Olfactory Detector Port OP275

Operations Manual

GL Sciences Inc.
22-1 Nishishinjuku 6-chome, shinjuku-ku, Tokyo 163-1130,Japan

Please Read

- The copyright of this manual is the property of GL Sciences. This manual may not be reprinted in part or in full without permission.

- For improvement purposes, the content, specifications or appearance are subject to change without notice.

- All care has been taken in the preparation of this document, however, should you discover any omissions or mistakes in the document please feel free to contact your nearest GL Sciences dealer for assistance.

About trademarks

☆Silcosteel® is a registered trademark of Restek Corporation.
☆Vespel® is a registered trademark of DuPont.
☆Windows® is a registered trademark of Microsoft.
☆Other company and product names appearing herein are trademarks or registered trademarks of those companies respectively.

Thank you for purchasing the OP275 Olfactory Detector Port.

Preface

This manual describes the OP275 Olfactory Detector Port options, functions, troubleshooting and operations.
To ensure prolonged reliability and performance, be sure to thoroughly read this manual before installing and operating the instrument.

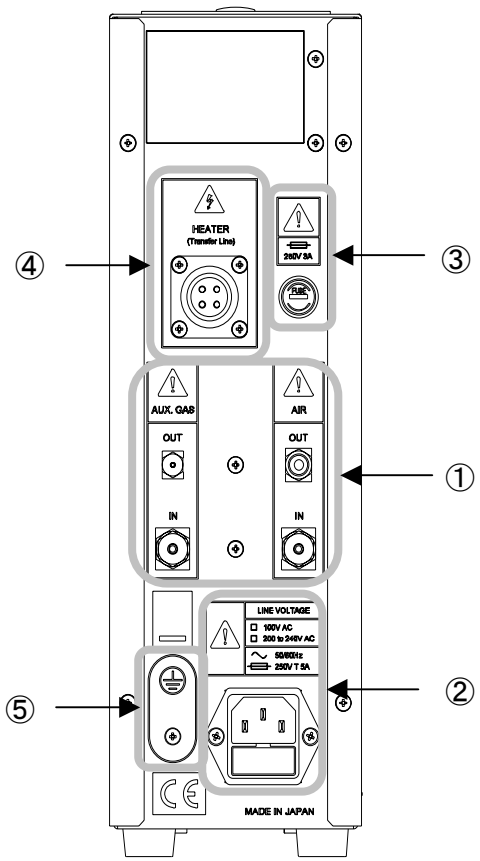
Attention!

This manual contains essential information to ensure safe and correct operating procedures, and prolonged, reliable performance. Especially for safety considerations, pay close attention to the warnings and signals listed below as they appear in this manual.

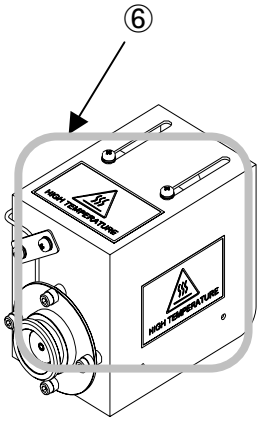
Warning 	Indicates that incorrect operation of the instrument can cause serious injury or death to the user.
Caution 	Indicates that incorrect operation of the instrument can cause minor injury or damage.
Attention!	Indicates that incorrect operation can result in damage to the instrument or adversely affect performance.
Note!	Indicates useful information or considerations regarding operation.

Warnings Displayed on the Instrument

Warning labels are shown in various places the product to ensure safety during installation and operation of the instrument. Please pay close attention to them during installation and use.



OP275



Cover

①

Warning To reduce the risk of damage, fire or explosion, do not use flammables, explosives or corrosive gas near the instrument.

②

Warning To prevent electric shock, be sure to unplug the power cable from the power outlet before replacing the fuse.

Warning To reduce the risk of damage, fire or excessive heat, connect the power cable to a properly rated and grounded 2P+E power outlet

Caution Be sure to use a fuse with the same rating when replacing the fuse.

③

Warning To prevent electric shock, be sure to unplug the power cable from the power outlet before replacing the fuse.

Caution Be sure to use a fuse with the same rating when replacing the fuse.

④

Warning To reduce the risk of electric shock or electrical leakage, do not connect a heater other than that designed for use with the transfer line.

Warning To prevent electric shock, always plug and unplug connectors after disconnecting the power cable from the power outlet. Also, do not switch the power on while connectors remain disconnected.

⑤

Caution To prevent damage to the instrument from electrical leakage, connect the supplied GND cable to the GND terminal on the transfer line.

⑥

Caution To prevent burns, never touch metallic parts and the areas surrounding them while the heater is on. Also while the heater is on, do not attempt to adjust the position of the transfer line or the nose cone.

Safety Precautions

This product is the OP275 olfactory detector port. Do not use the instrument for any purpose other than those described in this manual. To ensure safe usage, pay close attention to the following:

Warning 

The instrument is not explosion-proof. Do not use the instrument in the vicinity of volatile solvents as solvent vapor can ignite. If such a situation is unavoidable, ensure adequate ventilation in the area during usage.

This instrument delivers injected compounds for direct absorption into the human body through the nose. The use of dangerous compounds can result in serious bodily harm. Carefully check the safety of compounds before using them.

To prevent the risk of poisoning or death, do not use any liquid in the bubbling bottle other than clean water. Always make sure the bubbling bottle is clean when using it, and always clean the bubbling bottle after use.

Caution 

Do not place the instrument near any flammable materials or potential fire source.

When installing, operating and maintaining the instrument, carefully follow the procedures described herein and do not touch any parts other than those instructed.

Do not supply air to the bubbling bottle suddenly or at a flow speed greater than 50mL/min, as the bubbling bottle might break or the water might shoot out.

To prevent burns, do not arrange piping and so on while the gas chromatograph oven is hot.

To prevent burns, do not attach or adjust the transfer line while it is hot.

To prevent burns, do not use the instrument with the nose cone detached.

To prevent injury, do not force the nose cone when attaching or detaching it.

The smallest radius to which the transfer line can be bent is 70mm. Do not excessively bend or twist the transfer line as this can cause the heater line to break and result in electrical leakage.

Attention!

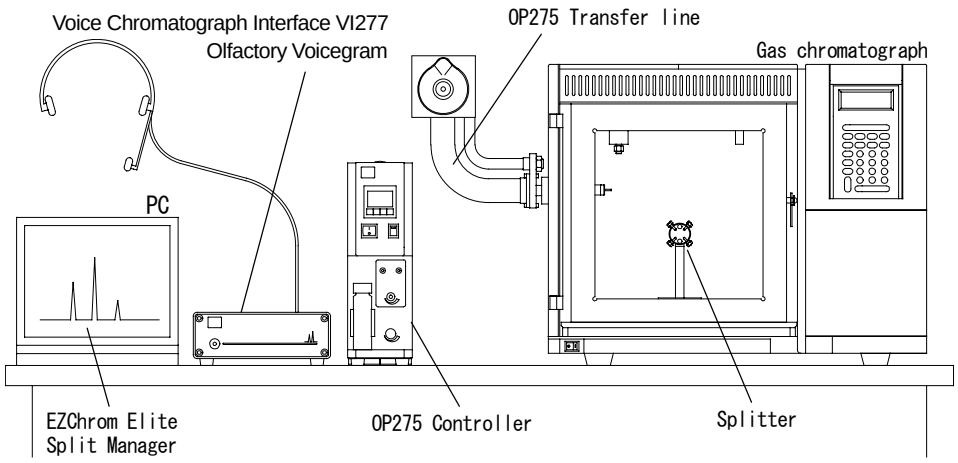
- Do not store or use the instrument in an area that is hot, damp, dusty or subject to strong vibrations.
- Do not store or use the instrument in direct sunlight.
- Install the instrument on a stable flat surface.
- Do not use the instrument in an area where there is corrosive solvent or corrosive gas.
- Do not install the instrument near devices such as high powered circuit breakers or high frequency furnaces that can cause power surges. Do not install the instrument near highly magnetic devices.
- Do not place objects on, or bend the power cable.
- Always check the piping for loose connections and leakage before use.
- Do not dismantle or modify any part of the instrument unless instructed in this manual.
- Do not adjust the internal parameters for the temperature control unit.
- For safety purposes, handling of organic solvents and so on must be carried out by persons with knowledge in this field.
- If a problem arises with the instrument, stop usage immediately, and disconnect the power cable from the power outlet.
- Do not use the transfer line for any purpose other than those described in this manual.
- To avoid breakage, do not force the nose cone when attaching it or detaching it.
- Do not hold the transfer line by the flexible arm or protective cover when adjusting its position. The protective cover might distort.

CONTENTS

1. Overview

1-1. Olfactory Detector OP275

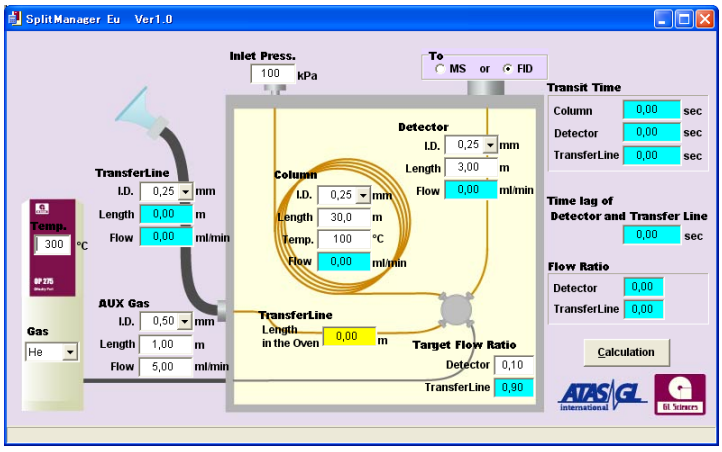
The OP275 takes a branch line from the capillary column in the gas chromatograph to the outside of the chromatograph allowing the operator to use his sense of smell (the nose) to detect compounds, a technique known as GC Olfactometry.



The OP275 is compatible with a wide range of gas chromatographs. And, since the transfer line does not have a cooling point, compounds with a high boiling point are less likely to leave residual odors around the outlet, removing the chance that subtle changes in scent may be missed, making it easier to determine compounds.

1-2. Split Manager (Split Ratio Simulation Software)

Split Manager is the split ratio simulation software application on the CD ROM provided. This allows you to make simulations by inputting analysis criteria, the split ratio (flow ratio) for the gas chromatograph and the transfer line outlet, the time it takes for samples to reach each outlet (retention time) and so on.



Conventionally, trial and error techniques are used to measure flow at each outlet to determine the optimum length and diameter for the capillary tube branching from the column. Split Manager provides a better solution than the troublesome procedure of having to repeatedly change columns and wait for the system to start up. Split Manager enables you to create a simulation beforehand and so setting up is quick and easy right from the beginning.

1-3. Features

■Can be used with high boiling point samples

Temperature settings up to 300 degrees are possible. Since there no or little high boiling point sample condensation around the outlet, there is little scent change or loss making detection of subtle scents easy.

■Sniffing possible while sitting

The transfer line is highly flexible and can be set in your desired position, making it possible to carry out sniffing while sitting.

■Protects the nasal mucous membrane from dryness

After long periods of sniffing, the nasal mucous membrane can become dry, causing the sense of smell to dull. The OP275 features a bubbling bottle that creates humidified air which is blown through the system to prevent nasal dryness experienced after long periods, hence allowing for greater sensitivity to subtle changes in scent.

■Compatible with a wide range of gas chromatographs

The transfer line can be attached to any gas chromatograph that has an access hole greater than 15 mm in diameter. However, for gas chromatographs other than the GC-4000(GL Sciences)or G-6000 (HITACHI)models, an optional adapter plate is required.

■Easy splitter ferrule removal

On the splitter tube connections there are slits for removing graphite ferrules, enabling easy removal of ferrules by inserting a tool from the side.

■Minimized sample condensation and absorption inside the splitter

The splitter is inactively treated, enabling minimization of sample condensation and absorption in the line.

■Split simulation software provided as a standard item

As a standard item, the CD-ROM provided contains Split Manager, software which enables you to input analysis criteria in advance to create a simulation in advance. Using a computer to input split ratio data beforehand and create a simulation to determine capillary tube size and so on makes setting up a simple task.

■Nose cone scent residue reduced to a minimum

When using high boiling point samples, samples can condense or become absorbed inside the conventional GC-O nose cone. This means that the operator often removes the nose cone and continues sniffing, which often results in burns to the nose. To solve this problem, the optional Nose Guard is available for the OP275, a nose cone featuring ventilation slits in the upper and lower part of the nose cone. The Nose Guard serves to reduce scent residue in the nose cone to a minimum, and act as a protector to prevent operator nose burns.

■Compact design

The controller features a compact design with the temperature control, flow control and bubbling bottle holder all contained in one unit. The external dimensions W96 × H300 × D230 mm enable the instrument to be set up in confined spaces.

■Bubbling bottle cleansing possible

The bubbling bottle attached to the controller is removable, making it easy to clean and use in a hygienic state at all times.

2. Unpacking/Installation Requirements

2-1. Unpacking

◆This is a precision instrument that includes glass parts. Handle with care while unpacking.

①Open the package, and carefully remove the packing material.

②Make sure that there is no damage to the instrument or accessories.

③Make sure that all the items are included in the package. To check the items, see '15. Packing List'.

All care has been taken in ensuring correct product shipment, however, should you find missing items or abnormalities, Please contact you nearest dealer.

2-2. Installation Requirements

Pay attention to the following when installing the instrument.

◆This instrument is not explosion proof.

Do not install the instrument in an area where there are volatile, flammable or corrosive substances, or organic solvents. Install the instrument on a flat stable surface. When using organic solvents, be sure to provide adequate ventilation, and ensure that the correct environmental requirements are met. Do not install the instrument in an area subject to drafts.

◆This product is designed for 200 to 240V AC, 50 to 60Hz(general power outlet)

To protect the instrument from lightning strike, electrical leakage, static electricity and so forth, Make sure the power cable is connected to a properly grounded 2P+E power outlet. Further, do not place the instrument near devices that can cause power surges such as a high power circuit breaker or high frequency furnace, nor place the instrument near devices that emulate strong magnetic fields.

◆The maximum power consumption is 500VA

Be sure that the power outlet to which the instrument is connected is suitably rated for the power consumption.

◆The transfer line outlet gets hot

The transfer line outlet and surrounding metallic parts get very hot. Do not use the device in areas where there is a lot of human traffic, or near flammable materials.

◆The instrument requires clean water

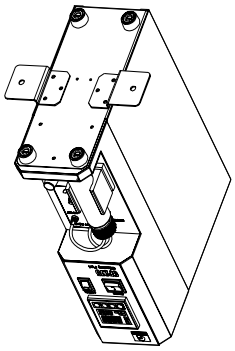
The controller uses clean water to provide humidified air. Do not place the controller on top of a gas chromatograph or electrical device. Water spillage from the instrument may result in damage to surrounding equipment.

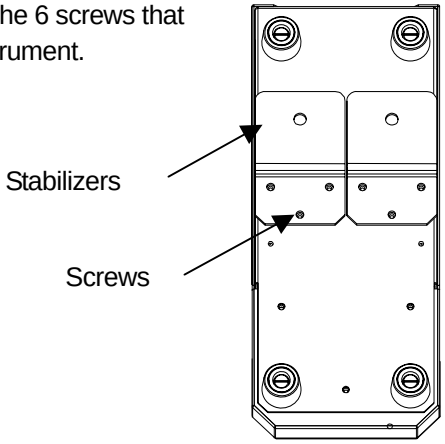
3. Preparation

3-1. Preparing the Stabilizers

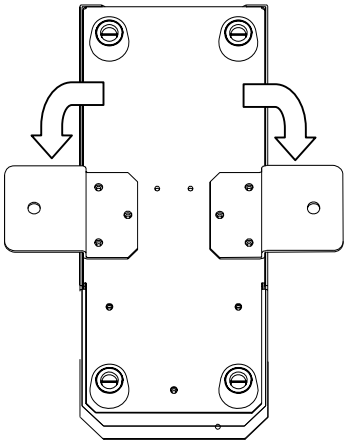
There are stabilizers attached to the base of the instrument to prevent the instrument from falling over during an earth quake or other situation. Please use the stabilizers when setting up the instrument.

① Gently turn the instrument over, and remove the 6 screws that secure the stabilizers to the bottom of the instrument.

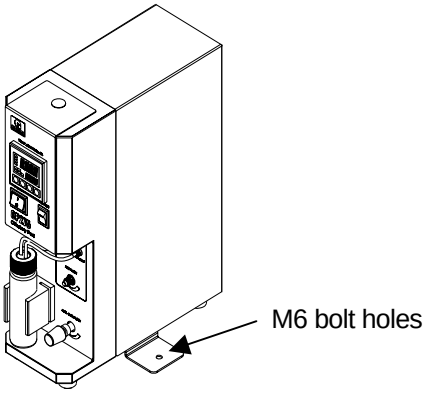




② Place the stabilizers as shown, and secure them with the 6 screws removed in ①.



③ Gently stand the instrument upright, and position it on your work bench or lab table. It is also possible to bolt the stabilizers to the bench through the M6 bolt holes as shown.



Caution 

When installing, operating and maintaining the instrument, carefully follow the procedures described herein and do not touch any parts other than those instructed.

Attention!

- **Install the instrument on a flat, stable surface.**
- **Do not dismantle or modify any part of the instrument unless instructed in this manual.**

3-2. Checking the Gas Chromatograph Type

When installing the transfer line, be sure to use the supplied GC holder. Information about gas chromatographs compatible with the holder is listed under Table 1. For other gas chromatographs, the optional adapter plate is required. Gas chromatographs compatible with the optional adapter plate are listed in Table 2.

Table 1)Gas Chromatographs Compatible with Standard Items

	Cat. No.	Part	GL Sciences	HITACHI	Remark
	P/N		GC-4000	G-6000	
1	2702-18540 275-3010	GC Holder ϕ15,M4×10 Screws	○	○	Standard item
2	2702-18550 275-3090	Arm stand	(○)	(○)	Standard item
3	2702-18508 275-4010	Mount system	(○)	(○)	Option

＊Optional mount system is also installable.

Table 2)Gas Chromatographs that Require Options

	Necessary Options		HP/Agilent	Shimadzu		Thermo
	Cat. No.	Part	6890	GC-2010	GC-17A	TRACE GC
	P/N					
1	2702-18508 275-4010	Mount system	(○)	(○)	(○)	(○)
2	2702-18551 275-4020	HP/Agilent 6890 adapter plate	○			
3	2702-18552 275-4030	Shimadzu GC-2010 adapter plate		○		
4	2702-18553 275-4040	Shimadzu GC-17A adapter plate			○	
5	2702-18554 2754060	Thermotrace GC adapter plate				○

＊Other gas chromatograph adapter plates are available by special order.

Note!

If an autosampler or mass spectrometer is set up in conjunction with the gas chromatograph, installation is may not be possible. Please check the type of gas chromatograph, installation point and connected peripheral equipment in advance.

3-3. Checking the Transfer Line Attachment Point

The options required for transfer line attachment and attachment point vary for different types of gas chromatograph. Please check the required options and attachment point to suit your gas chromatograph.

GC-4000 or G-6000

	Required Options		Transfer Line Attachment Point	Flexible arm attachment
	Cat. No. / P/N	Part		
1	(Not required)	(Not required)	GC left side	(Arm stand attachment)
2	2702-18508 / 275-4010	Mount system	GC left side	Mount system attachment

HP/Agilent 6890

	Required Options		Transfer Line Attachment Point	Flexible arm attachment
	Cat. No. / P/N	Part		
1	2702-18551 / 275-4020	HP/Agilent 6890 adapter plate	GC left side, GC top	(Arm stand attachment)
2	2702-18551 / 275-4020	HP/Agilent 6890 adapter plate	GC left side, GC top	Mount system attachment
	2702-18508 / 275-4010	Mount system		

Shimadzu GC-2010

	Required Options		Transfer Line Attachment Point	Flexible arm attachment
	Cat. No. / P/N	Part		
1	2702-18552 / 275-4030	Shimadzu GC-2010 adapter plate	GC left side, GC right side	Arm stand attachment
2	2702-18552 / 275-4030	Shimadzu GC-2010 adapter plate	GC left side, GC right side	Mount system attachment
	2702-18508 / 275-4010	Mount system		

ShimadzuGC-17A Ver.1

	Required Options		Transfer Line Attachment Point	Flexible arm attachment
	Cat. No. / P/N	Part		
1	2702-18553 275-4040	Shimadzu GC-17A adapter plate	GC left side	(Arm stand attachment)
2	2702-18553 275-4040	Shimadzu GC-17A adapter plate	GC left side	Mount system attachment
	2702-18508 275-4010	Mount system		

ShimadzuGC-17A Ver.2 and 3

	Required Options		Transfer Line Attachment Point	Flexible arm attachment
	Cat. No. / P/N	Part		
1	2702-18553 275-4040	Shimadzu GC-17A adapter plate	GC left side, GC top	(Arm stand attachment)
2	2702-18553 275-4040	Shimadzu GC-17A adapter plate	GC left side, GC top	Mount system attachment
	2702-18508 275-4010	Mount system		

Thermo TRACE GC

	Required Options		Transfer Line Attachment Point	Flexible arm attachment
	Cat. No. / P/N	Part		
1	2702-18554 275-4060	Thermo trace GC adapter plate	GC top	(not required)
2	2702-18554 275-4060	Thermo trace GC adapter plate	GC top	Mount system attachment
	2702-18508 275-4010	Mount system		

* Positions indicated in the table are as viewed from the front of the gas chromatograph.
* The maximum installation width for installing the mount system is 30mm.
* The standard accessories arm stand is attached to the flexible arm and the controller.
* All adapter plates are secured to the GC holder for the OP275.

Note!

If an autosampler or mass spectrometer is set up in conjunction with the gas chromatograph, installation is may not be possible. Please check the type of gas chromatograph, installation point and connected peripheral equipment in advance.

3-4. Checking the Gas Supply and Piping

This section describes the OP275 gas supply and piping preparation

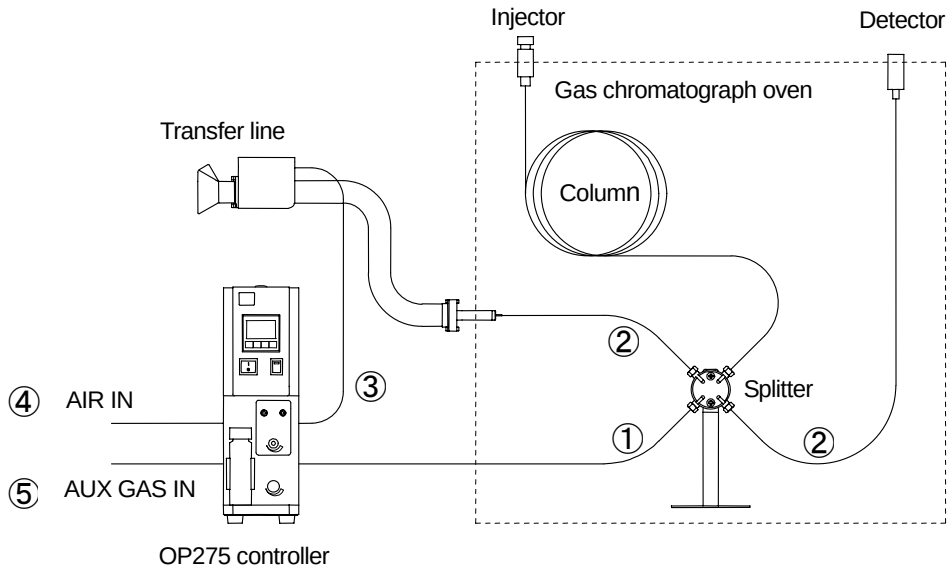
■AUX GAS

Use high purity helium or high purity nitrogen for the AUX GAS, use a high sensitivity regulator and stop valve. Avoid using a rubber diaphragm or seal tape. Use a branch line from the gas chromatograph or other instrument.

■AIR

Use clean air suitable for humidification and human consumption.

OP275 Basic Piping



OP275 Standard Accessories

①	Silcosteel® tube	0.79O.D.×0.53I.D. 2M
②	Fused silica capillary tube	0.25I.D.×0.35O.D.
③	PFA tube	3.18O.D.×1.58I.D. 2M

User supplied items

④	AIR IN supply piping	O.D.1/8inch (3.18mm) tube
⑤	AUX GAS supply piping	O.D.1/8inch (3.18mm) tube

Warning 

Do not use flammable, explosive or corrosive gas. Such gas may cause a fire, explosion or damage.

Caution 

To prevent burns, do not arrange piping and so on while the gas chromatograph oven is hot.

Caution 

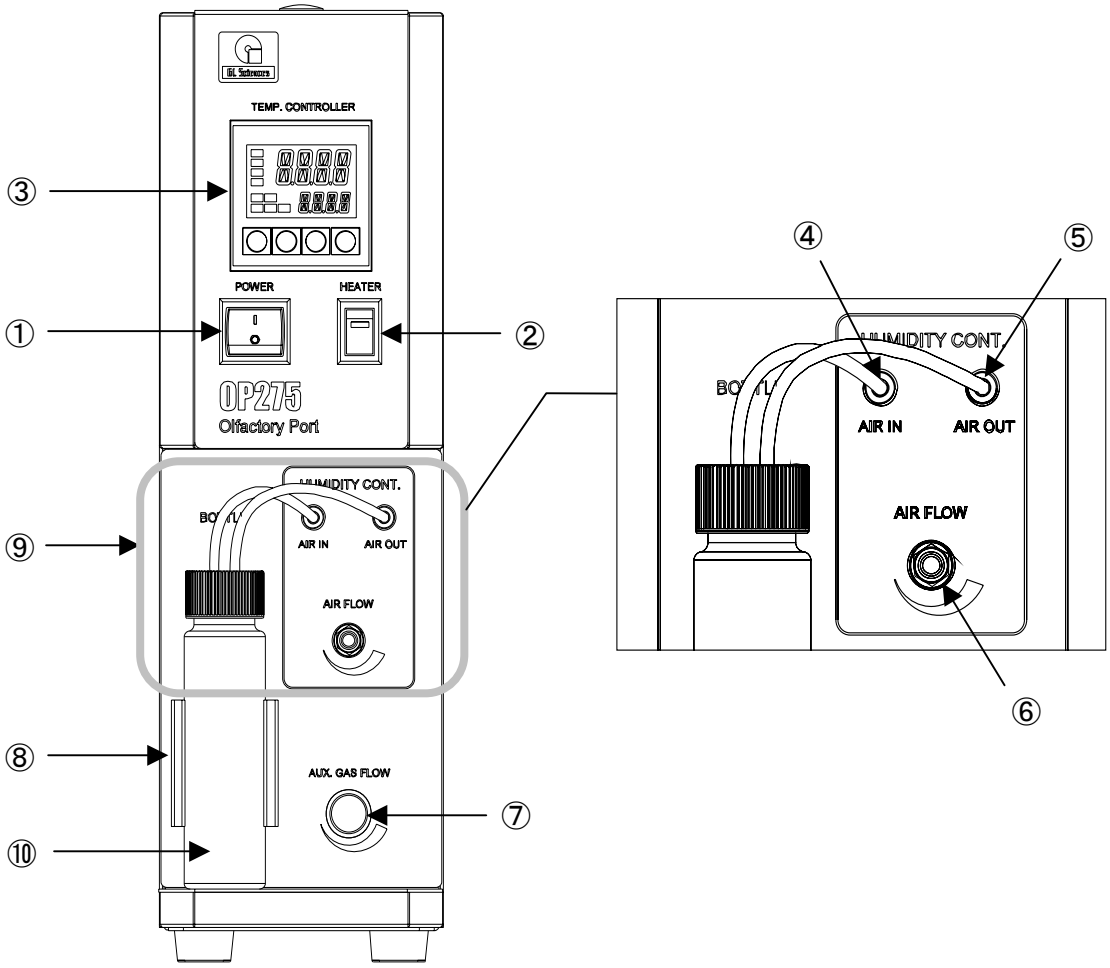
Do not supply air to the bubbling bottle suddenly or at a flow speed greater than 50mL/min, as the bubbling bottle might break or the water might shoot out.

Attention!

Be sure to inspect for gas leakage and loose piping before use.

4. Parts, Names and Functions

4-1. Controller Front Panel



① POWER

Turns the controller ON/OFF. Pressing the I side (top) turns the power ON, the ○ side turns the power OFF.

② HEATER

Turns the transfer line heater ON/OFF. Push the switch up to turn the heater on. The red LED flashes or stays on. Push the switch down to turn the heater off. The red LED goes off.

③ TEMP. CONTROLLER

The temperature controller for the transfer line. Displays the current temperature and is used for temperature settings.

④ AIR IN

Connects to the outlet pipe of the bubbling bottle where the humidified air is created. Air introduced into AIR IN is released through AIR OUT on the rear panel of the controller.

⑤ AIR OUT

Releases clean air introduced into AIR IN on the rear of the controller. Connects to the PFA tube attached to the filter inside the bubbling bottle.

⑥ AIR FLOW

Adjusts the air flow of clean air from the AIR OUT. Set the flow lower than 50mL/min. Rotate anticlockwise to increase flow, clockwise to decrease.

⑦ AUX GAS FLOW

Adjusts gas flow for AUX GAS introduced into the splitter. Set the flow to 5mL/min. Rotate anticlockwise to increase flow, clockwise to decrease. Since a mass flow valve is used, it takes a little time for the flow to stabilize.

⑧ BUBBLING BOTTLE HOLDER

The holder for the bubbling bottle where the humidified air is produced. Push the bubbling bottle in to secure it.

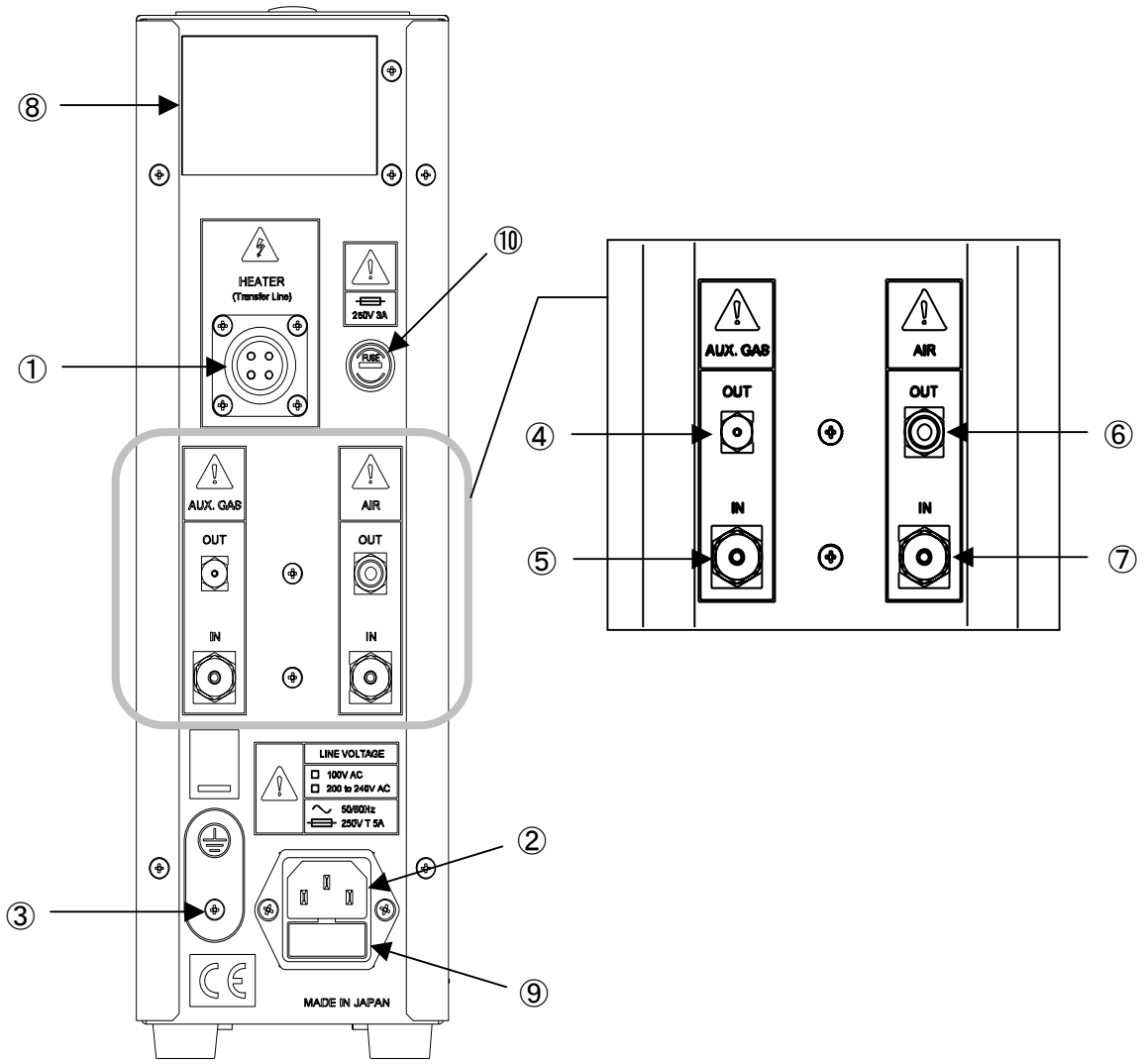
⑨ BUBBLING BOTTLE

The bottle that produces the humidified air. Air from AIR OUT bubbles inside the bottle to produce humidified air. Fill the bottle with less than 20m/l of clean water (about half full).

⑩ FILTER

Filter for clean air introduced into the bubbling bottle for bubbling.

4-2. Controller Rear Panel



① HEATER (Transfer Line)

Connects the heater cable for the transfer line. Do not connect any heater other than the one provided.

② AC inlet

Connects the power cable provided. Connect the power cable to a properly grounded 2P+E power outlet.

③ Earth terminal

Connects to the earth terminal on the transfer line via the GND cable provided.

④ AUX GAS OUT

Releases carrier gas introduced via AUX GAS IN. Connects to the splitter using the Silcosteel® tube and GI-0.8 graphite ferrule provided.

⑤ AUX GAS IN

Pipe connection for the AUX GAS supplied to the splitter. Connect a branch carrier gas pipe from the gas chromatograph primary supply pipe or other. Use a 1/8 inch tube (supplied by the user).

⑥ AIR OUT

Releases humidified air produced in the bubbling bottle. Use the PFA tube provided to connect to the transfer line humidified air intake.

⑦ AIR IN

Connects the clean air supply pipe used for the humidified air. Connect a branch air pipe to the gas chromatograph primary air supply pipe or other. Use a 1/8 inch tube (supplied by the user).

⑧ Compliance plate

Shows the serial number and date of manufacture.

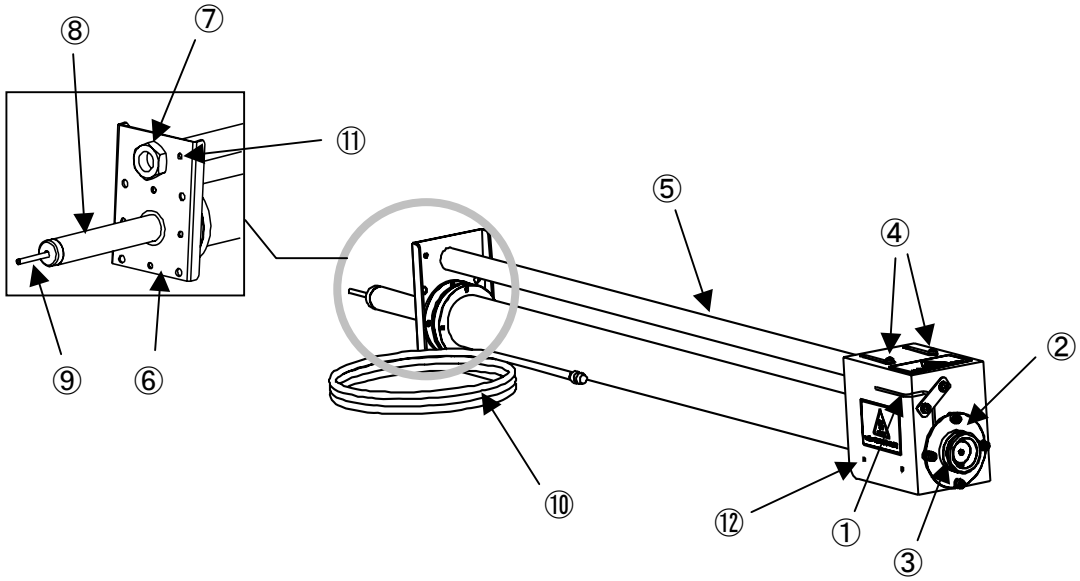
⑨ Fuse cartridge

Contains the main power fuse (1 main fuse, 1 spare fuse). The rating for the main power fuse is 250V 5A　5.2 × 20mm.

⑩ Fuse holder

Contains the fuse for the transfer line heater. The rating for the heater line fuse is 250V 3A 5.2 × 20mm.

4-3. Transfer Line



① Humidified air pipe connector

Connects the humidified air pipe. Using the PFA tube provided, connect this to AIR OUT on the rear panel of the controller. The humidified air supplied blows out of the nose cone flange.

② Nose cone flange

The flange to attach the nose cone provided. Do not touch this when the heater is on as it gets very hot.

③ O ring

The nose cone retention o ring. Made of fluoridized rubber for high chemical resistance and high temperature durability.

④ Flexible arm screws

Screws for attaching the transfer line and the flexible arm. Also used to adjust the position to suit the operator's posture.

⑤ Flexible arm

Supports the transfer line. Also used to adjust the position to suit the operator's posture.

⑥ Flexible arm plate

Plate for securing the transfer line and flexible arm. If you are using the optional mount system or arm stand, the flexible arm is not attached to the plate.

⑦ Nut

Nut to secure the flexible arm to the flexible arm plate. Use a 19mm spanner to remove.

⑧ GC insert

Gas chromatograph insert point. Do not touch while the heater is on, as it gets very hot. This is also used to secure the transfer line with the supplied GC holder.

⑨ **Transfer line tube insert point**

The insert point for the transfer line capillary tube that branches from the splitter. The internal diameter is 1mm.

⑩ **Heater cable**

Connects to the HEATER connector on the rear panel of the controller.

⑪ **Earth terminal**

Connects to the earth terminal on the rear panel via the GND cable provided.

⑫ **Protective cover**

Cover to protect the end of the transfer line. Do not touch while the heater is on, as it gets very hot. You can also attach resin side covers.

5. Attaching the Transfer Line

5-1. Securing the GC holder

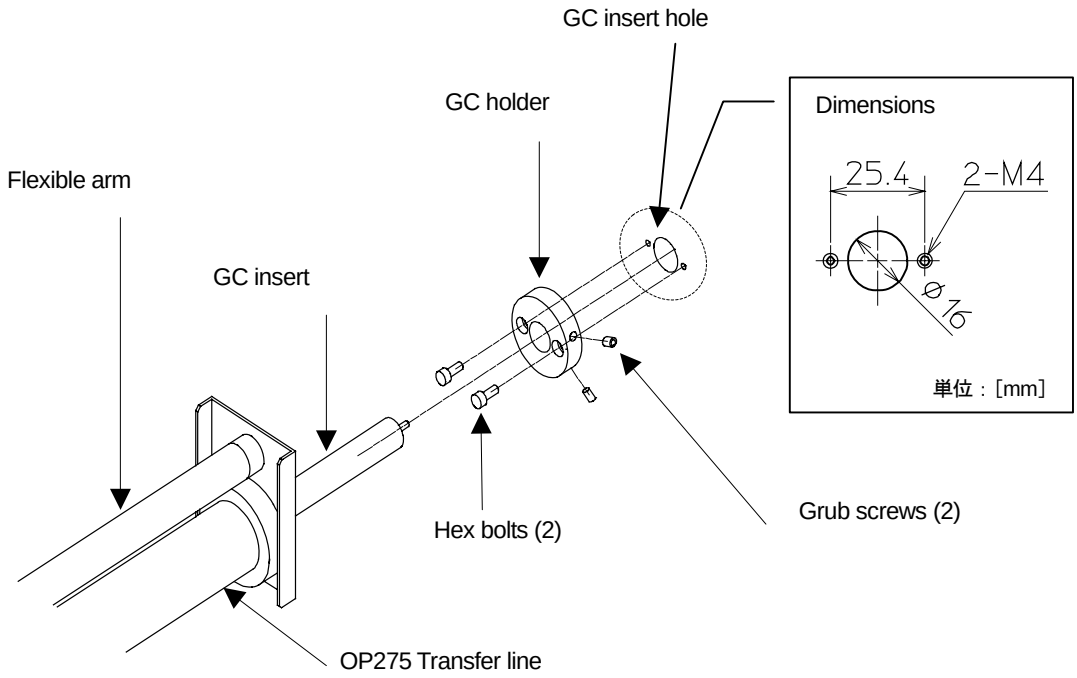
The transfer line can be attached to any gas chromatograph that has an access hole greater than 15 mm in diameter. Use the supplied GC holder for the installation. For gas chromatographs not listed in '3-2 Checking the Gas Chromatograph Type, Table 1 or Table 2', a special order adapter plate is required. Gas chromatographs compatible with an optional adapter plate are listed in Table 2.

Follow the procedure below to install the GC holder.

① For gas chromatographs other than the GC-4000(GL Sciences)or G-6000(HITACHI), install the optional adapter plate first.

② Using the 2 hex bolts, securely fasten the CG holder to the gas chromatograph insert hole or the adapter plate, as shown below. Use a 3.0mm hex key to tighten the bolts.

③ Push the transfer line insert straight into the hole in the GC holder installed in ② until it protrudes at least 10mm on the inside of the gas chromatograph oven, and then secure the transfer line with the 2 grub screws. Do not use force to bend or twist the transfer line.



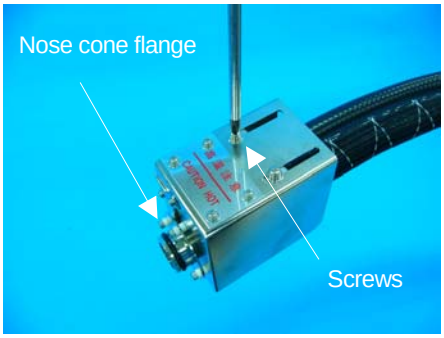
Caution

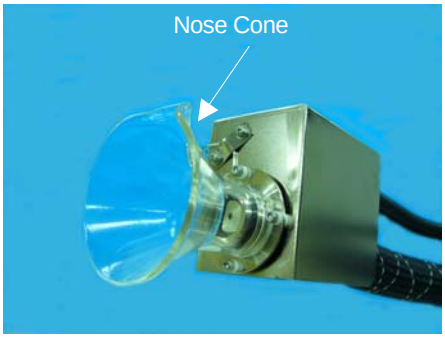
To prevent burns, do not attempt to attach or adjust the transfer line while it is hot.

5-2. Adjusting the Transfer Line Position

Follow the procedure below to adjust the transfer line position.

① Loosen the screws securing the flexible arm.
② Adjust position and height of the flexible arm to suit the operator's olfactory detection posture.
③ After adjusting to the desired position, tighten the screws, then attach the nose cone to the nose cone flange.





Caution

To prevent burns, never touch the metallic parts and surrounds while the heater is on as they get very hot. Also, do not attempt to adjust the transfer line position or attach and detach the nose cone while the heater is on.

Attention!

Hold the flexible arm and not the protective cover to adjust the transfer line. The protective cover might distort.

Note!

If the nose cone flange is tight, wet the nose cone attachment point (the inside) with some water.

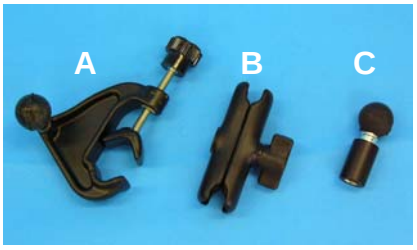
5-3. Using the Mount System

The mount system is used to attach the flexible arm to retain the transfer line to your work bench lab table or brace and so on. The maximum width that can be clamped with the mount system is 30mm. Use this if transfer line is difficult to retain at the gas chromatograph side etc.

The optional mount system includes the following three items.

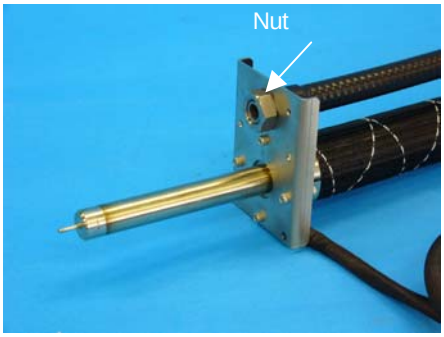
Mount System Parts

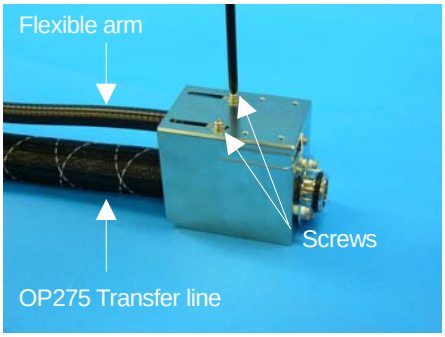
A : Clamp	1
B : Ball socket	1
C : Screw socket ball	1



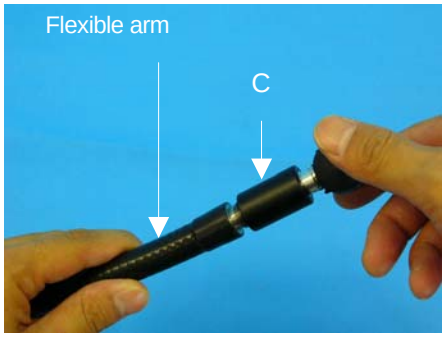
Follow the procedure below to install the mount system.

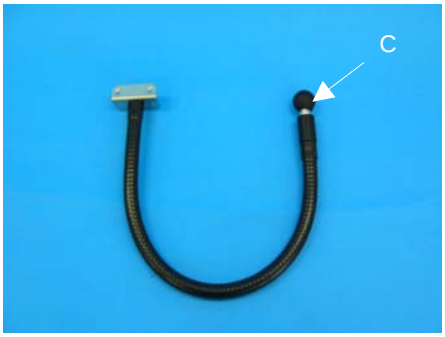
① Loosen the transfer line nut and screws, and remove the flexible arm. Use a 19 mm spanner to remove the nut.



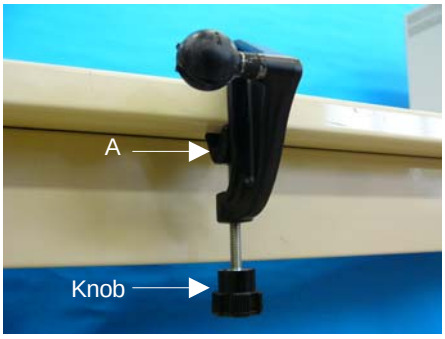


② Attach the end (the nut end) of the flexible arm removed in step ① to part C of the mount system.

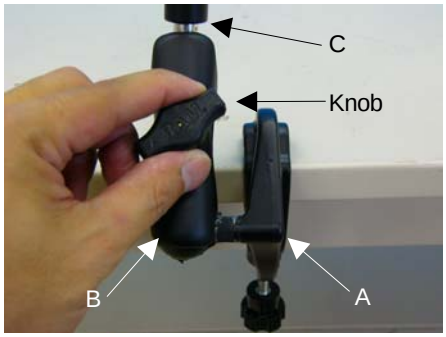




③ Turn the knob to secure the mount system clamp (part A) to the bench or brace where you are to perform sniffing.



④ Attach part B of the mount system to the balls on parts A and C, and then turn the knob to tighten it.



⑤ Screw the transfer line nose cone flange removed in ① to other end of the flexible arm and adjust it to the desired sniffing position.

Caution

When installing, operating and maintaining the instrument, carefully follow the procedures described herein and do not touch any parts other than those instructed.

Attention!

- The smallest radius to which the transfer line can be bent is 70mm. Do not excessively bend or twist the transfer line as this can cause the heater line to break and result in electrical leakage.
- Do not dismantle or modify any part of the instrument unless instructed in this manual.

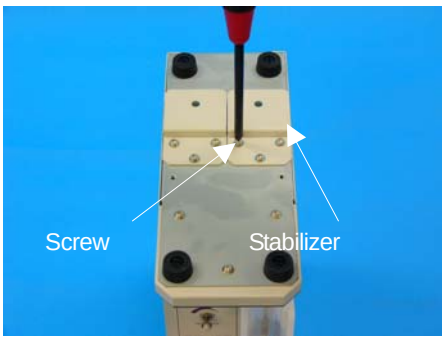
5-4. Using the Arm Stand

When securing the transfer line at the gas chromatograph or the optional mount system presents problems, secure the controller and the flexible arm to the arm stand to retain the transfer line.

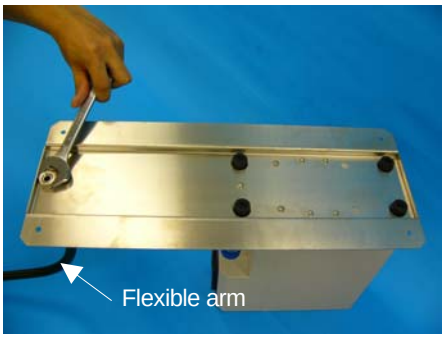
Follow the procedure below to install the arm stand.

① Remove the flexible arm from the transfer line. Follow the procedure described in '5-3 Using the Mount System' to remove it.

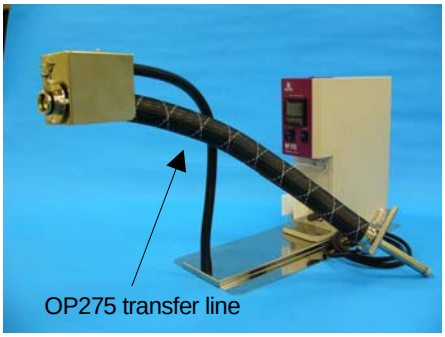
② Remove the stabilizers from the bottom of the controller. Gently turn the controller over and loosen the 6 screws that secure the stabilizers. Keep the screws in a safe place.



③ Align the optional arm stand with the holes in the bottom of the controller and secure it with the screws removed in ②. Then, with the nut, secure the flexible arm removed in ① to the arm stand.



④ Gently set the controller back to the upright position, and secure the flexible arm to the transfer line with the 2 screws.



Caution ⚠

When installing, operating and maintaining the instrument, carefully follow the procedures described herein and do not touch any parts other than those instructed.

Attention!

- **The smallest radius to which the transfer line can be bent is 70mm. Do not excessively bend or twist the transfer line as this can cause the heater line to break and result in electrical leakage.**
- **Do not dismantle or modify any part of the instrument unless instructed in this manual.**

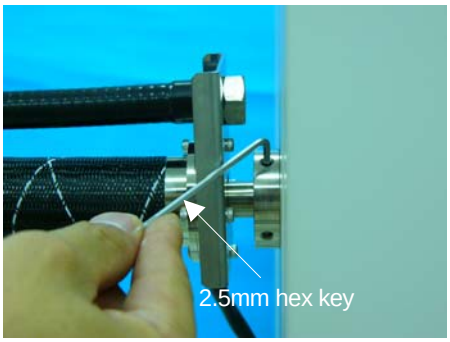
5-5. GC-4000 and G-6000

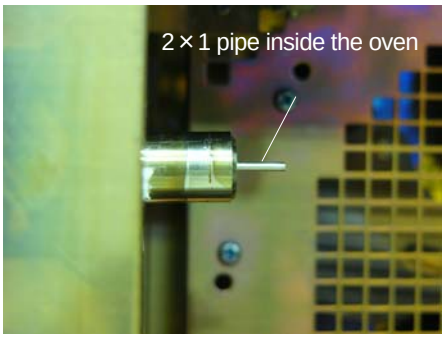
Installation in conjunction with the GC-4000 and G-6000 is possible with the standard accessories only, or with the optional mount system.

Follow the procedure below to install the instrument.

① Attach the GC holder to the left side of the gas chromatograph. For details, refer to '5-1.Securing the GC holder'.

② Securely attach the transfer line to the gas chromatograph. Use a 2.5mm hex key to tighten the grub screws.





③ Adjust the transfer line position. For details, refer to ‘5-2. Adjusting the Transfer Line Position.’

Caution ⚠

When installing, operating and maintaining the instrument, carefully follow the procedures described herein and do not touch any parts other than those instructed.

Attention!

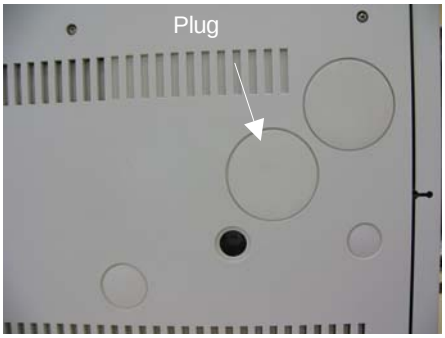
- The smallest radius to which the transfer line can be bent is 70mm. Do not excessively bend or twist the transfer line as this can cause the heater line to break and result in electrical leakage.
- Do not dismantle or modify any part of the instrument unless instructed in this manual.

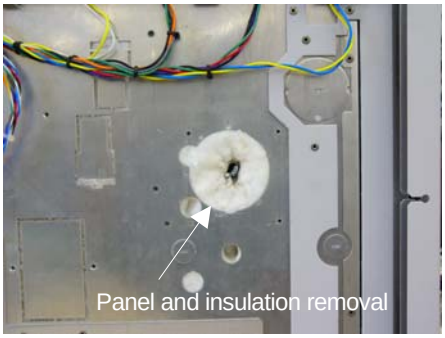
5-6. HP/Agilent 6890

To install the instrument in conjunction with the HP/Agilent 6890, optional accessories are required. For details, refer to ‘3-2 Checking the Gas Chromatograph Type.’ To avoid problems, never attempt to install part other than those mentioned herein, or use methods other than those described in this manual. Also when attaching or detaching the gas chromatograph cover and so on, be sure to follow the procedure described in the gas chromatograph manual.
The instrument can be installed on the left side and top of the HP/Agilent 6890 gas chromatograph. Choose the best position to suit your purposes.

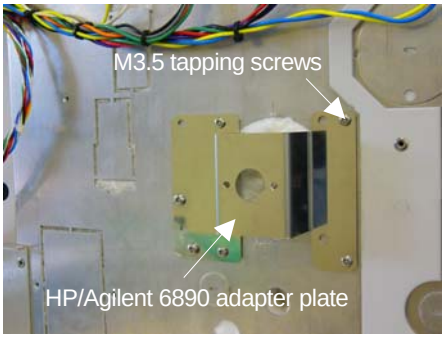
5-6-1. Installation on the Left

① Remove the panel from the left side of the gas chromatograph, and remove the panel and insulation from the transfer line insert point. Also remove the plug from the left side panel that you removed.

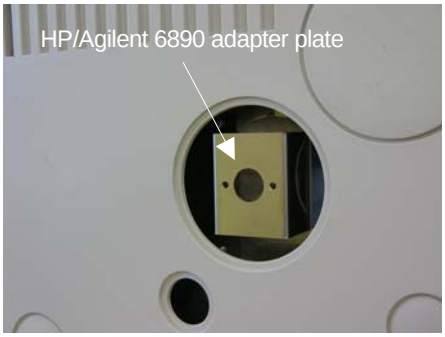


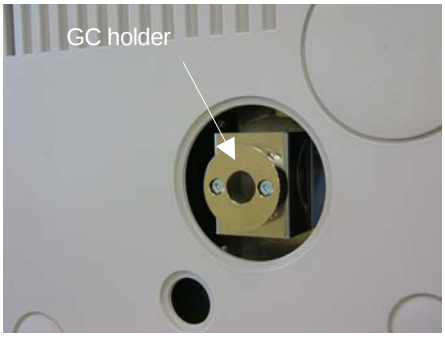


② Align the optional HP/Agilent 6890 adapter plate with the holes on the left side of the gas chromatograph, and use the M3.5 tapping screws to secure the adapter plate (4 places). Be sure to tighten the screws straight into the holes to avoid cross threading.

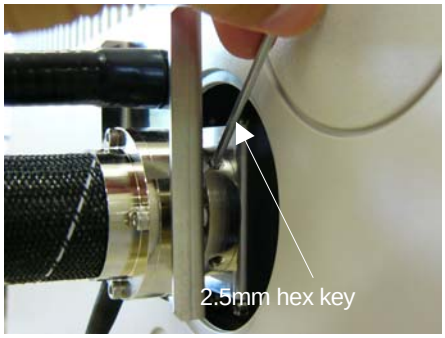


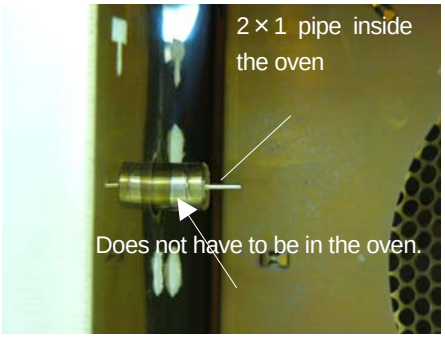
③ Replace the left side panel removed in step ①, and attach the GC holder to the HP/Agilent 6890 adapter plate. For details, refer to '5-1. Securing the GC holder'.





④ Securely attach the transfer line to the gas chromatograph. Use a 2.5mm hex key to tighten the grub screws.

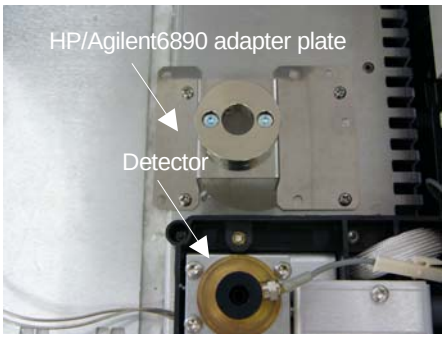




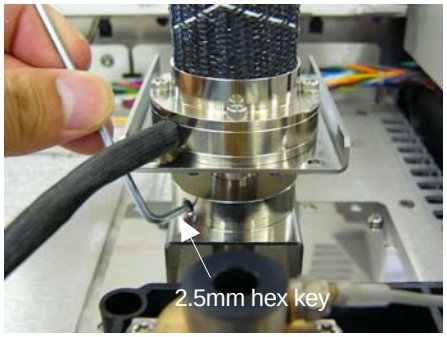
⑤ Adjust the transfer line position. For details, refer to ‘5-2. Adjusting the Transfer Line Position.’

5-6-2. Installation on the Top

① Open the top cover of the gas chromatograph, and align the HP/Agilent 6890 adapter with the holes in the gas chromatograph and screw it to the empty detector port. Attach the GC holder to the HP/Agilent 6890 adapter plate. For details, refer to ‘5-1. Securing the GC holder’.



② Securely attach the transfer line to the gas chromatograph. Use a 2.5mm hex key to tighten the grub screws.



③ Adjust the transfer line position. For details, refer to ‘5-2. Adjusting the Transfer Line Position.’

Caution ⚠

When installing, operating and maintaining the instrument, carefully follow the procedures described herein and do not touch any parts other than those instructed.

Attention!

- **The smallest radius to which the transfer line can be bent is 70mm. Do not excessively bend or twist the transfer line as this can cause the heater line to break and result in electrical leakage.**
- **Do not dismantle or modify any part of the instrument unless instructed in this manual.**

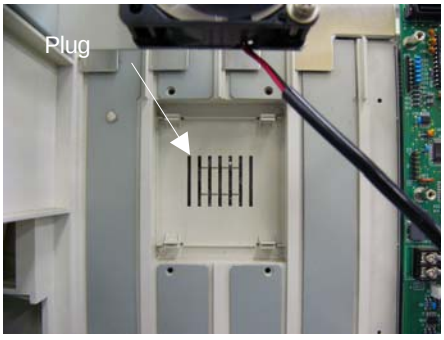
5-7. Shimadzu GC-2010

To install the instrument in conjunction with Shimadzu GC-2010 options other than the standard accessories are required. For details, refer to '3-2 Checking the Gas Chromatograph Type.' To avoid problems, never attempt to install part other than those mentioned herein, or use methods other than those described in this manual. Also when attaching or detaching the gas chromatograph cover and so on, be sure to follow the procedure described in the gas chromatograph manual.

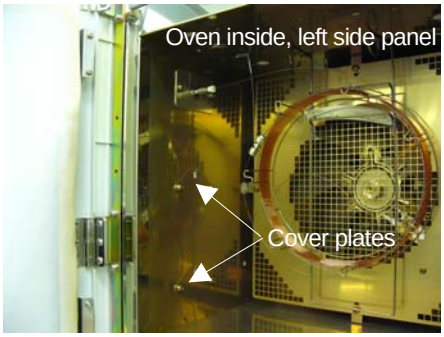
The instrument can be installed onto the Shimadzu GC-2010 left or right sides. If there are no restrictions, we recommend installation onto the left side.

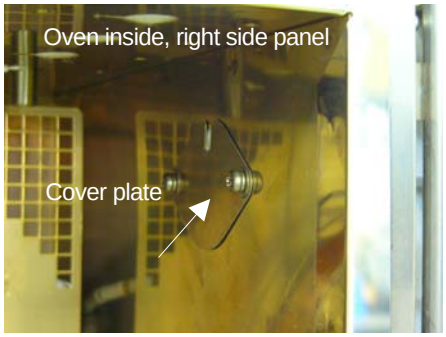
① First, attach the standard accessories arm stand to the controller and transfer line. For details, refer to '5-4.Using the Arm Stand'.

② Remove the panel from the side of the gas chromatograph into which you want to insert the transfer line, and remove the insulation and square plug from the transfer line insert point. (The photo below shows the right panel removed.)

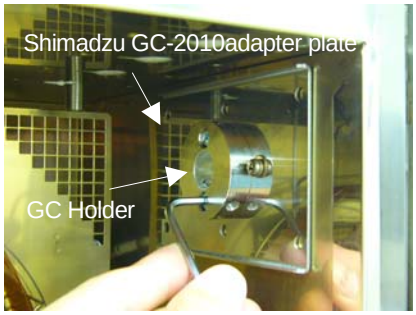


③ Remove the cover plate from inside the oven on the side where you want to insert the transfer line.

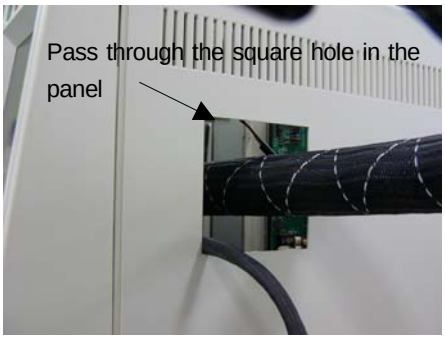


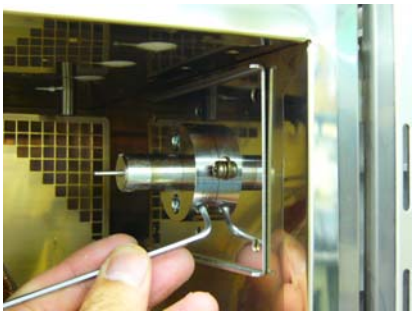


④ Align the optional Shimadzu GC-2010 adapter plate with the holes inside the oven made available in step ② secure it with the screws, and then attach the GC holder. For details, refer to '5-1. Securing the GC holder'. (The photo below shows the holder and adapter plate installed on the right side.)



⑤ Push the transfer line GC insert through the square hole in the gas chromatograph panel removed in step ②, and securely attach the transfer line to the gas chromatograph. Use a 2.5mm hex key to tighten the grub screws. (The photo below shows installation on the right side.)





⑥ Adjust the transfer line position. For details, refer to '5-2. Adjusting the Transfer Line Position.'

Caution

When installing, operating and maintaining the instrument, carefully follow the procedures described herein and do not touch any parts other than those instructed.

Caution

To prevent burns, do not attempt to attach or adjust the transfer line while it is hot.

Attention!

- **The smallest radius to which the transfer line can be bent is 70mm. Do not excessively bend or twist the transfer line as this can cause the heater line to break and result in electrical leakage.**
- **Do not dismantle or modify any part of the instrument unless instructed in this manual.**

Note!

You can also use the optional mount system with the Shimadzu GC-2010 as well as the arm stand.

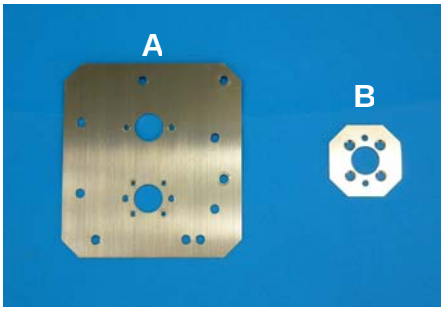
5-8. Shimadzu GC-17A

To install the instrument in conjunction with Shimadzu GC-17A options other than the standard accessories are required. For details, refer to '3-2 Checking the Gas Chromatograph Type.' To avoid problems, never attempt to install part other than those mentioned herein, or use methods other than those described in this manual. Also when attaching or detaching the gas chromatograph cover and so on, be sure to follow the procedure described in the gas chromatograph manual.

The Shimadzu GC-17A adapter plate includes the following items.

ShimadzuGC-17A adapter plate parts

A : OP275 adapter plate GC-17A 1
B : OP275 adapter plate GC-17A 1



5-8-1. Shimadzu GC-17A

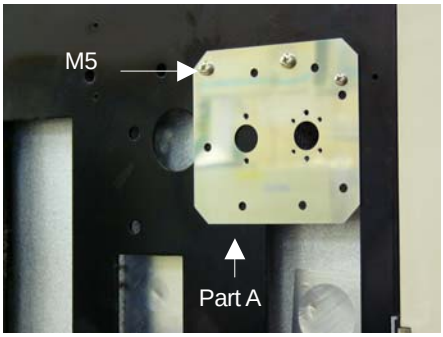
There are 3 types of Shimadzu GC-17A gas chromatograph. The method and position for attaching the transfer line varies with each type. For details, refer to Table 3 below.

Table 3) Shimadzu GC-17 Type and Installation method/position

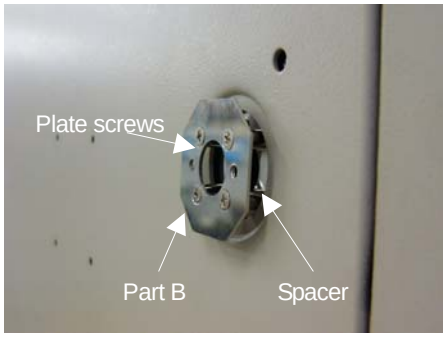
Shimadzu GC-17A	Outer Cabinet Panel	Available attachment points
Ver.1	Metal	Gas chromatograph left side
Ver.2 or 3	Resin	Gas Chromatograph left side or top

5-8-2. Ver.1 Installation on the Left

① Remove the left side panel from the gas chromatograph, and remove the metal tape and insulation from the transfer line insert point. Align Part A of the Shimadzu GC-17A adapter plate with the holes in the gas chromatograph side, and secure it with screws. Use M5 screws, flat washers and nuts if there are no screw threads available in the gas chromatograph casing. If required, tap the holes in the casing to insert the screws.



② Replace the gas chromatograph left side panel, and attach part B of the Shimadzu GC-2010 adapter plate to Part A attached in step ① using plate screws and the spacer



③ Attach the GC holder to the Shimadzu GC-2010 adapter plate attached in step ②. For details, refer to '5-1. Securing the GC holder'.

④ Securely attach the transfer line to the gas chromatograph. Use a 2.5mm hex key to tighten the

grub screws.

⑤ Adjust the transfer line position. For details, refer to ‘5-2. Adjusting the Transfer Line Position.’

Caution ⚠

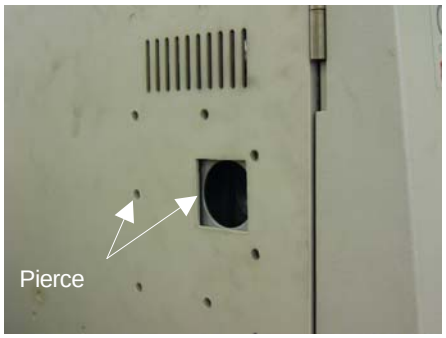
When installing, operating and maintaining the instrument, carefully follow the procedures described herein and do not touch any parts other than those instructed.

Attention!

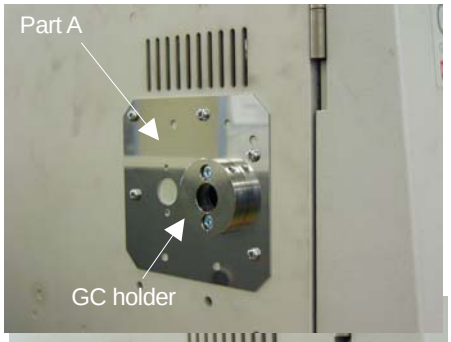
- **The smallest radius to which the transfer line can be bent is 70mm. Do not excessively bend or twist the transfer line as this can cause the heater line to break and result in electrical leakage.**
- **Do not dismantle or modify any part of the instrument unless instructed in this manual.**

5-8-3. Ver.2 or 3 Installation on the Left

① Remove the left side panel from the gas chromatograph, and remove the metal tape and insulation from the transfer line insert point. Then, pierce the screw holes and the square hole in the left panel. Reattach the pierced left side panel onto the gas chromatograph.



② Align part A of the Shimadzu GC-17A adapter plate with the holes opened in step ①, secure it with screws, and then attach the GC holder. For details, refer to ‘5-1. Securing the GC holder’. Part B of the Shimadzu GC-17A adapter plate is not required.



③ Securely attach the transfer line to the gas chromatograph. Use a 2.5mm hex key to tighten the grub screws.

④ Adjust the transfer line position. For details, refer to '5-2. Adjusting the Transfer Line Position.'

Caution ⚠

When installing, operating and maintaining the instrument, carefully follow the procedures described herein and do not touch any parts other than those instructed.

Attention!

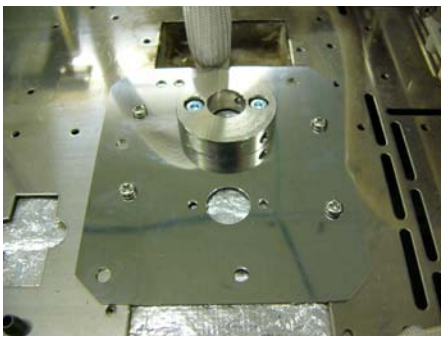
- **The smallest radius to which the transfer line can be bent is 70mm. Do not excessively bend or twist the transfer line as this can cause the heater line to break and result in electrical leakage.**
- **Do not dismantle or modify any part of the instrument unless instructed in this manual.**

5-8-4. Ver.2 or 3 Installation on the Top

You can attach the transfer line to an open detector port on top of the Shimadzu GC-17A Ver.2 or 3 gas chromatograph.

① Remove the top cover of the gas chromatograph, and remove the insulation from the open port into which you want to insert the transfer line.

② Align part A of the Shimadzu GC-17A adapter plate with the hole opened in step ①, secure it with screws, and then attach the GC holder. For details, refer to '5-1. Securing the GC holder'. Part B of the Shimadzu GC-17A adapter plate is not required.



③ Attach the transfer line to the GC holder. The procedure is the same as '5-8-3 Ver.2 or 3 Installation on the Left Side' B type from step ③ onwards. If the transfer line is installed from the top, perform

sniffing with the panel open.

Caution 

When installing, operating and maintaining the instrument, carefully follow the procedures described herein and do not touch any parts other than those instructed.

Attention!

- **The smallest radius to which the transfer line can be bent is 70mm. Do not excessively bend or twist the transfer line as this can cause the heater line to break and result in electrical leakage.**
- **Do not dismantle or modify any part of the instrument unless instructed in this manual.**

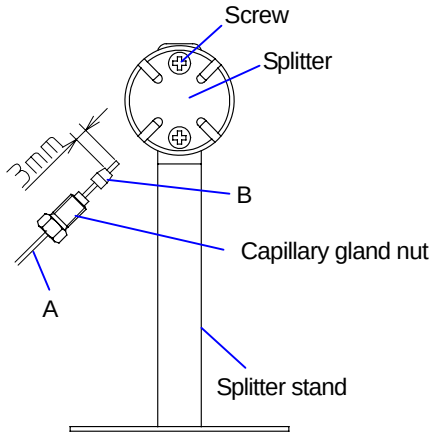
6. Splitter Connection

The splitter mixes samples separated in the column with AUX GAS, and splits the flow to the transfer line and the gas chromatograph detector. The splitter is inactively treated, enabling minimization of sample condensation and absorption in the line.

6-1. Connection Method

For the splitter piping, make sure you connect the sample line from the column and the AUX GAS line from the controller in a symmetrical fashion. When connecting capillary tubes, use a capillary tube cutter and cut the tube straight.
The split ratio (flow ratio) between the gas chromatograph detector side and the transfer line is determined by the length of the capillary tubes. Use the Split Manager software on the CD ROM supplied to perform a simulation and determine the split ratio and appropriate length for capillary tubes before actual set up.

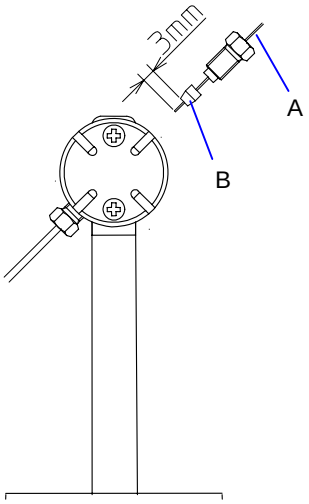
① Attach the AUX GAS supply line from the controller. Use the supplied Silcosteel® tube and graphite ferrule GI-0.8. Pass the Silcosteel® tube through a capillary gland nut and graphite ferrule GI-0.8 and mark the Silcosteel® tube 3mm from the end to position the ferrule. While paying attention to the mark, gently tighten the capillary gland nut into the splitter.



A : Silcosteel® tube 0.79 O.D. × 0.53 I.D. 2M
B : Graphite ferrule GI-0.8

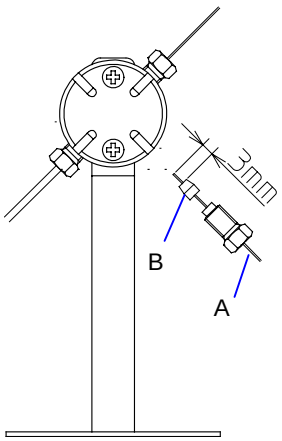
② Connect the capillary outlet column line. The graphite ferrule for connection to the capillary column is outside diameter 0.35mm. To connect other types of capillary column, different ferrules are required. For details, refer to '19 Parts/Expendables'.

Pass the capillary column tube through a capillary gland nut and graphite ferrule GI-0.5 and mark the capillary tube 3mm from the end to position the ferrule. While paying attention to the mark, gently tighten the capillary gland nut into the splitter.



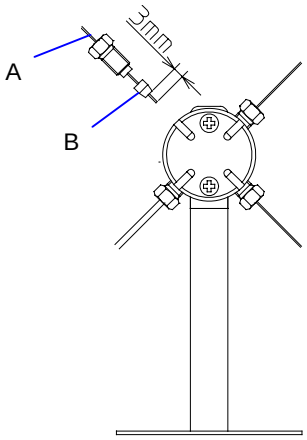
A : Capillary column 0.25 I.D. × 0.35 O.D.
B : Graphite ferrule GI-0.5

③ Refer to the results of the Split Manager simulation, and cut the supplied fused silica capillary tube 0.25I.D. × 0.35O.D. to the required length, then to connect the tube from the splitter to the gas chromatograph detector, pass the cut capillary tube through a capillary gland nut and graphite ferrule GI-0.5 and mark the capillary tube 3mm from the end to position the ferrule. While paying attention to the mark, gently tighten the capillary gland nut into the splitter.



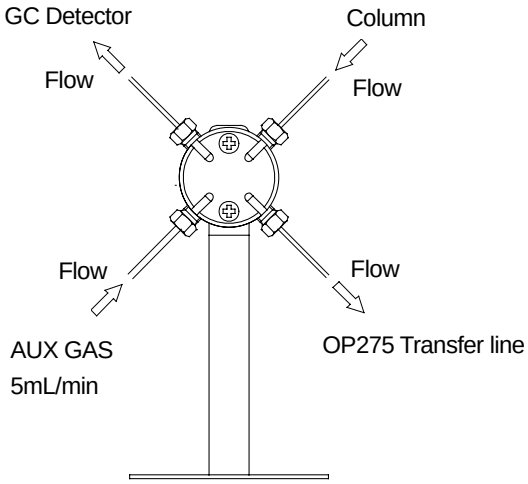
A : Fused silica capillary tube 0.25 I.D.×0.35 O.D.
B : Graphite ferrule GI-0.5

④ Refer to the results of the Split Manager simulation, and cut the supplied fused silica capillary tube 0.25I.D. × 0.35O.D. to the required length then to cconnect the capillary tube from the transfer line to the splitter, pass the cut capillary tube through a capillary gland nut and graphite ferrule GI-0.5 and mark the capillary tube 3mm from the end to position the ferrule. While paying attention to the mark, gently tighten the capillary gland nut into the splitter.



A：Fused silica capillary tube	0.25 I.D.×0.35 O.D.
B：Graphite ferrule	GI-0.5

⑤ After connecting all the lines to the splitter, place the splitter and stand in the gas chromatograph oven, and adjust the AUX GAS flow to 5mL with the AUX GAS FLOW valve on the controller. For details, refer to '7-2.Adjusting the AUX GAS flow'.
Use a gas leak detector LD229 to make sure there are no leaks in the piping. For details about the LD229 gas leak detector, refer to the GL Sciences catalogue.



Caution

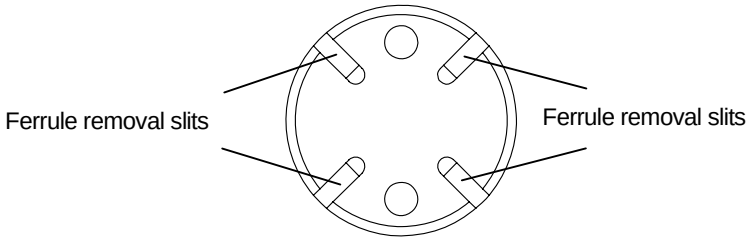
To prevent burns, do not arrange piping and so on while the gas chromatograph oven is hot.

Attention!

Always check the piping for loose connections and leakage before use.

6-2. Removing Ferrules

When changing columns and removing pipes from the splitter, the graphite ferrules might get stuck inside. Use the Capillary Column Tool Set C to easily remove the graphite ferrules from the ferrule removal slits in the splitter. For details about the Capillary Column Tool Set C, refer to refer to the GL Sciences catalogue.



Note!

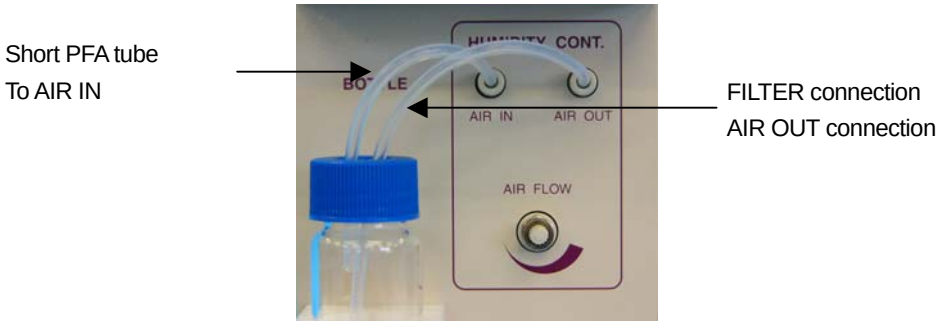
After disconnecting pipes from the splitter, use the plugs provided to ensure that no carrier gas leaks and no foreign material enters the splitter.

7. Preparation

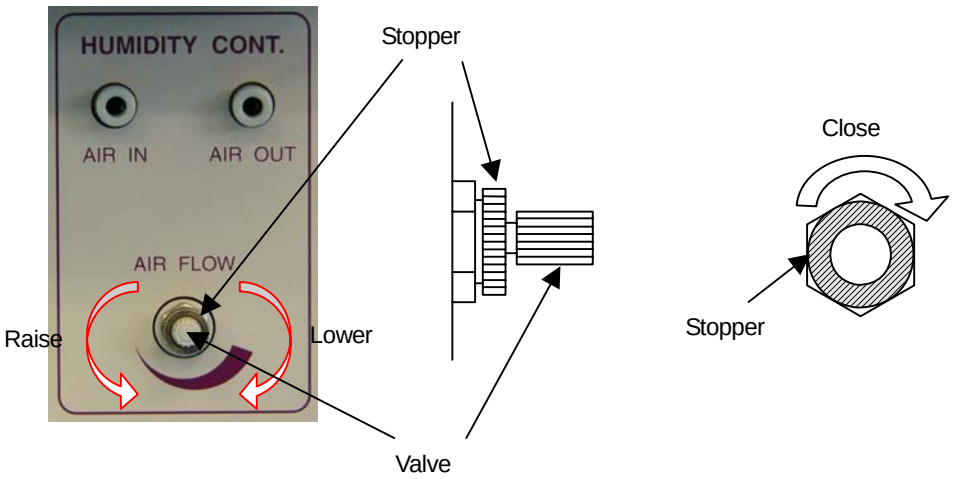
7-1. Preparing the Bubbling Bottle

After long periods of sniffing, the nasal mucous membrane can become dry, causing the sense of smell to dull. The bubbling bottle that creates humidified air which is blown out of the nose cone flange on the transfer line to prevent nasal dryness experienced after long periods.

① Fill the bubbling bottle with about 20mm of clean air (about half full), and close the cap tightly. Push the bubbling bottle into the bottle holder on the controller to secure it, and connect the PFA tube from the bubbling bottle to HUMIDITY CONT. For details, refer to the photograph below.



② On the front of the controller, rotate the AIR FLOW valve and stopper clockwise to make sure it is shut, and then supply air to the controller. Rotate the AIR FLOW stopper anticlockwise to loosen it, and then slowly rotate the valve anticlockwise to adjust the air flow to 50mL/min. Do not allow sudden increases in pressure. After adjusting the flow, rotate the stopper clockwise to secure the valve.



Warning

To prevent the risk of poisoning or death, do not use any liquid in the bubbling bottle other than clean water. Always make sure the bubbling bottle is clean when using it, and always clean the bubbling bottle after use.

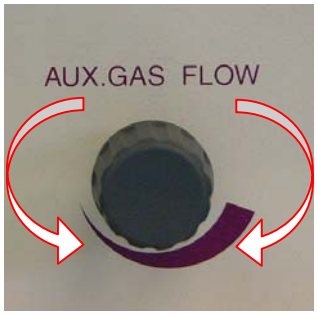
Caution

Do not supply air to the bubbling bottle suddenly or at a flow speed greater than 50mL/min, as the bubbling bottle might break or the water might shoot out.

7-2. Adjusting the AUX GAS flow

Adjust the AUX GAS flow to the splitter with the AUX GAS FLOW valve on the front of the controller. Rotate the valve anticlockwise to increase flow, and clockwise to decrease. It takes a little time for the flow to stabilize.

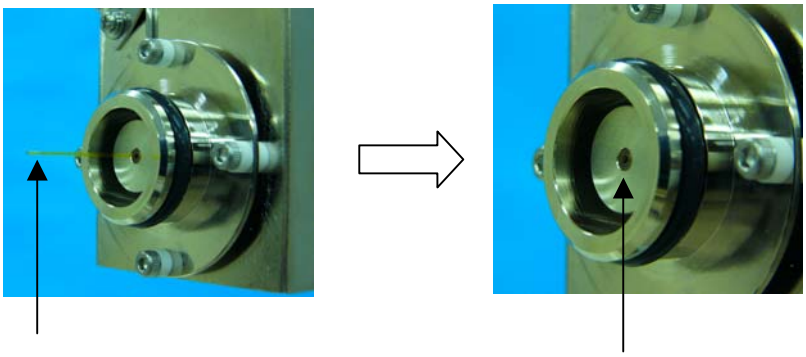
Raise



Lower

7-3. Preparing the Transfer Line

Gently insert the capillary tube connected to the splitter for the transfer line from the transfer line tube insert point. Then, push the tube into the nose cone flange heat block until the end of the tube is flush with the surface of the heat block. If the tube is not flush with the heat block surface, condensation or absorption may occur around the sample outlet. Further, do not perform this operation when the transfer line is hot.



Push the tube in until it emerges from the heat block.

Set the tube flush with the heat block surface.

Warning 

This instrument delivers injected compounds for direct absorption into the human body through the nose. The use of dangerous compounds can result in serious bodily harm. Carefully check the safety of compounds before using them.

Caution 

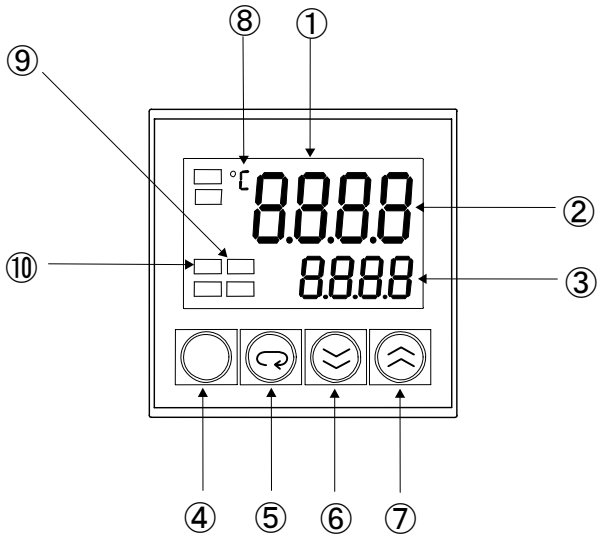
To prevent burns, never touch the metallic parts and surrounds while the heater is on as they get very hot. Also, do not attempt to adjust the transfer line position or attach and detach the nose cone while the heater is on.

7-4. Temperature Settings

Start raising the transfer line temperature after setting the temperature to suit the sample you are to use. For details, refer to ‘8 Operating the Temperature Control Unit’.
After the transfer line reaches the set temperature, wait about 10 minutes before commencing. When first using the transfer line, odd smells may occur. To prevent this, set the transfer line to 300 degrees and age it for 3 hours.

8. Operating the Temperature Control Unit

8-1. Display Items and Functions



① Display panel

Displays current transfer line temperature and temperature settings. You can also display the status of the temperature control unit.

② Current temperature(red display)

Displays current transfer line temperature and parameter settings.

③ Set temperature(green display)

Displays the set transfer line temperature and parameter values.

④ Level key

Not used with this instrument.

⑤ Mode key

Not used with this instrument

⑥ Down key

Lowers temperature settings and so on. Press the key to lower values.

⑦ Up key

Raises temperature settings and so on. Press the key to raise values.

⑧ ℃(temperature unit settings)

The temperature settings are displayed in ℃. When other settings are on the display, this is not illuminated.

⑨ **STP(stop display)**

Appears red when the RUN/STOP setting is set to [STOP].

⑩ **OUT(heater output display)**

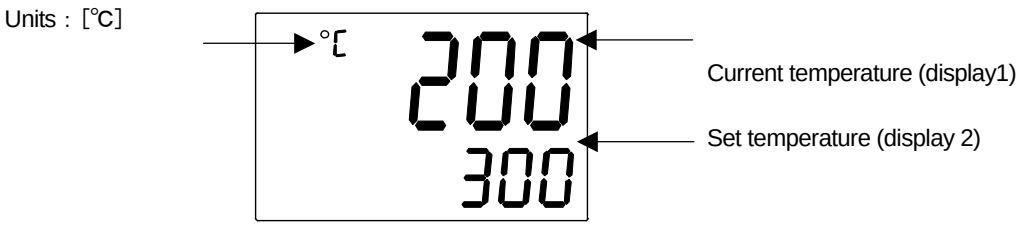
Appears red when current is passing through the transfer line heater. Flashes when the set temperature is reached.

Attention!

- **Do not adjust the internal parameters for the temperature control unit.**
- **If a problem arises with the instrument, stop usage immediately, and disconnect the power cable from the power outlet.**

8-2. Reading the Display

Display panel

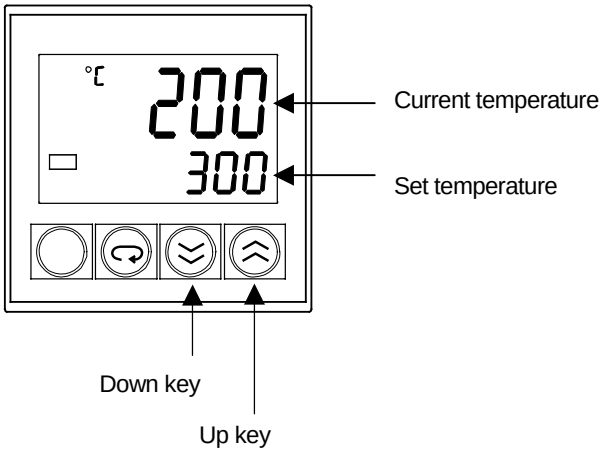


A screen similar to the one above appears when you turn the POWER switch ON. The current transfer line temperature appears in display 1 (red), and the set temperature appears in display 2 (green).

So, in the above screen, shown as an example, the current temperature is 200℃, and the set temperature is 300℃.

When ℃ appears on the display panel, the value displayed is temperature, and the units are in ℃.

8-3. Temperature Settings



① Use the up or down keys to set the desired temperature, and change the current temperature so it matches the setting.

② The up and down keys raise or lower the temperature in 1℃ increments. After changing the temperature setting, it takes 2 seconds for the setting to be processed. You can hold down the keys to change the values faster.

③ If you attempt to perform another operation before the 2 seconds have elapsed, the temperature setting is invalidated, and the unit reverts to the previous setting.

Attention!

- **Do not adjust the internal parameters for the temperature control unit.**
- **If a problem arises with the instrument, stop usage immediately, and disconnect the power cable from the power outlet.**

9. Split Manager Split Ratio Simulation Software

9-1. Functions

■Split ratio simulation

Enables you to create a simulation before setting up to determine the length and internal diameter of the column, head pressure, temperature, type of AUX GAS, length and internal diameter of the capillary tubes, and the split ratio (flow ratio) for the gas chromatograph detector line and transfer line .

■Capillary tube simulation

Enables you to create a simulation from the desired split ratio to determine the capillary tube lengths required for connection.

■Retention time simulation

Enables you to create a simulation to determine the time (difference) for the sample to pass through the gas chromatograph detector side and the transfer line side.

■Error display

Displays details of errors on the PC monitor, for such errors as incorrect parameter input, unsuitable criteria for simulation and so on. The error display makes it easy to make corrections.

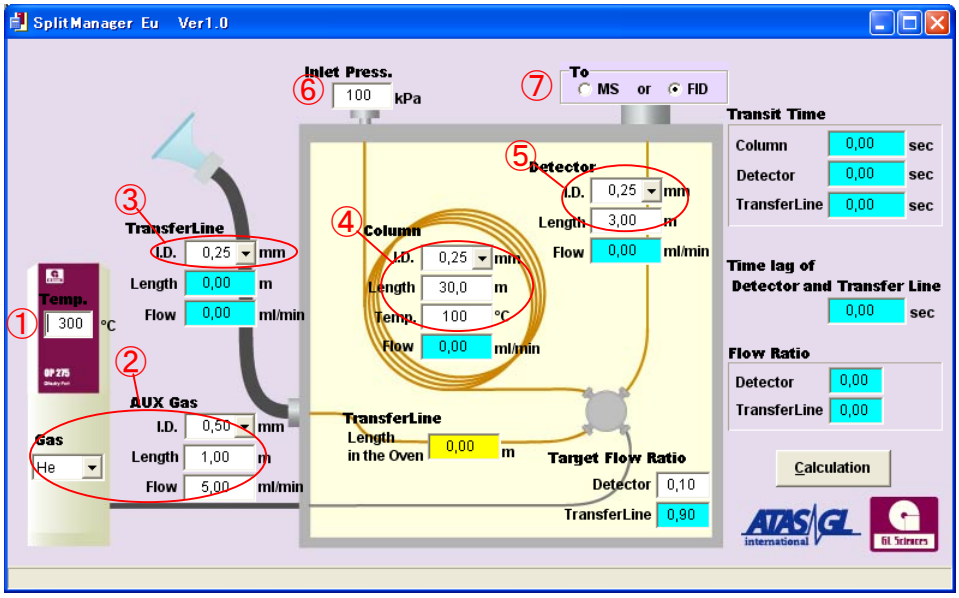
9-2. Set Up

It is not necessary to install the software. It can be run straight from the CD ROM, or copied to and executed from the desktop. Click the SplitManager.exe icon on the CD ROM or on the desktop after you have copied it.

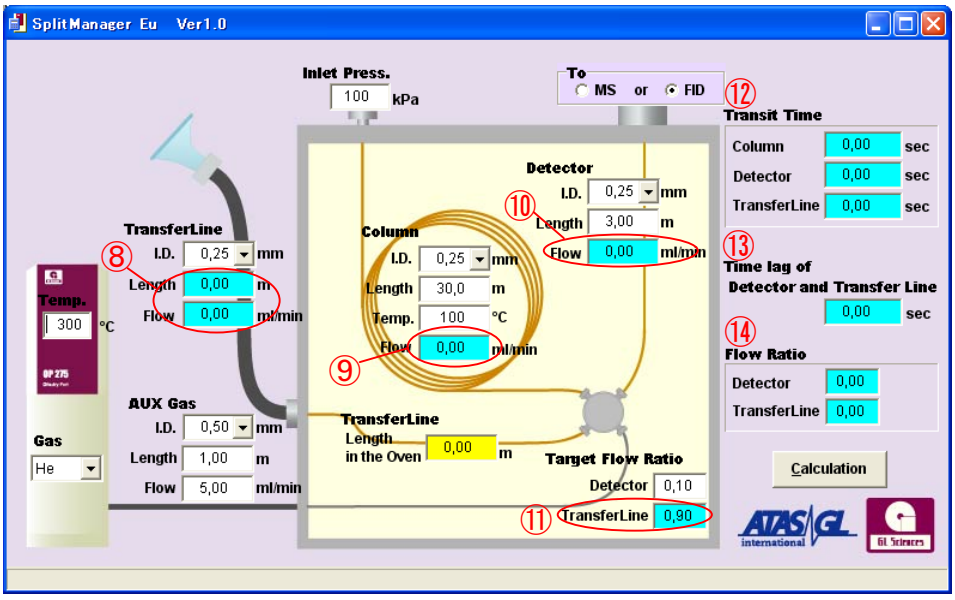
Operating System	Windows®95, 98, 2000, XP, NT4.0
Media	CD-ROM
Memory requirements	Recommended OS standard
Required HD capacity	More than1MBfor the program only

9-3. Screen descriptions

There are 3 types of text boxes displayed. Numeric values can be input into the white and yellow textboxes. The blue text boxes show the results of calculations.



① Specifies the transfer line temperature setting. Input up to a maximum of 300℃. (Default: 300℃)
② Specifies the AUX GAS details. (Default: GAS: He; ID: 0.5mm; LENGTH 1m; FLOW: 5ml/min)
③ Specifies the transfer line internal diameter. (Default: 0.25mm)
④ Specifies column specifications. (Default: ID: 0.25mm; Length: 30m; Temperature 100℃)
⑤ Specifies specifications for the line to the detector. (Default: ID: 0.25mm; Length 3m)
⑥ Specifies Inlet pressure (head pressure). (Default: 100kPa)
⑦ Specifies the detector type. (Default: FID)



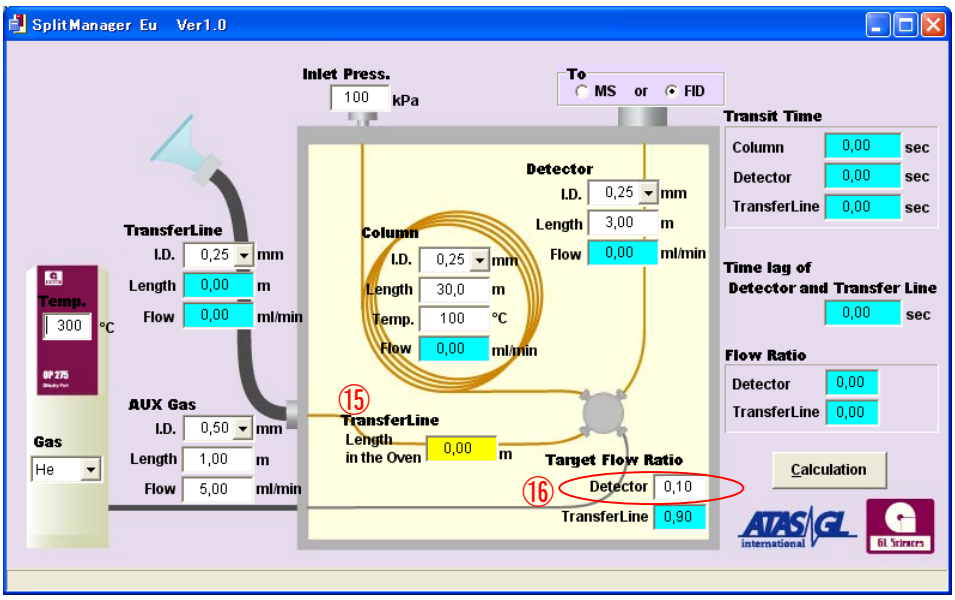
⑧ Displays the total capillary tube (transfer line) length (the total inside the oven + 0.6m).
⑨ Displays the column flow.
⑩ Displays the flow to the detector.

⑪ Displays the planned split ratio for the transfer line side (planned flow ratio). Input the planned flow rate for the detector side to display.

⑫ Displays all elapsed times.

⑬ Displays the difference in elapsed time (absolute value) between the detector and the transfer line.

⑭ Displays the split ratio (flow ratio) between the detector and the transfer line.



⑮ Inputs and displays the capillary tube (transfer line) length inside the oven (the transfer line length minus 0.6m.) When this text box is yellow, you can obtain the flow ratio by inputting the transfer line length inside the oven.

⑯ Inputs and displays the planned split ratio (planned flow ratio) for the detector side. When this text box is yellow, you can obtain the transfer line length inside the oven by inputting the planned flow ratio (detector).

9-4. Operation

① The default settings appear in the white text boxes upon executing Split Manager. Specify diameters, lengths and so on as required. If you make a mistake an error message appears. Check the content and input the values again.

② Specify whether to obtain the flow ratio from the transfer line length inside the oven, or the transfer line length inside the oven from the planned flow ratio. When you click on either of the text boxes, they turn yellow. Split Manager uses the yellow text box values for calculations, so be sure to specify them.

③ Press the calculation (C) button to start calculations.

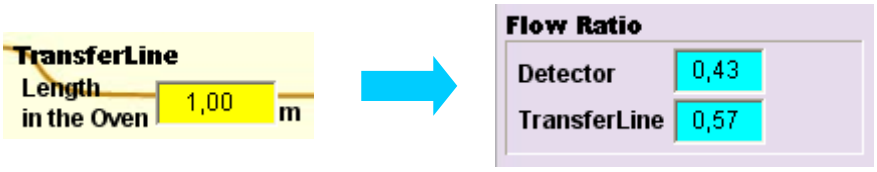
④ When Calculation completed appears on the bottom left of the screen, however, if the results are not suitable for analysis, an error message appears. If this happens, check the error message and input the values again as necessary.

⑤ To close the application, click the X at the upper right. Since the software does not save settings, the default values appear upon restarting the application.

9-4-1. Split Ratio Simulation

Follow the procedure below to make a split ratio simulation.

Click the text box for the transfer line length inside the oven to change it to yellow, and input the length and click Calculate (C) to obtain a split ratio simulation result.



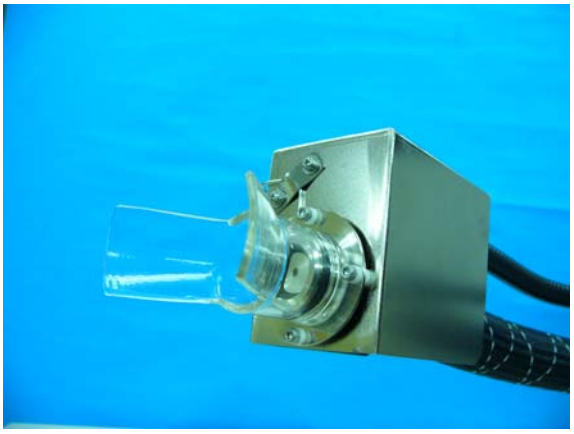
9-4-2. Capillary Tube Length Simulation

Follow the procedure below to make a split ratio simulation.

Click the detector text box for the planned flow ratio to change it to yellow, input the desired detector for the planned flow ratio, and click calculate (C) to obtain the results of the simulation for the capillary tube length inside the oven (the transfer line length inside the oven).

10. Nose Guard (Option)

When using high boiling point samples, samples can condense or become absorbed inside the conventional GC-O nose cone. This means that the operator often removes the nose cone and continues sniffing, which often results in burns to the nose. To solve this problem, there is an optional Y shaped nose guard available for the OP275 that has ventilation slits in the upper and lower part of the nose cone which allows the samples to be exhausted more freely.



This is most suitable for identifying subtle scents and for highly skilled operators. The nose guard also prevents burns to the nose often causes by contact with metallic parts.

11. Maintenance

11-1. Replacing the Fuse

◆When replacing a fuse, be sure to use a replacement fuse of the same rating.

The fuse cartridge is in the AC inlet on the rear panel of the controller. In the cartridge, there is a main fuse and a spare fuse. Use the spare fuse for main fuse replacement if necessary. For details of the spare fuse, refer to '20. Parts/Expendables'.

① Remove the power cable from the AC inlet.

② Pull out the fuse cartridge, and replace the main fuse and the spare fuse.

Power fuse rating: 250V T 5A　5.2×20mm

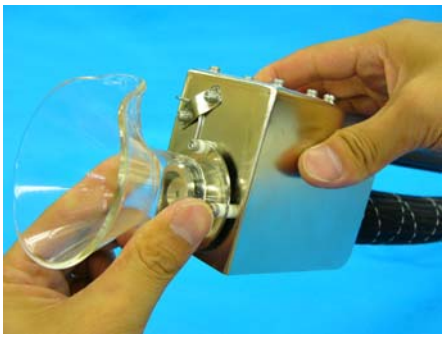
③ Put the fuse cartridge back in the AC inlet, and replace the power cord.

11-2. Cleaning the Nose Cone

After sniffing, samples may have become absorbed into the nose cone and smells might remain. When this happens, clean the sample residue from the nose cone.

① Remove the nose cone from the nose cone flange and clean it. Hold the nose cone by the straight part, and pull it off straight to remove it.

② Put the nose cone back onto the nose cone flange and continue sniffing.



Caution ⚠

To prevent injury, do not force the nose cone when attaching or detaching it.

Note!

If the nose cone flange is tight, wet the nose cone attachment point (the inside) with some water.

12. Troubleshooting

If a problem arises while using the instrument, check the following items to rectify the problem. If you cannot solve the problem with the measures listed, immediately stop using the instrument and contact your GL Sciences dealer for assistance.

Problem	Possible Cause	Action
No power	The power cable might not be connected.	Confirm that the power cable is connected to the AC inlet.
	The power outlet might not have power.	Be sure that the power supplied is AC100V. If incorrect power has been supplied, refer to '13-1. Replacing the Fuse' and replace the fuse. If you cannot solve the problem, immediately stop using the instrument and contact your GL Sciences dealer for assistance.
	There might not be a main fuse in the fuse cartridge in the AC inlet, or the fuse is not the correct rating.	Refer to '13-1. Replacing the Fuse' and insert the correct fuse.
		Refer to '13-1. Replacing the Fuse' and check that the main fuse is correctly inserted into the fuse cartridge. There is no electricity through the spare fuse.
Temperature does not rise	The HEATER switch might not be ON.	Push the HEATER switch up, and confirm that the red LED light is on or flashing.
	The transfer line heater cable might not be connected.	Connect the transfer line heater cable to the controller.
	The transfer line heater might be broken.	Immediately stop using the instrument and contact your GL Sciences dealer for assistance.
	There may be a short circuit inside the controller.	
	On the temperature controller, the set temperature might be lower than the current temperature.	Confirm that the set temperature is not lower than the current temperature.
Weak smell No output to detector	The AUX GAS might not be supplied.	Refer to '7-2.Adjusting the AUX GAS flow' and confirm that the AUX GAS is supplied. Adjust the flow to 5mL/min.
Weak smell No output to detector	One of the splitter lines is not attached, or there is a gas leak.	Check the capillary tube lines. Do not use soapy water and the like to check for gas leaks.
	The capillary tube inserted into the transfer line might be broken.	Confirm that the capillary tube is not broken. If it is, replace it.
Weak smell No output to detector	The end of the capillary tube inserted into the transfer line might not be correctly positioned.	Confirm that the end of the capillary tube is flush with the surface of the heat block.
	The temperature is not set correctly or the temperature has not risen.	Set the correct transfer line temperature to suit the sample boiling point.

	High viscosity sample has become clogged or condensed in the line.	Wash the splitter with organic solvent, and replace the capillary tubes with new ones.
Water squirts out of the humidified air outlet.	The clean water level in the bubbling bottle is too high or the air flow is too high.	Make sure the water level is less than. 20 m/L, and refer to '7-1. Preparing the Bubbling Bottle' to adjust the air flow to 50mL/min.
	The tubes for HUMIDITY CONT. on the front of the controller and the Bubbling bottle might be incorrectly connected.	Refer to '7-1. Preparing the Bubbling Bottle' and connect the tubes properly.
Humidified air does not come out of the nose cone flange.	The tubes for AIR OUT on the back of the controller and the transfer line humidified air inlet are incorrectly connected.	Confirm that the PFA humidified air tube on the back of the controller is correctly inserted into to the transfer line humidified air inlet. If it is not securely inserted it might leak.
Error display 	The temperature sensor may have deteriorated or broken.	Stop usage immediately, and contact your GL Sciences dealer for assistance.
Error display 	The temperature controller A/D converter may have a problem.	Turn off the power for all equipment and then turn it back on. If there is a problem with noise, set up peripheral equipment and so on separately. If you cannot solve the problem, immediately stop using the instrument and contact your GL Sciences dealer for assistance.
Error display 	Noise from peripheral equipment might be causing problems in the electronics.	

13. Utility specifications

13-1. Olfactory Detector Port OP275

(A) Power supply

Line frequency:	50 to 60Hz
Line voltage:	200 to 240V AC
Power consumption:	Max.500VA (5A)
Connection power cable:	Grounded 2P+E power outlet or power board

(B) Gas

Auxiliary gas:	High purity helium or nitrogen
AIR:	Pure air or nitrogen (general grade)

(C) Pressure

Auxiliary gas:	0.1 to 0.7MPa (recommended 0.3 to 0.5MPa)
AIR:	0.1 to 0.6MPa (recommended 0.3 to 0.5MPa)

(D) Flow range

Auxiliary gas:	0 to 5mL/min (recommended 5mL/min)
AIR:	0 to 50mL/min (recommended 50mL/min)

(E) Gas pipes

Auxiliary gas IN:	1/8inch (3.175mm) SL tube connection
Auxiliary gas OUT:	1/16inch (1.588mm) SL tube connection
AIR IN:	1/8inch (3.175mm) SL tube connection
AIR OUT:	1/8inch (3.175mm) one touch tube connection

(F) Clean water

Amount:	10 to 20mL (Bubbling Bottle: 40mL)

(G) Primary gas supply regulator

High sensitivity regulator for analysis purposes Rubber diaphragm, seal tape is not suitable.

(H) Tubing materials

The minimum required for set up and first use are provided as standard. For details, refer to ’15. Packing List’. Please prepare other parts and expendables to suit your requirements. For details, refer to ’16. Parts/Expendables’.

13-2. Split Manager (Split Ratio Simulation Software)

Recommended system requirements

Operating System:	Windows®95, 98, 2000, XP, NT4.0
Media:	CD-ROM
Memory requirements:	Recommended OS standard
Required HD capacity:	More than1MB for the program only

* This software has been confirmed to run on Windows® 2000, and Windows® XP
* This software does not require installation. It can be executed from the CD ROM, or copied to the desktop and executed from there.
* Acrobat Reader is required to read the software operations manual.

14. Specifications

14-1. Olfactory Detector Port OP275

(A) General Specifications

1) Transfer line

Temperature setting range:	0 to 300 degree C, 1 degree C increments
Temperature control type:	PID

2) Flow adjustment

Auxiliary gas:	mass flow valve
AIR:	speed control valve

3) Flow adjustment range

Auxiliary gas:	0 to 5mL/min
AIR:	0 to 10mL/min

4) Gas supply range

Auxiliary gas:	0.1 to 0.7MPa
AIR:	0.1 to 0.6MPa

5) OP275 controller Rear panel tube connection

Auxiliary gas IN:	1/8inch(3.175mm) SL type
Auxiliary gas OUT:	1/16inch(1.5875mm) SL type
AIR IN:	1/8inch(3.175mm) SL type
AIR OUT:	1/8inch(3.175mm) one touch type

6) OP275 controller Front panel tube connection

AIR IN:	1/8inch(3.175mm) one touch type
AIR OUT:	1/8inch(3.175mm) one touch type

7) Standard compatible gas chromatographs

GL Sciences:	GC-4000
HITACHI:	G-6000

(B) Environmental specification

Temperature range:	0 to 300 degree C, 1 degree C increments
Temperature control type:	SSR zero cross PID control
Shipping/Storage temperature:	-25 to 60 degree C
Shipping/Storage humidity:	10 to 85% non-condensing
Operating temperature:	5 to 35 degree C
Operating humidity:	10 to 85% non-condensing
Altitude:	2000m
Pollution degree:	2

(C) Electrical specification

Line frequency:	50 to 60Hz
Line Voltage:	200 to 240V AC
Power consumption:	Max.500VA,(5A)

(D) Dimension and weight

OP275 controller external dimensions:	W96×H300×D230mm (Without protuberances)
OP275 controller:	approx. 3.5kg
OP275 transfer line:	approx. 1.5kg
Heater cable length:	1000mm
Flexible arm length:	457.2mm
OP275 transfer line length:	650mm
OP275 transfer line Minimum bend radius:	70mm

15. Packing List

15-1. Olfactory Detector Port OP275

Part	Type	Quantity	P/N
OP275 utility CD-ROM	Split manager software	1	275-9999
OP275 controller		1	275-1000
OP275transfer line	L650mm	1	275-2000
GC holder	ϕ15, M4×10 screws	1	275-3010
Nose cone	PYREX R type	1	275-3020
Splitter	Inactive treated, M3×12 screws	1	275-3030
Splitter stand	M4×8 screws	1	275-3040
Capillary gland nuts		4	275-3050
Plugs		2	275-3060
Bubbling bottle	With filter	1	275-3070
O ring	P-22A	1	275-3080
Arm stand		1	275-3090
Side covers		1	275-3100
Power cable		1	275-3110
GND cable	L1100mm	1	275-3120
Spare fuse	250VT 5A 5.2×20mm	1	275-3130
PFA tube	3.18O.D.×1.58I.D. 2M	1	275-3140
Silcosteel® tube	0.79O.D.×0.53I.D. 2M	1	275-3150
F.S. Capillary tube	0.25I.D.×0.35O.D. 5M	1	275-3160
Graphite ferrules	GI-0.5	5	275-3170
Graphite ferrules	GI-0.8	3	275-3180

15-2. Options

Cat.No.2702-18506 (P/N 275-3021) Nose guard PYREX Y shape

Part	Type	Quantity	P/N
Nose guard	PYREX Y shape	1	275-3021

Cat.No.2702-18508 (P/N 275-4010) Mount System type: RAM

Part	Type	Quantity	P/N
Clamp		1	275-4011
Ball socket		1	275-4012
Screw socket ball		1	275-4013

Cat.No.2702-18551 (P/N 275-4020) HP/Agilent 6890 adapter plate

Part	Type	Quantity	P/N
OP275 adapter plate HP6890		1	275-4021
Tapping screws	M3.5 × 10	4	275-4022
Screws	M4 × 10	4	275-4023
Flat washers	M4	8	275-4024

Cat.No.2702-18552 (P/N 275-4030) Shimadzu GC-2010 adapter plate

Part	Type	Quantity	P/N
OP275 adapter plate GC-2010		1	275-4031
Screws	M4 × 10 SUS	4	275-4032
Shake-proof washers	M4 SUS	4	275-4033

Cat.No.2702-18553 (P/N 275-4040) Shimadzu GC-17A adapter plate

Part	Type	Quantity	P/N
OP275 adapter plate GC-17A		1	275-4041
OP275 adapter plate GC-17 (old)		1	275-4042
Spacers	SQ-10	4	275-4043
Plate screws	M3 × 6	4	275-4044
Screws	M4 × 6	10	275-4045
Screws	M5 × 8	4	275-4046
Flat washers	M4	12	275-4047
Flat washers	M5	8	275-4048
JIS 3 nuts	M4	4	275-4049
JIS 3 nuts	M5	4	275-4050

Cat.No.2702-18554 (P/N 275-4060) Thermotrace GC adapter plate

Part	Type	Quantity	P/N
OP275adapter plate THERMO		1	275-4061
Screws	M4 × 8	4	275-4062

16. Parts/Expendables

Cat. No.	P/N	Part	Type	Quantity
2702-18505	275-3020	Nose cone	PYREX R type	1
2702-18520	275-4070	Splitter	Inactive treated with stand, gland nuts	1 set
2702-18521	275-3030	Splitter	Inactive treated, M3 × 12Screw	1
2702-18525	275-3050	Capillary gland nuts	4	1 pack
2702-18530	275-3070	Bubbling bottle	With filter	1
2702-18540	275-3010	GC holder	ϕ15, M4 × 12Screw	1
2702-18509	275-3100	Side covers		1 Set
2702-18550	275-3090	Arm stand		1
2702-18560	275-4083	Spare fuse	250VT 3.15A 5.2 × 20mm (2)	1 pack
2702-18561	275-4085	Spare fuse	250V T 5A 5.2 × 20mm (2)	1 pack
3004-32231	275-5010	PFA tube	3.18O.D. × 1.58I.D. 10M coil	1 roll
3004-50001	275-5020	Silcosteel® tube	0.79O.D. × 0.53I.D. 7.5M	1 roll
1010-36132	275-5030	F.S. Capillary tube	0.150I.D. × 0.375O.D. 10M	1 roll
1010-36222	275-5031	F.S. Capillary tube	0.200I.D. × 0.350O.D. 10M	1 roll
1010-36322	275-5032	F.S. Capillary tube	0.250I.D. × 0.350O.D. 10M	1 roll
1010-36452	275-5033	F.S. Capillary tube	0.320I.D. × 0.450O.D. 10M	1 roll
1010-36682	275-5034	F.S. Capillary tube	0.530I.D. × 0.660O.D. 10M	1 roll
3007-14105	275-5040	Graphite ferrules	GI-0.5 10 (10)	1 box
3007-14108	275-5041	Graphite ferrules	GI-0.8 10 (10)	1 box
3007-14110	275-5042	Graphite ferrules	GI-1.0 10 (10)	1 box
3007-31104	275-5050	Graphite Vespel® ferrules	GV-04 10 (10)	1 box
3007-31105	275-5051	Graphite Vespel® ferrules	GV-05 10 (10)	1 box
3007-31108	275-5052	Graphite Vespel® ferrules	GV-08 10 (10)	1 box
3007-31110	275-5053	Graphite Vespel® ferrules	GV-10 10 (10)	1 box

Olfactory Detector Port OP275 Operations Manual

- Issued: 4th April 2007 Version 2
- Publisher: GL Sciences Inc.