

QUICK REFERENCE GUIDE

FI-8000 - Fumigation



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1. Safety Information

Do not use the concentration meter in a place where the temperature drops below -20°C or rises over 50°C.

- The operating temperature of the concentration meter is -20 to 50°C. Do not use the concentration meter at higher temperatures, humidity levels, or pressures, or at temperatures outside the operating range.
- Avoid long-term use of the concentration meter in a place exposed to radiant heat (infrared rays emitted from a high-temperature object) or direct sunlight.
- Do not store the concentration meter in a sun-heated car.

Observe the operating restrictions to prevent condensation inside the concentration meter or gas sampling hose. Condensation forming inside the concentration meter or gas sampling hose can cause clogging or gas adsorption, which may compromise the accuracy of gas measurements. Thus, condensation must be avoided. In addition to the operating environment, carefully monitor the temperature/humidity of the sampling point to prevent condensation inside the concentration meter or gas sampling hose. Please observe the operating restrictions.

Never fail to perform regular maintenance.

Never fail to perform regular maintenance to ensure safety. Continuing to use the concentration meter without performing maintenance will result in inaccurate gas measurement.

Specification for safety

Ex ia IIC T4 Ga

Ambient temperature range for use : -20°C to +50°C

Ambient temperature range during battery charging : 0°C to +40°C

Certificate numbers

IECEx Certificate number : IECEx PRE 14.0061

ATEX Certificate number : Presafe 14 ATEX 5711

List of standards

IEC 60079-0 : 2011 • EN60079-0:2012

IEC 60079-11 : 2011 • EN60079-11:2012

IEC 60079-26 : 2006 • EN60079-26:2007

WARNING

DO NOT CHARGE IN HAZARDOUS LOCATION.

DO NOT CHARGE IT EXCEPT BY GENUINE CHARGER.

DO NOT REPLACE BATTERY UNIT IN HAZARDOUS LOCATION.

DO NOT REPLACE DRY BATTERIES IN HAZARDOUS LOCATION.

DO NOT ATTEMPT TO DISASSEMBLE OR ALTER THE INSTRUMENT.

USE ONLY WITH CONNECTED ALKALINE AA BATTERY, TYPE LR6 MANUFACTURED BY TOSHIBA.

2. Main Unit and Accessories

After opening the package, check the main unit and accessories.
If any item in the following list is missing, contact control Equipment.

<Main Unit>

FI-8000 main unit



Dry battery unit (BUD-8000(F))

< Standard Accessories >

- Alkaline dry battery x 3



- Gas sampling hose x 1



- Shoulder strap x 1



- junction tubes x 3



Calcium Chloride filter tube x 2

-



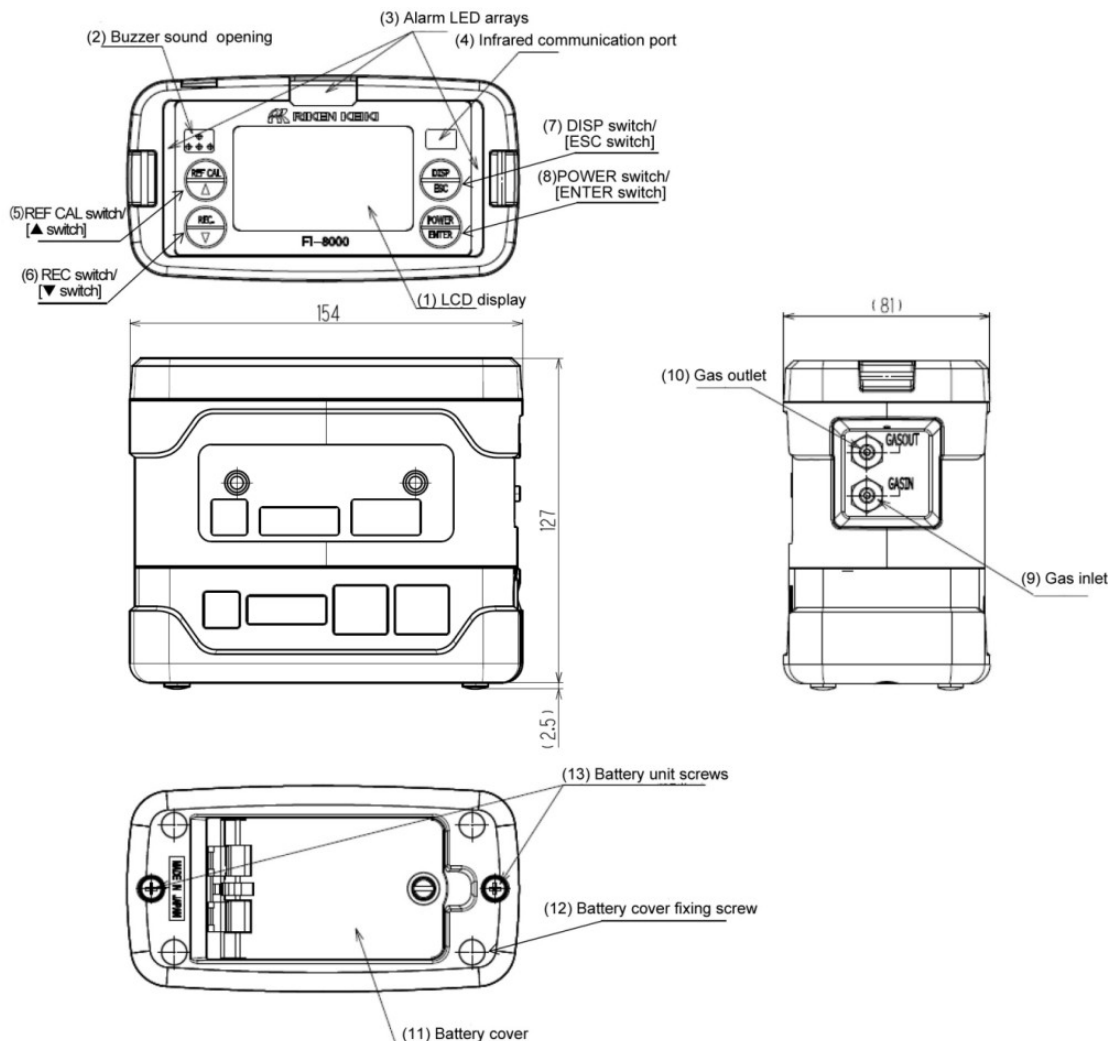
- Soda Lime filter tube x 1



- Clear filter holder x1

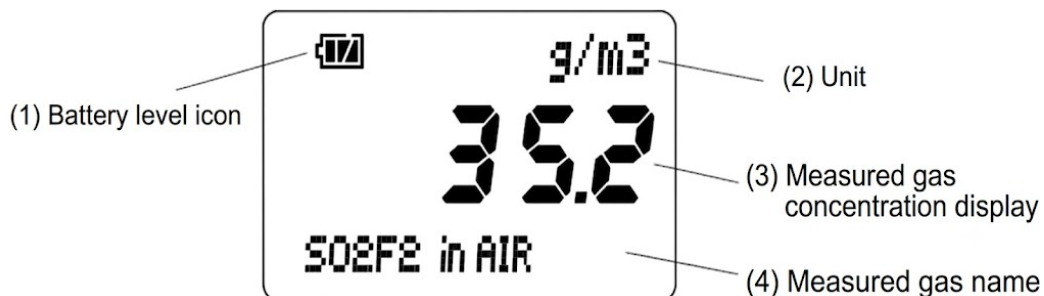


3. Product Diagram



(1)	LCD display	Displays a measuring gas name, concentration, error, etc.
(2)	Buzzer sound opening	Emits a buzzer sound at power-on/off or error occurrence. (Do not block it.)
(3)	Alarm LED arrays	The lamp blinks in response to error occurrence.
(4)	Infrared communication port	Used to carry out data communications with a PC in data logger mode.
(5)	REF CAL switch [▲ switch]	Used to perform reference gas calibration. [Used to enter numerical values or move a screen.]
(6)	REC. switch [▼ switch]	Used to save measurement results in the measuring mode. [Used to enter numerical values or move a screen.]
(7)	DISP switch [ESC switch]	Displays detailed information such as the range of measuring gas. [Used to stop processing and to do others.]
(8)	POWER switch [ENTER switch]	Turns ON/OFF the power. [Used to make a selection in the setup and recording measurement modes.]
(9)	Gas inlet	Draws in a gas (do not block it). The gas sampling hose is connected.
(10)	Gas outlet	Discharges a gas drawn into the concentration meter (do not block it). (A handy aspirator is attached for the handy aspirator specification type.)
(11)	Battery cover	Opened or closed when replacing dry batteries.
(12)	Battery cover fixing screw	Fix the battery cover.
(13)	Battery unit screws	Loosened to detach and replace the battery unit.

4. LCD Display (Measuring Mode)



(1)	Battery level icon	Displays the battery level. See the information below for the meanings of battery level icons.
(2)	Unit	Displays a unit of gas concentration.
(3)	Measuring gas concentration display	Displays the gas concentration as numeric output.
(4)	Measuring gas name	Displays the measuring gas name.

NOTE

The meanings of battery level icons are as follows:



Sufficient



Low



Needs replacement

If the battery level drops further, the inside of the battery icon starts blinking



5. Warnings



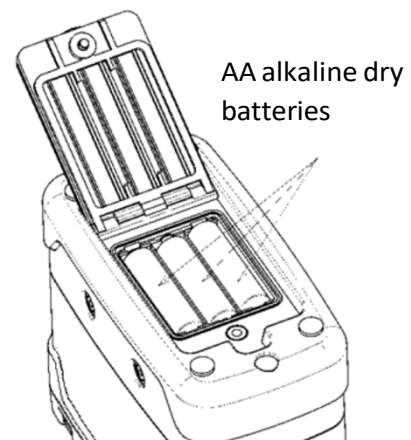
Special caution

Measuring gases are highly toxic.

Carefully handle the gases discharged from the gas outlet (GAS OUT) and take sufficient safety measures.

5-1. Batteries

- Use AA alkaline batteries. Rechargeable batteries cannot be used.
- Use specified AA alkaline batteries (LR6 or EN91) for the dry battery unit.
- Do not attach and remove batteries in the dry battery unit in a hazardous location.
- If the FI-8000 is not used for a long time, store it after removing the batteries.
- Failure to follow the instructions above can lead to damage and the warranty being voided.



6. Filter Maintenance

Please check that both the Calcium Chloride (moisture absorption) and Soda Lime (CO₂ scrubber) filters are dry and in good condition prior to using the unit. Calcium Chloride will clump together and dissolve when saturated with moisture. The Soda Lime filter will turn purple when saturated with CO₂ or show water droplets when damp.

NOTE

Any air leaks in the filter system will cause incorrect readings with the FI-8000

6-1. Calcium Chloride (Moisture Absorption) filter

This filter removes moisture from the sampled air and must be kept dry. It is recommended that this filter be checked prior to each use of the unit. When it becomes saturated, the desiccant will clump together, and you will be able to see it easily.

DO NOT attempt to remove stuck chemical with a hard implement or you may break the glass tube.

To replace the Calcium Chloride, unscrew the end caps and remove the glass tube. Remove the 2 cotton filters and rinse the glass tube under cold water until all the old Calcium Chloride has dissolved. Allow the glass tube to dry completely. Fit 1 new cotton filter in one end, refill with new Calcium Chloride, then add the second cotton filter to the remaining end. Put the glass tube back into the filter tube and screw on both end caps.

Please note: When installing the cotton filters, it is very important not to put in so much that it restricts airflow. Put in just enough to stop the chemical from blocking the end caps. 1/3 or 1/4 of a cotton bud is sufficient.

6-2. Soda Lime (CO₂ Scrubber) filter

This filter removes Carbon Dioxide from the sampled air. It will not require replacement as frequently as Calcium Chloride, but it should still be checked before each use of the instrument.

The Soda Lime will turn purple if saturated with Carbon Dioxide or will look damp/waterlogged if it has sucked in too much moisture.

To replace the Soda Lime, unscrew the end caps and remove the glass tube. Remove the 2 cotton filters and tip out the old Soda Lime. If it's stuck in the glass tube, you can try rinsing it with water to loosen it. Allow the glass tube to dry completely. Fit 1 new cotton filter in one end, refill with new Soda Lime, then add the second cotton filter to the remaining end. Put the glass tube back into the filter tube and screw on both end caps.

Please note: When installing the cotton filters, it is very important not to put in so much that it restricts airflow. Put in just enough to stop the chemical from blocking the end caps. 1/3 or 1/4 of a cotton bud is sufficient.

7. Fumigation Gas Specification

Selectable gases and measuring ranges

	Measuring gas type (Display characters)	Measuring range (Minimum digit)	Drift amount*
1	Methyl bromide in AIR (CH ₃ Br in AIR)	0 - 200 g/m ³ (0.2 g/m ³)	±5.0 g/m ³
2	Methyl bromide in AIR (CH ₃ Br in AIR)	0 - 200 oz/1000cft (0.2 oz/1000cft)	±5.0 oz/1000cft
3	Sulfuryl fluoride in AIR (SO ₂ F ₂ in AIR)	0 - 200 g/m ³ (0.5 g/m ³)	±7.0 g/m ³
4	Sulfuryl fluoride in AIR (SO ₂ F ₂ in AIR)	0 - 200 oz/1000cft (0.5 g/m ³)	±7.0 oz/1000cft
5	Phosphine in AIR (PH ₃ in AIR)	0 - 50 g/m ³ (0.1 g/m ³)	±2.1 g/m ³
6	Phosphine in AIR (PH ₃ in AIR)	0 - 50 oz/1000cft (0.1 g/m ³)	±2.1oz/1000cft
7	Cyanogen in AIR (C ₂ N ₂ in AIR)	0 - 300 g/m ³ (0.1 g/m ³)	±2.90 g/m ³
8	Cyanogen in AIR (C ₂ N ₂ in AIR)	0 - 50 g/m ³ (0.1 g/m ³)	±2.90 g/m ³

Interferometric chamber length: 48 mm

Reading accuracy: ±(Reading - REF CAL value) x 0.03

REF CAL value: A value that should be read in measuring a reference gas
 Drift amount: Reading accuracy Special caution
 Reading accuracy: The accuracy right after reference gas calibration (REF CAL)

8. Operating Procedures

For operating instructions specific to the required fumigant measurement, please refer to the sections listed below.

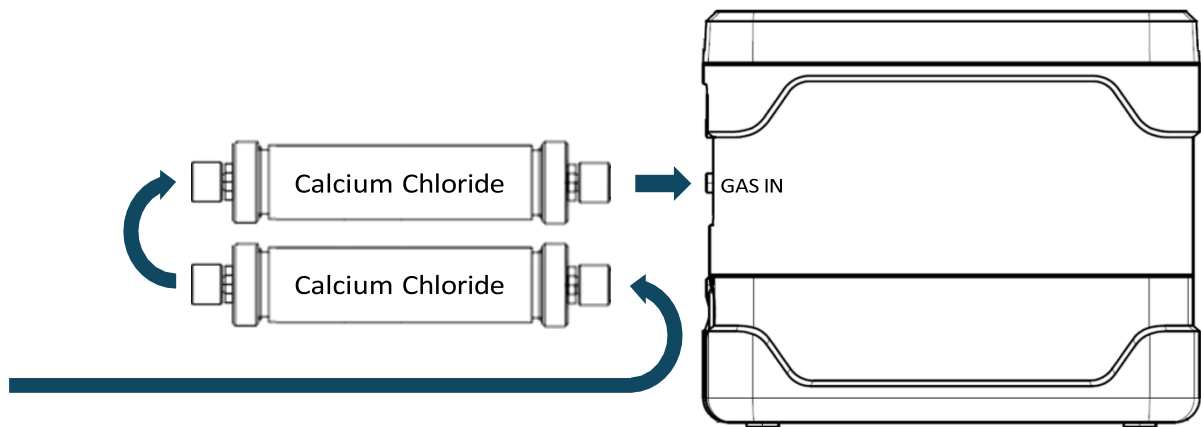
8-1 Sulfuryl fluoride (SO₂F₂) P.10
 8-2 Methyl Bromide (CH₃Br) P.12
 8-3 Phosphine (PH₃) P.14
 8-4 Cyanogen (C₂N₂) P.16

8-1. Sulfuryl fluoride (SO₂F₂)

These instructions are for measuring Sulfuryl fluoride (SO₂F₂) in either 0-200g m/3 or 0-200 oz/1000cft.

8-1.1. Filter Configuration

Before using the FI-8000, check and make sure the filters are in good condition as per 6 Filter Maintenance (on page 8.). Using the provided junction tubes with connectors, connect the filters as shown in the diagram below before connecting to the GAS IN port on the FI-8000.



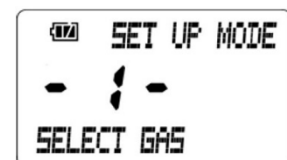
8-1.2. Stat Up

1. **Turn the unit on** - Press & hold **POWER | ENTER** for 3 seconds until the unit beeps.
2. **Self-check** – Allow the unit to complete its self-check until the measurement screen is displayed.
3. **Gas and units** – Verify the gas type in the bottom of the display is set to SO₂F₂ and the units (g/m³ or oz/1000cft) are correct. If not please follow 8-1.3 Changing the Measurement Gas.

8-1.3. Changing the Measurement Gas

This mode allows the measurement gas and units to be changed if not set to SO₂F₂ or the correct units.

1. Ensure the unit is turned off. Turn the unit on and enter setup mode by pressing **POWER | ENTER** while holding **REFCAL | ▲**.
2. Press **POWER | ENTER** to select "1 - SELECT GAS" from the menu
3. Press **POWER | ENTER** again and the number in the top right corner will start to blink
4. Use the up and down arrows to select the desired measurement gas and units and press **POWER | ENTER** to save
5. Cycle down to "6 - START MEAS" in the menu and press **POWER | ENTER** to start the unit



8-1.4.Reference Calibration

1. **Perform the reference calibration** - Ensure you are in a clean-air environment that allows fresh air to flow through the FI-8000 and filter system.
2. **60-second warm-up** – After 60 seconds, press and hold **REFCAL** | ▲ for 3 seconds until the unit beeps and the reading displays 0.0.
3. **Reference Calibration complete** - The FI-8000 is ready for use.

THIS MUST BE DONE IN A CLEAN AIR ENVIRONMENT

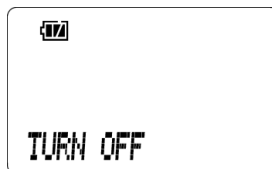


4. **Repeat** – A reference calibration can be performed at any point by following the steps 1-3 above.

8-1.5.How to Exit

After measurement, have the concentration meter draw in fresh air from GAS IN and discharge the remaining measuring gas inside.

To turn off the power, hold down the **POWER** | **ENTER** switch. The buzzer sounds three times. Hold down the **POWER** | **ENTER** switch until the screen display disappears to turn off the power.

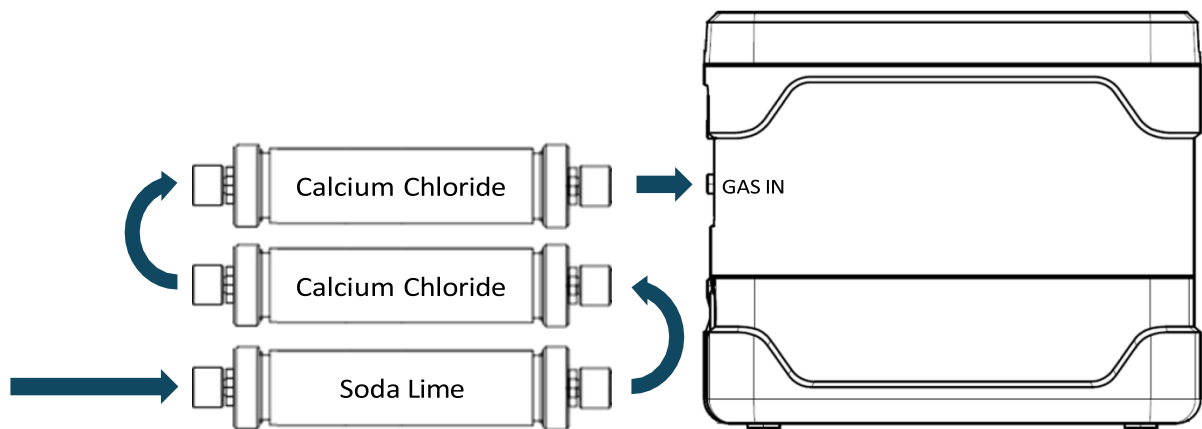


8-2. Methyl Bromide (CH₃Br)

These instructions are for measuring Methyl Bromide (CH₃Br) in either 0-200 g m³ or 0-200 oz/1000cft.

8-2.1. Filter Configuration

Before using the FI-8000, check and make sure the filters are in good condition as per 6 Filter Maintenance (on page 8.). Using the provided junction tubes with connectors, connect the filters as shown in the diagram below before connecting to the GAS IN port on the FI-8000.



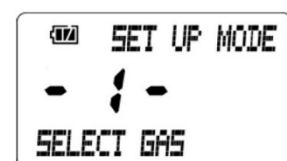
8-2.2. Stat Up

1. **Turn the unit on** - Press & hold **POWER | ENTER** for 3 seconds until the unit beeps.
2. **Self-check** – Allow the unit to complete its self-check until the measurement screen is displayed.
3. **Gas and units** – Verify the gas type at the bottom of the display is set to CH₃Br and the units (g/m³ or oz/1000cft) are correct. If not, please follow **Error! Reference source not found.**

8-2.3. Changing the Measurement Gas

This mode allows the measurement gas and units to be changed if not set to CH₃Br or the correct units.

6. Ensure the unit is turned off. Turn the unit on and enter setup mode by pressing **POWER | ENTER** while holding **REFCAL | ▲**.
7. Press **POWER | ENTER** to select "1 - SELECT GAS" from the menu
8. Press **POWER | ENTER** again, and the number in the top right corner will start to blink
9. Use the up and down arrows to select the desired measurement gas and units, and press **POWER | ENTER** to save
10. Cycle down to "6 - START MEAS" in the menu and press **POWER | ENTER** to start the unit



8-2.4.Reference Calibration

5. **Perform the reference calibration** - Ensure you are in a clean-air environment that allows fresh air to flow through the FI-8000 and filter system.
6. **60-second warm-up** – After 60 seconds, press and hold **REFCAL | ▲** for 3 seconds until the unit beeps and the reading displays 0.0.
7. **Reference Calibration complete** - The FI-8000 is ready for use.

THIS MUST BE DONE IN A CLEAN AIR ENVIRONMENT

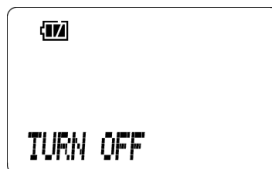


8. **Repeat** – A reference calibration can be performed at any point by following the steps 1-3 above.

8-2.5.How to Exit

After measurement, have the concentration meter draw in fresh air from GAS IN and discharge the remaining measuring gas inside.

To turn off the power, hold down the **POWER | ENTER** switch. The buzzer sounds three times. Hold down the **POWER | ENTER**

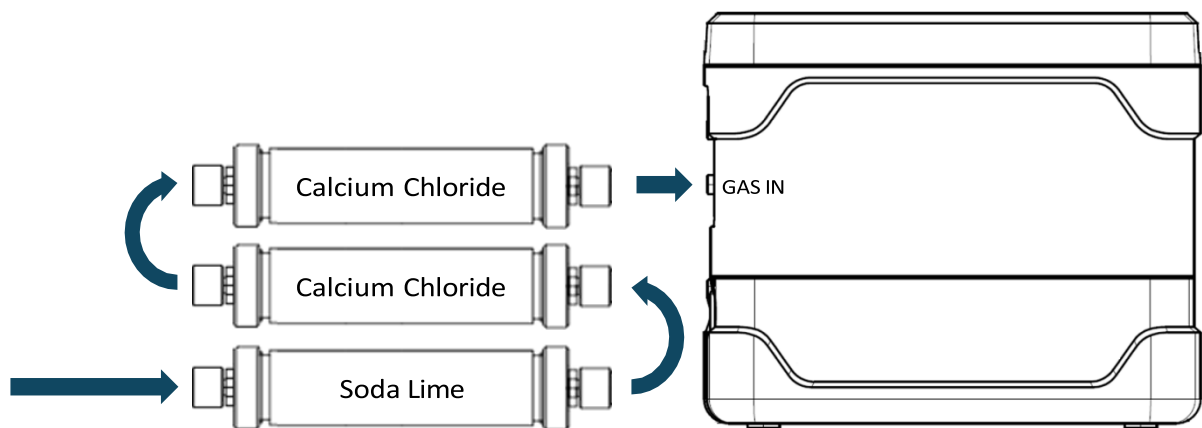


8-3. Phosphine (PH₃)

These instructions are for measuring Phosphine (PH₃) in either 0-50 g m/3 or 0-50 oz/1000cft.

8-3.1. Filter Configuration

Before using the FI-8000, check and make sure the filters are in good condition as per 6 Filter Maintenance (on page 8.). Using the provided junction tubes with connectors, connect the filters as shown in the diagram below before connecting to the GAS IN port on the FI-8000.



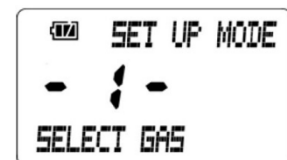
8-3.2. Stat Up

1. **Turn the unit on** - Press & hold **POWER | ENTER** for 3 seconds until the unit beeps.
2. **Self-check** – Allow the unit to complete its self-check until the measurement screen is displayed.
3. **Gas and units** – Verify the gas type at the bottom of the display is set to CH₃Br and the units (g/m³ or oz/1000cft) are correct. If not, please follow **Error! Reference source not found.**

8-3.3. Changing the Measurement Gas

This mode allows the measurement gas and units to be changed if not set to PH₃ or the correct units.

11. Ensure the unit is turned off. Turn the unit on and enter setup mode by pressing **POWER | ENTER** while holding **REFCAL | ▲**.
12. Press **POWER | ENTER** to select "1 - SELECT GAS" from the menu
13. Press **POWER | ENTER** again, and the number in the top right corner will start to blink
14. Use the up and down arrows to select the desired measurement gas and units and press **POWER | ENTER** to save
15. Cycle down to "6 - START MEAS" in the menu and press **POWER | ENTER** to start the unit



8-3.4.Reference Calibration

9. **Perform the reference calibration** - Ensure you are in a clean-air environment that allows fresh air to flow through the FI-8000 and filter system.
10. **60-second warm-up** – After 60 seconds, press and hold **REFCAL | ▲** for 3 seconds until the unit beeps and the reading displays 0.0.
11. **Reference Calibration complete** - The FI-8000 is ready for use.

THIS MUST BE DONE IN A CLEAN AIR ENVIRONMENT

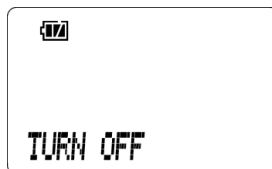


12. **Repeat** – A reference calibration can be performed at any point by following the steps 1-3 above.

8-3.5.How to Exit

After measurement, make the concentration meter draw fresh air from GAS IN and discharge the measuring gas remaining inside.

To turn off the power, hold down the **POWER | ENTER** switch. The buzzer sounds three times. Hold down the **POWER | ENTER**

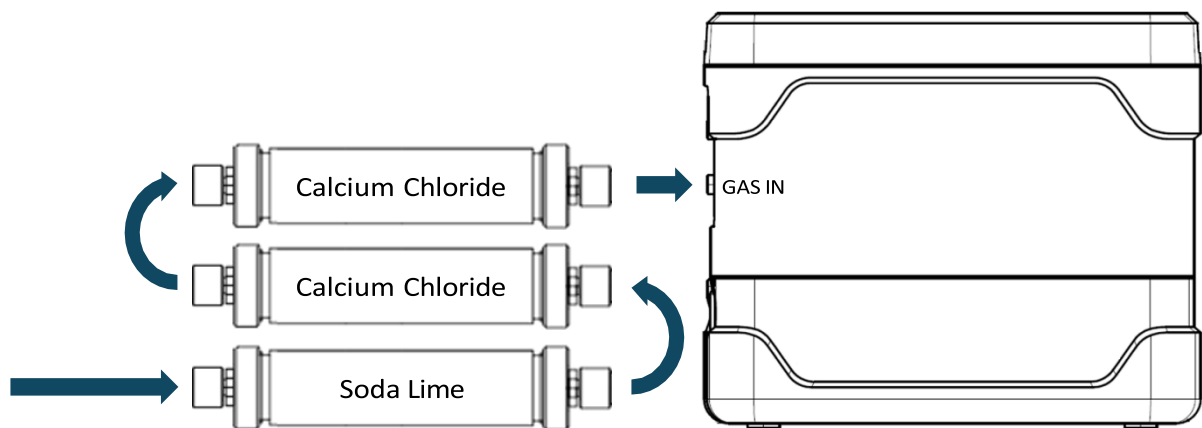


8-4. Cyanogen (C₂N₂)

These instructions are for measuring Cyanogen (C₂N₂) in either 0-50 g m/3 or 0-300 g m/3

8-4.1. Filter Configuration

Before using the FI-8000 check and make sure the filters are good condition as per 6 Filter Maintenance (on page 8.). Using the provided junction tubes with connectors, connect the filters as shown in the diagram below before connecting to the GAS IN port on the FI-8000.



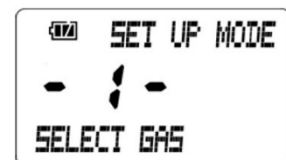
8-4.2. Stat Up

4. **Turn the unit on** - Press & hold **POWER | ENTER** for 3 seconds until the unit beeps.
5. **Self-check** – Allow the unit to complete its self-check until the measurement screen is displayed.
6. **Gas and units** – Verify the gas type in the bottom of the display is set to CH₃Br and the units (g/m³ or oz/1000cft) are correct. If not please follow **Error! Reference source not found.**
Error! Reference source not found..

8-4.3. Changing the Measurement Gas

This mode allows the measurement gas and units to be changed if not set to C₂N₂ or the correct units.

16. Ensure the unit is turned off. Turn the unit on and enter setup mode by pressing **POWER | ENTER** while holding **REFCAL | ▲**.
17. Press **POWER | ENTER** to select "1 - SELECT GAS" from the menu
18. Press **POWER | ENTER** again and the number in the top right corner will start to blink
19. Use the up and down arrows to select the desired measurement gas and units and press **POWER | ENTER** to save
20. Cycle down to "6 - START MEAS" in the menu and press **POWER | ENTER** to start the unit



8-4.4. Refence Calibration

13. **Perform the reference calibration** - Ensure you are in a clean-air environment that allows fresh air to flow through the FI-8000 and filter system.
14. **60-second warm-up** – After 60 seconds press and hold **REFCAL | ▲** for 3 seconds until the unit beeps and the reading displays 0.0.
15. **Reference Calibration complete** - The FI-8000 is ready for use.

THIS MUST BE DONE IN A CLEAN AIR ENVIRONMENT

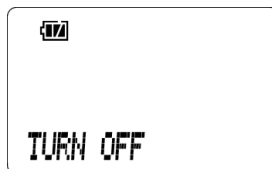


16. **Repeat** – A reference calibration can be performed at any point by following the steps 1-3 above.

8-4.5. How to Exit

After measurement, make the concentration meter draw fresh air from GAS IN and discharge the measuring gas remaining inside.

To turn off the power, hold down the **POWER | ENTER** switch. The buzzer sounds three times. Hold down the **POWER | ENTER**



9. Maintenance Interval

The instrument should be calibrated and serviced at intervals determined by usage and the environments in which it is used. For intermediate use in favourable environments, this should be carried out at least every **12 months**. For harsher environments and/or frequent use, 6-monthly servicing is recommended.

10. Troubleshooting

Symptoms	Causes	Actions
<u>The power cannot be turned on.</u>	The battery level is too low.	Dry battery unit: Turn off the power and replace all the three dry batteries with new ones in a non-hazardous area. Lithium-ion battery unit: Turn off the power and charge the batteries in a non-hazardous area.
	The POWER switch was not pressed long enough.	For power-on, keep the POWER switch pressed until a beep is heard.
	Improper installation of the battery unit	Check whether the battery unit is properly attached to the main unit.
Low battery voltage caution is displayed. (CAUTION) LOW BATTERY	The battery level is low.	Dry battery unit: Turn off the power and replace the dry batteries with new ones in a non-hazardous area.
		Lithium-ion battery unit: Turn off the power and charge the batteries in a non-hazardous area.
Low contrast caution is displayed. (CAUTION) LOW CONTRAST	The contrast of interferometric sensor has been decreased due to contamination.	Replacement or repair of the interferometric sensor is recommended. Request Control Equipment for replacement or repair.
Low UV intensity caution is displayed. (CAUTION) LOW BRIGHTNESS	The UV intensity of interferometric sensor has been dropped.	Replacement or repair of the interferometric sensor is recommended. Request Control Equipment for replacement or repair.
	Condensation occurred inside the product (light source sensor).	Draw dry air to dry the sensor.
Built-in clock error is displayed. (ERROR) CLOCK	An abnormal time setting for the internal clock was detected.	Reset date/time. If the symptom like this recurs frequently, contact Control Equipment.
Contrast error is displayed. (ERROR) LOW BRIGHTNESS	The contrast of interferometric sensor has been decreased so much due to contamination that measurement cannot be performed.	Request Control Equipment for the replacement or repair of interferometric sensor.
UV intensity error is displayed. (ERROR) LOW BRIGHTNESS	An abnormality occurred in the system.	Request Control Equipment for the replacement or repair of interferometric sensor.
System error is displayed. (ERROR)	An abnormality occurred in the system.	Request Control Equipment for repair.

SYSTEM		
Symptoms	Causes	Actions
Incorrect reading	Drifting of sensor output	Perform reference gas calibration.
	Measuring and base gases were not selected correctly.	Select measuring and base gases correctly.
	Presence of interference gas	If an interference gas (other than measuring and base gases) is included, correct measurement cannot be performed by the concentration meter. Remove the interference gas and perform measurement again.
	GAS IN/GAS OUT is not at atmospheric pressure.	The concentration meter can perform correct measurement under the atmospheric pressure only. Keep GAS IN/GAS OUT at the atmospheric pressure and then perform measurement again.
	Bended or clogged suction tube or exhaust tube	Fix the defective parts.
	Condensation is formed inside the suction tube.	Fix the defective parts.

11. Replacement parts and consumables

Description	Part No	
Internal glass tube for filters	R99.0057RK	
Moisture absorption tube complete (Calcium Chloride)	R99.0021RK	
CO2 Absorption tube complete (Soda Lime)	R99.0074RK	
Junction tube	R99.0260RK	
Clear filter holder	R99.4022RK	
Desiccant granules (Calcium Chloride) – 250 grams	R99.0021RK.CC.250	
Desiccant granules (Calcium Chloride) – 500 grams	R99.0021RK.CC.500	
CO2 Absorption Tube granules (Soda Lime) – 250 grams	R99.0074RK.CO2.250	
CO2 Absorption Tube granules (Soda Lime) – 500 grams	R99.0074RK.CO2.500	

12. Instructional Videos



**View all instructional
videos on our website**

Scan the QR Code

FI-8000 Portable Fumigation 8-Gas Monitor



Features

- Capable of measuring up to 8 kinds of gases
- Gas can be selected with key operation
- Direct digital readout
- Built in sampling pump
- Highly accurate measurement with CCD and Fourier analysis technology
- Data logging stores up to 100 readings
- Few consumable parts save on maintenance costs

12-1. FI-8000 - Startup Procedure for SO₂F₂



Scan to view on YouTube



12-2. FI-8000 - Startup Procedure for CH₃Br, PH₃ & C₂N₂



Scan to view on YouTube



12-3. FI-8000 – Unit Configuration



Scan to view on YouTube



12-4. FI-8000 - Filter Maintenance



Scan to view on YouTube



12-5. FI-8000 – Downloading Data



Scan to view on YouTube

