Surface Flaw Detection Scope™

SFD240305A

Instruction Manual

Thank you for purchasing our product.
Before using this equipment, please read through this instruction manual carefully to use this product correctly and safely.
After reading, keep this instruction manual handy so that you can refer to, whenever you need it.

Toshiba Teli Corporation

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Standard name might be trademark of each company.

DAA04890A

https://www.toshiba-teli.co.jp/en/

Contents

Safety Precautions

Before using this product, read these safety precautions carefully. Important information is shown in this Instruction Manual to protect users from bodily injuries and property damages, and to enable them to use the product safely and correctly.

Please be sure to thoroughly understand the meanings of the following signs and symbols before reading the main text that follow, and observe the instructions given herein.

[Definition of Safety Signs]

Safety Signs	Description
 WARNING	Indicates a potentially hazardous situation that may result in death or serious injury (*1) in the event of improper handling.
 CAUTION	Indicates a potentially hazardous situation that may result in light to moderate injuries (*2) or only in property damage (*3) in the event of improper handling.

Notes *1: “Serious injury” refers to cases of loss of eyesight, wounds, burns (high or low temperature), electric shock, broken bones, poisoning, etc., which leave after-effects, or which require hospitalization or a long period of outpatient treatment of cure.

*2: “Light to moderate injuries” refers to injuries, burns, electric shock etc. that do not require hospitalization or long-term treatment.

*3: “Property damage” refers to cases of extensive damage involving damage to buildings, equipment, farm animals, pet animals and other belongings.

[Explanation of Safety Symbols]

Safety Signs	Description
 PROHIBITED	This sign indicates **PROHIBITION** (Do not). The content of prohibition is shown by a picture or words beside the symbol.
 MANDATORY	This sign indicates **MANDATORY ACTION** (You are required to do). The content of action is shown by a picture or words beside the symbol.

1. GENERAL HANDING

⚠ WARNING

Unplug

- **Stop operation immediately when any abnormality or defect occurs.**

  If abnormal conditions are present, such as smoke, a burning smell, ingress of water or foreign matter, or if the equipment is dropped or malfunctions, fire or electric shock may result.
  Be always sure to disconnect the power cable from the wall socket at once and contact your dealer.

Do not get wet

- **Do not use the equipment in locations subject to water splashes.**

  Otherwise, fire or electric shock may result.

Never pull apart

- **Do not disassemble, repair, or modify the equipment.**

  Otherwise, fire or electric shock may result.
  For internal repair, inspection, or cleaning, contact your sales representative.

Avoid

- **Do not place anything on the equipment.**

  If metallic objects, liquid, or other foreign matter enters the equipment, fire or electric shock may result.

Avoid

- **Do not install the equipment in an unstable or inclined location or locations subject to vibration or impact.**

  Otherwise, the equipment may topple over and cause personal injury.

Do not touch

- **During an electrical storm, do not touch the power cable and the connection cable.**

  Otherwise, an electric shock may result.

Instruction

- **Use the specified voltage.**

  Use of an unspecified voltage may result in fire or electric shock.

Avoid

- **Do not be handled roughly, damaged, fabricated, bent forcefully, pulled, twisted, bundled, placed under heavy objects or heated the power cable and the connection cable.**

  Otherwise, fire or electric shock may result.

⚠ 注 意

Instruction

- **When installing the product, do not wrap it in cloth or push it into a confined space where heat can easily accumulate.**

Otherwise, heat will accumulate inside the equipment, possibly resulting in a fire.

Avoid

- **Do not place the equipment in locations subject to high moisture, oil fumes, steam, or dust.**

Otherwise, fire or electric shock may result.

Avoid

- **Do not install the equipment in locations exposed to direct sunlight or humidity.**

Otherwise, the internal temperature of the equipment will rise, which may cause a fire.

Instruction

- **Use only specified the power cable and the connection cables.**

Otherwise, fire or electric shock may result.

Avoid

- **Do not give strong impact against the equipment.**

It may cause the trouble.

Instruction

- **When performing connection, turn off power.**

When connecting the power cable and the connection cable, turn off the equipment power.
Otherwise, fire or electric shock may result.

Avoid

- **Do not expose its camera head to any intensive light (such as direct sunlight).**

Otherwise, its inner image pickup device might get damaged.

Avoid

- **Avoid short-circuiting signal output.**

Otherwise, a malfunction may occur.

Instruction

- **Contact your sales representative to request periodic inspection and cleaning (every approx four years).**

Accumulation of dust inside the equipment may result in fire or electric shock.
For inspection and cleaning costs, contact your sales representative.

2. CASES FOR INDEMNITY (LIMITED WARRANTY)

We shall be exempted from taking responsibility and held harmless for damage or losses incurred by the user in the following cases.

1. This product acquires color information based on the surface properties of the subject or object to be inspected.
   Even defects of the same size may or may not be distinguished depending on the state of light scattering in the defect area. Also, if the surface is rough or has low reflection, color separation will be insufficient. Since these are caused by the defect identification principle of this product, the results of defect identification by the images acquired by this device are not covered by the warranty.
   In particular, before using the product in automatic inspection equipment, etc., please conduct sufficient tests.
2. In the case of indirect, additional, consequential damages (loss of business interests, suspension of business activities) are incurred as result of malfunction or non-function of the equipment, we shall be exempted from responsibility for such damages.
3. The camera, lens and LED light source incorporated in the product are subject to the warranty of the respective equipment.
4. In the case damage or losses are caused by malfunction or other problems resulting from unintended use of equipment or software etc. that are not specified.
5. In the case damage or losses are caused by natural disasters, such as an earthquake and thunder, fire, or other acts of God, acts by a third party, deliberate or accidental misuse by the user, or use under extreme operating conditions.
   - In the case damage or losses are caused by failure to observe the information contained in the instructions in this instruction manual and specifications.
   - In the case damage or losses are caused by use contrary to the instructions in this instruction manual and specifications.
   - In the case damage or losses are caused by repair or modification conducted by the customer or any unauthorized third party (such as an unauthorized service representative).
   - In the case damage or losses are caused by a cable installation error.
6. The item that is not described in specifications of this product is out of the guarantee.
7. Expenses we bear on this product shall be limited to the individual price of the product.

3. RESTRICTION FOR USE

1. Should the equipment be used in the following conditions or environments, consider safety measures, and inform us of such usage:

(1) Use of the equipment in the conditions or environment contrary to those specified or use outdoors.
(2) Use of the equipment in applications expected to cause potential hazard to people or property, which require special safety measures to be adopted.

2. This product can be used under diverse operating conditions. Determination of applicability of equipment or devices concerned shall be determined after analysis or testing as necessary by the designer of such equipment or devices, or personnel related to the specifications. Such designer or personnel shall assure the performance and safety of the equipment or devices.

3. This product is not designed or manufactured to be used for control of equipment directly concerned with human life (*1) or equipment relating to maintenance of public services/functions involving factors of safety (*2). Therefore, the product shall not be used for such applications.

(*1) Equipment directly concerned with human life refers to:
- Medical equipment such as life-support systems, equipment for operating theaters.
- Exhaust control equipment for exhaust gases such as toxic fumes or smoke.
- Equipment mandatory to be installed by various laws and regulations such as the Fire Act or Building Standard Law
- Equipment related to the above

(*2) Equipment relating to maintenance of public services/functions involving factors of safety refers to:
- Traffic control systems for air transportation, railways, roads, or marine transportation
- Equipment for nuclear power generation
- Equipment related to the above

4. USAGE PRECAUTIONS

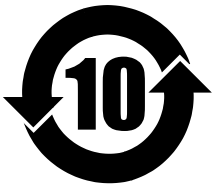
1. Handle with Care
   Do not drop the product or subject it to strong shocks or vibrations. Doing so may cause malfunction.
   Also, do not handle the connection cable roughly. There is a possibility of cable breakage.
2. Ambient Temperature and Humidity
   Do not use in locations where ambient temperature and humidity exceed specifications.
   This will not only degrade the image quality but also adversely affect the internal components.
   Please take special care when using the camera in direct sunlight.
3. Installation of Equipment
   When installing this product on a stand, etc., please take sufficient care to ensure that it does not wobble or fall.
4. Strong Light
   Pointing the lens directly at the sun or intense light may cause thermal damage to the “Multi-wavelength Coaxial Aperture Filter (Color Filter)” in the optical system and the “Image Sensor” of the camera.
5. When Not in Use
   When not in use for an extended period, turn off the power supply for safety reasons.
6. Care
   Turn off the power and wipe with a dry cloth.
   If the surface is heavily soiled, soak a soft cloth with diluted neutral detergent and wipe it lightly, then wipe it with clean water.
   Do not use alcohol, benzene, thinner, etc. Paint or markings may peel off or change in quality.
   If dust, dirt, or scratches appear on the imaging surface of the camera, please consult your dealer.

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC Rules.
These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communication.
Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

● Disposal

When disposing of the product, it may be necessary to disassemble it into separate parts, in accordance with the laws and regulations of your country and/or municipality concerning environmental contamination.

"This symbol is applicable for EU member states only"

 中华人民共和国 环保使用期限	环保使用期限标识，是根据电子信息产品污染控制管理办法以及，电子信息产品污染控制标识要求(SJ/T11364-2014)，电子信息产品环保使用期限通则，制定的适用于中国境内销售的电子信息产品的标识。 电子信息产品只要按照安全及使用说明内容，正常使用情况下，从生产月期算起，在此期限内，产品中含有的有毒有害物质不致发生外泄或突变，不致对环境造成严重污染或对其人身，财产造成严重损害。 产品正常使用后，要废弃在环保使用年限内或者刚到年限的产品时，请根据国家标准采取适当的方法进行处置。 另外，此期限不同于质量/功能的保证期限。 The Mark and Information are applicable for People's Republic of China only.

＜产品中有毒有害物质或元素的名称及含量＞

部件名称	有毒有害物质或元素					
	铅（Pb）	汞（Hg）	镉（Cd）	六价铬（Cr(VI)）	多溴联苯（PBB）	多溴二苯醚(PBDE）
産品本体	×	○	○	○	○	○

本表格依据SJ/T 11364的规定编制

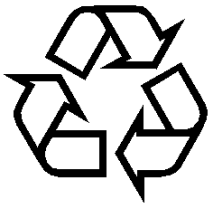
○：表示该有毒有害物质在该部件所有均质材料中的含量均在电子信息产品中有毒有害物质的限量要求标准规定的限量要求(GB/T26572)以下

×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出电子信息产品中有毒有害物质的限量要求标准规定的限量要求(GB/T26572)

This information is applicable for People's Republic of China only.

有关再利用的信息(包装物)
Information on recycling of wrapping composition

箱 / 箱子 / Box



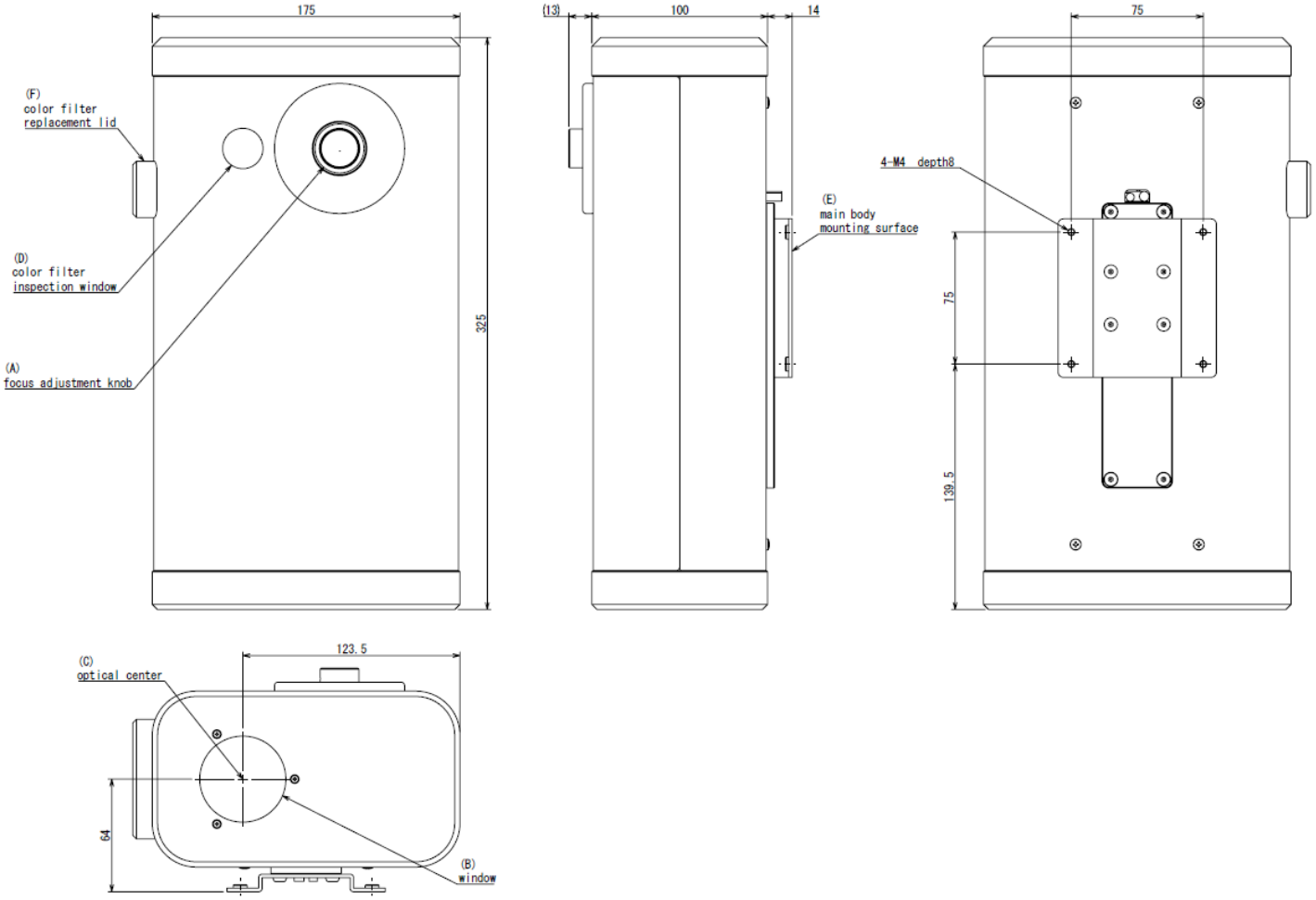
段ボール
瓦楞纸板
Corrugated cardboard

内部緩衝材料・袋
内部缓冲材料・袋
Internal buffer materials・Bag

PE-LD

Part Names and Functions

1. Part Names and Functions



(A) Focus Adjustment Knob

Adjustment knob for focusing

(B) Window

Illumination light is emitted through this window and reflected light from the subject is incident on the lens.

(C) Optical Center

The center position of the imaging field of view

(D) Color Filter Inspection Window

Looking-glass window for adjusting the directly reflected light from the subject to the center of the color filter

(E) Main Body Mounting Surface (Mounting Bracket)

Mounting bracket reference surface for attaching the main unit to a stand or device

It uses the same VESA 75 mounting standard as PC monitor mounting.

(F) Color Filter Replacement Lid

Lid of the color filter mounting area. When replacing the filter, open this lid.

Installation

1. Preparation of PC and Software

To use this equipment, an image display application such as “SFDViewer”, a dedicated viewer for the “Surface Flaw Detection Scope™”, and a register controller for camera control are required.

The software development kit “TeliCamSDK” for controlling our “USB I/F Digital Camera Series” from a PC can be downloaded from our website. User registration is required to use the download service.

Toshiba Teli Corporation Web site

https://www.toshiba-teli.co.jp/en/

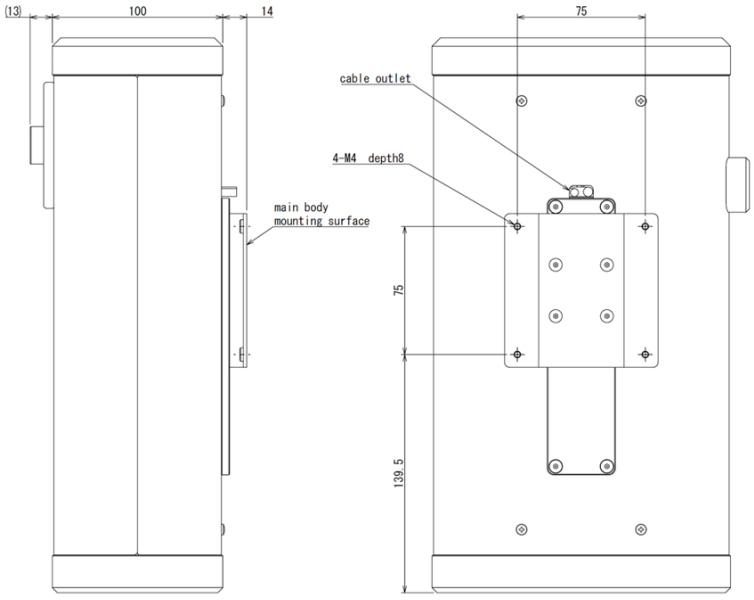
For information on the operating environment, installation and setup of the “TeliCamSDK”, please refer to the “Startup Guide” provided with the “TeliCamSDK.”

2. Installation of Equipment

1 Installation on Stand and Mounting Bracket

When installing the main unit of the “Surface Flaw Detection Scope” on the recommended optional stand or on a stand or mounting bracket provided by the customer, use the mounting screws on the mounting bracket. The mounting screws use the same “VESA 75 mount (FDMI MIS-D 75 mm, 75 x 75 mm, M4) standard” as used for PC monitor mounting.

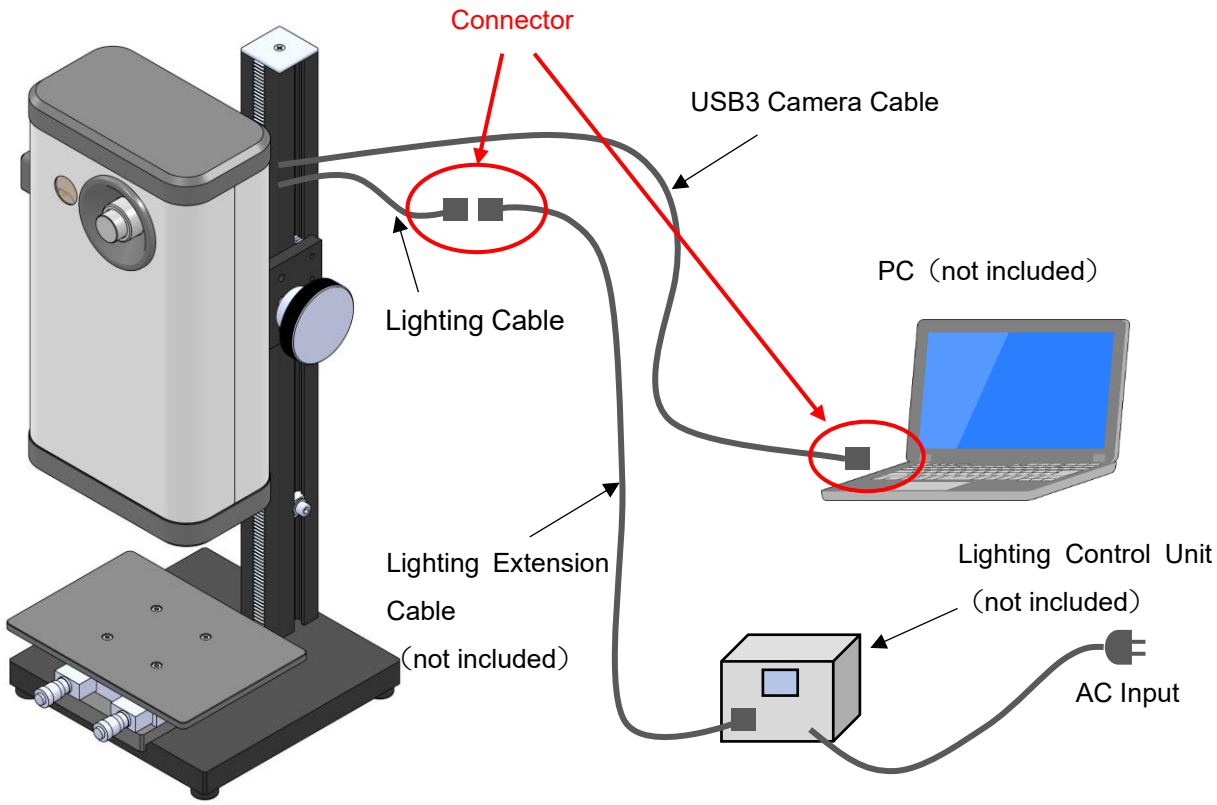
Since this product acquires color information based on the state of light scattering from the subject or specimen, it is important that the lens be squarely aligned (orthogonal to the optical axis of the lens and the surface of the specimen). For this reason, a mechanism to fine-tune the angle of the object to be inspected by means of a tilting stage, etc. should be provided.



2 Wiring

Connect the “Main Unit”, “PC”, and “Lighting Power Supply.”

Connect the “USB3 Cable” and the “Lighting Cable”, which are directly connected to the main unit, to the PC and the lighting power supply, respectively, using connectors. If necessary, use the recommended optional “Lighting Extension Cable” between the main unit and the lighting power supply.



Basic Operations

1. Display of Images Captured by Camera

Start the “Image Viewer”. Refer to the instruction manual of the viewer to be used.

Basically, the camera can be used simply by adjusting the exposure conditions (exposure time and gain), for other parameter settings such as color balance, refer to the camera and viewer manuals.

When adjusting the white balance of the camera, remove the color filter according to the procedure described in “Maintenance 2. Replacing the Color Filter” and use a white copy paper or gray card on the subject to adjust the white balance.

2. Turn on the Light

Turn “Lighting Power” to “ON” to turn on the light and adjust the light intensity. Refer to the lighting power supply's instruction manual for information on how to operate the lighting power supply.

When the light is turned on, illumination is emitted from the “Shooting Window,” illuminating the stage (mounting base) in a circular pattern.

This equipment uses high-luminance white LEDs, which deteriorate over time as they are used, and we recommend checking the light intensity periodically. For details on how to check the light intensity, refer to the section “Maintenance 3. Check the Lighting Intensity”. Since low luminance gives a longer life, we recommend using a camera with a longer exposure time and lower illumination intensity whenever possible.

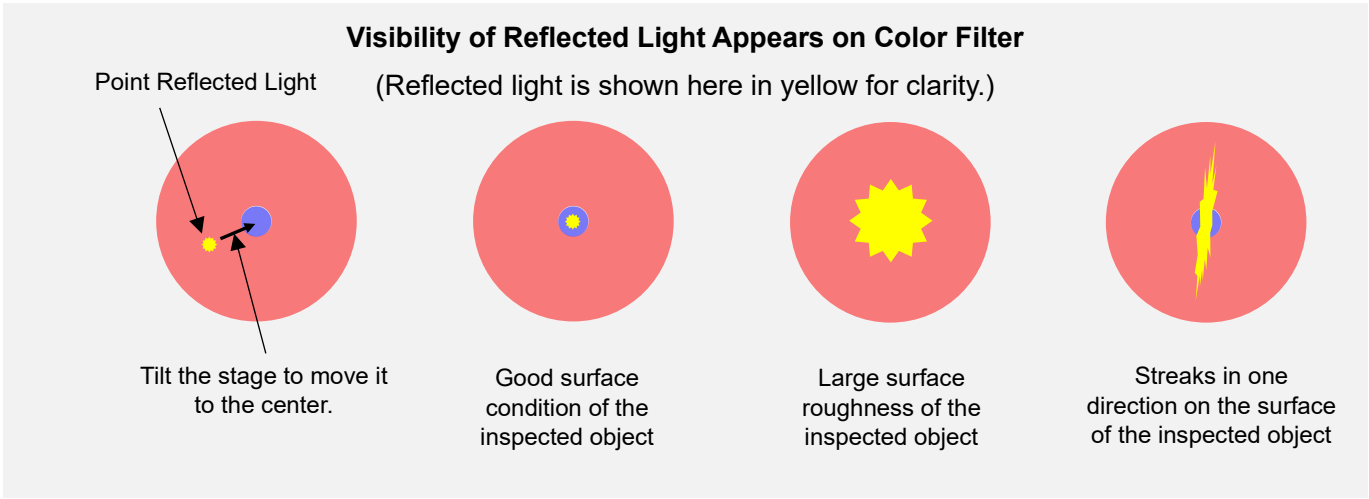
3. Imaging

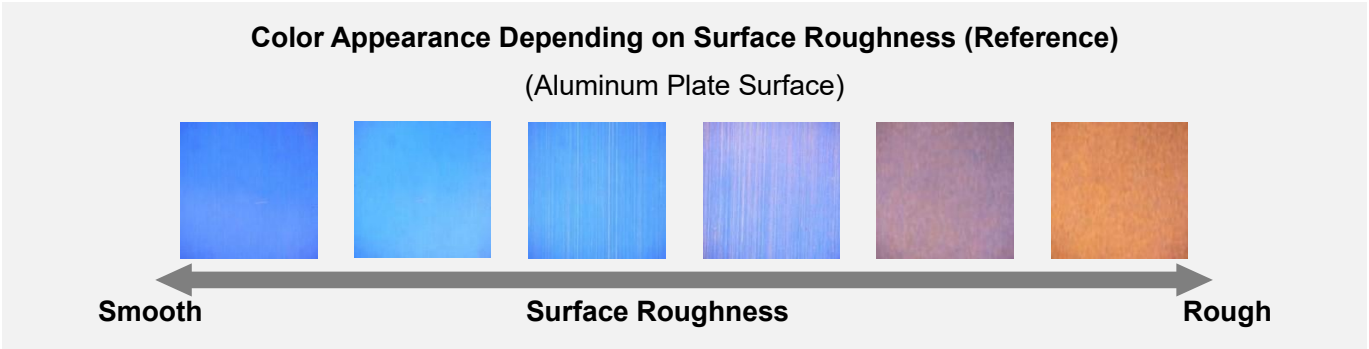
1 Operation Check and Rough Adjustment

This section describes the use of the recommended optional “Stand with Tilting Stage.” When using a stand or mounting bracket provided by the customer, follow the same procedure.

To separate the directly reflected light from the scattered light from the specimen, the inspection surface and the lens be squarely aligned (orthogonal to the optical axis of the lens and the surface of the specimen).

Adjustment is made while checking the position of the point reflected light at the color filter section through the “Color Filter Check Port”. Place the flat mirror on the “Tilting Stage” and adjust the tilting angle of the stage so that the reflected light is on the center of the “Color Filter.” The point-like reflected light spreads into a circle or a band when there is a lot of scattering on the surface of the inspected object. In such cases, the color separation between defect-free and defect areas is reduced in the captured image.





2 Placement of the Item to be Tested

(1) Place the “Workpiece” to be inspected on the “Tilting Stage.”

(2) Next, adjust the tilt of the stage so that the reflected light is in the center of the “Color Filter” as in the coarse adjustment shown in section 1.

(3) Adjust the magnification according to the field of view to be inspected and the size of the defect.
To adjust the magnification, adjust the height of the "Stand" to change the distance (WD) between the main unit and the object to be inspected.

(4) Turn the “Focus Adjustment Knob” to adjust the focus. The knob with a larger outer diameter is for coarse adjustment and the knob with a smaller outer diameter is for fine adjustment.

3 Inspection

When the image is in focus, the image is colored blue for defect-free areas on ideal surface properties such as flat mirrors, and red for defect areas such as scratches and foreign objects.

The appearance of defects differs depending on the surface properties of the inspected object, such as surface roughness.

[Defect visibility]

- No Defects ⇒ Blue
- Defected ⇒ Red
- Large Surface Roughness ⇒ Color separation not possible
- Deeply Dcarred ⇒ Appears dark
- Reflected Light Not Returned ⇒ Appears dark

The following phenomena may occur due to the characteristics of the camera.

[Phenomena]

- Moiré
  When fine stripe patterns are imaged, stripe patterns (moiré) that are not actually there may appear as interference fringes, but this is not a malfunction.
- Image Noise
  When wiring camera cables, if they are located near strong magnetic or radio wave emitting objects, screen noise may be generated. In this case, change the location or wiring.

4 Image Recording

Images can be recorded using the Viewer function.

Refer to the viewer's instruction manual for the image format and other settings.

5 On the Estimation of Defect Size

The “Surface Flaw Detection Scope™” was developed to easily visualize and identify the presence or absence of defects and is not suitable for measurement applications that directly indicate the size of defects. However, it is possible to estimate the defect size by photographing a “Chart” of known dimensions, such as a “Calibration Chart,” and comparing it with the number of pixels in the image.

The total horizontal field of view of this system is 5328 pixels.

[Defect size estimation method]

$$\text{Defect Size Estimate} = \text{Defective Area Pixels} \times \frac{\text{Actual chart dimensions}}{\text{Number of chart image pixels}}$$

Specifications

1. Overview

The “Surface Flaw Detection Scope™” is an appearance inspection equipment that uses the “OneShotBRDF®” technology to clearly detect defects on an inspection object in color by using a special optical system with the “Multi-wavelength Coaxial Aperture Filter (Color Filter).”

2. Features

1. Visualization of Difficult-to-observe Microscopic Scratches on Glossy and Flat Surfaces
   The “Surface Flaw Detection Scope” can detect micro flaws and other defects on glossy planes such as mirror surfaces, which have been difficult to detect.
2. High-speed Inspection with Scattered Light Discrimination by Multi-wavelength Coaxial Aperture
   This equipment optically resolves the scattered light generated in the defect area as color information, so that a clear image can be produced instantly without the use of image processing on a PC.
3. Color Identification of Scratches that are Difficult to Identify by Image
   By acquiring scattered light as color information, even minute defects can be identified. Also, Surface properties such as roughness can be identified by color.
4. High Resolution USB3 Camera Installed
   The camera uses the USB3.0 interface, a standard specification for machine vision, and can be easily connected to a PC for image display and processing.
5. Viewer for “Surface Flaw Detection Scope”
   By using the dedicated viewer “SFDViewer” for this equipment, camera parameters necessary for inspection can be easily set, and images can be displayed and recorded.

3. Configuration

1 Camera Part (Built into the Body Case)

(1) Color Camera ····· 1
(2) Focus Adjustment Mechanism ····· 1
(3) Color Filter ····· 1
(4) Camera Lens ····· 1

2 Lighting Part (Built into the Body Case)

(1) Coaxial Drop Optics ····· 1
(2) Light Source ····· 1

3 Accessories

(1) Color Filter (Low Sensitivity Filter) ····· 1
(2) Instruction Manual ····· 1

4. Recommended Optional Accessories

1 Lighting Equipment

(1) Lighting Control Unit
Used to control the LED lighting built into the main unit.
(2) Lighting Extension Cable
Used to extend the cable between the main unit and the lighting control unit.

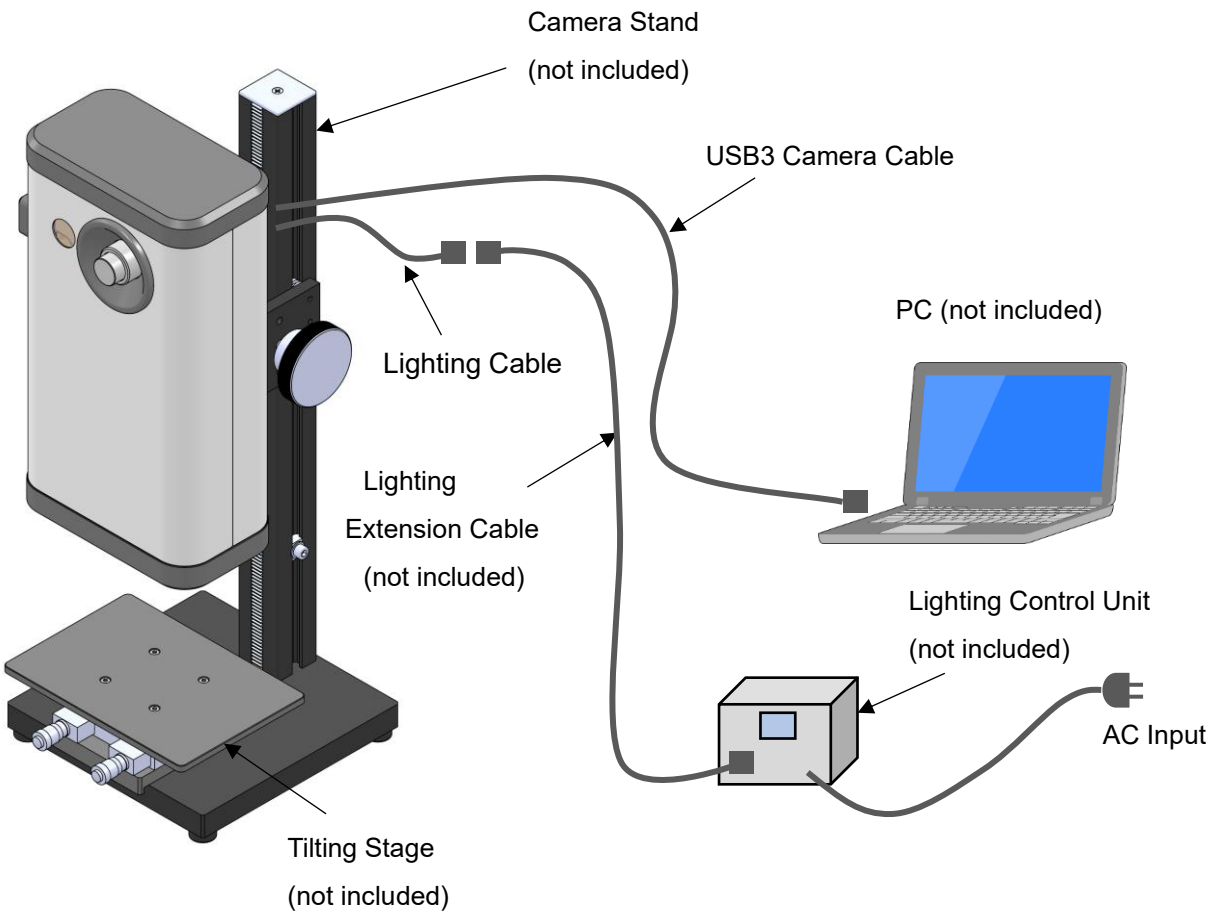
2 Installation Equipment

(1) Camera Stand (with Tilting Stage)
This is used when the main unit is used on a tabletop.
The tilt stage makes it easy to set the tilt angle during use.

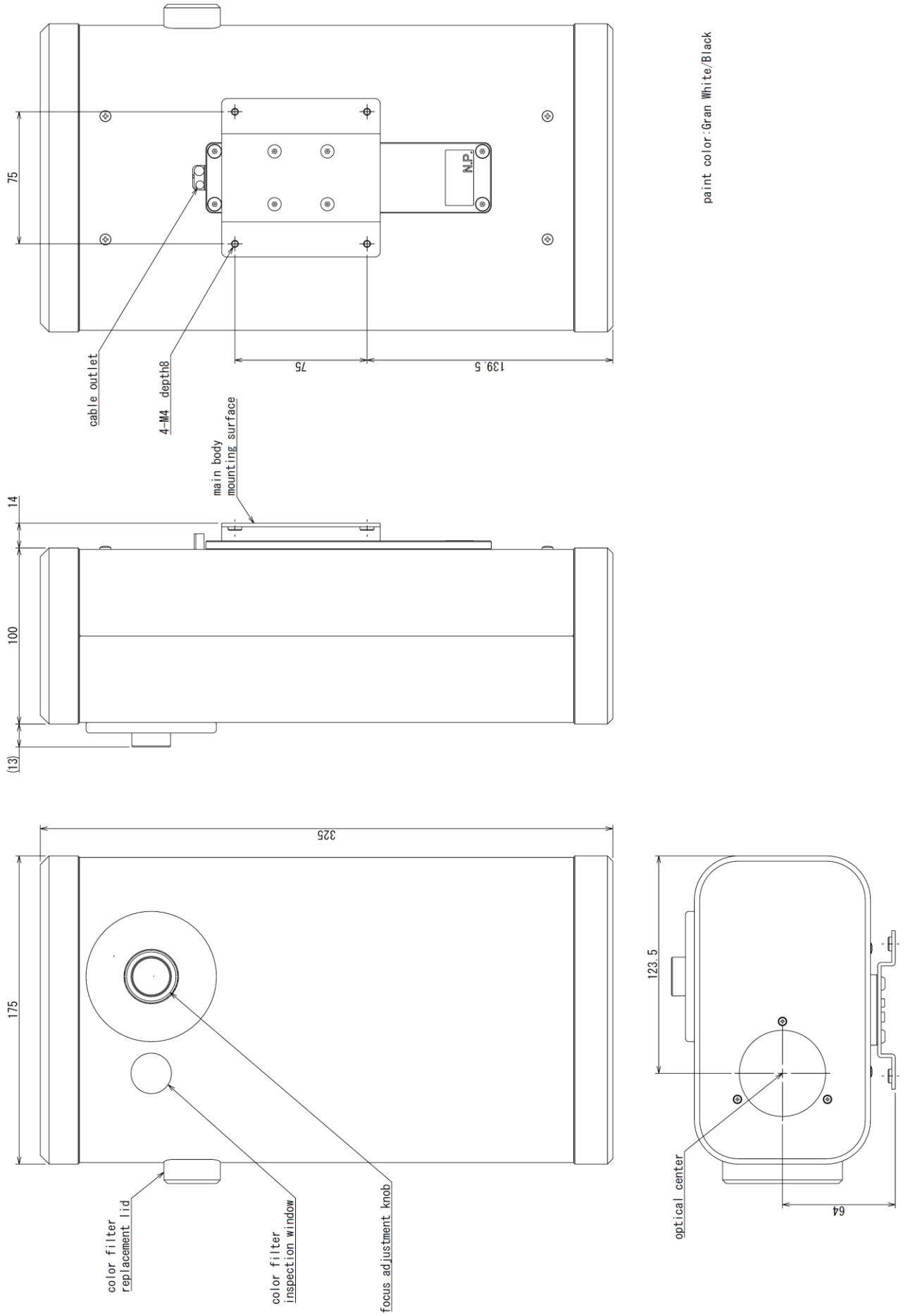
3 Adjustment Parts

(1) Flat Mirror
It is used for setting the tilt angle during use, maintenance management such as checking the illumination intensity, and inspection of transparent objects.
(2) Calibration Chart
It is used to estimate the defect size by comparing a rectangular chart of known dimensions with the number of pixels in the captured image.

5. Example of Connection



6. Outline Drawing



7. Equipment Specifications

For detailed specifications and handling of the “Camera,” “Camera Lens,” and “Light Source,” please refer to the specifications and instruction manuals of each device.

1 Camera Part

(1) Color Camera

(i)	Model:	BU2409MCF
(ii)	Interface:	USB3.0 (only Super Speed supported)
(iii)	Video Format:	Color (Bayer 8 bit)
(iv)	Electronic Shutter Method:	Global Shutter
(v)	Frame Rate:	15 fps
(vi)	Image Size:	1.2 Type (diagonal 19.27 mm)
(vii)	Pixel Size:	2.74 µm × 2.74 µm
(viii)	Resolution:	5328×4608 (24 MP)
(ix)	Scanning Area:	14.60 mm (H) × 12.63 mm (V)
(x)	Power Supply:	DC+5 V±5% (powered from USB Connector)
(xi)	Power Consumption:	3.3 W max.
(xii)	Camera Cable:	USB3 Cable (3 m, including wiring inside the Enclosure, straight out)

(2) Focus Adjustment Mechanism

(i)	Adjustable Mechanism:	Rack and Pinion Type Stages (Coarse/Fine)
(ii)	Optical magnification:	0.33～0.5 X

(3) Color Filters

(i)	Filter Color Pattern:	Red and Blue Type
(ii)	Standard Filter:	#1.5 (factory-installed)
(iii)	Low Sensitivity Filter:	#3.0 (accessory, user-replaceable)

(4) Camera Lens

(i)	Model:	AF-S NIKKOR 105mm f/1.4E ED (Made by Nikon Corp.)
(ii)	Focal Length, F/#:	105 mm, F1.4 (fixed)
(iii)	Focusing:	manual adjustment by moving the camera

(5) Screw Specifications for Stand Fixing Part

(i)	Fixed Part Standards:	VESA 75 Mount (FDMI MIS-D 75mm) (75×75 mm, M4)

(6) Optical Magnification and Field of View in H-direction, Working Distance (reference values)

Optical Magnification (X)	0.33	0.4	0.5
FoV (mm) (in H-direction)	44.2	36.5	29.2
WD (mm) (from Enclosure Front End)	251	195	143

2 Lighting Part

(1) Coaxial Drop Optics

(i) Effective Lighting Diameter: approx. 45 mm Dia.

(2) Lighting Part

(i)	Model:	HLV3-22SW-4C (made by CCS Inc.)
(ii)	Maximum Input Current:	1.00 A
(iii)	Lighting Cable Length:	0.3 m (including wiring inside the Enclosure, straight out)
(iv)	Power Supply Connector:	SMR-03V-B
(v)	Power Consumption:	3.5 W max.
(vi)	Low luminous flux characteristics:	

Depends on usage conditions (lower luminance gives longer life)

Periodic light intensity checks recommended.

3 Structure

(i)	Dimensions:	refer to Outline Drawing
(ii)	Mass:	approx. 4.2 kg (Body only)

4 Recommended Optional Accessories

For more information on recommended optional accessories, please contact our sales representatives.

(1) Lighting Control Unit

(A) 2 Channels Type

(i)	Model:	PJ2-1505-2CA-PE (made by CCS Inc.)
(ii)	Lighting Method:	Continuous Lighting
(iii)	Drive Method:	Constant-current System
(iv)	Input Voltage:	AC100 - 240 V, 50/60 Hz
(v)	Power Consumption:	38 VA max.
(vi)	Number of Channels:	2 channels

(B) 4 Channels Type

(i)	Model:	PJ2-3005-4CA-PE (made by CCS Inc.)
(ii)	Lighting Method:	Continuous Lighting
(iii)	Drive Method:	Constant-current System
(iv)	Input Voltage:	AC100 - 240 V, 50/60 Hz
(v)	Power Consumption:	68 VA max.
(vi)	Number of Channels:	4 channels

(2) Lighting Extension Cable

(i)	Model:	FCB-3 (made by CCS Inc.)
(ii)	Cable Length:	3 m (other lengths on request)

(3) Camera Stand (with Tilting Stage)

(i) Stand Part Model: HC-500 (made by SFC)

(ii) Tilting Stage Model: TD-902 (made by Chuo Precision Industrial Co., Ltd.)
(Bracket for Tilting Stage included.)

(4) Flat Mirror

(i) Model: Aluminum-coated Mirror

(ii) Dimensions: t=3 mm, 50×75 mm

(5) Calibration Chart

(i) Model: ST1-50T (made by Shibuya Optical Co., Ltd.)

(ii) Dimensions: t=1 mm, 55×55 mm

5 Maintenance Parts

(1) Color Filter (with Holder)

(i) Standard Filter: Model: #1.5

(ii) Low Sensitivity Filters.: Model: #3.0

8. Environmental Conditions for Use

1 Environmental Conditions for Use

(i) Installation Conditions: indoor, fixed

(ii) Operating Temperature: 0 - 40 degrees Celsius

(iii) Operating Humidity: 10 - 90 % (Noncondensing)

(iv) Storage Temperature: -20 - +60 degrees Celsius

(v) Storage Humidity: 90 % or less (Noncondensing)

(vi) EMC Requirements: EMC Directive: 2014/30/EU Compliant

(vii) EMI (Electromagnetic Interference):
EN IEC 61000-6-4: 2019
FCC Part 15 Subpart B Class A

(viii) EMS (Electromagnetic Sensitivity):
EN IEC 61000-6-2: 2019

● Compliance Information

- The identification of the product, model number: SFD240305A.
- This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

- Company Name: Toshiba Teli Corporation
- Address: 4-7-1, Asahigaoka, Hino-shi, Tokyo 191-0065. Japan
- Telephone number: +81-42-589-8771
- URL: https://www.toshiba-teli.co.jp/en

● Changes or Modifications

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

● Class A Statement

Statement for Class A equipment:

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Notes on Conformity of the EMC:

The adaptability of the safety standard of this camera is assured in the condition of combination with the following parts:

- Lighting Extension Cable FCB-3 (CCS Inc.)
- Lighting Control Unit PJ2-1505-2CA-PE (CCS Inc.)

Please confirm the EMC adaptability when it combines with parts other than them.

Maintenance

1. Routine Care

1. When Not in Use

(1) Cover the equipment with a plastic bag to prevent dust and debris from entering.

2. Care of External Appearance

(1) Turn off the power and wipe with a dry cloth.

(2) If the surface is heavily soiled, soak a soft cloth with diluted neutral detergent and wipe it lightly, then wipe it with clean water.

(3) Do not use organic solvents such as ethanol or acetone. Doing so may cause the paint or markings to peel off or change color.

3. Dust, Dirt, and Debris on Imaging Sensor

(1) If black dots or other such spots appear fixedly on the captured image, the image sensor surface may be covered with dust, dirt, or scratches. In this case, please consult your dealer.

4. Dust, Dirt, and Debris on the Front Protective Glass of the Imaging Lens and Illumination

(1) Blow off dust and debris with a blower, etc.

(2) Wipe off fingerprints and other smudges on the glass part using cleaning paper or a cloth and a solvent for optical parts (ethyl alcohol or anhydrous alcohol is also acceptable). Do not wipe with a dry cloth as this will scratch the surface. Do not use solvents other than for the glass part.

5. Removal of Dust from the Color Filter Section

(1) Pull out the color filter unit as described in “Maintenance 2. Replacing the color filter,” and blow dust and debris from the filter insertion slot with a blower, etc.

(2) Blow off dust and debris on both sides of the color filter with a blower, etc.

(3) When handling color filters, do not touch the filter surface directly with bare hands. If fingerprints or other debris adhere to the color filter, wipe it lightly with a microfiber eyeglass wipe first to prevent deformation. If it still does not come off, wipe lightly with anhydrous alcohol. Do not use other solvents as the filter is made of resin. Do not use other solvents as they may alter the filter.

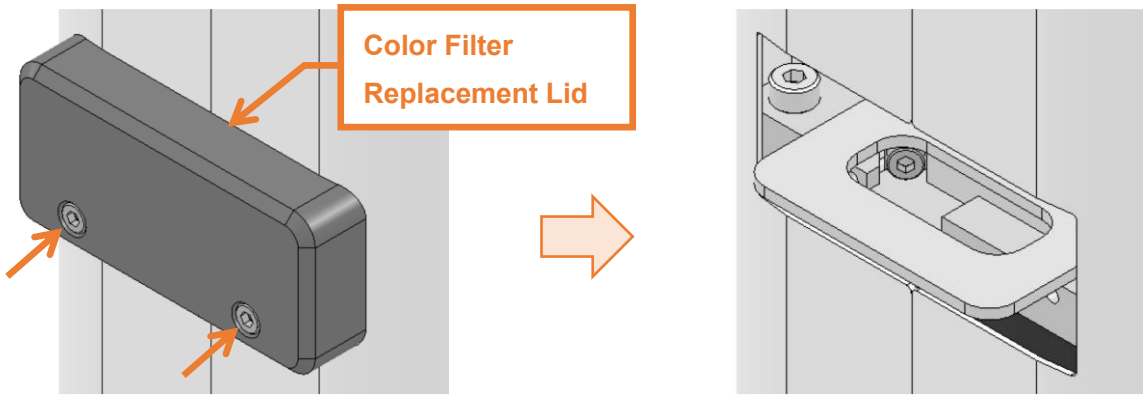
2. Replacement of Color Filter

By changing the diameter of the central blue circle of the “Color Filter,” the detection sensitivity of the scattered light can be changed.
“Standard Filter (#1.5)” is installed in this equipment at the time of shipment, however, if there are many scattered light components, such as when the surface roughness is large, the use of the supplied “Low Sensitivity Filter (#3)” may lower the detection sensitivity and make it easier to see.

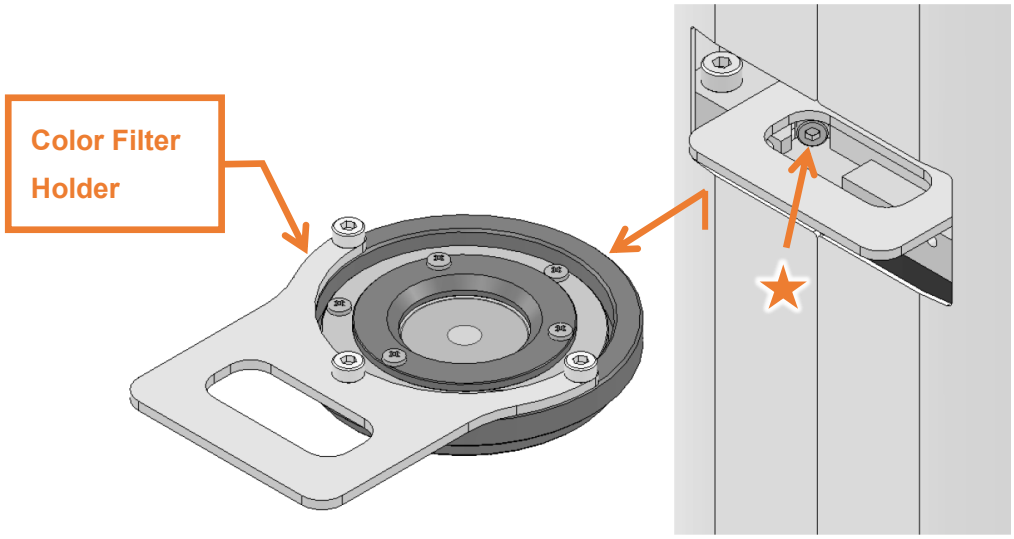
Note: Reference replacement time: approx. 11,000 hours = approx. 4 years (8 hours per day x 365 days)

The following procedure is used for replacement.

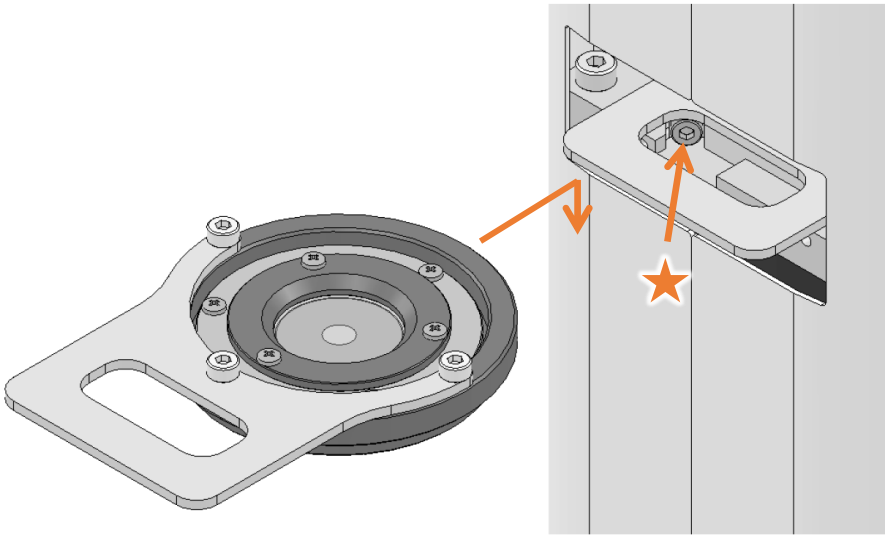
(1) Using a hexagonal wrench (2.5 mm on the opposite side), loosen the two hexagon socket head cap screws shown in the figure below and remove the "Color Filter Replacement Lid.”



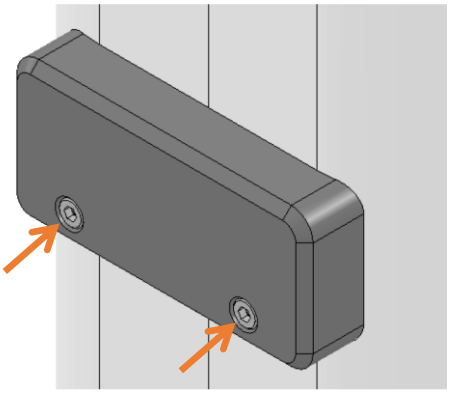
(2) Using a hexagonal wrench (2.5 mm), slightly loosen one of the hexagon socket head cap screws marked with [★], and then remove the “Color Filter Holder” by holding its handle and pulling it out while lifting it upward.
The “Color Filter Holder” can be removed by slightly loosening the bolt. Do NOT loosen the bolt more than necessary to remove it.



(3) Insert the “Color Filter Holder” to be replaced into the original position, check that the “Color Filter Holder” mates with the “Body” side, and then tighten the bolt marked with [★] (one bolt) to fix it in place.



(4) Install the “Color Filter Replacement Lid” and fasten the two bolts shown in the figure below.



3. Check the Lighting Intensity

Since the light intensity decreases as the LEDs deteriorate over time, periodic checks of the light intensity are recommended.

As a method of checking light intensity, we recommend that you prepare a reference “Flat Mirror” and check and record the “Image Luminance” when taken under the same exposure conditions.

WARRANTY RULES AND REPAIR

1. Warranty

1. Warranty Term

Warranty term is 12 months after your purchase.

We may assume the date of the purchase from our shipping date when the date is unidentified.

2. Limited Warranty

Free warranty is not applicable for the troubles, damages or losses caused by the cases of the followings, even if it is during the warranty term.

(1) Handling against the instructions and conditions described in the instruction manual.
(2) Remodeling, adjustment, and the part exchange. (Including the opening of the enclosure box and the alteration)
(3) Forgery product, products which does not have proper serial number, products of which serial number is forged, damaged or deleted.
(4) Damages caused during the transportation or deficiency of the handling such as drop or fall of the products after the products having been transferred to customers, leaving the products to corrosive environment such as sunlight, fire, sand, soil, heat, moisture, or an inappropriate storing method.
(5) A fire, an earthquake, a flood, a lightning, or other natural disasters, pollution and a short circuit, abnormal voltage, excessive physical pressure, theft, other accident
(6) When connected to the power supply which is not suitable.
(7) Failure to properly install the equipment to withstand external vibrations and shocks.
(8) When accessories included in the product configuration are not used.
(9) Failure or damage of the lighting source (LED) due to the use of a lighting power supply other than the recommended optional product.
(10) Image quality changes due to “aging” of color filter characteristics and LED illumination light intensity.
(11) Natural exhaust, wear or degradation of a component parts.
(12) Other cases falling under “1. Restrictions for Use” and “2. Disclaimer.”
(13) All defects that happened after the expiration for a warranty term.

2. Repair

1. Repair Regulations

1. Repair Methods

   In principle, maintenance, and services such as repair will be handled by returning the product to our factory for repair, but this will be discussed and arranged depending on the situation.

2. Repair coverage period

   (i) Free of charge repair:

   Depends on the warranty period indicated in the above warranty.

   (ii) Charged repair:

   After the free-of-charge repair period for cameras and purchased products has passed, and for other components, only repairable items will be accepted for a fee.

2. Repair Contact

For repair, please contact our sales department.

Industrial Property Right

1. Trademark Rights

1. “OneShotBRDF” is a trademark or registered trademark of Toshiba Information Systems (Japan) Corporation.
2. “Surface Flaw Detection Scope” is trademark of Toshiba Teli Corporation.
3. Company name, product name or logo might be trademark or registered trademark of each company or organization.

2. Patents and Licenses

1. Toshiba Corporation, Toshiba Digital Solutions Corporation, and Toshiba Information Systems (Japan) Corporation own patents and other intellectual property rights in Japan and abroad for the “OneShotBRDF” technology, which is legally protected.
2. Toshiba Corporation, Toshiba Digital Solutions Corporation, and Toshiba Information Systems (Japan) Corporation own patents and other intellectual property rights in Japan and abroad for the “OneShotBRDF” technology, which is legally protected.