

Intuitive Vision System CV-X Series

Setup Manual

(Area Camera Edition)

Read this manual before use.

Keep this manual in a safe place for future reference.



Introduction

This manual describes the setup procedures required for connections and initial installation of the CV-X Series (hereafter referred to in this manual as "the controller"), as well as related information and product specifications. Read this manual thoroughly in order to understand how the controller works and to maximize the performance of the controller.







This manual applies to the CV-X100/X200/X300/X400 Series. However, unless otherwise specified, the description in this manual basically refers to the CV-X472. For differences in specifications depending on the model, refer to "Main Specifications" (Page 4-32) and "CV-X Series User's Manual".

Always keep this manual in a safe place for future reference.

Please ensure that the manual is passed to the end user of the software.

Symbols

The following warning symbols are used to ensure safety and to prevent human injury and/or damage to property when using the system.

 DANGER	It indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	It indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	It indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	It indicates a situation which, if not avoided, could result in product damage as well as property damage.
 Important	It indicates cautions and limitations that must be followed during operation.
 Point	It indicates additional information on proper operation.
 Reference	It indicates tips for better understanding or useful information.

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Libraries and programs

libjpeg



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This software is based in part on the work of the Independent JPEG Group.


Safety information for CV-X Series

Safety Precautions


General Cautions

 DANGER	<ul style="list-style-type: none"> Do not use this product for the purpose to protect a human body or a part of human body. This product is not intended for use as explosion-proof product. Do not use this product in a hazardous location and/or potentially explosive atmosphere.
 CAUTION	<ul style="list-style-type: none"> You must verify that this product is operating correctly in terms of functionality and performance before the start and the operation of this product. We recommend that you take substantial safety measures to avoid any damage in the event of an assumed problem occurring.
NOTICE	<ul style="list-style-type: none"> Do not modify this product, or use it in any way other than described in the specification. When this product is used in combination with other instruments, functions and performance may be degraded, depending on the operating conditions and surrounding environment. Do not subject the controller or connected devices to a sudden change in temperature. There is the risk of condensation occurring.

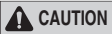
General cautions for the controller

 CAUTION	<ul style="list-style-type: none"> Do not use with any power voltage other than 24 VDC. Doing so may cause fire, electric shock, or product malfunction. Do not disassemble or modify the unit. Doing so may cause fire or electric shock.
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Operating environment and conditions

 CAUTION	<p>To use the system properly and safely, avoid installing this unit in the following locations. Doing so may cause fire, electric shock, or product malfunction.</p> <ul style="list-style-type: none"> Locations that contain moisture or dust, or that are poorly ventilated. Locations where the system is exposed to direct sunlight or temperature increases. Locations where there are flammable or corrosive gases. Locations where the unit may be directly subjected to vibration or impact. Locations where water, oil or chemicals may splash onto the unit. Locations where static electricity is present or electric discharge may occur.
NOTICE	<ul style="list-style-type: none"> Keep this unit and cables away from high-tension cables and power lines. Otherwise, noise may cause malfunction or accidents. Bundle cables with the camera cable protector (OP-88208) or protective material like spiral tubing. Direct bundling will concentrate the cable load on the bindings, which can result in cable damage or a short circuit. The controller and optional devices are precision components. To maintain performance do not subject them to vibration or shock.

Measures to be taken when an abnormality occurs

 CAUTION	<p>In the following cases, turn the power OFF immediately. Using the unit in an abnormal condition may cause fire, electric shock, or product malfunction. Contact your local Keyence office for repair.</p> <ul style="list-style-type: none"> If water or debris enters the system If the system is dropped or the case is damaged If smoke or a burning smell emits from the controller
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Usage

NOTICE	<ul style="list-style-type: none"> Before making any connections/disconnections, be sure to turn off the power of this unit and connected devices. Failure to do so may result in a malfunction of the controller or connected devices. Do not turn the power off while you are programming. Otherwise, all or part of the program settings may be lost. Do not block the ventilation holes. Otherwise, the inside temperature may rise and a malfunction may occur. Do not allow an excessive amount of sunlight or bright indoor light to enter the camera for a long period of time. Doing so may cause damage to the CCD inside the camera.
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Maintenance

NOTICE	<ul style="list-style-type: none"> Do not clean with benzene, thinner, or alcohol. Doing so may cause discoloration or deformation of the unit. If the unit has any dirt on it, wipe it off with a cloth moistened with a mild detergent, then wipe with a dry cloth.
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Precautions on Regulations and Standards

CE marking

KEYENCE evaluates compliance with the requirements of the EU directive according to how products fulfill the below conditions. KEYENCE has confirmed that this product meets these requirements. When this product is used in EU nations, take note of the following precautions.

EMC Directive

- Applicable standard EN61326-1, Class A
- This product is intended to be used in an industrial environment.
- Use cables shorter than 30 m to connect this product and its external devices.
- Be sure to connect the ground terminal to a grounding.

Remarks: These specifications do not give any guarantee that the end-product with this product incorporated complies with the essential requirements of EMC Directive. The manufacturer of the end-product is solely responsible for the compliance on the end-product itself according to EMC Directive.

FCC Regulations

This product complies with the following EMI regulation specified by the FCC.

- Applicable regulation FCC Part 15 Subpart B Class A
- 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.
- FCC CAUTION
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

KC mark (Republic of Korea)

Class A device

This product is an industrial electromagnetic wave generating device (Class A) and is intended for use in establishments other than domestic.

A 급 기기 (업무용 방송통신기자재)

이 기기는 업무용(A 급) 전자파적합기기로서 판매자또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

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Chapter

1

Before Setting Up

Documentation for the installation and configuration methods of the controller, software, and CAD data can be downloaded from the following URL.

www.keyence.com/cvxus

Standard System Configuration

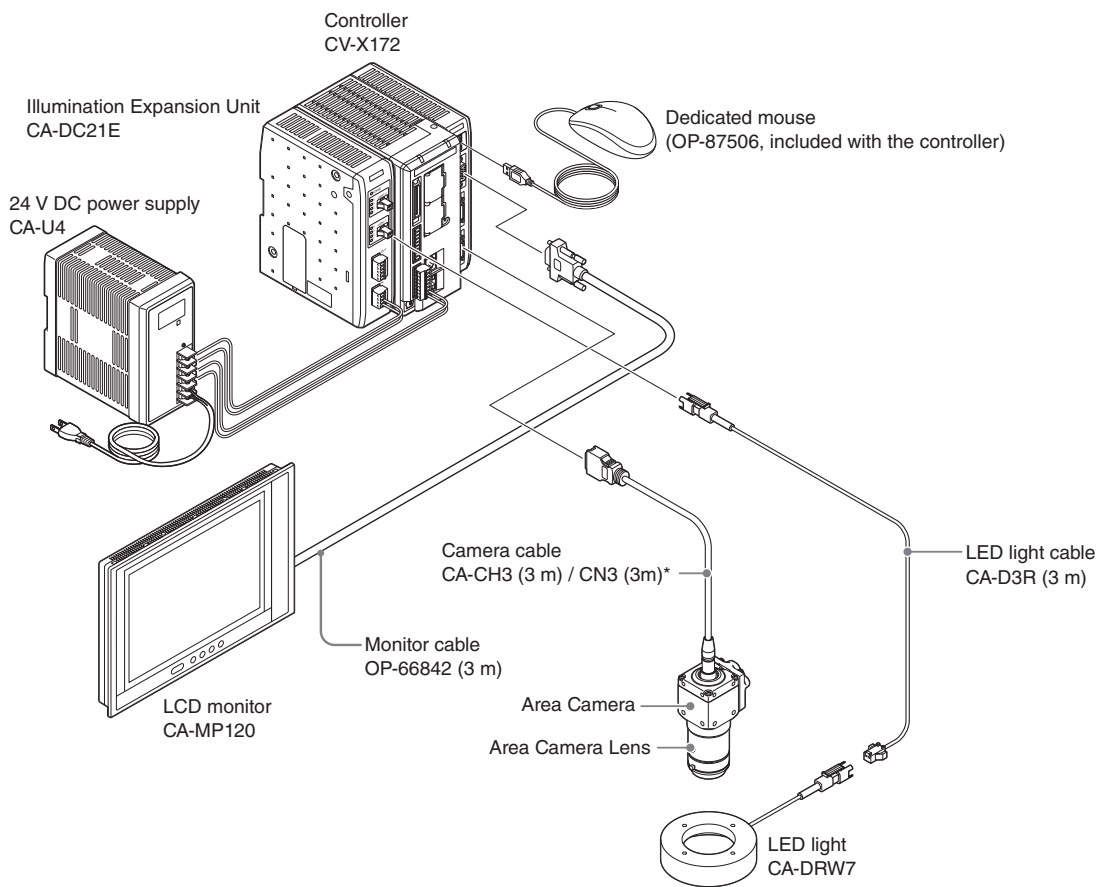
By combining various optional (sold separately) products, such as a camera, with the controller, this unit can support many applications. Typical basic system configurations that use an area camera are introduced below.

Reference

- Refer to "Main Specifications" (Page 4-32) for more details about the options which can be used with this controller.
- Except for the controller and the dedicated mouse, all the listed products are optional (sold separately).

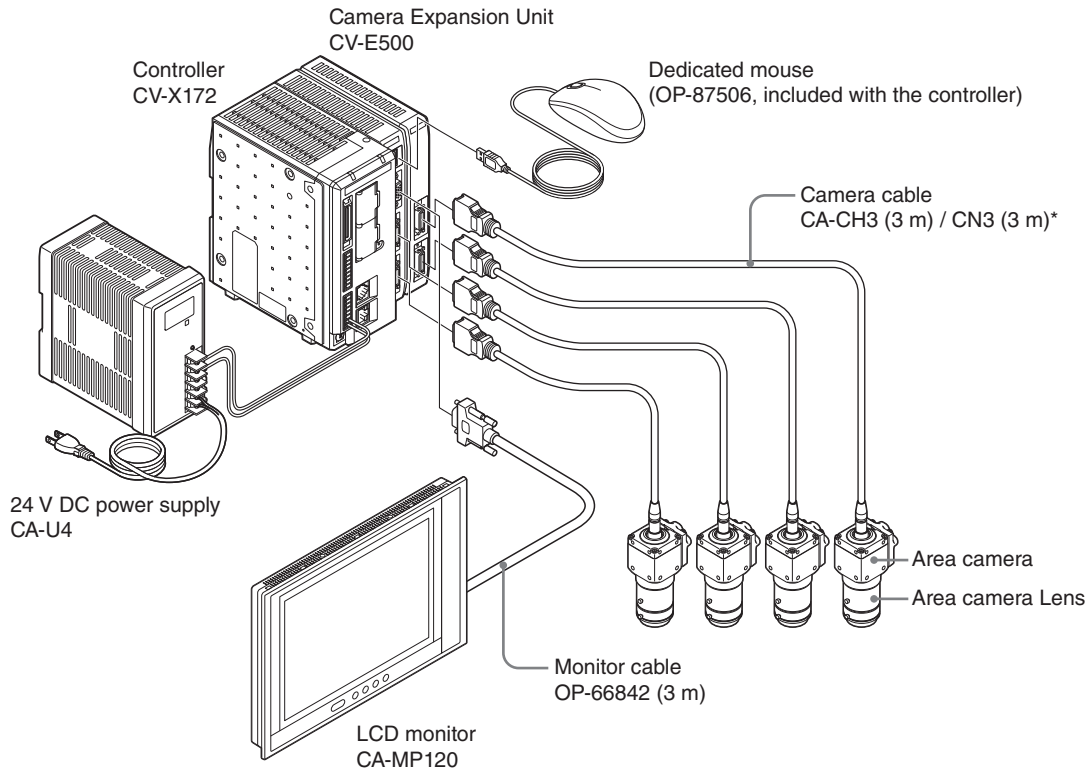
CV-X100 Series

Example of a standard system setup with one camera connected to the CV-X100 Series



* The camera cable that you can use varies depending on the camera model. For details, see "List of maximum cable lengths by camera" (Page 4-5).

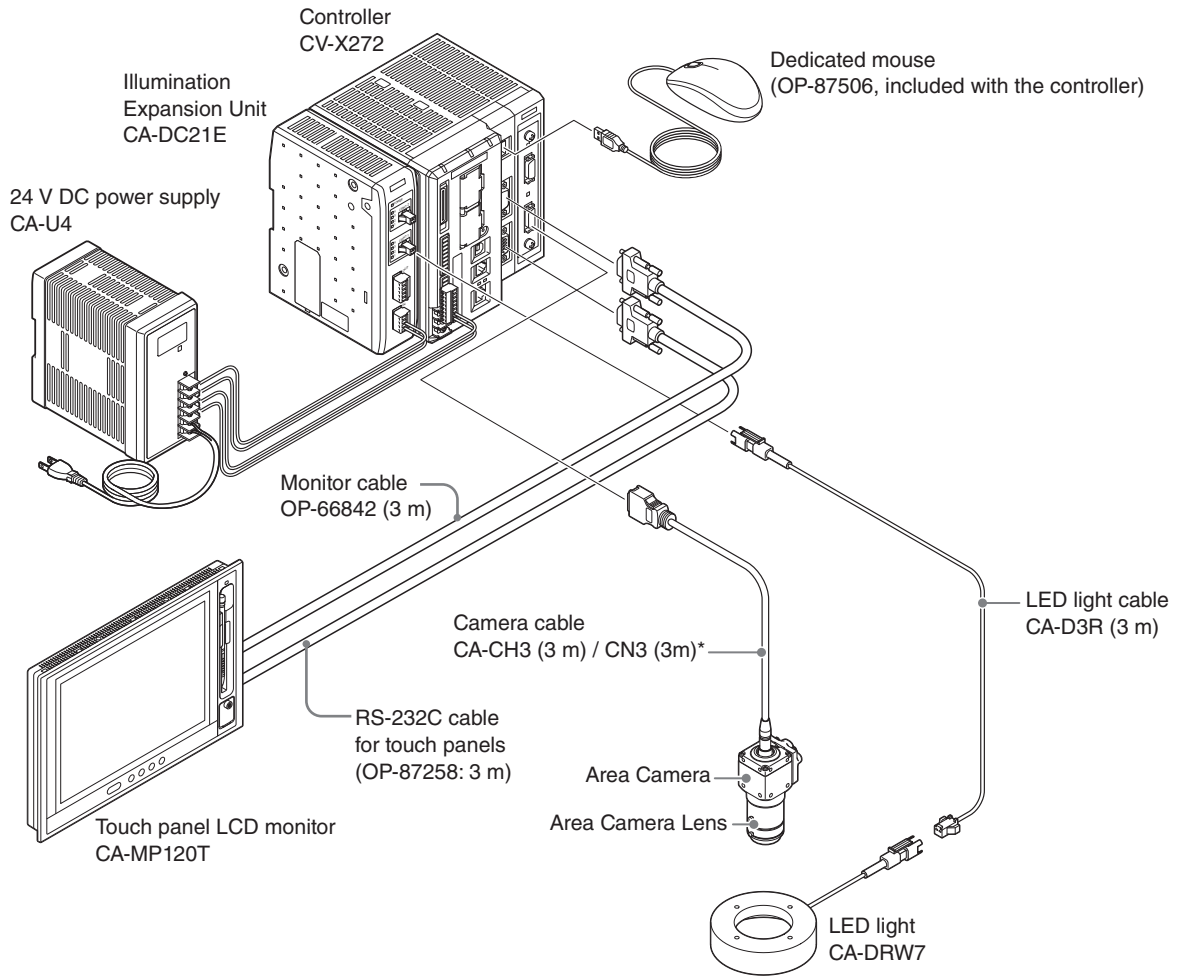
Example of a standard system setup with four cameras for CV-X100 Series



* The camera cable that you can use varies depending on the camera model. For details, see "List of maximum cable lengths by camera" (Page 4-5).

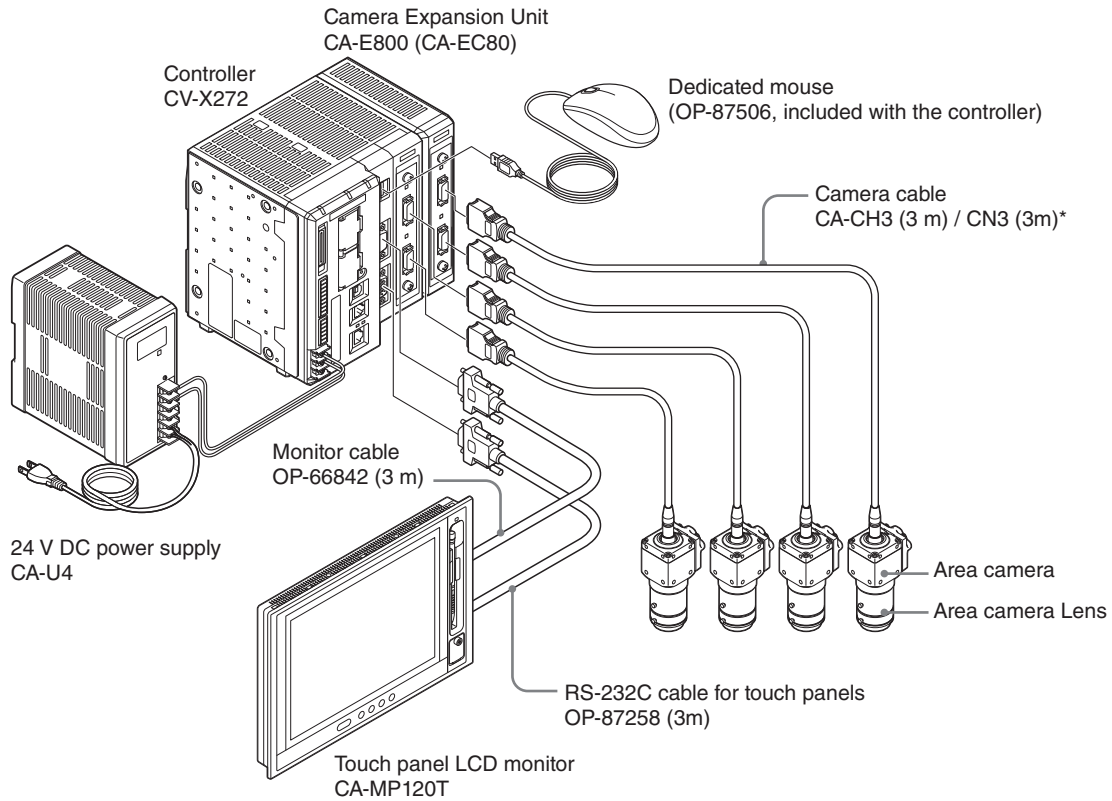
CV-X200 Series

Example of a standard system setup with one camera for CV-X200 Series



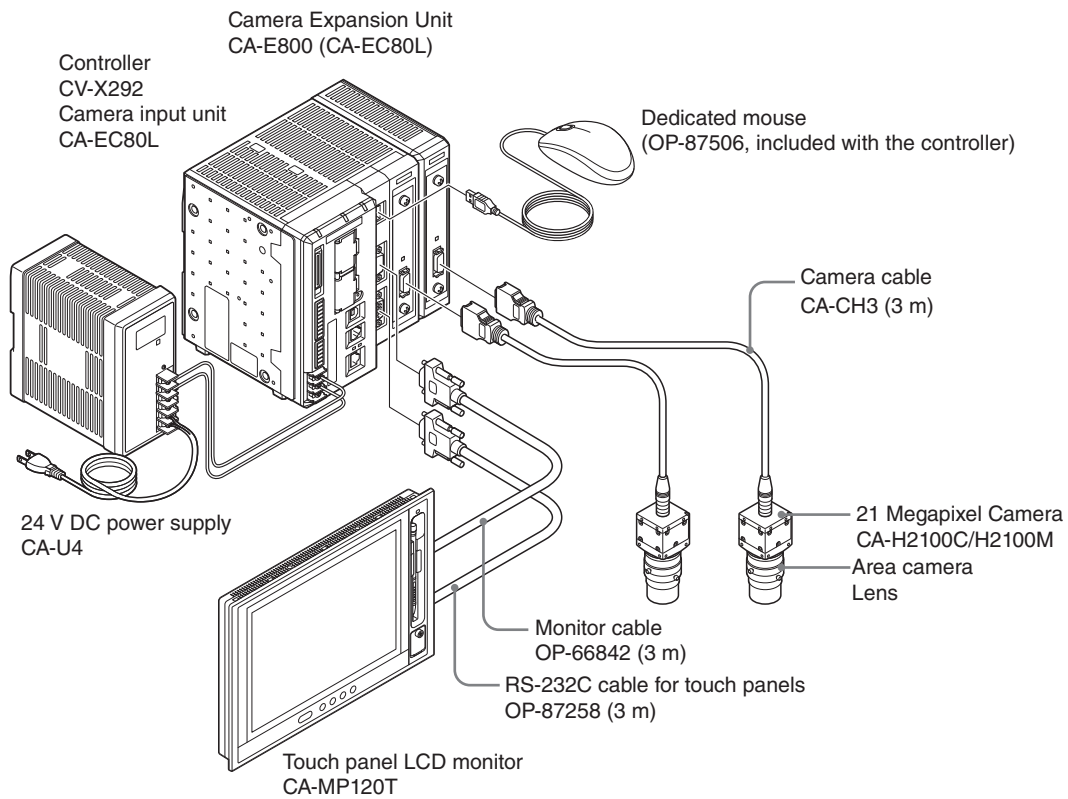
* The camera cable that you can use varies depending on the camera model. For details, see "List of maximum cable lengths by camera" (Page 4-5).

Example of a standard system setup with four cameras for CV-X200 Series



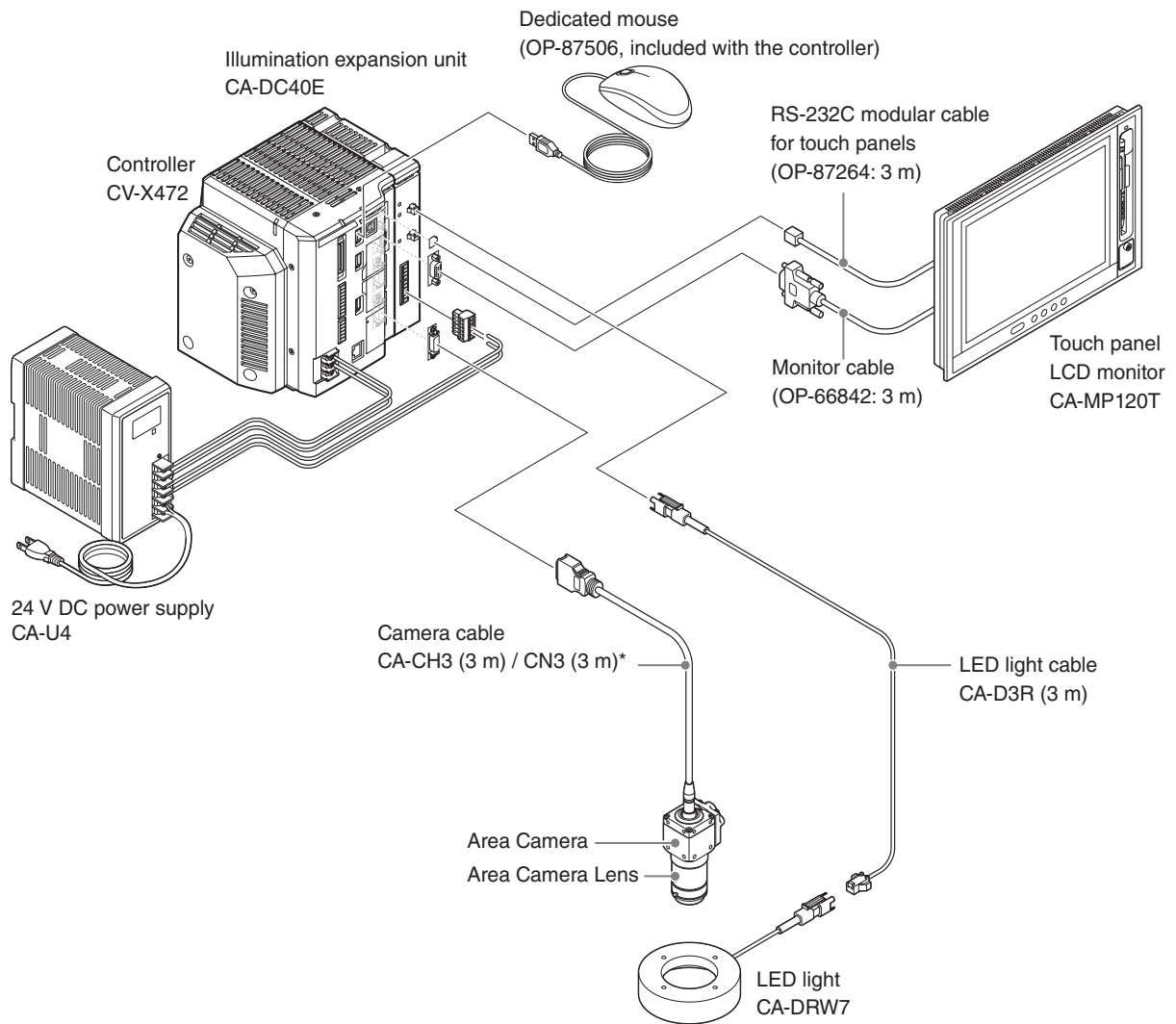
* The camera cable that you can use varies depending on the camera model. For details, see "List of maximum cable lengths by camera" (Page 4-5).

Example of a standard system setup with two units of CA-H2100C/H2100M for CV-X200 Series



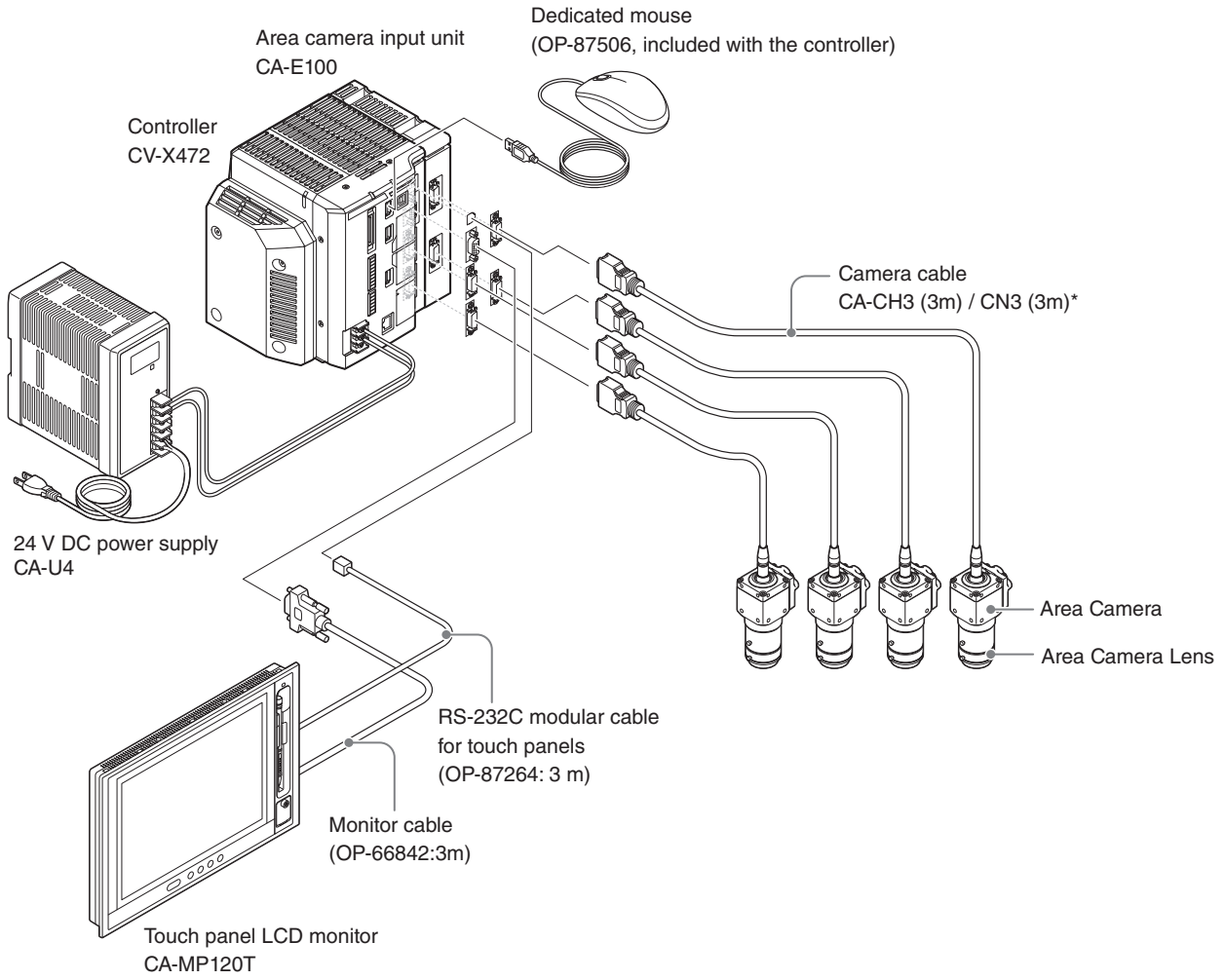
CV-X300/X400 Series

Example of a standard system setup with one camera connected to the CV-X300/X400 Series



* The camera cable that you can use varies depending on the camera model. For details, see "List of maximum cable lengths by camera" (Page 4-5).

Example of a standard system setup with four cameras for CV-X300/X400 Series

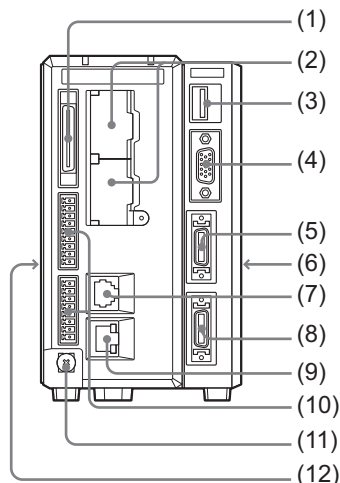


* The camera cable that you can use varies depending on the camera model. For details, see "List of maximum cable lengths by camera" (Page 4-5).

Identifying Controls and Connectors

CV-X100/X200 Series

Controller Unit (CV-X100 Series)



(1) Parallel I/O connector

Use to connect the parallel input/output signals.

(2) SD2 slot (upper), SD1 slot (lower)

Insert an SD card.

The lower slot (SD1) holds the included SD Card (512 MB or 1 GB) by factory default.

Important SD Card 1 must be inserted while the device is operating.

(3) USB connector for dedicated mouse

Use to connect the included dedicated mouse.

NOTICE The USB port is used exclusively for the dedicated mouse (OP-87506). If other equipment including a commercial USB mouse is connected, it can cause malfunction or damage to the controller or the connected device.

(4) RGB output terminal

Use to connect to an external monitor.

(5) Camera 2 connector

Use to connect camera 2.

(6) Expansion unit connector 1 (right side, only for CV-X152/X172)

Use to connect the camera expansion unit CV-E500.

(7) RS-232C connector

Use for RS-232C communication cable (OP-26487: 2.5 m, optional).

(8) Camera 1 connector

Use to connect camera 1.

(9) ETHERNET connector

Use to connect an Ethernet cable.

(10) Terminal Block

Use to connect power (24 VDC) and input/output signals.

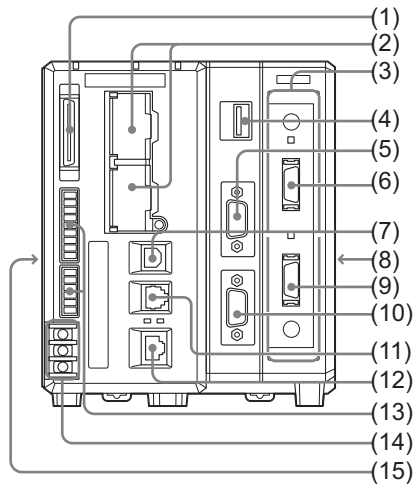
(11) Grounding terminal

Use to frame ground the unit.

(12) Expansion unit connector 2 (left side)

Use to connect the illumination expansion unit CA-DC10E/DC21E/DC30E.

Controller Unit (CV-X200 Series)



(1) Parallel I/O connector

Use for signal input and output.

(2) SD2 slot (upper), SD1 slot (lower)

Insert an SD card.

The lower slot (SD1) holds the included SD card (512 MB or 1GB) by factory default.



Important

SD card 1 must be inserted to operate the controller.

(3) Camera slot

Use to connect the camera input unit.

At the time of shipping, the camera input unit (CA-EC80) is connected to this slot.



Important

For CV-X292, the camera input unit is not connected since it is optional.

(4) USB connector for the dedicated mouse

Use to connect the included dedicated mouse.

NOTICE

The USB port is used exclusively for the dedicated mouse (OP-87506). Connecting other equipment including a commercial USB mouse can cause a malfunction or damage to the controller or connected devices.

(5) RGB output terminal

Use to connect to an external monitor.

(6) Camera 2 connector

Use to connect camera 2.

(7) USB connector

Use to connect a USB cable.

(8) Expansion unit connector 1

(right side, only for CV-X252/X272/X292)

Use to connect the camera expansion unit (CA-E800).

(9) Camera 1 connector

Use to connect camera 1.

(10) TOUCH PANEL port

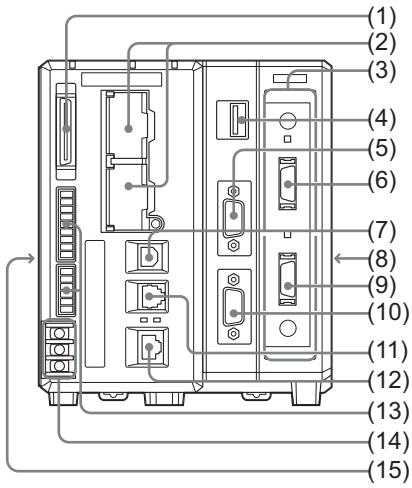
Use to connect an optional RS-232C cable for the touch panel (OP-87258: 3m/OP-87259: 10m).

(11) RS-232C port

Use to connect an optional RS-232C communication cable (OP-26487: 2.5m) or an optional RS-232C modular cable for touch panels (OP-87264: 3m/OP-87265: 10m).

Reference

By default, the RS-232C port is used for data output and command control. For details about how to change the setting, see the "CV-X Series User's Manual".



(12) ETHERNET connector

Use to connect an Ethernet cable.

(13) Terminal block

Use for signal input and output.

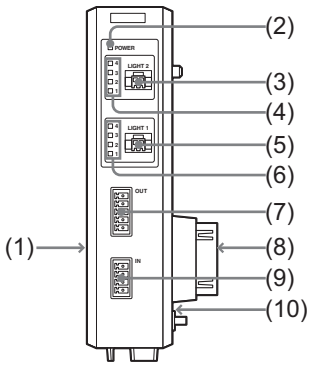
(14) Power and ground terminals

Use to connect power (24 V DC) and the ground wire.

(15) Expansion unit connector 2 (left side)

Use when connecting the illumination expansion unit CA-DC10E/DC21E/DC30E.

Illumination Expansion Unit (CA-DC21E: CV-X100/X200 Series Option)



(1) Connector on expansion unit side

Use when connecting two or more illumination expansion units.

(2) Power supply LED

Lit when the power is supplied to the illumination expansion unit.

(3) Light 2 output connector

Use to connect LED light No. 2.

(4) Light 2 intensity LED

Indicates the intensity of Light 2 in four steps*.

(5) Light 1 output connector

Use to connect LED light No. 1.

(6) Light 1 intensity LED

Indicates the intensity of Light 1 in four steps*.

(7) OUT Connector Terminal Block

Use when connecting lights directly to the terminal block.



Point

Do not use if the KEYENCE LED light emitter is connected.

(8) Controller connector

Connect to the controller.

(9) IN Connector Terminal Block

Use this to supply power to the illumination expansion unit, and to control the forced light off input.

(10) DIP switch for output voltage change

Use to select the output voltage on the output connector (Page 3-14).



CAUTION

Correctly set the voltage for the illumination unit on the CA-DC21E illumination expansion unit. Erroneously connecting a 12 V illumination unit to an output connector whose set voltage has been changed to 24 V may result in fire, electrical shock, or equipment failure.

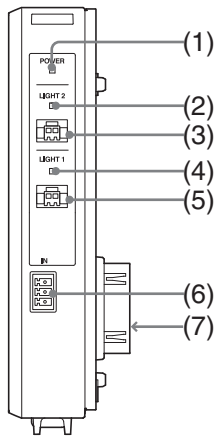


Point

* What the intensity LED indicates

If the light is enabled in the controller settings and is functioning normally, one LED lights up in green when the illumination level setting is 0 to 38, two LEDs light up in green when this setting is 39 to 64, three LEDs light up in green when this setting is 65 to 127, and three LEDs light up in green and one LED lights up in orange when this setting is 128 or higher.

Illumination Expansion Unit (CA-DC10E: CV-X100/X200 Series Option)



(1) Power supply LED

Lit when the power is supplied to the illumination expansion unit.

(2) Light 2 Status LED

Indicates the state* of Light 2.

(3) Light 2 output connector

Use to connect LED light No. 2.

(4) Light 1 Status LED

Indicates the state* of Light 1.

(5) Light 1 output connector

Use to connect LED light No. 1.

(6) IN connector

Use this to supply power to the illumination expansion unit.

(7) Controller connector

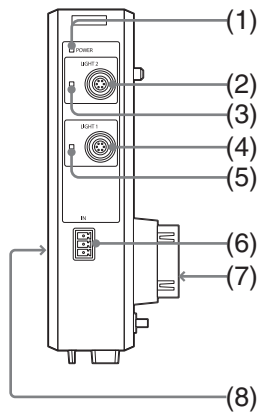
Connect to the controller.

! Point

* What the status LED indicates

- Green/orange: The light is enabled in the controller settings and is functioning normally (lights up in orange when the illumination level is set to 128 or higher).
- Off: No power is supplied to the controller or the illumination expansion unit, or the light is disabled in the controller settings.
- Red: Overcurrent has been detected due to the connected illumination unit exceeding the specification rating or a short in the cable, or voltage is not being correctly output due to a malfunction in the illumination expansion unit.

Illumination Expansion Unit (CA-DC30E: CV-X100/X200 Series Option)



(1) Power supply LED

Lit when the power is supplied to the illumination expansion unit.

(2) Light 2 output connector

Use to connect LED light No. 2.

NOTICE

If the light connector is to be removed or attached, shut off the power supply to the illumination expansion unit. If the light connector is removed or attached while power is being supplied, this may cause the illumination expansion unit and the light emitter to malfunction or become damaged.

(3) Light 2 LED indicator

Lights green if Light 2 is correctly connected. Lights red in such cases as when the cable is disconnected.

(4) Light 1 output connector

Use to connect LED light No. 1.

NOTICE

If the light connector is to be removed or attached, shut off the power supply to the illumination expansion unit. If the light connector is removed or attached while power is being supplied, this may cause the illumination expansion unit and the light emitter to malfunction or become damaged.

(5) Light 1 LED indicator

Lights green if Light 1 is correctly connected. Lights red in such cases as when the cable is disconnected.

(6) Power supply connector

Use to connect 24 V DC power supply.

(7) Controller connector

Connect to the controller.

(8) Connector on expansion unit side

Use when connecting two or more illumination expansion units.

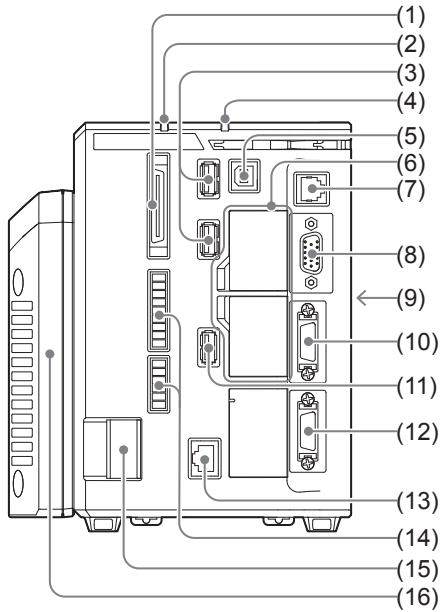
Point

* What the status LED indicates

- Green: The light is enabled in the controller settings and functioning normally.
- Off: No power is supplied to the controller or the illumination expansion unit, or the light is disabled in the controller settings.
- Red: Breakdown of the illumination unit or cable disconnection has been detected, or voltage is not being correctly output due to a malfunction in the illumination expansion unit.

CV-X300/X400 Series

Controller (CV-X300/X400 Series)



(1) I/O (Parallel I/O) connector

Use to connect the parallel input/output signals.

(2) Power supply LED

Lights up when the power supply is being fed to the unit.

(3) USB connector for the dedicated mouse

Connects the dedicated mouse (OP-87506, included in the package).

NOTICE	The USB connector for the dedicated mouse is used exclusively for the dedicated mouse (OP-87506, included in the package). Connecting other equipment including a commercial USB mouse can cause a malfunction or damage to the controller or connected devices.
---------------	--

(4) Error LED

Lights up in conjunction with the ERROR output terminal turning ON.

(5) USB connector

Use to connect a USB cable.

(6) SD2 slot (upper), SD1 slot (lower)

Insert an SD card.

The accessory SD card (CA-SD1G: 1 GB, or OP-87133: 512 MB) is inserted as SD card 1 in the lower slot (SD1).



SD Card 1 must be inserted to operate the controller.

(7) RS-232C port

Use to connect an optional RS-232C communication cable (OP-26487: 2.5 m) or an optional RS-232C modular cable for touch panels (OP-87264: 3 m/OP-87265: 10 m).



By default, the RS-232C port is used for data output and command control. For details about how to change the setting, see the CV-X Series User's Manual.

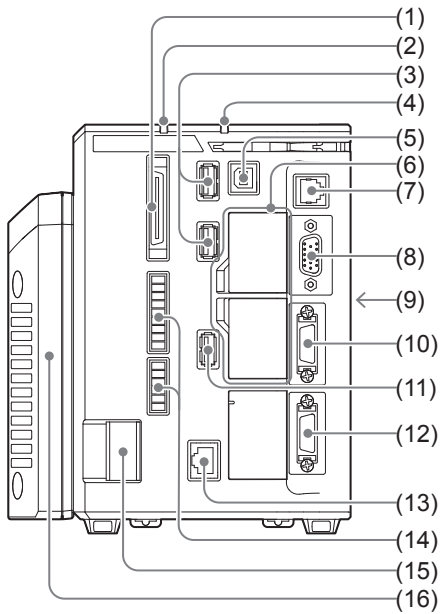
(8) MONITOR (RGB output) terminal

Use to connect to an external monitor.

NOTICE	The unit's power GND (0V) is shared in common with the connector shield and signal GND. If there is a potential difference with the connection for the external monitor, this may result in breakdowns or malfunctions of the unit and the connected external monitor. (Recommended monitors: CA-MP120/CA-MP120T)
---------------	---



The unit's monitor output is XGA (1024 × 768 pixels). If commercial analog RGB monitors other than XGA monitors are used, the display quality may worsen depending on the monitor's specifications, and images may not properly be displayed.



(9) Expansion unit connector (right side)

Use this when connecting various kinds of expansion units (camera input units and illumination expansion units).

(10) CAMERA 2 connector

Use to connect camera 2.

(11) USB HDD connector

Connect USB 3.0 or USB 2.0 compatible hard disks.

NOTICE	<p>The unit's power GND (0V) is shared in common with the connector shield and signal GND.</p> <p>If there is a potential difference with the connection for the USB HDD, this may result in breakdowns or malfunctions of the unit and the USB HDD.</p>
---------------	--

Reference	<ul style="list-style-type: none"> If there are concerns about the potential difference with the connections, then use a USB HDD which supports bus powered drives. <p>The unit's bus power feed capacity is 900 mA (USB 3.0 compatible). Check with the USB HDD manufacturer concerning the compatibility with bus powered drive of the USB HDD that you are using.</p> <p>In addition, do not use USB hubs since they may cause the feed capacities and the data transmission speeds to decrease.</p> <ul style="list-style-type: none"> For information about connecting and disconnecting the USB HDD, see "Connecting and Disconnecting the USB HDD (CV-X300/X400 Series Only)" (Page 2-28).
------------------	---

(12) CAMERA 1 connector

Use to connect to the camera 1.

(13) ETHERNET connector

Use to connect an Ethernet cable.

(14) OUT/IN connector (Terminal block)

Use for signal input and output.

(15) Power and ground terminals

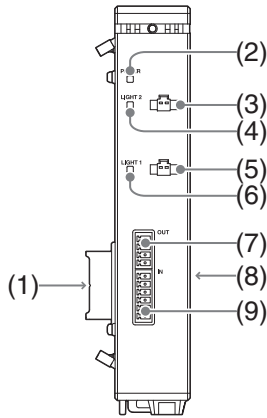
Use to connect power (24 V DC) and the ground wire.

(16) Fan unit (CV-X472/X482/X480LJ only)

Equipped with controller cooling fan unit (CA-F100).

NOTICE	<p>Although the equipped fan unit can be detached and replaced for maintenance, the controller cannot be operated with the fan unit detached.</p>
---------------	---

Illumination Expansion Unit (CA-DC40E: CV-X300/X400 Series Option)



(1) Connector on controller side

Connect the unit to the controller, or to a camera input unit or expansion unit already connected to the controller.

(2) Power supply LED

Lit when the power is supplied to the illumination expansion unit.

(3) Light 2 output connector

Connect the LED illumination unit of Light 2.

(4) Light 2 Status LED

Indicates the state* of Light 2.

(5) Light 1 output connector

Connect the LED illumination unit of Light 1.

(6) Light 1 Status LED

Indicates the state* of Light 1.

(7) OUT Connector Terminal Block

This is used when wiring a non-Keyence LED illumination unit directly to the terminal block.

	<p>Correctly set the voltage for the illumination unit on the CA-DC40E illumination expansion unit. If a 12 V illumination unit is mistakenly connected to the connector terminal block for which the set voltage has been changed to 24 V, this may cause a fire, electric shock, or product malfunction.</p>
--	--

	<p>Do not use if the Keyence LED light emitter is connected.</p>
--	--

(8) Connector on expansion unit side

This is used when connecting more than one illumination expansion unit.

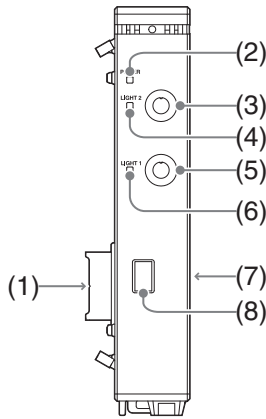
	<p>The camera input unit cannot be connected to the connector on the expansion unit side.</p>
--	---

(9) IN Connector Terminal Block

Use this to supply power to the illumination expansion unit, and to control the forced light off input.

	<p>* What the status LED indicates</p> <ul style="list-style-type: none"> - Green: The light is enabled in the controller settings and functioning normally. - Off: No power is supplied to the controller or the illumination expansion unit, or the light is disabled in the controller settings. - Red: Overcurrent has been detected due to the connected illumination unit exceeding the specification rating or a short in the cable, or voltage is not being correctly output due to a malfunction in the illumination expansion unit.
--	--

Illumination Expansion Unit (CA-DC50E: CV-X300/X400 Series Option)



(1) Connector on controller side

Connect the unit to the controller, or to a camera input unit or expansion unit already connected to the controller.

(2) Power supply LED

Lit when the power is supplied to the illumination expansion unit.

(3) Light 2 output connector

Connect the LED illumination unit of Light 2.

NOTICE	If the light connector is to be removed or attached, shut off the power supply to the illumination expansion unit. If the light connector is removed or attached while power is being supplied, this may cause the illumination expansion unit and the light emitter to malfunction or become damaged.
---------------	--

(4) Light 2 Status LED

Indicates the state* of Light 2.

(5) Light 1 output connector

Connect the LED illumination unit of Light 1.

NOTICE	If the light connector is to be removed or attached, shut off the power supply to the illumination expansion unit. If the light connector is removed or attached while power is being supplied, this may cause the illumination expansion unit and the light emitter to malfunction or become damaged.
---------------	--

(6) Light 1 Status LED

Indicates the state* of Light 1.

(7) Connector on expansion unit side

This is used when connecting more than one illumination expansion unit.

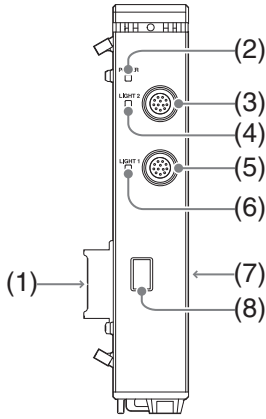
Point	The camera input unit cannot be connected to the connector on the expansion unit side.
--------------	--

(8) Power connector

This is used when connecting a power supply to the illumination expansion unit.

Point	<p>* What the status LED indicates</p> <ul style="list-style-type: none"> - Green: The light is enabled in the controller settings and functioning normally. - Off: No power is supplied to the controller or the illumination expansion unit, or the light is disabled in the controller settings. - Red: Breakdown of the illumination unit or cable disconnection has been detected, or voltage is not being correctly output due to a malfunction in the illumination expansion unit.
--------------	--

Illumination Expansion Unit (CA-DC60E: CV-X400 Series Option)



(1) Connector on controller side

Connect the unit to the controller, or to a camera input unit or expansion unit already connected to the controller.

(2) Power supply LED

Lit when the power is supplied to the illumination expansion unit.

(3) Light 2 output connector

Connect the LED illumination unit of Light 2.

NOTICE	If the light connector is to be removed or attached, shut off the power supply to the illumination expansion unit. If the light connector is removed or attached while power is being supplied, this may cause the illumination expansion unit and the light emitter to malfunction or become damaged.
---------------	--

(4) Light 2 Status LED

Indicates the state* of Light 2.

(5) Light 1 output connector

Connect the LED illumination unit of Light 1.

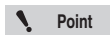
NOTICE	If the light connector is to be removed or attached, shut off the power supply to the illumination expansion unit. If the light connector is removed or attached while power is being supplied, this may cause the illumination expansion unit and the light emitter to malfunction or become damaged.
---------------	--

(6) Light 1 Status LED

Indicates the state* of Light 1.

(7) Connector on expansion unit side

This is used when connecting more than one illumination expansion unit.



Point

The camera input unit cannot be connected to the connector on the expansion unit side.

(8) Power connector

This is used when connecting a power supply to the illumination expansion unit.



Point

- * What the status LED indicates
- Green: The light is enabled in the controller settings and functioning normally.
 - Off: No power is supplied to the controller or the illumination expansion unit, or the light is disabled in the controller settings.
 - Red: Breakdown of the illumination unit or cable disconnection has been detected.

Chapter

2

Installation and Connection

Documentation for the installation and configuration methods of the controller, software, and CAD data can be downloaded from the following URL.

www.keyence.com/cvxus

Installing the Controller

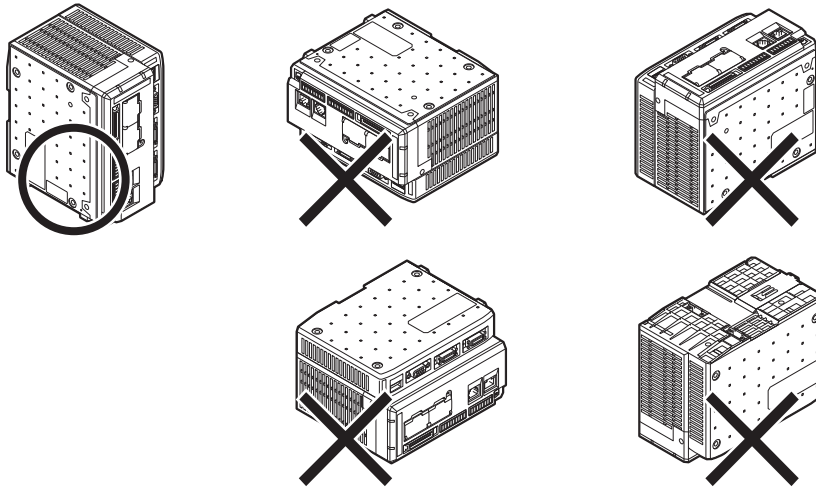
Install the controller to the DIN rail, or use the holes on the bottom of the controller to secure it with screws.

NOTICE

- Do not install the controller in a location with lots of dust or water vapor. The controller does not have a mechanism to protect it from dust or water. Dust or water entering the controller can cause damage to the controller.
- Turn off the controller when connecting or disconnecting an expansion unit, cable, or terminal block. Connecting or disconnecting a camera expansion unit, cable, or terminal block while connected to a power source may damage the controller or peripheral devices.
- When an expansion unit is not connected, keep the connector protection cover on the controller. Using the controller with the connector exposed may cause damage to the controller.

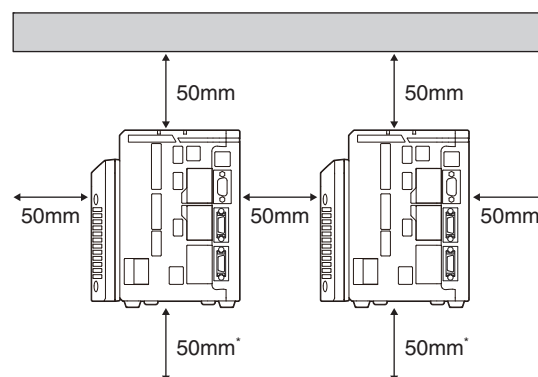
Caution on Direction of Controller Mounting

Install the controller in the direction indicated by the circle in the figure below.



Be careful in regard to cooling the unit in the installation site

- For ventilation, ensure a minimum of 50 mm of space above the controller unit and 50 mm of space on either side. So that the cables can be safely connected, ensure a minimum of 90 mm of space in front of the controller connector panel.
 - When two or more controllers are installed side by side, ensure a minimum of 50 mm of space between the controllers, and 50 mm above both controllers.
- * The CV-X400 Series can be used at a higher rated temperature if a space of 50 mm or more is guaranteed on each side, including the underside, when the product is mounted such as on a DIN rail.



NOTICE

- Do not block the ventilation openings (CV-X100/X200 Series: top and bottom, CV-X300/X400 Series: top, bottom, and left side) on the controller. If the vents are blocked, heat will accumulate inside the controller and can cause a system failure.
- If the temperature inside the control panel (CV-X100/X200 Series: the temperature at the front, top of the controller, CV-X300/X400 Series: the temperature at the bottom center of the controller) exceeds the rating, use forced air-cooling or increase the free space around the system to improve ventilation until the operating ambient temperature decreases below the rating.
- When mounting the CV-X100/X200 Series by its bottom surface, pierce holes in the surface at the positions of the ventilation openings on the bottom of the controller or perform similar operations to ensure that there is ventilation from the bottom of the controller to the top.
- When the temperature gets high inside the CV-X300/X400 Series controller unit, the unit may display abnormal heat generation alerts such as the following. (1) Warning: you are being notified that it is likely that operations may be terminated due to high temperatures, (2) Operations terminated: as the possibility of thermal runaway and unit damage occurring due to high temperature is high, operations are terminated as error state. If these alerts are displayed, quickly implement countermeasures, such as lowering the usage ambient temperature below the rated temperature, cooling the controller, and so on.
- Some CV-X400 Series models are factory-equipped with fan units (CA-F100) on their left sides. The fan units can be detached for maintenance and can be replaced, but the controller cannot be operated with its fan unit detached.

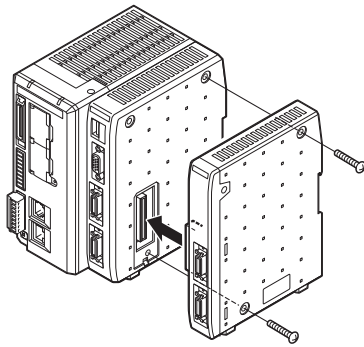
Installing the Expansion Units

CV-X100/X200 Series

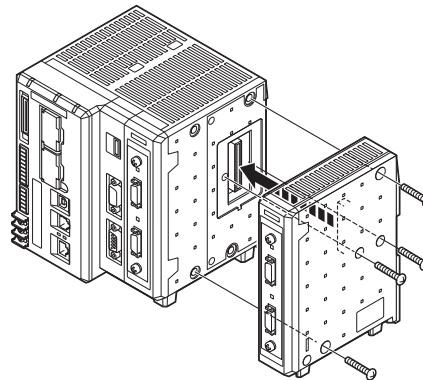
Installing the Camera Expansion Unit

When connecting more cameras, use the optional camera expansion unit CV-E500 (for CV-X172/X152) or the optional CA-E800 (for CV-X292/X272/X252) with a pre-installed camera input unit.

Remove the protective cover from connector 1 on the right side of the controller and install the camera expansion unit as shown below.



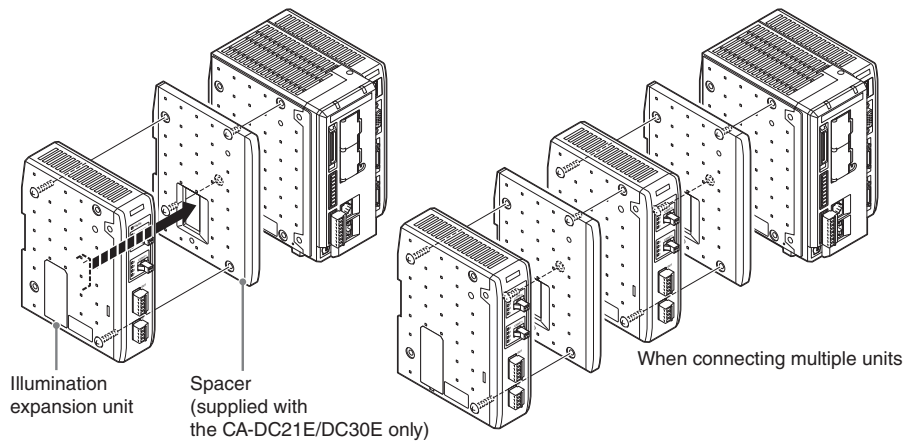
CV-X100 Series



CV-X200 Series

Installing the Illumination Expansion Unit

To control lighting from the controller, use the optional illumination expansion units. One CA-DC10E unit (two individual lighting units), up to four CA-DC21E units (eight individual lighting units), or up to two CA-DC30E units (four individual lighting units) can be connected to control lighting from a controller (you cannot connect a mixture of the CA-DC10E and CA-DC21E or CA-DC10E and CA-DC30E units). Remove the protective cover from connector 2 on the left side of the controller and install the illumination expansion unit as shown in the figure below (when CA-DC21E is connected to CV-X102).



Illumination expansion unit

Spacer (supplied with the CA-DC21E/DC30E only)

When connecting multiple units

NOTICE

- Turn off the power to the controller when connecting or removing each unit. Connecting or removing each unit while the power is being supplied may damage the controller or peripheral devices.
- When no unit is connected, place the connector protection cover back on the controller. Using the controller with the connector exposed may cause damage to the controller.
- When mounting the illumination expansion unit (CA-DC21E/DC30E), always mount the supplied attachments. The main unit and the illumination expansion unit can be damaged if the supplied attachments are not mounted (the CA-DC10E mounts directly to the controller without using the attachment).
- Turn off the power to the illumination expansion unit when connecting/removing the light head to/from the illumination expansion unit CA-DC30E. Connecting or removing the light head while the power is being supplied may damage the controller or peripheral devices.

When connecting both illumination expansion units CA-DC30E and CA-DC21E together

The illumination expansion units CA-DC30E and CA-DC21E can be connected in a mixed state. The maximum number of units for mixed connection is four (for eight lights). Of these four units, the CA-DC30E unit can make up only two of the units at most (for four lights).

CV-X300/X400 Series

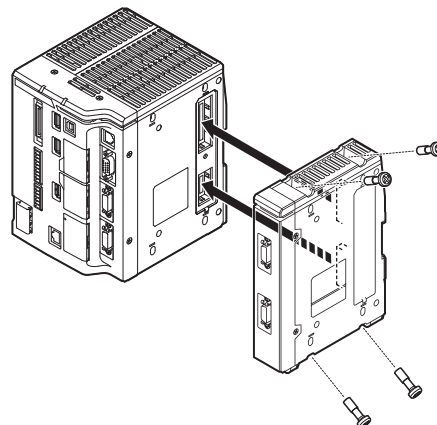
NOTICE

- Turn off the controller when connecting or disconnecting an expansion unit. Connecting or disconnecting an expansion unit while connected to a power source may damage the controller or peripheral devices.
- When an expansion unit is not connected, keep the connector protection cover attached. Using the controller with the connector exposed may cause damage to the controller.

Installing the Camera Input Unit

If you will connect three or more cameras, you can attach the CA-E100 camera input unit (sold separately) to the controller (this does not apply to the CV-X302/X402).

Remove the protective cover of the expansion unit connector from the right side of the controller, and then install the camera input unit as shown in the figure.



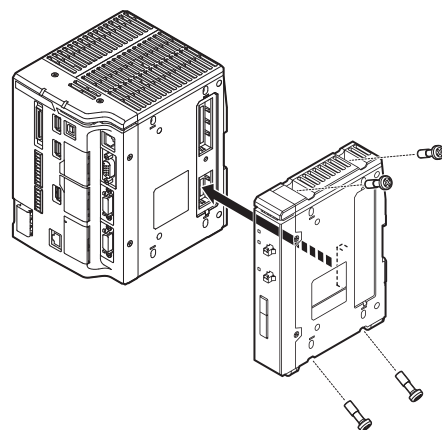
Point

- Illumination expansion units cannot be installed between camera input units and controllers.
- One CA-E100 for area cameras can be attached as a camera input unit to the controller (CV-X352/X322/X472/X452/X422).

Installing the Illumination Expansion Unit

If the illumination is to be controlled from the controller, up to a maximum of eight optional illumination expansion units (CA-DC40E/DC50E/DC60E) can be added (note that the maximum allowable number of CA-DC50E units and CA-DC60E units is two, respectively. However, the CV-X300 Series does not support CA-DC60E).

Remove the protective cover of the expansion unit connector from the right side of the controller and install the illumination expansion unit.

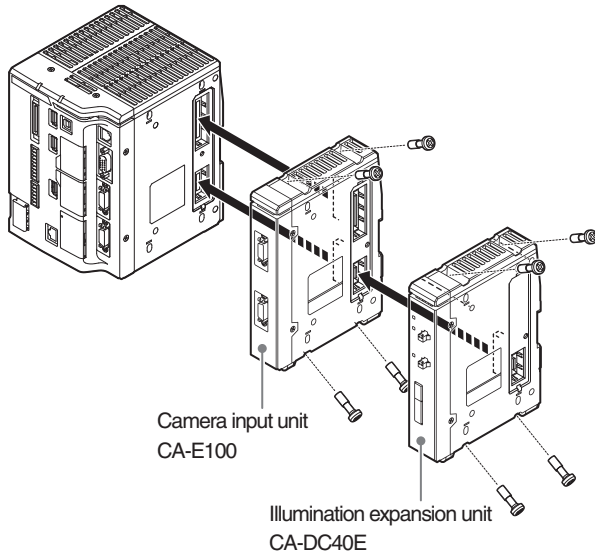


NOTICE

Stop the power supply to the controller and the illumination expansion unit when connecting or removing an illumination expansion unit. Connecting or removing the illumination expansion unit while connected to a power source may damage the controller or peripheral devices.

When Using the Camera Input Unit and Illumination Expansion Unit Together

Mount the camera input unit directly on the controller, and then mount the illumination expansion unit on the right side of the camera input unit.

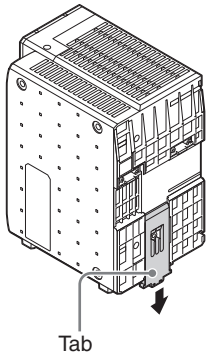


Point

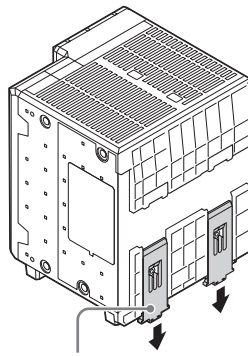
Illumination expansion units cannot be installed between camera input units and controllers.

Installing the Controller

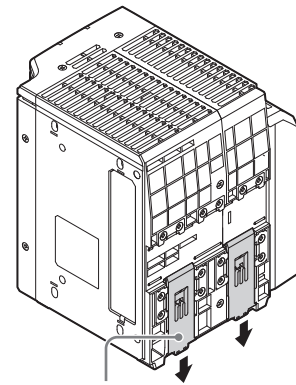
The controller and each unit are designed to be mounted on a DIN rail.



CV-X100 Series



CV-X200 Series



CV-X300/X400 Series

Pull the tab on the bottom in the direction of the arrow to mount or dismount the controller.

NOTICE

Mount the controller in a stable location that is free from vibration.

Reference

When mounting the controller by its bottom surface (M4 screws with a tightening torque of 0.8 Nm or less), you have to consider the heat radiated from the bottom surface. For details, see "Be careful in regard to cooling the unit in the installation site" (Page 2-3).

Installing the Camera

NOTICE
Notes on Electrical Insulation

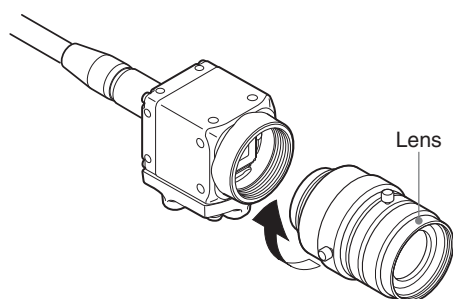
- The camera case acts as the ground for the camera circuit. There is continuity between the camera unit/connected metal components such as the lens/metallic connectors and the power GND. For secure insulation, be sure to use the plastic mounting brackets and screws that are supplied with the camera when installing the camera. If electrical potential or noise occurs at the installation location with no insulation provided, it may cause damage or malfunction of the camera.

1 Install the lens on the camera.

Select an appropriate lens according to the size of the object or distance between the object and the camera (Page 2-8).

Reference

For more details about how to attach a close-up ring between the camera and the lens, see "Using the Close-up Rings" (Page 2-9).


Important

- Do not touch the inside of the camera when installing the lens.
- Take care to ensure dust and/or foreign material does not enter into the camera.

2 Install the camera using the screw holes provided on the plastic mount.

There are three types of screw holes. Use the standard camera connection and appropriate screw holes suitable for the mounting setup.

Important

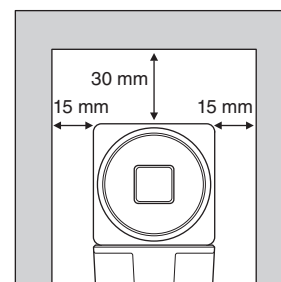
- When installing the camera, use a tightening torque of 0.5 Nm and a maximum tension of 30 N.
- Leave enough space around the lens to ensure easy adjustment of the focus and aperture (Page 2-25).
- If the camera is mounted where there is vibration, the lens mount or the lock screw for the lens may loosen. Use of a locking bond adhesive is recommended in such a case.
- Depending on the model of the camera, mounting the provided plastic mount on a side other than the bottom of the camera can cause gaps between the mount and the camera. If the installation needs to be very precise, try to fix the mount to the bottom of the camera as much as possible.

Reference

To allow for future adjustment of the camera, a 4-axis adjustable camera mount kit (CA-S20D) is available. Using slot holes for the mounting screws of the camera will allow for similar adjustments to be made.

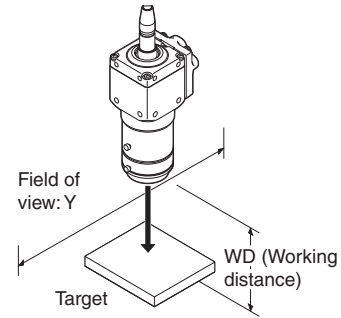
Warning on Installation Space for the Camera

When installing the camera, maintain 30 mm or more of space above the camera and 15 mm or more on both sides.



Selecting the Lens

Select the lens according to the size of the target (FOV (Field of view): Y) and the distance between the camera and the target (working distance). Select a suitable lens by referring to the FOV chart.



Reference The FOV chart differs depending on the models of the camera and lens to be used. For the FOV chart that corresponds to the various combinations of cameras and lenses, see "Field of View and the Working Distance by Camera (FOV Chart)" (Page 4-11).

Confirming the Working Distance from the FOV Chart

The numbers in the FOV chart represent the thickness required for the close-up ring. Install the close-up ring between the lens and the camera when required.

- Reference**
- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
 - If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.
 - For more details about the close-up ring, see "Using the Close-up Rings" (Page 2-9).

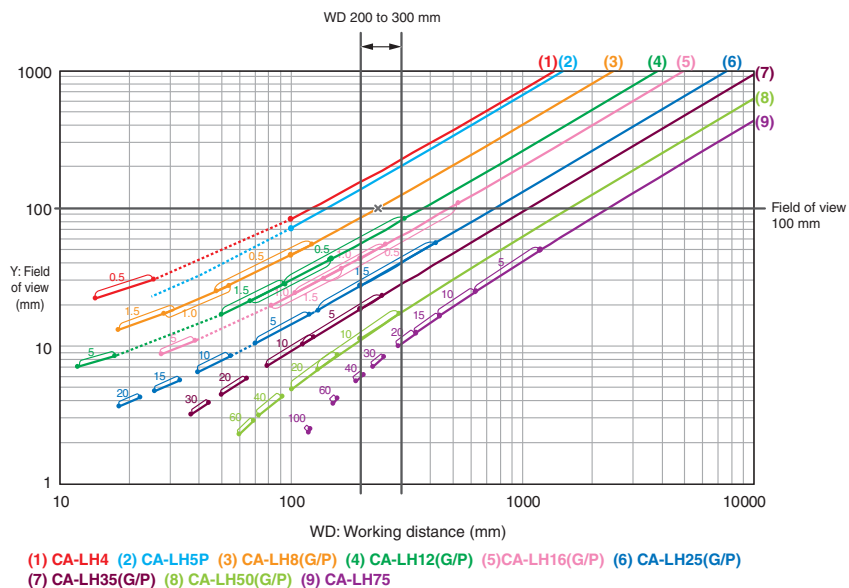
Lens selection example

The following describes the flow of selecting a lens when using an Environment resistant 0.35 megapixel camera (CA-035C) and a high precision lens (CA-LH*(G/P)) with the following conditions as an example.

Conditions

- With a target size of 60 mm and a conveyance error of ± 10 mm, the FOV must be 100 mm.
- The working distance (WD: distance from the tip of the lens up to the target) must be kept within a range of 200 to 300 mm.

Select a lens that matches the conditions from the FOV chart when using an Environment resistant 0.35 megapixel camera (CA-035C) and a high precision lens (CA-LH*(G/P)).

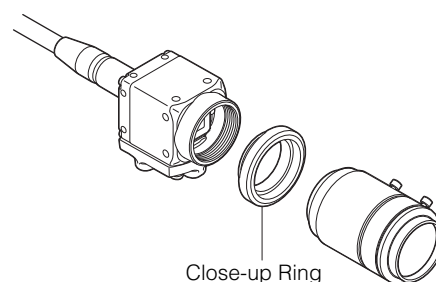


On the FOV chart, look for points that satisfy the necessary FOV within the required WD range. For the above conditions, (3) CA-LH8 (G/P) (close-up ring: none) satisfies the conditions.

Reference The FOV chart differs depending on the models of the camera and lens to be used. For the FOV chart that corresponds to the various combinations of cameras and lenses, see "Field of View and the Working Distance by Camera (FOV Chart)" (Page 4-11).

Using the Close-up Rings

The close-up ring is installed between the camera and the lens. Close-up rings are available in a set of five different sizes of 0.5 mm, 1.0 mm, 5 mm, 10 mm, and 22 mm (OP-51612, optional). If a single ring does not provide the required thickness, combine multiple rings.



- Use the 5 mm (OP-51500) or 10 mm (OP-51501) close-up ring when using the high-speed, small camera (CA-HS035M/HS035C) and the ultra small camera (CV-S035C/S035M).
- Use the 5 mm (OP-66830) or 10 mm (OP-66831) close-up ring when using the high-speed, small camera (CA-HS200C/HS200M) and the small camera (CV-S200C/S200M).

Point

- If you use the 0.5 mm or 1.0 mm close-up rings with other close-up rings, the lens may become loose through vibrations due to insufficient tightening with the camera. Use of a locking bond adhesive is recommended in such a case.
- If you use a close-up ring, the peripheral resolution performance of the lens may not be fully exploited.
- For more information about the required close-up ring thickness, see "Field of View and the Working Distance by Camera (FOV Chart)" (Page 4-11).

Looking up the FOV for the macro lens

- Use the formula below when calculating the macro lens field of view.
 Field of view (mm) in the Y direction = Image receiving element size in the Y direction ÷ Optical magnification
 For example, when CA-LM2 (2x optical magnification) is used with CA-035M, 3.3 (Image receiving element size in the Y direction) ÷ 2 (optical magnification) = 1.65 mm.
- The size of the Image receiving element in the Y direction for each type of camera is shown below.

Model	Image receiving element size	Number of pixels	Unit cell size	Image receiving element size in the Y direction
CA-035C/M	1/3-inch	640 x 480	6.9 μm	3.3 mm
CA-H035C/M		512 x 480		
CV-035C/M	1/3-inch	640 x 480	7.4 μm	3.6 mm
CV-H035C/M		512 x 480		
CA-H048CX/MX	1/3-inch	784 x 596	4.8 μm	2.9 mm
CA-HX048C/M		640 x 480		2.3 mm
		512 x 480		
CA-H100C/M	2/3-inch	1000 x 1000	7.4 μm	7.4 mm
CA-200C/M	1/1.8-inch	1600 x 1200	4.5 μm	5.4 mm
CA-H200C/M		1024 x 960		4.3 mm
CV-200C/M	1/1.8-inch	1600 x 1200	4.4 μm	5.3 mm
CV-H200C/M		1024 x 960		4.2 mm
CA-H200CX/MX	1/2-inch	1600 x 1200	3.45 μm	4.1 mm
CA-HX200C/M	2/3-inch	1600 x 1200	5.0 μm	6.0 mm
CA-H500C/M	2/3-inch	2432 x 2050	3.45 μm	7.1 mm
CV-H500C/M				
CA-H500CX/MX	2/3-inch	2432 x 2040	3.45 μm	7.0 mm
		1600 x 1200		4.1 mm
CA-HX500C/M	1-inch	2432 x 2040	5.0 μm	10.2 mm
		1600 x 1200		6.0 mm
CA-H2100C/M	4/3-inch	5104 x 4092	3.5 μm	14.3 mm
		2432 x 2050		7.0 mm

- The optical magnification is based on the optical design value. Individual variability will occur depending on assembly accuracy.

Point

The maximum image receiving element size that a macro lens can support is determined by its model. If you use a macro lens which does not support the image receiving element size, vignetting may occur or the area around the captured image may be dark due to the applied image size being insufficient.

Connecting Cables

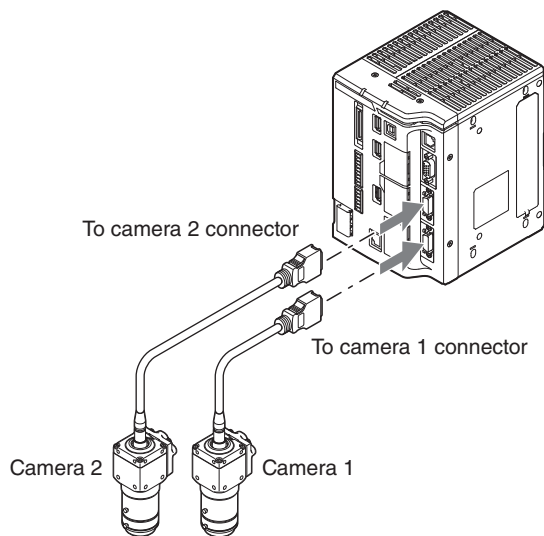
! Point

Notes when connecting cables or when wiring

- Make sure that there is no power to the controller before connecting cables or terminal blocks. Connecting cables or terminal blocks while the power is turned on may cause damage to the camera or peripherals.
- Bundle cables with protective material like a spiral tube. Direct bundling will concentrate load on the bindings of the cable, which can result in cable damage or short circuit.
- In the absence of other specifications, the minimum cable flexibility (R) should be 3 times the external diameter (5 times is recommended). Additionally, repeated flexing and twisting should be avoided. The minimum bend radius is the same, even when using high-flex cable. Unless otherwise stated, choose the R100 or greater when you use pair cable.

1 Connect the camera to the camera connector of the controller.

If connecting only a single camera, attach it to the camera 1 connector.



NOTICE

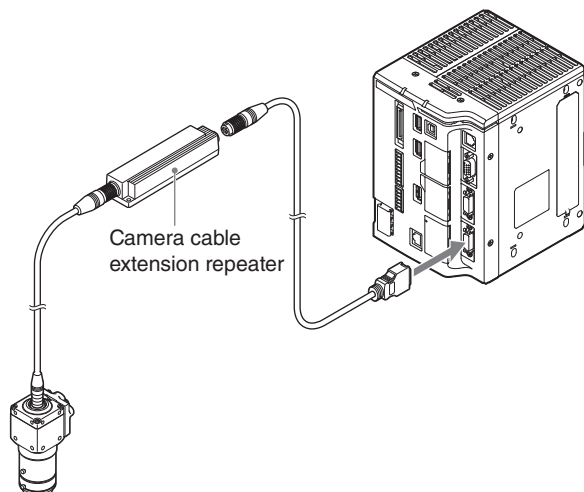
Do not connect cameras, LJ-V series heads, or camera cables, etc. which the controller does not support. This may cause failures, or breakdowns of the unit and connected devices.

! Point

- There are two types of area camera cables: the CA-CN** Series and the CA-CH** Series.
- For more details about the camera and cable combinations which the controller supports, see "List of maximum cable lengths by camera" (Page 4-5).

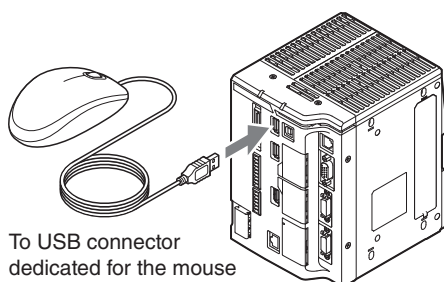
Using the camera cable extension repeater

Camera cables can be extended by using the camera cable extension repeater (Page 4-89).

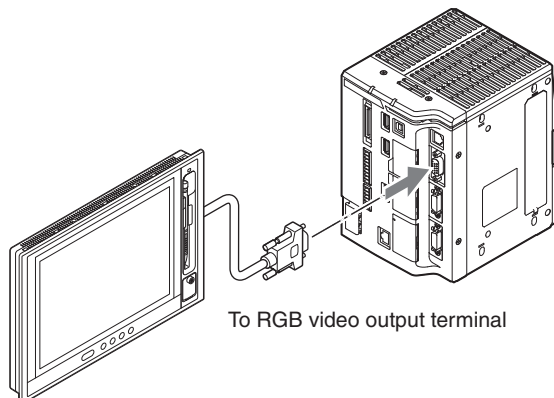


For more information on connection, read the instructions provided with the camera extension repeater.

- 2** Connect the dedicated mouse (OP-87506, included with the controller) to the USB connector which is dedicated for the mouse on the controller.



- 3** Connect the monitor to the video output terminal of the controller.

**NOTICE**

The connector shield, the monitor signal GND, and the power GND of the controller are common. Depending on the specifications of the monitor, the controller and/or the monitor may be damaged due to the voltage differences between GNDs (Recommended monitor: CA-MP120T/MP120). Damage may occur if using a 24V drive monitor for which the signal GND and power source are not insulated, a monitor with a built-in AC power supply, or a monitor that uses an AC adapter.

Point

- When using a commercial XGA (1024 x 768 pixels) in size, the displayed image quality may degrade and the screen may not appear correctly depending on the specifications of the monitor. (Recommended monitor: CA-MP120T/MP120)
- When connecting the controller via Keyence touch panel VT3 and VT3-VD4, use the special RGB cable (3 m) OP-66842 or RGB cable (10 m) OP-87055. If a commercial RGB cable is used, the screen may not be displayed correctly. Additionally, manually adjust the "RGB position". If set to "Default (Auto)", the screen may not appear correctly.

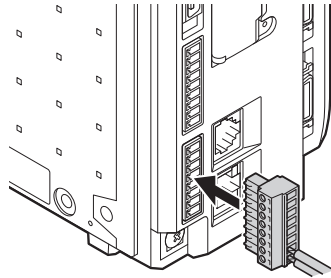
Connecting the 24 VDC Power Supply

CV-X100 Series

Supply 24 VDC to terminal numbers 7 and 8 of the INPUT connector.

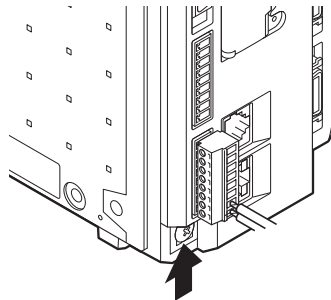
NOTICE	<ul style="list-style-type: none"> • Use a flat head screwdriver to connect the power supply to the input terminals. • Use a torque of 0.25 Nm or less to tighten the screws. • Use the electrical wires AWG14 to AWG22. • Do not solder-coat the end of the wire. Doing so may cause fire or product malfunction. • Make sure to connect the frame ground terminal for the 24 VDC power source to a type D ground. • Do not supply power until the installation is completed.
---------------	--

- 1 After stripping the insulating sheath by about 7 mm, insert the lead wires into terminal No. 7 (24 VDC) and No. 8 (0 V), and then insert the I/O terminal block into the I/O connector as far as it can go.**



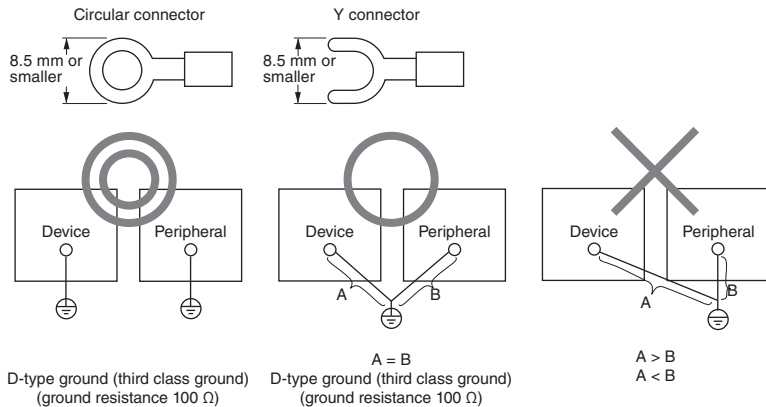
- 2 Connect the ground wire to the ground terminal.**

NOTICE	Do not connect the 0 V of the power terminal to the ground terminal or the ground wire.
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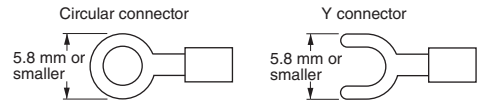
Connect the ground wire

NOTICE	<ul style="list-style-type: none"> • Ground each device separately. • Use a D type ground. • Keep ground resistance to 100 Ω or less. • Keep the ground wire as short as possible. • If it is not possible to ground each device separately, ground them together. However, make sure that the electrical cables are the same in length as shown below. • Solderless contact sizes are listed below. Contacts which fit M4 screws should be used. • Tighten the screws with a torque of 0.8 Nm.
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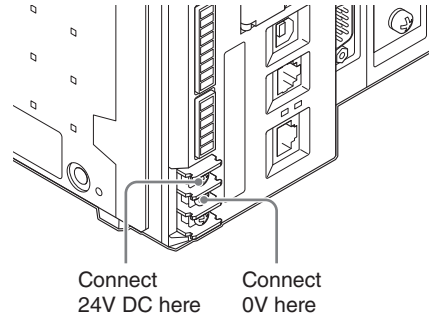
CV-X200 Series

NOTICE	<ul style="list-style-type: none"> • Use electrical wiring AWG14 to AWG22. • Make sure to connect the frame ground terminal for the 24 VDC power source to a type D ground. • The solderless terminal sizes are noted in the figure to the right. Terminals that fit M3 screws should be used. • Tighten the screws with a torque of 0.5 to 0.75 Nm.
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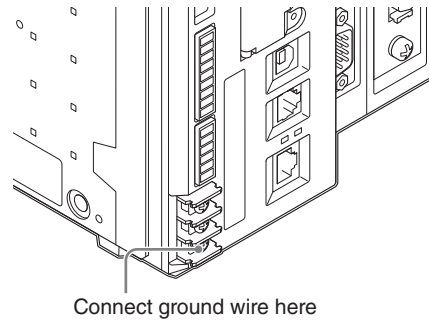


1 Connect 24 V DC and 0 V to the power terminals.

NOTICE	Do not connect the 0 V of the power terminal to the ground terminal or the ground wire.
---------------	---



2 Connect the ground wire to the grounding terminal.



NOTICE	<ul style="list-style-type: none"> • Ground each device separately. • Use a Class D ground. • Keep ground resistance to 100Ω or less. • Keep the ground wire as short as possible. • If it is not possible to ground each device separately, ground them together. However, make sure that the electrical cables are the same length.
---------------	--

D-type ground (third class ground)
(ground resistance 100 Ω)

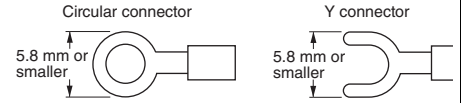
A = B
D-type ground (third class ground)
(ground resistance 100 Ω)

A > B
A < B

CV-X300/X400 Series

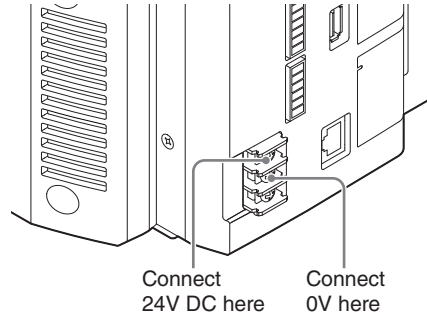
Connecting the 24 VDC Power Supply

NOTICE	<ul style="list-style-type: none"> • Use electrical wiring AWG14 to AWG22. • Make sure to connect the frame ground terminal for the 24 VDC power source to a type D ground. • The solderless terminal sizes are noted in the figure to the right. Terminals that fit M3 screws should be used. • Tighten the screws with a torque of 0.5 to 0.75 Nm.
---------------	--

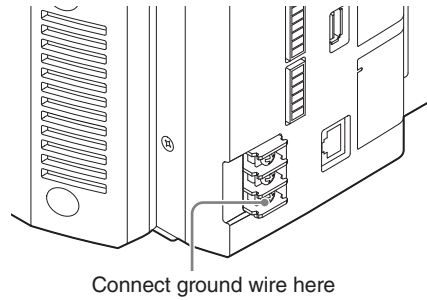


1 Connect 24 V DC and 0 V to the power terminals.

NOTICE	Do not connect the 0 V of the power terminal to the ground terminal or the ground wire.
---------------	---



2 Connect the ground wire to the grounding terminal.



NOTICE	<ul style="list-style-type: none"> • Ground each device separately. • Use a Class D ground. • Keep ground resistance to 100Ω or less. • Keep the ground wire as short as possible. • If it is not possible to ground each device separately, ground them together. However, make sure that the electrical cables are the same length.
---------------	--

D-type ground (third class ground)
(ground resistance 100 Ω)

A = B
D-type ground (third class ground)
(ground resistance 100 Ω)

A > B
A < B

Selection and Installation of LED Lighting

Reference

- Up to 8 LED lights (CV-X100/X200 Series) or 16 LED lights (CV-X300/X400 Series) can be controlled from the controller using an optional illumination expansion unit. See "Using the Illumination Expansion Unit" (Page 2-18) for more details.
- For details about operations when using LumiTrax illumination and MultiSpectrum illumination, see the "CV-X Series User's Manual".

Selecting the Correct Lighting System

Use the correct lighting system to ensure stable inspection

Inspecting in one of the following locations may lead to unstable detection. Relocate the inspection or use a dedicated lighting system.

- Locations where the inspection is exposed to direct sunlight
- Locations where the outside light varies greatly depending on the time of day
- Locations where the amount of light changes due to the movement of machines and people

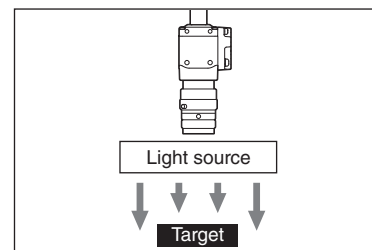
Ask your KEYENCE sales representative for details.

Reflected illumination

Illuminates broadly and evenly using a lighting system such as a ring light. This type of lighting is suitable for general surface inspection.

LED Illumination System

- Direct-ring lights (CA-DR)
- Multi-angle light (CA-DR**M/DQWM)



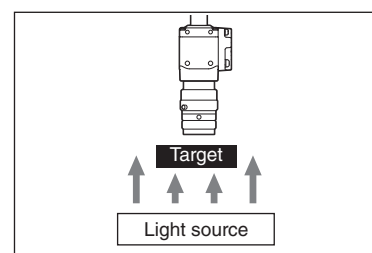
Backlight illumination

Illuminates from behind the target.

This type of lighting is suitable for measuring the shape, size, and position of a thin target.

LED Illumination System

Back lights (CA-DS)



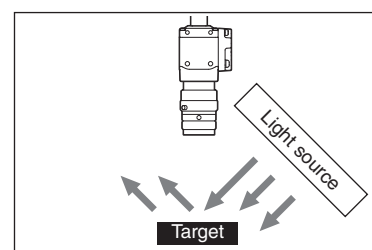
Indirect illumination

Illuminates the target from an angle.

This type of lighting is suitable for surface inspection when you want to reduce the effects of glare or specular reflection.

LED Illumination System

Bar lights (CA-DB/DZ)

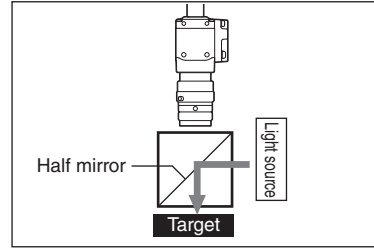


Coaxial Illumination

Illuminates along the same axis as the lens.
 This type of lighting makes flat glossy surfaces on the target appear brighter. This is suitable for surface inspection or position and size measurement of a flat surface.

LED Illumination System

Coaxial lights (CA-DX)

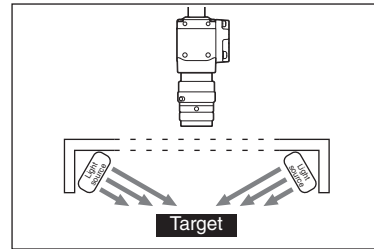


Low-angle Illumination

Illuminates the target from a very low angle.
 This type of lighting is suitable for detecting minute defects such as surface flaws (raised and reduced) and chipped edges.

LED Illumination System

- Low-angle lights (CA-DL)
- Multi-angle light (CA-DR**M/DQWM)
- Square bar lights (CA-DQ)

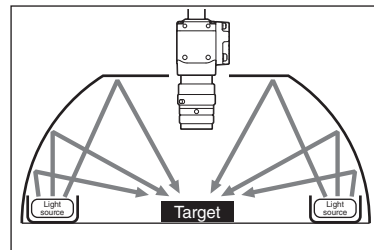


Dome Illumination

Illuminates evenly around a target. Dome lighting is more effective when used as close as possible to the target.
 This type of lighting reduces shadows and hot spots because it evenly distributes the light over the target's surface.

LED Illumination System

Dome lights (CA-DD)

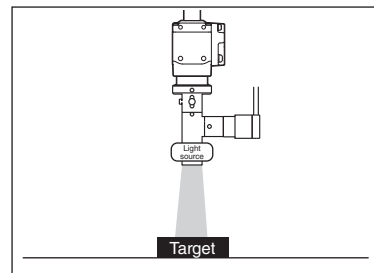


Spot Illumination

Used with a coaxial macro lens.
 This type of lighting provides high contrast, even illumination for images captured under high magnification.

LED Illumination System

Spot lights (CA-DP)



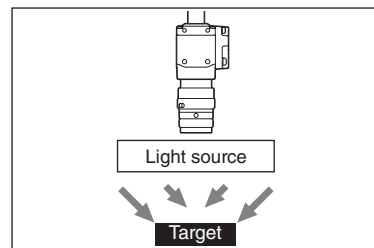
LumiTrax™ illumination

Uses a dedicated light which is a multi-angle type ring light that is internally divided into eight parts, and emits partial lighting and captures images multiple times with one inspection (LumiTrax Mode).

This is suitable for such applications as defect inspections that eliminate the influence from the background, which was difficult with conventional light.

LED Illumination System

- LumiTrax lights (CA-DRW*X)
- MultiSpectrum lights (CA-DRM*X: CV-X400 Series only)



Point

The CV-X400/X200 Series support LumiTrax illumination. For details, see the "CV-X Series User's Manual".

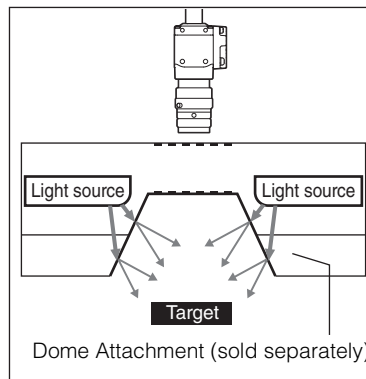
MultiSpectrum Illumination

Uses a dedicated light that is a multi-angle type ring light with a built-in eight-color LED and a dome attachment (optional) and captures images multiple times with one inspection while changing the color of the emitted light (MultiSpectrum Mode).

This is suited to inspections such as appearance inspections in which a specific pattern is extracted from a background in which various colors are used.

Illumination System

MultiSpectrum lights (CA-DRM*X)




Point

The CV-X400 Series supports MultiSpectrum illumination. For details, see the "CV-X Series User's Manual".

Using the Illumination Expansion Unit

Precautions and wiring when using the optional illumination expansion unit CA-DC21E/DC30E/DC10E/DC40E/DC50E/DC60E (optional) are explained here.

Usage Precautions

 WARNING	<ul style="list-style-type: none"> For more details on general precautions for the illumination expansion unit, see "Safety information for CV-X Series" (Page 3). For more details on cautions and warnings in the installation and handling of the unit, see the operation manuals of the illumination expansion unit and LED light that are being used.
--	--


Power supply

 CAUTION	Do not use with any power voltage other than 24 VDC. Doing so may cause fire, electric shock, or damage to the unit.
--	--



Always connect the frame ground terminal or ground terminal when a switching regulator is used.

Handling

 CAUTION	<ul style="list-style-type: none"> Illumination units may reach very high temperatures while in operation and immediately after use. Avoid direct contact. Doing so may cause burns. Do not disassemble or modify the unit. Doing so may cause fire, electric shock, or damage to the unit. Do not stare into the LED light source for prolonged periods of time. This may cause damage to the eyes. Correctly set the voltage for the illumination unit on the CA-DC21E/DC40E illumination expansion unit. Erroneously connecting a 12 V illumination unit when the set voltage has been changed to 24 V may result in fire, electric shock, or product malfunction.
--	---


Connecting Cables


After mounting the illumination expansion unit to the controller (Page 2-4), use the following procedures to connect the cables and wiring.



- An LED illumination unit that has a different output connector shape, such as a 24 V type, can also be wired directly to the terminal block of the CA-DC21E/DC40E.
- For more details about the specifications for the illumination expansion unit terminal blocks, see "Expansion Unit (CV-X100/X200 Series)" (Page 3-14) and "Expansion Unit (CV-X300/X400 Series)" (Page 3-31).
- All of the illustrations in this section are of the CA-DC21E.

1 Connect the LED light to the output connector of the illumination expansion unit.


 CAUTION	Correctly set the voltage for the illumination unit on the CA-DC21E/DC40E illumination expansion unit. If a 12 V illumination unit is mistakenly connected to the connector terminal block for which the set voltage has been changed to 24 V, this may cause a fire, electric shock, or product malfunction.
--	---

 NOTICE	If the light connector is to be removed or attached, shut off the power supply to the illumination expansion unit. If the light connector is removed or attached while power is being supplied, this may cause the illumination expansion unit and the light emitter to malfunction or become damaged.
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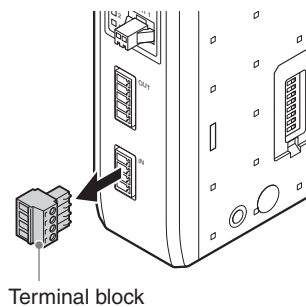
The light numbers are 1 for the bottom connector, and 2 for the top connector. If several illumination expansion units are connected, the light numbers are assigned in ascending order from the unit close to the controller.

2 Connect a 24 V DC power source to the IN connector terminal block.

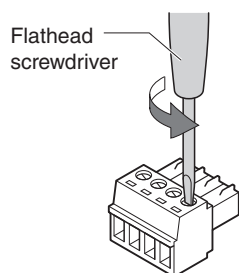
 CAUTION	<ul style="list-style-type: none"> Use a flat head screwdriver to connect the power supply to the input terminals. Use a torque of 0.25 Nm or less to tighten the screws. Use electrical wiring AWG14 to AWG22. Do not solder-coat the end of the wire. Doing so may cause fire or product malfunction. Make sure to connect the frame ground terminal for the 24 VDC power source to a Class D ground. Do not supply power until the installation is completed.
--	--

Reference All illustrations on this page show the CA-DC21E.

- (1) Remove the IN connector terminal block from the illumination expansion unit.

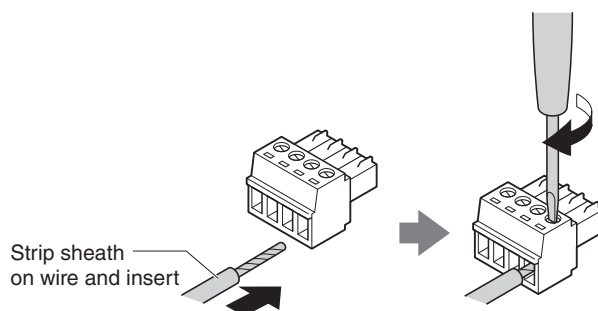


- (2) Loosen the screw of the IN connector terminal block using a flat head screwdriver.

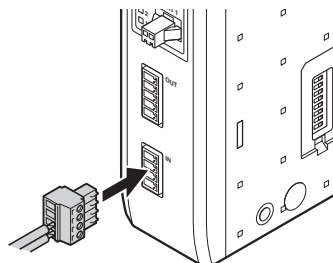


- (3) After stripping the insulating sheath by about 7 mm, insert the wires to the 24 V DC and 0 V terminals*, and then tighten the screws.

* When using the CA-DC30E/DC40E/DC50E/DC60E, the FG terminal must also be wired.



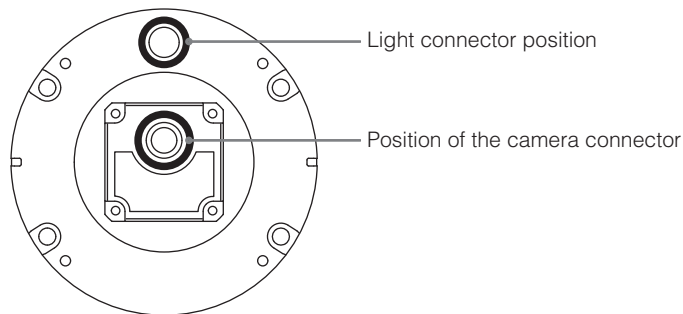
- (4) After connecting all the necessary wires, securely insert the IN connector terminal block into the I/O connector as far as it will go.



Points When Installing the LumiTrax Mode/Camera System

When installing a system that uses LumiTrax mode, pay attention to the following points.

- Align the position of the connector of the camera and the light when mounting.
- Align the camera and light center axes when installing.
- Align and install the camera and the light in the directions as shown in the figure to the right.



Reference

If the direction cannot be aligned due to restrictions in the installation location, make adjustments in the [Light Position Adjustment] settings. For more details, see the CV-X Series User's Manual.

Adjustments

This section explains how to adjust the controller from its purchased condition to capture images properly.

Reference

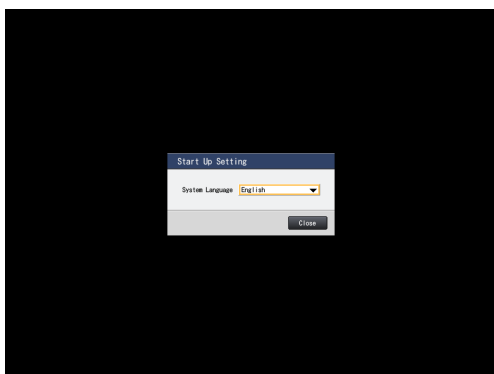
The software may not operate as described below if the inspection settings have already been configured.

Checking that a Screen is Displayed on the Monitor

1 Confirm that the cables are connected correctly, and then turn on the power.

The initial startup screen appears.

CV-X100 Series startup screen example



If nothing appears on the monitor

Check the following:

- Are the power input terminals connected correctly?
 - Is 24 V DC (2 A) being used for the power supply?
 - Have the power input terminals (+24 V) and (0 V) been connected in reverse polarity by mistake?
- Is the monitor cable connected correctly?
- Is the monitor turned on?
- Does the monitor support XGA (1024 x 768 pixel) resolution, and 60 Hz vertical frequency?

2 In the [System Language] box, select the language to use.

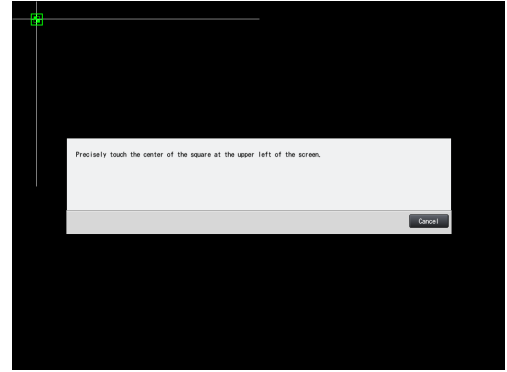
- English
- Japanese
- Simplified Chinese
- Traditional Chinese
- Korean
- Thai
- German
- French
- Italian
- Mexican Spanish
- Indonesian
- Brazilian Portuguese
- Vietnamese

3 (For the CV-X200/X300/X400 Series) If no touch panel is used, click [Close]. If a touch panel will be used, click [Calibrate CA Series Touch Panel].

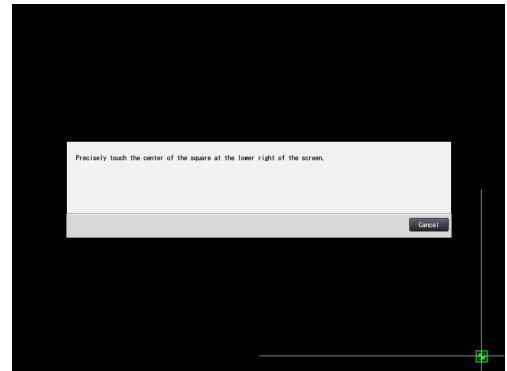
If no touch panel is used, proceed to Step 6.


4 (For the CV-X200/X300/X400 Series) Perform touch panel parallax correction.

(1) Touch  in the upper left corner of the screen.



(2) Touch  in the lower right corner of the screen.



(3) Touch  at the four corners of the screen, and verify that the touched locations were each selected correctly.

If selected correctly, the  at the touched location turns red.



If parallax correction is not correct, or if you wish to perform correction again, click [Redo Calibration] and perform correction again.

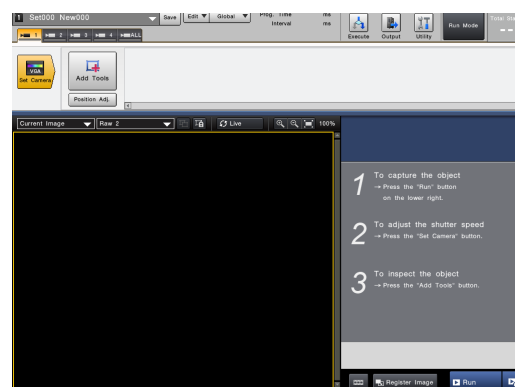
(4) Click [OK].

5 Click [Close].

The initial screen for the setup mode should appear.

6 Using the mouse, click the [Run] button located in the lower-right bottom of the screen and make sure that the raw image of the current screen appears on the screen.

The raw image displays the image as it is from the connected cameras.



Reference

- When connecting 2 or more cameras, the screen for camera 1 will appear. To display camera 2 and above, click the switch tab located at the upper left of the screen for the display camera of your choosing.
- Once the icon on the right side of the [Run] button is clicked, the display contents will be updated continuously.

If the raw image is not displayed

Check the following:

- Are the cameras connected correctly?
- Are the lens caps removed from the cameras?
- Is the aperture ring of the lens closed?

Specifying Capture Conditions (Shutter Speed, Illumination Control)

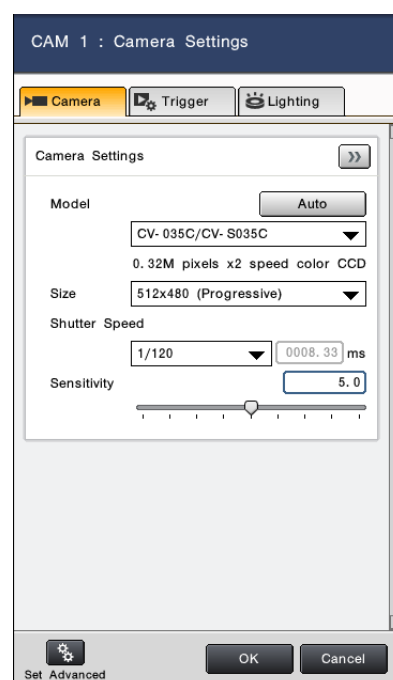
The shutter speed and the illumination control of the illumination expansion unit (optional) installed to the controller are specified.

1 In setup mode, left-click the display camera setting tab corresponding to the camera for which the settings will be changed.



2 Left-click .

The [Camera Settings] screen appears.

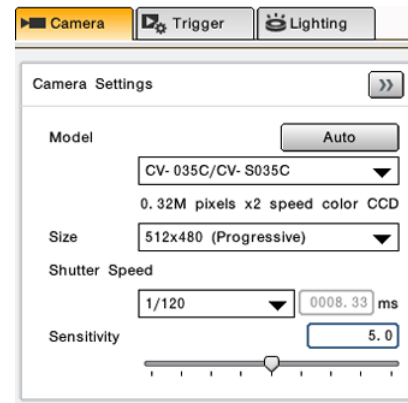


3 In the [Camera Settings] screen, left-click the [Camera] tab.

The configuration screen of the specified camera appears.

4 In the [Shutter Speed] box, select the shutter speed.

Select the shutter speed to be used according to the workpiece flow speed and the illumination conditions. To select the shutter speed for a line in which movement speed is fast, have lighting ready and available that ensures the light intensity required to capture images.

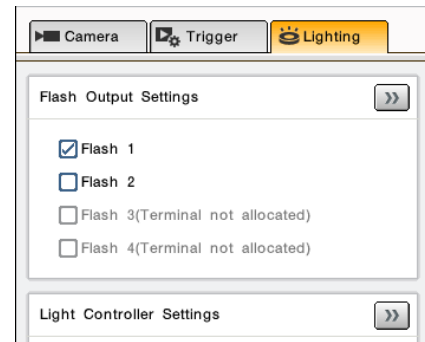


5 Continue to change the lighting configuration.

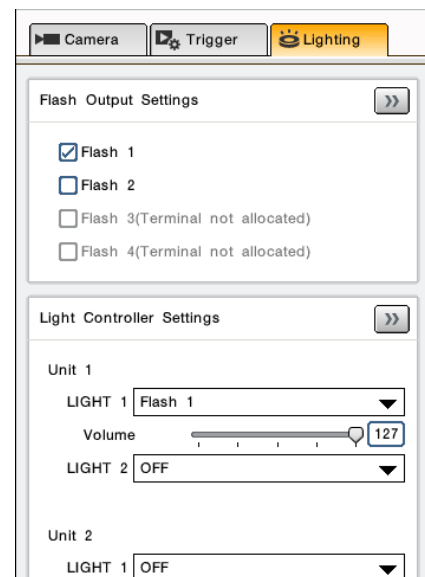
In the [Camera Settings] screen, left-click the [Lighting] tab.

The lighting configuration screen of the specified camera appears.

6 In the [Flash Output Settings] box, check the check box of the FLASH terminal used by the currently-selected camera.



7 In the [Light Controller Settings] box, select the lighting that emits light in conjunction with the camera and specify the light emitting timing.



When adjusting the illumination level, temporarily select "Continuous" for convenience. In that case, the trigger input can be skipped.

Light emitting timing

- When [Flash 1] to [Flash 4] ([Flash 1] to [Flash 8] for the CV-X300/X400 Series) is selected, the light turns on with the output timing specified under Flash Output Settings. Only flashes that have been specified in the Flash setting of this camera can be selected.
- When [Continuous] is selected, the light is always on regardless of the Flash Output Settings.
- When [OFF] is selected, the light does not turn on regardless of the Flash Output Settings.

8 Specify the volume of the lighting to be used.



For the lighting for which [OFF] has been specified in step 7, the volume setting is not displayed.

Adjusting the Aperture and Focus

Turn the aperture ring and the focus ring to adjust

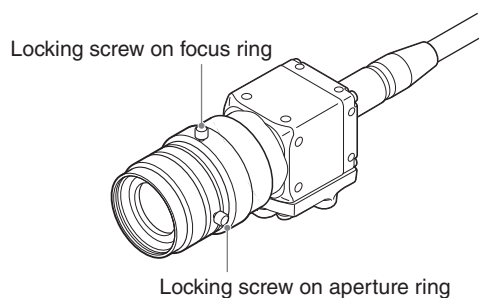
Target Camera

- CA-035C/035M
- CA-200C/200M
- CA-H500C/H500M
- CV-035C/035M
- CV-H200C/H200M
- CA-H035C/H035M
- CA-H200C/H200M
- CA-H500CX/H500MX
- CV-H035C/H035M
- CV-H500C/H500M
- CA-H048CX/H048MX
- CA-H200CX/H200MX
- CA-HX500C/HX500M
- CV-H100C/H100M
- CA-HX048C/HX048M
- CA-HX200C/HX200M
- CA-H2100C/H2100M
- CV-200C/200M

While viewing the monitor, turn the aperture ring and the focus ring to adjust the aperture and focus.

- Adjusting the aperture: Loosen the locking screw on the aperture ring and then make adjustments such that the target and its surroundings can be distinguished.
- Adjusting the focus: Loosen the locking screw on the focus ring and then make adjustments such that the outline of the target is captured clearly.

When the aperture and focus adjustments are complete, tighten the locking screws so that the aperture ring and the focus ring do not move.



Reference

The method for setting the focus and aperture is different for the high-resolution/low distortion vibration-resistant CA-LH (G) Series lens. See the lens User Manual for more details.

Turn the aperture locking screws A and B and the lens setting collar to adjust

Target Camera

- CA-HS035C/HS035M
- CA-HS200C/HS200M
- CV-S035C/S035M
- CV-S200C/S200M

While viewing the monitor, turn the aperture locking screws A and B and the lens setting collar to adjust the aperture and focus.

1 Screw the lens setting collar on the thread completely.

At the same time, install the lens as far on the thread as it will go.

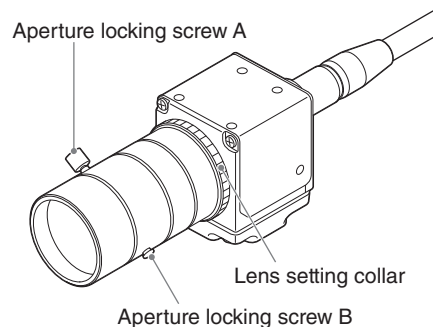
2 Adjust the distance between the camera and the target, then loosen the lens until the image is focused.

3 Fix the lens with the lens setting collar at the position where the image is in focus.

4 Loosen the aperture locking screws A and B to adjust for the best possible brightness of the image.

The image becomes brighter when turned towards the OPEN side, and darker when turned towards the CLOSE side.

5 After brightness is adjusted, fix the aperture with the aperture locking screws A and B.



Inserting and Removing an SD Card

Users can save the program settings or captured images on an SD card.

NOTICE	<ul style="list-style-type: none"> • The flash memory used as the storage element on the SD card has a read/write lifespan that, when reached, may result in an eventual loss of data. Data stored on an SD card should be backed up regularly to other media. • SD Card 1 contains the global settings and other data necessary for the controller to operate. Make sure it is inserted at startup and when powering up. • Data that must be loaded by swapping SD cards should be stored on SD Card 2.
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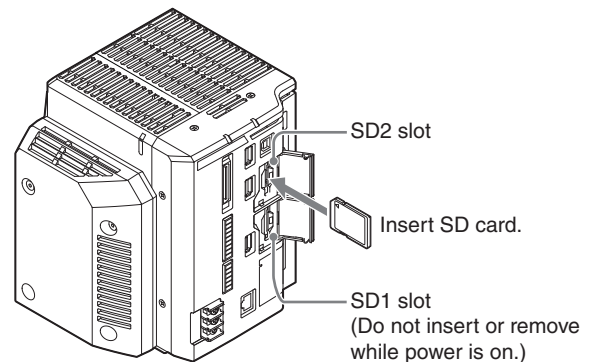
Supported SD Card Models

Use the optional Keyence OP-87133 (512 MB), optional CA-SD1G (1 GB), optional CA-SD4G (4 GB) or optional CA-SD16G (16 GB). Note that the controller ships with OP-87133 (CA-SD1G for CV-X172/X272/X292/X352/X452/X472/X482/X480LJ) inserted in the SD1 slot.

NOTICE	<ul style="list-style-type: none"> • Do not use SD cards other than the models mentioned above. This can cause a loss of data or corruption of setting data. • For details about file management on SD cards and card formatting, refer to the CV-X Series User's Manual.
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Inserting an SD Card

Insert the SD card into the SD1 and SD2 slot so that the triangle inscription is on the top of the card.



NOTICE	<ul style="list-style-type: none"> • Be sure the card is oriented correctly when inserting it. Inserting the card in the wrong direction may damage the data and SD card. • The access drive light illuminates while there is an SD card in the drive. <ul style="list-style-type: none"> - Green: An SD card is inserted and accessible. - Red: The SD card is being accessed. - Not lit: The SD card is not active. (The SD card can be removed from the slot.) • When inserting the SD card into the SD1 slot, turn off the controller. Keep SD Card 1 inserted at startup and while the power is ON.
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Removing an SD Card

Choose [Remove SD Card 2] operation, then press the SD card in the SD2 slot inward to release and remove the card.

NOTICE

- Take the following steps to protect the SD card and the data it contains.
- If you remove the SD card using a procedure other than that specified, or if power is turned off when the card is being accessed, any writing task will stop resulting in a possible loss of data or damage to the SD card.
- SD Card 1 should not be removed while the controller is turned on. Turn off the controller before removing SD Card 1.

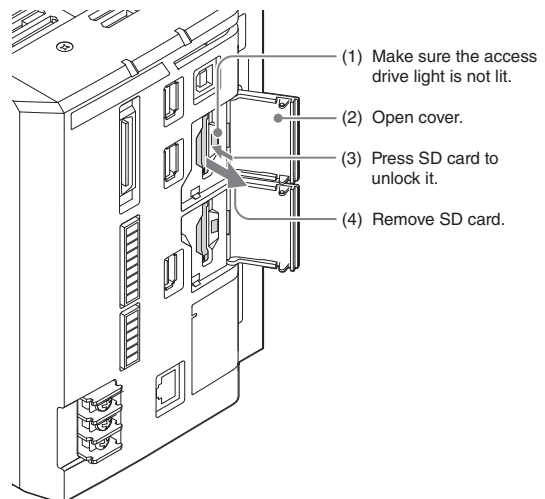
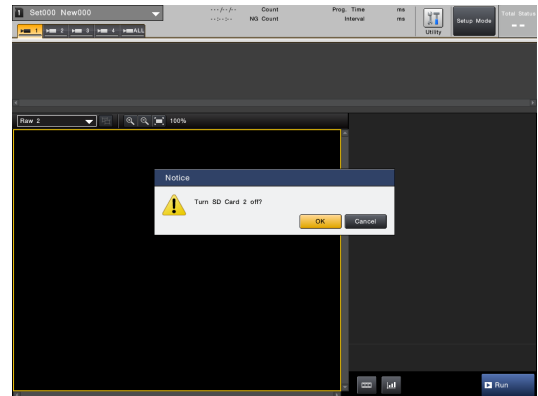
- 1 From Utility, select [Remove SD Card 2] (For the CV-X100/X200 Series), select [Remove External Media] > [SD Card 2] (For the CV-X300/X400 Series).**

A confirmation screen appears.

- 2 Click [OK].**

The LED indicator turns off, indicating that SD Card 2 can now be removed.

- 3 Remove the SD card from the SD2 slot on the controller.**



Reference

The cover on the SD1 slot is screwed in place using (M2 L5) screws when the CV-X100/X200 Series controller is shipped. This cover should be left on to prevent accidental removal while the controller is turned on.

Connecting and Disconnecting the USB HDD

(CV-X300/X400 Series Only)

Users can save the program settings or captured images on a USB HDD.

NOTICE	<ul style="list-style-type: none"> The unit's power GND (0V) is shared in common with the connector shield and signal GND. If there is a potential difference with the connection for the USB HDD, this may result in breakdowns or malfunctions of the unit and the USB HDD. Depending on lifespan, malfunctions, and the like, the saved data on the USB HDD may be lost. Data stored on a USB HDD should be backed up regularly to other media.
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Reference	<p>If you think that there are potential difference with the connections, use a USB HDD which supports bus powered drives. The controller's bus power feed capacity is 900 mA (USB 3.0 compatible). Check with the USB HDD manufacturer concerning the bus power drive compatibility of the USB HDD that you are using.</p> <p>In addition, do not use USB hubs since they may cause the feed capacities and the data transmission speeds to decrease.</p>
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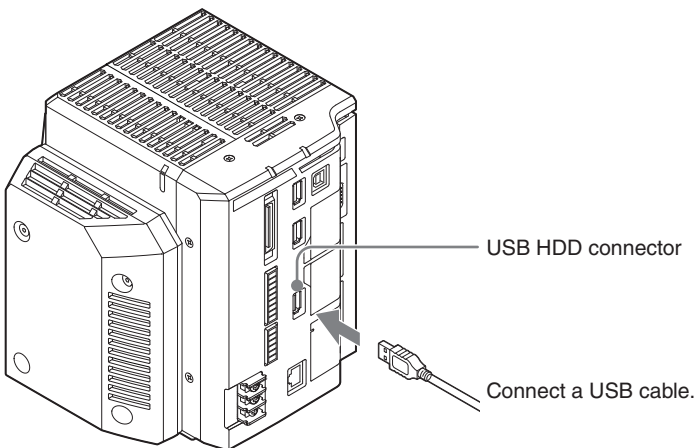
Supported USB HDD

NOTICE	<ul style="list-style-type: none"> External HDDs that support USB 2.0 and USB 3.0 can be connected to the controller's USB HDD connector. However, not every external HDD that is compatible with this specification is guaranteed to function on the controller. The maximum capacity that can be recognized as a disk on the controller is 2 TB. Additionally, if there are multiple partitions on the USB HDD, the controller will recognize only the first partition that it recognized as a disk.
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! Point	<p>The power saving function on some USB HDDs may cause the read speed from the controller to decrease. KEYENCE recommends that you disable the power saving function in advance.</p>
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Connecting a USB HDD

Insert a USB cable that is compatible with the USB HDD that you are going to connect into the controller's USB HDD connector (blue terminal).



NOTICE	<p>Use a USB cable that is compatible with the USB HDD that you are going to connect to the controller. Using a cable that is not compatible may cause the controller and the USB HDD to malfunction. Check with the USB HDD manufacturer concerning the compatible USB cable.</p>
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▶ Important	<p>Make sure to format the connected USB HDD with the controller before using it. The controller may not correctly recognize the USB HDD with its factory settings or if it has been formatted by a computer. For more details about formatting the USB HDD, see the CV-X Series User's Manual.</p>
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! Point	<p>Only the blue USB HDD connector on the controller can be used to connect a USB HDD. If you connect a USB HDD to the black MOUSE (USB) connector or the USB connector, it will not function.</p>
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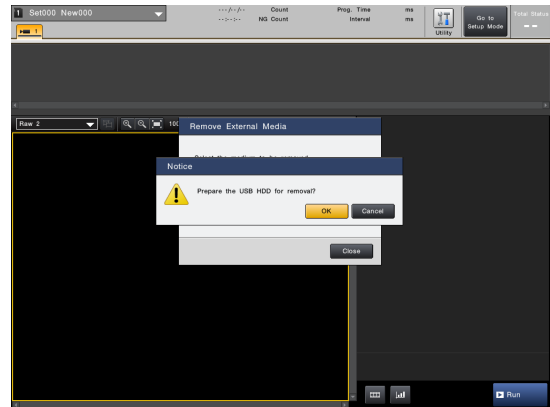
Removing a USB HDD

After you perform the procedure to remove the USB HDD, remove the USB cable and the USB HDD.

NOTICE

- To prevent the corruption of data or damaging the USB HDD, make sure to always perform the procedure below.
- If you perform a procedure other than the one specified and remove the USB HDD or turn off power to the USB HDD while it is being accessed, files will stop being saved, which may corrupt data or damage the USB HDD.

- 1 From Utility, select [Remove External Media] > [USB HDD].**
A confirmation screen appears.
- 2 Select [OK].**
- 3 When a confirmation screen appears stating that preparation to remove the USB HDD is complete, select [Close] to close the confirmation screen.**
The USB HDD can now be removed.



Overview of the I/O Interface

This controller has the following communication and I/O ports.

- RS-232C interface (Page 3-3)
- Ethernet Interface (Page 3-5)
- USB interface* (Page 3-6)
- Parallel I/O interface (Page 3-8)
- Terminal Block Interface (Page 3-10)

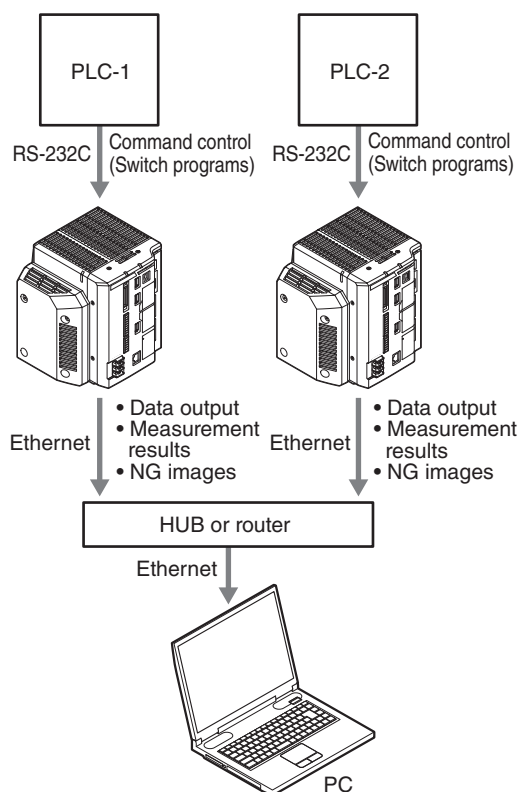
* Only the CV-X200/X300/X400 series support communication through the USB interface

The I/O ports and communication ports can be used to output measurement results, control the controller, input and output files, and perform similar operations.

Additionally, some expansion units connected to the controller are also equipped with ports such as I/O ports.

Example of communication port usage

Data such as measurement results and NG images are output to the PC via Ethernet while the inspection settings are controlled from the PLC via RS-232C.



! Point

KEYENCE PC application software is required in order to receive data.

Documentation for the installation and configuration methods of the controller, software, and CAD data can be downloaded from the following URL.

www.keyence.com/cvxus

CV-X100/X200 Series I/O Interface

CV-X100/X200 Series I/O Interface

RS-232C Interface (CV-X100/X200 Series)

The RS-232C port on the system can be used to communicate with external equipment. The system can communicate with external equipment using two communication modes: non-procedural mode or the PLC-Link mode.

The transmitted data will differ depending on the communication mode. Switch modes depending on the environment. Refer to "CV-X Series User's Manual" for more details on the non-procedural mode and switching the communication mode.

NOTICE

- With CV-X100 series, the signal GND is isolated from the power GND.
- With CV-X200 series, the signal GND and the power GND are common. If voltage differences occur with the SG of external equipment, it may cause damage to this unit and/or the external equipment.

RS-232C Port Specifications

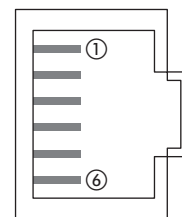
RS-232C basic specifications

- Connector: RJ-11
- Standards: The connected device must comply with EIA (Electronic Industries Association) RS-232C standards.

Item	Compatibility
Communication System	Full-duplex
Synchronous system	Asynchronous
Transmission Code	ASCII (Part binary code)
Data-bit Length	8-bit
Stop-bit Length	1-bit/2-bit
Parity Check	None/odd/even
Communication speed	9600/19200/38400/57600/115200/230400 (CV-X200 Series only) bps
Delimiter	CR/CR+LF
Flow Control	None, CTS/RTS
Maximum cable length	15 m

Connector specifications

The specifications of the RS-232C port on the controller are as follows:



(Controller Side)

No.	Signal	Signal Description	Signal direction
1	CS (CTS)	Data Transmission Permission	Output
2	Not used	—	—
3	SD (TXD)	Data Transmission	Input
4	SG (GND)	GND	—
5	RD (RXD)	Data Reception	Output
6	RS (RTS)	Data Transmission Request	Input

Reference

Since the controller uses the RS-232C modem definition, SD is assigned to input and RD is assigned to output.

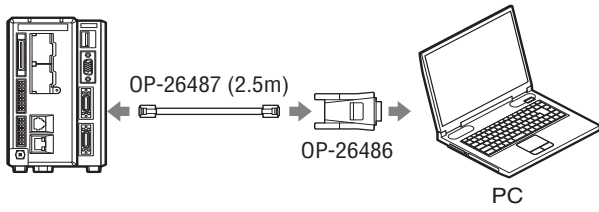
Point

The CV-X200 series controller touch panel port is exclusively for communications with the touch panel LCD monitor CA-MP120T (sold separately). It cannot be used for RS-232C communications such as the non-procedural mode and PLC link, etc.

Connecting to a PC

The controller can be connected to your computer using a dedicated serial cable (optional).

When the PC has a D-sub 9-pin connector



Reference In the connection example above, flow control is not possible.

Ethernet Interface (CV-X100/X200 Series)

In addition to connecting to KEYENCE PC application software, the Ethernet port of this unit can be used to communicate with external equipment. The controller can communicate with external equipment using communication modes: non-procedural mode based on the RS-232C command set, the PLC-Link mode, EtherNet/IP™, and PROFINET. The system has an FTP client function in which an external FTP server can be specified as the output destination for sending result data, an FTP server function in which access to the SD card of this unit is possible from an external FTP client, and a VNC server function in which remote operation is possible from an external PC client.

Reference

For more details about various types of communications control using the Ethernet port, refer to the "CV-X Series User's Manual".

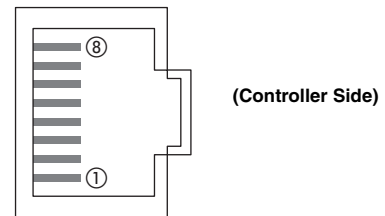
Ethernet Port Specifications

Standard specifications

- Connector: RJ-45
- Medium: 10 BASE-T/100 BASE-TX/1000 BASE-T
- Communications protocols:
 - TCP/IP (Non-procedural communication mode)

Connector Specifications

The specifications of the Ethernet port are as follows:



No.	10 BASE-T/ 100 BASE-TX		1000 BASE-T	
	Signal	Signal direction	Signal	Signal direction
1	TX +	Output	TRX+	Input/Output
2	TX -	Output	TRX-	Input/Output
3	RX +	Input	TRX+	Input/Output
4	Not used	—	TRX-	Input/Output
5	Not used	—	TRX-	Input/Output
6	RX -	Input	TRX-	Input/Output
7	Not used	—	TRX+	Input/Output
8	Not used	—	TRX-	Input/Output

Reference

Use a category 5e or higher LAN cable and a hub that supports Gigabit Ethernet when connecting via 1000BASE-T. An STP type is recommended for the cable structure.

USB Interface (CV-X200 Series only)

USB Interface (CV-X200 Series only)

The USB port on the controller (only on the CV-X200 Series) is used exclusively for connecting to KEYENCE PC application software. The USB port cannot be used with any other software.

NOTICE	The connector shield, signal GND, and power GND are common. A voltage difference between the external device and the controller may cause the controller and the external device to fail or malfunction.
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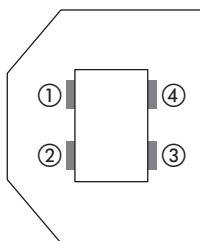
USB Port Specifications

Standard specifications

- Connector: Female B connector
- Standard: USB Version 2.0.

Connector Specifications

Specifications of the USB port on the controller are as follows:



No.	Signal	Signal description	Signal direction
1	VBUS	VBUS	—
2	D-	Differential signal -	Input/Output
3	D+	Differential signal +	Input/Output
4	GND	GND	—

Connecting to a PC

You can connect the controller to the PC via the USB port. To connect the controller to the PC, use the optional USB cable (2 m) OP-66844.

NOTICE	<ul style="list-style-type: none"> • Only one controller can be connected to a single PC. • If a cable other than OP-66844 or an extension cable is used, the controller may not operate correctly. • Conventional USB devices such as a USB mouse, card reader or thumb drive cannot be connected to this port. • Communication may be interrupted due to high voltage or electrical noise near the system. If communication is interrupted, unplug and plug again the USB cable, and reconnect the communication from the side of the application software. • If communication interruption occurs frequently, check the surrounding area for noise sources (inverter, solenoid valve, etc.).
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System requirements

To connect the controller to a PC via the USB port, a PC with the following requirements is needed.

- Operating system: Microsoft Windows 10 Home/Pro/Enterprise (64-bit versions only), Microsoft Windows 7 Home Premium/Professional/Enterprise/Ultimate (64-bit versions only), (Other Windows operating systems are not supported.)
- USB 2.0 compatible USB terminal

Installing the USB driver

To use the controller's USB interface, you must first install KEYENCE application software and the USB driver for the CX-V Series before connecting the controller to a computer. Normally the USB driver is installed when the KEYENCE application software is installed. However, if the driver was not installed, follow the procedure below to install the USB driver.

**Point**

USB driver installation must be performed by a user with Administrator privileges.

This section describes how to install the driver, using Windows 7 as an example.

- 1 Turn on the controller and the PC.**
- 2 Connect the USB port of the controller and that of the PC using the OP-66844 cable (optional).**
- 3 On the computer, open Device Manager, and then click [Update Driver] in the Properties of the item added under [Other devices].**
- 4 Click [Browse my computer for driver software] and specify the folder that contains the USB driver.**

The USB driver will be installed.

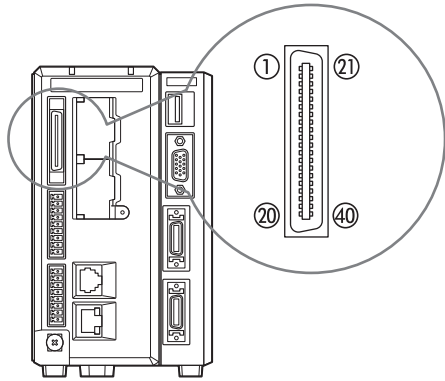
**Reference**

- If the KEYENCE PC application software is installed, the USB driver will be stored in C:\drivers\CV-H1X. You can also download the driver from the KEYENCE user support page.
- When you install the USB driver on your PC, a warning message may appear during the installation. When such a warning message appears, click [Continue] to continue installation.

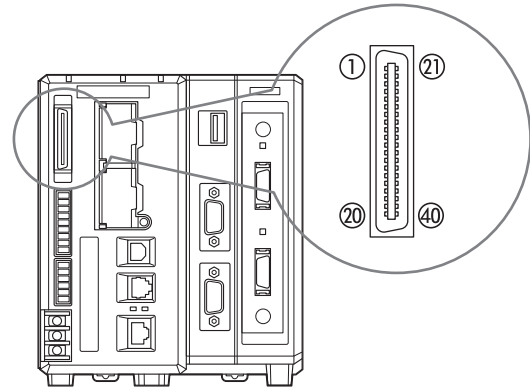
Parallel I/O Interface (CV-X100/X200 Series)

Connector Specifications

Parallel I/O Interface (CV-X100/X200 Series)



CV-X100 Series



CV-X200 Series

Reference

Use the dedicated parallel connection cable (3 m) OP-51657 (sold separately) to wire devices to the connector.

Pin Layout: Cable colors when optional OP-51657 is used.

No.	Terminal name	Signal	Signal Description ^{*2}	Circuit diagram (Page 3-17)	Cable color
1	COMIN2	-	Connector input common terminal	-	Brown
2	IN0	CMD_PARAM0	Command parameter bit 0	B	Red
3	IN1	CMD_PARAM1	Command parameter bit 1	B	Orange
4	IN2	CMD_PARAM2	Command parameter bit 2	B	Yellow
5	IN3	CMD_PARAM3	Command parameter bit 3	B	Green
6	IN4	CMD_PARAM4	Command parameter bit 4	B	Blue
7	IN5	CMD_PARAM5	Command parameter bit 5	B	Purple
8	IN6	CMD_PARAM6 ^{*1}	Command parameter bit 6 ^{*1}	B	Gray
9	IN7	CMD_PARAM7 ^{*1}	Command parameter bit 7 ^{*1}	B	White
10	IN8	CMD_CODE0	Command input bit 0	B	Black
11	IN9	CMD_CODE1	Command input bit 1	B	Brown
12	IN10	CMD_CODE2	Command input bit 2	B	Red
13	IN11	CMD_CODE3	Command input bit 3	B	Orange
14	IN12	CST	Command execution input	B	Yellow
15	IN13	RESET	Reset	B	Green
16	IN14	PST ^{*1}	Output data cycle input ^{*1}	B	Blue
17	COMOUT2	-	Connector output common terminal	-	Purple
18	OUT0	ACK ^{*1}	Verification of successfully executed command input ^{*1}	D	Gray
19	OUT1	NACK ^{*1}	Verification of unsuccessfully executed command input ^{*1}	D	White
20	OUT2	BUSY ^{*1}	Busy signal ^{*1}	D	Black
21	OUT3	CMD_READY	Command input permission	D	Brown
22	OUT4	READY1	Trigger 1 input permission	D	Red
23	OUT5	READY2	Trigger 2 input permission	D	Orange
24	OUT6	OUT_DATA0 ^{*1}	Data output bit 0 ^{*1}	D	Yellow
25	OUT7	OUT_DATA1 ^{*1}	Data output bit 1 ^{*1}	D	Green

No.	Terminal name	Signal	Signal Description ^{*2}	Circuit diagram (Page 3-17)	Cable color
26	OUT8	OUT_DATA2	Data output bit 2	D	Blue
27	OUT9	OUT_DATA3	Data output bit 3	D	Purple
28	OUT10	OUT_DATA4	Data output bit 4	D	Gray
29	OUT11	OUT_DATA5	Data output bit 5	D	White
30	OUT12	OUT_DATA6	Data output bit 6	D	Black
31	OUT13	OUT_DATA7	Data output bit 7	D	Brown
32	OUT14	OUT_DATA8	Data output bit 8	D	Red
33	OUT15	OUT_DATA9	Data output bit 9	D	Orange
34	OUT16	OUT_DATA10	Data output bit 10	D	Yellow
35	OUT17	OUT_DATA11	Data output bit 11	D	Green
36	OUT18	OUT_DATA12 ^{*1}	Data output bit 12 ^{*1}	D	Blue
37	OUT19	OUT_DATA13 ^{*1}	Data output bit 13 ^{*1}	D	Purple
38	OUT20	OUT_DATA14 ^{*1}	Data output bit 14 ^{*1}	D	Gray
39	OUT21	OUT_DATA15 ^{*1}	Data output bit 15 ^{*1}	D	White
40	COMOUT2	-	Connector output common terminal	-	Black

*1 It is the default assigned value on the terminal where the signal assignment can be changed. These assignments may vary if the Global settings have been changed.

*2 For more details about the signal description, see the "CV-X Series User's Manual".

Reference

- COMOUT2 for Pin 17 and Pin 40 are common.
- COMIN2 is a common terminal for input for the parallel I/O connector.
- COMOUT2 is a common terminal for output for the parallel I/O connector.
- Power source 0 V and COMIN1, COMIN2, COMOUT1, COMOUT2, COMOUT_F+, and COMOUT_F- are all isolated.

Terminal Block Interface (CV-X100 Series)

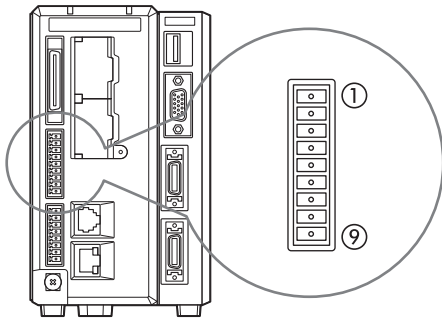
Standard Specifications

Terminal block specifications for the controller are as follows.

NOTICE

Tightening above the specified torque may cause damage to the terminal block.

OUTPUT connector



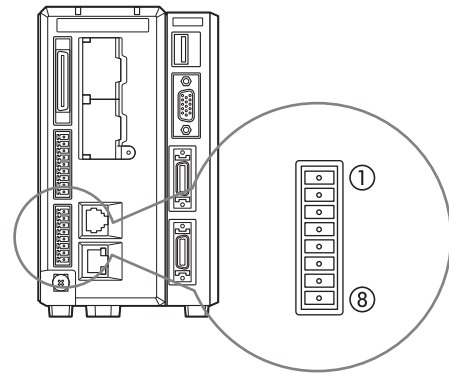
Suitable wiring

AWG 16 - 28

Terminal block screw torque

0.25 Nm or less

INPUT connector



Suitable wiring

AWG16 - 28

Terminal block screw torque

0.25 Nm or less

Terminal Layout

OUTPUT connector

No.	Terminal name	Signal	Terminal block display at time of shipment	Signal description*2	Circuit diagram (Page 3-17)
1	OUT22	STO	STO	Output timing indicator	D
2	OUT23	OR	OR	Total status output	D
3	F_OUT2	ERROR*1	ERR	Error output*1	C
4	F_OUT3	RUN*1	RUN	Run mode output*1	C
5	COMOUT1	-	COMOUT	Common for terminal block outputs	-
6	F_OUT0	FLASH 1	FLS1	Strobe light output for trigger 1	C
7	F_OUT1	FLASH 2	FLS2	Strobe light output for trigger 2	C
8	COMOUT_F+	-	COMF+	+ common for terminal output	-
9	COMOUT_F-	-	COMF-	- common for terminal output	-

*1 It is the default assigned value on the terminal where the signal assignment can be changed. These assignments may vary if the Global settings have been changed.

*2 For more details about the signal description, see the "CV-X Series User's Manual".

Reference

- Power source 0V, COMOUT1, COMOUT_F+, and COMOUT_F- are all isolated.
- COMOUT1 is a common terminal exclusively used for terminal outputs 1 and 2.
- COMOUT_F+ and COMOUT_F- are the common terminals exclusively used for terminal outputs 3 to 4 and 6 to 7.

INPUT connector

No.	Terminal name	Signal	Terminal block display at time of shipment	Signal description ^{*2}	Circuit diagram (Page 3-17)
1	COMIN1	–	COMIN	Common for terminal block inputs	–
2	IN15	PLC ^{*1}	PLC	Command read request from PLC ^{*1}	B
3	F_IN0	TRG1	TRG1	Trigger 1 input	A
4	F_IN1	TRG2	TRG2	Trigger 2 input	A
5	F_IN2	TEST ^{*1}	TEST	Trial run input ^{*1}	A
6	F_IN3	EXT ^{*1}	EXT	Disable trigger input ^{*1}	A
7	24 VDC	–	24 VDC	+ ve power supply input (24 VDC)	–
8	0 V	–	0 V	+ ve power supply input (0 VDC)	–

*1 It is the default assigned value on the terminal where the signal assignment can be changed. These assignments may vary if the Global settings have been changed.

*2 For more details about the signal description, see the "CV-X Series User's Manual".

Reference

- Power source 0V and COMIN1 are all isolated.
- COMIN1 is the common terminal for inputs 2 to 6.

Terminal Block Interface (CV-X200 Series)

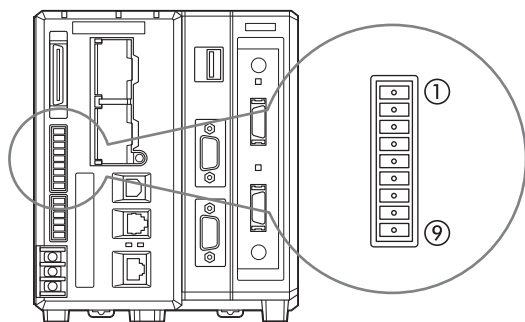
Terminal Block Interface (CV-X200 Series)

Standard Specifications

Terminal block specifications for the controller are as follows.

NOTICE	Tightening above the specified torque may cause damage to the terminal block
---------------	--

OUTPUT connector



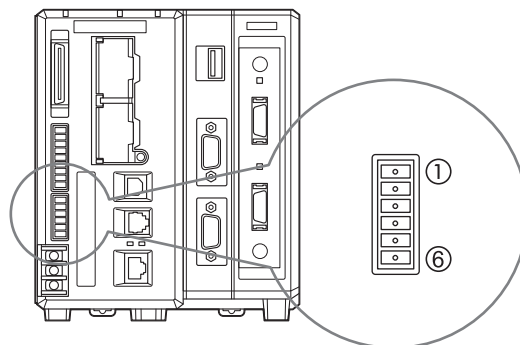
Suitable wiring

AWG 16 - 28

Terminal block screw torque

0.25 Nm or less

INPUT connector



Suitable wiring

AWG 16 - 28

Terminal block screw torque

0.25 Nm or less

Terminal Layout

OUTPUT connector

No.	Terminal name	Signal	Terminal block display at time of shipment	Signal description* ²	Circuit diagram (Page 3-17)
1	OUT22	STO	STO	Output timing indicator	D
2	OUT23	OR	OR	Total status output	D
3	F_OUT2	ERROR* ¹	ERR	Error output* ¹	C
4	F_OUT3	RUN* ¹	RUN	Run mode output* ¹	C
5	COMOUT1	-	COMOUT	Common for terminal block outputs	-
6	F_OUT0	FLASH 1	FLS1	Strobe light output for trigger 1	C
7	F_OUT1	FLASH 2	FLS2	Strobe light output for trigger 2	C
8	COMOUT_F+	-	COMF+	+ common for terminal output	-
9	COMOUT_F-	-	COMF-	- common for terminal output	-

*1 It is the default assigned value on the terminal where the signal assignment can be changed. These assignments may vary if the Global settings have been changed.

*2 For more details about the signal description, see the "CV-X Series User's Manual".



- Power source 0V, COMOUT1, COMOUT_F+, and COMOUT_F- are all isolated.
- COMOUT1 is a common terminal exclusively used for terminal outputs 1 and 2.
- COMOUT_F+ and COMOUT_F- are the common terminals exclusively used for terminal outputs 3 to 4 and 6 to 7.

INPUT connector

No.	Terminal name	Signal	Terminal block display at time of shipment	Signal description ^{*2}	Circuit diagram (Page 3-17)
1	COMIN1	–	COMIN1	Common for terminal block inputs	–
2	IN15	PLC ^{*1}	PLC	Command read request from PLC ^{*1}	B
3	F_IN0	TRG1	TRG1	Trigger 1 input	A
4	F_IN1	TRG2	TRG2	Trigger 2 input	A
5	F_IN2	TEST ^{*1}	TEST	Trial run input ^{*1}	A
6	F_IN3	EXT ^{*1}	EXT	Disable trigger input ^{*1}	A

*1 It is the default assigned value on the terminal where the signal assignment can be changed. These assignments may vary if the Global settings have been changed.

*2 For more details about the signal description, see the "CV-X Series User's Manual".

Reference

- Power source 0V and COMIN1 are all isolated.
- COMIN1 is the common terminal for inputs 2 to 6.

Expansion Unit (CV-X100/X200 Series)

Illumination expansion unit

Illumination expansion unit CA-DC21E (Option)

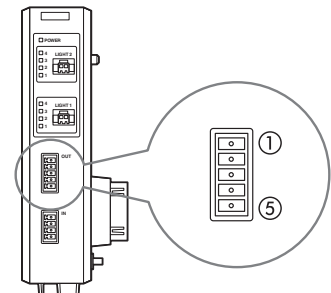
The following section details the terminal block specifications for the illumination expansion unit (CA-DC21E).

NOTICE

Tightening above the specified torque may cause damage to the terminal block.

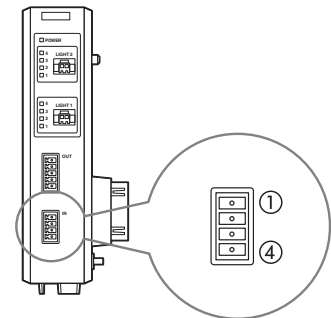
OUTPUT connector

- Compatible wires: AWG14 to 22
- Terminal block screw torque:
0.25 Nm or less



INPUT connector

- Compatible wires: AWG14 to 22
- Terminal block screw torque:
0.25 Nm or less



Connector Specifications

- OUT Connector Terminal Block

No.	Signal (terminal block display)	Signal Description	Description
1	LIGHT2+ (L2+)	+ ve terminal for Light 2	Connect the + ve side of light 2.
2	LIGHT2- (L2-)	- ve terminal for Light 2	Connect the - ve side of light 2.
3	NC (NC)	Not used	Not used
4	LIGHT1+ (L1+)	+ ve terminal for Light 1	Connect the + ve side of light 1.
5	LIGHT1- (L1-)	- ve terminal for Light 1	Connect the - ve side of light 1.



- Connecting a 12 V DC illumination unit to an output terminal at 24 V DC may cause fire, electric shock, or damage to the controller and user operating the unit.
- Ensure that the DIP switch located on the right side of the CA-DC21E is configured correctly for the illumination being connected.

- IN Connector Terminal Block

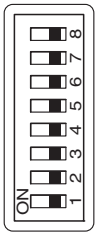
No.	Signal (terminal block display)	Signal Description	Description
1	COMIN (COMIN)	Common for terminal block inputs	Dedicated common input for the IN connector terminal.
2	LIGHT_OFF (LOFF)	Forced light off input	Used to force the emission of LED illumination units to off.
3	24VDC (24V)	+ ve power supply input (24 V DC)	Supplies a 24 V power source for the illumination expansion unit.
4	0 V (0 V)	- power supply (0 V) input	Supplies a 0 V power source for the illumination expansion unit.

The power source 0V and COMIN are insulated respectively.

The power source 0V and the controller power source 0V are insulated respectively.

DIP Switch Settings

Output voltages for Light 1 and Light 2 can be changed individually by configuring the DIP switches as indicated below. The factory settings of the DIP switch positions are indicated by ■.



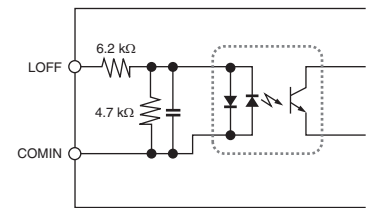
Bit								Output voltage
1	2	3	4	5	6	7	8	
OFF	OFF	OFF	OFF	—	—	—	—	Light 1: 12 V
ON	ON	ON	OFF	—	—	—	—	Light 1: 24 V
—	—	—	—	OFF	OFF	OFF	OFF	Light 2: 12 V
—	—	—	—	ON	ON	ON	OFF	Light 2: 24 V



Setting the output voltage incorrectly may cause fire, electric shock, or product malfunction. When connecting the KEYENCE illumination unit, use the factory setting of 12V.

Input Circuit Diagram

- Max. applied voltage: 26.4 V
- ON voltage: 10.8 V or greater
- ON current: 2 mA or greater
- OFF voltage: 3 V or less
- OFF current: 0.3 mA or less



Illumination expansion unit CA-DC10E (Option)

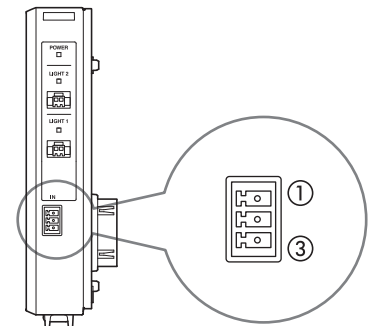
The following section details the terminal block specifications for the illumination expansion unit (CA-DC10E).



Tightening above the specified torque may cause damage to the terminal block.

INPUT connector

- Compatible wires: AWG14 to 22
- Terminal block screw torque: 0.25 Nm or less



Connector Specifications

- IN Connector Terminal Block

No.	Signal (terminal block display)	Signal Description	Description
1	24VDC (24V)	+ ve power supply input (24 V DC)	Supplies a 24 V power source for the illumination expansion unit.
2	NC	Not used	Not used.
3	0 V (0 V)	- power supply (0 V) input	Supplies a 0 V power source for the illumination expansion unit.

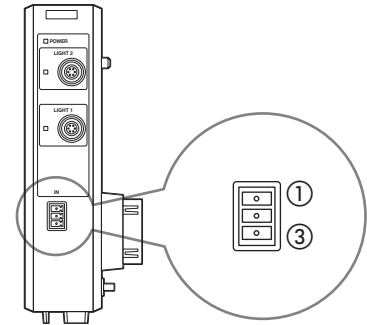
The power source 0V and the controller power source 0V are insulated respectively.

Illumination expansion unit CA-DC30E (Option)

The following section details the terminal block specifications for the illumination expansion unit (CA-DC30E).

Power connector

- Compatible wires: AWG14 to 22
- Terminal block screw torque: 0.25 Nm or less



Connector Specifications

- Power Connector Terminal Block

No.	Signal (terminal block display)	Signal Description	Description
1	24 VDC (24V)	+ ve power supply input (24 V DC)	Supplies a 24 V power source for the illumination expansion unit.
2	0 V (0 V)	- power supply (0 V) input	Supplies a 0 V power source for the illumination expansion unit.
3	FG	frame ground terminal	Connect to a Class D ground.

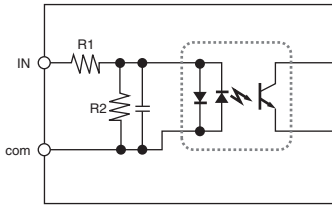
The power source 0V and the controller power source 0V are insulated respectively.

Input/Output Circuit (CV-X100/X200 Series)

Input Connections

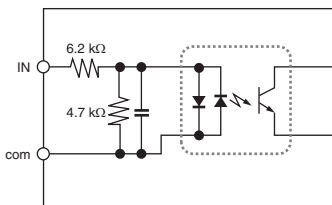
Input circuit diagram

Circuit A (For F_IN0 to 3 only, EV compatible)



- CV-X100 series
R1: 3.9 k Ω , R2: 680 Ω
- CV-X200 series
R1: 3.3 k Ω , R2: 10 k Ω
- Max. applied voltage: 26.4 V
- ON voltage: 10.8 V or greater
- ON current: 3 mA or greater
- OFF voltage: 5 V or less
- OFF current: 1 mA or less

Circuit B (other inputs)



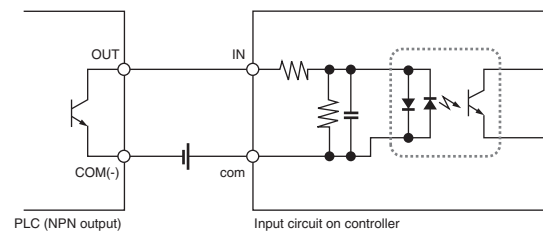
- Max. applied voltage: 26.4 V
- ON voltage: 10.8 V or greater
- ON current: 2 mA or greater
- OFF voltage: 3 V or less
- OFF current: 0.3 mA or less

Reference

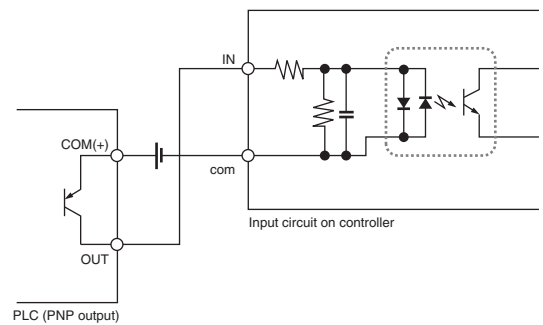
See "Terminal Layout" (Page 3-10) for common connections.

Example of connections

When connecting an NPN PLC output to the system input



When connecting a PNP output to the controller input



Output Connections

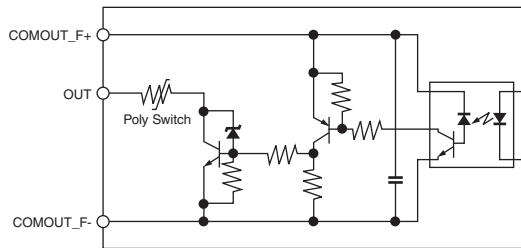
NOTICE

The overcurrent protective Poly Switch is set to trip at 1 A. For the power supplied to output, use a 1 A or larger power source.

Input/Output Circuit (CV-X100/X200 Series)

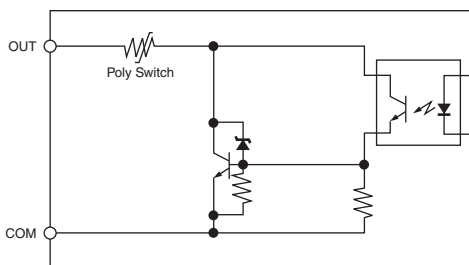
Output circuit diagram (NPN output type)

Circuit C (F_OUT0 to 3)



- Max. applied voltage: 30 V
- Max. sink current: 50 mA
- Leakage current: 0.1 mA or less
- Residual voltage:
1.4 V or less (50 mA)
1.0 V or less (20 mA)

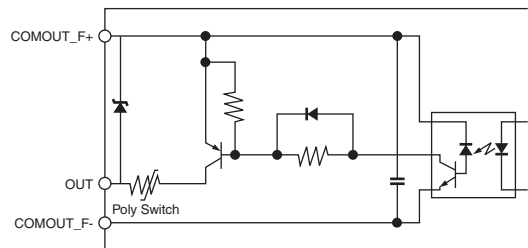
Circuit D (other outputs)



- Max. applied voltage: 30 V
- Max. sink current: 50 mA
- Leakage current: 0.1 mA or less
- Residual voltage:
1.4 V or less (50 mA)
1.0 V or less (20 mA)

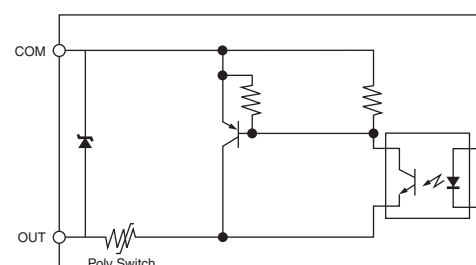
Output circuit diagram (PNP output type, controllers with a "P" at the end of the part number)

Circuit C (F_OUT0 to 3)



- Max. applied voltage: 30 V
- Max. sink current: 50 mA
- Leakage current: 0.1 mA or less
- Residual voltage:
1.4 V or less (50 mA)
1.0 V or less (20 mA)

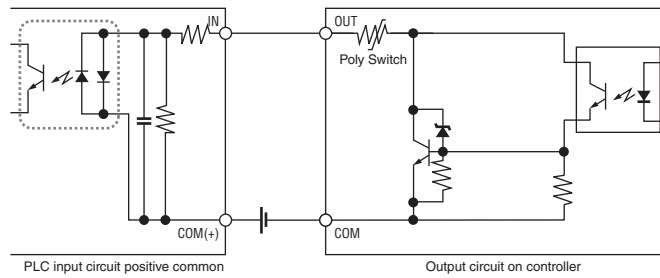
Circuit D (other outputs)



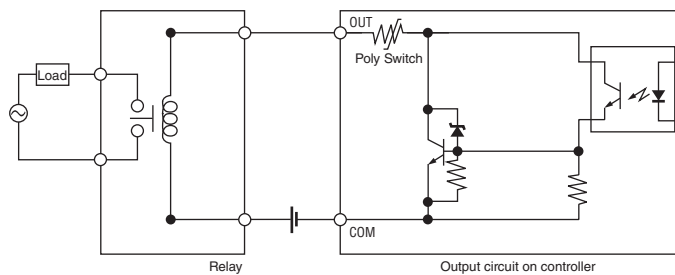
- Max. applied voltage: 30 V
- Max. sink current: 50 mA
- Leakage current: 0.1 mA or less
- Residual voltage:
1.4 V or less (50 mA)
1.0 V or less (20 mA)

Example of connections (system with NPN outputs)

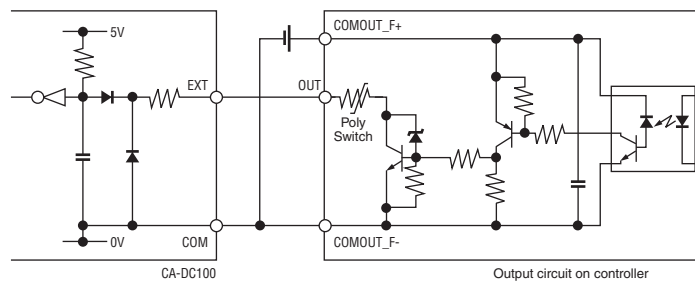
When connecting an NPN output from the controller to a PLC with a positive common



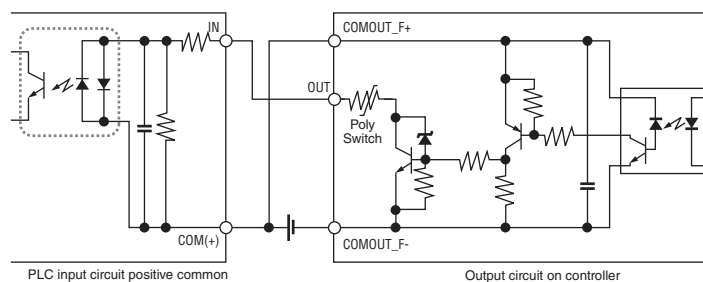
When connecting an NPN output from the controller to a relay



When connecting the F_OUT output (NPN) from the controller to the no-voltage input terminal for the CA-DC100 LED light controller



When connecting the F_OUT output (NPN) from the controller to a PLC with a positive common

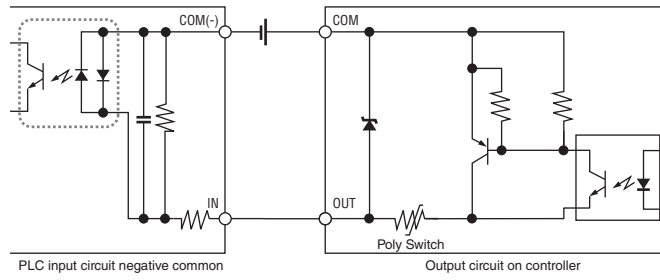


! Point

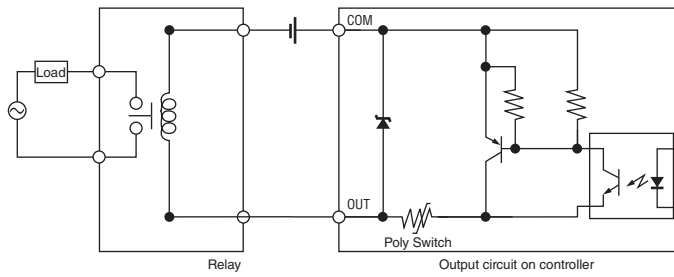
- The common output terminal for the terminal block1 is the COMOUT1 terminal.
- The common output terminal for the I/O connector is the COMOUT2 terminal of the parallel I/O interface.

Example of connections (PNP output type, controllers with a "P" at the end of the part number)

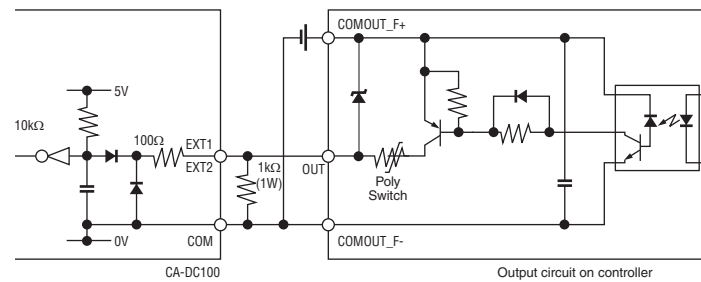
When connecting a PNP output from the controller to a PLC with a negative common



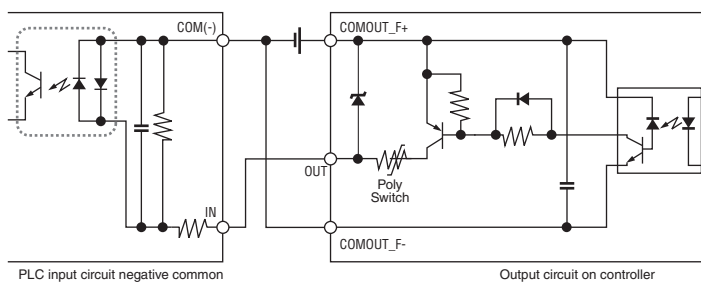
When connecting a PNP output from the controller to a relay



When connecting the F_OUT output (PNP) from the controller to the no-voltage input terminal for the CA-DC100 LED light controller



When connecting the F_OUT output (PNP) from the controller to a PLC with a negative common



! Point

- The common output terminal for the terminal block1 is the COMOUT1 terminal.
- The common output terminal for the I/O connector is the COMOUT2 terminal of the parallel I/O interface.

CV-X300/X400 Series I/O Interface

RS-232C Interface (CV-X300/X400 Series)

The RS-232C port on the system can be used to communicate with external equipment. The system can communicate with external equipment using two communication modes: non-procedural mode or the PLC-Link mode.

The transmitted data will differ depending on the communication mode. Switch modes depending on the environment. Refer to "CV-X Series User's Manual" for more details on the non-procedural mode and switching the communication mode.

NOTICE

The signal GND and power GND are isolated.

RS-232C Port Specifications

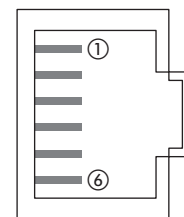
RS-232C basic specifications

- Connector: RJ-11
- Standards: The connected device must comply with EIA (Electronic Industries Association) RS-232C standards.

Item	Compatibility
Communication System	Full-duplex
Synchronous system	Asynchronous
Transmission Code	ASCII (Part binary code)
Data-bit Length	8-bit
Stop-bit Length	1-bit/2-bit
Parity Check	None/odd/even
Communication speed	9600/19200/38400/57600/115200/230400 bps
Delimiter	CR/CR+LF
Flow Control	None, CTS/RTS
Maximum cable length	15 m

Connector specifications

The specifications of the RS-232C port on the controller are as follows:



(Controller Side)

No.	Signal	Signal Description	Signal direction
1	CS (CTS)	Data Transmission Permission	Output
2	Not used	—	—
3	SD (TXD)	Data Transmission	Input
4	SG (GND)	GND	—
5	RD (RXD)	Data Reception	Output
6	RS (RTS)	Data Transmission Request	Input

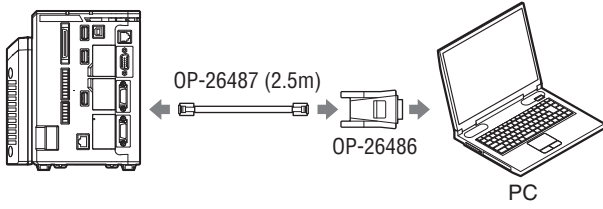
Reference

Since the controller uses the RS-232C modem definition, SD is assigned to input and RD is assigned to output.

Connecting to a PC

The controller can be connected to your computer using a dedicated serial cable (optional).

When the PC has a D-sub 9-pin connector

**Reference**

In the connection example above, flow control is not possible.

The Ethernet port of this unit can be used to communicate with external equipment in addition to connecting to KEYENCE computer application software. The controller can communicate with external equipment using communication modes: non-procedural mode based on the RS-232C command set, the PLC-Link mode, EtherNet/IP, and PROFINET. The system has an FTP client function in which an external FTP server can be specified as the output destination for sending result data, an FTP server function in which access to the SD card of this unit is possible from an external FTP client, and a VNC server function in which remote operation is possible from an external PC client.

Reference

For more details about various types of communications control using the Ethernet port, refer to the "CV-X Series User's Manual".

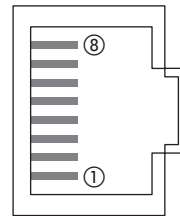
Ethernet Port Specifications

Standard specifications

- Connector: RJ-45
- Medium: 10 BASE-T/100 BASE-TX/1000 BASE-T
- Communications protocols:
 - TCP/IP (Non-procedural communication mode)

Connector Specifications

The specifications of the Ethernet port are as follows:



No.	10 BASE-T/ 100 BASE-TX		1000 BASE-T	
	Signal	Signal direction	Signal	Signal direction
1	TX +	Output	TRX+	Input/Output
2	TX -	Output	TRX-	Input/Output
3	RX +	Input	TRX+	Input/Output
4	Not used	—	TRX-	Input/Output
5	Not used	—	TRX-	Input/Output
6	RX -	Input	TRX-	Input/Output
7	Not used	—	TRX+	Input/Output
8	Not used	—	TRX-	Input/Output

Reference

Use a category 5e or higher LAN cable and a hub that supports Gigabit Ethernet when connecting via 1000BASE-T. An STP type is recommended for the cable structure.

USB Interface (CV-X300/X400 Series)

The USB port on the controller is used exclusively for connecting to KEYENCE PC application software. The USB port cannot be used with any other software.

NOTICE

The connector shield, signal GND, and power GND are common. If there is a potential difference with the connected device, this may result in breakdowns or malfunctions of the controller and the connected device.

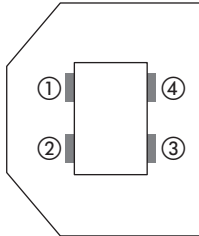
USB Port Specifications

Standard specifications

- Connector: Female B connector
- Standard: USB Version 2.0.

Connector Specifications

Specifications of the USB port on the controller are as follows:



No.	Signal	Signal description	Signal direction
1	VBUS	VBUS	—
2	D-	Differential signal -	Input/Output
3	D+	Differential signal +	Input/Output
4	GND	GND	—

Connecting to a PC

You can connect the controller to the PC via the USB port. To connect the controller to the PC, use the optional USB cable (2 m) OP-66844.

NOTICE

- Only one controller can be connected to a single PC.
- If a cable other than OP-66844 or an extension cable is used, the controller may not operate correctly.
- Conventional USB devices such as a USB mouse, card reader or thumb drive cannot be connected to this port.
- Communication may be interrupted due to high voltage or electrical noise near the system. If communication is interrupted, unplug and plug again the USB cable, and reconnect the communication from the side of the application software.
- If communication interruption occurs frequently, check the surrounding area for noise sources (inverter, solenoid valve, etc.).

System requirements

To connect the controller to a PC via the USB port, a PC with the following requirements is needed.

- Operating system: Microsoft Windows 10 Home/Pro/Enterprise (64-bit versions only), Microsoft Windows 7 Home Premium/Professional/Enterprise/Ultimate (64-bit versions only), (Other Windows operating systems are not supported.)
- USB 2.0 compatible USB terminal

Installing the USB driver

To use the controller's USB interface, you must first install KEYENCE application software and the USB driver for the CX-V Series before connecting the controller to a computer. Normally the USB driver is installed when the KEYENCE application software is installed. However, if the driver was not installed, follow the procedure below to install the USB driver.

! Point

USB driver installation must be performed by a user with Administrator privileges.

This section describes how to install the driver, using Windows 7 as an example.

- 1 Turn on the controller and the PC.**
- 2 Connect the USB port of the controller and that of the PC using the OP-66844 cable (optional).**
- 3 On the computer, open Device Manager, and then click [Update Driver] in the Properties of the item added under [Other devices].**
- 4 Click [Browse my computer for driver software] and specify the folder that contains the USB driver.**

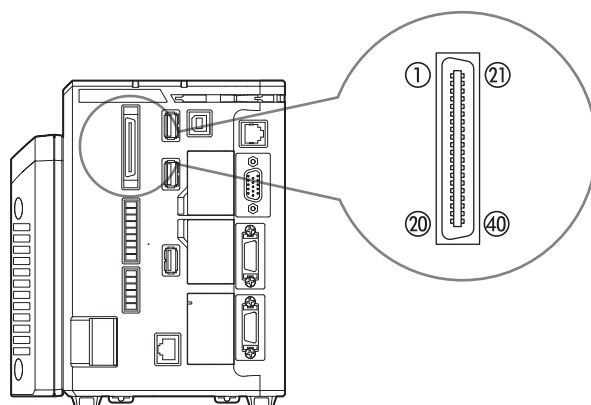
The USB driver will be installed.

Reference

- If the KEYENCE PC application software is installed, the USB driver will be stored in C:\drivers\CV-H1X. You can also download the driver from the KEYENCE user support page.
- When you install the USB driver on your PC, a warning message may appear during the installation. When such a warning message appears, click [Continue] to continue installation.

Parallel I/O Interface (CV-X300/X400 Series)

Connector Specifications


Reference

Use the dedicated parallel connection cable (3 m) OP-51657 (sold separately) to wire devices to the connector.

Pin Layout: Cable colors when optional OP-51657 is used.

No.	Terminal name	Signal	Signal Description ^{*2}	Circuit diagram (Page 3-33)	Cable color
1	COMIN2	–	Connector input common terminal	-	Brown
2	IN0	CMD_PARAM0	Command parameter bit 0	B	Red
3	IN1	CMD_PARAM1	Command parameter bit 1	B	Orange
4	IN2	CMD_PARAM2	Command parameter bit 2	B	Yellow
5	IN3	CMD_PARAM3	Command parameter bit 3	B	Green
6	IN4	CMD_PARAM4	Command parameter bit 4	B	Blue
7	IN5	CMD_PARAM5	Command parameter bit 5	B	Purple
8	IN6	CMD_PARAM6 ^{*1}	Command parameter bit 6 ^{*1}	B	Gray
9	IN7	CMD_PARAM7 ^{*1}	Command parameter bit 7 ^{*1}	B	White
10	IN8	CMD_CODE0	Command input bit 0	B	Black
11	IN9	CMD_CODE1	Command input bit 1	B	Brown
12	IN10	CMD_CODE2	Command input bit 2	B	Red
13	IN11	CMD_CODE3	Command input bit 3	B	Orange
14	IN12	CST	Command execution input	B	Yellow
15	IN13	RESET	Reset	B	Green
16	IN14	PST ^{*1}	Output data cycle input ^{*1}	B	Blue
17	COMOUT2	–	Connector output common terminal	-	Purple
18	OUT0	ACK ^{*1}	Verification of successfully executed command input ^{*1}	C	Gray
19	OUT1	NACK ^{*1}	Verification of unsuccessfully executed command input ^{*1}	C	White
20	OUT2	BUSY ^{*1}	Busy signal ^{*1}	C	Black
21	OUT3	CMD_READY	Command input permission	C	Brown
22	OUT4	READY1	Trigger 1 input permission	C	Red
23	OUT5	READY2	Trigger 2 input permission	C	Orange
24	OUT6	OUT_DATA0 ^{*1}	Data output bit 0 ^{*1}	C	Yellow
25	OUT7	OUT_DATA1 ^{*1}	Data output bit 1 ^{*1}	C	Green
26	OUT8	OUT_DATA2	Data output bit 2	C	Blue

No.	Terminal name	Signal	Signal Description ^{*2}	Circuit diagram (Page 3-33)	Cable color
27	OUT9	OUT_DATA3	Data output bit 3	C	Purple
28	OUT10	OUT_DATA4	Data output bit 4	C	Gray
29	OUT11	OUT_DATA5	Data output bit 5	C	White
30	OUT12	OUT_DATA6	Data output bit 6	C	Black
31	OUT13	OUT_DATA7	Data output bit 7	C	Brown
32	OUT14	OUT_DATA8	Data output bit 8	C	Red
33	OUT15	OUT_DATA9	Data output bit 9	C	Orange
34	OUT16	OUT_DATA10	Data output bit 10	C	Yellow
35	OUT17	OUT_DATA11	Data output bit 11	C	Green
36	OUT18	OUT_DATA12 ^{*1}	Data output bit 12 ^{*1}	C	Blue
37	OUT19	OUT_DATA13 ^{*1}	Data output bit 13 ^{*1}	C	Purple
38	OUT20	OUT_DATA14 ^{*1}	Data output bit 14 ^{*1}	C	Gray
39	OUT21	OUT_DATA15 ^{*1}	Data output bit 15 ^{*1}	C	White
40	COMOUT2	-	Connector output common terminal	-	Black

*1 It is the default assigned value on the terminal where the signal assignment can be changed. These assignments may vary if the Global settings have been changed.

*2 For more details about the signal description, see the "CV-X Series User's Manual".



- COMOUT2 for Pin 17 and Pin 40 are common.
- COMIN2 is a common terminal for input for the parallel I/O connector.
- COMOUT2 is a common terminal for output for the parallel I/O connector.
- Power source 0 V and COMIN1, COMIN2, COMOUT1, COMOUT2 and COMOUT_F are all isolated.

Terminal Block Interface (CV-X300/X400 Series)

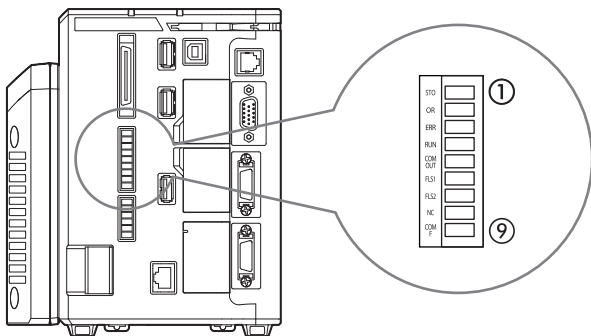
Standard Specifications

Terminal block specifications for the controller are as follows.

NOTICE

Tightening above the specified torque may cause damage to the terminal block.

OUTPUT connector



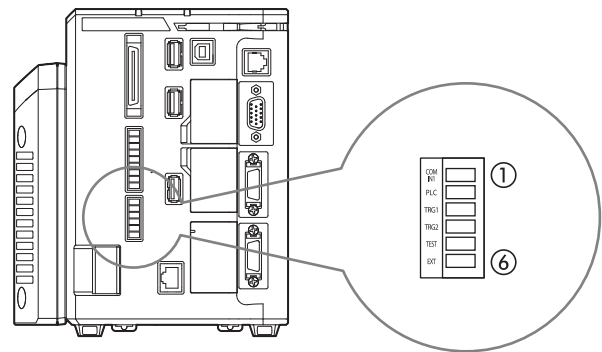
Suitable wiring

AWG 16 - 28

Terminal block screw torque

0.25 Nm or less

INPUT connector



Suitable wiring

AWG16 - 28

Terminal block screw torque

0.25 Nm or less

Terminal Layout

OUTPUT connector

No.	Terminal name	Signal	Terminal block display at time of shipment	Signal description*2	Circuit diagram (Page 3-33)
1	OUT22	STO	STO	Output timing indicator	C
2	OUT23	OR	OR	Total status output	C
3	F_OUT2	ERROR*1	ERR	Error output*1	C
4	F_OUT3	RUN*1	RUN	Run mode output*1	C
5	COMOUT1	–	COMOUT	Common for terminal block outputs	–
6	F_OUT0	FLASH 1	FLS1	Strobe light output for trigger 1	C
7	F_OUT1	FLASH 2	FLS2	Strobe light output for trigger 2	C
8	N.C.	–	–	–	–
9	COMOUT_F	–	COMF	Common terminal for F_OUT	–

*1 It is the default assigned value on the terminal where the signal assignment can be changed. These assignments may vary if the Global settings have been changed.

*2 For more details about the signal description, see the "CV-X Series User's Manual".

Reference

- Power source 0V, COMOUT1, and COMOUT_F are all isolated.
- COMOUT1 is a common terminal exclusively used for terminal outputs 1 and 2.
- COMOUT_F is the common terminals exclusively used for terminal outputs 3 to 4 and 6 to 7.

INPUT connector

No.	Terminal name	Signal	Terminal block display at time of shipment	Signal description *2	Circuit diagram (Page 3-33)
1	COMIN1	–	COMIN1	Common for terminal block inputs	–
2	IN15	PLC*1	PLC	Command read request from PLC*1	B
3	F_IN0	TRG1	TRG1	Trigger 1 input	A
4	F_IN1	TRG2	TRG2	Trigger 2 input	A
5	F_IN2	TEST*1	TEST	Trial run input*1	A
6	F_IN3	EXT*1	EXT	Disable trigger input*1	A

*1 It is the default assigned value on the terminal where the signal assignment can be changed. These assignments may vary if the Global settings have been changed.

*2 For more details about the signal description, see the "CV-X Series User's Manual".

Reference

- Power source 0V and COMIN1 are all isolated.
- COMIN1 is the common terminal for inputs 2 to 6.

Expansion Unit (CV-X300/X400 Series)

Illumination expansion unit

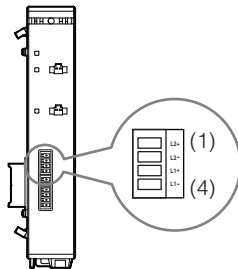
Illumination expansion unit CA-DC40E (Option)

The following section details the terminal block specifications for the illumination expansion unit (CA-DC40E).

Point Tightening above the specified torque may cause damage to the terminal block.

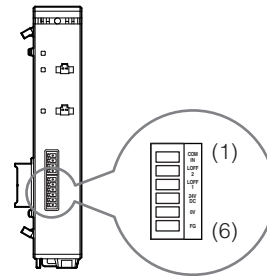
OUTPUT connector

- Compatible wires: AWG14 to 22
- Terminal block screw torque: 0.25 Nm or less



INPUT connector

- Compatible wires: AWG14 to 22
- Terminal block screw torque: 0.25 Nm or less



Connector Specifications

- OUT Connector Terminal Block

No.	Signal (terminal block display)	Signal Description	Description
1	LIGHT2+(L2+)	+ ve terminal for Light 2	Connect the + ve side of light 2.
2	LIGHT2-(L2-)	- ve terminal for Light 2	Connect the - ve side of light 2.
3	LIGHT1+(L1+)	+ ve terminal for Light 1	Connect the + ve side of light 1.
4	LIGHT1-(L1-)	- ve terminal for Light 1	Connect the - ve side of light 1.



If a 12 V illumination unit is connected to a terminal block for which the voltage has been set to 24 V, this may cause a fire, electric shock, or product malfunction. Normally, use the standard voltage for Keyence illumination units, 12 V, which is also the default setting.



If the voltage has been set to 24 V, nothing will be output from the Light 1 Output Connector or the Light 2 Output Connector.

- IN Connector Terminal Block

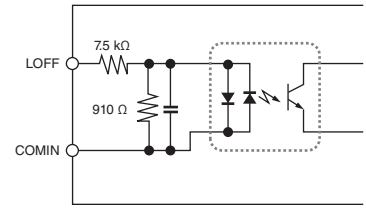
No.	Signal (terminal block display)	Signal Description	Description
1	COMIN(COMIN)	Common for terminal block inputs	Dedicated input common for the IN connector terminal block.
2	LIGHT2_OFF(LOFF2)	Forcibly stop lighting input for Light 2	Used to force the emission of LED illumination unit to off by level synchronized input.
3	LIGHT1_OFF(LOFF1)	Forcibly stop lighting input for Light 1	Used to force the emission of LED illumination unit to off by level synchronized input.
4	24VDC(24VDC)	+ ve power supply input (24 V DC)	Supplies a 24 V power source for the illumination expansion unit.
5	0V(0V)	- power supply (0 V) input	Connects the 0 V of the 24 V power source for the illumination expansion unit.
6	FG(FG)	frame ground terminal	Connect to a Class D ground.



The 0 V power supply, COMIN, controller, and other expansion unit commons are all insulated.

Input Circuit Diagram

- Max. applied voltage: 26.4 V
- ON voltage: 19 V or greater
- ON current: 3 mA or greater
- OFF voltage: 5 V or less
- OFF current: 1 mA or less

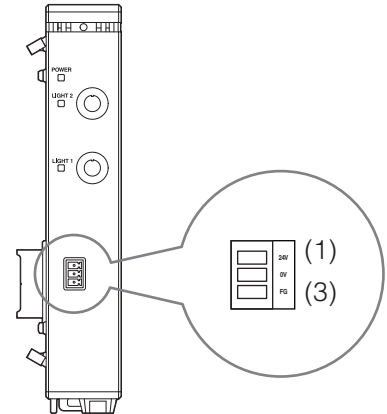


Illumination Expansion Unit (CA-DC50E: Option)

The following section details the terminal block specifications for the illumination expansion unit (CA-DC50E).

Power supply connector

- Compatible wires: AWG14 to 22
- Terminal block screw torque: 0.25 Nm or less



Connector Specifications

- Power supply Connector Terminal Block

No.	Signal (terminal block display)	Signal Description	Description
1	24VDC(24V)	+ ve power supply input (24 V DC)	Supplies a 24 V power source for the illumination expansion unit.
2	0V(0V)	- power supply (0 V) input	Connects the 0 V of the 24 V power source for the illumination expansion unit.
3	FG(FG)	frame ground terminal	Connect to a Class D ground.

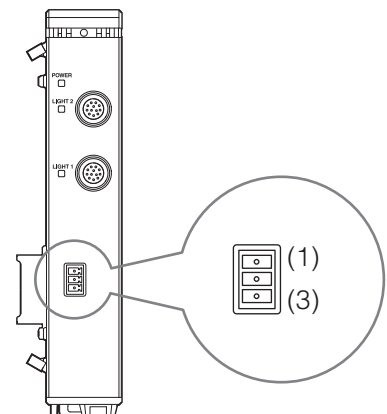
Point The 0 V power supply, controller, and other expansion unit commons are all insulated.

Illumination Expansion Unit (CA-DC60E: Option) (CV-X400 Series Only)

The following section details the terminal block specifications for the illumination expansion unit (CA-DC60E).

Power supply connector

- Compatible wires: AWG14 to 22
- Terminal block screw torque: 0.25 Nm or less



Connector Specifications

- Power supply Connector Terminal Block

No.	Signal (terminal block display)	Signal Description	Description
1	24VDC(24V)	+ ve power supply input (24 V DC)	Supplies a 24 V power source for the illumination expansion unit.
2	0V(0V)	- power supply (0 V) input	Connects the 0 V of the 24 V power source for the illumination expansion unit.
3	FG(FG)	frame ground terminal	Connect to a Class D ground.

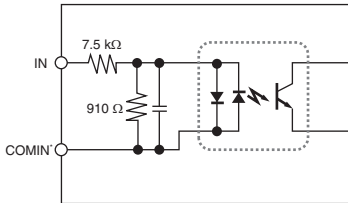
Point The 0 V power supply, controller, and other expansion unit commons are all insulated.

Input/Output Circuit (CV-X300/X400 Series)

Input Connections

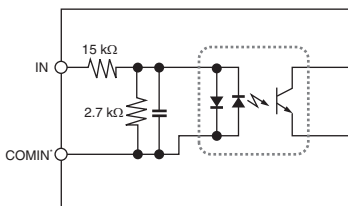
Input circuit diagram

Circuit A (For F_IN0 to 3 only, EV compatible)



- Max. applied voltage: 26.4 V
- ON voltage: 19 V or greater
- ON current: 3 mA or greater
- OFF voltage: 5 V or less
- OFF current: 1 mA or less

Circuit B (other inputs)



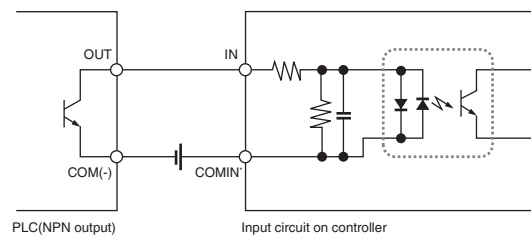
- Max. applied voltage: 26.4 V
- ON voltage: 19 V or greater
- ON current: 2 mA or greater
- OFF voltage: 3 V or less
- OFF current: 0.3 mA or less

! Point

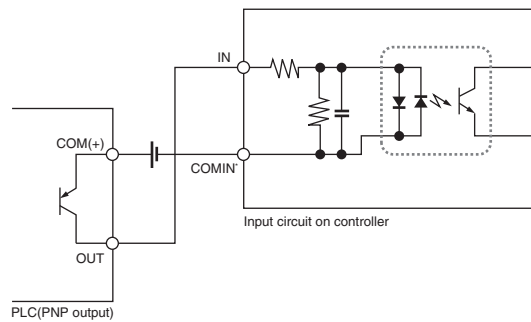
* The commons which are connected differ according to the IN terminals. The common terminal for IN connectors 2 - 6 is COMIN1, and the common terminal for parallel I/O connectors 2 - 16 is COMIN2.

Example of connections

When connecting an NPN PLC output to the system input



When connecting a PNP PLC output to the system input

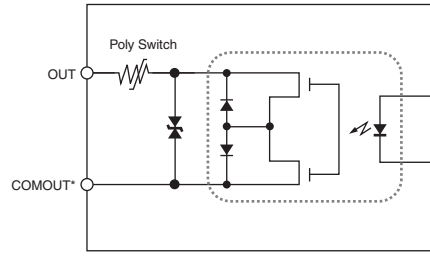


Output Connections

Output circuit diagram

Circuit C (common for all output terminals)

- Max. applied voltage: 30 V
- Max. sink current: 50 mA
- Leakage current: 0.1 mA or less
- Residual voltage:
 - 1.4 V or less (50 mA)
 - 1.0 V or less (20 mA)



! Point

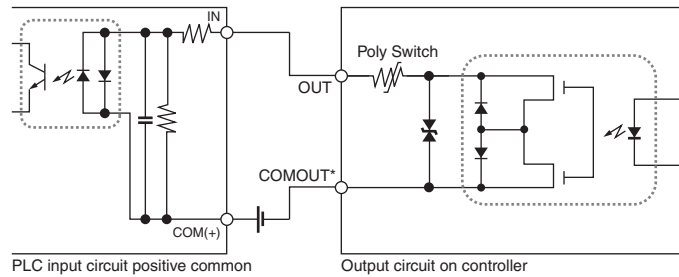
Since this unit utilizes a photo MOSFET in the output elements, any one of the NPN inputs, or PNP inputs is connectable.

Example of connections: When connecting the output from the controller with a positive common

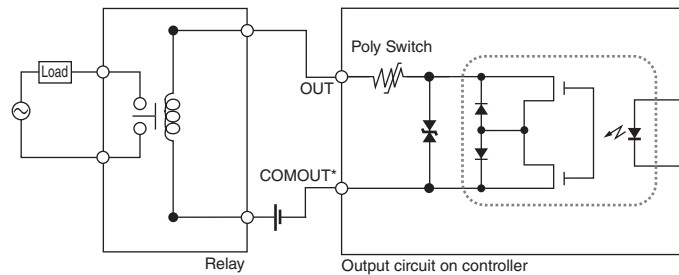
! Point

If the input instrument is compatible with the NPN open collector outputs, then refer to this connection example.

When connecting the output from the controller to a PLC with a positive common



When connecting the output from the controller to a relay



! Point

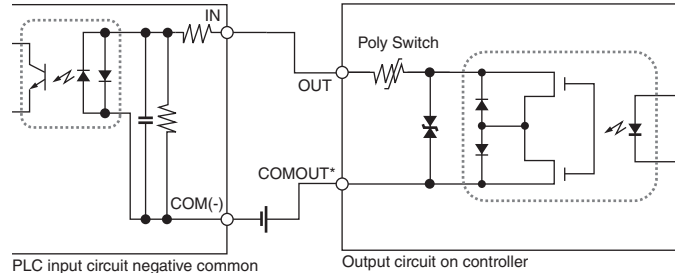
* The commons which are connected differ according to the OUT terminals. The common terminal for OUT connectors 1 - 2 is COMOUT1, and the common terminal for OUT connectors 3 - 4/6 - 7 is COMOUT_F, and the common terminal for parallel I/O connectors 18 - 39 is COMOUT2.

Example of connections: When connecting the output from the controller with a negative common

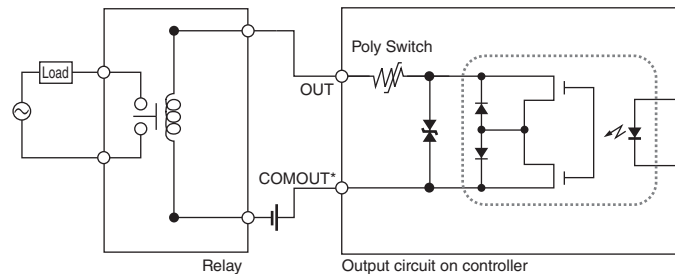
! Point

If the input instrument is compatible with the PNP open collector outputs, then refer to this connection example.

When connecting the output from the controller to a PLC with a negative common



When connecting the output from the controller to a relay



! Point

* The commons which are connected differ according to the OUT terminals. The common terminal for OUT connectors 1 - 2 is COMOUT1, and the common terminal for OUT connectors 3 - 4/6 - 7 is COMOUT_F, and the common terminal for parallel I/O connectors 18 - 39 is COMOUT2.

Chapter

4

Specifications and Optional Devices

Documentation for the installation and configuration methods of the controller, software, and CAD data can be downloaded from the following URL.

www.keyence.com/cvxus

Cameras and Camera Input Units That Can Be Connected

Reference

For more information on camera and cable combinations that can be used, see "List of maximum cable lengths by camera" (page 4-5).

Cameras that can be Connected (CV-X100 Series)

The cameras that can be connected as well as the maximum connectable number are listed by each model of the CV-X100 Series in the table below.

Camera	CV-X102	CV-X152	CV-X172
Area camera CA-035C/035M, CA-H035C/H035M, CA-HS035C/HS035M, CV-035C/035M, CV-H035C/H035M, CV-S035C/S035M	2	2 (4) ^{*1}	2 (4) ^{*1}
CA-HX048C/HX048M	2 ^{*2}	2 (4) ^{*1*2}	2 (4) ^{*1*2}
CV-H100C/H100M	×	2 (4) ^{*1}	2 (4) ^{*1}
CA-200C/200M, CA-H200C/H200M, CA-HS200C/HS200M, CV-200C/200M, CV-H200C/H200M, CV-S200C/S200M	×	2 (4) ^{*1}	2 (4) ^{*1}
CA-HX200C/HX200M	×	2 (4) ^{*1*2}	2 (4) ^{*1*2}
CA-H500C/H500M, CV-H500C/H500M	×	×	2 (4) ^{*1}
CA-HX500C/HX500M	×	×	2 (4) ^{*1*2}
CA-H048CX/H048MX CA-H200CX/H200MX CA-H500CX/H500MX	×	×	×
CA-H2100C/H2100M	×	×	×

*1 The number in the parenthesis is the maximum number of cameras that can be connected by adding the camera expansion unit (CV-E500).

*2 It works as an 11x-speed camera. It does not support LumiTrax.

Cameras that can be Connected (CV-X200 Series)

The cameras that can be connected as well as the maximum connectable number are listed by each model of the CV-X200 Series in the table below.

	Camera	Camera input unit to which connection is possible	CV-X202	CV-X252	CV-X272	CV-X292
Area camera	CA-035C/035M, CA-H035C/H035M, CA-HS035C/HS035M, CV-035C/035M, CV-H035C/H035M, CV-S035C/S035M	CA-EC80	2	2 (4) ^{*1}	2 (4) ^{*1}	2 (4) ^{*1}
	CA-HX048C/HX048M	CA-EC80	2 ^{*3*4}	2 (4) ^{**1*3*4}	2 (4) ^{**1*3*4}	2 (4) ^{**1*3*4}
		CA-EC80HX/EC80L	1 ^{*3*4}	1 (2) ^{**1*3*4}	1 (2) ^{**1*3*4}	1 (2) ^{**1*3*4}
	CV-H100C/H100M	CA-EC80	×	2 (4) ^{*1}	2 (4) ^{*1}	2 (4) ^{*1}
	CA-200C/200M, CA-H200C/H200M, CA-HS200C/HS200M, CV-200C/200M, CV-H200C/H200M, CV-S200C/S200M	CA-EC80	×	2 (4) ^{*1}	2 (4) ^{*1}	2 (4) ^{*1}
	CA-HX200C/HX200M	CA-EC80	×	2 (4) ^{**1*3*4}	2 (4) ^{**1*3*4}	2 (4) ^{**1*3*4}
		CA-EC80HX/EC80L	×	1 (2) ^{**1*3*4}	1 (2) ^{**1*3*4}	1 (2) ^{**1*3*4}
	CA-H500C/H500M, CV-H500C/H500M	CA-EC80	×	×	2 (4) ^{*1}	2 (4) ^{*1}
	CA-HX500C/HX500M	CA-EC80	×	×	2 (4) ^{**1*3*5}	2 (4) ^{**1*3*4}
		CA-EC80HX/EC80L	×	×	1 (2) ^{**1*3*5}	1 (2) ^{**1*3*4}
CA-H048CX/H048MX CA-H200CX/H200MX CA-H500CX/H500MX	-	×	×	×	×	
CA-H2100C/H2100M	CA-EC80L	×	×	×	1 (2) ^{**1*2}	
LJ-V Series head	LJ-V	CA-EC80LJ	×	×	×	1 (2) ^{**1*2}

*1 The number in the parenthesis is the maximum number of cameras that can be connected by adding the camera expansion unit (CA-E800).

*2 You cannot connect CA-H2100C/H2100M and the profile measuring instrument LJ-V simultaneously.

*3 The number of connectable units and the transfer speed of CA-HX500C/HX500M/HX200C/HX200M/HX048C/HX048M vary depending on the camera input unit mounted to the controller. (When CA-EC80HX/EC80L is mounted, one unit can be connected and it works as a 16x-speed camera. When CA-EC80 is mounted, two units can be connected and they work as 11x-speed cameras.)

*4 It supports LumiTrax.

*5 The CV-X272 does not support the LumiTrax function that uses CA-HX500C/HX500M.

Cameras that can be Connected (CV-X300/X400 Series)

The cameras that can be connected as well as the maximum connectable number are listed by each model of the CV-X300/X400 Series in the table below.

Camera	Camera connection	CV-X402/ CV-X302	CV-X422/ CV-X322	CV-X452/ CV-X352	CV-X472	CV-X482 ^{*1}	CV-X480LJ ^{*1}	
Area camera	CA-035C/H035M, CA-H035C/H035M, CA-HS035C/H035M, CV-035C/H035M, CV-H035C/H035M, CV-S035C/S035M	Camera port on the controller or CA-E100	2	2 (4) ^{*2}	2 (4) ^{*2}	2 (4) ^{*2}	(4) ^{*2}	×
	CA-H048CX/H048MX, CA-HX048C/HX048M		2 ^{*3*4}	2 (4) ^{*2*3*4}	2 (4) ^{*2*3*4}	2 (4) ^{*2*3}	(4) ^{*2*3}	×
	CA-200C/200M, CA-H200C/H200M, CA-HS200C/H200M, CV-200C/200M, CV-H200C/H200M, CV-S200C/S200M		×	2 (4) ^{*2}	2 (4) ^{*2}	2 (4) ^{*2}	(4) ^{*2}	×
	CA-H200CX/H200MX, CA-HX200C/HX200M		×	2 (4) ^{*2*3*4}	2 (4) ^{*2*3*4}	2 (4) ^{*2*3}	(4) ^{*2*3}	×
	CA-H500C/H500M, CV-H500C/H500M		×	×	2 (4) ^{*2}	2 (4) ^{*2}	(4) ^{*2}	×
	CA-H500CX/H500MX, CA-HX500C/HX500M		×	×	2 (4) ^{*2*3*4}	2 (4) ^{*2*3}	(4) ^{*2*3}	×
	CA-H2100C/H2100M		×	×	×	2 (4) ^{*2}	(4) ^{*2}	×
	LJ-V Series head							
LJ-V7020/V7020K/ V7060/V7060K/V7080/ V7200/V7300	CA-E100LJ	×	×	×	×	(4) ^{*2*5}	(2) ^{*2*5}	
	CA-E110LJ ^{*6}	×	×	×	×	(4) ^{*2*5}	×	

*1 For the CV-X482/X480LJ, the controller has no camera port, so at least one camera input unit is necessary.

*2 The number in the parentheses is the maximum number of cameras that can be connected by adding the camera expansion unit (CA-E100 or CA-E100LJ/E110LJ).

*3 The CV-X400 Series controller supports the LumiTrax light and the MultiSpectrum light. For more details about these lights, see the CV-X Series User's Manual.

*4 CV-X302/X322/X352 do not support capturing in LumiTrax mode and MultiSpectrum mode.

*5 For one camera input unit, up to two LJ-V Series heads (limited to the same model) can be connected. However, the capture timing and number of capture lines of the LJ-V Series heads connected to the same camera input unit will be the same.

*6 The CA-E110LJ is a camera input unit that also supports LJ-V Series luminance output type sensor heads (sensor heads whose models end in "B").

List of maximum cable lengths by camera

Up to 2 repeaters can be connected in series.

- The following table shows the maximum levels of extension and maximum cable length for each camera.
- Do not exceed the maximum camera cable length and maximum number of extensions allowed.

Camera model	Supported cable model		Supported repeater model ^{*3}		Max. length		
	CA-CH ^{**}	CA-CN ^{**}	CA-CHX10U	CA-CNX10U	No. of repeaters		
					None	One	Two
CA-035C/035M	○		○		17m	27m	37m
CA-200C/200M	○		○		10m	20m	30m
CA-H035C/H035M	○		○		10m	20m	30m
CA-H048CX/H048MX	○		○		10m	20m	30m
CA-H200C/H200M	○		○		10m	20m	30m
CA-H200CX/H200MX	○		○		10m	20m	Unable to connect
CA-H500C/H500M	○		○		10m	20m	30m
CA-H500CX/H500MX	○		○		10m	20m	Unable to connect
CA-H2100C/H2100M	○		○		10m	20m	30m
CA-HS035C/HS035M	○		○		10m	20m	30m
CA-HS200C/HS200M	○		○		10m	20m	30m
CA-HX048C/HX048M	○		○		10m	20m	30m
CA-HX200C/HX200M	○		○		10m	20m	Unable to connect
CA-HX500C/HX500M	○		○		10m	20m	Unable to connect
CV-035C/035M		○		○	17m	34m	51m ^{*2}
CV-200C/200M		○		○	10m	20m	30m
CV-H035C/H035M	○		○		10m	20m	30m
CV-H100C/H100M	○		○		10m	20m	30m
CV-H200C/H200M	○		○		10m	20m	Unable to connect
CV-H500C/H500M	○		○		10m	20m	Unable to connect
CV-H2100C/H2100M	○		○		10m	20m	30m
CV-S035C/S035M		○		○	10m	20m	Unable to connect
CV-S200C/S200M		○		○	10m	20m	30m ^{*1}

*1 Connection is not possible when doing a partial capture of less than 1,000 lines.

*2 Connection is not possible when doing a partial capture of less than 350 lines.

*3 A camera cable that is 10m or longer cannot be connected to the end of a repeater for applications where the camera will be used attached to a robot.

Therefore, the combinations CA-CH10X/CA-CN10X/CA-CH3X+CA-CH3BE/CA-CN3X+CA-CN3BE cannot be used.

List of Cable Characteristics

The connector shape, and cable length and characteristics are listed below.

Select a cable according to the connection condition.

Cable model	Connector shape		Flexible cable	Environment-resistant ^{*1} cable	For repeater	For extension	Length					
	CA-CH	CA-CN					Straight	L-shape	1m	3m	5m	7m
CA-CH*	○		○					○	○		○	
CA-CH*P	○		○		○			○			○	
CA-CH*R	○		○					○	○		○	○
CA-CH*L	○			○				○	○		○	
CA-CH*X	○		○			○		○			○	
CA-CH*RX	○		○			○		○	○		○	
CA-CH*BE	○		○				○	○ ^{*4}				
CA-CH*BEX	○		○			○		○ ^{*2}				
CA-CN*		○	○					○	○	○		○
CA-CN*R		○	○						○	○		○
CA-CN*L		○		○					○	○		○
CA-CN*X		○	○				○		○			○
CA-CN*RX		○	○				○		○			○
CA-CN*LX		○		○			○		○			○
CA-CN*RE		○	○								○ ^{*3}	
CA-CN*BE		○	○					○ ^{*5}				

*1 The environment-resistant cable has a protective structure equivalent to the IP64 protection level defined in IEC/EN 60529 only when correctly connected to an environment-resistant camera and lens designated by Keyence. For more details, see the User Manual of the environment-resistant camera and lens that are going to be used.

*2 The electrical characteristics of CA-CH3BEX are equivalent to a 5 m cable rather than a 3 m cable. Use the cable by converting it to a 5 m cable within the maximum extension range of the camera to be used.

*3 CA-CN7RE is an extension cable and cannot be used by itself. Connect a CA-CN1/CN3/CN5/CN10/CN3R/CN5R/CN10R/CN3L/CN5L/CN10L/CN3RX/CN10RX/CN3LX/CN10LX to the controller side connector and then use it within the maximum extension range of the camera to be used.

*4 CA-CH3BE is an extension cable and cannot be used by itself. Use it with a CA-CH3/CH3R/CH3L/CH3X/CH3RX connected to the controller side connector. Note that the electrical characteristics are equivalent to a 7 m cable rather than a 3 m cable. Use the cable by converting it to a 7 m cable within the maximum extension range of the camera to be used.

*5 CA-CN3BE is an extension cable and cannot be used by itself. Use it with a CA-CN3/CN3R/CN3L/CN3X/CN3RX connected to the controller side connector. Note that the electrical characteristics are equivalent to a 7 m cable rather than a 3 m cable. Use the cable by converting it to a 7 m cable within the maximum extension range of the camera to be used.

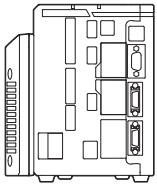
Examples of Cable Connection Between the Controller and a Camera

This section shows typical examples of cable connections from the controller to the camera. Check cable models that are compatible with the camera to be used in "List of maximum cable lengths by camera" (page 4-5) and use it as a reference for the system configuration to be used.

Connection Examples (When the CA-CH** Cable is Used)

Connecting with one camera cable

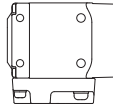
Controller
Example: CV-X472



Camera cable
Example: CA-CH3, CA-CH10R etc.

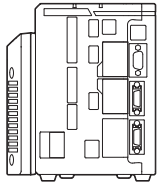


Camera
Example: CA-035C,
CA-H048MX etc.

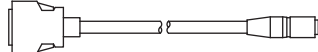


Connecting by using one repeater to extend the camera cable

Controller
Example: CV-X472



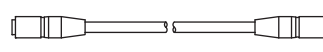
Camera cable
Example: CA-CH3, CA-CH10R etc.



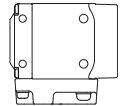
Repeater
CA-CHX10U



Repeater camera cable
Example:
CA-CH10X, CA-CH3BEX etc.

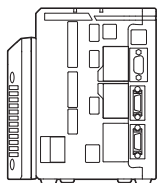


Camera
Example:
CA-035C,
CA-H048MX
etc.

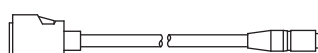


Connecting by using two repeaters to extend the camera cable

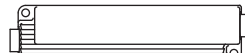
Controller
Example: CV-X472



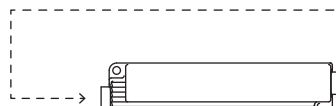
Camera cable
Example: CA-CH3, CA-CH10R etc.



Repeater
CA-CHX10U



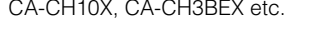
Repeater camera cable
Example:
CA-CH10X, CA-CH3BEX etc.



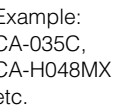
Repeater
CA-CHX10U



Repeater camera cable
Example:
CA-CH10X, CA-CH3BEX etc.

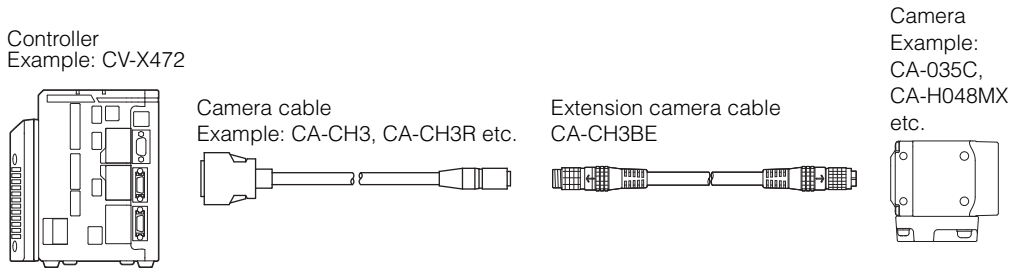


Camera
Example:
CA-035C,
CA-H048MX
etc.

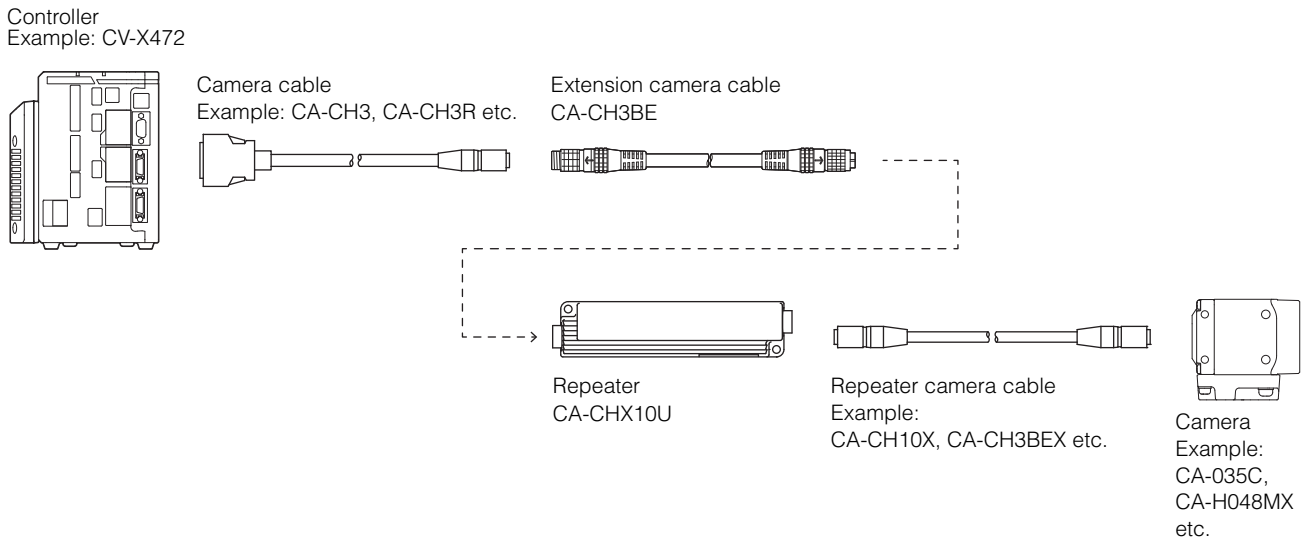


Examples of Cable Connection Between the Controller and a Camera

Connecting by using a high flex robotic extension cable to extend the camera cable



Connecting by using a high flex robotic extension cable and a repeater to extend the camera cable

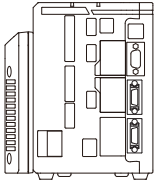


Examples of Cable Connection Between the Controller and a Camera

Connection Examples (When the CA-CN** Cable is Used)

Connecting with one camera cable

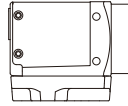
Controller
Example: CV-X472



Camera cable
Example: CA-CN3, CA-CN10R etc.

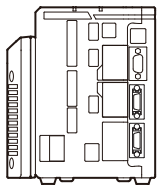


Camera
Example:
CV-035C,
CV-200M etc.

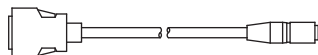


Connecting by using one repeater to extend the camera cable

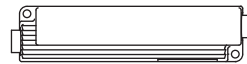
Controller
Example: CV-X472



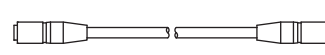
Camera cable
Example: CA-CN3, CA-CN10R etc.



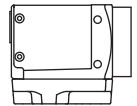
Repeater
CA-CNX10U



Repeater camera cable
Example:
CA-CN3X, CA-CN10RX etc.

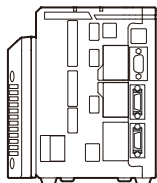


Camera
Example:
CV-035C,
CV-200M etc.

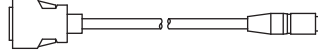


Connecting by using two repeaters to extend the camera cable

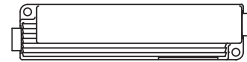
Controller
Example: CV-X472



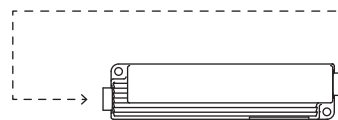
Camera cable
Example: CA-CN3, CA-CN10R etc.



Repeater
CA-CNX10U



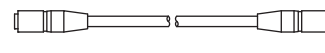
Repeater camera cable
Example:
CA-CN3X, CA-CN10RX etc.



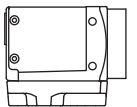
Repeater
CA-CNX10U



Repeater camera cable
Example:
CA-CN3X, CA-CN10RX etc.

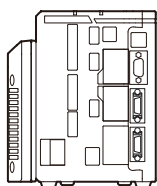


Camera
Example:
CV-035C,
CV-200M etc.

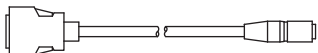


Connecting by using a high flex robotic extension cable to extend the camera cable

Controller
Example: CV-X472



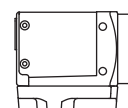
Camera cable
Example: CA-CN3, CA-CN3R etc.



Extension camera cable
CA-CN3BE, CA-CN7RE

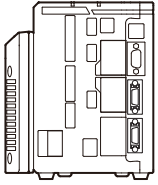


Camera
Example:
CV-035C,
CV-200M etc.



Connecting by using a high flex robotic extension cable and a repeater to extend the camera cable

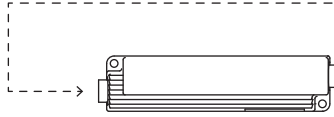
Controller
Example: CV-X472



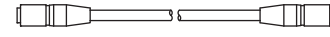
Camera cable
Example: CA-CN3, CA-CN3R etc.



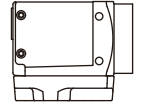
Extension camera cable
CA-CN3BE, CA-CN7RE



Repeater
CA-CNX10U



Repeater camera cable
Example:
CA-CN3X, CA-CN10RX etc.



Camera
Example:
CV-035C,
CV-200M etc.

Field of View and the Working Distance by Camera (FOV Chart)

List of FOV Charts by Camera

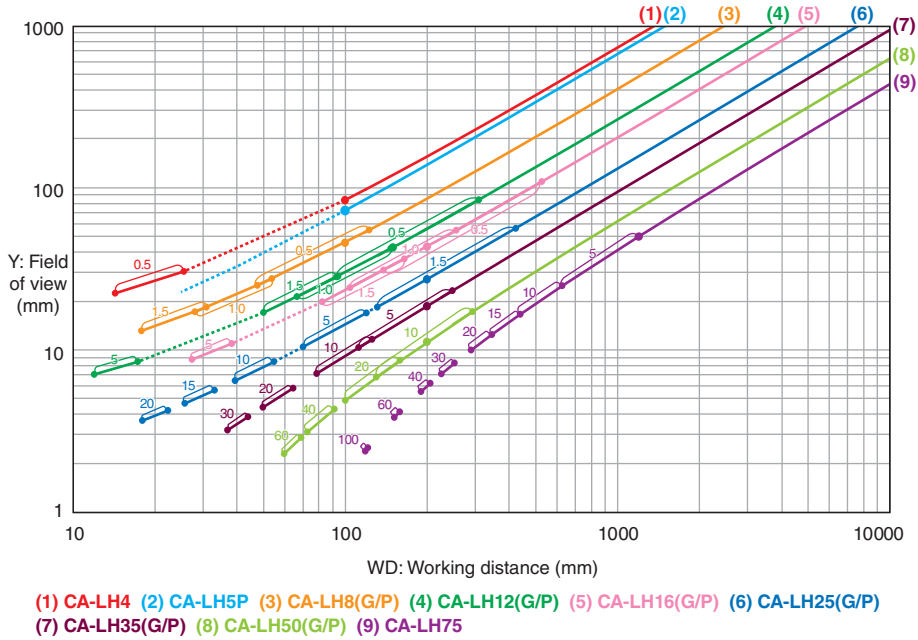
Camera model	Resolution	Lens to be used					
		CA-LHE**	CA-LHR**	CA-LH**	CV-L**	CA-LHS**	CA-LS**
CA-035C/M	640 x 480	-	-	Page 4-12	Page 4-12	-	-
	512 x 480	-	-			-	-
CA-200C/M	1600 x 1200	-	Page 4-13	Page 4-13	Page 4-15	-	-
	1024 x 960	-	Page 4-14	Page 4-14	Page 4-15	-	-
CA-H035C/M	640 x 480	-	-	Page 4-12	Page 4-12	-	-
	512 x 480	-	-			-	-
CA-H048CX/MX	784 x 596	-	Page 4-17	Page 4-16	-	-	-
	640 x 480	-	Page 4-17	Page 4-16	-	-	-
	512 x 480	-			-	-	-
CA-H200C/M	1600 x 1200	-	Page 4-13	Page 4-13	Page 4-15	-	-
	1024 x 960	-	Page 4-14	Page 4-14	Page 4-15	-	-
CA-H200CX/MX	1600 x 1200	-	Page 4-18	Page 4-18	-	-	-
CA-H500C/M	2432 x 2050	-	Page 4-19	Page 4-19	-	-	-
CA-H500CX/MX	2432 x 2040	-	Page 4-20	Page 4-20	-	-	-
	1600 x 1200	-	Page 4-18	Page 4-18	-	-	-
CA-H2100C/M	5104 x 4092	Page 4-21	-	-	-	-	-
	2432 x 2050	-	Page 4-19	Page 4-19	-	-	-
CA-HS035C/M	640 x 480	-	-	-	-	-	Page 4-22
	512 x 480	-	-	-	-	-	
CA-HS200C/M	1600 x 1200	-	-	-	-	Page 4-23	-
	1024 x 960	-	-	-	-	Page 4-23	-
CA-HX048C/M	784 x 596	-	Page 4-17	Page 4-16	-	-	-
	640 x 480	-	Page 4-17	Page 4-16	-	-	-
	512 x 480	-			-	-	-
CA-HX200C/M	1600 x 1200	-	Page 4-24	Page 4-24	-	-	-
CA-HX500C/M	2432 x 2040	Page 4-25	-	-	-	-	-
	1600 x 1200	-	Page 4-24	Page 4-24	-	-	-
CV-035C/M	640 x 480	-	-	Page 4-26	Page 4-26	-	-
	512 x 480	-	-			-	-
CV-200C/M	1600 x 1200	-	Page 4-27	Page 4-27	Page 4-29	-	-
	1024 x 960	-	Page 4-28	Page 4-28	Page 4-29	-	-
CV-H035C/M	640 x 480	-	-	Page 4-26	Page 4-26	-	-
	512 x 480	-	-			-	-
CV-H100C/M	1000 x 1000	-	-	Page 4-30	-	-	-
CV-H200C/M	1600 x 1200	-	Page 4-27	Page 4-27	Page 4-29	-	-
	1024 x 960	-	Page 4-28	Page 4-28	Page 4-29	-	-
CV-H500C/M	2432 x 2050	-	Page 4-19	Page 4-19	-	-	-
CV-S035C/M	640 x 480	-	-	-	-	-	Page 4-22
	512 x 480	-	-	-	-	-	
CV-S200C/M	1600 x 1200	-	-	-	-	Page 4-31	-
	1024 x 960	-	-	-	-	Page 4-31	-

Environment resistant 0.35 megapixel camera (CA-035C/035M) / High-speed, environment resistant 0.35 megapixel camera (CA-H035C/H035M)

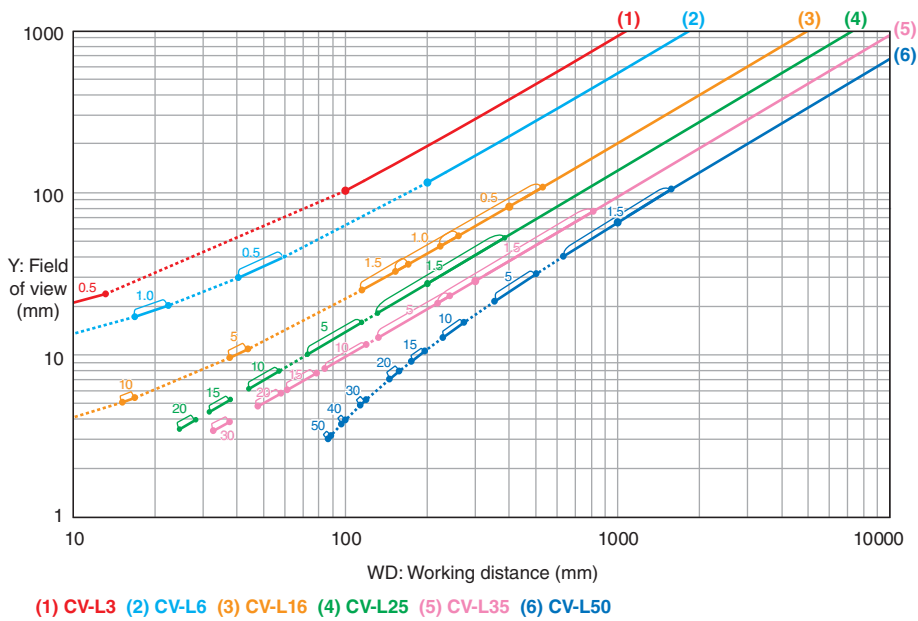
Point

- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
- If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.

When a high-resolution lens (CA-LH*(G/P)) is used



When a standard lens (CV-L*) is used



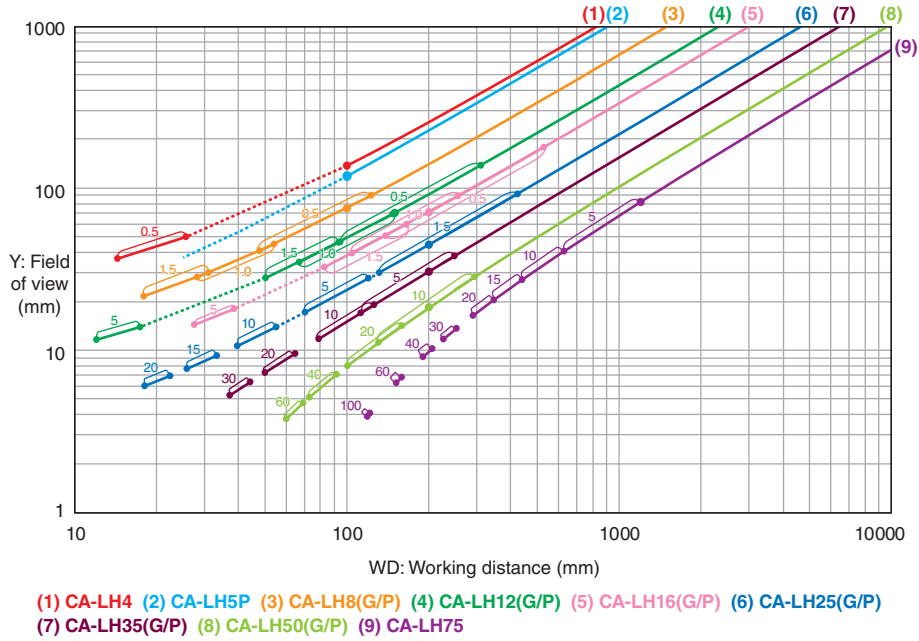
Field of View and the Working Distance by Camera (FOV Chart)

**Environment resistant 2 megapixel camera (CA-200C/200M) /
High-speed, environment resistant 2 megapixel camera (CA-H200C/H200M)**

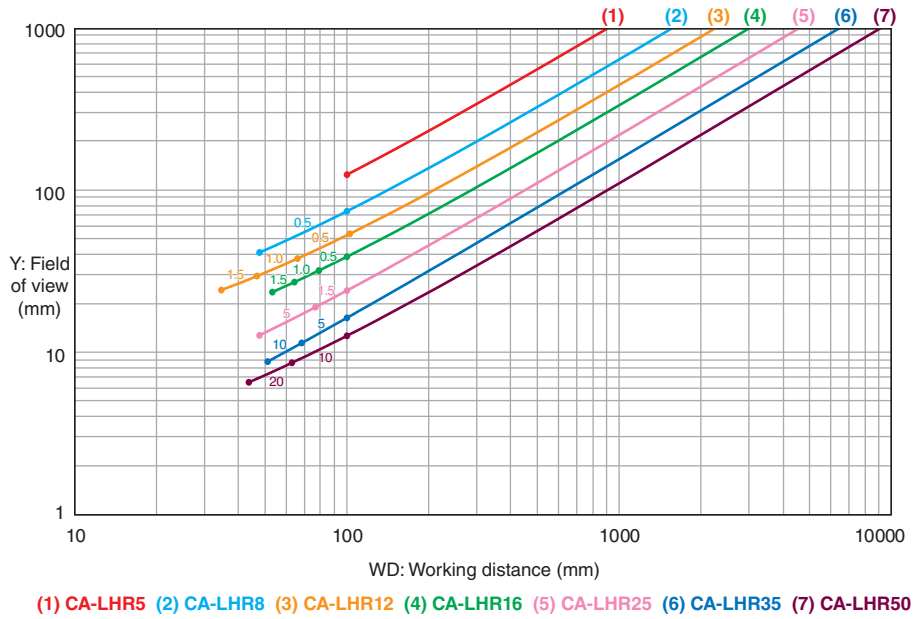
Point

- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
- If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.

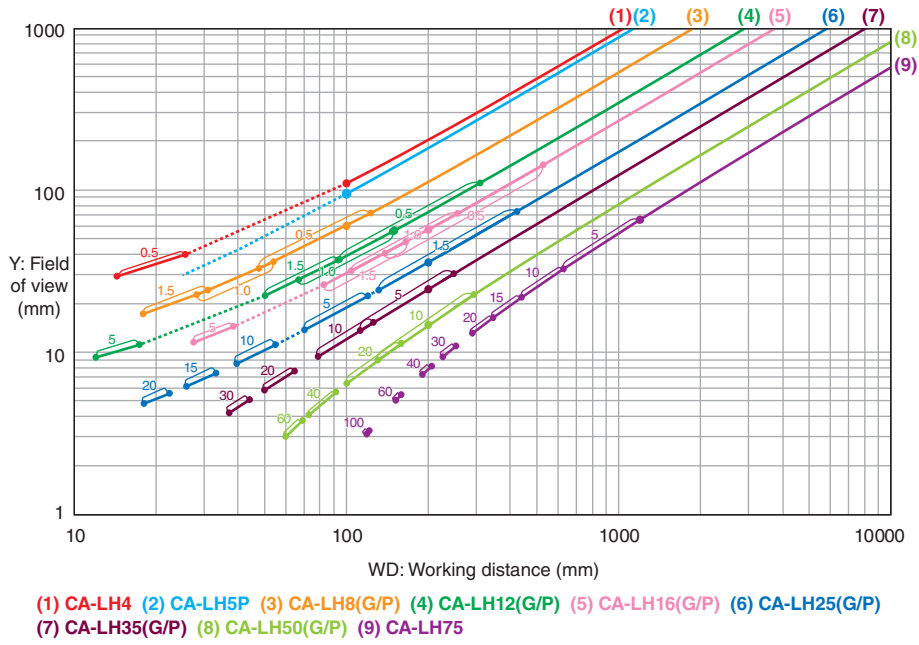
When a high-resolution lens (CA-LH*(G/P)) is used with 1600 × 1200 pixels (2 megapixel mode)



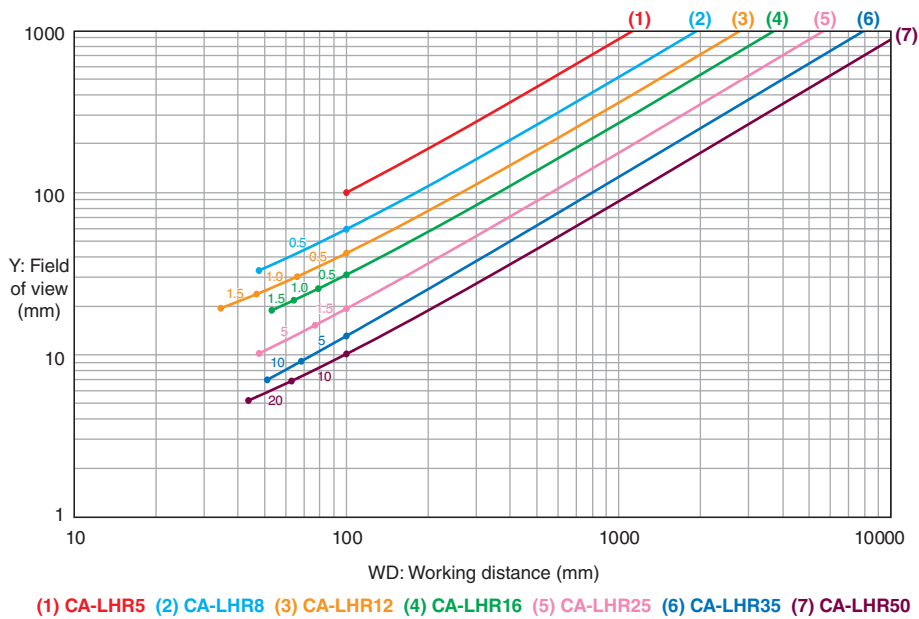
When an ultra high-resolution lens (CA-LHR*) is used with 1600 × 1200 pixels (2 megapixel mode)



When a high-resolution lens (CA-LH*(G/P)) is used with 1024 × 960 pixels (1 megapixel mode)

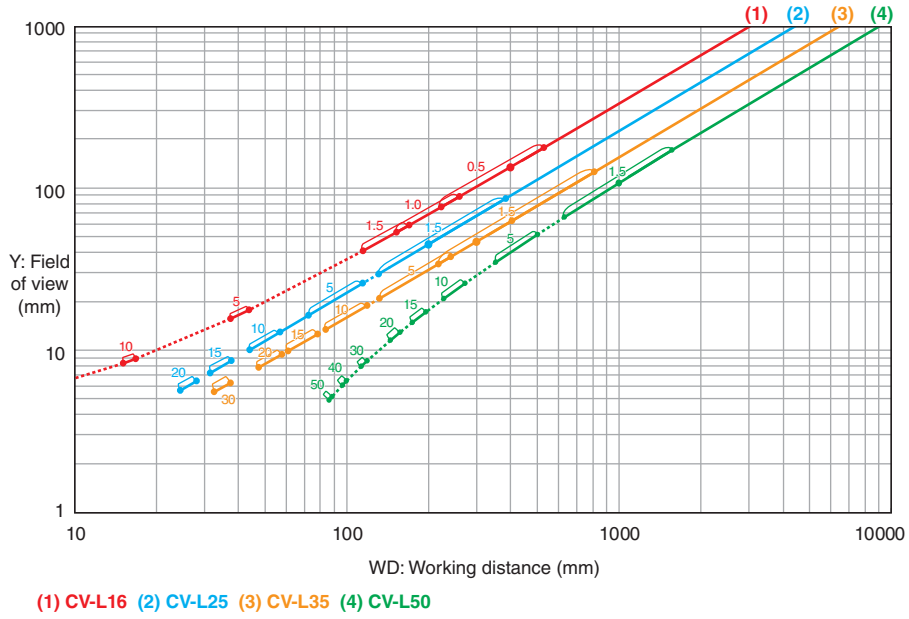


When an ultra high-resolution lens (CA-LHR*) is used with 1024 × 960 pixels (1 megapixel mode)

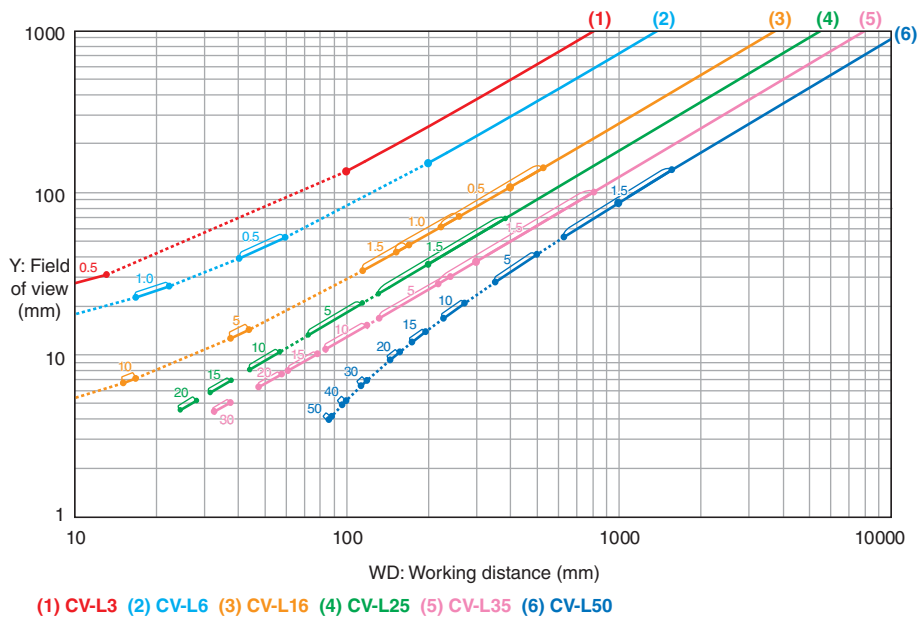


Field of View and the Working Distance by Camera (FOV Chart)

When a standard lens (CV-L*) is used with 1600 × 1200 pixels (2 megapixel mode)



When a standard lens (CV-L*) is used with 1024 × 960 pixels (1 megapixel mode)

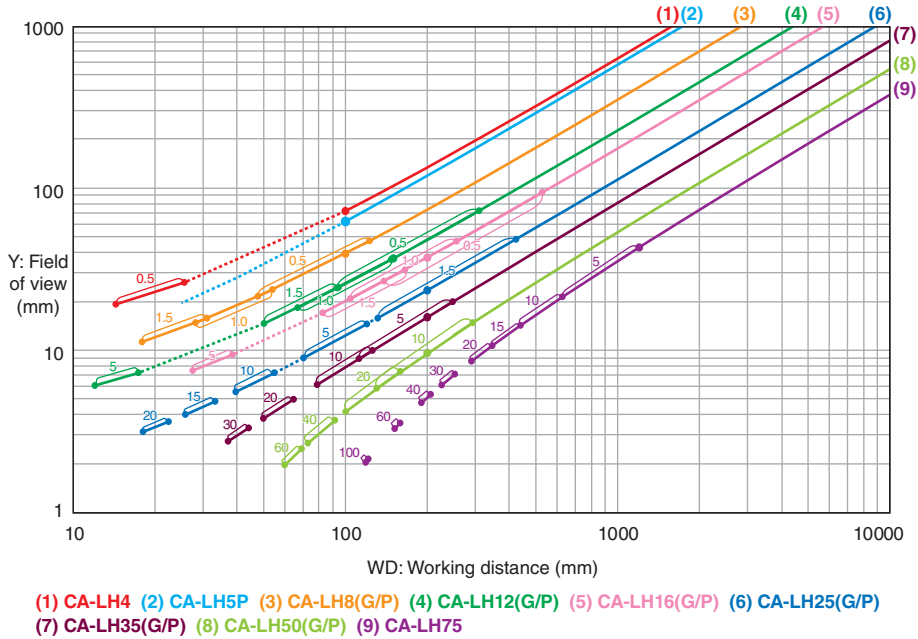


High-speed, high-functioning 0.47 megapixel camera (CA-H048CX/H048MX) / 0.47 megapixel camera (CA-HX048C/HX048M)

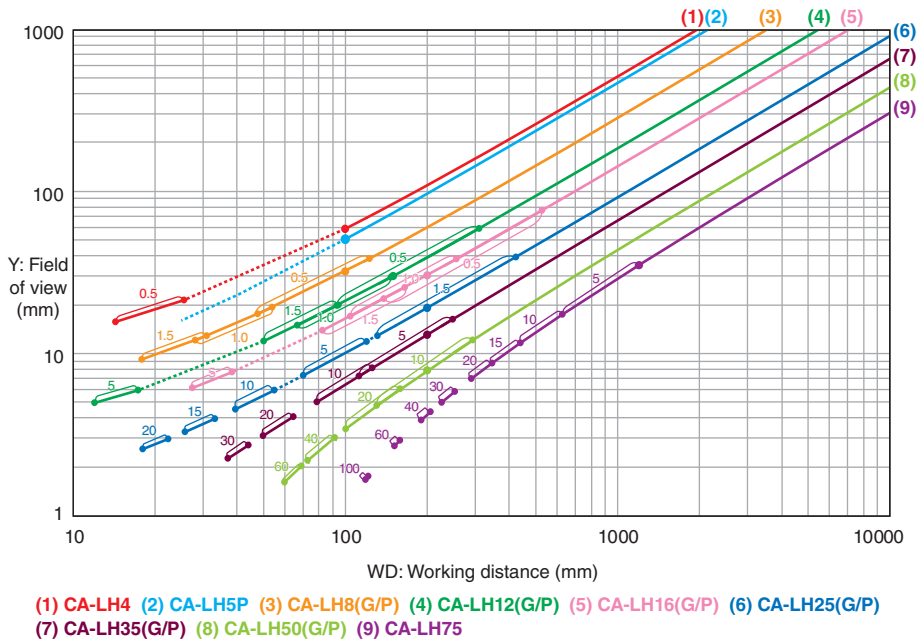
Point

- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
- If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.

When a high-resolution lens (CA-LH*(G/P)) is used with 784 × 596 pixels (0.47 megapixel mode)

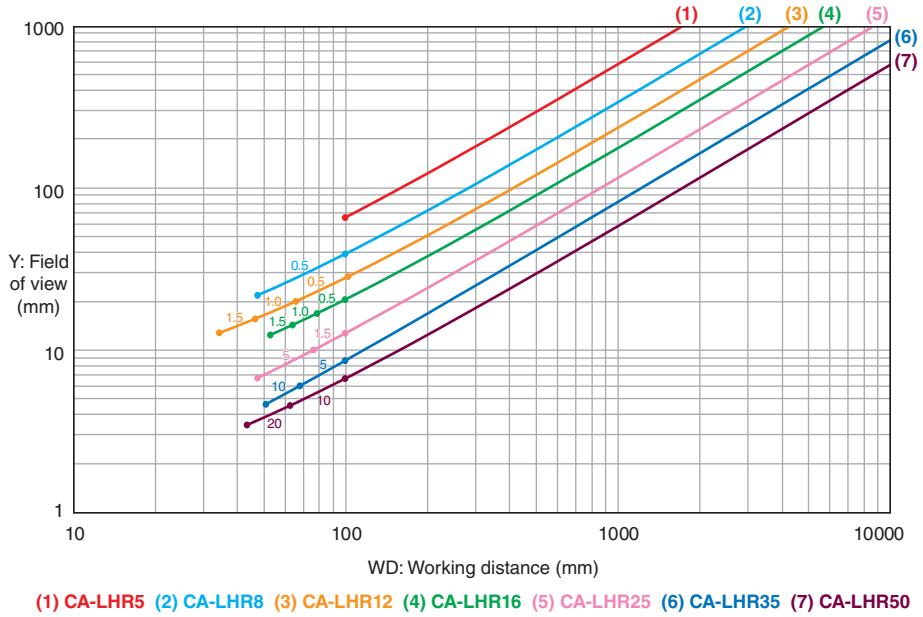


When a high-resolution lens (CA-LH*(G/P)) is used with 640 × 480 pixels (0.31 megapixel mode) or 512 × 480 pixels (0.24 megapixel mode)

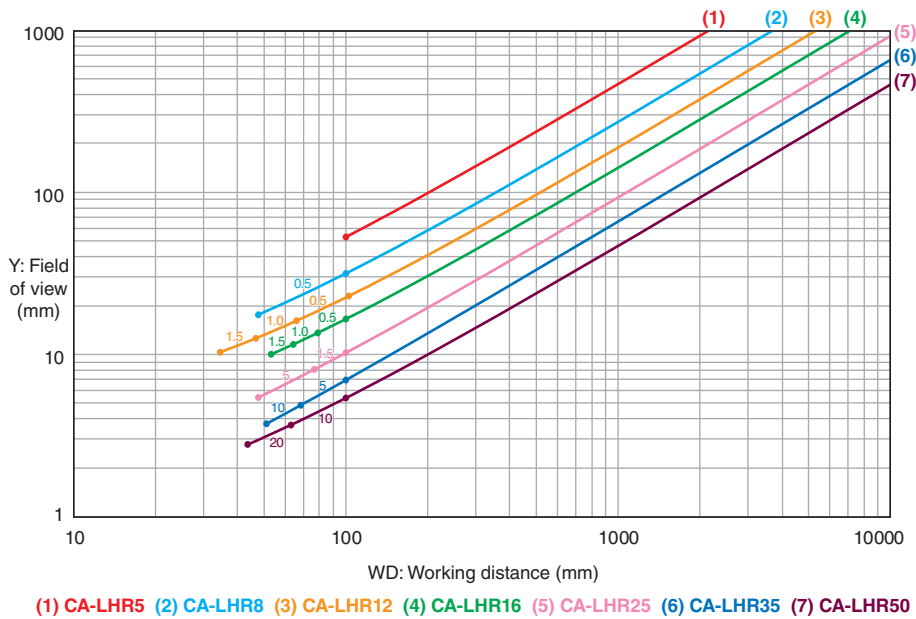


Field of View and the Working Distance by Camera (FOV Chart)

When an ultra high-resolution lens (CA-LHR*) is used with 784 × 596 pixels (0.47 megapixel mode)



When an ultra high-resolution lens (CA-LHR*) is used with 640 × 480 pixels (0.31 megapixel mode) or 512 × 480 pixels (0.24 megapixel mode)



High-speed, high-functioning 2 megapixel camera (CA-H200CX/H200MX)

Point

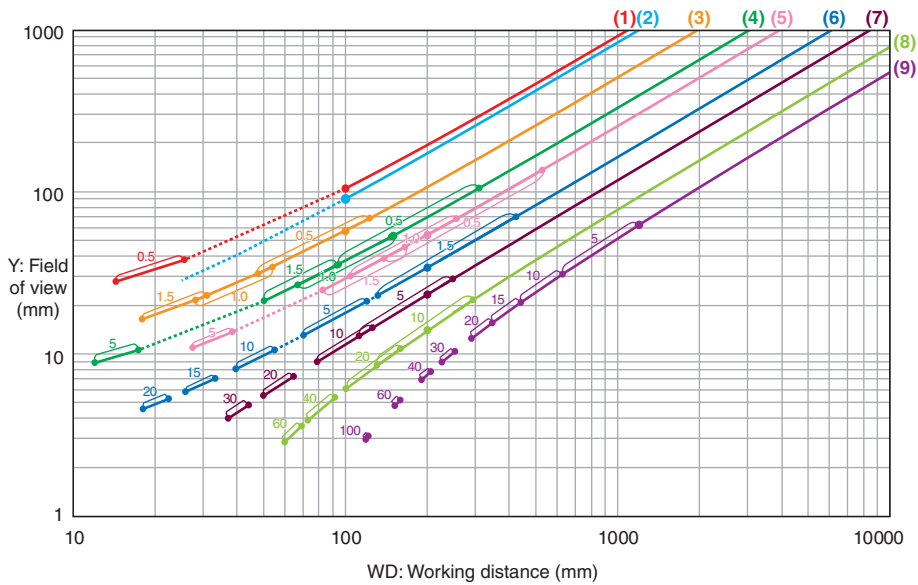
- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
- If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.

Reference

The following charts are the same for a High-speed, high-functioning 5 megapixel camera (CA-H500CX/H500MX) using 1600 x 1200 resolution (in 2 megapixel mode).

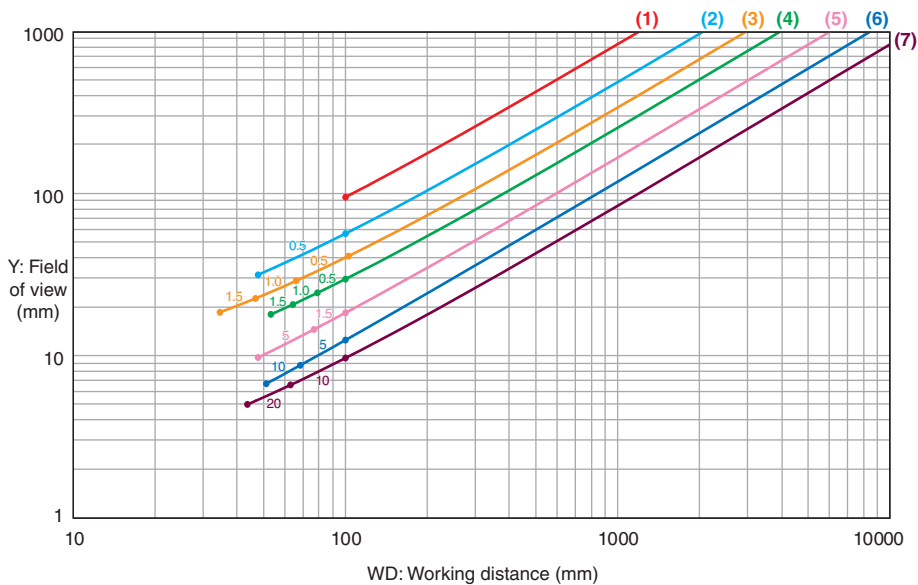
Field of View and the Working Distance by Camera (FOV Chart)

When a high-resolution lens (CA-LH*(G/P)) is used with 1600 x 1200 pixels (2 megapixel mode)



(1) CA-LH4 (2) CA-LH5P (3) CA-LH8(G/P) (4) CA-LH12(G/P) (5) CA-LH16(G/P) (6) CA-LH25(G/P)
 (7) CA-LH35(G/P) (8) CA-LH50(G/P) (9) CA-LH75

When an ultra high-resolution lens (CA-LHR*) is used with 1600 x 1200 pixels (2 megapixel mode)



(1) CA-LHR5 (2) CA-LHR8 (3) CA-LHR12 (4) CA-LHR16 (5) CA-LHR25 (6) CA-LHR35 (7) CA-LHR50

**High-speed, environment resistant 5 megapixel camera (CA-H500C/H500M)/
High-speed 5 megapixel camera (CV-H500C/H500M)**

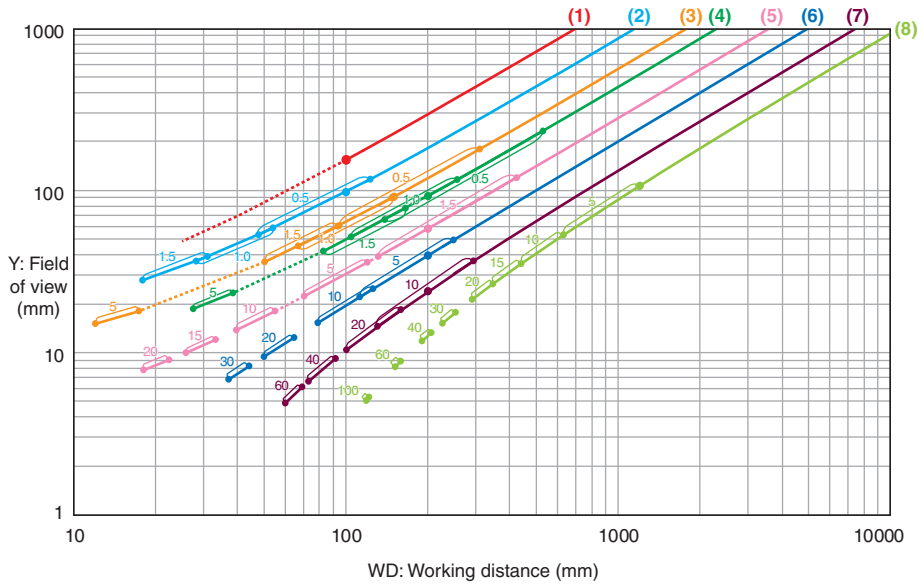
Point

- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
- If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.

Reference

The following charts are the same for a 21 megapixel camera (CA-H2100C/H2100M) using 2432 x 2050 resolution (in 5 megapixel mode).

When a high-resolution lens (CA-LH*(G/P)) is used

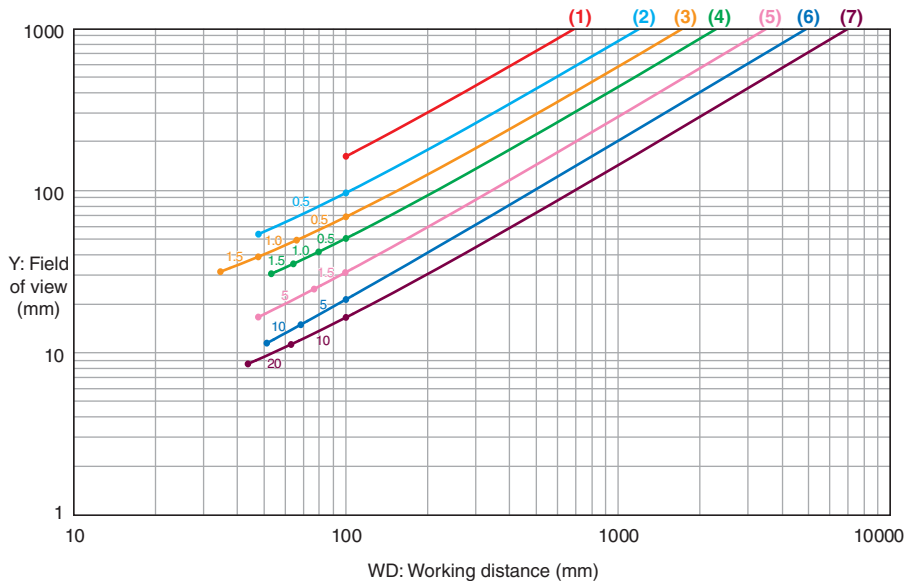


(1) CA-LH5P (2) CA-LH8(G/P) (3) CA-LH12(G/P) (4) CA-LH16(G/P) (5) CA-LH25(G/P)
(6) CA-LH35(G/P) (7) CA-LH50(G/P) (8) CA-LH75

Point

The standard lens (CV-L) cannot be used with a high-speed 5 megapixel camera (CV-H500C/H500M) due to vignetting.

When an ultra-high-resolution lens (CA-LHR*) is used



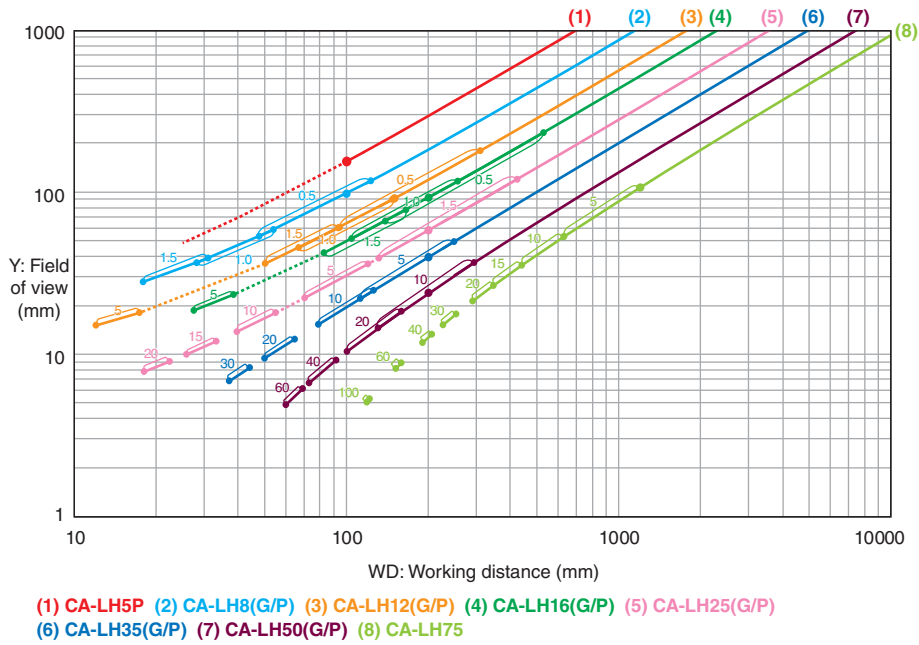
(1) CA-LHR5 (2) CA-LHR8 (3) CA-LHR12 (4) CA-LHR16 (5) CA-LHR25 (6) CA-LHR35 (7) CA-LHR50

High-speed, high-functioning 5 megapixel camera (CA-H500CX/H500MX)

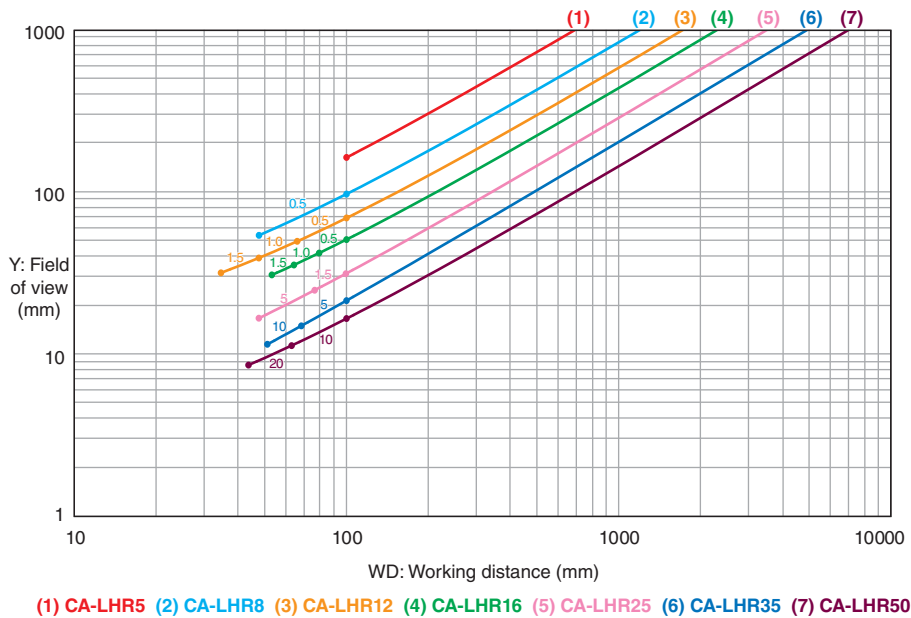
Point

- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
- If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.

When a high-resolution lens (CA-LH*(G/P)) is used with 2432 × 2040 pixels (5 megapixel mode)



When an ultra high-resolution lens (CA-LHR*) is used with 2432 × 2040 pixels (5 megapixel mode)



Reference

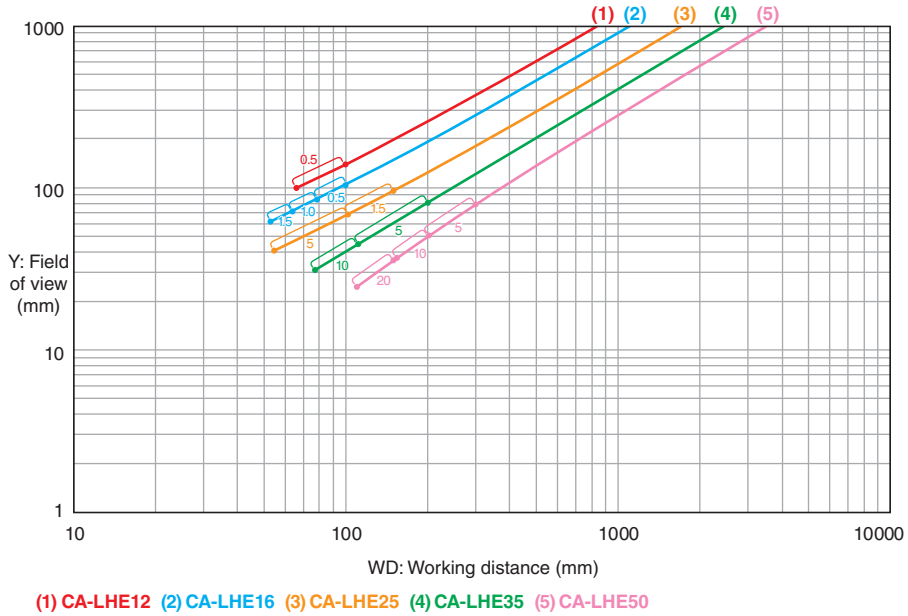
See "High-speed, high-functioning 2 megapixel camera (CA-H200CX/H200MX)" (page 4-18) for using the 1600 × 1200 pixels (2 megapixel mode).

21 megapixel camera (CA-H2100C/H2100M)

! Point

- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
- If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.

When a 4/3"-compatible, ultra high-resolution lens (CA-LHE*) is used with 5104 x 4092 pixels (21 megapixel mode)



Reference

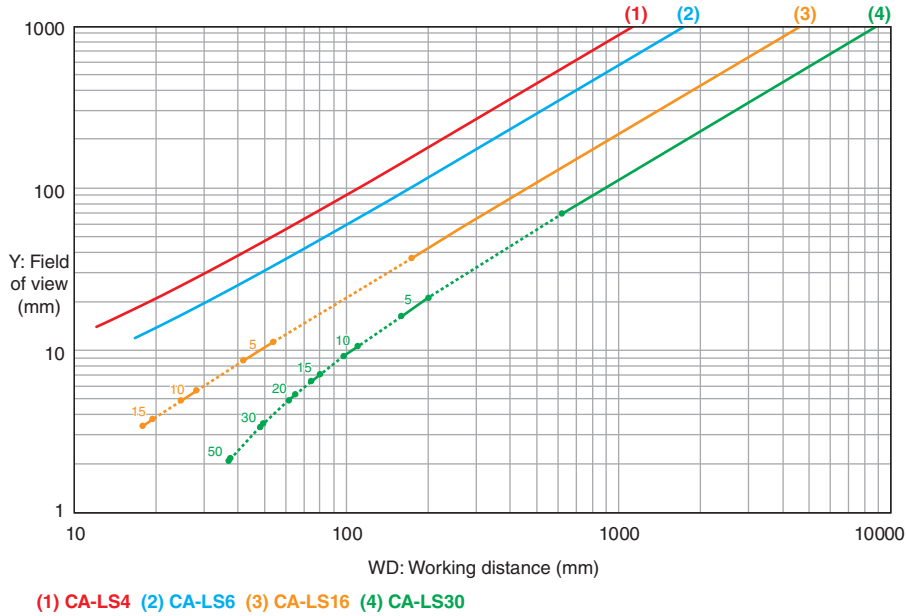
See "High-speed, environment resistant 5 megapixel camera (CA-H500C/H500M)/ High-speed 5 megapixel camera (CV-H500C/H500M)" (page 4-19) for using the 2432 x 2050 pixels (5 megapixel mode).

**High-speed, small 0.31 megapixel camera (CA-HS035C/HS035M)/
Ultra small 0.31 megapixel camera (CV-S035C/S035M)**

Point

- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
- If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.

When a small camera dedicated standard lens (CA-LS*) is used



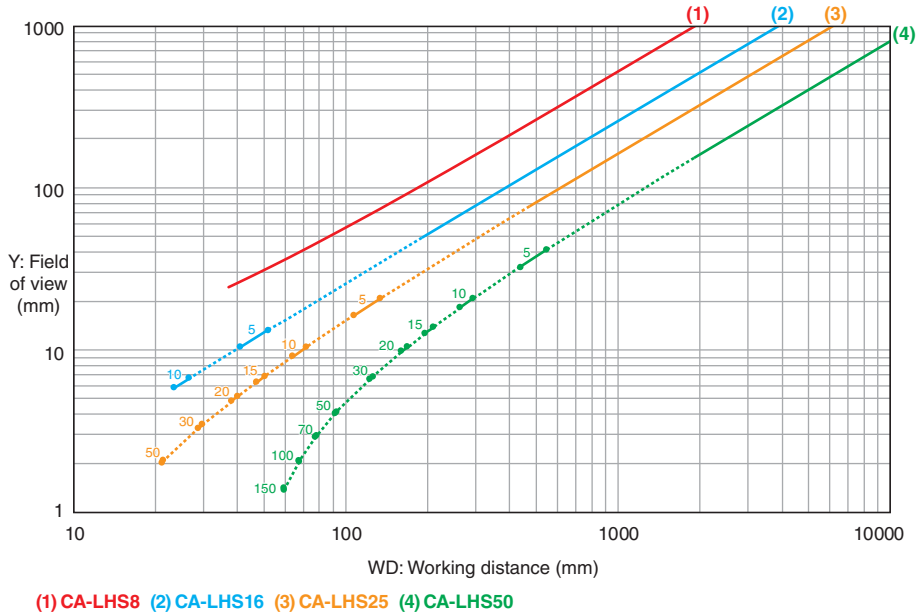
Field of View and the Working Distance by Camera (FOV Chart)

High-speed, small 2 megapixel camera (CA-HS200C/HS200M)

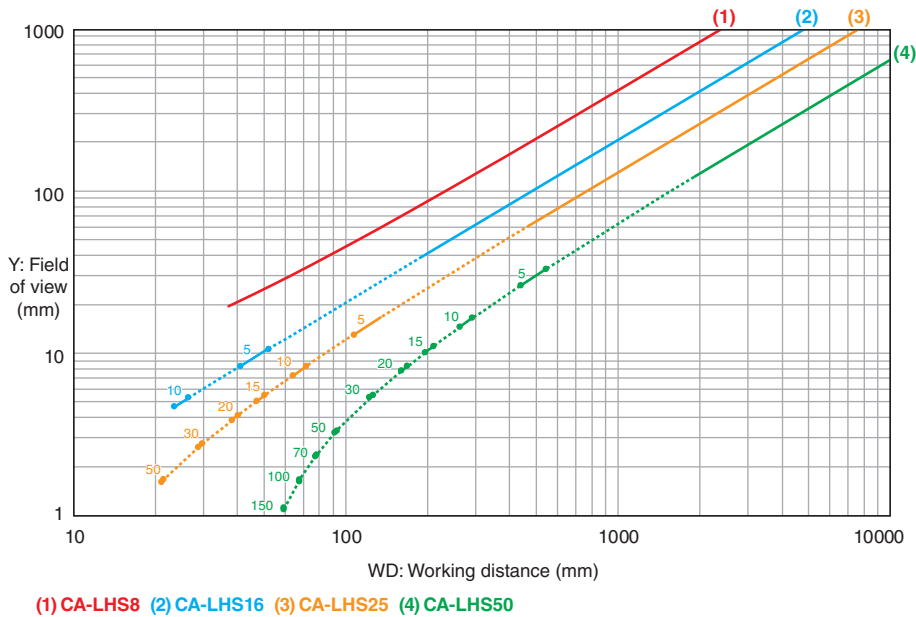
Point

- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
- If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.

When a small camera dedicated high-resolution lens (CA-LHS*) is used with 1600 × 1200 pixels (2 megapixel mode)



When a small camera dedicated high-resolution lens (CA-LHS*) is used with 1024 × 960 pixels (1 megapixel mode)



2 megapixel camera (CA-HX200C/HX200M)

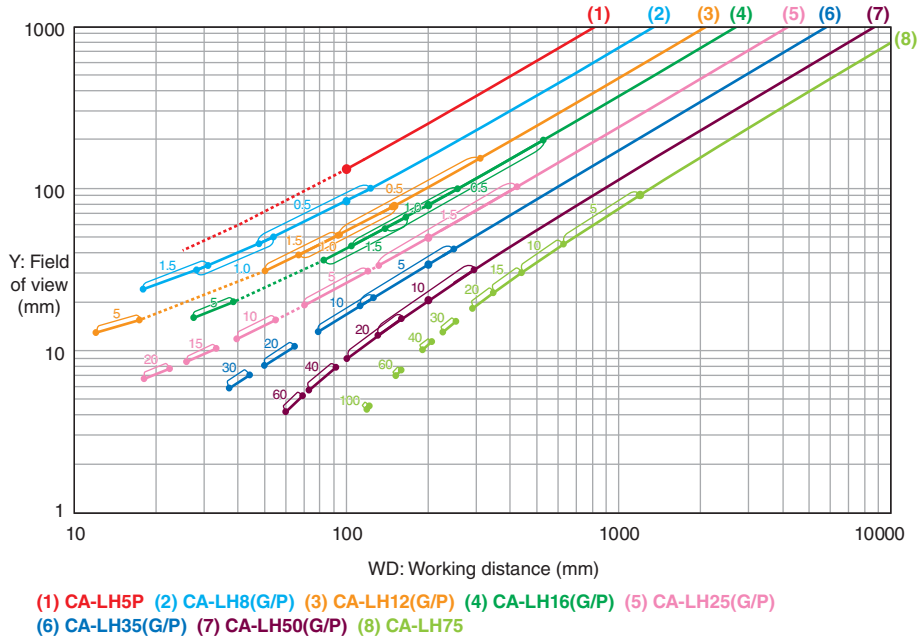
Point

- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
- If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.

Reference

The following charts are the same for a High-speed, high-functioning 5 megapixel camera (CA-HX500C/HX500M) using 1600 x 1200 resolution (in 2 megapixel mode).

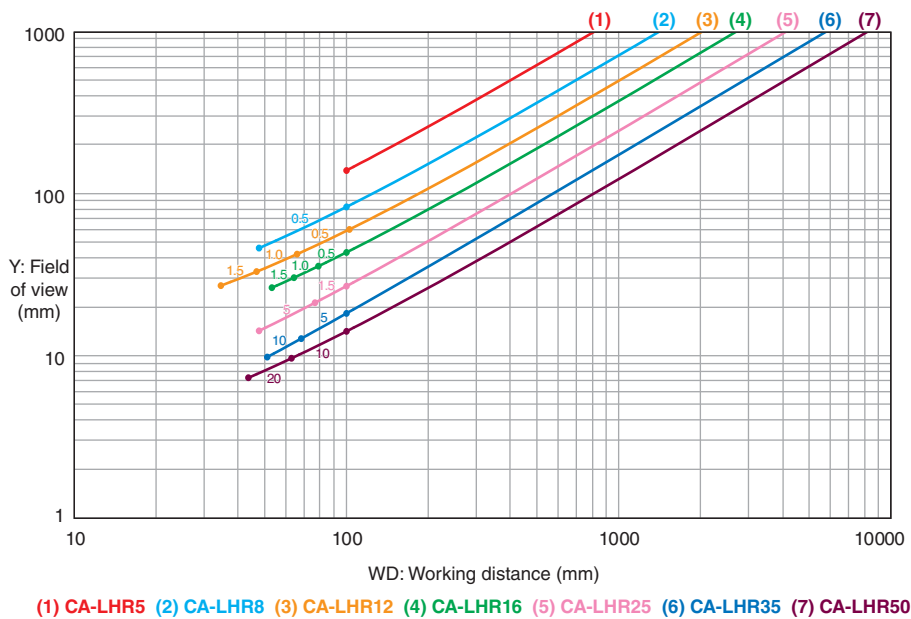
When a high-resolution lens (CA-LH*(G/P)) is used



Point

The standard lens (CV-L) cannot be used with a high-speed 2 megapixel camera (CA-HX200C/HX200M) due to vignetting.

When an ultra high-resolution lens (CA-LHR*) is used

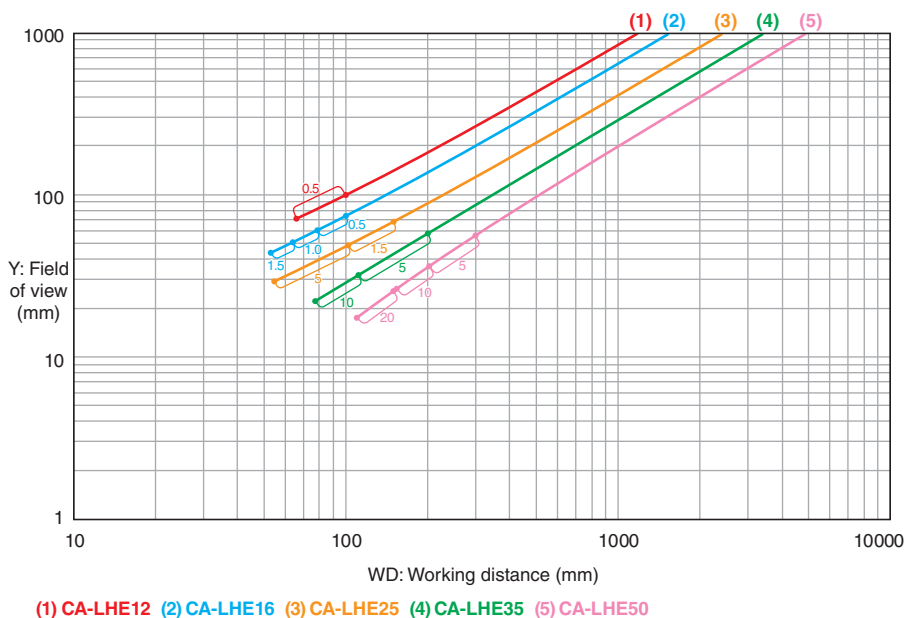


5 megapixel camera (CA-HX500C/HX500M)

Point

- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
- If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.

When a 4/3"-compatible, ultra high-resolution lens (CA-LHE*) is used with 2432 × 2040 pixels (5 megapixel mode)



Reference

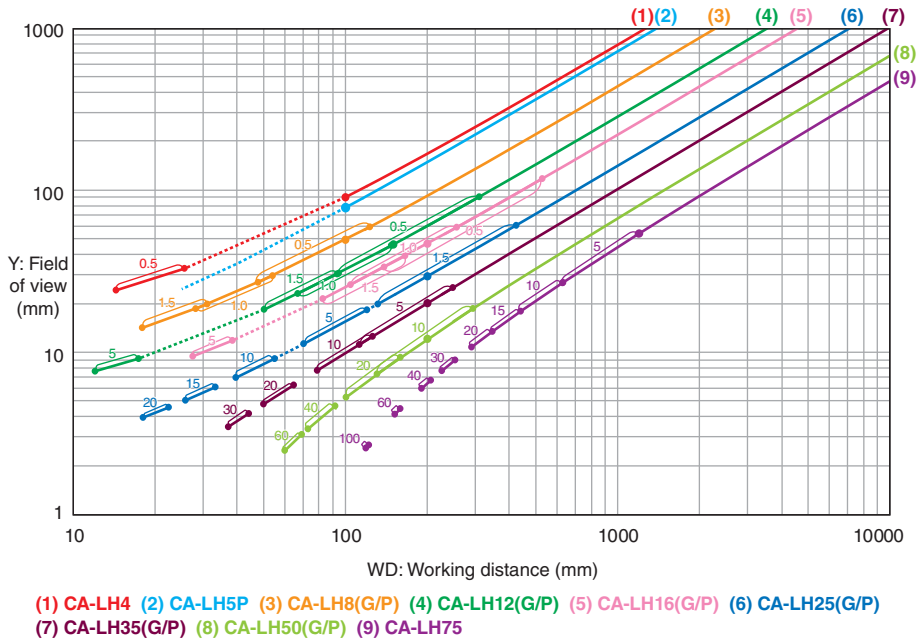
See "2 megapixel camera (CA-HX200C/HX200M)" (page 4-24) for using the 1600 × 1200 pixels (2 megapixel mode).

0.31 megapixel camera (CV-035C/035M) / High-speed 0.31 megapixel camera (CV-H035C/H035M)

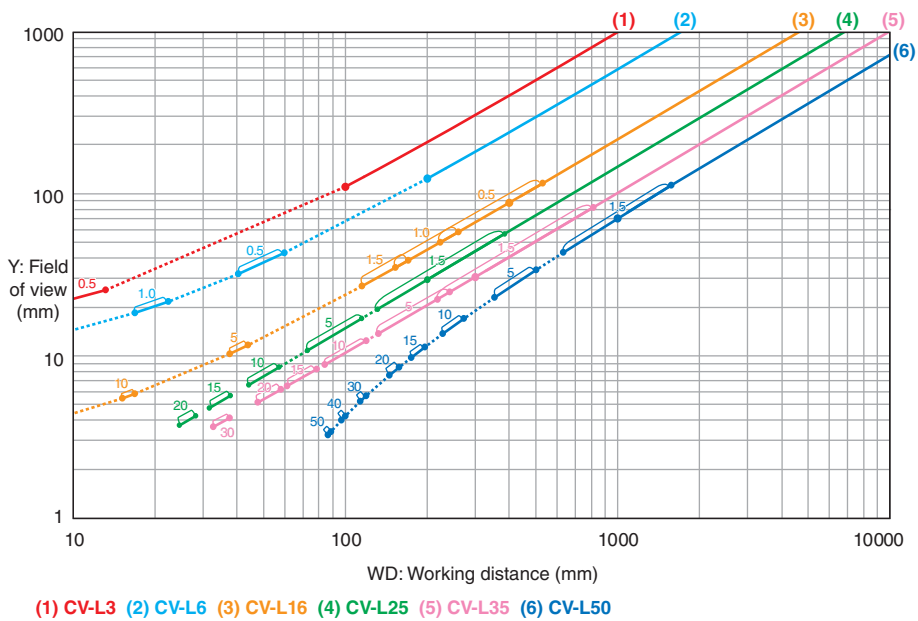
Point

- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
- If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.

When a high-resolution lens (CA-LH*(G/P)) is used



When a standard lens (CV-L*) is used



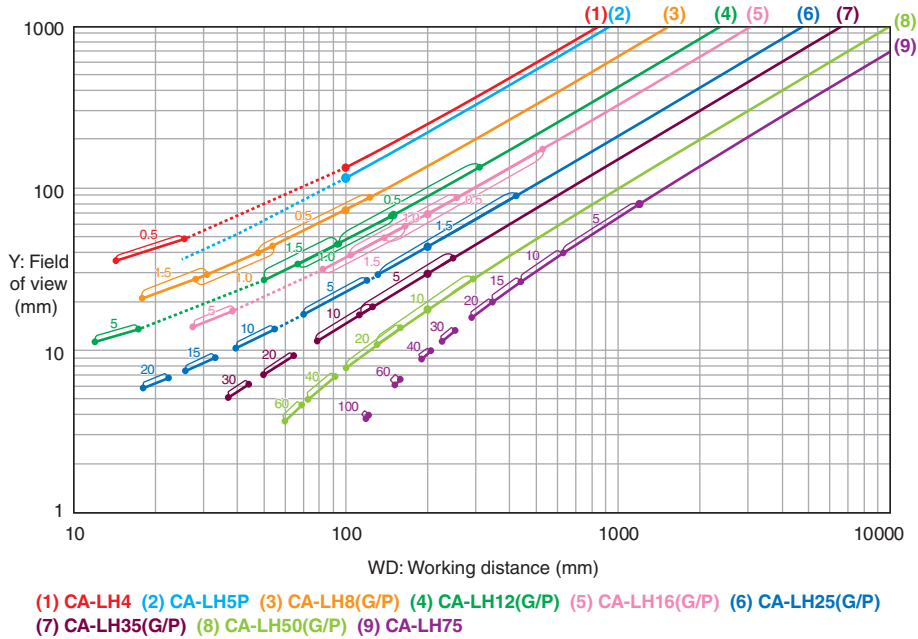
Field of View and the Working Distance by Camera (FOV Chart)

**2 megapixel camera (CV-200C/200M) /
High-speed 2 megapixel camera (CV-H200C/H200M)**

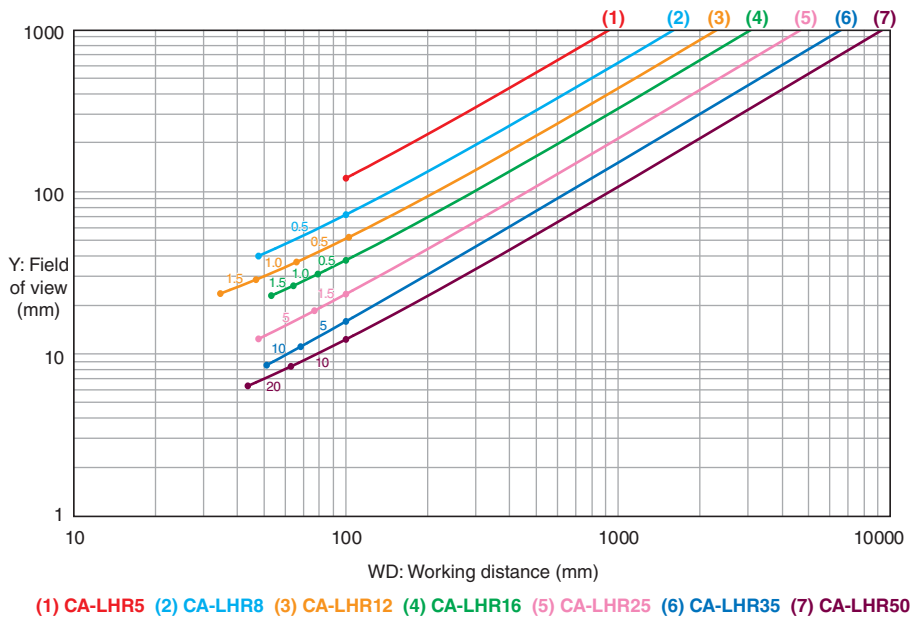
Point

- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
- If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.

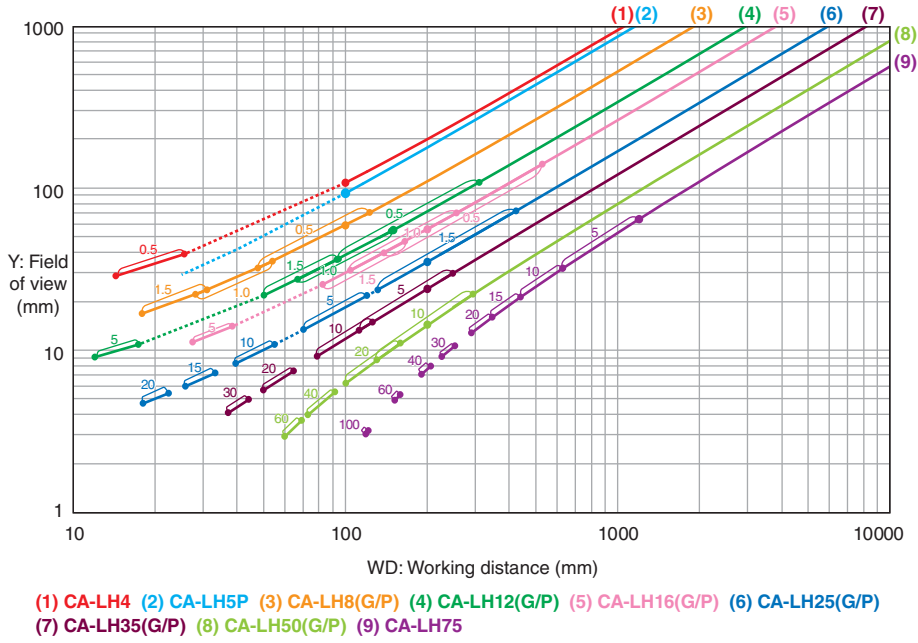
When a high-resolution lens (CA-LH*(G/P)) is used with 1600 × 1200 pixels (2 megapixel mode)



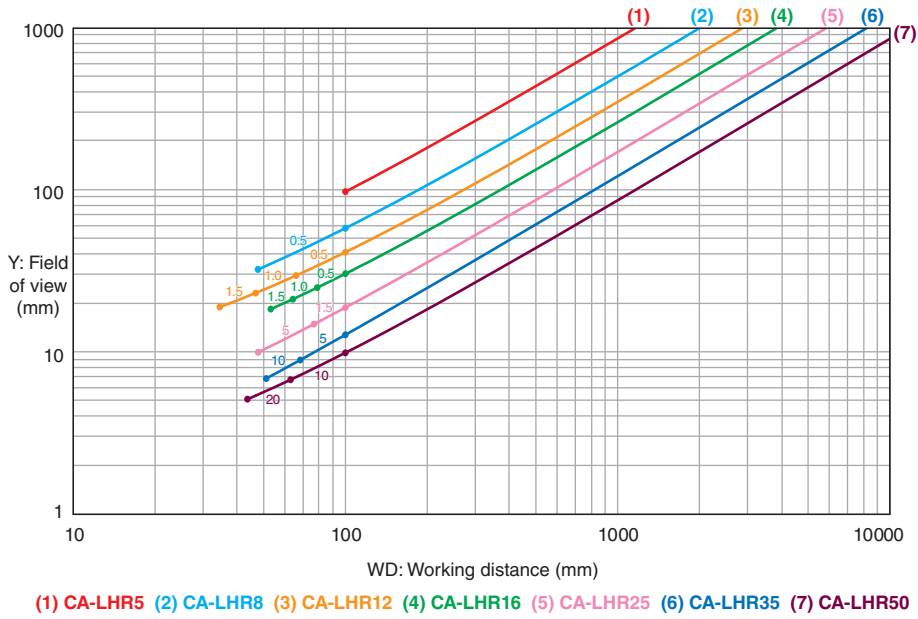
When an ultra high-resolution lens (CA-LHR*) is used with 1600 × 1200 pixels (2 megapixel mode)



When a high-resolution lens (CA-LH*(G/P)) is used with 1024 × 960 pixels (1 megapixel mode)

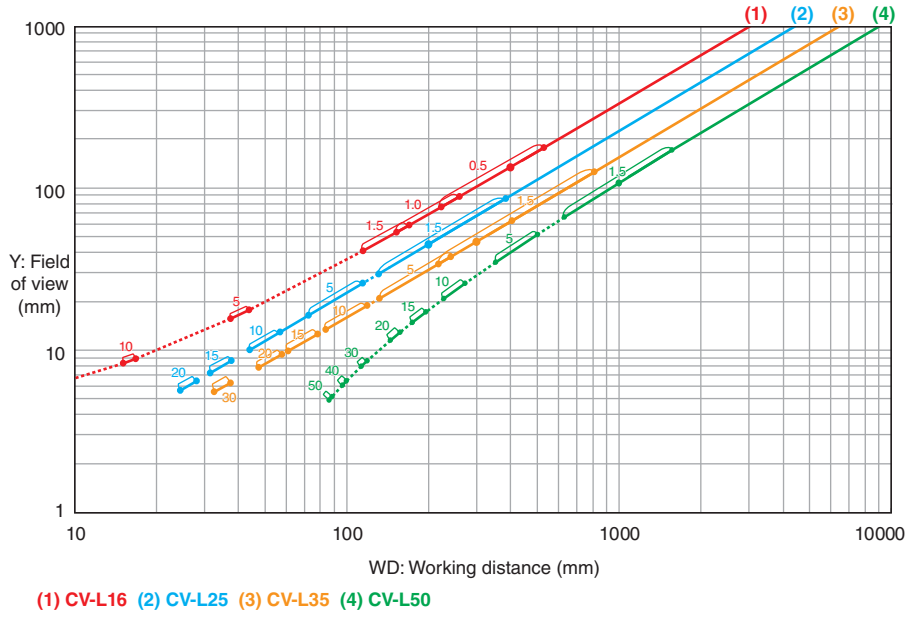


When an ultra high-resolution lens (CA-LHR*) is used with 1024 × 960 pixels (1 megapixel mode)

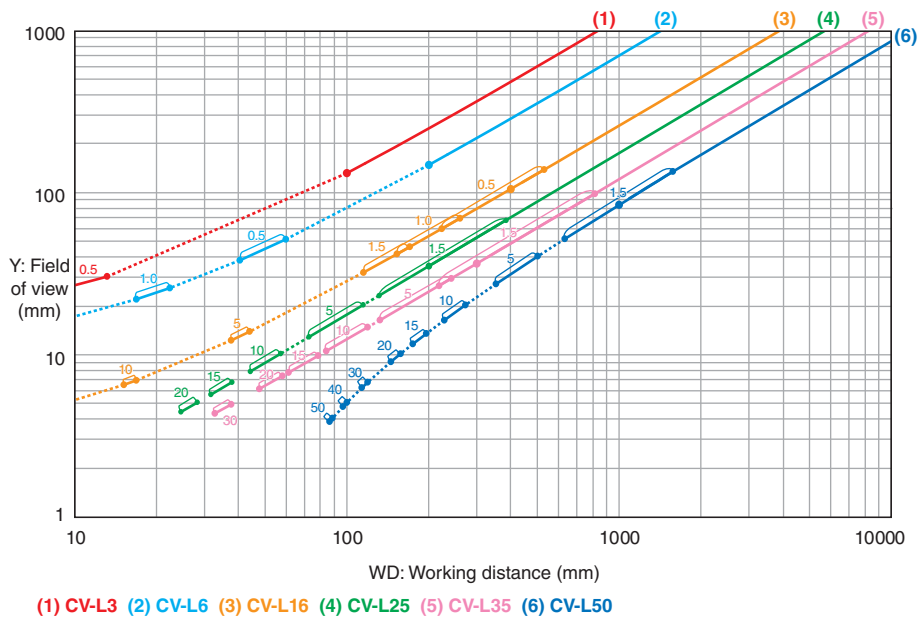


Field of View and the Working Distance by Camera (FOV Chart)

When a standard lens (CV-L*) is used with 1600 × 1200 pixels (2 megapixel mode)



When a standard lens (CV-L*) is used with 1024 × 960 pixels (1 megapixel mode)



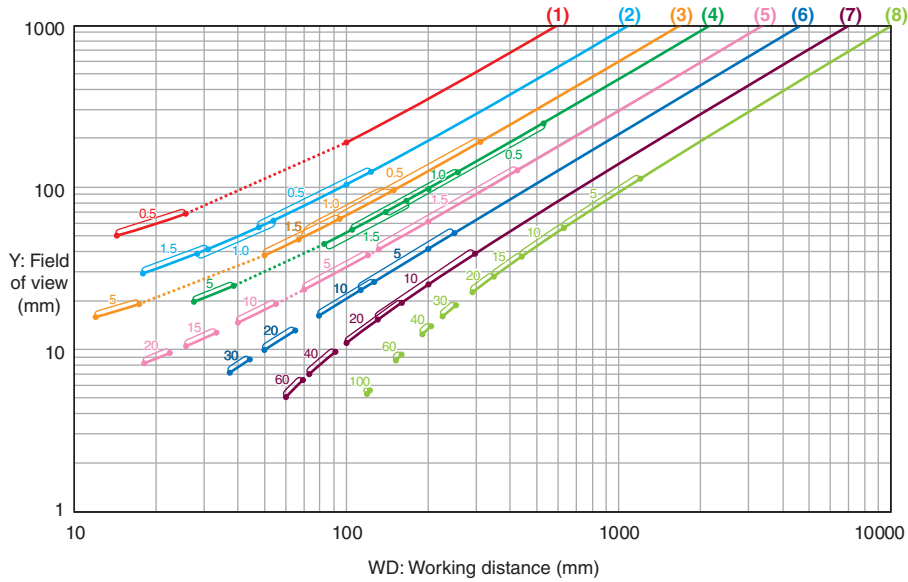
High-speed 1 megapixel camera (CV-H100C/H100M)

NOTICE High-speed, 1 megapixel camera (CV-H100C/H100M) cannot be used with the CV-X300/X400 Series.

Point

- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
- If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.

When a high-resolution lens (CA-LH*(G/P)) is used



(1) CA-LH4 (2) CA-LH8(G/P) (3) CA-LH12(G/P) (4) CA-LH16(G/P) (5) CA-LH25(G/P)
 (6) CA-LH35(G/P) (7) CA-LH50(G/P) (8) CA-LH75

Point

The standard CV-L lens cannot be used with High-speed, 1 megapixel camera (CV-H100C/H100M) due to vignetting.

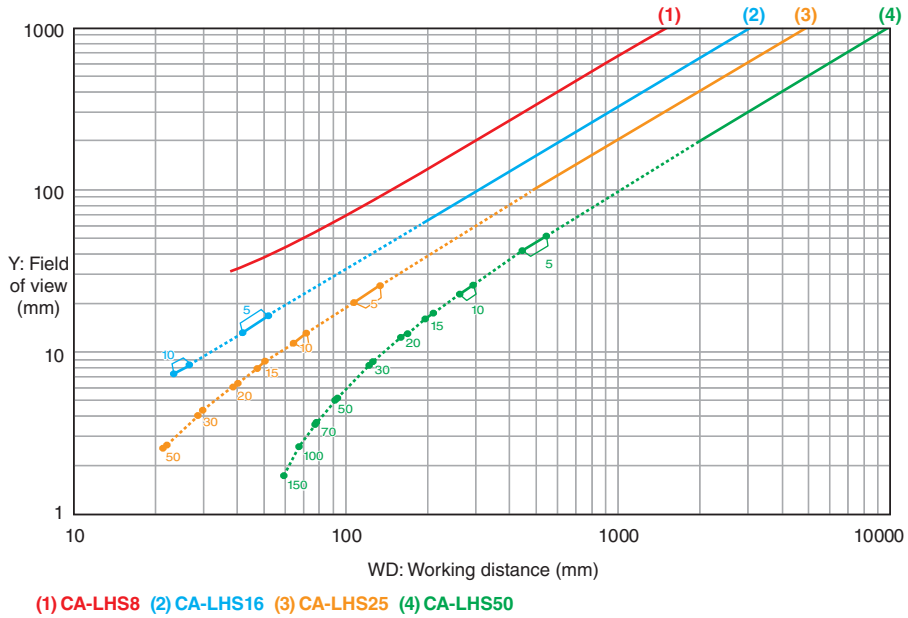
Field of View and the Working Distance by Camera (FOV Chart)

Small 2 megapixel camera (CV-S200C/S200M)

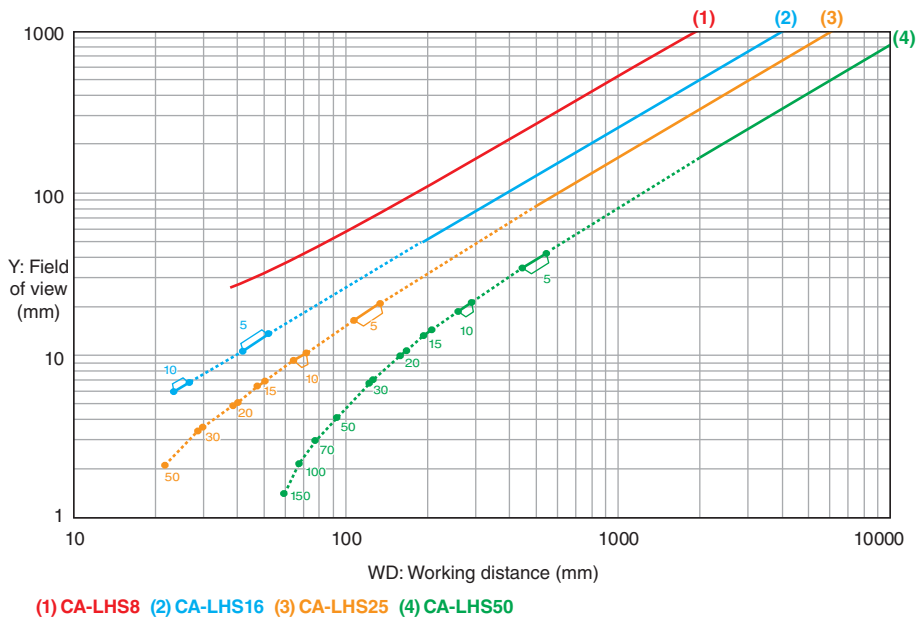
Point

- The numerical numbers shown in the FOV chart are typical values. Fine adjustment is needed during installation.
- If a close-up ring is used, the inherent peripheral resolution performance of the lens may not be satisfied.

When a small camera dedicated high-resolution lens (CA-LHS*) is used with 1600 × 1200 pixels (2 megapixel mode)



When a small camera dedicated high-resolution lens (CA-LHS*) is used with 1024 × 960 pixels (1 megapixel mode)



Point

- For more information on installing and adjusting small cameras, refer to the instruction manual provided with the camera.
- When attaching the side view attachment OP-66833, subtract the internal optical path length of 25.8 mm from the working distance value.

Main Specifications



Point

The number of settings actually available for all items listed depends on the memory capacity and remaining amount of available memory in the system.

Controller Unit (CV- X172/X152/X102)

Controller model*1 *2	CV-X172	CV-X152	CV-X102
Camera input	2 color/monochrome cameras (mixed connection possible) Supports 2 camera expansion and connection with up to 4 cameras via connection with the CV-E500 expansion unit ⁵		2 color/monochrome cameras (mixed connection possible) Connection with up to 2 cameras is possible ⁵
Trigger input	Can select from simultaneous/individual capture with up to 4 cameras (while the CV-E500 is disconnected, simultaneous capture is performed with up to 2 cameras)		Can select from simultaneous/individual capture with 2 cameras
Supported cameras/ Number of pixels	With CA-035C/035M/H035C/H035M/HS035C/HS035M connected		
	<ul style="list-style-type: none"> 310 k pixel mode: 640(H) x 480(V), approx. 310,000 pixels 240 k pixel mode: 512(H) x 480(V), approx. 240,000 pixels 		
	With CV-035C/035M/H035C/H035M/S035C/S035M connected		
	<ul style="list-style-type: none"> 310 k pixel mode: 640(H) x 480(V), approx. 310,000 pixels 240 k pixel mode: 512(H) x 480(V), approx. 240,000 pixels 		
	With CA-HX048C/HX048M connected		
	<ul style="list-style-type: none"> 470 k pixel mode: 784(H) x 596(V), approx. 470,000 pixels 310 k pixel mode: 640(H) x 480(V), approx. 310,000 pixels 240 k pixel mode: 512(H) x 480(V), approx. 240,000 pixels 		
	With CV-H100C/H100M connected		
	<ul style="list-style-type: none"> 1,000,000-pixel mode: 1000 (H) x 1000 (V), 1,000,000 pixels 		
With CA-200C/200M/H200C/H200M/HS200C/HS200M connected			
<ul style="list-style-type: none"> 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 1 mega-pixel mode: 1024(H) x 960(V), approx. 980,000 pixels 			
With CV-200C/200M/H200C/H200M/S200C/S200M connected			
<ul style="list-style-type: none"> 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 1 mega-pixel mode: 1024(H) x 960(V), approx. 980,000 pixels 			
With CA-HX200C/HX200M connected			
<ul style="list-style-type: none"> 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 			
With CA-H500C/H500M connected			
<ul style="list-style-type: none"> 5 mega-pixel mode: 2432(H) x 2050(V), approx. 4.99 mega-pixels 			
With CV-H500C/H500M connected			
<ul style="list-style-type: none"> 5 mega-pixel mode: 2432(H) x 2050(V), approx. 4.99 mega-pixels 			
With CA-HX500C/HX500M connected			
<ul style="list-style-type: none"> 5 mega-pixel mode: 2432(H) x 2040(V), approx. 4.96 mega-pixels 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 			
Main processor for image processing	DSP (High-Speed)	DSP (Medium)	DSP (Standard)
Number of setting registrations	Up to 1000 settings (depending on SD card capacity and setting contents) for SD card 1 and SD card 2 individually and external switching is possible		
Number of reference images	Each setting supports 900 images per camera (depending on SD card capacity), compress and save functions and image registration of position adjusted images.		
Memory card	<ul style="list-style-type: none"> SD card slot x2 Supports OP-87133 (512 MB: standard equipment on the SD1 slot for the CV-X152/X102), CA-SD1G (1 GB: standard equipment on the SD1 slot for the CV-X172), CA-SD4G (4 GB), and CA-SD16G (16 GB) 		

Controller model ^{*1 *2}		CV-X172	CV-X152	CV-X102	
Interface	Control input	External trigger input	4 points (2 of which support special function assignment) Input rating: 26.4 V max., 3 mA min., simultaneous/individual capture with up to 4 cameras is possible	4 points (2 of which support special function assignment) Input rating: 26.4 V max., 3 mA min., simultaneous/individual capture with up to 2 cameras is possible	
		Control input	Can set individual trigger delays (0 to 999 ms) for each trigger input		
	Control output	Common output	27 points (11 of which support special function assignment, includes 4 high speed outputs), NPN open collector, 50 mA max. (30 V max.)		
		Total status output	1 point, NPN open collector, 50 mA max. (30 V max.) Supports total status hold control, one-shot output (1 to 9999 ms)		
	Monitor output		Analogue RGB output XGA 1024 x 768 (24 bit color, 60Hz)		
	Operation indicator		Power, ERROR LED display		
	RS-232C		Can perform numerical value output and control I/O, supports a max. baud rate of up to 115200 bps (Cannot be used with PLC-Links using the RS-232C port)		
	PLC-Link		<ul style="list-style-type: none"> Can output numerical values and perform control input/output using the Ethernet or RS-232C port (EtherNet/IP and PROFINET cannot be used in conjunction with PLC-Link. When using the RS-232C port, nonprocedural RS-232C communication cannot be used in conjunction with PLC-Link.) The following PLCs are supported via link unit:³ <ul style="list-style-type: none"> KEYENCE: KV-7000 Series, KV-5000/3000 Series, KV-1000/700 Series, KV Nano Series Mitsubishi Electric: MELSEC iQ-R/L/Q Series, MELSEC A Series (RS-232C only), MELSEC iQ-F Series, MELSEC FX Series (RS-232C only) OMRON: SYSMAC CJ2/CJ1/CS1/CP1 Series, SYSMAC C Series (RS-232C only) YASKAWA Electric Corporation: MP2000 Series, MP900 Series (RS-232C only) 		
	Ethernet		<ul style="list-style-type: none"> Can output numerical values and perform control input/output Can output measured value and image data via the included PC programme, upload and download settings Supports FTP client and FTP server function VNC server (for non-PC clients, only displaying the monitor screen is supported) Supports BOOTP function 1000BASE-T/100BASE-TX/10BASE-T 		
	EtherNet/IP		<ul style="list-style-type: none"> Numerical value and control input/output using the Ethernet port enabled (Cannot be used in conjunction with PLC-link / PROFINET). Cyclic (implicit) communication (max. 1436 bytes) possible. Message communication possible. Maximum connections: 32. In conformity with conformance test Version.A9. 		
PROFINET		<ul style="list-style-type: none"> Numerical value and control input/output using the Ethernet port enabled (Cannot be used in conjunction with PLC-link / EtherNet/IP). Cyclic communication (max. 1408 bytes) possible. Record data communication possible. In conformity with Conformance Class A 			
Mouse		Possible to control every kind of menu via the dedicated mouse (OP-87506: included with the controller)			
Illumination control		<p>By connecting the optional Illumination Expansion Unit CA-DC30E, CA-DC21E or CA-DC10E, lighting and intensity control for the LED illumination is possible.⁴</p> <p>CA-DC10E: 2ch/unit, up to 1 unit can be connected, Output voltage 12V only, mixed connection with CA-DC21E or CA-DC30E is not possible.</p> <p>CA-DC21E: 2ch/unit, up to 4 units can be connected, Output voltage 12V/24V.</p> <p>CA-DC30E (dedicated for multi-emission lights CA-DRW5X/DRW10X/DRW20X): 2ch/unit, up to 2 units can be connected.</p> <p>A mixture of up to 4 CA-DC21E and CA-DC30E units can be connected, but only 2 CA-DC30E units can be connected.</p>			
Language		Switched among English, Japanese, Simplified Chinese, Traditional Chinese, Korean, Thai, German, French, Italian, Mexican Spanish, Indonesian, Vietnamese, and Brazilian Portuguese			
Rating	Power supply voltage	24 V DC ± 10%			
	Current consumption	3.0A (When 2 cameras are connected) 3.9A (When 4 cameras are connected) Figures indicate maximum load including rush current at start-up.	3.0A (When 2 cameras are connected) 3.9A (When 4 cameras are connected) Figures indicate maximum load including rush current at start-up.	2.6A (When 2 cameras are connected) Figures indicate maximum load including rush current at start-up.	
Environmental resistance	Ambient temperature	<ul style="list-style-type: none"> When 2 cameras are connected: 0 to +50°C (when a 1 megapixel or higher camera is connected: 0 to +45°C) When 4 cameras are connected: 0 to +45°C 		0 to +50°C	
	Relative humidity	35 to 85% RH (no condensation)			
Weight		Approx. 1250g			

*1 The letters that follow the model numbers describe differences in the software. For details, see the "CV-X Series User's Manual".

*2 A type with P-suffix at the end of its main unit model is a PNP open-collector.

*3 Models that are equipped with an Ethernet port on the CPU unit support direct connection with the Ethernet port.

*4 CA-DC30E supports fixed current mode only. CA-DC21E supports switching between the PWM and DC modes. CA-DC10E supports the PWM mode only.

*5 Transfer speed when the CA-HX500C/HX500M/HX200C/HX200M/HX048C/HX048M is connected to CV-X100 series is 11 times.

Controller Unit (CV-X292/X272/X252/X202)

Controller model ^{*1 *2}	CV-X292	CV-X272	CV-X252	CV-X202
Camera input	With CA-EC80 installed: 2 color/monochrome area cameras ^{*5}			
	With CA-EC80HX installed: 1 color/monochrome area camera ^{*5}			
	With CA-EC80L installed: 1 color/monochrome area camera ^{*5}			
	With CA-EC80LJ installed: 1 LJ-V			
	With the expansion unit CA-E800 (With CA-EC80 installed) connected, 2 color/monochrome area cameras expansion (up to 4 cameras) (mixed connection possible) ^{*5}			
	With the expansion unit CA-E800 (With CA-EC80HX installed) connected, 1 color/monochrome area camera expansion (up to 2 cameras) (mixed connection possible) ^{*5}			
	With the expansion unit CA-E800 (With CA-EC80L installed) connected, 1 color/monochrome area camera expansion (up to 2 cameras) (mixed connection possible) ^{*5}			
Trigger input	With the expansion unit CA-E800 (With CA-EC80LJ installed) connected, 1 LJ-V expansion (up to 2 LJ-V) The LJ-V cannot be used at the same time as the 21 megapixel camera or the LumiTrax.			
	Can select from simultaneous/individual capture with up to 4 cameras (while the CA-E800 is disconnected, simultaneous capture is performed with up to 2 cameras)			Can select from simultaneous/individual capture with up to 2 cameras
Supported cameras/ Number of pixels	With CA-035C/035M/H035C/H035M/HS035C/HS035M connected			
	<ul style="list-style-type: none"> 310 k pixel mode: 640(H) x 480(V), approx. 310,000 pixels 240 k pixel mode: 512(H) x 480(V), approx. 240,000 pixels 			
	With CV-035C/035M/H035C/H035M/S035C/S035M connected			
	<ul style="list-style-type: none"> 310 k pixel mode: 640(H) x 480(V), approx. 310,000 pixels 240 k pixel mode: 512(H) x 480(V), approx. 240,000 pixels 			
	With CA-HX048C/HX048M connected			
	<ul style="list-style-type: none"> 470 k pixel mode: 784(H) x 596(V), approx. 470,000 pixels 310 k pixel mode: 640(H) x 480(V), approx. 310,000 pixels 240 k pixel mode: 512(H) x 480(V), approx. 240,000 pixels 			
	With CV-H100C/H100M connected			
	<ul style="list-style-type: none"> 1,000,000-pixel mode: 1000 (H) x 1000 (V), 1,000,000 pixels 			
	With CA-200C/200M/H200C/H200M/HS200C/HS200M connected			
	<ul style="list-style-type: none"> 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 1 mega-pixel mode: 1024(H) x 960(V), approx. 980,000 pixels 			
	With CV-200C/200M/H200C/H200M/S200C/S200M connected			
	<ul style="list-style-type: none"> 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 1 mega-pixel mode: 1024(H) x 960(V), approx. 980,000 pixels 			
With CA-HX200C/HX200M connected				
<ul style="list-style-type: none"> 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 				
With CA-H500C/H500M connected				
<ul style="list-style-type: none"> 5 mega-pixel mode: 2432(H) x 2050(V), approx. 4.99 mega-pixels 				
With CV-H500C/H500M connected				
<ul style="list-style-type: none"> 5 mega-pixel mode: 2432(H) x 2050(V), approx. 4.99 mega-pixels 				
With CA-HX500C/HX500M connected				
<ul style="list-style-type: none"> 5 mega-pixel mode: 2432(H) x 2040(V), approx. 4.96 mega-pixels 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 				
With CA-H2100C/H2100M connected				
<ul style="list-style-type: none"> 21 mega-pixel mode: 5104(H)x4092(V), approx. 20.89 mega-pixels 5 mega-pixel mode: 2432(H)x2050(V), approx. 4.99 mega-pixels 				
With LJ-V connected				
<ul style="list-style-type: none"> 512 (H) x 16384 (L), approx. 8,390,000 pixels 1024 (H) x 8192 (L), approx. 8,390,000 pixels 2048 (H) x 4096 (L), approx. 8,390,000 pixels 				
Main processor for image processing	Multi-core DSP (High-Speed)		Multi-core DSP (Medium)	Multi-core DSP (Standard)
Number of setting registrations	Up to 1000 settings (depending on SD card capacity and setting contents) for SD card 1 and SD card 2 individually and external switching is possible			

Controller model ^{*1 *2}		CV-X292	CV-X272	CV-X252	CV-X202	
Number of reference images		Each setting supports 400 images/LJ-V, 900 images/area camera (depending on SD card capacity), compress and save functions and image registration of position adjusted images.	Each setting supports 900 images per camera (depending on SD card capacity), compress and save functions and image registration of position adjusted images.			
Memory card		<ul style="list-style-type: none"> SD card slot x2 Supports OP-87133 (512 MB: standard equipment on the SD1 slot for the CV-X252/X202), CA-SD1G (1 GB: standard equipment on the SD1 slot for the CV-X292/X272), CA-SD4G (4 GB) and CA-SD16G (16 GB) 				
Interface	Control input	External trigger input	4 points (2 of which support special function assignment) Input rating: 26.4 V max., 3 mA min., simultaneous/individual capture with up to 4 cameras is possible		4 points (2 of which support special function assignment) Input rating: 26.4 V max., 3 mA min., simultaneous/individual capture with up to 2 cameras is possible	
		Control input	Can set individual trigger delays (0 to 999 ms) for each trigger input			
	Control output	Common output	16 points (4 of which support special function assignment) Input rating: 26.4 V max., 2 mA min.			
		Total status output	27 points (11 of which support special function assignment, includes 4 high speed outputs), NPN open collector, 50 mA max. (30 V max.)			
	Monitor output	1 point, NPN open collector, 50 mA max. (30 V max.) Supports total status hold control, one-shot output (1 to 9999 ms)				
	Operation indicator	Analogue RGB output XGA 1024 x 768 (24 bit color, 60Hz)				
	RS-232C	Power supply, operation, ERROR LED display				
	PLC-Link	Can switch between the function of numerical value output and control input/output, and the function of CA series touch panel interface, supports a max. baud rate of up to 230400 bps (Cannot be used with PLC-Links using the RS-232C port)				
	Ethernet	<ul style="list-style-type: none"> Can output numerical values and perform control input/output using the Ethernet or RS-232C port (EtherNet/IP and PROFINET cannot be used in conjunction with PLC-Link. When using the RS-232C port, nonprocedural RS-232C communication cannot be used in conjunction with PLC-Link.) The following PLCs are supported via link unit:^{*3} <ul style="list-style-type: none"> KEYENCE: KV-7000 Series, KV-5000/3000 Series, KV-1000/700 Series, KV Nano Series Mitsubishi Electric: MELSEC iQ-R/L/Q Series, MELSEC A Series (RS-232C only), MELSEC iQ-F Series, MELSEC FX Series (RS-232C only) OMRON: SYSMAC CJ2/CJ1/CS1/CP1 Series, SYSMAC C Series (RS-232C only) YASKAWA Electric Corporation: MP2000 Series, MP900 Series (RS-232C only) 				
	USB	<ul style="list-style-type: none"> Can output numerical values and perform control input/output Can output measured value and image data via the included PC programme, upload and download settings Supports FTP client and FTP server function VNC server (for non-PC clients, only displaying the monitor screen is supported) Supports BOOTP function 1000BASE-T/100BASE-TX/10BASE-T 				
	EtherNet/IP	<ul style="list-style-type: none"> Can output measured value and image data via the included PC programme, upload and download settings USB 2.0 only. 				
	PROFINET	<ul style="list-style-type: none"> Numerical value and control input/output using the Ethernet port enabled (Cannot be used in conjunction with PLC-link / PROFINET). Cyclic (implicit) communication (max. 1436 bytes) possible. Message communication possible. Maximum connections: 32. In conformity with conformance test Version.CT10. 				
	Mouse	<ul style="list-style-type: none"> Numerical value and control input/output using the Ethernet port enabled (Cannot be used in conjunction with PLC-link / EtherNet/IP). Cyclic communication (max. 1408 bytes) possible. Record data communication possible. In conformity with Conformance Class A 				
Touch panel	Possible to control every kind of menu via the dedicated mouse (OP-87506: included with the controller)					
Touch panel	Possible to operate settings via CA series touch panel using TOUCH PANEL port or RS-232C port (When RS-232C is used, the nonprocedural communication and PLC-Links that use the RS-232C port cannot be used.)					
Illumination control	<p>By connecting the optional Illumination Expansion Unit CA-DC30E, CA-DC21E or CA-DC10E, lighting and intensity control for the LED illumination is possible.*4</p> <p>CA-DC10E: 2ch/unit, up to 1 unit can be connected, Output voltage 12V only, mixed connection with CA-DC21E or CA-DC30E is not possible.</p> <p>CA-DC21E: 2ch/unit, up to 4 units can be connected, Output voltage 12V/24V.</p> <p>CA-DC30E (dedicated for multi-emission lights CA-DRW5X/DRW10X/DRW20X): 2ch/unit, up to 2 units can be connected.</p> <p>A mixture of up to 4 CA-DC21E and CA-DC30E units can be connected, but only 2 CA-DC30E units can be connected.</p>					
Language	Switched among English, Japanese, Simplified Chinese, Traditional Chinese, Korean, Thai, German, French, Italian, Mexican Spanish, Indonesian, Vietnamese, and Brazilian Portuguese					

Main Specifications

Controller model ^{*1 *2}		CV-X292	CV-X272	CV-X252	CV-X202
Rating	Power supply voltage	24 V DC ± 10%			
	Current consumption	With area camera 3.6A (When 2 cameras are connected) 4.6A (When 4 cameras are connected) With L,J-V connected 2.6A (1 unit connected)/ 2.8A (2 units connected) Figures indicate maximum load including rush current at start-up.	3.6A (2 cameras connected)/4.6A (4 cameras connected) Figures indicate maximum load including rush current at start-up.		3.4A (When 2 cameras are connected) Figures indicate maximum load including rush current at start-up.
Environmental resistance	Ambient temperature	0 to +45°C			
	Relative humidity	35 to 85% RH (no condensation)			
Weight		Approx. 1600g			

*1 The letters that follow the model numbers describe differences in the software. For details, see the "CV-X Series User's Manual".

*2 A type with P-suffix at the end of its main unit model is a PNP open-collector.

*3 Models that are equipped with an Ethernet port on the CPU unit support direct connection with the Ethernet port.

*4 CA-DC30E supports fixed current mode only. CA-DC21E supports switching between the PWM and DC modes. CA-DC10E supports the PWM mode only.

*5 Transfer speed when the CA-HX500C/HX500M/HX200C/HX200M/HX048C/HX048M is connected to the CA-EC80L or CA-EC80HX is 16 times, and 11 times when connected to the CA-EC80.

Controller Unit (CV-X352/X322/X302)

Controller model ^{†1}			CV-X352	CV-X322	CV-X302		
Camera input			2 color/monochrome area cameras (mixed connection possible)				
			With the connection of 1 unit of the optional area camera input unit CA-E100, up to 4 cameras can be connected in total (mixed connection possible)				
	Trigger input		Simultaneous capture by up to 4 cameras/individual capture can be selected. (when CA-E100 is not connected, simultaneous capture is by up to 2 cameras)		Can select from simultaneous/individual capture with up to 2 cameras		
Supported cameras/ Number of pixels			With CA-035C/035M/H035C/H035M/HS035C/HS035M connected				
			<ul style="list-style-type: none"> 310 k pixel mode: 640(H) x 480(V), approx. 310,000 pixels 240 k pixel mode: 512(H) x 480(V), approx. 240,000 pixels 				
			With CV-035C/035M/H035C/H035M/S035C/S035M connected				
			<ul style="list-style-type: none"> 310 k pixel mode: 640(H) x 480(V), approx. 310,000 pixels 240 k pixel mode: 512(H) x 480(V), approx. 240,000 pixels 				
			With CA-H048CX/H048MX/HX048C/HX048M connected				
			<ul style="list-style-type: none"> 470 k pixel mode: 784(H) x 596(V), approx. 470,000 pixels 310 k pixel mode: 640(H) x 480(V), approx. 310,000 pixels 240 k pixel mode: 512(H) x 480(V), approx. 240,000 pixels 				
			With CA-200C/200M/H200C/H200M/HS200C/HS200M connected				
<ul style="list-style-type: none"> 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 1 mega-pixel mode: 1024(H) x 960(V), approx. 980,000 pixels 							
With CV-200C/200M/H200C/H200M/S200C/S200M connected							
<ul style="list-style-type: none"> 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 1 mega-pixel mode: 1024(H) x 960(V), approx. 980,000 pixels 							
With CA-H200CX/H200MX/HX200C/HX200M connected							
<ul style="list-style-type: none"> 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 							
With CA-H500C/H500M connected							
<ul style="list-style-type: none"> 5 mega-pixel mode: 2432(H) x 2050(V), approx. 4.99 mega-pixels 							
With CV-H500C/H500M connected							
<ul style="list-style-type: none"> 5 mega-pixel mode: 2432(H) x 2050(V), approx. 4.99 mega-pixels 							
With CA-H500CX/H500MX/HX500C/HX500M connected							
<ul style="list-style-type: none"> 5 mega-pixel mode: 2432(H) x 2040(V), approx. 4.96 mega-pixels 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 							
Main processor for image processing			DSP				
Number of setting registrations			Up to 1000 settings (depending on SD card capacity and setting contents) for SD card 1 and SD card 2 individually and external switching is possible				
Number of reference images			Each setting supports 900 images per camera (depending on SD card capacity), compress and save functions, and image registration of position adjusted images				
Memory card			<ul style="list-style-type: none"> SD card slot x 2 Supports OP-87133 (512 MB: standard equipment on the SD1 slot for the CV-X322/X302), CA-SD1G (1 GB: standard equipment on the SD1 slot for the CV-X352), CA-SD4G (4 GB), and CA-SD16G (16 GB) 				
Interface	Control input	External trigger input	4 points (2 of which support special function assignment) Input rating: 26.4 V max., 3 mA min., simultaneous/individual capture with up to 4 cameras is possible		4 points (2 of which support special function assignment) Input rating: 26.4 V max., 3 mA min., simultaneous/individual capture with up to 2 cameras is possible		
		Can set individual trigger delays (0 to 999 ms) for each trigger input					
	Control output	Control input	16 points (4 of which support special function assignment) Input rating: 26.4 V max., 2 mA min.				
		Common output	27 points (11 of which support special function assignment includes 4 high speed outputs), photo MOSFET ^{†2} , 50 mA max. (30 V max.)				
		Total status output	1 point, photo MOSFET ^{†2} , 50 mA max. (30 V max.) Supports total status hold control, and one-shot output (1 to 9999 ms)				
	Monitor output	Analog RGB Output, XGA 1024 x 768 (24 bit color, 60 Hz)					
	Operation indicator	Power, ERROR LED display					
RS-232C	Can switch between the function of numerical value output and control input/output, and the function of CA series touch panel interface, supports a max. baud rate of up to 230400 bps (Cannot be used with PLC-Links using the RS-232C port)						

Main Specifications

Controller model ¹		CV-X352	CV-X322	CV-X302
Interface (Continued)	PLC link	<ul style="list-style-type: none"> Can output numerical values and perform control input/output using the Ethernet or RS-232C port (EtherNet/IP and PROFINET cannot be used in conjunction with PLC-Link. When using the RS-232C port, nonprocedural RS-232C communication cannot be used in conjunction with PLC-Link.) The following PLCs are supported via link unit:³ <ul style="list-style-type: none"> KEYENCE: KV-7000 Series, KV-5000/3000 Series, KV-1000/700 Series, KV Nano Series Mitsubishi Electric: MELSEC IQ-R/L/Q Series, MELSEC A Series (RS-232C only), MELSEC IQ-F Series, MELSEC FX Series (RS-232C only) OMRON: SYSMAC CJ2/CJ1/CS1/CP1 Series, SYSMAC C Series (RS-232C only) YASKAWA Electric Corporation: MP2000 Series, MP900 Series (RS-232C only) 		
	Ethernet	<ul style="list-style-type: none"> Can output numerical values and perform control input/output Connecting to KEYENCE PC application software makes it possible to output measured data and image data to a PC, upload and download settings, and use the remote desktop function. Supports FTP client and FTP server function VNC server (for non-PC clients, only displaying the monitor screen is supported) Supports BOOTP function 1000BASE-T/100BASE-TX/10BASE-T 		
	USB	<ul style="list-style-type: none"> Connecting to KEYENCE PC application software makes it possible to output measured data and image data to a PC, upload and download settings, and use the remote desktop function. USB 2.0 only. 		
	EtherNet/IP	<ul style="list-style-type: none"> Numerical value and control input/output using the Ethernet port enabled (Cannot be used in conjunction with PLClink / PROFINET). Cyclic (implicit) communication (max. 1436 bytes) possible. Message communication possible. Maximum connections: 32. In conformity with conformance test Version.CT15. 		
	PROFINET	<ul style="list-style-type: none"> Numerical value and control input/output using the Ethernet port enabled (Cannot be used in conjunction with PLClink / EtherNet/IP). Cyclic communication (max. 1408 bytes) possible. Aperiodic (record data) communication possible. In conformity with Conformance Class A 		
	SNTP	By connecting to an SNTP server, the date and time of the controller can be automatically adjusted.		
	Mouse	Possible to control every kind of menu via the dedicated mouse (OP-87506: included with the controller)		
	Touch Panel	Possible to operate settings via CA series touch panel using RS-232C port (The nonprocedural communication and PLC-Links that use the RS-232C port cannot be used.)		
	USB HDD	By connecting a HDD (maximum 2 TB) to the dedicated USB port (USB 3.0 and bus powered compatible: rated output 900 mA), various kinds of data including image data can be output		
	VisionDataStorage	Data, including image data, can be output by connecting a VisionDataStorage (sold separately) via the dedicated VisionDataStorage USB cable (OP-88263)		
Illumination control		By connecting the optional illumination expansion unit CA-DC40E/DC50E, the lighting and light intensity of the LED illumination can be controlled. ⁴		
Cooling fan		None		
Language		Switched among English, Japanese, Simplified Chinese, Traditional Chinese, Korean, Thai, German, French, Italian, Mexican Spanish, Indonesian, Vietnamese, and Brazilian Portuguese		
Rating	Power supply voltage	24 V DC ±10%		
	Current consumption	3.8 A		2.4 A
Environmental resistance	Ambient temperature	0 to +45°C (DIN rail mounted)/0 to +40°C (Bottom mounted)		
	Relative humidity	35 to 85% RH (no condensation)		
Weight		Approx. 1600 g		

*1 The letters that follow the model numbers describe differences in the software. For details, see the "CV-X Series User's Manual".

*2 Either positive common connecting which is compatible with NPN input instruments, or negative common connecting which is compatible with PNP input instruments is feasible.

*3 Models that are equipped with an Ethernet port on the CPU unit support direct connection with the Ethernet port.

*4 Connect up to 8 illumination expansion units (note that the maximum allowable number of CA-DC50E units is two).

Controller Unit (CV-X482/X472/X452/X422/X402)

Controller model*1	CV-X482	CV-X472	CV-X452	CV-X422	CV-X402
Camera input*2	No camera input on the controller	2 color/monochrome area cameras (mixed connection possible)			
	With area camera input unit CA-E100 connected: 2 color/monochrome cameras per one CA-E100, up to 4 cameras via a maximum of 2 units can be connected (mixed connection possible*3)	With the connection of 1 unit of the optional area camera input unit CA-E100 for an additional 2 color/monochrome area cameras, up to 4 cameras can be connected in total (mixed connection possible)			
	With LJ-V input unit CA-E100LJ/E110LJ connected: Up to 2 identical models of the LJ-V series heads per one CA-E100LJ/E110LJ, up to 4 heads via a maximum of 2 units can be connected*3				
Trigger input	Can select from simultaneous/individual capture with up to 4 cameras (when one camera input unit is connected, simultaneous capture is performed with up to 2 cameras)	Simultaneous capture by up to 4 cameras/individual capture can be selected. (when CA-E100 is not connected, simultaneous capture is by up to 2 cameras)			Can select from simultaneous/individual capture with up to 2 cameras
Number of pixels	With CA-035C/035M/H035C/H035M/HS035C/HS035M connected				
	<ul style="list-style-type: none"> 310 k pixel mode: 640(H) x 480(V), approx. 310,000 pixels 240 k pixel mode: 512(H) x 480(V), approx. 240,000 pixels 				
	With CV-035C/035M/H035C/H035M/S035C/S035M connected				
	<ul style="list-style-type: none"> 310 k pixel mode: 640(H) x 480(V), approx. 310,000 pixels 240 k pixel mode: 512(H) x 480(V), approx. 240,000 pixels 				
	With CA-H048CX/H048MX/HX048C/HX048M connected				
	<ul style="list-style-type: none"> 470 k pixel mode: 784(H) x 596(V), approx. 470,000 pixels 310 k pixel mode: 640(H) x 480(V), approx. 310,000 pixels 240 k pixel mode: 512(H) x 480(V), approx. 240,000 pixels 				
	With CA-200C/200M/H200C/H200M/HS200C/HS200M connected				
	<ul style="list-style-type: none"> 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 1 mega-pixel mode: 1024(H) x 960(V), approx. 980,000 pixels 				
	With CV-200C/200M/H200C/H200M/S200C/S200M connected				
	<ul style="list-style-type: none"> 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 1 mega-pixel mode: 1024(H) x 960(V), approx. 980,000 pixels 				
With CA-H200CX/H200MX/HX200C/HX200M connected					
<ul style="list-style-type: none"> 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 					
With CA-H500C/H500M connected					
<ul style="list-style-type: none"> 5 mega-pixel mode: 2432(H) x 2050(V), approx. 4.99 mega-pixels 					
With CV-H500C/H500M connected					
<ul style="list-style-type: none"> 5 mega-pixel mode: 2432(H) x 2050(V), approx. 4.99 mega-pixels 					
With CA-H500CX/H500MX/HX500C/HX500M connected					
<ul style="list-style-type: none"> 5 mega-pixel mode: 2432(H) x 2040(V), approx. 4.96 mega-pixels 2 mega-pixel mode: 1600(H) x 1200(V), approx. 1.92 mega-pixels 					
With CA-H2100C/H2100M connected					
<ul style="list-style-type: none"> 21 mega-pixel mode: 5104(H)x4092(V), approx. 20.89 mega-pixels 5 mega-pixel mode: 2432(H)x2050(V), approx. 4.99 mega-pixels 					
LJ-V7020/7020K/7060/7060K/7080/7200/7300*4					
<ul style="list-style-type: none"> 512 (H) x 16384 (L), approx. 8,390,000 pixels 1024 (H) x 8192 (L), approx. 8,390,000 pixels 2048 (H) x 4096 (L), approx. 8,390,000 pixels 					
Main processor for image processing	DSP (High-speed)		DSP		
Number of setting registrations	Up to 1000 settings (depending on SD card capacity and setting contents) for SD card 1 and SD card 2 individually and external switching is possible				

Main Specifications

Controller model ¹			CV-X482	CV-X472	CV-X452	CV-X422	CV-X402
Number of reference images			Each setting supports 400 images/LJ-V, 900 images/area camera (depending on SD card capacity), compress and save function and image registration of position adjusted images	Each setting supports 900 images per camera (depending on SD card capacity), compress and save functions, and image registration of position adjusted images			
Memory card			<ul style="list-style-type: none"> SD card slot x 2 Supports OP-87133 (512 MB: standard equipment on the SD1 slot for the CV-X422/X402), CA-SD1G (1 GB: standard equipment on the SD1 slot for the CV-X482/X472/X452), CA-SD4G (4 GB), and CA-SD16G (16 GB) 				
Interface	Control input	External trigger input	20 input (including four high speed inputs designed for trigger input) Input rating 26.4 V or lower, 2 mA or greater (3 mA or greater for high speed input terminal)	4 points (2 of which support special function assignment) Input rating: 26.4 V max., 3 mA min., simultaneous/individual capture with up to 4 cameras is possible		4 points (2 of which support special function assignment) Input rating: 26.4 V max., 3 mA min., simultaneous/individual capture with up to 2 cameras is possible	
		Control input		Can set individual trigger delays (0 to 999 ms) for each trigger input			
				16 points (4 of which support special function assignment) Input rating: 26.4 V max., 2 mA min.			
Control output	Common output	Total status output	28 output (including four high speed outputs designed for FLASH outputting linked to external device) ⁵ Photo MOSFET ⁵ Maximum 50 mA (30 V or less)	27 points (11 of which support special function assignment includes 4 high speed outputs), photo MOSFET ⁵ , 50 mA max. (30 V max.)			
				1 point, photo MOSFET ⁵ , 50 mA max. (30 V max.) Supports total status hold control, and one-shot output (1 to 9999 ms)			
Encoder input			When connecting CA-E100LJ/E110LJ, 1 system per 1 unit, up to 2 systems via a maximum of 2 units RS-422 line-driver output (5 V output supplied maximum 150 mA), combined open collector output.				
Monitor output			Analog RGB Output, XGA 1024 × 768 (24 bit color, 60 Hz)				
Operation indicator			Power, ERROR LED display				
RS-232C			Can switch between the function of numerical value output and control input/output, and the function of CA series touch panel interface, supports a max. baud rate of up to 230400 bps (Cannot be used with PLC-Links using the RS-232C port)				
PLC link			<ul style="list-style-type: none"> Can output numerical values and perform control input/output using the Ethernet or RS-232C port (EtherNet/IP and PROFINET cannot be used in conjunction with PLC-Link. When using the RS-232C port, nonprocedural RS-232C communication cannot be used in conjunction with PLC-Link.) The following PLCs are supported via link unit:⁶ KEYENCE: KV-7000 Series, KV-5000/3000 Series, KV-1000/700 Series, KV Nano Series Mitsubishi Electric: MELSEC iQ-R/L/Q Series, MELSEC A Series (RS-232C only), MELSEC iQ-F Series, MELSEC FX Series (RS-232C only) OMRON: SYSMAC CJ2/CJ1/CS1/CP1 Series, SYSMAC C Series (RS-232C only) YASKAWA Electric Corporation: MP2000 Series, MP900 Series (RS-232C only) 				
Ethernet			<ul style="list-style-type: none"> Can output numerical values and perform control input/output Connecting to KEYENCE PC application software makes it possible to output measured data and image data to a PC, upload and download settings, and use the remote desktop function. Supports FTP client and FTP server function VNC server (for non-PC clients, only displaying the monitor screen is supported) Supports BOOTP function 1000BASE-T/100BASE-TX/10BASE-T 				
USB			<ul style="list-style-type: none"> Connecting to KEYENCE PC application software makes it possible to output measured data and image data to a PC, upload and download settings, and use the remote desktop function. USB 2.0 only. 				
EtherNet/IP			<ul style="list-style-type: none"> Numerical value and control input/output using the Ethernet port enabled (Cannot be used in conjunction with PLClink / PROFINET). Cyclic (implicit) communication (max. 1436 bytes) possible. Message communication possible. Maximum connections: 32. In conformity with conformance test Version.CT15. 				
PROFINET			<ul style="list-style-type: none"> Numerical value and control input/output using the Ethernet port enabled (Cannot be used in conjunction with PLClink / EtherNet/IP). Cyclic communication (max. 1408 bytes) possible. Aperiodic (record data) communication possible. In conformity with Conformance Class A 				
SNTP			By connecting to an SNTP server, the date and time of the controller can be automatically adjusted.				

Controller model ^{*1}		CV-X482	CV-X472	CV-X452	CV-X422	CV-X402
Interface (Continued)	Mouse	Possible to control every kind of menu via the dedicated mouse (OP-87506: included with the controller)				
	Touch Panel	Possible to operate settings via CA series touch panel using RS-232C port (The nonprocedural communication and PLC-Links that use the RS-232C port cannot be used.)				
	USB HDD	By connecting a HDD (maximum 2 TB) to the dedicated USB port (USB 3.0 and bus powered compatible: rated output 900 mA), various kinds of data including image data can be output				
	VisionDataStorage	Data, including image data, can be output by connecting a VisionDataStorage (sold separately) via the dedicated VisionDataStorage USB cable (OP-88263)				
Illumination control		By connecting the optional illumination expansion unit CA-DC40E/DC50E/DC60E, the lighting and light intensity of the LED illumination can be controlled. ^{*7}				
Cooling fan		Cooling fan unit CA-F100 is standard equipment (CV-X472/X482 only)				
Language		Switched among English, Japanese, Simplified Chinese, Traditional Chinese, Korean, Thai, German, French, Italian, Mexican Spanish, Indonesian, Vietnamese, and Brazilian Portuguese				
Rating	Power supply voltage	24 V DC \pm 10%				
	Current consumption	5.3 A	3.8 A			2.4 A
Environmental resistance	Ambient temperature	0 to +45°C (DIN rail mounted)/0 to +40°C (Bottom mounted)				
	Relative humidity	35 to 85% RH (no condensation)				
Weight		Approx. 1750 g	Approx. 1800 g	Approx. 1600 g		

*1 The letters that follow the model numbers describe differences in the software. For details, see the "CV-X Series User's Manual".

*2 Since the CV-X482 controller unit does not support camera inputs, at least 1 camera input unit (optional) is required.

*3 The LJ-V cannot be used at the same time as the 21 megapixel camera or the LumiTrax.

*4 LJ-V Series heads whose models end in "B" are luminance output types. To connect the luminance output type, the CV-X482 and the CA-E110LJ are required.

*5 Either positive common connecting which is compatible with NPN input instruments, or negative common connecting which is compatible with PNP input instruments is feasible.

*6 Models that are equipped with an Ethernet port on the CPU unit support direct connection with the Ethernet port.

*7 Connect up to 8 illumination expansion units (note that the maximum allowable number of CA-DC50E units and CA-DC60E units is two, respectively).

Illumination Expansion Unit (CA-DC10E: CV-X100/X200 Series Option)

		CA-DC10E
Output	Illumination control	Pulse width modulation (light emission frequency 100 kHz)
	Intensity level	256 digital levels (controller selectable)
	Lighting connections	2 channels (Connection to the LED connector)
	Voltage	12 V DC
	Capacity	Max. 40 W (However 30 W per channel)
	Synchronization	FLASH output synchronization/continuous illumination (controller selectable)
	Response speed	Within 1 ms
Display	LED display	Illumination volume display: Green/Orange (at 128 or more) Error display: Red
Rating	Power supply voltage	24 V DC \pm 10%
	Current consumption	3.0 A The maximum load including inrush when activating any device
Environmental resistance*1	Ambient temperature	0 to +50°C*2
	Relative humidity	35 to 85% RH (no condensation)
Weight		Approx. 300 g

*1 The environmental resistance of just the LED lights is ambient temperature 0 to +40°C and relative humidity 35 to 65% RH (no condensation).

*2 This is limited by the ambient temperature of the connected controller.

Illumination Expansion Unit (CA-DC21E: CV-X100/X200 Series Option)

		CA-DC21E
Output	Illumination control	(1) Rated voltage (DC) (2) Pulse width modulation (light emission frequency 100 kHz) (Controller selectable.)
	Intensity level	256 digital levels (controller selectable)
	Lighting connections	2 channels (LED connector or terminal block connection)
	Voltage	12 V DC/24 V DC (DIP switch selectable)
	Capacity	Max. 40 W (However 30 W per channel)
	Synchronization	FLASH output synchronization/continuous illumination (controller selectable)
	Response speed	(1) Rated voltage control: Within 10 ms (with 12 V output), within 20 ms (with 24 V output) (2) Pulse width modulation control: Within 1 ms (with 12V/24V output)
Inputs	Force illumination OFF	Rated voltage: 26.4 V or less, 2 mA or more
Display	LED display	Illumination volume display: Green/Orange (at 128 or more) Error display: Red (All lit)
Rating	Power supply voltage	24V DC \pm 10%
	Current consumption	3.0 A (12 V output)/6.5 A (24 V output) Figures indicate maximum load including rush current at start-up.
Environmental resistance*1	Ambient temperature	0 to +50°C*2
	Relative humidity	35 to 85% RH (no condensation)
Weight		Approx. 590 g

*1 The environmental resistance of just the LED lights is ambient temperature 0 to +40°C and relative humidity 35 to 65% RH (no condensation).

*2 This is limited by the ambient temperature of the connected controller.

Illumination Expansion Unit (CA-DC30E: CV-X100/X200 Series Option)

		CA-DC30E
Output	Illumination control	Constant current control
	Intensity level	256 digital levels (controller selectable)
	Lighting connections	2 channels (dedicated Six-pole circular connector)
	Synchronization	Synchronized with trigger applied to camera and with shutter (continuous lighting not supported)* ³
	Response speed	Within 1 ms
Display	LED display	When illumination is recognized: Green When a disconnection error occurs: Red
Rating	Power supply voltage	24 VDC \pm 10%
	Current consumption	5.0 A The maximum load including inrush when activating any device
Environmental resistance* ¹	Ambient temperature	0 to +50°C* ²
	Relative humidity	35 to 85% RH (no condensation)
Weight		Approx. 430 g

*1 The environmental resistance of just the LED lights is ambient temperature 0 to +40°C and relative humidity 35 to 65% RH (no condensation).

*2 This is limited by the ambient temperature of the connected controller.

*3 If the light-on time of the connected illumination unit is too long compared with the light-off time, an error occurs due to overload. In such a case, adjust the trigger intervals or shutter speed on the controller so that the light-off time of the unit is three times or more longer than the light-on time.

Illumination Expansion Unit (CA-DC40E: CV-X300/X400 Series Option)

		CA-DC40E
Output	Illumination control	(1) Rated voltage (DC) (2) Pulse width modulation (light emission frequency 100 kHz) (Controller selectable.)
	Intensity level	1024 digital levels (controller selectable)
	Lighting connections	2 channels (Connector or terminal block connection)* ¹
	Voltage* ¹	12 VDC/24 VDC (controller selectable)
	Capacity	Max. 30W (2 channels total: 40W)* ²
	Synchronization	FLASH output synchronization/continuous illumination (controller selectable)
	Response speed	(1) Rated voltage control: 3 ms or less (2) Pulse width modulation control: 1 ms or less
Inputs	Force illumination OFF	2 channels Individual control (Rated voltage: 26.4 V or less, 2 mA or more)
Display	LED display	Power display Light status display (separate for the 2 channels)
Rating	Power supply voltage	24V DC \pm 10%
	Current consumption	3.0 A
Environmental resistance* ³	Ambient operating temperature	0 to +45°C (DIN rail mounted)/0 to +40°C (Bottom mounted)
	Ambient operating humidity	35 to 85% RH (no condensation)
Weight		Approx. 500 g

*1 Output only from the terminal block when switched to 24 V

*2 The total for all CA-DC40E units for simultaneous lighting when multiple illumination expansion units are connected is 80 W or less.

*3 The environmental resistance of just the LED lights is ambient temperature 0 to +40°C and ambient humidity 35 to 65% RH (no condensation).

Illumination Expansion Unit (CA-DC50E: CV-X300/X400 Series Option)

		CA-DC50E
Output	Illumination control	Constant current control
	Intensity level	1024 digital levels (controller selectable)
	No. of connections	2 channels (dedicated Six-pole circular connector)
	Synchronization	Synchronized with trigger applied to camera and with shutter (continuous lighting not supported)* ¹
	Response speed	Within 1 ms
Display	LED display	Power display Light status display (separate for the 2 channels)
Rating	Power supply voltage	24 VDC \pm 10%
	Current consumption	5.0 A
Environmental resistance* ²	Ambient operating temperature	0 to +45°C (DIN rail mounted)/0 to +40°C (Bottom mounted)
	Ambient operating humidity	35 to 85% RH (no condensation)
Weight		Approx. 500 g

*1 If the light-on time of the connected illumination unit is too long compared with the light-off time, an error may occur due to overload. In such a case, adjust the trigger intervals or shutter speed on the controller so that the light-off time of the unit is three times or more longer than the light-on time.

*2 The environmental resistance of just the LED lights is ambient temperature 0 to +40°C and ambient humidity 35 to 65% RH (no condensation).

Illumination Expansion Unit (CA-DC60E: CV-X400 Series Option)

		CA-DC60E
Output	Illumination control	Constant current control
	Intensity level	1024 digital levels (controller selectable)
	No. of connections	2 channels (dedicated 12-pole circular connector)
	Synchronization	Synchronized with trigger applied to camera and with shutter* ¹
	Response speed	Within 1 ms
Display	LED display	Power display Light status display (separate for the 2 channels)
Rating	Power supply voltage	24 VDC \pm 10%
	Current consumption	5.1 A (including the part supplied to the illumination unit)
Environmental resistance* ²	Ambient operating temperature	0 to +45°C (DIN rail mounted)/0 to +40°C (Bottom mounted)
	Ambient operating humidity	35 to 85% RH (no condensation)
Weight		Approx. 500 g

*1 The continuous lighting (single color lighting in all directions) setting is only possible when the volume limitation is ON.

*2 The environmental resistance of just the lights is ambient temperature 0 to +40°C and ambient humidity 35 to 65%RH (no condensation).

Cameras (CA-035C/035M)

	CA-035C	CA-035M
Image receiving element	Color CMOS Square lattice 2x speed reading	Monochrome CMOS Square lattice 2x speed reading
Unit cell size	6.9 μm \times 6.9 μm	
Image size	Equivalent to 1/3-inch	
Number of effective pixels	In 0.31 megapixel mode: 640 (H) \times 480 (V) In 0.24 megapixel mode: 512 (H) \times 480 (V)	
Scanning system	Progressive In 0.31 megapixel mode: 16.5 ms In 0.24 megapixel mode: 16.5 ms	
Pixel transfer frequency	25 MHz	
Transfer system	Digital serial transfer	
Electronic shutter	1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 By using number input, the values 0.05 msec to 9000 msec can also be specified.	
Lens mount	C-mount	
Enclosure rating	IP64 ^{*1}	
Environmental resistance	Ambient operating temperature	0 to +50°C
	Ambient operating humidity	35 to 85%RH
Weight	Approx. 75 g (lens not included)	

*1 A KEYENCE-specified IP64-compatible lens and environment resistant cable must be mounted on the product.

Cameras (CA-200C/200M)

	CA-200C	CA-200M
Image receiving element	Color CMOS Square lattice 2x speed reading	Monochrome CMOS Square lattice 2x speed reading
Unit cell size	4.5 μm \times 4.5 μm	
Image size	Equivalent to 1/1.8-inch	
Number of effective pixels	In 2 megapixel mode: 1600 (H) \times 1200 (V) In 1 megapixel mode: 1024 (H) \times 960 (V)	
Scanning system	Progressive In 2 megapixel mode: 56.5 ms In 1 megapixel mode: 45.8 ms	
Pixel transfer frequency	43 MHz	
Transfer system	Digital serial transfer	
Electronic shutter	1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 By using number input, the values 0.05 msec to 9000 msec can also be specified.	
Lens mount	C-mount	
Enclosure rating	IP64 ^{*1}	
Environmental resistance	Ambient operating temperature	0 to +45°C
	Ambient operating humidity	35 to 85%RH
Weight	Approx. 75 g (lens not included)	

*1 A KEYENCE-specified IP64-compatible lens and environment resistant cable must be mounted on the product.

Cameras (CA-H035C/H035M)

		CA-H035C	CA-H035M
Image receiving element		Color CMOS Square lattice 7x/16x speed reading	Monochrome CMOS Square lattice 7x/16x speed reading
Unit cell size		6.9 μm \times 6.9 μm	
Image size		Equivalent to 1/3-inch	
Number of effective pixels		In 0.31 megapixel mode: 640 (H) \times 480 (V) In 0.24 megapixel mode: 512 (H) \times 480 (V)	
Scanning system		Progressive In 0.31 megapixel mode • At 7x transfer speed: 4.8 ms ^{*1} • At 16x transfer speed: 2.9 ms ^{*2}	In 0.24 megapixel mode • At 7x transfer speed: 4.8 ms ^{*1} • At 16x transfer speed: 2.9 ms ^{*2}
Pixel transfer frequency		At 7x transfer speed: 86 MHz (43 MHz \times 2) ^{*1} At 16x transfer speed: 198 MHz ^{*2}	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 By using number input, the values 0.05 msec to 9000 msec can also be specified.	
Lens mount		C-mount	
Enclosure rating		IP64 ^{*3}	
Environmental resistance	Ambient operating temperature	0 to +50°C	
	Ambient operating humidity	35 to 85%RH	
Weight		Approx. 75 g (lens not included)	

*1 CV-X300/X400 Series (Transfer speed setting: Standard) and CV-X100/X200 Series

*2 CV-X300/X400 Series (Transfer speed setting: Fast)

*3 A KEYENCE-specified IP64-compatible lens and environment resistant cable must be mounted on the product.

Cameras (CA-H048CX/H048MX)*

		CA-H048CX	CA-H048MX
Image receiving element		Color CMOS Square lattice 16x speed reading	Monochrome CMOS Square lattice 16x speed reading
Unit cell size		4.8 μm \times 4.8 μm	
Image size		Equivalent to 1/3-inch	
Number of effective pixels		In 0.47 megapixel mode: 784 (H) \times 596 (V) In 0.31 megapixel mode: 640 (H) \times 480 (V) In 0.24 megapixel mode: 512 (H) \times 480 (V)	
Scanning system		Progressive • In 0.47 megapixel mode: 2.9 ms • In 0.31 megapixel mode: 2.0 ms • In 0.24 megapixel mode: 1.7 ms	
Pixel transfer frequency		195 MHz	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 By using number input, the values 0.022 msec to 1000 msec can also be specified.	
Lens mount		C-mount	
Environmental resistance	Ambient operating temperature	0 to +40°C	
	Ambient operating humidity	35 to 85%RH	
Weight		Approx. 190 g (lens not included)	

* These cannot be used with the CV-X100/X200 Series.

Cameras (CA-H200C/H200M)

	CA-H200C	CA-H200M
Image receiving element	Color CMOS Square lattice 7x/16x speed reading	Monochrome CMOS Square lattice 7x/16x speed reading
Unit cell size	4.5 μm × 4.5 μm	
Image size	Equivalent to 1/1.8-inch	
Number of effective pixels	In 2 megapixel mode: 1600 (H) × 1200 (V) In 1 megapixel mode: 1024 (H) × 960 (V)	
Scanning system	Progressive In 2 megapixel mode <ul style="list-style-type: none"> At 7x transfer speed: 28.9 ms^{*1} At 16x transfer speed: 11.8 ms^{*2} 	In 1 megapixel mode <ul style="list-style-type: none"> At 7x transfer speed: 23.5 ms^{*1} At 16x transfer speed: 9.6 ms^{*2}
Pixel transfer frequency	At 7x transfer speed: 86 MHz (43 MHz × 2) ^{*1} At 16x transfer speed: 198 MHz ^{*2}	
Transfer system	Digital serial transfer	
Electronic shutter	1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 By using number input, the values 0.05 msec to 9000 msec can also be specified.	
Lens mount	C-mount	
Enclosure rating	IP64 ^{*3}	
Environmental resistance	Ambient operating temperature	0 to +45°C
	Ambient operating humidity	35 to 85%RH
Weight	Approx. 75 g (lens not included)	

*1 CV-X300/X400 Series (Transfer speed setting: Standard) and CV-X100/X200 Series

*2 CV-X300/X400 Series (Transfer speed setting: Fast)

*3 A KEYENCE-specified IP64-compatible lens and environment resistant cable must be mounted on the product.

Cameras (CA-H200CX/H200MX)*

	CA-H200CX	CA-H200MX
Image receiving element	Color CMOS Square lattice 16x speed reading	Monochrome CMOS Square lattice 16x speed reading
Unit cell size	3.45 μm × 3.45 μm	
Image size	Equivalent to 1/2-inch	
Number of effective pixels	1600 (H) × 1200 (V)	
Scanning system	Progressive (11.7 ms)	
Pixel transfer frequency	195 MHz	
Transfer system	Digital serial transfer	
Electronic shutter	1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000, 1/50000, 1/100000 By using number input, the values 0.017 msec to 100 msec can also be specified.	
Lens mount	C-mount	
Environmental resistance	Ambient operating temperature	0 to +40°C
	Ambient operating humidity	35 to 85%RH
Weight	Approx. 280 g (lens not included)	

* These cannot be used with the CV-X100/X200 Series.

Cameras (CA-H500C/H500M)

		CA-H500C	CA-H500M
Image receiving element		Color CMOS Square lattice 11x/16x speed reading	Monochrome CMOS Square lattice 11x/16x speed reading
Unit cell size		3.45 μm \times 3.45 μm	
Image size		Equivalent to 2/3-inch	
Number of effective pixels		2432 (H) \times 2050 (V)	
Scanning system		Progressive <ul style="list-style-type: none"> At 11x transfer speed: 61.2 ms^{*1} At 16x transfer speed: 28.4 ms^{*2} 	
Pixel transfer frequency		At 11x transfer speed: 132 MHz (66 MHz \times 2) ^{*1} At 16x transfer speed: 198 MHz ^{*2}	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 By using number input, the values 0.05 msec to 9000 msec can also be specified.	
Lens mount		C-mount	
Enclosure rating		IP64 ^{*3}	
Environmental resistance	Ambient operating temperature	0 to +50°C	
	Ambient operating humidity	35 to 85%RH	
Weight		Approx. 75 g (lens not included)	

*1 CV-X300/X400 Series (Transfer speed setting: Standard) and CV-X100/X200 Series

*2 CV-X300/X400 Series (Transfer speed setting: Fast)

*3 A KEYENCE-specified IP64-compatible lens and environment resistant cable must be mounted on the product.

Cameras (CA-H500CX/H500MX)*

		CA-H500CX	CA-H500MX
Image receiving element		Color CMOS Square lattice 16x speed reading	Monochrome CMOS Square lattice 16x speed reading
Unit cell size		3.45 μm \times 3.45 μm	
Image size		Equivalent to 2/3-inch	
Number of effective pixels		In 5 megapixel mode: 2432 (H) \times 2040 (V) In 2 megapixel mode: 1600 (H) \times 1200 (V)	
Scanning system		Progressive In 5 megapixel mode: 29.2ms In 2 megapixel mode: 11.7ms	Progressive In 5 megapixel mode: 27.7ms In 2 megapixel mode: 11.7ms
Pixel transfer frequency		195 MHz	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000, 1/50000, 1/100000 By using number input, the values 0.017 msec to 100 msec can also be specified.	
Lens mount		C-mount	
Environmental resistance	Ambient operating temperature	0 to +40°C	
	Ambient operating humidity	35 to 85%RH	
Weight		Approx. 280 g (lens not included)	

* These cannot be used with the CV-X100/X200 Series.

Cameras (CA-H2100C/H2100M)

		CA-H2100C	CA-H2100M
Image receiving element		4/3-inch Color CMOS image receiving element Square-lattice all-pixel 16x speed reading	4/3-inch Monochrome CMOS image receiving element Square-lattice all-pixel 16x speed reading
Unit cell size		3.5 μ m \times 3.5 μ m	
Effective pixels		In 21 megapixel mode: 5104 (H) \times 4092 (V) In 5 megapixel mode: 2432 (H) \times 2050 (V)	
Scanning system		Progressive In 21 megapixel mode: 110 ms In 5 megapixel mode: 40.2 ms	
Image transfer frequency		195 MHz	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 By using number input, the values 0.05 msec to 9000 msec can also be specified.	
Lens mount		C-mount	
Environmental resistance	Ambient operating temperature	0 to +40°C	
	Ambient operating humidity	35 to 85% RH (no condensation)	
Weight		Approx. 300 g (lens not included)	

Cameras (CA-HS035C/HS035M)

		CA-HS035C	CA-HS035M
Camera/Amplifier		CA-HS035CH/CA-HS035CU	CA-HS035MH/CA-HS035MU
Image receiving element		Color CMOS Square lattice 7x speed reading	Monochrome CMOS Square lattice 7x speed reading
Unit cell size		7.4 μ m \times 7.4 μ m	
Image size		Equivalent to 1/3-inch	
Number of effective pixels		In 0.31 megapixel mode: 640 (H) \times 480 (V) In 0.24 megapixel mode: 512 (H) \times 480 (V)	
Scanning system		Progressive In 0.31 megapixel mode: 4.5 ms In 0.24 megapixel mode: 4.5 ms	
Pixel transfer frequency		86 MHz (43 MHz \times 2)	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 By using number input, the values 0.05 msec to 100 msec can also be specified.	
Lens mount		Special mount (M10.5 P0.5 male)	
Environmental resistance	Ambient operating temperature	0 to +40°C	
	Ambient operating humidity	35 to 85%RH	
Weight	Camera	Approx. 135 g (cable included, lens not included)	
	Amplifier	Approx. 60 g	

Cameras (CA-HS200C/HS200M)

		CA-HS200C	CA-HS200M
Image receiving element		Color CMOS Square lattice 7x/16x speed reading	Monochrome CMOS Square lattice 7x/16x speed reading
Unit cell size		3.45 μm \times 3.45 μm	
Image size		Equivalent to 1/2-inch	
Number of effective pixels		In 2 megapixel mode: 1600 (H) \times 1200 (V) In 1 megapixel mode: 1024 (H) \times 960 (V)	
Scanning system		Progressive In 2 megapixel mode <ul style="list-style-type: none"> At 7x transfer speed: 28.4 ms^{*1} At 16x transfer speed: 14.2 ms^{*2} 	In 1 megapixel mode <ul style="list-style-type: none"> At 7x transfer speed: 22.9 ms^{*1} At 16x transfer speed: 11.5 ms^{*2}
Pixel transfer frequency		At 7x transfer speed: 86 MHz (43 MHz \times 2) ^{*1} At 16x transfer speed: 198 MHz ^{*2}	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 By using number input, the values 0.05 msec to 9000 msec can also be specified.	
Lens mount		Special mount (M15.5 P0.5 male)	
Environmental resistance	Ambient operating temperature	0 to +45°C	
	Ambient operating humidity	35 to 85%RH	
Weight		Approx. 45 g (lens not included)	

*1 CV-X300/X400 Series (Transfer speed setting: Standard) and CV-X100/X200 Series

*2 CV-X300/X400 Series (Transfer speed setting: Fast)

Cameras (CA-HX048C/HX048M)

		CA-HX048C	CA-HX048M
Image receiving element		1/3-inch Color CMOS image receiving element Square-lattice all-pixel 11x/16x speed reading	1/3-inch Monochrome CMOS image receiving element Square-lattice all-pixel 11x/16x speed reading
Unit cell size		4.8 μm \times 4.8 μm	
Number of effective pixels		In 470-k pixel mode 784(H) \times 596(V) In 310-k pixel mode 640(H) \times 480(V) In 240-k pixel mode 512(H) \times 480(V)	
Scanning system		Progressive In 470-k pixel mode <ul style="list-style-type: none"> At 11x transfer speed: 5.3 ms^{*1} At 16x transfer speed: 2.9 ms^{*2} In 310-k pixel mode <ul style="list-style-type: none"> At 11x transfer speed: 3.6 ms^{*1} At 16x transfer speed: 2.0 ms^{*2} In 240-k pixel mode: <ul style="list-style-type: none"> At 11x transfer speed: 2.9 ms^{*1} At 16x transfer speed: 1.7 ms^{*2} 	Progressive In 470-k pixel mode <ul style="list-style-type: none"> At 11x transfer speed: 5.2 ms^{*1} At 16x transfer speed: 2.9 ms^{*2} In 310-k pixel mode <ul style="list-style-type: none"> At 11x transfer speed: 3.5 ms^{*1} At 16x transfer speed: 2.0 ms^{*2} In 240-k pixel mode: <ul style="list-style-type: none"> At 11x transfer speed: 2.8 ms^{*1} At 16x transfer speed: 1.7 ms^{*2}
Pixel transfer frequency		130MHz ^{*1} /195MHz ^{*2}	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 Can specify from 0.022 to 1000 ms through numerical value input	
Lens mount		C-mount	
Environmental resistance	Ambient operating temperature	0 to +40°C	
	Ambient operating humidity	35 to 85% RH (no condensation)	
Weight		Approx. 190 g (lens not included)	

*1 CV-X100 Series, or CV-X200 Series with CA-EC80 installed

*2 CV-X300/X400 Series, or CV-X200 Series with CA-EC80HX/EC80L installed

Cameras (CA-HX200C/HX200M)

		CA-HX200C	CA-HX200M
Image receiving element		2/3-inch Color CMOS image receiving element Square-lattice all-pixel 11x/16x speed reading	2/3-inch Monochrome CMOS image receiving element Square-lattice all-pixel 11x/16x speed reading
Unit cell size		5 μm \times 5 μm	
Number of effective pixels		1600(H) \times 1200(V)	
Scanning system		Progressive <ul style="list-style-type: none"> At 11x transfer speed: 20.2 ms^{*1} At 16x transfer speed: 11.6 ms^{*2} 	Progressive <ul style="list-style-type: none"> At 11x transfer speed: 20.1 ms^{*1} At 16x transfer speed: 11.6 ms^{*2}
Pixel transfer frequency		130MHz ^{*1} /195MHz ^{*2}	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000, 1/50000, 1/100000 Can specify from 0.01 to 100 ms through numerical value input	
Lens mount		C-mount	
Environmental resistance	Ambient operating temperature	0 to +40°C	
	Ambient operating humidity	35 to 85% RH (no condensation)	
Weight		Approx. 280 g (lens not included)	

*1 CV-X100 Series, or CV-X200 Series with CA-EC80 installed

*2 CV-X300/X400 Series, or CV-X200 Series with CA-EC80HX/EC80L installed

Cameras (CA-HX500C/HX500M)

		CA-HX500C	CA-HX500M
Image receiving element		1-inch Color CMOS image receiving element Square-lattice all-pixel 11x/16x speed reading	1-inch Monochrome CMOS image receiving element Square-lattice all-pixel 11x/16x speed reading
Unit cell size		5 μm \times 5 μm	
Number of effective pixels		In 5 megapixel mode: 2432(H) \times 2040(V), In 2 megapixel mode: 1600(H) \times 1200(V)	
Scanning system		Progressive In 5-megapixel mode <ul style="list-style-type: none"> At 11x transfer speed: 52.4 ms^{*1} At 16x transfer speed: 29.0 ms^{*2} In 2-megapixel mode <ul style="list-style-type: none"> At 11x transfer speed: 20.2 ms^{*1} At 16x transfer speed: 11.6 ms^{*2} 	Progressive In 5-megapixel mode <ul style="list-style-type: none"> At 11x transfer speed: 50.3 ms^{*1} At 16x transfer speed: 27.6 ms^{*2} In 2-megapixel mode <ul style="list-style-type: none"> At 11x transfer speed: 20.1 ms^{*1} At 16x transfer speed: 11.6 ms^{*2}
Pixel transfer frequency		130MHz ^{*1} /195MHz ^{*2}	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000, 1/50000, 1/100000 Can specify from 0.01 to 100 ms through numerical value input	
Lens mount		C-mount	
Environmental resistance	Ambient operating temperature	0 to +40°C	
	Ambient operating humidity	35 to 85% RH (no condensation)	
Weight		Approx. 280 g (lens not included)	

*1 CV-X100 Series, or CV-X200 Series with CA-EC80 installed

*2 CV-X300/X400 Series, or CV-X200 Series with CA-EC80HX/EC80L installed

Cameras (CV-035C/035M)

		CV-035C	CV-035M
Image receiving element		1/3-inch Color CCD image receiving element, Square-lattice all-pixel 2x speed reading	1/3-inch Monochrome CCD image receiving element, Square-lattice all-pixel 2x speed reading
Unit cell size		7.4 μm x 7.4 μm	
Number of effective pixels		656 (H) x 492 (V) (In standard mode, 240,000 pixels (512 x 480) of the 320,000 pixels, or 310,000 pixels (640 x 480), are used as the process area.)	
Scanning system		Progressive In 0.31 megapixel mode: 16.0 ms In 0.24 megapixel mode: 16.0 ms	Progressive In 0.31 megapixel mode: 16.0 ms In 0.24 megapixel mode: 16.0 ms Interlace In 0.31 megapixel mode: 8.8 ms In 0.24 megapixel mode: 8.8 ms Interlace is a binning process which sums the odd lines and even lines.
Pixel transfer frequency		24.5MHz	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 0.05 ms to 9000 ms can be set through manual input	
Lens mount		C-mount	
Environmental resistance	Ambient operating temperature	0 to +50°C	
	Ambient operating humidity	35 to 85% RH (no condensation)	
Weight		Approx. 100 g (lens not included)	

Cameras (CV-200C/200M)

		CV-200C	CV-200M
Image receiving element		1/1.8-inch Color CCD image receiving element, Square-lattice all-pixel reading	1/1.8-inch Monochrome CCD image receiving element, Square-lattice all-pixel reading
Unit cell size		4.4 μm x 4.4 μm	
Number of effective pixels		1600 (H) x 1200 (V) (In the 1 megapixel mode, 980,000 pixels (1024 x 960) of the 1,920,000 pixels are the process area.)	
Scanning system		Progressive In 2 megapixel mode: 58.5 ms In 1 megapixel mode: 47.6 ms	Progressive In 2 megapixel mode: 58.5 ms In 1 megapixel mode: 47.6 ms Interlace In 2 megapixel mode: 32.7 ms In 1 megapixel mode: 27.0 ms Interlace is a binning process which sums the odd lines and even lines.
Pixel transfer frequency		40MHz	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 0.05 ms to 9000 ms can be set through manual input	
Lens mount		C-mount	
Environmental resistance	Ambient operating temperature	0 to +40°C	
	Ambient operating humidity	35 to 85% RH (no condensation)	
Weight		Approx. 110 g (lens not included)	

Cameras (CV-H035C/H035M)

		CV-H035C	CV-H035M
Image receiving element		1/3-inch Color CCD image receiving element Square-lattice all-pixel 7x speed reading (2 outputs)	1/3-inch Monochrome CCD image receiving element Square-lattice all-pixel 7x speed reading (2 outputs)
Unit cell size		7.4 μm x 7.4 μm	
Number of effective pixels		640 (H) x 480 (V) (In standard mode, 240,000 pixels (512 x 480) of the 310,000 pixels, or else all 310,000 pixels (640 x 480), are used as the process area.)	
Scanning system		Progressive In 0.31 megapixel mode: 4.7 ms In 0.24 megapixel mode: 4.7 ms	Progressive In 0.31 megapixel mode: 4.7 ms In 0.24 megapixel mode: 4.7 ms Interlace In 0.31 megapixel mode: 2.6 ms In 0.24 megapixel mode: 2.6 ms Interlace is a binning process which sums the odd lines and even lines.
Pixel transfer frequency		80 MHz (40 MHz x 2 ch)	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 0.05 ms to 9000 ms can be set through manual input	
Lens mount		C-mount	
Environmental resistance	Ambient operating temperature	0 to +40°C	
	Ambient operating humidity	35 to 85% RH (no condensation)	
Weight		Approx. 120 g (lens not included)	

Cameras (CV-H100C/H100M)*

		CV-H100C	CV-H100M
Image receiving element		Color CCD image receiving element Square-lattice all-pixel 7x speed reading (2 outputs)	Monochrome CCD image receiving element Square-lattice all-pixel 7x speed reading (2 outputs)
Unit cell size		7.4 μm x 7.4 μm	
Number of effective pixels		1 megapixel 1000 (H) x 1000 (V)	
Image size		Equivalent to 2/3-inch	
Scanning system		Progressive (20.5 ms)	Progressive (20.5 ms) Interlace (13.9 ms) Interlace is a binning process which sums the odd lines and even lines.
Pixel transfer frequency		80 MHz (40 MHz x 2 ch)	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 0.05 ms to 9000 ms can be set through manual input	
Lens mount		C-mount	
Environmental resistance	Ambient temperature	0 to +40°C	
	Relative humidity	35 to 85% RH (no condensation)	
Weight		Approx. 120 g (lens not included)	

* These cannot be used with the CV-X300/X400 Series.

Cameras (CV-H200C/H200M)

		CV-H200C	CV-H200M
Image receiving element		1/1.8-inch Color CCD image receiving element Square-lattice all-pixel 7x speed reading	1/1.8-inch Monochrome CCD image receiving element Square-lattice all-pixel 7x speed reading
Unit cell size		4.4 μm x 4.4 μm	
Number of effective pixels		1600 (H) x 1200 (V) (In the 1 megapixel mode, 980,000 pixels (1024 x 960) of the 1,920,000 pixels are the process area.)	
Scanning system		Progressive In 2 megapixel mode: 29.2 ms In 1 megapixel mode: 24.2 ms	Progressive In 2 megapixel mode: 29.2 ms In 1 megapixel mode: 24.2 ms Interlace In 2 megapixel mode: 16.1 ms In 1 megapixel mode: 13.6 ms Interlace is a binning process which sums the odd lines and even lines.
Pixel transfer frequency		82 MHz (41 MHz x 2 ch)	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 0.05 ms to 9000 ms can be set through manual input	
Lens mount		C-mount	
Environmental resistance	Ambient operating temperature	0 to +40°C	
	Ambient operating humidity	35 to 85% RH (no condensation)	
Weight		Approx. 130 g (lens not included)	

Cameras (CV-H500C/H500M)

		CV-H500C	CV-H500M
Image receiving element		2/3-inch Color CCD image receiving element Square-lattice all-pixel 11x speed reading (2 outputs)	2/3-inch Monochrome CCD image receiving element Square-lattice all-pixel 11x speed reading (2 outputs)
Unit cell size		3.45 μm x 3.45 μm	
Number of effective pixels		2432 (H) x 2050 (V)	
Scanning system		Progressive (61.2 ms)	Progressive (61.2 ms) Interlace (40.3 ms) Interlace is a binning process which sums the odd lines and even lines.
Pixel transfer frequency		130 MHz (65 MHz x 2 ch)	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 0.05 ms to 9000 ms can be set through manual input	
Lens mount		C-mount	
Environmental resistance	Ambient operating temperature	0 to +40°C	
	Ambient operating humidity	35 to 85% RH (no condensation)	
Weight		Approx. 130 g (lens not included)	

Cameras (CV-S035C/S035M)

		CV-S035C	CV-S035M
Camera/Amplifier		CV-S035CH/CV-S035CU	CV-S035MH/CV-S035MU
Image receiving element		1/3-inch Color CCD image receiving element, Square-lattice all-pixel 2x speed reading	1/3-inch Monochrome CCD image receiving element, Square-lattice all-pixel 2x speed reading
Unit cell size		7.4 μm x 7.4 μm	
Number of effective pixels		656 (H) x 492 (V) (In standard mode, 240,000 pixels (512 x 480) of the 320,000 pixels, or 310,000 pixels (640 x 480), are used as the process area.)	
Scanning system		Progressive (16.0 ms)	Progressive (16.0 ms) Interlace (8.8 ms) Interlace is a binning process which sums the odd lines and even lines.
Pixel transfer frequency		24.5 MHz	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 0.05 ms to 9000 ms can be set through manual input	
Lens mount		Special mount (M10.5 P0.5 male)	
Environmental resistance	Ambient operating temperature	Head: 0 to +50°C Amplifier: 0 to +40°C	
	Ambient operating humidity	35 to 85% RH (no condensation)	
Weight		Head: approx. 160 g (cable included, lens not included) Amplifier: approx. 70 g	

Cameras (CV-S200C/S200M)

		CV-S200C	CV-S200M
Camera/Amplifier		CV-S200CH/CV-S200CU	CV-S200MH/CV-S200MU
Image receiving element		1/1.8-inch Color CCD image receiving element, Square-lattice all-pixel reading	1/1.8-inch Monochrome CCD image receiving element, Square-lattice all-pixel reading
Unit cell size		4.4 μm x 4.4 μm	
Number of effective pixels		1600 (H) x 1200 (V) (In the 1 megapixel mode, 980,000 pixels (1024 x 960) of the 1,920,000 pixels are the process area.)	
Scanning system		Progressive In 2 megapixel mode: 58.5 ms In 1 megapixel mode: 47.6 ms	Progressive In 2 megapixel mode: 58.5 ms In 1 megapixel mode: 47.6 ms Interlace In 2 megapixel mode: 32.7 ms In 1 megapixel mode: 27.0 ms Interlace is a binning process which sums the odd lines and even lines.
Pixel transfer frequency		40MHz	
Transfer system		Digital serial transfer	
Electronic shutter		1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 0.05 ms to 9000 ms can be set through manual input	
Lens mount		Special mount (M15.5 P0.5 male)	
Environmental resistance	Ambient operating temperature	Head: 0 to +40°C Amplifier: 0 to +40°C (+35°C or less when using partial capture of 50 lines or less)	
	Ambient operating humidity	35 to 85% RH (no condensation)	
Weight		Head: approx. 210 g (cable included, lens not included) Amplifier: approx. 70 g	

Camera Cables (CA-CH** Series)

Reference

For information about cameras that can be connected, see "List of maximum cable lengths by camera" (page 4-5).

Standard type (CA-CH**)

Model	Cable length	Weight
CA-CH3	3 m	290 g
CA-CH5	5 m	440 g
CA-CH10	10 m	880 g

High flex robotic type (CA-CH**R)

Model	Cable length	Weight
CA-CH3R	3 m	250 g
CA-CH5R	5 m	410 g
CA-CH10R	10 m	740 g
CA-CH17R*	17 m	1300 g

* CA-CH17R can only be connected to CA-035C/035M.

L-shaped connector type (CA-CH**L)

Model	Cable length	Weight
CA-CH3L	3 m	270 g
CA-CH5L	5 m	450 g
CA-CH10L	10 m	810 g

High flex robotic extension type (CA-CH3BE)

NOTICE

- CA-CH3BE cannot be used on its own because it is an extension cable. This is used by connecting CA-CH3/CH3R/CH3L/CH3X to the connector on the controller side.
- CA-CH3BE is comparable to a 7m cable, not a 3m cable due to the electric characteristics. Use this within the range of the maximum extension of the camera that is used by converting it by calculation to a 7m cable.

Model	Cable length	Weight
CA-CH3BE	3 m	280 g

Environment resistant type (CA-CH**P)

Model	Cable length	Weight
CA-CH3P	3 m	250 g
CA-CH10P	10 m	750 g

Camera Cables (CA-CN** Series)

Reference

For information about cameras that can be connected, see "List of maximum cable lengths by camera" (page 4-5).

Standard type (CA-CN**)

Model	Cable length	Weight
CA-CN1	1m	100 g
CA-CN3	3m	220 g
CA-CN5	5m	330 g
CA-CN10	10m	660 g
CA-CN17*	17m	1100 g

High flex robotic type (CA-CN**R)

Model	Cable length	Weight
CA-CN3R	3m	240 g
CA-CN5R	5m	310 g
CA-CN10R	10m	720 g
CA-CN17R*	17m	1190 g

L-shaped connector type (CA-CN**L)

Model	Cable length	Weight
CA-CN3L	3 m	220 g
CA-CN5L	5 m	340 g
CA-CN10L	10 m	660 g
CA-CN17L*	17 m	1100 g

* CA-CN17/CN17R/CN17L can only be connected to CV-035C/035M.

Extension Cable (CA-CN7RE)

NOTICE

CA-CN7RE is an extension cable and cannot be used alone.
Connect a CA-CN1/CN3/CN5/CN10/CN3R/CN5R/CN10R/CN3L/CN5L/CN10L/CN3RX/CN10RX/CN3LX/CN10LX to the controller side connector and then use it within the maximum extension range of the camera to be used.

Model	Cable length	Weight
CA-CN7RE	7 m extension	500 g

Extension Cable: High flex robotic type (CA-CN3BE)

NOTICE

- CA-CN3BE cannot be used on its own because it is an extension cable. This is used by connecting a CA-CN1/CN3/CN5/CN10/CN3R/CN5R/CN10R/CN3L/CN5L/CN10L/CN3RX/CN10RX/CN3LX/CN10LX to the connector on the controller side and then using it within the maximum extension range of the camera to be used.
- CA-CN3BE is comparable to a 7m cable, not a 3m cable due to the electric characteristics. Use this within the range of the maximum extension of the camera that is used by converting it by calculation to a 7m cable.

Model	Cable length	Weight
CA-CN3BE	3 m	250 g

Camera Cable Extension Amplifier (CA-CHX10U/CNX10U)

Product name	Camera cable extension amplifier (for CA-CH** Series)		Camera cable extension amplifier (for CA-CN** Series)
Model name	CA-CHX10U		CA-CNX10U
Support cameras	<ul style="list-style-type: none"> CA-035C/035M CA-200C/200M CA-H035C/H035M CA-H048CX/H048MX CA-H200C/H200M CA-H200CX/H200MX CA-H500C/H500M CA-H500CX/H500MX CA-H2100C/H2100M CA-HS035C/HS035M CA-HS200C/HS200M CA-HX048C/HX048M CA-HX200C/HX200M^{*1} CA-HX500C/HX500M^{*1} CV-H035C/H035M CV-H100C/H100M^{*2} CV-H200C/H200M CV-H500C/H500M 		<ul style="list-style-type: none"> CV-035C/035M CV-S035C/S035M CV-200C/200M CV-S200C/S200M
Transfer system	Digital serial transfer		
Environmental resistance	Ambient temperature	0 to +40°C	<ul style="list-style-type: none"> When connected to CV-035C/035M: 0 to +50°C When connected to other cameras: 0 to +40°C
	Relative humidity	35 to 85% RH (no condensation)	
Outside dimensions	112.6 (W) x 26 (D) x 21 (H)		
Weight	Approx. 60 g		

*1 Controllers shipped on or before 14th October, 2014 do not support amplifier connection for the cameras CA-HX200C/HX200M/HX500C/HX500M and the maximum cable length supported is 10 m.

*2 These cannot be used with the CV-X300/X400 Series.

Controller power consumption ratings when using an amplifier

Connecting an amplifier changes the rated power consumption of the controller.

Controller type	Cameras connected	Power consumption with amplifier (Without amplifier)	Controller type	Cameras connected	Power consumption with amplifier (Without amplifier)
CV-X102	2	2.3A (2.1A)	CV-X302	2	2.4A (2.3A)
CV-X152	2	2.6A (2.5A)	CV-X322	2	2.7A (2.5A)
	4	3.5A (3.2A)		4	3.8A (3.4A)
CV-X172	2	2.6A (2.5A)	CV-X352	2	2.8A (2.6A)
	4	3.5A (3.2A)		4	3.8A (3.4A)
CV-X202	2	3.4A (3.1A)	CV-X402	2	2.4A (2.3A)
CV-X252	2	3.6A (3.3A)	CV-X422	2	2.7A (2.5A)
	4	4.6A (4.0A)		4	3.8A (3.4A)
CV-X272	2	3.6A (3.3A)	CV-X452	2	2.8A (2.6A)
	4	4.6A (4.0A)		4	3.8A (3.4A)
CV-X292	1	3.6A (3.3A)	CV-X472	2	2.8A (2.6A)
	2	4.6A (4.0A)		4	3.8A (3.5A)
			CV-X482	2	3.7A (3.4A)
				4	5.3A (4.8A)

Camera Cable for the Repeater (CA-CH** Series)

Point

If the camera to be connected to the repeater is compatible with the CA-CH** Series cable, connect the camera cable (CA-CH**X) especially made for the repeater to the camera side connector on the repeater unit. No other camera cables can be directly connected to the camera side connector on the repeater.

Standard type (CA-CH**X)

Model	Cable length	Weight
CA-CH3X	3 m	270 g
CA-CH10X	10 m	820 g

High flex robotic type (CA-CH**RX/CA-CH3BEX)

NOTICE

CA-CH3BEX is comparable to a 5m cable, not a 3m cable due to the electric characteristics. Use this within the range of the maximum extension of the camera that is used by converting it by calculation to a 5m cable.

Model	Cable length	Weight
CA-CH3RX	3 m	240 g
CA-CH5RX	5 m	380 g
CA-CH10RX*	10 m	740 g
CA-CH3BEX	3 m	280 g

* This cannot be used for purposes of using a camera attached to a robot.

Camera Cable for the Repeater (CA-CN** Series)

Point

If the camera to be connected to the repeater is compatible with the CA-CN** Series cable, connect the camera cable (CA-CN**X) especially made for the repeater to the camera side connector on the repeater unit. No other camera cables can be directly connected to the camera side connector on the repeater.

Standard type (CA-CN**X)

Model	Cable length	Weight
CA-CN3X	3 m	200 g
CA-CN10X	10 m	600 g
CA-CN17X	17 m	990 g

L-shaped connector type (CA-CN**LX)

Model	Cable length	Weight
CA-CN3LX	3 m	210 g
CA-CN10LX	10 m	610 g
CA-CN17LX	17 m	1000 g

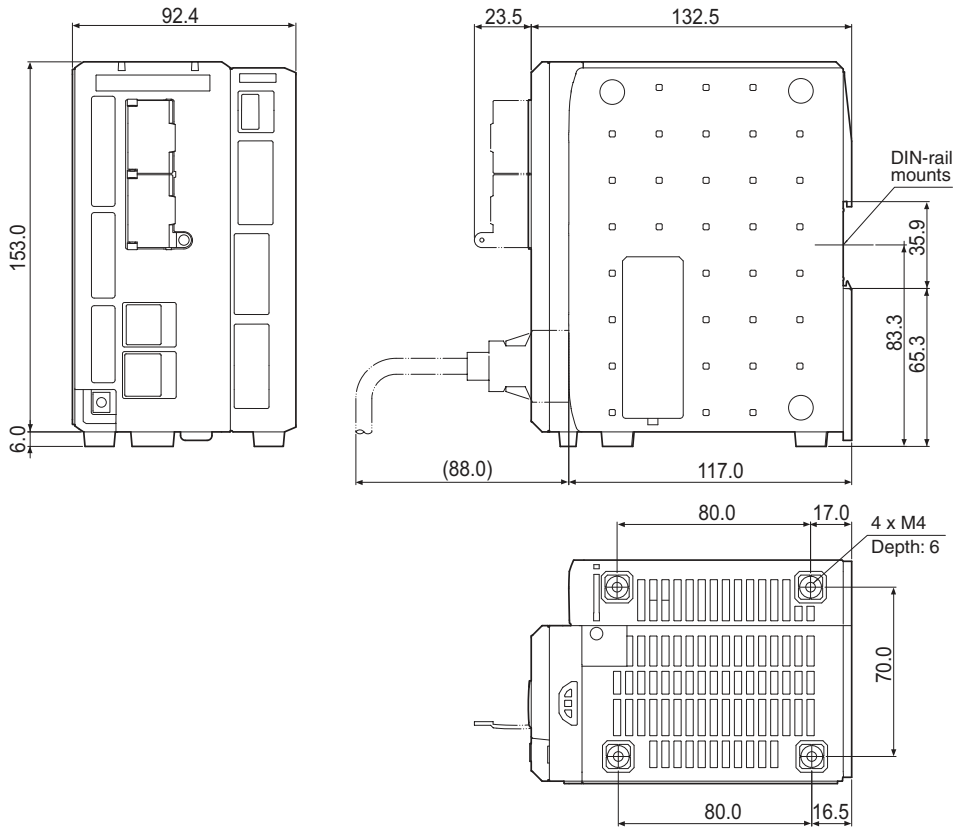
High flex robotic type (CA-CN**RX)

Model	Cable length	Weight
CA-CN3RX	3 m	190 g
CA-CN10RX	10 m	540 g
CA-CN17RX	17 m	900 g

Outside dimensions

Controller Unit (CV-X172/X152/X102)

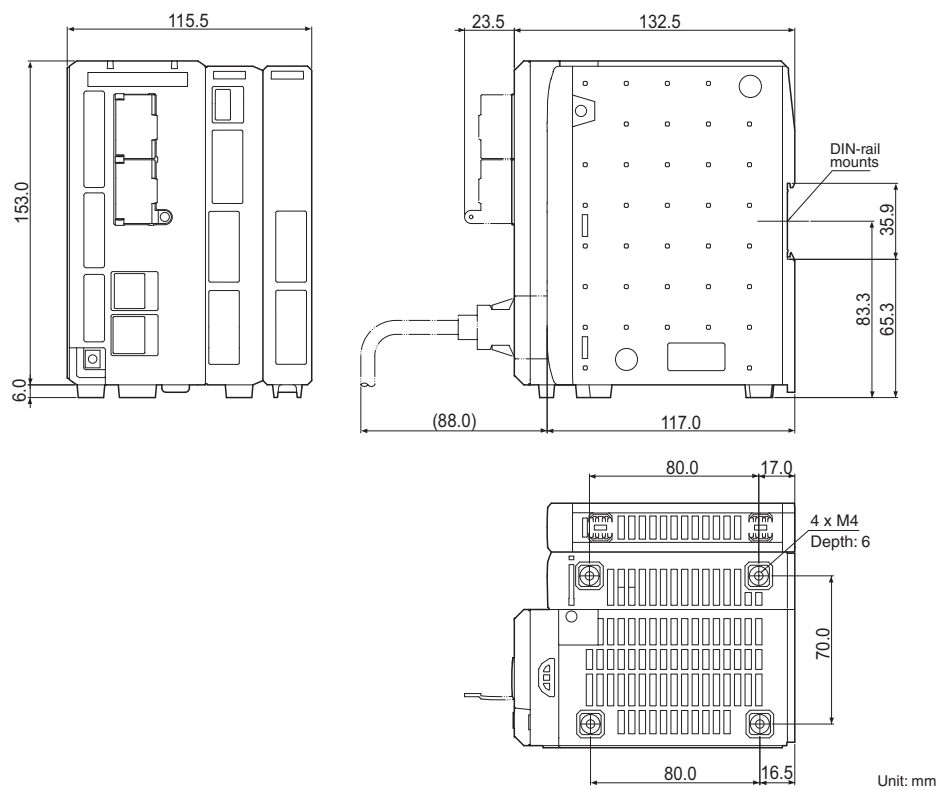
Outside dimensions



Unit: mm

(Total weight: approx. 1250 g)

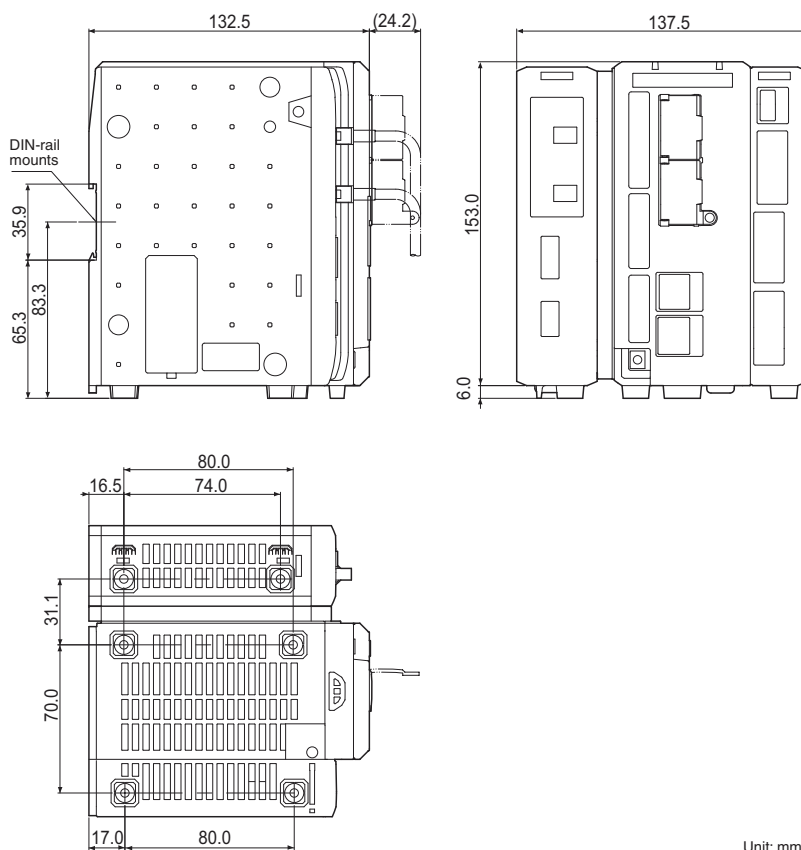
With camera expansion unit CV-E500 installed



Unit: mm

(Total weight: approx. 1490 g)

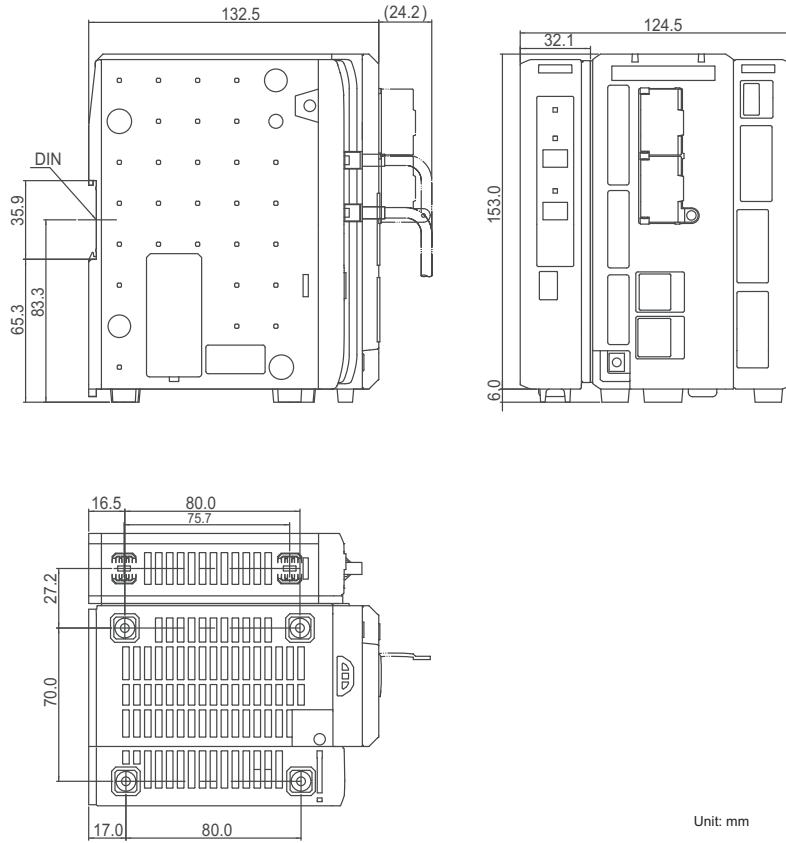
With the illumination expansion unit CA-DC21E installed



Unit: mm

(Total weight: approx. 1830 g)

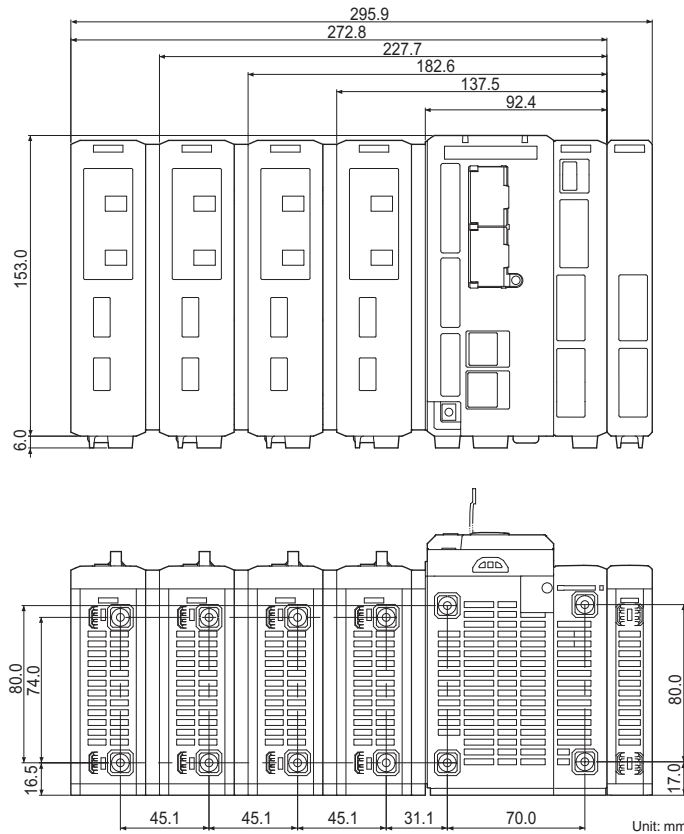
With the illumination expansion unit CA-DC10E installed



Unit: mm

(Total weight: approx. 1550 g)

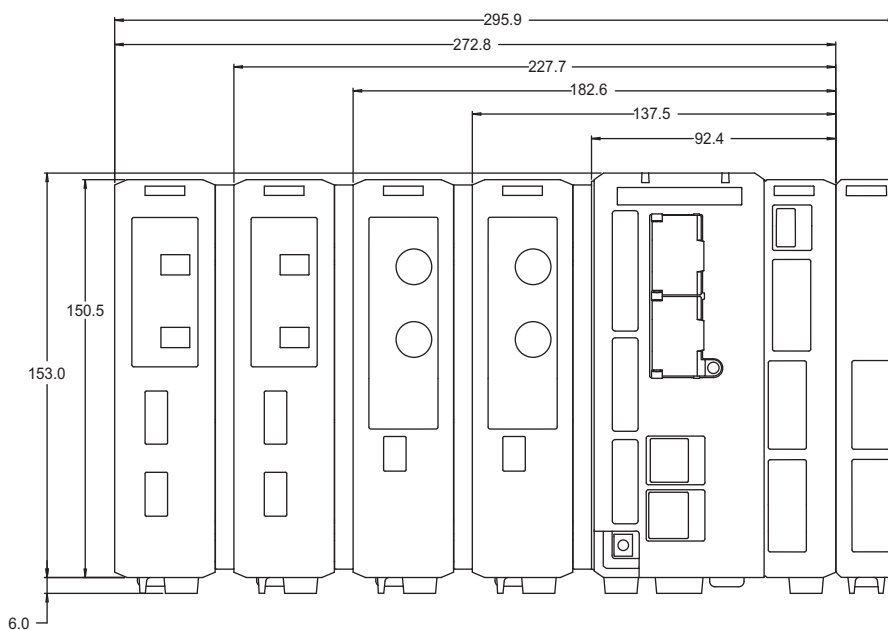
With camera expansion unit CV-E500 and illumination expansion unit CA-DC21E installed



Unit: mm

(Total weight: approx. 3800 g)

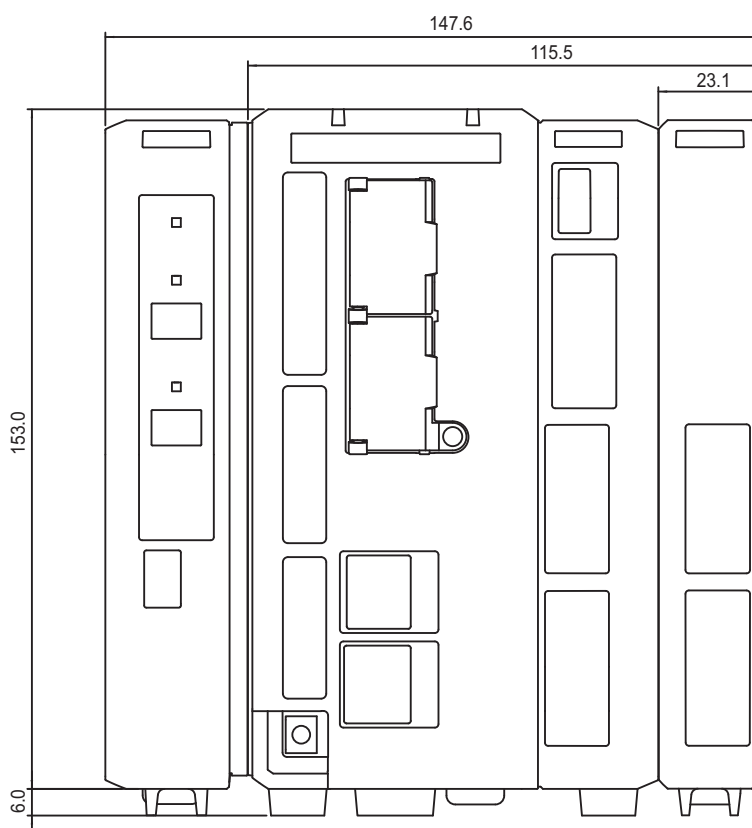
**With camera expansion unit CV-E500/illumination expansion unit CA-DC30E×2/
illumination expansion unit CA-DC21E×2 installed**



Unit: mm
(Total weight: approx. 3530 g)

Outside dimensions

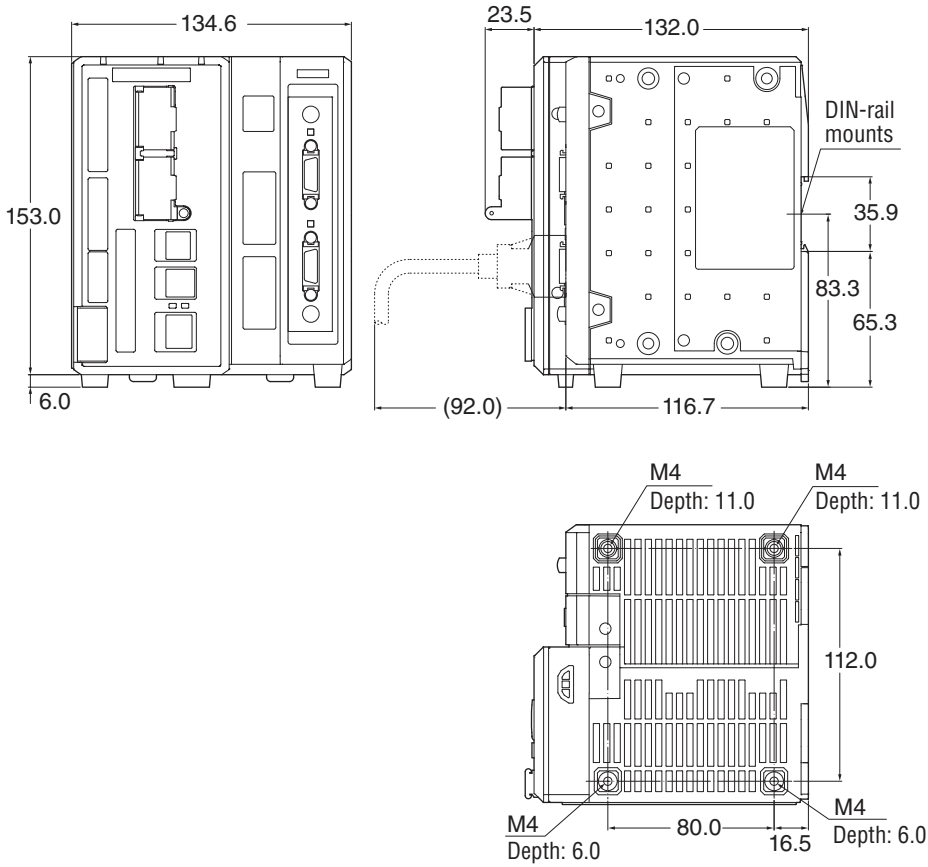
With camera expansion unit CV-E500 and illumination expansion unit CA-DC10E installed



Unit: mm
(Total weight: approx. 1790 g)

Controller unit (CV-X292/X272/X252/X202)

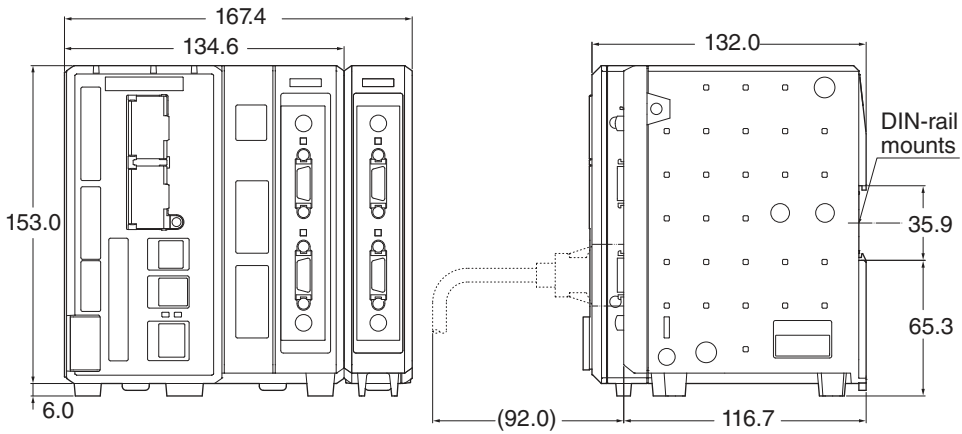
Outside dimensions



Unit: mm

(Total weight: approx. 1600 g)

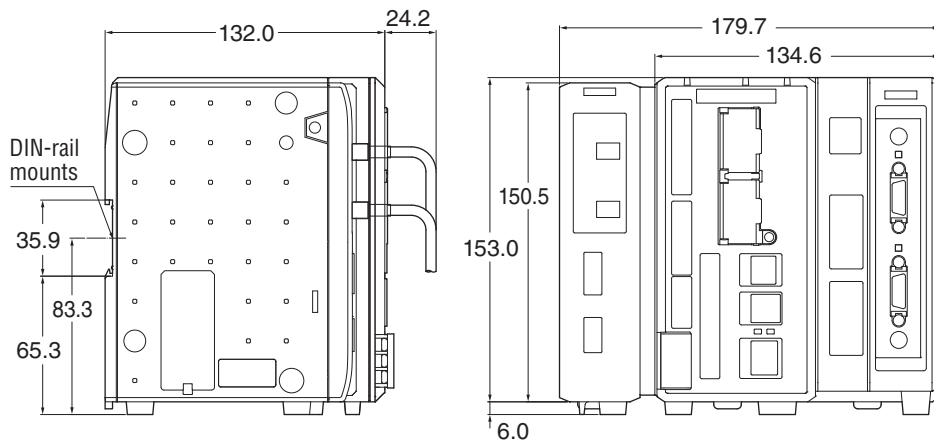
With camera expansion unit CA-E800 (CA-EC80) installed



Unit: mm

(Total weight: approx. 2090 g)

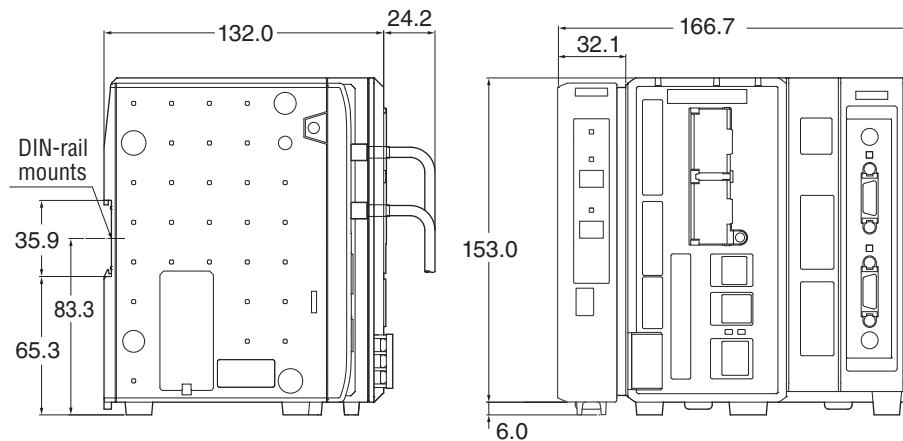
With the illumination expansion unit CA-DC21E installed



Unit: mm

(Total weight: approx. 2190 g)

With the illumination expansion unit CA-DC10E installed

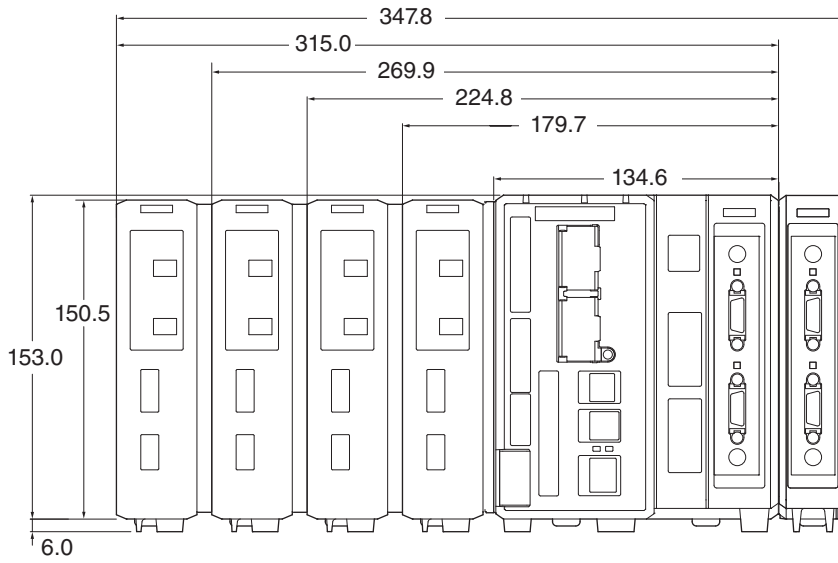


Unit: mm

(Total weight: approx. 1910 g)

With camera expansion unit CA-E800 (CA-EC80) and illumination expansion unit CA-DC21E installed

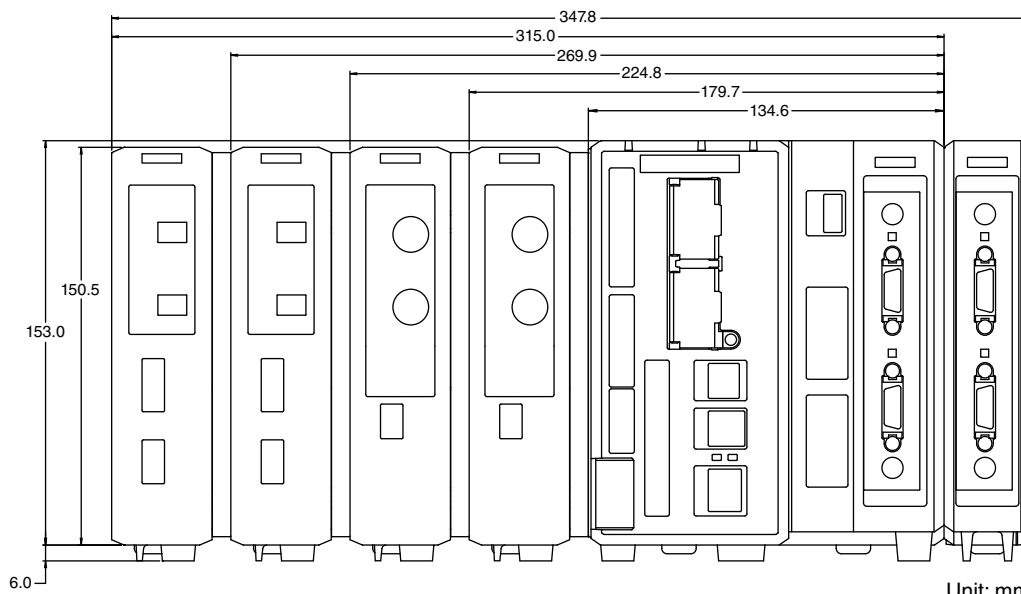
Outside dimensions



Unit: mm

(Total weight: approx. 4190 g)

With camera expansion unit CA-E800 (CA-EC80)/illumination expansion unit CA-DC30E×2/illumination expansion unit CA-DC21E×2 installed

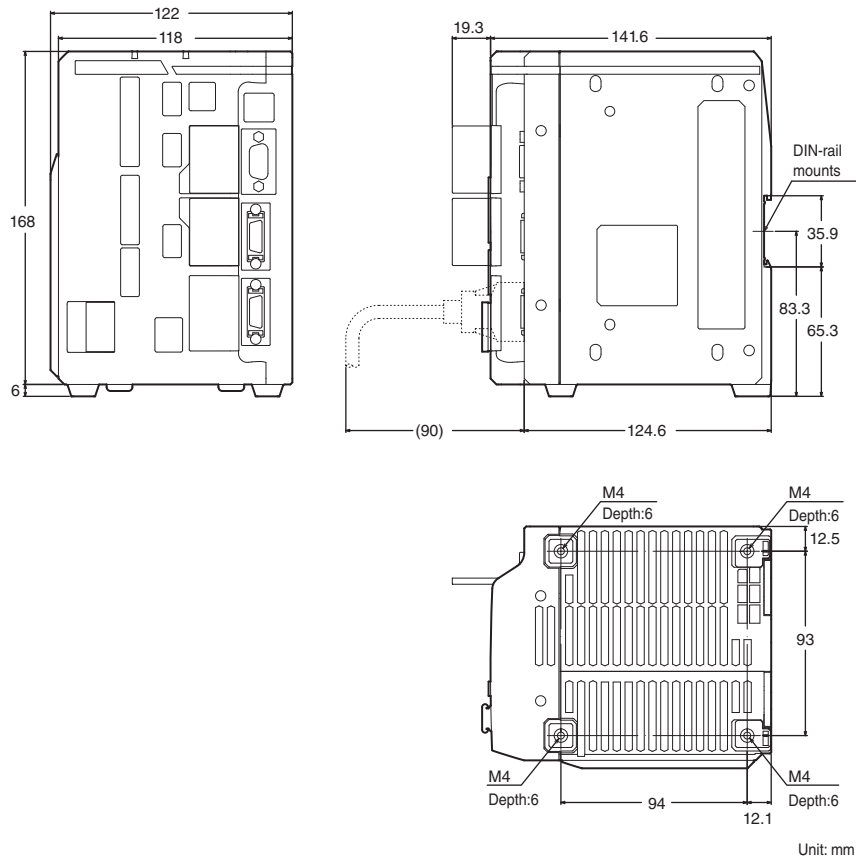


Unit: mm

(Total weight: approx. 4130 g)

Controller Unit (CV-X482/X472/X452/X422/X402/X352/X322/X302)

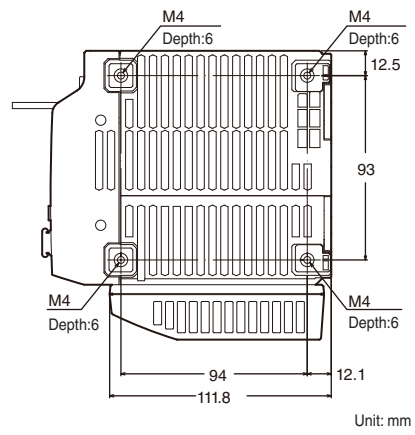
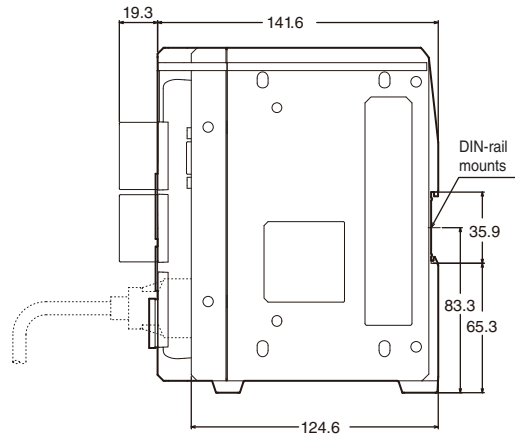
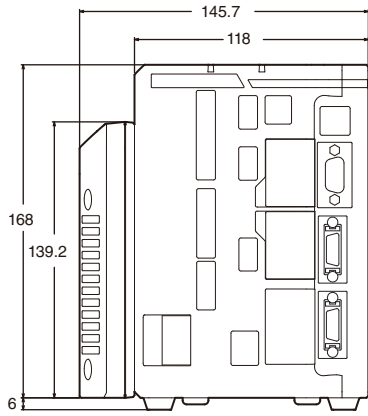
CV-X452/X422/X402/X352/X322/X302



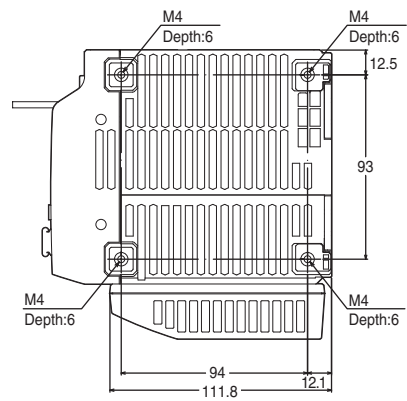
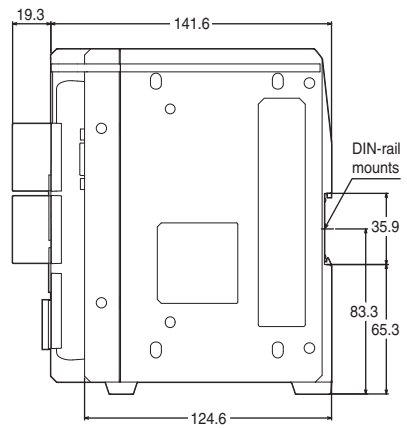
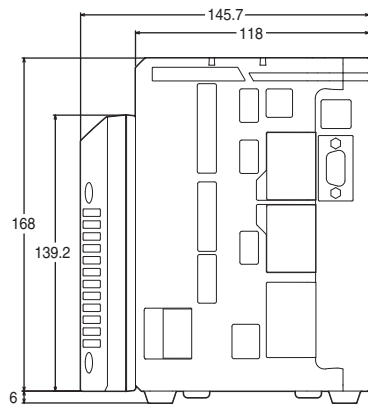
Outside dimensions

CV-X472

Outside dimensions



CX-X482

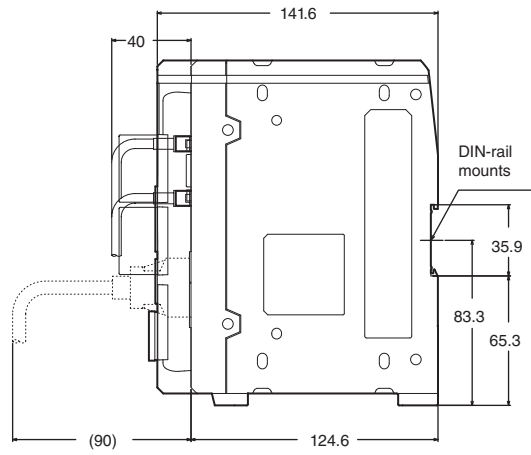
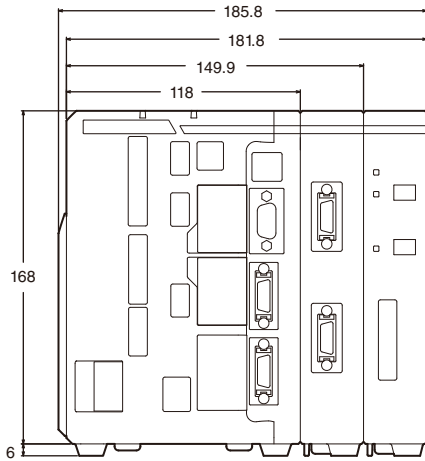


Unit: mm

With camera input unit CA-E100 and illumination expansion unit CA-DC40E installed

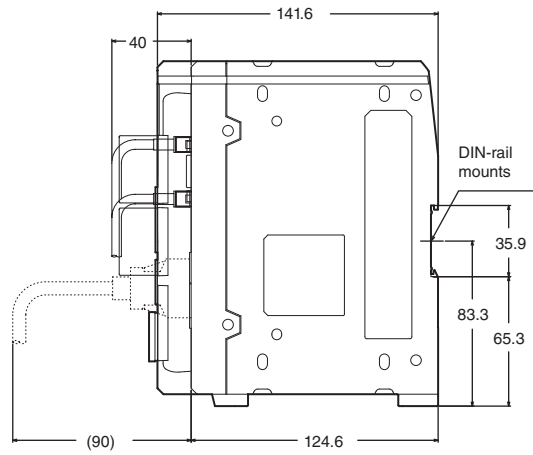
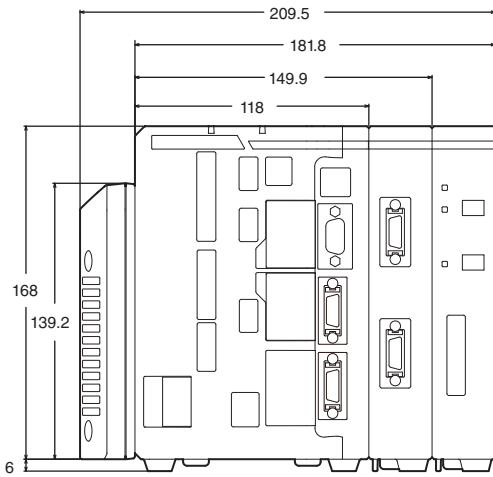
CV-X452/X422/X402/X352/X322/X302 + CA-E100 + CA-DC40E

Outside dimensions



Unit: mm
(Total weight: approx. 2650 g)

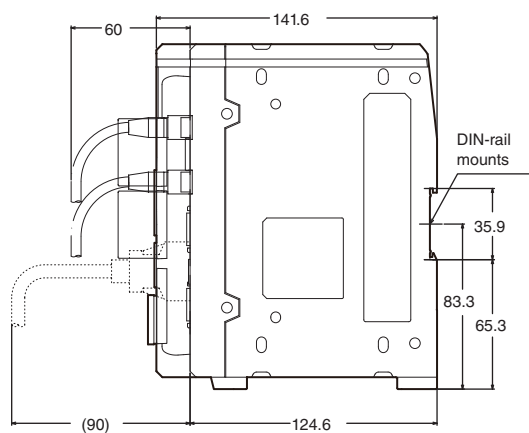
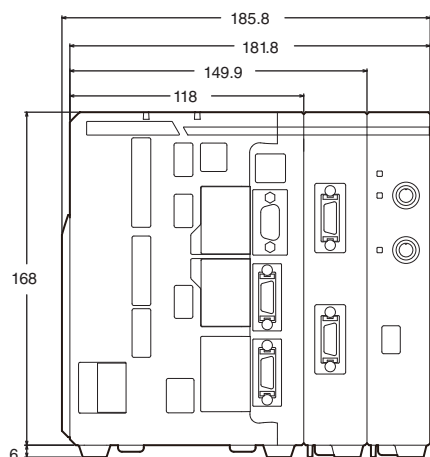
CV-X472 + CA-E100 + CA-DC40E



Unit: mm
(Total weight: approx. 2850 g)

With camera input unit CA-E100 and illumination expansion unit CA-DC50E installed

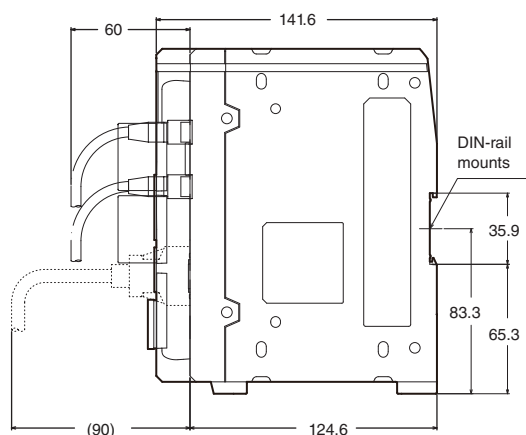
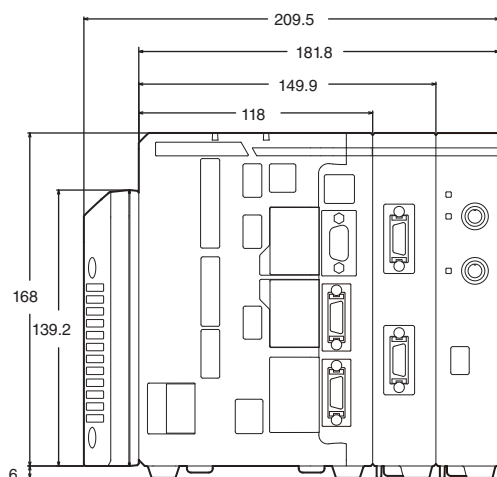
CV-X452/X422/X402/X352/X322/X302 + CA-E100 + CA-DC50E



Unit: mm

(Total weight: approx. 2650 g)

CV-X472+ CA-E100 + CA-DC50E



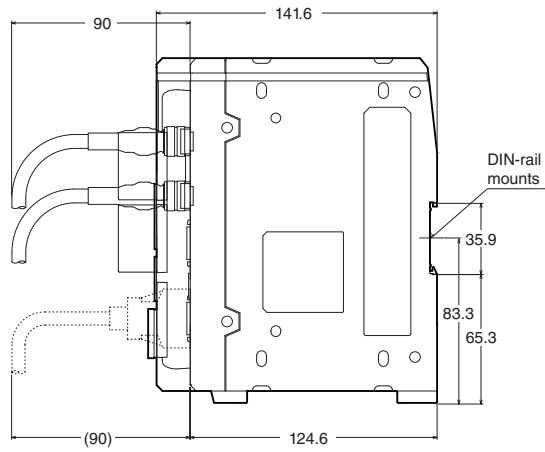
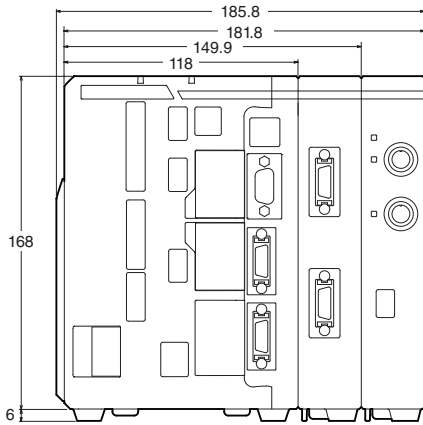
Unit: mm

(Total weight: approx. 2850 g)

With camera input unit CA-E100 and illumination expansion unit CA-DC60E installed

CV-X452/X422/X402 + CA-E100 + CA-DC60E

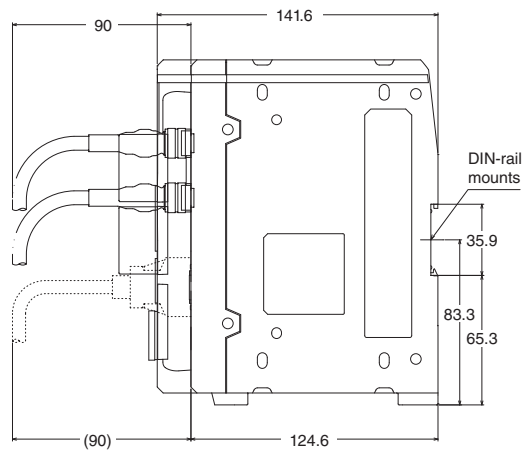
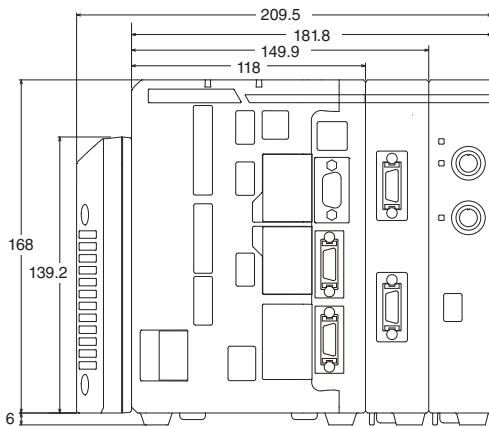
Outside dimensions



Unit: mm

(Total weight: approx. 2650 g)

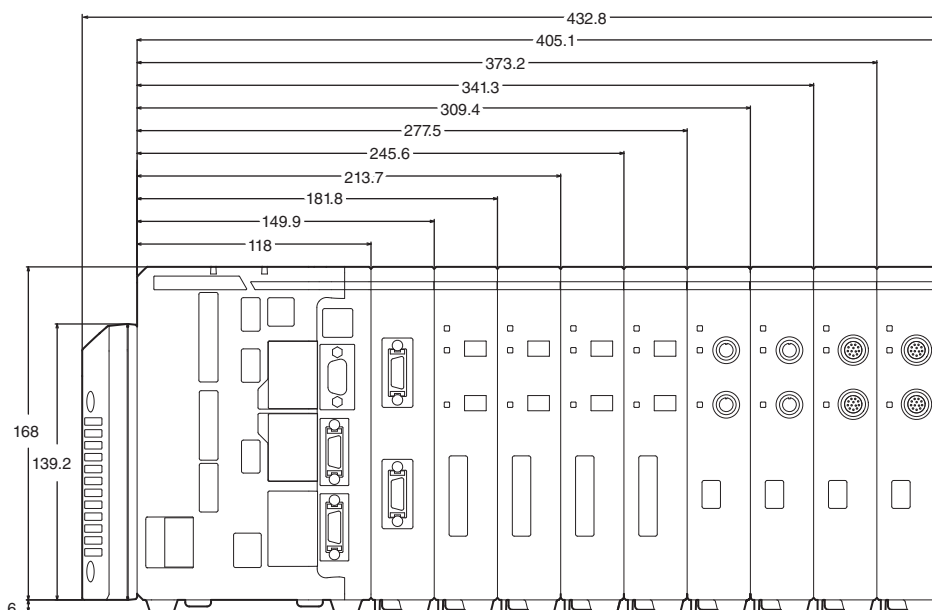
CV-X472+ CA-E100 + CA-DC60E



Unit: mm

(Total weight: approx. 2850 g)

With camera input unit CA-E100/illumination expansion unit CA-DC40E/CA-DC50E/CA-DC60E installed



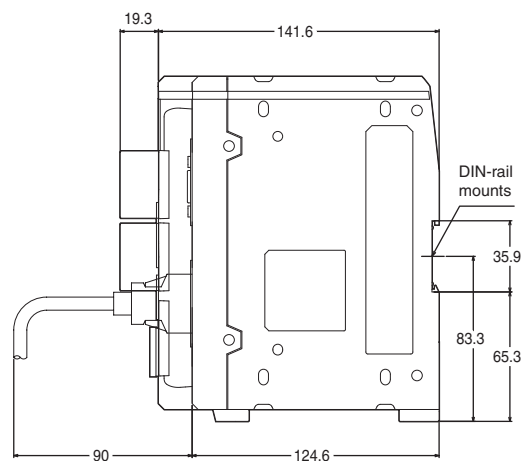
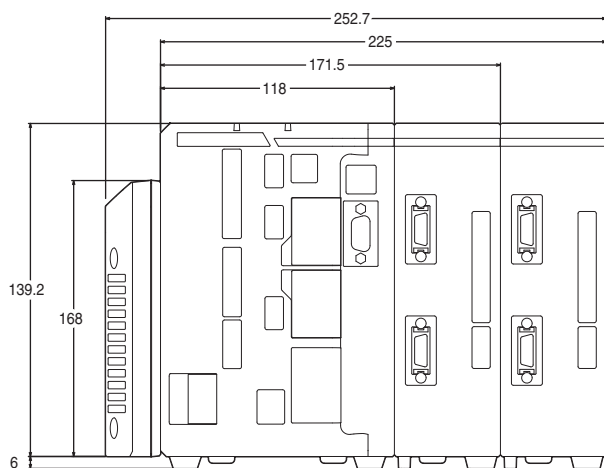
Unit: mm

(Total weight: approx. 6350 g)

Outside dimensions

With LJ-V input unit CA-E100LJ x 2 installed*

CV-X482 + CA-E100LJ x 2



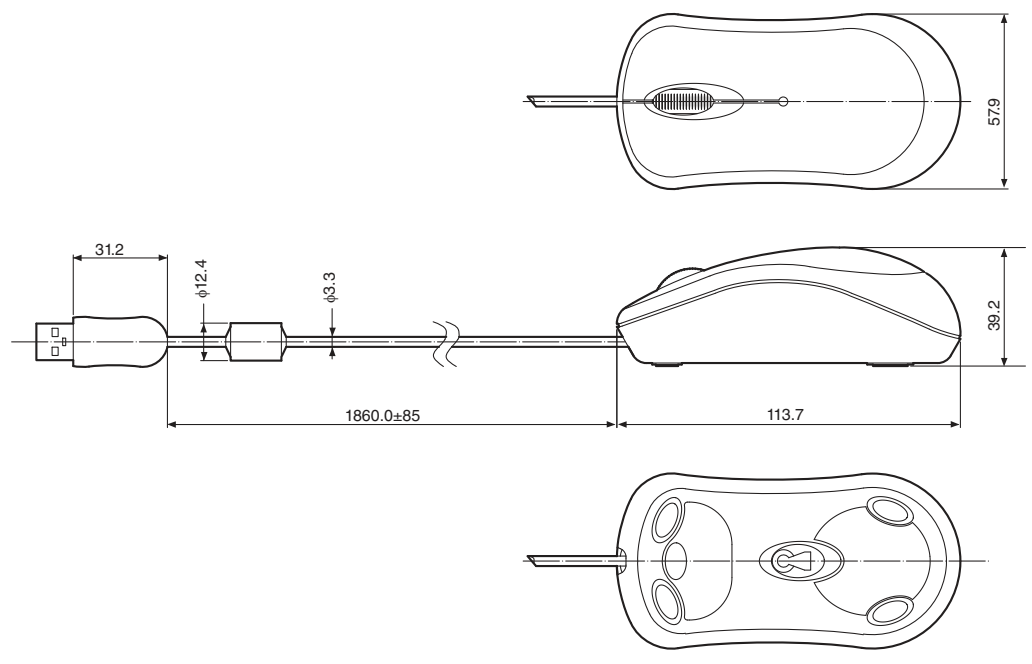
Unit: mm

* Only the CV-X482 supports two LJ-V input unit connection

(Total weight: approx. 3270g)

Dedicated Mouse (OP-87506: Included in the package)

Outside dimensions

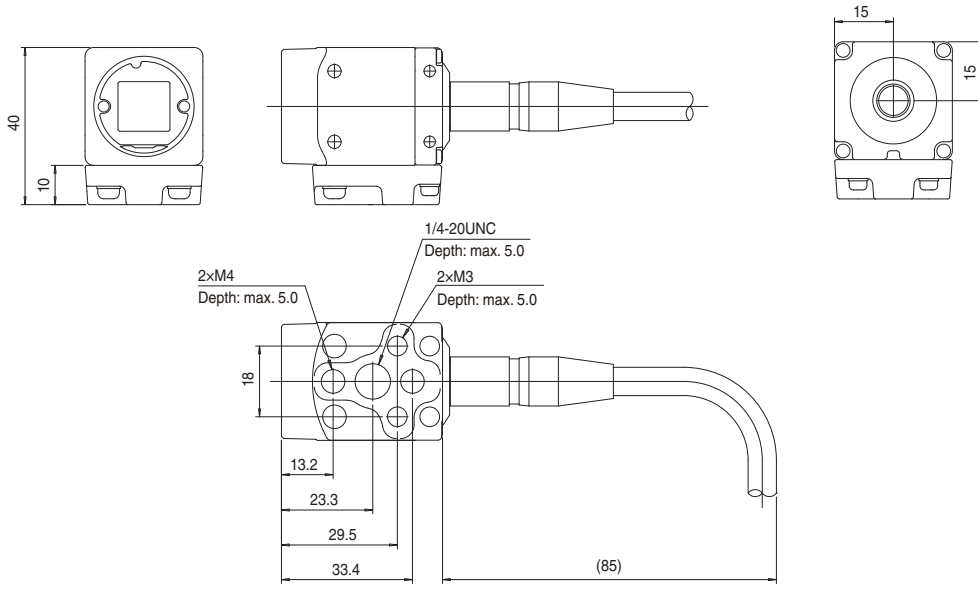


Unit: mm

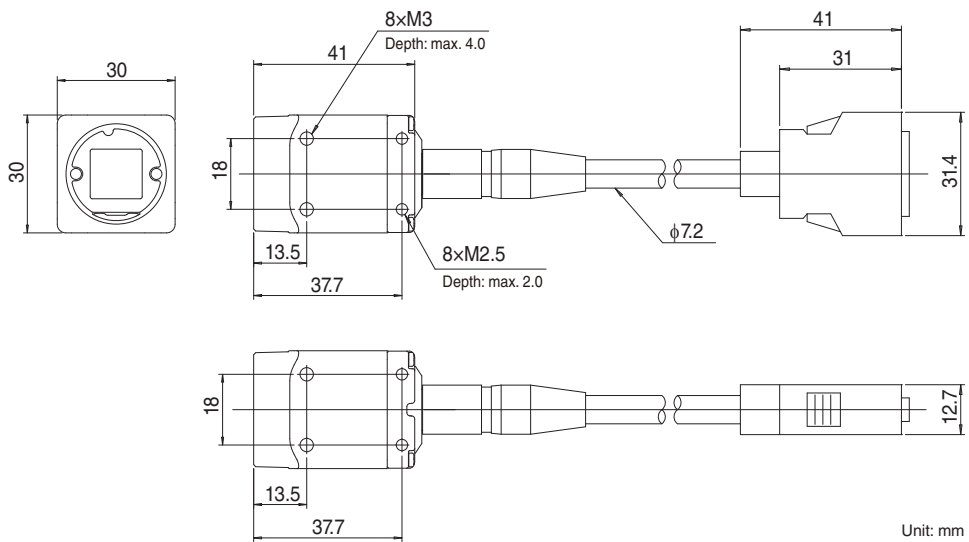
(Weight: approx. 100 g)

Cameras (CA-035C/035M/200C/200M/H035C/H035M/H200C/H200M/H500C/H500M)

With plastic mount attached (factory shipped condition)



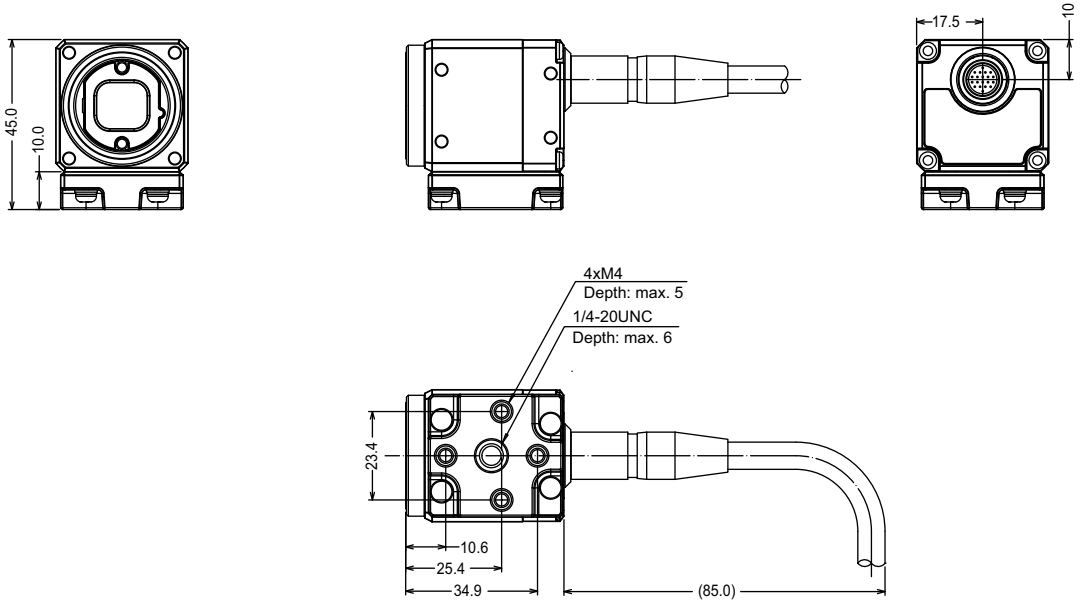
Without plastic mount



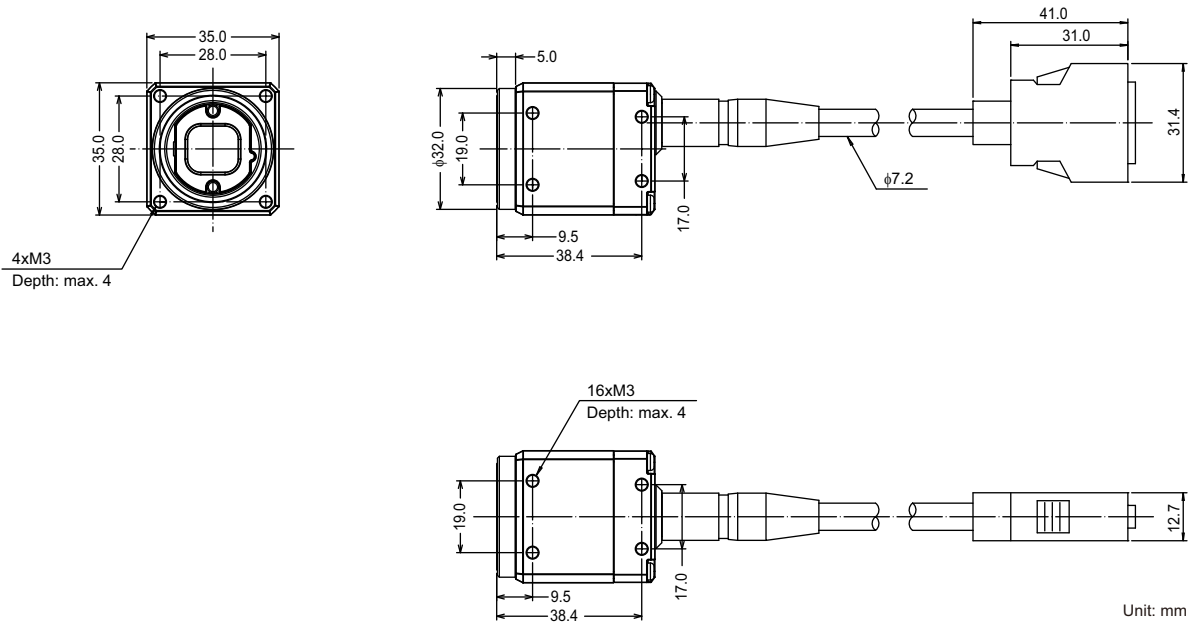
Unit: mm

Cameras (CA-H048CX/H048MX/HX048C/HX048M)

With plastic mount attached (factory shipped condition)

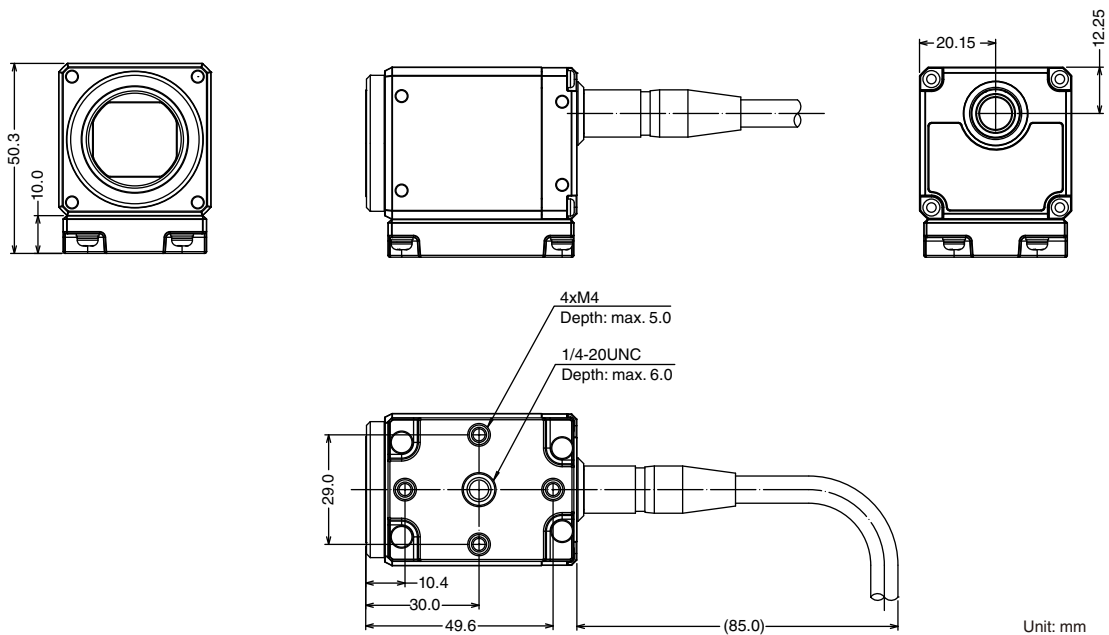


Without plastic mount

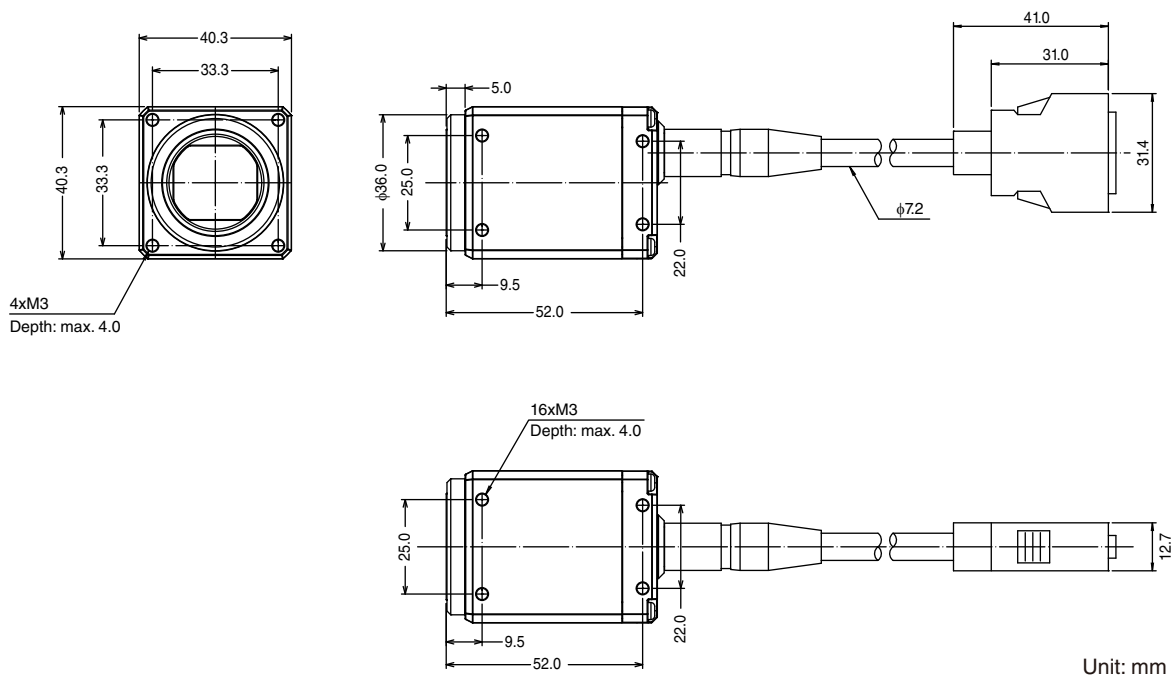


Cameras (CA-H200CX/H200MX/H500CX/H500MX/HX200C/HX200M/HX500C/HX500M)

With plastic mount attached (factory shipped condition)

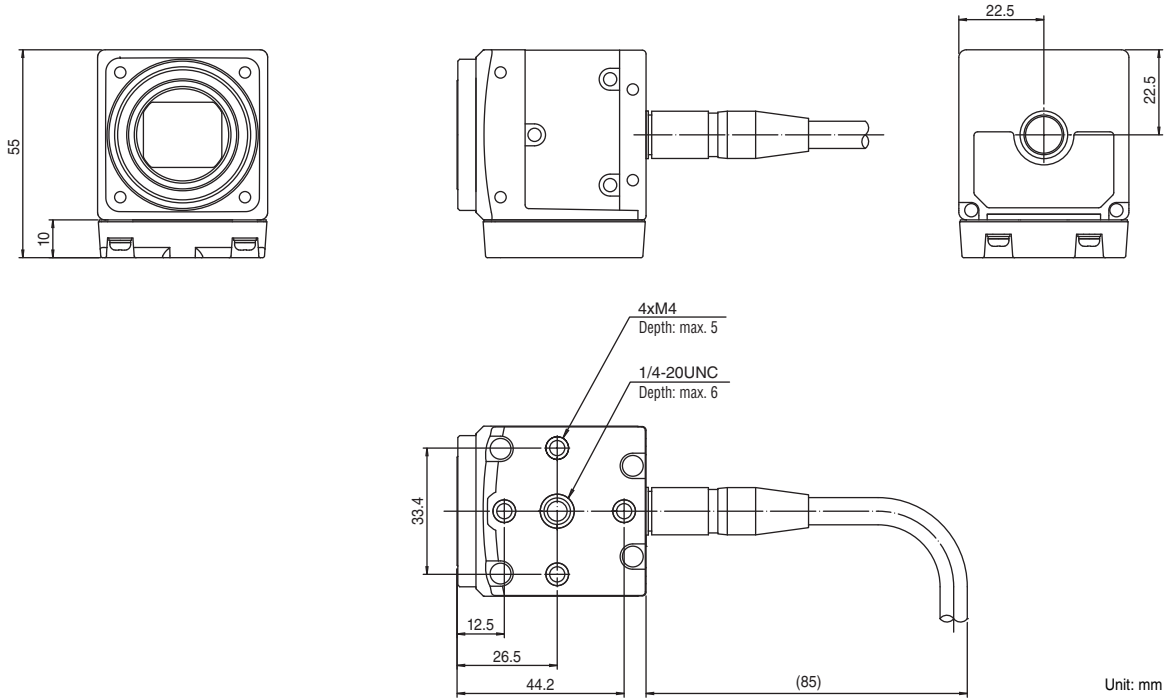


Without plastic mount

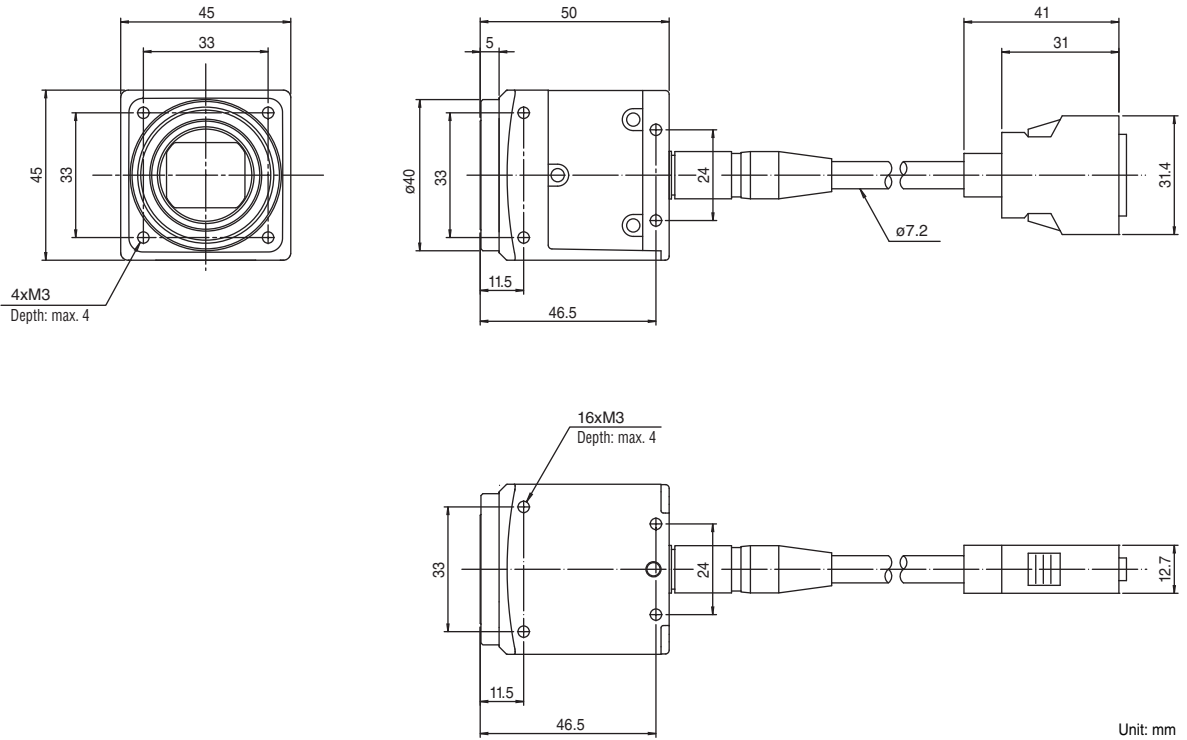


Cameras (CA-H2100C/H2100M)

With plastic mount attached (factory shipped condition)



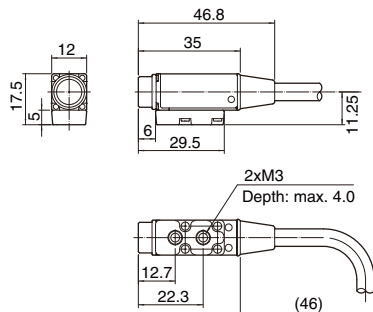
Without plastic mount



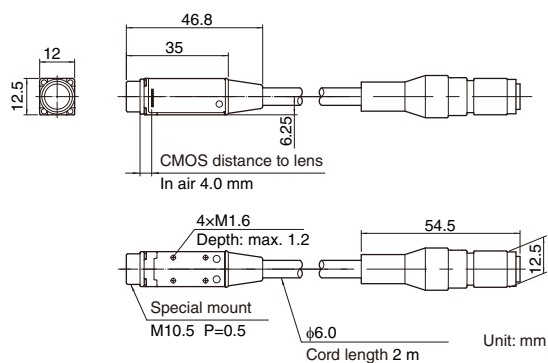
Cameras (CA-HS035C/HS035M)

Head (CA-HS035CH/HS035MH)

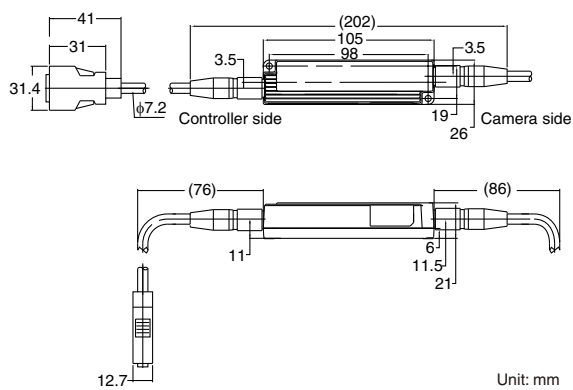
With plastic mount attached (factory shipped condition)



Without plastic mount

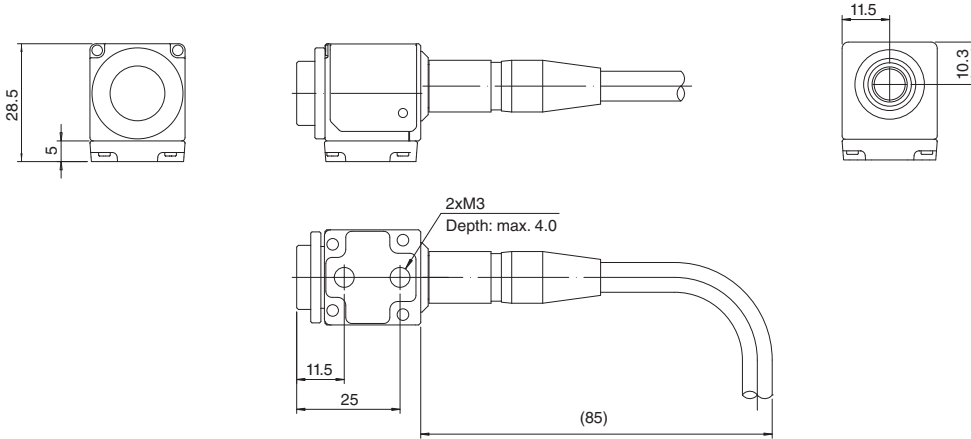


Amplifier (CA-HS035CU/CA-HS035MU)

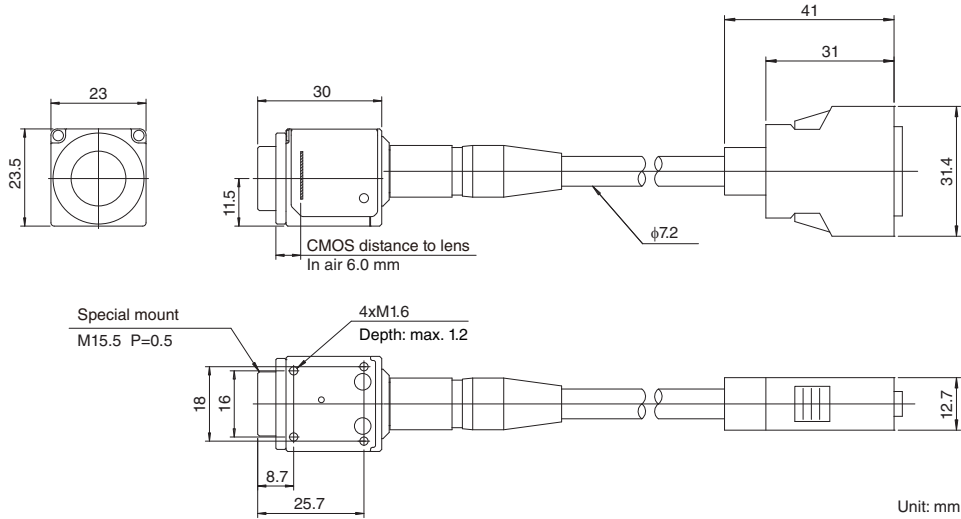


Cameras (CA-HS200C/HS200M)

With plastic mount attached (factory shipped condition)



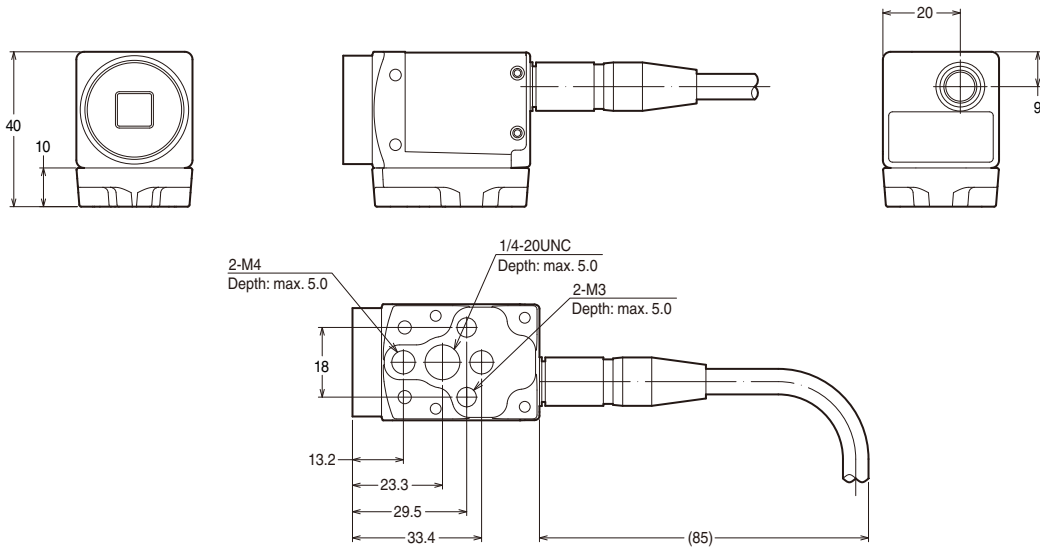
Without plastic mount



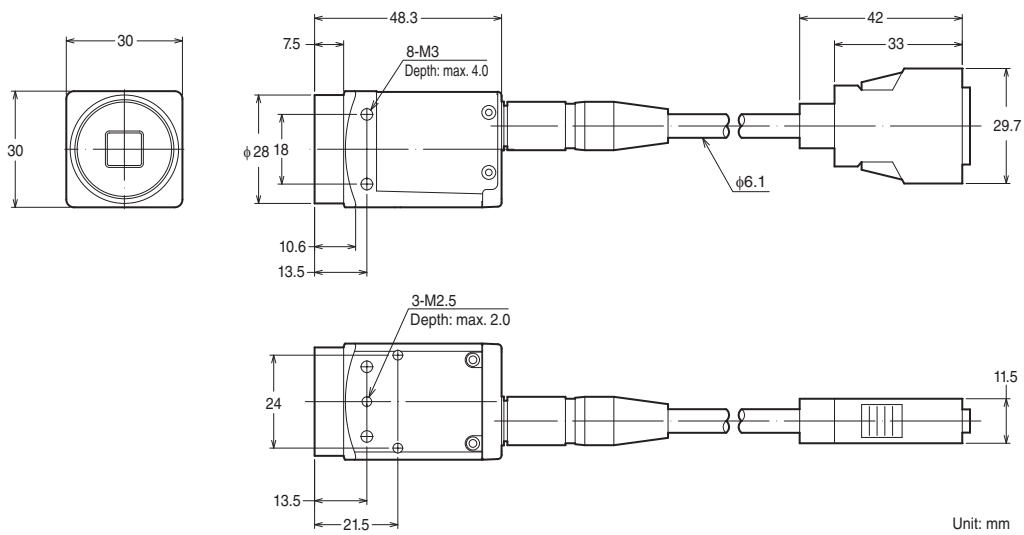
Outside dimensions

Cameras (CV-035C/035M)

With plastic mount attached (factory shipped condition)

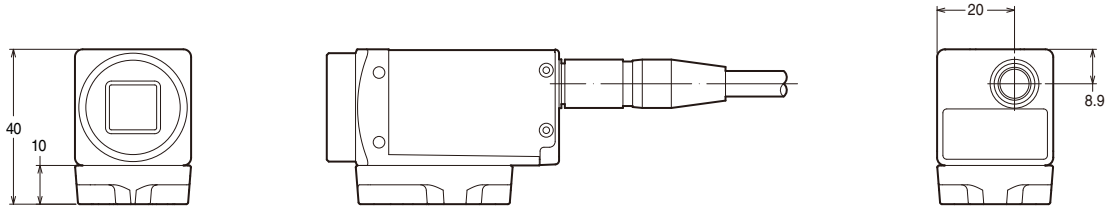


Without plastic mount

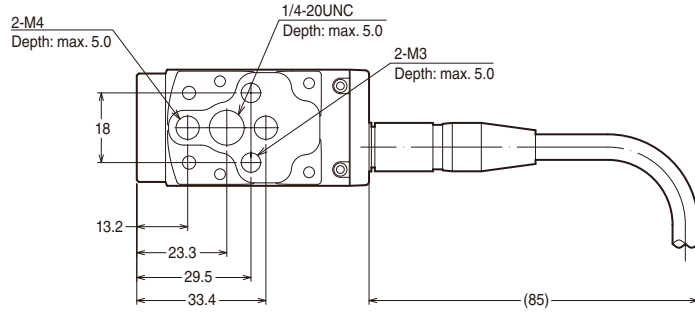


Cameras (CV-200C/200M)

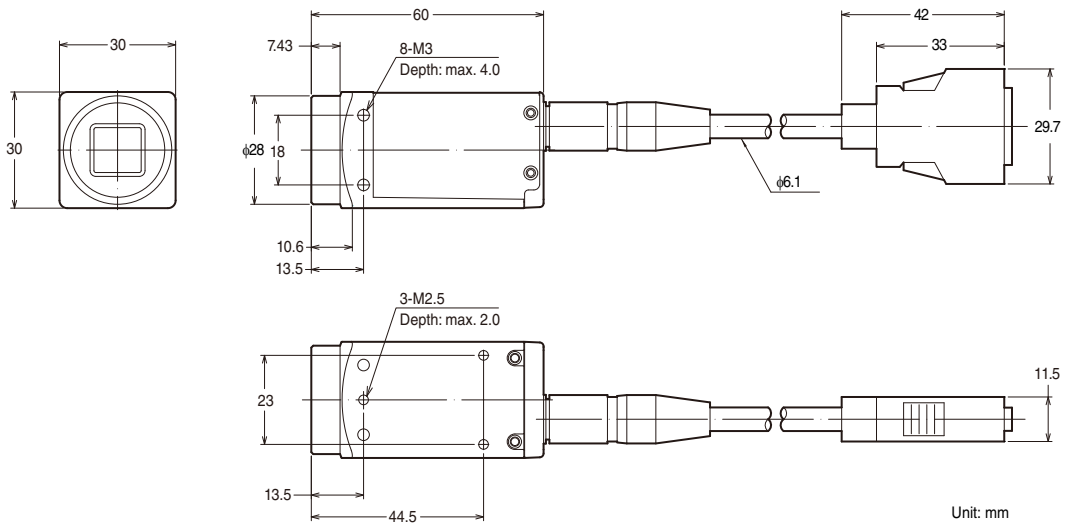
With plastic mount attached (factory shipped condition)



Outside dimensions

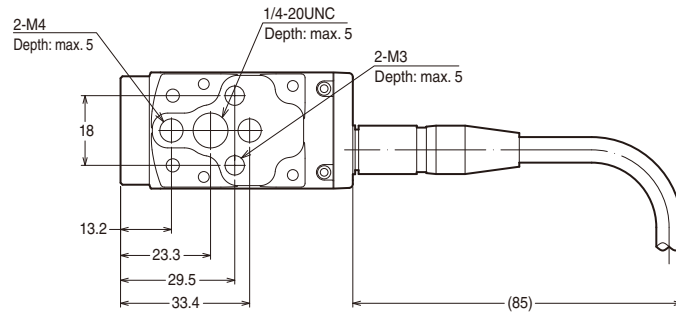
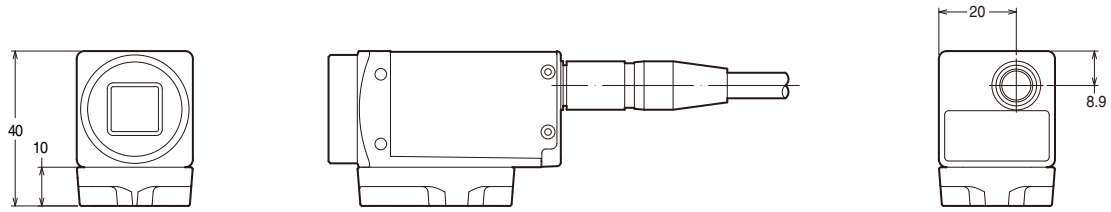


Without plastic mount

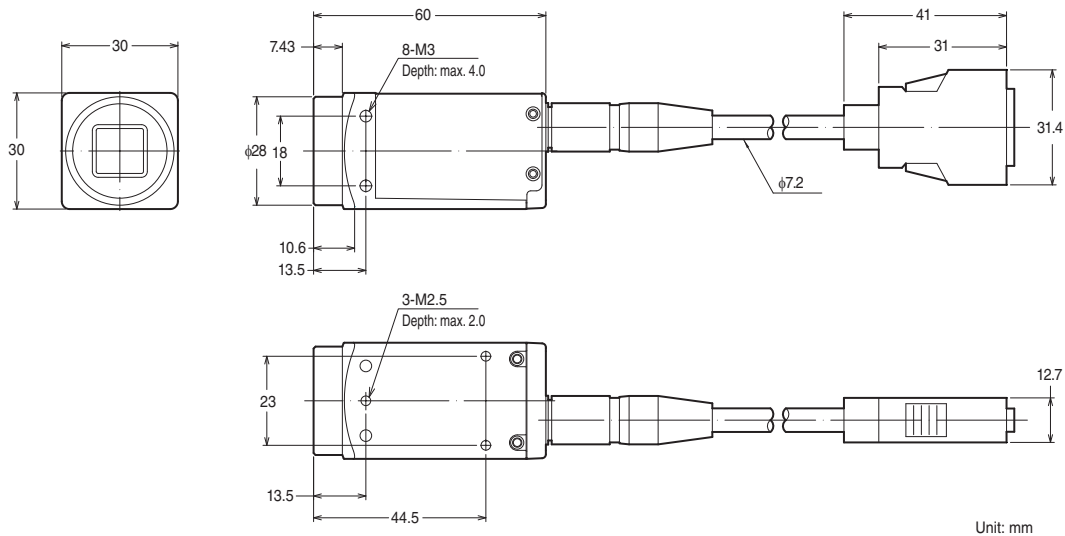


Cameras (CV-H035C/H035M/H100C/H100M/H200C/H200M/H500C/H500M)

With plastic mount attached (factory shipped condition)



Without plastic mount



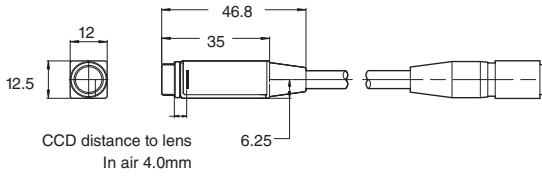
Unit: mm

Outside dimensions

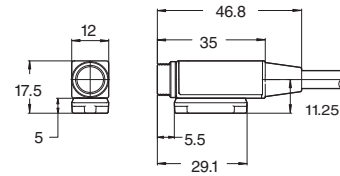
Cameras (CV-S035C/S035M/S200C/S200M)

Outside dimensions

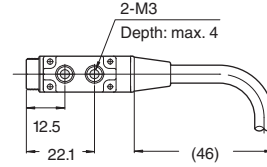
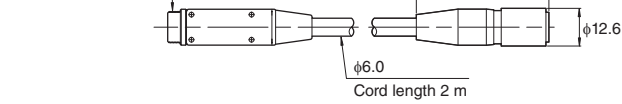
Camera CV-S035CH/CV-S035MH



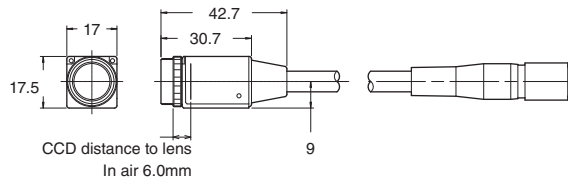
With plastic mount



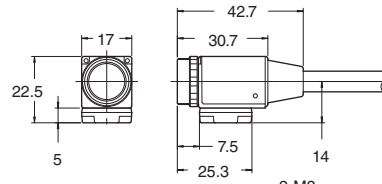
Special mount (M10.5 P0.5)



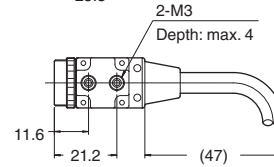
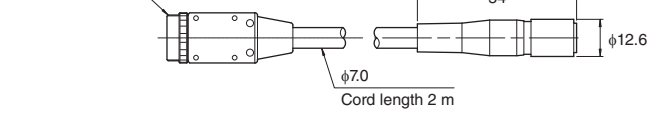
Camera CV-S200CH/CV-S200MH



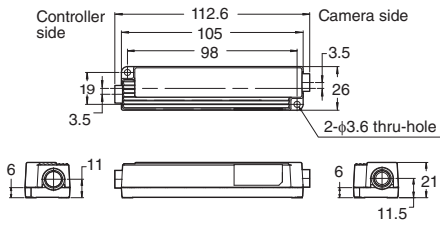
With plastic mount



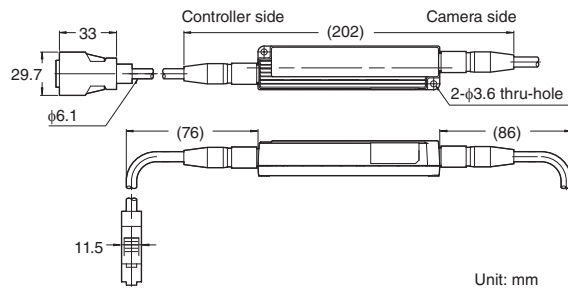
Special mount (M15.5 P0.5)



**Camera control unit
CV-S200CU/S200MU/S035CU/S035MU**



With cable connected

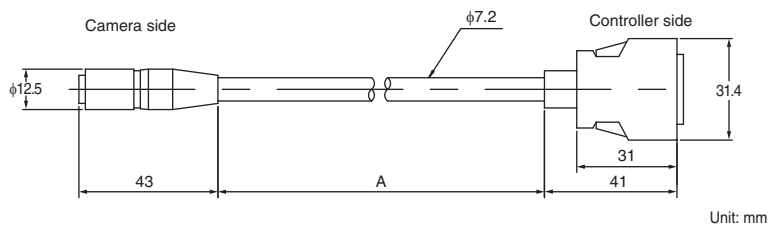


Unit: mm

Camera Cables (CA-CH** Series)

Reference For information about cameras that can be connected, see "List of maximum cable lengths by camera" (page 4-5).

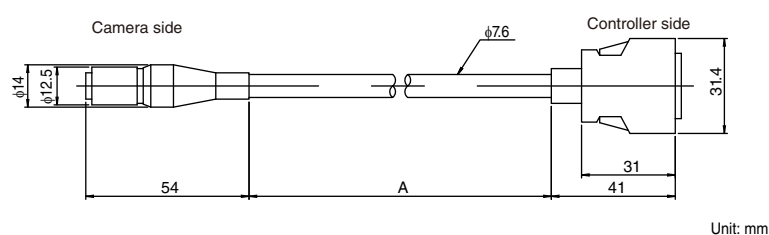
Standard type (CA-CH**)



Model	Cable length (A)
CA-CH3	3 m
CA-CH5	5 m
CA-CH10	10 m

Unit: mm

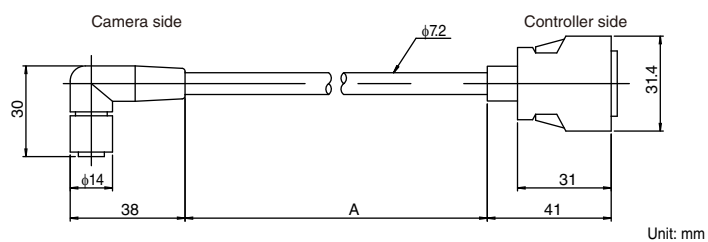
High flex robotic type (CA-CH**R)



Model	Cable length (A)
CA-CH3R	3 m
CA-CH5R	5 m
CA-CH10R	10 m
CA-CH17R	17 m

Unit: mm

L-shaped connector type (CA-CH**L)



Model	Cable length (A)
CA-CH3L	3 m
CA-CH5L	5 m
CA-CH10L	10 m

Unit: mm

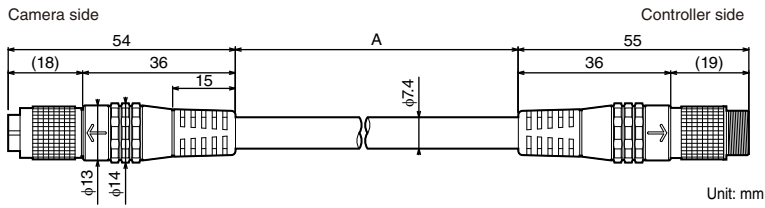
Direction to attach the L-shaped connector

NOTICE

The direction to attach the L-shaped connector is shown in the figure below.
The attachment direction cannot be changed.

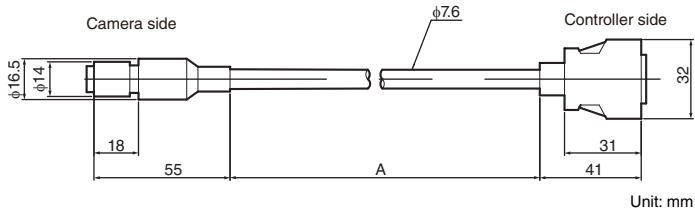
Make sure to extend the cable downwards

High flex robotic extension type (CA-CH3BE)



Model	Cable length (A)
CA-CH3BE	3 m

Environment Resistant type (CA-CH**P)



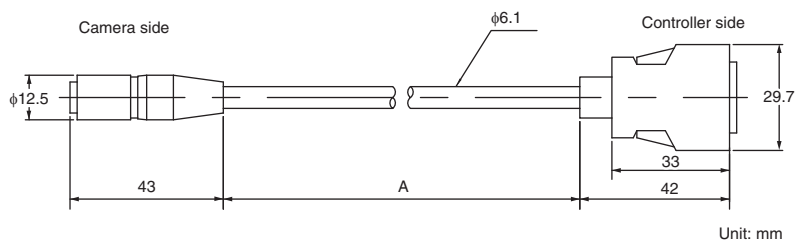
Model	Cable length (A)
CA-CH3P	3m
CA-CH10P	10m

Camera Cables (CA-CN** Series)

Reference

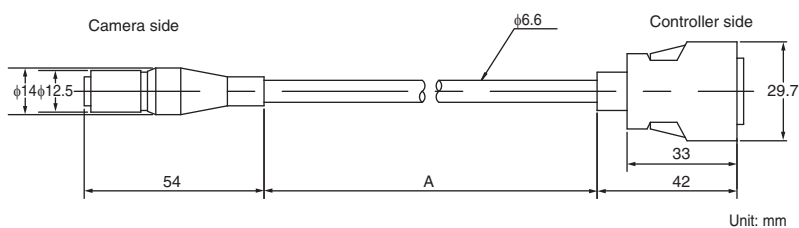
For information about cameras that can be connected, see "List of maximum cable lengths by camera" (page 4-5).

Standard type (CA-CN**)



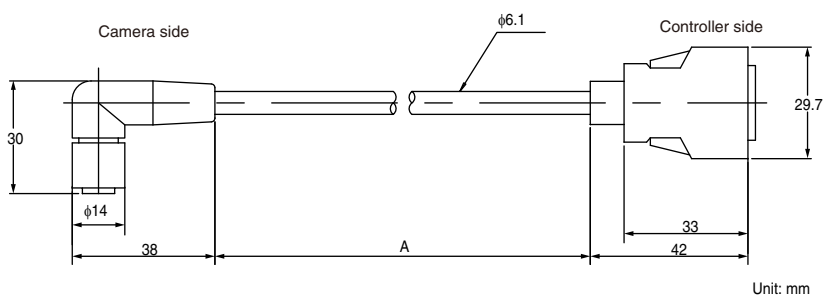
Model	Cable length (A)
CA-CN1	1m
CA-CN3	3m
CA-CN5	5m
CA-CN10	10m
CA-CN17	17m

High flex robotic type (CA-CN**R)



Model	Cable length (A)
CA-CN3R	3m
CA-CN5R	5m
CA-CN10R	10m
CA-CN17R	17m

L-shaped connector type (CA-CN**L)



Model	Cable length (A)
CA-CN3L	3 m
CA-CN5L	5 m
CA-CN10L	10 m
CA-CN17L	17 m

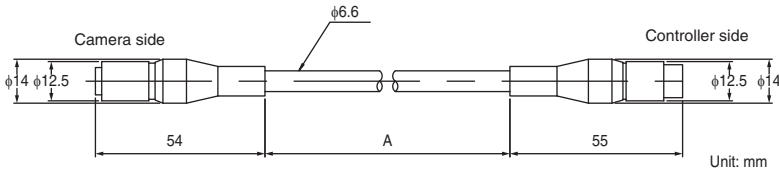
Direction to attach the L-shaped connector

The direction to attach the L-shaped connector is shown in the figure below.
The attachment direction cannot be changed.

NOTICE

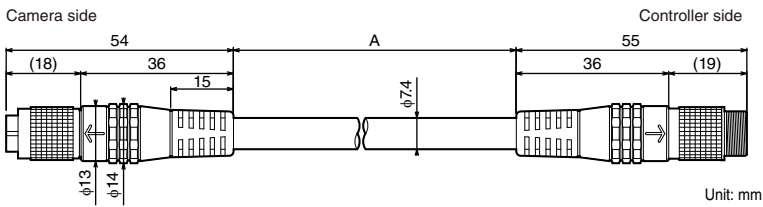
Make sure to extend the cable downwards

Extension Cable (CA-CN7RE)



Model	Cable length (A)
CA-CN7RE	7 m extension

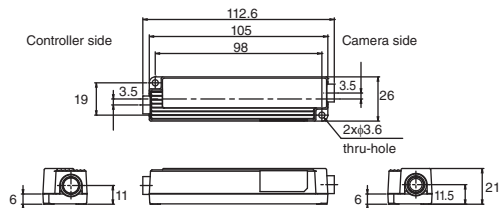
High flex robotic extension type (CA-CN3BE)



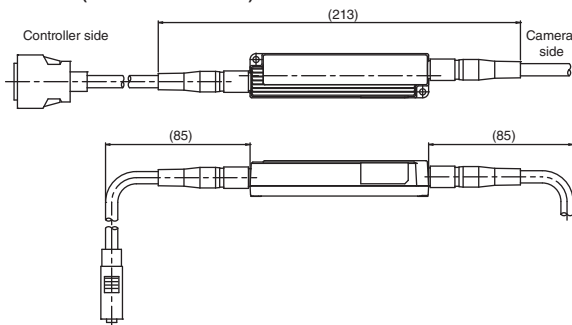
Model	Cable length (A)
CA-CN3BE	3 m

Camera Cable Extension Repeater (CA-CHX10U)/ Camera Cable for the Repeater (CA-CH** Series)

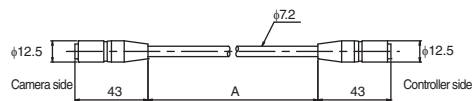
CA-CHX10U



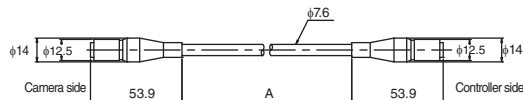
CA-CHX10U (with cable connected)



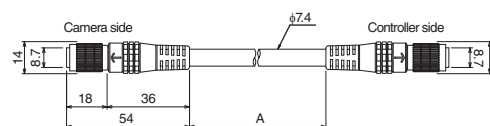
CA-CH3X/CH10X



CA-CH3RX/CH5RX/CH10RX



CA-CH3BEX



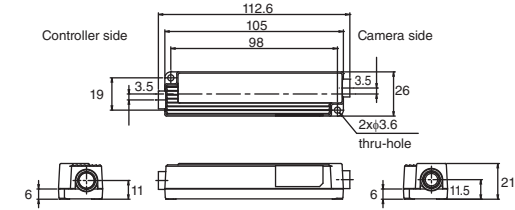
Unit: mm

Model	Cable length (A)
CA-CH3X	3 m
CA-CH10X	10 m
CA-CH3RX	3 m
CA-CH5RX	5 m
CA-CH10RX	10 m
CA-CH3BEX	3 m

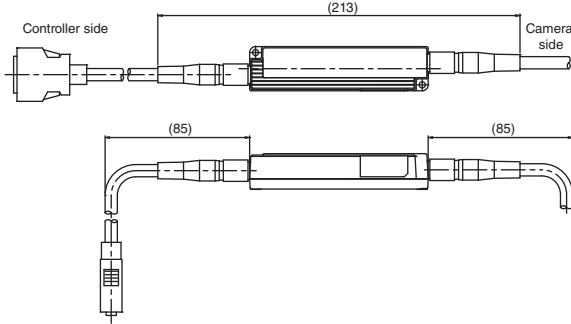
Camera Cable Extension Repeater (CA-CN10U)/ Camera Cable for the Repeater (CA-CN** Series)

Outside dimensions

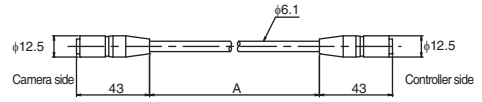
CA-CN10U



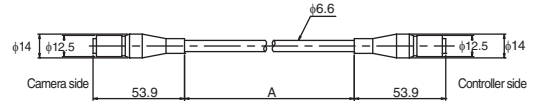
CA-CN10U (with cable connected)



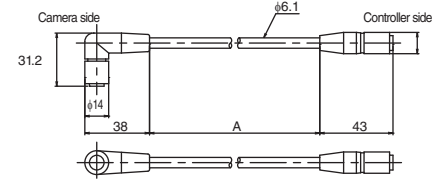
CA-CN3X/CN10X/CN17X



CA-CN3RX/CN10RX/CN17RX



CA-CN3LX/CN10LX/CN17LX



Unit: mm

Direction to attach the L-shaped connector

The direction to attach the L-shaped connector is shown in the figure below.
The attachment direction cannot be changed.

NOTICE

Make sure to extend the cable downwards

Model	Cable length (A)
CA-CN3X	3 m
CA-CN10X	10 m
CA-CN17X	17 m
CA-CN3RX	3 m
CA-CN10RX	10 m
CA-CN17RX	17 m
CA-CN3LX	3 m
CA-CN10LX	10 m
CA-CN17LX	17 m

Options

List of Options

C-mount camera options

Model	Description	Reference page
CV-L3	Standard lens (focal distance 3 mm)	Page 4-99
CV-L6	Standard lens (focal distance 6 mm)	Page 4-99
CV-L16	Standard lens (focal distance 16 mm)	Page 4-99
CV-L25	Standard lens (focal distance 25 mm)	Page 4-100
CV-L35	Standard lens (focal distance 35 mm)	Page 4-100
CV-L50	Standard lens (focal distance 50 mm)	Page 4-100
CA-LH4	High-resolution lens (focal distance 4 mm)	Page 4-102
CA-LH8	High-resolution lens (focal distance 8 mm)	Page 4-102
CA-LH12	High-resolution lens (focal distance 12 mm)	Page 4-102
CA-LH16	High-resolution lens (focal distance 16 mm)	Page 4-102
CA-LH25	High-resolution lens (focal distance 25 mm)	Page 4-103
CA-LH35	High-resolution lens (focal distance 35 mm)	Page 4-103
CA-LH50	High-resolution lens (focal distance 50 mm)	Page 4-103
CA-LH75	High-resolution lens (focal distance 75 mm)	Page 4-103
CA-LHR5	Ultra high-resolution lens (focal distance 5 mm)	Page 4-110
CA-LHR8	Ultra high-resolution lens (focal distance 8 mm)	Page 4-110
CA-LHR12	Ultra high-resolution lens (focal distance 12 mm)	Page 4-110
CA-LHR16	Ultra high-resolution lens (focal distance 16 mm)	Page 4-110
CA-LHR25	Ultra high-resolution lens (focal distance 25 mm)	Page 4-111
CA-LHR35	Ultra high-resolution lens (focal distance 35 mm)	Page 4-111
CA-LHR50	Ultra high-resolution lens (focal distance 50 mm)	Page 4-111
CA-LH8G	Vibration-resistant Lens with High Resolution and Low Distortion (focal distance 8 mm)	Page 4-105
CA-LH12G	Vibration-resistant Lens with High Resolution and Low Distortion (focal distance 12 mm)	Page 4-105
CA-LH16G	Vibration-resistant Lens with High Resolution and Low Distortion (focal distance 16 mm)	Page 4-105
CA-LH25G	Vibration-resistant Lens with High Resolution and Low Distortion (focal distance 25 mm)	Page 4-105
CA-LH35G	Vibration-resistant Lens with High Resolution and Low Distortion (focal distance 35 mm)	Page 4-106
CA-LH50G	Vibration-resistant Lens with High Resolution and Low Distortion (focal distance 50 mm)	Page 4-106
CA-LH5P	IP64-compliant, Environment Resistant Lens with High Resolution and Low Distortion (focal distance 5 mm)	Page 4-107
CA-LH8P	IP64-compliant, Environment Resistant Lens with High Resolution and Low Distortion (focal distance 8 mm)	Page 4-107
CA-LH12P	IP64-compliant, Environment Resistant Lens with High Resolution and Low Distortion (focal distance 12 mm)	Page 4-107
CA-LH16P	IP64-compliant, Environment Resistant Lens with High Resolution and Low Distortion (focal distance 16 mm)	Page 4-108
CA-LH25P	IP64-compliant, Environment Resistant Lens with High Resolution and Low Distortion (focal distance 25 mm)	Page 4-108
CA-LH35P	IP64-compliant, Environment Resistant Lens with High Resolution and Low Distortion (focal distance 35 mm)	Page 4-108
CA-LH50P	IP64-compliant, Environment Resistant Lens with High Resolution and Low Distortion (focal distance 50 mm)	Page 4-108
CA-LHE12	4/3"-compatible ultra high-resolution C mount lens (Focal distance 12 mm)	Page 4-113
CA-LHE16	4/3"-compatible ultra high-resolution C mount lens (Focal distance 16mm)	Page 4-113
CA-LHE25	4/3"-compatible ultra high-resolution C mount lens (Focal distance 25mm)	Page 4-113
CA-LHE35	4/3"-compatible ultra high-resolution C mount lens (Focal distance 35mm)	Page 4-113

Model	Description	Reference page
CA-LHE50	4/3"-compatible ultra high-resolution C mount lens (Focal distance 50mm)	Page 4-114
OP-51612	Close-up ring	Page 2-9, Page 4-114
CA-LMH05	High resolution telecentric macro lens with the optical magnification (standard magnification) x 0.5 (straight)	Page 4-116
CA-LMH10	High resolution telecentric macro lens with the optical magnification (standard magnification) x 1.0 (straight)	
CA-LMH20	High resolution telecentric macro lens with the optical magnification (standard magnification) x 2.0 (straight)	
CA-LMHA05	High resolution telecentric macro lens with the optical magnification (standard magnification) x 0.5 (coaxial)	
CA-LMHA10	High resolution telecentric macro lens with the optical magnification (standard magnification) x 1.0 (coaxial)	
CA-LMHA20	High resolution telecentric macro lens with the optical magnification (standard magnification) x 2.0 (coaxial)	
CA-LM1	Macro lens with 1x optical magnification (straight)	
CA-LM2	Macro lens with 2x optical magnification (straight)	
CA-LM4	Macro lens with 4x optical magnification (straight)	
CA-LM6	Macro lens with 6x optical magnification (straight)	
CA-LM8	Macro lens with 8x optical magnification (straight)	
CA-LMA1	Coaxial macro lens with 1x optical magnification	
CA-LMA2	Coaxial macro lens with 2x optical magnification	
CA-LMA4	Coaxial macro lens with 4x optical magnification	
CA-LM0510	Telecentric macro zoom lens (straight) with 0.5x to 1.0x optical magnification (standard magnification)	Page 4-121
CA-LM0307	Telecentric macro zoom lens (straight) with 0.3x to 0.7x optical magnification (standard magnification)	Page 4-120
CA-LMHE0510	4/3" compatible, optical magnification (standard magnification) x0.5 to x1.0 variable magnification telecentric macro lens (straight)	Page 4-122
CA-LMHE20	4/3" compatible, optical magnification (standard magnification) x2.0 telecentric macro lens (straight)	Page 4-124
CA-LMHR04	Optical magnification (standard magnification) x0.4 ultra high-resolution telecentric macro lens (straight)	Page 4-125
CA-LMHR08	Optical magnification (standard magnification) x0.8 ultra high-resolution telecentric macro lens (straight)	Page 4-125
CA-LMHR13	Optical magnification (standard magnification) x1.3 ultra high-resolution telecentric macro lens (straight)	Page 4-126
CA-LMHR20	Optical magnification (standard magnification) x2.0 ultra high-resolution telecentric macro lens (straight)	Page 4-126
CA-LMHR40	Optical magnification (standard magnification) x4.0 ultra high-resolution telecentric macro lens (straight)	Page 4-126
OP-87524	Dedicated stand for the telecentric macro lens	Page 4-120
OP-66852	Plastic camera mount	Page 4-82, Page 4-81

High-speed, Small Camera (CA-HS200C/HS200M), Small Camera (CV-S200C/S200M) Options

Model	Description	Reference page
CA-LHS8	High-resolution lens (focal distance 8 mm)	Page 4-129
CA-LHS16	High-resolution lens (focal distance 16 mm)	
CA-LHS25	High-resolution lens (focal distance 25 mm)	
CA-LHS50	High-resolution lens (focal distance 50 mm)	
OP-66830	Close-up ring (5 mm)	Page 4-129
OP-66831	Close-up ring (10 mm)	
OP-66832	Polarizing filter	
OP-66833	Side view attachment	

High-speed, Small Camera (CA-HS035C/HS035M), Ultra Small Camera (CV-S035C/S035M) Options

Model	Description	Reference page
CA-LS4	Standard lens (focal distance 4 mm)	Page 4-129
CA-LS6	Standard lens (focal distance 6 mm)	
CA-LS16	Standard lens (focal distance 16 mm)	
CA-LS30	Standard lens (focal distance 30 mm)	
OP-51500	Close-up ring (5 mm)	Page 4-129
OP-51501	Close-up ring (10 mm)	
OP-51502	Polarizing filter	
OP-51503	Side view attachment	

LumiTrax Mode/MultiSpectrum Mode Compatible Cameras

Model	Description	Reference page
CA-HX048C	16x speed color 470-k pixel camera	Page 4-76
CA-HX048M	16x speed monochrome 470-k pixel camera	Page 4-76
CA-HX200C	16x speed color 2-megapixel camera	Page 4-77
CA-HX200M	16x speed monochrome 2-megapixel camera	Page 4-77
CA-HX500C	16x speed color 5-megapixel camera	Page 4-77
CA-HX500M	16x speed monochrome 5-megapixel camera	Page 4-77

Various Lens Filters

Model	Description	Reference page
CA-LF25	Protective Filter M25.5 P0.5	Page 4-115
CA-LF27	Protective Filter M27 P0.5	
CA-LF30	Protective Filter M30.5 P0.5	
CA-LF34	Protective Filter M34P0.5	
CA-LF43	Protective Filter M43P0.75	
OP-51603	Polarizing Filter M25.5 P0.5	
OP-54029	Polarizing Filter M27 P0.5	
OP-54030	Polarizing Filter M30.5 P0.5	
OP-87893	Polarizing Filter M34P0.5	
OP-87894	Polarizing Filter M43P0.75	
CA-LF25R	Sharp Cut Filter (R60) M25.5P0.5	
CA-LF27R	Sharp Cut Filter (R60) M27P0.5	
CA-LF25Y	Blue Cut Filter M25.5P0.5	
CA-LF27Y	Blue Cut Filter M27P0.5	
CA-LF30Y	Blue Cut Filter M30.5P0.5	

Illumination

Model	Description	Reference page	
CA-DRR3	LED light (direct ring light, red)	Page 2-15, Page 4-130	
CA-DRW3	LED light (direct ring light, white)		
CA-DRB3	LED light (direct ring light, blue)		
CA-DRR5	LED light (direct ring light, red)		
CA-DRW5	LED light (direct ring light, white)		
CA-DRB5	LED light (direct ring light, blue)		
CA-DRR7	LED light (direct ring light, red)		
CA-DRW7	LED light (direct ring light, white)		
CA-DRB7	LED light (direct ring light, blue)		
CA-DRR9	LED light (direct ring light, red)		
CA-DRW9	LED light (direct ring light, white)		
CA-DRB9	LED light (direct ring light, blue)		
CA-DRR4F	LED light (direct ring light, red)		
CA-DRW4F	LED light (direct ring light, white)		
CA-DRB4F	LED light (direct ring light, blue)		
CA-DRR10F	LED light (direct ring light, red)		
CA-DRW10F	LED light (direct ring light, white)		
CA-DRB10F	LED light (direct ring light, blue)		
CA-DLR7	LED light (low angle light, red)		Page 2-16, Page 4-130
CA-DLR10	LED light (low angle light, red)		
CA-DLR12	LED light (low angle light, red)		
CA-DBR5	LED light (bar light, red)	Page 2-15, Page 4-131	
CA-DBW5	LED light (bar light, white)		
CA-DBB5	LED light (bar light, blue)		
CA-DBR8	LED light (bar light, red)		
CA-DBW8	LED light (bar light, white)		
CA-DBB8	LED light (bar light, blue)		
CA-DBR13	LED light (bar light, red)		
CA-DBW13	LED light (bar light, white)		
CA-DBB13	LED light (bar light, blue)		
CA-DBW12W	LED light (bar light, white)		
CA-DBW24W	LED light (bar light, white)		
CA-DBW34H	LED light (bar light, white)		
CA-DBW50H	LED light (bar light, white)		
CA-DDR8	LED light (dome light, red)		Page 2-16, Page 4-131
CA-DDW8	LED light (dome light, white)		
CA-DDB8	LED light (dome light, blue)		
CA-DDR15	LED light (dome light, red)		
CA-DDW15	LED light (dome light, white)		
CA-DDB15	LED light (dome light, blue)		
CA-DSR2	LED light (back light, red)	Page 2-15, Page 4-135	
CA-DSW2	LED light (back light, white)		
CA-DSB2	LED light (back light, blue)		
CA-DSR3	LED light (back light, red)		
CA-DSW3	LED light (back light, white)		
CA-DSB3	LED light (back light, blue)		
CA-DSR9	LED light (back light, red)		
CA-DSW7	LED light (back light, white)		
CA-DSB7	LED light (back light, blue)		
CA-DSR15	LED light (back light, red)		
CA-DSW15	LED light (back light, white)		
CA-DSB15	LED light (back light, blue)		
CA-DSW30	LED light (back light, white)		

Model	Description	Reference page
CA-DXR3	LED light (coaxial light, red)	Page 2-16, Page 4-136
CA-DXW3	LED light (coaxial light, white)	
CA-DXB3	LED light (coaxial light, blue)	
CA-DXR5	LED light (coaxial light, red)	
CA-DXW5	LED light (coaxial light, white)	
CA-DXB5	LED light (coaxial light, blue)	
CA-DXR7	LED light (coaxial light, red)	
CA-DXW7	LED light (coaxial light, white)	
CA-DXB7	LED light (coaxial light, blue)	
CA-DQW10	LED light (square bar light, white)	Page 2-16, Page 4-136
CA-DQB10	LED light (square bar light, blue)	
CA-DQW15	LED light (square bar light, white)	
CA-DQB15	LED light (square bar light, blue)	
CA-DRR8M	LED light (round multi-angle light, red)	Page 2-15, Page 2-16, Page 4-137
CA-DRW8M	LED light (round multi-angle light, white)	
CA-DRB8M	LED light (round multi-angle light, blue)	
CA-DRR13M	LED light (round multi-angle light, red)	
CA-DRW13M	LED light (round multi-angle light, white)	
CA-DRB13M	LED light (round multi-angle light, blue)	
CA-DQW7M	LED light (square multi-angle light, white)	Page 2-15, Page 2-16, Page 4-137
CA-DQW10M	LED light (square multi-angle light, white)	
CA-DQW12M	LED light (square multi-angle light, white)	
CA-DPR2	LED light (spot, red)	Page 2-16, Page 4-137
CA-DPW2	LED light (spot, white)	
CA-DPB2	LED light (spot, blue)	
CA-DPU2	Special power adapter for spot lights	
CA-DP3R	Spot light cable (3 m)	
CA-DP5R	Spot light cable (5 m)	
CA-DZW15D	White Diffused Bar light / Line light 150mm	Page 4-138
CA-DZW30D	White Diffused Bar light / Line light 300mm	
CA-DZW45D	White Diffused Bar light / Line light 450mm	
CA-DRW5X	White ring diffuse illumination 92-50	Page 4-140
CA-DRW10X	White ring diffuse illumination 142-100	Page 4-140
CA-DRW20X	White ring diffuse illumination 260-200	Page 4-141
CA-DRM5X	MultiSpectrum Light ø50mm	Page 4-143
CA-DRM10X	MultiSpectrum Light ø100mm	
CA-DRM20X	MultiSpectrum Light ø200mm	
CA-DRM5DA	Dome Attachment for MultiSpectrum Light ø50mm	Page 4-145
CA-DRM10DA	Dome Attachment for MultiSpectrum Light ø100mm	
CA-DRM20DA	Dome Attachment for MultiSpectrum Light ø200mm	
CA-DRM5PA	Polarization Filter Attachment for MultiSpectrum Light ø50mm	Page 4-146
CA-DRM10PA	Polarization Filter Attachment for MultiSpectrum Light ø100mm	
CA-DRM20PA	Polarization Filter Attachment for MultiSpectrum Light ø200mm	
CA-DRW13P	IP67-compliant, Environment Resistant LED Light (Ring type)	Page 4-148
CA-DBW15P	IP67-compliant, Environment Resistant LED Light (Bar type)	Page 4-148

Cables

Model	Description	Reference page	
CA-CN1	Camera cable (CA-CN** Series) (1 m)	Page 4-87	
CA-CN3	Camera cable (CA-CN** Series) (3 m)		
CA-CN5	Camera cable (CA-CN** Series) (5 m)		
CA-CN10	Camera cable (CA-CN** Series) (10 m)		
CA-CN17	Camera cable (CA-CN** Series) (17 m)		
CA-CN3R	High flex robotic camera cable (CA-CN** Series) (3 m)		
CA-CN5R	High flex robotic camera cable (CA-CN** Series) (5 m)		
CA-CN10R	High flex robotic camera cable (CA-CN** Series) (10 m)		
CA-CN17R	High flex robotic camera cable (CA-CN** Series) (17 m)		
CA-CN7RE	High flex robotic camera extension cable (CA-CN** Series) (7 m)		Page 4-57
CA-CN3L	L-shape connector camera cable (CA-CN** Series) (3 m)		Page 4-87
CA-CN5L	L-shape connector camera cable (CA-CN** Series) (5 m)		
CA-CN10L	L-shape connector camera cable (CA-CN** Series) (10 m)		
CA-CN17L	L-shape connector camera cable (CA-CN** Series) (17 m)		
CA-CN3BE	High flex robotic camera extension cable (CA-CN** Series) (3 m)		
CA-CH3	Camera cable (CA-CH** Series) (3 m)		
CA-CH5	Camera cable (CA-CH** Series) (5 m)		
CA-CH10	Camera cable (CA-CH** Series) (10 m)		
CA-CH3R	High flex robotic camera cable (CA-CH** Series) (3 m)		
CA-CH5R	High flex robotic camera cable (CA-CH** Series) (5 m)		
CA-CH10R	High flex robotic camera cable (CA-CH** Series) (10 m)		
CA-CH17R	High flex robotic camera cable (CA-CH** Series) (17 m)		
CA-CH3L	L-shape connector camera cable (CA-CH** Series) (3 m)		
CA-CH5L	L-shape connector camera cable (CA-CH** Series) (5 m)		
CA-CH10L	L-shape connector camera cable (CA-CH** Series) (10 m)		
CA-CH3BE	High flex robotic extension cable (CA-CH** Series) (3 m)		
CA-CH3P	Environment resistant camera cable (CA-CH** Series) (3 m)		
CA-CH10P	Environment resistant camera cable (CA-CH** Series) (10 m)		
CA-CNX10U	Camera cable extension amplifier (CA-CN** Series)	Page 2-10, Page 4-58, Page 4-89	
CA-CHX10U	Camera cable extension amplifier (CA-CH** Series)		
CA-CN3X	Repeater camera cable (CA-CN** Series) (3 m)	Page 4-89	
CA-CN10X	Repeater camera cable (CA-CN** Series) (10 m)		
CA-CN17X	Repeater camera cable (CA-CN** Series) (17 m)		
CA-CH3X	Repeater camera cable (CA-CH** Series) (3 m)		
CA-CH10X	Repeater camera cable (CA-CH** Series) (10 m)		
CA-CH3BEX	Repeater high flex robotic camera cable (CA-CH** Series) (3 m)		
CA-CN3RX	Repeater high flex robotic camera cable (CA-CN** Series) (3 m)		
CA-CN10RX	Repeater high flex robotic camera cable (CA-CN** Series) (10 m)		
CA-CN17RX	Repeater high flex robotic camera cable (CA-CN** Series) (17 m)		
CA-CH10RX	Repeater high flex robotic camera cable (CA-CH** Series) (10 m)		
CA-CN3LX	Repeater L-shape connector camera cable (CA-CN** Series) (3 m)		
CA-CN10LX	Repeater L-shape connector camera cable (CA-CN** Series) (10 m)		
CA-CN17LX	Repeater L-shape connector camera cable (CA-CN** Series) (17 m)		
CA-D2	LED light cable (2 m)		Page 4-139
CA-D5	LED light cable (5 m)		
CA-D3R	High flex robotic LED light cable (3 m)		
CA-D5R	High flex robotic LED light cable (5 m)		
CA-D10R	High flex robotic LED light cable (10 m)		
CA-D17R	High flex robotic LED light cable (17 m)		
CA-D1W	Y-split LED light cable (0.5 m)		
OP-84457	Bare wire LED light cable (1 m)		

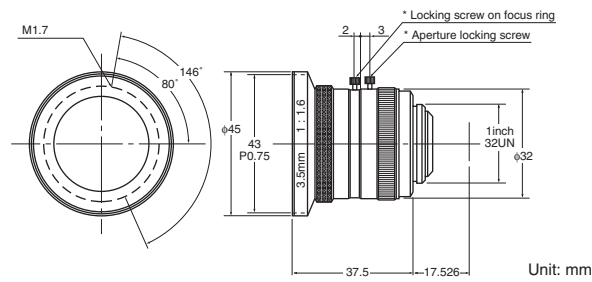
Model	Description	Reference page
CA-D3X	LED light cable 3m	Page 4-142
CA-D5X	LED light cable 5m	
CA-D10X	LED light cable 10m	
CA-D5XR	High flex robotic LED light cable 5m	Page 4-142
CA-D02XE	LED light extension cable 0.2m	Page 4-142
CA-D3MX	LED light cable (3 m)	Page 4-147
CA-D5MX	LED light cable (5 m)	
CA-D10MX	LED light cable (10 m)	
CA-D5MXE	LED light extension cable (5 m)	
CA-D10MXE	LED light extension cable (10 m)	
CA-D3P	Environment resistant LED light cable (3 m)	Page 4-150
CA-D5PE	Environment resistant LED light extension cable (5 m)	Page 4-150
CA-D10PE	Environment resistant LED light extension cable (10 m)	
OP-26487	Serial connection cable (2.5 m, straight)	Page 3-4, Page 3-23
OP-26486	D-sub 9-pin connector (female)	
OP-84384	D-sub 9-pin connector (male, for SYSMAC)	
OP-86930	D-sub 9-pin connector (male, for MELSEC)	
OP-66843	Ethernet cable (3 m, cross cable)	
OP-51657	Parallel port ribbon cable (3 m)	Page 3-8, Page 3-27
OP-66844	USB2.0 cable (2 m)	Page 3-8, Page 3-25
OP-66842	Monitor cable (3 m)	Page 2-11
OP-87055	Monitor cable (10 m)	
OP-87258	Touch panel RS-232C cable (3 m)	
OP-87259	Touch panel RS-232C cable (10 m)	
OP-87264	Touch panel modular RS-232C cable (3 m)	
OP-87265	Touch panel modular RS-232C cable (10 m)	

Other

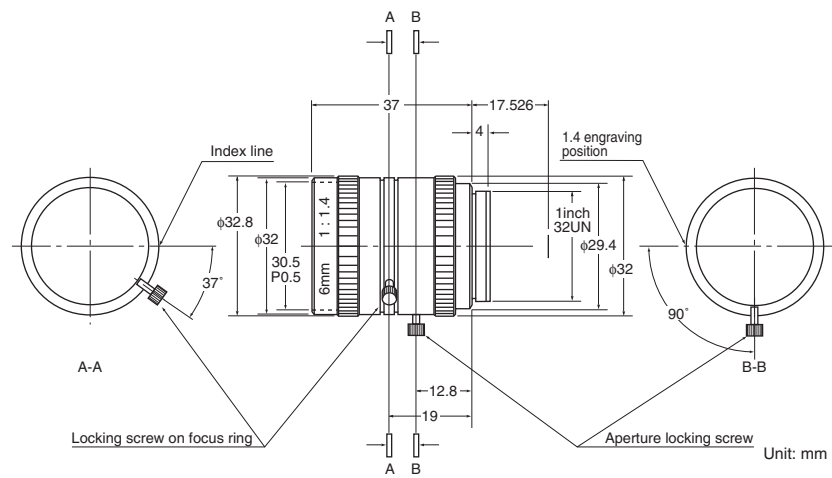
Model	Description	Reference page
CA-U4	Ultracompact switching power supply (6.5 A)	Page 4-151
CA-U5	Ultracompact switching power supply (12.5 A)	Page 4-151
OP-87133	SD card (512 MB)	Page 2-26
CA-SD1G	SD card (1 GB)	
CA-SD4G	SD card (4 GB)	
CA-SD16G	SD card (16 GB)	
CA-MP120	LCD monitor	Page 4-153
CA-MP120T	Touch panel LCD monitor	
OP-87262	Monitor stand for CA Series LCD monitor	
OP-87263	Touch panel scratch-prevention sticker	
OP-87506	Dedicated mouse	Page 4-74
CA-DWC30	Light wavelength conversion sheet (297x210mm)	-
OP-87895	Side view mirror	Page 4-128
OP-87896	C-mount lens adapter for spot lights	Page 4-139
CA-F100	Fan unit	Page 2-3
CA-S20D	4-Axis Adjustable Camera Mount Kit	-

Standard Lenses

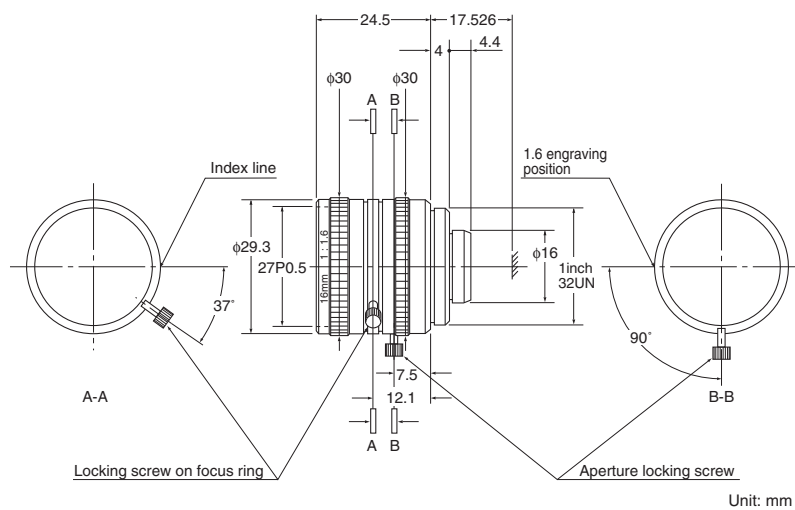
3.5-mm lens (CV-L3)



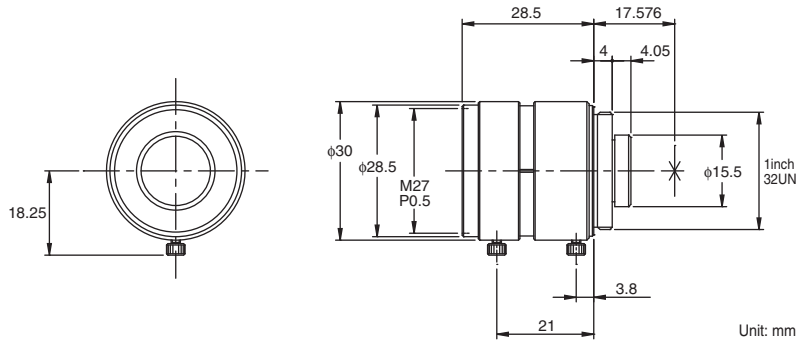
6-mm lens (CV-L6)



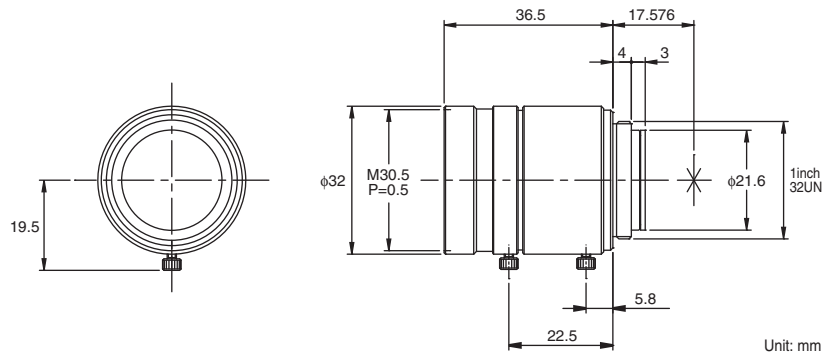
16-mm lens (CV-L16)



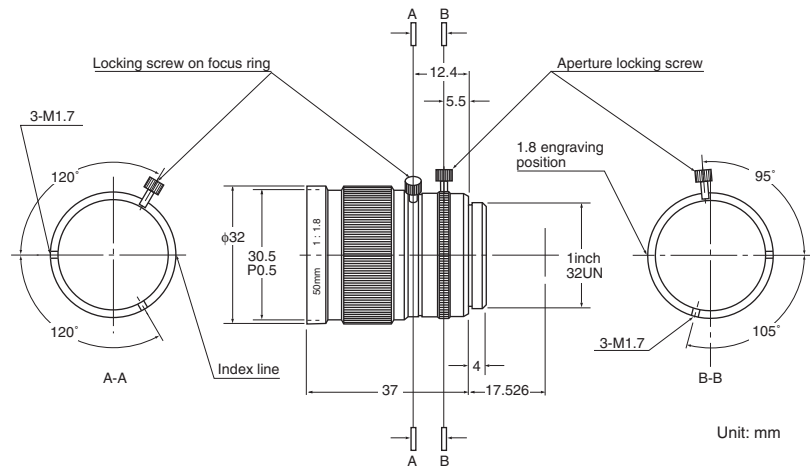
25-mm lens (CV-L25)



35-mm lens (CV-L35)



50-mm lens (CV-L50)



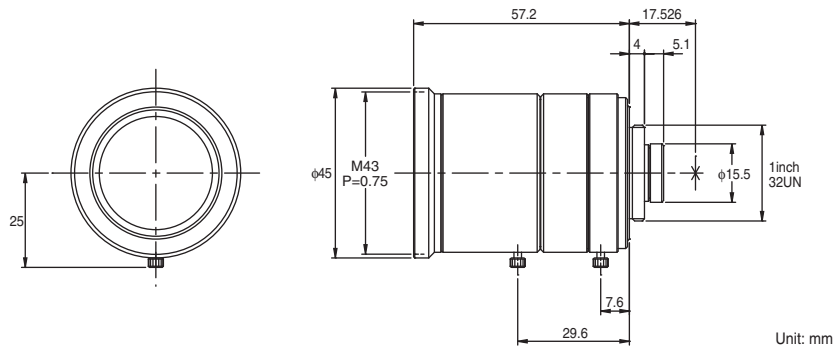
Specifications

Model	CV-L3	CV-L6	CV-L16	CV-L25	CV-L35	CV-L50
Focal Distance	3.5 mm	6 mm	16 mm	25 mm	35 mm	50 mm
Aperture	F1.6 to CLOSE	F1.4 to CLOSE	F1.6 to CLOSE	F1.6 to F16	F1.6 to F16	F1.8 to CLOSE
Minimum working distance	0.1m	0.2m	0.4m	0.2m	0.3m	1.0m
Mount	C-mount					
Filter thread diameter	43.0 mm P0.75	30.5 mm P0.5	27.0 mm P0.5	27.0 mm P0.5	30.5 mm P0.5	30.5 mm P0.5
Maximum CCD size	1/2 inch		2/3 inch			
TV distortion*	-10.0% (-5.0%)	-1.8% (-1.4%)	-0.8% (-0.2%)	-0.6% (-0.1%)	-0.2% (-0.08%)	-0.2% (-0.1%)
Operating temperature/ humidity range	0 to +50°C, 35 to 80% RH (no condensation)					
Weight	Approx. 90 g	Approx. 70 g	Approx. 44 g	Approx. 58 g	Approx. 85 g	Approx. 50 g

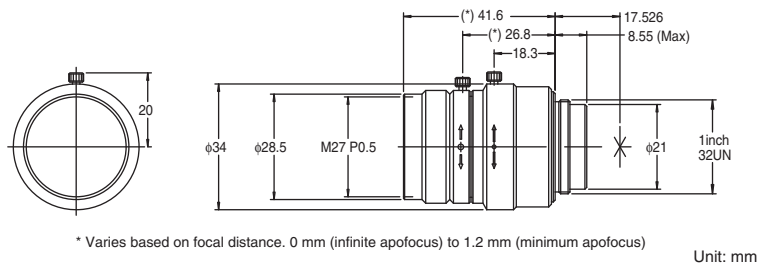
* The indicated values are for a 2/3-inch CCD. The values for 1/3 inch are indicated in parenthesis ().

High-resolution lens

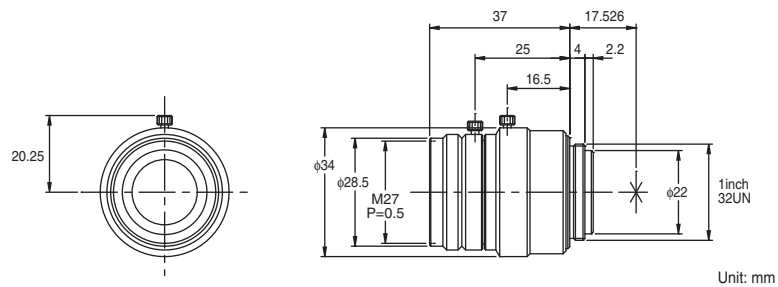
4-mm lens (CA-LH4)



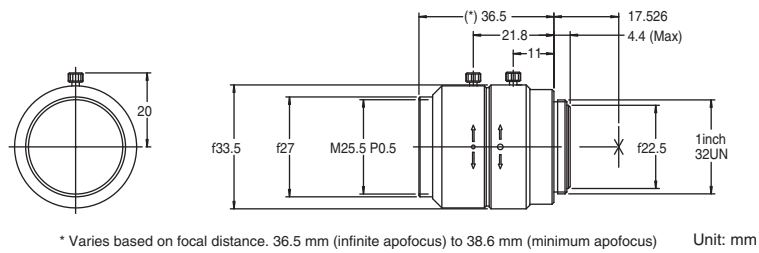
8-mm lens (CA-LH8)



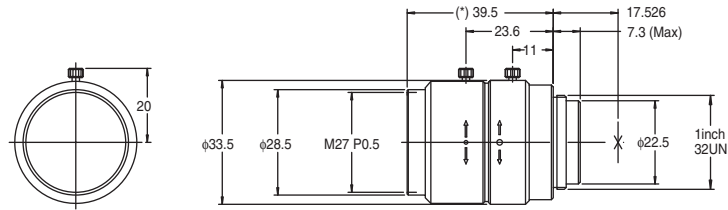
12-mm lens (CA-LH12)



16-mm lens (CA-LH16)

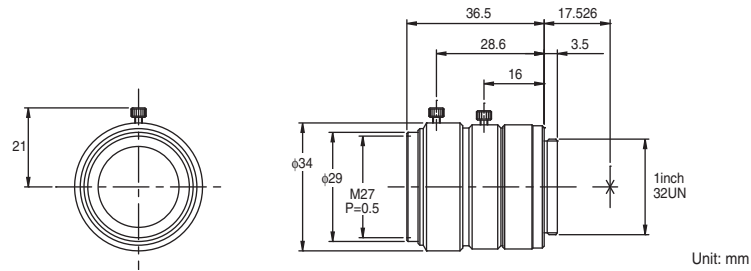


25-mm lens (CA-LH25)



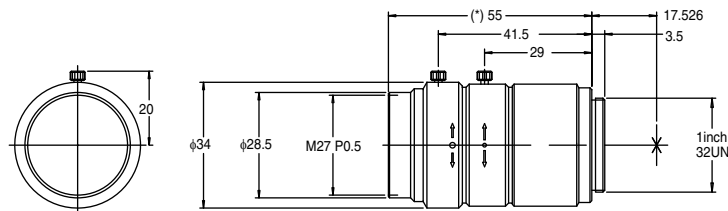
* Varies based on focal distance. 39.5 mm (infinite apofocus) to 44.0 mm (minimum apofocus) Unit: mm

35-mm lens (CA-LH35)



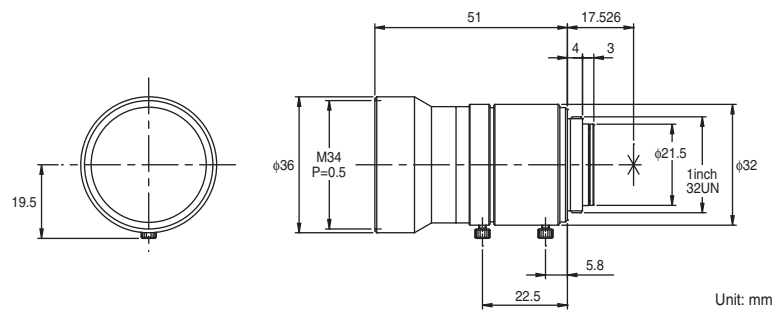
Unit: mm

50-mm lens (CA-LH50)



* Varies based on focal distance. 55.0 mm (infinite apofocus) to 73.5 mm (minimum apofocus) Unit: mm

75-mm lens (CA-LH75)



Unit: mm

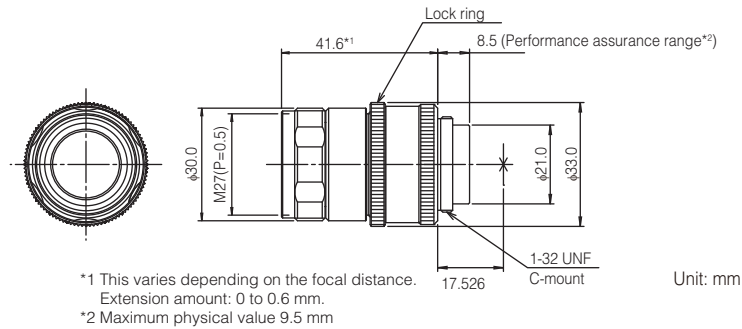
Specifications

Model	CA-LH4	CA-LH8	CA-LH12	CA-LH16	CA-LH25	CA-LH35	CA-LH50	CA-LH75
Focal distance	4 mm	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm
F-stop range (aperture)	F1.6 to F16	F1.4 to F16	F1.4 to F16	F1.4 to F16	F1.4 to F16	F2.0 to F16	F2.8 to F22	F2.5 to F22
Minimum WD	0.1m	0.1m	0.15m	0.2m	0.2m	0.2m	0.2m	1.2m
Mount	C-mount							
Filter thread diameter	43.0 mm P0.75	27.0 mm P0.5	27.0 mm P0.5	25.5 mm P0.5	27.0 mm P0.5	27.0 mm P0.5	27.0 mm P0.5	34.0 mm P0.5
Maximum supported image size	1/1.8-inch	2/3-inch						
TV distortion*	-0.2% (-0.13%)	-0.6% (-0.28%)	-0.07% (-0.04%)	-0.05% (-0.1%)	-0.04% (-0.02%)	-0.2% (-0.05%)	-0.03% (-0.01%)	-0.1% (-0.05%)
Ambient temperature and humidity ranges	0 to +50°C, 35 to 80%RH (No condensation)							
Weight	Approx. 150 g	Approx. 83 g	Approx. 75 g	Approx. 81 g	Approx. 89 g	Approx. 89 g	Approx. 92 g	Approx. 105 g

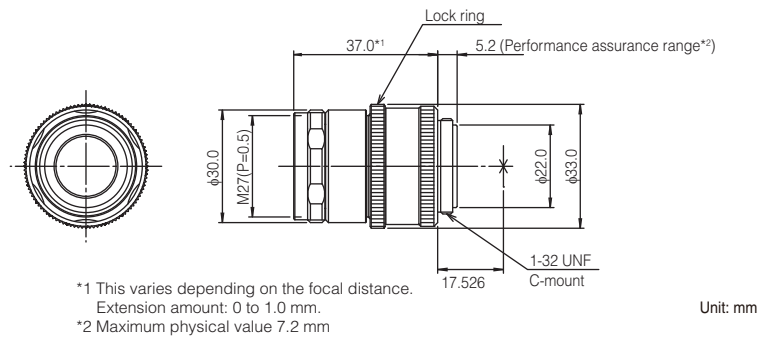
* The indicated values are for a 2/3-inch CCD. The values for 1/3 inch are indicated in parenthesis ().

Vibration-resistant Lens with High Resolution and Low Distortion

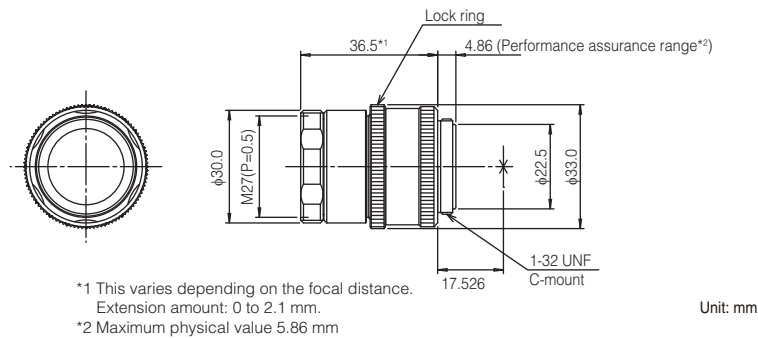
CA-LH8G



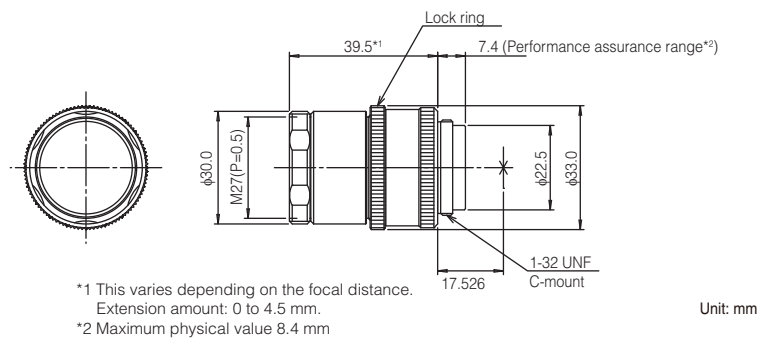
CA-LH12G



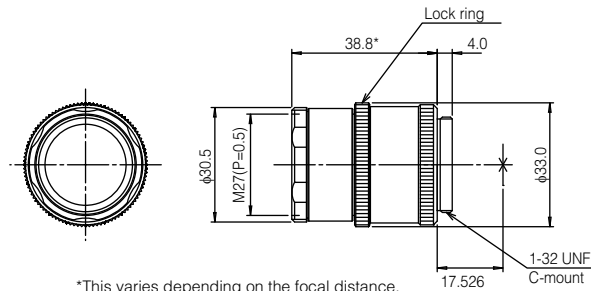
CA-LH16G



CA-LH25G



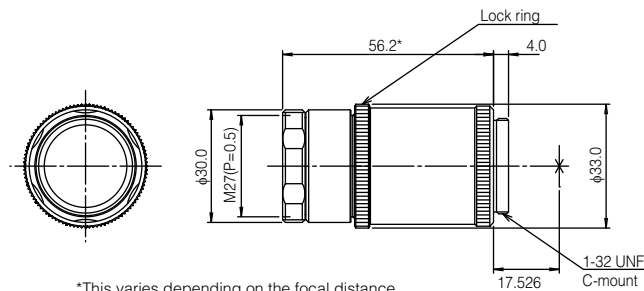
CA-LH35G



*This varies depending on the focal distance.
Extension amount: 0 to 6.5 mm.

Unit: mm

CA-LH50G



*This varies depending on the focal distance.
Extension amount: 0 to 15.8 mm.

Unit: mm

Specifications

Model	CA-LH8G	CA-LH12G	CA-LH16G	CA-LH25G	CA-LH35G	CA-LH50G
Focal distance	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm
F-stop range (aperture) ^{*1}	F1.4/4/8/16	F1.4/4/8/16	F1.4/4/8/16	F1.4/4/8/16	F2.0/4/8/16	F2.8/4/8/16
Minimum WD ^{*2}	0.1 m	0.15 m	0.2 m	0.2 m	0.2 m	0.2 m
Mount	C-mount					
Filter thread diameter	27.0 mm P0.5					
Maximum supported image size	2/3-inch					
TV distortion ^{*3}	-0.6% (-0.28%)	-0.07% (-0.04%)	-0.05% (-0.1%)	-0.04% (-0.02%)	-0.2% (-0.05%)	-0.03% (-0.01%)
Resolving power	100 lines/mm at center, 80 lines/mm on periphery					
Operating temperature and humidity ranges	0 to +50°C, 35 to 80%RH (No condensation)					
Weight	Approx. 78 g	Approx. 65 g	Approx. 66 g	Approx. 73 g	Approx. 62 g	Approx. 76 g

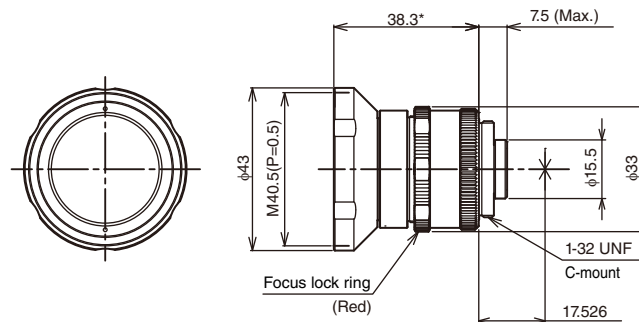
*1 The f-stop (aperture) is changed by replacing the diaphragm plate. When this product is shipped, the OPEN diaphragm plate is attached to the lens, so replace this with one of the other included diaphragm plates (F4, F8, or F16) as necessary. To use the f-stop (aperture) in the OPEN mode, use the lens without removing the OPEN diaphragm plate.

*2 If the instrument is installed in a position where the working distance is much closer than the minimum that is listed in the specifications table, this increases the likelihood that the instrument will fall due to vibrations. When performing this type of installation, please implement extra fall prevention countermeasures.

*3 The indicated values are for a 2/3-inch CCD. The values for 1/3 inch are indicated in parenthesis ().

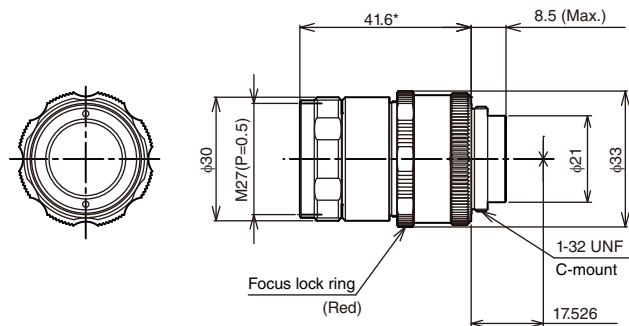
IP64-compliant, Environment Resistant Lens with High Resolution and Low Distortion

CA-LH5P



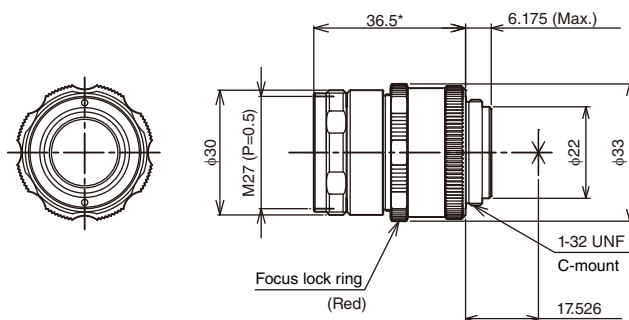
* This varies depending on the focal distance.
Extension amount: 0 to 0.25 mm.

CA-LH8P



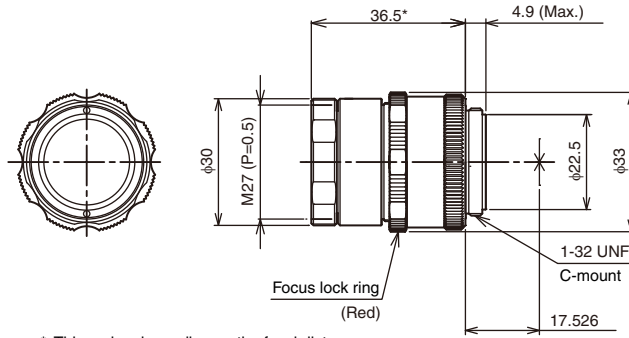
* This varies depending on the focal distance.
Extension amount: 0 to 0.6 mm.

CA-LH12P



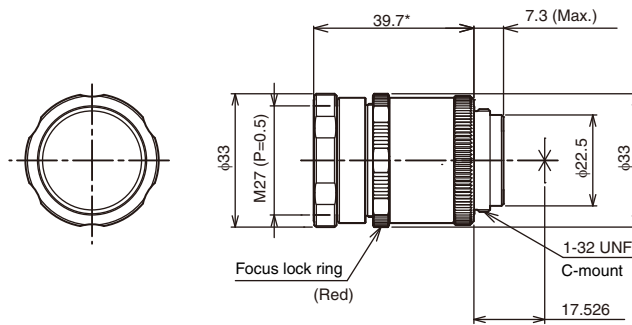
* This varies depending on the focal distance.
Extension amount: 0 to 1.0 mm.

CA-LH16P



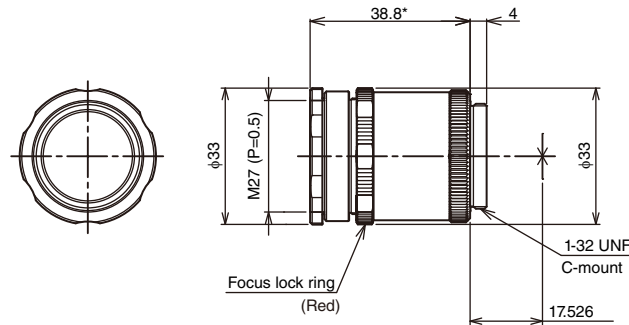
* This varies depending on the focal distance.
Extension amount: 0 to 1.3 mm.

CA-LH25P



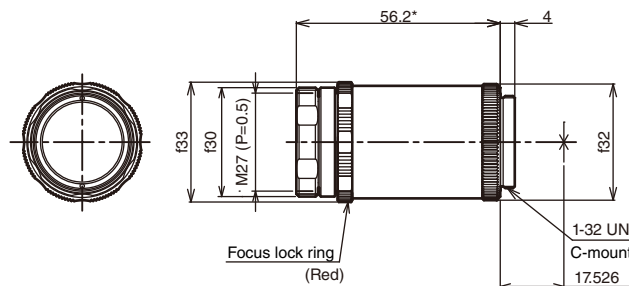
* This varies depending on the focal distance.
Extension amount: 0 to 3.2 mm.

CA-LH35P



* This varies depending on the focal distance.
Extension amount: 0 to 6.5 mm.

CA-LH50P



* This varies depending on the focal distance.
Extension amount: 0 to 15.6 mm.

Specifications

	CA-LH5P	CA-LH8P	CA-LH12P	CA-LH16P	CA-LH25P	CA-LH35P	CA-LH50P
Focal distance	5mm	8mm	12mm	16mm	25mm	35mm	50mm
F-stop range (aperture) ^{*1}	F2.8/4/8/16	F1.4/4/8/16				F2.0/4/8/16	F2.8/4/8/16
Minimum WD ^{*2}	0.1m		0.15m	0.2m			
Filter thread diameter	40.5mm P0.5	27.0mm P0.5					
Mount	C-mount						
Maximum supported image size	2/3-inch						
Resolving power	100 lines/mm at center, 80 lines/mm on periphery						
TV distortion ^{*3}	0.5% (-0.1%)	-0.6% (-0.28%)	-0.07% (-0.04%)	-0.05% (-0.1%)	-0.04% (-0.02%)	-0.2% (-0.05%)	-0.03% (-0.01%)
Protection structure ^{*4}	IP64 (objective lens, water repellent coating specifications)						
Operating temperature and humidity ranges	0 to +50°C, 35 to 80% RH (No condensation)						
Weight	Approx. 75 g	Approx. 85 g	Approx. 75 g	Approx. 75 g	Approx. 75 g	Approx. 65 g	Approx. 85 g

*1 The f-stop (aperture) is changed by replacing the diaphragm plate. When this product is shipped, the OPEN diaphragm plate is attached to the lens, so replace this with one of the other included diaphragm plates (F4, F8, or F16) as necessary. To use the f-stop (aperture) in the OPEN mode, use the lens without removing the OPEN diaphragm plate.

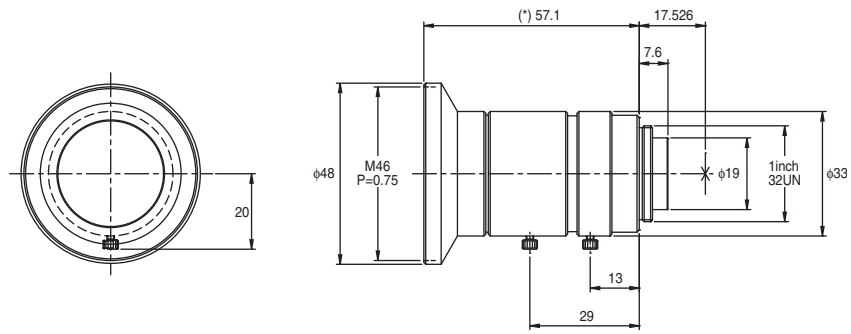
*2 If the instrument is installed in a position where the working distance is much closer than the minimum that is listed in the specifications table, this increases the likelihood that the instrument will fall due to vibrations. When performing this type of installation, please implement extra fall prevention countermeasures.

*3 This indicates the value with the maximum supported image size. The value with the 1/3" image size is shown in parentheses.

*4 When connected to a KEYENCE environment resistant camera (excluding when the close-up ring and filter are attached)

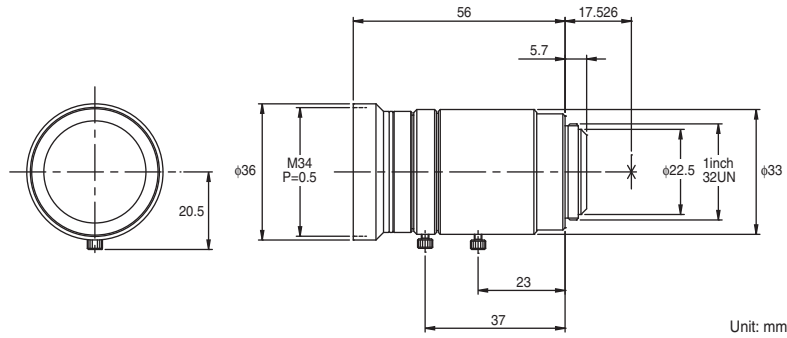
Ultra High-resolution Lenses

5-mm lens (CA-LHR5)



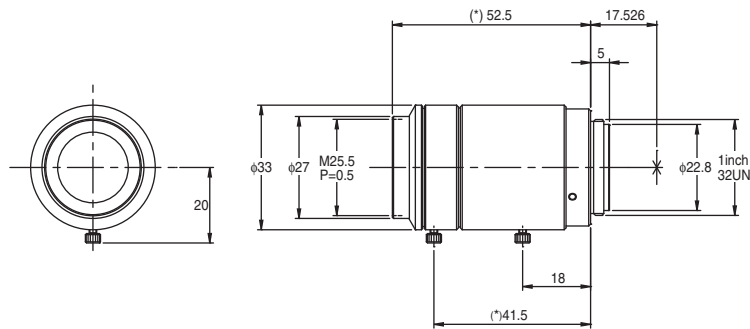
* Varies based on focal distance. 0 mm (infinite apofocus) to 2.3 mm (minimum apofocus) Unit: mm

8-mm lens (CA-LHR8)



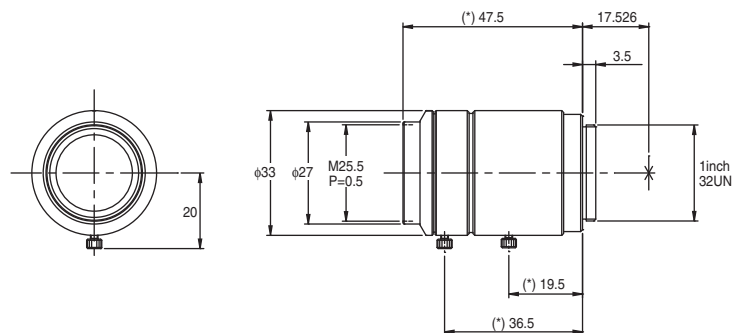
Unit: mm

12-mm lens (CA-LHR12)



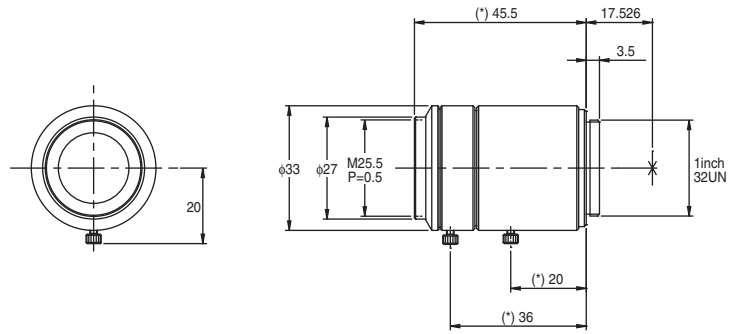
* Varies based on focal distance. 0 mm (infinite apofocus) to 1 mm (minimum apofocus) Unit: mm

16-mm lens (CA-LHR16)



* Varies based on focal distance. 0 mm (infinite apofocus) to 2.5 mm (minimum apofocus) Unit: mm

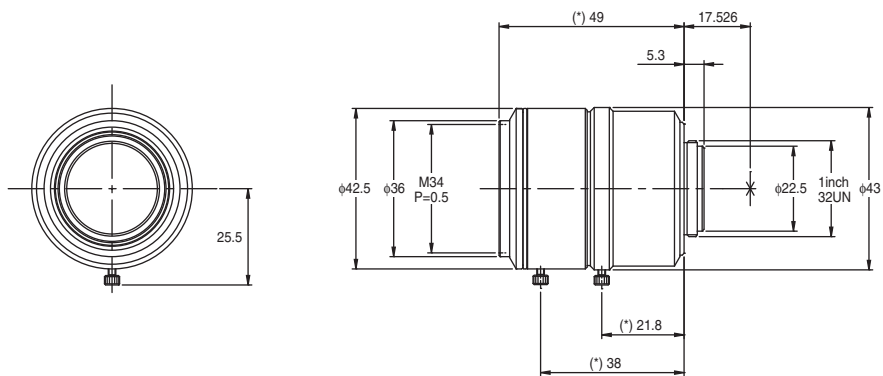
25-mm lens (CA-LHR25)



* Varies based on focal distance. 0 mm (infinite apofocus) to 5.7 mm (minimum apofocus)

Unit: mm

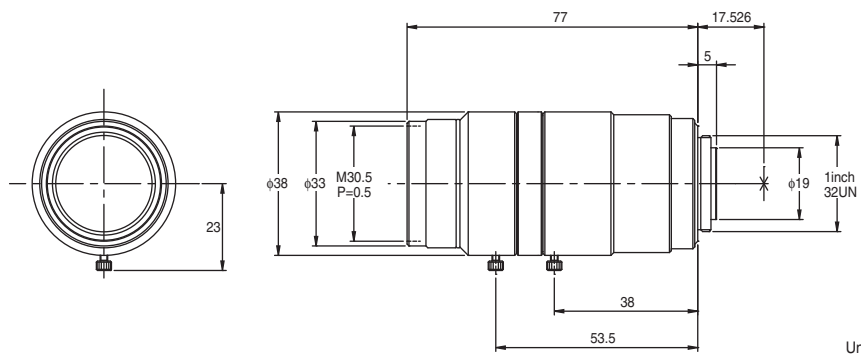
35-mm lens (CA-LHR35)



* Varies based on focal distance. 0 mm (infinite apofocus) to 19.2 mm (minimum apofocus)

Unit: mm

50-mm lens (CA-LHR50)



Unit: mm

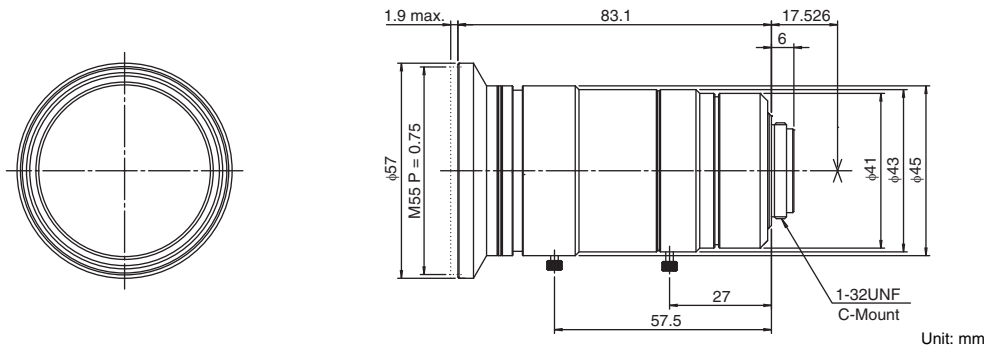
Specifications

Model	CA-LHR5	CA-LHR8	CA-LHR12	CA-LHR16	CA-LHR25	CA-LHR35	CA-LHR50
Focal Distance	5 mm	8.5 mm	12 mm	16 mm	25 mm	35 mm	50 mm
Aperture	F1.8 to F16	F1.8 to F16	F1.8 to F11	F1.8 to F16	F1.8 to F16	F2.0 to F16	F2.8 to F16
Minimum working distance	0.1 m						
Mount	C-mount						
Filter thread diameter	46.0 mm P0.75	34.0 mm P0.5	25.5 mm P0.5	25.5 mm P0.5	25.5 mm P0.5	34.0 mm P0.5	30.5 mm P0.5
Maximum image size	2/3 inch						
TV distortion*	-0.33% (-0.11%)	-0.31% (-0.02%)	-0.12% (0.01%)	-0.20% (-0.11%)	-0.09% (-0.04%)	-0.05% (-0.01%)	-0.02% (0.02%)
Resolving power	Center 200 lines/mm, periphery 140 lines/mm						
Lens coating	WIDE BAND MULTI COATING						
Operating temperature/ humidity range	0 to +50°C, 35 to 80% RH (no condensation)						
Weight	Approx. 120 g	Approx. 115 g	Approx. 105 g	Approx. 90 g	Approx. 95 g	Approx. 160 g	Approx. 170 g

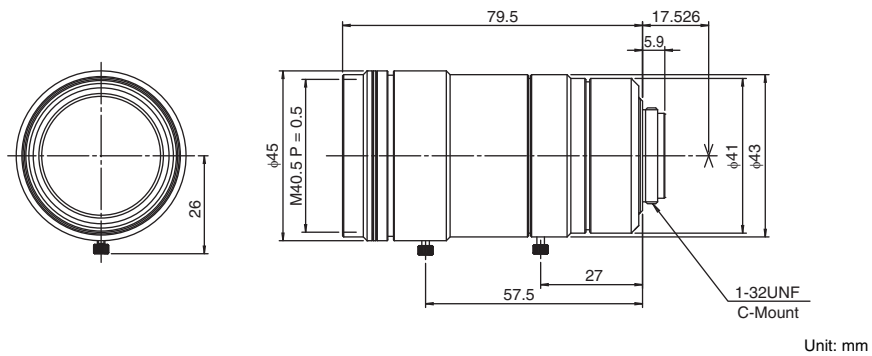
* The indicated values are for the applicable size CCD. The values for 1/3 inch are indicated in parenthesis ().

4/3"-compatible Ultra High-resolution C Mount Lens

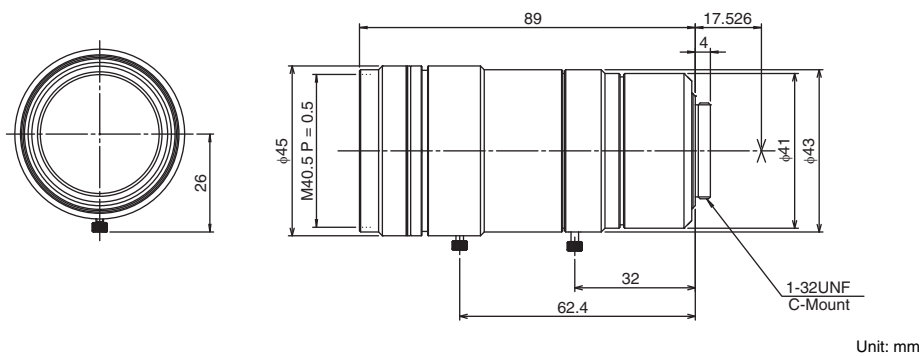
12-mm lens (CA-LHE12)



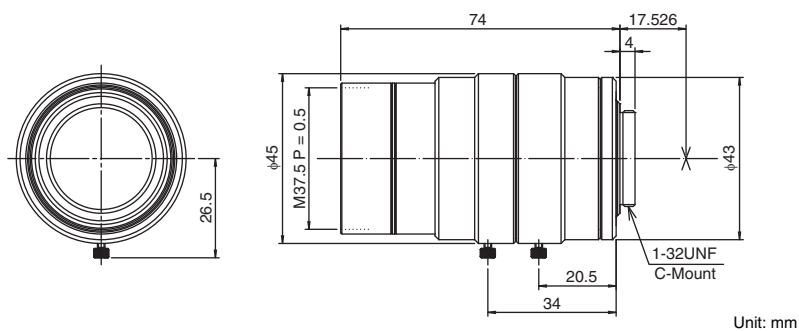
16-mm lens (CA-LHE16)



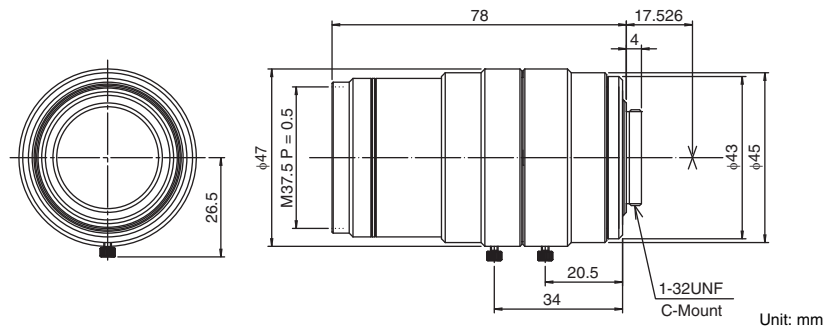
25-mm lens (CA-LHE25)



35-mm lens (CA-LHE35)



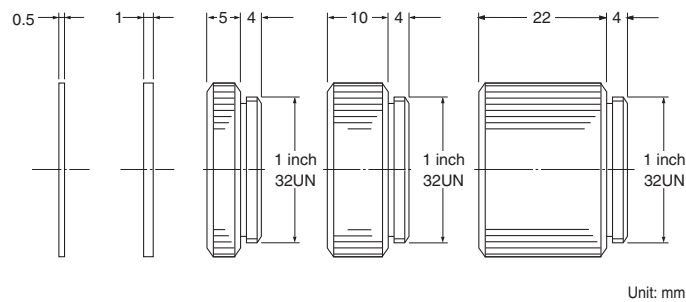
50-mm lens (CA-LHE50)



Specifications

Model	CA-LHE12	CA-LHE16	CA-LHE25	CA-LHE35	CA-LHE50
Focal Distance	12mm	16mm	25mm	35mm	50mm
Aperture	F2.0 to F22	F2.0 to F22	F2.0 to F16	F2.0 to F16	F2.0 to F22
Minimum working distance	0.1m	0.1m	0.15m	0.2m	0.3m
Mount	C-mount				
Filter thread diameter	55mm P0.75	40.5mm P0.5	40.5mm P0.5	37.5mm P0.5	37.5mm P0.5
Maximum CCD size	$\phi 23$ (C mount full-size)				
TV distortion	0.59%	0.02%	-0.57%	-0.17%	0.80%
Resolving power	Center 160 lines/mm, periphery 80 lines/mm				
Lens coating	WIDE BAND MULTI COATING				
Operating temperature/humidity range	0 to +50°C, 35 to 80% RH (no condensation)				
Weight	Approx. 270 g	Approx. 250 g	Approx. 260 g	Approx. 210 g	Approx. 220 g

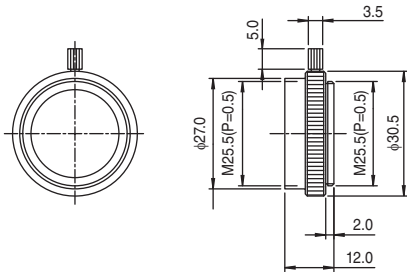
Close-up ring (OP-51612)



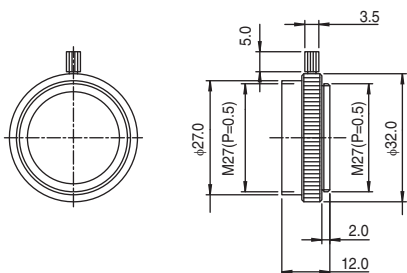
Various lens filters

Polarizing Filter

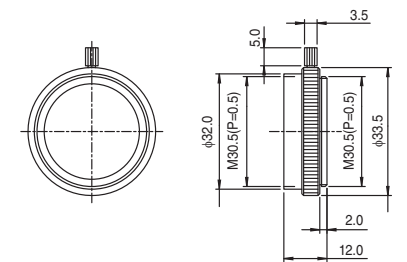
OP-51603 (M25.5 P0.5)



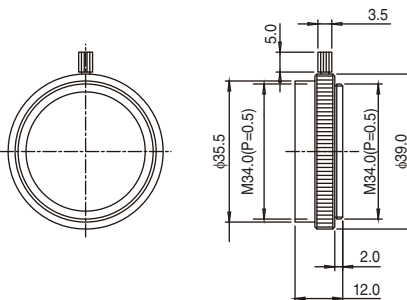
OP-54029 (M27 P0.5)



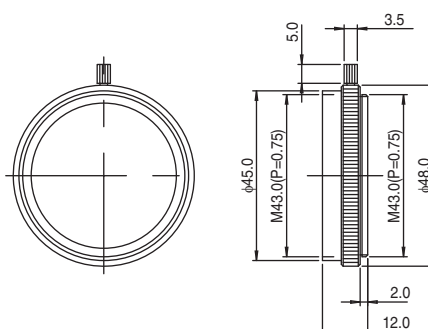
OP-54030 (M30.5 P0.5)



OP-87893 (M34 P0.5)



OP-87894 (M43 P0.75)



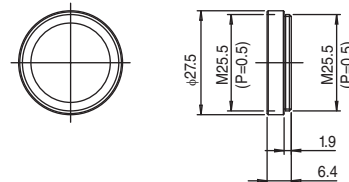
Unit: mm

Protective Filter/Sharp Cut Filter (R60)/ Blue Cut Filter

CA-LF25 (Protective Filter) (M25.5 P0.5)

CA-LF25R (Sharp Cut Filter (R60)) (M25.5 P0.5)

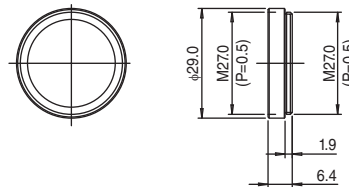
CA-LF25Y (Blue Cut Filter) (M25.5 P0.5)



CA-LF27 (Protective Filter) (M27 P0.5)

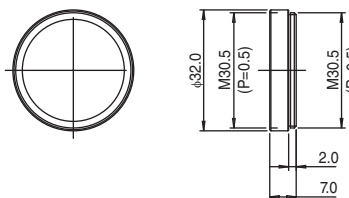
CA-LF27R (Sharp Cut Filter (R60)) (M27 P0.5)

CA-LF27Y (Blue Cut Filter) (M27 P0.5)

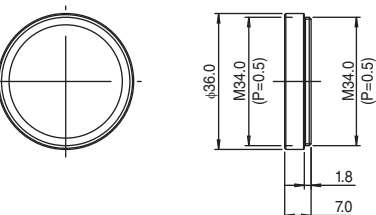


CA-LF30 (Protective Filter) (M30.5 P0.5)

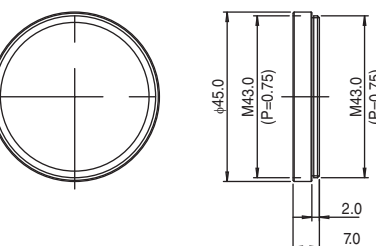
CA-LF30Y (Blue Cut Filter) (M30.5 P0.5)



CA-LF34 (Protective Filter) (M34 P0.5)



CA-LF43 (Protective Filter) (M43 P0.75)



Unit: mm

Macro Lenses

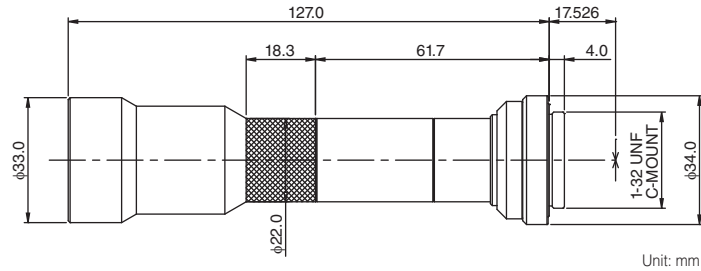
CA-LMH05/LMH10/LMH20/LMHA05/LMHA10/LMHA20

NOTICE

- If installing this product, make sure to secure it on the specified locations (specified in the outside dimensions) on the camera and lens.
- For more information on mounting this product, read the instructions provided with this product.

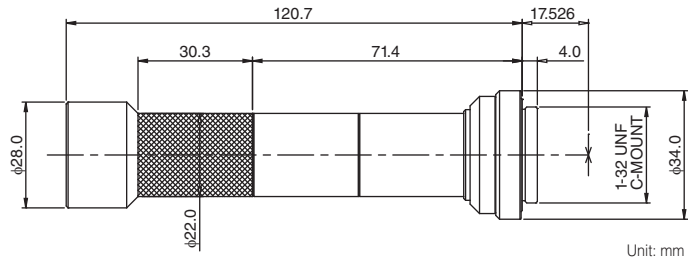
CA-LMH05

Specified fixing locations on the device
Mount at the spot which is specified on the hatching.



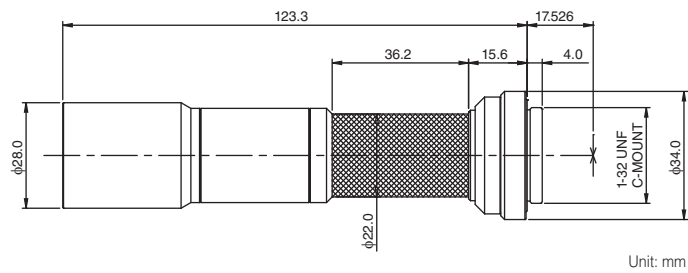
CA-LMH10

Specified fixing locations on the device
Mount at the spot which is specified on the hatching.



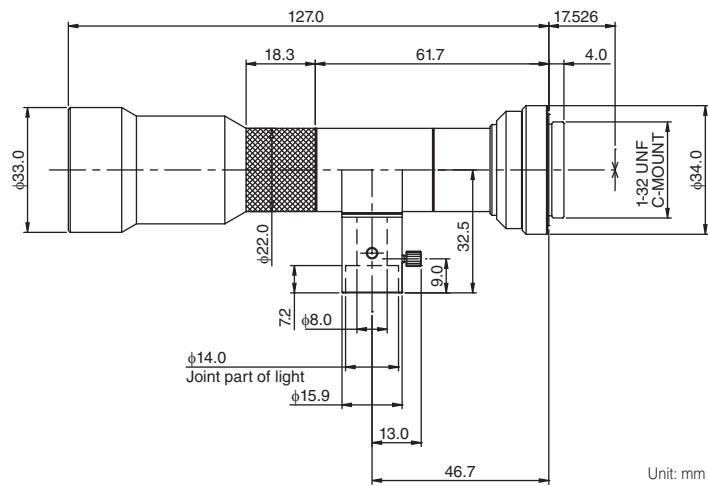
CA-LMH20

Specified fixing locations on the device
Mount at the spot which is specified on the hatching.



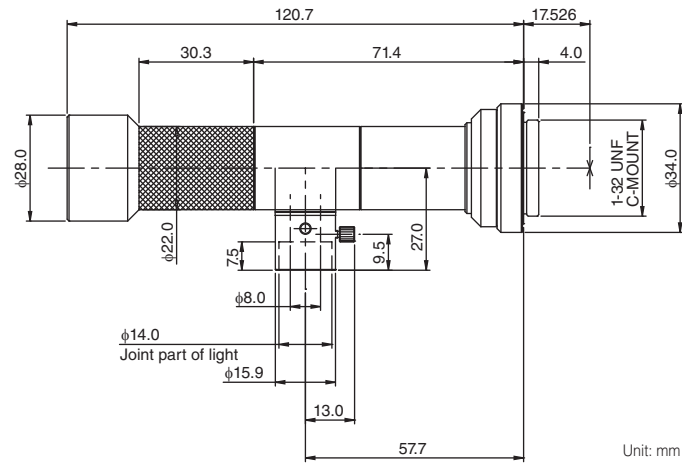
CA-LMHA05

Specified fixing locations on the device
Mount at the spot which is specified on the hatching.



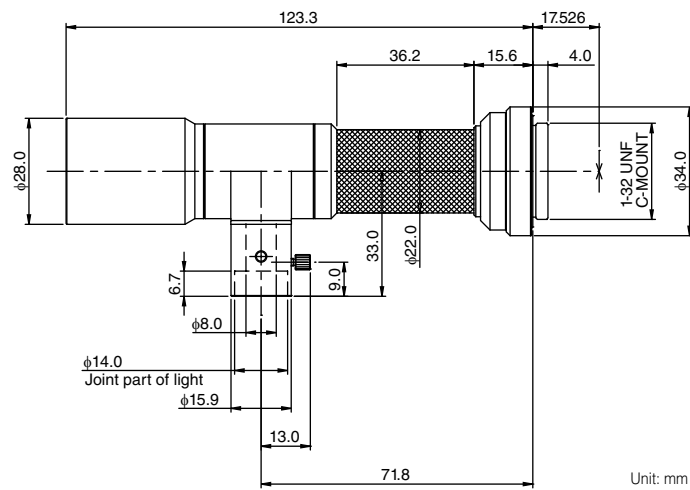
CA-LMHA10

Specified fixing locations on the device
Mount at the spot which is specified on the hatching.

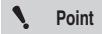


CA-LMHA20

Specified fixing locations on the device
Mount at the spot which is specified on the hatching.



Specifications



All the values in the specifications below are based on the optical design value. Individual differences can occur depending on the assembling accuracy.

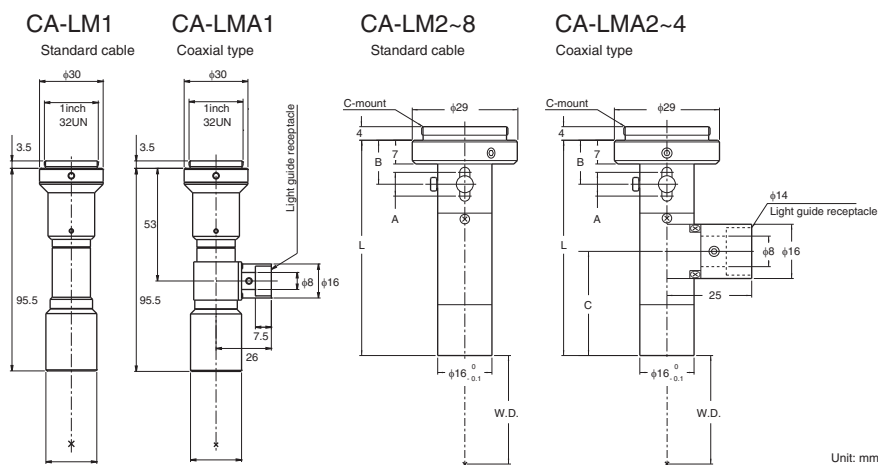
Model	CA-LMH05	CA-LMH10	CA-LMH20	CA-LMHA05	CA-LMHA10	CA-LMHA20	
Shape	Straight			Coaxial			
Optical magnification (standard magnification)	x0.5	x1.0	x2.0	x0.5	x1.0	x2.0	
Working distance (mm, at standard magnification) ^{*1}	110.2	110.1	110.2	110.2	110.1	110.2	
Compatible image/CCD size	2/3 inch						
Field of view (mm, at standard magnification)	1/3 inch	7.2 × 9.6	3.6 × 4.8	1.8 × 2.4	7.2 × 9.6	3.6 × 4.8	1.8 × 2.4
	1/2 inch	9.6 × 12.8	4.8 × 6.4	2.4 × 3.2	9.6 × 12.8	4.8 × 6.4	2.4 × 3.2
	2/3 inch	13.2 × 17.6	6.6 × 8.8	3.3 × 4.4	13.2 × 17.6	6.6 × 8.8	3.3 × 4.4
Effective F value	9.6	11.1	13.5	9.6	11.1	13.5	
Depth of field (mm) ^{*2}	3.1	0.9	0.3	3.1	0.9	0.3	
TV distortion (Max)	0.00%		0.01%	0.00%		0.01%	
Resolution (μm) ^{*3}	12.9	7.5	4.5	12.9	7.5	4.5	
Mount	C-mount						
Operating temperature and humidity range	0 to +50°C, 35 to 80% RH (no condensation)						
Weight	Approx. 100 g	Approx. 95 g	Approx. 130 g	Approx. 110 g	Approx. 105 g	Approx. 140 g	

*1 The working distance indicates the operation distance when using each lens with the standard magnification.

*2 The depth of field is the simulation value with the minimum circle of confusion of 40 μm.

*3 The resolution indicates a simulation value calculated at 550 nm.

CA-LM1/LMA1/LM2/LMA2/LM4/LMA4/LM6/LM8



Model	CA-LM(A)2	CA-LM(A)4	CA-LM6	CA-LM8
L (length)	63.5 mm	69.3 mm	80.6 mm	95.0 mm
A (adjustment range)	7.0 mm	9.3 mm	7.7 mm	7.6 mm
B (adjustment position)	13.0 mm	15.1 mm	20.5 mm	34.9 mm
C (coaxial position)	30.7 mm	31.8 mm	—	—

Point

All the values in the specifications below are based on the optical design value. Individual differences can occur depending on the assembling accuracy.

Model	CA-LM1	CA-LM2	CA-LM4	CA-LM6	CA-LM8	CA-LMA1	CA-LMA2	CA-LMA4	
Shape	Straight					Coaxial			
Optical magnification (standard magnification)	x1	x2	x4	x6	x8	x1	x2	x4	
Magnification range	—	Approx. ±3% relative to the standard magnification	Approx. ±5% relative to the standard magnification			—	Approx. ±3% relative to the standard magnification	Approx. ±5% relative to the standard magnification	
Working distance (mm, at standard magnification) ^{*1}	66.9	66.9	70.3	64.4	64.5	66.9	66.9	70.3	
Compatible image/CCD size	2/3 inch	1/2 inch	1/2 inch	1/2 inch	1/2 inch	2/3 inch	1/2 inch	1/2 inch	
Field of view ^{*2} (mm, at standard magnification)	1/3 inch	3.6 x 4.8	1.8 x 2.4	0.9 x 1.2	0.6 x 0.8	0.45 x 0.6	3.6 x 4.8	1.8 x 2.4	0.9 x 1.2
	1/2 inch	4.8 x 6.4	2.4 x 3.2	1.2 x 1.6	0.8 x 1.07	0.6 x 0.8	4.8 x 6.4	2.4 x 3.2	1.2 x 1.6
	2/3 inch	6.6 x 8.8	—	—	—	—	6.6 x 8.8	—	—
Effective F value	11.5	15.4	26.5	39.3	52.4	11.5	15.4	26.5	
Depth of field (μm) ^{*3 *4}	920	400	172	111	79	920	400	172	
TV distortion (Max)	0.02%	-0.04%	-0.22%	-0.10%	-0.04%	0.02%	-0.04%	-0.22%	
Resolution (μm) ^{*5}	7.7	5.1	4.5	4.4	4.4	7.7	5.1	4.5	
Mount	C-mount								
Operating temperature and humidity range	0 to +50°C, 80% RH (no condensation)								
Weight	Approx. 66 g	Approx. 57 g	Approx. 58 g	Approx. 64 g	Approx. 67 g	Approx. 75 g	Approx. 62 g	Approx. 66 g	

^{*1} The working distance indicates the operating distance when each lens is used at standard magnification. Working distance will vary depending on the magnification adjustment.

^{*2} Field of view indicates the standard field of view for each CCD size. The field of view can be changed by approximately ±5% by adjusting the magnification.

^{*3} The indicated depth of field is a simulation value that assumes 1/2" image/CCD size and a horizontal resolution of 320 TV lines. (Circle of least confusion is 40 μm in the image)

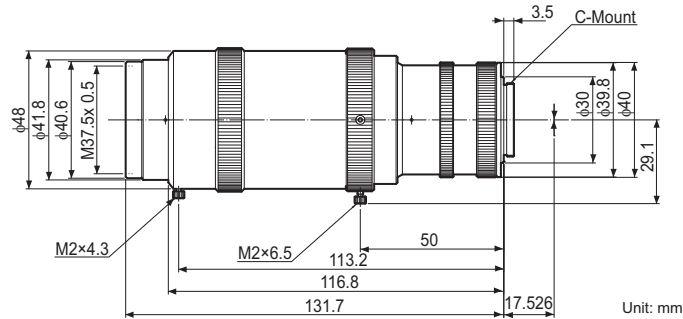
^{*4} Depth of field varies depending on the F value.

^{*5} The resolution indicates a simulation value calculated at 550 nm.

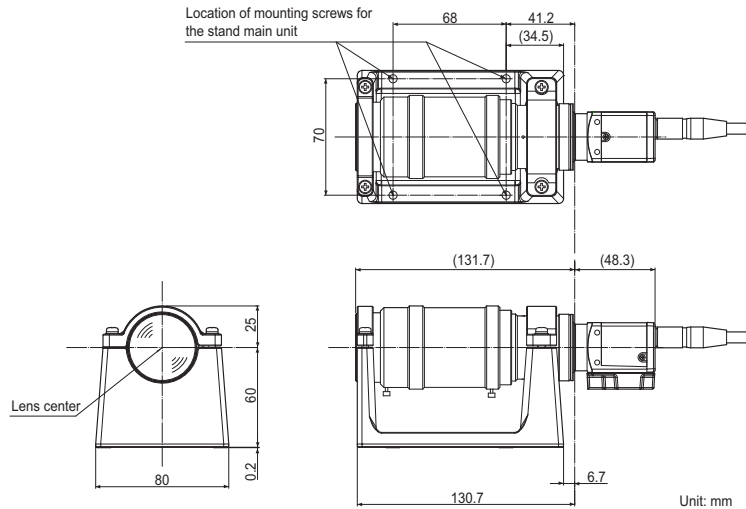
CA-LM0307

NOTICE

When using the CA-LM0307, make sure to secure the macro lens directly to the equipment with the dedicated stand for the telecentric macro lens (OP-87524: sold separately) or with a similarly structured mechanism. If unsecured, an extreme amount of load will be applied in the vicinity of the camera mount and may cause the equipment to break or the cause the lens to fall out. For details, see "Precautions on Use", which is included with the CA-LM0307.



With dedicated stand for the telecentric macro lens (OP-87524: Sold separately), and camera (CV-035C/M: Sold separately) equipped



Model	CA-LM0307	
Shape	Straight	
Optical magnification (standard magnification)	×0.3 to ×0.75	
Magnification range	-	
Working distance (mm, at standard magnification) ^{*1}	177.8(×0.3), 97(×0.75)	
Compatible image/CCD size	2/3 inch	
Field of view ^{*2} (mm, at standard magnification)	1/3 inch	4.8×6.4 to 12×16
	1/2 inch	6.4×8.5 to 16×21.3
	2/3 inch	8.8×11.7 to 22×29.3
Effective F value	5 to CLOSE (F value 2.8 to CLOSE)	
Depth of field (μm) ^{*3 *4}	14220(×0.3), 2270(×0.75)	
TV distortion (Max)	0.1%(×0.3), 0.025%(×0.75)	
Resolution (μm) ^{*5}	11.2(×0.3), 4.5(×0.75)	
Mount	C-mount	
Filter screw diameter	M37.5 P0.5	
Operating temperature and humidity range	0 to +50°C, 80% RH (no condensation)	
Weight	Approx. 345 g	

^{*1} WD indicates the working distance when each lens is used at standard magnification. Working distance will vary depending on the magnification adjustment.

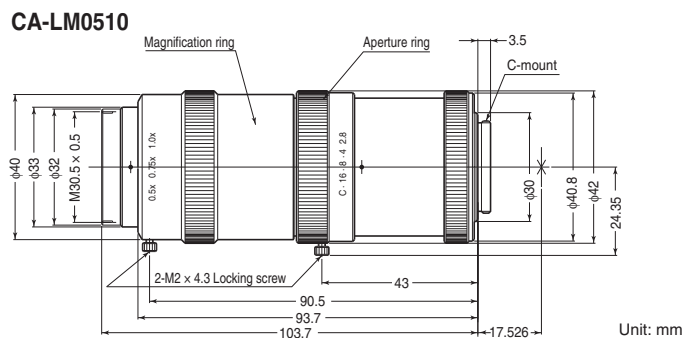
^{*2} Field of view indicates the standard field of view for each CCD size. The field of view can be changed by adjusting the magnification.

^{*3} The indicated depth of field is a simulation value that assumes 1/2" image/CCD size and a horizontal resolution of 320 TV lines. (Circle of least confusion is 40 μm in the image)

^{*4} The CA-LM0307 depth of field is for an effective F value of 32. Depth of field varies depending on the F value.

^{*5} The resolution indicates a simulation value calculated at 550 nm.

CA-LM0510



! Point

All the values in the specifications below are based on the optical design value. Individual differences can occur depending on the assembling accuracy.

Model		CA-LM0510
Shape		Straight
Optical magnification (standard magnification)		×0.5 to ×1
Magnification range		-
Working distance (mm, at standard magnification) ^{*1}		111(×0.5), 78(×1.0)
Compatible image/CCD size		2/3 inch
Field of view ^{*2} (mm, at standard magnification)	1/3 inch	3.6×4.8 to 7.2×9.6
	1/2 inch	4.8×6.4 to 9.6×12.8
	2/3 inch	6.6×8.8 to 13.2×17.6
Effective F value		5 to CLOSE (F value 2.8 to CLOSE)
Depth of field (μm) ^{*3 *4}		5120(×0.5) to 1280(×1.0)
TV distortion (Max)		-0.4%(×0.5), -0.1%(×1.0)
Resolution (μm) ^{*5}		3.8(×0.5), 3.4(×1.0)
Mount		C-mount
Filter screw diameter		M30.5 P0.5
Operating temperature and humidity range		0 to +50°C, 80% RH (no condensation)
Weight		Approx. 220 g

^{*1} WD indicates the working distance when each lens is used at standard magnification. Working distance will vary depending on the magnification adjustment.

^{*2} Field of view indicates the standard field of view for each CCD size. The field of view can be changed by adjusting the magnification.

^{*3} The indicated depth of field is a simulation value that assumes 1/2" image/CCD size and a horizontal resolution of 320 TV lines. (Circle of least confusion is 40 μm in the image)

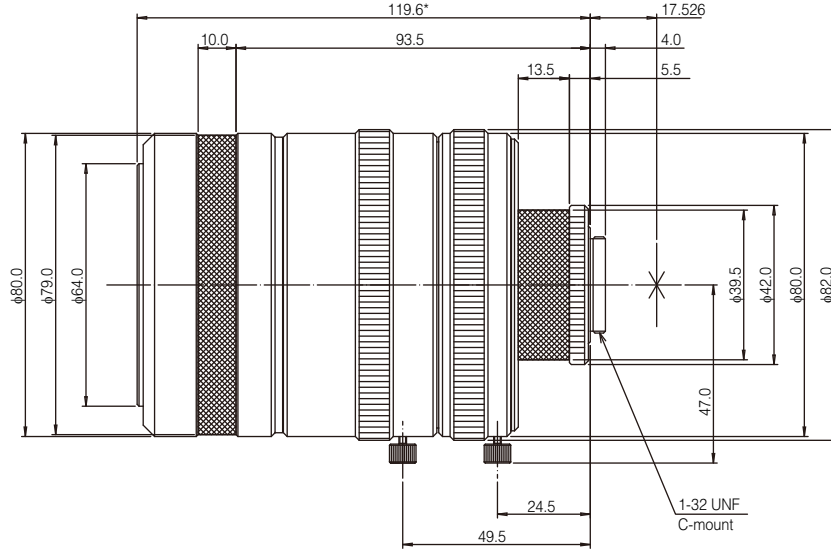
^{*4} The CA-LM0510 depth of field is for an effective F value of 32. Depth of field varies depending on the F value.

^{*5} The resolution indicates a simulation value calculated at 550 nm.

4/3" Compatible Variable Magnification Telecentric Macro Lens

CA-LMHE0510

Specified fixing locations on the device
Mount at the spot which is specified on the hatching.



* This varies depending on the focal magnification. Extension amount: 0 to 31.9 mm
(the extension amount is at its maximum value when the magnification is at its minimum value).

Unit: mm

NOTICE

- If installing this product, make sure to secure it on the 2 designated locations (specified in the outside dimensions) on the camera and lens.
- For more information on mounting this product, read the instructions provided with this product.

Specifications



Point

All the values in the specifications below are based on the optical design value. Individual differences can occur depending on the assembling accuracy.

Model		CA-LMHE0510
Shape		Straight
Optical magnification		x0.5 to x1.0
WD *1 (mm)		80.0(x0.5), 81.8(x1.0)
CCD size		4/3 inch (φ23.0 mm)
Captured field of view *2 (mm, at standard magnification)	4/3 inch	36.8x27.6 to 18.4x13.8
	2/3 inch	17.6x13.2 to 8.8x6.6
	1/3 inch	9.6x7.2 to 4.8x3.6
Effective F value		5 to 32
Resolving power		Center/periphery 120 lines/mm
Depth of field *3 (μm)		5120(x0.5), 1280(x1.0)
TV distortion (Max)		0.1%(x0.5), 0.1%(x1.0)
Resolution *4 (μm)		6.7(x0.5), 3.4(x1.0)
Mount		C-mount
Operating temperature and humidity range		0 to +50°C, 35 to 80%RH (no condensation)
Weight		Approx. 1050 g

*1 WD indicates the distance from the tip of the lens to the workpiece. Changing the magnification changes this distance.

*2 Field of view indicates the standard field of view for each CCD size. The field of view can be changed by adjusting the magnification.

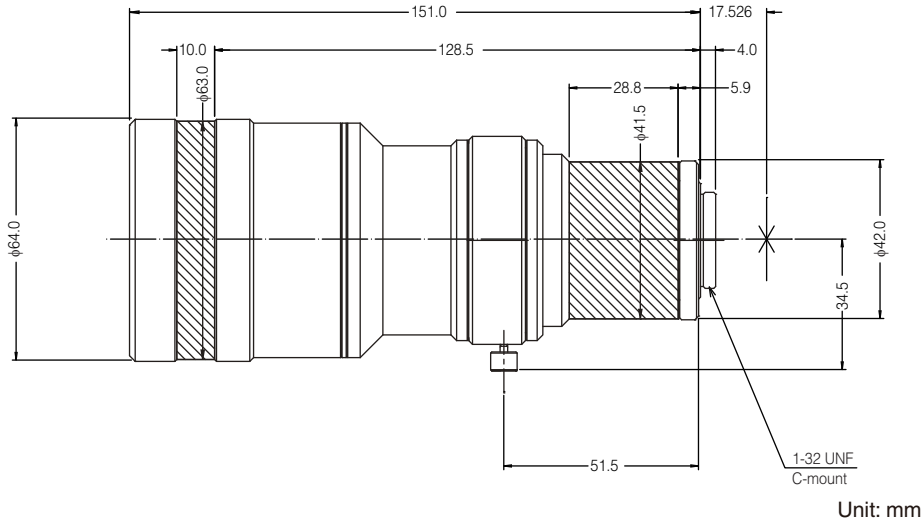
*3 The depth of field is a theoretical value calculated with an effective f-value of 16 and a circle of least confusion of 40 μm. This varies depending on the f-value.

*4 The resolution indicates a theoretical value calculated at 550 nm.

4/3" Compatible, Telecentric Macro Lens

CA-LMHE20

Specified fixing locations on the device
Please secure the spot (the shaded area) that is hatched around the hatching.

**NOTICE**

- If installing this product, make sure to secure it on the 2 designated locations (specified in the outside dimensions) on the camera and lens.
- For more information on mounting this product, read the instructions provided with this product.

Specifications

Point

All the values in the specifications below are based on the optical design value. Individual differences can occur depending on the assembling accuracy.

Model	CA-LMHE20	
Shape	Straight	
Optical magnification	x2.0	
WD *1(mm)	80.6	
CCD size	4/3 inch (ø23.0mm)	
Captured field of view *2 (mm, at standard magnification)	4/3 inch	9.2×6.9
	2/3 inch	4.4×3.3
	1/3 inch	2.4×1.8
Effective F value	5.0 to 72	
Resolving power	Center/periphery: 120 lines/mm	
Depth of field *3 (μm)	320	
TV distortion (Max)	0.1%	
Resolution *4 (μm)	1.7	
Mount	C-mount	
Operating temperature and humidity range	0 to +50°C, 35 to 80% RH (no condensation)	
Weight	Approx. 830 g	

*1 WD indicates the distance from the tip of the lens to the workpiece. Changing the magnification changes this distance.

*2 The capture field of view range indicates the standard field of view for each CCD size.

*3 The depth of field is a theoretical value calculated with an effective f-value of 16 and a circle of least confusion of 40 μm. This varies depending on the f-value.

*4 The resolution indicates a theoretical value calculated at 550 nm.

Ultra High-resolution Telecentric Macro Lens

NOTICE

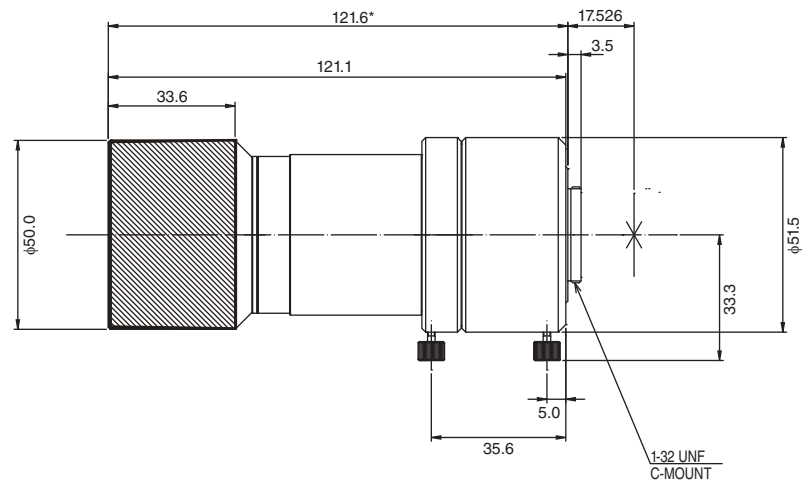
- If installing this product, make sure to secure it on the designated locations (specified in the outside dimensions) on the camera and lens.
- For more information on mounting this product, read the instructions provided with this product.

Point

As the lens extends or retracts when the magnification is changed, set the magnification settings first before fixing the lens.

CA-LMHR04

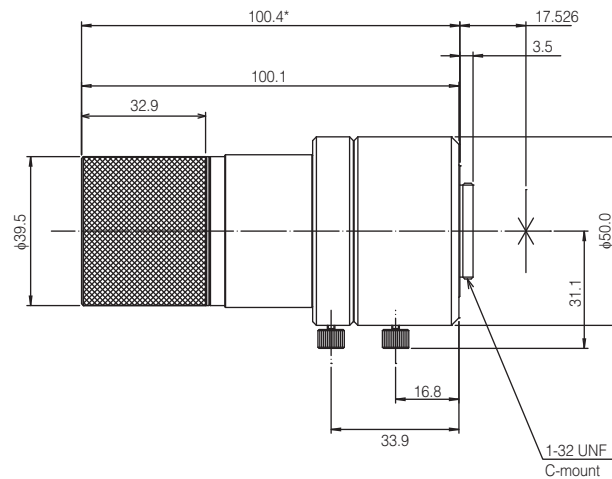
Specified fixing locations on the device
Mount at the spot which is specified on the hatching.



* This varies depending on the focal magnification. Extension amount: 0 to 20.7 mm
(the extension amount is at its maximum value when the magnification is at its maximum value). Unit: mm

CA-LMHR08

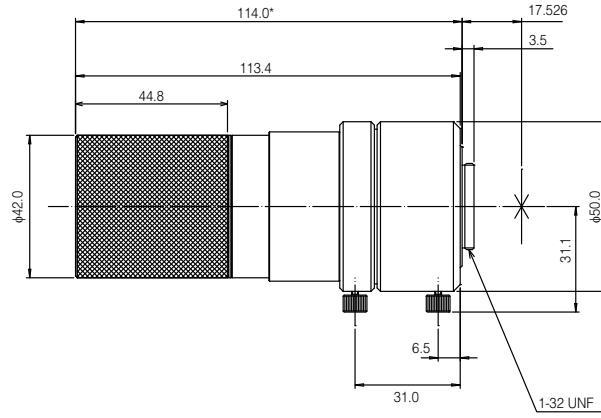
Specified fixing locations on the device
Mount at the spot which is specified on the hatching.



* This varies depending on the focal magnification. Extension amount: 0 to 21.2 mm
(the extension amount is at its maximum value when the magnification is at its maximum value). Unit: mm

CA-LMHR13

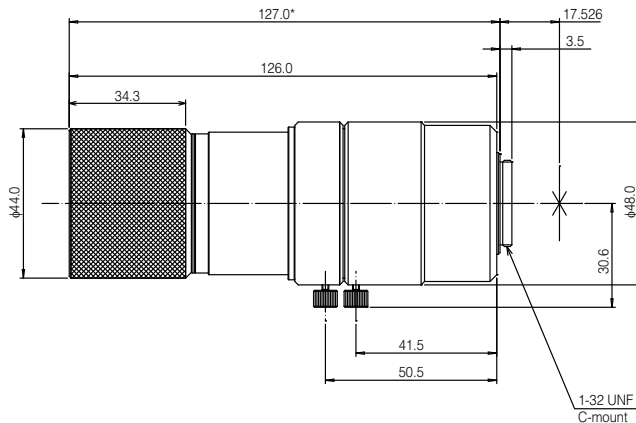
Specified fixing locations on the device
Mount at the spot which is specified on the hatching.



* This varies depending on the focal magnification. Extension amount: 0 to 10 mm
(the extension amount is at its maximum value when the magnification is at its maximum value). Unit: mm

CA-LMHR20

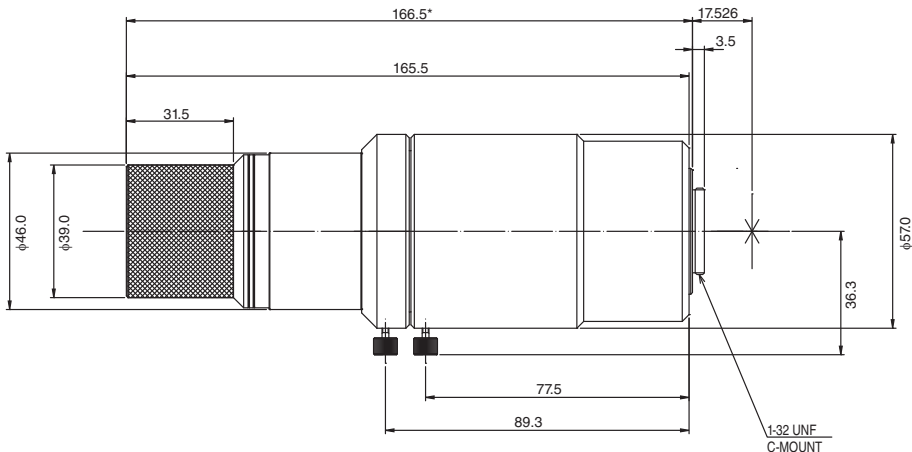
Specified fixing locations on the device
Mount at the spot which is specified on the hatching.



* This varies depending on the focal magnification. Extension amount: 0 to 20.6 mm
(the extension amount is at its maximum value when the magnification is at its maximum value). Unit: mm

CA-LMHR40

Specified fixing locations on the device
Mount at the spot which is specified on the hatching.



* This varies depending on the focal magnification. Extension amount: 0 to 13.5 mm
(the extension amount is at its maximum value when the magnification is at its maximum value). Unit: mm

Specifications



All the values in the specifications below are based on the optical design value. Individual differences can occur depending on the assembling accuracy.

Model		CA-LMHR04	CA-LMHR08	CA-LMHR13	CA-LMHR20	CA-LMHR40
Shape		Straight				
Pixel resolution *1 (US 3.5 μm: low magnification to US 4.4 μm: high magnification)		10μm/pixel	5μm/pixel	3μm/pixel	2μm/pixel	1μm/pixel
Optical magnification		x0.35 to x0.44	x0.69 to x0.88	x1.15 to x1.47	x1.73 to x2.20	x3.45 to x4.41
WD *2(mm)	At the time of low magnification	112.7	111.0	111.6	114.8	65.9
	At the time of high magnification	112.7	111.0	111.6	109.4	65.9
Maximum CCD size		2/3 inch				
Captured field of view *3 (mm)	2/3 inch At the time of low magnification	24.0 x 20.2	12.2 x 10.3	7.3 x 6.2	4.8 x 4.1	2.4x2.1
	2/3 inch At the time of high magnification	19.1 x 16.1	9.5 x 8.0	5.7 x 4.8	3.8 x 3.2	1.9 x 1.6
	1/1.8 inch At the time of low magnification	20.1 x 15.1	10.2 x 7.7	6.1 x 4.6	4.1 x 3.1	2.0 x 1.5
	1/1.8 inch At the time of high magnification	16.0 x 12.0	8.0 x 6.0	4.8 x 3.6	3.2 x 2.4	1.6 x 1.2
Effective F value	At the time of low magnification	4.4 to 18	5.6 to 21	5.7 to 35	6.8 to 43	8.6 to 183
	At the time of high magnification	5.5 to 22	7.1 to 27	7.3 to 45	8.7 to 56	11 to 234
Resolving power		Center/periphery: 120 lines/mm				
Depth of field *4 (mm)	At the time of low magnification	10.449	2.689	0.968	0.428	0.108
	At the time of high magnification	6.612	1.653	0.592	0.264	0.066
TV distortion	At the time of low magnification	0.02%	0.005%	0.011%	0.001%	0.015%
	At the time of high magnification	0.01%	-0.001%	-0.015%	0.011%	-0.002%
Resolution *5 (μm)		8.39	5.4	3.3	2.6	1.68
Mount		C-mount				
Operating temperature and humidity ranges		0 to +50°C, 35 to 80%RH (No condensation)				
Weight		Approx. 400 g	Approx. 285 g	Approx. 330 g	Approx. 410 g	Approx. 650 g

*1 The pixel resolution is the capture field of view per pixel. This varies depending on the camera used.

US = Unit cell size size of 1 pixel

*2 WD indicates the distance from the tip of the lens to the workpiece. Changing the magnification changes this distance.

*3 The capture field of view range indicates the field of view for each CCD size. The field of view can be changed by adjusting the magnification.

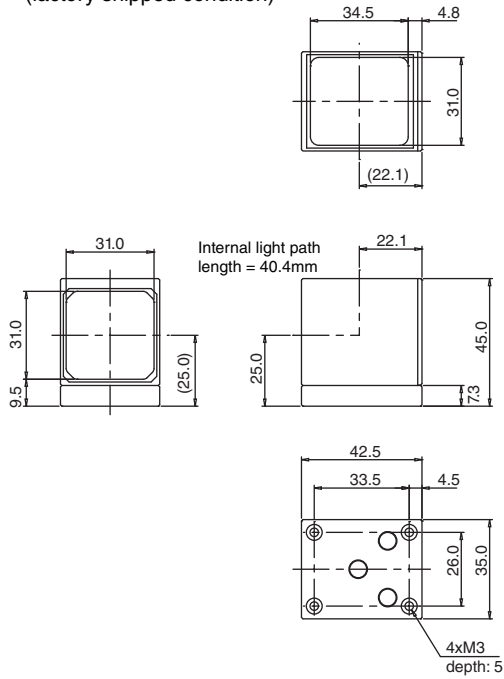
*4 The depth of field is a theoretical value calculated with an effective f-value of 16 and a circle of least confusion of 40 μm. This varies depending on the f-value.

*5 The resolution indicates a theoretical value calculated at 550 nm.

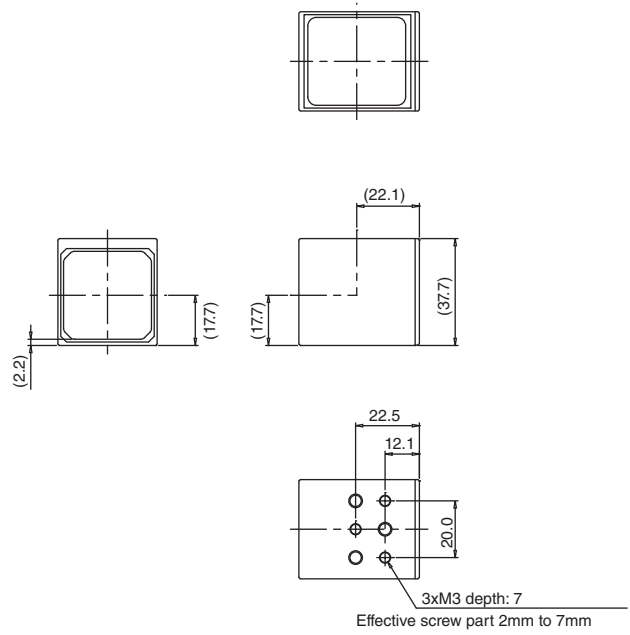
Side View Mirror (OP-87895)

Options

With plastic mount attached
(factory shipped condition)



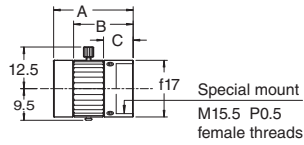
Without plastic mount



Unit: mm

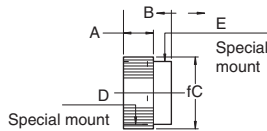
High-speed, small camera (CA-HS200C/HS200M) / Small Camera (CV-S200C/S200M) Options

Lens CA-LHS*



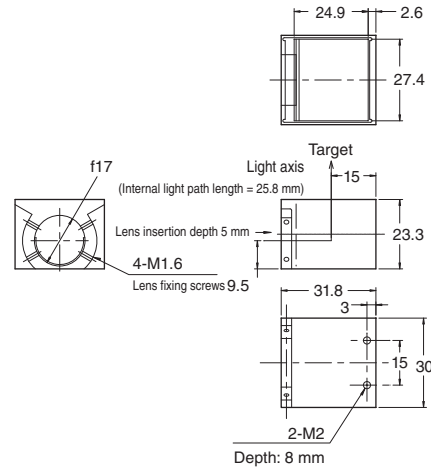
	CA-LHS8	CA-LHS16	CA-LHS25	CA-LHS50
A	40.4	23.9	24.9	40.4
B	28.6	17.9	18.6	27.1
C	19.6	8.9	9.6	18.1

Close-up ring OP-66830 (5 mm)/OP-66831 (10 mm)



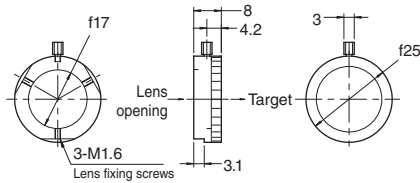
	OP-66830	OP-66831
A	5	10
B	8	13
C	17	17
D	M15.5 P=0.5 female threads	
E	M15.5 P=0.5 male threads	

Side view attachment OP-66833



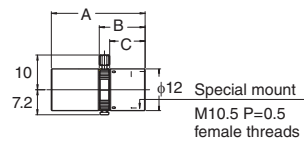
Unit: mm

Polarizing filter OP-66832



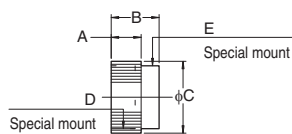
High-speed, small camera (CA-HS035C/HS035M) / Ultra Small Camera (CV-S035C/S035M) Options

Lens CA-LS*



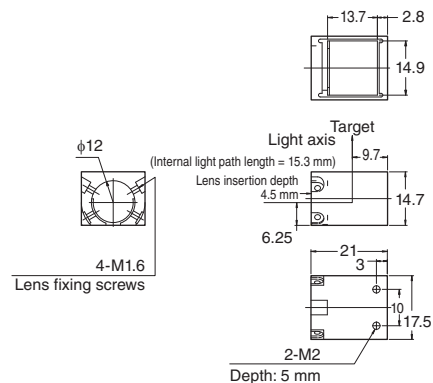
	CA-LS4	CA-LS6	CA-LS16	CA-LS30
A	16.7	21.3	20.4	27
B	11.5	15.9	10.2	13.2
C	8.5	12.9	7.2	10.2

Close-up ring OP-51500 (5 mm)/OP-51501 (10 mm)



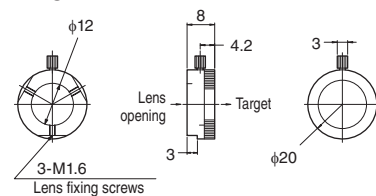
	OP-51500	OP-51501
A	5	10
B	8	13
C	12	12
D	M10.5 P=0.5 female threads	
E	M10.5 P=0.5 male threads	

Side view attachment OP-51503



Unit: mm

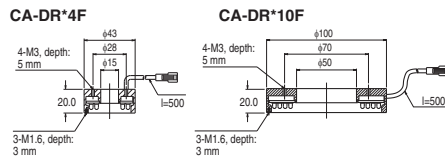
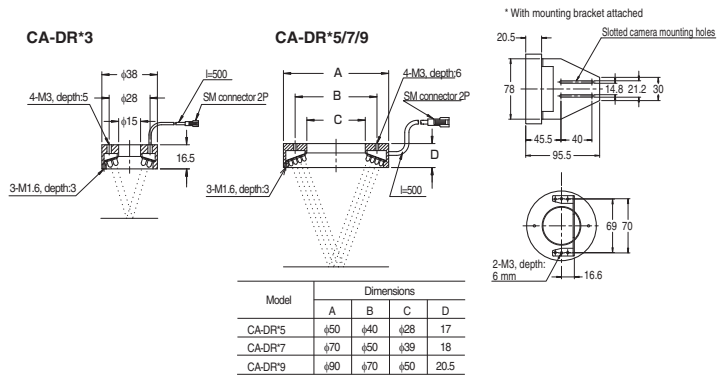
Polarizing filter OP-51502



LED Lights

Direct ring lights (CA-DR)

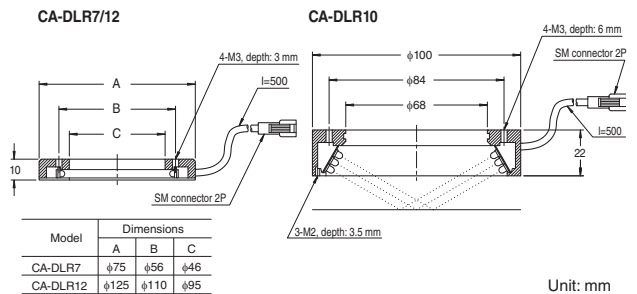
Model	LED color	Weight	Current consumption
CA-DRR3	Red	Approx. 20 g	1.5 W
CA-DRW3	White	Approx. 20 g	2.9 W
CA-DRB3	Blue	Approx. 20 g	2.9 W
CA-DRR5	Red	Approx. 40 g	3.2 W
CA-DRW5	White	Approx. 40 g	3.6 W
CA-DRB5	Blue	Approx. 40 g	3.6 W
CA-DRR7	Red	Approx. 60 g	7.2 W
CA-DRW7	White	Approx. 60 g	7.7 W
CA-DRB7	Blue	Approx. 60 g	7.7 W
CA-DRR9	Red	Approx. 90 g	8.3 W
CA-DRW9	White	Approx. 80 g	7.9 W
CA-DRB9	Blue	Approx. 80 g	7.9 W
CA-DRR4F	Red	Approx. 20 g	1.5 W
CA-DRW4F	White	Approx. 20 g	2.9 W
CA-DRB4F	Blue	Approx. 20 g	2.9 W
CA-DRR10F	Red	Approx. 90 g	8.3 W
CA-DRW10F	White	Approx. 80 g	7.9 W
CA-DRB10F	Blue	Approx. 80 g	7.9 W



Unit: mm

Low-angle lights (CA-DL)

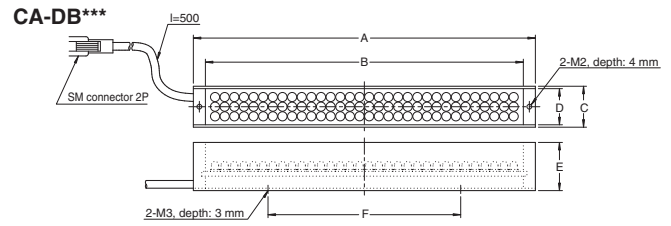
Model	LED color	Weight	Current consumption
CA-DLR7	Red	Approx. 40g	2W
CA-DLR10	Red	Approx. 80g	7.7W
CA-DLR12	Red	Approx. 85g	3.3W



Unit: mm

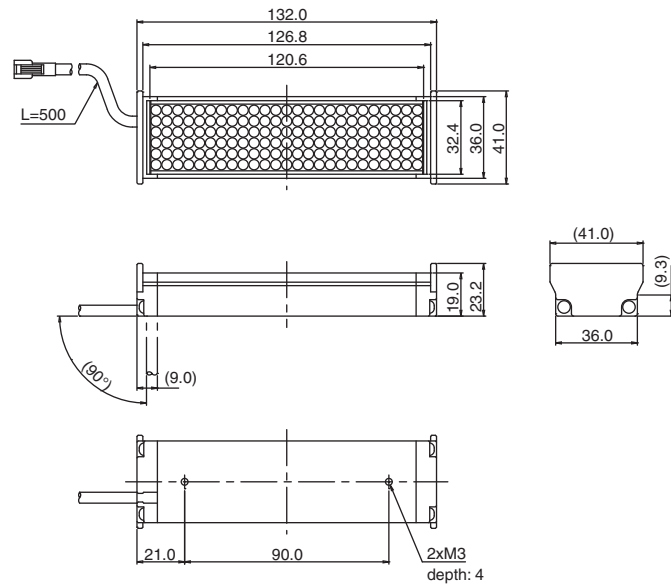
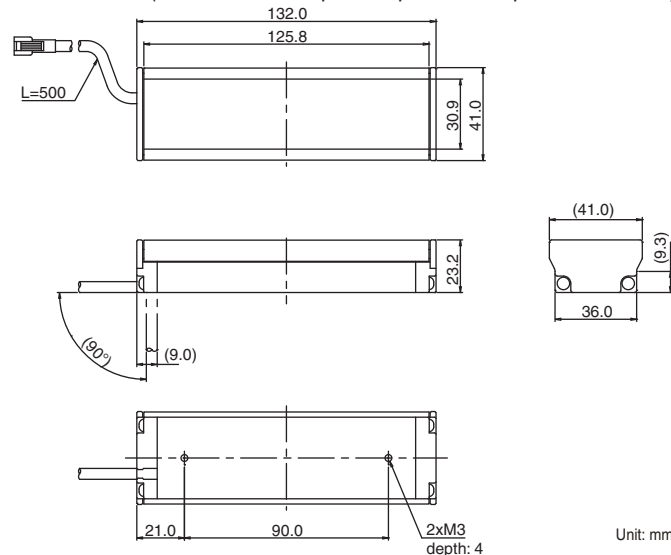
Bar lights (CA-DB)

Model	LED color	Weight	Current consumption
CA-DBR5	Red	Approx. 35g	1.7 W
CA-DBW5	White	Approx. 40 g	2.9 W
CA-DBB5	Blue	Approx. 40 g	2.9 W
CA-DBR8	Red	Approx. 60 g	3.6 W
CA-DBW8	White	Approx. 60 g	4.8 W
CA-DBB8	Blue	Approx. 60 g	4.8 W
CA-DBR13	Red	Approx. 80 g	4.2 W
CA-DBW13	White	Approx. 90 g	7.3 W
CA-DBB13	Blue	Approx. 90 g	7.3 W
CA-DBW12W	White	Approx. 195g	13.8 W
CA-DBW24W	White	Approx. 345g	27.6 W
CA-DBW34H	White	Approx. 1050 g	18.4 W×2ch
CA-DBW50H	White	Approx. 1490 g	19.8 W×2ch



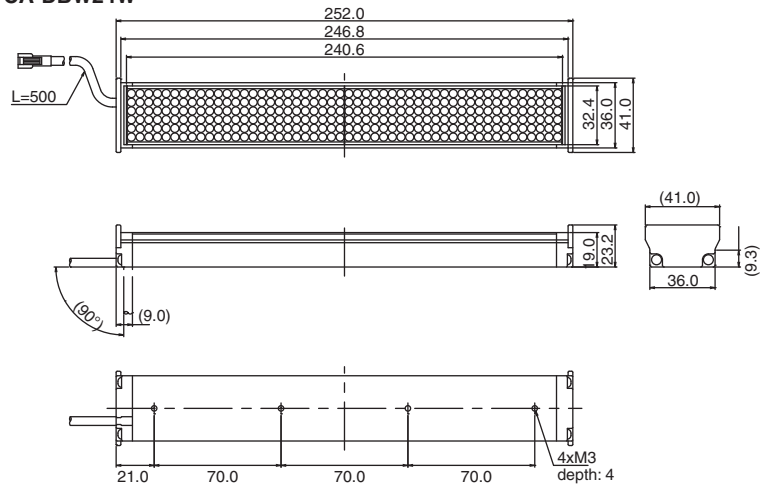
Model	Dimensions					
	A	B	C	D	E	F
CA-DB*5	60	50	17	15	20	30
CA-DB*8	92	82	17	15	20	50
CA-DB*13	142	132	17	15	20	80

Unit: mm

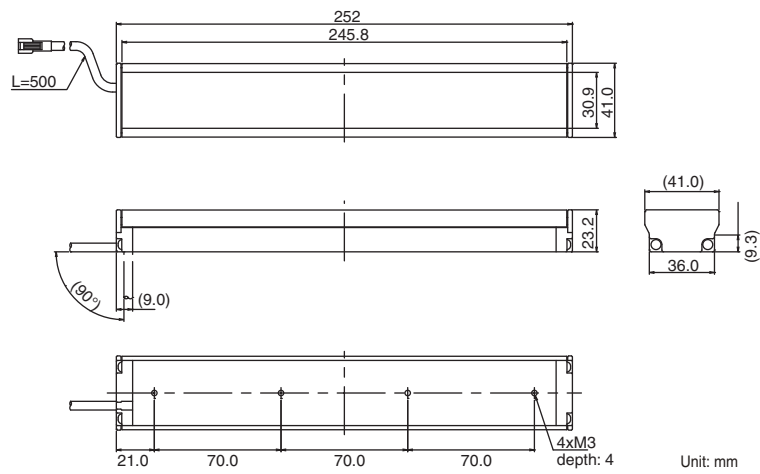
CA-DBW12W**CA-DBW12W (When a diffusion plate or polarization plate is mounted)**

Unit: mm

CA-DBW24W

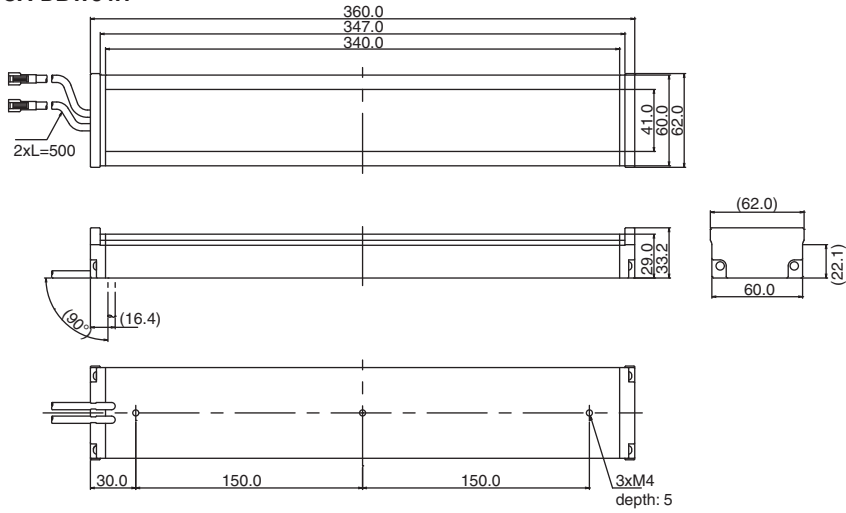


CA-DBW24W (When a diffusion plate or polarization plate is mounted)

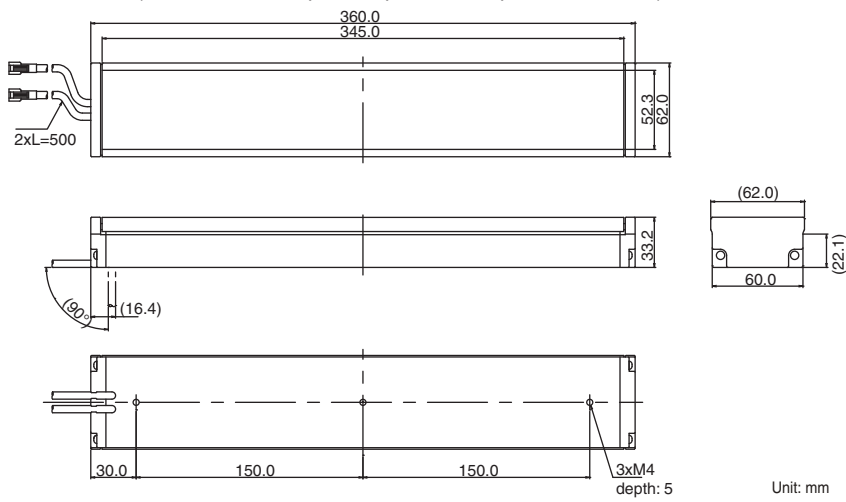


Unit: mm

CA-DBW34H

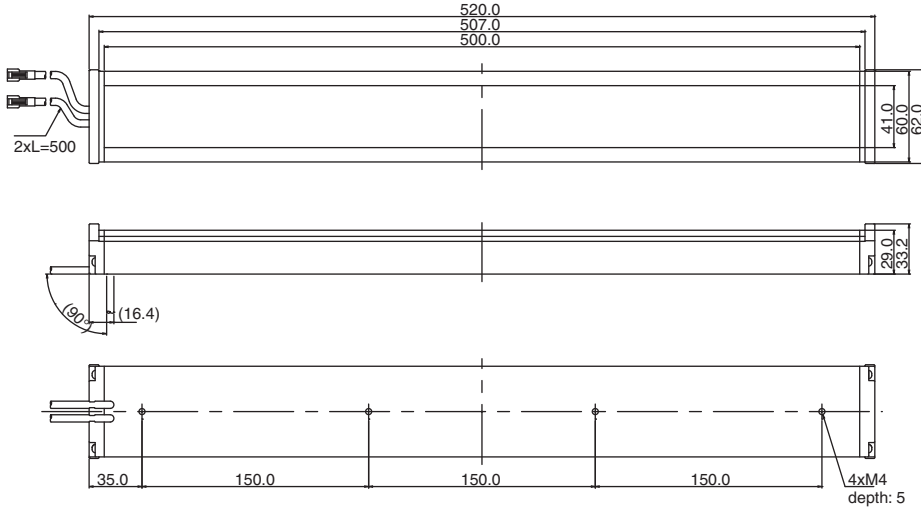


CA-DBW34H (When a diffusion plate or polarization plate is mounted)

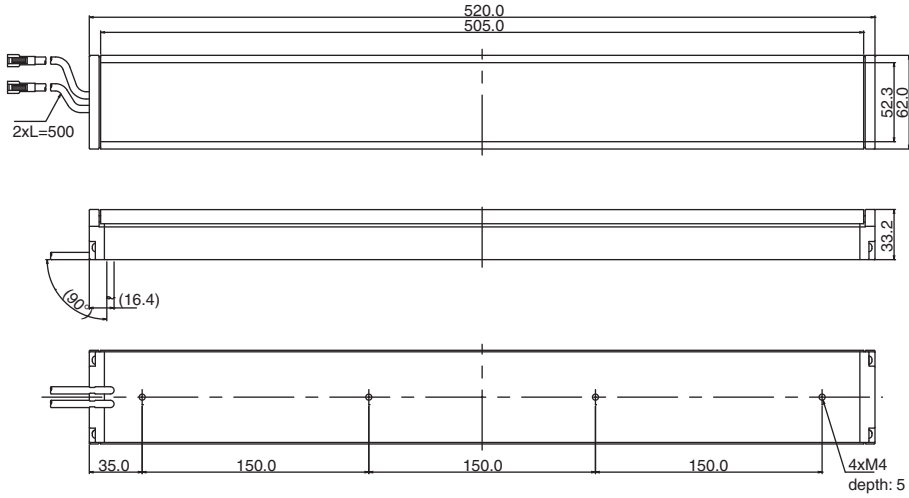


Unit: mm

CA-DBW50H



CA-DBW50H (When a diffusion plate or polarization plate is mounted)

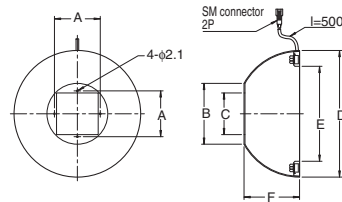


Unit: mm

Dome lights (CA-DD)

Model	LED color	Weight	Current consumption
CA-DDR8	Red	Approx. 70 g	5.8 W
CA-DDW8	White	Approx. 70 g	5.8 W
CA-DDB8	Blue	Approx. 70 g	5.8 W
CA-DDR15	Red	Approx. 130 g	11 W
CA-DDW15	White	Approx. 170 g	18.8 W
CA-DDB15	Blue	Approx. 170 g	18.8 W

CA-DD*8/15



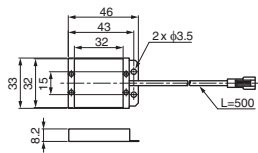
Model	Dimensions					
	A	B	C	D	E	F
CA-DD*8	26	φ30	20	φ87	φ54	40
CA-DD*15	55	φ73	50	φ154.5	φ114	66

Unit: mm

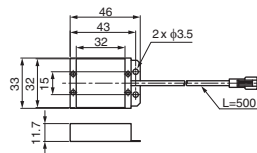
Back lights (CA-DS)

Model	LED color	Weight	Current consumption
CA-DSR2	Red	Approx. 30 g	2.2 W
CA-DSW2	White	Approx. 30 g	2.9 W
CA-DSB2	Blue	Approx. 30 g	2.9 W
CA-DSR3	Red	Approx. 40 g	3.6 W
CA-DSW3	White	Approx. 40 g	5.8 W
CA-DSB3	Blue	Approx. 40 g	5.8 W
CA-DSR9	Red	Approx. 110 g	14 W
CA-DSW7	White	Approx. 90 g	18 W
CA-DSB7	Blue	Approx. 90 g	18 W
CA-DSR15	Red	Approx. 320 g	27.4 W
CA-DSW15	White	Approx. 320 g	27.4 W
CA-DSB15	Blue	Approx. 320 g	27.4 W
CA-DSW30	White	Approx. 1780 g	19.8 Wx2ch

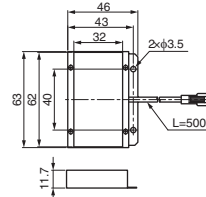
CA-DSR2



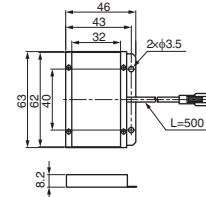
CA-DSW/B2



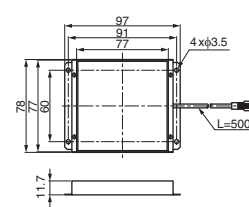
CA-DSW/B3



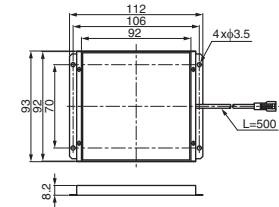
CA-DSR3



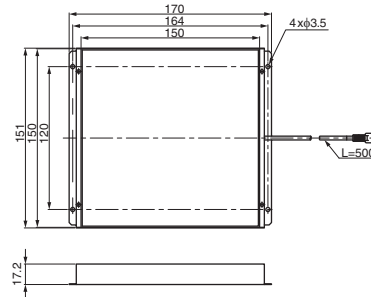
CA-DS*7



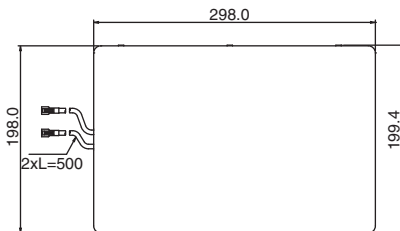
CA-DS*9



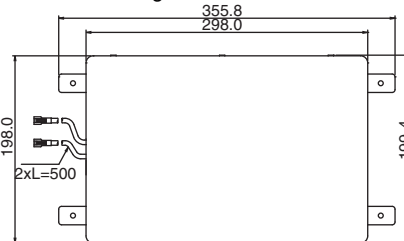
CA-DS*15



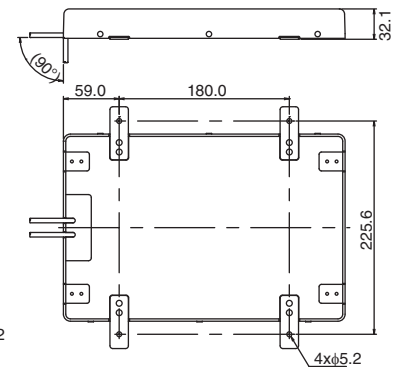
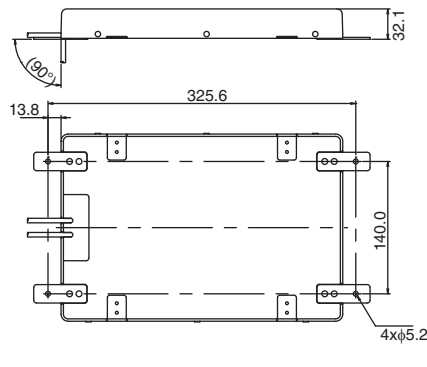
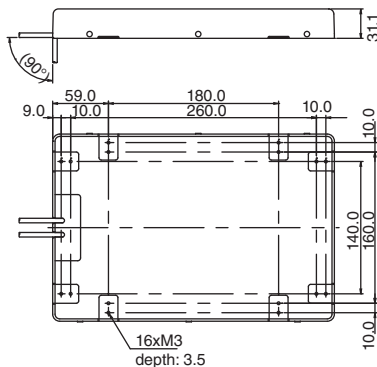
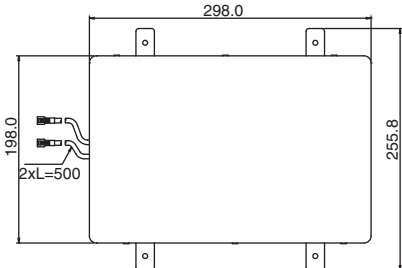
CA-DSW30



In the case of installing metal fixture
on the long side



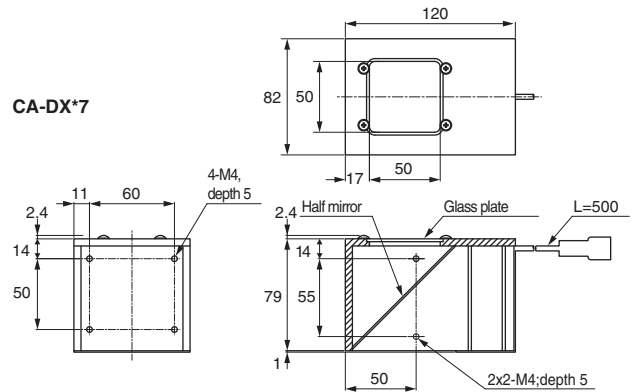
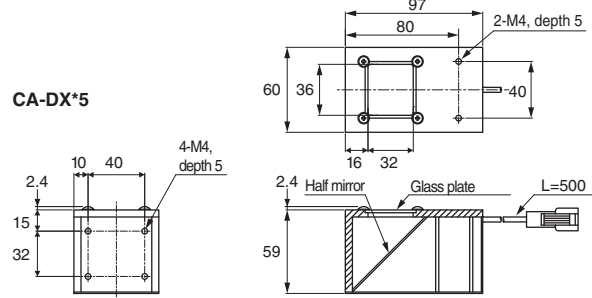
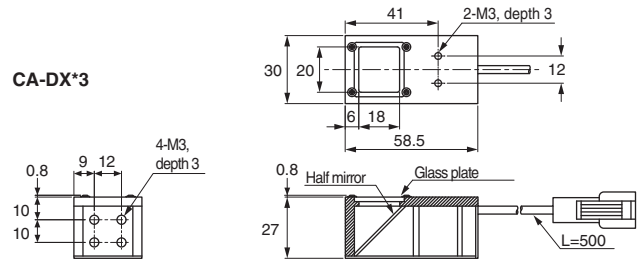
In the case of installing metal fixture
on the short side



Unit: mm

Coaxial lights (CA-DX)

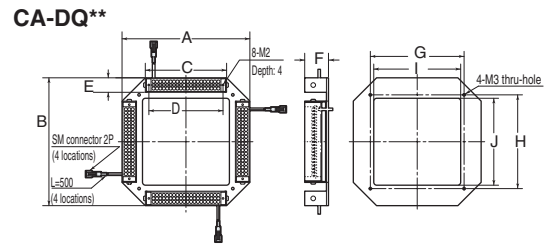
Model	LED color	Weight	Current consumption
CA-DXR3	Red	Approx. 60 g	1.8 W
CA-DXW3	White	Approx. 60 g	1.9 W
CA-DXB3	Blue	Approx. 60 g	1.9 W
CA-DXR5	Red	Approx. 230 g	5 W
CA-DXW5	White	Approx. 230 g	4.9 W
CA-DXB5	Blue	Approx. 230 g	4.9 W
CA-DXR7	Red	Approx. 380 g	6.7 W
CA-DXW7	White	Approx. 380 g	10.1 W
CA-DXB7	Blue	Approx. 380 g	10.1 W



Unit: mm

Square lights (CA-DQ)

Model	LED color	Weight	Current consumption
CA-DQW10	White	Approx. 370 g	11.5 W
CA-DQB10	Blue	Approx. 370 g	11.5 W
CA-DQW15	White	Approx. 520 g	19.2 W
CA-DQB15	Blue	Approx. 520 g	19.2 W

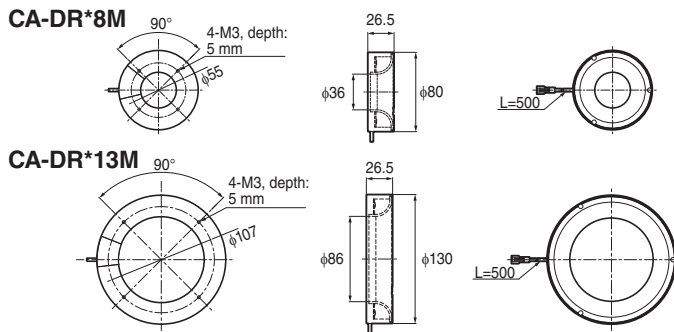


Model	Dimensions									
	A	B	C	D	E	F	G	H	I	J
CA-DQ*10	109	109	63.4	55	17	27.9	70	70	60	60
CA-DQ*15	150	150	95.4	87	17	27.9	110	110	102	102

Unit: mm

Multi-angle ring lights (CA-DR**M)

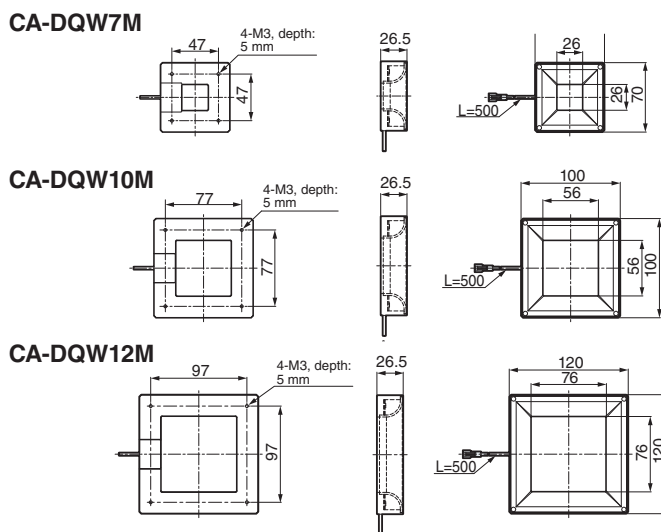
Model	LED color	Weight	Current consumption
CA-DRR8M	Red	Approx. 150 g	6.6 W
CA-DRW8M	White	Approx. 150 g	10.6 W
CA-DRB8M	Blue	Approx. 150 g	10.6 W
CA-DRR13M	Red	Approx. 260 g	12.5 W
CA-DRW13M	White	Approx. 260 g	19.8 W
CA-DRB13M	Blue	Approx. 260 g	19.8 W



Unit: mm

Multi-angle square lights (CA-DQ**M)

Model	LED color	Weight	Current consumption
CA-DQW7M	White	Approx. 160 g	11.3 W
CA-DQW10M	White	Approx. 250 g	16.9 W
CA-DQW12M	White	Approx. 310 g	19.9 W



Spot lights (CA-DP)

Model	LED color	Weight	Current consumption
CA-DPR2	Red	Approx. 20 g	8.4 W (2.0 W)
CA-DPW2	White	Approx. 20 g	8.4 W (2.0 W)
CA-DPB2	Blue	Approx. 20 g	8.4 W (2.0 W)

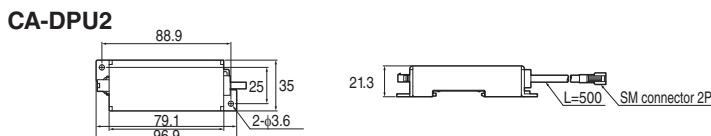
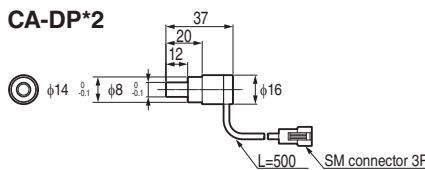
* CA-DPU2 is needed when using CA-DP*2 cannot be used by inputting 12 V directly. Current consumption indicates the total power consumed by both the spot light and the power adapter. Figures in parenthesis () indicate the power consumption of the spot light.

Model	Compatible lights	Weight
CA-DPU2	<ul style="list-style-type: none"> CA-DPR2 CA-DPW2 CA-DPB2 	Approx. 120 g

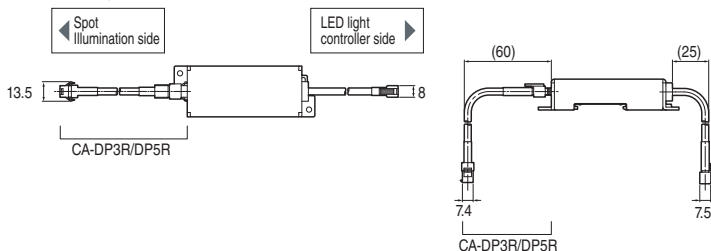
Compatible spot light cables

Extension cable (high flex robotic)

Model	Cable length
CA-DP3R	3m
CA-DP5R	5m



CA-DP3R/DP5R (With spot light cable (3 m/5 m) connected)

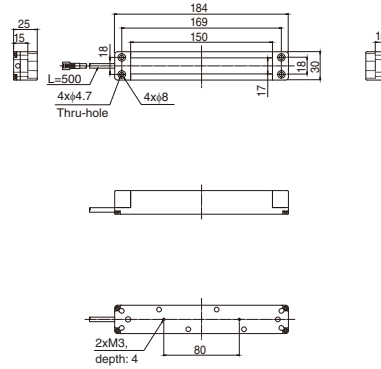


Unit: mm

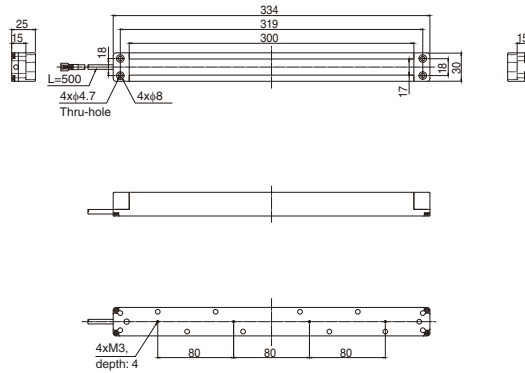
Diffused Line Method (CA-DZD)**

Model	LED color	Weight	Current consumption
CA-DZW15D	White	Approx. 250 g	13.2 W
CA-DZW30D	White	Approx. 420 g	26.4 W
CA-DZW45D	White	Approx. 620 g	19.8 W x 2 ch

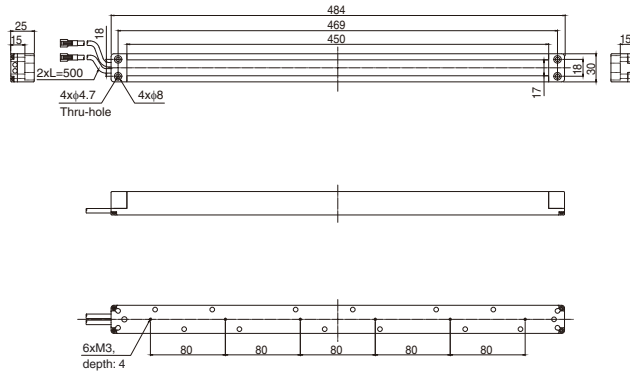
CA-DZW15D



CA-DZW30D

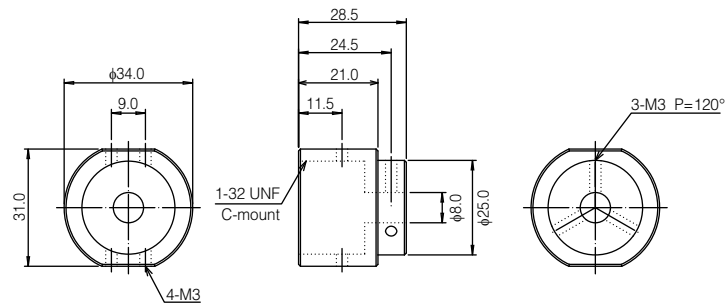


CA-DZW45D



Unit: mm

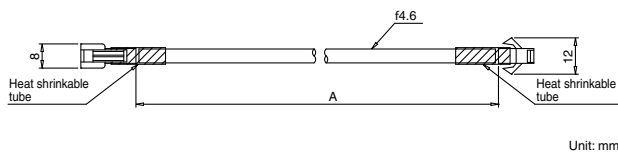
C-mount Lens Adapter for Spot Lights (OP-87896)



Unit: mm

LED Light Cable

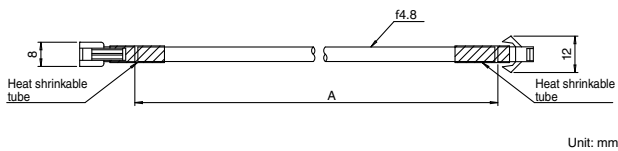
Standard cable



Unit: mm

Model	Cable length (A)	Weight
CA-D2	2m	60g
CA-D5	5m	130g

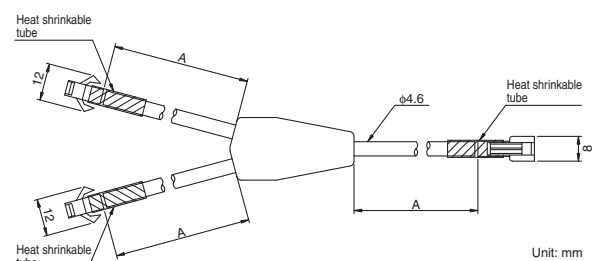
High flex robotic cable



Unit: mm

Model	Cable length (A)	Weight
CA-D3R	3m	80g
CA-D5R	5m	140g
CA-D10R	10m	270g
CA-D17R	17m	450g

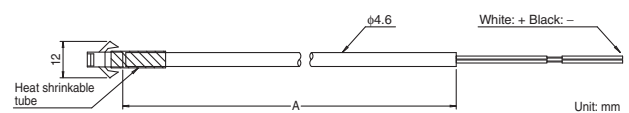
Y-split type



Unit: mm

Model	Cable length (A)	Weight
CA-D1W	0.5m	50g

Bare wire to connector cable

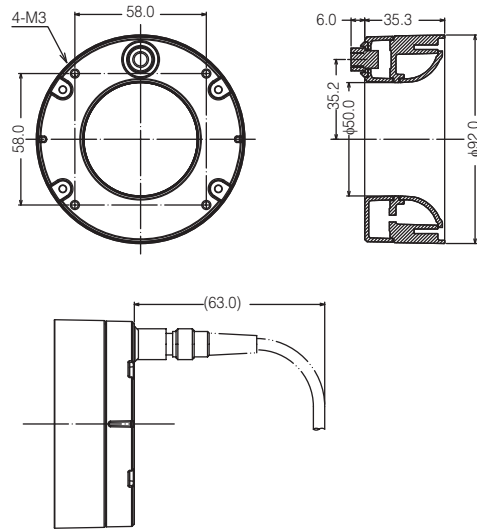


Unit: mm

Model	Cable length (A)	Weight
OP-84457	1m	30g

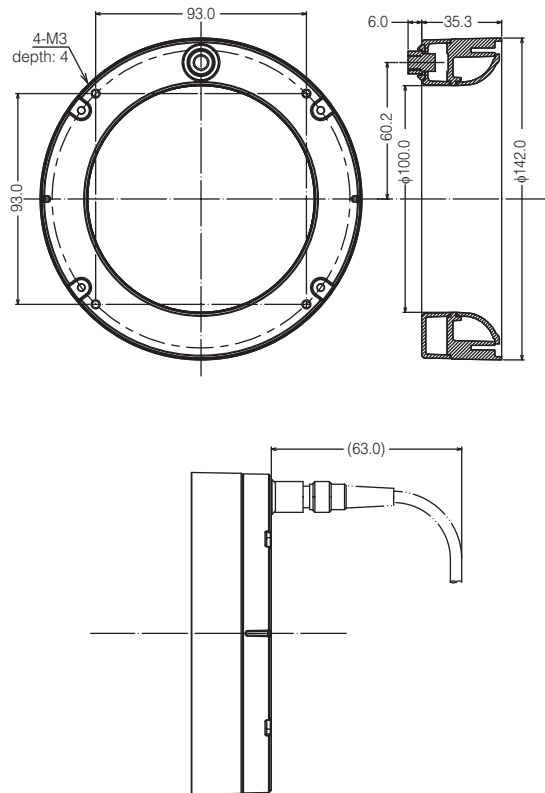
LumiTrax Light

CA-DRW5X



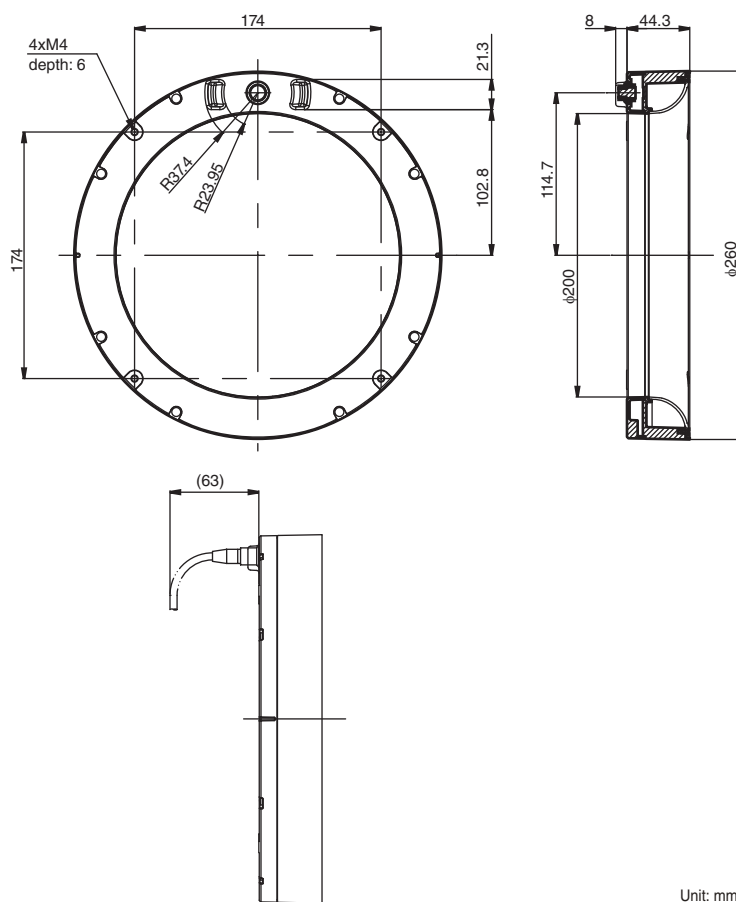
Unit: mm

CA-DRW10X



Unit: mm

CA-DRW20X



Unit: mm

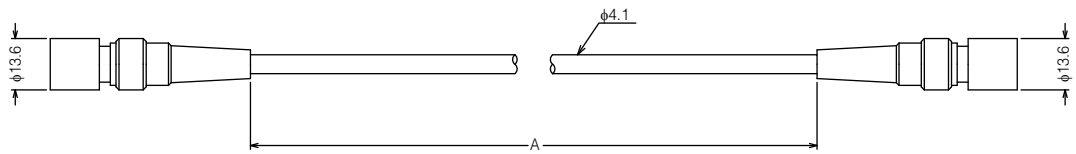
Specifications

Model	CA-DRW5X	CA-DRW10X	CA-DRW20X
Illumination method	Ring illumination configuration LumiTrax emission/regular emission Constant current control (255 digital levels) (256 digital levels when connected to the CA-DC30E/1024 digital levels when connected to the CA-DC50E)*		
Light adjustment responsiveness	Within 1 ms		
LED	Color	White	White
	Lamp count	16 lamps	32 lamps
Outside dimensions	φ92×35 mm (not including connector)	φ142×35 mm (not including connector)	φ260×45 mm (not including connector)
	(Internal diameter)	φ50	φ100
Connection with the controller	Dedicated Cable (3 m/5 m/10 m), maximum 20 m (when using relay cables)		Dedicated Cable (3 m/5 m/ 10 m), maximum 10 m (when using relay cables)
I/F inputs	Six-pole circular connector for LumiTrax LED illuminations (dedicated cable)		
Power consumption	34.5 W (during regular emission)	40.5 W (during regular emission)	60.9 W (during regular emission)
Environmental resistance	Ambient operating temperature	0 to +40°C	
	Ambient operating humidity	35 to 85% RH (No condensation)	
Weight	Approx. 190 g	Approx. 240 g	Approx. 610 g

* If two lights, which include a CA-DRW20X, are connected to CA-DC30E, the maximum intensity is limited to 80 regardless of the setting value. Also, if two lights, which include a CA-DRW20X, are connected to the CA-DC50E, the maximum intensity is limited to 320 regardless of the setting value.

LED Light Cable (dedicated for CA-DRW5X/DRW10X/DRW20X)

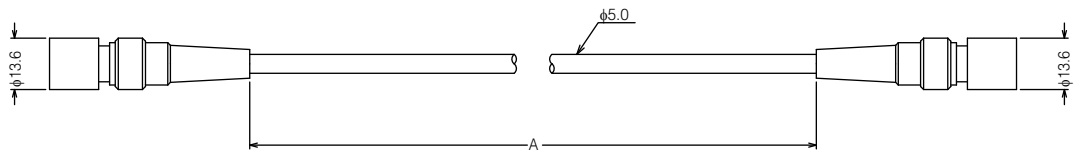
Standard cable CA-D3X/D5X/D10X



Unit: mm

Model	Cable length (A)	Weight
CA-D3X	3 m	110 g
CA-D5X	5 m	170 g
CA-D10X	10 m	320 g

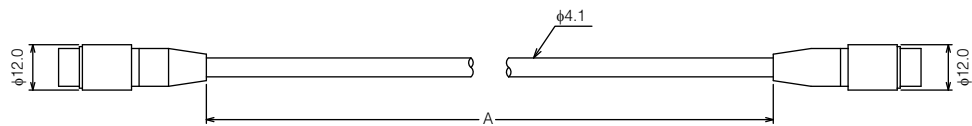
High flex robotic cable CA-D5XR



Unit: mm

Model	Cable length (A)	Weight
CA-D5XR	5 m	230 g

Relay cable CA-D02XE

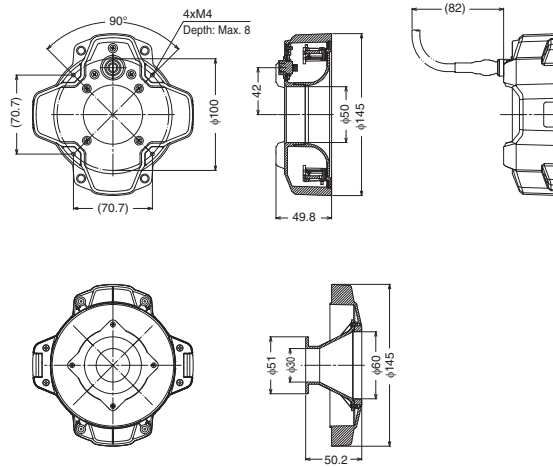


Unit: mm

Model	Cable length (A)	Weight
CA-D02XE	0.2 m	30 g

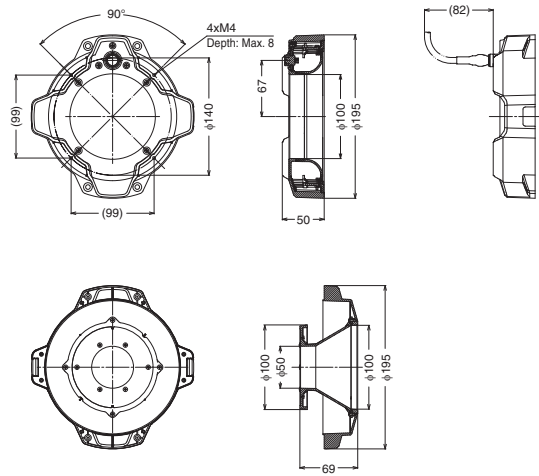
MultiSpectrum Light

CA-DRM5X



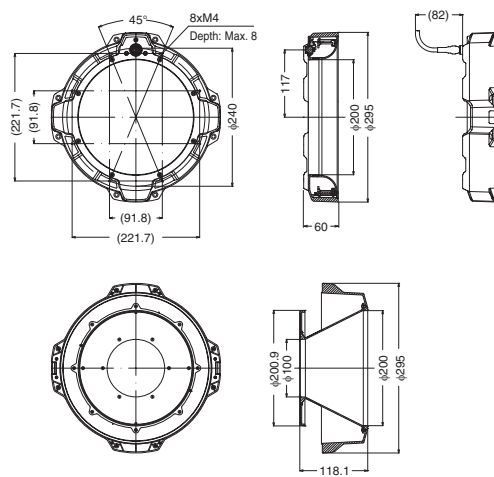
Unit: mm

CA-DRM10X



Unit: mm

CA-DRM20X



Unit: mm

Specifications

Model		CA-DRM5X	CA-DRM10X	CA-DRM20X
Illumination method		Ring illumination configuration (compatible with the CA-DRM(DA) Series optional dome attachment, CA-DRM(PA) Series optional polarization filter attachment* ¹) Multispectrum emission/LumiTrax emission/regular emission (single color lighting in all directions)* ² Constant current control (1024 digital levels when connected to the CA-DC60E/can be adjusted for each wavelength)* ³		
Light adjustment responsiveness		Within 1 ms		
LED	Peak wavelength	Approx. 405 nm (UV), approx. 457 nm (B), approx. 527 nm (G), approx. 600 nm (AM), approx. 660 nm (R), approx. 730 nm (FR), approx. 860 nm (IR), approx. 600 nm (W)		
	Lamp count (per color)	8	16	
Outside dimensions (not including the connector)		φ145×49.8 mm	φ195×50 mm	φ295×61 mm
(Internal diameter)		φ50 mm	φ100 mm	φ200 mm
Connection with the controller		Dedicated cable (3 m/5 m/10 m), max. 30 m (when using extension cables)* ⁴		
I/F inputs		12-pole circular connector for LumiTrax LED illuminations (dedicated cable)		
Power consumption		51.4 W (during regular emission)	71.0 W (during regular emission)	71.0 W (during regular emission)
Environmental resistance	Ambient operating temperature	0 to +40°C		
	Ambient operating humidity	35 to 65% RH (No condensation)		
Weight (with dome attachment)		Approx. 560 g (Approx. 680 g)	Approx. 600 g (Approx. 820 g)	Approx. 1080 g (Approx. 1730 g)

*¹ Wavelengths of approx. 405 nm(UV) and approx. 860nm (IR) are not supported.

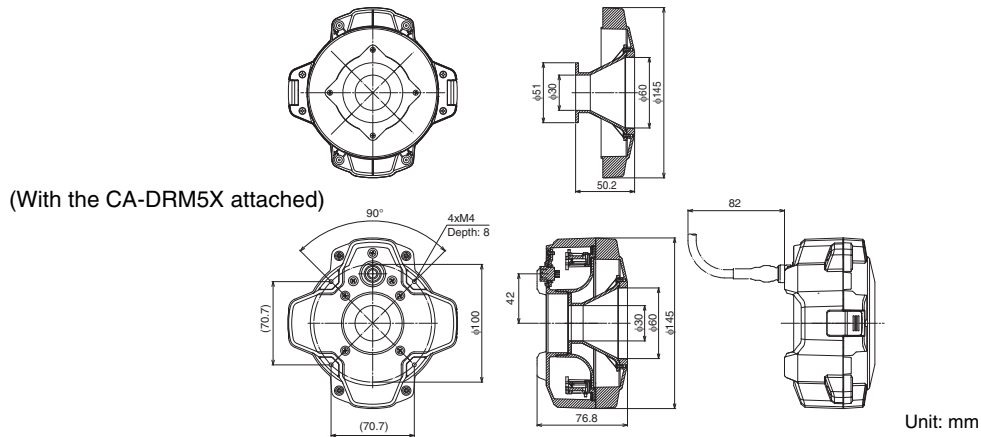
*² Continuous lighting during regular emission can only be set when the volume limitation for lighting is ON.

*³ Simultaneous lighting in multiple colors is not supported.

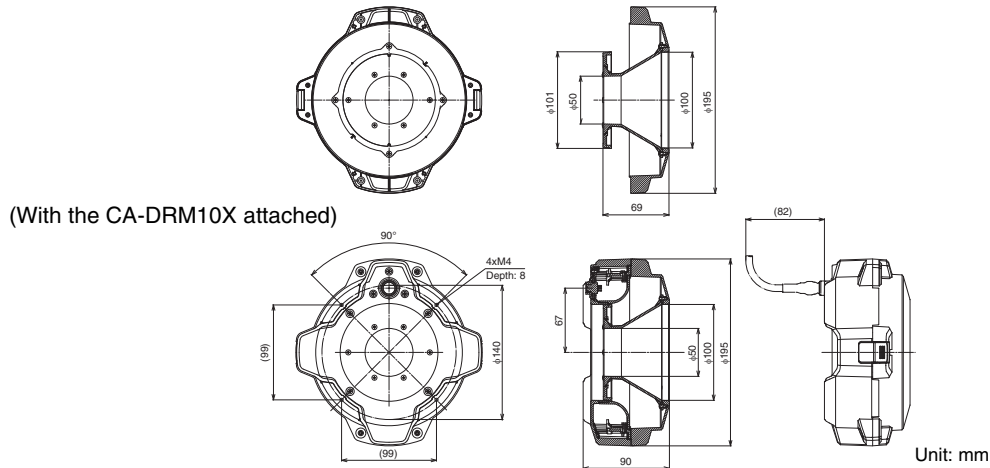
*⁴ You can connect a maximum of two extension cables to the dedicated cable.

Dome Attachment for MultiSpectrum Light

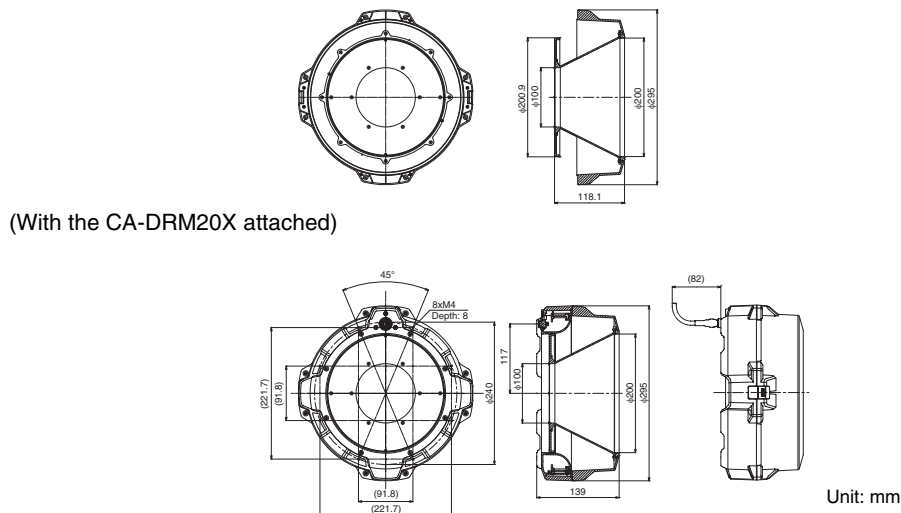
CA-DRM5DA



CA-DRM10DA



CA-DRM20DA

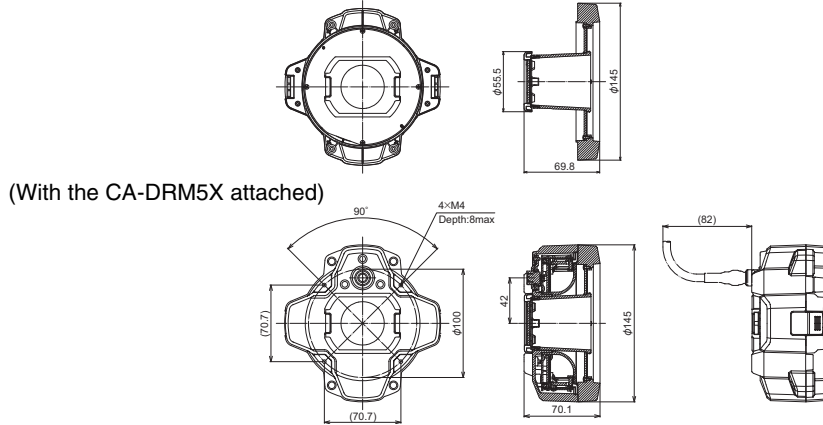


Specifications

Model	CA-DRM5DA	CA-DRM10DA	CA-DRM20DA
Compatible light	CA-DRM5X	CA-DRM10X	CA-DRM20X
Effective field of view	φ50 mm	φ100 mm	φ200 mm
Environmental resistance	Ambient operating temperature	0 to +40°C	
	Ambient operating humidity	35 to 65% RH (No condensation)	
Weight (with dome attachment)	Approx. 120 g (Approx. 680 g)	Approx. 220 g (Approx. 820 g)	Approx. 650 g (Approx. 1730 g)

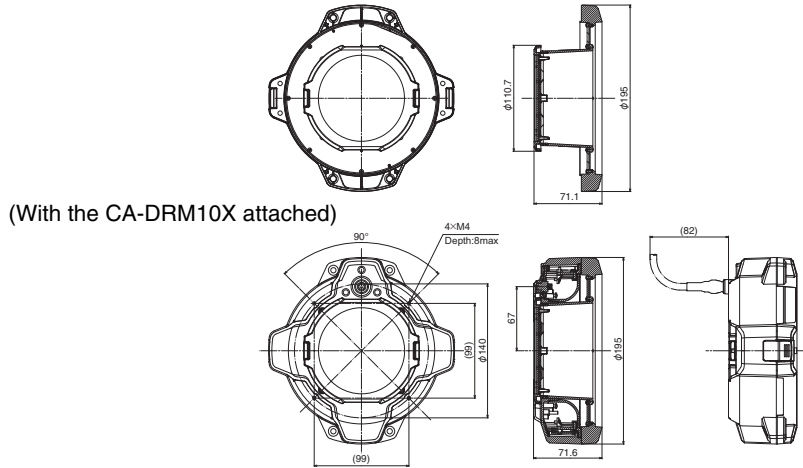
Polarization Filter Attachment for MultiSpectrum Light

CA-DRM5PA



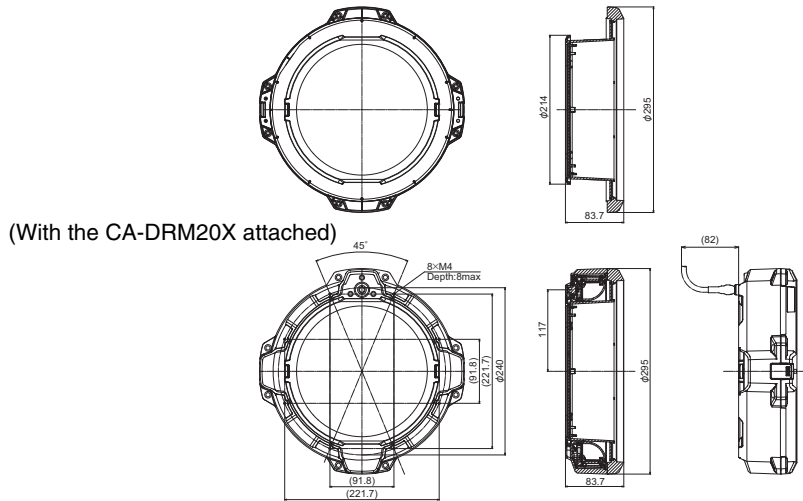
Unit: mm

CA-DRM10PA



Unit: mm

CA-DRM20PA



Unit: mm

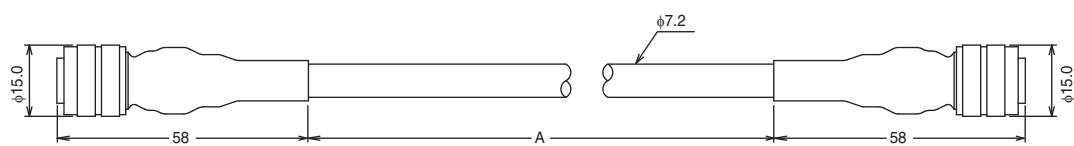
Specifications

Model	CA-DRM5PA	CA-DRM10PA	CA-DRM20PA
Compatible light	CA-DRM5X	CA-DRM10X	CA-DRM20X
Effective field of view	φ50 mm	φ100 mm	φ200 mm
Supported wavelength*	Approx. 457 nm(B)/Approx. 527 nm(G)/Approx. 600 nm(AM)/Approx. 660 nm(R)/Approx. 730 nm(FR)/Approx. 600 nm(W)		
Environmental resistance	Ambient operating temperature	0 to +40°C	
	Ambient operating humidity	35 to 65% RH (No condensation)	
Weight (with compatible light)	Approx. 130 g (Approx. 690 g)	Approx. 210 g (Approx. 810 g)	Approx. 470 g (Approx. 1550 g)

* Wavelengths of approx. 405 nm(UV) and approx. 860nm (IR) are not supported.

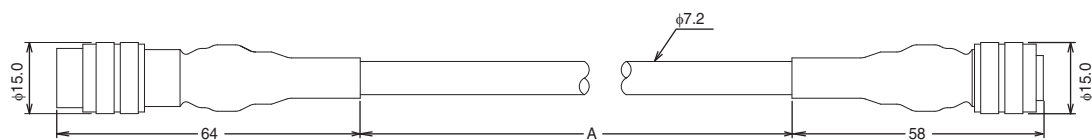
LED Light Cable (dedicated for CA-DRM5X/DRM10X/DRM20X)

Standard cable (high-flex type) CA-D3MX/D5MX/D10MX



Model	Cable length (A)	Weight
CA-D3MX	3 m	310 g
CA-D5MX	5 m	490 g
CA-D10MX	10 m	900 g

Light extension cable (high-flex type) CA-D5MXE/D10MXE

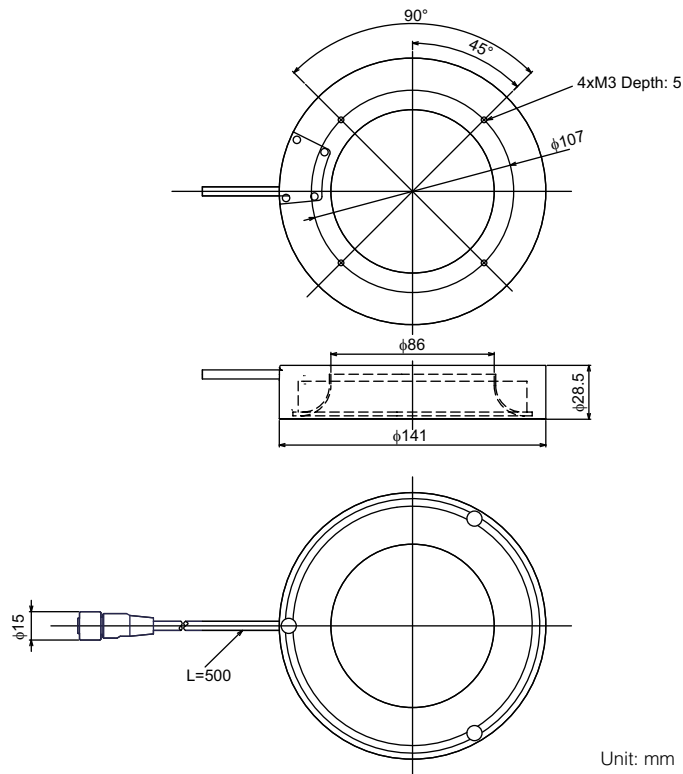


*

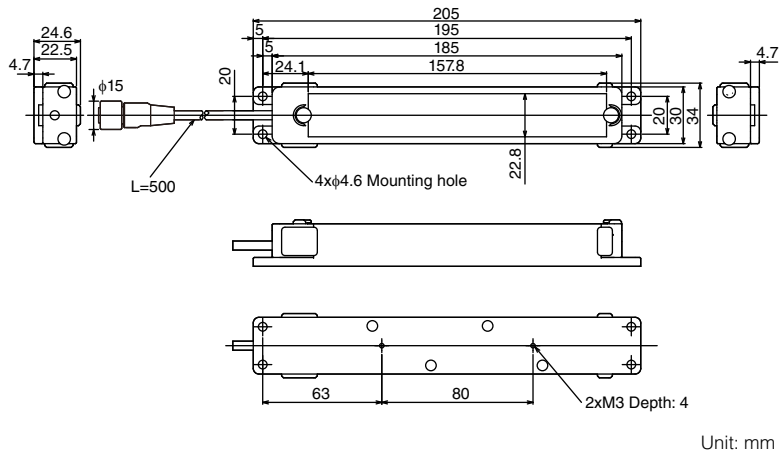
Model	Cable length (A)	Weight
CA-D5MXE	5 m	490 g
CA-D10MXE	10 m	900 g

IP67-compliant, Environment Resistant LED Light

Ring type (CA-DRW13P)



Bar type (CA-DBW15P)



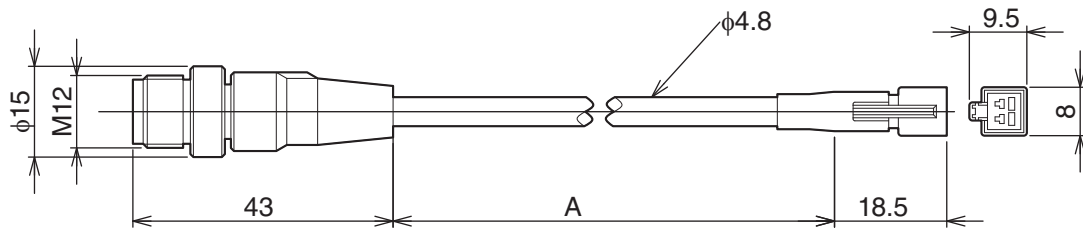
Specifications

	CA-DRW13P	CA-DBW15P
Shape	Ring type	Bar type
LED Color	White	
Compatible illumination cables	Environment resistant illumination cable CA-D3P (3 m) Environment resistant illumination extension cable CA-D5PE (5 m)/CA-D10PE (10 m)	
Rated input voltage	12 V	
Power consumption	19.8W	13.2W
Enclosure rating	IP67*	
Environmental resistance	Ambient temperature	0 to 40C°
	Relative humidity	35 to 65%RH
Weight	Approx. 480 g	Approx. 260 g

* A KEYENCE-specified environment resistant illumination cable must be mounted on the product.

LED Light Cable (for CA-DRW13P/CA-DBW15P)

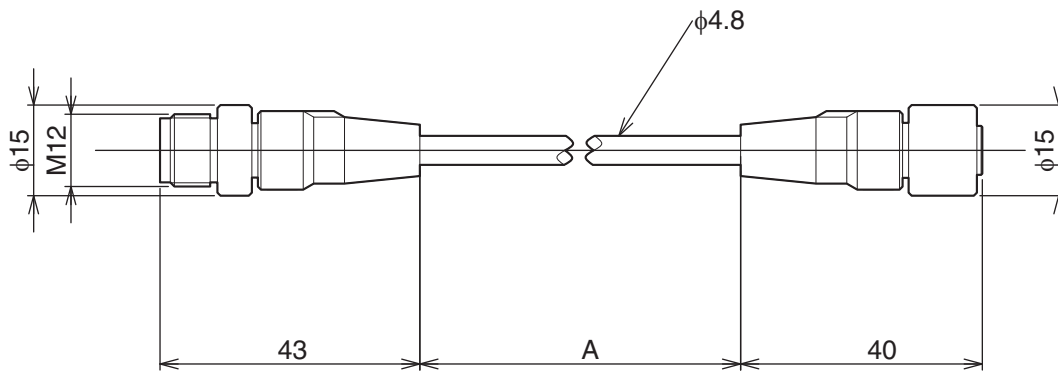
For lighting power connection (CA-D3P)



Unit: mm

Model	Cable length (A)	Weight
CA-D3P	3m	100g

For extension (CA-D5PE/D10PE)

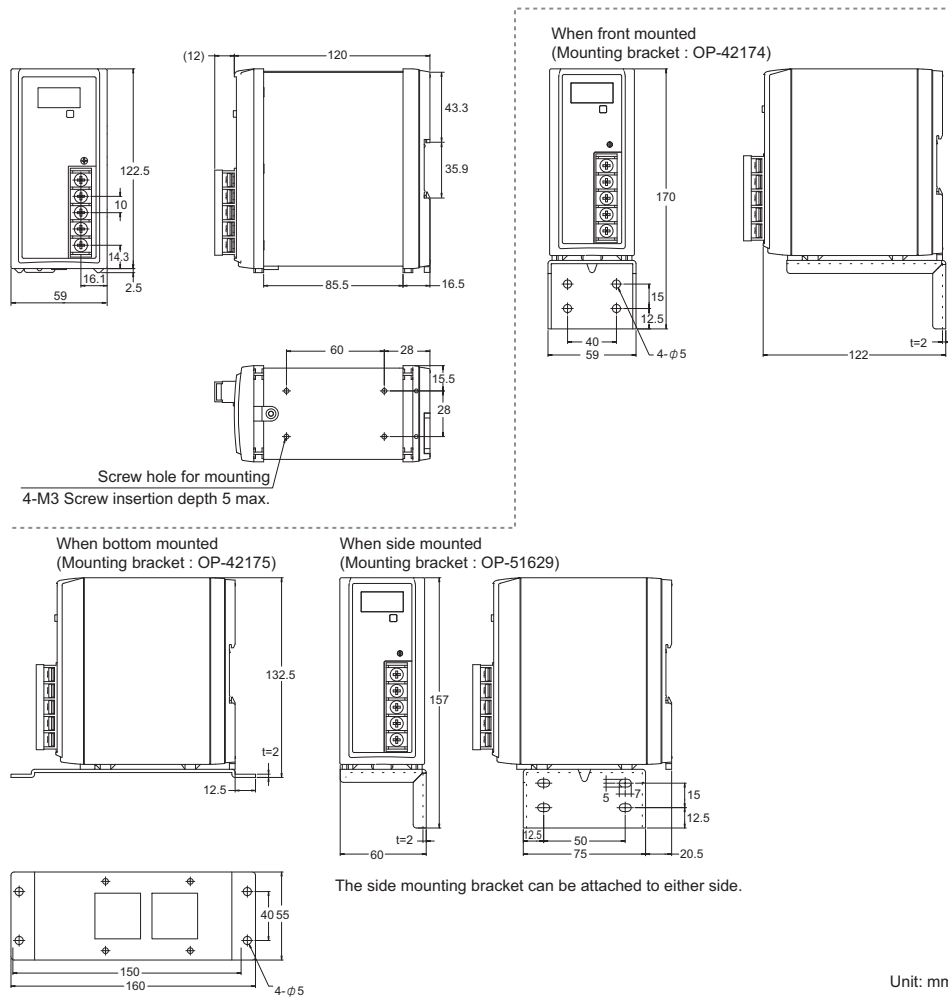


Unit: mm

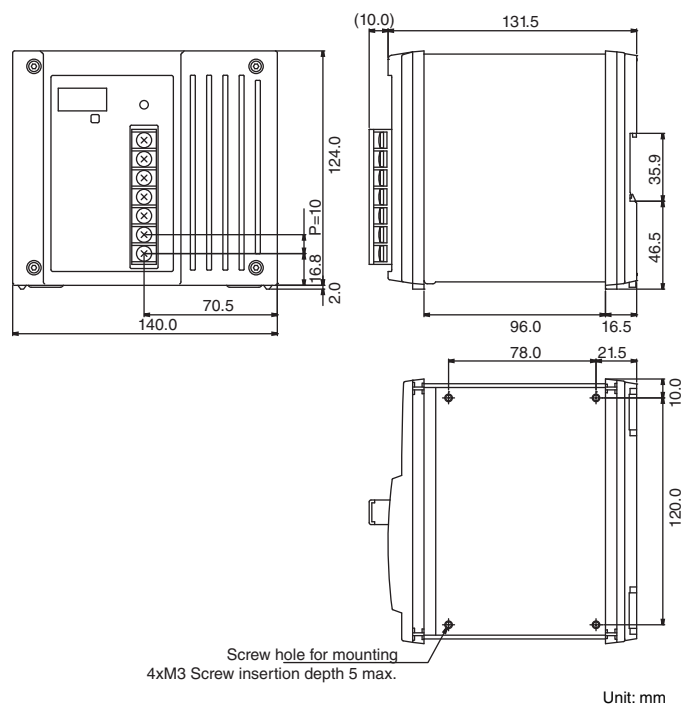
Model	Cable length (A)	Weight
CA-D5PE	5m	170g
CA-D10PE	10m	310g

Ultracompact switching power supply (CA-U4/U5)

Ultracompact switching power supply CA-U4



Ultracompact switching power supply CA-U5



Specifications

Model		CA-U4	CA-U5
Input conditions	Rated Input voltage*1	85 to 264 VAC, 110 to 370 VDC	
	Rated Frequency*1	47 to 63 Hz, DC	
	Input current (100/200 VAC)	2.2 A/1.1 A max.	3.9 A/1.8 A max.
	Efficiency (100/200 VAC)	82%/85% typ. (with 100% load)	
	Leakage current (100/200 VAC)	0.4 mA/0.75 mA max. (with 100% load)	
	Rush current (100/200 VAC)	25 A/50 A max. (with 100% load, at 25 °C cold start)	
Output characteristics	Rated output voltage	24V DC	
	Adjustable voltage range	±5% (with V.ADJ)	
	Rated output current	6.5 A	12.5 A
	Ripple/noise voltage	180mVp-p max.	
	Input fluctuation	0.4% max.	
	Load fluctuation	1.5% max.	
	Temperature fluctuation	0.02%/°C max.	
	Starting time	500 ms max. (at Surrounding Air Temperature of 0 to 55°C under rated I/O conditions)	
	Output holding time	20 ms min. (at Surrounding Air Temperature of 25°C under rated I/O conditions)	
Protection	Overcurrent protection	Constant current reduction. Automatic reset	
		6.5 A	15.6 A
	Overvoltage protection*2	Activates when the voltage reaches 26.4 V or more. Voltage turn-off. Operation resumes when the input power is turned on again.	
Display	Display method	3-digit, 7-segment LED (Character height: 10 mm)	
	Memory backup time	Approx. 10 years (at 20°C)	
	Display resolution	0.1 A/0.1 V/1%	
Environmental resistance	Surrounding Air Temperature (for operation)	-10 to 55°C, No freezing (See "Output Derating Characteristics".)	
	Ambient operating humidity	25 to 85%RH, No condensation	
	Surrounding Air Temperature (for storage)	-20 to 70°C, No freezing	
	Withstand voltage	3.0 kVAC 50/60 Hz 1 min (across input and output terminals) 2.0 kVAC 50/60 Hz 1min (across input terminal and FG terminal) 500 VAC 50/60 Hz 1 min (across output terminal and FG terminal)	
	Shock resistance	Peak acceleration: 300 m/s ² , in X, Y, and Z directions, 2 times respectively	
	Vibration resistance	In X, Y, and Z directions, 2 hours respectively under the following conditions 10 to 57 Hz: 0.3 mm double-amplitude, 57 to 500 Hz: 19.6 m/s ² (2G), 5.5-minute cycle	
	Insulation resistance	100 MΩ min. (with 500 VDC megohmmeter) (across input and output terminals) (across input terminal and FG terminal) (across output terminal and FG terminal)	
Applicable standard	Safety standard	UL: UL508, UL60950-1 C-UL: CSA C22.2 No.14-M95, CSA C22.2 No.60950-1-03 EN: EN60950-1, EN50178 IEC: IEC60950-1	
	EMC standard	FCC Part15B ClassA, EN55011 ClassA, EN61000-6-2	
	Harmonic current emissions regulation	EN61000-3-2	
Others	Parallel operation	Possible (OP-42207 is required.)*3	
	Serial operation	Possible (External diode is required.)*3	
	Cooling method	Natural air-cooling	
	Weight	Approx. 700 g	Approx. 1540 g

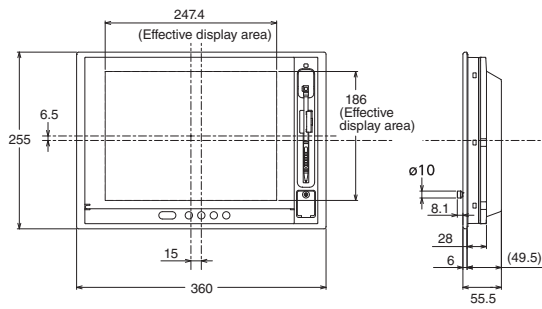
*1 During the application for safety standard, the rated input voltage is 100 to 240 VAC and the rated frequency is 50/60 Hz.

*2 To reset the unit, turn off the input power once, wait for 1 minute or more, and then turn on the input power again.

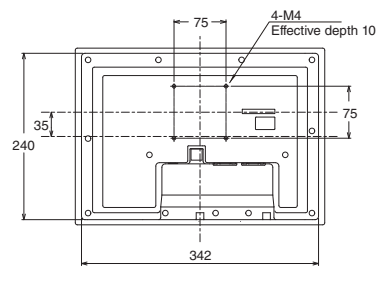
*3 The Applicable standards do not apply for parallel and serial operations.

Touch Panel LCD Monitor (CA-MP120T)/LCD Monitor (CA-MP120)

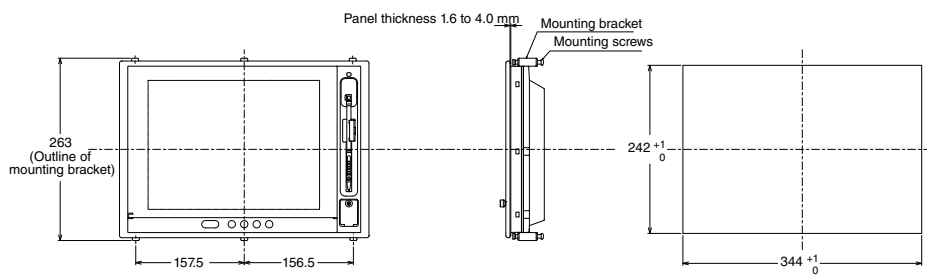
CA-MP120T



Panel installation diagram

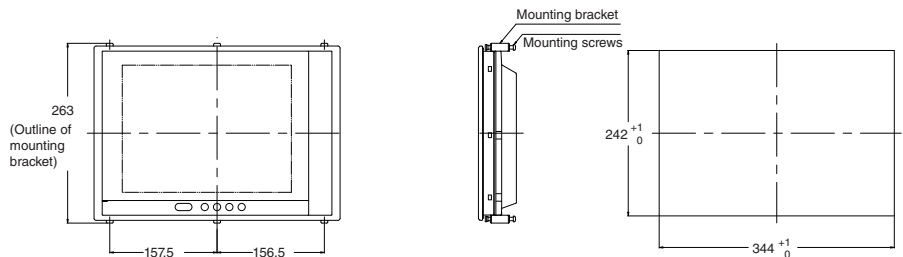


Panel cut dimensions



Panel installation diagram

Panel cut dimensions



Unit: mm

Specifications

Model		CA-MP120T	CA-MP120
Liquid crystal panel	Display element	a-Si TFT Active Matrix	
	Effective display area	245 (W) x 184 (H) mm	
	Number of display dots	1024 (W) x 768 (H) dots or 800 (W) x 600 (H) dots	
	Display color	16,777,216 colors	
Backlight	Life	Average life: approx. 100,000 hours (+25°C vertical installation)	
Input/Output	Input signal	Analog RGB signal (0.7 Vp-p, 75Ω) horizontal, vertical period signal	
	Input signal mode	1024 (W) x 768 (H), vertical frequency 60 Hz, or 800 (W) x 600 (H), vertical frequency 60 Hz	
	Input signal connector	High-density mini D-sub 15-pin, female (3WAY, inch screw)	
	Touch panel connector	D-sub 9-pin, male (2WAY, inch screw)	-
	Handheld controller connector	RJ45 connector*	-
Rating	Power supply voltage	24 V DC ±10%	
	Current consumption	1.5 A or less	
	Ambient temperature	0 to +40°C	
	Relative humidity	35 to 85% RH	
Structure	Panel embedded type, dust-proof, drop-proof structure equivalent to IP65f at front only		
Weight	Approx. 2.3 kg		

* This is not used with CV-X series.

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Revision history

Date printed	Revision number	Revision contents
April 2014	Official release	
October 2014	2nd edition	Edition for Version 3.2.0000
May 2015	Revised 1st edition	Edition for Version 3.4.0000
October 2015	Revised 2nd edition	Addition of descriptions/Correction of errors
October 2016	Revised 3rd edition	Edition for Version 4.0.0000
October 2017	4th revision 1st edition	Edition for Version 4.2.0000
January 2019	5th revision 1st edition	Edition for Version 5.0.0000

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