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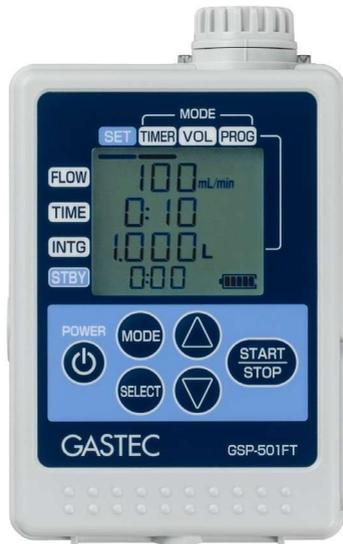
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Instruction manual

Automatic Air Sampling Pump

GSP-501FT



Important Notices

Please read this manual thoroughly before using this product.
Keep this manual with this product.

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IM23GSP501FTE2

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1. Introduction

Be sure to read the manual before using the product.

Thank you for purchasing our Automatic Air Sampling Pump GSP-501FT.

Please read and understand the manual completely before using this sampling pump.

Also, after reading, keep the manual in a place where it can be referred to at any time.

About this manual

- Do not use this product until you understand the manual completely.
- When lending or giving this product to a third party, be sure to hand over the manual with this product.
- If the manual is lost or damaged, contact Gastec or your Gastec representative promptly.
- This manual contains "2. For Safe Operations" to ensure safe operation. Be sure to read this section before using this product.

Copyright Notice

- The copyright of this document is owned by Gastec Corporation. Therefore, unauthorized reproduction or duplication in whole or in part is strictly prohibited.

2. For Safe Operations

- To use this product properly, be sure to observe the following precautions. The precautions are critical for safety.
- This product should be used by specialists with knowledge of environmental measurements.
- This product is an automatic air sampling pump. Do not use the product for purposes other than air sampling of various Gastec gas detector tubes, sorbent tubes, etc.

Gastec Corporation shall not take responsibility for any accidents that occur in situations that are contrary to the above items.

- The precautions in this manual are classified by the following indications according to the magnitude of the danger or damage and the degree of the imminence.
- The shape, size, and position of the figures and illustrations may be different from the actual product.
- Symbol marks with the following definitions are used to ensure proper and safe use of the product.

 Warning	This means that death or serious bodily injuries may result if not observed.
 Caution	This means that minor or moderate bodily injuries may result if not observed.
 Note	This means operational tips for proper use of the product to prevent functional failures.

Warning

- This product is NOT approved as explosion-proof. Do not use this product in hazardous locations.

Note

- Ensure to perform an inspection before use to ensure that the product operates properly.
- Avoid water entering in air routing. The suction of water may damage the sampling train (air pump, flow sensor, etc.).
- Do not block the air outlet port. Flow resistance may cause errors in the product flow rate and integrated volume.
- Do not use this product in high temperatures. Malfunction or mechanical failure may result.
- This product is not waterproof. Avoid using this product where it may be exposed to water. Mechanical failure may result.
- Dropping or other significant impacts may cause mechanical failure.
- Do not use electromagnetic wave generation devices such as professional radios and amateur radios within 30cm from this product. If electromagnetic wave generation devices are used near this product, errors may occur in the measured flow rate.
- Do not disassemble or modify the product. The safety and quality of the product cannot be guaranteed.
- Be sure to turn off the power before replacing the battery. Mechanical failure may result.
- Do not store the product where it may be exposed to direct sunlight.
- Do not store the product where the temperature is above 50°C (122°F) or below -10°C (14°F).
- Do not store the product in an extremely dry (humidity 10% or less) or high humidity (90% or higher).
- Do not store the product where it may be exposed to water, steam, sand, or dust.
- If the product will not be used for a long time (one month or more), remove the batteries. If the product is stored with batteries installed may cause battery drain and mechanical failure due to battery leakage.

3. List of Components

When opening the package please check that all the following items are present.



	Item	Product code	Quantity
Ⓒ	Model GSP-501FT Unit		1
Ⓒ	Detector Tube Adapter	GSP300-13	1
Ⓒ	AA Alkaline Batteries (Panasonic Corporation LR06)		2
④	Dust Filter (5 pcs.)		1
⑤	Tube Tip Holder	722	1
	Instruction Manual		1

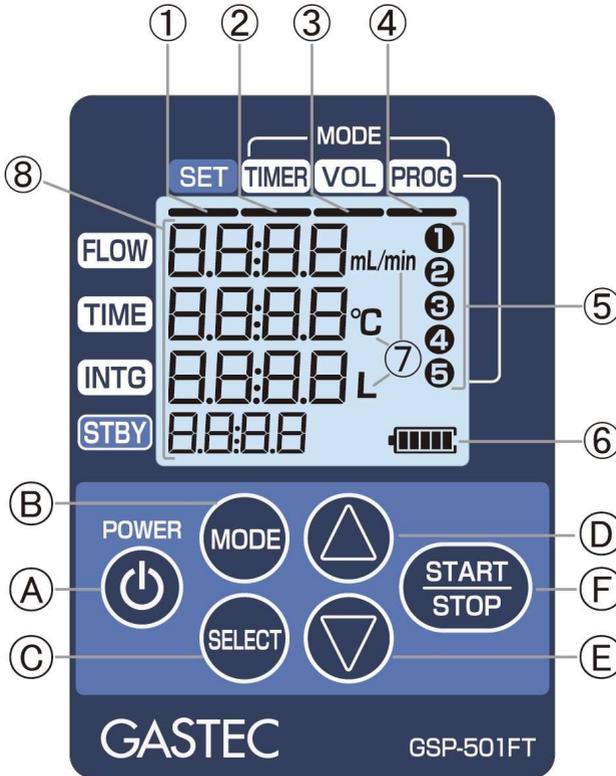
4. Design and Basic Features

4.1 Names and Functions



③	Suction Inlet	Connect the detector tube or the sorbent tube using the attached detector tube adapter or tubing. (The outer diameter of the inlet is $\Phi 6\text{mm}$)
③	LCD	Displays the remaining battery power, each measured value, each set value, current operation mode, previous records, error information, etc. In normal mode, the backlight turns on for 10 seconds when any of the buttons is operated. In calibration mode, the backlight stays on.
③	Keypad	The pump is operated using six buttons. For details, see "4.2 Description of the LCD and Operating Buttons".
④	Status Lamp	The light colour and flashing indicate the operation status.
⑤	Battery Chamber/ Battery Chamber Cover	Set two AA alkaline batteries or AA nickel-metal hydride batteries in the battery chamber. The battery chamber cover is opened and closed by sliding it while pressing it with your finger when replacing the batteries.
⑥	Air Outlet Port	This is the outlet of the sampled air. Connect the tubing when you want to guide the sampled gas away from this pump. (The outer diameter: $\Phi 6.4\text{mm}$)
③	Screw Hole for Attaching a Tripod	Screw hole for fixing this pump on a tripod.

4.2 Description of the LCD and Operating Buttons



• LCD

Ⓒ	Setting	The bar turns on while each set value is displayed or set.
Ⓒ	Timer	The bar turns on when setting or operating in timer mode.
Ⓒ	Constant volume	The bar turns on when setting or operating in Volume Mode.
④	Program	The bar turns on when setting or operating in program mode.
⑤	Program Number	The number of the saved program turns on when setting or operating in the program mode. It flashes while the program is being selected.
⑥	Battery Level Indicator (AA Batteries)	The remaining battery power in the battery chamber is displayed in five levels. Refer to "5.1.3 Relationship between Battery Level Indicator and Sampling Time" for remaining battery power.
Ⓒ	Unit	The unit is displayed according to the displayed values.
⑧	Set Value/ Measured value	Each set value is displayed during setting, and each measured value is displayed during operation. The value being set blinks during setting. "FLOW": Display of set instantaneous flow rate/measured instantaneous flow rate "TIME": Display of set sampling time/measured sampling time

<p>"INTG": Display of set integrated volume /measured integrated volume "STBY": Display of set standby time/measured standby time</p>
--

● **Operating Buttons**

A	Power Button	Press this button to turn on the power. To turn off the power, press and hold this button for 2 seconds or longer.
B	Mode Button	Switches mode to the Timer Mode, Volume Mode, Program Mode, or Previous Sampling Results.
C	Select Button	Switches the items to be changed (instantaneous flow rate, sampling time, integrated volume, and standby time) in order. Press this button during pump operation to check the current sampling operation setting.
D	Increase Button	Press this button to increase the setting value. (In the program mode, the registration number is switched).
E	Decrease Button	Press this button to decrease the setting value. (In the program mode, the registration number is switched).
F	START/STOP Button	Press this button to start and stop (forced termination) the sampling operation.

5. Before use

5.1 Prepare the Power Supply

•5.1.1 Power Supply

The following batteries can be used for GSP-501FT:

Two AA alkaline batteries (accessories)

or

Two AA nickel-metal hydride batteries

△ Note

- The AA nickel-metal hydride batteries do not come with this product.
- This product does not charge the AA nickel-metal hydride batteries.
- It is recommended to use AA nickel-metal hydride batteries when the flow rate is high and the suction load is high, or when the product is used at low temperatures.

•5.1.2 How to Install and Replace AA Batteries

△ Note

- Ensure to turn off the power before installing or removing the batteries. Mechanical failure may result.

- © Slide the battery chamber cover toward the rear side while pressing it, and then open the battery chamber cover.



- © [When replacing the batteries]
Tilt the body to remove the two AA batteries from the battery chamber.

- ③ Insert the AA batteries according to the “+” and “-” indications engraved on the back of the battery cover.



- ④ Close the battery chamber cover, and slide it toward the front side while pressing it until the cover is locked.
※After locked, confirm if the battery chamber cover is locked by sliding it toward the back side without pressing it.



△ Note

- Note that the power will not be turned on if the battery is installed in the wrong direction.
- Check if the battery cover is locked before use. The cover may open due to impact or vibration, which may interfere with energization and cause unexpected power failure.
- If the electrode is dirty, wipe it with a dry cloth before use. Otherwise, this may interfere with energization, and the power may not be turned on.

●5.1.3 Relationship between Battery Level Indicator and Sampling Time

The battery level indicator on GSP-501FT screen indicates the remaining battery power in five levels. The indication of the battery level indicator and the sampling time are shown below.

Table 1. Relationship between battery level indicator and the sampling time (2 AA alkaline batteries(Panasonic Corporation LR06)) [typical example]

Sampling condition		Sampling time (hours)				
Flow rate (mL/min)	Load (kPa)					
50	30 ※1	14	11	8	5	2
100	1.5	28	19	13	7	3
100	20 ※2	15	11	9	5	2
200	2	23	16	12	6	3
500	10	5	4	3	2	1

※1:An example of using an Ethylene oxide Detector Tube 163TP

※2:An example of using a Formaldehyde Detector tube 91TP

Table 2. Relationship between battery level indicator and the sampling time (2 AA nickel-metal hydride batteries) [typical example]

Sampling condition		Sampling time (hours)				
Flow rate (mL/min)	Load (kPa)					
50	30 ※1	15	13	5	1	0.3
100	1.5	29	17	7	2	0.5
100	20 ※2	17	14	5	2	0.3
200	2	23	20	10	4	1.2
500	10	6.4	6	5	1	0.3

△ Note

- The values in Tables 1 & 2 are typical examples at a temperature of 25°C and atmospheric pressure of 1 atm. Please note that these values are not guaranteed values. In low-temperature environments, the sampling time may be shorter than the above tables.
- The values in Table 2 are for reference only and vary depending on the manufacturer and model number of the AA nickel-metal hydride batteries.
- When the battery indicator is "", the battery is running out. Replace the batteries.
- If the battery runs out during the sampling operation, the integrated volume and sample time immediately before the pump stops are recorded as the previous sampling result.

5.2 Flow Rate Conversion Temperature

This pump displays the flow rate, adjusts the pump output, and calculates the integrated volume by converting it to a volume flow at 20°C or 25°C, regardless of the environmental temperature, as long as it is within the operating temperature range. The set flow rate conversion temperature is displayed when starting up the pump (factory default conversion temperature: 25°C).

<How to check the flow rate conversion temperature>

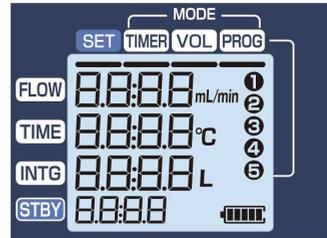
Press the "Power Button" to turn on the power.
When activated, the followings are displayed in order.

©All segments light up (for 2 seconds)

©**Flow Rate Conversion Temperature (for 2 seconds)**

©Previous Sampling Results

※Check at the timing of © above.



(When the flow rate conversion temperature is 25°C)

Conversion temperature is selectable between 20°C and 25°C.

To change the conversion temperature, refer to "7.3 Setting of Flow Rate Conversion Temperature".

6. Settings and Operations

6.1 Connect Sampling media, tubing, and the pump

Connect the sampling media or Gastec detector tube to the suction inlet using the supplied detector tube adapter or another tubing before the sampling operation. Connect a tubing prepared by the user to the air outlet to guide the exhaust away from the pump when necessary.

△ Note

- Before connecting the detector tube adapter or tubing, check that there is no damage or dust on the inner wall. Leakage may occur, which may interfere with accurate sampling.
- If the suction load is suddenly reduced, the flow rate may not stabilize in some cases (such as a continuous flow rate variation of 20% or more of the set flow rate). Make sure that the suction load does not fluctuate suddenly. If the flow rate becomes unstable, stop sampling once and restart.
- Do not block the air outlet port. Flow resistance may cause errors in the instantaneous flow rate and integrated volume.
- The outflow rate from the air outlet port is out of the guaranteed flow rate accuracy.

Also, be careful of the following items regarding placing the pump.

△ Note

- Select a place with little airflow and little fluctuation of atmospheric pressure and install the pump with the inclination of the left and right sides within $\pm 10^\circ$. If the left or right inclination is large, the measured flow rate error becomes large.
- Place the pump in a stable position. Shock or vibration can cause errors in flow rate measurements.
- When the suction load is heavy, the pump may move due to vibration depending on the conditions. When placing the pump on a table, etc., take measures to prevent from dropping.
- When used with the tripod, take measures to prevent the tripod from falling over. Otherwise, mechanical failure may result due to a fall.
- For personal sampling purposes, use the dedicated belt loop pump holder (optional product).

6.2 Sampling Mode and Setting Ranges

There are three sampling modes: Timer mode, Volume Mode, and Program mode.

Timer mode	<p>After the set time has elapsed, the sampling operation automatically stops. Select this mode to prioritize the ending time.</p> <p>[Items to be set and selectable range]</p> <ul style="list-style-type: none"> ● Flow rate: 50~500 mL/min ● Sampling time: 1 min. to 30 hr. <p>※ Select "Cont" if you wish to sample for a time that exceeds the selectable range. Stop manually or continue to sample until the battery runs out.</p> <ul style="list-style-type: none"> ● Standby time: 0 min to 24 h
Volume Mode	<p>When the integrated volume reaches the set value, the sampling operation automatically stops. Select this mode to prioritize the integrated volume.</p> <p>[Items to be set and selectable range]</p> <ul style="list-style-type: none"> ● Flow rate: 10~500 mL/min <p>※ When set to 10~49 mL/min, the pump runs intermittently with the flow rate of 50mL/min. (See "6.12 Intermittent Operation" for details.)</p> <ul style="list-style-type: none"> ● Volume : 0.010~900.0 L <p>※ The range where the sampling time is within 30 hours</p> <p>※ Select "Cont" if you wish to sample with the integrated volume that exceeds the selectable range. Stop manually or continue to sample until the battery runs out.</p> <ul style="list-style-type: none"> ● Standby time: 0 min to 24 h
Program mode	<p>The sampling setting (Timer mode or Volume Mode) is saved in advance, and the setting is read out to perform sampling. This is useful when using the same sampling setting repeatedly. The maximum number of sampling settings that can be stored is 5.</p>

※ Sampling can be performed with the same setting as the previous one by starting the pump while "Previous Sampling Setting" or "Previous Sampling Result" are displayed.

△ Note

<ul style="list-style-type: none"> ➤ The operation is the same when "Cont" is set for the sampling time in the Timer mode and when "Cont" is set for the integration flow rate in the Volume Mode. □ Even if the flow rate can be set, the actual flow rate may not reach the set flow rate depending on the load of the sampling media. Refer to "Constant flow rate operating range" in "10. Specifications" for the maxim load for each set flow rate. □ Even if the sampling time and integrated volume can be set, depending on the remaining battery power, the battery may run out and stop during sampling. Refer to "5.1.3 Relationship between Battery Level Indicator and Sampling Time" for details. ➤ When the sampling time is less than 5 minutes, the effect of the error from the start of sampling till the flow becomes stable is large. Therefore, the measured integrated volume in the case of the timer mode and the measured sampling time in the case of the Volume Mode may deviate from the range of $\pm 5\%$ of each calculated value.
--

6.3 Timer Mode

- © When the pump is turned on by pressing the "POWER Button", the flow rate conversion temperature is displayed for 2 seconds, and then the sampling results in the previous operation are displayed.

※ When turned on firstly after purchase, the followings are displayed

Mode: Timer
FLOW: ---
TIME: 0:00
INTG: 0.000L
STBY: ---



Previous sampling results (above is when purchased)

- © Press "MODE Button" to select the Timer mode.



- © Check that the set value of "Instantaneous flow rate" is blinking, and set the desired instantaneous flow rate with the "Increase Button" and "Decrease Button". Press and hold to make fast forward.

[Setting range]

50~500mL/min

※ The setting increment is 1 mL/min.



(Example) Flow rate: 100 mL/min



- ④ To set the sampling time, press the "SELECT Button", to make the "Time" setting value blink, and set the desired sampling time with the "INCREASE Button" and "DECREASE Button". Press and hold to make fast forward.

[setting range] 0:01 to 30:00 (1 min to 30 h)

※ The setting increment is one-minute.

※ When the instantaneous flow rate and sampling time are set, the integrated volume is automatically calculated, and the value is displayed at the "Integrated volume" position.

※ Set to "Cont" for continuous sampling.

Cont Setting procedure

When 0:01 is displayed, press "DECREASE Button" once.

When 30:00 is displayed, press "INCREASE Button" once.

(When "Time" is set to "Cont", "Cont" is also displayed at the "Integrated volume" position)



(Example) Sampling time: 10 min.



Press

or

- ⑤ To set the standby time, press "SELECT Button" to make the "Standby" setting value blink, then set the desired standby time with the "INCREASE Button" and "DECREASE Button". Press and hold to make fast forward.

[setting range] 0:00 to 24:00 (0 min to 24 h)

※ The setting increment is one-minute.



(Example) Standby time: 5 min.



Press

or

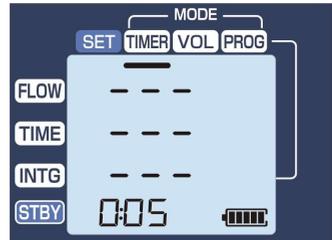
- ⑥ Check that the instantaneous flow rate, sampling time, integrated volume, and standby time are set correctly.

- © When the sampling is ready, press and hold the "START/STOP Button". The bar at the "SET" segment disappears and the status lamp flashes in green, and the sampling operation starts.

※If the standby time is set, the followings are displayed,
 "FLOW": ---
 "TIME": ---
 "INTG": ---
 and the sampling operation starts when the remaining standby time becomes "0:00".



Pump running

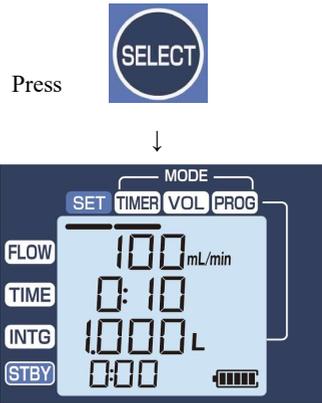


On standby

- ⑧ After the set sampling time has elapsed, the sampling operation is completed and the sampling result is displayed.



- ⑧ The screen is switched by pressing the "SELECT Button" and the settings (mode, instantaneous flow rate, sampling time, integrated volume, and standby time) for the completed sampling operation are displayed.



- ⑩ Press and hold the "POWER Button" to turn off the power.



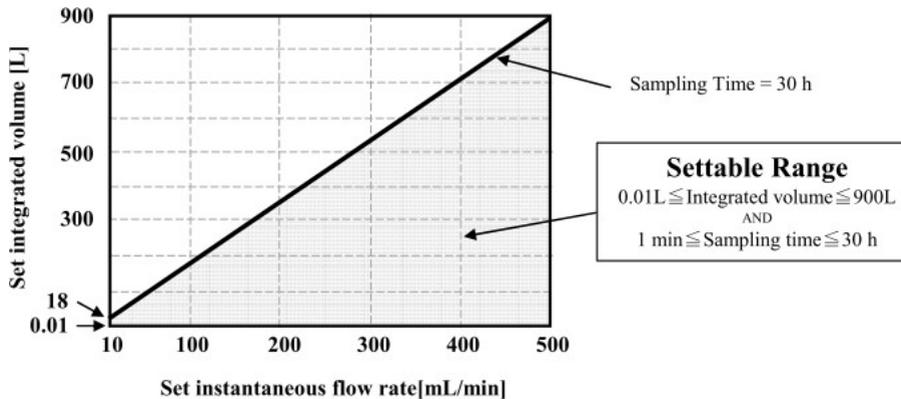
△ Note

- To repeat sampling with the same settings, press and hold the "Start/Stop Button" in the state described in ⑧ and ⑩ above to start the sampling operation.

6.4 Volume Mode

△ Note

- The integrated volume rate cannot be set to beyond 30 hours of sampling. See the settable range in the graph below.



Example)

When the instantaneous flow rate is set to 10 mL/min (intermittent run)

Min: 0.01L Max: 18 L (=10 mL/min x 30 h)

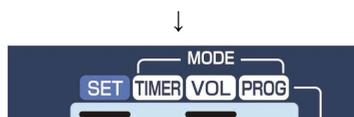
When the instantaneous flow rate is set to 500 mL/min
 Min: 0.01L Max: 900 L (=500mL/min×30 h)

- © When the pump is turned on by pressing the "POWER Button", the flow rate conversion temperature is displayed for 2 seconds, and then the sampling results in the previous operation are displayed.



Previous sampling result

- © Press "MODE Button" to select the Volume Mode.



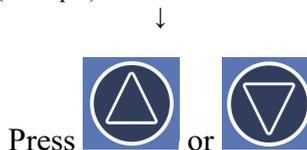
- © Check that the set value of "Instantaneous flow rate" is blinking, and set the desired instantaneous flow rate with the "INCREASE Button" and "DECREASE Button". Press and hold to make fast forward.

[Setting range]
 10~500mL/min

- ※ The setting increment is 1mL/min.
- ※ When the instantaneous flow rate is set at 10 to 49mL/min, the pump runs intermittently with the flow rate of 50mL/min. Refer to "6.12 Intermittent Operation" for details.



(Example) Flow rate: 100 mL/min



- ④ To set the integrated volume, press the "SELECT Button" to make the "Integrated volume" setting value blink, and set the desired integrated volume with the "INCREASE Button" and "DECREASE Button". Press and hold to make fast forward.

[Setting range]

0.010~900L

Max.: 30 hours × Instantaneous flow setting value

※Setting exceeding 900 L is not allowed.

※Setting increments

0.010~9.990L:0.01L

10.00~99.90L:0.1L

100.0~900.0L:1L

※When the instantaneous flow and the integrated volume are set, the sampling time is automatically calculated and the value is displayed at the "Time" position.

※Set to "Cont" for continuous sampling.

Cont Setting procedure

When 0.010L is displayed, press "DECREASE Button" once.

When 900.0 is displayed, press "INCREASE Button" once.

(When "Integrated volume" is set to "Cont", "Cont" is also displayed at the "Time" position)

- ⑤ To set the standby time, press "SELECT Button" to make the "Standby" setting value blink, and set the desired standby time with the "INCREASE Button" and "DECREASE Button". Press and hold to make fast forward.

[setting range] 0:00 to 24:00 (0 min to 24 h)

※The setting increment is one-minute.



Press



(Example) Integrated volume: 1 L



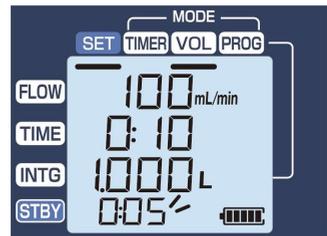
Press



or



Press



(Example) Standby time: 5 min



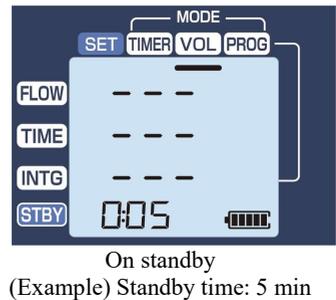
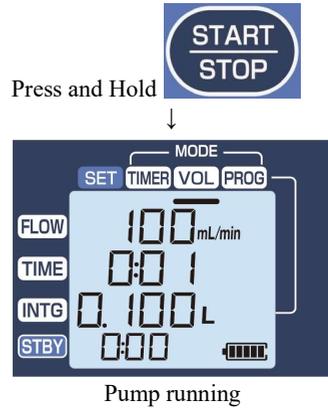
Press



or

- ⑥ Check that the instantaneous flow rate, sampling time, integrated volume, and standby time are set correctly.
- ⑦ When the sampling is ready, press and hold the "START/STOP Button". The status lamp flashes in green, and the sampling operation starts.

※If the standby time is set, the followings are displayed,
 "FLOW": ---
 "TIME": ---
 "INTG": ---
 and the sampling operation starts when the remaining standby time becomes "0:00".



- ⑧ When the set integrated volume is reached, the sampling operation is completed and the sampling result is displayed.



- ⑨ The screen is switched by pressing the "SELECT Button" and the settings (mode, instantaneous flow rate, sampling time, integrated volume, and standby time) for the finished sampling operation are displayed.





- ⑩ Press and hold the "POWER Button" to turn off the power.



Press and Hold

△ Note

- To perform sampling with the same settings, press and hold the "Start/Stop Button" in the state described in ⑧ and ⑨ above to start the sampling operation.

6.5 Program Mode

● 6.5.1 How to Save and Change the Program

- © When the pump is turned on by pressing the "POWER Button", the flow rate conversion temperature is displayed for 2 seconds, and then the sampling results in the previous operation are displayed.

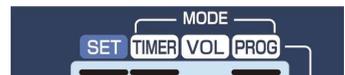


Previous sampling results

- © Press "MODE Button" to select the Program mode.



Press three times

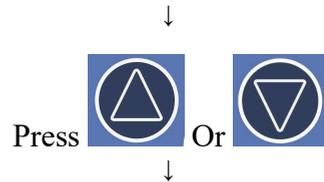


- ③ Check that the program number **1** is blinking, and then select the program number to be changed (the number blinks) with the "INCREASE Button" and "DECREASE Button".

※Program numbers are from **1** to **5**.

※If the program is not saved, the following settings are registered by default.

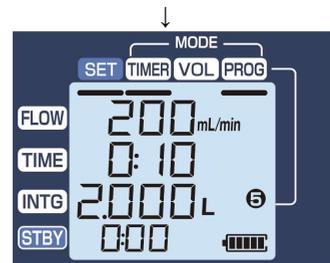
Mode: Timer
 FLOW: 100 mL/min
 TIME: 0:10
 INTG: 1.000L
 STBY: 0:00



(Example) Program registration number **5**

- ④ When the "SELECT Button" is pressed and held, the program number is switched from blinking to a steady light, allowing the program to be set.

For program settings, please refer to ③ to ⑤ of "6.3 Timer Mode" and ③ to ⑤ of "6.4 Volume Mode".



(Example) Timer mode
 Flow rate: 200 mL/min
 Sampling time: 10 min

- ⑤ Confirm that the mode, the instantaneous flow rate, sampling time, integrated volume, and standby time are set correctly, and press and hold the "SELECT Button" to complete registration and



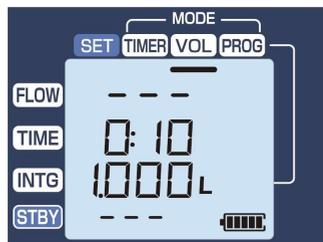
change.

※When the settings are saving are completed, the selected program number will blink, allowing sampling in the program mode.



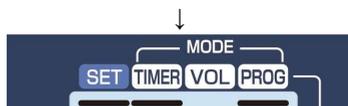
•6.5.2 Sampling by Program Mode

© When the pump is turned on by pressing the "POWER Button", the flow rate conversion temperature is displayed for 2 seconds, and then the sampling results in the previous operation are displayed.



Previous sampling results

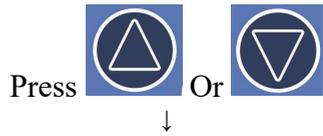
© Press "MODE Button" to select the Program mode.



© Check that the program number ① is blinking, and then select the program number to be changed (the number blinks) with the "INCREASE Button" and "DECREASE Button".

※Program numbers are from ① to ⑤.





(Example) Timer mode
Flow rate: 200 mL/min
Sampling time: 10 min

④ Confirm that the mode, the instantaneous flow rate, sampling time, integrated volume, and standby time are set correctly for the selected program mode.

⑤ When the sampling is ready, press and hold the "START/STOP Button". The status lamp flashes in green, and the sampling operation starts.

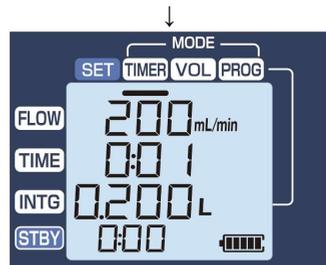
※If the standby time is set, the followings are displayed,

"FLOW": ---

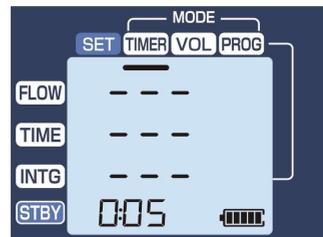
"TIME": ---

"INTG":---

and the sampling operation starts when the remaining standby time becomes "0:00".



Pump running



On standby
(Example) Standby time: 5 min

- ⑥ When the set sampling stop condition is reached, the sampling operation stops and the sampling result is displayed.



- ⑦ Press the "SELECT Button" to switch the screen and display the selected program number and the setting of the saved setting (mode, instantaneous flow rate, sampling time, integrated volume, and standby time).



Press



(Example) Timer mode
Flow rate: 200 mL/min
Time: 10 min

- ⑧ Press and hold the "POWER Button" to turn off the power.



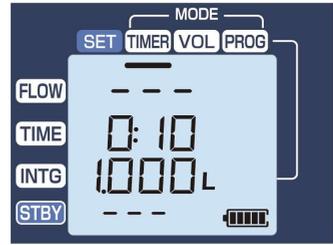
Press and Hold

△ Note

- To perform sampling with the same settings, press and hold the "Start/Stop Button" in the state described in ⑥ and ⑦ above to start the sampling operation.

6.6 Repeat Sampling with the Previous Sampling Setting

- © When the pump is turned on by pressing the "POWER Button", the flow rate conversion temperature is displayed for 2 seconds, and then the sampling results in the previous operation are displayed.



Previous sampling results

- © Press "SELECT Button" to display the mode, program registration number [In case of program mode], set instantaneous flow rate, set sampling time, calculated integrated volume, and set value of standby time at the previous sampling.



Previous sampling setting

- © Check that the mode, instantaneous flow rate, sampling time, integrated volume, and standby time are set correctly.

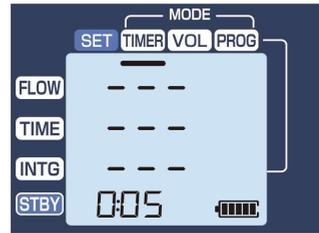
- ④ When the sampling is ready, press and hold the "START/STOP Button". The status lamp flashes in green, and the sampling operation starts.



Pump running

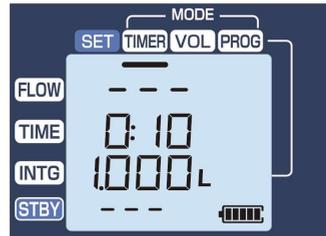
※If the standby time is set, the following are displayed,
 "FLOW": ---
 "TIME": ---
 "INTG":---

and the sampling operation starts when the remaining standby time becomes "0:00".



On standby
(Example) Standby time: 5 min

- ⑤ When the set sampling stop condition is reached, the sampling operation stops and the sampling result is displayed.



- ⑥ Press the "SELECT Button" to switch the screen and display the setting of the sampling performed (mode, program number [In case of program mode], instantaneous flow rate, sampling time, integrated volume, and standby time).



- ③ Press and hold the "POWER Button" to turn off the power.



6.7 Display of Sampling Information during Sampling Operation

For sampling information during sampling operation, please check the values on LCD and the status lamp.

• Values on LCD

The instantaneous flow rate and the integrated volume are displayed by rounding off to the smallest digit displayed.

The sampling time is displayed by rounding down less than 1 minute.

The standby time is displayed by rounding up less than 1 minute.

• Status Lamp

The status lamp flashes in green when standby and sampling operations are performed normally. The status lamp flashes in red to notify a warning or error. See "9. Troubleshooting" for details of the warnings and errors.

6.8 Display of Setting Information during Sampling Operation

Press the "SELECT Button" during standby or sampling operations to switch the screen and check the current sampling operation setting (mode, program registration number [in case of program mode], instantaneous flow rate, sampling time, integrated volume, and standby time).

6.9 Stop the Sampling Operation

The sampling operation can be stopped by pressing and holding the "START/STOP Button" during standby or sampling operation. At this time, the sampling result (sampling time, integrated volume) at the time is displayed.

△ Note

- The power cannot be turned off during standby or sampling operation. Press and hold the "START/STOP Button" to stop the operation, and then press and hold the "POWER Button" to turn off the power.

6.10 Auto Power Off

Auto Power OFF function is active until sampling is executed after the power is turned on. The power is turned off after one hour of inactivity. When the sampling operation is performed, the Auto Power OFF is cancelled and the power is not turned off.

△ Note

- In the calibration mode, if no operation is performed for 10 minutes, the calibration mode is automatically cancelled and the power is turned off.

6.11 Clogging

If the sampling flow rate is smaller than the set value, the pump output will increase. If the pump runs at maximum output but the instantaneous flow rate is less than 5mL/min for 1 minute, the pump determines a clog is found and stops the sampling. In this case, the error message "STUF" is displayed on the screen.

△ Note

- If the pump is used in a low-temperature environment or when the remaining battery level is low, the power may be turned off even before the sampling is stopped due to clogging. The sampling results just before sampling is stopped are still recorded.

6.12 Intermittent Operation

When the instantaneous flow rate is set to 10 - 49mL/min in the Volume Mode, the intermittent operation is performed by sampling at an instantaneous flow rate of 50mL/min.

●About intermittent operation●

The operation mode in which the pump is repeatedly runs and stops as the following cycles so that the integrated volume becomes the value calculated by multiplying the set instantaneous flow rate by the elapsed time every minute is called "intermittent operation".

ⒸPump starts: The pump runs and the instantaneous flow rate reaches 50mL/min (section A in the figure below).

(until the integrated volume reaches the value calculated by multiplying the set instantaneous flow rate by elapsed time)

ⒸPump stops: The pump stops, only the status lamp flashes (section B in the figure below)

ⒸThereafter, repeat Ⓒ and Ⓒ until the set integrated volume is reached.

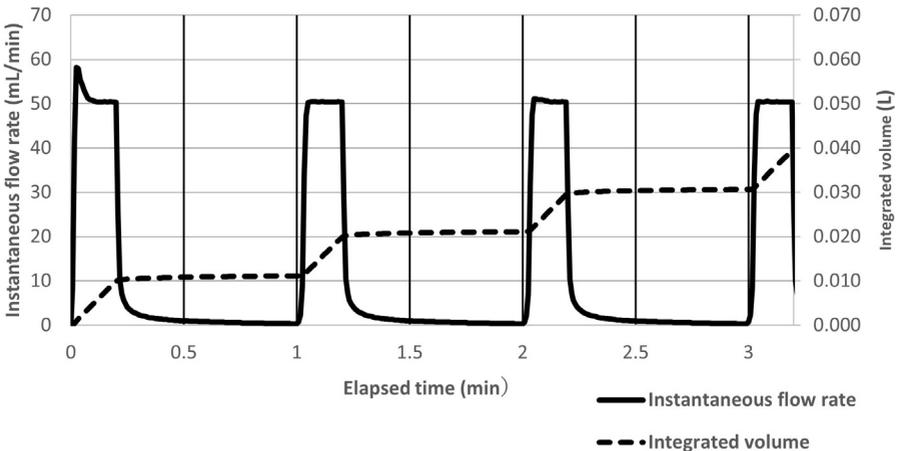


Figure: Example of intermittent operation (set instantaneous flow rate: 10 mL/min, set integrated volume: 0.040L)

△ Note

- If there is a sudden change in the gas concentration or if sampling is performed for a short period of time, the error of the sampling result may be large.

7. Flow Calibration

7.1 About Flow Calibration

This pump is shipped calibrated. Perform flow calibration regularly (about once a month) to ensure the specified accuracy. Calibration is possible to guarantee accuracy in the range of flow rate 50 to 500mL/min. The actual flow rate measurement error of this pump is the value obtained by adding the error of the flow meter for calibration (hereafter referred to as a calibrator) to the following accuracy.

Flow rate: 50-500mL/min Accuracy $\pm 5\%RD$

Pay attention to the followings when flow calibration.

△ Note

- Select a place with little airflow and little fluctuation of atmospheric pressure, and install the pump with the inclination of the left and right sides within $\pm 10^\circ$. If the left or right inclination is large, the error of calibration becomes large.
- Calibrate the pump in a stable position. Shock or vibration can cause errors in calibration.
- Use short tubes to connect devices as possible. Shorter tubes make the flow rate stable and calibration error can be reduced.
- Make sure to clear the air outlet port. Flow resistance may cause errors in the instantaneous flow rate and integrated volume.

7.2 Calibration Mode

Use "Calibration Mode" for flow rate calibration.

The calibration mode consists of the following items:

To perform the calibration correctly, perform the flow rate calibration after setting, zero point adjustment, and inspection in the following order.

- 1) Setting of Flow Rate Conversion TemperatureRefer to (7.3)
- 2) Setting the flow rate conversion temperature of the calibratorRefer to (7.4)
- 3) Zero point adjustmentRefer to (7.5)
- 4) Leak checkRefer to (7.6)
- 5) Flow rate calibrationRefer to (7.7)

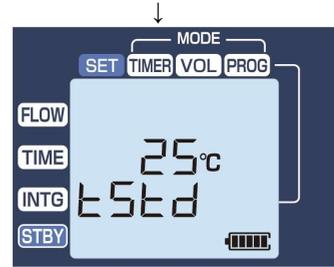
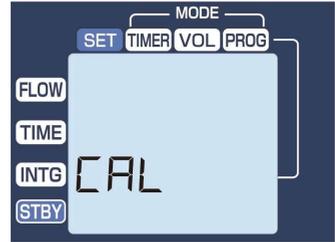
● How to activate calibration mode

- © While pressing the "SELECT Button", press the "POWER Button".



- © After "CAL" is displayed for 2 seconds, "25°C tStd" is displayed. (When the conversion temperature is set to 20°C, "20°C tStd" is displayed.)

This completes the activation of the calibration mode.



(When the flow rate conversion temperature is 25°C)

△ Note

- In the calibration mode, if no operation is performed for 10 minutes, the calibration mode is automatically terminated and the power is turned off.

7.3 Setting of Flow Rate Conversion Temperature

Set the flow rate conversion temperature during sampling operation. Select the desired temperature between 20°C or 25°C (factory default conversion temperature: 25°C). It is not necessary to recalibrate even if the flow rate conversion temperature is changed.

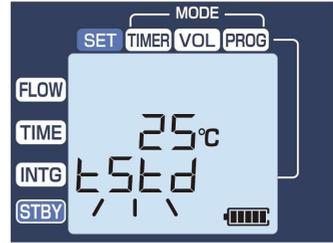
- © (If it is not in the calibration mode), activate the calibration mode and make sure that "25°C tStd" is displayed. (When the conversion temperature is set to 20°C, "20°C tStd" is displayed.)



- © Press "START/STOP Button".



③ Check that "tStd" is blinking.



④ Press the "INCREASE Button" and "DECREASE Button" to select the desired temperature between 20°C and 25°C.



⑤ Press "START/STOP Button" again. If the displayed temperature blinks three times, the setting is completed.



⑥ To make other settings continuously, press "MODE Button" to select the desired item.



[For other settings]



Press

△ Note

- If no operation is performed for 2 minutes while selecting the flow rate conversion temperature (in ③ and ④ above), " " is displayed and the display returns to the state of the item selection in the calibration mode without saving any changes. [To exit the calibration mode]
- Press the "MODE Button" while selecting the flow rate conversion temperature (in ③ and ④ above) to exit the "Setting of Flow Rate Conversion Temperature" without saving any changes. In this case, " " is displayed. Press and Hold 

" "

7.4 Setting of the Flow Rate Conversion Temperature of the Calibrator

Set the conversion temperature of the pump at the time of flow rate calibration within the range of 0 to 40°C (in 1°C steps, Factory setting: 25°C). By using this function, the pump can use the same conversion temperature with the calibrator during calibration.

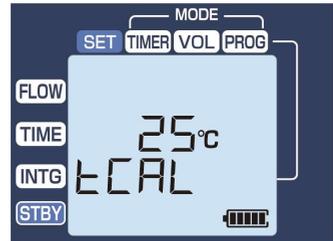
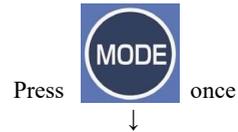
△ Note

- If a calibrator without pressure compensation is used, adjust it to 101.3kPa.

- © (If it is not in the calibration mode), activate the calibration mode and make sure that "25°C tStd" is displayed. (When the conversion temperature is set to 20°C, "20°C tStd" is displayed.)



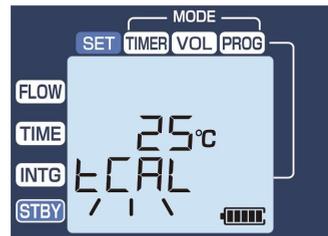
- © Press "MODE Button" once to check that "25°C tCAL" is displayed. (For example, if the conversion temperature is set to 15 °C, "15 °C tCAL" is displayed)



- © Press "START/STOP Button".



- ④ Check that "tCAL" is blinking.



⑤ Press the "INCREASE Button" and "DECREASE Button" to adjust to the conversion temperature of the external calibrator. The temperature setting range is 0 to 40°C.



⑧ Press "START/STOP Button" again. If the displayed temperature blinks three times, the setting is completed.



[For other settings]

③ To make other settings continuously, press "MODE Button" to select the desired item.

If not, press and hold the "POWER Button" to exit the calibration mode. (The power is turned off.)



[To exit the calibration mode]



△ Note

- If no operation is performed for 2 minutes while selecting the flow rate conversion temperature of the calibrator (in ④ and ⑤ above), "  " will be displayed, and the display will return to the state of item selection in the calibration mode without saving any changes.
- Press the "MODE Button" while selecting the flow rate conversion temperature of the calibrator (in ④ and ⑤ above) to exit "Setting of the Flow Rate Conversion Temperature of the Calibrator" without saving any changes. In this case, "  " is displayed.

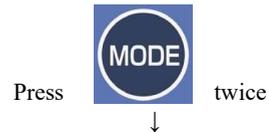
7.5 Zero Point Adjustment

Adjust the zero point of GSP-501FT built-in flowmeter.

- ③ (If it is not in the calibration mode), activate the calibration mode and make sure that "25°C tStd" is displayed. (When the conversion temperature is set to 20°C, "20°C tStd" is displayed.)



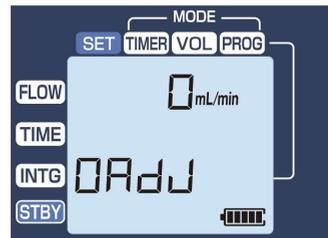
- ③ Press "MODE Button" twice and confirm that "0Adj" is displayed.



- ③ Press "START/STOP Button".



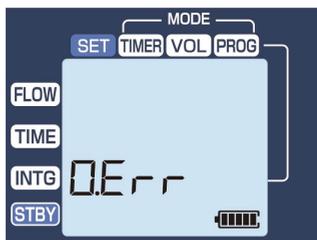
- ④ The display of blinking "0Adj" → Zero point of flow rate prior to calibration → blinking "0mL/min" (Zero point of flow rate after calibration) indicates the completion of zero-point adjustment. If the zero point is 0mL/min after calibration, it is normal. If it does not reach 0 mL/min, recalibration is necessary.



△ Note

If "0.Err" is displayed or if the flow rate does not reach 0mL/min after readjustment, the flow rate sensor or circuit may be defective.

As repairs are required, please refer to "11.1 Repair".



[In an abnormal condition].

- ⑤ To make other settings continuously, press "MODE Button" to select the desired item.

[For other settings]

If not, press and hold the "POWER Button" to exit the calibration mode. (The power is turned off.)



Press

[To exit the calibration mode]

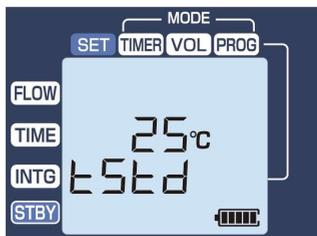


Press and Hold

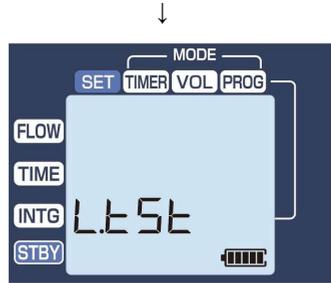
7.6 Leak Check

Ensure that there is no air leakage inside GSP-501FT.

- © (If it is not in the calibration mode), activate the calibration mode and make sure that "25°C tStd" is displayed. (When the conversion temperature is set to 20°C, "20°C tStd" is displayed.)



- ③ Press "MODE Button" three times and check that "L.tSt" is displayed.



- ④ Block the suction port of the suction inlet by one of the following ways.

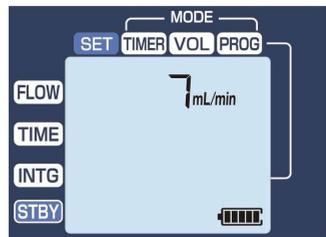
- Press a finger against the suction port.
- Attach the supplied detector tube adapter to the suction inlet, and insert an unused (unbroken) detector tube into the suction port of the adapter.
- Attach a crack-free tubing to the suction inlet and bend the tubing.



- ④ Press the "START/STOP Button" to start the pump.



- ⑤ After "L.tSt" blinks, it turns off. Then the instantaneous flow rate is displayed.



- ⑧ When the value of the instantaneous flow rate stabilizes, press the "START/STOP Button" to test the air leakage.

●Test result●

[Good (no air leakage)]

Criterion value: Instantaneous flow rate
3mL/min or less

The value of instantaneous flow rate blinks three times.

[Error (air leakage)]

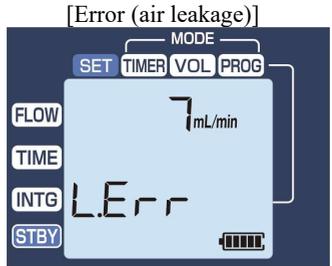
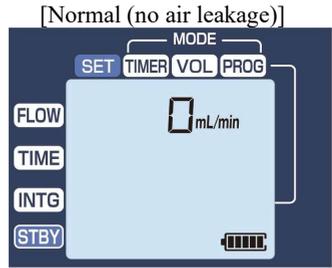
Criterion value: Instantaneous flow rate greater
than 3mL/min

"L.Err" is displayed after blinking.

At the same time, the status lamp flashes in red.

- © To make other settings continuously, press "MODE Button" to select the desired item.

If not, press and hold the "POWER Button" to exit the calibration mode. (The power is turned off.)



[For other settings]



Press

[To exit the calibration mode]



Press and Hold

△ Note

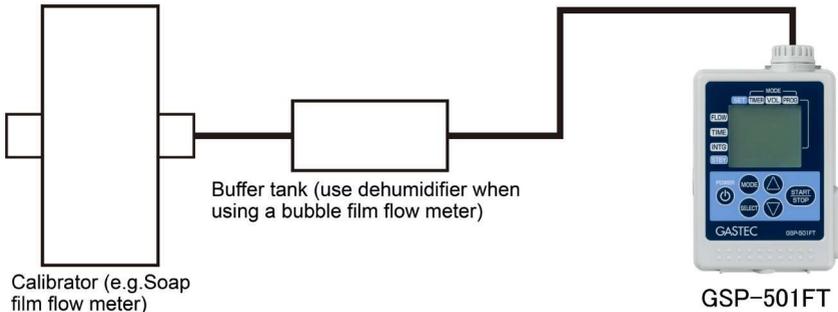
- If the instantaneous flow rate does not fall below 3mL/min during the leak check ("L.Err" is displayed), there is a possibility of air leakage. Please check the items described below.
 - i. Activate the calibration mode, perform the zero point adjustment referring to "7.5 Zero Point Adjustment", and then perform the leak check again.
 - ii. Remove the suction inlet and check that there is no dust, cracks, etc. on the sealing O-ring, and check that there is no dust or scratches on the sealing surface of the inlet referring to "8.1 Replacing the Dust Filter and O-ring". Remove any dust, etc., and check again for air leakage. If there is a scratch on the sealing surface, it must be repaired.
 - iii. If the instantaneous flow rate does not fall below 3mL/min even after confirming i and ii, there is air leakage inside the pump and it must be repaired. Please refer to [11.1 Repair] for repair request.
- During the leak check (⑤ above), if no operation is performed for 10 minutes, "□□□□" is displayed, and the display returns to the state of the item selection in the calibration mode.

- Press the "MODE Button" to exit "Leak Check" without making a judgement during leak check (⑤ above). In this case, "CLF" is displayed.

7.7 Flow Calibration Procedures

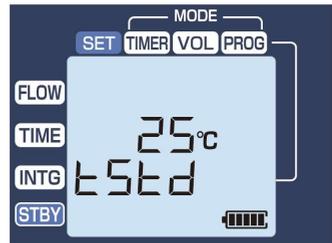
Operate the pump under the condition that the flow rate is around 300mL/min with no load to calibrate the flow rate.

- ③ Connect the calibrator to the pump. See the figure below.

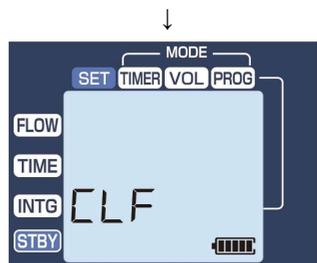


Example of device connections

- ③ (If it is not in the calibration mode), activate the calibration mode and make sure that "25°C tStd" is displayed. (When the conversion temperature is set to 20°C, "20°C tStd" is displayed.)



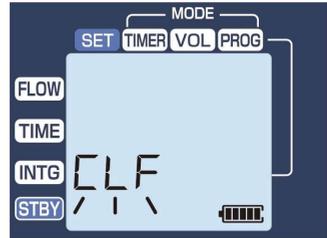
- ③ Press "MODE Button" four times and check that "CLF" is displayed.



- ④ Press "START/STOP Button".



- ⑤ The pump starts. "CLF" blinks for about 10 seconds, and then the instantaneous flow rate which the current calibration value is applied to is displayed.



- ⑧ Wait until the flow rate displayed on GSP-501FT stabilizes, and then measure the flow rate with the calibrator.

- © Set the flow rate value of the pump to the measured value of the calibrator by pressing the "INCREASE Button" and "DECREASE Button". (Pressing the buttons changes the flow rate value of this pump.)



※ When the adjustable range is exceeded, "C.Err" is displayed.

[If the adjustable range is exceeded]



- ⑧ Press "START/STOP Button" again. When the displayed instantaneous flow rate blinks three times, the setting is completed.



- ⑧ To exist the calibration mode, press and hold "POWER Button". (The power is turned off.)



Press and Hold

△ Note

- When "C.Err" is displayed in excess of the adjustable range in the flow rate calibration, check the following items.
 - i. Check if there are any defects in the calibrator.
 - ii. Check for air leakage in the sampling path between the calibrator and GSP-501FT.
 - iii. Refer to "7.6 Leak Check" and check for air leakage inside GSP-501FT .
 - iv. If there are no problems with i~iii, there may be a mechanical failure of the flow sensor or circuit, or air leakage inside the pump so that it must be repaired. Please refer to 「11.1 Repair」 for repair request.
- If no operation is performed for 10 minutes while the flow rate is being calibrated (⑤ above), "□□□□" is displayed, and the display returns to the state of the item selection in the calibration mode.
- Press the "MODE Button" to exit the "Flow Rate Calibration" without saving any changes during the flow rate calibration (⑤ above). In this case, "□□□□" is displayed.

8. Maintenance and Inspection

8.1 Replacing the Dust Filter and O-ring

Caution

- Used dust filters and O-rings may be contaminated with chemicals or other substances from materials used for sampling. Handle with care.

Note

- For the recommended replacement time of the dust filter and O-ring, refer to “11.3 Recommended Time for Maintenance Parts Replacement”.

- ③ With the main unit in an upright position, turn the suction inlet counterclockwise while pressing it downward to remove it from the main unit.

※ When the inlet is turned, it rises up.



- ③ Remove the O-ring and dust filter from the suction inlet.

※ The O-ring and filter may remain on the main unit side. In this case, tilt the main unit or use tweezers, etc. to remove the O-ring and filter.

- ③ Place a new dust filter and a new O-ring to the suction inlet.



- ④ Align the tips on both sides of the suction inlet with the slits on the main unit side, and insert them all the way in.



- ⑤ Turn the suction inlet clockwise until the marks on the suction inlet and the main unit align.



- ⑧ Perform leak check. If there is no air leakage, the replacement is completed. For details, refer to “7.6 Leak Check”.



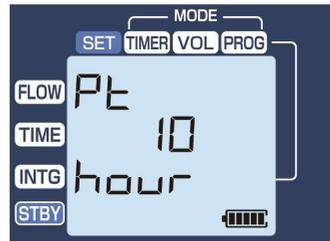
8.2 Checking the Total Operating Time of the Air Pump

The total operating time of the built-in air pump is recorded and can be checked by the user. Use this information as a guide when using more than one GSP-501FT properly or to know when the maintenance time.

- ⓐ While pressing the “MODE Button”, press the “POWER Button”.



- ⓑ “Pt” (Pump Total Operation Time) is displayed in hour.



(Example) Pump total operating time: 10 hours

- ⓒ After checking, press and hold the “POWER Button” to exit. (The power is turned off.)



△ Note

- The total operating time of the built-in air pump is displayed by rounding down minutes or less. (Example: When the pump operation time is 4 hours 58 minutes, indicated value is 4 hours.)
- Refer to “11.3 Recommended Time for Maintenance Parts Replacement” for the recommended replacement timing of the air pump.

9. Troubleshooting

The status of the pump is indicated by error messages displayed on the LCD or by the status lamps. If any problem occurs, please check the followings before repair request.

[The List of Errors and Warnings]

●During operation

Error Message	Status Lamp	Name	Cause and meaning	Countermeasure
None	Flashing red light	Flow Error	During sampling, the instantaneous flow is out of $\pm 10\%$ of the set value. ※During intermittent operation, this error is not detected.	The flow rate may not reach the set value due to a large resistance of the sampling media. Check if the flow resistance of the sampling media at the set flow rate is within the specifications of the pump. (Refer to "10. Specifications")
 Blinking	Flashing red light	Low Battery	The remaining battery level is getting low.	Replace with new AA alkaline batteries or recharged AA nickel-metal hydride batteries. (Refer to "5.1 Prepare the Power Supply")
Lo	Flashing red light	Low Alarm	Flow sensor output error	The flow sensor or circuit may be faulty and must be repaired. (Refer to "11.1 Repair")

• When previous sampling results are being displayed.

Error Message	Status Lamp	Name	Cause and meaning	Countermeasure
bErr	Flashing red light	Battery Error	During the last sampling, the pump stopped due to a drop in the battery voltage.	Replace with new AA alkaline batteries or recharged AA nickel-metal hydride batteries. (Refer to "5.1 Prepare the Power Supply")
StUF	Flashing red light	Clogging	The pump stopped due to clogging, etc.	Check if there is no clogging in the sampling path, filter, etc. (Refer to "8.1 Replacing the Dust Filter and O-ring")
r.out	Off	Sampling time/Integration Error	<ul style="list-style-type: none"> • When timer mode If the measured integrated value falls out of $\pm 5\%$ of the value calculated from multiplying the set sampling time by the flow rate, the error message is displayed after the pump stops • When Volume Mode If the actual sampling time is out of $\pm 5\%$ of the value calculated from the set integrated value and flow rate (In intermittent operation, if calculated sampling time + 1 minute is exceeded), the error message is displayed after the pump stops. <p>※ Not applicable if sampling is stopped with "Start/Stop Button"</p>	<p>The flow rate may not reach the set value due to a large resistance of the sampling media.</p> <p>Check if the flow resistance of sampling media at the set flow rate is within the specifications of the pump. (Refer to "10. Specifications")</p>

●Calibration Mode

Error Message	Status Lamp	Name	Cause and meaning	Countermeasure
CAL	Off	Calibration	This message is displayed for 2 seconds at the beginning when the unit enters the calibration mode. ※ This is not an error.	After 2 seconds, the unit enters the calibration mode. Perform calibration.
QErr	Flashing red light	Sensor Zero Output Error	The flow sensor or circuit may be faulty.	Perform the zero point adjustment again. If the sensor zero output error occurs repeatedly, the flow sensor or circuit may be defective and must be repaired. (Refer to "11.1 Repair")
LErr	Flashing red light	Leak Error	There is a possibility of air leakage.	<p>◎Perform the zero point adjustment again. (Refer to "7.5 Zero Point Adjustment")</p> <p>◎Replace the dust filter and O-ring. (Refer to "8.1 Replacing the Dust Filter and O-ring")</p> <p>◎ If the problem is not solved in ◎ and ◎, there might be air leakage inside the pump and must be repaired. (Refer to "11.1 Repair")</p>
CErr	Flashing red light	Span Error	The sensor is out of adjustable range during flow rate calibration.	<p>◎Check the calibrator for any defects.</p> <p>◎Check for air leakage in the sampling path between the calibrator and GSP-501FT.</p> <p>◎Check for air leakage inside GSP-501FT. (Refer to "7.6 Leak Check")</p> <p>④If no problem is found in ◎ ◎◎, the flow sensor or circuit may be defective, or there might be air leakage inside the GSP-501FT and must be repaired. (Refer to "11.1 Repair")</p>

● Possible Causes of Issues and Corrective Actions

Issues	Possible Cause	Corrective Actions
Batteries does not last long.	Continuous operation time is greatly influenced by ambient temperature and the sampling load. (When using alkaline batteries, continuous operation time at 0°C is 30-50% of 20°C.)	Use AA nickel-metal hydride batteries (sold separately) when the load is small and the influence of ambient temperature is large. (Refer to "5.1 Prepare the Power Supply")
The flow rate is not stable. The flow rate does not reach the set value.	The pump can not control the flow because the filter is dirty or flow resistance is too large.	Replace the dust filter or change the flow rate. (Refer to "8.1 Replacing the Dust Filter and O-ring" and "10. Specification")
The pump does not operate.	The standby time may be set.	Set the standby time to zero. (("6. Setting and Operations"))
The power does not turn off.	The Power Button is disabled during sampling, standby, or calibration.	During sampling or standby, press and hold the "START/STOP Button" to stop sampling, and then press and hold the "POWER Button" to turn off the power. During calibration, press "MODE Button" to cancel the calibration mode, and then press and hold "POWER Button" to turn off the power.
The power does not turn on.	<ul style="list-style-type: none"> •The batteries are not installed properly. •Batteries are discharged. 	<ul style="list-style-type: none"> •Check the polarity of the AA batteries and set them in the battery chamber correctly. •Replace the AA alkaline batteries. •Charge the AA nickel-metal hydride batteries. (Refer to "5.1 Prepare the Power Supply")
In the Volume Mode, the set instantaneous flow rate stops lowering.	The integrated volume cannot be set beyond 30 hours of sampling.	Lower the set integrated volume so that the sampling time does not exceed 30 hours. (Refer to "6.4 Volume Mode")

10. Specifications

Name	Automatic Air Sampling Pump
Model	GSP-501FT
Air pump	Diaphragm type
Display range	0~600mL/min
Constant flow rate operating range	10~49mL/min(※):0.0~5.0kPa 50mL/min:0.0~40.0kPa 100mL/min:0.0~37.0kPa 200mL/min:0.0~30.0kPa 300mL/min:0.0~23.0kPa 400mL/min:0.0~16.0kPa 500mL/min:0.0~10.0kPa (※) Intermittent run at instantaneous flow rate of 50mL/min [Volume Mode only]
Sampling mode	<ul style="list-style-type: none"> ●Timer mode: Air pump automatically stops at set time Settable instantaneous flow rate: 50 to 500mL/min Settable time: 1 minute to 30 hours
	<ul style="list-style-type: none"> ●Volume Mode: Air pump automatically stops at set volume Settable instantaneous flow rate: 10 to 500mL/min ※When set to 10~49 mL/min, intermittent operation is performed at 50mL/min Settable integrated volume: 0.010 to 900.0L ※The range where the sampling time is within 30 hours
Display	Liquid crystal digital display (with backlight)
	Instantaneous flow rate display: 0 to 600mL/min (“Hi” is displayed at 601mL/min or higher) [Minimum scale] <ul style="list-style-type: none"> - When set instantaneous flow rate: 10 to 99mL/min minimum scale of instantaneous flow rate: 0.5mL/min - When set instantaneous flow rate: 100 to 500mL/min minimum instantaneous flow rate on the display: 1 mL/min
	Sampling time display: 0 to 99 hours 59 minutes Minimum scale: 1min “Hi” is displayed for 100 hours or higher
	Integrated volume display: 0.000-9.999L Minimum scale: 0.001L 10.00~99.99L Minimum scale: 0.01L 100.0~999.9L Minimum scale: 0.1L 1000 L or higher “Hi” is displayed
	Standby time: 0 hr 00 min to 24 hr 00 min Minimum scale: 1 min
Structure and function	Constant flow rate function (built-in set flow rate holding circuit), Autostart function (autostart after set standby time in standby mode), Status lamp
Accuracy of instantaneous flow measurement	Instantaneous flow rate: 50~500 mL/min $\pm 5\%$
Accuracy of integrated flow Measurement	[When set flow rate: 10 to 49mL/min (Volume Mode only)] $\pm(2.5 \times \text{sampling time [min]}) \text{ mL}$. [When set flow rate: 50 to 500mL/min] $\pm 5\%$.

Operating temperature range	0~40°C
Operating humidity range	10 to 90% RH (non-condensing)
Power supply	<ul style="list-style-type: none"> ● Available power supply 2 AA alkaline batteries (standard accessories, commercially available) 2 AA nickel-metal hydride batteries (commercially available) ● Continuous operation time* 2 AA alkaline batteries (Standard Accessories): 20 hours
	*Set flow rate: 200 mL/min, suction pressure: 2kPa or less, ambient temperature: 25°C
Dimensions and weight	80(W) ×40(D)×126(H) mm 280g (including batteries)
Standard accessories	2 AA alkaline batteries (Panasonic Corporation LR06), detector tube adaptor, tube tip holder, dust filter (5 pcs), instruction manual, warranty certificate, inspection certificate
Directives and regulations	EU Directive:2014/30/EU(EMC)、2011/65/EU,(EU)2015/863(RoHS)
	UK Regulation :2016 No. 1091(EMC)、2012 No.3032(RoHS)
EMC harmonised standards	EU:EN 61326-1:2013
	UK:BS EN 61326-1:2013
RoHS designated standards	EU:EN IEC63000:2018
	UK:BS EN IEC63000:2018

●Optional/Replacement parts

Item	Model	Description
Belt loop pump holder	GSP500FT-30	Case for personal wear.
Dust filters and O-rings	GSP500FT-40	5 pcs of dust filters & 2 pcs of O-rings
Tripod	GSP-TRIPOD	Attach GSP-501FT to allow sampling at the desired height.
Detector tube adapter	GSP300-13	Adaptor for attaching the detector tube or sorbent tube
Detector tube protective cover	GSP300-14	It improves stability of the detector tube and prevents damage to the detector tube or injury caused by the detector tube.
Tube tip holder	722	It breaks and store the tip of the detector tube safely and prevents the broken tips from scattering.

11. Repair and Warranty

11.1 Repair

For repairs, please contact the distributor you purchased the product or Gastec Corporation.

11.2 PRODUCT WARRANTY AND DISCLAIMER

Gastec warrants that its products are free from defects in design, material, and workmanship and will comply with the specifications established by Gastec for a period of one year from the date of purchase. With respect to any defective product to which this Warranty applies, Gastec shall, at its sole option, either replace the defective product with a new product or refund the purchase price of the defective product. THIS REPLACEMENT OR REFUND REMEDY SHALL BE THE CUSTOMER'S OR END USER'S SOLE AND EXCLUSIVE REMEDY FOR DEFECTIVE PRODUCTS. THE AGGREGATE LIABILITY THAT GASTEC SHALL HAVE WITH RESPECT TO PRODUCTS SHALL BE LIMITED TO THE AMOUNT ACTUALLY PAID BY THE CUSTOMER OR END USER FOR THE PRODUCT THAT IS THE SUBJECT OF THE PARTICULAR CLAIM.

GASTEC MAKES NO WARRANTY, PROMISE, OR REPRESENTATION NOT EXPRESSLY SET FORTH IN THIS WARRANTY STATEMENT. EXCEPT FOR THE WARRANTIES EXPRESSLY SET FORTH HEREIN, GASTEC PROVIDES THE PRODUCTS "AS IS" WITHOUT WARRANTY AND DISCLAIMS ANY AND ALL OTHER WARRANTIES, EITHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, NONINFRINGEMENT OF THIRD-PARTY RIGHTS, OR FITNESS FOR A PARTICULAR PURPOSE, OTHER THAN THOSE WARRANTIES THAT ARE IMPLIED BY AND INCAPABLE OF EXCLUSION, RESTRICTION, OR MODIFICATION UNDER APPLICABLE LAW. THE TERM OF ANY IMPLIED WARRANTIES THAT CANNOT BE DISCLAIMED UNDER APPLICABLE LAW IS LIMITED TO THE LESSER OF NINETY (90) DAYS AFTER SHIPMENT OF THE PRODUCT FROM GASTEC'S FACILITIES OR THE SHORTEST PERIOD THAT IS PERMITTED BY APPLICABLE LAW.

GASTEC SHALL NOT BE LIABLE FOR ANY DAMAGES CAUSED BY ANY DELAY IN THE DELIVERY OF PRODUCTS. NEITHER SHALL GASTEC BE LIABLE PURSUANT TO THIS WARRANTY FOR ANY INDIRECT, INCIDENTAL, SPECIAL, AND/OR CONSEQUENTIAL DAMAGES, HOWEVER CAUSED AND REGARDLESS OF THE THEORY OF LIABILITY, INCLUDING BUT NOT LIMITED TO COMPENSATION, REIMBURSEMENT, AND/OR DAMAGE ON ACCOUNT OF THE LOSS OF PROSPECTIVE PROFITS OR ANTICIPATED SALES, ANY EXPENDITURES OR COMMITMENTS MADE OR INCURRED IN CONNECTION WITH THE BUSINESS OR GOODWILL OF SUCH OTHER PARTY, OR OTHERWISE, EVEN GASTEC IS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

This Warranty shall not apply if: (a) the product is modified, tampered with or altered by anyone other than Gastec after leaving Gastec's control, unless authorized by Gastec in writing; (b) Gastec is not notified in writing of the loss, claim or product nonconformity within 365 days after purchase; (c) the product is not distributed, stored, used, maintained, and/or repaired in accordance with all applicable instructions, guidelines, warnings, laws, standards and product literature; (d) the product is subjected to abuse, accident, misuse, neglect, inadequate protection against shock, vibration, excessively high or low temperatures or overpressure, or unauthorized repair, testing, storage, shipping or handling; (e) the loss, claim, product nonconformity, or damage to the product is caused by a combination of the product with any items not supplied by Gastec, or by the use of the product with any other Gastec product contrary to Gastec's instructions, guidelines, and warnings; (f) the product is beyond its expiration date, tube shelf life, maximum storage period, or maximum refrigerated storage period; (g) the product was purchased or acquired through a source other than an authorized Gastec or its

authorized distributor or reseller; or (h) the loss, claim, product nonconformity, or damage to the product was the result of any cause beyond Gastec's control, including natural disaster, fire, flood, or other force majeure.

The Warranty shall not apply to consumable products, parts, or components.

The Warranty shall be voided if the product is used by persons untrained and unfamiliar with the proper use and application of the products, particularly those used with hazardous or toxic substances.

This Warranty may not be modified, expanded, or altered in any way except in a writing signed by a fully authorized representative of Gastec Corporation.

For any questions, please contact: international@gastec.co.jp

11.3 Recommended Time for Maintenance Parts Replacement

The following parts need to be replaced: (It varies depending on the actual use frequency and environment).

Part name	The recommendation exchange next term
Air pump	600 Use of time or one year after purchase
Flow sensor	3 Years
Dust-proof filter	6 Months or when aspiration is not possible
O-ring	1 year or when air leaks occur.

12. Declaration of Conformity



GASTEC

EU DECLARATION OF CONFORMITY (No.GDOC1005-1)

1. Apparatus model/Product:
GSP-501FT / Automatic Air Sampling Pump
2. Name and address of the manufacturer:
GASTEC CORPORATION
8-8-6 Fukayanaka, Ayase-City, Kanagawa 252-1195, Japan
3. This declaration of conformity is issued under the sole responsibility of the manufacturer
4. Object of the declaration:



5. The object of the declaration described above is in conformity with the requirements of the following EU legislation and harmonized standards:

Council Directives		Applicable standards
RoHS Directive	2011/65/EU, (EU)2015/863	EN IEC63000:2018
EMC Directive	2014/30/EU	EN61326-1:2013

6. Notified Body involved:
-
7. Additional information:
-

(place and date of issue): **Ayase-City, Kanagawa, Japan 27 Jul. 2022**
(name, function)(signature): **YUICHIRO KAIFUKU Director of Quality Assurance**

Yuichiro Kaifuku

UK DECLARATION OF CONFORMITY (No.GDOC1005UK-1)

1. Apparatus model/Product:
GSP-501FT / Automatic Air Sampling Pump
2. Name and address of the manufacturer:
GASTEC CORPORATION
8-8-6 Fukayanaka, Ayase-City, Kanagawa 252-1195, Japan
3. This declaration of conformity is issued under the sole responsibility of the manufacturer
4. Object of the declaration:



5. The object of the declaration described above is in conformity with the requirements of the following UK legislation and designated standards:

UK Regulations		Applicable standards
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012	2012 No.3032	BS EN IEC63000:2018
Electromagnetic Compatibility Regulations 2016	2016 No.1091	BS EN 61326-1:2013

6. Notified Body involved:
-
7. Additional information:
-

(place and date of issue): **Ayase-City, Kanagawa, Japan 27 Jul. 2022**
 (name, function)(signature): **YUICHIRO KAIFUKU Director of Quality Assurance**

Yuichiro Kaifuku