Control Number: ZAQFMAE-10

INSTRUCTION MANUAL
For
Automatic Quick Furnace
MODEL AQF-100

MITSUBISHI CHEMICAL ANALYTECH

EC DECLARATION OF CONFORMITY

We hereby declare that the following equipment complies with the essential requirements of:

EC Electromagnetic Compatibility Directive: 89/336/EEC
Electrical Equipment Designed for Use within Certain Voltage Limits : 73/23/EEC

Model Name : Automatic Quick Furnace Model AQF-100

Standard to which Conformity is Declared:

EN55011 (1991) Class B

EN50082-1 (1997)

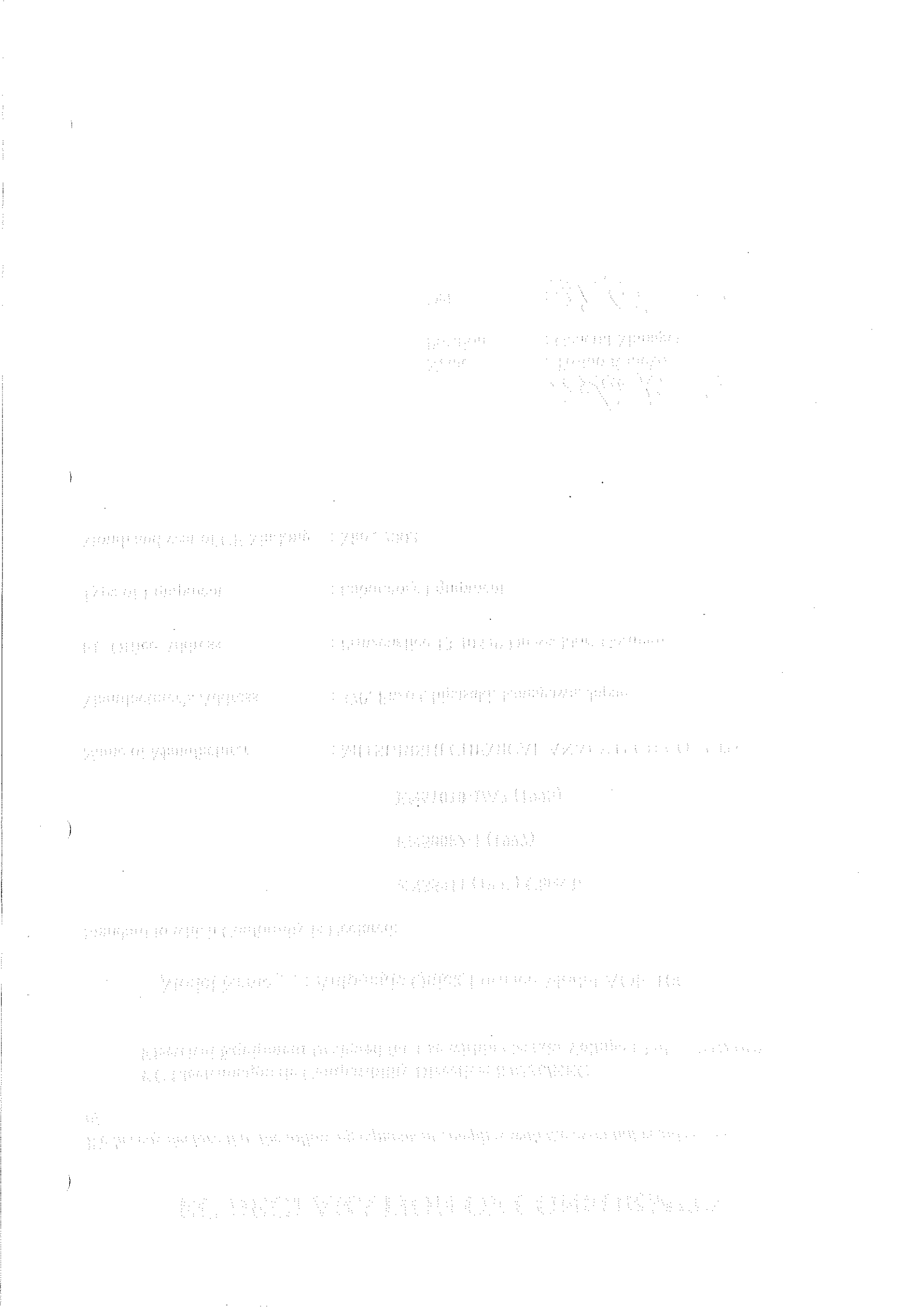
EN61010-1/A2 (1995)

Name of Manufacturer	: MITSUBISHI CHEMICAL ANALYTECH CO., LTD
Manufacturer's Address	: 370, Enzo Chigasaki, Kanagawa, Japan
EU Office Address	: Prinzenallee 13 40549 Duesseldorf Germany
Type of Equipment	: Laboratory Equipment
Month and year of CE Marking	: May, 2002

Toshio Kaneko

Name : Toshio Kaneko
Position : General Manager

Date : 29 Oct. 2008
DD.MMM.YYYY



INTRODUCTION

Thank you for your purchase of our Automatic Quick Furnace Model AQF-100.
This unit has the following features.

- Appropriate for pretreatment of simultaneous analysis of anion such as sulfur and halogen
  By connecting combustion part, automatic absorption part, and a liquid or solid sampler, the pretreatment from combustion to absorption can be run automatically.
  Absorption solvent is automatically injected into an ion chromatography unit and sulfur and halogen can be measured simultaneously.

- Available for pretreatment of dioxin bromide
  Sample is extracted and concentrated with toluene and combusted and absorbed by this unit. It can be measured as total bromine with an ion chromatography unit.

- Whole control by a personal computer
  The personal computer controls combustion part temperature, gas flow, automatic absorption of combustion gas, and a liquid or solid sampler. Therefore operation is easy.
  By combustion and absorption and automatic injection to an ion chromatography unit, measurement can be accurate.

To use Model AQF-100 efficiently and safely, read this manual and understand functions and the operation fully.

NOTICE

(1) Do not reprint this manual wholly or partially without permission.

(2) The contents may be changed without notice.

(3) Though this manual was prepared carefully, contact our local distributors when mistakes, omission, and missing pages are found. But the system program screen in this manual may be different partially every version.

(4) For the influence of used results, we don't take the responsibility regardless of (3).

(5) Decide operators when using this unit.

(6) Follow the contents in this manual. When troubles or damage occur by neglecting the contents in this manual, we do not guarantee the unit even under the guarantee.

IMPORTANT SAFEGUARDS AND PRECAUTIONS

Thank you for purchasing our Automatic Quick Furnace Model AQF-100.
Read this instruction manual with care before the use.
Keep the manual at hand when you are operating the analyzer.
If you operate the analyzer in the way except this manual description, the security can't be assured. If you find questions, errors, and omissions, contact our distributors.

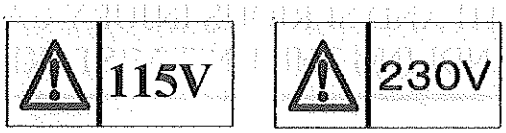
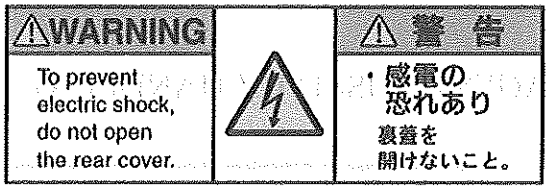
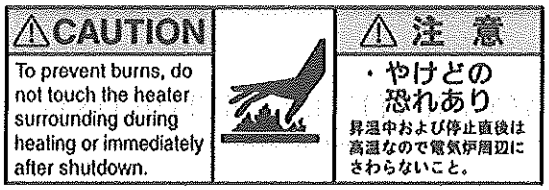
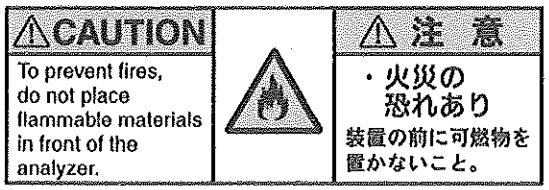
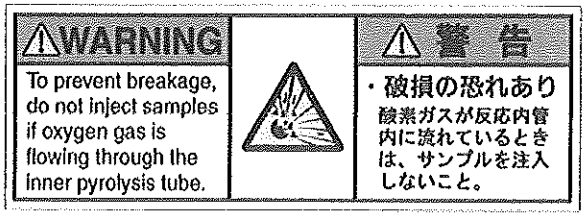
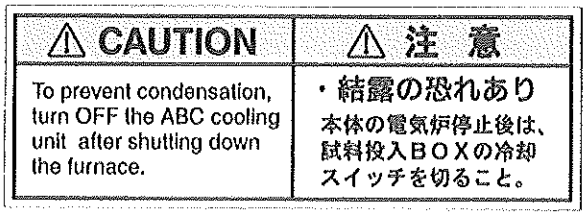
WARNING
"WARNING" SHOWS DANGER OF DEATH AND SERIOUS INJURY CAUSED BY NEGLECTING "WARNING" AND HANDLING THE UNIT MISTAKENLY.

CAUTION
"CAUTION" SHOWS DANGER OF DAMAGES CAUSED BY HANDLING THE UNIT MISTAKENLY.

POINT
IMPORTANT INFORMATION FOR THE ACCURATE USE OF THE UNIT

Labels

The following labels are attached to AQF-100. Follow the instructions in the labels necessarily.

Warning and Caution labels	Attached places
	At the gas connection part of AQF-100 rear
	At power voltage setting box of AQF-100 rear At AC POWER sides of ABC rear and GA-100 rear
	At AQF-100 rear lower side (electric furnace rear side)
	At the right and left sides of AQF-100
	At the bottom of AQF-100 front air inlet
	At ABC safety cover
	At the rear of ABC upper right

At installation

CAUTION
Install the unit at the place where the temperature is 15℃~35℃.
By installing it at immoderate temperature places, a fire is caused and operation is unstable.

CAUTION
Install the unit in the place free from direct sunlight to prevent a fire.

CAUTION
Install the unit in the place free from strong vibration or continuous weak vibration to prevent operation instability.

CAUTION
Install the unit in the place free from strong electromagnetic field to prevent error operation.

CAUTION
Install the unit in the place where humidity is under 80% to prevent a fire and an electric shock.

CAUTION
Install the unit in the place free from corrosive gas not to deteriorate the unit.

CAUTION
Install the unit in the place free from much dust to prevent a fire and an electric shock.

CAUTION
Install the unit in the place where fire is not used to prevent a fire.

CAUTION
Install the unit horizontally.

At the unit use

WARNING

Check gas leak necessarily before using the unit. When organic matter mixes with oxygen or air at high temperature, explosive combustion can occur and glass part such as a pyrolysis tube and a guide tube is damaged.
To prevent explosive combustion, this unit vaporizes slowly a sample in argon gas and mixes it with oxygen or air and combust it. Before the use, check necessarily gas piping looseness, O-ring deterioration, and gas leak by septum removal.

WARNING

Do not expose directly the unit to combustibles and combustible gas.
The unit furnace is high-temperature. Combustible liquid causes a fire and it is very dangerous.

CAUTION

Appoint a person responsible for the operation and operators.

CAUTION

Check gas flow and inject a sample.

CAUTION

Do not touch high temperature part. The electric furnace is heated up to 900℃~1000℃.
Do not open the door and touch it with naked hands.

CAUTION

Do not touch a power plug with wet hands to prevent an electric shock.

CAUTION

Do not remake and break a power cable. Do not load a heavy thing on the cable and heat it.

CAUTION

Do not remove the unit cover except our servicemen. An electric shock and a fire can be caused.

CAUTION

Check that a ground terminal is connected to prevent an electric shock.

CAUTION

When handling chemicals, put on the safety goggles or glasses to protect ears, skin, and eyes. Do not inhale chemicals vapor.

CAUTION

When using ABC, use a safety cover. Without the cover, measurement can't start. When the cover is open, an error message is displayed in a monitor.

Maintenance and inspection

CAUTION

Check the unit every day before the use. If you fail to check it, it doesn't perform properly and a serious accident can be caused.

Table of Contents

Section 1: Names and Functions of AQF-100 System

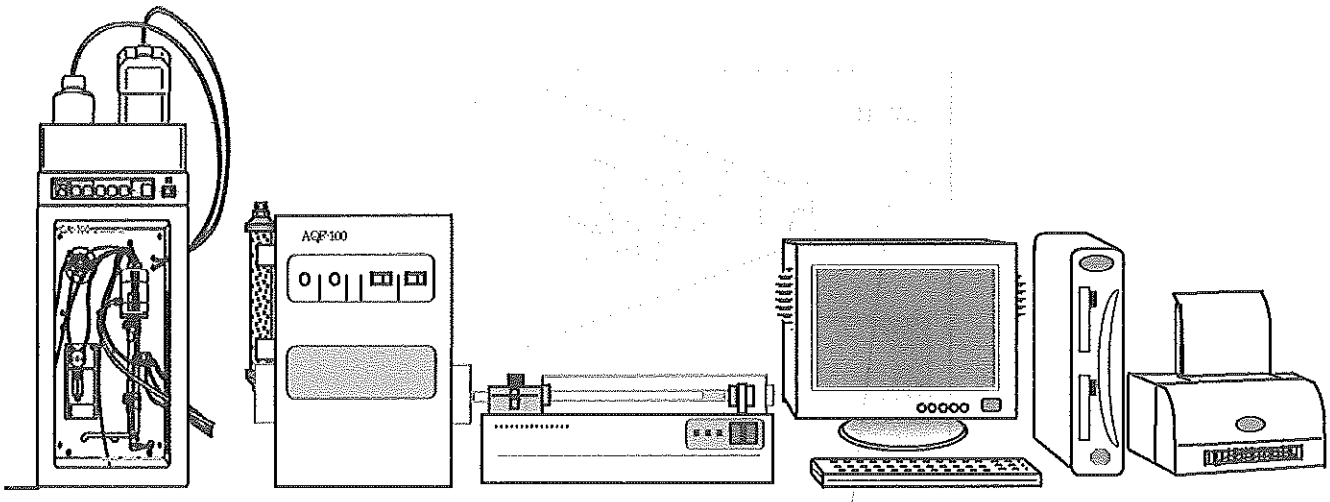
Section 2: Packed Parts Check

Section 3: Installation

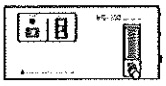
Section 5: Measurement

Section 1: Names and Functions of AQF-100 System

1-1. System Composition



GA-100 **AQF-100** **Automatic boat controller (ABC)** **Personal computer (Supplied by local distributors)** **Printer**



WS-100

Illustration 1-1. AQF-100 system

No.	Unit name	Function
1	AQF-100	Sample heating and decomposition, System control
2	Automatic boat controller (ABC)	Automatic feeding of a sample boat
3	GA-100	Absorption of combustion gas
4	WS-100	Water supply

Table 1-1. AQF-100 system composition

1-2. Names and Functions of System

1-2-1. AQF front side names and functions

Illustration 1-2 and Table 1-2 show AQF front side and the names and functions.

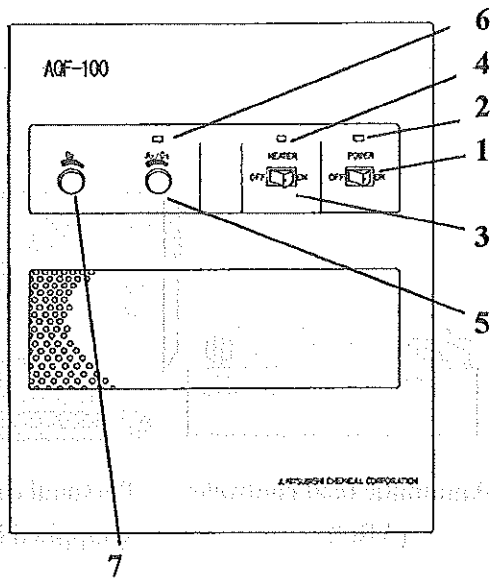


Illustration 1-2. AQF-100 front side

No.	Indication	Name	Function
1	POWER	Power switch	Power is supplied to the unit by turning on this switch.
2		Power switch LED	This LED (green) is ON when the power switch is turned on.
3	HEATER	Heater switch	For an electric furnace To increase the heater temperature, set it at "Heater" of "System". When this switch is off, power is not supplied to the heater.
4		Heater LED	This LED (green) is ON when the electric furnace is under control.
5	Ar/ O_2	Ar/O_2 adjustment knob	Turn it left to increase the flow. Turn it right to decrease the flow. Adjust the flow by checking gas flow in the computer display.
6		O_2 LED	It lights when O_2 flows into an inner pyrolysis tube.
7	O_2	O_2 adjustment knob	Turn it left to increase the flow. Turn it right to decrease the flow. Adjust the flow by checking gas flow in the computer display.

Table 1-2. AQF-100 front side names and functions

1-2-2. AQF rear side names and functions

Illustration 1-3 and Table 1-3 show AQF rear side and the names and functions.

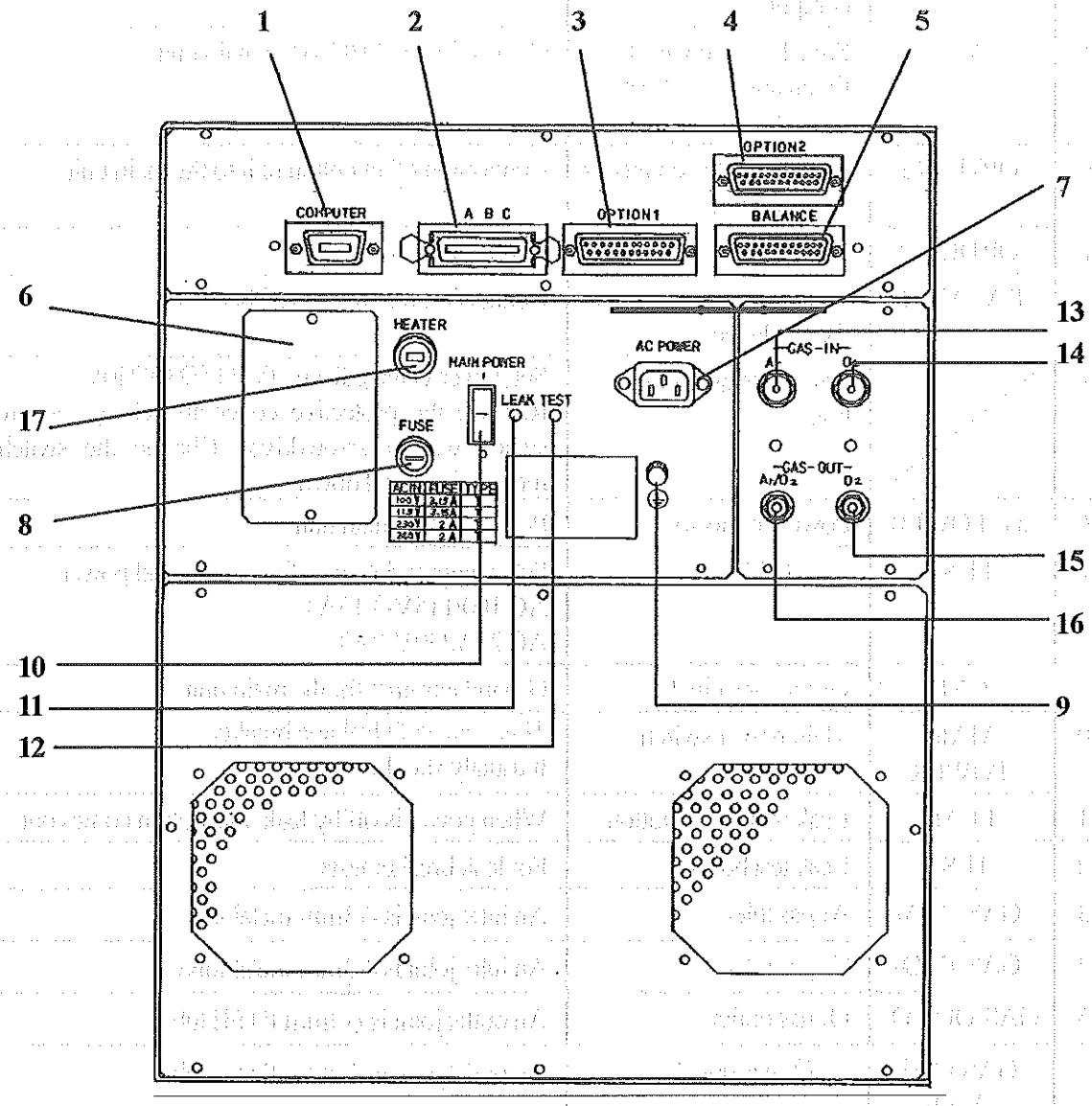


Illustration 1-3. AQF rear side names and functions

No.	Indication	Name	Function
1	COMPUTER	Connector for a personal computer	For a signal cable connecting a personal computer
2	ABC	Signal cable connector for an automatic boat controller	Connection of ABC to the main unit
3	OPTION 1	Signal cable connector for an option	Connection of an option unit to the main unit
4	OPTION 2		This is not used.
5	BALANCE	Signal cable connector for a balance	Connection for an optional balance
6		Power voltage setting box	Set power voltage from 100/115/230/240V. Remove the protective cover and change the rotary switch with a screwdriver. Change the switch by moving it up and down.
7	a.c. POWER	Power connector	Power for the main unit
8	FUSE	Fuse holder	Set an appropriate fuse for voltage and power. AC 100/115V-3.15AT AC 230/240V-2AT
9	GND	Ground terminal	Ground terminal for the main unit
10	MAIN POWER	Main power switch	This is an earth leakage breaker. It usually should be on.
11	LEAK	Leak indication button	When power is off by leak, this button comes out.
12	TEST	Leak test button	For leak breaker tests
13	GAS-IN Ar	Ar gas inlet	An inlet joint is ϕ 3mm metal tube.
14	GAS-IN O_2	O_2 gas inlet	An inlet joint is ϕ 3mm metal tube.
15	GAS-OUT O_2	O_2 gas outlet	An outlet joint is ϕ 4mm PTFE tube.
16	GAS-OUT Ar/O_2	Ar/O_2 gas outlet	An outlet joint is ϕ 4mm PTFE tube.
17	HEATER	Circuit protector for a heater	No fuse breaker for heater circuit protection

Table 1-3. AQF rear side names and functions

1-2-3. AQF-100 left side names and functions

Illustration 1-4 and Table 1-4 show AQF left side and the names and functions.

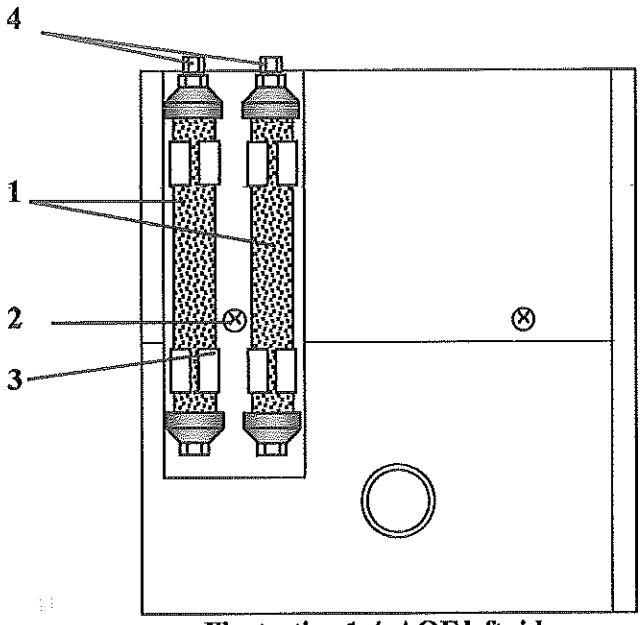


Illustration 1-4. AQF left side

No.	Name	Function
1	Gas purification filter (Hydro-purge II)	Removing impurities in supply gas
2	Screw for a gas purification filter fixing metal	Fixing a gas purification filter fixing metal
3	Gas purification filter fixing metal	Metal for fixing a gas purification filter
4	Reducer	Joint for a gas purification filter and a ϕ4/2 PTFE tube

Table 1-4. AQF left side names and functions

1-2-4. GA-100 front side names and functions

Illustration 1-5 and Table 1-5 show GA-100 front side and the names and functions.

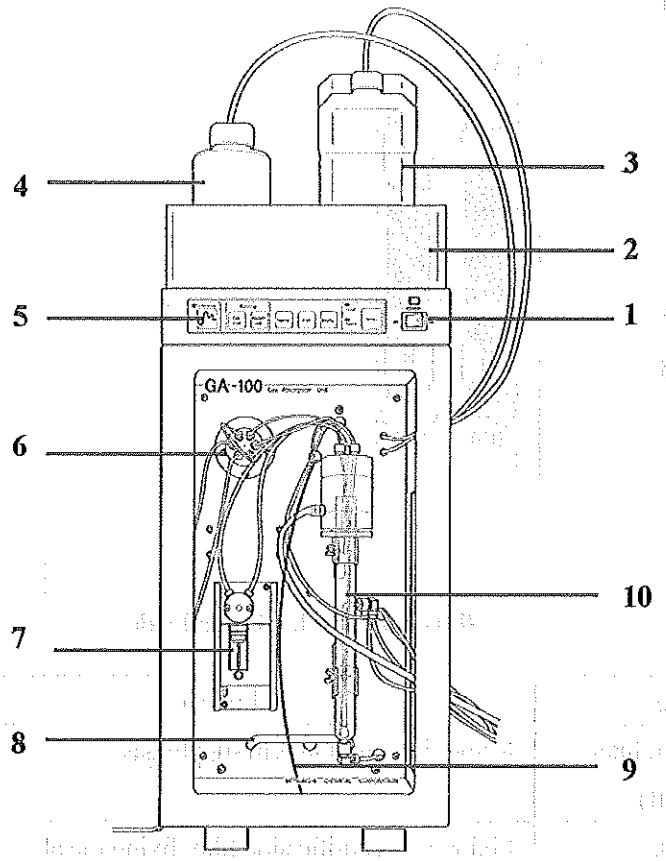


Illustration 1-5. GA-100 front side

No.	Name	Function
1	Power switch	GA-100 power switch
2	Bottle tray	Place an absorption solvent bottle and a washing solution bottle.
3	Washing solution bottle	For washing solution (2 L)
4	Absorption solvent bottle	For absorption solvent (0.5 L)
5	Operation panel	For manual operation of GA-100 Refer to Illustration 1-9. GA-100 operation panel for details.
6	Sample injector	For filing a sample loop with absorption solvent or standard solution and injecting a sample into an ion chromatography unit
7	Syringe	Absorption solvent is injected into an absorption tube.
8	Handle	For pulling GA-100 front forward
9	Standard solution injection tube	For injecting standard solution
10	Absorption tube	Absorption solvent is injected and combustion gas is absorbed.

Table 1-5. GA-100 front side names and functions

1-2-5. GA-100 rear side names and functions

Illustration 1-6 and Table 1-6 show GA-100 rear side and the names and functions.

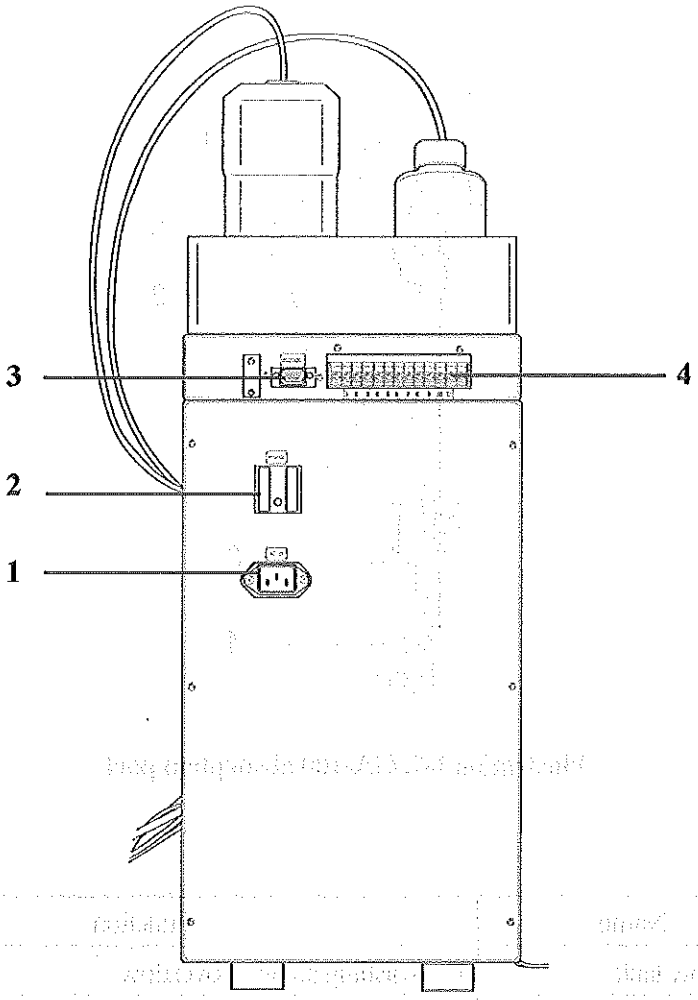


Illustration 1-6. GA-100 rear side

No.	Indication	Name	Function
1	a.c. POWER	Power connector	For GA-100
2	MAIN POWER	Main power switch	This is an earth leakage breaker switch. It should be ON.
3	RS-232C	Connector of a signal cable for a personal computer	Connection of a personal computer to GA-100
4	1~11	Signal terminal for an ion chromatography unit	Connection of an ion chromatography unit and WS-100 to GA-100

Table 1-6. GA-100 rear side names and functions

1-2-6. GA-100 absorption part names and functions

Illustration 1-7 and Table 1-7 show GA-100 absorption part and the names and functions.

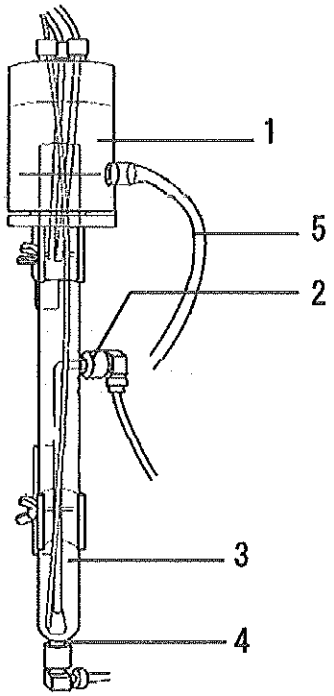


Illustration 1-7. GA-100 absorption part

No.	Name	Function
1	Overflow tank	For washing solution overflow
2	Combustion gas inlet	For combustion gas
3	Absorption tube	Absorption solvent is injected and combustion gas is absorbed.
4	Drain outlet	For absorption solvent and washing solution
5	Vinyl tube	For draining overflowed washing solution

Table 1-7. GA-100 absorption part names and functions

1-2-7. GA-100 absorption part line names and functions

For pump (P) and valve (V) positions, refer to Illustration 8-3. GA-100 line control part and the leakage sensor.

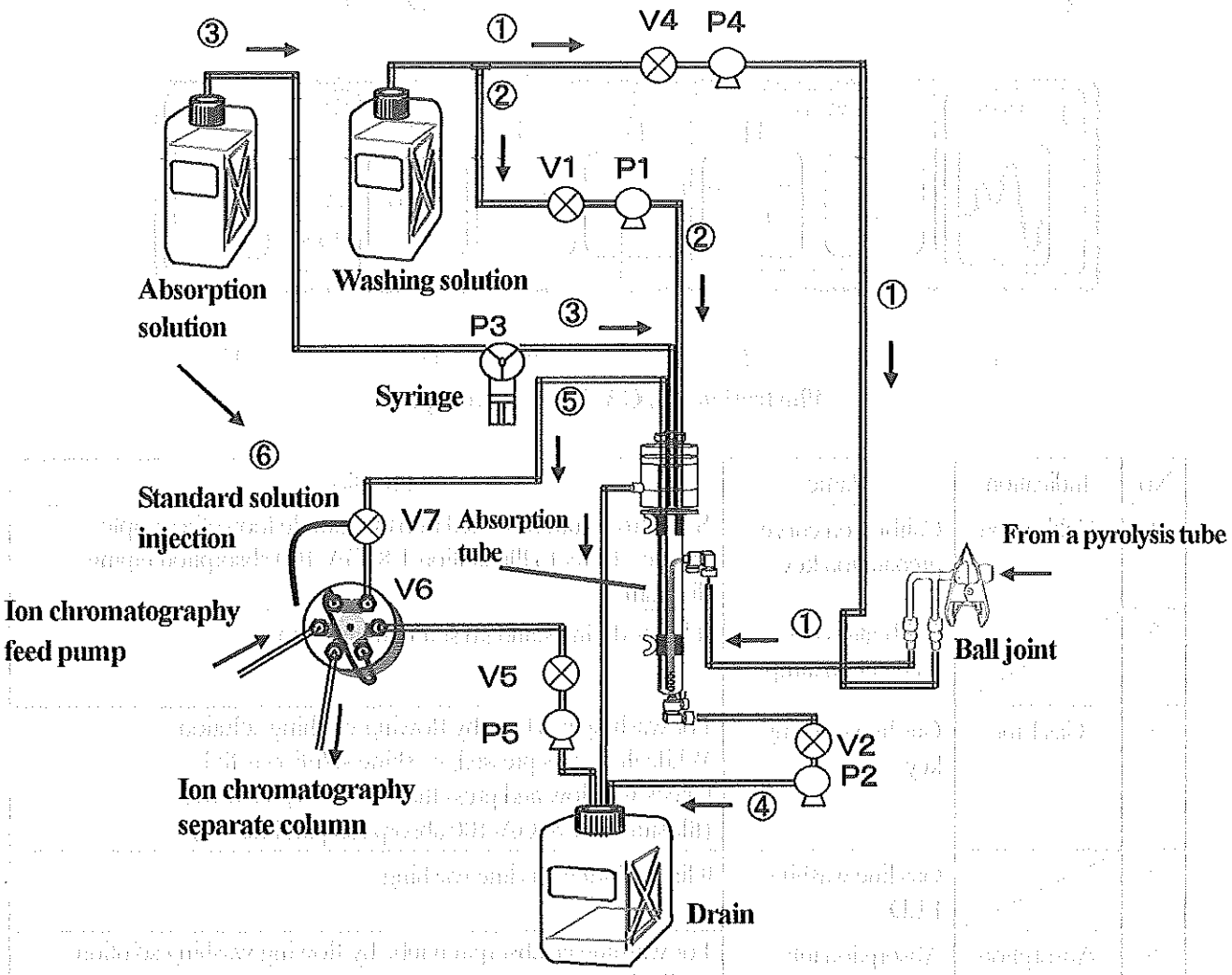


Illustration 1-8. GA-100 absorption part lines

Line No.	Name	Valve No.	Pump No.	Function
①	Gas Line	V4	P4	For washing gas lines
②	Absorption Tube	V1	P1	For washing an absorption tube
③	Dispense		P3	For filling absorption solvent into an absorption tube
④	Drain	V2	P2	For draining absorption solvent from an absorption tube
⑤	Sampling	V5	P5	For sampling absorption solvent of an absorption tube
⑥	Calibration	V5, V7	P5	For injecting directly measurement solution such as standard solution

Table 1-8. GA-100 absorption part line names and functions

1-2-8. GA-100 operation panel names and functions

Illustration 1-9 shows GA-100 operation panel and Table 1-9 shows GA-100 operation panel names and functions.

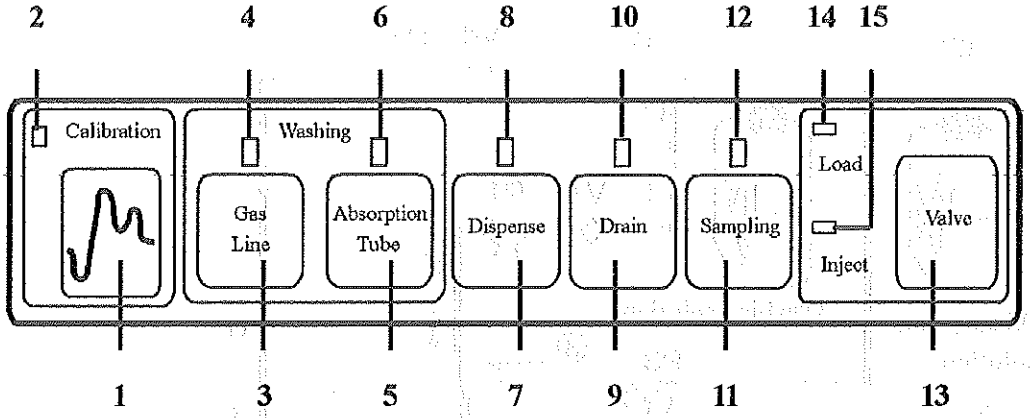


Illustration 1-9. GA-100 operation panel

No.	Indication	Name	Function
1	Calibration	Calibration curve preparation key	Standard solution is filled into the sample loop of a sample injector. Refer to Illustration 1-8. GA-100 absorption piping diagram.
2		Calibration curve preparation lamp	It lights during standard solution injection.
3	Gas Line	Gas line washing key	For washing gas lines by flowing washing solution While the key is pressed, washing solution is fed. Check gas flow and press the key when gas flows. (Illustration 1-8. GA-100 absorption part line ①)
4		Gas line washing LED	It lights during gas line washing.
5	Absorption Tube	Absorption tube washing key	For washing an absorption tube by flowing washing solution While the key is pressed, washing solution is fed. (Illustration 1-8 GA-100 absorption part line ②)
6		Absorption line washing LED	It lights during absorption line washing.
7	Dispense	Absorption solvent injection key	For filling absorption solvent into an absorption tube Once it is pressed, absorption volume is fed. (Illustration 1-8. GA-100 absorption part line ③)
8		Absorption solvent injection LED	It lights during injection.
9	Drain	Drain key	For draining absorption solvent or washing solution from an absorption tube While it is pressed, a drain valve is open. (Illustration 1-8. GA-100 absorption part line ④)
10		Drain LED	It lights during draining.

No.	Indication	Name	Function
11	Sampling	Sampling key	For injecting absorption solvent after absorption into a sample loop of a sample injector Absorption solvent is injected while pressing this key. (Illustration 1-8. GA-100 absorption part line ⑤)
12		Sampling LED	It lights during sampling.
13	Valve	Valve key	It changes a sample injector into the load side or the injection side.
14	Load	Load LED	It lights when a sample injector is in the load side.
15	Inject	Injection LED	It lights when a sample injector is in the injection side.

Table 1-9. GA-100 operation panel names and functions

1-2-9. ABC front side names and functions

Illustration 1-10 and Table 1-10 show ABC front side and the names and functions.

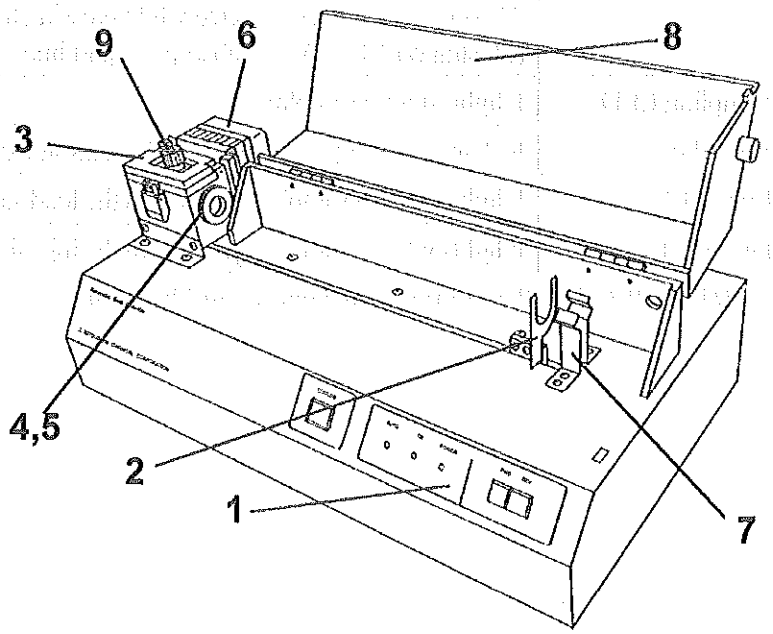


Illustration 1-10. ABC front panel

No.	Name	Function
1	Operation panel	ABC operation panel Refer to 1-2-11. ABC operation panel names and functions for details
2	Arm for magnet	For moving a round magnet
3	Sample introduction box	For putting in and out a sample boat
4	O-ring	For fixing a pyrolysis tube and a guide tube
5	O-ring holder	For holding an O-ring and fixing a pyrolysis tube and a guide tube
6	Cooling unit	For cooling a heated sample introduction box by boat heat
7	Guide tube holder	For supporting a guide tube
8	Safety cover	For the protection from explosion When a safety cover is open, the unit does not operate. By opening the cover during the operation, AQF-100 pretreatment is suspended and the unit stops.
9	Septum holder	Cap for fixing the septum of a sample inlet port

Table 1-10. ABC front panel names and functions

1-2-10. ABC rear side names and functions

Illustration 1-11 and Table 1-11 show ABC rear side and the names and functions.

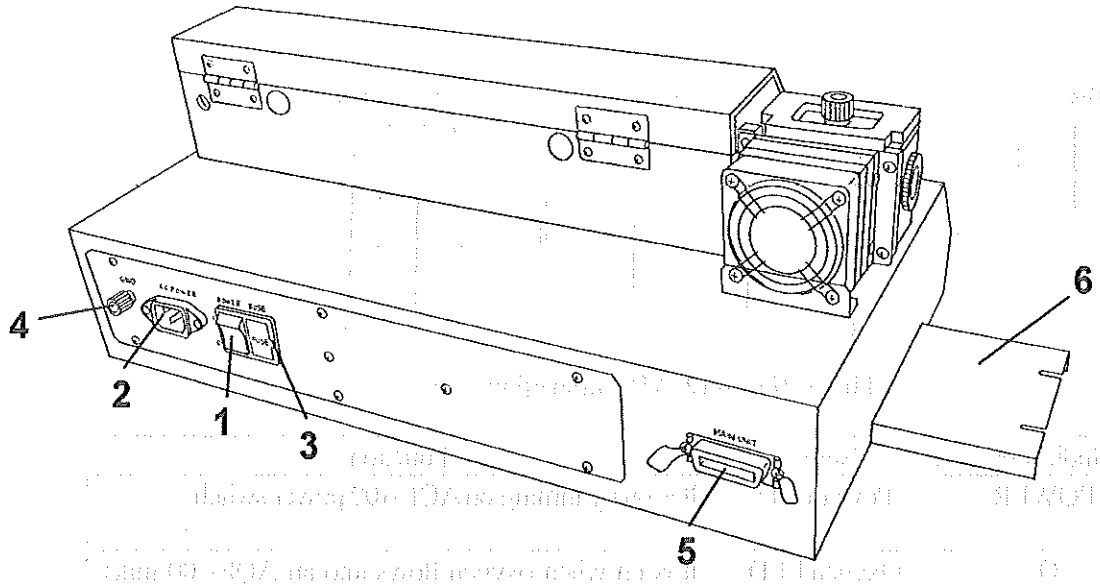


Illustration 1-11. ABC rear panel

No.	Indication	Name	Function
1	POWER	Power switch	For cooling the fan of a sample introduction box
2	a.c. POWER	Power connector	For supplying power to ABC AC100/115/230/240V is available.
3	FUSE 2AT	Fuse	Set a 2A midget fuse.
4	⏚	Ground terminal	Ground terminal for ABC When the power cable can't be grounded, ground an earth line here.
5	MAIN UNIT	ABC signal cable connector	For connecting ABC to AQF-100
6		ABC fixing plate	For fixing ABC to AQF-100

Table 1-11. ABC rear side panel names and functions

1-2-11. ABC operation panel names and functions

Illustration 1-12 and Table 1-12 show ABC operation panel and the names and functions.

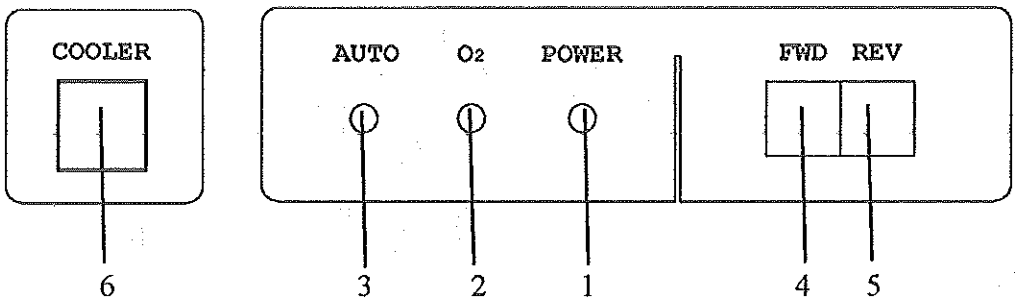


Illustration 1-12. ABC operation panel

No.	Indication	Name	Function
1	POWER	Power LED	It is on by turning on AQF-100 power switch.
2	O_2	Oxygen LED	It is on when oxygen flows into an AQF-100 inner pyrolysis tube. When this lamp is on during sequence operation (when the sample boat moves forward), an error message is displayed in a monitor, a buzzer sounds (long), operation is stopped, and measurement is suspended. **CAUTION:** **At the manual mode, never move a sample boat forward when this lamp is on.** **Sample combusts explosively and glass breaks and scatters.**
3	AUTO	Automatic operation LED	It is on when AQF-100 communicates with a personal computer.
4	FWD	Forward button	By pressing the button during manual operation, the boat moves forward. By releasing the button, the boat stops. By pressing the button again, the boat moves.
5	REV	Reverse button	By pressing the button during manual operation, the boat moves backward. By releasing the button, the boat stops. By pressing the button again, the boat moves.
6	COOLER	Cooler switch	For the cooling fan of a sample introduction box It is on during cooling fan operation. It is unavailable when the power switch of the unit rear is off.

Table 1-12. ABC operation panel names and functions

1-2-12. WS-100 front panel names and functions

Illustration 1-13 and table 1-13 show WS-100 front panel and the names and functions.

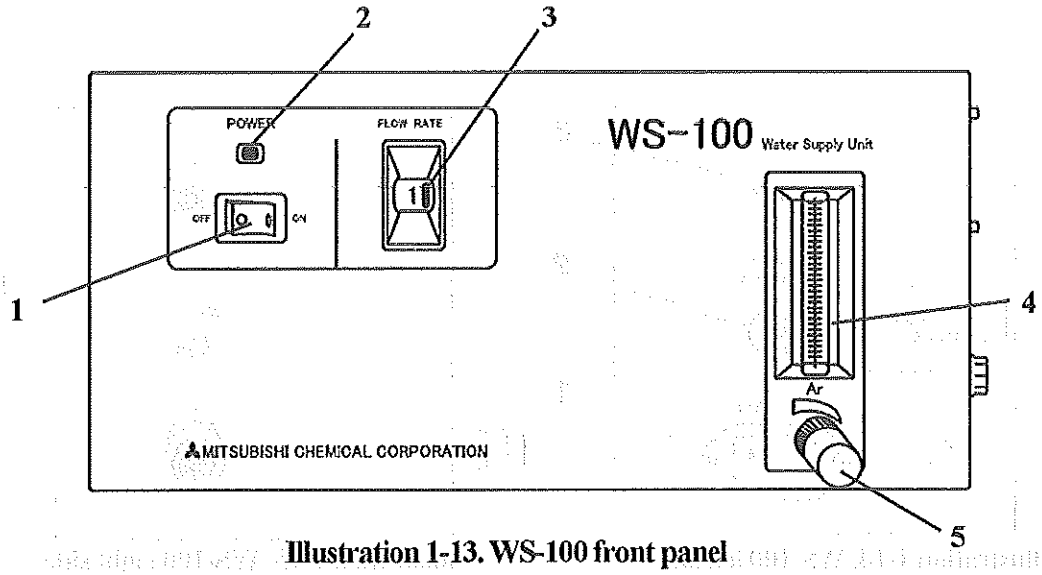


Illustration 1-13. WS-100 front panel

No.	Display	Name	Function
1		Power switch	Power switch of WS-100
2	POWER	Power indicator	It lights when the power switch is ON.
3	FLOW RATE	Water supply dial	Supply volume can be changed by 10 steps of 0~9.
4		Flow meter	For displaying argon gas flow
5		Flow adjustment knob	Turn it left to increase argon gas flow. Turn it right to decrease argon gas flow. Adjust the flow by checking a flow meter.

Table 1-13. WS-100 front panel names and functions

1-2-13. WS-100 left side and right side names and functions

Illustration 1-14 and 15 show WS-100 left side and right side. Table 1-14 shows the names and functions.

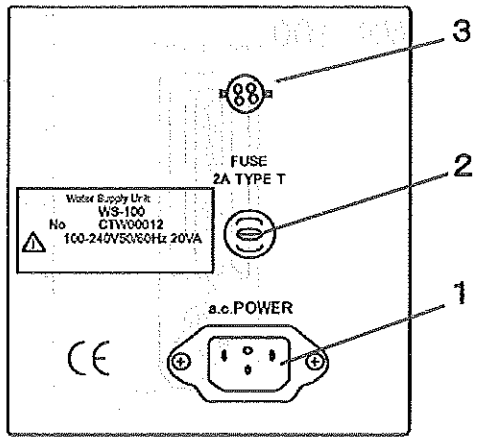


Illustration 1-14. WS-100 left side

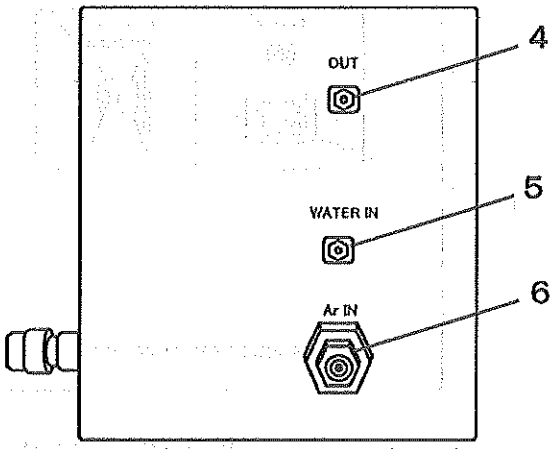


Illustration 1-15. WS-100 right side

No.	Display	Name	Function
1	a.c.POWER	Power connector	WS-100 power connector
2	FUSE 2A TYPE T	Fuse	Set a 2A midget fuse.
3		Signal connector	Connect the signal cable of GA-100.
4	OUT	Argon outlet	Outlet for argon including ultrapure water
5	WATER IN	Water inlet	Water inlet
6	Ar IN	Argon inlet	Argon inlet

Table 1-14. WS-100 left and right sides names and functions

Section 2: Packed Parts Check

2-1. AQF-100 Main Unit Parts

No.	Part name	Quantity	Check		Remarks
1	AQF-100 main unit	1 pc			
2	Thermal insulator (right)	1 set			With a fixing metal and knurled screws (2 pcs)
3	Thermal insulator (left)	1 set			With a knurled screw
4	Clip, P18	1 pc			
5	Gastight microsyringe 50 μ l	1 pc			
6	Flow meter for gas leak check (1L/min)	1 pc			
7	ϕ6/4 L-type joint (30-6RUE4-S)	2 pcs			
8	ϕ 4/2 PTFE tube 1.2m	1 pc			For Ar
9	ϕ 4/2 PTFE tube 0.7m	1 pc			For O_2
10	ϕ 3 Nut (with a ferrule)	2 sets			
11	ϕ 4 Nut (with a ferrule)	2 sets			
12	Quartz wool 5g	1 pc			
13	Quartz wool poker	1 pc			It is not used for XS-100 series.
14	O-ring, P-16	5 pcs/set			For ABC
15	Tweezers (L=150mm)	1 pc			
16	Spanner, 10×12mm	2 pcs/set			
17	Plus and minus screwdriver	1 pc			
18	RS-232C cable 9-pin cross type	1 pc			For a personal computer
19	Fuse, 3.15A or 2A	2 pcs/set			
20	Thermal fuse (93℃)	1 pc			
21	Power cable (AC 100/115V or 230/240V, 2.5m)	1 pc			
22	2P-3P converting plug	1 pc			115V only
23	AQF-100 system program	1 pc			CD-ROM
24	AQF instruction manual	1 pc			
25	AQF digest manual	1 pc			

Table 2-1. AQF-100 parts

2-2. GA-100 Parts

No.	Part name	Quantity	Check		Remarks
1	GA-100 main unit	1 pc			
2	Syringe 5ml (Cavro)	1 pc			
3	Ball joint with branch tubes (Quartz)	1 pc			
4	Inline filter	1 pc			
5	Connector EASYFITT ϕ 12	2 pcs/set			For an inline filter (beige)
6	ϕ 1/6" Union	6 pcs/set			For a sample injector (black, 2pcs spares)
7	ϕ 1/16" connector (#9005)	1 pc			
8	ϕ 6/3 Connector (30-6RU3-S)	2 pcs/set			For the connection of a ball joint, straight
9	ϕ 6/3 Gas inlet connector (30-6RUE3-S)	2 pcs/set			For the connection of an absorption tube, elbow
10	Vinyl tube 1.6m	1 pc			For drain
11	PEEK tube (Blue) ϕ 1/16"×0.01" 3m	1 pc			For the connection of a sample injector and an ion chromatography unit
12	PTFE tube ϕ 3/2 0.5m	1 pc			For the connection of an absorption tube and a pyrolysis tube
13	PTFE tube ϕ 4/2 0.7m	2 pcs/set			For the connection of a gas purification filter and AQF-100
14	Polyethylene tank 4L	1 pc			For drain
15	Polyethylene tank 2L	1 pc			For washing solution, with 2 holes in a cap
16	Polyethylene tank 0.5L	1 pc			For absorption solvent, with 2 holes in a cap
17	Tube holder (resin)	1 pc			
18	Double-ended spanner, 6×8mm	1 pc			
19	Double-ended spanner, 8×10mm	1 pc			
20	Double-ended spanner 3/8" × 7/16"	1 pc			
21	Double-ended spanner 1/2"×9/16"	1 pc			
22	Hexagonal wrench	1 pc			
23	Tube cutter	1 pc			

No.	Part name	Quantity	Check		Remarks
24	Gas purification filter (HYDRO-PURGE Ⅱ)	2 pcs			
25	Gas purification filter fixing board	1 pc			
26	Gas purification filter fixing metal	4 pcs/set			With a magnet rubber
27	Screw M3 × 8mm	8 pcs/set			
28	Insert	6 pcs/set			
29	Reducer	4 pcs/set			
30	Signal cable	1 pc			
31	RS-232C cable 9-pin cross type	1 pc			
32	Power cable (AC 100/115V or 230/240V, 2 m)	1 pc			
33	2P-3P converting plug	1 pc			

Table 2-2. GA-100 parts

2-3. Automatic Boat Controller (ABC) Parts

No.	Part name	Quantity	Check		Remarks
1	ABC unit	1 pc			
2	Outer pyrolysis tube	1 pc			
3	Inner pyrolysis tube	1 pc			
4	Spring for a pyrolysis tube	2 pcs/set			
5	Fixing plate	1 pc			
6	Signal cable	1 pc			
7	Guide tube	1 pc			
8	Ladle	1 pc			
9	Magnet	1 pc			
10	Sample boat (Quartz)	2 pcs/set			
11	Glass petri dish	1 pc			
12	Septum holder	1 pc			They are already set to a sample injection port on delivery.
13	Septum for a sample injection port	100 pcs/set			
14	Sample introduction port packing	1 pc			
15	Power cable (AC 100/115V/230/240V, 2 m)	1 pc			
16	2P-3P converting plug	1 pc			115V only
17	Fuse 2A	2 pcs/set			

Table 2-3. ABC parts

2-4. WS-100 Parts

No.	Name	Quantity	Check	Remarks
1	WS-100 unit	1 pc		
2	ϕ6/3 Gas inlet connector (30-6RUE3-S)	1 pc		Connect it to the branch tube of an inner pyrolysis tube.
3	T-type joint (4TTT-B)	1 pc		With a copper tube
4	ϕ3/2 PTFE tube 2.0m	1 pc		
5	ϕ4/2 PTFE tube 2.0m (blue)	1 pc		
6	Insert	2 pcs/set		
7	Fuse 2A	1 pc		
8	Plastic tank 250ml	1 pc		With 2 holes in a cap
9	Syringe for evacuation	1 pc		
10	Signal cable	1 pc		
11	L-type power cable (AC100/115V or 230/240V 2m)	1 pc		
12	2P-3P converting plug	1 pc		115V only
13	ϕ4 Nut (with a ferrule)	1 pc		

Table 2-4. WS-100 parts

2-5. AQF-100 Parts

No.	Name	Quantity	Check		Remarks
1	Absorption tube 10ml	1 pc			Only for impurities analysis system
2	Absorption tube 20ml	1 pc			Only for high concentration system
3	Sample loop 5 μl	1 pc			
4	Sample loop 20 μl	1 pc			
5	Trap column	1 pc			

Table 2-5. AQF-100 parts

Section 3: Installation

3-1. Installation

Install the unit as the following conditions for the long-term stable use.
Refer to Important safeguards and precautions for the details.

- Room temperature is 15~35℃.
- Free from direct sunlight
- No strong vibration and continuous weak vibration
- No strong electromagnetic field
- The humidity is under 80%.
- No corrosive gas
- Free from much dust
- Fire must not be used.
- No flammable materials
- The horizontal surface for installation

Even within the guarantee term, we can't compensate the troubles or damages caused by neglecting the above conditions.

3-2. Installation Space

AQF-100 system size is as follows.

- Table size : (Width 2250mm + ion chromatography unit width)×Depth 650mm
- Table load capacity : About 100kg
- Do not place things at the back of AQF rear side fan for ventilation.
  Prepare more than 150mm space between the unit and the back wall.

Illustration 3-1. shows the space of AQF-100 system.

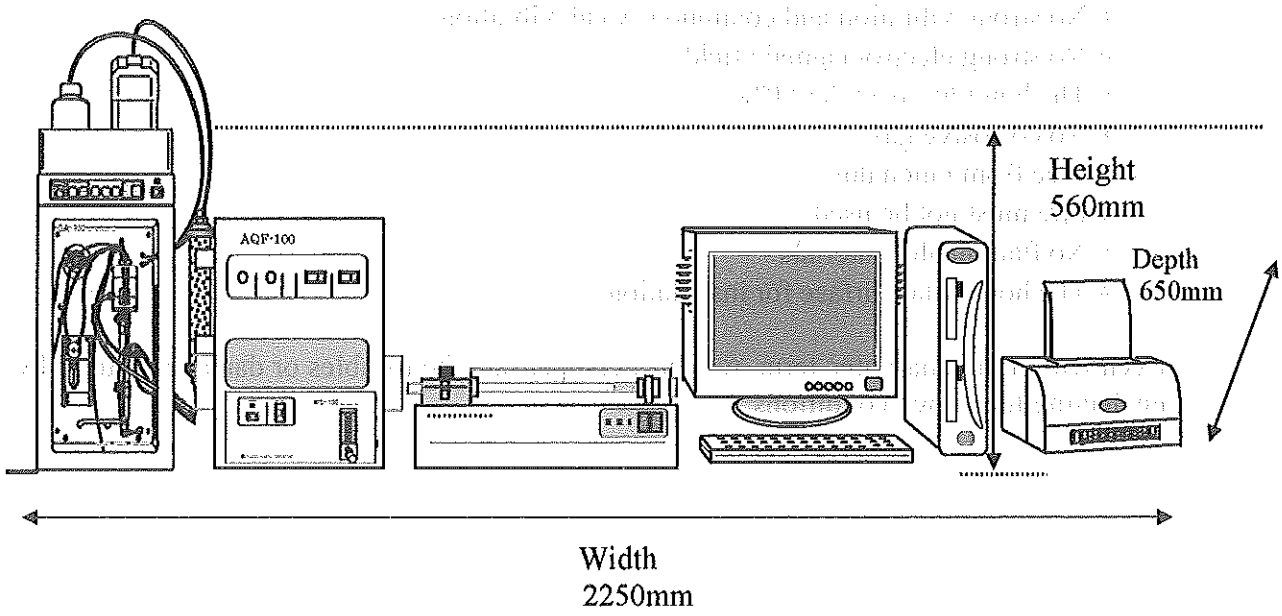


Illustration 3-1. Installation space of AQF-100 system

3-3. Power Preparation

3-3-1. Power

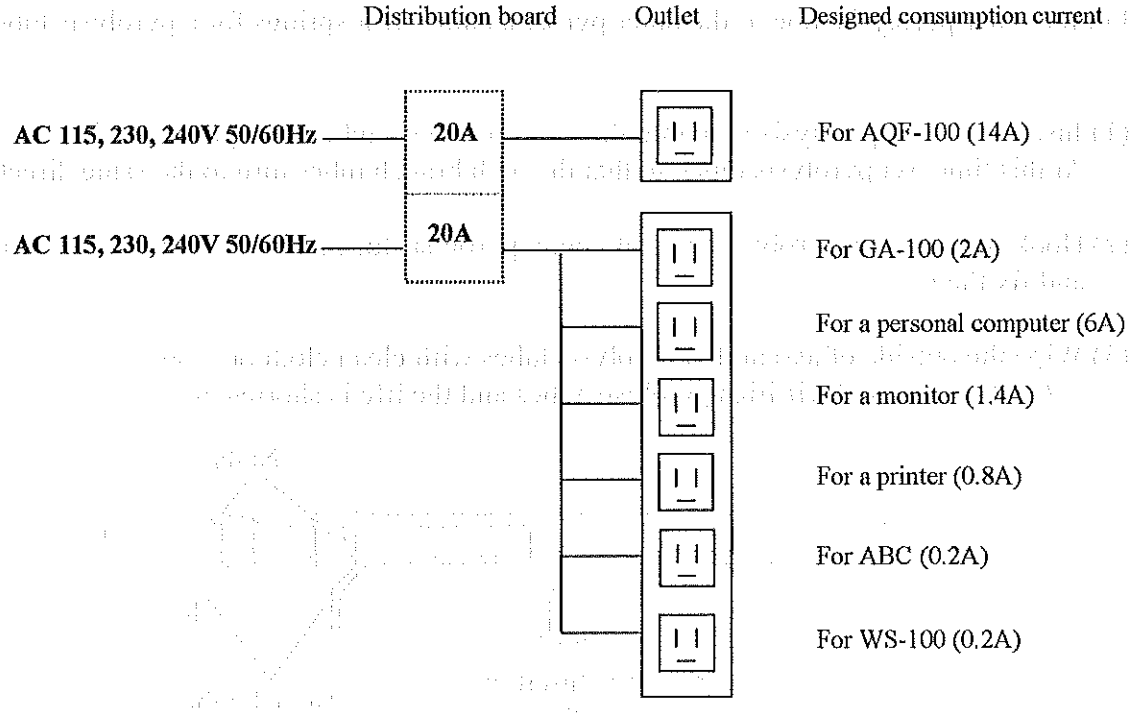
AQF-100 consumption power is 1.4kVA. Consumption power including peripheral equipment such as a personal computer is 1kVA.
Prepare 2 lines of power of over 20A capacity.
Voltage fluctuation range should be within ±10% of incoming electricity.
When voltage fluctuation is over 10%, use a voltage stabilizer.

3-3-2. Grounding

The attached power cable is 3-line type including a grounding line.
Insert a power cord into a 3-line type power outlet and ground it stably.
If the power outlet is 2-line type, ground it necessarily from the earth terminal of a power cable or an unit grounding terminal.

Wiring

The following diagram is a wiring example.
Separate the distribution board for AQF-100 from the one for others.



The following consumption currents are reference values.

- Personal computer (6A)
- Monitor (1.4A)
- Printer (0.8A)

The cable length is as follows.

- Power cable for AQF-100 : 2.5m
- Power cable for GA-100 : 2m
- Power cable for ABC : 2m
- Power cable for WS-100 : 2m

3-4. Preparation for pyrolysis tubes

3-4-1. Filling of quartz wool

Fill about **1g** quartz wool into an outer pyrolysis tube so that the width should be about 40～60mm.

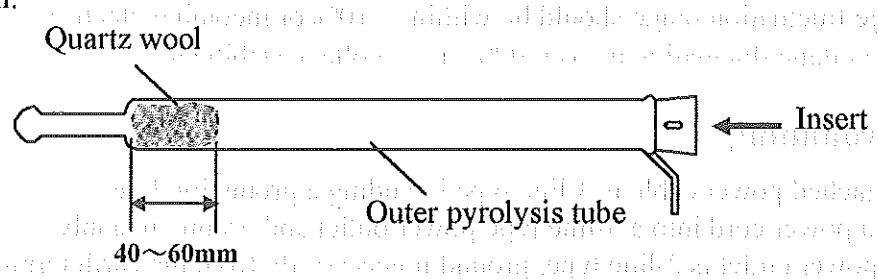


Illustration 3-2. Filling of quartz wool

3-4-2. Assembly of an inner pyrolysis tube

Assemble an outer pyrolysis tube with quartz wool and an inner pyrolysis tube as follows. Fix the inner pyrolysis tube to the outer pyrolysis tube with springs for a pyrolysis tube.

(1) Insert the inner pyrolysis tube into the outer pyrolysis tube with quartz wool.
At this time, set pyrolysis tubes so that the both branch tubes turn to the same direction.

(2) Hook springs for a pyrolysis tube into outer pyrolysis tube and inner pyrolysis tube nails and fix them.

(3) Wipe the outside of assembled pyrolysis tubes with clean cloth or tissue.
* Contamination devitrifies pyrolysis tubes and the life is shortened.

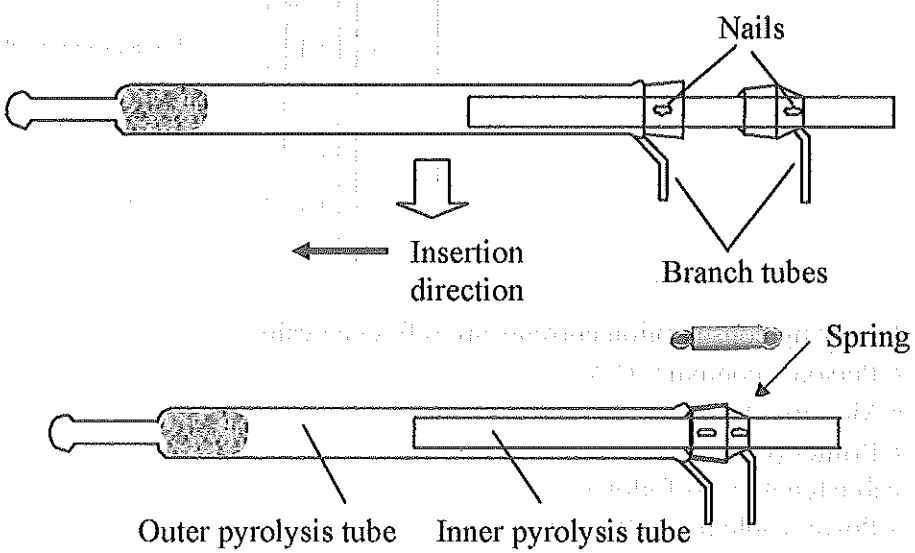


Illustration 3-3. Assembly of pyrolysis tubes

3-5. Gas Line

3-5-1. Preparation for gas lines

Prepare gas lines as follows.

- Prepare O_2 line and Ar line to the center of a table.
- Use outer size ϕ 3 metal line to connect lines to the unit.
- Prepare about 1m space at the end of lines to connect lines to the unit.

POINT

When setting a new line, check contamination and impurities are not in the line.

Set the pressures of O_2 and Ar to the same value.

Setting pressure : 0.4 ± 0.1MPa

Use the following gas purities.

O_2 gas 99.7% or more

Ar gas 99.98% or more

3-5-2. Gas purification filter setting

Set gas purification filters (HYDRO-PURGE Ⅱ) at the left side of AQF-100 as follows.

(1) Remove screws from the left side of AQF-100.

(2) Set the gas purification filter metal plate on the left side of AQF-100 with (1) screws. Refer to Illustration 1-4. AQF left side.

(3) Set 2 gas purification filters on the metal plate.

3-5-3. Connection of supply gas lines

(1) Set O_2 metal line to the bottom of the gas purification filter at the left side of AQF-100.

(2) Set Ar metal line to the bottom of the gas purification filter at the left side of AQF-100.

(3) Put inserts into the both ends of 2 PTFE tubes (ϕ 4/2 0.7m).

(4) Connect the top of an oxygen gas purification filter to GAS IN O_2 of AQF-100 rear with a PTFE tube and a reducer.

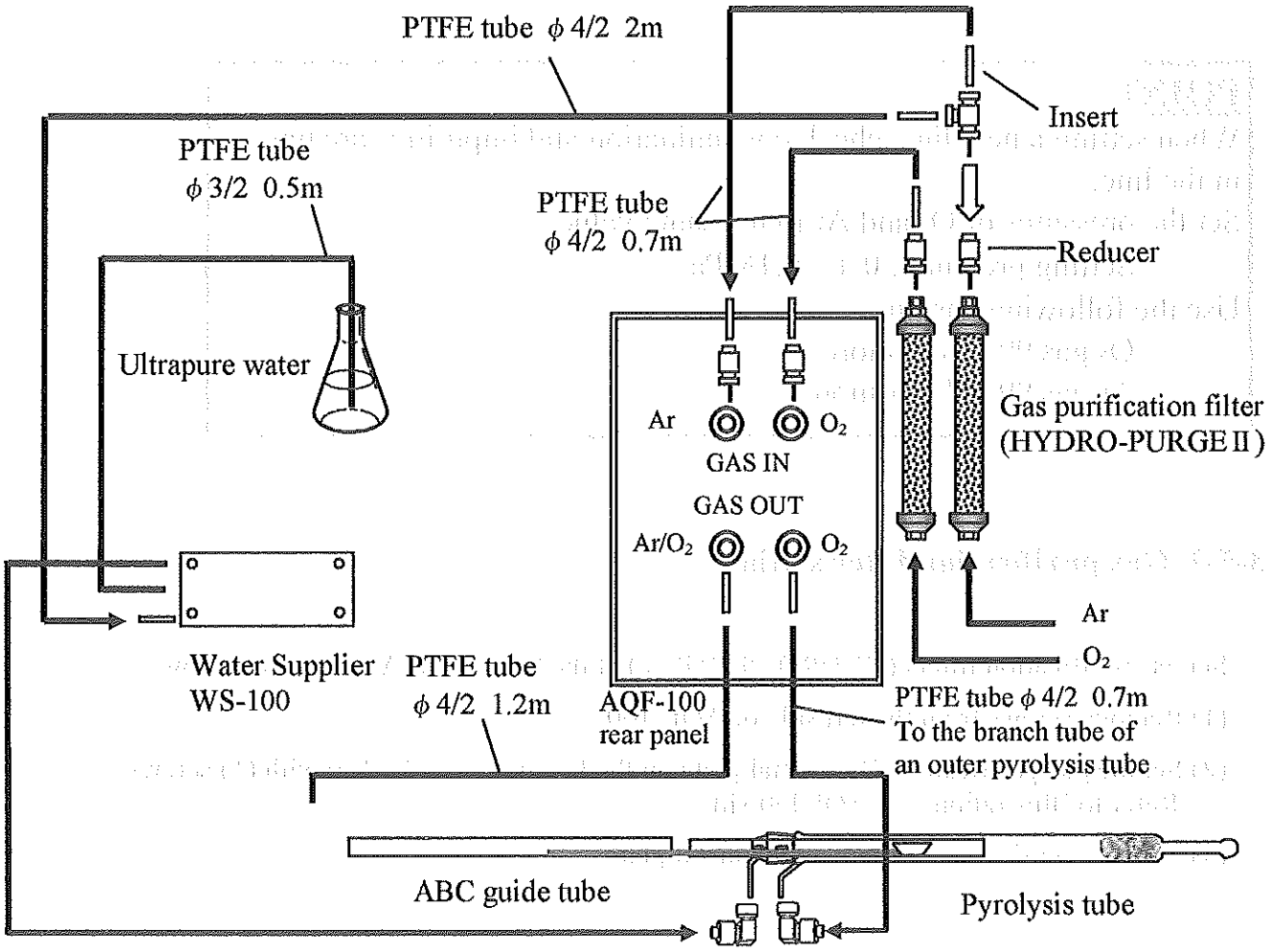


Illustration 3-4. Connection of supply gas lines

(5) Connect a reducer and a joint (T-type) to the top of an argon gas purification filter.

(6) Connect the one side of the joint to GAS IN Ar at the rear panel of AQF-100 with a PTFE tube (ϕ 4/2 0.7m) and a reducer.

(7) Put inserts into the both sides of a PTFE tube (ϕ 4/2 2m) and connect it to the both sides of the joint (T-type).

(8) Connect the one side of a PTFE tube (ϕ 4/2 2m) to GAS-IN of WS-100 right side.

(9) Set a ϕ 6/3 gas inlet connector (30-6RUE3-SP) to the branch tube of the pyrolysis tube.

(10) Connect OUT at the right side of WS-100 and the ϕ 6/3 gas inlet connector (30-6RUE3-SP) to a PTFE tube (ϕ 3/2 0.5m).

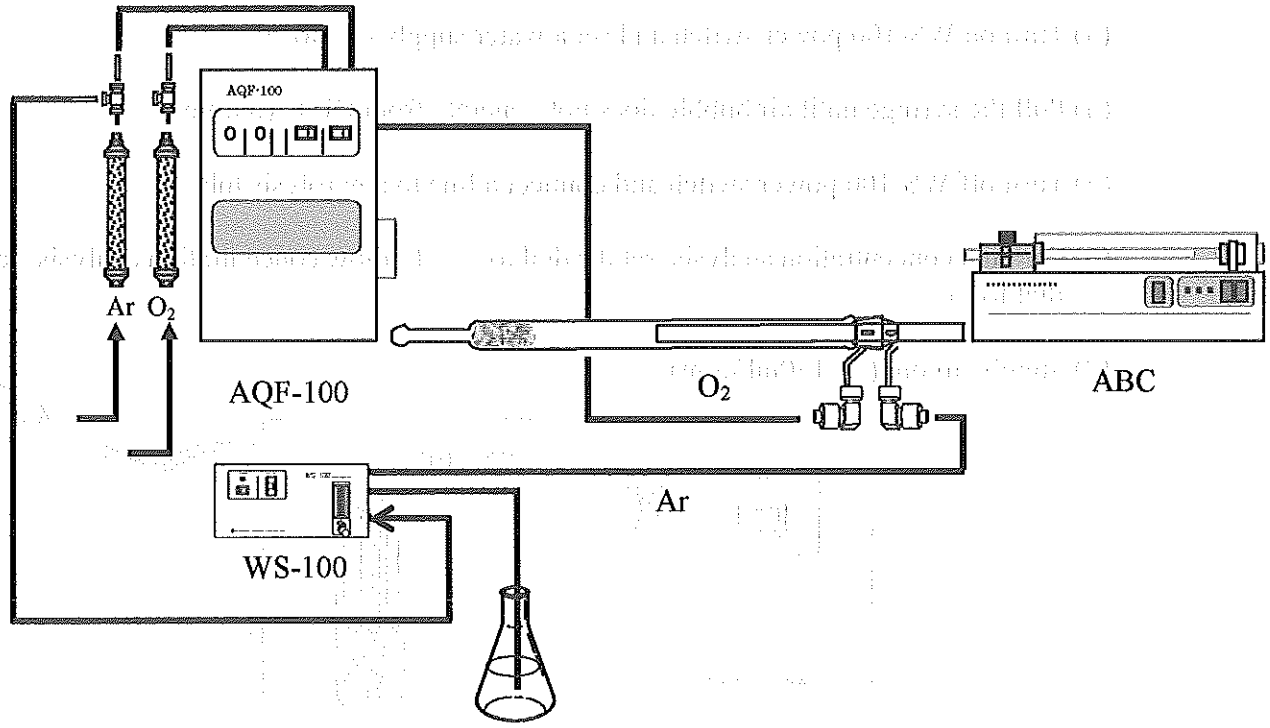


Illustration 3-5. The front of supply gas lines connection

3-5-4. Setting of WS-100

Evacuate pump air and set WS-100. Illustration 3-5 shows the setting of a syringe for evacuation. When supply volume is wrong, take the following steps.

* Set WS-100 when a communication cable is removed.
  About the cable connection position, refer to (5) in 3-12-1. Connection of communication cables.

(1) Turn a flow adjustment knob to set flow to zero.

(2) Remove a line from Ar gas outlet (OUT) and set a syringe with a PTFE tube for evacuation.

(3) Turn on WS-100 power switch and set a water supply dial to "9".

(4) Pull the syringe until air bubble does not generate from OUT. (5 times)

(5) Turn off WS-100 power switch and connect a line to a pyrolysis tube.

(6) For high concentration analysis, set the dial to "4". For low concentration analysis, set the dial to "1".

(7) Supply argon. (Ar 150ml/mim)

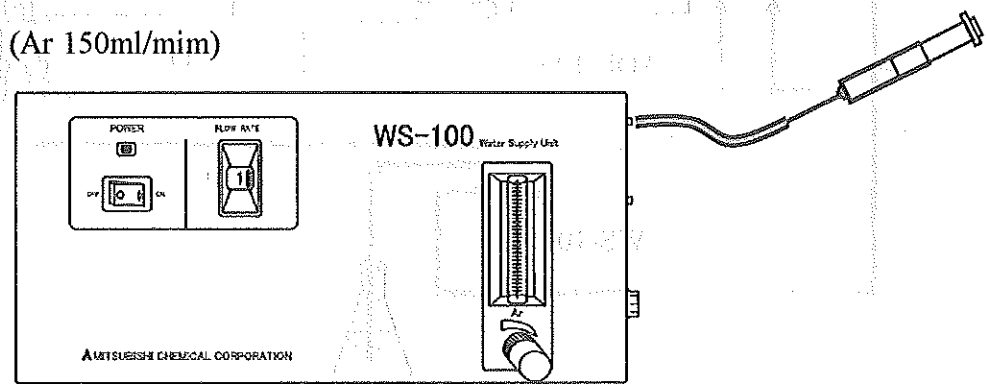


Illustration 3-6. Setting of a syringe for evacuation

3-5-5. Gas exhaust

This unit passes sample gas after combustion through absorption solvent and discharges it from the upper hole of GA-100 overflow tank.
Prepare a ventilating fan and ventilation line from GA-100 to outside.

3-6. Preparation for ABC

3-6-1. Setting of AQF-100 fixing plate

Insert screws into the screw holes of AQF-100 fixing plate and ABC lower part on the left of ABC front and attach the plate.

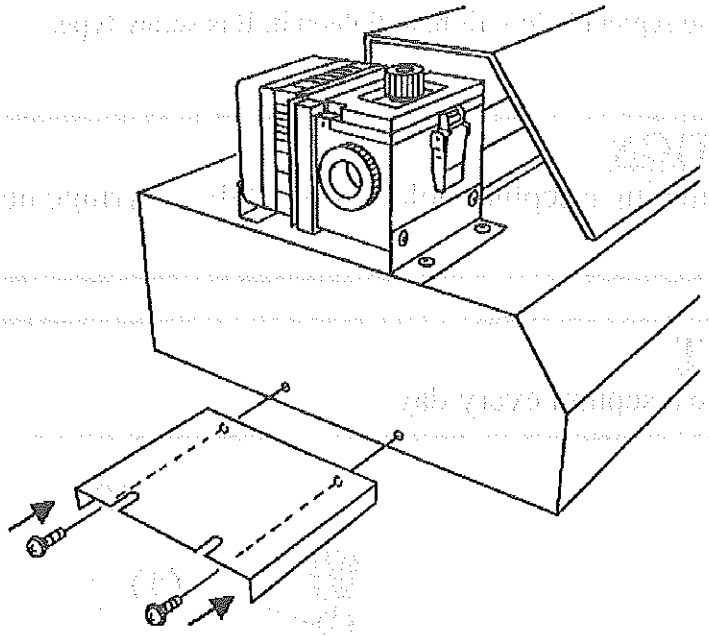


Illustration 3-7. Setting of AQF fixing plate

3-6-2. Setting of a septum and a septum holder

A septum and a septum holder are set to ABC sample injection port on delivery.
When changing a septum, set it as follows.

(1) Place a septum on the upper part of the sample injection port and put a septum holder on it.

(2) Turn the septum holder right to tighten it. It is screw-type.

CAUTION
By tightening a septum holder too tightly, a syringe needle can break.

POINT
Replace a septum every day.

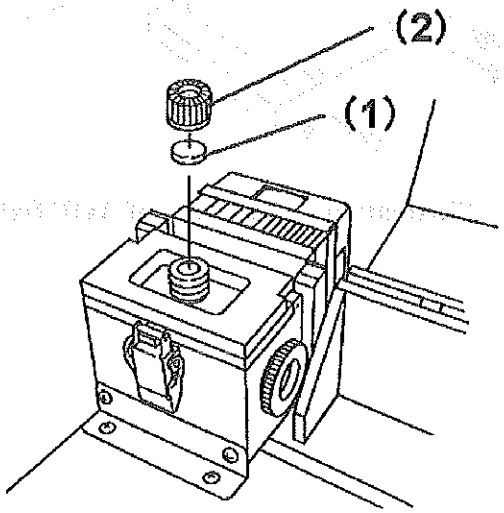


Illustration 3-8. Setting of a septum and a septum holder

3-6-3. Setting of a guide tube

(1) Insert a ladle ② into a guide tube ①.

(2) Insert a magnet ③ to the outside of the guide tube into which the ladle is inserted.

(3) Open ABC safety cover and remove an O-ring holder ④ of the sample introduction box right. Put an O-ring ⑤ and set it loosely with the O-ring holder.

(4) Set the right of the guide tube at which the ladle and the magnet are set to the guide tube holder. Set the magnet set at the guide tube to the left of the arm for a magnet.

(5) Slide slowly the guide tube into the left and insert it into the O-ring holder.
* Open the cover of the sample introduction box and check that the guide tube touches the box right.

(6) Tighten the O-ring holder by hand and fix the guide tube.

CAUTION
Loose tightening of an O-ring holder causes gas leakage and too tight tightening causes guide tube breakage. Take care of the tightening of an O-ring holder.

(7) Move the arm for magnet about 2cm to the left by hand.
(8) Close ABC safety cover.

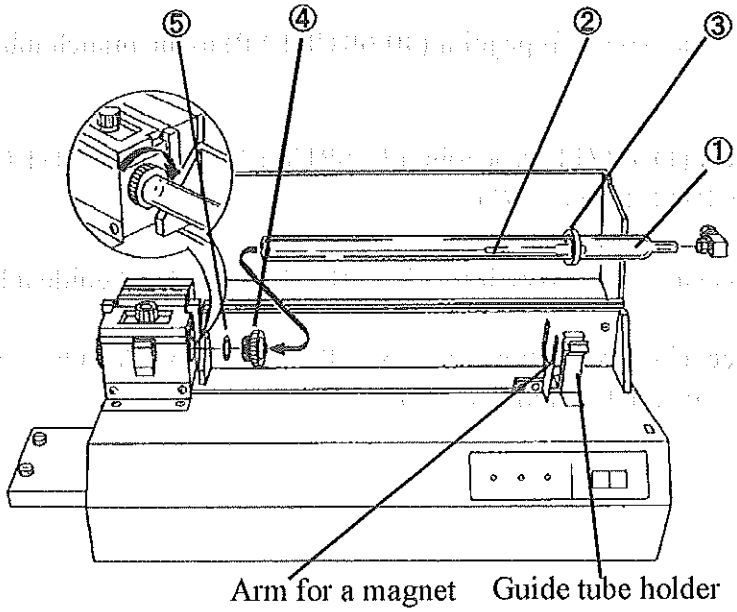


Illustration 3-9. Setting of a guide tube

3-6-4. Insertion of a pyrolysis tube into AQF-100

Insert an assembled pyrolysis tube into AQF-100 electric furnace from the right side (ABC side) of AQF-100 front.

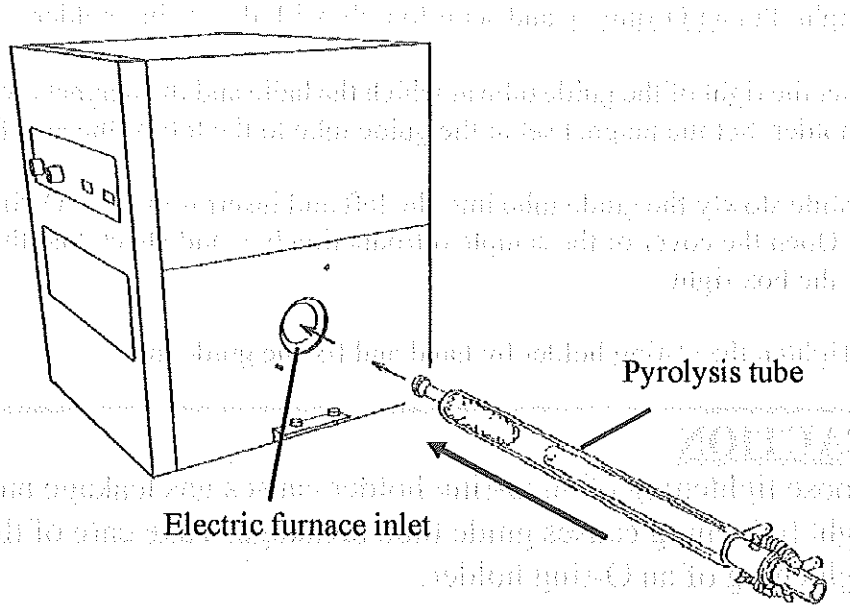


Illustration 3-10. Insertion of a pyrolysis tube

3-6-5. Connection of ABC pyrolysis tube and gas lines

(1) Connect a ϕ 6/4 L-type joint (30-6RUE4-SP) to the branch tube of an outer pyrolysis tube.

(2) Connect (1) ϕ 6/4 L-type joint (30-6RUE4-SP) to GAS-OUT O_2 of AQF-100 rear panel with a PTFE tube (ϕ 4/2).

(3) Connect a ϕ 6/4 L-type joint (30-6RUE4-SP) to ABC guide tube.

(4) Connect (3) ϕ 6/4 L-type joint (30-6RUE4-SP) to GAS-OUT Ar/O_2 of AQF-100 rear panel with a PTFE tube (ϕ 4/2).

3-6-6. Connection of ABC to AQF-100

Connect ABC to AQF-100 as follows.

(1) Insert a pyrolysis tube deeply to the O-ring of the left of the sample introduction box of ABC while rotating it.

(2) Fix ABC to which a fixing plate and a guide tube are set into the locking plate in the right of AQF-100 with screws.

(3) Tighten an O-ring holder and fix the pyrolysis tube.
Set an inner pyrolysis tube so that the branch tube should face downward.

CAUTION
Loose an O-ring holder causes gas leakage and too tight tightening causes pyrolysis tube breakage. Tighten the O-ring holder carefully.

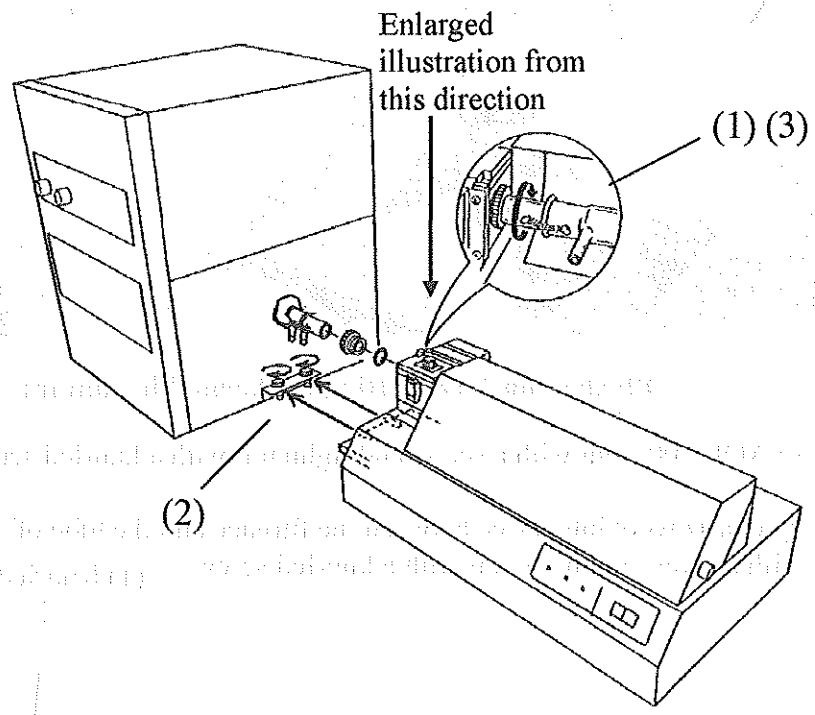


Illustration 3-11. Connection of ABC to AQF-100

3-6-7. Setting of thermal insulators

Set thermal insulators to the both sides of AQF-100.

CAUTION

Set a thermal insulator while the electric furnace temperature is cool fully. The electric furnace is heated up to 900℃ to 1000℃. Pyrolysis tube both ends, pyrolysis side, a thermal insulator are hot. Therefore, never touch them with naked hands.

(1) To keep heat, put about 0.5g quartz wool into space between the furnace inlet and the pyrolysis tube of AQF-100 right.

(2) Extend quartz wool so that the width and the length are about 3 to 4cm and 13cm.

(3) Wind extended quartz wool around the electric furnace and the branch tube.

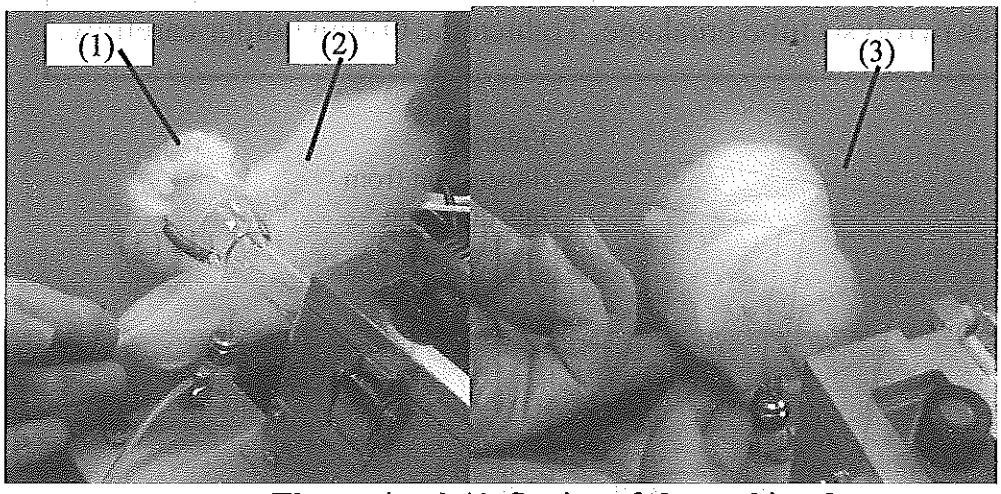
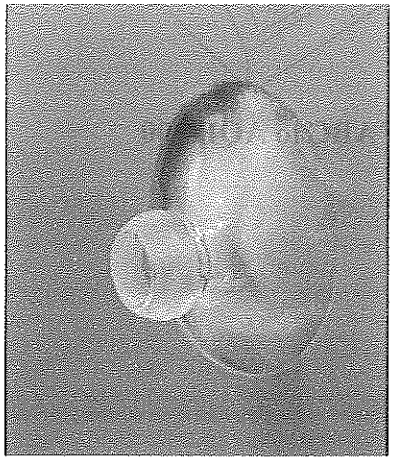


Illustration 3-12. Setting of thermal insulators

(4) Fix it to AQF-100 right with a screw and tighten it with a knurled screw.

(5) Put 0.2g quartz wool into space between the furnace and the tube of AQF-100 left. Fix it with a screw and tighten it with a knurled screw.



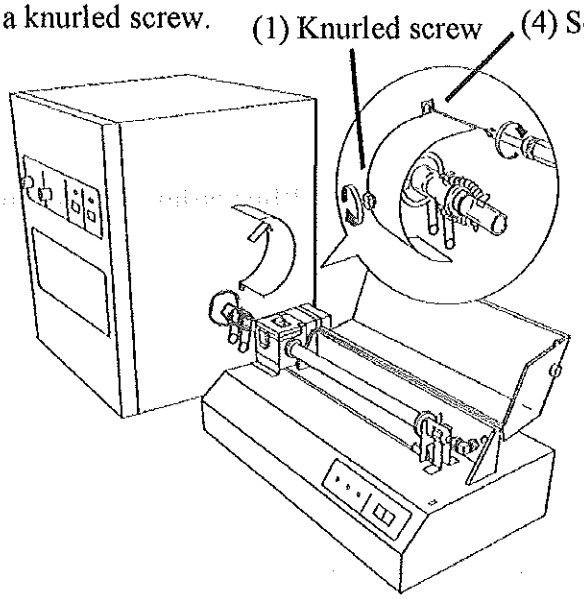


Illustration 3-12. Thermal insulator setting

3-7. Assembly of a pyrolysis tube outlet

(1) Connect a PTFE tube and the ball joint main tube (away from the fitting part) with branch tubes to the combustion gas inlet of an absorption tube with a ϕ6/3 connector (30-6RU3-S).

(2) Connect a PTFE tube with WASH.G tag and the branch tube (near the fitting part) of a ball joint with a ϕ6/3 connector joint (30-6RU3-S).

(3) Connect the ball joint with branch tubes to a pyrolysis tube outlet with a clamp for a ball joint and clamp it.

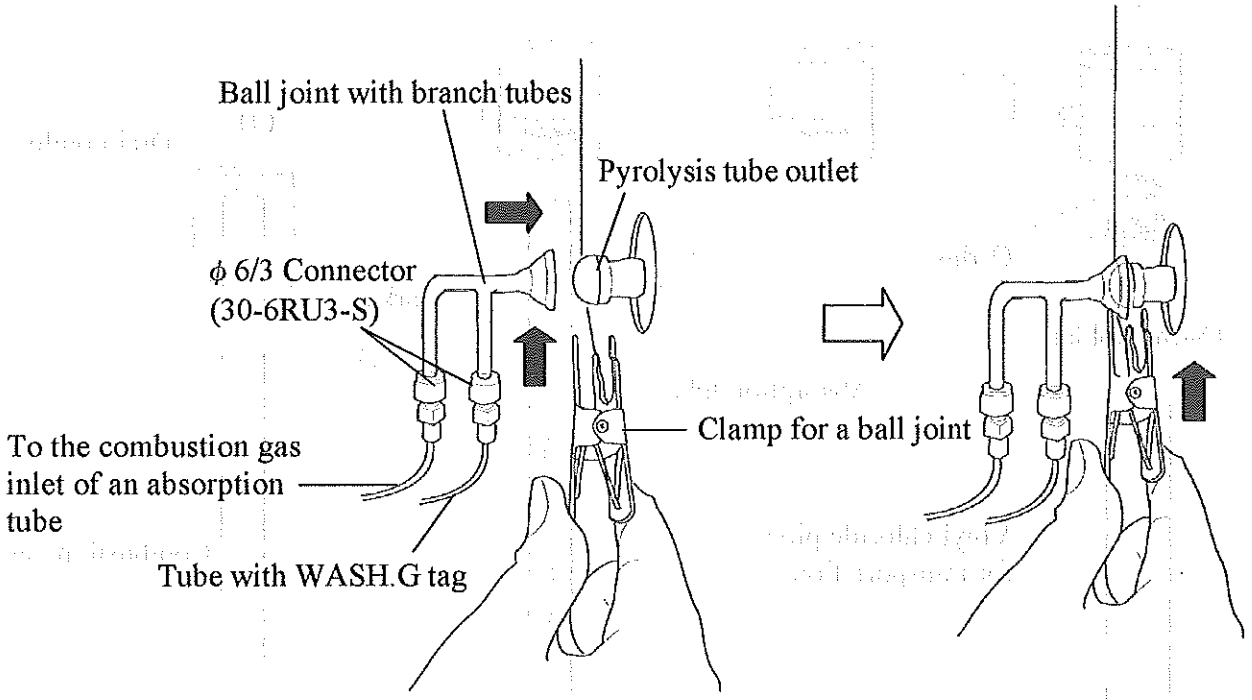


Illustration 3-13. Assembly of a pyrolysis tube outlet

3-8. Assembly of GA-100 absorption part

Set an overflow tank to an absorption tube, attach it to GA-100, and set a line.

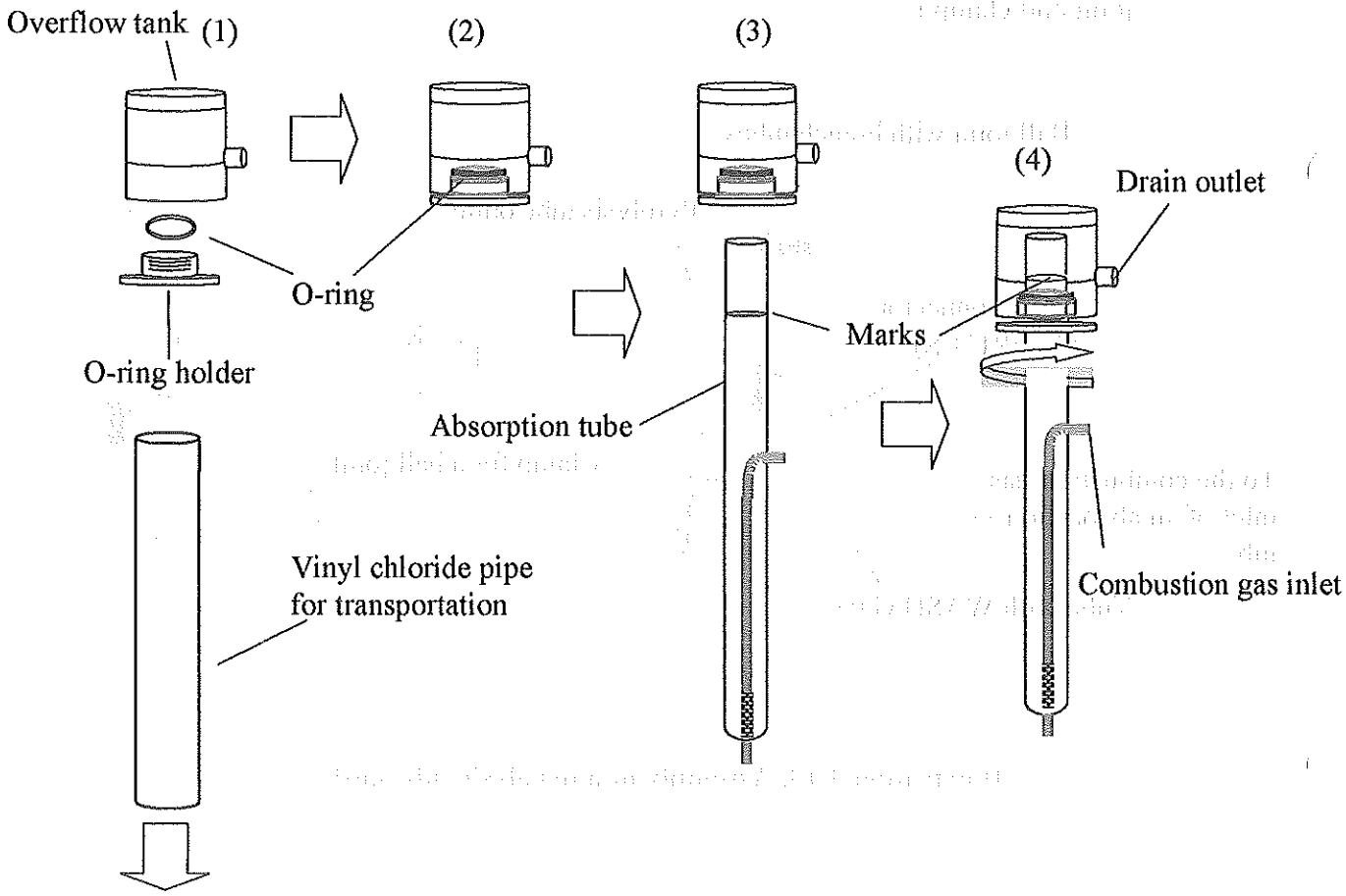
(1) Remove a vinyl chloride pipe for transportation from an overflow tank.

(2) Put an O-ring to the overflow tank from the bottom and screw an O-ring holder lightly.

(3) Insert an absorption tube into the overflow tank.

Put together an absorption tube marker and the overflow tank bottom.

(4) Turn the overflow tank drain outlet into the left and the combustion gas inlet into the right.



Screw the O-ring holder and tighten it.

Illustration 3-14-1. Assembly of GA-100 absorption part

(5) Put three lines with caps into the absorption tube.

(6) Fix the absorption tube to a GA-100 holder with thumbscrews.

(7) Adjust the tip length of an absorption soltuion absorption tube (green) by moving the green tube to touch the bottom of the absorption tube.

(8) Connect another side of the PTFE tube connected to a ball joint main tube (away from the fitting part) to combustion gas inlet with a ϕ6/3 gas inlet connector (30-6RUE3-S) from the outlet of GA-100 right tube.

(9) Connect a PTFE tube for drain to the absorption tube drain outlet with the ϕ6/3 gas inlet connector (30-6RUE3-S).

(10) Connect the vinyl tube to the overflow tank from the outlet of GA-100 right tube.

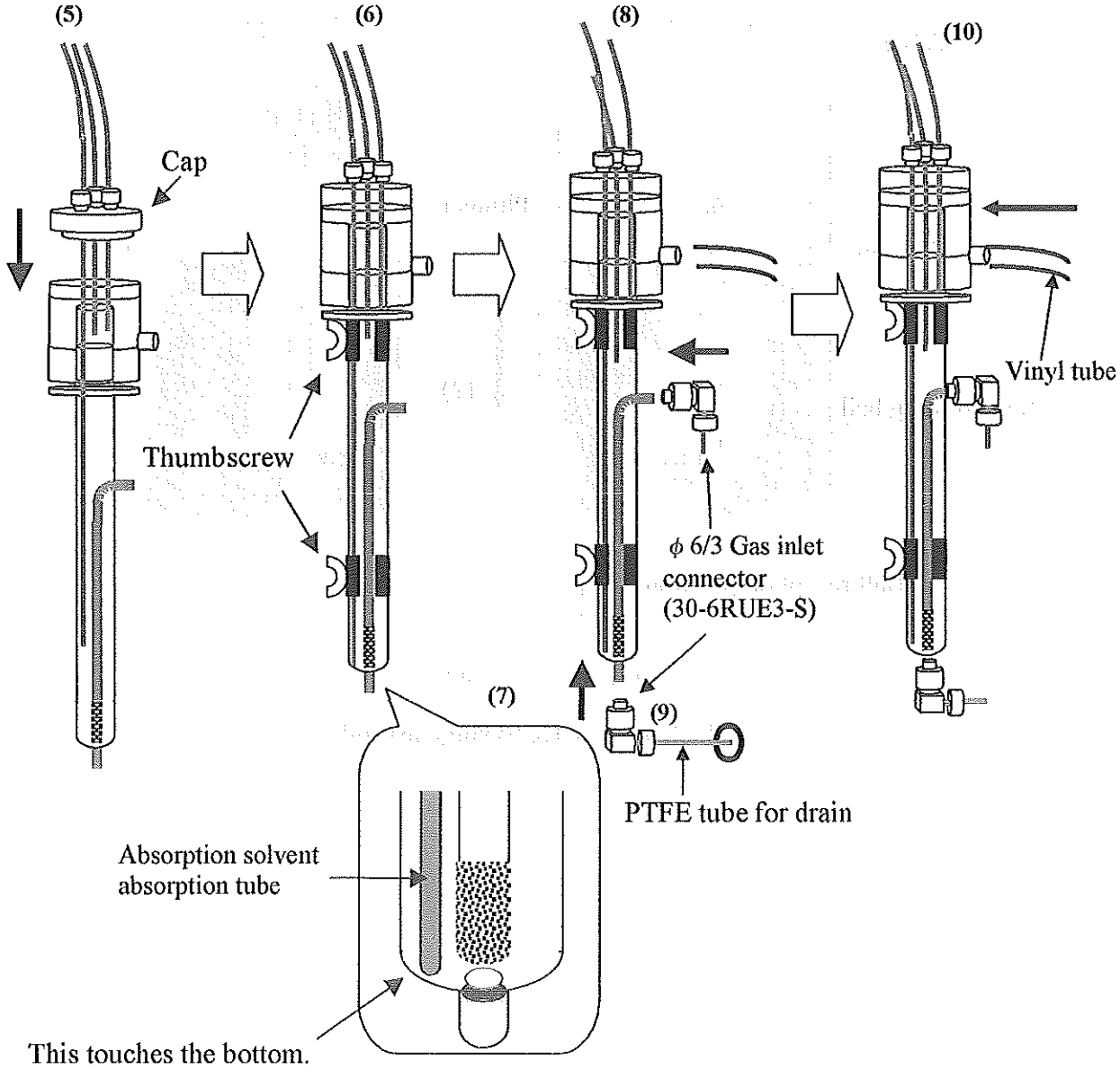


Illustration 3-14-2. Assembly of GA-100 absorption part

3-9. Syringe setting

Set a syringe to a plunger drive.

(1) Turn off GA-100 power switch.

(2) Lower a carriage assembly to the lowest part by hand.

(3) When a plunger is pushed, place a self aligning ball to the reception position.

(4) Raise the syringe and screw it to a valve. Turn it by a quarter to fix.

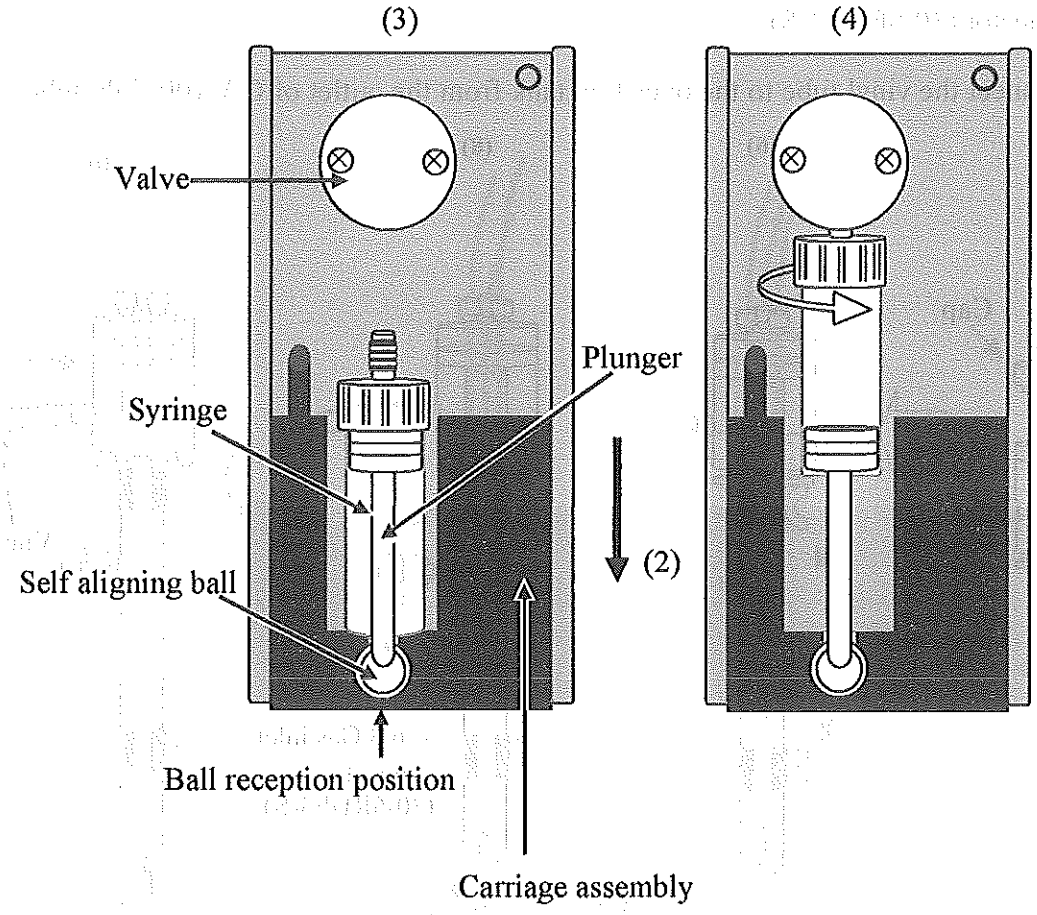


Illustration 3-15. Syringe assembly

3-10. GA-100 Line Connection

Connect GA-100 lines. See illustration 3-15. GA-100 line connection.

(1) Put a PTFE tube with "WATER" tag into a polyethylene tank for washing solution (2L). Put a PTFE tube with "ABS." tag into a polyethylene tank for absorption solvent (0.5L). Pass PTFE tubes through caps with holes and fix them not to come out of polyethylene tanks.

(2) Fix PTFE tubes with a tube holder (magnet).

(3) Connect a PTFE tube with "WASH.G" tag to the branch tube (near the fitting part) of the ball joint connected to a pyrolysis tube outlet.

(4) Put out 2 PTFE tubes with "DRAIN" tags from the right bottom of GA-100 and a vinyl tube for drain from the right tube outlet of an absorption tube. Put them into the drain tank. Put the vinyl tube for drain not to contact the solution level in the drain tube. Put and fix it.

CAUTION
Drain free-falls from an overflow tank. When the tip of a vinyl tube is in drain, solution can't be drained and overflows from the tank. As a result, you can get an electric shock. Place the vinyl tube so that the tip should be higher than solution level.

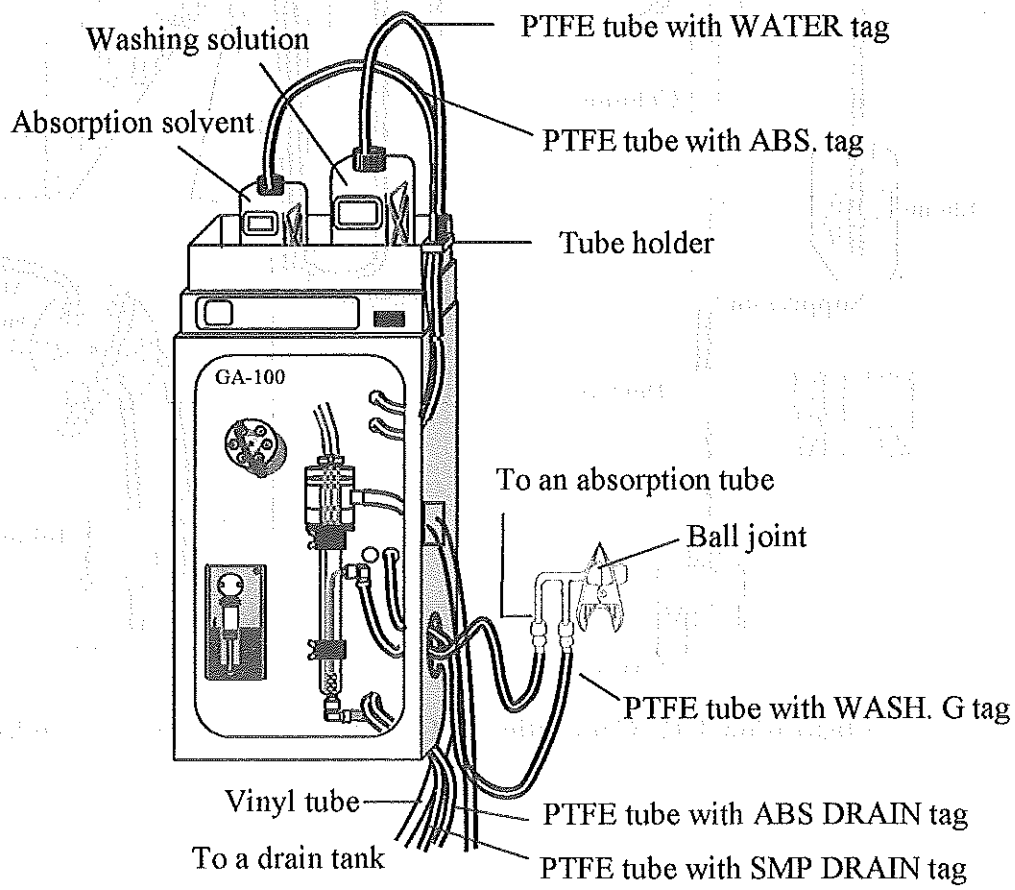


Illustration 3-16. GA-100 line connection

3-11. Connection of GA-100 and ion chromatography unit lines

Connect GA–100 sample injector lines to ion chromatography unit lines.
Cut tubes with a tube cutter.

(1) Connect the tube from the ion chromatography unit pump and ϕ 1/16" Union.
Connect ϕ 1/16" Union and GA-100 sample injector with an attached PEEK tube (blue).

(2) Connect the GA-100 sample injector to an inline filter with an attached PEEK tube (blue).

(3) Connect the inline filter to the sample injector of the ion chromatography unit with an attached PEEK tube (blue).

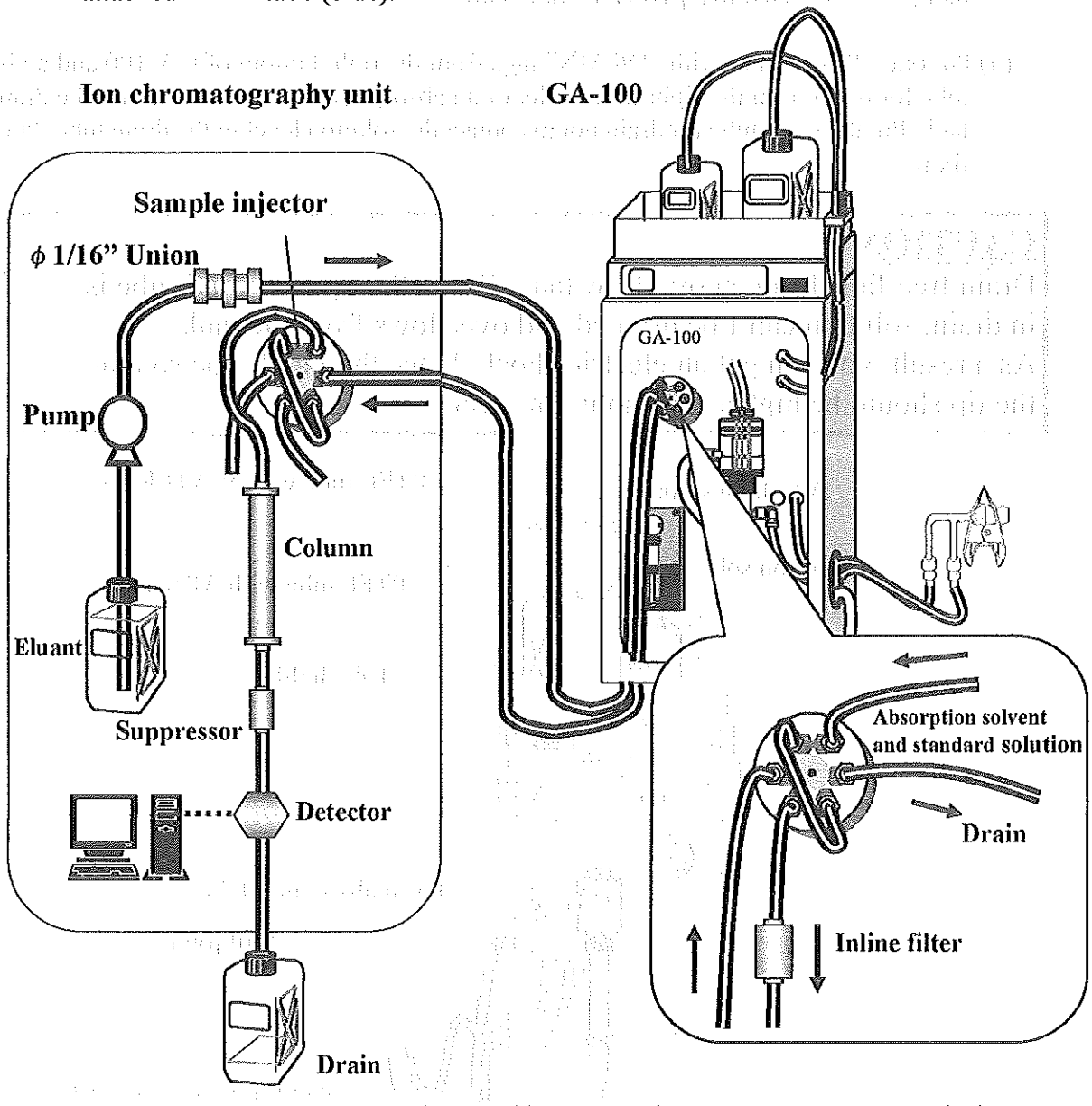


Illustration 3-17. Connection of GA-100 and ion chromatography unit lines

3-12. Cable Connection

3-12-1. Connection of communication cables

Connect AQF-100, GA-100, ABC, and a personal computer with communication cables.

(1) Connect ABC connector of AQF-100 rear to MAIN UNIT connector of ABC rear panel with an ABC signal cable.

(2) Connect COMPUTER connector of AQF-100 rear to COM1 port of the personal computer with a RS-232C cable (9 pin cross).

(3) Connect the RS-232C connector of GA-100 rear to COM2 port of the personal computer with a RS-232C cable (9 pin cross).

(4) Connect the start terminal of an ion chromatography unit to the signal terminal outside contact point of GA-100 rear with a signal cable.
For contact point operation timing, refer to 4-5-2-3. "Absorption solvent sampling" flow and 4-5-2-4. "Calibration" flow.
For ion chromatography unit terminals, refer to the instruction manual.

(5) Connect 8 and 9 of the signal terminal outside contact of GA-100 rear panel and WS-100 signal connector with a signal cable.
* The connection to COM2 is sometimes different by the system structure.

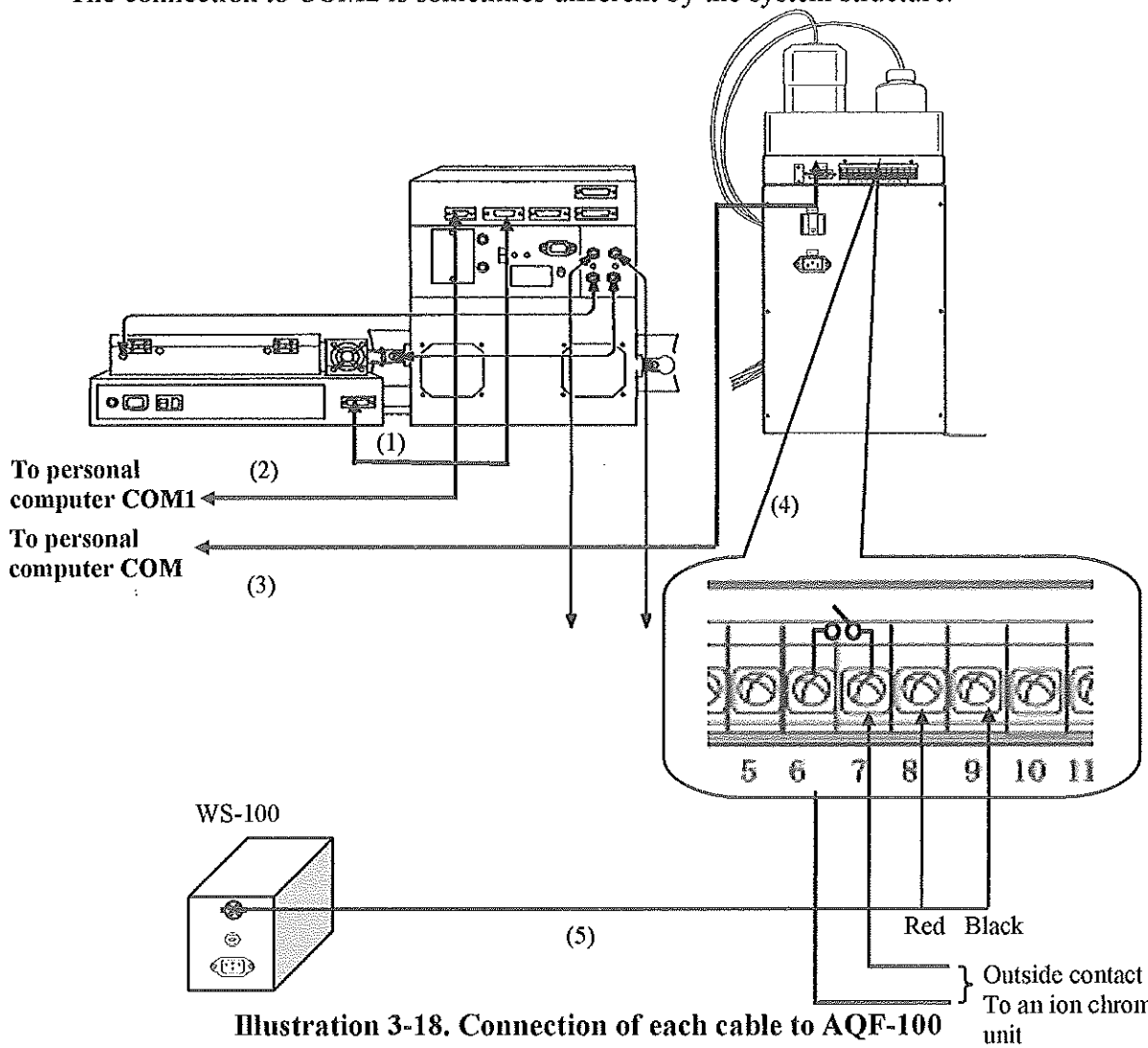


Illustration 3-18. Connection of each cable to AQF-100

3-12-2. Connection of power cables

Connect power cables of AQF-100, GA-100, and ABC.
* For the connection of power cables of a personal computer, a monitor, and a printer, refer to each instruction manual.

(1) Connect the power cable for AQF-100 to a.c. POWER connector of AQF-100 rear panel.

(2) Connect the power cable for ABC to a.c. POWER connector of ABC rear panel.
Turn on the power switch of ABC rear cooling unit.

(3) Connect the power cable for GA-100 to a.c. POWER connector of GA-100 rear panel.

3-13. WS-100 Connection

By using WS-100, the recovery is up and the unit is useful for fluorine measurement.
For gas line and water line connection, refer to 3-5-3. Connection of supply gas lines.

3-13-1. Gas line connection

Connect AQF-100 to WS-100 Ar IN with a ϕ 4/2 PTFE tube.

3-13-2. Power cable connection

Connect a power cable to a WS-100 power connector (a.c. POWER).

3-13-3. Water line cable connection

Connect a water line to supply argon gas including ultrapure water to a pyrolysis tube.
Connect the water container to WS-100 WATER IN with a ϕ 3/2 PTFE tube.
Next, connect an inner pyrolysis tube to WS-100 OUT with a ϕ 3/2 PTFE tube.

3-14. The connection of a kit for high concentration

When sample elements are more than 1000ppm, use a kit for high concentration (an absorption tube 20ml, a sample loop 20 μ l, a trap column) to measure accurately.

3-14-1. Absorption tube connection

Assemble 20ml absorption tube by referring to 3-8. Assembly of GA-100 absorption part and connect it.

3-14-2. Sample loop connection

(1) Press Absorption Tube key of GA-100 and pour 10ml water into an absorption tube.

(2) Press Valve key to switch the valve into Load side.

(3) Change a sample loop.

(4) Press Sampling key to absorb water in the absorption tube.
Check that water flows into a PTFE tube with DRAIN tag.

(5) Press Valve key to switch the valve into Inject side.

(6) Check a water dip peak with the ion chromatography unit and measure a sample.

3-14-3. Trap column connection

Change a PTFE tube used at (1) in 3-7. Assembly of a pyrolysis tube outlet and (8) in 3-8. Assembly of GA-100 absorption part with one with a trap column.
Connect it.

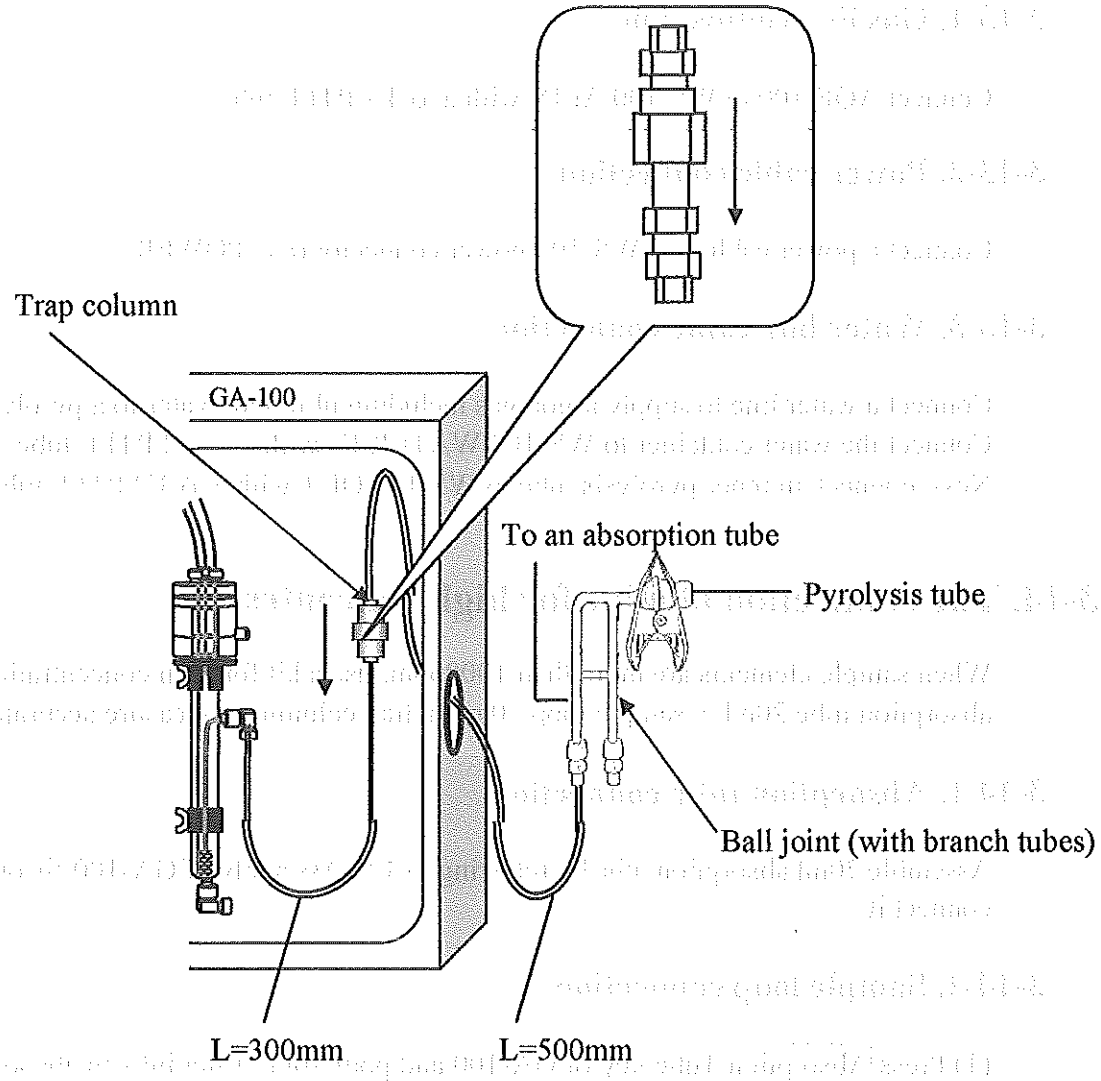


Illustration 3-19. Connection of a PTFE tube with a trap column

3-15. ASC-150L (Option) Connection

By using ASC-150L, up to 50 liquid samples can be measured automatically.
For ASC-150L assembly, installation, and operation, refer to ASC-150L instruction manual.

3-15-1. Connection of AQF-100/ABC and ASC-150L

Refer to ASC-150L instruction manual.

3-15-2. Connection of a communication cable

Connect AQF-100 communication connector (OPTION 1) to ASC-150L connector (MAIN UNIT) with a RS-232C cable.

3-15-3. Connection of a power cable

Connect a power cable to ASC-150L power connector (a.c. POWER).

3-16. ASC-120S (Option) Connection

By using ASC-120S (option), up to 20 solid samples can be measured automatically.
For ASC-120S assembly, installation, and operation, refer to ASC-120S instruction manual.

3-16-1. Connection of AQF-100 and ASC-120S

Refer to ASC-120S instruction manual.

3-16-2. Connection of a communication cable

Connect AQF-100 communication connector (OPTION 1) to ASC-120S connector (MAIN UNIT) with a RS-232C cable.

3-16-3. Connection of a power cable

Connect a power cable to ASC-120S power connector (a.c. POWER).

Section 4: AQF-100 System Program

4-1. AQF-100 System Program Start and Shutdown

4-1-1. Start

Before starting AQF-100 system program, turn on the following switches.

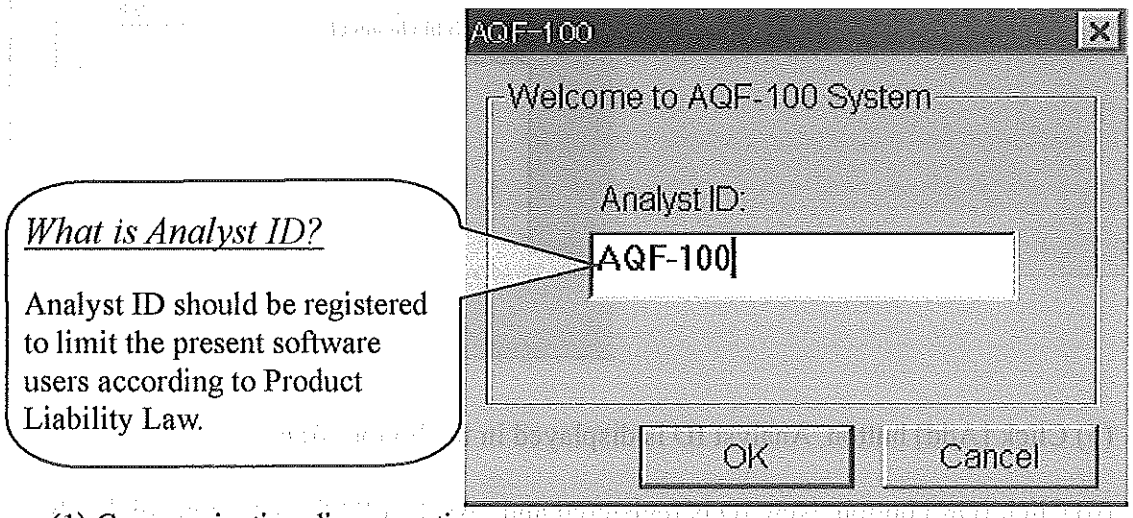
- Power and heater switches of AQF-100 front
- Power switch of GA-100 front
- Power switch of ABC rear
- Cooler switch of ABC front
- Power switch of options

(1) Click "Programs", "AQF-100 System", and "AQF-100 System".
After "AQF-100 System Program" is displayed, "AQF-100" dialog box is displayed.

(2) Input AQF-100 into Analyst ID and click [OK] button. AQF-100 system main window is displayed.

4-1-2. Shutdown

After measurement, shut down AQF-100 system program as follows.



(1) Communication disconnection
Click "System", "System Setup", and [Disconnect] button.
→Heater switch is off and communication to AQF-100 is disconnected.

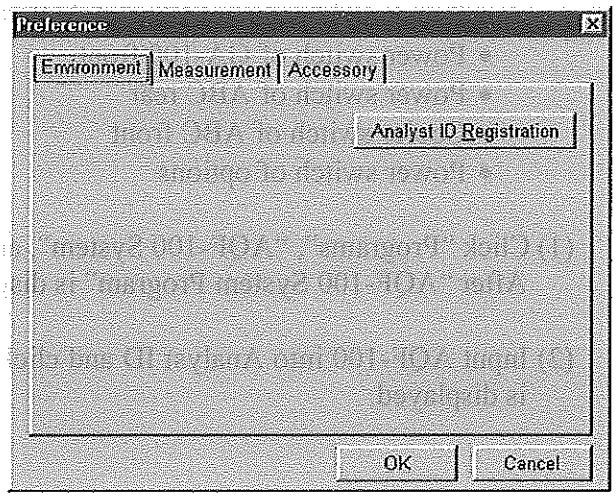
(2) AQF-100 system program exit
Click "×" of the right top of the main window or click "File" and "Exit".
→AQF-100 system program is exited.

4-2. Registration and Deletion of Analyst ID

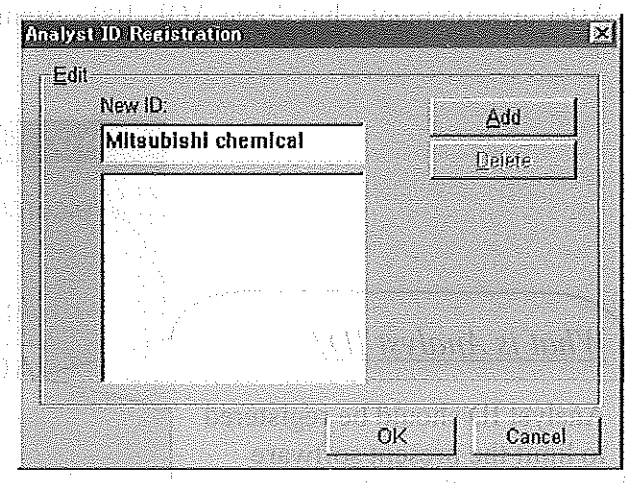
To use AQF-100 system program, Analyst ID is required.
An initial Analyst ID for AQF-100 system is "AQF-100". By using "AQF-100" as Analyst ID, anyone can use this software.
To limit the software user for Product Liability Law, a different ID can be registered.

4-2-1. Analyst ID registration

(1) Click "Preference" in "System" menu of AQF-100 measurement program. "Preference" dialog box is indicated.
(2) Click [Analyst ID Registration] button. "Analyst ID Registration" dialog box is indicated.
(3) Input an analyst ID into "New ID".



(4) Press <Enter> key. New ID is highlighted and [Add] button is available.



(5) Click [Add] button. Analyst ID is displayed in the bottom frame.

(6) Click [OK] button. New ID is registered and "Analyst ID Registration" dialog box is closed and "Preference" returns.

* By clicking [Cancel] button, "New ID" is not registered.

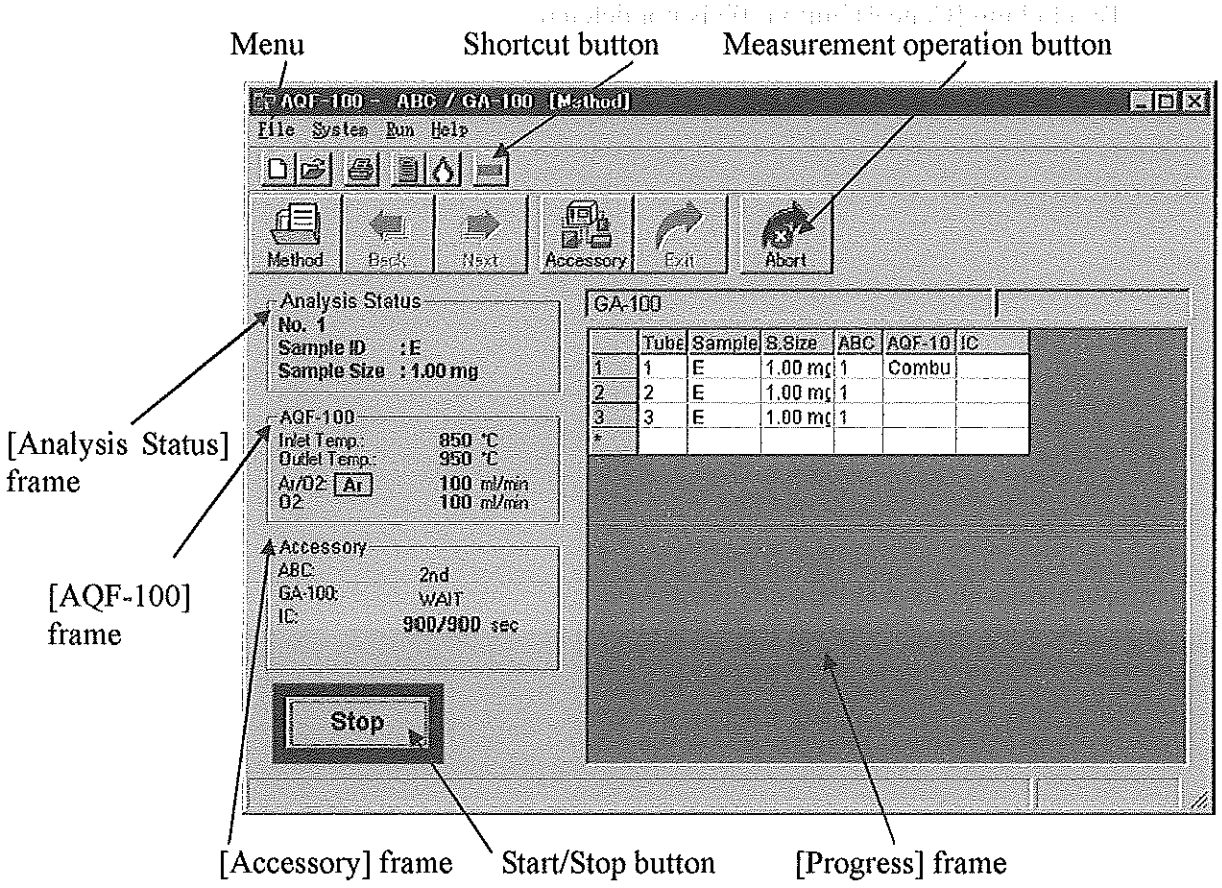
4-2-2. Analyst ID deletion

(1) Click "Preference" in "System". "Preference" dialog box is indicated.
(2) Click [Analyst ID Registration] button. "Analyst ID Registration" dialog box is indicated.
(3) Click ID to select it.
(4) Click [Delete] button. ID is deleted.
(5) Click [OK] button.
* By clicking [Cancel] button, ID is not deleted.

4-3. Main Window Function

4-3-1. Description of main window items

AQF-100 system program main window is as follows.



[Analysis Status] frame

When measurement starts, the following contents are displayed in "Analysis Status".

Display	Contents
No.	Current measurement number
Sample ID	Sample name
Sample Size	Sample volume

Table 4-1. Display contents in "Analysis Status" frame

[AQF-100] frame

When measurement starts, the following contents are displayed in "AQF-100" frame.

Display	Contents
Inlet Temp	The temperature of an electric furnace inlet
Outer Temp	The temperature of an electric furnace outlet
Ar/O_2	Flowing gas type (Ar/O_2) and the flow
O_2	O_2 flow

Table 4-2. Display contents in "AQF-100" frame

[Accessory] frame

When measurement starts, the following contents are displayed in "Accessory" frame. Display contents are different by the accessory connected at "System Setup".

Display	Contents
ABC	ABC condition
GA-100	GA-100 condition
IC	IC Measurement Time and the passing time

Table 4-3. Display contents in "Accessory" frame

[Progress] frame

When measurement starts, the following contents are displayed in "Progress" frame.

Display	Contents
No.	Serial number of sample
Tube	Absorption solvent is measured in tube number order. For repetitive measurement, after the sample of the same tube number is combusted and absorbed, the solvent is measured.
Sample ID	Sample name
S. Size	Sample size
ABC	ABC program number
AQF-100	AQF-100 condition Combustion : During combustion Absorption : During combustion gas absorption Finished : Combustion end
IC	Ion Chromatography unit condition Measurement : During measurement Finished : Measurement end

Table 4-4. Display contents in "Progress" frame

4-3-2. Menu and function list

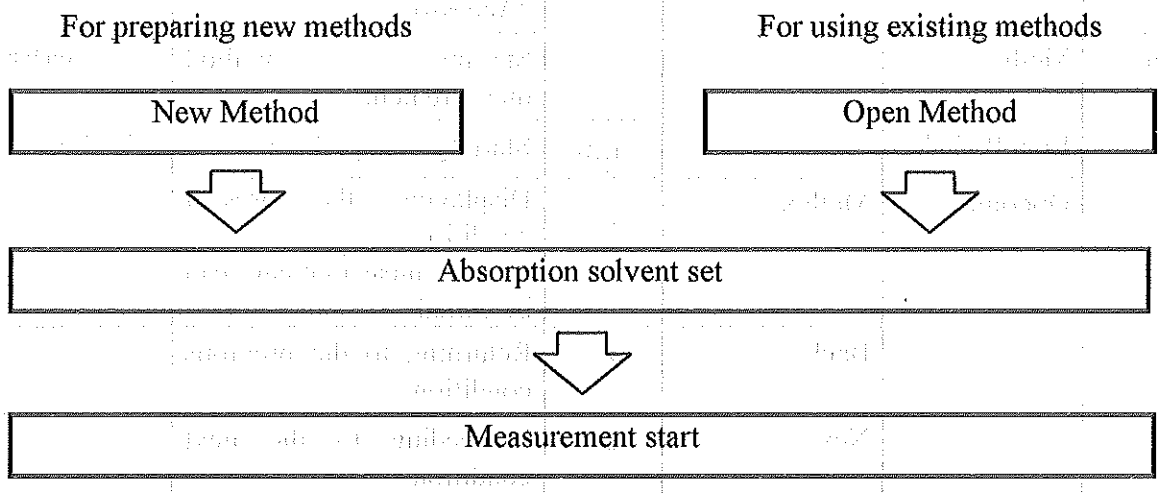
Menu	Sub menu		Button	Contents	Reference
File	New Method			Preparing new methods	4-4-1. New Method
	Open Method			Opening existing methods	4-4-2. Open Method
	Printer Setup			Printer setting	4-6-1. Printer setting
	Print	Print Method		Printing methods during measurement	4-6-2. Print type
		Print Parameters		Printing parameters during measurement	
		Print All ABC Programs Lists		Printing all ABC program lists	
		Print Preference		Printing set preference	
		Print ASC-150L Parameters		Printing ASC-150L parameters	
		Print GA-100 Parameters		Printing GA-100 parameters	
	Exit			Shutting down AQF-100 system program	4-1-2. Shutdown
System	System Setup			Setting an option and starting the communication to AQF-100	5-4-3-1 System Setup
	Heater			Turning on and off the heater switch and setting the temperature	5-4-5. Heater On
	Ar/O2 Gas			Changing Ar/O_2 Gas manually	
	Analysis Parameters			Setting absorption time and ion chromatography time	5-4-3-2. Analysis Parameters
	Accessory			Displaying accessory operation	4-5-1. Accessory (ABC) setting
	GA-100			Setting GA-100 parameters "Wash All", "Solvent Set", and "Solvent Sampling" are available. Displaying GA-100 conditions	4-5-2. GA-100 parameter

Menu	Sub menu		Button	Contents	Reference
	Computer I/F			Setting and checking communication for a computer	4-5-3. Computer I/F
	Preference			Setting "Environment", "Measurement", and "Accessory"	4-5-4. Preference
Run	Method			Starting method measurement	5-7-5. Combustion
	Boat Prebake			Starting boat prebaking	5-4-7. Boat Prebake
	Operation	Method		Displaying the present condition Added measurement can be edited.	
		Back		Returning to the previous condition	
		Next		Proceeding to the next condition	
		Exit Run		Shutting down method measurement	
	Start			Starting measurement	
	Stop			Stopping measurement	
	Abort			Interrupting all power and stopping the unit urgently	
	GA-100 Start			Starting setting GA-100 absorption solvent	
	ABC Manual			Setting ABC program by manual operation	5-6-3. Combustion by ABC manual operation
Help	About System			Displaying AQF-100 system program version information	

Table 4-5. Menu and function list

4-4. Method

To run measurement, "Method" of file for setting measurement conditions is required.
At this system, sample is measured by methods.
At methods, set accessory (Standard composition: ABC), measurement order, and times by samples. Set measurement conditions as follows.



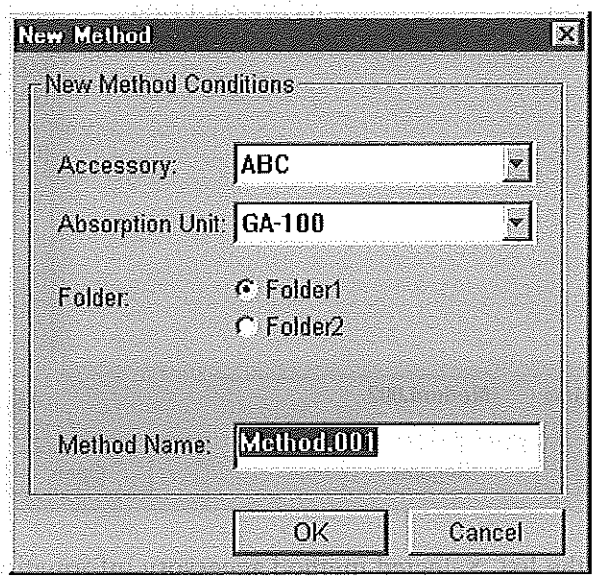
POINT
Any methods can be prepared. When running almost the same measurement, open existing methods and edit them.

4-4-1. New Method

Set a folder to store an accessory, a measurement mode, a method name, and a method.
* Measurement conditions are different by a combination of an accessory and a mode.

(1) Click  or click "File" and "New Method".
"New Method" dialog box is displayed.

(2) Click ▼ of Accessory to select it. For standard composition, select "ABC".



Accessory name	Description
ABC	Automatic Boat Controller ABC
ASC-150L+ABC	Automatic Sample Changer ASC-150L and ABC
ASC-120S	Automatic Sample Changer ASC-120S

(3) Click ▼ of "Absorption Unit" to select a unit.

Absorption Unit name	Description
(NOT USED)	GA-100 is not used.
Gilson	Gilson sampler
GA-100	Gas Absorption Unit GA-100

(4) Click Folder 1 or Folder 2 to save a method file.

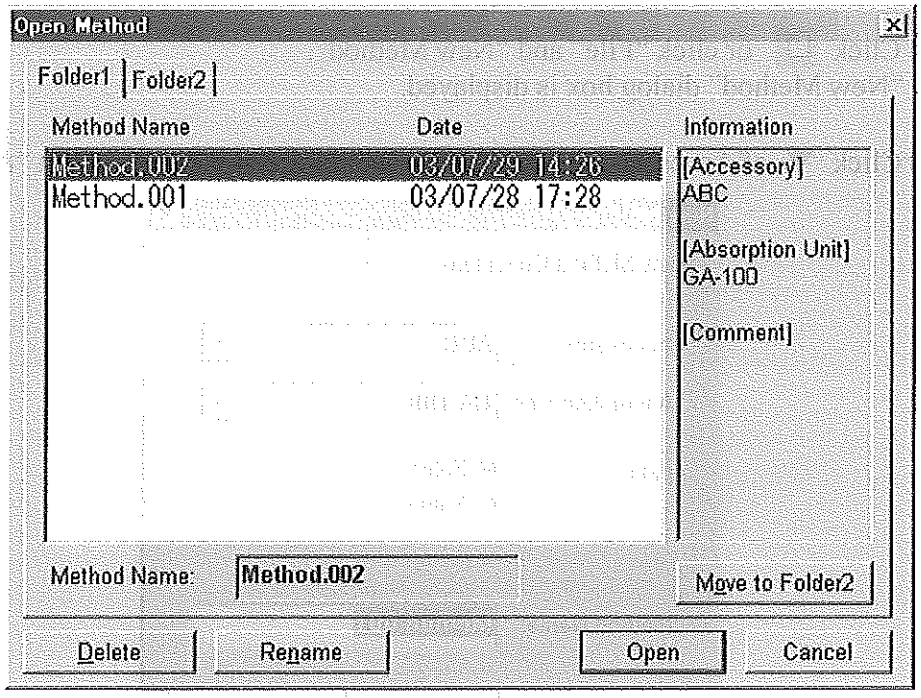
* For example, like folder 1 can be used for calibration curve and Folder 2 can be used for sample, folders can be separated.

(5) Input a method name into "Method Name".

(6) Click [OK] button. "New Method" dialog box is displayed. Refer to 4-4-3. Method edit.

4-4-2. Open Method

(1) Click  or click "File" and "Open Method". "Open Method" dialog box is displayed.



(2) Click methods in the list. Selected method accessory information is displayed in "Information".

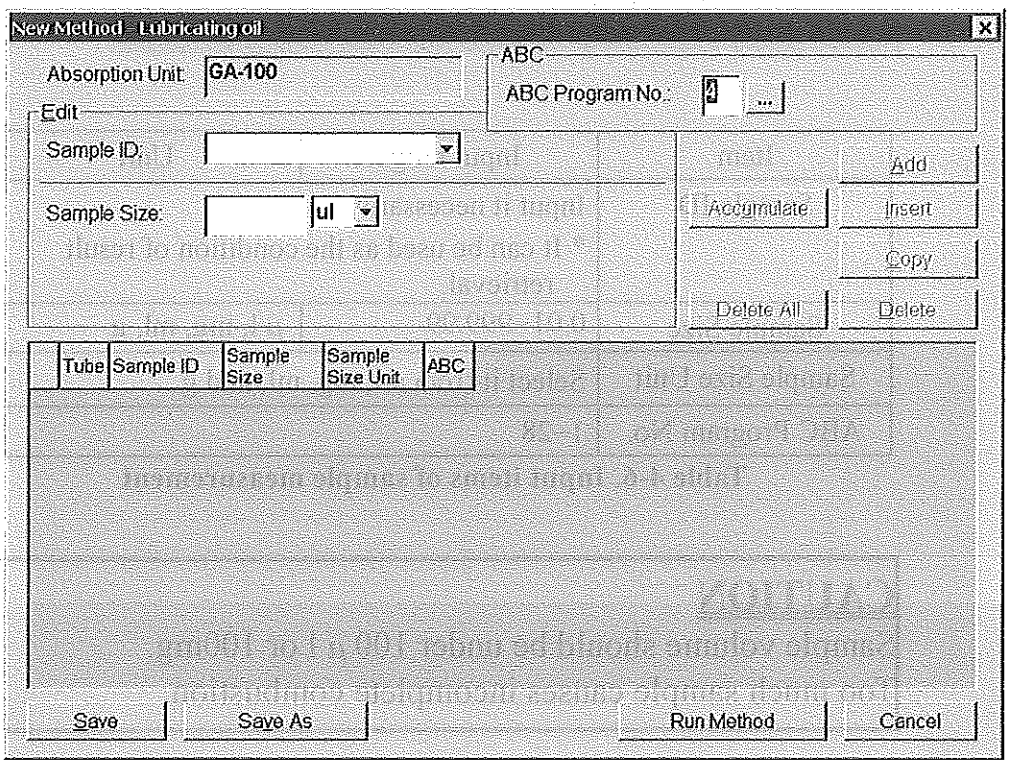
(3) Click [Open] button. The method edit dialog box is displayed.
Refer to 4-4-3. Method edit.

4-4-3. Method edit

Edit a method and set measurement conditions.

4-4-3-1. Edit flow

(1) Prepare a new method or open an existing method. (Refer to 4-4-1. New Method or 4-4-2. Open Method.) The method edit dialog box is displayed.

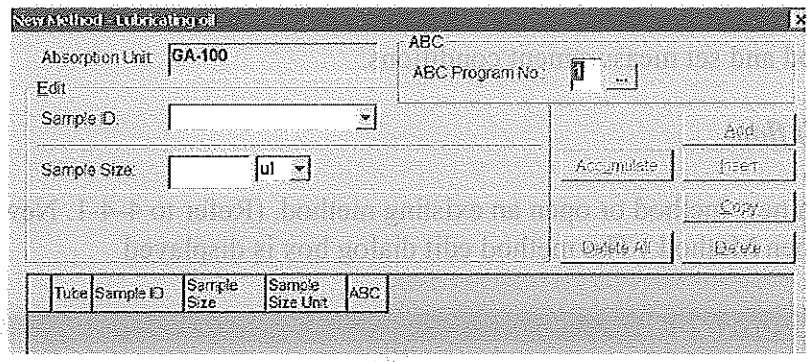


* "New Method" contents are partly different from "Open Method" contents. The above dialog box is "New Method".

* The title of "New Method" edit dialog box is different from one of "Open Method". But their contents are same.

For preparing a new method	[New Method (Method Name)]
For using an existing method	[Open Method (Method Name)]

(2) Input items of sample measurement



Item	Input range	Unit
Sample ID	Input it necessarily. * It can be used as the condition of result retrieval.	
Sample Size	0.01~999.99	μ l, mg, ml, g
Sample Size Unit	Select it from μ l, mg, ml, and g.	
ABC Program No.	1~28	

Table 4-6. Input items of sample measurement

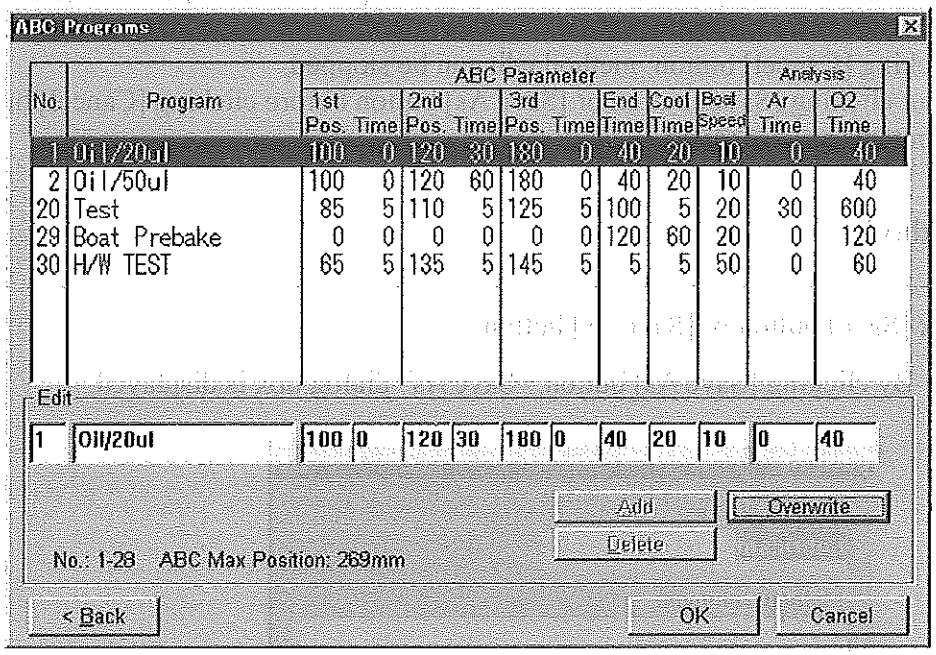
CAUTION
Sample volume should be under 100 μ l or 100mg.
Too much sample causes incomplete combustion.

(3) Click ... button of "ABC Program No." right.

"ABC Programs" dialog box is displayed.

* When a program No. is known, input it directly to "ABC Program No." and proceed to (5).

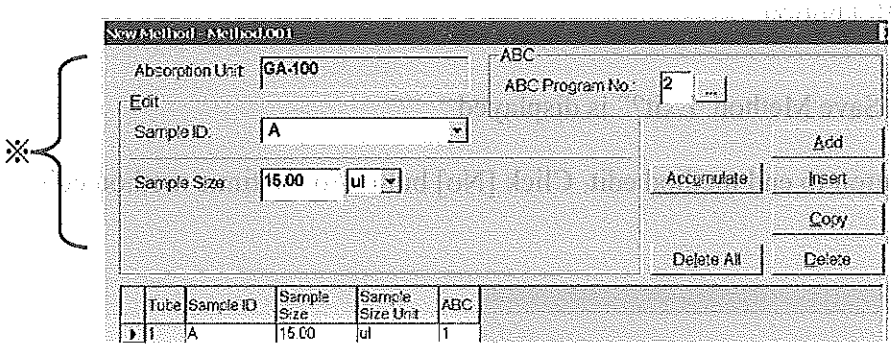
(4) Click a program (Example : No.1) and click [OK] button.



The method edit dialog box returns. Selected ABC program No. is displayed in "ABC Program No.".

(5) Click [Add] button. "ABC Program No." program is added into a dialog box bottom list.

* Added parts are ※ contents and ABC Program No.



(6) Add programs after the second into the list by (3)~(6) in the same way.

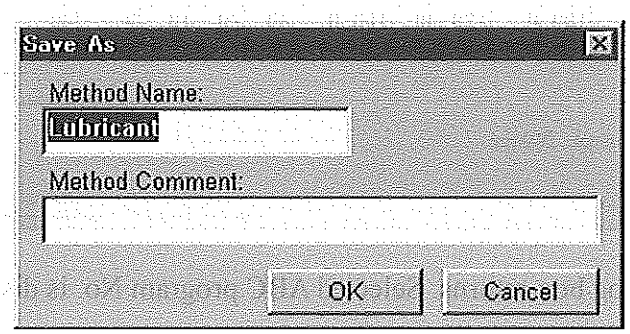
	Tube	Sample ID	Sample Size	Sample Size Unit	ABC
	1	A	15.00	ul	1
	2	A	15.00	ul	1
	3	B	20.00	ul	2
▶	4	B	20.00	ul	2

This is the completion of method edit.
To start measurement by the edited method, click [Run Method] button. (Refer to 4-4-4. Run.)
* By clicking [Cancel] button, method edit can be stopped.
Without clicking [Save] button or [Save As] button before clicking [Cancel] button, edit contents are not saved.

For saving methods

(1) Click [Save] button or [Save As] button.

① By clicking [Save As] button, "Save As" dialog box is displayed.



② Input method name into "Method Name".

Up to 40 characters can be inputted into "Method Comment".

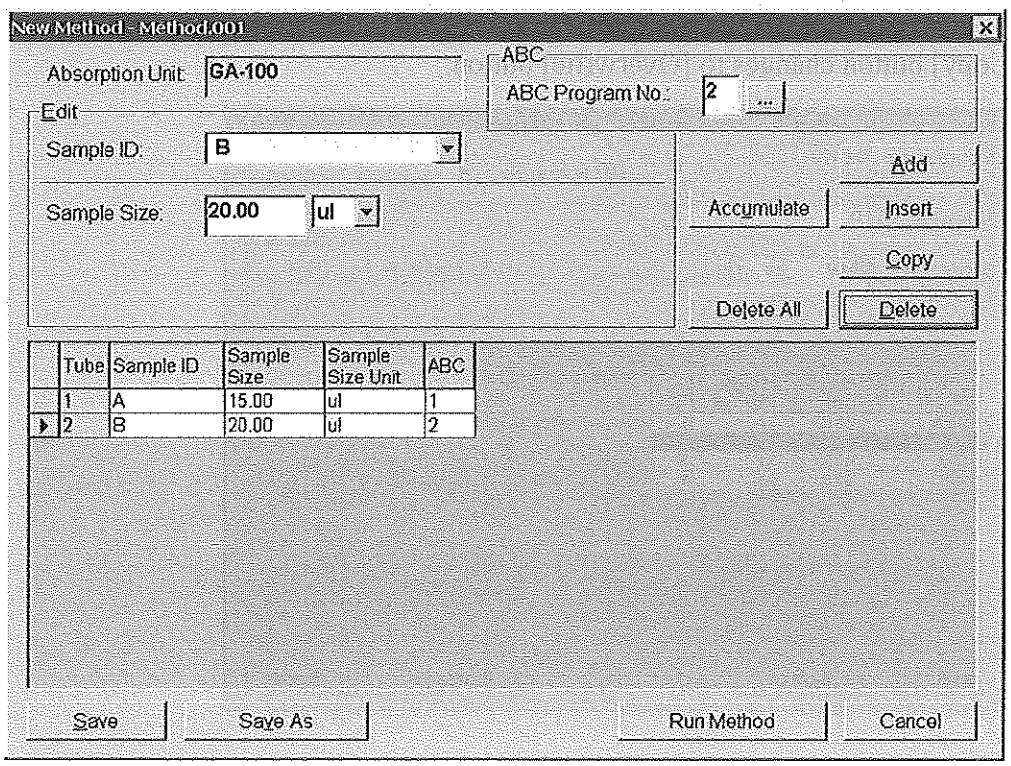
③ Click [OK] button.

(2) After saving, "Save Method. Exit?" is displayed.

(3) Click [Yes] button to end method edit. Click [No] button to continue method edit.

4-4-3-2. Measurement addition and deletion

By using [Add], [Insert], [Copy (Overwrite)], [Accumulate], and [Delete], and [Delete All] buttons, the following edit operations can be run.



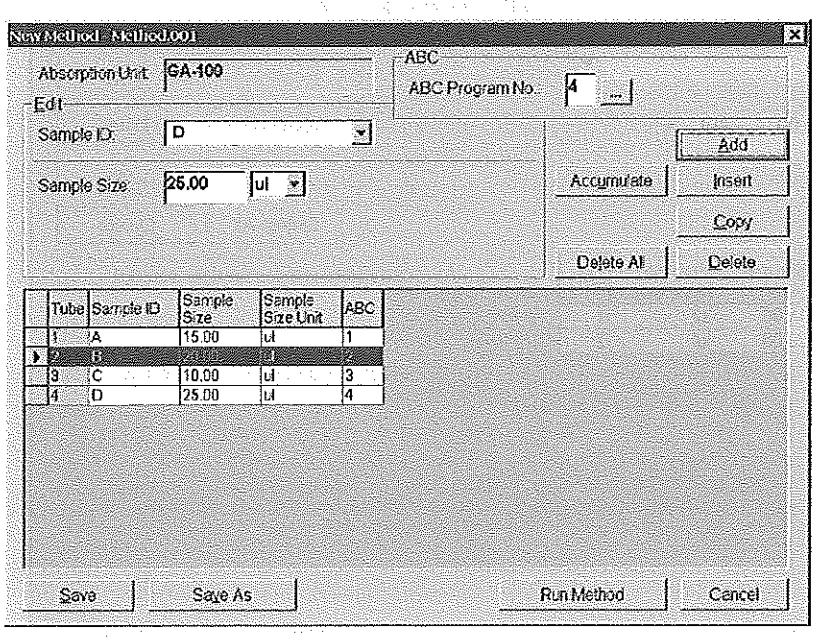
- Measurement copy
- Measurement addition
- Measurement insertion
- Measurement overwrite
- Measurement deletion
- Measurement accumulation
- All measurements deletion

Refer to the next page and after for operation.

Measurement copy

To add and insert set contents, copy the line.

(1) Click the line (Example : the second line) to highlight it.
(2) Click [Copy] button. The line contents are copied to edit part and ABC Program No. [Copy] button changes to [Overwrite] button.



Measurement insertion

New measurement can be inserted among set measurements.

(1) Copy measurement or input edit part and ABC program No.

(2) Click a line (Example : the fourth line) to highlight it. A new line is inserted into the above of a selected line.

	Tube	Sample ID	Sample Size	Sample Size Unit	ABC
	1	A	15.00	ul	1
	2	B	20.00	ul	2
	3	C	10.00	ul	3
▶	4	D	25.00	ul	4

(3) Click [Insert] button. A new line is inserted.

	Tube	Sample ID	Sample Size	Sample Size Unit	ABC
	1	A	15.00	ul	1
	2	B	20.00	ul	2
	3	C	10.00	ul	3
▶	4	B	20.00	ul	2
	5	D	25.00	ul	4

(4) By clicking [Insert] button repeatedly, new lines are inserted.

Measurement addition

Lines can be added to the bottom of existing measurement lines.

(1) Copy measurement contents or input edit parts and ABC program No.

(2) Click [Add] button. One line is added to the bottom line.

	Tube	Sample ID	Sample Size	Sample Size Unit	ABC
	1	A	15.00	ul	1
	2	B	20.00	ul	2
	3	C	10.00	ul	3
	4	B	20.00	ul	2
	5	D	25.00	ul	4
▶	6	B	20.00	ul	2

(3) By clicking [Add] button repeatedly, new lines are added.

[Overwrite] button

Unnecessary lines can be overwritten by copy and changed into new contents.

(1) Copy an existing measurement line (Example: the second line).

	Tube	Sample ID	Sample Size	Sample Size Unit	ABC
	1	A	15.00	ul	1
▶	2	B	20.00	ul	2
	3	C	10.00	ul	3
	4	B	20.00	ul	2
	5	D	25.00	ul	4
	6	B	20.00	ul	2

(2) Click an unnecessary line (Example : the third line) to highlight it.

	Tube	Sample ID	Sample Size	Sample Size Unit	ABC
	1	A	15.00	ul	1
	2	B	20.00	ul	2
▶	3	C	10.00	ul	3
	4	B	20.00	ul	2
	5	D	25.00	ul	4
	6	B	20.00	ul	2

(3) Click [Overwrite] button. The line is overwritten and new contents are displayed.

	Tube	Sample ID	Sample Size	Sample Size Unit	ABC
	1	A	15.00	ul	1
	2	B	20.00	ul	2
▶	3	B	20.00	ul	2
	4	B	20.00	ul	2
	5	D	25.00	ul	4
	6	B	20.00	ul	2

Measurement deletion

Unnecessary lines can be deleted.

(1) Click an unnecessary line (Example : the sixth line) to highlight it.

	Tube	Sample ID	Sample Size	Sample Size Unit	ABC
	1	A	15.00	ul	1
	2	B	20.00	ul	2
	3	B	20.00	ul	2
	4	B	20.00	ul	2
	5	D	25.00	ul	4
▶	6	B	20.00	ul	2

(2) Click [Delete] button. The line is deleted.

	Tube	Sample ID	Sample Size	Sample Size Unit	ABC
	1	A	15.00	ul	1
	2	B	20.00	ul	2
	3	B	20.00	ul	2
	4	B	20.00	ul	2
▶	5	D	25.00	ul	4

- By clicking [Delete All] button, all measurements can be deleted. With lines of ended measurement, this button can't be clicked.

Measurement accumulation

Different samples in the same tube (absorption solvent) can be measured continuously.

(1) Input edit part and ABC Program No.

(2) Click a line position (Example: the fifth line) to highlight it.
A new line is inserted below selected line.

	Tube	Sample ID	Sample Size	Sample Size Unit	ABC
	1	A	15.00	ul	1
	2	B	20.00	ul	2
	3	B	20.00	ul	2
	4	B	20.00	ul	2
▶	5	D	25.00	ul	4

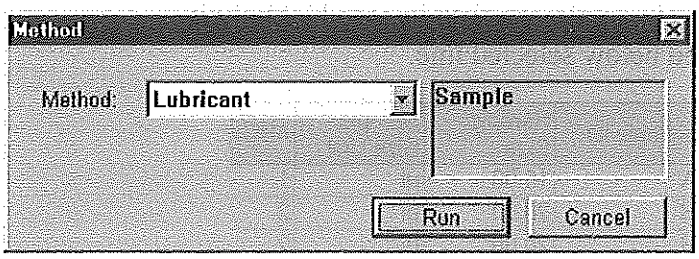
(3) Click [Accumulate] button. A new line is inserted.

	Tube	Sample ID	Sample Size	Sample Size Unit	ABC
	1	A	15.00	ul	1
	2	B	20.00	ul	2
	3	B	20.00	ul	2
	4	B	20.00	ul	2
	5	D	25.00	ul	4
	5	E	25.00	ul	4
▶	5	F	25.00	ul	4

(4) By clicking [Accumulate] button repetitively, new lines are inserted.
The "Tube" numbers of inserted lines are same.

4-4-4. Run

(1) Click [Run Method] button in the method edit dialog box. [Method] dialog box is displayed.
* By selecting "Run" and "Method", [Method] dialog box is displayed. But, click ▼ of "Method" to select methods.



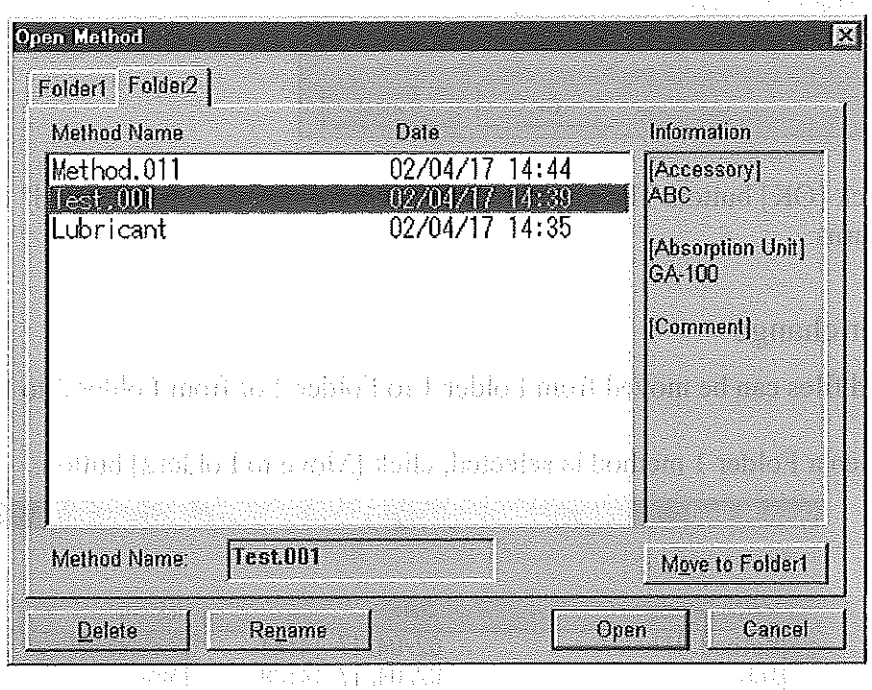
(2) Click [Run] button. The main window returns and "ABC Home Moving" is displayed. After a while, measurement is ready.

4-4-5. Method management

Existing method names and saving positions can be changed.
In addition, unnecessary methods can be deleted.

(1) Click  or click "File" and "Open Method". "Open Method" dialog box is displayed.

(2) Select a method from a list.

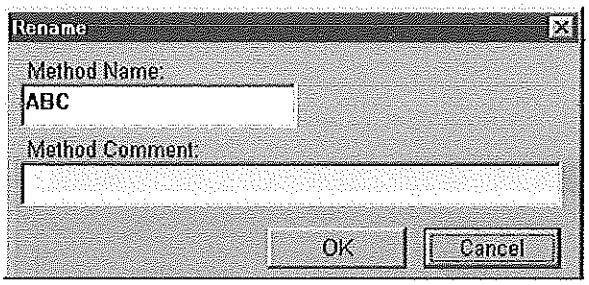


Selected method information is displayed in "Information".
The selected method name and the folder can be changed and deleted.

Rename

(1) Click [Rename] button of "Open Method" dialog box when a method is selected. "Rename" dialog box is displayed.

(2) Input a name into "Method Name".

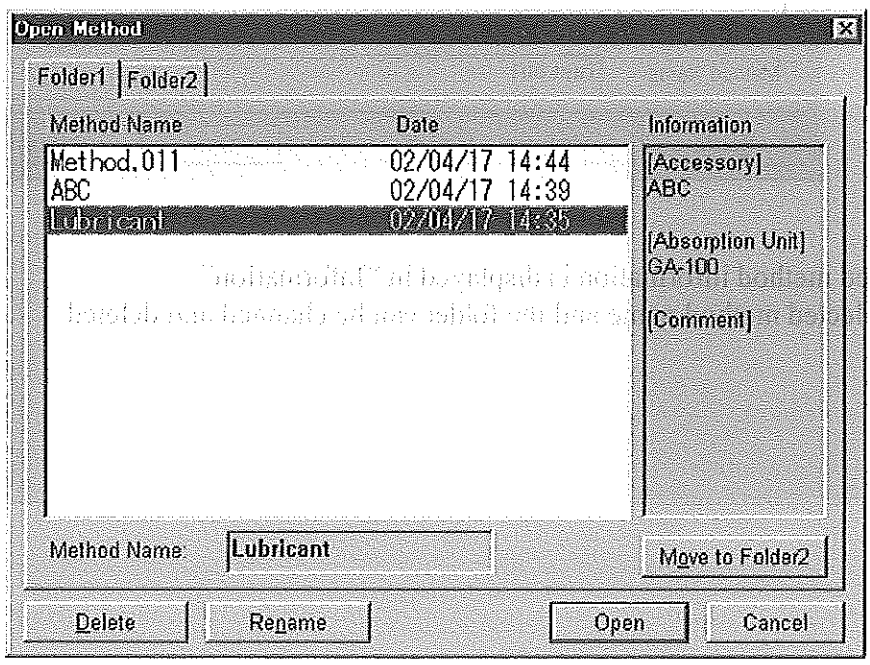


(3) Click [OK] button. The method name is changed and "Open Method" dialog box returns.

Method folder change

Method files can be moved from Folder 1 to Folder 2 or from Folder 2 to Folder 1.

(1) When a Folder 1 method is selected, click [Move to Folder2] button.



The method moves to Folder 2.

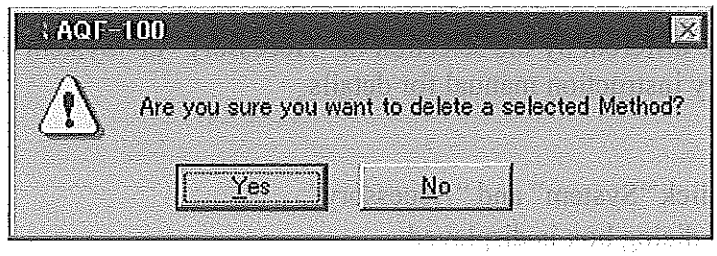
* In the opposite case, click [Move to Folder1] button when a Folder 2 method is selected.

Method deletion

Unnecessary methods can be deleted.

POINT
Deleted methods can't be undone.

(1) Click [Delete] button when methods are selected.
The following dialog box is displayed.



(2) Click [Yes] button. They are deleted.

4-5. Setting

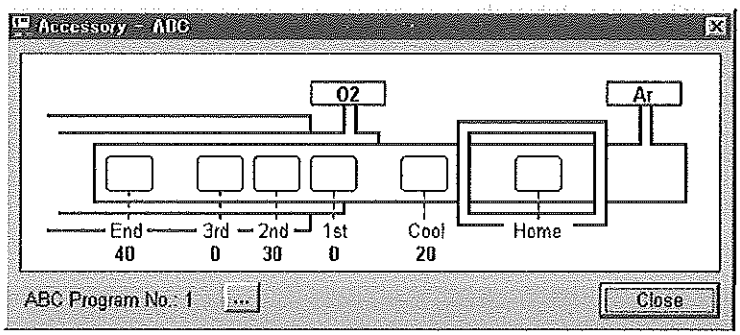
POINT

Once the condition is set on the same measurement condition, the change is not required. Change it if necessary.

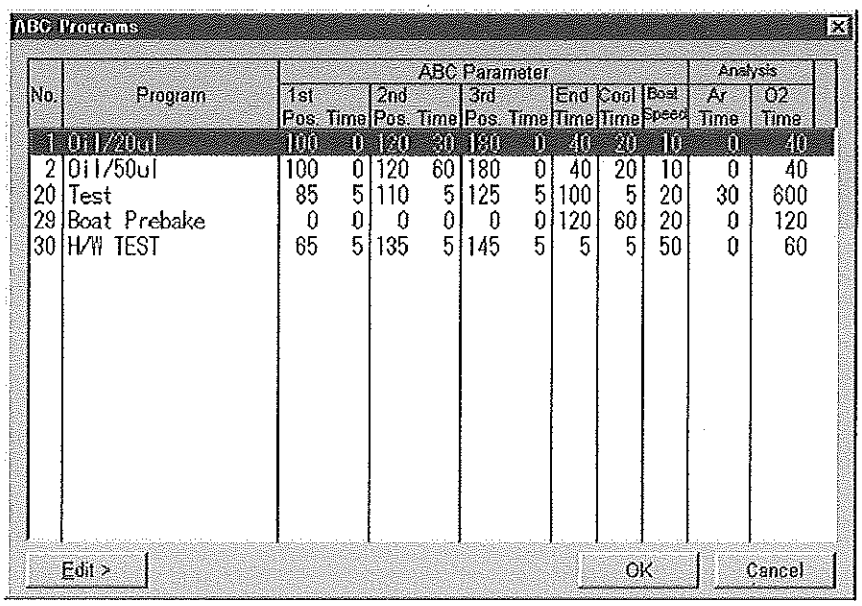
4-5-1. Accessory (ABC) setting

Set ABC program.
Accessory contents are different by the selection of "Accessory" at "System Setup".
Refer to each accessory instruction manual for details.

(1) Click  or click "System" and "Accessory".
"Accessory-ABC" dialog box is displayed.

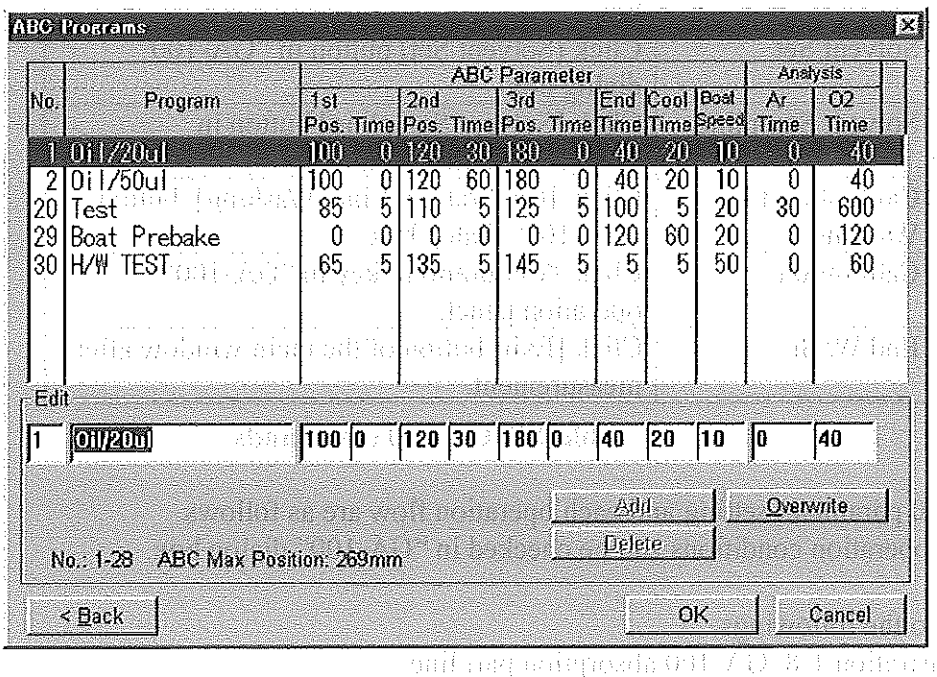


(2) Click  button to display "ABC Programs" dialog box.



(3) Click [Edit] button to move to the edit mode.

(4) Move a cursor to each item of "ABC Parameter" and "Analysis" to correct it.
Click [Add] button to add the program.
Click [Overwrite] button to overwrite the program.
Click [Delete] button to delete the whole of Program No.



(5) Click [OK] button. ABC program setting is saved and "ABC Programs" dialog box is closed.

4-5-2. GA-100 parameter

Absorption unit has the following five commands.

Command	Operation method
Wash All	Click [Wash All] button in "GA-100" dialog box.
Solvent Set	Click [Solvent Set] button in "GA-100" dialog box.
Solvent Sampling	Click [Solvent Sampling] button in "GA-100" dialog box.
Calibration Line Washing	Click [Calibration Line Washing] button in "GA-100" dialog box.
Calibration	Click <Calibration> key in "GA-100" operation panel.
End Wash	Click [Exit] button of the main window after measurement.

Table 4-7. GA-100 commands

GA-100 parameter setting and each operation flow are as follows.
These operation conditions can be checked in "GA-100" dialog box.

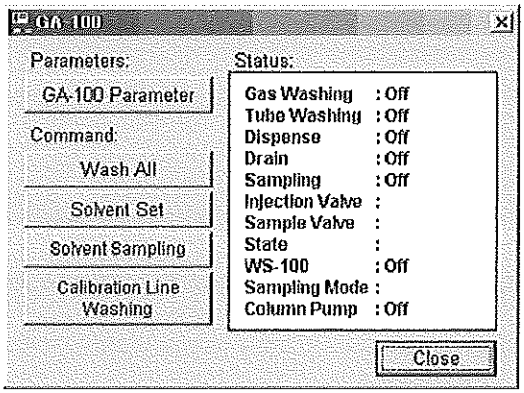
Refer to the followings.
Illustration 1-8. GA-100 absorption part line
Table 1-8. GA-100 absorption part line names and functions
Illustration 1-9. GA-100 operation panel
Table 1-9. GA-100 operation panel names and functions

POINT

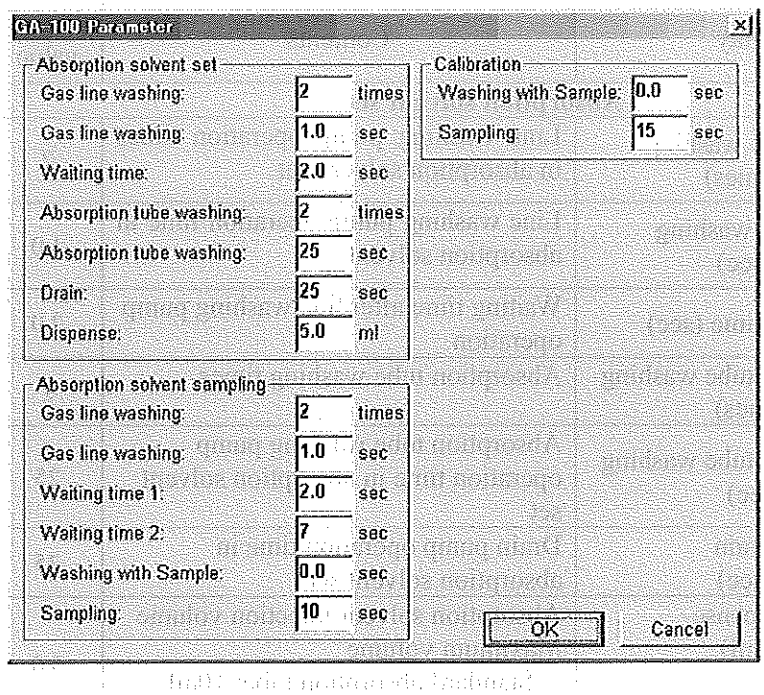
Set "GA-100 Parameter" while checking each operation.
Once it is set, setting is not changed so often.
Change it if necessary.
Adjust the gas flow same as measurement condition when setting parameters. Without the same amount of gas flow, setting parameter errors might occur.
Without flowing gas at the setting, washing solution flows back into a pyrolysis tube during line washing.

4-5-2-1. GA-100 parameter setting

(1) Click "System" and "GA-100". "GA-100" dialog box is displayed.



(2) Click [GA-100 Parameter] button. "GA-100 Parameter" dialog box is displayed.



(3) By absorption tube capacity, initial values should be as Table 4-8.
Measure them with a stopwatch and set appropriate values.

Parameters	Absorption tube 10ml	Absorption tube 20ml
Absorption tube washing	20 sec	30 sec
Drain	15 sec	30 sec

Table 4-8. Initial values

(4) Input each item. Table 4-9 shows GA-100 parameter setting input items.

(5) Click [OK] button. GA-100 Parameter setting is saved and "GA-100 Parameter" dialog box is closed.

(6) Check "Wash All", "Solvent Set", "Solvent Sampling", and "Calibration Line Washing" movements with each button of "GA-100" dialog box.
Check "Calibration" movement with <Calibration> key of GA-100 operation panel.

POINT
Once measurement starts, parameters can't be changed.

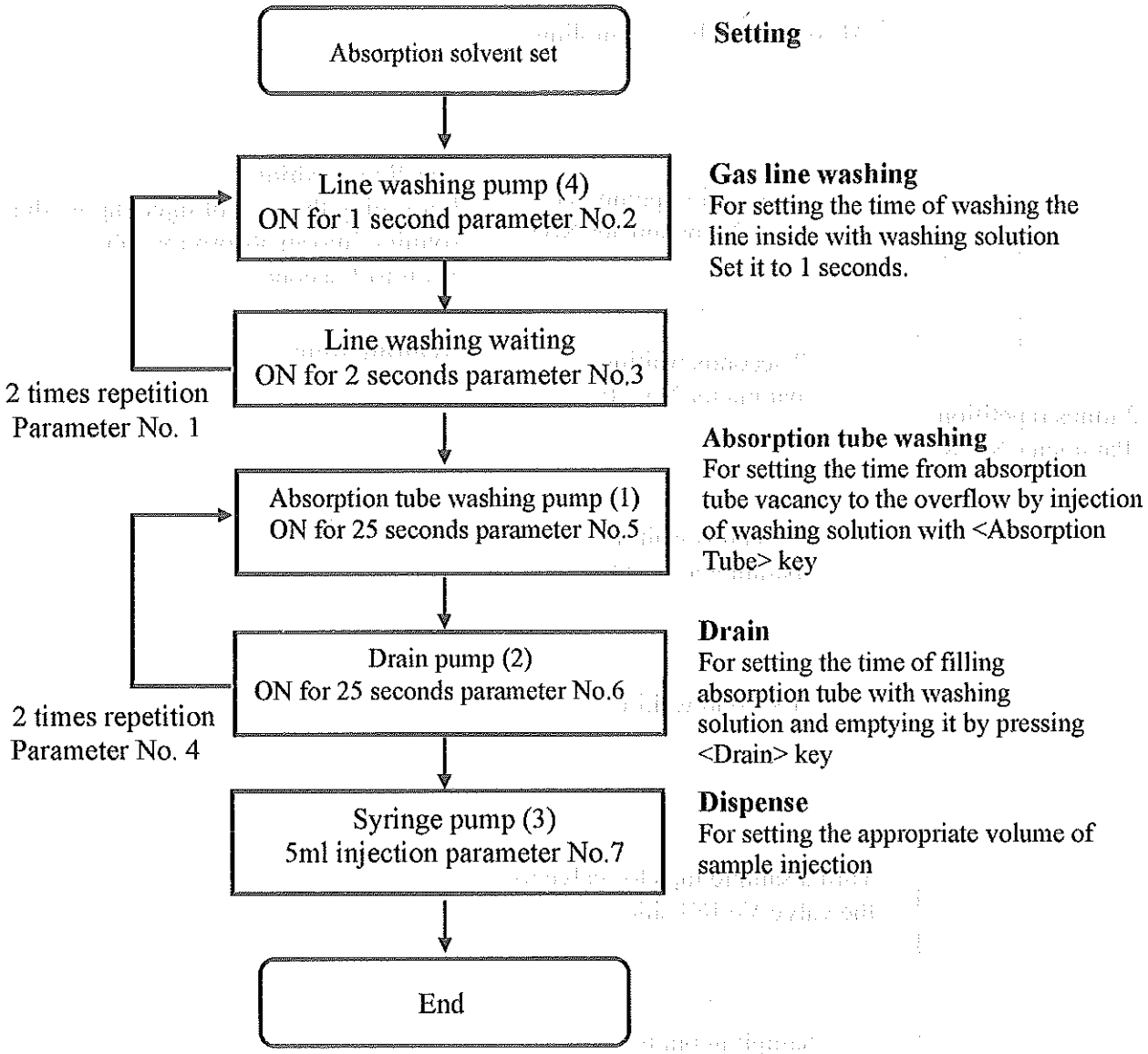
CAUTION
Conduct movement command when the cover of ABC sample box is closed. For command except "Calibration", operation is wrong and washing solution runs into a pyrolysis tube.

Parameter No.	Display	Contents	Initial value	Setting range
Absorption solvent set				
1	Gas line washing (times)	Line washing pump operation times in absorption solvent set	2	0~99
2	Gas line washing (sec)	Line washing pump operation time in absorption solvent set	1.0	0.1~2.0
3	Waiting time (sec)	Waiting time after line washing pump operation	2.0	0~99.0
4	Absorption tube washing (times)	Absorption tube washing times	2	1~99
5	Absorption tube washing (sec)	Absorption tube washing pump operation time in absorption solvent set	25	0~99
6	Drain (sec)	Drain pump operation time in absorption solvent set	25	0~99
7	Dispense (ml)	Absorption solvent injection volume Maximum volume Standard absorption tube: 10ml Optional absorption tube: 20ml	5.0	0.1~30
Absorption solvent sampling				
8	Gas line washing (times)	Line washing pump operation times in absorption solvent sampling	2	0~99.0
9	Gas line washing (sec)	Line washing pump operation time in absorption solvent sampling	1.0	0.1~2.0
10	Waiting time 1 (sec)	Line washing pump operation interval in absorption solvent sampling	2.0	0.1~ 10.0
11	Waiting time 2 (sec)	Waiting time until absorption solvent sampling after line washing	7	0~99
12	Washing with Sample (sec)	Time of washing with a sample from an absorption solvent tube to a sample injector Recommended conditions by sample loops 100 μl: 0.0, 20 μl: 20	0.0	0.0~ 99.9
13	Sampling (sec)	Sampling time of absorption solvent	10	0~99
Calibration				
14	Washing with Sample (sec)	Time of washing with a sample from a standard solution tube to a sample injector Recommended conditions by sample loops 100 μl: 0.0, 20 μl: 10	0.0	0.0~ 99.9
15	Sampling (sec)	Sampling time of standard solution	15	0~99

Table 4-9. GA-100 parameter setting input items

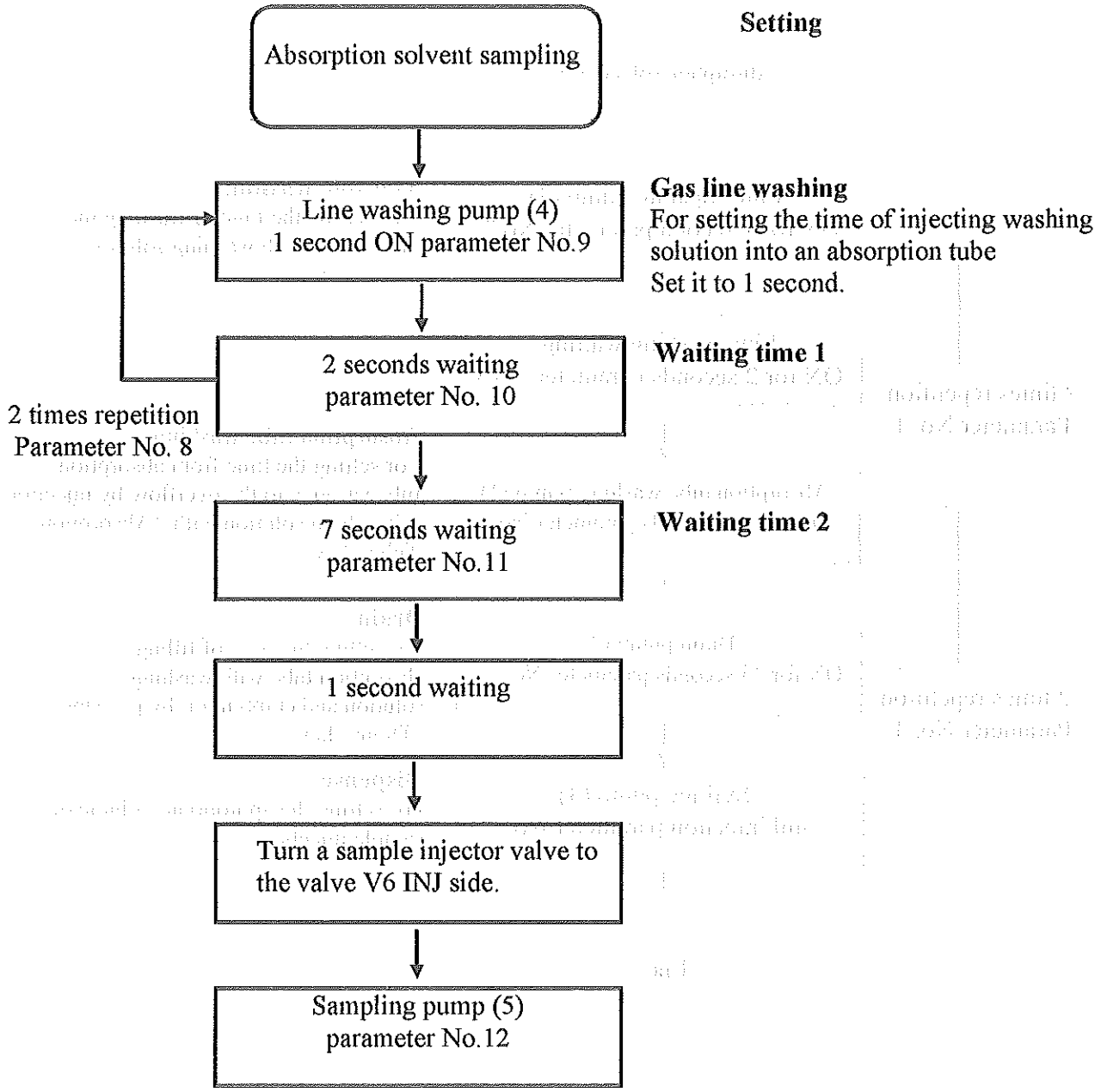
4-5-2-2. "Absorption solvent set" flow

"Absorption solvent set" is operation for injecting absorption solvent into an absorption tube. The following flow parameter values are indicated by initial values.

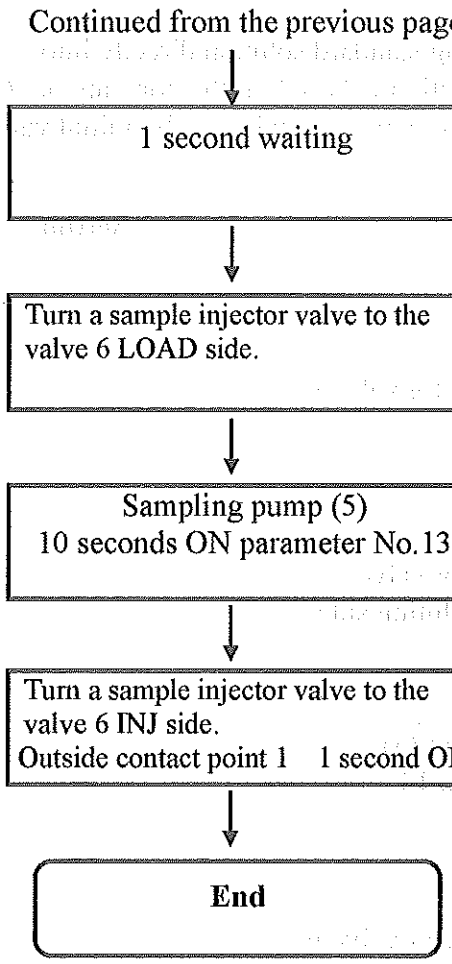


4-5-2-3. "Absorption solvent sampling" flow

"Absorption solvent sampling" is operation for injecting absorption solvent into a sample loop. The following flow parameter values are indicated by initial values.



Continued on the next page



Sampling
For setting the time of absorption solvent flowing into a drain line by pressing <Sampling> key Refer to POINT.

POINT

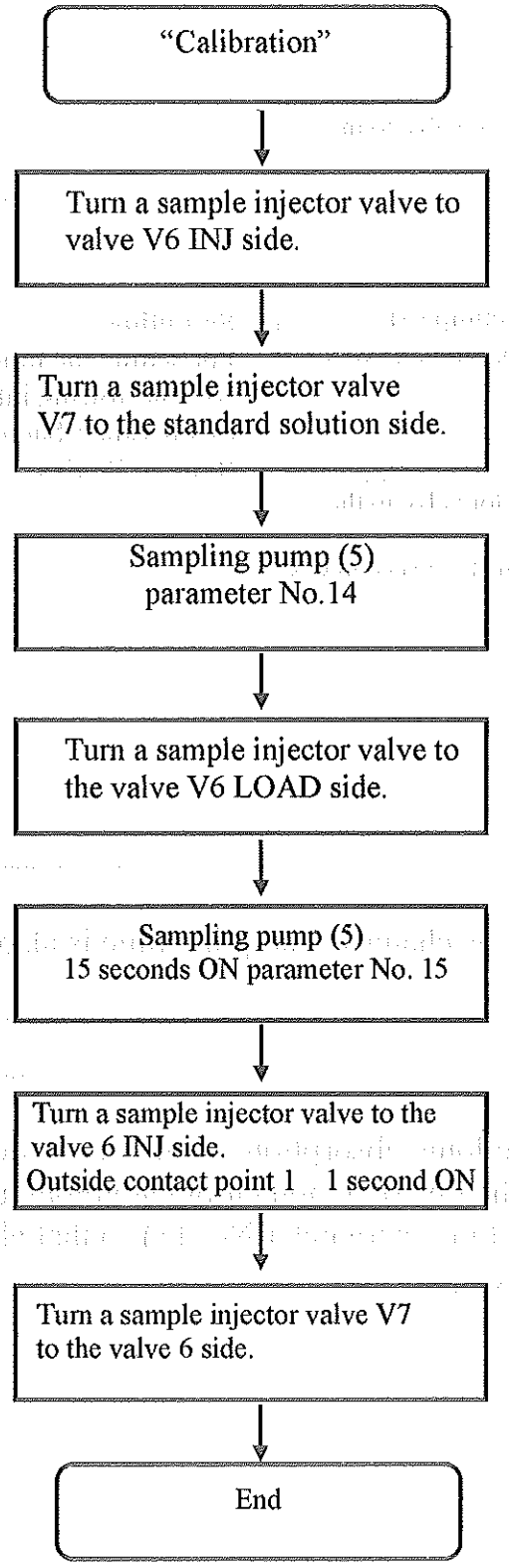
If sample loop volume is changed, sampling time is also different.

CAUTION

If sampling time is too long, absorption solution becomes empty. Air goes into the line of an ion chromatography unit and column. Set sampling time (parameter No. 13) so that absorption solvent should not be empty.

4-5-2-4. "Calibration" flow

"Calibration" is operation for injecting standard solution directly into a sample loop from a tube. The operation is based on the contents of "GA-100 Parameter" setting. The following flow parameter values are indicated by initial values.



Setting

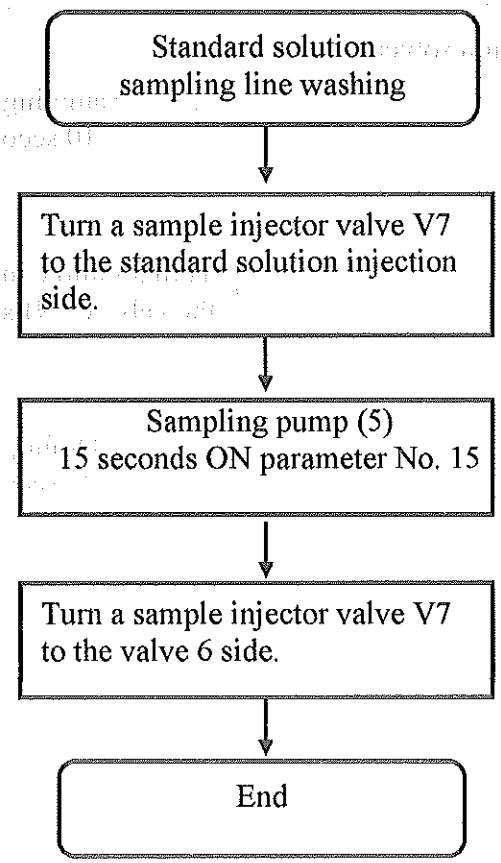
Sampling
For setting the time of standard solution flowing into a drain line by pressing <Calibration> key Refer to POINT.

POINT
If sample loop volume is changed, sampling time is also different.

CAUTION
If sampling time is too long, absorption solution becomes empty. Air goes into the line of an ion chromatography unit and column. Set sampling time (parameter No. 15) so that absorption solvent should not be empty.

4-5-2-5. "Calibration Line Washing" flow

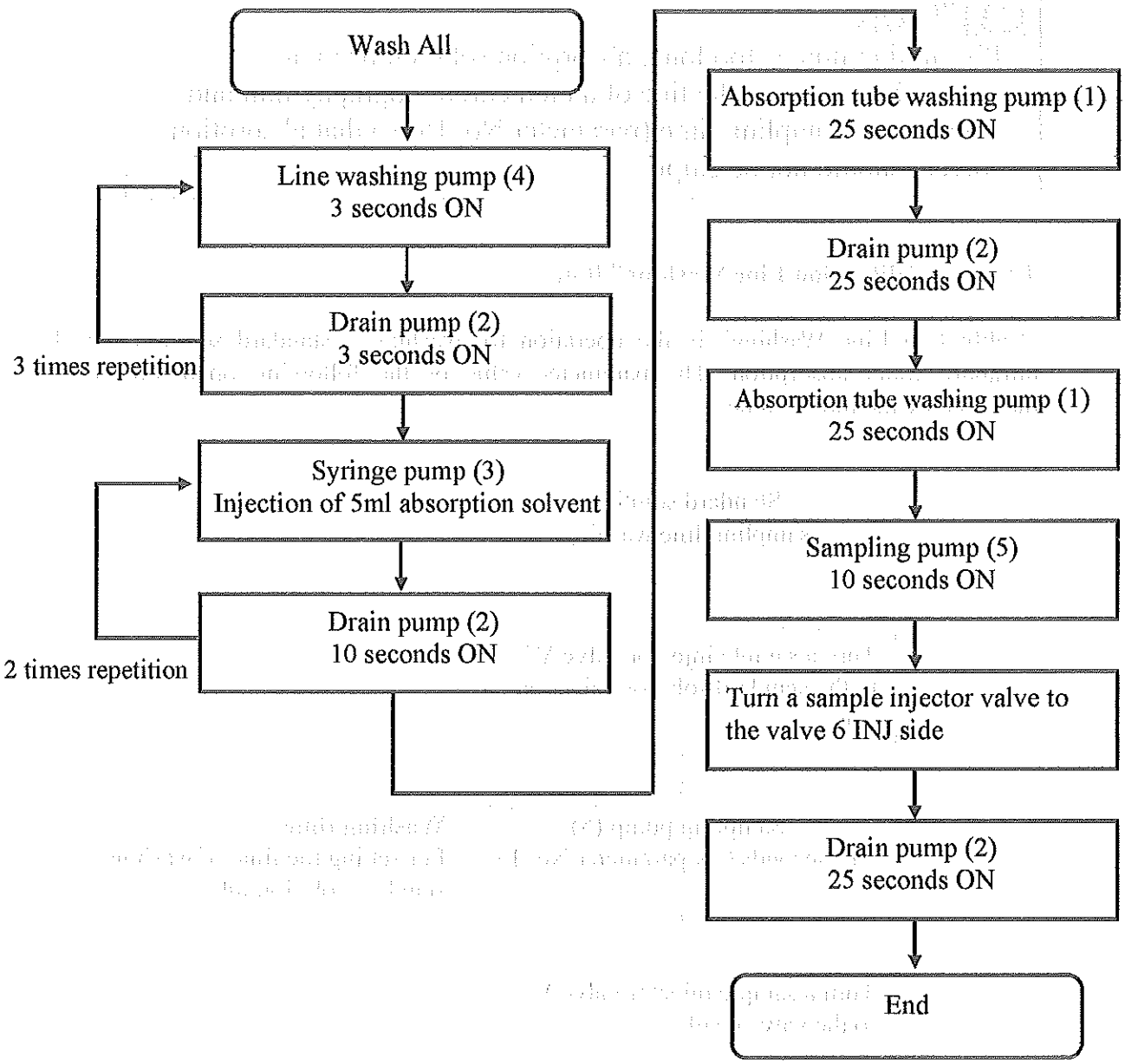
"Calibration Line Washing" is the operation for washing a standard solution tube by ultrapure water absorption. The parameter value of the following operation flow is indicated by the initial value.



Washing time
For setting the time of washing a standard solution tube

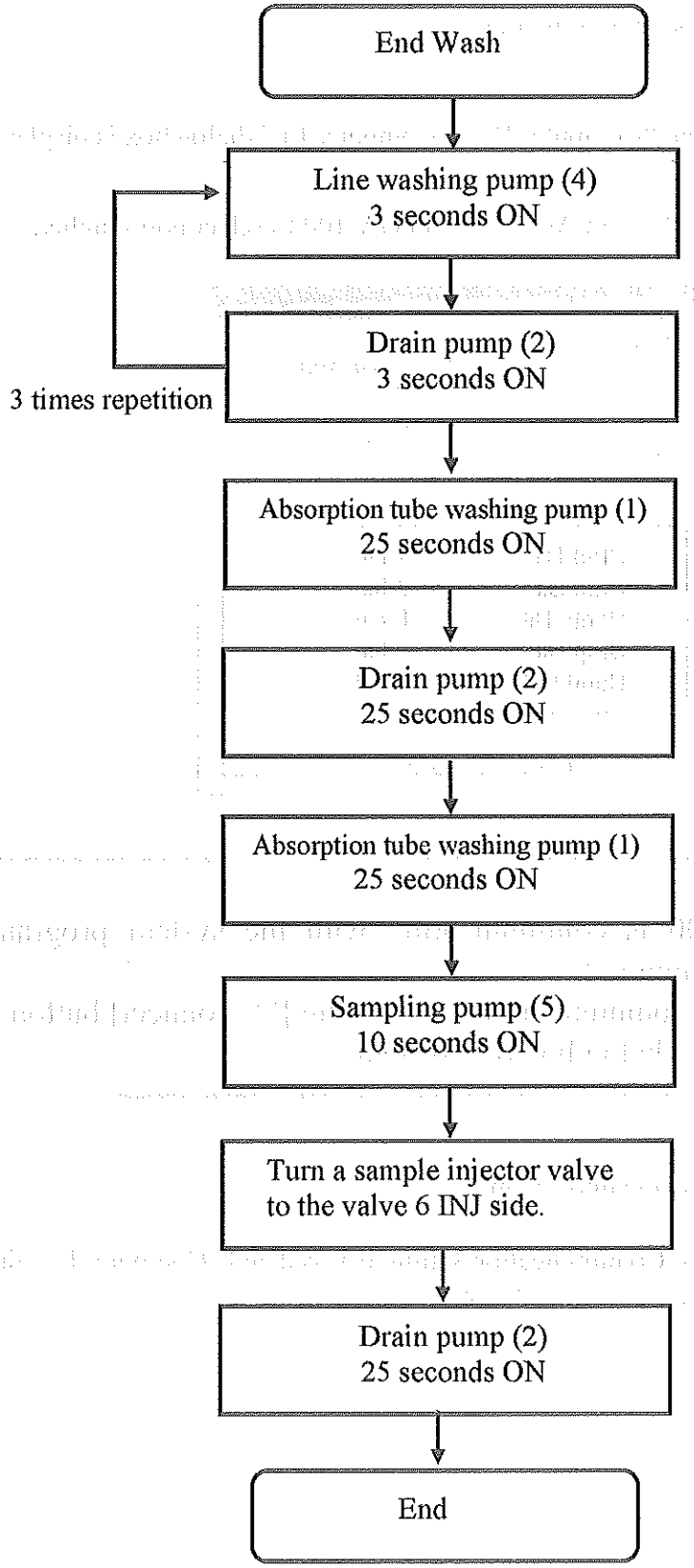
4-5-2-6. "Wash All" flow

Run "Wash All " before measurement start. GA-100 runs by the following flow chart.



4-5-2-7. End Wash flow

Run "End Wash" at measurement end. GA-100 runs by the following flow chart.

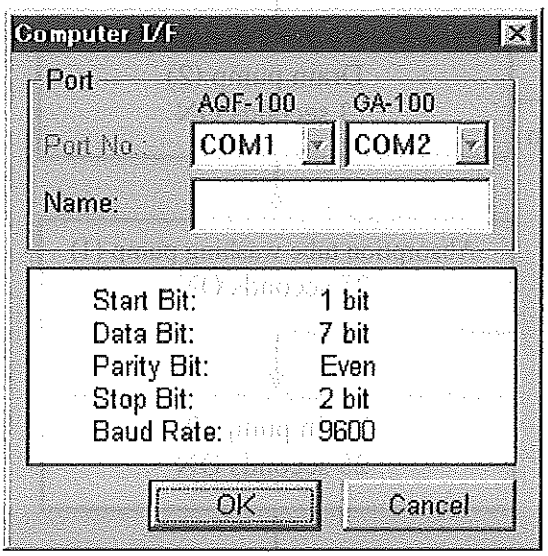


4-5-3. Computer I/F

In "Computer I/F" dialog box, set "Port No." and input a unit name.
Communication conditions are displayed. By inputting a name into "Name", print result can be separated in common printer use.

(1) Click "System" and "Computer I/F". "Computer I/F" dialog box is displayed.

(2) Click ▼ of "Port No." of AQF-100 and GA-100 to select port numbers.



POINT

When AQF-100 is communicating with the system program, a name can't be inputted.
Disconnect the communication by clicking [Disconnect] button of "System Setup" dialog box of "System".

(3) Input an optional name into "Name".

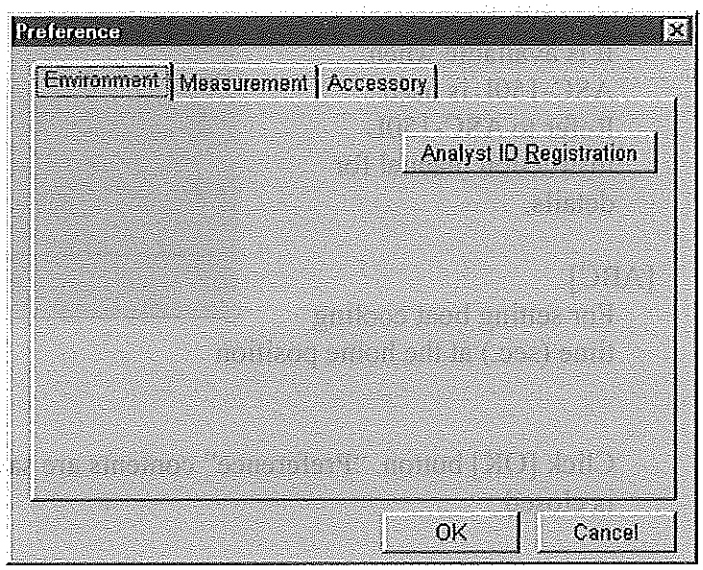
(4) Click [OK] button. Communication setting is saved and "Computer I/F" dialog box is closed. Optional name is printed to print result.

4-5-4. Preference

Set and change basic system environment here.
Click "System" and "Preference". "Preference" dialog box is displayed.

Environment

[Analyst ID Registration]
Refer to 4-2. Registration and Deletion of Analyst ID.

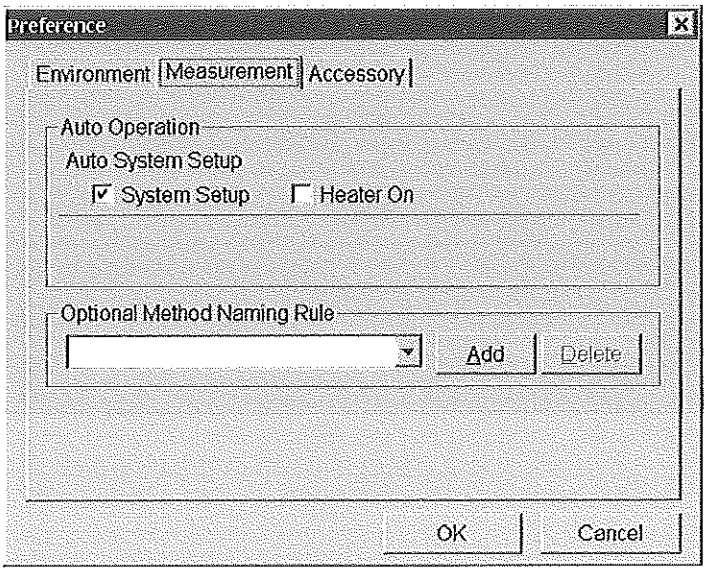


Measurement

[Auto System Setup]
After starting the system program, set automatic operation.
Click the item check box.

- System Setup
- Heater On

("Heater On" is effective by checking "System Setup".)

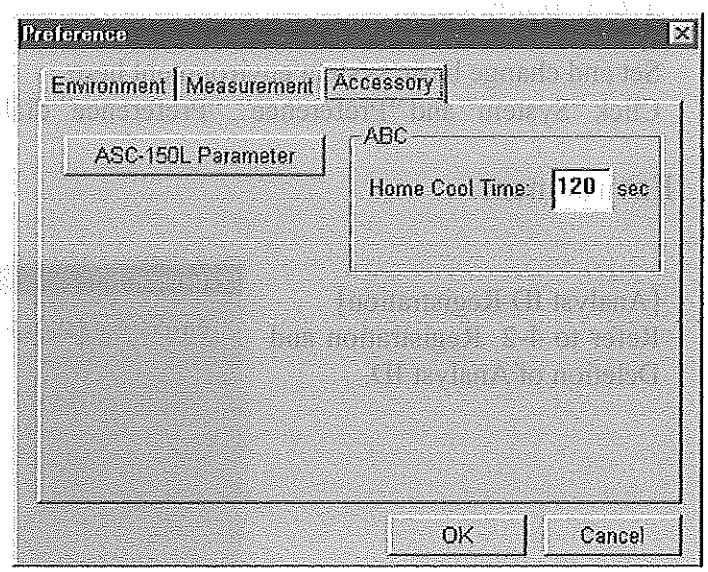


[ASC-When all measurement is finished.]

Setting for ASC-150L or ASC-120S use
(Without the use, the setting is invalid.)

Refer to ASC-150L or ASC-120S instruction manual for details.

Accessory



For setting the use environment and operation when an accessory is connected

[ASC-150L Parameter]
It is available when ASC-150L is used. Refer to ASC-150L instruction manual for details.

[ABC]
For setting boat cooling time (sec.) at the home position

Click [OK] button. "Preference" contents are saved and "Preference" dialog box is closed.

4-6. Print Function

4-6-1. Printer setting

(1) Click "File" and "Printer Setup". "Printer Setup" window is displayed.

(2) When some printers are connected, click ▼ of "Name" to select a printer.

(3) Click [Property] button to set printer details. Refer to a printer instruction manual.

(4) Click ▼ of "Size" to select a paper size. (Default: A4)

(5) Click a print direction. (Default: Vertical direction)

(6) Click [OK] button. The setting is saved.

4-6-2. Print type

For AQF-100 system program, some types of print are available.
The following items can be selected by clicking "File" and "Print".

- Print Method
- Print Parameters
- Print All ABC Programs Lists
- Print Preference
- Print ASC-150L Parameters
- Print GA-100 Parameters