# Instruction manual

Model CO/USB series

CO-G32
CO-HV
USB-OPT
CO-E32

Matsusada Precision

B/N: 009.9.026 Rev. 1.5

F-RA-001-2R2

## Note



## Trademarks



## Warranty

- For details, refer to the following website.
  https://www.matsusada.com/support/manufacturer_warranty.html

# For Safe Use of the Product

## ◆ Introduction

The product generates high-voltage and high-energy.
Therefore, wrongly handling or operating the product could cause electric shock, which may result in death or serious injury and maybe property damage as well. In order to use the product safely, read the instruction manual thoroughly before use to understand how to use and operate it properly.
Please note that we will not be held responsible for any damage or injury caused by not following the warnings, cautions, and procedures described in the manual.

Keep the manual with you so that you can read it whenever you want.

## ◆ Symbols

Symbols are used in the manual and product, which indicate precautions to be observed for safe use.
Understand these symbols first and then read the manual thoroughly.
Some symbols below are not used in products.

| | |
|---|---|
| WARNING | Indicates a hazardous situation, which, if not avoided, may result in serious injury or death. |
| CAUTION | Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury or in property damage. |

| | | | |
|---|---|---|---|
| | Indicates danger/warning/caution. Refer to the instruction manual when this symbol appears on the unit. | | Frame or chassis terminal |
| | Indicates the possible danger of electric shock under specific conditions, which may result in serious injury or death. | | Ground terminal |
| | High Temperature Caution:<br>Indicates the possible danger of injury by high temperature under specific conditions. | | Power ON |
| | Indicates general prohibitions, including warnings. | | Power OFF |
| | Indicates an action that must be performed in order to demonstrate the performance of the product. | | Standby |
| | Protective earth terminal (ground terminal for preventing electric shock) | | Bistable push button switch ON |
| | Indicates the possible danger of death if you drink it and burns or blindness if it attaches. | | Bistable push button switch OFF |
| | Indicates the possible danger of exposure to radiation. | | Alternative Current |

## ⚠WARNING

- **Understand the risks.**
  The Product generates high voltage and high-energy.
  The product is designed for electrical engineers or the equivalents who install, wire, and operate it.
  Read the instruction manual thoroughly before use and familiarize yourself with the proper use and danger of the product.

- **Make sure to allow only specific people to handle the product.**
  Make sure to allow only the following personnel to conduct installation, wiring, or operation of the product.
  1. who are electrical engineers or the equivalents and have already familiarized themselves with the proper use and danger of the product, or
  2. who are electrical engineers or the equivalents and have already been trained by the above-mentioned people, or
  3. who work under the supervision of the above-mentioned people.

  If people other than those listed above install, wire, or operate the product, it may cause electric shock, burnout, or injury.

- **Do not open or remove the case or panel of the product.**
  Do not disassemble, repair, or modify the product by yourself. High voltage is applied to the inside of it.
  Otherwise, it may cause electric shock, fire, or malfunction.
  Moreover, if you do it, the safety and functions are not covered with the warranty.

- **The product does not suit to install and use in places where children may be present.**
  The product is designed to be installed in places such as factories or laboratories. Do not install and use it where children may be present.

- **Make sure to ground it.**
  When the product has a protection ground terminal or GND terminal, make sure to ground it.
  When the AC line input of it is an inlet type, connect the attached power cable or a power cable suitable for your area to an outlet with the ground. Otherwise, it may result in electric shock or fire.

- **Power cable**
  When a power cable is enclosed or attached to the product, do not use it for other products.
  When no power cable is enclosed with the product, prepare the power cable suitable for the usage environment and area by yourself.

- **Connection of power cable**
  Electrical engineers or the equivalents who have already been familiarized with the proper use and danger of the product should connect the power cable to the AC input by referring to the instruction manual.
  Regarding products that have acquired the safety standard, check the page describing the overvoltage categories too.

- **Do not modify or damage power cables**
  It may result in electric shock or fire.

- **Input voltage**
  Check the page describing the input terminals and input voltage in the instruction manual.
  Do not supply any voltage out of the specifications.

- **Fuse**
  The product builds in a protective fuse. In the case where a fuse holder is arranged outside of the product, you can replace it by yourself. Refer to the instruction manual to replace it.
  In the case where a fuse holder is not arranged outside of the product, you cannot replace it by yourself. In this case, do not open the case or panel of the product and contact us.

- **Designed for indoor use.**
  Use the product indoors only, not outdoors. Even indoors, do not use it if there is a possibility of water leakage, flooding, or snow covering.

## ⚠WARNING

- **Operating temperature and humidity**
  Use the product within the range of the specifications describing in the instruction manual.
  Do not use it in a place where the ambient temperature exceeds the specified range or a closed place.

- **Do not install the product in places where condensation may occur.**
  Doing so, insulation deteriorates and it may cause electric shock, fire, or malfunction.

- **Do not place anything on top of the product.**
  Doing so, they may fall or tumble from it.

- **Do not put anything in the product.**
  Do not put foreign objects such as metal or liquid into the product through the air inlets, air outlets, or other openings. Doing so, it may result in electric shock, fire, or malfunction.

- **Operate the product with the right hand.**
  **Use only your right hand to operate the product and keep your left hand away from it, which can reduce the risk of electric current flowing through the left hand to the vital organs of the body in the event of an electric shock.**

- **Do not touch the wiring/load connected to the output and any terminals/connectors during the operation or just after turning output off.**
  Very high voltage is on the terminals and connectors during the operation and even just after the output is turned off. Touching them may result in serious injury or death by electric shock.
  The terminals here mean all terminals like input and output terminals and terminals for communications and remote controls.

- **Turn off the product before touching the wiring/load connected to the product and any terminals/connectors on the product and cut it off from the AC input.**
  Before touching the terminals/connectors and wiring/load, turn off the product and unplug the AC input cable from the outlet or turn off the AC input breaker. Then, check there is no voltage remained using a tester.
  Since the output and sense terminals are connected to condensers in it, there is high-voltage remained on them even just after it is turned off.
  In order to avoid electric shock, ground the terminals to discharge using a short-circuit grounding apparatus and check the voltage again.
  The terminals here mean all terminals like input and output terminals and terminals for communications and remote controls.

## ⚠CAUTION

- **Level the product out to use for good heat dissipation.**
  Do not install the product upside down or sideways. If not, the inner heat dissipation will be insufficient. It may result in smoke or fire due to components deterioration.

- **Do not install the product in a place where cold air directly blows to it.**
  It may result in electric leakage or burnout due to condensation.

- **Do not install the product in a place where it is exposed to corrosive gases or liquids.**
  It may result in smoke or burnout due to components deterioration.

- **Do not install the product in a dusty place.**
  Accumulating dust in the air inlet will make hard to cool it down it, it may result in malfunction. In that case, remove dust immediately.

- **Do not block the air inlet and outlet.**
  Secure 30 cm space at least around the openings.
  If they are blocked, the product cannot show the rated performance due to the internal temperature increase. Moreover, components deteriorate and it may result in smoke or fire.

- **Remove wiring to and from the product when work like welding near it is done.**

- **Do not wipe the equipment with a dust cloth wet with chemicals (thinner or the like) or water.**
  Otherwise, it may result in an electric shock, electric leakage, or burnout due to water getting inside.

- **Regarding fan replacement**
  When products equip a fan, it has a lifetime. It will be worn out and deteriorated with the time passed and its operation may become unstable. Also, its lifetime greatly varies depending on the usage environment such as temperature, humidity, dust. It requires to be replaced at regular intervals to extend the lifetime. For the replacement, contact us.
  (It requires a replacement charge separately. Do not replace it by yourself, as there is a risk of electric shock.)

# Table of Contents

# 1 Introduction

## 1-1 Introduction

Thank you for purchasing our CO series.
We have taken all possible measures to control the quality of our products.
In order to get the full benefit of its superior performance and use it long and safe, handle it properly according to this manual.
We have applied our best to prepare this instruction manual, but if you find any unclear points, errors, and missing contents, please contact us.

## 1-2 Unpacking

After unpacking the box, check that the following accessories are supplied with the unit.
If the accessories are different, missing, or broken, please contact us immediately.

<Accessories>

| | | | |
|---|---|---|---|
| ☐ | Instruction manual | 1 | |
| ☐ | CO-RG/RGH/AU/AF/W/HL cable | 1 | Supplied with CO-RG and CO-HV. |
| ☐ | CO-OPT cable | 1 | Supplied with CO-RG and CO-HV. |
| ☐ | Rubber feet | 4 | |
| ☐ | USB driver download guide | 1 | Supplied with USB-OPT |

## 1-3 Installation Conditions

| | |
|---|---|
|  | Do not place anything on top of the unit. |
|  | Do not expose the unit for overly aggressive environments such as salt mist, corrosive or explosive gases, steam, or dust. |
|  | Prevent liquids or metals from entering the unit through the air inlet and outlet. It may result in malfunction, electric shock, or fire. |
|  | Do not block inlet and outlet. |
|  | Do not install the unit in a place where condensation may occur. |
|  | Set the unit on a level place to use. |
|  | Secure more than 30cm space on the front and back of the product. |
|  | If dust collects in the air inlet, remove it immediately.<br>It prevents the unit from cooling. |
|  | When doing something such as welding near the unit, detach all connections from the unit. |

## 1-4 Handling Precautions

**⚠WARNING**

- In high voltage power systems, equipment can be sometimes exposed to failures caused by high voltage.
- When using GPIB, connect only devices and cables needed to operate the system.
- Although the unit is equipped with protection for instantaneous short circuit, it should not be operated in the event of repeated short circuits with discharge.
- Although we have already applied finely-tuned noise suppression, if the unit hangs up or an unset voltage was output,
  ⇨ Shut down the unit and turn off the input power, reset the bus, turn on the input power gain, restart it, and then send commands from the controller again.
- **When changing the system, turn off the power to all devices consisting of the system.**
- **Make sure to ground the GROUND terminal.**
- **Ground the GROUND terminal of CO-32/CO-E32 and that of CO-HV separately.**

## 1-5 Input Specifications and Environment

The unit is designed to be used under the following conditions.

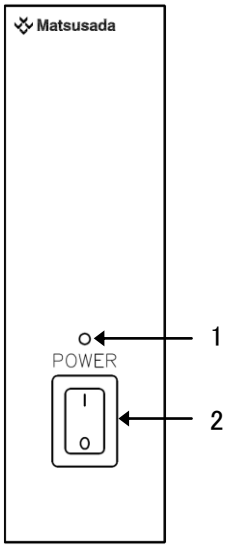
| Model | CO-G32<br>CO-E32<br>CO-HV | CO-OPT2-25<br>CO-OPT2-9<br>CO-OPT4-25<br>CO-MET4-25 | CO-MET2-25<br>CO-MET2-9<br>USB-OPT |
|---|---|---|---|
| Rated input voltage | 100 to 240Vac | 100 to 240Vac | |
| Voltage tolerance | ±10% | ±10% | |
| Frequency | 50/60Hz | 50/60Hz | |
| Input current | 0.1A | 0.3A | |
| Operating environment | Indoor use, OVC Ⅱ*1 | Indoor use, OVC Ⅱ*1 | Indoor use, OVC Ⅱ*1 |
| Pollution degree | Pollution degree2*2 | Pollution degree2*2 | Pollution degree2*2 |
| Operating temperature | 0 to +50℃ | 0 to +40℃ | 0 to +50℃ |
| Operating temperature | 20 to 80% RH<br>(no condensation) | 20 to 80% RH<br>(no condensation) | 20 to 80% RH<br>(no condensation) |
| Storage temperature | -20 to +70℃ | -20 to +65℃ | -20 to +70℃ |
| Storage humidity | 20 to 80% RH<br>(no condensation) | 20 to 80% RH<br>(no condensation) | 20 to 80% RH<br>(no condensation) |
| Altitude | 2,000m or less | 2,000m or less | 2,000m or less |

*1 OVC Ⅱ: Energy-consuming equipment supplied from fixed equipment.
*2 Pollution degree 2: Only nonconductive pollution occurs except for temporary conductivity due to condensation.

# 2 External view

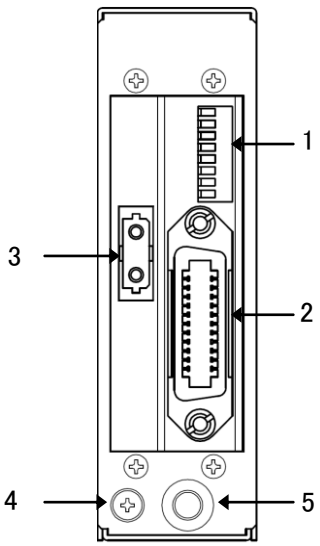
## 2-1 CO-G32

Front Panel




1 POWER LED
2 POWER ON/OFF switch

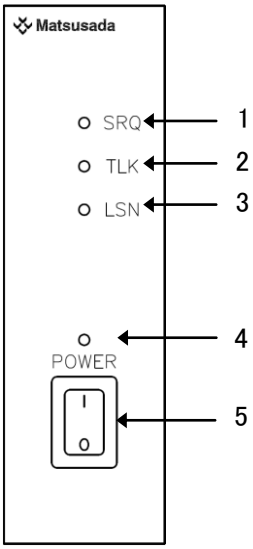
Rear Panel




1 ADDRESS setting switch
2 IEEE-488 connection connector
3 CO-OPT cable connection connector (OUT)
4 GROUND terminal
5 AC input

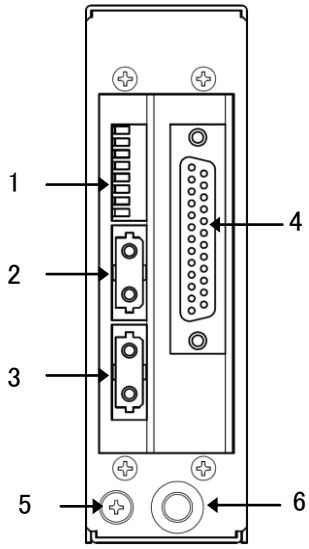
## 2-2 CO-HV

Front Panel




1 SRQ LED
2 TLK LED
3 LSN LED
4 POWER LED
5 POWER ON/OFF switch

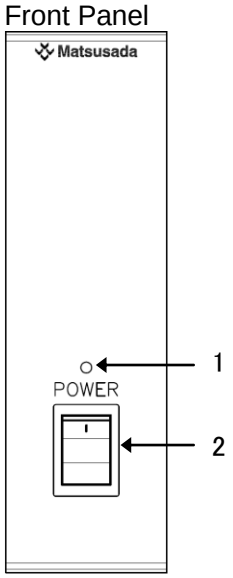
Rear Panel




1 Unit number and upper connection device setting switch
2 CO-OPT cable connection connector (IN)
3 CO-OPT cable connection connector (OUT)
4 Control cable connection connector (D-sub25 socket)
5 GROUND terminal
6 AC input

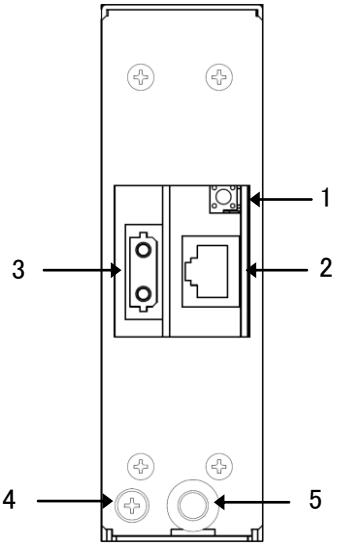
## 2-3 CO-E32

Front Panel



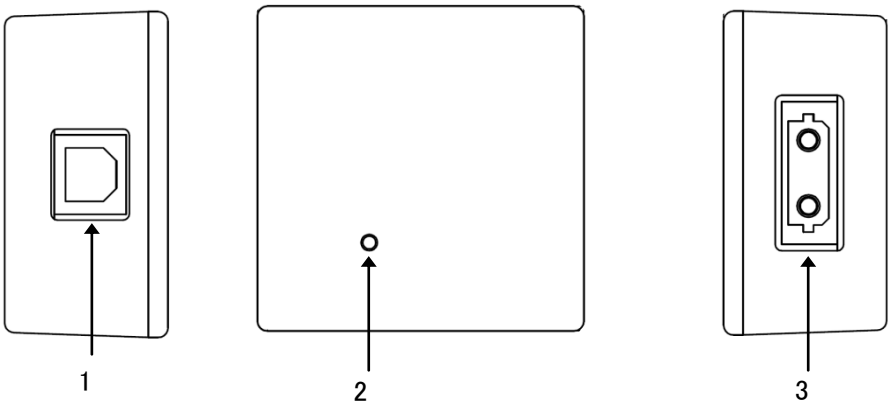

1 POWER LED
2 POWER ON/OFF switch

Rear Panel



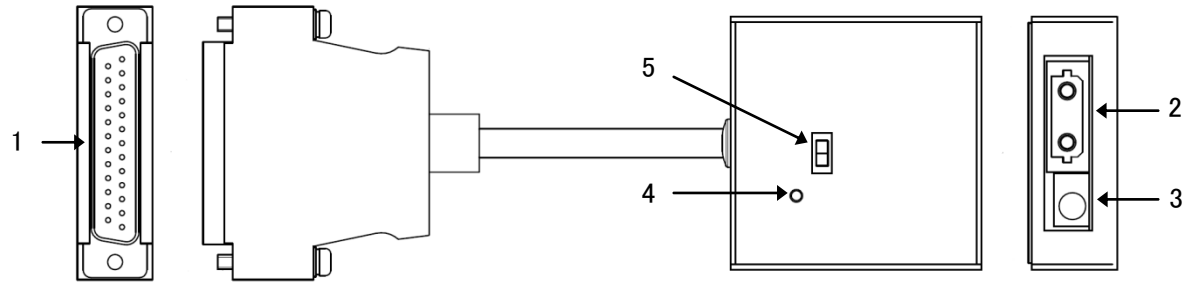

1 LAN reset switch
2 LAN connection connector
3 CO-OPT cable connection connector (OUT)
4 GROUND terminal
5 AC input

## 2-4 USB-OPT

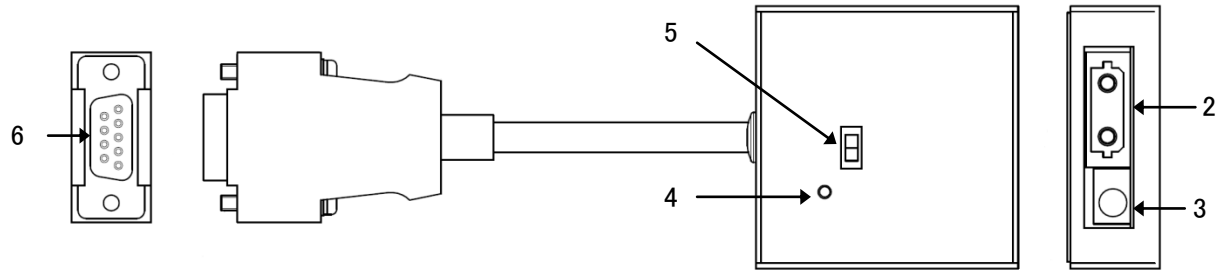



1 USB connection connector
2 POWER LED
3 CO-OPT cable connector

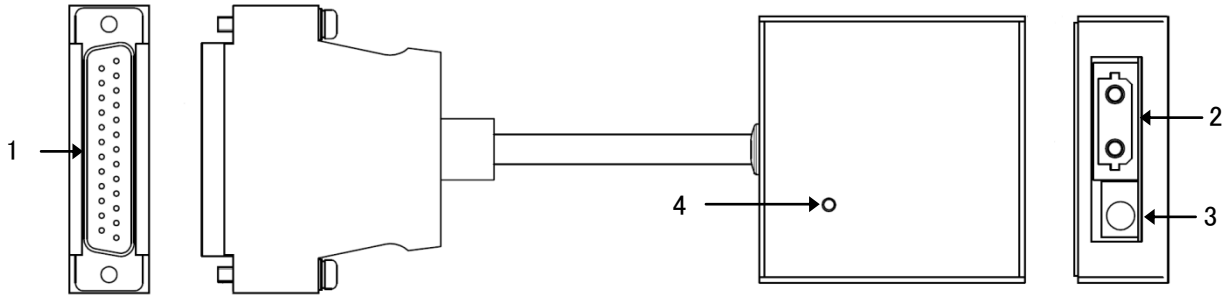
## 2-5 CO-OPT2-25



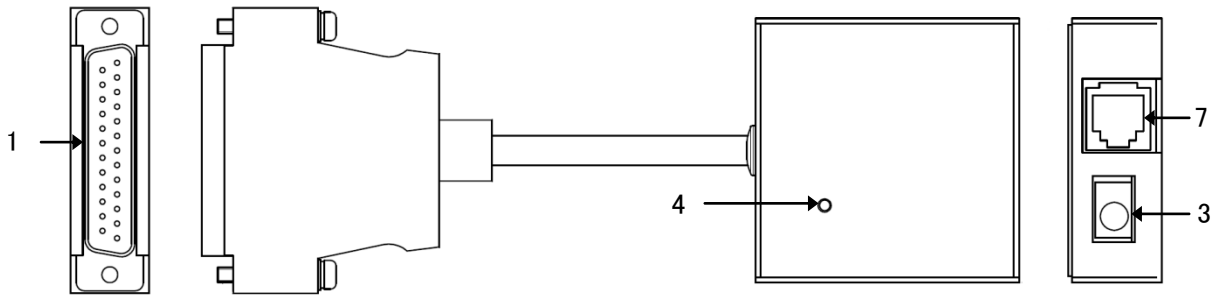

## 2-6 CO-OPT2-9




## 2-7 CO-OPT4-25

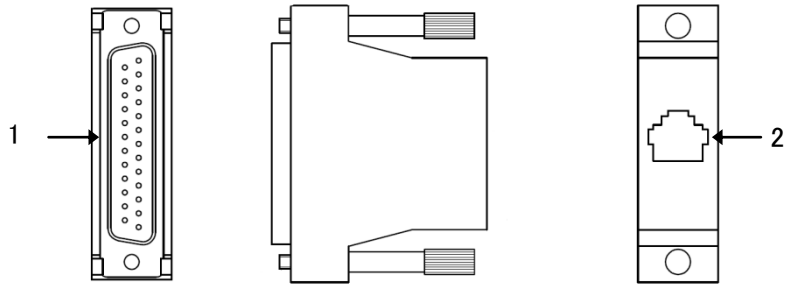



## 2-8 CO-MET4-25

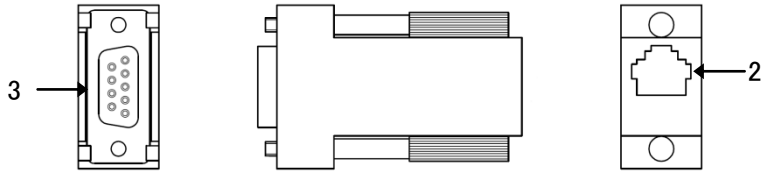



1 D-Sub 25-pin connector
2 CO-OPT cable connector
3 DC input terminal
4 POWER LED
5 DTE-DCE selector switch
6 D-Sub 9-pin connector
7 CO-M cable connection connector

## 2-9 CO-MET2-25

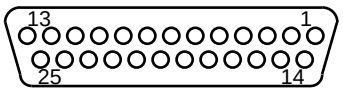



## 2-10 CO-MET2-9




1 D-Sub 25-pin connector
2 CO-M cable connection connector
3 D-Sub 9-pin connector

## 2-11 Pin Assignment of Control Cable Connection Connector



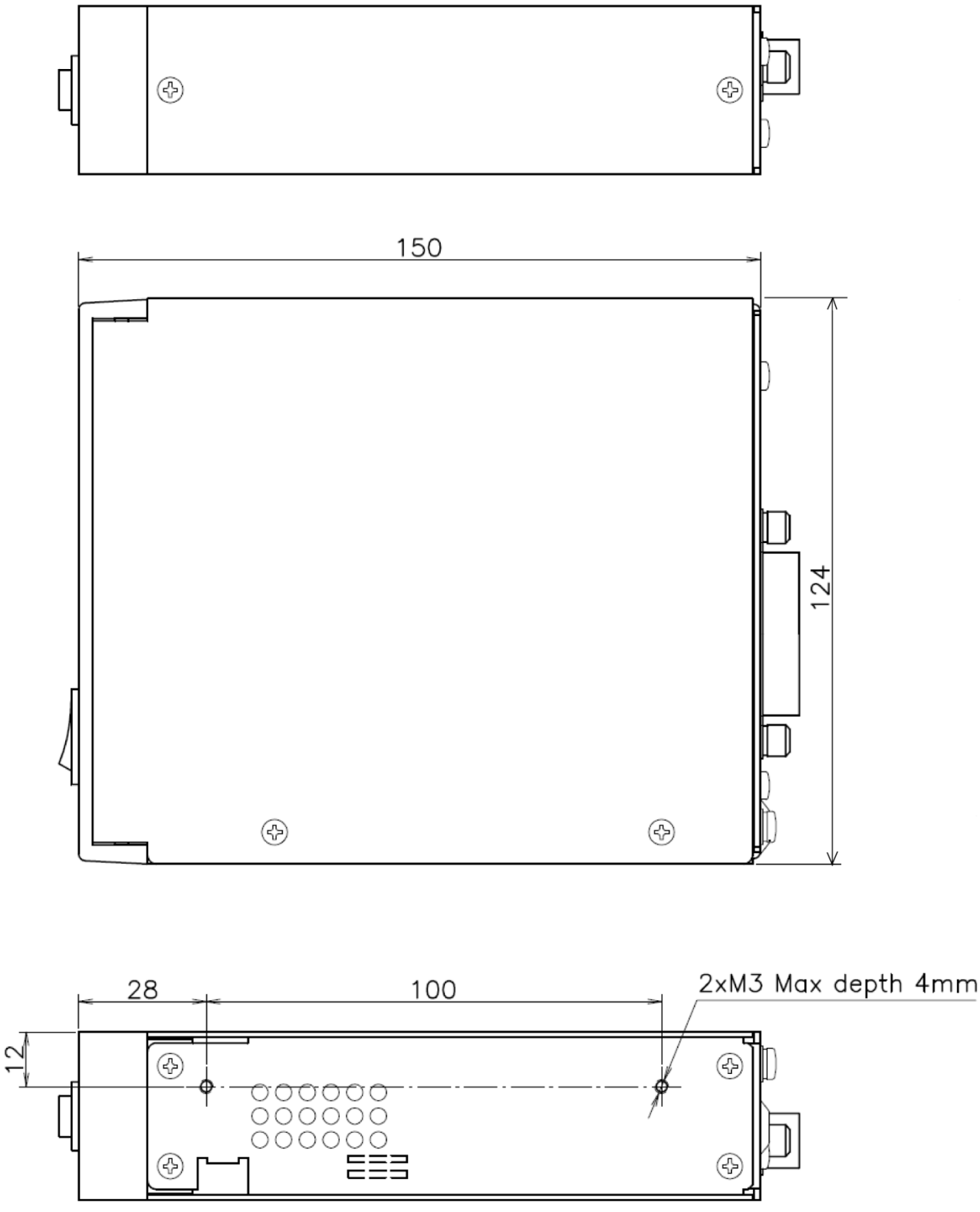

D-Sub 25-pin socket

Table: Pin assignment

| Pin No. | Function | command |
|---|---|---|
| 1 | Output voltage setting | CH0, VCN |
| 2 | Output current setting | CH1, ICN |
| 18 | Overvoltage protection setting | CH2, OVP |
| 15 | Voltage monitor | MN1, VM |
| 3 | Current monitor | MN2, IM |
| 4, 21 | Output ON/OFF signal | SW |
| 8 | Cutoff reset signal | RST |
| 20 | Remote/local mode setting | REN/GTL |
| 16 | SRQ | SRQ |
| 11 | Error state | SRQ |
| 12 | CV state | STS |
| 13 | CC state | STS |
| 5, 6, 10 | COMMON | ———— |

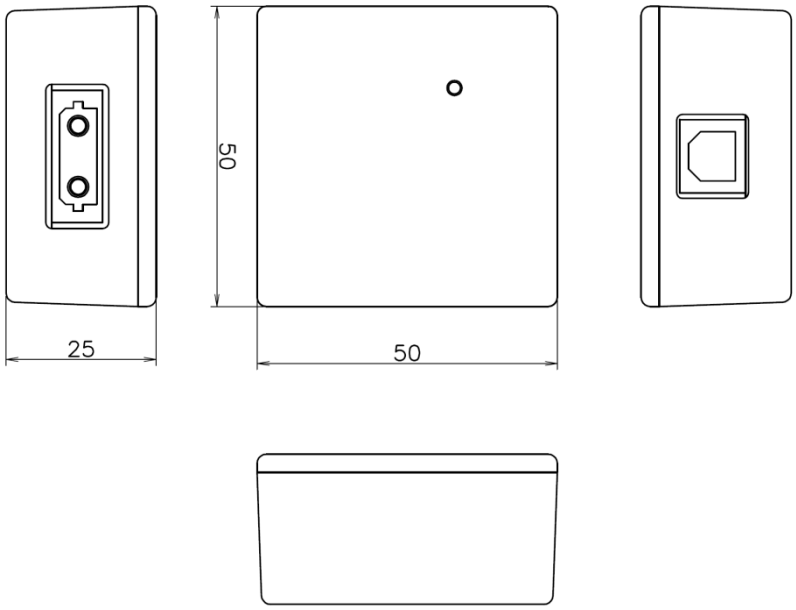
## 2-12 Dimensions

### 2-12-1 CO-G32/CO-E32/CO-HV

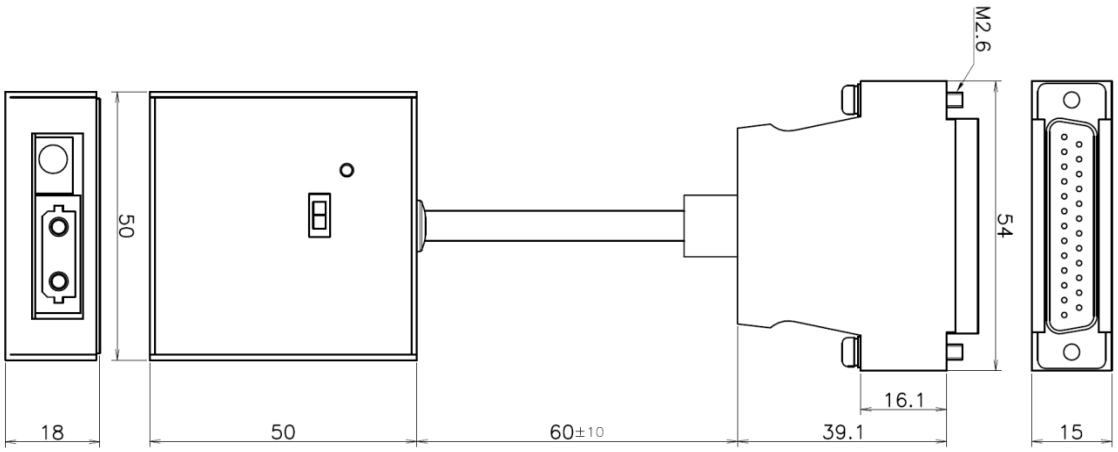



※ Protrusions not included.
※ Unit: [mm]

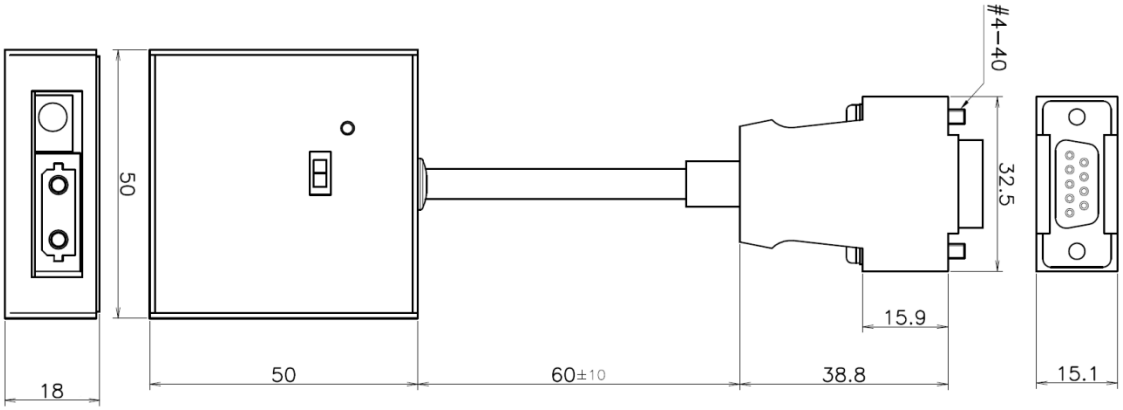
## 2-12-2 USB-OPT




## 2-12-3 CO-OPT2-25

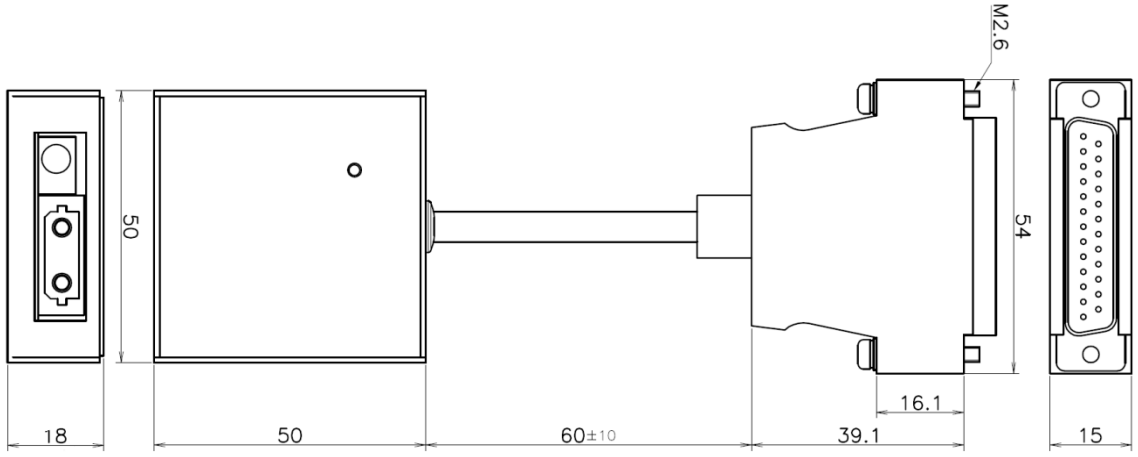



## 2-12-4 CO-OPT2-9

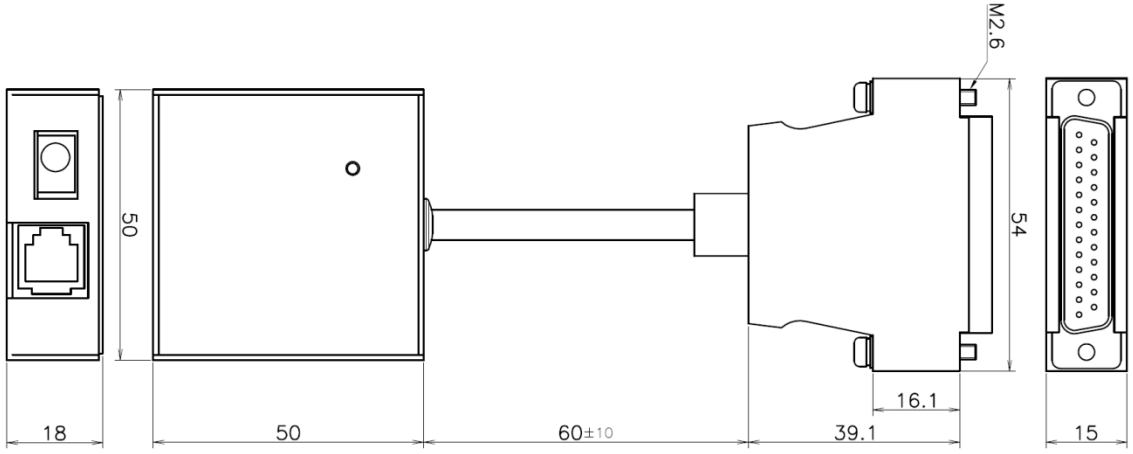



※ Protrusions not included.
※ Unit: [mm]

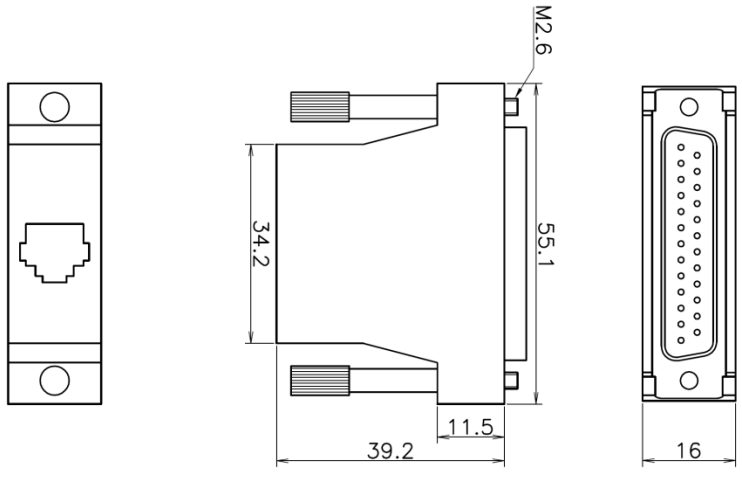
## 2-12-5 CO-OPT4-25




## 2-12-6 CO-MET4-25

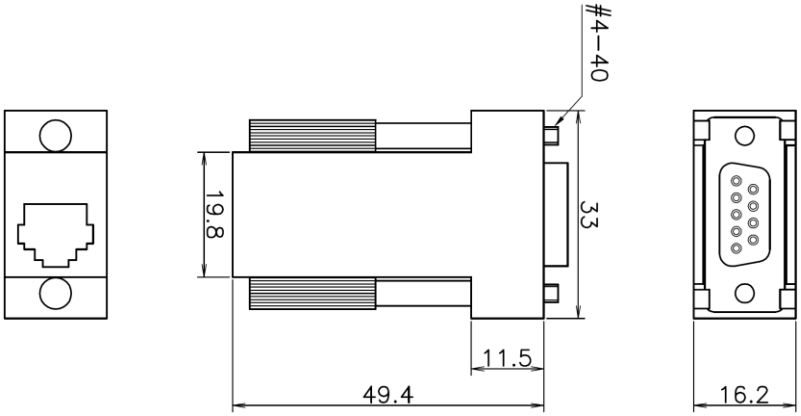



## 2-12-7 CO-MET2-25




※ Protrusions not included.
※ Unit: [mm]

## 2-12-8 CO-MET2-9




※ Protrusions not included.
※ Unit: [mm]

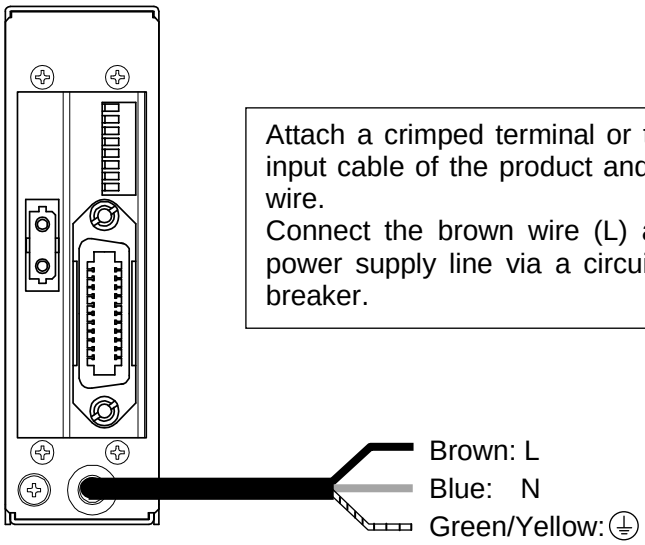
# 3 Connecting

## 3-1 Connecting AC Input Power

| ⚠WARNING |
|---|
| AC input connections should be performed by a trained electrician, or personnel with a similar level of knowledge who understands how to use this unit correctly and who is familiar with the risks involved. |
| ⏚ is GROUND. Make sure to ground. |
| Before connecting or modifying cables, be sure to cut off the AC input power.<br>After completing the work, check that all wiring is correct and there are no loose connections before turning the AC input power on. |

### 3-1-1 CO-G32, CO-E32, and CO-HV

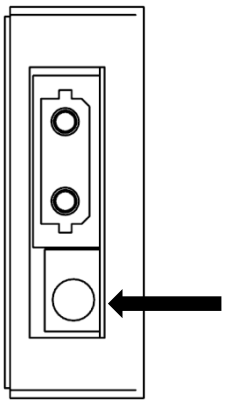
Here, take CO-G32 as an example.




Attach a crimped terminal or the like to the end of the input cable of the product and ground the green/yellow wire.
Connect the brown wire (L) and blue wire (N) to the power supply line via a circuit breaker or other circuit breaker.

### 3-1-2 CO-OPT2-25, CO-OPT2-9, CO-OPT4-25, and CO-MET4-25

Here, take CO-OPT2-25 as an example.



Insert the output side of the supplied AC adapter into the DC input terminal of this product, and connect the input side of the AC adapter to an AC outlet.

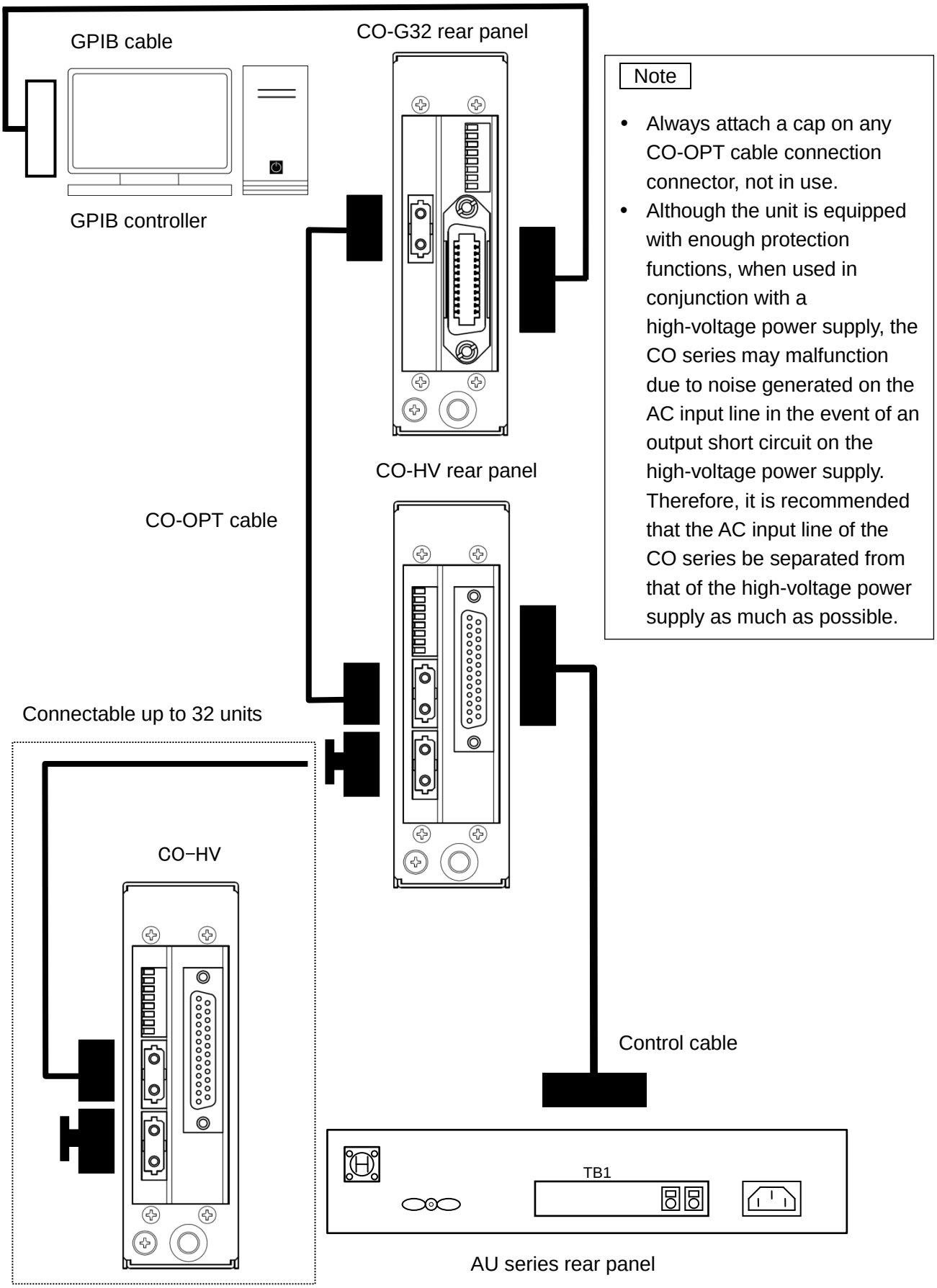
### 3-1-3 CO-K12 cable

The CL-K12 cable has power input harness for the K12-R (12W) series.
In accordance with the following, properly wiring.

| | | |
|---|---|---|
| +24V DC input | = | ORANGE |
| +24V DC input return | = | BLACK |

# 3-2 Connecting Interface

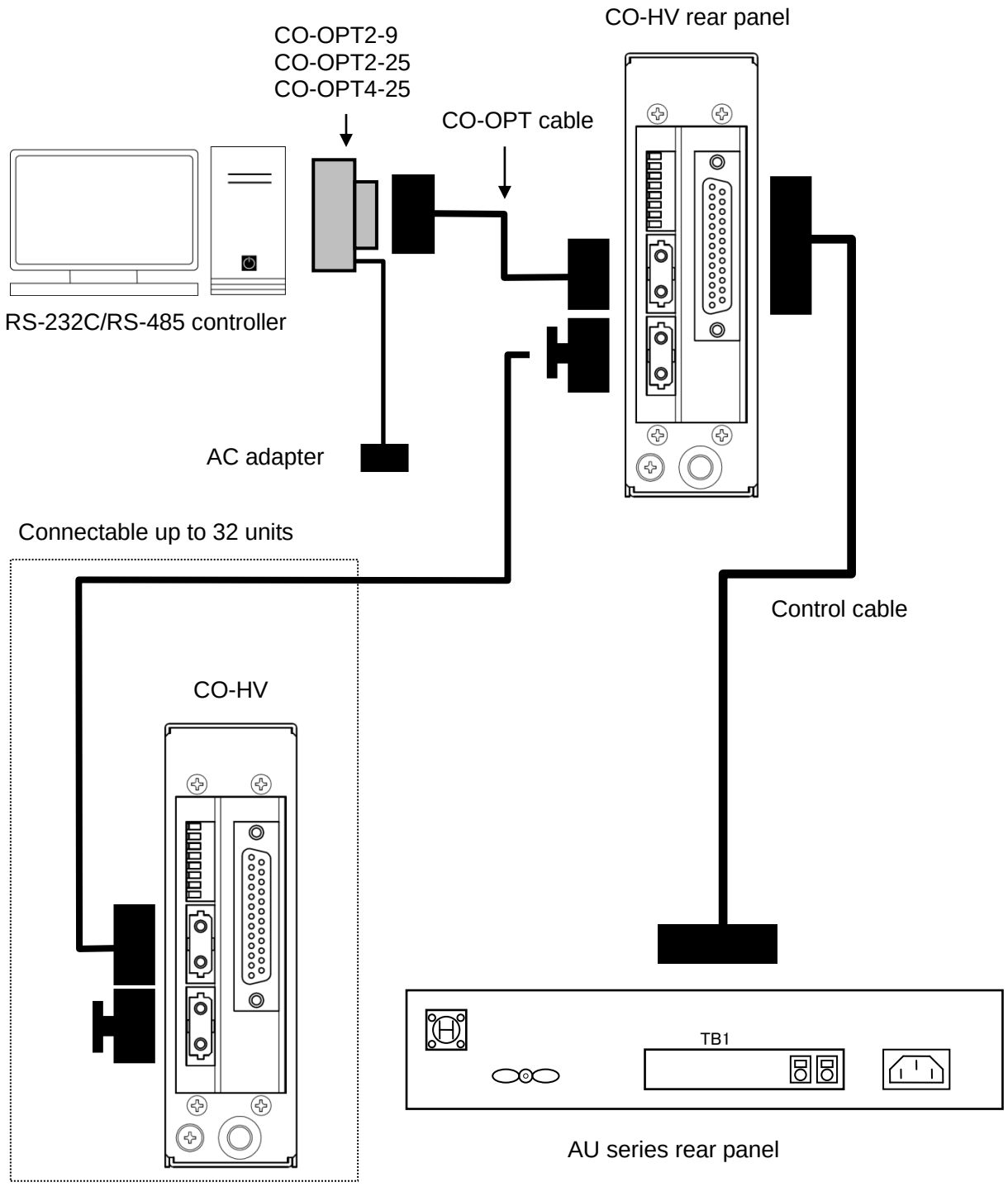
## 3-2-1 Connecting CO-G32 and CO-HV




**Note**

- Always attach a cap on any CO-OPT cable connection connector, not in use.
- Although the unit is equipped with enough protection functions, when used in conjunction with a high-voltage power supply, the CO series may malfunction due to noise generated on the AC input line in the event of an output short circuit on the high-voltage power supply. Therefore, it is recommended that the AC input line of the CO series be separated from that of the high-voltage power supply as much as possible.

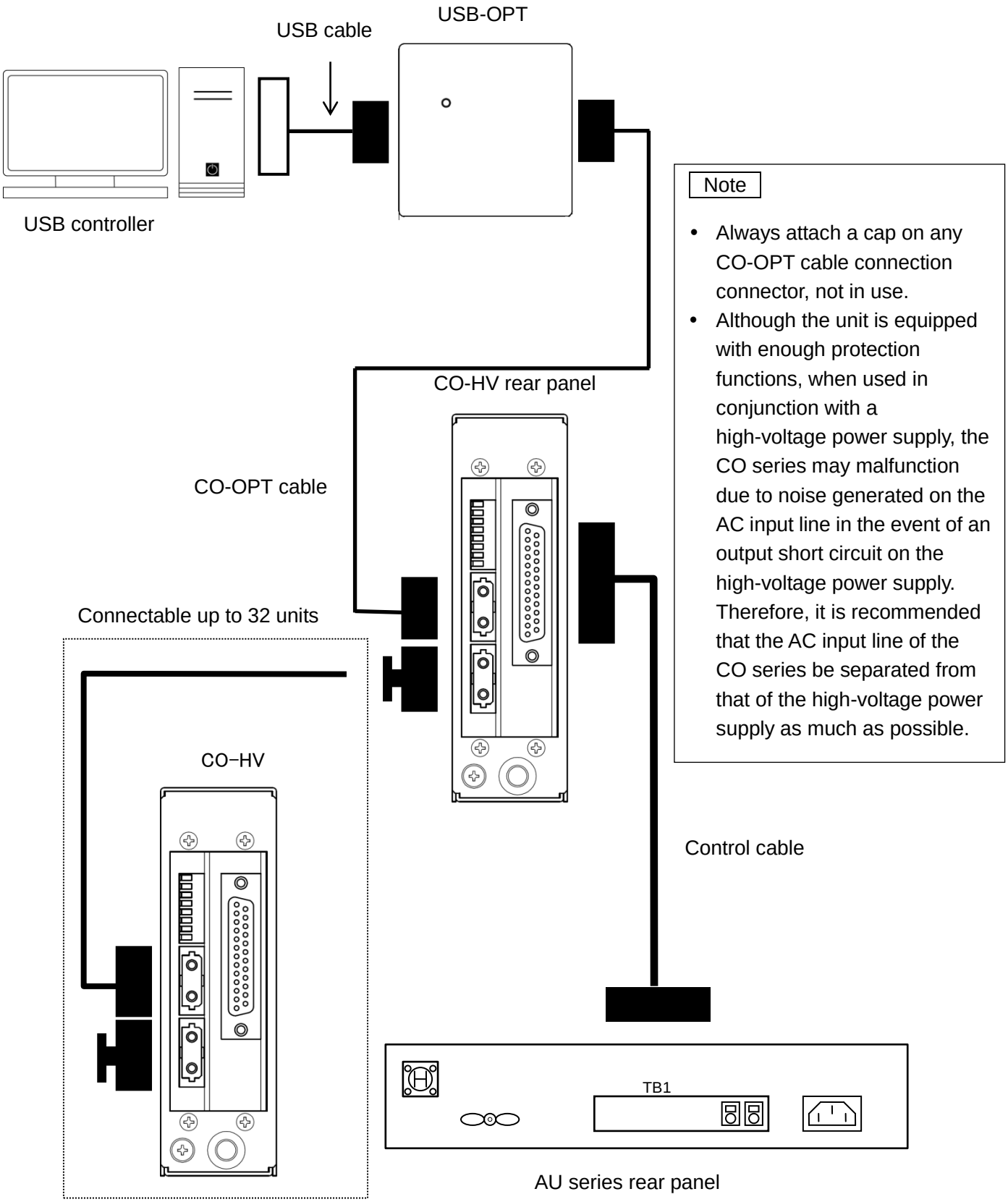
## 3-2-2 Connecting CO-OPT2-9/CO-OPT2-25/CO-OPT4-25 and CO-HV




Note

- Always attach a cap on any CO-OPT cable connection connector, not in use.
- Although the unit is equipped with enough protection functions, when used in conjunction with a high-voltage power supply, the CO series may malfunction due to noise generated on the AC input line in the event of an output short circuit on the high-voltage power supply.
  Therefore, it is recommended that the AC input line of the CO series be separated from that of the high-voltage power supply as much as possible.

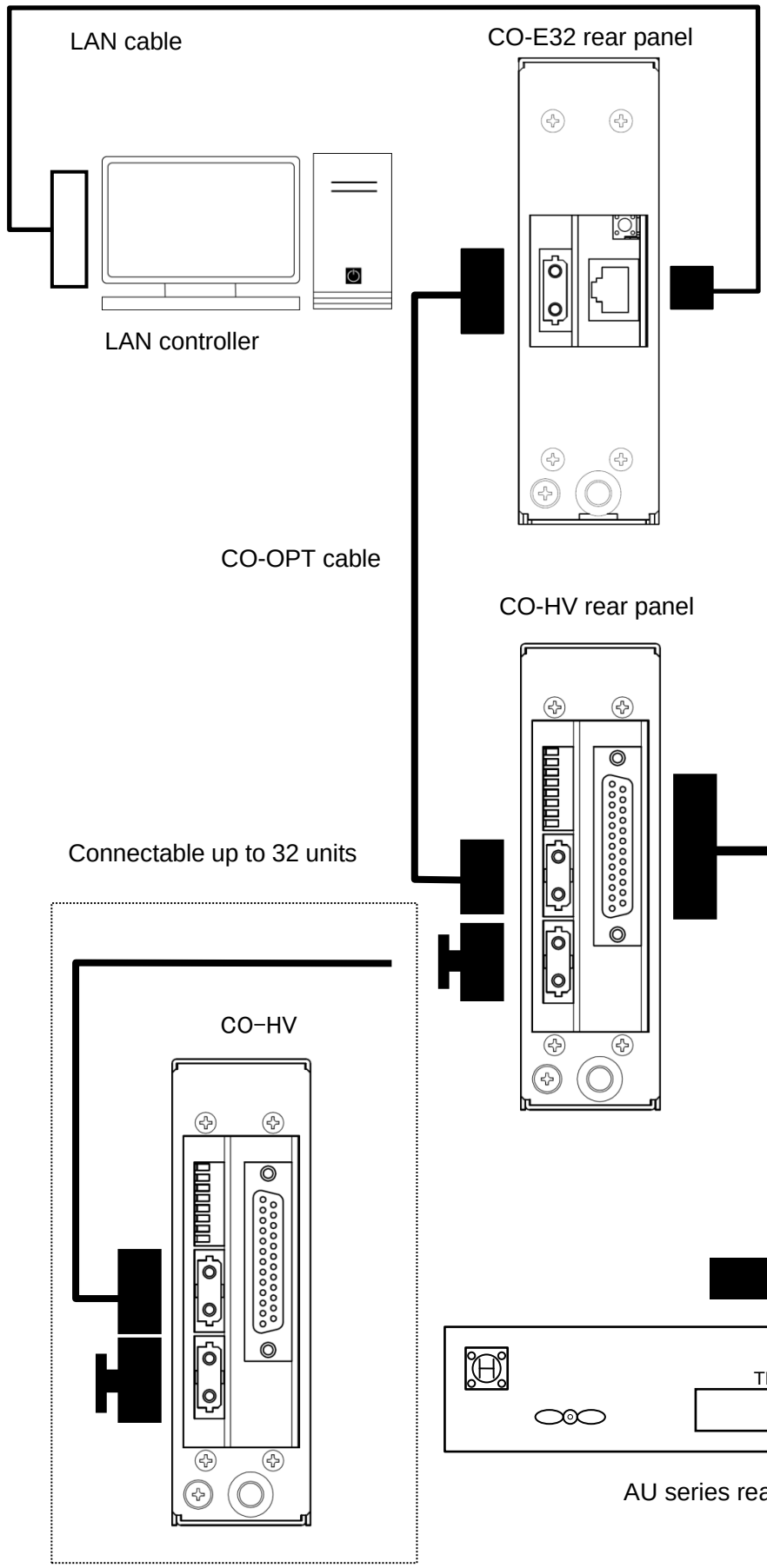
## 3-2-3 Connecting USB-OPT and CO-HV




**Note**

- Always attach a cap on any CO-OPT cable connection connector, not in use.
- Although the unit is equipped with enough protection functions, when used in conjunction with a high-voltage power supply, the CO series may malfunction due to noise generated on the AC input line in the event of an output short circuit on the high-voltage power supply. Therefore, it is recommended that the AC input line of the CO series be separated from that of the high-voltage power supply as much as possible.

## 3-2-4 Connecting CO-E32 and CO-HV




Note

- Always attach a cap on any CO-OPT cable connection connector, not in use.
- Although the unit is equipped with enough protection functions, when used in conjunction with a high-voltage power supply, the CO series may malfunction due to noise generated on the AC input line in the event of an output short circuit on the high-voltage power supply. Therefore, it is recommended that the AC input line of the CO series be separated from that of the high-voltage power supply as much as possible.

# 4 Functional Description

## 4-1 Overview

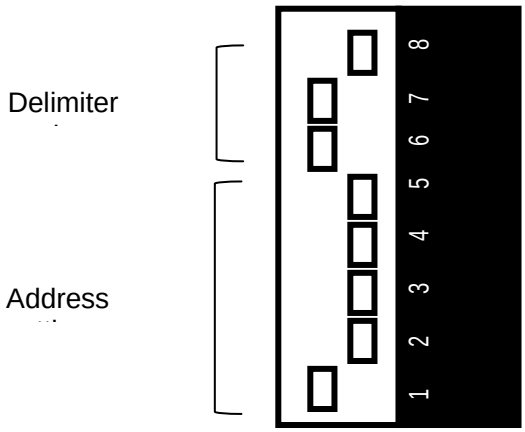
1. Setting output voltage and output current (16-bit)
2. Setting output ON/OFF
3. Measuring output voltage and output current (12-bit)
4. When the output of the power supply unit or the unit itself is turned off, the CO series issue an SRQ.
5. Controlling up to 32 power supply units with one GPIB address.

## 4-2 Setting GPIB Address and Delimiter

Set the GPIB address with the "Address setting switch" on the rear panel of CO-G32. Set the address in binary numbers using SW1 (LSB) through SW5 (MSB). Setting each switch to ON/the left position represents "1" in logic.
Although the GPIB address can be set from 0 to 30, make sure not to set the same address as other units. In addition, set a delimiter by combining SW6 through SW8.

- Switch 6 ・・・・・・ LF ($0A_H$)
- Switch 7 ・・・・・・ CR ($0D_H$)
- Switch 8 ・・・・・・ EOI

At shipment, the GPIB address is set to "1" and delimiter to "EOI".




Setting example

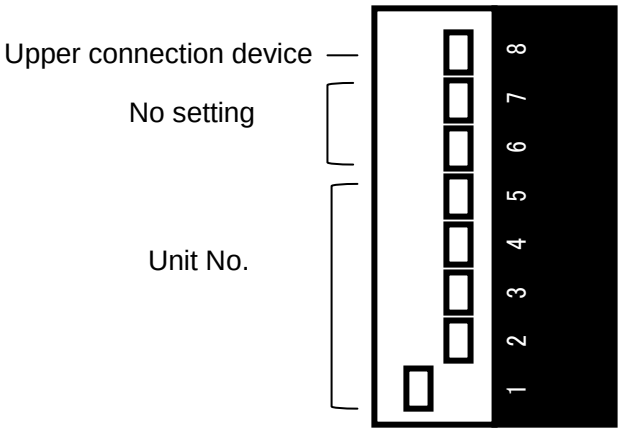
- GPIB address: 1
- Delimiter ・・・・: CR+LF

Note:

Since these settings are loaded when the unit is started up, be sure to set them while the unit is turned off. If not, the settings will not be reflected until the unit is rebooted.

## 4-3 Setting the Unit Number and the Upper Connection Device

Set the unit number with the "Unit number setting switch" on the rear panel of CO-RG/CO-HV. Use SW1 (LSB) through SW5 (MSB) to set the unit number in binary numbers. Setting each switch to ON/the left position represents "1" in logic. Although the unit number can be set from 0 to 31, make sure not to set the same unit number as other units.
In addition, set an upper connection device with SW8. When the -LGob option for our power supply units, CO-G32, USB-OPT, CO-E32, or CO-HV is connected to the CO-OPT cable connection connector (IN), set the SW8 to OFF. When CO-OPT2-9, CO-OPT2-25, or CO-OPT4-25 is connected to the CO-OPT cable connection connector (IN), set the switch 8 to ON.
At shipment, the unit number is set to "1", and the upper connection device is set to CO-G32, USB-OPT, CO-E32, CO-HV, or -LGob option for our power supply units.




Setting example

- Unit No. : 1
- Upper connection device: CO-G32, USB-OPT, CO-E32, CO-HV, or -LGob option for our power supply units

CO-HV

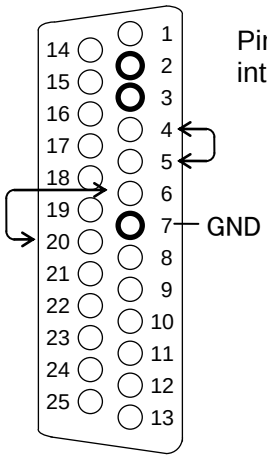
Note:

Since these settings are loaded when the unit is started up, be sure to set them while the unit is turned off. If not, the settings will not be reflected until the unit is rebooted.

# 4-4 Setting CO-OPT2-9/CO-OPT2-25/CO-OPT4-25

## 4-4-1 RS-232C

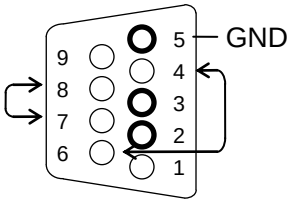
CO-OPT2-9 or CO-OPT2-25 connection uses three RS-232C signals for communication: TxD, RxD, and GND.
Refer to the following diagrams to make the connection between the controller such as a PC to be used and CO-OPT2-9 or CO-OPT2-25 properly.




Pin 4 - 5 and 6 – 20 are internally connected.

CO-OPT2-25 pin assignment
(D-Sub 25-pin MALE)

Pin 4-6 and 7-8 are internally connected.

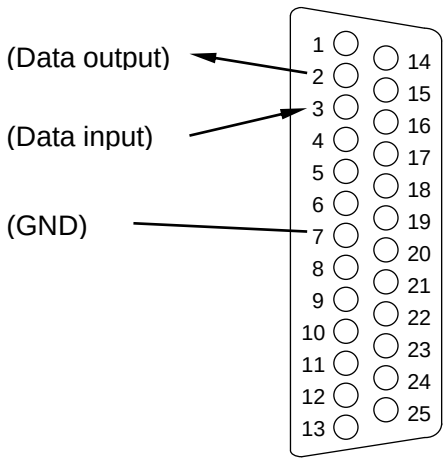



CO-OPT2-9 pin assignment
(D-Sub 9-pin FEMALE)

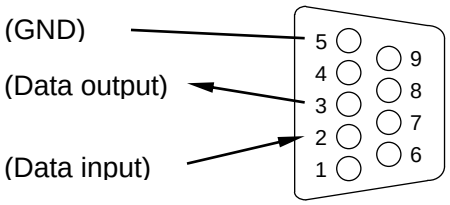
| Data direction / Pin No. | Selector switch | |
|---|---|---|
| | DTE | DCE |
| 2 | RxD (Input) | TxD (Output) |
| 3 | TxD (Output) | RxD (Input) |
| 7 | GND | |

| Data direction / Pin No. | Selector switch | |
|---|---|---|
| | DTE | DCE |
| 2 | TxD (Output) | RxD (Input) |
| 3 | RxD (Input) | TxD (Output) |
| 5 | GND | |

Before setting up the DTE/DCE selector switch, check the pin assignment of the RS-232C port with the instruction manual of the controller (PC, etc.) to be used. If the switch is not set correctly, communication will not be available.



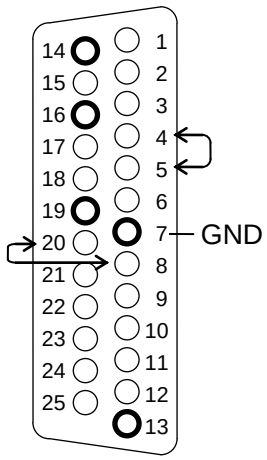

Typ. pin assignment of a controller (PC, etc.)
(D-Sub 25-pin FEMALE)




Typ. pin assignment of a controller (PC, etc.)
(D-Sub 9-pin MALE)

## 4-4-2 RS-485

CO-OPT4-25 connection uses five RS-485 signals: TxD+, TxD-, RxD+, RxD-, and GND.
Refer to the following diagrams to make the connection between the controller such as a PC to be used and CO-OPT4-25 properly.




Pin assignment of CO-OPT4-25
（D-Sub 25-pin MALE）

Pin 4-5 and 8-20 are short-circuited internally.

| Pin No. | Data direction |
|---|---|
| 13 | TxD+ (Output) |
| 14 | TxD- (Output) |
| 16 | RxD+ (Input) |
| 19 | RxD- (Input) |
| 7 | GND |

## 4-4-3 Communication Parameters

| | |
|---|---|
| Baud rate | Asynchronous 9,600 [bps] (Fixed) |
| Character length | 8 [bits] |
| Stop bit | 1 [bit] |
| Parity | None |
| Flow control | None |

## 4-4-4 Delimiter

The delimiter is CR ($0D_H$) and fixed.

## 4-5 Setting USB

Download the driver from our website to install.
For installing the driver, refer to the "USB Driver Installation Guide" downloaded.
The delimiter is CR ($0D_H$) and fixed.

## 4-6 Setting LAN

### 4-6-1 LAN Connector

Use RJ-45 connectors for 10Base-T or 100Base-T to connect LAN.
XPort® from Lantronix, Inc. is used for LAN devices.
Use Category 5 or higher LAN cables for connection.

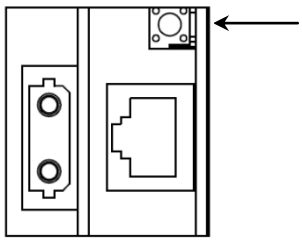
### 4-6-2 Setting LAN

Follow the instructions of your company's network administrator to set up the LAN.

| Initial setting values | | | | |
|---|---|---|---|---|
| IP address | 192 | 168 | 10 | 1 |
| Subnet mask | 255 | 255 | 255 | 0 |
| Default gateway | 0 | 0 | 0 | 0 |
| Remote port No. | 10001 | | | |

### 4-6-3 Initializing Network

In order to initialize the network, turn the power on while pressing the "LAN reset switch" on the CO-E32's rear panel. The network address and other settings will be set to the initial values above.



## 4-6-4 Network Settings Using the Web Manager

In order to set the CO-E32 network, use XPort's "Web Manager" as a LAN device.
We partially describe the XPort® settings provided by Lantronix, Inc. below.

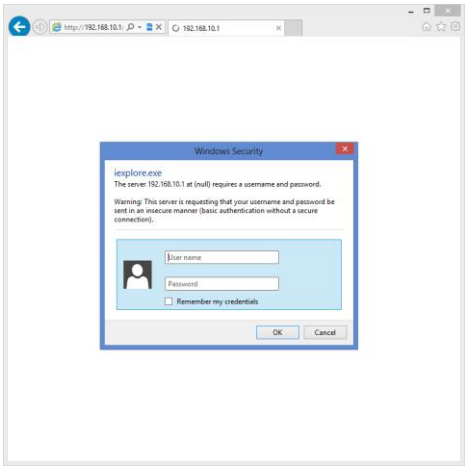
Note that we do not provide any support for setting up or operating methods other than those described in this manual.

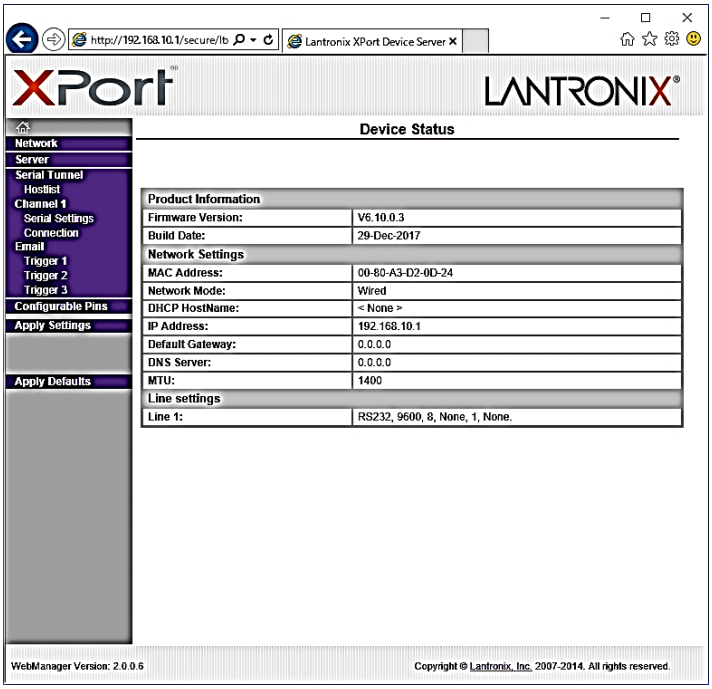
※ Web Manager basically assumes that it is used with Microsoft's Internet Explorer browser.

### 4-6-4-1 Starting up Web Manager

If you know the IP address of your LAN network, open your Internet Explorer browser and enter the IP address in the address field, then the account entry screen will appear.

※ If you don't know the IP address, perform the procedure [4-6-3 Initializing Network] to set "192.168.10.1" of the factory default IP address.



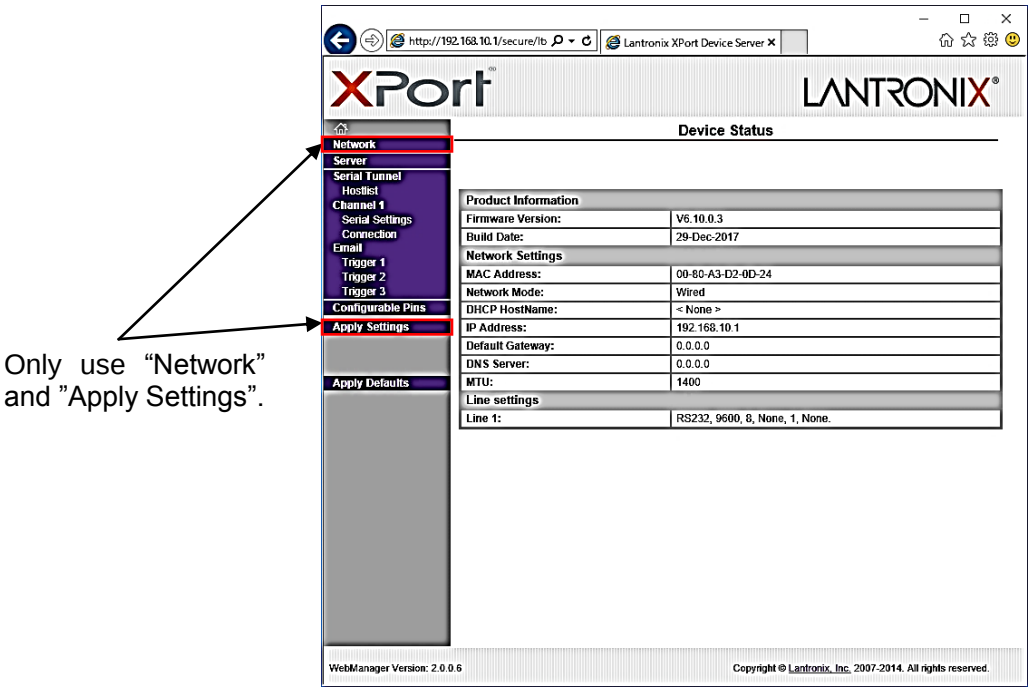




The setting screen will appear.

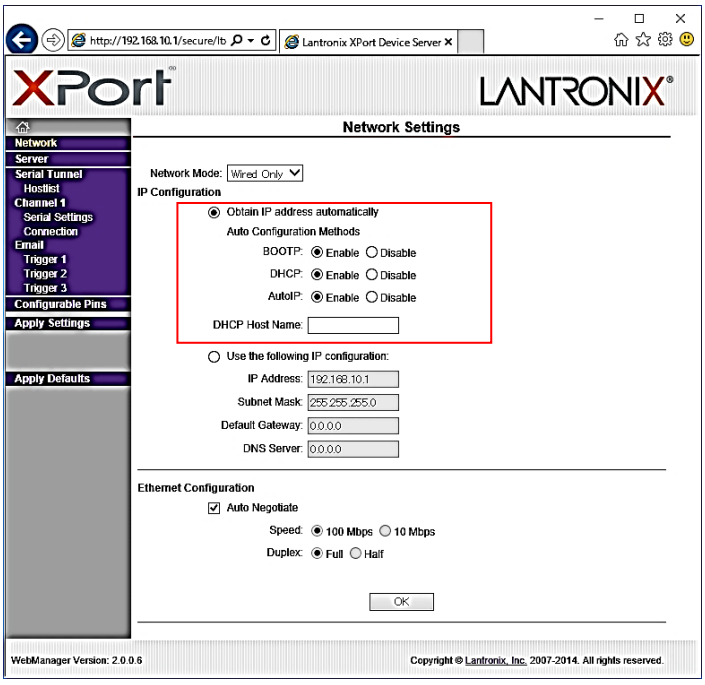
※ If the proxy setting is enabled in your browser, deactivate it, or exclude the set IP address.
※ When Internet Explorer 11 is used, add the IP address to the compatibility view setting.

### 4-6-4-2 Setting Network

In order to set the network, click the "Network" button.
Note that we cannot guarantee that you will be able to communicate with the unit if you set any setting other than those of the following steps.



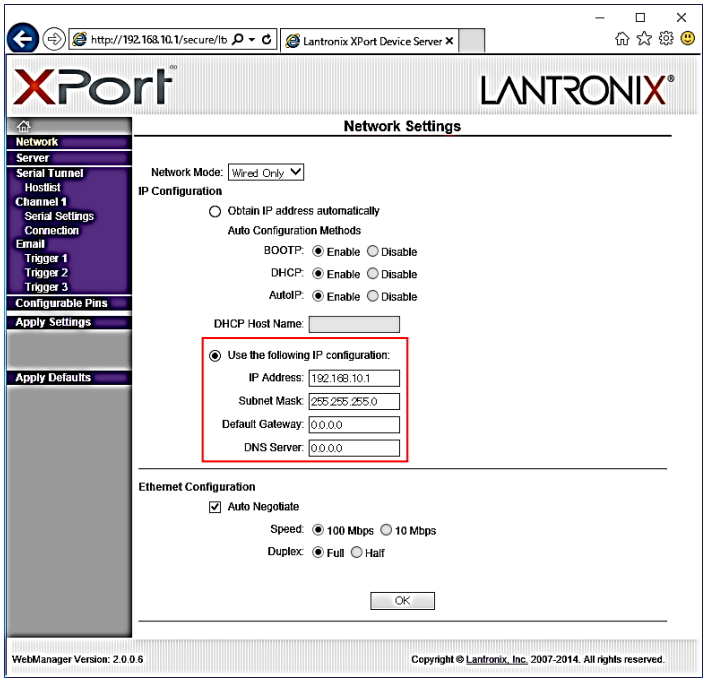

- Automatic IP address setting
  IP addresses can be automatically assigned.
  However, it requires a DHCP server or BOOTP server on the network.




| | |
|---|---|
| BOOTP | Setting "Enable" enables the Bootstrap Protocol (BOOTP) to automatically read the IP address. |
| DHCP | Setting "Enable" enables the Dynamic Host Configuration Protocol (DHCP) to automatically assign IP addresses. |
| AutoIP | Setting 'Enable' enables IP creation in the address range of class B subnet 169.254.x.x. |
| DHCP Host Name | Name the host providing IP addresses. |

1. Click the "Network" button in the setting screen.
2. Select "Obtain IP address automatically" in "IP Configuration".
3. Select BOOTP/DHCP/AutoIP according to your network status.
4. Click the "OK" button when you have completed the settings.
5. Click the "Apply Settings" button in the setting screen.

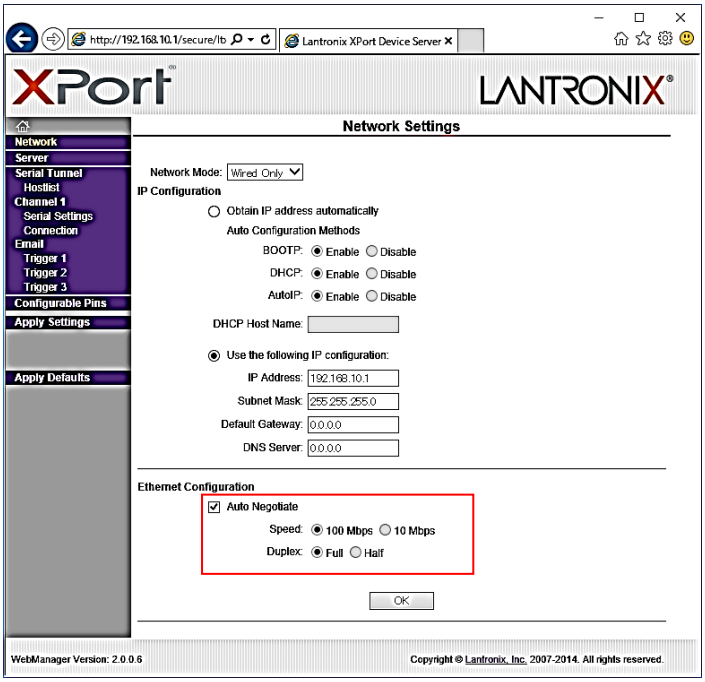
- Manual IP address setting
  IP addresses can be manually assigned.




| | |
|---|---|
| IP Address | When DHCP is not used for the IP address assignment, set the IP address manually. |
| Subnet Mask | The subnet mask defines the number of bits in the host portion of the IP address. |
| Default Gateway | The default gateway setting sets the IP address of the router going outside of the LAN. (Set the IP address of the LAN side of the router.) When only using it within the LAN, do not set this. |
| DNS Server | The DNS server automatically solves the remote machine name. Set the IP address of the DNS server. When the DHCP server is enabled, this setting will be overwritten by the IP address assigned by the DHCP server. ※ Make this setting only in manual configuration mode. |

1. Click the "Network" button in the setting screen.
2. Select "Use the following IP configuration" in "IP Configuration".
3. Set the "IP Address", "Subnet Mask", "Default Gateway", and "DNS Server" according to your network status.
4. Click the "OK" button when you have completed the settings.
5. Click the "Apply Settings" button in the setting screen.

- LAN setting
  Set the data transmission rate and scheme.




| | |
|---|---|
| Auto Negotiate | Checking this performs the automatic negotiation of data transmission rates and schemes.<br>Unchecking it needs to select "Speed" and "Duplex" respectively.<br>• Speed: 100BASE-T/10BASE-T<br>• Duplex: Full Duplex/Half Duplex |

1. Click the "Network" button in the setting screen.
2. Select "Auto Negotiate" in "Ethernet Configuration".
3. Click the "OK" button when you have completed the settings.
4. Click the "Apply Settings" button in the setting screen.

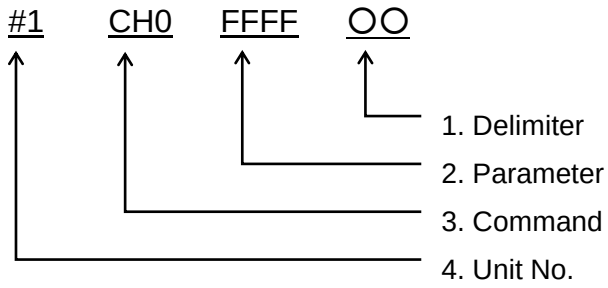
### 4-6-5 Delimiter

The delimiter is CR ($0D_H$) and fixed.

# 5 Program

## 5-1 Command Format

Ex.: In order to set the output voltage of the power supply unit connected to UNIT1 to its maximum rating, write the following.




1. Enter the delimiter.
   - GPIB connection ⟶ The delimiter set in [4-2 Setting GPIB Address and Delimiter].
   - RS-232C/RS-485 connection ⟶ CR(0D$_H$)
   - USB connection ⟶ CR(0D$_H$)
   - LAN connection ⟶ CR(0D$_H$)
2. There are commands requiring parameters.
3. Commands inputted incorrectly are ignored.
4. Set the unit number. (Except for SRQ command)
   - CO-HV ⟶ #0 to #31, or #AL

Note

The length of a command string is limited to 20 excluding the delimiter.
If it exceeds 20 characters, every 20 characters will be discarded from the beginning of the string and the rest of 20 or lower characters will be taken.

Ex.: #1 VCN 12.3456789012345 CR(0D$_H$) Total: 25 characters

↓

345 CR(0D$_H$) 20 characters are discarded and the rest of five characters are taken.

Remarks: In the above case, the command string of "345 CR(0D$_H$)" will be discarded as a wrong command.

## 5-2 Multi-Command

A command with "AL" specified for the unit number will be effective for all connected power supply units.

Ex.: 1) #AL CH0 FFFF ← Set the output voltage of all power supply units to the maximum rating.
2) #AL SW1 ⟵ Turn on the output of all power supply units.

Remarks: Commands supporting the multi-command are CH0, CH1, VCN, ICN, SW, RST, REN, and GTL.

## 5-3 Characters Used for Commands

- Do not use characters in [ ] (gray part) in the ASCII code table.
- Use LF ($0A_H$) and CR ($0D_H$) only as delimiters.
- Alphabetic characters used in commands are not case sensitive.
- Use a space ($20_H$) to separate the unit number, command, and parameter in command strings.

ASCII code table

| Lowe \ Uppe | $0_H$ | $1_H$ | $2_H$ | $3_H$ | $4_H$ | $5_H$ | $6_H$ | $7_H$ |
|---|---|---|---|---|---|---|---|---|
| $0_H$ | NUL | DLE | SP | 0 | @ | P | ` | p |
| $1_H$ | SOH | DC1 | ! | 1 | A | Q | a | q |
| $2_H$ | STX | DC2 | ” | 2 | B | R | b | r |
| $3_H$ | ETX | DC3 | # | 3 | C | S | c | s |
| $4_H$ | EOT | DC4 | $ | 4 | D | T | d | T |
| $5_H$ | ENQ | NAK | % | 5 | E | U | e | u |
| $6_H$ | ACK | SYN | & | 6 | F | V | f | v |
| $7_H$ | BEL | ETB | ‘ | 7 | G | W | g | w |
| $8_H$ | BS | CAN | ( | 8 | H | X | h | x |
| $9_H$ | HT | EM | ) | 9 | I | Y | i | Y |
| $A_H$ | LF | SUB | * | : | J | Z | j | z |
| $B_H$ | VT | ESC | + | ; | K | [ | k | { |
| $C_H$ | FF | FS | , | < | L | ¥ | l | \| |
| $D_H$ | CR | GS | - | = | M | ] | m | } |
| $E_H$ | SO | RS | . | > | N | ^ | n | ~ |
| $F_H$ | SI | US | / | ? | O | _ | o | |

## 5-4 Command Response String

A response string and the following delimiter are returned when a readout command is transmitted.

- GPIB connection — GPIB delimiter
  (The delimiter set in [4-2 Setting GPIB Address and Delimiter])
- RS-232C/RS-485 connection — CR（$0D_H$）
- USB connection — CR（$0D_H$）
- LAN connection — CR（$0D_H$）

When a command requesting no response is transmitted, nothing is returned.

Example of receiving "STS" command: "#1 CO RM"

| # | 1 | SP | C | O | SP | R | M | CR |
|---|---|---|---|---|---|---|---|---|
| $23_H$ | $31_H$ | $20_H$ | $43_H$ | $4F_H$ | $20_H$ | $52_H$ | $4D_H$ | $0D_H$ |

# 6 Digital Operation Check

## 6-1 GPIB Communication Between CO-G32 and CO-HV

The power supply units connected to the CO-G32 and CO-HV are controlled via GPIB.

**⚠CAUTION**

- Performing the following steps will **output the voltage** from the power supply units.
- **Never connect any "load" to the output** until the "operation check" ends.

1 Set GPIB address and delimiter.
Using the "address setting switch" on the rear panel of the CO-G32 sets the GPIB address and delimiter.
For details, refer to [4-2 Setting GPIB Address and Delimiter].

2 Set the unit number and upper connection device.
Set the unit number to "1" with the "Unit number/upper connection device setting switch" on the rear panel of CO-HV. Set the upper connection device to "CO-G32".
For details, refer to [4-3 Setting the Unit Number and the Upper Connection Device].

3 Connect to GPIB.
Connect a commercially available GPIB cable to the IEEE-488 connector of the CO-G32 to connect to a GPIB controller such as a PC.

4 Connect CO-G32 and CO-HV.
Connect the "CO-OPT cable connection connector (OUT)" of the CO-G32 and the "CO-OPT cable connection connector (IN)" of the CO-HV with the "CO-OPT cable" supplied with the CO-HV.
Always attach a cap on any fiber optic cable connection connector, not in use.

5 Connect the power supply units to check each function.
Users using the ES series, refer to [6-5 ES Series] to confirm each function
Users using the AU series, refer to [6-6 AU Series] to confirm each function.
Users using the AF series, refer to [6-7 AF Series] to confirm each function.
Users using the W series, refer to [6-8 W Series] to confirm each function.
Users using the EQ series, refer to [6-9 EQ Series] to confirm each function.

# 6-2 RS-232C/RS-485 Communication Between CO-OPT2-9, CO-OPT2-25, CO-OPT4-25, and CO-HV

The power supply units connected to CO-OPT2-9, CO-MET2-25, CO-OPT4-25, and CO-HV are controlled via RS-232C/RS-485.

**⚠CAUTION**

- Performing the following steps will **output the voltage** from the power supply units.
- **Never connect any "load" to the output** until the "operation check" ends.

1 Set the unit number and upper connection device.
Set the unit number to "1" with the "Unit number/upper connection device setting switch" on the rear panel of CO-HV.
In addition, set the upper connection device to "CO-OPT2-9/CO-OPT2-25/CO-OPT4-25".
For details, refer to [4-3 Setting the Unit Number and the Upper Connection Device].

2 Connect GP-OPT2-9/GP-OPT2-25/GP-OPT4-25.
Connect CO-OPT2-9/CO-OPT2-25/CO-OPT4-25 to a controller of RS-232C/RS-485 such as a PC.
In addition, connect AC adapters to CO-OPT2-9/CO-OPT2-25/CO-OPT4-25.

3 Connect CO-OPT2-9/CO-OPT2-25/CO-OPT4-25 to CO-HV.
Using the "CO-OPT cable" supplied with CO-HV, connect CO-OPT2-9/CO-OPT2-25/CO-OPT4-25 to the "CO-OPT cable connection connector (IN)" on the CO-HV.
Always attach a cap on any CO-OPT cable connection connector, not in use.

4 Connect the power supply units to check each function.
Users using the ES series, refer to [6-5 ES Series] to confirm each function
Users using the AU series, refer to [6-6 AU Series] to confirm each function.
Users using the AF series, refer to [6-7 AF Series] to confirm each function.
Users using the W series, refer to [6-8 W Series] to confirm each function.
Users using the EQ series, refer to [6-9 EQ Series] to confirm each function.

## 6-3 USB Communication with USB-OPT and CO-HV

The power supply units connected to the USB-OPT and CO-HV are controlled via USB.

**⚠CAUTION**

- Performing the following steps will **output the voltage** from the power supply units.
- **Never connect any "load" to the output** until the "operation check" ends.

1 Set the unit number and upper connection device.
Set the unit number to "1" with the "Unit number/upper connection device setting switch" on the rear panel of CO-HV. In addition, set the upper connection device to the "USB-OPT".
For details, refer to [4-3 Setting the Unit Number and the Upper Connection Device].

2 Connect the USB-OPT.
Connect a commercial USB cable to the USB connector of USB-OPT to connect it to the USB controller such as a PC.

3 Connect the USB-OPT and CO-HV.
Connect the "CO-OPT cable connection connector (OUT)" of the USB-OPT and the "CO-OPT optical cable connection connector (IN)" of the CO-HV with the "CO-OPT cable" supplied with the CO-HV.
Always attach a cap on any CO-OPT cable connection connector, not in use.

4 Connect the power supply units to check each function.
Users using the ES series, refer to [6-5 ES Series] to confirm each function
Users using the AU series, refer to [6-6 AU Series] to confirm each function.
Users using the AF series, refer to [6-7 AF Series] to confirm each function.
Users using the W series, refer to [6-8 W Series] to confirm each function.
Users using the EQ series, refer to [6-9 EQ Series] to confirm each function.

## 6-4 LAN Communication Between CO-E32 and CO-HV

The power supply units connected to the CO-E32 and CO-HV are controlled via the LAN network.

**⚠CAUTION**

- Performing the following steps will **output the voltage** from the power supply units.
- **Never connect any "load" to the output** until the "operation check" ends.

1 Set the unit number and upper connection device.
Set the unit number to "1" with the "Unit number/upper connection device setting switch" on the rear panel of CO-HV. Set the upper connection device to "CO-E32".
For details, refer to [4-3 Setting the Unit Number and the Upper Connection Device].

2 Connect CO-E32.
Connect a commercially available LAN cable to the LAN connector of CO-E32 to connect it to the LAN controller such as a PC.

3 Connect CO-E32 and CO-HV.
Connect the "CO-OPT cable connection connector (OUT)" of the CO-E32 and the "CO-OPT cable connection connector (IN)" of the CO-HV with the "CO-OPT cable" supplied with the CO-HV.
Always attach a cap on any CO-OPT cable connection connector, not in use.

4 Connect the power supply units to check each function.
Users using the ES series, refer to [6-5 ES Series] to confirm each function
Users using the AU series, refer to [6-6 AU Series] to confirm each function.
Users using the AF series, refer to [6-7 AF Series] to confirm each function.
Users using the W series, refer to [6-8 W Series] to confirm each function.
Users using the EQ series, refer to [6-9 EQ Series] to confirm each function.

## 6-5 ES Series

1 Connect the ES series with CO-HV.
Connect the "control cable connection connector" of the CO-HV and the "Amphenol 14-pin connector" of the ES series with the "CO-AF cable" supplied with the CO-HV.

2 Set the ES series to enable remote mode.
Set the toggle switch on the rear panel of the ES series to IEEE-488.

3 Turn on the CO-G32/CO-E32 and CO-HV.
Set the POWER ON/OFF switch of CO-G32/CO-E32 and CO-HV to ON.
For the CO-HV, the "SRQ", "TLK", and "LSN" LEDs will blink three times and then the "SRQ" LED is lit.

4 Turn on the ES series power supply units.
Set the POWER ON/OFF switch to ON.

5 Enable the output of the ES series.
Transmit "#1 REN" and "#1 SW1" from the controller.
For the CO-HV, the "LSN" LED will blink and then the "SRQ" LED will be turned off.

6 Set the output voltage of the ES series and output it.
Transmit "#1 VCN xxxx" from the controller. For "xxxx", specify a number from 0 to 100.
For details, refer to [7-1 Command List].

7 Stop the output of the ES series.
Transmit "#1 SW0" from the controller.
For the CO-HV, the "LSN" LED will blink and then the "SRQ" LED is lit.

8 End the operation of the ES series.
Set the POWER ON/OFF switch to OFF.

9 End remote control.
Set the POWER ON/OFF switch of CO-G32/CO-E32 and CO-HV to OFF.

## 6-6 AU Series

1 Connect the AU series with CO-HV.
Connect the control cable connection connector of the CO-HV and the "TB1 connector" of the AU series with the CO-AU cable supplied with the CO-HV.

2 Turn on the CO-G32/CO-E32 and CO-HV.
Set the POWER ON/OFF switch of CO-G32/CO-E32 and CO-HV to ON.
For the CO-HV, the "SRQ", "TLK", and "LSN" LEDs will blink three times and then the "SRQ" LED is lit.

3 Turn on the AU series power supply units.
Set the POWER ON/OFF switch to ON.

4 Make the AU series ready for output.
Set the "HV ON/OFF switch" to ON.（However, when you want to set the "HV ON/OFF switch" to ON, set the "POWER ON/OFF switch" to ON and wait for 10 seconds or more to pass.）

5 Enable remote control.
Transmit "#1 REN" from the controller.
For the AU series, the "EXT" LED will be lit. For the CO-HV, the "LSN" LED will blink.

6 Make the AU series ready for output.
From the controller;
transmit “#1 ICN 100” and “#1 SW1” for the AK and AKP series.
transmit “#1 ICN 100”, “#1 RST”, and “#1 SW1” for the AU series.

For the AU series, the "HV-ON" LED will be lit. For the CO-HV, the "LSN" LED will blink and then the "SRQ" LED will be turned off.

7 Set the output voltage of the AU series and output it.
Transmit "#1 VCN xxxx" from the controller. For "xxxx", specify a number from 0 to 100.
For details, refer to [7-1 Command List].

8 Stop the output of the AU series.
Transmit "#1 SW0" from the controller.
For the AU series, the "HV-ON" LED will be turned off.
For the CO-HV, the "LSN" LED will blink and then the "SRQ" LED is lit.

9 Stop the operation of the AU series.
Set the POWER ON/OFF switch to OFF.

10 End remote control.
Set the POWER ON/OFF switch of CO-G32/CO-E32 and CO-HV to OFF.

## 6-7 AF Series

1 Connect the AF series with CO-HV.
Connect the "control cable connection connector" of the CO-HV and the "Amphenol 14-pin connector" of the AF series with the "CO-AF cable" supplied with the CO-HV.

2 Set the AF series to enable remote mode.
Set the toggle switch on the rear panel of the AF series to IEEE-488.
Short-circuit the optional terminal board 7 and 8.

3 Turn on the CO-G32/CO-E32 and CO-HV.
Set the POWER ON/OFF switch of CO-G32/CO-E32 and CO-HV to ON.
For the CO-HV, the "SRQ", "TLK", and "LSN" LEDs will blink three times and then the "SRQ" LED is lit.

4 Turn on the AF series power supply units.
Set the POWER ON/OFF switch to ON.

5 Make the AF series ready for output.
Set the "HV switch" to ON.

6 Enable remote control
Transmit "#1 REN" from the controller. For the CO-HV, the "LSN" LED will blink.

7 Enable the output of the AF series.
Transmit "#1 SW1" from the controller.
For the AF series, the "HV-ON" LED will be lit. For the CO-HV, the "LSN" LED will blink and then the "SRQ" LED will be turned off.

8 Set the output voltage of the AF series and output it.
Transmit "#1 VCN xxxx" from the controller. For "xxxx", specify a number from 0 to 100.
For details, refer to [7-1 Command List].

9 Stop the output of the AF series.
Transmit "#1 SW0" from th controller.
For the AF series, the "HV-ON" LED will be lit.
For the CO-HV, the "LSN" LED will blink and then the "SRQ" LED is lit.

10 End the operation of the AF series.
Set the POWER ON/OFF switch to OFF.

11 End remote control.
Set the POWER ON/OFF switch of CO-G32/CO-E32 and CO-HV to OFF.

## 6-8 W Series

1 Connect the W series with CO-HV.
Connect the control cable connection connector of the CO-HV and the "I/O connector" of the W series with the CO-W cable supplied with the CO-HV.

2 Turn on the CO-G32/CO-E32 and CO-HV.
Set the POWER ON/OFF switch of CO-G32/CO-E32 and CO-HV to ON.
For the CO-HV, the "SRQ", "TLK", and "LSN" LEDs will blink three times and then the "SRQ" LED is lit.

3 Turn on the W series power supply units.
Supply power to the HUNS series.

4 Enable remote control
Transmit "#1 REN" from the controller. For the CO-HV, the "LSN" LED will blink.

5 Enable the output of the W series.
Transmit “#1 ICN 100” and “#1 SW1” from the controller.
For the CO-HV, the "LSN" LED will blink and then the "SRQ" LED will be turned off.

6 Set the output voltage of the W series and output it.
Transmit "#1 VCN xxxx" from the controller. For "xxxx", specify a number from 0 to 100.
For details, refer to [7-1 Command List].

7 Stop the output of the W series.
Transmit "#1 SW0" from the controller.
For the CO-HV, the "LSN" LED will blink and then the "SRQ" LED is lit.

8 End the operation of the W series.
Interrupt power to the W series.

9 End remote control.
Set the POWER ON/OFF switch of CO-G32/CO-E32 and CO-HV to OFF.

Note:
The door switch (LD) of the W series is short-circuited inside of the "CO-W cable" supplied with the CO-HV.
（7 and 17）

## 6-9 EQ Series

1 Connect the EQ series with CO-HV.
Connect the "control cable connection connector" of the CO-HV and the "Amphenol 14-pin connector" of the EQ series with the "CO-AF cable" supplied with the CO-HV.

2 Set the EQ series to enable remote mode.
Set the toggle switch on the rear panel of the EQ series to IEEE-488.

3 Turn on the CO-G32/CO-E32 and CO-HV.
Set the POWER ON/OFF switch of CO-G32/CO-E32 and CO-HV to ON.
For the CO-HV, the "SRQ", "TLK", and "LSN" LEDs will blink three times and then the "SRQ" LED is lit.

4 Turn on the EQ series power supply units.
Set the POWER ON/OFF switch to ON.

5 Enable the output of the EQ series.
Transmit "#1 REN" and "#1 SW1" from the controller.
For the CO-HV, the "LSN" LED will blink and then the "SRQ" LED will be turned off.

6 Set the output voltage of the EQ series and output it.
Transmit "#1 VCN xxxx" from the controller. For "xxxx", specify a number from 0 to 100.
For details, refer to [7-1 Command List].7−1

7 Stop the output of the EQ series.
Transmit "#1 SW0" from th controller.
For the CO-HV, the "LSN" LED will blink and then the "SRQ" LED is lit.

8 End the operation of the EQ series.
Set the POWER ON/OFF switch to OFF.

9 End remote control.
Set the POWER ON/OFF switch of CO-G32/CO-E32 and CO-HV to OFF.

# 7 Commands

## 7-1 Command List

Table: Command list

| Classification | | Command name | Function | Page |
|---|---|---|---|---|
| Setting | Output settings | CH0<br>CH1<br>VCN<br>ICN | Set the output voltage value. (Hex mode)<br>Set the output current value. (Hex mode)<br>Set the output voltage value. (Percent mode)<br>Set the output current value. (Percent mode) | 40 |
| | Mode setting | SW1/0<br>PL1/0<br>RST<br>REN<br>GTL | Turn the output on/off.<br>Switch the output polarity.<br>Restore the output by resetting the cutoff state.<br>Enable remote control.<br>Disable remote control. | 41 |
| | GP-IB | SRQ<br>ON/OFF | Enable/disable the SRQ issue on GPIB. | 42 |
| Readout | Output Measurement | MN1<br>MN2<br>VM<br>IM | Measure the output voltage. (Hex mode)<br>Measure the output current. (Hex mode)<br>Measure the output voltage. (Percent mode)<br>Measure the output current. (Percent mode) | 42 |
| | Mode check | PLM<br>STS | Query the output polarity state.<br>Query the power supply status. | 43 |
| | Setting check | CH0?<br>CH1?<br>VCN?<br>ICN?<br>SW?<br>PL?<br>SRQ? | Query the setting value of the output voltage. (Hex mode)<br>Query the setting value of the output current. (Hex mode)<br>Query the setting value of the output voltage. (percent mode)<br>Query the setting value of the output current. (percent mode)<br>Query the setting of the output ON/OFF.<br>Query the setting of the output polarity.<br>Query the setting of SRQ. | 43<br>43<br>44<br>44<br>44<br>44<br>44 |

## 7-2 Supported Commands

Table: Supported commands

| Command name | CO-HV | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Power supplies | | | | | | | | |
| | ES | AK/AKP | AU | AF/AE | W | EQ | K12-R (12W) | EJ | XR |
| CH0 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CH1 | | Yes | Yes | | Yes | | (Yes) | Yes | Yes |
| VCN | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| ICN | | Yes | Yes | | Yes | | (Yes) | Yes | Yes |
| SW1/0 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | |
| PL1/0 | | | | | | | Yes | Yes | |
| RST | | | Yes | | | | | | |
| REN | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| GTL | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| SRQ | Yes | Yes | Yes | Yes | Yes | Yes | | Yes | |
| MN1 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| MN2 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| VM | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| IM | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| PLM | | | | | | | Yes | Yes | |
| STS | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CH0? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CH1? | | Yes | Yes | | Yes | | (Yes) | Yes | Yes |
| VCN? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| ICN? | | Yes | Yes | | Yes | | (Yes) | Yes | Yes |
| SW? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | |
| PL? | | | | | | | Yes | Yes | |
| SRQ? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | |

# 7-3 Command Descriptions

CH0 command

Sets the output voltage value with hexadecimal format, $0000_H$ to $FFFF_H$ (16-bit).
Format ex.: 1) CH0 FFFF : Output voltage = Max rated voltage
2) CH0 7FFF : Output voltage = A half of max rated voltage.
3) CH0 F0 : Same as CH0 00F0
4) CH0 12345 : Output voltage is not changed.
Default: CH0 0000
Remarks: Settings greater than four digits are ignored as invalid commands. (Format ex. 4))
This supports "Multi-command".

CH1 command

Sets the output current value with hexadecimal format, $0000_H$ to $FFFF_H$ (16-bit).
Format ex.: 1) CH1 FFFF : Output current = Max rated current
2) CH1 7FFF : Output current = A half of max rated current
3) CH1 F0 : Same as CH1 00F0
4) CH1 12345 : Output current is not changed.
Default: CH1 0000
Remarks: Settings greater than four digits are ignored as invalid commands. (Format ex.: 4))
This supports "Multi-command".

VCN command

Sets the output voltage value with percentage, 0.0 to 100.0.（0.01% increments)
Format ex.: 1) VCN 100 : Output voltage = Max rated voltage
2) VCN 12.34 : Output voltage = 12.34% of max rated voltage
3) VCN 123.4 : Output voltage is not changed
4) VCN 12.345 : Same as VCN 12.34
Default: VCN 0
Remarks: Settings greater than three digits are ignored as invalid commands. (Format ex.: 3))
If the number of decimals exceeds 2, only the second decimal place is valid, and the third and subsequent digits are truncated. (Ex.: 4))
This supports "Multi-command".

ICN command

Sets the output current value with percentage, 0.0 to 100.0.（0.01% increments)
Format ex.: 1) ICN 100 : Output current = Max rated current
2) ICN 12.34 : Output current = 12.34% of max rated current
3) ICN 123.4 : Output current is not changed.
4) ICN 12.345 ： Same as ICN 12.34
Default: ICN 0
Remarks: Settings greater than three digits are ignored as invalid commands. (Format ex.: 3))
If the number of decimals exceeds 2, only the second decimal place is valid, and the third and subsequent digits are truncated. (Format ex.: 4))
This supports "Multi-command".

SW command

Sets the output ON/OFF.
Format ex.: 1) SW0 : Output disabled
2) SW1 : Turn on the output
Default: SW0
Remarks: If products are equipped with an "OUTPUT switch" or "HV switch", set the switch to ON.
If products are equipped with power failure protection, the output may not be turned on by this command.
For details on how to restore the power failure protection, refer to the product instruction manual.
This supports "Multi-command".

PL command

Switches output polarity.
Format ex.: 1) PL0 : Positive output
2) PL1 : Negative output
Default: PL0
Remarks: This supports "Multi-command".

RST command

Restore the output by resetting the cutoff state.
Format: RST
Remarks: If products are not equipped with a remote reset (LT) function, this command will be ignored.
This supports "Multi-command".

REN command

Enables remote control of products.
Format: REN
Remarks: After the product is turned on and receives this command from the controller, the product is allowed to use all other commands.。
(MN1, MN2, VM, IM, and STS commands are always available even if this command is not received.)
This supports "Multi-command".
Default: GTL

GTL command

Disables remote control of products.
Format: GTL
Remarks: When receiving this command, the product ignores all commands other than REN, MN1, MN2, VM, IM, and STS.
Until receiving the REN command, the product keeps the current settings.
This supports "Multi-command".
Default: GTL

SRQ command

Enables/disables the SQR issue on GPIB.

Format ex.: 1) SRQ ON : Enabled
2) SRQ OFF : Disabled

Default: SRQ OFF

Remarks: The default sets the SRQ to OFF. (Disabled)
In order to use the service request function, transmit the "SRQ ON" command from the controller.
The "SRQ" LED on the front panel will be lit when detecting the "SRQ" regardless of this command.
Do not specify the "Unit number" with this command.

Table: SRQ conditions

| Products | SRQ conditions |
|---|---|
| ES series<br>AU series<br>AF series<br>W series<br>EQ series<br>K12-R series<br>EJ series | Output is OFF.<br>or<br>POWER switch is set to OFF. |

When products are connected with RS-232C/RS-485, USB, or LAN, this command will be ignored.
When products satisfy the above conditions, "!" ($21_H$) is returned to the controller.

MN1 command

The monitored output voltage value is returned in the range of $000_H$ to $FFF_H$ (12-bit).

Format: MN1

Return ex.: 1) MONI1=FFFH : Monitor value= Max rated voltage
2) MONI1=7FFH Monitored value=A half of max rated voltage

MN2 command

The monitored output current value is returned in the range of $000_H$ to $FFF_H$ (12-bit).

Format: MN2

Return ex.: 1) MONI2=FFFH : Monitor value=Max rated current
2) MONI2=7FFH : Monitor value=A half of max rated current

VM command

The monitored output voltage is returned in the range of 0.0 to 100.0%.（0.01% increments)

Format: VM

Return ex.: 1) VM=100.0 : Monitor value=Max rated voltage
2) VM=12.34 : Monitor value=12.34% of max rated voltage
3) VM=25.0 : Monitor value=25% of max rated voltage

Remarks: If the second decimal place is "0", it is omitted. (Return ex. 3))

IM command

The monitored output current value is returned in the range of 0.0 to 100.0%.（0.01% increments)

Format: IM

Return ex.: 1) IM=100.0 : Monitor value=Max rated current
2) IM=12.34 : Monitor value=12.34% of max rated current
3) IM=25.0 : Monitor value=25% of max rated current

Remarks: If the second decimal place is "0", it is omitted. (Return ex. 3))

PLM command

Output polarity state is returned with "0: Positive" or "1: Negative".

Format: PLM

Return ex.: 1) PLM=0 : Positive output

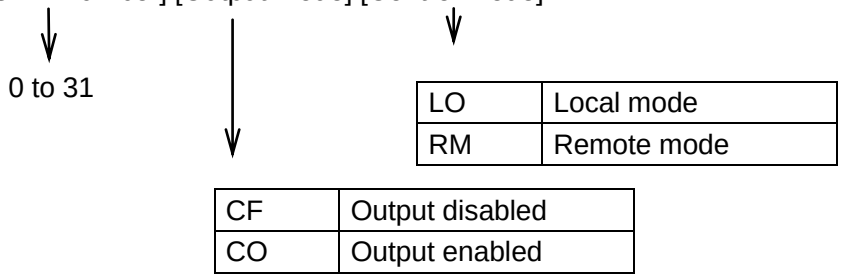
2) PLM=1 : Negative output

STS command

The status of the output and control mode is returned as a string.

Format: STS

Return: #[UNIT number] [Output mode] [Control mode]




Return ex.: #1 CO RM : Unit 1 is in the output enabled and in remote mode.

CH0? command

The set value of output voltage is returned with hexadecimal format, $0000_H$ to $FFFF_H$ (16-bit).

Format: CH0?

Return ex.: 1) CH0=FFFFH : Output voltage is set to max rated voltage.

2) CH0=7FFFH : Output voltage is set to a half of max rated voltage.

CH1? command

The set value of output current is returned with hexadecimal format, $0000_H$ to $FFFF_H$ (16-bit).

Format: CH1?

Return ex.: 1) CH1=FFFFH : Output current is set to max rated current.

2) CH1=7FFFH : Output current is set to a half of max rated current.

VCN? command

The set value of output voltage is returned in the range of 0.0 to 100.0%.（0.01% increments)

Format: VCN?

Return ex.: 1) VCN=100.0 : Output voltage is set to max rated voltage.
2) VCN=12.34 : Output voltage is set to 12.34% of max rated voltage.
3) VCN=25.0 : Output voltage is set to 25% of max rated voltage.

Remarks: If the second decimal place is "0", it is omitted. (Return ex. 3))

ICN? command

The set value of output current is returned in the range of 0.0 to 100.0%.（0.01% increments)

Format: ICN?

Return ex.: 1) ICN=100.0 : Output current is set to max rated current.
2) ICN=12.34 : Output current is set to 12.34% of max rated current.
3) ICN=25.0 : Output current is set to 25% of max rated current.

Remarks: If the second decimal place is "0", it is omitted. (Return ex. 3))

SW? command

The setting state of the output ON/OFF is returned with "0: OFF" or "1: ON".

Format: SW?

Return ex.: 1) SW0 : Output disabled
2) SW1 : Output enabled

PL? command

The set state of the output polarity is returned with "0: Positive" or "1: Negative".

Format: PL?

Return ex.: 1) PL0 : Positive output
2) PL1 : Negative output

SRQ? command

The state of the SRQ issue is returned.

Format: SRQ?

Return ex.: 1) SRQ ON : Enabled
2) SRQ OFF : Disabled

When products are connected with RS-232C/RS-485, USB, or LAN, this command will be ignored.

Revision History

| Rev. No. | Rev. Date | Revision Contents |
|---|---|---|
| 0.0 | 2001/04 | First edition |
| 1.5 | 2020/08 | Applied a new format |

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