Pro-face
for the best interface

# DeviceNet スレーブユニット ハードウェアマニュアル

# DeviceNet Slave Unit Hardware Manual

# Preface

Thank you for purchasing the DeviceNet Slave unit “CA6-DNSALL/EX-01” (hereafter referred to as the “DeviceNet unit”).

This unit is intended for use with expansion interface of the Pro-face’s GP3000 series[*1] programmable operator interface (hereafter referred to collectively as the “GP”), and as an interface between the DeviceNet data network and any of the above mentioned GPs. Before actually beginning to use the DeviceNet unit, please be sure to read through this manual and other related manuals to fully understand all the settings and functions.

[*1]Excluding the GP-3200 series.

NOTICE

1. Copying this manual’s contents, either in whole or in part, is prohibited without the express permission of Digital Electronics Corporation, Japan.
2. The information contained in this manual is subject to change without notice.
3. If you find any errors or omissions in this document, please contact Digital Electronics Corporation to report your findings.
4. Regardless of those above, Digital Electronics Corporation shall not take responsibility for any damage, losses or third-party’s damage resulting from the use of this product.

## Essential Safety Precautions

All safety-related procedures stated in this document must be followed to operate the DeviceNet unit correctly and safely. Be sure to read this and any related documents thoroughly to understand the correct operation and functions of the DeviceNet unit.

### Safety Icons

Throughout this manual, these icons provide essential safety information for DeviceNet unit operation procedures requiring special attention. These icons indicate the following levels of danger:

| | |
|---|---|
| ⚠ WARNING | Indicates situations where severe bodily injury, death or major equipment damage can occur. |
| ⚠ CAUTION | Indicates situations where slight bodily injury or minor equipment damage can occur. |
| ⃠ | Indicates actions or procedures that should NOT be performed. |
| ❗ | Indicates actions or procedures that MUST be performed to ensure correct unit operation. |

### ⚠ WARNING

❗ Due to the possibility of an electrical shock, be sure that the power supply for the GP is not plugged in when installing the DeviceNet unit.

❗ Be sure to design your system so that a communication fault between GP and external device (PLC etc.) will not cause equipment to malfunction. This is to prevent any possibility of bodily injury or equipment damage.

⃠ Do not modify the DeviceNet unit. Doing so may cause a fire or an electric shock.

### ⚠ CAUTION

### General Safety Precautions

⃠ Do not allow water, liquids, or metal particles to enter into the DeviceNet unit's case, otherwise it can cause a malfunction or electrical shock.

- Avoid storing or operating the DeviceNet unit in locations where it will be exposed to direct sunlight, high temperature, excessive dust, or vibration.
- Avoid storing or operating the DeviceNet unit in locations where it would be exposed to excessive temperature and dew condensation happens.
- Do not store or operate the DeviceNet unit where chemicals or acids are stored, or where high concentrations of fumes are present.
- Because the DeviceNet unit is a precision instrument, do not store or operate it in locations where something may strike or hit the unit.
- Do not use paint thinner or organic solvents to clean the outside of the DeviceNet unit. Instead, soak a soft cloth in a diluted neutral detergent, wring it tightly, and then wipe the unit's outside case.

### Unit Disposal

- When the product is disposed of, it should be treated as industrial waste products. Therefore, you are requested to obey the disposal standards or regulations of your country.

## Information Symbols

This manual uses the following icons:

| | |
|---|---|
| IMPORTANT | Indicates a warning or a product limitation. Be sure to follow the instructions given with this icon to ensure the safe operation of the DeviceNet unit. |
| NOTE | Contains additional or useful information. |
| (1) (2) | Indicates steps used to accomplish a given task.<br>Be sure to follow these steps in the order they are written. |
| *1 | Indicates useful or important supplemental information. |
| SEE → | Indicates pages containing related information. |
| External Device | Indicates the DeviceNet-DP Master CPU (PLC etc.), which connects a GP with DeviceNet unit. |
| GP-Pro EX | Indicates the Screen editor program for Pro-face's GP3000 series. |

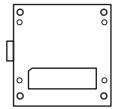
## Device Profile

| | |
|---|---|
| Vendor Name | Digital Electronics Corporation |
| Vendor ID | 96 |
| Device Type | 24 |
| Device Profile Name | Human Machine Interface |
| Product Revision | 1.00 |
| Product Code | 16 |
| Product Name | GP3000 Series |

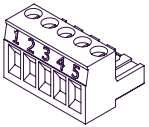
## Package Contents

The following items are included in the DeviceNet unit's package. Before using the DeviceNet unit, please check that all items listed here are present.

DeviceNet Unit (1)



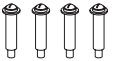
DeviceNet terminal strip connector (1)
(Unit attached)




Hardware Manual <This Manual> (1)

Warning/Caution Information (1)

Screws (4)



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

## Inquiry

Do you have any questions about difficulties with this product ?
Please access our site anytime that you need help with a solution.
**http://www.pro-face.com/otasuke/**

## Installation prerequisites for standards

The DeviceNet unit "CA6-DNSALL/EX-01" is a UL/c-UL product, listed on UL File No.E220851 and UL File No.E182139.
The DeviceNet unit "CA6-DNSALL/EX-01" is a UL/c-UL product, recognized on UL File No.E171486 and UL File No.E231702.

| Product Model No. | UL Registration Model No. |
|---|---|
| CA6-DNSALL/EX-01 | 3580801 |

This product conforms to the following standards:
- UL508

Standard for Industrial Control Equipment
- UL60950-1

Information Technology Equipment - Safety - Part 1
- ANSI/ISA-12.12.01

Nonincendive Electrical Equipment for Use in Class I, Division 2 Hazardous (classified) Locations.
- CSA-C22.2 No.142-M1987 (c-UL Approval)

Process Control Equipment
- CSA-C22.2 No.213-M1987 (c-UL Approval)

Non-incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations
- CAN/CSA C22.2 No.60950-1-03 (c-UL Approval)

Information Technology Equipment - Safety - Part 1

<Cautions>

Be aware of the following items when building the GP into an end-use product:
- Be sure that the unit is installed so that it is at least 100 mm away from any adjacent structures or devices. If these requirements are not met, the heat generated by the unit's internal components may cause the unit to fail to meet UL standard requirements.
- For use with the following models only: Models 3280007-01, -02, -03, -12, -13, -24; 3280024-02, -14, -22, -32; 3280035-01, -02, -31, -41.
- For use with the following models only: Models 3280024-01, -11, -13, -21; 3280035-45, -75; 3581301-01, -03.

<Hazardous Locations - Compliance and Handling Cautions>

- Suitable for use in Class I, Division 2, Groups A, B, C, and D Hazardous Locations, or Non-Hazardous Locations.
- WARNING: Explosion hazard - substitution of any components may impair suitability for Class I, Division 2.

- WARNING: Explosion hazard - when in hazardous locations, turn off power before replacing or wiring modules.
- WARNING: Explosion hazard - do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

## CE Marking

The DeviceNet unit “CA6-DNSALL/EX-01” is CE marked product that conforms to EMC directives, EN55011 Class A and EN61000-6-2.

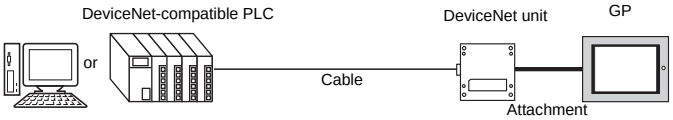
## Contents

# Chapter 1 General

## 1.1 Operating the DeviceNet Unit

If the DeviceNet unit is attached to the GP and connected via a cable, this unit enables your GP to be directly connected to an DeviceNet-compatible PLC or personal computer *1.

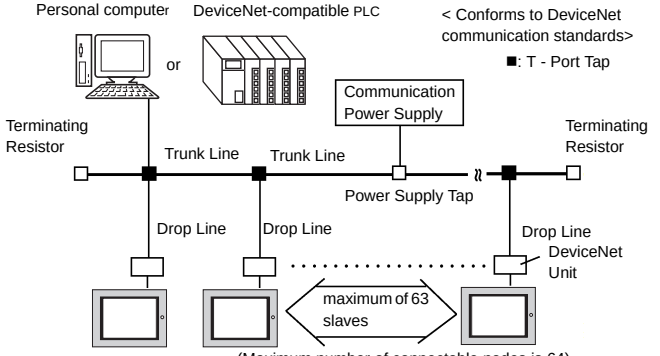
| Host Computer (Master) | Connection Cable | I/F Module (Slave) | GP Type |
|---|---|---|---|
| DeviceNet master compatible PLC for each company or personal computer *1 | See"3.2Wiring for DeviceNet-DP" | DeviceNet unit (CA6-DNSALL/ EX-01) | GP3000 Series *2 |



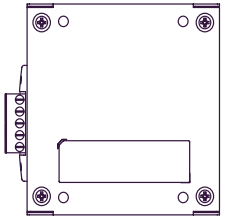

*1 The number of compatible PC types may be limited.
*2 Excluding the GP-3200 series

## 1.2 System Configuration

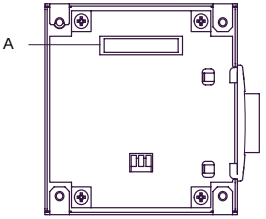
Be sure all connections conform to DeviceNet communication standards. Refer to the connection example shown below.



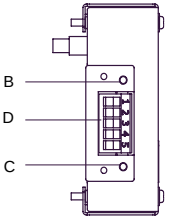
## 1.3 Parts Name and Functions



Front




Rear




Left Side

A. GP connector
For connection to the expansion interface of a GP unit.

B. Network LED

| Color | Display | Status |
|---|---|---|
| Green | Lit | Correct communication |
| | Blinking | Not communicate |
| Red | Lit | Defective connection |
| | Blinking | Timeout, communication is failed. |
| Not lit | | Power is OFF. |

C. Module LED

| Color | Display | Status |
|---|---|---|
| Green | Lit | Normally operated |
| | Blinking | Poor connection |
| Red | Lit | Failure may be occurred in DeviceNet side. |
| | Blinking | Recovery is failed. |
| Not lit | | Power is OFF. |

D. DeviceNet Connector Pins

| Pin No | Wire Cover Color | Comment |
|---|---|---|
| 1 | Black | Power Supply (V-) |
| 2 | Blue | Communication Data [Low side] (CAN_L) |
| 3 | No Cover | Shield |
| 4 | White | Communication Data [High side] (CAN_H) |
| 5 | Red | Power Supply (V+) |

## 1.4 Software

DeviceNet unit is compatible for GP-Pro EX Ver. 2.0 or later.
For further detail of the communication setup, refer to “GP-Pro EX Device/PLC Connection Manual”.

# Chapter 2 Specifications

## 2.1 General Specifications

### 2.1.1 Electrical

| Items | | Specifications |
|---|---|---|
| Power Supply | Rated Voltage | DC5V ± 5%(supplied by the GP unit) |
| | Power Consumption | 4W or less |
| Voltage Endurance | | When the GP is DC type:<br>AC1000V 20mA for 1 minute<br>(between charging and FG terminals)<br>When the GP is AC type:<br>AC1500V 20mA for 1 minute<br>(between charging and FG terminals) |
| Insulation Resistance | | DC500V 10MΩ (min.)<br>(between charging and FG terminals) |

## 2.1.2 Environmental

| Items | | Specifications |
|---|---|---|
| Physical | Surrounding Air Temperature | 0°C to 50°C |
| | Storage Temperature | -20°C to +60°C |
| | Ambient Humidity | 10%RH to 90%RH<br>(Wet bulb temperature: 39°C max. - no condensation.) |
| | Storage Humidity | 10%RH to 90%RH<br>(Wet bulb temperature: 39°C max. - no condensation.) |
| | Dust | Less than 0.1mg/$m^3$ and below<br>(non-conductive levels) |
| | Pollution Degree | For use in Pollution Degree 2 environment |
| | Atmosphere | Free of corrosive gas |
| | Air Pressure Vibration Resistance (availment altitude) | 800 to 1114hPa<br>(2,000 meters above sea-level and below) |
| Mechanical | Vibration Resistance | Comply with JIS B 3502, IEC61131-2<br>5 to 9Hz single-amplitude 3.5mm<br>9 to 150Hz constant-accelerated velocity 9.8m/$s^2$<br>X,Y,Z directions for 10 cycles (100 minute) |
| | Impact Resistance | Comply with JIS B 3502, IEC61131-2<br>(147m/$s^2$ to twice X, Y, Z each directions) |
| Electrical | Noise Immunity (via noise simulator) | Noise Voltage: 1000$V_{P-P}$ (GP:DC type)<br>1500$V_{P-P}$ (GP:AC type)<br>Pulse Duration: 1µs<br>Rise Time: 1ns |
| | Electrostatic Discharge Immunity | Contact Electrical Discharge<br>6kV (complies with IEC61000-4-2 Level 3) |

### 2.1.3 Structural

| Items | | Specifications |
|---|---|---|
| Installation | Installation method | Screw fixing |
| | Cooling Method | Natural air circulation |
| | Weight | Approx. 500g [1.1lb] |
| | External Dimensions | W88.4mm [3.48in.] x H91mm [3.58in.] x D35.1mm [1.38in.] (excluding projection and connector part) |

## 2.2 Performance Specifications

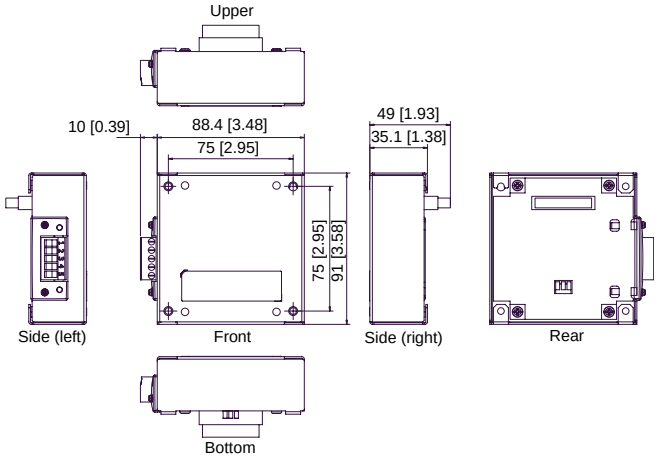
### 2.2.1 Transmission Specifications

| Items | Specifications | | | | |
|---|---|---|---|---|---|
| The number of connecta-ble units | Max. 64 units | | | | |
| I/O | Conforms to DeviceNet communication standards | | | | |
| Transmission method | CAN (CSMA/NBA) | | | | |
| Transmission distance | Baud Rate | Maximum Length of Trunk Line | | Drop Line | Total Drop Line Length |
| | | Thick Cable | Thin Cable | | |
| | 500Kbps | 100m or less | 100m or less | 6m or less | 39m or less |
| | 250Kbps | 250m or less | 100m or less | 6m or less | 78m or less |
| | 125Kbps | 500m or less | 100m or less | 6m or less | 156m or less |
| Encoding method | NRZ (Non Return Zero) method | | | | |
| Data packet | 0-8 byte | | | | |

## 2.3 Dimensions

### 2.3.1 DeviceNet Unit External Dimensions

Unit: mm [in.]



# Chapter 3 Installation

## 3.1 Installing the DeviceNet Unit

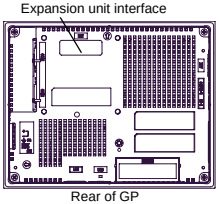
### ⚠WARNING

Due to the possibility of an electrical shock before installation, be sure the GP's power cord is not plugged in to the power supply.

The following figure describes how to install the DeviceNet module into an AGP-3450T.

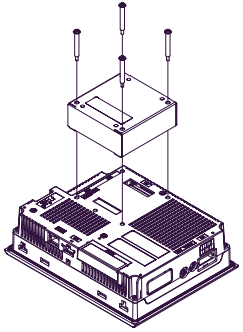
(1) Disconnect the power cable and place the GP face down on a flat horizontal surface.

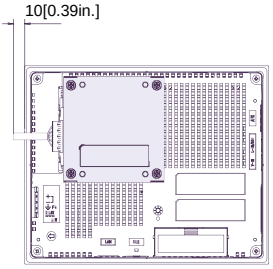
(2) Insert the GP connector of the DeviceNet unit into the Expansion Unit interface on the back of GP.




Rear of GP

(3) Fix the DeviceNet unit by four screws. (Tightening torque: 0.5 to 0.6 N•m)






After completion of installation

## 3.2 Wiring for DeviceNet-DP

### ⚠ CAUTION

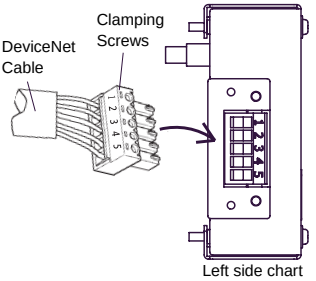
Be sure to earth the FG of the external device (PLC etc.) according to Class 3 earthing standards. For details, please refer to the manual of the device/PLC used. Collect all the data cable's shield wires and connect them to the FG of the external device (PLC etc.).

IMPORTANT

- For connection of this unit and any equipment related to DeviceNet, use special cables which comply with the DeviceNet communication standards.

### 3.2.1 Connecting Cables

First, connect each wire of the cable to the connector, as shown below (a 5-wire cable is used here) and then attach the DeviceNet connector.
The connector (plug) used is MSTB 2.5-5.08 made by Phoenix Contact.




| Pin No. | Wire Cover Color | Comment |
|---|---|---|
| 1 | Black | Power Supply (V-) |
| 2 | Blue | Communication Data [Low side] (CAN_L) |
| 3 | None | Shield |
| 4 | White | Communication Data [High side] (CAN_H) |
| 5 | Red | Power Supply (V+) |

IMPORTANT

- ***Use a standard screwdriver (size: 0.6 x 3.5) to tighten the clamping screws. Correct clamping torque is 0.5 to 0.6 N•m[5 - 7 Lb•In].***

NOTE

- **Do not solder cable wires to the connector.**
- **Use copper conductors only.**
- **The temperature rating of field installed conductors: 80°C only.**

### When using 3-wire cables

- Connect these wire to the communication and shield pins only.
- Use separate cables as slave-to-slave power-supply lines.

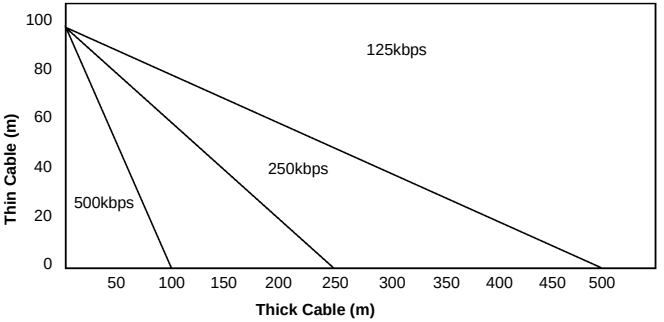
■ Recommended cables

| Product name | Manufacturer | Remarks |
|---|---|---|
| DCA1-5C10 | OMRON Corporation | Thin |
| DCA2-5C10 | OMRON Corporation | Thick |
| KND-SBT | KURAMO ELECTRIC CO., LTD. | Thin, thick |
| TDN18UF | SWCC SHOWA HOLDINGS CO., LTD. | Thick cable, for fixed portion |
| TDN24UF | SWCC SHOWA HOLDINGS CO., LTD. | Thin cable, for fixed portion |
| DM-THICK (c2464) | DAIDEN CO., LTD. | Thick cable |
| DM-THIN (c2464) | DAIDEN CO., LTD. | Thin cable |
| DVN18SF | Nihon Electric Wire & Cable Co., LTD. | Equivalent to thick cable, for main line/movable portion |
| DVN24SF | Nihon Electric Wire & Cable Co., LTD. | Equivalent to thin cable, for branch line/movable portion |
| DSEFV-ESLAB | Belden Wire & Cable Company | DSEFV-ESLAB |

## 3.2.2 DeviceNet Cable Types

DeviceNet cables use contain either 3 or 5 wires. These 3- or 5-wire cables are available as either thick or thin cables.
Thick cables are hard and difficult to handle. However, they are suitable for long-distance communications since signal degradation is minimal.
On the other hand, thin cables are flexible and easily handled but exhibit more signal degradation. Therefore, they are used for short-distance communications where complex cabling is required.
Also, thick and thin cables, can be combined together to create a single network. The maximum length of cables (total of thick and thin cables) can be calculated by referring to the following graph.

■ Maximum Length of Cables (Total Thick and Thin Cables)




- L (Thick) + 5 x L (Thin) = 500 Baud Rate: 125kbps
- L (Thick) + 2.5 x L (Thin) = 250 Baud Rate: 250kbps
- L (Thick) + L (Thin) = 100 Baud Rate: 500kbps

The "L (Thick)" represents "Thick Cable Length" and "L (Thin)" represents "Thin Cable Length."

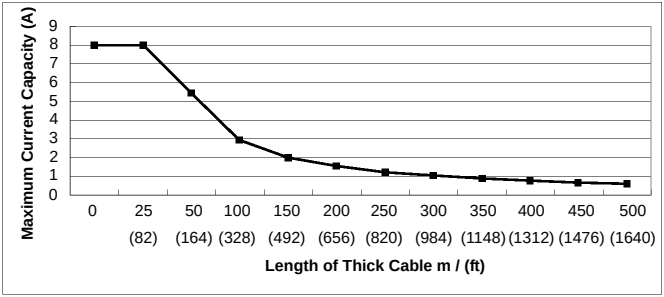
IMPORTANT **• *Between a trunk and a drop line, do not mix 3-wire and 5-wire cables. Use only one type of cable.***

### 3.2.3 Communication Power Supply

For this unit, use a communication power supply whose AC input and DC output lines are insulated. Also, be sure the power supply has sufficient current capacity by calculating the total current flow required by all the connected slaves.
(The consumption current of this unit is 38mA or less.)

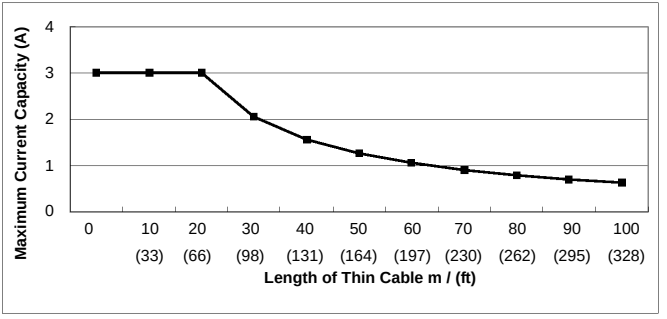
■ Maximum current capacity for each length of thick cable

| Length of Thick Cable | (m) (ft) | 0 | 25 (82) | 50 (164) | 100 (328) | 150 (492) | 200 (656) | 250 (820) | 300 (984) | 350 (1148) | 400 (1312) | 450 (1476) | 500 (1640) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Current | (A) | 8.00 | 8.00 | 5.42 | 2.93 | 2.01 | 1.53 | 1.23 | 1.03 | 0.89 | 0.78 | 0.69 | 0.63 |



■ Maximum current capacity for each length of thin cable

| Length of Thin Cable | (m) (ft) | 0 | 10 (33)) | 20 (66) | 30 (98) | 40 (131) | 50 (164) | 60 (197) | 70 (230) | 80 (262) | 90 (295) | 100 (328) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Current | (A) | 3.00 | 3.00 | 3.00 | 2.06 | 1.57 | 1.26 | 1.06 | 0.91 | 0.80 | 0.71 | 0.64 |




IMPORTANT

- ***Be sure your power supply is in excess of that required by all the units on the network.***
- ***Be sure to choose a power supply with sufficient capacity, and take into account elements such as the amount of rush current during startup. Also, set up a fail-safe mechanism to protect against short circuits or other malfunctions.***
- ***Use a dedicated communication power supply for this unit. Do not connect any other equipment to it.***

NOTE

- **We recommend you consult with an authorized agent when preparing Device Net connections.**