

# **GP3000H Direct-connect Cable Installation Guide**

Thank you for purchasing Pro-face's GP3000H Hard-type/Soft-type Direct-connect Cable (Hereafter referred to as "this cable"). This optional cable connects GP3000H series unit to the peripheral equipment.

## **Safety Precautions**

### **⚠ WARNING**

- Be sure to confirm that power is not being supplied to the GP and the external devices before connecting the cable. Failure to do so can result in an electric shock.
- Do not modify the cable, since it may lead to a fire or electric shock.
- This cable is not appropriate for use with aircraft control devices, aerospace equipment, central trunk data transmission (communication) devices, nuclear power control devices, or medical life support equipment, due to these devices inherent requirements of extremely high levels of safety and reliability.
- When using this cable with transportation vehicles (trains, cars and ships), disaster and crime prevention devices, various types of safety equipment, non-life support related medical devices, etc. redundant and/or failsafe system designs should be used to ensure the proper degree of reliability and safety.

## **Package Contents**

- (1) GP3000H Direct-connect Cable (1)
- (2) Common Mode Filter (1)
- (3) Connector Cap (1)  
(attached to the cable connector)
- (4) Installation Guide (1) <This Guide>

This cable has been carefully packed, with special attention to quality. However, should you find anything damaged or missing, please contact your local GP distributor immediately.

## **About the Manual**

For the detailed information on GP3000H series, refer to the following manual.

- GP3000H Series Hardware Manual
- GP-Pro EX Device/PLC Connection Manual "GP3000H Series Connection Guide"
- GP3000H Conversion Adapter Installation Guide
- Maintenance/Troubleshooting
- GP-Pro EX Reference Manual "Hand Held GP"

The above manuals can be selected from the help menu of GP-Pro EX or downloaded from Pro-face Home Page.

URL

<http://www.pro-face.com/otasuke/>



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## Types of GP3000H Direct-connect Cable

| Name                                       | Model            | Description   |
|--|------------------|---|
| GP3000H Hard-type 10m Direct-connect Cable | GP3000H-CBLH-10M | Heavy-duty type interface cable for communication between the GP and external equipment (e.g. host controller), equipped with common mode filter. |
| GP3000H Soft-type 3m Direct-connect Cable  | GP3000H-CBLS-3M  | Standard type interface cable for communication between the GP and external equipment (e.g. host controller), equipped with common mode filter.   |
| GP3000H Soft-type 5m Direct-connect Cable  | GP3000H-CBLS-5M  |   |
| GP3000H Soft-type 10m Direct-connect Cable | GP3000H-CBLS-10M |   |

### NOTE

- This cable cannot be used to connect the GP3000H conversion adapter. For details, refer to “GP3000H Conversion Adapter Installation Guide”.

## Connection with Peripheral Equipment (Specifications of the GP3000H Direct-connect Cable)

### 1. Connecting Peripheral Equipment

#### IMPORTANT

- Do not make the cable's connector fall down or hit the connector against something hard, or the connector could be damaged.
- Be sure to connect peripheral equipment first, and connect the GP unit last. Otherwise, the RS232C/RS422/RS485 circuit may fail.
- Be sure to terminate unused wires to avoid short-circuits by other signals or metal parts.
- After cable length adjustment, be sure to connect the shield on the cable to the FG terminal.

#### ■ Serial Interface

|                                    |                                 |
|------------------------------------|---------------------------------|
| Recommended Cable Connector        | XM2D-0901 <made by OMRON Corp.> |
| Recommended Jack Screw #4-40 (UNC) | XM2Z-0073 <made by OMRON Corp.> |
| Recommended Cable Cover            | XM2S-0913 <made by OMRON Corp.> |

| Cable Color/<br>Marking Color,<br>Number | RS232C           |   | RS422/RS485      |                                  |
|--|------------------|---|------------------|----------------------------------|
|  | Signal Name      | Description   | Signal Name      | Description                      |
| Brown/White 1                            | CD               | Carrier Detect  | RDA              | Receive Data A(+)                |
| Brown/Black 1                            | RD(RXD)          | Receive Data  | RDB              | Receive Data B(-)                |
| Brown/White 2                            | SD(TXD)          | Send Data   | SDA              | Send Data A(+)                   |
| Brown/White 4                            | ER(DTR)          | Data Terminal Ready   | ERA              | Data Terminal Ready A(+)         |
| Brown/None                               | SG               | Signal Ground   | SG               | Signal Ground                    |
| Brown/Black 3                            | DR(DSR)          | Data Set Ready  | CSB              | Clear to Send B(-)               |
| Brown/Black 2                            | RS(RTS)          | Request to Send   | SDB              | Send Data B(-)                   |
| Brown/White 3                            | CS(CTS)          | Clear to Send   | CSA              | Clear to Send A(+)               |
| Brown/Black 4                            | CI(RI)/VCC       | Called status display/<br>+5 V $\pm$ 5% Output 0.25 A <sup>*1</sup> | ERB              | Data Terminal Ready B(-)         |
| Green/None                               | FG <sup>*2</sup> | Frame Ground<br>(Common with SG)                                    | FG <sup>*2</sup> | Frame Ground<br>(Common with SG) |

\*1 The RI/VCC selection is switched via software. The VCC output is not protected against overcurrent. To prevent damage or unit malfunctions, use only the rated current.

\*2 Select AWG22 cable to use out of two green cables. Be sure to twist wires from a part close to the power supply.

#### IMPORTANT

- The GP3000H direct-connect cable's serial interface is not isolated. When the host (PLC) unit is also not isolated, and to reduce the risk of damaging the RS232C/RS422/RS485 circuit, be sure to connect the SG (Signal Ground) terminal.

#### NOTE

- If isolation is required, use the Pro-face's RS232C isolation unit (CA3-ISO232-01), and the following recommended equipment.

|                                    |                                 |
|------------------------------------|---------------------------------|
| Recommended Intermediate Connector | XM2A-0901 <made by OMRON Corp.> |
| Recommended Fastener 1             | XM2Z-0003 <made by OMRON Corp.> |
| Recommended Cable Cover            | XM2S-0913 <made by OMRON Corp.> |

### ■ Ethernet Interface

Ethernet (IEEE802.3u, 10BASE-T/100BASE-TX) with modular jack connector (RJ-45)

| Cable Color | Signal Name | Direction | Description          |
|-------------|-------------|-----------|----------------------|
| Blue        | TX +        | Output    | Ethernet Send (+)    |
| White       | TX -        | Output    | Ethernet Send (-)    |
| Brown       | RX +        | Input     | Ethernet Receive (+) |
| Gray        | RX -        | Input     | Ethernet Receive (-) |

## ■ DC24 V Interface

### ⚠ WARNING

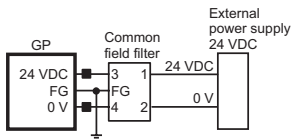
- To avoid an electric shock, prior to connecting the GP unit's power cord terminals to the power terminal block, confirm that the GP unit's power supply is completely turned OFF, via a breaker, or similar unit.
- Any other power level can damage both the GP and the power supply.
- Since there is no power switch on the GP unit, be sure to attach a breaker switch to its power cord.
- When the FG terminal is connected, be sure the wire is grounded.

| Cable Color | Signal Name | Direction | Description                   |
|-------------|-------------|-----------|-------------------------------|
| Red         | DC24 V      | Input     | Power Input DC24 V            |
| Black       | 0 V         | Input     | Power Input 0 V               |
| Green       | FG*1        | —         | Frame Ground (Common with SG) |

\*1 Select AWG16 cable to use out of two green cables. Be sure to twist wires from a part close to the power supply.

### NOTE

- It's recommended to use the provided common mode filter on the direct-connect cable to reduce noise.



- The black square indicates the connection point for the dedicated cable and common field filter.

## ◆ Power Supply Cautions

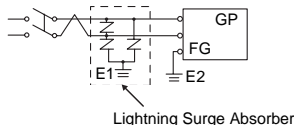
- Input and Output signal lines must be separated from the power control cables for operational circuits.
- To improve the noise resistance, be sure to twist the ends of the power cord wires before connecting them to the power supply.
- The GP unit's power supply cord should not be bundled with or kept close to main circuit lines (high voltage, high current), or input/output signal lines.
- To reduce noise, make the power cord as short as possible.
- If the supplied voltage exceeds the GP unit's range, connect a voltage transformer.
- Between the line and the ground, be sure to use a low noise power supply. If there is an excess amount of noise, connect a noise reducing transformer.

### IMPORTANT

- Use voltage and noise reducing transformers with capacities exceeding Power Consumption value.
- Connect a surge absorber to handle power surges.

### IMPORTANT

- Be sure to ground the surge absorber (E1) separately from the GP unit (E2). Select a surge absorber that has a maximum circuit voltage greater than that of the peak voltage of the power supply.

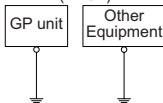


## ◆ Grounding Cautions

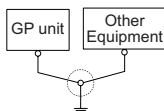
- Be sure to create an exclusive ground for the Power Cord's FG terminal. Use a grounding resistance of 100  $\Omega$ , a wire of 2 mm<sup>2</sup> or thicker, or your country's applicable standard.

- The SG (signal ground) and FG (frame ground) terminals are connected internally in the GP unit. When connecting the SG line to another device, be sure that the design of the system/connection does not produce a shorting loop.
- The grounding wire should have a cross sectional area greater than  $2 \text{ mm}^2$ . Create the connection point as close to the GP unit as possible, and make the wire as short, as possible. When using a long grounding wire, replace the thin wire with a thicker wire, and place it in a duct.

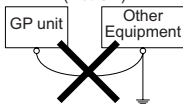
Exclusive Grounding  
(BEST)



Common Grounding (OK)



Common Grounding  
(Not OK)



#### ◆ Input/Output Signal Line Cautions

- All GP Input and Output signal lines must be separated from all operating circuit (power) cables.
- If this is not possible, use a shielded cable and ground the shield.

#### ■ 3-Position Enable Switch Output Interface

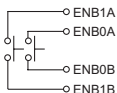
| Cable Color/<br>Marking Color,<br>Number | Signal Name | Description   |
|--|-------------|---|
| Blue/<br>Black 2                         | ENB0A       | 3-position enable switch 0A (a-contact : normally open)<br>Rating: 30 VDC, 700 mA<br>(Minimum applicable load: 3 VDC, 5 mA) |
| Blue/<br>Black 3                         | ENB0B       | 3-position enable switch 0B (a-contact : normally open)   |
| Blue/<br>None                            | ENB1A       | 3-position enable switch 1A (a-contact : normally open)<br>Rating: 30 VDC, 700 mA<br>(Minimum applicable load: 3 VDC, 5 mA) |
| Blue/<br>Black 1                         | ENB1B       | 3-position enable switch 1B (a-contact : normally open)   |

The switch provides three positions: A position where the switch is not pressed (released), a position where the switch is pressed to the intermediate position, and a position where the switch is pressed to the innermost position (fully pressed).

When the switch is set at each position, ON/OFF status of the ENB0 to ENB1 signals are as follows:

|      | The switch is not pressed. | The switch is pressed to the intermediate position. | The switch is pressed to the innermost position. |
|------|----------------------------|---|--|
| ENB0 | 0 (OFF)                    | 1 (ON)  | 0 (OFF)  |
| ENB1 | 0 (OFF)                    | 1 (ON)  | 0 (OFF)  |

\*1 The contact is OFF when the switch is fully depressed and then returned to the released position.



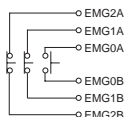
## ■ Emergency Switch Output Interface

| Cable Color/<br>Marking Color,<br>Number | Signal Name | Description   |
|--|-------------|---|
| Purple/<br>Black 2                       | EMG0A       | Emergency switch 0A<br>(a-contact : normally open) Rating: 30 VDC, 1 A (Minimum applicable load: 5 VDC, 1 mA)   |
| Purple/<br>White 3                       | EMG0B       | Emergency switch 0B<br>(a-contact : normally open)  |
| Purple/<br>Black 1                       | EMG1A       | Emergency switch 1A<br>(b-contact : normally closed) Rating: 30 VDC, 1 A (Minimum applicable load: 5 VDC, 1 mA) |
| Purple/<br>White 2                       | EMG1B       | Emergency switch 1B<br>(b-contact : normally closed)  |
| Purple/<br>None                          | EMG2A       | Emergency switch 2A<br>(b-contact : normally closed) Rating: 30 VDC, 1 A (Minimum applicable load: 5 VDC, 1 mA) |
| Purple/<br>White 1                       | EMG2B       | Emergency switch 2B<br>(b-contact : normally closed)  |

With the GP unit incorporating an emergency switch, the emergency switch activates the contact output, when the emergency switch is enabled. To reset the emergency stop status (lock status), pull the button forward, or turn the button in the direction indicated by arrow. When the emergency switch is pressed, ON/OFF status of the EMG0 to EMG2 signals are as follows:

( ) indicates contact status.

|      | Emergency Stop Reset | Emergency Stop |
|------|----------------------|----------------|
| EMG0 | 0 (OFF)              | 1 (ON)         |
| EMG1 | 1 (ON)               | 0 (OFF)        |
| EMG2 | 1 (ON)               | 0 (OFF)        |



### NOTE

- These signal lines must be disconnected (NC) when a GP unit without an emergency switch is used.

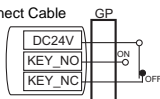
## ■ Key Switch Output Interface

| Cable Color/<br>Marking Color,<br>Number | Signal Name | Description   |
|--|-------------|---|
| Orange/<br>None                          | KEY_NC      | Key Switch b-contact<br>(normally closed)<br>Rating: 24 VDC, 300 mA |
| Orange/<br>Black 1                       | KEY_NO      | Key Switch a-contact<br>(normally open)<br>Rating: 24 VDC, 300 mA   |

- Turning OFF GP unit with the key switch

GP3000H

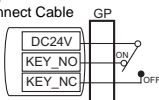
Direct-connect Cable



- Turning ON GP unit with the key switch

GP3000H

Direct-connect Cable



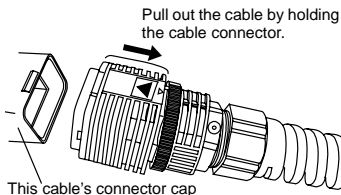
**NOTE**

- When the key is not turned to ON or OFF, either the "KEY\_NO" or the "KEY\_NC" signal is ON. These signals will not simultaneously turn OFF.
- These signal lines must be disconnected (NC) when a GP unit without a key switch is used.

## 2. Connecting the GP Unit

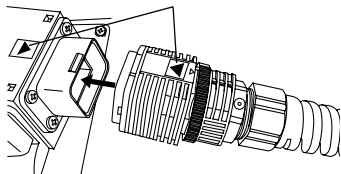
### ◆ Attachment

- Before connection, remove the cable's connector cap and GP3000H connector cover. To remove the cable's connector cap, pull out the cable by holding the cable connector as shown.

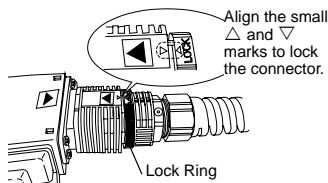
**NOTE**

- To disconnect the cable from the connector cap, be sure to hold the cable connector and pull it out. If you hold other parts of the cable (lock ring, etc.), the cable cannot be disconnected.
- Insert the cable connector to the GP3000H cable connector until it clicks. Match the ▲ points and insert the cable connector, as shown below.

Match the ▲ points and insert the cable connector until it clicks.

**NOTE**

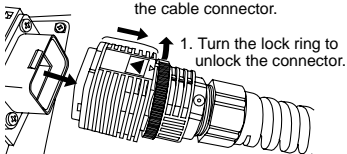
- Be sure to insert the cable connector as shown. Failure to do so might result in damage to the connector.
- Turn the cable connector lock ring to lock the connector, so that the small ▲ mark (for LOCK) on the lock ring is aligned with the small ▼ mark on the cable connector.



### ◆ Removal

- Unlock the connector that has been locked in the mounting procedure. (Turn the lock ring as shown so that the small ▲ mark is displaced from the ▼ mark). Then, pull out the cable by holding the cable connector.

2. Pull out the cable by holding the cable connector.

**NOTE**

- To disconnect the cable, be sure to hold the cable's connector and pull it out. If you hold other parts of the cable (lock ring, etc.), the cable cannot be disconnected.

# ◆ Connector Pin Assignment

|  | Cable Color/<br>Marking Color,<br>Number | Pin<br>No. | Signal Name                       |  | Description                                     |
|--|--|------------|-----------------------------------|--|---|
| <div><div>Protrusion</div><div>Protrusion</div><div>87654321</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>D</div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>C</div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>B</div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>A</div><div>(Cable side)</div></div></div> | Orange/None                              | D7         | KEY_NC                            |  | Key Switch<br>Output Signal                     |
|  | Orange/Black 1                           | D8         | KEY_NO                            |  |   |
|  | Blue/Black 2                             | C7         | ENB0A                             |  | 3-Position<br>Enable<br>Switch Output<br>Signal |
|  | Blue/Black 3                             | B7         | ENB0B                             |  |   |
|  | Blue/None                                | A6         | ENB1A                             |  |   |
|  | Blue/Black 1                             | A7         | ENB1B                             |  |   |
|  | Purple/Black 2                           | C6         | EMG0A                             |  | Emergency<br>Switch Output<br>Signal            |
|  | Purple/White 3                           | B6         | EMG0B                             |  |   |
|  | Purple/Black 1                           | A5         | EMG1A                             |  |   |
|  | Purple/White 2                           | D6         | EMG1B                             |  |   |
|  | Purple/None                              | C5         | EMG2A                             |  |   |
|  | Purple/White 1                           | B5         | EMG2B                             |  |   |
|  | Brown/White 1                            | D3         | (When the<br>RS232 is used)<br>CD | (When the<br>RS422 or<br>RS485 is used)<br>RDA | Serial Signal                                   |
|  | Brown/Black 1                            | D4         | RD (RXD)                          | RDB  |   |
|  | Brown/White 2                            | C3         | SD (TXD)                          | SDA  |   |
|  | Brown/Black 2                            | C4         | RS (RTS)                          | SDB  |   |
|  | Brown/None                               | D5         | SG                                | SG   |   |
|  | Brown/White 4                            | B3         | ER (DTR)                          | ERA  |   |
|  | Brown/Black 4                            | B4         | CI (RI)/VCC                       | ERB  |   |
|  | Brown/White 3                            | A3         | CS (CTS)                          | CSA  |   |
|  | Brown/Black 3                            | A4         | DR (DSR)                          | CSB  |   |
|  | Blue/None                                | D1         | TX+                               |  | Ethernet<br>Signal                              |
|  | White/None                               | C1         | TX-                               |  |   |
|  | Brown/None                               | B1         | RX+                               |  |   |
|  | Gray/None                                | A1         | RX-                               |  |   |
|  | Red/None                                 | C8         | Power Input DC24 V                |  | DC24 V  |
|  | Black/None                               | B8         | Power Input 0 V                   |  |   |
|  | Green/None                               | A8         | Frame Ground<br>(Common with SG)  |  |   |

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