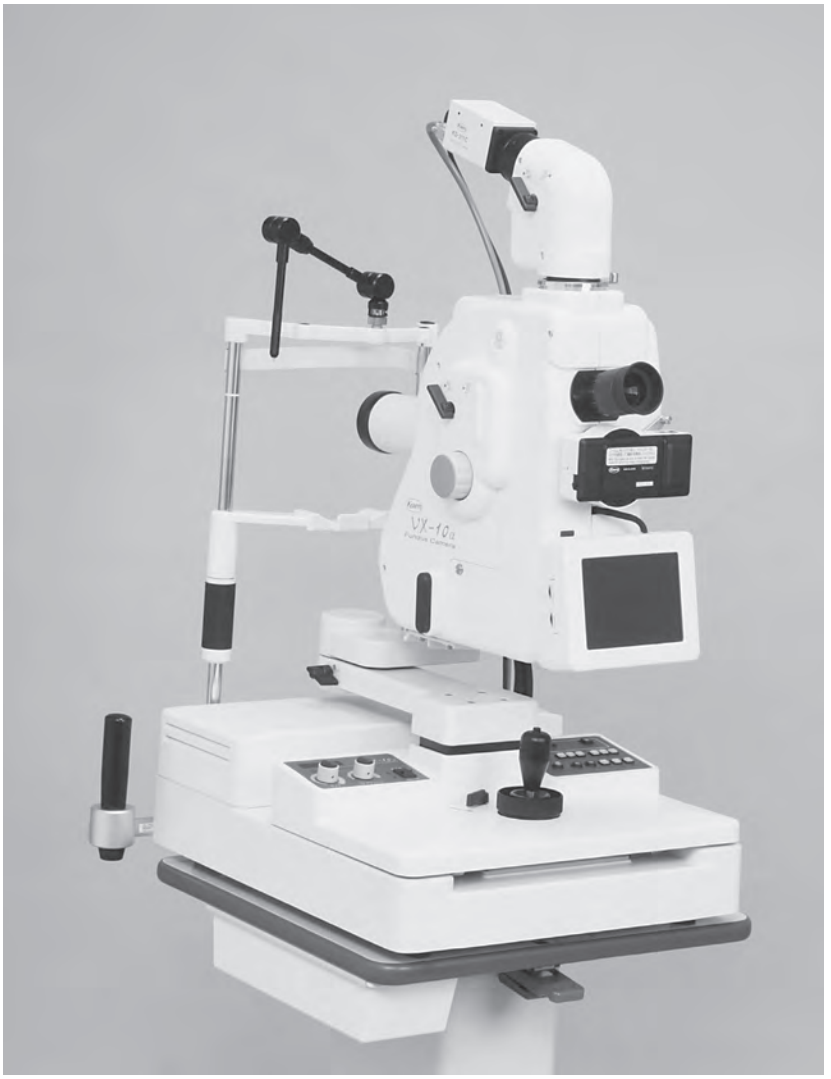
FUNDUS CAMERA

KOWA VX-10α

INSTRUCTION MANUAL



EU

KOWA VX-10α

Kowa

INTRODUCTION

INTRODUCTION

This manual provides a description of the operating procedures of KOWA VX-10α along with important precautions to be observed during its use. Please read this entire manual carefully to assure that the instrument can demonstrate its full capabilities and be used effectively. After you have finished reading it, please keep it in an easily accessible location near the instrument for future's reference.

Operational considerations for safety

This manual describes important precautions to be observed during its use to assure that the instrument can be used safely without causing any damage to the human body and property of its purchaser and other persons. The designations and their pictorial symbols have the following meanings. These should be fully comprehended before reading the text of this manual.

■ Meanings of markings

⚠ Warning

If the instrument should be operated wrongly, there may occur a danger of causing death or serious injury.

⚠ Caution

If the instrument should be operated wrongly, there may result an injury to the human body (not so serious as to cause death though)*1 or damage to property*2.

*1: An injury to the human body means any injury, burn, electrical shock and so forth that will not necessitate hospitalization or long-term outpatient treatment.
*2: Damage to property means an extensive damage to the house and household goods as well as the domestic animal and pet.

■ Meanings of symbols

Graphical indication of any danger (including warning and caution). What is warned is explicitly and pictorially indicated by a picture or its associated message on or near a pictorial symbol.

Graphical indication of prohibited operation (prohibitive item). What is prohibited is explicitly and pictorially indicated by a picture or it's associated message on or near a pictorial symbol.

Graphical indication of mandatory action (obligatory item). What must always done is explicitly and pictorially indicated by a picture or it's associated message on or near a pictorial symbol.

■ Kowa is not responsible for:

- Any damage caused by fire, earthquake, third party's action, any other accident or user's intentional or unintentional error, abuse or use under abnormal conditions.
- Any damage resulting from use of the product or its malfunction (e.g. Operating loss, shutdown, change/loss of stored data and so forth).
- Any damage resulting from disobedience of what is described in the instruction manual.
- Any damage resulting from, for instance, malfunctioning of the instrument caused by a combination of connected devices.

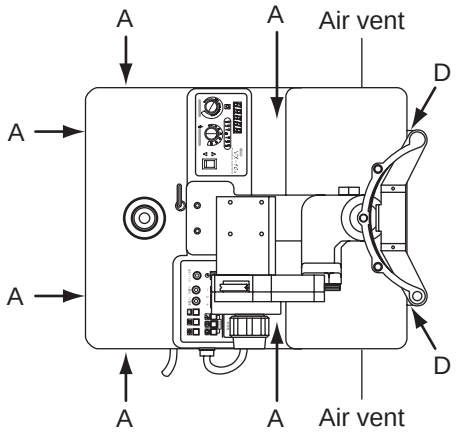
⚠ Warning

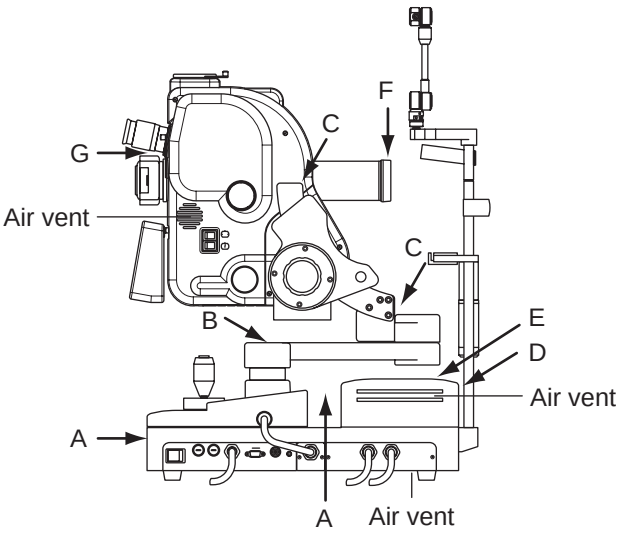
 Unplug		If any abnormal smell or sound, or overheating or smoke should be detected, be sure to turn OFF power supply immediately and then unplug it from the power outlet. If it should continue in use, a fire may break out on the instrument resulting in its malfunctioning. Contact your Kowa dealer where you purchased it or your nearest repair shop for inspection.
 Unplug	 Warning High-voltage	When replacing the flash tube or observation light bulb, be sure to turn OFF the main power switch and unplug it from the power outlet, and wait for 30 minutes or more. Otherwise, there may occur electrical shock.
 Unplug	 Warning High-voltage	When replacing the fuse, be sure to turn OFF the main switch and unplug it from the power outlet. If the fuse holder cover is removed with the instrument unplugged, there may occur electrical shock.
 Obligatory		Be sure to properly plug the plug or AC adapter into the power outlet. Otherwise, there may occur a fire or electrical shock.
 Obligatory		Use an accessory or designated fuse. Otherwise, the instrument may malfunction or a fire may break out.
 Obligatory		Make sure that the instrument is properly grounded to protect the human body. Put the plug in the three-wire grounding socket. Otherwise, there may occur electrical shock.
 Prohibitory		Install at a location away from, for instance, a cup containing liquid. If liquid should be spilled into the instrument, there may occur electrical shock. If so, turn OFF the instrument and then unplug it from the socket. Contact your Kowa dealer where you purchased it or your nearest repair shop for inspection.
 Disassembly prohibited		Do not disassemble, modify or repair the instrument yourself. Otherwise, there may occur a fire, electrical shock, instrument malfunctioning or the human body may be injured. Contact your Kowa dealer where you purchased the instrument for repair. The product assembled by yourself will not get warranty or any other service.
 Prohibitory		The socket or plug board must not be loaded in excess of its rated capacity. If the main power cable should share an outlet with many other devices, there may occur a fire or you may get an electrical shock.
 Prohibitory		Insertion of any metallic object in air vent slots may cause electrical shock resulting in malfunction, fire or electrical shock.
 Obligatory		Be sure to use accessory batteries. When replacing them because of their having been in use longer than a specified useful life, be sure to use specified ones. Because the battery contains flammable substance such as lithium and organic solvent, there may occur heat build-up, burst or fire. 1. Be sure to observe the following: • Do not charge, short-circuit, disassemble, deform, heat or put into fire, the battery. • Do not connect the battery's (+) and (–) poles by wire. Do not carry or store it closely together with metal necklace or the like. • Properly wire either of the battery's (+) and (–) poles. • Do not combine new batteries and used or any other types of batteries when in use. • Do not solder a wire directly on the battery. 2. Before discarding used batteries, apply adhesive tape around their terminals for insulation. If they jumble up with other metallic objects or batteries, there may result heat build-up, burst or fire. 3. Be sure to keep batteries off children.

⚠ Caution

Prohibitory	Pull off the plug from the power outlet without giving a pull.
Prohibitory	Do not plug or unplug the power cord with wet hand.
Prohibitory	Do not install the power unit at unstable locations, for instance, on a shaky base or a tilting surface. Otherwise, if it should drop off or fall over, the human body may be injured.
Prohibitory	 Warning High-temperature Do not replace flash tube and the observation light bulb immediately after its service. Otherwise, you may burn your fingers on the hot tube or lamp. Allow 30 minutes or so of cool-off before replacing.
Obligatory	When replacing the camera back, firmly hold by hand and fix it. Otherwise, it may drop off resulting in a bodily injury.
Obligatory	The power supply must be provided for the sole use of this fundus camera. Sharing one and the same power supply with other devices may cause a malfunction.
Obligatory	• This camera back uses two lithium batteries CR123A. Be sure to use appropriate batteries. • Remove the batteries when the camera is expected to be kept unused for a long period of time. • Store batteries in a dry and cool place with no direct sunlight.
Obligatory	When moving up or down the chin-rest to adjust the height of the patient's eyes, carefully manipulate the camera while checking the position of the patients' head. A patient with the smaller head may get his or her head caught between the device components.
Prohibitory	Do not increase the amount of observation light more than is required. Otherwise, the eye may be injured.
Prohibitory	Do not increase the amount of flash level more than is required. Otherwise, the patient's eyes may be injured.
Prohibitory	The air vent must not be obstructed. Such obstruction will cause internal temperature to increase resulting in occurrences of breakdown, malfunction or a fire.
Prohibitory	When batteries are stored, they must not be exposed to direct sunlight, high temperature or high humidity.
Prohibitory	Keep your fingers off the spaces between sliding base and base's power housing when operating the control lever. There is a fear of your fingers being caught and injured when the sliding base moves.
Prohibitory	Keep your hand off the space between the main camera unit and the horizontal arm when tilting the camera. There is a fear of your fingers being caught and injured when the main camera unit is tilted.
Prohibitory	Keep your fingers off the space between the tilt arm and its sliding area. There is a fear of your fingers being caught and injured when the tilt's sliding area is moving.

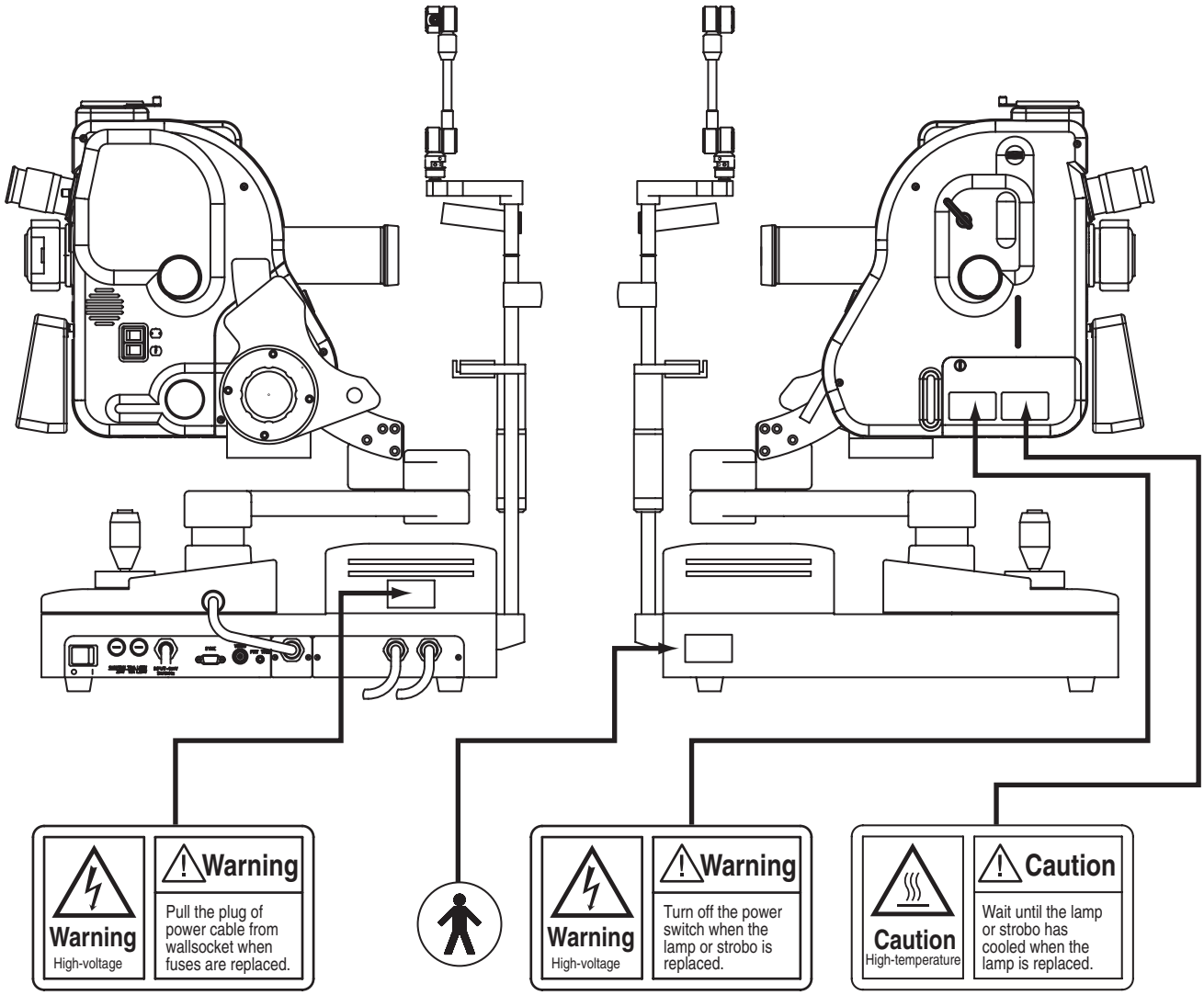
⚠ Caution	
 Prohibitory	Keep your fingers off the gap between the base's power housing and the poles of chin-rest unit. Therefore, instruct the patient not to hold the poles by hand because there is a fear of your fingers being caught and injured.
 Prohibitory	Keep your fingers off the gap between the base's power housing and the horizontal arm. There is a fear of your fingers being caught and injured. When the horizontal arm is lowered or the sliding base is moving.
 Prohibitory	Be careful about the distance between the objective lens and patient's face. There is a fear that the end of objective lens may get in touch with the patient's face (eye, nose, so forth) and injure it when you bring the camera close to the patient.
 Prohibitory	Keep your fingers off the space between the ocular and the 35-mm camera back when adjusting diopter. There is a fear of your fingers being caught and injured when you rotate the eyepiece.
 Prohibitory	Do not wipe the exterior of the instrument with solvent such as benzene, alcohol, thinner and ether. Doing so may cause discoloration or degradation.





⚠ Caution	
Caution	A. Keep your fingers off the spaces between the sliding base and the base's power housing when operating the control lever. There is a fear of your fingers being caught and injured when the sliding base moves.
Caution	B. Keep your hand off the space between the main camera unit and the horizontal arm when tilting the camera. There is a fear of your fingers being caught and injured when the main camera unit is tilted.
Caution	C. Keep your fingers off the space between the tilt arm and its sliding area. There is a fear of your fingers being caught and injured when the tilt's sliding area is moving.
Caution	D. Keep your fingers off the gap between the base's power housing and the poles of chin-rest unit. Therefore, instruct the patient not to hold the poles by hand because there is a fear of your fingers being caught and injured.
Caution	E. Keep your fingers off the gap between the base's power housing and the horizontal arm. There is a fear of your fingers being caught and injured when the horizontal arm is lowered or the sliding base is moving.
Caution	F. Be careful about the distance between the objective lens and patient's face. There is a fear that the end of objective lens gets in touch with the patient's face (eye, nose, so forth) and injures it when you bring the camera close to the patient.
Caution	G. Keep your fingers off the space between the optical viewfinder and the 35-mm camera back when adjusting diopter. There is a fear of your fingers being caught and injured when you rotate the eyepiece.
Caution	Insertion of any metallic object in air vent slots may cause electrical shock resulting in malfunction, fire or electrical shock.
Caution	The air vent must not be obstructed. Such obstruction will cause internal temperature to increase resulting in occurrences of breakdown, malfunction or a fire.

Indication of caution label



Emblem list

	Type B applied part
~	Alternative Current
O	OFF
I	ON

	Warning,Caution : See APPENDIX
	Warning High-voltage (See P7-3,P7-4)
	Caution High-temperature (See P7-3,P7-4)
	Symbol for "MANUFACTURER"
EC REP	Symbol for "AUTHORISED REPRESENTATIVE IN THE EUROPEAN COMMUNITY"

Precautions in operation

- Only qualified personnel should operate this equipment.
- When handling the fundus camera, pay special attention not to give strong shock to it.
- Install and store the instrument in a place free from high temperature and humidity, direct sunlight, and avoid the dusty place. Strictly observe the following environmental conditions:

	In operation	In Transportation, storage
Environmental Temperature	10 to 35°C	-15 to +55°C
Relative Humidity	30 to 90%	10 to 95%

- When in use, in storage or in transit, care must be used to keep the instrument from dewing.
- Place this fundus camera in room, the luminance of which can be lowered as low as about 5 lx (the luminance as low as you can scarcely read newspaper).
- To keep the instrument dust-free, use the cover supplied with it when the camera is not in use.

Precautions on electric system

- In case the KOWA VX-10α should be used after a long 'unused' period of time, inspect and check the following before starting it:
- The objective lens is neither dusty nor stained.
- The observation light's intensity has not changed.
- The battery (for instance, camera battery) the level of which stays within service range.
- Connect the camera with the power outlet properly so that the plug might not be pulled out accidentally.
  But if it should occur, be sure to turn OFF the main switch before connecting the plug again.
- If irregularity should occur in the circuit in the power unit, for instance, when you plug in with the main switch ON, "Err 1" will appear on the display and photographing will be disabled. In this case, turn OFF the main switch and wait for a while. Then turn it ON. If "Err 1"does not appear on the display, you may resume photography.
- Kowa is not responsible for any failure(s) or damage(s) caused by improvement, repair or maintenance rendered by the third party other than Kowa and its authorized agent.
- Kowa is not responsible for any failure(s) or damage(s) caused by improvement, repair, or maintenance rendered using the part(s) other than its designated one(s).
- The line voltage should be within ±10% of the rated value.
- Never change the electronic flash intensity when it's flashing is on.
- To operate switches on the control panel, first turn ON the main switch and then wait for about 10 seconds (until the power unit becomes internally stable).
- Do not turn ON/OFF the main switch in succession. There should be an interval of 5 seconds or more.
- When plugging or unplugging, turn OFF the main switch beforehand.
- Do not change the camera back with the main switch ON.
- The power line from the power outlet must be exclusively connected to the fundus camera.

Precautions on the main camera unit and relative systems

- If any stain, smear or scratch should exist on objective lens, it will appear as a white spot on pictures taken. Therefore, it is essential to always keep the lens surface clean.
- Do not leave the camera mount open without camera back mounted. In case the camera is expected to be not used for a long period of time, be sure to seal the mount with the accessory cap.
- Protect the optical viewfinder barrel and eyepiece tube from strong shocks or forceful pressures.
- Set a dial or knob with click(s) to its proper click index.
- If picture angle selector, filters in the observation light system or dioptric lens for compensating the examined eye should be incorrectly set, pictures taken will result in failures such as vignetting, under-exposure, and so forth.
- Securely fix the camera back on the camera mount by its lever. If not, pictures taken will result in failures such as displaced or out-of-focus images. At worst, the camera back may drop off and damaged and as a result, you will be obliged to suspend photography.
- Because the main camera unit and camera back are composed of precision parts, special tools will be needed for adjustment. Do not attempt to disassemble or adjust them by yourself.

Disposal Precautions

- LCD display of this instrument has a fluorescent lamp that contains mercury. When disposing this instrument, applicable federal, state, and local regulations must be observed.
- When disposing, this instrument is categorized as industrial waste; therefore, the disposal must be handled by licensed industrial waste disposal contractor.

Operational (Safety and Hazard prevention) Considerations for hospital Grade Electrical Equipment

1. Only qualified personnel should operate this equipment.

2. The following items shall be considered when installing equipment.

(1) Install at a location away from water or accidental splashing.
(2) Install at a location which will not be adversely affected by atmospheric pressure, temperature, humidity, ventilation, sunlight, dust, air containing salt, sulfur and other substances, and the like.
(3) Take care to guard against tilt, vibration and strong impacts, for instance, during transportation.
(4) Equipment must not be installed at locations where chemicals are stored or gasses are generated.
(5) Be careful with the radio frequencies, voltages and allowable amperes (power consumption) of the power supply.
(6) Make sure that all batteries are installed properly and in good working order (discharging curve, polarity, and so forth).
(7) Properly connect ground wires.

3. The following items shall be considered when using the instrument.

(1) Make sure that equipment activates properly after checking switch contact, polarity, dial setting and meters and so forth.
(2) Make sure that the instrument is properly grounded.
(3) Make sure that all cords are properly connected and secured.
(4) Use of other instruments and appliances on the same power circuit is liable to cause errors and incorrect flash output resulting in incorrect diagnosis or hazards.
(5) External circuits and connectors that may come in direct contact with the patient must be checked frequently for signs of wear.
(6) Before operations, make sure that the camera back battery is sufficiently charged.

4. The following items shall be considered when using the instrument.

(1) Be sure to minimize the time and quantity required for diagnosis and treatment.
(2) Always assure that the equipment and patient are in good condition.
(3) When an abnormality is found on the equipment, take proper measures, for instance, to stop the operation of the instrument while assuring the patient's safety.
(4) Do not allow the patient to touch any of the instrument controls.

5. The following items shall be considered after using the instrument.

(1) Turn OFF the instrument after setting control switches, dials, and so forth to their initial statuses following with a specified procedure.
(2) Do not pull cords for removal because an excessive force is exerted on them.
(3) The following shall be considered regarding storage location.
  (a) Store the instrument at locations free from splashes of water.
  (b) Store at a location which will not be adversely affected by atmospheric pressure, temperature, humidity, ventilation, sunlight, dust, air containing salt, sulfur and other substances, and the like.
  (c) Take care to guard against tilt, vibration and strong impacts, for instance, during transportation.
  (d) Equipment must not be stored at locations where chemicals are stored or gasses are generated.
(4) Clean and rearrange accessories, cords, cord restraints and the like.
(5) The instrument must be cleaned prior to use so that there will be no problem when using it again.
(6) In case it is expected to be not used for a long period of time, keep the camera back with batteries unloaded from it.

6. If it has some trouble, a label describing the trouble should be affixed on the instrument and contact a repair shop for repair.

7. Equipment shall not be modified.

8. Maintenance

(1) Periodically check the equipment and its components for any abnormality.
(2) When using again the equipment that has not been used for a while, it must be checked beforehand to assure that it is in normal condition and operates safely.

● Combination of medical electrical equipment and non-medical electrical equipment

IEC 60601-1-1 “Safety requirements for medical electrical systems” describes the components combination grouped into various clinical settings. The brief overview of IEC 60601-1-1 is shown below.

Situation No.		Medically used room: Inside the PATIENT ENVIRONMENT	Medically used room: Outside the PATIENT ENVIRONMENT	Non-medically used room	Feasible solution (See clause 19 in all situations)
1	1a Items A and B in PATIENT ENVIRONMENT	A IEC 60601 — B IEC 60601			
	1b Items A and B in PATIENT ENVIRONMENT	A IEC 60601 — B IEC XXXXX			For B:Additional protective earth or separating transformer
	1c Item A powerd from specified power supply in item B in PATIENT ENVIRONMENT	A IEC 60601; B IEC XXXXX			For B:Additional protective earth or separating transformer
2	2a Item A in PATIENT ENVIRONMENT and item B in medically used room	A IEC 60601	B IEC 60601		
	2b Item A in PATIENT ENVIRONMENT and item B in medically used room	A IEC 60601 — B IEC XXXXX; Common protective earth			For B:See 19.201 and its rationale
3	3a Item A in PATIENT ENVIRONMENT and item B in non-medically used room	A IEC 60601		B IEC 60601 or IEC XXXXX	For B:See 19.201 and its rationale
	3b Item A in PATIENT ENVIRONMENT and item B in non-medically used room	A IEC 60601 — B IEC 60601 or IEC XXXXX; Protective earth; Protective earth with potential diffence			For B:Additional protective earth or SEPARATION DEVICE

KEY TO TABLE

- Additional protective earth : In necessary, provide additional protective earthing , which is permanently connected(See also 58.201).
  NOTE Equipment modification may be required.
- Separating transformer : If necessary, limit the ENCLOSURE LEAKAGE CURRENT, by using an additional separating transformer according to annex EEE.
  NOTE1 No equipment modification is required.
  NOTE2 A separating transformer is a transformer with one or more input winding(s) separated from the output winding(s) by at least basic insulation [IEC 60989]
- SEPARATION DEVICE : If necessary, apply SEPARATION DEVICE.
- IEC 60601 : MEDICAL ELECTRICAL EQUIPMENT in compliance with IEC 60601.
- IEC XXXXX : Non medical equipment in compliance with relevant IEC safety standards.

Precautions: Use of Medical Electrical System

Precautions for System installation

- All components of this medical electrical system may be installed within a limited patient environment (a radius of 1.5 m around a patient) when all components are installed in accordance with the installation instructions using “Multi-tap with Isolation Transformer”, one of the system components.
- Prerequisite for installing other components (a PC, printer, video capture printer, video monitor, or other devices) which do not comply with IEC60601-1 along with this system is that the electric power to the components is supplied from “Multi-tap with Isolation Transformer”. The electric power to these components supplied from an electric source other than Multi-tap with Isolation Transformer (e.g., directly from wall outlets) may cause increased enclosure leakage current or potential difference between protective grounds, resulting in the injury to the patient or operator. Please use the Multi-tap with Isolation Transformer only for supplying the power to the components other than the system components.
- Any medical electrical equipment that is connected to this system to compose a medical system must comply with IEC60601-1.
- Any non-medical electrical equipment that is connected to this system to compose a medical system must comply with safety standards of IEC or ISO provisions applicable to such a non-medical electrical equipment.
- Do not use any additional multi-tap receptacle or extension power cable other than those specified to this system by KOWA.
- Power supply to this system or “Multi-tap with Isolation Transformer” must be provided individually. (Do not route the power supply through other multi-tap receptacle to the system or “Multi-tap with Isolation Transformer”.)
- The power cable for an electrical device that compose a medical system must have durability that meets IEC60245/ IEC60227 or higher standards.
- Assure that the power supply is turned off when connecting an electrical device to the system.
- Do not turn on the power supply until all devices are completely connected.
- Do not place or install the devices and the system components on the unstable or inclined table.

Precautions for “Multi-tap with Isolation Transformer”

- Do not place “Multi-tap with Isolation Transformer” directly on the floor. Water droplets during room cleaning may enter the multi-tap resulting in the component failure.
- The power supply cable to “Multi-tap with Isolation Transformer” must be connected to a power receptacle with a protective ground terminal.
- When using “Multi-tap with Isolation Transformer” with a protective ground terminal, read the instruction for use attached to the “Multi-tap” receptacle to familiarize yourself with the correct use before using it.

Daily Maintenance and Cleaning

1. System components

- Wipe the soiled outer surface with soft cloth from which water was firmly squeezed off. Do not wipe the exterior of the system components with chemicals or solvents such as thinner and benzene. (Because LCD monitor screen covers easily get scratched, lightly wipe with soft cloth such as gauze.)
- Refer to the instruction for use provided with each device for details of device maintenance and cleaning.

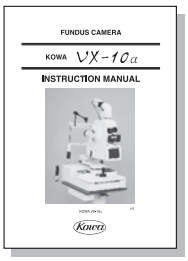
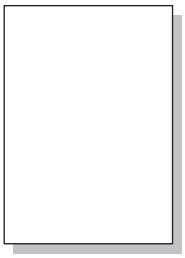
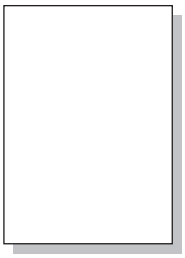
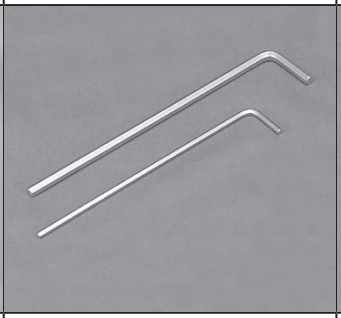
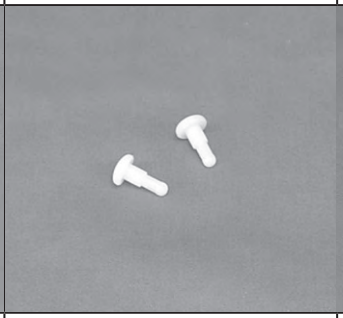
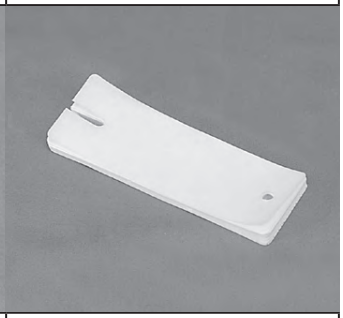
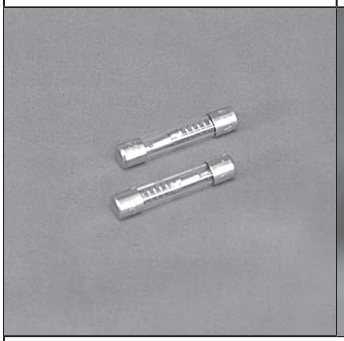
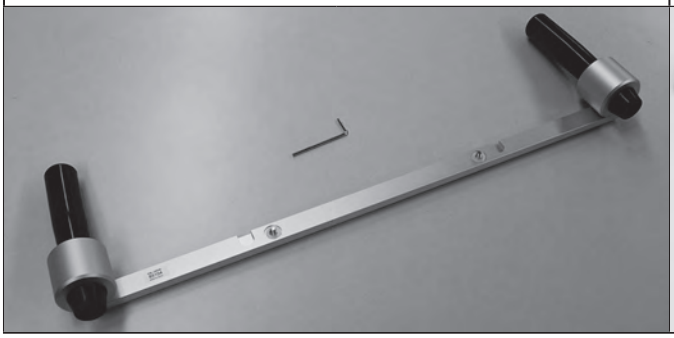
2. Power cables, connecting cables, and connectors

- Visually verify that all cables have no flaw or damage.
- Visually verify that earth leads of all components and protective ground terminals are securely connected.
- Disconnect the power cables from the power supply receptacles when you do not use the system for a long period of time.

3. Others

- When you add a PC to the system for a filing purpose, captured images are stored in the hard disk drive of the PC. Back up the data stored in the hard disk drive regularly since hard disk drives may have a mechanical or electrical failure.

ACCESSORIES

Dust cover: 1 pc.	Instruction manual: 1	Attached document: 1	Quick manual: 1
			
External fixation lamp: 1 pc.	**Hexagon wrench:2 pcs.**	**Pin: 2 pcs.**	**Chin-rest paper: 1 set**
			
Fuse: 2 pcs.	**Observation lamp: 1 pc.**	**Blower: 1 pc.**	**Detach tool: 1 pc.**
			
Grip (option)		**Internal fixation target (option)**	**Data card: (option)**
			

KOWA VX-10α

CONTENTS

1 Summary of equipment

1-1 Purpose of use and effectiveness

KOWA VX-10α is intended for taking pictures of fundus images with mydriatic or without mydriatic.

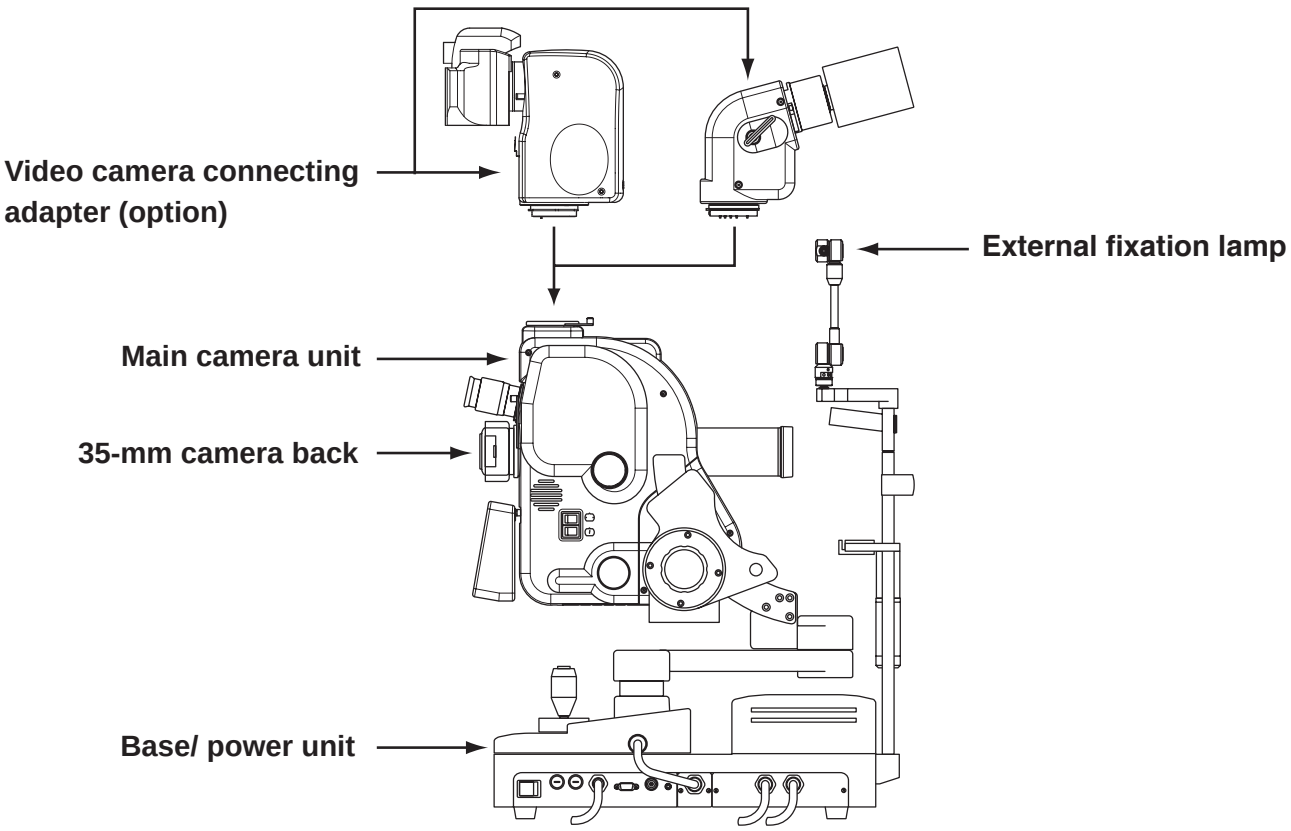
1-2 General information

This equipment is a fundus camera which is capable of mydriatic and non-mydriatic photography with two angles of view: 50° and 30° (45° and 27° for non-mydriatic photography). You can record photographic data with 35-mm film, video and so forth.

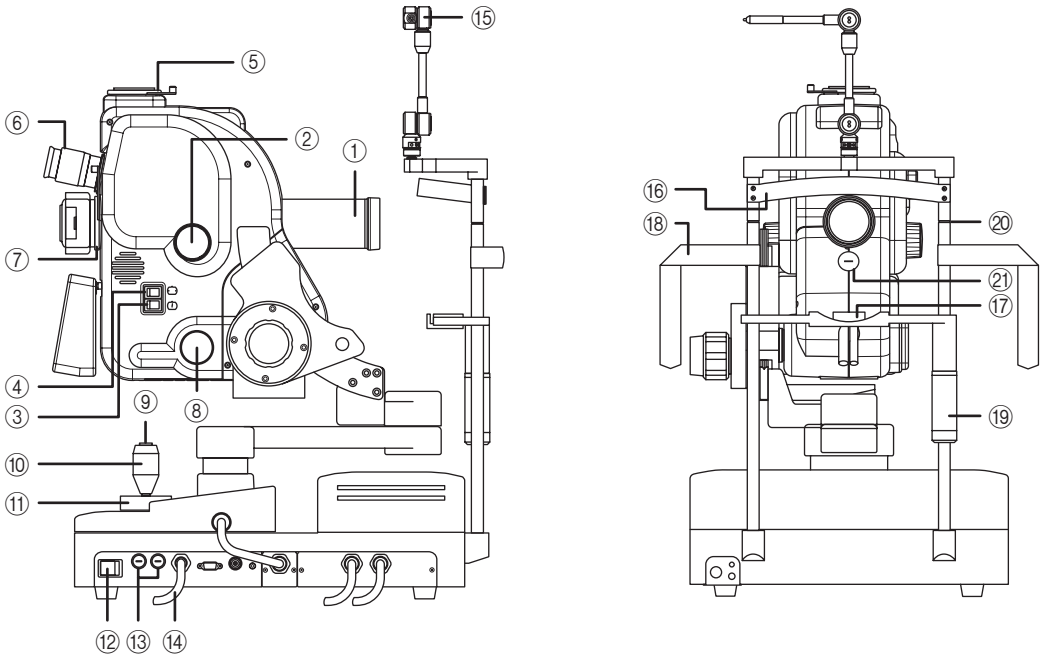
1-3 Features

1) A single operation of the instrument allows you to select non-mydriatic color, mydriatic color, or mydriatic fluorescent photography.
2) Design for small size, lightweight and power-saving taking into account the service environment of equipment.
3) Automatic exposure system which can be automatically linked with a camera in use.
4) Wide-range flash of 0.6WS to 300 WS (19 steps) for fully handling film/digital image recordings.
5) Switch at hand which enables automatic insertion of exciter filter and barrier filter.
6) Switch at hand which enables switching to diopter lens for compensating the examined eye.
7) Working distance guiding function and focus detecting function, enabling flare-less, sharp pictures to be taken.
8) Small pupil mode to cope with insufficient pupil's diameter in mydriatic photography (not for non-mydriatic photography).
9) LCDmonitoring mode for readily enabling mydriatic photography without an attempt to look through a finder (switch to infrared illumination).
10) Digital camera can be connected if combined with a filing device.
11) Easy-to-see panel display which will indicate only available switches in each mode.

1-4 System configuration



1-5 Name and function of each part



① **Objective lens**

A large aspherical lens with protective lens cap for keeping lens surface from dirt and dust.

② **Focusing knobs**

Knobs located on both sides of main camera unit for fine focusing adjustment.

③ **F.D. switch**

Used to switch ON/OFF the luminous lines of focus detection aid (available in mydriatic mode only).

④ **W.D. switch**

Used to turn ON/OFF the detecting luminous dots for camera alignment (available in mydriatic mode only).

⑤ **Upper camera back mount (video mount)**

Special mount for fixing video camera adapter.

⑥ **Optical viewfinder(eyepiece)**

Adjustable to the photographer's eye dioptric power in a range of -8D to +5D (a double-cross reticle is incorporated for focusing).
Because fundus image must be brought to the focus point of optical viewfinder, the photographer must adjust the optical viewfinder to his or her eye previously beforehand.

⑦ **Lower camera back mount (35-mm mount)**

Special mount for fixing 35-mm camera back. Cordless connection provided of the back to the main camera unit.

⑧ **Cap for electronic flash compartment**

Upon removal of this cap, a red-marked base will be exposed. A simple press on the base will cause the flash tube to be released. Before replacement, be sure to turn off the power switch.

⑨ **Shutter button**

Pressing this button causes the electronic flash to energize and shooting is complete.

⑩ **Control lever**

A stick lever for moving the main camera unit both laterally and longitudinally so that the incident light can enter the examined eye properly.

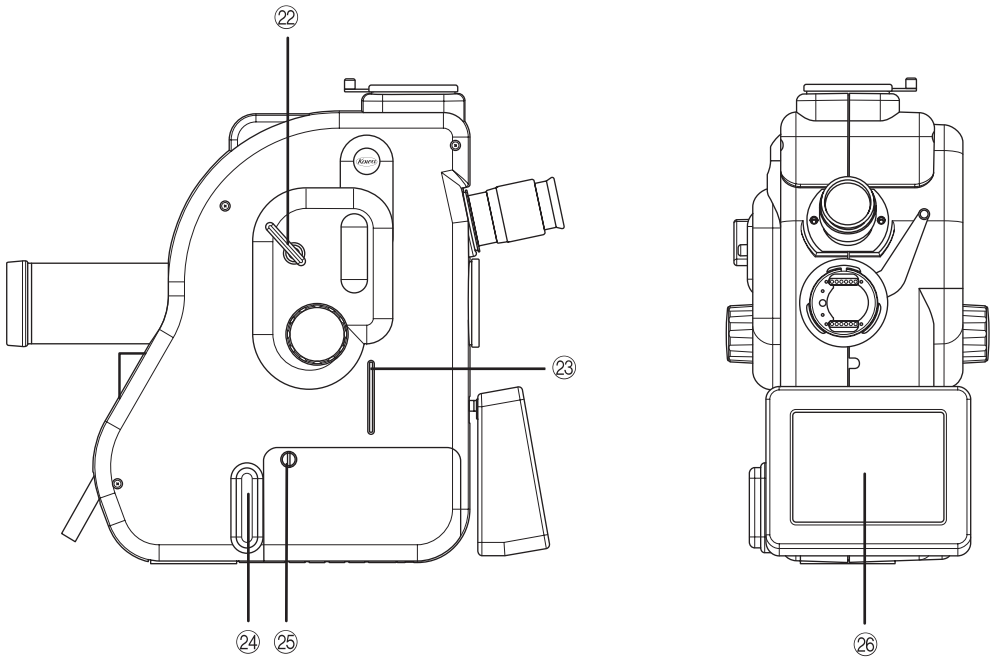
⑪ **Camera height adjusting handle**

Handle for moving main camera unit vertically so that the incident light can enter the examined eye properly.

⑫ **Power switch**

I : ON O : OFF

⑬ **Fuse holder**



⑭ **Power cord**

The shape of the plug varies according to the input voltage.

⑮ **External eye fixation lamp**

Used to guide the examined eye's fixation to desired direction.

⑯ **Forehead-rest**

Used to rest and fix the patient's forehead against it.

⑰ **Chin-rest**

Used to rest and fix the patient's chin on it.

⑱ **Head fixation band**

Used to secure patient's head in case his or her face is likely to move (e.g. child patient).

⑲ **Chin-rest handle**

Used to raise/lower the chin-rest.

⑳ **Eye level mark**

The vertical position of examined eye must be aligned with this mark.

㉑ **Fitting part of internal fixation target**

Fit internal fixation target (optional) at its mount.

㉒ **Picture angle knob**

Used to select a picture angle of either 50° or 30° (45° or 27° for non- mydriatic photography).

㉓ **Data card slot**

An insertion slot for written data card to be inserted.

㉔ **Filter inserting slot**

Used for inserting optional green filter after removing the protective rubber cap.

㉕ **Light housing cover fixing screws**

Upon removal of this cover and inner cover, observation bulb and flash bulb will be exposed allowing replacement.

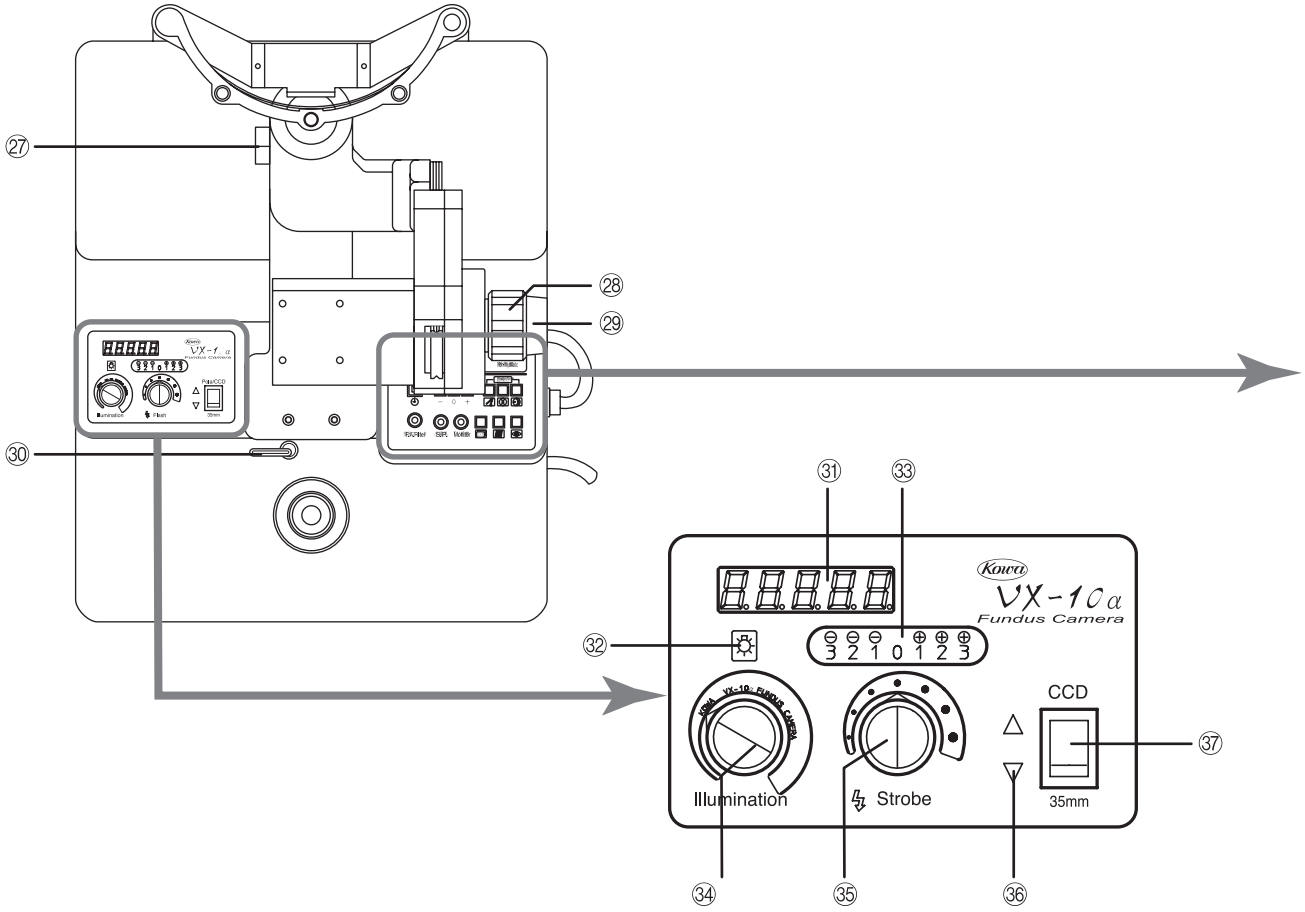
Be sure to turn off the power switch before replacement.

㉖ **Liquid crystal monitor (LCD)**

In non-mydriatic mode,the examined eye is continuously observed on this monitor so that the fundus camera can be properly guided.

This monitor can also be used to check the images photographed.

1. Summary of equipment



㉗ **Horizontal lock lever**

Upon operation of this lever, the rotating arm will be locked.

㉘ **Tilting handle**

By turning this handle, the main camera unit will be tilted vertically.

㉙ **Lock handle**

By turning this handle, the tilting handle will be locked.

㉚ **Lock lever**

Upon operation of this lever, the base will be locked.

㉛ **Display screen**

Timer's count is indicated increasing 0.1 second at a time on the screen with 5 digits.
When timer is not in work, flash intensity and error will be indicated.

㉜ **Observation lamp indicating lamp**

The lamp will indicate a reading of observation lamp intensity.

㉝ **Flash intensity compensation indicating lamp**

This lamp indicates flash intensity compensation.

㉞ **Observation light intensity control knob**

Used to adjust observation light intensity.

㉟ **Flash intensity knob**

Used to adjust flash intensity level.

㊱ **Working camera back indicator**

This indicator comes on indicating which camera back of upper or lower ones is in work, linking with the camera back select switch. When camera back is not loaded on a selected camera back mount, the indicator will come off. When film is not loaded on the camera back, it will flash.

㊲ **Camera back select switch**

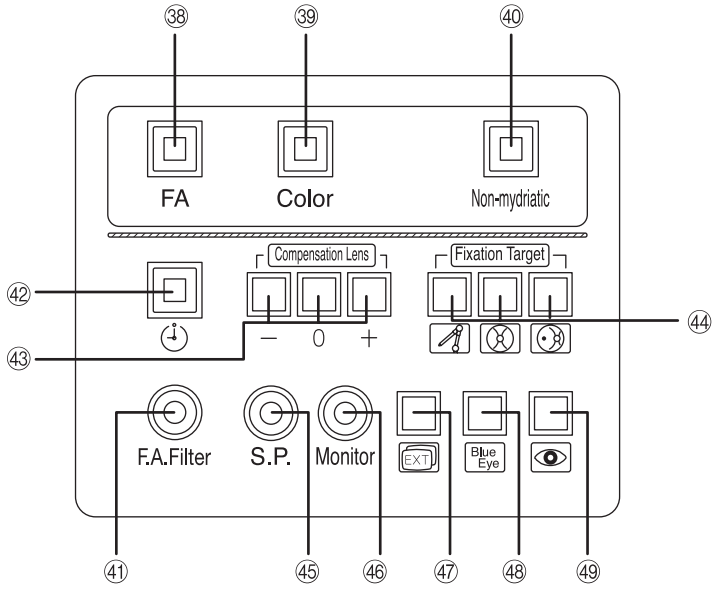
Used to select the optical paths, upper (35-mm) or lower(Electronic images).

㊳ **Mydriatic fluorescein angiography select switch**

Used to select Mydriatic fluorescein angiography mode.

㊴ **Mydriatic color switch**

Used to switch the system to mydriatic color photography mode.



㊵ **Non-mydriatic switch**

Used to switch the system to non-mydriatic color photography.

㊶ **Fluorescein Angiography filter switch**

Used to insert or remove fluorescein filter in mydriatic fluorescein angiography mode.

㊷ **Timer switch**

Used to start or stop the timer in mydriatic fluorescein mode.

㊸ **Diopter lens switch**

Used to insert diopter lens for compensating the examined eye.

Although the examined eye's bias is indicated as plus (+), zero (0) or minus (-), it is not intended to compensate flash intensity.

㊹ **Fixation lamp switch**

Used to select a desired type of fixation lamp in non-mydriatic mode.

㊺ **S.P. switch**

Used to switch the system to small pupil photography in mydriatic fluorescein mode.

㊻ **LCD monitoring switch**

Used to switch the observation system from a finder to LCD monitoring.

㊼ **Monitor select switch**

Used to switch the images shown on the LCD monitor between the internal CCD images and the images from an external input.

㊽ **Blue Eye switch**

Used to adjust the intensity which is suitable for blue eyes.

㊾ **Anterior chamber select switch**

Used to insert or remove dioptric lens for anterior chamber observation.

2 Preparatory procedure

2-1 Installing

1) Assemble the fundus camera main camera unit and power unit/base in accordance with a separate Assembly Manual.
2) Mount the fundus camera on motorized table (option).
3) Make sure that the power switch is OFF (○ -marked side) on the power unit and base.
4) Insert power cord's three-wire grounding plug of the power unit/base into the power outlet.

Make sure the power is OFF.

⚠ Caution

Obligatory

The power line from the power outlet must be exclusively connected to the fundus camera. If the camera should share the same power outlet with any other external device, its malfunction may result.

⚠ Warning

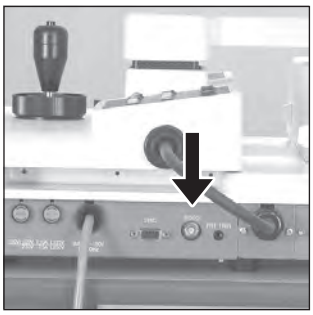
Obligatory

Make sure that the instrument is properly grounded to protect the human body. Put the plug in the three-wire grounding socket. Otherwise, there is a fear of electrical shock.

2-2 Connecting to external device

KOWA VX-10α is equipped with synchronization connecting cable and external image input terminal connectable to external device when video camera is in use. When the video camera is in use, connect the external device to the fundus camera by designated synchronization cable. When image output from the external device is entered into the fundus camera's image input (composite terminal), pictures taken can be checked on the LCD of the main camera unit.

Location of input connector

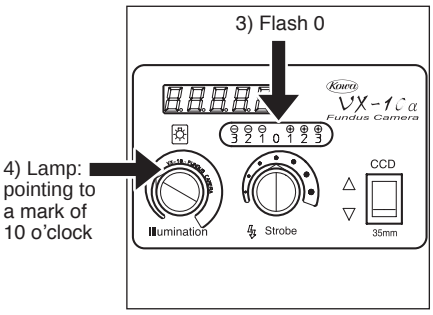


Note

- When you use a peripheral device and/or other device connected to the peripheral device, it must meet all applicable EN(IEC) standards.
- Data processing device must meet EN60601-1(IEC60601-1) or IEC60950. The system that combines such data processing device must meet EN60601-1-1(IEC60601-1-1). The system administrator who builds such system bears all responsibility to have the system comply with requirement of EN60601-1-1(IEC60601-1-1). Should you have any question, contact Kowa sales representative or dealership.

2-3 Preparatory procedure of fundus camera

1) Remove the objective lens cap.
2) Turn ON (I-marked side) the power switch.
3) Set the flash intensity knob to zero (0).
   (Check the indicating lamp on the upper portion of switch.)
4) Set the observation light intensity control knob at a mark of 10 o'clock ("K" as in Kowa).
5) Make sure the picture angle knob is set at 50°.
6) Check the objective lens has no dirt. For checking/cleaning method, see "7. Maintenance / Inspection."



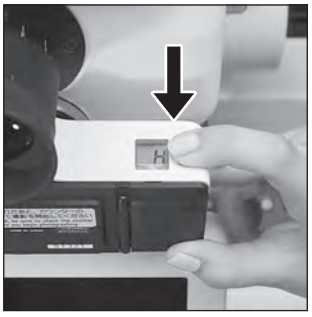
2-4 Loading 35-mm camera back's batteries

1) Press the battery cover in the direction marked "▲" and open the battery cover.
2) Load new batteries.
3) For checking the remaining battery charge level, keep pressing the battery check button with the power switch being turned OFF, provided that a film is not being loaded. "H" for high level or "L" for low level will appear on the film counter. If "L" appears, load new batteries at this moment.

1) Open the cover.

2) Load batteries.

3) Check for remaining charge level.



Note

- A winding film without mounting to the main camera unit shortens a life of batteries.
- If film is wound being mounted the main camera unit, its useful life is one year and a half.

⚠ Caution

Obligatory

- This camera back uses two lithium batteries CR123A. Be sure to use proper ones.
- If the camera back is not expected to be used for a long period of time, keep the batteries unloaded from it.
- Store batteries in a place where they can be protected from direct sunlight, high temperature and high humidity.

⚠ Warning

Obligatory

Be sure to use accessory batteries. When replacing them by the new because their use is in excess of a specified useful life, be sure to use designated ones. Because the battery contains flammable substance such as lithium and organic solvent, there may occur heat build-up, burst or fire.

1. Be sure to observe the following:
   - Do not charge, short-circuit, disassemble, deform, heat or put into fire the battery.
   - Do not connect the battery's (+) and (–) poles by wire. Do not carry or store it closely together with metal necklace or the like.
   - Properly connect its (+) and (–) poles.
   - Do not combine new batteries and used batteries or any other types of batteries when in use.
   - Do not solder a wire directly onto the battery.
2. Before discarding the used batteries, apply adhesive tape around their terminals for insulation. If they should jumble up with other metallic objects or batteries, heat build-up, burst or fire may result.
3. Be sure to keep batteries off children.

2-5 Mounting 35-mm camera back

1) Mount the camera back with the limit pin facing upward on the main camera unit's 35mm mount and fix it by turning the handle downward.
2) To dismount it, turn the handle upward.

⚠ Warning

Obligatory

When replacing the camera back, fix it while firmly holding it by hand. Otherwise, it may drop off resulting in a bodily injury.

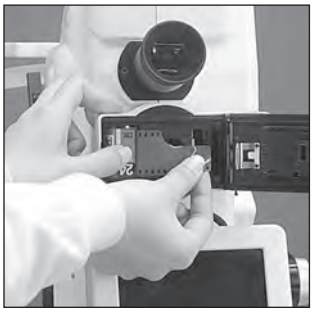
1) To mount/ turn the handle downward

2) To dismount/ turn the handle upward

2-6 Replacing with new 35-mm film

1) Open the rear cover by pressing down the lock lever on the left-hand side.
2) Press in a new roll of film (in Patrone) as far as you hear a click.
3) Pull out the film lead toward the wind-up side as far as it comes to a red line. Make sure the perforations on both film sides engage with sprocket teeth. Then close the rear cover.
4) When the rear cover is closed, the film will be automatically wound up as far as the first frame is ready. Make sure that frame count display indicates "01."
5) After a desired number of frames have been exposed, press the rewind button. After rewinding is complete, open the rear cover and take out the roll of film.

3) Engage the film perforations



4) Check the frame count display

5) The rewind button

Note

- The number on frame count display will disappear in four seconds for power saving. You may check it by pressing the battery check button.
- If the rear cover should be opened with the exposed film unwound, the exposed film will be ruined under light. Be sure to check the display of a film count before opening the rear cover.
- If "Er" appears or "00" does not come off on the film count display, it suggests that the film is incorrectly loaded. Follow the film loading procedure all over again.
- When the film is exposed up to the last frame, an alarm sound will buzz and rewinding will be done automatically.

2-7 Types of available films

Recommended 35-mm camera back films

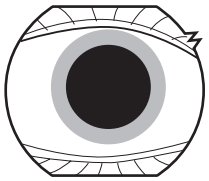
Photography mode	Type of film		Film speed	Development
Color photography	Reversal film	Color	ISO100	Standard
Fluorescein angiography	Negative film	B&W	ISO400	3 X development
	Negative film	B&W	ISO1600	Standard
Red-free photography	Negative film	B&W	ISO400	3 X development
	Negative film	B&W	ISO1600	Standard

Note

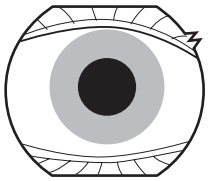
- Do not use other than designated films to avoid improperly exposed photographs.

2-8 Preparatory procedure of the examined eye

1) In case of mydriatic photography, apply mydriatic eye drops to the examined eye. After it dilates fully, guide the patient to the fundus camera. In case of non-mydriatic photography, take the patient to a dark room and let the examined eye dilate spontaneously.
2) Make sure that the pupil is sufficiently open.
Sufficient diameter of the pupil is 5.5 mm or more in mydriatic mode, 4.0 mm or more in small pupil mode and 4.0 mm or more in non-mydriatic mode.



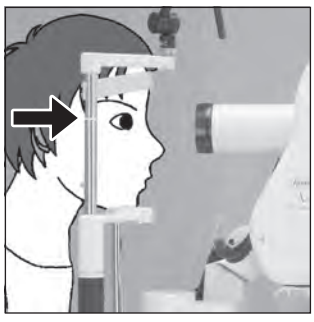
Mydriatic photography is enabled if 5.5 mm or more in diameter.



Small pupil or non-mydriatic photography is enabled if 4.0 mm in diameter.

3) Fixing the patient
   ① Instruct the patient whose eyes is dilated sufficiently, to be seated in front of the fundus camera.
   ② Adjust the height of motorized table to let the chin on the chin-rest and the forehead on the Forehead-rest in a natural posture.
   ③ Adjust the chin-rest height by chin-rest handle.
   ④ Set the examined eye at the eye level mark.

3) Fixing the patient



Note

- When using mydriatic eye drops, be sure to follow the instruction of the eye drops.

⚠ Warning


Prohibitory

Carefully operate the fundus camera so that the camera will not get in touch with the patient's face (eye, nose, so forth).

⚠ Caution


Prohibitory

In operating the fundus camera, keep your fingers off the spaces or gaps between (1) the base and power unit, (2) the main camera unit and horizontal arm, (3) tilt arm and tilt moving portion, (4) the power unit and chin-rest support, (5) the power unit and horizontal arm, and (6) the objective lens and the patient's face. Otherwise, your fingers may be caught and injured. Instruct the patient not to place his or her hand on the fundus camera.

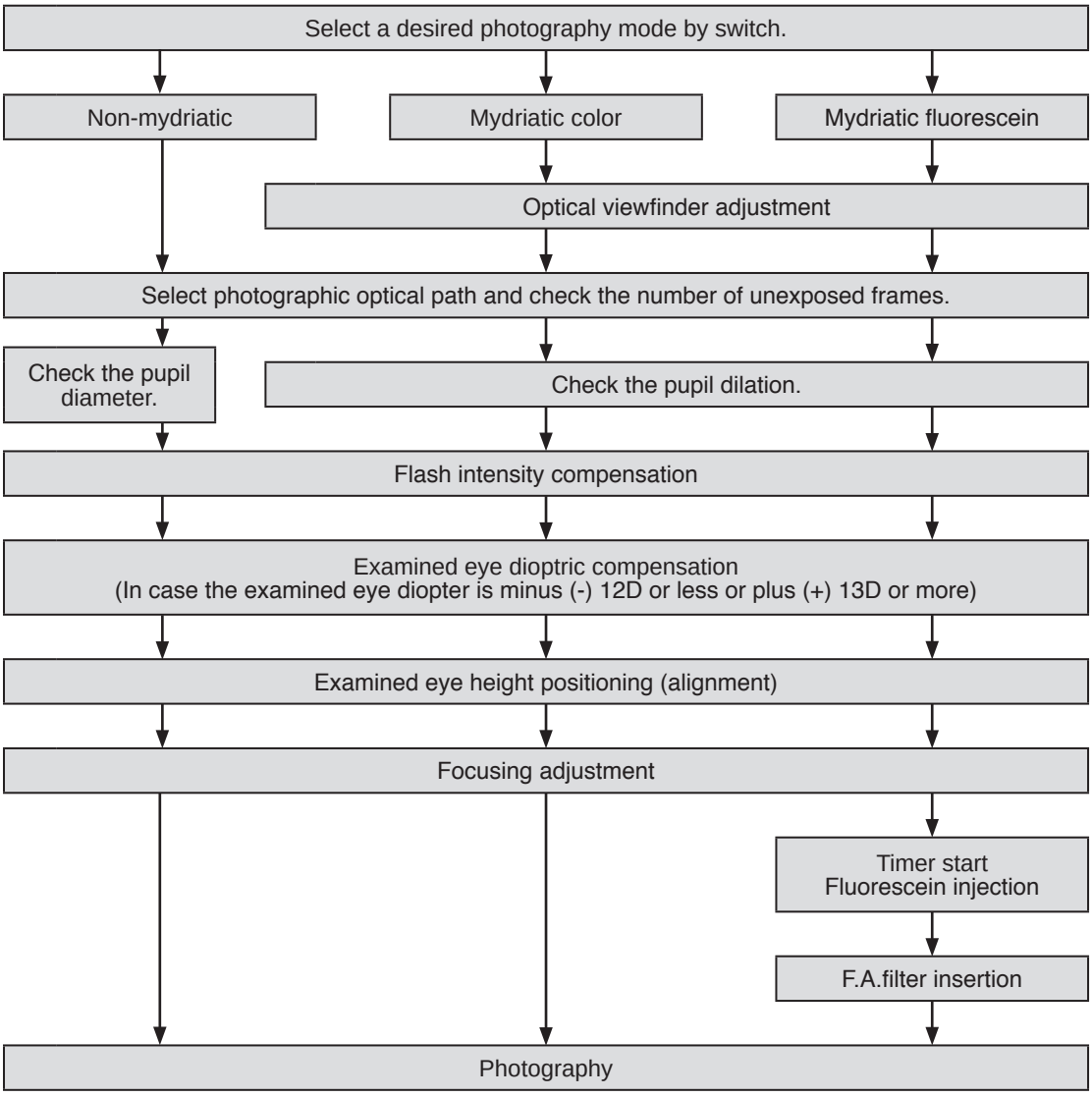
⚠ Caution


Obligatory

Carefully adjust the height of the examined eye by moving the chin-rest vertically while looking at the patient's face. There is a fear that too small a face may be caught.

3 Basic photography

3-1 Operation procedure flowchart



Photography by this instrument is classified into non-mydriatic/mydriatic color, mydriatic fluorescein photography. It is recommendable to grasp a rough operations' flow along the purpose of each photography. If malfunction should occur on this equipment, an alarm will buzz.

Besides this classification of photography, also available are photography of enlarged image, small pupil, LCDmonitoring and infrared photography (when optional filter is mounted). It is also possible to record hand-written data into 35-mm film. For more information about the method, see items of "4 Other practical photography" described below.

Note

- It takes about three seconds to switch to a desired photography mode.

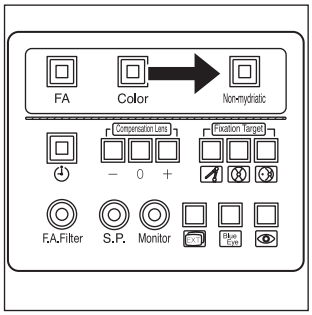
Do not photograph immediately after switching to a desired mode to avoid an improper picture image. Therefore, wait at least three seconds before starting photography.

3-2 Non-mydriatic photography

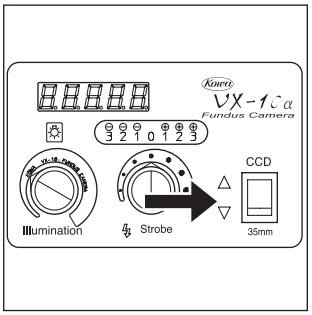
This paragraph describes the method of non-mydriatic fundus photography. To let the examined eye dilate spontaneously, reduce room's luminance as low as you can scarcely read newspaper.

1) Selecting "Non-mydriatic" on the mode select switch on the right-hand panel.
2) Selecting a desired photography optical path by camera select switch on the left-hand panel.
3) Checking the remaining number of film on the camera back of selected optical path.
   In case of electronic image, check the peripheral devices are ready.

1) Non-mydriatic switch



2) Selection of optical path



3) Check for the remaining number of film

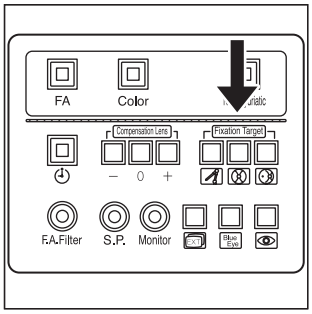
4) Selecting a desired fixation lamp by fixation lamp switch.

① Internal fixation lamp-posterior pole photography : General photography capable of photographing the whole posterior pole.

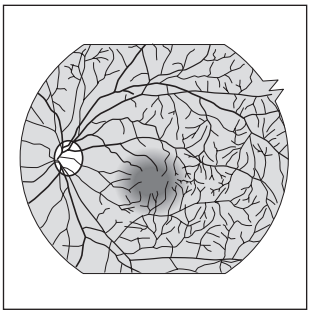
② Internal fixation lamp-central optic disk : Used when photographing around central optic disk.

③ External fixation lamp : Used when intended to fixate peripherals and arbitrary points.

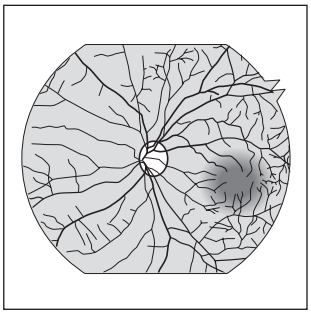
4) Selection of fixation target



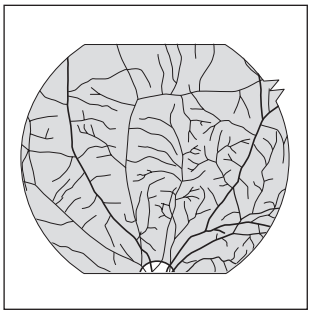
4) – ① Posterior pole



4) – ② Optic disk

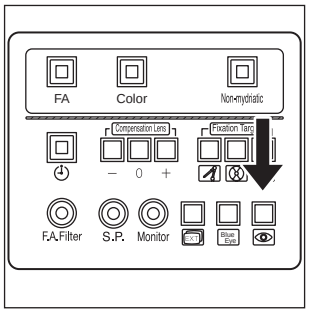


4) – ③ Peripherals



5) Checking the pupil's diameter.
   ① Insert dioptric lens for anterior chamber by Anterior chamber select switch.
   ② Pull the fundus camera toward you as closely as the anterior area of the eye is almost seen.
   ③ For adjustment, move the fundus camera backward and forward to align the periphery of the patient's iris to the monitor's vertical line.
   ④ Check the pupil for diameter.
   ⑤ After checking the pupil's diameter, remove diopter lens for anterior chamber by Anterior chamber select switch.

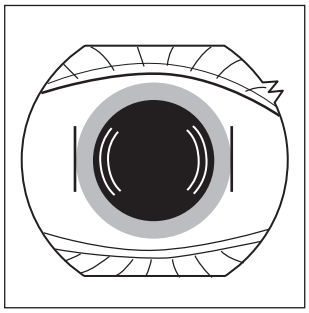
5) – ① Anterior chamber select switch.



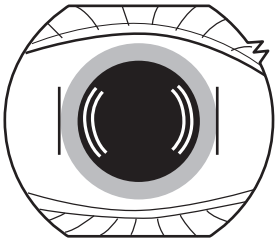
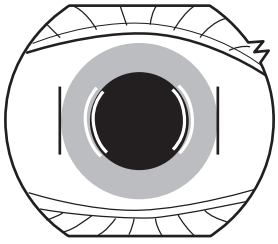
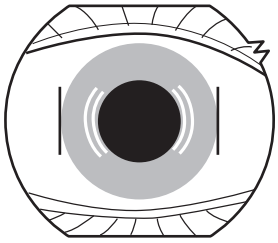
5) – ② Pull the base toward you.

5) – ③ Set the position.

5) – ④ Check pupil's diameter.



Check the examined eye's pupil for dilation and correct the flash intensity.

○ Pupil sufficiently dilated	△ Pupil's slightly insufficiently dilated	× Pupil's insufficiently dilated
Sufficient dilation 	Slightly insufficient dilation 	Insufficient dilation 
Photography enabled at flash intensity of 0	Correct the flash intensity in a range of +1 to +3 before starting photography.	Insufficiently dilated. Photography with uniform exposure disabled

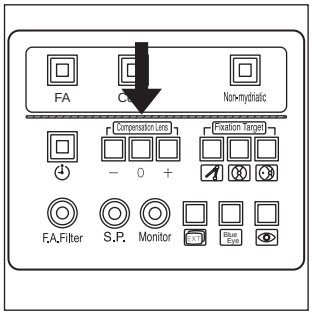
Note

- If the pupil is insufficiently dilated, take longer time to acclimate the examined eye to darkness and let it dilate spontaneously.
- If the pupil is still insufficiently dilated even by the above method, switch to mydriatic photography mode.
- The above conditions may not be applicable to some patients.

6) Compensating the examined eye's diopter.
Insert diopter lens by diopter lens switch.
Examined eye's diopter –12D to +13D : Diopter lens unnecessary.
–10D to –32D : Insert minus (–) diopter lens.
+10D to +35D : Insert plus (+) diopter lens.

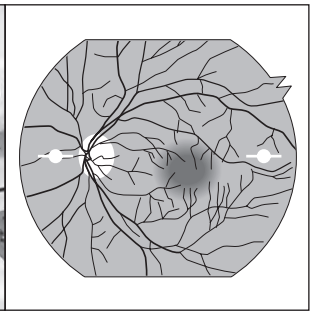
7) Setting the examined eye's position.
Adjust positioning of the fundus camera such that the luminous spots for alignment can be positioned as illustrated in the drawing, by moving the base longitudinally, laterally and vertically. Adjust the direction of vertical and lateral movements such that luminous spots can come in the center of line. Align the direction of longitudinal movement with a point where the luminous spot is the smallest.

6) Diopter lens switch



7) Alignment (positioning)

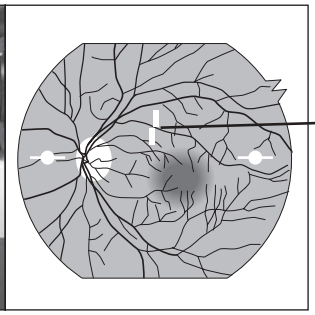
Luminous spots in for detecting alignment

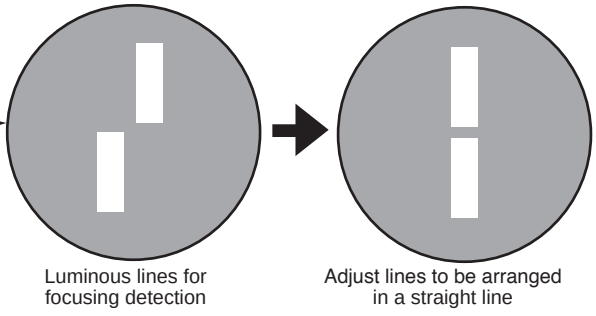


8) Adjusting focus.
Adjust the positions of luminous lines for focusing detection by turning the focusing knob such that they are arranged in a straight line.

8) Adjusting focus

Luminous lines for focusing detection





Luminous lines for focusing detection

Adjust lines to be arranged in a straight line

9) Press the Shutter button for photographing. The film will be advanced automatically.
In case of electronic images, images to be taken will be displayed on the monitor.

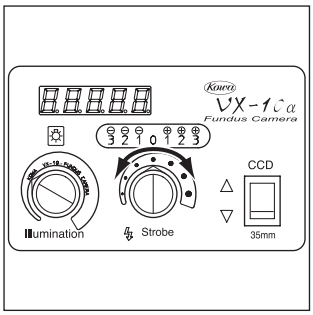
9) Shutter button

☞ POINTS

■ Flash intensity.

Exposure can be automatically adjusted to have a standard intensity for each photography. But it is expected that excess or deficiency in exposure caused by the difference in dilation, color of iris, etc. will cause some deviation from the standard state. In case excess or deficiency in exposure should be expected, correct the exposure by the flash intensity knob. On the display on the panel, a currently set value of exposure will be indicated as a standard. If stage 1 is selected of the flash intensity compensation switch, the intensity of exposure will change by 1/2 EV.

■ Flash intensity knob / display



■ Location of liquid crystal monitor.

If the monitor should be hard to watch, adjust its location so that it comes in front of your line of sight.

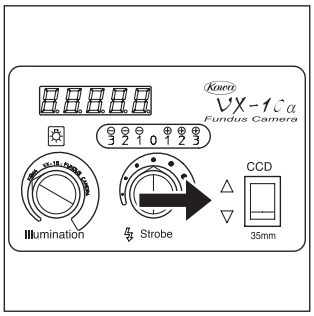
■ Location of liquid crystal monitor

■ Working camera back indicator.

Operations of the indicating lamp show the following:

Camera selected	Display	Description
35-mm camera	▼OFF	Camera back not mounted
	“ ▽ ” FLASH	Film not loaded
	▽ON	Photography enabled
Electronic image	▲OFF	Connecting adapter not fitted
	△ON	Photography enabled

■ Camera change-over indicating lamp



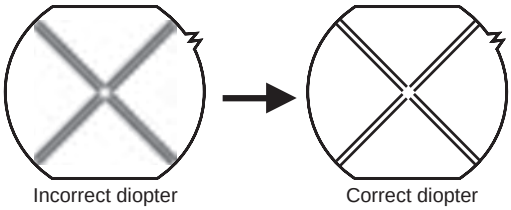
Note

- 35-mm camera back.
  Photography with 35-mm film in non-mydriatic mode will produce flare around the picture taken.
- Panel display.
  On the panel display, only available switches in a selected switch will be displayed to prevent likely malfunctioning in a dark room.
  Note that the switch on the display, which is OFF, will not be available in the selected mode.
- Non-mydriatic photography of peripherals is liable to produce flare around the picture.

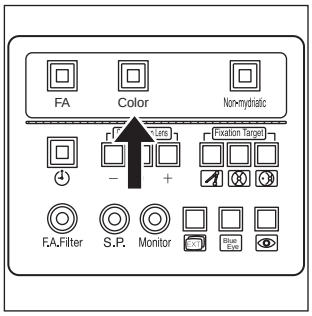
3-3 Mydriatic color photography

This paragraph describes a method of mydriatic color fundus photography. Reduce the room's luminance as low as you can scarcely read newspaper.

1) Select "Color" by the mode select switch on the right-hand panel.
2) Adjust optical viewfinder diopter.
   Turn the optical viewfinder to a full range of plus (+) side. Then slowly turn it clockwise while looking into the viewfinder and stop it when the double line comes clearly in sight. If the diopter is incorrect, the result is that the picture will be out of focus. If you wear glasses, look into the view finder with its rubber adapter turned up.

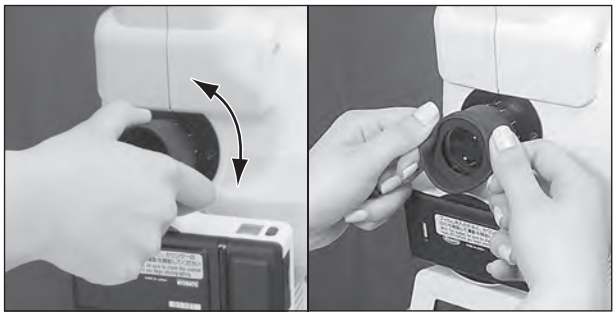


1) Mydriatic color switch



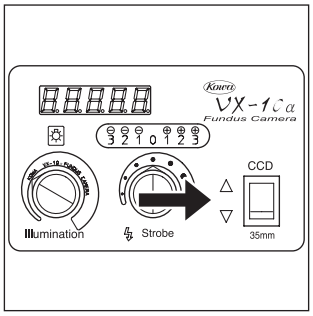
2) Diopter adjustment

Finder rubber adapter (when you wear glasses)



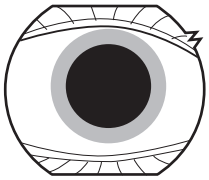
3) Select a desired photography optical path by the camera back select switch on the left-hand panel.
4) Check the remaining film level in the back of the selected optical path.
   In case of electronic images, check if the peripheral devices are ready.
5) Check the state of dilation.
   Make sure that the pupil is sufficiently dilated. If not, see the paragraph "4-2 Small pupil photography ("Mydriatic color" and "FA" mode)".

3) Selection of optical path

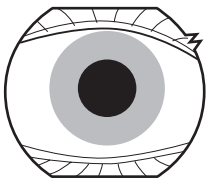


4) Check the film.

5) Check the state of dilation.



Photography when 5.5 mm or more in diameter

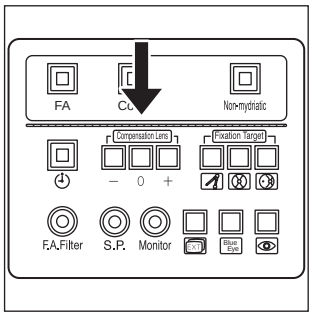


5.5 mm or less
"4.2 Small pupil photography"

6) Compensating the examined eye's diopter.
Insert diopter lens by diopter lens switch.
Examined eye's diopter –12D to +13D : Diopter lens unnecessary.
–10D to –32D : Insert minus (–) diopter lens.
+10D to +35D : Insert plus (+) diopter lens.

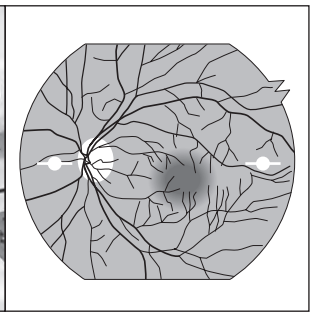
7) Setting the examined eye's position.
Adjust positioning of the fundus camera such that the luminous spots for alignment can be positioned as illustrated in the drawing, by operating the control lever. See the point in the paragraph in the next page "■ How to guide the observation light to the examined eye in mydriatic photography."

6) Diopter lens switch



7) Alignment (positioning)

Luminous spots for detecting alignment

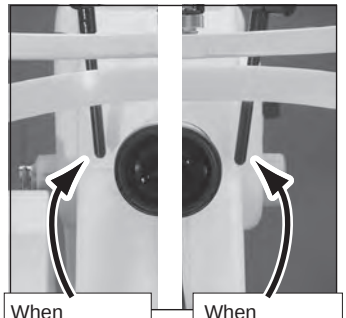


8) Adjusting the position of external fixation lamp.
Adjust the position of external fixation lamp such that it comes in a position as illustrated in the drawing. Posterior pole photography is enabled in this state.

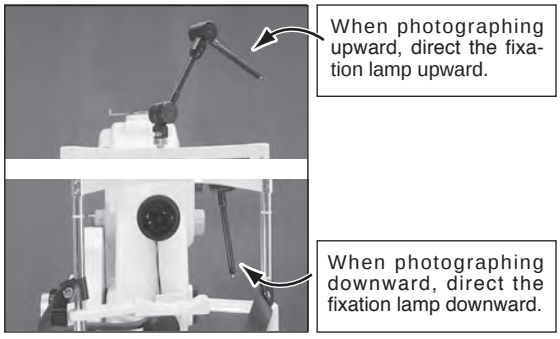
9) Guiding the line of sight of the examined eye.
Instruct the patient to fixate the flashing tip of the fixation lamp with his or her eye (not to be examined). Guide his or her line of sight to the location of fundus to be photographed while slowly moving the external fixation lamp.

8) External fixation lamp

Position of fixation lamp for photographing the posterior pole



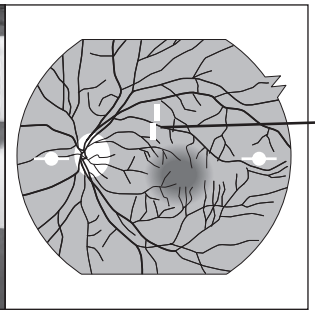
9) Example of guiding the patient's line of sight

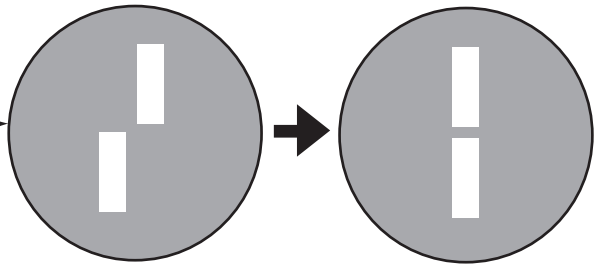


10) Adjusting the focus.
Turn the focusing knob such that luminous lines for focusing detection can be arranged in a straight line as illustrated in the drawings.

10) Adjust the focusing

Luminous lines for focusing detection





Luminous lines for focusing detection

Arrange them in a straight line.

11) Press the Shutter button to photograph. The film will be automatically advanced.
In case of electronic images, photographed images will be displayed on the monitor.

11) Shutter button

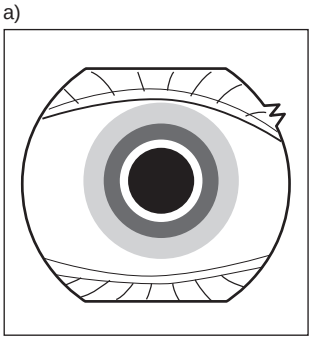
☞ POINTS

■ How to guide the observation light to the examined eye in mydriatic photography.

In fundus photography, it is necessary to guide necessary exposure which comes to the fundus through the pupil. Therefore, the camera position that will satisfy this lighting condition to the examined eye is very restricted. Flashlight travels on the same path as observation light. So if you can observe the fundus under a uniform illumination without flare and reflections (correct camera position for incidence), you are sure to get good fundus photographs.

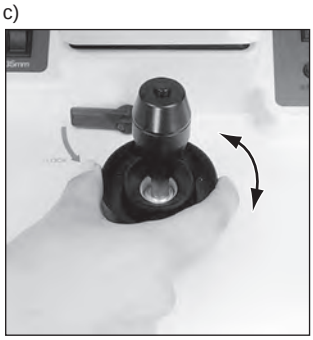
a) While looking into the cornea of the examined eye from the side of objective lens, move the base longitudinally and laterally with the control lever upright such that a rough image of illumination ring-slit focused on the cornea of the examined eye can be obtained.
b) Adjust vertical positioning of the camera by turning the camera height adjusting ring.
c) Then while looking into the viewfinder, adjust alignment, guide the observation light into the fundus.

a)



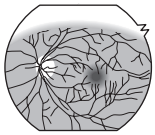
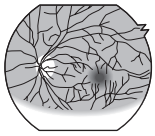
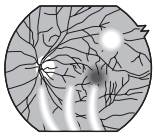
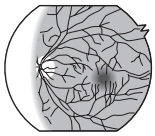
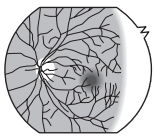
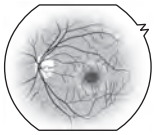
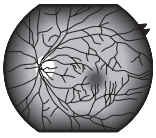
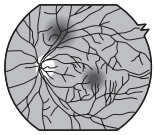
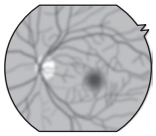
b)

c)



■ Observation through the ocular lens

Perform fine adjustment while looking into the ocular. For better photography, be careful about the following:

Photograph	Quality of view	Recommended remedy
	White reflection at top	Camera positioned too high.
	White reflection at bottom	Camera positioned too low. Eyelid of examined eye overhanging. Instruct the patient to open the eyes.
	Circular or line-shaped blur in white	Eyelash of examined eye overhanging. Or the objective lens is not clean.
	White reflection at left	Camera positioned too leftward.
	White reflection at right	Camera positioned too rightward.
	White flare in peripheral	Camera too close to examined eye.
	Shadow in peripheral	Camera too far from examined eye.
	Shadow in locals	Examined eye insufficiently dilated.
	Out of focus in general despite fine focusing	• Too much tear wetting on the cornea of examined eye, or the cornea is too dry. Instruct the patient to blink a couple of times. • Incorrect optical viewfinder diopter. Correct the optical viewfinder diopter or use luminous spots for focusing detection.

Note

- Do not increase the amount of observation light and the amount of light for exposure more than required. Otherwise, pain and/or injury may be inflicted on the patient.
- Be sure to use correct optical viewfinder diopter. If the diopter is incorrect, pictures will become out of focus.

3-4 Mydriatic fluorescein angiography

This paragraph describes a method of mydriatic fundus fluorescein angiography. Reduce room's luminance as low as you can scarcely read newspaper.

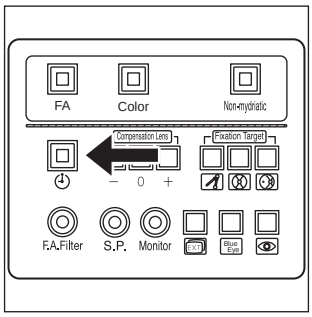
Items 2) through 10) are the same with those of "3-3 Mydriatic color photography." For more information, see the items of "3-3 Mydriatic color photography".

1) Select mydriatic fluorescein by the mode select switch on the panel.
2) Adjust the optical viewfinder diopter.
3) Select a desired photography optical path by the camera select switch on the left-hand panel.
4) Check the remaining film level in the back of the selected optical path.
5) Check the diameter of pupil.
6) Compensate the examined eye's diopter.
7) Adjust positioning of the examined eye.
8) Adjust the position of external fixation lamp.
9) Guide the patient's line of sight.
10) Adjust the focusing.

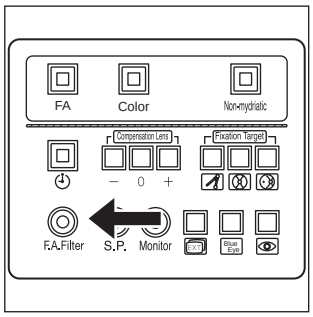
Next, proceed to the procedure necessary for fluorescein angiography only.
A blue exciter filter is inserted automatically when "F.A." is selected by the mode select switch in Step 1) above.

11) Fluorescein injection and timer start.
Simultaneously with fluorescein injection into the vein, press the timer switch and measure the amount of time by the timer.
The timer will indicate the amount of time in a 5-digit number increasing 0.1 second at a time. At the same time with photographing, timer counts are recorded on the left-hand side of image on each frame of 35-mm film. If a filing device is in use, timer counts are simultaneously recorded.
12) Inserting barrier filter.
Insert the barrier filter in the photography optical path by pressing "F.A. Filter" switch.
13) Press the shutter button to photograph.
Perform fine adjustment of focusing and aligning and then press the shutter button.
The film will be advanced automatically.

11) Timer start



12) Inserting F.A.Filter



13) Shutter button

Note

- When injecting fluorescein, be sure to follow the instruction of fluorescein.

☞ POINTS

■ Fluorescein angiography at the rate of one frame per second.

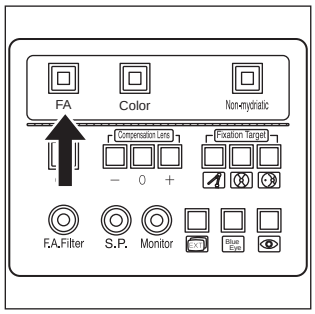
In case of consecutively photographing at an interval of 1 second, keep pressing the shutter button.
But some backs may not support such photography.

■ 1 frame per second photography

■ Automatic insertion of exciter filter.

Upon pressing mydriatic fluorescein select switch, the blue exciter filter will be automatically inserted. But another method is that ,alternatively, upon pressing mydriatic fluorescein select switch, the barrier filter can be automatically inserted, and the exciter filter later inserted.
For more information, see the paragraph “Summary of DIP-SW on power unit” in “9. Technical references.”

■ Automatic insertion of exciter filter



4 Other practical photography

4-1 Photography of enlarged image

This paragraph describes the method of photographing enlarged image. On this equipment, you can select from the picture angles of 50° and 30° in mydriatic color and mydriatic fluorescein modes, and from those of 45° and 27° in non-mydriatic mode.

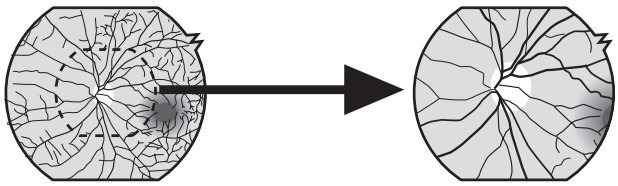
4) Switching picture angle

1) Operate according to the paragraphs of “3. Basic photography.”
2) In each type of photography, operate from positioning and focussing of the examined eye at the picture angle of 50°(45°).
3) Select a desired picture angle by the picture angle knob. If video camera connecting adapter is in use, be sure to switch the picture angle knob of the video camera adapter.
4) Perform fine adjustment of focussing and alignment, and then press the shutter button to photograph.

☞ POINTS

■ Photography of enlarged image

- Photograph by enlarging the central part to be photographed at the picture angles of 30° (27°) against those of 50° (45°).
- In photographing enlarged image, guide the patient's line of sight such that the part to be photographed can come in the center of the picture angles of 50° (45°).
- When luminous lines for focusing detection is in use, adjust the focusing at the picture angles of 50° (45°). You need not adjust focussing after changing the picture angle.



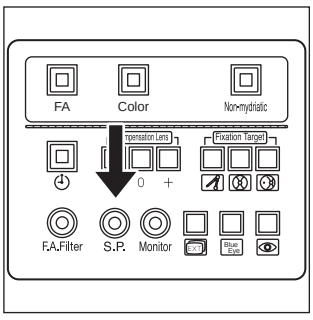
Note

- When video camera connecting adapter is in use, be sure to switch the picture angle knob at the same time as well.
- When the picture angles of main camera unit and video adapter do not agree, pressing the shutter button causes an alarm to sound and permits no image to be captured.
- It takes about 3 seconds to switch to Small pupil mode.
  Since photographing immediately after switching the mode does not allow you to capture a good image, wait at least three seconds before starting photography.

4-2 Small pupil photography

This paragraph describes a small pupil photography method in mydriatic “Color” and “FA” mode. 4.0 mm or more in diameter, photography is enabled in Small pupil mode.

2) S.P. switch

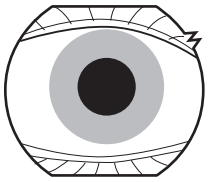


1) Operate according to the paragraphs of “3-3 Mydriatic color photography” and “3-4 Mydriatic fluorescein angiography.”
2) Press S.P. switch on the right-hand panel. For timing of pressing the S.P. switch, see below mentioned points.
3) Adjust the focusing and alignment and then press the shutter button to photograph.

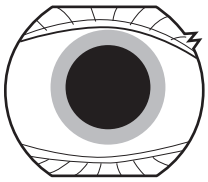
☞ POINTS

■ Small pupil mode

- The pupil with a minimum diameter of 5.5 mm can be photographed in mydriatic mode. When in small pupil mode, the diameter of pupil to be photographed can be reduced to a minimum diameter to 4.0 mm.
- In case of the examined eye the pupil of which is obviously 5.5 mm or less in diameter, immediately after selecting mydriatic color mode or mydriatic fluorescein angiography mode, select the small pupil mode by pressing the S.P. switch, before starting photography.
- In case of the examined eye the pupil of which is 5.5 mm or so in diameter, tentatively observe and perform aligning. When an image should have shadow in its center or peripheral, switch to the small pupil mode by pressing the S.P. switch.



If obviously 5.5 mm or less in diameter, try to photograph in small pupil mode.



If 5.5 mm or so in diameter, try to photograph in mydriatic mode.

Note

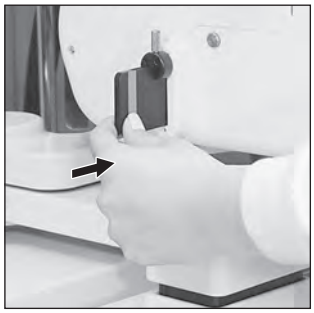
- In case the small pupil mode is used, the picture angles of photography will be 45° and 27°.
- In case of the pupil the diameter of which is 4.0 mm or less in diameter, uniformly exposed images cannot be photographed.
- It takes about three seconds to switch to small pupil mode.
  Do not photograph immediately after switching to a desired photography mode to avoid an improper picture image. Therefore, wait at least three seconds before starting photography.

4-3 Red-free photography (mydriatic color mode)

This paragraph describes red-free photography with optional green filter.
The designated green filter is available as an option.

1) Select “Color” by the mode select switch on the right-hand panel.
2) Insert the optional green filter into the slot on the side of the main camera unit. Now the patient observation light turns green.
3) The subsequent procedure is the same as in the items of “3-3 Mydriatic color photography.” Proceed to photography following the preceding paragraph.

2) Filter inserting slot



☞ POINTS

■ In red-free photography, red-less light is produced by absorbing red wavelength from light, and as a result, good fundus pictures are obtained in which blood vessels have a high contrast with the retina.

Note

In these types of photography, roll of ISO400 B&W negative film (3-times-development) or of B&W ISO1600 film (standard development) is recommended.

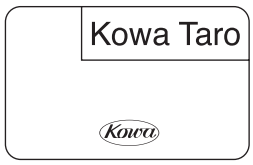
4-4 Photography of data card

In this paragraph, methods of photographing a data card on 35-mm film are described.

Photography of data card

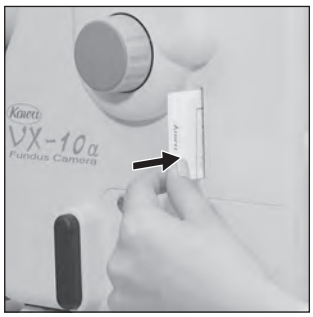
You can photograph a data card on 35-mm camera back. The data card is sold separately as an option.

① Use a pen and write data (e.g., patient name) on the data card placed in the position as shown in the figure.
② Insert the data card into the slot on the main camera unit in the direction as shown in the figure.
③ When photographing normally, data on the data card will be recorded on 35-mm film.
④ The data card may be reused after wiping it off with alcohol.



Insert the card into the slot in this direction.

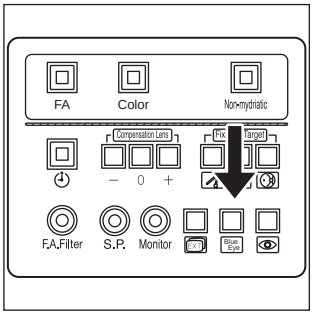
③ Insert the data card



4-5 Blue Eye switch

This paragraph describes the Blue Eye switch function. Using this function with patient with blue iris makes the flash intensity one level lower than normal, and compensates the exposure to an appropriate level. (Change the exposure accordingly as its excess or deficiency changes according to the dilation of the pupil.)
Check the color of the patient's iris before photography and use this function if necessary.

Blue Eye switch



4 Other practical photography

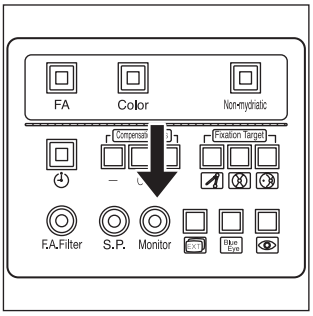
5 Handy features

5-1 LCD monitoring mode (“Mydriatic color” and “FA” mode)

This paragraph describes the method of performing mydriatic photography watching LCD monitor instead of looking into viewfinder as if doing non-mydriatic photography. This feature allows you to photograph without diopter adjustment. Also a patient becomes free from dazzling observation light since it uses infrared light in the mydriatic color mode and reduces the intensity of observation light in the mydriatic fluorescein mode. Therefore you can photograph smoothly.

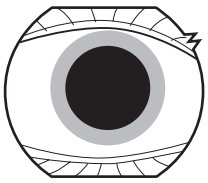
1) Select “Color” by the mode select switch on the right-hand panel.
2) Press “LCD monitoring” switch on the right-hand panel.
   The LCD monitor will start with operating sound while the observation light turns infrared light.
3) From now on, operate according to the paragraph of “3-2 Non-mydriatic photography.”
   Starting with the item 2), you can photograph as if doing non-mydriatic photography.

2) LCD monitoring switch



☞ POINTS

- In LCD monitoring mode, you can perform non-mydriatic photographing at a picture angle of 50° of the examined eye the pupil of which can be spontaneously dilated to 5.5 mm or so in diameter, without applying mydriatic eye drops to it.(non-mydriatic photography at a picture angle of 50°.)
- In mydriatic color mode, observe and set the examined eye with infrared light as in the case of non-mydriatic photography. Thus, because the patient can be free from dazzling observation light, you can smoothly perform photography for the patient even if not accustomed to dilating the pupil.



Non-mydriatic photography at a picture angle of 50° will be enabled if the pupil can be spontaneously dilated to 5.5 mm or more in diameter

Note

- Unlike observation through viewfinder, accurate states of flare and focusing will become hard to check for.
- When observing on LCD monitor, bear in mind that, unlike an actual picture image taken, both a fluorescein angiogram and a normal fundus picture image will appear on the monitor. (Picture image taken will be limited to fluorescein angiogram.)

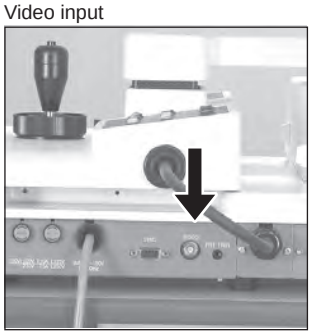
5-2 External image input display function

In this paragraph, the method of displaying the images of an external imaging device is described. With this function, you can use the TV monitor of this unit to review the fundus images from the external imaging device located remotely. There are two types of image displays; “Automatic” after photography and “Manual”.

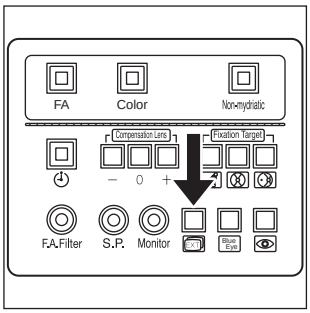
1) Automatic external image display
   ① Connect the video output of an external imaging device to the external video input port of this unit.
   ② Follow the steps described in “3 Basic photography” to photograph.
   ③ The photographed color fundus image is displayed automatically on the TV monitor of this unit.
   ④ In order to display the images of non-mydriatic photography, select the alignment screen using the monitor select switch on the right-hand panel after an image is displayed on the monitor. (This switching is not required for the images of mydriatic photography.)

2) Manual external image display
   ① Connect the video output of an external imaging device to the external video input port of this unit.
   ② Press the monitor select switch on the right-hand panel to switch the monitor display.
   ③ The image from the external imaging device connected to this unit is displayed.

Video input



Monitor select switch



	Automatic display	Manual display
Mydriatic mode	Displays a color image (The next color image is automatically displayed.)	ON: Displays a color image OFF: Displays no image
Non-mydriatic mode	Displays a color image (The monochrome alignment screen is automatically switched to the color image.)	Monochrome alignment screen (Press the monitor select switch to view a photographed color image.)

* Factory default settings

☞ POINTS

■ The default setting is switched between Automatic and Manual. For details see “5-3 Changing default setting”. Monitor select switch may be disabled. By disabling the switch, you can prevent a malfunction when no external imaging device is used. Refer to “5-3 Changing initial settings” for details.

Note

■ When you use the external image display mode, make sure to use an external imaging device with a video output and connect it to the video input of this unit. Please note that no image is shown on the fundus camera monitor when the external image display mode is selected.

5-3 Changing initial settings

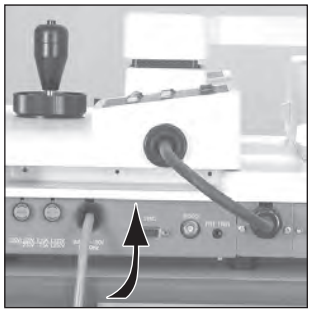
This paragraph describes initialization of this main camera unit. This equipment will be more conveniently utilized by changing initial settings.
Initial settings can be changed by changing over the switches from one position to the other.

List of switches at the back of panel

SW	Description	OFF	ON
SW 1	Start-up mode when power is turned ON	Non-mydriatic	Mydriatic
SW 2	External video input	Don't use	Don't use
SW 3	Counting sound when the timer operates	Sounding	No sounding
SW 4	Monitor select switch	Enabled	Disabled
SW 5	Don't use	Don't use	Don't use
SW 6	Don't use	Don't use	Don't use
SW 7	Don't use	Don't use	Don't use
SW 8	Don't use	Don't use	Don't use
SW 9	Don't use	Don't use	Don't use
SW 0	Don't use	Don't use	Don't use

* Factory default settings

Position of switch



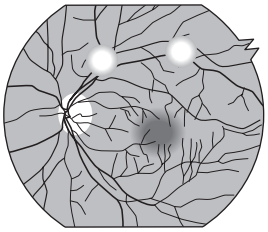
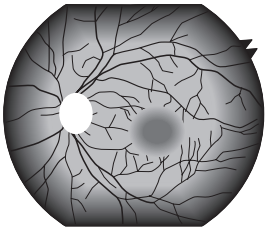
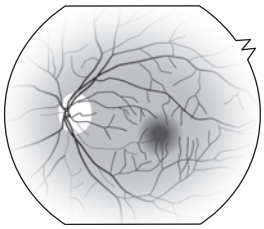
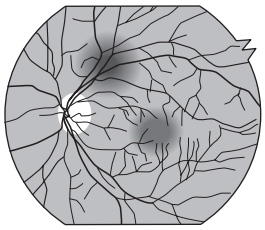
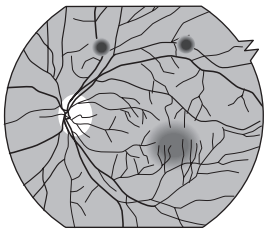
(in the rear of panel)

6 Troubleshooting

This paragraph describes remedies for any irregularity occurring on this equipment. If any irregularity should occur on this equipment, check the following before contacting your Kowa dealer where you purchased it.

Irregularity	Check item	Remedy
Observation lamp does not come ON.	Non-mydriatic mode wrongly selected.	Switch to “Color” mode.
	TV monitoring mode wrongly selected.	Switch to “Color” mode.
	Observation light improperly fixed.	Fix the observation lamp properly. See “7-3 Replacing observation light bulb.”
	Observation light bulb has burnt out.	Replace with new observation lamp. See “7-3 Replacing observation light bulb.”
	Fuse blown.	Replace with new fuse. See “7-5 Replacing with new fuse.”
Shutter is not released with 35mm camera mounted.	Camera back improperly mounted. Camera change-over indicator on the left-hand panel: H-mark ON. Film improperly set.	Mount camera back properly. If not, H-mark will not come ON.
	Camera change-over indicator on the left-hand panel: H-mark FLASHING.	Set film properly. If film is not loaded, ▼-mark will FLASH.
	“Video camera adapter” for photography optical path wrongly selected by camera change-over switch: G-mark ON.	Select “35-mm” (▼-mark) for photography optical path. Make sure ▼-mark is ON.
	Perhaps the buzzer is sounding to warn you of some wrong operation.	Remove filter from slot.
Shutter is not released with the video camera connecting adapter.	Perhaps the buzzer is sounding to warn you of some wrong operation.	The picture angles of the main camera unit and the video camera connecting adapter do not agree with each other. Make sure the picture angle knob on the main camera unit and the video camera connecting adapter are pointing at a proper guide mark.
	This may occur immediately after manipulating the picture angle select knob.	Immediately after manipulating the picture angle knob, it may not be detected whether or not the picture angles of the main camera unit and the video camera connecting adaptor are in agreement.
A picture image produced via the video camera connecting adapter has some shading on its periphery, or is out of focus in some areas.	This may occur immediately after manipulating the picture angle select knob.	Immediately after manipulating the picture angle knob, it may not be detected whether or not the picture angles of the main camera unit and the video camera connecting adaptor are in agreement.
Camera flash lamp is not exposed.	Flash lamp improperly fixed.	Fix flash lamp properly. See “7-4 Replacing with new flash lamp.”
	Flash lamp blurring in white.	Replace with new flash lamp. Flash lamp degrading. See “7-4 Replacing with new flash lamp.”
	Fuse brown.	Replace with new fuse.

Irregularity	Check item	Remedy
LCD monitor does not operate.	Mydriatic color or mydriatic fluorescein mode selected.	See “7-5 Replacing with new fuse.” Switch to non-mydriatic mode.
	Is External video input selected by Monitor select switch?	Turn off External video input.
	The picture angle knob wrongly positioned and fixed.	Align the picture angle knob with a position of 50°.
	Observation lamp OFF.	Make sure the observation lamp is ON.
Nothing seen when looking into viewfinder.	Non-mydriatic mode selected.	Switch to mydriatic or fluorescein mode.
	LCD monitoring mode selected.	Cancel the LCD monitoring mode.
	Picture angle knob wrongly positioned and fixed.	Align the picture angle knob with a position of 50°.
Luminous lines for focusing detection/luminous spots for aligning the position detection does not appear.	Fundus camera wrongly set.	Properly adjust the fundus camera’s alignment.
	OFF selected on ON/OFF switch.	Turn the switch ON.
	Is Anterior chamber select switch on?	Turn off Anterior chamber select switch. When Anterior chamber select switch is on, detecting luminous dots turns off.
	Diopter lens inserted.	Switch “Anterior chamber select” switch to OFF. When inserting dioptic lens, the luminous line for focusing detection will come OFF.
External fixation light does not come ON.	Fixation lamp for photographing posterior pole or optic disk selected.	Select the external fixation lamp.
	Improperly fixed.	Fasten by hand the external fixation lamp at its bottom.
	Pin jack pulled off from the chin-rest’s bottom.	Fully insert the pin jack.
Timer’s counting does not sound.	OFF selected in initial setting of “timer’s counting sound in operation.”	Set it to ON. See “5-3 Changing initial settings.”
Buzzing does not stop.	Optional green filter inserted in fluorescein mode.	In case of fluorescein photography, remove the green filter. In case of red-free photography, select the mydriatic color mode.
Err 1 appearing on panel’s indicator.	Power switch was repeatedly turned ON/OFF.	After turning OFF the power, wait for ten seconds before turning it ON again. If “Err 1” should still appear, stop the equipment before contact your Kowa dealer where you purchased it.
Err 2 indicated on panel's indicator	Power switch was repeatedly turned ON/OFF.	After turning OFF the power, wait for ten seconds before turning it ON again. If Err 2 should still appear, stop the equipment and contact your Kowa dealer where you purchased it.

Irregularity	Check item	Remedy
White dots appearing on picture 	Objective lens fouled with dust.	Clean the objective lens. See “7-2 Inspecting/cleaning the objective lens.”
	Objective lens fouled with, for instance, tears rolling down from the examined eye.	Clean the objective lens. See “7-2 Inspecting/cleaning the objective lens.”
	Examined eye partly covered with its eyelashes.	Keep the examine eye’s eyelashes from optically interfering with its pupil.
Shadow around peripheral of picture 	Camera too far from the examined eye.	Properly adjust the fundus camera’s alignment.
Whitening around peripheral of picture 	Camera too close to the examined eye.	Properly adjust the fundus camera’s alignment.
Locally darkening on picture 	Examined eye insufficiently dilated.	In case of mydriatic mode, set to small pupil mode. In case of non-mydriatic mode, check the pupil for its diameter. If it should be less than a specified value, shadow will appear in the center of picture.
Dark spots appearing in identical locations of any picture 	Inside of camera fouled with dust.	Please contact your Kowa dealer where you purchased it, asking for repair.

7 Daily inspection

Since the fundus camera is a precision instrument, it is necessary to carry out daily inspection and maintenance. To keep your KOWA VX-10α in good and safe conditions, please read this paragraph carefully.

7-1 Daily inspection

1) After finishing photography, be sure to turn OFF the equipment and seal the objective lens with its protective lens cap, and then lock the base. Enclose the fundus camera with the dust cover to guard against dust as well.
2) Take care that the objective lens is free of dust, fingerprints and bodily fluid like tears. Right before starting photography for the day, make sure that the objective lens is free of dirt. If mydriatic mode is selected, you can sufficiently check for any dirt.
3) If the main camera unit, power unit, forehead-rest, a chin-rest and options should be dirty, clean them with soft cloth.
   If dirt is stubborn, apply neutral detergent to clean. Do not use chemicals and solvents such as thinner and benzene that may cause deterioration, deforming or paint peel-off.
   ① Wipe the outer surface with soft cloth, from which water (used to moisten the cloth) was firmly squeezed off.
   ② Lightly wipe the monitor screen cover with soft cloth such as gauze because it is open to scar.
   ③ Wipe off the obstinate dirt with soft cloth, from which water or lukewarm water used to dilute a small amount of neutral detergent was squeezed off.

4) If you intend not to use the camera for a long period of time, unplug from the power outlet for safety's sake.

1) Seal the objective lens with cap

Note

- If the fundus camera in a cool room should be suddenly moved to a warmer room, or if the room in which the camera is located should be suddenly heated, the objective lens and/or internal lens may be prohibitively fogged. Wait for a while until the lens is defogged, and after defogging, start photography. Otherwise, pictures taken may become out of focus.
- If it has been repeatedly fogged, the lens may get moldy. In this case, contact our company or Kowa dealer where you purchased it.

⚠ Caution

Prohibitory

Do not wipe the outer surface of the instrument with solvents such as benzene, alcohol, thinner, ether and the like. Otherwise, such substances may cause the surface to be discolored or deteriorated.

7-2 Inspecting/cleaning the objective lens

If objective lens should be fouled with fingerprints and the like, white spots will appear on identical locations of any picture taken. Clean the lens following the steps below:

1) Turn ON the power switch.
2) Darken the room so that dirt on the objective lens can be discerned. Then set to “mydriatic color mode” and maximize lamp intensity.
3) Blow off dirt and dust from the objective lens by the accessory blower.
4) If the dust blower is inefficient, wipe the surface with lens cleaning paper or gauze moistened with a mixture of pure alcohol and ether (in a 1 to 1 ratio). Be sure to wipe carefully and mildly without applying force. Rotate the wipe little by little in a circular motion from in the center of the lens toward the edge.
5) Dirt, which cannot be cleaned off with the mixture, will be removed by lightly wiping the lens with cotton swab moistened with a small amount of water.
   After this step, fully wipe the lens with the solution all over again.
   If dirt should still resist cleaning, contact your Kowa dealer where you purchased the instrument.

3) Blow off by the accessory blower

4) Wipe the surface of the lens

☞ POINTS

■ For cleaning all over again, discard the used lens cleaning paper (or gauze) and use the fresh one moistened with the mixture, for complete cleaning.

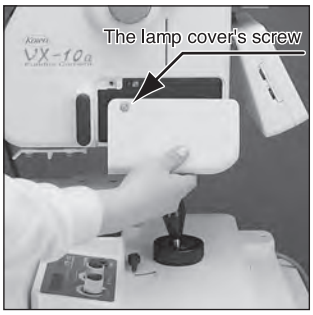
Note

- If it should be wiped with dust staying still on it or with force being applied on it, the lens may get scars on its surface.
- Never use chamois skin or silicone-treated cloth.
- Because the suggested cleaning solution is highly volatile and flammable, special attention must be paid to when handling and storing.

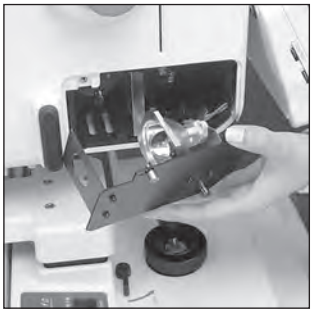
7-3 Replacing observation light bulb

1) Turn OFF the power switch before unplugging from the power outlet.
2) Loosen the lamp cover's screws by coin or flathead screwdriver for removal.
   Make sure the lamp has been sufficiently cooled off before proceeding to the subsequent steps.
3) For removal, loosen the inner black lamp cover's screws by coin or flathead screwdriver .
4) Remove the observation lamp from its socket as it is fitted while holding the lampshade by hand.
5) Press down a new observation lamp deeply into the socket to fit it securely, with its shade being held by hand, while you must be careful about the direction in which the shade's protrusions are facing. Make sure that the protrusion is securely fitted into the groove.
6) Tighten the inner black lamp cover's screws again to fit it.
7) Fit the lamp cover and tighten the lamp cover's fitting screws.

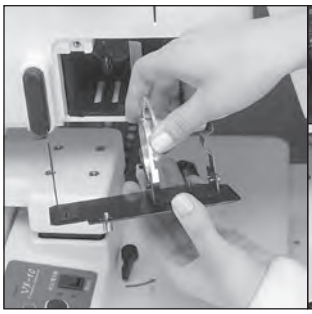
2) Remove the cover



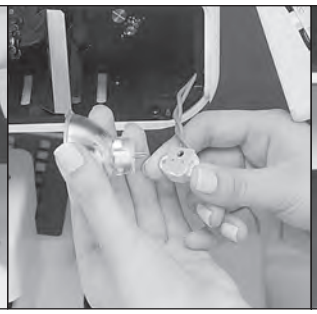
3) Remove the inner cover



4) Remove the lamp



5) Replace with new lamp



Direction in which the lamp is facing

Location of protrusion

Note

- Remove the observation lamp straight from the direction of the three pins located at its the base. Fit the new lamp in the socket without applying any twisting force.
- Press down the observation lamp deep into the socket to fit it securely.
- Fit the lamp cover while taking care that excessive stress will not be exerted upon the socket's cord.
- Securely fit the shade's protrusion into the groove to keep the lamp from giving uneven illumination during observation.
- Do not touch the lamp in the shade with your bare hands. Otherwise, lamp's useful life will be made shorter due to burning of finger's fat on hot lamp surface.

⚠ Warning

Unplug

Warning
High-voltage

When replacing with new observation lamp and flash lamp, be sure to turn OFF the power switch before unplugging from the power outlet. Otherwise, there is a fear of electrical shock.

⚠ Caution

Warning
High-temperature

When replacing the flash tube or observation light bulb, be sure to turn OFF the main power switch and unplug it from the power outlet, and wait for 30 minutes or more.

Do not touch the flash lamp tube with your bare hands. Otherwise, the lamp may have a lower quantity of light and a shorter useful life.

7-4 Disinfect

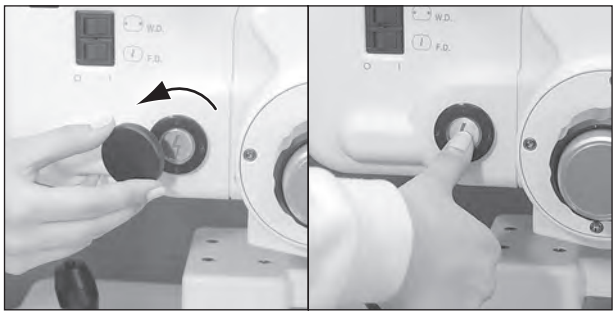
Wipe the forehead-rest and the grip(option) with rubbing alcohol as soon as a patient completes the examination. Also wipe the chin-rest with rubbing alcohol when no chin-rest paper is used.

7-5 Replacing with new flash lamp

1) Turn OFF the power switch before unplugging from the power outlet.
2) Remove the lamp cover by the same procedure as that for replacing the observation lamp to expose the flash lamp.
   See items 1) to 3) of "7-3 Replacing observation light bulb".
3) Remove the cap for electronic flash compartment, then push the marked base inward with force to release the flash tube.
4) With a fresh flash tube being held by its porcelain base, join three pins with their socket holes and firmly push it down to fix.
5) Fit the flash cover and cap for electronic flash compartment.

3) Remove the cap for electronic flash compartment

Push the base



4) Replace with new lamp

*Do not touch the glass-made part with your bare hand.

Note

- Remove the flash lamp straight from the direction of the three pins located at its base and then fit a new one in the socket.
- Do not apply any twisting force.
- Press down the flash lamp deep into the socket and fit it securely.
- When installing the lamp cover, do not exert stress on the cord of the flash lamp socket.
- Do not touch the flash lamp with your bare hands. Otherwise, lamp's useful life will be made shorter due to burning of finger's fat on hot lamp surface.

⚠ Warning

Unplug

When replacing with new observation lamp and flash lamp, be sure to turn OFF the power switch before unplugging from the power outlet. Otherwise, there is a fear of electrical shock.

Warning
High-voltage

⚠ Caution

Warning
High-temperature

When replacing the flash tube or observation light bulb, be sure to turn OFF the main power switch and unplug it from the power outlet, and wait for 30 minutes or more.

Do not touch the flash lamp tube with your bare hands. Otherwise, the lamp may have a lower quantity of light and a shorter useful life.

7-6 Replacing with new fuse

1) Turn OFF the power switch before unplugging from the power outlet.
2) Turn the power unit's fuse holder by flathead screwdriver counterclockwise to take out fuses in service.
3) Replace with new fuses and close the fuse holder. Check for their indicated capacity and type before fitting them in place.

2) Fuse holder

⚠ Warning


Unplug

When replacing with new fuses, turn OFF the power switch and unplug from the power outlet. Otherwise, there is a fear of electrical shock.
Use accessory or designated fuses. If other than designated ones should be used, there may occur failure or a fire on the equipment.

7-7 Fitting chin-rest paper

Set chin-rest paper at the chin-rest and fix it by pins.
For each patient, replace by a piece of fresh chin-rest paper being used for a previous patient.

Fit chin-rest paper.

7-8 Replenishing consumables

Please place your orders by the ordering numbers listed right.

⚠ Caution

The fuse differs according to the voltage which is used. Make sure to use a correct fuse when replacing one.

Consumables	Ordering number
Flash lamp	K9L9 FU3A
Observation lamp	K9L52 A26
Data card	K9L33#225
Fuse×2	0218005.MXP
Chin-rest paper	K9L-TB45#102
Chin-rest paper pin	K9L-TB45#101
Dust cover	FT5#520I

7-9 Periodical Inspection

It is recommendable to periodically inspect your instrument once every year. For information about what is to be inspected and costs, contact Kowa distributor where you purchased the KOWA VX-10α.

7-10 Repairing the Instrument

If there is a need to return your KOWA VX-10α to the manufacturer for repair or maintenance, please contact one of Kowa's distributors indicated on the back cover of INSTRUCTION MANUAL.

8 Specifications

• Picture angle	Mydriatic 50° / 30° Non-mydriatic 45° / 27°
• Working distance	39 mm (from examined eye to front of objective lens)
• Range of Compensation of examined eye	0 – 12D ~ + 13D – –10D ~ – 32D + +10D ~ + 35D
• Focusing	Agreement of split luminous lines (with ON/OFF function)
• Working distance adjustment	Luminous spot indication (with ON/OFF function)
• Range of dioptric correction of optical viewfinder	–8D ~ + 5D
• Observation light source	Halogen lamp
• Electronic flash source	Xenon flash lamp
• Base vertical working range	Forward/backward (coarse motion) 90mm (slightmotion) about 22mm leftward/rightward (coarsemotion) 140mm (slightmotion) about 22mm
• Base vertical working range	30mm
• Tilt working range	Angle of depression.....15° Angle of elevation.....8.5°
• Rotating arm working range	30° each of leftward and rightward motions
• Power supply	Input voltage AC 230 V(EU) (※ In case of changingthe input of voltage, please call a serviceperson.) Input (Powerconsumption) Normal 50/60Hz :280VA Maximum :1500VA
• Dimensions	400mm(W) × 520mm(D) × 620mm(H)
• Weight	35.5kg

Compliance standard

- EN 60601-1:1990 + A1:1993 + A2:1995 + A13:1996
- EN 60601-1-1:2001(IEC 60601-1-1:2000)
- EN 60601-1-2:2001 + A1:2006(IEC 60601-1-2:2001 + A1:2004)

Safety standard and classification

According to the type of protection against electric shock.
< CLASS I EQUIPMENT >
According to the degree of protection against electric shock.
< TYPE B APPLIED PART >
According to the degree of protection against ingress of water as detailed in the current edition of IEC 60529.
< IPX0 >
According to the degree of safety of application in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide.
< Equipment not suitable for use in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide. >
According to the mode of operation.
< CONTINUOUS OPERATION >

Complied EC Directive

Meidcal Device Directive 93/42/EEC : CE
WEEE Directive 2002/96/EC

9 Technical references

Summary of synchronous connector

Connector in service: D-SUB 9-pin type
Engagement: M3

Pin No.	Signal
1	TIMER START
2	GND
3	GND
4	TRIG–IN(STOROBE)
5	GND
6	TRIG–OUT(TRIG)
7	NC
8	NC
9	NC

Dedicated synchronous cables

K9L-SC48 (D-SUB⑨ ~ D-SUB⑨) 5m For connecting VK2
K9L-SC48D (K9L-SC48 + BNC Cord N = 2) 5m For connecting VK2D

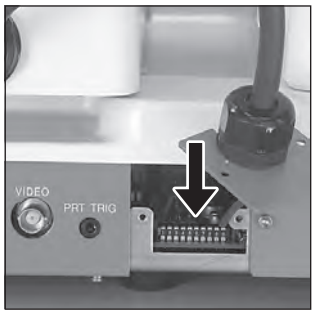
⚠ Caution

If you intend to use external synchronization connector, please contact Kowa distributer.

Summary of DIP-SW on power unit

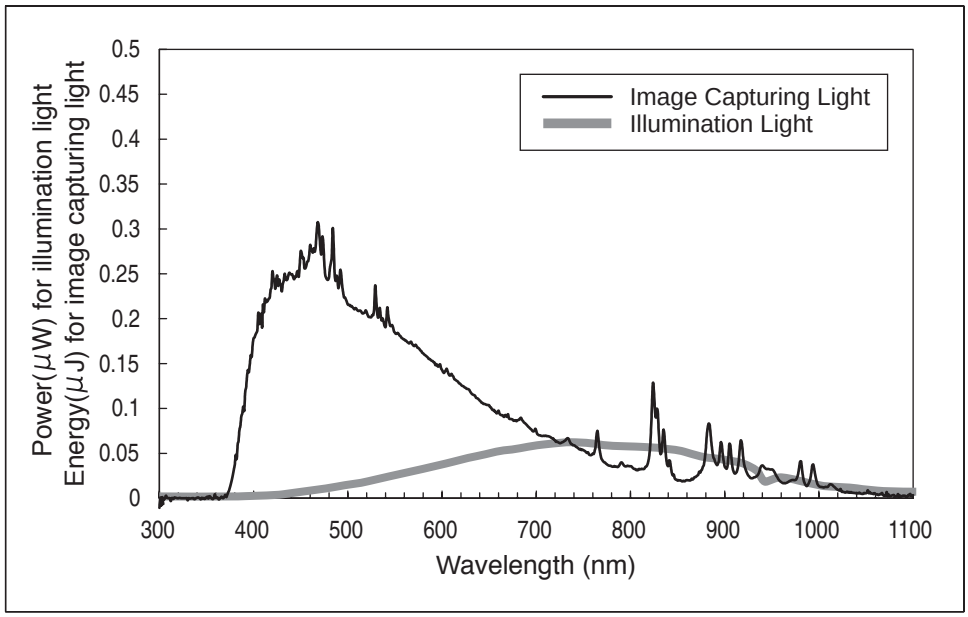
Pin No.	Operations
1	Flash compensation: upper optical path/color/+1
2	Flash compensation: upper optical path/color/–1
3	Flash compensation: upper optical path/FA/+1
4	Flash compensation: upper optical path/FA/–1
5	Don't use
6	Mydriatic fluorescein angiography select switch can operate ON: Barrier filter insertion OFF: Exciter filter insertion
7	Don't use
8	Don't use
9	Don't use
10	Don't use

DIP - SW



10 Photochemical Hazard ((ISO 15004))

The relative spectral output of the instrument



• The spectrally-weighted photochemical source radiance, both phakic L_B and aphakic L_A

<Illumination Light>	<Image Capturing Light>
L_B = 1.89 mW/(cm^2 • sr)	L_B =66.8 mJ/(cm^2 • sr)
L_A = 3.08 mW/(cm^2 • sr)	L_A =98.2 mJ/(cm^2 • sr)

(informative)

Spectrally weighted photochemical radiances L_B and L_A give a measure of the potential that exists of a beam of light to cause photochemical hazard to the retina. L_B gives the measure for eyes in which the crystalline lens is in place. L_A gives this measure either for eyes in which the crystalline lens has been removed (aphakes) and has not been replaced by a UV-blocking lens or for the eyes of very young children.

The value stated for this ophthalmic instrument gives a measure of hazard potential when the instrument is operated at maximum intensity and maximum aperture. Values of L_B or L_A over 80mW/(cm^2 • sr) are considered high for beams which wholly fill a dilated pupil.

The retinal exposure dose for a photochemical hazard is a product of the radiance and the exposure time. For instance, at a radiance level of 80mW/(cm^2 • sr), 3 min irradiation of the dilated (8mm diameter) pupil would cause the retinal exposure dose level to attain the recommended exposure limit. If the value of radiance were reduced to 40mW/(cm^2 • sr), twice that time (i.e.6min) would be needed to reach the recommended limit. The recommended exposure dose is based on calculations arising from the American Conference of Governmental Industrial Hygienists (ACGIH) - Threshold Limit Values for Chemical Substances and Physical Agents (1995-1996 edition).

While no acute optical radiation hazards have been identified for ophthalmic instruments, it is recommended that the intensity of light directed into the examined eye be limited to the minimum level which is necessary for diagnosis.Infants, aphakes and persons with diseased eyes will be at greater risk. The risk may also be increased if theperson being examined has had any exposure with the same instrument or any other ophthalmic instrument using avisible light source during the previous 24 h. This will apply particularly if the eye has been exposed to retinal photography.

Should you have any question (e.g., ratio of the variable intensity to the maximum intensity), contact us or your Kowa dealer.

11 Electromagnetic Compatibility (IEC60601-1-2)

KOWA VX-10α is a medical electrical instrument. The medical electrical instrument requires special care concerning electromagnetic compatibility (EMC). This section describes its suitability in terms of electromagnetic compatibility of this instrument. When installing or using this instrument, please read carefully and observe what is described here.

(This instrument was tested on electromagnetic compatibility (EMC) based on IEC60601-1-2.)

1. Carefully handle portable- or mobile-type radio frequency communication unit (RF communications equipment) since it may have an adverse effect on this instrument resulting in malfunctioning.
2. This instrument was tested on electromagnetic compatibility (EMC) with optional or accessory parts being assembled into it.
   Do not assemble into this instrument any optional or accessory parts other than those designated by Kowa. Otherwise, this instrument may be adversely affected by other instrument resulting in malfunctioning, or the latter itself may malfunction.

   - Power cable (a maximum length of 3 m)
   - Video Adapters made by Kowa
   - Dedicated synchronous cables (a maximum length of 5m),see P9-1
   - Cameras with CE marking

3. This instrument is not designed such that it can be used adjacent to other instrument or placing one on top of another. Therefore, do not apply such use. Nevertheless, if such use is inevitable, it is necessary to constantly monitor if the instrument is functioning normally after such use has been adopted.
4. We specified the functions listed in the table below as the essential performance of this instrument to determine electromagnetic compatibility(EMC) of this instrument.

Functions	Essential performance
Light-emitting functions	Flash lamp luminescence Flash lamp intensity switching Illumination light intensity switching
Instrument operation functions	F.D LED working W.D LED working Diopter compensation solenoid operation Ring slit motor operation Mask solenoid operation IR filter motor operation Barrier filter solenoid operation Exciter filter solenoid operation Mechanical shutter operation Return miller solenoid operation Fan motor operation
Photography functions	External synchronous terminal working
Display functions	IR CCD camera operation Screen display (through image)

[Compliance verification and guidance]

Guidance and manufacturer's declaration - electromagnetic emissions		
The KOWA VX-10α is intended for use in the electromagnetic environment specified below.		
The customer or the user of the KOWA VX-10α should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The KOWA VX-10α uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The KOWA VX-10α is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity			
The KOWA VX-10α is intended for use in the electromagnetic environment specified below. The customer or the user of the KOWA VX-10α should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment-guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6kV contact ±8kV air	±6kV contact ±8kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the KOWA VX-10α requires continued operation during power mains interruptions, it is recommended that the KOWA VX-10α be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field IEC61000-4-8	3 A/m	3A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE U_T is the a.c. mains voltage prior to application of the test level.			

11. Electromagnetic Compatibility (IEC60601-1-2)

Guidance and manufacturer's declaration - electromagnetic immunity

The KOWA VX-10α is intended for use in the electromagnetic environment specified below.
The customer or the user of the KOWA VX-10α should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment– guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the KOWA VX-10α, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 V	Recommended separation distance $d=1.2\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d=1.2\sqrt{P}$ 80 MHz to 800 MHz $d=2.3\sqrt{P}$ 800 MHz to 2.5 GHz, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site surveya, should be less than the compliance level in each frequency rangeb. Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE 1 At 80MHz and 800MHz, the higher frequency range applies.
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the KOWA VX-10α is used exceeds the applicable RF compliance level above, the KOWA VX-10α should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the KOWA VX-10α.

b Over the frequency range 150kHz to 80MHz, field strengths should be less than 3 V/m.

Recommended separation distances between portable and mobile RF communications equipment and the KOWA VX-10α			
The KOWA VX-10α is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the KOWA VX-10α can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the KOWA VX-10α as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz d=1.2 $\sqrt{P}$	80 MHz to 800 MHz d=1.2 $\sqrt{P}$	800 MHz to 2.5 GHz d=2.3 $\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.2	1.2	2.3
10	3.7	3.7	7.4
100	12	12	23
For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer. NOTE 1 80MHz and 800MHz, the separation distance for the higher frequency range applies. NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

11. Electromagnetic Compatibility (IEC60601-1-2)

For EU market.

Likvidace tohoto výrobku
Likvidace tohoto výrobku musí být podle zákona provedena ekologicky a výrobek je třeba individuálně soustřeďovat na sběrných místech. Při likvidaci tohoto výrobku postupujte podle pokynů na následující webové stránce.
Nemůžete-li tuto webovou stránku použít, obraťte se na prodejce.

URL: http://www.kowa-europe.com/

Bortskaffelse af dette produkt
Miljørigtig bortskaffelse er angivet ved lov for dette produkt, og det skal bortskaffes særskilt. Bortskaffelse af dette produkt skal foregå i overensstemmelse med proceduren på følgende webside.
Hvis du ikke kan finde det på websiden, skal du kontakte din forhandler.

URL: http://www.kowa-europe.com/

Procedure voor opruimen van dit product
Dit product dient volgens een wettelijke bepaling op een milieuvriendelijke manier te worden opgeruimd en dient afzonderlijk voor opruimen opgehaald te worden. Ruim dit product op overeenkomstig de procedure door de volgende website te raadplegen.
Als u de website niet kunt raadplegen, contact opnemen met uw dealer.

URL: http://www.kowa-europe.com/

Disposal procedure for this product
An environmentally-friendly disposal method is specified by law for this product and it must be collected individually for disposal. Please discard this product in accordance with the procedure referred to in the following website.
If you cannot access the website, please contact your dealer.

URL: http://www.kowa-europe.com/

Toote äraviskamise eeskirjad
Seadusega on ette nähtud keskkonna sõbralik meetod selle toote jaoks ja seda peab väljaviskamise jaoks eraldi korjama. Palun visake see toode ära vastavalt protseduurile mis on kirjeldatud alljärgnevas veebsaidis.
Kui Te ei saa kätte veebsaiti, palun võtke ühendust oma diileriga.

URL: http://www.kowa-europe.com/

Tuotteen hävittämistapa
Laki määrittelee, että tämä tuote on hävitettävä ympäristöystävällisellä tavalla ja että se on toimitettava erikseen hävitettäväksi. Hävittäkää tämä tuote seuraavassa sivustossa kuvatulla tavalla.
Jos ette voi käyttää sivustoa, ottakaa yhteys jälleenmyyjään.

URL: http://www.kowa-europe.com/

Procédures d'élimination de cet appareil
La loi prescrit comment vous débarasser de cet appareil dans le respect de l'environnement en recourant à la collecte sélective individuelle. Veuillez vous débarasser de cet appareil en procédant de la façon indiquée sur le site Web.
Si vous ne pouvez pas consulter le site Web, adressez-vous à votre revendeur.

URL: http://www.kowa-europe.com/

Entsorgung des Produkts
Das Gesetz schreibt die umweltverträgliche Entsorgung dieses Produkts vor. Es darf nicht in den normalen Haushaltsmüll gegeben werden. Bitte entsorgen Sie das Produkt entsprechend den Hinweisen auf dieser Website.
Falls Sie diese Website nicht besuchen können, wenden Sie sich bitte an Ihren zuständigen Fachhändler.

URL: http://www.kowa-europe.com/

Διαδικασία απόρριψης του παρόντος προϊόντος
Η φιλική προς το περιβάλλον μέθοδος απόρριψης καθορίζεται από το νόμο για το παρόν προϊόν το οποίο πρέπει να συλλέγεται μεμονωμένα για την απόρριψη. Απορρίψτε το παρόν προϊόν σύμφωνα με τη διαδικασία που αναφέρεται στον παρακάτω ιστοχώρο.
Εάν δεν μπορείτε να κάνετε αναφορά τον ιστοχώρο, επικοινωνήστε νε τον αντιπρόσωπο.

URL: http://www.kowa-europe.com/

Termék-elhelyezési munkafolyamat
Egy – a törvény által előírt - környezetbarát lerakási módszer létezik erre a termékre, melyet egyesével kell összegyűjteni. Kérjük az ezen a honlapon található folyamat alapján selejtezze ki ezt a terméket. Ha nem tudja elérni a honlapot, kérjük keresse fel a termékforgalmazót.

URL: http://www.kowa-europe.com/

Per lo smaltimento di questo prodotto
Un metodo di smaltimento corretto per la salvaguardia dell'ambiente è specificato per legge e il prodotto deve essere raccolto in modo differenziato. A fine uso, disfarsi del prodotto seguendo la procedura indicata nel sito web seguente. Senza accesso al sito web, rivolgersi al proprio rivenditore di fiducia.

URL: http://www.kowa-europe.com/

Šim izstrādājumam paredzētā iznīcināšanas procedūra
Videi draudzīgo šī produkta iznīcināšanas procedūru nosaka likumdošana, un tam nepieciešama atsevišķa, iznīcināšanai paredzēta, savākšana. Lūdzu, izmetiet šo produktu atbilstoši šajā interneta lapā norādītajai procedūrai.
Ja Jūs nevarat piekļūt šai interneta lapai, lūdzu, sazinieties ar savu dīleri.

URL: http://www.kowa-europe.com/

Šio gaminio išmetimo procedūra
Nežalingą aplinkai šio gaminio išmetimo būdą apibrėžia įstatymas ir išmetimui jį reikia išvežti atskirai. Šį gaminį išmeskite pagal šioje svetainėje nurodytą procedūrą.
Jeigu negalite pasinaudoti šia svetaine, prašome susisiekti su savo prekybos agentu.

URL: http://www.kowa-europe.com/

Proċedura ta' rimi għal dan il-prodott
Metodu ta' rimi li ma jagħmilx ħsara lill-ambjent huwa speċifikat bil-liġi għal dan il-prodott u dan għandu jinġabar individwalment biex jintrema'. Armi dan il-prodott skond il-proċedura riferita fil-websajt li ġejja.
Jekk ma tistax tfittex fil-websajt, jekk joghġbok ikkuntattja lin-negozjant li minn għandu xtrajtu.

URL: http://www.kowa-europe.com/

Procedura utylizacji produktu
Odpowiednią, przyjazną dla środowiska metodę utylizacji tego produktu określają przepisy prawne.
Produkt należy utylizować zgodnie z procedurą podaną w poniższym serwisie WWW.
Jeżeli skorzystanie z podanego serwisu WWW nie jest możliwe, prosimy o kontakt z lokalnym przedstawicielem.

URL: http://www.kowa-europe.com/

Procedimento de eliminação para este produto
O método de eliminação sem prejudicar o meio ambiente é especificado pela lei aplicável a este produto e este deve ser eliminado individualmente. Elimine este produto de acordo com o procedimento referido no seguinte website.
Caso não consulte o website, contacte o seu vendedor.

URL: http://www.kowa-europe.com/

Postup odstránenia tohto výrobku do odpadu
Zákonom je pre tento výrobok stanovený spôsob odstránenia do odpadu tak, aby nedošlo k poškodeniu životného prostredia a preto sa musí individuálne zbierať do odpadu. Odstráňte prosím tento výrobok do odpadu podľa postupu, ktorý je uvedený na nasledovnej webovej stránke.
Ak nemáte prístup k tejto webovej stránke, skontaktujte sa prosím s predajcom.

URL: http://www.kowa-europe.com/

Postopek odstranitve za ta izdelek
Okolju prijazen postopek odstranjevanja je določen z zakonom za ta izdelek in mora biti zbran individualno za odstranitev. Prosimo, odvrzite ta izdelek ustrezno s postopkom, ki je opisan na sledeči spletni strani.
V kolikor nimate dostopa do spletne strani, prosimo, da se obrnete na vašega trgovca.

URL: http://www.kowa-europe.com/

Procedimiento para desechar este producto
La ley prevé un método ecológico específico para desechar este producto, el cual debe recogerse en forma individual para su descarte. Respete este procedimiento, de acuerdo con el siguiente sitio Web.
Si no puede consultar el sitio Web, contacte con el distribuidor.

URL: http://www.kowa-europe.com/

Procedur för att kasta bort denna produkt
Miljövänliga källsorteringsmetoder ska enligt lag användas för denna produkt och delarna måste sorteras individuellt innan de kastas bort. Vänligen gör dig av med denna produkt i enlighet med proceduren som beskrivs på följande webbplats. Om du inte kan nå webbplatsen, ska du kontakta din återförsäljare.

URL: http://www.kowa-europe.com/

MEMO

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