OMRON

SETUP MANUAL

F210 Vision Sensor

1

This manual provides information on system hardware and installation. Be sure to read this manual first.

Cat. No. SCHB-738B

Operating Procedures and Reference Manuals

Connect

Wire

Setup Manual

(Supplied with the Controller)

The Setup Manual provides:
- Information for safety use of controller
- Procedures from package content check and installation up to connection of controller
- Information such as functions and specifications of controller and peripheral devices

Install software

Set conditions

Test/Measure

Output to external device

Vision Mate Series Software (CD-ROM)

Vision Composer Net*
Operation Manual

The Operation Manual provides:
- Method of operating the controller from Vision Controller Net
- Basic operating procedures
- Explanation of functions of Vision Composer Net

* Only for the models that support Ethernet connection (Models whose model name contains "ETN")

Application Software
Operation Manual

The Operation Manual provides:
- Installation method of application software
- Basic operating procedures
- Setting method of each processing item
- Communication method with external devices

Customize Manual

The Customize Manual provides the information necessary for customization and explains the macro function.

READ AND UNDERSTAND THIS DOCUMENT

Please read and understand this document before using the products. Please consult your OMRON representative if you have any questions or comments.

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

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OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the product.

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The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.

- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.
NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the product may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ERRORS AND OMISSIONS

The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

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INTRODUCTION

Thank you for your purchase of this F210-C10/C15 (hereinafter referred to as the Controller). This manual explains how to use the Controller.Please observe the following points when using the Controller.

- Please read and understand this manual thoroughly before using the Controller so that it is not used incorrectly.
- Please keep this manual at hand so that you can refer to it at any time.

Setup Manual

Vision Sensor F210

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Table of Contents

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Meanings of Signal Words

The following signal words are used in this manual.

⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.

Meanings of Alert Symbols

The following alert symbols are used in this manual.

	Indicates the possibility of explosion under specific conditions.
	Indicates general prohibitions for which there is no specific symbol.

Alert statements in this Manual

The following alert statements apply to the products in this manual. Each alert statement also appears at the locations needed in the manual to attract your attention.

⚠ WARNING

This product is not designed or rated for ensuring safety of persons.
Do not use it for such purposes.

A lithium battery is built into the Controller and may occasionally combust, explode, or burn if not treated properly.
Dispose of the Controller as industrial waste, and never disassemble, apply pressure that would deform, heat to 100 ?C or higher, or incinerate the Controller.

A lithium battery is built into the Controller and may occasionally combust, explode, or burn if not treated properly.
When replacing the battery, never short-circuit, attempt to charge, disassemble, apply pressure that would deform, or incinerate the battery

Regulations and Standards

The Controller complies with the EC Directive and EN standard below.

1. EC Regulations
   EMC Directive: No.2004/108/EC
2. EN Standards (European Standards)
   EN61326-1: 2006/Annex A+A1:1998/Class A
3. TRACEABILITY INFORMATION:
   Representative in EU:
   Omron Europe B.V.
   Wegalaan 67-69
   2132 JD Hoofddorp,
   The Netherlands

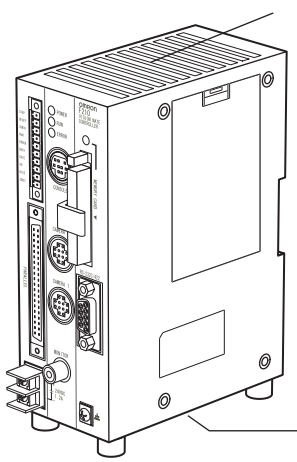
   Manufacture:
   Omron Corporation,
   Automation Systems Division H.Q.
   Application Sensors Division
   Shiokoji Horikawa,
   Shimogyo-ku, Kyoto 600-8530 JAPAN
4. The following notice applies only to products that carry the CE mark:
   Notice:
   This is a class A product. In residential areas it may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.

Precautions for Safe Use

Please observe the following precautions for safe use of the products.

Installation Environment

- Do not use the product in environments where it can be exposed to inflammable/explosive gas.
- Install the Controller so that cooling vents are not blocked.



Cooling vent
A label has been attached to the top cooling vent prior to shipment. It is provided to prevent entry of wire fragments during wiring, so it should not be removed until wiring is complete. After wiring has been completed, remove the label for heat release.

- Do not install the product close to high-voltage devices and power devices in order to secure the safety of operation and maintenance.
- Make sure to tighten all installation screws securely.

Power Supply and Wiring

- Make sure to use the product with the power supply voltage specified by this manual.
- Use a power supply cable and crimp terminals of the specified size.Do not simply connect the twisted ends of the wires directly to the terminal block.
- Keep the power supply wires as short as possible (Max. 10 m).
- Use a DC power supply with countermeasures against high voltages (safe extra low-voltage circuits on the secondary side). p.30
- Ground the Controller's ground terminal to less than 100 Ω.
- Use a grounding point that is as close as possible and keep the ground wire as short as possible.
- Wire the Controller to the ground with a separate ground wire.To avoid grounding problems, do not share the ground wire with any other devices or wire the ground to the building's steel framing.
- Confirm wiring again before the turning on the power .

Other

- Do not attempt to dismantle, repair, or modify the Controller.
- If you suspect an error or malfunction, stop using the Controller immediately, turn OFF the power supply, and consult your OMRON representative.
- Do not touch fluorescent or halogen lights while the power is ON or immediately after the power is turned OFF.
- Dispose of this product as industrial waste.

Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunctions, or undesirable effects on product performance.

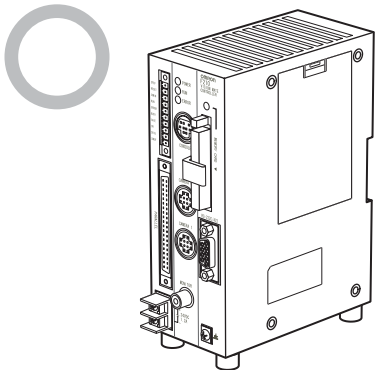
Installation of the Controller

Install the Controller in a place that meets the following conditions:

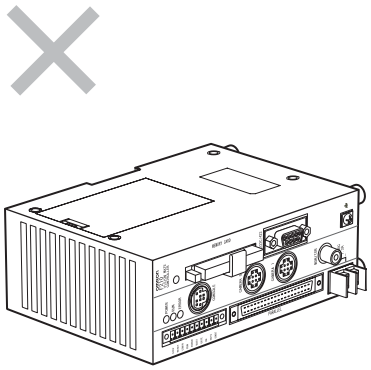
- Surrounding temperature of 0 to +50°C
- No rapid changes in temperature (place where dew does not form)
- Relative Humidity of between 35 to 85%
- No presence of corrosive or flammable gases
- Place free of dust, salts and iron particles
- Place free of vibration and shock
- Place out of direct sunlight
- Place where it will not come into contact with water, oils or chemicals

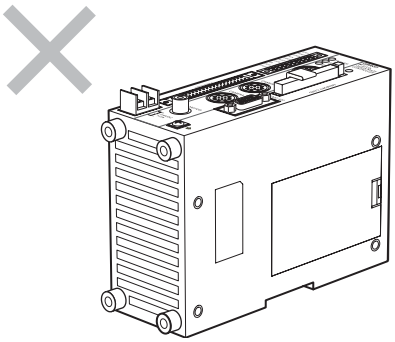
Orientation of Controller

To improve heat dissipation, install the Controller in the following orientation only.



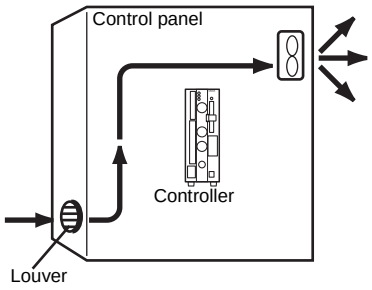
Do not install the Controller upside down as shown in the following diagram.





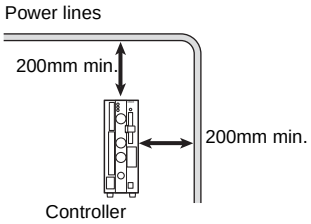
Ambient temperature

- Maintain a minimum clearance of 50 mm above and below the Controller to improve air circulation.
- Do not install the Controller immediately above significant heat sources, such as heaters, transformers, or large-capacity resistors.
- Do not let the ambient operating temperature exceed 50°C (122°F).
- Provide a forced-air fan cooling or air conditioning if the ambient temperature is near 50°C (122°F) so that the ambient temperature never exceeds 50°C (122°F).



Noise resistance

- Do not install the Controller in a cabinet containing high-voltage equipment.
- Do not install the Controller within 200 mm of power cables.



Component Installation and Handling

OMRON Components

Use a Camera, Camera Cable, and Console designed specifically for the Controller.

Connecting Cables

Always turn OFF the Controller's power before connecting or disconnecting a camera or cable.

Handling the Camera

The Camera's case is connected to the 0V line in the internal circuits. Observe the following precautions to prevent noise interference.

- Do not ground the Camera.
- Do not remove the base attached to the Camera.
- Do not remove the ferrite core attached to the F150-VS Camera Cable.

Optical axis of a special camera

The center of the optical axis varies with the camera used. Therefore, when installing the camera, always check the center of the image displayed on the monitor.

Touching Signal Lines

To prevent damage from static electricity, use a wrist strap or another device for preventing electrostatic discharges when touching terminals or signal lines in connectors.

Handling the Memory Card

- To prevent damage from static electricity, do not touch the Memory Card directly while it is installed in the Controller.
- To remove a Memory Card, turn OFF the power supply to the Card (using the menu command) or turn OFF the Controller. Press the eject button to eject the Card. The Memory Card or the Controller itself may be damaged if a Memory Card is removed while power is being supplied. (The power supply is stopped using the menu)

NOTICE

About Application Software

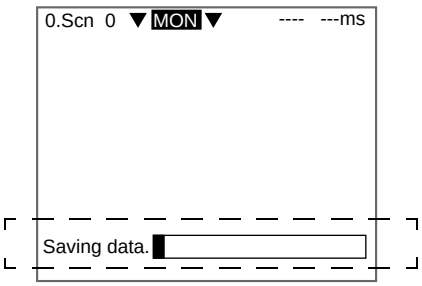
It will not be possible to start the Setup Menu if you change the contents of the Memory Card after installing it in a personal computer or other device.

Never change the contents of the Card with operations such as the following:

- Changing file names
- Moving or deleting files
- Overwriting data
- Formatting

Turning OFF the Power

Do not turn OFF the power while a message is being displayed indicating that processing is being performed. Data in memory will be corrupted, and the Controller may not operate correctly the next time it is started.



Message indicating that processing is in progress

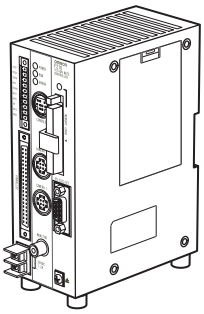
Using the RESET Signal

Do not use the RESET input immediately after power is turned ON. When using the RESET input to synchronize startup timing, wait at least 1 second after the Controller's power supply is turned ON before turning ON the RESET signal.

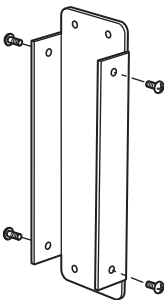
Confirming Package Contents

Check the contents of the package as soon as you receive the Controller.
It is extremely rare for components to be missing, but contact the nearest OMRON representative if any of the following items are missing.

- Controller…Qty.: 1

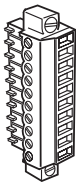


- Mounting bracket (for rear panel)

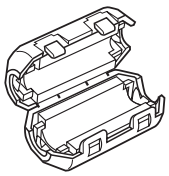


Bracket…Qty.: 1
Screw (M3x6)…Qty.: 4

- Input/output connector…Qty.: 1
  By Phoenix Contact
  Model: MC1.5/10/STF-3.5



- Ferrite core for F150–VM monitor cable…Qty.: 1



- Manual
  Setup Manual (this manual)…Qty.: 1

CHECK!

The Operation Manual and Customize Manual (on CD-ROM) are packed with the Application Software.

Editor's Note

Visual Aids

Indicates information required to take full advantage of the functions and performance of the product.Incorrect application methods may result in the loss of damage or damage to the product. Read and follow all precautionary information.

Indicates points that are important in using product functions or in application procedures.

Indicates where to find related information.

Indicates information helpful in operation, such as the definition of terms.

Product Availability

Some of the products listed may not be available in some countries. Please contact your nearest OMRON sales office by referring to the addresses provided at the back of this manual.

SECTION 1
Features

Vision Sensor

Vision Sensors work in place of the human eye to perform inspections by processing images using cameras. The visual inspections can be automated and complicated inspections can be performed accurately at high speeds.

The OMRON Vision Sensor helps create production lines with a highly efficient inspection system, which is important to meet current demands for small-lot, variable-product production, produce greater added-value, and improve product quality.

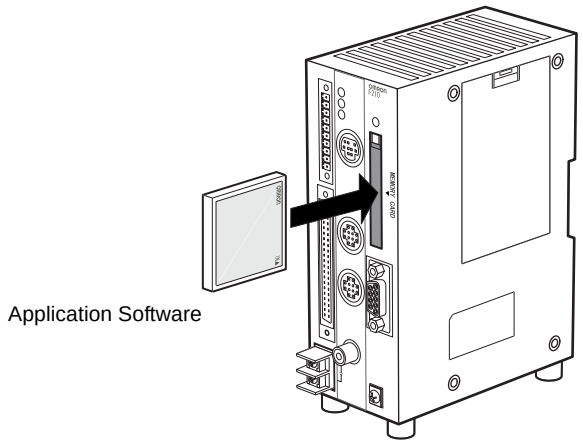
Using the Vision Sensor yields a high return on investments by ensuring the following benefits:

- Repetitive work is reduced.
- More complicated, more precise inspections are possible.
- Inspection data management is easier (CIM, GMP, ISO9000).
- Working hours can be shortened.
- Less 3-D work (difficult, dirty, dangerous) is required.
- Work can be performed by less experienced staff.

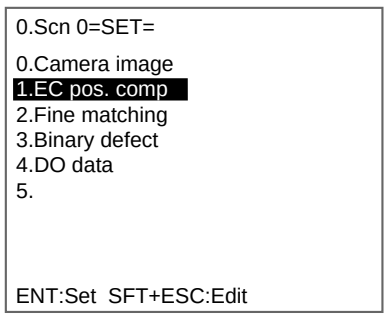
F210 Features

Application software (sold separately) is installed in the controller and used.
Inspection conditions can be set simply and flexibly using the flow-chart system.

First, install the processing items necessary for inspection from the application software.



Processing items can be freely combined on the menu.



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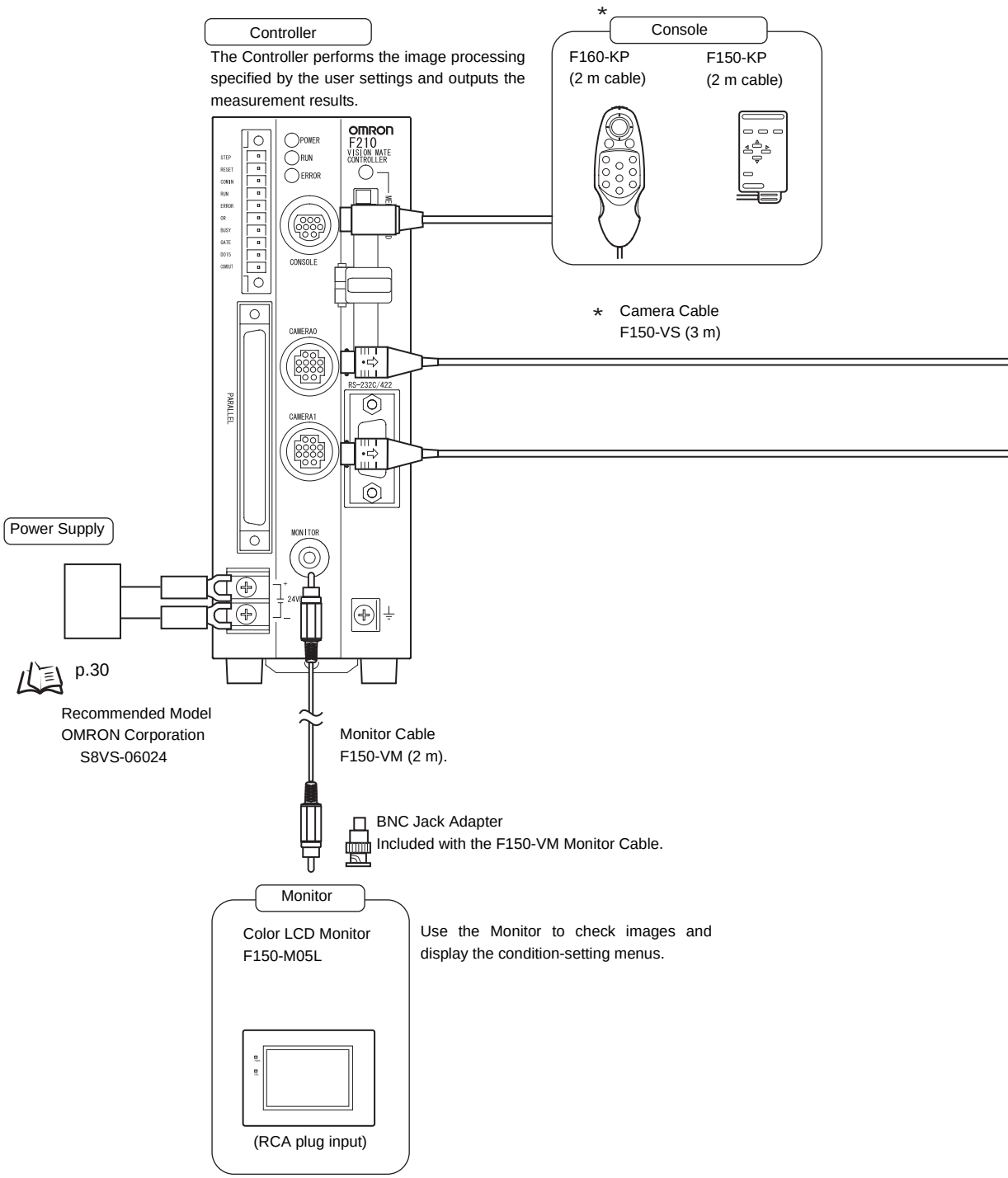
SECTION 2
Installation and Connections

Basic System Configuration

The following diagram shows the basic system configuration.

NOTICE Some of the components shown in the configuration diagram are special OMRON products that cannot be substituted with comparable devices. Using devices other than OMRON products may result in damage to the system. ("*" indicates a special OMRON product.)



* Camera

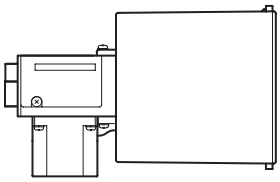
The Camera captures images of the measurement objects.
Up to 2 Cameras can be connected to one Controller.

CHECK!

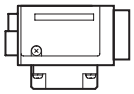
If F150-□□□ or F160-□□□ Cameras are being used, the connected Cameras must belong to the same series, i.e., they must have the same model number prefix (F150 or F160).

Double-speed Cameras

Camera with Intelligent Lighting
F160-SLC20 (20 mm field of vision)
F160-SLC50 (50 mm field of vision)



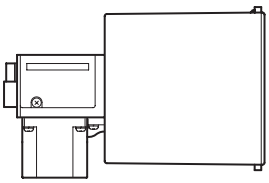
Camera Only
F160-S2



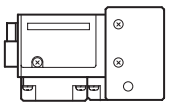
Use the Camera by itself when the field of vision of the F160-SLC□0 does not match the size of the measurement object. A standard CCTV lens and light source will be needed.

F150 Cameras

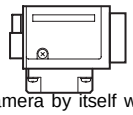
Camera with Intelligent Lighting
F150-SLC20 (20-mm field of vision)
F150-SLC50 (50-mm field of vision)



Camera with Light
F150-SL20A (20-mm field of vision)
F150-SL50A (50-mm field of vision)

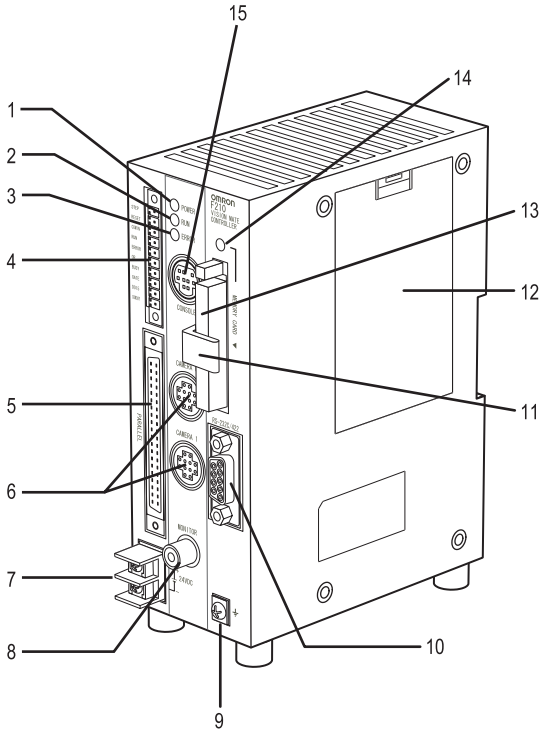


Camera Only
F150-S1A



Use the Camera by itself when the field of vision of the F150-SLC□0 does not match the size of the measurement object. A standard CCTV lens and light source will be needed.

Component Names and Functions



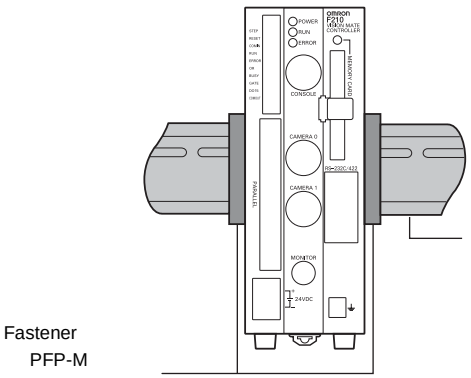
Pin	Name	Function
1	POWER Indicator	Lit while power is ON.
2	RUN Indicator	Lit while the Controller is in Run Mode.
3	ERROR Indicator	Lit when an error has occurred.
4	I/O terminals (control lines)	Connect the Controller to external devices such as a sync sensor or PLC.
5	I/O terminals (control lines, data lines)	
6	Camera connecting connector	Connect to the Cameras.
7	Power Supply Terminals	Connect to the DC power supply.
8	Monitor Connector	Connects to a monitor.
9	Ground Terminal	Connects to the ground wire.
10	RS-232C/RS-422 Connector	Connects the Controller to an external device such as a personal computer or PLC.
11	Card lock	Provided to hold the memory card to prevent it from becoming disconnected when exposed to vibration.
12	Battery cover	The battery is installed behind this cover.
13	Memory card slot	Memory Cards such as the Application Software Memory Card can be inserted in these slots.
14	Memory card indicator	Lit when power is being supplied to the corresponding Memory Card. (The Memory Card must not be inserted or removed when this indicator is lit.)
15	Console Connector	Connects the Controller to a Console.

Mounting the Controller

There are four ways to mount the controller: DIN track mounting, Rear panel mounting, Side panel mounting and Bottom panel mounting.

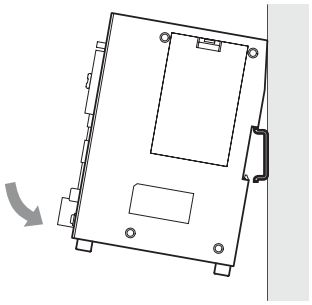
DIN Track Mounting

The controller can easily be mounted on or removed from a 35-mm width DIN track.



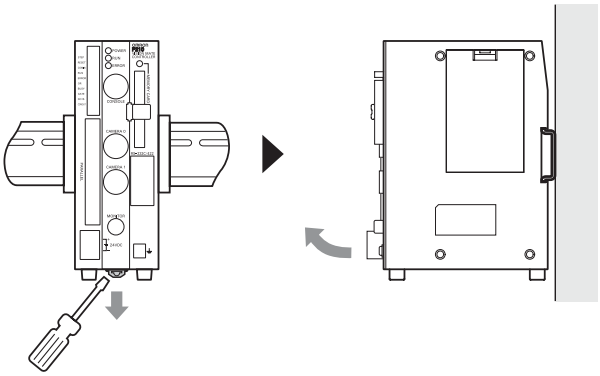
Mounting the Controller

Hook the controller into the DIN track as shown in the diagram and then press in at the bottom until the controller locks into place.



Removing the Controller

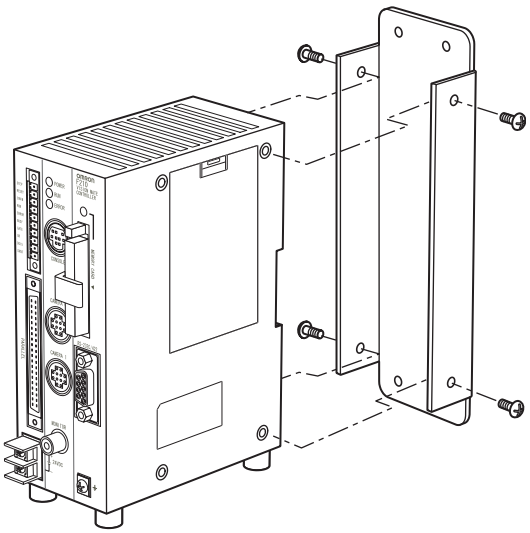
Use a flat-bladed screwdriver to pull the hook down and then pull out the controller from the bottom.



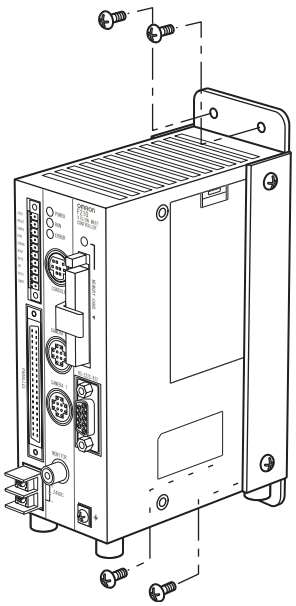
Rear Panel Mounting

1. Attach the bracket to the controller.

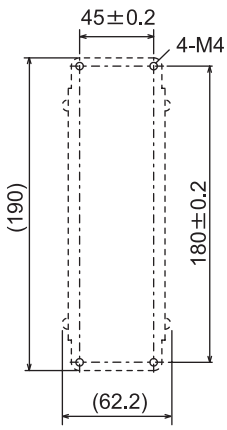
The bracket and screws (M3 x 6) are supplied with the controller.



2. Have the four M4 screws ready and screw them into the mount positions.

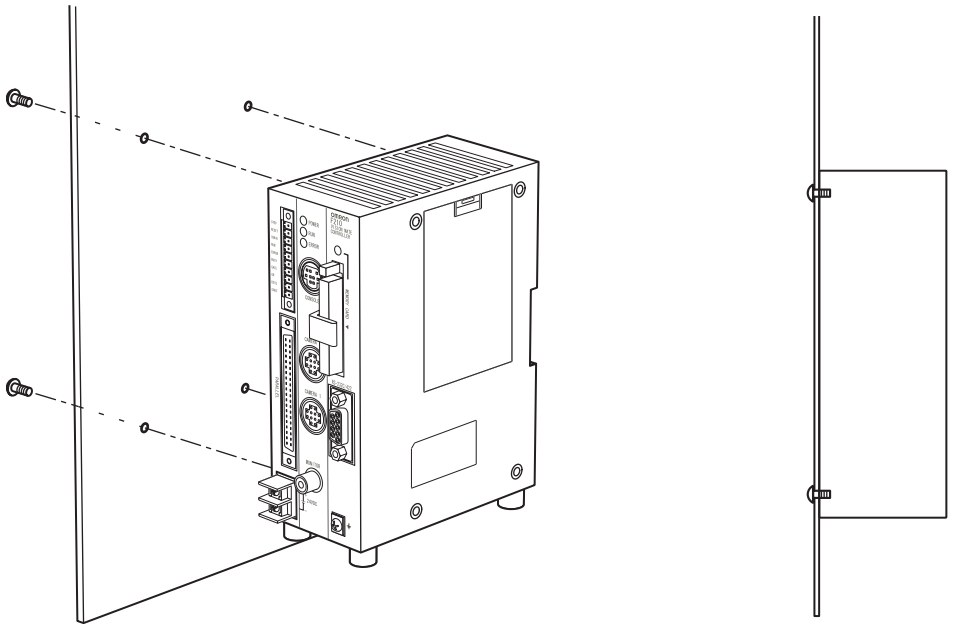


Mounting dimensions



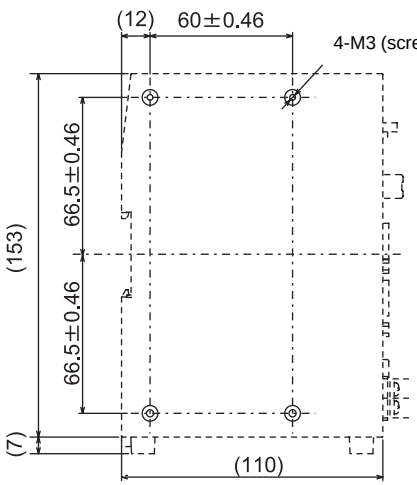
(Unit: mm)

Side Panel Mounting

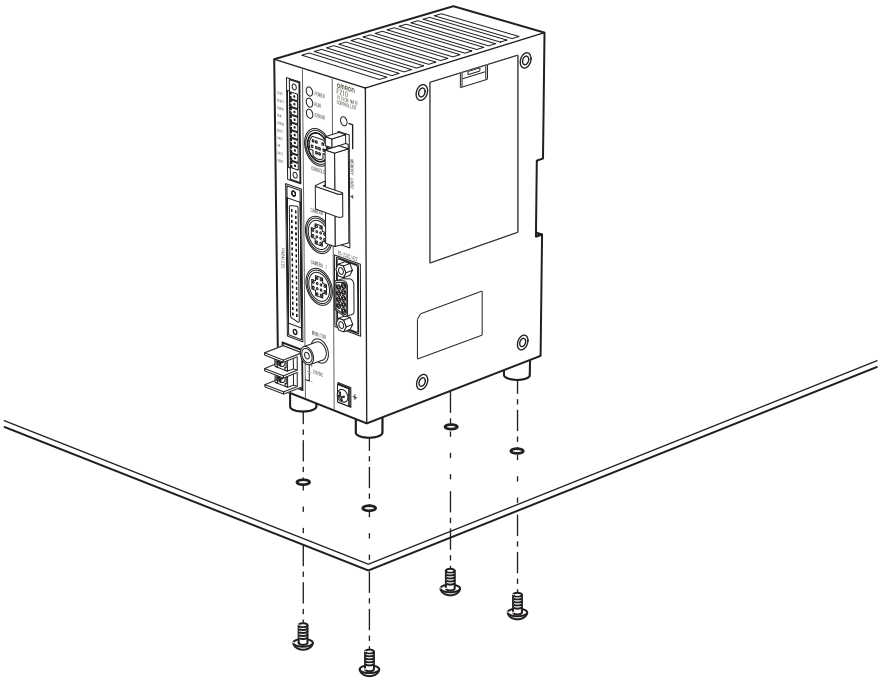


Mounting dimensions

(Unit: mm)

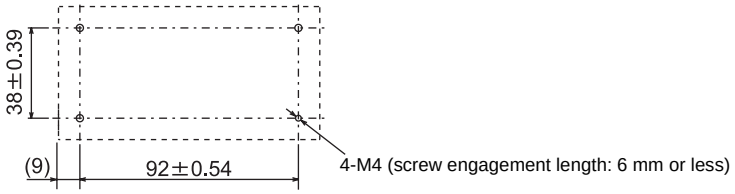


Side Panel Mounting



Mounting dimensions

(Unit: mm)



Connecting Peripheral Devices

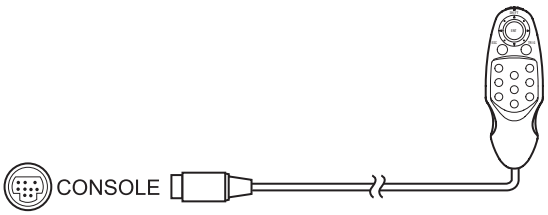
This section shows how to connect peripheral devices to the Controller.

NOTICE Always turn OFF the power supply before connecting or disconnecting a peripheral device's cable.The peripheral device may be damaged if it is connected while the power is ON.

NOTICE The various connectors on the Controller are capped when the Controller is shipped.When a connector is not being used, leave the cap in place or replace the cap to protect against dust, dirt, and static electricity.

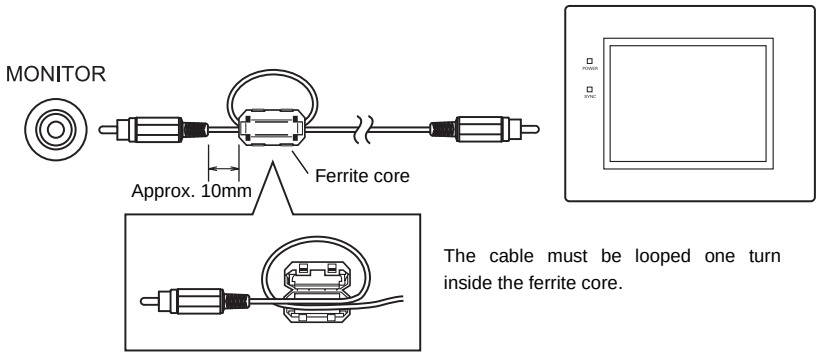
Connecting a Console

Connect the Console to the Controller's CONSOLE connector.An F160-KP or F150-KP Console can be connected.



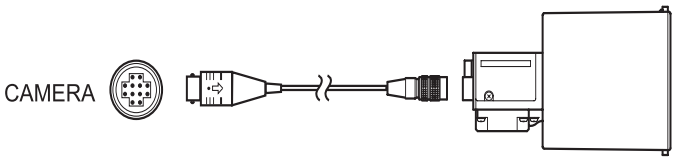
Connecting a Monitor

Connect the monitor cable to the Controller's MONITOR connector.Install the provided ferrite core onto the F150-VM Monitor Cable, positioning the ferrite core about 10 mm from the Controller' side connector.



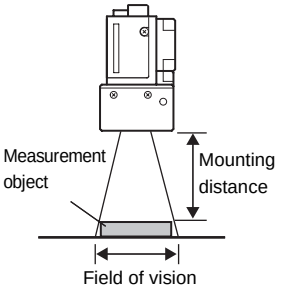
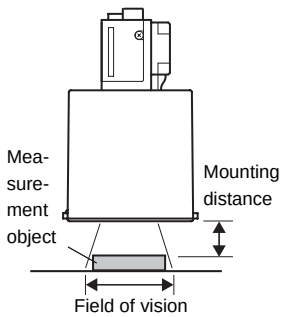
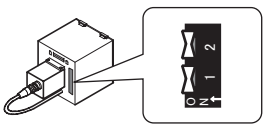
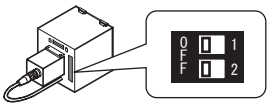
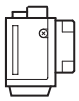
Connecting a Camera

Connect the camera cable to the Controller's Camera connector.



Camera with Light

The Camera with Light is a special Camera that has a special lens and light source already attached.The light source and lens are contained in a single unit, so installation is very simple.Just mount the Camera at the proper distance from the measurement object and it is ready to use.

<table>
<tr><th colspan="2" rowspan="2">Item</th><th colspan="3">Field of vision and distance to object</th><th rowspan="2">Lighting precautions</th></tr>
<tr><th>Field of vision</th><th>Mounting distance</th><th>Relationship between Camera and object</th></tr>
<tr><td rowspan="2">Camera with Light</td><td>F150-SL20A</td><td>20 mm
×
20 mm</td><td>61 to 71 mm</td><td rowspan="2"> 
</td><td rowspan="2">None in particular</td></tr>
<tr><td>F150-SL50A</td><td>50mm
×
50mm</td><td>66 to 76 mm</td></tr>
<tr><td rowspan="2">Camera with Intelligent Lighting</td><td>F150-SLC20
F160-SLC20</td><td>20 mm
×
20 mm</td><td>15 to 25 mm</td><td rowspan="2"> 
</td><td>Use with DIP switch pins 1 and 2 both set to OFF.
 
</td></tr>
<tr><td>F150-SLC50
F160-SLC50</td><td>50mm
×
50mm</td><td>16.5 to 26.5 mm</td><td>Use with DIP switch pins 1 and 2 both set to OFF.
 
</td></tr>
<tr><td>Camera Only</td><td>F150-S1A
F160-S2</td><td colspan="3">Determine the required field of vision based on the size of the measurement object and select an appropriate CCTV lens (C mount).
  </td><td>Provide a light source appropriate for the measurement object.</td></tr>
</table>

CHECK!

Observe the following precautions when using a Camera with Light or Camera with Intelligent Lighting.

- The lens has a fixed focal point.The actual field of vision and focal point vary from lens to lens, so adjust the distance to the measurement object after replacing the lens or camera.
- The camera mounting distance is an approximate value. Mount the Camera so that the distance to the measurement object can be adjusted easily.

If the object size and field of vision are incompatible, use a standard CCTV lens and light source.

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Power Supply and Ground

Wire the power supply and the ground to their respective terminals.Tighten the screws to a torque of between 0.49 N·m. After wiring, confirm that the wiring is correct.

Crimp Terminals and Cables

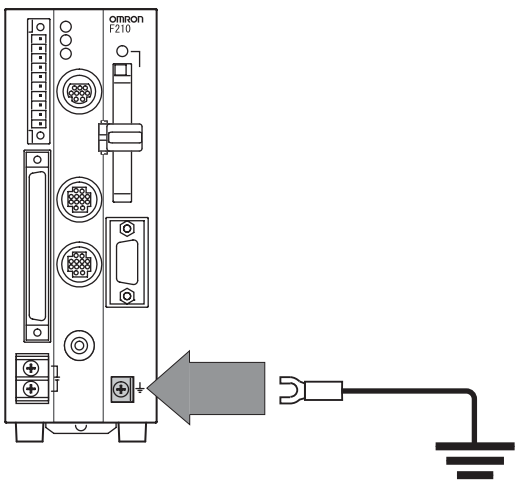
The terminal block uses M3 terminal screws.
Use appropriate crimp terminals for M3 screws, as shown below.

Recommended Model

	Manufacturer	Item	Applicable wire size
Forked 	J.S.T. Mfg Co., Ltd.	V1.25-N3A	1.31 to 1.65 mm² (AWG 16 to AWG 15)
Round 	J.S.T. Mfg Co., Ltd.	V1.25-MS3	

Ground (Earth) Wiring

Always connect a ground wire to the Controller's ground terminal.To avoid grounding problems, do not share the ground wire with any other devices or wire the ground to the building's steel framing.
Use a grounding point that is as close as possible and keep the ground wire as short as possible.



Ground to 100 Ω or less.

Wiring the Power Supply

Wire the Power Supply Unit independently of other devices.In particular, keep the power supply wired separately from inductive loads.
Use a power supply that meets the following specifications.

Condition

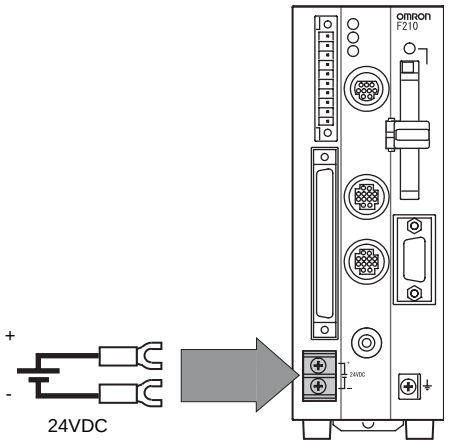
Output current	Power supply voltage
1.6A min.	24 VDC +10%, -15%

Recommended Model

Manufacturer	Item
OMRON Corporation	S8VS-06024

CHECK!

Use a DC power supply with countermeasures against high voltages (safe extra low-voltage circuits on the secondary side).
If the system must meet UL standards, use a UL class II power supply.



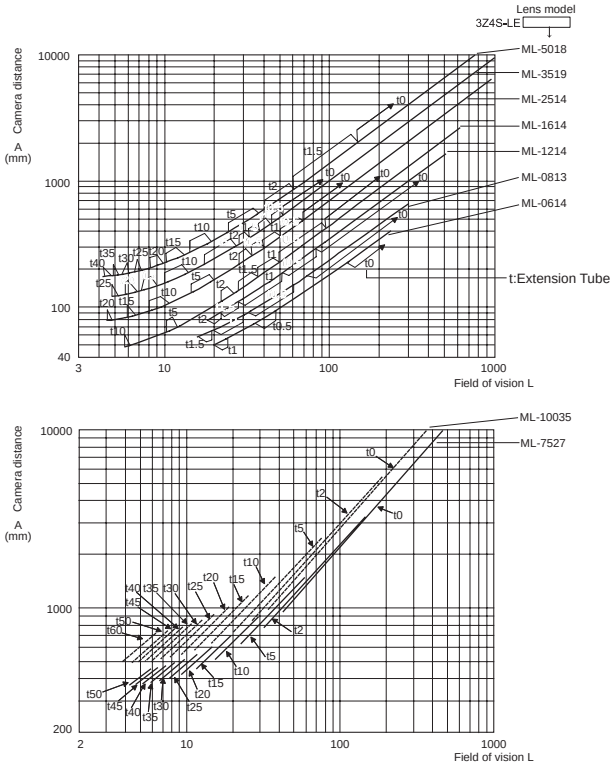
- Keep the power supply line as short as possible (less than 10 m).
- After wiring, replace the protective cover on the power supply terminals.

SECTION 3
Lenses, Lighting, and Memory Cards

CCTV Lenses

When using a Camera without a light (F150-S1A or F160-S2), refer to the following graph to select the appropriate Lens and Extension Tube. The lens will differ depending on the size of the measurement object and the distance from the Camera.

Optical Chart

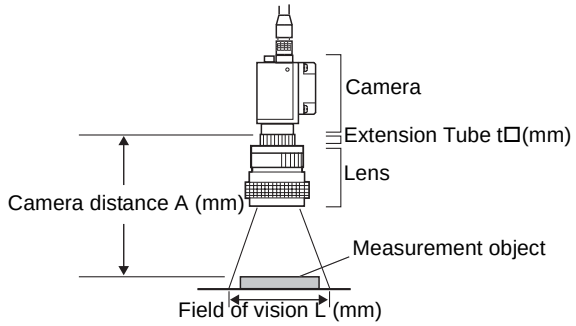


Understanding the above chart

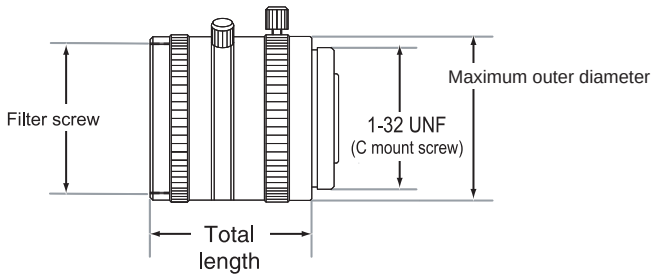
The X axis of the graph shows field of vision L (mm), and the Y axis shows the camera distance A (mm). The curves on the graph show the relationship between the field of vision and camera distance for each CCTV lens. The values are significantly different for each lens, so double-check the model of the lens before using the graph.The "t" values indicate the lengths of the Extension Tubes.The value "t0" shows the case where an Extension Tube is not needed and the value "t5.0" shows the case where a 5 mm Extension Tube is used.

Example:

When a 3Z4S-LE ML-2514 CCTV Lens is being used and a field of vision of 40 mm is needed at the measurement object, a camera distance of 300 mm and 1 mm Extension Tube are required.



Lenses and Lens Diameters

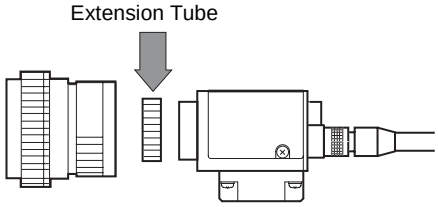


Lenses and Lens Diameters

Lens model	Focal length	Brightness	Maximum outer diameter	Total length (mm)	Filter Size
3Z4S-LE ML-0614	6	F1.4	30 dia.	30	M27 P0.5
3Z4S-LE ML-0813	8	F1.3		34.5	M25.5 P0.5
3Z4S-LE ML-1214	12	F1.4			M27 × P0.5
3Z4S-LE ML-1614	16			24.5	
3Z4S-LE ML-2514	25				
3Z4S-LE ML-3519	35	F1.9		29	
3Z4S-LE ML-5018	50	F1.8	32 dia.	37	M30.5 × P0.5
3Z4S-LE ML-7527	75	F2.7		42.5	
3Z4S-LE ML-10035	100	F3.5		43.9	

Extension Tube

One or more Extension Tubes can be inserted between the lens and the Camera to focus the Camera image.Use a combination of one or more of the seven tubes to achieve the required length.



Extension Tube

Item	Maximum outer diameter	Length
3Z4S-LE EX-C6	30 dia.	Length: 40 mm 20 mm 10 mm 5 mm 2.0 mm 1.0 mm 0.5 mm 7 item set

NOTICE

- Do not use the 0.5 mm, 1.0 mm and 2.0 mm Extension Tubes attached to each other.
  Since these Extension Tubes are placed over the threaded section of the Lens or other Extension Tube, the connection may loosen when more than one 0.5 mm, 1.0 mm or 2.0 mm Extension Tube are used together.
- Reinforcement may be required for combinations of Extension Tubes exceeding 30 mm if the Camera is subject to vibration.

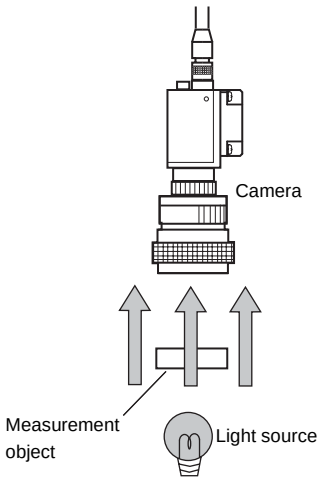
Lighting

A stable image must be obtained to ensure accurate inspection.
Use appropriate lighting for the application and the measurement object if using a Camera without a light (F150-S1A or F160-S2).

Lighting Methods

Back Lighting

A stable, high-contrast image can be obtained using back lighting.

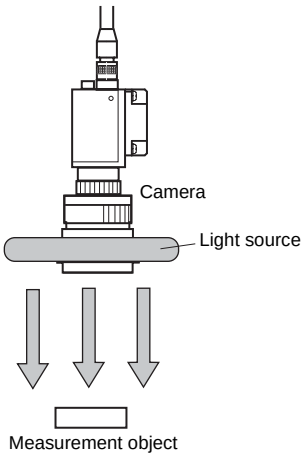


Applications: Inspection of exterior shape or positioning inspection

Reflected Lighting

Ring Lights

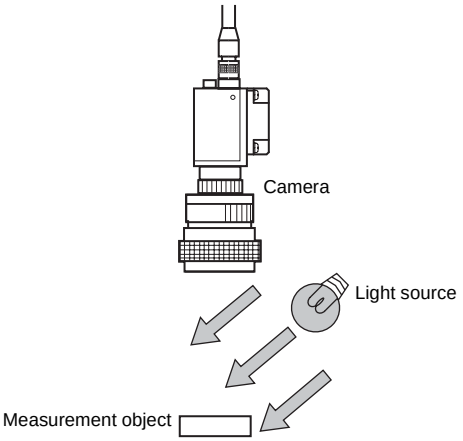
Light is shone uniformly on the measurement object.



Applications: Surface inspections

Oblique Lighting

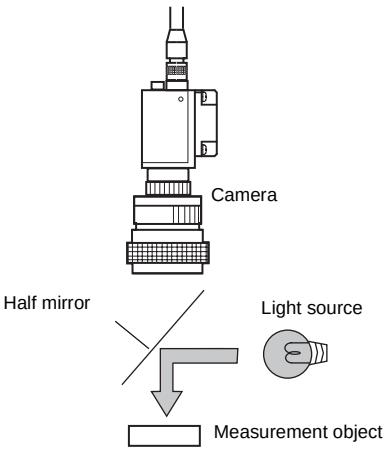
Detection can be made utilizing the difference in regular and diffuse reflected light.



Applications: Inspections for surface gloss

Coaxial Lighting

A stable image can be obtained with few shadows from uneven surfaces on the measurement object.



Applications: Surface inspections, positioning, and hole inspections of comparatively small objects

Memory Cards

Use a Memory Card to back up data such as settings and image data or increase the number of scenes when you are using the Scene Group function.Data from the Controller can be backed up in the computer just by inserting the Memory Card into the computer and copying the desired data.The following procedures also apply to the Memory Card containing the Application Software.

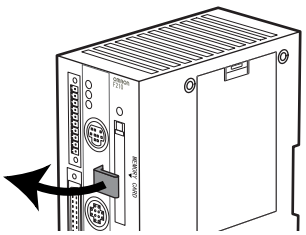
Recommended Model

Manufacturer	Item	Capacity
OMRON Corporation	F160-N128S	128 MB

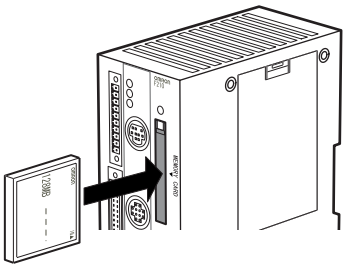
NOTICE A filler card with no memory is inserted into the Controller's Memory Card slot before the Controller is shipped.Remove this filler card and install a Memory Card to use the Memory Card functions.If Memory Cards are not being used, leave the filler card in place to prevent dust or dirt from entering the Memory Card slot.

Installing a Memory Card

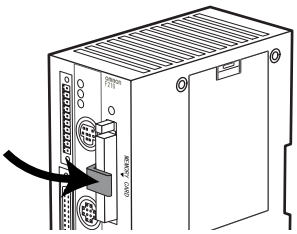
1. Lift the card lock of the memory card slot.
Do not force it. Just lift gently.



2. Insert a memory card into the slot.



3. Push the card lock to secure the memory card.



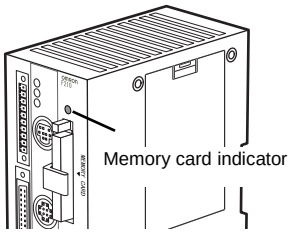
Removing the Memory Card

1. Turn OFF the power supply to the Memory Card or turn OFF the Controller.

Chapter 4 Additional Functions in the Operation Manual

2. Verify that the Memory Card indicator is not lit.

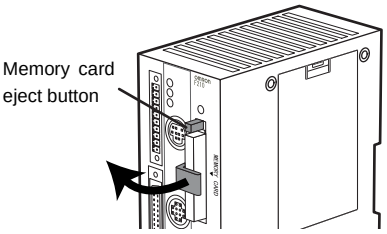
NOTICE Do not remove the Memory Card if the Memory Card indicator is lit. Doing so may damage the Memory Card or the Controller itself.



3. Lift the card lock.

4. Press the eject button located above the Memory Card slot.

The Memory Card will pop out slightly.



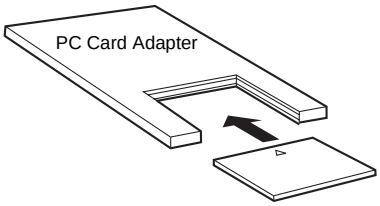
NOTICE Do not remove the Memory Card without pressing the eject button. Doing so may damage the Controller.

5. Pull the Memory Card straight out from the slot.

Using Memory Cards in a Personal Computer

The Memory Cards can be used in a personal computer with a PC Card drive (PCMCIA 2.0 or higher, type II compatible) or CompactFlash™ drive.

The Memory Card must be inserted into a PC Card Adapter in order to be used in a PC Card drive.



Recommended Model

Name	Manufacturer	Item
PC Card Adapter	OMRON Corporation	HMC-AP001

SECTION 4
Connecting External Devices

Parallel Connection Methods

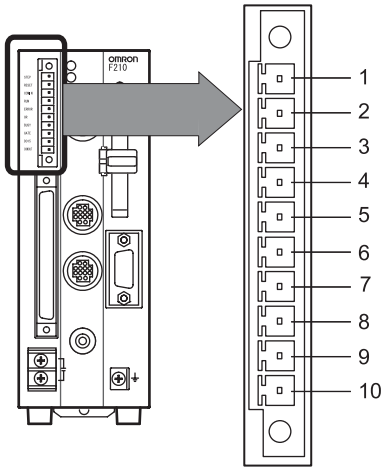
The Controller's parallel interface (Parallel I/O connector) can be used to input signals such as measurement triggers or output signals such as measurement results.The connection method is explained here.
The interface can be connected in two ways: via "I/O terminal" and via "I/O connector". Connect it by one of the two ways. It is not possible to use both.
If the I/O signals include necessary control signals, wire the signals to the connector (MC1.5/10-STF-3.5 by Phoenix Contact, supplied with the controller) and connect it to the controller. If you want to input commands and output measurement results via the parallel interface, have a parallel I/O cable (optional) ready and connect it to the I/O connector.

For the communication parameter setting method and I/O format, refer to the Operation Manual.

I/O Terminals

Wiring method

Wire the cable to the connector (supplied with the controller) and plug it into the controller. Terminal assignment on the controller side is shown below.Wire only necessary terminals.



Pin	Signal	Function
1	STEP	Measurement trigger signal (input terminal)
2	RESET	Controller restart (input terminal)
3	COMIN	Common for input signals
4	RUN	ON while in Run mode (output terminal)
5	ERROR	ON when there is an error (output terminal)
6	OR	Combined judgment result (output terminal)
7	BUSY	ON during processing (output terminal)
8	GATE	ON during the specified output time (output terminal)
9	DO15	Measurement results (output terminal)
10	COMOUT	Common for output signals (Connected to COMOUT1 and COMOUT3 of the I/O connector)

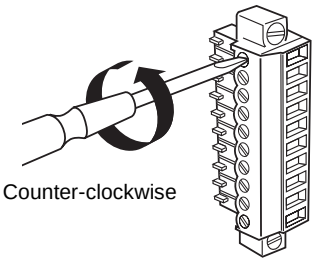
NOTICE Do not input the RESET input immediately after turning ON the power.When using the RESET input to synchronize startup timing, wait at least 1 second after the Controller's power supply is turned ON before turning ON the RESET signal.

CHECK! Use a DC power supply with countermeasures against high voltages (safe extra low-voltage circuits on the secondary side) for the COMIN and COMOUT terminals.If the system must meet UL standards, use a UL class II power supply.

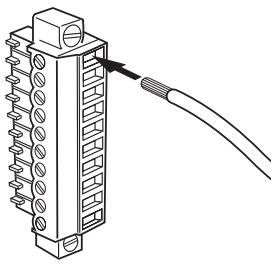
Applicable wire size

A size of 0.14mm to 1.5mm^2 is recommended. Keep the cable length less than 30 m.

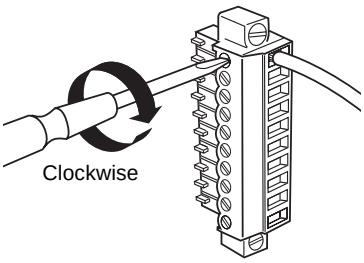
1. Loosen the wire fixing screw using a flat-bladed screwdriver.



2. Insert the wire.



3. Tighten the screw.



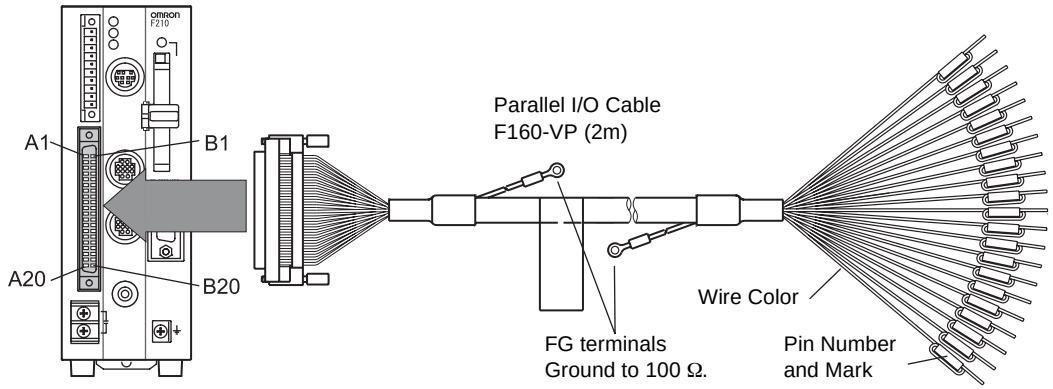
4. Plug in the connector into the controller.

5. Tighten the fixing screw.

The screw must be tightened with a torque of 0.22 to 0.25N·m.

I/O Connector

Use an F160-VP Parallel I/O Cable (sold separately) to connect the Controller to external devices. Align the connectors and insert the cable's connector straight into the Controller's parallel connector. Tighten the connector's mounting screws to secure the connection.



NOTICE Turn OFF the power supply before connecting or disconnecting a Parallel I/O Cable. Peripheral devices may be damaged if the cable is connected or disconnected with the power ON.
The parallel connectors are capped with screw-on covers when the Controller is shipped.When the connector is not being used, leave the cover in place or replace the cover to protect against dust, dirt, and static electricity.

Each wire of the F160-VP Parallel I/O Cable has a unique wire-color/mark combination.

Pin	Signal	Wire Color	Mark (Black)	Function
A1	RESET	Lt. brown	■	Restarts the Controller
A2	STEP	Yellow	■	Measurement trigger signal input
A3	DI0	Green	■	Command input
A4	DI2	Gray	■	
A5	DI4	White	■	
A6	DI6	Lt. brown	■■	
A7	DI8	Yellow	■	Command input expansion
A8	STGOUT0	Green	■	Strobe trigger 0 output(See note 1.)
A9	RUN	Gray	■■	ON while in Run mode
A10	BUSY	White	■■	ON during processing
A11	OR	Lt. brown	■■■	Combined judgement result
A12	DO0	Yellow	■■■	Data output
A13	DO2	Green	■■■	
A14	DO4	Gray	■■■	
A15	DO6	White	■■■	
A16	DO8	Lt. brown	■■■■	
A17	DO9	Yellow	■■■■	
A18	DO11	Green	■■■■	
A19	DO13	Gray	■■■■	
A20	DO15	White	■■■■	

Pin	Signal	Wire Color	Mark (Red)	Function
B1	COMIN	Lt. brown	■	Common for input signals
B2	DSA	Yellow	■	Inputs data send request signals
B3	DI1	Green	■	Command input
B4	DI3	Gray	■	
B5	DI5	White	■	
B6	DI7	Lt. brown	■■	
B7	DI9	Yellow	■■	Command input expansion
B8	STGOUT1	Green	■■	Strobe trigger 1 output(See note 1.)
B9	ERROR	Gray	■■	ON when there is an error.
B10	GATE	White	■■	ON for the set output time
B11	COMOUT1	Lt. brown	■■■	Common for output signals (See note 2.)
B12	DO1	Yellow	■■■	Data output
B13	DO3	Green	■■■	
B14	DO5	Gray	■■■	
B15	DO7	White	■■■	
B16	COMOUT2	Lt. brown	■■■■	Common for DO0 to DO7
B17	DO10	Yellow	■■■■	Data output
B18	DO12	Green	■■■■	
B19	DO14	Gray	■■■■	
B20	COMOUT3	White	■■■■	Common for DO8 to DO15

*1: This is a signal that is used when the strobe device is connected to the Controller.
Each Camera has its own strobe trigger output as shown in the following table.

Strobe trigger output	Signal
Camera 0	STGOUT0(A8)
Camera 1	STGOUT1(B8)

Connecting a Strobe Device p.72

*2: A8 to A11 and B8 to B10 are used for control signals.

NOTICE Do not input the RESET input immediately after turning ON the power.When using the RESET input to synchronize startup timing, wait at least 1 second after the Controller's power supply is turned ON before turning ON the RESET signal.

CHECK! Use a DC power supply with countermeasures against high voltages (safe extra low-voltage circuits on the secondary side) for the COMIN and COMOUT terminals.If the system must meet UL standards, use a UL class II power supply.

Making a Parallel I/O Cable

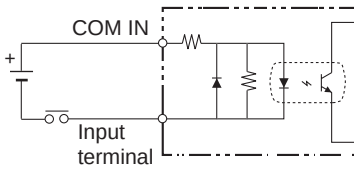
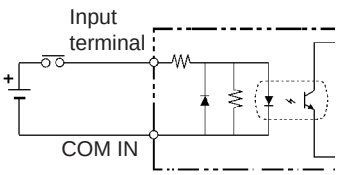
A parallel I/O cable can be assembled using the following connector and cover or equivalent components. Keep the cable length less than 30 m.

	Manufacturer	Item
Connector	Fujitsu	FCN-361J040-AU
Cover	Fujitsu	FCN-360C040-B

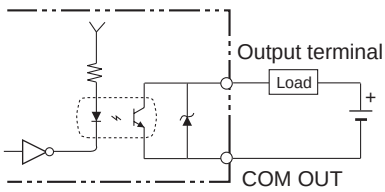
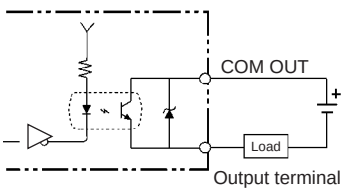
CHECK! Double-check the connector wiring for mistakes before turning ON the power supply for the first time.

I/O Specifications

Input Specifications

Item	Specification	
Model	F210-C10 (NPN mode)	F210-C15 (PNP mode)
Input voltage	12 to 24 VDC ±10%	
ON current *1	5 to 15 mA	
ON voltage *1	8.8 V max.	
OFF current *2	0.1 mA max.	
OFF voltage *2	4.5 V min.	
ON delay	RESET input: 10 ms max. Other inputs: 0.5 ms max	
OFF delay	RESET input: 15 ms max. Other inputs: 0.7 ms max.	
Internal circuits		

Output Specifications

Item	Specification	
Model	F210-C10 (NPN mode)	F210-C15 (PNP mode)
Output voltage	12 to 24 VDC ±10%	
Load current	45 mA max.	
ON residual voltage	2 V max.	
OFF leakage current	0.1 mA max.	
Internal circuits		

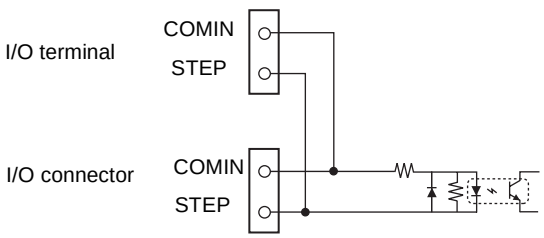
NOTICE Do not exceed the maximum load current specified for the Controller.

*1: ON Current/ON Voltage
This refers to the current or voltage values needed to shift from the OFF¨ON state.
The ON voltage value is the potential difference between each of the input terminals and COM IN.

*2: OFF Current/OFF Voltage
This refers to the current or voltage values needed to shift from the ON¨OFF state.
The OFF voltage value is the potential difference between each of the input terminals and COM IN.

CHECK! The same signals are shared by the I/O terminals and the I/O connector.

Example: STEP signal



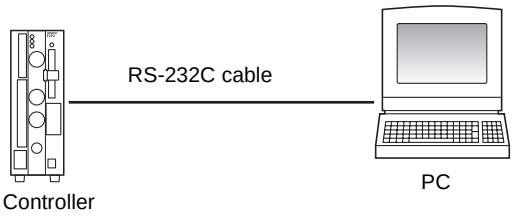
Connecting through the Serial Interface

The Controller's serial interface (RS-232C/RS-422 connector) can be used to input signals such as measurement triggers or output signals such as measurement results.Additionally, data that has been set in the Controller can be backed up in a personal computer.The connection method is explained here.

For the communication parameter setting method and I/O format, refer to the Operation Manual.

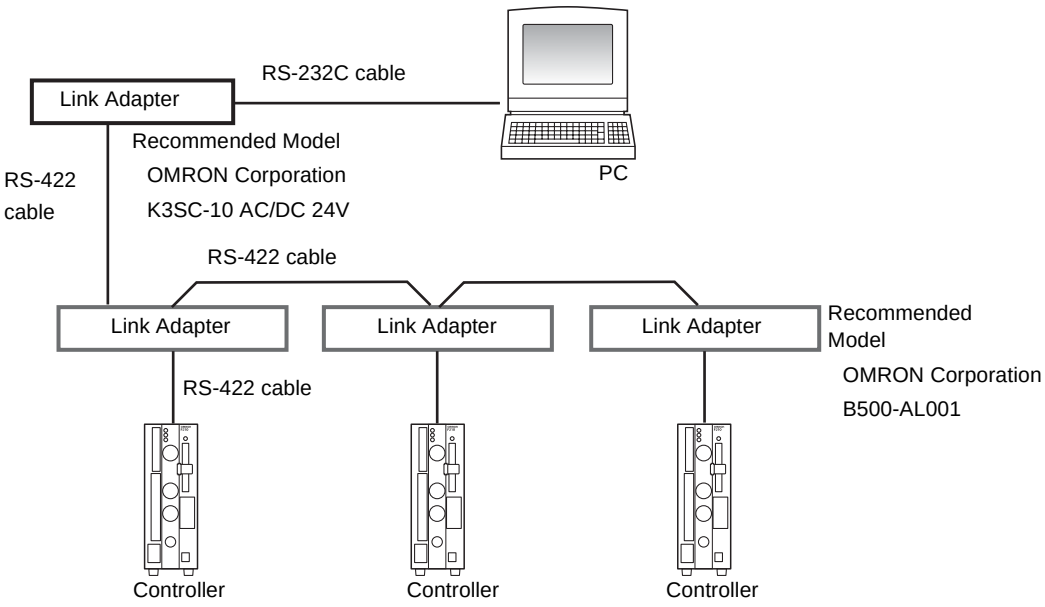
ConnectionExample

1:1 Connection (Normal, Menu Operation)



Multi-drop Connection (Normal)

Communications between one computer and several Controllers (at most 31 Controllers) is possible using Link Adapters.

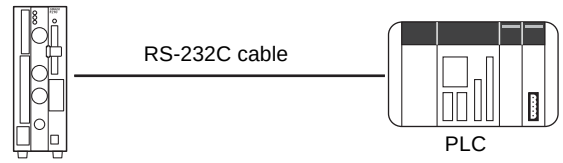


CHECK!

When 3G2A9-AL004-E Link Adapters are being used, termination must be set to ON in the last node in the line and the node must be terminated as follows:

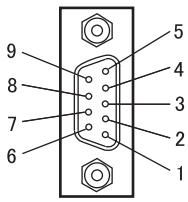
Connect 220 Ω (1/2 W min.) between RDA(-) and RDB(+).
Connect 220 Ω (1/2 W min.) between SDA(-) and SDB(+).

1:1 Connection (Host Link)



Connector

The Controller's RS-232C/RS-422 Connector is a 9-pin D-SUB female connector.
The pin allocation is shown below.



Pin	Signal	Function
1	FG	Protective frame ground
2	SD	For RS-232C
3	RD	For RS-232C
4	NC	Not connected
5	RDB(+)	For RS-422
6	RDA(-)	For RS-422
7	SDB(+)	For RS-422
8	SDA(-)	For RS-422
9	GND	Signal ground

A parallel I/O cable can be assembled using the following connector and cover or equivalent components.

Recommended Model

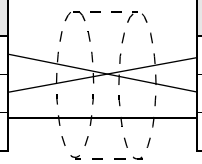
	Manufacturer	Item
Plug	OMRON Corporation	XM2A-0901
Hood	OMRON Corporation	XM2S-0911

Wiring

Keep the cable length less than 15 m.

RS-232C

Controller			External device	
Signal	Pin		Pin	Signal
SD	2		*	SD
RD	3		*	RD
GND	9		*	GND

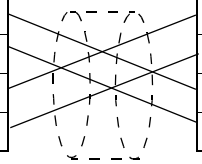


RS/CS control cannot be used.

Use only shielded cable.

RS-422

Controller			External device	
Signal	Pin		Pin	Signal
RDB(+)	5		*	RDB(+)
RDA(-)	6		*	RDA(-)
SDB(+)	7		*	SDB(+)
SDA(-)	8		*	SDA(-)

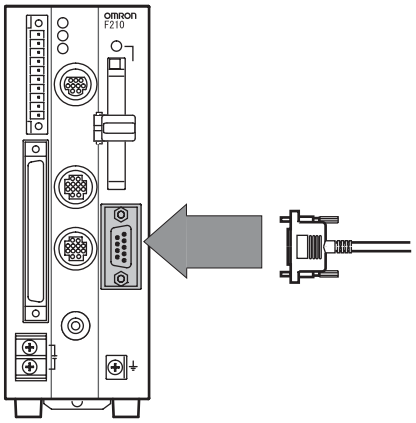


Use only shielded cable.

(*) Pin numbers on the external device will depend on the device being connected.
Refer to the manual for the personal computer or PLC being connected.

Connection Methods

Align the connectors and insert the cable's connector straight into the Controller's connector. Tighten the connector's mounting screws to secure the connection.



NOTICE Turn OFF the power supply before connecting or disconnecting a Cable.
Peripheral devices may be damaged if the cable is connected or disconnected with the power ON.

NOTICE The various connectors on the Controller are capped when the Controller is shipped.When a connector is not being used, leave the cover in place or replace the cover to protect against dust, dirt, and static electricity.

SECTION 5
Troubleshooting and Maintenance

Troubleshooting

This section lists probable corrections for common hardware problems.Please check all of the following items before requesting repairs.

Connection Errors

Problem	Probable cause	Reference
The POWER indicator is not lit.	•The Power Supply is not connected properly. •The supply voltage is not 24 VDC +10%/-15%.	p.30
The Monitor is blank.	•The power to the Monitor is not ON. •The Monitor Cable is not connected properly. •The Monitor is malfunctioning. •When using Monitor, the power supply capacity is insufficient.	p.27
The Monitor image is not clear.	•There is electrical noise entering from the power supply or cables. •The Monitor Cable is not connected properly.	—
Cannot make key inputs from the Console.	•The Console Cable is not correctly connected.	p.27
Camera images do not appear on the screen (for Cameras with Light Source)	•The Camera Cable is not correctly connected. •The lighting cable is not properly connected to the Camera.	p.27
Camera images do not appear on the screen (when a standard CCTV lens and lighting are used)	•The lens cap has not been removed. •The Camera Cable is not correctly connected. •The lens iris is opened or closed too far. •The shutter speed is not suitable. •The lighting method is not suitable.	p.27 p.34

Connection Errors (continued)

Problem	Probable cause	Reference
The indicators do not turn ON. (for Cameras with Light Source)	•The lighting cable is not correctly connected to the Camera. •Power is not being supplied to the Controller. •When using a Camera with Intelligent Lighting, the DIP switch pins are not set to 0. •When using Intelligent Lighting with the F160-S2 camera model, the number of input lines is not set to 484 lines.	p.30 p.28 Operation Manual

Menu Operation Errors

Problem	Probable cause	Reference
The measurement results are not displayed on the Video Monitor.	•The Controller is not in Monitor or Run mode.	Operation Manual

Parallel Interface Errors

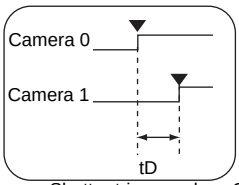
Problem	Probable cause	Reference
Trigger signals (input signals) are not received.	•The cables are not correctly wired. •The signal line is disconnected. The status of communications can be checked with the I/O monitor. •The Controller is not in Monitor or Run mode.	p.38 Operation Manual
Signals cannot be output externally.	•The trigger signal has not been input. •The cables are not correctly wired. •The signal line is disconnected. The status of communications can be checked with the I/O monitor. •The Controller is not in Run mode.	p.38 Operation Manual

Serial Interface (RS-232C/RS-422) Errors

Problem	Probable cause	Reference
No communications are possible.	•The cables are not correctly wired. •The Controller's communications specifications do not match those of the external device. •The communications mode was not selected under [System settings/Communication/Serial]. Select [Normal], [Host link], or [Menu] in the Communications (Serial) menu. The status of communications can be checked with the I/O monitor.	p.43 Operation Manual
The Unit operates well initially, but after a while there is no response from the Controller.	•The reception buffer on the external device (e.g., computer) is full. Check that settings allow the data to be properly received.	—
Cannot perform menu operations from the computer.	•The communications mode was not set to Menu in the [System settings/Communication/Serial].	Operation Manual
Data cannot be saved.	•The Controller's communications specifications do not match those of the external device. •Is flow control turned OFF under [System settings/Communication/Normal]?	Operation Manual

Q&A

Cameras

Questions	Answers
Are the shutter trigger pulses synchronized when more than one camera is connected?	The shutter trigger pulses are not synchronized for the F160-S2 and F150-S1A. The timing is offset so that light from other Cameras does not enter.The offset depends on the model of Camera that is used.  ▼: Shutter trigger pulses ON F160-S2: tD=Approx. 500 μs F150-S1A: tD=Approx. 1 ms If a strobe is used, the strobe trigger signals are also offset in the same way as the shutter trigger pulses. The shutter trigger pulses are synchronized for other Cameras, i.e., there is no offset.
Can more than one internally synchronized Cameras be connected?	No.Only one internally syncronized Camera can be connected, and it must be connected to Camera connector 0.
Can the F150-LT10A Light be connected to the F160-S2 Camera?	Yes, it can be connected and the following Lenses are available. • Lens with 20-mm field of vision: F150-LE20 • Lens with 50-mm field of vision: F150-LE50

Cabling Errors

Questions	Answers
Are there any recommended OMRON RS-232C cable available?	One of the following OMRON cables is recommended. Select a cable that works with the device being connected. Connecting to a PC/AT or compatible computer (9-pin connector) • XW2Z-200S-V (2m) • XW2Z-500S-V (5m) Connecting to a SYSMAC device (9-pin connector) • XW2Z-200T (2m) • XW2Z-500T (5m)

Maintenance

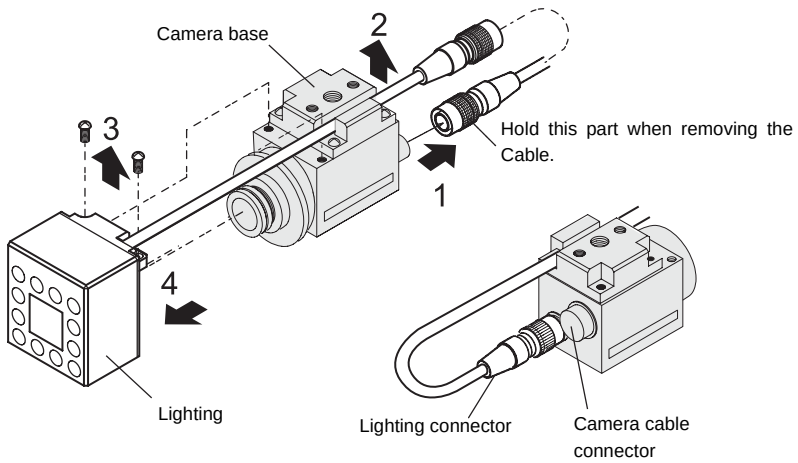
Replacing the Light

The Light will gradually lose brightness over time (about 20% loss after 1,500 hours of use).
Replace the Light after about 1,500 hours of use.
Replace the Light if it is damaged or not fully functional.

F150-SL20A/SL50A

Light model	Remark
F150-LT10A	The F150-LT10A cannot be connected to the older F150-S1 Camera.

- Removing the Light



1. Disconnect the light cable from the light connector on the back of the Camera.

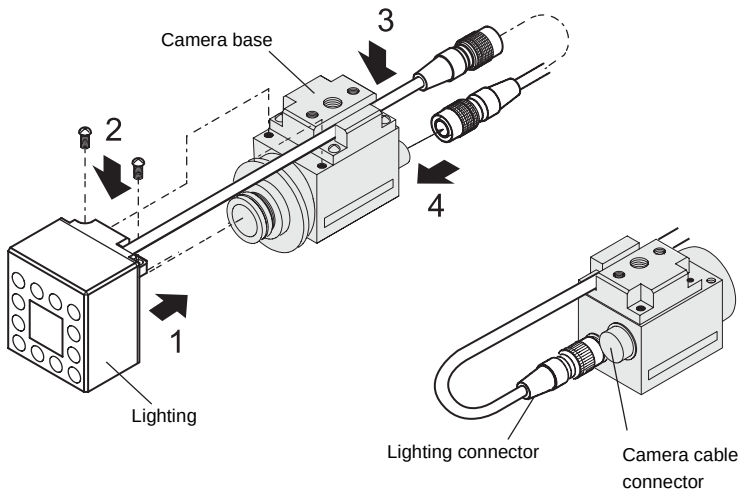
2. Remove the light cable from the slot in the camera base.

3. Remove the two screws securing the Light.

4. Remove the Light from the Camera.

NOTICE Do not disassemble the Lens.

- Installing the Light



1. Mount the Light on the Camera.

2. Screw in the two screws that secure the Light.

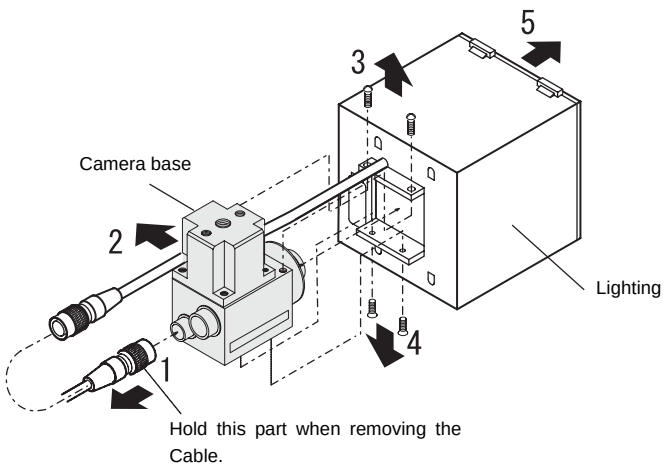
3. Place the light cable in the slot in the camera base.

4. Connect the light cable to the light connector on the back of the Camera.

F150-SLC20/SLC50 or F160-SLC20/SLC50

Field of vision	Light model
20 mm	F150-LTC20
50mm	F150-LTC50

- Removing the Light



1. Disconnect the light cable from the light connector on the back of the Camera.

2. Remove the light cable from the slot in the camera base.

3. Remove the two screws securing the Light.

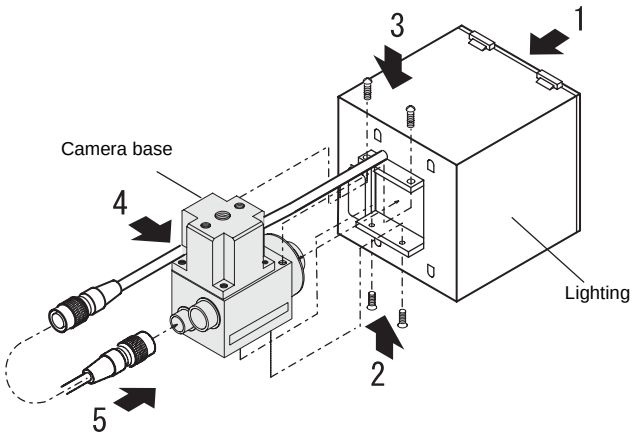
4. Remove the two screws securing the Light.

5. Remove the Light from the Camera.

NOTICE Do not disassemble the Lens.

CHECK! When you want to use the Camera alone without connecting an Intelligent Lighting, use M2 × 3 screws in the bottom of the Camera instead of the long screws removed in step 4. The screws removed in step 3 are not needed.

- Installing the Light



1. Mount the Light on the Camera.

2. Screw in the two screws that secure the Light.

3. Screw in the two screws that secure the Light.

4. Place the light cable in the slot in the camera base.

5. Connect the light cable to the light connector on the back of the Camera.

Replacing the Battery

The Controller is equipped with a battery that backs up the clock.When the battery is low, the message “BATTERY LOW” will be displayed on the monitor at startup.In this case, replace the battery with the one shown below.
The used battery must be disposed of as industrial waste.

Manufacturer	Item
OMRON Corporation	3Z49-BAT1

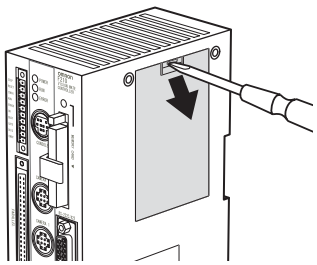
The battery life is approximately seven years.

CHECK!

Always turn OFF the power supply before replacing the battery.
The new battery must be installed within two minutes after the old battery is removed, otherwise the clock will be reset. If this happens, set the clock again.

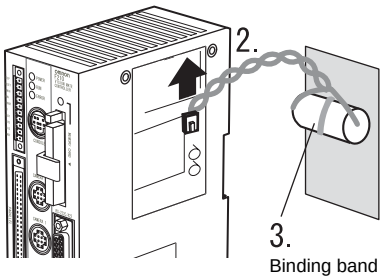
Chapter 5 System Settings in the Operation Manual.

1. Open the battery cover on the side of the controller.
Insert a flat-bladed screwdriver into the cover and open it.



The battery is installed behind this cover.

2. Pull the battery by holding the base of the battery connector.
3. Cut the band and remove the battery from the cover.



4. Install a new battery in the reverse order of removal.
Secure the battery with the binding band supplied with the battery.

⚠WARNING

Do not short circuit, attempt to charge, disassemble, apply pressure that would deform, or incinerate the lithium battery.
The lithium battery may start a fire, explode, or burn if not treated properly.

Regular Inspections

To maintain the Controller in the best condition, perform the following regularly.

- Clean the Lens and LED lights with a lens-cleaning wipe or blow off dust with an aerosol air sprayer.
- Lightly wipe off dirt with a soft cloth.

Inspection point	Details	Tools required
Power supply	The voltage measured at the power supply terminals must be 24 VDC +10%/-15%.	Circuit tester
Ambient temperature	The operating ambient temperature inside the cabinet must be between 0 and 50°C.	Thermometer
Ambient humidity	The operating ambient humidity inside the cabinet must be between 35% and 85%.	Hygrometer
Installation	Each component must be firmly secured. The Cameras must be firmly secured. Mount the Lens on the Camera.	Phillips screwdriver
LED lights	All indicators must light when the power is turned ON. • Verify that a through-image is displayed. • When using an Intelligent Lighting, verify that the light level settings are set to their maximum values.	—

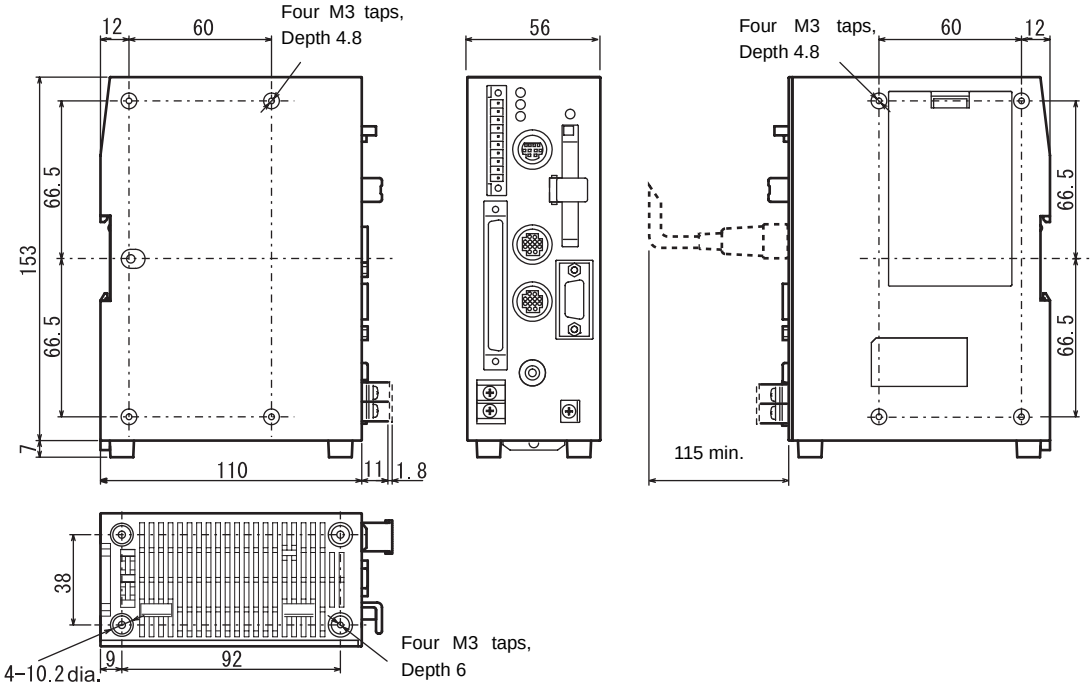
NOTICE
- Turn OFF the power and take safety precautions before conducting inspections. Electrical shock can result from attempting safety inspections with the power turned ON.
- Do not use thinners or benzene to clean the Controller.

Specifications

Controller

F210-C10/C15

(Unit: mm)

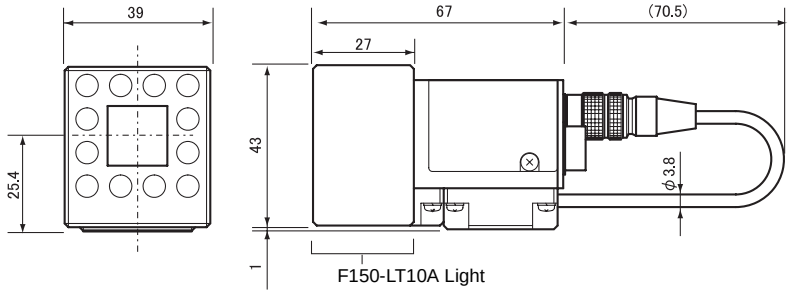


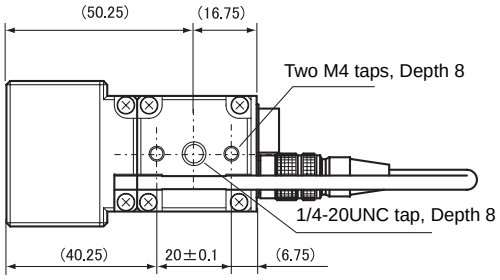
Specification

Model	F210-C10	F210-C15
Input/Output type	NPN	PNP
Power supply voltage	20.4 to 26.4 VDC	
Current consumption	Approx. 1.6 A max	
Insulation resistance	Between the group of external DC terminals and the ground terminal: 20 MΩ min. (by 100 V DC megger)	
Dielectric strength	Between the group of external DC terminals and the ground terminal: 1000 V AC at 50/60 Hz (when the built-in surge absorber is removed)	
Leakage current	10mA max.	
Noise resistance	2,000 V; pulse width: 50 ns; rise time: 5 ns (pulse) Burst continuation time: 15 ms; Period: 300 ms	
Vibration resistance	10 to 150 Hz; half-amplitude: 0.1 mm; maximum acceleration: 15 m/s^2, 10 times for 8 minutes each in 3 directions.	
Shock resistance	150 m/s^2, 3 times each in 6 directions	
Ambient temperature range	Operating: 0 to 50°C (with no condensation) Storage: -25 to 65°C (with no condensation)	
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)	
Ambient environment	No corrosive gases	
Ground	Class 1 (Ground resistance 100Ω max.)	
Degree of protection	IEC60529 IP20 (in-panel)	
Case material	ABS/PC	
Weight	Approx. 570g (Controller only)	

Camera with Light
F150-SL20A/SL50A

(Unit:mm)

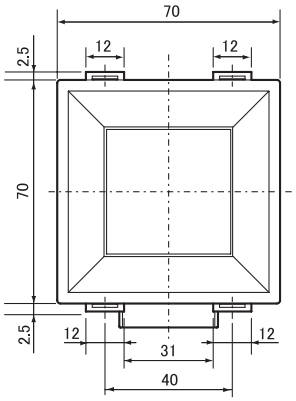


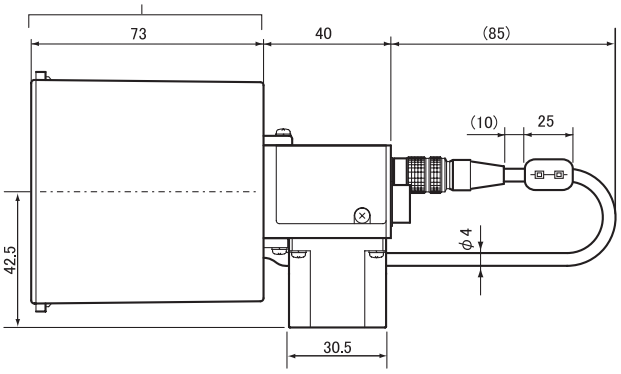


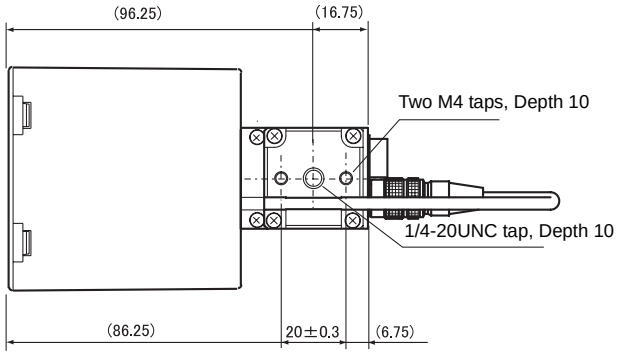
Camera with Intelligent Lighting
F150-SLC20

F150-LT20 Light

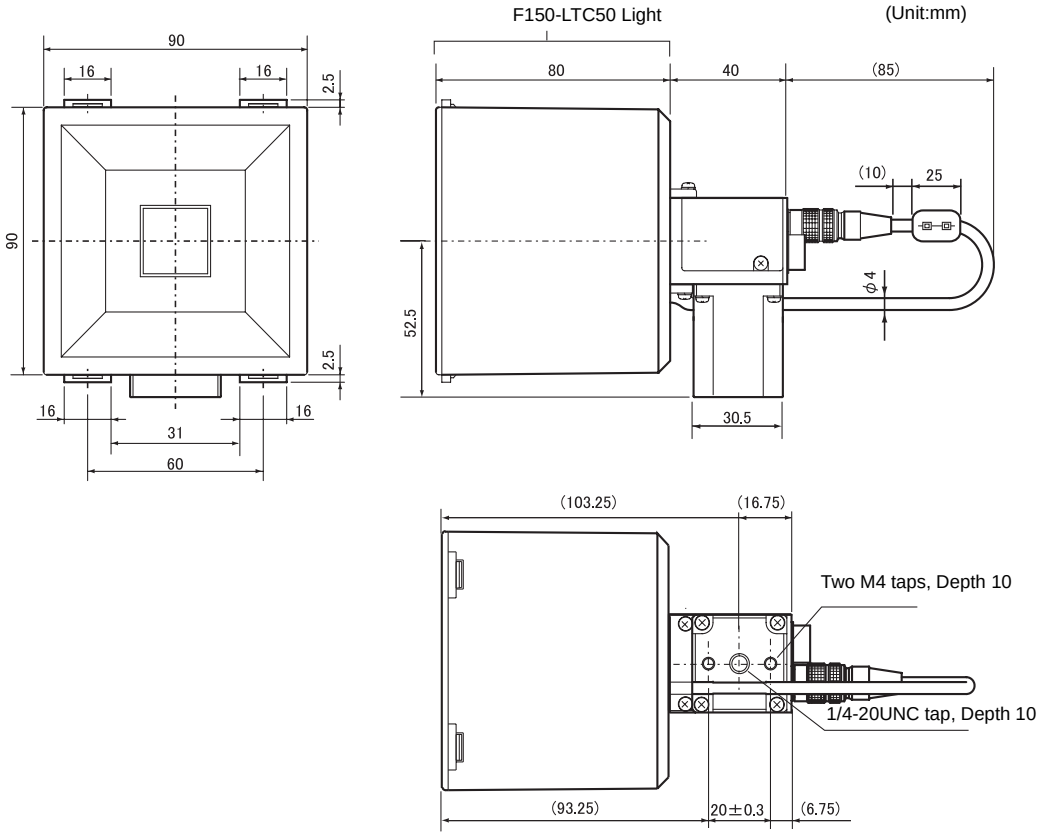
(Unit:mm)



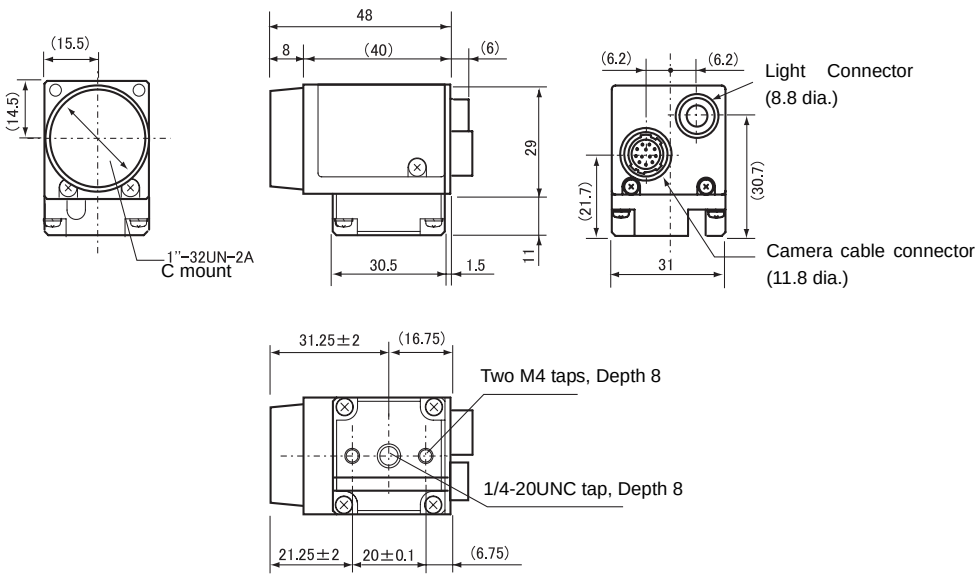




Camera with Intelligent Lighting
F150-SLC50

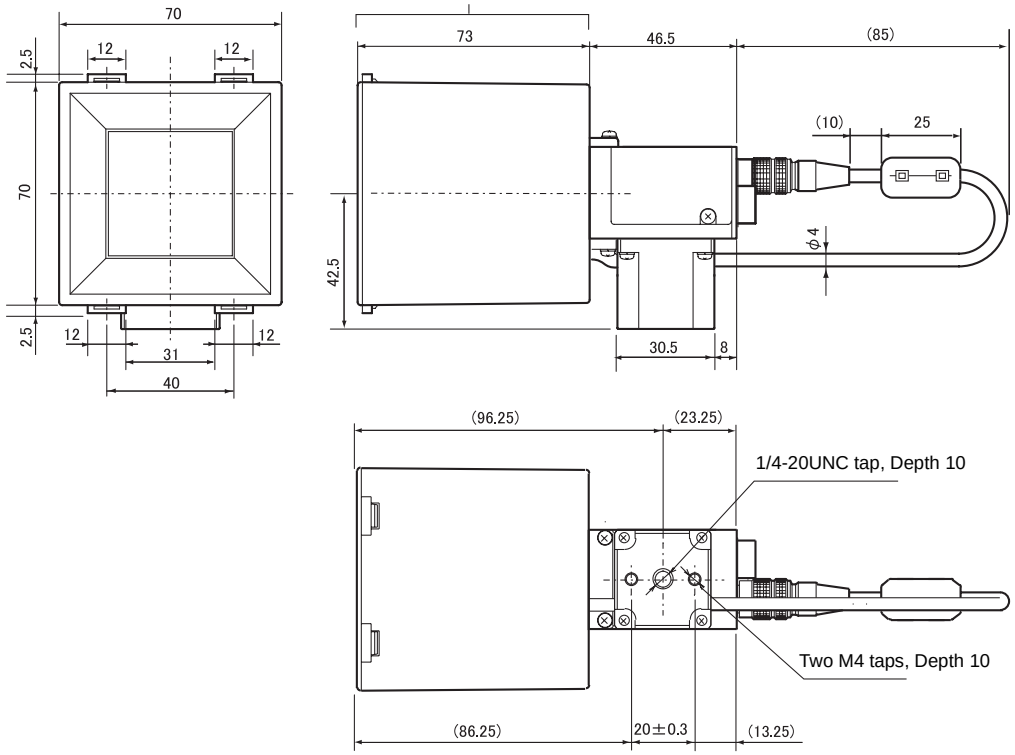


Camera Only
F150-S1A

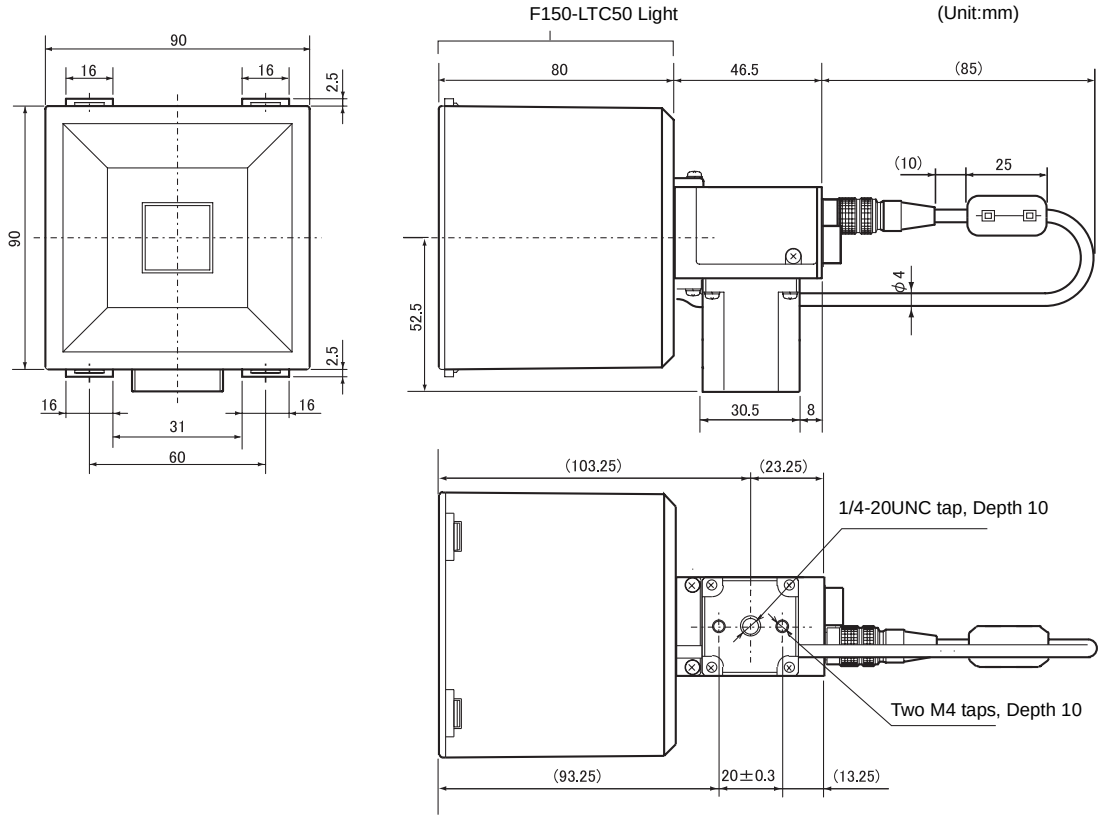


Camera with Intelligent Lighting
F160-SLC20

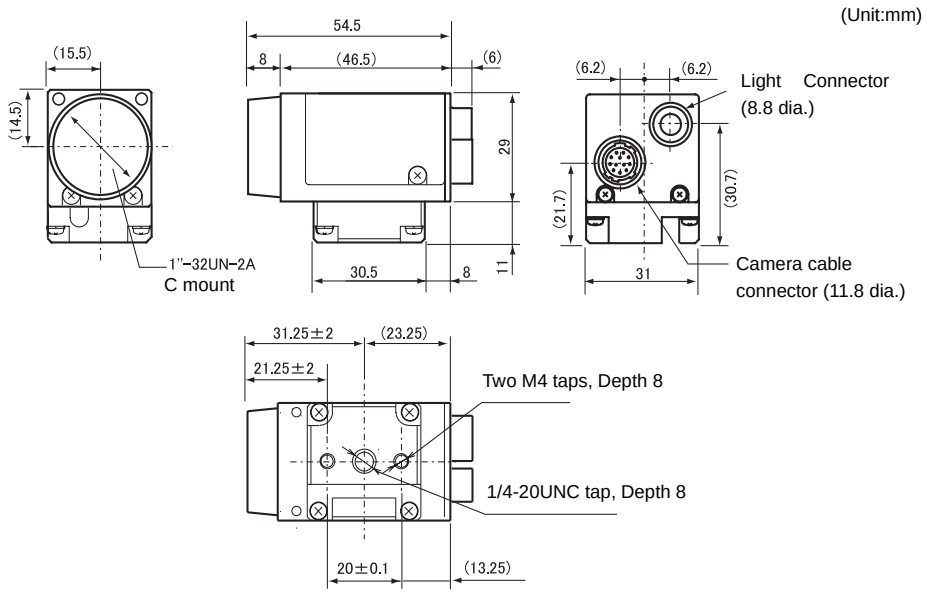
(Unit:mm)



Camera with Intelligent Lighting
F160-SLC50



Camera Only
F160-S2



Cameras

Specification

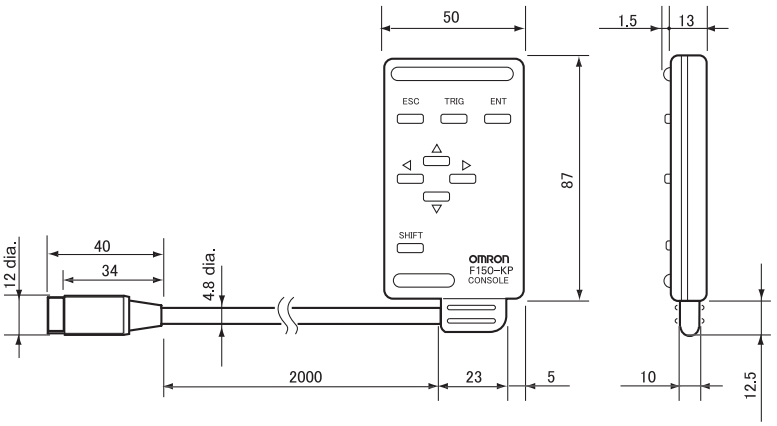
	F150 -SL20A	F150 -SL50A	F150 -SLC20	F150 -SLC50	F160 -SLC20	F160 -SLC50	F160 -S2	F150 -S1A
Current consumption	1.4 W max.		2.4 W max.		3.4 W max.	4.4 W max.	1.7 W max.	1.2 W max.
Vibration resistance	10 to 150 Hz; half-amplitude: 0.35 mm; maximum acceleration: 50 m/s2, 10 times for 8 minutes each in 3 directions.							
Shock resistance	150 m/s^2, 3 times each in 6 directions							
Ambient temperature range	Operating: 0 to 50°C (with no condensation) Storage: -25 to 60°C (with no condensation)							
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)							
Ambient environment	No corrosive gases							
Camera materials	Cover: Galvanized steel sheet metal Case: Die-cast aluminum alloy Camera mounting base: Fiber-reinforced plastic (black)							
Light materials	Case: ABS Transparent cover: PC						—	
Weight	Approx. 135 g	Approx. 135 g	Approx. 280g	Approx. 370g	Approx. 285g	Approx. 375g	Approx. 85g	Approx. 80g

Characteristics

	F150 -SL20A	F150 -SL50A	F150 -SLC20	F150 -SLC50	F160 -SLC20	F160 -SLC50	F160 -S2	F150 -S1A
Camera Characteristics								
Picture element	1/3” Interline CCD (reading all pixels)							
Effective pixels	659 494 (H V)							
Synchronization	External sync. via horizontal sync signal							
Shutter speed (Electronic shutter)	F150-series: 1/100 s, 1/500 s, 1/2000 s, 1/10000 s F160-series: 1/120 s, 1/200 s, 1/500 s, 1/1000 s, 1/2000 s, 1/4000 s, 1/8000 s, 1/20000 s							
Partial scanning	Disable						Enable	Disable
Lens mounting	C mount							
Lens Characteristics								
Lens model	F150 -LE20	F150 -LE50	F150 -LE20	F150 -LE50	F150 -LE20	F150 -LE50	—	
Method	Fixed focal point, fixed iris							
Brightness	F2.8							
Focal length	13mm	6.1mm	13mm	6.1mm	13mm	6.1mm		
Light Characteristics								
Light model	F150-LT10A		F150 -LTC20	F150 -LTC50	F150 -LTC20	F150 -LTC50	—	
Light source	Red LED (Peak emission wavelength: 680 nm)		Red and green LED combination (Peak emission wavelengths: 660 nm and 570 nm)					
Light emission method	Pulse emission (synchronized with the camera shutter)							
Mounting distance	61 to 71mm	66 to 76mm	15 to 25mm	16.5 to 26.5mm	15 to 25mm	16.5 to 26.5mm	Depends on lens being used.	
Field of vision	20 mm × 20 mm	50mm × 50mm	20 mm × 20 mm	50mm × 50mm	20 mm × 20 mm	50mm × 50mm		

Console
F150-KP

(Unit:mm)

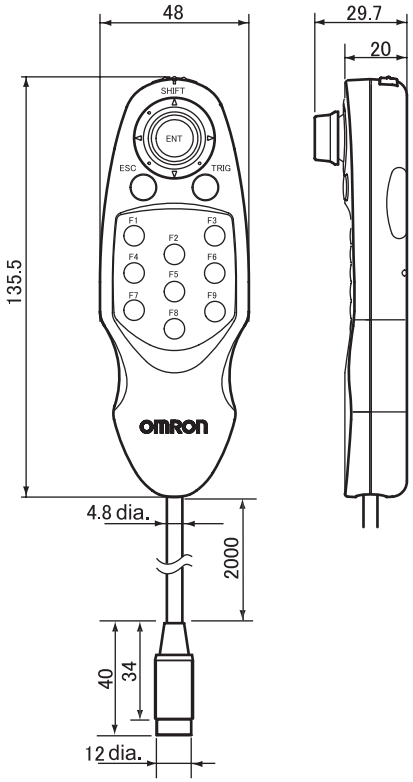


Specification

Vibration resistance	10 to 150 Hz; half-amplitude: 0.15 mm; 4 times for 8 minutes each in 3 directions
Shock resistance	196m/s², 3 times each in 6 directions
Ambient temperature range	Operating: 0 to 50°C (with no condensation) Storage: -25 to 65°C (with no condensation)
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)
Ambient environment	No corrosive gases
Degree of protection	IEC60529 IP20 (in-panel)
Minimum bending radius	75mm
Materials	Body: ABS Cable sheathing: Heat-resistant PVC Connector: PC and PBT
Weight	Approx. 135 g

Console
F160-KP

(Unit:mm)

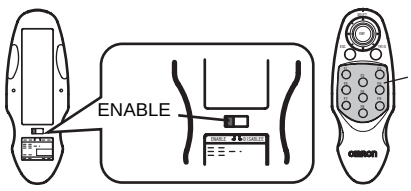


Specification

Current consumption	Approx. 10mA
Vibration resistance	10 to 150 Hz; half-amplitude: 0.35 mm; maximum acceleration: 50 m/s^2,10 times for 8 minutes each in 3 directions
Shock resistance	150 m/s^2, 3 times each in 6 directions
Ambient temperature range	Operating: 0 to 50°C (with no condensation) Storage: -25 to 65°C (with no condensation)
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)
Ambient environment	No corrosive gases
Degree of protection	IEC60529 IP20 (in-panel)
Minimum bending radius	75mm
Materials	Body: ABS Cable sheathing: Heat-resistant PVC Connector: PC and PBT
Weight	Approx. 160g

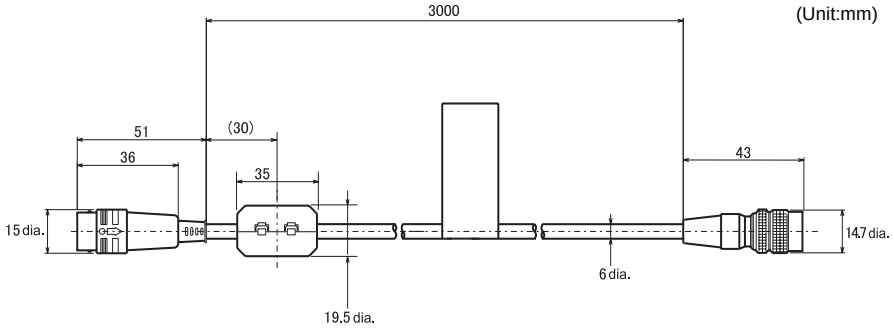
CHECK!

The switch on the back of the F160-KP must be set to “ENABLE”.



These keys will be disabled if the switch is set to “DISABLE”.

Camera Cable (For F150-S □, F160-S □ Cameras)
F150-VS



Specification

Vibration resistance	10 to 150 Hz; half-amplitude: 0.15 mm; 4 times for 8 minutes each in 3 directions
Shock resistance	196m/s², 3 times each in 6 directions
Ambient temperature range	Operating: 0 to 50°C (with no condensation) Storage: -25 to 65°C (with no condensation)
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)
Ambient environment	No corrosive gases
Materials	Cable sheathing: Heat-resistant PVC, Connector: Fiberglass-reinforced PC and PBT
Minimum bending radius	75 mm
Weight	Approx. 170g

Controller Connector	
Signal	Pin
Power	1
GND	2
GND	3
VIDEO GND	4
VD	5
ESCNT1	6
VIDEO	7
HD	8
SCAN	9
ESCNT2	10
INDEX	11
TRG	12
Shell	–

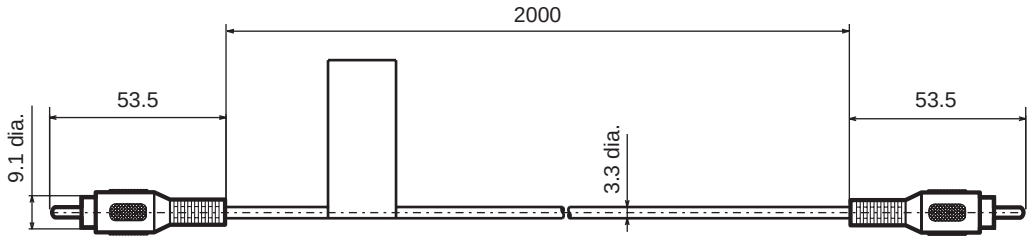
Camera Connector	
Pin	Signal
1	GND
2	Power
3	GND
4	VIDEO
5	VIDEO GND
6	HD
7	(Open)
8	ESCNT1
9	ESCNT2
10	INDEX
11	TRG
12	SCAN
–	Shell

Connector model
Hirose PR17A-13P-12PC (71)
(equivalent part)

Connector model
Hirose HR10A-10P-12SC (73)
(equivalent part)

Monitor Cable
F150-VM

(Unit:mm)

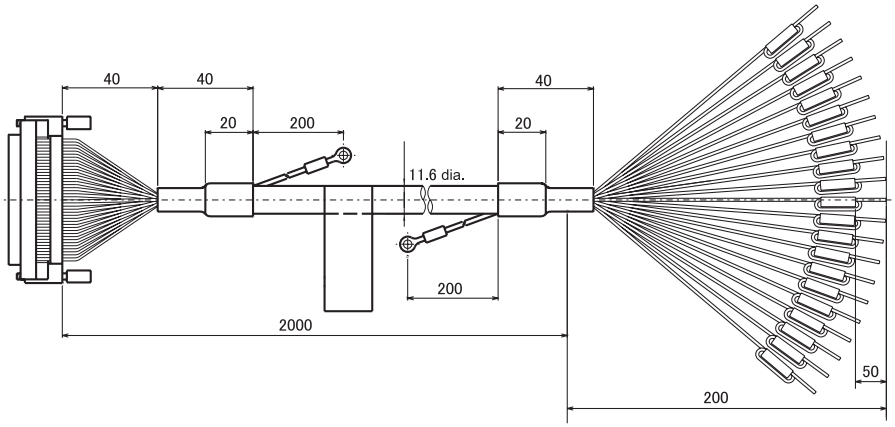


Specification

Vibration resistance	10 to 150 Hz; half-amplitude: 0.15 mm; 4 times for 8 minutes each in 3 directions
Shock resistance	196m/s², 3 times each in 6 directions
Ambient temperature range	Operating: 0 to 50°C (with no condensation) Storage: -25 to 65°C (with no condensation)
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)
Ambient environment	No corrosive gases
Materials	Cable sheathing: Super flame retardant PVC Connector: PVC
Minimum bending radius	50mm
Weight	Approx. 40g
Accessories	BNC Jack Adapter

Parallel I/O Cable
F160-VP

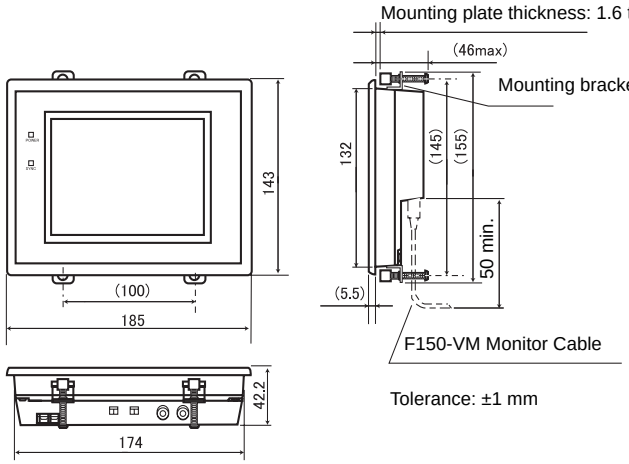
(Unit:mm)



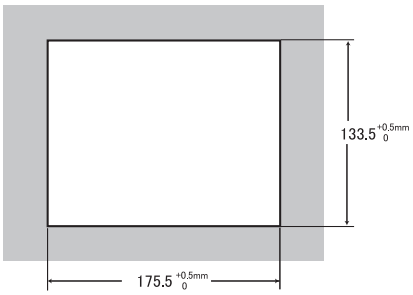
Specification

Vibration resistance	10 to 150 Hz; half-amplitude: 0.15 mm; 4 times for 8 minutes each in 3 directions
Shock resistance	196m/s^2, 3 times each in 6 directions
Ambient temperature range	Operating: 0 to 50°C (with no condensation) Storage: -25 to 65°C (with no condensation)
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)
Ambient environment	No corrosive gases
Materials	Cable sheathing: Heat-resistant PVC Connector: Polyesterresin
Minimum bending radius	120mm
Weight	Approx. 340g

LCD Color Monitor
F150-M05L



Panel opening dimensions



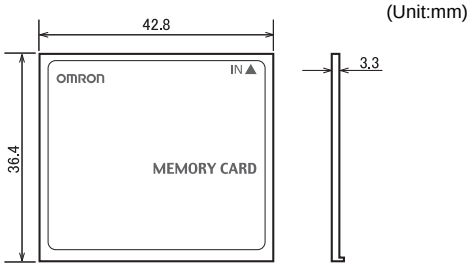
Specification

Power supply voltage	20.4 to 26.4 VDC
Current consumption	700mA max.
Vibration resistance	10 to 150 Hz; half-amplitude: 0.1 mm; maximum acceleration: 15 m/s2, 10 times for 8 minutes
Shock resistance	150 m/s^2, 3 times each in 6 directions
Ambient temperature range	Operating: 0 to 50°C (with no condensation) Storage: -25 to 65°C (with no condensation)
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)
Ambient environment	No corrosive gases
Degree of protection	IEC60529 IP20 (in-panel)
Materials	Case: ABS/PCDisplay surface: PMMA (Acrylic)
Weight	Approx. 610g
Accessories	Four mounting brackets

Characteristics

Panel size	5.7 inches (116.16 × 87.12 mm (H × V))
Panel type	TFT color liquid crystal
Resolution	620 × 480 dots
Image pitch	0.1815 × 0.1815 mm (H × V))
Contrast	850:1 (typical)
Viewable angle	80° up/down and 80° left/right (with a contrast ratio > 10:1)
Luminance	400 cd/m^2 (typical)
Backlight	LED
Response speed	18 ms (typical)
Input signal	NTSC composite video (1.0 V/75 Ω termination)

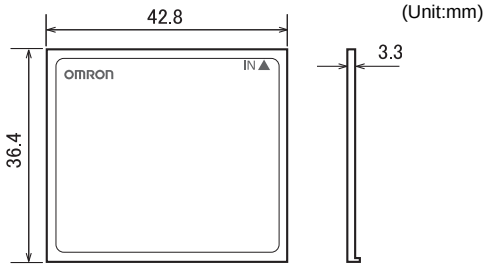
Memory Cards
F160-N128S



Specification

Ambient temperature range	Operating: 0 to 60°C (with no condensation) Storage: -25 to 85°C (with no condensation)
Ambient humidity range	Operating and storage: 8% to 95% (with no condensation)
Ambient environment	No corrosive gases
Life expectancy	300,000 overwrite operations
Number of pins	50 pins
Weight	Approx. 15g

Application Software
F250-UME



Specification

Ambient temperature range	Operating: 0 to 60°C (with no condensation) Storage: -25 to 85°C (with no condensation)
Ambient humidity range	Operating and storage: 8% to 95% (with no condensation)
Ambient environment	No corrosive gases
Life expectancy	300,000 overwrite operations
Number of pins	50 pins
Weight	Approx. 15g

Connecting a Strobe Device

Use the camera's corresponding strobe trigger output signal (STGOUT0, STGOUT1) to control the strobe flash timing.

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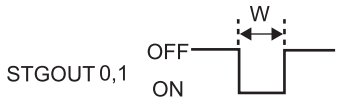
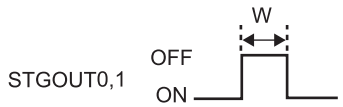
Check the strobe device's specifications and set the appropriate "Shutter trigger polarity" and "Shutter trigger width" in the Camera settings (Detail) Menu.The Camera settings (Detail) window is displayed at startup and can be displayed at other times by selecting Camera settings from the System Menu.

Strobe specifications	Shutter trigger Shutter trigger polarity	Shutter trigger width
When the flash is synchronized to the OFF-to-ON transition of the strobe trigger signal 	Positive	The "shutter trigger width" setting determines the pulse width W. Can be set to match the strobe's specifications. • When using a Double-speed Camera: W = Shutter trigger width setting (H) 32 µs (1H = 32 µs)
When the flash is synchronized to the ON-to-OFF transition of the strobe trigger signal 	Negative	• When using a Camera other than a Double-speed Camera: W = Shutter trigger width setting (H) 63 µs (1H = 63 µs) Note: Depending upon the timing, W may have an error of up to 1H.

Combining an OMRON Camera and Strobe

The following table shows the timing polarity.
Use a strobe that is compatible with this timing.

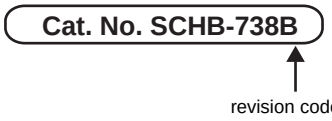
Camera	Shutter trigger polarity	Shutter trigger width	
F150-S1A	Positive	3H (1H = 63 µs)	(*)
F160-S2	Positive	3H (1H = 32 µs)	(*)
F300-S	Positive	Can be set to match the strobe's	
F300-S2R	Negative	7H (1H = 63 µs)	
F300-S3DR			
F300-S4R			

(*) The window used to change the shutter trigger polarity and shutter trigger pulse will not be displayed when an F150-S1A or F160-S2 Camera is connected, but the STGOUT0, STGOUT1 signals will be output with the polarity and width shown in the table above.

MEMO

Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.



Revision	Date	Revised content
B	03 January	Orginal Production of English Version
B	04 June	Added warranty and other PL-related information
B	04 October	Added warranty and other PL-related information
B	05 March	Added warranty and other PL-related information
B	05 November	Changed descriptions on Monitor Cable
B	07 April	Changed external dimension drawing and Optical Chart
B	09 February	Changed cabling errors
B	10 December	Minor corrections

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