

AUTO SAMPLER

AS-11

Instruction Manual

Version 1.08

To The User

We ask that you read this manual carefully and in its entirety before installing and using the unit.

After reading please keep the manual for reference. A product warranty is attached at the back.

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Introduction

Thank you for purchasing the FLOM AS-11 Autosampler.

- This instruction manual will assist you in the safe and proper operation of the AS-11 Autosampler, and will help prevent harm damage and accident as you operate and maintain the unit.
- For safety's sake, please read this manual carefully before installing, wiring, connecting, and operating the unit.
- Please follow the Safety Notes found throughout the manual, as they contain key points about the safe handling and care of the unit.
- Please keep this manual in a safe place easily accessible to the actual operators of the unit. By following these instructions, you will ensure a long and safe operating life to the AS-11 Autosampler.

Note carefully the safety information given in the points below.

- I. The Safety Notes are divided into 3 categories, in descending order of hazard: [Danger], [Warning], and [Caution]. Read and understand these points well before operating the unit.
- II. FLOM Corporation assumes no responsibility for the following:
 - 1) accidents or problems occurring as a result of not following this manual's instruction;
 - 2) accidents or problems resulting from the use of non-standard replacement parts (neither FLOM brand parts nor parts from a FLOM-approved vendor).
 - 3) accidents or problems resulting from operating the unit outside the defined specifications and parameters.
- III. If you wish to recondition the unit, always consult with FLOM first.
- II. Follow the instructions in this manual when you make repairs or perform periodic maintenance on the unit.
- III. Do not install the unit in the locations listed under "Locations to Avoid" in Section 7-2. In general do not install or use the unit in any place deemed hazardous for whatever reason.
- IV. There is a product warranty on the last page of this manual. Please be careful not to damage or lose it. In case of loss, contact FLOM and inform us of the model and serial number of the unit (for custom specification units, please also supply the specifications). We will issue you another copy of the instruction manual, but please be aware that under certain circumstances the contents of the warranty may no longer be applicable.

1 Safety Precautions

Please read this instruction manual carefully and follow the instructions while installing, running, maintaining and servicing the degassing unit. Make sure you understand the basic operation of the unit, safety information, and the safety precautions listed below.

< Definition of Markers Denoting Safety Cautions >

The  Mark: This mark indicates matters of special concern and caution which need to be heeded *before* handling or running the unit. After the  mark, one of 3 words: **Danger**, **Warning**, or **Caution**, will appear indicating the level of hazard. For safety's sake please follow all instructions appearing after these marks.

● Safety caution categories indicate the degree of hazard resulting from mistaken application of the instructions.

- | | | |
|--|---|--|
|  Danger | : | A “Danger” Mark indicates the imminent and acute possibility of injury or death, if the situation or action described is not avoided. |
|  Warning | : | A “Warning” Mark indicates the possibility of injury or death if the situation or action described is not avoided. |
|  Caution | : | A “Caution” Mark indicates the possibility of moderate or light injury, or physical damage, if the situation or action described is not avoided. |

In addition, the “※ Note” sign indicates important and useful reference information.

2 Standard Accessory List

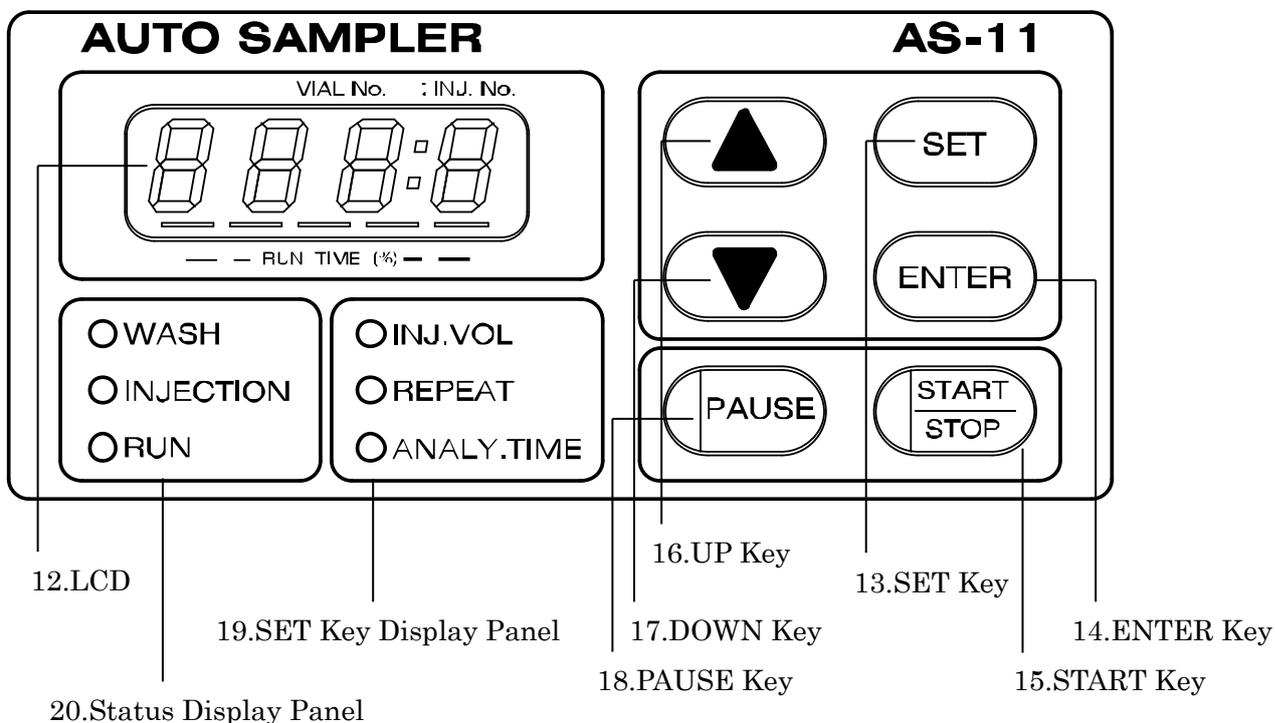
When opening the unit packaging, please check that all the accessories listed below are included.

※ Note: if you discover any accessory part to be missing or defective, please contact your vendor immediately. Please do not use off-market or knock-off connector items on the unit; FLOM will not be responsible for any damage resulting from their use, and using such products may void the FLOM guarantee of free repair.

Part Name	Specifications	Number	Notes
Power Cord	16A 250V	1	
Fuse	3A	2	Time-lag Type
Wrench	6×8	1	
2.5mm Hex Wrench	2.5mm	1	
PEEK Tubing	1/16×0.25×1m 1/16×0.50×1m	1 each	
1/16" Double Lock Fitting L	#9412	4	
1/16" Double Lock Ferrule	#9401	4	
Suction Filter	P.P #8800	1	
Reducing Union	#9110	1	
PTFE Tubing	1/16×0.50×1m	1	
PFA Tubing	3×2×1m	1	
1/8 Flat Seal Fitting	#9711	1	
φ 3 Flat Seal Ferrule	#9701	1	
Easy Fitt 10 φ	#9001	1	
Elbow	L8	1	
Silicone Tubing	9×7×2m	1	
Sample Holder		1	
Sample Tubes		50	

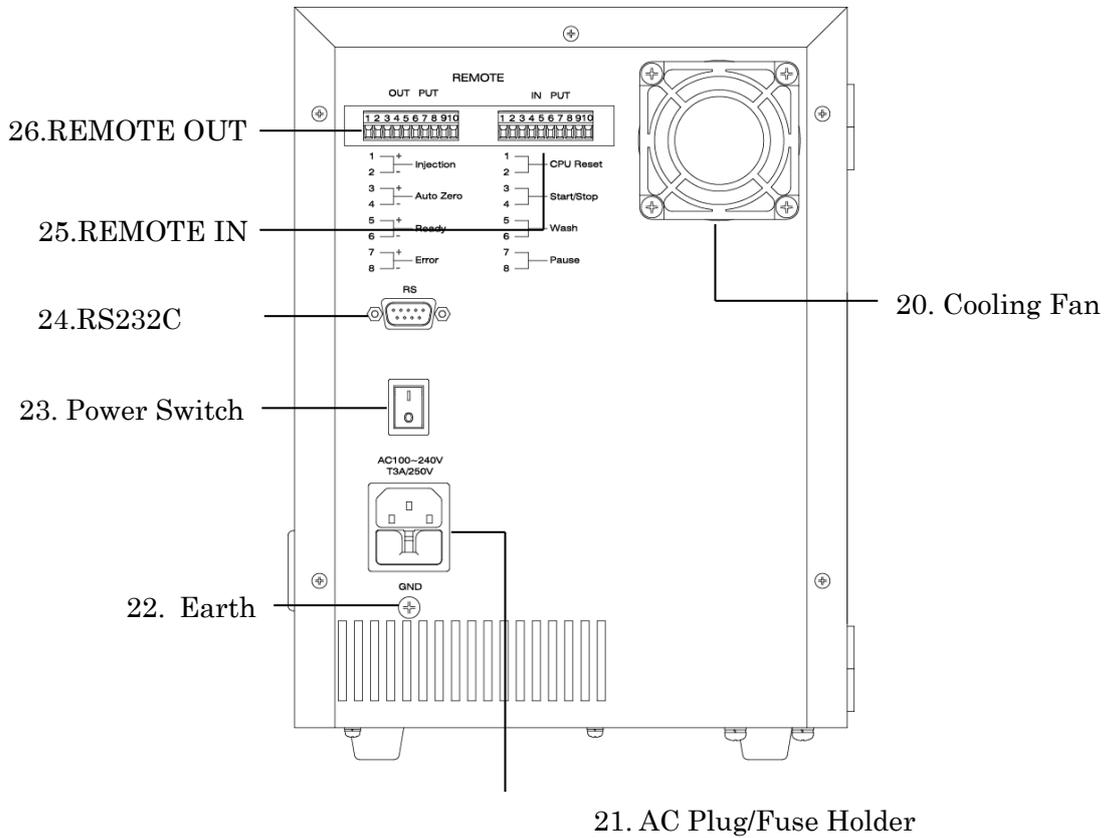
	Name	Function
1	LCD Display	see 3-2 Display Panel below
2	Operation Panel	see 3-2 Display Panel below
3	Hatch	Smoky gray PVC hatch thru which sample tubes are visible
4	Syringe Pump	for Samples and Wash liquid
5	Valve side hatch	Access door for internal connections
6	Z axis	up/down movement of needle
	Y axis	left/right movement of needle
	X axis	front/back movement of needle
7	Sample Tubes	holds samples for testing
8	Sample Holder	securely holds sample tubes
9	Tray	catches drips
10	1-2 Way Valve	switches between wash side and sample tube side
11	6-Way Valve	switches between samples tubes, pump, and detector sides

3-2 Display Panel



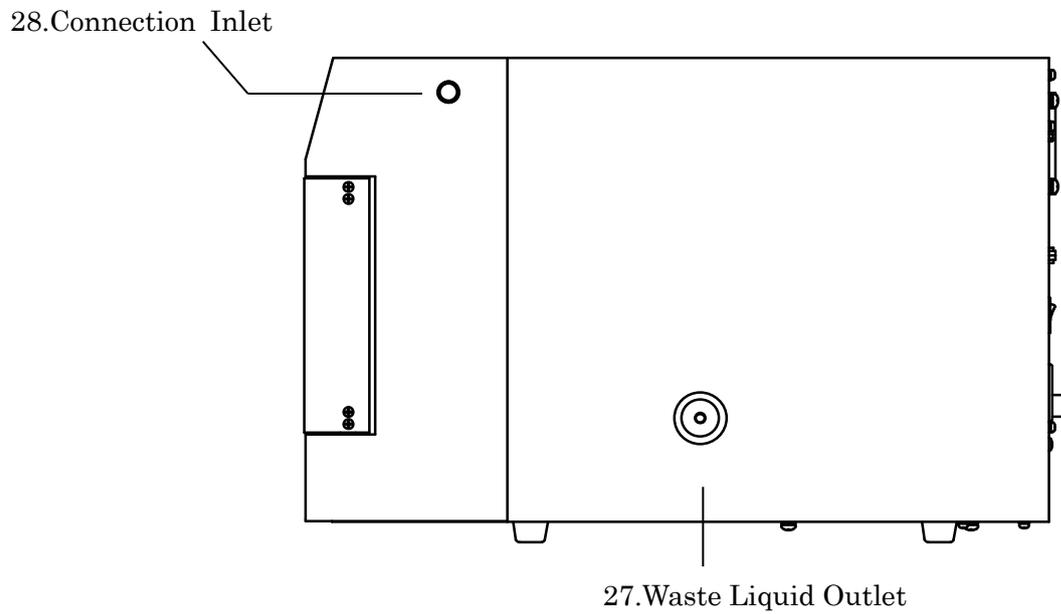
	Name	Function
12	LCD	Parameter Display
13	SET Keys	Use to change operations
14	ENTER Key	Determine the set-up value for each function
15	START/STOP Key	Starts and Finishes autosampler operation
16	UP Key	Increases currently displayed parameter
17	DOWN Key	Decreases currently displayed parameter
18	PAUSE Key	Pauses operation
19	SET Key Display Panel	pressing the SET Key switches operation between WASH, INJ.V, INTERVAL, REPEAT, and RUNTIME.
20	Status Display Panel	Indicate status during operation

3-3 Back Panel



	Name	Function
20	Cooling Fan	DC24V Air-flow Out of Unit
21	AC Plug/Fuse Holder	One-Piece Fuse Holder Slow-Blow Fuse 3A · 2
22	Earth	chassis ground
23	Power Switch	Rocker Switch
24	RS232C	9 pin D-Sub Male refer to section 9 – External Control
25	REMOTE IN	15 pin D-Sub Female refer to section 9 – External Control
26	REMOTE OUT	15 pin D-Sub Male refer to section 9 – External Control

3-4 Side Panel Components



	Name	Function
27	Waste Liquid Outlet	Waste Liquid Drainage
28	Connection Inlet	Hole for Liquid Inlet

At shipping, the waste liquid outlet has no tube connected to it. Make sure to connect a tube with waste container below before operating.

4 Installation

4-1 Preparation

When first opening the unit packaging, check to make sure that all standard accessories are included. (See Section 2, Standard Accessory List.)

※ Note: If any accessories are missing or damaged, contact your vendor. FLOM corporation will not be held responsible for any problems resulting from the use of off-market or knockoff parts.

※ Note: Before switching on power, remove the stabilizing screw and insert from the X axis. Damage caused by operating the unit with the screw and insert still attached will be not covered by the warranty!

4-2 Electrical Connection



Warning

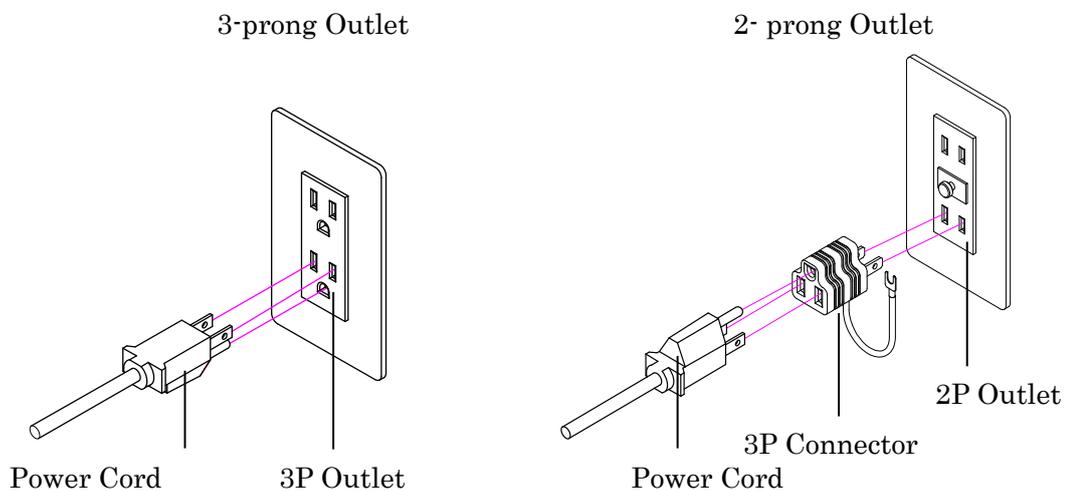
Holding the plug head of the power cord, insert into a nearby electrical outlet. Do not touch the cord with wet hands to avoid electric shock.



Caution

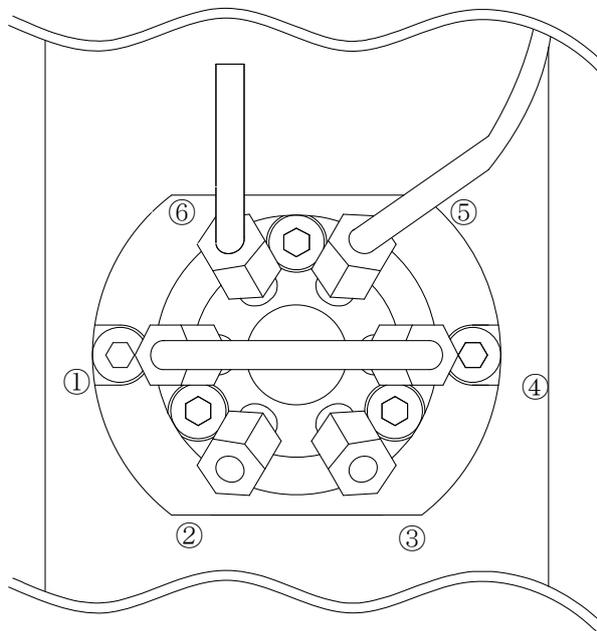
Your system may contain a large device that could produce an electrical surge in the autosampler unit if they are run from the same power outlet.

In this case please connect the autosampler unit to a separate power outlet. Plug the power cord provided with the unit into the connector on the back panel, and plug the other end into an indoor electrical outlet. The power source can be from AC 100V to 240V and can use both 50Hz and 60Hz frequencies. The cord provided is a 3-pronged triplex cable. If connecting to a 2-pronged outlet, always use a 3-pronged adapter unit in between, as shown in the illustration below.



4-3 Tubing Installation

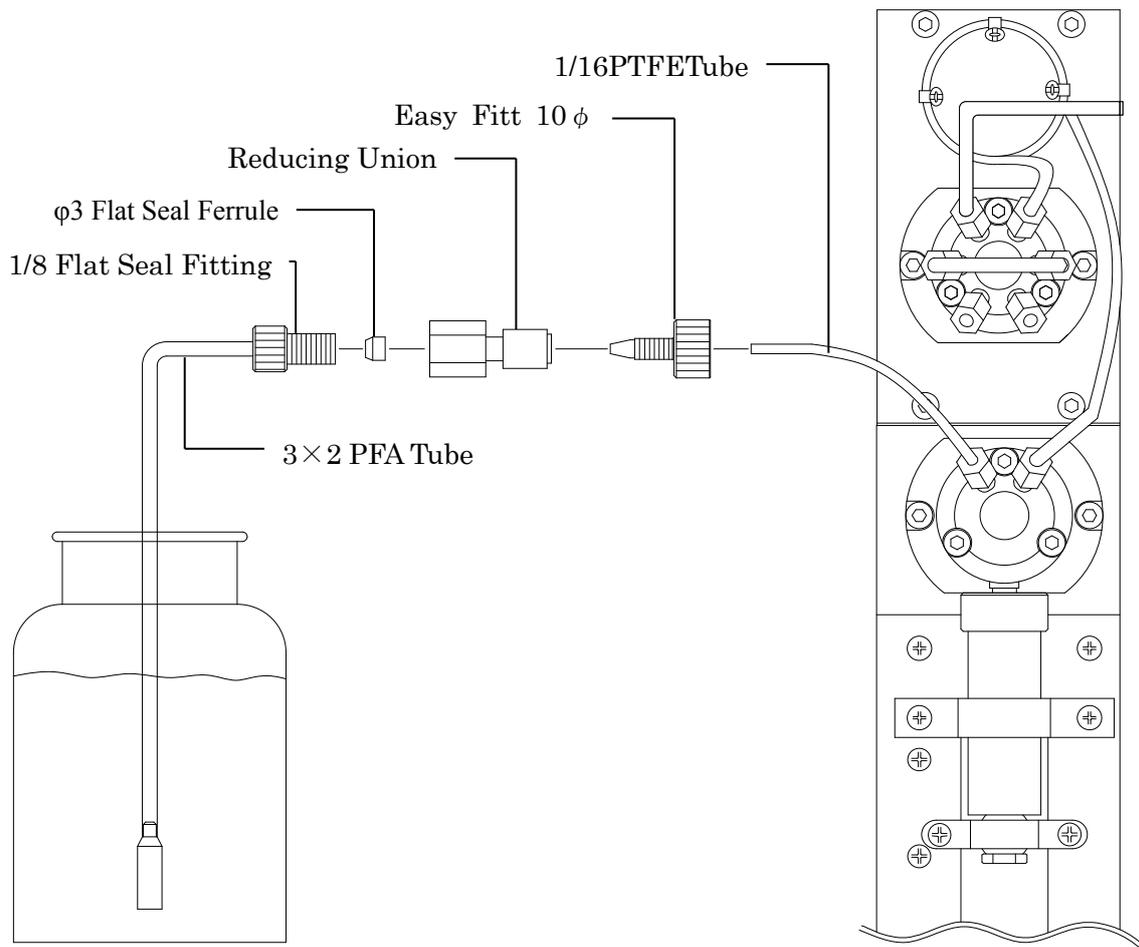
Pump and Column Connections



Connect a 20 μ l sample loop between ports 1 and 4 on the 6-way valve. Connect port 2 to the solvent pump, connect port 3 to the column. Connect port 5 to the front side port of the 1-2-way valve. Connect port 6 to the needle.

Caution: when connecting valves, be careful not to overtighten the fitting when attaching plastic tubing. Tighten until finger tight, then carefully give it a further 90° with the wrench.

Wash Connections



Connect the 1/16 Teflon tube to the left front port of the 1-2-Way Valve, place the EASY FITT 10 φ on the end and connect that to the reducing union. Next, on the wash liquid side, attach the filter to the end of the 3x2 PFA tube, and on the other end attach the 1/8 flat seal fitting and the flat seal ferrule, and attach this unit to the reducing union.

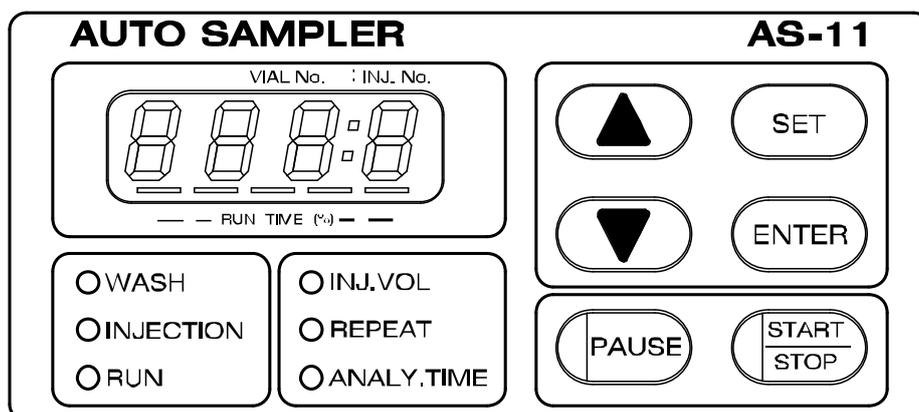
5 Basic Operation

① Switching Power On

Switch the power on with the rocker switch on the back of the unit. Each component of the autosampler will return to its default position, and the needle will receive washing twice. When these preparatory steps have finished, the “0:0” on the Display Panel will light up, indicating setup is complete and sample injection is ready to start.

② Parameter setting:

Press the SET Key repeatedly will cycle through the parameter settings for INJ.VOL – REPEAT – ANALY.TIME as displayed on the panel, the lit LED light indicating which parameter is currently being displayed.



Mode Settings

1. INJ.VOL : this sets the volume of sample to inject into the sample loop. Press the SET key until the INJ.VOL LED lights on the display panel. Use the UP and DOWN keys to select the number of sample volume from 1 - 200 $\mu\ell$.
2. REPEAT: this sets the number of times the same sample is repeatedly injected. Press the SET key until the REPEAT LED lights on the display panel. Use the UP and DOWN keys to select the number of inject repeats from 1 – 9 times.
3. ANALY.TIME (Interval) : this sets the length of time between the end of one sample injection and the beginning of another. Units displayed are minutes. Press the SET key until the ANALY.TIME LED lights on the display panel. Use the UP and DOWN keys to select time interval; range is 0.1 – 99.9 minutes.

③ Using the Keys to Operate the Autosampler

1. **START/STOP Key** : pushing the START/STOP Key begins autosampling Run mode: the needle receives the predetermined number of washes then begins injecting samples. While running, the LED to the left of the START/STOP Key will light. Also while running the LCD indicates the current sample number and the current injection repeat number. Pressing the START Key during Run mode will immediately halt operation.
2. **PAUSE Key**: while in Run mode, pressing the PAUSE key will temporarily halt operation after the completion of the current sample injection. Press the PAUSE key again to resume operation.
3. **Auto Completion**: once the autosampler has run through its complete program, or it can no longer detect sample tubes, the run will end and the LCD will display the END message.

④ Status display

LED lights indicate the current operation status in WASH, INJECTION and RUN.

※ Parameters, once set, are automatically saved. Powering off the autosampler does not erase the current settings: when power is switched on again, the previous parameters will be ready to run again.

6 Key Points of Operation

6-1 Special Precautions during Operation



Warning

: The points below are all WARNINGS. Avoid these actions and situations at all times.

- Never wet the panel or cover of the unit with water or solvents, organic or otherwise. If solvent is inadvertently spilled on it, unplug the unit and clean immediately. Do not start the unit until it is completely dry. A wet unit is a hazard for fire, short circuits, electric shock and unit damage. If you suspect a large volume of solvent has leaked into the unit interior, contact your vendor for advice.
- Never allow stainless steel tubing or metal fragments of any kind to enter the unit through the cover vents. This could cause short circuits, electrical shock, damage or injury.
- Do not attempt to repair or dismantle the unit if you suspect a technical problem, nor attempt to convert or upgrade it yourself. Doing so could cause fire, electrical shock, or injury.
- When changing the pump head or head guide seals, always turn off the power switch on the back panel, and unplug the power cord from the AC outlet. Do not plug or unplug with wet hands. Do not attempt any remove or replace of components except for the needle. Doing so could cause electric shock or damage.



Caution

: The points below are CAUTIONS. Be sure to follow them to ensure safe operation of the unit.

- Do not run this unit on a electric power system outside the standard AC 100V-240V (50/60 Hz) range. Doing so could result in fire, electrical shock or damage.
- If a malfunction occurs, stop operation immediately. Contact FLOM, providing clear descriptions of the problem. Using the unit after malfunction could cause fire, electrical shock, or injury.
- Treat the electric power cord carefully: do not excessively bend, treat, tuck into small spaces, connect to long extension cords, wrap up, bind up, or place under heavy objects. Doing so could result in fire, overheating, and electrical shock.
- Do not cover the waste liquid outlet on the side or the vent on the back of the unit with paper or tape. Doing so could result in fire, overheating, or damage.

6-2 Location of Installation and Storage



: The points below are all dangerous HAZARDS. Avoid these actions and situations at all times.

- This device is not rated explosion-proof. Never use in an environment with an explosion hazard. Doing so will result in a high risk of death, injury and/or fire hazard.
- This unit features a compact design, but do not place in a location above head level or where the unit could easily fall. Doing so could result in death, injury, or damage to the unit.

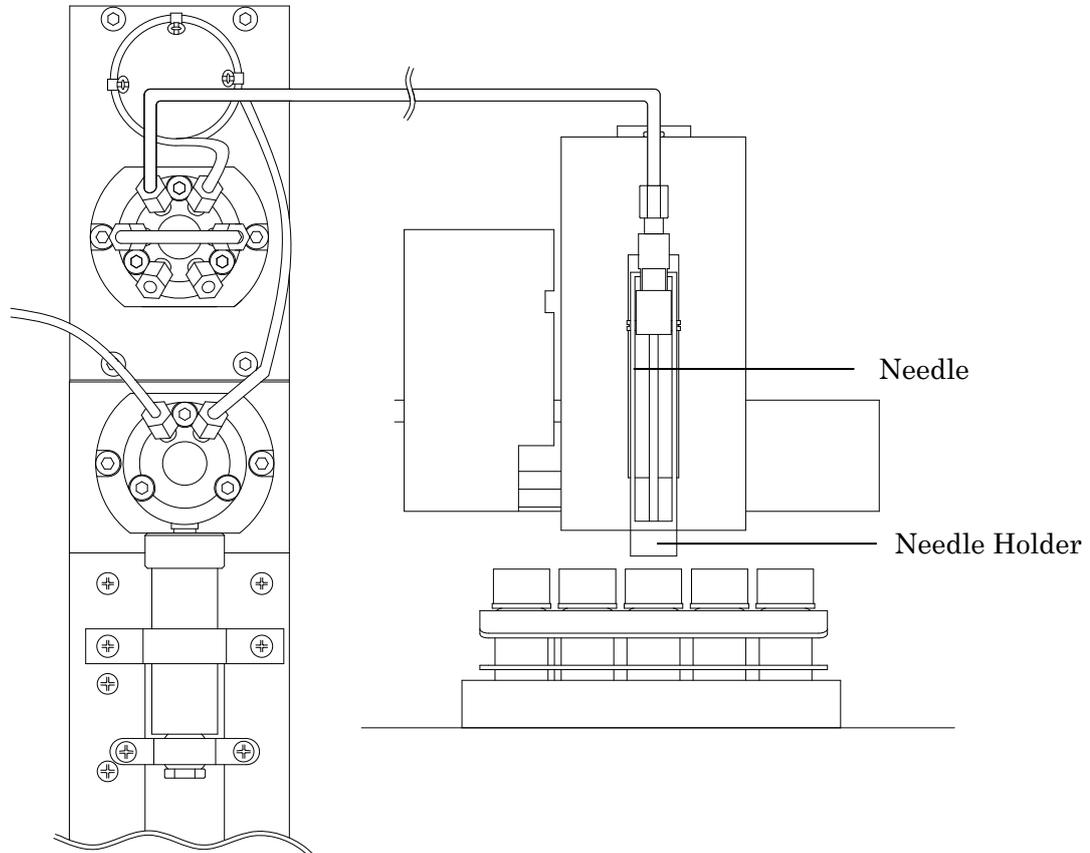


: The points below are CAUTIONS. Be sure to follow them to ensure safe operation of the unit.

- Do not use or store the unit out-of-doors.
- Do not use or store the unit near a source of corrosive gas.
- Strong electromagnetic waves can cause malfunctioning in nearby CPUs, so do not use the unit near high-frequency equipment.
- Do not place the unit in vibrating or unstable locations.
- Do not place in direct sunlight or sources of high heat.
- Do not use or store in places with high humidity or excessive dust or dirt.
- One important condition is to always use and store the unit at room temperature (indoors). Avoid use or storage under extremes of temperature. (Around 4° – 45° C in areas without water condensation.)

7 Maintenance

Changing the Needle



Change the needle when it gets bent or clogged. The needle unit includes Teflon tubing, a spring for the tube cover, and a HEX FITT MINI fitting.

To remove the needle:

- ① Turn off power to the unit.
- ② Gently pull the needle holder forward, and use the hex wrench to remove connected tube.
- ③ Use the hex wrench to loosen the needle from the needle holder, then pull down gently along the Z axis to separate the needle from the top of the holder.

To install the needle:

- ① Make sure the unit is turned off.
- ② Gently pull the needle holder forward, and insert the needle from below along the Z axis. Raise the Z axis, tighten the needle with the hex wrench, and connect the needle to the 6-way valve.

8 Troubleshooting

Error Messages

When malfunctions occur, the unit indicates the malfunction error number on the display.

E: 1	X axis malfunction
E: 2	Y axis malfunction
E: 3	Z axis malfunction
E: 4	Syringe pump malfunction
E: 5	6-way valve malfunction
E: 6	1-2-way valve malfunction

Other indications of malfunction

No power • check the outlet, socket, and breaker
 • check the fuse
 • check for AC power.

(Use of any electric power outside the 100-240V AC or 250V AC range may damage the power switch.)

If there is still no power after checking the above, there may be a problem with the fan, the motor, with a leak from the valves. In this case unplug the unit and immediately and call your vendor for maintenance, and explain the problem in detail.

<Leak preventing sensor>

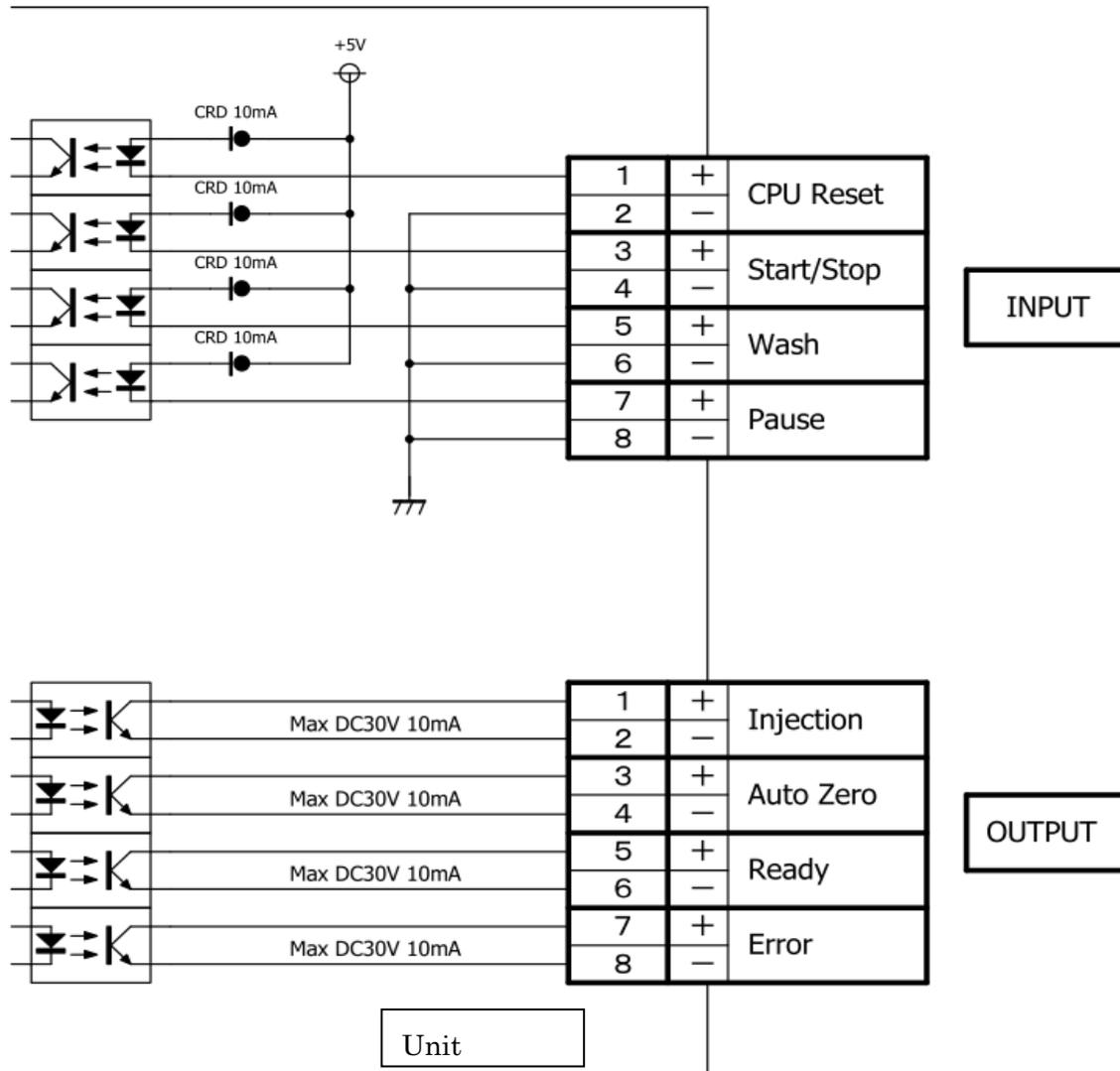
Leak preventing sensor activates with buzzer alarm when waste liquid cause fluid to collect in the waste liquid tank (Located inside of the waste liquid outlet) and stop the autosampler's operation intermittently. "O.F." (Over Flow) would be shown on the LCD display and "PAUSE" key lights at the condition.

After draining the waste liquid and press any keys on the panel, regular operation starts again.

Note: The sensor activates only for the liquid with specific gravity less than 0.80 (Methanol etc.)

9 External Control

9-1 Remote Input/Output



Wiring Diagram

Use the REMOTE terminal on the back panel for external input/output. The REMOTE IN terminal is a D-SUB 15 female connector, and the REMOTE OUT terminal is a D-SUB 15 male connector

Input Signals

	Signal	Description	
1	START/STOP Input	Starts and stops autosampler injection (run) mode	
		Photocoupler OFF→ON	start solvent
		Photocoupler ON→OFF	stop solvent
2	CPU RESET Input	Internal CPU reset command. Use to restart autosampler run mode.	
		Photocoupler ON	change to RESET (halt unit)
		Photocoupler ON→OFF	Restart autosampler
3	WASH Input	Start and stop autosampler wash.	
		Photocoupler OFF→ON	wash start
		Photocoupler ON→OFF	wash stop
4	PAUSE Input	Pause or resume autosampler run mode	
		Photocoupler OFF→ON	pause
		Photocoupler ON→OFF	resume

Output Signals

	Signal	Description	
1	Injection Output	Signal parameters → DC 30V or less, 10mA or less	
		injection starts 1 second after light ON	Photocoupler ON (1 sec)
		injection starts as light goes OFF	Photocoupler OFF
2	Auto Zero Output	Signal parameters → DC 30V or less, 10mA or less	
		Photocoupler light ON 3 sec before injection starts	Photocoupler ON (1 sec)
		Photocoupler ON for 1 sec; after photocoupler light OFF, injection starts in 2 sec	Photocoupler OFF
3	Ready Output	Signal parameters → DC 30V or less, 10mA or less	
		Enter Ready State	Photocoupler ON
		Start autosampler	Photocoupler OFF
4	Error Output	Signal parameters → DC 30V or less, 10mA or less	
		on error generation	Photocoupler ON
		no error detected	Photocoupler OFF

9-2 RS-232C Communication Protocol

RS232C communication is enabled thru the RS232C port on the back panel. The connector is D-SUB 9 pin male connector. Use a cross-cable when connecting to a PC.

Communications Settings

Baud Rate	9600 bps
Data bits	8 bit
Parity bit	none
Stop bit	1 bit
Flow control	none

Command List

All commands are in ASCII format.

Add a CR or LF delimiter byte to the end of every command. CR or LF are not shown on the command list below but must be added when sending any command.

Command lengths are fixed; if a portion of the code is not needed, fill in with a 0 insert.

Decimal points are not used in any command.

■ PC→Autosampler

Operation Command	Description	Notes
AS,G1,0	halt injection	
,1	start/resume injection	
,2	pause	
AS,G2,0	halt wash	
,1	start wash	
Setting Command	Description	Notes
AS,S3,a,bbb,ccc,d	parameter setting	a: number of washes b: sample injection volume c: interval time d: number of repeat injections
Request Command	Description	Notes
AS,Q2	Request current status	Autosampler responds with the following codes to indicate current status
		<p><u>AS,Q2,a,bb,c,ddd</u></p> <p>a : Status</p> <p>1=returning to start point</p> <p>2=running sequence</p> <p>3=paused</p> <p>4=wash cycle</p> <p>5=error generation</p> <p>9=waiting</p> <p>b : current sample number</p> <p>c : current injection number</p> <p>d : time remaining on interval</p>
AS,Q3	Request for parameter values	Autosampler responds with the following codes to indicate current status
		<p><u>AS,Q3,a,bbb,ccc,d</u></p> <p>a : number of wash cycles</p> <p>b : sample injection volume in $\mu\ell$</p> <p>c : interval value in 0.1 minutes</p> <p>d : number of repeated injections</p>

■ Autosampler → PC

Command from Autosampler	Description	Notes
AS,OK	Answer OK	operation or setting command received correctly: will perform as requested.
AS,E,aa	Error command	a : 1= X axis error 2= Y axis error 3= Z axis error 4= syringe pump error 5= 6-way valve error 6= 1-2-way valve error
AS,IN,aa,b	Injection command	a : current sample number b : current injection number
AS,F1	END command	Sequence End

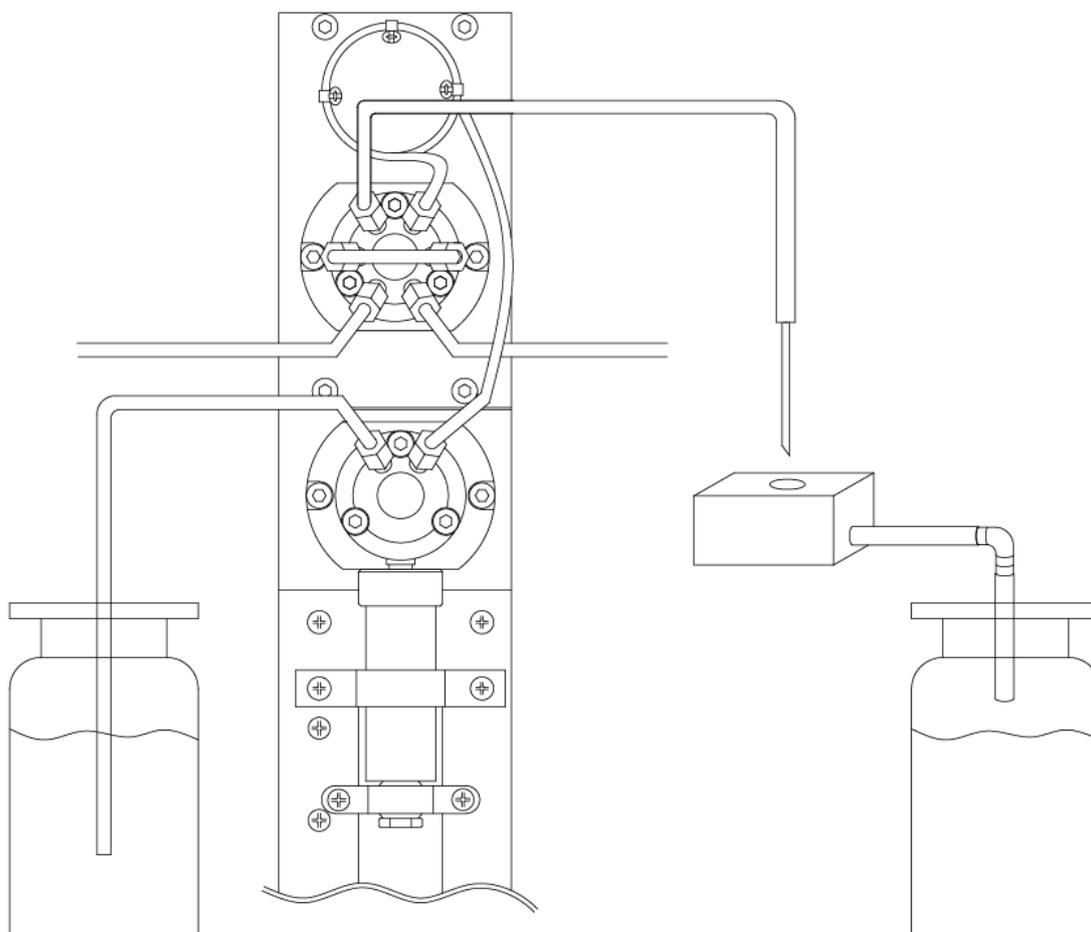
10 Specifications

Volume Measurement	Fixed Loop Injection
Sample Set	Max 50
Injection Repeats	from 1-9 times in each sample tube (8 times at Max when 200uL sample loop is used)
Path Wash	After each analysis, and can be performed at any time
Pressure	Max 400 kgf/cm ² (40 Mpa)
Input Operations	Start Pause CPU Reset Wash
Output Operations	Auto Zero Injection Ready Error
Communication	RS232C
Error Detection	ERROR display, Operation halted, Leakage from the waste liquid holder
Power	AC100~240V 50/60Hz
Dimensions	(H)270×(W)205×(D)420 excluding protuberances
Weight	approx. 13.7kg

11 Principles of Operation

See the diagram below. The unit aspirates sample into the sample loop, and by switching the valve introduces sample into the column. The volume of the sample loop determines the volume injected; the unit comes equipped with a standard $20\mu\text{l}$ loop. In order to fill the sample loop completely and to make sure the loop is washed properly, the first time INJ.VOL is run on each sample tube the amount aspirated is $(\text{set value}) + 20\mu\text{l} + 240\mu\text{l}$. From the 2nd injection on in this sample tube, the amount aspirated is $(\text{set value}) + 20\mu\text{l}$. When $200\mu\text{l}$ is set up on INJ.VOL, the Autosampler automatically limit injection number at 8 times as maximum.

Standard Configuration



12 Advanced Operation

AS-11 Parameter Setting Input Mode

This section explains how to set the special parameters of the autosampler. There are 2 special parameters:

- ① Injection speed
- ② Number of needle washes

The special parameter mode starts with holding down the SET key and turn on the power switch. Parameters ① and ② above can be set-up at the condition.

※ Parameters, once set, are automatically saved. Powering off the autosampler does not erase the current settings: when power is switched on again, the previous parameters will be ready to run again.

① Injection speed
Parameter 1:1 (Regular speed) The initial set-up condition with regular injection speed gives accurate CV values with saving sample consumption. ※This is the default set-up mode at the shipping condition.
Parameter 1:0 (High speed) This effects time reduction for analysis. ※There is loss at sample consumption. The first time INJ.VOL is run on each sample tube the amount aspirated is (set value) + 3 times of the set value + 480 μ l. From the 2 nd injection on in this sample tube, the amount aspirated is (set value) + 3 times of the set value.
② Number of needle washes
This sets the number of needle washes to perform between sample injections. Press the SET key until the WASH LED lights on the display panel. Use the UP and DOWN keys to select the number of washes from 1 – 9 times.

Indication of operating number

There are 2 modes to indicate the number of times which the valve was operated on the display. Hold either UP or DOWN key down and switch the power on, and the operating number mode starts.

Parameters:

- ① When the 6-position valve is in operation
Hold down the UP key and switch the power on.
- ② When the 1 to 2-position valve is in operation
Hold down the DOWN key and switch the power on.

Note: the indication of number starts 1 at 100 times of back and forth operation, and counts each 100 times of operation. 1 or 10 unit would not be indicated on the display.

To reset the number, hold down the ENTER key for 2 seconds.

This mode activates if RS232C is connected.

MEMO

MEMO

13 Product Warranty

Product Warranty

Thank you for purchasing this FLOM product.

FLOM Corporation guarantees the performance of this product for one (1) year.

FLOM Corporation will assume responsibility for covering the costs of repair and/or replacement for any defect in, or damage to, the unit, occurring within this period, when such defect or damage can be shown to be the responsibility of FLOM. However, FLOM Corporation will assume no responsibility for defects or damage due to, or substantially similar to, the following circumstances or conditions:

- 1) operating the unit not in accordance with the instructions given in the operating manual under section 10, Operating Instructions;
- 2) mistakes in operation;
- 3) repairs or reconditioning not done by FLOM;
- 4) earthquakes, fire, catastrophes or other acts of God;
- 5) all defects or damage resulting from causes not inherent in the unit;
- 6) high temperature, high humidity, extremely low temperature, corrosive gas, constant high vibration and other factors produced by extreme environments
- 7) replacement of consumables and similar parts.

Filling out the information below is required to activate the warranty. If the required information is missing the warranty may be null and void.

Model _____

Serial Number _____

Purchase Date: _____

Dealer: _____

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