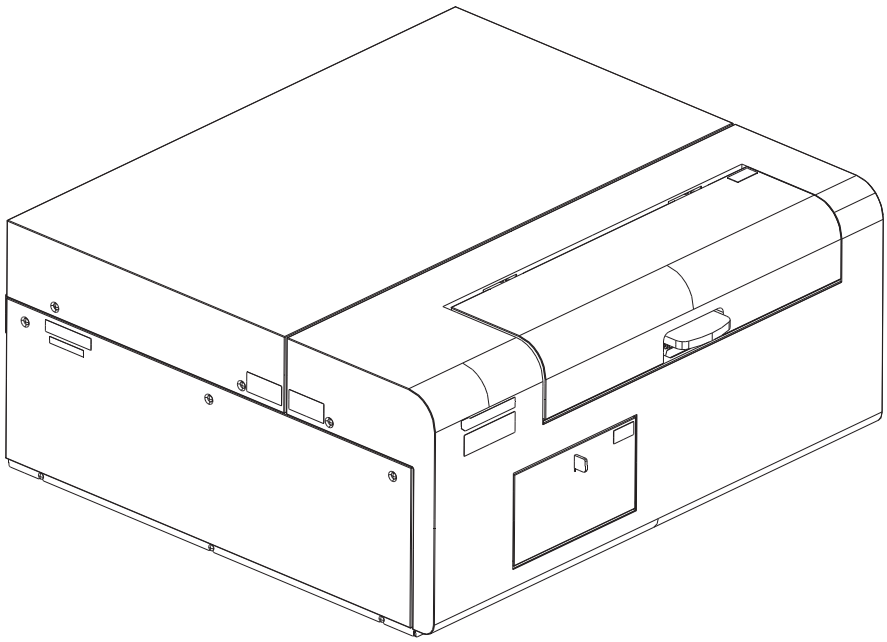
FUJIFILM

Fluor Imager

FLA-5100

OPERATION MANUAL



Version 2.0

2004. Feb

◇ Contents ◇

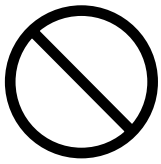
Part
1

PRECAUTIONS

This section describes the matters that require special attention to the safe use of the FLA-5100.
This section shows the general precautions for using the FLA-5100, some of which are also described in other sections.

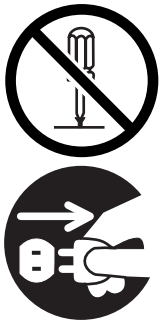
⚠ CAUTION

- Do not place a vase, flowerpot or glass containing water or a metallic object on this instrument. If water or metallic object penetrates into the instrument, it may cause a fire, electric shocks or electrocution.
- Do not place a heavy object on this instrument. If it falls down or drops, it may cause injury.



⚠ WARNING

- Do not modify this instrument. Unauthorized modification may cause a fire, electric shocks or electrocution.
- If a metallic piece, water, fluid or foreign matter is put in the instrument, turn off the instrument, disconnect the AC power cable, and contact the dealer. Using the instrument with foreign matters in it may cause a fire, electric shocks or electrocution.



⚠ CAUTION

- Ask the dealer to move this instrument when needed.
- When you use the instrument for a long time, take a rest for 10 to 15 minutes every hour and give your eyes and hands a rest.

1. Grounding Safety

Purposes of grounding

It is quite important to ground an electric or electronic instrument. The purposes of grounding are as shown below:

(1) Preventing damages to the instrument caused by charging of the metallic casing originating from deterioration or defects of insulating material used in the electrical circuits of the instrument.

(2) Preventing electrostatic hazards caused by static electricity in the instrument.

(3) Eliminating noises by equalizing the potential levels of the instrument casing and the ground.

(4) Preventing lightning damages.

Grounding work

Before use, the FLA-5100 Reader must be connected to the protective earth line of the indoor wiring.

WARNING

Be sure to ground this instrument. A failure to ground the instrument may cause leakage, which will result in a fire, electric shocks or electrocution. Consult the dealer if it is impossible to ground the instrument.

Although the LD laser (670nm-wavelength) is optional with FLA-5100, this manual is written with the presupposition that the optional LD laser (670nm-wavelength) is adopted.

2. Laser Safety

Caution

Caution-use of controls or adjastments or performance of procedures other than those specified herein may result in hazardous rodiation exposure.

Lasers used

The FLA-5100 uses the following four lasers:

(1) LD laser, class IIIb, wavelength of 635 nm, maximum power of 20 mW (CW)
(2) SHG laser, class IIIa, wavelength of 473 nm, maximum power of 2 mW (CW)
(3) SHG laser, class IIIb, wavelength of 532 nm, maximum power of 5.5 mW (CW)
(4) LD laser, class IIIb, wavelength of 670 nm, maximum power of 10 mW (CW)

Applicable safety standards

This instrument meets the laser radiation safety requirements specified in the Code of the Federal Regulations (21 CFR, Chapter 1, Subchapter J).

It also conforms to EN60825-1/A11 (1996), Class 1 Laser Product.

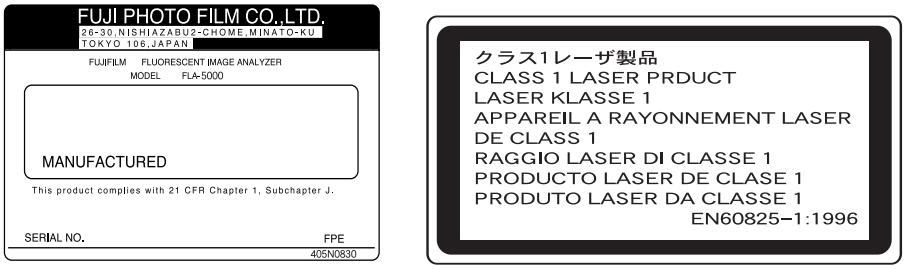


Fig.1.1

Laser safety

This instrument conform to the above-mentioned Code of the Federal Regulations and is designed to be safe against laser radiation. The laser leak level is suppressed below 22.1 mJ for sufficiently safe operation, provided the user carries out operation (including user maintenance) of the instrument properly.

Instrument cover

The cover is fixed with screws to the instrument.
If you loosen these screws or detach the cover, laser beam may leak out. Never loosen these screws or detach the cover. Such an act is allowed to a serviceman only.

⚠ WARNING

Never detach the inner cover screwed to this instrument. If it is detached, laser beam may leak and you may loose your eyesight.

(Back of the instrument)

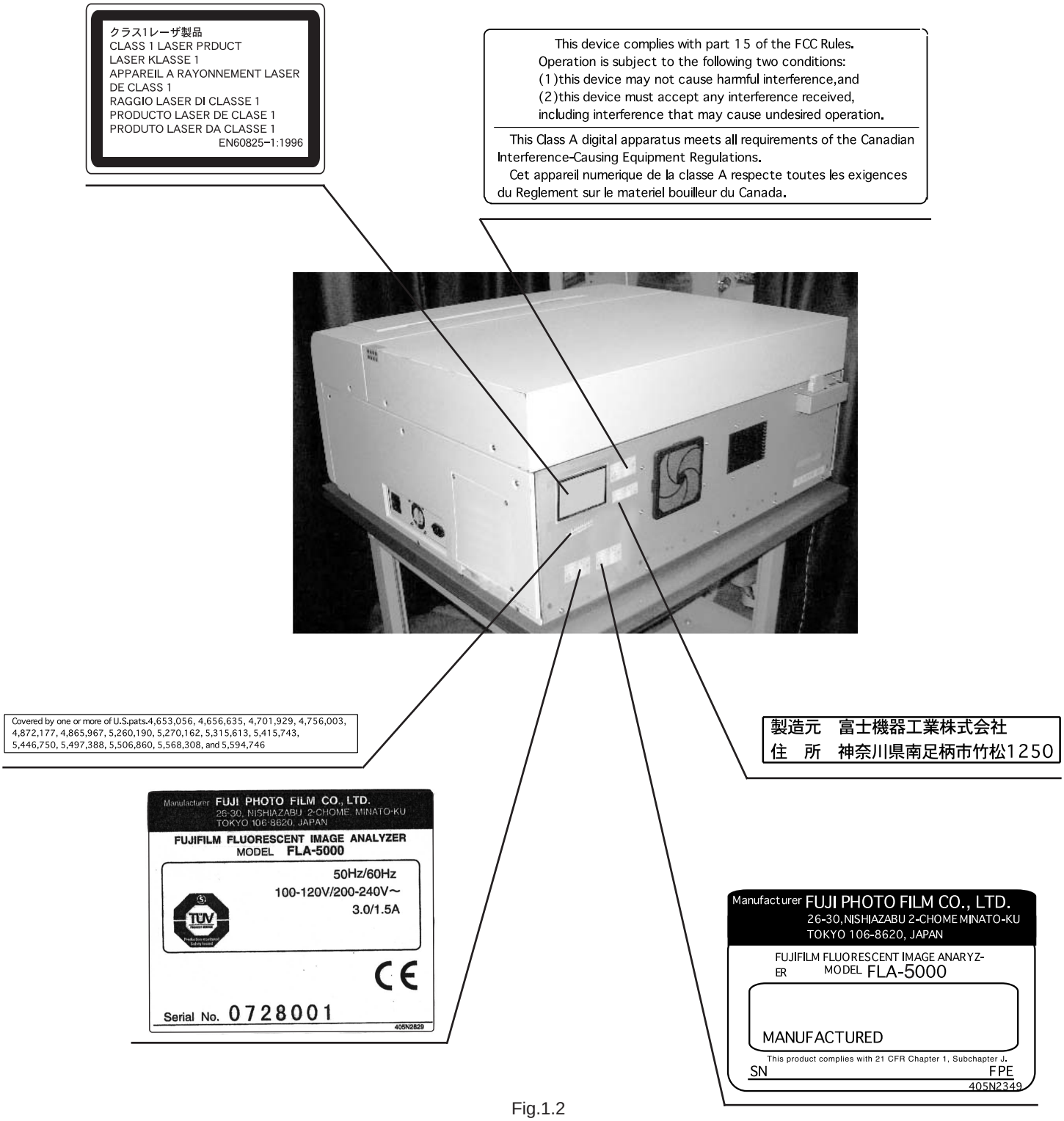
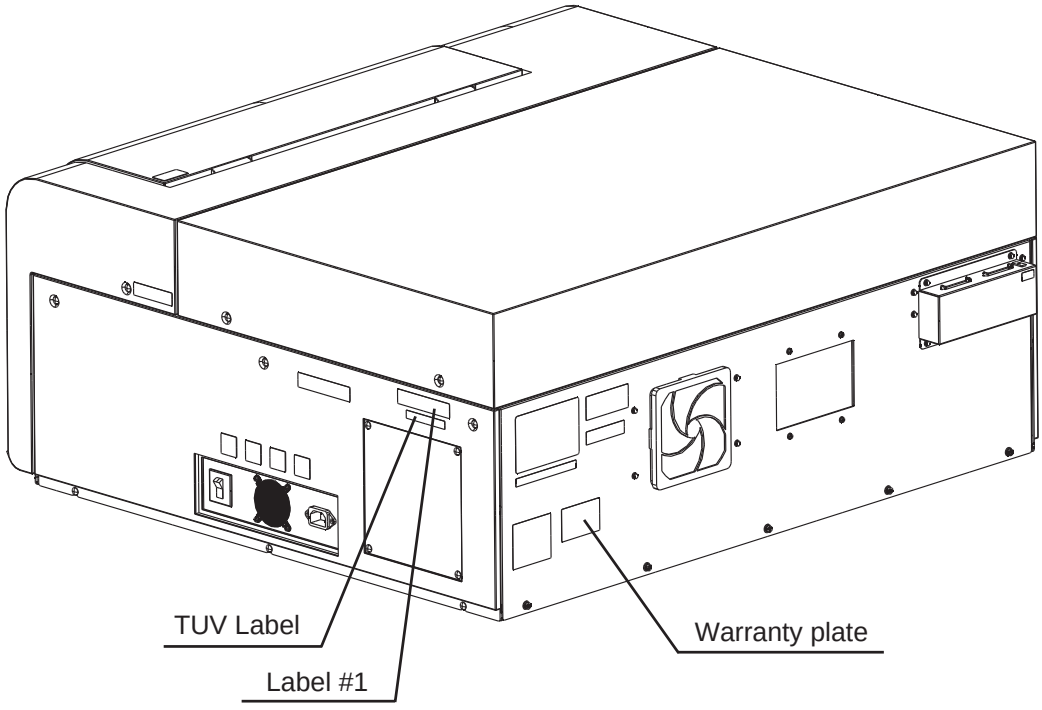
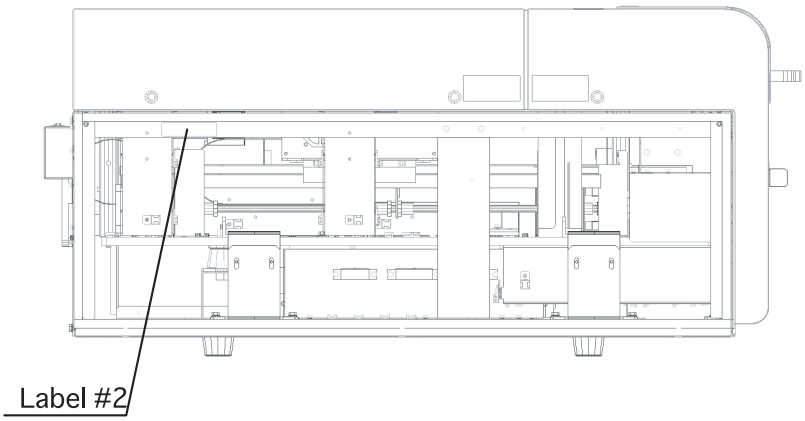
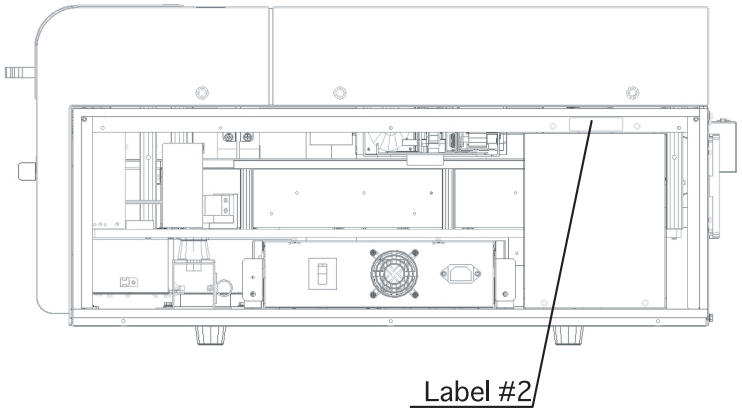


Fig.1.2

Sticking positions of the warranty plate and labels #1, #2
(Rear panel)







Manufacturer FUJI PHOTO FILM CO., LTD.
26-30,NISHIAZABU 2-CHOME MINATO-KU
TOKYO 106-8620, JAPAN

FUJIFILM FLUORESCENT IMAGE ANALYZER
MODEL **FLA-5000**

MANUFACTURED

This product complies with 21 CFR Chapter 1 , Subchapter J.

Serial No. FPE

405N2830

Warranty plate

DANGER-Laser radiation when open
AV OID DIRECT EXPOSURE TO BEAM

Label #1

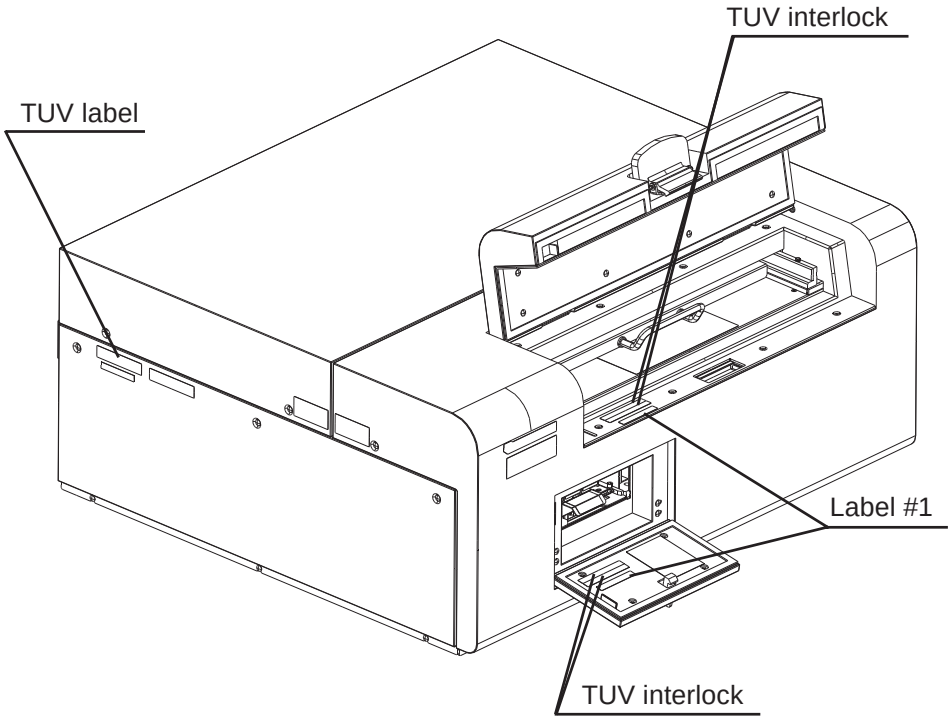
DANGER
Laser radiation
when open external cover
AV OID DIRECT EXPOSURE TO BEAM

Label #2

注意 ――――ここを開いて、インターロックを解除するとレーザー光が出ます。
ビームを直接見たり、触れたりしないでください。
CAUTION — LASER RADIATION WHEN OPEN
AVOID EXPOSURE TO BEAM

TUV label

Sticking positions of the labels #1



DANGER
Laser radiation
when open external cover and interlock defeate.
AV OID DIRECT EXPOSURE TO BEAM

Label #1

注意 ———ここを開いて、インターロックを解除するとレーザー光が出ます。
ビームを直接見たり、触れたりしないでください。
CAUTION — LASER RADIATION WHEN OPEN
AVOID EXPOSURE TO BEAM

TUV lavel

注意 ———ここを開いて、インターロックを解除するとレーザー光が出ます。
ビームを直接見たり、触れたりしないでください。

CAUTION —— LASER RADIATION WHEN OPEN AND INTERLOCK
DEFEATED. AVOID EXPOSURE TO BEAM

TUV interlock

3. High-Voltage Safety

This instrument employs a high-voltage power supply unit for the lasers and photo-multipliers (PMTs).
However, the user is completely free from the possibility of touching the high-voltage power supply unit, provided the user carries out operation (including user maintenance) of the instrument properly.

⚠ WARNING

Never detach the cover from the instrument. This instrument has high-voltage circuits. If you detach the cover, you may possibly get an electric shock or be electrocuted in the worst case.

4. Regulations and Standards

This instrument fits or conforms to the regulations and standards shown below.

EMC
- Japan VCCI, Class A (Conformance)
- USA FCC Rules, Part 15, Class A
- Europe EMI EN55022 (1998)
  EMS EN55024 (1998)

Safety
- Europe EN61010-1 (1993) + A2 (1995)
  Pollution Degree 2
  Overvoltage Category II
  TUV approval (TUV PS)

Laser
- USA 21 CFR, Chapter I, Subchapter J, Part 1040.10 Laser Products
- Europe EN60825-1/A11 (1996)

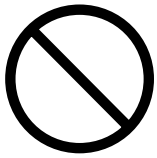
CE
- LV Instruction (73/23/EEC)
- EMC Instruction (89/336/EEC)

Fig. 1.3

5. Radiation Safety

CAUTION

Follow the instructions of your radiation administrator if radioisotope pollution occurs.



Relationship with radiation hazard prevention law

This instrument is not equipped with any radioisotope (RI) or radiation generating unit. Therefore, the radiation hazard prevention law or relevant regulations do not impose any legal controls on the instrument.

Radio isotope pollution

This instrument is, however, capable of reading image plates (IPs). The IP surface may be polluted by radioisotope (RI), depending on the sample condition.
Such pollution is greatly influenced by the sample condition, and it is quite difficult to foresee the degree of pollution.
Radioisotope pollution may harm the FLA-5100 body due to improper operation or an unexpected trouble. The performances of the FLA-5100 will not be deteriorated even if it is polluted by radioisotope.
However, it is not easy to know about the degree of pollution of objects that may sustain such radioisotope pollution.

6. Radiation Hazard Prevention Related to Radioisotope Pollution

Controlled area

Paragraph 1 of Article 1 of the Law Enforcement Rules for Prevention of Radiation Hazards due to Radioisotope and so forth (Prime Minister's Office ordinance No. 56) defines the controlled area as "a place where the dose equivalent related to external radiation exceeds the dose equivalent determined by the Director General of the Science and Technology Agency (hereinafter referred to as the Director General), the concentration of radioisotope in the air exceeds the concentration determined by the Director General, or the radioisotope density on the surface polluted by radioisotope exceeds the density determined by the Director General."

Limit of superficial pollution

Paragraph 3 of Article 4 of Notice No. 15 of the Science and Technology Agency that determines the quantity, etc. of radiating isotope specifies that the density of radioisotope on the surface polluted by radioisotope must be one tenth of the density defined in Article 8.
Article 8 and Table 3 of this Notice define the limits as shown below:
(1) Superficial density of radioisotope that radiates alpha rays: 4 Bq/cm^2
(2) Superficial density of radioisotope that does not radiate alpha rays: 40 Bq/cm^2

Installation site of instrument

This instrument is capable of reading not only IPs but also fluorescent pigment label samples (non-RI method). Therefore, it is recommended that the user should install it outside the controlled area and use RI-indicated samples without contacting them with IPs directly.
However, as described above, the IP surface may be polluted by radioisotope (RI), depending on the sample condition, since the instrument sticks the sample fast to the ^{3}H-compatible IP surface and exposes it in an auto-radiography experiment of the ^{3}H label sample.

When a sample is in direct contact with an IP, it is generally known that the sample for making an auto-radiogram contains quite a small quantity of radioisotope. However, the degree of superficial pollution of the IP is greatly influenced by the dryness of the sample and dose of radioisotope in an experiment and may exceed the limits mentioned in [Limit of superficial pollution] above.

When the instrument reads an IP with a polluted non-exposure area, it may be polluted. The degree of such superficial pollution greatly differs with users' operation conditions. Superficial pollution may exceed the limit mentioned above.

<u>As mentioned above, install this instrument in the RI controlled area if the user uses RI-indicated samples that will be in direct contact with IPs.</u>

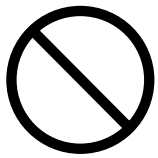
Carrying out of the controlled area

If it is necessary to carry the instrument and its laboratory, which were installed and have been used in the controlled area, out of the controlled area, it should be made sure that the degree of the superficial pollution is below the limits mentioned in [Limit of superficial pollution] above.

7. Radioisotope (RI) Pollution

⚠ CAUTION

Follow the instructions of your radiation administrator if radio isotope pollution occurs.



RI pollution of IP

This instrument is capable of reading IPs. The IP surface (fluorescent material surface) may be polluted by radioisotope (RI), depending on the sample conditions, if a sample is in direct contact with the IP surface.

If even a part of the protection layer is damaged and the fluorescent material surface is RI-polluted, such pollution may not be eliminated.

Dispose of RI-polluted ^{3}H-compatible IPs as non-flammable radioactive waste.

If RI-polluted ^{3}H-compatible IPs are stored with other non-polluted IPs, pollution may be transcribed to the non-polluted IPs. Be very careful.

IPs may be used repetitively and accordingly should be protected against RI pollution. If a RI sample is used in direct contact with an IP, cover the RI sample with Saran Lap® or other lapping film to prevent it from touching the IP surface directly.

Note this it is difficult to eliminate RI pollution completely if a general-purpose IP surface is RI-polluted.

NOTE:

Saran Lap® is the registered trademark of Asahi Chemical Industry Co., Ltd.

Pollution of instrument body

The fluorescent material surface of a ^{3}H-compatible IP may be polluted by radioisotope. Therefore, RI pollution may expand to the inside of the instrument (within the limit of the IP transporting route) in the case of improper operation.

It is necessary to use the instrument properly in order to prevent expansion of RI pollution (to the inside of the instrument), though the performances of the instrument will not be deteriorated even if the instrument is RI-polluted.

8. Maintenance of SHG Laser

The SHG laser units employed in this instrument require periodical calibration. If they are not calibrated periodically, SHG-laser reading may be disabled or the life of the SHG lasers may be reduced.
When the user turns on and starts the instrument, the SHG lasers are calibrated automatically. Thus, the user need not pay special attention to periodical calibration if using it at short intervals. Even though the instrument is not used for a long time, the user only has to turn it on once every 30 days and it is calibrated automatically.

9. Installation Environment

This instrument reads IPs and fluorescent samples in a well-lighted room. However, do not install it in a place exposed to the direct sunlight, which is not suitable to IP reading and may cause temperature rise inside the instrument or shield leakage, resulting in a failure of proper operation of the instrument. Install the instrument in a place that meets the temperature and humidity conditions shown in "Specifications" (shown on page 148).

10. Precaution for Disposal

It is not certain that this instrument will not be RI-polluted, depending on the operating conditions, even if it is installed out of the controlled area. Before disposing of the instrument body, IPs and/or other materials, check superficial pollution as mentioned in 6 "Radiation Hazard Prevention Related to Radioisotope Pollution" above, whether the instrument is installed inside or outside the controlled area. Dispose of them as radioactive waste if the superficial pollution level exceeds the limit. Most of the parts composing of this system fall under the category of the industrial wastes. If the superficial
pollution level is below the allowable limit, dispose of the instrument body, IPs and other materials as industrial wastes in conformity to the "law with regard to disposal and cleaning of wastes." (The instrument body and IPs are industrial wastes.)

11. Other Instructions

FLA fluor-stage

⚠ CAUTION

- The FLA fluor-stage(Hereinafter referred to as the fluor-stage) weighs about 2 kg. If it drops onto your feet, your feet will be injured.
- The fluor-stage employs a glass plate. Be very careful not to drop it. Never place any other objects than samples on the glass plate or apply pressure to it.
- Be very careful not to break the glass plate of the fluor-stage. The broken glass may cause injury.
- If the fluor-stage drops and becomes as shown below, it may be unusable.
  *Bending *Edge Damage *Scratches on glass *Glass breakages
- The sample placed on the FLUOR stage shall be not higher than 20 mm, and the solution shall be 4 mm or lower.

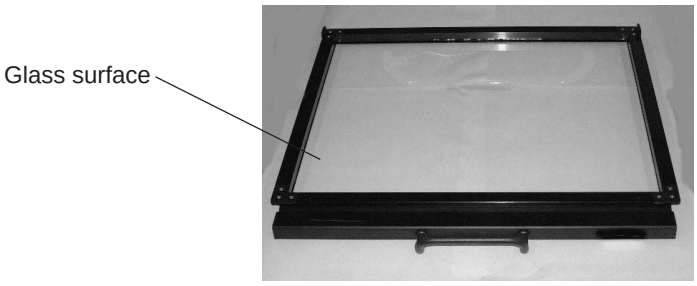


Fig. 1.4 FLA Fluor-Stage

NOTE:

Put the fluor-stage in the exclusive case and keep it in safe when not using it.

Fig. 1.5

FLA multi-stage

⚠ CAUTION

- The FLA multi-stage advanced (hereinafter referred to as the multi-stage) weighs about 2.5 kg. If it drops onto your feet, your feet will be injured.
- **When gel with glass is mounted on the multi-stage, fix it securely with the stopper in order not to allow it to come off. Be very careful not to drop the multi-stage. Never place any other objects than samples on the glass surface or apply pressure to it. Becareful not to break the glass of the multi-stage. The broken glass may cause injury.**
- **When the FLA TP plug-in and titer plate are mounted on the multi-stage, do not tilt them. Otherwise, they may drop from the multi-stage.**
- **If the multi-stage drops and becomes as shown below, it may be unusable.**
  ***Bending *Edge Damage *Stopper breakages**

Fig. 1.6 FLA Multi-Stage Advanced

Fig. 1.7 FLA TP Plug-In
(Accessory of Multi-Stage)

NOTE:

Place the FLA TP plug-in on the multi-stage, put them together in the exclusive case and keep it in safe when not using the multi-stage.

Fig. 1.8

FLA IP stage

⚠ CAUTION

- The FLA IP-stage (hereinafter referred to as the IP-stage) weighs about 2.5 kg. If it drops onto your feet, your feet will be injured.
- If the IP stage drops and is deformed or its parts are chipped off, it may be unusable.

(IP sticking side)

Fig. 1.9 FLA IP Stage

NOTE:

Put the IP stage in the exclusive case and keep it in safe when not using it.

Fig. 1.10

Part
2

SYSTEM CONFIGURATION

1. Features of Instrument

The Fuoro Image Analyzer FLA-5100 employs solid-state lasers of wavelengths suitable to excitation of fluorescent pigments originally developed by Fuji Photo Film Co., Ltd. It combines several lasers of different wavelengths with many types of filters and may read gel, membranes, etc. dyed with various fluorescent pigments.
In addition, it may read imaging plates (IPs) originally developed as radiation energy sensors by Fuji Photo Film Co., Ltd.

After an IP is read, beams are emitted onto it uniformly inside the eraser to erase the after-image. It is possible to use IPs repeatedly by erasing after-images, resulting in cost saving. Besides, compactly designed IPs are easier to handle than the conventional X-ray film.
With these features, a single FLA-5100 unit enables not only gel imaging of DNA, RNA and protein but also auto-radiography.

This instrument system has the following features:

* Makes high-sensitivity, high-resolution images of gel, membranes, etc. dyed with fluorescent pigments.
* Provides very-high-resolution images equivalent to X-ray film.
* Reusable IPs feature very high sensitivity, wide dynamic range, reliable linearity and high resolution. (The ^{3}H-compatible IPs may not be used repeatedly.)
* Capable of other analysis during IP exposure. Reading completes within seven minutes.
* High resolution, high sharpness and linearity high surpassing any other film-less systems.
* Advanced system configuration requiring no darkrooms or automatic development systems.

2. Standard System Configuration

The standard components of this instrument are as shown below.

1. Instrument Body
   The instrument body reads IPs, or gel, membranes, etc. dyed with fluores cent pigments in the maximum size of 46 cm by 40 cm and transfers image data immediately to the analyzer unit.
   (*Hereinafter, the instrument body is merely referred to as the body in this manual.)

Fig. 2.1 Body

2. AC Power Cable
   The AC power cable is exclusive for this instrument.

3. FLA Fluor-Stage (Fluor-Stage) (Option)
   The fluor-stage is used to read gel dyed with fluorescent pigments or membranes to which enzyme amplification fluorescent procedure is applied. Put gel or membrane directly on the glass of the fluor-stage and set the stage in the instrument.

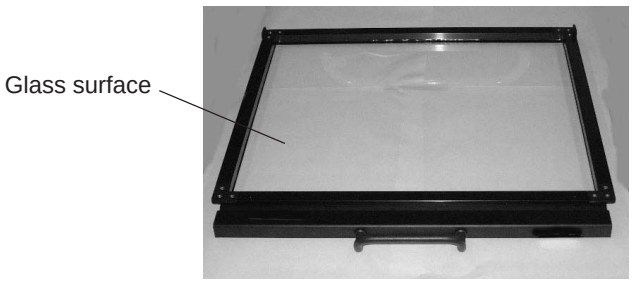


Fig. 2.2 FLA Fluor-Stage (Fluor-Stage)

4. FLA Multi-Stage Advanced (Multi-Stage) (Option)
   The multi-stage is used to read gel with glass (gel merely supported by glass) or titer plate. Mount gel with glass directly on the multi-stage. Or, set a titer plate to the FLA TP plug-in attached to the instrument and mount the titer plate on the multi-stage.

Fig. 2.3 FLA Multi-Stage Advanced

Fig. 2.4 FLA TP Plug-In
(Accessory of Multi-Stage)

5. IP Reading Kit (Option)

6. Reading Software "Image Reader"
   Install "Image Reader" in the analyzer unit and set the reading conditions to control the body. (The FLA-5100 comes with an operation manual.)

7. Filter Unit and Filter Block (Option)
   Select a filter most suitable to the laser and sample used.

8. Filter Expand Box (Option)
   An Optional equipment for a commercial 25mm filter use.

9. Active Terminator
   A SCSI terminator.

10. Operation Manual
    This printing.

3. IP Reading Kit

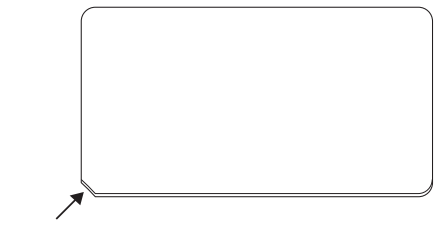
The IP reading kit consists of components for detecting radiation energy such as radioisotope from IPs, which are as shown below.

1. FLA IP stage (IP stage)
   The FLA IP stage is used to read IPs.
   Stick an IP on the magnetic side of the IP stage, and set the IP stage in the body.

(IP sticking side)

Fig. 2.5 FLA IP stage (IP stage)

2. Imaging plate (IP)
   The imaging plate IP is a quite new radiation energy memory type two-dimensional sensor with an image recording layer, which is formed by coating polyester supporting body highly densely with fine crystals of accelerated phosphorescent material.
   You may erase images recorded on IPs by irradiating light uniformly on them in the IP eraser. Therefore, it is possible to use IPs as many times as you like. (However, ^{3}H-compatible IPs may not be used repeatedly.)



Notch

Fig. 2.6 IP

3. BAS cassette (with BAS gauge)
   The BAS cassette is used to expose IPs.

Fig. 2.7

BAS gauge
It is possible to read not only the whole IP but also any intended part of the IP. The BAS gauge is used to specify a part to be read.

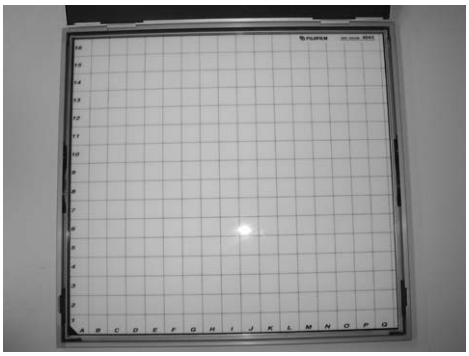


Fig. 2.8 BAS Gauge

4. Suction plate
   The suction plate is used to suck an IP and take it out of the cassette when moving it from the cassette onto the IP stage.

Fig. 2.9 Suction plate

4. Body

⚠ WARNING

Do not connect the body with an AC power line that supplies voltage higher or lower than the indicated source voltage. Do not put any other loads on the AC outlet with which the body is connected. Disobedience to this instruction may cause a fire, electric shocks or electrocution.

1. Power switch

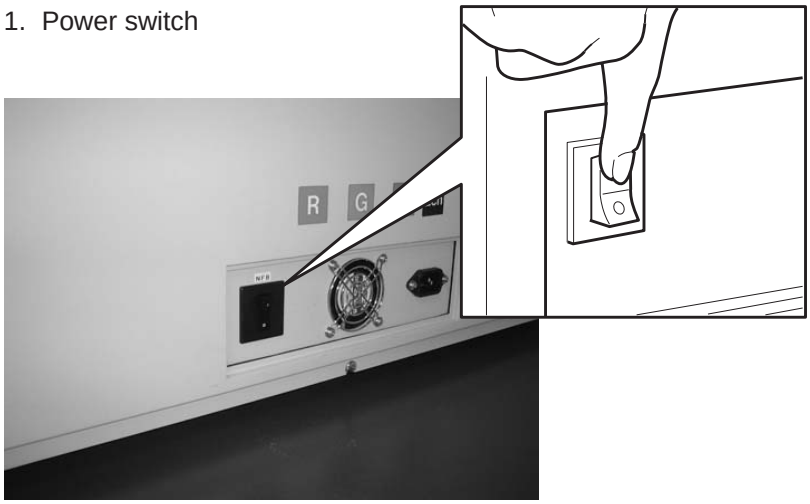


Fig. 2.10 Turning On Body

2. Stage setting block

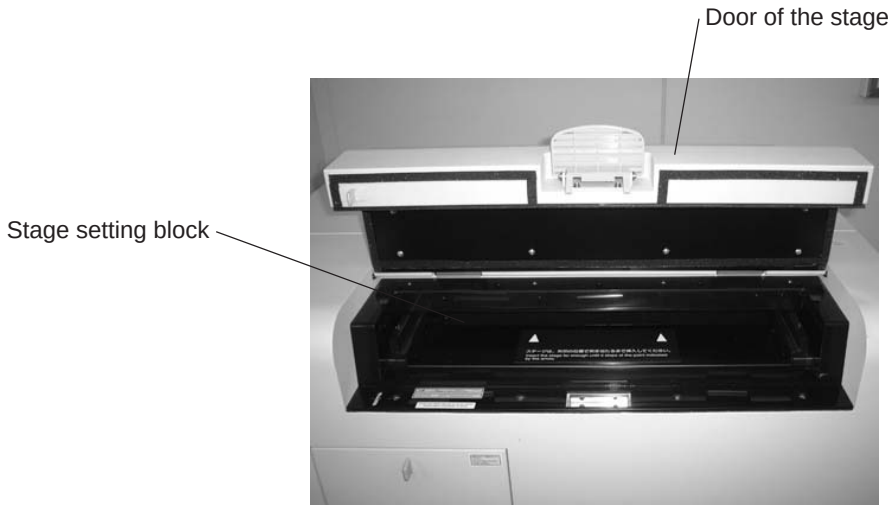


Fig. 2.11 Stage Setting Block

3. Indicator lamps

Three indicator lamps go on, blink or go out to indicate the body condition, occurrence of an error and so forth.

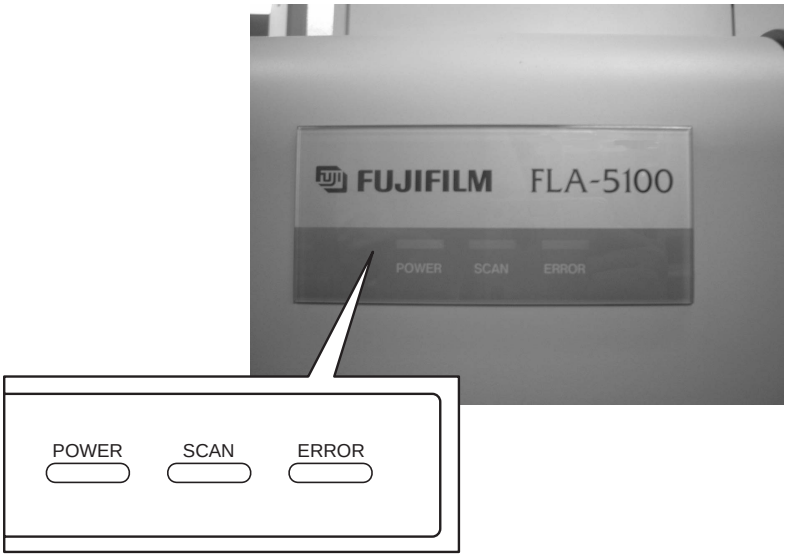


Fig. 2.12 Indicator Lamps

4. SCSI ID change-over switches

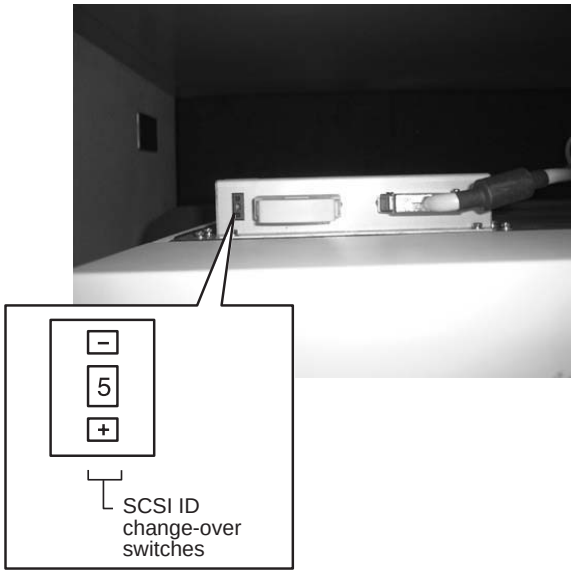


Fig. 2.13 SCSI ID Change-Over Switches

SCSI ID change-over switches:

Use these switches to change the SCSI ID of the body.

NOTES1:

Be sure to turn off the body, analyzer unit and peripheral devices before changing the SCSI ID.

NOTES2:

Changing the SCSI ID may cause inconsistency with the setting of the analyzer unit (computer) or assigning the same ID redundantly to the body and peripheral device, resulting in malfunctioning of the system. Be very careful when changing the SCSI ID.

NOTES3:

SCSI ID 7 is used for the maintenance mode.
Any people other than the serviceman must not set the SCSI ID to 7.

5. Turning On or Off the Body

Turning on the body

Turn on the body in the order shown below.

NOTE:

Before turning on the body, open the cover and make sure that a stage previously used is not left inside. Then, close the cover securely.

1. Push the power switch on the right side of the body to the "I" position. (See Fig. 2.10 on page 23 for the position of the power switch.)

2. When the body is turned on, the On/Off conditions of the indicator lamps change as shown below.

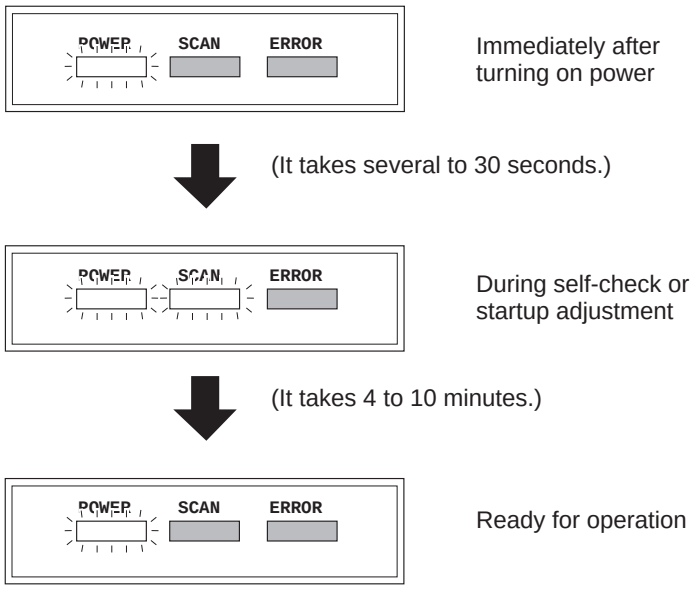


Fig. 2.14

Turning off the body

Push the power switch on the right side of the body to the "O" position when the body is not executing reading. (See Fig. 2.10 on page 23 for the position of the power switch.)

6. Cooling Fans

The body has cooling fans in the two positions illustrated below in order to prevent the internal temperature from rising.

⚠ CAUTION

Do not block the cooling fans with a wall or objects. If they are blocked, the instrument may become faulty.

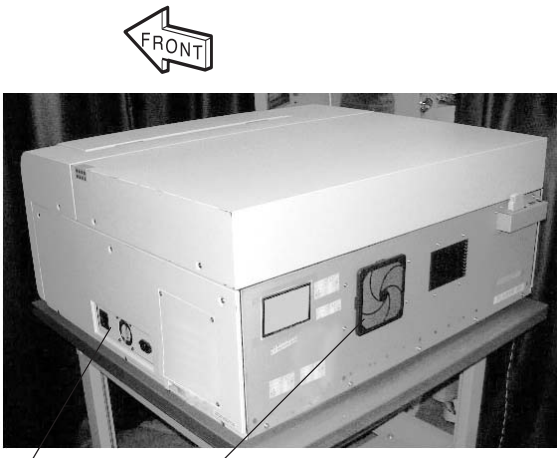


Fig. 2.15

Part
3

Usage of IPs

1. Usage of IPs

1.1 About IPs

The imaging plate (IP) is quite a new radiation energy memory type two-dimensional sensor, which has an image recording layer consisting of polyester base material densely coated with accelerated phosphorescent fluorescent material of fine crystals.

- Exposure
  An IP accumulates and stores radiation energy while it is exposed. It is exposed in close contact with an RI sample in a cassette like X-ray film.

- Scanning
  The recording surface of an exposed IP is scanned with a laser beam inside the FLA-5100 and emits fluorescent light according to the exposure level. A photo-multiplier tube (PMT) detects the fluorescent light and converts it into electric signals. A radiation image recorded on the IP during exposure is read as digital image information at the maximum resolution of 25 µm per pixel (40 pixels/ mm) and recorded in the analyzer unit.

- Erasure
  You may reuse a general-purpose IP by erasing an after-image.

1.2 Available IPs

IP's with magnetic layers for sticking on the IP stage are usable.

- Use conditions
  It is necessary to stick a non-curled IP to the carrier free from separation. A separated IP may cause a failure of the equipment.

1.3 Checking the exposure surface

The exposure surface is white or blue overall. A sample is brought into contact with this surface. Laser is irradiated on it.

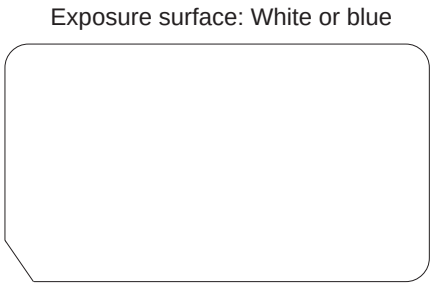


Fig.3.1 Exposure surface of IP

1.4 Instructions on handling IPs

- General handling
  While handling IPs, always wear gloves to maintain the quality of the IPs. Be very careful not to bend, damage or soil them. Do not handle them in a dusty place.

- Cleaning
  General-purpose IPs:
  Clean the back surfaces of IPs with proper cleaning material such as KIMWIPE, etc. If IPs are very dirty, clean them with unwoven cotton cloth moistened with ethanol (of grade I or guaranteed reagent).

Notes:
- *Ethanol stored in bad conditions may deteriorate IPs. Use ethanol stored in a brown reagent bottle or in accordance with manufacturer's handling method.*
- *Never wipe IPs with water. The sensitivity of the fluorescent material on IPs may be deteriorated by water.*

- Environmental conditions
  Do not expose IPs to the direct sunlight. Do not use them in a place with much ultraviolet rays or natural radiation. Do not use them in a hot and humid place.

- Storage
  Store IPs level in order not to let them curl. (Curled IPs may cause failures of the equipment.)

  Store IPs in a dry place. It is recommended that IPs be stored in a dry booth if they will not be used for a long time.

PRECAUTIONS

The fluorescent material on IPs may be deteriorated by water. Be very careful not to moisten them.
Some organic solvents may curl IPs. Even if samples are covered with lapping film, organic solvents may penetrate it and the cassette may be filled organic solvent vapor since organic solvents are volatile, in general.

- Examples of solvents that may let IPs curl
  Dichloromethane, chloroform, acetone, acetic acid, acetic acid derivative, etc.

1.5 Precaution before exposure

Tools required for exposure (Membrane filters and other RI indicator samples)

Prepare the following before exposure:

- IPs
- Cassette
- Samples labeled with radioisotope
- Gloves (Put them on when handling IPs.)
- Saran Lap® or equivalent lapping films (Lap the samples with the lapping film before exposing them.)
- KIMWIPE and ethanol (Use them to clean dirty IPs and inside of the cassette.)

Checking the safety light (darkroom condition)

Conventional X-ray film are quite sensitive to visible light and requires works in a darkroom. On the contrary, IPs may be handled in a normal room, though they are much more sensitive to radiation than conventional X-ray film. However, turn down the room light (below 20 luxes) and use the safety light (darkroom condition) only when carrying out the following:

- Taking exposed IPs out of the cassette, sticking them on the IP carrier, and setting the IP carrier into the FLA-5100.

Setting the exposure time

The highest image quality is guaranteed when an IP is scanned by the FLA-5100 immediately after it is exposed. Therefore, it is important to set the exposure start time and exposure time so that exposure ends just before scanning starts.

Cleaning IPs and cassette

Before exposing an IP, clean its exposure surface and inside of the cassette with KIMWIPE, etc. to remove dust and dirt.

Precautions

1. Be sure to erase an IP before exposing it. (A failure of erasure may cause noises (fogging) due to environmental radiation.)

2. Scan an exposed IP as soon as possible.

3. An IP detects quite a small quantity of radiation. Thus, do not expose it in a place easily affected by the environmental radiation (near a concrete wall, for example).

4. Exposing the edges of an IP shown below may disorder the image data. Thus, do not expose these parts.

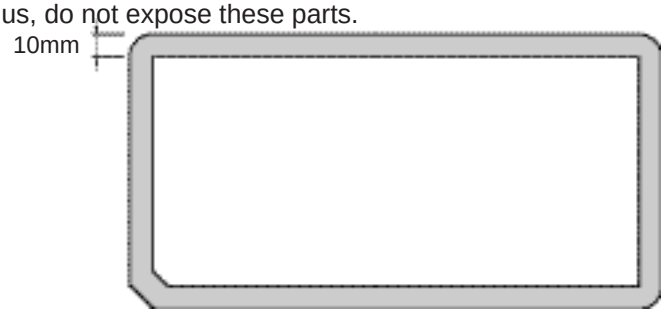


Fig.3.2 Edges of IP

1.6 Erasing IPs

Erase an IP sufficiently before exposing it.

> ***Note:*** *If an IP is exposed excessively, it may not be erased completely. In such a case, scan it once by way of trial to check if it is erased completely.*

■ Erasing IPs with IP eraser

Refer to the manual of the IP eraser.

The IP eraser may erase an IP in fourteen minutes (if it is not exposed excessively). For the usage of the IP eraser, refer to its manual.

2. Exposing and Scanning IPs

Expose an IP as shown below.

2.1 Tools and materials needed for exposing IPs

- Sample
- Saran wrap (Wrapping film)
- IP cassette
- IP

1 Cover the sample with Saran Wrap® or equivalent Wrapping film.

Note: *Do not wrinkle the Wrapping film.*

2 Set the sample face up on the cassette.
Use the gauge grating (25 mm) to adjust the sample position with the IP position.

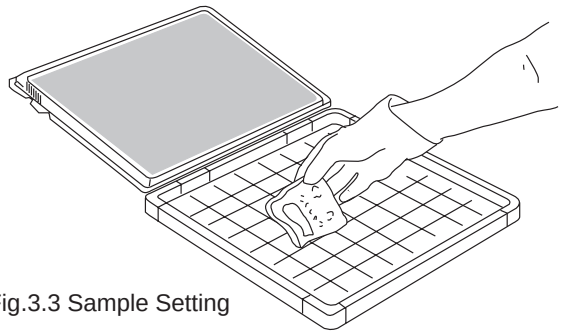
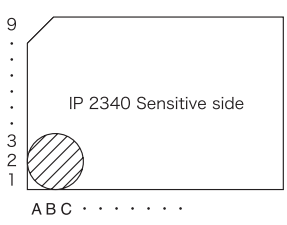


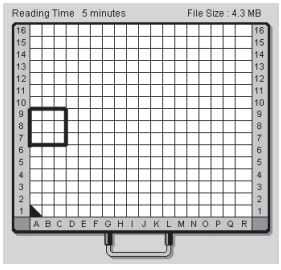
Fig.3.3 Sample Setting

! Caution !

The gauge serves as the benchmark when you determine the reading area on the software.
However, attention must be paid when using cassettes other than 4043, **i.e., cassettes 2340, 2325, 2040, 2025.** Since these cassettes' gauge scale is set for scanning with the BAS series, FLA-2000, FLA-3000 and FLA-8000, the numbers on the vertical axis are reversed, which makes the numbers mismatch with the reading area of FLA-5100. As in the example below, please confirm the numbers and set the readeing area with ImageReader software.

Example





In case of placing a sample on this area of the sensitive side of the IP.
Example 1) The reading area:horizontal A-C
vertical 1-3

When setting the reading area of FLA-5100, please reverse the numbers on the vertical axis (1→9, 9→1).
Setting the area of Example 1: horizontal A-C
vertical 9-7

FLA-5100 ImageReader software can easily set the area corresponding to the IP size. Therefore we recommend whole-area reading.

3 Set the IP on the cassette so that its exposure surface is in contact with the sample as shown below. Use the notch of the IP to adjust the sample direction with the IP direction and the direction of sticking on the stage (i.e., scanning direction).

Adjust the notch of the IP to the left front of the cassette.

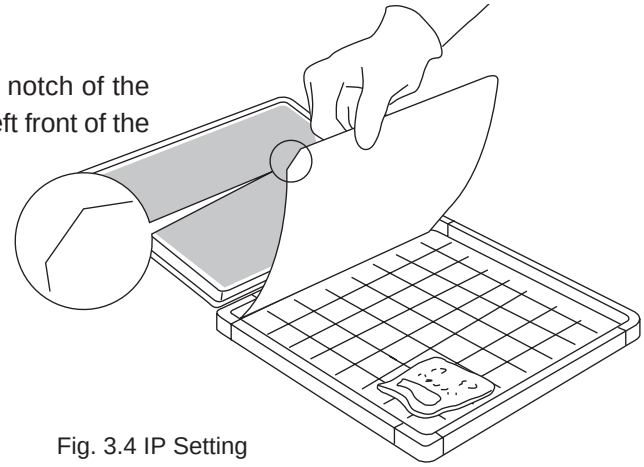


Fig. 3.4 IP Setting

4 Close the cassette cover.
(Close it firmly until a click sound is heard.)

Note: Do not have any IP corners be caught by the cassette cover.
Be very careful not to apply an impact to the cassette. An impact applied to the cassette may shift the sample and IP.
Do not expose the IP in a place with much environmental radiation (in order to avoid the increase of background).

PRECAUTION

Do not expose the exposed IP to the light. If an exposed IP is exposed to the light, the image on the IP may be lost.

Part
4

Reading IP

Reading IP

Set the reading conditions.

↓

Set an IP on the stage.

↓

Set the stage on the FLA-5100.

↓

Start reading.

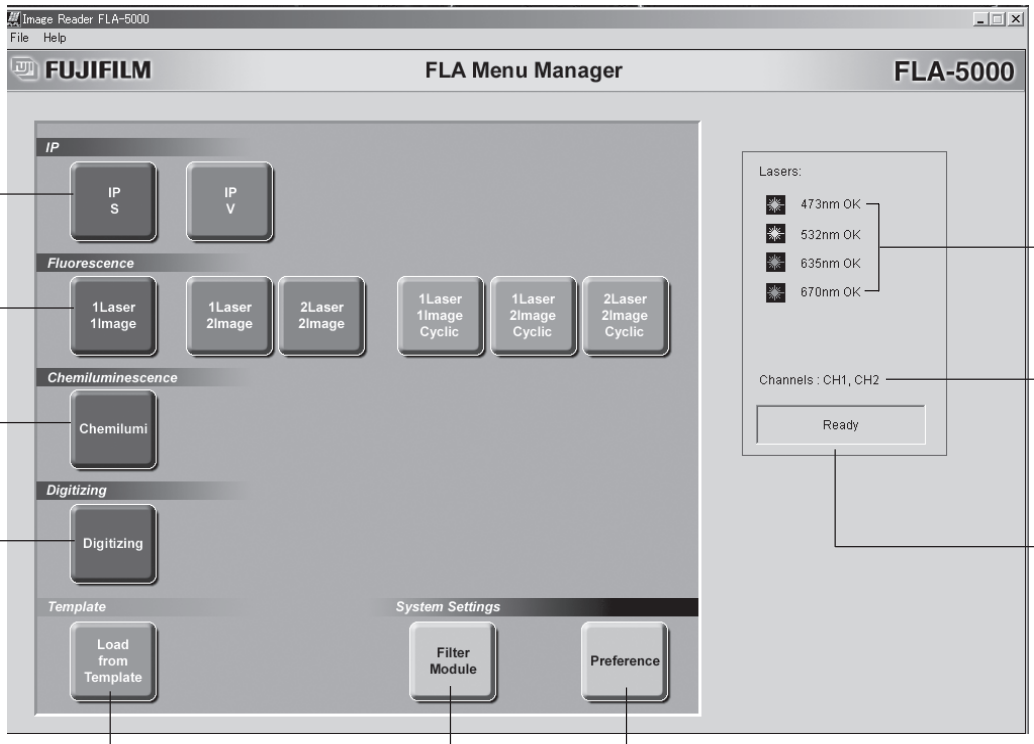
* The FLA-5100 Image Reader is available in two types: Windows version, and Macintosh version. Either version has the same functions.
This manual shows the screens of the Windows version. Follow the instructions of this manual, except the OS-related operations (such as starting and exiting the software), if you use the Macintosh version.

1. Turn on the FLA-5100 and peripheral devices.

2. Turn on the computer (DOS/V PC or Macintosh).

3. Make sure that the FLA-5100 has warmed up. (Only the power lamp on the upper left panel on the front of the FLA-5100 is lit when warming-up is completed.) Start the FLA-5000 Series Image Reader from the startup menu or using the shortcut key. (On the Macintosh, double-click the alias to start the software.)

4. The main window of the FLA-5000 Series Image Reader is displayed.



IP mode
Click this button to open the screen for setting the IP reading conditions.

Fluorescent mode
Click this button to open the screen for setting the fluorescent sample reading conditions.

Chemiluminescence mode
Click this button to open the screen for setting the chemiluminescent sample reading conditions.

Digitize mode
Click this button to open the screen for setting the digitize sample reading conditions.

The conditions of the built-in laser units are displayed. This example shows that four types of laser units (473 nm, 532 nm,635 nm and 670nm) are built in and all units are ready for operation (OK).

The number of built-in photo-multiplier tubes (PMTs) is displayed. This example shows that two PMTs are built in.

The condition of the FLA-5100 is displayed. This example shows that the FLA-5100 is ready for reading.

Use this button to recall stored reading conditions.

Use this button to change or register the filter.

Use this button to set the display menu, file format or the Log / Square Root of image data type.

5. Select a reading mode and set the reading conditions.

5.1 Selecting a reading mode

Two IP reading modes are available as shown below:

.....This is the standard reading mode, whose reading sensitivity is fixed. Values of read images are displayed in the PSL/mm2 unit system.

.....The sensitivity of this mode is variable. Use this mode if you need a low reading sensitivity. Values of read images are displayed in the LAU/mm2 unit system.

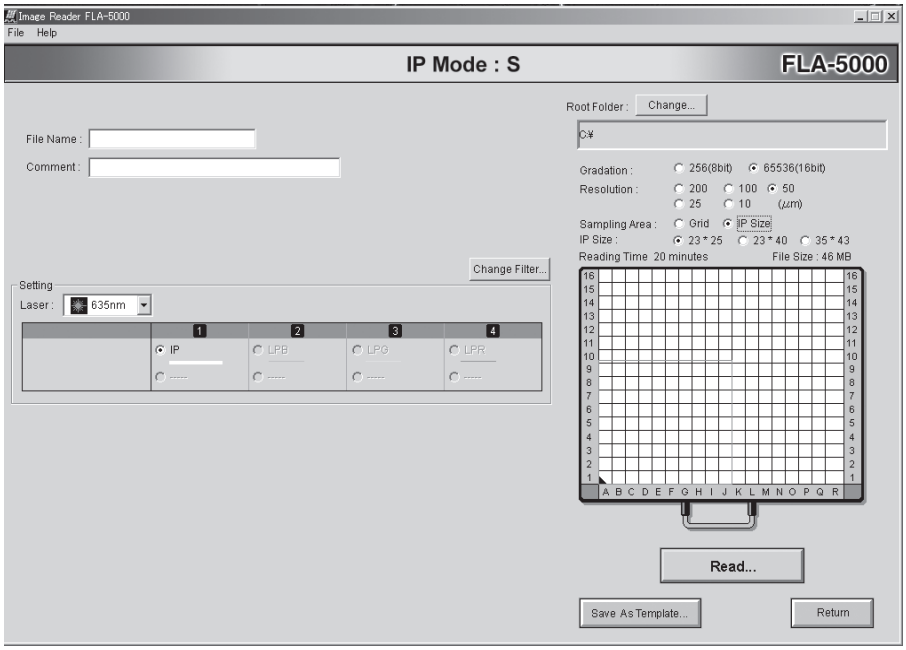
IP S mode

5-1-1 IP S mode

Click the 

button.

5-1-2 The following window appears.



Refer to the instruction below and set the reading conditions.

→ Input the name of a file for saving data of a read image. (You may input half-size alphanumeric characters only.)

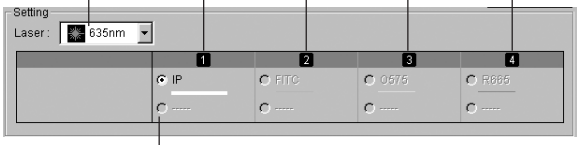
* You may not start reading unless you input a file name.

The comment is saved with the file name. Input it as the necessity requires. (You may input half-size alphanumeric characters only.)

* You may start reading even if you input no comment.

..... Use this button to change the data of the filter registered on the software. This function is not normally used in IP reading. You need not pay attention to this function, in particular.

Laser to be used for reading is displayed.



These numeric values shown in these areas correspond to the numbers (1, 2, 3 and 4) on the filter tray. This example shows that the filter for IPs is set at the leftmost position.

The check on the left of a filter to be used for reading changes into .

In IP reading, the 635 nm laser and IP filter are selected automatically.

* However, if the 532-nm laser unit is built in but the 635-nm laser unit is not built in, the 532-nm laser is selected automatically.

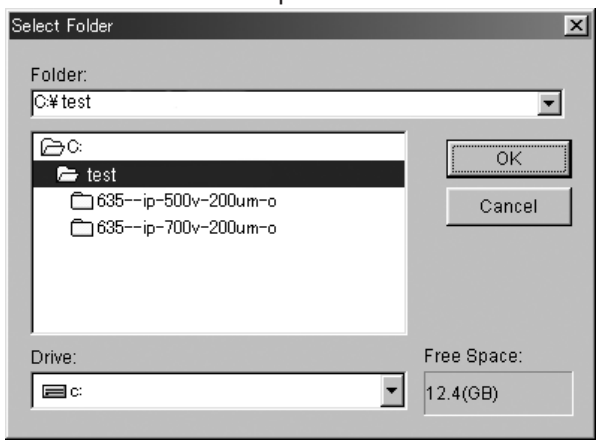
The 532-nm laser may only be used to read IPs outside Japan.

Before starting reading, make sure that the 635 nm or 532nm laser is shown and the IP filter is selected in the Setting field as shown above.

* The IP filter need not always be set at the above-shown position (position #1 in the above example). When the IP filter is set on the filter tray #2 and registered, it is displayed at position #2.

..... Specify where to save the file for saving the image data. Click the 

button and specify the file saving position.



Gradation : 256(8bit) 65536(16bit) .....Click to select the number of gradations of a read image. It is not related with the reading time. The image capacity depends on the number of gradations.

Resolution : 200 100 50 25 10 (μm) .....Click to select one of five reading pixel sizes. The reading time and image capacity depend on the pixel size.

200 100 50 25 10 μm
Short Reading time Long

Small Image file size Large

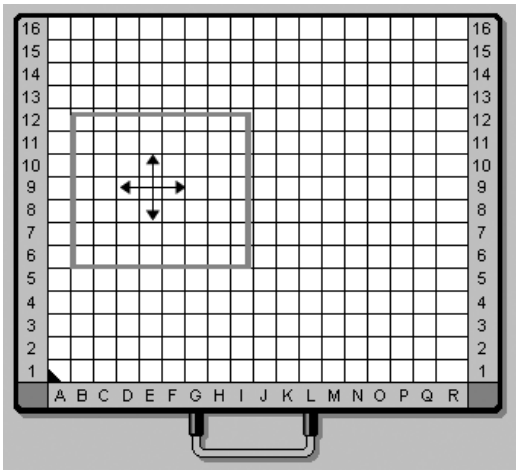
Sampling Area : Grid IP Size .....Click to select a reading area setting method.

Grid .....Select this to set the reading area in units of BAS gauge blocks (2.5-cm squares shown in the drawing).

* The grid assumes that only the area where a sample is placed is read. Use the BAS gauge grid shown on page 34 as the benchmark of positioning.

IP Size .....Select this to select the overall surface of the IP as the reading area. Click on the left of the IP Size to put a check mark, then click on an IP size to be used.

How to specify the reading area when the grid is selected
Move the mouse cursor to the red frame line or the center of the area, and drag the mouse to change the area size and/or position.



Tips

The 10μm-pixel size processing is conducted by applying Bi-cubic algorithm to the images read at 25μm-pixel size. Therefore, computer processing after reading may take longer time than image reading time.

Bi-cubic : Using the densities of 16 lattice points around (u_0, v_0), cubic interpolation is done.

$$f(u_0,v_0) = \sum_k \sum_l f(u_k,u_l)\, c(u_k-u_0)\, c(v_l-v_0)$$

Here (u_k,v_l) is a lattice point around (u_0 , v_0) and interpolative coefficient c(x) is defined linearly.

$$c(x) = \begin{cases} 1 - 2|x|^2 + |x|^3 & 0 \le |x| < 1 \\ 4 - 8|x| + 5|x|^2 - |x|^3 & 1 \le |x| < 2 \\ 0 & 2 \le |x| \end{cases}$$

Function c(x) is piecewise three-dimension polynomial approximation of function sinx/x that is revealed with the sampling theorem for continuous signals.

! Caution !

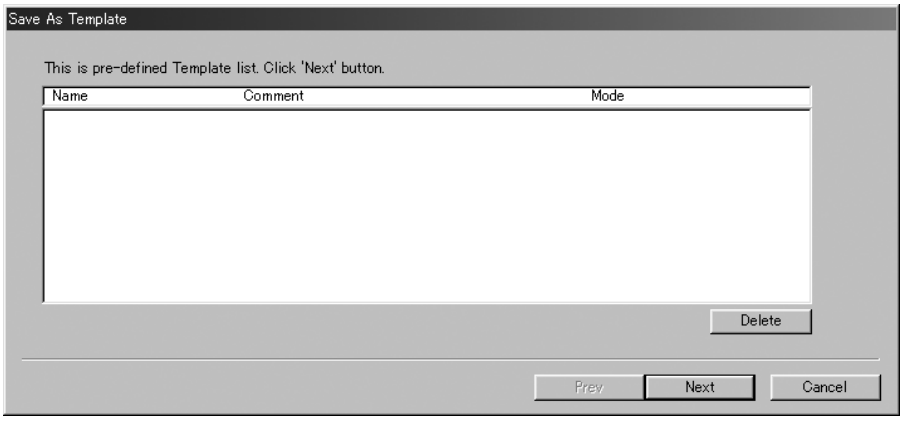
When exposing a sample on IP, **attention must be paid to the setting of reading area with** Grid if you are to use the cassettes other than 4043, designed specially for FLA-5100. Since **the cassettes 2340, 2325, 2040 and 2025** have the gauge scale designed for scanning with the BAS series, FLA-2000, FLA-3000, and FLA-8000, the numbers on the vertical axis are reversed, which makes the numbers mis-match with the reading area of FLA-5000 Series.

Please refer to page 34 of this manual for the details.

Save As Template... ..... Use this button to save the reading conditions in a file. You may save the reading conditions used frequently and recall them later.

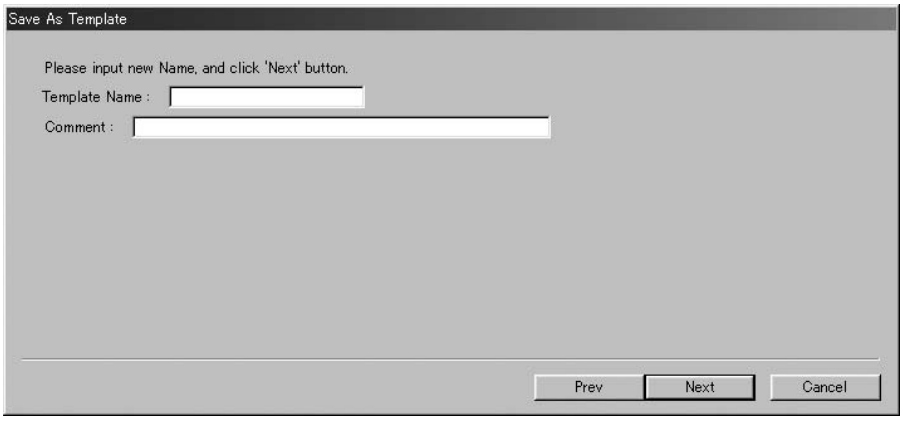
Click on Save As Template... .

The following window opens. Saved reading conditions are displayed in this window.



Click the Next button.

The following window opens.



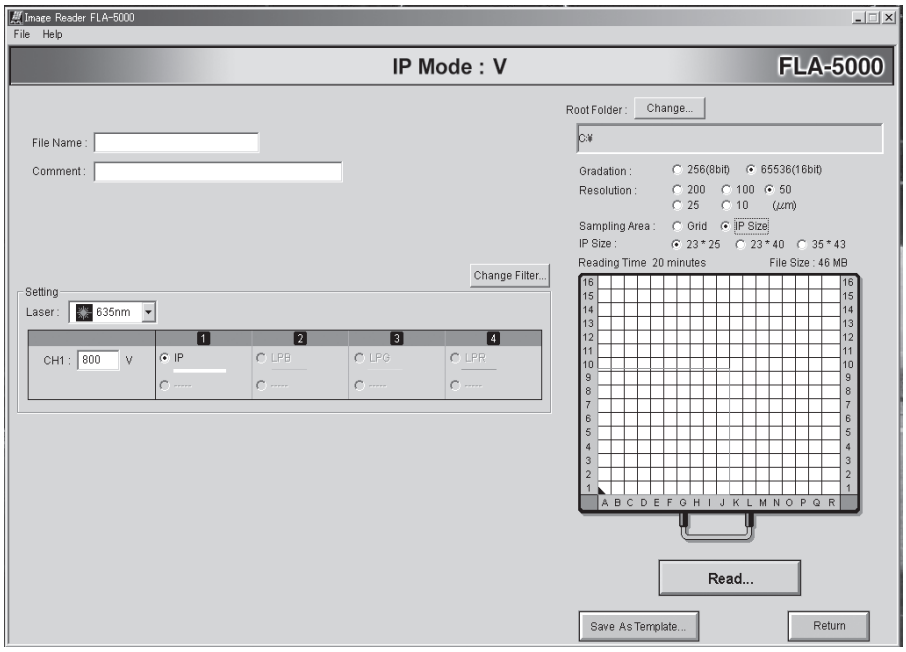
Input a template name in the Template Name box, and click the Next button. The reading conditions are saved.

IP V mode

5-1-2 IP V mode

Click the  button.

5-1-2-2 The following window appears.



Refer to the instruction below and set the reading conditions.

→ Input the name of a file for saving data of a read image. (You may input half-size alphanumeric characters only.)

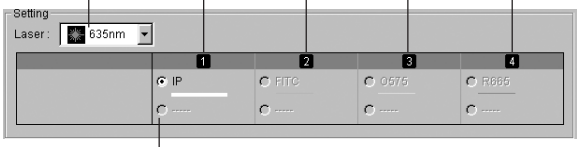
* You may not start reading unless you input a file name.

→ The comment is saved with the file name. Input it as the necessity requires. (You may input half-size alphanumeric characters only.)

* You may start reading even if you input no comment.

.....Use this button to change the data of the filter registered on the software. This function is not normally used in IP reading. You need not pay attention to this function, in particular.

Laser to be used for reading is displayed.



These numeric values shown in these areas correspond to the numbers (1, 2, 3 and 4) on the filter tray. This example shows that the filter for IPs is set at the leftmost position.

The check ○ on the left of a filter to be used for reading changes into ◉.

In IP reading, the 635 nm laser and IP filter are selected automatically.
* However, if the 532-nm laser unit is built in but the 635-nm laser unit is not built in, the 532-nm laser is selected automatically.

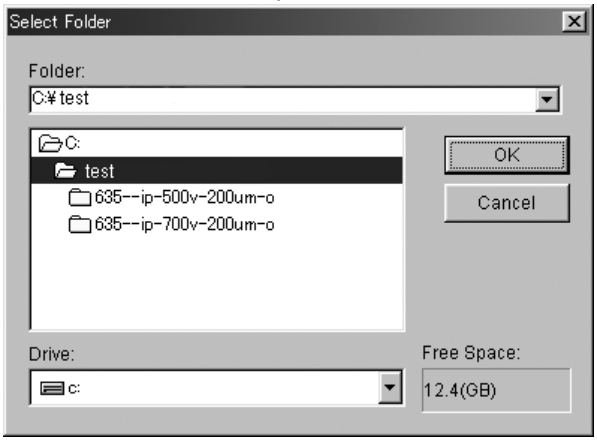
The 532-nm laser may only be used to read IPs outside Japan.
Before starting reading, make sure that the 635 nm or 532nm laser is shown and the IP filter is selected in the Setting field as shown above.
* The IP filter need not always be set at the above-shown position (position #1 in the above example). When the IP filter is set on the filter tray #2 and registered, it is displayed at position #2.

This voltage is applied to the first PMT.
Input a voltage value directly in this box. (You may input a value between 250 and 1000.) The greater the value is, the higher the voltage to be applied to the PMT and the reading sensitivity are.

Small ◄—— Value ——► Large

Low ◄—— Sensitivity ——► High

..... Specify where to save the file for saving the image data. Click the Change... button and specify the file saving position.



Gradation : ○ 256(8bit) ● 65536(16bit) .....Click to select the number of gradations of a read image. It is not related with the reading time. The image capacity depends on the number of gradations.

Resolution : ○ 200 ○ 100 ● 50 ○ 25 ○ 10 (μm) .....Click to select one of five reading pixel sizes. The reading time and image capacity depend on the pixel size.

200 100 50 25 10 μm

Short Reading time Long

Small Image file size Large

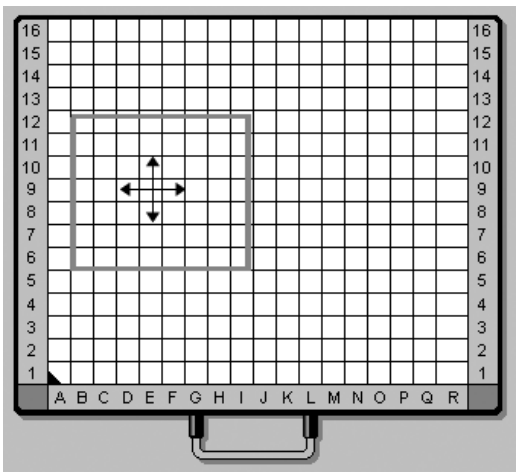
Sampling Area : ● Grid ○ IP Size .....Click to select a reading area setting method.

● Grid .....Select this to set the reading area in units of BAS gauge blocks (2.5-cm squares shown in the drawing).

* The grid assumes that only the area where a sample is placed is read. Use the BAS gauge grid shown on page 34 as the benchmark of positioning.

○ IP Size .....Select this to select the overall surface of the IP as the reading area. Click on the left of the IP Size to put a check mark, then click on an IP size to be used.

How to specify the reading area when the grid is selected
Move the mouse cursor to the red frame line or the center of the area, and drag the mouse to change the area size and/or position.



Tips

The 10μm-pixel size processing is conducted by applying Bi-cubic algorithm to the images read at 25μm-pixel size. Therefore, computer processing after reading may take longer time than image reading time.

Bi-cubic : Using the densities of 16 lattice points around (u_0, v_0), cubic interpolation is done.

$$f(u_0,v_0) = \sum_k \sum_l f(u_k,u_l)\, c(u_k-u_0)\, c(v_l-v_0)$$

Here (u_k,v_l) is a lattice point around (u_0, v_0) and interpolative coefficient c(x) is defined linearly.

$$c(x) = \begin{cases} 1 - 2|x|^2 + |x|^3 & 0 \le |x| < 1 \\ 4 - 8|x| + 5|x|^2 - |x|^3 & 1 \le |x| < 2 \\ 0 & 2 \le |x| \end{cases}$$

Function c(x) is piecewise three-dimension polynomial approximation of function sinx/x that is revealed with the sampling theorem for continuous signals.

! Caution !

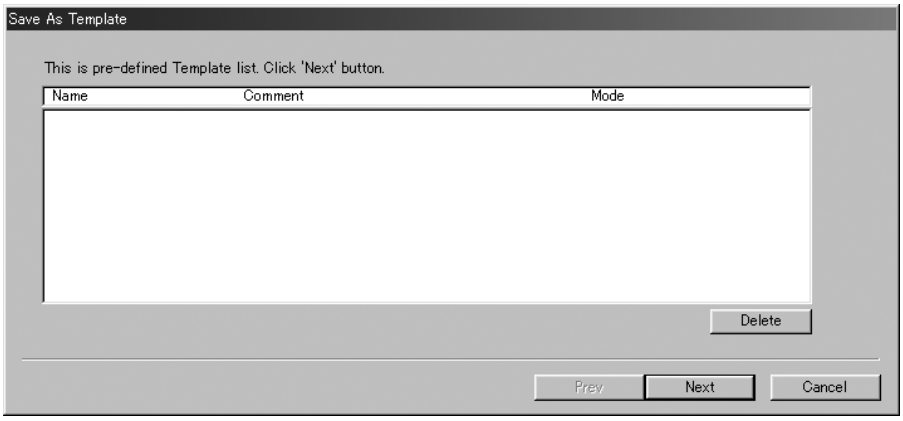
When exposing a sample on IP, **attention must be paid to the setting of reading area with** ● Grid if you are to use the cassettes other than 4043, designed specially for FLA-5100. Since **the cassettes 2340, 2325, 2040 and 2025** have the gauge scale designed for scanning with the BAS series, FLA-2000, FLA-3000, and FLA-8000, the numbers on the vertical axis are reversed, which makes the numbers mis-match with the reading area of FLA-5100.

Please refer to page 34 of this manual for the details.

Save As Template... ..... Use this button to save the reading conditions in a file. You may save the reading conditions used frequently and recall them later.

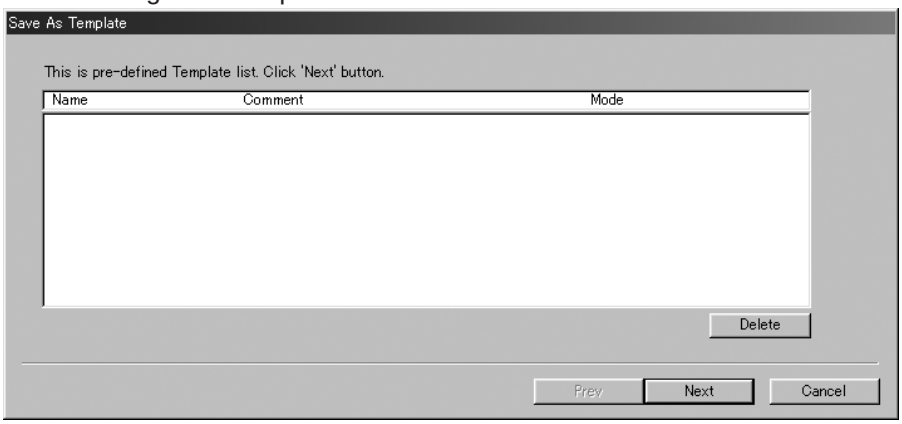
Click on Save As Template... .

The following window opens. Saved reading conditions are displayed in this window.

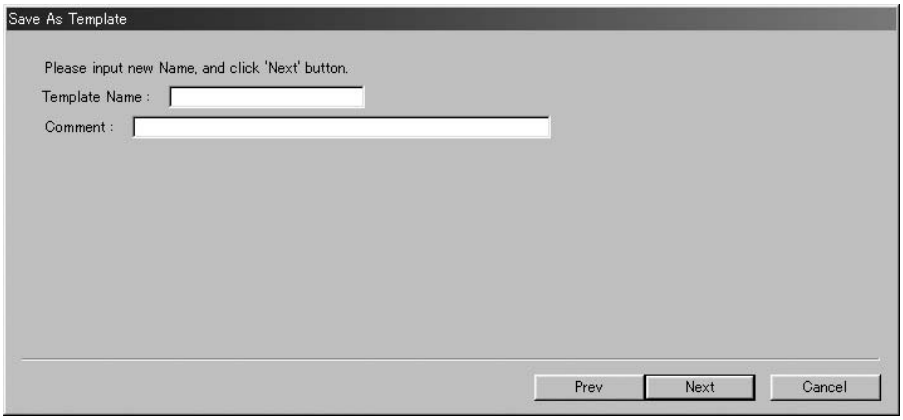


Click the Next button.

The following window opens.



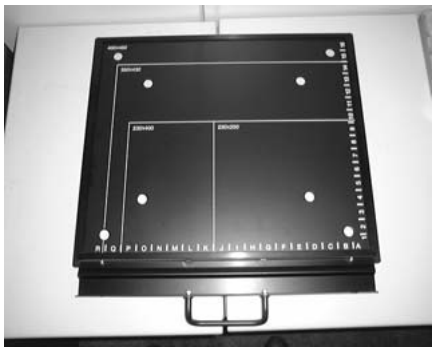
Input a template name in the Template Name box, and click the Next button. The reading conditions are saved.



Setting the IP and stage

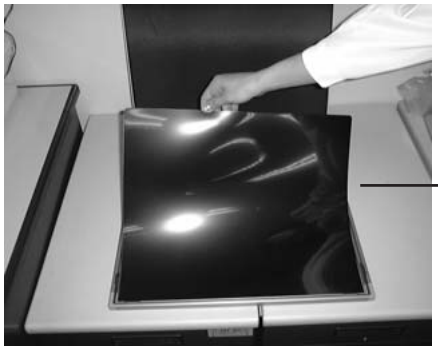
6. Set an IP on the IP stage.
   * You may use only IPs with magnetic absorption layers on the back on the IP stage. Since an IP is stuck on the IP stage by the magnetic force, any IPs without magnetic absorption layers may not be attached to the IP stage. Such IPs are unusable.

6-1 Put the IP cassette with an exposed IP on the side of the IP stage.



6-2 Turn down the room lighting (below 20 luxes).
(Keep the room lighting turned down until the IP stage is set and the main cover is closed.)

6-3 Take the IP out of the IP cassette and set it on the IP stage immediately.



Set the IP on the back side (with a numeric value and alphabetic characters) of the IP stage so that the IP reading surface (white or blue side with fluorescent material applied) faces up.

7. Set the IP stage on the FLA-5100.

7-1 Open the door of the stage setting block, and set the IP stage with the stuck IP facedown.

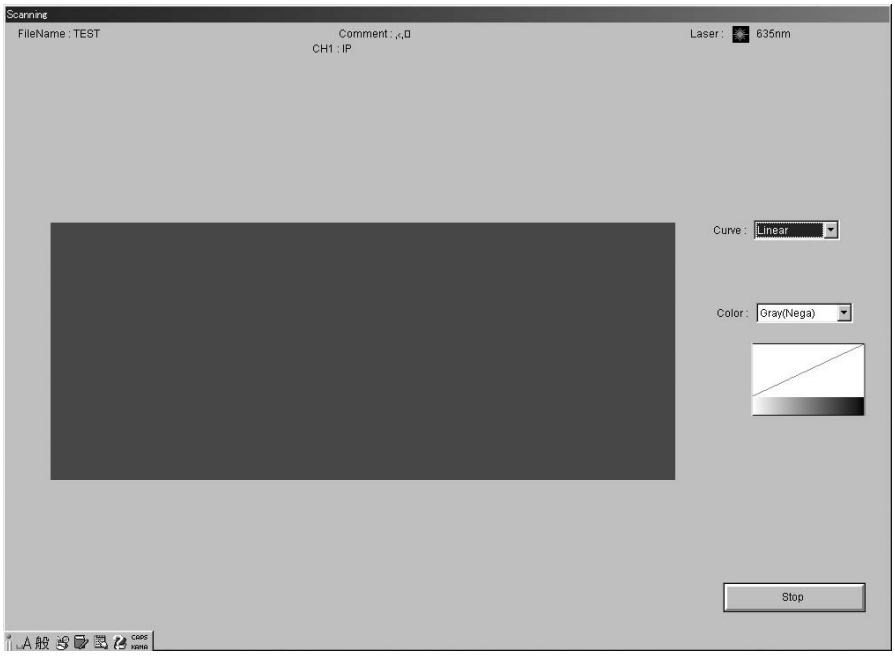
7-2 Push the IP stage to the very end (until it butts).

7-3 Close the door of the stage setting block.

Starting reading

8. Starting reading

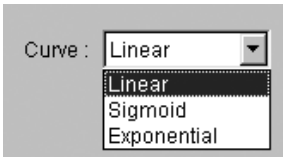
8-1 Click the Read... button, and reading starts.



8-2 You may carry out the following operations in the reading status real-time display window shown above:

a) Changing the tone curve

Select an intended curve from the pull-down menu.



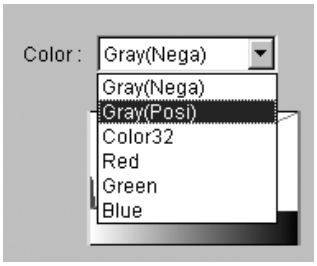
Linear: The linear tone curve is used to adjust gradations.

Sigmoid: The sigmoid tone curve is used to adjust gradations.

Exponential: The exponential tone curve is used to adjust gradations.

b) Changing the display color

Select an intended color from the pull-down menu.



Gray (Nega): An image is displayed in nega tive gray. (Low-density areas are displayed in white, and high-den sity areas are displayed in black.)

Gray (Posi): An image is displayed in positive gray. (Low-density areas are displayed in black, and high-density areas are displayed in white.)

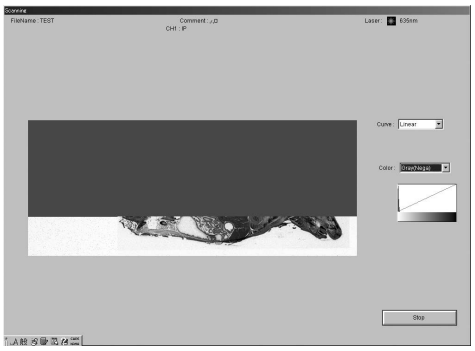
Color 32: An image is displayed in 32 pseudo colors.

Red: An image is displayed in red fluo rescent color.

Green: An image is displayed in green fluorescent color.

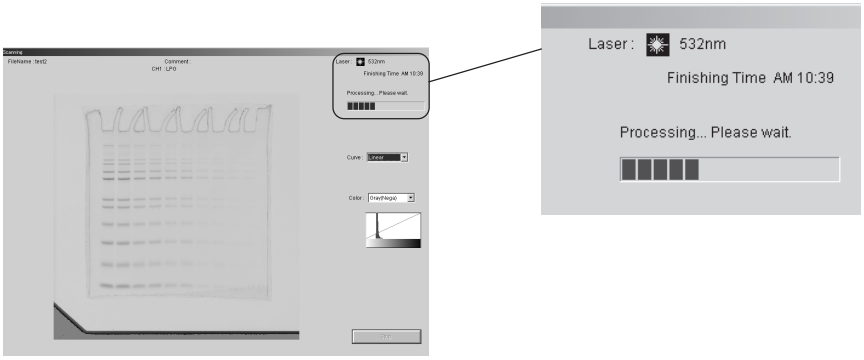
Blue: An image is displayed in blue fluo rescent color.

8-3 As fields in the specified reading area are read, they are displayed in the reading status real-time display window as shown below.



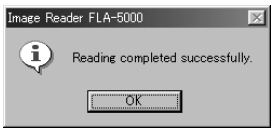
The stage is read from the front toward the back. The read image is displayed from down upward in the reading status real-time display window.

Reading at 10μm-pixel size may take longer time in computer processing after image reading. When processing, a progress bar appears in the upper right corner.

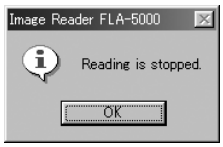


Processing cannot be terminated halfway.

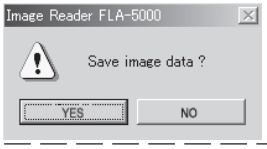
8-4 When reading finishes normally, the following dialog box appears. Click the OK button.



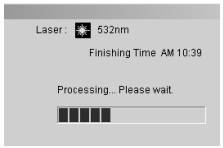
8-5 You may finish reading at any time before the whole reading area is read.
Click the Stop button when you want to finish reading.
■When the reading has been done with pixel size at 200μm, 100μm,50μm and 25μm, the following dialog box appears. Click the OK button.



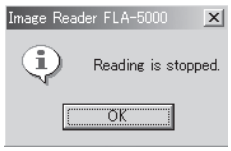
■When the reading has been done with pixel size at 10μm, the dialogue box shown below appears.



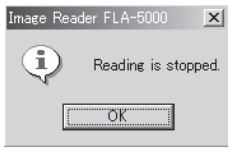
Click YES to start processing. While processing, a progress bar appears as shown below.



When processing is completed, the dialogue box shown below appears. Please click OK button.



When NO is clicked, the dialogue box shown below appears.
Please click OK button.
*Note: The image data file will be deleted in this case.



8-6 Carry out reading in the above-shown procedures to read two IPs continuously.
Click the Return button, and the previous menu manager window is displayed.

9. Removing the IP from the IP stage
On completion of reading, put your finger into the hole in the stage as shown below and push the back of the IP to remove the IP from the IP stage easily.

Part
5

Reading Fluorescent Samples

Reading Fluorescent Samples

Set the reading conditions.

↓

Set a Fluorescent Samples on the stage.

↓

Set the stage on the FLA-5100

↓

Start reading.

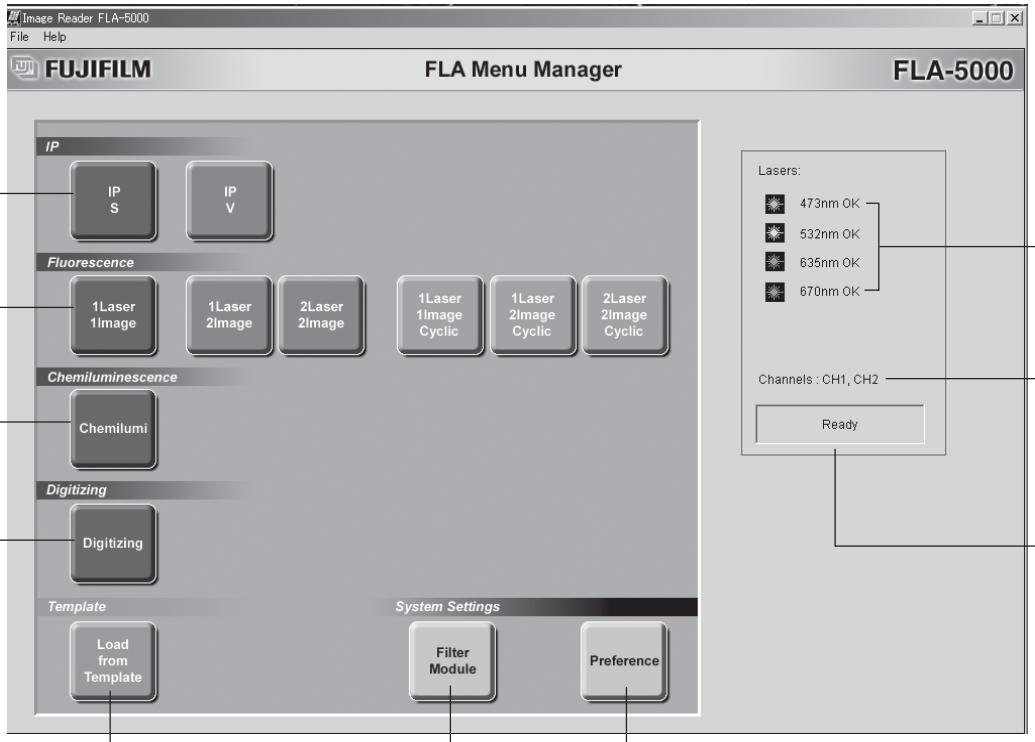
* The FLA-5100 Image Reader is available in two types: Windows version, and Macintosh version. Either version has the same functions. This manual shows the screens of the Windows version. Follow the instructions of this manual, except the OS-related operations (such as starting and exiting the software), if you use the Macintosh version.

1. Turn on the FLA-5100 and peripheral devices.

2. Turn on the computer (DOS/V PC or Macintosh).

3. Make sure that the FLA-5100 has warmed up. (Only the power lamp on the upper left panel on the front of the FLA-5100 is lit when warming-up is completed.) Start the FLA-5000 Series Image Reader from the startup menu or using the shortcut key. (On the Macintosh, double-click the alias to start the software.)

4. The main window of the FLA- 5000 Series Image Reader is displayed.



IP mode
Click this button to open the screen for setting the IP reading conditions.

Fluorescent mode
Click this button to open the screen for setting the fluorescent sample reading conditions.

Chemiluminescence mode
Click this button to open the screen for setting the chemiluminescent sample reading conditions.

Digitize mode
Click this button to open the screen for setting the digitize sample reading conditions.

The conditions of the built-in laser units are displayed. This example shows that four types of laser units (473 nm, 532 nm,635 nm and 670nm) are built in and all units are ready for operation (OK).

The number of built-in photo-multiplier tubes (PMTs) is displayed. This example shows that two PMTs are built in.

The condition of the FLA-5100 is displayed. This example shows that the FLA- 5100 is ready for reading.

Use this button to recall stored reading conditions.

Use this button to change or register the filter.

Use this button to set the display menu, file format or the Log / Square Root of image data type.

5. Select a reading mode and set the reading conditions.
   5-1 The number of modes available for reading fluorescent samples depends on the number of photo-multiplier tubes (PMTs) built in the FLA- 5100 as shown below.

One PMT is built in the FLA- 5100 → Two reading modes are available.
Two PMTs are built in the FLA- 5100 → Six reading modes are available.

Available when two PMTs are built in.

Available when one PMT is built in.

- 1 laser 1 image ... One laser is used to excite fluorescent samples. Fluorescent light from a sample passes through a single filter and forms a single image.
- 1 laser 1 image Cyclic ... 1-laser, 1-image reading is repeated (up to four times).
- 1 laser 2 image ... One laser is used to excite fluorescent samples. Fluorescent light from a sample is divided and filtrated through two filters to form two images.
- 1 laser 2 image Cyclic ... 1-laser, 2-image reading is repeated (up to two times).
- 2 laser 2 image ... Two lasers are used to excite fluorescent samples simultaneously. Fluorescent light from a sample is divided and filtrated through two filters to form two images.
- 2 laser 2 image Cyclic ...2-laser, 2-image reading is repeated (up to two times).

1-laser, 1-image mode

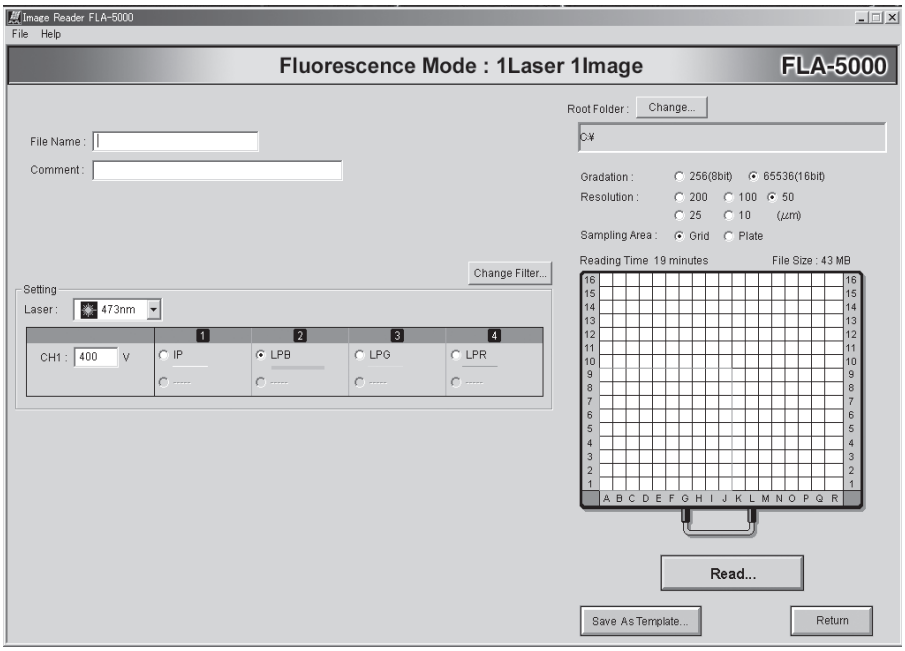
5-1-1 1-laser, 1-image mode

Set the reading conditions as shown below.

Click the 

button.

5-1-1-2 The following window appears.



Refer to the instruction below and set the reading conditions.

File Name : → Input the name of a file for saving data of a read image. (You may input half-size alphanumeric characters only.)

* You may not start reading unless you input a file name.

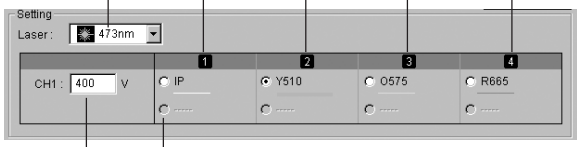
Comment : → The comment is saved with the file name. Input it as the necessity requires. (You may input half-size alphanumeric characters only.)

* You may start reading even if you input no comment.

Change Filter..... Use this button to change the data of the filter registered on the software. Ignore this button and proceed to the next step if the filter set in the FLA- 5100 is displayed on the Setting screen properly.

For the usage of Change Filter, see page 126.

Laser to be used for reading is displayed.

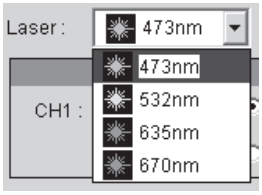


These numeric values shown in these areas correspond to the numbers (1, 2, 3 and 4) on the filter tray.

The check ○ on the left of a filter to be used for reading changes into ◉.

The voltage to be applied to the photo-multiplier tube (PMT) is displayed.

Select a laser unit to be used for reading in the pull-down menu.



value to be applied to the photo-multiplier tube (PMT) in this box.

(You may input a value between 250 and 1000.)
The greater the value is, the higher the voltage to be applied to the PMT and the reading sensitivity are.

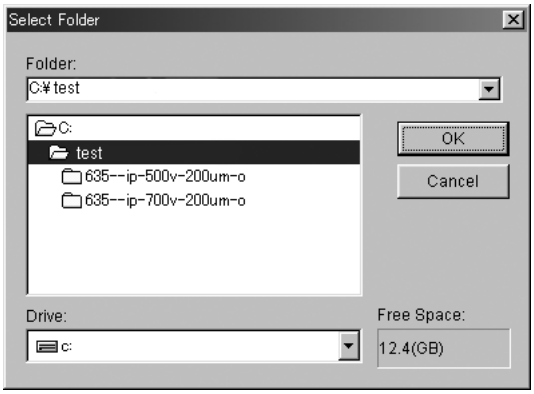
Small ◄——— Value ———► Large

Low ◄——— Sensitivity ———► High

Select a filter to be used for reading by clicking the radio button on the left of the filter name.

○ → ◉

..... Specify where to save the file for saving the image data. Click the Change... button and specify the file saving position.



Gradation : ○ 256(8bit) ● 65536(16bit) .....Click to select the number of gradations of a read image. It is not related with the reading time. The image capacity depends on the number of gradations.

Resolution : ○ 200 ○ 100 ● 50 ○ 25 ○ 10 (μm) .....Click to select one of five reading pixel sizes. The reading time and image capacity depend on the pixel size.

200 100 50 25 10 μm

Short ← Reading time → Long

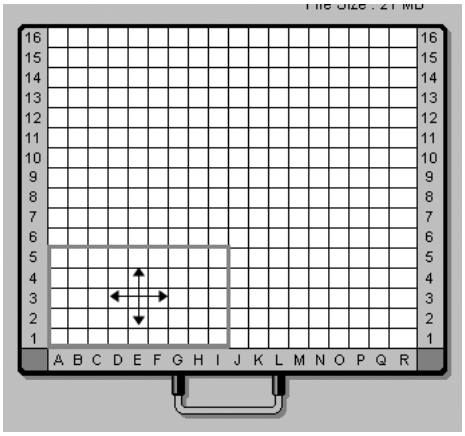
Small ← Image file size → Large

Sampling Area : ● Grid ○ Plate

● Grid ..... Select this to specify the reading area based on the 2.5-cm grid lines on the fluorescent stage.

○ Plate ..... Select this to specify the position of the titer plate placed on the multi-stage as the reading area.

How to specify the reading area when the grid is selected
Move the mouse cursor to the red frame line or the center of the area, and drag the mouse to change the area size and/or position.



Tips

The 10μm-pixel size processing is conducted by applying Bi-cubic algorithm to the images read at 25μm-pixel size. Therefore, computer processing after reading may take longer time than image reading time.

Bi-cubic : Using the densities of 16 lattice points around (u_0, v_0), cubic interpolation is done.

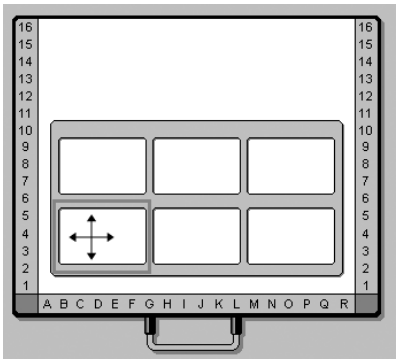
$$f(u_0,v_0) = \sum_k \sum_l f(u_k,u_l)\, c(u_k-u_0)\, c(v_l-v_0)$$

Here (u_k,v_l) is a lattice point around (u_0, v_0) and interpolative coefficient c(x) is defined linearly.

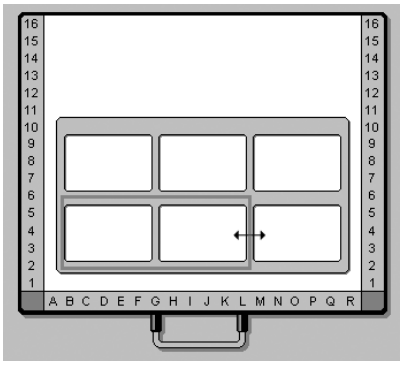
$$c(x) = \begin{cases} 1 - 2|x|^2 + |x|^3 & 0 \le |x| < 1 \\ 4 - 8|x| + 5|x|^2 - |x|^3 & 1 \le |x| < 2 \\ 0 & 2 \le |x| \end{cases}$$

Function c(x) is piecewise three-dimension polynomial approximation of function sinx/x that is revealed with the sampling theorem for continuous signals.

How to specify the area when titer plate(s) is/are selected
When reading one titer plate, move the mouse pointer to the center inside the red frame and drag the mouse to move the red frame to an intended plate.



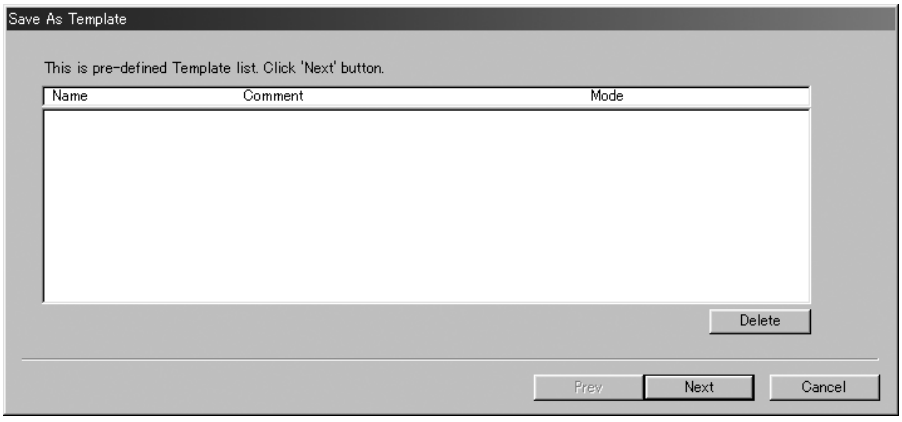
When reading two or more titer plates, place the mouse pointer on the red frame line shown above and drag the mouse to extend the red frame.



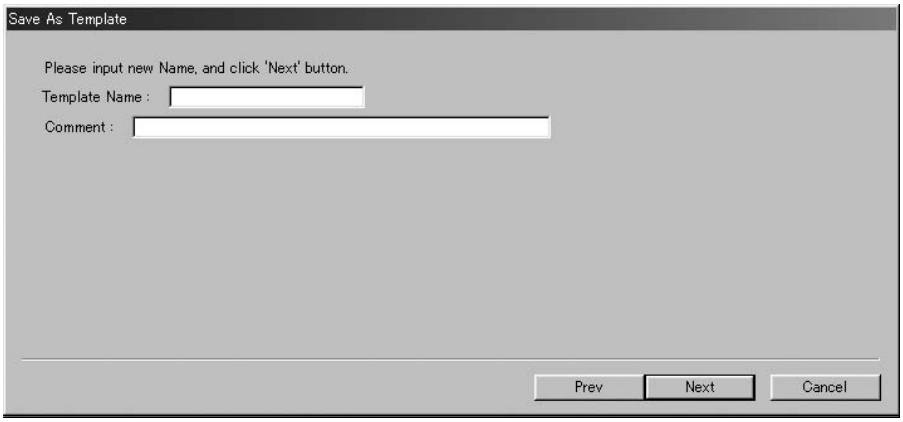
Save As Template... ..... Use this button to save the reading conditions in a file. You may save the reading conditions used frequently and recall them later.

Click on Save As Template... .

The following window opens. Saved reading conditions are displayed in this window.



Click the Next button.
The following window opens.



Input a template name in the Template Name box, and click the Next button. The reading conditions are saved.

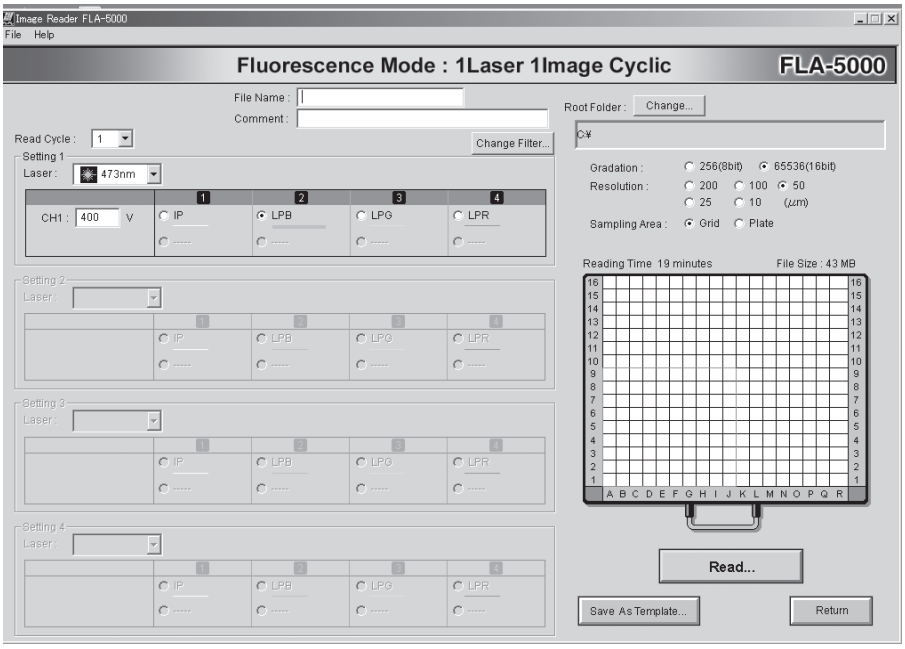
For the succeeding procedures, see page 85.

1-laser, 1-image Cyclic mode

5-1-2 1-laser, 1-image Cyclic mode

Click the 1Laser 1Image Cyclic button.

5-1-2-1 The following window appears.



Set the setting reading conditions referring to the following explanation.

→ Input the name of a file for saving data of a read image. (You may input half-size alphanumeric characters only.)

* You may not start reading unless you input a file name.

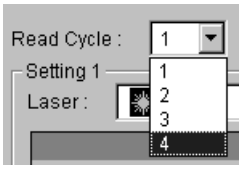
→ The comment is saved with the file name. Input it as the necessity requires. (You may input half-size alphanumeric characters only.)

* You may start reading even if you input no comment.

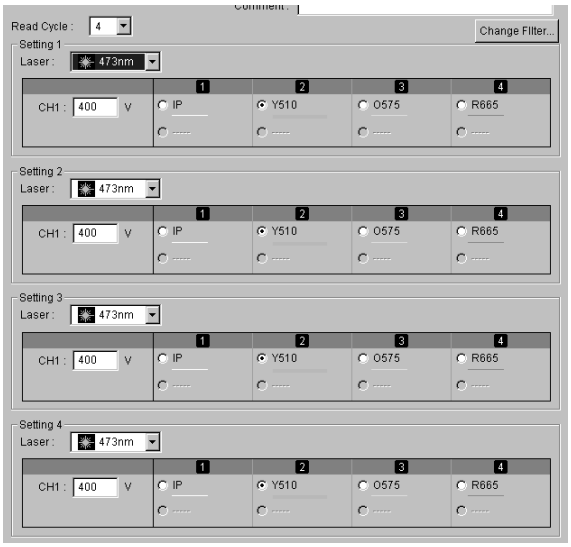
..... Use this button to change the data of the filter registered on the software. Ignore this button and proceed to the next step if the filter set in the FLA- 5100 is displayed on the Setting screen properly.

For the usage of Change Filter, see page 126.

..... Select the number of reading cycles in the pull-down menu. It is possible to repeat reading up to four times.

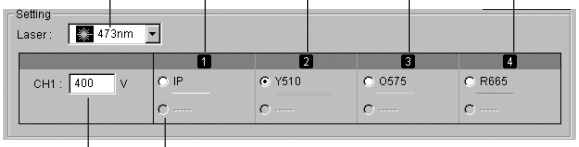


When Read Cycle is set to 4, for example, the following screen is displayed and you may specify the reading conditions for each cycle.



* Gradation, Resolution, and Sampling Area are common to every reading. (It is impossible to set these conditions differently for each reading cycle.)

Laser to be used for reading is displayed.

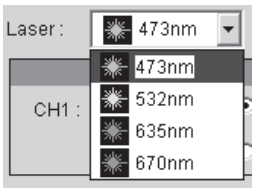


These numeric values shown in these areas correspond to the numbers (1, 2, 3 and 4) on the filter tray.

The check on the left of a filter to be used for reading changes into .

The voltage to be applied to the photo-multiplier tube (PMT) is displayed.

Select a laser unit to be used for reading in the pull-down menu.



Input a voltage value to be applied to the photo-multiplier tube (PMT) in this box.

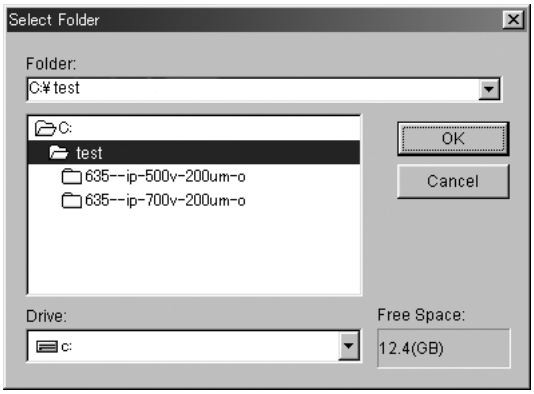
(You may input a value between 250 and 1000.)
The greater the value is, the higher the voltage to be applied to the PMT and the reading sensitivity are.

Small ◄—— Value ——► Large

Low ◄—— Sensitivity ——► High

Select a filter to be used for reading by clicking the radio button on the left of the filter name.

..... Specify where to save the file for saving the image data. Click the Change... button and specify the file saving position.



Gradation : ○ 256(8bit) ● 65536(16bit) .....Click to select the number of gradations of a read image. It is not related with the reading time. The image capacity depends on the number of gradations.

Resolution : ○ 200 ○ 100 ● 50 ○ 25 ○ 10 (μm) .....Click to select one of five reading pixel sizes. The reading time and image capacity depend on the pixel size.

200 100 50 25 10 μm

Short ← Reading time → Long

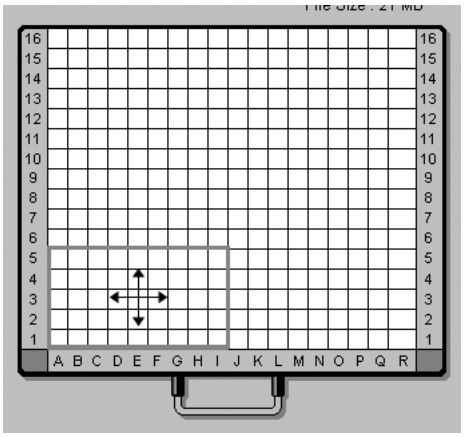
Small ← Image file size → Large

Sampling Area : ● Grid ○ Plate

● Grid ..... Select this to specify the reading area based on the 2.5-cm grid lines on the fluorescent stage.

○ Plate ..... Select this to specify the position of the titer plate placed on the multi-stage as the reading area.

How to specify the reading area when the grid is selected
Move the mouse cursor to the red frame line or the center of the area, and drag the mouse to change the area size and/or position.



Tips

The 10μm-pixel size processing is conducted by applying Bi-cubic algorithm to the images read at 25μm-pixel size. Therefore, computer processing after reading may take longer time than image reading time.

Bi-cubic : Using the densities of 16 lattice points around (u_0, v_0), cubic interpolation is done.

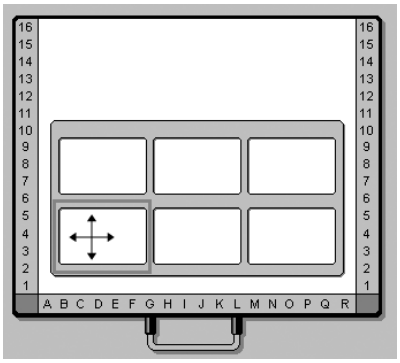
$$f(u_0,v_0) = \sum_k \sum_l f(u_k,u_l)\, c(u_k-u_0)\, c(v_l-v_0)$$

Here (u_k,v_l) is a lattice point around (u_0, v_0) and interpolative coefficient c(x) is defined linearly.

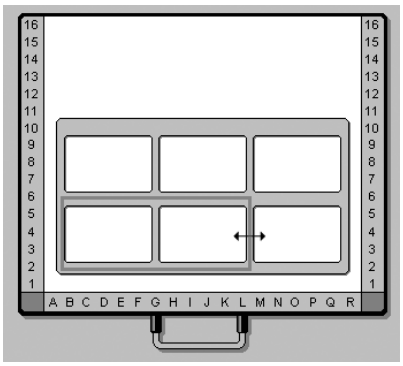
$$c(x) = \begin{cases} 1 - 2|x|^2 + |x|^3 & 0 \le |x| < 1 \\ 4 - 8|x| + 5|x|^2 - |x|^3 & 1 \le |x| < 2 \\ 0 & 2 \le |x| \end{cases}$$

Function c(x) is piecewise three-dimension polynomial approximation of function sinx/x that is revealed with the sampling theorem for continuous signals.

How to specify the area when titer plate(s) is/are selected
When reading one titer plate, move the mouse pointer to the center inside the red frame and drag the mouse to move the red frame to an intended plate.



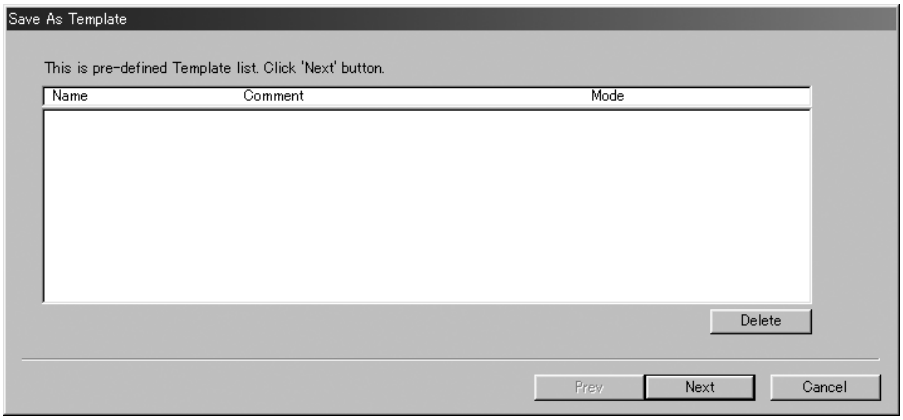
When reading two or more titer plates, place the mouse pointer on the red frame line shown above and drag the mouse to extend the red frame.



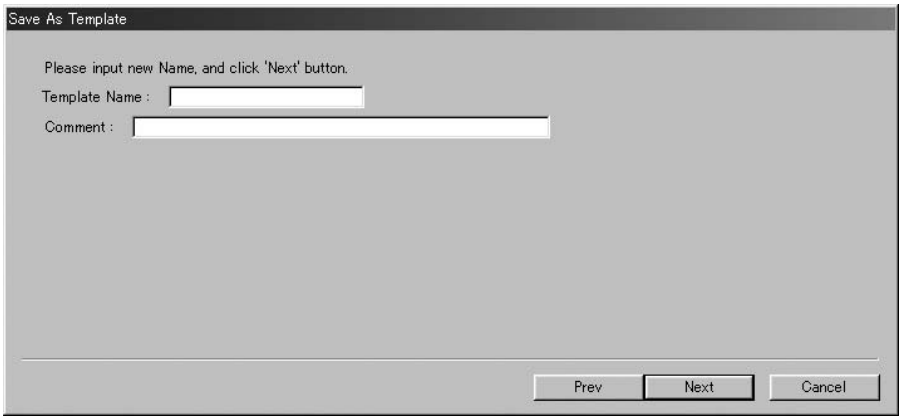
Save As Template... ..... Use this button to save the reading conditions in a file. You may save the reading conditions used frequently and recall them later.

Click on Save As Template... .

The following window opens. Saved reading conditions are displayed in this window.



Click the Next button.
The following window opens.



Input a template name in the Template Name box, and click the Next button. The reading conditions are saved.

For the succeeding procedures, see page 85.

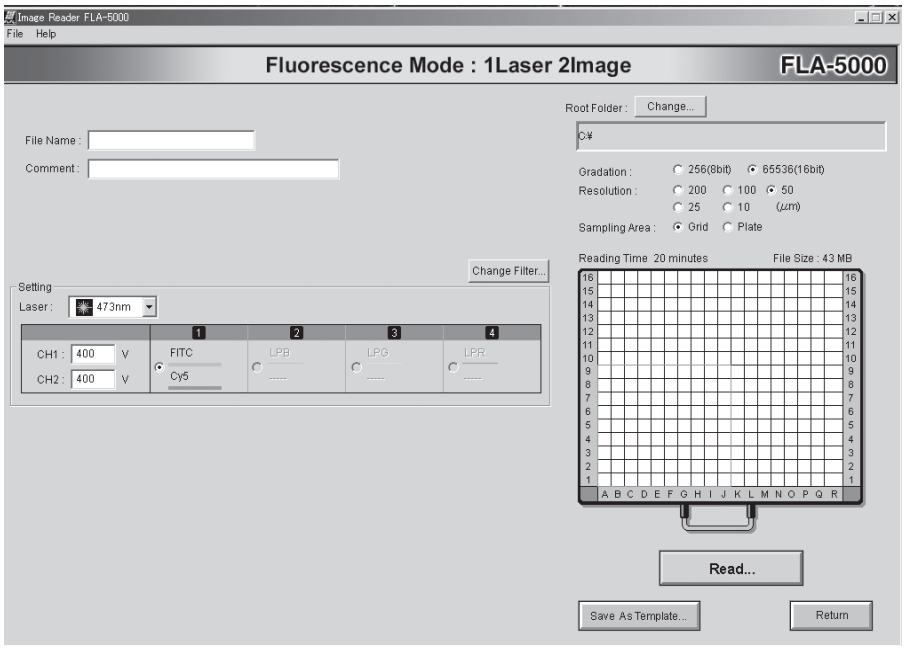
1-laser, 2-image mode

5-1-3 1-laser, 2-image mode

*** This mode is available only when two photo-multiplier tubes (PMTs) are built in the FLA- 5100 and the 2-channel filters are set in it.**

Click the 1Laser 2Image button.

5-1-3-1 The following window appears.

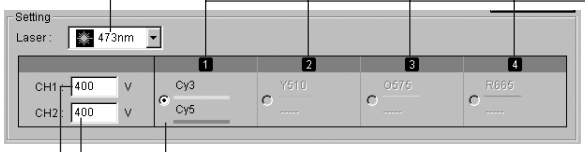


Refer to the instruction below and set the reading conditions.

File Name : → Input the name of a file for saving data of a read image. (You may input half-size alphanumeric characters only.)
* You may not start reading unless you input a file name.

Comment : → The comment is saved with the file name. Input it as the necessity requires. (You may input half-size alphanumeric characters only.)
* You may start reading even if you input no comment.

Change Filter... ..... Use this button to change the data of the filter registered on the software. Ignore this button and proceed to the next step if the filter set in the FLA- 5100 is displayed on the Setting screen properly.
For the usage of Change Filter, see page 126.



Laser to be used for reading is displayed.

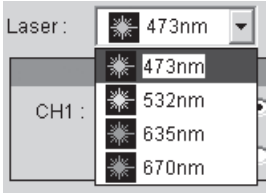
These numeric values shown in these areas correspond to the numbers (1, 2, 3 and 4) on the filter tray.

The check on the left of a filter to be used for reading changes into .

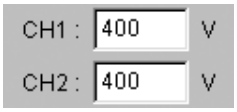
The voltage to be applied to the second photo-multiplier tube (PMT) is displayed.

The voltage to be applied to the first photo-multiplier tube (PMT) is displayed.

Select a laser unit to be used for reading in the pull-down menu.



Input voltages to be applied to the first and second photo-multiplier tubes (PMTs). (You may input an integer between 250 and 1000 in each box.)



The greater the value is, the higher the voltage to be applied to the PMT and the reading sensitivity are.

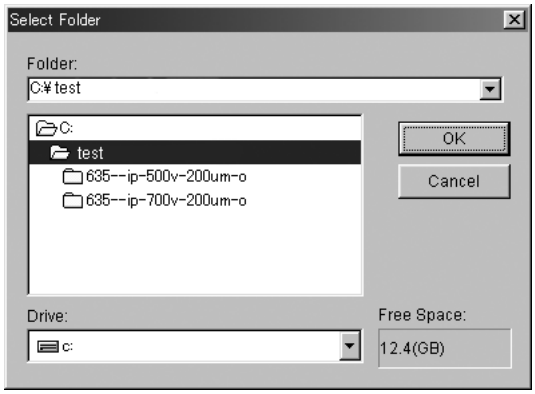
Small ◄—— Value ——► Large

Low ◄—— Sensitivity ——► High

Select a filter to be used for reading by clicking the radio button on the left of the filter name.

*** It is impossible to select any other filters than the 2-channel filters in this mode.**

..... Specify where to save the file for saving the image data. Click the Change... button and specify the file saving position.

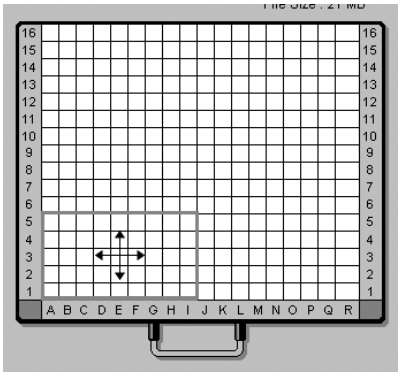


.....Click to select the number of gradations of a read image. It is not related with the reading time. The image capacity depends on the number of gradations.

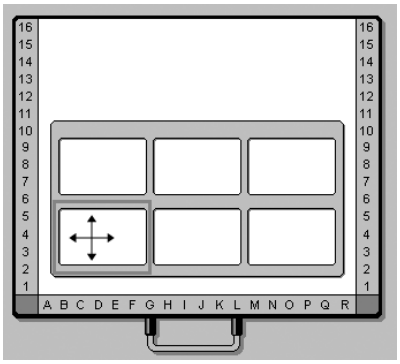
Grid ..... Select this to specify the reading area based on the 2.5-cm grid lines on the fluorescent stage.

Plate ..... Select this to specify the position of the titer plate placed on the multi-stage as the reading area.

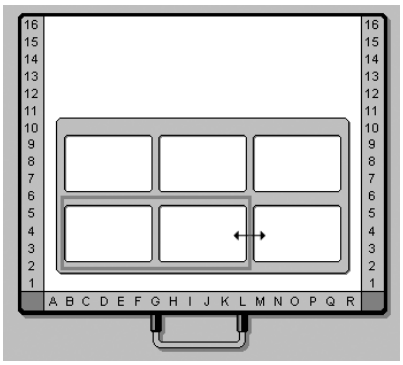
How to specify the reading area when the grid is selected
Move the mouse cursor to the red frame line or the center of the area, and drag the mouse to change the area size and/or position.



How to specify the area when titer plate(s) is/are selected
When reading one titer plate, move the mouse pointer to the center inside the red frame and drag the mouse to move the red frame to an intended plate.



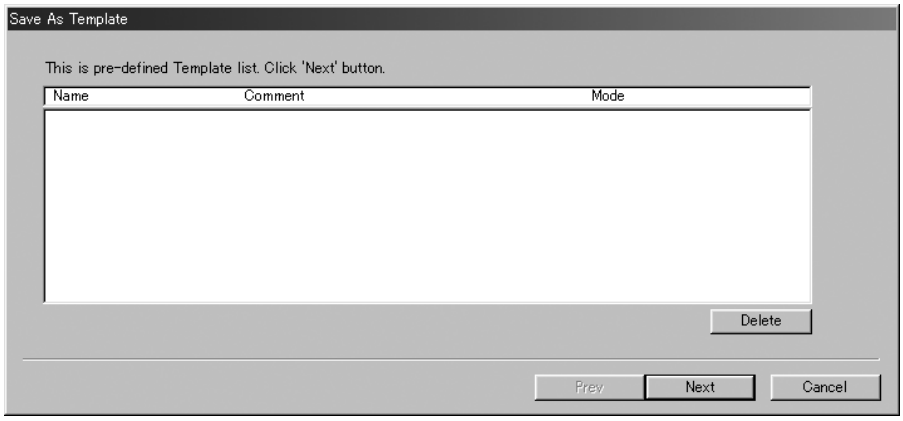
When reading two or more titer plates, place the mouse pointer on the red frame line shown above and drag the mouse to extend the red frame.



Save As Template... ..... Use this button to save the reading conditions in a file. You may save the reading conditions used frequently and recall them later.

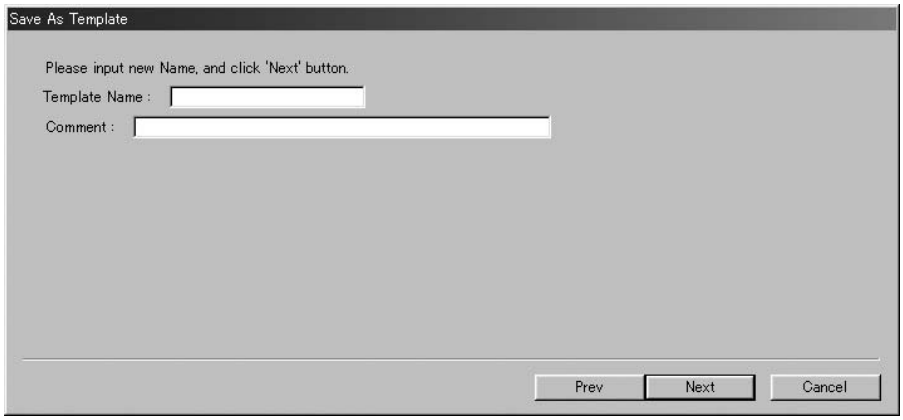
Click on Save As Template....

The following window opens. Saved reading conditions are displayed in this window.



Click the Next button.

The following window opens.



Input a template name in the Template Name box, and click the Next button. The reading conditions are saved.

For the succeeding procedures, see page 85.

1-laser, 2-image Cyclic mode

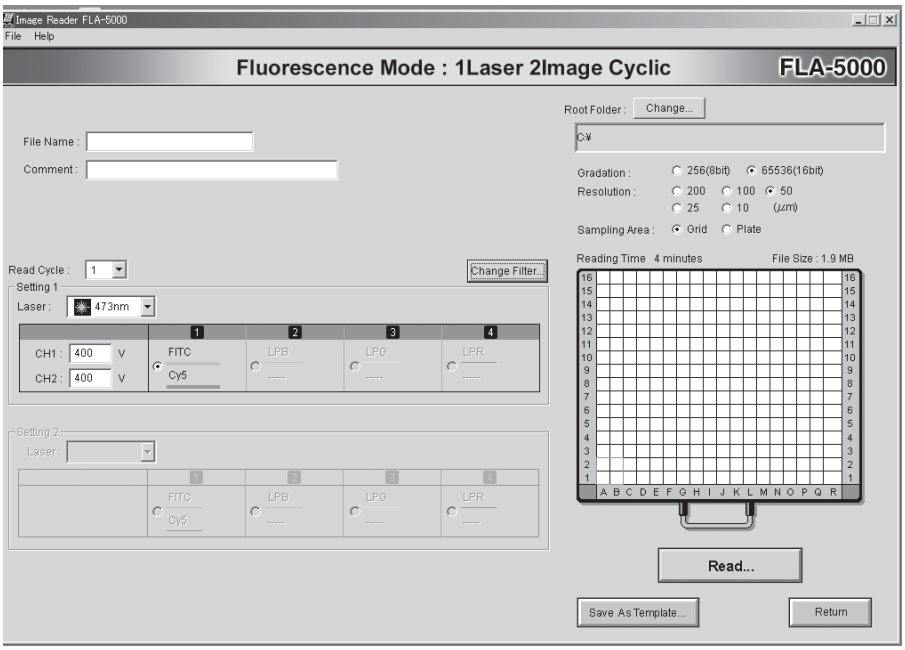
5-1-4 1-laser, 1-image Cyclic mode

Click the 

button.

*** This mode is available only when two photo-multiplier tubes (PMTs) are built in the FLA- 5100 and the 2-channel filters are set in it.**

5-1-4-1 The following window appears.



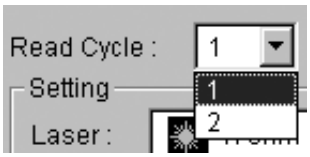
Refer to the instruction below and set the reading conditions.

File Name : → Input the name of a file for saving data of a read image. (You may input half-size alphanumeric characters only.)
* You may not start reading unless you input a file name.

Comment : → The comment is saved with the file name. Input it as the necessity requires. (You may input half-size alphanumeric characters only.)
* You may start reading even if you input no comment.

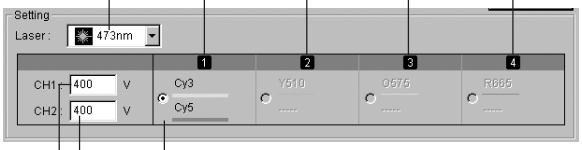
Change Filter... ..... Use this button to change the data of the filter registered on the software. Ignore this button and proceed to the next step if the filter set in the FLA- 5100 is displayed on the Setting screen properly.
For the usage of Change Filter, see page 126.

.....Select the number of reading cycles in the pull-down menu. It is possible to repeat reading up to two times.



When Read Cycle is set to 2, for example, the following screen is displayed and you may specify the reading conditions for each cycle.

Laser to be used for reading is displayed.



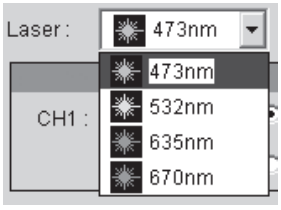
These numeric values shown in these areas correspond to the numbers (1, 2, 3 and 4) on the filter tray.

The check ○ on the left of a filter to be used for reading changes into ◉.

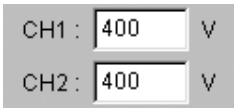
The voltage to be applied to the second photo-multiplier tube (PMT) is displayed.

The voltage to be applied to the first photo-multiplier tube (PMT) is displayed.

Select a laser unit to be used for reading in the pull-down menu.



Input voltages to be applied to the first and second photo-multiplier tubes (PMTs). (You may input an integer between 250 and 1000 in each box.)



The greater the value is, the higher the voltage to be applied to the PMT and the reading sensitivity are.

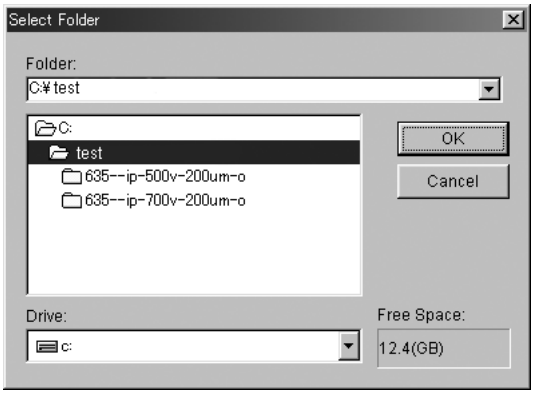
Small ◄—— Value ——► Large

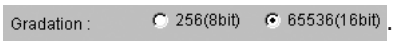
Low ◄—— Sensitivity ——► High

Select a filter to be used for reading by clicking the radio button on the left of the filter name.

*** It is impossible to select any other filters than the 2-channel filters in this mode.**

..... Specify where to save the file for saving the image data. Click the Change... button and specify the file saving position.



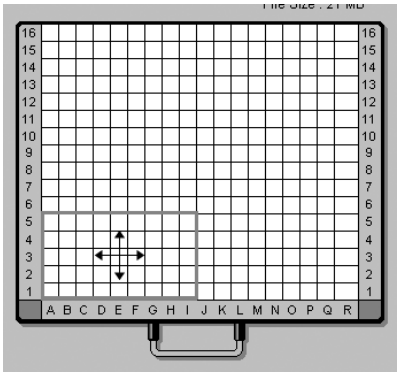


.....Click to select the number of gradations of a read image. It is not related with the reading time. The image capacity depends on the number of gradations.

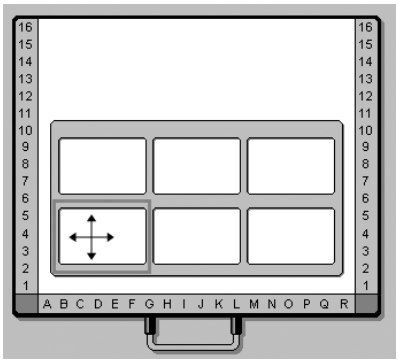
Grid ..... Select this to specify the reading area based on the 2.5-cm grid lines on the fluorescent stage.

Plate ..... Select this to specify the position of the titer plate placed on the multi-stage as the reading area.

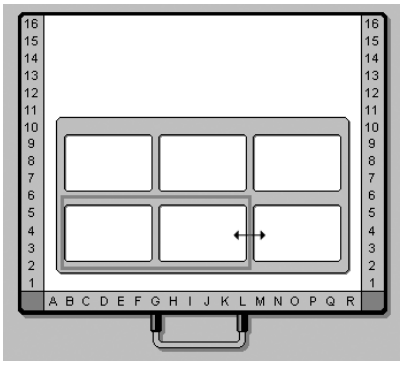
How to specify the reading area when the grid is selected
Move the mouse cursor to the red frame line or the center of the area, and drag the mouse to change the area size and/or position.



How to specify the area when titer plate(s) is/are selected
When reading one titer plate, move the mouse pointer to the center inside the red frame and drag the mouse to move the red frame to an intended plate.



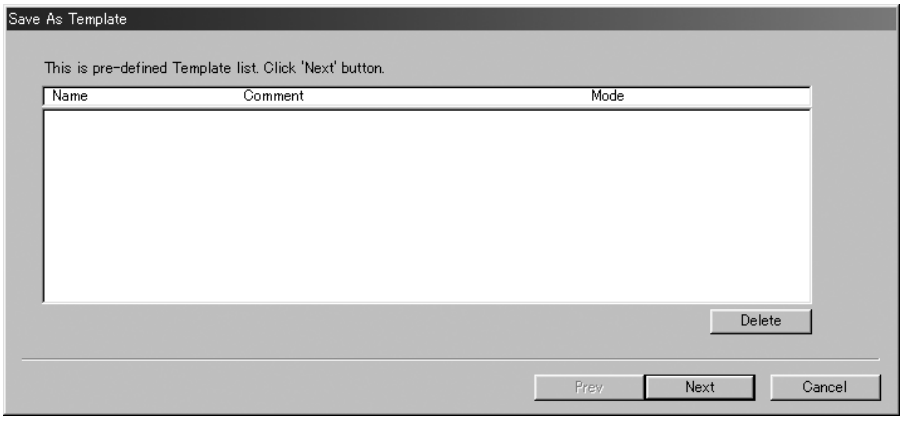
When reading two or more titer plates, place the mouse pointer on the red frame line shown above and drag the mouse to extend the red frame.



Save As Template... ..... Use this button to save the reading conditions in a file. You may save the reading conditions used frequently and recall them later.

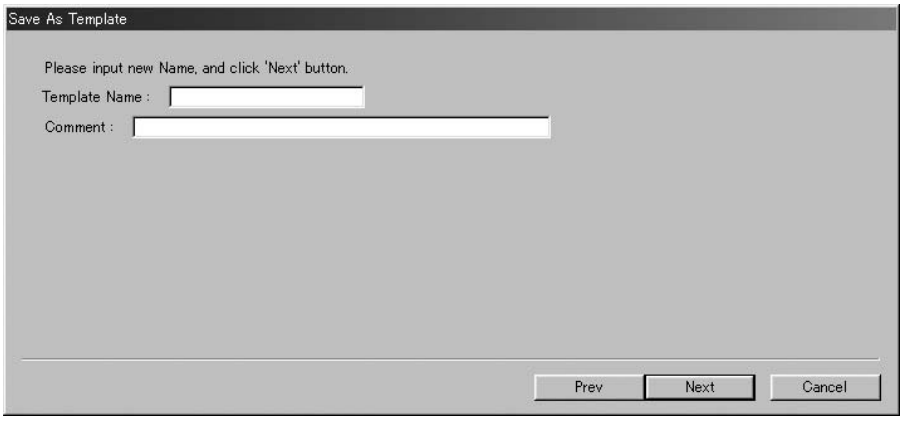
Click on Save As Template....

The following window opens. Saved reading conditions are displayed in this window.



Click the Next button.

The following window opens.



Input a template name in the Template Name box, and click the Next button. The reading conditions are saved.

For the succeeding procedures, see page 85.

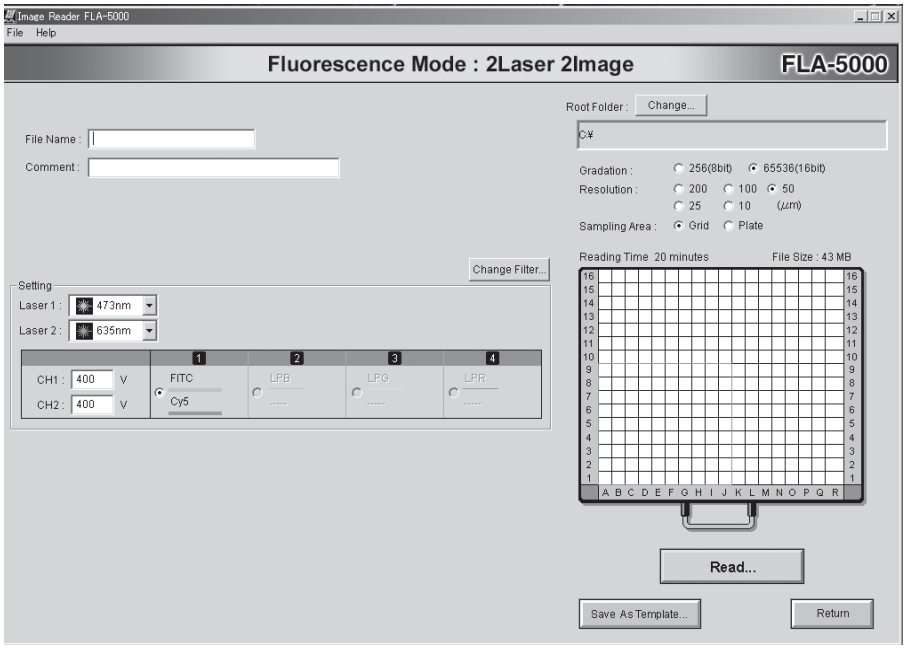
2-laser, 2-image mode

5-1-5 2-laser, 2-image mode

Click the 2Laser 2Image button.

*** This mode is available only when two photo-multiplier tubes (PMTs) are built in the FLA- 5100 and the 2-channel filters are set in it.**

5-1-5-1 The following window appears.



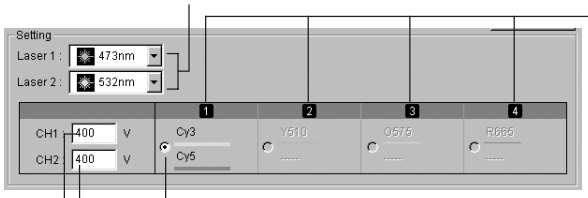
Refer to the instruction below and set the reading conditions.

File Name : → Input the name of a file for saving data of a read image. (You may input half-size alphanumeric characters only.)
* You may not start reading unless you input a file name.

Comment : → The comment is saved with the file name. Input it as the necessity requires. (You may input half-size alphanumeric characters only.)
* You may start reading even if you input no comment.

Change Filter... ..... Use this button to change the data of the filter registered on the software. Ignore this button and proceed to the next step if the filter set in the FLA- 5100 is displayed on the Setting screen properly.
For the usage of Change Filter, see page 126.

Laser to be used for reading is displayed.



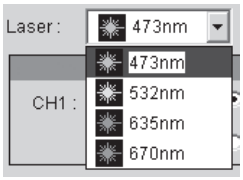
These numeric values shown in these areas correspond to the numbers (1, 2, 3 and 4) on the filter tray.

The check ○ on the left of a filter to be used for reading changes into ◉.

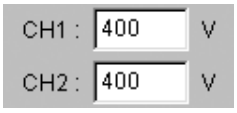
The voltage to be applied to the second photo-multiplier tube (PMT) is displayed.

The voltage to be applied to the first photo-multiplier tube (PMT) is displayed.

Select two types of lasers used for reading in the pull-down menu.



Input voltages to be applied to the first and second photo-multiplier tubes (PMTs). (You may input an integer between 250 and 1000 in each box.)



The greater the value is, the higher the voltage to be applied to the PMT and the reading sensitivity are.

Small ← Value → Large

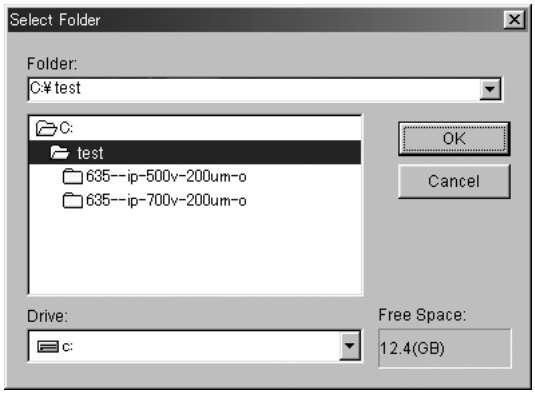
Low ← Sensitivity → High

Select a filter to be used for reading by clicking the radio button on the left of the filter name.

○ → ◉

*** It is impossible to select any other filters than the 2-channel filters in this mode.**

Root Folder : Change... ..... Specify where to save the file for saving the image data. Click the Change... button and specify the file saving position.



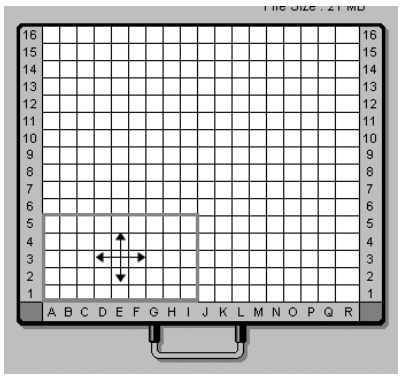
Gradation : 256(8bit) 65536(16bit) .....Click to select the number of gradations of a read image. It is not related with the reading time. The image capacity depends on the number of gradations.

Sampling Area : Grid Plate

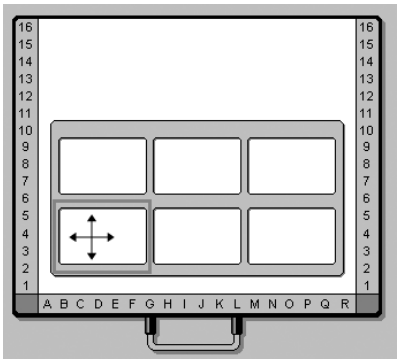
Grid ..... Select this to specify the reading area based on the 2.5-cm grid lines on the fluorescent stage.

Plate ..... Select this to specify the position of the titer plate placed on the multi-stage as the reading area.

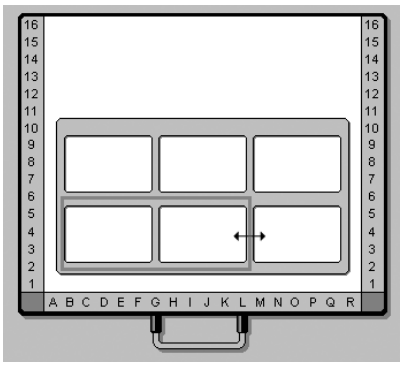
How to specify the reading area when the grid is selected
Move the mouse cursor to the red frame line or the center of the area, and drag the mouse to change the area size and/or position.



How to specify the area when titer plate(s) is/are selected
When reading one titer plate, move the mouse pointer to the center inside the red frame and drag the mouse to move the red frame to an intended plate.



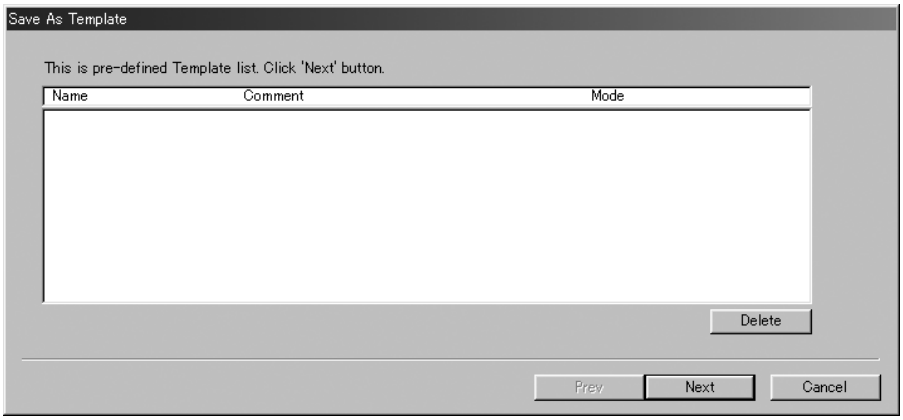
When reading two or more titer plates, place the mouse pointer on the red frame line shown above and drag the mouse to extend the red frame.



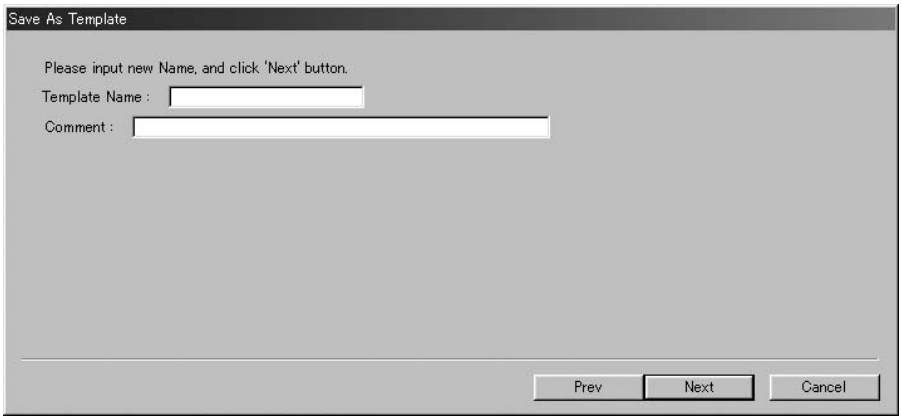
Save As Template... ..... Use this button to save the reading conditions in a file. You may save the reading conditions used frequently and recall them later.

Click on Save As Template... .

The following window opens. Saved reading conditions are displayed in this window.



Click the Next button.
The following window opens.



Input a template name in the Template Name box, and click the Next button. The reading conditions are saved.

For the succeeding procedures, see page 85.

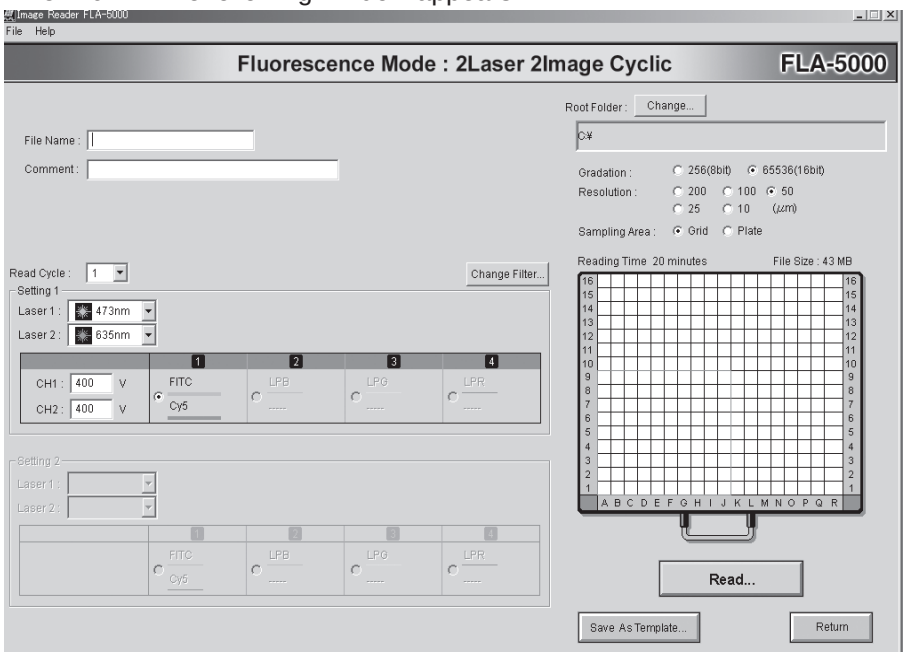
2-laser, 2-image Cyclic mode

5-1-6 2-laser, 2-image Cyclic mode

Click the 2Laser 2Image Cyclic button.

*** This mode is available only when two photo-multiplier tubes (PMTs) are built in the FLA- 5100 and the 2-channel filters are set in it.**

5-1-6-1 The following window appears.



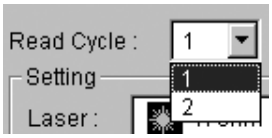
Refer to the instruction below and set the reading conditions.

→Input the name of a file for saving data of a read image. (You may input half-size alphanumeric characters only.)
* You may not start reading unless you input a file name.

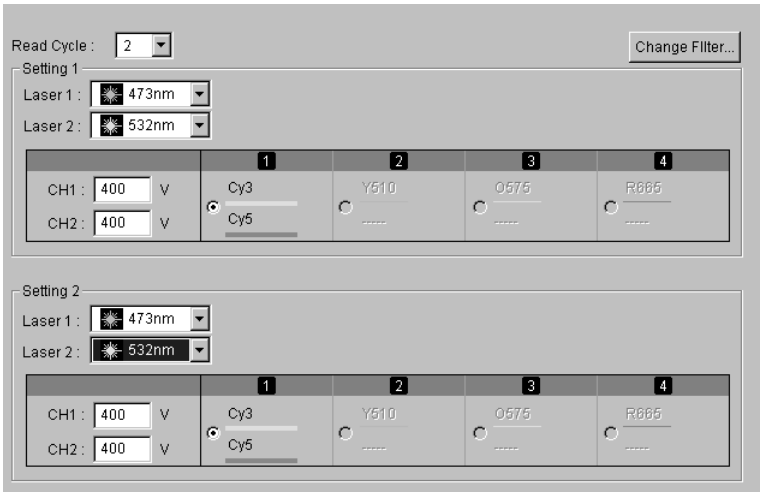
→The comment is saved with the file name. Input it as the necessity requires. (You may input half-size alphanumeric characters only.)
* You may start reading even if you input no comment.

..... Use this button to change the data of the filter registered on the software. Ignore this button and proceed to the next step if the filter set in the FLA- 5100 is displayed on the Setting screen properly.
For the usage of Change Filter, see page 126.

.....Select the number of reading cycles in the pull-down menu. It is possible to repeat reading up to two times.

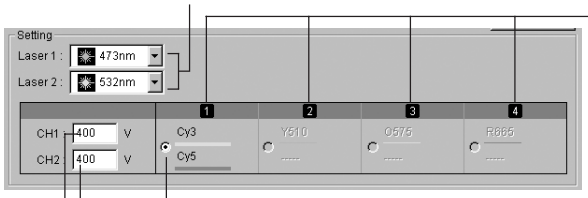


When Read Cycle is set to 2, for example, the following screen is displayed and you may specify the reading conditions for each cycle.



* Gradation, Resolution, and Sampling Area are common to every reading. (It is impossible to set these conditions differently for each reading cycle.)

Laser to be used for reading is displayed.



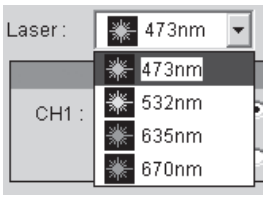
These numeric values shown in these areas correspond to the numbers (1, 2, 3 and 4) on the filter tray.

The check ○ on the left of a filter to be used for reading changes into ◉.

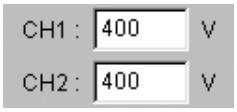
The voltage to be applied to the second photo-multiplier tube (PMT) is displayed.

The voltage to be applied to the first photo-multiplier tube (PMT) is displayed.

Select two types of lasers used for reading in the pull-down menu.



Input voltages to be applied to the first and second photo-multiplier tubes (PMTs). (You may input an integer between 250 and 1000 in each box.)



The greater the value is, the higher the voltage to be applied to the PMT and the reading sensitivity are.

Small ← Value → Large

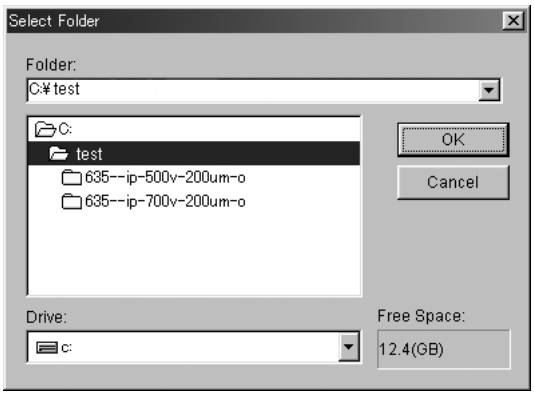
Low ← Sensitivity → High

Select a filter to be used for reading by clicking the radio button on the left of the filter name.

○ → ◉

*** It is impossible to select any other filters than the 2-channel filters in this mode.**

Root Folder : Change... ..... Specify where to save the file for saving the image data. Click the Change... button and specify the file saving position.



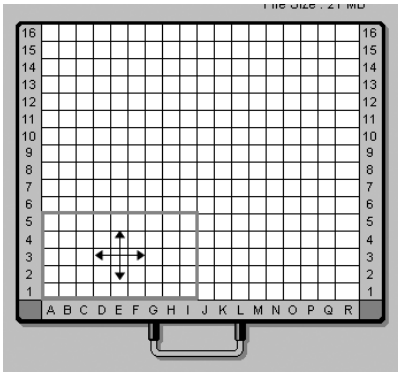
Gradation : 256(8bit) 65536(16bit) .....Click to select the number of gradations of a read image. It is not related with the reading time. The image capacity depends on the number of gradations.

Sampling Area : Grid Plate

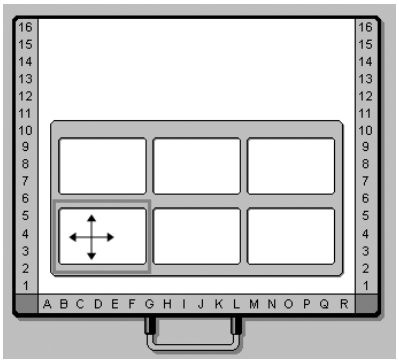
Grid ..... Select this to specify the reading area based on the 2.5-cm grid lines on the fluorescent stage.

Plate ..... Select this to specify the position of the titer plate placed on the multi-stage as the reading area.

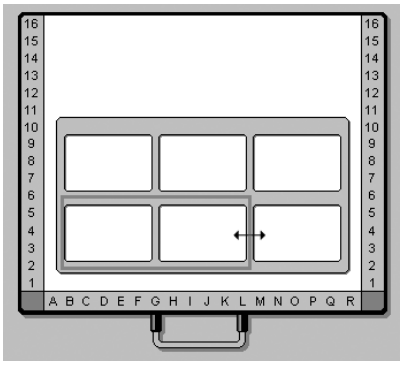
How to specify the reading area when the grid is selected
Move the mouse cursor to the red frame line or the center of the area, and drag the mouse to change the area size and/or position.



How to specify the area when titer plate(s) is/are selected
When reading one titer plate, move the mouse pointer to the center inside the red frame and drag the mouse to move the red frame to an intended plate.



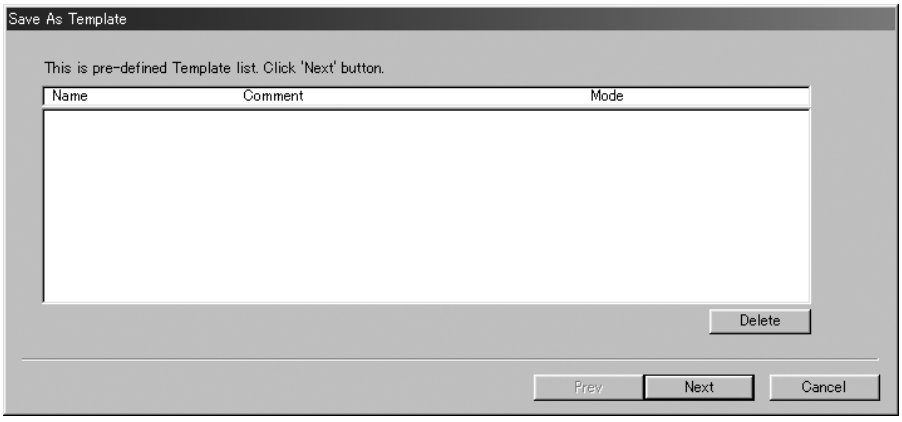
When reading two or more titer plates, place the mouse pointer on the red frame line shown above and drag the mouse to extend the red frame.



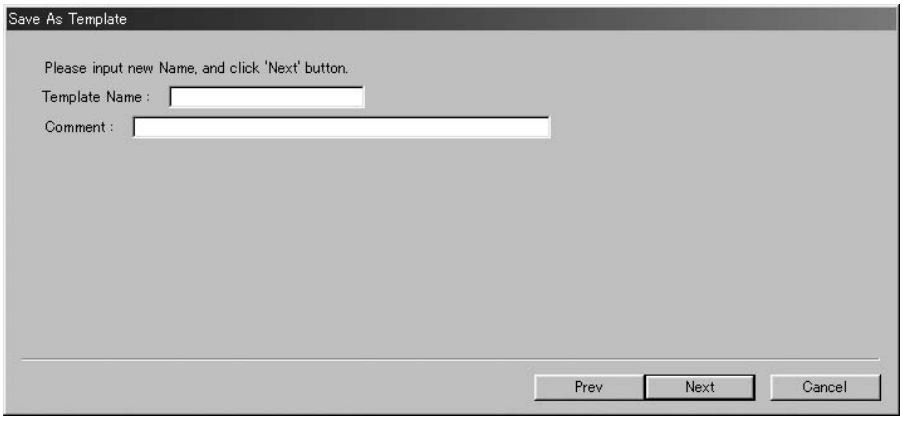
Save As Template... ..... Use this button to save the reading conditions in a file. You may save the reading conditions used frequently and recall them later.

Click on Save As Template... .

The following window opens. Saved reading conditions are displayed in this window.



Click the Next button.
The following window opens.



Input a template name in the Template Name box, and click the Next button. The reading conditions are saved.

For the succeeding procedures, see the sample setting procedures below.

6. Set a fluorescent sample on the fluorescent sample stage or multi-stage.

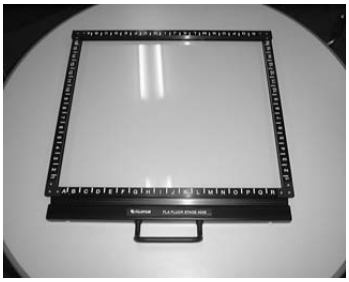
This manual describes the typical procedures of setting a fluorescent sample on fluorescent sample stage, setting a titer plate on the multi-stage, and setting a gel sample with glass on the multi-stage.

Setting a gel sample

6-1 Set a fluorescent sample on fluorescent sample stage.

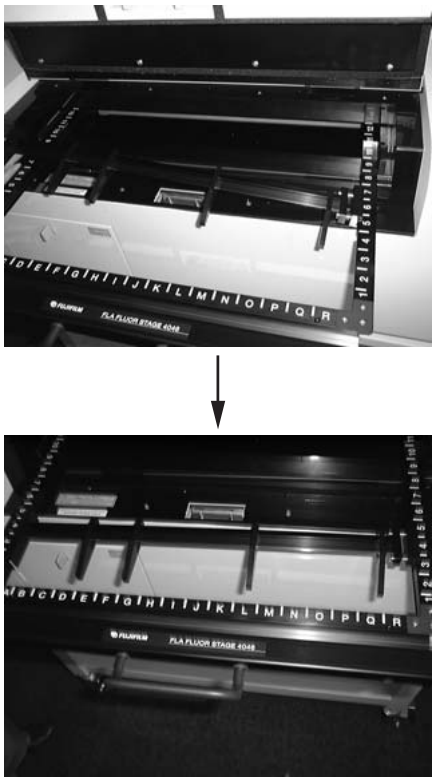
When reading a fluorescent gel sample, set the fluorescent sample stage on the FLA-5100 first and set the fluorescent gel sample on the fluorescent sample stage then as shown below. This is an easy way.

6-1-1 Open the door of the stage setting block, and set the fluorescent sample stage with the printed frame side faceup on the FLA-5100.

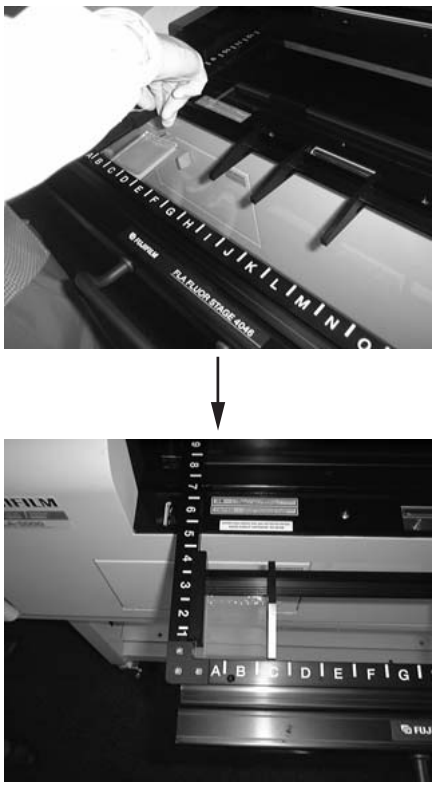


Set the stage in the front position. Do not pull it to the very end.

6-1-2 Press the gel stopper against the right frame side of the fluorescent sample stage as shown below.



6-1-3 Put a gel sample so that the side with charging holes faces up. Fix it with the gel stopper.



6-1-4 Press the fluorescent sample stage slowly to the very end (until it butts).

6-1-5 Close the door of the stage setting block.

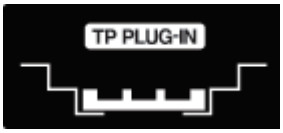
Setting the titer plates

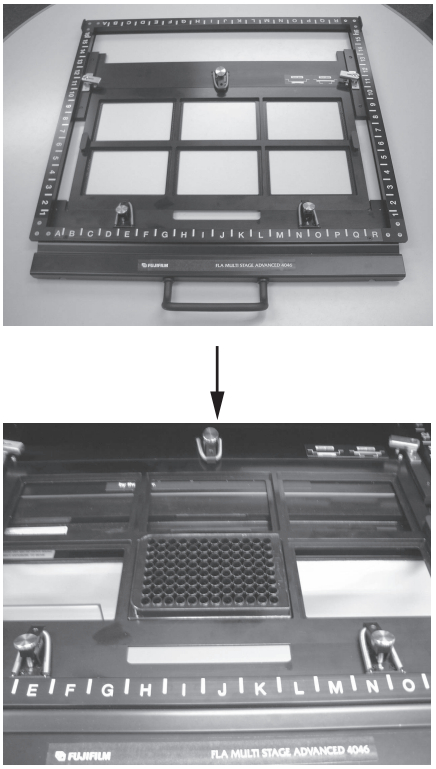
6-2 Set a titer plate on the multi-stage.

6-2-1 Set a titer plate in any position of the titer plate frame set on the multi-stage.

! Caution !

To set the titer plate plug-in into the MULTI Stage, adjust it along with the deep groove of MULTI Stage and movable stays.





6-2-2 Open the door of the stage setting block, and set the multi-stage with the printed frame side faceup on the FLA-5100. Push the multi-stage slowly to the very end.

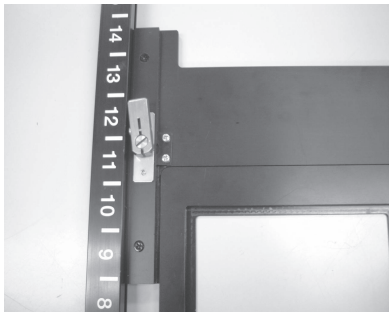
6-2-3 Close the door of the stage setting block.

Setting gel with glass

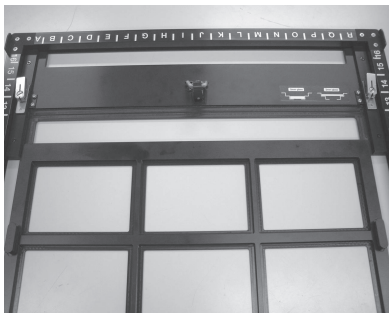
6-3 Set a gel sample with glass on the multi-stage.

6-3-1 Detach the titer plate plug-in as shown below, if it has been set.

a) Turn the lock levers on both sides to unlock them.

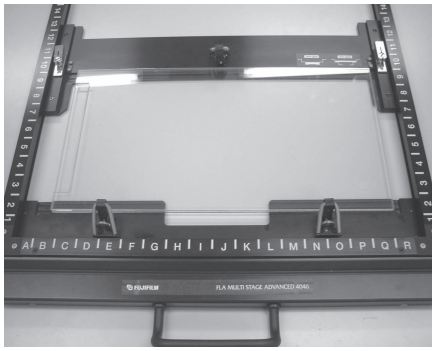


b) Move the movable stays, which fix the titer plate plug-in, to the back, and detach the titer plate plug-in.

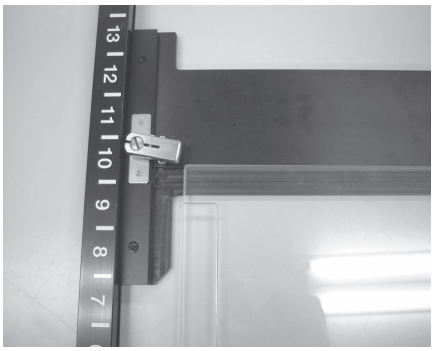


6-3-2 Insert one or two gel samples with glass from the front side. Use the deep groove for 5mm thick glass, and the shallow groove for 3mm thick glass.

6-3-3 Adjust the movable stays to the glass edges (by moving them from the back to the front).

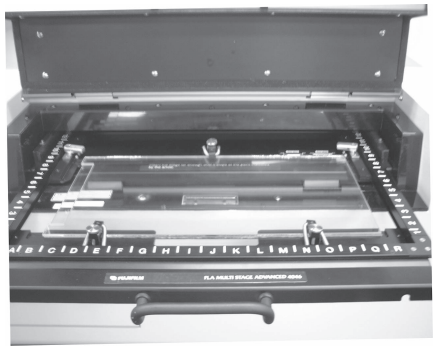


6-3-4 Turn the levers on both sides horizontally to lock them.



6-3-5 Fix the glass with two glass holders in the front position and one glass holder in the rear position. (Push each glass holder down and turn it clockwise to fix the glass.)

6-3-6 Open the door of the stage setting block, and set the multi-stage with the printed frame side faceup on the FLA-5100. Push the multi-stage slowly to the very end (until it butts).



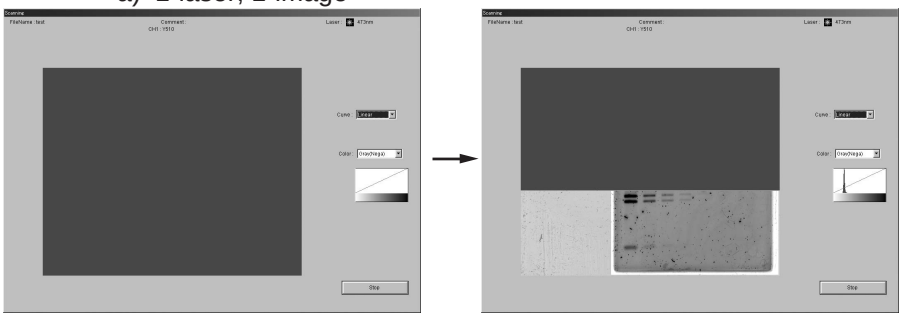
6-3-7 Close the door of the stage setting block.

Starting reading

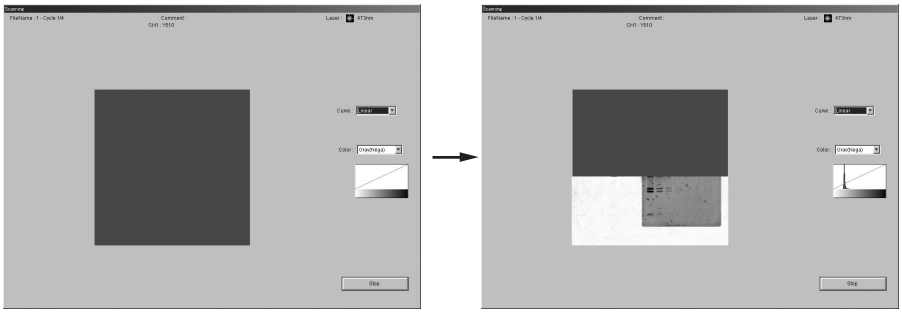
7. Start reading.

7-1 Click the Read... button, and reading starts.
The condition of the preset reading area, where reading is completed, is displayed in the reading status real-time display window. Reading is executed from the front side of the stage to the back. On the monitor screen, read data is displayed from below to above.

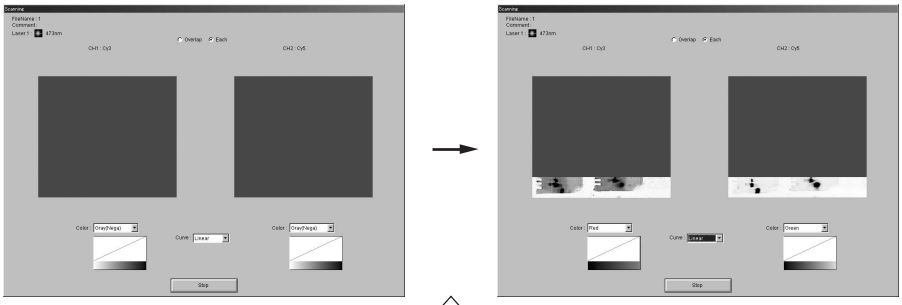
a) 1-laser, 1-image



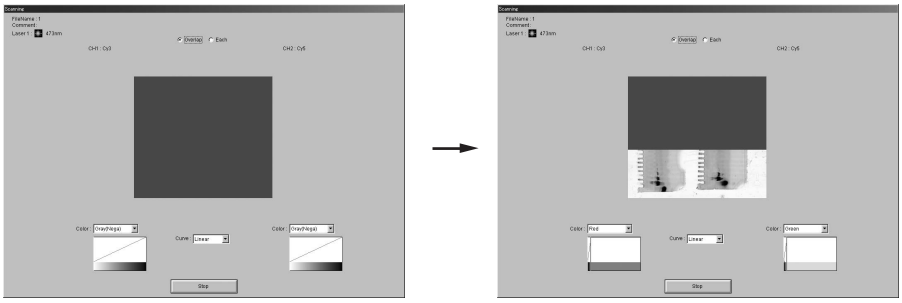
b) 1-laser, 1-image Cyclic



c) 1-laser, 2-image

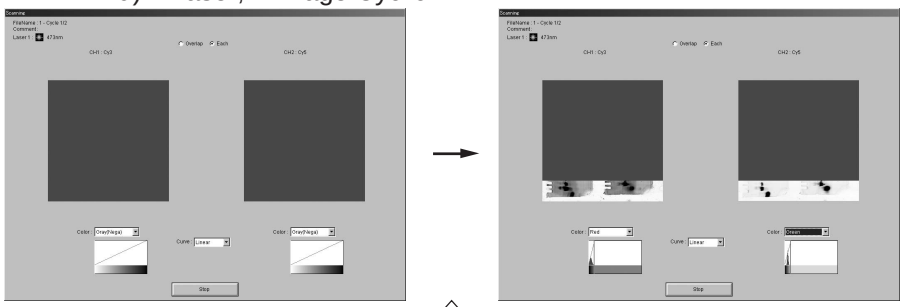


Clicking the radio button on the left alternates Overlap and Each.

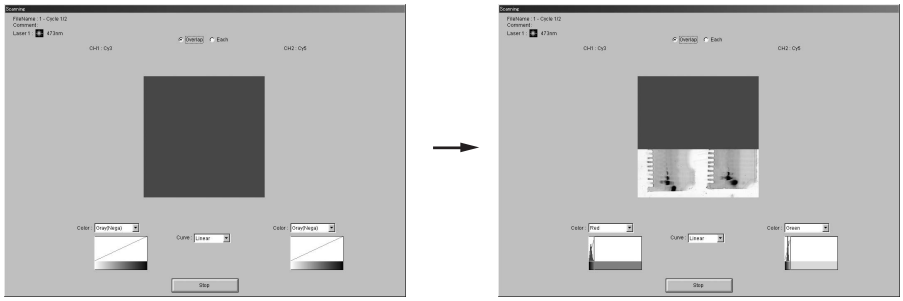


Overlap display Overlap display

d) 1-laser, 2-image Cyclic

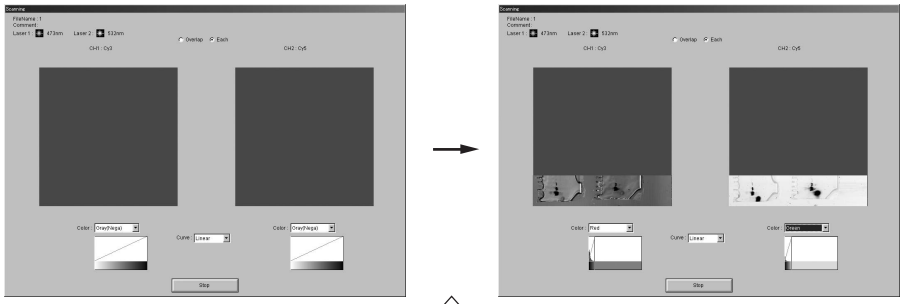


Clicking the radio button on the left alternates Overlap and Each.

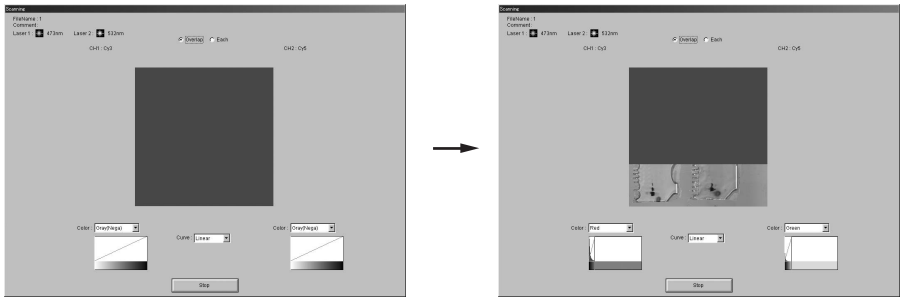


Overlap display Overlap display

e) 2-laser, 2-image

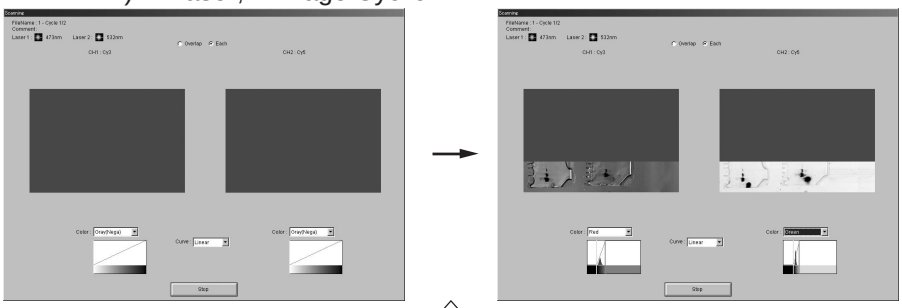


Clicking the radio button on the left alternates Overlap and Each.

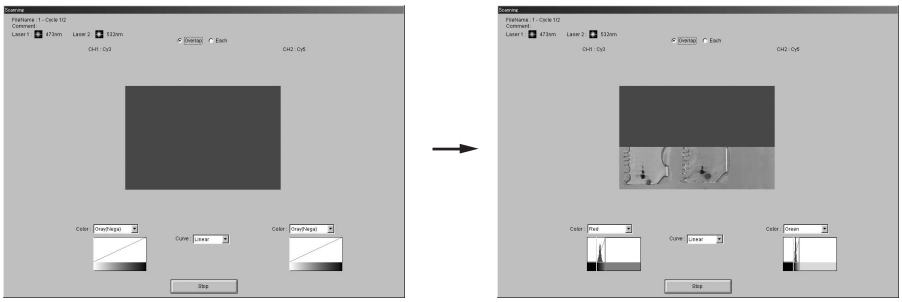


Overlap display Overlap display

f) 2-laser, 2-image Cyclic

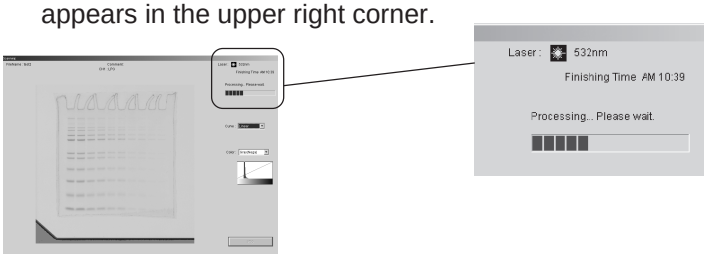


Clicking the radio button on the left alternates Overlap and Each.



Overlap display Overlap display

Reading at 10μm-pixel size may take longer time in computer processing after image reading. When processing, a progress bar appears in the upper right corner.

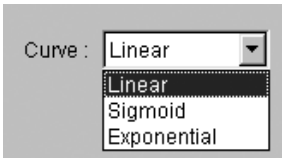


Processing cannot be terminated halfway.

7-2 You may carry out the following operations in the windows shown above.

a) Changing the tone curve

Select an intended curve from the pull-down menu.



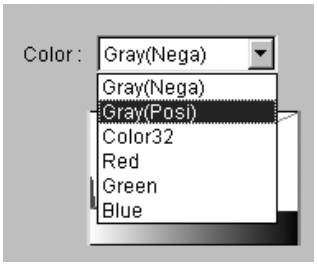
Linear: The linear tone curve is used to adjust gradations.

Sigmoid: The sigmoid tone curve is used to adjust gradations.

Exponential: The exponential tone curve is used to adjust gradations.

b) Changing the display color

Select an intended color from the pull-down menu.



Gray (Nega): An image is displayed in nega tive gray. (Low-density areas are displayed in white, and high-den sity areas are displayed in black.)

Gray (Posi): An image is displayed in positive gray. (Low-density areas are displayed in black, and high-density areas are displayed in white.)

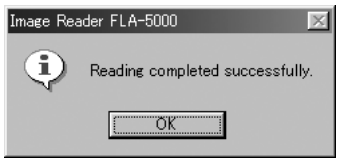
Color 32: An image is displayed in 32 pseudo colors.

Red: An image is displayed in red fluo rescent color.

Green: An image is displayed in green fluorescent color.

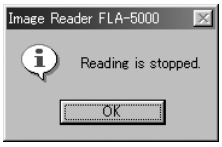
Blue: An image is displayed in blue fluo rescent color.

7-3 When reading finishes normally, the following dialog box appears. Click the OK button.

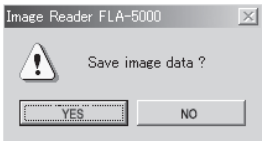


7-4 You may finish reading at any time before the whole reading area is read. Click the Stop button when you want to finish reading.

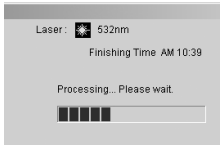
■When the reading has been done with pixel size at 200μm, 100μm,50μm and 25μm, the following dialog box appears. Click the OK button.



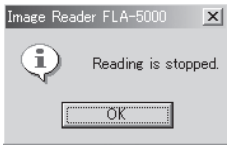
■When the reading has been done with pixel size at 10μm, the dialogue box shown below appears.



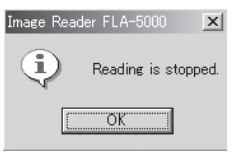
Click YES to start processing. While processing, a progress bar appears as shown below.



When processing is completed, the dialogue box shown below appears. Please click OK button.



When NO is clicked, the dialogue box shown below appears. Please click OK button.
*Note: The image data file will be deleted in this case.



7-5 Click the Return button to return to the previous menu manager window.

Part
6

Reading Chemiluminescent Samples

Reading Chemiluminescent Samples

Set the reading conditions.

↓

Set the stage on the FLA-5100.

↓

Set a Chemiluminescent Sample on the stage.

↓

Start reading.

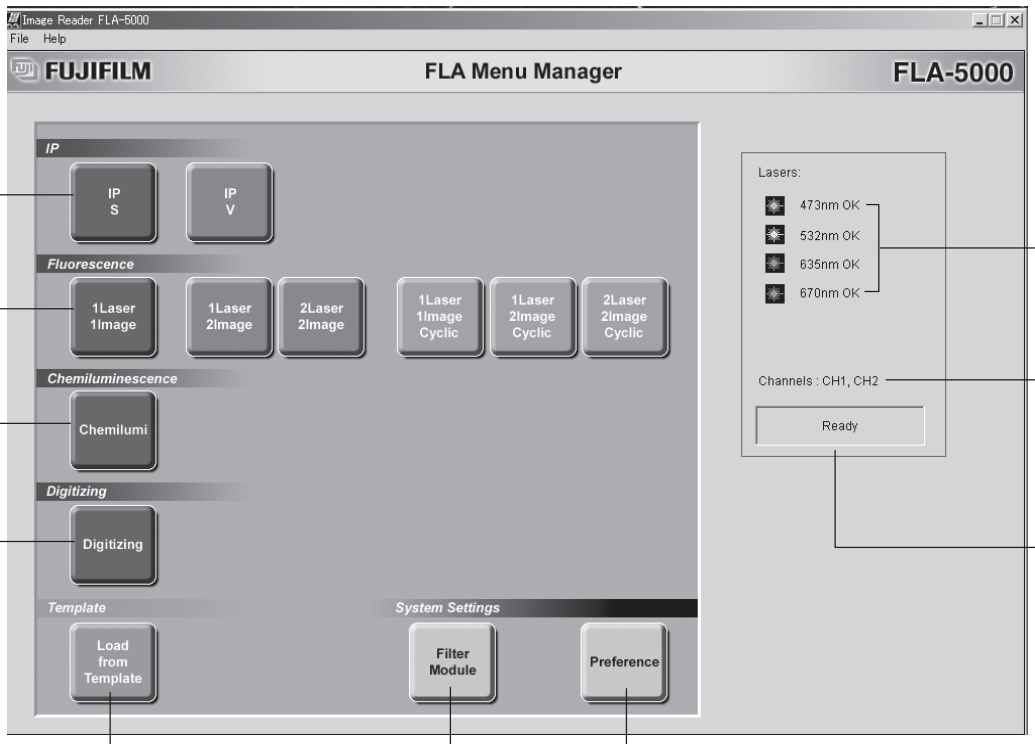
* The FLA-5100 Image Reader is available in two types: Windows version, and Macintosh version. Either version has the same functions.
This manual shows the screens of the Windows version. Follow the instructions of this manual, except the OS-related operations (such as starting and exiting the software), if you use the Macintosh version.

1. Turn on the FLA-5100 and peripheral devices.

2. Turn on the computer (DOS/V PC or Macintosh).

3. Make sure that the FLA-5100 has warmed up. (Only the power lamp on the upper left panel on the front of the FLA-5100 is lit when warming-up is completed.) Start the FLA-5000 Series Image Reader from the startup menu or using the shortcut key. (On the Macintosh, double-click the alias to start the software.)

4. The main window of the FLA-5000 Series Image Reader is displayed.



IP mode
Click this button to open the screen for setting the IP reading conditions.

Fluorescent mode
Click this button to open the screen for setting the fluorescent sample reading conditions.

Chemiluminescence mode
Click this button to open the screen for setting the chemiluminescent sample reading conditions.

Digitize mode
Click this button to open the screen for setting the digitize sample reading conditions.

The conditions of the built-in laser units are displayed. This example shows that four types of laser units (473 nm, 532 nm,635 nm and 670nm) are built in and all units are ready for operation (OK).

The number of built-in photo-multiplier tubes (PMTs) is displayed. This example shows that two PMTs are built in.

The condition of the FLA-5100 is displayed. This example shows that the FLA- 5100 is ready for reading.

Use this button to recall stored reading conditions.

Use this button to change or register the filter.

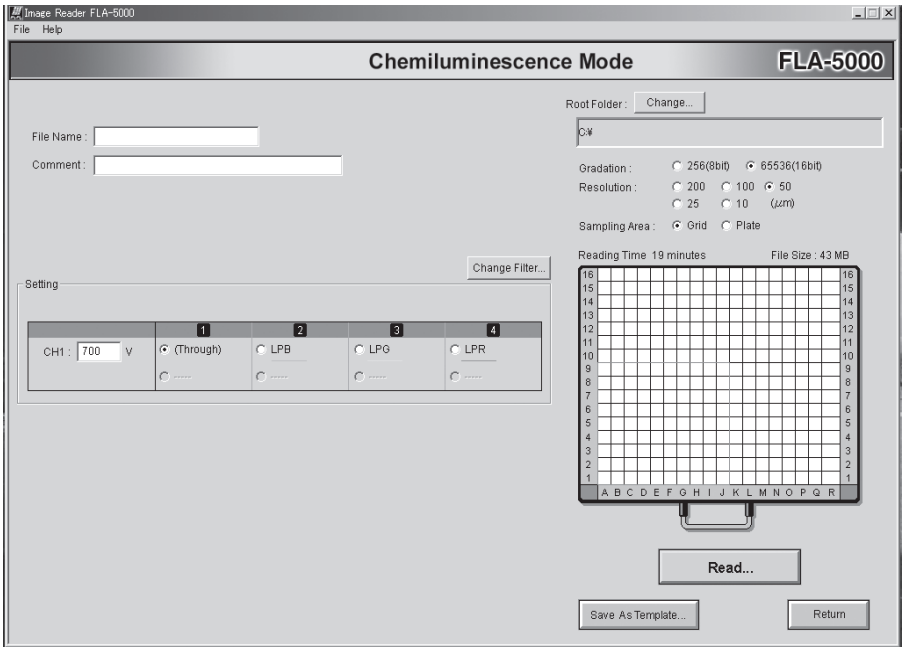
Use this button to set the display menu, file format or the Log / Square Root of image data type.

5. Setting the reading conditions

5-1 Click the 

button.

5-2 The following window opens.



Refer to the instruction below and set the reading conditions.

→Input the name of a file for saving data of a read image. (You may input half-size alphanumeric characters only.)
* You may not start reading unless you input a file name.

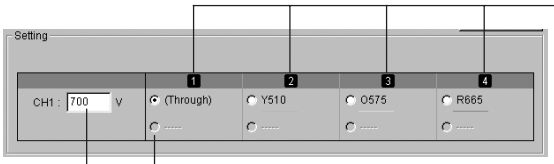
→The comment is saved with the file name. Input it as the necessity requires. (You may input half-size alphanumeric characters only.)
* You may start reading even if you input no comment.

.....Use this button to change the data of the filter registered on the software. **No filter is normally used in reading a chemiluminescent sample.** Thus, you need not pay attention to this button, in particular.
When the FLA- 5100 enters the chemiluminescence mode, the software automatically selects the through-position where no filter is built in.

When four filter modules are set on the filter tray, remove one of them physically and deselect it on the software (through).

Click the Remove button below the position where the filter is removed in the Filter Mode Setting dialog box, and the filter is deselected (through) on the software.

For details, see page 128.



These numeric values shown in these areas correspond to the numbers (1, 2, 3 and 4) on the filter tray.

The check on the left of the filter used for reading changes into . When the FLA- 5100 enters the chemiluminescence mode, the software automatically selects the through-position where no filter is built in.

The voltage to be applied to the photo-multiplier tube (PMT) is displayed.

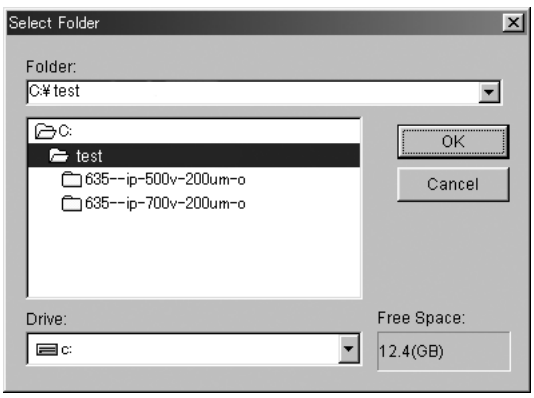
Input a voltage value to be applied to the photo-multiplier tube (PMT) in this box.
(You may input a value between 250 and 1000.)
The greater the value is, the higher the voltage to be applied to the PMT and the reading sensitivity are.

Small ← Value → Large

Low ← Sensitivity → High

Select a filter to be used for reading by clicking the radio button on the left of the filter name.

..... Specify where to save the file for saving the image data. Click the Change... button and specify the file saving position.



Tips

The 10μm-pixel size processing is conducted by applying Bi-cubic algorithm to the images read at 25μm-pixel size. Therefore, computer processing after reading may take longer time than image reading time.

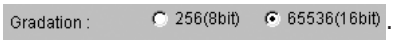
Bi-cubic : Using the densities of 16 lattice points around (u_0, v_0), cubic interpolation is done.

$$f(u_0,v_0) = \sum_k \sum_l f(u_k,u_l)\, c(u_k-u_0)\, c(v_l-v_0)$$

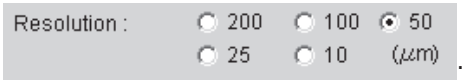
Here (u_k,v_l) is a lattice point around (u_0, v_0) and interpolative coefficient c(x) is defined linearly.

$$c(x) = \begin{cases} 1 - 2|x|^2 + |x|^3 & 0 \le |x| < 1 \\ 4 - 8|x| + 5|x|^2 - |x|^3 & 1 \le |x| < 2 \\ 0 & 2 \le |x| \end{cases}$$

Function c(x) is piecewise three-dimension polynomial approximation of function sinx/x that is revealed with the sampling theorem for continuous signals.



.....Click to select the number of gradations of a read image. It is not related with the reading time. The image capacity depends on the number of gradations.



.....Click to select one of five reading pixel sizes. The reading time and image capacity depend on the pixel size.

200 100 50 25 10 μm

Short Reading time Long

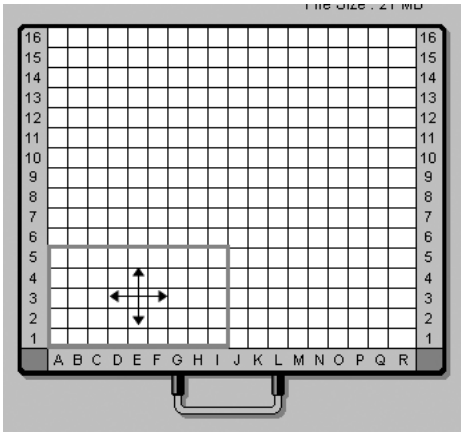
Small Image file size Large

Grid ..... Select this to specify the reading area based on the 2.5-cm grid lines on the fluorescent stage.

Plate ..... Select this to specify the position of the titer plate placed on the multi-stage as the reading area.

The normal fluorescent sample stage is only used to read a chemiluminescent sample. Thus, the following describes the method of setting the reading area using the grid only.

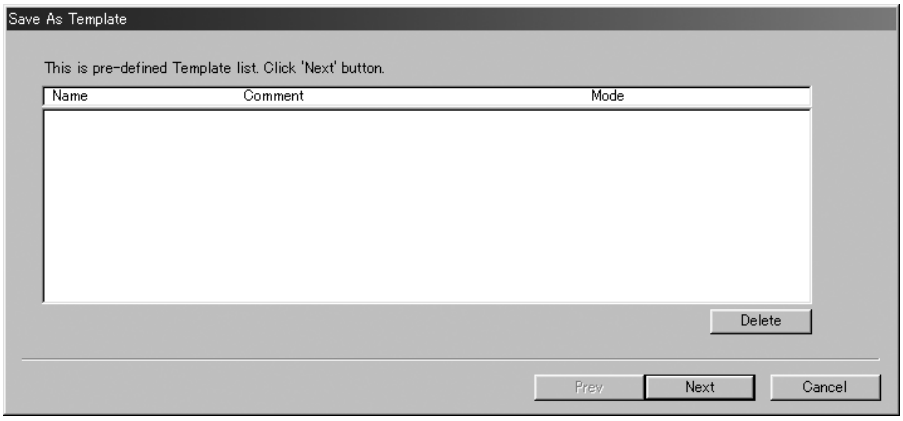
How to specify the reading area when the grid is selected
Move the mouse cursor to the red frame line or the center of the area, and drag the mouse to change the area size and/or position.



Save As Template... ..... Use this button to save the reading conditions in a file. You may save the reading conditions used frequently and recall them later.

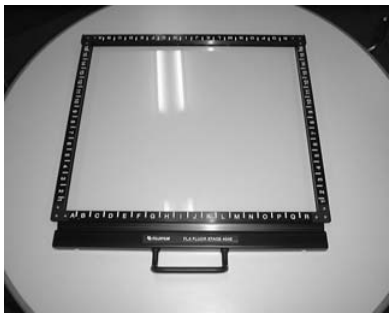
Click on Save As Template... .

The following window opens. Saved reading conditions are displayed in this window.



Setting stage/sample

6. Set the fluorescent sample stage on the FLA- 5100.
   6-1 Open the door of the stage setting block, and set the fluorescent sample stage with the printed frame side faceup on the FLA- 5100.



Set the stage in the front position. Do not pull it to the very end.

7. Set a chemiluminescent sample on the fluorescent sample stage.
   The following descriptions show an example of setting a membrane sample.

   7-1 Set a membrane sample with the chemiluminescent side facedown on the fluorescent sample stage.

   Tape the corners of the membrane to reduce influences of physical vibrations upon the image.

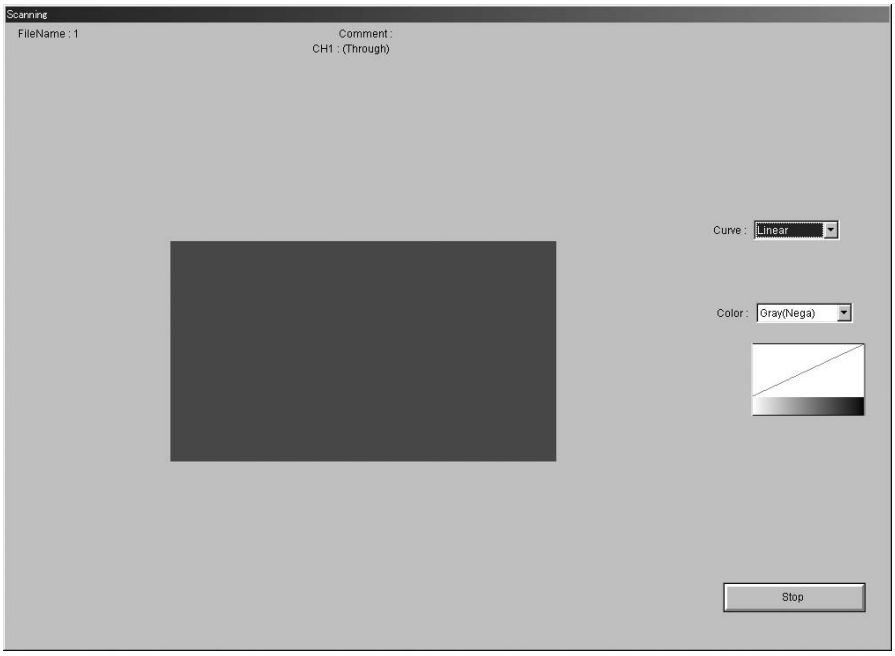
   7-2 Press the fluorescent sample stage slowly to the very end (until it butts).

   7-3 Close the door of the stage setting block.

Starting reading

8. Starting reading

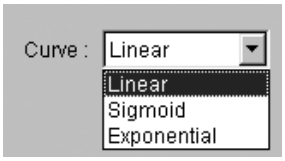
8-1 Click the Read... button, and reading starts.



8-2 You may carry out the following operations in the windows shown above.

a) Changing the tone curve

Select an intended curve from the pull-down menu.



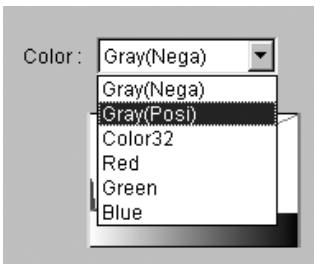
Linear: The linear tone curve is used to adjust gradations.

Sigmoid: The sigmoid tone curve is used to adjust gradations.

Exponential: The exponential tone curve is used to adjust gradations.

b) Changing the display color

Select an intended color from the pull-down menu.



Gray (Nega): An image is displayed in nega tive gray. (Low-density areas are displayed in white, and high-den sity areas are displayed in black.)

Gray (Posi): An image is displayed in positive gray. (Low-density areas are displayed in black, and high-density areas are displayed in white.)

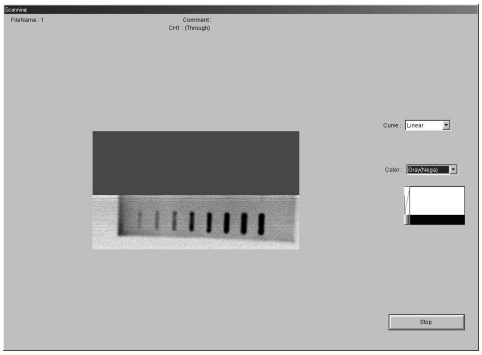
Color 32: An image is displayed in 32 pseudo colors.

Red: An image is displayed in red fluo rescent color.

Green: An image is displayed in green fluorescent color.

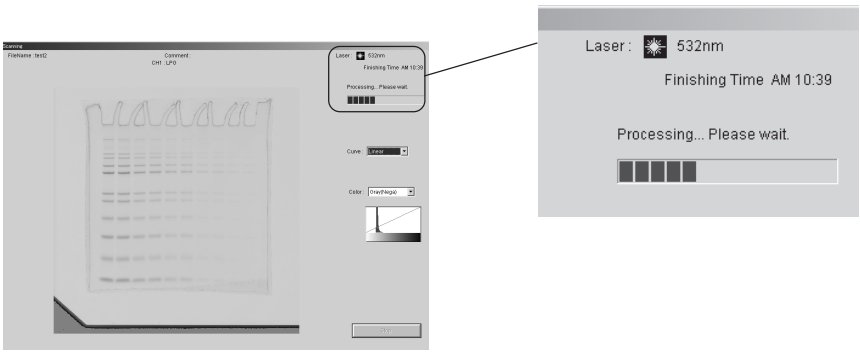
Blue: An image is displayed in blue fluo rescent color.

8-3 As fields in the specified reading area are read, they are displayed in the reading status real-time display window as shown below.



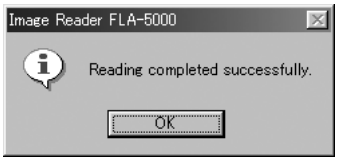
The stage is read from the front toward the back. The read image is displayed from down upward in the reading status real-time display window.

Reading at 10μm-pixel size may take longer time in computer processing after image reading. When processing, a progress bar appears in the upper right corner.



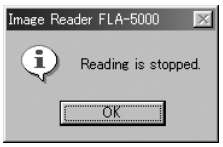
Processing cannot be terminated halfway.

8-4 When reading finishes normally, the following dialog box appears. Click the OK button.

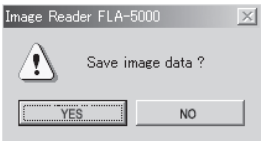


8-5 You may finish reading at any time before the whole reading area is read. Click the [Stop] button when you want to finish reading.

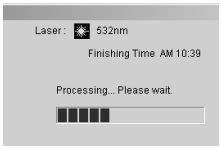
■When the reading has been done with pixel size at 200μm, 100μm,50μm and 25μm, the following dialog box appears. Click the [OK] button.



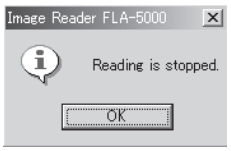
■When the reading has been done with pixel size at 10μm, the dialogue box shown below appears.



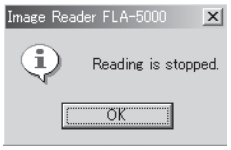
Click [YES] to start processing. While processing, a progress bar appears as shown below.



When processing is completed, the dialogue box shown below appears. Please click [OK] button.



When [NO] is clicked, the dialogue box shown below appears. Please click [OK] button.
*Note: The image data file will be deleted in this case.



8-6 Click the [Return] button, and the previous menu manager window is displayed.

Part 7

Reading Digitize Samples

Reading Digitize Samples

Set the reading conditions.

↓

Set the stage on the FLA-5100.

↓

Set a Digitize Samples on the stage.

↓

Start reading.

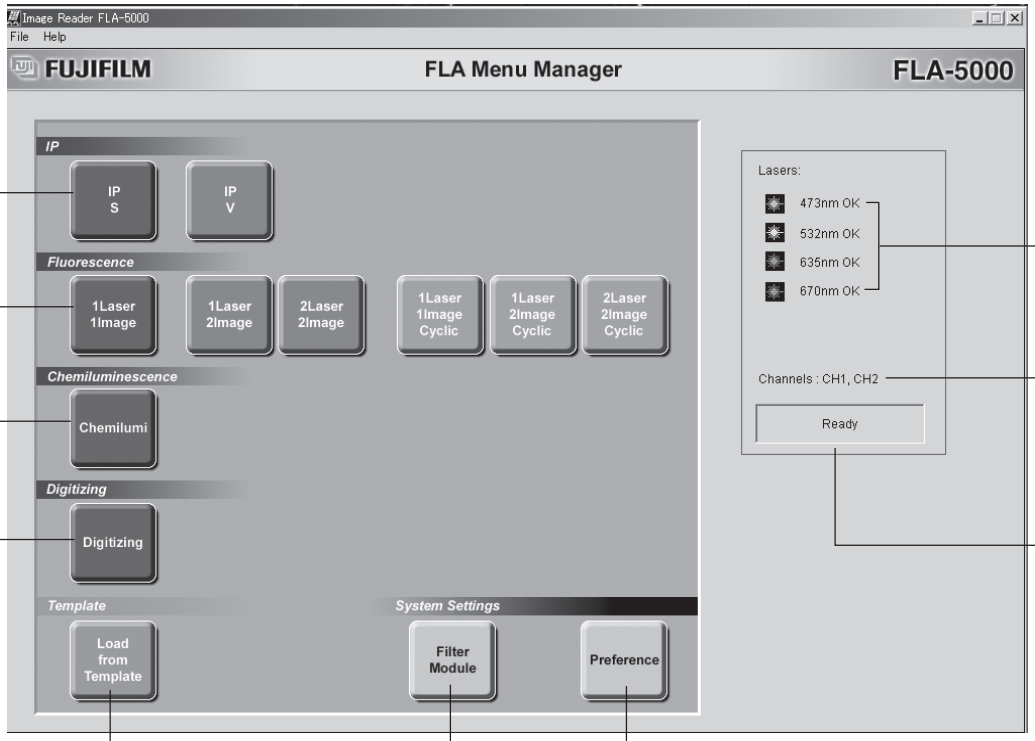
* The FLA-5100 Image Reader is available in two types: Windows version, and Macintosh version. Either version has the same functions.
This manual shows the screens of the Windows version. Follow the instructions of this manual, except the OS-related operations (such as starting and exiting the software), if you use the Macintosh version.

1. Turn on the FLA-5100 and peripheral devices.

2. Turn on the computer (DOS/V PC or Macintosh).

3. Make sure that the FLA-5100 has warmed up. (Only the power lamp on the upper left panel on the front of the FLA-5100 is lit when warming-up is completed.) Start the FLA-5000 Series Image Reader from the startup menu or using the shortcut key. (On the Macintosh, double-click the alias to start the software.)

4. The main window of the FLA-5000 Series Image Reader is displayed.



IP mode
Click this button to open the screen for setting the IP reading conditions.

Fluorescent mode
Click this button to open the screen for setting the fluorescent sample reading conditions.

Chemiluminescence mode
Click this button to open the screen for setting the chemiluminescent sample reading conditions.

Digitize mode
Click this button to open the screen for setting the digitize sample reading conditions.

The conditions of the built-in laser units are displayed. This example shows that four types of laser units (473 nm, 532 nm,635 nm and 670nm) are built in and all units are ready for operation (OK).

The number of built-in photo-multiplier tubes (PMTs) is displayed. This example shows that two PMTs are built in.

The condition of the FLA-5100 is displayed. This example shows that the FLA- 5100 is ready for reading.

Use this button to recall stored reading conditions.

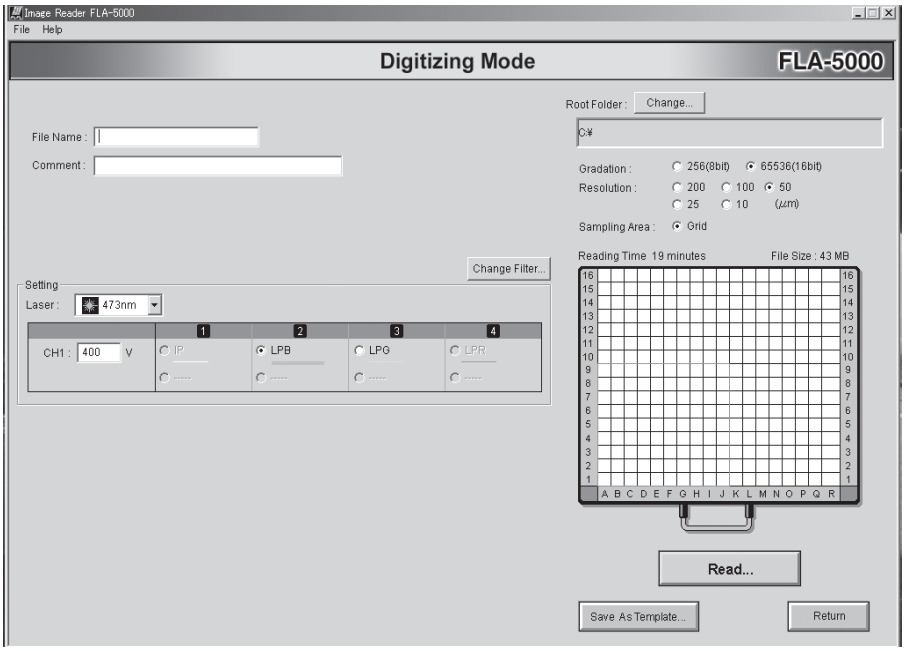
Use this button to change or register the filter.

Use this button to set the display menu, file format or the Log / Square Root of image data type.

5. Setting the reading conditions

5-1 Click the Digitizing button.

5-2 The following window opens.



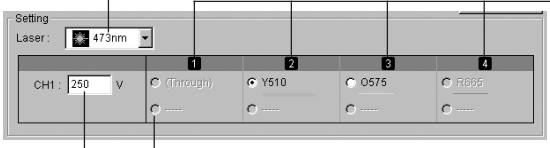
Refer to the instruction below and set the reading conditions.

File Name : → Input the name of a file for saving data of a read image. (You may input half-size alphanumeric characters only.)
* You may not start reading unless you input a file name.

Comment : → The comment is saved with the file name. Input it as the necessity requires. (You may input half-size alphanumeric characters only.)
* You may start reading even if you input no comment.

Change Filter... ..... Use this button to change the data of the filter registered on the software. Ignore this button and proceed to the next step if the filter set in the FLA- 5100 is displayed on the Setting screen properly.
For the usage of Change Filter, see page 126.

Laser to be used for reading is displayed.



These numeric values shown in these areas correspond to the numbers (1, 2, 3 and 4) on the filter tray.

The check ○ on the left of a filter to be used for reading changes into ◉.

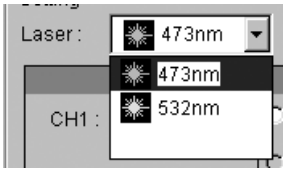
The voltage to be applied to the photo-multiplier tube (PMT) is displayed.

Lasers and filters used for digitizing

Two types of lasers (473 nm and 532 nm) are available in the digitizing mode. The 635 nm and 670nm laser is not available even if it is built in. (It is not displayed in the pull-down menu.)

Two types of filters (Y510 and O575) are available in the digitizing mode. Other filters are not available even if they are built in. (They are non-active and may not be selected.)

Select a laser unit to be used for reading in the pull-down menu.



Input a voltage value to be applied to the photo-multiplier tube (PMT) in this box.

(You may input a value between 250 and 1000.)

The greater the value is, the higher the voltage to be applied to the PMT and the reading sensitivity are.

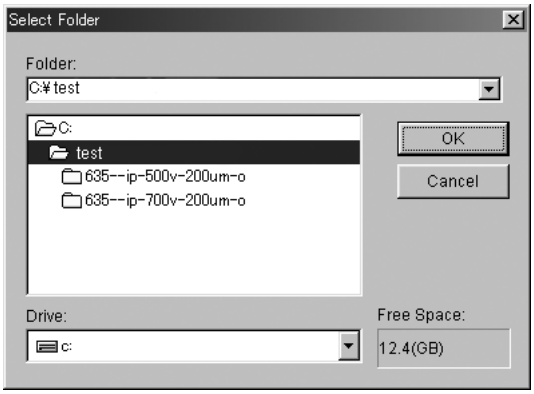
Small ← Value → Large

Low ← Sensitivity → High

Select a filter to be used for reading by clicking the radio button on the left of the filter name.

○ → ◉

Root Folder : Change... ..... Specify where to save the file for saving the image data. Click the Change... button and specify the file saving position.



Gradation : 256(8bit) 65536(16bit) .....Click to select the number of gradations of a read image. It is not related with the reading time. The image capacity depends on the number of gradations.

Resolution : 200 100 50 25 10 (μm) .....Click to select one of five reading pixel sizes. The reading time and image capacity depend on the pixel size.

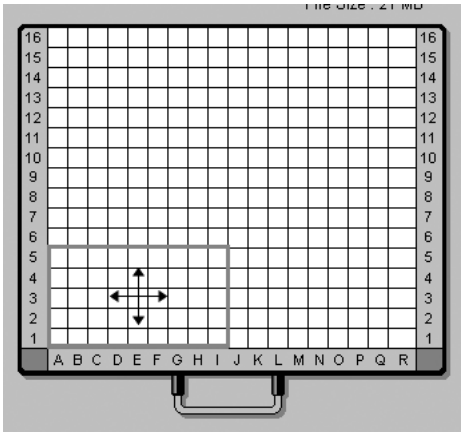
200 100 50 25 10 μm
Short Reading time Long

Small Image file type Large

Sampling Area : Grid

Grid ..... Select this to specify the reading area based on the 2.5-cm grid lines on the fluorescent stage.

How to specify the reading area when the grid is selected
Move the mouse cursor to the red frame line or the center of the area, and drag the mouse to change the area size and/or position.



Tips

The 10μm-pixel size processing is conducted by applying Bi-cubic algorithm to the images read at 25μm-pixel size. Therefore, computer processing after reading may take longer time than image reading time.

Bi-cubic : Using the densities of 16 lattice points around (u_0, v_0), cubic interpolation is done.

$$f(u_0,v_0) = \sum_k \sum_l f(u_k,u_l)\, c(u_k-u_0)\, c(v_l-v_0)$$

Here (u_k,v_l) is a lattice point around (u_0, v_0) and interpolative coefficient c(x) is defined linearly.

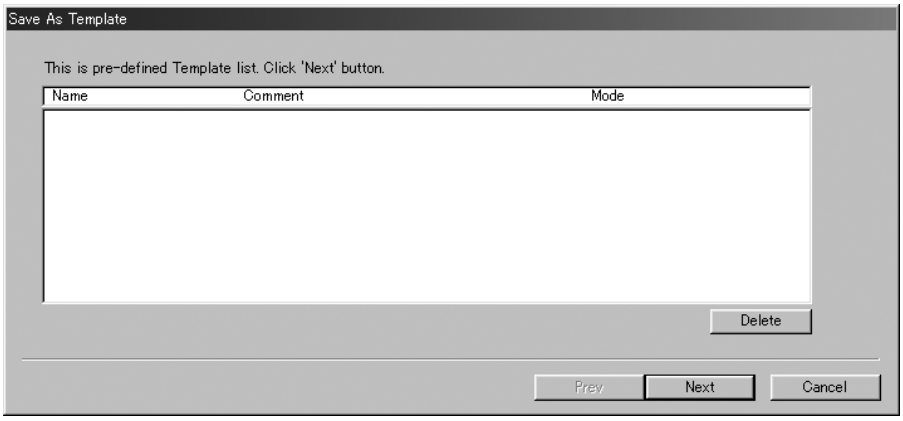
$$c(x) = \begin{cases} 1 - 2|x|^2 + |x|^3 & 0 \le |x| < 1 \\ 4 - 8|x| + 5|x|^2 - |x|^3 & 1 \le |x| < 2 \\ 0 & 2 \le |x| \end{cases}$$

Function c(x) is piecewise three-dimension polynomial approximation of function sinx/x that is revealed with the sampling theorem for continuous signals.

Save As Template... ..... Use this button to save the reading conditions in a file. You may save the reading conditions used frequently and recall them later.

Click on Save As Template... .

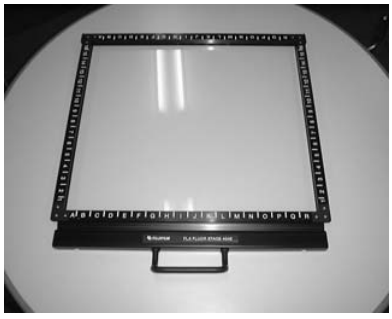
The following window opens. Saved reading conditions are displayed in this window.



Setting stage/sample

6. Set the fluorescent sample stage on the FLA- 5100.

6-1 Open the door of the stage setting block, and set the fluorescent sample stage with the printed frame side faceup on the FLA- 5100.



Set the stage in the front position. Do not pull it to the very end.

7. Set a digitize sample on the fluorescent sample stage.
   The following descriptions show an example of setting a dry gel sample.

   7-1 Set a sample with the migration side facedown on the fluorescent sample stage.

   7-2 Put the fluorescent plate for digitizing supplied with the fluorescent sample stage on the digitize sample.
   * Put the fluorescent plate with the mat (lusterless) side facedown.

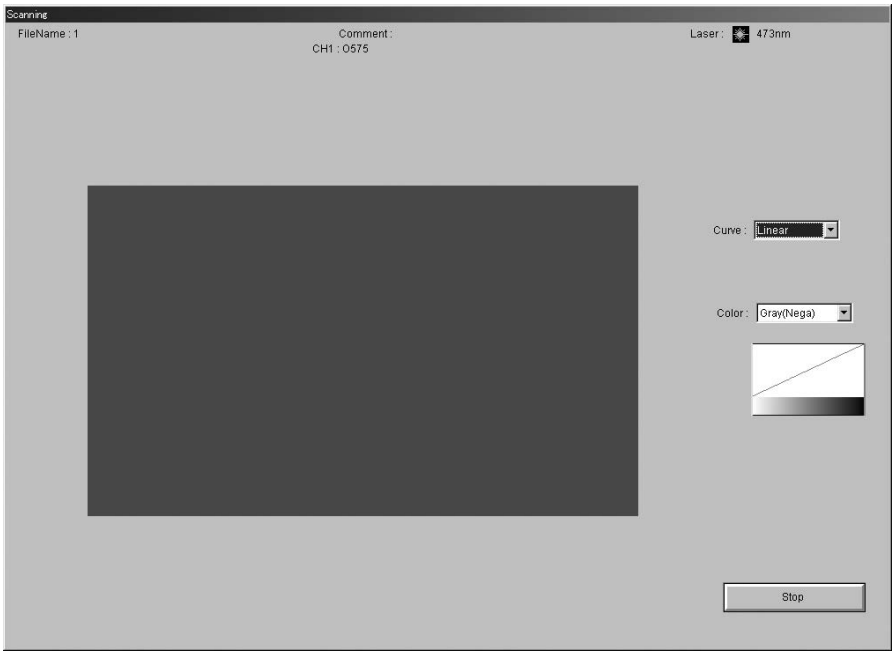
   7-3 Press the fluorescent sample stage slowly to the very end (until it butts).

   7-4 Close the door of the stage setting block.

Starting reading

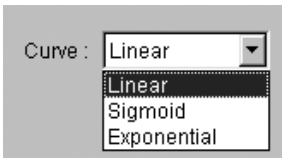
8. Starting reading

8-1 Click the Read... button, and reading starts.



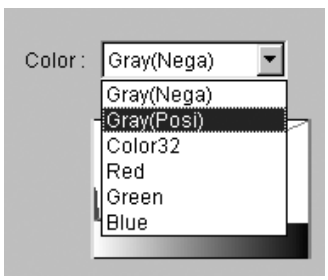
8-2 You may carry out the following operations in the reading status real-time display window shown above:

a) Changing the tone curve
Select an intended curve from the pull-down menu.



Linear: The linear tone curve is used to adjust gradations.
Sigmoid: The sigmoid tone curve is used to adjust gradations.
Exponential: The exponential tone curve is used to adjust gradations.

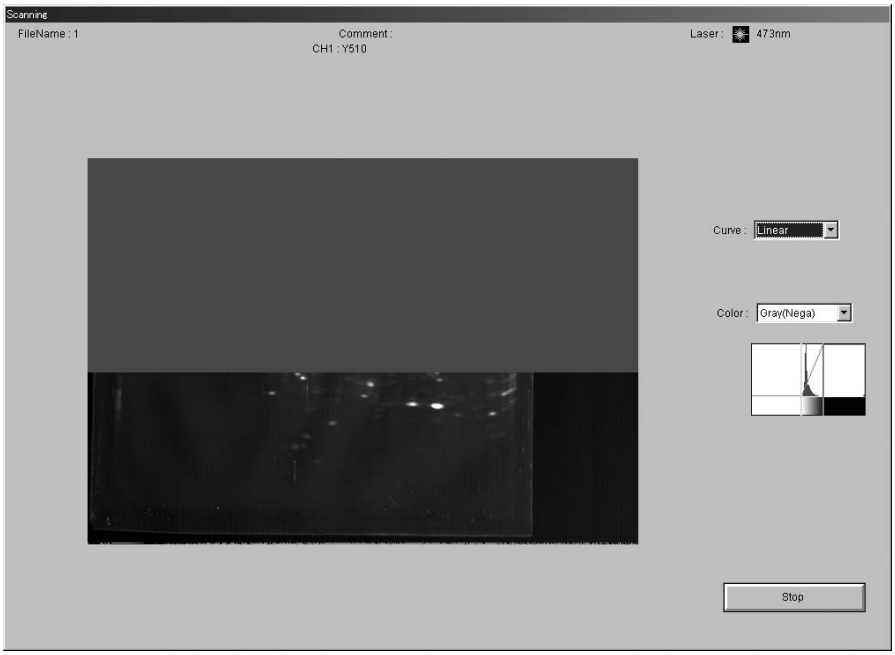
b) Changing the display color
Select an intended color from the pull-down menu.



Gray (Nega): An image is displayed in nega tive gray. (Low-density areas are displayed in white, and high-den sity areas are displayed in black.)
Gray (Posi): An image is displayed in positive gray. (Low-density areas are displayed in black, and high-density areas are displayed in white.)
Color 32: An image is displayed in 32 pseudo colors.
Red: An image is displayed in red fluo rescent color.
Green: An image is displayed in green fluorescent color.
Blue: An image is displayed in blue fluo rescent color.

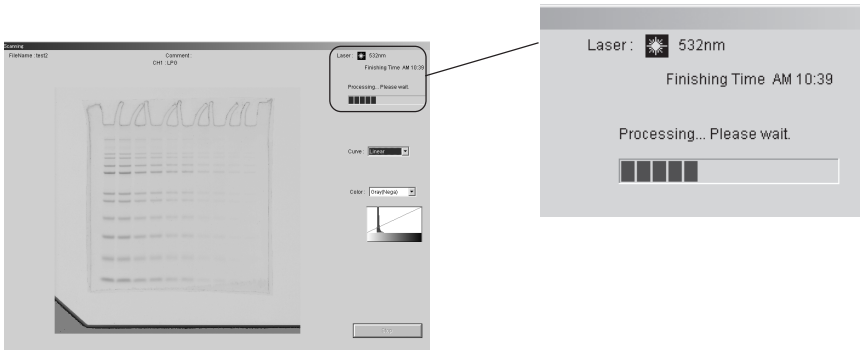
*** The FLA- 5100 uses fluorescent light from the fluorescent plate to form a digitized image. Thus, a dense part of a sample is displayed white in the Nega mode.**

8-3 As fields in the specified reading area are read, they are displayed in the reading status real-time display window as shown below.



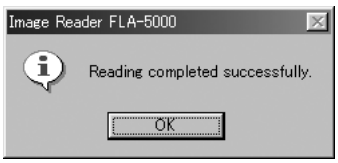
The stage is read from the front toward the back. The read image is displayed from down upward in the reading status real-time display window.

Reading at 10μm-pixel size may take longer time in computer processing after image reading. When processing, a progress bar appears in the upper right corner.



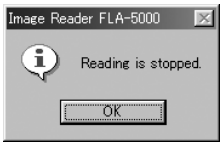
Processing cannot be terminated halfway.

8-4 When reading finishes normally, the following dialog box appears. Click the [OK] button.

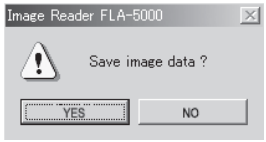


8-5 You may finish reading at any time before the whole reading area is read. Click the [Stop] button when you want to finish reading.

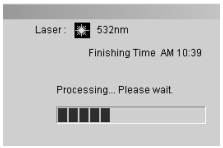
■When the reading has been done with pixel size at 200μm, 100μm,50μm and 25μm, the following dialog box appears. Click the [OK] button.



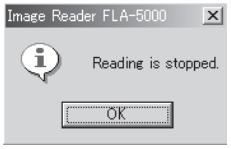
■When the reading has been done with pixel size at 10μm, the dialogue box shown below appears.



Click [YES] to start processing. While processing, a progress bar appears as shown below.

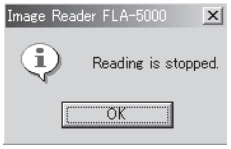


When processing is completed, the dialogue box shown below appears. Please click [OK] button.



When [NO] is clicked, the dialogue box shown below appears. Please click [OK] button.

*Note: The image data file will be deleted in this case.



8-6 Click the Return button, and the previous menu manager window is displayed.

Part
8

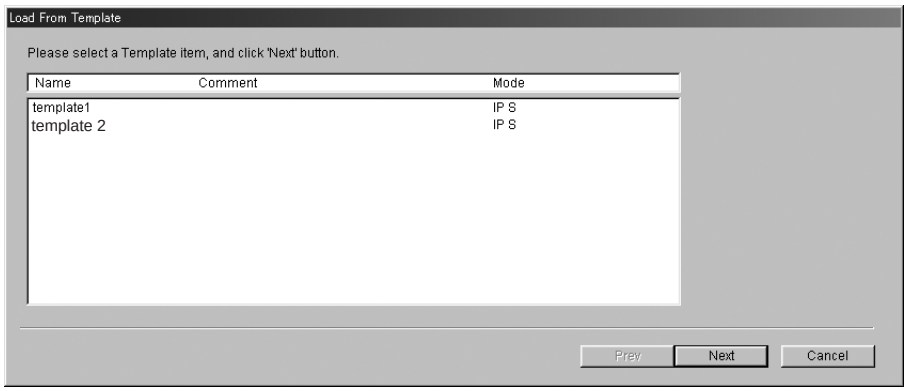
Loading Reading Conditions

If you save the reading conditions in any mode, you may load the saved conditions when starting reading.

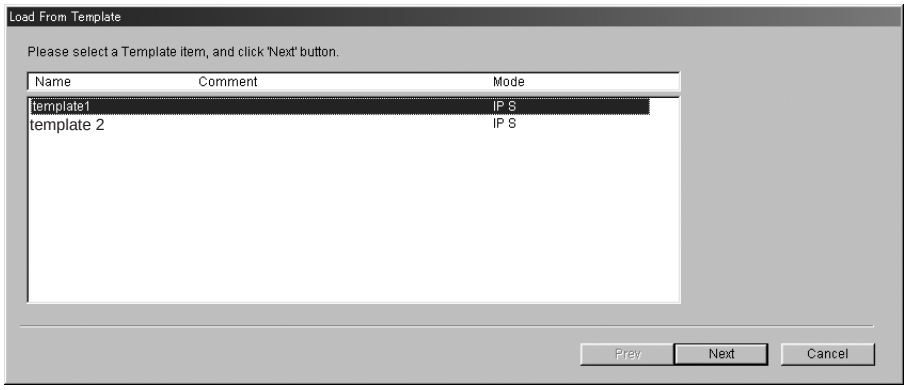
1. Click the 

button.

2. The following dialog box opens.



3. Click on a file containing intended reading conditions in the list to select it.

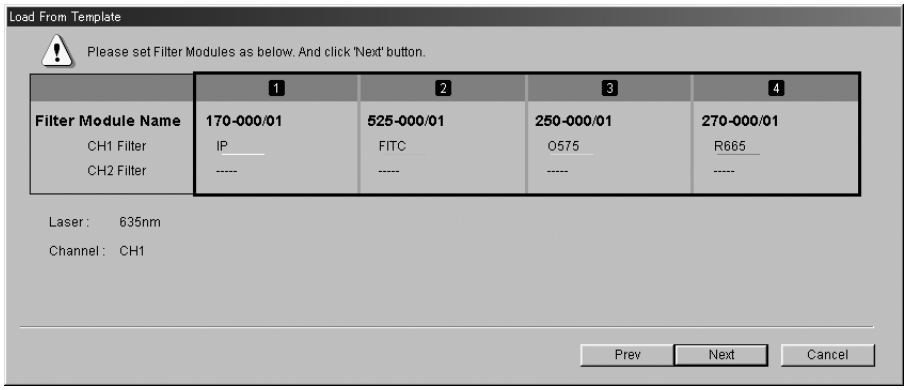


4. Click the 

button.

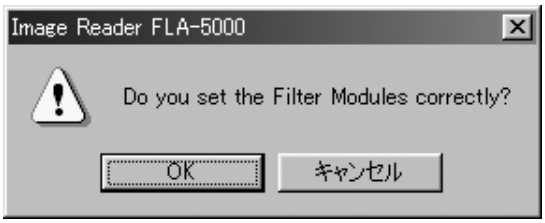
5. If the current filter condition is different from the filter condition in the selected reading conditions, the dialog box shown below appears. Set the same filters as contained in the saved reading conditions and register them in the software.

For the method of registering filters, see page 126.



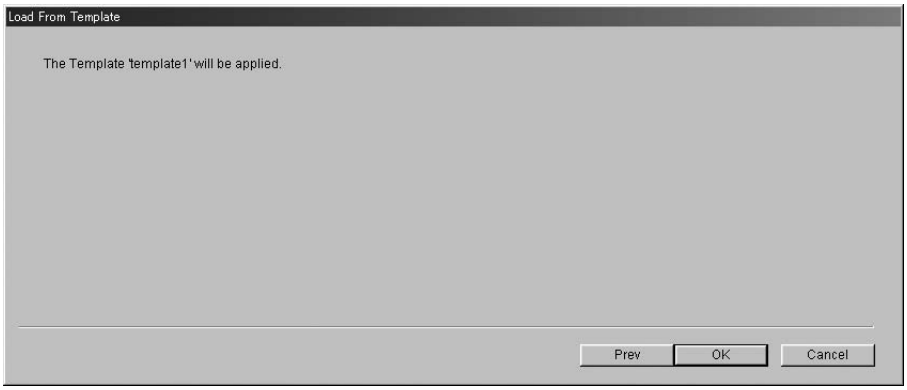
* If the current filter condition is the same as the saved filter condition when the Next button is clicked, the dialog box shown in 7 appears.

6. Click the Next button.
   The following dialog box appears.



Make sure that the proper filters are set. Click the OK button.

7. The following dialog box appears.



8. Click the OK button.
   The mode starts in the saved reading conditions.

Part
9

Other Setting

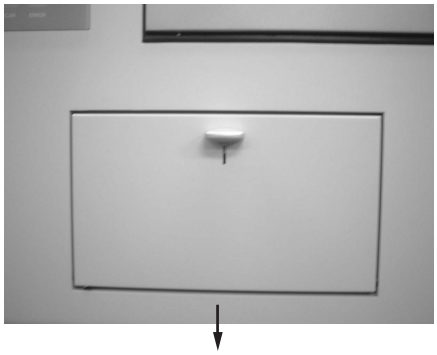
This part describes the following:
A. Exchanging the filters and registering them in the software
B. Instruction for a commercial filter

A. Exchanging the filters and registering them in the software.

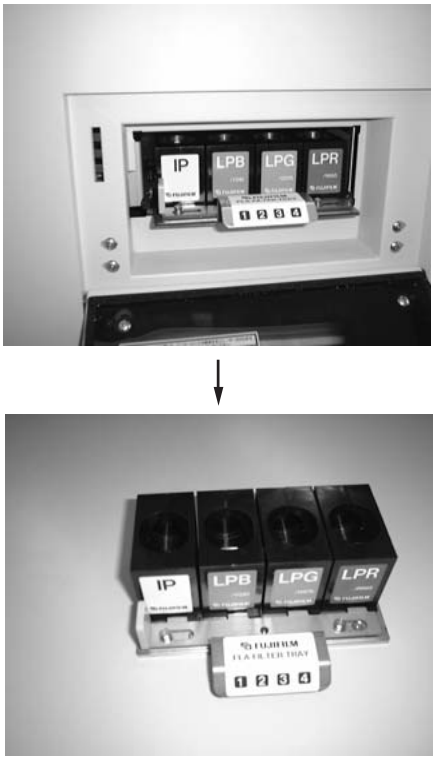
It is possible to set four filter modules on the filter tray of the FLA-5100.
You may set any filter modules. Setting filter modules in the FLA-5100 and registering them in the software allow various types of filtering.
This part describes how to set filter modules and register them in the software in this order.

1. Setting the filter modules

1-1 Pull down the knob of the filter exchange door to unlock the door. Open the filter exchange door.

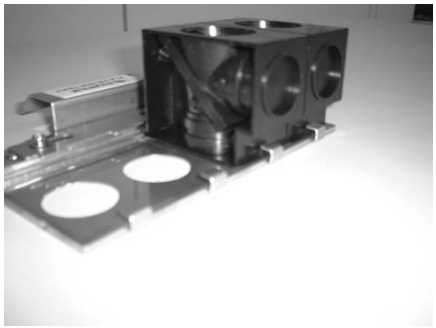


1-2 Hold the knob of the filter tray, and pull it out.



1-3 Pull the green knob in the front of the tray. The bar locking a filter module moves and the filter module is unlocked. Remove the filter module. (1 to 4 marked on the knobs of the tray show the tray positions.)

1-4 Set intended filter modules on the filter tray.
Set each filter module so that the lug on the block is engaged with the hook of the tray when you see the filter tray from the back. (If the filter module is not engaged properly, it may not be locked in the next step.)



1-5 Move the green knob in the front of the tray to the right to lock the filter module.

1-6 Set the tray in the reverse sequence to the tray removing procedure. Close the filter exchange door.

2. Registering the filters in the software

When you set the filter modules, register them in the software.

*** If filter modules are not registered in the software, they are not displayed in the window, even though they are set physically in the FLA- 5100.**

The descriptions below show an example of registering filters in the software when the Cy3 and Cy5 2-channel filters are set in filter tray position No. 1.

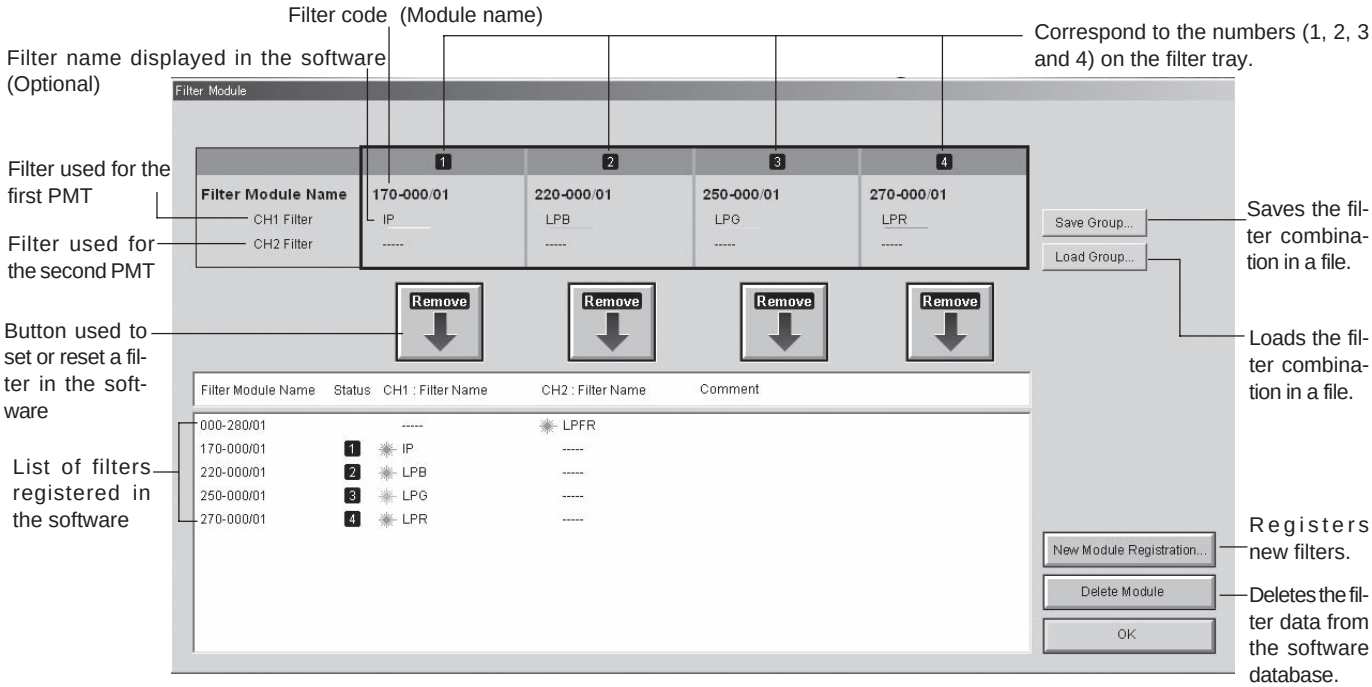
2-1 Click the 

button.

* The same operations apply to the case where you click the 

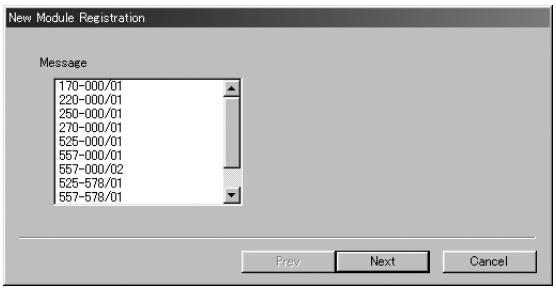
button in any reading mode.

2-2 The following dialog box appears.



2-3 Click the New Module Registration... button.

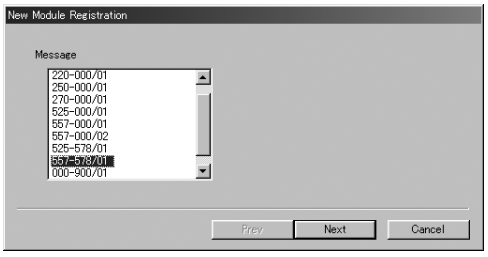
2-4 The following dialog box appears.



2-5 Select a filter module name for registration by clicking on its number (catalog number) (557-578/01 in the case of Cy3/Cy5).
*Each filter module name number is printed on the seal of the filter module. Check it.

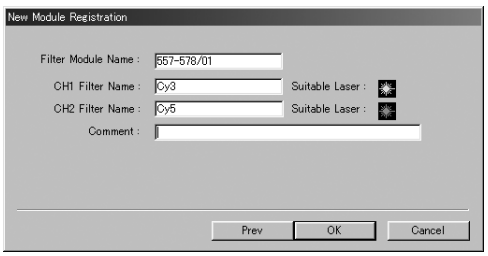
Major filter module numbers

Nos.	Name	
170-000/**	IP	Filter module for IPs
220-000/**	LPB	Filter module for general-purpose 473-excitation fluorescent digitizing
250-000/**	LPG	Filter module for general-purpose 532-excitation fluorescent digitizing
270-000/**	LPR	Filter module for general-purpose 635-excitation fluorescent sample
000-280/**	LPFR	Filter module for general-purpose 670-excitation fluorescent sample



2-6 Click the Next button.

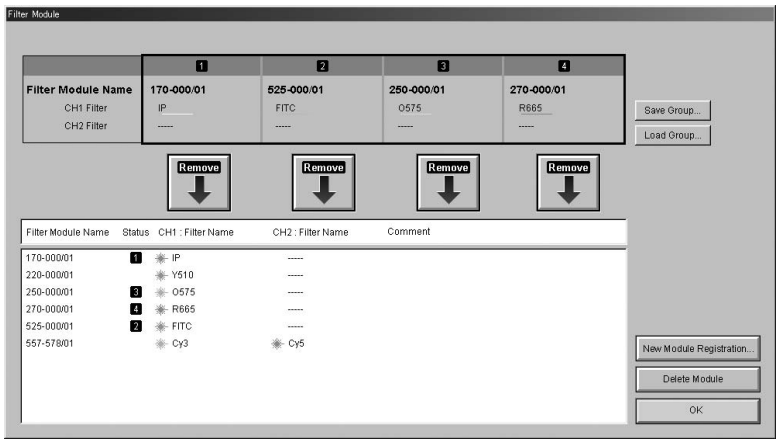
2-7 The following dialog box appears.



You may change Filter Module Name, CH1 Filter Name and CH2 Filter Name freely. You may also input a comment.

2-8 Click the OK button.

2-9 It is known that the selected filter is added to the database list as shown below.

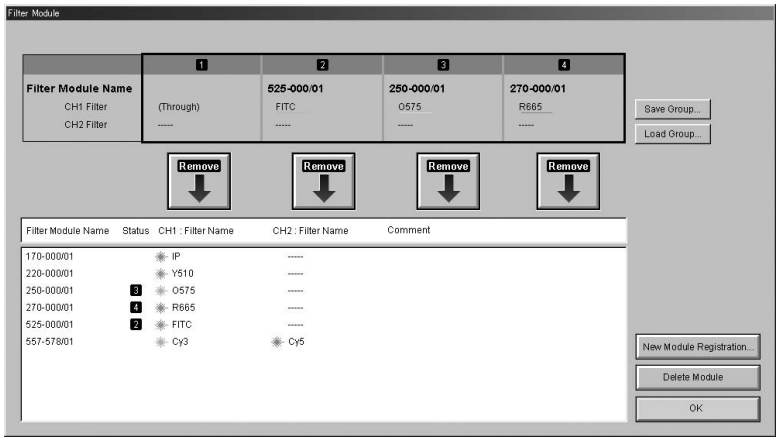


The added Cy3/Cy5 filter module is replaced with the IP filter, which has been set in tray position 1, in the next step.

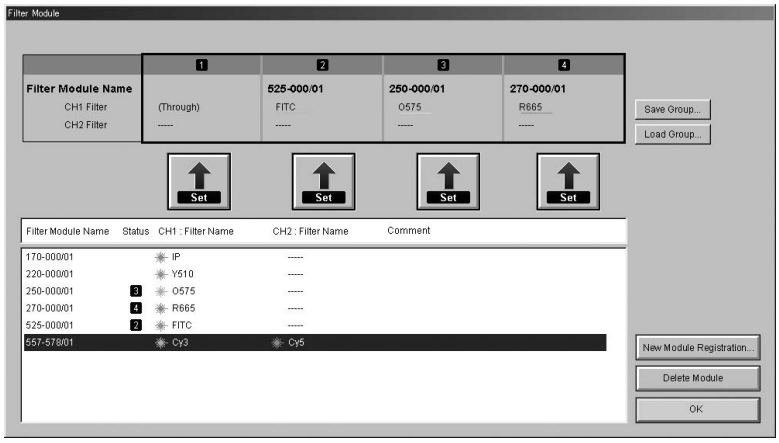
2-10 Click the 

button below the IP filter (in tray position No. 1).

2-11 The IP filter is removed from tray position No. 1 as shown in below.

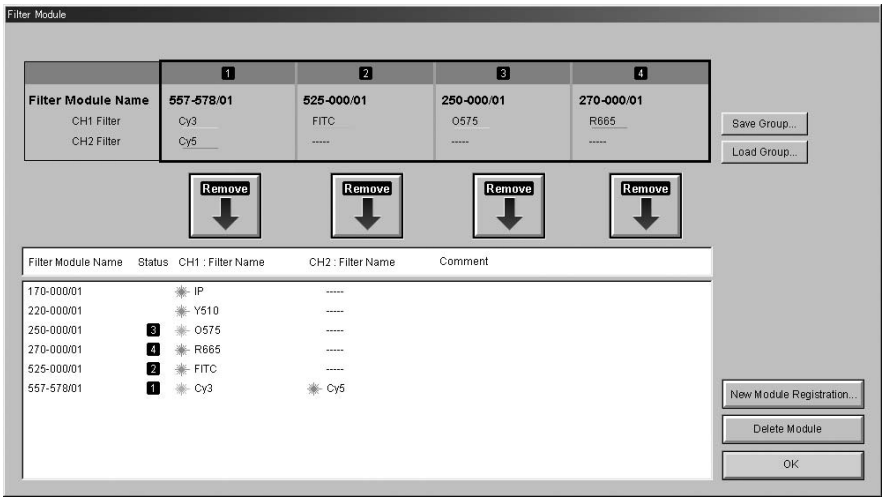


2-12 Select the Cy3/Cy5 filter in the list by clicking on it.



2-13 Click the  button below tray position No. 1.

2-14 As shown below, the Cy3/Cy5 filter is set in tray position No. 1.



2-15 Click the  button. Operation is completed.

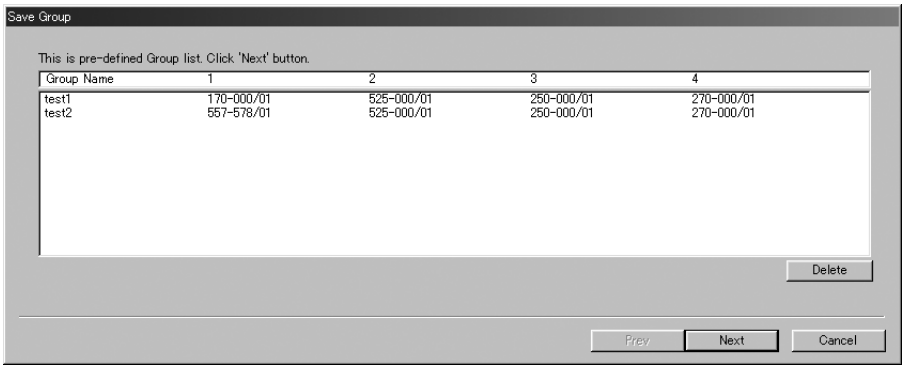
3. Other window functions when registering filters

a) Saving the filter groups

You may save the currently displayed combination of filters as a filter group.

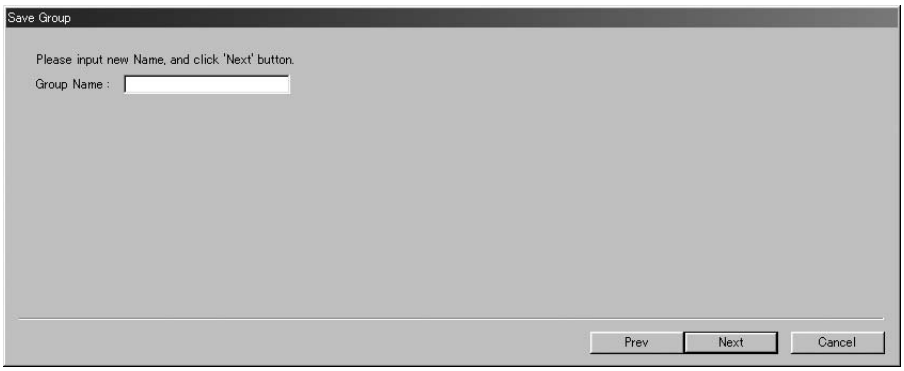
1. Click the  button.

2. The following dialog box appears. A list of saved files is displayed.



3. Click the  button.

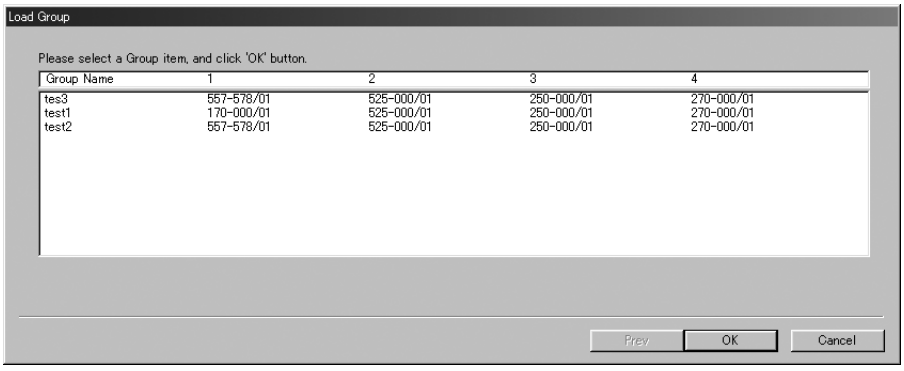
4. The following dialog box appears. Input a file group name, click the Next button, and click the OK button.



b) Loading a filter group
You may load a stored filter group.

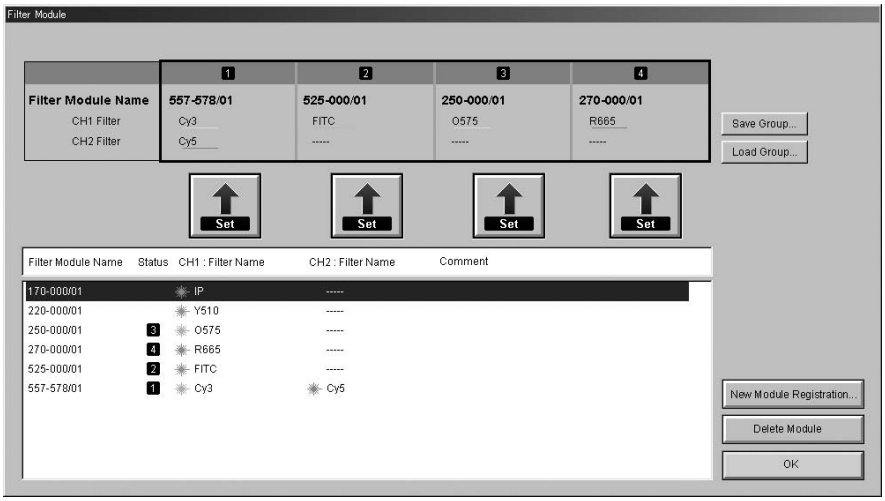
1. Click the Load Group... button.

2. The following dialog box appears. Select an intended filter group by clicking on it. Then, click the OK button. Now, the filter group is loaded.



c) Deleting filter data from the database
Filter data is deleted from the database as shown below.

1. Select filter data to be deleted by clicking on it.



2. Click the Delete Module button.

3. Click the OK button in the following dialog box, and the selected filter data is deleted.

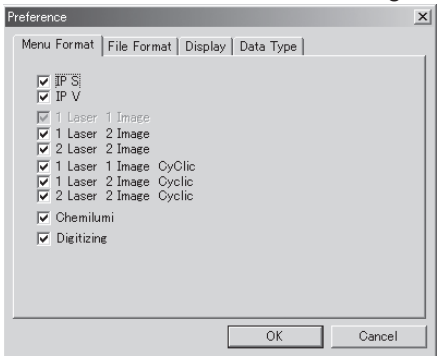
4. Setting the menu format

Menu format

Use "Menu Format" to change the active or non-active state of each mode. It is not necessary to pay attention to it, in particular, if it was specified properly after installing the FLA- 5100.

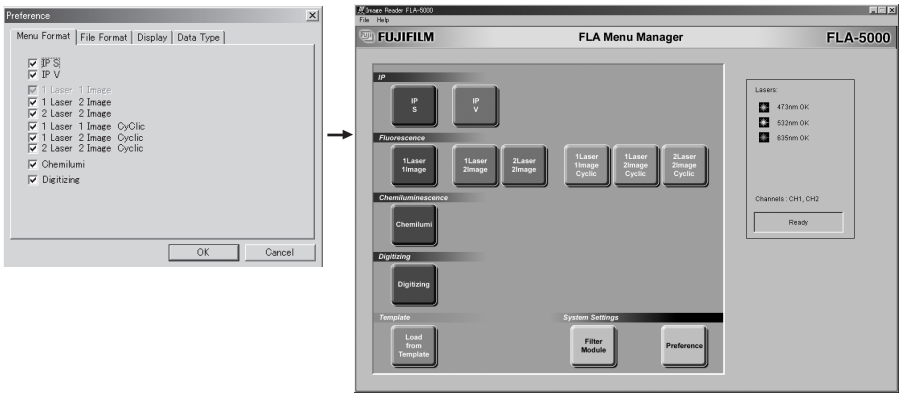
4-1 Click the Preference button.

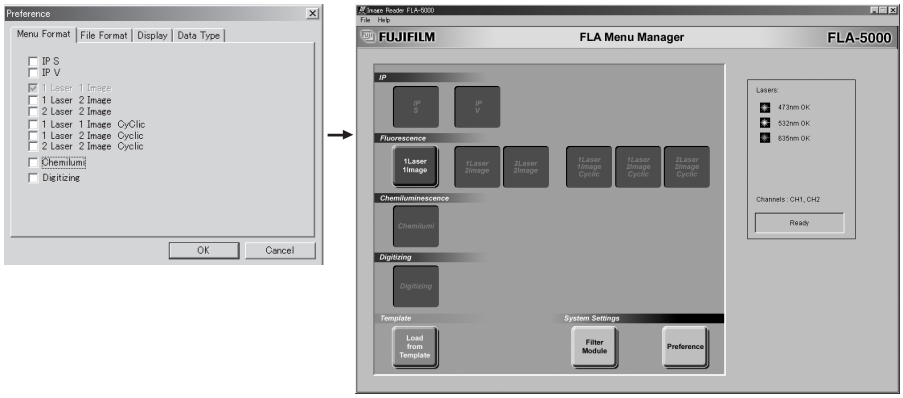
4-2 The following dialog box appears. If another dialog is displayed, click on the Menu Format tag.



4-3 Modes with check marks in their boxes ☐→☑ are active in the FLA menu manager.

* The 1-laser, 1-image mode is always active. It is impossible to change its status.





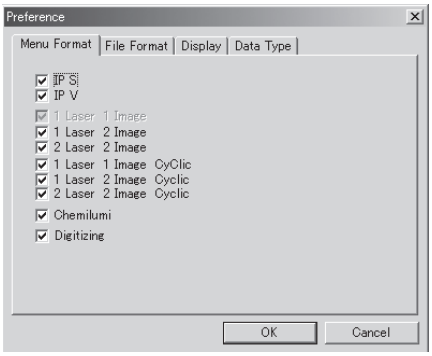
5. Setting the file format

File format

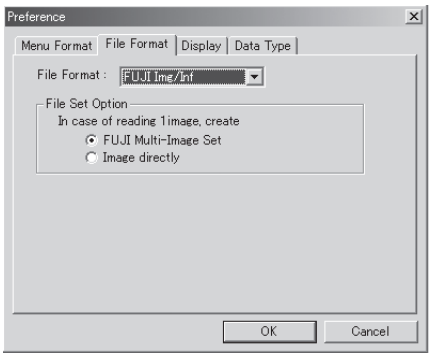
Use "File Format" to set the file format of a read image.

5-1 Click the Preference button.

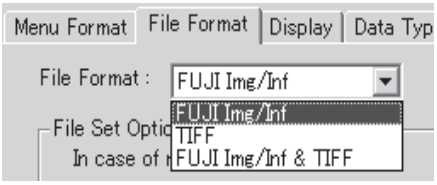
5-2 The following dialog box appears.



5-3 Click the File Format tag. The dialog box changes into the following.



5-4 Select a file format in the pull-down menu as shown below.



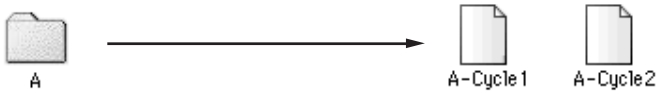
Img/Inf..... The standard file format of the Fuji Film BAS/FLA series. Each file of this format consists of a luster file (xxx.img) and an information file (xxx.inf).
Use the Img/Inf format to analyze an image file using the Fuji Film Science Lab or Array Gauge/Multi Gague in the next step.

TIFF..... A read image is saved in a 16-bit linear/gray TIFF file. In TIFF files, image data type is always set to Linear conversion(please see P135 of this manual.)

Img/Inf & TIFF..... A read image is saved in both Img/Inf and TIF file formats. In TIFF files, image data type is always set to Linear conversion(please see P135 of this manual.)

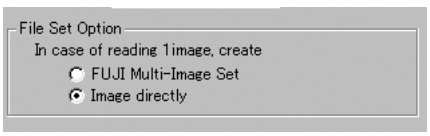
How to save a file
A folder is created in a specified position first, and files containing images read by the FLA- 5100 are saved in that folder.

Example: Reading is repeated twice using a <A> file



Two files on the right are saved in this folder.

Tick off the radio button on the left of "Image directly" to save a file directly without saving it in a folder in the 1-laser, 1-image mode.



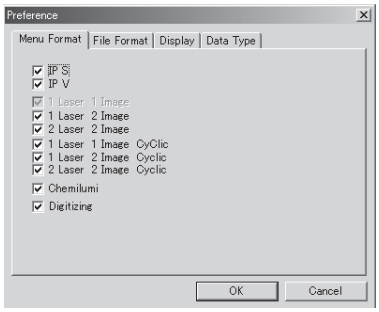
6. Setting the tone curve

Setting the tone curve

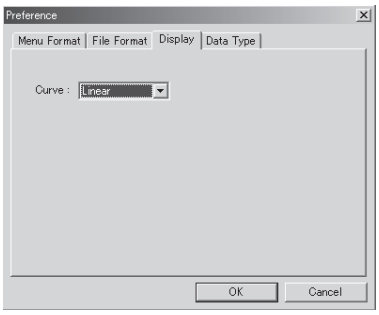
During reading, an image in a read field is displayed in the real-time display window. Set the tone curve to specify the gradation of displaying the image.

6-1 Click the Preference button.

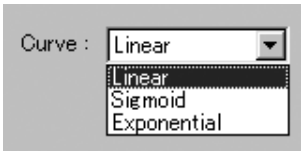
6-2 The following dialog box appears.



6-3 Click the Display tag. The dialog box changes into the following.



6-4 Select a tone curve in the pull-down menu.



Linear:	The linear tone curve is used to adjust gradations.
Sigmoid:	The sigmoid tone curve is used to adjust gradations.
Exponential:	The exponential tone curve is used to adjust gradations.

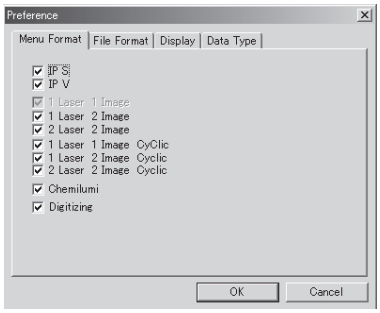
7. Setting the data type

Setting Data type

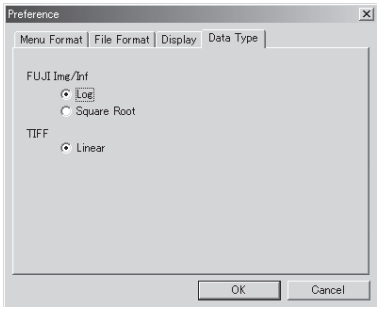
Before scanning, an image data type is to be set.

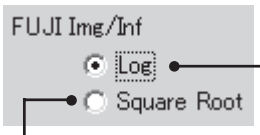
7-1 Click the Preference button.

7-2 The following dialog box appears.



7-3 Click the Data Type tag. The dialog box changes into the following.





When detecting a very weak signal of a sample, Log conversion is rather appropriate because the lower range is more finely converted to the gray scale in Log conversion.
Log conversion is also recommended when digitizing CBB or silver stained gels.

When reading a relatively strong signal of a sample with IP or fluorescence detection, clearer images can be obtained with this function.

! Caution !

The following versions of the software are required for quantitative analysis of images read with Square Root conversion. Square Root conversion files cannot be opened properly with software of younger versions.

WIN	Science Lab 2003(Multi Gauge Ver.2.1, Colony Ver.1.1, L-Process Ver.2.1)
	Array Gauge Ver.2.1
MAC	Science Lab 2003(Image Gauge Ver.4.2, L-Process Ver.2.2)

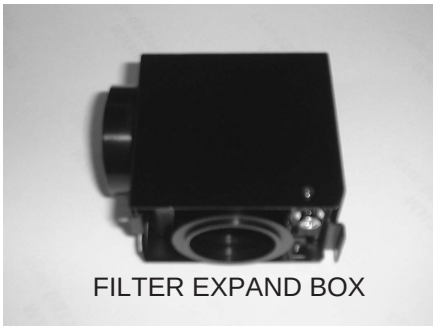
In TIFF files, Linear conversion is always active and cannot be switched to non-active status. When TIFF format is chosen (please see P135 of this manual), images data type always takes Linear conversion.

B. Instruction for a commercial filter

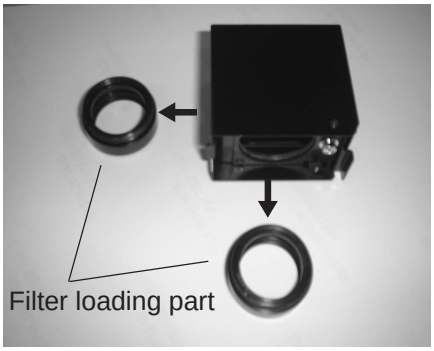
A commercial 25mm diameter filter can be used for FLA-5100 by setting FILTER EXPAND BOX(option). The registration with software allows you to use several kinds of filters. This manual illustrates how to set FILTER EXPAND BOX.

FILTER EXPAND BOX Instruction

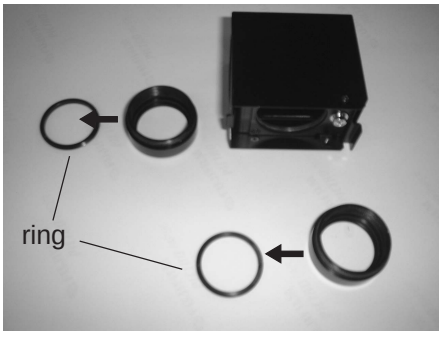
1 Prepare a commercial 25mm diameter filter and FILTER EXPAND BOX.


FILTER EXPAND BOX

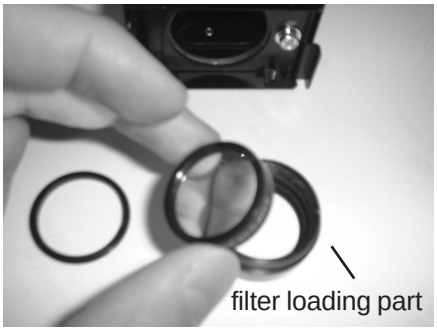
2 Open the filter loading part that is located on each channel of FILTER EXPAND BOX.



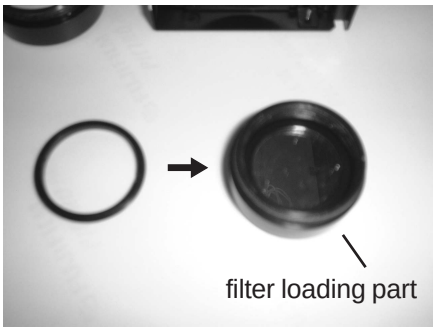
3 Remove the ring on the loading part.



4. Attach a commercial 25mm diameter filter to the loading part.

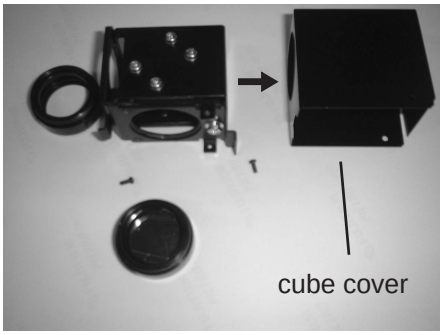


5. Fix a filter with the ring.

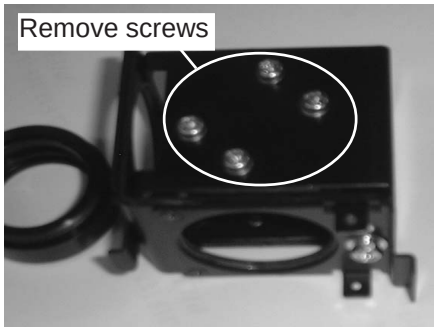


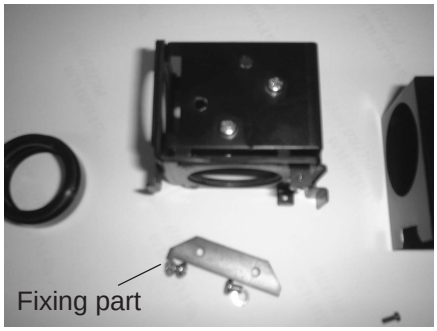
6. Remove screws that locate outside of cube cover.

7. Remove a cube cover.



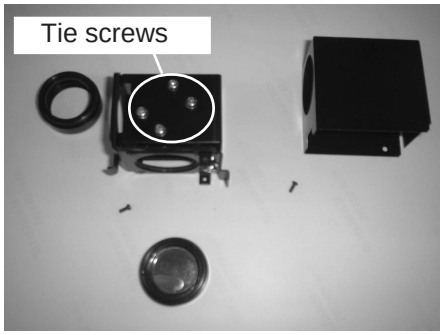
8. Remove screws that fix mirror and a fixing part.



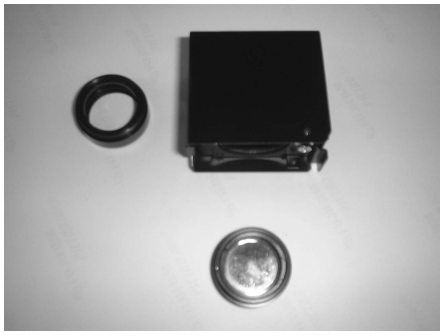


9. Insert a mirror.

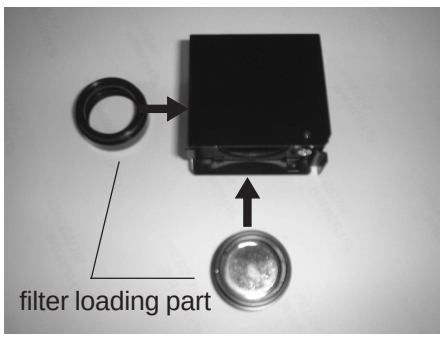
10. Tie screws for fixing the mirror and attach the fixing part.

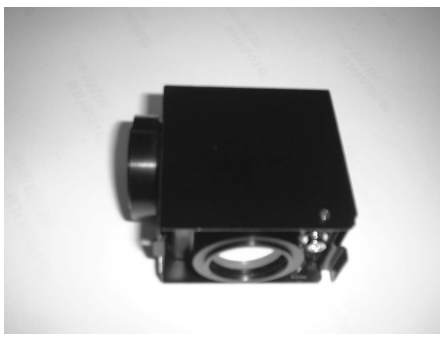


11. Set the cube cover with screws.



12. Attach the filter loading part.





Part
10

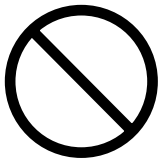
Daily Maintenance

1. Maintenance of SHG Laser

The SHG laser employed in the FLA-5100 requires periodical calibration. When the FLA-5100 is switched on, it automatically executes calibration. Thus, you need not carry out calibration intentionally if you use the FLA-5100 repeatedly at a short time interval (shorter than a month).

CAUTION

- Activate the FLA-5100 once every 30 days, at least, to ex ecute
  calibration even though it is not used for a long time. If the FLA-5100 is not calibrated for a long time, the life of the SHG laser may be reduced or scanning with the laser may be disabled.



Operation procedures

1 Switch on the FLA-5100 body and analyzer unit.
2 Make sure that they have started up. Then, turn them off.

2. Cleaning and storing of the stage

2-1 Cleaning

For cleaning of the stage, use a fluorescence-free neutral detergent with a sponge or other soft material.
After cleaning, thoroughly rinse the stage with water and dry with KimWipe or other proper lint-free material.

2-2 Storage

Store the stage in the original packaging case.

Part
11

Troubleshooting

Troubles in FLA- 5100 body

Troubles that occur in the FLA-5100 body are classified into the following three levels:

1 Request to close the cover

A request to close the cover does not imply a trouble. The cover of the FLA-5100 body must be closed when it starts up or scans samples. If the cover is open in such a condition, the indicator lamps and beep sound indicate that the cover must be closed.

2 Warning

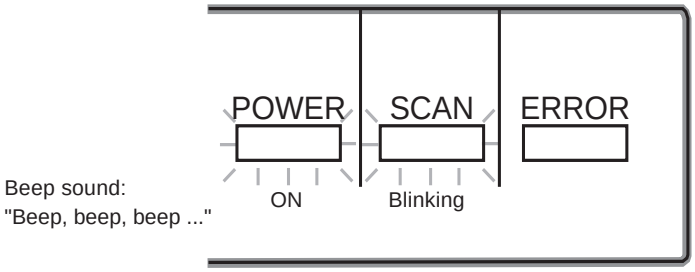
A warning indicates that only the scanning mode where a trouble occurs is not functional. The major warning causes are as shown below:

1. The laser is defective.
   You may not use the specific scanning mode where the defective laser is used. Other scanning modes are available.
2. If the reading circuit is adjusted improperly
   If the reading circuit is adjusted improperly in the preset reading conditions, the reading conditions are not available.
3. PMT protective function works.
   As soon as the PMT protective function works, scanning stops.
   You may restart scanning if you change the sample to be scanned or reduce the sensitivity.

3 Errors

An error means the condition where all scanning modes of the FLA-5100 are not available. The indicator lamps and beep sound indicate that an error occurs.

■ Request to close the cover



When a request to close the cover occurs

Causes and Countermeasures

CASE 1

Cause

Didn't you open the cover during the self-diagnosis and startup adjustment of the FLA-5100 (about fifteen minutes after turning on the power)?

Countermeasure

Close the cover.

CASE 2

Cause

Didn't you open the cover during scanning?

Countermeasure

Close the cover immediately.
Scanning stops if you open the cover during scanning.

Note: Never open the cover during scanning.

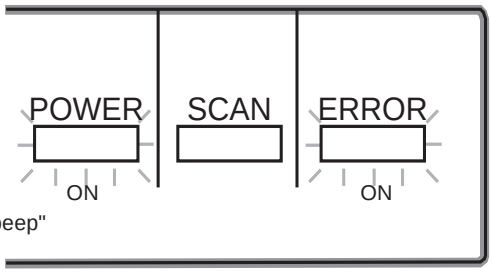
■ Warning

A warning message dialog box is displayed on the Image Reader screen displayed on the analyzer unit.
Refer to "Countermeasures according to warning and error messages" below.
The indicator lamps and beep sound do not indicate occurrence of a warning.

■ Errors

An error occurs in the FLA-5100 body.

Beep sound:
"Be-beep, be-beep, be-beep"



When an error occurs

An error message dialog box is displayed on the Image Reader screen displayed on the analyzer unit.
Refer to "Countermeasures according to warning and error messages" below.

NOTE

If an error occurs after completion of reading, an error message may not be displayed. In such a case, execute reading using the Image Reader in the analyzer block. (You may execute reading without a sample.)
Now, an error message is displayed on the analyzer block.

Most messages displayed in the Image Reader window imply easy-to-recover troubles. If displayed messages include instructions, follow them.
The typical messages and countermeasures are as shown below.

Message	Meaning & countermeasure
Can not enter this menu. Reader makes no response (Power off?)	Meaning: The FLA-5100 makes no response. Countermeasures: 1) Check if the FLA-5100 is turned on. 2) Check if the SCSI cable connector is plugged properly.
Please close the door.	Meaning: The door is open. Countermeasures: 1) Check if the door of the stage setting block is closed firmly. 2) Check if the filter exchange door is closed firmly.
The disk capacity is insufficient.	Meaning: The free disk spaces are insufficient. Countermeasure: Check if there are sufficient free spaces in the specified image saving position.
IP Filter is none.	Meaning: The software cannot find the IP filter. Countermeasure: Check if the IP filter is set physically and it is registered
Filter Module is none.	Meaning: The software cannot detect the fluorescent filter. Countermeasure: Check if the fluorescent filter is set physically and it is registered and set in the software.
CH1+CH2 Filter Module is none.	Meaning: The software cannot detect the 2-channel filter. Countermeasure: Check if the 2-channel filter is set physically and it is registered and set in the software.

If an error code is displayed, the serviceman should take the countermeasures against the trouble. Contact the dealer where you purchased the FLA-5100.

Part
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Specifications

Specifications

Major performances

(1) Read image size: 40 x 46 cm
(2) Pixel size: 10, 25, 50, 100 or 200 µm (Selectable)
(3) Gradation: 16-bit or 8-bit (Selectable)
(4) Latitude: Five digits
(Dynamic range)
(5) Maximum image capacity: 3510MB(10µm),561.52MB (25 µm), 140.35MB (50 µm), 35.09MB (100 µm), or 8.77MB (200 µm)
(6) Detection sensitivity 1. IP ^{14}C: Detectable to 0.9 dpm/mm^2.
2. Fluorescent: DNA/SYBR-Green 7 pg/band
3. Chemiluminescence: pBR328/AttoPhos 100 g/spot

Outside dimensions & weight

		Dimensiion (W×D×Hmm)	Weight
Standard	Reading block	900×800×400 (projections not included)	110kg
Option	IP cassette	460×430×20	Appox.2.5kg
	IP stage	502×538×45	Appox.2.5kg
	Multi-stage	502×538×45	Appox.2.8kg
	Fluorescent stage	502×538×45	Appox.2.3kg
	High-quality preinter	650×561×563	65kg
	IP eraser	603×512×164	14.5kg
	Shield box	316×574×370	460kg

Power supply

(1) Input AC power: 100 to 120/200 to 240 VAC
(2) Phase: Single
(3) Frequency: 50/60 Hz
(4) Power consumption of reader block: 3.0 A (100 VAC) or 1.5 A (200 VAC)

Environmental conditions

(1) Operating conditions Temperature: 15 to 30°C
Humidity: 30 to 70% (No dew condensation)
(2) Non- operating conditions Temperature: -10 to +60°C
Humidity: 20 to 95% (No dew condensation)
(3) Transportation & storage conditions (Within 96 hours) Temperature: -25 to +60°C
Humidity: 5 to 100% (No dew condensation)
(4) Heat radiation: 151 W • h (Reader block + IP eraser)
(5) Lighting: It is recommended to turn down the lighting level to about 20 luxes when moving a sample from the cassette into the FLA- 5100 after exposure. (20 luxes imply the brightness level at which a person can read newspaper characters when he/she becomes accustomed to it.)

Part
13

Warranty

Warranty of FLA- 5100

The FLA-5100 is warranted as shown below.

Warranty period: One year from the date of installation
Warranty condition: Fuji Photo Film Co., Ltd. will repair, without charge, the defective product in the warranty period shown above.

However, charge will be made even in the warranty period in the following cases.

1) If the product is used in a place that does not meet the environmental conditions
2) If an unauthorized personnel repairs or modifies the product
3) If a peripheral device or software whose performances are not confirmed by Fuji Photo Film Co., Ltd. is installed
4) If the user carries out improper operation or maintenance
5) If a trouble originates from moving or transportation after installation
6) If a trouble is caused by irresistible forces (such as natural calamities, riot, radiation pollution or the like)
7) If a trouble is caused by computer viruses

The customer is liable for the costs of any repair services after expiration of the warranty period. (Fuji Photo Film Co., Ltd. will provide a maintenance contract service.)

Repair Service Period of Product

The guaranteed repair service period of this product is seven years from the end of sales. Thereafter, repair services may not be provided if repair parts become out of stock. Please note this.