
1.Introduction

Thank you for purchasing DIGITALPACKTEST·MULTI SP (model: DPM-MTSP).

This product is stored with calibration curve data that have been obtained by using PACKTEST or other reagents and enables simple measurement of the concentration of analytes in a sample.

With this product, absorbance measurement, spectrum measurement, and time scans are also possible.

Read this operation manual before use to thoroughly understand the functions of this product for proper operation.

2. Safety Precautions

To safely use this product, be sure to strictly observe the following precautions. If this product is used in a different manner than described in this operation manual, the protection functionality equipped on the instrument may be impaired.

1. This product is a visible spectrophotometer. Do not use this product for other purposes.
2. Use this product after thoroughly reading this operation manual.
3. Handle this product by following the procedures and method of use described in this operation manual.
4. Be sure to observe the precautions described in this operation manual.
5. Do not perform any other operations or actions than as described in this operation manual.
6. Do not disassemble or modify this product under any circumstances.
7. If you recognize any abnormality such as an abnormal sound, unusual smell, or smoke, immediately pull out the power cable and stop using this product.

2.1. Safety precautions

This operation manual indicates the degrees of danger and damage according to the following classification:



Indicates an item that, if this product is mishandled, could result in death or serious bodily injury.

WARNING



Indicates an item that, if this product is mishandled, could result in minor injury to the operator or property damage.

CAUTION



Indicates a prohibition (prohibited action) in the handling of this product.

















PROHIBITION













Indicates enforcement (mandatory action) in the handling of this product.

ENFORCEMENT




2.1.1. Warnings/Cautions on use of product

 WARNING	
 Do not use other than the peripherals supplied with this product. → Cause of ignition and fire	 Do not place the product in a location subject to high temperature (near fire, near stove, in the hot sun). → Cause of ignition, fire, and burn injury
 Do not use this product in a location with flammable gas or oily smoke. → Cause of ignition and fire	 Do not throw the product in fire or heat it. → Cause of ignition and fire
 Do not contact/insert a conductive foreign object (metal piece, pencil lead, etc.) with/in a connection terminal. → Cause of ignition, fire, and electric shock	 Do not install the product in the following locations. Humid and dusty location Location exposed to rain and snow → Cause of ignition and fire
 Do not disassemble or modify the product. → Cause of failure, fire, and electric shock	 If an abnormality such as smoke, unusual smell, and abnormal noise occurs, immediately stop using the product. Pull out the plug of the power cord from the receptacle. → Cause of ignition, fire, and electric shock
 Do not touch a connection terminal while it is energized. → Cause of electric shock and injury	 Do not place this product within the reach of children. → Cause of injury
 Do not pour water over onto the product, wet it, or spill reagent on it. → Cause of fire and electric shock	
 CAUTION	
 Do not place this product in the following locations. Location under direct sunlight Location subject to extremely low temperature → Cause of ignition and fire	 Do not place the product in an unstable location or a location subject to vibration. → Possibility of fall and injury
	 Do not carry the product with a cell and a solution contained in it. → Cause of failure

2.1.2. Warnings/Cautions on power supply unit, power cord, and AC adapter

 WARNING	
 Do not damage the power cord, tamper it, put a heavy object on it, pull it, or forcefully bend it. → Cause of fire and electric shock	 Do not touch the power cord or AC adapter with a wet hand. → Cause of electric shock
 Do not use a damaged power cord or AC adapter. → Cause of fire and electric shock	 Insert the plug of the power cord all the way in the receptacle. → Cause of fire and electric shock
 Use the power cord and AC adapter supplied with this product. → Cause of fire and electric shock	 When disconnecting the plug of the power cord from the receptacle, do not pull the cord. → Cause of fire and electric shock
 CAUTION	
 When disconnecting the power cord from the receptacle, disconnect it by holding the plug. → Cause of fire and electric shock	 If you do not use the product for an extended period of time, turn off the power, disconnect the power cord from the receptacle, and remove the batteries from it. → Cause of ignition, fire, and failure

2.1.3. Precautions to observe during cleaning

 CAUTION	
 Turn off the power during cleaning and disconnect the plug of the power cord from the receptacle. → Cause of fire and electric shock	 Do not use organic solvent during cleaning. → Cause of fire and electric shock

2.1.4. Precautions on LCD



CAUTION



Do not expose the LCD to a strong shock. Do not hit.
Do not damage the LCD with a sharp object.
Do not put the liquid in the LCD into your mouth. Do not touch .
→ Cause of failure and injury

【First aid】

When the LCD has been broken and the liquid in it has entered your mouth, immediately rinse your mouth.

If the liquid touches your skin or enters the eyes, immediately flush the eyes with running water for 15 minutes or longer and consult a doctor.

Carefully handle the glass of the LCD.

→ Cause of failure and injury



The LCD is made of glass.
The glass may be broken depending on the way it is handled

3. Precautions

3.1. About product warranty

We will provide the following guarantee only if this product is used in accordance with the contents of this operation manual.

1. Scope of warranty: If this product fails due to defects in our workmanship, we will repair the defective product without charge.
2. Region of warranty: Limited to Japan.
3. Warranty period: One year after purchase. For customers who have registered as users, the warranty period is extended to two years. If the warranty period expired, we will repair the product with charge.
4. Warranty exclusion items: If any of the following conditions are met, the product is excluded from the scope of the warranty even within the warranty period.
 - Instrument failure caused by neglectful handling or misuse of the product
 - Instrument failure caused by dropping or shock, exposure to sand or dirt, or immersion or submersion in water
 - Instrument failure caused by leakage of the solution due to failure to take out cells
 - Instrument failure caused by use of this product in such a location that does not comply with the installation location specified by us
 - Instrument failure caused by failure to use the power supply specified by us or due to abnormality in the power supply
 - In the case where corrosion of electric circuits or deterioration of optical elements has occurred due to highly corrosive gas in the air
 - Instrument failure due to usage not described in the operation manual
 - In the case where the product has been disassembled or modified
 - Instrument failure caused by natural disaster, pollution, or abnormal voltage
 - Instrument failure caused by inevitable accident
 - Consumables (battery, printer paper)
 - In the case where the warranty is not presented
 - Instrument failure caused by other factors than as listed above that cannot be attributed to us
5. Warranty: We will not reissue the warranty.
6. Other: We do not assume any liability or responsibility for any direct or indirect damage arising from failure of this product or use of this product.

3.2. After-sale service

If a reaction considered a failure has occurred, contact our distributor or us. Within the warranty period, we will repair the product according to the description in the warranty. Also, if the version of the stored calibration curve data has been updated, we will report to that effect via our website as necessary.

To customers who wished to be informed of version updates at the time of user registration, we will send information via e-mail.

3.3. Parts supply period

The supply period for repair parts for this product is five years from the end of sales. After this period, we may not be able to repair the product. However, if parts purchased from other part manufacturers have been discontinued, we may not be able to repair the product even within the warranty period.

3.4. Notes on disposal

Dispose of waste according to the laws and regulations of the local government concerning disposal of waste.

3.5. Design standard use period

The design standard use period is five years. If the product is used beyond the design standard use period, an accident such as fire and injury may occur due to age deterioration. If you recognize a malfunction or abnormality in the product, contact our distributor or us.

3.6. About the result by Photometry mode

The results obtained by Photometry mode using PACKTEST etc. as measuring reagent are not certificated value.

For first time use or when doubt about the results, you may need to check the correlation with official method.

4. Notes before Use

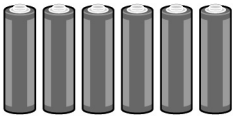
4.1. Confirmation of contents of package



DIGITALPACKTEST·MULTI SP
(1)



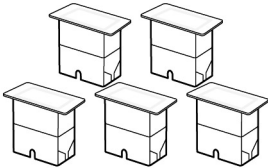
AC Adapter
(1)



Alkaline AA battery
(6)



SDHC Memory Card
(1)



PACKTEST Square Cup
(5)



Round Cell
(1)



Operation manual
(1)



Instruction manual
(Stored in Memory Card)



List of Items
(1)



Warranty
(Stored in Operation manual)



Product Registratin
(1)



USB cable
(1)

4.2. Power supply

AC adapter: Power supply voltage: 100 to 240 V
Frequency: 50 or 60 Hz
Batteries: 6 alkaline AA batteries (Recommended)
Power consumption: DC9V, 0.4A(TYP)

4.3. Operating environment

Location: Indoor use (Outdoor use when running on batteries)
Altitude: up to 2,000m
Operating temperature: 10°C to 35°C
Operating humidity: 30% to 80% (no condensation)
Main supply
voltage fluctuations: AC 100 to 240V \pm 10%
Transient over voltage: OVERVOLTAGE CATEGORY II
Pollution degree: POLLUTION DEGREE 2
Atmosphere/gas: Air must not be filled with metal corrosive gas such as acid gas or alkali gas.
Air must not be filled with organic solvent gas (in particular, benzene and thinners).
General precautions Avoid a location subject to direct sunlight.
Strong vibration or shock must not be applied to the product.
Avoid a location with high or low temperature.
Avoid a location with high humidity.
Avoid a location near fire.
Avoid a location near a device that generates strong electric field.
Avoid a dusty location.
The power supply voltage must not abruptly fluctuate.

4.4. Specifications

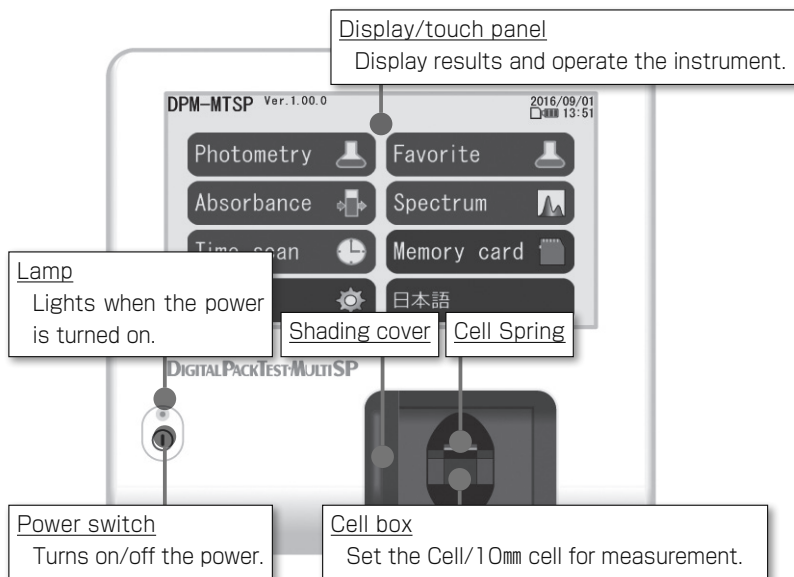
Optical system

Wavelength range:	420 to 680 nm (Recommended range: 450 to 670 nm)	
Wavelength accuracy:	±3 nm	
Wavelength resolution:	15 nm Max (Band width)	
Measurement modes:	Photometry mode	
	Absorbance mode	
	Spectrum mode	
	Time scan mode	
Photometric range:	-1.500 to 1.500 Abs	
Photometric accuracy:	±5% Abs (0.5Abs, 1.0Abs)	
Display range:	concentration:	0.000 to 9999
		-9999 to 9999 (User programs)
	absorbance:	-2.000 to 2.000
Light source:	white LED	
Detector:	CMOS linear image sensor with grating	
Cell used:	PACKTEST Square Cup (the Cell), (optical path length: 20mm)	
	10mm cell, 10mm semi-micro cell (Except disposable type)	
Display:	LCD with touch panel	
Printer connection:	USB-A	
PC connection:	USB-B	
Data storage type:	CSV format	
Memory card:	SDHC	
Size:	185L×205W×95H mm	
Weight:	1.1kg	
Power supply:	AC adapter:	100 to 240V AC, 50/60 Hz
	Batteries:	6 alkaline AA batteries (Recommended)
Power consumption:	4.5W	
Language:	Japanese, English	

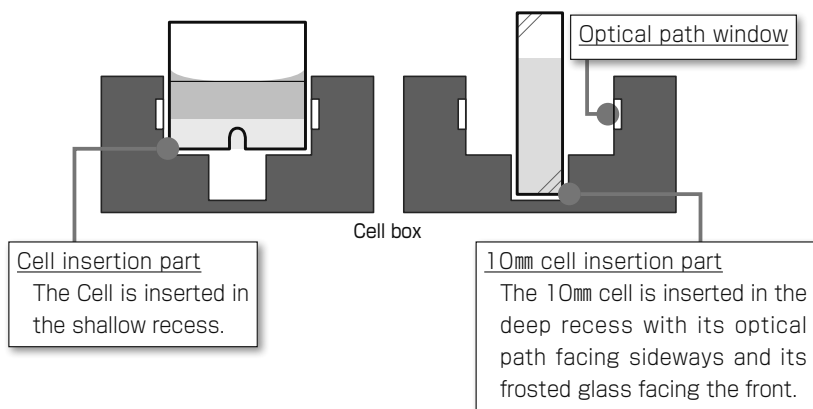
4.5. Names and functions of components

4.5.1. Names of components

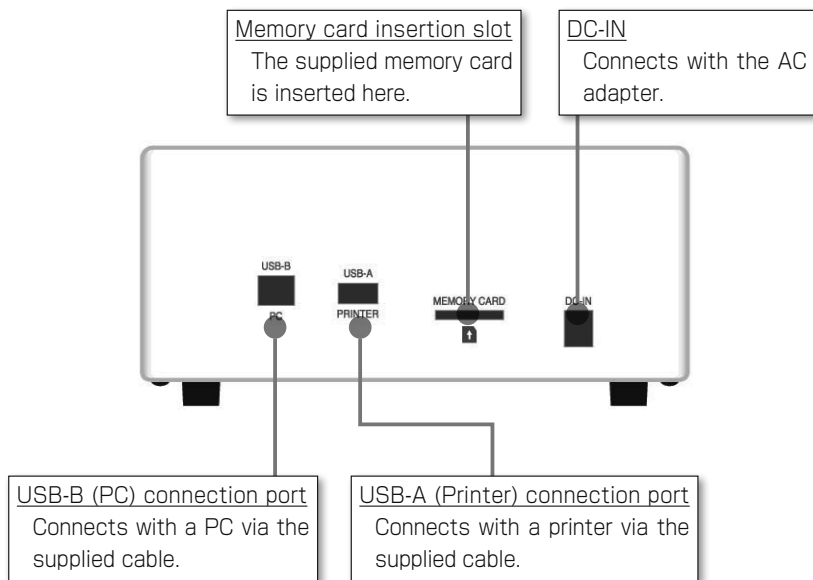
The front



Cell box

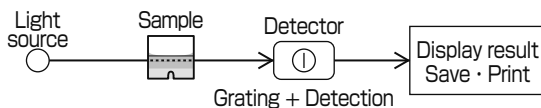


The back



4.5.2. Operation system

The configuration of this product is shown in the figure below.



White light (visible light) emitted from the light source passes through the sample. The instrument spectrally disperses the light having passed the sample at the detector and converts the amount of lights at respective wavelengths into electric signals to detect the color. The electric signals are then converted into concentration data by means of absorbance or calibration curve data, and the result is displayed (saved, printed).

4.5.3. Display function (LCD)

On the display, the following icons are always displayed on its upper part.

Memory card mark



This mark is displayed when a memory card is inserted.



When a memory card is not inserted or not recognized, this mark is displayed.



When amount of stored data reached the upper limit, this mark is displayed.

Remaining battery capacity mark



The remaining battery capacity is sufficient.



Displayed when the remaining battery capacity has decreased.



The remaining battery capacity is small and preparation for battery replacement is necessary.



There is no remaining battery capacity and battery replacement is necessary. Photometry mode is not available at this time.

Date and time

2016/09/01

The date is displayed in the format of year/month/day. If the calendar setting has not been configured, this is displayed as
****/**/** .

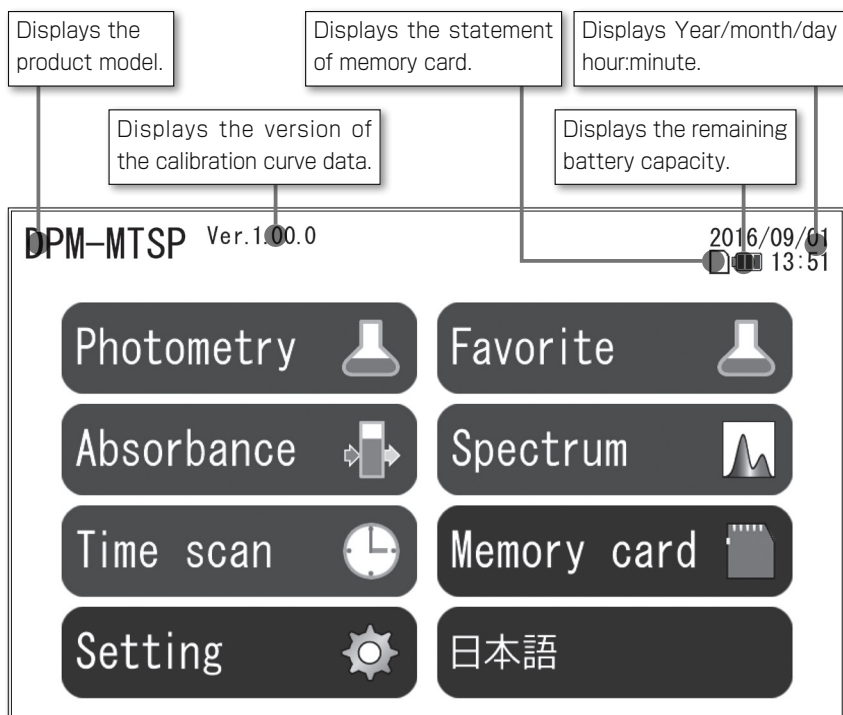
12 : 00

The time is displayed in a 24-hour format.

Printer mark



Displayed when the printer is valid.



The product model and the the calibration curve data are displayed only on [Main window].

4.5.4. Operation function (touch panel)

The display is equipped with a touch-panel function, and pressing the buttons on the display.

[Back] button



Returns to the upper structure (previous screen).

Page Feed button



Moves backward to the previous page.



Moves forward to the next page.

【Input button】



The cursor is displayed on the selected **【input button】**.



Indicates an **【input button】** that is not selected.

【OK】 button



Confirms the input contents. (Does not save the contents.)

【Clear】 button

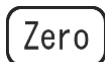


Clears the contents of the selected input button.

【Zero】 button



Performs zero adjustment of the sample.



This indicates that the zero adjustment of the sample has finished. Zero adjustment can be performed any number of times before and after measurement.

【Start】 button



In Photometry mode, the timer starts up and a measurement value is displayed after the reaction time ends. In Time scan mode, the timer starts up and measurement values are displayed at one-minute intervals.

In Absorbance mode and Spectrum mode, a measurement value is displayed.



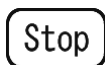
Measurement is in progress (timer is working).

【Cancel】 button



Reverts the condition to that before operation by clearing the input contents, deleting the measurement result, or canceling the measurement.

[Stop] button



Stops measurement (stops timer) at Time scan mode.
The stopped measurement cannot be resumed.

[Data] button



Moves to the corresponding [Data Window] to allow the operator to view the past measurement results.



A memory card has not been inserted or is in an error state.

[Print] button



Prints measurement result in Spectrum mode and Time scan mode. In Photometry mode and Absorbance mode, the result is automatically printed.

Prints the displayed contents on [Data Window].



A printer is not connected or is in an error state.

[Save] button



Saves measurement result in Spectrum mode and Time scan mode. In Photometry mode and Absorbance mode, the result is automatically saved.

Saves the input contents on [Setting Window].



A memory card has not been inserted or is in an error state.

[Edit] button



Changes the setting contents.

[Delete] button



Deletes all the input contents.

Cursor move buttons



Moves the cursor up and down.



Moves the cursor to right and left.

4.6. Connection of Power Supply

4.6.1. Connection of AC adapter

Insert the supplied AC adapter into the DC-IN connector.

Insert the plug of the AC adapter to a receptacle.

Press the power switch on.

Notes on use of this product overseas

As the shape of receptacle varies depending on the region, a conversion plug adapter is necessary. Check the shape of the receptacle used at the destination and prepare the adapter as necessary.



- Do not use other adapter than the supplied AC adapter.

4.6.2. Installation of battery

Open the battery case at the bottom face of the instrument and install 6 alkaline AA batteries.

Press the power switch on the instrument body to turn on the power.

The instrument can be driven by batteries only.

When the AC adapter is connected, the batteries are not consumed.

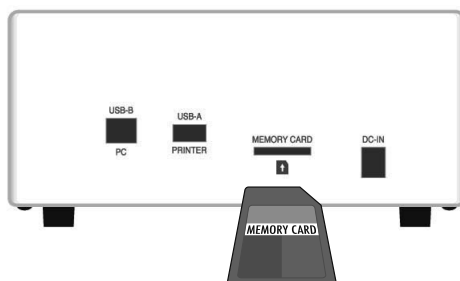
However, during power failure, the power supply is automatically switched to the batteries.



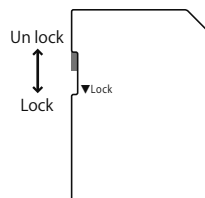
- Install batteries after confirming that the power is turned off.
- Install batteries by correctly orienting their + and - terminals.
- When replacing batteries, replace all of 6 batteries.
- If the instrument is not used for an extended period of time, store it after removing batteries from it.

4.7. Insertion of memory card

Turn off the power, and then insert the supplied memory card with its label face up until a click is heard. To remove the memory card, turn off the power, and then push the memory card again until a click is heard so that it comes out, and the pull it straight out.



- Do not use other memory card than the supplied memory card.
- Be sure to insert or remove the memory card only after you have turned off the power.
- If the memory card is locked, it is not recognized even when it has been inserted.



5.Starting up Instrument

5.1. Turning on the power

Confirm that no cell is in the cell box before turn on the power.

1. Press the power switch to turn on the power.
2. Display [Start Window].
3. While [Start Window] is displayed, self-check is executed.
4. After the self-check, the display jumps to [Main Window].
5. To turn off the power, remove a cell from the cell box and press the power switch.



- If the resume function is enabled, after the self-check has finished, the display jumps to the screen that was displayed at the end of the previous session.

5.2. Implementation of Self-check

When the power supply to the instrument is turned on, check of the following items starts.

System check: Checks that the system is normal.

Calibration curve data check: Checks that the calibration curve data are not damaged.

Light source/light receiving section check: Checks that the optical system is free from abnormality.

Temperature check: Checks that the temperature is in the operating range.

Memory card check: Checks the memory card insertion state, write prohibition state, available capacity, etc.

Calendar setting check: Checks the calendar setting. If the calendar setting has not been configured, each digit of date and time is displayed as " * ".

Remaining battery capacity check: Checks the remaining battery capacity when the instrument is driven by batteries.

When an abnormality is recognized, an error message is displayed.

When the error E1 or E4 is displayed, turn off the power.

When the error E2, E3, or E5 is displayed, you can continue operation by pressing **[OK]**.

E1: System error.
E2: Resume is invalid.
E3: Temperature error.
E4: Optical system error.
E5: Memory card error.

OK

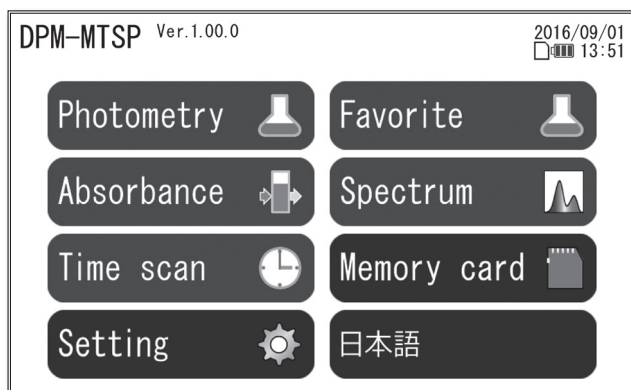
Error displays	Cause	Solution
E1 : System error.	Calibration curve may be corrupted.	Contact our distributor or us.
	Abnormality of electric circuit.	Contact our distributor or us.
E2 : Resume is invalid.	Failed to save the state at the time of turning off the power.	Press [OK] to continue the operation.
E3 : Temperature error.	The temperature is not within the range between 10°C and 35°C.	Set the temperature in the range between 10°C and 35°C, and then turn on the power again or press [OK] to continue the operation. When the operation is continued, a measurement error may occur.
E4 : Optical system error.	Power supply was turned on while cell was set.	Remove the cell from the cell box, and then turn on the power again.
	The optical path window is dirty.	Clean the optical path window, and then turn on the power again.
	Deterioration of the light source or abnormality of the detector may be the cause.	Contact our distributor or us.
E5 : Memory card error.	A memory card has not been inserted.	Insert the supplied memory card, or press [OK] to continue the operation.
	The memory card is locked.	Disengage "LOCK" of the memory card, or press [OK] to continue the operation.
	The standard of the memory card is different.	Insert the supplied memory card (SDHC), or press [OK] to continue the operation.
	The format of the memory card is different.	Insert the supplied memory card, or press [OK] to continue the operation.
	The available space is not sufficient. The amount of stored data has reached the upper limit.	Remove unnecessary data on the instrument. Operation can be continued even when existing data are not deleted, but new data cannot be saved.
	Data are corrupted.	Replace the memory card with a new one, or press [OK] to continue the operation.



- Measurement is possible even when the memory card is in an error state.
However, it is not possible to save or review the measurement result.
- Insert or remove the memory card after turning off the power.

5.3. Main window

From [Main Window], you can display various windows.



【Photometry】	"6.1 Photometry (Measuring concentration)"
【Favorite】	"6.2 Favorite (Measuring concentration)"
【Absorbance】	"6.3 Measuring absorbance"
【Spectrum】	"6.4 Measuring spectrum"
【Time scan】	"6.5. Performing time scan"
【Memory card】	"7. Data Management (Memory Card)"
【Setting】	"8. Settings of functions"
【English】	"9. Language Selection"
【日本語】	"9. Language Selection"



- When the resume function is enabled, the Main Window is not displayed, but the window displayed at the end of the last session is displayed.

6.Measurement

This chapter explains the following measurement functions equipped on this instrument and their operation methods.

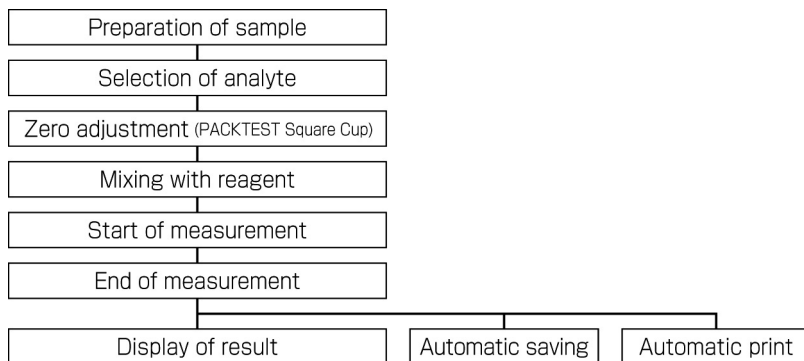
- Measurement using stored calibration curve
 - 【Photometry】 "6.1 Photometry (Measuring concentration)"
 - 【Favorite】 "6.2 Favorite (Measuring concentration)"
- Measurement of absorbance of set wavelength
 - 【Absorbance】 "6.3 Measuring absorbance"
- Measurement of absorbance spectrum of sample solution
 - 【Spectrum】 "6.4 Measuring spectrum"
- Observation of change of absorbance with time
 - 【Time scan】 "6.5. Performing time scan"

From [Main Window], you can display various windows.

6.1. Photometry (Measuring concentration)

6.1.1. Explanation of purpose

By using the stored calibration curve data and simplified reagent, the concentration of an analyte substance in the sample is obtained. The flow of operation is as follows:



6.1.2. Handling of reagent

Use reagents made by KYORITSU CHEMICAL-CHECK Lab., Corp.

As the reagent varies depending on the analyte, refer to the instructions.

Use a reagent after reading the instructions supplied with it, the GHS symbols, and SDS. For precautions on reagent prepared by the user and the relevant first aid method, refer to the SDS supplied from the manufacturer.

< Safety measurement >

- Thoroughly clean the hands before and after measurement. Do not inhale or contact the reagent.
- Wear PPE such as protective gloves, protective goggles, and mask as much as possible.
- Do not leak reagent or waste liquid into the surrounding environment.

< First aid >

If reagent or solution **enters your eye**

- immediately wash your eye with water for 15 minutes or longer. Immediately consult an ophthalmologist even if you do not experience any pain or abnormal symptoms.

If reagent or solution **contacts your skin or clothing**

- immediately rinse the skin or clothing with water.

If reagent or solution **enters your mouth**

- immediately rinse your mouth with water.

If you have swallowed reagent or solution or you experience any abnormal symptoms after receiving the above treatment, immediately consult a doctor.

For details, refer to the instructions supplied with the reagent or the SDS.

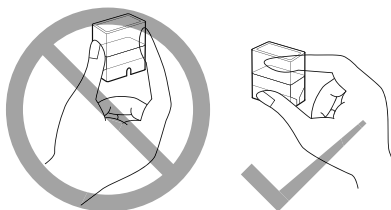
- < **Storage** > Store reagent in a cool, dark, and dry place beyond the reach of children.
- < **Disposal** > Appropriately dispose of reagent according to the relevant laws and regulations.
- < **Others** > Before using a reagent, check its expiration date. Measurement using a reagent beyond its expiration period is invalid.

6.1.3. Handling of cell

In Photometry mode, use PACKTEST Square Cup as a cell.

For some analytes, Round Cell is used as a reaction container.

1. Use "PACKTEST Square Cup" (model: WAK-CC10) as the Cell.
2. Use the same Cell in steps from zero adjustment to measurement.
3. The side faces of the Cell serve as an optical path. Do not hold the faces where light passes with your hand.
4. If the water temperature is significantly lower than the ambient temperature, dew may be condensed on the Cell to cause turbid and abnormal measurement value.
5. When setting the Cell in the cell box, cleanly wipe its surface so as not to leave water droplets or finger prints, and then gently put it the cell box.
6. When setting the Cell in the cell box, remove the cap of the cell to prevent the leak.
7. After measurement, take out the Cell or Round Cell, clean it with pure water, because reagent or other substances remaining in it may cause a measurement error in the next measurement. If pure water is not available, thoroughly rinse it with tap water, and then clean it with the sample before conducting the next measurement.
8. As a flaw or dirt on the Cell causes a measurement error, replace the Cell with a new one as necessary.
9. The material of the Cell and that of Round Cell are as follows. Dispose of them according to the relevant instruction of the local government.



Sort of cell	Material of cell	Material of cap
PACKTEST Square Cup	polystyrene	polyethylene
Round Cell	glass	polypropylene(PP)

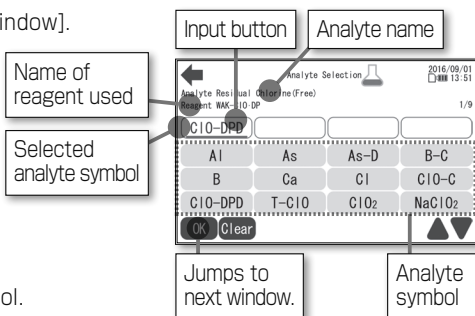
10. Values displayed when the Cell is not set in the cell box are invalid.

6.1.4. Photometry (1 item)

Refer to the instructions stored in the memory card.

Selecting analyte

1. Press **[Photometry]** on [Main window].
2. [Analyte Selection Window] is displayed.
Pressing **[▼]** brings you to the next page.
Pressing **[▲]** brings you to the previous page.
3. Press the desired analyte symbol.
4. The analyte name and the name of reagent used are displayed, and the analyte symbol is displayed in an input button.
5. Pressing **[OK]** brings you to [Photometry Window].



- User programs are displayed on [Analyte Selection window].

Canceling analyte

1. Press an input button on which the desired analyte symbol is displayed.
2. Pressing **[Clear]** clears the contents of the input button and the analyte is canceled.

Clear

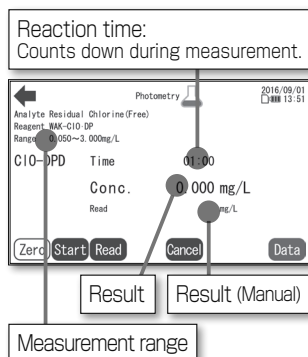
Performing zero adjustment

1. Fill the Cell with the sample.
2. Put the Cell in the cell box.
3. Press **[Zero]**.
4. When the zero adjustment finishes, the color of **[Zero]** is inverted. "0" is displayed in the result display area.

Zero



- Zero adjustment can be performed any number of times.
- During measurement, **[Zero]** is disabled.
- After measurement, the color inversion of **[Zero]** returns to the original state.



Performing measurement

1. After zero adjustment, mix the sample with the reagent. At the same time, press **[Start]**.
2. The color of **[Start]** is inverted and countdown of reaction time starts.
3. Pour the solution to the Cell and put the Cell in the cell box.
4. After the reaction time has elapsed, the result is displayed.
5. The result will be saved automatically.
(When a memory card is inserted)
6. The result will be printed out automatically.
(When a printer is connected)



- Before zero adjustment, **[Start]** is disabled.
- At 30 seconds before the reaction time ends, the buzzer issues a bleep as a reminder to set the cell.
- After measurement, the color inversion of **[Start]** returns to the original color.
- After measurement, **[Start]** is disabled. Perform the steps from zero adjustment.
- During measurement, it is not possible to turn off the power supply.
- Even when a memory card is inserted, automatic saving may not be executed if it is locked or the data in it have reached the upper limit.

Performing manual measurement

1. Press **[Read]**.
2. A result is displayed.
3. The result will be saved automatically. (When a memory card is inserted)
4. The result will be printed out automatically. (When a printer is connected)



- Manual measurement is enabled after zero adjustment, during measurement and after measurement finished.
- Even when a memory card is inserted, automatic saving may not be executed if it is locked or the data in it have reached the upper limit.

Start

Read

Canceling measurement

1. Press **[Cancel]**.
2. The instrument state returns to the state as of before zero adjustment.

Cancel



- After zero adjustment, **[Cancel]** is enabled.
- During measurement, measurement is canceled. The stopped measurement cannot be resumed.
- If **[Cancel]** is pressed during and after measurement, the result are deleted from the window.
- To turn off the power during measurement, first press **[Cancel]**.

Viewing data

1. Press **[Data]**.
2. [Photometry Data Window] is displayed.
3. It is possible to view the past results stored in the memory card.

Data

A screenshot of the instrument's Photometry Data Window. The window displays the following information: Analyte: Residual Chlorine (Free), Reagent: WAK-C10 DP, Range: 0.050~3.000mg/L, C10-DPD, Time: 01:00, Conc.: 2.000 mg/L, Read: mg/L. At the bottom, there are buttons for Zero, Start, Read, Cancel, and Data. The Data button is highlighted with a red circle.

Photometry

2016/09/01 13:51

Analyte Residual Chlorine (Free)
Reagent WAK-C10 DP
Range 0.050~3.000mg/L

C10-DPD Time 01:00
Conc. 2.000 mg/L
Read mg/L

Zero Start Read Cancel Data

Jumps to next window.

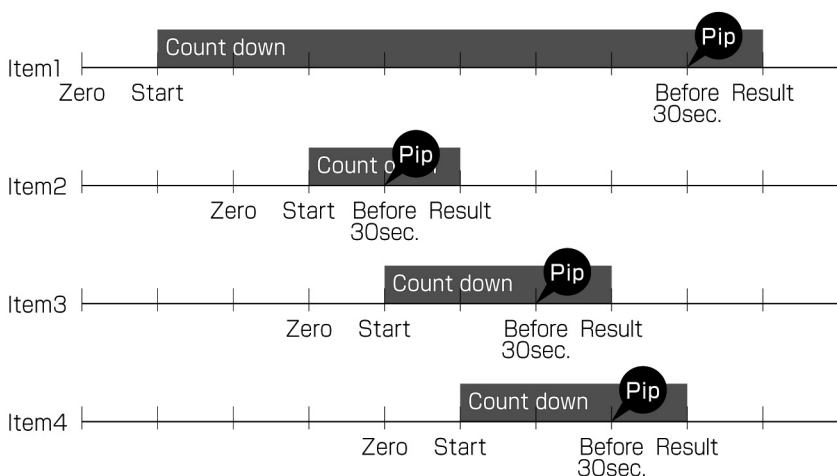
6.1.5. Photometry (parallel measurement of four samples)

Measurement for multiple analytes or measurement of multiple samples for the same analyte can be performed in parallel.

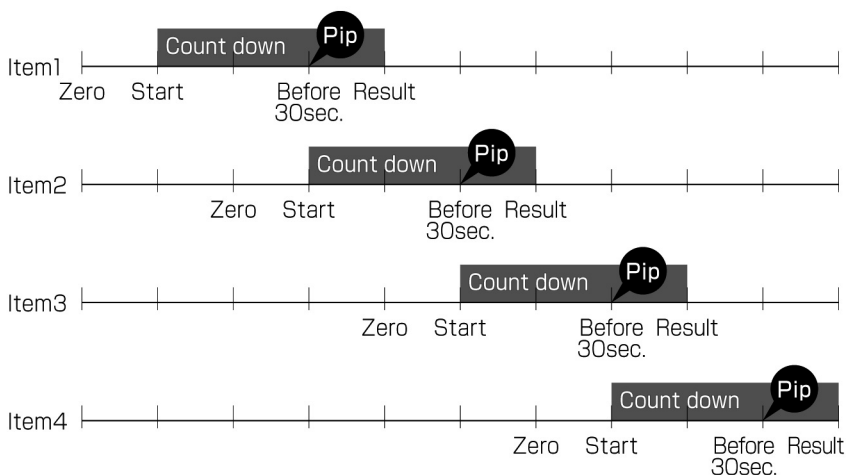
It is possible to set items 1 to 4.

Refer to the instructions stored in the memory card.

Measurement example 1 (multiple analytes)

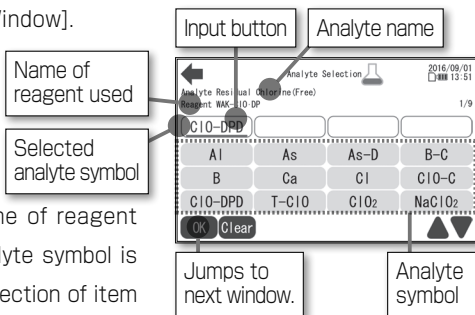


Measurement example 2 (multiple samples for the same analyte)



Selecting analyte

1. Press **[Photometry]** on [Main Window].
2. [Analyte Selection Window] is displayed.
3. Press an input button.
4. Press the desired analyte symbol.
5. The analyte name and the name of reagent used are displayed, and the analyte symbol is displayed in an input button. (Selection of item 1 has finished.)
6. Press a different input button from that in Step 3. The cursor moves.
7. If you press a analyte symbol, a analyte name and the name of reagent used are displayed, and the corresponding analyte symbol is displayed in an input button. (Selection of item 2 has finished.)
8. To set item 3 and item 4, repeat the steps 6 to 7.
9. Pressing **[OK]** brings you to [Photometry Window].



Canceling analyte

1. Press an input button on which the desired analyte symbol is displayed.
2. Pressing **[Clear]** clears the contents of the input button and the analyte is canceled.

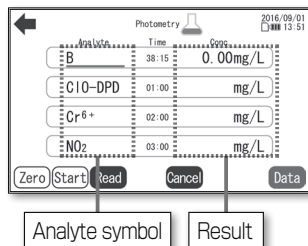
Clear

[Item 1] Performing zero adjustment and measurement

1. Fill the Cell with the sample.
2. Put the Cell in the cell box.
3. Press **[Zero]**.
4. When the zero adjustment finishes, the color of **[Zero]** is inverted. "0" is displayed in the result display area for item 1.
5. After zero adjustment, mix the sample with the reagent. At the same time, press **[Start]**.
6. The color of **[Start]** is inverted and countdown of reaction time starts.
7. Pour the solution to the Cell.

Zero

Start





- Inversion of **[Zero]** and **[Start]** indicates the state of the selected analyte.

[Item2] Performing zero adjustment and measurement

1. Fill the Cell with the sample.
2. Press the desired analyte symbol for item 2.
3. The inverted state of **[Zero]** and **[Start]** returns to the original state.
4. Put the Cell in the cell box.
5. Press **[Zero]**.
6. Mix the sample with the reagent. At the same time, press **[Start]**.
7. Pour the solution to the Cell.

Zero

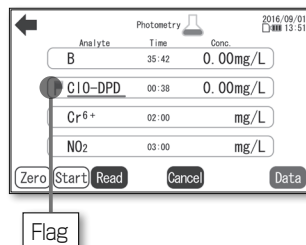
Start



- Repeat the same steps for item 3 and item 4.

Finishing measurement

1. A flag is displayed on the analyte whose reaction time finishes most early.
2. Put the Cell for the analyte indicated with the flag in the cell box.
3. After the reaction time has elapsed, the result is displayed in black in the result display area.
4. The result will be saved automatically.
5. The result will be printed out automatically.
6. A flag is displayed on the analyte whose reaction time finishes next.
7. Repeat steps 2 to 6.



Performing manual measurement

1. Press a analyte symbol for which you want to perform manual measurement.
2. Press **[Read]**.
3. A result is displayed in **red**. * is displayed at the right end.
4. The result will be saved automatically.
5. The result will be printed out automatically.

Read

Canceling measurement

1. Press a analyte symbol whose measurement you want to cancel.
2. Press **Cancel**.
3. Only for the selected analyte, the state returns to that of before zero adjustment.

Cancel



- Only for the selected analyte, **Cancel** is enabled.
- After zero adjustment, **Cancel** is enabled.
- During measurement, measurement is stopped. The stopped measurement cannot be resumed.
- If **Cancel** is pressed during and after measurement, the result are deleted from the window.
- To turn off the power during measurement, first cancel the ongoing measurement.

Viewing data

1. Press **Data**.
2. [Photometry Data Window] is displayed.
3. It is possible to view the past results stored in the memory card.

Data



- During countdown of reaction time, **Data** is disabled.

6.2. Favorite (Measuring concentration)

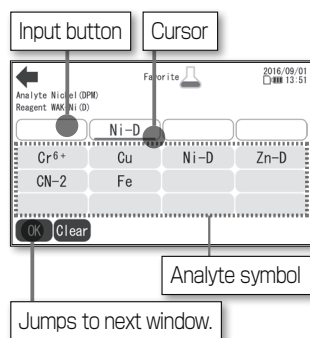
6.2.1. Explanation of purpose

If you register such analytes in [Analyte Selection Window] that you use frequently to Favorite in advance, you can move from [Favorite Window] to [Photometry Window].

6.2.2. Measuring concentration from favorite

Selecting analyte

1. Press **[Favorite]** on [Main window].
2. [Favorite Window] is displayed.
3. Press an input button.
4. Press the desired analyte symbol.
5. The analyte name and the name of reagent used are displayed, and the analyte symbol is displayed in an input button. (Selection of item 1 has finished.)
6. To select two or more analyte, press a different input button from that in Step 3. The cursor moves.
7. If you press a analyte symbol, a analyte name and the name of reagent used are displayed, and the corresponding analyte symbol is displayed in an input button. (Selection of item 2 has finished.)
8. To set item 3 and item 4, repeat the steps 6 to 7.
9. Pressing **[OK]** brings you to [Photometry Window]. For the subsequent steps, follow the steps in "6.1.4" and "6.1.5".



- To use this function, configure the setting of analytes in advance by referring to "8.3 Setting favorite."

Canceling analyte

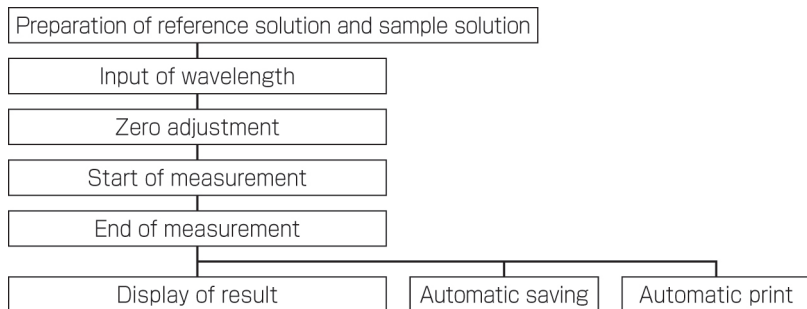
1. Press an input button on which the desired analyte symbol is displayed.
2. Pressing **[Clear]** clears the contents of the input button and the analyte is canceled.

Clear

6.3. Measuring absorbance

6.3.1. Explanation of purpose

You can set any wavelengths (up to 3 wavelengths) and measure their absorbance.



6.3.2. Cell to be used

Any of PACKTEST Square Cup, 10mm cell, and semi-micro cell can be used as a cell. As the absorbance varies depending on the cell, use the same cell for zero adjustment and measurement.

The absorbance of PACKTEST Square Cup is about twice that of 10mm cell.

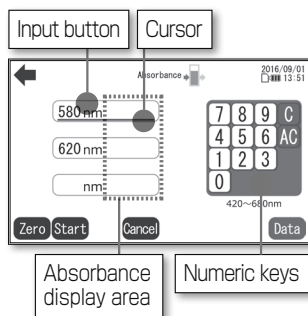
6.3.3. Absorbance measurement operation

Inputting wavelength

1. Press **[Absorbance]** on [Main window].
2. [Absorbance Window] is displayed.
3. Press an input button.
4. Enter the wavelength by using numeric keys.



- Set wavelength in the range of 420 nm to 680 nm.
- It is possible to set up to 3 wavelengths.
- To change the input contents, press **[C]** or **[AC]** among the numeric keys to delete the wavelength.
- Pressing the input button deletes the set wavelength, zero adjustment, and result.



Performing zero adjustment

1. Fill the cell with the reference solution.
2. Put the cell in the cell box.
3. Press **[Zero]**.
4. When the zero adjustment finishes, the color of **[Zero]** is inverted. Zero (0.000) is displayed in the absorbance display area.

Zero



- Zero adjustment can be performed any number of times.
- When no wavelength has been entered or a wavelength out of the range has been entered, **[Zero]** is disabled.

Performing measurement

1. Fill the cell with the sample solution.
2. Set the cell in the cell box.
3. Press **[Start]**.
4. An absorbance is displayed.
5. The absorbance will be saved automatically.
6. The absorbance will be printed automatically.

Start



- Before zero adjustment, **[Start]** is disabled.
- Once zero adjustment is performed, measurement can be performed any number of times.
- Even when a memory card is inserted, automatic saving may not be executed if it is locked or the data in it have reached the upper limit.
- ***.*.*** means <-2.000 or >2.000 .

Canceling measurement

1. Press **[Cancel]**.
2. The instrument state returns to the state as of before wavelength setting.

Cancel



- After wavelength setting, **[Cancel]** is enabled.
- If you press **[Cancel]** after measurement, the wavelength and absorbance are deleted from the window.

Viewing data

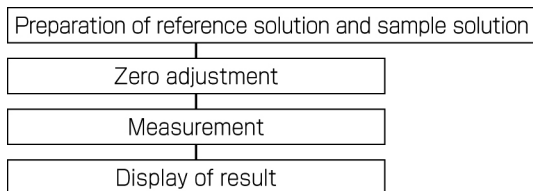
1. Press **[Data]**.
2. [Absorbance Data Window] is displayed.
3. It is possible to view the past measurement results stored in the memory card.

Data

6.4. Measuring spectrum

6.4.1. Explanation of purpose

You can measure the absorption spectrum of a colored liquid or a solution whose color has been developed by adding reagent. Absorbance in the range of 420 nm to 680 nm can be read in units of 1 nm.



6.4.2. Cell to be used

Any of PACKTEST Square Cup, 10mm cell, and semi-micro cell can be used as a cell. As the absorbance varies depending on the cell, use the same cell for zero adjustment and measurement.

The absorbance of PACKTEST Square Cup is about twice that of 10mm cell.

6.4.3. Spectrum measurement operation

Performing zero adjustment

1. Press **[Spectrum]** on [Main window].
2. Fill the cell with the reference solution.
3. Put the cell in the cell box.
4. Press **[Zero]**.
5. When the zero adjustment finishes, the color of **[Zero]** is inverted.
6. Zero (0.000) is displayed in the absorbance display area.



- Zero adjustment can be performed any number of times.
- ***.*.*** means <-2.000 or >2.000 .

Performing measurement

1. Fill the cell with the sample solution.
2. Put the cell in the cell box.
3. Press **[Start]**.
4. A spectrum is displayed.

Start



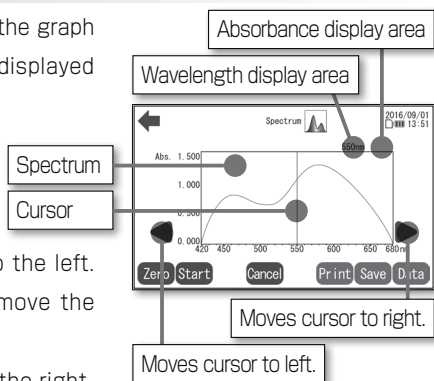
- Before zero adjustment, **[Start]** is disabled.
- Once zero adjustment is performed, measurement can be performed any number of times.
- Automatic saving does not execute in this mode.

Display of spectrum

1. The wavelength and absorbance on the graph that are selected by the cursor are displayed at the upper right part of the graph.
2. By moving the cursor, it is possible to read the absorbance of wavelengths in 1 nm steps.

Pressing **[◀]** moves the cursor to the left. Holding down it can continuously move the cursor.

Pressing **[▶]** moves the cursor to the right. Holding down it can continuously move the cursor.



- The vertical axis is set automatically according to the result, and the horizontal axis is fixed in the range of 420 to 680 nm. Both axes cannot be changed.

Saving measurement result

1. Press **[Save]**.
2. The spectrum is saved.

Save



- If a memory card is not inserted or in an error state, **[Save]** is invalid.

Printing measurement result

1. Press **[Print]**.
2. The spectrum is printed out.

A dark gray rounded rectangular button with the word "Print" in white text.

- If a printer is not connected or in an error state, **[Print]** is invalid.

Canceling measurement

1. Press **[Cancel]**.
2. The instrument state returns to the state as of before zero adjustment.

A dark gray rounded rectangular button with the word "Cancel" in white text.

- After wavelength setting, **[Cancel]** is enabled.

- If you press **[Cancel]** after measurement, the spectrum is deleted from the window.

Viewing data

1. Press **[Data]**.
2. [Spectrum Data Window] is displayed.
3. It is possible to view the past results stored in the memory card.

A dark gray rounded rectangular button with the word "Data" in white text.

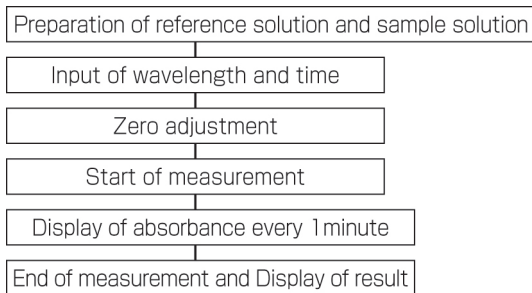
6.5. Performing time scan

6.5.1. Explanation of purpose

You can measure the change of absorbance with time at a constant wavelength.

The reaction time can be set in the range of 1 to 39 minutes.

Time scan can not be perform by batteries.



6.5.2. Cell to be used

Any of PACKTEST Square Cup, 10mm cell, and semi-micro cell can be used as a cell.

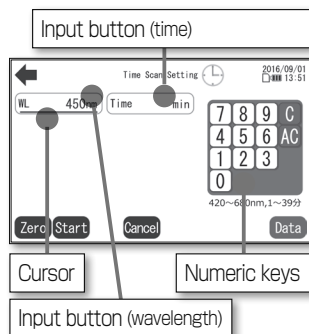
As the absorbance varies depending on the cell, use the same cell for zero adjustment and measurement.

The absorbance of PACKTEST Square Cup is about twice that of 10mm cell.

6.5.3. Time scan measurement operation

Inputting wavelength and reaction time

1. Press **[Time scan]** on [Main window].
2. [Time Scan Setting Window] is displayed.
3. Press an **[input button (WL)]**.
4. Enter the wavelength by using numeric keys.
5. Press an **[input button (Time)]**.
6. Enter the time by using numeric keys.





- Set wavelength in the range of 420 nm to 680 nm.
- Set time in the range of 1 minute to 39 minutes.
- To change the input contents, press **[C]** or **[AC]** among the numeric keys to delete them.

Performing zero adjustment

1. Fill the cell with the reference solution.
2. Put the cell in the cell box.
3. Press **[Zero]**.
4. When the zero adjustment finishes, the color of **[Zero]** is inverted.

Zero



- Zero adjustment can be performed any number of times.
- During measurement, **[Zero]** is disabled.
- When no wavelength or time has been entered or a wavelength or reaction time out of the valid range has been entered, **[Zero]** is disabled.

Performing measurement

1. Fill the cell with the sample solution.
2. Put the cell in the cell box.
3. Press **[Start]**.
4. **[Time Scan Window]** is displayed.
5. **[Start]** changes to **[Stop]**, and absorbance is displayed every 1 minute until the measurement finishes.
6. When the measurement has finished, **[Stop]** changes to **[Start]**.

Start



- Before zero adjustment, **[Start]** is disabled.
- Once zero adjustment is performed, measurement can be performed any number of times.
- During measurement, it is not possible to turn off the power.
- Automatic saving does not execute in this mode.

Stopping measurement

1. Press **[Stop]**.
2. The measurement is stopped in the middle of the reaction time.

Stop



- The stopped measurement cannot be resumed.
- The result that has been stopped halfway is not deleted.

Saving measurement result

1. Press **[Save]**.
2. The result will be saved.

Save



- If a memory card is not inserted or in an error state, **[Save]** is invalid.
- Even when the measurement is stopped, the measurement result can be saved.

Printing measurement result

1. Press **[Print]**.
2. The result will be printed out.

Print



- If a printer is not connected or in an error state, **[Print]** is invalid.

Canceling measurement

1. Press **[Cancel]**.
2. The message <<Time scan is interrupted. Delete the running data?>> pops up.
3. Pressing **[OK]** returns the instrument state to that as of before the setting of wavelength and time.
4. Pressing **[Cancel]** returns the window to [Time Scan Window].

Cancel



- After wavelength or reaction time is input, **[Cancel]** is valid.
- When press **[Cancel]** during measurement, result is cleared. Then the measurement cannot be resumed.
- If **[Cancel]** is pressed during and after measurement, the wavelength/ time and the result are deleted from the window.
- To turn off the power during measurement, first cancel the ongoing measurement.

Performing steps again from input of wavelength and time.

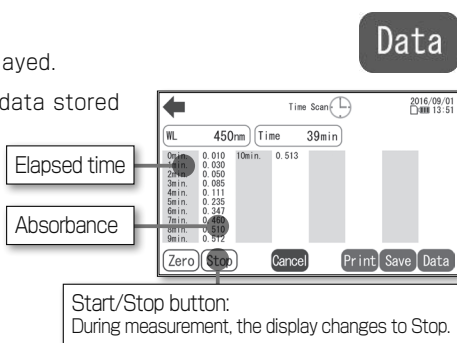
1. On [Time Scan Window], press an **[input button (WL)]** or **[input button (Time)]**.
2. [Time Scan Setting Window] is displayed.
3. The content of the input button is cleared.
4. Enter the wavelength and time.



- Pressing the wavelength display area or time display area deletes the wavelength/reaction time, zero adjustment, and result.

Viewing data

1. Press **[Data]**.
2. [Time Scan Data Window] is displayed.
3. It is possible to view the time scan data stored in the memory card.



7.Data Management (Memory Card)

This chapter explains the management method of measurement data stored in memory card and the update method of calibration curve data.

The main functions are as follows:

- Viewing, editing and printing measurement data
 - 【Photometry】** "7.1. Viewing/editing/printing Photometry data"
 - 【Absorbance】** "7.2. Viewing/editing/printing Absorbance data"
 - 【Spectrum】** "7.3. Viewing/editing/printing Spectrum data"
 - 【Time scan】** "7.4. Viewing/editing/printing Time scan data"

- Updating calibration curve data
 - 【Update】** "7.5. Updating calibration curve data"

- Reading out data to PC, writing calibration curve data from PC
 - 【PC connection】** "7.6. Connecting to PC"

Start operation after inserting the memory card supplied with the instrument.

Operation is impossible if the memory card is in an error state even when it is inserted.

For insertion of memory card, refer to "4.7. Insertion of memory card".

Press **【Memory card】** on [Main window].

From [Memory Card Window], you can display various windows.

Pressing **【←】** on [Memory Card Window] brings you back to [Main window].

7.1. Viewing/editing/printing Photometry data

7.1.1. Explanation of purpose

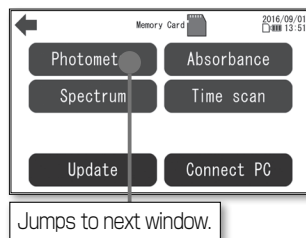
You can view, print out, and delete photometry data.

Also, it is possible to give sample names to individual data.

Photometry data are stored in "DATA.CSV" file.

7.1.2. Viewing data

1. Press **[Memory card]** on [Main window].
2. Press **[Photometry]** on [Memory Card Window].
3. The list of photometry data is displayed.
Pressing **[▼]** brings you to the next page.
Pressing **[▲]** brings you to the previous page.



- Ten pieces of data are displayed on a single window. It is possible to view 1,200 pieces of data in total.
- Up to 30,000 of data can be stored.

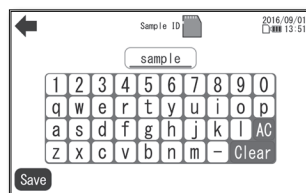
The screenshot shows the 'Photometry Data' window with a date/time display of 2016/09/01 13:51. It displays a table of data points with columns for Date, Analyte, SampleID, Conc., and Read. The data points are as follows:

Date	Analyte	SampleID	Conc.	Read
2016/08/08 15:02	C10-DPD	*****	UNDER mg/L	100/100
2016/08/04 15:58	Al	*****	UNDER mg/L	*
2016/08/02 19:36	Cr6-D	*****	UNDER mg/L	*
2016/08/02 18:18	P-Turbid	*****	UNDER deg	*
2016/08/02 18:17	P-Turbid	*****	UNDER deg	*
2016/08/02 17:46	1.1014	*****	9999 ppm	*
2016/08/02 17:34	1.rei	*****	120.0 ppm	*
2016/08/02 17:21	1.rei	*****	120.0 ppm	*
2016/08/02 17:21	1.rei	*****	120.0 ppm	*
2016/08/02 17:21	1.rei	*****	120.0 ppm	*

At the bottom, there are buttons for 'Sample ID', 'Print', and 'Delete all Data', along with up and down arrow navigation buttons.

7.1.3. Entering sample name

1. Move the cursor to a desired data and press **[Sample ID]**.
Pressing **[▲]** moves the cursor upward within the page.
Pressing **[▼]** moves the cursor downward within the page.
2. Move to [Sample ID Window].
3. Enter desired characters and press **[Save]**.
4. The window returns to [Photometry Data Window].
5. The entered sample name is applied.





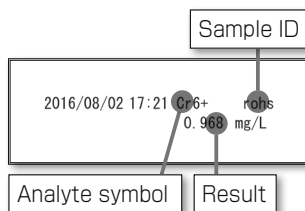
- Up to 6 characters can be used for sample name.
- To change the input characters, press **[Clear]** to delete them.
- After a sample name has been entered, if you return to the previous window by pressing **[←]** instead of **[OK]** , the input contents will not be applied.

7.1.4. Printing data

1. Press **[Print]**.
2. The selected data is printed out.



- If a printer is not connected or in an error state, **[Print]** is invalid.



7.1.5. Deleting data

1. Press **[Delete all Data]**.
2. [Confirmation window] is displayed.



To execute deletion of all data

3. Press **[OK]**.
4. All the data are deleted.

To cancel deletion of all data

3. Press **[Cancel]**.
4. Deletion of all data is canceled.



- On [Photometry Data Window], it is not possible to delete data individually.
- Pressing **[←]** on [Confirmation window] cancels deletion of all data.

7.2. Viewing/editing/printing Absorbance data

7.2.1. Explanation of purpose

You can view, print out, and delete absorbance data.

Also, it is possible to give sample names to individual data.

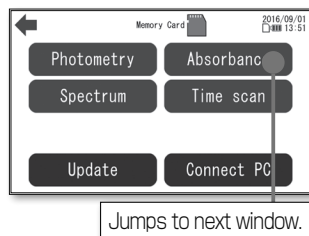
Absorbance measurement data are stored in "ABS.CSV" file.

7.2.2. Viewing data

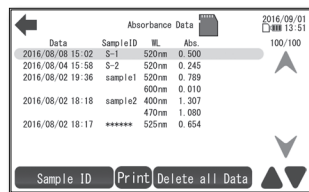
1. Press **[Memory card]** on [Main window].
2. Press **[Absorbance]** on [Memory Card Window].
3. The list of data is displayed.

Pressing **[▼]** brings you to the next page.

Pressing **[▲]** brings you to the previous page.



- Ten pieces of data are displayed on a single window. It is possible to view 1,200 pieces of data in total.
- Up to 10,000 pieces of absorbance data can be stored.

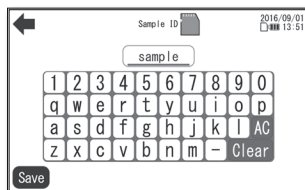


7.2.3. Entering sample name

1. Move the cursor to a desired data and press **[Sample ID]**.
Pressing **[▲]** moves the cursor upward within the page.
Pressing **[▼]** moves the cursor downward within the page.
2. Move to [Sample ID Window].
3. Enter desired characters and press **[Save]**.
4. The window returns to [Absorbance Data Window].
5. The entered sample name is applied.



- Up to 6 characters can be used for sample name.
- To change the input characters, press **[Clear]** or **[AC]** to delete them.
- After a sample name has been entered, if you return to the previous window by pressing **[◀]** instead of **[Save]**, the input contents will not be applied.

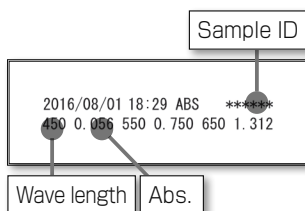


7.2.4. Printing data

1. Press **[Print]**.
2. The selected data is printed out.



- If a printer is not connected or in an error state, **[Print]** is invalid.



7.2.5. Deleting data

1. Press **[Delete all Data]**.
2. [Confirmation window] is displayed.



To execute deletion of all data

3. Press **[OK]**.
4. All the data are deleted.

To cancel deletion of all data

3. Press **[Cancel]**.
4. Deletion of all data is canceled.



- On [Absorbance Data Window], it is not possible to delete data individually.
- Pressing **[◀]** on [Confirmation window] cancels deletion of all data.

7.3. Viewing/editing/printing Spectrum data

7.3.1. Explanation of purpose

You can view, print out, and delete spectrum data.

CSV files are created and saved to store spectrum data on a one-to-one basis.

It is possible to give a sample name to each spectrum data.

7.3.2. Viewing data

1. Press **[Memory card]** on [Main window].
2. Press **[Spectrum]** on [Memory Card Window].
3. The list of files of spectrum measurement data is displayed.

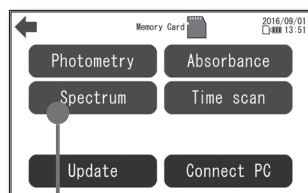
Pressing **[▼]** brings you to the next page.

Pressing **[▲]** brings you to the previous page.

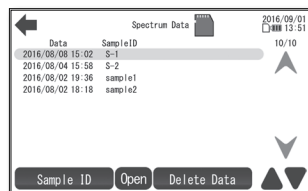
4. Move the cursor to a desired file and press **[Open]**.

Pressing **[▲]** moves the cursor upward within the page. Pressing **[▼]** moves the cursor downward within the page.

5. A spectrum is displayed.



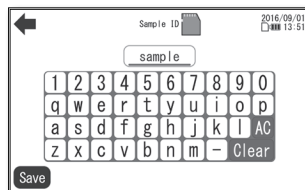
Jumps to next window.



- Ten files are displayed on a single window. It is possible to view the newest 100 pieces of measurement data in total.
- Over 100 pieces of data can be stored in SUB_SPEC folder in the memory card.

7.3.3. Entering sample name

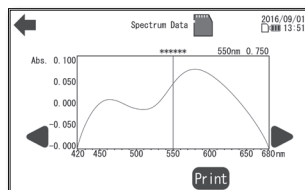
1. Move the cursor to a desired file and press **[Sample ID]**.
2. Move to [Sample ID Window].
3. Enter desired characters and press **[OK]**.
4. The window returns to [Spectrum Data Window].
5. The entered sample name is applied.



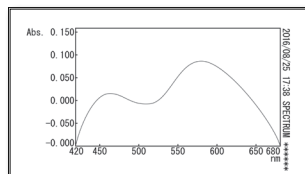
- Up to 6 characters can be used for sample name.
- To change the input characters, press **[Clear]** or **[AC]** to delete them.
- After a sample name has been entered, if you return to the previous window by pressing **[←]** instead of **[OK]**, the input contents will not be applied.

7.3.4. Printing spectrum

1. Move the cursor to a desired file and press **[Open]**.
2. A spectrum is displayed.
3. Press **[Print]**.
4. The spectrum on the displayed page is printed out.

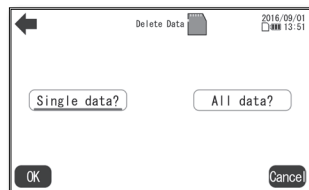


- If a printer is not connected or in an error state, **[Print]** is invalid.



7.3.5. Deleting single file

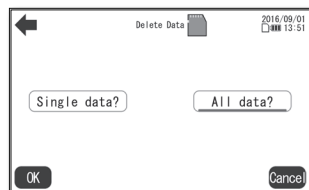
1. Move the cursor to a file you want to delete and press **[Delete Data]**.
2. [Delete Data Window] is displayed.
3. Press **[Single data ?]**.
4. Press **[OK]**.
5. The selected file is deleted.



- Pressing **[Cancel]** or **[←]** on [Delete Data Window] brings you back to [Spectrum Data Window] and enables you to cancel deletion of data.

7.3.6. Deleting all files

1. Press **[Delete Data]**.
2. [Delete Data Window] is displayed.
3. Press **[All data ?]** and press **[OK]**.
4. [Confirmation window] is displayed.



To execute deletion of all data

5. Press **[OK]**.
6. All the data are deleted.

To cancel deletion of all data

5. Press **[Cancel]**.
6. The deletion is stopped.



- Pressing **[Cancel]** or **[←]** on [Delete Data Window] brings you back to [Spectrum Data Window] and enables you to cancel deletion of data.

7.4. Viewing/editing/printing Time scan data

7.4.1. Explanation of purpose

You can view, print out, and delete time scan data.

CSV files are created and saved to store Time scan data on a one-to-one basis.

It is possible to give a sample name to each time scan data.

7.4.2. Viewing data

1. Press **[Memory card]** on [Main window].
2. Press **[Time scan]** on [Memory Card Window].
3. The list of files of time scan measurement data is displayed.

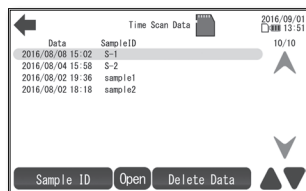
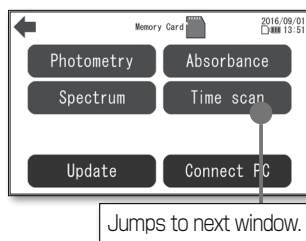
Pressing **[▼]** brings you to the next page.

Pressing **[▲]** brings you to the previous page.

4. Move the cursor to a file you want to display and press **[Open]**.

Pressing **[▲]** moves the cursor upward within the page. Pressing **[▼]** moves the cursor downward within the page.

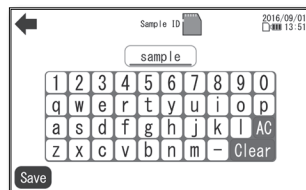
5. The time scan data is displayed.



- Ten files are displayed on a single window. It is possible to view the newest 100 pieces of measurement data in total.
- Over 100 pieces of data can be stored in SUB_TIME folder in the memory card.

7.4.3. Entering sample name

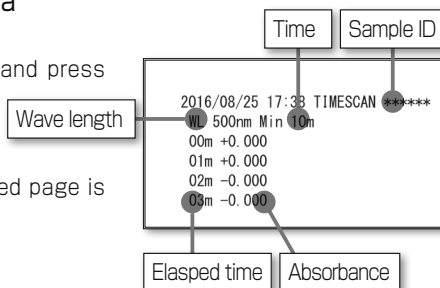
1. Move the cursor to a desired file and press **[Sample ID]**.
2. Move to [Sample ID Window].
3. Enter desired characters and press **[OK]**.
4. The window returns to [Time Scan Data Window].
5. The entered sample name is applied.



- Up to 6 characters can be used for sample name.
- To change the input characters, press **[Clear]** or **[AC]** to delete them.
- After a sample name has been entered, if you return to the previous window by pressing **[←]** instead of **[Save]**, the input contents will not be applied.

7.4.4. Printing time scan data

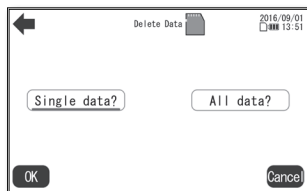
1. Move the cursor to a desired file and press **[Open]**.
2. Press **[Print]**.
3. The time scan data on the displayed page is printed out.



- If a printer is not connected or in an error state, **[Print]** is invalid.

7.4.5. Deleting single file

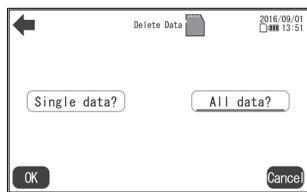
1. Move the cursor to a file you want to delete and press **[Delete Data]**.
2. [Delete Data Window] is displayed.
3. Press **[Single data ?]**.
4. Press **[OK]**.
5. The selected file is deleted.



- Pressing **[Cancel]** or **[←]** on [Delete Data Window] brings you back to [Time Scan Data Window] and enables you to cancel deletion of data.

7.4.6. Deleting all files

1. Press **[Delete Data]**.
2. [Delete Data Window] is displayed.
3. Press **[All data ?]** and press **[OK]**.
4. [Confirmation window] is displayed.



To execute deletion of all data

5. Press **[OK]**.
6. All the data are deleted.

To cancel deletion of all data

5. Press **[Cancel]**.
6. The deletion is stopped .



- Pressing **[Cancel]** or **[←]** on [Delete Data Window] brings you back to [Spectrum Data Window] and enables you to cancel deletion of data.

7.5. Updating calibration curve data

7.5.1. Explanation of purpose

When the calibration curve data are updated due to addition of analyte, correction of calibration curve associated with improvement of reagent and other reasons, the calibration curve data stored in the instrument are updated to the latest data through the memory card.

7.5.2. Preparation of calibration curve data

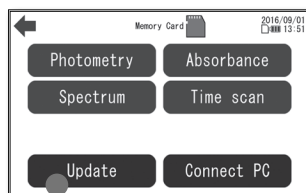
1. Obtain the latest calibration curve data (CAL.BIN).
2. Connect the instrument to PC. For the connection method, refer to "7.6. Connecting to PC."
3. Memory card folder is displayed on the PC.
4. Overwrite the latest calibration curve data (CAL.BIN).
5. Close the folder on the PC and disconnect the instrument from the PC. For the disconnection method, refer to "7.6. Connecting to PC."
6. Pull out the USB cable from the PC and the instrument.



- When the version of the stored calibration curve data has been updated, we will inform to that effect via our website as necessary.
- To customers who wished to be informed of version update at the time of user registration, we will send calibration curve data (CAL.BIN) via e-mail.
- Do not change the file name (CAL.BIN) to prevent from update failure.

7.5.3. Update operation

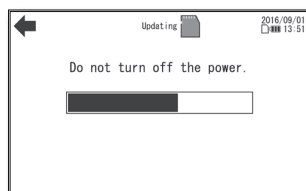
1. Press **[Memory card]** on [Main window].
2. Press **[Update]** on [Memory Card Window].
3. Press **[OK]**.
4. Update is executed.
5. After the update has finished, the window returns to [Memory Card Window].



Jumps to next window.



- If **[Cancel]** or **[←]** is pressed on [Update Window], update will not be executed.
- When executing update, be sure to use the AC adapter and insert batteries in the instrument just in case of power failure.
- It takes several minutes to finish update.
- During update, never remove the memory card. Also never turn off the power by, for example, pulling out the plug. Doing so causes instrument failure.
- If analytes that have been set in Favorite are deleted from the instrument due to update, those items in Favorite will also be deleted.



7.6. Connecting to PC

7.6.1. Explanation of purpose

You can connect the instrument with a PC to view measurement data stored in the memory card on the PC or save them to the PC.

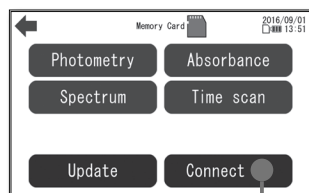
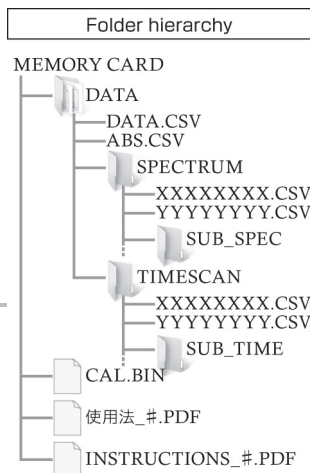
Also, it is possible to write calibration curve data from a PC to the memory card.

7.6.2. Connection operation

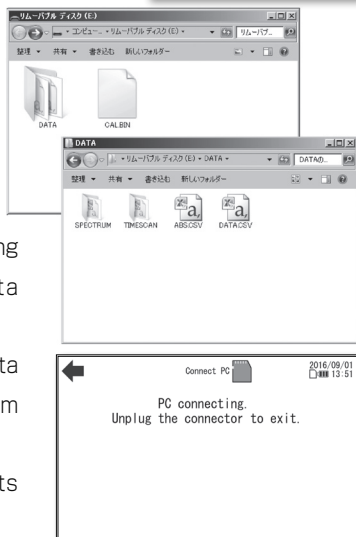
1. Press **[Memory card]** on [Main window].
2. Press **[Connect PC]** on [Memory Card Window].
3. Connect the instrument with a PC via the supplied USB cable.
4. When the connection with the PC is recognized, the window on the instrument moves to [Connect PC].
5. Double-click the memory card folder of the PC.
6. The memory card window is displayed on the PC.
7. You can copy measurement data to the PC or write calibration curve data from the PC to the memory card.



- The names of the CSV files containing spectrum data and time scan data are fixed. Do not change them.
- The sample names of spectrum data and time scan data are different from the file name.
- Do not revise or delete the contents of CSV file from PC.



Jumps to next window.



7.6.3. Open the data

Each data is stored in the memory card in csv format.

- DATA.CSV Photometry
- ABS.CSV Absorbance
- SPECTRUM folder → SXXXXXXX.CSV Spectrum
- TIMESCAN folder → TXXXXXXX.CSV Time scan

Display example by Excel®

DATA.csv

2016/07/16	14:58:32	Cu	waste2	1.63	mg/L
2016/07/17	15:03:15	Cr6+	waste1	under	mg/L
2016/08/20	11:00:40	NO3	tama-r	3.2	mg/L
2016/08/20	11:00:20	NO2	tama-r	0.050	mg/L

Data

Analyte symbol

The sample ID

Result

Manual measurement

ABS.csv

2016/07/16	14:58:10	sample	400	1.307
			470	1.080
			525	0.654
2016/07/17	15:03:20	*****	520	0.789
			600	0.010
2016/07/17	11:00:15	s-2	520	0.245
2016/08/20	11:00:45	s-1	520	0.500

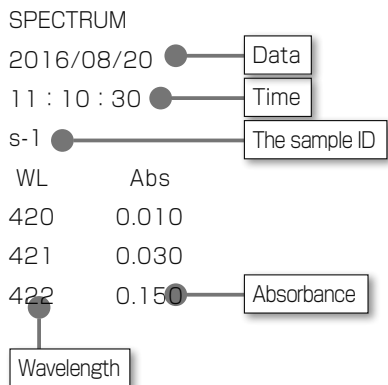
Data

The sample name

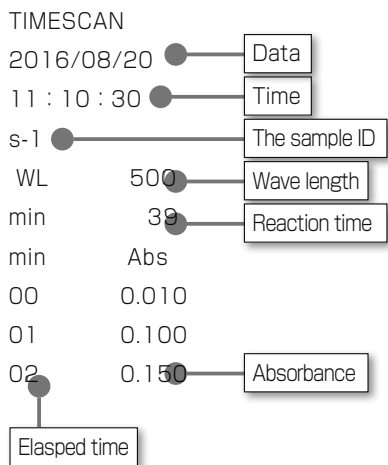
Wavelength

Absorbance

SPECTRUM folder : The latest 100 pieces of data are stored in SPECTRUM folder.
More data is stored in SUB_SPEC folder.



TIMESCAN folder : The latest 100 pieces of data are stored in TIMESCAN folder.
More data is stored in SUB_TIME folder.



7.6.4. Disconnection operation

1. Perform USB disconnection on the PC.
2. Pull out the USB cable from the PC and the instrument.
3. The window returns to [Memory Card Window].

7.7. Data storage

In the memory card, the following measurement data can be stored.

- Photometry data 30,000 pieces
- Absorbance data 10,000 pieces
- Spectrum data 100 pieces (over 100 pieces in SUB_SPEC)
- Time scan data 100 pieces (over 100 pieces in SUB_TIME)

When the number of saved data reaches the upper limit during measurement, the message <<Exceeding the storage limit. Delete some data to free up space.>> is displayed.

In this case, save measurement data on the PC, and then delete the measurement data from [Memory Card Window] on the instrument.

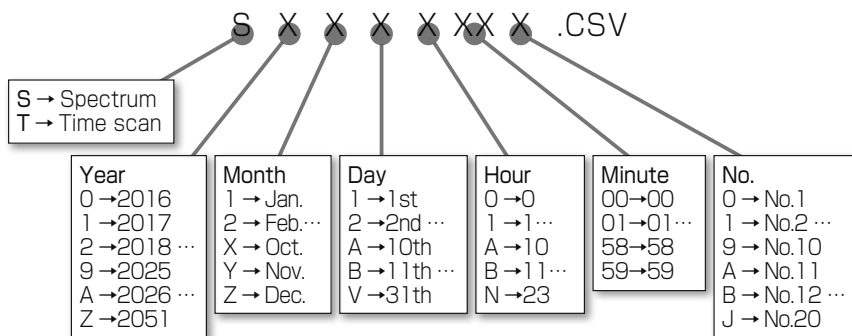
Or you can continue measurement even though the measurement data are not saved.



- On the instrument, only a certain number of measurement data (1,200 pieces for Photometry data and Absorbance data, and 100 pieces for Spectrum data and Time scan data) can be displayed, but old data that are not displayed will not be deleted.

7.8. File name

File name is given by following rules.



8. Function Settings

This chapter explains the functions that can be set on this instrument. The main functions are as follows:

- Setting date and time

【Date and Time】 "8.1. Setting Date and Time"

- Setting the backlight, sound volume of buzzer, automatic power off, and resume functions.

【Display/Sound/Power】

"8.2. Setting Display/Sound/Power"

- Registering frequently used analytes in Favorite

【Favorite】 "8.3 Setting Favorite"

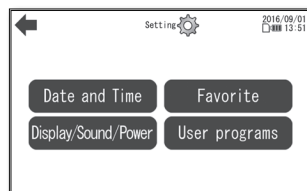
- Creating dedicated calibration curve data

【User programs】 "8.4 Setting User programs"

Press 【Setting】 on [Main window].

From [Setting Window], you can display various windows.

Pressing 【←】 on [Setting Window] brings you back to [Main window].



8.1. Setting Date and Time

8.1.1. Explanation of purpose

You can set the date and time on the instrument.

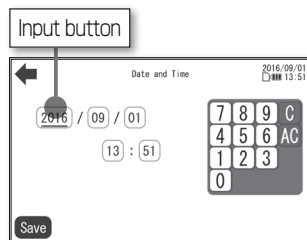
Measurement data are saved together with their date and time.

The set date and time are retained for about 1 month.

If the date and time have not been configured, each digit of date and time is displayed as "*".

8.1.2. Date and Time setting operation

1. Press **[Setting]** on [Main window].
2. Press **[Date and time]** on [Setting Window].
3. [Date and Time Window] is displayed.
4. Press an input button.
5. Enter the date and time by using numeric keys.
6. Press **[Save]**. The date and time are applied.



- To change the input contents, press **[C]** or **[AC]** among the numeric keys to delete the number.
- After the date and time has been entered, if you return to the previous window by pressing **[←]** instead of **[Save]**, the input contents will not be applied.

8.2. Setting Display/Sound/Power

8.2.1. Explanation of purpose

You can specify the following settings display, sound, and power.

Backlight

You can adjust the backlight of the display in 5 steps.

The initial setting is "3."

Resume

When this function is enabled, the window displayed when the power was turned off is memorized, and it is displayed when the power is turned on next time.

The resume function works when [Analyte Selection Window], [Favorite Window], [Photometry Window], [Absorbance Window], [Spectrum Window] or [Time Scan Setting Window] is displayed. The initial setting is "OFF."

Volume

You can adjust the sound volume of the buzzer that is issued when a button is pressed in 5 steps. The initial setting is "3."

Auto power off

When batteries are used, the power supply automatically turns off when no operation is made for a certain period.

When the power is turned on again, the window displayed before automatic power off will be displayed, and the instrument state as of before automatic power off will also be restored. Note that during measurement (count down), automatic power off will not be executed.

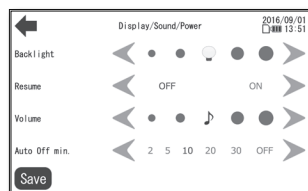
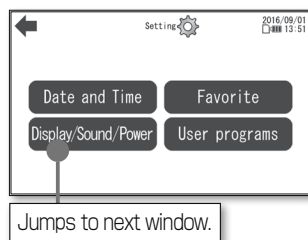
The initial setting is 10 minutes.

8.2.2. Display/Sound/Power setting operation

1. Press **[Setting]** on [Main window].
2. Press **[Display/Sound/Power]** on [Setting Window].
3. [Display/Sound/Power Window] is displayed.
4. Press **[<]** **[>]** to adjust each function.
8. Press **[Save]**. The window returns to [Setting Window].



- If you return to the previous window by pressing **[<]** instead of **[Save]**, the input contents will not be applied.



8.3. Setting Favorite

8.3.1. Explanation of purpose

You can register frequently used analytes from [Analyte Selection Window] altogether in one page.

After registration, analytes can be selected from **[Favorite]** on [Main window].

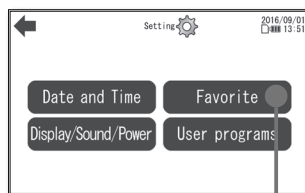
Up to 12 items can be registered.

8.3.2. Registration operation of Favorite

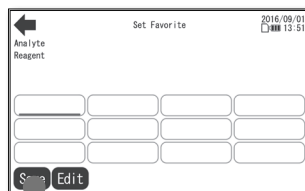
1. Press **[Setting]** on [Main window].
2. Press **[Favorite]** on [Setting Window].
3. [Set Favorite] is displayed.
4. Press an input button and press **[Edit]**.
5. [Analyte Selection-Favorite] is displayed.
6. Press the analyte symbol you want to register.
7. The analyte name and the name of reagent used are displayed.
8. Press **[OK]**.
9. The selected analyte symbols are displayed in input buttons.
10. Press **[Save]**. The window returns to [Setting Window].



- To set further items continuously, repeat Steps 4 to 8.
- When you exit setting, if you return to the previous window by pressing **[←]** instead of **[Save]**, the setting will not be saved.
- Items on [Analyte Selection-Favorite] whose analyte symbols are displayed in gray have been already registered and cannot be pressed.

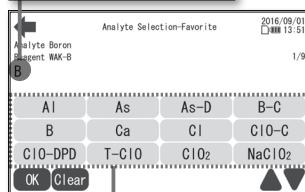


Jumps to next window.



Jumps to next window.

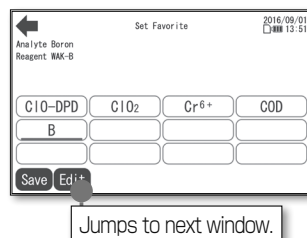
Selected analyte symbol



Analyte symbol

8.3.3. Change/registration cancellation operation of Favorite

1. Press **[Setting]** on [Main window].
2. Press **[Favorite]** on [Setting Window].
3. [Set Favorite] is displayed.
4. Press an input button on which the analyte symbol you want to change is displayed, and press **[Edit]**.
5. [Analyte Selection-Favorite] is displayed.



To change registered analyte

6. Press the analyte symbol you want to newly register.
7. Press **[OK]**.
8. The selected analyte symbols are displayed in input buttons.
9. Press **[Save]**.

To cancel registered analyte

6. Press **[Clear]**.
7. The content of the selected input button is cleared.
8. Press **[Save]**.



- When you exit setting, if you return to the previous window by pressing, **[←]** instead of **[Save]**, the setting will not be saved.
- If analytes that have been set in Favorite are deleted from the instrument due to update of calibration curve data, those items in Favorite will also be deleted.

8.4. Setting User programs

8.4.1. Explanation of purpose

You can set calibration curve data you have created and register it as an analyte. After registration, it can be selected from [Analyte Selection Window] and the corresponding concentration measurement is possible.

Up to 9 items can be registered.

Contents of parameter (range)

Program name: analyte symbol (up to 6 characters, always prefixed with #_(# = 1 to 9))

K: slope of calibration curve (± 0.001 to 9999)

b: y-intercept of calibration curve (± 0.001 to 9999)

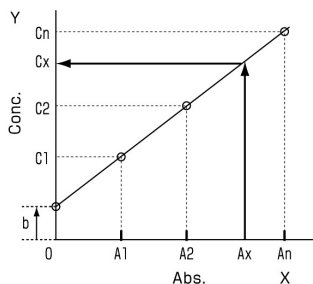
Reaction time: (0 to 99 minutes, 0 to 59 seconds)

Wavelength: (420 to 680 nm)

Unit: mg/L, $\mu\text{g/L}$, g/L, mL/L, $\mu\text{L/L}$, mol/L, g/m³, mL/m³, mg/kg, %, deg. °, ppm, ppb, —

8.4.2. Creation method of calibration curve

1. Prepare several standard solutions (C1, C2, . . . Cn).
2. Add reagent, and then measure the absorbance (A1, A2, . . . An) of the standard solutions at determined wavelength.
3. Set A in X-axis and C in Y-axis.
4. Plot intersections between A1 and C1, A2 and C2, . . . An and Cn .
5. Draw a straight line between plotted points.
6. From the calibration curve, obtain "Slope: K factor" and "y-Intercept: b factor."



From the obtained K factor and b factor, the concentration of the target substance in the sample can be obtained using the following formula.

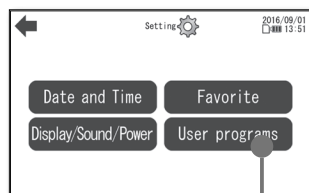
$$C \text{ (concentration)} = K \times \text{Abs.} + b$$



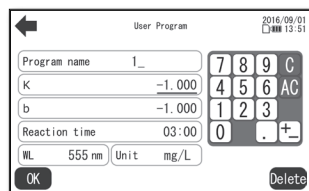
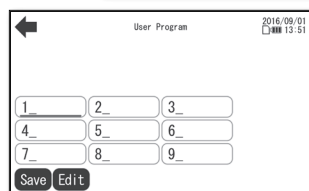
- For measurement of absorbance, refer to "6.3 Measuring absorbance".

8.4.3. Registration method of User program

1. Press **[Setting]** on [Main window].
2. Press **[User programs]** on [Setting Window].
3. Press an input button and press **[Edit]**.
4. Press **[Program name]**.
5. Enter desired characters and press **[OK]**.
6. Press **[K]** and enter a numeric value by using numeric keys.
7. Press **[b]** and enter a numeric value by using numeric keys.
8. Press **[Reaction time]** and enter a numeric value by using numeric keys.
9. Press **[WL]** and enter a wavelength by using numeric keys.
10. Press **[Unit]**.
11. Select the unit you want to use and press **[OK]**.
12. Press **[OK]** . The window returns to [User Program Window].
13. Press **[Save]**.



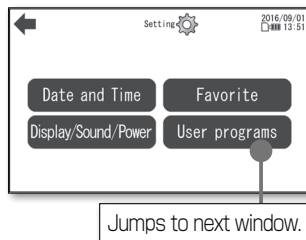
Jumps to next window.



- To set further items continuously, repeat Steps 3 to 12.
- When you exit setting, if you return to the previous window by pressing **[←]** instead of **[Save]**, the setting will not be saved.

8.4.4. Deleting User program

1. Press **[Setting]** on [Main window].
2. Press **[User programs]** on [Setting Window].
3. [User Program Window] is displayed.
4. Press an input button you want to delete and press **[Edit]**.
5. [Parameter Program Window] is displayed.
6. Press **[Delete]**.
7. [Confirmation window] is displayed.



To execute deletion

8. Press **[OK]**.
9. The selected file is deleted.

To cancel deletion

8. Press **[Cancel]**.
9. The deletion is stopped.
10. Press **[OK]**. The window returns to [User Program Window].
11. Press **[Save]**.



- To set further delete items continuously, repeat steps.
- When you exit setting, if you return to the previous window by pressing **[◀]** instead of **[Save]**, the setting will not be saved.



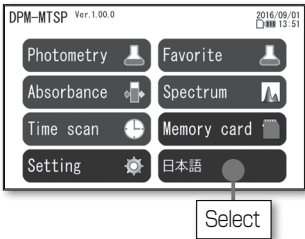
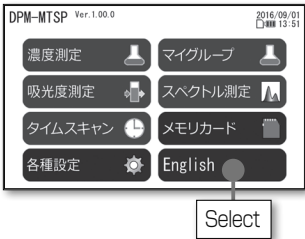
9. Language Selection

You can select Japanese or English as the display language on this instrument.

Press **【English】** on [Main window].
The display language changes to English.



- To return to Japanese, press **【日本語】** on [Main window].



10. Printer

Recommended printer : BL-58 UNWJC (Sanei Electrinc Inc.)

Settings :

```
BL2-58U N
[Ver1.57]
*****

---COMMON SETTING---
COMMAND MODE      = MODE A
PAPER FEED        = OFF
OFFLINE BUSY      = ON
AUTO POWER OFF    = ON(090min)
POWER SWITCH      = 1sec
SELECT SENSOR     = Reflection
MARK DETECTION    = OFF
MARK RE-DETECTION = OFF
CHARACTER TABLE  = KATAKANA
PRINT DENSITY     = 100%
USB DEVICE CLASS  = SERIAL
```

How to set up :

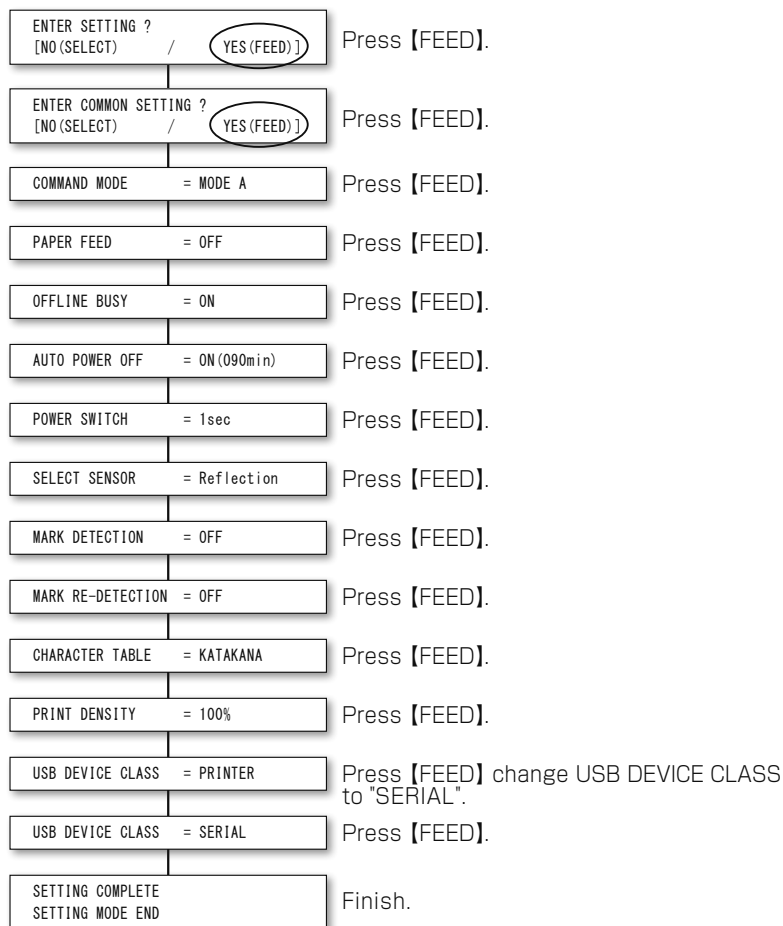
1. Turn on the power while pressing **[SELECT]** button.
2. Release the buttons when printing is started and LED is lighting.

```
HEX DUMP or FUNCTION SETTING
[HEX DUMP (SELECT)/SETTING (FEED)]
```

3. Press **[FEED]**.

Settings are printed.

4. Configure the settings of the printer according to the message.



5. Turn off the power.

11. Maintenance

11.1. Checking the instrument

If you hope to check wavelength accuracy and photometric accuracy of the instrument, contact our distributor or us.

11.2. Daily maintenance

Cleaning of instrument body and display/touch panel.

Wipe the instrument body and display/touch panel with a soft cloth that has been moistened and tightly squeezed.



- For cleaning of display/touch panel, do not use materials such as cleaner for window glass, household detergent, liquid cleaner, organic solution, alcohol, abrasive, etc.

When solution is spilled on cell box.

Remove the solution by having a soft cloth or paper absorb it, and thoroughly wipe the cell box with a cloth or paper moistened with water (preferably pure water).

Finally clean it with a dry cloth or paper.

When solution is spilled on display/touch panel.

Have a tissue paper or the like absorb the solution so as not to leave the solution in the clearance. After that, drop a small amount of water (preferably pure water), clean and suck the solution in the clearance, and dry the instrument.

Replacement of Cell-Spring.

Cell-Spring can be replaced.

Refer to "11.5. List of options".



11.3. Error displays

When the error E1 or E4 is displayed, turn off the power.

When the error E2, E3, or E5 is displayed, you can continue operation by pressing **[OK]**.

Error displays	Cause	Solution
E1 : System error. (during self-check)	Corruption of calibration curve data stored.	Update the calibration curve data.
	Abnormality of electric circuit.	Contact our distributor or us.
(during measurement)	An error occurred during calculation.	Perform zero adjustment or measurement again.
E2 : Resume is invalid.	Failed to save the state at the time of turning off the power.	Though the window does not move to the window displayed at the end of the last session, but the instrument can be used.
E3 : Temperature error.	Not under 10°C or over 35°C.	The instrument can be used, but a measurement error may occur. Or turn on the power again at 10°C to 35°C.
E4 : Optical system error.	Turned on while an object obstructing light was set.	Empty the cell box, and then turn on the power again.
	The optical path window is dirty.	Clean the optical path window.
	Deterioration of light source or abnormality of detector.	Contact our distributor or us.
E5 : Memory card error.	A memory card has not been inserted.	Turn off the power, and insert the memory card.
	The memory card is locked.	Turn off the power, and disengage the "LOCK".
	The standard of the memory card is different.	Turn off the power, and insert the supplied memory card (SDHC).
	The format of the memory card is different.	Turn off the power, and insert the supplied memory card.
	The available space is not sufficient. The amount of stored data has reached the upper limit.	Remove unnecessary data. Measurement can be continued even when data are not deleted, but data cannot be saved.
	Data are corrupted.	Replace the memory card with a new one. Perform the steps again.
	Failed to read and write. Data are corrupted.	Turn off the power, and insert the memory card again. If the error still occurs, replace the memory card with a new one.

Error displays	Cause	Solution
E6 : Error in processing.	Data are corrupted. Failure to delete data, and to update.	Turn off the power, insert the memory card again, and perform the steps again.
Incorrect zero range.	The turbidity and color of the sample are blocking the light.	Remove turbid. Dilute the sample.
Incorrect WL setting.	Out of the setting range.	Enter a numeric value in the range of 420 to 680 nm.
Incorrect WL and Time setting.	Out of the setting range.	Enter WL, Time in the range.
Wrong K value, Wavelength, Sec.	Out of the setting range.	Enter a K factor. Enter wavelength, Sec in the range.
Displaying digit over the range.	The number of digits of the measurement value exceeds 4.	Adjust the K factor, digits of b factor and unit in the user setting.
Exceeding the storage limit. Delete some data to free up space.	The amount of stored data reached the upper limit during measurement.	Remove the data on the instrument. Or you can continue measurement even though the measurement data cannot be saved.

11.4. Troubleshooting

Symptom	Cause	Solution
Power does not turn on.	The plug of the power cable is not connected to the receptacle.	Connect the AC adapter to the receptacle.
	The batteries are depleted.	Replace the batteries.
	No batteries are installed in the machine.	Install the batteries.
Japanese is displayed.	The display language is set to Japanese.	Press the "English" button on [Main Window]. (Refer to Chapter 9.)
Date and time is not displayed. (* is displayed.)	Date is not set.	Set the Date and Time. (Refer to Section 8.1.)
Main Window is not displayed after turning on.	The resume function is enabled.	Cancel the resume function. (Refer to Section 8.2.)
It is not possible to press the "Start" button.	Zero adjustment has not been performed. Measurement is in progress (timer is working).	Press the "Start" button after performing zero adjustment. "Start" button is disabled during measurement.
It is not possible to press the "Print" button (gray).	A printer is not connected or in an error state.	Connect the printer.
It is not possible to press the "Save" button (gray).	A memory card has not been inserted or in an error state.	Insert the memory card.
It is not possible to press the "Data" button (gray).	A memory card has not been inserted or in an error state.	Insert the memory card.
Part of Spectrum data is not displayed.	An error occurred during measurement of the corresponding wavelength.	Perform measurement again.
Part of Time scan data is not displayed.	An error occurred during measurement at the corresponding time.	Perform measurement again.

Symptom	Cause	Solution
Measurement value is abnormal.	The cell used during zero adjustment and that used during measurement are different.	The measurement value differs by approximately two times between PACKTEST Square Cup and 10mm cell. Use the same cell during zero adjustment and measurement.
	The amount of liquid is small.	Put the sample or solution up to the mark line in PACKTEST Square Cup or up to half the height or more in 10mm cell or semi-micro cell.
	Screw of the Cell-Spring is loose.	Tighten the screw.
SAT. is displayed.	Over the measurement range.	Dilute the sample.

11.5. List of options

品 名	Model
PACKTEST Square Cup	WAK-CC10
Round Cell	MCM-VIAL
MTSP AC adapter (PSE)	MTSP-AC-PSE
Cell-Spring	MTSP-SPR

12. Contact



5-37-11 Den-enchofu, Ota-ku, Tokyo 145-0071, JAPAN Monday-Friday 9:00-17:00
<http://kyoritsu-lab.co.jp/english/> E-mail: eng@kyoritsu-lab.co.jp FAX: +81-3-3721-0666

