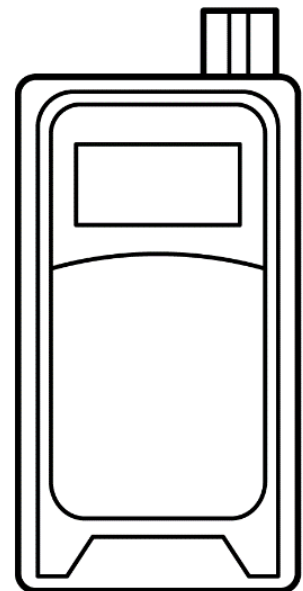


CODE 080870-001



Operation Manual



Personal Mini Pump **PMP-001**

- **Before using this product, be sure to read "Operation Settings When an Error Occurs," and then configure the settings accordingly.**
- This operation manual describes precautions that are important for preventing accidents as well as instructions for using the product.
- To ensure safety, read this operation manual thoroughly before use, and use the product correctly.
- After reading this operation manual, keep it in a safe place where it can be referred to at any time.

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1 Introduction

1.1 Indications Used in This Manual

1.1.1 "Danger," "Warning," and "Caution"

This product is designed with the safety of the user as the top priority. However, some unavoidable risks remain due to the characteristics of the product. In this manual, the severity and level of danger of these risks are divided into three categories, indicated as "Danger," "Warning," and "Caution." Carefully read and make sure that you understand the indicated items before operating or performing maintenance on this product. The indications "Danger," "Warning," and "Caution" are in order of the severity of risk (with "Danger" greater than "Warning," which is greater than "Caution"). The details are explained below.

 DANGER	Indicates a dangerous situation that if not avoided will result in serious injury or death.
 WARNING	Indicates a situation that if not avoided could result in serious injury or death.
 CAUTION	Indicates a situation that if not avoided could result in minor to moderate injuries, or could result in property damage or breakage.




1.1.2 "Important" and "Hint"

In addition to "Danger," "Warning," and "Caution," items that are important or essential to the user are indicated using the following format.

Important	Indicates important content that must be considered during product operation.
Hint	Indicates content that will be useful if considered during product operation.

1.1.3 Symbols

In this manual, in addition to the indications "Danger," "Warning," and "Important," the following symbols are used to make it easier to understand the content of these warnings.

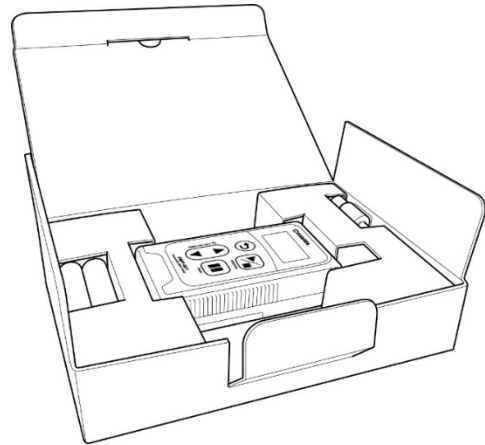
	This symbol indicates a danger that could pose a hazard to someone.
	This symbol indicates something that is prohibited and must not occur.
	This symbol indicates something that is a necessity and must occur.

1.2 Checking the Packed Items

After opening the packaging, confirm that all the items have been included.

If one of the packed items is damaged or missing, contact your Sibata representative. In addition, after opening the packaging, it is recommended that you store the packing material and box so that you can reuse it in the event that you request repairs. If you decide to dispose of them however, do so in accordance with the applicable laws and legislations, and as indicated by your municipality.

- | | |
|---|---|
| (1) Main unit: | 1 |
| (2) AA batteries for checking operations: | 2 |
| (3) Low flow rate orifice: | 1 |
| (4) Adapter: | 1 |








1.3 Definition of Suitable Users











This product should only be operated by trained and experienced operators that understand the specialized technology and dangers involved. Untrained or currently being trained operators should only operate the product under close supervision by a person that is already trained or has sufficient specialized experience.

This operation manual is written assuming the product will be operated by a person that understands the risks of operating the product.

2 Safety Instructions

The precautionary information in this operation manual is for ensuring that the product is used safely and for preventing injury to you and other people and damage to equipment. It is all important for ensuring safety, so be sure to read it thoroughly before using the product and observe it during use.

 DANGER	
	This product is not explosion proof, so do not use it near combustible or flammable materials. Doing so could cause explosion or fire.
	Do not operate the product near highly flammable or combustible items. Also, do not take in any gas other than the air. Doing so could cause explosion or fire.
	Keep the product away from open flames. Do not burn the product in a fire. Doing so could cause explosion or fire.
	Do not connect to the connector electrode using wire or other metal objects. Doing so could cause burns, a battery leak, heat generation, or an explosion.

 WARNING	
	Do not expose the product directly to water. Doing so could cause an electric shock or fire.
	Do not subject the product to strong impacts or drops. Doing so could cause a malfunction or accident.
	Do not leave the product inside a car in the hot sun, or store it in strong direct sunlight, in front of heating equipment, or near a fire. Doing so could cause operational problems or a malfunction.
	Do not connect to the connector using wire or other metal objects, or any other method not specified in this manual. Doing so could cause fire or equipment damage.
	Never attempt to disassemble or modify the product. Doing so could cause a malfunction or accident.
	If a problem occurs during operation, immediately stop operating the product, and identify and eliminate the cause. If it is determined that the product caused the problem, contact your Sibata representative or the distributor where you purchased the product.
	Do not cover this product with a cloth or blanket or enclose it inside a box when it is operating. Doing so could cause heat buildup, a fire or malfunction.
	Do not block the exhaust port. Doing so could limit the required flow rate, causing the internal temperature to rise, leading to a malfunction or fire.
	This product is designed for indoor use. Do not use it in an environment in which it will be exposed to the wind and rain. Doing so could cause a malfunction.



CAUTION

	If not using the product for an extended period, remove the batteries and store it at a dry, low temperature location, away from direct sunlight.
	Install the product at a level, stable location. Not doing so could cause operational problems or a malfunction.
	Do not place anything on top of the product. Doing so could cause the product falling down, deformation, malfunction, or accident.
	When assembling this product, such as when inserting the batteries, be careful that your fingers do not get pinched.
	This product is an air sampling pump. Do not use it for any purpose not indicated in this manual. Doing so could cause a malfunction.
	Do not permit water, other liquids, or non-atmospheric gases to enter the product. Doing so could cause a malfunction.
	Be sure to operate the product with a filter element and sampling unit installed at the intake port. Sampling air directly for long periods could cause a malfunction.
	Do not permit flammable gases, corrosive gases, or chemicals to enter the product. Doing so could cause a malfunction or fire.
	Do not insert screws or other foreign objects into the intake port or exhaust port. If a foreign object accidentally enters the product, immediately switch the power OFF. Then contact your Sibata representative or the distributor where you purchased the product.
	The normal operating temperature range of this product is 0 to 40 °C, with humidity between 10 and 90 % RH (and no condensation). Operating the product outside these temperature and humidity ranges could reduce performance, shorten the service life, or cause a malfunction.
	Remove the batteries and disconnect any external batteries before cleaning or inspecting the product. Not doing so could cause an electric shock, battery leakage, or other problems.
	Keep the product away from sources of noise. Also, do not place it in areas with strong magnetic fields, high dust levels, or high humidity. Doing so could cause product damage or other problems.

Important

Please be aware that in the unlikely event of a product failure, Sibata bears no responsibility to compensate for sampling data not acquired or recorded, and is not responsible for loss of data, or for other direct or indirect damages incurred from such loss. Be sure to back up* data on a regular basis in case of an accident or failure.

* This product does not have a data output function. To back up the results, you must write them down for example.

3 About This Product

3.1 Overview

The personal mini pump PMP-001 is a lightweight, portable air sampling pump equipped with functionality for measuring accumulated flow rates. The flow rate for this pump is 10 mL/min to 300 mL/min, which in the air sampling pump lineup from Sibata is a particularly low flow rate range. It is equipped with a pressure loss correction function and a constant flow rate function. The pump is controlled so as to maintain the set flow rate even if you are using sampling tubes with different pressure loss values, or the pressure loss changes during sampling. As a result, this can be used as an air sampling pump for toxic substances in work environments, indoor environments, and ambient environments.

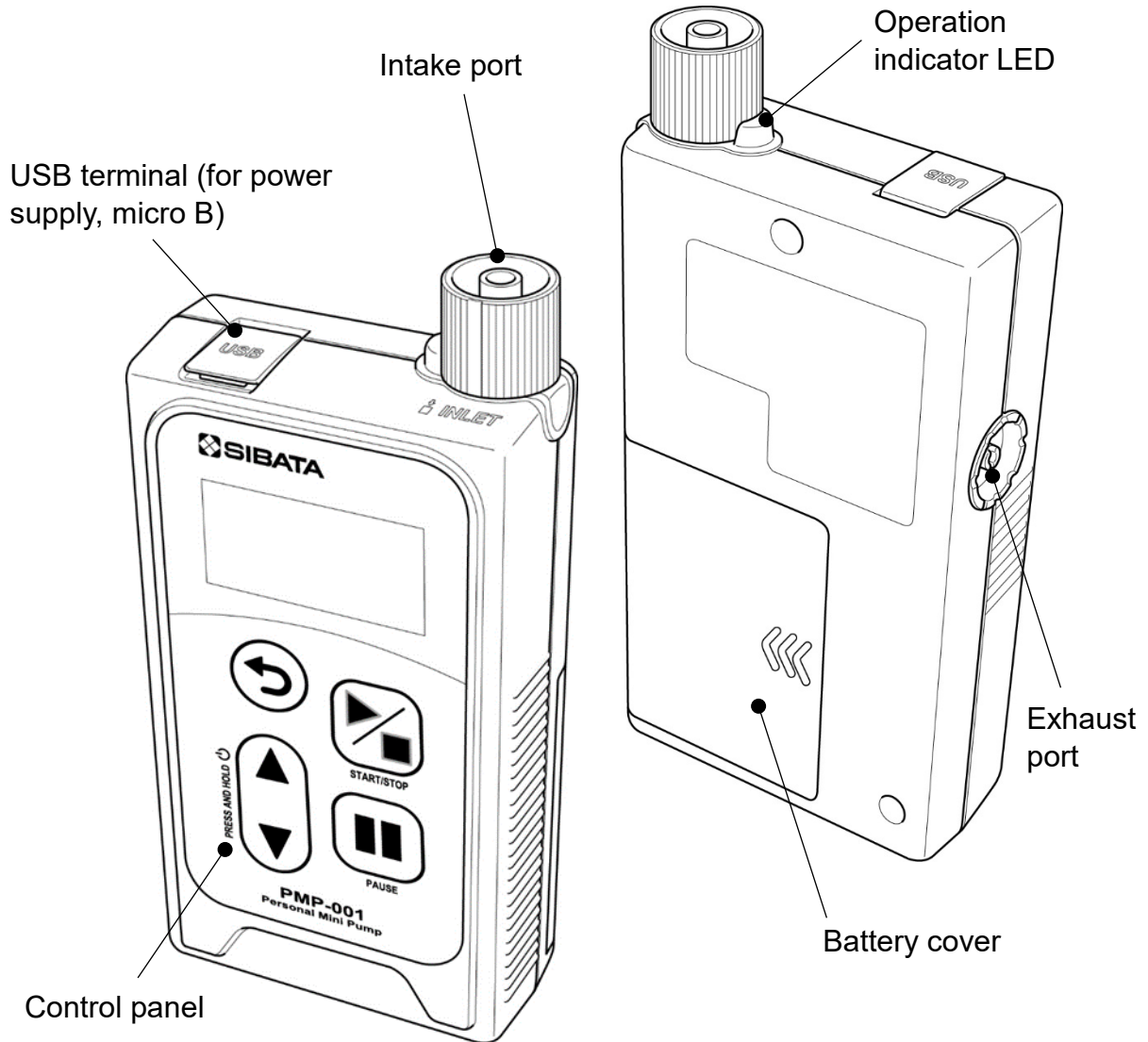
3.2 Features

- ◆ A pressure loss correction function is built in, which suppresses intake flow rate fluctuations if sampling tubes with different pressure loss values are used with the same set flow rate.
- ◆ A constant flow rate function is built in, which suppresses intake flow rate fluctuations if a sampling material is used with a pressure loss that changes due to sampling.
- ◆ An organic EL graphics display has been adopted as the indicator, so you can check the flow rate information even at a dark location.
- ◆ The product can run for approx. 10 hours on two alkaline batteries (100 mL/min, unloaded conditions).
- ◆ The USB terminal can be connected to a mobile battery* with an output of at least 5 V DC and 500 mA or to an AC adapter for use as an external power supply.

* The product might not operate properly depending on the mobile battery specifications.

3.3 Names of the Parts

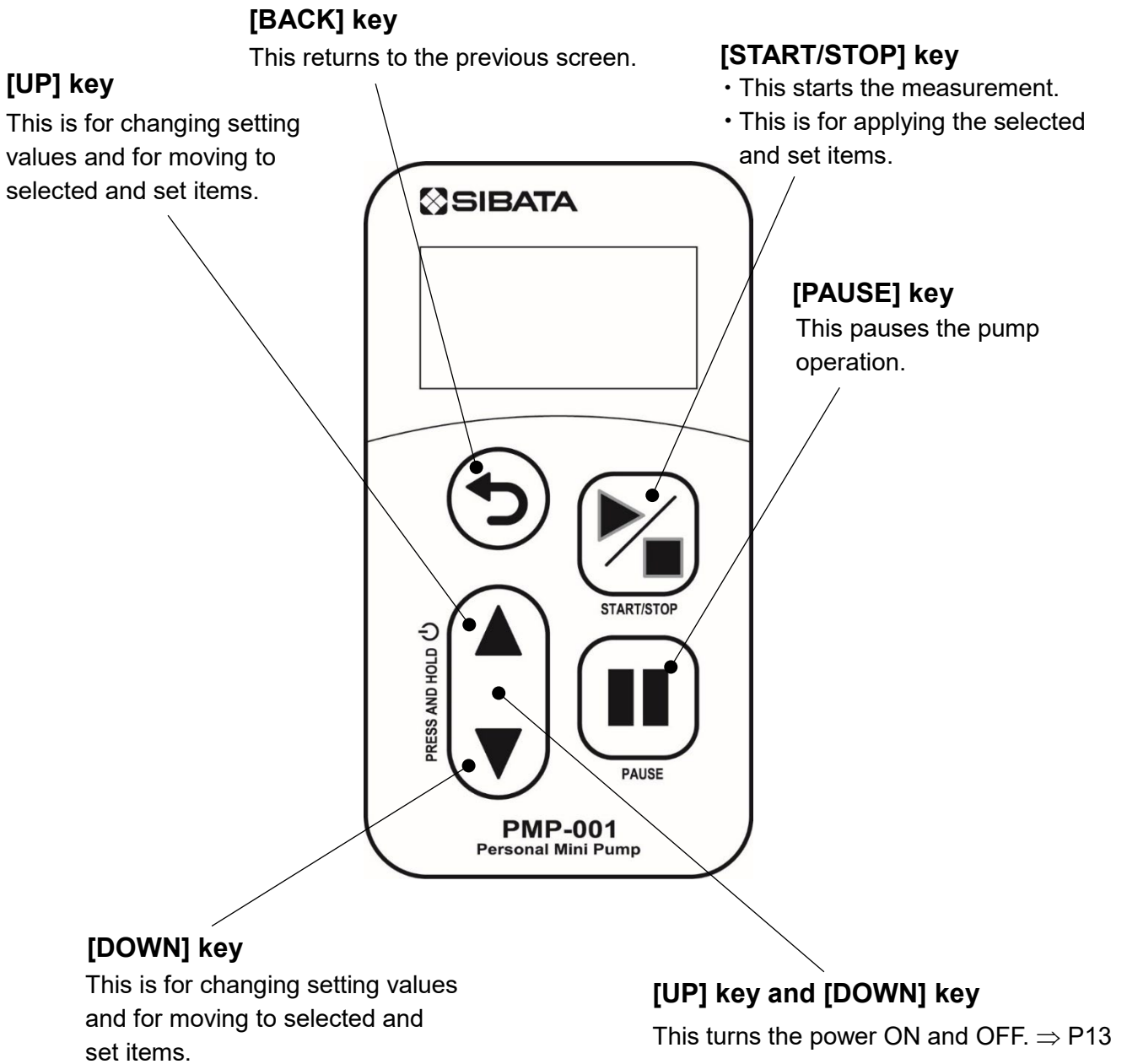
3.3.1 Main Unit



■ Pump Status and the Color of the Operation Indicator LED (Operating Mode)

Color of the Operation Indicator LED	Pump Status (Operating Mode)
Orange	During Delay and Manual operation
Green	During Run.T and Interval Timer operation
Blue	During Volume operation
Red	During an error

3.3.2 Control Panel



Hint	If you press and hold the [BACK] key for 1 second or longer, the system will return to the [HOME] screen. (If this operation is performed in the setting screen, the setting details will be lost.)
	When changing the setting values, press and hold the [UP] key or [DOWN] key to increase the amount of change in the value.

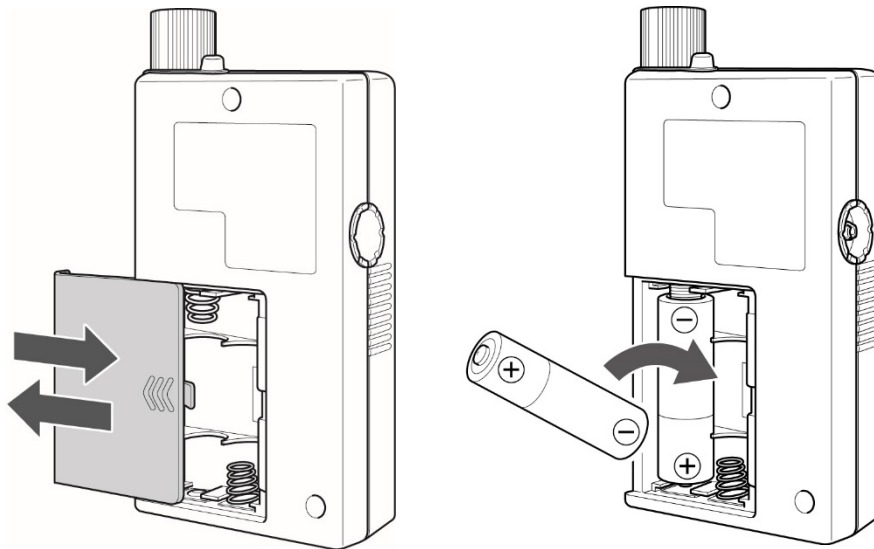
4 Operation Procedures

4.1 Preparing the Power Supply and Turning the Pump ON and OFF

4.1.1 Installing and Removing Batteries

Important	When replacing the batteries, ensure that both of the two batteries are replaced simultaneously with new ones.
	Check the recommended usage time for the batteries and use them before this time expires.
	Be careful not to put the batteries in backwards. (Do not accidentally reverse the + and - ends.)
	Remove the batteries when the product is not in use.
	If the batteries leak, the fluid could damage the circuit boards inside the product. In this case, request repairs or an inspection.

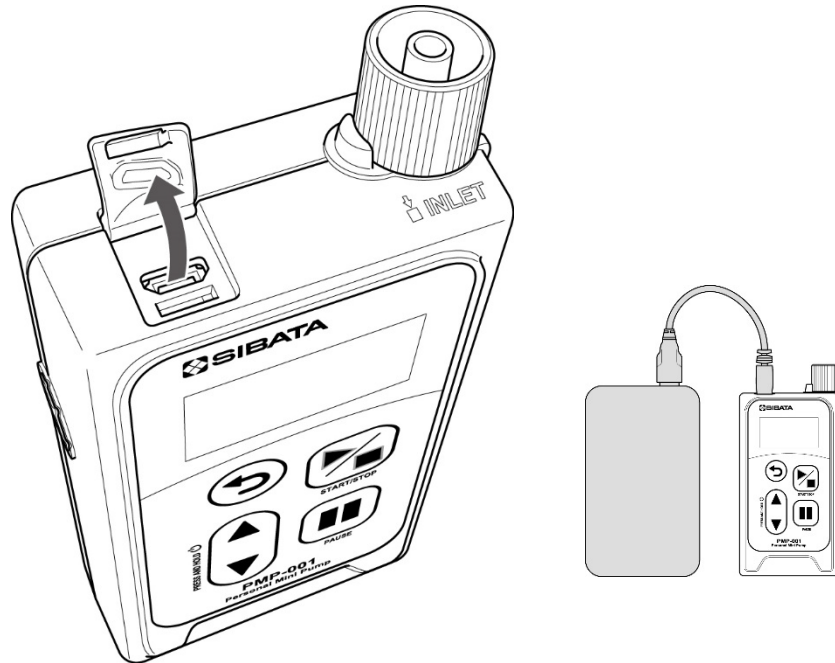
- (1) Slide the battery cover and remove it.
- (2) Insert two AA batteries (alkaline batteries recommended).
- (3) Restore the battery cover.



Hint	You can also use rechargeable AA batteries, but limitations will result regarding the battery level indicator. ⇒ P13
	If the batteries run out and the power is inadvertently turned OFF, sampling will be discontinued, and it will not be possible to continue. The discontinued data can be viewed by checking the previous sampling data (<i>2 Previous Data</i>). ⇒ P34 Note that if you use the pause function, you can replace the batteries and then continue sampling. ⇒ P30

4.1.2 External Power Supply

With this product, you can use an external power supply other than the regular batteries by using the USB terminal. Note that if a mobile battery is used, ensure that the output is at least 5 V and 500 mA.



Important	<p>Mobile batteries sold for use with smartphones are equipped with a function that stops the current supply if it drops below a certain value.</p> <p>Accordingly, If the current value for this product is below the above-mentioned threshold value, the pump may not operate properly with the mobile battery. It may stop operating for example, or the power may turn OFF after 10 or 20 seconds.</p>
Hint	<p>You can also use an AC adapter with an output of at least 5 V and 500 mA.</p> <p>If there are batteries in the product when an external power supply is connected, the external power supply connection will take priority when running it.</p> <p>In this case, if the power supplied from the external power supply stops, the product will switch to the power supplied by the internal batteries and it will continue to operate, thus avoiding problems.</p>

4.1.3 Turning the Pump ON and OFF

To turn the power ON or OFF, simultaneously press and hold the [UP] key and [DOWN] key for approximately 2 seconds. Note that if the power is ON and you are turning it OFF, operation of either the [UP] key or [DOWN] key will be applied. Continue to press and hold however.






Hint	After the power is ON, if you continue to press and hold the [UP] key and [DOWN] key, the power will turn OFF, after which it will not turn ON.
	The product may not operate as per the specifications immediately after the power is turned ON. Let it warm up (with the pump running) for several minutes before use.

4.1.4 Remaining Battery Level Display




Important	The remaining battery level is displayed at the top right of the screen, but only during intake. The remaining battery level will not be displayed during setting changes or other operations, or during standby via timer operation. Also, the remaining battery level display is designed on the assumption that alkaline batteries are being used in this product. Rechargeable AA batteries can also be used. However, because of differences in discharge characteristics, the relationship between the remaining battery level displayed and the operating time will also differ.
-----------	---

The remaining battery level is displayed as four stages. Note that when power is supplied from the USB terminal, USB will be displayed in the remaining battery level area and the bar graph will not be displayed. In this case, check the remaining battery level display on the mobile battery.

■ Battery Level Display

	Over 2.8 V
	Between 2.5 V and 2.8 V
	Between 2.3 V and 2.5 V
	Less than 2.3 V
	When power is supplied from the USB terminal

■ Remaining Battery Level Display and Reference Operating Times Until the Pump Stops (When alkaline batteries are used, and Sleep Mode is set to OFF)

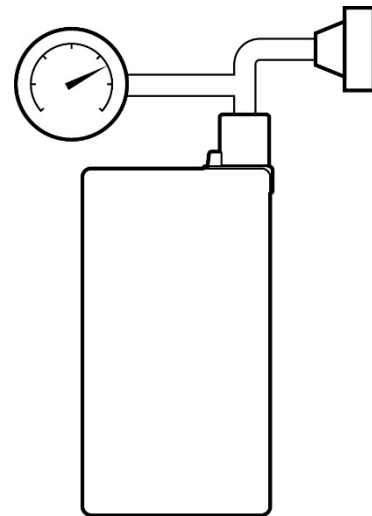
Flow Rate	Load			
10 mL/min	Heat desorption tube	9 to 10 hours	6 to 9 hours	2.5 to 6 hours
50 mL/min	Charcoal tube	5 to 5.5 hours	3.5 to 5 hours	1.5 to 3.5 hours
100 mL/min	Charcoal tube	10 to 11 hours	6.5 to 10 hours	2.5 to 6.5 hours
100 mL/min	Load equivalent to 20 kPa	5.5 to 6.5 hours	3.5 to 5.5 hours	1.5 to 3.5 hours
200 mL/min	Load equivalent to 20 kPa	5 to 5.5 hours	3 to 5 hours	1.5 to 3 hours
300 mL/min	Charcoal tube	6 to 7 hours	4 to 6 hours	2 to 4 hours

- These values are based on actual measured values under a 25 °C environment. Note that these values are not guaranteed.

4.2 Pressure Loss

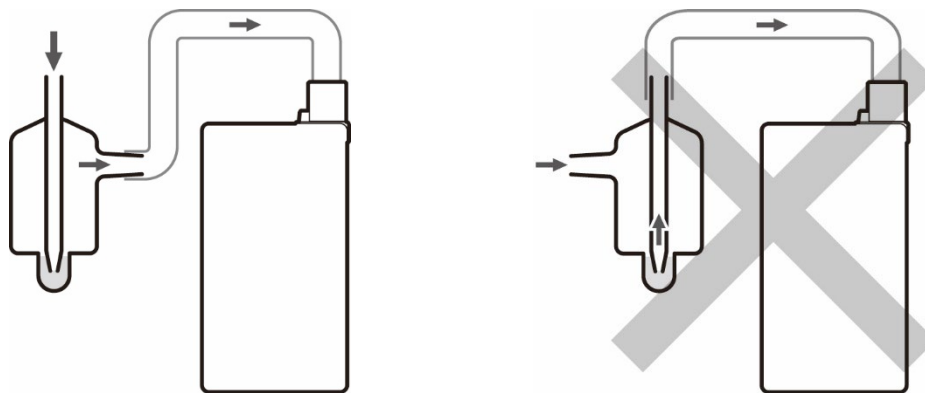
Pressure loss occurs due to sampling tubes or other sampling materials attached to the intake port. A constant flow rate usage range has been established for this product (\Rightarrow P 55). If the specified range is exceeded, a malfunction could occur. However, this product is not equipped with a function to measure pressure loss.

It is recommended that you measure the pressure loss of the sampling material in advance, as per the figure.



4.3 Using a Micro Impinger

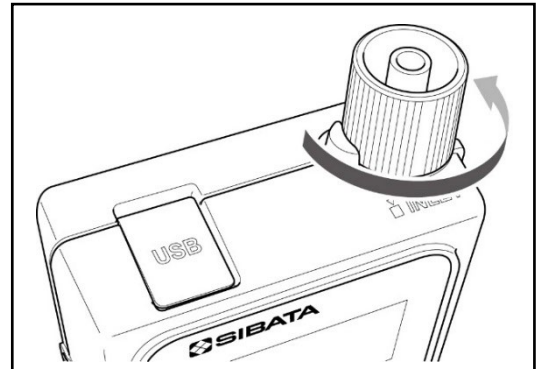
When a micro impinger is used, if the tubing is connected incorrectly, liquid will inadvertently be taken into the main unit, resulting in a malfunction. Accordingly, connect the tubing as per the figure below.



Important	As per the figure at top right, never connect tubing in which liquid is taken in directly.
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4.4 Attaching and Removing the Intake Port

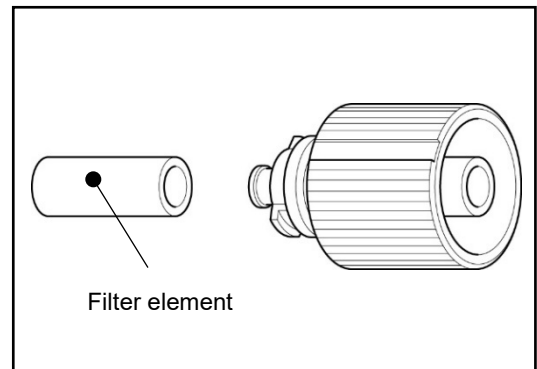
To remove the intake port, turn it in the counter clockwise direction.



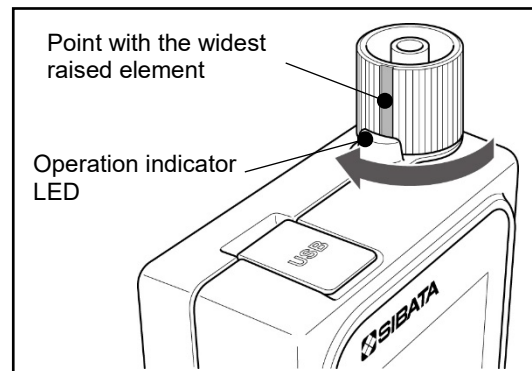
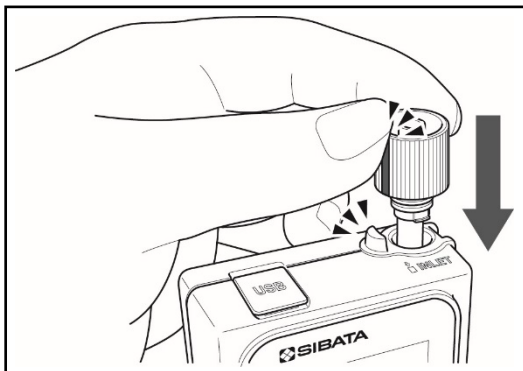
Pull gently on the filter element attached to the intake port to remove the filter element, and then replace it.

Important

To prevent malfunctions due to the intake of foreign objects and fine particles, be sure to attach a filter element.



Match the point on the intake port with the widest raised element* to the operation indicator LED. Then push the intake port in and turn it 90 degrees in the clockwise direction.

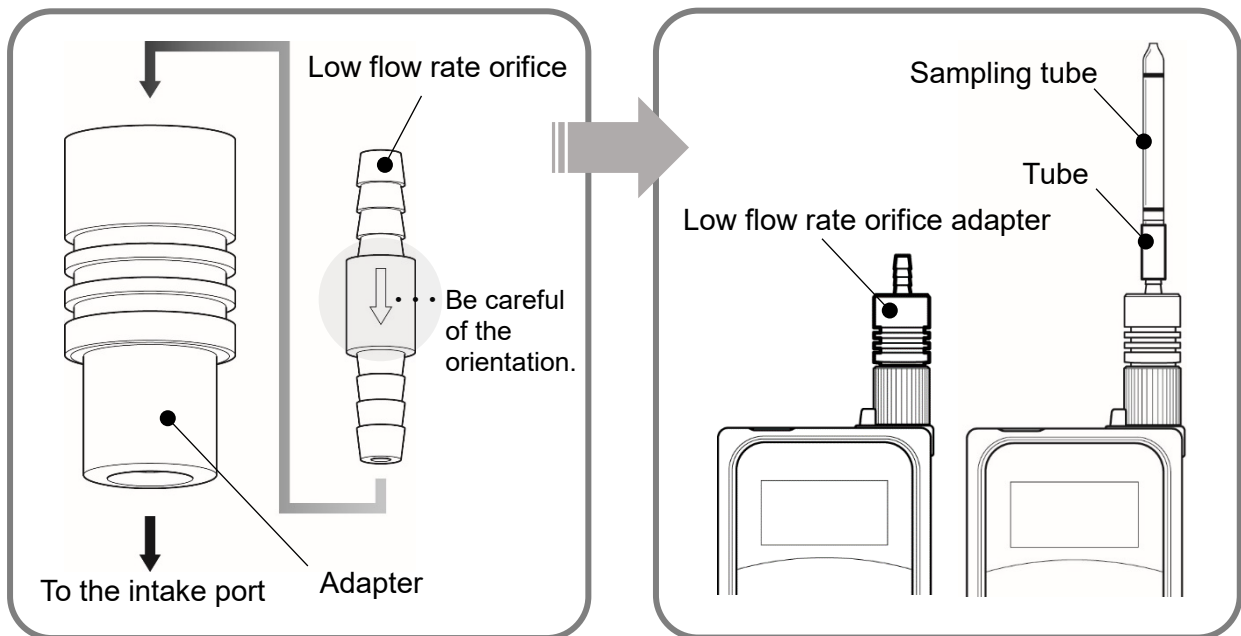


* There are two points on the intake port to serve as positioning guides.

4.5 Using the Low Flow Rate Orifice and Adapter

A low flow rate orifice and adapter are provided with this pump. If you are using the pump with a flow of 50 mL/min or less, attach the low flow rate orifice adapter with the low flow rate orifice connected, to the intake port and then connect the sampling tube, etc.

Important	When the settings are configured to 50 mL/min or less, if a low flow rate orifice adapter is not used, the indicated value will not reach the set value or will fluctuate significantly during operation, so be sure to use it. Note that even if the low flow rate orifice adapter is used, the pump may operate intermittently depending on the set flow rate and the load conditions.
	When connecting the low flow rate orifice to the adapter, be sure that the arrow on the low flow rate orifice faces downwards with respect to the adapter.



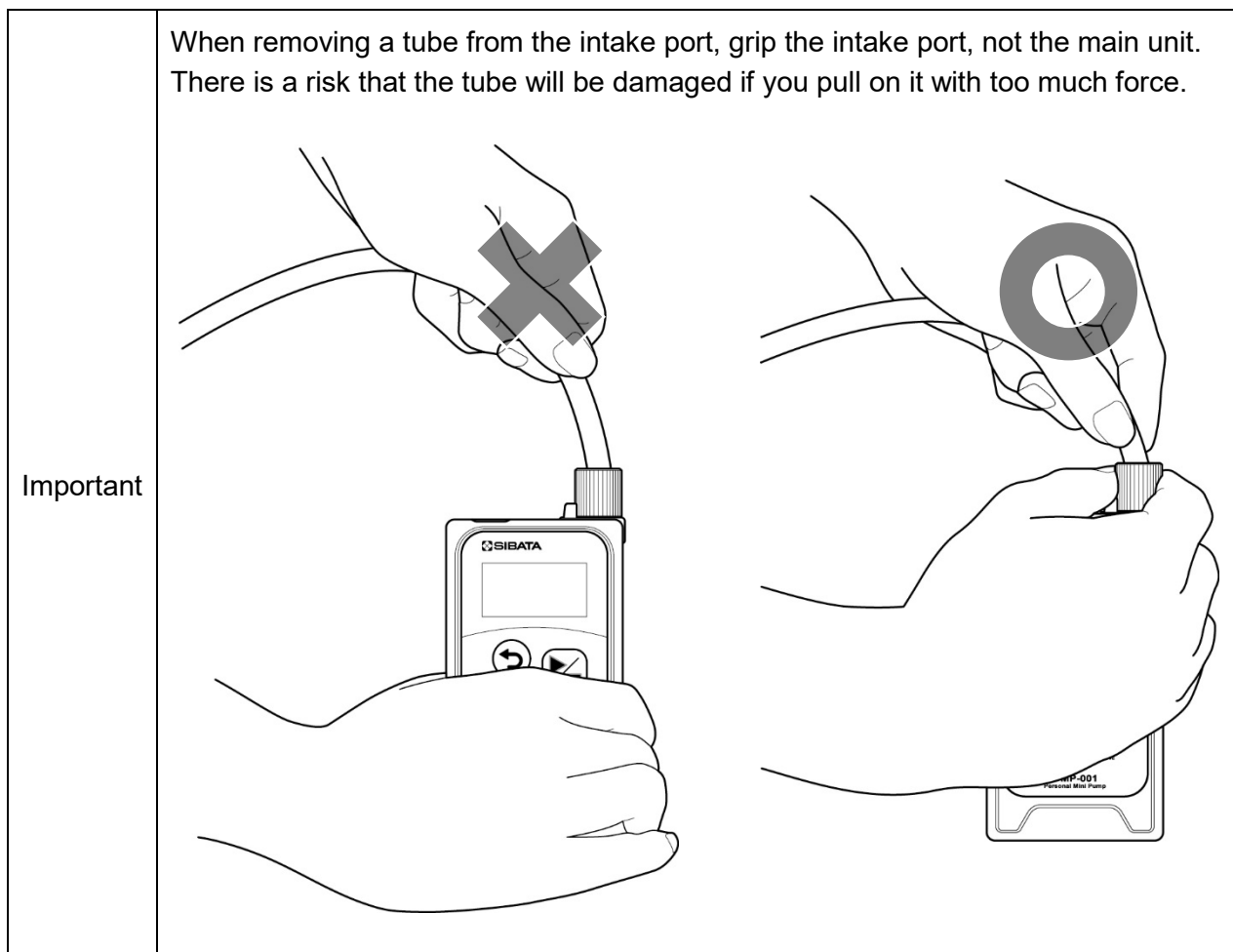
Hint	<p>If the flow rate is set to a value at which the low flow rate orifice adapter is not used, sampling can be performed with the sampling tube connected directly to the adapter.</p> <p>Note that in this case, be very careful not to lose the low flow rate orifice.</p>	<p>The diagram shows the 'Sampling tube' connected directly to the 'Adapter' without the low flow rate orifice adapter. Labels include 'Sampling tube' and 'Adapter'.</p>
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4.6 Installing the Pump and Connecting the Tube

Install this pump on a flat surface. Avoid sites with high humidity, moist sites, sites close to open flames or heat sources, and sites with extremely high dust levels.

Confirm that the filter element is attached to the intake port. Also, replace the filter element if it becomes very dirty. ⇒ P15

Tubes with an inner diameter of 5 mm or 7 mm can be attached to the intake port.



4.7 [HOME] Screen and [MENU] Screen

When the power is turned ON (by pressing and holding the [UP] key and [DOWN] key), the version information will be displayed, and then the system will proceed to the [HOME] screen.

[HOME] Screen

The sampling conditions are displayed.

◆ The key based operations are as follows.

[START/STOP] key

This starts the sampling. ⇒ P25

[UP] key or [DOWN] key

This switches to the [MENU] screen.

```
HOME  START▶ SCROLL ▲▼
-----
Flow :100mL/min [25]
Start:Manual
Stop :Manual
```



[MENU] Screen

This screen consists of the following three items.

The selected item will blink.

1 Setup

This is for setting the sampling conditions. ⇒ P19

2 Previous Data

This is for checking previous sampling data. ⇒ P34

3 Extra

This is for setting various settings other than the sampling conditions. ⇒ P38

```
MENU  SCROLL ▲▼
-----
1 Setup
2 Previous Data
3 Extra
```

◆ The key based operations are as follows.

[BACK] key: This switches to the [HOME] screen.

[UP] key or [DOWN] key: This switches the item selected.

[START/STOP] key: This switches to the screen for the item selected.

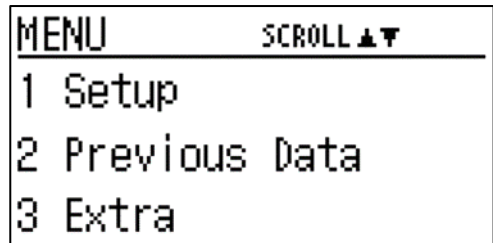
4.8 Sampling Procedures (Setup)

4.8.1 Setting the Sampling Conditions

Select 1 Setup on the [MENU] screen to set the sampling conditions.

[MENU] Screen

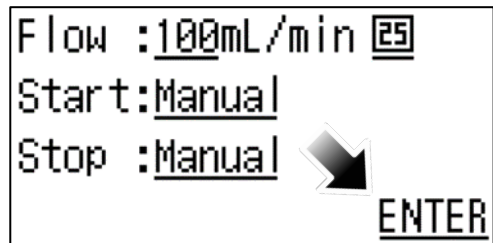
Press the [UP] key or [DOWN] key to select 1 Setup.
Then press the [START/STOP] key.



[Setup] Screen

On the [Setup] screen, the following four items can be changed.

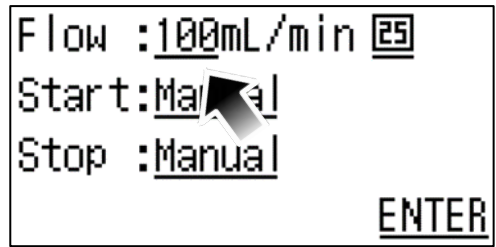
- Sampling flow rate ⇒ P20
- Flow rate conversion temperature ⇒ P20
- Sampling start ⇒ P21
- Sampling pause ⇒ P22



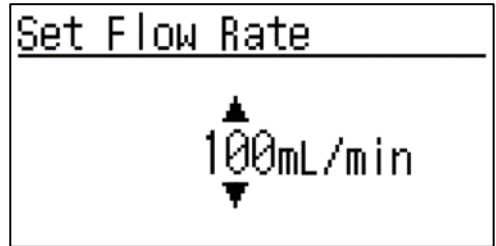
Important	<p>After changing to the setting conditions of your choice, press the [UP] key or [DOWN] key to select <u>ENTER</u>. Then press the [START/STOP] key. Apply the changes to the setting conditions and return to the [HOME] screen.</p>
	<p>If you press the [BACK] key before applying the changes to the setting conditions, the system will return to the [MENU] screen without applying the changes.</p>

4.8.2 Setting the Flow Rate

As per the figure, press the [UP] key or [DOWN] key to select an underlined item. Then press the [START/STOP] key.



Press the [UP] key or [DOWN] key to change to the set flow rate of your choice. If you press the [START/STOP] key, the system will return to the [Setup] screen. Confirm that the set flow rate is displayed.



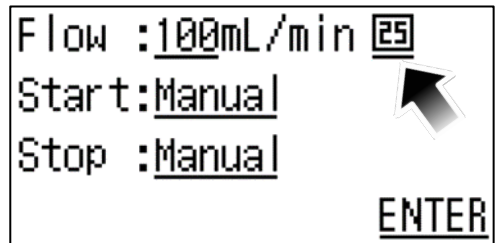
◆ Other key based operations

[BACK] key ⇒ This returns to the [Setup] screen without applying the changes.

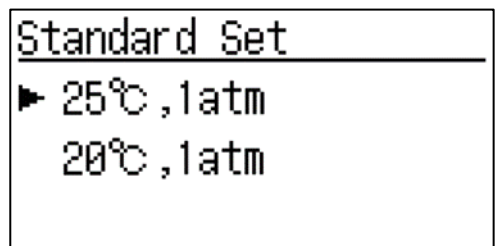
Hint	If you set the flow rate to the user calibrated value, an icon will be displayed on the [HOME] screen. ⇒ P39
------	--

4.8.3 Setting the Flow Rate Conversion Temperature

As per the figure at right, press the [UP] key or [DOWN] key to select an underlined item. Then press the [START/STOP] key.



Press the [UP] key or [DOWN] key to select the flow rate conversion temperature of your choice (25 °C or 20 °C). If you press the [START/STOP] key, the system will return to the [Setup] screen. Confirm that the selected flow rate conversion temperature icon is displayed.



◆ Other key based operations

[BACK] key ⇒ This returns to the [Setup] screen without applying the changes.

4.8.4 Setting the Sampling Start Operation

The following two sampling start operations can be selected.

<u>Manual</u>	<p>Sampling is started manually. On the [HOME] screen, press the [START/STOP] key. Sampling will start immediately.</p>
<u>Delay</u>	<p>Sampling will start after the set time of your choice has elapsed. Use this to start measurements 30 minutes later for example. Setting range: 1 second to 999 hours, 59 minutes, 59 seconds</p>

● Delay Setting

As per the figure at right, press the [UP] key or [DOWN] key to select an underlined item. Then press the [START/STOP] key.

Flow : 100mL in [ES]
Start: Manual
Stop : Manual
ENTER

Press the [UP] key or [DOWN] key to select Delay.

◆ Other key based operations

[BACK] key ⇒ This returns to the [Setup] screen without applying the changes.

Start Timer
Manual
▶ Delay ←

If you select Delay and press the [START/STOP] key, the system will return to the [Setup] screen. Confirm that Start:Delay is displayed.

Note that when Delay is selected for the first time, the initial value is automatically set to 1 minute. Afterwards, the most recent setting value is displayed.

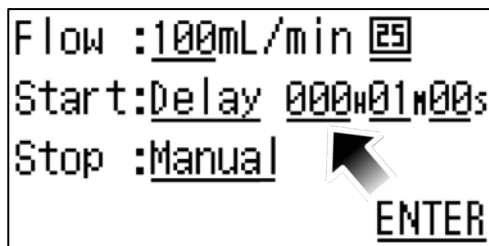
Flow : 100mL in [ES]
Start: Delay 000H01M00s
Stop : Manual
ENTER

Important	<p>If you set <u>000H00M00S</u> and press the [ENTER] key, the system will switch to the [HOME] screen as per usual, but the <u>Delay</u> setting value will be set to the initial values of 1 minute automatically.</p>
-----------	--

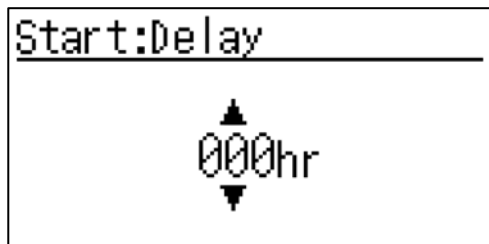
If you select the numerical values displayed beside Delay, the system will switch to a screen on which you can change the value of 000H in 1 hour increments, 01M in 1 minute increments, and 00S in 1 second increments. In accordance with the time settings, press the [UP] key or [DOWN] key to select an underlined item.

Example: To change the settings in 1 hour increments

Select the underlined item in the figure at right and press the [START/STOP] key to switch to a screen on which you can change the numerical value in 1 hour increments.



Press the [UP] key or [DOWN] key to change to the time setting of your choice. If you press the [START/STOP] key, the system will return to the [Setup] screen. Confirm that the set time is displayed.



◆ Other key based operations

[BACK] key ⇒ This returns to the [Setup] screen without applying the changes.

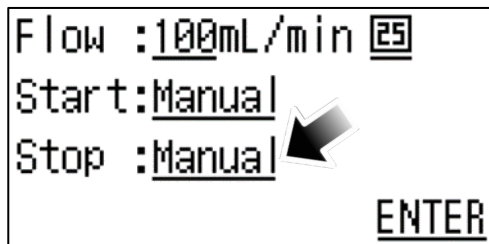
4.8.5 Setting the Sampling Stop Operation

The following three sampling stop operations can be selected.

<u>Manual</u>	<p>Sampling is stopped manually. During sampling or a delay operation, press the [START/STOP] key. The pump will stop operating immediately. ⇒ For the maximum operating time, see P33 "Measurement Value Overflow."</p>
<u>Run.T</u>	<p>Sampling is stopped at the setting of your choice for the operating time. Use this to stop measurements 30 minutes later for example. Settings range: 1 second to 999 hours, 59 minutes, 59 seconds</p>
<u>Volume</u>	<p>Sampling is stopped at the setting of your choice for the accumulated flow rate. Use this to stop measurements at the set accumulated flow rate value. Setting range: 0.010 L to 9999.9 L</p>

● **Setting the Run Time**

As per the figure at right, press the [UP] key or [DOWN] key to select an underlined item. Then press the [START/STOP] key.



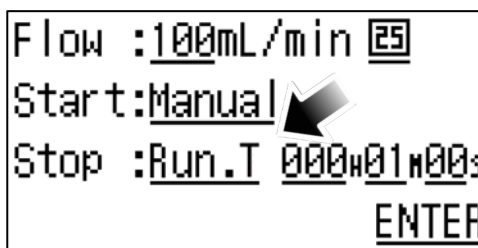
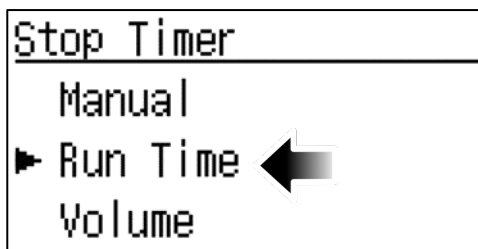
Press the [UP] key or [DOWN] key to select Run Time.

◆ Other key based operations

[BACK] key ⇒ This returns to the [Setup] screen without applying the changes.

If you press the [START/STOP] key, the system will return to the [Setup] screen. Confirm that Stop:Run.T is displayed.

Note that when run time is selected for the first time, the initial value is automatically set to 1 minute. Afterwards, the most recent setting value is displayed.



If you select the numerical values displayed beside Run.T, the system will switch to a screen on which you can change the value of 000H in 1 hour increments, 01M in 1 minute increments, and 00S in 1 second increments. In accordance with the time settings, press the [UP] key or [DOWN] key to select an underlined item.

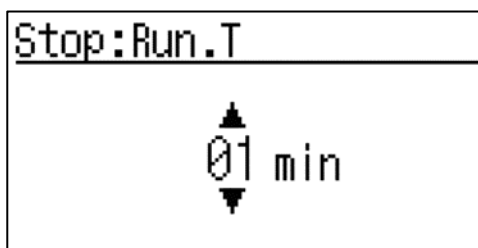
Important	If you set <u>000H00M00S</u> and press the [ENTER] key, the system will switch to the [HOME] screen as per usual, but the <u>Run.T</u> setting value will be set to the initial values of 1 minute automatically.
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Example: To change the settings in 1 minute increments
Select the underlined item in the figure at right, and press the [START/STOP] key to switch to a screen on which you can change the numerical value in 1 minute increments.



Press the [UP] key or [DOWN] key to change to the time setting of your choice.

If you press the [START/STOP] key, the system will return to the [Setup] screen. Confirm that the set time is displayed.



◆ Other key based operations

[BACK] key ⇒ This returns to the [Setup] screen without applying the changes.

● Setting the Volume

Press the [UP] key or [DOWN] key to select Volume.

◆ Other key based operations

[BACK] key ⇒ This returns to the [Setup] screen without applying the changes.

If you press the [START/STOP] key, the system will return to the [Setup] screen. Confirm that Stop:Volume is displayed.

Note that when volume is selected for the first time, the initial value is automatically set to 0.010 L. Afterwards, the most recent setting value is displayed.

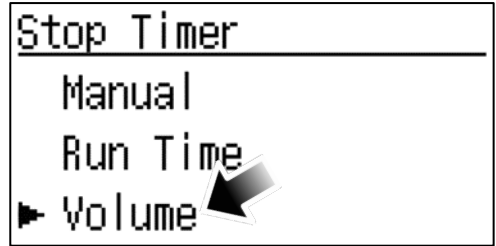
If you select the numerical value displayed beside Volume and press the [START/STOP] key, the system will switch to a screen on which you can change the value.

Press the [UP] key or [DOWN] key to change to the accumulated flow rate of your choice.

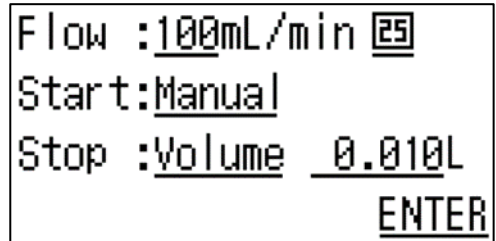
If you press the [START/STOP] key, the system will return to the [Setup] screen. Confirm that the set flow rate is displayed.

◆ Other key based operations

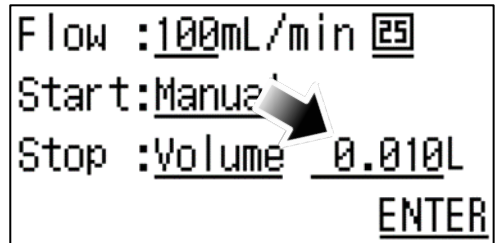
[BACK] key ⇒ This returns to the [Setup] screen without applying the changes.



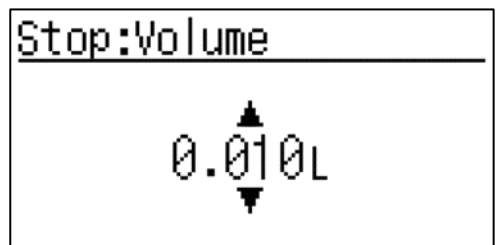
Stop Timer
Manual
Run Time
▶ Volume



Flow : 100mL/min [25]
Start: Manual
Stop : Volume 0.010L
ENTER



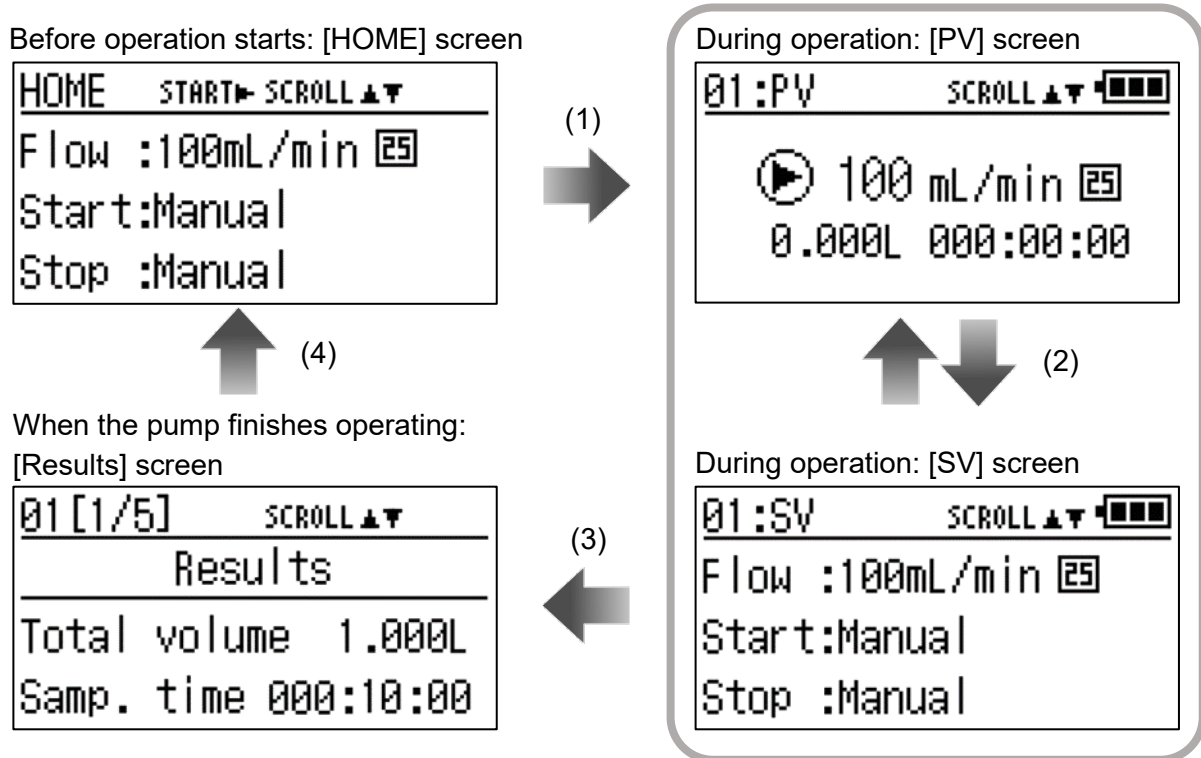
Flow : 100mL/min [25]
Start: Manual
Stop : Volume 0.010L
ENTER



Stop:Volume
0.010L

4.8.6 Screens Displayed from the Start to the Stop of Operations

- (1) On the [HOME] screen, press the [START/STOP] key to start the pump operation with the set conditions and at the same time, to switch to the [PV] screen.
- (2) During operation, press the [UP] key or [DOWN] key to switch between the [PV] screen and the [SV] screen.
- (3) When the conditions for the pump to finish operating have been satisfied or when the pump is stopped manually, the [Results] screen will be displayed. ⇒ P29
- (4) Press the [BACK] key to return to the [HOME] screen.



● [PV] Screen and [SV] Screen

[PV] screen: This displays information during operation (such as instantaneous flow rate, accumulated flow rate, and pump operation time). ⇒ P26 and from 27 onwards

[SV] screen: This displays the operating conditions (settings).

● Measurement No.

A measurement No. is displayed at the top left of the [PV] screen and [SV] screen. These numbers are in sequence from 00 to 99. Each time the pump starts operating, the number is increased by 1.

This number is interlinked with the sampling results, which can be checked on the [Previous Data] screen. Accordingly, recording this number enables you to check the results even after sampling. Note that after 99 is reached, it will start again at 00.



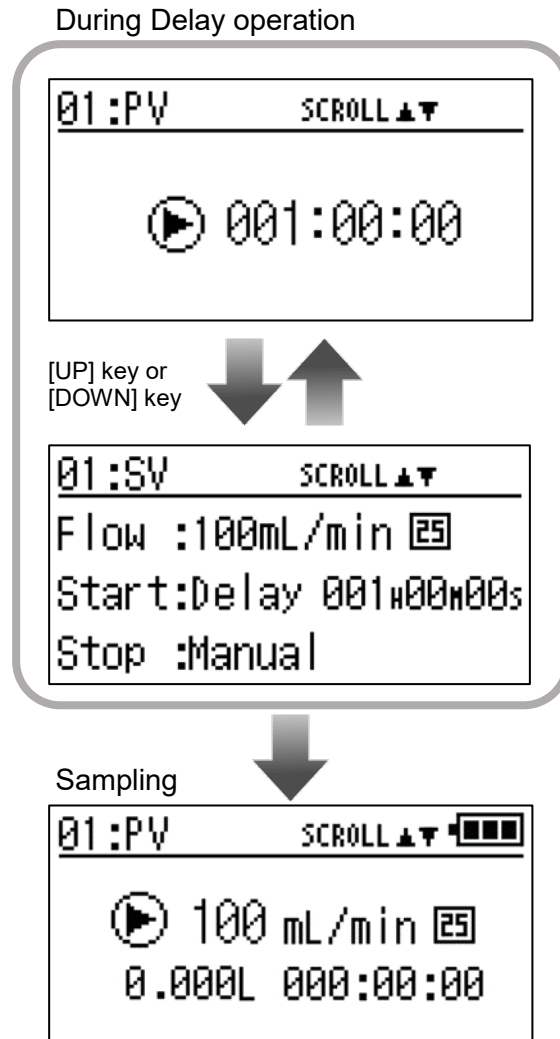
Important	If you are comparing measurement data sets, be sure to record the measurement No. for each measurement.
------------------	---

4.8.7 During Operation Standby

● Start: Delay (Example: If the delay is set for 1 hour later)

During the Delay operation, a countdown of the remaining time until sampling starts is displayed on the [PV] screen.

Sampling will start when the set time has elapsed.

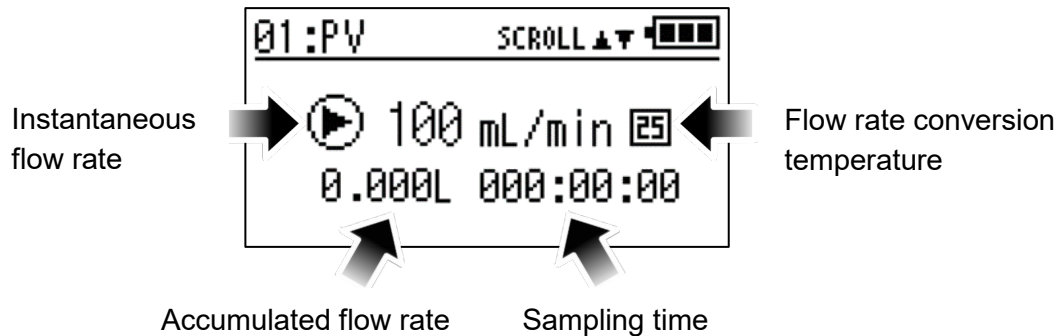


◆ Key operations for the [PV] screen or [SV] screen are as follows.

- [START/STOP] key: This ends the Delay operation and displays the [Results] screen.
- [UP] key or [DOWN] key: This switches between the [PV] screen and the [SV] screen.
- [PAUSE] key: This pauses the pump operation. ⇒ P30

4.8.8 During Operation

● Stop:Manual



Accumulated flow rate: Increases from 0.000L.

Sampling time: Increases in 1 second increments from 000:00:00.

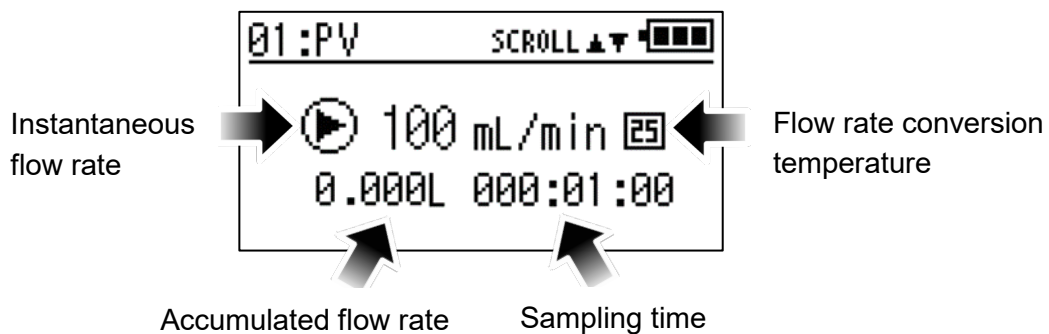
◆ Key operations for the [PV] screen or [SV] screen are as follows.

[START/STOP] key: This finishes sampling and displays the [Results] screen.

[UP] key or [DOWN] key: This switches between the [PV] screen and the [SV] screen.

[PAUSE] key: This pauses the pump operation. ⇒ P30

● Stop:Run.T (Example: If 1 minute is set)



Accumulated flow rate: Increases from 0.000L until the set time has elapsed.

Sampling time: Decreases in 1 second increments from the set time.

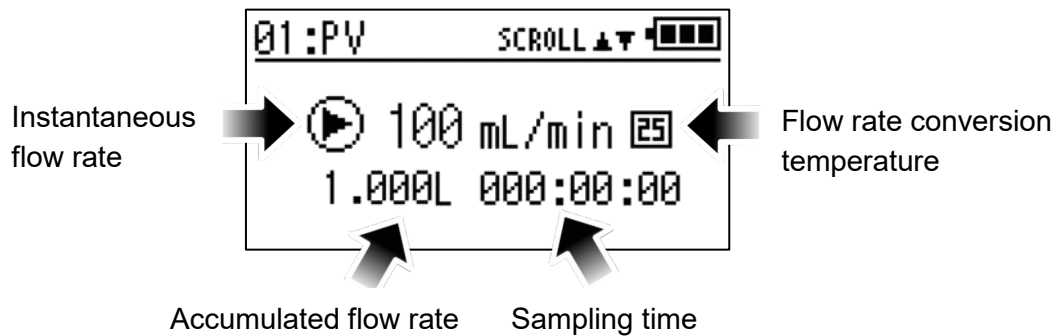
◆ Key operations for the [PV] screen or [SV] screen are as follows.

[START/STOP] key: This finishes sampling and displays the [Results] screen.

[UP] key or [DOWN] key: This switches between the [PV] screen and the [SV] screen.

[PAUSE] key: This pauses the pump operation. ⇒ P30

● **Stop:Volume (Example: If 1 L is set)**



Accumulated flow rate: Decreases from the set value.

Sampling time: Increases in 1 second increments until the accumulated flow rate reaches the set value.

◆ Key operations for the [PV] screen or [SV] screen are as follows.

[START/STOP] key: This finishes sampling and displays the [Results] screen.

[UP] key or [DOWN] key: This switches between the [PV] screen and the [SV] screen.

[PAUSE] key: This pauses the pump operation. ⇒ P30

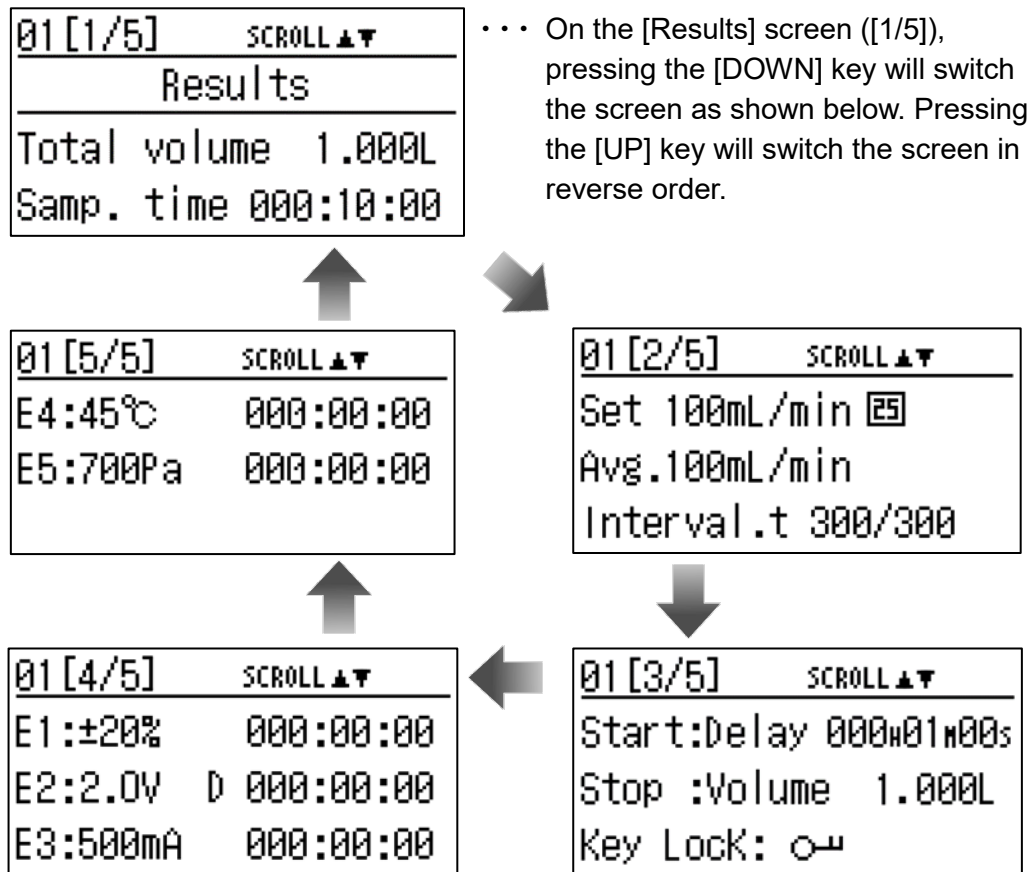
4.8.9 When the Pump Finishes Operating

When the conditions for the pump to finish operating have been satisfied or when the pump is stopped manually, the [Results] screen (sampling results) will be displayed.

◆ Key operations for the [Results] screen are as follows.

[UP] key or [DOWN] key: This switches between the pages.

[BACK] key: This returns to the [HOME] screen.



● Content Displayed on Each Screen

[1/5]: Accumulated flow rate and sampling time

[2/5]: Set flow rate, conversion temperature, average flow rate, and interval timer implementation cycles/set number of cycles*1

[3/5]: Operation start conditions, operation stop conditions, and key lock*2

[4/5]: Error (E1 to E3) occurrence time*3

[5/5]: Error (E4 to E5) occurrence time

*1 This is only displayed if the interval timer is enabled. ⇒ P48

*2 This is displayed when the key lock is implemented during measurements with Run.T and Volume as the conditions for stopping measurement and the key lock has not been canceled before the pump finishes operating.

*3 If an error occurred during measurement standby, D will be displayed to the left of the time, but only in the case of E2.

4.9 Pause Function

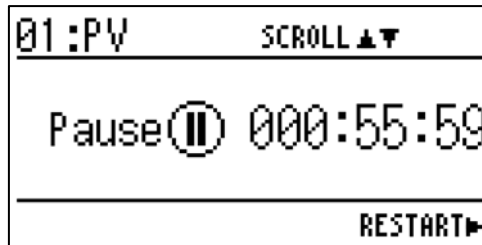
While the pump is operating including during operation standby (*Start:Delay*), if you press the [PAUSE] key on the [SV] screen or [PV] screen, pump operation will pause when the key is pressed.

◆ Key operations for the [PV] screen or [SV] screen when the pump is paused are as follows.

- [START/STOP] key: This restarts the pump operation.
- [UP] key or [DOWN] key: This switches between the [PV] screen and the [SV] screen.
- [PAUSE] key: Pressing and holding this key will end the measurement.

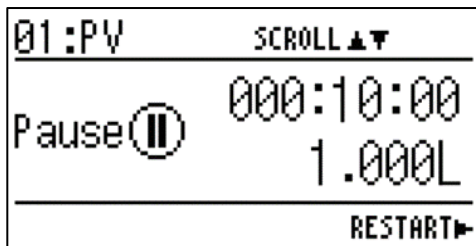
● **Pausing the Pump While It Is on Operation Standby (*Start:Delay*)**

The time remaining until sampling starts will be displayed.



● **Pausing the Pump While It Is Operating**

The accumulated flow rate and instantaneous flow rate values displayed during operation will be displayed. Note that the meaning of the values displayed depends on the sampling stop operation settings.



← Time
← Accumulated flow rate

Setting	Time	Accumulated Flow Rate
Manual	Elapsed	Accumulated
Run.T	Remaining	Accumulated
Volume	Elapsed	Remaining

Hint	<p>After the product has been paused, the state at the pause will be remembered even if the power is turned OFF (and even if the batteries are removed).</p> <p>To replace the batteries during sampling, pause the product, turn OFF the power, and replace the batteries. Turn the power ON and press the [START/STOP] key to restart sampling. Note that sampling cannot be restarted automatically.</p>
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4.10 Key Lock Function

When a pump is operating including during operation standby (Start:Delay), if you press and hold the [BACK] key and [UP] key (on the [SV] screen and [PV] screen), key based operations will be disabled (i.e. key lock will be enabled) with the exception of specific operations. Enabling key lock can prevent operational mistakes while the pump is operating. Note that the key lock is canceled in the same way by pressing and holding the [BACK] key and [UP] key.

- **Key Lock Icon**

While the key lock is enabled, a key lock icon will be displayed at the top of the screen. It will no longer be displayed when the key lock is canceled.

For details, see the examples below.

- **Key Operations While the Pump Is Operating**

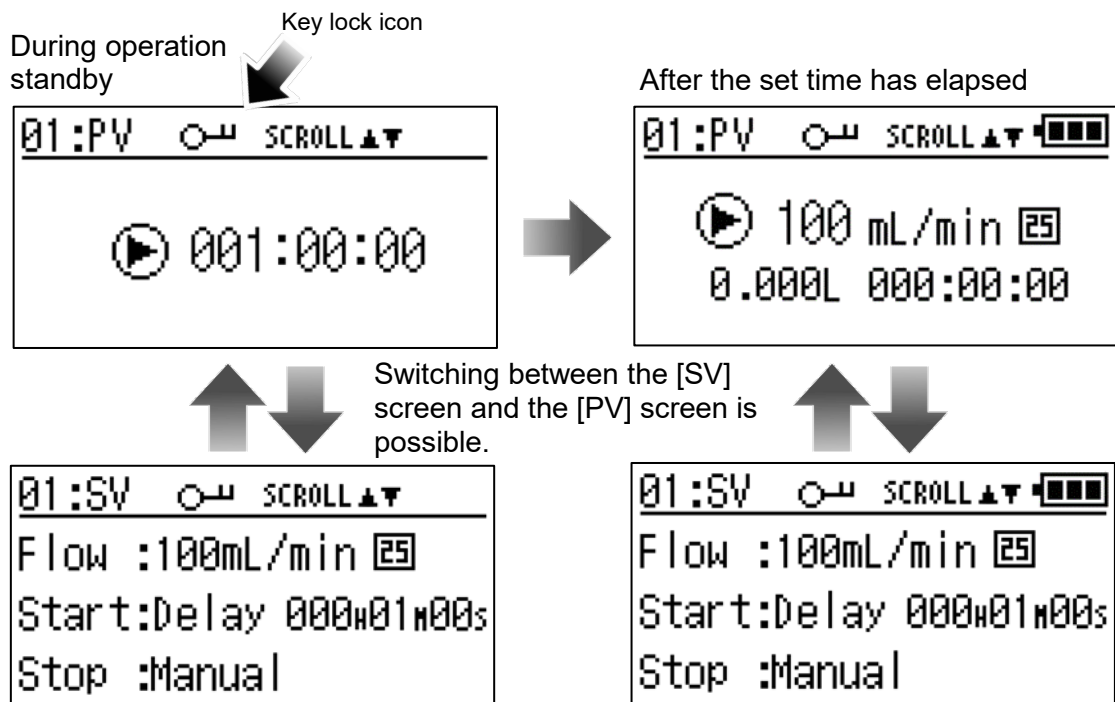
Key operations will be disabled with the exception of switching between the [SV] screen and the [PV] screen by pressing the [UP] key or [DOWN] key.

- **Key Operations When the Pump Has Finished Operating**

Key operations will be disabled with the exception of scrolling up or down the screen by pressing the [UP] key or [DOWN] key. To perform the following operations, cancel the key lock.

Example: For Start:Delay and Stop:Manual

If the key lock is enabled after a Delay operation has started (during operation standby), measurement will start automatically after the set time has elapsed. (In other words, this is not affected by the key lock.) When measurement has finished however, the pump will need to be stopped manually, so it will be necessary to cancel the key lock.



4.11 Errors Displayed

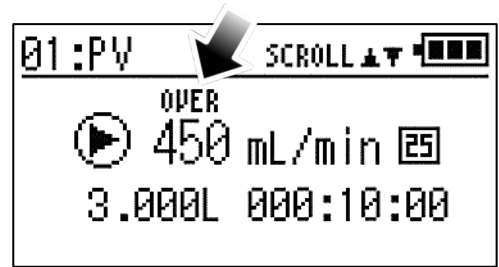
If a problem occurs during operation, the pump will stop operating and an error screen will be displayed.

Error Displayed	Description, Cause, and Remedy
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>E1:±20%</p> <hr/> <p>Flow Error</p> <hr/> <p>Please Press any Key</p> </div>	<p>This is displayed if the difference between the set flow rate and the instantaneous flow rate displayed is greater than ±20 % for 60 seconds continuously.</p> <p>Cause: The load is heavy and the pressure loss is significant. Remedy: Lighten the load. If the operation stop due to an error is disabled ⇒ P51</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>E2:2.0V</p> <hr/> <p>Power Error</p> <hr/> <p>Please Press any Key</p> </div>	<p>This is displayed if the power supply voltage drops below 2.0 V for 10 seconds continuously.</p> <p>Cause: The batteries have run out. They are low. Remedy: Replace the batteries with new ones.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>E3:450mA</p> <hr/> <p>Current Error</p> <hr/> <p>Please Press any Key</p> </div>	<p>This is displayed if the power supply current rises above 450 mA for 10 seconds continuously.</p> <p>Cause: The load is heavy and the pressure loss is significant. Remedy: Lighten the load.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>E4:70°C</p> <hr/> <p>Temperature Error</p> <hr/> <p>Please Press any Key</p> </div>	<p>This is displayed if the temperature rises above 70 °C for 10 seconds continuously.</p> <p>Cause: The normal operating temperature range has been exceeded. Remedy: Wait for the temperature to drop before using the pump again. If the operation stop due to an error is disabled ⇒ P51</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>E5:700hPa</p> <hr/> <p>Pressure Error</p> <hr/> <p>Please Press any Key</p> </div>	<p>This is displayed if the atmospheric pressure drops below 700 hPa for 10 seconds continuously.</p> <p>Cause: The altitude at the site is probably too high. Remedy: Use the pump at a lower altitude site. If the operation stop due to an error is disabled ⇒ P51</p>

4.12 Measurement Value Overflow

4.12.1 Instantaneous Flow Rate

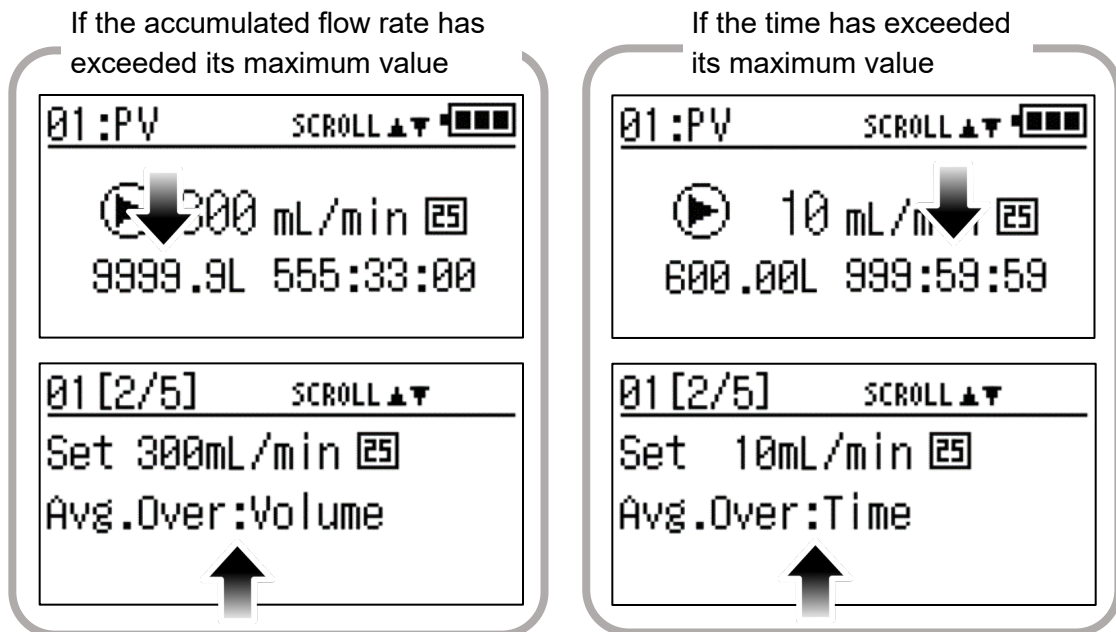
If the instantaneous flow rate exceeds 450 mL/min, *OVER* will be displayed. In addition, the pump will continue to operate, but the value will be treated as 450 mL/min, so there will be an impact on the average flow rate and the accumulated flow rate.



4.12.2 Accumulated Flow Rate and Sampling Time

If the sampling stop operation is set to *Manual*, the maximum value for the accumulated flow rate will be 9999.9 L and the maximum value for the sampling time will be 999 hours, 59 minutes, and 59 seconds.

Even if both the accumulated flow rate and the sampling time exceed their maximum values, operation itself will continue. However, the applicable items will blink and they will not subsequently increase. Note that if the accumulated flow rate or the sampling time has exceeded its maximum value, the recorded value will also become the respective maximum value. In terms of the average flow rate, the item that has reached its maximum value will be displayed as shown below.



● If Both the Accumulated Flow Rate and the Sampling Time Have Exceeded Their Maximum Values

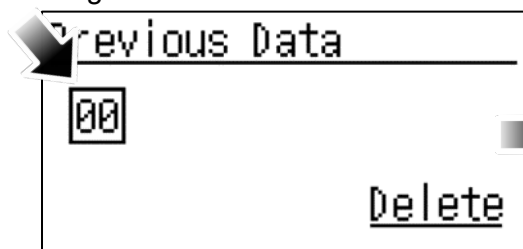
Operation of the pump will continue even if both the accumulated flow rate and the sampling time have exceeded their upper limit. In this case, both items will blink. In addition, in terms of the average flow rate, the item that reached its upper limit first will be displayed.

4.13 Checking Previous Sampling Data (Previous Data)

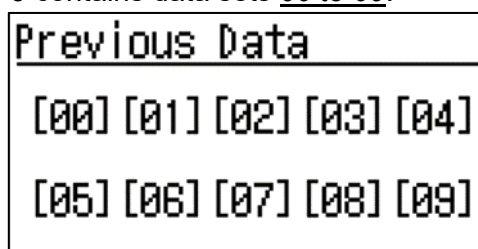
Items displayed at 2 Previous Data on the [Menu] screen when the pump finishes operating (⇒ P29) can be checked as previous measurement data.

Previous measurement data is divided into sets of 10 each (large divisions). The individual measurement data set is then saved within each large division.

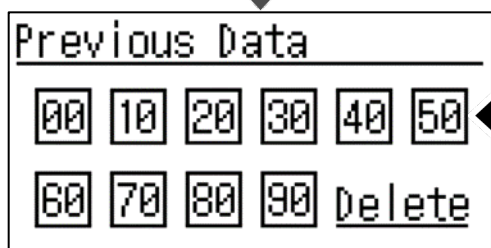
Data sets 00 to 09 are saved within this large division.



This large division for data sets 0 to 9 contains data sets 00 to 09.



As the number of measurement data sets increases, the number of large divisions increases in order to save the data.



Example: Data sets 50 to 59 are saved within this large division (Nos. 50 to 59).

● Overwriting Data

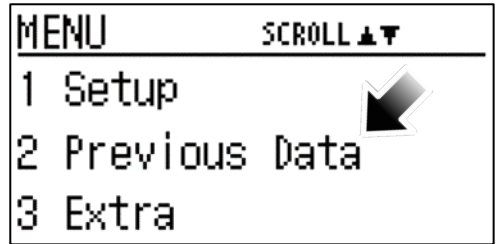
- (1) As with the measurement Nos., up to 100 data sets (No. 00 to 99) are divided into 10 sets each and automatically saved.
- (2) If the number of measurement data sets exceeds 100, the oldest 10 data sets (the first large division) will be deleted and overwritten automatically.

Example: If measurement No. 99 is reached, the next measurement will be labeled No. 00. The 10 data sets [00] to [09] saved in the large division for 00 to 09 will be deleted automatically, and the new measurement No. 00 will be saved as [00]. In addition, if measurement No. 10 is reached (i.e. the large division for 00 to 09 is full), the 10 data sets [10] to [19], saved in the large division for 10 to 19, will be deleted and overwritten. Subsequently, this process is repeated until the data is deleted.

● **Checking the Latest Measurement Data**

[MENU] Screen

Press the [UP] key or [DOWN] key to select 2
Previous Data. Then press the [START/STOP] key.



[Previous Data] Screen

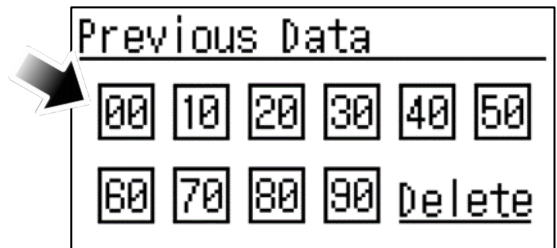
On the [Previous Data] screen, press the [START/STOP] key twice to display the latest measurement data.

Hint	When you move from the [MENU] screen to the [Previous Data] screen, the latest measurement data is always selected.
------	---

Example: If the measurement No. of the latest measurement performed is 09

Previous Data (Large Division)

The large division with measurements 00 to 09 will automatically be selected. Press the [START/STOP] key.

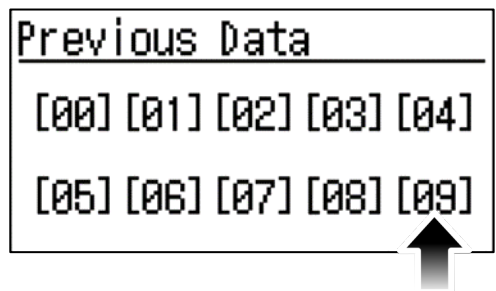


◆ Other key based operations

[BACK] key ⇒ This switches to the [MENU] screen.

Previous Data (Individual Data Sets)

Measurement No. 09 will automatically be selected. Press the [START/STOP] key.



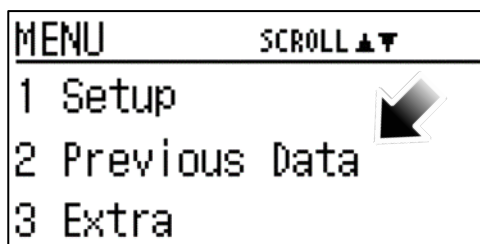
◆ Other key based operations

[BACK] key ⇒ This switches to the [Previous Data] (large division) screen.

● Checking a Measurement Data Set of Your Choice

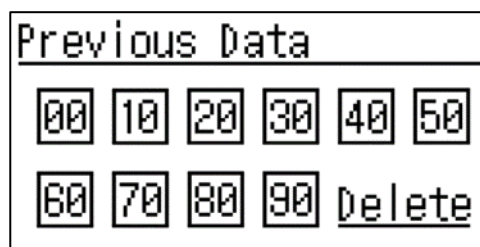
[MENU] Screen

Press the [UP] key or [DOWN] key to select 2 Previous Data. Then press the [START/STOP] key.



Previous Data (Large Division)

Press the [UP] key or [DOWN] key to select the applicable large division for the measurement No. you wish to check. Then press the [START/STOP] key.

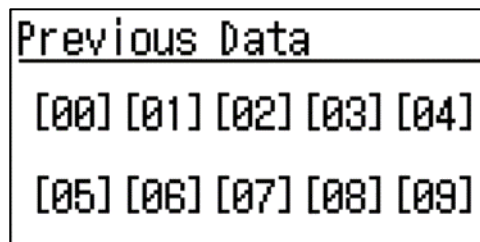


◆ Other key based operations

[BACK] key ⇒ This switches to the [MENU] screen.

Previous Data (Individual Data Sets)

Press the [UP] key or [DOWN] key to select the measurement No. you wish to check. Then press the [START/STOP] key.



◆ Other key based operations

[BACK] key ⇒ This switches to the [Previous Data] (large division) screen.

● **Deleting Measurement Data**

Important	You cannot select and then delete measurement data. If measurement data is deleted, all saved data is deleted. If measurement data has been deleted, it cannot be recovered.
-----------	--

Press the [UP] key or [DOWN] key to select Delete. Then press the [START/STOP] key.

◆ Other key based operations

[BACK] key ⇒ This switches to the [MENU] screen.

To delete the measurement data, press the [START/STOP] key.

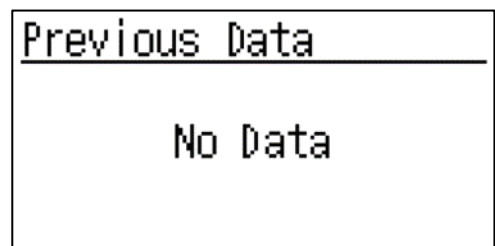
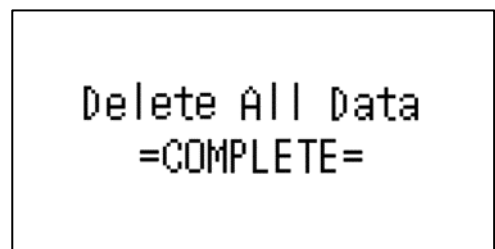
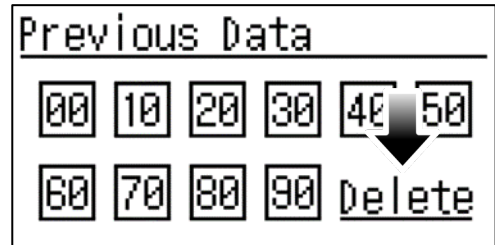
◆ Other key based operations

[BACK] key ⇒ This switches to the [Previous Data] screen.

Delete All Data=COMPLETE= will be displayed. Then the system will return to the [MENU] screen.

● **If There Is No Previous Measurement Data**

If there is no measurement data, No Data will be displayed. Press the [BACK] key to return to the [HOME] screen.

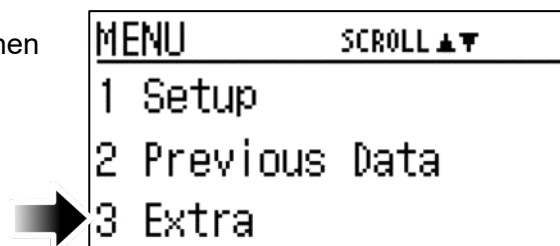


4.14 Extra Menu

Select 3 Extra on the [MENU] screen to configure settings other than the sampling conditions.

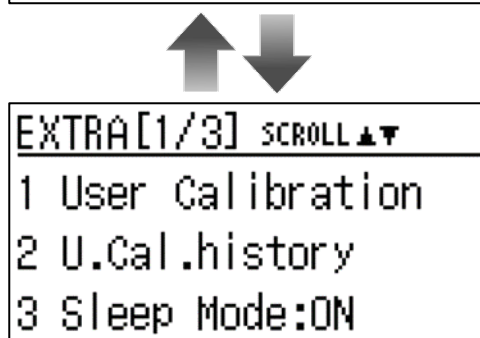
[MENU] Screen

Press the [UP] key or [DOWN] key to select 3 Extra. Then press the [START/STOP] key.



[EXTRA] Screen

Press the [UP] key or [DOWN] key to select an item of your choice. Then press the [START/STOP] key. The system will switch to the setting screen for the selected item.



◆ Other key based operations

[BACK] key ⇒ This switches to the [MENU] screen.

For details on each item, see the applicable page.

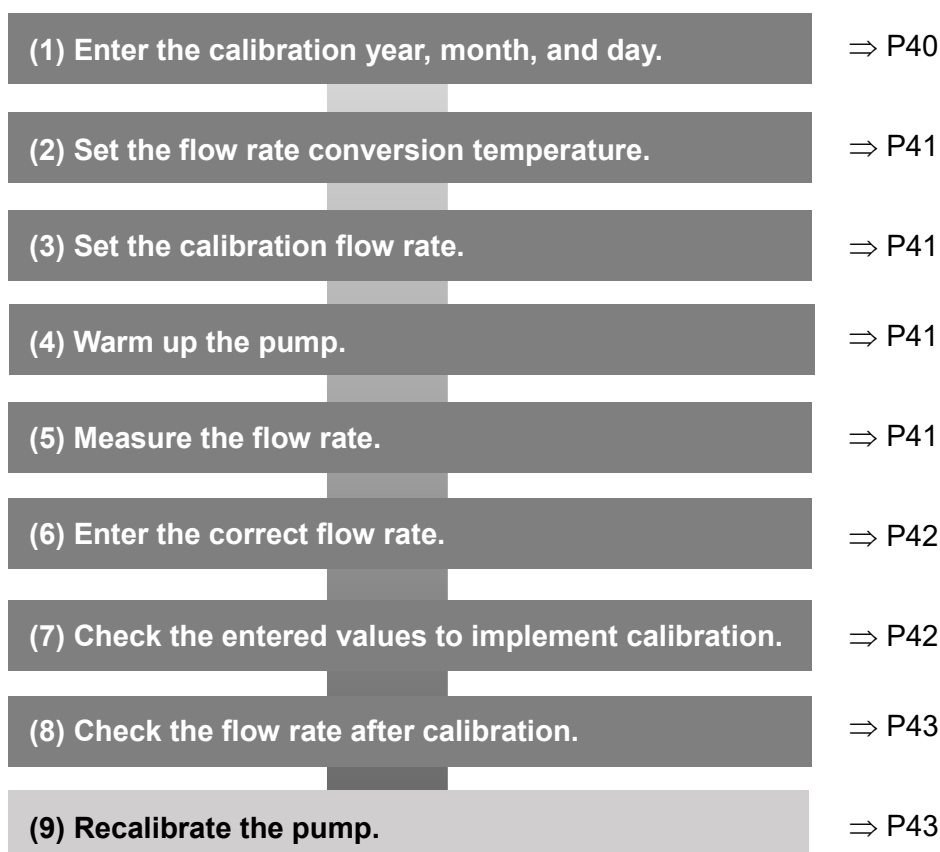
<p>EXTRA[1/3] SCROLL ▲▼ 1 User Calibration 2 U.Cal.history 3 Sleep Mode:ON</p>	<p>1 User Calibration ⇒ P39 You can perform calibration (for a single point of your choice).</p> <p>2 U.Cal.history ⇒ P44 You can check the calibration logs.</p> <p>3 Sleep Mode ⇒ P45 This configures the settings for the display if no operation has been performed for a certain amount of time.</p>
<p>EXTRA[2/3] SCROLL ▲▼ 4 LED:ON 5 Test 6 Interval timer:OFF</p>	<p>4 LED ⇒ P45 This configures the LED ON/OFF settings.</p> <p>5 Test ⇒ P46 This measures the voltage and current when the pump is operating.</p> <p>6 Interval timer ⇒ P48 This configures the settings when measurements are repeated at regular intervals.</p>
<p>EXTRA[3/3] SCROLL ▲▼ 7 Operating Time 8 Stop Error 9 Factory default</p>	<p>7 Operating Time ⇒ P51 You can check the pump (motor) operating time.</p> <p>8 Stop Error ⇒ P51 This configures the settings related to pump operation when an error occurs.</p> <p>9 Factory default ⇒ P53 This returns the settings to the factory defaults.</p>

4.14.1 User Calibration

In order to perform measurements with higher accuracy, perform calibration with a sampling tube attached to the intake port.

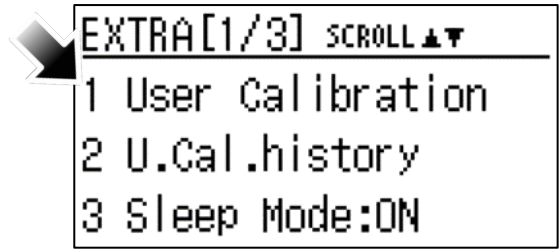
Important	If user calibration has been performed, fluctuations in the flow rate may occur under any other conditions (the set flow rate and sampling tube used during calibration). As a result, the specified performance may not be achieved except under the calibration conditions.
-----------	---

● User Calibration Workflow



Hint	<p>An icon will be displayed on the [HOME] screen and the [SV] screen when sampling is performed with the same set flow rate and flow rate conversion temperature as when user calibration was implemented. By making use of <u>2 U.Cal.history</u>, on the pump you can check the information on when and under what conditions the pump was calibrated.</p>	<p>Example: [HOME] Screen</p> <pre> HOME START▶ SCROLL▲▼ ----- Flow :100mL/min 25 UC Start:Manual Stop :Manual </pre> <p>The screenshot shows a monochrome LCD display. At the top, it says 'HOME' followed by 'START▶ SCROLL▲▼'. Below a horizontal line, it displays 'Flow :100mL/min 25 UC'. The '25 UC' is enclosed in a box with a small arrow pointing up. Below that, it shows 'Start:Manual' and 'Stop :Manual'. A large black arrow points upwards from the bottom of the screen towards the '25 UC' box.</p>
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As in the figure at right, press the [UP] key or [DOWN] key to select 1 User Calibration. Then press the [START/STOP] key.



(1) Entering the Calibration Date

Set the year, month, and day of calibration.

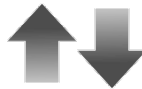
◆ Key operations on the [1 User Calibration] screen are as follows.

[UP] key or [DOWN] key: This changes the numerical values.

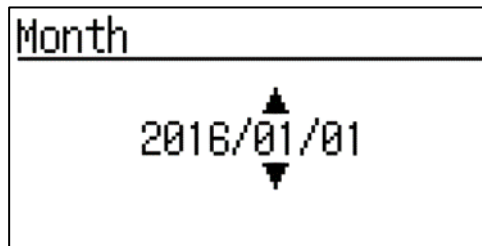
[START/STOP] key: This applies the changes to a value and moves to the next item.

[BACK] key: This returns to the previous item.

[Year] Screen



[Month] Screen



[Day] Screen

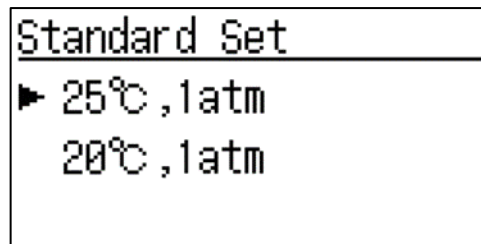


(2) Setting the Flow Rate Conversion Temperature

([Standard Set] Screen)

Press the [UP] key or [DOWN] key to select the flow rate conversion temperature of your choice.

Press the [START/STOP] key to apply the selection and proceed to the next screen.

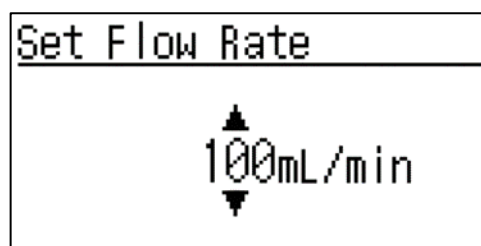


◆ Other key based operations

[BACK] key ⇒ This switches to the [Day] screen without applying the changes.

(3) Setting the Calibration Flow Rate ([Set Flow Rate] Screen)

Press the [UP] key or [DOWN] key to change to the set flow rate of your choice. Press the [START/STOP] key to apply the setting and start the pump operation.

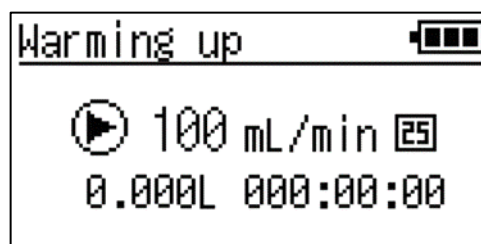


◆ Other key based operations

[BACK] key ⇒ This switches to the [Standard Set] screen without applying the changes.

(4) Warming Up the Pump ([Warming up] Screen)

After the pump starts operating, leave it as is for approx. 1 minute to warm up so that the intake flow rate stabilizes.



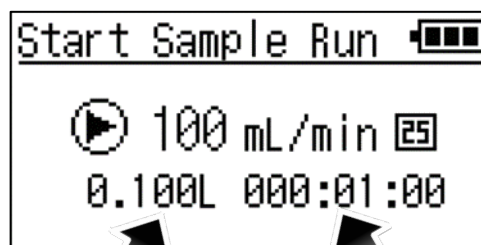
◆ Other key based operations

[BACK] key ⇒ This pauses operation and switches to the [Set Flow Rate] Screen.

(5) Measuring the Flow Rate ([Start Sample Run] Screen)

After 1 minute has elapsed, the system switches from the [Warming up] screen to the [Start Sample Run] screen.

Confirm that the instantaneous flow rate indicator has stabilized. Then record the value indicated by the flow meter as the standard and press the [START/STOP] key.



Accumulated flow rate Sampling time

Increases from 0 as with Stop:Manual.
⇒ P27

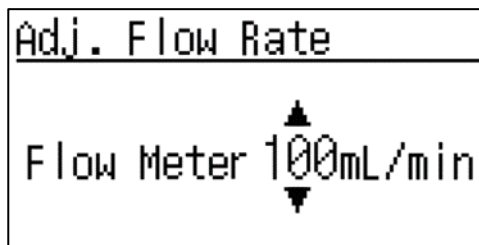
◆ Other key based operations

[BACK] key ⇒ This pauses operation and switches to the [Set Flow Rate] Screen.

Hint	During warm up, if you have confirmed that the instantaneous flow rate indicator has stabilized, you can proceed to the [Start Sample Run] screen before 1 minute has elapsed by pressing and holding the [DOWN] key. Only do this however if you have confirmed that the indicator has fully stabilized.
------	---

(6) Entering the Correct Flow Rate ([Adj. Flow Rate] Screen)

The average flow rate during pump operation is displayed as the default value. Press the [UP] key or [DOWN] key to change to the value indicated by the flow meter, which you recorded as the standard. Press the [START/STOP] key to apply the settings and proceed to the next screen.

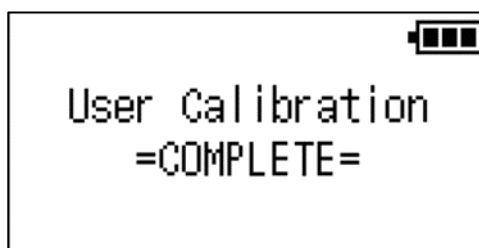
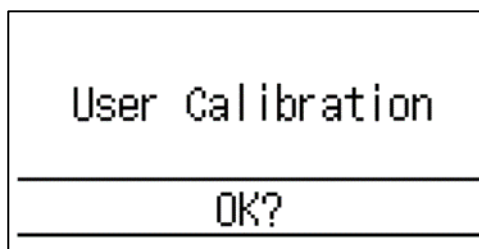


◆ Other key based operations

[BACK] key ⇒ This switches to the [Set Flow Rate] screen without applying the changes.

(7) Checking the Entered Values to Implement Calibration

If the value entered on the [Adj. Flow Rate] screen is correct, press the [START/STOP] key to implement calibration.



◆ Other key based operations

[BACK] key

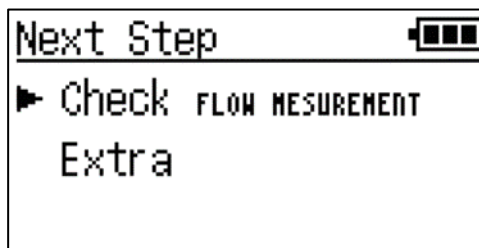
⇒ This switches to the [Adj. Flow Rate] screen without applying the changes.

User Calibration=COMPLETE= will be displayed and the system will automatically proceed to the next screen.

Important	Calibration is not complete until <u>User Calibration=COMPLETE=</u> is displayed. During the process, if you turn the power OFF or return to the [HOME] screen by pressing the [BACK] key, operations (1) to (6) will be disabled even if they have been implemented.
-----------	---

(8) Checking the Flow Rate After Calibration ([Next Step] Screen-Check FLOW MESUREMENT)

In order to confirm that calibration was implemented correctly, it is recommended that you measure the flow rate again at the flow rate set when calibration was performed.

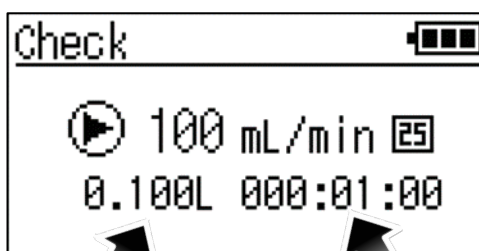


● **To Proceed Without Checking**

Press the [UP] key or [DOWN] key to select Extra. Then press the [START/STOP] key. The system will return to the [EXTRA] screen. Note that the system will also return to the [EXTRA] screen if you press the [BACK] key.

● **To Perform a Check ([Check] Screen)**

Press the [UP] key or [DOWN] key to select Check FLOW MESUREMENT. Then press the [START/STOP] key. Start the pump operation at the flow rate set on the [Set Flow Rate] screen (step (3) Setting the Calibration Flow Rate).



Confirm that the instantaneous flow rate indicator has stabilized. Then compare the value with the one indicated by the flow meter as the standard.

Accumulated flow rate Sampling time

On the [Check] screen, press the [START/STOP] key to stop the pump operation and switch to the next screen.

Increases from 0 as with Stop:Manual. ⇒ P27

◆ Other key based operations

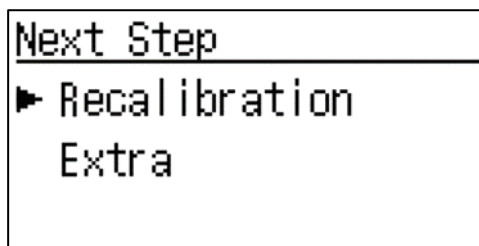
[BACK] key ⇒ This switches to the [Next Step] screen-Check FLOW MESUREMENT.

(9) Recalibrating the Pump

If the results of the flow rate check after calibration are not better than before calibration, it is recommended that you repeat the calibration (recalibration).

● **To Calibrate the Pump Again ([Next Step] Screen-Recalibration)**

Press the [UP] key or [DOWN] key to select Recalibration. Then press the [START/STOP] key. The system will return to the [Standard Set] screen (step (2) Setting the Flow Rate Conversion Temperature). Follow the same procedures to recalibrate the pump.



● **To End the Calibration**

Press the [UP] key or [DOWN] key to select Extra. Then press the [START/STOP] key. The system will return to the [EXTRA] screen.

◆ **Other key based operations**

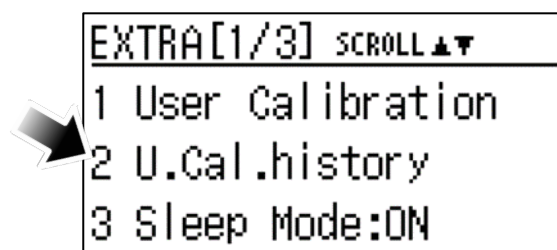
[BACK] key ⇒ This switches to the [Next Step] screen-Check FLOW MEASUREMENT.

Important	If you repeat the calibration but the results do not improve, the capability of the pump may have worsened or there may be a malfunction, so request repairs.
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4.14.2 Checking the User Calibration Logs

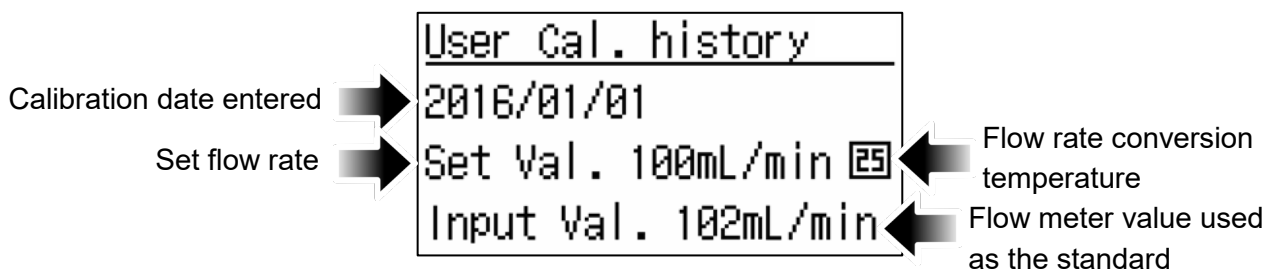
You can check the logs created when user calibration is performed.

Press the [UP] key or [DOWN] key to select 2 U.Cal.history. Then press the [START/STOP] key.



[User Cal.history] Screen

Press the [BACK] key to return to the [EXTRA] screen.



Hint	Calibration logs can be checked on the pump, so it is easy to distinguish those pumps that have not been subject to user calibration. In addition, by entering the correct calibration date, this information can be applied as an index for performing user calibration periodically.
------	--

● **If There Are No User Calibration Logs**

No Data will be displayed on the screen. Press the [BACK] key to return to the [EXTRA] screen.

4.14.3 ON/OFF Setting for Sleep Mode

You can enable (turn ON) or disable (turn OFF) the function that automatically turns OFF the screen display if no operation has been performed for 30 minutes.

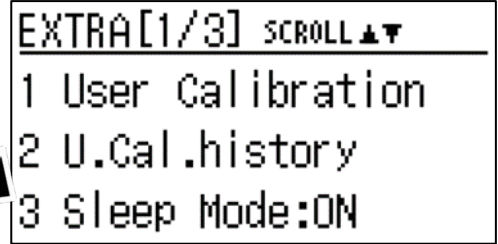
Press the [UP] key or [DOWN] key to select 3 Sleep Mode. Then press the [START/STOP] key.

[Sleep Mode] Screen

Press the [UP] key or [DOWN] key to select ON or OFF. Then press the [START/STOP] key. The system will return to the [EXTRA] screen. Confirm that the settings have been applied.

◆ Other key based operations

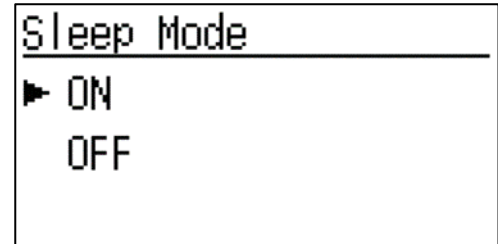
[BACK] key ⇒ This switches to the [EXTRA] screen without applying the changes.



EXTRA[1/3] SCROLL ▲▼

1 User Calibration
2 U.Cal.history
3 Sleep Mode:ON

Current setting value
(Default value is ON = Enabled)



Sleep Mode

▶ ON
OFF

ON: Enabled, OFF: Disabled

4.14.4 ON/OFF Setting for the Operation Indicator LED

You can enable (turn ON) or disable (turn OFF) the operation of the operation indicator LED showing the operation status of the pump.

Press the [UP] key or [DOWN] key to select 4 LED. Then press the [START/STOP] key.

[Led] Screen

Press the [UP] key or [DOWN] key to select ON or OFF. Then press the [START/STOP] key. The system will return to the [EXTRA] screen. Confirm that the settings have been applied.

◆ Other key based operations

[BACK] key ⇒ This switches to the [EXTRA] screen without applying the changes.



EXTRA[2/3] SCROLL ▲▼

4 LED:ON
5 Test
6 Interval timer:OFF

Current setting value
(Default value is ON = Enabled)



Led

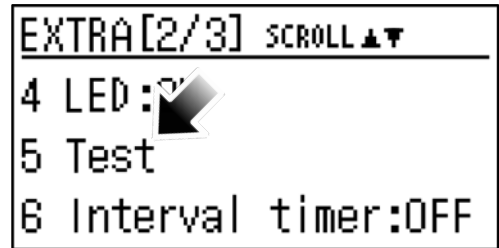
▶ ON
OFF

ON: Enabled, OFF: Disabled

4.14.5 Testing

You can measure the power supply voltage and current consumed when the pump is operating.

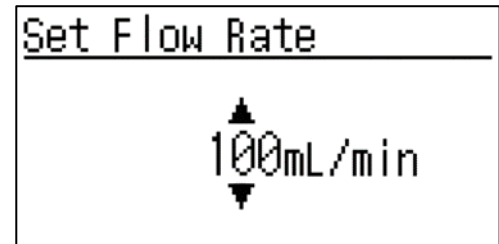
Press the [UP] key or [DOWN] key to select 5 Test. Then press the [START/STOP] key.



● Flow Rate Setting

[Set Flow Rate] Screen

Press the [UP] key or [DOWN] key to change to the set flow rate of your choice. Press the [START/STOP] key to start the pump operation.

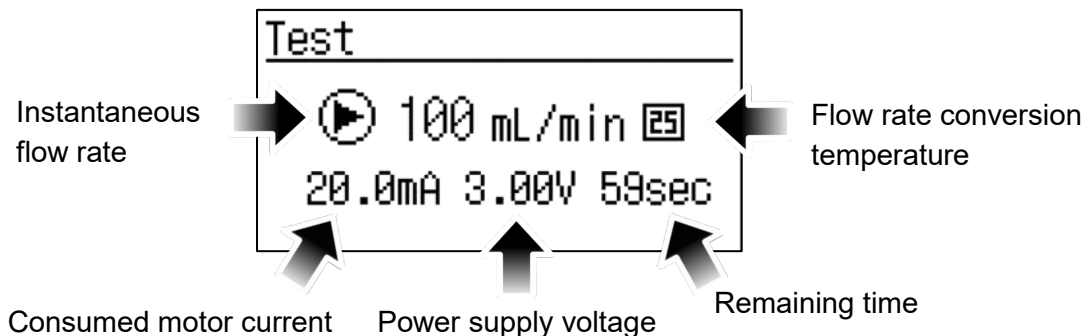


◆ Other key based operations

[BACK] key ⇒ This switches to the [EXTRA] screen without applying the changes.

● Test Operation (Measuring the Power Supply Voltage and Flow Rate)

During the Test operation, the numerical value at the bottom right of the screen (remaining time) counts down from 60sec. In this case, the instantaneous flow rate, consumed motor current, and power supply voltage values are updated each second. When 60 seconds have elapsed, the system will automatically switch to the [Test] results display screen.



◆ Other key based operations

[START/STOP] key: This stops the Test operation and switches to the [Test] results display screen.

[PAUSE] key: This pauses the pump operation. (The instantaneous value at the time the key was pressed will be displayed.)

[BACK] key: This stops the Test operation and returns to the [Set Flow Rate] screen.

● Displaying the Results

[Test] Results Display Screen

The set flow rate, consumed motor current, and the measured power supply voltage are displayed as follows.

Test	SELECT ▲▼
Set 100mL/min	25
50.0mA	3.00V
▶Retry	EXTRA

Press the [UP] key or [DOWN] key to switch the item selected. Select an item of your choice and then press the [START/STOP] key. If you select Retry, the system will return to the [Set Flow Rate] screen. If you select EXTRA, the system will return to the [EXTRA] screen.

Important	The measurement results are the average values for the final 10 second interval of the remaining time. If you stop the process before 60 seconds have elapsed by pressing the [START/STOP] key, the instantaneous values at that time will be displayed as the measurement results.
-----------	---

4.14.6 Interval Timer

Run.T(⇒ P22): You can repeatedly operate the pump at an interval (time) of your choice.

Important	<p>The interval timer function is only enabled when the sampling stop operation setting is configured to <u>Run.T</u>. If you attempt to change the settings when the sampling stop operation setting is configured to anything except <u>Run.T</u>, the screen will appear as shown in the figure and the system will return to the [EXTRA] screen. In this case, change the sampling stop operation setting to <u>Run.T</u>, and then repeat the settings.</p>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> <p style="text-align: center;"><u>Interval timer</u></p> <p style="text-align: center;">Please change to the Run.T and try again</p> </div>
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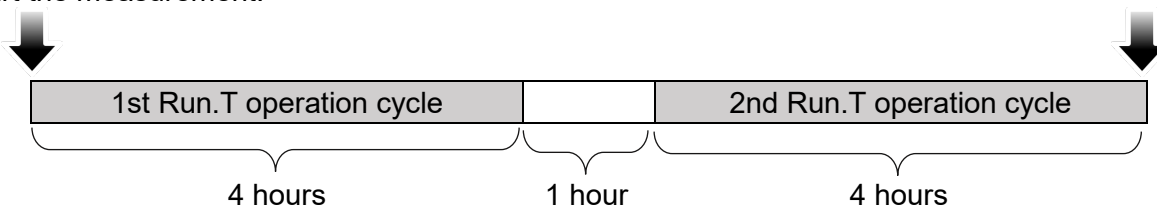
On the [Setup] screen, configure the set flow rate and the Run.T operating time. Then in the interval timer settings area, set (1) the number of times to implement the Run.T operation and (2) the interval (time) for implementing the Run.T operation.

Example: If the settings are configured as follows

Set flow rate	100 mL/min	Set on the [Setup] screen ⇒ P20 and P22
Run.T set time	4 hours	
(1) Number of times to implement the <u>Run.T</u> operation	Two	Set on the [Interval timer] screen ⇒ P49
(2) Interval (time) for implementing the <u>Run.T</u> operation	1 hour	

Start the measurement.

Finish the measurement.



● Identifying the Interval Time Setting Status

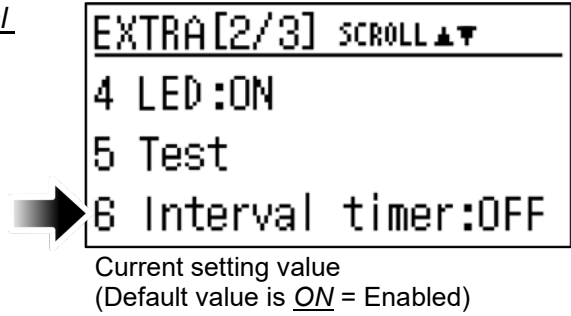
When the interval timer is set, an icon will be displayed as in the figure. (It is displayed on the [HOME] screen, [PV] screen, and [SV] screen.)

You can distinguish between ordinary Run.T operation and operation via the interval timer by checking whether this icon is present.

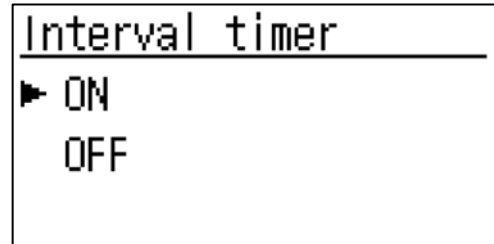


● **Setting the Interval Timer**

Press the [UP] key or [DOWN] key to select 6 Interval timer. Then press the [START/STOP] key.



Press the [UP] key or [DOWN] key to select ON or OFF. Then press the [START/STOP] key. If ON is selected, the system will proceed to the [Interval timer] setting screen. A message will be displayed, and then the system will return to the [EXTRA] screen. ⇒ P48



ON: Enabled, OFF: Disabled

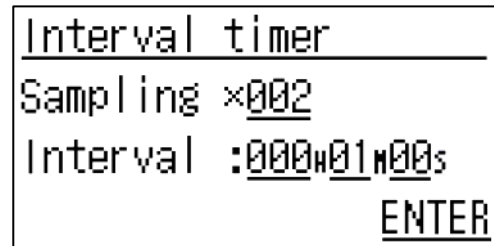
◆ **Other key based operations**

[BACK] key ⇒ This switches to the [EXTRA] screen without applying the changes.

[Interval timer] Screen

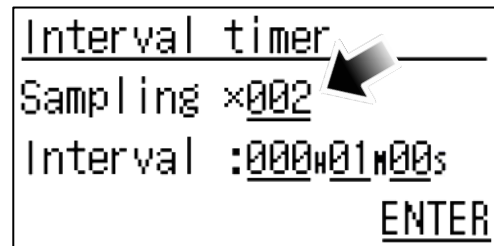
On the [Interval timer] screen, you can set the following two items.

- (1) Sampling x: Number of times to implement the Run.T operation
- (2) Interval: Interval for implementing the Run.T operation



(1) Number of Times to Implement the Run.T Operation

If you select the numerical value displayed beside Sampling x and then press the [START/STOP] key, the system will switch to a screen on which you can set the number of times to implement the Run.T operation.



Press the [UP] key or [DOWN] key to change the number of times to a value of your choice. If you press the [START/STOP] key, the system will return to the [Interval timer] setting screen. Confirm that the set number of times is displayed.

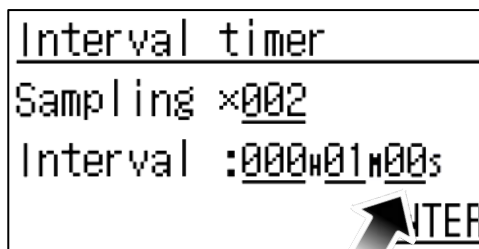


◆ **Other key based operations**

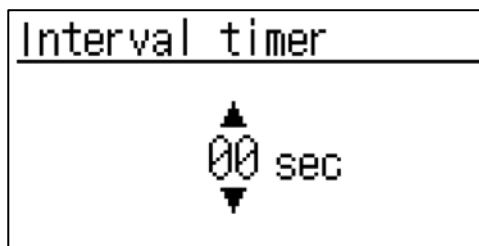
[BACK] key ⇒ This switches to the [Interval timer] setting screen without applying the changes.

(2) Interval for Implementing the *Run.T* Operation

If you select the numerical values displayed beside *Interval* and then press the [START/STOP] key, the system will switch to a screen on which you can change the value of *000H* in 1 hour increments, *00M* in 1 minute increments, or *00S* in 1 second increments. In accordance with the time settings, press the [UP] key or [DOWN] key to select an underlined item.



Example: To change the settings in 1 second increments, select *00S* as in the figure at right and press the [START/STOP] key to switch to a screen on which you can change the numerical value in 1 second increments. Press the [UP] key or [DOWN] key to change to the time of your choice.



If you press the [START/STOP] key, the system will return to the [Interval timer] setting screen. Confirm that the set time is displayed.

◆ Other key based operations

[BACK] key ⇒ This switches to the [Interval timer] setting screen without applying the changes.

After changing to the setting conditions of your choice, press the [UP] key or [DOWN] key to select *ENTER*. Then press the [START/STOP] key. Apply the changes to the setting conditions and then return to the [HOME] screen. If an icon is displayed as in the figure at right, the settings have been applied. If the icon is not displayed, repeat the settings.



Important	If you press the [BACK] key before applying the changes to the setting conditions, the system will return to the [EXTRA] screen without applying the changes.
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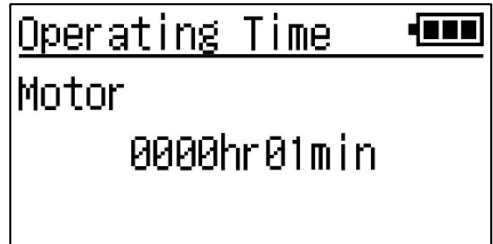
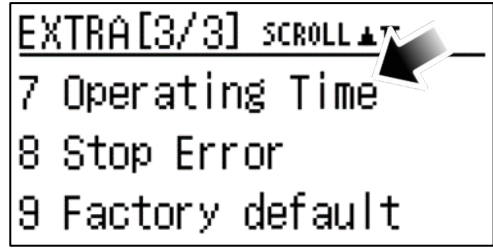
4.14.7 Checking the Operating Time

You can check the motor operating time (how long the pump has been used).

Press the [UP] key or [DOWN] key to select 7 Operating Time. Then press the [START/STOP] key.

[Operating Time] Screen

The value is displayed in 1 minute increments up to 9999 hours and 59 minutes. If this time has been exceeded, the display will blink. Press the [BACK] key to return to the [EXTRA] screen.



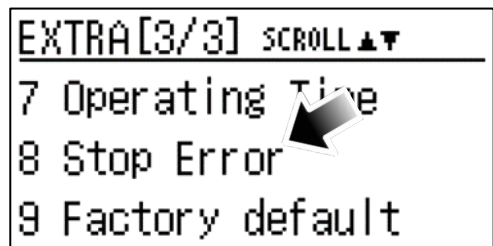
Hint	The estimated operating life of the motor is 2000 hours.
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4.14.8 Operation Settings When an Error Occurs

Important	With this setting, you can configure individual settings related to pump operation when errors 1, 4, or 5 occur. If the setting is disabled (turned OFF), the pump will operate even if an error has occurred. In the default settings, this is only disabled (turned OFF) for error 1. However, if the pump is used with the operation setting when errors occur disabled (turned OFF), any flow rate accuracy or other problems that occur will not be covered by the warranty. Accordingly, it is recommended that you enable (turn ON) this setting the first time you use the product.
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You can enable (turn ON) or disable (turn OFF) operation stops due to an error.

Press the [UP] key or [DOWN] key to select 8 Stop Error. Then press the [START/STOP] key.



[Stop Error] Screen

The current settings with respect to E1, E4, and E5 will be displayed.


Default settings: E1: Disabled (turned OFF);
E4 and E5: Enabled (turned ON)

E1:±20%	<u>OFF</u>
E4:70°C	<u>ON</u>
E5:700hPa	<u>ON</u>
	<u>ENTER</u>

● Changing the Settings

Press the [UP] key or [DOWN] key to select an underlined item. Then press the [START/STOP] key.

E1:±20%	<u>OFF</u>
E4:70°C	<u>ON</u>
E5:700hPa	<u>ON</u>
	<u>ENTER</u>



Press the [UP] key or [DOWN] key. Then press the [START/STOP] key.

<u>E1:±20%</u>
ON
▶ OFF

◆ Other key based operations

[BACK] key ⇒ This returns to the [Stop Error] screen without applying the changes.

The same procedures can be used to change the settings with respect to E4 and E5.

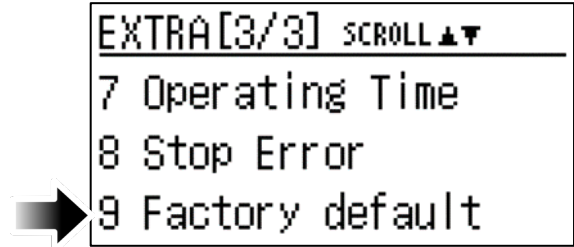
After changing to the settings of your choice, press the [UP] key or [DOWN] key to select ENTER. Then press the [START/STOP] key. Apply the changes to the settings and then return to the [EXTRA] screen.

Important	If you press the [BACK] key before applying the changes to the setting conditions, the system will return to the [EXTRA] screen without applying the changes.
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4.14.9 Returning to the Factory Default Setting (Initialization)

Important	If you perform the following operation, the previous measurement data and setting values (including user calibration) will be returned to the factory default setting. This information cannot be recovered afterwards.
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Press the [UP] key or [DOWN] key to select 9 Factory default. Then press the [START/STOP] key.

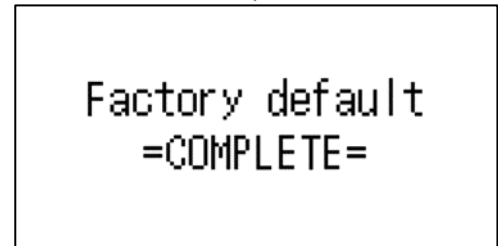
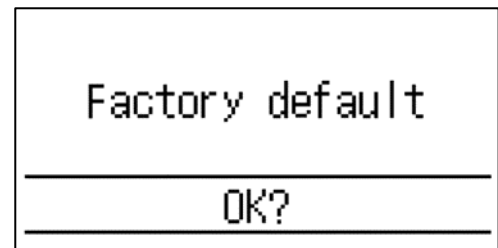


To implement initialization, press the [START/STOP] key.

◆ Other key based operations

[BACK] key ⇒ This switches to the [EXTRA] screen without initializing the settings.

Factory default=COMPLETE= will be displayed. Then the system will return to the [EXTRA] screen.



5 Troubleshooting

Problem	Possible Cause	Remedy
After the power is turned ON, nothing is displayed or the display disappears after a few seconds.	The batteries are not installed.	Insert two AA batteries.
	Batteries are depleted.	Replace the AA batteries with two new ones.
	You are using a mobile battery sold for use with smartphones. (This type is equipped with a function that stops the current supply automatically if it drops below a certain value.)	The function that stops the current supply automatically differs depending on the type of mobile battery used. Accordingly, replace your mobile battery with another mobile battery, or one that is not equipped with this function. Then check the pump operation.
The pump operates, but the set flow rate is not reached or the flow rate is unstable.	After the power is turned ON, you are continuing to press and hold the [UP] key and [DOWN] key.	Release the [UP] key and [DOWN] key when <u>SIBATA</u> is displayed on the screen.
	Liquid has inadvertently been taken into the pump.	Request repairs or adjustments.
	The filter element is clogged.	Replace the filter element. ⇒ P15
	The sampling tube is crushed.	Replace the tube or change the connection method.
The pump stopped during sampling.	The pressure loss exceeds the specified range.	Confirm that the pressure loss is within the specified range. ⇒ P55
	You are not using a low flow rate orifice adapter.	If you are using the pump at 50 mL/min or less, use the low flow rate orifice adapter provided. ⇒ P16
The screen display disappears after a certain amount of time.	An error has occurred.	On the [Previous Data] screen, select the applicable sampling data. Check the error that has occurred and troubleshoot the cause. ⇒ P32 If the problem persists, request repairs and adjustments.
The operation indicator LED does not blink.	The pump is set so that if no key operations are performed for a certain amount of time, the screen display disappears.	Change the settings by selecting <u>3</u> <u>Sleep Mode</u> on the [EXTRA] screen. ⇒ P45
The operation indicator LED does not blink.	The pump has been set so that the operation indicator LED does not blink.	Change the settings by selecting <u>4</u> <u>LED</u> on the [EXTRA] screen. ⇒ P45

6 Specifications

6.1 Specifications

Item Code	080870-001
Model	PMP-001
Variable Flow Rate Range *1	10 to 300 mL/min
Instantaneous Flow Rate Display Range	10 to 450 mL/min
Constant Flow Rate Operational Range *1	10 mL/min: 0 to 10 kPa *2 50 mL/min: 0 to 30 kPa *2 100 mL/min: 0 to 30 kPa 200 mL/min: 0 to 20 kPa 300 mL/min: 0 to 10 kPa
Constant Flow Rate Precision *1	±5 % or ±5 mL/min of the set flow rate, whichever is larger
Accumulated Flow Rate Setting Range	0.000 to 9999.9 L
Accumulated Flow Rate Display Range	0.000 to 9999.9 L
Time Setting Display Range	000:00:00 to 999:59:59
Internal Flow Meter	Differential pressure type
Pump Type	Diaphragm
Display	Organic EL system
Intake Port Diameter	External diameter: 6 and 8 mm (The internal diameter of the tube used is 5 and 7 mm dia.)
Ambient Temperature and Humidity Range	0 °C to 40 °C; 10 to 90 % RH (no condensation)
Power Supply	AA batteries, 2 pc., 5 V DC (microB USB)
Continuous Operating Time *3 (When alkaline batteries are used)	10 mL/min: Over 10 hours (when unloaded) 100 mL/min: Over 10 hours (when unloaded) 300 mL/min: Over 7 hours (when unloaded)
Dimensions	W63 × D29 × H115 mm (not including protruding parts)
Weight	190 g (including batteries)

*1 The above-mentioned variable flow rate range, constant flow rate operational range, and constant flow rate precision are specified for use at 1 atmospheric pressure. The above-mentioned performance may not be obtained at high altitude locations where the air pressure is lower.

*2 This is the specified range when the low flow rate orifice adapter is used. The flow rate display may vary depending on the operational environment or other conditions.

*3 The operating time is a reference value for a 25 °C environment. It will vary depending on the ambient usage temperature and the usage history. (See P13.)

- If the flow rate is 100 mL/min or less, it may take some time to reach the set value depending on the length of the tube or the attachment position of sampling tubes and other loads, or there may be large fluctuations in the instantaneous flow rate.
- If the flow rate is 100 mL/min or less, the instantaneous flow rate displayed may momentarily exceed the flow rate precision.
- The above-mentioned performance may not be obtained immediately after the power is turned ON. Let the pump warm up (with the pump running) for several minutes before use.

6.2 List of Materials Used

Product Name		Material
Case		PC
Flow line unit	Resin	PC and ABS
	Rubber	EPDM and NBR
	Metal	SUS304
Internal parts		PC, ABS, and POM
Metal		SUS304 and iron
Low flow rate orifice adapter		PSF and VMQ
Other		Electronic parts and PCBs are glass epoxy.

6.3 Spare Parts, Consumables, and Optional Parts

Spare Parts and Consumables

Item Code	Product Name	Remarks
080870-0011	Inlet for PMP-001	Set of intake port and filter element
080870-0015	Low flow rate orifice adapter	Set of low flow rate orifice and adapter
080870-0014	Filter element VFE-015, 5 pcs	

Optional Parts (Purchase this separately based on the intended applications.)

Item Code	Product Name
080870-0017	Soft case and tripod mounting hardware for PMP-001

7 Maintenance

7.1 Replacing the Filter Element

Check the filter element visually for contamination on a regular basis. If the filter element becomes darkened with excessive dirt, replace it. ⇒ P15

7.2 Periodic Inspections

In order to maintain the flow rate precision of this product, periodic inspections by Sibata (at cost) once per year are recommended.

8 Warranty and Repairs

If a Sibata product fails within 1 year from date of purchase, it will be repaired free of charge. To request repairs, contact the distributor where you purchased the product. The warranty excludes consumable parts included with the product, products without the purchase date or distributor information recorded, and products for which warranty information was revised.

A repair service fee is charged in the following cases.

- Faults or damage resulting from incorrect use
- Faults or damage resulting from repairs or modifications implemented by parties other than Sibata
- Faults caused by abuse or inadequate maintenance
- Faults or damage resulting from fires, earthquakes, or other natural disasters
- Faults or damage that occur due to shipping, relocating, or dropping the unit, or exposing it to vibration, after purchasing the product
- Faults or damage resulting from the use of consumable items not specified by Sibata
- Malfunctions or damage if the operation setting when error occurs is disabled (turned OFF)

Disclaimers

Sibata shall not be responsible for providing compensation for data that was not successfully acquired or recorded, or for incidental damages (such as loss of profits or interruption of business operations) resulting from any problem that occurred for some reason while using the product. Under the given conditions Sibata will repair product problems under the warranty, but Sibata does not warrant any loss or damage to data recorded in memory. Therefore, always make a backup* of necessary data before requesting repairs or other service work by Sibata. If you ignore the precautions in this manual or fail to create a backup, Sibata shall not be responsible for any damages resulting from lost or damaged data.

For more information regarding repairs after the warranty period, contact the distributor where you purchased the product. If Sibata determines that repairs can restore normal performance levels and that those levels can be maintained as long as the specified operating methods are used, then Sibata offers repair services on a fee basis.

* This product does not have a data output function. To back up the results, you must write them down for example.

9 Product Disposal

Dispose of this product in accordance with local disposal requirements. (See P56 regarding the parts used.)

10 Inquiries

If you have any questions about this product, or if there is any other way in which we can be of assistance, contact the distributor where you purchased the product or your Sibata representative.



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