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KEYENCE

96M14033

*96M14033-2*

High-speed, High-capacity
Machine Vision System

# CV-X100 Series

# Controller Instruction Manual

Read this manual thoroughly before using the CV-X100 Series.
Always keep this manual in a safe place for future reference.



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**

## Introduction

This manual describes the hardware information. Read this manual thoroughly to understand how the CV-X100 Series works in order to maximize the performance of the system.

- This manual is for the CV-X100 Series. All references however, unless otherwise noted, pertain to the CV-X172F. For more details about the differences between the models, see "Main Specifications" (page 7) and the "CV-X Series User's Manual".
- Always keep this manual in a safe location for future reference.
- Please ensure that the manual is passed to the end user of the controller.

### Symbols

The following symbols alert you to important messages. Be sure to read these messages carefully.

| | |
|---|---|
| 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. |

### Trademarks

- "SD Memory Card" is a registered trademark of the SD Association.
- Other company names and product names noted in this document are registered trademarks or trademarks of their respective companies. The TM mark and ® mark are omitted in this manual.

### Libraries and programs

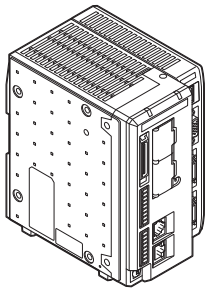
libjpeg
Copyright ©1991-2012, Thomas G. Lane.
This software is based in part on the work of the Independent JPEG Group.

## Package Contents

The equipment and accessories listed below are included in the package when shipped. After opening the carton, check that you have received all of the equipment and accessories listed below.

### Standard Package

- Controller Unit × 1
  (CV-X102/X152/X172)
- SD Card × 1
  (OP-87133 (512MB): CV-X102/X152,
  CA-SD1G (1GB): CV-X172)
  (pre-installed in SD1 slot))
- Dedicated mouse (OP-87506) × 1
- Controller instruction manual



## Safety Precautions

### General Cautions

| | |
|---|---|
| DANGER | • Do not use this product for the purpose of protecting the human body or any part thereof.<br>• Because this product was not designed for use in an explosion-proof area, it must never be used in an explosion-proof area.<br>• Do not use this product in an application which requires functional safety. It should not be used in situations where death or serious property damage is possible, such as nuclear power plants, on aircraft, trains, ships, or vehicles, used within medical equipment, playground equipment, roller coasters and other rides, etc. |

| | |
|---|---|
| WARNING | You must perform a sufficient risk assessment for the machine where this product is to be installed prior to installing this product. Provide appropriate protective fail-safe measures on the machine independent from this product in case a failure with this product should occur. |

| | |
|---|---|
| CAUTION | Before starting or operating the system, check to make sure all system functions are working properly. |

| | |
|---|---|
| NOTICE | • If the system is operated beyond its published specifications or if the system is modified, its functions and performance cannot be guaranteed.<br>• Please note that when the system is used in combination with other instruments, its functions and performance may be degraded.<br>• Do not subject the controller or connected devices to a sudden change in temperature.<br>There is the risk of condensation occurring. |

**General cautions for the controller**

| | |
|---|---|
| WARNING | • Do not use with any power voltage other than 24 VDC. Doing so may cause fire, electric shock, or product malfunction.<br>• Do not disassemble or modify the unit. Doing so may cause fire or electric shock. |

**Operating environment and conditions**

| | |
|---|---|
| CAUTION | • 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.<br>– Locations that contain moisture or dust, or that are poorly ventilated.<br>– Locations where the system is exposed to direct sunlight or temperature increases.<br>– Locations where there are flammable or corrosive gases.<br>– Locations where the unit may be directly subjected to vibration or impact.<br>– Locations where water, oil or chemicals may splash onto the unit.<br>– Locations where static electricity is present or electric discharge may occur. |

| | |
|---|---|
| NOTICE | • Keep this unit and cables away from high-tension cables and power lines.<br>Otherwise, noise may cause malfunction or accidents.<br>• Bundle cables with a camera cable protector (OP-88208) or with spiral tubing material. Direct bundling will concentrate the cable load on the bindings, which can result in cable damage or short circuit.<br>• 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 | 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.<br>• If water or debris enters the system<br>• If the system is dropped or the case is damaged<br>• If smoke or a burning smell emits from the controller |

**Usage**

| | |
|---|---|
| NOTICE | • 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.<br>• Do not turn the power off while you are programming. Otherwise, all or part of the program settings may be lost.<br>• Do not block the ventilation holes. Otherwise, the inside temperature may rise and a malfunction may occur.<br>• 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 image capture surface inside the camera. |

**Maintenance**

| | |
|---|---|
| NOTICE | • Do not clean with benzene, thinner, or alcohol. Doing so may cause discoloration or deformation of the unit.<br>• 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. |

## Precautions on Regulations and Standards

### CE Marking

KEYENCE evaluates compliance with the requirements of the EC 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 EMI: EN61326-1, Class A
- This product is intended to be used in an industrial electromagnetic environment.
- Use cables shorter than 30 m to connect the controller and its external devices.
- Be sure to connect the ground terminal to a grounding.

However, these precautions do not guarantee that the customer's entire machinery installation is compliant with the EMC Directive. The customer is responsible for determining the compliance of the overall machinery installation.

**FCC Regulations**

This product complies with the following regulations 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)

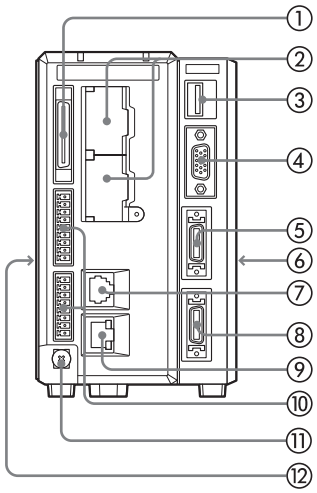
**Class A device**

This product is a industrial electromagnetic wave generating device (Class A) and is intended for use in all 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.

## Identifying Controls and Connectors




**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 for the mouse of this device is used exclusively for the dedicated mouse (OP-87506).<br>If other equipment including a commercial USB mouse is connected, it can cause malfunction or damage of this device or the connecting device. |
|---|---|

**④ RGB output terminal**

Use to connect to an external monitor.

**⑤ CAM2 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 to connect to the RS-232C communication cable (OP-26487: 2.5 m, sold separately).

**⑧ CAM1 connector**

Use to connect camera 1.

**⑨ ETHERNET connector**

Use to connect an Ethernet cable.

**⑩ Terminal Block**

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

**⑪ Grounding terminal**

Use to connect the installation line.

**⑫ Expansion unit connector 2 (left side)**

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

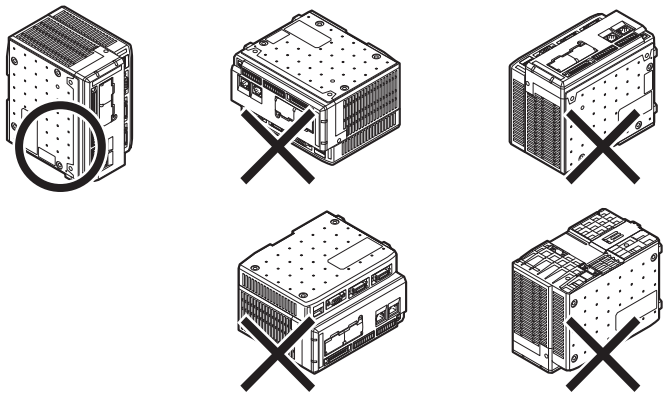
## Installing the Controller Unit

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

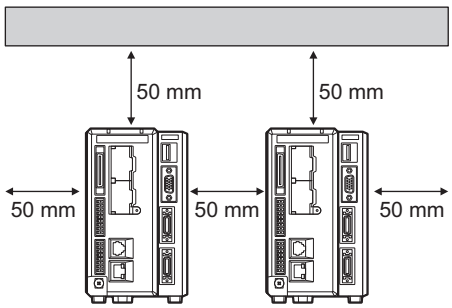
| NOTICE | • Do not install the controller in a location with lots of dust or water vapor.<br>The controller does not have a mechanism to protect it from dust or water. Dust or water entering the controller can cause damage to the controller.<br>• Turn off the power to the controller when connecting or removing an expansion unit, a cable, or a terminal block. Connecting or removing the camera expansion unit, the cable, or the terminal block while the power is being supplied may damage the controller or peripheral devices.<br>• When an expansion unit is not connected, place the connector protection cover back 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 shown below. Do not install the controller in any other direction.



- For ventilation, keep the space free of objects for 50 mm or more above the controller and 50 mm or more for both sides. Keep the space free of objects for 90 mm or more in the front of the connector panel in order to connect the cables safely.
- When two or more controllers are installed side by side, maintain 50 mm or more of space between the controllers, and 50 mm or more above both controllers.

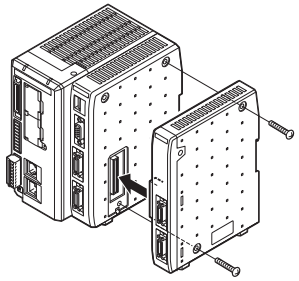



| NOTICE | • Do not block the ventilation openings on the top and bottom of the controller. If the vents are blocked, heat will accumulate inside the controller and can cause a system failure.<br>• When installing the controller on a surface, pierce holes in the surface at the positions of the ventilation 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.<br>• If the temperature inside the control panel (temperature at the bottom 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. |
|---|---|

## Installing the Expansion Unit

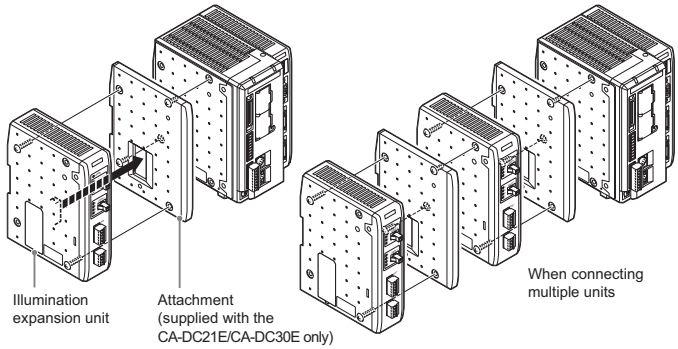
### Installing the Camera Expansion Unit (CV-X152/X172 only)

Use the camera expansion unit CV-E500 (sold separately) to connect three or more cameras.
Remove the protective cover of connector 1 from the right side of the controller, and then install the camera expansion unit as shown on the right.



### Installing the Illumination Expansion Unit

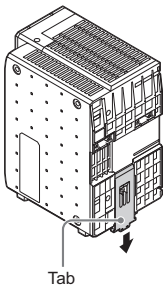
To control lighting from a controller, use an illumination expansion unit (sold separately). One CA-DC10E unit (two individual lighting units), up to four CA-DC21E units (eight individual lighting units), or up to two CA-DC30E units (four individual lighting units) can be connected (you cannot connect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




| | |
|---|---|
| NOTICE | • Turn off the power to the controller when connecting or removing a unit. Connecting or removing a unit while the power is being supplied may damage the controller or peripheral devices.<br>• If you will not connect units to the controller, do not remove the connector protective cover from the controller. Using the controller with the connector exposed may cause damage to the controller.<br>• When mounting the illumination expansion unit (CA-DC21E and CA-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 attachments).<br>• Turn off the power to the illumination expansion unit when removing the illumination head for the illumination expansion unit CA-DC30E. Removing the illumination head while the power is being supplied may damage the controller or peripheral devices. |

## Installing the Controller

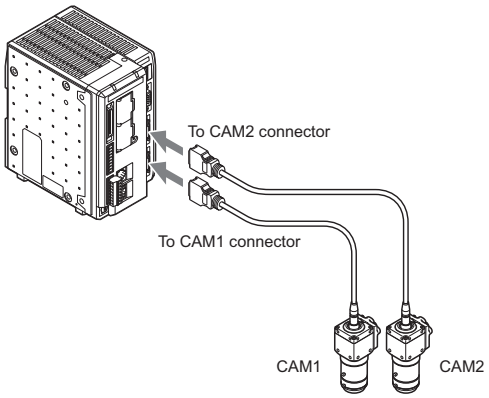
The controller unit and other units are designed to be mounted on a DIN rail. Pull the tab on the bottom in the direction of the arrow to mount or dismount the controller.




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

## Connecting the Camera Cables

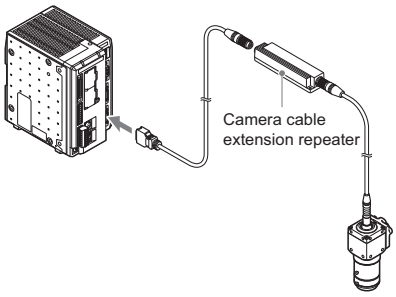
Connect the camera to the camera connector of the controller unit using one of the optional camera cables.
If connecting only a single camera, attach it to the CAM1 connector.




| | |
|---|---|
| NOTICE | • Bundle cables with a camera cable protector (OP-88208) or with spiral tubing material. Direct bundling will concentrate the cable load on the bindings, which can result in cable damage or a short circuit.<br>• In the absence of other specifications, the minimum cable flexibility (R) should be 3 times the external diameter (5 times is recommended). Additionally, repeated curvature and screw stress should be avoided. The minimum bend radius is the same, even when using high-flex cable. Unless otherwise stated, use R100 or greater.<br>• Do not connect cameras or cables, etc. which the controller does not support. This may cause failures, or breakdowns of the unit and connected devices.<br>• For details about the cameras and cable combinations that the controller supports, see the CV-X Series Setup Manual. |

### Using the repeater for camera cable extension

The camera cable can be extended by using the extension repeater for the camera cable.

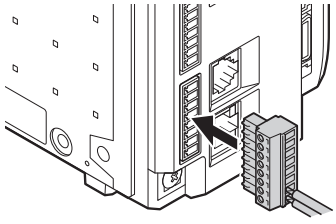



## Connecting the 24 VDC Power Source

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

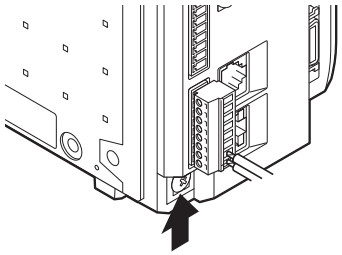
| | |
|---|---|
| NOTICE | • Use a flat head screwdriver to connect the power supply to the input terminals.<br>• Use a torque of 0.25 Nm or less to tighten the screws.<br>• Use the electrical wires AWG14 to AWG22.<br>• Do not solder-coat the end of the wire. Doing so may cause fire or product malfunction.<br>• Make sure to connect the frame ground terminal for the 24 VDC power source to a type D ground.<br>• 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.**



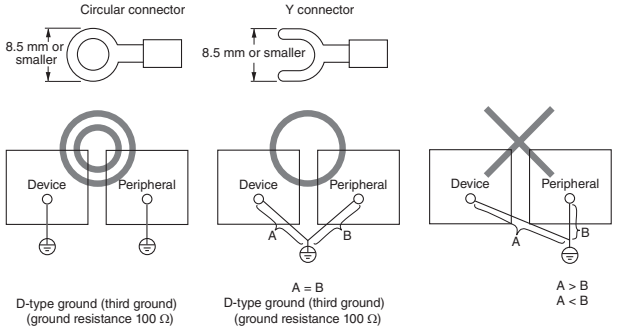
| | |
|---|---|
| NOTICE | Do not connect the 0 V power supply terminal to the ground terminal or ground wire. |

**2 Connect the ground wire to the ground port.**

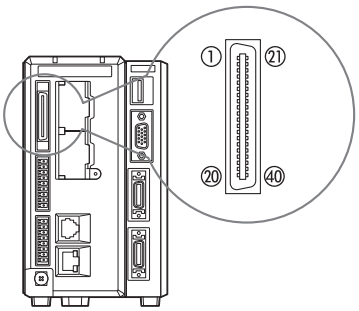


Connect the ground wire

| NOTICE | |
|---|---|
| | • Ground each device separately.<br>• Use a D type ground.<br>• Keep ground resistance to 100 Ω or less.<br>• Keep the ground wire as short as possible.<br>• If it is not possible to ground each device separately, ground them together. However, make sure that the electrical cables are the same as shown below.<br>• Solderless contact sizes are listed below. M4 screws should be used.<br>• Tighten the screws with a torque of 0.8Nm. |




## Parallel I/O Interface




Reference Use the specialized parallel connection cable (3 m) OP-51657 (option) when connecting to the connector.

### Pin layout: The cable color when the OP-51657 (option) is used.

| No. | Terminal name | Signal | Signal Description*2 | Circuit diagram | 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 |
| 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 |

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.

Reference
*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".

## Terminal Block Interface

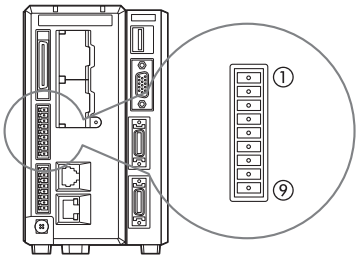
### Standard Specifications

Terminal block specifications for the controller are as follows.

| NOTICE | |
|---|---|
| | Tightening with a force above the standard torque may cause damage to the terminal block. |

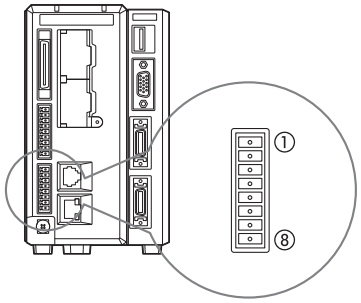
**OUTPUT connector**

- 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




## Pin Settings

Reference

*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".

**OUTPUT connector**

| No. | Terminal name | Signal | Terminal block display at time of shipment | Signal description*2 | Circuit diagram |
|---|---|---|---|---|---|
| 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 | – |

Reference

- Power source 0V, COMOUT1, COMOUT_F+, and COMOUT_F- are all isolated.
- COMOUT1 is the common terminal for output for OUTPUT connectors 1 to 2.
- COMOUT_F+ and COMOUT_F- are the common terminals for OUTPUT connectors 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 |
|---|---|---|---|---|---|
| 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) | – |

Reference

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

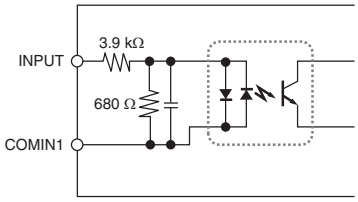
# Input/Output Circuit

## Input Circuit

**Input circuit diagram**

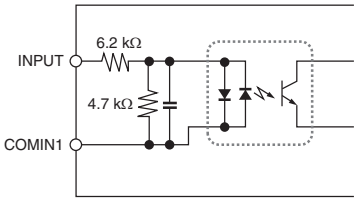
**Circuit A (F_IN0 to 3 only, EV compatible)**

- Max. imposed 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. imposed 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 "Parallel I/O Interface" (page 5) and "Terminal Block Interface" (page 5) for common connections.

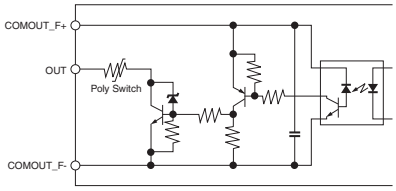
## Output Circuit

| NOTICE | The overcurrent protective Poly Switch is set to trip at 1 A. Use a power supply with an output rated 1 A or more. |
|---|---|

**Output circuit diagram (NPN output type)**

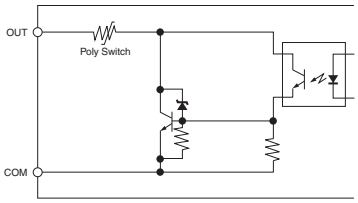
**Circuit C (F_OUT0 to 3 only)**

- Max. imposed voltage: 30 V
- Leakage 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)**

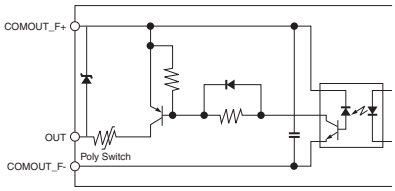
- Max. imposed voltage: 30 V
- Leakage current: 50 mA
- Leakage current: 0.1 mA or less
- Residual voltage:
  1.4 V or less (50 mA)
  1.0 V or less (20 mA)




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

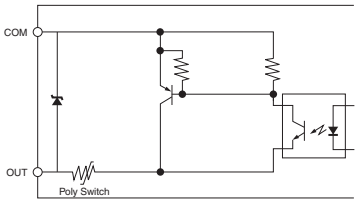
**Circuit C (F_OUT0 to 3 only)**

- Max. imposed voltage: 30 V
- Leakage 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. imposed voltage: 30 V
- Leakage 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)



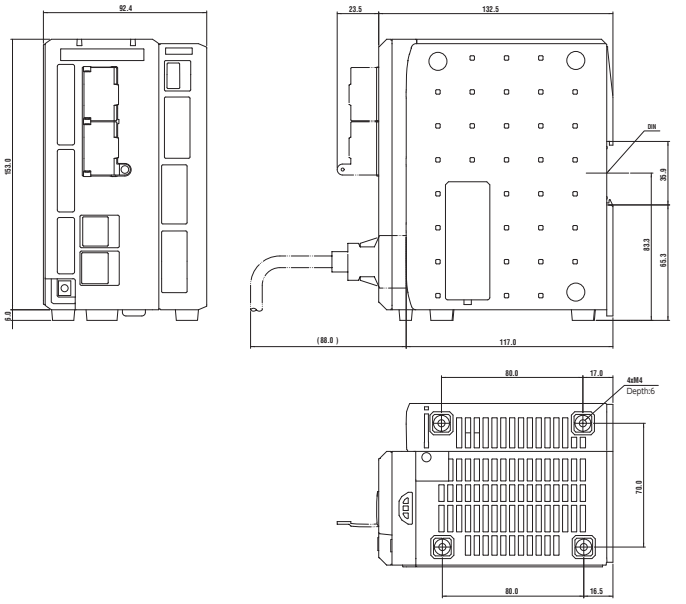
# Main Specifications

| Model name[*1*2] | | | CV-X172 | CV-X152 | CV-X102 |
|---|---|---|---|---|---|
| Camera input | | | 2 color/monochrome cameras | | |
| | | | A maximum of up to four are connectable by connecting one optional area camera input unit CV-E500 | | - |
| | Trigger input | | Simultaneous capture by up to 4 cameras/individual capture can be selected. (when CV-E500 is not connected, up to 2 cameras can be connected simultaneously) | | Simultaneous capture by up to 2 cameras/ individual capture can be selected. |
| Supported cameras / Number of pixels | | | **CA-HX500C/HX500M**<br>• 5,000,000-pixel mode: 2432 (H) x 2040 (V), approx. 4,960,000 pixels<br>• 2,000,000-pixel mode: 1600 (H) x 1200 (V), approx. 1,920,000 pixels<br>**CA-HX200C/HX200M**<br>• 2,000,000-pixel mode: 1600 (H) x 1200 (V), approx. 1,920,000 pixels<br>**CA-HX048C/HX048M**<br>• 470,000-pixel mode: 784 (H) x 596 (V), approx. 470,000 pixels<br>• 310,000-pixel mode: 640 (H) x 480 (V), approx. 310,000 pixels<br>• 240,000-pixel mode: 512 (H) x 480 (V), approx. 240,000 pixels<br>**CA-H500C/H500M**<br>• 5,000,000-pixel mode: 2432 (H) x 2050 (V), approx. 4,990,000 pixels<br>**CA-200C/HS200C/H200C/200M/HS200M/ H200M**<br>• 2,000,000-pixel mode: 1600 (H) x 1200 (V), 1,920,000 pixels<br>• 1,000,000-pixel mode: 1024 (H) x 960 (V), approx. 980,000 pixels<br>**CA-035C/HS035C/H035C/035M/HS035M/ H035M**<br>• 310,000-pixel mode: 640 (H) x 480 (V), approx. 310,000 pixels<br>• 240,000-pixel mode: 512 (H) x 480 (V), approx. 240,000 pixels | **CA-HX200C/HX200M**<br>• 2,000,000-pixel mode: 1600 (H) x 1200 (V), approx. 1,920,000 pixels<br>**CA-HX048C/HX048M**<br>• 470,000-pixel mode: 784 (H) x 596 (V), approx. 470,000 pixels<br>• 310,000-pixel mode: 640 (H) x 480 (V), approx. 310,000 pixels<br>• 240,000-pixel mode: 512 (H) x 480 (V), approx. 240,000 pixels<br>**CA-200C/HS200C/H200C/200M/HS200M/ H200M**<br>• 2,000,000-pixel mode: 1600 (H) x 1200 (V), 1,920,000 pixels<br>• 1,000,000-pixel mode: 1024 (H) x 960 (V), approx. 980,000 pixels<br>**CA-035C/HS035C/H035C/035M/HS035M/ H035M**<br>• 310,000-pixel mode: 640 (H) x 480 (V), approx. 310,000 pixels<br>• 240,000-pixel mode: 512 (H) x 480 (V), approx. 240,000 pixels | **CA-HX048C/HX048M**<br>• 470,000-pixel mode: 784 (H) x 596 (V), approx. 470,000 pixels<br>• 310,000-pixel mode: 640 (H) x 480 (V), approx. 310,000 pixels<br>• 240,000-pixel mode: 512 (H) x 480 (V), approx. 240,000 pixels<br>**CA-035C/HS035C/H035C/035M/HS035M/ H035M**<br>• 310,000-pixel mode: 640 (H) x 480 (V), approx. 310,000 pixels<br>• 240,000-pixel mode: 512 (H) x 480 (V), approx. 240,000 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 | | | • SD card slot x2<br>• 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), CA-SD16G (16 GB) | | |
| Interface | Control input | External trigger input | 4 points (2 of which support special function assignment)<br>Input rating: 26.4 V max., 3 mA min, simultaneous/individual capture with up to 4 cameras (two camera with the CV-X102) is possible | | |
| | | | Can set individual trigger delays (0 to 999 ms) for each trigger input | | |
| | | Control input | 16 points (4 of which support special function assignment) Input rating: 26.4 V max., 2 mA min. | | |
| | 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 | | Analog RGB output<br>XGA 1024 x 768 (24 bit color, 60Hz) | | |
| | Operation indicator | | Power and ERROR LED display | | |
| | RS-232C | | Can perform numerical value output and control I/O, supports a max. baud rate of up to 115200 bps<br>(Cannot be used with PLC-Links using the RS-232C port) | | |
| | PLC-Link | | • Can output numerical values and perform control input/output using the Ethernet or RS-232C port (Cannot be used in conjunction with EtherNet/IP and PROFINET. When using the RS-232C port, nonprocedural RS-232C communication is cannot be used in conjunction.)<br>• The following PLCs are supported via link unit:[*3]<br>KEYENCE: KV-7000 Series, KV-5000/3000 Series, KV-1000/700 Series, KV Nano Series<br>Mitsubishi Electric: MELSEC iQ-R/L/Q Series, MELSEC A Series (RS-232C only), MELSEC iQ-F Series, MELSEC FX Series (RS-232C only)<br>OMRON: SYSMAC CJ2/CJ1/CS1/CP1 Series, SYSMAC C Series (RS-232C only)<br>YASKAWA Electric Corporation: MP2000 Series, MP900 Series (RS-232C only) | | |
| | Ethernet | | • Can output numerical values and perform control input/output<br>• Can output measured value and image data via the included PC programme, upload and download settings<br>• Supports FTP client and FTP server function<br>• VNC server (for non-PC clients, only displaying the monitor screen is supported)<br>• Supports BOOTP function<br>• 1000BASE-T/100BASE-TX/10BASE-T | | |
| | EtherNet/IP | | • Numerical value and control input/output using the Ethernet port enabled (Cannot be used in conjunction with PLC-link / PROFINET).<br>• Cyclic (implicit) communication (max. 1436 bytes) possible. Message communication possible.<br>• Maximum connections: 32.<br>• In conformity with conformance test Version.A9. | | |
| | PROFINET | | • Numerical value and control input/output using the Ethernet port enabled (Cannot be used in conjunction with PLC-link / EtherNet/IP).<br>• Cyclic communication (max. 1408 bytes) possible. Record data communication possible.<br>• In conformity with Conformance Class A | | |
| | Mouse | | Possible to control various menus via an optional dedicated mouse (OP-87506: included with the controller) | | |
| Illumination control | | | By connecting the optional Illumination Expansion Unit CA-DC30E/21E/10E, lighting and intensity control for the LED illumination is possible.[*4]<br>CA-DC30E: 2ch/unit, up to 2 units can be connected, only supports dedicated illumination unit.<br>CA-DC21E: 2ch/unit, up to 4 units can be connected, Output voltage 12V/24V.<br>CA-DC10E: 2ch/unit, up to 1 unit can be connected, Output voltage 12V only, mixed connection with CA-DC30E/21E is not possible. | | |
| Language | | | Switched among English, Japanese, Simplified Chinese, Traditional Chinese, Korean, Thai, German, French, Italian, Mexican Spanish, Indonesian, Vietnamese and Portuguese (Brazilian) | | |
| Rating | Power supply voltage | | 24 V DC ± 10% | | |
| | Current consumption | | 3.0A (When 2 cameras are connected)<br>3.9A (When 4 cameras are connected)<br>Figures indicate maximum load including rush current at start-up. | | 2.6A (When 2 cameras are connected)<br>Figures indicate maximum load including rush current at start-up. |
| Environmental resistance | Ambient temperature | | • When 2 cameras are connected: 0 to +50°C (when a 1 megapixel or higher camera is connected: 0 to +45°C)<br>• 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 letter at the end of the model number means the difference of the installed software function. For details, see the "CV-X Series User's Manual".
*2 The PNP open collector is used for model types with P at the end.
*3 Models that have an Ethernet port installed on the CPU unit support Ethernet port direct connections.
*4 The CA-DC21E supports switching between PWM and DC methods. The CA-DC30E is Constant current control method and the CA-DC10E is fixed to the PWM method.

## Dimensions

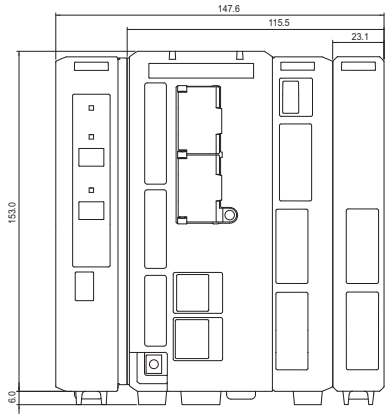
### Controller Unit CV-X102/152/172




Unit: mm

### With camera expansion unit (CV-E500) and illumination expansion unit (CA-DC10E) connected

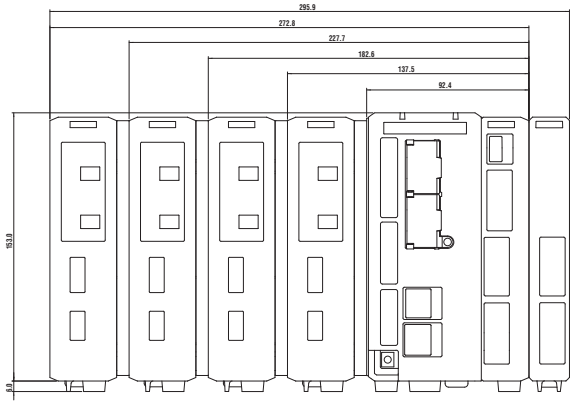
**(CV-E500 can be connected only to CV-X152/172)**




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

### With camera expansion unit (CV-E500) and illumination expansion unit (CA-DC21E) connected

**(CV-E500 can be connected only to CV-X152/172)**




Unit: mm
(Total weight: approx. 3800g)

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