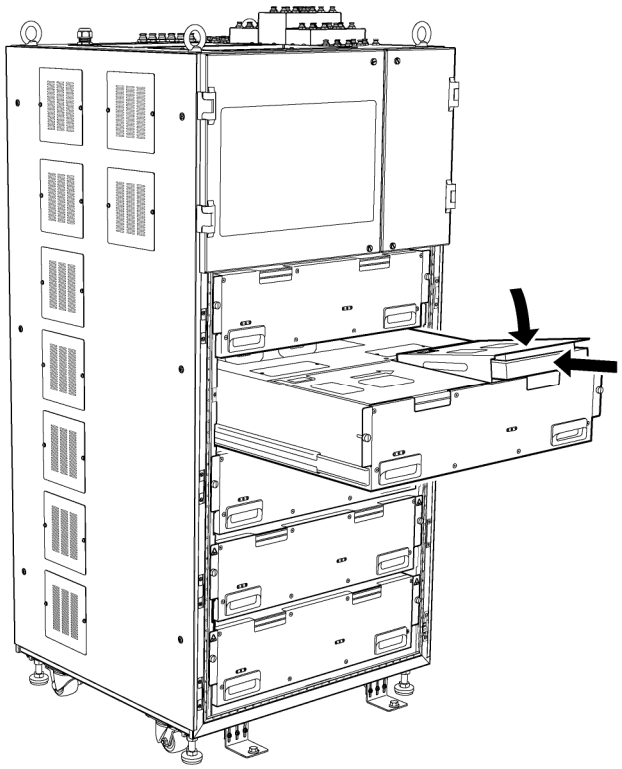
Before newly installing gas detection cassette tape, make sure it is new cassette tape.



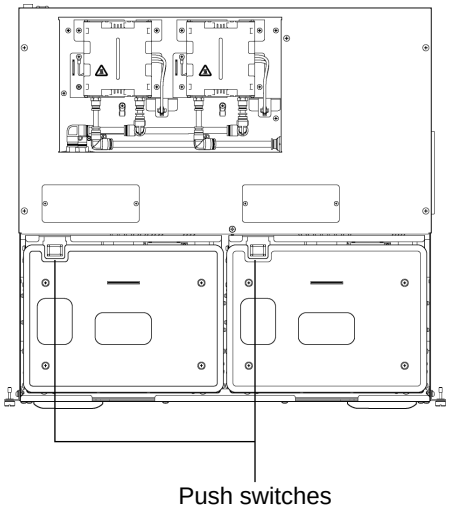
7 Display the ANALYSIS screen and check to confirm that no error messages are displayed. Check to confirm that [180 days] is displayed for [Tape valid] (depending on the tape model and replacement interval for the gas group).

An error message will be displayed if the gas detection cassette tape model inserted differs from the model specified. If an error message appears, check the gas detection cassette tape model and insert the correct gas detection cassette tape. (See '8-5-1 Checking the gas detection cassette tape model'.) If [180 days] is not displayed for [Tape valid] (depending on the tape model and replacement interval for the gas group), insert new gas detection cassette tape.

8 Push the top of the cassette tray to close it.



16-point rack top view



Once the cassette tray is closed and self-diagnostic is complete, detection starts if the results are normal.

9 Push the detection rack into the product, then secure with the bolts on the left and right.

10 Close the front door.

8-6 Parts replacement

8-6-1 Periodic replacement parts

The periodic replacement parts for the product are as follows. Replace using the recommended replacement intervals as a guide.

NOTE

- The recommended replacement intervals are guidelines only. Replacement intervals may vary depending on actual operating conditions. These intervals do not constitute warranty periods. Replacement intervals may vary depending on the results of regular maintenance.

No.	Name	Part No.	Recommended maintenance interval	Recommended replacement interval
1	Pump (for 16-point rack)	9112 9558 90	6 months	2 years
2	Pump (for pyrolyzer unit rack)	9112 9640 50	6 months	2 years
3	Pump (for backup pump)	9112 9637 70	6 months	2 years
4	Dust filter A	1670 3313 20	6 months	6 months to 1 year
5	Dust filter B (CF-8369)	1670 3340 80	—	2 to 4 years
6	Flow sensor	9112 9581 50	1 year	5 years
7	Catalyst tube + O-ring	9112 9663 50	6 months	1 year
8	Optical component cleaning	(No part number)	—	1 year or as necessary

8-6-2 Replacing dust filters

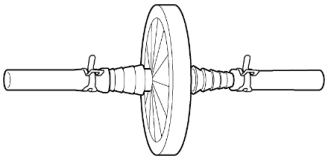
Check to confirm that the dust filters are neither dirty nor clogged. Replace if necessary.
If the product is running, switch to maintenance mode and stop the pump before replacing the dust filters.

NOTE

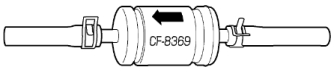
- Use the same procedure to fit filters when connecting piping to the product. However, there is no need to switch to maintenance mode if the product is not running. When fitting dust filters to gas inlets not used for gas detection, it does not matter what type of dust filter is used.
- To replace filters while the product is running, log in with an account that has the [Maint.] and [Individual Maint.] access permissions enabled. (See '6-1-1 Logging in', '6-2-2 Access permissions', and '13-1 Access permissions required to operate the product'.)

The dust filters that can be fitted differ depending on the gas type. For more information on the dust filters compatible with different gas types, refer to '<Dust filter compatibility with different gas types>'.

- Dust filter A
  Millipore filter (disk type)



- Dust filter B
  CF-8369 (tube type)



<Dust filter compatibility with different gas types>

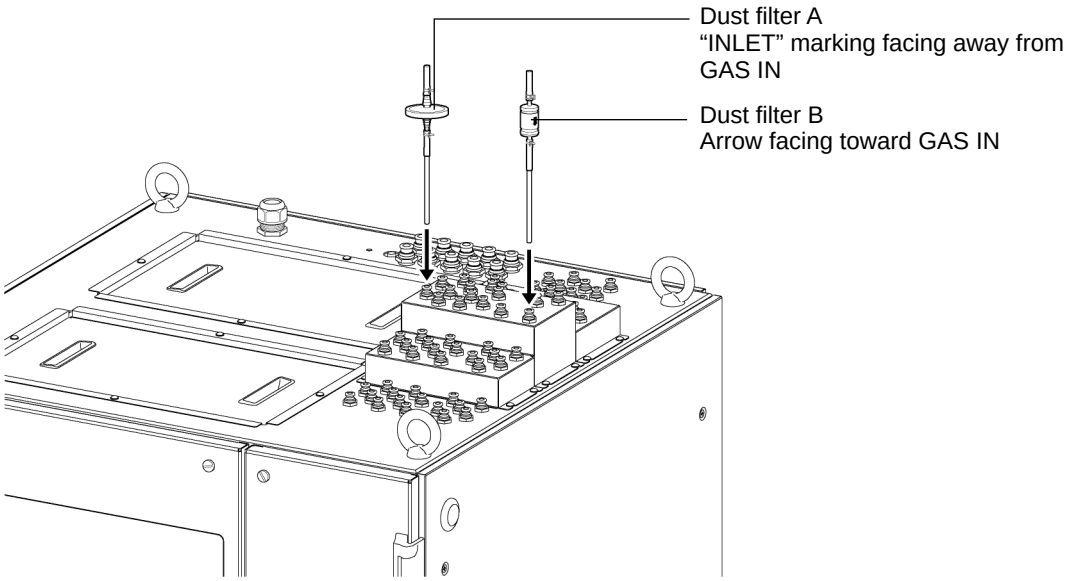
(○: Compatible, ×: Not compatible)

Gas type	Dust filter A	Dust filter B
PH_3	○	○
H_2S	○	×
AsH_3	○	○
SiH_4	○	○
B_2H_6	○	×
AsH_3 (Low range)	○	○
H_2Se	○	×
GeH_4	○	○
NH_3	○	×
HF	○	×
HBr	○	×
HCl	○	×
Cl_2	○	×
F_2	○	×
ClF_3	○	×
NF_3	○	○
C_5F_8	○	×
C_4F_6	○	×
NO_2	○	×

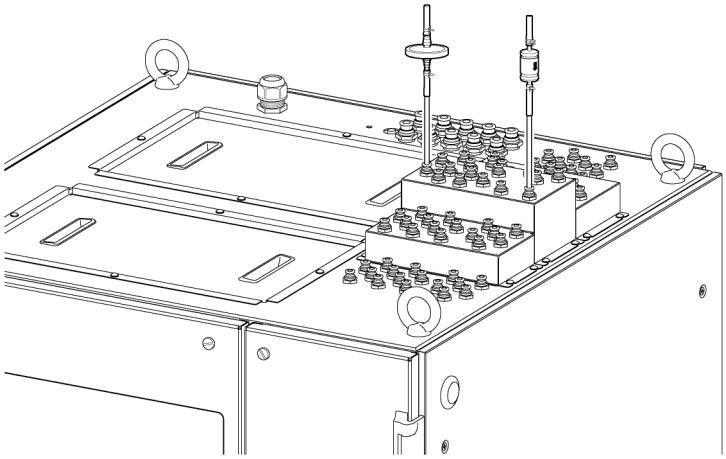
1 Switch the deck or port for the dust filter to be replaced to maintenance mode. (See '6-4-1 Switching to maintenance mode'.)

2 Attach tubes to the dust filter.

3 Insert dust filter A or B into the union on the gas inlet (GAS IN) on the product.
Insert dust filter A so that the "INLET" marking printed on the filter disk surface faces away from the gas inlet (GAS IN) (i.e. toward the sample gas inlet side) on the product.
Insert dust filter B so that the arrow printed on the side of the filter faces toward the gas inlet (GAS IN) on the product.
Insert the tube fitted to the dust filter straight on and firmly to the back of the fitting.



4 Pull gently on the tubes to confirm that they do not come loose.



8-7 Saving data

The following data saved on the product internal data collection PC or redundant data collection PC will be overwritten after one year.

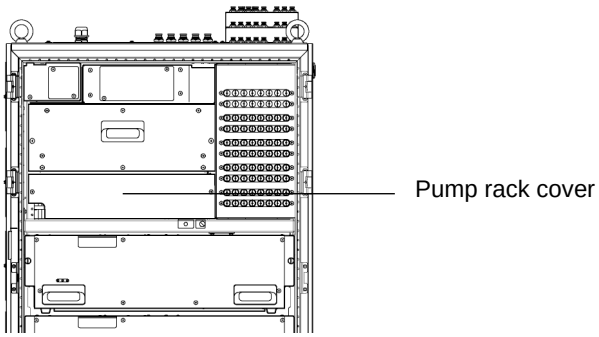
- [TREND] folder: Stores operation history data.
- [INFO] folder: Stores settings for each deck.
- [share_save] folder: Stores detection tape photograph data.

NOTE

- To save data, log in with an account that has the [USB export] access permission enabled. (See '6-1-1 Logging in', '6-2-2 Access permissions', and '13-1 Access permissions required to operate the product'.)
- To back up data, copy the data to a separate PC every 180 days.

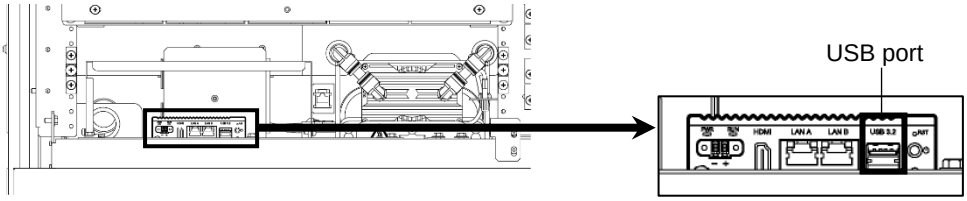
1 Open the power supply unit cover on the front of the product, then remove the pump rack cover.

Remove the two bolts on the left and right of the cover, then remove the cover.

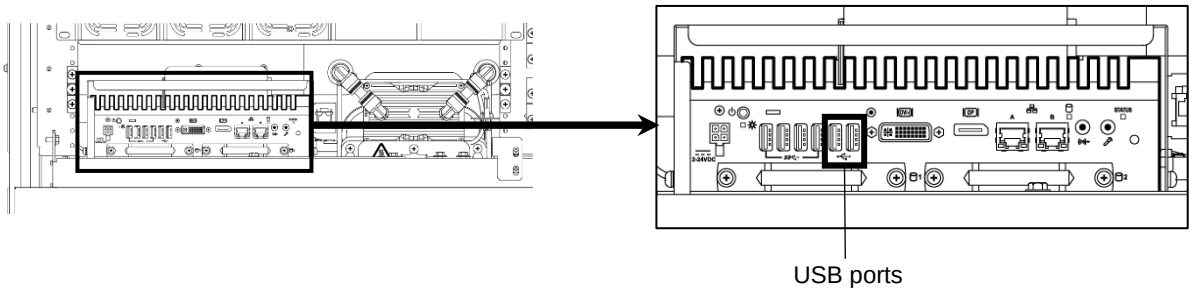


2 Connect a USB flash drive to the internal data collection PC or redundant data collection PC.

<Internal data collection PC>



<Redundant data collection PC>



3 Touch the [USB EXPORT] button.

A confirmation message is displayed for outputting to the USB flash drive. Touch the [Yes] button.

The [Trend] folder, [INFO] folder, and [share_save] folder data saved on the internal data collection PC or redundant data collection PC is saved to the USB flash drive.

9

Storage and Disposal

9-1 Procedures for storage or when not in use for extended periods

9-1-1 Storing the product

The product must be stored in the following environment:

- In a dark place at normal temperatures and humidity and away from direct sunlight
- In a location free of gases, solvents, and vapor

Store the product away from dust and dirt.

9-1-2 Storing gas detection cassette tape

Store unused gas detection cassette tape in a refrigerator (-10 °C to +10 °C).
When storing gas detection cassette tape once again after opening their bag, seal them in their bag to prevent contact with the outside air and store under the same conditions as before use.

CAUTION

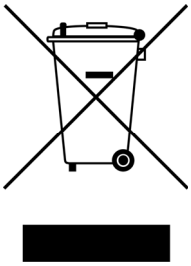
- Gas detection cassette tape should be stored in a refrigerator (-10 °C to +10 °C) without removing from its bag. After opening the bag of gas detection cassette tape, allow it to acclimatize to the ambient temperature for at least two hours to prevent condensation.
  The detection tape is extremely delicate. If not stored and managed correctly, the detection tape performance will be impaired, preventing correct gas detection.
- Start using gas detection cassette tape before the usage start due date.
  Install gas detection cassette tape in the product and start using before the usage start due date printed on the bag. If first used after the usage start due date, the detection tape may result in deterioration and inability to maintain the specified performance.
- Use gas detection cassette tape promptly after opening its bag.
  Storing detection cassette tape outside its bag or leaving it installed in the product may result in discoloration of the tape and inability to maintain the specified performance.

9-2 Product disposal

9-2-1 Disposing of the product

Dispose of the product as industrial waste (incombustible) in accordance with national and local regulations.

<User information on the disposal of electrical and electronic equipment waste>



The crossed-out wheeled bin symbol indicates that the product and its components must not be disposed of as general waste or household garbage.
Proper disposal helps prevent potential harm to human health and the environment.
To ensure appropriate processing, collection, and recycling of products that have reached the end of their service life, dispose of the product using the collection and recycling systems provided in your country.
For more information on the collection and recycling of used products, contact your retailer.

- Commercial users in the EU
  Contact your retailer or supplier for more information before disposing of electrical and electronic equipment.
- Information on disposal in countries outside the EU
  The crossed-out wheeled bin symbol is valid only in EU member states.
  To dispose of products bearing this symbol, contact your local authority or retailer to confirm the correct disposal method.

<Manufacturer list by country>

Country	Manufacturer	Address
Germany	RIKEN KEIKI GmbH	Mergenthalerallee 15-21 65760, Eschborn, Germany
UK/ Ireland	Weatherall Equipment & Instruments Ltd.	Unit 1 Station Approach, Wendover, Buckinghamshire, HP22 6BN, United Kingdom

9-2-2 Disposing of gas detection cassette tape

Dispose of gas detection cassette tape appropriately in accordance with national and local regulations.
Although an SDS (Safety Data Sheet) is prepared for each gas detection cassette tape model, it does not need to be handled as a toxic or hazardous substance.

10

Troubleshooting

This troubleshooting section does not address causes of all problems that may occur with the product. It provides brief explanations to assist in determining the causes of common problems.
If you encounter symptoms not addressed here or if the problem persists even after taking corrective action, contact RIKEN KEIKI.

10-1 Fault causes and corrective action

Fault types

- General fault: Fault indicating abnormality that allows measurement to continue
- Critical fault: Fault that occurs when measurement stops at one or more measurement points

<Power supply problems>

Category	Symptom/display (error message)	Cause	Corrective action
-	The power cannot be turned on.	• Power supply terminal disconnected	Connect the cable securely to the terminal plate. (See '4-6 Wiring'.)
		• No power supply voltage	Check the power supply voltage.
		• Circuit breaker tripped	Contact RIKEN KEIKI.

<Detection rack problems>

Category	Symptom/display (error message)	Cause	Corrective action
Critical fault	[System fault]	• Detection control PCB internal system abnormality	Turn the detection rack power off and then back on again. (See '5-2 Turning on the power'.) If the problem persists even after taking the action described above, contact RIKEN KEIKI.
	[Head system fault]		
General fault	[Housing comm error]	• System control unit and detection control PCB communication abnormality	
Critical fault	[SYS ERR]		
		• Detection rack power not turned on	
	[24 V power fault]	• Detection rack power supply abnormality	
		• Cable abnormality (break or short-circuit, etc.)	

Category	Symptom/display (error message)	Cause	Corrective action
Critical fault	[12V circuit fault]	• Detection control PCB internal power supply abnormality	Turn the detection rack power off and then back on again. (See ‘5-2 Turning on the power’.) If the problem persists even after taking the action described above, contact RIKEN KEIKI.
	[5V circuit fault]		
	[3.3V circuit fault]		
	[LVD fault]		
	[Head LVD fault]		
	[Motor fault]	• Tape feed mechanism abnormality	Turn the detection rack power off and back on again, then reinstall the gas detection cassette tape. (See ‘5-2 Turning on the power’ and ‘8-5 Gas detection cassette tape replacement’.) If the problem persists even after taking the action described above, contact RIKEN KEIKI.
General fault	[Fan fault]	• Fan stopped	Contact RIKEN KEIKI.
Critical fault	[Tape break]	• Gas detection cassette tape not properly installed	Reinstall new gas detection cassette tape correctly. (See ‘8-5 Gas detection cassette tape replacement’.)
		• Detection tape breakage when installing gas detection cassette tape	
General fault	[No tape detected]	• No gas detection cassette tape installed	Install gas detection cassette tape correctly. Remove the gas detection cassette tape and check the state of the detection tape. Reinstall if you find no issues. (See ‘8-5 Gas detection cassette tape replacement’.)
		• Gas detection cassette tape installed incorrectly	
	[Different tape model]	• Tape model differs from product setting.	Install the correct gas detection cassette tape model. (See ‘8-5 Gas detection cassette tape replacement’.)
General fault	[Change tape]	• Approaching gas detection cassette tape expiration date	Reinstall new gas detection cassette tape correctly. (See ‘8-5 Gas detection cassette tape replacement’.)
Critical fault	[Tape end]	• Gas detection cassette tape has reached expiration date.	
General fault	[Tape expired]	• Gas detection cassette tape exceeds usage start due date.	

Category	Symptom/display (error message)	Cause	Corrective action
Critical fault	[Tray fault]	• Cassette eject mechanism abnormality	Check whether the tray for installing the gas detection cassette tape is fully open. If the problem persists even after taking the action described above, contact RIKEN KEIKI.
	[Tape level fault]	• Sensor output deterioration	The sensor head must be replaced. Contact RIKEN KEIKI.
		• Excessive fouling of measurement optical path components	Clean the sensor head. If there is no improvement, the sensor head must be replaced. Contact RIKEN KEIKI.
	[Head comm error]	• Communication abnormality with sensor unit	The sensor head must be replaced. Contact RIKEN KEIKI.
		• Sensor unit disconnection or connector detachment	
	[Sensor fault]	• Sensor unit output abnormality	
	[Ref. sensor fault]		
	[Head LED driver fault]	• Light source control function abnormality	
	[Temperature fault]	• Product used outside operating temperature range (5 °C to 35 °C) • Fan exhaust not functioning (filter clogging, etc.)	Check the ambient conditions. ■ If outside operating temperature range Allow the product to adjust to the operating temperature range (5 °C to 35 °C) for at least 30 minutes before turning the detection rack power back on again. (See ‘5-2 Turning on the power’.) If the problem persists even after taking the action described above, contact RIKEN KEIKI. ■ If within operating temperature range (5 °C to 35 °C) An abnormality may have occurred inside the product. Contact RIKEN KEIKI.
	[Flow sensor fault]	• Flow sensor disconnection or faulty connection	Turn the detection rack power off and back on again, then reinstall the gas detection cassette tape. (See ‘5-2 Turning on the power’ and ‘8-5 Gas detection cassette tape replacement’.) If the problem persists even after taking the action described above, contact RIKEN KEIKI.

Category	Symptom/display (error message)	Cause	Corrective action
Critical fault	[Flow fault]	• Gas flow passage blockage	Adjust the flow rate using the flow adjustment needles. (See ‘8-2 Sample gas flow rate adjustment (FLOW screen)’.) Or check the dust filter for contamination. Replace the dust filter if excessively dirty. (See ‘8-6-2 Dust filter replacement’.)
	[Pump fault]	• Pump aging deterioration	The pump must be replaced. Contact RIKEN KEIKI.
		• Gas flow passage blockage	
	[SUB Pump fault]	• Sub pump aging deterioration	
		• Gas flow passage blockage	
General fault	[RFID fault]	• RFID module abnormality	Turn the detection rack power off and then back on again. (See ‘5-2 Turning on the power’.) If the problem persists even after taking the action described above, contact RIKEN KEIKI.
	[RFID comm error]	• Communication abnormality with RFID module	
	[Gas Tracer fault]	• Gas tracer does not start up.	Turn the detection rack power off and then back on again. (See ‘5-2 Turning on the power’.) If the problem persists even after taking the action described above, contact RIKEN KEIKI.
		• Communication abnormality with gas tracer	
		• Gas tracer fault	
	[Gas Tracer circuit fault]	• Gas tracer power supply voltage abnormality	
	[Gas Tracer no response]	• Communication abnormality with gas tracer	
		• Gas tracer fault	
	[Gas Tracer capture fault]	• Capture failed	Check whether manual capture is possible. (See ‘6-4-7 Setting the gas tracer function’.) If the problem persists even after taking the action described above, contact RIKEN KEIKI.
	[Gas Tracer upload error]	• Failed to upload image captured using gas tracer to system control unit	Turn the product main power supply circuit breaker off and then back on again. (See ‘5-2 Turning on the power’.) If the problem persists even after taking the action described above, contact RIKEN KEIKI.

<Pyrolyzer rack problems>

<table>
<tr><th>Category</th><th>Symptom/display (error message)</th><th>Cause</th><th>Corrective action</th></tr>
<tr><td rowspan="11">Critical fault</td><td>[System fault]</td><td>• Pyrolyzer control PCB internal system abnormality</td><td rowspan="10">Turn the pyrolyzer rack power off and then back on again. (See ‘5-2 Turning on the power’.)
* When turning the power off and back on again, operate both the 24 V and 12 V power supply switches at the same time.
If the problem persists even after taking the action described above, contact RIKEN KEIKI.</td></tr>
<tr><td rowspan="2">[Pyrolyzer SYS ERR]</td><td>• System control unit and pyrolyzer control PCB communication abnormality</td></tr>
<tr><td>• Pyrolyzer rack power not turned on</td></tr>
<tr><td>[24V Power fault]</td><td rowspan="2">• Pyrolyzer control unit power supply abnormality
• Cable abnormality (break or short-circuit, etc.)</td></tr>
<tr><td rowspan="2">[12V Power fault]</td></tr>
<tr><td>• 12 V power switch is not turned on
• 24 V power switch and 12 V power switch not turned on at the same time</td></tr>
<tr><td>[5V Circuit fault]</td><td rowspan="4">• Pyrolyzer control PCB internal circuit abnormality</td></tr>
<tr><td>[3.3V Circuit fault]</td></tr>
<tr><td>[1V Circuit fault]</td></tr>
<tr><td>[LVD fault]</td></tr>
<tr><td>[Fan fault]</td><td>• Fan stopped</td><td>Contact RIKEN KEIKI.</td></tr>
<tr><td>[Fuse break]</td><td>• Pyrolyzer thermal fuse blown
• Product used outside operating temperature range (5 °C to 35 °C)
• Fan exhaust not functioning (filter clogging, etc.)</td><td>Check the ambient conditions.
■ If outside operating temperature range
Allow the product to adjust to the operating temperature range (5 °C to 35 °C) for at least 30 minutes before turning the pyrolyzer rack power back on again. (See ‘5-2 Turning on the power’.)
If the problem persists even after taking the action described above, contact RIKEN KEIKI.
■ If within operating temperature range (5 °C to 35 °C)
An abnormality may have occurred inside the product. Contact RIKEN KEIKI.</td></tr>
</table>

Category	Symptom/display (error message)	Cause	Corrective action
Critical fault	[Pyrolyzer fault]	• Abnormality in pyrolyzer	Turn the pyrolyzer rack power off and then back on again. (See '5-2 Turning on the power'.) If the problem persists even after taking the action described above, contact RIKEN KEIKI.
	[Temperature range fault]	• Pyrolyzer temperature greatly exceeds setting	
	[Temperature maintenance fault]	• Pyrolyzer temperature not at set temperature even after warming up	
	[Temperature control fault]	• Pyrolyzer temperature does not increase (or decrease)	

<Problems other than detection unit problems>

Category	Symptom/display (error message)	Cause	Corrective action
Critical fault	[System fault]	• System control unit system abnormality	Turn the product main power supply circuit breaker off and then back on again. (See '5-2 Turning on the power'.) If the problem persists even after taking the action described above, contact RIKEN KEIKI.
	[24V Power fault]	• System control unit power supply abnormality	
		• Cable abnormality (break or short-circuit, etc.)	
	[5V Circuit fault]	• System control unit circuit abnormality	
	[3.3V Circuit fault]		
	[LVD fault]		
	[Main unit SYS ERR]	• System control unit internal communication abnormality	
	[PLC comm error]		
	[Fan fault]	• Fan stopped	Contact RIKEN KEIKI.
General fault	[PS 24V A fault]	• Redundant power supply unit abnormality	Replace the corresponding power supply unit.
	[PS 24V B fault]		
	[PS 24V C fault]		
	[PS 12V A fault]		
	[PS 12V B fault]		
	[PS 12V C fault]		
	[Front door open]	• Front door is open.	Close the front door.

11

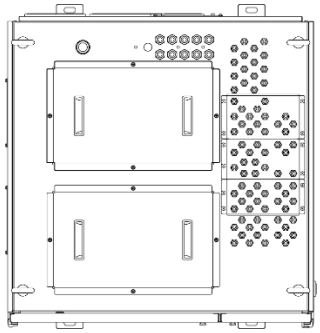
Product Specifications

11-1 FPM-80A specifications

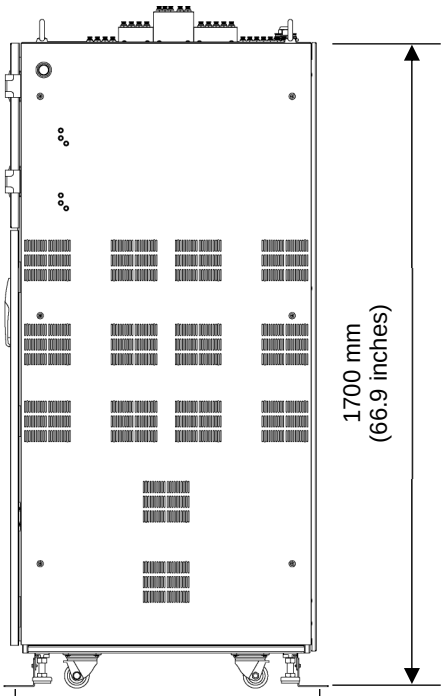
Model	FPM-80A
Detection principle	Detection tape photoelectric photometry
Detection target gas	Toxic gas (See '11-2 Detection target gas list')
Display	Touch panel (gas name, gas concentration, number of tape remaining days, flow rate, etc.)
Detection range	Depends on detection target gas.
Detection cycle	Depends on detection target gas.
Detection tape replacement interval	Max. 180 days (depending on the tape model and replacement interval for the gas group)
Detection points	1 to 80 points
Detection method	Pump suction method (1 pump per deck (max. 8 points))
Sampling flow rate	Approx. 2.5 L/min (per point)
Sampling distance	Max. 120 m (400 ft)
Sampling piping	Outer diameter 6.35 mm (1/4 inch), inner diameter 4.35 mm PTFE tubing
Exhaust line piping	Outer diameter 10.0 mm, inner diameter 8.0 mm
Exhaust line distance	Max. 15 m (49 ft)
Alarm setpoints	Depends on target gas
Screen display	Screen saver
Indication accuracy	Depends on detection target gas.
Response time	Depends on detection target gas.
Alarm accuracy (for identical conditions)	Within ±30 % of alarm setpoint
Gas alarm type	Two-step alarm (H-HH)
Gas alarm pattern	Auto reset, self-latching, or lock-in
Fault alarm/self-diagnosis	System abnormality, sensor abnormality, flow abnormality, communication abnormality, tape replacement notice
Fault alarm indication	Color display (yellow) and detail display on touch panel
Fault alarm pattern	Auto reset or self-latching
Contact capacity	24 to 230 V AC/24 to 120 V DC, max. resistance load 5 A, 150 W (option)
Transmission method	Analog transmission (option)
Transmission specifications	Analog transmission: 4 to 20 mA DC, max. load resistance: 500 Ω (option)

Functions	Alarm trend display, event history display, alarm test (communication to upstream system)
Power supply cable	CVV or equivalent cable, 3-core
	100 V AC, AWG10 (5.5 sq.)
	220 V AC, AWG14 (2.0 sq.)
Power source	Single-phase grounded 100 to 240 V ± 10 % AC (50/60 Hz)
Max. consumption current	100 V AC: 23.0 A
	240 V AC: 9.6 A
Max. power consumption	2.3 kVA (80-point specification: 1.0 kVA, pyrolyzer unit rack specification: 2.3 kVA)
Initialization	3 minutes (Pyrolyzer unit rack: 30 minutes)
Detection tape storage	Storage conditions: Store in refrigerator (-10 °C to +10 °C), maximum storage period: 180 days
Operating location	Indoors (semiconductor plant)
Operating temperature range	5 °C to 35 °C (41 °F to 95 °F) (no sudden fluctuations)
Operating humidity range	30 to 60 %RH (no condensation)
Operating altitude	Max. 2,000 m (6,561 ft) above sea level
Contamination	Level 2
Overvoltage category	II
External dimensions	800 (W) × 1,700 (H) × 800 (D) mm (31.5 (W) × 66.9 (H) × 31.5 (D) inches) (excluding projections)
Weight	Approx. 400 kg (881 lbs)
Exterior color	Black (Munsell N-1)

<Exterior drawings>



800 mm
(31.5 inches)



800 mm
(31.5 inches)

11-2 Detection target gas list

Tape Model	Gas Group	Gas Name	Display Units	Range	LDL*3	LAL*4	Default 1st Alarm	Default 2nd Alarm	Digit	Measuring Cycle (Second)	Time to Default 1st Alarm @twice concentration, 2.5m Sample line
FML-202E	Hydride-1	PH_3	ppb	1,500	30	30	300	600	1	30	20
		H_2S	ppm	20	0.2	0.2	1.0	2.0	0.1	30	21
		AsH_3	ppb	150	6	6	50	100	1	60	33
		SiH_4*2	ppm	30	0.2	0.2	5.0	10.0	0.1	60	38
		B_2H_6*2	ppb	1,000	20	20	100	200	10	60	35
	Hydride-2	AsH_3 (Low range)	ppb	15	1.4	1.4	5.0	10.0	0.1	180	98
	Hydride-3	H_2Se	ppb	500	15	15	50	100	1	120	60
	Hydride-4	GeH_4*2	ppb	2,000	20	20	200	400	10	300	197
FM-024E	Ammonia	NH_3	ppm	150	5.0	5.0	25.0	50.0	0.1	20	10
FM-106	Mineral acid	HF	ppm	20	0.4	0.4	3.0	6.0	0.1	20	17
		HBr	ppm	20	0.3	0.3	2.0	4.0	0.1	20	19
		HCl	ppm	15	0.2	0.2	2.0	4.0	0.1	20	15
FM-015	Oxidizer	Cl_2	ppb	3,200	30	30	500	1,000	10	20	17
		F_2	ppb	3,000	40	40	500	1,000	10	20	20
		ClF_3	ppb	3,000	60	60	500	1,000	10	20	13
FM-106	Pyrolyzer-1	NF_3	ppm	40	0.5	0.5	10.0	20.0	0.1	20	18
	Pyrolyzer-2	C_5F_8	ppm	5	0.2	0.2	2.0	4.0	0.1	20	20
		C_4F_6	ppm	5	0.2	0.2	2.0	4.0	0.1	20	24
FM-025E	NO2	NO_2*1	ppm	30	0.1	0.1	3.0	6.0	0.1	60	19

*1 Tape replacement interval: Max. 60 days
*2 Operating temperature range: 10 °C to 35 °C
*3 LDL: Lower detection limit
*4 LAL: Lower alarm limit

12

Appendix 1

12-1 Upstream communication settings (Modbus TCP, S7)

DANGER

- Do not remove the grommets attached to the external output connectors on the rear of the product. Touching parts inside the product may result in electric shock. Also, continuing to use the product with foreign matter inside may result in damage to the product.
- The product must be connected only to a secure network environment that is physically and logically isolated, with appropriately configured firewalls and access controls.
  Do not connect it directly to an open network or to any network lacking adequate security.
  Connecting the product to any such network significantly increases the risk of data leaks, malware infection, and unauthorized access, which may cause malfunctioning of measuring devices or serious disruption to the entire system.

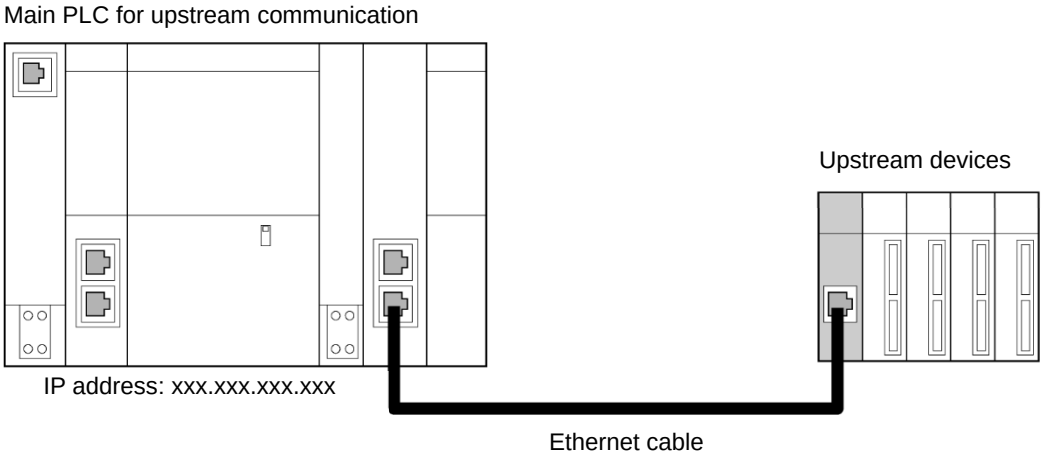
12-1-1 Upstream communication connection

The PLC Ethernet port can be connected to an upstream device to enable remote product operation or monitoring.

NOTE

- For more information on data mapping for communication with the PLC (Modbus TCP, S7), refer to ‘12-1-3 Upstream communication data map’. For more information on fault types related to upstream communication, refer to ‘12-1-4 Upstream communication fault type display’.

Connect the PLC Ethernet port to the upstream device using an Ethernet cable.



12-1-2 Setting the IP address

Set the IP address for upstream communication on the ADVANCED SETTING screen.

NOTE

- To set the IP address, log in with an account that has the [Advanced setting] access permission enabled. (See ‘6-1-1 Logging in’, ‘6-2-2 Access permissions’, and ‘13-1 Access permissions required to operate the product’.)

1 Touch the [Advanced setting] button.

The ADVANCED SETTING screen is displayed.

2 Set the IP address, subnet mask, and default gateway for upstream communication.

Touch to select the values for [IP address], [Subnet mask], and [Default gateway], then touch the [▲] or [▼] button to edit the values.

Values that have been changed turn dark pink.

3 Touch the [Apply] button.

The IP address, subnet mask, and default gateway settings are changed.

4 Set byte order specifications for when gas concentration and operation status data is sent.

Touch the [AB] or [BA] button for [Gas concentration] and [Status].

For more information on byte order, refer to '<Byte order specifications>'.

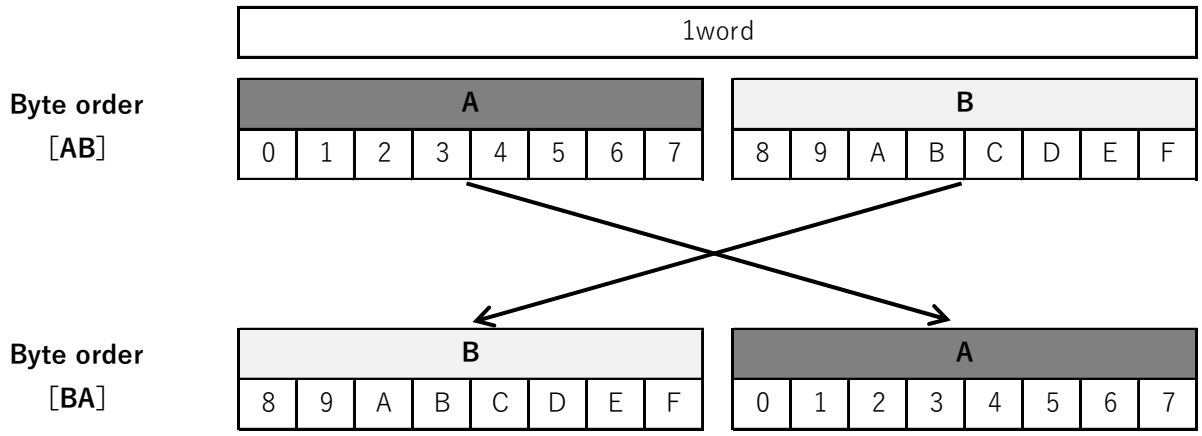
The buttons touched turn dark pink.

5 Touch the [Apply] button.

The byte order specifications are changed.

<Byte order specifications>

The byte sequences for the byte orders when sending data are as follows:



12-1-3 Upstream communication data map

<Modbus TCP>

FPM-80A Datamap(ModbusTCP)

Data size：121Words

Offset	Address	Words	Data description	Format	Content
0	40001	1	Communication status	Word	Watchdog
1	40002	80	Gas concentration	Word	Gas concentration for all 80 points
81	40082	1	Deck A status	Bit 0-15	A1-1～4
82	40083	1		Bit 0-15	A1-5～8
83	40084	1		Bit 0-15	A2-1～4
84	40085	1		Bit 0-15	A2-5～8
85	40086	1	Deck B status	Bit 0-15	B1-1～4
86	40087	1		Bit 0-15	B1-5～8
87	40088	1		Bit 0-15	B2-1～4
88	40089	1		Bit 0-15	B2-5～8
89	40090	1	Deck C status	Bit 0-15	C1-1～4
90	40091	1		Bit 0-15	C1-5～8
91	40092	1		Bit 0-15	C2-1～4
92	40093	1		Bit 0-15	C2-5～8
93	40094	1	Deck D status	Bit 0-15	D1-1～4
94	40095	1		Bit 0-15	D1-5～8
95	40096	1		Bit 0-15	D2-1～4
96	40097	1		Bit 0-15	D2-5～8
97	40098	1	Deck E status	Bit 0-15	E1-1～4
98	40099	1		Bit 0-15	E1-5～8
99	40100	1		Bit 0-15	E2-1～4
100	40101	1		Bit 0-15	E2-5～8
101	40102	1	Deck A alarm1	Bit 0-15	A1-1～8/A2-1～8
102	40103	1	Deck B alarm1	Bit 0-15	B1-1～8/B2-1～8
103	40104	1	Deck C alarm1	Bit 0-15	C1-1～8/C2-1～8
104	40105	1	Deck D alarm1	Bit 0-15	D1-1～8/D2-1～8
105	40106	1	Deck E alarm1	Bit 0-15	E1-1～8/E2-1～8
106	40107	1	Deck A alarm2	Bit 0-15	A1-1～8/A2-1～8
107	40108	1	Deck B alarm2	Bit 0-15	B1-1～8/B2-1～8
108	40109	1	Deck C alarm2	Bit 0-15	C1-1～8/C2-1～8
109	40110	1	Deck D alarm2	Bit 0-15	D1-1～8/D2-1～8
110	40111	1	Deck E alarm2	Bit 0-15	E1-1～8/E2-1～8
111	40112	1	Deck A fault	Bit 0-15	A1-1～8/A2-1～8
112	40113	1	Deck B fault	Bit 0-15	B1-1～8/B2-1～8
113	40114	1	Deck C fault	Bit 0-15	C1-1～8/C2-1～8
114	40115	1	Deck D fault	Bit 0-15	D1-1～8/D2-1～8
115	40116	1	Deck E fault	Bit 0-15	E1-1～8/E2-1～8
116	40117	1	Deck A status/fault Deck B status/fault	Bit 0-15	A1/A2/B1/B2
117	40118	1	Deck C status/fault Deck D status/fault	Bit 0-15	C1/C2/D1/D2
118	40119	1	Deck E status/fault	Bit 0-15	E1/E2
119	40120	1	FPM-80 status/fault	Bit 0-15	
120	40121	1	Alarm reset	Bit 0	Alarm reset(write from Upstream device)

0～1bit ：A1-1 magnification
(0：1/1、1：1/10、2：1/100、3：1/1000)
2～3bit ：A1-1 unit
(0：vol% or %、1：%LEL、2：ppm、3：ppb)
4～5bit ：A1-2 magnification
6～7bit ：A1-2 unit
8～9bit ：A1-3 magnification
10～11bit：A1-3 unit
12～13bit：A1-4 magnification
14～15bit：A1-4 unit

0bit：A1-1 alarm1
|
7bit：A1-8 alarm1
8bit：A2-1 alarm1
|
15bit：A2-8 alarm1

0bit：A1-1 alarm2
|
7bit：A1-8 alarm2
8bit：A2-1 alarm2
|
15bit：A2-8 alarm2

0bit：A1-1 fault
|
7bit：A1-8 fault
8bit：A2-1 fault
|
15bit：A2-8 fault

0bit：FPM-80 total critical fault
1bit：FPM-80 total general fault
2bit：FPM-80 total alarm1
3bit：FPM-80 total alarm2
4bit：FPM-80 total gas warning

0bit ：A1 total critical fault
1bit ：A1 total general fault
2bit ：A1 total alarm1
3bit ：A1 total alarm2
4bit ：A2 total critical fault
5bit ：A2 total general fault
6bit ：A2 total alarm1
7bit ：A2 total alarm2
8bit ：B1 total critical fault
9bit ：B1 total general fault
10bit：B1 total alarm1
11bit：B1 total alarm2
12bit：B2 total critical fault
13bit：B2 total general fault
14bit：B2 total alarm1
15bit：B2 total alarm2

<S7>

FPM-80A Datamap(S7 protocol)

Data size：121Words PLC slot：1 DB200

Offset	Words	Data description	Format	Content
0	1	Communication status	Word	Watchdog
2	80	Gas concentration	Word	Gas concentration for all 80 points
162	1	Deck A status	Bit 0-15	A1-1～4
164	1		Bit 0-15	A1-5～8
166	1		Bit 0-15	A2-1～4
168	1		Bit 0-15	A2-5～8
170	1	Deck B status	Bit 0-15	B1-1～4
172	1		Bit 0-15	B1-5～8
174	1		Bit 0-15	B2-1～4
176	1		Bit 0-15	B2-5～8
178	1	Deck C status	Bit 0-15	C1-1～4
180	1		Bit 0-15	C1-5～8
182	1		Bit 0-15	C2-1～4
184	1		Bit 0-15	C2-5～8
186	1	Deck D status	Bit 0-15	D1-1～4
188	1		Bit 0-15	D1-5～8
190	1		Bit 0-15	D2-1～4
192	1		Bit 0-15	D2-5～8
194	1	Deck E status	Bit 0-15	E1-1～4
196	1		Bit 0-15	E1-5～8
198	1		Bit 0-15	E2-1～4
200	1		Bit 0-15	E2-5～8
202	1	Deck A alarm1	Bit 0-15	A1-1～8/A2-1～8
204	1	Deck B alarm1	Bit 0-15	B1-1～8/B2-1～8
206	1	Deck C alarm1	Bit 0-15	C1-1～8/C2-1～8
208	1	Deck D alarm1	Bit 0-15	D1-1～8/D2-1～8
210	1	Deck E alarm1	Bit 0-15	E1-1～8/E2-1～8
212	1	Deck A alarm2	Bit 0-15	A1-1～8/A2-1～8
214	1	Deck B alarm2	Bit 0-15	B1-1～8/B2-1～8
216	1	Deck C alarm2	Bit 0-15	C1-1～8/C2-1～8
218	1	Deck D alarm2	Bit 0-15	D1-1～8/D2-1～8
220	1	Deck E alarm2	Bit 0-15	E1-1～8/E2-1～8
222	1	Deck A fault	Bit 0-15	A1-1～8/A2-1～8
224	1	Deck B fault	Bit 0-15	B1-1～8/B2-1～8
226	1	Deck C fault	Bit 0-15	C1-1～8/C2-1～8
228	1	Deck D fault	Bit 0-15	D1-1～8/D2-1～8
230	1	Deck E fault	Bit 0-15	E1-1～8/E2-1～8
232	1	Deck A status/fault Deck B status/fault	Bit 0-15	A1/A2/B1/B2
234	1	Deck C status/fault Deck D status/fault	Bit 0-15	C1/C2/D1/D2
236	1	Deck E status/fault	Bit 0-15	E1/E2
238	1	FPM-80 status/fault	Bit 0-15	
240	1	Alarm reset	Bit 0	Alarm reset(write from Upstream device)

0～1bit ：A1-1 magnification
(0：1/1、1：1/10、2：1/100、3：1/1000)
2～3bit ：A1-1 unit
(0：vol% or %、1：%LEL、2：ppm、3：ppb)
4～5bit ：A1-2 magnification
6～7bit ：A1-2 unit
8～9bit ：A1-3 magnification
10～11bit：A1-3 unit
12～13bit：A1-4 magnification
14～15bit：A1-4 unit

0bit：A1-1 alarm1
|
7bit：A1-8 alarm1
8bit：A2-1 alarm1
|
15bit：A2-8 alarm1

0bit：A1-1 alarm2
|
7bit：A1-8 alarm2
8bit：A2-1 alarm2
|
15bit：A2-8 alarm2

0bit：A1-1 fault
|
7bit：A1-8 fault
8bit：A2-1 fault
|
15bit：A2-8 fault

0bit：FPM-80 total critical fault
1bit：FPM-80 total general fault
2bit：FPM-80 total alarm1
3bit：FPM-80 total alarm2
4bit：FPM-80 total gas warning

0bit ：A1 total critical fault
1bit ：A1 total general fault
2bit ：A1 total alarm1
3bit ：A1 total alarm2
4bit ：A2 total critical fault
5bit ：A2 total general fault
6bit ：A2 total alarm1
7bit ：A2 total alarm2
8bit ：B1 total critical fault
9bit ：B1 total general fault
10bit：B1 total alarm1
11bit：B1 total alarm2
12bit：B2 total critical fault
13bit：B2 total general fault
14bit：B2 total alarm1
15bit：B2 total alarm2

12-1-4 Upstream communication fault type display

Faults that occur within the housing are either critical faults or general faults as shown in the following table.
Critical faults and general faults are issued as representative alarms using contact output and upstream communication.

Fault area	Fault type		
	Critical fault		General fault
Tape unit	Tape break Tape end Motor fault System fault LVD fault 5V Circuit fault 24V Power fault 3.3V Circuit fault 12V Circuit fault Pump fault Tray fault Head comm error Temperature fault Head System fault Head LVD fault Head LED driver fault SYS ERR	[Individual point↓] Flow fault Flow sensor fault Sensor fault Tape level fault Ref. sensor fault Pyrolyzer fault	No tape detected Change tape Housing comm error Different tape model Tape expired RFID comm error RFID fault FAN fault Gas Tracer fault Gas Tracer Capture fault Gas Tracer no response Gas Tracer circuit fault Gas Tracer upload error
Pyrolyzer unit	System fault LVD fault 5V Circuit fault 24V Power fault 3.3V Circuit fault 12V Power fault Pyrolyzer SYS ERR	[Individual point↓] FAN fault 1V Circuit fault Fuse break Temperature range fault Temperature maintenance fault Temperature control fault	
Main unit	FAN fault System fault LVD fault 5V Circuit fault 24V Power fault 3.3V Circuit fault Main unit SYS ERR		PS 12 V A fault PS 12 V B fault PS 12 V C fault PS 24 V A fault PS 24 V B fault PS 24 V C fault Front door open
PLC	PLC comm error		

12-2 Upstream communication settings when using a gateway (option)

DANGER

- Do not remove the grommets attached to the external output connectors on the rear of the product. Touching parts inside the product may result in electric shock. Also, continuing to use the product with foreign matter inside may result in damage to the product.
- The product must be connected only to a secure network environment that is physically and logically isolated, with appropriately configured firewalls and access controls.
  Do not connect it directly to an open network or to any network lacking adequate security.
  Connecting the product to any such network significantly increases the risk of data leaks, malware infection, and unauthorized access, which may cause malfunctioning of measuring devices or serious disruption to the entire system.

12-2-1 Upstream communication connection when using a gateway

Upstream communication connection is possible using a gateway with the following communication protocols:

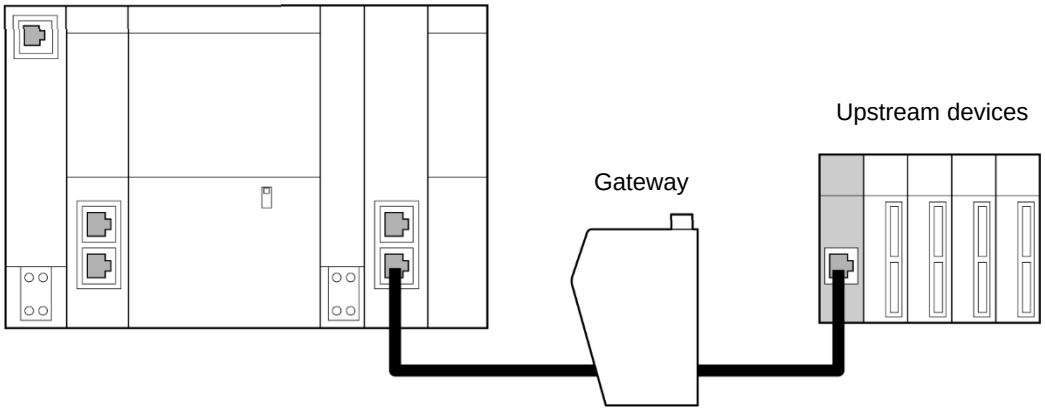
- EtherNet/IP
- PROFIBUS
- Modbus RTU
- DeviceNet
- OPC UA

NOTE

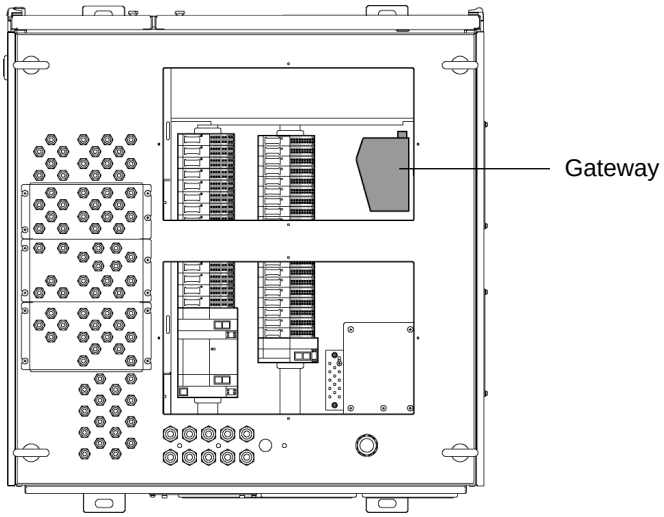
▶ For more information on data mapping when using a gateway, refer to ‘12-2-3 Upstream communication data map when using a gateway’.

Connect the PLC Ethernet port to the gateway using an Ethernet cable.
The cable used to connect the gateway to the upstream device differs depending on the communication protocol.

Main PLC



Product top



<Communication protocols and gateway models>
The gateways are manufactured by HMS Co., Ltd.
The table below lists the communication protocols and compatible gateway models.
For information on the settings for each gateway model, refer to the relevant product page on the HMS website.

Communication protocol	Gateway model
EtherNet/IP	ABC4011-A
PROFIBUS	ABC4018-A
Modbus RTU	AB7641-F
DeviceNet	AB7635-F
OPC UA	AB7555-F

CAUTION

- When setting the gateway, do not change the data size or Modbus TCP settings.
  Doing so may prevent normal communication.

12-2-2 Enabling the gateway

When using a gateway, enable the gateway on the ADVANCED SETTING screen.

NOTE

- To set the gateway, log in with an account that has the [Advanced setting] access permission enabled. (See ‘6-1-1 Logging in’, ‘6-2-2 Access permissions’, and ‘13-1 Access permissions required to operate the product’.)

1 Touch the [Advanced setting] button.

The ADVANCED SETTING screen is displayed.

2 Enable or disable the gateway.

To use the gateway, touch the [ON] button for [Gateway].

The button touched turns dark pink.

3 Touch the [Apply] button.

The gateway setting is changed.

NOTE

- Enabling the gateway will change the communication settings and prevent the IP address from being set.

12-2-3 Upstream communication data map when using a gateway

<Gateway>

FPM-80A Datamap(when using a gateway)

Up link(Upstream device→ FPM-80A)

Data size：1Word

Offset	Words	Data description	Format	Content
0	1	Alarm reset	Bit 0	Alarm reset(write from Upstream device)

Down link(FPM-80A → Upstream device)

Data size：120Words

Offset	Words	Data description	Format	Content
0	1	Communication status	Word	Watchdog
1	80	Gas concentration	Word	Gas concentration for all 80 points
81	1	Deck A status	Bit 0-15	A1-1～4
82	1		Bit 0-15	A1-5～8
83	1		Bit 0-15	A2-1～4
84	1		Bit 0-15	A2-5～8
85	1	Deck B status	Bit 0-15	B1-1～4
86	1		Bit 0-15	B1-5～8
87	1		Bit 0-15	B2-1～4
88	1		Bit 0-15	B2-5～8
89	1	Deck C status	Bit 0-15	C1-1～4
90	1		Bit 0-15	C1-5～8
91	1		Bit 0-15	C2-1～4
92	1		Bit 0-15	C2-5～8
93	1	Deck D status	Bit 0-15	D1-1～4
94	1		Bit 0-15	D1-5～8
95	1		Bit 0-15	D2-1～4
96	1		Bit 0-15	D2-5～8
97	1	Deck E status	Bit 0-15	E1-1～4
98	1		Bit 0-15	E1-5～8
99	1		Bit 0-15	E2-1～4
100	1		Bit 0-15	E2-5～8
101	1	Deck A alarm1	Bit 0-15	A1-1～8/A2-1～8
102	1	Deck B alarm1	Bit 0-15	B1-1～8/B2-1～8
103	1	Deck C alarm1	Bit 0-15	C1-1～8/C2-1～8
104	1	Deck D alarm1	Bit 0-15	D1-1～8/D2-1～8
105	1	Deck E alarm1	Bit 0-15	E1-1～8/E2-1～8
106	1	Deck A alarm2	Bit 0-15	A1-1～8/A2-1～8
107	1	Deck B alarm2	Bit 0-15	B1-1～8/B2-1～8
108	1	Deck C alarm2	Bit 0-15	C1-1～8/C2-1～8
109	1	Deck D alarm2	Bit 0-15	D1-1～8/D2-1～8
110	1	Deck E alarm2	Bit 0-15	E1-1～8/E2-1～8
111	1	Deck A fault	Bit 0-15	A1-1～8/A2-1～8
112	1	Deck B fault	Bit 0-15	B1-1～8/B2-1～8
113	1	Deck C fault	Bit 0-15	C1-1～8/C2-1～8
114	1	Deck D fault	Bit 0-15	D1-1～8/D2-1～8
115	1	Deck E fault	Bit 0-15	E1-1～8/E2-1～8
116	1	Deck A status/fault Deck B status/fault	Bit 0-15	A1/A2/B1/B2
117	1	Deck C status/fault Deck D status/fault	Bit 0-15	C1/C2/D1/D2
118	1	Deck E status/fault	Bit 0-15	E1/E2
119	1	FPM-80 status/fault	Bit 0-15	

0～1bit : A1-1 magnification
(0：1/1、1：1/10、2：1/100、3：1/1000)
2～3bit : A1-1 unit
(0：vol% or %、1：%LEL、2：ppm、3：ppb)
4～5bit : A1-2 magnification
6～7bit : A1-2 unit
8～9bit : A1-3 magnification
10～11bit : A1-3 unit
12～13bit : A1-4 magnification
14～15bit : A1-4 unit

0bit：A1-1 alarm1
|
7bit：A1-8 alarm1
8bit：A2-1 alarm1
|
15bit：A2-8 alarm1

0bit：A1-1 alarm2
|
7bit：A1-8 alarm2
8bit：A2-1 alarm2
|
15bit：A2-8 alarm2

0bit：A1-1 fault
|
7bit：A1-8 fault
8bit：A2-1 fault
|
15bit：A2-8 fault

0bit：FPM-80 total critical fault
1bit：FPM-80 total general fault
2bit：FPM-80 total alarm1
3bit：FPM-80 total alarm2
4bit：FPM-80 total gas warning

0bit : A1 total critical fault
1bit : A1 total general fault
2bit : A1 total alarm1
3bit : A1 total alarm2
4bit : A2 total critical fault
5bit : A2 total general fault
6bit : A2 total alarm1
7bit : A2 total alarm2
8bit : B1 total critical fault
9bit : B1 total general fault
10bit : B1 total alarm1
11bit : B1 total alarm2
12bit : B2 total critical fault
13bit : B2 total general fault
14bit : B2 total alarm1
15bit : B2 total alarm2

<Gateway (OPC UA)>

FPM-80A Datamap(when using a gateway OPC UA)

Down link(FPM-80A → Upstream device)

Data size：63tags

Offset	Tags	Data description	Format	Content
0	1	Communication status	Word	Watchdog
1	40	Gas concentration	Word	Gas concentration A1-1
			Word	Gas concentration A1-2
41	1	Deck A status	Bit 0-15	A1-1～4
			Bit 0-15	A1-5～8
42	1		Bit 0-15	A2-1～4
			Bit 0-15	A2-5～8
43	1	Deck B status	Bit 0-15	B1-1～4
			Bit 0-15	B1-5～8
44	1		Bit 0-15	B2-1～4
			Bit 0-15	B2-5～8
45	1	Deck C status	Bit 0-15	C1-1～4
			Bit 0-15	C1-5～8
46	1		Bit 0-15	C2-1～4
			Bit 0-15	C2-5～8
47	1	Deck D status	Bit 0-15	D1-1～4
			Bit 0-15	D1-5～8
48	1		Bit 0-15	D2-1～4
			Bit 0-15	D2-5～8
49	1	Deck E status	Bit 0-15	E1-1～4
			Bit 0-15	E1-5～8
50	1		Bit 0-15	E2-1～4
			Bit 0-15	E2-5～8
51	1	Deck A alarm1	Bit 0-15	A1-1～8/A2-1～8
		Deck B alarm1	Bit 0-15	B1-1～8/B2-1～8
52	1	Deck C alarm1	Bit 0-15	C1-1～8/C2-1～8
		Deck D alarm1	Bit 0-15	D1-1～8/D2-1～8
53	1	Deck E alarm1	Bit 0-15	E1-1～8/E2-1～8
		Deck A alarm2	Bit 0-15	A1-1～8/A2-1～8
54	1	Deck B alarm2	Bit 0-15	B1-1～8/B2-1～8
		Deck C alarm2	Bit 0-15	C1-1～8/C2-1～8
55	1	Deck D alarm2	Bit 0-15	D1-1～8/D2-1～8
		Deck E alarm2	Bit 0-15	E1-1～8/E2-1～8
56	1	Deck A fault	Bit 0-15	A1-1～8/A2-1～8
		Deck B fault	Bit 0-15	B1-1～8/B2-1～8
57	1	Deck C fault	Bit 0-15	C1-1～8/C2-1～8
		Deck D fault	Bit 0-15	D1-1～8/D2-1～8
58	1	Deck E fault	Bit 0-15	E1-1～8/E2-1～8
59	1	Deck A status/fault Deck B status/fault	Bit 0-15	A1/A2/B1/B2
60	1	Deck C status/fault Deck D status/fault	Bit 0-15	C1/C2/D1/D2
61	1	Deck E status/fault	Bit 0-15	E1/E2
62	1	FPM-80 status/fault	Bit 0-15	

0～1bit : A1-1 magnification
(0：1/1、1：1/10、2：1/100、3：1/1000)
2～3bit : A1-1 unit
(0：vol% or %、1：%LEL、2：ppm、3：ppb)
4～5bit : A1-2 magnification
6～7bit : A1-2 unit
8～9bit : A1-3 magnification
10～11bit：A1-3 unit
12～13bit：A1-4 magnification
14～15bit：A1-4 unit

0bit：A1-1 alarm1
|
7bit：A1-8 alarm1
8bit：A2-1 alarm1
|
15bit：A2-8 alarm1

0bit：A1-1 alarm2
|
7bit：A1-8 alarm2
8bit：A2-1 alarm2
|
15bit：A2-8 alarm2

0bit：A1-1 fault
|
7bit：A1-8 fault
8bit：A2-1 fault
|
15bit：A2-8 fault

0bit：FPM-80 total critical fault
1bit：FPM-80 total general fault
2bit：FPM-80 total alarm1
3bit：FPM-80 total alarm2
4bit：FPM-80 total gas warning

0bit : A1 total critical fault
1bit : A1 total general fault
2bit : A1 total alarm1
3bit : A1 total alarm2
4bit : A2 total critical fault
5bit : A2 total general fault
6bit : A2 total alarm1
7bit : A2 total alarm2
8bit : B1 total critical fault
9bit : B1 total general fault
10bit：B1 total alarm1
11bit：B1 total alarm2
12bit：B2 total critical fault
13bit：B2 total general fault
14bit：B2 total alarm1
15bit：B2 total alarm2

12-3 Upstream communication settings when using a PN/PN coupler (option)

DANGER

- Do not remove the grommets attached to the external output connectors on the rear of the product. Touching parts inside the product may result in electric shock. Also, continuing to use the product with foreign matter inside may result in damage to the product.
- The product must be connected only to a secure network environment that is physically and logically isolated, with appropriately configured firewalls and access controls.
  Do not connect it directly to an open network or to any network lacking adequate security.
  Connecting the product to any such network significantly increases the risk of data leaks, malware infection, and unauthorized access, which may cause malfunctioning of measuring devices or serious disruption to the entire system.

12-3-1 Upstream communication connection when using a PN/PN coupler

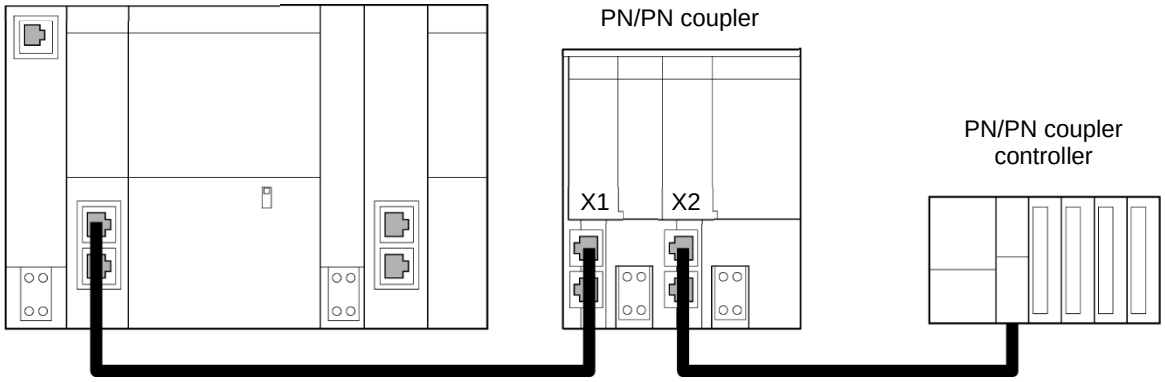
Upstream communication connection with PROFINET is possible using a PN/PN coupler.

NOTE

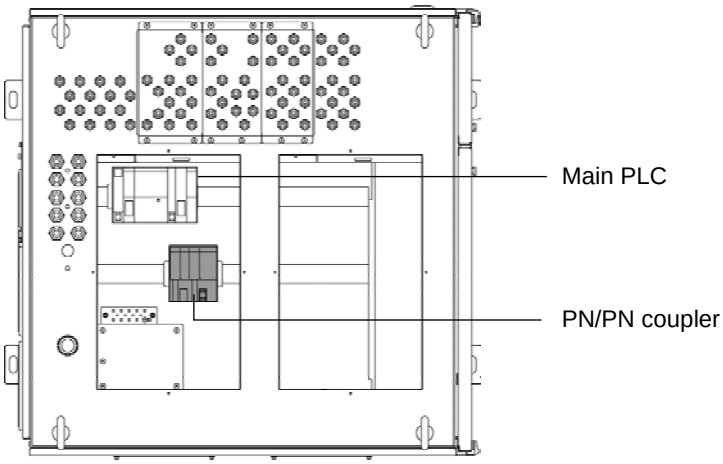
- The PN/PN coupler supports PROFINET S2 mode, enabling communication redundancy.
- For more information on data mapping when using a PN/PN coupler, refer to ‘12-3-2 Upstream communication data map when using a PN/PN coupler’.

Connect the PLC Ethernet port to the PN/PN coupler using a PROFINET compliant cable.

Main PLC



Product top



<PN/PN coupler model>
The PN/PN coupler used is manufactured by Siemens AG.
The PN/PN coupler model is shown below.
For information on the PN/PN coupler settings, refer to the relevant product page on the Siemens AG website.

- PROFINET: 6ES7158-3AD10-0XA0

NOTE

- When using a PN/PN coupler for upstream communication connection, no settings are required on the product operating screen.

12-3-2 Upstream communication data map when using a PN/PN coupler

FPM-80A Datamap(PROFINET)

Outside of project(X2) → FPM-80A(X1)

Data size：2bytes Virtual slot：1

Offset	Bytes	Data description	Format	Content
0	2	Alarm reset	Bit 0	Alarm reset(write from Outside of project)

FPM-80A(X1) → Outside of project(X2)

Data size：241bytes Virtual slot：2

Offset	Bytes	Data description	Format	Content
0	2	Communication status	Word	Watchdog
2	160	Gas concentration	Word	Gas concentration for all 80 points
162	2	Deck A status	Bit 0-15	A1-1～4
164	2		Bit 0-15	A1-5～8
166	2		Bit 0-15	A2-1～4
168	2		Bit 0-15	A2-5～8
170	2	Deck B status	Bit 0-15	B1-1～4
172	2		Bit 0-15	B1-5～8
174	2		Bit 0-15	B2-1～4
176	2		Bit 0-15	B2-5～8
178	2	Deck C status	Bit 0-15	C1-1～4
180	2		Bit 0-15	C1-5～8
182	2		Bit 0-15	C2-1～4
184	2		Bit 0-15	C2-5～8
186	2	Deck D status	Bit 0-15	D1-1～4
188	2		Bit 0-15	D1-5～8
190	2		Bit 0-15	D2-1～4
192	2		Bit 0-15	D2-5～8
194	2	Deck E status	Bit 0-15	E1-1～4
196	2		Bit 0-15	E1-5～8
198	2		Bit 0-15	E2-1～4
200	2		Bit 0-15	E2-5～8
202	2	Deck A alarm1	Bit 0-15	A1-1～8/A2-1～8
204	2	Deck B alarm1	Bit 0-15	B1-1～8/B2-1～8
206	2	Deck C alarm1	Bit 0-15	C1-1～8/C2-1～8
208	2	Deck D alarm1	Bit 0-15	D1-1～8/D2-1～8
210	2	Deck E alarm1	Bit 0-15	E1-1～8/E2-1～8
212	2	Deck A alarm2	Bit 0-15	A1-1～8/A2-1～8
214	2	Deck B alarm2	Bit 0-15	B1-1～8/B2-1～8
216	2	Deck C alarm2	Bit 0-15	C1-1～8/C2-1～8
218	2	Deck D alarm2	Bit 0-15	D1-1～8/D2-1～8
220	2	Deck E alarm2	Bit 0-15	E1-1～8/E2-1～8
222	2	Deck A fault	Bit 0-15	A1-1～8/A2-1～8
224	2	Deck B fault	Bit 0-15	B1-1～8/B2-1～8
226	2	Deck C fault	Bit 0-15	C1-1～8/C2-1～8
228	2	Deck D fault	Bit 0-15	D1-1～8/D2-1～8
230	2	Deck E fault	Bit 0-15	E1-1～8/E2-1～8
232	2	Deck A status/fault Deck B status/fault	Bit 0-15	A1/A2/B1/B2
234	2	Deck C status/fault Deck D status/fault	Bit 0-15	C1/C2/D1/D2
236	2	Deck E status/fault	Bit 0-15	E1/E2
238	2	FPM-80 status/fault	Bit 0-15	
240	1	Active data status	Bit 0-7	

0～1bit : A1-1 magnification
(0：1/1、1：1/10、2：1/100、3：1/1000)
2～3bit : A1-1 unit
(0：vol% or %、1：%LEL、2：ppm、3：ppb)
4～5bit : A1-2 magnification
6～7bit : A1-2 unit
8～9bit : A1-3 magnification
10～11bit : A1-3 unit
12～13bit : A1-4 magnification
14～15bit : A1-4 unit

0bit：A1-1 alarm1
|
7bit：A1-8 alarm1
8bit：A2-1 alarm1
|
15bit：A2-8 alarm1

0bit：A1-1 alarm2
|
7bit：A1-8 alarm2
8bit：A2-1 alarm2
|
15bit：A2-8 alarm2

0bit：A1-1 fault
|
7bit：A1-8 fault
8bit：A2-1 fault
|
15bit：A2-8 fault

0bit：FPM-80 total critical fault
1bit：FPM-80 total general fault
2bit：FPM-80 total alarm1
3bit：FPM-80 total alarm2
4bit：FPM-80 total gas warning

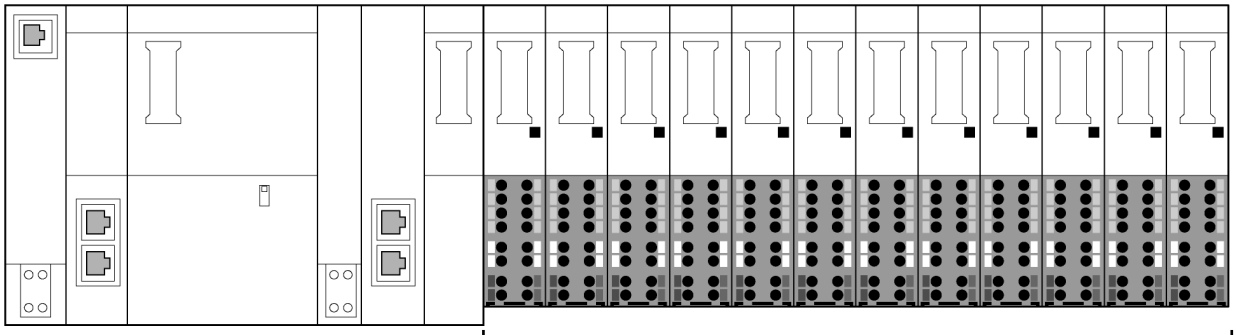
0bit : A1 total critical fault
1bit : A1 total general fault
2bit : A1 total alarm1
3bit : A1 total alarm2
4bit : A2 total critical fault
5bit : A2 total general fault
6bit : A2 total alarm1
7bit : A2 total alarm2
8bit : B1 total critical fault
9bit : B1 total general fault
10bit：B1 total alarm1
11bit：B1 total alarm2
12bit：B2 total critical fault
13bit：B2 total general fault
14bit：B2 total alarm1
15bit：B2 total alarm2

12-4 External output settings for output units (option)

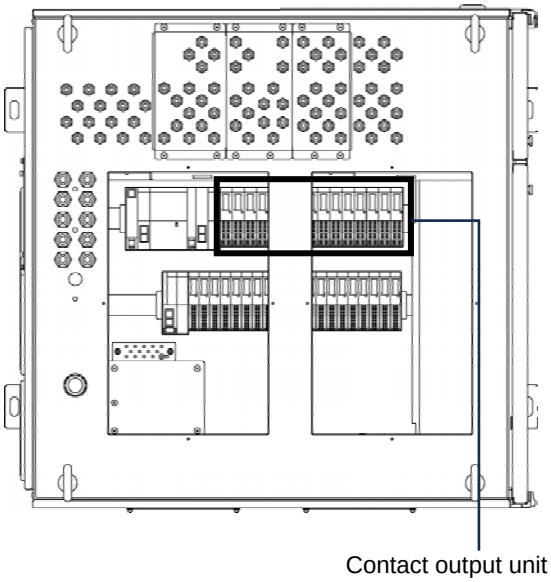
12-4-1 Representative contact output

The contact output units connected to the main PLC inside the product serve as representative contact output.
Each contact output unit has four output channels (CH0 to CH3).
For more information on the contact output unit assignment, refer to '<Representative contact output assignment table>'.

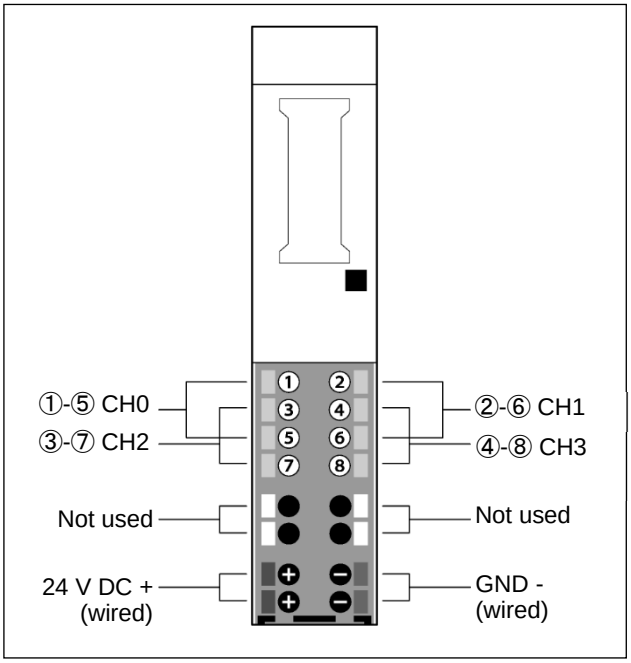
Main PLC



Product top



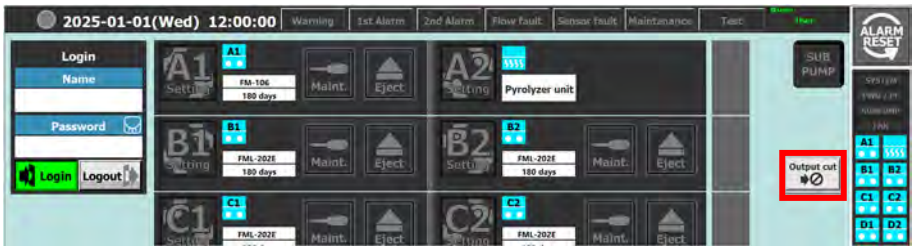
Contact output unit



①-⑤: Alarm contact output CH0
②-⑥: Alarm contact output CH1
③-⑦: Alarm contact output CH2
④-⑧: Alarm contact output CH3

NOTE

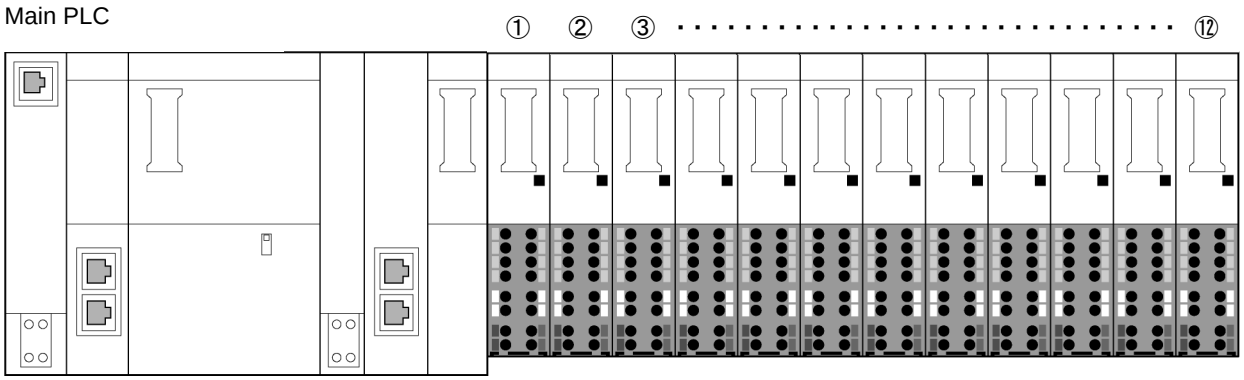
- When logged in with an account with the [Output cut] operation permission enabled, the contact output from the PLC can be cut off by touching the [Output cut] button on the SETTING screen.



CAUTION

- Do not use the contact output for control purposes, such as for controlling shutoff valves.
- The alarm is issued via contact output in the alarm test. Before performing an alarm test, be aware of the impact this may have externally. Notify any departments that may be affected before testing alarm operation. Take all necessary precautionary measures.

<Representative contact output assignment table>



Slot	CH	Description
①	0	Power
①	1	Buzzer
①	2	None
①	3	None
②	0	FPM-80 total critical fault
②	1	FPM-80 total general fault
②	2	FPM-80 total alarm1
②	3	FPM-80 total alarm2
③	0	A1 total critical fault
③	1	A1 total general fault
③	2	A1 total alarm1
③	3	A1 total alarm2
④	0	A2 total critical fault
④	1	A2 total general fault
④	2	A2 total alarm1
④	3	A2 total alarm2
⋮		
⑪	0	E1 total critical fault
⑪	1	E1 total general fault
⑪	2	E1 total alarm1
⑪	3	E1 total alarm2
⑫	0	E2 total critical fault
⑫	1	E2 total general fault
⑫	2	E2 total alarm1
⑫	3	E2 total alarm2

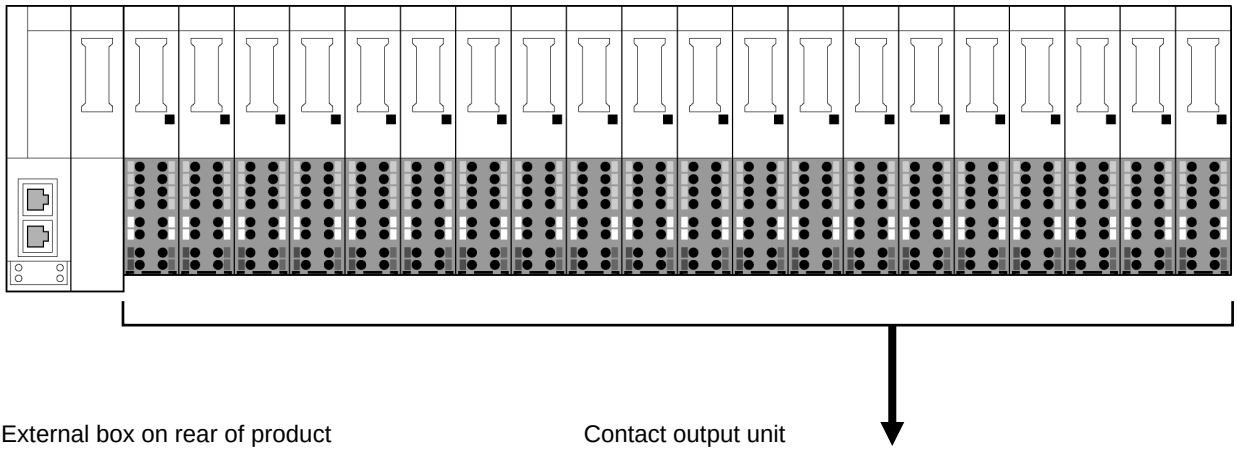
12-4-2 Individual contact output

Expansion interfaces are installed inside the external box on the rear of the product, and contact output units connected to the expansion interfaces provide individual contact output.
Each contact output unit has four output channels (CH0 to CH3).
For more information on the contact output unit assignment, refer to '<Individual contact output assignment table>'.

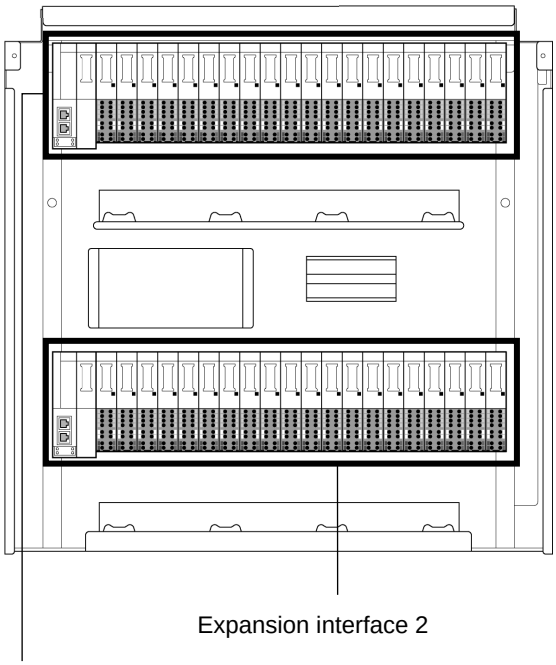
NOTE

- An external box must be fitted to use the individual contact output option.

Expansion interface

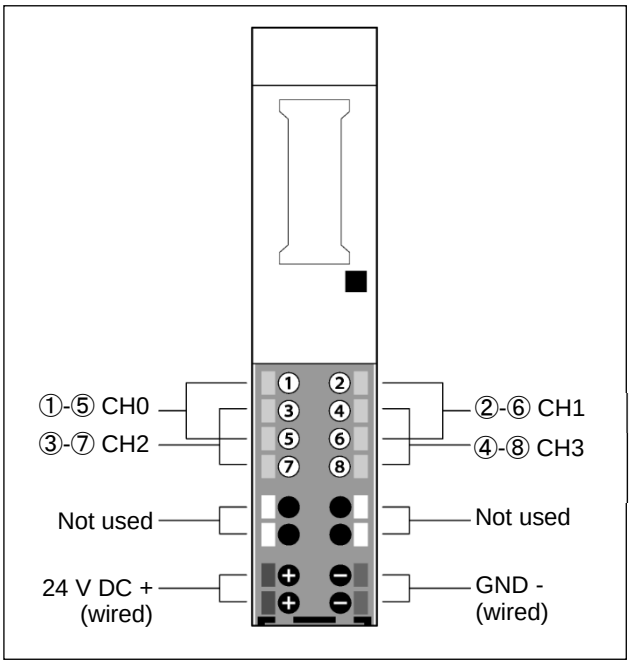


External box on rear of product



Expansion interface 1

Contact output unit



①-⑤: Alarm contact output CH0
②-⑥: Alarm contact output CH1
③-⑦: Alarm contact output CH2
④-⑧: Alarm contact output CH3

NOTE

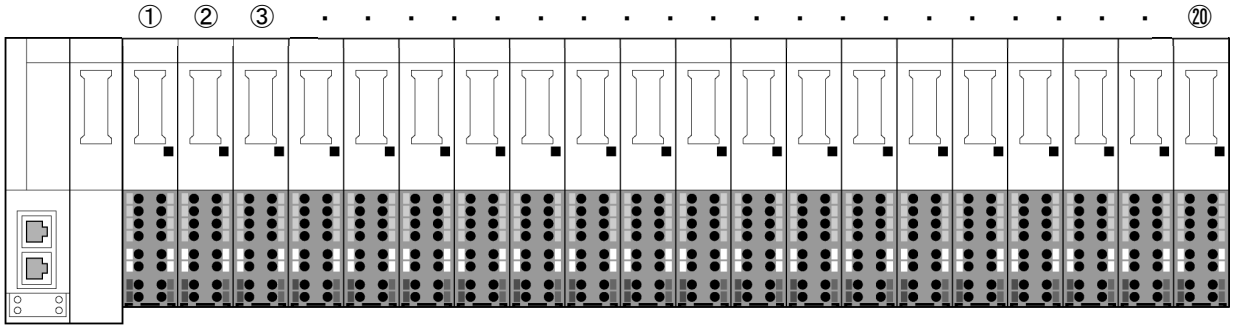
- When logged in with an account with the [Output cut] operation permission enabled, the contact output from the PLC can be cut off by touching the [Output cut] button on the SETTING screen.

CAUTION

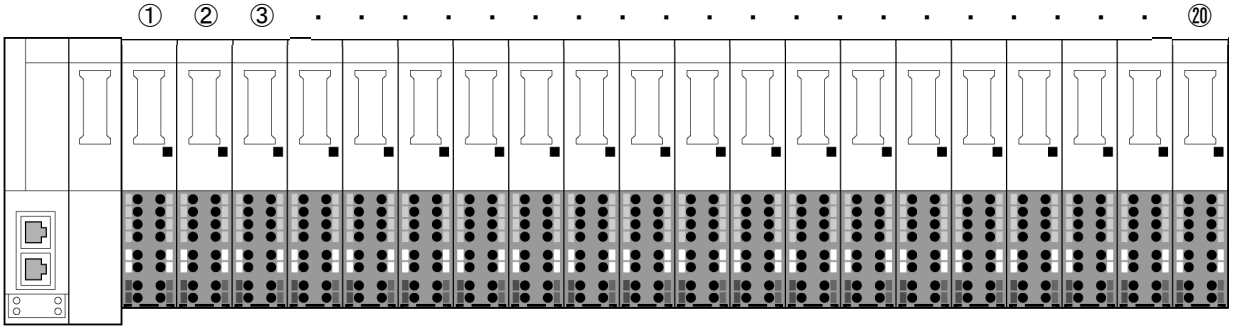
- Do not use the contact output for control purposes, such as for controlling shutoff valves.
- The alarm is issued via contact output in the alarm test. Before performing an alarm test, be aware of the impact this may have externally. Notify any departments that may be affected before testing alarm operation. Take all necessary precautionary measures.

<Individual contact output assignment table>

Expansion interface 1



Expansion interface 2



Expansion interface 1

Slot	CH	Description
①	0	A1-1 alarm1
①	1	A1-2 alarm1
①	2	A1-3 alarm1
①	3	A1-4 alarm1
②	0	A1-5 alarm1
②	1	A1-6 alarm1
②	2	A1-7 alarm1
②	3	A1-8 alarm1
③	0	A2-1 alarm1
③	1	A2-2 alarm1
③	2	A2-3 alarm1
③	3	A2-4 alarm1
④	0	A2-5 alarm1
④	1	A2-6 alarm1
④	2	A2-7 alarm1
④	3	A2-8 alarm1
⋮		
⑳	0	E2-5 alarm1
⑳	1	E2-6 alarm1
⑳	2	E2-7 alarm1
⑳	3	E2-8 alarm1

Expansion interface 2

Slot	CH	Description
①	0	A1-1 alarm2
①	1	A1-2 alarm2
①	2	A1-3 alarm2
①	3	A1-4 alarm2
②	0	A1-5 alarm2
②	1	A1-6 alarm2
②	2	A1-7 alarm2
②	3	A1-8 alarm2
③	0	A2-1 alarm2
③	1	A2-2 alarm2
③	2	A2-3 alarm2
③	3	A2-4 alarm2
④	0	A2-5 alarm2
④	1	A2-6 alarm2
④	2	A2-7 alarm2
④	3	A2-8 alarm2
⋮		
⑳	0	E2-5 alarm2
⑳	1	E2-6 alarm2
⑳	2	E2-7 alarm2
⑳	3	E2-8 alarm2

12-4-3 Individual analog output

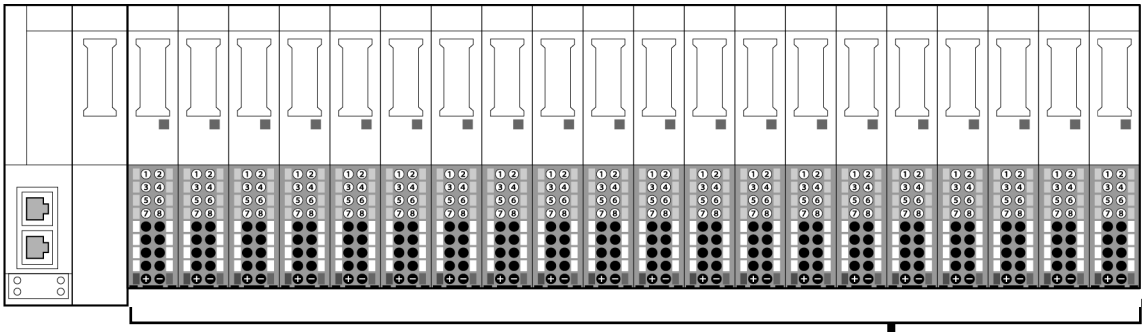
An expansion interface is installed inside the product, and analog output units connected to the expansion interface provide analog output (4 to 20 mA).
Each analog output unit has four output channels (CH0 to CH3).
For more information on the analog output unit assignment, refer to '<Individual analog output assignment table>'.
The output current values from analog output units for each parameter are as follows:

Parameter	Output current value
Normal (detection mode)	4 to 20 mA
Fault (fault alarm)	0.5 mA
Maintenance (maintenance mode)	2.5 mA
Inhibit (inhibit mode)	2.5 mA
Full scale over (full scale exceeded)	21 mA

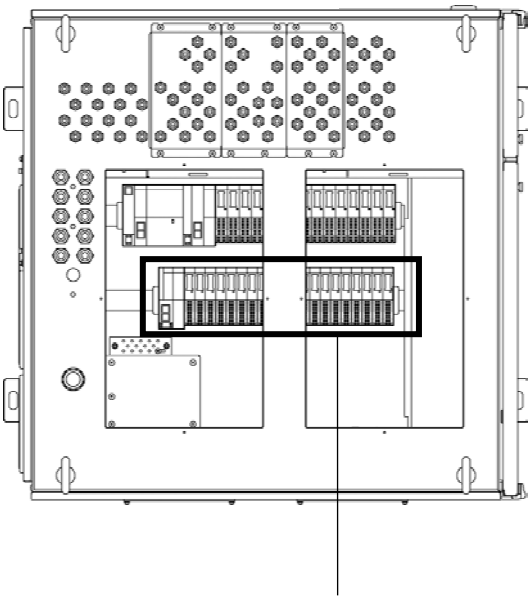
NOTE

- Since the analog output unit parameter during an alarm test is Maintenance, the output current is fixed at 2.5 mA even when an alarm is triggered.
- Attach the anti-noise accessory to the analog output unit, as the expansion interface requires cable grounding. (See '12-4-4 Attaching the anti-noise accessory (option)'.)

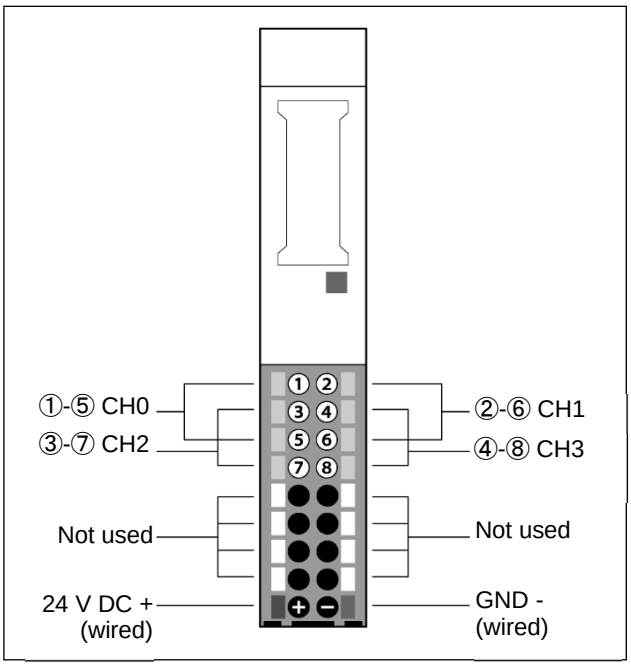
Expansion interface



Product top



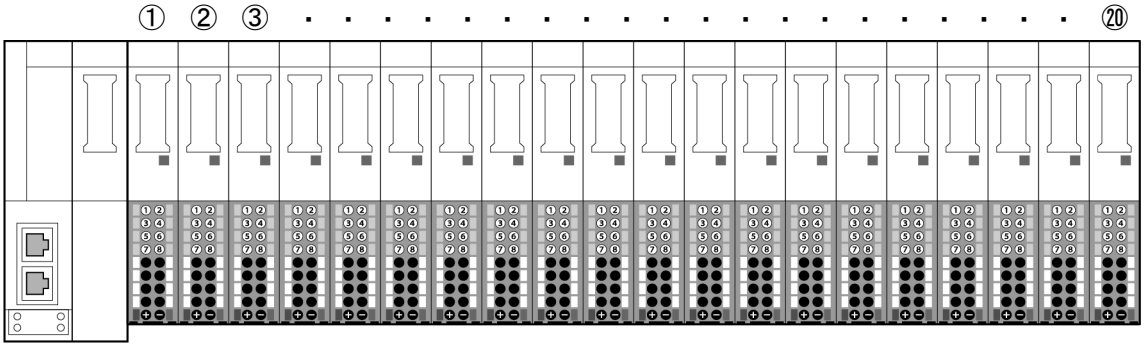
Analog output unit



①-⑤: Analog output (4 to 20 mA) CH0
②-⑥: Analog output (4 to 20 mA) CH1
③-⑦: Analog output (4 to 20 mA) CH2
④-⑧: Analog output (4 to 20 mA) CH3

<Individual analog output assignment table>

Expansion interface



Slot	CH	Description
①	0	A1-1 analog (4 to 20 mA)
①	1	A1-2 analog (4 to 20 mA)
①	2	A1-3 analog (4 to 20 mA)
①	3	A1-4 analog (4 to 20 mA)
②	0	A1-5 analog (4 to 20 mA)
②	1	A1-6 analog (4 to 20 mA)
②	2	A1-7 analog (4 to 20 mA)
②	3	A1-8 analog (4 to 20 mA)
③	0	A2-1 analog (4 to 20 mA)
③	1	A2-2 analog (4 to 20 mA)
③	2	A2-3 analog (4 to 20 mA)
③	3	A2-4 analog (4 to 20 mA)
④	0	A2-5 analog (4 to 20 mA)
④	1	A2-6 analog (4 to 20 mA)
④	2	A2-7 analog (4 to 20 mA)
④	3	A2-8 analog (4 to 20 mA)
⋮		
⑳	0	E2-5 analog (4 to 20 mA)
⑳	1	E2-6 analog (4 to 20 mA)
⑳	2	E2-7 analog (4 to 20 mA)
⑳	3	E2-8 analog (4 to 20 mA)

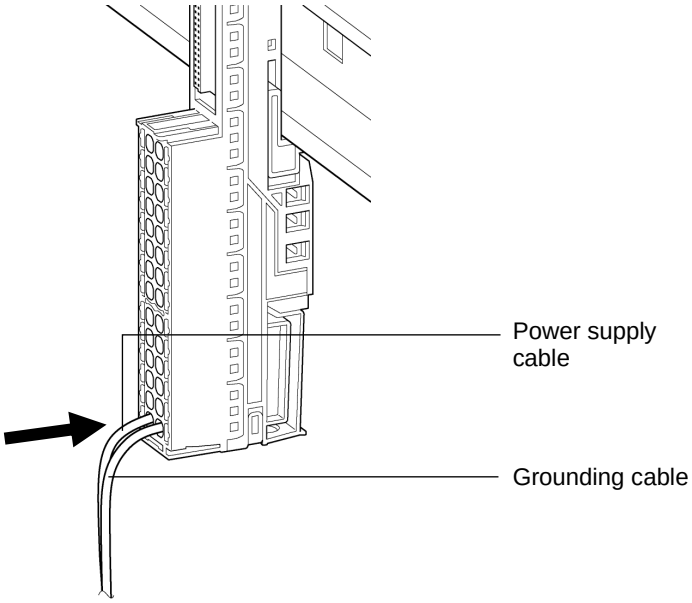
12-4-4 Attaching the anti-noise accessory (option)

The optional anti-noise accessory can be attached to base units such as the analog output unit to shield the cables from electromagnetic interference.

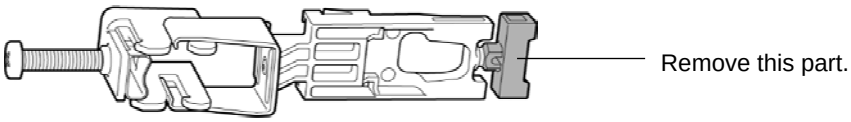
DANGER

- Always turn off the power for the product before attaching the anti-noise accessory. Attaching while the power is on may result in electric shock.

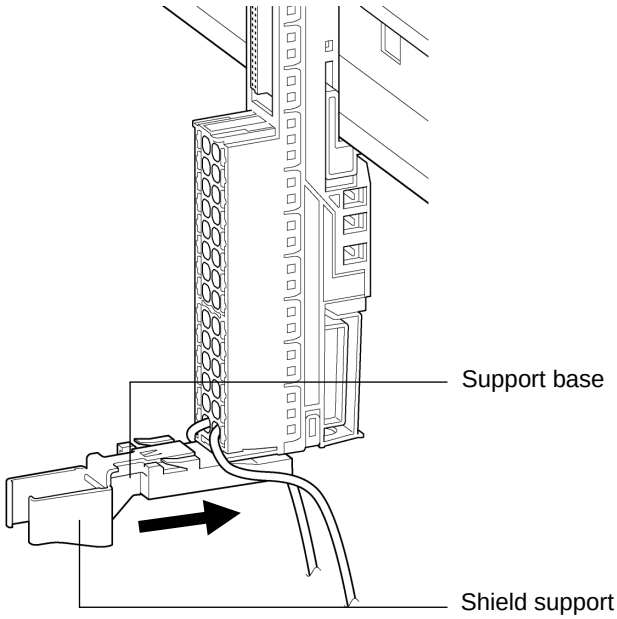
1 Connect the power supply and grounding cables to the base unit as necessary.



2 Remove the part shown below from the anti-noise accessory.

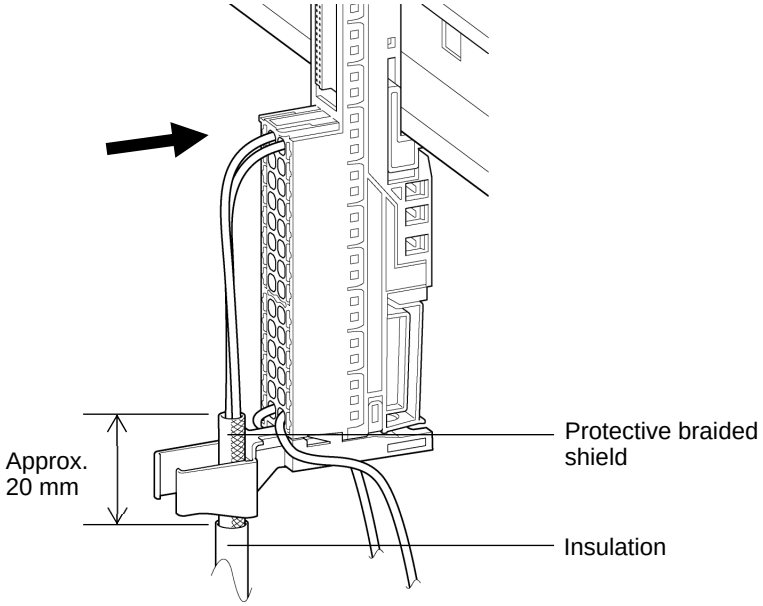


3 Push the support base of the shield support firmly into the guideway until it clicks into place.
When using a 7.5 mm mounting rail, loosen the spacer securing the shield support to the support base to reduce the length of the support base.



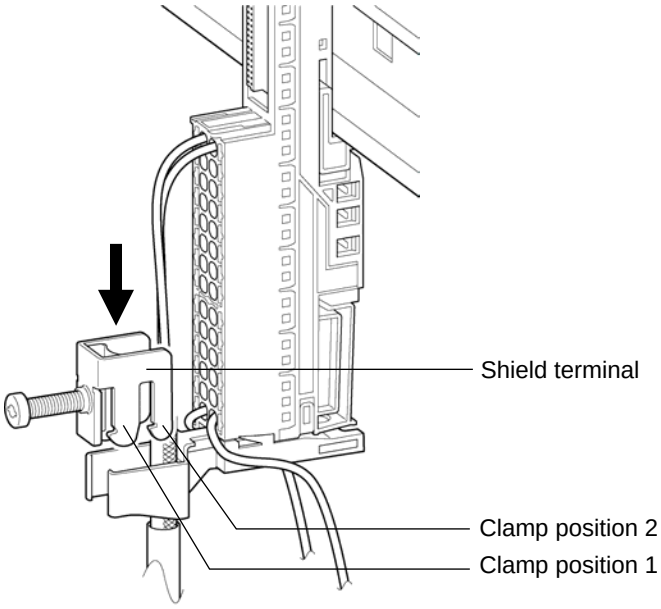
4 Strip approximately 20 mm of insulation from the cable on the shield support side.

5 Connect the cable to the base unit, then pass through the shield support.



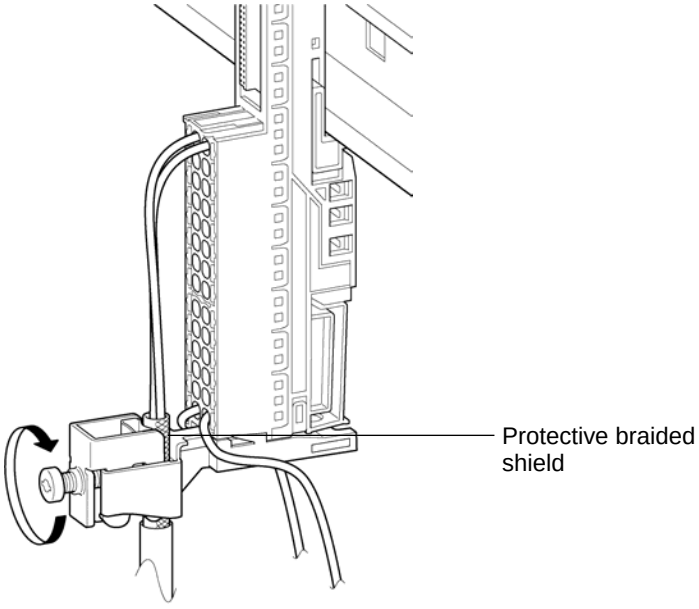
6 Choose the shield terminal clamp position to suit the size of the shield support and cable thickness, then insert into the shield support.

There are two clamp positions on the shield terminal.
Clamp position 1: Clamp space height 1.9 to 15.5 mm
Clamp position 2: Clamp space height 10.9 to 23.5 mm



7 Tighten the bolt on the shield terminal. (Tightening torque: approx. 0.5 Nm)

Check to confirm here that the shield terminal is in full contact with the exposed protective braided shield.

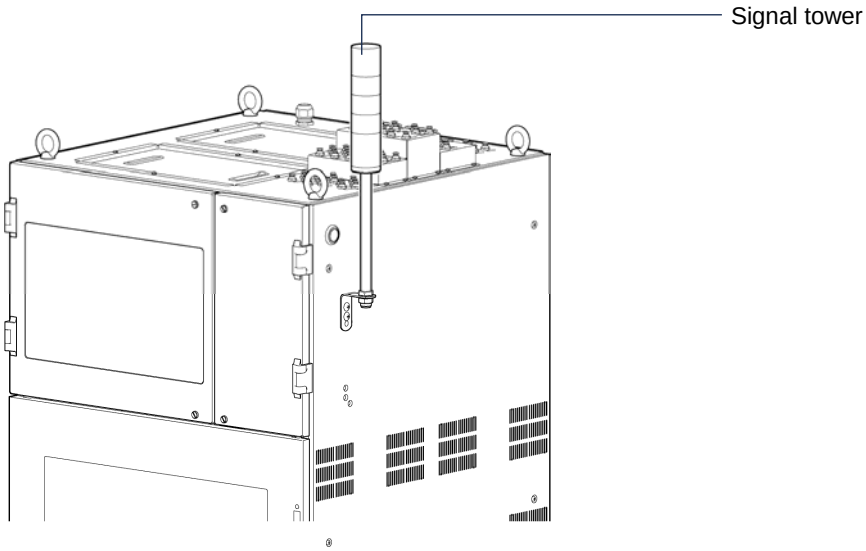


NOTE

- There is no shield terminal on the base unit.
  Secure the shield terminal of the anti-noise accessory only when at least one cable is connected to the base unit.

12-5 FPM-80A status display using the signal tower (option)

The signal tower can be installed on the side of the product to provide a visual display of alarms and product fault status.



The signal tower lamp and buzzer operations are as follows:

	When normal	First alarm	Second alarm	Fault alarm	Maintenance
Red	-	Flashing	Flashing	-	-
Yellow	-	-	-	Flashing	-
Green	Lit	Lit	Lit	Lit	Flashing
Buzzer	-	Sounding	Sounding	Sounding	-

NOTE

▶ To mute the signal tower buzzer, touch the [ALARM RESET] button on the product touch panel.

<Signal tower model>
The signal tower used is manufactured by PATLITE Corporation.
The model of the signal tower is shown below.
For more information on the signal tower lamp and buzzer specifications, refer to the relevant product page on the PATLITE website.

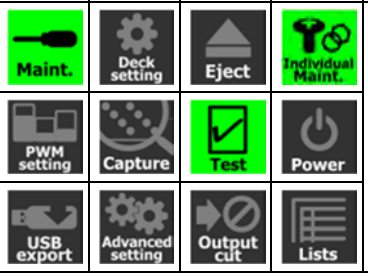
- Signal tower (⌀60): LR6-302LJBW-RYG

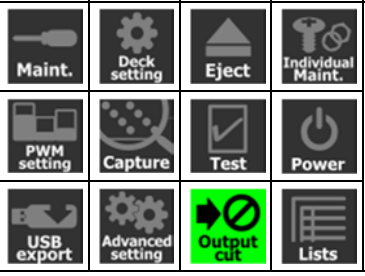
13

Appendix 2

13-1 Access permissions required for operating the product

Operation	Required access permission (icon lit up green)	Reference
• Checking individual deck settings • Checking individual port settings		5-7-1 Checking deck settings (SETTING-Deck screen) 5-7-2 Checking individual deck port settings (SETTING-Deck-Port screen)
• Stopping operation		5-8 Stopping operation
• Displaying individual deck setting screens • Displaying individual port setting screens		6-3-2 Displaying the SETTING-Deck screen 6-3-3 Displaying the SETTING-Deck-Port screen
• Setting tape unit decks*		6-4 Deck settings (tape unit)
• Setting tape unit ports*		6-5 Port settings (tape unit)

Operation	Required access permission (icon lit up green)	Reference
• Setting pyrolyzer unit decks*		6-6 Deck settings (pyrolyzer unit)
• Setting pyrolyzer unit ports*		6-7 Port settings (pyrolyzer unit)
• Checking colored marks on detection tape • Displaying Summary screen • Checking operation history • Displaying Trend screen • Checking operation history trend information		7-1-2 Checking colored marks on the detection tape 7-2 Checking the operation history (Summary screen) 7-3 Checking operation history trend information (Trend screen)
• Setting port tag names		7-4 Tag name settings
• Adjusting sample gas flow rate		8-2 Sample gas flow rate adjustment (FLOW screen)
• Displaying TEST screen • Performing alarm tests		8-3 Performing alarm tests (TEST screen)

Operation	Required access permission (icon lit up green)	Reference
• Displaying Optical Verification screen • Performing optical checking		8-4 Optical checking (Optical Verification screen)
• Removing gas detection cassette tape		8-5 Gas detection cassette tape replacement
• Replacing dust filters		8-6-2 Replacing dust filters
• Saving data		8-7 Saving data
• Setting IP address • Enabling gateway		12-1-2 Setting the IP address 12-2-2 Enabling the gateway
• Cutting off setting output from PLC		12-4 External output settings for output units (option)

* For more information on deck and port settings, refer to ‘6-3-1 Settings lists’.

14

Appendix 3

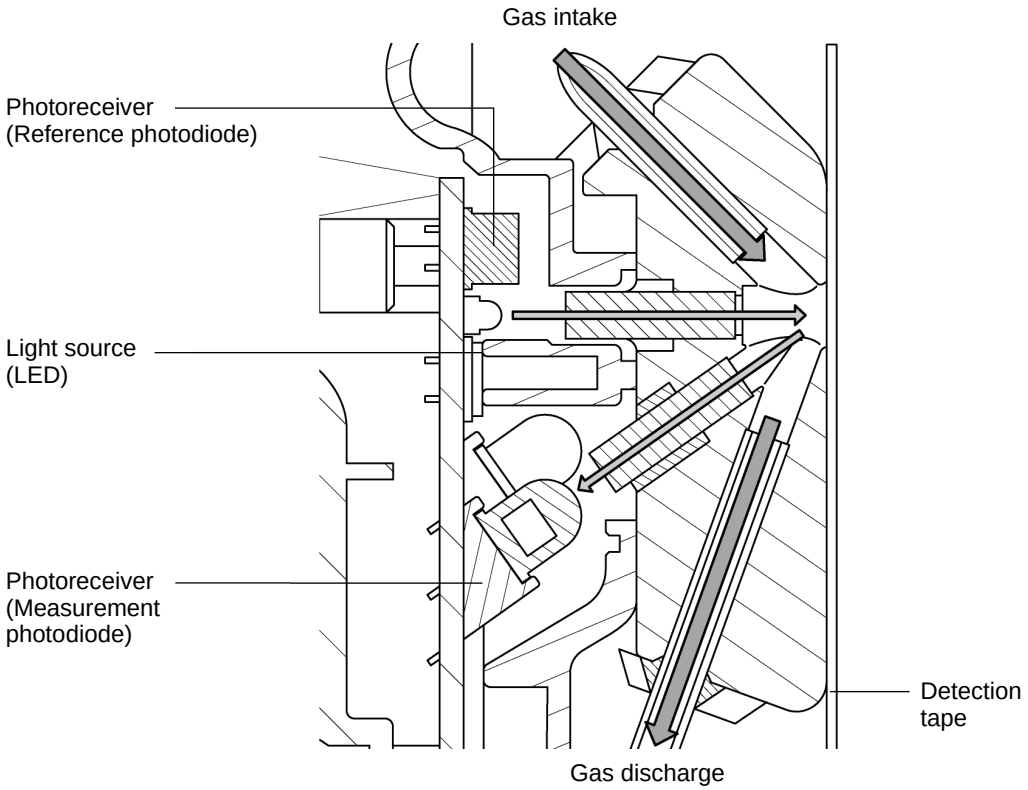
14-1 Detection principle

When the detection target gas comes into contact with cellulose tape impregnated with a detection reagent, a color reaction occurs, creating a colored mark on the detection tape. Trace levels of toxic gases can be detected and quantified by measuring the light reflected from the surface of the detection tape and detecting colored marks caused by contact with gas.
A reference photodiode receives direct light from the light source to prevent false alarms caused by fluctuations in the light source.
The gas chamber in which the detection tape is exposed to the detection target gas is a light-shielded enclosure containing a photoemitter and a photoreceiver.
When the gas comes into contact with the detection tape, a chemical reaction causes the tape to change color. For example, when phosphine (PH_3) comes in contact with the tape, colloidal silver is generated, as shown in the following reaction equation, turning the white tape black.

$$PH_3 + AgClO_4 \rightarrow Ag + H_3PO_4 + {}^1/_2\,Cl_2$$

The degree of color change is detected as a variation in the intensity of the light reflected from the tape. The rate of change in the intensity of this reflected light is referred to as the response value to the gas concentration, and the gas concentration can be determined from the response value of the detection target gas using a pre-determined calibration curve.

<Color change principle mechanism>



14-2 Radio law certification

The product is certified as complying with radio laws in individual countries and regions as follows.
The product cannot be used in countries not listed in this document. Keep this precaution in mind.
Note that the following actions are prohibited by radio laws. The user and/or retailer may be subject to punishment if prohibited actions are committed.

- Use in countries or regions in which radio law certification has not been obtained
- Sale in countries or regions in which radio law certification has not been obtained
- Disassembly or modification
- Removal of certification labels

<Wireless specifications>

- Air interface standards: ISO/IEC 15693
- Frequency: 13.56 MHz

Radio law certification (country/region)	Description
SRRC (China)	Certification not required due to short-range wireless device
FCC compliance (United States)	FCC NOTICE This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. FCC WARNING Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. The following sentence has to be displayed on the outside of the device in which the transmitter module is installed: "Contains FCC ID: MK4TR3-C202-A0-1"
NCC (Taiwan)	根據 NCC LP0002 低功率射頻器材技術規範_章節 3.8.2: 取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。 低功率射頻器材之使用不得影響飛航安全及干擾合法通信;經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。 前述合法通信，指依電信管理法規定作業之無線電通信。 低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。
RE Directive (EU countries)	CE We declare that this equipment complies with the basic requirements of Directive 2014/53/EU and other relevant provisions.

KCC (Korea)	Identification code:GD5-FPM-80A Applicant: RIKEN KEIKI Co., Ltd. Product name: Multi-Point Toxic Gas Detection System Manufacturer: RIKEN KEIKI Co., Ltd. Country of manufacture: Japan National Radio Research Agency (NRRA) website link: https://www.rra.go.kr/selform/GD5-FPM-80A RFID module certification registration No.: R-R-GD5-TR3-C202-A0-1
IMDA (Singapore)	Certification label: Comlies with IMDA Standards DA107653

14-3 Warranty policy

Product warranty

1. In the event of defects, we will repair the product at no cost within the warranty period as long as the product has been used correctly in accordance with the operating manual, labels affixed to the product, and other such warnings.
   - Warranty period: 12 months from the date on which the power is first turned on or 18 months from the date of purchase, whichever is shorter
2. For information about repairs, maintenance, and after sales servicing, please contact RIKEN KEIKI.
3. When on-site repairs are required at remote locations, we will request that you defray the cost of traveling to the site.
4. Even within the warranty period, a fee will be charged for repairs in the following cases:
   (a) When the fault or damage is the result of erroneous operation, unwarranted repair, or modification
   (b) When faults or damages are due to the item being repaired or modified at service agencies other than RIKEN KEIKI or service agencies designated by RIKEN KEIKI
   (c) When the fault or damage is due to the item being incorrectly moved, transported, toppled, dropped, or stored after the product was purchased
   (d) When the faults or damages are due to external factors such as; acts of providence such as fire, earthquake, flood, lightning strikes, etc.; pollution; abnormal voltage; use of power sources outside of rated ranges (voltage, frequency); etc.
   (e) When the cause of the fault lies other than with this product
   (f) Replacement of consumable parts (e.g., filters and batteries)

Revision history

Issue	Revision details	Issue date
0	First issue	2025.7.14
1	Complete Revision	2026.3.23
2	Clerical corrections, Words added	2026.4.22