

**Model V-630/650/660/670**

**Spectrophotometer**

**Hardware/Function Manual**

*JASCO*

# Safety Considerations

To ensure operation safety, this instrument must be operated correctly and maintained according to a regular schedule. Carefully read to fully understand all safety precautions in this manual before operating the instrument. Please take a moment to understand what the signal words **WARNING!**, **CAUTION**, and *Note* mean in this manual.

## (1) Safety symbols



Instruction manual symbol. If the product is marked with this symbol, refer to the instrument manuals to protect the instrument against damage.

**WARNING!** A **WARNING!** indicates a potentially hazardous situation which, if not avoided, could result in serious injury or even death.

**CAUTION** A **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against damaging the equipment.

Do not proceed beyond a **WARNING!** or **CAUTION** notice until you understand the hazardous conditions and have taken the appropriate steps.

*Note* A *Note* provides additional information to help the operator achieve optimal instrument performance.

## (2) Warning indication

Warnings are indicated at several locations on this instrument. Do not deface or damage the warning indication.

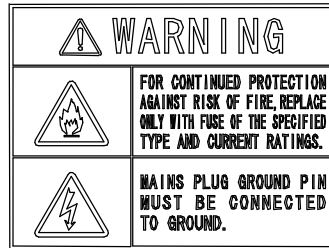


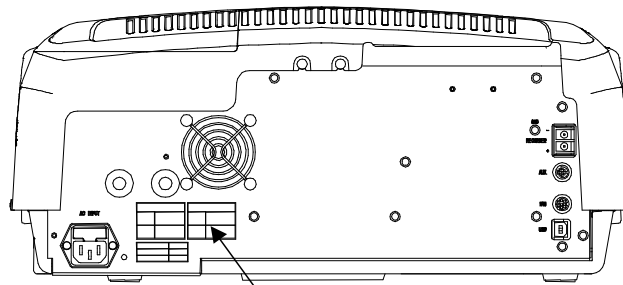
Figure.1 Warning indication

### 1) Warning for FUSE (Fig. 2 or Fig. 3)

Only use fuses of the designated rating to protect both operator and instrument from fire and other hazards. Whenever replacing the lamp, be sure to turn the “Power” switch OFF and unplug the power cable from the power outlet to avoid the risk of electric shock and other hazards.

### 2) Warning for GROUND (Fig. 2 or Fig. 3)

You may receive an electric shock if the instrument is not properly grounded. Correctly ground the instrument using the grounding terminal on the power board. Do not use water supply pipes for grounding because they are often made of nonmetals. For the same reason, do not use gas piping for grounding either.



Warning indication

Figure 2 V-630 Rear Panel

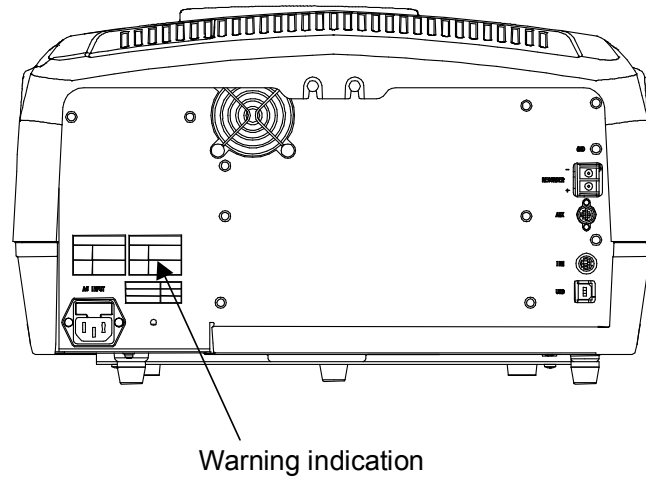


Figure 3 V-650/660/670 Rear Panel

### (3) Warning for carrying

These instruments weigh as follows:

V-630: 15.0 kg	V-650: 27.0 kg
V-660: 29.0 kg	V-570: 28.0 kg

When carrying the instrument, hold the carrying handle at the bottom of the instrument firmly (See Fig. 4 or Fig. 5).

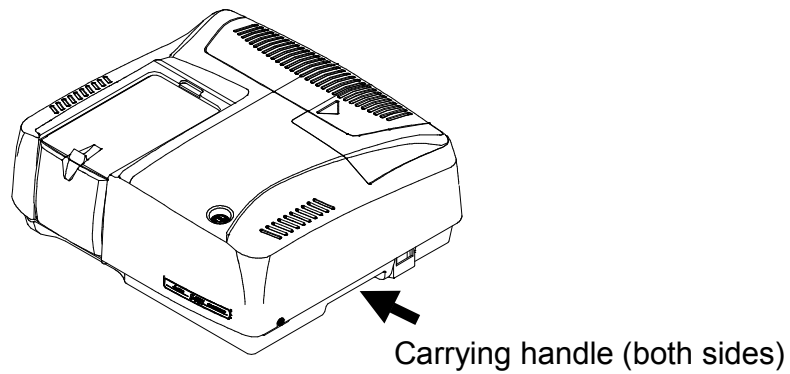


Figure 4 V-630 side view

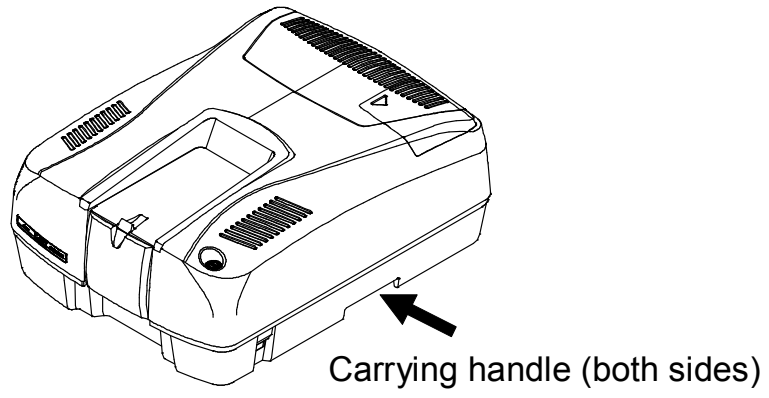


Figure 5 V-650/660/670 side view

# Connecting the Power Cable

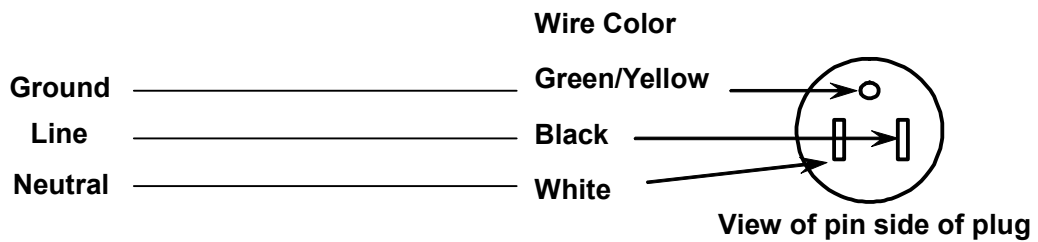
**WARNING!** The green/yellow ground core of the mains lead must be connected to a ground that complies with the local electricity supply authority (or equivalent body). The instrument is dangerous if not correctly grounded.

## 240 Volt (nominal) Supply

	Wire Color
Ground	Green/Yellow
Line	Brown
Neutral	Blue

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## 115 Volt (nominal) Supply



*Note: Instruments intended for operation at 115 V, 60 Hz are supplied with a mains cable with a molded plug and socket.*

# Regulatory Statement

## *CE Notice*

The **CE** symbol indicates compliance of this JASCO system to the EMC (Electromagnetic Compatibility) and Low Voltage Directives of the European Community. This symbol indicates that this JASCO system meets the relevant basic safety and health requirements of the EC Directive based on the following technical standards:

- EN61326-1: "Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements"

**WARNING!:** This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take corrective measures.

- IEC61000-3-2: "Electromagnetic compatibility (EMC) Part 3-2: Limits – Limits for harmonic current emissions (equipment input current up to and including 16A per phase) "
- IEC61010-1: "Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements"
- A "Declaration of Conformity" in accordance with the above standards has been made and is on file at JASCO CORPORATION, 2967-5 Ishikawa-machi, Hachioji-shi, Tokyo 192-8537, JAPAN.

## *FCC Statement (for USA only)*

Federal Communications Commission Radio Frequency Interference Statement

**WARNING!:** This equipment generates, uses, and can radiate radio frequency energy. If it is not installed and used in accordance with the instruction manual, it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the users at their own expense will be required to take whatever measures may be required to correct the interference.

## Preface

This instruction manual is your guide for using this instrument. It instructs first-time users on how to use the instrument, and serves as a reference for experienced users.

Before using the instrument, please read this instruction manual carefully, and make sure that the contents are fully understood. This manual should be easily accessible to the operator at all times during instrument operation. When not using the instrument, keep this manual in a safe place. If this instruction manual becomes lost, order a replacement from your local JASCO distributor.

*Note: The operating procedure varies with the type of instrument. Operation is described by type. Read the portion relevant to your instrument.*



# Installation Requirements

To ensure operation safety, observe the following conditions:

- (1) Do not operate the instrument under voltage fluctuations exceeding 10% of the recommended line voltage. Otherwise, the instrument may not function properly.
- (2) Frequency or spike noise in the power supply should be minimal.
- (3) Ensure that the instrument is grounded.
- (4) Operate the instrument in a temperature range of 15 to 30 °C.
- (5) Operate the instrument in humidity below 85% (RH). JASCO recommends operating the instrument in humidity below 60% to avoid the deterioration of the optical components due to the condensation caused by high humidity.
- (6) Operate the instrument in an atmospheric pressure range of 750 to 1060 hPa.
- (7) Avoid strong magnetic fields and sources of high frequency. The instrument may not function properly when near a strong magnetic field or high frequency source.
- (8) Avoid vibration from vacuum pumps, electric motors, processing equipment and machine tools.
- (9) Avoid dust and corrosive gas. Do not install the instrument where it may be exposed to dust, especially in locations exposed to outside air or ventilation outlets that discharge dust particles.
- (10) Do not install the instrument in a location where it may be exposed to direct sunlight.
- (11) Install the instrument in a horizontal and stable position. (This includes a table or desk upon which the instrument is installed.)
- (12) Ensure that no air conditioner blows air directly onto the instrument. This may prevent stable measurement.
- (13) Install the instrument in a location that allows easy access for maintenance.

<p><i>Note: The above conditions do not guarantee optimal performance of this instrument.</i></p>
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# Servicing

Contact your local JASCO distributor for instrument servicing. In addition, contact your JASCO distributor before moving the instrument to another location. Consumable parts should be ordered according to part number from your local JASCO distributor. If a part number is unknown, give your JASCO distributor the model name and serial number of your instrument.

***Do not return contaminated products or parts that may constitute a health hazard to JASCO employees.***

# Notices

- (1) JASCO shall not be held liable, either directly or indirectly, for any consequential damage incurred as a result of product use.
- (2) Prohibitions on the use of JASCO software
  - Copying software for purposes other than backup
  - Transfer or licensing of the right to use software to a third party
  - Disclosure of confidential information regarding software
  - Modification of software
  - Use of software on multiple workstations, network terminals, or by other methods (not applicable under a network licensing agreement concluded with JASCO)
- (3) The contents of this manual are subject to change without notice for product improvement.
- (4) This manual is considered complete and accurate at publication.
- (5) This manual does not guarantee the validity of any patent rights or other rights.
- (6) If a JASCO software program has failed causing an error or improper operation, this may be caused by a conflict from another program operating on the PC. In this case, take corrective action by uninstalling the conflicting product(s).
- (7) *Windows* is a registered trademark of *Microsoft Corporation* in the United States and other countries. In general, company names and product names are trademarks or registered trademarks of the respective companies. However, the <sup>TM</sup> and <sup>®</sup> marks are not used in all cases in this manual.
- (8) JASCO and the JASCO logo are registered trademarks of JASCO Corporation in Japan and other countries.

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## Limited Warranty

Products sold by JASCO, unless otherwise specified, are warranted for a period of one year from the date of shipment to be free of defects in materials and workmanship. If any defects in the product are found during this warranty period, JASCO will repair or replace the defective part(s) or product free of charge.

THIS WARRANTY DOES NOT APPLY TO DEFECTS RESULTING FROM THE FOLLOWING:

- (1) IMPROPER OR INADEQUATE INSTALLATION
- (2) IMPROPER OR INADEQUATE OPERATION, MAINTENANCE, ADJUSTMENT OR CALIBRATION
- (3) UNAUTHORIZED MODIFICATION OR MISUSE
- (4) USE OF CONSUMABLE PARTS NOT SUPPLIED BY AN AUTHORIZED JASCO DISTRIBUTOR
- (5) CORROSION DUE TO THE USE OF IMPROPER SOLVENTS, SAMPLES, OR DUE TO SURROUNDING GASES
- (6) ACCIDENTS BEYOND JASCO'S CONTROL, INCLUDING NATURAL DISASTERS

This warranty does not cover the consumable parts listed below:

- (1) Tungsten lamp, and other light sources
- (2) Mirrors in the light source section, and cell windows
- (3) Fuses, batteries, glassware, chart paper and ink

THE WARRANTY FOR ALL PARTS SUPPLIED AND REPAIRS PROVIDED UNDER THIS WARRANTY EXPIRES ON THE WARRANTY EXPIRATION DATE OF THE ORIGINAL PRODUCT. FOR INQUIRIES CONCERNING REPAIR SERVICE, CONTACT YOUR JASCO DISTRIBUTOR AFTER CONFIRMING THE MODEL NAME AND SERIAL NUMBER OF YOUR INSTRUMENT.

JASCO Corporation  
2967-5, Ishikawa-machi, Hachioji-shi  
Tokyo 192-8537  
JAPAN

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# 1 Unpacking and Installation

**WARNING!:** This section is intended for trained JASCO servicemen. If the user attempts unpacking and installation, injury may result. Please leave unpacking and installation to your JASCO serviceman.

**CAUTION:** Use this manual when you are unpacking/installing the instrument in conjunction with a JASCO serviceman's instructions in the case of a problem.

## 1.1 Unpacking

### (1) Unpacking the main unit

Take out the main unit from the carton and make sure that the serial No. displayed on the serial No. label located on the left side of the unit and the serial No. on the inspection certificate agree. Also ensure that the line voltage is consistent with the power requirement of the instrument.

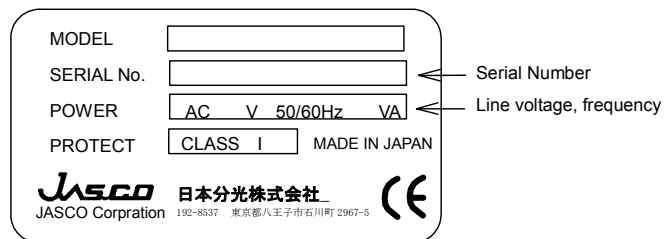


Figure 1.1 Serial No. label

### (2) Unpacking the standard accessories

Remove the standard accessories from the carton and check them against the packing list. If you find any parts missing or damaged items, contact your local JASCO distributor.

Table 1.1 List of Standard Accessories for V-630 iRM Type

Description	Qty.	Comments
Intelligent remote module (iRM)	1	
iRM touch pen	1	
Compact flash	1	
Card adapter	1	
Holmium glass	1	Bifunctional holmium glass holder/shielding plate
Time-lag fuse	2	
AC power cable	1	
Allen wrench	1	For adjustment of the light source mirror
Certificate of inspection	1	
Instruction manual	1 set	

*Note 1: Use of the holmium glass does not guarantee wavelength accuracy.*  
*Note 2: Holmium glass holder can also be used as a shielding plate by rotating it through 90 degree from its usual position.*

Table 1.2 List of Standard Accessories for V-650/660/670 iRM Type

<b>Description</b>	<b>Qty.</b>	<b>Comments</b>
Intelligent remote module (iRM)	1	
iRM touch pen	1	
Compact flash	1	
Card adapter	1	
Holmium glass	1	Bifunctional holmium glass holder/shielding plate
Time-lag fuse	2	
AC power cable	1	
Phillips screw driver	1	For adjustment of the light source mirror
Certificate of inspection	1	
Instruction manual	1 set	

*Note 1: Use of the holmium glass does not guarantee wavelength accuracy.*  
*Note 2: Holmium glass holder can also be used as a shielding plate by rotating it through 90 degree from its usual position.*

Table 1.3 List of Standard Accessories for V-630 PC Type

<b>Description</b>	<b>Qty.</b>	<b>Comments</b>
Holmium glass	1	Bifunctional holmium glass holder/shielding plate
Time-lag fuse	2	
USB cable	1	
AC power cable	1	
Allen wrench	1	For adjustment of the light source mirror
Software setup CD	1	
Certificate of inspection	1	
Instruction manual	1 set	

*Note 1: Use of the holmium glass does not guarantee wavelength accuracy.*  
*Note 2: Holmium glass holder can also be used as a shielding plate by rotating it through 90 degree from its usual position.*

Table 1.4 List of Standard Accessories for V-650/660/670 PC Type

Description	Qty.	Comments
Holmium glass	1	Bifunctional holmium glass holder/shielding plate
Time-lag fuse	2	
USB cable	1	
AC power cable	1	
Phillips screw driver	1	For adjustment of the light source mirror
Software setup CD	1	
Certificate of inspection	1	
Instruction manual	1 set	

*Note 1: Use of the holmium glass does not guarantee wavelength accuracy.*  
*Note 2: Holmium glass holder can also be used as a shielding plate by rotating it through 90 degree from its usual position.*



## 1.2 Installation and Connecting Cables

**Note:** *Be certain to comply with the instrument installation requirements described in this manual (see page viii). Failure to comply with these requirements can cause faults with the instrument.*

### 1.2.1 Preparation

Prepare a table which can bear a weight of about 50 kg (differs according to instrument) and has an area of 700 mm (length) × 600 mm (width) when using the iRM type.

If using a PC as well, prepare a table, which can hold a weight of about 70 kg (differs according to instrument) and has an area of 700 mm (length) × 1500 mm (width), allowing space for a printer.

Confirm that the power switch of the main unit is off and that the power switch of the PC is off when using a PC.

### 1.2.2 Connecting the Cable of iRM Type

**WARNING!:** *You may receive an electric shock if the instrument is not properly grounded. Correctly ground the instrument using the grounding terminal on the power board.*

**CAUTION:** For grounding, do not use water pipes, which are often made of nonmetals. For safety reasons, do not use gas tubing for grounding either.

**Note:** *Use of a 3-pin power plug with a grounding terminal is recommended.*

- (1) Connect the cable from the iRM to the “iRM” connector on the rear of V-600.
- (2) Connect the AC power cable to the “AC INPUT” connector on the rear of V-600. Connect the other end of the AC power cable to an electrical outlet.

### 1.2.3 Connecting the Cable of PC Type

**WARNING!:** *You may receive an electric shock if the instrument is not properly grounded. Correctly ground the instrument using the grounding terminal on the power board.*

**CAUTION:** For grounding, do not use water pipes, which are often made of nonmetals. For safety reasons, do not use gas tubing for grounding either.

**Note:** *Use of a 3-pin power plug with a grounding terminal is recommended.*

- (1) Connect the “USB” port located on the rear of V-600 and the USB port on the PC using the USB cable.

- (2) Connect the PC and the monitor.
- (3) Connect the AC power cable to the "AC INPUT" connector on the rear of V-600. Connect the other end of the AC power cable to an electrical outlet.
- (4) Connect the AC power cables to the AC input connector of PC and monitor. Connect the other ends of the AC power cables to an electrical outlet.

## 2 Specifications

The specifications of each model covered in this manual are given below.

### 2.1 V-630 UV/VIS Spectrophotometer Specifications

Optical system	Single monochromator UV/VIS region: 1200 lines/mm concave grating Rowland off-circle arrangement Double beam type
Light source	Deuterium lamp: 190 to 350 nm Halogen lamp: 330 to 1100 nm
Light source exchange wavelength	Any wavelength between 330 and 350 nm can be selected.
Detector	Silicon photodiode (S1337)
Wavelength range	190 to 1100 nm
Wavelength accuracy	±0.2 nm (at 656.1 nm, when the room temperature is stabilized.)
Wavelength repeatability	±0.1 nm
Slew speed	12000 nm/min
Spectral bandwidth	1.5 nm fixed
Photometric range	0 to 10000 %T -2 to 3 Abs
Photometric accuracy	±0.002 Abs (0 to 0.5 Abs) ±0.003 Abs (0.5 to 1 Abs) ±0.3 %T (Tested with NIST SRM 930D)
Photometric repeatability	±0.001 Abs (0 to 0.5 Abs) ±0.001 Abs (0.5 to 1 Abs)
Stray light	1 % (198 nm KCL 12 g/L aqueous solution) 0.04 % (220 nm NaI 10 g/L aqueous solution) 0.02 % (340 nm NaNO <sub>2</sub> 50 g/L aqueous solution) 0.02 % (370 nm NaNO <sub>2</sub> 50 g/L aqueous solution) (10 mm cell used)
Baseline stability	0.0004 Abs/hour (Value obtained more than two hours after turning on the light source, when the room temperature is stabilized, wavelength: 250 nm, and response: slow.)
Baseline flatness	±0.0006 Abs (Value obtained after baseline correction with a temperature variation of less than 5°C, wavelength: 200 to 1000 nm, response: medium, with smoothing processing and wavelength scanning speed: 400 nm/min.)
RMS noise	0.00006 Abs (0 Abs, wavelength: 500 nm, measurement time: 60 sec, response: medium)
Power requirements	100, 115, 200, 220, 230, 240 V ±10 %, 105 VA
Dimensions and weight	216(H) × 486(W) × 441(D)mm (excluding protrusions) 15 kg

*Note: Values given for wavelength accuracy, wavelength repeatability, photometric accuracy, photometric repeatability, baseline flatness, and RMS noise are those obtained more than one hour after the light source was turned on.*

## 2.2 V-650 UV/VIS Spectrophotometer Specifications

Optical system	Single monochromator UV/VIS region: 1200 lines/mm plane grating Czerny-Turner mount Double beam type
Light source	Deuterium lamp: 190 to 350 nm Halogen lamp: 330 to 900 nm
Light source exchange wavelength	Any wavelength between 330 and 350 nm can be selected.
Detector	Photomultiplier tube
Wavelength range	190 to 900 nm
Wavelength accuracy	±0.2 nm (at a spectral bandwidth of 0.5 nm, wavelength: 656.1 nm, when the room temperature is stabilized.)
Wavelength repeatability	±0.05 nm
Slew speed	12000 nm/min
Spectral bandwidth	0.1, 0.2, 0.5, 1, 2, 5, 10 nm L2, L5, L10 nm (low stray-light mode) M1, M2 nm (micro-cell mode)
Photometric range	0 to 10000 %T -2 to 4 Abs
Photometric accuracy	±0.002 Abs (0 to 0.5 Abs) ±0.003 Abs (0.5 to 1 Abs) ±0.3 %T (Tested with NIST SRM 930D)
Photometric repeatability	±0.001 Abs (0 to 0.5 Abs) ±0.001 Abs (0.5 to 1 Abs)
Stray light	1 % (198 nm KCL 12g/L aqueous solution) 0.005 % (220 nm NaI 10g/L aqueous solution) 0.005 % (340 nm NaNO <sub>2</sub> 50g/L aqueous solution) 0.005 % (370 nm NaNO <sub>2</sub> 50g/L aqueous solution) (spectral bandwidth: L2 nm, 10 mm cell used)
Baseline stability	0.0003 Abs/hour (value obtained more than two hours after turning on the light source, when the room temperature is stabilized, wavelength: 250 nm, response: slow, and spectral bandwidth: 2nm.)
Baseline flatness	±0.0003 Abs (value obtained after baseline correction with a temperature variation of less than 5°C, wavelength: 200 to 850 nm, response: medium, spectral bandwidth: 2 nm, and wavelength scanning speed: 400 nm/min with smoothing processing)
RMS noise	0.00003 Abs (0 Abs, wavelength: 500 nm, measurement time: 60 sec, response: medium, spectral bandwidth: 2 nm)
Power requirements	100, 115, 200, 220, 230, 240 V ±10 %, 145 VA
Dimensions and weight	270(H) × 460(W) × 602(D) mm (excluding protrusions) 27 kg

<p><i>Note: Values given for wavelength accuracy, wavelength repeatability, photometric accuracy, photometric repeatability, baseline flatness, and RMS noise are those obtained more than one hour after the light source was turned on.</i></p>
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## 2.3 V-660 UV/VIS Spectrophotometer Specifications

Optical system	Double monochromator UV/VIS region: 600 lines/mm plane grating Czerny-Turner mount Double beam type
Light source	Deuterium lamp: 187 to 350 nm Halogen lamp: 330 to 900 nm
Light source exchange wavelength	Any wavelength between 330 and 350 nm can be selected.
Detector	Photomultiplier tube
Wavelength range	187 to 900 nm
Wavelength accuracy	±0.1 nm (at a spectral bandwidth of 0.5 nm, wavelength: 656.1nm, when the room temperature is stabilized.)
Wavelength repeatability	±0.05 nm
Slew speed	12000 nm/min
Spectral bandwidth	0.1, 0.2, 0.5, 1, 2, 5, 10 nm L2, L5, L10 nm (low stray-light mode) M1, M2 nm (micro-cell mode)
Photometric range	0 to 10000 %T -2 to 6 Abs
Photometric accuracy	±0.002 Abs (0 to 0.5 Abs) ±0.003 Abs (0.5 to 1 Abs) ±0.3 %T (Tested with NIST SRM 930D)
Photometric repeatability	±0.001 Abs (0 to 0.5 Abs) ±0.001 Abs (0.5 to 1 Abs)
Stray light	1 % (198 nm KCL 12 g/L aqueous solution) 0.00008 % (220 nm NaI 10 g/L aqueous solution) 0.00008 % (340 nm NaNO <sub>2</sub> 50 g/L aqueous solution) 0.00008 % (370 nm NaNO <sub>2</sub> 50g/L aqueous solution) (spectral band width: L2 nm, 10 mm cell used)
Baseline stability	0.0003 Abs/hour (Value obtained more than two hours after turning on the light source, when the room temperature is stabilized, wavelength: 250 nm, response: slow, and spectral bandwidth: 2nm)
Baseline flatness	±0.0005Abs (Value obtained after baseline correction with a temperature variation of less than 5°C, wavelength: 200 to 800 nm, response: medium, spectral bandwidth: 2 nm, smoothing processing and wavelength scanning speed: 400 nm/min)
RMS noise	0.00005 Abs (0 Abs, wavelength: 500 nm, measurement time: 60 sec, response: Medium, spectral bandwidth: 2 nm)
Power requirements	100, 115, 200, 220, 230, 240 V ±10 %, 145 VA
Dimensions and weight	270(H) × 460(W) × 602(D) mm (excluding protrusions) 29 kg

<p><i>Note: Values given for wavelength accuracy, wavelength repeatability, photometric accuracy, photometric repeatability, baseline flatness, and RMS noise are those obtained more than one hour after the light source was turned on.</i></p>
---

## 2.4 V-670 UV/VIS/NIR Spectrophotometer Specifications

Optical system	Single monochromator UV/VIS region: 1200 lines/mm plane grating NIR region: 300 lines/mm plane grating Czerny-Turner mount Double beam type
Light source	Deuterium lamp: 190 to 350 nm Halogen lamp: 330 to 2700 nm
Light source exchange wavelength	Any wavelength between 330 and 350 nm can be selected.
Detector	Photomultiplier tube PbS photoconductive cell
Detector exchange wavelength	Any wavelength between 750 and 900 nm can be selected. The diffraction grating is set to the same wavelength as the detector exchange wavelength.
Wavelength range	190 to 2700 nm Using the optional wavelength extension accessory, wavelength of up to 3200 nm can be measured.
Wavelength accuracy	$\pm 0.3$ nm (at a spectral bandwidth of 0.5 nm, UV/VIS region, when the room temperature is stabilized.) $\pm 1.5$ nm (at a spectral bandwidth of 2.0 nm, NIR region, when the room temperature is stabilized.)
Wavelength repeatability	$\pm 0.05$ nm (at a spectral bandwidth of 0.5 nm, UV/VIS region) $\pm 0.2$ nm (at a spectral bandwidth of 2.0 nm, NIR region)
Slew speed	12000 nm/min (UV/VIS region) 48000 nm/min (NIR region)
Spectral bandwidth	0.1, 0.2, 0.5, 1, 2, 5, 10 nm (UV/VIS region) L2, L5, L10 nm (low stray-light mode, UV/VIS region) M1, M2 nm (micro-cell mode) 0.4, 0.8, 1, 2, 4, 8, 20, 40 nm (NIR region) L8, L20, L40 nm (low stray-light mode, NIR region) M4, M8 nm (micro-cell mode, NIR region)
Photometric range	0 to 10000 %T -2 to 4 Abs (UV/VIS region) -2 to 3 Abs (NIR region)
Photometric accuracy	$\pm 0.002$ Abs (0 to 0.5 Abs) $\pm 0.003$ Abs (0.5 to 1 Abs) $\pm 0.3$ %T (Tested with NIST SRM 930D)
Photometric repeatability	$\pm 0.001$ Abs (0 to 0.5 Abs) $\pm 0.001$ Abs (0.5 to 1 Abs)
Stray light	1 % (198 nm KCL 12g/L aqueous solution) 0.005 % (220 nm NaI 10g/L aqueous solution) 0.005 % (340 nm NaNO <sub>2</sub> 50g/L aqueous solution) 0.005 % (370 nm NaNO <sub>2</sub> 50g/L aqueous solution) (spectral band width: L2 nm, 10 mm cell used) 0.04% (1690 nm H <sub>2</sub> O 10 mm cell used)

Baseline stability	0.1% (1690 nm CH <sub>2</sub> Br <sub>2</sub> 50 mm cell used) (spectral bandwidth: L8 nm) 0.0003 Abs/hour (Value obtained more than two hours after turning on the light source, when the room temperature is stabilized, wavelength: 250 nm, response: slow, and spectral bandwidth: 2nm)
Baseline flatness	±0.0005 Abs (Value obtained after baseline correction with a temperature variation of less than 5°C, wavelength: 200 to 850 nm, response : medium, spectral bandwidth: 2 nm, smoothing processing and wavelength scanning speed: 400 nm/min, spectral bandwidth: 8 nm in wavelength 850 to 2500 nm)
RMS noise	0.00003 Abs (0 Abs, wavelength: 500 nm, measurement time 60 sec, response: medium, spectral bandwidth: 2 nm)
Power requirements	100, 115, 200, 220, 230, 240 V ±10 %, 145 VA
Dimensions and weight	270(H) × 460(W) × 602(D) mm (excluding protrusions) 28 kg

*Note: Values given for wavelength accuracy, wavelength repeatability, photometric accuracy, photometric repeatability, baseline flatness, and RMS noise are those obtained more than one hour after the light source was turned on.*

### 3 General Description of Instrument

#### 3.1 V-630 Spectrophotometer Optical System

##### (1) Optical System

The V-630 is designed to measure the absorption spectrum of a sample over a wavelength range of 190 to 1100 nm. The light sources used are a deuterium ( $D_2$ ) lamp (190 to 350 nm) for the UV region, and a halogen (WI) lamp (330 to 1100 nm) for the VIS/NIR region. The light from the light source is focused and enters the monochromator. The light is dispersed by the grating in the monochromator and focused onto the exit slit. The light that passes through the exit slit is monochromated. This light is split into two beams, one going to the sample to be measured and the other to the reference sample such as a solvent. The light that has passed through the sample and the reference sample is incident upon the silicon photodiode.

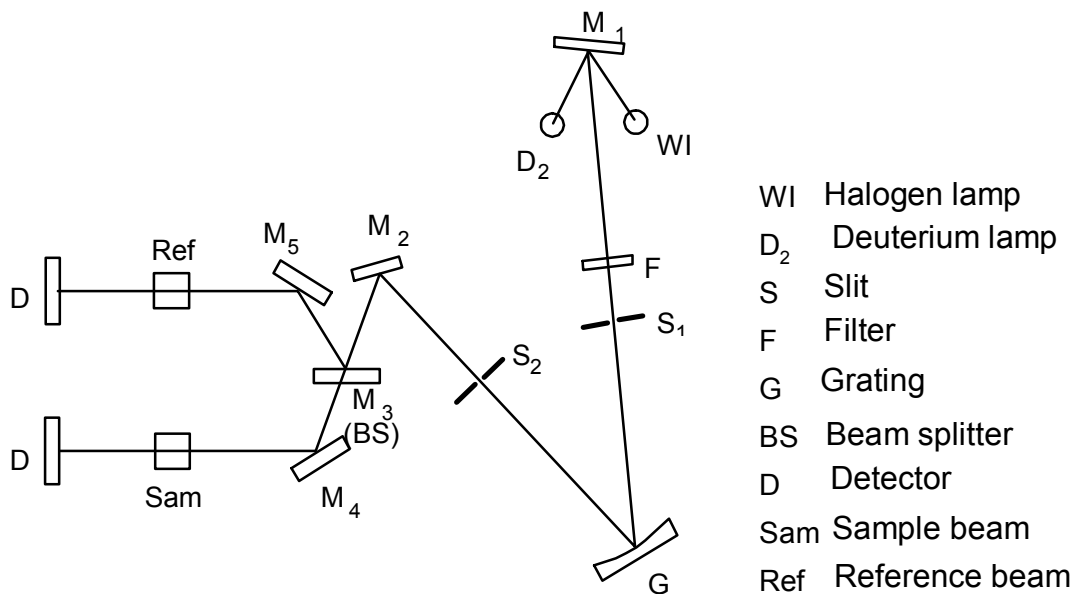


Figure 3.1 V-630 Optical system

##### (2) Electrical System

A schematic diagram of the electrical system used in the V-630 is shown in Fig. 3.2. The light detected by the silicon photodiode is converted into an electrical signal and, after being subjected to synchronous rectification, is converted into a digital signal and is sent to the computer. The signal processed by the computer is displayed on the monitor as digital data or a spectrum.

Actions such as light source exchange, wavelength drive, filter drive, etc. are controlled by the computer.



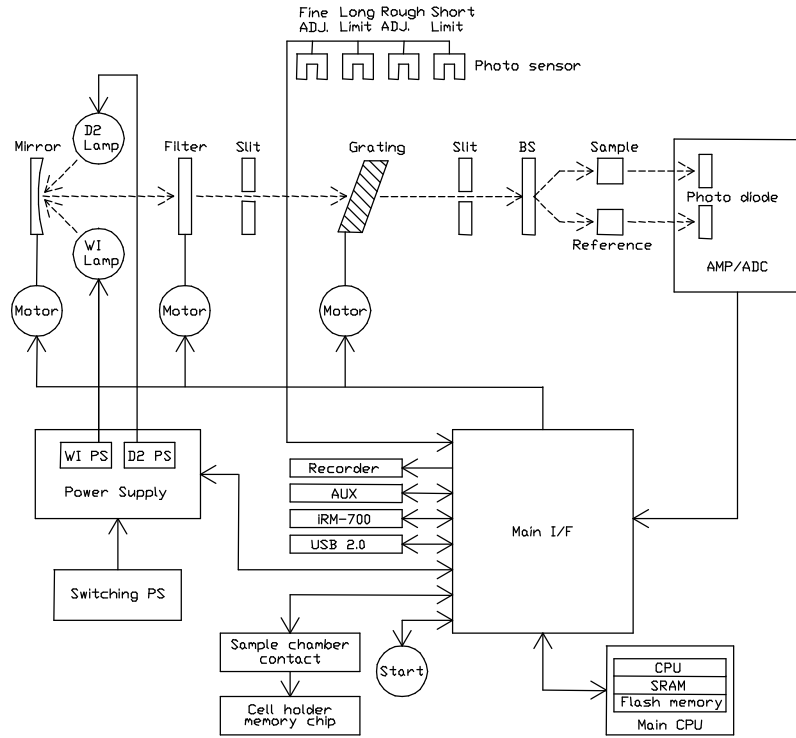


Figure 3.2 V-630 electrical system diagram

## 3.2 V-650/660/670 Spectrophotometers Optical System

### (1) Optical System

The optical system varies between the models of the instrument. Figures 3.3 through 3.5 show the optical systems. The V-650 measures the absorption spectrum of a sample over a wavelength range of 190 to 900 nm, the V-660 measures the absorption spectrum of a sample over a wavelength range of 187 to 900 nm and the V-670 measures the absorption spectrum of a sample over a wavelength range of 190 to 2700 nm (can be extended to 3200 nm using the optional wavelength extension accessory). The light sources used are a deuterium ( $D_2$ ) lamp (187 to 350 nm) for use in the UV region and a halogen (WI) lamp (330 to 2700 nm) for use in the VIS/NIR region. The light from the light source is focused and enters the monochromator. It is dispersed by the grating in the monochromator and focused on to the exit slit. The light that passes through the exit slit is monochromated. This light is split into two beams by a sector mirror, one going to the sample to be measured and the other to the reference sample such as a solvent. The beams that have passed through the sample and reference sample are alternately incident upon the detector (that is a photomultiplier tube or a PbS photoconductive cell).

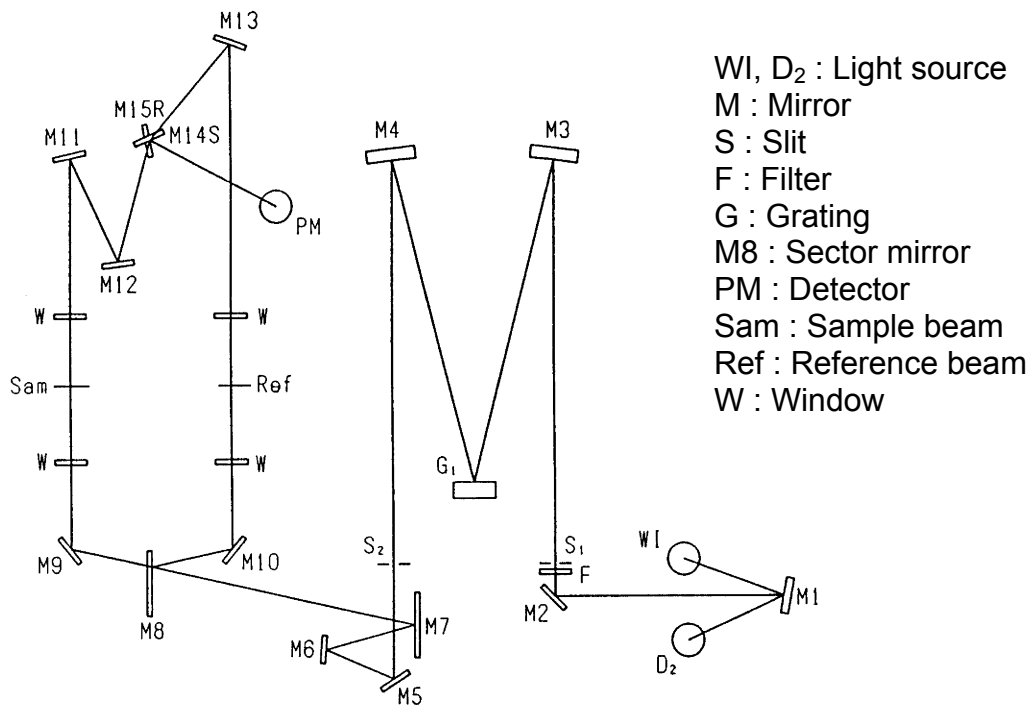


Figure 3.3 V-650 Optical system

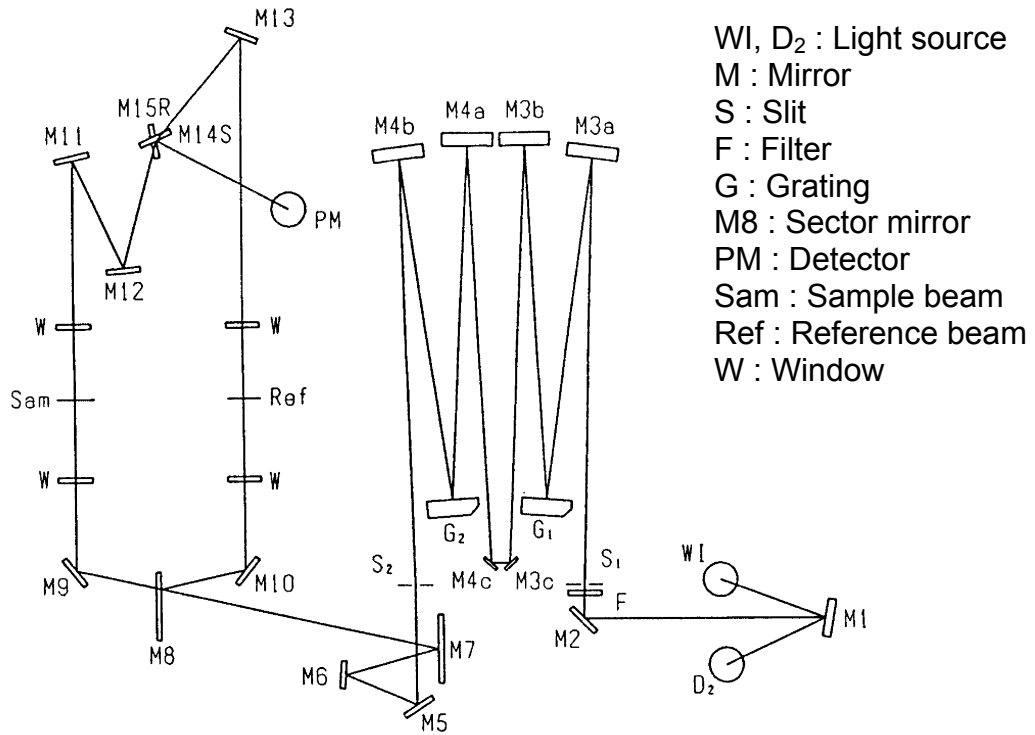


Figure 3.4 V-660 Optical system

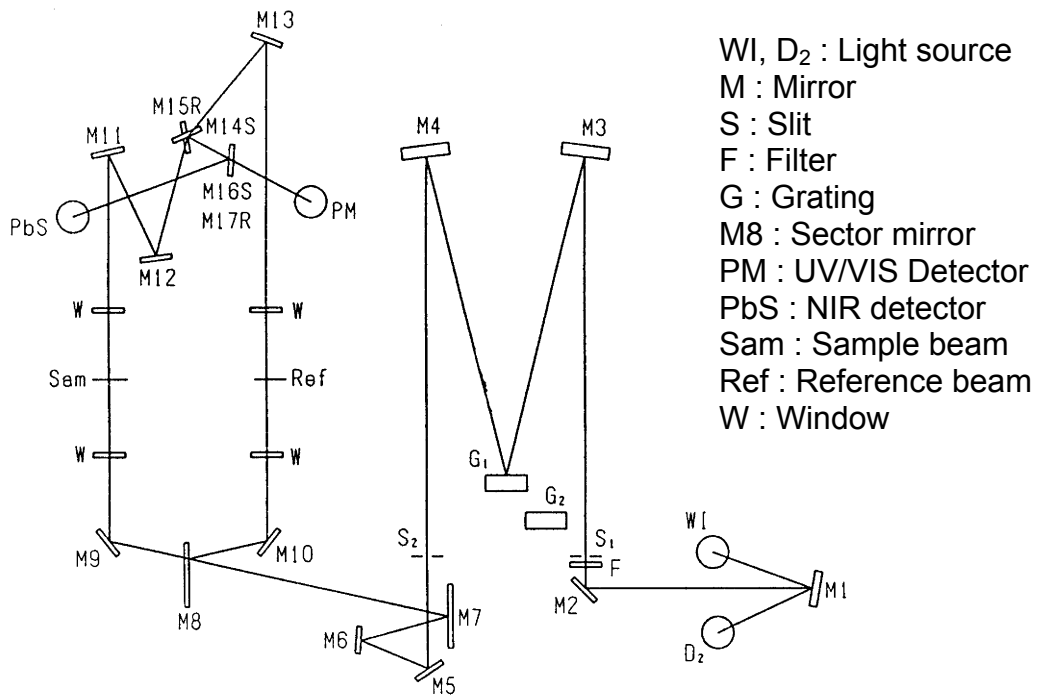


Figure 3.5 V-670 Optical system

## (2) Electrical System

Figure 3.6 shows a schematic diagram of the electrical system used in the V-650, V-660 and V-670 spectrophotometers. The light incident upon the photomultiplier tube or PbS photoconductive cell is converted into an electrical signal and, after being subjected synchronous rectification, it is converted into a digital signal. The signal processed by the computer is displayed on the monitor as digital data or a spectrum.

Actions such as light source exchange, wavelength drive, slit drive, filter drive, etc. are controlled by the computer.

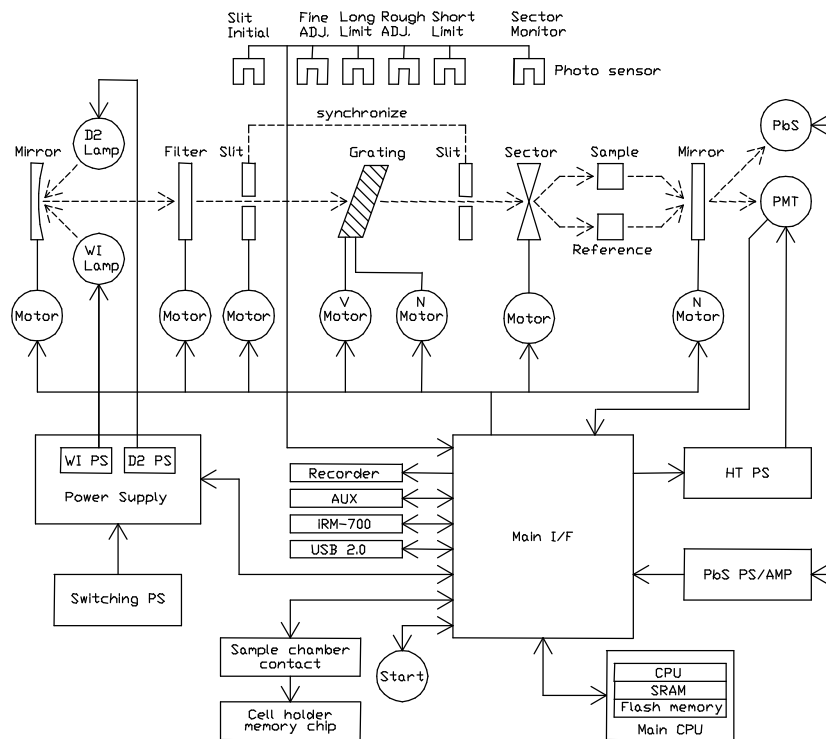


Figure 3.6 V-650/660/670 electrical system diagram

### 3.3 iRM System

Figure 3.7 shows the schematic diagram of the iRM system.

The iRM can be connected to the V-630/650/660/670 spectrophotometers, and can be used to control measurement, printing, and saving. Various menus can be selected using the touch panel key on the color LCD.

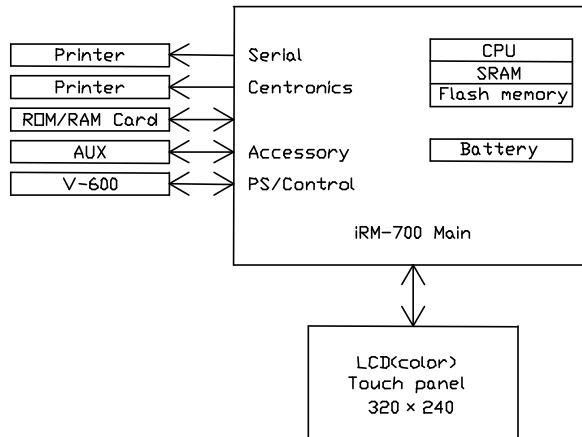


Figure 3.7 iRM system diagram

## 4 Names and Functions of Components

### 4.1 V-630 Spectrophotometer

#### 4.1.1 Overview

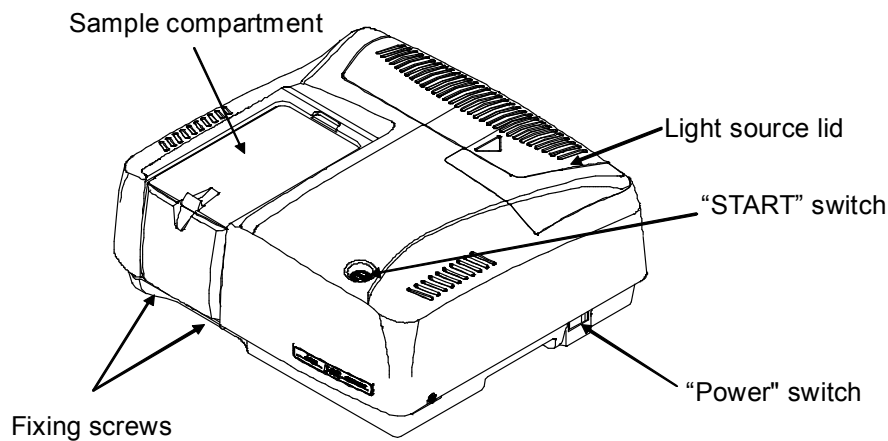


Figure 4.1 V-630 appearance

Name	Function
Sample compartment	Slide the lid to the back to open it. The single position cell holder (the standard cell holder) is installed. The cell holder located toward the front is the sample cell holder, and the one located toward the rear is the reference cell holder.
Fixing screws	Fixes the standard cell holder in position. Loosen the two fixing screws, pull the standard cell holder toward you a little and lift to remove it.
"Power" switch	When the switch is pressed on, the power supply is turned on.
"START" switch	Switch to start measurement. The lamp flashes during measurement.
Light source lid	The light source is housed here.

## 4.1.2 Rear Panel

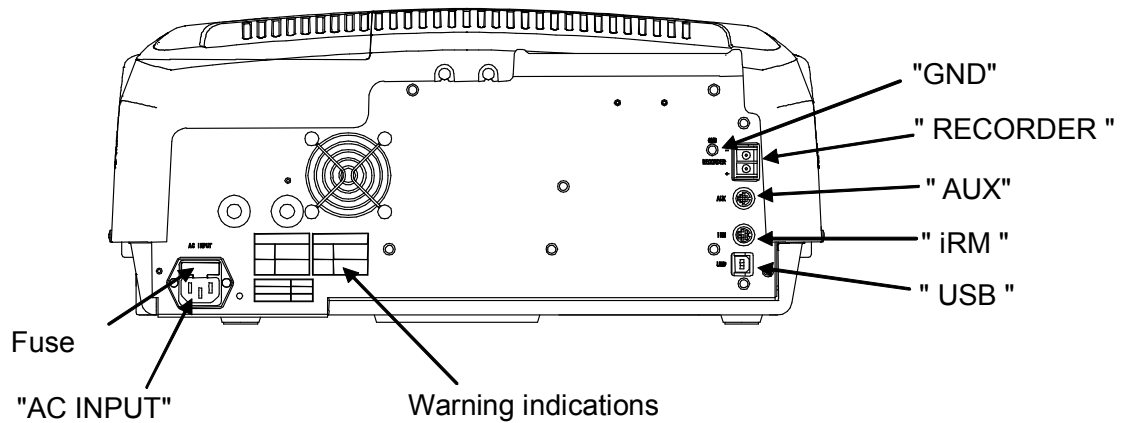


Figure 4.2 V-630 rear panel

Name	Function
AC INPUT	The power supply input connector. Connect with the power cable.
Fuse	Fuses for the main unit
Warning indications	Warning indications for fuse and ground.
GND	Grounding terminal
RECORDER	Terminal for analog output. The value specified by setting the scale of [Abs/%T meter] program is recorded in the range 0 to 1 V.
AUX	Auxiliary connector for connecting an accessory.
iRM	Connector for connecting the cable of iRM.
USB	Connector for connecting the cable with PC.

## 4.2 V-650/660/670 Spectrophotometers: Overview

### 4.2.1 Overview

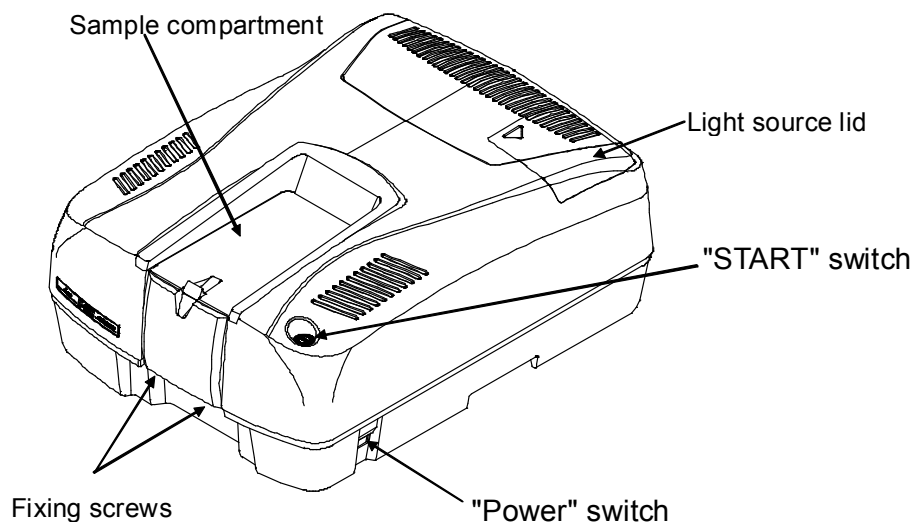


Figure 4.3 V-650/660/670 appearance

Name	Function
Sample compartment	Slide the lid back to open it. The single position cell holder (the standard cell holder) is installed. The cell holder located toward the front is the sample cell holder, and the one located toward the rear is the reference cell holder.
Fixing screws	Fixes the standard cell holder in position. Loosen the two fixing screws, pull the standard cell holder toward you a little and lift to remove it.
"Power" switch	When the switch is pressed on, the power supply is turned on.
"START" switch	Switch to start measurement. The lamp flashes during measurement.
Light source lid	The light source is housed here.



## 4.2.2 Rear Panel

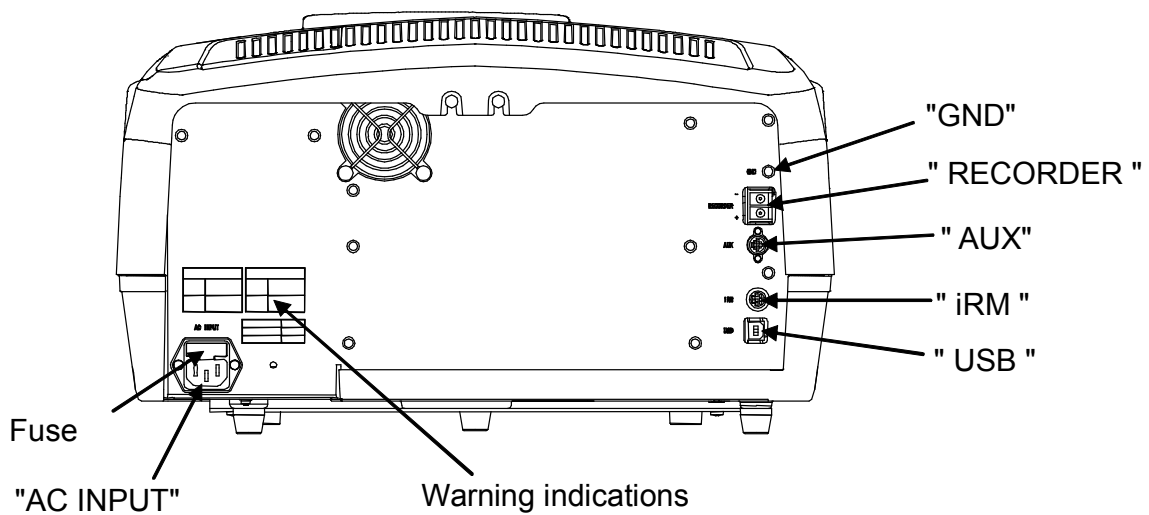


Figure 4.4 V-650/660/670 rear panel

Name	Function
AC INPUT	The power supply input connector. Connect with the power cable.
Fuse	Fuses for the main unit.
Warning indications	Warning indications for fuse and ground.
GND	Grounding terminal.
RECORDER	Terminal for analog output. The value specified by setting the scale of [Abs/%T meter] program is recorded in the range 0 to 1 V.
AUX	Auxiliary connector for connecting an accessory.
iRM	Port for connecting the cable of iRM.
USB	Port for connecting the cable with PC.

### 4.3 Standard Cell Holder (Model USE-753 Rectangular Cell Holder)

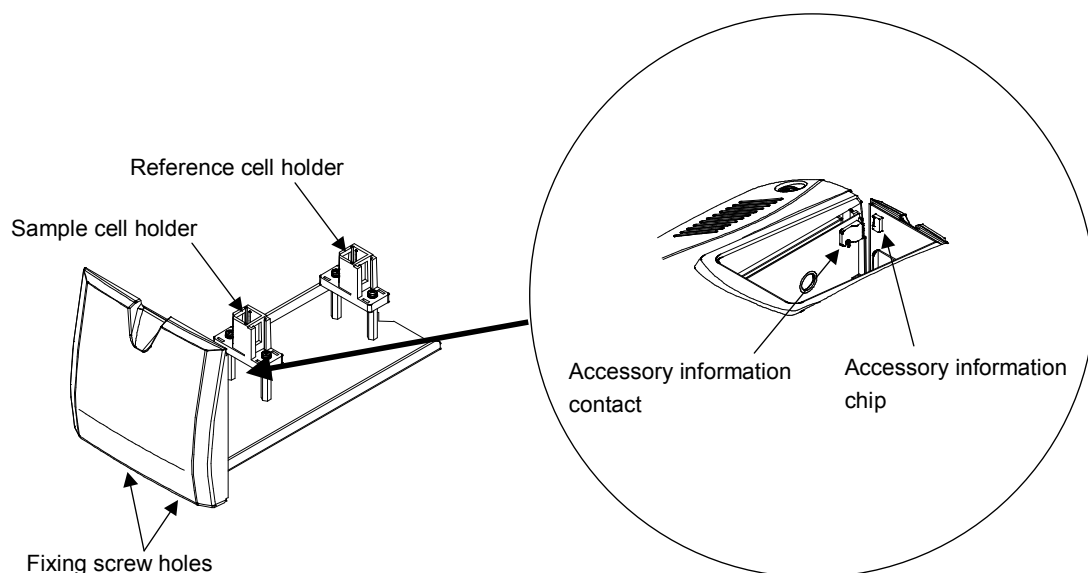


Figure 4.5 Standard cell holder (Model USE-753 Rectangular cell holder)

Name	Function
Sample cell holder	Mount the cell containing the sample here.
Reference cell holder	Mount the cell containing the reference solvent here.
Fixing screw holes	Screw holes for attaching the standard cell holder.
Accessory information chip	Memory chip for accessory information.
Accessory information contact	Contact pin for reading accessory information.

## 4.4 Intelligent Remote Module (iRM)

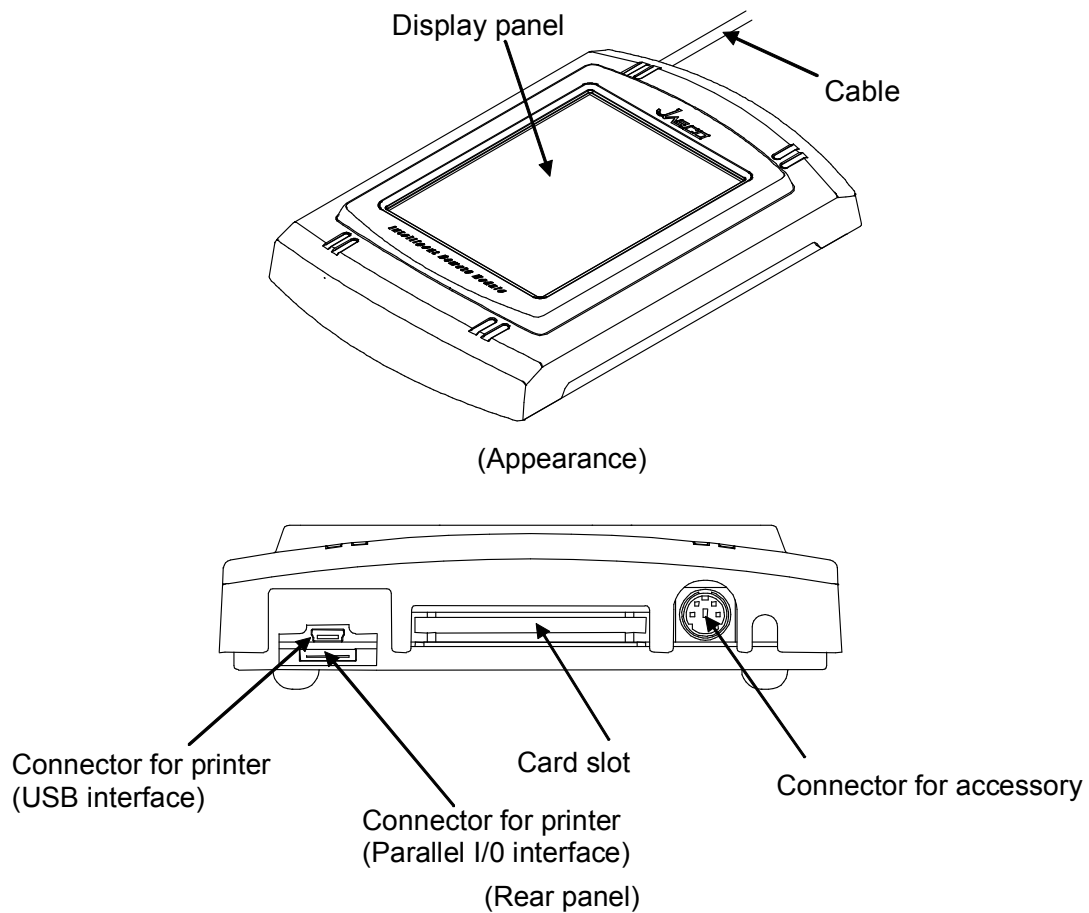


Figure 4.6 Intelligent remote module

Name	Function
Display panel	320x240 pixel color LCD. Displays wavelength, absorbance, measurement parameters, etc. Also used for selecting menus and editing measurement parameters via the touch key pad.
Cable	Connects to the main unit.
Card slot	Accepts a compact flash card or a flash ATA card. Card adapter is necessary for the compact flash card.
Connector for printer	Connector for the printer (USB interface and parallel I/O interface).
Connector for accessory	Connects to an accessory.

## 5 Maintenance

Pay attention to the instrument operating environment and always keep it clean so that the instrument can be used in a stabilized condition over a long period.

This section contains instructions on how to clean the sample compartment when a sample is spilt, and on replacing consumables.

It is recommended that the validation program be used for checking the performance of the instrument.

### 5.1 Cautions for Routine Operation

- (1) Before operating the instrument, allow the instrument to warm-up for at least 15 minutes after turning the power on.
- (2) Do not place anything on the instrument.
- (3) After completing measurements, remove the sample from the sample compartment.

### 5.2 Cleaning the Sample Compartment

If a sample is spilt in the sample compartment, quickly wipe up the spillage using gauze or a similar material, remove the cell holder, and clean it using the following procedure.

**CAUTION:** Use ethanol to clean the sample compartment. Do not use other types of organic solvent as this may remove the instrument paint.

- (1) Removing the standard cell holder
  - a) Open the sample compartment lid and loosen the two fixing screws located on the front underside of the sample compartment by hand (see Fig. 4.1 or Fig. 4.3).
  - b) Pull the standard cell holder toward you a little and lift to remove it.

- (2) Cleaning the standard cell holder

**<<When the sample is soluble in water>>**

Wipe up the spilt sample using gauze or a similar material. Remove any trace of the spillage with gauze soaked in water. Finally, remove any moisture with gauze and then allow drying.

**<<When the sample is insoluble in water>>**

Wipe up the spilt sample using gauze or a similar material. Remove any trace of the spillage with gauze soaked in ethanol. Finally, remove any moisture with gauze and then allow drying.

- (3) Remounting the standard cell holder
  - a) Locate the standard cell holder over the two positioning pins on the main unit certainly and move it toward to the back.
  - b) Ensure that light is incident upon the center of the cell holder. To check it visually, set the wavelength to 500 nm and place a piece of white paper in front of the cell holder.
  - c) Firmly tighten the two fixing screws of the bottom of the standard cell holder.

## 5.3 Replacement of Consumables

### 5.3.1 Replacement of Fuse

**WARNING!:** Only use fuses of the rated capacity to prevent injury to personnel and overheating of the instrument.

**WARNING!:** To avoid electric shock, always turn off the power switch and unplug the AC power cable from the outlet before replacing a fuse.

V-630 uses 2A time-lag fuses (P/N: 5840-H102A 5pcs/set) when using a 100 V voltage supply and 1.6 A time-lag fuses (P/N: 5840-H106A 5pcs/set) when using a 200 V voltage supply. V-650/660/670 use 2.5 A time-lag fuses (P/N: 5840-H103A 5pcs/set) when using a 100 V voltage supply and 1.6 A time-lag fuses (P/N: 5840-H106A 5pcs/set) when using a 200 V voltage supply.

(V-630)

100 V to 120 V: 2.0 A time-lag fuse  
200 V to 240 V: 1.6 A time-lag fuse

(V-650/660/670)

100 V to 120 V: 2.5 A time-lag fuse  
200 V to 240 V: 1.6 A time-lag fuse

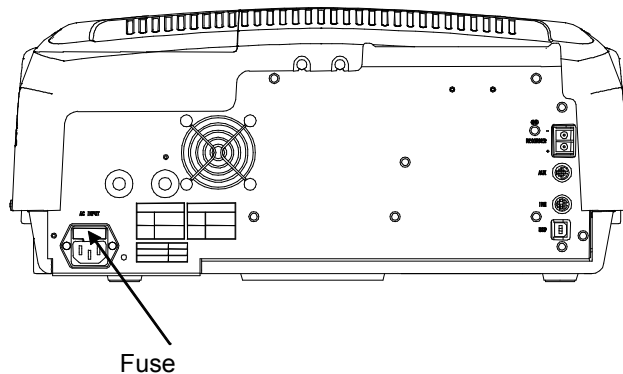


Figure 5.1 V-630 rear panel

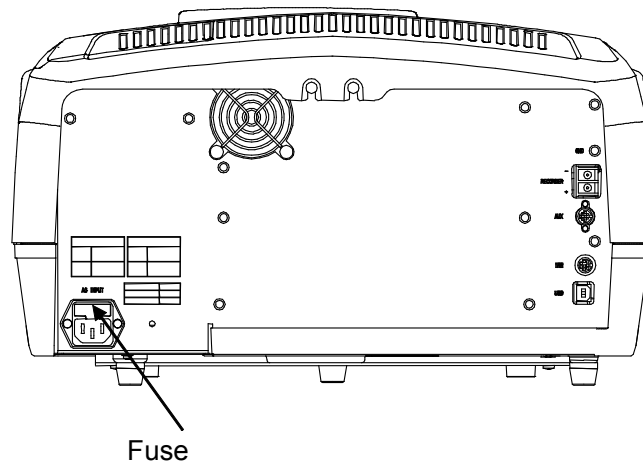


Figure 5.2 V650/660/670 rear panel

**Note: Replace both fuses, even if only one is burned out.**

- (1) Turn off the power and disconnect the AC power cable from the "AC INPUT".
- (2) Insert a flat-head screwdriver under the fuse holder, then pull forward to remove the fuses with the holder (Fig. 5.3).
- (3) Take the old fuses out of the holder, and replace with new ones. Insert the fuse holder in its original position.
- (4) Plug the power cable into the "AC INPUT" and turn the power switch on, then check that the instrument can be operated.

**Note: If the fuses burn out again soon after replacement, contact your nearest local JASCO distributor.**

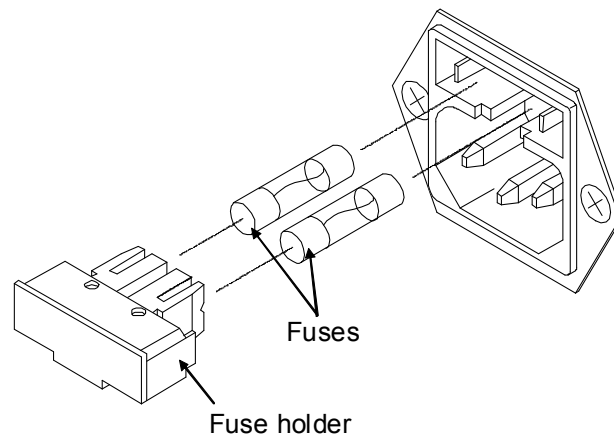


Figure 5.3 Replacement of fuse

### 5.3.2 Lamp Replacement and Adjustment of the Light Source Mirror

The lifetime of both the deuterium (D<sub>2</sub>) lamp and the halogen (WI) lamp is approx. 1000 hours. After prolonged use, the noise level in the measured data will increase because of the low light intensity.

#### 5.3.2.1 Lamp replacement

##### **WARNINGS!:**

- (1) The lamp is hot when lit. Therefore, before replacing the lamp, switch off the light source and wait for at least 15 minutes.
- (2) To avoid electric shock, turn off the power and remove the power cable from the outlet.

##### **Notes:**

- (1) *Never loosen any screws other than those required for lamp replacement.*
- (2) *When handling the lamp, wear clean cloth gloves. Never handle the lamp with bare hands.*
- (3) *Never touch the mirror or any other optical elements by hands.*
- (4) *If the lamp surface is contaminated, clean it with gauze soaked in ethanol and wipe it with dry clean gauze.*

##### <<Replacement of halogen (WI) lamp>>

- (1) Slide the outer lid of the light source unit to remove it and then remove the inner lid (Fig. 5.4). The way to remove the lamp is the same for V-630, even though V-650/660/670 is shown in figure 5.4.

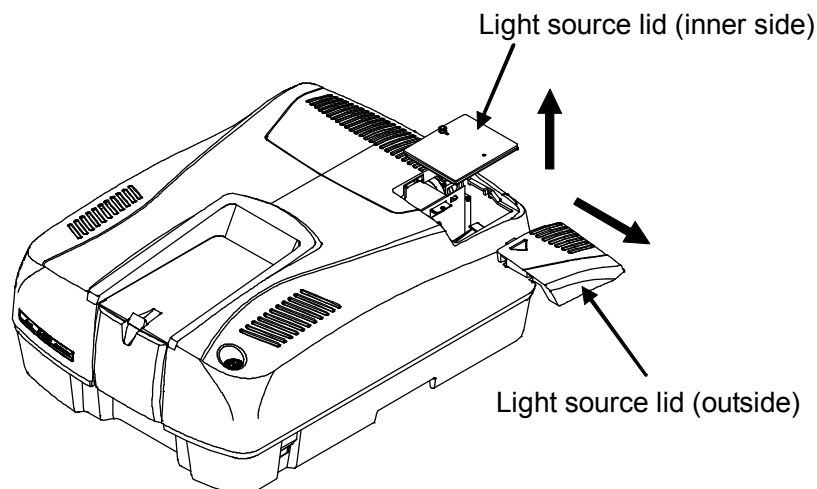


Figure 5.4 Removal of light source lid (V-650/660/670)

- (2) Remove the halogen lamp from the socket.
- (3) Insert a new halogen lamp into the socket (Fig. 5.5 or 5.6).
- (4) Adjust the light source mirror as described in Section 5.3.2.2 or 5.3.2.3.

### <<Replacement of deuterium lamp>>

- (1) Slide the outer lid of the light source unit to remove it.
- (2) Remove the deuterium lamp from the socket.
- (3) Insert a new deuterium lamp into the socket (Fig. 5.5 or 5.6).
- (4) Adjust the light source mirror as described in Section 5.3.2.2 or 5.3.2.3.

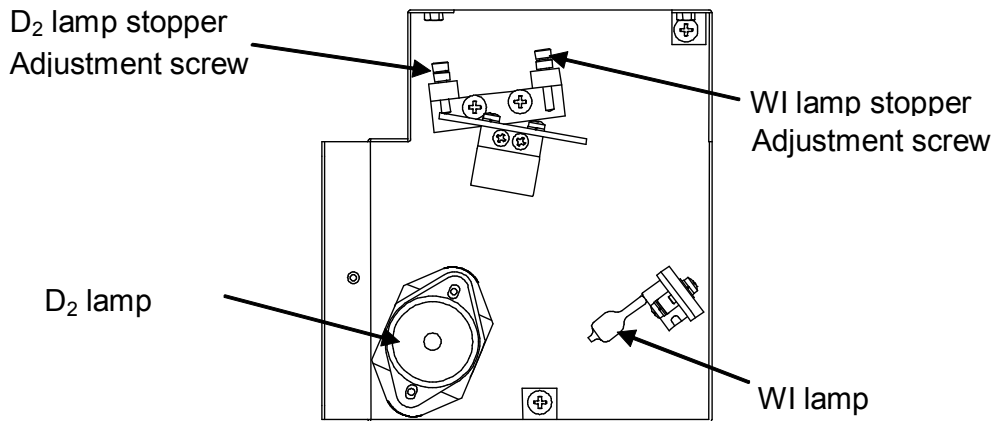


Figure 5.5 Light source unit (V-630)

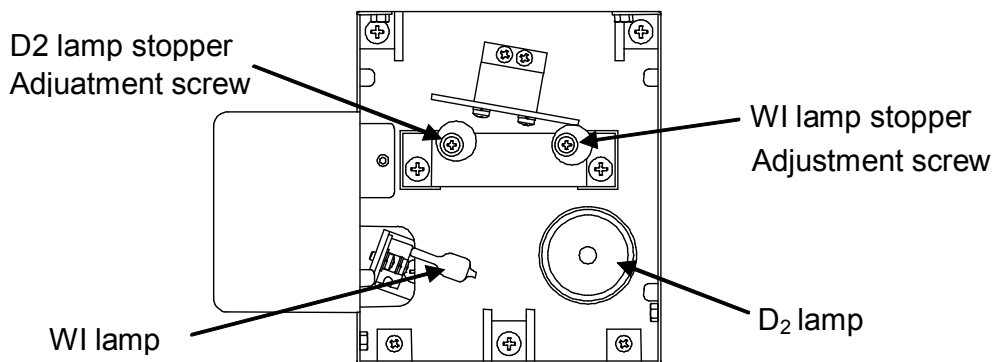


Figure 5.6 Light source unit (V-650/660/670)

### 5.3.2.2 Adjustment of iRM type light source mirror

When the light source is replaced, if the beam from the lamp is not incident upon the entrance slit correctly, problems will occur, such as insufficient light intensity, a non-linear baseline, and incorrect values for measurements. Whenever the lamp is replaced, be sure to adjust the light source mirror.

#### **WARNINGS!:**

- (1) The lamp is hot when lit. Do not touch with bare hands.
- (2) Wear glasses (ordinary glasses or sunglasses) during adjustment to protect your eyes from ultraviolet rays.
- (3) Do not touch the wiring either with your hand or with a screwdriver. Contact with the wiring may cause electric shock.

*Note: Never loosen any screws other than those required for lamp replacement.*



### <<Adjustment of light source mirror for halogen lamp>>

- (1) Turn on the instrument and the halogen lamp.
- (2) Select [Environment] from the main menu to display the [Environment] menu.
- (3) Select [Single Beam Measurement] from the [Environment] menu to display the single beam measurement window.
- (4) Set parameters as follows.

#### **V-630 measurement parameters**

Photometric mode	Sam
Response	Fast

#### **V-650/660/670 measurement parameters**

Photometric mode	Sam
Response	Fast
Band Width	2.0 nm
PMT Voltage	200 V

- (5) Set the wavelength to 500 nm.
- (6) Slide the lid of the light source unit to remove it (see Fig. 5.4).

**Note:** Do not mistakenly loosen other screws instead of the adjustment screw.

- (7) Turn the halogen lamp stopper adjustment screw (Fig. 5.5 or 5.6) and search for a position where the value displayed on the monitor is a maximum.
- (8) Replace the lid of the light source unit.

### <<Adjustment of light source mirror for deuterium lamp>>

- (1) Turn on the instrument, and light the deuterium lamp.
- (2) Select [Environment] from the main menu to display the [Environment] menu.
- (3) Select [Single Beam Measurement] from the [Environment] menu to display the single beam measurement window.
- (4) Set parameters as follows.

#### **V-630 measurement parameters**

Photometric mode	Sam
Response	Fast

#### **V-650/660/670 measurement parameters**

Photometric mode	Sam
Response	Fast
Band width	2.0 nm
PMT voltage	300 V

- (5) Set the wavelength to 250 nm.
- (6) Slide the lid of the light source unit to remove it (see Fig.5.4).

**Note:** Do not mistakenly loosen other screws instead of the adjustment screw.

- (7) Turn the deuterium lamp stopper adjustment screw (Fig. 5.5 or Fig. 5.6) and search for a position where the value displayed on the monitor is a maximum.
- (8) Replace the of the light source unit.

### 5.3.2.3 Adjustment of PC type light source mirror

When the light source is replaced, if the beam from the lamp is not incident upon the entrance slit correctly, problems will occur, such as insufficient light intensity, a non-linear baseline, and incorrect values for measurements. Whenever the lamp is replaced, be sure to adjust the light source mirror.

#### **WARNINGS!:**

- (1) The lamp is hot when lit. Do not touch with bare hands.
- (2) Wear glasses (ordinary glasses or sunglasses) during adjustment to protect your eyes from ultraviolet rays.
- (3) Do not touch the wiring either with your hand or with a screwdriver. Contact with the wiring may cause electric shock.

*Note: Never loosen any screws other than those required for lamp replacement.*

#### <<Adjustment of light source mirror for halogen lamp>>

- (1) Turn on the instrument.
- (2) Start [Abs/%T meter] from the [Spectra Manager] window and appears the [Abs/%T meter] window.
- (3) Set parameters as follows.

##### **V-630 measurement parameters**

Photometric mode	Sample
Response	Fast
Wavelength	500 nm
Halogen lamp	Turn on

##### **V-650/660/670 measurement parameters**

Photometric mode	Sample
Response	Fast
Band Width	2.0 nm
Wavelength	500 nm
HT Voltage	200 V
Halogen lamp	Turn on

- (4) Slide the lid of the light source unit to remove it.

*Note: Do not mistakenly loosen other screws instead of the adjustment screw.*

- (5) Turn the WI lamp stopper adjustment screw (Fig. 5.5 or Fig. 5.6) and search for a position where the value displayed on the monitor is a maximum.
- (6) Replace the lid of the light source unit.

#### <<Adjustment of light source mirror for deuterium lamp>>

- (1) Turn on the instrument.
- (2) Start [Abs/%T meter] from the [Spectra Manager] window and appears the [Abs/%T meter] windows.
- (3) Set parameters as follows.

##### **V-630 measurement parameters**

Photometric mode	Sample
Response	Fast
Wavelength	250 nm
Deuterium lamp	Turn on

##### **V-650/660/670 measurement parameters**

Photometric mode	Sample
Response	Fast
Band Width	2.0 nm
Wavelength	250 nm
PMT Voltage	200 V
Deuterium lamp	Turn on

(4) Slide the lid of the light source unit to remove it (see Fig.5.4).

**Note:** *Do not loosen screws other than the adjustment screw for the stopper.*

(5) Turn the deuterium lamp stopper adjustment screw (Fig. 5.5 or Fig. 5.6) and search for a position where the value displayed on the monitor is a maximum.

(6) Replace the lid of the light source unit.

### 5.3.3 Consumable Parts

Table 5.1 gives consumable parts necessary for maintenance. On any order, please quote the part names and also the part numbers.

Table 5.1 Consumable parts

Part name	Part number	Description
Halogen lamp (WI)	5330-0099	
Deuterium lamp (D <sub>2</sub> )	5330-0094B	
Fuse (2.0 A Time-lag fuse)	5840-H102A	5 fuses/set, V-630, 100 V
Fuse (2.5 A Time-lag fuse)	5840-H103A	5 fuses/set, V-650/660/670, 100 V
Fuse (1.6 A Time-lag fuse)	5840-H106A	5 fuses/set, V-630/650/660/670, 200 V

## 6 Troubleshooting

If the spectrophotometer does not operate normally, it may be due to the following causes:

- Erroneous operation
- Deterioration of a consumable parts
- Instrument trouble

Possible causes and corrective actions to be taken against these problems are given below in the troubleshooting chart. In the event that the trouble cannot be corrected after following the actions given in the troubleshooting chart, contact your local JASCO distributor and provide the model name and serial number of your instrument together with a complete description of the problem.

When checking the instrument, observe the following warnings and cautions.

### **WARNINGS!:**

- (1) Do not directly look at the light (ultraviolet ray) emitted from the deuterium lamp as this may cause injury your eyes. Wear glasses (ordinary glasses or sunglasses) during adjustment.
- (2) The lamp is very hot when lit. When the lamp is lit do not touch with bare hands. Before replacing the lamp, wait for at least 15 minutes after turning off the lamp until the lamp cools down.
- (3) Before checking the electrical system, be sure to turn off the power switch.

### **Notes:**

- (1) *Before plugging in the AC power cable, ensure that the power switch is in the OFF position.*
- (2) *Never touch the mirror or any other optical elements by hands.*

<b>Symptoms</b>	<b>Check</b>	<b>Possible solutions</b>
The instrument does not operate at all.	<ol style="list-style-type: none"> <li>1. Check if the power cable is securely plugged into the outlet.</li> <li>2. Remove the power cable from the outlet and check the fuse in the main unit. Replace the fuse if blown.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reconnect the cable securely, if disconnected.</li> <li>2. Replace the fuse if it blows. (Refer to Section 5.3.1.) If the fuse blows immediately after replacement, the electrical system is faulty. Contact your local JASCO distributor.</li> </ol>
WI lamp does not come on.	Check the WI lamp to see if it has burnt out.	Replace the lamp with a new one if burnt out. (Refer to Section 5.3.2.)
D <sub>2</sub> lamp does not come on.	Check the D <sub>2</sub> lamp to see if it has burnt out.	Replace the lamp with a new one if burnt out. (Refer to Section 5.3.2.)
The baseline is curved greatly, in excess of 1%.	Check if baseline correction is set to "OFF".	Set it to "ON" if set to "OFF" (Refer to the Software manual.)
When the light source is changed from WI to D <sub>2</sub> , the step height of the baseline is greater than 1%.	<ol style="list-style-type: none"> <li>1. Check if baseline correction is set to "OFF".</li> <li>2. Poor adjustment of light source mirror.</li> <li>3. Check if the standard cell holder is in good contact with the two positioning pins. The beam may be incident upon the cell holder.</li> </ol>	<ol style="list-style-type: none"> <li>1. Set it to "ON" if set to "OFF". (Refer to the Software manual.)</li> <li>2. Re-adjust the mirror referring to Section 5.3.2.2 or Section 5.3.2.3.</li> <li>3. Set the standard cell holder in the correct position.</li> </ol>
The performance at wavelengths shorter than 320 nm is not stable.	D <sub>2</sub> lamp is "OFF".	Turn the D <sub>2</sub> lamp "ON" (Refer to the Software manual.)
The performance at wavelengths longer than 400 nm is not stable.	WI lamp is "OFF".	Turn the WI lamp "ON". (Refer to the Software manual.)
Noise is high.	<ol style="list-style-type: none"> <li>1. Check if light is incident upon the center of the entrance slit.</li> <li>2. Spectral bandwidth is too small.</li> <li>3. The absorption of the solvent placed on the reference beam side is too high.</li> <li>4. Lamp output has deteriorated.</li> </ol>	<ol style="list-style-type: none"> <li>1. If not, adjust the light source mirror. (Refer to Section 5.3.2.2 or Section 5.3.2.3.)</li> <li>2. Increase the spectral bandwidth.</li> <li>3. Replace the solvent with a more suitable one.</li> <li>4. Replace the lamp with a new one. (Refer to Section 5.3.2.)</li> </ol>

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