# 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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IM23GSP501FTE4

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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.

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- 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 may cause damage to the air pump, flow sensor, etc.
- When sampling gases other than air or nitrogen, be sure to connect a detector tube or sorbent tube to the suction inlet. The suction of such gases may cause damage to the 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.

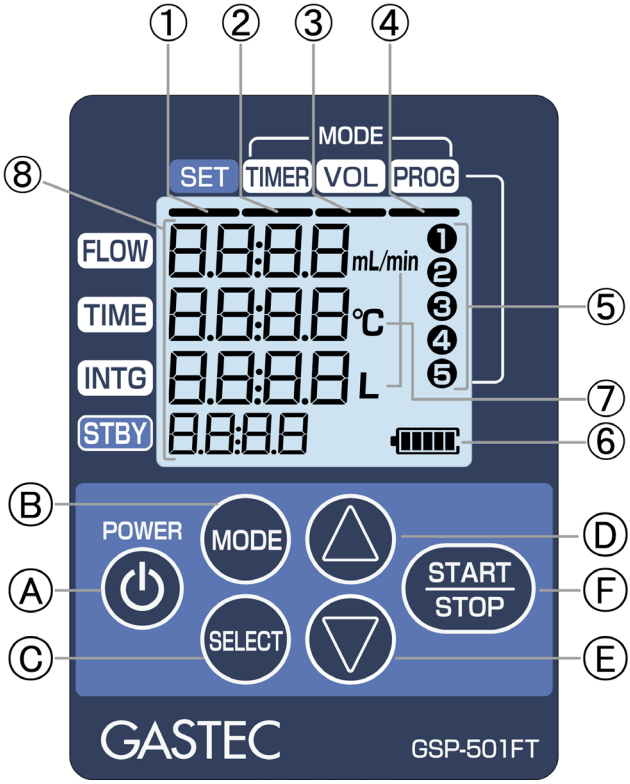
| Item | | Quantity |
|---|---|---|
| ① | Model GSP-501FT Unit | 1 |
| ② | Detector Tube Adapter | 1 |
| ③ | AA Alkaline Batteries (LR06) | 2 |
| ④ | Dust Filter (5 pcs.) | 1 |
| ⑤ | Tube Tip Holder | 1 |
| Instruction Manual | | 1 |

# 4. Design and Basic Features

## 4.1 Names and Functions

| | | |
|---|---|---|
| ① | 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 Φ6mm) |
| ② | LCD | Displays the remaining battery power, each measured value, each set value, current operation mode, previous records, error information, etc.<br>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.<br>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: Φ 6.4mm) |
| ⑦ | 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**

| | | |
|---|---|---|
| ① | Setting | The bar turns on while each set value is displayed or set. |
| ② | Timer | The bar turns on when setting or operating in timer mode. |
| ③ | 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.<br>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.<br>Refer to "5.1.3 Relationship between Battery Level Indicator and Sampling Time" for remaining battery power. |
| ⑦ | Unit | The unit is displayed according to the displayed values. |

| | | |
|---|---|---|
| ⑧ | Set Value/<br>Measured value | Each set value is displayed during setting, and each measured value is displayed during operation. The value being set blinks during setting.<br>"FLOW": Display of set instantaneous flow rate/measured instantaneous flow rate<br>"TIME": Display of set sampling time/measured sampling time<br>"INTG": Display of set integrated volume /measured integrated volume<br>"STBY": Display of set standby time/measured standby time |

## ● 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.<br>(In the program mode, the registration number is switched). |
| E | Decrease Button | Press this button to decrease the setting value.<br>(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.

① Slide the battery chamber cover toward the rear side while pressing it, and then open the battery chamber cover.

② [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 | 34.5 ※1 | 14 | 10 | 7 | 4 | 1 |
| 100 | 1.5 ※2 | 28 | 19 | 13 | 7 | 3 |
| 100 | 27 ※3 | 14 | 10 | 8 | 4 | 2 |
| 200 | 2 | 23 | 16 | 12 | 6 | 3 |
| 400 | 3 | 14 | 11 | 8 | 5 | 2 |
| 500 | 10 | 5 | 4 | 3 | 2 | 1 |

※1: An example of using an Ethylene oxide Detector Tube 163TP
※2: An example of using an Activated Charcoal Tube 258
※3: 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 | 34.5 ※1 | 17 | 15 | 6 | 2 | 1 |
| 100 | 1.5 ※2 | 29 | 17 | 7 | 2 | 0.5 |
| 100 | 27 ※3 | 16 | 14 | 5 | 2 | 0.3 |
| 200 | 2 | 23 | 20 | 10 | 4 | 1 |
| 400 | 3 | 16 | 12 | 4 | 1 | 0.2 |
| 500 | 10 | 6.4 | 6.1 | 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, 101.3 kPa, 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>

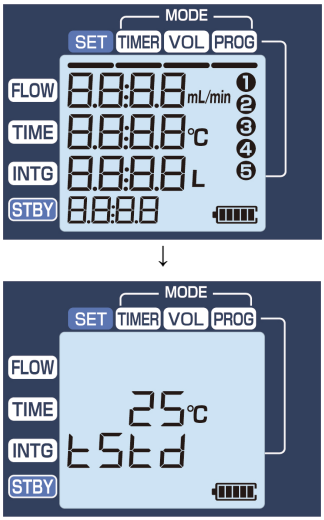
Press the "Power Button" to turn on the power.
When activated, the followings are displayed in order.

①All segments light up (for 2 seconds)

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

③Previous Sampling Results

※Check at the timing of ② 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

- Avoid water entering in air routing. The suction of water may cause damage to the air pump, flow sensor, etc.
- When sampling gases other than air or nitrogen, be sure to connect a detector tube or sorbent tube to the suction inlet. The suction of such gases may cause damage to the air pump, flow sensor, etc.
- 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 ±10°. If the left or right inclination is large, the flow rate error becomes large.
- Place the pump in a stable position. Shock or vibration can cause errors in flow rate.
- 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 | After the set time has elapsed, the sampling operation automatically stops.<br>Select this mode to prioritize the ending time.<br>**[Items to be set and selectable range]**<br>●Flow rate: 50～500 mL/min<br>●Sampling time: 1 min. to 30 hr.<br>※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.<br>●Standby time: 0 min to 24 h |
| Volume Mode | When the integrated volume reaches the set value, the sampling operation automatically stops.<br>Select this mode to prioritize the integrated volume.<br>**[Items to be set and selectable range]**<br>●Flow rate: 10～500 mL/min<br>※When set to 10～49 mL/min, the pump runs intermittently with the flow rate of 50mL/min. (See "6.12 Intermittent Operation" for detail.)<br>●Volume : 0.010～900.0 L<br>※The range where the sampling time is within 30 hours<br>※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.<br>●Standby time: 0 min to 24 h |
| Program mode | The sampling setting (Timer mode or Volume Mode) is saved in advance, and the setting is read out to perform sampling.<br>This is useful when using the same sampling setting repeatedly.<br>The maximum number of sampling settings that can be stored is 5. |

※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

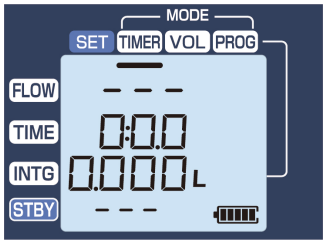
- The operation is the same when "Cont" is set for the sampling time in the Timer mode and when "Cont" is set for the integration flow rate in the Volume Mode.
- Even if the flow rate can be set, the actual flow rate may not reach the set flow rate depending on the load of the sampling media. Refer to "Constant flow rate operating range" in "10. Specification" 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 ±5% of each calculated value.

## 6.3 Timer Mode

① 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: ---



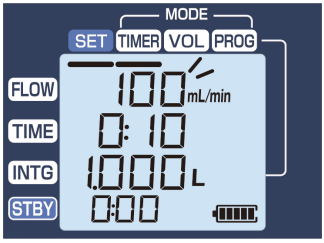

Previous sampling results (above is when purchased)

② Press "MODE Button" to select the Timer mode.

Press


③ 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 1mL/min.




(Example) Flow rate: 100 mL/min
↓

Press or

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.

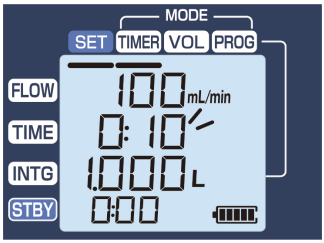
**[setting range] 0:01 to 30:00 (1 min to 30 h)**
※The setting increment is one-minute.

※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)

Press


↓




(Example) Sampling time: 10 min.

↓

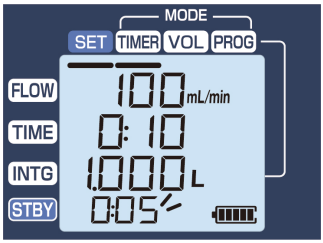
Press or

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.

Press


↓




(Example) Standby time: 5 min.

↓

Press or

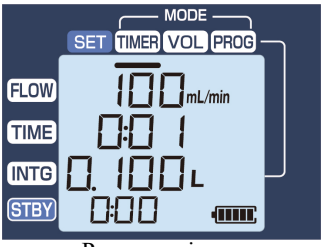
⑥ Check that the instantaneous flow rate, sampling time, integrated volume, and standby time are set correctly.

⑦ When the sampling is ready, press and hold the "START/STOP Button". The bar at the "SET" segment disappears and the status lamp flashes in green, and the sampling operation starts.

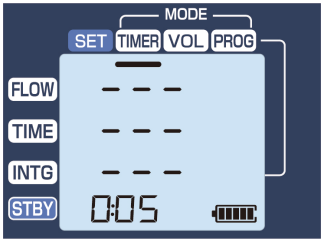
※If the standby time is set, the followings are displayed,
"FLOW": ---
"TIME": ---
"INTG":---
and the sampling operation starts when the remaining standby time becomes "0:00".

Press and Hold


↓

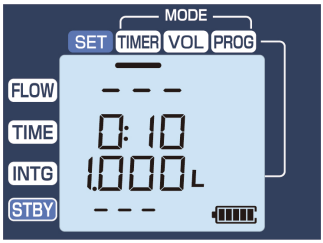



Pump running




On standby

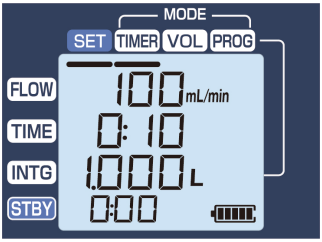
⑧ After the set sampling time has elapsed, the sampling operation is completed and the sampling result is displayed.



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 completed sampling operation are displayed.

Press


↓




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

Press and Hold

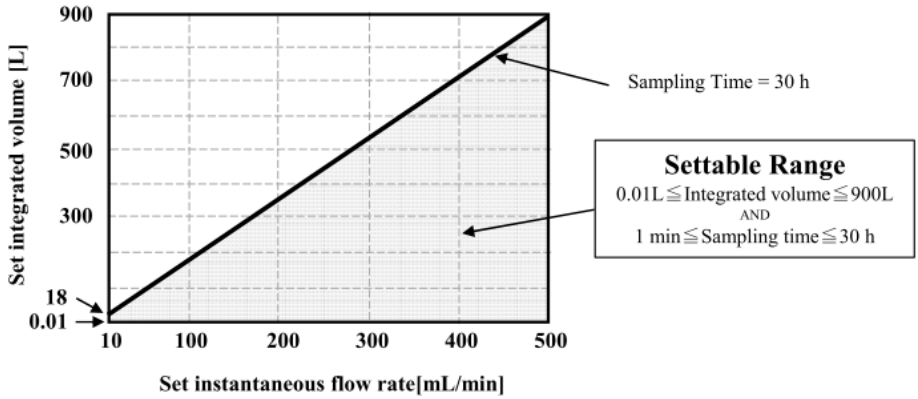
## △ Note

➢ To repeat 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.

## 6.4 Volume Mode

## △ Note

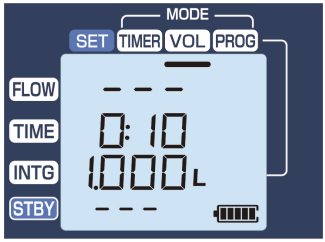
➢ The integrated volume rate cannot be set to beyond 30 hours of sampling.
See the settable range in the graph below.



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(1,800min))

When the instantaneous flow rate is set to 500 mL/min
Min: 0.01L Max: 900 L (=500mL/min×30 h(1,800min))

① 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

② Press "MODE Button" to select the Volume Mode.

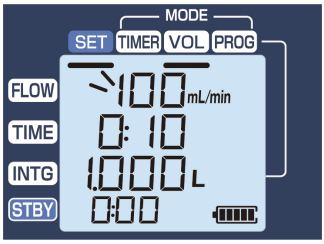
Press twice

↓

③ 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

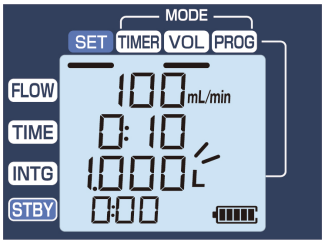
↓

Press or

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.

Press


↓




(Example) Integrated volume: 1 L

↓

Press or

**[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

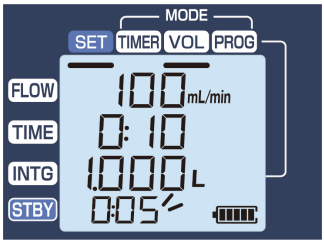
※When the instantaneous flow and the integrated volume are set, the sampling time is automatically calculated and the value is displayed at the "Time" position.

※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.

Press


↓




(Example) Standby time: 5 min

↓

Press or

**[setting range] 0:00 to 24:00 (0 min to 24 h)**
※The setting increment is one-minute.

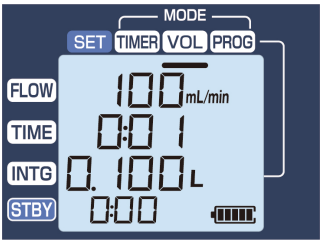
⑥ Check that the instantaneous flow rate, sampling time, integrated volume, and standby time are set correctly.

⑦ When the sampling is ready, press and hold the "START/STOP Button". The status lamp flashes in green, and the sampling operation starts.

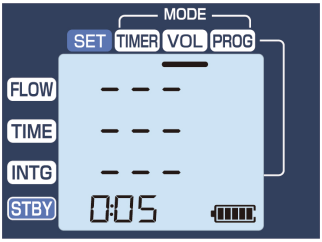
※If the standby time is set, the followings are displayed,
"FLOW": ---
"TIME": ---
"INTG":---
and the sampling operation starts when the remaining standby time becomes "0:00".

Press and Hold


↓

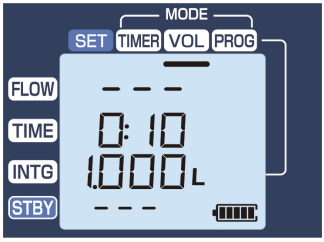



Pump running




On standby
(Example) Standby time: 5 min

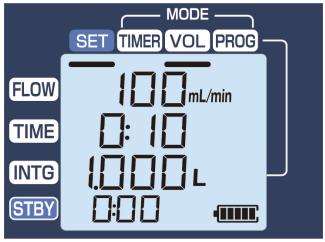
⑧ When the set integrated volume is reached, the sampling operation is completed and the sampling result is displayed.




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.

Press


↓




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

Press and Hold

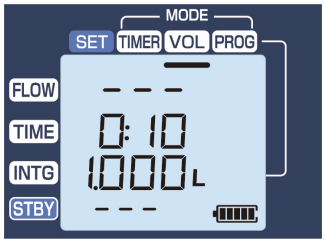
## △ Note

➢ 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

① 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

② Press "MODE Button" to select the Program mode.

Press

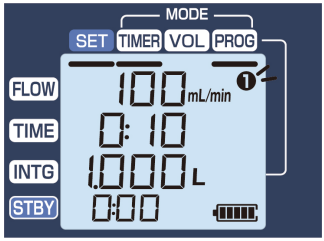
three times

↓

③ Check that the program number ❶ 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 ❶ to ❺.

※ The factory default settings are as follows:

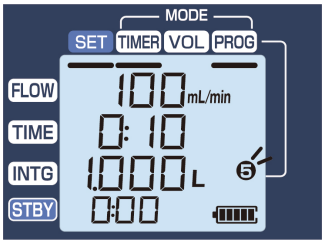
Mode: Timer
FLOW: 100 mL/min
TIME: 0:10
INTG: 1.000L
STBY: 0:00




↓

Press Or

↓



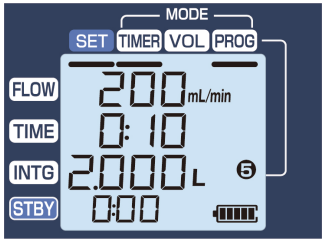

(Example) Program registration number ❺

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 ② to ⑤ of "6.3 Timer Mode" and ② to ⑤ of "6.4 Volume Mode".

Press and Hold


↓



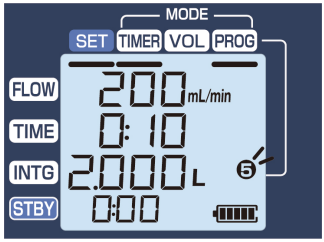

(Example) Timer mode
Flow rate: 200 mL/min
Sampling time: 10 min

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.

Press and Hold

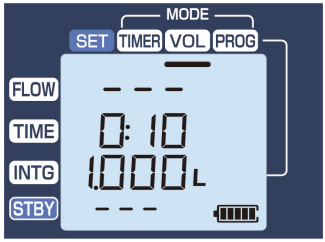
※When the settings are saving are completed, the selected program number will blink, allowing sampling in the program mode.

↓




## ●6.5.2 Sampling by Program Mode

① 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

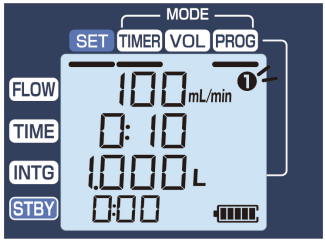
② Press "MODE Button" to select the Program mode.

Press

three times

↓

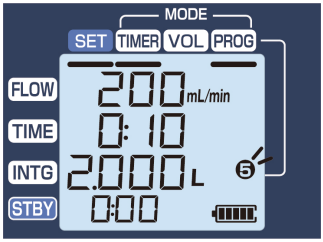
③ Check that the program number ❶ is blinking, and then select the program number to be changed (the number blinks) with the "INCREASE Button" and "DECREASE Button".
※Program numbers are from ❶ to ❺.




↓

Press Or

↓




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

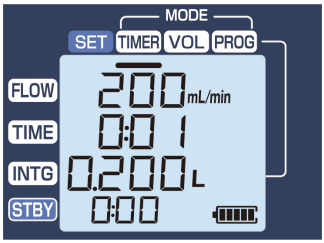
④ Confirm that the mode, the instantaneous flow rate, sampling time, integrated volume, and standby time are set correctly for the selected program mode.

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

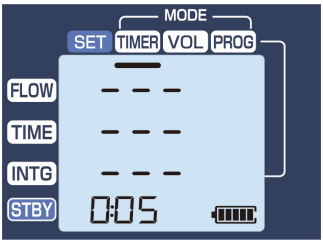
※If the standby time is set, the followings are displayed,
"FLOW": ---
"TIME": ---
"INTG":---
and the sampling operation starts when the remaining standby time becomes "0:00".

Press and Hold


↓

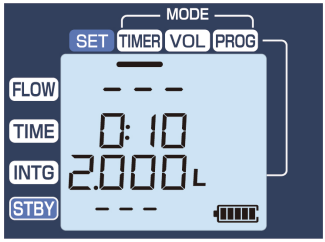



Pump running




On standby
(Example) Standby time: 5 min

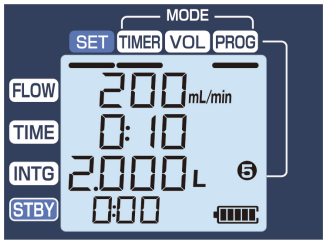
⑥ When the set sampling stop condition is reached, the sampling operation stops and the sampling result is displayed.




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.

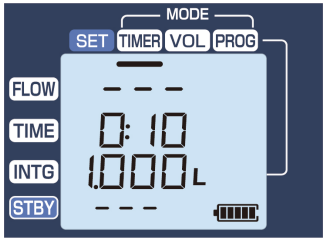
Press and Hold

## △ 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

① 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.

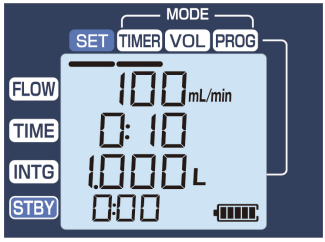


Previous sampling results

② 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.

Press


↓



Previous sampling setting

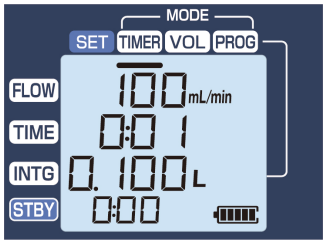
③ Check that the mode, instantaneous flow rate, sampling time, integrated volume, and standby time are set correctly.

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

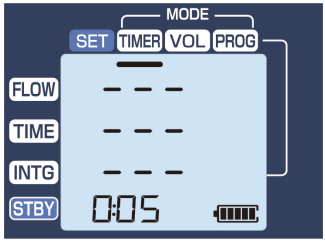
※If the standby time is set, the following are displayed,
"FLOW": ---
"TIME": ---
"INTG":---
and the sampling operation starts when the remaining standby time becomes "0:00".

Press and Hold


↓

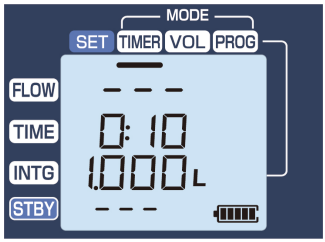


Pump running




On standby
(Example) Standby time: 5 min

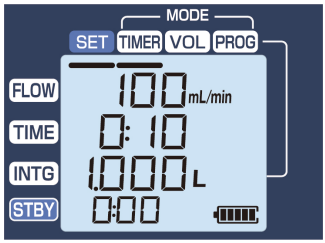
⑤ When the set sampling stop condition is reached, the sampling operation stops and the sampling result is displayed.




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).

Press


↓




⑦ 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 ① above to start the sampling.

## 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".

①Pump 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)

②Pump stops: The pump stops, only the status lamp flashes (section B in the figure below)

③Thereafter, repeat ① and ② until the set integrated volume is reached.

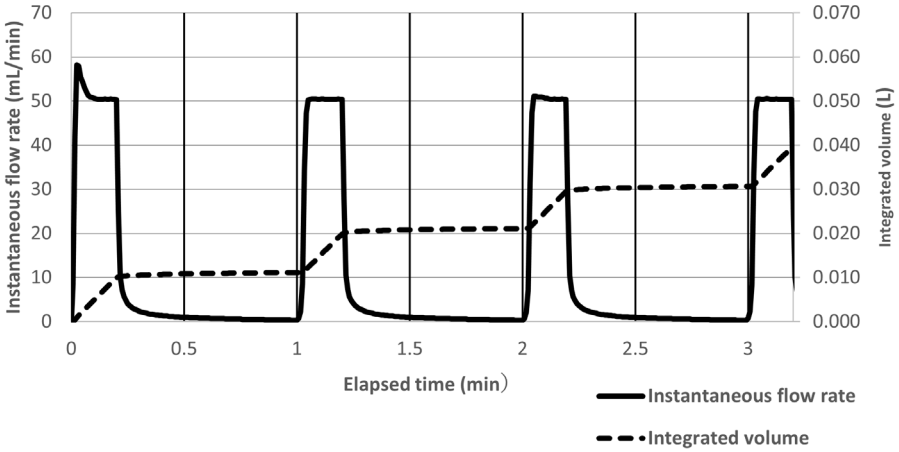



Figure: Example of intermittent operation (set instantaneous flow rate: 10 mL/min, set integrated volume: 0.040L)

### △ 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 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 ±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 ±10°. 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 Temperature ••••••••••••Refer to (7.3)
2)Setting the flow rate conversion temperature of the calibrator ••••••••••••Refer to (7.4)
3)Zero point adjustment ••••••••••••Refer to (7.5)
4)Leak check ••••••••••••Refer to(7.6)
5)Flow rate calibration ••••••••••••Refer to (7.7)

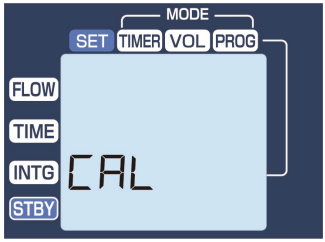
### ●How to activate calibration mode

① While pressing the "SELECT Button ", press the "POWER Button ".

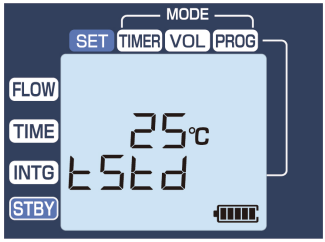
Press while pressing

② 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)

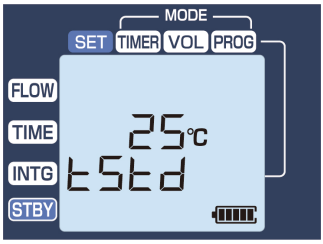
## △ Note

➢ 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.

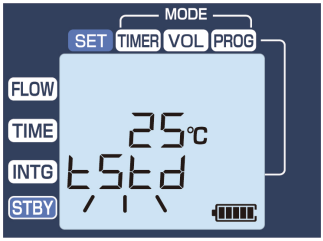
① (If it is not in the calibration mode), activate the calibration mode and make sure that "25°C tStd" is displayed. (When the conversion temperature is set to 20°C, "20°C tStd" is displayed.)




② Press "START/STOP Button".

Press

③ Check that "tStd" is blinking.



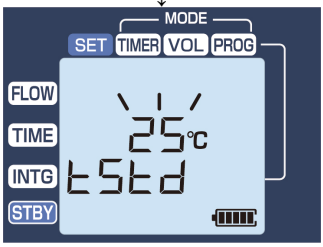

④ Press the "INCREASE Button" and "DECREASE Button" to select the desired temperature between 20°C and 25°C.

Press or

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

Press


↓




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

[For other settings]

Press


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

[To exit the calibration mode]

Press and Hold

## △ Note

- ➢ If no operation is performed for 2 minutes while selecting the flow rate conversion temperature (in ③ and ④ above), "CnCL" is displayed and the display returns to the state of the item selection in the calibration mode without saving any changes.
- ➢ 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, "CnCL" is displayed.

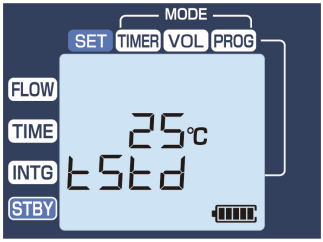
## 7.4 Setting of the Flow Rate Conversion Temperature of the Calibrator

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.

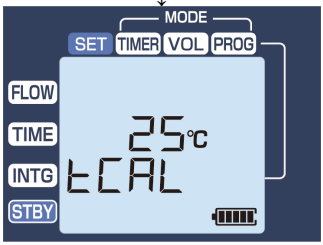
① (If it is not in the calibration mode), activate the calibration mode and make sure that "25°C tStd" is displayed. (When the conversion temperature is set to 20°C, "20°C tStd" is displayed.)




② 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 once

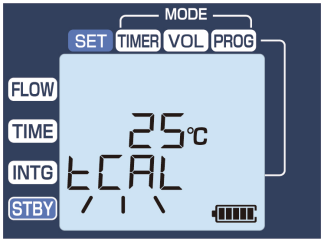
↓




③ Press "START/STOP Button".

Press

④ Check that "tCAL" is blinking.



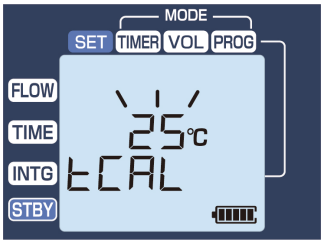
⑤ Press the ""INCREASE Button" and "DECREASE Button" to adjust to the conversion temperature of the external calibrator. The temperature setting range is 0 to 40°C.

Press or

⑥ Press "START/STOP Button" again. If the displayed temperature blinks three times, the setting is completed.

Press


↓




⑦ 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

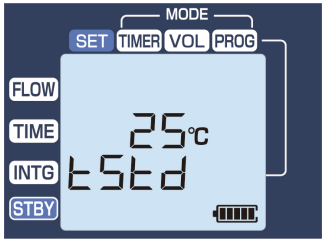
- If no operation is performed for 2 minutes while selecting the flow rate conversion temperature of the calibrator (in ④ and ⑤ above), "CnCL" will be displayed, and the display will return to the state of item selection in the calibration mode without saving any changes.

- 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, "CnCL" is displayed.

## 7.5 Zero Point Adjustment

Adjust the zero point of GSP-501FT.

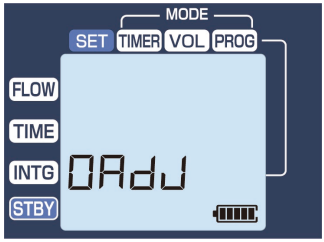
① (If it is not in the calibration mode), activate the calibration mode and make sure that "25°C tStd" is displayed. (When the conversion temperature is set to 20°C, "20°C tStd" is displayed.)




② Press "MODE Button" twice and confirm that "0AdJ" is displayed.

Press twice

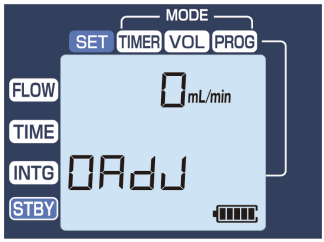
↓




③ Press "START/STOP Button".

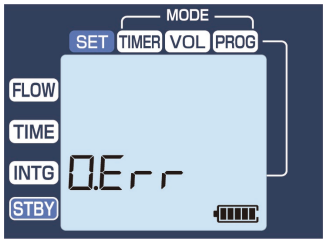
Press

④ The display of blinking "0AdJ" → Zero point of flow rate prior to calibration → blinking "0AdJ" → 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.

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

[For other settings]

Press

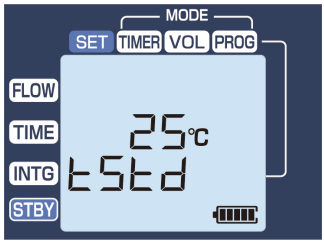

[To exit the calibration mode]

Press and Hold

## 7.6 Leak Check

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

① (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.)

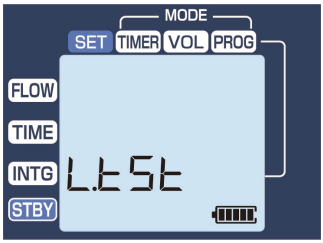


② Press "MODE Button" three times and check that "L.t St" is displayed.

Press

three times

↓



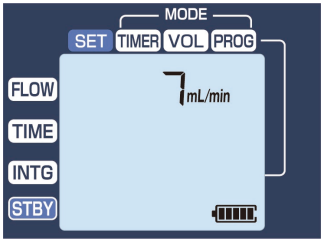

③ Block the suction port of the suction inlet by one of the following ways.

○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.

Press


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



⑥ 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.

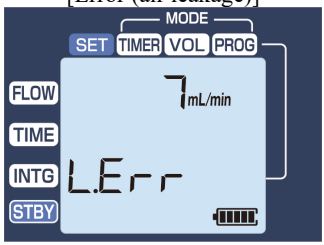
[Error (air leakage)]

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.

[Normal (no air leakage)]

[Error (air leakage)]




⑦ 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.

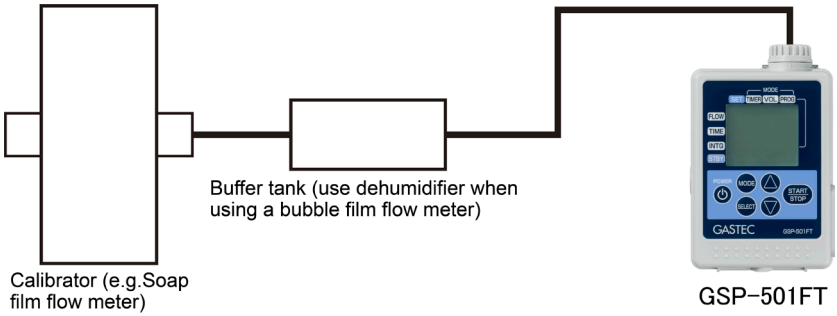
- During the leak check (⑤ above), if no operation is performed for 10 minutes, "CnCL" is displayed, and the display returns to the state of the item selection in the calibration mode.

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

## 7.7 Flow Calibration Procedures

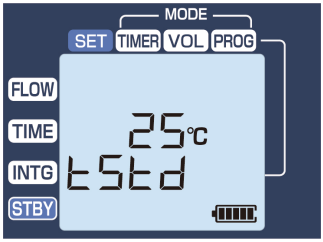
Follow the steps below to calibrate the flow rate of the GSP-511FT.

① Connect the calibrator to the pump. See the figure below.

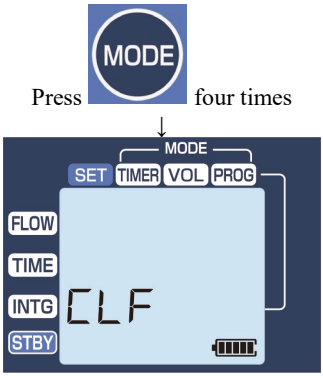



Example of device connections

② (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.)



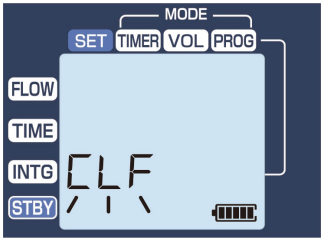

③ Press " MODE Button" four times and check that "CLF" is displayed.



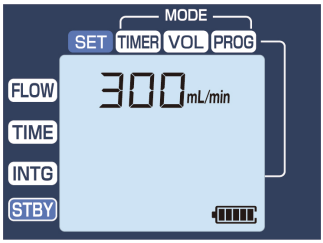
④ Press "START/STOP Button".

Press


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.




↓




⑥ Wait until the flow rate displayed on GSP-501FT stabilizes, and then measure the flow rate with the calibrator.

Press or

⑦ 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.)

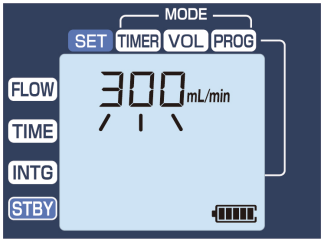
※When the adjustable range is exceeded, "C.Err" is displayed.

[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.

Press


↓




⑨ To exist the calibration mode, press and hold "POWER Button". (The power is turned off.)

Press and Hold

## △ Note

- When "CErr" 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), "CnCL" 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, "CnCL" 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

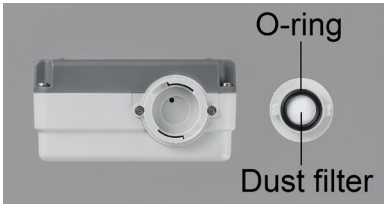
- The recommended replacement times for the dust filter and O-ring are as follows:
  - ・Dust filter: 6 months or when aspiration is not possible
  - ・O-ring: 1 year or when air leaks occur.

① 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.

② 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.

⑥ Perform leak check. If there is no air leakage, the replacement is completed. For details, refer to “7.6 Leak Check”.

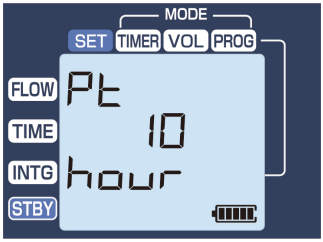
## 8.2 Checking the Total Operating Time of the Air Pump

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.

① While pressing the “MODE Button”, press the “POWER Button”.

Press while pressing


② “Pt” (Pump Total Operation Time) is displayed in hour.




(Example) Pump total operating time: 10 hours

③ After checking, press and hold the “POWER Button” to exit. (The power is turned off.)

Press and Hold

## △ 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.)

- Replacement of the air pump is recommended after a total operating time of 600 hours or 1 year after purchase. If you wish to replace the air pump, refer to “11.1 Repair” and request replacement.

# 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 ±10% of the set value.<br><br>※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.<br>Check if the flow resistance of the sampling media at the set flow rate is within the specifications of the pump.<br>(Refer to “10. Specification”) |
| 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.<br>(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.<br>(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 | Battey Error | ●During the last sampling, the pump stopped due to a drop in the battery voltage.<br><br>●Excessive flow resistance | ●Replace with new AA alkaline batteries or recharged AA nickel-metal hydride batteries.<br>(Refer to "5.1 Prepare the Power Supply")<br><br>●Check that the suction nipple, exhaust port, and connected tubes are not clogged. |
| StUF | Flashing red light | Clogging | The pump stopped due to clogging, etc. | Check if there is no clogging in the sampling path, filter, etc.<br>(Refer to "8.1 Replacing the Dust Filter and O-ring") |
| r.out | Off | Sampling time/ Integration Error | ●When timer mode<br>If the measured integrated value falls out of ±5% of the value calculated from multiplying the set sampling time by the flow rate, the error message is displayed after the pump stops<br><br>●When Volume Mode<br>If the actual sampling time is out of ±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.<br><br>※Not applicable if sampling is stopped with "Start/Stop Button" | The flow rate may not reach the set value due to a large resistance of the sampling media.<br>Check if the flow resistance of sampling media at the set flow rate is within the specifications of the pump.<br>(Refer to “10. Specification”) |

**●Calibration Mode**

| Error Message | Status Lamp | Name | Cause and meaning | Countermeasure |
|---|---|---|---|---|
| CAL | Off | Calibr ation | This message is displayed for 2 seconds at the beginning when the unit enters the calibration mode.<br><br>※This is not an error. | After 2 seconds, the unit enters the calibration mode.<br>Perform calibration. |
| O.Err | 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.<br>(Refer to "11.1 Repair") |
| L.Err | Flashing red light | Leak Error | There is a possibility of air leakage. | ①Perform the zero point adjustment again.<br>(Refer to “7.5 Zero Point Adjustment”)<br><br>②Replace the dust filter and O-ring.<br>(Refer to “8.1 Replacing the Dust Filter and O-ring”)<br><br>③ If the problem is not solved in ① and ②, there might be air leakage inside the pump and must be repaired.<br>(Refer to "11.1 Repair") |
| C.Err | Flashing red light | Span Error | The sensor is out of adjustable range during flow rate calibration. | ①Check the calibrator for any defects.<br>②Check for air leakage in the sampling path between the calibrator and GSP-501FT.<br>③Check for air leakage inside GSP-501FT.<br>(Refer to "7.6 Leak Check")<br><br>④If no problem is found in ①②③, the flow sensor or circuit may be defective, or there might be air leakage inside the GSP-501FT and must be repaired.<br>(Refer to "11.1 Repair") |

## ●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.<br>( When using alkaline batteries, the continuous operation time at 0°C is shorter than at 25°C.) | Use AA nickel-metal hydride batteries (sold separately) when the load is small and the influence of ambient temperature is large.<br><br>(Refer to "5.1 Prepare the Power Supply") |
| The flow rate is not stable.<br>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.<br>(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.<br>("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.<br>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. | ・The batteries are not installed properly.<br>・Batteries are discharged. | ・Check the polarity of the AA batteries and set them in the battery chamber correctly.<br>・Replace the AA alkaline batteries.<br>・Charge the AA nickel-metal hydride batteries.<br>(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.<br>(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<br>50mL/min:0.0～40.0kPa<br>100mL/min:0.0～37.0kPa<br>200mL/min:0.0～30.0kPa<br>300mL/min:0.0～23.0kPa<br>400mL/min:0.0～16.0kPa<br>500mL/min:0.0～10.0kPa<br>(※) Intermittent run at instantaneous flow rate of 50mL/min [Volume Mode only] |
| Sampling mode | ●Timer mode: Air pump automatically stops at set time<br>Settable instantaneous flow rate: 50 to 500mL/min<br>Settable time: 1 minute to 30 hours |
| | ●Volume Mode: Air pump automatically stops at set volume<br>Settable instantaneous flow rate: 10 to 500mL/min<br>※When set to 10～49 mL/min, intermittent operation is performed at 50mL/min<br>Settable integrated volume: 0.010 to 900.0L<br>※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)<br>[Minimum scale]<br>・When set instantaneous flow rate: 10 to 99mL/min<br>minimum scale of instantaneous flow rate: 0.5mL/min<br>・When set instantaneous flow rate: 100 to 500mL/min<br>minimum instantaneous flow rate on the display: 1 mL/min |
| | Sampling time display: 0 to 99 hours 59 minutes Minimum scale: 1min<br>“Hi” is displayed for 100 hours or higher |
| | Integrated volume display: 0.000-9.999L Minimum scale: 0.001L<br>10.00~99.99L Minimum scale: 0.01L<br>100.0~999.9L Minimum scale: 0.1L<br>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 ±5% |
| Accuracy of integrated flow Measurement | [When set flow rate: 10 to 49mL/min (Volume Mode only)]<br>±(2.5×sampling time [min]) mL.<br>[When set flow rate: 50 to 500mL/min] ± 5%. |

| | |
|---|---|
| Operating temperature range | 0～40℃ |
| Operating humidity range | 10 to 90% RH (non-condensing) |
| Power supply | ●Available power supply<br>2 AA alkaline batteries (standard accessories, commercially available)<br>2 AA nickel-metal hydride batteries (commercially available)<br>●Continuous operation time*<br>2 AA alkaline batteries (Standard Accessories): 20 hours |
| | *Set flow rate: 200 mL/min, suction pressure: 2kPa or less, ambient temperature: 25℃ |
| Dimensions and weight | 80(W) ×40(D)×126(H) mm 280g (including batteries) |
| Standard accessories | 2 AA alkaline batteries (LR06), detector tube adaptor, tube tip holder, dust filter (5 pcs), instruction manual |
| Directives and regulations | 2014/30/EU(EMC)、 2011/65/EU,(EU)2015/863(RoHS)、(EU)2023/1542(BATTERY) |
| EMC harmonised standards | EN 61326-1:2013 |
| RoHS designated standards | 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 (2 pcs.) |
| 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 WARRENTY 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 MERCHANTIBILITY, 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

# 12. Declaration of Conformity

CE

GASTEC

**EU DECLARATION OF CONFORMITY (No.GDOC1005CE-2)**

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** |
| **BATTERY Regulation** | **(EU)2023/1542** | - |

6. Notified Body involved:

   -

7. Additional information:

   -

(place and date of issue): **Ayase-City, Kanagawa,Japan 12 Jul . 2024**

(name, function)(signature): **YUICHIRO KAIFUKU Director of Quality Assurance**

Yuichiro Kaifuku

26J-MP