

Notes on Use of 24-V Controller by Grounding Its Power Supply at Positive Terminal

Please Read Before Use

Thank you for purchasing our product.

This Operation Manual explains the grounding methods of this product, among others, providing the information you need to know to use the product safely.

Before using the product, be sure to read this manual and fully understand the contents explained herein to ensure safe use of the product.

The CD that comes with the product contains operation manuals for IAI products.

When using the product, refer to the necessary portions of the applicable operation manual by printing them out or displaying them on a PC.

After reading the Operation Manual, keep it in a convenient place so that whoever is handling this product can reference it quickly when necessary.

[Important]

- The product cannot be operated in any way unless expressly specified in this Operation Manual. IAI shall assume no responsibility for the outcome of any operation not specified herein.
- Information contained in this Operation Manual is subject to change without notice for the purpose of product improvement.
- If you have any question or comment regarding the content of this manual, please contact the IAI sales office near you.
- Using or copying all or part of this Operation Manual without permission is prohibited.
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1. Overview

If a 24-V controller (or gateway or ROBONET) is used by grounding its power supply at the positive terminal, connecting a teaching pendant or PC to the controller may short-circuit the 24-V power supply.

This is because most teaching pendants and PCs have their communication ground (GND) and frame ground (FG) connected internally and therefore connecting such teaching pendant or PC to a 24-V controller will cause short-circuiting through the frame ground (FG). Also, in the communication between controllers using a different DC power supply, the communication line becomes the power supply path of the controller and may be damaged.

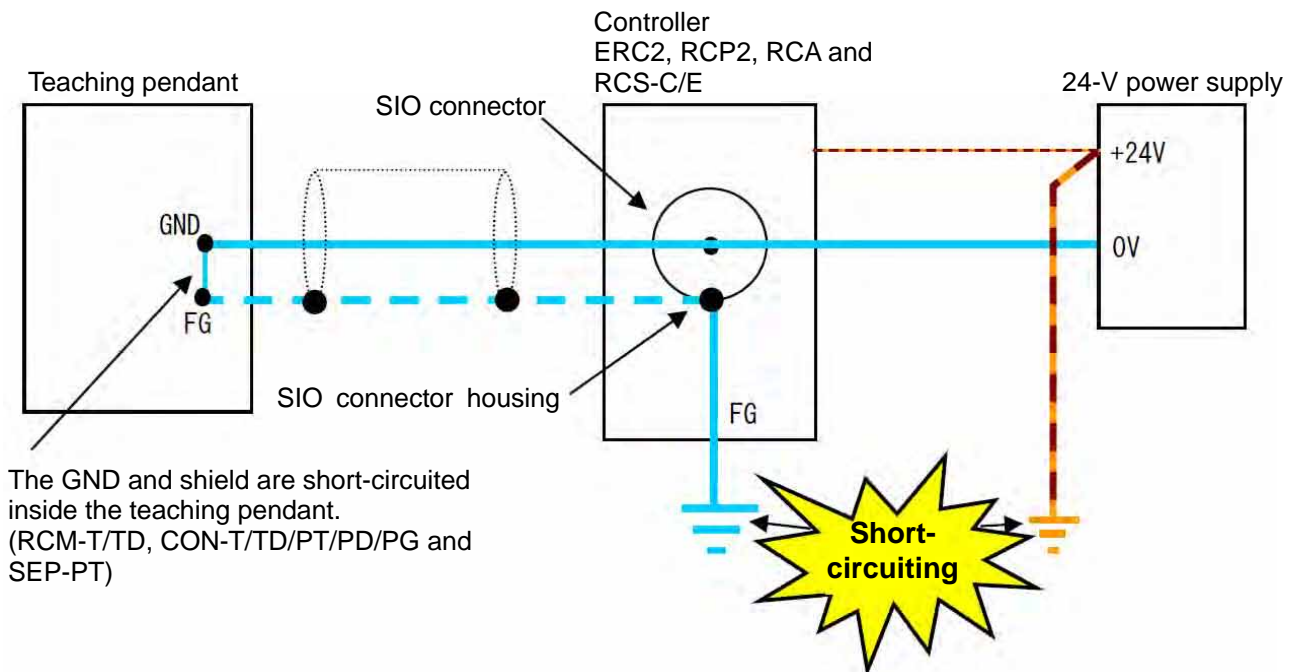
This document gives examples of this problem and explains countermeasures. Use this document as a reference when grounding the positive supply of your 24-V controller at the positive terminal.

2. Examples of Problem

Examples are shown in (1) to (4) below.

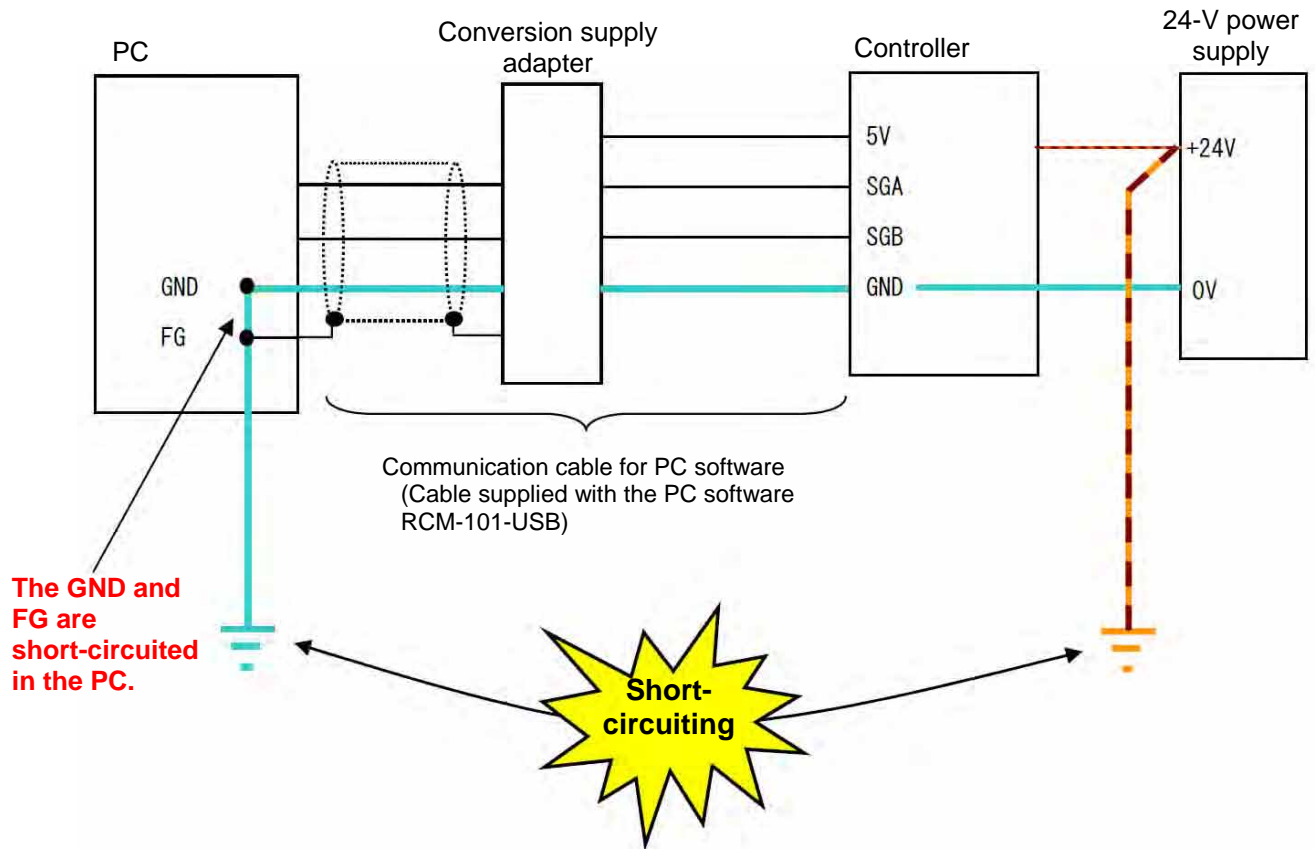
(1) Connect a teaching pendant to a controller (ERC2, RCP2, RCA and RCS-C/E.)

If the 24-V power supply is grounded at the positive terminal, current will flow through the path indicated by the bold line below and the +24-V and 0-V lines of the 24-V power supply will be short-circuited.



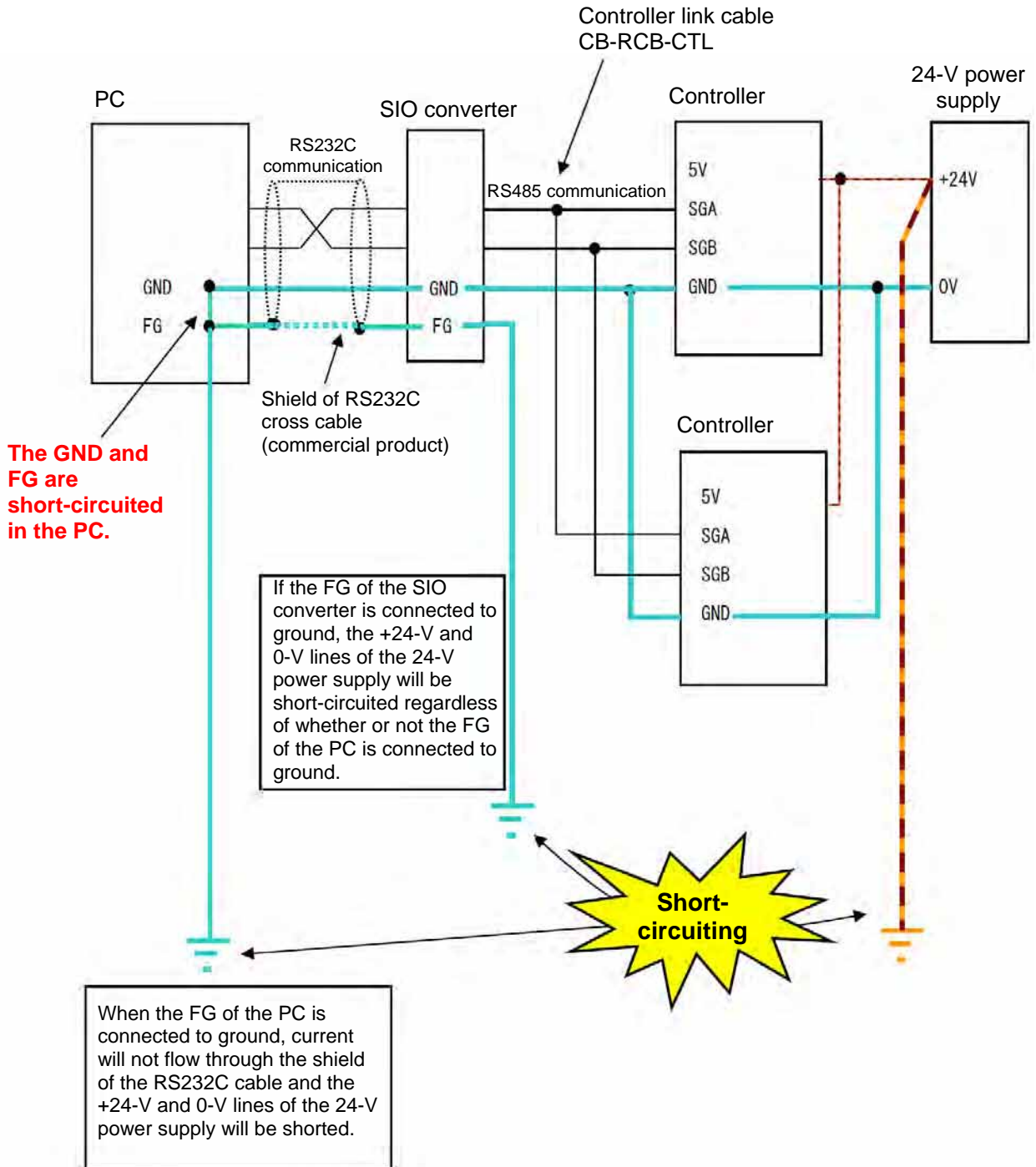
(2) Connect a PC to a controller (or gateway or ROBONET)

If the 24-V power supply is grounded at the positive terminal, grounding the FG of the PC will cause current to short-circuit flow through the path indicated by the bold line below and the +24-V and 0-V lines of the 24-V power supply will be short-circuited.
If the FG of a device connected to a different COM port of the same PC is grounded, or when the PC is placed on a metal table or any device currently being adjusted, the frame ground (FG) may connect to ground. (Communication cable for PC software of RS232C specification or USB specification)



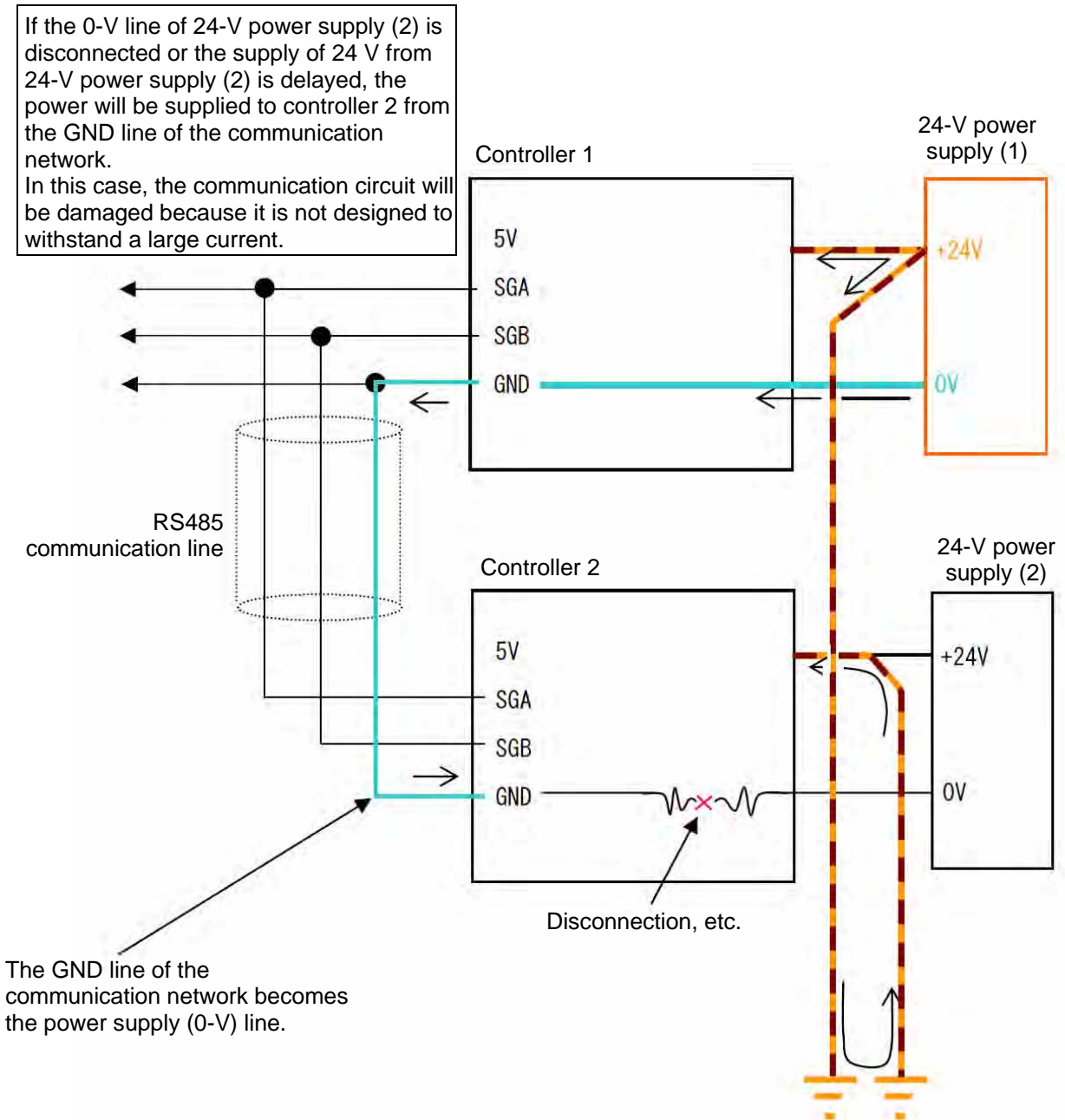
(3) Connect a PC to a controller via a SIO converter

If the 24-V power supply is grounded at the positive terminal, current will flow through the path indicated by the bold line below and the +24-V and 0-V lines of the 24-V power supply will be short-circuited.




(4) A network has been built using multiple 24-V power supplies and controllers

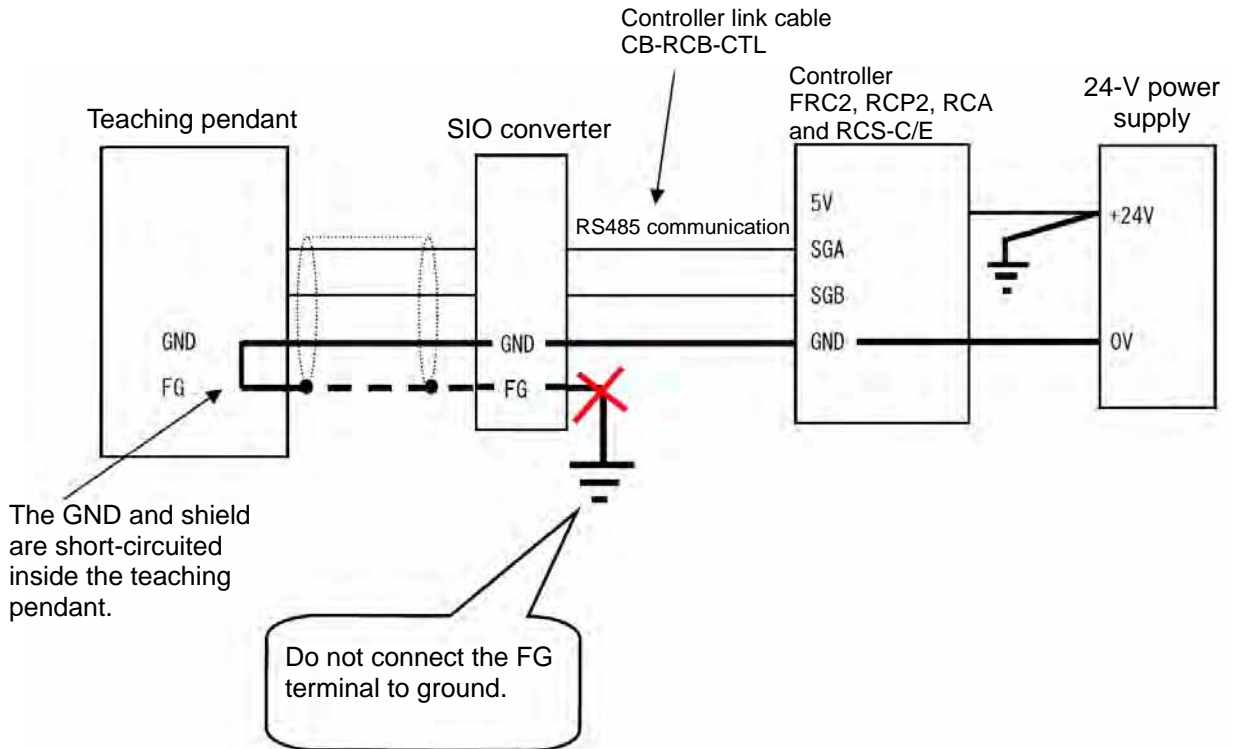
If the 24-V power cannot be supplied to the controllers simultaneously, the power will be supplied from the communication line and the controllers will be damaged.



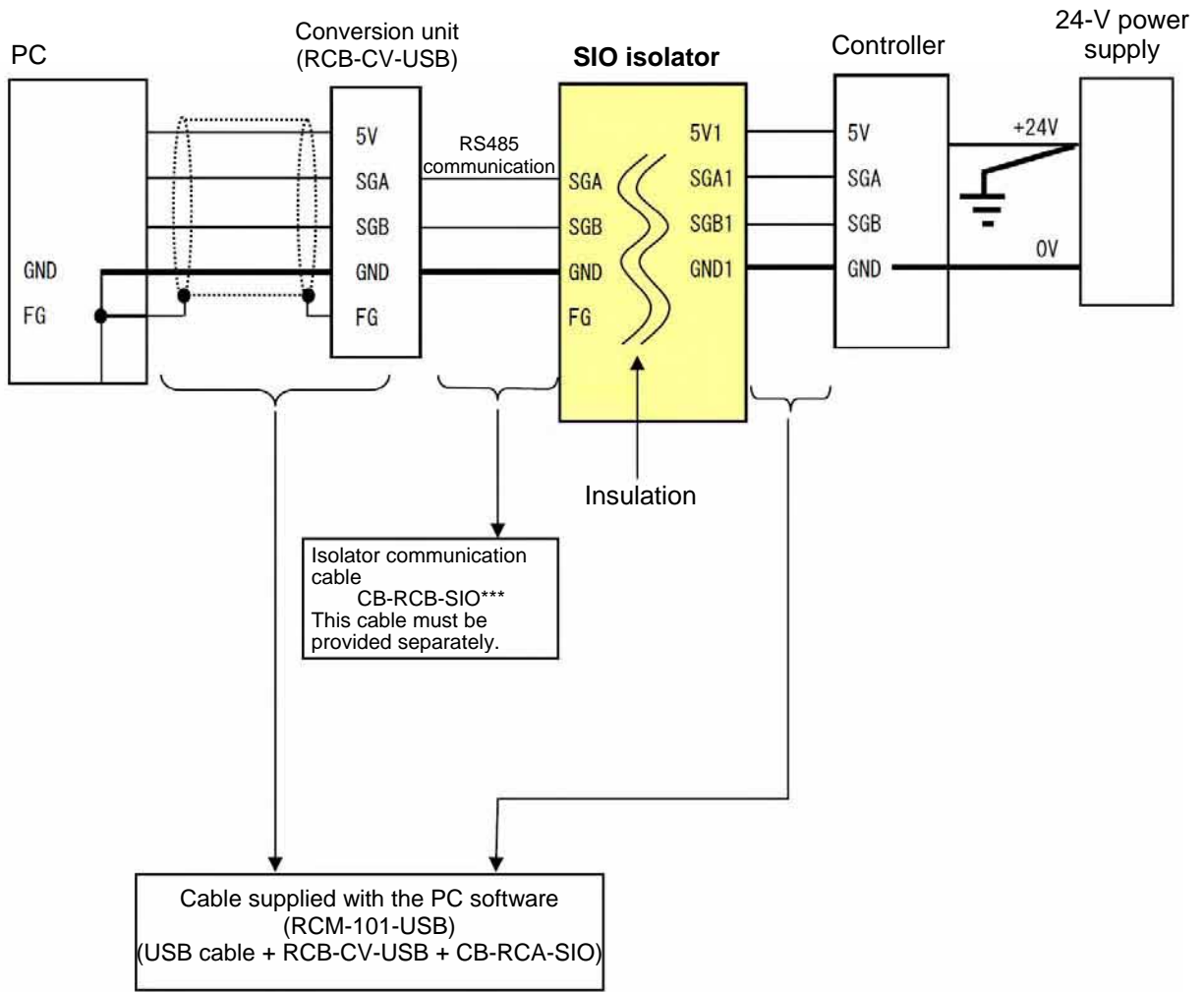
3. Countermeasures


- (1) Connect a teaching pendant to a controller (ERC, RCP2, RCA and RCS-C/E.)
Use the RCM-E, RCM-P or RCM-PM-01 as the teaching pendant to be connected.

 Note Teaching pendants RCM-T/TD, CON-T/TD/PT/PD/PG and SEP-PT cannot be connected directly. When connecting any of these teaching pendants, use a SIO converter as shown below.



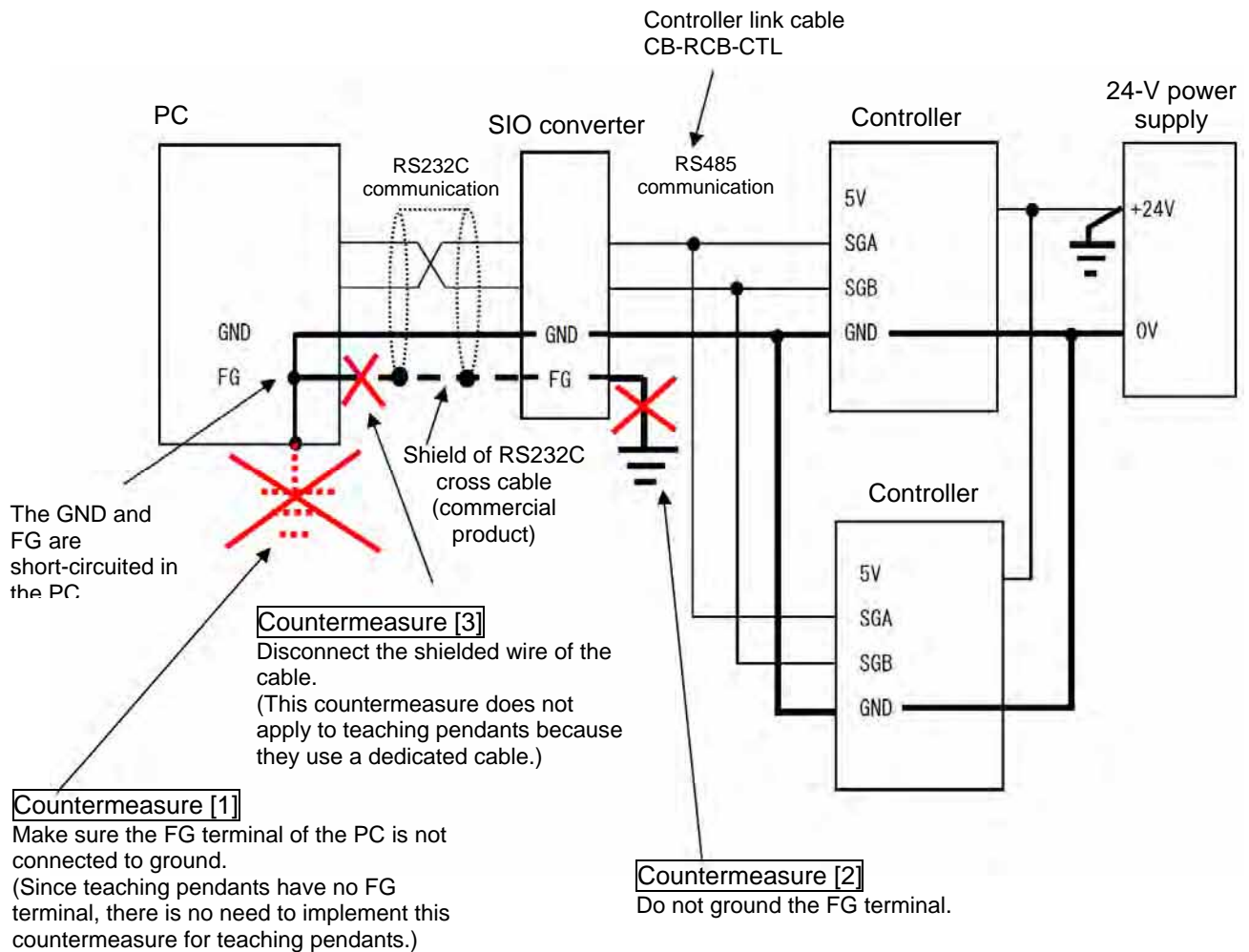
- (2) Connect a PC to a controller (or gateway or ROBONET)
Connect them using the **SIO isolator (RCB-ISL-SIO)** as shown below.
You can only use the PC software RCM-101-USB and the RCM-101-MW cannot be used.



 Note The RS232 conversion unit (RCB-CV-MW) cannot be used.

- (3) Connect a PC to a controller via a SIO converter
 Implement countermeasure [1] as explained below, and then implement countermeasure [2] or [3].
 * For the teaching pendant, implement countermeasure [2] only.

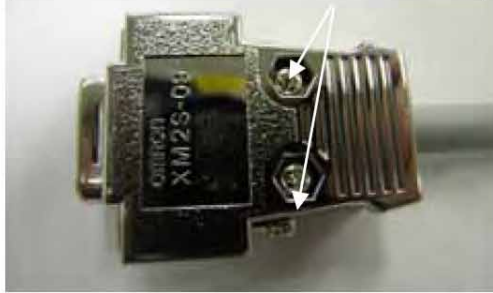
- Countermeasure [1] Make sure the FG of the PC does not connect to ground.
 - If the PC case may be connected to ground, place the PC on an insulating material.
 - If the FG may be connected to ground through other COM port, disconnect the cable from the applicable COM port.
- Countermeasure [2] Do not ground the FG terminal of the power-supply terminal block of the SIO converter.



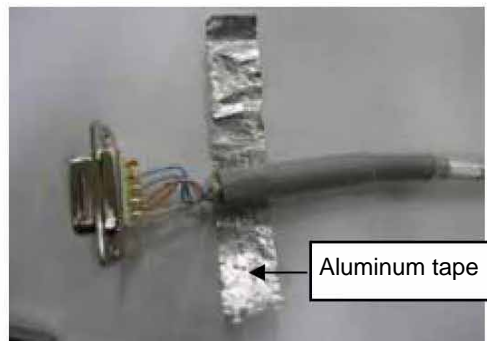
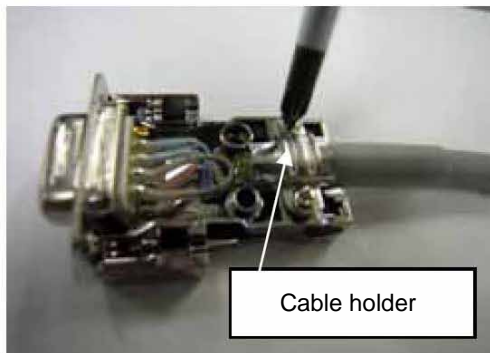
■ Countermeasure [3] Remove the shield from the PC-end connector of the RS232C cable.

[1] Remove the connector cover.

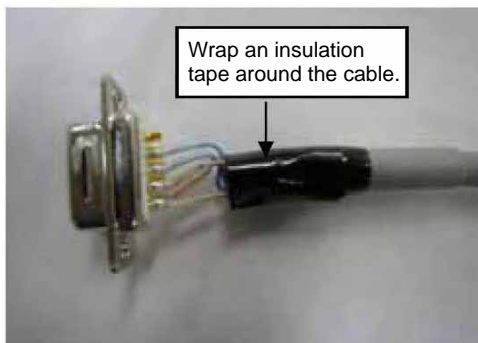
Remove the screws affixing the cover to the PC-end connector.



[2] Take out the cable holder and then remove the aluminum foil tape.



[3] Wrap an insulation table around the cable and then affix the cable with the cable holder. At this time, make sure the shielded wire does not project from the cable holder. (Cut the shielded wire, if necessary.)

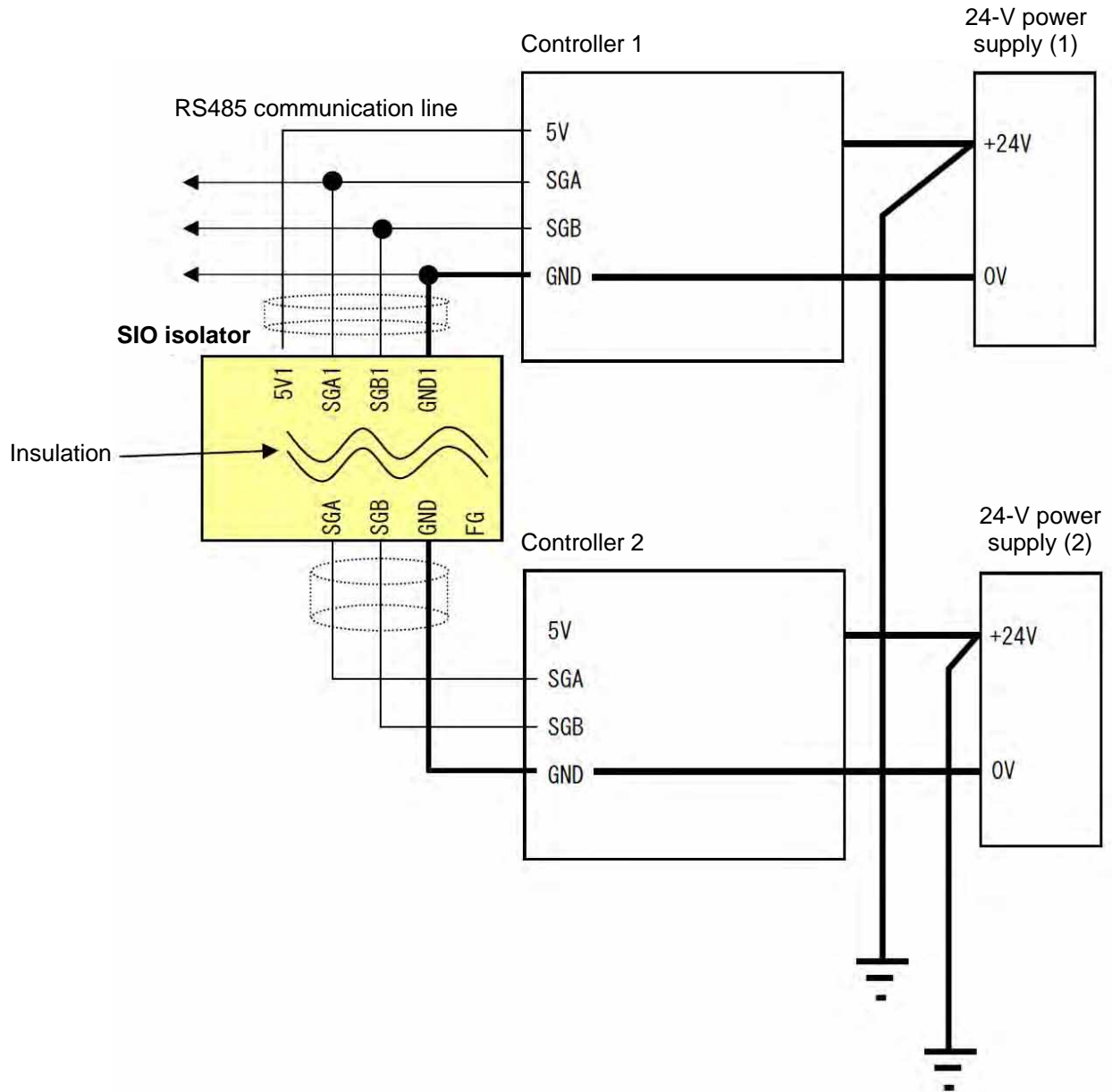


[4] Install and affix the connector cover.

[5] Perform cable check.

Apply the probes of the tester to the connector covers on both sides to confirm that they are insulated. (If the connector covers are not insulated, the shielded wire may be contacting. Insulate the shielded wire properly.)

- (4) A network has been built using multiple 24-V power supplies and controllers
Isolate the communication line using a **SIO isolator (RCB-ISL-SIO)**.
(Do this even when only one power supply is used, if the power is supplied to the controllers at timings controlled by relays, switches, etc.)

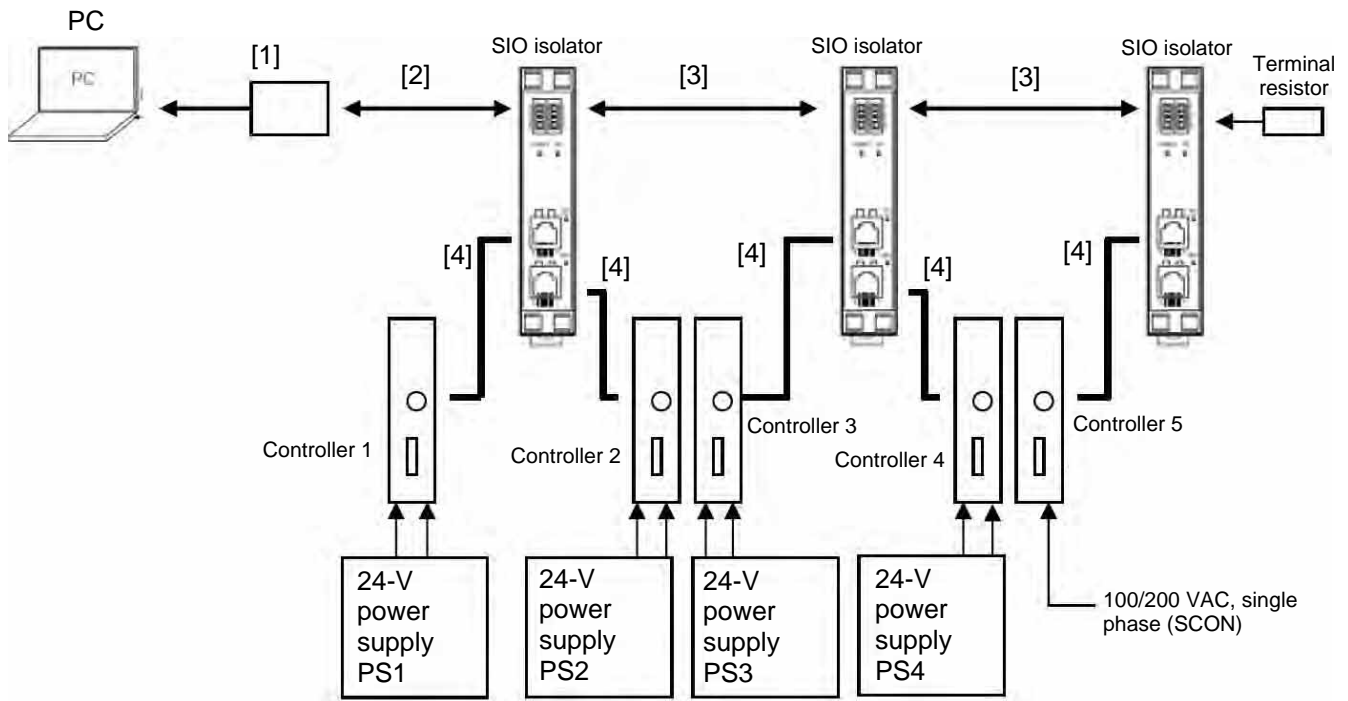


4. Connection Example

(1) Connect to a host PC via a SIO converter

If all controllers cannot use a common 0-V line for their power supplies or when 24-VDC and 100/200-VAC controllers are combined, you can supply the power independently to each controller as shown below.

(The same configuration can also be used when a common power supply is used.)



Cable	Name	Model	Remarks
[1]	USB cable USB conversion adapter	CB-SEL-USB RCB-CV-USB	Supplied with the PC software RCM-101-USB
[2]	Isolator communication cable	CB-RCB-SIO	Provided separately
[3]	Isolator link cable	CB-ISL-SIO	Provided separately
[4]	External device communication cable	CB-RCA-SIO	Supplied with the PC software

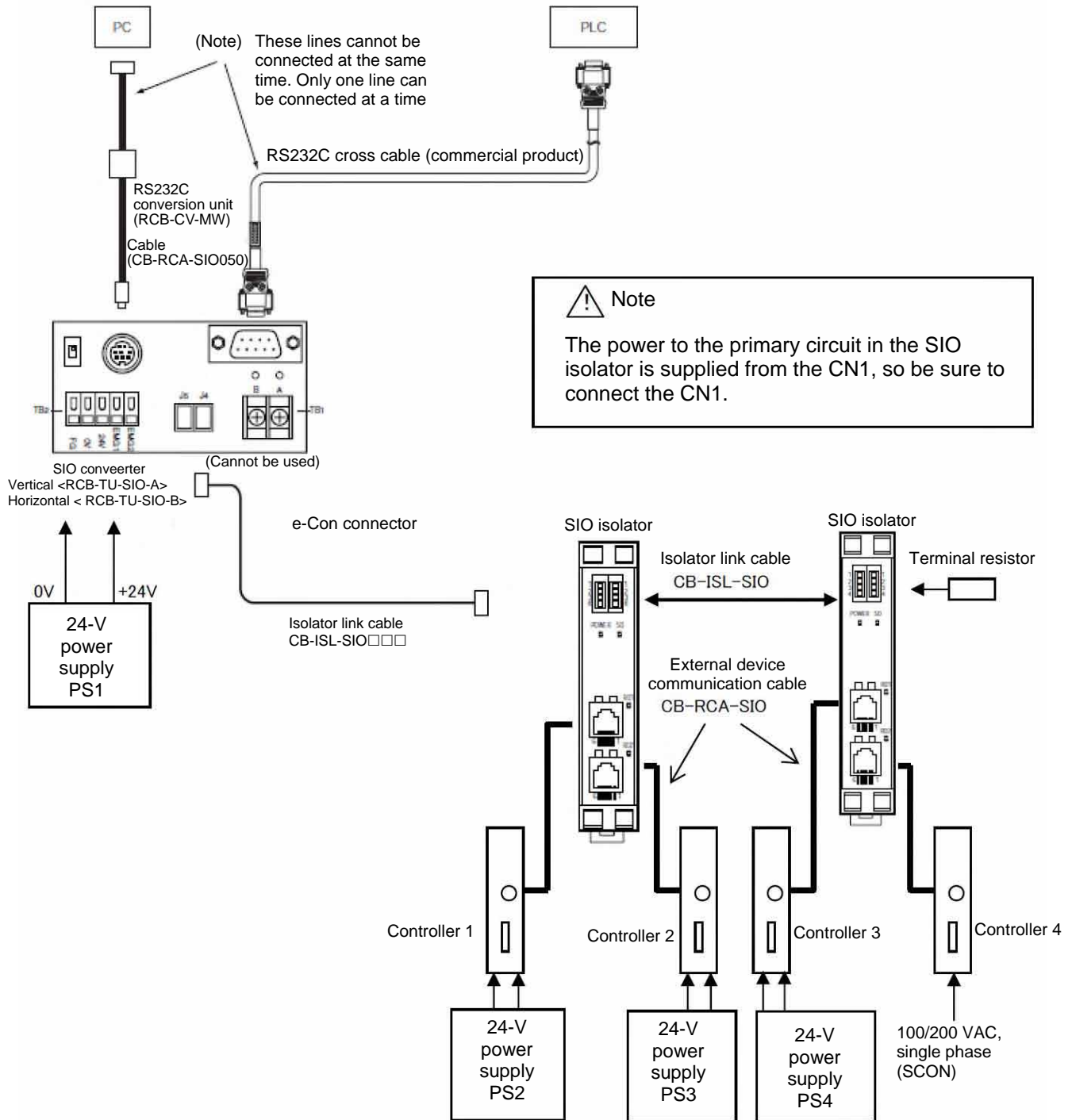


Note The power to the primary circuit in the SIO isolator is supplied from the CN1, so be sure to connect the CN1.

(2) Connect to a host PC or PLC via a SIO converter

If all controllers cannot use a common 0-V line for their power supplies or when 24-VDC and 100/200-VAC controllers are combined, you can supply the power independently to each controller as shown below.

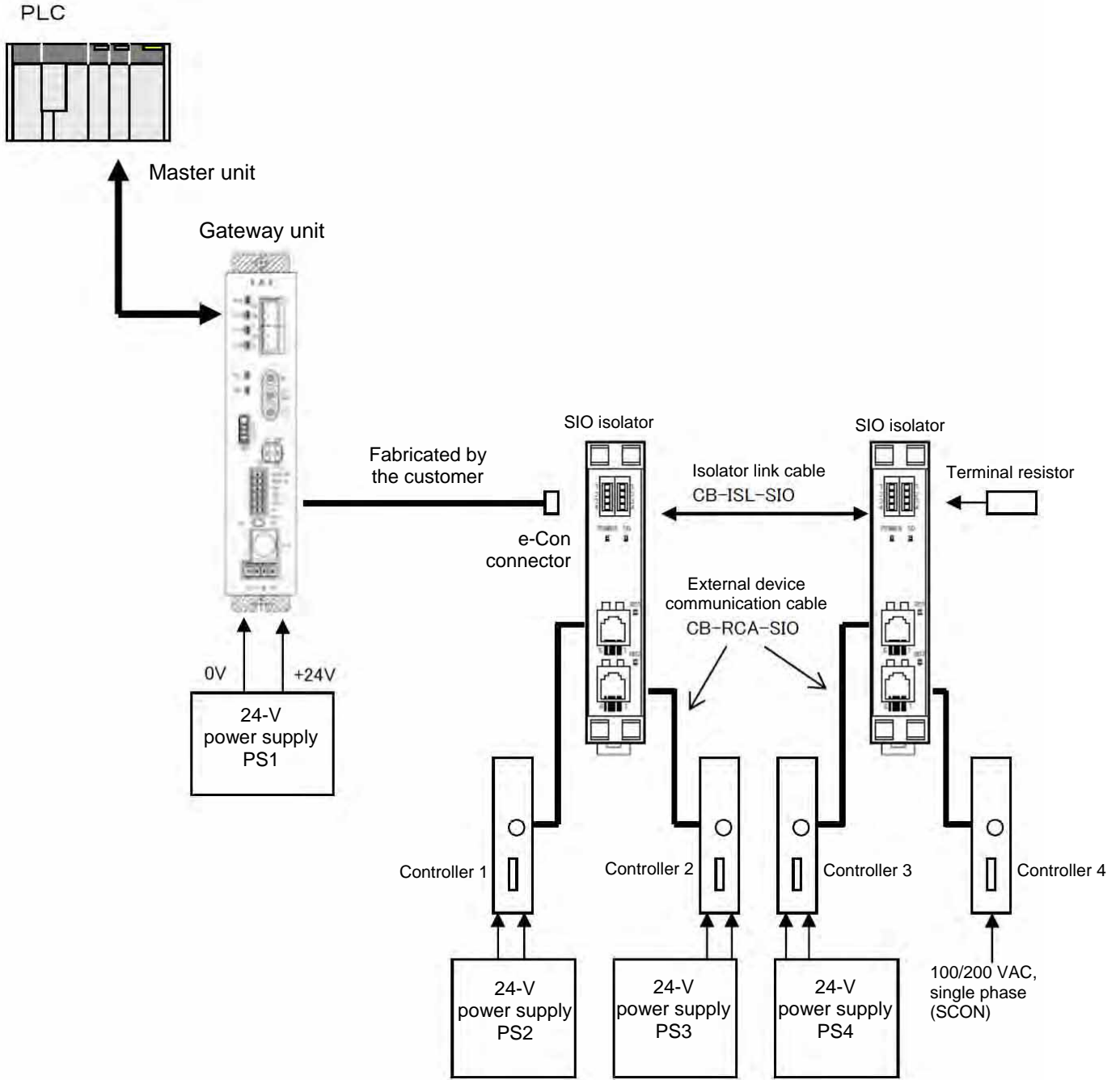
(The same configuration can also be used when a common power supply is used.)



(3) Link connection via a gateway unit

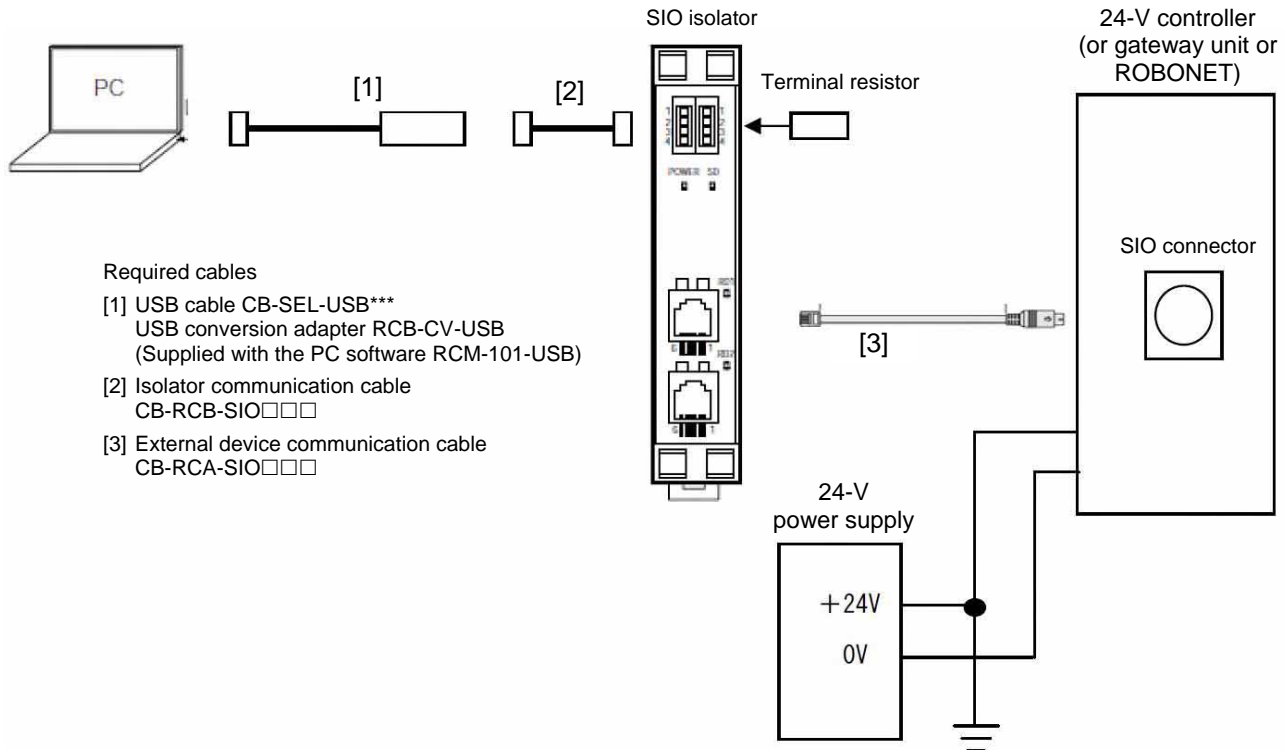
If all controllers cannot use a common 0-V line for their power supplies or when 24-VDC and 100/200-VAC controllers are combined, you can supply the power independently to each controller as shown below.

(The same configuration can also be used when a common power supply is used.)



! Note The power to the primary circuit in the SIO isolator is supplied from the CN1, so be sure to connect the CN1.

- (4) Connect a PC to a controller whose 24-V power supply is grounded at the positive terminal. Most PCs have their communication GND (0 V) line and FG (frame ground) short-circuited internally. Accordingly, connecting such PC to a controller will short-circuit the controller's 24-V power supply, thereby causing damage to the PC. To connect a PC to a controller (or gateway unit or ROBONET), do so by using the SIO isolator and USB conversion adapter (RCB-CV-USB).



Note

1. The RS232C conversion unit RCB-CV-MW (supplied with the PC software RCM-101-MW) cannot be used to connect a PC and a SIO isolator.
2. Connect the external device communication cable [3] to the CN1 of the SIO isolator.

5. Whether or not each teaching pendant can be used with a 24-V controller whose power supply is grounded at the positive terminal

Teaching pendant	RCM-E	RCM-P	RCM-T/TD	CON-PT/PD/PG CON-T/TD	RCM-PM-01 (touch panel)	SEP-PT
Action						
○: No countermeasure needed X: Countermeasure based on this document needed	○	○	X	X	△	X

6. Change History

Revision Date	Description of Revision
August 2010	First edition



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