INSTRUCTION MANUAL

MODEL UH5300 SPECTROPHOTOMETER

Hitachi High-Technologies Corporation

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1st Edition, 2013
Part No. 3J1-9001 HM-M (HMS)

Be sure to read through and understand the following points with regard to this manual.

1. Information contained in this document is subject to change without notice for improvement.
2.
3. Hitachi High-Technologies Corporation assumes no liability for any direct, indirect, or consequential damages arising from use not described in this manual.
Utmost care must be exercised when using the instrument.
4. This document does not provide any warranty or permission for industrial properties or any rights to grant license lawfully and without infringement.

PREFACE

We thank you for purchasing the Hitachi Model UH5300 Spectrophotometer.

The Model UH5300 Spectrophotometer is specially designed for measuring absorbance and transmittance of samples.
Note that samples that may have been infected with bacteria or viruses are not applicable to this instrument.

This instrument is intended for use by persons having a basic knowledge of chemical analysis procedures.
Keep in mind that improper use of analytical instruments, chemicals or samples would result not only in wrong analytical data but also in consequences adverse to safety.
Note that it is allowed only for persons having a basic knowledge of chemical analysis procedures to use this instrument.

Please read this instrument manual carefully before attempting operation and acquaint yourself with this instrument for its correct use.

ABOUT THIS MANUAL

This instruction manual has been prepared for the user of the Model UH5300 Spectrophotometer. The operating procedures and maintenance/inspection instructions for the instrument are contained in this manual.

First of all, be sure to read "IMPORTANT" and "SAFETY SUMMARY" at the beginning of this manual.

The contents of **"IMPORTANT"** and **"SAFETY SUMMARY"** described hereafter apply to the accessories of this instrument also.

IMPORTANT

Precautions on CE Conformity Marking

In consideration of use in the European countries, this instrument bears the CE mark indicating the conformity to the requirements mentioned below.

1. Electromagnetic Compatibility Requirement

This instrument is designed to satisfy the European Norm EN61326-1 (2006) for the CE conformity marking through conformity to the EMC Directive 2004/108/EC.

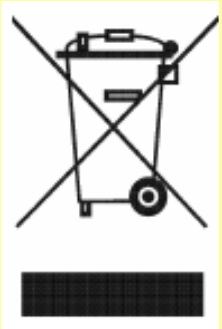
This instrument is classified as Class A of EN61326-1. So, this instrument must not be used in domestic establishments nor in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purpose.

And this instrument is also designed to comply with table 1 "Basic immunity test requirements" in the above European Norms. If the instrument is used near an intense electromagnetic source, however, interfering noise may be given to the instrument to cause an adverse effect on its performance or functionality.

2. Safety Requirement

This instrument is also designed to satisfy the European Norm EN61010-1 (2001) for the CE conformity marking through conformity to the LVD Directive 2006/95/EC.
This instrument is requested to be used in a suitable environment and grounded appropriately.

Information for Users on WEEE (only for EU Countries)



This symbol is in compliance with the Waste Electrical and Electronic Equipment directive 2002/96/EC (WEEE).
This symbol on the product indicates the requirement NOT to dispose of the equipment as unsorted municipal waste, but use the return and collection systems available.

Information on Disposal for Users

1. In the European Union

If you need to discard this product or discard user serviceable parts:
Please contact your local sales representative or distributor who will inform you of the recycle of the product.
You might be charged for the costs arising from take-back and recycling.

2. In other Countries outside the EU

If you wish to discard this product, please contact your local authorities and ask for the correct method of disposal.

Warranty on Product

This product, inclusive of its accessories, is warranted to be free from defects in material or workmanship under normal use within the product specifications indicated in this manual and under conditions given below.
This warranty is void if the instrument is not used according to the instruction manual.

(1) Scope of Warranty

Any parts that prove to be defective in design or workmanship during the warranty period will be repaired, adjusted or replaced without charge. A substitute part may be used for repair, or replacement with an equivalent product may be made instead of repair. Such system components as a personal computer, tablet devices, router, and printer to be updated frequently for improvement may not be available in original versions at the time of replacement.
The manufacturer assumes no liability for any damage to data or application software due to any possible fault or failure of this instrument.

(2) Warranty Period

One year from the date of initial installation
(In case a separate warranty document has been issued, the warranty period indicated in it takes precedence over the above period)

(3) Limitations and Exclusions on Warranty

Note that the following cases are excluded from the scope of this warranty, i.e., these cases are beyond the coverage of free-of-charge repair even during the warranty period indicated above.

(a) Failure due to operation at a place not meeting the installation requirements specified by the manufacturer.

(b) Failure due to power supply voltage/frequency other than specified by the manufacturer or due to abnormality in power supply.

(c) Corrosion or deterioration of the piping due to impurities contained in gas, compressed air or cooling water supplied by the user.

(d) Corrosion of the electric circuits or deterioration of the optical elements due to highly corrosive atmospheric gas.

(e) Failure due to use of software, hardware or spare parts not supplied by the manufacturer.

(f) Failure due to use not described in the manual or improper repair not approved by the manufacturer.

(g) Failure due to maintenance or repair by other than service engineer qualified by the manufacturer.

(h) Failure due to relocation or transport conducted not under the supervision of the manufacturer after the initial installation of the instrument.

(i) Failure due to disassembly, modification or relocation not approved by the manufacturer.

(j) Failure due to acts of God, including fire, earthquake, storm, flood, lightning, social disturbance, riot, crime, insurrection, terrorism, war (declared or undeclared), radioactive pollution, contamination with harmful substances, etc.

(k) Failure of the hardware, or damage to the system software, application software or data due to computer virus infection.

(l) After disposal of this instrument, after its resale without prior approval from the manufacturer, consumable parts, and failure of any part that have reached the end of its service life.

(m) Failure due to life-limited parts that has exceeded the end of its useful lifetime.

(4) Disclaimer of Warranty

THE MANUFACTURER MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, EXCEPT AS PROVIDED HEREIN, INCLUDING WITHOUT LIMITATION THEREOF, WARRANTIES AS TO MARKETABILITY, MERCHANTABILITY, FOR A PARTICULAR PURPOSE OR USE, OR AGAINST INFRINGEMENT OF ANY PATENT. IN NO EVENT SHALL THE MANUFACTURER BE LIABLE FOR ANY DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE, OR LOSSES OR EXPENSES RESULTING FROM ANY DEFECTIVE PRODUCT OR THE USE OF ANY PRODUCT.
NO ORAL OR WRITTEN INFORMATION OR ADVICE GIVEN BY THE MANUFACTURER, ITS DEALERS, DISTRIBUTORS, AGENTS OR EMPLOYEES SHALL CREATE A WARRANTY OR IN ANY WAY INCREASE THE SCOPE OF THIS WARRANTY.

Service Life of This Instrument

This instrument has a useful service life of seven years after the date of its initial use (installation), which is estimated under the condition that periodic maintenance, checkup, replacement of life-limited parts, and repair of worn parts are carried out as specified in the present instruction manual.

(In use of the instrument under standard operating conditions (8 h/day, 20 days/month))

For using the instrument beyond the useful service life, it shall be checked for safety by Hitachi High-Technologies Corporation sales representative or service office of Hitachi High-Technologies Corporation sales representative. (This safety check will be available on a chargeable basis.)

If use of the instrument is continued without receiving the safety check, the instrument might become faulty and cause a danger. Note that replacement may be recommended as a result of the safety check.

Installation, Relocation and After-sale Technical Service

(1) Installation and Relocation

(a) When the user intends to install the instrument by oneself, be sure to read and comprehend description in the annexed sheets: “Read Before Use”, “User-preparation Items”, and “Setup Sheet” for the Model UH5300 Spectrophotometer, before installation. If the indication “NG” appears in the performance check at the time of setup, conduct the performance check again without fail. If the indication “NG” appears again, record the item of such “NG” indication and the results, and then contact our sales representative to inform of the situation.

(b) Before installation, the user shall make preparations for satisfying the installation requirements in accordance with this instruction manual.

(c) If relocation becomes necessary after initial installation (delivery), please contact the dealer from whom you purchased the instrument or our sales representative.

(2) After-sales Service

(a) For after-sales service, contact our sales representative or service office of our sales representative.

(b) For service after the warranty period, consult our sales representative or service office of our sales representative with regard to a maintenance and inspection service contract. (Service will be available on a chargeable basis.)

(c) The maintenance and consumables of the instrument can be supplied within the useful service life of the instrument (7 years). Even after the period of useful service life, the parts and units can be supplied (within 10 years after the date of initial use) so far as they are obtainable. However, this measure will not lead to an extension of the 7-year useful service life which is assured by the manufacturer.
And, if a part or unit is unavailable due to the discontinuance of its manufacture, a substitute part or unit may be supplied, for which we request your understanding.

(d) It may be impossible to supply the main unit components other than the maintenance parts and consumables due to the discontinuance of main-unit manufacture, etc. If the instrument becomes faulty, it might be irreparable due to lack of such components. In this case, the user is requested to stop operation and replace the instrument with a new one.

Technical Seminars and Training Courses for Users

We offer technical seminars and training courses at either our or user's facilities to ensure proper and safe operation of the analytical instrument to its full performance. For further information, contact our sales representative. (Applicants will be charged.)

Cautions on Security in Use of Wireless LAN Equipment

The wireless LAN is advantageous in that LAN connections can be freely established as long as an access for connection is attempted from an area within the reach of radio wave, because information is exchanged between a wireless access point and a personal computer or a similar device on radio wave instead of the use of LAN cables.
On the other hand, there is a possibility of intercepting communication or unauthorized invading the system if a security measures are not provided, because radio wave will reach all the places within a certain range beyond obstacles (such as walls).

- The intercepting of the communication
- The unauthorized invasion

In order to reduce the occurrence of security problems, follow all the instruction about the settings related to security reading well the manuals of wireless LAN equipment such as routers.

Other Precautions

Handling of Chemicals and Samples

(1) The user is responsible for following relevant legal standards and regulations in handling, storage and disposal of chemicals and samples used in analytical operations with this instrument.

(2) Reagents, standard solutions and accuracy-control samples shall be handled, stored and discarded as instructed by the respective suppliers.

(3) Samples that may have been infected with bacteria or viruses are not applicable to the instrument.

SAFETY SUMMARY

General Safety Guidelines

Before using the Hitachi Model UH5300 Spectrophotometer, be sure to read the following safety instructions carefully.

The hazard warnings which appear on the warning labels on the product or in the manual have one of the following alert headings consisting of a safety alert symbol and signal word DANGER, WARNING or CAUTION.

	:	Safety alert symbol used for calling attention to a potential hazard which could cause personal injury. To avoid possible injury or death, observe all the safety messages following this symbol.
DANGER	:	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	:	Indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.
CAUTION	:	Indicates a hazardous situation which, if not avoided, can result in minor or moderate injury.
NOTICE	:	Indicates a hazardous situation which, if not avoided, can result in damage to property.

In addition to the above, the following signal word is used to indicate instructions for ensuring proper use of the product.

NOTE:	Indicates an instruction for ensuring correct use of the product and accurate analysis therewith.

SAFETY SUMMARY

Common Safety Precautions

Prior to Use

- Before using the instrument, be sure to read this instruction manual carefully to attain a full understanding of its operations.
- Keep the instruction manual handy nearby so it can be referred to whenever needed.
- Be sure to observe the procedures specified in the manual.
- Be sure to understand and follow all the safety instructions given in the manual.
- Be sure to observe all the hazard warnings attached to the instrument or provided in the manual. Failure to do so could result in personal injury or damage to the instrument.
- Be sure to follow all the methods of use instructed in the manual for proper application of the product.
- Absolutely avoid modifying the product, using non-specified parts, or removing safety devices as it could be hazardous.
- Do not perform any operation or action other than described in the manual.
  On occurrence of any trouble in the instrument, notify your nearest Hitachi High-Technologies Corporation sales representative or service office of Hitachi High-Technologies Corporation sales representative.
- When using chemicals for the instrument, be sure to provide proper ventilation of the room. Inadequate ventilation could endanger human health.

SAFETY SUMMARY

Common Safety Precautions (Continued)

- Keep in mind that the hazard warnings in the manuals or on the product cannot cover every possible case, as it is impossible to predict and evaluate all circumstances beforehand. Always be alert and use your common sense.

- Wear appropriate protective equipment when using chemicals. In the case of accidental contact with the skin or ingestion, refer to the Material Safety Data Sheet (MSDS) to take first-aid action and seek medical care.

In Use

- If an abnormality such as unusual noise, odor, fuming or gas leakage occurs during operation of the instrument, immediately disconnect power to the instrument, and take proper safety measures as required. Then, notify your nearest Hitachi High-Technologies Corporation sales representative or service office of Hitachi High-Technologies Corporation sales representative.

Installation, Maintenance, and Relocation

- When the Model UH5300 Spectrophotometer is delivered, check the content of the package to see whether or not there is missing items against the information in the section “Read Before Use” in the annexed sheet attached to the instrument. If the instrument having a missing-item is put into operation, a failure could occur to result in a hazardous condition.
  If any item is missing or damaged or if you have any question, notify your nearest Hitachi High-Technologies Corporation sales representative or service office of Hitachi High-Technologies Corporation sales representative.

SAFETY SUMMARY

Common Safety Precautions (Continued)

- The maintenance and checkup procedures to be taken by the user are only those described in the manual. When taking the maintenance and checkup procedures described in the manual, attain a clear understanding of them.
  Do not perform other maintenance and checkup procedures to avoid jeopardizing safety and causing troubles in the instrument.

- After installation of the instrument, do not give any strong vibrations or shocks that human body feels. Such strong vibrations, etc. may affect the precisely adjusted optical system and will cause sensitivity lowering or wavelength deviation.

- The parts having a useful lifetime indicated in this manual must be replaced periodically as specified. If the instrument is operated though the replacement of life-limited parts has already been required, the instrument might become faulty due to part deterioration, etc., causing leak, fuming, combustion or the like trouble on safety.
  For other than the replacement procedures instructed in this manual, contact your nearest Hitachi High-Technologies Corporation sales representative or service office of Hitachi High-Technologies Corporation sales representative.

- For reducing a risk of trouble occurrence due to physical deterioration, it is requested to carry out the safety check (available on a chargeable basis) or replacement with a new one when the instrument has reached the end of its useful service life.

SAFETY SUMMARY

Safety Instructions in This Manual

Shown below are the safety instructions contained in this manual and their relevant sections in it.

DANGER Indications

The indication "⚠ DANGER" does not apply to this instrument.

WARNING Indications

Electric Shock upon Contact with Hazardous Voltage (100 V)

- Contact with the power supply voltage (100 V) may cause an electric shock, resulting in fatal or serious injury.
  Before connecting the power cord, make sure that the power switch of the spectrophotometer main unit is being turned OFF.
  Absolutely do not attempt to disassemble or to modify the instrument.
  (Annexed sheet : Model UH5300 Spectrophotometer Read Before Use)
  (Section 1.2)

Electric Shock due to Improper Grounding

- Improper grounding may cause electric shock hazard. Provide the instrument with a correct grounding system. Do not connect the grounding wire to a gas piping, a telephone cable, or a water supply piping; laws or regulations prohibit such grounding connection.
  (Annexed sheet : Model UH5300 Spectrophotometer Read Before Use)
  (Section 1.2)

SAFETY SUMMARY

WARNING Indications (Continued)

Electric Shock due to Contact with Inside of Instrument

- Before replacing power line fuses, make sure that the power cord has been disconnected.

(Section 7.8)

- This instrument has electrical parts mounted inside that works on a voltage having a potential to invite an electric shock hazard if touched directly. Leave the checking inside the instrument always to the service engineer.

(Section 7.10)

SAFETY SUMMARY

CAUTION Indications

Caution in Carrying Heavy Instrument

- This instrument weighs about 19 kg. Be very careful not to cause injury due to accidental dropping the instrument when carrying. Hold the handles on the left and right of the instrument firmly when carrying.

(Annexed sheet : Model UH5300 Spectrophotometer Read Before Use)
(Section 1.2)

Fatigue due to Long Hours of Operation

- In operating the instrument watching the display, a long hour watching in the same posture can build up fatigue in the eyes or body. For your health, when operating the instrument for long hours, take a break 10 to 15 minutes every hour or so to rest your eyes and body.

(Chapter 4)

Direct Gazing into Lighting Mercury Lamp Damages Your Eyes

- Mercury lamp emits strong ultraviolet rays. Do not therefore gaze directly into the lamp. Wear a protective eye glasses that blocks ultraviolet rays if gazing into the lamp is unavoidable.

(Section 5.4)

Mercury Lamp Becomes Hot When Lights

- The mercury lamp is still hot immediately after turning off the lamp power supply. Wait for about five minutes until the lamp is fully cooled for safe handling.

(Section 5.4)

SAFETY SUMMARY

CAUTION Indications (Continued)

Direct Gazing into Lighting Xe Flash Lamp Damages Your Eyes

- Xe flash lamp emits strong ultraviolet rays. Do not therefore gaze directly into the lamp. Wear a protective eye glasses that blocks ultraviolet rays if gazing into the lamp is unavoidable.

(Section 6.2)

Burst of a Lithium Battery

- The Model UH5300 spectrophotometer uses a lithium battery for time control. A lithium battery may burst should it be handled improperly.
  Absolutely do not attempt to charge, disassemble, or throw into a fire under any circumstance. The battery should be handled totally separate from ordinary wastes.
  When the lithium battery needs replacement (for example, an error message “RAM NG” appears frequently on the screen), contact your nearest Hitachi High-Technologies Corporation sales representative or service office of Hitachi High-Technologies Corporation sales representative.
  Leave the replacement work to the service engineer who has completed our technical training. (The replacement after expiration of the warranty period is a pay service.)

(Section 7.7)

SAFETY SUMMARY

NOTICE

Disposal of Waste Solution

- Be sure to collect waste solution and treat it for proper disposal in accordance with the relevant laws and regulations regarding water pollution control and sewage treatment. Improper treatment of waste solution may result in environmental pollution, and could also lead to a penalty.

Accuracy and Precision of Measured Values

- Carry out periodic inspection and check whether the system is operating normally. If necessary, conduct measurement on a control sample.

Electricity

- Make sure that power supply to the spectrophotometer is 100 V AC, 150 VA or more (50 or 60 Hz). Fluctuation in the supply voltage or noise on the supply line not only may affect on the main unit of spectrophotometer but also may be a cause of accident.

- Be sure to prepare a grounding wire together with power cables and confirm that the wire has a ground resistance of 100 Ω or less (Class D grounding construction in Electric Facility Technical Standards). If the grounding is not proper, the measuring system becomes sensitive to external noise disturbance; further, the main unit of the spectrophotometer will be charged with a stray voltage, which is hazardous for human body.

CONTENTS

1 INSTALLATION AND SET-UP OF INSTRUMENT

1.1 Feature of Instrument

This instrument is capable of measuring liquid samples for their concentration, absorbance, transmittance, absorbing spectrum, transmission spectrum; and time scan measuring for absorbance and transmittance. The light source of this instrument lights only while the measuring is going on. The instrument therefore consumes less power than that of such a spectrophotometer as uses a continuously illuminating light source. The instrument is further capable of making a quantitative analysis with an eased operation because an automatically rotating 6 cell measuring device is equipped as the standard specifications. A lid open-close detector is equipped on the sample chamber lid. The detector permits closing the lid to start measuring automatically (an intelligent start function).

1.2 Installation of Instrument

⚠ CAUTION

Caution in Carrying Heavy Instrument

This instrument weighs about 19 kg. Be very careful not to cause injury due to accidental dropping the instrument when carrying. Hold the handles on the left and right of the instrument firmly when carrying.

Fig. 1-1 How to Hold Instrument

This instrument weighs about 19 kg. Be very careful not to invite injury due to accidental dropping the instrument when carrying.

1.2.1 Place of Installation

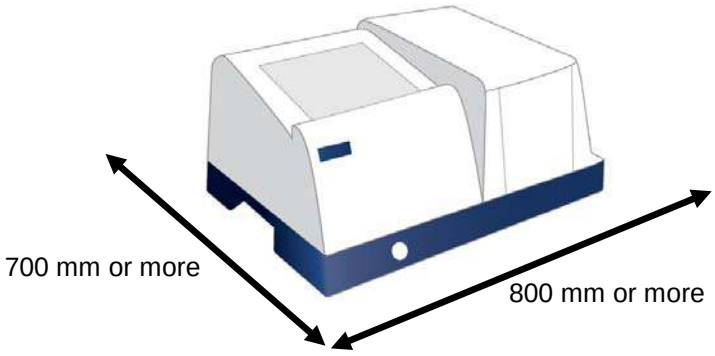


Fig. 1-2 Space for Installation

(1) Secure a space of 800 mm wide and 700 mm deep or larger. When a PC or a printer is, or both are, to be installed, secure another space having suitable extent.

(2) A horizontal plane, elevated 300 mm or more from the floor, capable of bearing the instrument weight and an operational load under the instrument use conditions

1.2.2 Installation Conditions

(1) Service temperature: 15 to 35 °C
It is recommended to install the instrument in an air-conditioned room regulated to 20 to 25 °C for the measuring under the most stable conditions.

(2) Service humidity: 25 to 80 %RH
Install in a place where no condensation occurs. Where the ambient temperature is 30 °C or more, control the relative humidity to 70 %RH or below.

(3) Atmosphere and ambient gas
No corrosive gases such as acidic or alkaline gas that heavily attack metals shall exist in ambience.
No coating-dissolving gasses such as gas of organic solvent (particularly benzine and thinner) that dissolve coating shall exist in ambience.

(4) Other general precautions

(a) Do not place in the direct sunlight. (Direct sunlight may be the cause of disorder in the optical performance or of discoloration on the instrument. Avoid installing at the window.)

(b) No strong vibrations or shocks that human body feels shall be applied (otherwise fine adjustment or delicate mechanism will be affected).

(c) No heat-generators such as gas burners, electric heaters, or ovens shall exist nearby.

(d) The instrument shall not be placed close to equipment that generates strong electric field (such as electric welders, high frequency electric furnace, and pole transformers).

(e) No excessive dusts or litters shall exist (dusts, etc. will cause disorder in the optical performance).

(f) No sharp variation of the power supply voltage shall occur (such variation may be the cause of noise).

(g) Do not turn on or off frequently the power source of motors (such as for stirrers and vibrators) that does not have noise prevention devices when such motors are connected with the same power supply line to which the main unit of the spectrophotometer is connected.

NOTICE: The optical system in the spectrophotometer is a very delicate system. The control section of the instrument has high density electronic components that function as a computer. Therefore, above-stated precautions must be fully observed.

1.2.3 Power Supply

Voltage:	One of 100, 115, 220, 230, 240 V Fluctuation shall be within ±10 % of nominal voltage.
Frequency:	50 or 60 Hz Fluctuation shall be within ±10 % of nominal frequency.
Capacity:	150 VA or more for instrument alone Provide a power supply having adequate capacity compatible with the entire system power consumption including the PC, the printer, the router, etc. to be used in the actual system.
Grounding line:	Grounding resistance shall be 100 Ω or lower.

1.2.4 Connecting Power Cord and Ground Wire

⚠ WARNING

Electric shock due to Dangerous Voltage

An electric shock due to power voltage could result in death or serious injury. Before connecting the power cord, make sure that the power switch of the spectrophotometer main unit is turned off.
Also, absolutely avoid disassembling or modifying the instrument.

⚠ WARNING

Electric Shock due to Improper Grounding

Improper grounding may result in an electric shock hazard. Be sure to provide proper grounding connection.

(1) To prevent an electric shock hazard due to improper grounding, provide a proper grounding connection.
This UH5300 is equipped with a power supply cord 'Ⓐ' having a earthing plug 'Ⓑ'. To minimize possible shock hazard, the cord must be plugged into a mating earthing-type wall receptacle 'Ⓒ'. If a mating wall receptacle is not available, it is the personal responsibility and obligation of the customer to have the proper earthed wall receptacle installed by a qualified electrician.

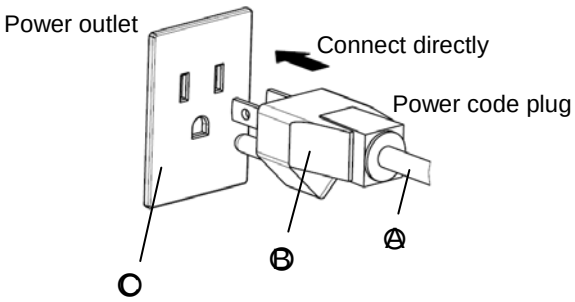


Fig. 1-3 Type B plug

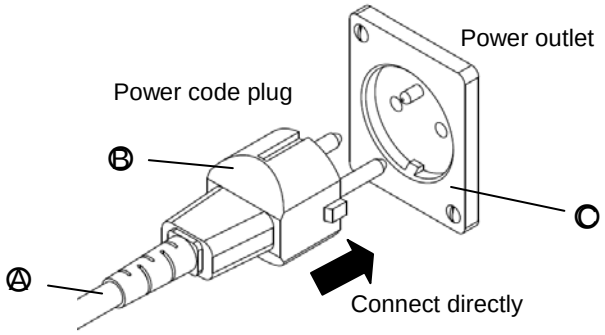


Fig. 1-4 Type E and F plug

(2) Connect the power cord to the power cord receptacle on the Model UH5300 Spectrophotometer.

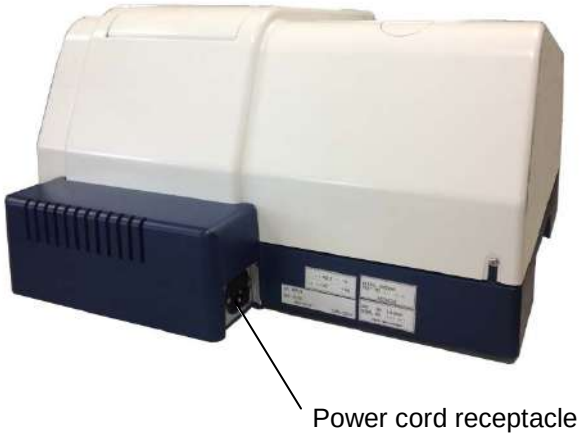


Fig. 1-5 Power Cord Receptacle

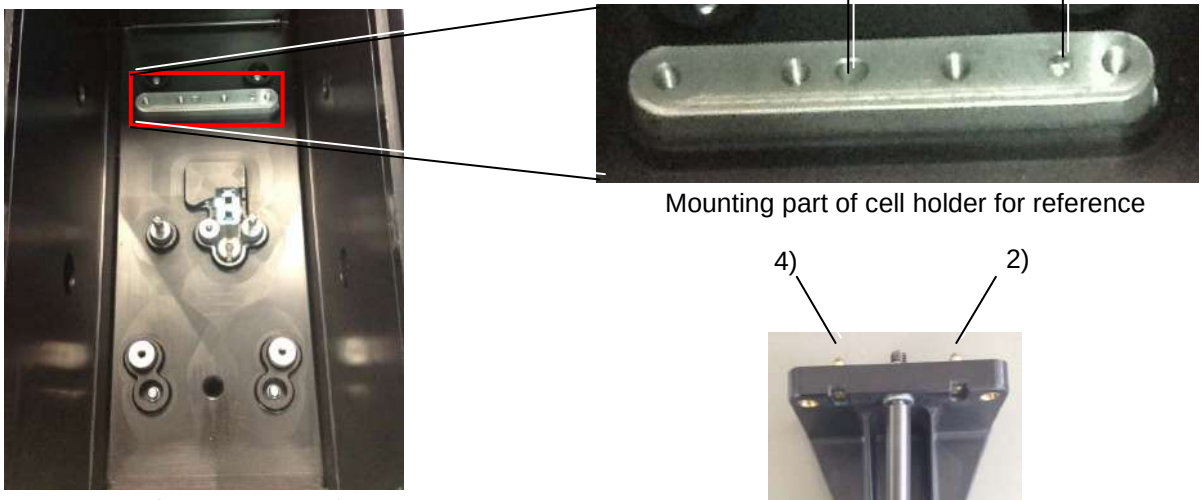
1.3 Mounting and Dismounting Cell Holder

This section describes method of mounting and dismounting the cell holder for reference and the 6 cell turret in and from the sample compartment.

1.3.1 Cell Holder for Reference

1. Mounting Method

(1) Check the mounting part at the back of the sample compartment for the mounting position of the cell holder for reference. Insert the cell holder for reference into the compartment aligning positioning pins on the bottom face of the cell holder for reference with positioning holes of the second and the fourth from the right in the mounting part.



External appearance of sample compartment

Mounting part of cell holder for reference

Cell holder for reference

Fig. 1-6 Mounting Cell Holder for Reference

(2) Tighten the fixing screw on the cell holder for reference to fix the cell holder.

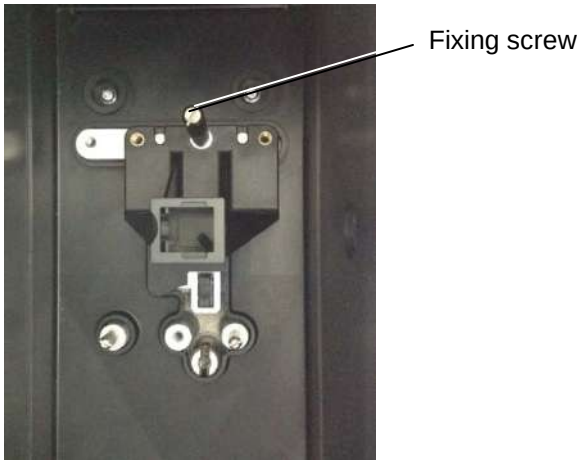


Fig. 1-7 External Appearance of Sample Compartment with Cell Holder for Reference Mounted

2. Dismounting Method

Dismounting is performed in the reverse order of the mounting method. Loosen the fixing screw and lift the cell holder for reference to dismount.

1.3.2 6 Cell Turret

1. Mounting Method

(1) Check the shaft of the driving motor in the sample compartment; the shaft has a cut (an incision). Then, check the shaft aligning part (a salient portion) on the rear of the 6 cell turret to be mounted. Insert the 6 cell turret so that the salient on the shaft aligning part of the 6 cell turret will engage closely with the cut on the shaft of the driving motor.

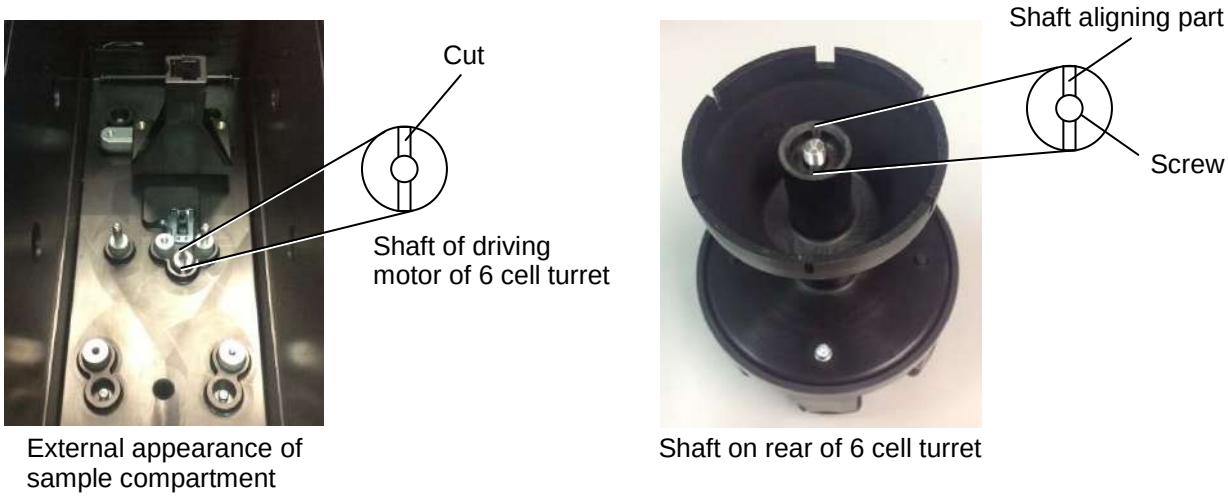


Fig. 1-8 Shaft Aligning in Mounting 6 Cell Turret

(2) Hold the 6 cell turret at its center with hand and tighten firmly the fixing screw to fix the 6 cell turret. Thus, mounting the 6 cell turret is completed.

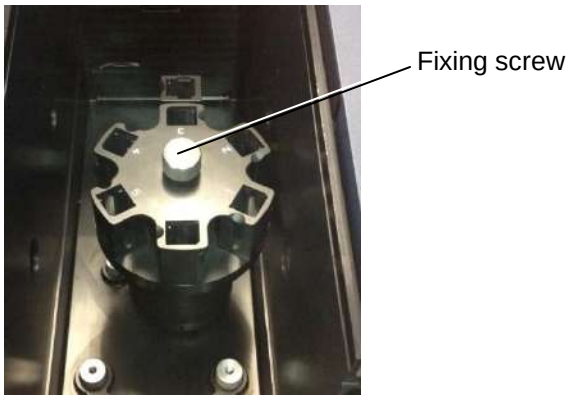


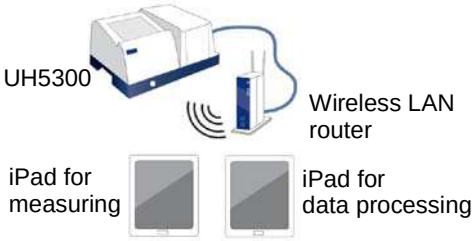
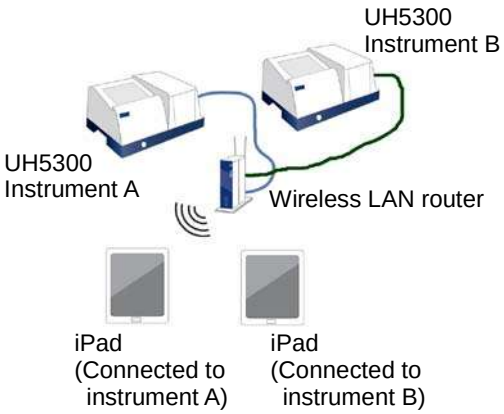
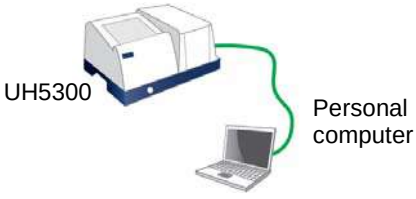
Fig. 1-9 Fixing Screw for 6 Cell Turret

2. Dismounting Method

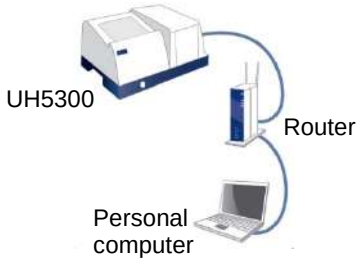
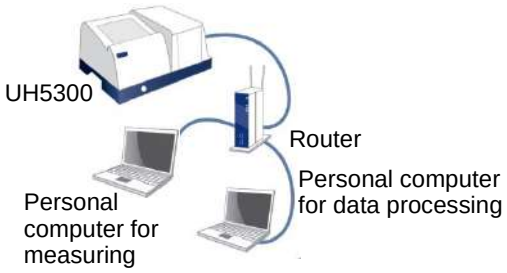
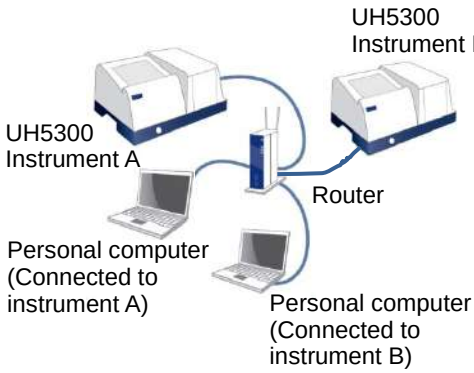
Dismounting is performed in the reverse order of the mounting method. Loosen the fixing screw and lift the 6 cell turret to dismount.

1.4 Set-up Method

Use of the Model UH5300 Spectrophotometer needs to prepare some devices that should be purchased separately depending on use conditions. Prepare such devices according to the use conditions referring to the annexed paper, “List of User-preparation Devices for Use of Model UH5300 Spectrophotometer”. The set-up method is as follows.

	Use environment of instrument	Connection configuration	Set-up method
A	iPad control (Connected to wireless LAN)	UH5300 and iPad are connected in one-to-one configuration 	See Section 1.4.1.
		Two iPads are connected to one UH5300 	See Section 1.4.2.
		Plural UH5300s are connected to the same wireless router. 	See Section 1.4.3.
B	Personal computer control • One-to-one connection between instrument and personal computer		See Section 1.4.4.

(cont'd)

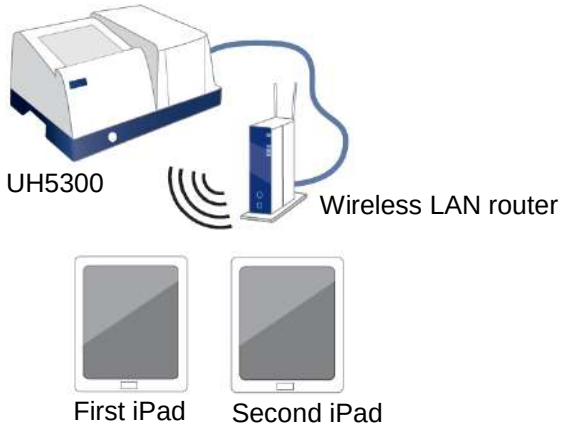
	Use environment of instrument	Connection configuration	Set-up method
C	Personal computer control • Network connection through router	UH5300 and personal computer are connected through router in one-to-one configuration.  	See Section 1.4.5.
		Two personal computers are connected to one UH5300  	See Section 1.4.6.
		Plural UH5300s are connected to the same router.  	See Section 1.4.7.

1.4.1 Connecting UH5300 and iPad in One-to-one Configuration

Refer to the annexed paper, “Model UH5300 Spectrophotometer Set-up Sheet, For iPad”.

1.4.2 Connecting Plural iPads to One UH5300

This section describes method of the set-up for connecting two iPads to one UH5300.



(1) First, set up the first iPad according to the annexed paper, “Model UH5300 Spectrophotometer Set-up Sheet, For iPad”. After that set-up, turn off once the power supply to the first iPad and the instrument.

(2) Prepare the second iPad. Set up the second iPad according to the annexed paper, “Model UH5300 Spectrophotometer Set-up Sheet, For iPad, 2. iPad Set-up”.

* Use the same SSID and KEY for the wireless LAN router used for the first iPad.

(3) Next, connect the second iPad to UH5300 according to the annexed paper, “Model UH5300 Spectrophotometer Set-up Sheet, For iPad, 4. Connection to UH5300”.

* When the connection to the instrument is established, the home screen of UH5300 appears instead of the language screen.

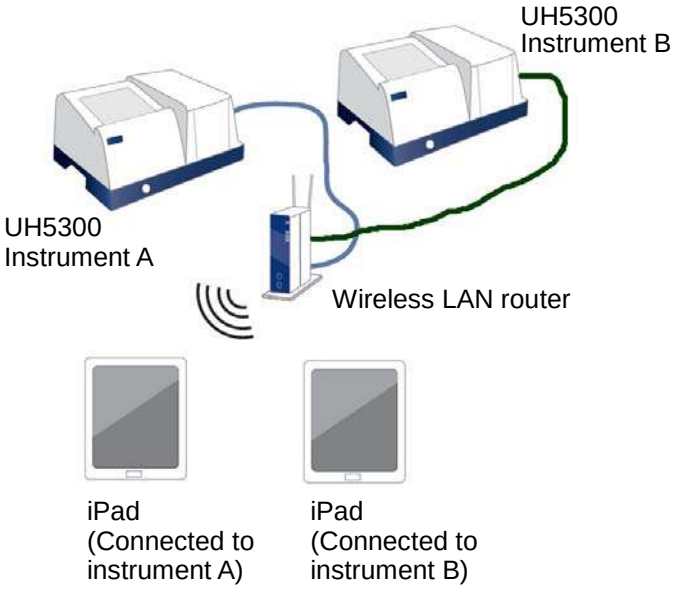
Connect the second iPad in the same manner as in the first iPad. Use the created icon in connecting the second iPad to the instrument. By this, two iPads become connectable to the instrument.

NOTE: When one iPads has been connected to the instrument and is engaged in measuring, the other iPad cannot engage in measuring. Only one single iPad can engage in measuring.

NOTE: Although it is possible to connect three or more iPads to UH5300 simultaneously, communication may not be available in such a case depending on the connection environment as it takes more processing time when the number of the connected devices increases. For this reason, when connecting multiple iPads, it is recommended to check your connection environment first and limit the number of the devices to about five or less.

1.4.3 Operating, Through iPad, Plural UH5300s Connected to Same Wireless LAN Router

This section describes the method of set-up for connecting plural UH5300s to the same wireless LAN router. One wireless LAN router accepts maximum four connections of UH5300s. This section deals with an example method of set-up for two UH5300s (hereinafter referred to as the instrument A and the instrument B).



(1) Prepare the instrument A of UH5300 and the iPad to be connected to the instrument A. Set up the iPads according to the annexed paper, “Model UH5300 Spectrophotometer Set-up Sheet, For iPad”. After the set-up, turn off once the power supply to the iPad.

(2) Prepare the instrument B of UH5300 and the iPad to be connected to the instrument B. Set up the iPad in the same manner as in the instrument A according to the annexed paper, “Model UH5300 Spectrophotometer Set-up Sheet, For iPad”.

* When connecting the wireless router and UH5300, link the vacant LAN port on the wireless LAN router and the LAN port on the right side of the main unit of UH5300 using a straight through LAN cable.

* For set-up of the printer, no work is required because the printer has been installed in the set-up works described in step (1) mentioned above.

* As for the SERIAL No. for connecting to UH5300, use always the SERIAL No. of the instrument to be connected.

(3) By these works, the set-up of the instrument A and the instrument B have been completed. When connecting plural instruments is further intended, repeat the works described in item (2) above as many times as same as the number of the measuring instruments.

NOTE: If there are vacant ports in the wireless LAN router, it is possible to connect three or more UH5300s simultaneously. However, communication may not be available in such a case depending on the connection environment as it takes more processing time when the number of the instruments increases. For this reason, it is recommended to connect four UH5300s or less to a single wireless LAN router.

1.4.4 Connecting UH5300 and Personal Computer in One-to-one Configuration

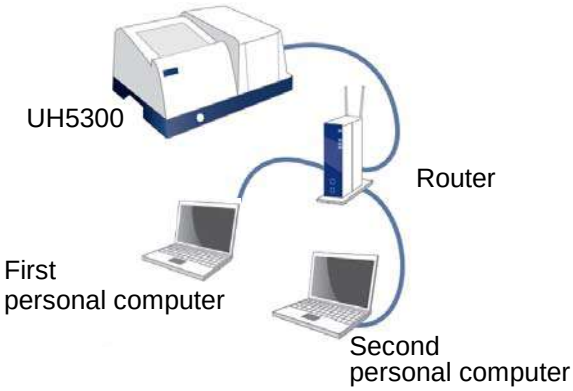
Refer to the annexed paper, “Model UH5300 Spectrophotometer Set-up Sheet, For Windows® 7 (Connecting directly Instrument and Personal Computer using LAN Cable)”.

1.4.5 UH5300 and Personal Computer are Connected Through Router in One-to-one Configuration

Refer to the annexed paper, “Model UH5300 Spectrophotometer Set-up Sheet, For Windows® 7 (Connecting Instrument and Personal Computer through Router)”.

1.4.6 Connecting Plural Personal Computers to One UH5300 Through Router

This section describes method of the set-up for connecting two personal computers to one UH5300.



(1) First, set up the first personal computer according to the annexed paper, “Model UH5300 Spectrophotometer Set-up Sheet, For Windows® 7 (Connecting Instrument and Personal Computer through Router)”. After that set-up, turn off once the power supply to the first personal computer and the instrument.

(2) Prepare the second personal computer. Set up the second personal computer according to the annexed paper, “Model UH5300 Spectrophotometer Set-up Sheet, For Windows® 7 (Connecting Instrument and Personal Computer through Router), 1. Installing Safari on Personal Computer, and 2. Setting Personal Computer for LAN”.

(3) Next, connect the LAN port on the second personal computer and the LAN port on the router in a same manner as in the first personal computer using the LAN cable (straight through LAN cable).

(4) Using the second personal computer, perform works described in the annexed paper, “Model UH5300 Spectrophotometer Set-up Sheet, For Windows® 7 (Connecting Instrument and Personal Computer through Router), 5. Setting and Performance Examination of UH5300”.

* When the connection to the instrument is established, the home screen of UH5300 appears instead of the language screen.

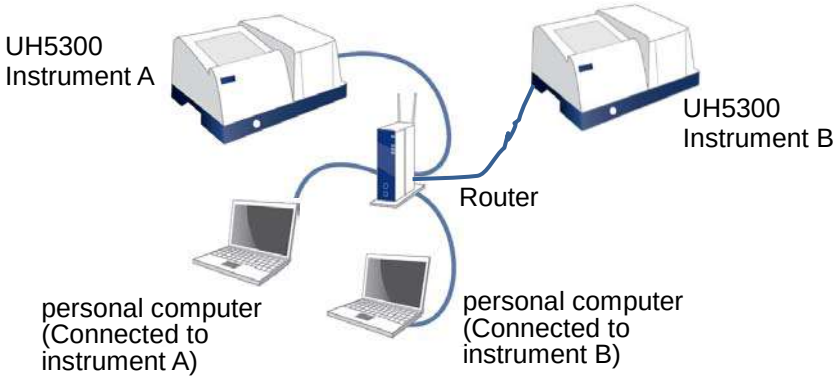
As with the first personal computer, register the top menu of UH5300 on the bookmark bar. When the second iPad is to be connected to the instrument, press the registered UH5300 button. Thereby, two personal computers become connectable to the instrument.

NOTE: When one personal computer has been connected to the instrument and is engaged in measuring, the other personal computer cannot engage in measuring. Only one single personal computer can engage in measuring.

NOTE: If there are vacant ports in the router, it is possible to connect three or more personal computers to UH5300 simultaneously. However, communication may not be available in such a case depending on the connection environment as it takes more processing time when the number of the computers increases. For this reason, when connecting multiple personal computers, it is recommended to limit the number of the computers to about five or less.

1.4.7 Operating, Through Personal Computer, Plural UH5300s Connected to Same Router

This section describes the method of set-up for connecting plural UH5300s to the same router. This section deals with an example method of set-up for two UH5300s (hereinafter referred to as the instrument A and the instrument B).



(1) Prepare the instrument A of UH5300 and the personal computer to be connected to the instrument A. Set up the personal computer according to the annexed paper, “Model UH5300 Spectrophotometer Set-up Sheet, For Windows® 7 (Connecting Instrument and Personal Computer through Router)”. After the set-up, turn off once the power supply to the personal computer.

(2) Prepare the instrument B of UH5300 and the personal computer to be connected to the instrument B. Set up the personal computer in the same manner as in the instrument A according to the annexed paper, “Model UH5300 Spectrophotometer Set-up Sheet, For Windows® 7 (Connecting Instrument and Personal Computer through Router)”.

* When connecting the router and UH5300, link the vacant LAN port on the router and the LAN port on the right side of the main unit of UH5300 using a straight through LAN cable.

* For set-up of the printer, no work is required because the printer has been installed in the set-up works described in step (1) mentioned above.

* As for the SERIAL No. for connecting to UH5300, use always the SERIAL No. of the instrument to be connected.

(3) By these works, the set-up of the instrument A and the instrument B have been completed. When connecting plural instruments is further intended, repeat the works described in item (2) above as many times as same as the number of the measuring instruments.

NOTE: If there are vacant ports in the wireless LAN router, it is possible to connect three or more UH5300s simultaneously. However, communication may not be available in such a case depending on the connection environment as it takes more processing time when the number of the instruments increases. For this reason, it is recommended to connect four UH5300s or less to a single wireless LAN router.

2 FUNCTION AND BASIC OPERATION

This chapter describes mainly the basic operation of this instrument.

2.1 Name and Function of Each Part of Instrument

2.1.1 Name and Function of Each Part of Main Unit of Spectrophotometer

1. Front View

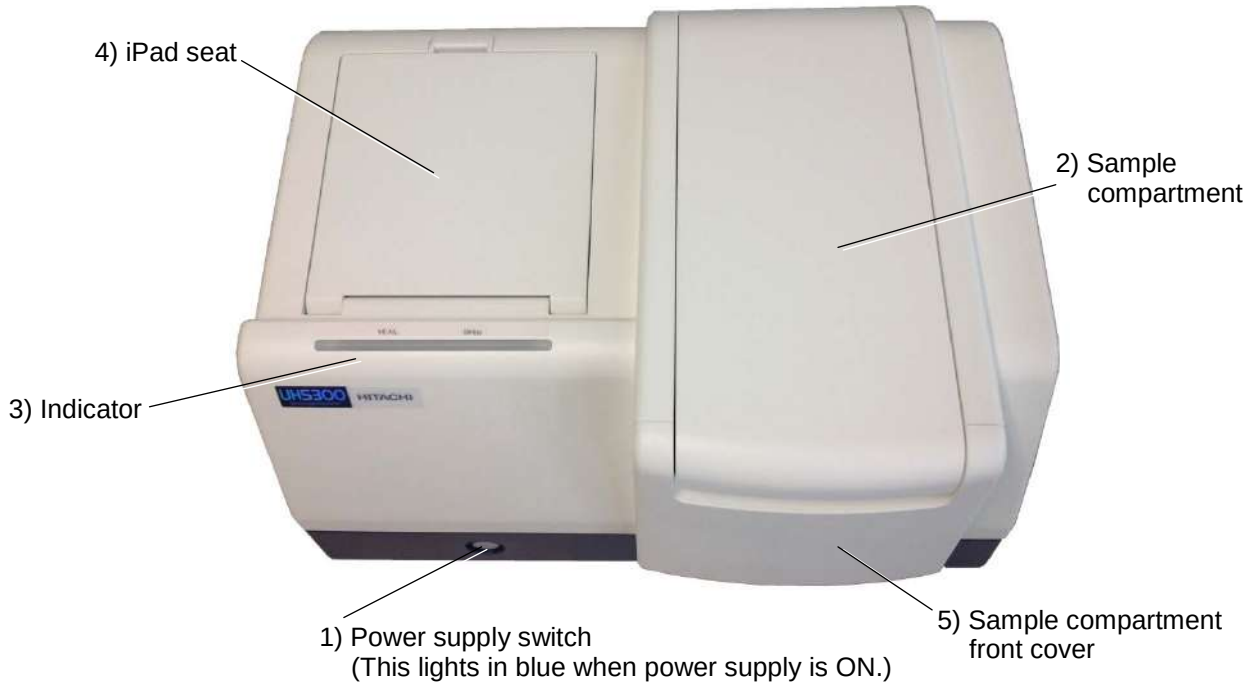


Fig. 2-1 Front View of Model UH5300 Spectrophotometer

1) Power supply switch: This is the power supply switch to turn ON and OFF the power supply.
2) Sample compartment: This is the room for setting samples for measuring.
3) Indicator: These are indicators for indication of the status of instrument. The indicator on the left is the MEAS indicator and on the right the OPEN indicator. The MEAS indicator blinks while the instrument is under starting up and lights in green while measuring. The OPEN indictor indicates the open/close status of lid of the sample compartment and lights in orange when the lit is open.

4) iPad seat: The iPad can be seated on this part. The seat angle can be adjusted to three position by raising the seat. Refer to Fig. 2-2 for details

5) Sample compartment front cover: This is the front cover of the sample compartment. Refer to Section 5.4.5 Sample Compartment Front Cover for removing and installing the cover.

2. iPad Seat

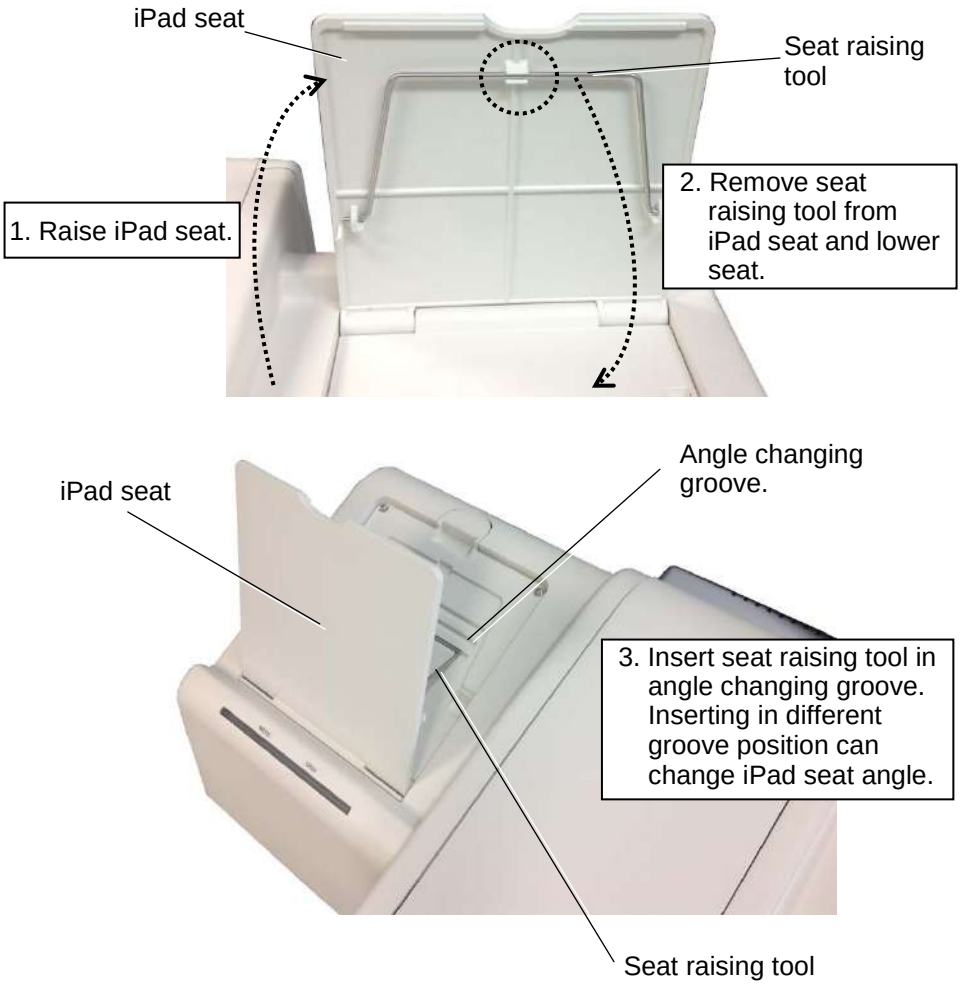


Fig. 2-2 Method of Using iPad Seat

To house the iPad seat, operate in the reverse order of the operation shown in Fig. 2-2. In housing operation, push the seat raising tool against the lug at the rear of the iPad seat until a snap sounds. When housing the iPad seat in the main unit of the instrument, push the iPad seat fully into the main unit until a snap sounds.

Fig. 2-3 Important Points in Housing iPad Seat

3. Left side View

Fig. 2-4 Left Side View of Spectrophotometer

6) ACC port: This port is used for connecting accessory instruments of separate purchase.

4. Right side View

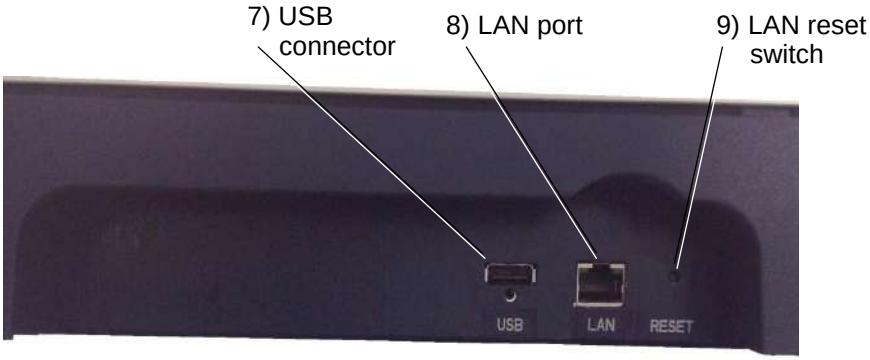


Fig. 2-5 Right Side View of Spectrophotometer

7) USB connector: This is the connector for inserting a USB memory to store data therein.

8) LAN port: This port is connected to the wireless LAN router and is used for sending and receiving data between the main unit of the spectrophotometer and the iPad.

9) LAN reset switch: This is used for resetting the network settings for the LAN.

5. Rear View

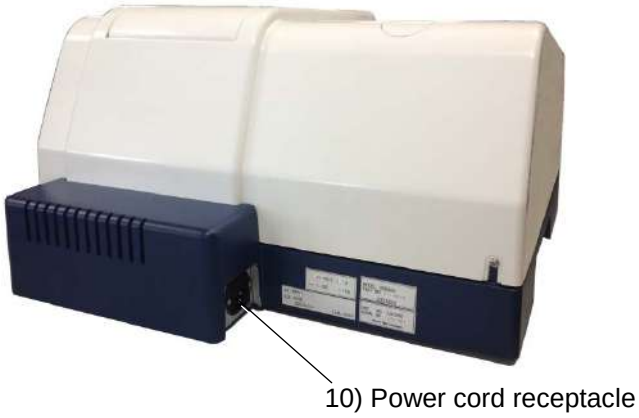


Fig. 2-6 Rear View of Spectrophotometer

10) Power cord receptacle: This is the receptacle to which the power cord is plugged.

6. Bottom View

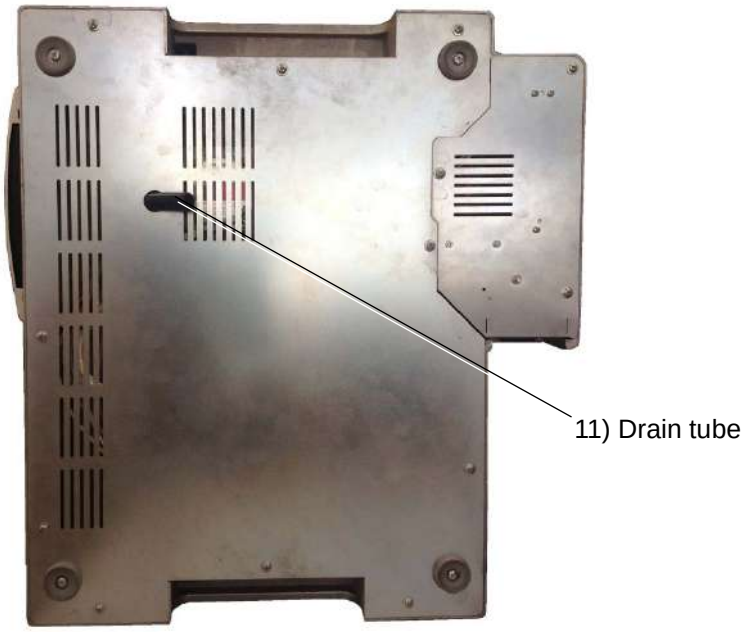


Fig. 2-7 Bottom of Spectrophotometer

11) Drain tube: The drain tube is a tube that drains the liquid spilled accidentally in the sample compartment to the outside thereof. Such spilled liquid is discharged to the bottom of the instrument through this drain tube. If such accidental spilling occurs, clean the instrument according to 7.4 Cleaning Instrument.

2.1.2 Inside of Sample Compartment

This section describes a view of the inside of the sample compartment, the 6 cell turret, and the drain.

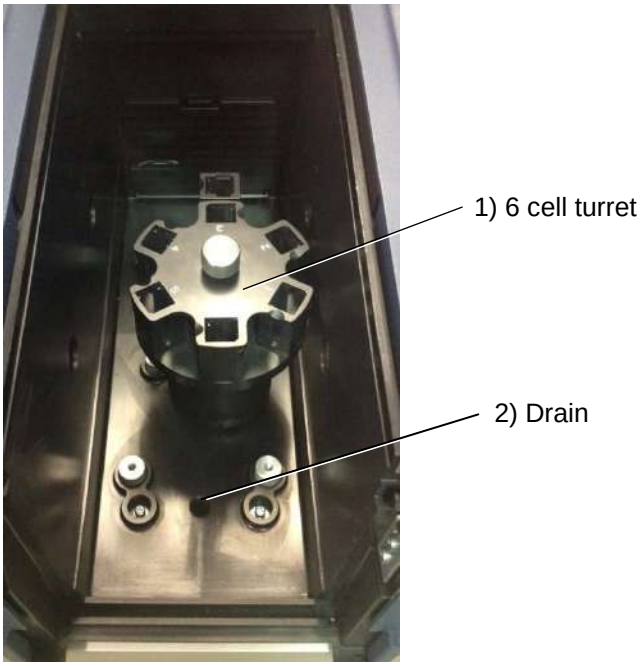


Fig. 2-8 View of Inside of Sample Compartment

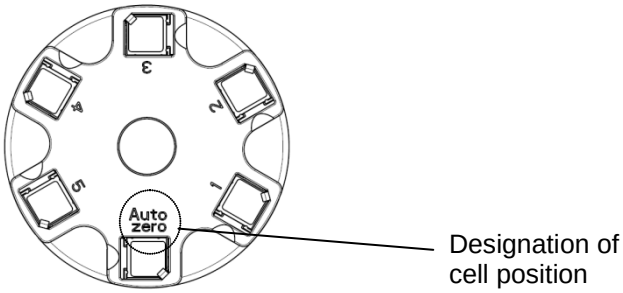


Fig. 2-9 View From Top of 6 Cell Turret

1) 6 cell turret: The 6 cell turret is used for measuring with cells loaded thereon. The turret has places that accommodate six cells. The place marked with “Autozero” is the dedicated position for the autozero measuring. The autozero is performed at this position. (In this manual hereinafter, referred to as the Cell A.) Those cell positions marked with numerals of 1 to 5 are the places for measuring ordinary samples. (In this manual hereinafter, referred to as Cell 1, Cell 2, ..., and Cell 5.)
2) Drain: The drain connects to the drain tube installed at the bottom of the instrument. The drain works as a discharging device that discharges accidentally spilled liquid in the sample compartment to the outside of the instrument through the drain tube. If such accidental spilling occurs, clean the instrument according to 7.4 Cleaning Instrument.

2.2 Starting Up and Shutting Down Instrument

2.2.1 Starting Up Instrument

1. Turning on Power Supply to Instrument

(1) Make sure that the installation and set up of the instrument have been completed.

(2) Make sure that the power switch on the front of the instrument has been turned off.

(3) Make sure that the instrument and the power outlet have been connected with the power cable.

(4) Make sure that there is no cells or samples set in the sample compartment. If exists, take out them from the sample compartment.

(5) Make sure that the lid of the sample compartment has been closed.

(6) Start the iPad or the personal computer.

(7) Press the power switch on the front of the instrument.

2. Starting Up Instrument

(1) Pressing the power switch on the instrument causes the MEAS indicator on the front of UH5300 to blink. The blinking of the indicator shows that the instrument is under starting up. Wait about one and half minutes until the MEAS indicator turns off. While blinking, the instrument is performing self diagnosis and self adjustment. After the indicator turned off, the connection to the iPad or the personal computer becomes workable.

NOTE: During the starting up, the instrument performs the automatic adjustment of the WL driver system using the lamp light. Therefore, do not open the sample compartment lid while the starting up of the instrument is ongoing. If the sample compartment lid is opened, a light will invade from the outside and prevents accurate adjustment. Opening the sample compartment lid during the instrument start up causes an error that warns lid opening. If mistakenly opened, closed the lid and shut down the instrument, and then start again.

(2) If you are connecting from the iPad, press the UH5300 icon  created at the time of set-up. If you are connecting from a personal computer, start Safari and then start the UH5300 application from the bookmark bar. These procedures establish connection with UH5300.

NOTE: When starting UH5300 from the iPad, start the iPad before pressing the power supply switch of the UH5300 main unit. After the power of the iPad is turned on, approximately one minute is required until the communication settings for the iPad, wireless LAN router, and UH5300 are established. For this reason, starting the iPad before starting UH5300 allows the connection to be established smoothly. If it is necessary to connect from the iPad immediately after turning on the power of the iPad, wait approximately one minute before doing so.

3. Self Diagnosis and Automatic Adjustment on Starting Up

(1) When no error was detected in the self diagnosis and automatic adjustment of the instrument at the time of starting up, the top screen appears (Fig. 2-10). If an error is detected, automatically the maintenance history screen appears. When the maintenance history screen appears, follow the guidance indicated on the screen.

Fig. 2-10 Top Screen

Items that the self diagnosis and the automatic adjustment perform at the time of starting up are as follows:

- Checking ROM: Checking ROM
- Checking RAM: Checking RAM
- Checking EEPROM: Checking EEPROM
- Checking lamp lighting: Checking for sending lamp lighting signal
- WL initialization: Checking WL driver system
- Checking WL starting point: Checking detection of WL starting point at 484.3 nm
- Lid open detection: Checking whether or not sample compartment lid was opened during instrument starting up

4. Top Screen

Starting from the top screen, the operation can proceed to menus for measuring, file lookup, maintenance, basic set-up of instrument, etc. After starting up, warm up the instrument for two hours when performing such a measuring that the instrument stability is required to be the specifications level of baseline stability (0.0005 Abs/h).

2.2.2 Shutting Down Instrument

1. Ending Measuring

(1) Make sure that the lamp of the power supply switch on the front of the instrument is lighting.

(2) When a measuring is being ongoing, wait until the measuring ends or make the measuring cease.

(3) When there is a data to be stored, store the data. When there is a data to be printed, print the data. Refer to Chapter 4 First-time Measuring for details of storing and printing.

(4) Press the Home button of the iPad to end the application program.

2. Shutting Down Instrument

Press the power supply switch button on the front of the main unit of the instrument to turn off the power supply. Confirm that the power supply lamp has been turned off.

NOTE: Do not turn off the power supply switch immediately after data was stored. Turn off the power supply switch only after the important data has been definitely stored.

2.3 Basic Operation

This section describes the basic operation of the instrument. Start up the instrument according to 2.2.1 Starting up instrument and display the top screen.

2.3.1 Screen Structure

1. Top Screen

Fig. 2-11 shows the top screen. At the upper left of the top screen, the hierarchy of the screen is indicated. Checking this part tells that via which screen the current screen has appeared. Displayed at the home center of the top screen is the guidance area. In this area, the guidance on the recommended next operation is indicated.
Below the guidance area, five operation buttons are indicated. Functions of these buttons are detailed in Table 2-1.

Fig. 2-11 Top screen

Table 2-1 Functions of Buttons on Top screen

Button	Button name	Details
	Measurement button	This button is used for the measuring operation. Pressing this button displays buttons for the measuring of concentration, absorbance and transmittance, and nucleic acid; and for the measuring with WL scan, time scan, and monitoring. Refer to Chapter 4 First-time Measurement for details of functions under this measuring button.
	Condition file lookup button	This button is used for the measurements that uses the saved condition files or for lookup of content of the saved condition files. Refer to Section 5.2 of Chapter 5 For Increased Convenience of Use for details of this function.
	Data file lookup button	This button is used for lookup of the saved data files. Refer to Chapter 6 Performance Check or Chapter 7 Maintenance for details of this function.
	Maintenance button	This button is used for maintenance operations of the instrument. Pressing this button displays buttons for the lamp use time, WL initialization, sample compartment cover open/close check, performance check, WL calibration, and maintenance history. Refer to Section 5.2 of Chapter 5 For Increased Convenience of Use for details of this function.
	Basic Set-up button	This button is used for setting basics of the instrument. Pressing this button leads to setting measuring-related conditions such as the lamp OFF time, 6 cell mode, and intelligent start; setting file manipulation-related matters such as specifying saving and export destinations of files; setting on operating language; screen coloration; and graphs. Refer to Chapter 3 Basic Set-up for details of this function.

2. Measurement Conditions Setting Screen

On the top screen, press [Measurement Button]. The measuring item selection screen appears. Then, press [Concentration Measuring button]. The measurement conditions setting screen, shown in Fig. 2-12, appears. The basic structures of other measurement conditions setting screens are the same. Using structure of this screen, the functions of buttons and areas are detailed in Table 2-2.

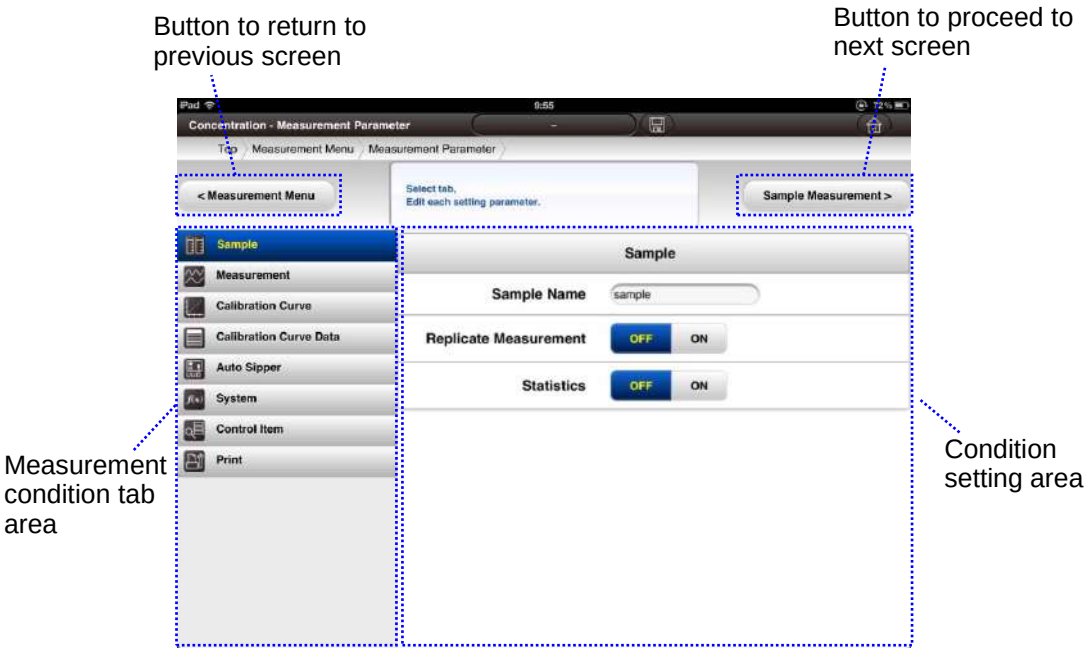


Fig. 2-12 Measurement Conditions Setting Screen

Table 2-2 Functions on Measurement Conditions Setting Screen

Button	Button name	Details
Example < Measurement Menu	Button to return to previous screen	Pressing button indicated in this part causes the operation to return to the next screen. In the example shown in Fig. 2-12, the operation goes back to the Measurement Menu screen.
Example Sample Measurement >	Button to proceed to next screen	Pressing button indicated in this part causes the operation to proceed to the previous screen. In the example shown in Fig. 2-12, the operation proceeds to the sample measuring screen.
–	Measurement condition tab area	In the measurement condition tab area, measurement condition tabs are indicated. By pressing these tabs one by one to open, select or enter values appropriate to setting items in measurement conditions shown in the condition setting area.
–	Condition setting area	In the condition setting area, setting items of measurement condition are indicated. Select or enter values appropriate to those measurement conditions.

3. Measurement Screen

Press the STD Measurement > [STD Measurement Button] on the measurement conditions setting screen shown in Fig. 2-12. The measurement screen shown in Fig. 2-13 appears. The basic structures of other measurement screens are the same. Using structure of this screen, the functions of buttons and areas are detailed in Table 2-3.

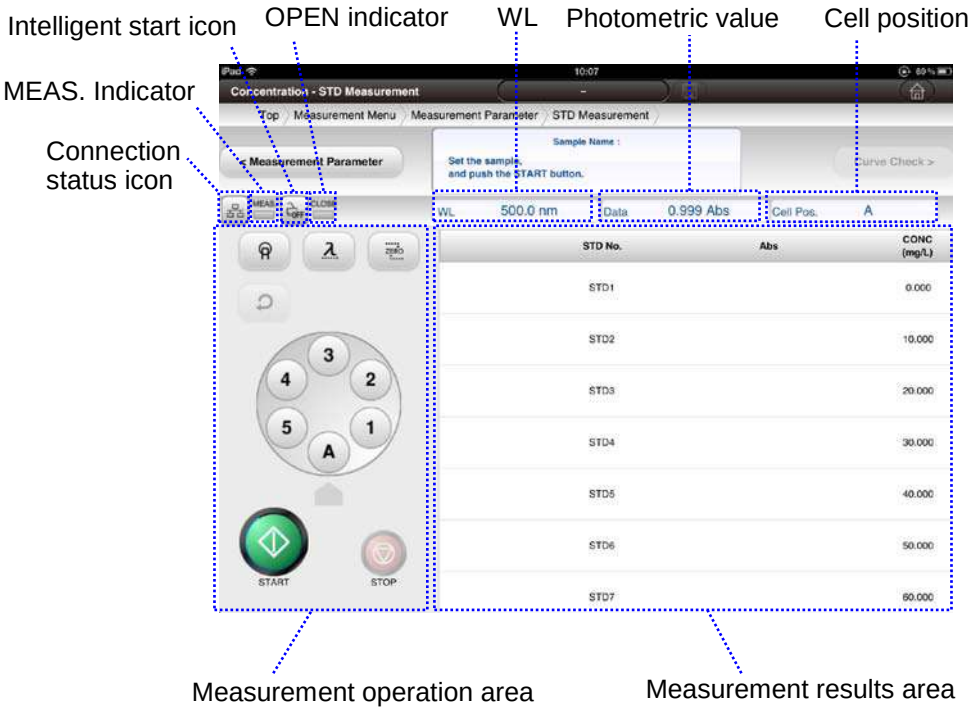


Fig. 2-13 Measurement Screen

Table 2-3 Functions on Measurement Screen

Button	Button name	Details
 	Connection status icon	This icon indicates whether or not the current screen is connected to the instrument.  : Indicates being currently connected  : Indicates being off-connection Pressing this icon causes the confirmation screen to appear. After that, it becomes practicable to switch the connection status from being connected to being off-connection or vice versa. For example; at first, operate this button to disconnect the operation terminal of a user A currently being connected to connect the operation terminal of a user B currently being in off-connection; thereby measuring on the User B side becomes practicable.
	MEAS. Indicator	These indicators indicate whether or not the instrument is currently under measuring.  : Indicates that instrument is currently under measuring.  : Indicates the instrument is currently under changing WL or moving 6 cell turret.  : Indicates the instrument is under a status other than above.
 	Intelligent start icon	This permits switching ON/OFF of the intelligent start. Refer to 3.1.3 Intelligent Start for details of this function.
 	Sample compartment lid Open/Close indicator	These are indicators for indication of Open/Close status of the sample compartment lid. When the lid is open, OPEN is indicated, and when closed CLOSE.
	WL indication	Indicates the present WL.
	Photometric value indication	Indicates the present photometric value (absorbance or transmittance).

(cont'd)

<table>
<tr><th>Button</th><th>Button name</th><th>Details</th></tr>
<tr><td> 
</td><td>Cell position indication</td><td>Indicates the present cell position.
<table>
<tr><th>Cell position indication</th><th>Status of 6 cell turret</th></tr>
<tr><td>A</td><td>This is indicated when Autozero of the 6 cell turret is in the measuring position.</td></tr>
<tr><td>1</td><td>This is indicated when cell 1 of the 6 cell turret is in the measuring position.</td></tr>
<tr><td>2</td><td>This is indicated when cell 2 of the 6 cell turret is in the measuring position.</td></tr>
<tr><td>3</td><td>This is indicated when cell 3 of the 6 cell turret is in the measuring position.</td></tr>
<tr><td>4</td><td>This is indicated when cell 4 of the 6 cell turret is in the measuring position.</td></tr>
<tr><td>5</td><td>This is indicated when cell 5 of the 6 cell turret is in the measuring position.</td></tr>
<tr><td>*</td><td>This is indicated when the 6 cell turret is on move.</td></tr>
<tr><td>-</td><td>This is indicated when the position of the 6 cell turret is not identified.</td></tr>
<tr><td>S</td><td>This is indicated when the 6 cell mode is OFF. The indication appears when the single cell holder of separate purchase or the rectangular long cell holder is used.</td></tr>
</table></td></tr>
<tr><td>-</td><td>Measurement operation area</td><td>In this area, buttons for the measuring control: the light turning-on button, WL change button, 6 cell turret button, start button, stop button, etc. are arranged. See Table 2-4 for details of buttons in this area.</td></tr>
<tr><td>-</td><td>Measurement results area</td><td>This area is for displaying the measurement results. Displayed are the measured calibration curve, data of samples, measurement of WL scan, spectrum when time scan is performed, and time scan data.</td></tr>
</table>

4. Measurement Operation Area

Explanation of the function of buttons in the measurement operation area follows hereunder.

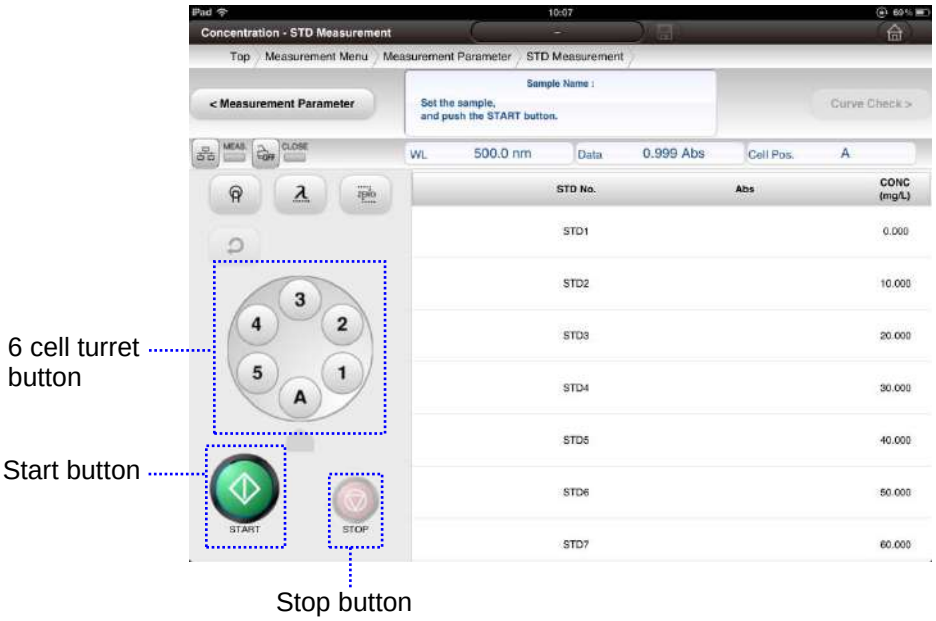


Fig. 2-14 Buttons in Measurement Operation Area (6 Cell Mode: ON)

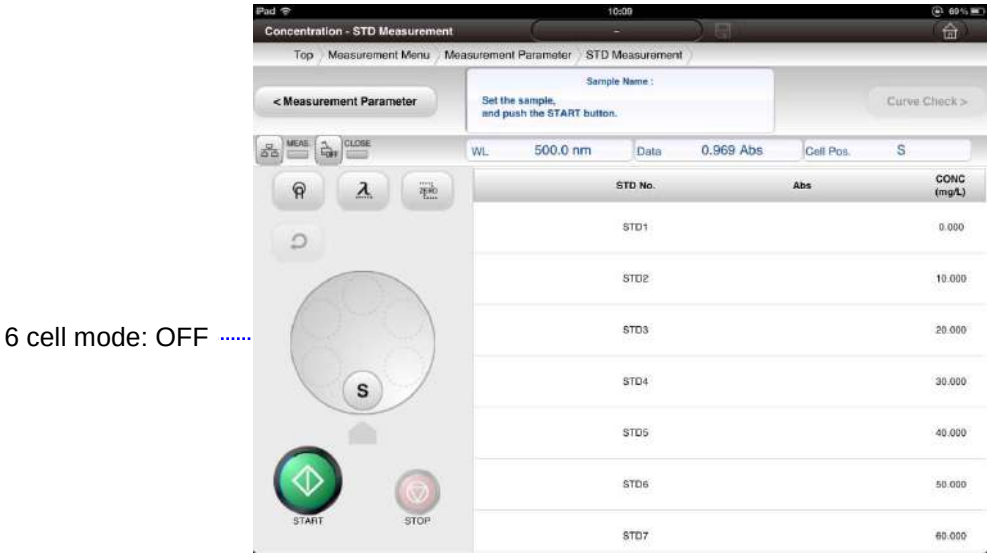
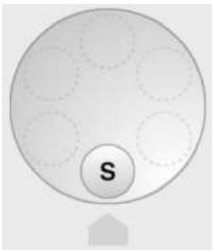


Fig. 2-15 Buttons in Measurement Operation Area (6 Cell Mode: OFF)

Table 2-4 Buttons in Measurement Operation Area

Button	Button name	Details
	6 cell turret button	This appears when the 6 cell turret is usable. The arrow indicates the present measuring position. When the measuring is under the 6 cell manual mode or is performed with monitoring, the 6 cell turret can be moved by operating in the manner described in 2.3.2 Button operation, c. Drag operation. When the 6 cell mode is OFF, the 6 cell mode OFF status as shown below is indicated instead of the 6 cell turret button. For the 6 cell mode, refer to 3.1.2 6 cell mode.  : This shows the status of the 6 cell mode being OFF.
	Start button	This button is used for starting the measuring. Pressing the button causes the measuring to start.
	Stop button	This button is used for stopping the measuring. Pressing the button causes the measuring to stop.

2.3.2 Screen Operation

This section describes the button operation necessary for operating UH5300.

1. Tap

A tap operation is a finger action for giving a light and quick hit with a finger to the button. The tapping is used in a usual button operation.
When operating with the mouse on a personal computer, click on the button.

Fig. 2-16 Tap Operation

2. Flick

A flick operation is a light and quick sweeping-like motion of a finger on the screen. This is used for scrolling a part of screen hidden above or below the display window to bring into the visible area or for other similar purpose.
When operating with the mouse on a personal computer, use the scroll wheel of the mouse.

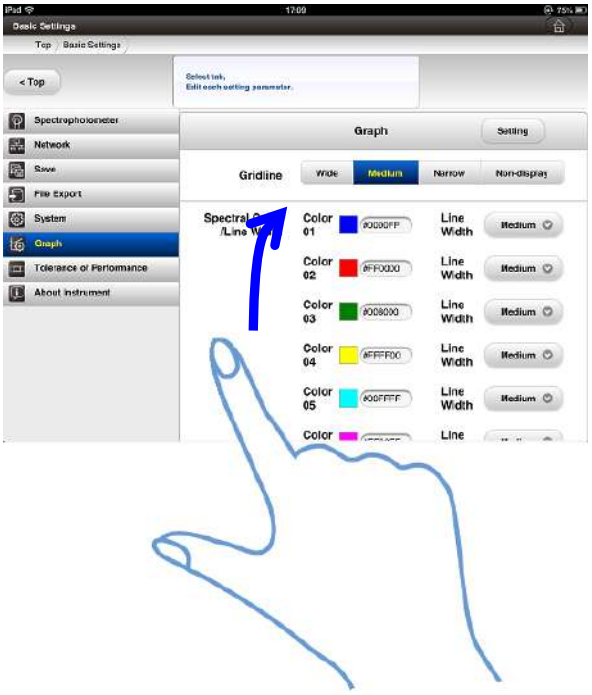


Fig. 2-17 Flick Operation

3. Drag

A drag operation is an operation to shift the finger to the desired position while touching the screen. This is used for changing the cell position of the 6 cell turret, which is indicated on the screen when the measuring is under the 6 cell manual mode or is performed with monitoring, to the desired position. The operation is also used for moving the tracing cursor.
When operating with the mouse on a personal computer, drag likewise. When dragging on the spectrum with the mouse, the spectrum can be moved.

Fig. 2-18 Drag Operation (An Example of Moving Cell 2 to Measuring Position)

4. Pinch in and Pinch Out

A pinch in operation and a pinch out operation are to scale the object on the screen by changing the distance between the two fingers. The object is reduced when the distance is narrowed (pinch in) and enlarged when widened (pinch out). This is used for scaling graphs of measurements of the spectrum, the calibration curve, the time scan data, etc.
When operating with a mouse on a personal computer, operating the wheel of mouse can scale the object. Operating the mouse wheel while pressing [Shift] key can reduce or enlarge the object.

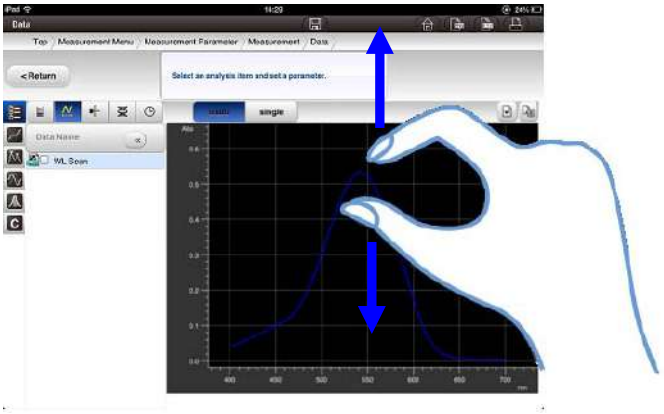


Fig. 2-19 Pinch Out Operation (Narrow Distance Between Two Fingers for Pinch in Operation)

5. Double Tap

A double tap operation is a finger action for giving two continuous light and quick “clap clap” hits with a finger to one button.
When operating with a mouse on a personal computer, use the double-click. The tracing bar appears if the double-click is made not on the data line.

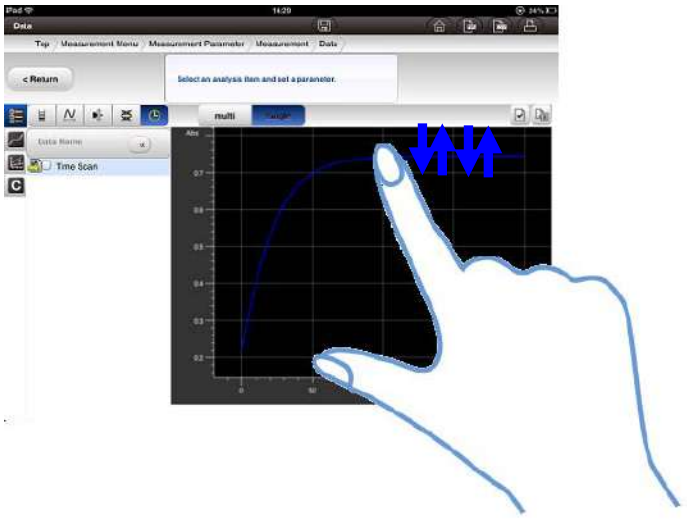


Fig.2-20 Double tap Operation

2.3.3 Entering Characters

This section describes the method of entering numerals and characters. When numerals or characters are to be entered through the iPad, tapping the enterable part will cause the keyboard to appear at the lower part of the screen. Tapping this keyboard, numerals and characters can be entered. Use always en letters for entering numerals for such as WLs and ranges. Do not use any pictorial symbols.

Pressing the  button indicated on the keyboard of iPad switches the current input method to another method. Use whichever method that is easy to use.

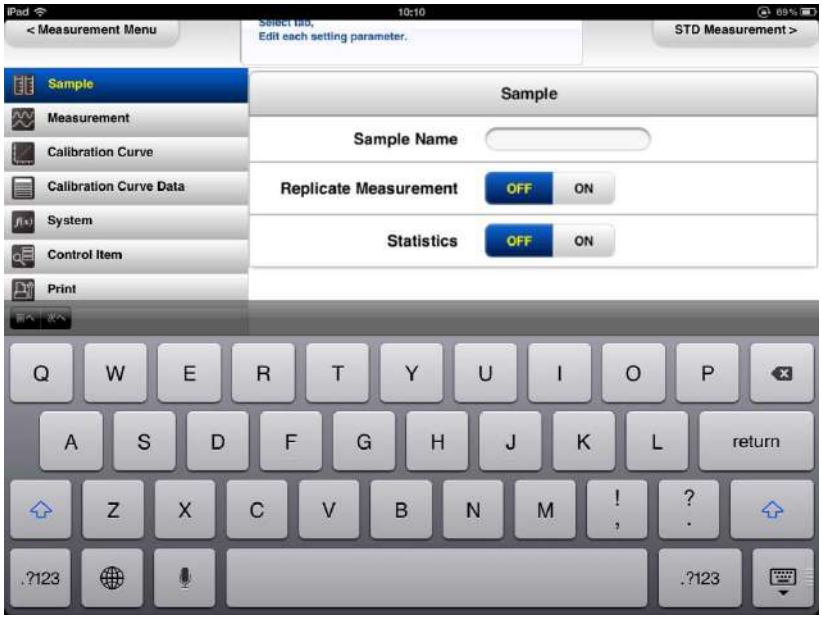


Fig. 2-21 Input Method on iPad

When operating with a personal computer, use the keyboard of the computer for inputting characters.

2.3.4 Setting Method of Cells

This section describes matters related to the cell such as the selection of cells, the amount of samples necessary for measuring, and the method of setting of cells on the 6 cell turret.

1. Cells

Use cells listed in Table 2-5 for measurement.

Table 2-5 Specifications

Type of cell	P/N	Measurable sample amount
10 mm quartz cell (Separate purchase)	123-1004	1.7 to 3.5 mL
10 mm glass cell (Separate purchase)	123-1010	1.7 to 3.5 mL

NOTE: When the measurement was performed using cells other than those listed in Table 2-5 (P/N: 123-1004 and P/N: 123-1010), some measurements may possibly be not accurate depending on cells used.

2. Setting Cells

Cells have two types of side walls, one is clear and the other has a rough surface. Hold the rough surface walls when taking the cell. If the cell is held at the clear walls, the measuring face will be soiled by such as fingerprint, which will be the cause of unexpected measurement error.

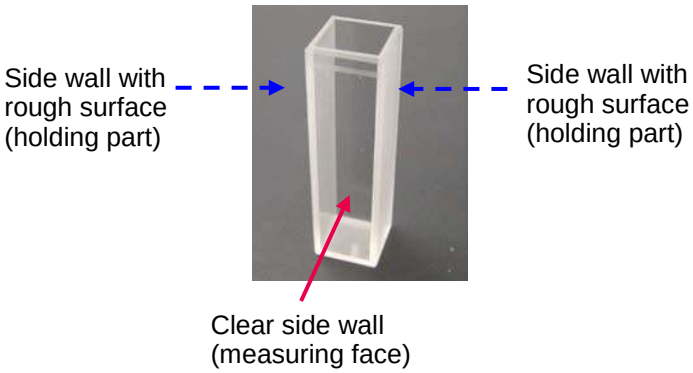


Fig. 2-22 10 mm Quartz Cell

To enter into the measurement, place the cell so that the light flux will pass through the clear walls. External view of the 6 cell turret is shown (Fig. 2-23). In measuring, the 6 cell turret rotates so that the sample in each cell will be measured. Therefore, each of cells should be set to face correctly according to its setting position. The 6 cell turret has, on its turret, a semicircular shaped cut facing to the incident direction of the light flux. Accordingly, set the cell so that the clear wall wills face to the cut.

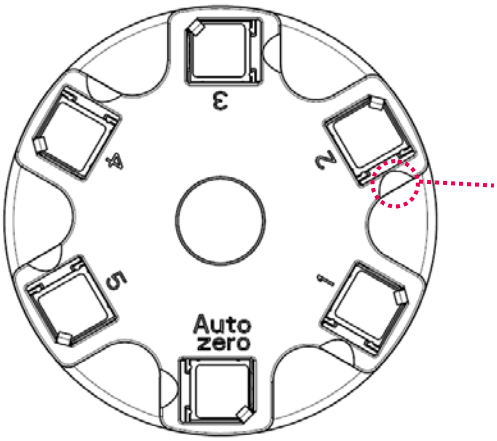


Fig. 2-23 6 cell Turret

3. Other Cells

As for other cells, the micro cells (for sample quantities 340 to 600 µL) is applicable to measuring operation by associated use of the single cell holder and the mask for micro cell, which are available by separate purchasing.
The joint use of the single cell holder and the mask for small amount cell permits use of cells: 1.5 µL small amount cells (for sample amount 1.5 to 4.0 µL), 12 µL small amount cells (for sample amount 12 to 40 µL), and 50 µL small amount cell (for sample amount 50 to 90 µL).
In addition, use of the rectangular long cell holder permits use of the cell having 100 mm of optical path length (for sample amount 17 to 35 µL). Refer to 5.4 Description and Installation of Optional Components for details of these optional items.

2.3.5 Notes on Operation

Note the following points during operation and measurement from the perspective of data management.

1. During Operation on iPad

NOTE: Do not press the power button of the iPad while the UH5300 application is being used. In case you have mistakenly pressed the power button, close the UH5300 application once by pressing the Home button of the iPad, wait for approximately one minute, and then restart the UH5300 application.

NOTE: If, while the UH5300 application is being used, the iPad has gone outside the wireless LAN coverage area and then entered the area again, close the UH5300 application once by pressing the Home button of the iPad, wait for approximately one minute, and then restart the UH5300 application.

2. During Measurement Operation

NOTE: Close definitely the lid of the sample compartment while the sample is under measurement. Do not open the lid during measurement. Opening the lid is the cause of abnormal measurement results, and further, breaks the measurement when the intelligent start is being ON.

3. Data Management

NOTE: The instrument has the saving function that stores measurement data and measurement conditions. The stored contents however may possibly be lost if the lithium battery for the memory backup is exhausted or deteriorated. It is therefore recommended to back up the important data in another media in the form of the csv files or to be printed out on paper.

4. About OS of Operating Terminal

NOTE: Make sure that the iPads and personal computers used as operating terminals have the OS and version that support UH5300. In addition, if you are upgrading the version of the iOS or Windows, be sure to contact the dealer from whom you purchased the instrument or our designated service company to check whether the version you are upgrading to is compatible with UH5300. In this case, the firmware Program No. of your UH5300 is required. Check the description stated in 3.8 Instrument of this instruction manual and inform the Program No.

3 BASIC SET-UP

This chapter describes mainly the basic set-up of applications to be used with this instrument. Start the instrument according to 2.2.1 Starting up instrument to display the top screen. Press [Basic Set-up button]. The basic set-up screen shown in Fig. 3-1 opens. The details of the buttons displayed on the left of the screen are described in the following sections.

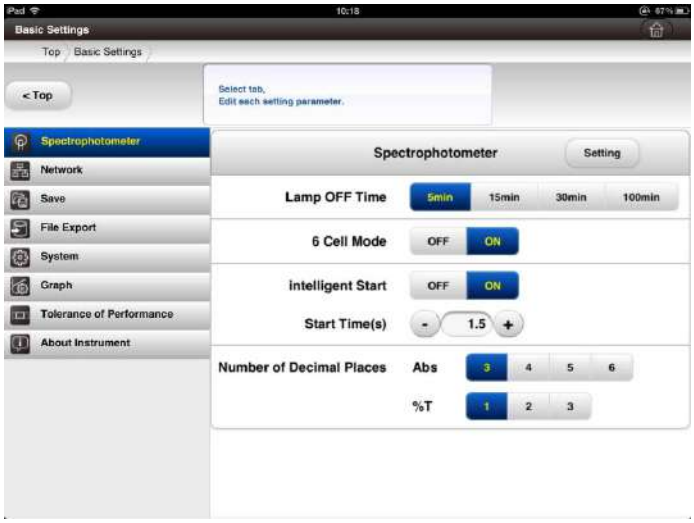


Fig. 3-1 Basic Setting Window

After the setting of each of items, always press Setting [Setting apply button] to verify that the confirmation screen appears indicating that settings were applied as shown in Fig. 3-2. After confirmation, press OK [OK button]. By this, the settings will be applied.

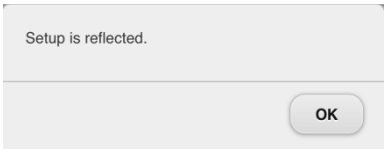


Fig. 3-2 Confirmation Screen: Settings were Applied

3.1 Spectrophotometer

This section details items under the photometer tab.

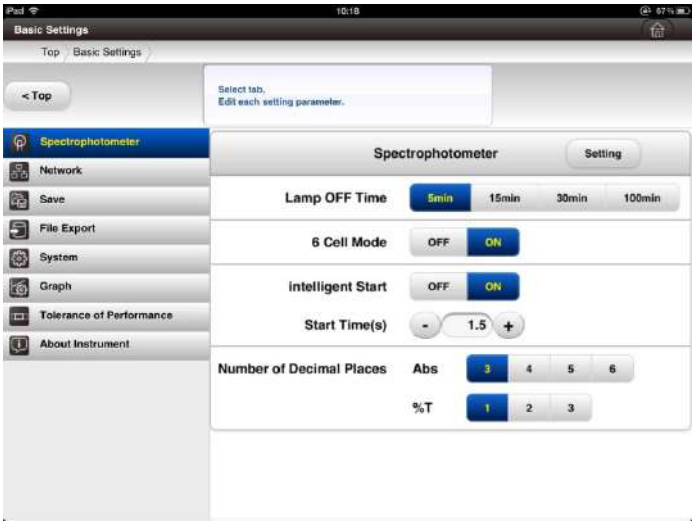


Fig. 3-3 Spectrophotometer Tab

3.1.1 Lamp OFF Time

The instrument has a function for measuring with monitoring. With this function, the lamp always lights intermittently to indicate the photometric values at all the time. This function has an automatic lamp-off function to prevent careless long-time lamp lighting. The lamp is turned off automatically after the preset time elapsed. In this lamp-off function, the time until the lamp-off can be set as desired.
Refer to 4.4 Monitored Measurement for details of this function.

Table 3-1 Lamp-off Time Setting

Time to off	Description
5 min.	These set the time to the lamp-off after the starting of the measuring with monitoring. When the use of this measuring with monitoring function is anticipated to last not longer time, selecting “5 min.” is recommended.
15 min.	
30 min.	
100 min.	

After the changing of the settings, always press 

[Setting apply button] to verify that the confirmation screen appears indicating that settings were applied.

3.1.2 6 Cell Mode

The 6 cell mode requires to set whether or not the 6 cell turret control is applied. This setting needs to be changed when the 6 cell turret was exchanged for the devices of the separate purchase other than the auto-sipper listed in Table 3-2. When devices for sample compartments are used according to Table 3-2, set the 6 cell mode as specified in the table.

Table 3-2 Settings for Devices for Sample Compartment in 6 Cell Mode

Devices for sample compartment		6 cell mode
6 cell turret	Standard equipment	ON
Auto-sipper	To be purchased separately	Optionally ON or OFF
Holder base		OFF
Single cell holder		
Rectangular long cell holder		
Glass filter holder		
Film holder		
Polarizer holder		
Holder for thermostat cell with stirrer		
Holder for Peltier device thermostat cell with programmable function		
Quadruple long cell holder		

Table 3-3 Setting 6 Cell Mode

Setting item	Description
ON	Select this when the 6 cell turret control is to apply. Set when the 6 cell turret is used.
OFF	Select this when the 6 cell turret controll is not to apply. Select also this when the device for sample compartment that is described as OFF in the column of 6 cell mode in Table 3-2 is used.

NOTE: The ON/OFF setting of the 6 cell mode may change when the measuring condition file is opened from the condition files lookup list. (Refer to 5.2 Reading and Deleting Saved Measurement Conditions.)

After the changing of the settings, always press 

[Setting apply button] to verify that the confirmation screen appears indicating that settings were applied.

3.1.3 Intelligent Start

The instrument has an intelligent start function that starts the measuring synchronizing with the closing action of the sample compartment lid. The setting requires specifying whether or not this function is to be used.

The intelligent start function has another function in addition to the function that starts the measuring synchronizing with the closing action of the sample compartment lid. That function examines whether or not the sample compartment lid is closed and stops the measuring from starting if the sample compartment lid is open. Thereby, a mistake of improper measuring that is performed with the sample compartment lid open is prevented.

Setting this intelligent start may be changed by operating ON/OFF of the intelligent start icons   on the measurement screen (refer to 2.3.2 Screen operation for details). When change is desired during the measuring, use these icons.

Table 3-4 Setting Intelligent Start

Setting item	Description
ON	Starting the measring being synchronized with the closing of the sample compzrtment is available. This saves manpower in the measuring operation. If the sample compartment lid is open, the measuring will not start though the start button is pressed. This prevents the measuring with the sample compartment lid open from starting.
OFF	Synchronized starting the measring with the closing of the sample compzrtment is NOT available. Always press the start button to start the measuring. Starting the measring is available by pressing the start button even though the sample compartment lid is open.

When the intelligent start function is ON, the time to start the measuring after the sample compartment lid is closed (the start time) is settable.

Table 3-5 Setting Start Time

Setting item	Description
Start time	This specifies the time to start the meaasuring after the sample copmpartment lid is closed. This setting is available when the intelligent start function is ON. The default value is 1.5 s. Set 1.5 s or longer time when the measurement is desired to be performed with the sample compartment being in a fully stabilized condition. If the time is shorter than 1.5 s, the measurement will be performed before the sample compartment becomes stabilized. The setting of times shorter than 1.5 s is admitted only when the measuring time has priority over the measurement data.

After the changing of the settings, always press Setting [Setting apply button] to verify that the confirmation screen appears indicating that settings were applied.

3.1.4 Number of Decimal Places

This setting specifies number of decimal places to be displayed for the obtained photometric value. Set according to Table 3-6.

Table 3-6 Setting Number of Decimal Places

Setting item	Description
Abs	Set the number of decimal places for the photometric value of the absorbance. Available decimal place is 3, 4, 5, and 6.
%T	Set the number of decimal places for the photometric value of the the transmittance. Available decimal place is 1, 2, and 3.

After the changing of the settings, always press Setting [Setting apply button] to verify that the confirmation screen appears indicating that settings were applied.

3.2 Network

This section describes details of items under the network tab. Under the network tab, the information on the network environment connected to the present instrument is indicated.

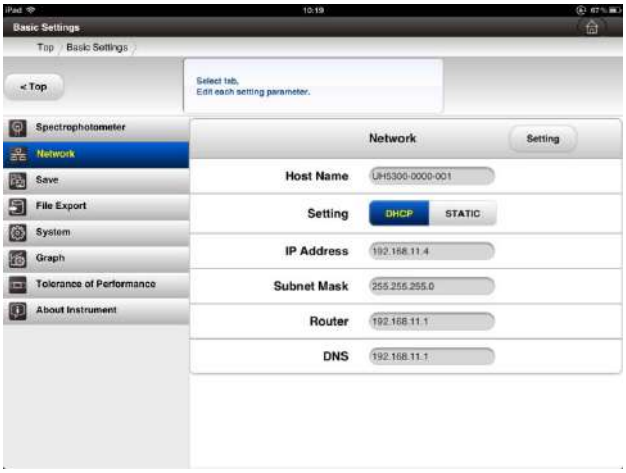


Fig. 3-4 Network Tab

Table 3-7 Items Under Network Tab

Setting item	Description
Host to instrument	The name of instrument currently connected is indicated.
Installation method	DHCP: IP addresses are automatically assigned between the operating terminal and the instrument. Connecting through the router uses DHCP. STATIC: This is used when connecting directly the instrument and the personal computer using LAN cable.
IP address	Indicated is the IP address of the main unit of the photometer currently connected.
Subnet mask	Indicated is the address of the subnet mask currently connected.
Router	Indicated is the address of the router currently connected.
DNS	Indicated is the name of the domain name server.

After the changing of the settings, always press Setting [Setting apply button] to verify that the confirmation screen appears indicating that settings were applied.

3.3 Save

This section describes details of items under the file destination tab. Under this tab, the operator can specify destinations to save the condition files and the data files. File names for saving such files can also be specified.

Initial values are saved in the default folder. When changing the file destination is desired, press Edit [Edit button] at the upper position for the condition file and press Edit [Edit button] at the lower position for the data files.

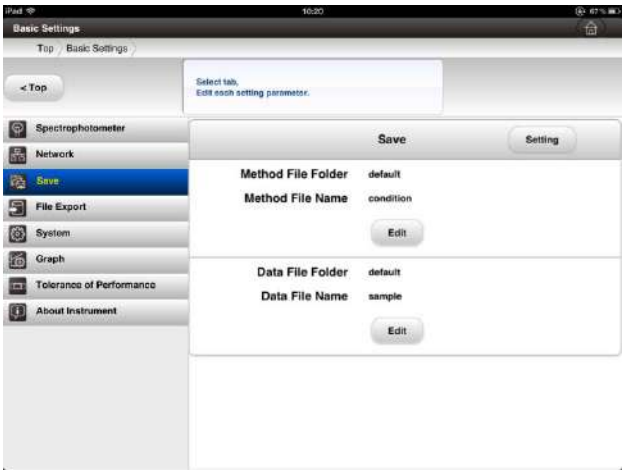


Fig. 3-5 Save Tab

As screen appears as shown in Fig. 3-6, change the save-destination folder and the file name. When a file is to be saved creating a new save-destination folder for saving that file, create in advance such new folder according to Section 5.2.3 Managing a Saved Condition File or Section 5.1.3 Managing Saved Data.
Explanation follows about the destination and the file name for saving, taking an example of the condition files.

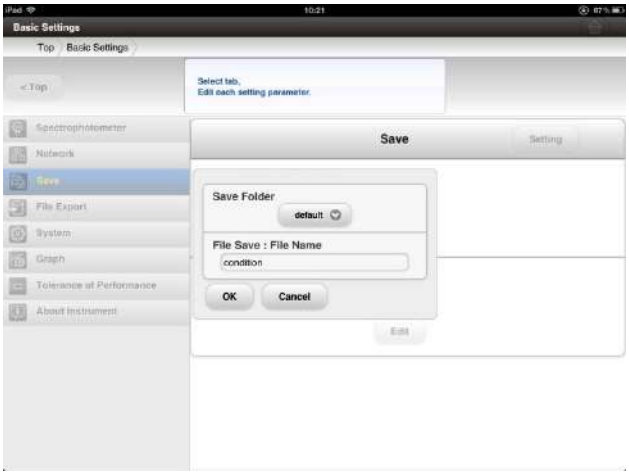


Fig.3-6 Specifying File Destination (For Condition Files)

Table 3-8 Setting Items for File Destination

Setting item	Description
Folder name of destination	Select the folder for file saving. The initial setting is the default folder.
Name of file to be saved	Set the name of file to be saved. The initial setting is as follows. Condition file: Condition; Data file: Sample.

After setting, press OK [OK button].

Then, always press Setting [Setting apply button] to verify that the confirmation screen appears indicating that the settings were applied.

By this, the names of the save-destination folder and the initial file that are to be displayed at the time of file saving were changed.

3.4 File Export

With this procedure, the file export destination can be registered when a measurement data file is converted into the CSV format or the PNG format. The destinations for the CSV format and the PNG format are selected at the time of transferring operation from among destinations registered with this procedure. The main unit USB device is a USB memory device connected to the main unit of the instrument (refer to Section 2.1.1 Name and function of each part of main unit of spectrophotometer). This main unit USB device is a registered device in advance and does not accept for deleting or editing.

NOTE: When using a medium like a USB memory is desired, a password-registered memory or a memory with the fingerprint authentication function is not usable.

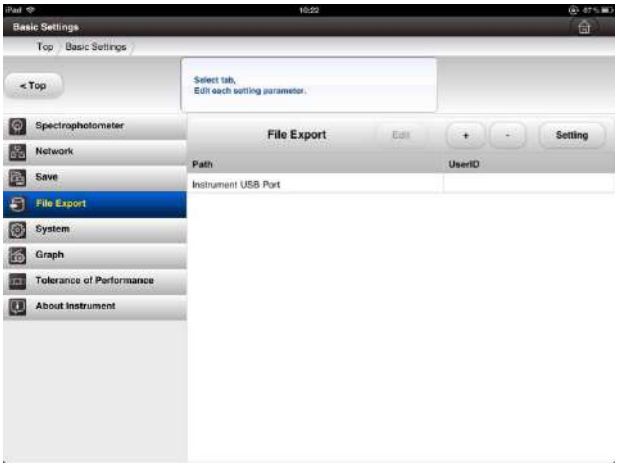


Fig. 3-7 File Export Tab

To add a new export destination, press + . To delete an unnecessary export destination, press to select the path of the deletion-desired export destination and press - . To edit the registered export destination, press to select the path of the edit-desired export path and press Edit .
Pressing + or Edit makes the setting screen shown in Fig. 3-8 appear. Enter contents in Table 3-9.

Fig. 3-8 Setting Path to Shared Folder

Table 3-9 Setting Path to Shared Folder

Setting item	Description
Path to shared folder	Enter the address of the folder to access. Use the followings in entering. //(Host name or IP address)/(Folder name) (Host name or IP address): Enter replacing with the host name or the IP address. (Folder name): Enter replacing with the folder name to access. Refer to Section 3.4.1 Example of file export destination setting for details.
UserID	Enter these when the user ID and the password for the shared folder for accessing have been set. Refer to Section 3.4.1 Example of file export destination setting for details. User ID: Enter the user ID set. Password: Enter the password set.
Password	

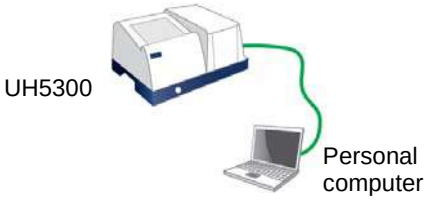
Press Test after enter. Since an error will be displayed if entered incorrectly, enter again.

After the changing of the settings, always press Setting [Setting apply button] to verify that the confirmation screen appears indicating that settings were applied.

3.4.1 Example of File Export Destination Setting

a. Saving in Personal Computer (for one-to-one connection between instrument and personal computer)

The example is described for saving data in the personal computer.

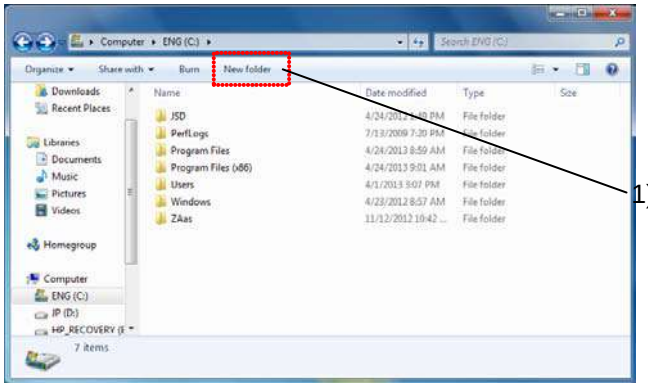


1. Starting Uup Instrument

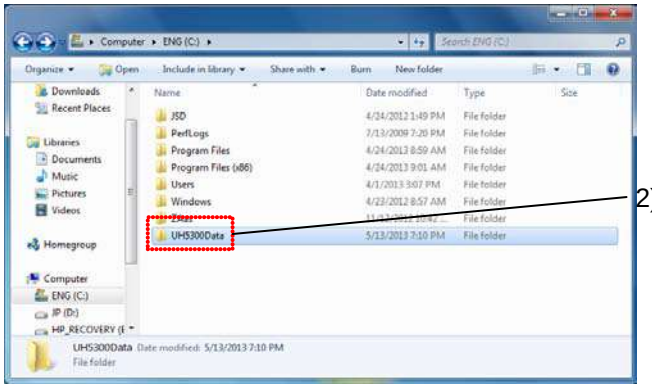
Start the instrument and the personal computer according to Section 2.2.1 Starting up instrument.

2. Creating Folder

Create a folder, in which saving files of the CSV format or PNG format is desired, on Windows of the personal computer. However, creating on the desktop or in the my document is not recommended because they are given a special access right. In this example, creating a folder, named [UH5300Data], immediately under the C-drive is explained.



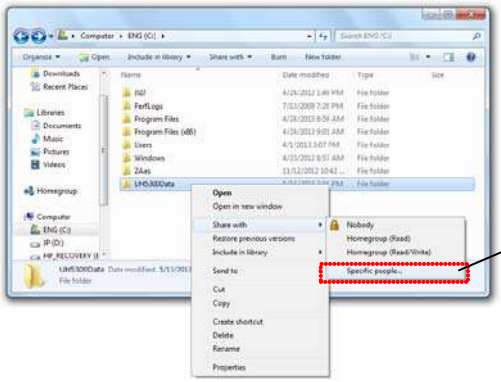
1) Press new folder.



2) Use any name for the folder. In this example, the new folder is named “UH5300Data”.

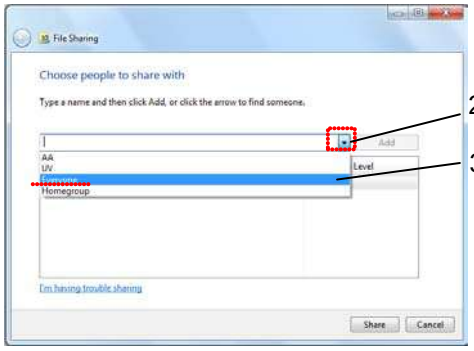
3. Folder Sharing

Right-click on the folder created in the step 2 above and proceed to “Share with - Specific people... “, and then click “Specific people...”.



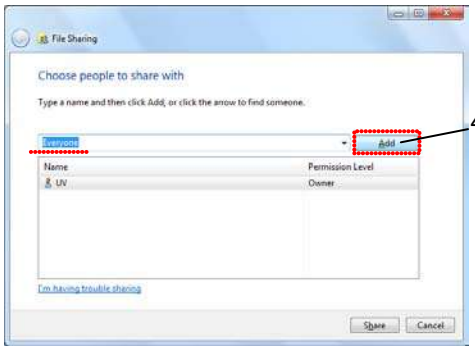
1) Click “Specific people ...”.

The screen, “File sharing”, opens. Click the pull down menu and select “Everyone”, and then click “Add (A)”.



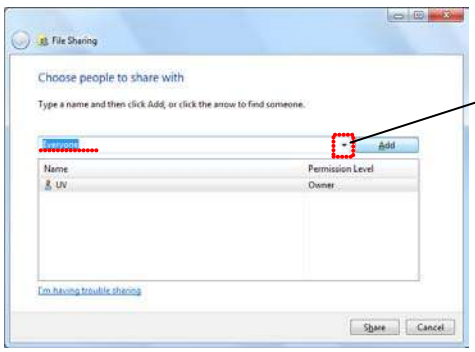
2) Pull down ▼.

3) Select “Everyone”.

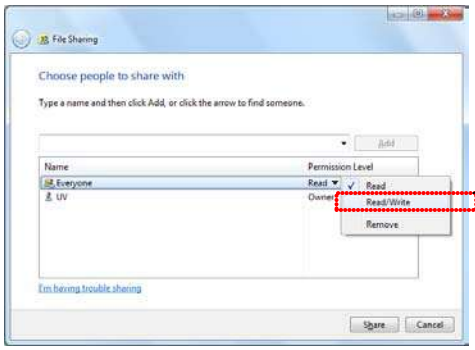


4) Confirming that the “Everyone” is indicated, click “Add”.

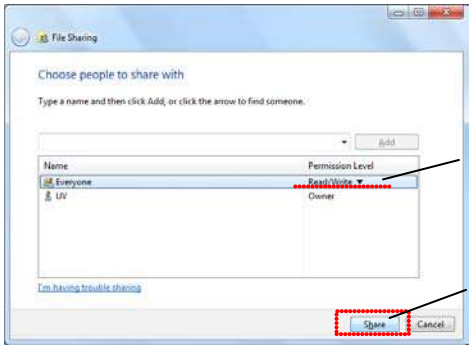
Confirm that “Everyone” was added and pull down ▼. Select then “Read/Write”.



5) Confirm that “Everyone” was added and pull down ▼.



6) Select “Read/Write”.

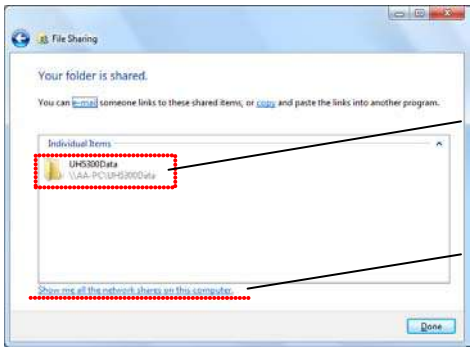


7) Confirm that “Reade/Write” is indicated.

8) Click “Share”.

4. Verification of Shared Folder

Confirm that the file name created at the step 2 exists and click “Show me all the network shares on this computer”.

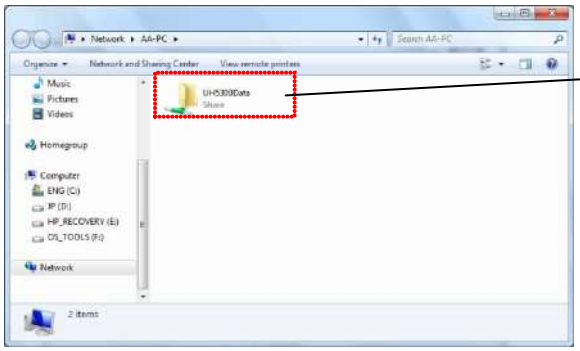


1) Confirm that the created folder name is indicated.

2) Click “Show me all the network shares on this computer”.

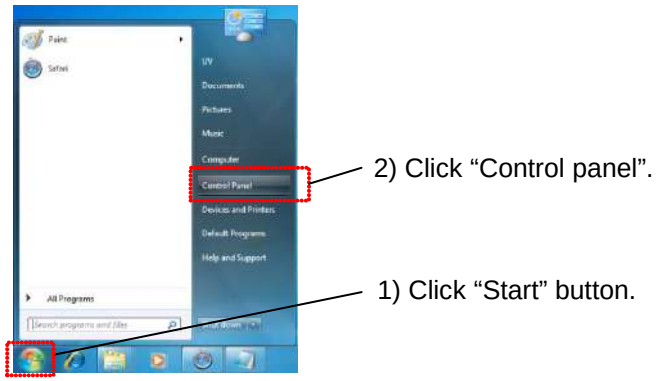
Confirm again that the folder name created at the step 2 is indicated.

3.4 File export Destination

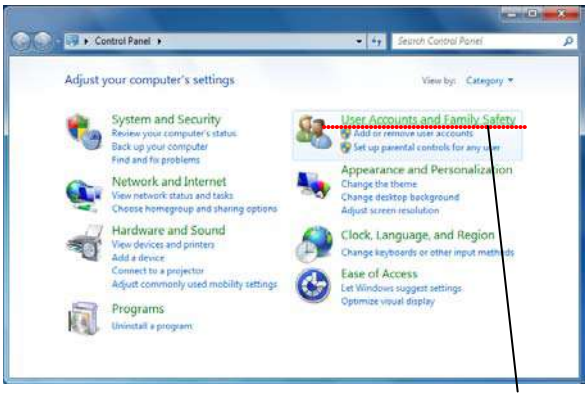


5. Confirmation of Setting for User Account and Login Password

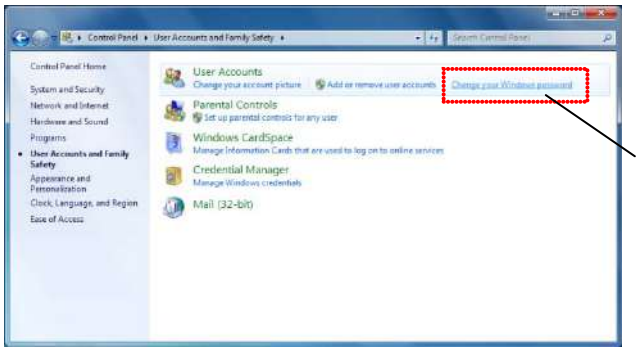
In order to set the path to the shared folder, the login password needs to have been set in Windows.
First, press “Start button” on Windows and click “Control panel”.



“Control panel” opens. Then, click “Safety setting for user account and family”.

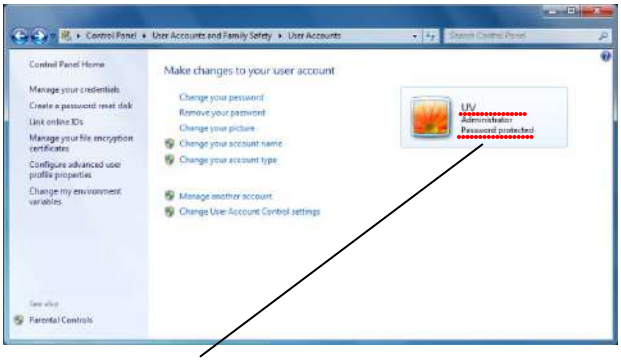


The “User Accounts and Family Safety” screen opens. In this step, click “Change your Windows password”.

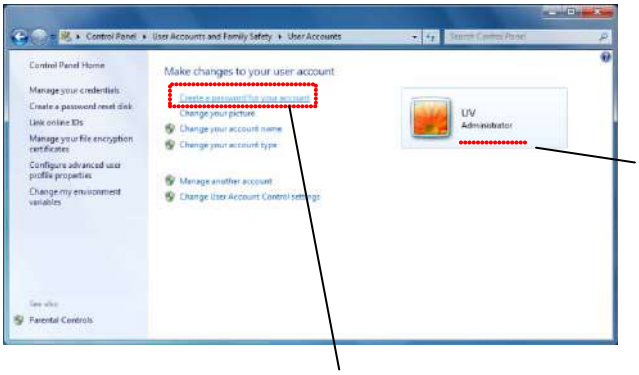


4) Click “Change your Windows password”.

The “User Account” screen opens. Check whether or not the “Password protected” is indicated. When indicated, close the “User accounts” screen and proceed to 6. Setting file export destination. If “Password protected” is not indicated, click “Create a password for your account”.



5) Check and take notes the user account indicated on the Administrator. In this example, the user account is defined as “UV”. Confirm that “Password protected” is indicated on this portion. When indicated, close the “User accounts” screen and proceed to 6. Setting file export destination.

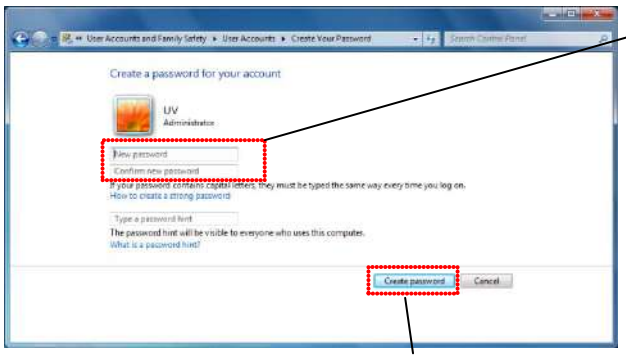


6) If “Password protected” is not indicated, set the password.

7) Click “Create a password for your account”.

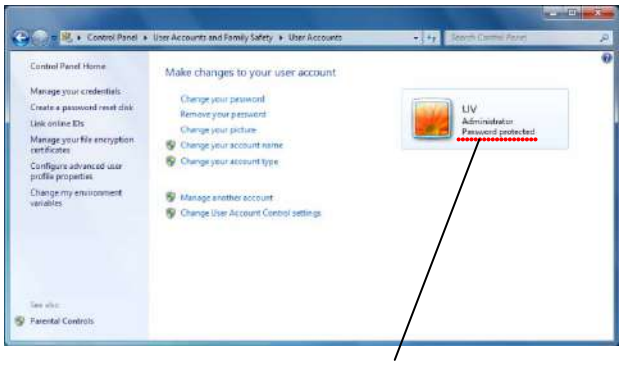
“Create Your password” screen appears. Set the password following

the screen instruction and click “Create password”.



8) Set the password following the screen instruction.

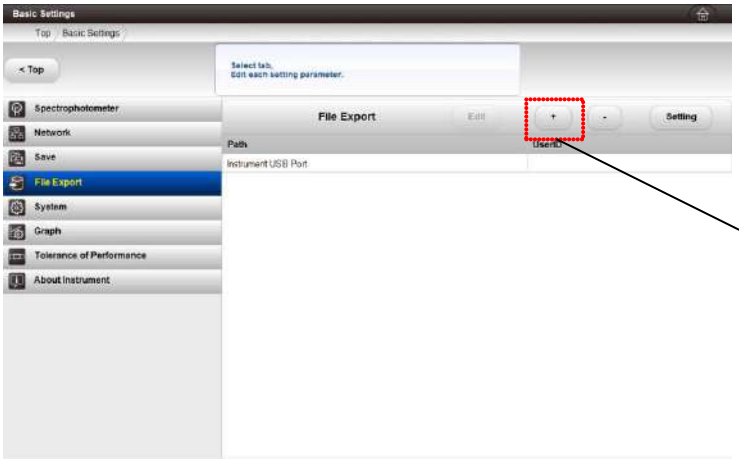
9) Click “Create password”.



10) Confirm that “Password protected” is indicated and close “User accounts” screen.

6. Setting File Export Destination

Open the basic set-up screen described at the beginning of Chapter 3 Basic Set-up. Open “File export destination tab”. Press + to add a new destination.

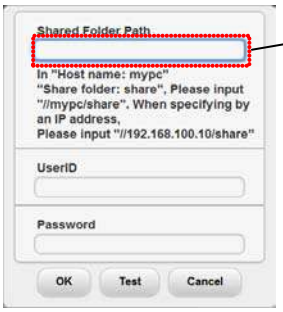


1) Click this.

“Path to shared folder” entry screen appears. Enter the following in this screen.

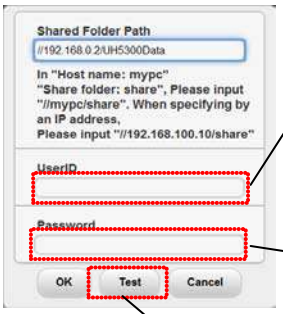
//192.168.0.2/AABBCC

In the position AABBCC, enter the name of the shared folder shared at the step 3 Folder sharing. In this example, enter “//192.168.0.2/UH5300Data” because the folder named as “UH5300Data” was created.



2) Enter //192.168.0.2/AABBCC in the path to the shared folder (AABBCC is the name of the shared folder).

As UserID, enter the user account that was noted at the step, “5. Confirmation of setting for user account and login password”. As Password, enter the password used for the login to Windows or the password set at the step, “5. Confirmation of setting for user account and login password”. After entry, click “Test”.



3) As UserID, enter the user account that was noted at the step, “5. Confirmation of setting for user account and login password”. In this example, “UV” was entered

4) As Password, enter the password used for the login to Windows or the password set at the step, “5. Confirmation of setting for user account and login password”.

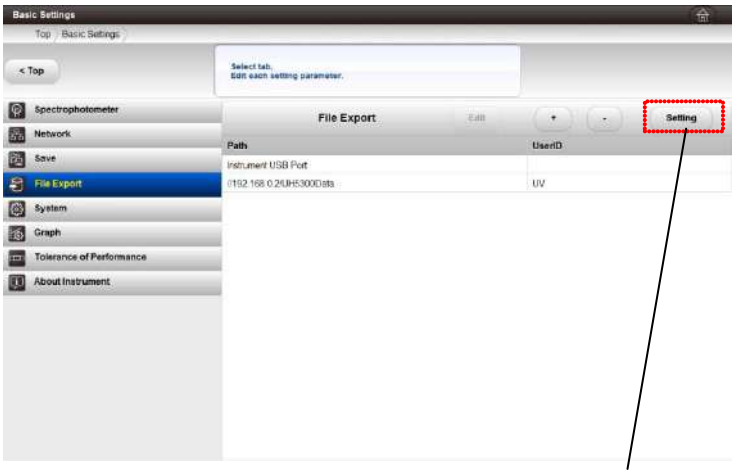
5) Click “Test”.

When settings are correct, “Succeeded” is indicated. Click “OK”. If an error is indicated, check again for the correctness of the setting entries.

6) Click “OK”.

3.4 File export Destination

Click “Setting”. When “Completed Successfully” appears, click “OK”; and move to the top screen. By this, setting the file export destination is complete.



7) Click “Setting apply”.

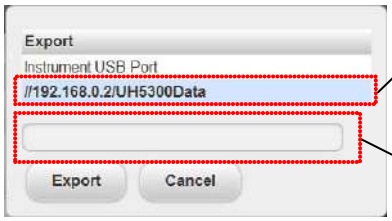
8) Click “OK”.

7. Saving Data of CSV Format and PNG Format

To save data of CSV format and PNG format in the shared folder in the personal computer, press 

[Create CVS file button] or 

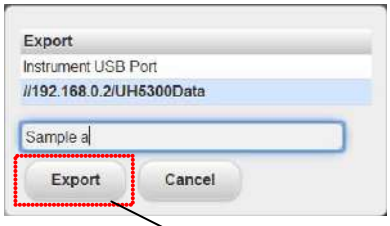
[Create PNG file button] on the “Data confirmation” screen. “File export destination” screen appears. Select the shared folder created just before and enter the file name.



1) Select the shared folder created. The light-blue colored part is the selected export destination.

2) Enter the file name. In this example, “Sample a” was entered.

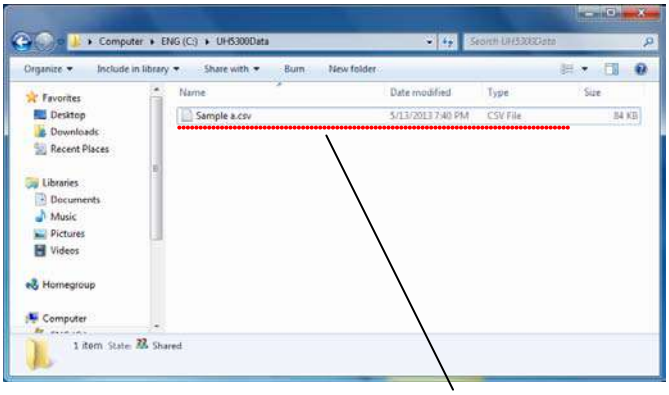
After setting, press “Export”. On completion of the saving, “File is saved” appears. Press “OK”.



3) Press “Export”.

4) Click “OK”.

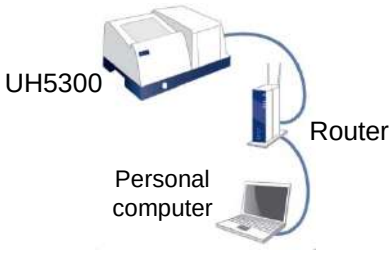
Open the shared folder on Windows. Confirm that the file has been created.



5) File was created.

b. Saving in Personal Computer (connection to network through routers)

The following explains an example of settings in the saving of the measurement data in the personal computer.



1. Starting Up Instrument

2. Creating Folder

3. Folder Sharing

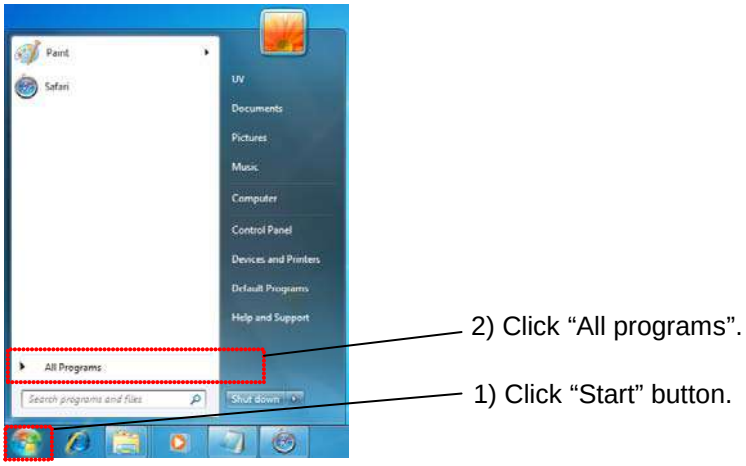
4. Verification of Shared Folder

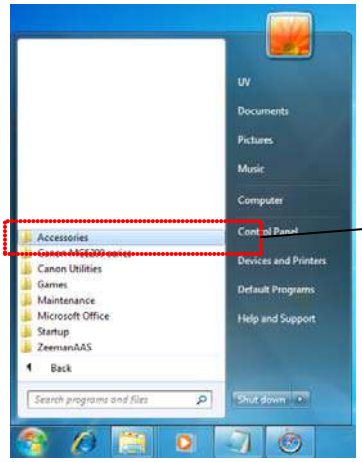
5. Confirmation of Settings of User Account and Login Password

For procedures in operations from 1. Starting up instrument to 5. Confirmation of settings of user account and login password, use the same procedures and settings described in Section 3.4.1 Example of file export destination setting, a. Saving in personal computer (for one-to-one connection between instrument and personal computer).

6. Verification of IP Address of Personal Computer

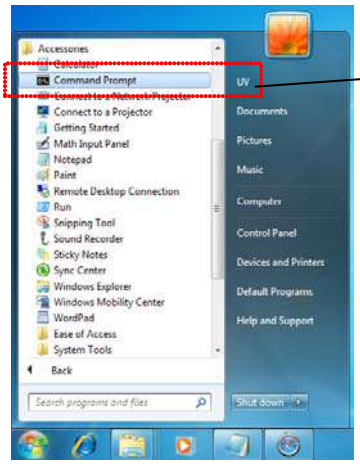
Setting the file export destination needs IP address of the personal computer. In this operation, IP address of the personal computer is verified. First, press “Start button” of Windows, next click “All programs”, and then click “Accessories”.





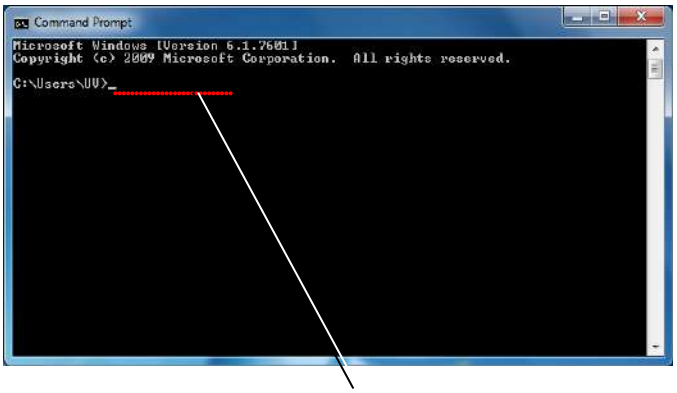
3) Click “Accessories”.

Click “Command prompt”.



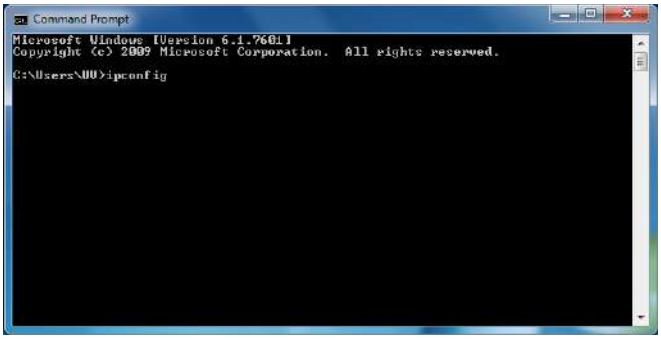
4) Click “Command prompt”.

“Command prompt” screen opens. Then, enter *ipconfig* and then press ENTER key on the keyboard.

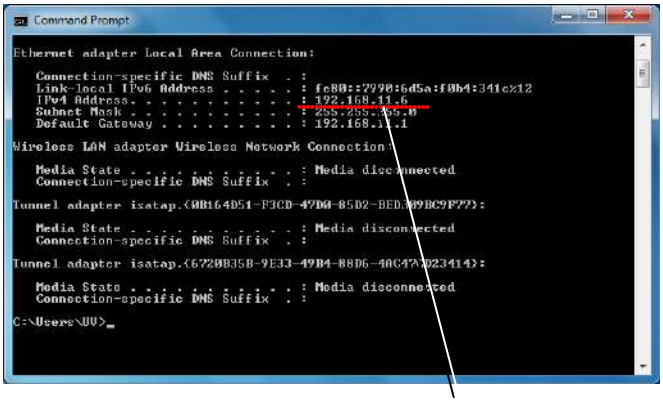


5) Enter ipconfig.

3.4 File export Destination



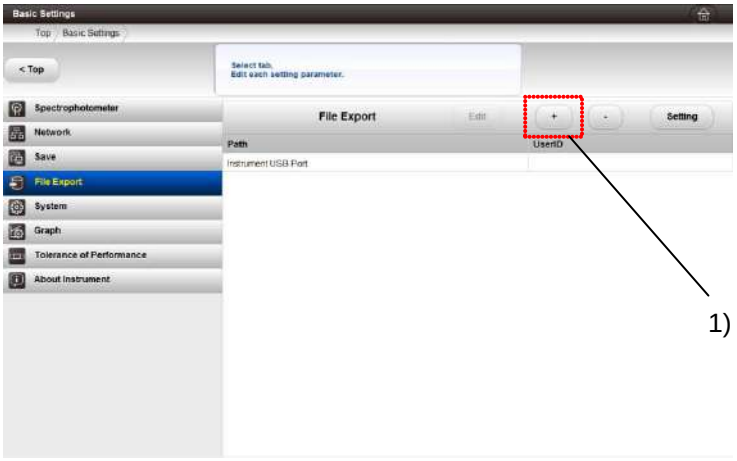
The construction of Windows IP is displayed. Take notes IPv4 address in the displayed items. After taking note, close “Command prompt” screen.



7) Take notes IPv4 address. In this example, note “192.168.11.6”. After noted, close “Command prompt”.

7. File Export

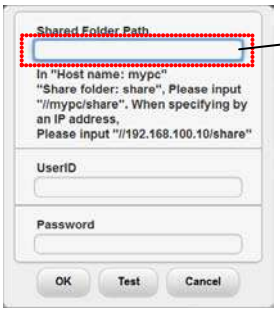
Open the basic set-up screen described at the beginning of Chapter 3 Basic Set-up. Open “File Export tab”. Press + to add a new destination.



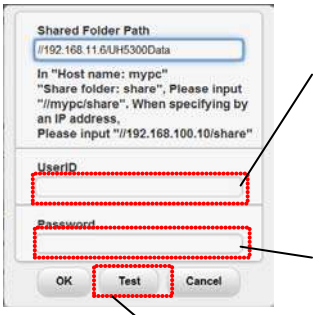
“Path to shared folder” entry screen appears. Enter the following on this screen.

//XXX.XXX.X.XXX/AABBCC

In the position XXX.XXX.X.XXX, enter IPv4 address that was noted at the step 6. Verification of IP address of personal computer.
In the position AABBCC, enter the name of the shared folder shared at the step 3. Folder sharing. In this example, enter “//192.168.11.6/UH5300Data” because IPv4 address was indicated as “192.168.11.6” and the folder named as “UH5300Data” was created.



As UserID, enter the user account that was noted at the step, “5. Confirmation of setting for user account and login password”. As Password, enter the password used for the login to Windows or the password set at the step, “5. Confirmation of setting for user account and login password”. After entry, click “Test”.



3) As UserID, enter the user account that was noted at the step, “5. Confirmation of setting for user account and login password”. In this example, “UV” was entered.

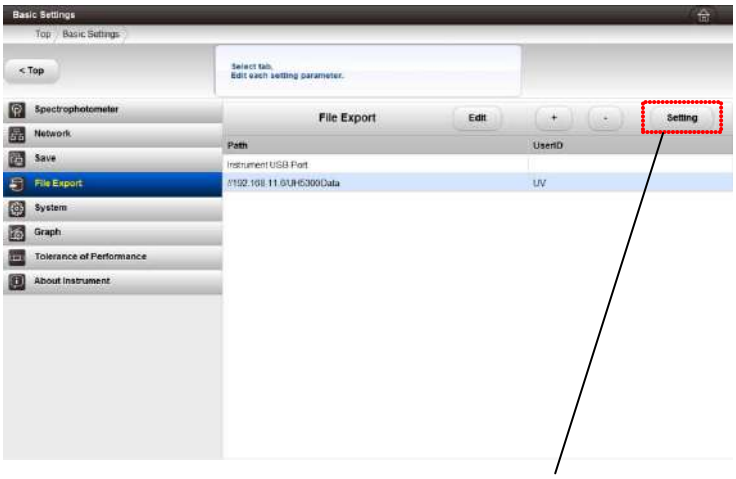
4) As Password, enter the password used for the login to Windows or the password set at the step, “5. Confirmation of setting for user account and login password”.

5) Click “Test”.

When settings are correct, “Completed successfully” is indicated. Click “OK”. If an error is indicated, check again for the correctness of the setting entries.

6) Click “OK”.

Click “Setting”. When “Completed successfully” appears, click “OK”; and move to the top screen. By this, setting the file export destination is complete.



7) Click “Setting”.

8) Click “OK”.

NOTE: If the power supply to the router becomes OFF or when the router was replaced, perform again the operation specified in the steps 6. Verification of IP address of personal computer and 7. Setting file export destination.

8. Saving Data of CSV Format and PNG Format

For saving data of CSV format and PNG format, operate in the same manner as described in Section 3.4.1 Example of file export destination setting, a. Saving in personal computer (for one-to-one connection between instrument and personal computer).

3.5 System

This section describes the language setting and the screen coloration.

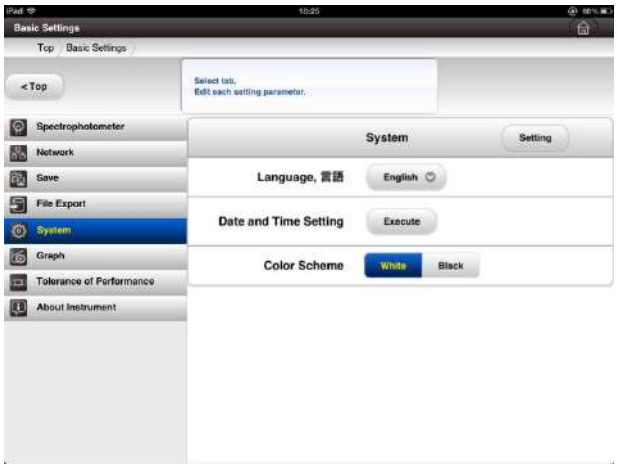


Fig. 3-9 System Tab

3.5.1 Language, 言語

With this procedure, the language on the screen is selected.

Table 3-10 Setting Language Selection

Setting item	Description
Language, 言語	English: Screen indicates in English 日本語: Screen indicates in Japanese

After the changing of the settings, always press Setting [Setting apply button] to verify that the confirmation screen appears indicating that settings were applied.

3.5.2 Date and Time Setting

With this procedure, time is set. To set time, press Execute [Execute button] and set the present time.

After the changing of the settings, always press Setting [Setting apply button] to verify that the confirmation screen appears indicating that settings were applied.

3.5.3 Color Scheme

With this procedure, the coloration of the screen is selected. The screen base color can be determined either black or white. The initial setting is the white base. Fig. 3-10 shows a black base screen. Use preferred coloration.

Table 3-11 Setting Color Scheme

Setting item	Description
Color Scheme	This sets screen coloration. The initial setting is white. White: Screen is set to a white based screen. Black: Screen is set to a black based screen.

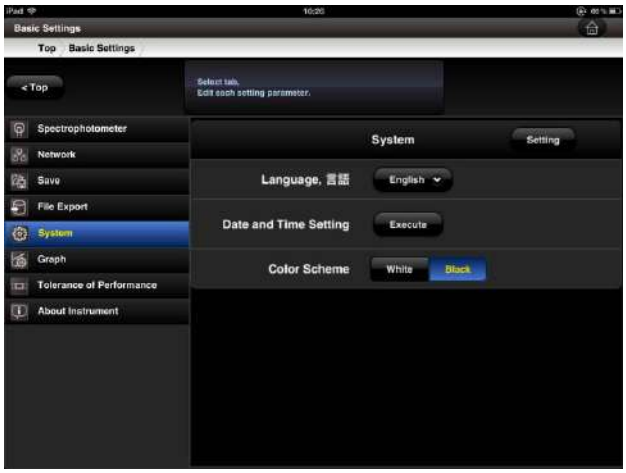


Fig. 3-10 Black Based Screen

After the changing of the settings, always press Setting [Setting apply button] to verify that the confirmation screen appears indicating that settings were applied.

3.6 Graph

This section describes setting details for graphing: colors and line thicknesses of the calibration curve and the spectrum, gridlines intervals for the vertical and horizontal axes, and whether to hide gridlines.

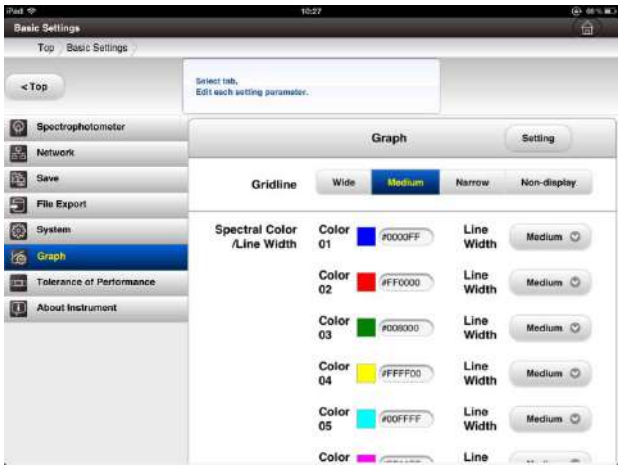


Fig. 3-11 Graph Tab

3.6.1 Gridline

With this procedure, details for graphing: colors and line thicknesses of the calibration curve and the spectrum, gridline intervals for the vertical and horizontal axes, and whether to hide gridlines, are specified.

Table 3-12 Gridline

Setting item	Description
Gridline	These set particulars for displaying gridlines on the graph. The initial setting is Standard. Wide: Interval of gridlines is wider. Standard: Interval of gridlines is generally accepted distance. Narrow: Interval of gridline is narrower. Hide: Gridline is not displayed.

After the changing of the settings, always press Setting [Setting apply button] to verify that the confirmation screen appears indicating that settings were applied.

3.6.2 Spectral Color

With this procedure, the spectrum color can be specified. Color selection is available optionally from 10 colors: Color 01, Color 02, ... Color 10. When spectra are overwritten, colors will be overwritten in the numerical order of the color numbers.

When setting change is desired, press the change-desired color number. This pressing displays a menu of 10 colors on the screen as shown in Fig. 3-12. Select a preferred color from displayed colors.

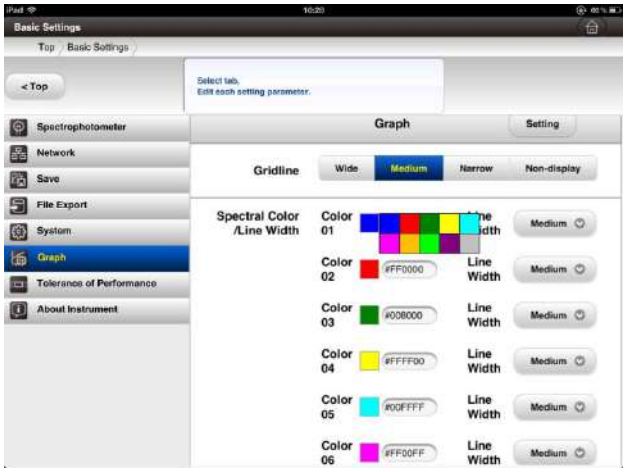


Fig. 3-12 Color Selection

After the changing of the settings, always press Setting [Setting apply button] to verify that the confirmation screen appears indicating that settings were applied.

3.6.3 Line Width

With this procedure, the line thicknesses of the calibration curve and the spectrum can be changed. Press the button on the right side of the line thickness. This pressing displays a menu of line thicknesses: a thin line, a standard thickness line, and a thick line as shown in Fig. 3-13. Select a preferred line thickness.

Fig. 3-13 Line Thickness Selection

After the changing of the settings, always press Setting [Setting apply button] to verify that the confirmation screen appears indicating that settings were applied.

3.7 Tolerance of Performance

With this tolerance of performance tab, the acceptable level of the tolerance of performance in the verification of instrument performance is specified. Refer to Chapter 6 Performance Check for details of the performance verification.

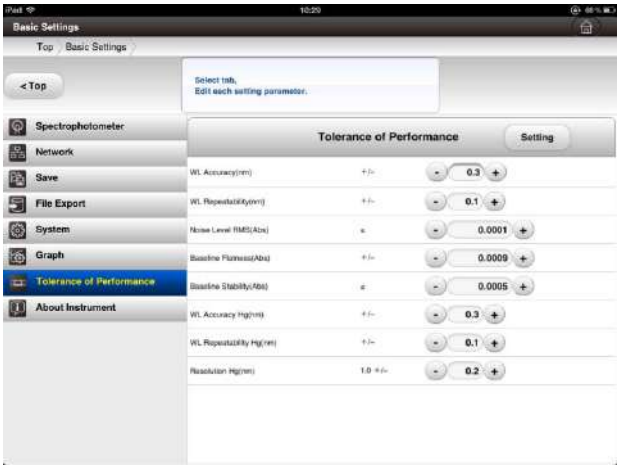


Fig. 3-14 Tolerance of Performance Tab

When the tolerance change is desired, press numerical values of the change-desired item and enter new values. Initial values and acceptable range of change for them are listed in Table 3-13.

NOTE: If the acceptable level of the tolerance of performance in the verification of instrument performance is set to a severe value in providing a standard operational procedure (SOP) or similar instructions, a frequent maintenance operation will be required. In contrast, setting to a lax value will cause the verification to be meaningless. This means that the reliability of the measurement will become low, leading to increased possibility of having wrong results. Therefore, verification criteria should be properly determined in conformity with each of the purposes of tests and analyses. That is, the tolerance needs to be set to an appropriate range according to the purpose of use.

Table 3-13 Setting Tolerance of Performance

Setting item	Description
WL accuracy	Initial value: ±0.3 nm Settable range: ±(0.3 to 1.0) nm
WL repeatability	Initial value: ±0.1 nm Settable range: ±(0.1 to 1.0) nm
Noise level	Initial value: 0.0001 Abs Settable range: 0.0001 to 0.0100 Abs
Baseline flatness	Initial value: ±0.0009 Abs Settable range: ±(0.0009 to 0.0100) Abs
Baseline stability	Initial value: 0.0005 Abs Settable range: 0.0005 to 0.0100 Abs
WL accuracy (Hg lamp)	Initial value: 0.3 nm Settable range: 0.3 to 1.0 nm
WL repeatability	Initial value: ±0.1 nm Settable range: ±(0.1 to 1.0) nm
Resolution	Initial value: 1.0±0.2 nm Settable range: 1.0±(0.2 to 1.0) nm

After the changing of the settings, always press 

[Setting apply button] to verify that the confirmation screen appears indicating that settings were applied.

3.8 About Instrument

This section describes tabs related to the instrument. Names of units of the instrument, the manufacturing number, and the software program number can be confirmed.

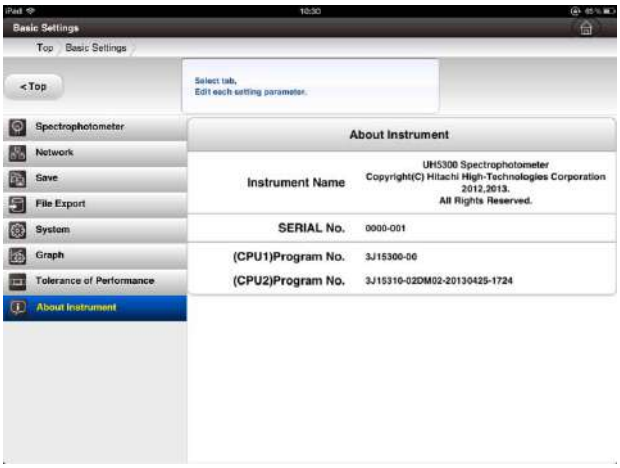


Fig. 3-15 About Instrument Tab

4 FIRST-TIME MEASUREMENT

4.1 What the Product Can Do

Quantifying the Concentration of Solution

The Product can measure the level of absorbance of a solution and quantify the concentration of the solution using the measured absorbance.

I want to automatically make continuous measurement. ⇒ 4.2.1 Quantifying the Concentration of Solution

I want to measure samples one by one. ⇒ 4.3.1 Quantifying the Concentration of Solution

Measuring absorbance/ transmittance

The Product can measure absorbance and transmittance of a solution. Up to six wavelengths can be measured.

I want to automatically make continuous measurement. ⇒ 4.2.2 Measuring Absorbance/Transmittance

I want to measure samples one by one. ⇒ 4.3.2 Measuring Absorbance/Transmittance

Measuring nucleic acids

The Product can measure absorbance of a sample nucleic acid (230 nm, 260 nm, 280 nm, 320 nm) and calculate purity, concentration, protein concentration, etc. of the nucleic acid from the absorbance ratio (A260/A280, A260/A230).

I want to automatically make continuous measurement. ⇒ 4.2.3 Measuring Nucleic Acid Specimens

I want to measure samples one by one. ⇒ 4.3.3 Measuring Nucleic Acid Specimens

Measuring spectra

The Product can measure absorption spectra or transmission spectra of a sample.

I want to automatically measure spectra after baseline correction. ⇒ 4.2.4 Measuring Spectra

I want to measure samples one by one. ⇒ 4.3.4 Measuring Spectra

Time scanning

The Product can conduct time scanning of absorbance or transmittance of a sample at a specific wavelength.

⇒ 4.3.5 Time Scanning

Conducting monitored measurement

The Product can measure absorbance or transmittance of a sample at a specific wavelength.

⇒ 4.3.6 Conducting Monitored Measurement

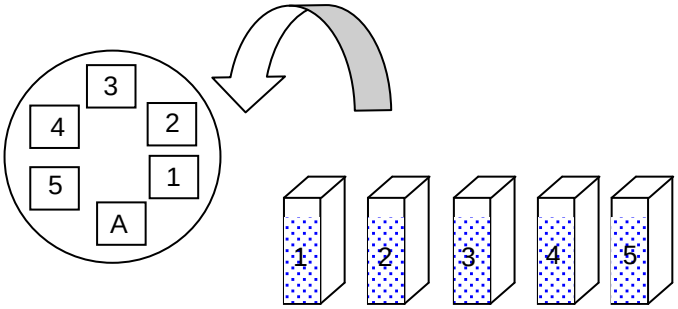
⚠ CAUTION

Fatigue due to Long Hours of Operation

In operating the instrument watching the display, a long hour watching in the same posture can build up fatigue in the eyes or body. For your health, when operating the instrument for long hours, take a break 10 to 15 minutes every hour or so to rest your eyes and body.

4.2 Automatic Continuous Measurement (6 Cell Auto Mode)

Up to six samples* can be measured (* excluding spectral measurement but autozero samples included).
Zero correction of absorbance or baseline correction using the position of Cell A can be made.



4.2.1 Quantifying the Concentration of Solution

This function is used to prepare the calibration curve and quantify the concentration of an unknown specimen or input clibration curve factors to quantify the concentration.

1. Starting Up the Product

Start up this product. (For the start-up procedure, see 2.2 “Starting Up and Shutting Down Instrument”.)

2. Setting Measurement Conditions

(1) Press  [measurement button] icon in the top page (Fig. 4-1).

Fig. 4-1 Top Window

(2) Measurement Menu window (Fig. 4-2) will then be displayed. In order to set conditions for concentration measurement, press  [concentration button] icon.

4.2 Automatic Continuous Measurement (6 Cell Auto Mode)

Fig. 4-2 Measurement Menu Window

3. Setting Sample Conditions

(1) Press  [sample tab] to set sample conditions.

(2) The sample conditions window (Fig. 4-3) will be shown.

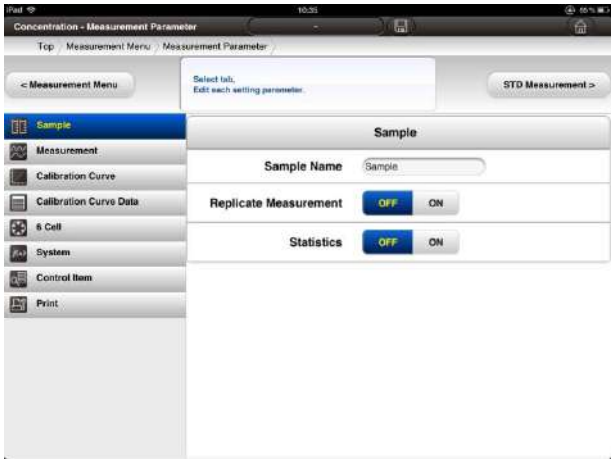


Fig. 4-3 Sample Tab

(3) Set sample conditions. See Table 4-1 for parameters.

Table 4-1 Parameters for Setting Sample Conditions

Setting Item	Description
Sample Name	Sample names can be input in two-byte or one-bype English character fonts. The largest number of characters inputtable is 20 in one-byte English character fonts. Sample names input here will be printed in the field of "Sample Name" of the report.
Replicate Measurement	Choose whether measurement will be repeatedly made or not. ON: Measurement will be repeatedly made. OFF: No measurement will be repeatedly made.
Number of repetition	This will be shown when repeated measurement is ON. Set the number of samples that will be measured repeatedly. Any number from 2 to 5 can be set.
Statistics	Select whether or not statistical operation will be conducted. ON: Statistical operation will be conducted. OFF: No statistical operation will be conducted. In statistical operation processing, mean value (MEAN), standard deviation (SD), and relative standard deviation (RSD) will be calculated for the quantified value of a sample according to the following equations. This calculation will be conducted for every operand *(N)* set in the following item. [Mean value] $MEAN = \frac{\sum_{i=1}^{N} X_i}{N}$ (*N* = operand) [Standard deviation] $SD = \sqrt{\frac{\left(\sum_{i=1}^{N} X_i^{\,2}\right) - \left(\sum_{i=1}^{N} X_i\right)^2 \Big/ N}{N-1}}$ (*N* = operand) [Relative standard deviation] $RSD = \frac{SD}{MEAN} \times 100$
Operand	This will be shown when statistical operation is ON. Set the number of samples for which statistical operation will be conducted. Any number from 2 to 100 can be set. When 3 is set for operand, statistical operation will be conducted three samples at a time. When repeated measurement is ON and statistical operation is ON, the operand will not be shown. In this case, statistical operation will be conducted to match the number of repetition.

4. Setting Measurement Conditions

(1) Press  [measurement tab] to set measurement conditions.

(2) The sample conditions window (Fig. 4-4) will be shown. Then set the number of wavelength, wavelength and initial delay. See Table 4-2 and Commentary 4-1 for the details of each parameter.

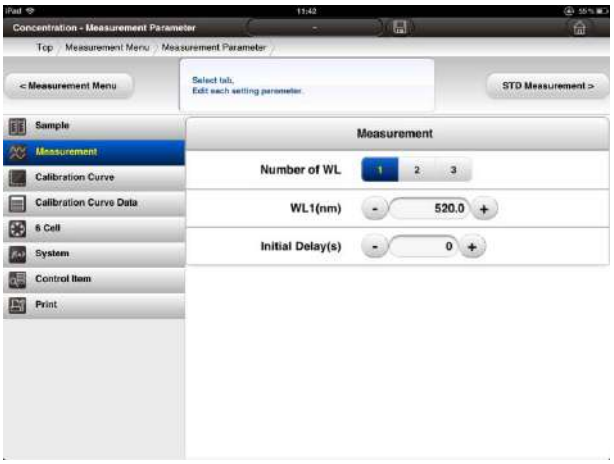
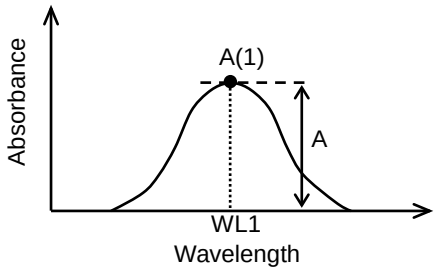
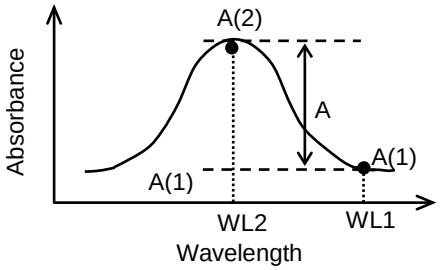
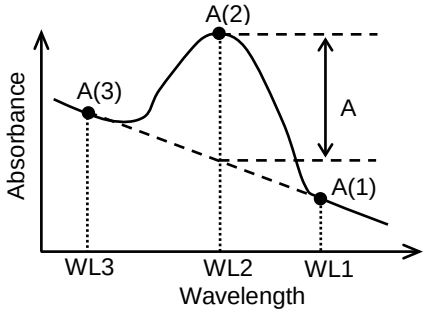


Fig. 4-4 Measurement Tab

Table 4-2 Parameters for Setting Measurement Conditions

Setting Item	Description
Number of WL	Set the number of wavelengths to be used for measurement. Usually set one for the number of wavelength. When deducting background absorption, set 2 or 3. (⇒ See Commentary 4-1 for setting conditions in detail.)
WL 1 (nm) to WL 3 (nm)	Input the wavelength to measure. Set any value at an interval of 0.1 nm between 190.0 and 1100.0 nm. Case of 1 for the number of wavelength: Input the wavelength to measure in Wavelength 1. Case of 2 for the number of wavelength: Input in Wavelength 1 the wavelength that produces the absorption attributable to the background. Input in Wavelength 2 the wavelength that produces the absorption attributable to the quantified substance. The value to be input in Wavelength 1 and 2 should be Wavelength 1 > Wavelength 2. Case of 3 for the number of wavelength: Input in Wavelength 1 and 3 the wavelength that produces the absorption attributable to the background. Input in Wavelength 2 the wavelength that produces the absorption attributable to the quantified substance. Howver, be sure to make Wavelength 1> 2 > 3 when values are input.
Initial Delay (s)	Prior to measuring, press  [start button] icon, wait for the time set here and start measurement. Any value at an inteval of 1 second can be input between 0 to 9999 seconds. This setting is used when you want to start measurement after the passage of a certain duration of time such as when you want to measure a specimen after returning the temperature of the specimen to room temperature or when you want to start measurement after completing the reaction. Input 0 when you don't make any special setting.

Commentary 4-1 Setting Wavelength Number

Number of WL	Setting
1	Most widely used method. Set a wavelength to WL1 to prepare the calibration curve from the obtained absorbance A and calculate the concentration of an unknown specimen. $A = A(1)$  Absorption spectra of unknown specimen
2	It is effective when the background exists evenly for the wavelength. Set in WL2 the wavelength that obtains absorption attributable to a substance to be quantified and set in WL1 the wavelength that obtains absorption attributable to the background. When the obtained absorbance is A(2) and A(1), respectively, calcualte A from the following equation, prepare the calibration curve from that value and calculate the concentration of the unknown specimen. $A = A(2)-A(1)$  Absorption spectra of unknown specimen
3	It is effective when turbidity occurs to the specimen or when the background slantingly occurs. When absorbance at three wavelengths is A(1), A(2), and A(3) respectively, calcualte A using the following equation, prepare the calibration curve and calculate the concentration of the unknown specimen. $A = A(2) - \frac{(WL1 - WL2) \times A(3) + (WL2 - WL3) \times A(1)}{WL1 - WL3}$ (Where *WL1>WL2>WL3*)  Absorption spectra of unknown specimen

5. Setting Calibration Curve Conditions

(1) Press  [calibration curve tab] to set calibration curve conditions.

(2) Then the calibration curve window (Fig. 4-5) will be shown.

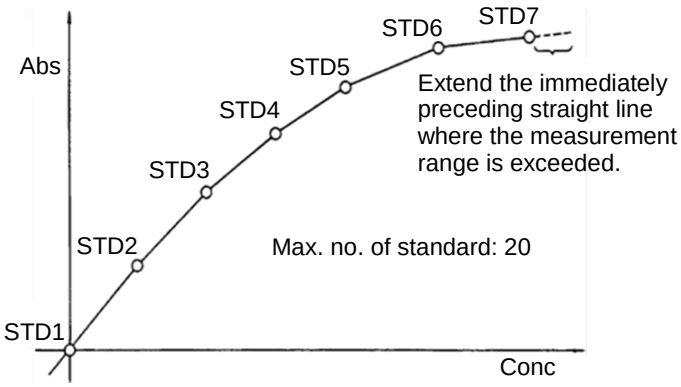
Fig. 4-5 Calibration Curve Conditions Window

(3) Set calibration curve conditions. See Table 4-3 for the details of the parameters. See Commentary 4-2 and 4-3 for the calculation method of the regression equation of the calibration curve.

Table 4-3 Parameters for Setting Calibration Curve Conditions

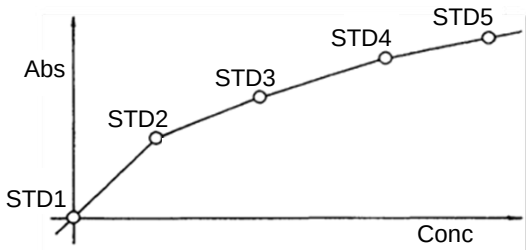
Setting Item	Description
Calibration Curve Type	Select one of the following five types of method to calculate the concentration of an unknown specimen. [When the calibration curve condition is Conc = f(Abs)] (a) Linear straight line Measure a standard and prepare the calibration curve. Quantify an unknown specimen using the calibration curve of a linear approximation straight line. The calibration curve equation is written as follows: $x=A_1y+A_0$ Where x: quantified value of an unknown specimen y: absorbance of an unknown specimen (measurement result) (b) Quadratic curve Measure a standard to prepare the calibration curve. Quantify an unknown specimen using the calibration curve of a quadratic approximation curve. The calibration curve equation is written as follows: $x=A_2y^2+A_1y+A_0$ Where x: quantified value of an unknown specimen y: absorbance of an unknown specimen (measurement result) (c) Linear coefficient Prepare the calibration curve in the form of linear approximate straight line from the calibration curve equation and factor of the known standard. Input the slope and intercept of the calibration curve and calculate the concentration of an unknown specimen based on its factor. This method is used when the concentration is calculated based on the literature or the data of the calibration curves measured with other equipment or when you want to measure the concentration by multiplying absorbance by the factor using molar absorptivity or specific absorbance. $x=A_1y+A_0$ Where x: quantified value of an unknown specimen y: absorbance of an unknown specimen (measurement result) A_0, A_1: input value

(cont'd)

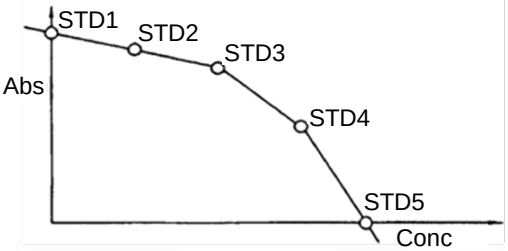
Setting Item	Description
	(d) Quadratic coefficient Prepare the calibration curve in the form of quadratic approximation curve from the calibration curve equation of a known standard specimen and its factor. Input the slope and intercept of the calibration curve and calculate the concentration of an unknown specimen based on its factor. $x=A_2y^2+A_1y+A_0$ Where x: quantified value of an unknown specimen y: absorbance of an unknown specimen (measurement result) A_0, A_1, A_2: input value (e) Polygonal line It is a calibration curve that represents as a linear graph a standard specimen based on the measurement or the input data.  **NOTE:** The right calibration curve can be prepared when the photometric value monotonously increases or decreases relative to the concentration value. For a monotonous increase, the calibration curve that is drawn is that with Standard 1 (STD1) as the datum. For a monotonous decrease, the calibration curve to be drawn is one with STD1 and STD5 plotted on the photometric value axis and the concentration axis, respectively. This example is a case with 5 set for the number of standards.

(cont'd)

Setting Item	Description



Monotonously rising calibration curve



Monotonously falling calibration curve

[When the calibration curve condition is Abs = f(Conc)]

(a) Linear straight line

Measure a standard and prepare the calibration curve. Quantify an unknown specimen using the calibration curve of a linear approximation straight line. The calibration curve equation is written as follows:

$y = A_1x + A_0$

Where x: quantified value of an unknown specimen
y: absorbance of an unknown specimen (measurement result)

(b) Quadratic curve

Measure a standard to prepare the calibration curve. Quantify an unknown specimen using the calibration curve of a quadratic approximation curve. The calibration curve equation is written as follows:

$y = A_2x^2 + A_1x + A_0$

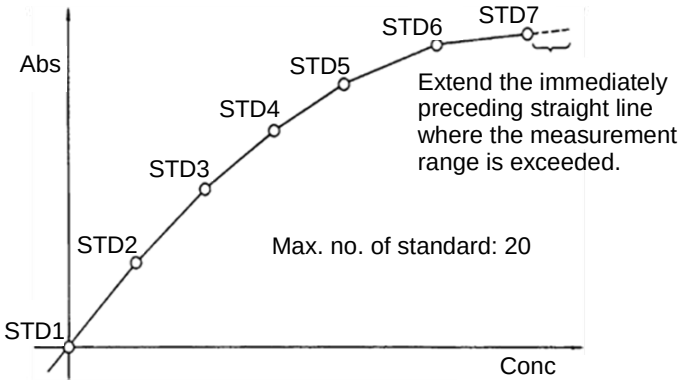
Where x: quantified value of an unknown specimen
y: absorbance of an unknown specimen (measurement result)

(cont'd)

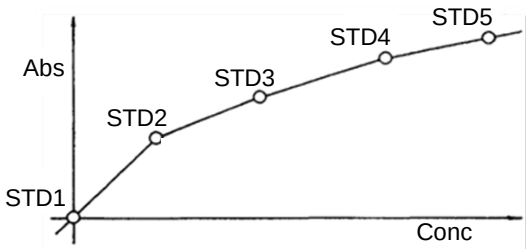
Setting Item	Description
	(c) Inputting linear coefficient Prepare the calibration curve in the form of linear approximate straight line from the calibration curve equation and factor of the known standard. Input the slope and intercept of the calibration curve and calculate the concentration of an unknown specimen based on its factor. This method is used when the concentration is calculated based on the literature or the data of the calibration curves measured with other equipment or when you want to measure the concentration by multiplying absorbance by the factor using molar absorptivity or specific absorbance. $y=A_1x+A_0$ Where x: quantified value of an unknown specimen y: absorbance of an unknown specimen (measurement result) A_0, A_1: input value (d) Inputting quadratic coefficient Prepare the calibration curve in the form of quadratic approximation curve from the calibration curve equation of a known standard specimen and its factor. Input the slope and intercept of the calibration curve and calculate the concentration of an unknown specimen based on its factor. $y=A_2x^2+A_1x+A_0$ Where x: quantified value of an unknown specimen y: absorbance of an unknown specimen (measurement result) A_0, A_1, A_2: input value (e) Polygonal line It is a calibration curve that represents as a linear graph a standard specimen based on the measurement or the input data.

(cont'd)

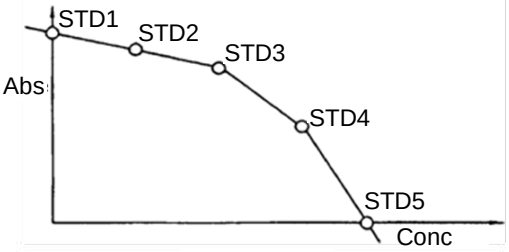
Setting Item	Description



NOTE: The right calibration curve can be prepared when the photometric value monotonously increases or decreases relative to the concentration value. For a monotonous increase, the calibration curve that is drawn is that with Standard 1 (STD1) as the datum. For a monotonous decrease, the calibration curve to be drawn is one with STD1 and STD5 plotted on the photometric value axis and the concentration axis, respectively. This example is a case with 5 set for the number of standards.



Monotonously rising calibration curve



Monotonously falling calibration curve

(cont'd)

Setting Item	Description
Plot of Replicate	Select the plotting method when repeated measurement is selected for standard measurement. Mean value: When STD of the same concentration is measured a few times, the mean value of repeatedly measured absorbances is shown on the calibration curve. Total score: All measured absorbance values are shown on the calibration curve.
Through Zero	Choose preparation of either the calibration curve that passes through zero (point of zero concentration or zero absorbance) or the calibration curve that doesn't pass through zero. ON: Prepare the calibration curve that passes through zero. OFF: Prepare the calibration curve that doesn't pass through zero. With through zero ON, regression analysis with the intercept of the calibration curve being zero will be conducted. With through zero OFF, regression analysis will be conducted with the calibration curve having an intercept. See Commentary 4-2 and 4-3 for calculation of the regression equations. See Commentary 4-4 and 4-5 for the details of usage.
CONC Unit	An arbitary unit of concentration can be selected and input (such as mg/L, %, mol/l, or M). If the list does not contain a unit you want to use, you can select the unit you want and input it.
Number of Decimal Places of CONC	Select the number of decimals to be shown for the maximum or minimum of concentration, standard concentration data, or sample concentration data. Any value from 0 to 4 can be selected.
CONC Max	When the quantification result exceeds the set value, "H" will be printed beside the quantification result. This is used to simply check if the quantified value is in the normal range of concentration. Any value from 0 to 9999 can be selected.
CONC Min	When the quantification result falls under the set value, "L" will be printed beside the quantification result. This is used to simply check if the quantified value is in the normal range of concentration. Any value from 0 to 9999 can be selected.

Commentary 4-2 Calculation of Regression Equation (when Abs = f (Conc.))

Calibration curve equation for system conditions	Through Zero ON	Through Zero OFF
Abs = f(Conc.)	Case of linear straight line Regression equation: $y = A1 \cdot x$ $A1 = \dfrac{\sum x_n y_n}{\sum x_n{}^2}$ Case of quadratic curve Regression equation: $y = A2 \cdot x^2 + A1 \cdot x$ $A2 = \dfrac{\left(\sum x_n{}^3\right)\left(\sum x_n y_n\right) - \left(\sum x_n{}^2\right)\left(\sum x_n{}^2 y_n\right)}{\left(\sum x_n{}^3\right)^2 - \left(\sum x_n{}^4\right)\left(\sum x_n{}^2\right)}$ $A1 = \dfrac{\left(\sum x_n y_n\right)\left(\sum x_n{}^4\right) - \left(\sum x_n{}^2 y_n\right)\left(\sum x_n{}^3\right)}{\left(\sum x_n{}^2\right)\left(\sum x_n{}^4\right) - \left(\sum x_n{}^3\right)^2}$	Case of linear straight line Regression equation: $y = A1 \cdot x + A0$ $A0 = \dfrac{\left(\sum x_n{}^2\right)\left(\sum y_n\right) - \left(\sum x_n\right)\left(\sum x_n y_n\right)}{n\left(\sum x_n{}^2\right) - \left(\sum x_n\right)^2}$ $A1 = \dfrac{n\left(\sum x_n y_n\right) - \left(\sum x_n\right)\left(\sum y_n\right)}{n\left(\sum x_n{}^2\right) - \left(\sum x_n\right)^2}$ Case of quadratic curve Regression equation: $y = A2 \cdot x^2 + A1 \cdot x + A0$ $A2 = \dfrac{S\left(X^2Y\right) \cdot S(XX) - S(XY) \cdot S\left(XX^2\right)}{S(XX) \cdot S\left(X^2X^2\right) - \left\{S\left(XX^2\right)\right\}^2}$ $A1 = \dfrac{S(XY) \cdot S\left(X^2X^2\right) - S\left(X^2Y\right) \cdot S\left(XX^2\right)}{S(XX) \cdot S\left(X^2X^2\right) - \left\{S\left(XX^2\right)\right\}^2}$ $A0 = \dfrac{\sum y_n}{n} - b\dfrac{\sum x_n}{n} - c\dfrac{\sum x_n{}^2}{n}$ Where $S(XX) = \sum x_n{}^2 - \dfrac{\left(\sum x_n\right)^2}{n}$ $S(XY) = \sum x_n y_n - \dfrac{\left(\sum x_n\right)\left(\sum y_n\right)}{n}$ $S\left(XX^2\right) = \sum x_n{}^3 - \dfrac{\left(\sum x_n\right)\left(\sum x_n{}^2\right)}{n}$ $S\left(X^2Y\right) = \sum x_n{}^2 y_n - \dfrac{\left(\sum x_n{}^2\right)\left(\sum y_n\right)}{n}$ $S\left(X^2X^2\right) = \sum x_n{}^4 - \dfrac{\left(\sum x_n{}^2\right)^2}{n}$

x: Concentration of standard sample

y: Measured absorbance of the standard sample

n: No. of standard samples

Commentary 4-3 Calculation of Regression Equation (when Conc. = f (Abs))

Calibration curve equation for system conditions	Through zero ON	Through zero OFF
Conc. = f(Abs)	Case of linear straight line Regression equation: $x = A1 \cdot y$ $A1 = \dfrac{\sum y_n x_n}{\sum y_n{}^2}$ Case of quadratic curve Regression equation: $x = A2 \cdot y^2 + A1 \cdot y$ $A2 = \dfrac{\left(\sum y_n{}^3\right)\left(\sum y_n x_n\right) - \left(\sum y_n{}^2\right)\left(\sum y_n{}^2 x_n\right)}{\left(\sum y_n{}^3\right)^2 - \left(\sum y_n{}^4\right)\left(\sum y_n{}^2\right)}$ $A1 = \dfrac{\left(\sum y_n x_n\right)\left(\sum y_n{}^4\right) - \left(\sum y_n{}^2 x_n\right)\left(\sum y_n{}^3\right)}{\left(\sum y_n{}^2\right)\left(\sum y_n{}^4\right) - \left(\sum y_n{}^3\right)^2}$	Case of linear straight line Regression equation: $x = A1 \cdot y + A0$ $A0 = \dfrac{\left(\sum y_n{}^2\right)\left(\sum x_n\right) - \left(\sum y_n\right)\left(\sum y_n x_n\right)}{n\left(\sum y_n{}^2\right) - \left(\sum y_n\right)^2}$ $A1 = \dfrac{n\left(\sum y_n x_n\right) - \left(\sum y_n\right)\left(\sum x_n\right)}{n\left(\sum y_n{}^2\right) - \left(\sum y_n\right)^2}$ Case of quadratic curve Regression equation: $x = A2 \cdot y^2 + A1 \cdot y + A0$ $A2 = \dfrac{S\left(Y^2YX\right) \cdot S(YY) - S(YX) \cdot S\left(YY^2\right)}{S(YY) \cdot S\left(Y^2Y^2\right) - \left\{S\left(YY^2\right)\right\}^2}$ $A1 = \dfrac{S(YX) \cdot S\left(Y^2Y^2\right) - S\left(Y^2X\right) \cdot S\left(YY^2\right)}{S(YY) \cdot S\left(Y^2Y^2\right) - \left\{S\left(YY^2\right)\right\}^2}$ $A0 = \dfrac{\sum x_n}{n} - A1\dfrac{\sum y_n}{n} - A2\dfrac{\sum y_n{}^2}{n}$ Where $S(YY) = \sum y_n{}^2 - \dfrac{\left(\sum y_n\right)^2}{n}$ $S(YX) = \sum y_n x_n - \dfrac{\left(\sum y_n\right)\left(\sum x_n\right)}{n}$ $S\left(YY^2\right) = \sum y_n{}^3 - \dfrac{\left(\sum y_n\right)\left(\sum y_n{}^2\right)}{n}$ $S\left(Y^2X\right) = \sum y_n{}^2 x_n - \dfrac{\left(\sum y_n{}^2\right)\left(\sum x_n\right)}{n}$ $S\left(Y^2Y^2\right) = \sum y_n{}^4 - \dfrac{\left(\sum y_n{}^2\right)^2}{n}$

x: Concentration of standard sample

y: Measured absorbance of the standard sample

n: No. of standard samples

6. Setting Calibration Curve Data

(1) Press  [calibration Curve Data tab] to set the calibration curve data.

[Calibration curve conditions - calibration curve type: linear straight line, quadratic curve, and broken line]

(1) Calibration curve data window (calibration curve type: linear straight line, quadratic curve, and broken line) (Fig. 4-6) will be shown.

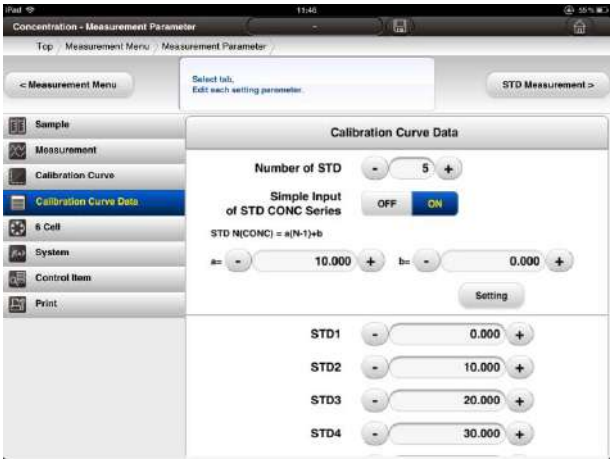


Fig. 4-6 Calibration Curve Data Window (Calibration Curve Type: Linear Straight Line, Quadratic Curve, and Broken Line)

(2) Input the number of standard samples. Any value between 1 and 20 can be input.

(3) Set the concentration series input.
See Table 4-4 for each item. After completing inputting in a and b, press the item in which the setting is to be reflected.

Table 4-4 Simple Input of Concentration Series

Simple input of STD CONC Series	OFF: Manually input the concentration of the standard sample. ON: The standard concentration, calculated using the conversion equation, STD N (concentration) = a(N-1)+b will be input. * N should be the number of the subject standard samples.
	a: The interval of set concentration of the standard samples b: The starting concentration of the standard samples

[Calibration curve conditions - calibration curve type: linear coefficient and quadratic coefficient]

(1) Calibration curve data window (calibration curve type: linear coefficient and quadratic coefficient) (Fig. 4-7) will be shown.

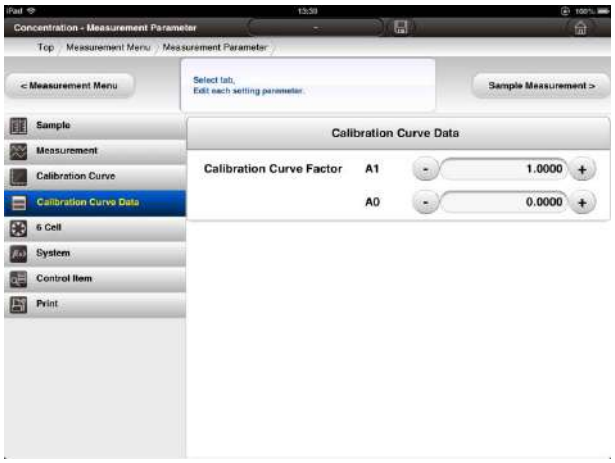


Fig. 4-7 Calibration Curve Data Window (Calibration Curve Type: Linear Coefficient and Quadratic Coefficient)

(2) Input each calibration curve factor. Inputtable factors will be any value between 0.0000 and ± 99999 in five effective digits. For the details of setting calibration curve factors, see Table 4-5 and 4-6.

Table 4-5 Setting Calibration Curve Factors (Example for Linear Coefficient)

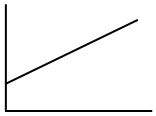
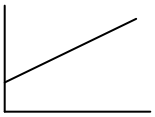
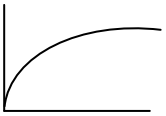
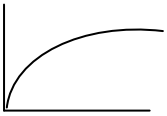
	[Ordinary method of use] Calibration curve equation for system conditions ABS = f(CONC)	**Calibration curve equation for system conditions CONC = f(ABS)**
Calculation equation	Absorbance = A1 x concentration + A0 Concentration = (absorbance - A0)/A1	Concentration = A1 x absorbance + A0
Use the coefficients of calibration curves already acquired by the equipment or literature data.	 Input the following values A1: value of the slant A0: value of Y intercept when absorbance and concentration are plotted for Y axis and X axis, respectively.	 Input the following values A1: value of the slant A0: value of Y intercept when absorbance and concentration are plotted for Y axis and X axis, respectively.
Use specific absorptivity.	When molar absorbance coefficients ε ($M^{-1}cm^{-1}$) light path length of cell L (cm)and concentration C (μM), absorbance = εCL/1000 Then, when concentraiton C is calculated, input A1: εL/1000 A0: 0	When molar absorbance coefficients ε ($M^{-1}cm^{-1}$) light path length of cell L (cm) and concentration C (μM), absorbance = εCL/1000 Then, when concentraiton C is calculated, input A1: 1000/εL A0: 0
Use specific absorptivity.	When specific absorptivity $E^{1\%}_{1cm}$ optical path length of cell L (cm) and concentration C (mg/l), absorbance = $E^{1\%}_{1cm}$CL/10000 Then, when concentraiton C is calculated, input A1: $E^{1\%}_{1cm}$ L/10000 A0: 0	When specific absorptivity $E^{1\%}_{1cm}$ optical path length of cell L (cm) and concentration C (mg/l), absorbance = $E^{1\%}_{1cm}$CL/10000 Then, when concentraiton C is calculated, input A1: 10000/$E^{1\%}_{1cm}$ L A0: 0

Table 4-6 Setting Calibration Curve Factors (Example for Quadratic Coefficient)

	[Ordinary method of use] Calibration curve equation for system conditions ABS = f(CONC)	**Calibration curve equation for system conditions CONC = f(ABS)**
Calculation equation	Absorbance = A2 x concentration^2 + A1 × concentration + A0	Concentration = A2 x absorbance^2 + A1 × absorbance + A0
Use the coefficients of calibration curves already acquired by the equipment or literature data.	Abs (Y axis)  Conc (X axis) Input the following values: A2: value of the slant A1: value of the slant A0: value of Y intercept when absorbance and concentration are plotted for Y axis and X axis, respectively.	Conc (Y axis)  Abs (X axis) Input the following values: A2: value of the slant A1: value of the slant A0: value of Y intercept when absorbance and concentration are plotted for Y axis and X axis, respectively.

7. Setting 6 Cell

NOTE: When Off is the condition for 6 cell settings to be determined when single cell holder or rectangular long cell holder is used, the 6 cell mode will not be shown (See 3.1.2.6 Cell Mode for details). When the auto shipper is connected, the items of the auto shipper will be shown instead of the 6 cell mode.

(1) Press  [6 cell tab] in order to set the six cell conditions.

(2) The 6 cell conditions window (Fig. 4-8) will be shown (case of calibration curve type: linear straight line).

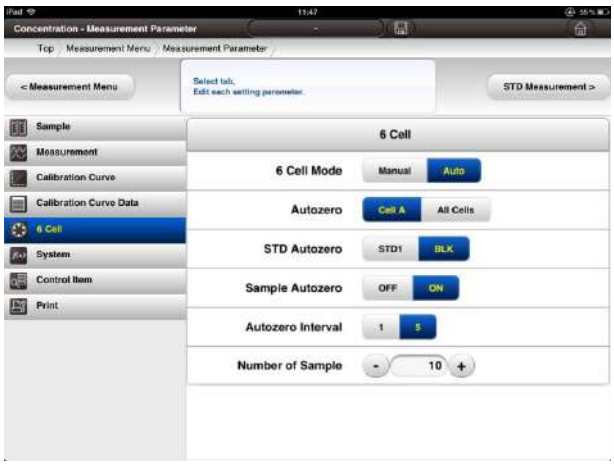


Fig. 4-8 6 Cell Window

(3) Select and determine each item of the 6 cell conditions. Set the 6 cell mode to "Auto." See Table 4-7 for the details of the parameters.

Table 4-7 Parameters for Setting Calibration Curve Conditions

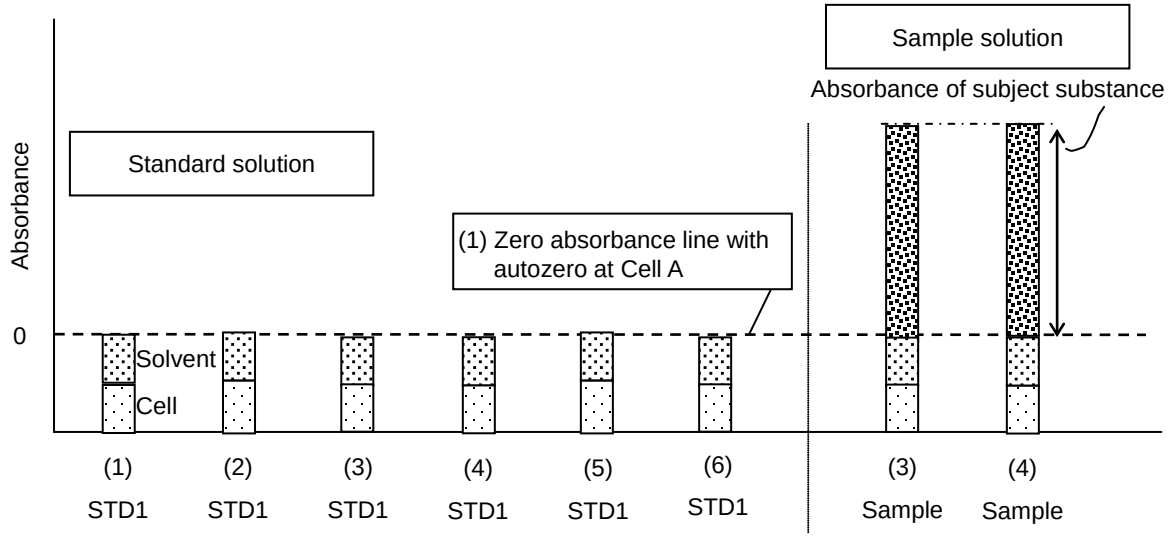
Setting Item	Description
6 Cell Mode	Determine the movement of 6 cells during measurement. Auto: This mode automatically rotates 6 cells, with samples manually set to each position in advance, and automatically conducts all processes of measurement from autozero to standards and samples. As the equipment has 6 cells, use of this mode is recommended when there are many specimens to measure. Manual: Standards and samples are measured using one of the 6 cell positions (which may be either from 1 to 5). Autozero can be easily conducted by setting a solution at Cell A for autozero in order to remove the influence of drift (shaking of the baseline) of the equipment during measurement. In the ordinary use, a standard solution or a sample solution will be set at Cell 1. (See 4.3.1 Quantifying the concentration of solution for details of the manual mode.)
Autozero	Set the method of autozero. Cell A: Conduct autozero at Cell A. Measure the autozero value of Cell A as a representative value and record it as a correction value. All cells: Conduct autozero for all cells. Measure autozero values for all cells before measuring a standard and a sample and memorize them as correction values. Then the individual differences of absorbance among all cells will be corrected. This is effective for cases where minute absorbance differences are measured. * See Commentary 4-4 for setting conditions in detail.

(cont'd)

Setting Item	Description
STD Autozero (Calibration curve type: shown only when linear straght line is used)	Select STD1 or blank for a sample to undergo autozero (operation to adjust the absorbance to zero) at the time of standard measurement. STD1: When a standard is measured, set this in case a sample to undergo autozero is a standard solution (STD1) of zero concentration. Conduct automatic autozero with STD1 when a standard is measured. With this setting, setting of ON is recommended for the setting of through zero for parameters of Table 4-3 Calibration curve conditions in order to adjust aboserbence of a solution with zero concentration to zero. Blank: Set this when a sample for autozero operation during standard measurement is other than the standard solution with zero concentration (blank). Conduct automatic autozero with a blank solution when a standard is measured. Usually set OFF for through zero for parameters of Table 3-3 Calibration curve conditions. * See Commentary 4-5 and 4-6 for setting conditions in detail.
Sample Autozero	Select a sample for autozero operation during sample measurement or select no automatic autozero operation. ON: Select this when a sample to undergo autozero during sample measurement is the same as that for standard measurement. Autozero will be automatically performed. OFF: When OFF is selected, no automatically autozero will be performed during sample measurement. When autozero is performed, it should be done manually. * See Commentary 4-5 and 4-6 for setting conditions in detail.
Autozero interval	5: Autozero will be automatically performed once in five measurements. 1: Autozero will be automatically performed for every sample.
Number of sample	Set the number of samples to measure. Choose a number between 1 and 300. For repeated measurement, select the number of samples so that the number of sample multiplied by repetition number is 300 or under.

Commentary 4-4 Setting Autozero Method

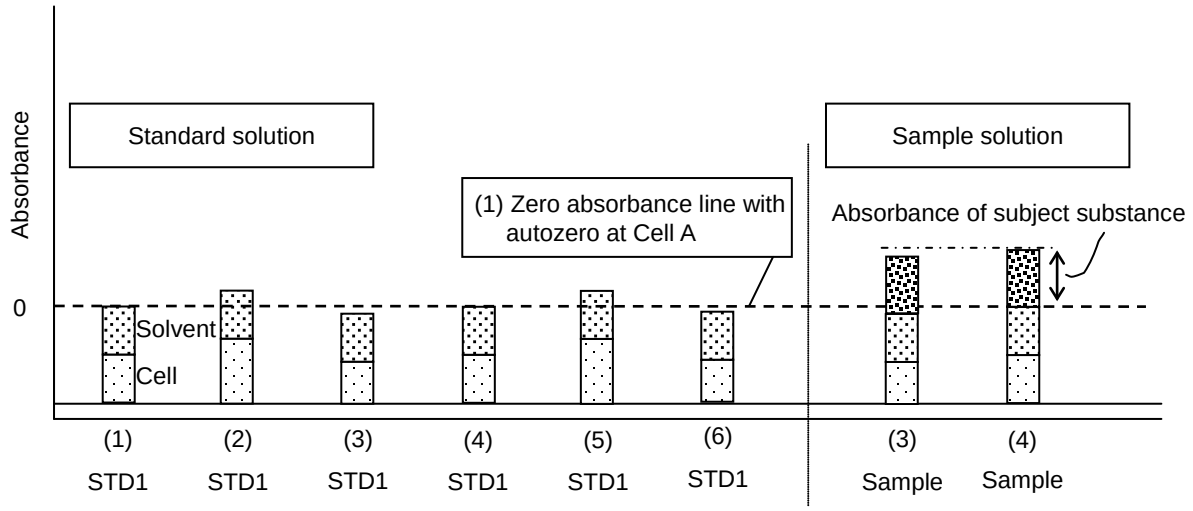
(Ordinary specimen)



Line of zero absorbance when autozero method (Cell A) is selected (for ordinary specimens)

When Cell A is selected for autozero method, autozero is performed at (1), and the autozero value of Cell A will be applied to measurement with other cell positions (2 to 6). There is a slight difference in cell absorbance among samples. Since this minute difference can often be ignored, the autozero value of Cell A is usually chosen as the representative value and used as the correction value.

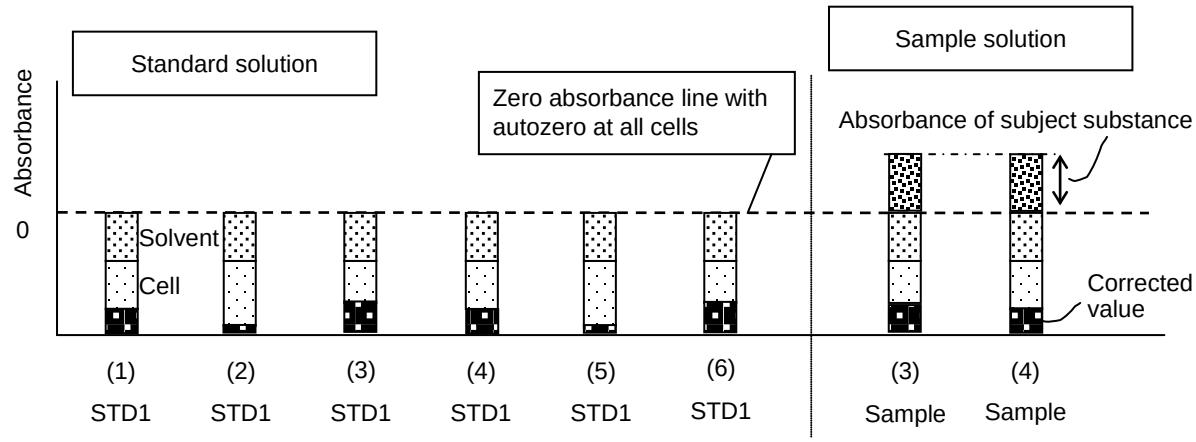
(samples with extremely small absorbance)



Line of zero absorbance when autozero method (Cell A) is selected (when absorbance of the subject substance is small)

But when samples have small absorbance or the difference in absorbance among samples is extremely small, it is sometime impossible to ignore the errors in absorbance among cells. In that case, selecting "all cells" for the autozero method will perform autozero for all cells where samples are to be measured in the initial autozero operation.

(cont'd)

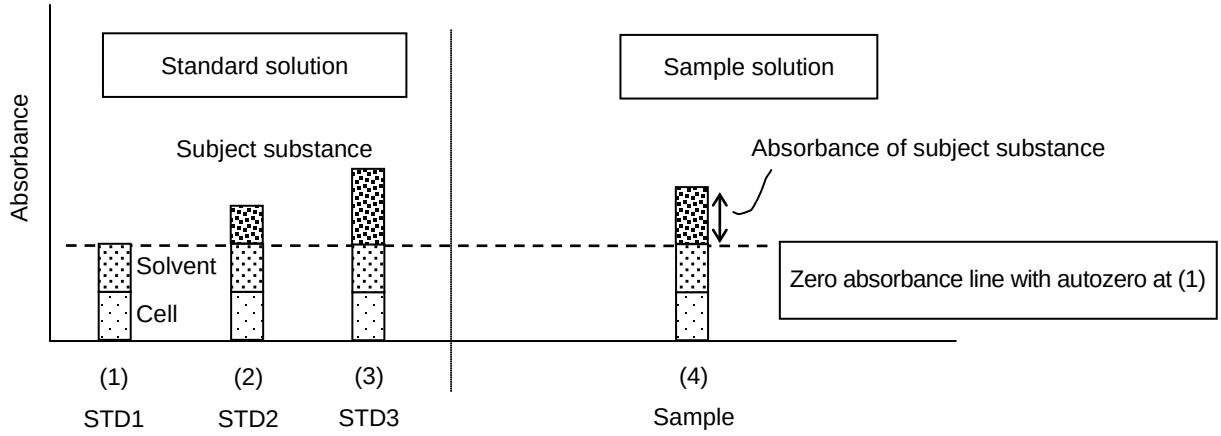


Zero absorbance line when "all cells" is selected for the autozero method (when absorbance of the subject substance is small)

When autozero is performed at all cells, the zero point unique to each cell position will be recorded. In a series of measurements thereafter, measurement values will be calculated from the zero point unique to each cell position.
When the guidance for sample placement is shown, press ZERO the [autozero] icon to perform autozero at Cell A. Changes in zero point attributable to the drift of the equipment will be reflected on the zero point of all cells positions while the zero point unique to each cell position is maintained.

NOTE: When "all cells" is selected for autozero method, use the same combination of cells in a series of measurement as that used for acquisition of autozero.

Commentary 4-5 Setting 6 Cell Conditions When No Coloring Reagent is Used



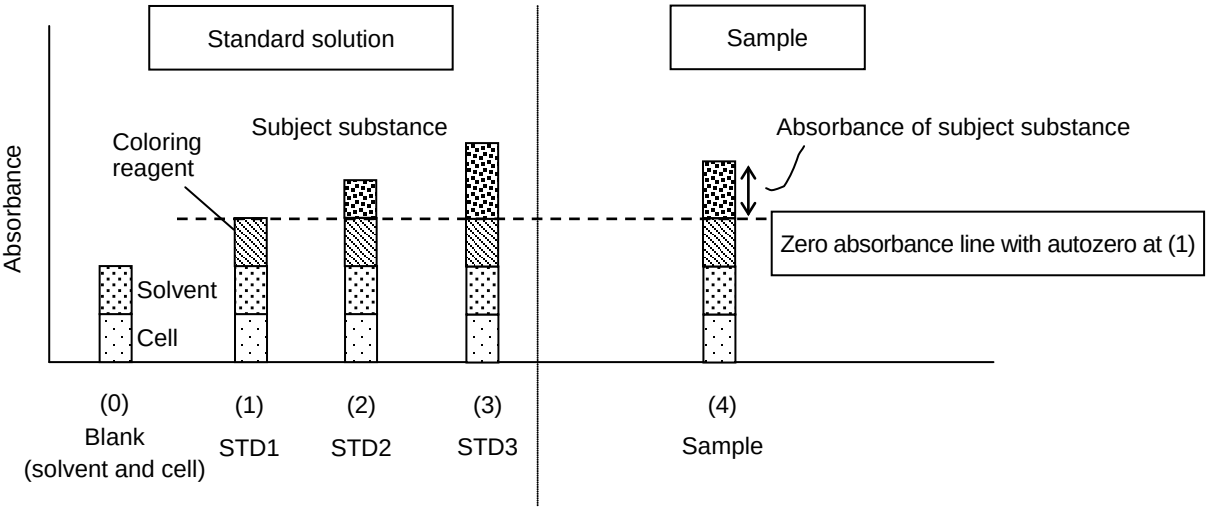
Constituents of absorbance when no coloring reagent is used. (excluding interfering substance)

Absorbance, which comes out as the result of measurement, is the summation of absorbances attributable to various elements such as cells, solvents, coloring reagents, subject substances and interfering substances. It means the resultant absorbance is not only the measurement result of the subject substance.

When a calibration curve is prepared using concentration 0, 1 or 2, prepare a solution of concentraiton 0, 1, and 2 for STD1, STD2 and STD3 respectively (as shown in (1) to (3) above). These STD1 to 3 values contain absorbances of cells, solvents and subject substances. In reality, the absorbance necessary for actual quantification is that attributable to the subject substance. It is therefore necessary to reduce the contribution of the cell and solvent (autozero operation). In this case, autozero operation should be conducted at STD1, and the calibration curve should be prepared by measuring the absorbance of STD1 through STD3.

When quantifying a sample, use the absorbance with the contribution of the celll and solvent eliminated and calculate the concentration of the sample. As shown in (4) above, when the absorbance, excluding that from the cell and solvent, comes from the subject substance, the acquired concentration will be the concentration of the subject substance. When this sample is quantified using the automatic 6 cell mode, set the calibration curve autozero to STD1, sample autozero to ON or OFF and through zero to ON.

Commentary 4-6 Setting 6 Cell Conditions When Coloring Reagent is Used



Constituents of absorbance when coloring reagent is used (excluding interfering substance)

When a coloring reagent is used, absorbance of the cell and solvent as well as abosrbence of the coloring reagent are included in the solution. When reducing absorbance including that of the coloring reagent, perform autozero for the solvent of (1) in the above figure.
When quantifying a sample, use the absorbance with the contributions of the cell, solvent and coloring reagent eliminated and calculate the concentration of the sample. As shown in (4) above, when any absorbance, excluding the absorbances of the cell, solvent, and coloring reagent, comes from the subject substance, the resultant concentration should be the concentration of the subject substance. When this sample is quantified using the automatic 6 cell mode, set the calibration curve autozero to STD1, sample autozero to ON or OFF and through zero to ON (see the measurement conditions of D in the following table).
When the absorbene of the solution of (1) above is kept instable, it is not appropriate for the solution of autozero operation. Therefore, use of the blank for autozero operation is recommended. In this case, set the calibration curve autozero to blank, sample autozero to ON or OFF and through zero to OFF.

8. Setting System

(1) Press f(x) [system tab] to set system conditions.

(2) The system conditions window (Fig. 4-9) will then be shown. Set the conditions for the calibration curve regression equation according to the guidance. See Table 4-8 for details.

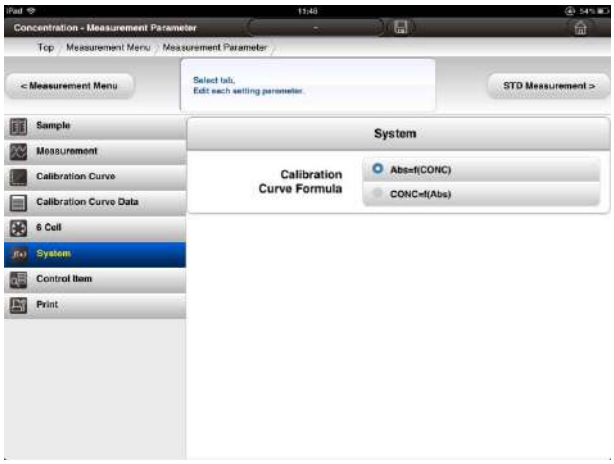


Fig. 4-9 System Conditions Window

Table 4-8 Parameters for Setting Calibration Curve Factors

Setting Item	Description
Calibration Curve Formula	Select the expression method of the calibration curve equation from either of the following two kinds: ABS = f(CONC): Calibration curve equation is expressed as (absorbance = A1 x concentration + A0). Usually this "ABS = f(CONC)" should be used. ABS = f(ABS): Calibration curve equation is expressed as (absorbance = A1 x absorbance + A0). This equation is used only when the calibration curve used for reference is expressed as CONC = f(ABS) or when the calibration curve type is linear coefficient and a value of the absorbance obtained by being multiplied by the factor number plus a value is used as the concentration.

9. Setting Control Item

(1) Press [control item tab] to set control items.

(2) The control item window window (Fig. 4-10) will then be shown.

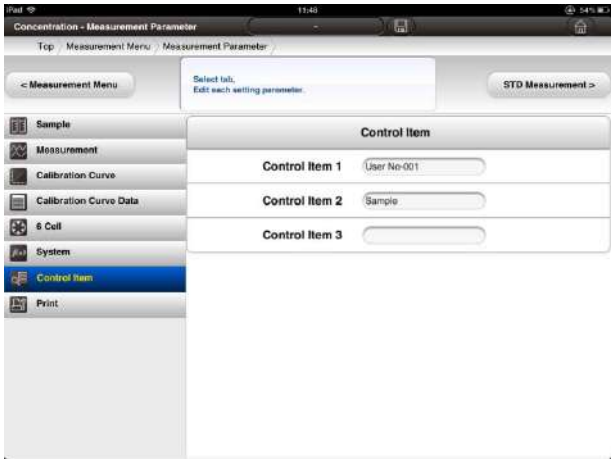


Fig. 4-10 Control Item Window

(3) Input a comment in a control item.

GUIDE: A comment to be input in a control item should be a search keyword in reference for condition file or reference for data file.
(See 5.1.1 Reading Saved Data for details)

10. Setting Printing Conditions

GUIDE: Set those conditions when items to be printed are predetermined. Printing items can be set even after completion of measurement.

(1) Press  [print tab] to set printing conditions.

(2) The printing conditions window (Fig. 4-11) will then be shown.

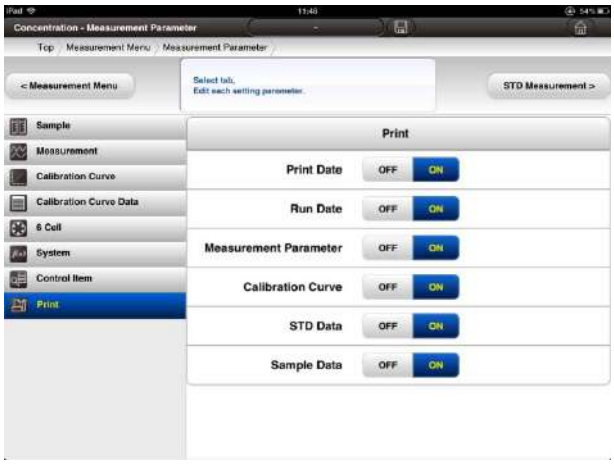


Fig. 4-11 Print Window

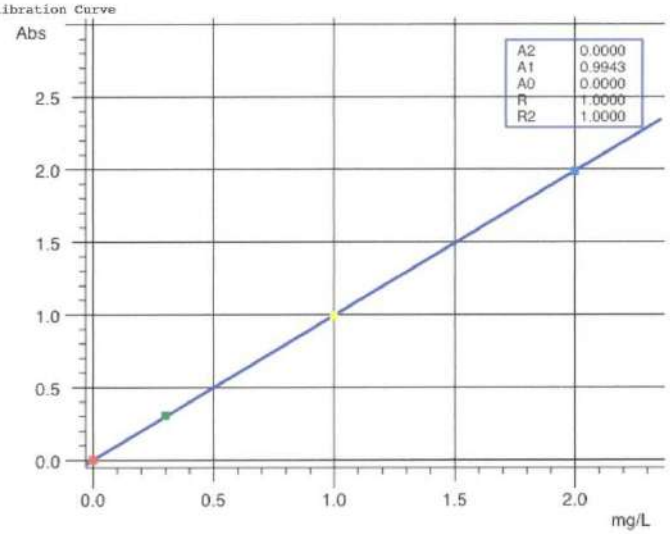
(3) Selet each item of printing conditions and make the settings according to the guidance. See Table 4-9 for the details of each parameter.

Table 4-9 Parameters for Setting Printing Conditions

Setting item	Description	Position of a printing example in Fig. 4-12
Print Date	ON: Printing date and time will be printed. OFF: Printing date and time will not be printed.	1)
Run Date	ON: Analysis date and time will be printed. OFF: Analysis date and time will not be printed.	2)
Measurement Parameter	ON: Measurement conditions will be printed. OFF: Measurement conditions will not be printed.	3)
Calibration Curve	ON: Calibration curve will be printed. OFF: Calibration curve will not be printed.	4)
STD Data	ON: Measurement results of the standard data will be printed. OFF: Measurement results of the standard data will not be printed.	5)
Sample Data	ON: Measurement results of the sample will be printed. OFF: Measurement results of the sample will not be printed.	6)

Report : 2013/05/17 13:52 ..... 1)

Calibration Curve



4)

Sample Name :
File Name : Data
Run Date : 2013/05/13 17:16 ..... 2)
Operator :

Spectrophotometer
Model : UH5300 Spectrophotometer
SERIAL No. : 0000-009
(CPU1)Program No. : 3J15300-01
(CPU2)Program No. : 3J15310-02DM02-20130501-1439
Option : 6 Cell

Instrument Parameter

Measurement Mode :	Concentration	Bandpass(nm) :	1.0
Data Mode :	Abs	Replicate Measurement :	OFF
Number of WL :	1	Statistics :	OFF
WL1 (nm) :	540.0	6 Cell Mode :	Auto
Initial Delay(s) :	0	Autozero :	Cell A
		STD Autozero :	STD1
		Sample Autozero :	ON
		Autozero Interval :	5
		Number of Sample :	5

3)

STD

STD No.	Abs	CONC (mg/L)	DIFF	RD	T
STD1	0.000	0.000	0.000	0.01474	0.02813
STD2	0.306	0.300	0.007	0.89627	1.71040
STD3	0.993	1.000	-0.001	-0.12180	-0.23245
STD4	1.988	2.000	-0.001	-0.07354	-0.14034

5)

Curve Information
Calibration Curve Type : 1st Order
Calibration Curve Formula : Abs=f(CONC)
Through Zero : ON
CONC Min : 0.000
CONC Max : 100.000
Calibration Curve Factor : A0 : 0.0000 A1 : 0.9943
Factor : Correlation Coefficient: R =1.0000 Determination Coefficient: R2 =1.0000

3)

Sample

Sample ID	Abs	CONC (mg/L)
1	0.000	0.000
2	0.306	0.307
3	0.993	0.999
4	1.988	2.000
5	0.000	0.000 L

6)

Fig. 4-12 Example of Printing of Quantification Operation

11. Saving Measurement Conditions

GUIDE: When the set measurement conditions are not saved, the window will move to the calibration curve measurement window.

(1) When saving the set conditions, press  [save button] icon shown at the header part.

(2) The file input window (Fig. 4-13) will then be shown. After a saving file name is input, press [OK button].

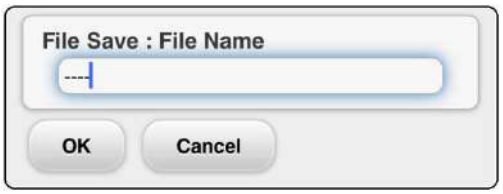


Fig. 4-13 Measurement Condition Saving Window

12. Measuring Standard Solution

GUIDE: When linear straight line or quadratic coefficient is chosen for the calibration curve type at 4. Setting Calibration Curve Conditions, you will go to measurement of sample solution as no standard solution is measured.

(1) Press STD Measurement > [STD Measurement button] and move to the calibraction curve measurement window.

(2) The standard set window (Fig. 4-14) will be shown. Functions shown in Table 4-10 can be used while waiting for measurement.

Fig. 4-14 Standard Setting Window

In the window will be shown, from left to right, the number of cell holder, number of standards, and concentration of the standard. Set the standard that corresponds to each cell holder. No standard will be set to the cell position with the standard ID being blank. Cells should be set as instructed by Table 4-11 (autozero method: Cell A) and Table 4-12 (autozero method: all cells) when the setting of "calibration curve autozero" is STD1. The equipment will conduct measurement according to the order shown in Table 4-13. Cells should be set as instructed by Table 4-14 (autozero method: Cell A) or Table 4-15 (autozero method: all cells) when the setting of "calibration curve autozero" is blank. Then, measurement will be conducted as in the order of Table 4-16. Measurement will be conducted for five standards at a time until the number input at "number of standards."

Table 4-10 Explanation of Icons for the Measurement Window

Button	Name	Description
	Lamp on/off (when light is off)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp temporarily.
	Lamp on/off (when light is on)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp.
	Wavelength movement	Pressing the [wavelength movement] icon will be able to temporarily monitor the absorbance of any given wavelength.
	Autozero	Pressing the [autozero] icon when the setting of "Sample autozero" is OFF, you can perform autozero operation.

Table 4-11 Calibration Curve Autozero: Placing a Cell with STD1 (Autozero Method: Cell A)

	Cell A	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	STD1	None	STD2	STD3	STD4	STD5
2nd round	STD1	STD6	STD7	STD8	STD9	STD10
3rd round	STD1	STD11	STD12	STD13	STD14	STD15
4th round	STD1	STD16	STD17	STD18	STD19	STD20

Table 4-12 Calibration Curve Autozero: Placing a Cell with STD1 (Autozero Method: All Cells)

	Cell A	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	STD1	STD1	STD1	STD1	STD1	STD1
2nd round	STD1	None	STD2	STD3	STD4	STD5
3rd round	STD1	STD6	STD7	STD8	STD9	STD10
4th round	STD1	STD11	STD12	STD13	STD14	STD15
5th round	STD1	STD16	STD17	STD18	STD19	STD20

Table 4-13 Autozero Interval and Standard Measurement Operation 1

Operation order		Cellposition	Measurement operation
Autozero interval: 5	Autozero interval: 1		
Standard set: 1st round			
1	1	Cell A	Autozero
2	2	Cell A	STD1 measurement
-	3	Cell A	Autozero
3	4	Cell 2	STD2 measurement
-	5	Cell A	Autozero
4	6	Cell 3	STD3 measurement
-	7	Cell A	Autozero
5	8	Cell 4	STD4 measurement
-	9	Cell A	Autozero
6	10	Cell 5	STD5 measurement
Standard set: 2nd round			
7	11	Cell A	Autozero
8	12	Cell 1	STD6 measurement
-	13	Cell A	Autozero
9	14	Cell 2	STD7 measurement
Repeated until the designated number of standards.			

Table 4-14 Calibration Curve Autozero: Placing a Cell with Blank (Autozero Method: Cell A)

	Cell A	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	Blank	STD1	STD2	STD3	STD4	STD5
2nd round	Blank	STD6	STD7	STD8	STD9	STD10
3rd round	Blank	STD11	STD12	STD13	STD14	STD15
4th round	Blank	STD16	STD17	STD18	STD19	STD20

Table 4-15 Calibration Curve Autozero: Placing a Cell with Blank (Autozero Method: All Cells)

	Cell A	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	Blank	Blank	Blank	Blank	Blank	Blank
2nd round	Blank	STD1	STD2	STD3	STD4	STD5
3rd round	Blank	STD6	STD7	STD8	STD9	STD10
4th round	Blank	STD11	STD12	STD13	STD14	STD15
5th round	Blank	STD16	STD17	STD18	STD19	STD20

Table 4-16 Autozero Interval and Equipment Operation 2

Operation order		Cellposition	Measurement operation
Autozero interval: 5	Autozero interval: 1		
Standard set: 1st round			
1	1	Cell A	Autozero
2	2	Cell 1	STD1 measurement
-	3	Cell A	Autozero
3	4	Cell 2	STD2 measurement
-	5	Cell A	Autozero
4	6	Cell 3	STD3 measurement
-	7	Cell A	Autozero
5	8	Cell 4	STD4 measurement
-	9	Cell A	Autozero
6	10	Cell 5	STD5 measurement
Standard set: 2nd round			
7	11	Cell A	Autozero
8	12	Cell 1	STD6 measurement
-	13	Cell A	Autozero
9	14	Cell 2	STD7 measurement
Repeated until the designated number of standards.			

(3) When standard settings are completed, press  [start button] icon. This will then begin measurement.

(4) During measurement, the window showing ongoing standard measurement will be shown.

Fig. 4-15 Standard Measurement Window

GUIDE: When you want to end operation during measurement, press [stop button] icon. When you resume measurement, press [start button] icon.

(5) When the "number of standards" is set to 6 or a larger number, the measurement results from STD1 to 5 will be shown as shown in Fig. 4-16. Then, set the next standard. When setting is completed, press [start button] icon. This will then start measurement of the next standard.

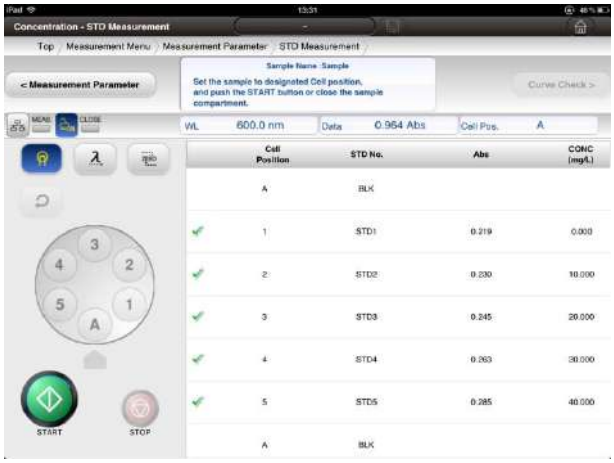


Fig. 4-16 Standard Measurement Window (Standard Number: 10)

GUIDE: When you want to re-measure a standard, conduct re-measurement with the calibration curve confirmation window.

(6) When measurement of all set number of standardss is completed, the window of Fig. 4-17 will be shown.

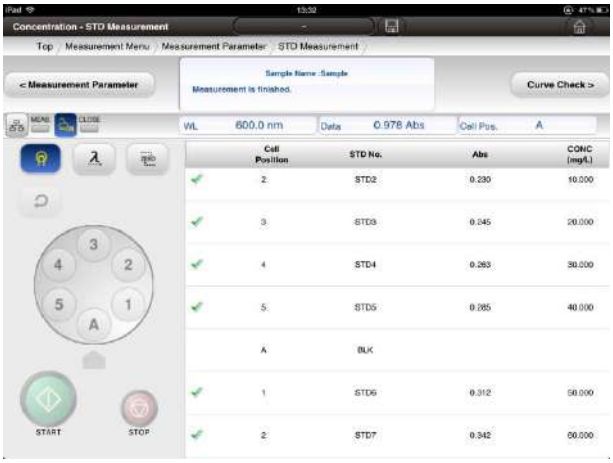


Fig. 4-17 Window After Standard Measurement (Standard Number: 10)

13. Confirming Calibration Curve

(1) Press 

[Curve Check] button and move to the calibration curve confirmation window. The calibration curve confirmation window (Fig. 4-18) will be shown.

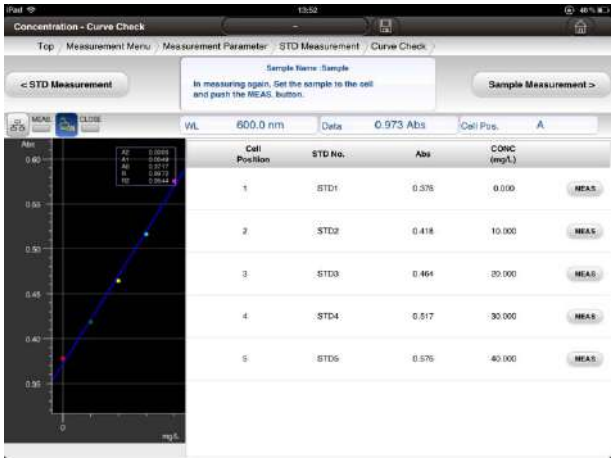


Fig. 4-18 Calibration Curve Confirmation Window

(2) Calibration curve factor, correlation coefficient and determination coefficient will be shown on the calibration curve display window. See Exhibit D for details on calibration curve factor, correlation coefficient and determination coefficient.

(3) Re-measurement of a standard can be made using the calibration curve confirmation window. Set a standard you want to re-measure and press the re-measurement button corresponding to it.

14. Measuring Sample Solution

(1) Press Sample Measurement > [sample measurement] button and move to the sample measurement window.

(2) The sample setting window (Fig. 4-19) will be shown. Functions shown in Table 4-17 can be used while waiting for measurement.

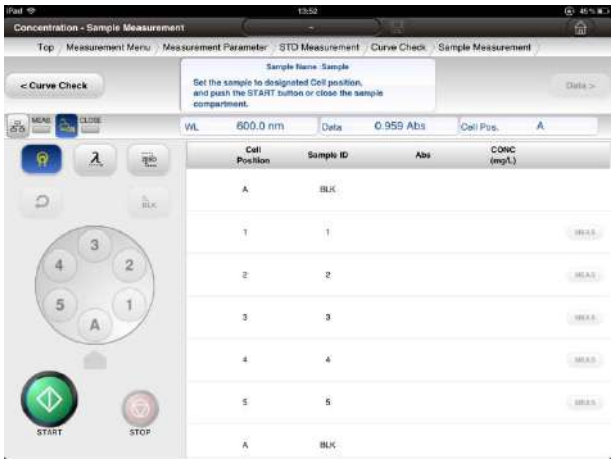


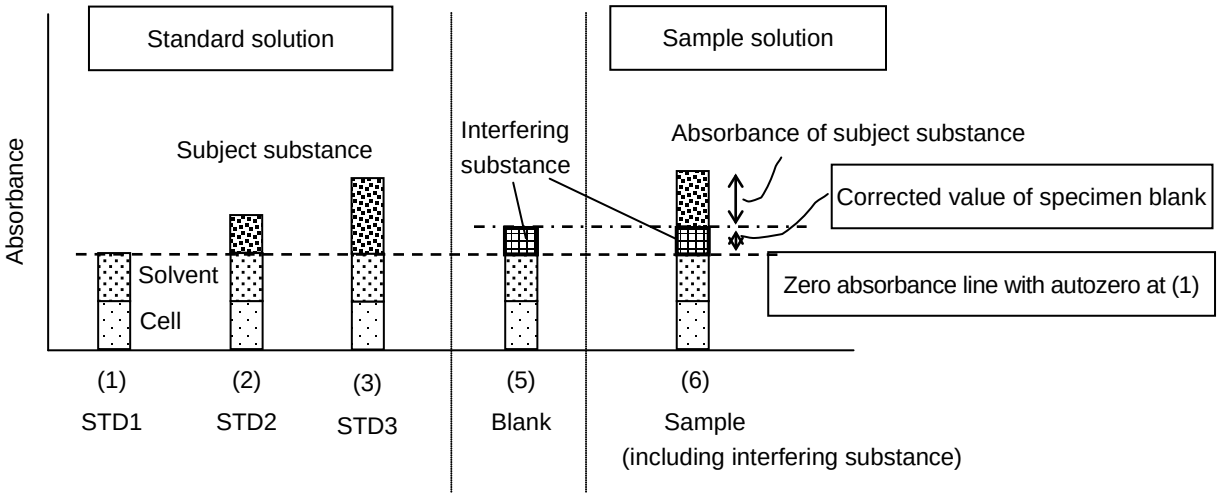
Fig. 4-19 Sample Setting Window

On the window are shown from left to right the number of cell holder and sample ID. Set a sample that corresponds to each cell holder. Set nothing at the cell positions with sample ID being blank. Set a sample to a cell according to the order given in Table 4-18 (autozero method: Cell A) or Table 4-19 (autozero method: all cells) when the setting of "sample autozero" is ON. Set a sample to a cell according to the order given in Table 4-20 (autozero method: Cell A) or Table 4-21 (autozero method: all cells) when the setting of "sample autozero" is OFF. Each measurement will be made according to the order shown in Table 4-22.

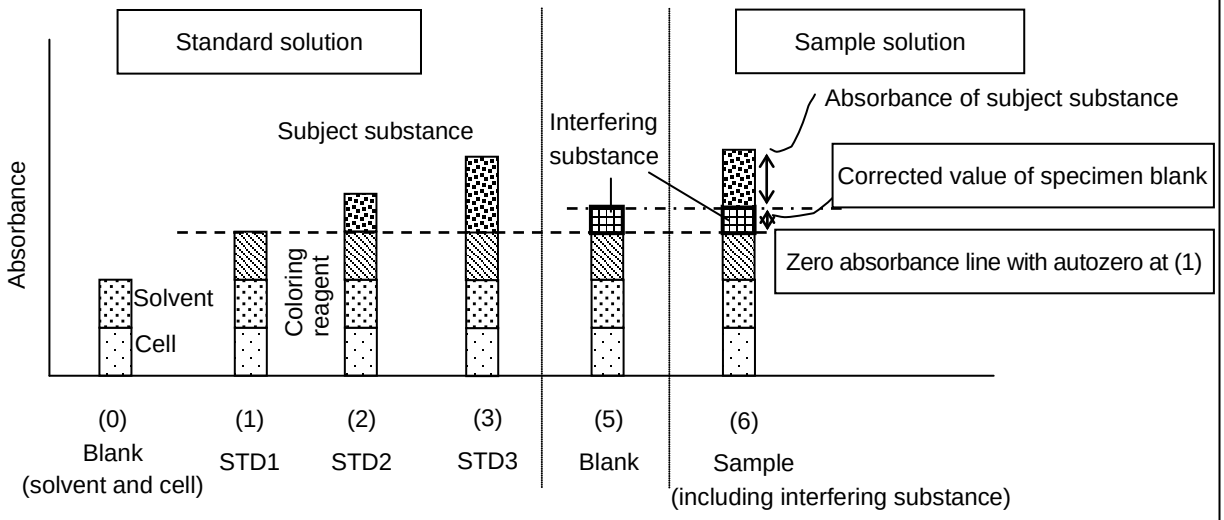
Table 4-17 Explanation of Icons for the Measurement Window

Button	Name	Description
	Lamp on/off (when light is off)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp temporarily.
	Lamp on/off (when light is on)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp.
	Wavelength movement	Pressing the [wavelength movement] icon will be able to temporarily monitor the absorbance of any given wavelength.
	Autozero	Pressing the [autozero] icon when the setting of "Sample autozero" is OFF, you can perform autozero operation.
	Re-measurement	Pressing the [re-measurement] icon after suspending the ongoing measurement will be able to resume re-measurement of the sample solution.

Commentary 4-7 Explanation on Specimen Blank Correction



Constituents of absorbance when coloring reagent is used (interfering substances included)



Constituents of absorbance when coloring reagent is used (interfering substances included)

As shown in the above figure 6, when the sample solution is turbid or contains interfering substances such as obstruction components, the absorbance derived from those interfering substances is added to the quantified value of the subject substance.
In this case, it is necessary to create a specimen blank solution (a solution created by conducting the same pretreatment as that for the sample using purified water) and deduct the quantified value of the specimen blank solution from the quantified value of the sample in order to reduce the increment of the interfering substance from the sample. When quantification is automatically conducted in the 6 cell mode and the quantified value is deducted by autozero, such deduction can be made by placing a specimen blank solution (blank) at Cell A.

When quantification is manually conducted in the 6 cell mode, press the [specimen blank] icon to acquire the correction value for the specimen blank and deduct the concentration of the specimen blank from the concentration of the following samples.

Table 4-18 Sample autozero: Setting a Cell in ON Condition (Autozero Method: Cell A)

	Cell A*	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	STD1 or blank	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
2nd round	STD1 or blank	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
3rd round	STD1 or blank	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15
4th round and thereafter	Operation will be repeated until the designated number of samples.					

* Set the solution selected under the conditions of "calibration curve autozero." When linear coefficient is selected for the calibration curve type, set STD1 or blank.

Table 4-19 Sample autozero: Setting a Cell in ON Condition (Autozero Method: All Cells)

	Cell A*	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	STD1 or blank	STD1 or blank	STD1 or blank	STD1 or blank	STD1 or blank	STD1 or blank
2nd round	STD1 or blank	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
3rd round	STD1 or blank	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
4th round	STD1 or blank	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15
5th round and thereafter	Operation will be repeated until the designated number of samples.					

* Set the solution selected under the conditions of "calibration curve autozero." When linear coefficient is selected for the calibration curve type, set STD1 or blank.

Table 4-20 Sample autozero: Setting a Cell in OFF Condition (Autozero Method: Cell A)

	Cell A*	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	None placed	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
2nd round	None placed	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
3rd round	None placed	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15
4th round and thereafter	Operation will be repeated until the designated number of samples.					

* When each round is completed, autozero operation at Cell A can be conducted as required. Set a specimen for autozero at Cell A and press ZERO [autozero icon] to execute autozero operation.

Table 4-21 Sample autozero: Setting a Cell in OFF Condition (Autozero Method: A ll Cells)

	Cell A*	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	None placed	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
2nd round	None placed	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
3rd round	None placed	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15
4th round and thereafter	Operation will be repeated until the designated number of samples.					

* When each round is completed, autozero operation at Cell A can be conducted as required. Set a specimen for autozero at Cell A and press ZERO [autozero icon] to execute autozero operation.

Table 4-22 Autozero Interval and Standard Measurement Operation 1

Sample autozero: OFF	Sample autozero: ON		Cellposition	Measurement operation
	Autozero interval: 5	Autozero interval: 1		
Sample setting: 1st round				
-	1	1	Cell A	Autozero
1	2	2	Cell 1	Measure Sample 1.
-	-	3	Cell A	Autozero
2	3	4	Cell 2	Measure Sample 2
-	-	5	Cell A	Autozero
3	4	6	Cell 3	Measure Sample 3
-	-	7	Cell A	Autozero
4	5	8	Cell 4	Measure Sample 4
-	-	9	Cell A	Autozero
5	6	10	Cell 5	Measure Sample 5
Sample setting: 2nd round				
-	7	11	Cell A	Autozero
6	8	12	Cell 1	Measure Sample 6
-	-	13	Cell A	Autozero
7	9	14	Cell 2	Measure Sample 7
Repeated until the designated number of standards.				

The sample has been placed as per the guidance, press  [start button] icon. This will then begin measurement. Samples will be measured for five at a time, and operation will be guided until the number set for the sample number of 6 cells.

(3) During measurement, the window showing ongoing sample measurement (Fig. 4-20) will be shown.

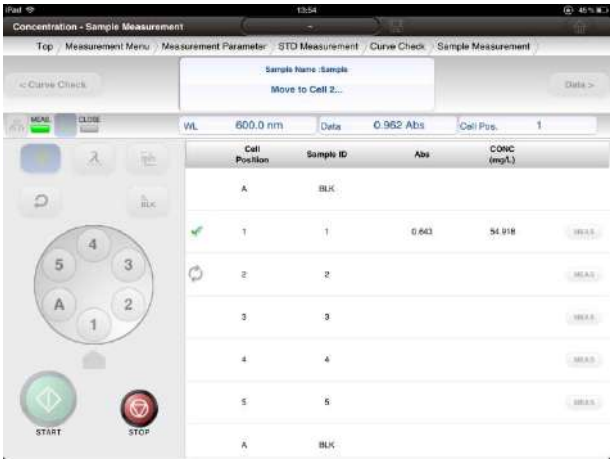


Fig. 4-20 Window Showing Ongoing Sample Measurement

(4) When 6 or a larger number is set for "number of samples," the measurement results of Sample 1 to 5 will be shown as in Fig. 4-21. Set the following sample according to the guidance. When the sample has been placed, press [start button] icon. This will then begin measurement.

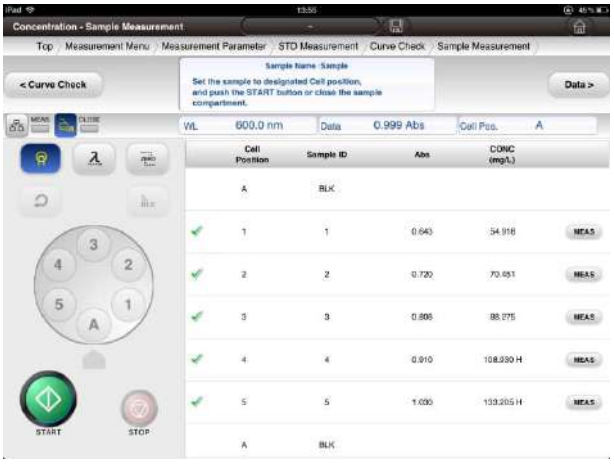


Fig. 4-21 Example of the Window After Measurement of the First Round of Samples

(5) When measurement of the set number of samples is completed, the window shown in Fig. 4-22 will be show.

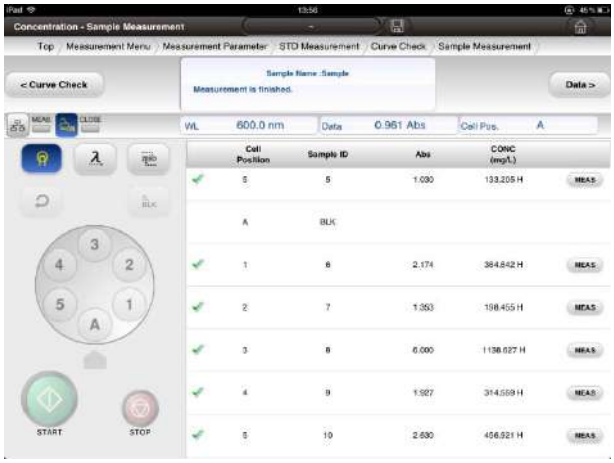


Fig. 4-22 Example of the Window After Sample Measurement (Sample Number: 10)

15. Saving and Printing Data

When the measurement data are saved

(1) When saving the measured data, press  [save button] icon shown at the header part.

(2) The file input window (Fig. 4-23) will then be shown. After a saving file name is input, press [OK button].

Fig. 4-23 Data Saving Window

Moving to the data confirmation window

Press  [Data button] and move to the data confirmation window (Fig. 4-24).

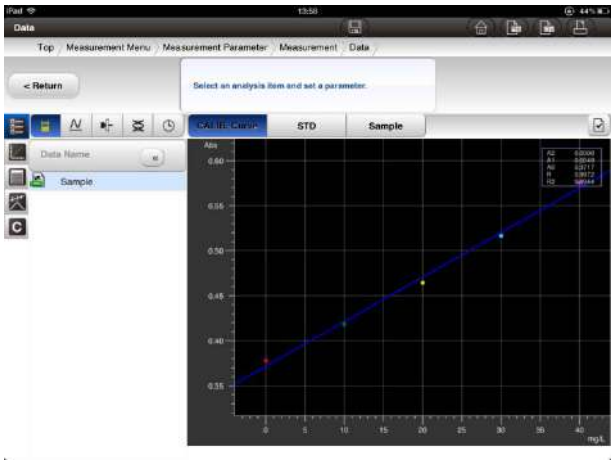


Fig. 4-24 Data Confirmation Window

When printing the measurement data

(1) When printing the measured data, press  [print button] icon shown at the header part.

(2) The printing condition setting window will be shown (Fig. 4-25). Turn ON the item you want to print and press the [preview button under the above conditions].

Fig. 4-25 Printing Condition Setting Window

(3) Print preview (Fig. 4-26) will be shown.

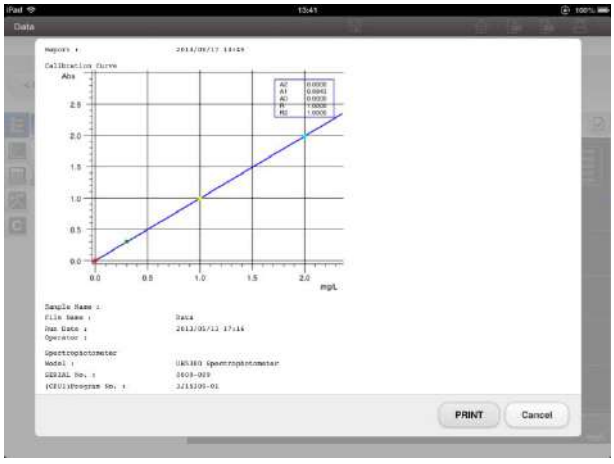


Fig. 4-26 Print Preview Window

(4) Press PRINT [print] to show the printer option (Fig. 4-27). Select the printer and the number of copy and press [print].

Fig. 4-27 Printer Option Window

When outputting the measured data in CSV

(1) When saving the measured data in CSV, press [CSV file preparation button] icon shown at the header part.

(2) The export window (Fig. 4-28) will then be shown. After inputting the name of the file to save, press [export].

When outputting the measured data in image file

(1) When saving the measured data in image file, press [PNG file preparation button] icon shown at the header part.

(2) The export window (Fig. 4-28) will then be shown. After inputting the name of the file to save, press [export].

Fig. 4-28 File Export Window

4.2.2 Measuring Absorbance/Transmittance

Absorbance and transmittance of solutions can be measured. Up to six wavelengths can be measured.

1. Starting Up the Pproduct

Start up this product. (For the start-up procedure, see 2.2 “Starting Up and Shutting Down Instrument”.)

2. Setting Measurement Conditions

(1) Press  [measurement button] icon in the top page (Fig. 4-29). Then, the measurement item selection window (Fig. 4-30) will be displayed. Press  [Abs/Transmittance] button to set conditions for concentration measurement.

Fig. 4-29 Top Window

Fig. 4-30 Measurement Menu Window

3. Setting Sample Conditions

(1) Press  [sample tab] to set sample conditions.

(2) The sample conditions window (Fig. 4-31) will be shown.

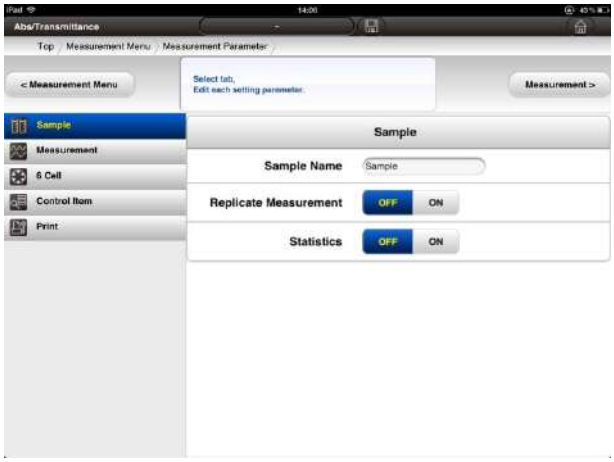


Fig. 4-31 Sample Window

(3) Set sample conditions. See Table 4-23 for parameters.

Table 4-23 Parameters for Setting Sample Conditions

Setting Item	Description
Sample Name	Sample names can be input in two-byte or one-bype English character fonts. The largest number of characters inputtable is 20 in one-byte English character fonts. Sample names input here will be printed in the field of "Sample Name" of the report.
Replicate Measurement	Choose whether measurement will be repeatedly made or not. ON: Measurement will be repeatedly made. OFF: No measurement will be repeatedly made.
Number of Replicate	This will be shown when repeated measurement is ON. Set the number of samples that will be measured repeatedly. Any number from 2 to 5 can be set.
Statistics	Select whether or not statistical operation will be conducted. ON: Statistical operation will be conducted. OFF: No statistical operation will be conducted. In statistical operation processing, mean value (MEAN), standard deviation (SD), and relative standard deviation (RSD) will be calculated for the quantified value of a sample according to the following equations. This calculation will be conducted for every operand *(N)* set in the following item. [Mean value] $MEAN = \frac{\sum_{i=1}^{N} X_i}{N}$ (*N* = operand) [Standard deviation] $SD = \sqrt{\frac{\left(\sum_{i=1}^{N} X_i^{\,2}\right) - \left(\sum_{i=1}^{N} X_i\right)^2 \Big/ N}{N-1}}$ (*N* = operand) [Relative standard deviation] $RSD = \frac{SD}{MEAN} \times 100$
Operand	This will be shown when statistical operation is ON. Set the number of samples for which statistical operation will be conducted. Any number from 2 to 100 can be set. When 3 is set for operand, statistical operation will be conducted three samples at a time. When repeated measurement is ON and statistical operation is ON, the operand will not be shown. In this case, statistical operation will be conducted to match the number of repetition.

4. Setting Measurement Conditions

(1) Press  [measurement tab] to set measurement conditions.

(2) The sample conditions window (Fig. 4-32) will be shown. Set data mode, number of wavelength and wavelength, and initial delay. See Table 4-24 for each parameter.

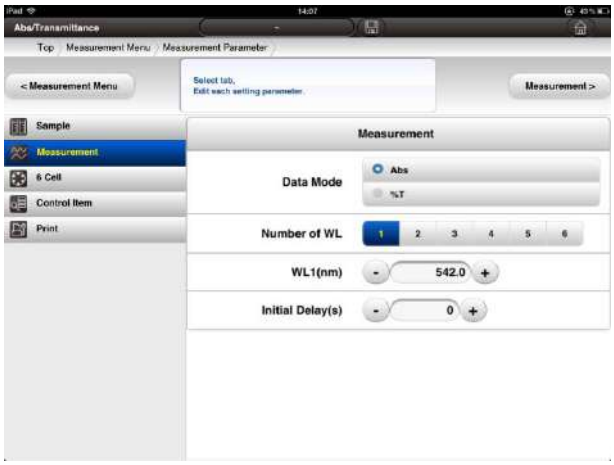


Fig. 4-32 Measurement Conditions Window

Table 4-24 Parameters for Setting Measurement Conditions

Setting Item	Description
Data Mode	ABS: Used to measure absorbance %T: Used to measure transmittance
Number of WL	Set the number of wavelength to measure. Any number from 1 to 6 may be selected for the number of wavelength.
WL 1 (nm) to WL 6 (nm)	Input the wavelength to measure. Set any value at an interval of 0.1 nm between 190.0 and 1100.0 nm.
Initial Delay (s)	Prior to measuring, press  [start button] icon, wait for the time set here and start measurement. Any value at an inteval of 1 second can be input between 0 to 9999 seconds. This setting is used when you want to start measurement after the passage of a certain duration of time such as when you want to measure a specimen after returning the temperature of the specimen to room temperature or when you want to start measurement after completing the reaction. Input 0 when you don't make any special setting.

5. Setting 6 Cells

NOTE: When Off is the condition for 6 cell settings to be determined when single cell holder or rectangular long cell holder is used, the 6 cell mode will not be shown (See 3.1.2 6 Cell Mde for details). When the auto shipper is connected, the items of the auto shipper will be shown instead of the 6 cell mode.

(1) Press  [6 cell tab] in order to set the six cell conditions.

(2) 6 cell conditions window (Fig. 4-33) will be shown.

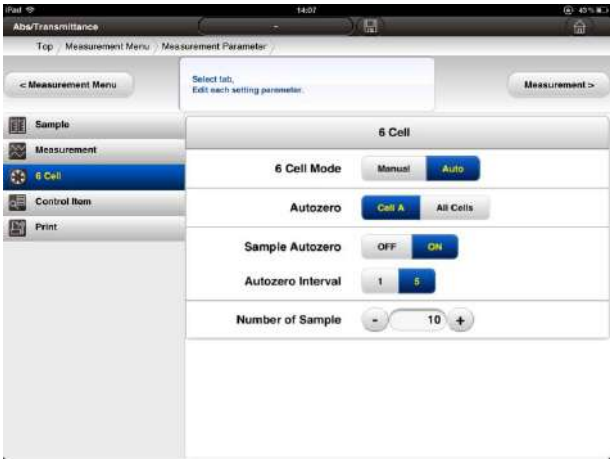


Fig. 4-33 6 cell Conditions Window

(3) Select and determine each item of the 6 cell conditions. Set the 6 cell mode to "Auto." See Table 4-25 for the details of the parameters.

Table 4-25 Parameters for Setting Calibration Curve Conditions

Setting Item	Description
6 Cell Mode	Determine the movement of 6 cells during measurement. Auto: This mode automatically rotates 6 cells, with samples manually set to each position in advance, and automatically conducts all processes of measurement from autozero to standards and samples. As the equipment has 6 cells, use of this mode is recommended when there are many specimens to measure. Manual: Standards and samples are measured using one of the 6 cell positions (which may be either from 1 to 5). Autozero can be easily conducted by setting a solution at Cell A for autozero in order to remove the influence of drift (shaking of the baseline) of the equipment during measurement. In the ordinary use, a standard solution or a sample solution will be set at Cell 1. (See 4.3.2 Measuring Absorbance/Transmittance for the details of the manual mode.)
Autozero	Set the method of autozero. Cell A: Conduct autozero at Cell A. Measure the autozero value of Cell A as a representative value and record it as a correction value. All cells: Perform autozero at all cells to measure. Measure autozero values for all cells before measuring a STD and a sample and memorize them as correction values. Then the individual differences of absorbance among all cells will be corrected. This is effective for cases where minute absorbance differences are measured. * See Commentary 4-4 for the details on the setting method.

(cont'd)

Setting Item	Description
Sample Autozero	Select a sample for autozero operation during sample measurement or select no automatic autozero operation. ON: Select this when a sample to undergo autozero during sample measurement is the same as that for standard measurement. Autozero will be automatically performed. OFF: When OFF is selected, no automatically autozero will be performed during sample measurement. When autozero is performed, it should be done manually. * See Commentary 4-5 and 4-6 for setting conditions in detail.
Autozero Interval	5: Autozero will be automatically performed once in five measurements. 1: Autozero will be automatically performed for every sample.
Number of Sample	Set the number of samples to measure. Choose a number between 1 and 300. For repeated measurement, select the number of samples so that the number of sample multiplied by repetition number is 300 or under.

6. Setting Control Items

(1) Press [control item tab] to set control items.

(2) The control item window window (Fig. 4-34) will then be shown.

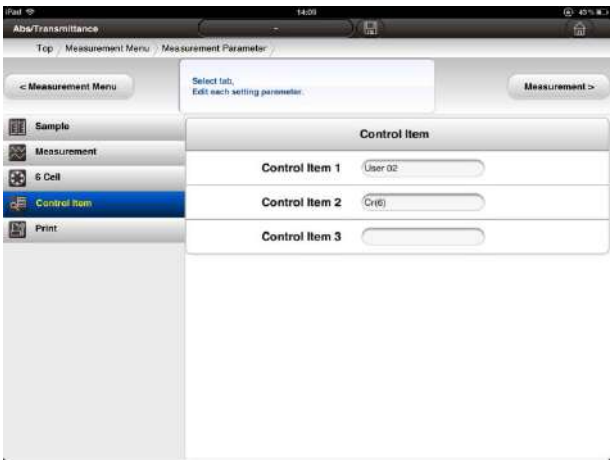


Fig. 4-34 Control Item Window

(3) Input a comment in a control item.

GUIDE: A comment to be input in a control item should be a search keyword in reference for condition file or reference for data file.
(See 5.1.1 Reading Saved Data for details)

7. Setting Printing Conditions

GUIDE: Set those conditions when items to be printed are predetermined. Printing items can be set even after completion of measurement.

(1) Press  [print tab] to set printing conditions.

(2) The printing conditions window (Fig. 4-35) will then be shown.

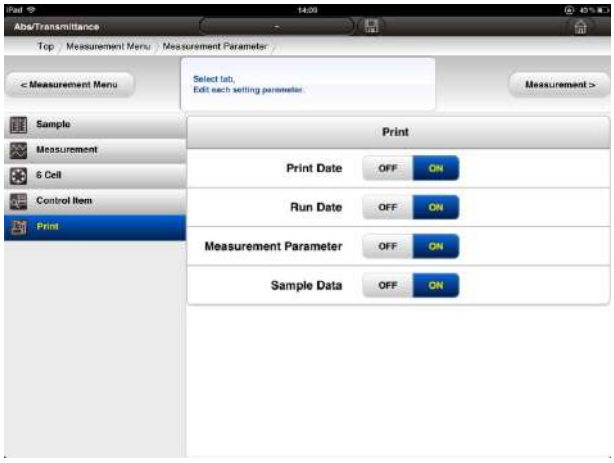


Fig. 4-35 Printing Conditions Window

(3) Selet each item of printing conditions and make the settings according to the guidance. See Table 4-26 for the details of each parameter.

Table 4-26 Parameters for Setting Printing Conditions

Setting item	Description	Position of a printing example in Fig. 4-36
Printe Date	ON: Printing date and time will be printed. OFF: Printing date and time will not be printed.	1)
Run Date	ON: Analysis date and time will be printed. OFF: Analysis date and time will not be printed.	2)
Measurement Parameter	ON: Measurement conditions will be printed. OFF: Measurement conditions will not be printed.	3)
Sample Data	ON: Measurement results of the sample will be printed. OFF: Measurement results of the sample will not be printed.	4)

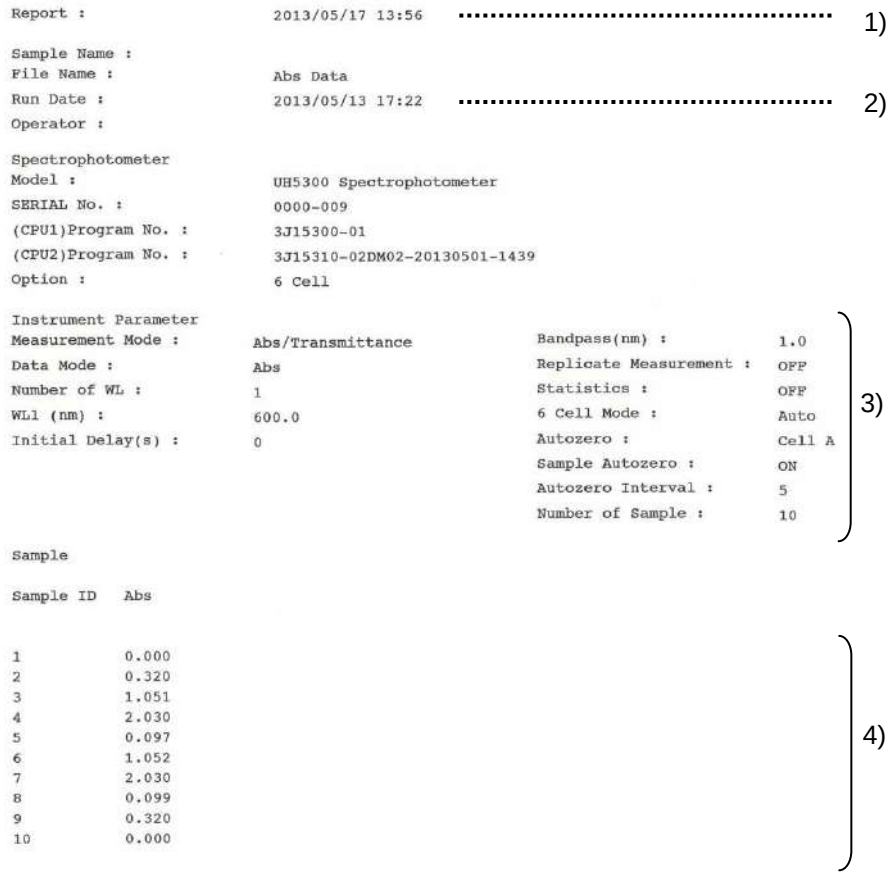


Fig. 4-36 Example of the Printed Measurement of Absorbance/Transmittance

8. Saving Measurement Conditions

GUIDE: When the set measurement conditions are not saved, the window will move to the calibration curve measurement window.

(1) When saving the set conditions, press  [save button] icon shown at the header part.

(2) The file input window (Fig. 4-37) will then be shown. After a saving file name is input, press [OK button].

Fig. 4-37 Measurement Condition Saving Window

9. Measuring Samples

(1) Press Measurement > [measurement button] and move to the sample measurement window.

(2) The sample setting window (Fig. 4-38) will be shown. Functions shown in Table 4-27 can be used while waiting for measurement.

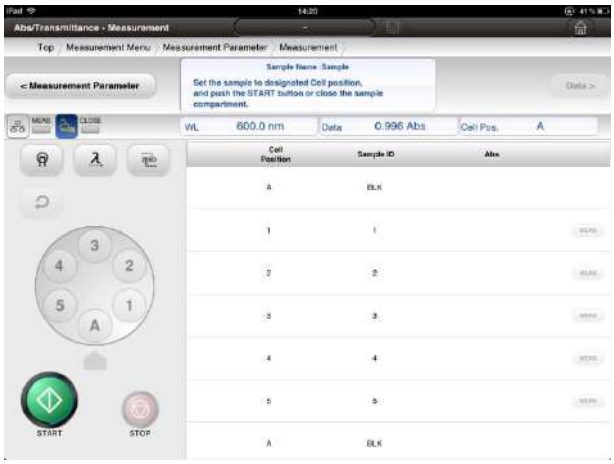


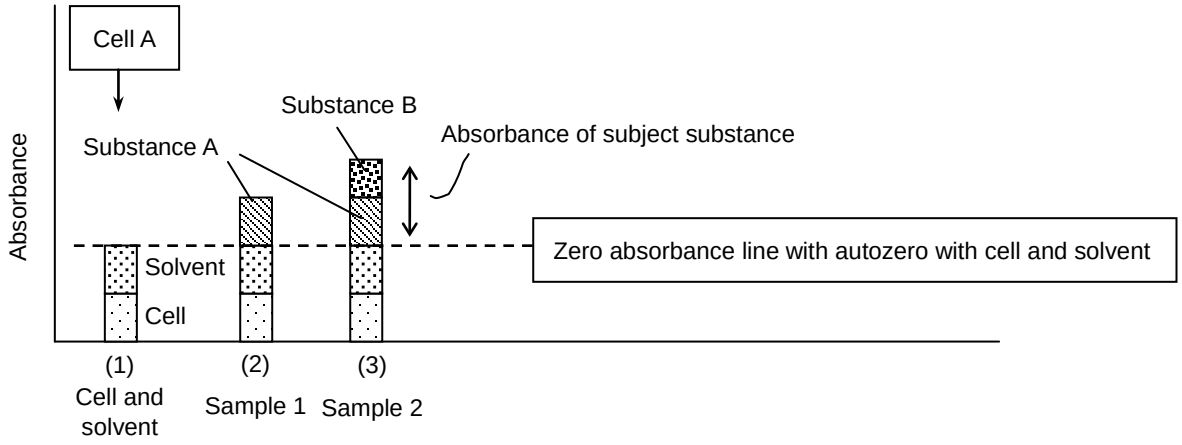
Fig. 4-38 Sample Setting Window

On the window are shown from left to right the number of cell holder and sample ID. Set a sample that corresponds to each cell holder. When you don't know what sample should be put at Cell A (blank), see Commentary 4-8 for absorbance measurement and Commentary 4-9 for transmittance measurement.

Table 4-27 Explanation of Icons for the Measurement Window

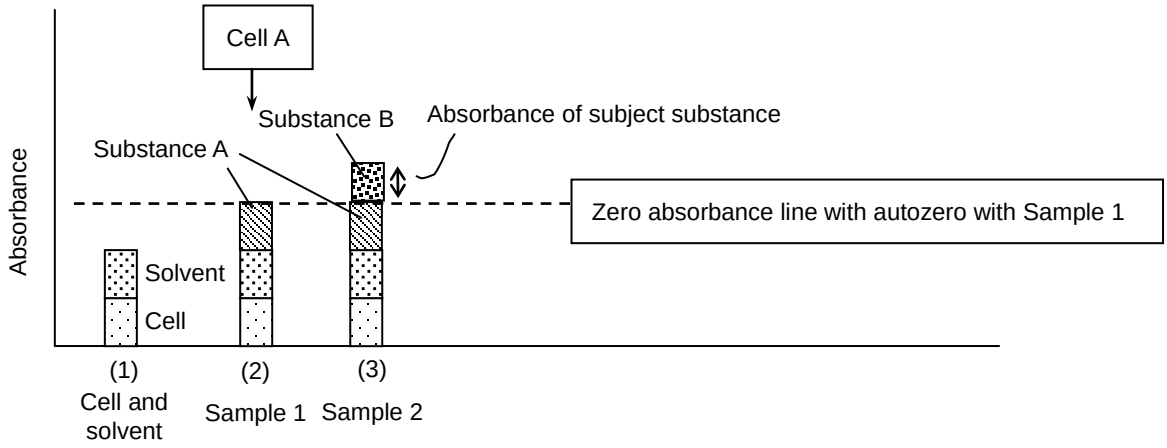
Button	Name	Description
	Lamp on/off (when light is off)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp temporarily.
	Lamp on/off (when light is on)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp.
	Wavelength movement	Pressing the [wavelength movement] icon will be able to temporarily monitor the absorbance of any given wavelength.
	Autozero	Pressing the [autozero] icon when the setting of "Sample autozero" is OFF, you can perform autozero operation.
	Re-measurement	Pressing the [re-measurement] icon after suspending the ongoing measurement will be able to resume re-measurement of the sample solution.

Commentary 4-8 Method of Autozero for Absorbance Measurement



Autozero when absorbance of a substance other than a cell or solvent is measured

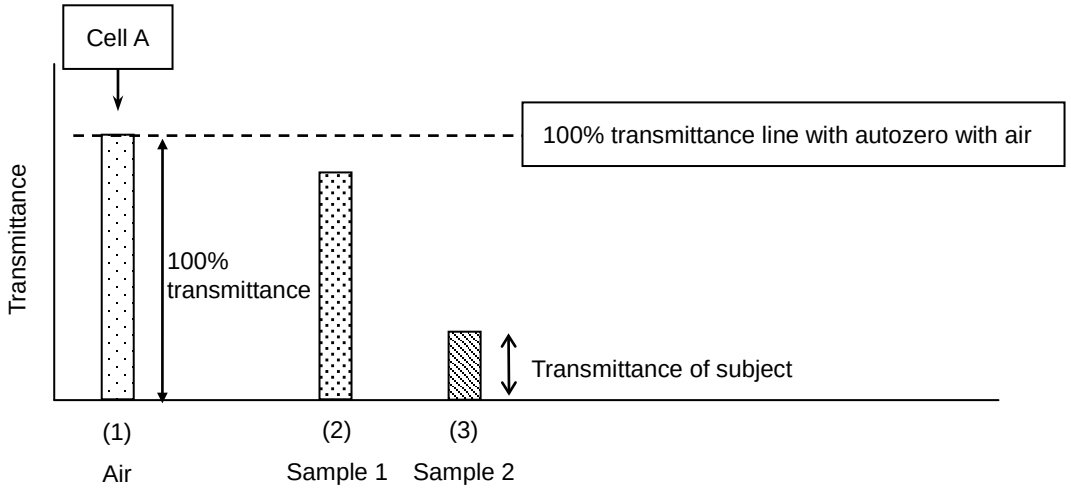
Absorbance, which comes out as the result of measurement, is the summation of absorbances attributable to various elements such as cells, solvents, or various substances contained. Therefore, the measurer needs to pick out the necessary absorbance out of those absorbances.
Assume that (1) solution with the solvent is contained in the cell, (2) Sample 1 solution with Substance A contained in the cell, and (3) Sample 2 solution with Substance A and B contained are prepared. See the above figure (autozero when the absorbance of a substance other than the cell or solvent is measured) for reference. It is shown that the absorbance of those solutions are derived from the cell, solvent and Substance A for (2) and from the cell, solvent, Substance A and Substance B for (3). Now when we assume the absorption of a substance other than the cell or solvent is the subject of measurement, we can obtain the absorbance of only Substance A for (2) and the summation of the absorbance of Substance A and that of Substance B for (3) by executing an autozero for the cell in which the solvent is contained.



Autozero when the absorbance of Substance B is measured

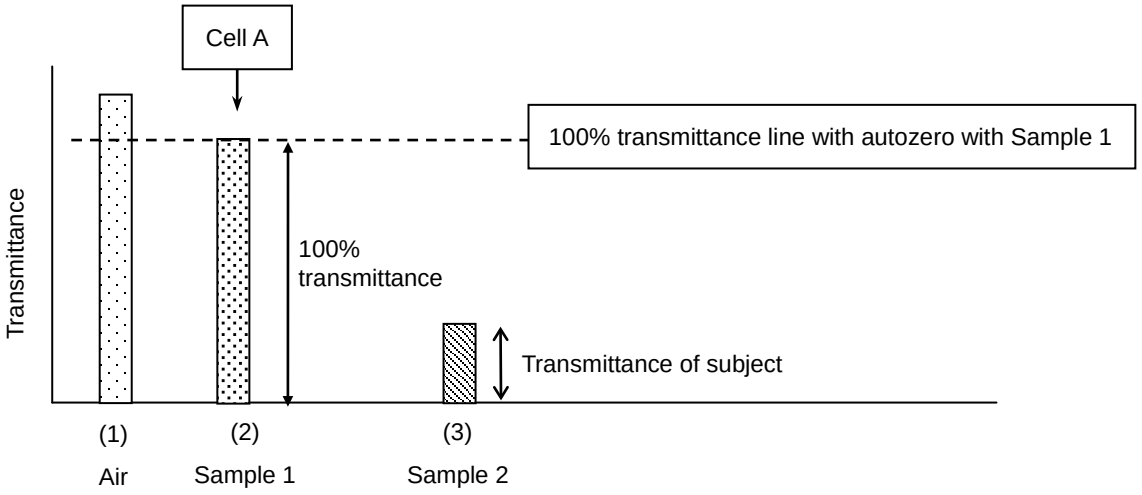
But when the absorbance of Substance B alone is the subject of measurement, measurement of the absorbance of Substance B alone can be made for (3) by performing autozero with Sample 1 (2) [See the above figure (autozero when the absorbance of Substance B is measured)].
As explained above, when the necessary absorbance is measured, performing autozero with a solution that containes components other than what is necessary can deduct the absorbance of that solution. The solution with which such autozero is performed is called "blank" in absorbance/transmittance measurement. Use appropriate blanks with this fact well taken into consideration.

Commentary 4-9 Method of Autozero for Transmittance Measurement



Autozero when air transmittance is taken as 100%

When measuring transmittance, it is important to define what condition is 100% transmittance. Defining transmittance of air is 100%, when measuring the transmittance of a sample, autozero should be performed with nothing, but air, placed on Cell A. See the above figure (autozero when air has 100% transmittance) for reference. When Sample 1 or 2 is measured, the transmittance of Sample 1 or 2 relative to air can be obtained.



Autozero when the cell or the solvent is 100% transmissive.

Defining the transmittance of Sample 1 as 100%, when the transmittance is measured, perform autozero with Sample 1 placed at Cell A. This will produce the transmittance of Sample 2 relative to the transmittance of Sample 1. The sample with which such autozero is performed is called "blank" in absorbance/transmittance measurement. Use appropriate blanks with this fact well taken into consideration.

Set nothing at the cell positions with sample ID being blank. Set a sample to a cell according to the order given in Table 4-28 (autozero method: Cell A) or Table 4-29 (autozero method: all cells) when the setting of "sample autozero" is ON. Set a sample to a cell according to the order given in Table 4-30 (autozero method: Cell A) or Table 4-31 (autozero method: all cells) when the setting of "sample autozero" is OFF. Each measurement will be made according to the order shown in Table 4-32.

Table 4-28 Sample autozero: Setting a Cell in ON Condition (Autozero Method: Cell A)

	Cell A*	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	Blank	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
2nd round	Blank	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
3rd round	Blank	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15
4th round and thereafter	Operation will be repeated until the designated number of samples.					

Table 4-29 Sample autozero: Setting a Cell in ON Condition (Autozero Method: All Cells)

	Cell A*	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	Blank	Blank	Blank	Blank	Blank	Blank
2nd round	Blank	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
3rd round	Blank	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
4th round	Blank	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15
5th round and thereafter	Operation will be repeated until the designated number of samples.					

Table 4-30 Sample autozero: Setting a Cell in OFF Condition (Autozero Method: Cell A)

	Cell A*	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	None	STD1	STD2	STD3	STD4	STD5
2nd round	None	STD6	STD7	STD8	STD9	STD10
3rd round	None	STD11	STD12	STD13	STD14	STD15
4th round	Operation will be repeated until the designated number of samples.					

Table 4-31 Sample autozero: Setting a Cell in ON Condition (Autozero Method: All Cells)

	Cell A*	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	Blank	Blank	Blank	Blank	Blank	Blank
2nd round	Blank	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
3rd round	Blank	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
4th round	Blank	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15
5th round	Operation will be repeated until the designated number of samples.					

* When each round is completed, autozero operation at Cell A can be conducted as required.

Table 4-32 Autozero Interval and Standard Measurement Operation 1

Sample autozero: OFF	Sample autozero: ON		Cellposition	Measurement operation
	Autozero interval: 5	Autozero interval: 1		
Sample setting: 1st round				
-	1	1	Cell A	Autozero
1	2	2	Cell 1	Measure Sample 1.
-	-	3	Cell A	Autozero
2	3	4	Cell 2	Measure Sample 2
-	-	5	Cell A	Autozero
3	4	6	Cell 3	Measure Sample 3
-	-	7	Cell A	Autozero
4	5	8	Cell 4	Measure Sample 4
-	-	9	Cell A	Autozero
5	6	10	Cell 5	Measure Sample 5
Sample setting: 2nd round				
-	7	11	Cell A	Autozero
6	8	12	Cell 1	Measure Sample 6
-	-	13	Cell A	Autozero
7	9	14	Cell 2	Measure Sample 7
Repeated until the designated number of standards.				

The sample has been placed as per the guidance, press  [start button] icon. This will then begin measurement. Samples will be measured for five at a time, and operation will be guided until the number set for the sample number of 6 cells.

GUIDE: See 2.3.4 Setting Cells for the method of setting samples to cell holders.

(3) The windows below Fig. 4-39, window for ongoing sample measurement, will be shown during measurement.

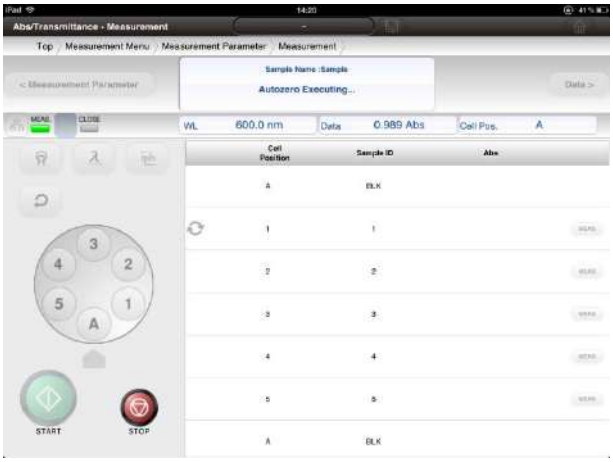


Fig. 4-39 Window Showing Ongoing Sample Measurement

(4) When 6 or a larger number is set for "number of samples," the measurement results of Sample 1 to 5 will be shown as in Fig. 4-40. Set the following sample according to the guidance. When the sample has been placed, press [start button] icon. This will then begin measurement.

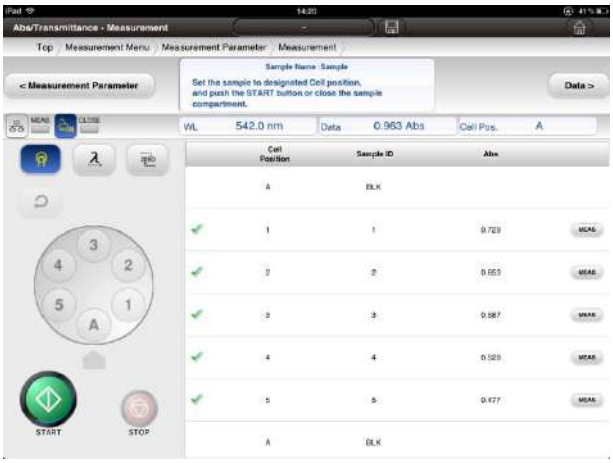


Fig. 4-40 Example of the Window After Measurement of the First Round of Samples

(5) When measurement of the set number of samples is completed, the window shown in Fig. 4-41 will be show.

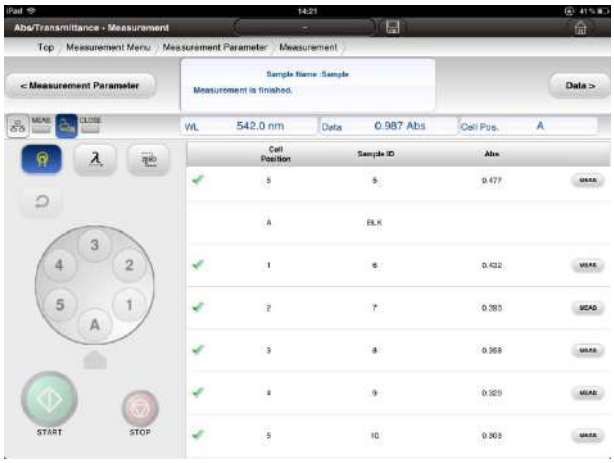


Fig. 4-41 Example of the Window After Sample Measurement (Sample Number: 10)

10. Saving and Printing Data

When the measurement data are saved

(1) When saving the measured data, press  [save button] icon shown at the header part.

(2) The file input window (Fig. 4-42) will then be shown. After a saving file name is input, press [OK button].

Fig. 4-42 Measured Data Saving Window

Moving to the data confirmation window

(1) Press  [Data button] and move to the data confirmation window (Fig. 4-43).

Fig. 4-43 Data Confirmation Window

When printing the measurement data

(1) When printing the measured data, press  [print button] icon shown at the header part.

(2) The printing condition setting window will be shown (Fig. 4-44). Turn ON the item you want to print and press the [preview button under the above conditions].

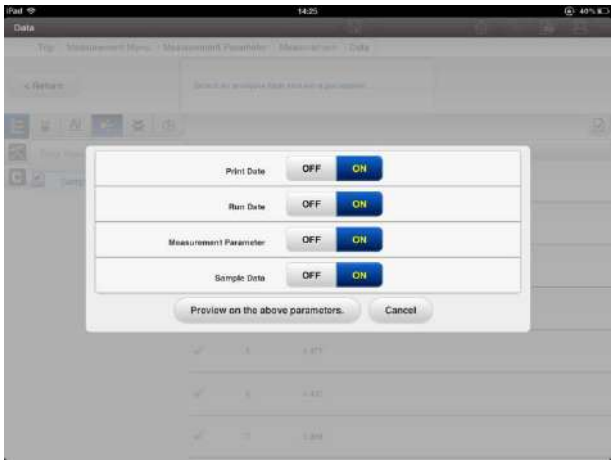


Fig. 4-44 Printing Condition Setting Window

(3) Print preview (Fig. 4-45) will be shown.

Fig. 4-45 Print Preview Window

(4) Press PRINT [print] to show the printer option (Fig. 4-46). Select the printer and the number of copy and press [print].

Fig. 4-46 Printer Option Window

When outputting the measured data in CSV

(1) When saving the measured data in CSV, press [CSV file preparation button] icon shown at the header part.

(2) The export window (Fig. 4-47) will then be shown. After inputting the name of the file to save, press [export].

Fig. 4-47 File Export Window

4.2.3 Measuring Nucleic Acid Specimens

Absorbance of nucleic acid specimens (230 nm, 260 nm, 280 nm, and 320 nm) can be measured, and purity, concentration, protein concentration, etc. of nucleic acids can be calculated from the measured absorbance and the absorbance ratios (A260/A280, A260/A230). This function is also used to calculate the ratio of absorbance after absorbance of two wavelengths is measured.

1. Starting Up the Product

Start up this product. (For the start-up procedure, see 2.2 “Starting Up and Shutting Down Instrument”.)

2. Setting Measurement Conditions

(1) Press [measurement button] icon in the top page (Fig. 4-48). Then, the measurement item selection window (Fig. 4-49) will be displayed. Press [nucleic acid measurement button] icon to set conditions for concentration measurement.

Fig. 4-48 Top Window

Fig. 4-49 Measurement Menu Window

3. Setting Sample Conditions

(1) Press  [sample tab] to set sample conditions.

(2) The sample conditions window (Fig. 4-50) will be shown.

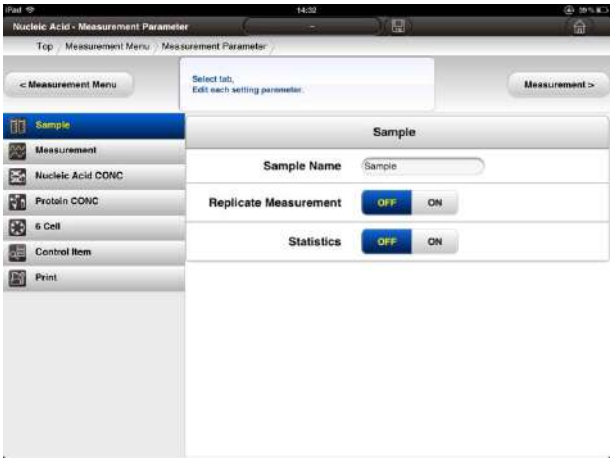


Fig. 4-50 Sample Window

(3) Set sample conditions. See Table 4-33 for parameters.

Table 4-33 Parameters for Setting Sample Conditions

Setting Item	Description
Sample Name	Sample names can be input in two-byte or one-bype English character fonts. The largest number of characters inputtable is 20 in one-byte English character fonts. Sample names input here will be printed in the field of "Sample Name" of the report.
Replicate Measurement	Choose whether measurement will be repeatedly made or not. ON: Measurement will be repeatedly made. OFF: No measurement will be repeatedly made.
Number of Replicate	This will be shown when repeated measurement is ON. Set the number of samples that will be measured repeatedly. Any number from 2 to 5 can be set.
Statistics	Average (MEAN), standard deviation (SD) and relative standard deviation (RSD) will be calculated relative to the absorbance ratio or difference of samples according to the following equation. This calculation should be conducted for every operand (N) set at the following items: [Mean value] $MEAN = \frac{\sum_{i=1}^{N} X_i}{N}$ (*N* = operand) [Standard deviation] $SD = \sqrt{\frac{\left(\sum_{i=1}^{N} X_i^{\,2}\right) - \left(\sum_{i=1}^{N} X_i\right)^2 \Big/ N}{N-1}}$ (*N* = operand) [Relative standard deviation] $RSD = \frac{SD}{MEAN} \times 100$
Operand	This will be shown when statistical operation is ON. Set the number of samples for which statistical operation will be conducted. Any number from 2 to 100 can be set. When 3 is set for operand, statistical operation will be conducted three samples at a time.

4. Setting Measurement Conditions

(1) Press  [Measurement tab] to set measurement conditions.

(2) The sample conditions window (Fig. 4-51) will be shown. Set the wavelength number, wavelength, and initial delay. See Table 4-34 for each parameter.

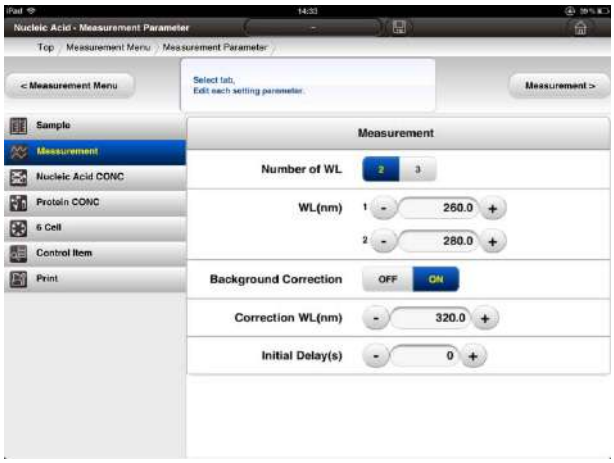


Fig. 4-51 Measurement Window

Table 4-34 Parameters for Setting Measurement Conditions

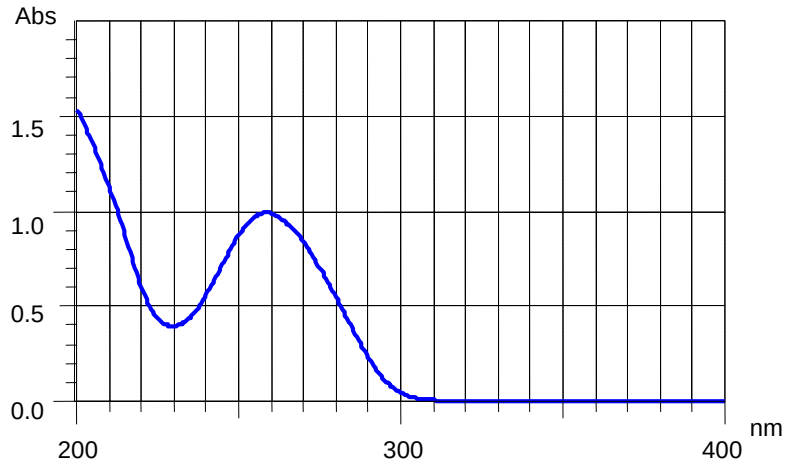
Setting Item	Description
Number of WL	Set the number of wavelength to measure. Wavelength 2: Select this for ratioing, such as calculation of A260/A280 (ratio of 260 nm to 280 nm) or A260/A230. Wavlength 3: Measure absorbance of a wavelength other than two wavelengths used in ratioing. See Commentary 4-10 for measurement of DNA.
WL 1 (nm) to WL 3 (nm)	Designate a wavelength used for calculations of ratio, purity, concentration, or protein concentration. Set any value at an interval of 0.1 nm between 190.0 and 1100.0 nm. The following wavelengths are set as the default values: (WL 1) 260 nm: Wavelength of maximum absorption of absorption spectra of nucleic acid (WL 2) 280 nm: Absorption wavelength of protein (WL 3) 230 nm: Wavelength that minimizes the absorption spectram of nucleic acid Operate the following calculations using the absorbance of the set wavelengths, 1 and 2, or A(1) and A(2), respectively: [Background correction: OFF] Absorbance ratio = A(1)/A(2) [Background correction: ON] Absorbance ratio =(A(1)-A(corrected))/ (A(2)-A(corrected)) A(corrected): Background correction value
Background Correction	Set the wavelength for which background correction is made. ON: Set ON when deducting the absorption of the background. OFF: Set OFF when no background absorption is deducted. See Commentary 4-11 for the details of the functions.
Correction WL	Set the wavelength for which background correction is made. This will be shown only when background correction is ON. Set any value at an interval of 0.1 nm between 190.0 and 1100.0 nm.

(cont'd)

Setting Item	Description
Initial Delay (s)	Prior to measuring, press  [start button] icon, wait for the time set here and start measurement. Any value at an inteval of 1 second can be input between 0 to 9999 seconds. Set this when you want to start measurement after the passage of a certain period of time, such as when you want to measure after returning the temperature of the speciment to the room temperture. Input 0 when you don't make any special setting.

Commentary 4-10 Set Wavelength for DNA Measurement

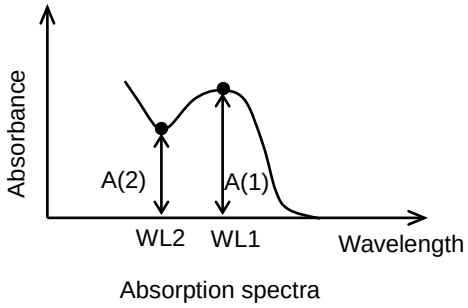
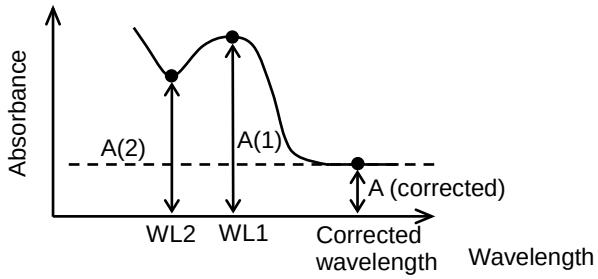
The absorption spectra of the nucleic acid solution contain the minimum absorption at around 230 nm and maximum absorption at around 260 nm. This wavelength with the maximum absorption varies depending on the content and sequence of bases contained in the nucleic acid. It is known that the A260/A230 ratio is about 1.8 for DNA and 2.0 for RNA.
As a concomitant protein has an absorption maximum at 280 nm, estimation of purity can be made by calculating the ratio of A260 to a280. For DNA, when the value is smaller than 1.8, it is possible that the protein might have been contained. The value is known to rise when RNA is mixed.



Absorption spectra of salmon testis DNA

Analytical Chemistry Handbook, Version 5, Japan Society for Analytical Chemistry, p.400

Commentary 4-11 About Background Correction

Background correction	Setting method
OFF	No background setting will be made. Absorbance for which ratioing is conducted should be calculated using the obtained values. Absorbance ratio = A(1)/A(2)  Absorption spectra
ON	Background correction will be made. This is effective when the background exists evenly for the wavelength. The absorbance of a set correction wavelength should be deducted from another absorbance to measure. Use the following equation for calculation. Absorbance ratio = (A(1)-A(corrected))/(A(2)-A(corrected))  Absorption spectra

5. Setting Nucleic Acid Concentration Conditions

(1) Press  [Nucleic Acid CONC tab] to set nucleic acid concentration conditions.

(2) The nucleic acid concentration conditions window (Fig. 4-52) will then be shown.

Fig. 4-52 Nucleic Acid CONC Window

(3) Select each item of nucleic acid concentration conditions and make the settings. See Table 4-35 for each parameter.

Table 4-35 Parameters Setting Measurement Conditions

Setting Item	Description
Nucleic Acid CONC	Choose either calculation or no calculation of nucleic acid concentration. ON: Select this when you want to calculate nucleic acid concentration. OFF: Select this when you don't calculate nucleic acid concentration.
Nucleic Acid CONC Factor	Input a concentration factor to calculate nucleic acid concentration. Calculation will be conducted using the following equation: Nucleic acid concentration = (A(1) - A(corrected)) * nucleic acid factor (Example of concentration factor) RNA concentration factor = 40 ssDNA concentration factor = 33 dsDNA concentration factor = 50 A(1): Photometric value of calculation wavelength 1 A(corrected): Background correction value No correction = 0
Nucleic CONC Unit	An arbitary unit of concentration can be selected and input (such as µg/mL or mg/mL) If the list does not contain a unit you want to use, you can select the unit you want and input it.
Purity	Select either calculation or no calculation of purity. ON: Select this when you calculate purity. OFF: Select this when you don't calculate purity.
Expected Ratio	Set an expected ratio used for purity calculation. Calculate the photometric value ratio of calculation wavelength 1 to calculation wavelength 2 to measure purity (ratio of the expected value to the measured value). RATIO = (A(1)-A(corrected))/(A(2)-A(corrected)) A(1): Photometric value of calculation wavelength 1 A(2): Photometric value of calculation wavelength 2 A(corrected): Background correction value No correction = 0 Purity = (RATIO/expected ratio (input value)) * 100%

6. Setting Protein Concentration Conditions

(1) Press  [Protein CONC tab] to set protein concentration conditions.

(2) The protein concentration conditions window (Fig. 4-53) will then be shown.

Fig. 4-53 Protein CONC Window

(3) Select each item of protein concentration conditions and make the settings. See Table 4-36 for the details of each parameter.

Table 4-36 Parameters for Setting Measurement Conditions

Setting Item	Description
Protein CONC	Choose either calculation or no calculation of protein concentration. ON: Select this when you calculate protein concentration. OFF: Select this when you don't calculate protein acid concentration.
Protein CONC Factor	Input concentration factors for calculation of protein concentration. Calculation will be conducted using the following equation: Protein concentration calculation (Warburg-Christian method) Calculation concentration from the absorbance (after background correction) of calculation wavelength 1, absorbance (after background correction) of calculation wavelength 2, and factors K0, K1 and K2. Protein concentration = K0 * (K1 * (A(2) - (A(corrected)) - K2 * (A(1) - A(corrected))) Initial value: K0=1, K1=1.55, K2＝0.76 A(corrected): Background correction value
Protein CONC Unit	Concentration units (µg/mL) can be selected. If the list does not contain a unit you want to use, you can select the unit you want and input it.

7. Setting 6 Cells

NOTE: When Off is the condition for 6 cell settings to be determined when single cell holder or rectangular long cell holder is used, the 6 cell mode will not be shown (See 3.1.2.6 Cell Mode for details). When the auto shipper is connected, the items of the auto shipper will be shown instead of the 6 cell mode.

(1) Press  [6 Cell tab] in order to set the six cell conditions.

(2) 6 cell conditions window (Fig. 4-54) will be shown.

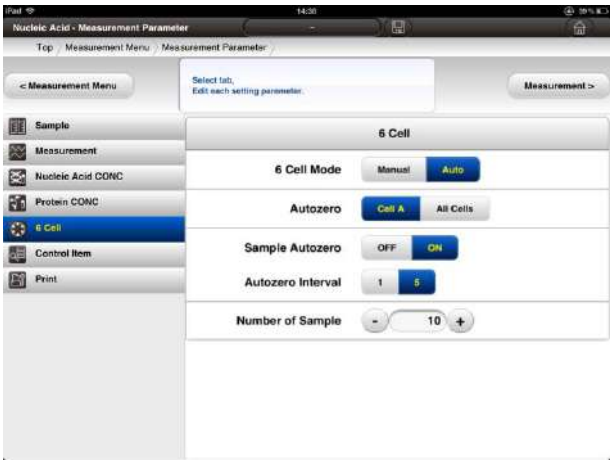


Fig. 4-54 6 Cell Window

(3) Select and determine each item of the 6 cell conditions. Set the 6 cell mode to "Auto." See Table 4-37 for the details of the parameters.

Table 4-37 Parameters for Setting 6 Cell Conditions

Setting Item	Description
6 Cell Mode	Determine the movement of 6 cells during measurement. Auto: This mode automatically rotates 6 cells, with samples manually set to each position in advance, and automatically conducts all processes of measurement from autozero to standards and samples. As the equipment has 6 cells, use of this mode is recommended when there are many specimens to measure. Manual: Standards and samples are measured using one of the 6 cell positions (which may be either from 1 to 5). Autozero can be easily conducted by setting a solution at Cell A for autozero in order to remove the influence of drift (shaking of the baseline) of the equipment during measurement. In the ordinary use, a standard solution or a sample solution will be set at Cell 1. (See 4.3.3 Measuring Nucleic Acid Specimens for the details of the manual mode.)
Autozero	Set the method of autozero. Cell A: Conduct autozero at Cell A. Measure the autozero value of Cell A as a representative value and record it as a correction value. All cells: Conduct autozero for all cells. Measure autozero values for all cells before measuring a standard and a sample and memorize them as correction values. Then the individual differences of absorbance among all cells will be corrected. This is effective for cases where minute absorbance differences are measured. * See Commentary 4-4 for setting conditions in detail.

(cont'd)

Setting Item	Description
Sample Autozero	Select a sample for autozero operation during sample measurement or select no automatic autozero operation. ON: Select this when a sample to undergo autozero during sample measurement is the same as that for standard measurement. Autozero will be automatically performed. OFF: When OFF is selected, no automatically autozero will be performed during sample measurement. When autozero is performed, it should be done manually. * See Commentary 4-5 and 4-6 for setting conditions in detail.
Autozero Interval	5: Autozero will be automatically performed once in five measurements. 1: Autozero will be automatically performed for every sample.
Number of Sample	Set the number of samples to measure. Choose a number between 1 and 300. For repeated measurement, select the number of samples so that the number of sample multiplied by repetition number is 300 or under.

8. Setting Control Items

(1) Press [Control Item tab] to set control items.

(2) The control item window window (Fig. 4-55) will then be shown.

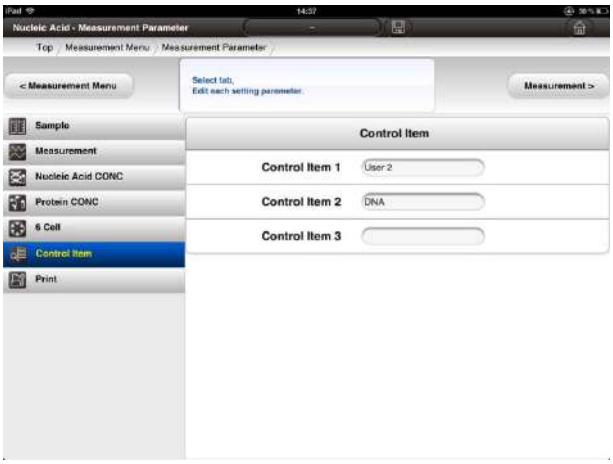


Fig. 4-55 Control Item Window

(3) Input a comment in a control item.

GUIDE: A comment to be input in a control item should be a search keyword in reference for condition file or reference for data file.
(See 5.1.1 Reading Saved Data for details)

9. Setting Printing Conditions

GUIDE: Set those conditions when items to be printed are predetermined. Printing items can be set even after completion of measurement.

(1) Press  [print tab] to set printing conditions.

(2) The printing conditions window (Fig. 4-56) will then be shown.

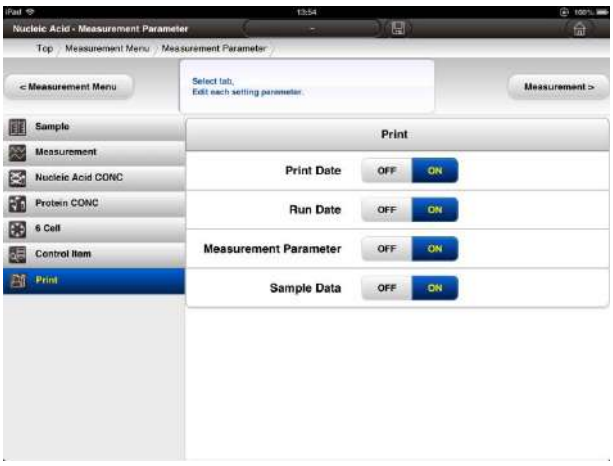
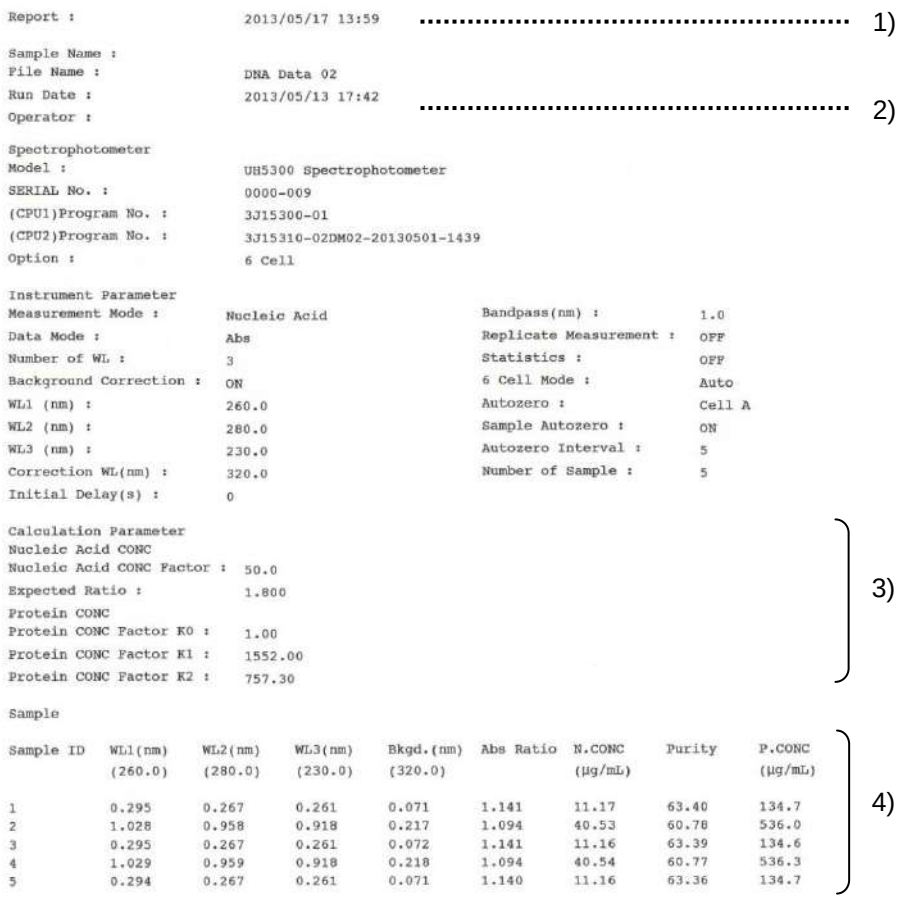


Fig. 4-56 Print Window

(3) Selet each item of printing conditions and make the settings according to the guidance. See Table 4-38 for the details of each parameter.

Table 4-38 Parameters for Setting Printing Conditions

Setting item	Description	Position of a printing example in Fig. 4-57
Print Date	1 ON: Printing date and time will be printed. 2 OFF: Printing date and time will not be printed.	1)
Run Date	1 ON: Analysis date and time will be printed. 2 OFF: Analysis date and time will not be printed.	2)
Measurement Parameter	1 ON: Measurement conditions will be printed. 2 OFF: Measurement conditions will not be printed.	3)
Sample Data	1 ON: Measurement results of the sample will be printed. 2 OFF: Measurement results of the sample will not be printed.	4)



Report : 2013/05/17 13:59 ..... 1)

Sample Name :
File Name : DNA Data 02
Run Date : 2013/05/13 17:42 ..... 2)
Operator :

Spectrophotometer
Model : UH5300 Spectrophotometer
SERIAL No. : 0000-009
(CPU1)Program No. : 3J15300-01
(CPU2)Program No. : 3J15310-02DM02-20130501-1439
Option : 6 Cell

Instrument Parameter

Measurement Mode :	Nucleic Acid	Bandpass(nm) :	1.0
Data Mode :	Abs	Replicate Measurement :	OFF
Number of WL :	3	Statistics :	OFF
Background Correction :	ON	6 Cell Mode :	Auto
WL1 (nm) :	260.0	Autozero :	Cell A
WL2 (nm) :	280.0	Sample Autozero :	ON
WL3 (nm) :	230.0	Autozero Interval :	5
Correction WL(nm) :	320.0	Number of Sample :	5
Initial Delay(s) :	0		

Calculation Parameter
Nucleic Acid CONC
Nucleic Acid CONC Factor : 50.0
Expected Ratio : 1.800
Protein CONC
Protein CONC Factor K0 : 1.00
Protein CONC Factor K1 : 1552.00
Protein CONC Factor K2 : 757.30] 3)

Sample

Sample ID	WL1(nm) (260.0)	WL2(nm) (280.0)	WL3(nm) (230.0)	Bkgd.(nm) (320.0)	Abs Ratio	N.CONC (µg/mL)	Purity	P.CONC (µg/mL)
1	0.295	0.267	0.261	0.071	1.141	11.17	63.40	134.7
2	1.028	0.958	0.918	0.217	1.094	40.53	60.78	536.0
3	0.295	0.267	0.261	0.072	1.141	11.16	63.39	134.6
4	1.029	0.959	0.918	0.218	1.094	40.54	60.77	536.3
5	0.294	0.267	0.261	0.071	1.140	11.16	63.36	134.7

] 4)

Fig. 4-57 Example of Print of Nucleic Acid Measurement Mode

10. Saving Measurement Conditions

GUIDE: Move to the measurement window when you don't save set measurement conditions.

(1) When saving the set conditions, press  [save button] icon shown at the header part.

(2) The file input window (Fig. 4-58) will then be shown. After a saving file name is input, press [OK button].

Fig. 4-58 Measurement Condition Saving Window

11. Measuring Samples

(1) Press 

[measurement button] and move to the sample measurement window.

(2) The sample setting window (Fig. 4-59) will be shown. Functions shown in Table 4-39 can be used while waiting for measurement.

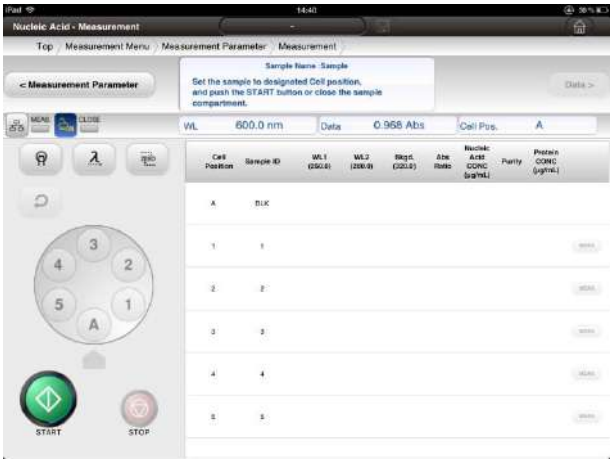


Fig. 4-59 Sample Setting Window

On the window are shown from left to right the number of cell holder and sample ID. Set a sample that corresponds to each cell holder. Set nothing at the cell positions with sample ID being blank. Set a sample to a cell according to the order given in Table 4-40 (autozero method: Cell A) or Table 4-41 (autozero method: all cells) when the setting of "sample autozero" is ON. Set a sample to a cell according to the order given in Table 4-42 (autozero method: Cell A) or Table 4-43 (autozero method: all cells) when the setting of "sample autozero" is OFF. Each measurement will be made according to the order shown in Table 4-44.

Table 4-39 Explanation of Icons for the Measurement Window

Button	Name	Description
	Lamp on/off (when light is off)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp temporarily.
	Lamp on/off (when light is on)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp.
	Wavelength movement	Pressing the [wavelength movement] icon will be able to temporarily monitor the absorbance of any given wavelength.
	Autozero	Pressing the [autozero] icon when the setting of "Sample autozero" is OFF, you can perform autozero operation.
	Re-measurement	Pressing the [re-measurement] icon after suspending the ongoing measurement will be able to resume re-measurement of the sample solution.

Table 4-40 Sample autozero: Setting a Cell in ON Condition (Autozero Method: Cell A)

	Cell A*	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	Blank	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
2nd round	Blank	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
3rd round	Blank	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15
4th round and thereafter	Operation will be repeated until the designated number of samples.					

Table 4-41 Sample autozero: Setting a Cell in ON Condition (Autozero Method: All Cells)

	Cell A*	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	Blank	Blank	Blank	Blank	Blank	Blank
2nd round	Blank	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
3rd round	Blank	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
4th round	Blank	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15
5th round and thereafter	Operation will be repeated until the designated number of samples.					

Table 4-42 Sample autozero: Setting a Cell in OFF Condition (Autozero Method: Cell A)

	Cell A*	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	None placed	STD1	STD2	STD3	STD4	STD5
2nd round	None placed	STD6	STD7	STD8	STD9	STD10
3rd round	None placed	STD11	STD12	STD13	STD14	STD15
4th round	Operation will be repeated until the designated number of samples.					

Table 4-43 Sample autozero: Setting a Cell in ON Condition (Autozero Method: All Cells)

	Cell A*	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5
1st round	Blank	Blank	Blank	Blank	Blank	Blank
2nd round	Blank	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
3rd round	Blank	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
4th round	Blank	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15
5th round and thereafter	Operation will be repeated until the designated number of samples.					

* When each round is completed, autozero operation at Cell A can be conducted as required.

Table 4-44 Autozero Interval and Standard Measurement Operation 1

Sample autozero: OFF	Sample autozero: ON		Cellposition	Measurement operation
	Autozero interval: 5	Autozero interval: 1		
Sample setting: 1st round				
-	1	1	Cell A	autozero
1	2	2	Cell 1	Measure Sample 1
-	-	3	Cell A	autozero
2	3	4	Cell 2	Measure Sample 2
-	-	5	Cell A	autozero
3	4	6	Cell 3	Measure Sample 3
-	-	7	Cell A	autozero
4	5	8	Cell 4	Measure Sample 4
-	-	9	Cell A	autozero
5	6	10	Cell 5	Measure Sample 5
Sample setting: 2nd round				
-	7	11	Cell A	autozero
6	8	12	Cell 1	Measure Sample 6
-	-	13	Cell A	autozero
7	9	14	Cell 2	Measure Sample 7
Repeated until the designated number of standards.				

The sample has been placed as per the guidance, press  [start button] icon. This will then begin measurement. Samples will be measured for five at a time, and operation will be guided until the number set for the sample number of 6 cells.

GUIDE: See 2.3.4 Setting Cells for the method of setting samples to cell holders.

(3) The windows below Fig. 4-60, window for ongoing sample measurement, will be shown during measurement.

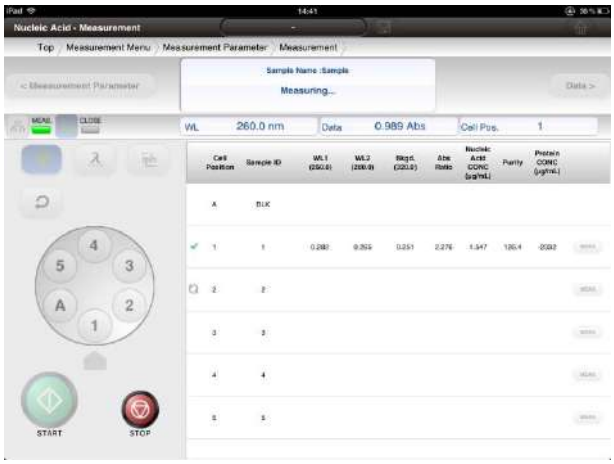


Fig. 4-60 Window Showing Ongoing Sample Measurement

(4) When 6 or a larger number is set for "number of samples," the measurement results of Sample 1 to 5 will be shown as in Fig. 4-61. Set the following sample according to the guidance. When the sample has been placed, press [start button] icon. This will then begin measurement.

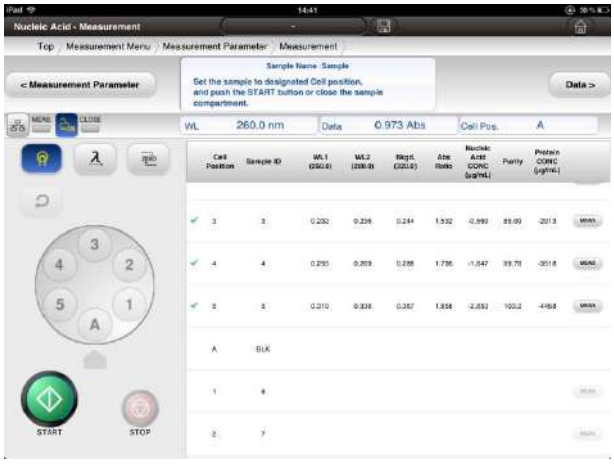


Fig. 4-61 Example of the Window After Measurement of the First Round of Samples

(5) When measurement of the set number of samples is completed, the window shown in Fig. 4-62 will be show.

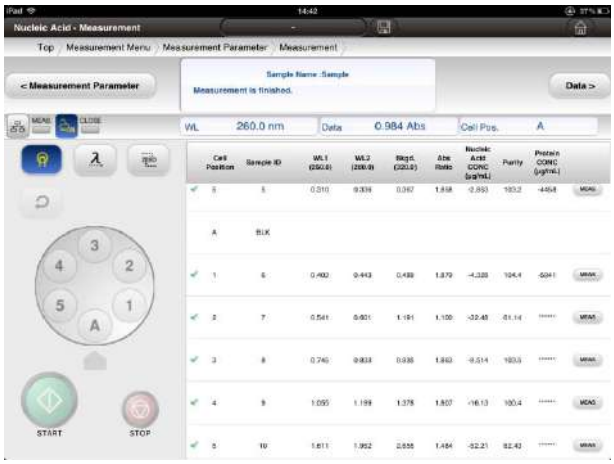


Fig. 4-62 Example of the Window After Sample Measurement (Sample Number: 10)

12. Saving and Printing Data

When the measurement data are saved

(1) When saving the measured data, press  [save button] icon shown at the header part.

(2) The file input window (Fig. 4-63) will then be shown. After a saving file name is input, press [OK button].

Fig. 4-63 Measured Data Saving Window

Moving to the data confirmation window

(1) Press 

[Data button] and move to the data confirmation window (Fig. 4-64).

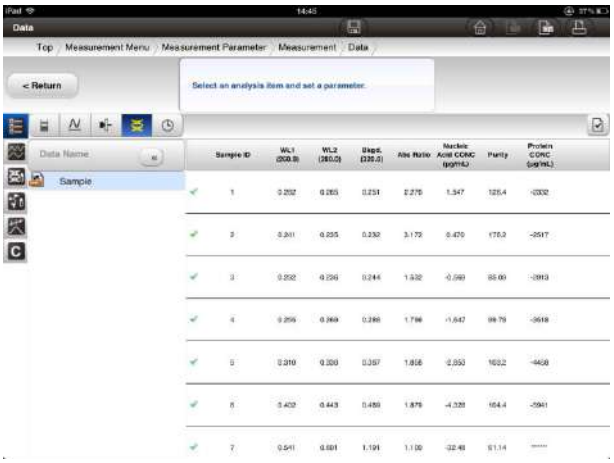


Fig. 4-64 Data Confirmation Window

When printing the measurement data

(1) When printing the measured data, press  [print button] icon shown at the header part.

(2) The printing condition setting window will be shown (Fig. 4-65). Turn ON the item you want to print and press the [preview button under the above conditions].

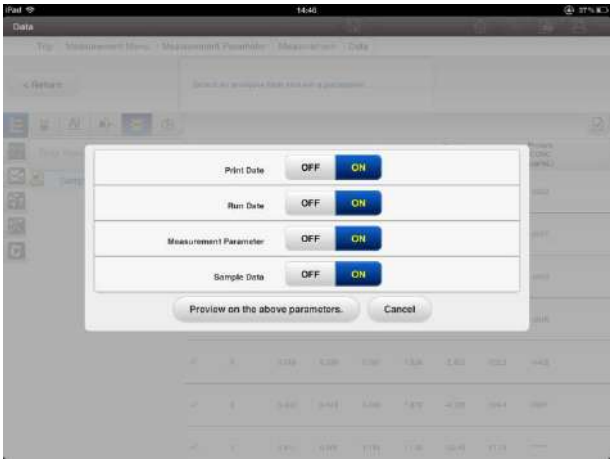


Fig. 4-65 Printing Condition Setting Window

(3) Print preview (Fig. 4-66) will be shown.

Fig. 4-66 Print Preview Window

(4) Press PRINT [print] to show the printer option (Fig. 4-67). Select the printer and the number of copy and press [print].

Fig. 4-67 Printer Option Window

When outputting the measured data in CSV

(1) When saving the measured data in CSV, press [CSV file preparation button] icon shown at the header part.

(2) The export window (Fig. 4-68) will then be shown. After inputting the name of the file to save, press [export].

Fig. 4-68 File Export Window

4.2.4 Measuring Spectra

Transmission spectra and absorption spectra can be measured. When a blank is placed at Cell A, the equipment will automatically conduct baseline correction and measures a sample.

1. Starting Up the Product

Start up this product. (For the start-up procedure, see 2.2 “Starting Up and Shutting Down Instrument”.)

2. Setting Measurement Conditions

(1) Press [measurement button] icon in the top page (Fig. 4-69). Then, the measurement item selection window (Fig. 4-70) will be displayed. Press [wavelength scan measurement button] icon to set concentration measurement conditions.

Fig. 4-69 Top Window

Fig. 4-70 Measurement Menu Window

3. Setting Sample Conditions

(1) Press [sample condition tab] to set sample conditions.

(2) The sample conditions window (Fig. 4-71) will be shown.

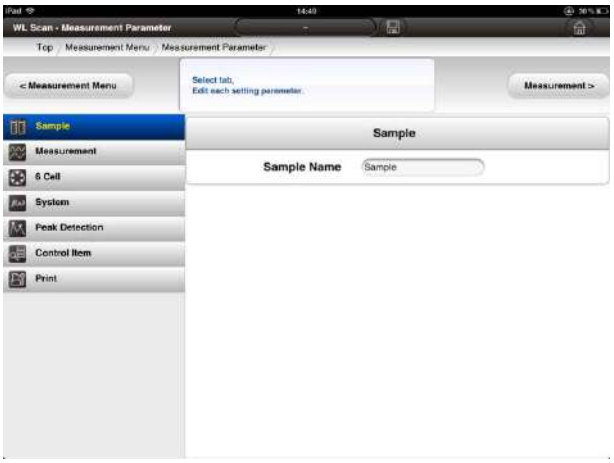


Fig. 4-71 Sample Window

(3) Set sample conditions. See Table 4-45 for parameters.

Table 4-45 Inputting Sample Names

Setting Item	Description
Sample Name	Sample names can be input in two-byte or one-bype English character fonts. The largest number of characters inputtable is 20 in one-byte English character fonts. Sample names input here will be printed in the field of "Sample Name" of the report.

4. Setting Measurement Conditions

(1) Press  [Measurement tab] to set measurement conditions.

(2) The sample conditions window (Fig. 4-72) will be shown. Set the wavelength number, wavelength, and initial delay. See Table 4-46 for each parameter.

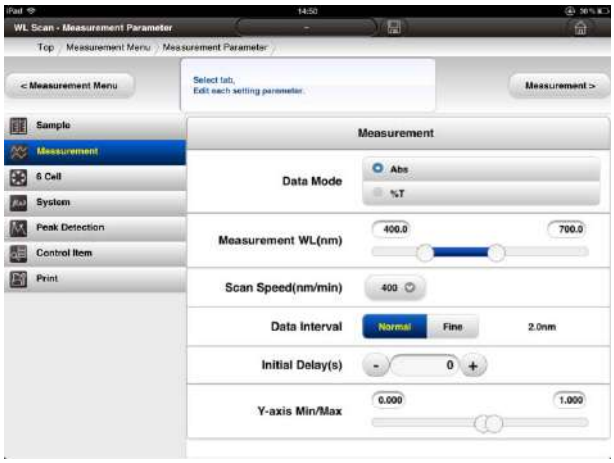


Fig. 4-72 Measurement Window

Table 4-46 Setting Parameters in the Measurement Conditions Window

Setting Item	Description
Data Mode	Select the data mode for the vertical axis. ABS: Used to measure absorption spectra (vertical axis indicates the spectra of absorbance) %T: Used to measure transmission spectra (vertical axis indicates the spectra of transmittance)
Measurement WL(nm) (Start WL)	Input a wavelength at which measurement should start. Starting wavelength: Input the wavelength at an interval of 0.1 nm in the range from 200.0 to 1,100.0 nm. Make sure the start wavelength is smaller than the end wavelength when setting. Make sure (end wavelength - start wavelength) ≧ 10.
(End WL)	Input a wavelength at which measurement should end. End wavelength: Input the wavelength at an interval of 0.1 nm in the range from 200.0 to 1,100.0 nm. Make sure the start wavelength is smaller than the end wavelength when setting. Make sure (end wavelength - start wavelength) ≧ 10.
Scan Speed (nm/min)	Set the speed at which to send a wavelength. Speeds may be selected from the following nine stages: 10, 40, 100, 200, 400, 800, 1200, 2400, 4800 The data interval that can be obtained will change depending on the scanning speed. Data interval should be given a smaller value for slower speed and a larger value for higher speed. See the section on data interval for details.

(cont'd)

<table>
<tr><th>Setting Item</th><th>Description</th></tr>
<tr><td>Data Interval</td><td>Set the data interval to obtain. Select the interval from the following two:
Standard: This is the ordinary choice.
High resolution: Measurement can be made at a smaller data interval than when the standard is selected. But this setting shortens the data acquisition time per piece compared with the standard interval and therefore is less likely to produce noise on spectra.

The settable smallest data interval depends on the scanning speed.
<table>
<tr><th rowspan="2">Scanning speed (nm/min)</th><th colspan="2">Data interval (s)</th></tr>
<tr><th>Standard</th><th>High-resolution</th></tr>
<tr><td>10</td><td>0.1</td><td>-</td></tr>
<tr><td>40</td><td>0.2</td><td>0.1</td></tr>
<tr><td>100</td><td>0.5</td><td>0.2</td></tr>
<tr><td>200</td><td>1.0</td><td>0.5</td></tr>
<tr><td>400</td><td>2.0</td><td>1.0</td></tr>
<tr><td>800</td><td>2.5</td><td>2.0</td></tr>
<tr><td>1200</td><td>5.0</td><td>2.5</td></tr>
<tr><td>2400</td><td>10.0</td><td>5.0</td></tr>
<tr><td>4800</td><td>20.0</td><td>10.0</td></tr>
<tr><td>6000</td><td>-</td><td>20.0</td></tr>
</table>
</td></tr>
<tr><td>Initial Delay (s)</td><td>Prior to measuring, press  [start button] icon, wait for the time set here and start measurement. Any value at an inteval of 1 second can be input between 0 to 9999 seconds.
This is used when you want to start measurement after the passage of a certain period of time such as when you want to measure after returning the temperature of a specimen to room temperature or start measurement after completing the reaction. Input 0 when you don't make any setting.</td></tr>
<tr><td>Y-axis Max</td><td>Input the upper limit of the vertical axis of the spectra to be shown during measurement.
It may be input in the following range:
For ABS: -9.999 to 9.999
For %T: -999.9 to 999.9</td></tr>
<tr><td>Y-axis Min</td><td>Input the lower limit of the vertical axis of the spectra to be shown during measurement.
It may be input in the following range:
For ABS: -9.999 to 9.999
For %T: -999.9 to 999.9</td></tr>
</table>

5. Setting 6 Cells

NOTE: When Off is the condition for 6 cell settings to be determined when single cell holder or rectangular long cell holder is used, the 6 cell mode will not be shown (See 4.3.4 Measuring spectra for details.). When the auto shipper is connected, the items of the auto shipper will be shown instead of the 6 cell mode.

(1) Press  [6 Cell tab] in order to set the six cell conditions.

(2) 6 cell conditions window (Fig. 4-73) will be shown.

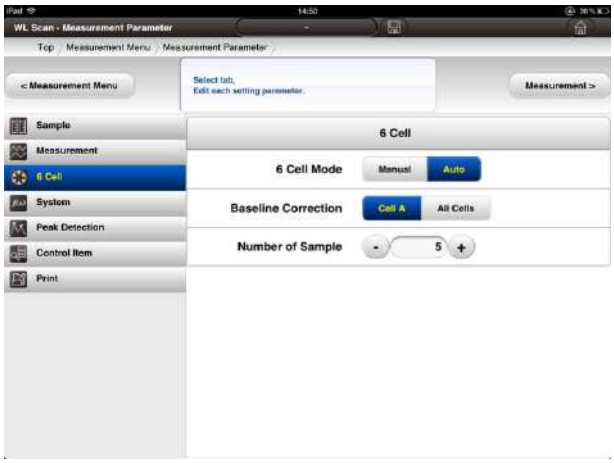


Fig. 4-73 6 Cell Window

(3) Select and determine each item of the 6 cell conditions. Set the 6 cell mode to "Auto." See Table 4-47 for the details of the parameters.

Table 4-47 Parameters for Setting Calibration Curve Conditions

Setting Item	Description
6 Cell Mode	Select the movement of the 6 cells during measurement from either of the following two: Auto: This setting can automatically measure one sample after automatically rotating 6 cells and conducting baseline correction by setting specimens for baseline and samples to the 6 cells. Manual: In this setting, the user should manually conduct baseline correction and sample measurement. The user needs to manually move cells or make baseline correction. (See 4.4.1. Measuring Sample by Sample for the details of the manual mode (six manual modes).)
Baseline Correction	Select the method of baseline correction. Cell A: Baseline correction will be conducted at Cell A. The equipment will measure the baseline of Cell A as a representative value and record it as a correction value. All cells: The equipment will conduct baseline crrection at all cells. It will measure baseline correction at all cells before measurement of STD or measurement of samples and memorize them as correction values. Then the individual differences of absorbance among all cells will be corrected. This is effective for cases where minute absorbance differences are measured. * See Commentary 4-4 for setting conditions in detail.
Number of sample	Set the number of samples to measure. Any value from 1 to 150 can be selected.

6. Setting System Conditions

(1) Press f(x) [System tab] to set system conditions.

(2) The system conditions window (Fig. 4-74) will then be shown. Set the conditions for the calibration curve regression equation according to the guidance. See Table 4-48 for details.

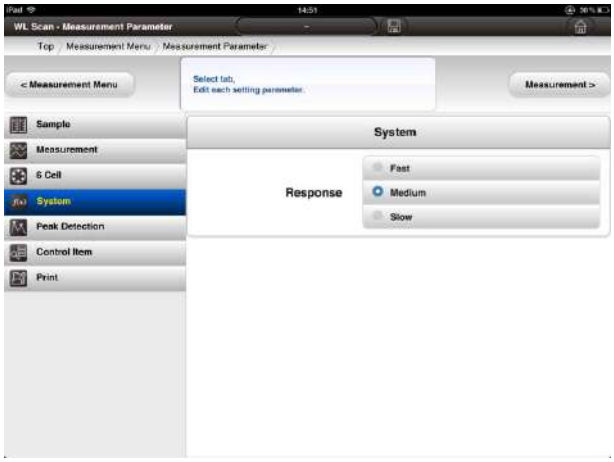


Fig. 4-74 System Conditions Window

Table 4-48 Parameters for Setting Responses

Setting Item	Description
Response	Select the type of response from either of the following three: Fast: Used to make fine measurement for the wavelength. The result will contain larger noise compared with the standard speed or low speed. Medium: Used for ordinary measurement. Slow: Used to reduce dispersion of photometric values or noise. It is not appropriate for fine measurement compared with the high speed or standard speed.

7. Setting Peak Detection Conditions

(1) Press  [Peak Detection tab] to set peak detection conditions.

(2) The peak detection conditions setting window (Fig. 4-75) will then be shown. These settings are for threshold values and sensitivity, which are necessary to conduct peak detection. See Table 4-49 for details.

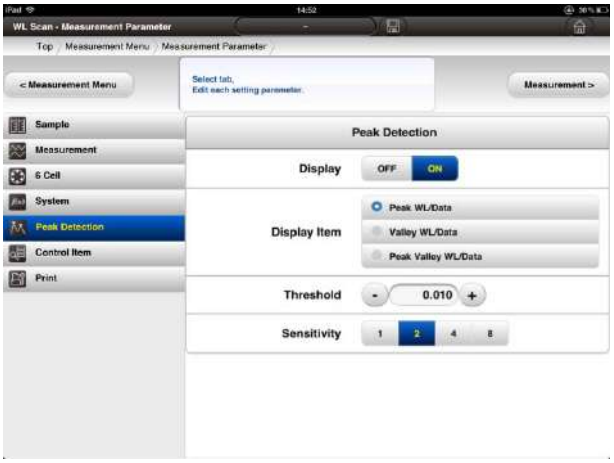
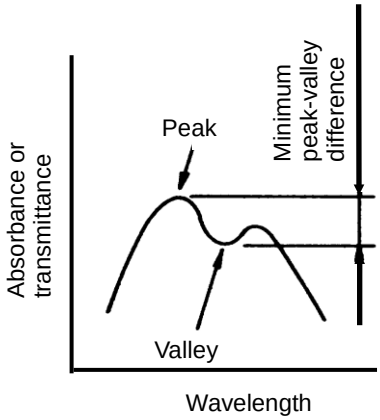


Fig. 4-75 Peak detection Conditions Setting Window

Table 4-49 Parameters for Setting Peak Detection Conditions

Setting Item	Description
Display	Set either of the two selections about graphical presentation of measurement results, indication or no indication of the peak detection results in the comment field of the graph. ON: Indicated OFF: Not indicated
Display Item	Indicated when indication is ON. Select from the following three: Peak wavelength/data: Peak wavelength and data will be shown in the comment field of the graph. Valley wavelength/data: Valley wavelength and data will be shown in the comment field of the graph. Peak valley wavelength/data: Peak wavelength, valley wavelength and data will be shown in the comment field of the graph.

(cont'd)

Setting Item	Description
Threshold	Set conditions for detection of peak and valley from the measured spectra. When detecting a peak, reducing a threshold value will eventually allow detection of noise elements. On the contrary, increasing a threshold value will not allow detection of minute peaks. As above, a threshold is what determines the detection capability of spectra in the vertial axis direction. The minimum peak-valley difference shown in the following figure will be detected as a peak and a valley when it is larger than the threshold. Peak and valley to detect: minimum peak-valley difference > threshold It may be input in the following range: For ABS: -0.001 to 1.000 For %T: 0.1 to 100.0 
Sensitivity	Set conditions for detection of peak and valley from the measured spectra. Sensitivity is what determines the detection capability of spectra in the horizontal axis direction. Select Sensitivity 1 to detect sharp peaks and Sensitivity 8 to detect broad peaks. It may be selected from four types, or 1, 2, 4 and 8. See Commentary 4-12 for details.

Commentary 4-12 Densitivity of Peak Detection

For sensitivity of peak detection, a peak will be determined based on the results of comparison between the data of a point currently in question and the data of N number of points ahead and whether the data are rising or falling. Here is the explanation of peak detection sensitivity using the case of peak detection with peak sensitivity of 1 (refer to six points ahead).

The data currently in question is compared with the data N number of points ahead, and when the data N number of points ahead is larger than the other, the data is judged to be rising. The data is judged falling in the opposite case. Whether the data is rising or falling will be judged by comparing the data currently in question with the data N number of points ahead one after another (Fig. 1). Peak is detected when the rise continues N/2 times and then the fall continues N/2 times. Valley point is detected when the fall continues N/2 times and then the rise continues N/2 times (Fig. 2).

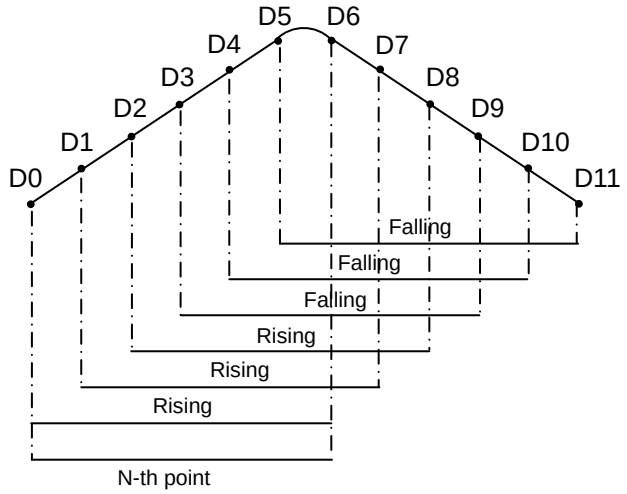


Fig. 1 Coceptual Diagram of Peak

Table 1 Judgment on Rise and Fall

Data in question	D0	D1	D2	D3	D4	D5
Data N number of points ahead	D6	D7	D8	D9	D10	D11
Rise or fall	Rise	Rise	Rise	Fall	Fall	Fall

Sensitivity compares the data of what number of points ahead and judges whether or not it should be used for peak detection. Table 2 shows the sensitivity and the data reference points. Sensitivity 1 uses the data six points ahead, while Sensitivity 8 uses the data 48 points ahead. To this end, select Sensitivity 1 to detect peaks or valleys of sharp spectra and Sensitivity 8 to detect peaks or valleys of softly changing spectra.

Table 2 Sensitivity and Data Reference Points

Sensitivity	N-th point
1	Six points ahead
2	twelve points ahead
4	twenty-four points ahead
8	forty-eight points ahead

8 Setting Control Items

(1) Press  [control item tab] to set control items.

(2) The control item window window (Fig. 4-76) will then be shown.

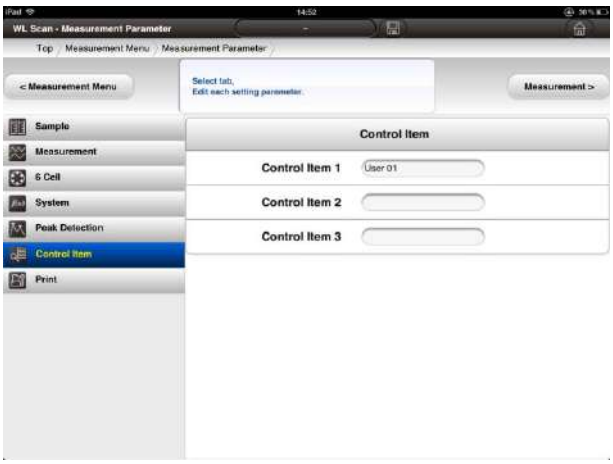


Fig. 4-76 Control Item Window

(3) Input a comment in a control item.

GUIDE: A comment to be input in a control item should be a search keyword in reference for condition file or reference for data file.
(See 5.1.1 Reading Saved Data for details)

9. Setting Printing Conditions

GUIDE: Set those conditions when items to be printed are predetermined. Printing items can be set even after completion of measurement.

(1) Press  [print tab] to set printing conditions.

(2) The printing conditions window (Fig. 4-77) will then be shown.

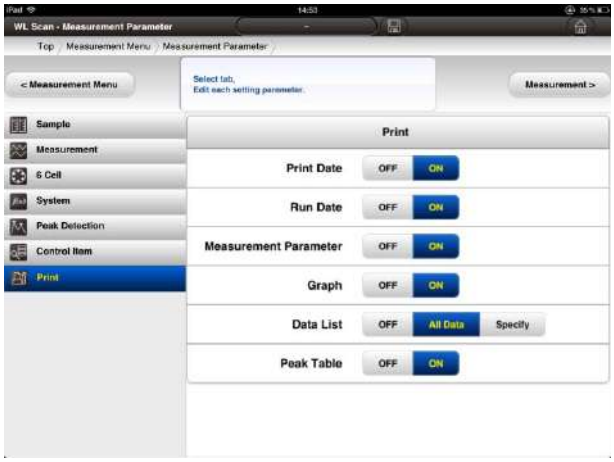


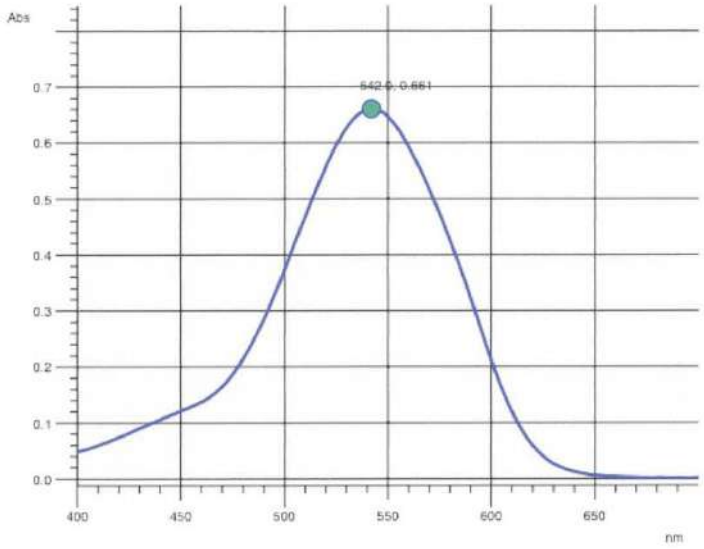
Fig. 4-77 Printing Conditions Window

(3) Selet each item of printing conditions and make the settings according to the guidance. See Table 4-50 for the details of each parameter.

Table 4-50 Parameters for Setting Printing Conditions

Setting item	Description	Position of a printing example in Fig. 4-78
Print Date	ON: Printing date and time will be printed. OFF: Printing date and time will not be printed.	1)
Run Date	ON: Analysis date and time will be printed. OFF: Analysis date and time will not be printed.	2)
Measurement Parameter	ON: Measurement conditions will be printed. OFF: Measurement conditions will not be printed.	3)
Graph	ON: Prints spectra OFF: Does not print spectra	4)
Data list	OFF: Does not print the numerical data of spectra. All data: Prints all numerical data of spectra. Designated interval: Prints numerical data of spectra at the designated interval.	5)
Interval	This will be shown when the designated range is selected at data list printing. Set the printing interval of the data list. This will be shown when the designated interval for printing of data lists is selected.	-
Range	This will be shown when the designated range is selected at data list printing. Set the printing range of the data list.	-
Peak Table	ON: Prints peak table. OFF: Does not print peak table.	6)

Report : 2013/05/17 13:56 ..... 1)



4)

Sample Name : 130213 Cr(VI)1.0再 ..... 2)
File Name : Cr(VI) 1.0
Operator :

Spectrophotometer
Model : UH5300 Spectrophotometer
SERIAL No. : 1234-567
(CPU1)Program No. : 3J15300-01
(CPU2)Program No. : 3J15310-01
Option : 6 Cell

Instrument Parameter

Measurement Mode :	WL Scan	Bandpass(nm) :	1.0
Data Mode :	Abs	Response :	Medium
Start WL(nm) :	700.0	6 Cell Mode :	Manual
End WL(nm) :	400.0		
Scan Speed(nm/min) :	400		
Data Interval(nm) :	2.0		
Initial Delay(s) :	0		

3)

Peak
Threshold : 0.010
Sensitivity : 2

Peak Table

No.	WL(nm)	Peak	WL(nm)	Valley
1	542.0	0.661		

6)

Data List

No.	WL(nm)	Abs	No.	WL(nm)	Abs	No.	WL(nm)	Abs
1	700.0	0.001	12	590.0	0.323	23	480.0	0.214
2	690.0	0.001	13	580.0	0.427	24	470.0	0.165
3	680.0	0.001	14	570.0	0.516	25	460.0	0.137
4	670.0	0.002	15	560.0	0.593	26	450.0	0.121
5	660.0	0.003	16	550.0	0.646	27	440.0	0.106
6	650.0	0.006	17	540.0	0.659	28	430.0	0.090
7	640.0	0.012	18	530.0	0.626	29	420.0	0.074
8	630.0	0.026	19	520.0	0.557	30	410.0	0.060
9	620.0	0.059	20	510.0	0.468	31	400.0	0.049
10	610.0	0.119	21	500.0	0.372			
11	600.0	0.211	22	490.0	0.285			

5)

Fig. 4-78 Example of Printing of Wavelength Scanning Mode

10. Saving Measurement Conditions

GUIDE: Move to the measuring window when the set measurement conditions are not saved.

(1) When saving the set conditions, press  [save button] icon shown at the header part.

(2) The file input window (Fig. 4-79) will then be shown. After a saving file name is input, press [OK button].

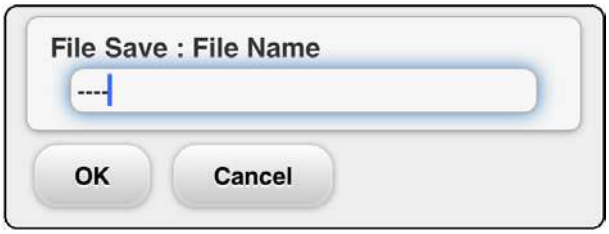


Fig. 4-79 Measurement Condition Saving Window

11. Setting and Measuring Samples

(1) Press Measurement > [measurement button] and move to the sample measurement window.

(2) Guidance "Baseline measurement will be made" will be shown. Put a specimen for baseline in Cell A and press [OK button]. When baseline measurement has already been conducted, press Cancel and move to the sample measurement window.

(3) The sample setting window (Fig. 4-80) will be shown. Functions shown in Table 4-51 can be used while waiting for measurement.

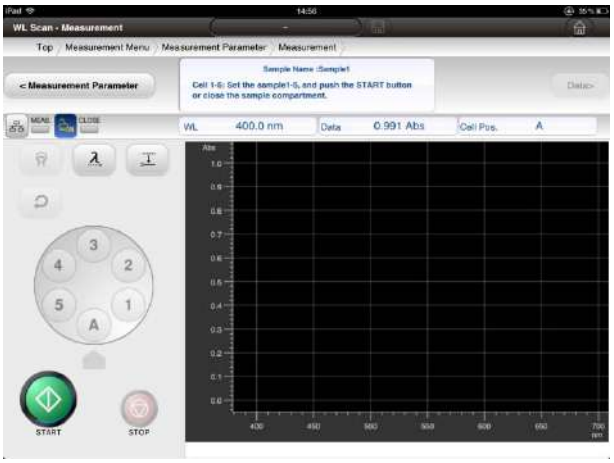


Fig. 4-80 Wavelength Scan Measurement Window

(4) Set specimen 1 to 5 at Cell 1 to 5, respectively. When setting is completed, press [start button] icon. This will start measurement sequentially from Sample 1.

(5) When 6 or a larger number is set for "number of samples," the measurement results for Sample 1 to 5 will be shown overlapped as in Fig. 4-81. Set the next sample according to the guidance. When setting is completed, press [start button] icon.

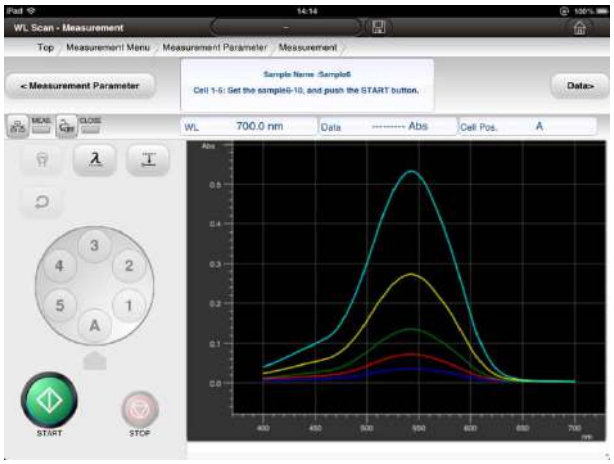


Fig. 4-81 Sample Setting Guidance Window

(6) When measurement of all set samples is completed, the window of Fig. 4-82 will be shown.

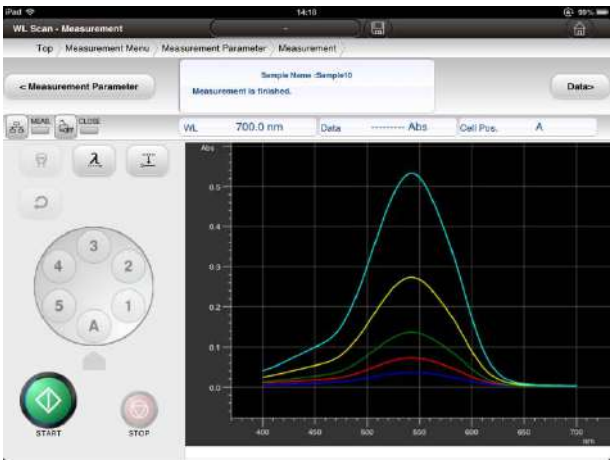


Fig. 4-82 Measurement Completion Window

Table 4-51 Explanation of Icons for the Measurement Window

Button	Name	Description
	Lamp on/off (when light is off)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp temporarily.
	Lamp on/off (when light is on)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp.
	Wavelength movement	Pressing the [wavelength movement] icon will be able to temporarily monitor the absorbance of any given wavelength.
	Baseline correction	Pressing the [baseline correction] icon will move the turret measurement position to Cell A to re-correct the baseline. This setting is effective for long-time measurement.
	Re-measurement	Press the [re-measurement] icon to re-measure a sample solution.

12. Saving and Printing Data

When the measurement data are saved

(1) When saving the measured data, press  [save button] icon shown at the header part.

(2) The file input window (Fig. 4-83) will then be shown. After a saving file name is input, press [OK button].

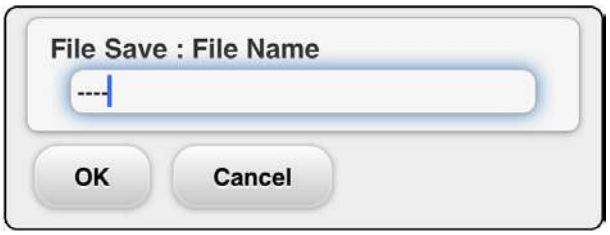


Fig. 4-83 File Save Window

Moving to the data confirmation window

(1) Press  [Data button] and move to the data confirmation window (Fig. 4-84).

Fig. 4-84 Data Confirmation Window

When printing the measurement data

(1) When printing the measured data, press  [print button] icon shown at the header part.

(2) The printing condition setting window will be shown (Fig. 4-85). Turn ON the item you want to print and press the [preview button under the above conditions].

Fig. 4-85 Printing Condition Setting Window

(3) Print preview (Fig. 4-86) will be shown.

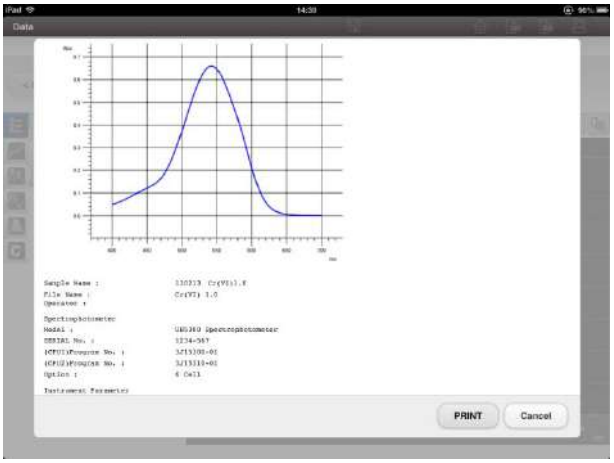


Fig. 4-86 Print Preview Window

(4) Press PRINT [print] to show the printer option (Fig. 4-87). Select the printer and the number of copy and press [print].

Fig. 4-87 Printer Option Window

When outputting the measured data in CSV

(1) When saving the measured data in CSV, press [CSV file preparation button] icon shown at the header part.

(2) The export window (Fig. 4-88) will then be shown. After inputting the name of the file to save, press [export].

When outputting the measured data in image file

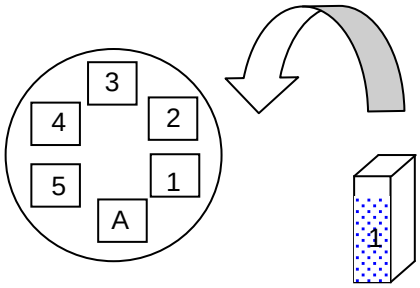
(1) When saving the measured data in image file, press [PNG file preparation button] icon shown at the header part.

(2) Then, the export window (Fig. 4-88) will be shown. Input the name of a file to save and press [export].

Fig. 4-88 File Export Window

4.3 Measuring Sample by Sample (6 cell Manual Mode)

This function measures samples one by one. This mode is appropriate when samples are measured using two cells (one being used for autozero). Pressing ZERO [autozero] icon can correct the absorbance at the preset Cell A to zero.



4.3.1 Quantifying the Concentration of Solution

This function is used to prepare the calibration curve and quantify the concentration of an unknown specimen or input clibration curve factors to quantify the concentration.

1. Starting up the product

Start up this product. (See 2.2.1 Starting Up Instrument about the start-up procedure.)

2. Measurement Conditions

3. Setting Sample Conditions

4. Setting Measurement Conditions

5. Setting Calibration Curve Conditions

6. Setting Calibration Curve data

2. For 2. Measurement Conditions to 6. Setting Calibration Curve Data, see 2. Measurement Conditions to 6. Setting Calibration Curve Data in 4.2.1 Quantifying the Concentration of Solution.

7. Setting 6 cells

NOTE: When Off is the condition for 6 cell settings to be determined when single cell holder or rectangular long cell holder is used, the 6 cell mode will not be shown (See 3.1.2.6 Cell Mode for details). When the auto shipper is connected, the items of the auto shipper will be shown instead of the 6 cell mode.

(1) Press  [6 cell tab] in order to set the six cell conditions.

(2) The 6 cell conditions window (Fig. 4-89) will be shown.

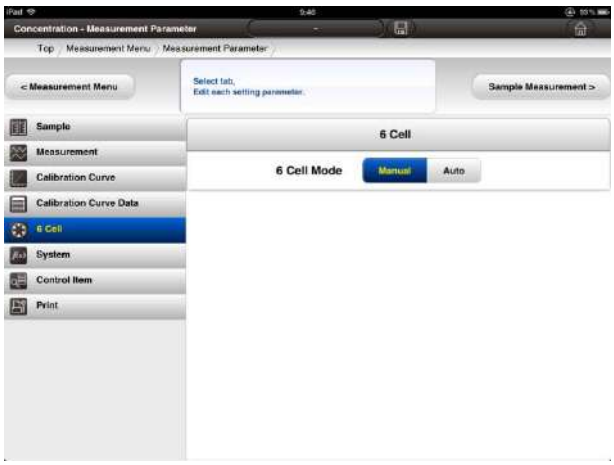


Fig. 4-89 6 Cell Conditions Window

(3) Select and determine each item of the 6 cell conditions. Set the 6 cell mode to "Manual" See Table 4-52 for the details of the parameters.

Table 4-52 Parameters for Setting Calibration Curve Conditions

Setting Item	Description
6 cell mode	Determine the movement of 6 cells during measurement. Auto: This mode automatically rotates 6 cells, with samples manually set to each position in advance, and automatically conducts all processes of measurement from autozero to standards and samples. As the equipment has 6 cells, use of this mode is recommended when there are many specimens to measure. Manual: Standards and samples are measured using one of the 6 cell positions (which may be either from 1 to 5). Autozero can be easily conducted by setting a solution at Cell A for autozero in order to remove the influence of drift (shaking of the baseline) of the equipment during measurement. In the ordinary use, a standard solution or a sample solution will be set at Cell 1. (See 4.2.1 Quantifying the Concentration of Solution for the details of auto.)

8 Setting System Conditions

9 Setting Control Items

10 Setting Printing Conditions

11 Saving Measurement Conditions

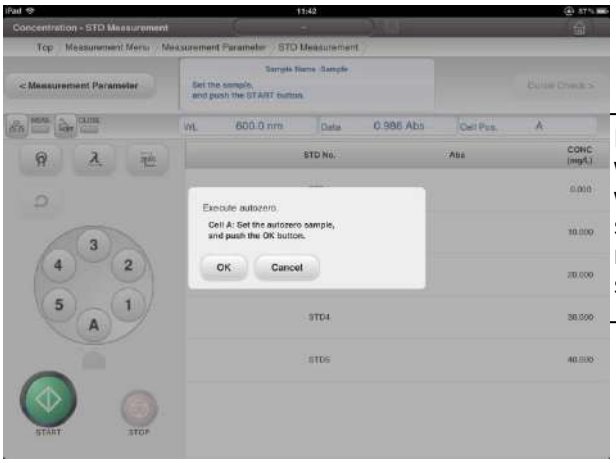
(For 8. Setting System Conditions, 9. Setting Management Items, 10. Printing Conditions and 11. Setting Saving of Measurement Conditions, see 8. Setting system Condiitions in 4.2.1 Quantifying the Concentration of Solution.

12 Measuring Standard Solution

GUIDE: When linear coefficient or quadratic coefficient is chosen for the type of calibration curve at 5. Setting Calibration Curve Conditions, move to 13. Measuring Sample Solution as that selection does not involve measurement of standard solution.

(1) Press STD Measurement > [STD Measurement button] and move to the calibraction curve measurement window.

(2) Guidance, "Autozero will be conducted," will be shown (Fig. 4-90). Put a standard for autozero at Cell A and press [OK button]. When an autozero has already been conducted, press Cancel and move to the sample measurement window.



Example of window when 5 is set for the number of standards.

Fig. 4-90 Window for Putting a Specimen for Autozero

NOTE: Be sure to perform autozero when you make the first measurement under the set condition.

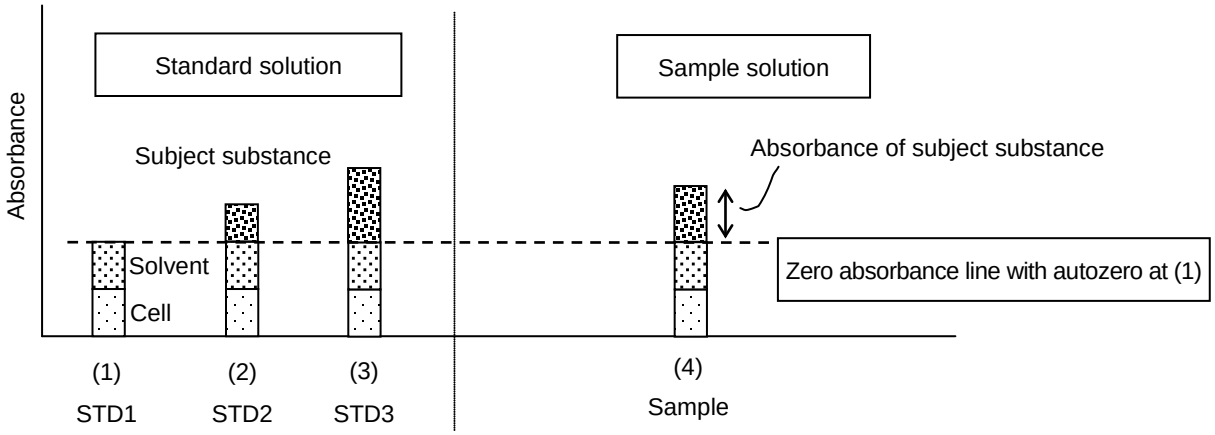
See Commentary 4-13 Autozero Method (when no coloring reagent is used) and Commentary 4-14 Autozero Method (when coloring reagent is used) for the details of specimens with which to perform autozero.

Functions shown in Table 4-53 can be used while waiting for measurement.

Table 4-53 Explanation of Icons for the Measurement Window

Button	Name	Description
	Lamp on/off (when light is off)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp temporarily.
	Lamp on/off (when light is on)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp.
	Wavelength movement	Pressing the [wavelength movement] icon will be able to temporarily monitor the absorbance of any given wavelength.
	Autozero	Pressing the [autozero] icon when the setting of "Sample autozero" is OFF, you can perform autozero operation.
	Re-measurement	Pressing the [re-measurement] icon will conduct re-measurement of a standard solution.

Commentary 4-13 Autozero Method (When no Coloring Reagent is Used)



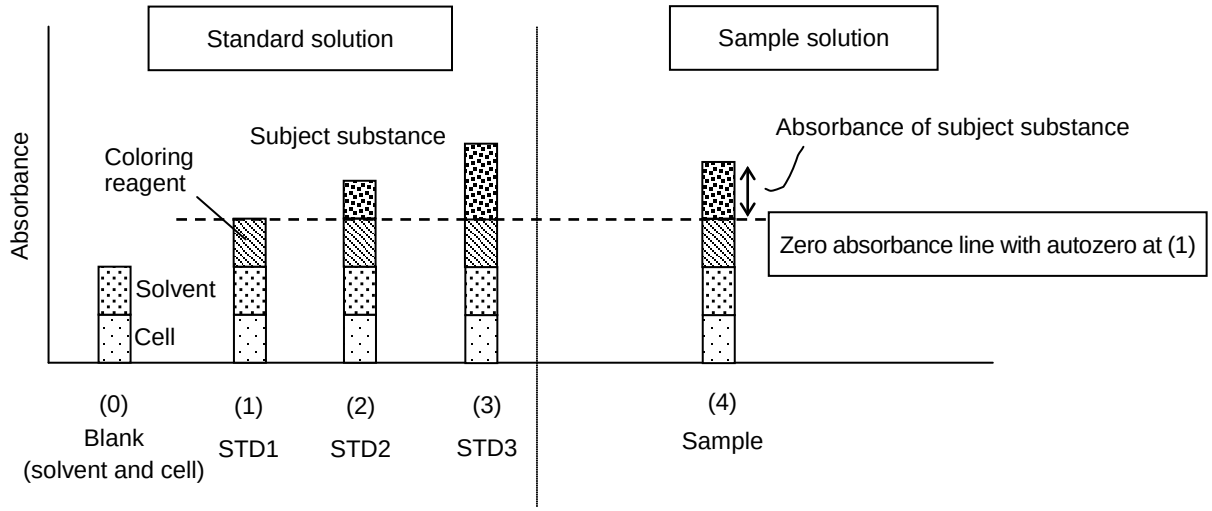
Constituents of absorbance when no coloring reagent is used. (excluding interfering substance)

Absorbance, which comes out as the result of measurement, is the summation of absorbances attributable to various elements such as cells, solvents, coloring reagents, subject substances and interfering substances. It means the resultant absorbance is not only the measurement result of the subject substance.

When a calibration curve is prepared using concentration 0, 1 or 2, prepare a solution of concentraiton 0, 1, and 2 for STD1, STD2 and STD3 respectively (as shown in (1) to (3) above). These STD1 to 3 values contain absorbances of cells, solvents and subject substances. In reality, the absorbance necessary for actual quantification is that attributable to the subject substance. It is therefore necessary to reduce the contribution of the cell and solvent (autozero operation). In this case, autozero operation should be conducted at STD1, and the calibration curve should be prepared by measuring the absorbance of STD1 through STD3.

When quantifying a sample, use the absorbance with the contribution of the celll and solvent eliminated and calculate the concentration of the sample. As shown in (4) above, when the absorbance, excluding that from the cell and solvent, comes from the subject substance, the acquired concentration will be the concentration of the subject substance.

Commentary 4-14 Autozero Method (When Coloring Reagent is Used)



Constituents of absorbance when coloring reagent is used (excluding interfering substance)

When a coloring reagent is used, absorbance of the cell and solvent as well as absorbance of the coloring reagent are included in the solution. When reducing absorbance including that of the coloring reagent, perform autozero for the solvent of (1) in the above figure.
When quantifying a sample, use the absorbance with the contributions of the cell, solvent and coloring reagent eliminated and calculate the concentration of the sample. As shown in (4) above, when any absorbance, excluding the absorbances of the cell, solvent, and coloring reagent, comes from the subject substance, the resultant concentration should be the concentration of the subject substance. When the absorbance of a solution as in the above figure (1) remains instable over time, it is not suitable as a solution for autozero. Therefore, execution of autozero with a blank (solvent and cell) is recommended.

(3) The standard measurement window (Fig. 4-91) will be shown. Put a standard at the measurement cell position shown on the window. When you want to measure at a different cell position, rotate the turret on the window with your finter and move the cell position.

NOTE: In the 6 cell manual mode, the equipment will measure photometric values at the cell position shown on the window. To do this, make sure if the cell position at which a standard was set and the cell position shown on the window match each other before measurement.

GUIDE: In the 6 cell manual mode, the equipment will measure photometric values at the cell position shown on the window. Use of Cell 1 is recommended when autozero is frequently conducted. Use of Cell 1 will allow smooth measurement as the time to move cells to Cell A is short.
While the guidance is kept shown, press ZERO [autozero] icon to conduct autozero at Cell A position. After executing an autozero, the position will return to the cell position before execution. When you put a specimen for autozero at Cell A and a sample at Cell 1, you can execute an autozero without putting any sample in or out a cell just by pressing ZERO [autozero] icon.

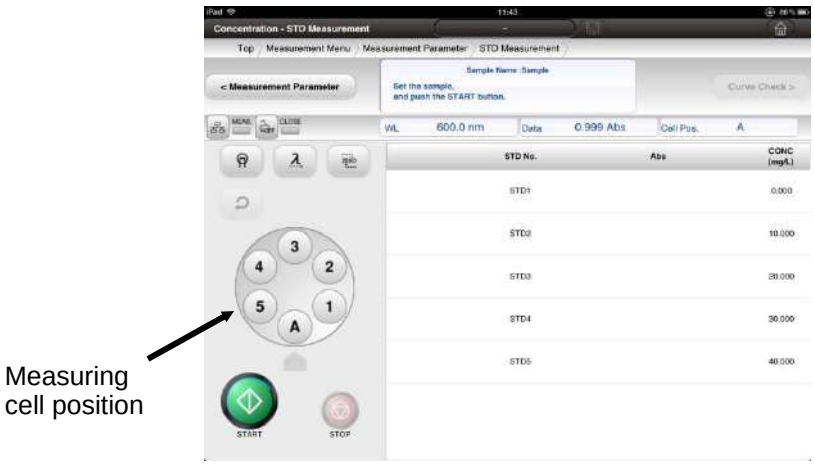
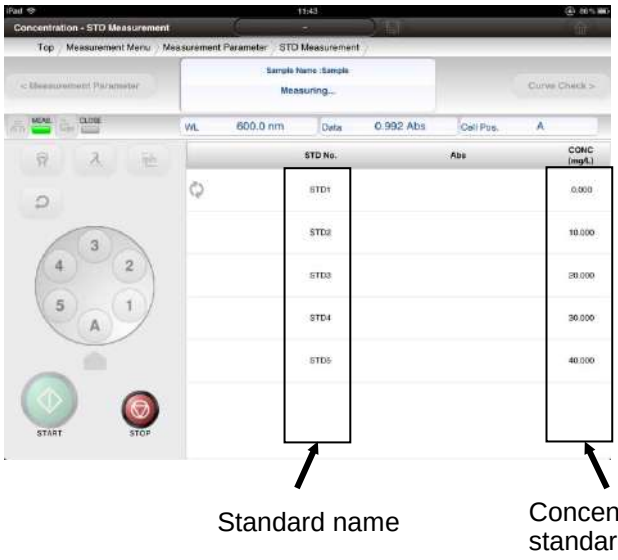


Fig. 4-91 Standard Measurement Window

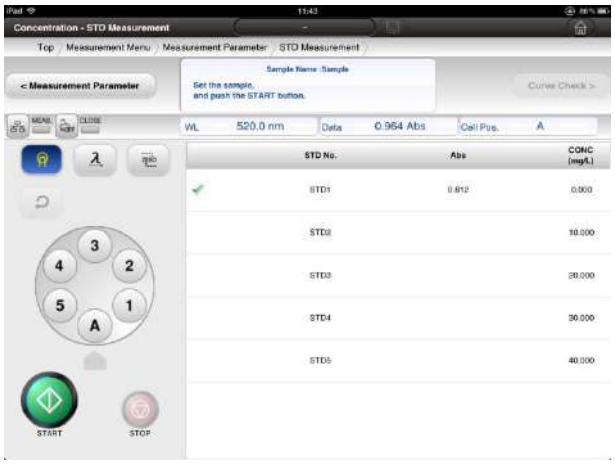
(4) The measurement window is shown in Fig. 4-92. In the window will be shown, from left to right, the number of standards, absorbance after measurement and the concentration of the standard. Measurement will be conducted starting from STD1 sequentially until the number of standards set at condition setting. Set a shown standard at the cell position shown on the window (Cell 1), put the lid on the sample compartment, press [start button] icon and start measurement according to the guidance.



Example of window when 5 is set for the number of standards.

Fig. 4-92 Standard Setting Window

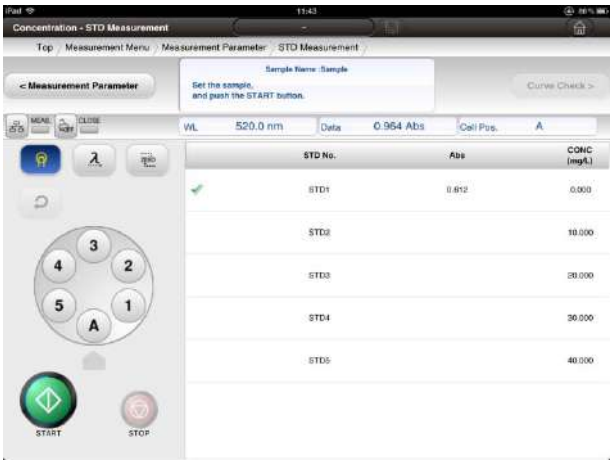
(5) During measurement, the window showing ongoing standard measurement (Fig. 4-93) will be shown.



Example of window when 5 is set for the number of standards.

Fig. 4-93 Window Showing Ongoing Standard Measurement

(6) When measurement is completed, the absorbance of STD1 is shown on the window (Fig. 4-94). This window is shown after completion of measurement of each standard. When [start button] icon is pressed, measurement of the next standard (STD2) will start.



Example of window when 5 is set for the number of standards.

Fig. 4-94 Standard Measurement Window

GUIDE: When you want to re-measure a standard, conduct re-measurement with the calibration curve confirmation window.

(7) When measurement of all set number of standardss is completed, the window of Fig. 4-95 will be shown.

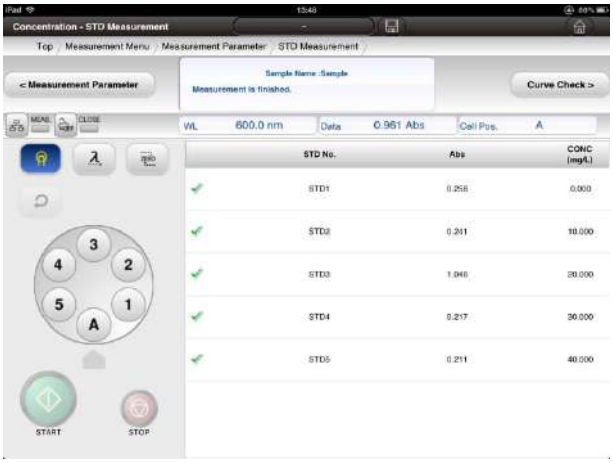


Fig. 4-95 Standard Measurement Window (Standard Number: 5)

13. Confirming Calibration Curve

(1) Press Curve Check > [Curve Check] button and move to the calibration curve confirmation window. The calibration curve confirmation window (Fig. 4-96) will be shown.

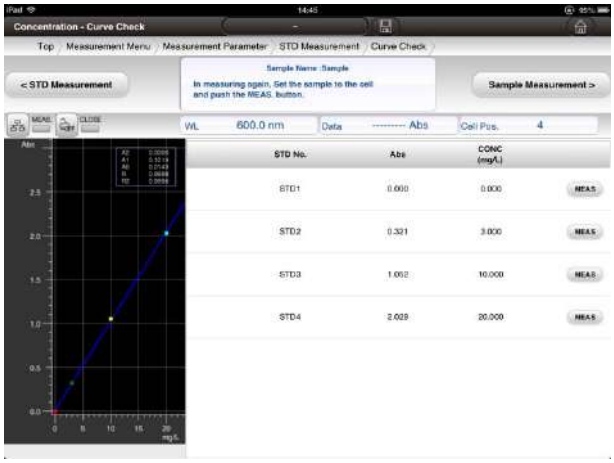


Fig. 4-96 Calibration Curve Confirmation Window

(2) Calibration curve factor, correlation coefficient and determination coefficient will be shown on the calibration curve display window. See Exhibit D for details on calibration curve factor, correlation coefficient and determination coefficient.

(3) Re-measurement of a standard can be made using the calibration curve confirmation window. Set a standard you want to re-measure and press the re-measurement button corresponding to it.

14. Measuring Sample Solution

(1) Press [Measurement >] [measurement button] and move to the sample measurement window. The sample setting window (Fig. 4-97) will be shown. Functions shown in Table 4-54 can be used while waiting for measurement.

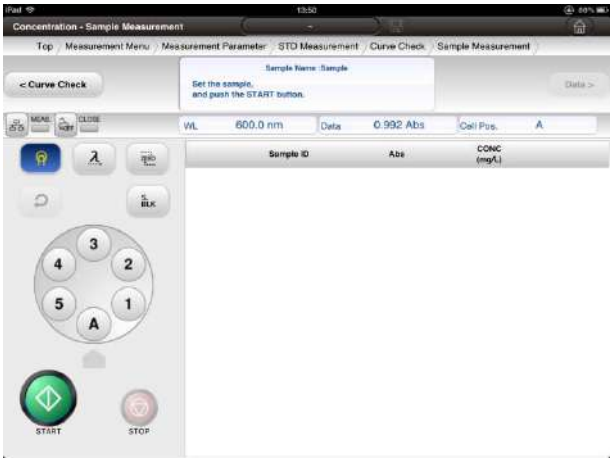


Fig. 4-97 Sample Measurement Window

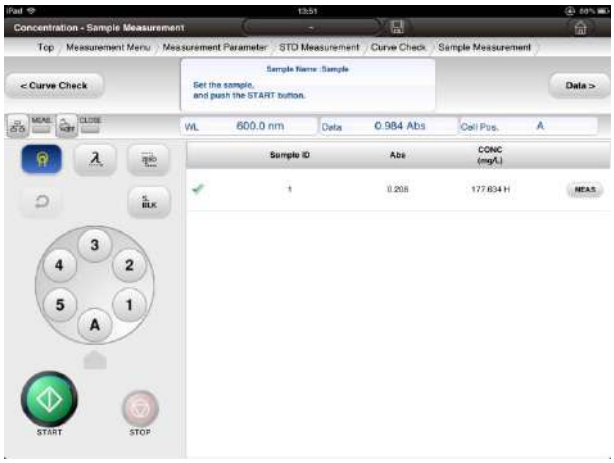
Table 4-54 Explanation of Icons for the Measurement Window

Button	Name	Description
	Lamp on/off (when light is off)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp temporarily.
	Lamp on/off (when light is on)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp.
	Wavelength movement	Pressing the [wavelength movement] icon will be able to temporarily monitor the absorbance of any given wavelength.
	Autozero	Pressing the [autozero] icon allows you to perform autozero. See the method of autozero execution (Fig. 4-98) for details.
	Specimen blank correction	When a specimen blank solution (blank) is placed and the [specimen blank] icon is pressed, the corrected value of the specimen blank will be obtained. See Commentary 4-7 for details.
	Re-measurement	Pressing the [re-measurement] icon will conduct re-measurement of the sample solution.

(2) Set a sample shown in the guidance to the sample compartment. When the sample setting is completed, press  [start button] icon. This will then begin measurement.

NOTE: In the 6 cell manual mode, the equipment will measure photometric values at the cell position shown on the window. To do this, make sure if the cell position at which a standard was set and the cell position shown on the window match each other before measurement.

(1) Make sure the start button is active.
When performing autozero, press ZERO [autozero] icon.



Sample Measurement Window

(2) Set a specimen for autozero at Cell A and press [OK button]. This will then move the 6 cells to Cell A position, at which an autozero will be performed at Cell A position.

(3) After the autozero, the 6 cells return to the position before autozero, and the sample measurement window will return.

GUIDE: When an autozero is frequently conducted, put a specimen for autozero at Cell A position in advance. This will then move the specimen to Cell A position and execute an autozero by just pressing ZERO [autozero] icon.

Fig. 4-98 Autozero Execution Method

(3) After measuring a sample, the absorbance and concentration after measurement will be shown at the corresponding sample position (Fig. 4-99). This window will be shown after measuring each sample.
In addition, when  [start button] icon is pressed, measurement of the next sample will begin.

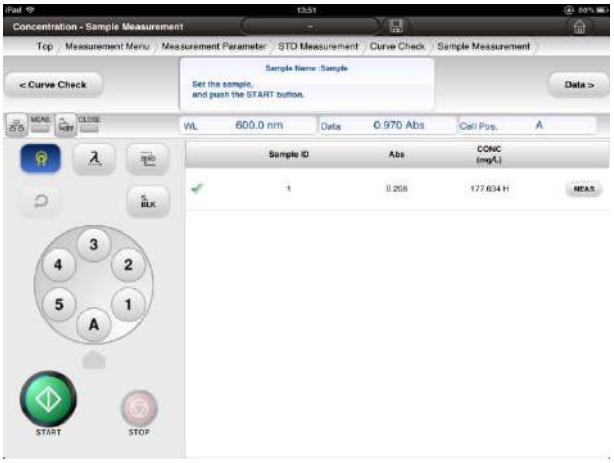


Fig. 4-99 Sample Measurement Window

(4) When measurement of all samples was ended, press [data confirmation button] and move to the data confirmation window.

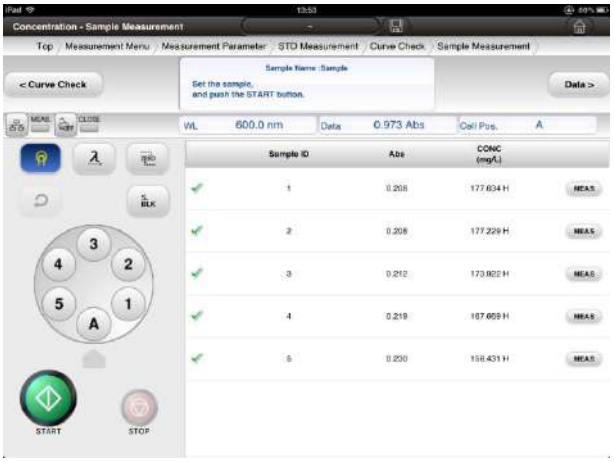


Fig. 4-100 Window After Completion of Measurement of All Samples

GUIDE: When a sample, whose measurement was completed, needs to be MEAS, press  [MEAS button] in the table of the said sample.

15. Saving and Printing Data

When the measurement data are saved

(1) When saving the measured data, press  [save button] icon shown at the header part.

(2) The file input window (Fig. 4-101) will then be shown. After a saving file name is input, press [OK button].

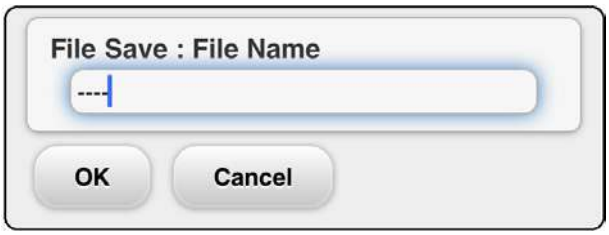


Fig. 4-101 Measured Data Saving Window

Moving to the data confirmation window

(1) Press  [Data button] and move to the data confirmation window (Fig. 4-102).

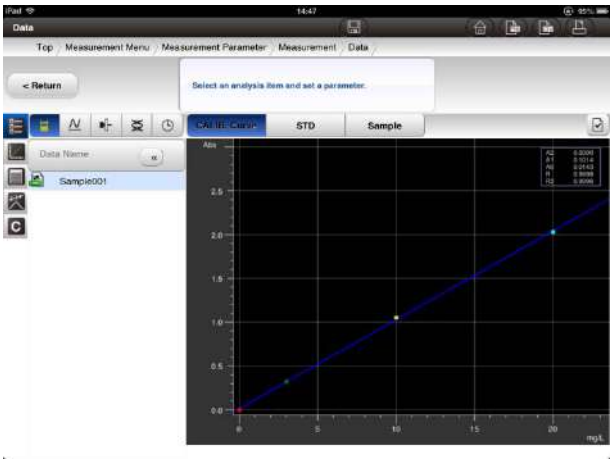


Fig. 4-102 Data Confirmation Window

When printing the measurement data

(1) When printing the measured data, press  [print button] icon shown at the header part.

(2) The printing condition setting window will be shown (Fig. 4-103). Turn ON the item you want to print and press the [preview button under the above conditions].

Fig. 4-103 Printing Condition Setting Window

(3) Print preview (Fig. 4-104) will be shown.

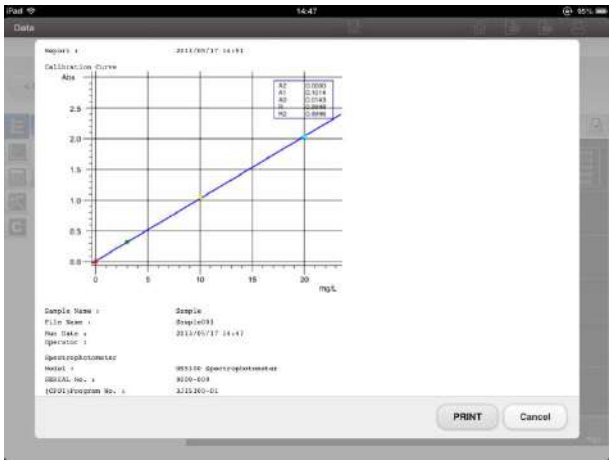


Fig. 4-104 Print Preview Window

(4) Press PRINT [print] to show the printer option (Fig. 4-105). Select the printer and the number of copy and press [print].

Fig. 4-105 Printer Option Window

When outputting the measured data in CSV

(1) When saving the measured data in CSV, press  [CSV file preparation button] icon shown at the header part.

(2) The export window (Fig. 4-106) will then be shown. After inputting the name of the file to save, press [export].

When outputting the measured data in image file

(1) When saving the measured data in image file, press  [PNG file preparation button] icon shown at the header part.

(2) Then, the export window (Fig. 4-106) will be shown. Input the name of a file to save and press [export].

Fig. 4-106 File Export Window

4.3.2 Measuring Absorbance/Transmittance

This function is used to prepare the calibration curve and quantify the concentration of an unknown specimen or input clibration curve factors to quantify the concentration.

1. Starting Up the Product

Start up this product. (See 2.2.1 Starting Up Instrument about the start-up procedure.)

2. Measurement Conditions

3. Setting Sample Conditions

4. Setting Measurement Conditions

For 2. Measurement Conditions, 3. Setting Sample Conditions, and 4. Setting Measurement Conditions, see 2. Measurement Condition to 4. Setting Measurement Conditions in 4.2.2 Measuring Absorbance/Transmittance.

5. Setting 6 Ccells

NOTE: When Off is the condition for 6 cell settings to be determined when single cell holder or rectangular long cell holder is used, the 6 cell mode will not be shown (See 3.1.2.6 Cell Mode for details). When the auto shipper is connected, the items of the auto shipper will be shown instead of the 6 cell mode.

(1) Press  [6 cell tab] in order to set the six cell conditions.

(2) The 6 cell conditions window (Fig. 4-107) will be shown.

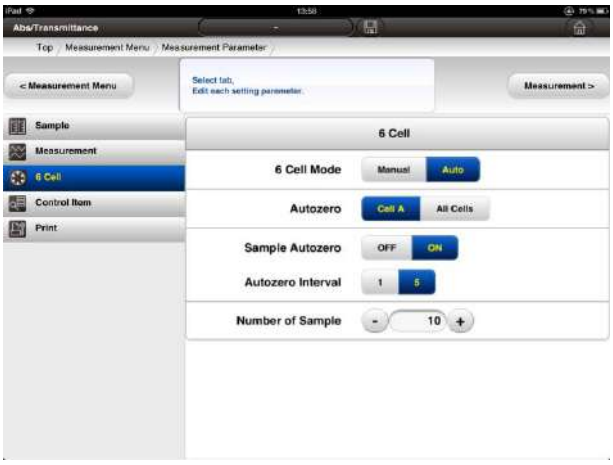


Fig. 4-107 6 Cell Conditions Window

(3) Select and determine each item of the 6 cell conditions. Set the 6 cell mode to "Manual" See Table 4-55 for the details of the parameters.

Table 4-55 Parameters for Setting Calibration Curve Conditions

Setting Item	Description
6 cell mode	Determine the movement of 6 cells during measurement. Auto: This mode automatically rotates 6 cells, with samples manually set to each position in advance, and automatically conducts all processes of measurement from autozero to standards and samples. As the equipment has 6 cells, use of this mode is recommended when there are many specimens to measure. (See 4.2.2 Measuring Absorbance/Transmittance for details of auto mode.) Manual: Standards and samples are measured using one of the 6 cell positions (which may be either from 1 to 5). Autozero can be easily conducted by setting a solution at Cell A for autozero in order to remove the influence of drift (shaking of the baseline) of the equipment during measurement. In the ordinary use, a standard solution or a sample solution will be set at Cell 1.

6. Setting Control items

7. Setting Printing Conditions

8. Setting Condition Saving

For 6. Setting Management Items, 7. Setting Printing Conditions, and 8. Setting Condition Saving, see6. Setting Management Items to 8. Saving Measurement Conditions in 4.2.2 Measuring Absorbance/Transmittance.

9. Measuring Sample Solution

(1) Guidance, "Autozero will be conducted," will be shown (Fig. 4-108). Put a standard for autozero at Cell A and press OK button. When an autozero has already been conducted, press Cancel and move to the sample measurement window.
See the method of autozero execution (Fig. 4-109) for the dtails of autozero method other than when moving to the sample measurement window.

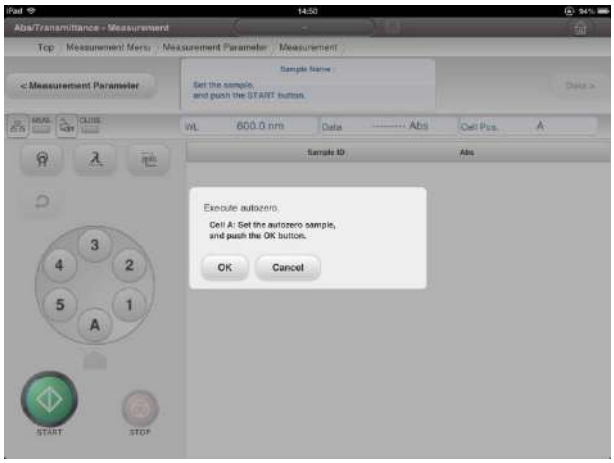
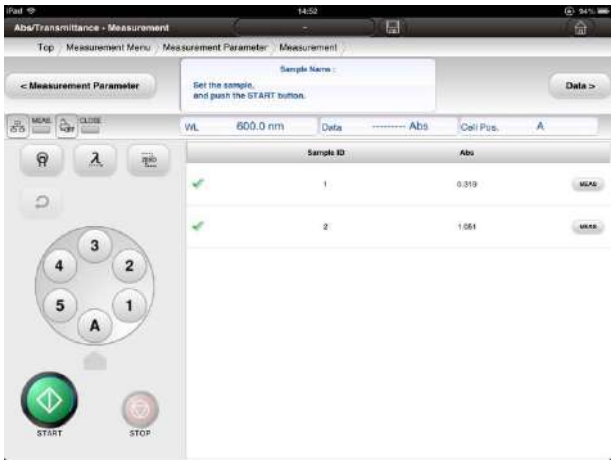


Fig. 4-108 Autozero Execution Window

(1) Make sure the start button is active.
When performing autozero, press ZERO [autozero] icon.



Sample Measurement Window

(2) Set a specimen for autozero at Cell A, put the lid on and press [OK button]. This will then move the 6 cells to Cell A position, at which an autozero will be performed at Cell A position.

(3) After the autozero, the 6 cells return to the position before autozero, and the sample measurement window will return.

GUIDE: When an autozero is frequently conducted, put a specimen for autozero at Cell A position in advance. This will then move the specimen to Cell A position and execute an autozero by just pressing ZERO [autozero] icon.

Fig. 4-109 Autozero Execution Method

Functions shown in Table 4-56 can be used while waiting for measurement.

Table 4-56 Explanation of Icons for the Measurement Window

Button	Name	Description
	Lamp on/off (when light is off)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp temporarily.
	Lamp on/off (when light is on)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp.
	Wavelength movement	Pressing the [wavelength movement] icon will be able to temporarily monitor the absorbance of any given wavelength.
	Autozero	Pressing the [autozero] icon allows you to perform autozero.
	Re-measurement	Pressing the [re-measurement] icon will conduct re-measurement of a standard solution.

(2) The guidance for sample measurement (Fig. 4-110) will be shown. Set a sample shown in the guidance to the sample compartment. When the sample setting is completed, press  [start button] icon. This will then begin measurement.

NOTE: In the 6 cell manual mode, the equipment will measure photometric values at the cell position shown on the window. To do this, make sure if the cell position at which a standard was set and the cell position shown on the window match each other before measurement.

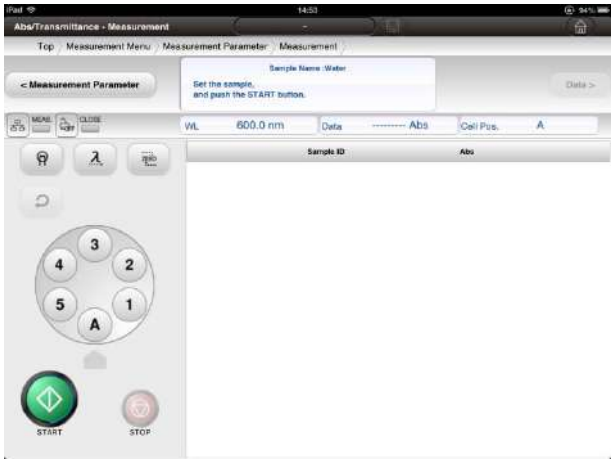


Fig. 4-110 Sample Measurement Window

(3) After measuring a sample, the absorbance and concentration after measurement will be shown at the corresponding sample position (Fig. 4-111). This window will be shown after measuring each sample.
In addition, when  [start button] icon is pressed, measurement of the next sample will begin.

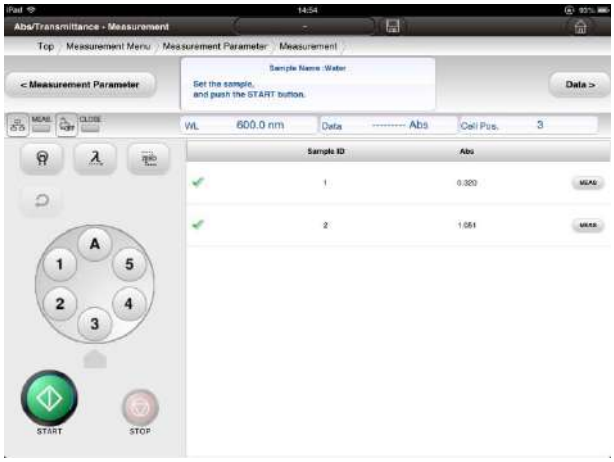


Fig. 4-111 Sample Measurement Window

(4) When measurement of all samples was ended, press  [Data button] and move to the data confirmation window.

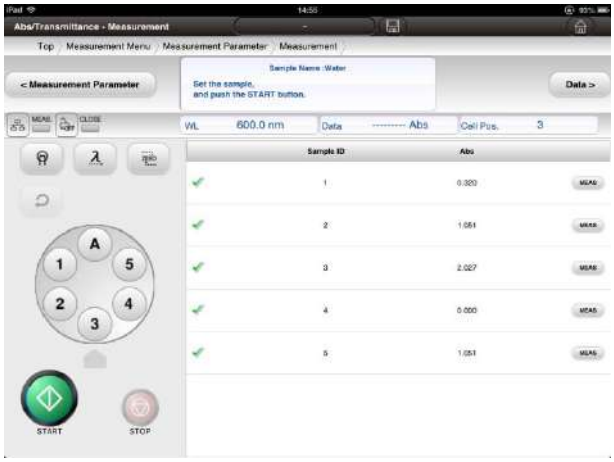


Fig. 4-112 Window After Completion of Measurement of All Samples

GUIDE: When a sample, whose measurement was completed, needs to be re-measured, press  [MEAS button] in the table of the said sample.

10. Saving and Printing Data

When the measurement data are saved

(1) When saving the measured data, press  [save button] icon shown at the header part.

(2) The file input window (Fig. 4-113) will then be shown. After a saving file name is input, press [OK button].

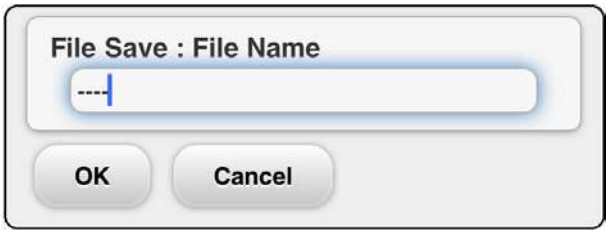


Fig. 4-113 Measured Data Saving Window

Moving to the data confirmation window

(1) Press  [Data button] and move to the data confirmation window (Fig. 4-114).

Fig. 4-114 Data Confirmation Window

When printing the measurement data

(1) When printing the measured data, press  [print button] icon shown at the header part.

(2) The printing condition setting window will be shown (Fig. 4-115). Turn ON the item you want to print and press the [preview button under the above conditions].

Fig. 4-115 Printing Condition Setting Window

(3) Print preview (Fig. 4-116) will be shown.

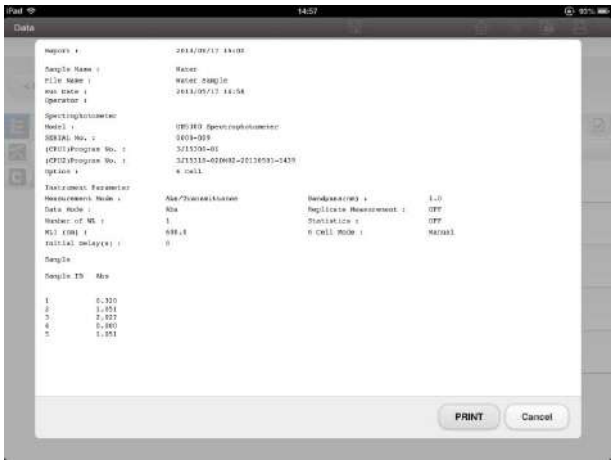


Fig. 4-116 Print Preview Window

(4) Press PRINT [print] to show the printer option (Fig. 4-117). Select the printer and the number of copy and press [print].

Fig. 4-117 Printer Option Window

When outputting the measured data in CSV

(1) When saving the measured data in CSV, press [CSV file preparation button] icon shown at the header part.

(2) The export window (Fig. 4-118) will then be shown. After inputting the name of the file to save, press [export].

Fig. 4-118 File Export Window

4.3.3 Measuring Nucleic Acid Specimens

Absorbance of nucleic acid specimens (230 nm, 260 nm, 280 nm, and 320 nm) can be measured, and purity, concentration, protein concentration, etc. of nucleic acids can be calculated from the measured absorbance and the absorbance ratios (A260/A280, A260/A230). This function is also used to calculate the ratio of absorbance after absorbance of two wavelengths is measured.

1. Starting Up the Product

Start up this product. (See 2.2.1 Starting Up Instrument about the start-up procedure.)

2. Measurement Conditions

3. Setting Sample Conditions

4. Setting Measurement Conditions

5. Setting Nucleic Acid Concentration Conditions

6. Setting Protein Concentration Conditions

For 2. Measurement Conditions, 3. Setting Sample Conditions, 4. Setting Measurement Conditions, 5. Setting Nucleic Acid Concentration Conditions, and 6. Setting Protein Concentration Conditions, see 2. Setting Measurement Conditions to 6. Setting Protein Concentration Conditions in 4.2.3 Measuring Nucleic Acid Specimens.

7. Setting 6 Cells

NOTE: When Off is the condition for 6 cell settings to be determined when single cell holder or rectangular long cell holder is used, the 6 cell mode will not be shown (See 3.1.2.6 Cell Mode for details). When the auto shipper is connected, the items of the auto shipper will be shown instead of the 6 cell mode.

(1) Press  [6 cell tab] in order to set the six cell conditions.

(2) The 6 cell conditions window (Fig. 4-119) will be shown.

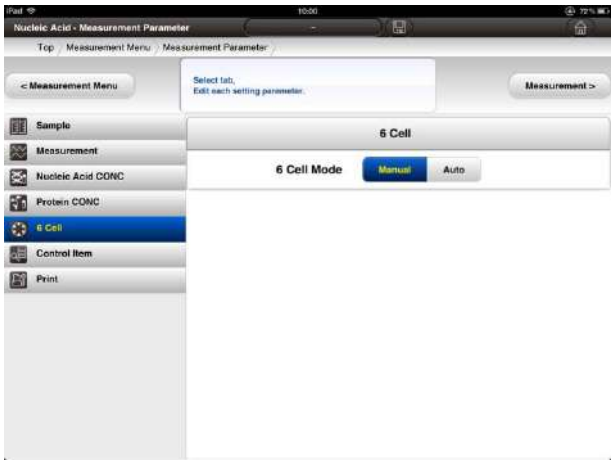


Fig. 4-119 6 cell Conditions Window

(3) Select and determine each item of the 6 cell conditions. Set the 6 cell mode to "Manual" See Table 4-57 for the details of the parameters.

Table 4-57 Parameters for Setting Calibration Curve Conditions

Setting Item	Description
6 cell mode	Determine the movement of 6 cells during measurement. Auto: This mode automatically rotates 6 cells, with samples manually set to each position in advance, and automatically conducts all processes of measurement from autozero to standards and samples. As the equipment has 6 cells, use of this mode is recommended when there are many specimens to measure. (See 4.3.3 Measuring Nucleic Acid Specimens for the details of auto mode.) Manual: Standards and samples are measured using one of the 6 cell positions (which may be either from 1 to 5). Autozero can be easily conducted by setting a solution at Cell A for autozero in order to remove the influence of drift (shaking of the baseline) of the equipment during measurement. In the ordinary use, a standard solution or a sample solution will be set at Cell 1.

8. Setting Control Items

9. Setting Printing Conditions

10. Setting Condition Saving

See 8. Setting Management Items, 9. Setting Printing Conditions and 10. Setting Condition Saving in 4.3.3 Measuring Nucleic Acid Specimens.

11. Measuring Sample Solution

(1) Guidance, "Autozero will be conducted," will be shown (Fig. 4-120). Put a standard for autozero at Cell A and press OK button. When an autozero has already been conducted, press Cancel and move to the sample measurement window.

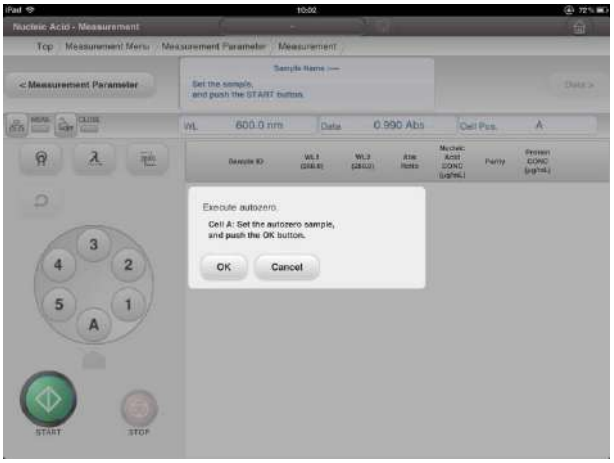
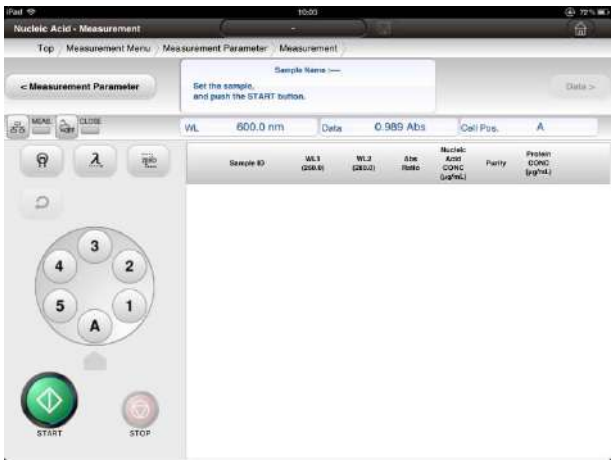


Fig. 4-120 Autozero Execution Window

(1) Make sure the start button is active.
When performing autozero, press ZERO [autozero] icon.



Sample Measurement Window

(2) Set a specimen for autozero at Cell A, put the lid on and press [OK button]. This will then move the 6 cells to Cell A position, at which an autozero will be performed at Cell A position.

(3) After the autozero, the 6 cells return to the position before autozero, and the sample measurement window will return.

GUIDE: When an autozero is frequently conducted, put a specimen for autozero at Cell A position in advance. This will then move the specimen to Cell A position and execute an autozero by just pressing ZERO [autozero] icon.

Fig. 4-121 Autozero Execution Method

Functions shown in Table 4-58 can be used while waiting for measurement.

Table 4-58 Explanation of Icons for the Measurement Window

Button	Name	Description
	Lamp on/off (when light is off)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp temporarily.
	Lamp on/off (when light is on)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp.
	Wavelength movement	Pressing the [wavelength movement] icon will be able to temporarily monitor the absorbance of any given wavelength.
	Autozero	Pressing the [autozero] icon allows you to perform autozero.
	Re-measurement	Pressing the [re-measurement] icon will conduct re-measurement of a standard solution.

(2) The guidance for sample measurement (Fig. 4-122) will be shown. Set a sample shown in the guidance to the sample compartment. When the sample setting is completed, press  [start button] icon. This will then begin measurement.

NOTE: In the 6 cell manual mode, the equipment will measure photometric values at the cell position shown on the window. To do this, make sure if the cell position at which a standard was set and the cell position shown on the window match each other before measurement.

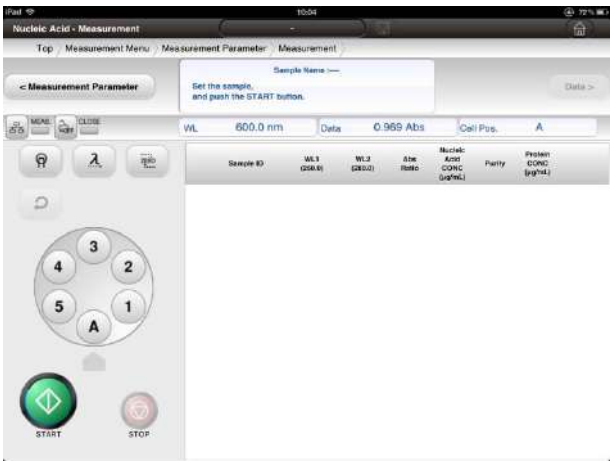


Fig. 4-122 Sample Measurement Window

(3) After measuring a sample, the absorbance and concentration after measurement will be shown at the corresponding sample position (Fig. 4-123). This window will be shown after measuring each sample.
In addition, when  [start button] icon is pressed, measurement of the next sample will begin.

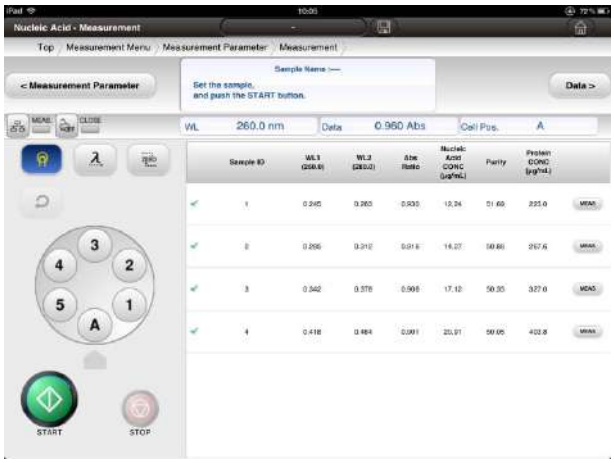


Fig. 4-123 Sample Measurement Window

(4) When measurement of all samples was ended, press  [Data button] and move to the data confirmation window.

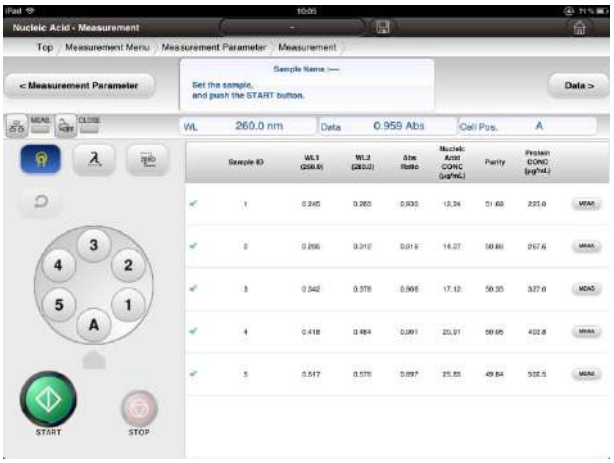


Fig. 4-124 Window After Completion of Measurement of All Samples

GUIDE: When a sample, whose measurement was completed, needs to be re-measured, press  [MEAS button] in the table of the said sample.

12. Saving and Printing Data

When the measurement data are saved

(1) When saving the measured data, press  [save button] icon shown at the header part.

(2) The file input window (Fig. 4-125) will then be shown. After a saving file name is input, press [OK button].

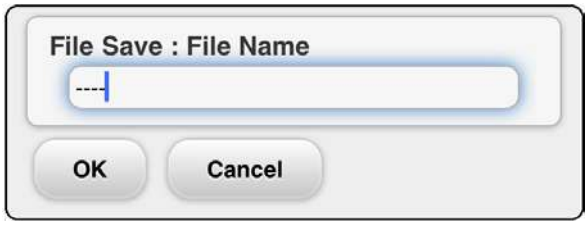


Fig. 4-125 Measured Data Saving Window

Moving to the data confirmation window

(1) Press  [Data button] and move to the data confirmation window (Fig. 4-126).

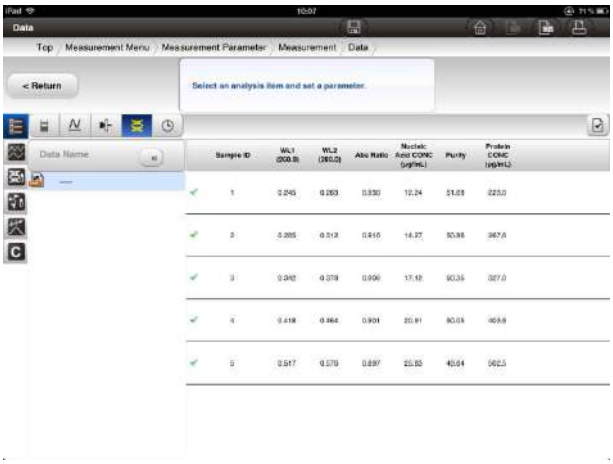


Fig. 4-126 Data Confirmation Window

When printing the measurement data

(1) When printing the measured data, press  [print button] icon shown at the header part.

(2) The printing condition setting window will be shown (Fig. 4-127). Turn ON the item you want to print and press the [preview button under the above conditions].

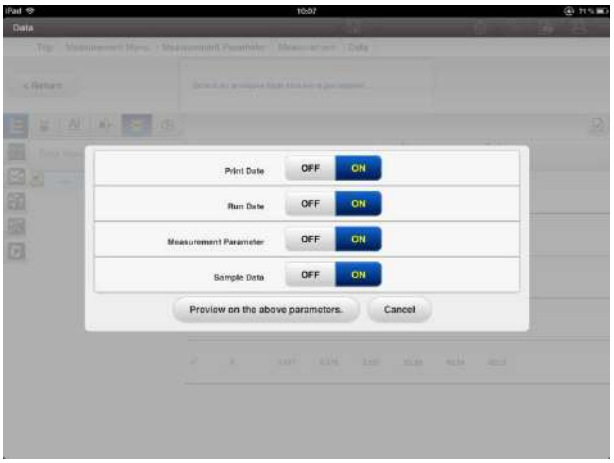


Fig. 4-127 Printing Condition Setting Window

(3) Print preview (Fig. 4-128) will be shown.

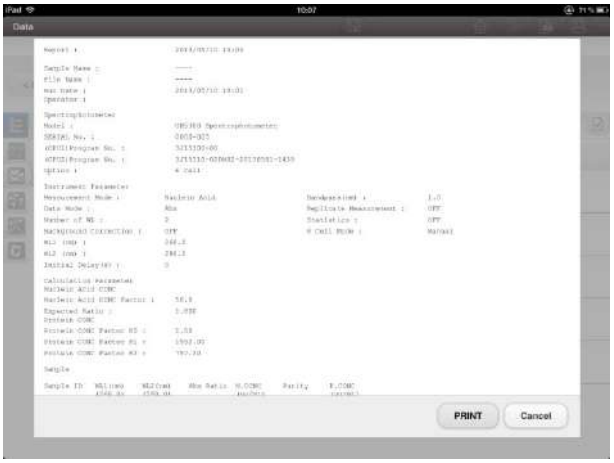


Fig. 4-128 Print Preview Window

(4) Press PRINT [print] to show the printer option (Fig. 4-129). Select the printer and the number of copy and press [print].

Fig. 4-129 Printer Option Window

When outputting the measured data in CSV

(1) When saving the measured data in CSV, press [CSV file preparation button] icon shown at the header part.

(2) The export window (Fig. 4-130) will then be shown. After inputting the name of the file to save, press [export].

Fig. 4-130 File Export Window

4.3.4 Measuring Spectra

Transmission spectra and absorption spectra can be measured. When a blank is placed at Cell A, the equipment will automatically conduct baseline correction and measures a sample.

1. Starting Up the Product

Start up this product. (See 2.2.1 Starting Up Instrument about the start-up procedure.)

2. Measurement Conditions
3. Setting Sample Conditions
4. Setting Measurement Conditions

For 2. Measurement Conditions, 3. Setting Sample Conditions, and 4. Setting Measurement Conditions, see 2. Setting Measurement Conditions to 4. Setting Measurement Conditions in 4.2.4 Measuring Spectra.

5. Setting 6 Cells

NOTE: When Off is the condition for 6 cell settings to be determined when single cell holder or rectangular long cell holder is used, the 6 cell mode will not be shown (See 3.1.2.6 Cell Mode for details). When the auto shipper is connected, the items of the auto shipper will be shown instead of the 6 cell mode.

(1) Press  [6 cell tab] in order to set the six cell conditions.

(2) The 6 cell conditions window (Fig. 4-131) will be shown.

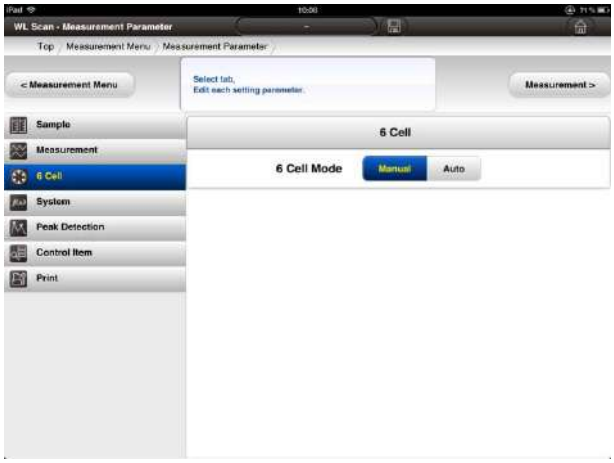


Fig. 4-131 6 cell Conditions Window

(3) Select and determine each item of the 6 cell conditions. Set the 6 cell mode to "Auto." See Table 4-59 for the details of the parameters.

Table 4-59 Parameters for Setting Calibration Curve Conditions

Setting Item	Description
6 cell mode	Select the movement of the 6 cells during measurement from either of the following two: Auto: This setting can automatically measure one sample after automatically rotating 6 cells and conducting baseline correction by setting specimens for baseline and samples to the 6 cells. (See 4.2.4 Measuring Spectra for the details of the auto mode.) Manual: In this setting, the user should manually conduct baseline correction and sample measurement. The user needs to manually move cells or make baseline correction.

6. Setting System Conditions

7. Setting Peak Detection Conditions

8. Setting Control Items

9. Setting Printing Conditions

10. Setting Measurement Conditions

For 6. Setting System Conditions to 10. Saving Measurement Conditions, see 6. Setting System Conditions to 10. Saving Measurement Conditions in 4.2.4 Measuring Spectra.

11. Baseline Correction

(1) Guidance, "Baseline measurement will be conducted," will be shown. Put a specimen for baseline in Cell A and press [OK button]. When baseline measurement has already been conducted, press Cancel and move to the sample measurement window.
Pressing  [baseline correction] icon can also execute baseline correction. When any baseline saved under the same measurement conditions exists, the user can conduct sample measurement without conducting baseline correction.

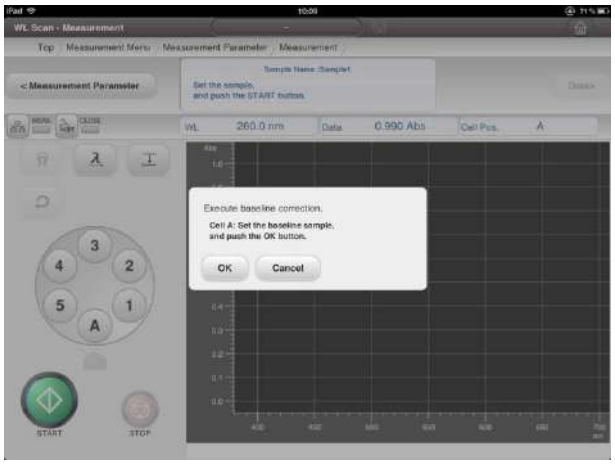


Fig. 4-132 Guidance on Baseline Correction

12. Measuring Sample Solution

(1) When baseline correction is completed, the guidance on sample measurement (Fig. 4-133) will be shown. Set a sample at the present cell position. Then, press  [start button] icon to start measurement.

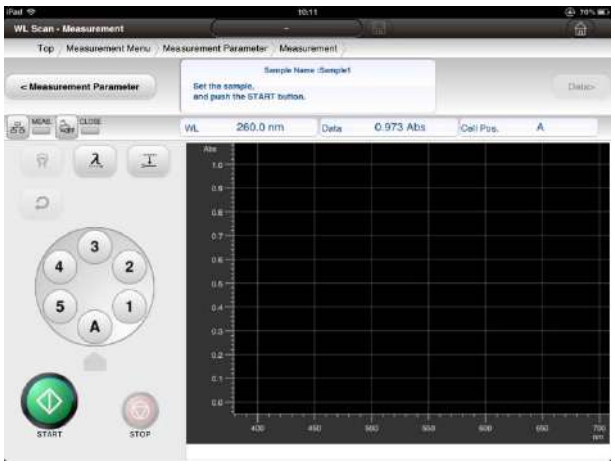


Fig. 4-133 Sample Measurement Window

NOTE: In the 6 cell manual mode, the equipment will measure photometric values at the cell position shown on the window. To do this, make sure if the cell position at which a standard was set and the cell position shown on the window match each other before measurement.

(2) When measurement is completed, the window as in Fig. 4-134 will be shown.

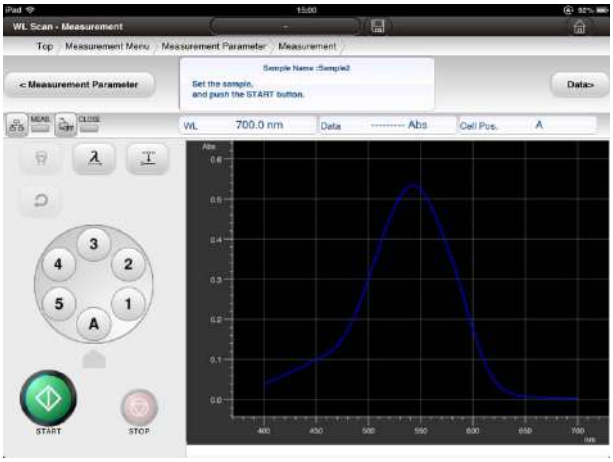


Fig. 4-134 Window After Sample Measurement

(3) To continue sample measurement, set the next sample at the present cell position. Pressing  [start button] icon to start measurement.

Functions shown in Table 4-60 can be used while waiting for measurement.

Table 4-60 Explanation of Icons for the Measurement Window

Button	Name	Description
	Lamp on/off (when light is off)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp temporarily.
	Lamp on/off (when light is on)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp.
	Wavelength movement	Pressing the [wavelength movement] icon will be able to temporarily monitor the absorbance of any given wavelength.
	Baseline correction	Pressing the [baseline correction] icon will move the turret measurement position to Cell A to re-correct the baseline. This is effective for long-time measurement.
	Re-measurement	Pressing the [re-measurement] icon will conduct re-measurement of a standard solution.

13. Saving and Printing Data

When the measurement data are saved

(1) When saving the measured data, press  [save button] icon shown at the header part.

(2) The file input window (Fig. 4-135) will then be shown. After a saving file name is input, press [OK button].

Fig. 4-135 Measurement Condition Saving Window

Moving to the data confirmation window

(1) Press Data > [Data button] and move to the data confirmation window (Fig. 4-136).

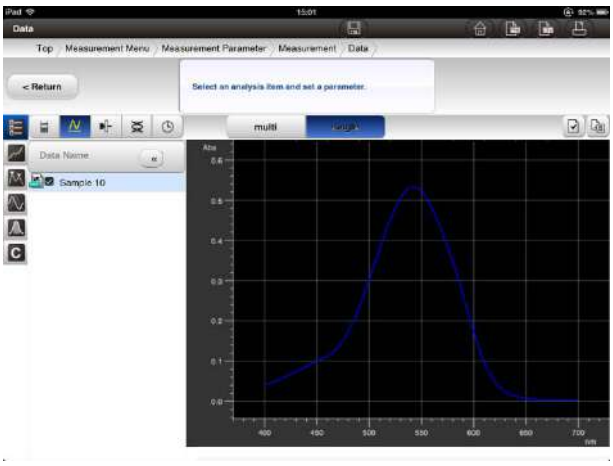


Fig. 4-136 Data Confirmation Window

When printing the measurement data

(1) When printing the measured data, press  [print button] icon shown at the header part.

(2) The printing condition setting window will be shown (Fig. 4-137). Turn ON the item you want to print and press the [preview button under the above conditions].

Fig. 4-137 Printing Condition Setting Window

(3) Print preview (Fig. 4-138) will be shown.

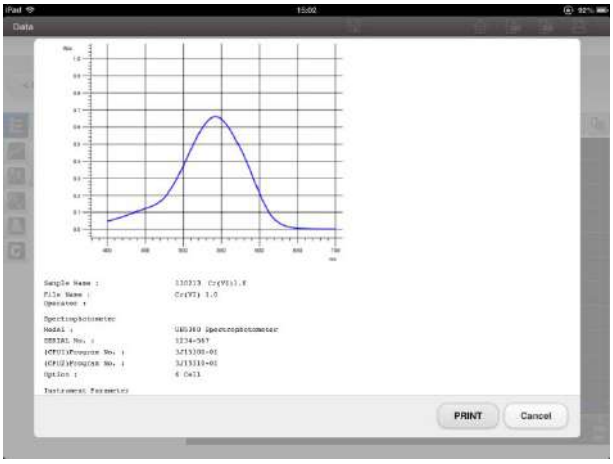


Fig. 4-138 Print Preview Window

(4) Press PRINT [print] to show the printer option (Fig. 4-139). Select the printer and the number of copy and press [print].

Fig. 4-139 Printer Option Window

When outputting the measured data in CSV

(1) When saving the measured data in CSV, press [CSV file preparation button] icon shown at the header part.

(2) The export window (Fig. 4-140) will then be shown. After inputting the name of the file to save, press [export].

When outputting the measured data in image file

(1) When saving the measured data in image file, press [PNG file preparation button] icon shown at the header part.

(2) Then, the export window (Fig. 4-140) will be shown. Input the name of a file to save and press [export].

Fig. 4-140 File Export Window

4.3.5 Time Scanning

This function is used to measure changes in absorbance/transmittance of specimens with time. It is used to evaluate deterioration of specimens by changes in absorbance or evaluate enzyme activity.

1. Starting Up the Product

Start up this product. (See 2.2.1 Starting Up Instrument about the start-up procedure.)

2. Setting Measurement Conditions

(1) Press  [measurement button] iceon on the top page (Fig. 4-141). Then, the measurement item selection window (Fig. 4-142) will be displayed. In order to set conditions for time scan, press  [time scan button] icon.

Fig. 4-141 Top Window

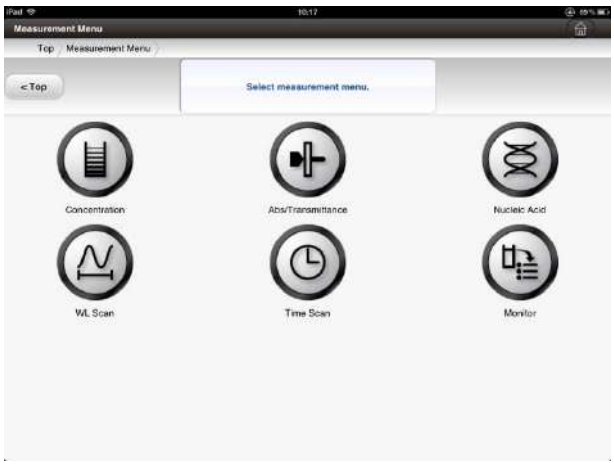


Fig. 4-142 Measurement Menu Window

3. Setting Sample Conditions

(1) Press  [Sample tab] to set sample conditions.

(2) The sample conditions window (Fig. 4-143) will be shown.

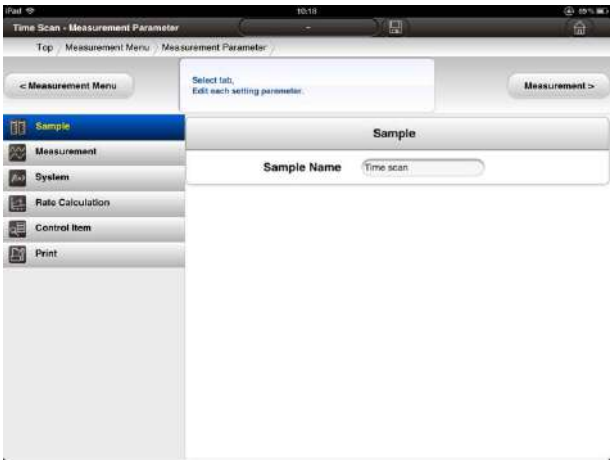


Fig. 4-143 Sample Conditions Window

(3) Select each item of sample condition and make the setting. See Table 4-61 for the details of each parameter.

Table 4-61 About Inputting Sample Names

Setting Item	Description
Sample Name	Sample names can be input in two-byte or one-bype English character fonts. The largest number of characters inputtable is 20 in one-byte English character fonts. Sample names input here will be printed in the field of "Sample Name" of the report.

4. Setting Measurement Conditions

(1) The time scan window (Fig. 4-144) will be shown. Use [Measurement tab] to set data mode, wavelength, scan time, sampling interval, and initial delay. See Table 4-62 for the details of each parameter.

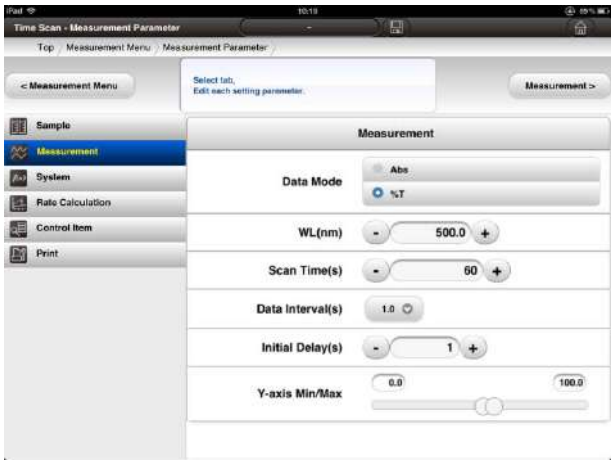


Fig. 4-144 Measurement Conditions Window

Table 4-62 Parameters for Setting Measurement Conditions

<table>
<tr><th>Setting Item</th><th>Description</th></tr>
<tr><td>Data Mode</td><td>Select the data mode for the vertical axis.
ABS: used to measure absorbance.
%T: Used to measure transmittance.</td></tr>
<tr><td>WL (nm)</td><td>Input the wavelength to measure.
Set any value at an interval of 0.1 nm between 190.0 and 1,100.0 nm.</td></tr>
<tr><td>Scan Time (s)</td><td>Set the scan time.
The time can be set at an interval of 1 second in the range of 10 to 100,000 s.</td></tr>
<tr><td>Data Interval (s)</td><td>Set the data interval.
The selectable data interval changes depending on the scan time.
Scan time and data interval
<table>
<tr><th>Scan time (s)</th><th>Data interval (s)</th></tr>
<tr><td rowspan="4">10≦T≦10000</td><td>1.0</td></tr>
<tr><td>2.0</td></tr>
<tr><td>5.0</td></tr>
<tr><td>10.0</td></tr>
<tr><td rowspan="3">10000＜T≦20000</td><td>2.0</td></tr>
<tr><td>5.0</td></tr>
<tr><td>10.0</td></tr>
<tr><td rowspan="2">20000＜T≦50000</td><td>5.0</td></tr>
<tr><td>10.0</td></tr>
<tr><td>50000＜T≦100000</td><td>10.0</td></tr>
</table></td></tr>
<tr><td>Initial Delay (s)</td><td>Prior to measuring, press  [start button] icon, wait for the time set here and start measurement. Any value at an inteval of 1 second can be input between 0 to 9999 seconds.
This is used when you want to start measurement after the passage of a certain period of time such as when you want to measure after returning the temperature of a specimen to room temperature or start measurement after completing the reaction. Input 0 when you don't make any setting.</td></tr>
<tr><td>Y-axis Max</td><td>Set the upper limit of the vertical axis when spectra are shown.
A coefficient may be set in the following range:
For %T: -999.9 to 999.9
For ABS: -9.999 to 9.999</td></tr>
<tr><td>Y-axis Min</td><td>Set the lower limit of the vertical limit when spectra are shown.
A coefficient may be set in the following range:
For %T: -999.9 to 999.9
For ABS: -9.999 to 9.999</td></tr>
</table>

5. Setting System Conditions

(1) Press f(x) [System tab] to set system conditions.

(2) The system conditions window (Fig. 4-145) will then be shown. Set the conditions for response and lighting mode according to the guidance. See Table 4-63 for details.

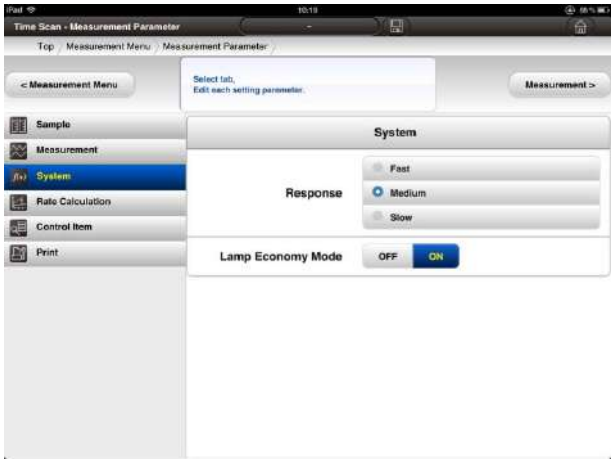


Fig. 4-145 System Conditions Window

Table 4-63 About Parameters for Setting System Conditions

Setting Item	Description
Response	Select the type of response from either of the following three: Fast: Used to make fine measurement for the wavelength. The result will contain larger noise compared with the standard speed or low speed. Medium: Used for ordinary measurement. Slow: Used to reduce the dispersion of photometric values. This mode is not appropriate for sample measurement that show large changes with time compared with the high speed or standard mode.
Lamp Economy Mode	Set the lamp economy mode. ON: Standard mode. OFF: In this mode, the number of lighting-up frequency of the light source per piece of data is larger than in ON mode. This mode enables measurement with low noise. It is appropriate for measurement with reduced noise or when strict measurement is required.

6. Setting Rate Calculation Conditions

(1) Press  [Rate Calculation tab] to set rate calculation conditions.

(2) The rate calculation conditions window (Fig. 4-146) will then be shown. Set the rate calculation conditions. See Table 4-64 for details.

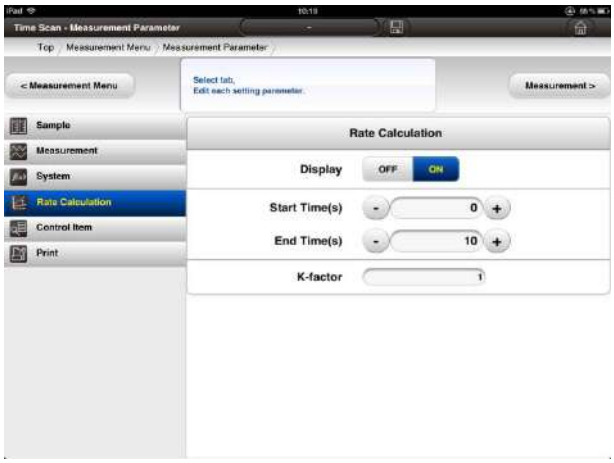


Fig. 4-146 Rate Calculation Conditions Window

Table 4-64 Parameters for Setting Rate Calculation Conditions

Setting Item	Description
Display	Select whether or not rate calculation is conducted. ON: Conducts rate calculation. OFF: Does not conduct rate calculation. See Exhibit E Details of Rate Analysis Function for details of rate calculation.
Start Time	Input the time to start rate calculation. Starting time: 0 to 100,000 Set the time so that the starting time < ending time.
End Time	Input the time to end rate calculation. Ending time: 0 to 100000 Set the time so that the starting time < ending time.
K-factor	Set a coefficient used for rate calculation. A coefficient may be set in the following range: Coefficient: -999999.9 to 999999.9

7. Setting Control Items

(1) Press  [control item tab] to set control items.

(2) The control item window window (Fig. 4-147) will then be shown.

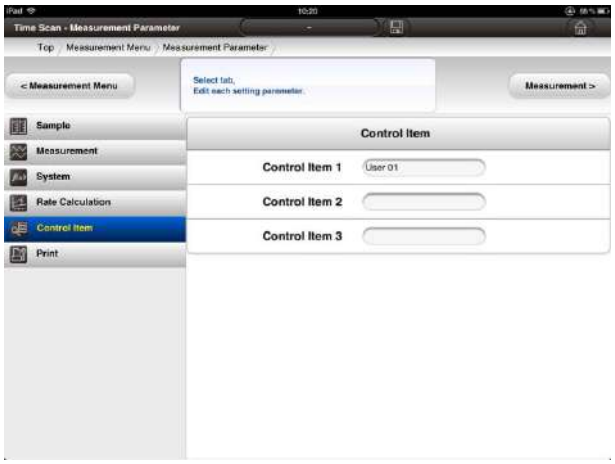


Fig. 4-147 Control Item Window

(3) Input a comment in a control item.

GUIDE: A comment to be input in a control item should be a search keyword in reference for condition file or reference for data file.
(See 5.1.1 Reading Saved Data for details)

8. Setting Printing Conditions

GUIDE: Set those conditions when items to be printed are predetermined. Printing items can be set even after completion of measurement.

(1) Press  [print tab] to set printing conditions.

(2) The printing conditions window (Fig. 4-148) will then be shown.

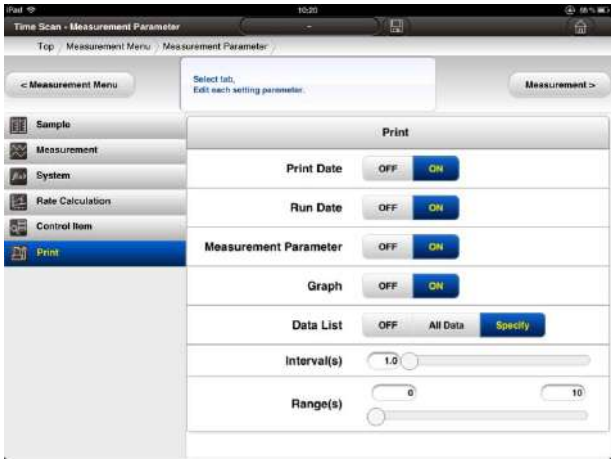


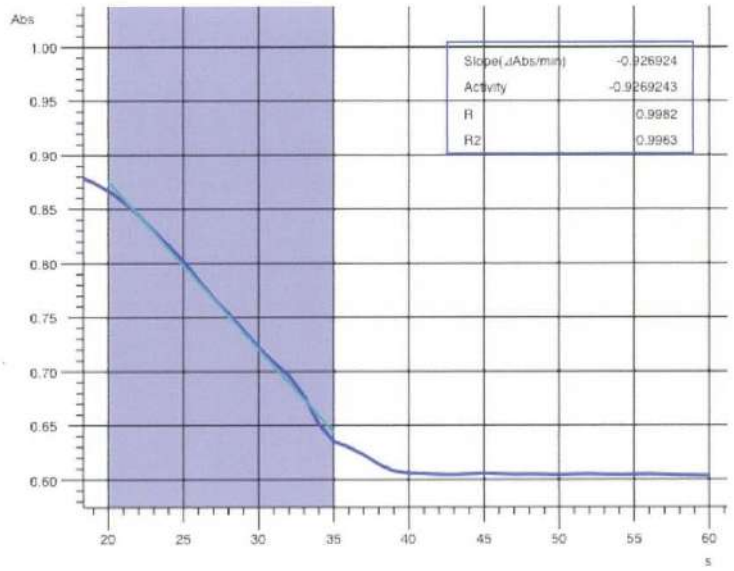
Fig. 4-148 Printing Conditions Window

(3) Selet each item of printing conditions and make the settings according to the guidance. See Table 4-65 for the details of each parameter.

Table 4-65 Parameters for Setting Printing Conditions

Setting item	Description	Position of a printing example in Fig. 4-149
Print Date	ON: Printing date and time will be printed. OFF: Printing date and time will not be printed.	1)
Run Date	ON: Analysis date and time will be printed. OFF: Analysis date and time will not be printed.	2)
Measurement Parameter	ON: Measurement conditions will be printed. OFF: Measurement conditions will not be printed.	3)
Graph	ON: Prints a graph for changes with time. OFF: Does not print a graph for changes with time.	4)
Data List	OFF: Does not print numerical data of changes with time. All data: Prints all numerical data of changes with time. Designated interval: Prints numerical data of changes with time at the designated interval.	5)
Interval(s)	Set the interval for printing data lists. This will be shown when the designated interval for printing of data lists is selected. It may be input in the range from 1 to 100.	-
Range	This will be shown when the data printing interval is designated. Designate the printing range.	-

Report : 2013/05/17 15:08 ..... 1)



4)

Sample Name :
File Name : Time Data 02 ..... 2)
Run Date : 2013/05/13 17:34
Operator :

Spectrophotometer
Model : UH5300 Spectrophotometer
SERIAL No. : 0000-009
(CPU1)Program No. : 3J15300-01
(CPU2)Program No. : 3J15310-02DM02-20130501-1439
Option : 6 Cell

Instrument Parameter

Measurement Mode :	Time Scan	Bandpass(nm) :	1.0
Data Mode :	Abs	Response :	Medium
WL(nm) :	540.0	Lamp Economy Mode :	ON
Scan Time(s) :	60		
Data Interval(s) :	1.0		
Initial Delay(s) :	0		

3)

Rate Calculation

Start(s) :	20.0
End(s) :	35.0
K-factor :	1
Slope(⊿Abs/min) :	-0.926924
Activity :	-0.9269243
R :	0.9982
R2 :	0.9963

Data List

No.	TIME(s)	Abs	No.	TIME(s)	Abs	No.	TIME(s)	Abs
1	20	0.867	4	26	0.785	7	32	0.696
2	22	0.845	5	28	0.754	8	34	0.651
3	24	0.817	6	30	0.722	9	36	0.630

5)

Fig. 4-149 Example of Printing of Changes with Time

9. Setting Printing Conditions

GUIDE: Move to the measuring window when the set measurement conditions are not saved.

(1) When saving the set conditions, press  [save button] icon shown at the header part.

(2) The file input window (Fig. 4-150) will then be shown. After a saving file name is input, press [OK button].

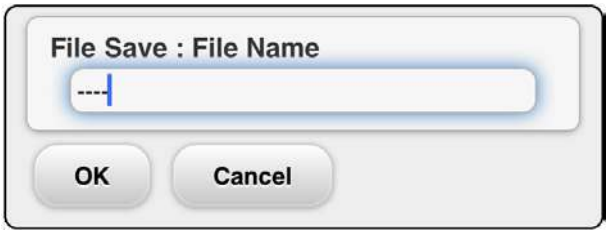


Fig. 4-150 Measurement Condition Saving Window

10. Measuring Sample Solution

(1) Guidance, "Autozero will be conducted," will be shown (Fig. 4-151). Put a standard for autozero at Cell A and press OK button. When an autozero has already been conducted, press Cancel and move to the sample measurement window.

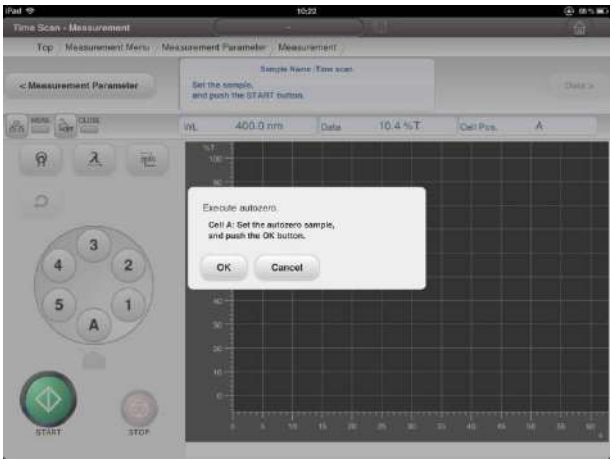


Fig. 4-151 Autozero Execution Window

(2) The guidance for sample measurement (Fig. 4-152) will be shown. Set a sample shown in the guidance to the sample compartment. When the sample setting is completed, press  [start button] icon. This will then begin measurement.

NOTE: In the 6 cell manual mode, the equipment will measure photometric values at the cell position shown on the window. To do this, make sure if the cell position at which a standard was set and the cell position shown on the window match each other before measurement.

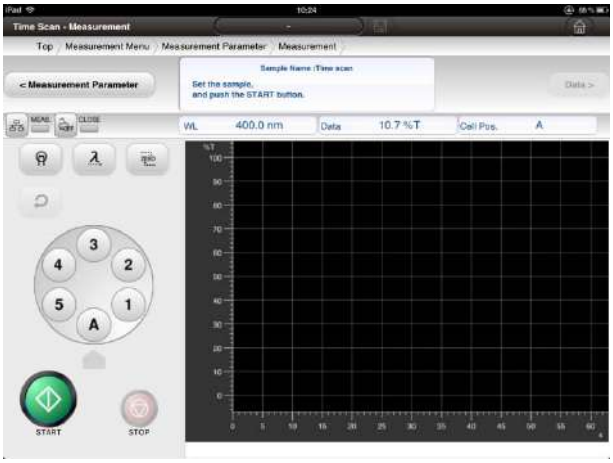


Fig. 4-152 Sample Measurement Window

(3) When measurement of samples is completed, the window of Fig. 4-153 will be shown.

Fig. 4-153 Window After Sample Measurement

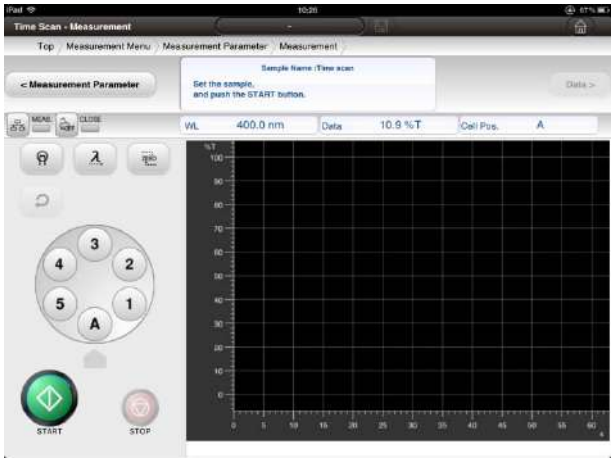
(4) When sample measurement continues, set the next sample at the present cell position. Press  [start butotn] icon to start measurement.

Functions shown in Table 4-66 can be used while waiting for measurement.

Table 4-66 Explanation of Icons for the Measurement Window

Button	Name	Description
	Lamp on/off (when light is off)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp temporarily.
	Lamp on/off (when light is on)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp.
	Wavelength movement	Pressing the [wavelength movement] icon will be able to temporarily monitor the absorbance of any given wavelength.
	Autozero	Pressing the [autozero] icon allows you to perform autozero.
	Re-measurement	Pressing the [re-measurement] icon will conduct re-measurement of a standard solution.

(1) Make sure the start button is active.
When performing autozero, press ZERO [autozero] icon.



Sample Measurement Window

(2) Set a specimen for autozero at Cell A, put the lid on and press [OK button]. Then, autozero will be performed at Cell A position.

(3) After the autozero, the 6 cells return to the position before autozero, and the sample measurement window will return.

GUIDE: When an autozero is frequently conducted, put a specimen for autozero at Cell A position in advance. This will then move the specimen to Cell A position and execute an autozero by just pressing ZERO [autozero] icon.

Fig. 4-154 Autozero Execution Method

11. Saving and Printing Data

When the measurement data are saved

(1) When saving the measured data, press  [save button] icon shown at the header part.

(2) The file input window (Fig. 4-155) will then be shown. After a saving file name is input, press [OK button].

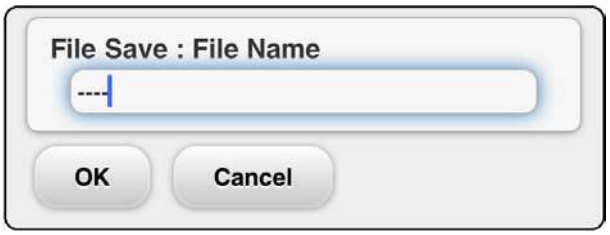


Fig. 4-155 Measured Data Saving Window

Moving to the data confirmation window

(1) Press  [Data button] and move to the data confirmation window (Fig. 4-156).

Fig. 4-156 Data Confirmation Window

When printing the measurement data

(1) When printing the measured data, press  [print button] icon shown at the header part.

(2) The printing condition setting window will be shown (Fig. 4-157). Turn ON the item you want to print and press the [preview button under the above conditions].

Fig. 4-157 Printing Condition Setting Window

(3) Print preview (Fig. 4-158) will be shown.

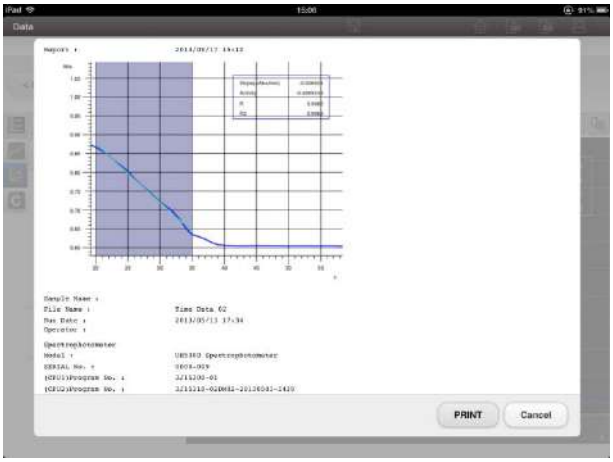


Fig. 4-158 Print Preview Window

(4) Press PRINT [print] to show the printer option (Fig. 4-159). Select the printer and the number of copy and press [print].

Fig. 4-159 Printer Option Window

When outputting the measured data in CSV

(1) When printing the measured data, press [print button] icon shown at the header part.

(2) The printing condition setting window will be shown (Fig. 4-160). Turn ON the item you want to print and press the [preview button under the above conditions].

When outputting the measured data in image file

(1) When saving the measured data in image file, press [PNG file preparation button] icon shown at the header part.

(2) Then, the export window (Fig. 4-160) will be shown. Input the name of a file to save and press [export].

Fig. 4-160 File Export Window

4.4 Monitored Measurement

This function measures photometric values while showing the values on the monitor. This is effective when measuring the photometric value of a wavelength while checking the value. The following is the explanation on how to make measurement using this function.

1. Starting Up the Product

Start up this product. (See 2.2.1 Starting Up Instrument about the start-up procedure.)

2. Setting Measurement Conditions

(1) Press  [measurement button] icon on the top page (Fig. 4-161). Then, the measurement item selection window (Fig. 4-162) will be displayed. In order to set conditions for time scan, press  [monitor measurement button] icon.

Fig. 4-161 Measurement Menu Window

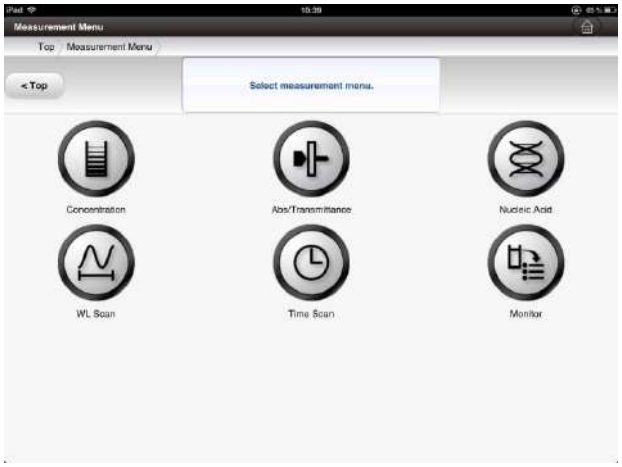


Fig. 4-162 Measurement Item Selection Window

(2) The monitor measurement window (Fig. 4-163) will then be shown. Simultaneously the lamp will be automatically turned on to start photometry. The current set wavelength and its photometric value will be shown on the monitor. Photometric values will be updated every two seconds. The functions listed in Table 4-67 can be used from the monitor measurement window. When setting measurement conditions such as data mode, press < Measurement Parameter [Measurement Parameter button] icon. Then, the window of Fig. 4-164 will be shown. See Table 4-68 for setting measurement conditions. After setting measurement conditions, press Measurement > [measurement button].

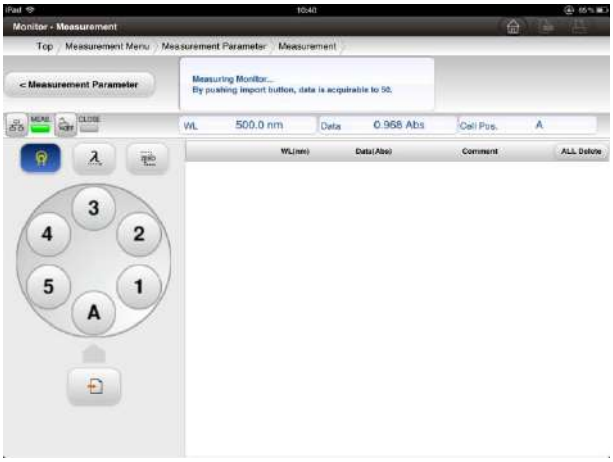


Fig. 4-163 Monitor Measurement Window

Table 4-67 Explanation of Icons for the Measurement Window

Button	Name	Description
	Lamp on/off (when light is off)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp temporarily.
	Lamp on/off (when light is on)	It indicates whether the lamp is on or off. Pressing the [lamp on/off] icon under this condition will be able to turn off the lamp.
	Wavelength movement	Press the [wavelength moving] icon to set a wavelength. It will also temporarily move to any given wavelength and show the absorbance on the monitor.
ZERO	Autozero	Pressing the [autozero] icon allows you to perform autozero.

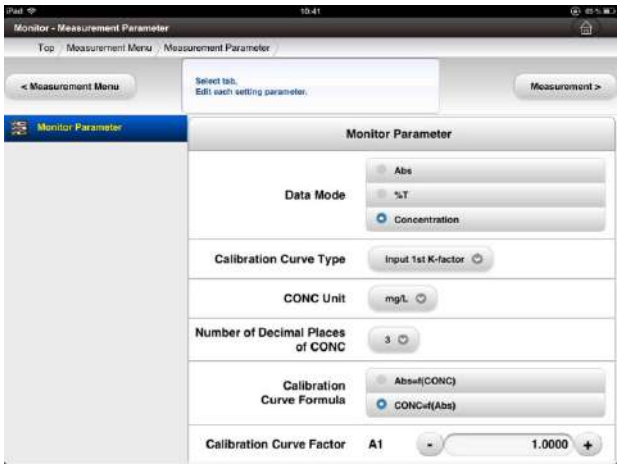


Fig. 4-164 Monitor Conditions Window

Table 4-68 Parameters for Setting Monitor Conditions

Setting Item	Description
Data Mode	ABS: used to measure absorbance. %T: Used to measure transmittance. Concentration: Used to measure concentration of a sample solution. Concentration is calculated using linear coefficient or quadratic coefficient. When "concentration" is selected in the data mode, the following items will be shown.
Calibration Curve Type	Select the type of calibration curve. Linear coefficient: Concentration is calculated using linear coefficient. Quadratic coefficient: Concentration is calculated using quadratic coefficient.
Number of Decimal Places of CONC	Select the number of decimals to be shown for the maximum or minimum of concentration, standard concentration data, or sample concentration data. Any value from 0 to 4 can be selected.
CONC Unit	An arbitary unit of concentration can be selected and input (such as mg/L, %, mol/l, or M). If the list does not contain a unit you want to use, you can select the unit you want and input it.
Calibration Curve Formula	Select the expression method of the calibration curve equation from either of the following two kinds: ABS = f(CONC): Calibration curve equation is expressed as (absorbance = A1 x concentration + A0). Usually this "ABS = f(CONC)" should be used. ABS = f(ABS): Calibration curve equation is expressed as (absorbance = A1 x absorbance + A0). This equation is used only when the calibration curve used for reference is expressed as CONC = f(ABS) or when the calibration curve type is linear coefficient and a value of the absorbance obtained by being multiplied by the number of coefficient plus a value is used as the concentration. See Table 4-3 for the details of calibration curve equation.
Calibration Curve Factor	Input each factor of the calibration curve. Factor available for input are selectable between 0.0000 and ± 99999 in five effective digits.

3. Monitored Measurement

(1) Current set wavelength and photometric value will be shown on the monitor measurement window. Photometric values will be updated every two seconds.
In the monitor measurement items, there is the function of automatic lamp lighting. This function is designed to prevent unnecessary long-time lighting of the lamp. After the passage of the lamp off time, the lamp will be automatically turned off, and the indication is shown as in Fig. 4-165. To show photometric values again, press [lamp light-on/off button].
Five minutes is the default value for lamp off time. To change this setting, refer to 3.1.1 Lamp Off Time.

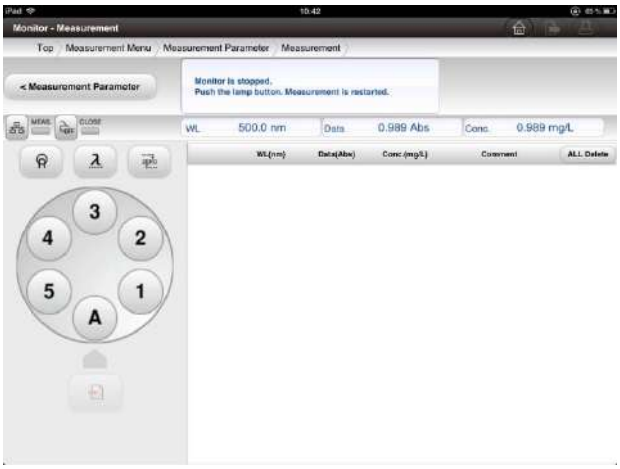


Fig. 4-165 Monitor Measurement Window when the Lamp is Turned Off

(2) Check the indication window of the cell position. When the 6 cell turrent is connected, rotate the turret on the window with finger pinching to move the cell position to the target position. When no specific designation is given, it will move to Cell 1.

(3) Set a specimen (blank) for autozero to Cell A and put the lid on. After setting, press ZERO [autozero] icon to perform autozero at Cell A position.

(4) When the 6 cell turrent is connected, set a specimen to the cell position shown on the window. When a single cell holder or rectangular cell holder is used, set a specimen to the cell holder.

(5) Photometric values shown on the window will be read. When you want to record read values, press [read button] icon. The data read with [read button] icon can be deleted with Delete [Delete button] icon. Batch deletion can be made with ALL Delete [ALL Delete button] icon.

NOTE: Photometric values to be shown will be updated every two seconds. Read the next updated photometric value only when the sample compartment is ready for measurement, such as when a specimen is placed.

GUIDE: Up to 50 items of data, which were read with the [read button] icon, can be shown.

When printing the measurement data

(1) When printing the measured data, press [print button] icon shown at the header part.

(2) Print preview (Fig. 4-166) will be shown.

Fig. 4-166 Print Preview Window

(3) Press PRINT [print] to show the printer option (Fig. 4-167). Select the printer and the number of copy and press [print].

Fig. 4-167 Printer Option Window

When outputting the measured data in CSV

(1) When saving the measured data in CSV, press  [CSV file preparation button] icon shown at the header part.

(2) The export window (Fig. 4-168) will then be shown. After inputting the name of the file to save, press [export].

Fig. 4-168 File Export Window

5 FOR INCREASED CONVENIENCE OF USE

This chapter describes the use of the advanced features of this product to make its use more convenient. Read this document to make full use of the product.

5.1 Reading and Deleting Saved Data

This section describes the steps to read and delete saved data and other operations.

5.1.1 Reading Saved Data

1. Starting Up the Product

Start up this product. (See 2.2.1 Starting Up Instrument about the start-up procedure.)

2. Reading Data

(1) Tap on the [Data File] button on the top page (Fig. 5-1). The Data File Browse window (Fig. 5-2) appears.

Fig. 5-1 Top Screen

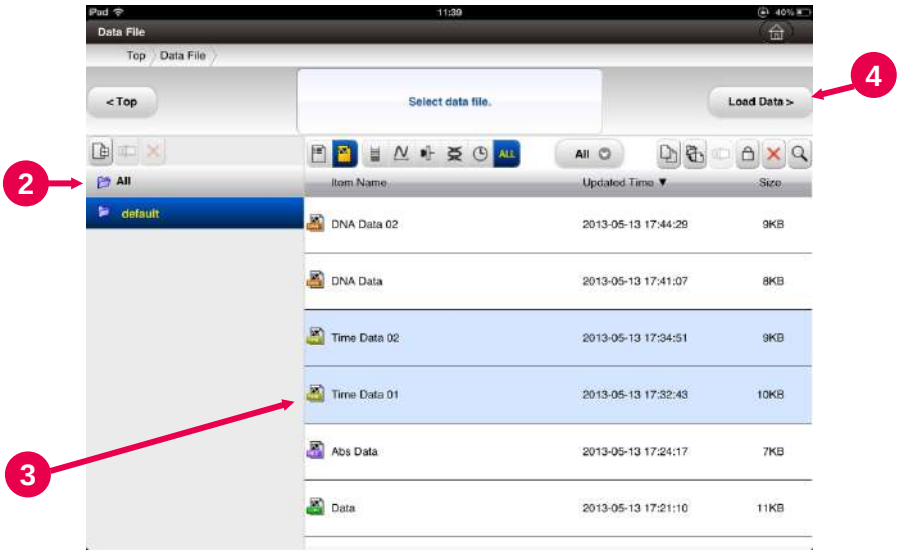


Fig. 5-2 Data File Browse Window

(2) Select a folder to save to. If you select All, all data files are displayed.

(3) Select a desired data file. You can select multiple data files.

(4) Press the [Open Data] button 

to read data. Check the data in the Data Check window.

GUIDE: You can open multiple files with a total file size of less than 3 MB (= 3000 kB). You cannot open multiple files in excess of 3 MB.

5.1.2 Deleting Saved Data

1. Starting Up the Product

Start up this product. (See 2.2.1 Starting Up Instrument about the start-up procedure.)

2. Deleting Data

(1) Tap on the [Data File] button on the top page (Fig. 5-3). The Data File Browse window (Fig. 5-4) appears.

Fig. 5-3 Top Screen

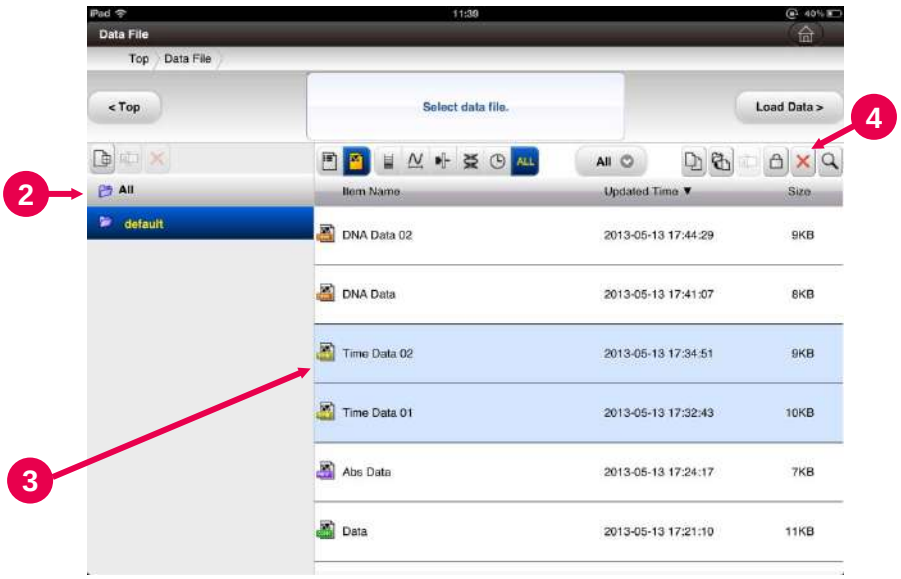


Fig. 5-4 Data File Browse Window

(2) Select a folder to save to. If you select All, all data files are displayed.

(3) Select a desired data file. You can select multiple data files.

(4) Press the [Delete] button.

(5) When the window shown in Fig. 5-5 appears, click OK. The data will be deleted.

Fig. 5-5

(6) The data is deleted.

5.1.3 Managing Saved Data

1. Starting Up the Product

Start up this product. (See 2.2.1 Starting Up Instrument about the start-up procedure.)

2. Managing a Data File

(1) Tap on the [Data File] button on the top page (Fig. 5-6). The Data File Browse window (Fig. 5-7) appears.

Fig. 5-6 Top Screen

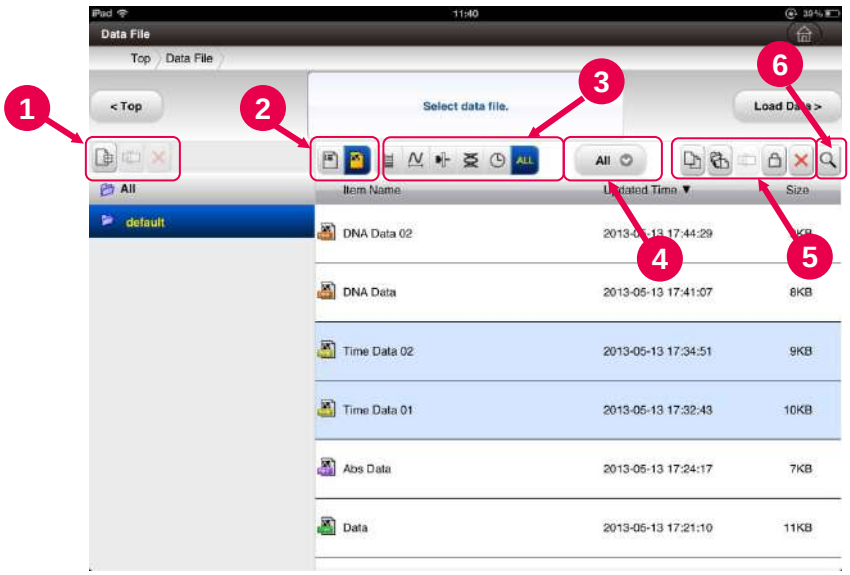


Fig. 5-7 Data File Browse Window

(1) A folder to save to can be edited in the file browse window.

Table 5-1 Folder Operation Cons

Button	Name	Description
	New	Create a folder to save to. Press the [New] icon and enter a file name.
	Rename	A folder to save to can be renamed. Select a folder and press the [Rename] icon.
	Delete	Delete a folder to save to. Select a folder and press the [Delete] icon.

(2) The File Browse window can be switched between the Data File Browse window and the Condition File Browse window.

Table 5-2 File Browse Mode Selection Icons

Button	Name	Description
	Browse Condition File	Open the Condition File Browse window.
	Browse Data File	Open the Data File Browse window.

(3) The saved data file can be displayed for each measurement mode.

Table 5-3 Measurement Mode Selection Icons

Button	Name	Description
	Display Concentration Measurement Mode	Display only data files in the concentration measurement mode.
	Display Wavelength Scan Mode	Display only data files in the wavelength scan mode.
	Display Absorbance/ Transmittance Measurement Mode	Display only data files in the absorbance/transmittance measurement mode.
	Display Nucleic Acid Measurement Mode	Display only data files in the nucleic acid measurement mode.
	Display Time Scan Mode	Display only data files in the time scan mode.
ALL	Display All Measurement Mode	Display data files in the all measurement mode.

(4) Only data files of a selected time period can be displayed. (Today/yesterday/recent one week/recent one month/recent three months/all)

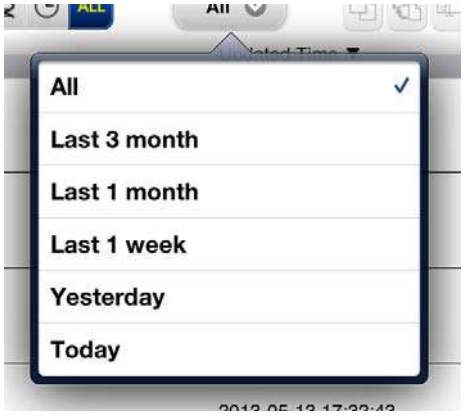


Fig. 5-8 Example of a View of The File Display Period

(5) A data file can be edited in the Data File Browse window.

Table 5-4 File Operation Icons

Button	Name	Description
	New	Create a folder to save to. Press the [New] icon and enter a file name.
	Copy	Allow you to copy a data file. Select a file and press the [Copy] icon.
	Move	Allow you to move a data file folder. Select a file and press the [Move] icon.
	Rename	Allow you to rename a data file. Select a file and press the [Rename] icon.
	Protect	Allow you to protect a data file. Select a file and press the [Protect] icon.
	Delete	Delete a data file. Select a file and press the [Delete] icon.

(6) You can search for data files in the Data File Browse window. Press the [Search] icon  to open the Search Criteria window and enter search criteria (sample name, management information, period). Search results are displayed in a list.

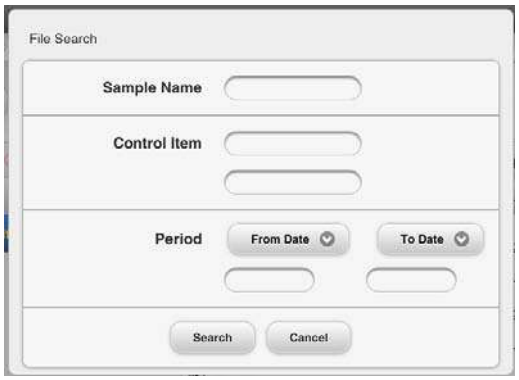


Fig. 5-9 File Search Window

5.2 Reading and Deleting Saved Measurement Conditions

This section describes the steps to read saved measurement conditions and make measurements using the conditions.

5.2.1 Reading Saved Measurement Conditions and Making Measurements

1. Starting Up the Product

Start up this product. (See 2.2.1 Starting Up Instrument about the start-up procedure.)

2. Reading Measurement Conditions

(1) Tap on the [Condition File] button  on the top page (Fig. 5-10). The Data File Browse window (Fig. 5-11) appears.

Fig. 5-10 Top Screen

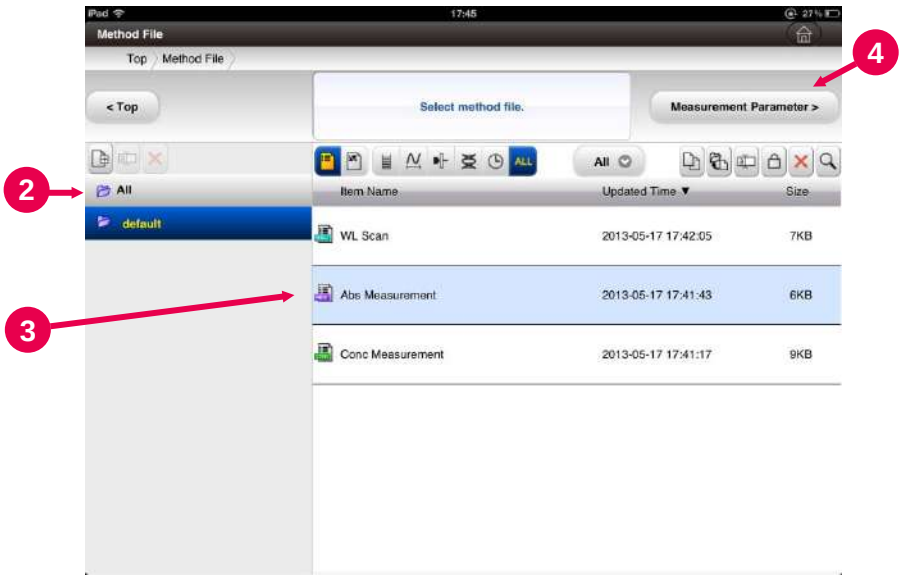
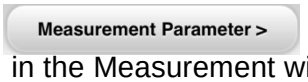


Fig. 5-11 Condition File Browse Window

(2) Select a folder to save to. If you select All, all data are displayed.

(3) Select a desired data file.

(4) Press the [Measurement Parameter] button


to read data. Measurements are made in the Measurement window.

5.2.2 Deleting Saved Measurement Conditions

1. Starting Up the Product

Start up this product. (See 2.2.1 Starting Up Instrument about the start-up procedure.)

2. Deleting Data

(1) Tap on the [Condition File] button on the top page (Fig. 5-12). The Data File Browse window (Fig. 5-13) appears.

Fig. 5-12 Top Screen

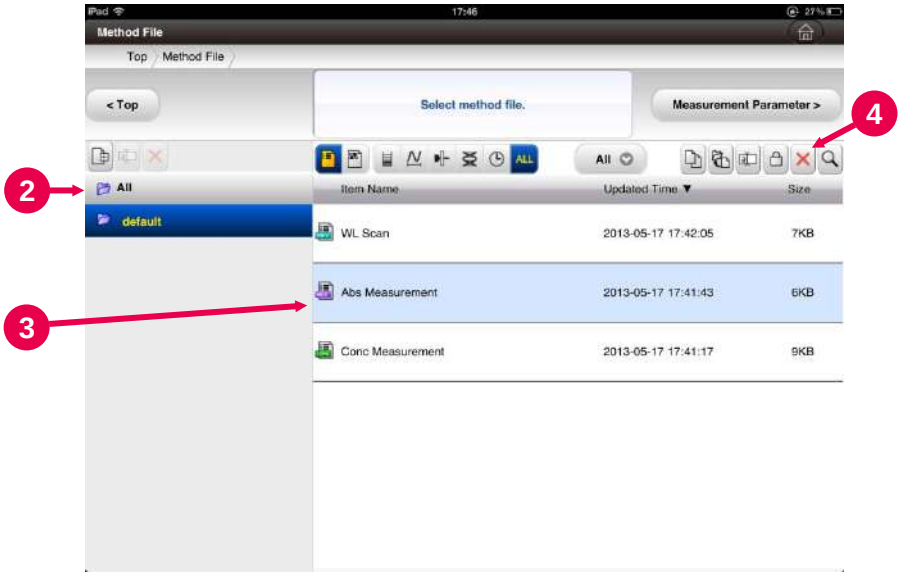


Fig. 5-13 Condition File Browse Window

(2) Select a folder to save to. If you select All, all data files are displayed.

(3) Select a desired data file.

(4) Press the [Delete] button.

(5) When the window shown in Fig. 5-14 appears, click OK. The data will be deleted.

Fig. 5-14

(6) The data is deleted.

5.2.3 Managing a Saved Condition File

1. Starting Up the Product

Start up this product. (See 2.2.1 Starting Up Instrument about the start-up procedure.)

2. Managing a Condition File

(1) Tap on the [Condition File] button on the top page (Fig. 5-15). The Data File Browse window (Fig. 5-16) appears.

Fig. 5-15 Top Screen

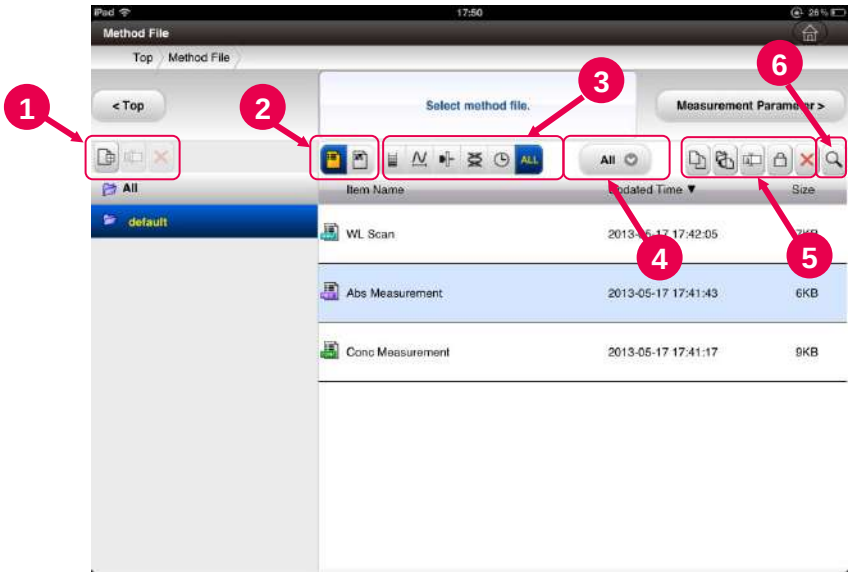


Fig. 5-16 Condition File Browse Window

(1) A folder to save to can be edited in the file browse window.

Table 5-5 Folder Operation Cons

Button	Name	Description
	New	Create a folder to save to. Press the [New] icon and enter a file name.
	Rename	A folder to save to can be renamed. Select a folder and press the [Rename] icon.
	Delete	Delete a folder to save to. Select a folder and press the [Delete] icon.

(2) The File Browse window can be switched between the Data File Browse window and the Condition File Browse window.

Table 5-6 File Browse Mode Selection Icons

Button	Name	Description
	Browse Condition File	Open the Condition File Browse window.
	Browse Data File	Open the Data File Browse window.

(3) The saved condition file can be displayed for each measurement mode.

Table 5-7 Measurement Mode Selection Icons

Button	Name	Description
	Display Concentration Measurement Mode	Display only condition files in the concentration measurement mode.
	Display Wavelength Scan Mode	Display only condition files in the wavelength scan mode.
	Display Absorbance/ Transmittance Measurement Mode	Display only condition files in the absorbance/transmittance measurement mode.
	Display Nucleic Acid Measurement Mode	Display only condition files in the nucleic acid measurement mode.
	Display Time Scan Mode	Display only condition files in the time scan mode.
ALL	Display All Measurement Mode	Display condition files in the all measurement mode.

(4) Only data files of a selected time period can be displayed. (Today/yesterday/recent one week/recent one month/recent three months/all)

Fig. 5-17 Example of a View of The File Display Period

(5) A data file can be edited in the Data File Browse window.

Table 5-8 File Operation Icons

Button	Name	Description
	New	Create a folder to save to. Press the [New] icon and enter a file name.
	Copy	Allow you to copy a condition file. Select a file and press the [Copy] icon.
	Move	Allow you to move a condition file folder. Select a file and press the [Move] icon.
	Rename	Allow you to rename a condition file. Select a file and press the [Rename] icon.
	Protect	Allow you to protect a condition file. Select a file and press the [Protect] icon.
	Delete	Delete a condition file. Select a file and press the [Delete] icon.

(6) You can search for data files in the Data File Browse window. Press the [Search] icon  to open the Search Criteria window and enter search criteria (sample name, management information, period). Search results are displayed in a list.

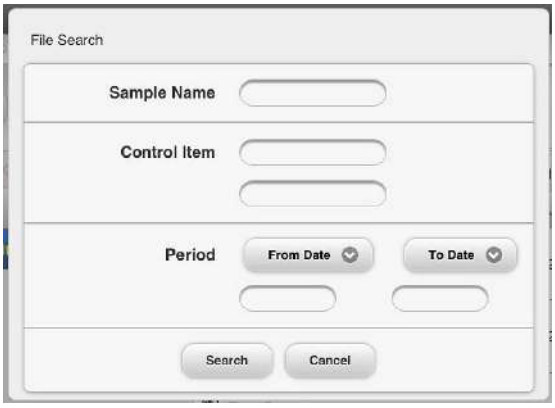


Fig. 5-18 File Search Window

5.3 Data Check

5.3.1 Editing Concentration Measurement Data

1. Displaying the Data Check Window

Displaying the window from saved data

When opening and checking saved data, open saved concentration measurement data using the steps in 5.1.1 “Reading Saved Data” and move to the Data Check window (Fig. 5-20).

Displayin the window during measurement

Press the [Data] button 

displayed in the Sample Measurement window during concentration measurement and move to the Data Check window (Fig. 5-20).

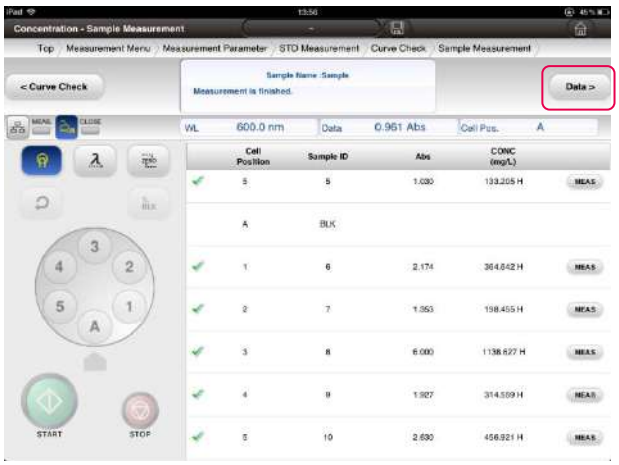


Fig. 5-19 Example of a Window After Sample Measurement

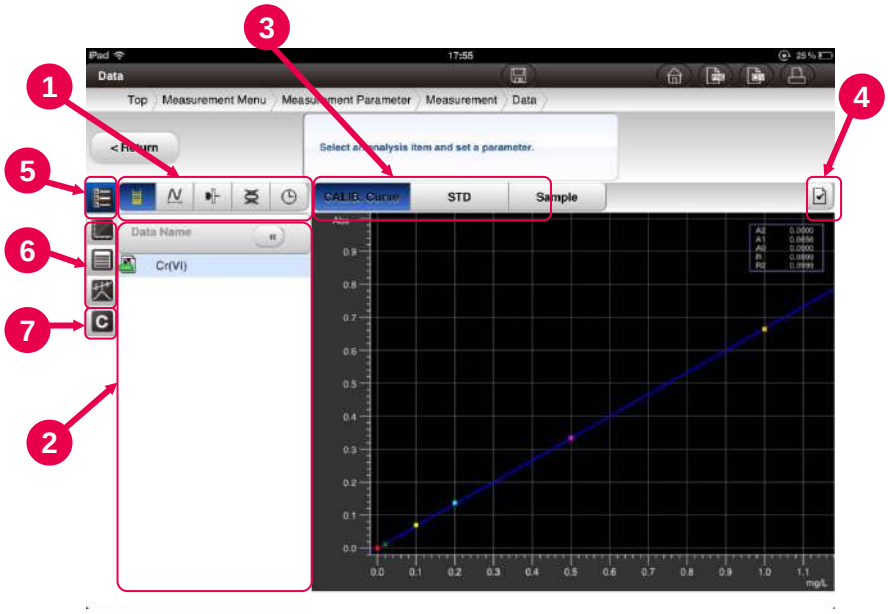


Fig. 5-20 Example of a Display in the Data Check Window

(1) When you press an icon in the data type selection area, a list of files in the selected mode is displayed.

Table 5-9 Measurement Mode Selection Icons

Button	Name	Description
	Display Concentration Measurement Mode	Display only data files in the concentration measurement mode.
	Display Wavelength Scan Mode	Display only data files in the wavelength scan mode.
	Display Absorbance/ Transmittance Measurement Mode	Display only data files in the absorbance/transmittance measurement mode.
	Display Nucleic Acid Measurement Mode	Display only data files in the nucleic acid measurement mode.
	Display Time Scan Mode	Display only data files in the time scan mode.

(2) When you select the Read File button, a data file list selection area is displayed. When you select a different tool icon, the setting parameters are displayed.

(3) You can select a graph display mode.

Table 5-10 Graph Display Mode Selection Icon

Button	Name	Description
CALIB. Curve	Calibration Curve Display	Display a calibration curve graph.
STD	Standard Data Display	Display a standard data list.
Sample	Sample Data Display	Display a sample data list.

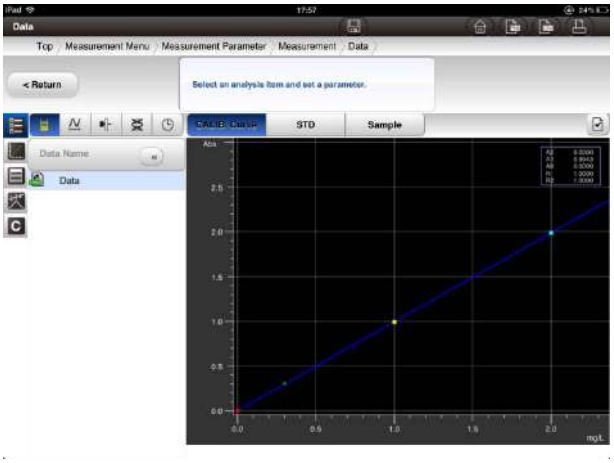


Fig. 5-21 Example of a Display in the Calibration Curve Display Window

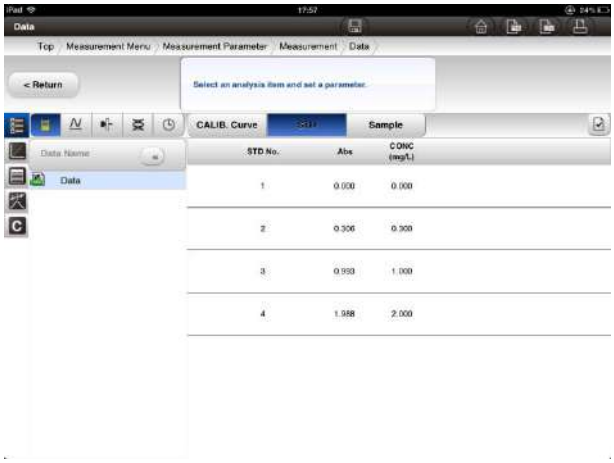


Fig. 5-22 Example of a Display in the Standard Data Display Window

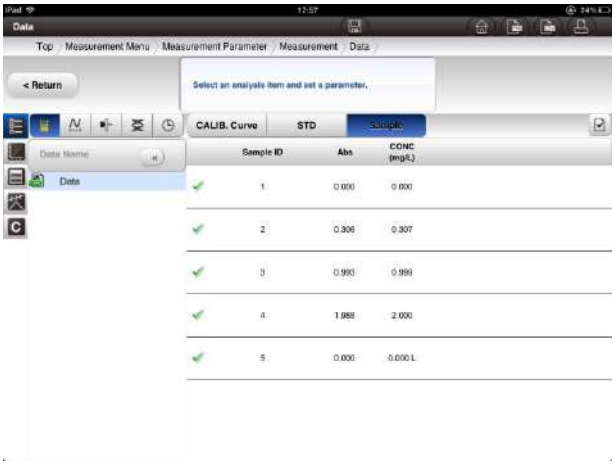


Fig. 5-23 Example of a Display in the Sample Data Display Window

(4) When you press an icon in the data information browse area, the properties of the data and the details of the data processing are displayed.

Table 5-11 Data Information Browse Icon

Button	Name	Description
	Property Tool Icon	Display properties.

(5) When you click the [Read File] button  , a data file list selection area is displayed.

(6) When you press an icon in the tool icon area, the settings area for the data processing operation is displayed.

Table 5-12 Tool Icons for Concentration Measurement

Button	Name	Description
	Calibration Curve Condition Tool Icon	Display setting parameters for a calibration curve.
	Calibration Curve Data Tool Icon	Display setting parameters for calibration curve data.
	Statistical Calculation Tool Icon	Display setting parameters for statistical calculation

(7) When you click the [Clear] button  , the selected data are returned to the state before processing.

2. Changing a Calibration Curve

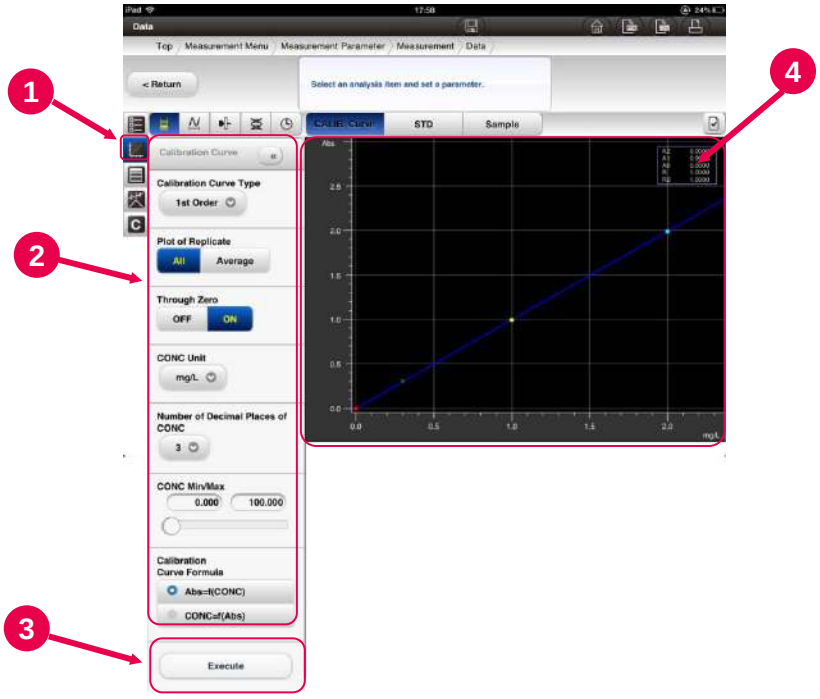


Fig. 5-24 Calibration Curve Setting Parameters Window

(1) Click [Calibration Curve Tool] icon  to change the calibration curve.

(2) The setting parameters for the calibration curve (Fig. 5-24) are displayed. See 4.2.1 “Quantifying the Concentration of Solution” for the setting parameters.

(3) Set up the items and press the [Execute] button.

(4) The results of the date processing are displayed.

3. Changing Calibration Curve Data

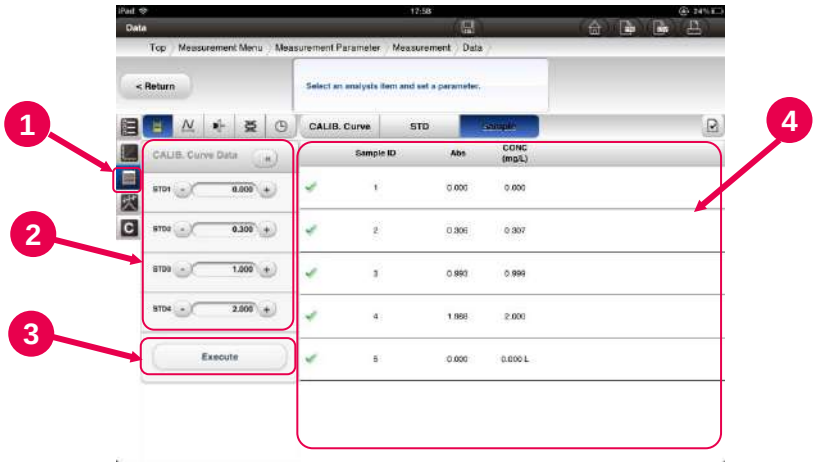


Fig. 5-25 Calibration Curve Setting Parameters Window

(1) Press the [Calibration Curve Data Icon] button to change the calibration data.

(2) The setting parameters for the calibration curve (Fig. 5-25) are displayed. See 4.2.1 “Quantifying the Concentration of Solution” for the setting parameters.

(3) Set up the items and press the [Execute] button.

(4) The results of the date processing are displayed.

4. Changing Statistical Calculation Setting Parameters

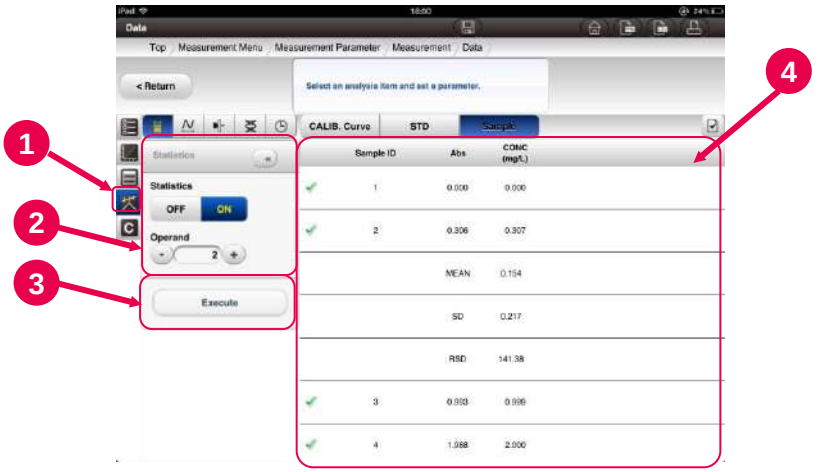


Fig. 5-26 Statistical Calculation Setting Parameters Window

(1) To change the statistical calculation setting parameters, press the [Statistical Calculation Tool Icon] button .

(2) The setting parameters for the statistical calculation (Fig. 5-26) are displayed. See 4.2.1 “Quantifying the Concentration of Solution” for the setting parameters.

(3) Set up the items and press the [Execute] button.

(4) The results of the date processing are displayed.

5. Changing the Scale of the Calibration Curve

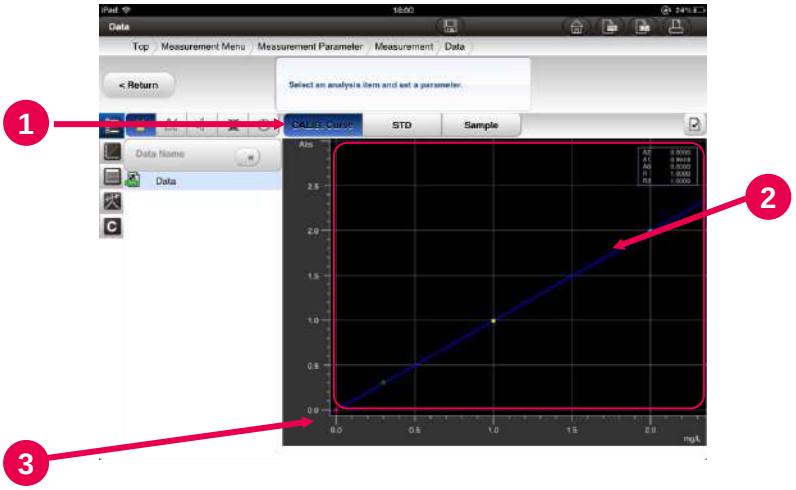


Fig. 5-27 Calibration Curve Data Check Window

(1) To display the calibration curve, press the [CALIB. Curve] button CALIB. Curve

(2) The calibration calibration curve graph (Fig. 5-27) is displayed. To enlarge the calibration curve, pinch out on the area you want to zoom in on. To shrink the calibration curve, pinch in the area you want to zoom out on.

(3) When you double-tap on the intersection of the x- and y-axes in the calibration curve graph, the graph is auto-scaled. When you double-tap again, the scale is reset.

See 3.4.2 “Button Operations” for the details of pinch-in, pinch-out and double-tap operations.

6. Displaying the Trace Bar for Calibration Curve Data

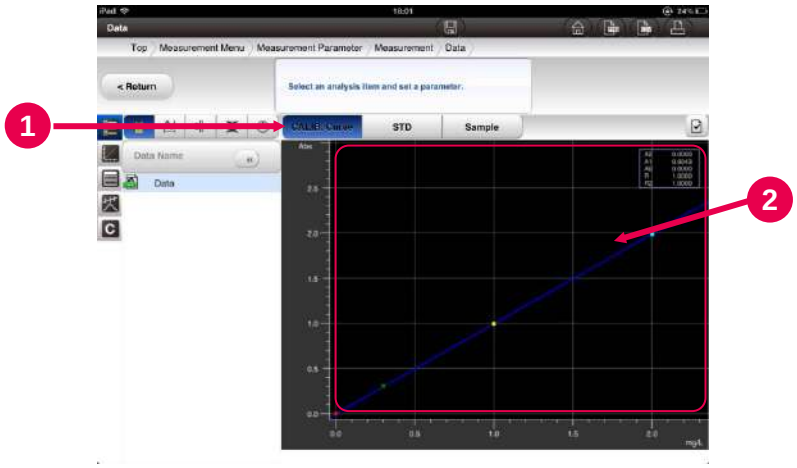


Fig. 5-28 Calibration Curve Data Check Window

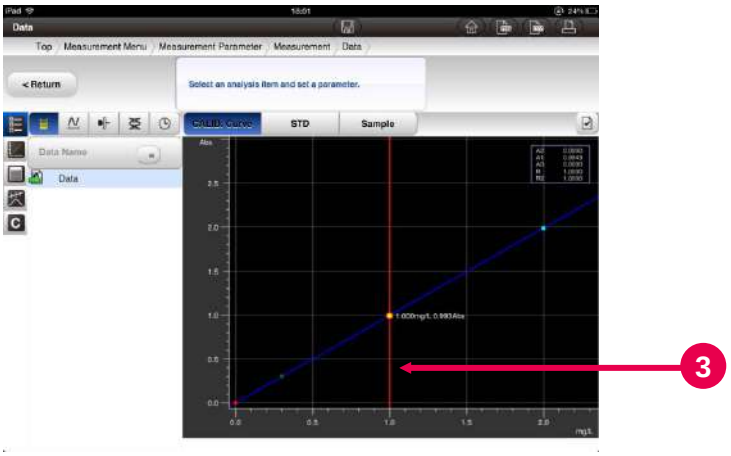


Fig. 5-29 Calibration Curve Data Check Window (Displaying the Trace Bar)

(1) To display the calibration curve, press the [CALIB. Curve] button CALIB. Curve

(2) The calibration curve graph (Fig. 5-28) is displayed. When you double-tap on the graph, the trace bar is displayed (Fig. 5-29). The concentration and the photometric value in the current trace bar position are displayed at the intersection of the trace bar and the calibration curve. As a result, the photometric value at the target concentration can be read. You can move the trace bar by moving a figure to the left or right over the bar.

(3) To hide the trace bar, double-tap on the bar.

7. Displaying the Properties of Concentration Measurement Data

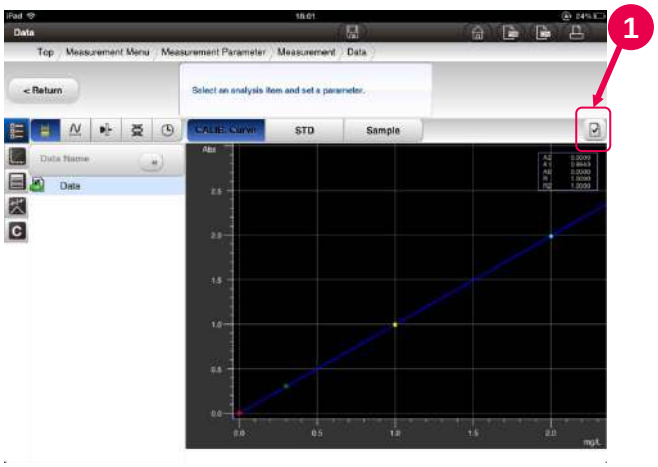


Fig. 5-30 Concentration Measurement Data Check Window

(1) To display the properties of the concentration measurement data, press the [Property Tool Icon] button .

(2) The properties of the concentration measurement data (Fig. 5-31) are displayed.

Fig. 5-31 Properties of Concentration Measurement Data

5.3.2 Editing Absorbance/Transmittance Measurement Data

1. Displaying the Data Check Window

Displaying the window from saved data

When opening and checking saved data, open saved absorbance/transmittance measurement data using the steps in 5.1.1 “Reading Saved Data” and move to the Data Check window (Fig. 5-33).

Displayin the window during measurement

Press the [Check Data] button Data > displayed in the Sample Measurement window during absorbance/transmittance measurement and move to the Data Check window (Fig. 5-33).

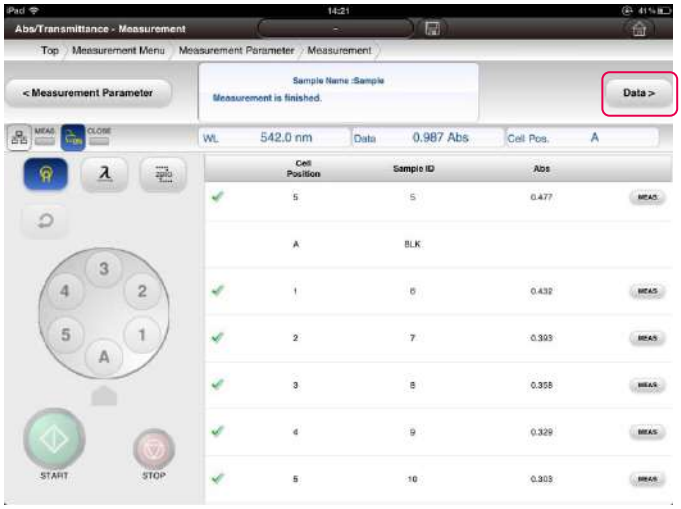


Fig. 5-32 Example of a Window After Sample Measurement

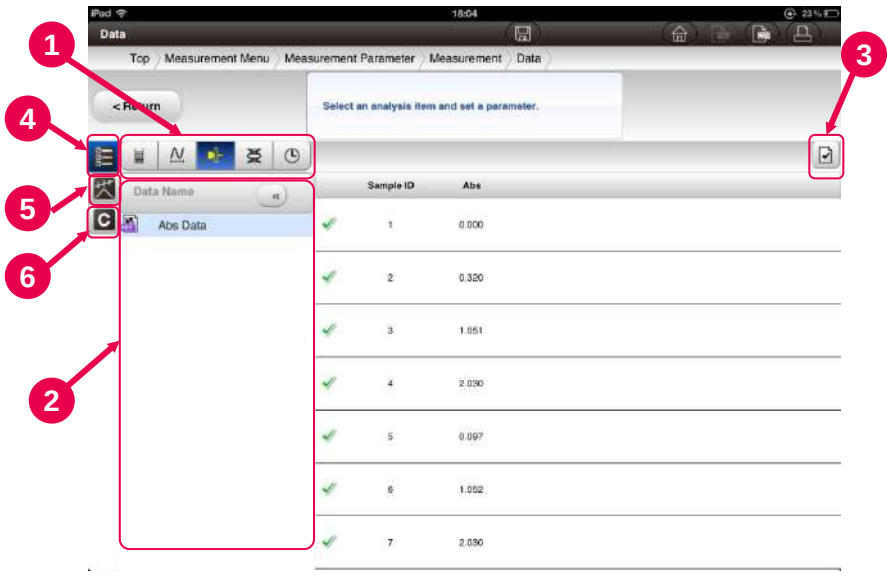


Fig. 5-33 Example of a Display in the Data Check Window

(1) When you press an icon in the data type selection area, a list of files in the selected mode is displayed.

Table 5-13 Measurement Mode Selection Icons

Button	Name	Description
	Display Concentration Measurement Mode	Display only data files in the concentration measurement mode.
	Display Wavelength Scan Mode	Display only data files in the wavelength scan mode.
	Display Absorbance/ Transmittance Measurement Mode	Display only data files in the absorbance/transmittance measurement mode.
	Display Nucleic Acid Measurement Mode	Display only data files in the nucleic acid measurement mode.
	Display Time Scan Mode	Display only data files in the time scan mode.

(2) When you select the Read File button, a data file list selection area is displayed. When you select a different tool icon, the setting parameters are displayed.

(3) When you press an icon in the data information browse area, the properties of the data are displayed.

Table 5-14 Data Information Browse Icon

Button	Name	Description
	Property Tool Icon	Display properties.

(4) When you click the [Read File] button  , a data file list selection area is displayed.

(5) When you press an icon in the tool icon area, the settings area for the data processing operation is displayed.

Table 5-15 Tool icon for Absorbance/Transmittance Measurement

Button	Name	Description
	Statistical Calculation Tool Icon	Display setting parameters for statistical calculation

(6) When you click the [Clear] button  , the selected data are returned to the state before processing.

2. Changing Statistical Calculation Setting Pparameters

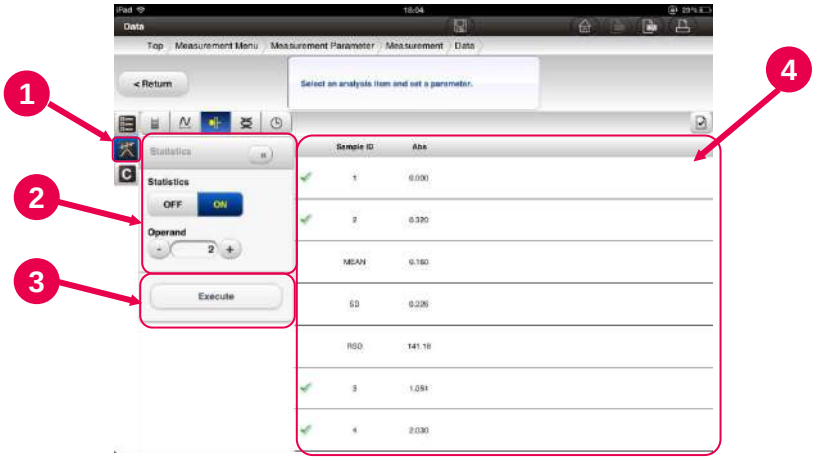


Fig. 5-34 Statistical Calculation Setting Parameters Window

(1) To change the statistical calculation setting parameters, press the [Statistical Calculation Tool Icon] button  .

(2) The setting parameters for the statistical calculation (Fig. 5-34) are displayed. See 4.2.2 “Measuring Absorbance/Transmittance” for the setting parameters.

(3) Set up the items and press the [Execute] button.

(4) The results of the date processing are displayed.

3. Displaying the Properties of Absorbance/Transmittance Measurement Data

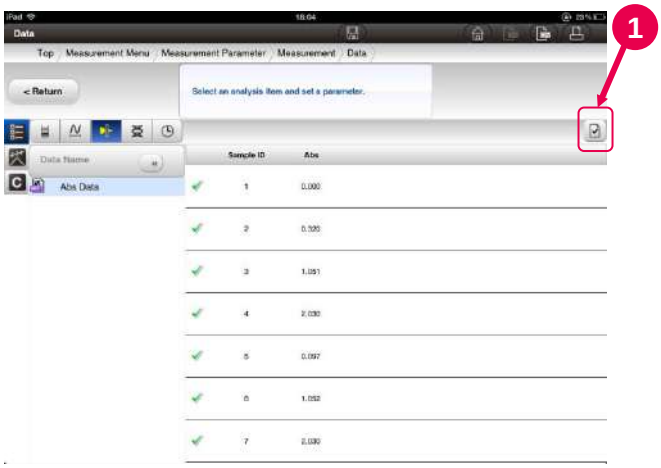


Fig. 5-35 Absorbance/Transmittance Measurement Data Check Window

(1) To display the properties of the absorbance/transmittance measurement data, press the [Property Tool Icon] button .

(2) The properties of the absorbance/transmittance measurement data (Fig. 5-36) are displayed.

Fig. 5-36 Properties of Absorbance/Transmittance Measurement Data

5.3.3 Editing Nucleic Acid Measurement Data

1. Displaying the Data Check Window.

Displaying the window from saved data

When opening and checking saved data, open saved nucleic acid measurement data using the steps in 5.1.1 “Reading Saved Data” and move to the Data Check window (Fig. 5-38).

Displayin the window during measurement

Press thData button 

displayed in the Sample Measurement window during nucleic acid measurement and move to the Data Check window (Fig. 5-38).

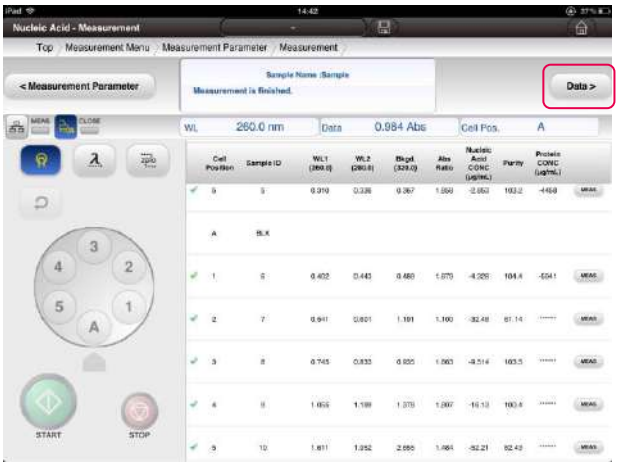


Fig. 5-37 Example of a Window After Sample Measurement

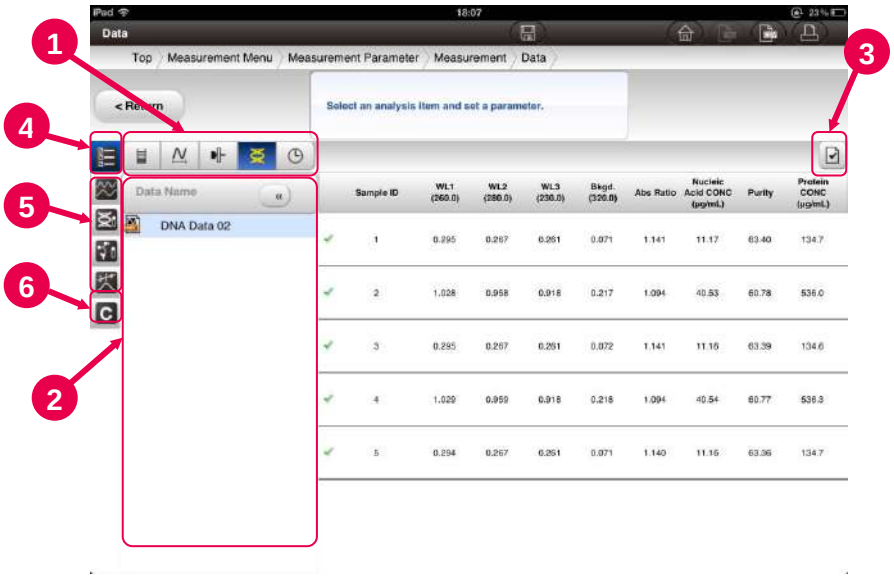


Fig. 5-38 Example of a Display in the Data Check Window

(1) When you press an icon in the data type selection area, a list of files in the selected mode is displayed.

Table 5-16 Measurement Mode Selection Icons

Button	Name	Description
	Display Concentration Measurement Mode	Display only data files in the concentration measurement mode.
	Display Wavelength Scan Mode	Display only data files in the wavelength scan mode.
	Display Absorbance/ Transmittance Measurement Mode	Display only data files in the absorbance/transmittance measurement mode.
	Display Nucleic Acid Measurement Mode	Display only data files in the nucleic acid measurement mode.
	Display Time Scan Mode	Display only data files in the time scan mode.

(2) When you select the Read File button, a data file list selection area is displayed. When you select a different tool icon, the setting parameters are displayed.

(3) When you press an icon in the data information browse area, the properties of the data and the details of the data processing are displayed.

Table 5-17 Data Information Browse Icon

Button	Name	Description
	Property Tool Icon	Display properties.

(4) When you click the [Read File] button  , a data file list selection area is displayed.

(5) When you press an icon in the tool icon area, the settings area for the data processing operation is displayed.

Table 5-18 Tool Icons for Concentration Measurement

Button	Name	Description
	Nucleic Acid Measurement Conditions Tool Icon	Display setting parameters for nucleic acid measurement conditions.
	Nucleic Acid Concentration Conditions Tool Icon	Display setting parameters for nucleic acid concentration conditions.
	Protein Concentration Conditions Tool Icon	Display setting parameters for protein concentration conditions.
	Statistical Calculation Tool Icon	Display setting parameters for statistical calculation

(6) When you click the [Clear] button  , the selected data are returned to the state before processing.

2. Changing Nucleic acid Measurement Conditions

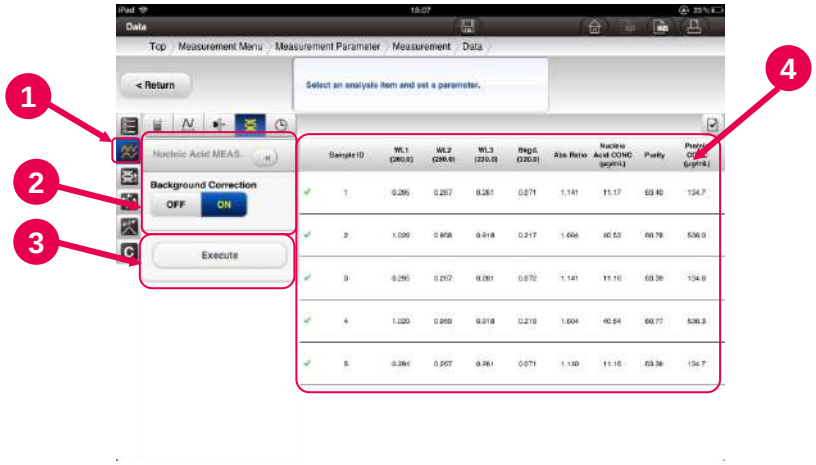


Fig. 5-39 Nucleic Acid Measurement Conditions Setting Parameters Window

(1) To change the nucleic acid measurement conditions, press the [Nucleic Acid Measurement Conditions Tool Icon] button .

(2) The setting parameters for the nucleic acid measurement conditions (Fig. 5-39) are displayed. See 4.2.3 “Measuring Nucleic Acid Specimens” for the statistical calculation setting parameters.

(3) Set up the items and press the [Execute] button.

(4) The results of the date processing are displayed.

3. Changing Nucleic acid Measurement Conditions

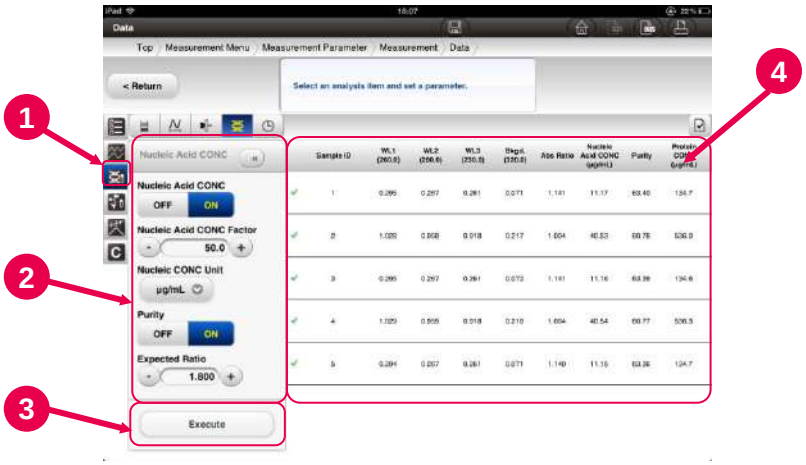


Fig. 5-40 Nucleic Acid Concentration Conditions Setting Parameters Window

(1) To change the nucleic acid concentration conditions, press the [Nucleic Acid Concentration Conditions Tool Icon] button .

(2) The setting parameters for the nucleic acid concentration conditions (Fig. 5-40) are displayed. See 4.2.3 “Measuring Nucleic Acid Specimens” for the setting parameters.

(3) Set up the items and press the [Execute] button.

(4) The results of the date processing are displayed.

4. Changing Protein Concentration Conditions

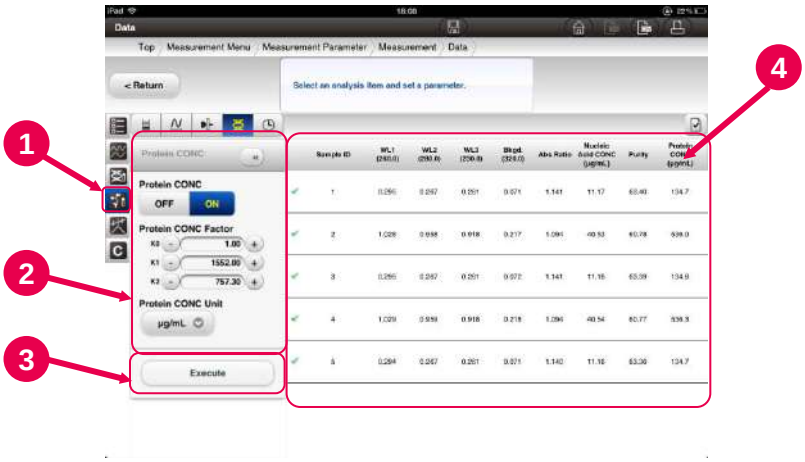


Fig. 5-41 Protein Concentration Conditions Setting Parameters Window

(1) To change the protein concentration conditions, press the [Protein Concentration Conditions Tool Icon] button .

(2) The setting parameters for the protein concentration conditions (Fig. 5-41) are displayed. See 4.2.3 “Measuring Nucleic Acid Specimens” for the statistical calculation setting parameters.

(3) Set up the items and press the [Execute] button.

(4) The results of the date processing are displayed.

5. Changing Statistical Calculation Setting Parameters

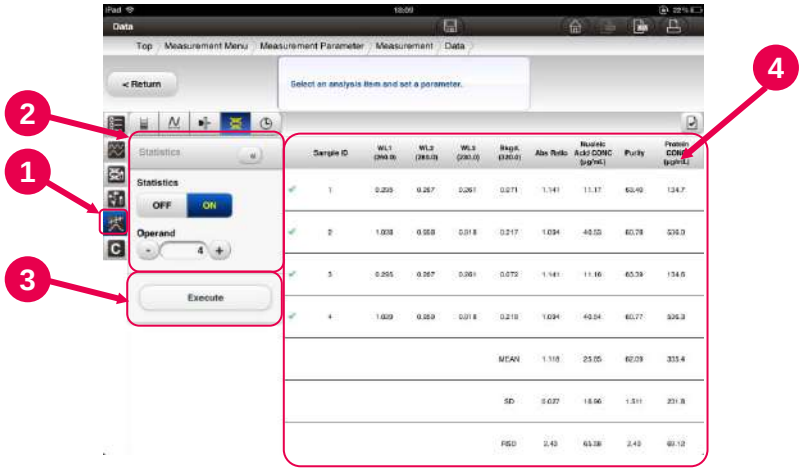


Fig. 5-42 Statistical Calculation Setting Parameters Window

(1) To change the statistical calculation setting parameters, press the [Statistical Calculation Tool Icon] button .

(2) The setting parameters for the statistical calculation (Fig. 5-42) are displayed. See 4.2.3 “Measuring Nucleic Acid Specimens” for the statistical calculation setting parameters.

(3) Set up the items and press the [Execute] button.

(4) The results of the date processing are displayed.

6. Displaying the Properties of Nucleic acid Measurement Data

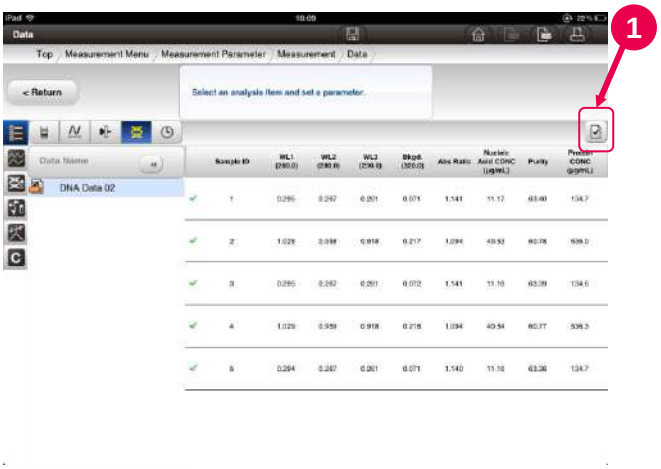


Fig. 5-43 Nucleic Acid Measurement Data Check Window

(1) To display the properties of the nucleic acid measurement data, press the [Property Tool Icon] button .

(2) The properties of the nucleic acid measurement data are (Fig. 5-44) are displayed.

Fig. 5-44 Properties of Nucleic Acid Measurement Data

5.3.4 Editing Spectrum Measurement Data

1. Displaying the Data Check Window.

Displaying the window from saved data

When opening and checking saved data, open saved spectrum measurement data using the steps in 5.1.1 “Reading Saved Data” and move to the Data Check window (Fig. 5-46).

Displayin the window during measurement

Press the [Check Data] button 

displayed in the Sample Measurement window during spectrum measurement and move to the Data Check window (Fig. 5-46).

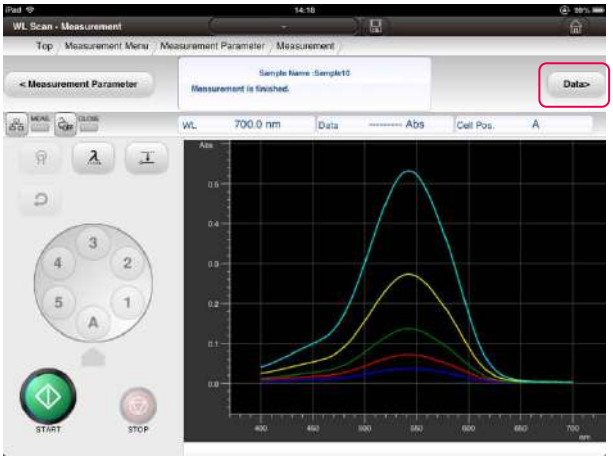


Fig. 5-45 Example of a Window After Sample Measurement

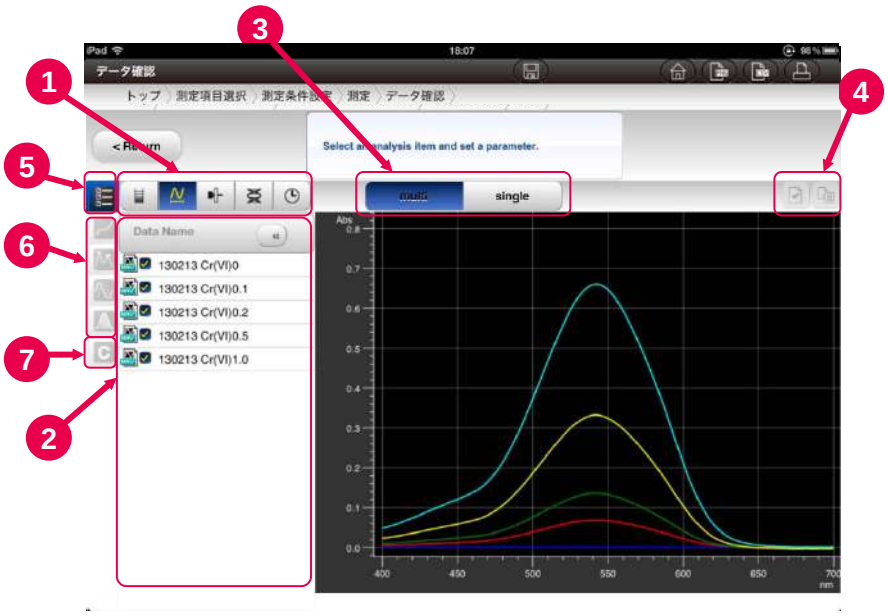


Fig. 5-46 Example of a Display in the Data Check Window

(1) When you press an icon in the data type selection area, a list of files in the selected mode is displayed.

Table 5-19 Measurement Mode Selection Icons

Button	Name	Description
	Display Concentration Measurement Mode	Display only data files in the concentration measurement mode.
	Display Wavelength Scan Mode	Display only data files in the wavelength scan mode.
	Display Absorbance/ Transmittance Measurement Mode	Display only data files in the absorbance/transmittance measurement mode.
	Display Nucleic Acid Measurement Mode	Display only data files in the nucleic acid measurement mode.
	Display Time Scan Mode	Display only data files in the time scan mode.

(2) When you select the Read File button, a data file list selection area is displayed. When you select a different tool icon, the setting parameters are displayed.

(3) You can select a graph display mode.

Table 5-20 Graph Display Mode Selection Icon

Button	Name	Description
single	Single Display	Display a single file selected by the data file list selection area.
multi	Multi-Display	Display multiple files selected by the data file list selection area in a stack. Up to 10 spectra can be drawn on the graph. No more than 10 spectra can be drawn.

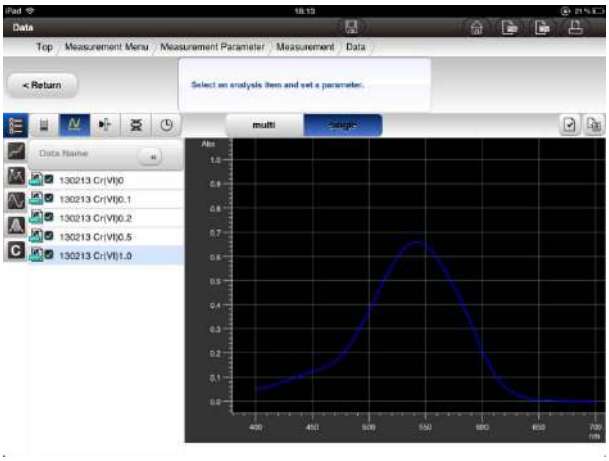


Fig. 5-47 Example of a single display Window

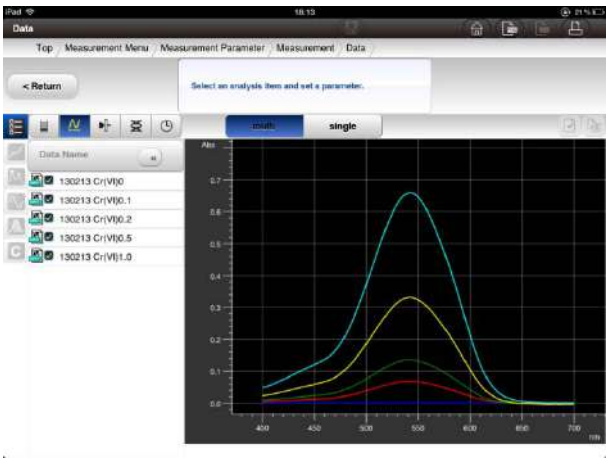


Fig. 5-48 Example of a Multi-Display Window

(4) When you press an icon in the data information browse area, the properties of the data and the details of the data processing are displayed.

Table 5-21 Data Information Browse Icon

Button	Name	Description
	Property Tool Icon	Display properties.
	Data Processing Results Tool Icon	Display the details of data processing.

(5) When you click the [Read File] button  , a data file list selection area is displayed.

(6) When you press an icon in the tool icon area, the settings area for the data processing operation is displayed.

Table 5-22 Tool Icons for Concentration Measurement

Button	Name	Description
	Smoothing Tool Icon	Display smoothing settings.
	Peak Detection Tool Icon	Display peak detection settings.
	Differential Tool Icon	Display differential settings.
	Area Calculation Tool Icon	Display area calculation setting parameters.

(7) When you click the [Clear] button  , the selected data are returned to the state before processing.

2. Smoothing a Spectrum

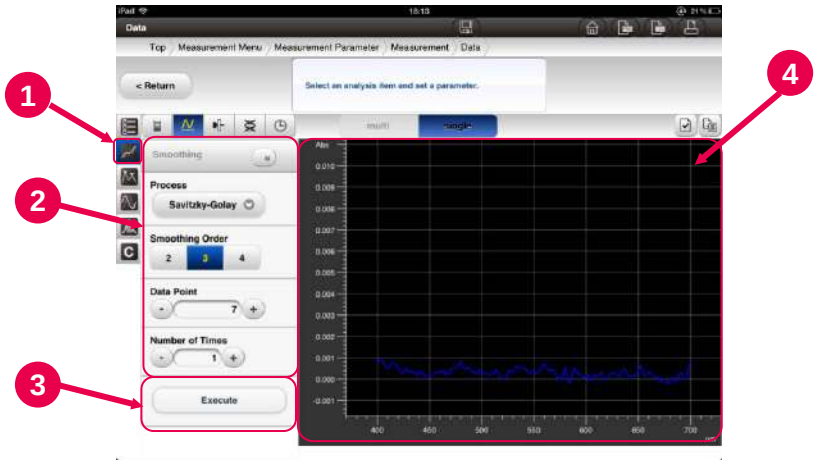


Fig. 5-49 Smoothing Setting Parameters Window

(1) To specify smoothing settings, press the [Smoothing Tool Icon] button  .

(2) The smoothing setting parameters (Fig. 5-49) are displayed. See Table 5-23 for the setting parameters.

Table 5-23 Smoothing Setting Parameters

Setting Item	Description
Processing Method	Select one of the following three smoothing methods. See Appendix F: Smoothing for details. (a) Savitzky-Golay (b) Mean (c) Median
Smoothing Degree	Specify the degree of smoothing. Input range: 2 to 4, Default: 3
Number of Data Points	Specify the number of data points to be used for calculation. Input range: 7 to all points, Default: 7
Number of Times	Specify the number of times of smoothing operations. Input range: 1 to 100, Default: 1

(3) Set up the items and press the [Execute] button.

(4) The results of the date processing are displayed.

3. Changing Peak Detection Settings

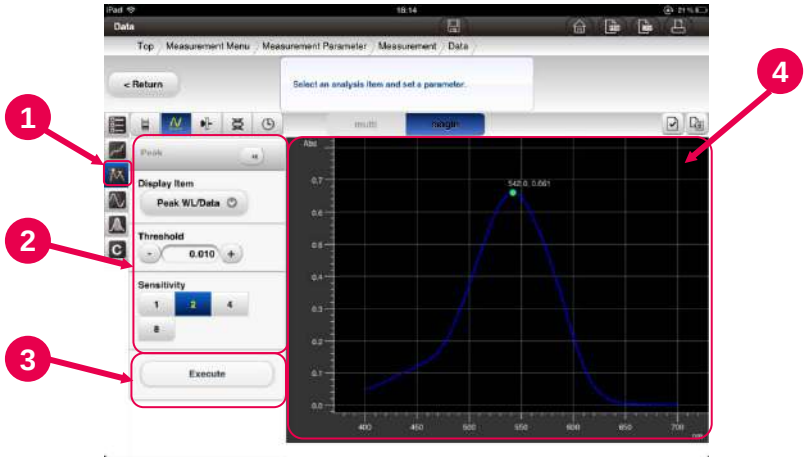


Fig. 5-50 Peak Detection Setting Parameters Window

(1) To change the peak detection settings, press the [Peak Detection Tool Icon] button  .

(2) The statistical calculation setting parameters (Fig. 5-50) are displayed. See 4.2.4 “Measuring Spectra” for the peak detection setting parameters.

(3) Set up the items and press the [Execute] button.

(4) The results of the date processing are displayed.

NOTE: Peak detection is performed in the wavelength range of the currently displayed spectrum. If the wavelength range to be displayed is changed, the number of peaks detected may change. After changing the wavelength range to be displayed, make sure that the target peak is detected.

4. Differentiating a Spectrum

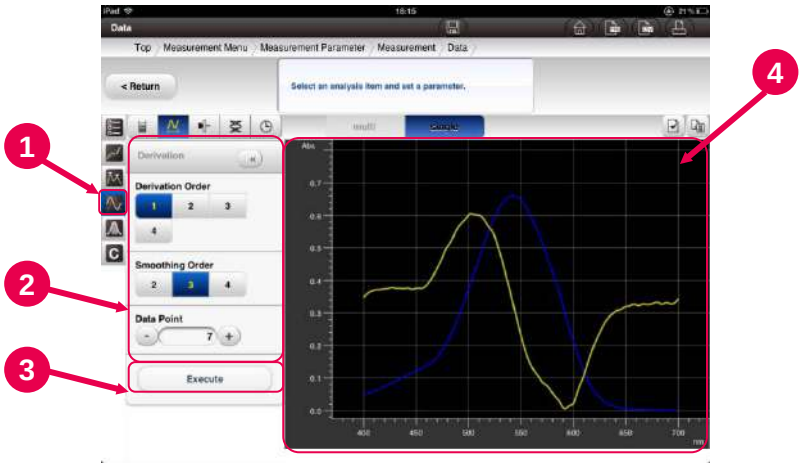


Fig. 5-51 Differentiation Setting Parameters Window

(1) To specify differentiation settings, press the [Differentiation Tool Icon] button  .

(2) The differentiation setting parameters (Fig. 5-51) are displayed. See Table 5-24 for the differentiation setting parameters.

Table 5-24 Differentiation Setting Parameters

Setting Item	Description
Order of differentiation	Specify the order of differentiation. Input range: 1 to 4, Default: 1
Smoothing Degree	Specify the degree of smoothing. Input range: 2 to 4, Default: 3
Number of Data Points	Specify the number of data points to be used for calculation. Input range: 7 to all points, Default: 7

(3) Set up the items and press the [Execute] button.

(4) The spectra before and after differentiation are displayed.

NOTE: To allow easy comparison with the spectrum before differentiation, the differential spectrum that has been differentiated is displayed in the center of the spectrum before differentiation. Therefore, the value of the spectrum on the vertical scale does not agree with the value of the differentiated spectrum. Check the differentiated value with the trace value and the data list.

NOTE: The differentiated data are displayed in the data list after differentiation. If you want to display the data list before differentiation, you need to do so before differentiation.

5. Performing Area Calculation

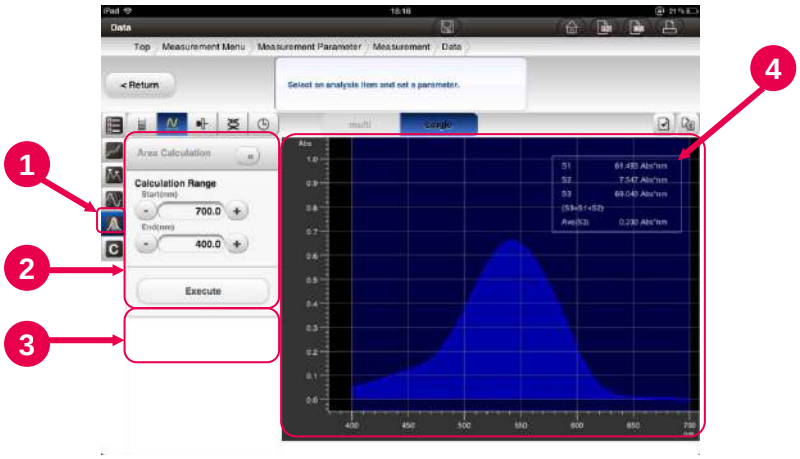


Fig. 5-52 Area Calculation Setting Parameters Window

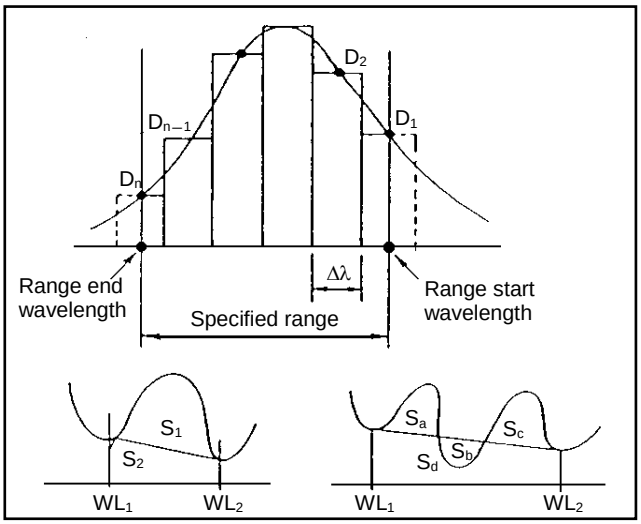
(1) To specify area calculation settings, press the [Area Calculation Tool Icon] button  .

(2) The area calculation setting parameters (Fig. 5-52) are displayed. Specify the range of area calculation. There are two ways of specifying the range of area calculation.
   (a) Specifying the range with a number
   Using the keyboard, enter the desired start wavelength in the starting wavelength field and the desired end wavelength in the ending wavelength field.
   (b) Specifying the range from the displayed spectrum
   You can determine the start and end wavelengths by moving the cursor along the wavelength axis at the bottom of the spectrum.

(3) Set up the items and press the [Execute] button.

(4) The results of the data processing are displayed. See Commentary 5-1 for the principle of area calculation.

Commentary 5-1 Area Calculation



Principle of calculation

To calculate the area, the following calculation is performed for each component (D_1 to D_n) of the spectrum.

S3 $=S1+S2=Sa+Sc+Sd$
$=\{D_2+D_3+ \cdots D_{n-2}+D_{n-1}+(D_1+D_n)/2\}*\Delta\lambda$
S2 $=Sb+Sd$
$=[(D_1+D_n)*\{\Delta\lambda*(n-1)\}]/2$
=[(D_1+D_n)*{range start wavelength (WL_2) - range end wavelength (WL_1)}]/2
S1 =S3-S2

D_1: Spectral data at the range start wavelength
D_n: Spectral data at the range end wavelength
$\Delta\lambda$: Sampling interval

In the time scan mode, the start and end wavelengths are as follows:
Start wavelength (WL_2) → End time (T_2)
End wavelength (WL_1) → Start time (T_1)

6. Displaying the Trace Bar for a Spectrum

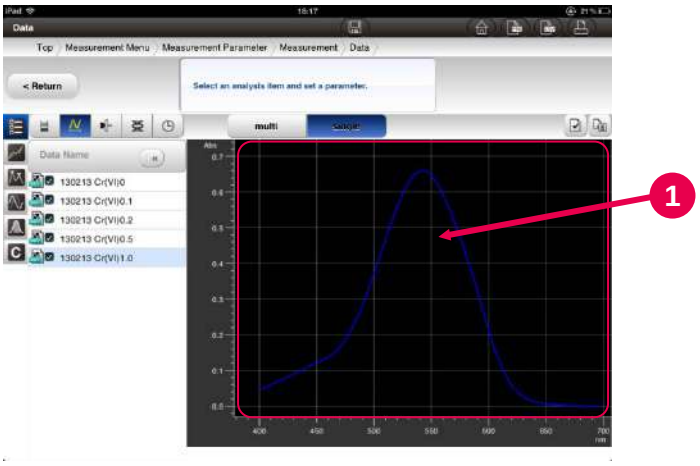


Fig. 5-53 Spectrum Measurement Data Check Window

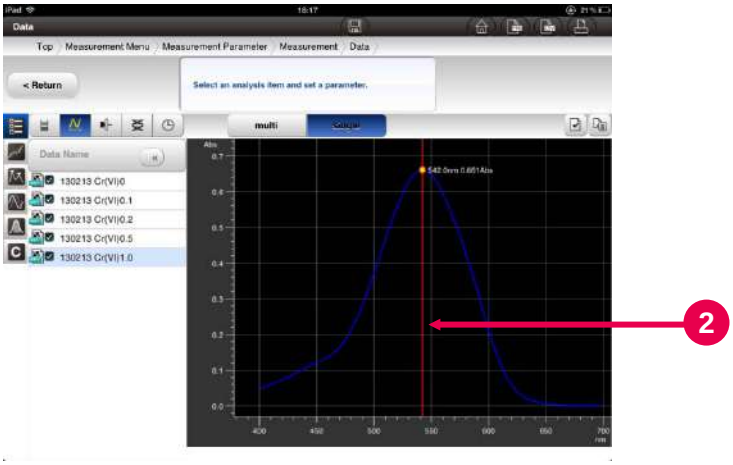


Fig. 5-54 Spectrum Measurement Data Check Window (Displaying the Trace Bar)

(1) When you double-tap on the spectrum window in the Spectrum Measurement Data Check window (Fig. 5-53), the trace bar is displayed (Fig, 5-54). The wavelength and the photometric value in the current trace bar position are displayed at the intersection of the trace bar and the spectrum. As a result, the photometric value at the target wavelength can be read. You can move the trace bar by moving a figure to the left or right over the bar.

(2) To hide the trace bar, double-tap on the bar.

7. Displaying Spectra in a Stack

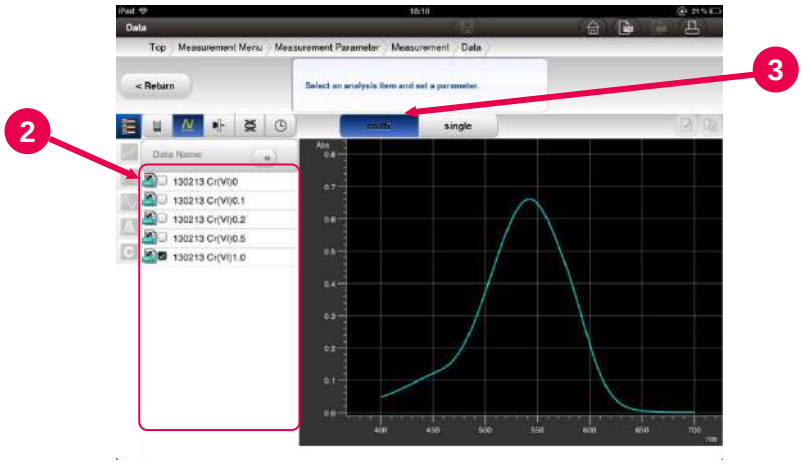


Fig. 5-55 Spectrum Measurement Data Check Window

(1) Select spectral data files to be displayed in a stack using the steps in 5.1.1 “Reading Saved Data” and move to the Data Check window (Fig. 5-55).

(2) Click the checkbox for the spectral data files to be displayed in a stack. You can select up to 10 spectral data files.

(3) When you press the Multi-Display button **multi**, the spectra are displayed in a stack (Fig. 5-56).

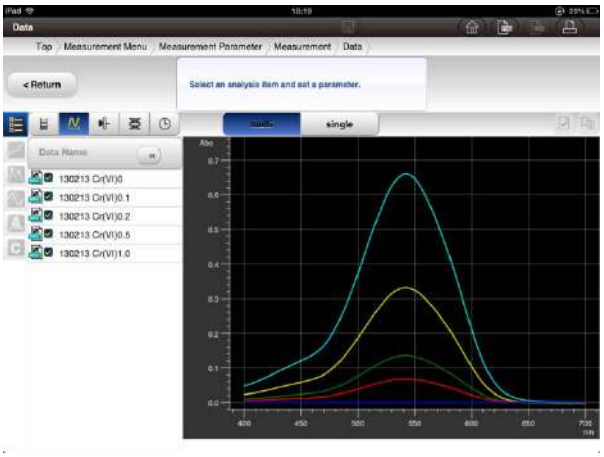


Fig. 5-56 Multi-Spectra Display Window

GUIDE: When you print out from the Multi-Spectra Display window, the conditions for the device to print to are the conditions for the first one among the selected spectra. Processing data, displaying properties, the Data Processing Results tool, and outputting to a CSV file cannot be performed in the multi-display mode, and should be performed in the single-display mode.

8. Displaying the Properties of Spectral Data

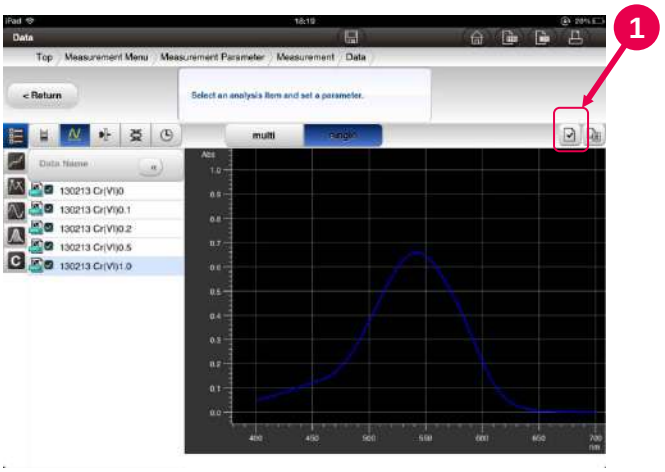


Fig. 5-57 Spectra Data Check Window

(1) To display the properties of the spectral data, press the [Property Tool Icon] button .

(2) The properties of the spectral data (Fig. 5-58) are displayed.

Fig. 5-58 Properties of Spectral Measurement Data

9. Displaying the Results of Spectral Data Processing

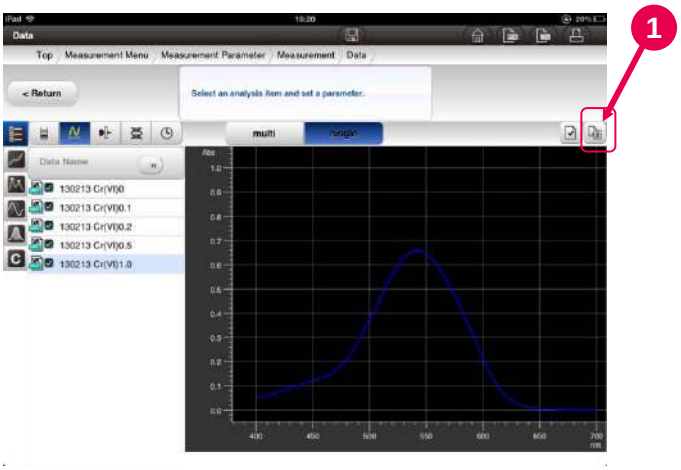


Fig. 5-59 Spectral Data Check Window

(1) To display the results of the spectral data processing, press the [Data Processing Results Tool Icon] button .

(2) The results of the spectral data processing (Fig. 5-60) are displayed.

Fig. 5-60 Results of Spectral Data Processing

5.3.5 Editing Time Scan Data

1. Displaying the Data Check Window.

Displaying the window from saved data

When opening and checking saved data, open saved time scan data using the steps in 5.1.1 “Reading Saved Data” and move to the Data Check window (Fig. 5-62).

Displayin the window during measurement

Press the [Check Data] button 

displayed in the Sample Measurement window during a time scan and move to the Data Check window (Fig. 5-62).

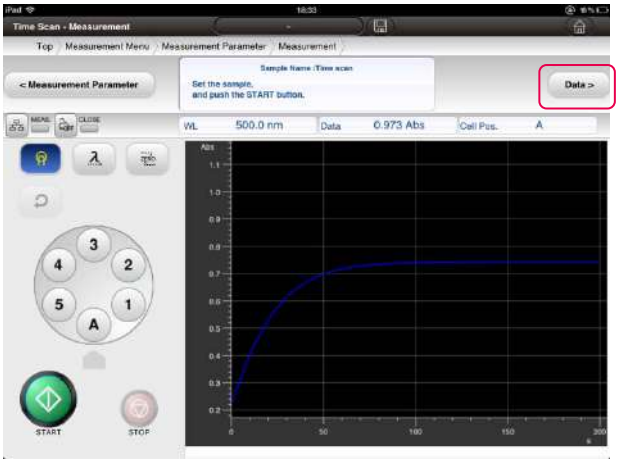


Fig. 5-61 Example of a Window After Sample Measurement

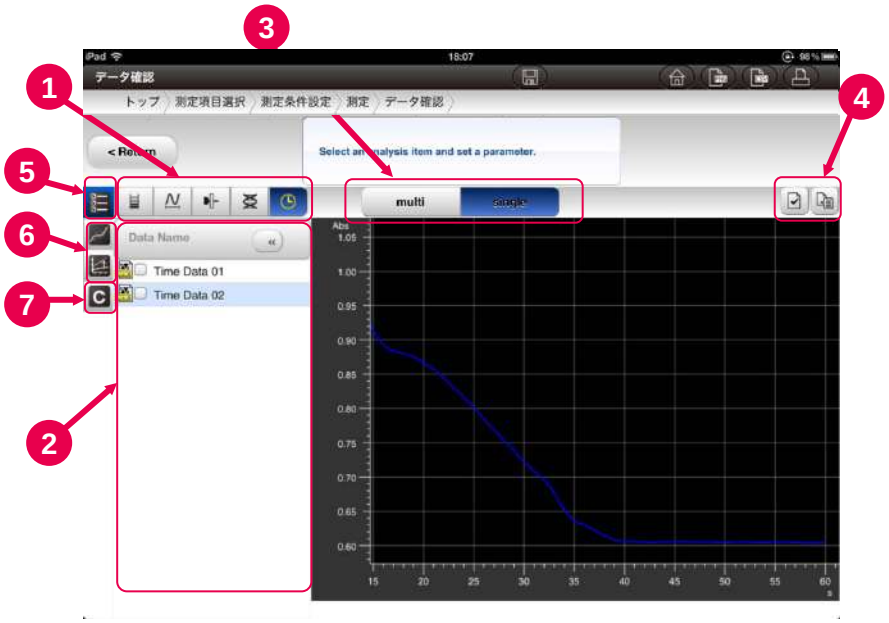


Fig. 5-62 Example of a Display in the Data Check Window

(1) When you press an icon in the data type selection area, a list of files in the selected mode is displayed.

Table 5-25 Measurement Mode Selection Icons

Button	Name	Description
	Display Concentration Measurement Mode	Display only data files in the concentration measurement mode.
	Display Wavelength Scan Mode	Display only data files in the wavelength scan mode.
	Display Absorbance/ Transmittance Measurement Mode	Display only data files in the absorbance/transmittance measurement mode.
	Display Nucleic Acid Measurement Mode	Display only data files in the nucleic acid measurement mode.
	Display Time Scan Mode	Display only data files in the time scan mode.

(2) When you select the Read File button, a data file list selection area is displayed. When you select a different tool icon, the setting parameters are displayed.

(3) You can select a graph display mode.

Table 5-26 Graph Display Mode Selection Icon

Button	Name	Description
single	Single Display	Display a single file selected by the data file list selection area.
multi	Multi-Display	Display multiple files selected by the data file list selection area in a stack. Up to 10 spectra can be drawn on the graph. No more than 10 spectra can be drawn.

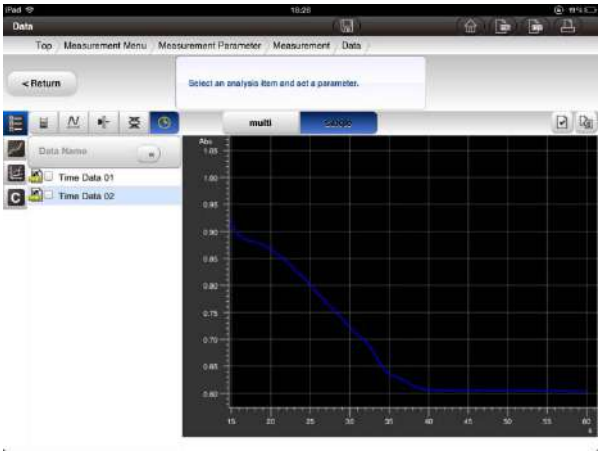


Fig. 5-63 Example of a single display Window

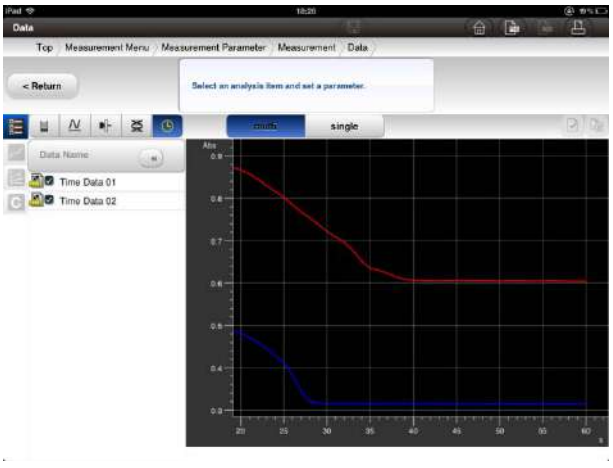


Fig. 5-64 Example of a Multi-Display Window

(4) When you press an icon in the data information browse area, the properties of the data and the details of the data processing are displayed.

Table 5-27 Data Information Browse Icon

Button	Name	Description
	Property Tool Icon	Display properties.
	Data Processing Results Tool Icon	Display the details of data processing.

(5) When you click the [Read File] button  , a data file list selection area is displayed.

(6) When you press an icon in the tool icon area, the settings area for the data processing operation is displayed.

Table 5-28 Tool Icons for Concentration Measurement

Button	Name	Description
	Smoothing Tool Icon	Display smoothing setting parameters.
	Rate Calculation Tool Icon	Display rate calculation setting parameters.

(7) When you click the [Clear] button  , the selected data are returned to the state before processing.

2. Smoothing a Spectrum

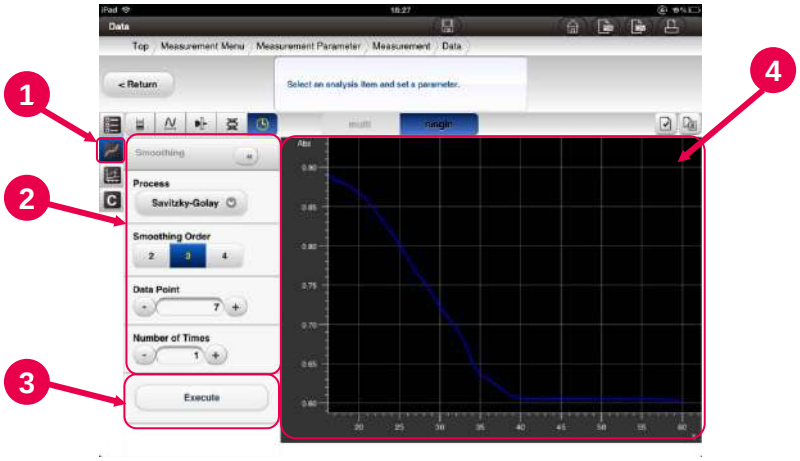


Fig. 5-65 Smoothing Setting Parameters Window

(1) To specify smoothing settings, press the [Smoothing Tool Icon] button  .

(2) The smoothing setting parameters (Fig. 5-65) are displayed. See Table 5-23 for the smoothing setting parameters.

(3) Set up the items and press the [Execute] button.

(4) The results of the date processing are displayed.

NOTE: The smoothed data are displayed in the data list after smoothing. If you want to display the data list before smoothing, you need to do so before smoothing.

3. Changing Rate Calculation Conditions

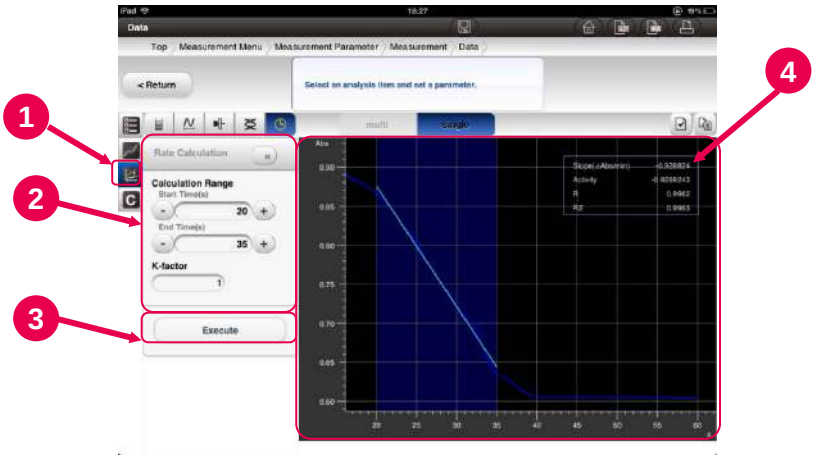


Fig. 5-66 Rate Calculation Setting Parameters window

(1) To specify rate calculation conditions, press the [Rate Calculation Tool Icon] button .

(2) The rate calculation setting parameters (Fig. 5-66) are displayed. See 4.3.5 “Time Scanning” for the setting parameters.

(3) Set up the items and press the [Execute] button.

(4) The results of the date processing are displayed.

4. Displaying the Trace Bar for a Spectrum

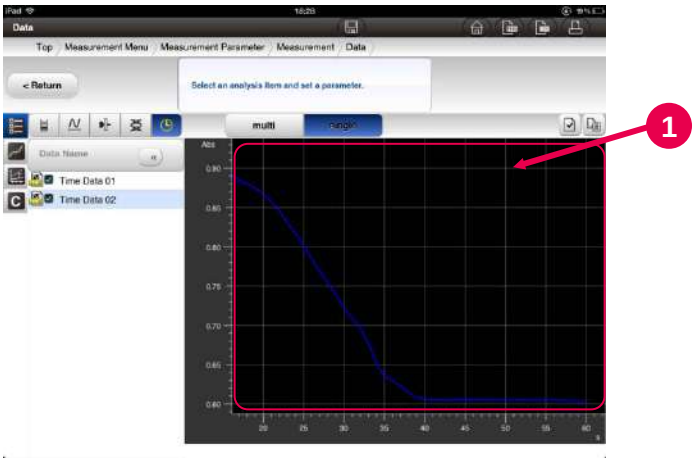


Fig. 5-67 Time scan Data Check Window

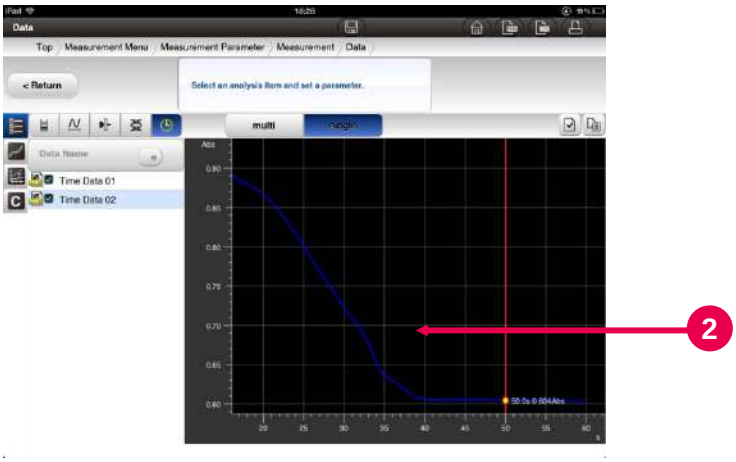


Fig. 5-68 Time scan Data Check Window (Displaying the Trace Bar)

(1) When you double-tap on the time scan spectrum window in the Spectrum Measurement Data Check window (Fig. 5-67), the trace bar is displayed (Fig, 5-68). The wavelength and the photometric value in the current trace bar position are displayed at the intersection of the trace bar and the spectrum. As a result, the photometric value at the target wavelength can be read. You can move the trace bar by moving a figure to the left or right over the bar.

(2) To hide the trace bar, double-tap on the bar.

5. Displaying Spectra in a Stack

(1) Select spectral data files to be displayed in a stack using the steps in 5.1.1 “Reading Saved Data” and move to the Data Check window (Fig. 5-69).

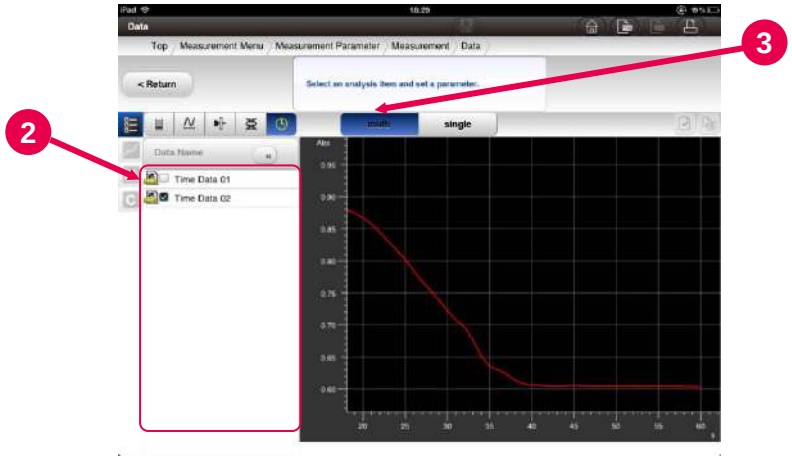


Fig. 5-69 Time scan Data Check Window

(2) Click the checkbox for the spectral data files to be displayed in a stack. You can select up to 10 spectral data files.

(3) When you press the[Multi-Display] button **multi**, the spectra are displayed in a stack (Fig. 5-70).

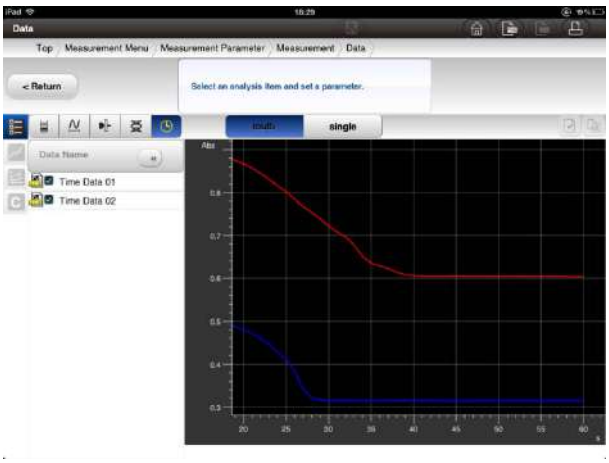


Fig. 5-70 Multi-Spectra Display Window

GUIDE: When you print out from the Multi-Spectra Display window, the conditions for the device to print to are the conditions for the first one among the selected spectra. Processing data, displaying properties, the Data Processing Results tool, and outputting to a CSV file cannot be performed in the multi-display mode, and should be performed in the single-display mode.

6. Displaying the Properties of Time Scan Data

Fig. 5-71 Time scan Check Window

(1) To display the properties of the time scan data, press the [Property Tool Icon] button .

(2) The properties of the time scan data (Fig. 5-72) are displayed.

Fig. 5-72 Properties of Time Scan Data

7. Displaying the Results of Time Scan Data Processing

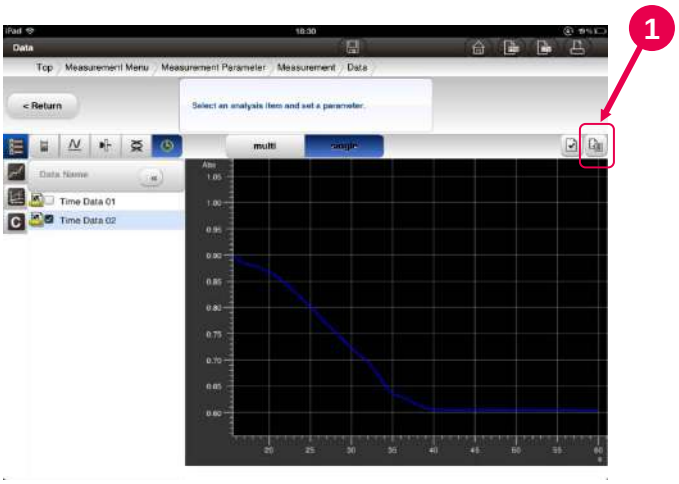


Fig. 5-73 Time scan Data Check window

(1) To display the results of the temporary change data processing, press the [Data Processing Results Tool Icon] button .

(2) The results of the spectral data processing (Fig. 5-74) are displayed.

Fig. 5-74 Results of Time Scan Data Processing

5.3.6 How to Open CSV Format File in Microsoft® Excel®

This section explains how to open a CSV format file generated with UH5300 in Microsoft® Excel®. It is recommended to use Microsoft® Excel® 2007 or later because of its operability. If you are using Excel® 2003, see 2. For Excel® 2003.

1. For Excel® 2007 or Later

(1) Open the CSV format file generated by UH5300 in a personal computer where Microsoft® Excel® 2007 or later is installed.

(2) Select Column A.

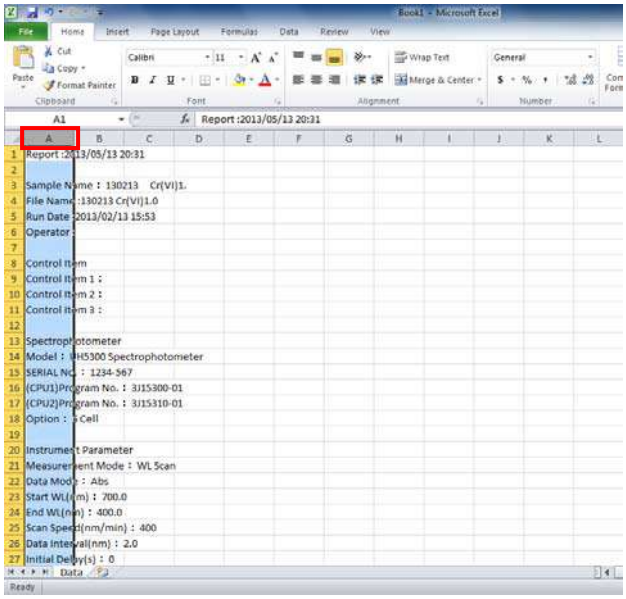


Fig. 5-75 Excel Screen When CSV Format File Has Been Opened

(3) Select the "Data" tab and press the "Text to Columns" button in "Data Tools".

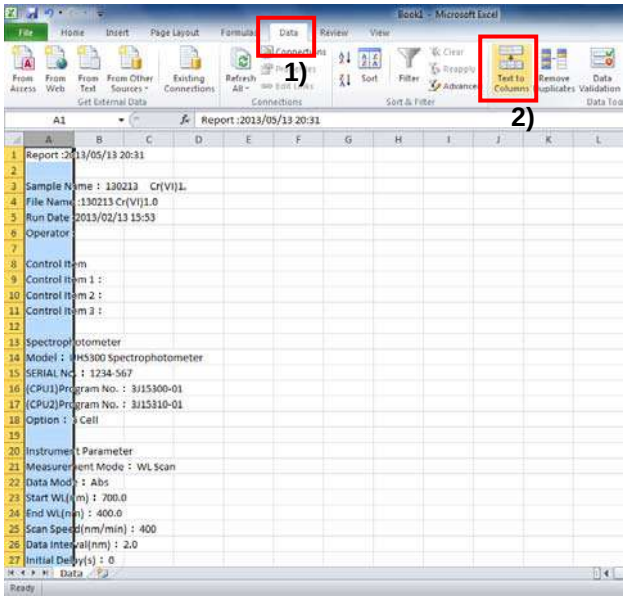


Fig. 5-76 Specifying Delimiters

(4) When the wizard shown in Fig. 5-77 is displayed, confirm that the "Delimited - Characters such as commas or tabs separate each field." radio button is selected, and then press the "Finish" button.

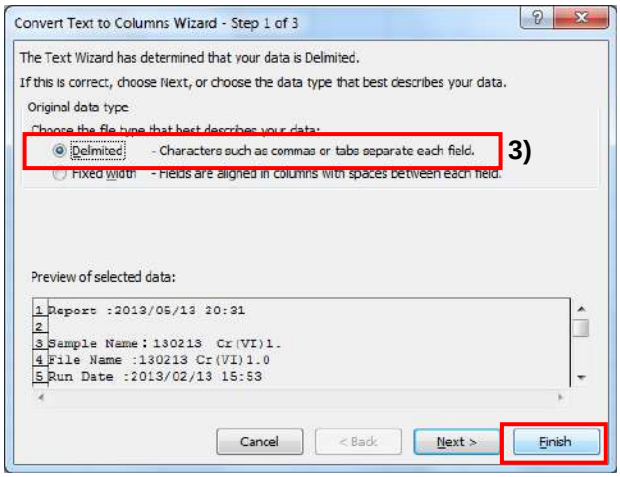


Fig. 5-77 Convert Text to Columns Wizard Window

(5) The data is divided into cells. Save the data in Excel format.

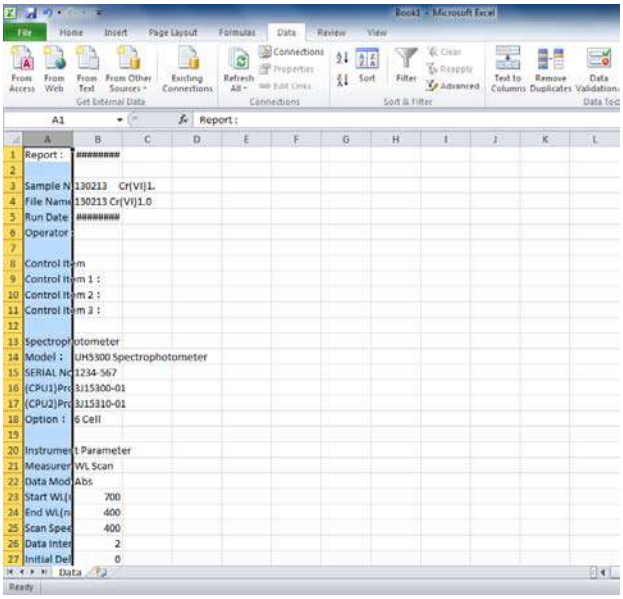


Fig. 5-78 Screen When CSV Format File Has Been Opened

2. For Excel® 2003

(1) First, save the target CSV format file in a personal computer where Microsoft® Excel® 2003 is installed. Then, start Microsoft® Excel® 2003.

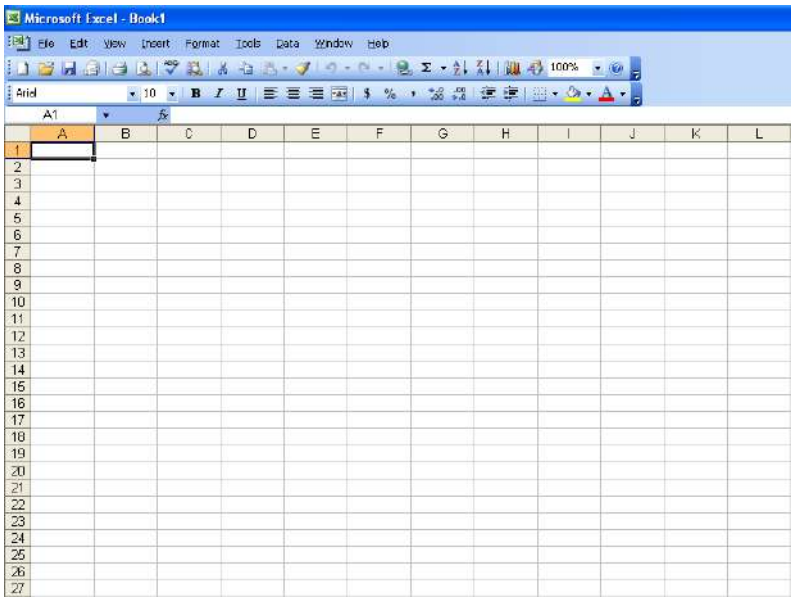


Fig. 5-79 Starting Microsoft® Excel® 2003

(2) Select the "Data" tab, "Import External Data", and then "Import Data".

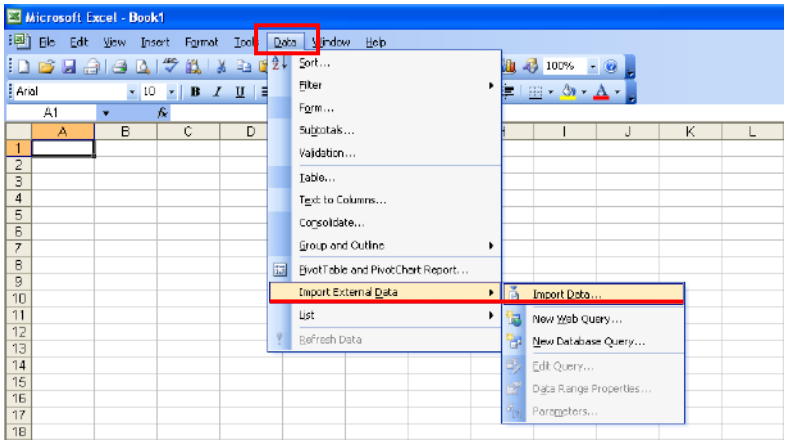


Fig. 5-80 Importing External Data

(3) Select the target CSV format file and press "Open". In this example, the Wavelength scan.csv file is opened.

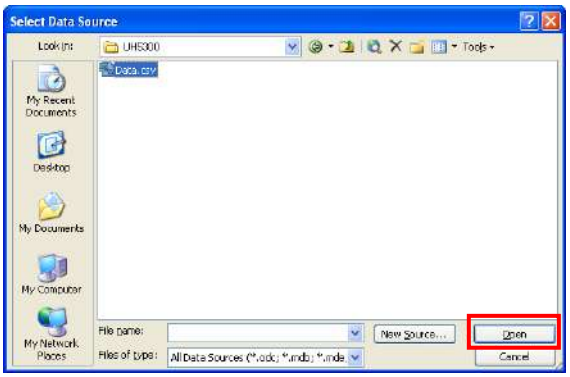


Fig. 5-81 Window to Select Data File

(4) Press the "Delimited - Characters such as commas or tabs separate each field." radio button, and select "1" in "Start import at row". Then, select "65001 : Unicode (UTF-8)" in "File origin". Then, press "Next >".

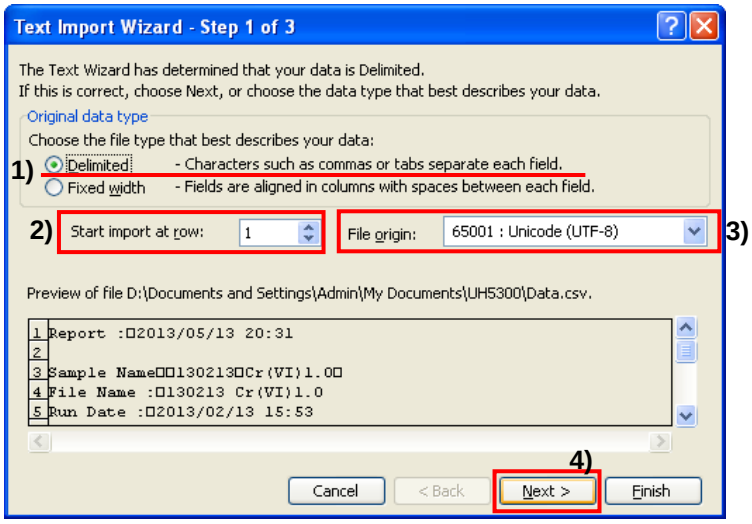


Fig. 5-82 Text Import Wizard 1

(5) Put a check mark in "Tab" in "Delimiters". Then, press "Finish".

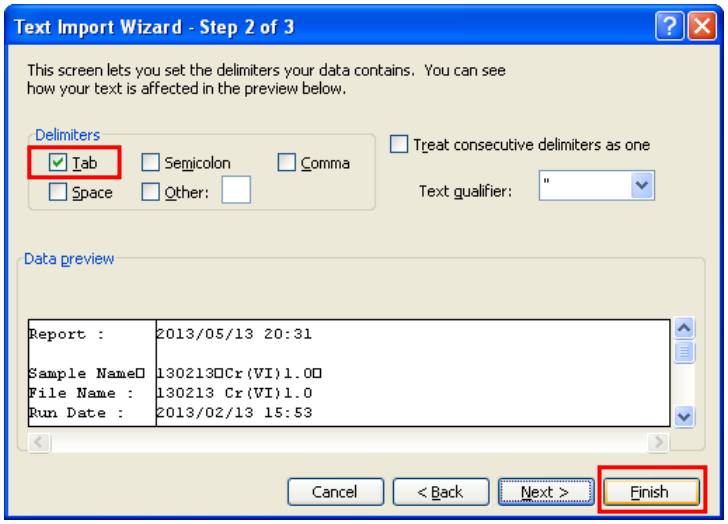


Fig. 5-83 Text Import Wizard 2

(6) Select the cells that you want to put the data in and press "OK".

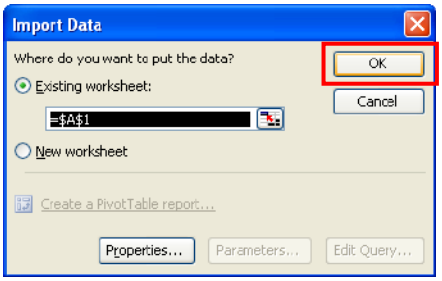


Fig. 5-84 Import Data

(7) The data is opened in Excel. Save the file with a name as required.

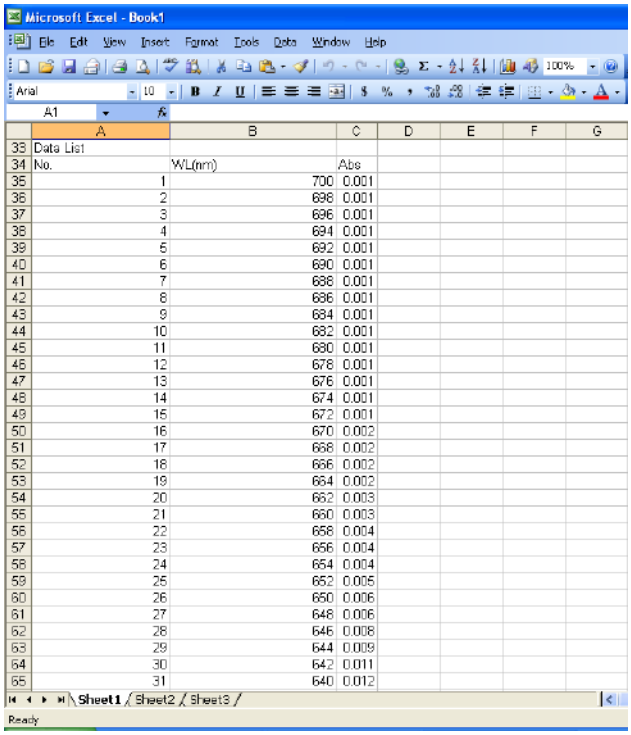


Fig. 5-85 CSV Format File Opened in Excel

* For Excel® 2003, there is another method to open a CSV format file: open the CSV format file with Notepad, which is available from Accessories of the Windows® Start menu, and save it with the ANSI encoding, and then open this file in Excel® 2003.

5.4 Description and Installation of Optional Components

This section describes optional components. Use them according to the intended purpose. Sections 5.4.2 to 5.4.4 describe the installation and setting-up of a single-cell holder, a micro-cell mask and a mercury lamp.

Table 5-29 Optional items

Purpose	Optional Items		Sample Quantity
Measurement using a conventional cell holder	Holder base	P/N: 3J1-0109	1.7 to 3.5 mL
	Single cell holder	P/N: 3J1-0106	
Measurement of small amounts of samples (340 to 600 µL)	Holder base	P/N: 3J1-0109	340 to 600 µL
	Single cell holder	P/N: 3J1-0106	
	Micro-cell mask	P/N: 200-1537	
	10 mm quartz micro-cell	P/N: 124-0357	
	10 mm black micro-cell	P/N: 200-0551	
Measurement of very amounts of samples (Less than 90 µL)	Holder base	P/N: 3J1-0109	1.5 to 4.0 µL 12 to 40 µL 50 to 90 µL
	Single cell holder	P/N: 3J2-0106	
	Mask for trace sample cell	P/N: 3J1-0116	
	1.5 µL trace sample cell	P/N: 3J2-0120	
	12 µL trace sample cell	P/N: 3J2-0121	
	50 µL trace sample cell	P/N: 3J2-0122	
Measurement with increased sensitivity	Holder base	P/N: 3J1-0109	17 to 35 mL
	Rectangular long cell holder	P/N: 210-2107	
	100 mm quartz cell	P/N: 210-3939	
Measurement of clear plate samples	Holder base	P/N: 3J1-0109	-
	Glass filter holder	P/N: 210-2109	
Measurement of film samples	Holder base	P/N: 3J1-0109	-
	Film holder	P/N: 210-2112	
Measurement of polarization properties	Holder base	P/N: 3J1-0109	-
	Polarizer holder	P/N: 210-2130	
Measurement using a shipper	Auto-shipper	P/N: 3J1-0101	-
Measurement under at different temperatures under agitation conditions	Temperature-controlled cell holder with a stirrer	P/N: 3J1-0104	-

(cont'd)

Purpose	Optional Items		Sample Quantity
Measurement at pre-programmed temperatures	Thermoelement temperature-controlled cell holder with programming capability	P/N: 131-0301 or P/N: 131-0302	-
	Front panel	P/N: 3J1-3214	
Measurement by manually switching four oblong cells	Oblong quadruple cell holder	P/N: 150-0940	-
	Front panel	P/N: 3J1-3214	
Wavelength calibration and verification of wavelength accuracy using a mercury lamp	Pen-type low-pressure mercury lamp holder	Please contact your dealer or a maintainance service provider in your area.	-
	Pen-type low-pressure mercury lamp		-
	Dedicated power supply		-

For information on these optional components and the latest information, please contact your dealer or a maintainance service provider in your area. Information on the latest optional components and applications are available on our membership-based information website S.I.navi at https://members.hht-net.com/.

5.4.1 Holder Base (optional)

The holder base is required to mount the following optional components.

Table 5-30 Optional Components Requiring the Holder Base

Produce Name	P/N
Single cell holder	3J1-0106
Rectangular long cell holder	210-2107
Glass filter holder	210-2109
Film holder	210-2112
Polarizer holder	210-2130

1. Removing the 6-cell Turret

Remove the 6-cell turret using the steps in item in Section 2. “Dismounting Method” of 1.3.2 “6 Cell Turret.”

2. Removing the Cell Holder for Reference

Remove the reference cell holder using the steps in item in Section 2. “Dismounting Method” of 1.3.1 “Cell Holder for Reference.”

3. Installing the Holder Base

(1) Open the sample compartment cover. Install the holder base so that the positioning screws enter the guide pins of the sample compartment. Align oblong positioning hole 1) with guide pin 1) and positioning hole 2) with guide pin 2).

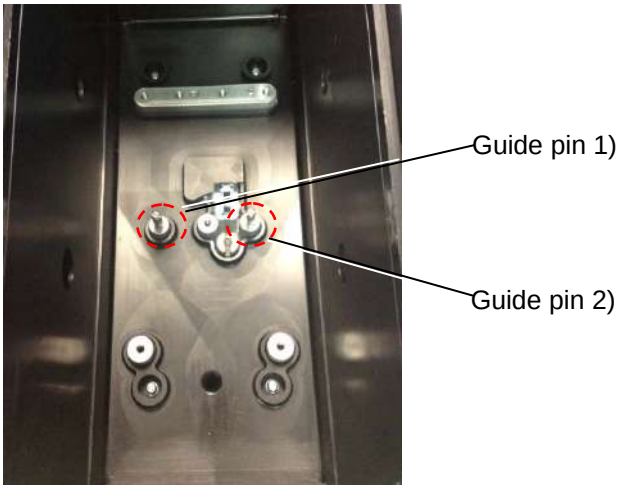


Fig. 5-86 Guide Pins of the Sample Compartment

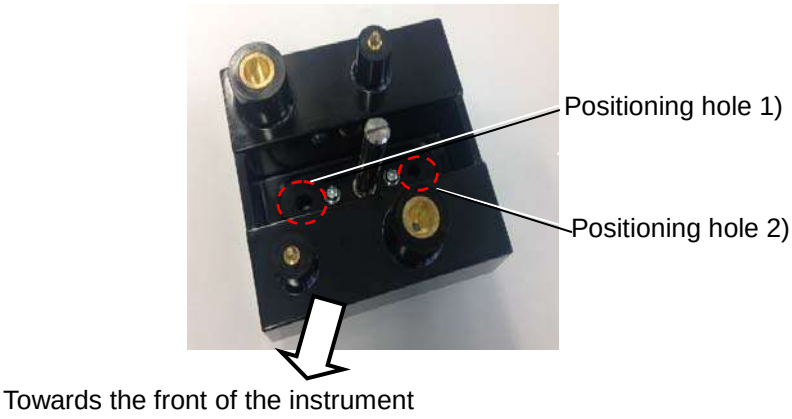


Fig. 5-87 Appearance of the Holder Base

(2) Tighten the setscrews of the holder base to secure the holder base.

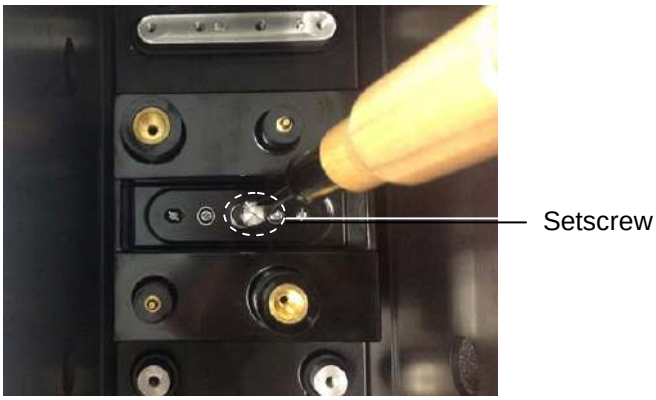


Fig. 5-88 Installing the Holder Base in the Sample Compartment

4. Removing the Holder Base

Reverse the installation steps to remove the holder base. Loosen the setscrews and lift the holder base.

5.4.2 Single Cell Holder (optional)

The single cell holder is used for the measurement of a square cell with an optical path length of 10 mm and is mounted on the holder base.

1. Installing the Holder Base

Install the holder base using the holder base installation steps in 5.4.1.

2. Installing the Single-cell Holder

(1) Open the sample compartment. Enter the guide pins in the holder base in the positioning holes in the single-cell holder. Align the holder base setscrews with the holder base setscrew through-holes.

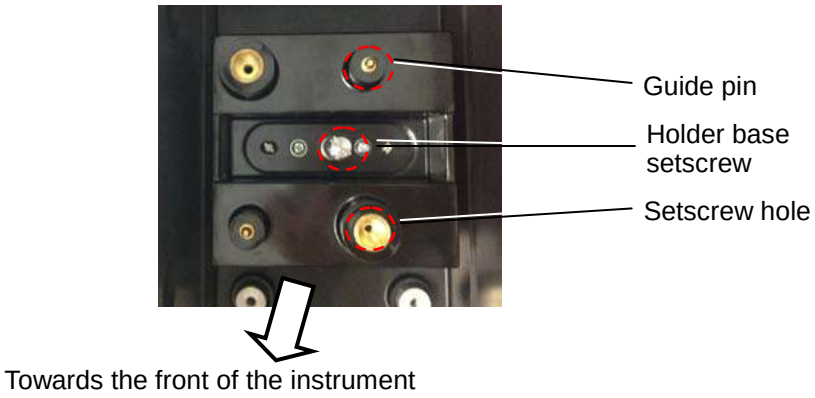


Fig. 5-89 Guide Pins of the Sample Compartment

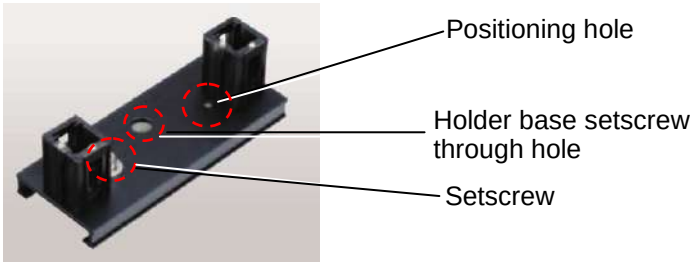


Fig. 5-90 Appearance of the Single-Cell Holder

(2) Tighten the setscrews with a flat blade screwdriver to secure the single-cell holder to the holder base.

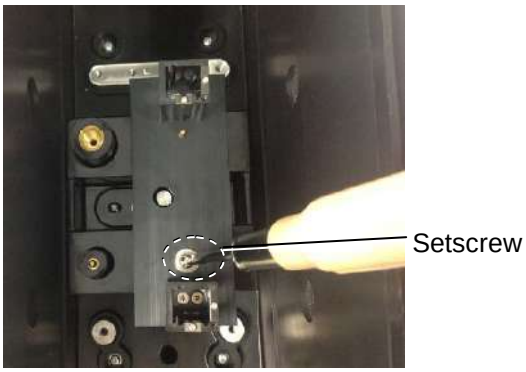


Fig. 5-91 Mounting the Single-Cell Holder on the Holder Base

3. Changing the 6-cell Mode

Set up the 6-cell mode. Change the 6-cell mode from ON to OFF using the steps in 3.1.2 “6 Cell Mode” and take measurements.

4. Removing the Single-cell Holder

Reverse the installation steps to remove the single-cell holder. Loosen the setscrews and lift the holder.

5.4.3 Micro-Cell and Micro-Cell Mask (optional)

A micro-cell is used in the UH5300-type sample compartment, together with the holder base (3J1-0109), single-cell holder (3J1-0106) and the micro-cell mask (200-1537), and is suitable for the measurement of trace amounts of samples of 340 to 600 µL.

1. Installing the Holder Base

Install the holder base using the holder base installation steps in 5.4.1.

2. Installing the Single-cell Holder

Install the single-cell holder using the single-cell holder installation steps in 5.4.2.

3. Installing the Micro-cell Mask

(1) The figure below shows the appearance of the micro-cell mask and its side view. The raised side of the mask is called here the convex mask side and its recessed side is called the concave mask side.

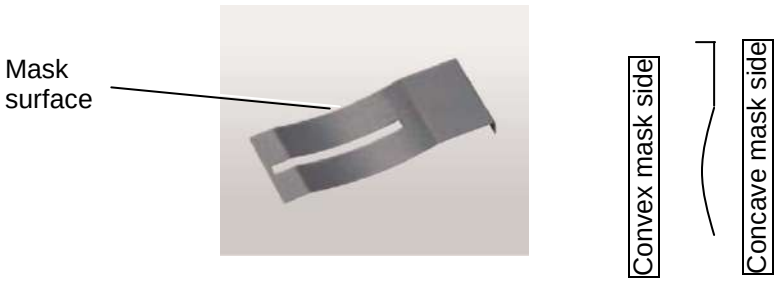


Fig. 5-92 Appearance and Side-View of the Micro-Cell Mask

(2) The figure below shows the appearance of the single-cell holder. The cell holders on both the sample and reference sides have a groove for installing the mask. Slide the mask into the grooves with the convex mask side facing in the direction shown in the figure. Push it in until it stops.

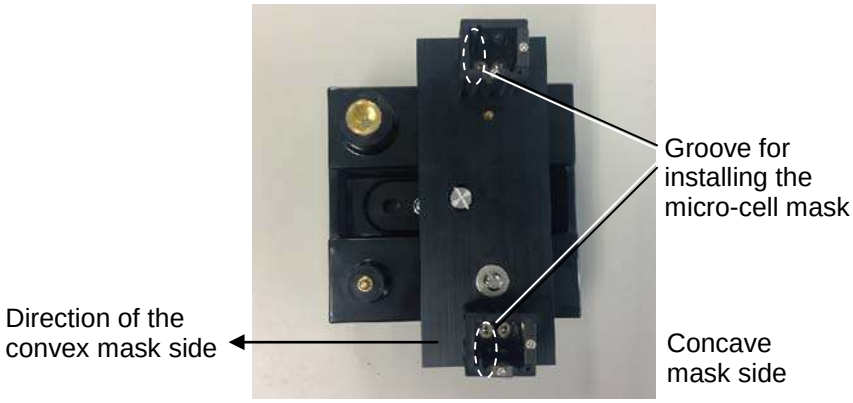


Fig. 5-93 Appearance of the Single-Cell Holder

* In this figure, the single-cell holder is removed from the sample compartment.

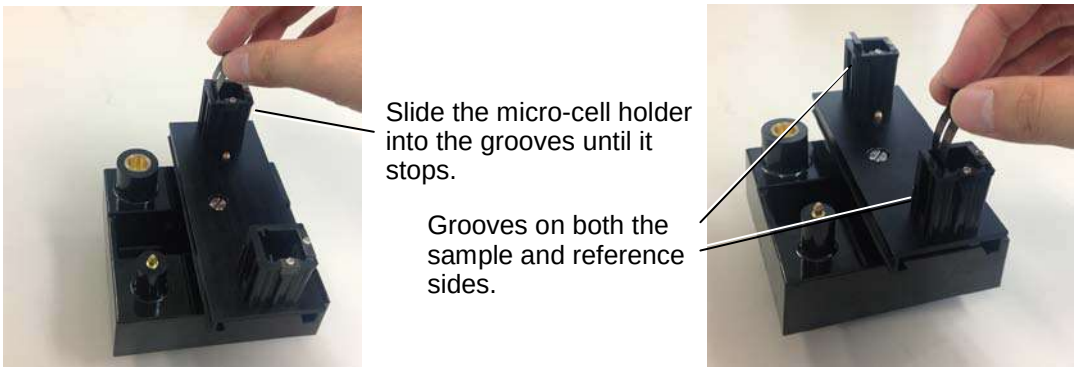


Fig. 5-94 Installing the Micro-Cell Mask

4. Changing the 6-cell mode

Set up the 6-cell mode. Change the 6-cell mode from ON to OFF using the steps in 3.1.2 “6 Cell Mode” and take measurements.

5. Removing the single-cell holder

Reverse the installation steps to remove the single-cell holder. Loosen the setscrews and lift the holder.

5.4.4 Pen-type Low-Pressure Mercury Lamp Holder (optional)

The pen-type low-pressure mercury lamp holder is used for wavelength calibration and the verification of wavelength accuracy using a mercury lamp. The pen-type low-pressure mercury lamp and dedicated power supply should be provided by the customer. Install the lamp using the pen-type low-pressure mercury lamp holder.
For detailed information about the pen-type-pressure mercury lamp, the dedicated power supply, and the pen-type Low-Pressure Mercury Lamp Holder for this UH5300, contact your sales representative or local maintenance service office.
An example of the pen-type low-pressure mercury lamp (manufactured by Hamamatsu Photonics K.K) and the dedicated power supply is described here.

⚠ CAUTION

Direct Gazing into Lighting Mercury Lamp damages Your Eyes

Mercury lamp emits strong ultraviolet rays. Do not therefore gaze directly into the lamp. Wear a protective eye glasses that blocks ultraviolet rays if gazing into the lamp is unavoidable.

1. Preparing the pen-type Low-pressure Mercury Lamp and the Dedicated Power Supply

NOTICE: First, please check that the pen-type Low-pressure Mercury Lamp and the Dedicated Power Supply correspond to the voltage and frequency of your power supply.

Insert the connector of the pen-type low-pressure mercury lamp into the socket of the power supply. Insert the power cord plug into the power outlet.

2. Installing the Pen-type Low-pressure Mercury Lamp Holder

Insert the pen-type low-pressure mercury lamp into the pen-type low-pressure mercury lamp holder in the direction shown in the figure.

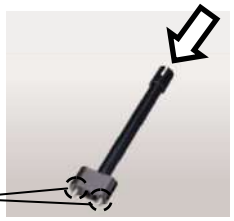


Fig. 5-96 Installing the Pen-Type Low-Pressure Mercury Lamp holder

3. Removing the iPad Mount

Raise the iPad mount and remove the two screws. Lift the tab and remove the iPad mount.

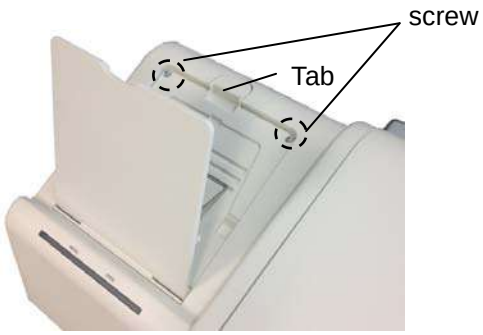


Fig. 5-97 Removing the iPad Mount

4. Installing the Pen-type Low-pressure Mercury Lamp Holder

Align the guide pins of the pen-type low-pressure mercury lamp holder with the positioning holes between the XeF lamp and the mirror. Insert the pins into the holes with the window in the lamp holder facing towards the front of the instrument.

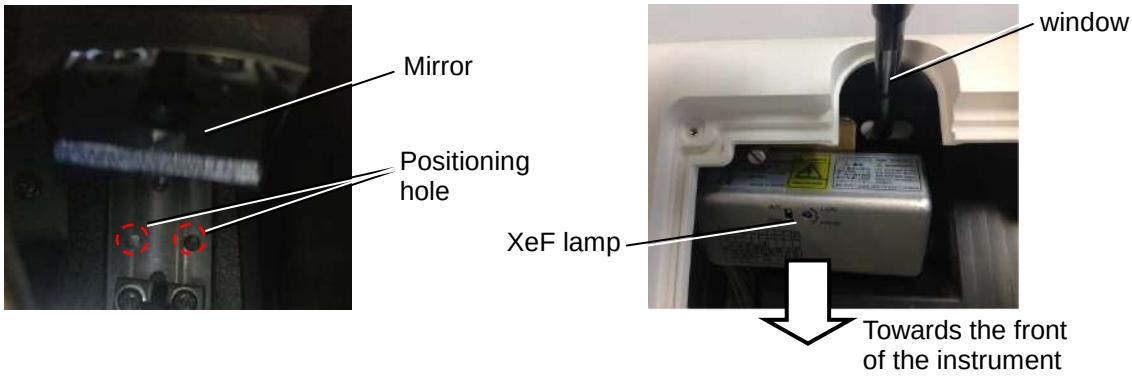


Fig. 5-98 Installing the Pen-Type Low-Pressure Mercury Lamp Holder

NOTE: The installation position of the mercury lamp is close to the mirror. Do not bring the lamp into contact with the mirror.

5. Turning on the Pen-type Low-pressure Mercury Lamp

Turn on the switch of dedicated power supply to turn on the mercury lamp. Turn off the lamp after use.

> **⚠ CAUTION**
>
> **Mercury Lamp becomes hot when lights**
>
> The mercury lamp is still hot immediately after turning off the lamp power supply. Wait for about five minutes until the lamp is fully cooled for safe handling.

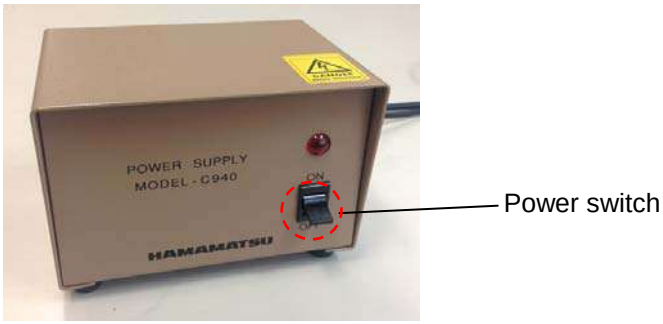


Fig. 5-99 Power Supply for the Pen-Type Low-Pressure Mercury Lamp

6. Removing the Pen-type Low-pressure mMercury Lamp Holder

Reverse the installation steps. Lift and remove the lamp. Install the iPad mount and secure it with screws in two positions.

NOTE: The installation position of the mercury lamp is close to the mirror. Do not bring the lamp into contact with the mirror.

5.4.5 Sample Compartment Front Cover

When using an optional component in Table 5-31, you need to remove the front cover of the sample compartment attached to the main body of the instrument. This section describes the removal and installation of the front cover of the sample compartment.

Table 5-31 Optional Components Requiring Removal of the Front Cover of the Sample Compartment

Optional Component	Component No.
Auto-shipper	P/N: 3J1-0101
Temperature-controlled cell holder with a stirrer	P/N: 3J1-0104
Thermoelement temperature-controlled cell holder with programming capability	P/N: 131-0301 or 131-0302
Oblong quadruple cell holder	P/N: 150-0940

1. Removing the Sample Compartment Front Cover

Open the sample compartment cover. Hold and lift the front cover of the sample compartment as shown in Fig. 5-100. Now you can remove the cover. The sample compartment with the cover removed looks like Fig. 5-101. Do not misplace the cover. Place it in an easy-to-find location.

Fig. 5-100 Removing the Front Cover of the Sample Compartment

Fig. 5-101 Sample Compartment with the Cover Removed

2. Installing the Sample Compartment Front Cover

When installing the front cover of the sample compartment, check the tabs on the front cover and those on the instrument side shown in Fig. 5-102. Hook the left and right tabs of the cover on the tabs on the instrument side. Slide it in from the top to the bottom (see Fig. 5-103).

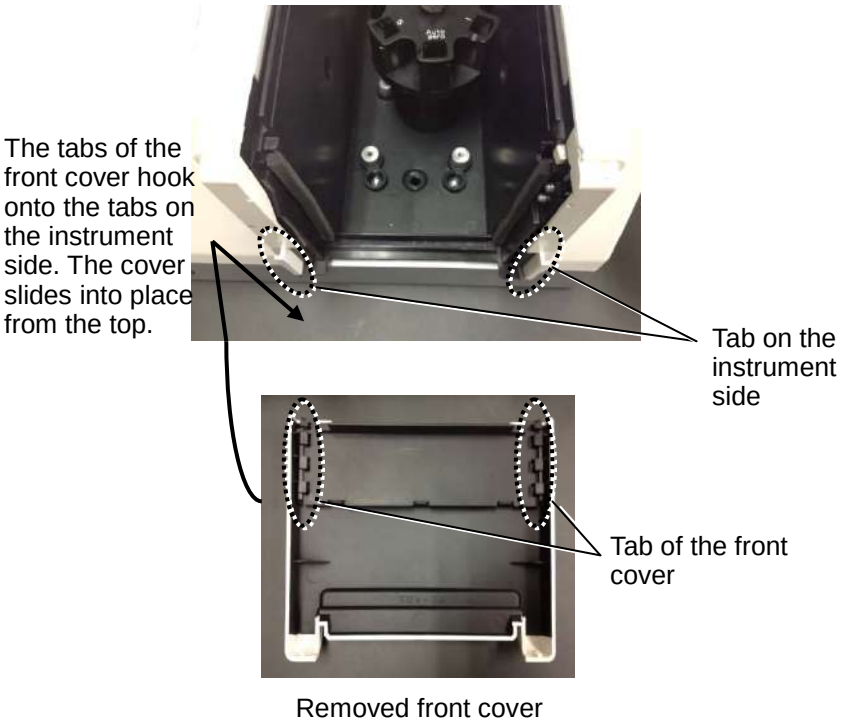


Fig. 5-102 Installing the Front Cover of the Sample Compartment

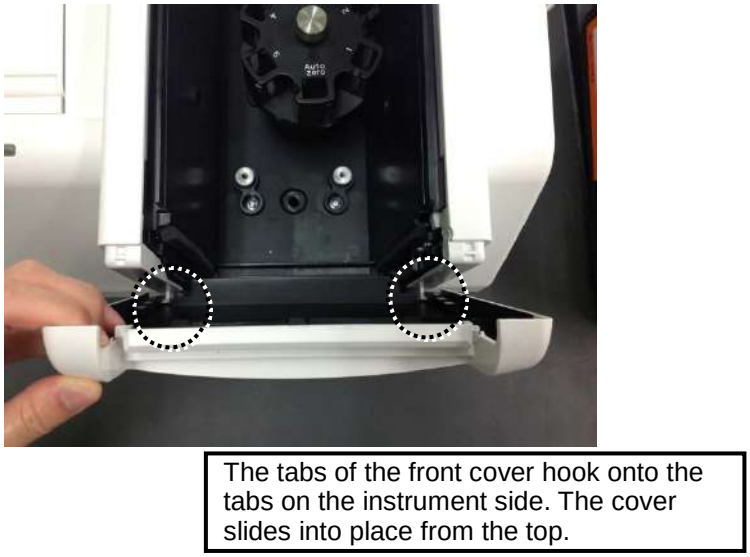


Fig. 5-103 Installing the Front Cover of the Sample Compartment

Check that the cover is level with the instrument at the top connection. Check that the cover closes.

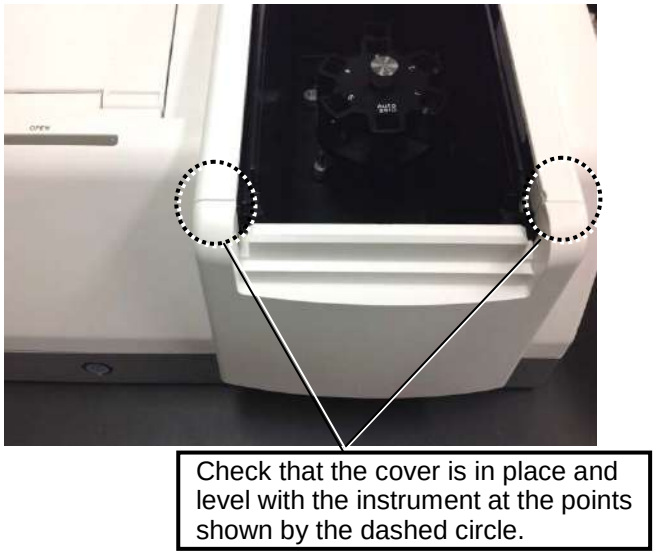


Fig. 5-104 Sample Compartment with the Front Cover in Place

6 PERFORMANCE CHECK

This chapter describes the method of performing a performance check to make sure the instrument satisfies the specification. You have to purchase an available option to perform the performance check by a pen type low-pressure mercury lamp. See “5.4.4 Pen-type Low-Pressure Mercury Lamp Holder (optional)” on how to set a pen type low-pressure mercury lamp.
The performance check consists of performance check items using the built-in lamp (Xe flash lamp) and performance check items using the Hg lamp.

NOTE: When checking whether the performance of the main unit satisfies the specification, remove the options mentioned in 5.4 Description and Installation of Optional Components in accordance with their respective instruction manuals, and check the description in 1.3 Mounting and Dismounting Cell Holder and execute the calibration with the 6 cell turret and cell holder for reference being attached.

(1) Performance check items by built-in lamp
   (a) WL accuracy (484.3 nm)
   (b) WL accuracy (260.6 nm)
   (c) WL accuracy (881.9 nm)
   (d) WL repeatability
   (e) Noise level
   (f) Baseline flatness
   (g) Baseline stability
   (h) Hardware check
   ⇒ See “6.1 Check by Built-in Lamp” for each item.

(2) Performance check items by Hg lamp
   (a) WL accuracy (253.7 nm)
   (b) WL accuracy (435.8 nm)
   (c) WL accuracy (546.1 nm)
   (d) WL repeatability
   (e) Resolution
   (f) Hardware check
   ⇒ See “6.2 Check by Optional Pen Type Low-Pressure Mercury Lamp” for each item.

6.1 Check by Built-in Lamp

(1) After starting up the instrument, press the  [Maintenance button] icon on the top page. The Measurement Menu screen is displayed (Fig. 6-1).

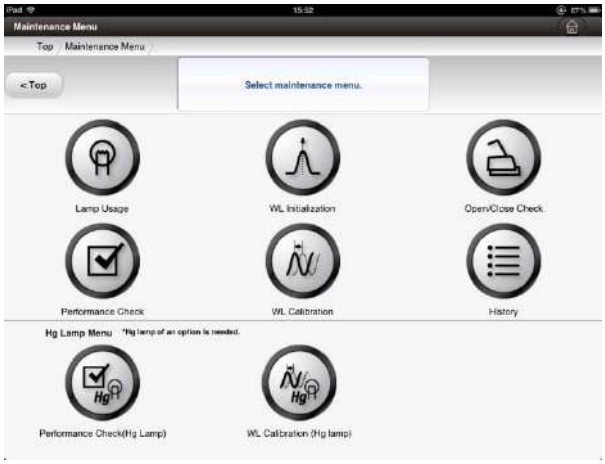


Fig. 6-1 Maintenance Screen

Make sure the sample compartment is empty and close the cover. Press the  [Performance Check button] icon to select the performance check.

(2) The Instrument Performance Check screen (Fig. 6-2) is displayed.

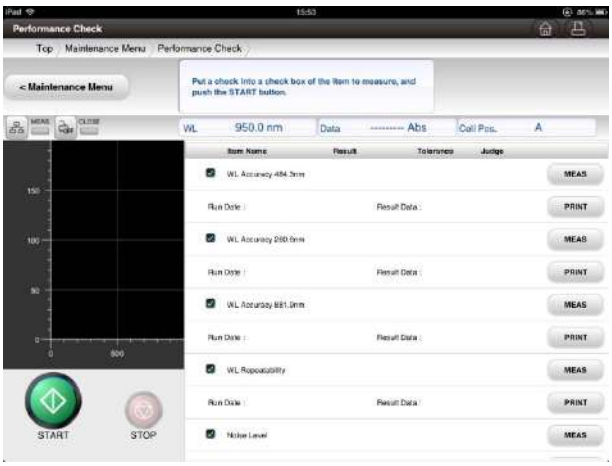


Fig. 6-2 Instrument Performance Check Screen

[Automatic instrument performance check]
For automatic instrument performance check, mark the item name and press the All Start button icon.

[Instrument performance check per item]
For instrument performance check per item, press the MEAS on the right of an item name. For this check, also see from “6.1.1 Wavelength Accuracy” to “6.1.6 Hardware Check.”

6.1.1 Wavelength Accuracy

(1) Display the Instrument Performance Check screen (Fig. 6-3). Press the MEAS button on the right edge of the item name “WL accuracy 484.3 nm.” The Wavelength accuracy check of the selected Wavelength is performed.

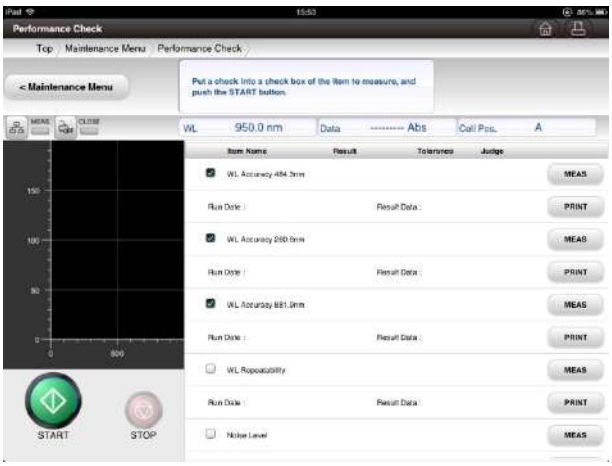


Fig. 6-3 Performance Check Screen

(2) The guidance for measurement conditions under configuration (Fig. 6-4) is displayed and the conditions are set. Then, the Wavelength accuracy check is performed.

Fig. 6-4 Wavelength Accuracy (Measuring) Screen

(3) The screen (Fig. 6-5) is displayed after the Wavelength accuracy check is finished. The measurement result is displayed on the Wavelength Accuracy section. The difference with the peak value for each Wavelength of the emission line as well as “OK” if the value is within the standard or “NG” if the value is out of the standard are also displayed. In the case of “NG”, perform the “6.4 Wavelength Initialization.” Then, perform the Wavelength accuracy again in the above procedure. If “NG” is displayed again, perform the “6.5 Wavelength Calibration” and check the Wavelength accuracy again in the above procedure. If “NG” is displayed again, see “7.10 Troubleshooting.”

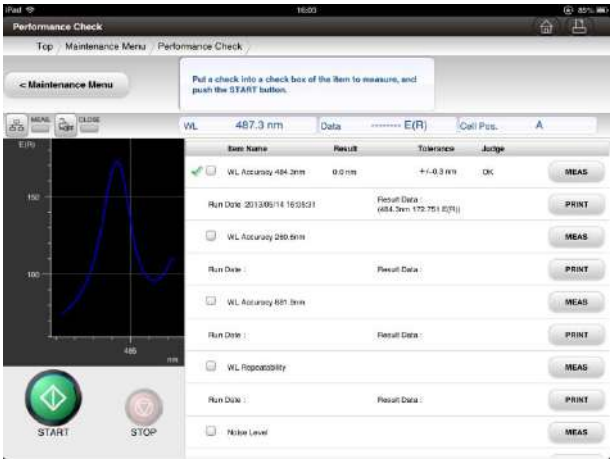


Fig. 6-5 Wavelength Accuracy 484.3nm Check Result Screen

(4) Press the PRINT (Print) to print out the measurement result.
Follow the similar procedure for 260.6 nm and 881.9 nm.

Table 6-1 Measurement Result and Specification for Wavelength Accuracy (484.3 nm)

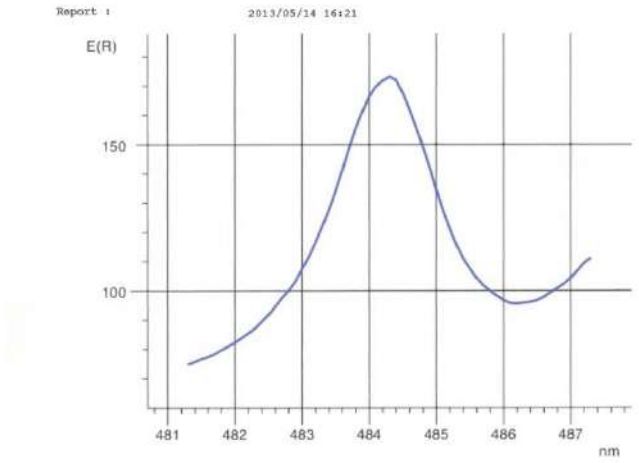
Item	WL Accuracy (484.3 nm)
Measurement conditions	The emission spectrum of the emission line of the Xe flash lamp (the detector on the monitor) WL range: 487.3 to 481.3 nm Scanning speed: 10 nm/min Data interval: Normal (1 nm) Response: Normal Measure the spectrum.
Calculation	Calculate the difference between the peak Wavelength of the spectrum obtained and 484.3 nm. Wavelength accuracy (484.3 nm) = (Peak Wavelength obtained) - 484.3
Specification	Within ±0.3 nm

Table 6-2 Measurement Result and Specification for Wavelength Accuracy (229.0 nm)

Item	Wavelength Accuracy (260.6 nm)
Measurement conditions	The emission spectrum of the emission line of the Xe flash lamp (the detector on the monitor) WL range: 263.6 to 257.6 nm Scanning speed: 10 nm/min Data interval: Normal (1 nm) Response: Normal Measure the spectrum.
Calculation	Calculate the difference between the peak Wavelength of the spectrum obtained and 260.6 nm. Wavelength accuracy (260.6 nm) = (Peak Wavelength obtained) - 260.6
Specification	Within ±0.3 nm

Table 6-3 Measurement Result and Specification for Wavelength Accuracy (822.8 nm)

Item	Wavelength Accuracy (881.9 nm)
Measurement conditions	The emission spectrum of the emission line of the Xe flash lamp (the detector on the monitor) WL range: 884.9 to 878.9 nm Scanning speed: 10 nm/min Data interval: Normal (1 nm) Response: Normal Measure the spectrum.
Calculation	Calculate the difference between the peak Wavelength of the spectrum obtained and 881.9 nm. Wavelength accuracy (881.9 nm) = (Peak Wavelength obtained) - 881.9
Specification	Within ±0.3 nm



Performance Check

WL Accuracy(484.3 nm) :	0.0 nm	Tolerance +/-0.3 nm	OK

Run Date :	2013/05/14 16:08
Spectrophotometer	
Model :	UH5300 Spectrophotometer
SERIAL No. :	6000-069
(CPU1)Program No. :	3J15306-01
(CPU2)Program No. :	3J15316-02DM02-20130501-1439
Option :	6 Cell
Instrument Parameter	
Measurement Mode :	WL Scan
Data Mode :	E(R)
Start WL(nm) :	487.3
End WL(nm) :	481.3
Scan Speed(nm/min) :	10
Data Interval(nm) :	Normal(0.1)
Initial Delay(s) :	0
Bandpass(nm) :	1.0
Response :	Medium

Fig. 6-6 Example of Printing Wavelength Accuracy (484.6 nm) Check Result

6.1.2 Wavelength Repeatability

(1) Display the Performance Check screen (Fig. 6-7). Press the MEAS button on the right edge of the item name “WL repeatability.” Then, the Wavelength repeatability check is performed.

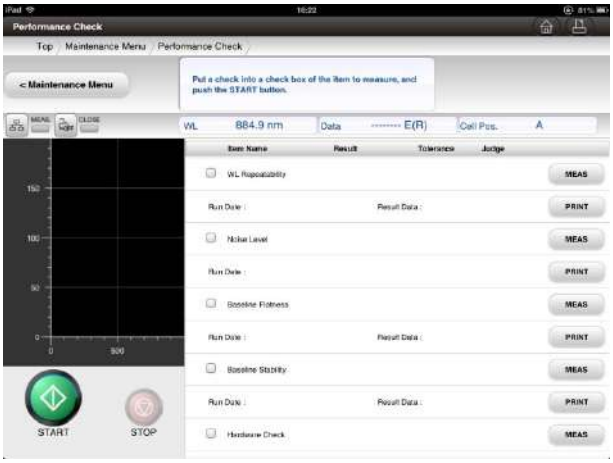


Fig. 6-7 Performance Check Screen

(2) The guidance for measurement under way is displayed and conditions are set. Then, the Wavelength repeatability check is performed.

(3) After the Wavelength repeatability check is finished, the Wavelength Repeatability Check Result screen (Fig. 6-8) is displayed. The measurement result is displayed on the Wavelength Repeatability section and “OK” if the value is within the standard or “NG” if the value is out of the standard is displayed. In the case of “NG”, perform the check again in the above procedure. If “NG” is displayed again, see “7.10 Troubleshooting.”

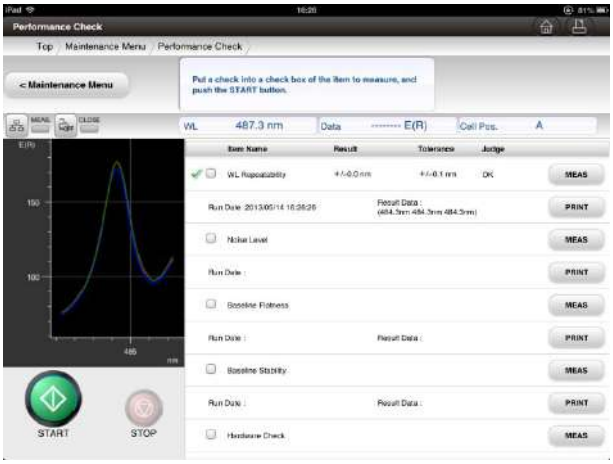
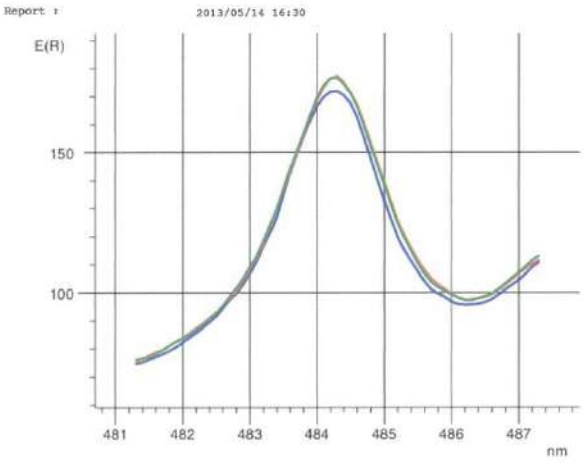


Fig. 6-8 Wavelength Repeatability Check Result Screen

(4) Press the PRINT (Print) to print out the measurement result.

Table 6-4 Measurement Conditions and Specifications for Wavelength Repeatability

Item	Wavelength repeatability
Measurement conditions	The emission spectrum of the emission line of the Xe flash lamp (the detector on the reference) WL range: 487.3 to 481.3 nm Scanning speed: 10 nm/min Data interval: Normal (1 nm) Response: Normal Measure the spectrum three times. Make the second measurement after moving to the 1100 nm. For the third measurement, move to the 190 nm.
Calculation	Calculate the difference between the MAX and MIN values of the peak Wavelength obtained through 3 rounds of measurement. Use the following formula to calculate the Wavelength repeatability: Wavelength repeatability = ±(difference between MAX and MIN values of peak Wavelength)/2
Specification	Within ±0.1 nm



Performance Check
WL Repeatability : +/-0.0 nm Tolerance +/-0.1 nm OK

Run Date : 2013/05/14 16:26

Spectrophotometer
Model : UH5300 Spectrophotometer
SERIAL No. : 0000-009
(CPU1)Program No. : 3J15300-01
(CPU2)Program No. : 3J15310-02DM02-20130501-1439
Option : 6 Cell

Instrument Parameter
Measurement Mode : WL Scan
Data Mode : E(R)
Start WL(nm) : 487.3
End WL(nm) : 481.3
Scan Speed(nm/min) : 10
Data Interval(nm) : Normal(0.1)
Initial Delay(s) : 0
Bandpass(nm) : 1.0
Response : Medium

Fig. 6-9 Example of Printing Wavelength Repeatability Check Result

6.1.3 Noise Level (RMS)

(1) Display the Performance Check screen (Fig. 6-10). Press the MEAS button on the right edge of the item name “Noise level.” Then, the noise level check is performed.

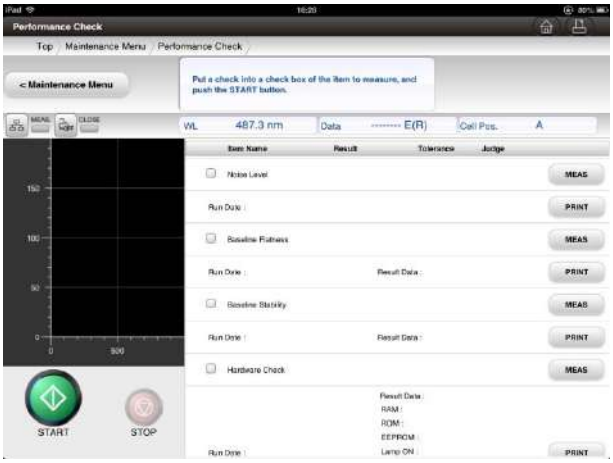


Fig. 6-10 Performance Check Screen

(2) The guidance for measurement conditions under configuration is displayed and the conditions are set. Then, the noise level check is performed.

(3) After the noise level check is performed, the Post-Noise Level Check screen (Fig. 6-11) is displayed. The measurement result is displayed on the Noise Level section and “OK” if the value is within the standard or “NG” if the value is out of the standard is displayed. In the case of “NG”, perform the check again in the above procedure. If “NG” is displayed again, see “7.10 Troubleshooting.”

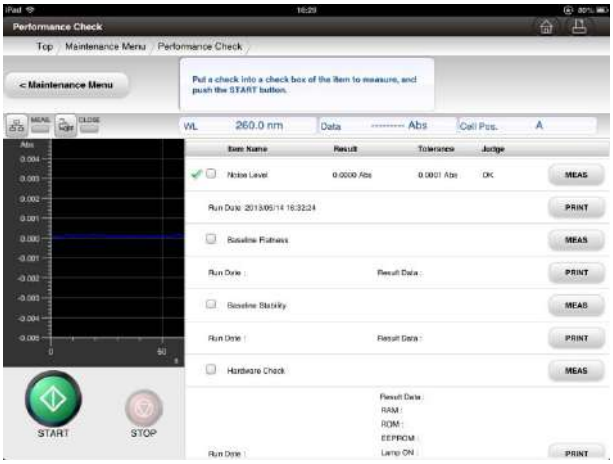
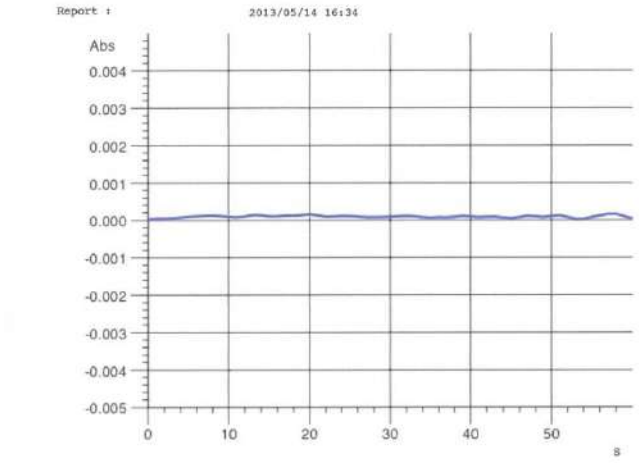


Fig. 6-11 Post-Noise Level Check Screen

(4) Press the PRINT (Print) to print out the measurement result.

Table 6-5 Measurement Conditions and Specifications for Noise Level (RMS)

Item	Noise Level (RMS)
Measurement conditions	Time scan (ABS measurement) WL: 260 nm Scan time: 60 s Data interval: 1 s Lamp economy mode: OFF Response: Normal Start measurement after performing auto-zero.
Calculation	Use the following formula to calculate the noise level (RMS) by using the ABS obtained: Noise level (RMS)= $\sqrt{\frac{\sum_{i=1}^{n}(X_i - \sum_{i=1}^{n}(X_i / n))^2}{n}}$ (n: Total data points, X_i: ABS at "i" point)
Specification	Within 0.0001 Abs



Performance Check

Noise Level (RMS) :	0.0000 Abs	Tolerance 0.0001 Abs	OK

Run Date :	2013/05/14 16:32
Spectrophotometer	
Model :	UH5300 Spectrophotometer
SERIAL No. :	0000-009
(CPU1)Program No. :	3J15300-01
(CPU2)Program No. :	3J15310-02DM02-20130501-1439
Option :	6 Cell
Instrument Parameter	
Measurement Mode :	Time Scan
Data Mode :	Abs
WL(nm) :	260.0
Scan Time(s) :	60
Data Interval(nm) :	1
Initial Delay(s) :	0
Bandpass(nm) :	1.0
Response :	Medium
Lamp Economy Mode :	OFF

Fig. 6-12 Example of Printing Noise Level Check Result

6.1.4 Baseline Flatness

(1) Display the Performance Check screen (Fig. 6-13). Press the MEAS button on the right edge of the item name “Baseline flatness.” Then, the baseline flatness check is performed.

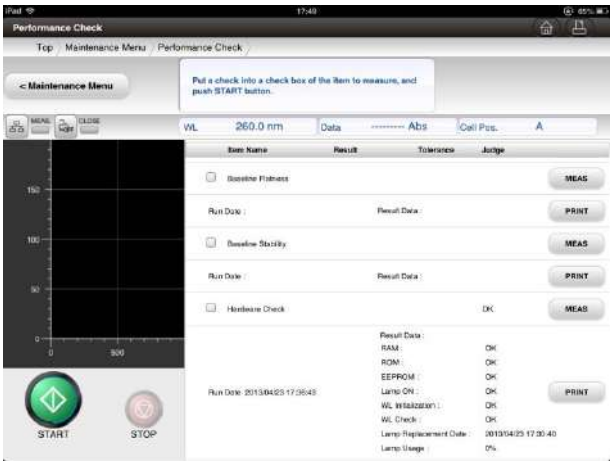


Fig. 6-13 Performance Check Screen

(2) The guidance for measurement conditions under configuration is displayed and the conditions are set. Then, the baseline flatness check is performed.

(3) After the baseline flatness check is performed, the Post-Baseline Flatness Check screen (Fig. 6-14) is displayed. The measurement result is displayed on the Baseline Flatness section and “OK” if the value is within the standard or “NG” if the value is out of the standard is displayed. In the case of “NG”, perform the check again in the above procedure. If “NG” is displayed again, see “7.10 Troubleshooting.”

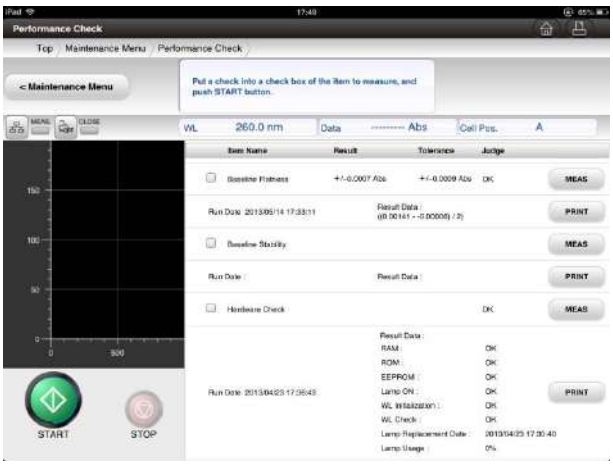


Fig. 6-14 Post-Baseline Flatness Check Screen

(4) Press the PRINT (Print) to print out the measurement result.

Table 6-6 Measurement Conditions and Specifications for Baseline Flatness

Item	Baseline flatness
Measurement conditions	WL scan (ABS measurement) WL range: 950 to 200 nm Scanning speed: 200 nm/min Data interval: Normal (1.0 nm) Response: Normal Use the measured data after baseline correction. Excluding the influence of noise, steam and quartz.
Calculation	Divide 750 points of data excluding the initial data into 150 blocs (1 bloc = 5nm) and calculate the MAX value (a(i)) and MIN value (b(i)) in an “i” bloc. Then, calculate the flatness for 5nm (c(i)) by using the following formula: Flatness for 5 nm (c(i)) = (a(i)-b(i))/2+b(i) Calculate the flatness for 5 nm (c(i)) for all the data (150 blocs) to obtain the MAX value (A) and MIN value (B) of c(i). Use the following formula to calculate the baseline flatness: Baseline Flatness = ±(A-B)/2
Specification	Within ±0.0009 Abs

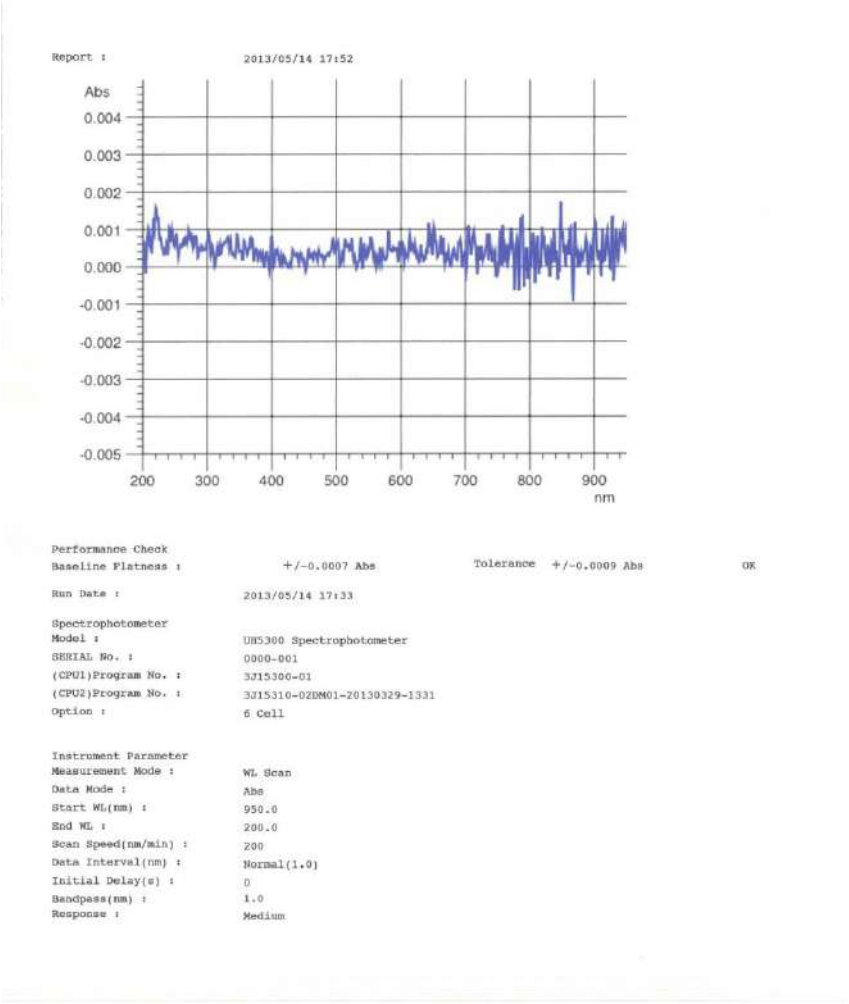


Fig. 6-15 Example of Printing Baseline Flatness Check Result

6.1.5 Baseline Stability

(1) Display the Performance Check screen (Fig. 6-16). Measure the baseline stability at the room temperature of 20-25 °C and the temperature variation of 5 °C or less 2 hours after the power activation. Press the MEAS button on the right edge of the item name “Baseline stability.” Then, the baseline stability check is performed.

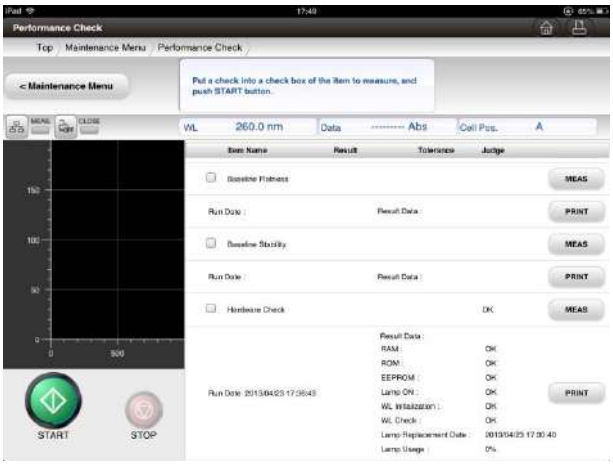


Fig. 6-16 Performance Check Screen

(2) The guidance for measurement under way is displayed and conditions are set. Then, the baseline stability check is performed.

(3) After the baseline stability check is performed, the Post-Baseline Stability Check screen (Fig. 6-17) is displayed. The measurement result is displayed on the Baseline Stability section and “OK” if the value is within the standard or “NG” if the value is out of the standard is displayed. In the case of “NG”, perform the check again in the above procedure. If “NG” is displayed again, see “7.10 Troubleshooting.”

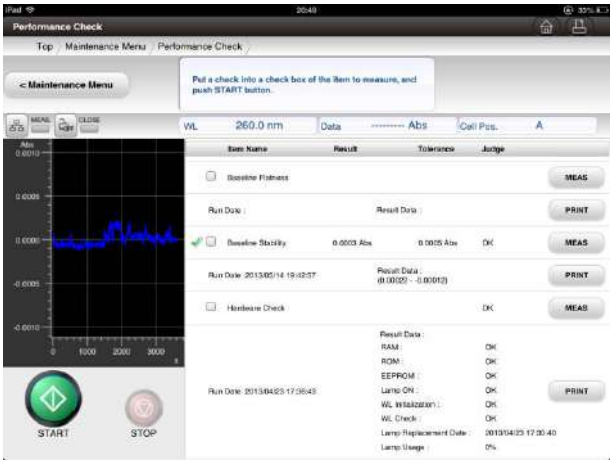
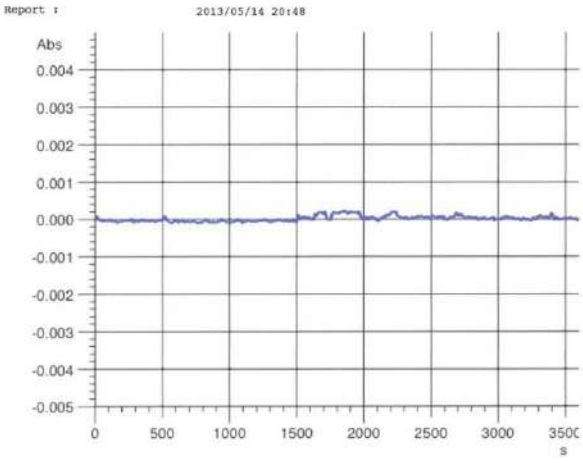


Fig. 6-17 Post-Baseline Stability Check Screen

(4) Press the PRINT (Print) to print out the measurement result.

Table 6-7 Measurement Conditions and Specifications for Baseline Stability

Item	Baseline Stability
Measurement conditions	Time scan (ABS measurement) WL: 260 nm Scan time: 3600 s Data interval: 1 s Lamp economy mode: ON Response: Normal Room Temperature: 20-25 °C, temperature variation of 5 °C or less 2 hours after power activation, excluding noise Use the measured data after performing auto-zero.
Calculation	Perform the data smoothing of the obtained data once. Calculate the MAX value (A) and the MIN value (B) of the ABS based on the result. Use the following formula to calculate the baseline stability: Baseline stability (Abs/h) = A-B
Specification	Within 0.0005 Abs/h



Performance Check

Baseline Stability :	0.0003 Abs	Tolerance 0.0005 Abs	OK
Run Date :	2013/05/14 19:42		

Spectrophotometer

Model :	UH5300 Spectrophotometer
SERIAL No. :	0000-001
(CPU1)Program No. :	3JI5300-01
(CPU2)Program No. :	3JI5310-02DM01-20130329-1331
Option :	6 Cell

Instrument Parameter

Measurement Mode :	Time Scan
Data Mode :	Abs
WL(nm) :	260.0
Scan Time(s) :	3600
Data Interval(nm) :	1
Initial Delay(s) :	0
Bandpass(nm) :	1.0
Response :	Medium
Lamp Economy Mode :	ON

Fig. 6-18 Example of Printing Baseline Stability Check Result

6.1.6 Hardware Check

(1) Display the Performance Check screen (Fig. 6-19). Press the MEAS button on the right edge of the item name “Hardware check.” Then, the hardware check is performed.

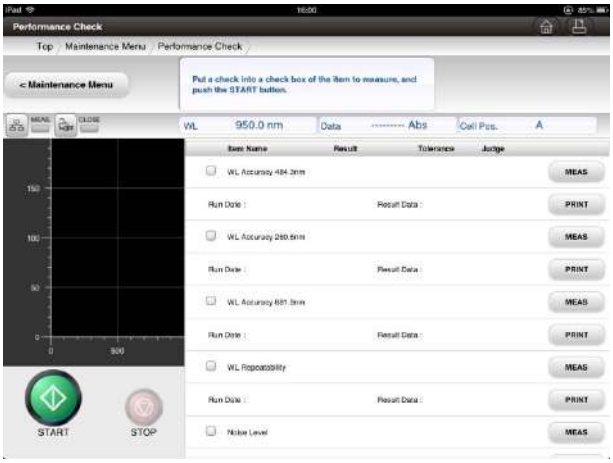


Fig. 6-19 Performance Check Screen

(2) After RAM, ROM, lamp, Wavelength drives, Wavelength and lamp usage checks are performed, the Hardware Check screen (Fig. 6-20) is displayed. The result is displayed after each item is checked.

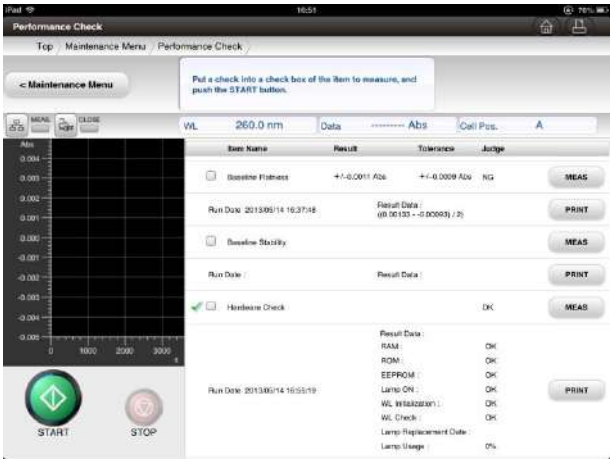
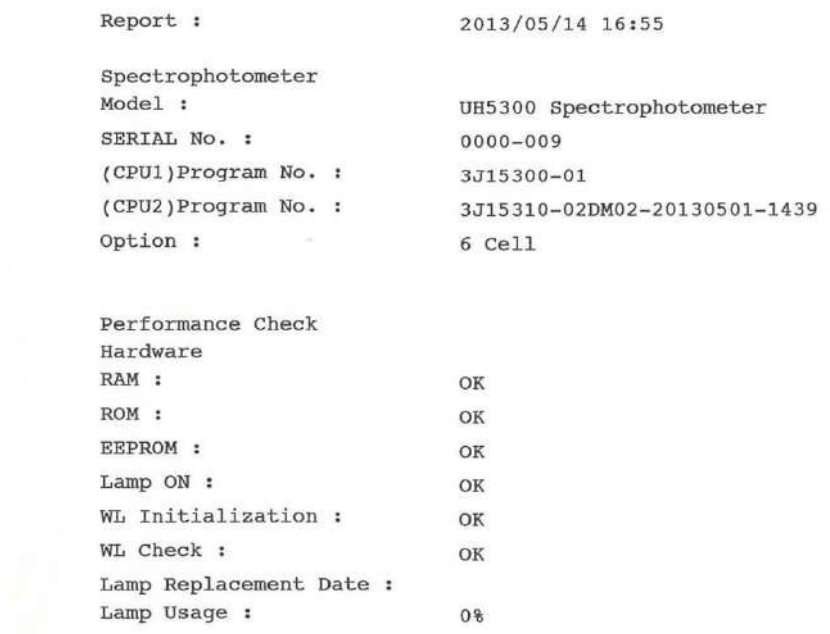


Fig. 6-20 Hardware Check Screen

(3) Press the PRINT (Print) to print out the measurement result.

Table 6-8 Hardware Check Standard

Item	Hardware	
Check item	RAM:	Check RAM.
	ROM:	Check ROM.
	Lamp ON:	Make sure lamp is ON.
	WL initialization:	Check WL drives.
	WL check:	Make sure the Wavelength correction is performed for 484.3 nm on the Initialization screen and the peak is detected.
Standard	All items must be OK.	



```
Report :                        2013/05/14 16:55

Spectrophotometer
Model :                         UH5300 Spectrophotometer
SERIAL No. :                    0000-009
(CPU1)Program No. :             3J15300-01
(CPU2)Program No. :             3J15310-02DM02-20130501-1439
Option :                        6 Cell


Performance Check
Hardware
RAM :                           OK
ROM :                           OK
EEPROM :                        OK
Lamp ON :                       OK
WL Initialization :             OK
WL Check :                      OK
Lamp Replacement Date :
Lamp Usage :                    0%
```

Fig. 6-21 Example of Printing Hardware Check Result

6.1.7 Printing Report

(1) Display the Performance Check screen (Fig. 6-22). For printing report, open the Performance Check screen checked, and press the  Print button.

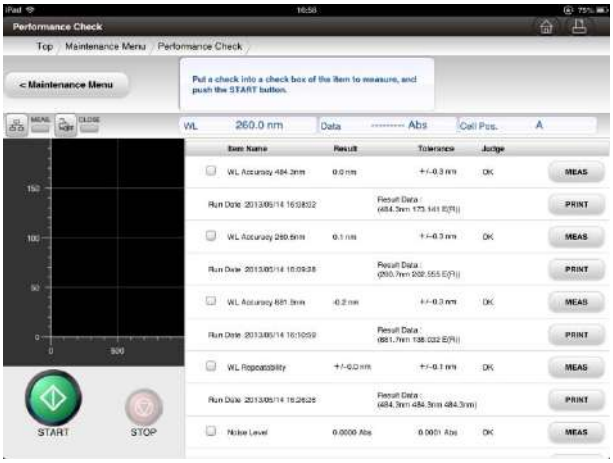


Fig. 6-22 Performance Check Screen

(2) For printing report, select “Print.” Then, the report is printed out.

```
Report :                    2013/05/14 17:01

Spectrophotometer
Model :                     UH5300 Spectrophotometer
SERIAL No. :                0000-009
(CPU1)Program No. :         3J15300-01
(CPU2)Program No. :         3J15310-02DM02-20130501-1439
Option :                    6 Cell

Performance Check
WL Accuracy(484.3 nm) :       0.0 nm      Tolerance  +/-0.3 nm      OK
WL Accuracy(260.6 nm) :       0.1 nm      Tolerance  +/-0.3 nm      OK
WL Accuracy(881.9 nm) :      -0.2 nm      Tolerance  +/-0.3 nm      OK
WL Repeatability :           +/-0.0 nm    Tolerance  +/-0.1 nm      OK
Noise Level (RMS) :           0.0000 Abs  Tolerance  0.0001 Abs     OK
Baseline Flatness :          +/-0.0004 Abs Tolerance  +/-0.0009 Abs OK
Baseline Stability :          0.0004 Abs  Tolerance  0.0005 Abs     OK
Hardware
RAM :                       OK
ROM :                       OK
EEPROM :                    OK
Lamp ON :                   OK
WL Initialization :         OK
WL Check :                  OK
Lamp Replacement Date :
Lamp Usage :                0%
```

Fig. 6-23 Example of Printing Report

6.1.8 Automatic Check

(1) Display the Performance Check screen (Fig. 6-24). Make sure the sample compartment is empty.
Mark the checkbox at the top of each item to be checked. Then,

select the  All Start button.

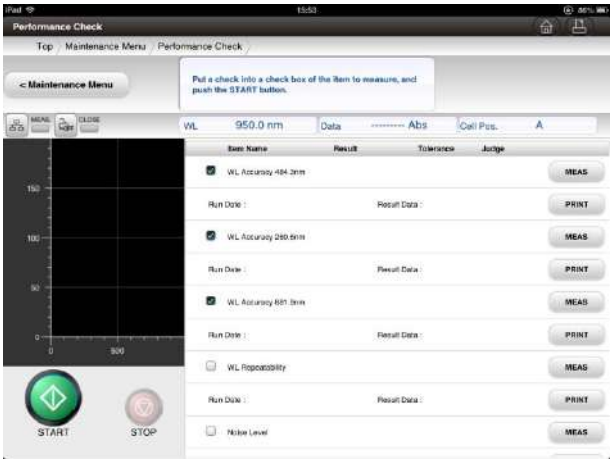


Fig. 6-24 Performance Check Screen

(2) Each item is measured and the result is displayed.

(3) It takes about 80 minutes to finish the measurement when all the items are selected. After the measurement, the Post-Performance Check screen (Fig. 6-25) is displayed. “OK” if the value is within the standard or “NG” if the value is out of the standard is displayed for each item. See each item in “6.1.1 Wavelength Accuracy” to “6.1.6 Hardware Check” for the standard of each item and the procedure for any NG displayed.

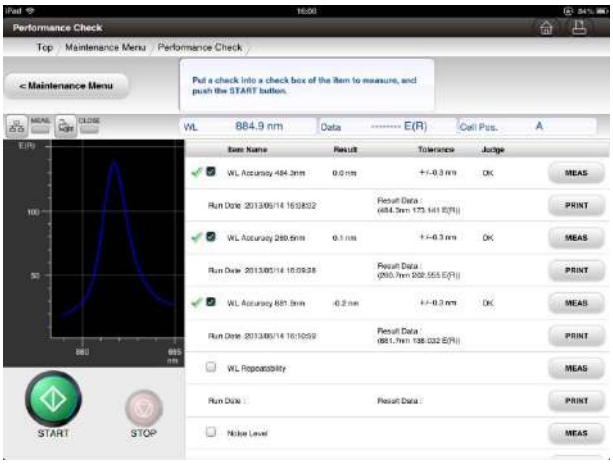


Fig. 6-25 Post-Performance Check Screen

6.2 Check by Optional Pen Type Low-Pressure Mercury Lamp

The available option is required for the performance check by pen type low-pressure mercury lamp. See “5.4.4 Pen Type Low-Pressure Mercury Lamp Holder” on how to set a pen type low-pressure mercury pen.

CAUTION

Direct Gazing into Lighting Xe Flashlamp damages Your Eyes

Xe flashlamp emits strong ultraviolet rays. Do not therefore gaze directly into the lamp. Wear a protective eye glasses that blocks ultraviolet rays if gazing into the lamp is unavoidable.

(1) After starting up the instrument, press the [Maintenance button] icon to display the Measurement Menu screen (Fig. 6-26).

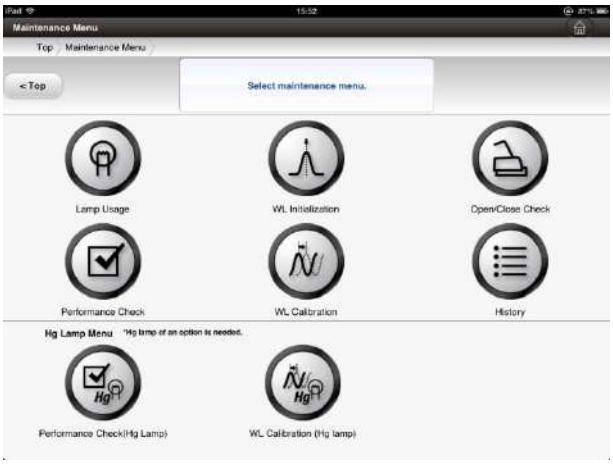


Fig. 6-26 Measurement Menu Screen

(2) Make sure the sample compartment is empty and close the cover. To select the Performance Check, press the  (Performance Check (Hg lamp) button icon. Then, the Instrument Configuration screen (Fig. 6-27) is displayed.

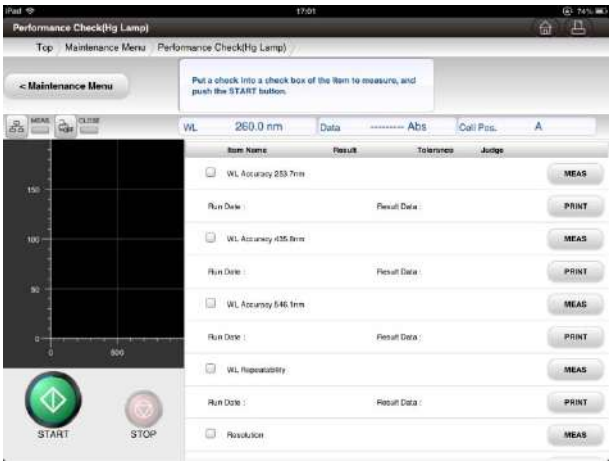


Fig. 6-27 Performance Check Screen

[Automatic instrument performance check]

For automatic instrument performance check, mark the item name and press the All Start button icon.

[Instrument performance check per item]

For instrument performance check per item, press the MEAS on the right of an item name. For this check, also see from “6.2.1 Wavelength accuracy” to “6.2.3 Resolution.”

6.2.1 Wavelength Accuracy (Hg Lamp)

(1) Display the Performance Check screen (Fig. 6-28). Press the MEAS button on the right edge of the item name “WL accuracy 253.7 nm.” The Wavelength accuracy check of the selected Wavelength is performed.

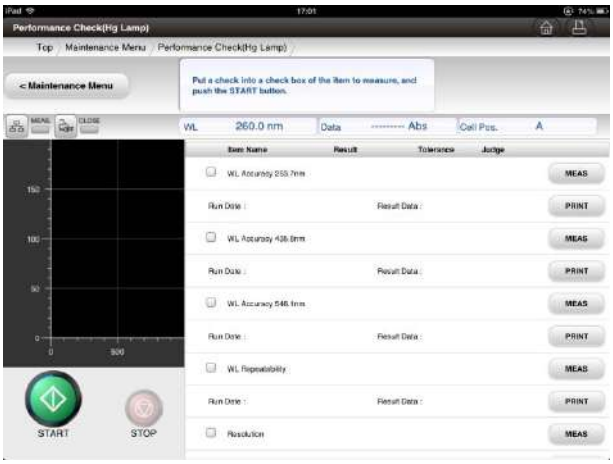


Fig. 6-28 Performance Check Screen

(2) The guidance in Fig. 6-29 is displayed. Set the Hg lamp at this point. See “5.4.4 Pen-type Low-Pressure Mercury Lamp Holder (optional)” on how to set the pen type low-pressure mercury lamp. If the lamp turns ON after it is set, press the OK. Then, the measurement starts.

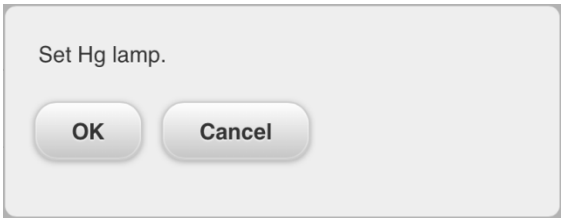


Fig. 6-29 Guidance to Set Hg Lamp

(3) The screen (Fig. 6-30) is displayed after the Wavelength accuracy check is finished. The measurement result is displayed on the Wavelength Accuracy section. The difference with the peak value for each Wavelength of the emission line as well as “OK” if the value is within the standard or “NG” if the value is out of the standard are also displayed. In the case of “NG”, perform the “6.4 Wavelength Initialization.” Then, perform the Wavelength accuracy again in the above procedure. If “NG” is displayed again, perform the “6.5 Wavelength Calibration” and check the Wavelength accuracy again in the above procedure. If “NG” is displayed again, see “7.10 Troubleshooting.”

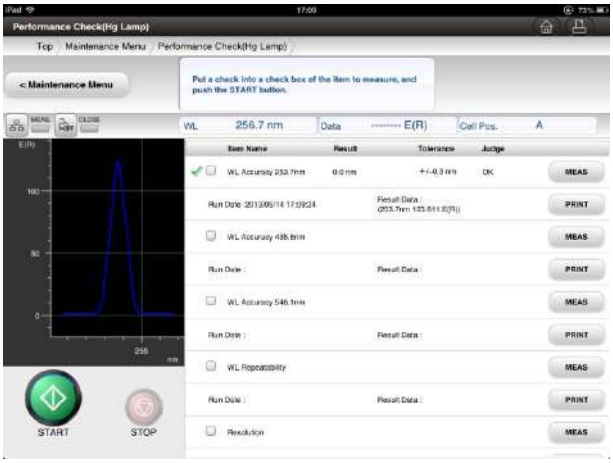


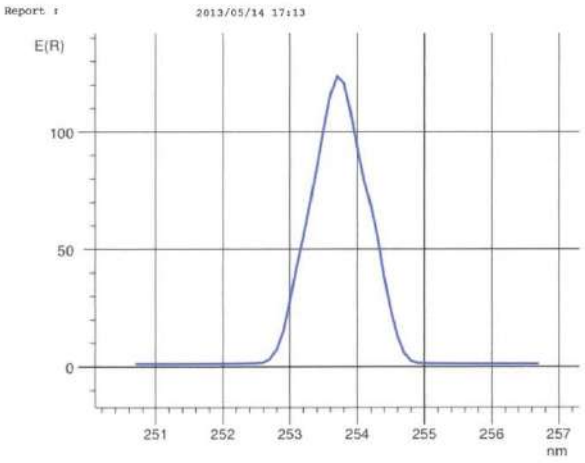
Fig. 6-30 Post-Wavelength Accuracy Check Screen

(4) Press the PRINT (Print) to print out the measurement result. After the printing is finished, return to the Performance Check screen by the tap. Follow the similar procedure to perform the Wavelength accuracy check for the other Wavelengths.

Table 6-9 Measurement Conditions and Specifications for Wavelength Accuracy Hg

<table>
<tr><td>Item</td><td>Wavelength accuracy (253.7 nm), (435.8 nm), (546.1 nm)</td></tr>
<tr><td>Measurement conditions</td><td>The emission spectrum of the emission line of Hg lamp (the detector on the reference)
<table>
<tr><td></td><td colspan="3">Wavelength of Hg lamp emission line</td></tr>
<tr><td></td><td>253.7 nm</td><td>435.8 nm</td><td>546.1 nm</td></tr>
<tr><td>WL range</td><td>256.7 to 250.7 nm</td><td>438.8 to 432.8 nm</td><td>549.1 to 543.1 nm</td></tr>
</table>
Scanning speed: 10 nm/min
Data interval: Normal (1 nm)
Response: Normal
Measure the spectrum.</td></tr>
<tr><td>Calculation</td><td>Calculate the difference between the peak Wavelength of the spectrum obtained and the emission line. Use the following formula to calculate the Wavelength accuracy:
<table>
<tr><td></td><td colspan="3">Wavelength of Hg lamp emission line</td></tr>
<tr><td></td><td>253.7 nm</td><td>435.8 nm</td><td>546.1 nm</td></tr>
<tr><td>WL accuracy</td><td>(Peak Wavelength obtained)–253.7</td><td>(Peak Wavelength obtained)–435.8</td><td>(Peak Wavelength obtained)–546.1</td></tr>
</table></td></tr>
<tr><td>Specification</td><td>Within ±0.3 nm</td></tr>
</table>

6.2 Check by Optional Pen Type Low-Pressure Mercury Lamp



Performance Check(Option)

WL Accuracy Hg(253.7 nm) :	0.0 nm	Tolerance +/-0.3 nm	OK

Run Date :	2013/05/14 17:09
Spectrophotometer	
Model :	UH5300 Spectrophotometer
SERIAL No. :	0000-009
(CPU1)Program No. :	3J15300-01
(CPU2)Program No. :	3J15310-02DM02-20130501-1439
Option :	6 Cell
Instrument Parameter	
Measurement Mode :	WL Scan
Data Mode :	E(R)
Start WL(nm) :	256.7
End WL(nm) :	250.7
Scan Speed(nm/min) :	10
Data Interval(nm) :	Normal(0.1)
Initial Delay(s) :	0
Bandpass(nm) :	1.0
Response :	Medium

Fig. 6-31 Example of Printing Check Result

6.2.2 Wavelength Repeatability (Hg Lamp)

(1) Display the screen for instrument performance (Hg lamp) (Fig. 6-32). Press the MEAS Measurement button on the right of the WL Repeatability. Then, the Wavelength repeatability check is performed.

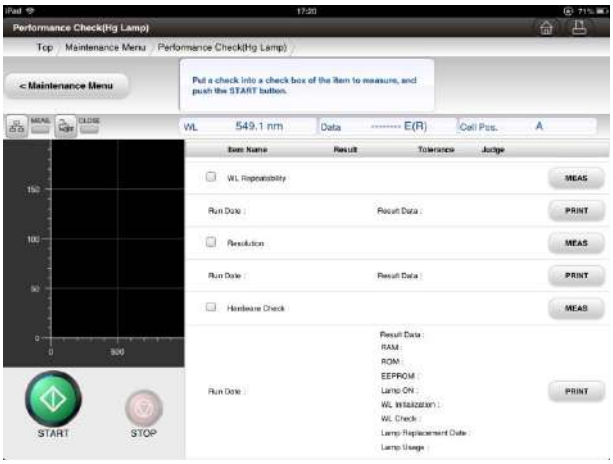


Fig. 6-32 Performance Check Screen

(2) Set the Hg lamp at this point. See “5.4.4 Pen Type Low-Pressure Mercury Lamp Holder” on how to set the pen type low-pressure mercury lamp. If the lamp turns ON after it is set, press the OK. Then, the measurement conditions are set and the Wavelength repeatability check is performed.

(3) After the Wavelength repeatability check is finished, the Wavelength Repeatability Check Result screen (Fig. 6-33) is displayed. The measurement result is displayed on the Wavelength Repeatability section and “OK” if the value is within the standard or “NG” if the value is out of the standard is displayed. In the case of “NG”, perform the check again in the above procedure. If “NG” is displayed again, see “7.10 Troubleshooting.”

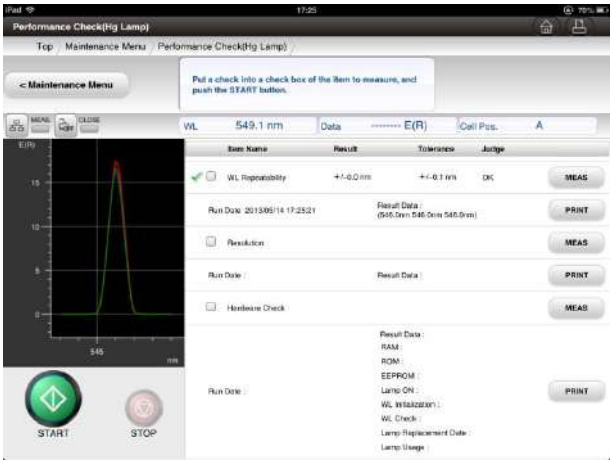
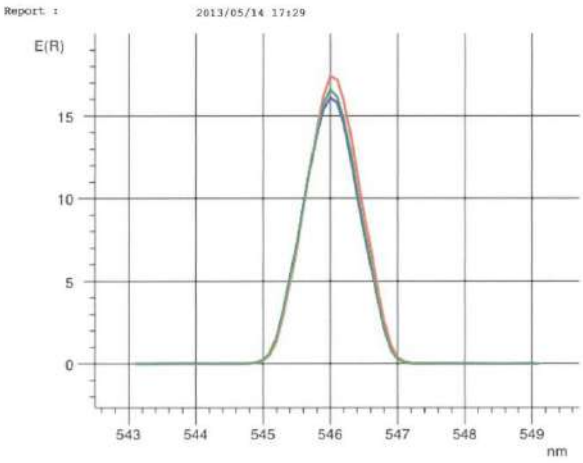


Fig. 6-33 Post-Wavelength Repeatability Check Screen

(4) Press the PRINT (Print) to print out the measurement result.

Table 6-10 Measurement Conditions and Specifications for Wavelength Repeatability (Hg Lamp)

Item	WL Repeatability (Hg Lamp)
Measurement conditions	The emission spectrum of the emission line of Hg lamp (the detector on the reference) WL range: 549.1 to 543.1 nm Scanning speed: 10 nm/min Data interval: Normal (1.0 nm) Response: Normal Measure the spectrum three times. Make the second measurement after moving to the 1100 nm. For the third measurement, move to the 190 nm.
Calculation	Calculate the difference between the MAX and MIN values of the peak Wavelength obtained through 3 rounds of measurement. Use the following formula to calculate the Wavelength repeatability: Wavelength repeatability = ±(difference between MAX and MIN values of peak Wavelength)/2
Specification	Within ±0.1 nm



Report : 2013/05/14 17:29

Performance Check(Option)

WL Repeatability Hg :	+/-0.0 nm	Tolerance	+/-0.1 nm OK

Run Date :	2013/05/14 17:25
Spectrophotometer	
Model :	UH5300 Spectrophotometer
SERIAL No. :	0000-009
(CPU1)Program No. :	3J15300-01
(CPU2)Program No. :	3J15310-02DM02-20130501-1439
Option :	6 Cell
Instrument Parameter	
Measurement Mode :	WL Scan
Data Mode :	E(R)
Start WL(nm) :	549.1
End WL(nm) :	543.1
Scan Speed(nm/min) :	10
Data Interval(nm) :	Normal(0.1)
Initial Delay(s) :	0
Bandpass(nm) :	1.0
Response :	Medium

Fig. 6-34 Example of Printing Check Result

6.2.3 Resolution

(1) Display the Performance Check screen (Fig. 6-35). Press the MEAS button on the right edge of the item name “Resolution.” Then, the resolution is performed.

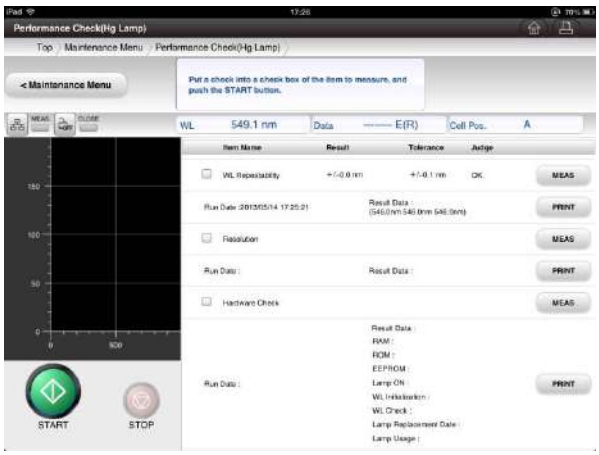


Fig. 6-35 Performance Check Screen

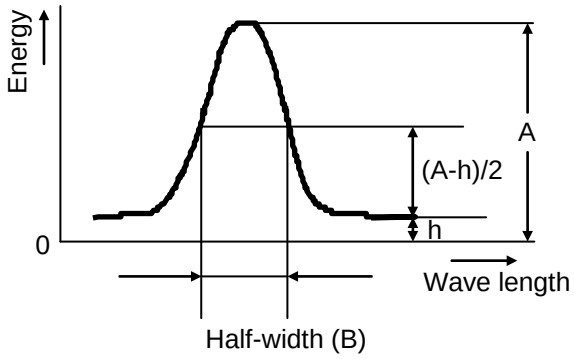
(2) Set the Hg lamp at this point. See “5.4.4 Pen Type Low-Pressure Mercury Lamp Holder” on how to set the pen type low-pressure mercury lamp. If the lamp turns ON after it is set, press the OK. Then, the measurement conditions are set and the resolution check is performed.

(3) After the resolution check is finished, the Post-Resolution screen (Fig. 6-36) is displayed. The measurement result is displayed on the Resolution section and “OK” if the value is within the standard or “NG” if the value is out of the standard is displayed. In the case of “NG”, perform the check again in the above procedure. If “NG” is displayed again, see “7.10 Troubleshooting.”

Fig. 6-36 Post-Resolution Screen

(4) Press the PRINT (Print) to print out the measurement result.

Table 6-11 Measurement Conditions and Specifications for Resolution

Item	Resolution
Measurement conditions	The emission spectrum of the emission line of Hg lamp (the detector on the reference) WL range: 549.1 to 543.1 nm Scanning speed: 10 nm/min Data interval: Normal (1.0 nm) Response: Normal Measure the spectrum.
Calculation	Calculate the Wavelength width B (half-width) at the height of (A＋h)/2 based on the peak value (A) of the spectrum obtained. The value “B” is used as the resolution value. 
Specification	Within 1±0.2 nm

6.2 Check by Optional Pen Type Low-Pressure Mercury Lamp

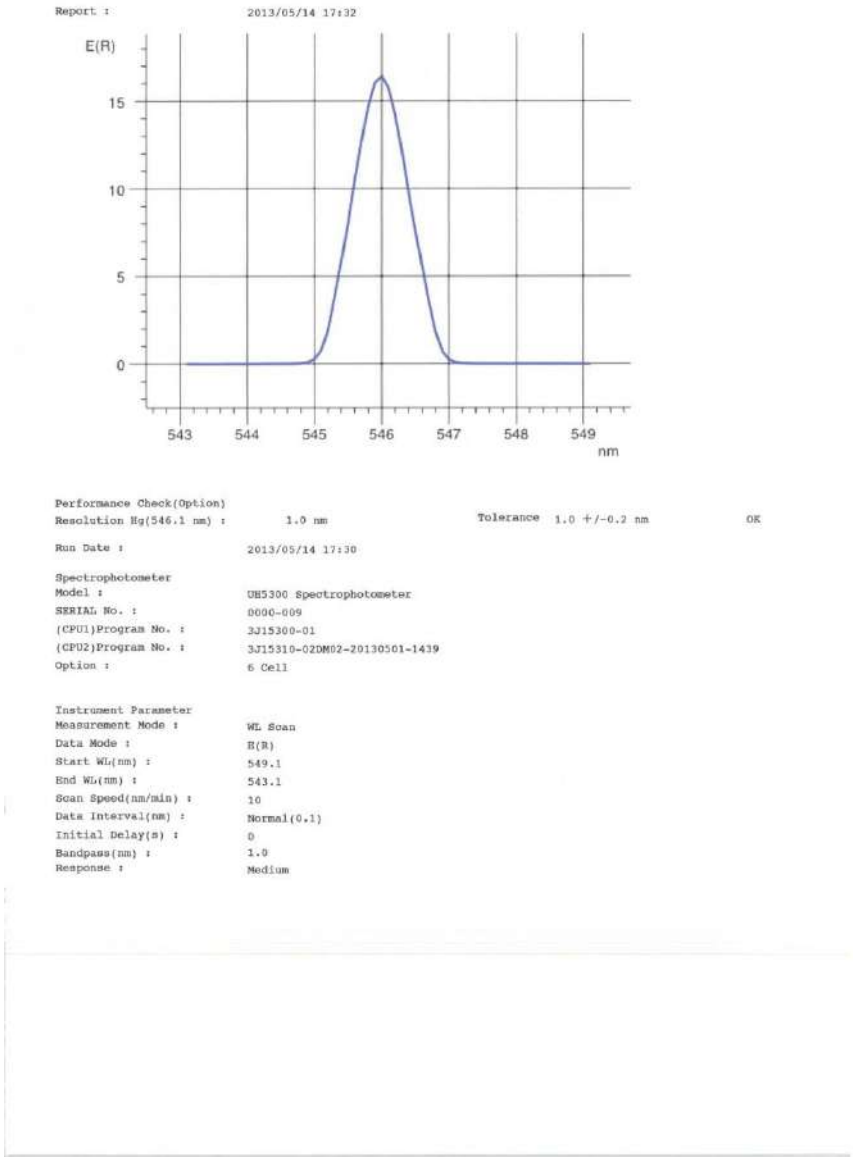


Fig. 6-37 Example of Printing Check Result

6.2.4 Printing Report

(1) Display the Performance Check (Hg lamp) screen (Fig. 6-38). You can print in a report format each performance check item checked by using the Hg lamp. For printing report, press the  on the screen as shown in Fig. 6-38.

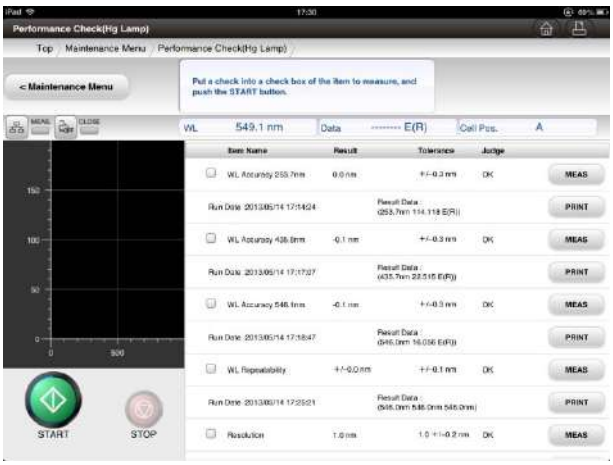


Fig. 6-38 Performance Check Screen

(2) The Preview screen (Fig. 6-39) is displayed. Press the PRINT.

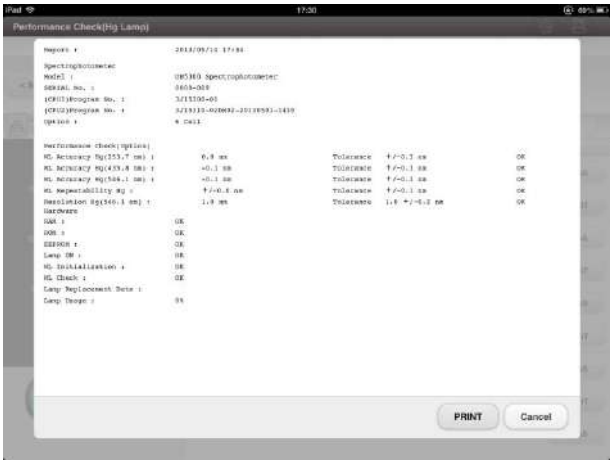


Fig. 6-39 Preview Screen

The Printer Option screen (Fig. 6-40) is displayed.

Fig. 6-40 Printer Option Screen

Check the printer and the number of copies and press the Print. Then, the report is printed.

Report : 2013/05/14 17:34

Spectrophotometer
Model : UH5300 Spectrophotometer
SERIAL No. : 0000-009
(CPU1)Program No. : 3J15300-01
(CPU2)Program No. : 3J15310-02DM02-20130501-1439
Option : 6 Cell

Performance Check(Option)

WL Accuracy Hg(253.7 nm) :	0.0 nm	Tolerance	+/-0.3 nm	OK
WL Accuracy Hg(435.8 nm) :	-0.1 nm	Tolerance	+/-0.3 nm	OK
WL Accuracy Hg(546.1 nm) :	-0.1 nm	Tolerance	+/-0.3 nm	OK
WL Repeatability Hg :	+/-0.0 nm	Tolerance	+/-0.1 nm	OK
Resolution Hg(546.1 nm) :	1.0 nm	Tolerance	1.0 +/-0.2 nm	OK

Hardware
RAM : OK
ROM : OK
EEPROM : OK
Lamp ON : OK
WL Initialization : OK
WL Check : OK
Lamp Replacement Date :
Lamp Usage : 0%

Fig. 6-41 Example of Printing Check Result

6.3 Wavelength Initialization

When the performance check result fails to satisfy the specification, initialize the Wavelength. This section describes the method of initializing Wavelengths.

(1) After starting up the instrument, display the Maintenance screen (Fig. 6-42) on the top screen.

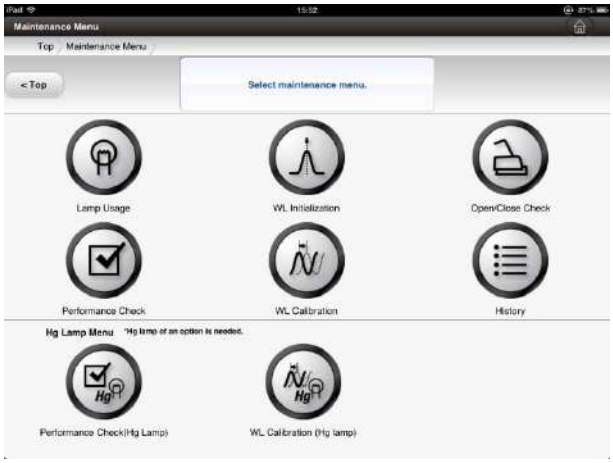


Fig. 6-42 Maintenance Screen

(2) Press the  [WL Initialization button] on the Maintenance screen. The Wavelength Initialization Execution screen (Fig. 6-43) is displayed.

Fig. 6-43 Wavelength Initialization Execution Screen

(3) Select the  [Start button] and initialize the Wavelength.

(4) After the WL initialization is finished, perform the Wavelength accuracy of the performance check as necessary. When the re-check fails to satisfy the specification, see “6.4 Wavelength Calibration” and perform the calibration.

6.4 Wavelength Calibration

This section describes the method of calibrating Wavelengths.
Calibrate the Wavelength in accordance with “6.4.1 Wavelength Calibration by Built-in Lamp” when the Wavelength accuracy check by built-in lamp (Xe flash lamp) (6.1.1) of the performance check failed to satisfy the specification.
Calibrate the Wavelength in accordance with “6.4.2 Wavelength Calibration by Pen Type Low-Pressure Mercury Lamp” when the check by optional pen type low-pressure mercury lamp (6.2.1) failed to satisfy the specification.

NOTE: When executing a Wavelength calibration, remove the options mentioned in 5.4 Description and Installation of Optional Components in accordance with their respective instruction manuals, and check the description in 1.3 Mounting and Dismounting Cell Holder and execute the calibration with the 6 cell turret and cell holder for reference being attached.

6.4.1 Wavelength Calibration by Built-in Lamp

(1) After starting up the instrument, display the Maintenance screen (Fig. 6-44) on the top screen.

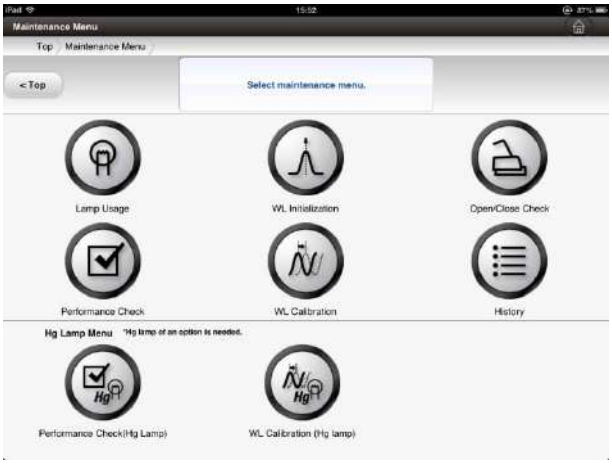


Fig. 6-44 Maintenance Screen

(2) Select the  Wavelength Calibration on the Maintenance screen. The Wavelength Calibration Execution screen (Fig. 6-45) is displayed.

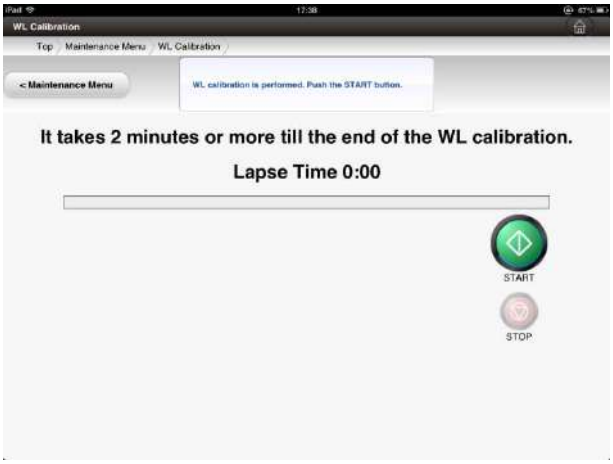


Fig. 6-45 Wavelength Calibration Execution Screen

(3) Select the  Start button and perform the Wavelength calibration. To cancel trhe calibration in the middle, press the  Stop button.

(4) After the WL Calibration is finished, perform the Wavelength accuracy of the performance check as necessary.

6.4.2 Wavelength Calibration by Pen Type Low-Pressure Mercury Lamp

(1) After starting up the instrument, display the Maintenance screen (Fig. 6-46) on the top screen.

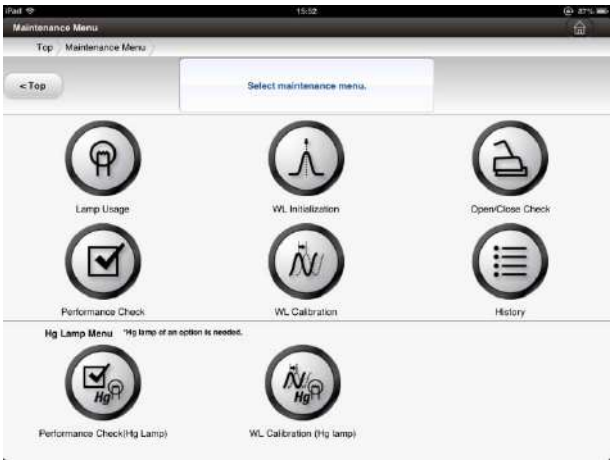


Fig. 6-46 Maintenance Screen

(2) Press the  [Wavelength Calibration (Hg lamp) button] on the Maintenance screen. The Wavelength Calibration Execution screen (Fig. 6-47) is displayed. **Do not set** a low-pressure mercury lamp at this point. Calibrate the Wavelength by using the built-in lamp at first.

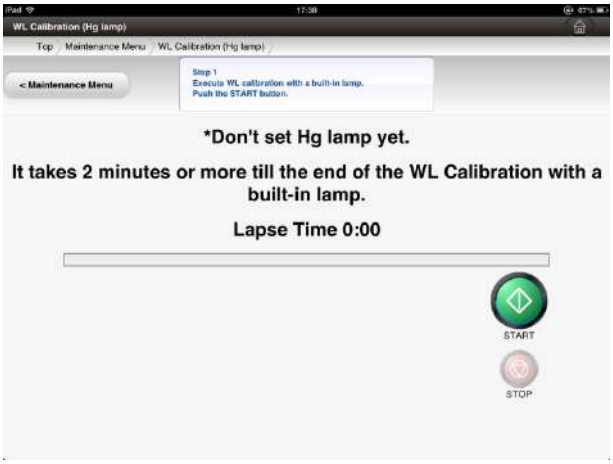


Fig. 6-47 Wavelength Calibration Execution Screen

(3) Press the  [Start button] to perform the Wavelength calibration. The calibration starts and the screen in Fig. 6-48 is displayed.

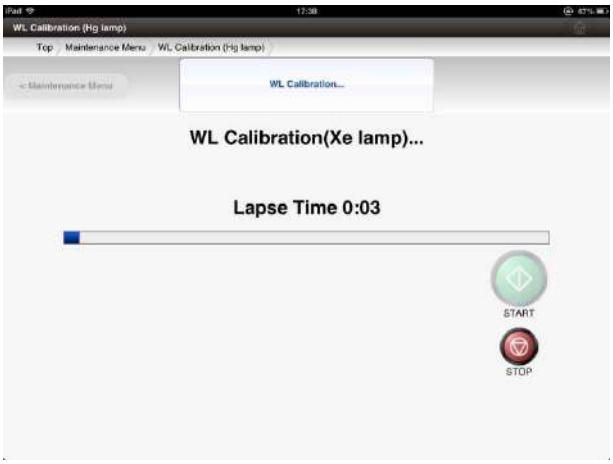


Fig. 6-48 Wavelength Calibration by Built-in Lamp Under Way Screen

(4) After the calibration by built-in lamp is finished, the scren in Fig. 6-49 is displayed. Set to the instrument a pen type low-pressure mercury lamp in accordance with 5.4.4 at this point and turn the

lamp ON. Press the  [Start button] after the lamp is ON.

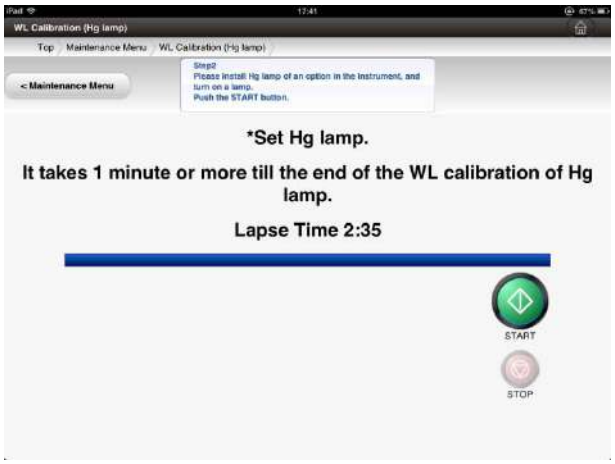


Fig. 6-49 Wavelength Calibration by Hg Lamp Under Way Screen

(5) The calibration by Hg lamp starts and the screen in Fig. 6-50 is displayed.

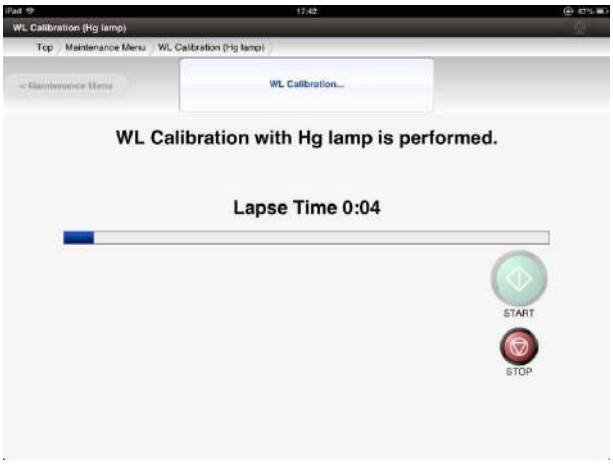


Fig. 6-50 Wavelength Calibration by Pen Type Low-Pressure Mercury Lamp Under Way Screen

(6) After the calibration by Hg lamp is finished, the scren in Fig. 6-51 is displayed. The Wavelength calibration by the pen type low-pressure mercury lamp fully completed. Remove the pen type low-pressure mercury lamp from the instrument at this point. Then, check the Wavelength accuracy of the performance check as necessary.

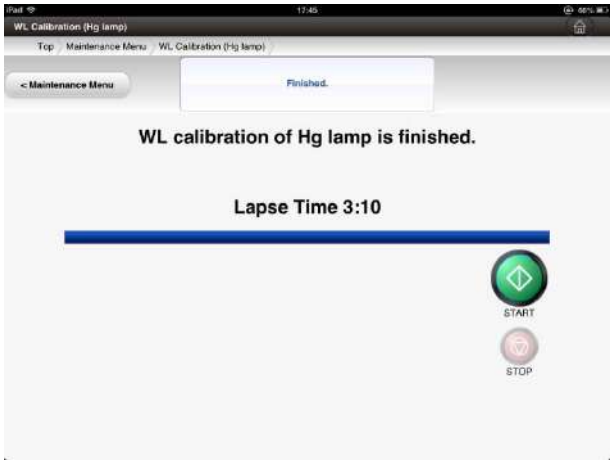


Fig. 6-51 Post-Wavelength Calibration by Pen Type Low-Pressure Mercury Lamp Screen

7 MAINTENANCE

This instrument requires regular maintenance. This chapter mainly describes the cleaning, storage and specifications, etc. of the instrument. Using the instrument without regular inspections and maintenance may lead to serious accidents such as water leakage, electric leakage or firing, etc. caused by failures, etc.
Please contact the store where you purchased the instrument or our designated maintenance service company near you for purchasing expendables and products with limited life

7.1 Lamp Usage

You can check the lamp usage status in the following procedure:

(1) After starting up the instrument, press the  Maintenance on the top screen to display the Measurement Menu screen (Fig. 7-1).

Fig. 7-1 Top Screen

(2) Tap the  Lamp Usage.

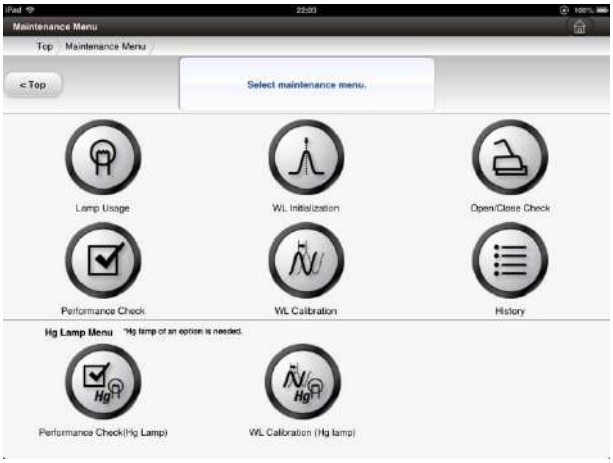


Fig. 7-2 Maintenance Screen

(3) The Lamp Usage screen (Fig. 7-3) is displayed. The lamp usage is indicated by percentage (%). The value of 100% is the guideline value for the lamp's service life. Perform the performance check by referring to "Chapter 5 For Increased Convenience of Use" to make sure it is tolerable for use if it exceeds the 100% threshold.

Fig. 7-3 Lamp Usage Screen

NOTE: The Lamp-on time reset button displayed on the Lamp Usage screen is used to reset the lamp usage status to 0% when you have replaced the Xe flash lamp, which is equipped within the main unit of the instrument. For this reason, do not press the Lamp-on time reset button unless you have replaced the Xe flash lamp, which is equipped in the main unit of the instrument.

(4) After finishing the configuration, return to the top screen by pressing the top key.

7.2 Maintenance History

You can check the lamp usage status in the following procedure:

(1) After starting up the instrument, press the  Maintenance on the top screen to display the Measurement Menu screen (Fig. 7-4).

Fig. 7-4 Top Screen

(2) Press the  Maintenance History.

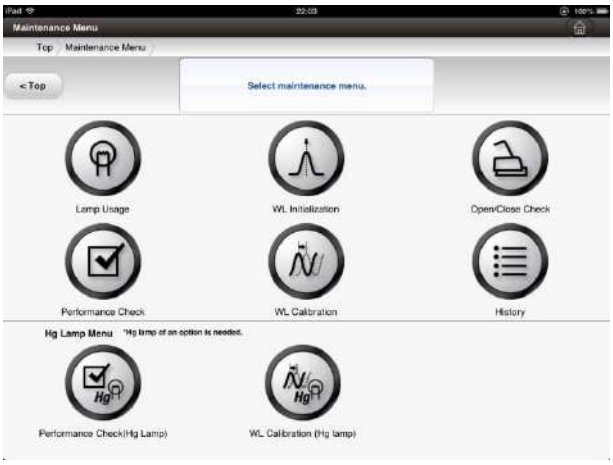


Fig. 7-5 Maintenance Screen

(3) The history is displayed.

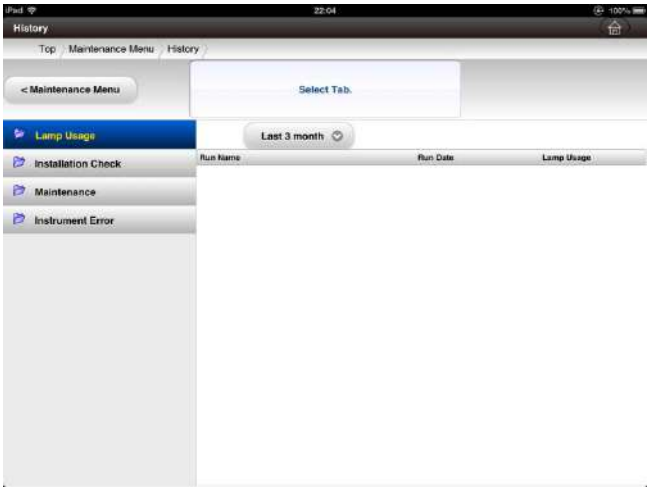


Fig. 7-6 Maintenance History Screen

It consists of 4 categories.

Setting item	Description
Lamp usage	Records on lamp are displayed.
Installation check	Results of performance check at installation are displayed.
Maintenance	Performance check records are displayed.
Instrument error	Error information are displayed including wave length calibration error and 6 cell detection error, etc.

The history can be indicated also by period. Press, for example, the “recent 3 months” and select any of the following periods:

- Recent 3 months
- Recent 1 month
- Recent 1 week
- All

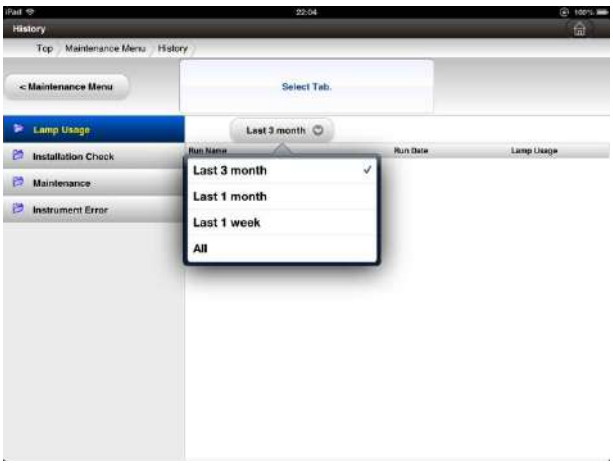


Fig. 7-7

7.3 Sample Compartment Cover Open/Close Check

You can check the lamp usage status in the following procedure:

(1) After starting up the instrument, press the  Maintenance on the top screen to display the Measurement Menu screen (Fig. 7-8).

Fig. 7-8 Top Screen

(2) Press the  Sample Compartment Cover Open/Close Check.

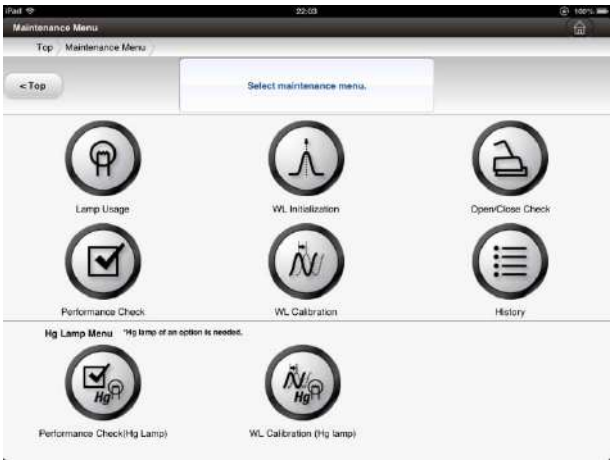


Fig. 7-9 Maintenance Screen

(3) The Open/Close Check screen is displayed.

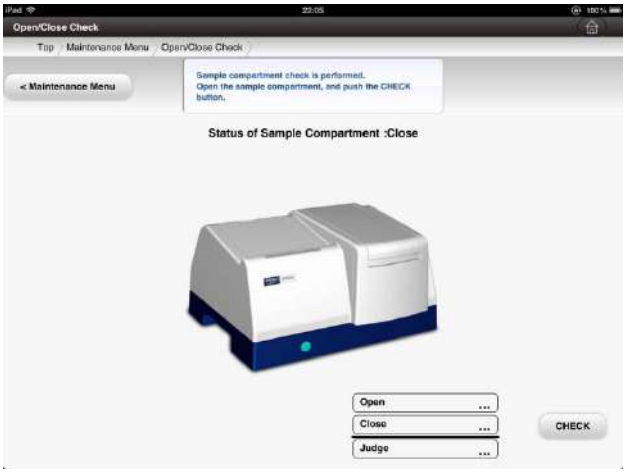


Fig. 7-10 Maintenance History Screen

Make sure the cover is open.

Open the sample compartment and press the CHECK.

Fig. 7-11

Then, close the cover.

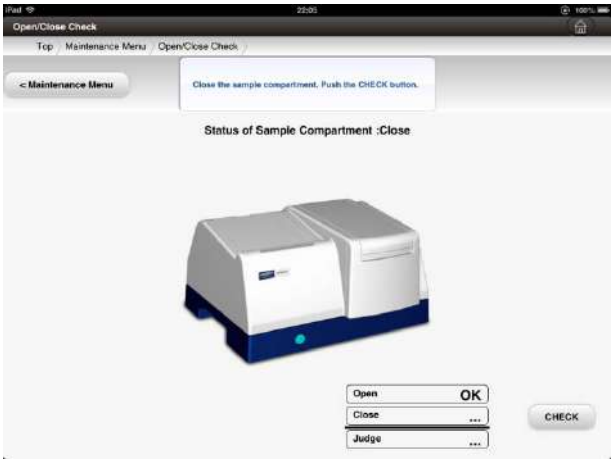


Fig. 7-12

Press the **CHECK** .

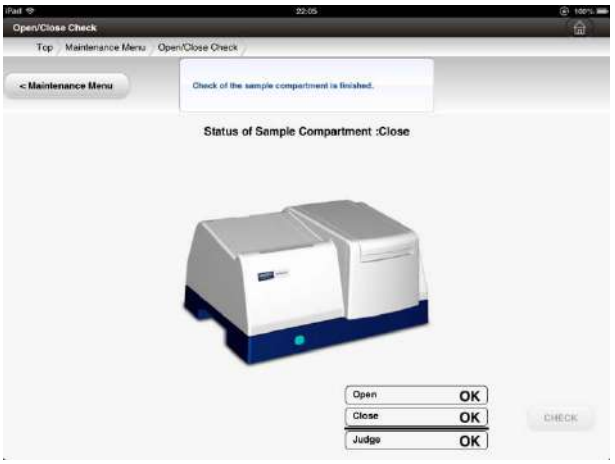


Fig. 7-13

After “OK” is displayed, press the **< Maintenance Menu** to return to the previous screen.
After “NG” is displayed, please contact the store where you purchased the instrument or our designated maintenance service company near you.

NOTE: The order of performing the Open/Close Check varies depending on the status when the check screen is displayed. When the status is “Open”, the status check starts with “Close.” Follow the message displayed.

7.4 Cleaning Instrument

(1) Cleaning sample compartment

When you spilled over samples in the sample compartment, remove, through the procedure in “1.3 Mounting and Dismounting Cell Holder”, 6 cell turret and cell holder for reference and immediately wipe off and clean the spilled samples. Also clean the available option in a similar manner.

(a) Power down the instrument.
(b) Unplug the power plug.
(c) Open the sample compartment cover.
(d) Turn the screw on the 6 cell turret to remove it.
(e) When the spilled liquid flew out of the vent at the bottom of the instrument through the drain of the sample compartment, also clean the bottom of the instrument.

(2) Cleaning Instrument Exterior

For cleaning the instrument exterior, power down the instrument and unplug the power plug. Be sure to use soft cloth or wet but tightly-squeezed cloth to clean the exterior. Never use flammable solvents such as alcohol, benzene and thinner, etc.

When you spilled over samples on the instrument itself, power down the instrument and unplug the power plug. Be sure to use soft cloth or wet but tightly-squeezed cloth to clean and dry the instrument immediately. Be careful not to spill over samples on the operation panel. Please contact the store where you purchased the instrument or our designated maintenance service company near you if you find any abnormality.

7.5 Washing and Storing Cell

After washing cells by correctly using cleaning agents exclusively used for cleaning cells such as the Cellochiru solvent by Fujiwara Scientific Company, etc. or cleaning agents exclusively used for cleaning experimental tools made of glass, wash the cleaning agents away by using ultra pure water and dry and store the cells in a clean environment.

7.6 Lamp

The warranty period for a lamp is for one year. Product registration is recommended to extend the lamp warranty period. In this case the extended warranty period for a lamp is the described number of lighting, or 7 years after delivery, whichever is the earlier. The specific number of turning ON of the lamp is indicated by the percentage (%) on the Lamp Usage of the Maintenance Menu of the UH5300 (See “7.1 Lamp Usage.”). The lamp usage value of 100% is the guideline value for the number of turning ON of the lamp. The measurement guideline value for the lamp usage value of 100%, assuming that the lamp is used for seven years on a 240 days/year basis, equals to 300 measurements/day (No. of wavelengths: 1 wavelength) by the ABS measurement or 20 measurements/day (scan range: 190-1100 nm, scan speed: 200 nm/min) by the wavelength scan. Do not lose the delivery statement stamped with the delivery date.

For further information about the product registration, contact your sales representative.

7.7 Lithium Battery

CAUTION

Burst of a lithium battery

The Model UH5300 spectrophotometer uses a lithium battery for time control. A lithium battery may burst should it be handled improperly.
Absolutely do not attempt to charge, disassemble, or throw into a fire under any circumstance. The battery should be handled totally separate from ordinary wastes.
When the lithium battery needs replacement (for example, an error message “RAM NG” appears frequently on the screen), inform the sales office from whom your bought this instrument or the nearest maintenance service company authorized by us of the situation.
Leave the replacement work to the service engineer who has completed our technical training. (The replacement after expiration of the warranty period is a pay service.)

7.8 Exchanging Fuses

> **WARNING**
>
> **Electric Shock due to Contact with Inside of Instrument**
>
> Before replacing power line fuses, make sure that the power cord has been disconnected.

When a fuse blew up for some reason, exchange the fuses in the following procedure: If the fuse blows up again after the replacement, some spectrophotometer failure is suspected. Please contact the store where you purchased the instrument or our designated maintenance service company.

(1) Unplug the power cable from the connector on the spectrophotometer (See Fig. 7-14 (1)).

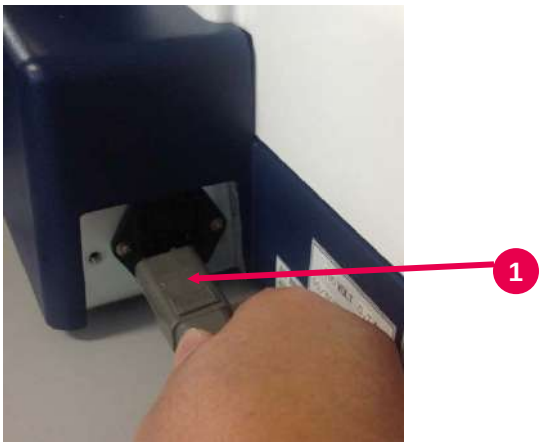


Fig. 7-14 Unplugging Power Cable

(2) The fuse holder is located above the power connector on the back of the spectrophotometer. Push one side of the fuse holder screw (See Fig. 7-15 (2)) by using a flat-blade screwdriver. Then, the fuse holder pops out a little. Next, push the other side of the screw in a similar manner. Then, the entire holder pops out a little. Pull out the fuse holder by hand.

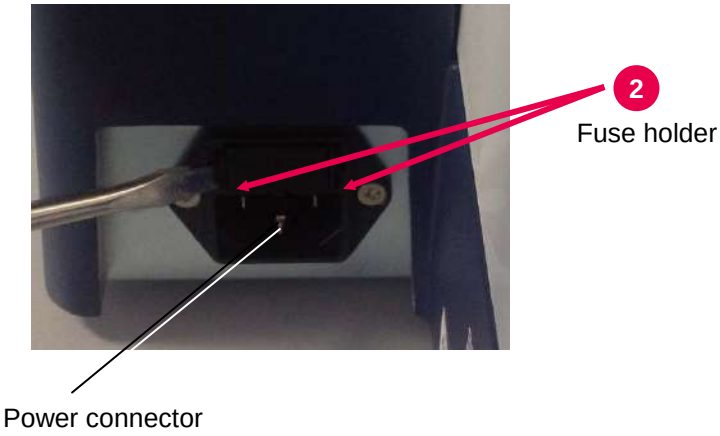


Fig. 7-15 Removing Fuse Holder

(3) Remove the blown fuse and replace with a new one (See Fig. 7-16 (3)).
Use fuses with appropriate capacity (time lag fuse (2A) P/N: J821391). We recommend you to keep spare fuses.

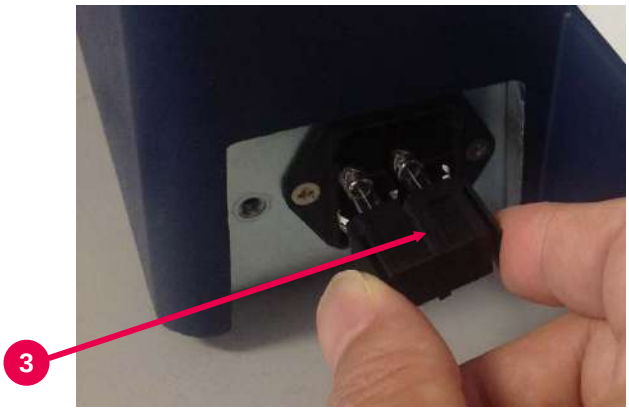


Fig. 7-16 Removing Fuse Holder

7.9 Storing Instrument

(1) After finishing measurement
   (a) Turn OFF the power and unplug the power plug.
   (b) Cover the instrument with clean cloth, etc.

NOTE: When organic solvents or toxic gas samples are set in the sample compartment, remove them from the sample compartment. Never leave them in the sample compartment.

(2) When instrument is not used for a long time
   (a) Store the instrument at the temperature between 0-40 °C and humidity between 15-80% (the humidity must be 70% or less when the temperature is 30 °C or higher). Be careful about the condensation of the instrument while storing it.
   (b) Cover the instrument with clean cloth, etc.
   (c) Never allow toxic gasses such as acid and alkali, etc. from entering the instrument.
   (d) Keep the instrument away from magnetic fields.
   (e) Keep the instrument away from heavy dirt and dusts.
   (f) Keep the instrument away from direct sunlight.
   (g) Data stored on the instrument may be lost due to lithium battery attrition or degradation, etc. Please back up important measurement data and measurement conditions, etc. stored on the instrument by, for example, printing them on paper, etc.

7.10 Troubleshooting

When an error message is indicated, handle the message by referring to “(1) Error message.” If you find any abnormality with the instrument, take corrective actions by referring to “(3) Troubleshooting.” If the instrument does not function correctly after taking the corrective actions, please contact the store where you purchased the instrument or our designated maintenance service company.

⚠ WARNING

Electric Shock due to Contact with Inside of Instrument

This instrument has electrical parts mounted inside that works on a voltage having a potential to invite an electric shock hazard if touched directly. Leave the checking inside the instrument always to the service engineer.

(1) Error message (software)

Error message	Cause	Corrective action
Input is needed.	Required items are not set.	Set the required items.
Input numerical value.	A character other than a numerical value is set.	Check the input value and set again.
Input by %a characters or less.	The number of characters entered exceeds the limit.	Set the no. of characters below the no. indicated in the message.
Input by % characters or more.	The value entered is small.	Set the numerical value indicated in the message.
Change an interval more than %a.	The interval is too narrow.	Change the set value.
Set a value of between %a and %b	The value entered is out of range.	Set a numerical value within the range.
Correct the magnitude correlation of a value.	The magnitude correlation of a value is in reverse.	Review the magnitude correlation of the value and set again.
Set up the minimum width of a value more than %a.	The minimum width is too narrow.	Set the numerical value larger than that indicated in the message.
Set up to the upper limit of vertical axis > lower limit of vertical axis	The upper/lower limit of vertical axis is in reverse.	Review the upper/lower limit and set again.
Sampling interval is out of range. Change scan speed or data interval.	The sampling interval entered is out of range.	Change the scan speed or the data interval.
No. of STD ≥ 2.	The standard is 1 or less.	Change the standard to 2 or more.
When Through zero is OFF, set up different CONC of two or more pieces.	The same value is set to the standard CONC.	Review the standard CONC and set a different CONC.

(cont'd)

Error message	Cause	Corrective action
When through zero is ON and no. of STD is 1, the CONC should be set to other than zero.	CONC is set to "0" when the through zero is "ON" and the standard is set to "1."	Add the no. of STD or set a numerical value other than "0" for CONC.
When BLK is selected for STD Autozero, through zero must be OFF.	BLK is selected for the STD Autozero and the through zero is ON.	Change the through zero to OFF.
Set up the number of STD ≥ 3.	No. of STD is 1 or 2. It needs to be 3 or higher for the 2nd order.	Set the standard to 3 or higher.
When BLK is selected for STD Autozero, through zero must be OFF.	You are trying to set the through zero to ON while the STD Autozero is BLK.	Change the through zero to OFF.
When through zero is ON, BLK is unselectable.	You are trying to select BLK while the through zero is ON.	The through zero must be OFF to select BLK.
Set Factor A1 ≠ 0.	The factor is set to "0."	Set a numerical value other than "0."
Set Factor A2 ≠ 0.	The factor is set to "0."	Set a numerical value other than "0."
Set up by 8 or less characters.	The no. of characters is 9 or more.	Set the no. of characters to 8 or less.
Set WL1 > WL2.	WL1 < WL2 is set.	Set a WL value in a way WL1 is bigger than WL2.
Set WL1 > WL2 > WL3.	WL1 > WL2 > WL3 is not set.	Set a WL in the manner of WL1 > WL2 > WL3.
Set WL2 ≠ Correction WL.	WL2 = Correction WL is set.	Set the WL value in a way WL2 is different from correction WL.
Input the value of X of the following. [-999999.9 ≤ X ≤-0.0000001, or 0.0000001 ≤ X ≤ 999999.9]	You are trying to set a value close to "0."	Set a value within the range as shown in the message.
Data point is over 10000. Change scan time or data interval.	The data point exceeds 10000.	Change the scan time or data interval.
Start time is over the scan time of a measurement parameter.	Start time is over the scan time of a measurement parameter.	Set a start time which is not over the scan time of a measurement parameter.
End time is over the scan time of a measurement parameter.	End time is over the scan time of a measurement parameter.	Set an end time which is not over the scan time of a measurement parameter.
Set the start time < End WL.	The start time < End WL is not set.	Set a start time < End WL.
Area is incalculable. Please set with "Start WL > End WL".	It is incalculable because it is "Start WL > End WL."	Set a start time > End WL.
Input value is wrong. Set correct value.	The input value is wrong.	Set a correct value.
Input value for interval is too small. Set correct value.	The interval value is too small.	Set a bigger interval value.

(cont'd)

Error message	Cause	Corrective action
Data point is short. (Data Point * Number of Times) ≤"+ errStr +"	The data point to be calculated is short.	Review and set again the data point.
Specify DHCP/STATIC.	The DHCP/STATIC is not specified.	Specify a DHCP/STATIC.
Set up Host name.	The Host name is not set.	Set up a Host name.
Set IP address into router.	The IP address is not set into the router.	Set an IP address into the router.
Set IP address.	The IP address is not set.	Set an IP address.
Set subnet mask.	The subnet mask is not set.	Set a subnet mask.
Open sample compartment.	The sample compartment is closed.	Open the sample compartment cover.
Close sample compartment.	The sample compartment is open.	Close the sample compartment cover.
File of same name already exists. Set different file name.	A file of the same name already exists.	Set a different file name.
Input numerical value.	A numerical value is not set.	Set a numerical value.
Spectrophotometer is in use.	It is connected to the other terminal.	Wait till the terminal finishes the use of the spectrophotometer.
Photometer Error! It is not connectable.	Error occurred on the spectrophotometer and it is not connectable.	Restart the spectrophotometer and connect again. If the error occurs again, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.
Because sample compartment cover is open, measurement cannot be started.	The sample compartment is open.	Check and close tightly the sample compartment.
Measurement is failed. Please perform measurement from the beginning once again.	The measurement failed.	Measure again.
Error!!	Error occurred on the spectrophotometer.	Restart the spectrophotometer and connect again. If the error occurs again, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.
Error! Number of lists of the file export places exceeded %a. Please delete other file export places.	The number of lists of the file export places exceeded.	Please delete other file export places to make additions.
Error! Double-byte character is contained in the Password. Please use a Half-size character.	A double-byte character is contained in the Password.	Set a half-byte character.
Error! Double-byte character is contained in the shared folder. Please use a Half-size character.	A double-byte character is contained in the shared folder.	Set a half-byte character.
Error! Double-byte character is contained in the user name. Please use a Half-size character.	A double-byte character is contained in the user name.	Set a half-byte character.

(cont'd)

Error message	Cause	Corrective action
Peak was not found.	The peak was not found.	・Make sure the sample compartment is empty. ・Make sure the lamp is ON.
Maintenance history cannot be written in.	The memory is full. It cannot be written in for some error.	・Delete stored data. ・If the error occurs again, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.
Because sample compartment cover is open, measurement cannot be started.	The sample compartment is open.	Check and close tightly the sample compartment.
Double-byte character is contained in IP address.	A double-byte character is contained.	Check and set again the IP address without double-byte character.
Double-byte character is contained in subnet mask.	A double-byte character is contained.	Check and set again the IP address without double-byte character.
Input the right subnet mask.	The subnet mask set is wrong.	Set a correct subnet mask.
Double-byte character is contained in router.	A double-byte character is contained.	Check and set again the IP address without double-byte character.
Double-byte character is contained in DNS.	A double-byte character is contained.	Check and set again the IP address without double-byte character.
Double-byte character is contained in search domain.	A double-byte character is contained.	Check and set again the IP address without double-byte character.
Input the right IP address.	The IP address set is wrong.	Set a correct IP address.
Input the right IP address into a router column.	The IP address set is wrong.	Set a correct IP address.
Input the right DNS.	The DNS address set is wrong.	Set a correct DNS address.
Date is not set. Set the date.	The date is not set.	Set the time.
Double-byte character is contained. Input numerical value.	A double-byte character is contained.	Set a numerical value.
Other than numerical values and delimiters (/, -, :) are set. Input a time.	Other than numerical values and delimiters (/, -, :) are set.	Set the time again.
Double-byte character is contained in the SERIAL No.	A double-byte character is contained in the SERIAL No.	Check and set again the SERIAL No. of the spectrophotometer.
Sign is contained in the SERIAL No.	A sign is contained in the SERIAL No.	Check and set again the SERIAL No. of the spectrophotometer.
SERIAL No. is over 12 characters.	The SERIAL No. is over 12 characters.	Check and set again the SERIAL No. of the spectrophotometer.

(cont'd)

Error message	Cause	Corrective action
The top of the list cannot be deleted. It can be edited by using Edit button on Edit screen. To change to USB, edit as shown below. 1. State "/media/sda1(=example)" in the path. 2. Make sure it can be viewed by pressing the Test button. 3. Display the result on the list by pressing the OK button. 4. Confirm the list by pressing the "Reflect the Setting" button.	You are trying to delete the top of the list. It cannot be deleted when there is only one on the list.	Don't delete it. Or edit it as shown in the message.

(2) Error message (Spectrophotometer hardware)

Error	Error cause	Timing to occur	Corrective action
ROM error	ROM SUM value error	While initializing spectrophotometer	Power up the spectrometer again. If the error occurs again, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.
RAM error	RAM access error in work area	While initializing spectrophotometer	
Lamp ON error	Error when the lamp is not turned ON	While lamp is ON	
WL motor error	WL driver (including motor controller) error	While WL drive motor is running	
WL initialization error	WL initialization position error by PI	While initializing spectrophotometer	
WL calibration error	WL calibration error	While calibrating wave length	Make sure the sample compartment is empty. Perform WL calibration followed by WL calibration (Hg lamp). If the error occurs again, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.
WL calibration value existence or non-existence error	An essential WL calibration value is absent or an WL calibration value is already set	While calibrating wave length	
Tolerance of WL calibration error	WL calibration value is out of tolerance.	While calibrating wave length	
WL calibration step error	No. of actual steps does not meet the following: S1 > S2 > S3 > S0 > S4 > S5 > S6 > S7.	While calibrating wave length	
WL calibration 881.9 nm peak error	Peak detection error of 881.9 nm while WL calibration is under way	While calibrating wave length	Make sure the sample compartment is empty. Perform WL calibration. If the error occurs again, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.
WL calibration 484.3 nm peak error	Peak detection error of 484.3 nm while WL calibration is under way	While calibrating wave length	
WL calibration 260.6 nm peak error	Peak detection error of 260.6 nm while WL calibration is under way	While calibrating wave length	

(cont'd)

Error	Error cause	Timing to occur	Corrective action
WL calibration 253.7 nm peak error	Peak detection error of 253.7 nm while WL calibration is under way	While calibrating wave length	Make sure the sample compartment is empty. Perform WL calibration (Hg lamp). If the error occurs again, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.
WL calibration 435.8 nm peak error	Peak detection error of 435.8 nm while WL calibration is under way	While calibrating wave length	
WL calibration 546.1 nm peak error	Peak detection error of 546.1 nm while WL calibration is under way	While calibrating wave length	
Capacitor change judge error (OVER)	Capacitor change judge error because the energy value is too large.	While performing spectrophotometer initialization, WL calibration, autozero, pre-scanning, baseline measurement	Power up the spectrometer again. If the error occurs again, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.
Capacitor change judge error (UNDER)	Capacitor change judge error because the energy value is too small.	While performing spectrophotometer initialization, WL calibration, baseline measurement	
Autozero (all cells) error	Wave length conditions differ between the first and second multi-autozero.	While performing multi-autozero	Check the measurement conditions and perform the multi-autozero.
Sample compartment cover is open.	Error caused by the fact the sample compartment cover is open while executing sequence	While executing command	Check the sample compartment cover by referring to Section 7.3. If the error occurs again, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.
6 cell position error	Cell position error of each cell (The photo coupler signal is checked by using a slit located at correct position for each cell.)	While moving cells or cells under measurement	Set the 6 cell turret correctly and try again. If you don't use the 6 cell turret, set the 6 cell conditions by referring to "3.1.2 6 Cell Mode." Make sure nothing hinders the rotation of the 6 cell turret in the sample compartment.
Lamp usage SUM error	Lamp usage SUM value error in the EEPROM.	While initializing spectrophotometer	Power up the spectrometer again. If the error occurs again, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.

(cont'd)

Error	Error cause	Timing to occur	Corrective action
SERIAL No. SUM error, SERIAL No. is not decided.	SERIAL No. SUM value error in the EEPROM.	While initializing spectrophotometer	Set the SERIAL No. again and power up the spectrometer again. If the error occurs again, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.
WL calibration value SUM error	WL calibration value SUM value error in the EEPROM	While initializing spectrophotometer	Power up the spectrometer again. If the error occurs again, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.
Tolerance SUM error	WL calibration tolerance SUM value error in the EEPROM.	While initializing spectrophotometer	
It cannot communicate with a spectro-photometer. Check that the power supply of a photometer is turned on, and check a network setup.	Communication error	While connecting the spectrophotometer	・Make sure the spectrophotometer and the router are powered up and the LAN cable is connected correctly by using the specified cable. ・Make sure the address is set correctly by checking the network configuration.
It failed to open"○○○○" because it could not connect to the server. (when started by the icon on the home screen)			
It cannot open the page. (when started by Safari)			

(3) Troubleshooting

Symptom	Cause	Action
The spectrophotometer does not start up after the power switch is turned ON.	(1) The power cable is unplugged. (2) The fuse blew up. (3) Causes other than (1) and (2)	(1) Plug the power cable. (2) Exchange fuses. (3) Turn the power switch OFF and, then, ON. If the symptom continues, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.
The measurement value varies widely.	(1) Cell or window frame is tainted by dirt or water droplets. (2) The sample compartment not closed. (3) Causes other than (1) and (2).	(1) Remove the dirt or the water droplets, etc. (2) Close the sample compartment cover. (3) Turn the power switch OFF and, then, ON. If the symptom continues, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.
“NG” was indicated in the performance check result of the WL accuracy.	The performance check result of the WL accuracy is out of specification.	Perform WL calibration by referring to the method of WL Calibration in 6.3 and perform the performance check again. If the error occurs again, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.
“NG” was indicated after the WL repeatability performance check.	The result of the WL repeatability performance check did not meet the specification.	Perform the performance check again. If the error occurs again, contact your nearest service office of Hitachi High-Technologies Corporation sales representative.
“NG” was indicated after the noise level performance check.	The result of the noise level performance check did not meet the specification.	
“NG” was indicated after the baseline flatness performance check.	The result of the baseline flatness performance check did not meet the specification.	
“NG” was indicated after the baseline stability performance check.	The result of the baseline stability performance check did not meet the specification.	
“NG” was indicated after the resolution performance check.	The result of the resolution performance check did not meet the specification.	

(cont'd)

Symptom	Cause	Action
The iPad terminal and the spectrophotometer cannot be connected.	The setup is not performed correctly.	Power up again the spectrophotometer, the tablet terminal and the router. Make sure the tablet terminal, the spectrophotometer and the router are compatible. Correct it if not. Set up again by referring to Chapter1 and 2.
No printing	The printer is not set with the wireless LAN environment.	Set the environment by referring to the printer manual.
No response	(1) The communication is disconnected. (2) The data is in process. It takes long to process if the data volume is huge.	(1) Make sure the spectrophotometer power is not OFF. (2) Wait for a while. Close the Safari and connect again.
The iPad and the router are not connected. The  icon is not indicated.	(1) The router is not powered up. (2) The router is located too far away. (3) Any shielding object exists between the router and the iPad	(1) Power up the router. (2) Operate near the router. (3) Remove the shielding object.

7.11

Specifications of UH5300 Spectrophotometer

Table 7-1 Specifications of UH5300 Spectrophotometer

Optical	Czerny-Turner mount double beam
Measurement wave length range	190-1100 nm
Spectrum bandwidth	1±0.2 nm (546.1 nm)
Stray light	0.05 % or less (220 nm NaI, 340 nm $NaNO_2$) 1.0%(198 nm KCl)
Wave length accuracy	±0.3 nm (484.3 nm, 260.6 nm, 881.9 nm, 253.7nm, 435.8 nm, 546.1 nm)
Wave length repeatability	±0.1 nm
Measurement mode	ABS/Transmittance, wave length scan, time scan, concentration, nucleic acid measurement
Measurement range	Abs: -3.300 - 3.300 %T: 0 - 300%T Conc: 0.000 - 9999
Measurement accuracy (Test by NIST SRM930)	±0.002 Abs(0 - 0.5 Abs) ±0.004 Abs(0.5 - 1.0 Abs)
Measurement repeatability (Reproducible by NIST SRM930)	±0.002 Abs(0 - 1.0 Abs)
Wave length scan speed	10, 40, 100, 200, 400, 800, 1200, 2400, 4800, 6000 nm/min (except for filter replacement)
Baseline stability	0.0005 Abs/h (260 nm, room temperature: 20-25 °C, temperature variation: 5 °C or less, 2 hours after power activation)
Baseline flatness	±0.0009 Abs (200-950 nm, excluding the influence of absorbing noise, steam and quartz.)
Noise level (RMS)	0.0001 Abs (0 Abs noise for wave length 260 nm)
Lamp	Xenon (Xe) flash lamp
Detector	Silicon photodiode
Size	511(W)×465(D)×269(H) mm
Weight	About 19 kg
Power	100, 115, 220, 230, 240 V 50/60 Hz
Power consumption	70 VA

7.12 Software License Information

Software configuration

The built-in software of the UH5300 Ultra-Violet and Visible Spectrophotometer consist of multiple independent software modules each of which is protected by our or third party copyrights.

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Built-in software module

This instrument has built-in software modules as shown in the following table:

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log4js	Apache License, Version 2.0
libpcap	BSD License
tcpdump	
sprintf	
base-files	GNU General Public License
initscripts	
libcap	
makedevs	
netbase	
x-loader	GNU GENERAL PUBLIC LICENSE Version 2
u-boot	
Linux	
arago-bitbake	
glibc	
alsa-utils	
attr	
base-passwd	
busybox	
dbus	
devmem2	
ethtool	
module-init-tools	
mtd-utils	
opkg	
readline	
sysvinit	
tinylogin	
udev	
update-rc.d	
zeroconf	
aufs	
GCC libraries	GNU GENERAL PUBLIC LICENSE Version 3
samba	
alsa-lib	GNU LESSER GENERAL PUBLIC LICENSE Version 2.1
avahi	
glibc	
libdaemon	
libnss-mdns	
GCC libraries	GNU LESSER GENERAL PUBLIC LICENSE Version 3

(cont'd)

Software module	License information
arago	MIT License
arago-oe-dev	
angstrom-version	
arago-feed-configs	
curl	
expat	
initscript-telnetd	
ncurses	
nodejs	
opkg-collateral	
popt	
task-arago-base	
ejs	
express	
jsdom	
serialport	
socket.io	
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APPENDIX

Appendix A Operation Mechanism of Instrument

A.1 Optical Part

Fig. A-1 shows the optical part of the Hitachi UH5300 Spectrophotometer.
It uses the xenon (Xe) flash lamp. The white light emitted from the lamp goes through the entrance slit and is separated into single color lights by using the plane diffraction lattice (lattice constant 1200/mm, blaze wavelength 250 nm, diffraction area 28 mm x 28 mm) of the Czerny-Turner monochromator. The separated lights are screened by the bandpass 1nm at the entrance slit and goes through the stray light cut filter and reflected by the toroidal mirror and, then, branched into a sample light and a reference light by the half mirror. Both the sample light and the reference light penetrate samples in the sample compartment and enter each detector. The sample light and the reference light entered into detectors are converted into the electric signals. The UH5300 Spectrophotometer is a double-beam spectrophotometer, enabling to achieve highly stable measurement values that any single-beam spectrophotometers cannot achieve.
The luminous flux size at the center of the 10mm cell is 8 mm in height and 1 mm in width (the height from the bottom of the cell installation to the center of the luminous flux is 10mm).

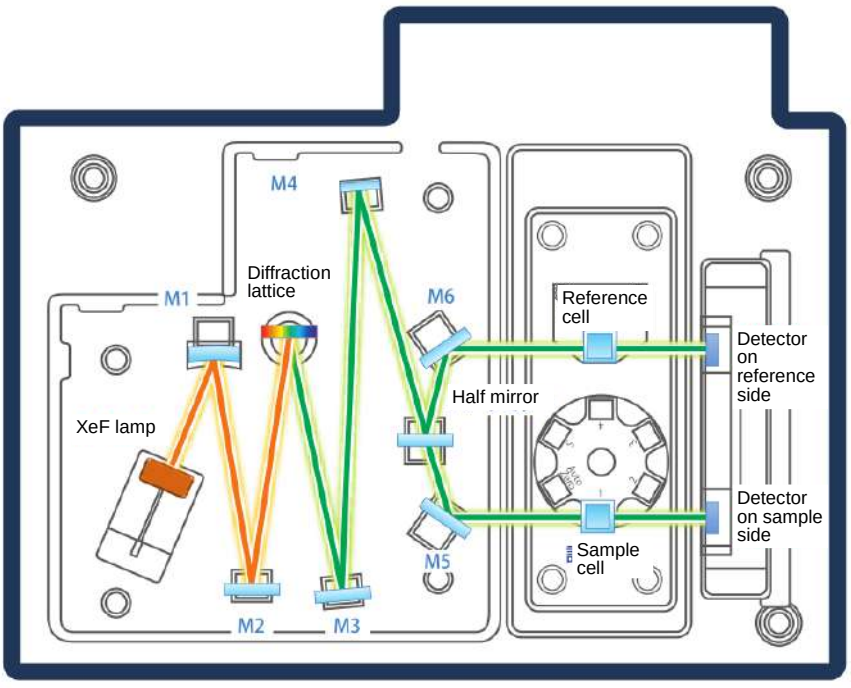


Fig. A-1 Optical Part of Hitachi UH5300 Spectrophotometer

A.2 Signal Processing/Control

Fig. A-2 shows the signal processing/control part. This system is controlled by the operation panel. Light signals converted into electric signals by detectors are, after amplified and A/D converted, logarithmically transformed by the software into the ABS data. The measurement results are displayed on the data display part or printed out.

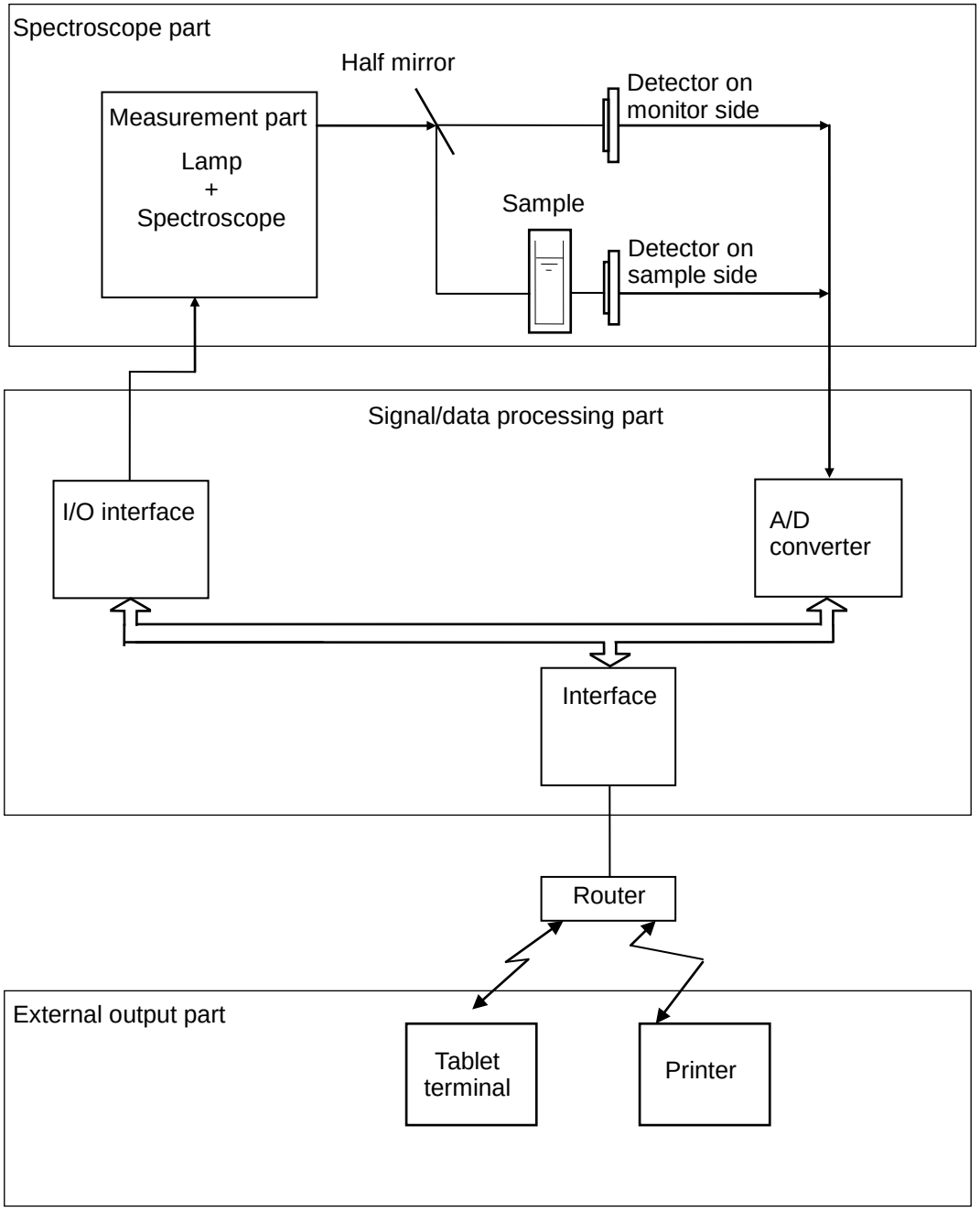


Fig. A-2 Signal Processing/Control

Appendix B Absorptiometric Analysis

The spectrophotometer is used for the absorptiometric analysis of liquid, solid and gas samples in the ultra-violet and visible lights. Formula 1 can be established when the single-color light I_0 penetrates the liquid layer with the concentration of the single component sample c and the length ℓ and the quantity of light is reduced to I_t. ε is the ABS factor which is a constant to indicate how much light the sample absorbs. t is the transmittance. The transmissivity T is a value of the transmittance expressed in percentage.

$$\frac{I_t}{I_0} = 10^{-\varepsilon \cdot c \cdot \ell} = t \quad \text{.....(Formula 1)}$$

$$100 \cdot t = T \quad \text{.....(Formula 2)}$$

$$\log \frac{1}{t} = \varepsilon \cdot c \cdot \ell = A \quad \text{.....(Formula 3)}$$

Formula 3 can be established when the common logarithm of the reciprocal of the transmittance t is used. Formula 3 is called the Bougue-Beer (Lambert- Beer) Law. A in Formula 3 is the absorbance or Abs. The absorbance A is in proportion to the concentration c. Therefore, you can use this proportional relation to perform quantitative analysis by comparing the absorbance of the standard liquid of known concentration with that of the solvent of unknown concentration. The U-5100 Ratio Beam Spectrophotometer can measure both the transmissivity and the absorbance.
Please read the “JIS K 0115 (2004) ‘General rules for molecular absorptiometric analysis’” before using the spectrophotometer for the first time.

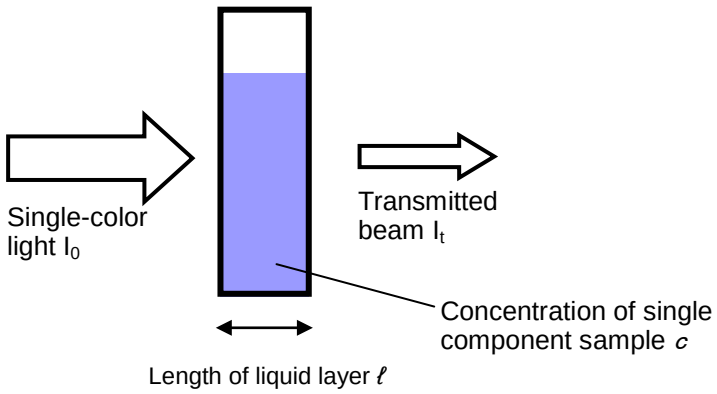


Fig. B-1 Bougue-Beer (Lambert- Beer) Law

Appendix C Advice on Using Spectrophotometer

(1) Selecting solvents

Take the following points fully into consideration in selecting solvents to create samples:

- No or little absorption in the measurement wave length region
- No interaction with solutes
- Little volatility

Table C-1 shows the range of organic solvents used relatively often. (See The Chemical Society of Japan “Experimental Chemistry, Vol. 15, Analytical Chemistry, Vol. 1” for the detail.) The wave length range of an organic solvent varies depending on the grade. We recommend you to use solvents with the spectrum analysis grade for the spectrophotometer.

Table C-1 Wave Length Range Used (marked with _____)

Solvent \ Wave length	200 nm	300 nm	Over 400 nm
Cyclohexane	200 nm		
Ethanol	220 nm		
Methanol	220 nm		
Diethyl ether	220 nm		
Dioxane	220 nm		
n-hexane	220 nm		
Chloroform	250 nm		
Isopropyl alcohol	250 nm		
Acetic acid	250 nm		
Ethyl acetate	270 nm		
Carbon tetrachloride	275 nm		
Benzene	280 nm		
2-butanone (methyl ethyl ketone)	335 nm		
Acetone	340 nm		
Carbon disulfide	380 nm		

(2) Special samples

Note that the Bougue-Beer (Lambert- Beer) Law in Appendix b cannot be established by the following samples:

- Fluorescent samples
- Heavily turbid samples

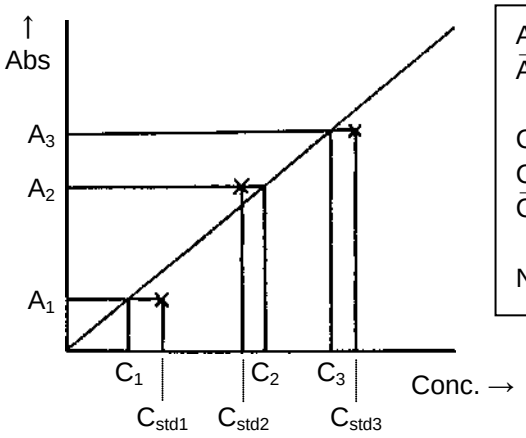
To measure solid samples such as glass plate, etc., you have to add the light energy loss (r) caused by the surface reflection on the solid surface. It can be expressed by Formula 4. r varies depending on the substance.

$$It/Io = 10^{-\varepsilon \cdot c \cdot \ell} - r \quad \text{.....(Formula 1)}$$

Appendix D Determination Coefficient for Calibration Curve

D.1 Calculation for Determination Coefficient

Use the following formula to calculate determination coefficient, etc.:



A_n:	Absorbance after measuring the standard
$\bar{A}$:	Average value of absorbance after measuring the standard
C_n:	Concentration on the calibration curve for A_n
C_{stdn}:	Concentration of the standard
$\bar{C}$:	Average value of concentration on the calibration curve for A_n
N:	No. of standard

Residual (difference) DIFF: $DIFF_n = C_n - C_{stdn}$

Relative residual (difference) RD: $RD_n = \frac{DIFF}{\bar{A}} \times 100$

$$\bar{A} = \frac{\sum A_n}{N}$$

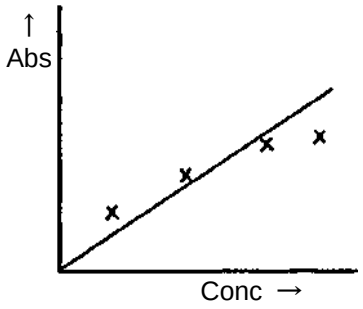
Student t (t test): $t_n = \frac{DIFF_n}{\sqrt{\frac{\sum DIFF^2}{N-1}}}$

Correlation coefficient: $R = \sqrt{\frac{\sum (C_n - \bar{C})^2 - \sum (C_n - C_{stdn})^2}{\sum (C_n - \bar{C})^2}}$

Determination coefficient: $R_2 = (R)^2$

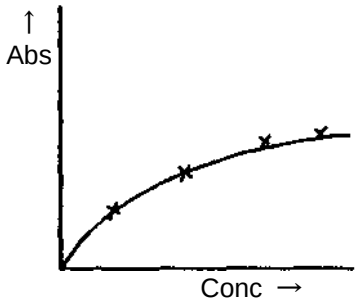
D.2 Using Determination Coefficient

The determination coefficient shows the level of consistency between measured standards and calibration curves created. Any value closer to “1” indicates the consistency is good between the measured value and the calibration curve while any value away from “1” indicates the standard data need to be checked again or the calibration mode needs to be changed.
An example of a determination coefficient on the calibration mode is as follows:



X： Standard measurement point

Calibration curve type is set to the linear straight line:
Determination coefficient < 1



Calibration curve type is set to the quadratic curve:
Determination coefficient ≒ 1

In this example of the standard data, you can get a better result by setting the calibration type to the quadratic curve. Determining the calibration curve which used to be determined visually or by experience can be made easier through quantification.

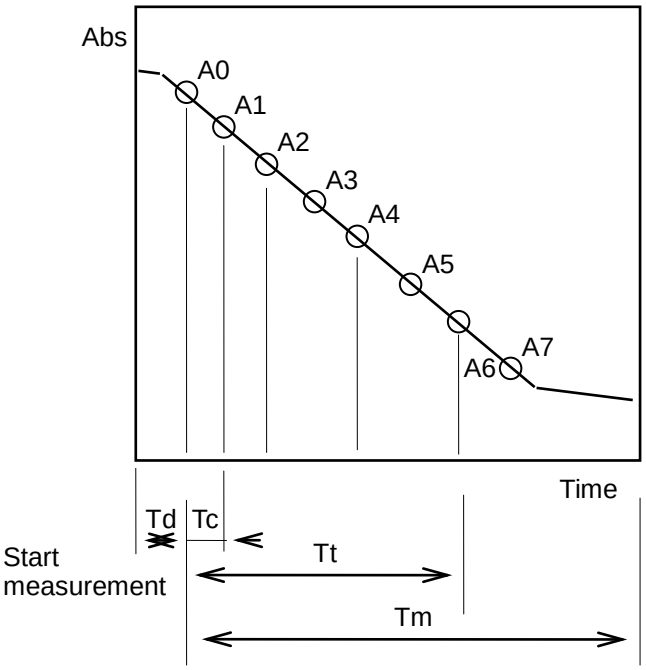
Appendix E Detailed Rate Analysis Functions

E.1 Introduction

The rate analysis is used for the enzyme reaction analysis. This analysis method is used in the clinical examination and biochemical fields by drug makers and hospitals. The concentration is calculated based on the change of data per unit of time by using computers and the result is displayed on a screen or printed out.

E.2 Operation Method

Fig. E-1 shows the timing chart of the rate analysis. The data are taken in after an initialization time is past after pressing the Measurement button. The regression line is created based on these measurement data by using the least squares method to calculate the slope and the activity.



Data: A0, A1, A2, A3, A4....

Td: Waiting time for initialization
Tm: Measurement time
Tc: Sampling interval
Tt: Calculation time

Fig. E-1

Create a regression line based on the measurement data by using the least squares method to calculate the determination coefficient.

$$y = ax + b$$

where

$$a = \frac{\sum x_i y_i - \sum x_i \sum y_i \Big/ n}{\sum x_i^2 - \left(\sum x_i\right)^2 \Big/ n} \qquad b = \sum y_i - a * \left(\sum x_i\right) \Big/ n$$

xi: Time (s) for each data
yi: Absorbance for each data
n: No. of samples

The determination coefficient CD is as follows:

$$CD = \frac{\left(n\sum x_i y_i - \sum x_i \sum y_i\right)^2}{\left(n\sum x_i^2 - \left(\sum x_i\right)^2\right)\left(n\sum y_i^2 - \left(\sum y_i\right)^2\right)}$$

- Slope (Amount of change per minute)

$$D_i = \frac{a}{Tk} = 60a \text{ (/min)}$$

- Activity

$$C_i = k \cdot D_i$$

- R (Corelation coefficient)

$$R = CD = \sqrt{\frac{\left(n\sum x^i y^i - \sum x^i \sum y^i\right)^2}{\left(n\sum x^{i\,2} - \left(\sum x^i\right)^2\right)\left(n\sum y^{i\,2} - \left(\sum y^i\right)^2\right)}}$$

- R2 (Determination coefficient)

$$R = (CD)^2 = \frac{\left(n\sum x_i y_i - \sum x_i \sum y_i\right)^2}{\left(n\sum x_i^2 - \left(\sum x_i\right)^2\right)\left(n\sum y_i^2 - \left(\sum y_i\right)^2\right)}$$

NOTE: When the range of the rate calculation differs from the range of the actual measurement data, calculate by using the measurement data of the range.

Appendix F Smoothing

F.1 Introduction

The following 3 smoothing methods are available for the UH5300:

- Savitsky-Golay smoothing
- Mean smoothing
- Median smoothing

See the following for the details:

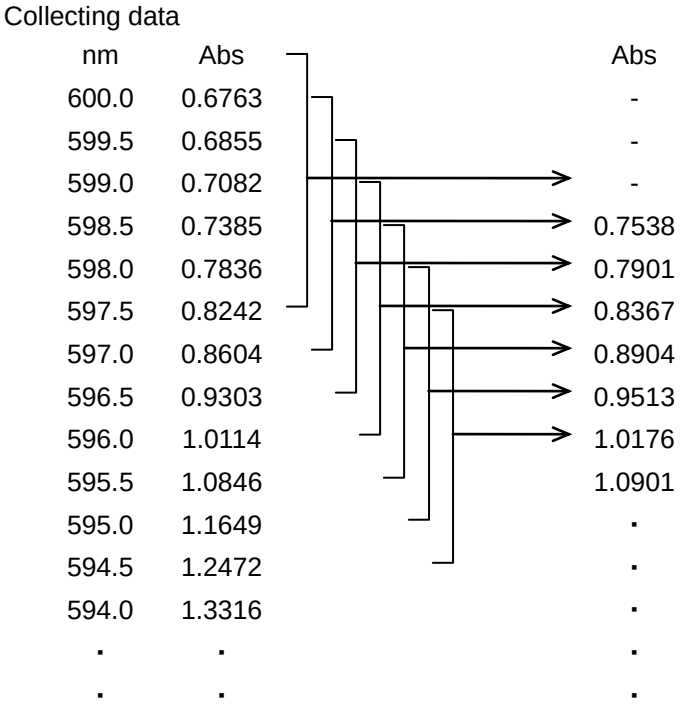
F.2 Savitsky-Golay Smoothing

See the following reference documents for this method:
Gorry,P.A.;“General Least-Squares Smoothing and Differentiation by the Convolution（Savitsky-Golay）Method”; Anal.Chem. 1990, 62, 570-573.

F.3 Mean Smoothing

Calculate the average value of the numerical values included in the data point specified and set it to the central wave length.

Example: 7 data are smoothed once:
Calculate the average of 7 data and the average value is set in the 598.5 nm which is the central wave length value when the 7 data from the 600.0 nm are used as shown in the example below.
3 data on both sides of the spectrum disappear.



When the even-numbered number of data point 2n is used, calculate by the formula of “2n+1.” Therefore, when the data point is set to 8, the result is the same as that when the data point is set to 9.

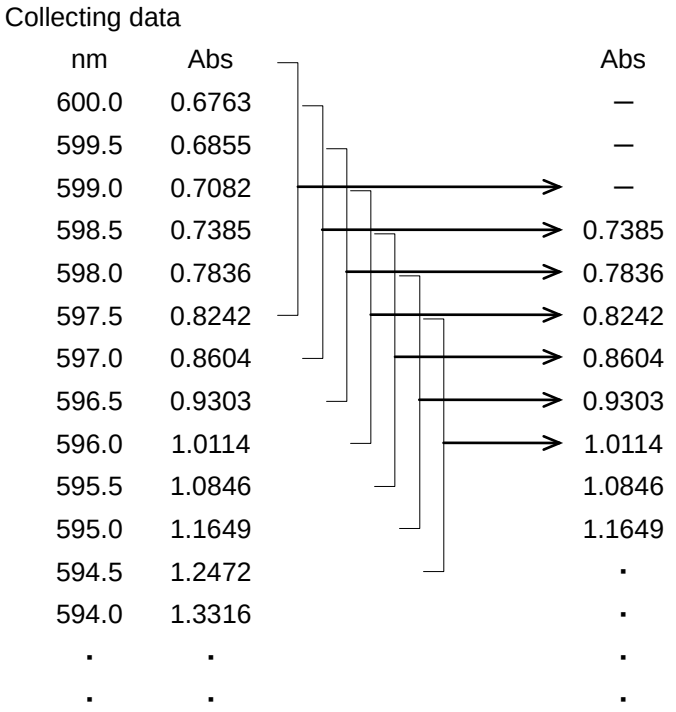
F.4 Median Smoothing

Calculate the average value of the numerical values included in the data point specified and set it to the central wave length.

Example: 7 data are smoothed once:

Use the central value or the 4th smallest value when the 7 data are assorted in the order of smaller to larger. The value is set in the 598.5 nm which is the central wave length value when the 7 data are used from the 600.0 nm as shown in the example below.

3 data on both sides of the spectrum disappear



When the even-numbered number of data point 2n is used, calculate by the formula of “2n+1.” Therefore, when the data point is set to 8, the result is the same as that when the data point is set to 9.

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