Pro-face
for the best interface

CANopen マスタユニット
ハードウェアマニュアル
CANopen Master Unit
Hardware Manual

Thank you for purchasing the CANopen Master Unit (hereafter referred to as "this unit") for the Pro-face's LT3000 Series. This is an expansion unit intended to add Pro-face's LT3000 Series Graphic Logic Controller (hereafter referred to as "LT") to the CANopen network to enable communication with CANopen slaves.
Before actually beginning to use this product, please be sure to read through this manual and other related manuals to fully understand all the settings and functions.

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NOTICE

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2. The information contained in this manual is subject to change without notice.

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1. Essential Safety Precautions

⚠ DANGER

- An emergency stop circuit and an interlock circuit should be constructed outside of this unit. Constructing these circuits inside this unit may cause a runaway situation, system failure, or an accident due to unit failure.

- Systems using this unit should be designed so that output signals which could cause a serious accident are monitored from outside the unit.

- This unit is designed to be a general-purpose device for general industries, and is neither designed nor produced to be used with equipment or systems in potentially life-threatening conditions. If you are considering using this unit for special uses, including nuclear power control devices, electric power devices, aerospace equipment, medical life support equipment, or transportation vehicles, please contact your local distributor.

⚠ WARNING

- Whenever installing, dismantling, wiring, and conducting maintenance or inspections, be sure to disconnect power to this unit to prevent the possibility of electric shock or fire.

- Do not disassemble or remodel this unit, since it may lead to an electric shock or fire.

- Do not use this unit in an environment that contains flammable gases since an explosion may occur.

- Do not use this unit in an environment that is not specified in the manuals. Otherwise, an electric shock, fire, malfunction or other failure may occur.

- Because of the possibility of an electric shock or malfunction, do not touch any power terminals while the unit is operating.

⚠ CAUTION

- Communication cables or I/O signal lines must be wired separately from the main circuit (high-voltage, large-current) line, high-frequency lines such as inverter lines, and the power line. Otherwise, a malfunction may occur due to noise.

- This unit must be properly installed according to directions in the manuals. Improper installation may cause the unit to malfunction, or fail.

- This unit must be properly wired according to directions in the manuals. Improper wiring may cause a malfunction, failure or electric shock.

- Do not allow foreign substances, including chips, wire pieces, water, or liquids to enter inside this unit's case. Otherwise, a malfunction, failure, electric shock, or fire may occur.

- When disposing of this unit, handle it as an industrial waste.

■ To Avoid Damage

- Avoid storing or operating this unit in either direct sunlight or excessively dusty or dirty environments.

- Because this unit is a precision instrument, do not store or use it in locations where excessive shocks or vibration may occur.

- Avoid covering this unit's ventilation holes, or operating it in an environment that may cause it to overheat.

- Avoid operating this unit in locations where sudden temperature changes can cause condensation to form inside the unit.

- Do not use paint thinner or organic solvents to clean this unit.

2. Package Contents

(1) CANopen Master Unit (1)

(2) CANopen Master Unit Hardware Manual <This Manual> (1)

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

3. Supported Model

LT3000 Series

IMPORTANT

• The LT with a project file, GP-Pro EX Ver.2.2 or later, should be used. (Version of transfer tool should be GP-Pro EX Ver.2.2 or later.)

4. About the Manual

For detailed information on the LT3000 Series, refer to Pro-face's PDF manuals such as follows:

• LT3000 Series Hardware Manual

• Maintenance/Troubleshooting

The 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/

5. 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/

6. Installation Prerequisites for standards

The following unit is UL/c-UL listed products: (UL File No.E220851, UL File No.E210412)

Product Model No.	UL/c-UL Registration Model No.
CA8-CANLT-01	3610007-01

This product conforms to the following standards:

• UL508

Standard for Industrial Control Equipment

Industrial Control Equipment

• ANSI/ISA-12.12.01[*1]

Nonincendive Electrical Equipment for Use in Class I, Division2 Hazardous (classified) Locations.

• CSA-C22.2 No.142-M1987 (c-UL Approval)

Standard for Process Control Equipment

• CSA-C22.2 No.14-M95

Industrial Control Equipment

• CSA-C22.2 No.213-M1987 [*1]

Non-incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations

[*1] Rev.1 or later are compliant to this standard.

<Cautions>

Be aware of the following items when building the CANopen Master Unit into LT:

• If the LT is mounted so as to cool itself naturally, be sure to install it in a vertical panel. Also, it's recommended that the LT should be mounted at least 100 mm away from any other adjacent structures or machine parts. The temperature must be checked on the final product in which the LT is installed.

• For use with the following models only: Models 3481401-01, -02; 3583401-01, -02, -11, -12, -13, -14.

<Hazardous Locations - Compliance and Handling Cautions[1]>

(1) Suitable for use in Class I, Division 2, Groups A, B, C, and D Hazardous Locations, or Non-Hazardous Locations only.
(2) "WARNING: Explosion hazard-substitution of any components may impair suitability for Class I, Division 2".
(3) WARNING: Explosion hazard-when in hazardous locations, turn OFF power before replacing or wiring modules.
(4) "WARNING: Explosion hazard-do not disconnect equipment unless power has been switched off or the area is known to be Non-Hazardous".

[1] Rev.1 or later are compliant to this standard.
(SEE→) *Revision (4 page)*

7. CE Marking

This unit is CE marked product that conforms to EMC directives, EN55011 Class A and EN61000-6-2.

8. Revision

The revision number of the CANopen Master Unit is shown in the label affixed to the CANopen Master Unit. In the example shown below, an asterisk "*" is displayed in the position where "A" should be, meaning "Rev. A".

9. Contents

10. System Design

LT Interface
(1) AUX Unit Interface/Expansion Unit (EXT2)

CANopen Master Unit Interface
(2) Extension Connector
(3) CANopen Interface

*1 For supported models, refer to Pro-face's support site "Otasuke Pro!"
(http://www.pro-face.com/otasuke/).
You can connect to this site by clicking the GP-Pro EX's [Help(H)] menu-[Connect to
Support Site "Otasuke Pro!" (C)] command.

*2 Up to 63 CANopen slaves can be connected to the CANopen Master Unit's CANopen
I/F (master) with CANopen recommended transfer cables and connectors.
See '13.4 CANopen Communication Cable and Connectors" on page 11.

*3 When the CANopen Master Unit is used, the EX modules cannot be attached to the LT's
back together.

11. Part Names and Functions

Left Side

Front

Bottom

	Name	Description
A	LED	<table><tr><th>LED</th><th>Color</th><th>Status</th><th>Description</th></tr><tr><td rowspan="2">PWR</td><td rowspan="2">Green</td><td>ON</td><td>Power is on.</td></tr><tr><td>OFF</td><td>Power is OFF.</td></tr><tr><td rowspan="3">RUN</td><td rowspan="3">Green</td><td>Blinks once per second.</td><td>Communication STOPPED state.</td></tr><tr><td>Blinks three times and then blinks again three times after 1 second has elapsed.</td><td>Initialization is in progress.</td></tr><tr><td>ON</td><td>Normal Communication State.</td></tr><tr><td rowspan="5">ERR</td><td rowspan="5">Red</td><td>OFF</td><td>Normal Communication State.</td></tr><tr><td>Blinks once per second.</td><td>Communication data error</td></tr><tr><td>Blinks twice and then blinks again twice after 1 second has elapsed</td><td>Check the node ID and baud rates of the connection devices.</td></tr><tr><td>ON</td><td>The connected device is not connected to the bus. (BUS OFF)</td></tr><tr><td>Blinking</td><td>The node ID address or communication settings are invalid.</td></tr></table>
B	Latch Button	Bracket that secures the CANopen Master Unit to the LT.
C	Extension Connector	Connect the extension connector to the AUX unit interface/expansion unit (EXT2) at the rear side of the LT.
D	CANopen Interface	CANopen Slaves Interface

12. General Specifications

12.1 Electrical Specifications

<table>
<tr><td rowspan="4">Power Supply</td><td>Rated Voltage</td><td>DC5V (Supplied from LT)</td></tr>
<tr><td>Power Consumption</td><td>2.4W max.</td></tr>
<tr><td>Voltage Endurance</td><td>AC500V 20mA for 1 minute
(between charging and FG terminals)</td></tr>
<tr><td>Insulation Resistance</td><td>DC500V 10MΩ (min.)
(between charging and FG terminals)</td></tr>
</table>

12.2 Environmental Specifications

<table>
<tr><td rowspan="9">Physical</td><td>Surrounding Air Temperature</td><td>0°C to 50°C</td></tr>
<tr><td>Storage Temperature</td><td>-20°C to + 60°C</td></tr>
<tr><td>Ambient Humidity</td><td>10% RH to 90% RH
(Wet bulb temperature: 39°C max. - no condensation.)</td></tr>
<tr><td>Storage Humidity</td><td>10% RH to 90% RH
(Wet bulb temperature: 39°C max. - no condensation.)</td></tr>
<tr><td>Dust</td><td>$0.1mg/m^3$ or less
(non-conductive levels)</td></tr>
<tr><td>Pollution Degree</td><td>For use in Pollution Degree 2 environment</td></tr>
<tr><td>Atmosphere</td><td>Free of corrosive gas</td></tr>
<tr><td>Air Pressure Vibration Resistance (availment altitude)</td><td>800 to 1114hPa
(2000m above sea-level max.)</td></tr>
<tr><td rowspan="2">Mechanical</td><td>Vibration Resistance</td><td>Compliant with JIS B 3502, IEC61131-2
5 to 9Hz single-amplitude 3.5mm [0.14in.]
9 to 150Hz constant-accelerated velocity $9.8m/s^2$
X,Y,Z directions for 10 cycles (100 minutes)</td></tr>
<tr><td>Impact Resistance</td><td>Compliant with JIS B 3502, IEC61131-2
($147m/s^2$ to three times each X, Y, Z direction)</td></tr>
<tr><td rowspan="2">Electrical</td><td>Noise Immunity
(via noise simulator)</td><td>Noise Voltage: 1000 V_{P-P}
Pulse Duration: 1µs
Rise Time: 1ns</td></tr>
<tr><td>Electrostatic Discharge Immunity</td><td>Contact Electrical Discharge
6kV (complies with IEC61000-4-2 Level 3)</td></tr>
</table>

12.3 Structural Specifications

Installation Configuration	Connect the CANopen Master Unit directly to the rear side of the LT.
Cooling Method	Natural air circulation
Weight Approx.	500g max.
External Dimensions	W 23.5mm [0.93in.] x H 90mm [3.54in.] x D 71mm [2.80in.] (excluding projection and connector part)

13. CANopen Specifications

13.1 CANopen Interface

Connector (CANopen Master Unit side)		XM2C-0942-502L <OMRON Co.>	
Recommended Cable Connector (Cable side)		See '13.4 CANopen Communication Cable and Connectors" on page 11.	
Interfit Bracket		#4-40 (UNC)	
Pin Arrangement		Signal Name	Description
(see figure)	1	–	
	2	CAN_L	CAN-L bus line
	3	CAN_GND	CAN ground
	4	–	
	5	–	
	6	–	
	7	CAN_H	CAN-H bus line
	8	–	
	9	–	
(CANopen Master Unit Side)	Shell	FG	Frame Ground (Common with SG)

13.2 CANopen Data Transfer Settings

CANopen is the networking concept based on the international standard CAN. CANopen is defined as a uniform application layer by the DS301 specifications of the CiA (CAN in automation).

Communication Type	1: N	
Connection Method	Bus	
Transfer Method	CSMA/NBA. Half-duplex serial transmission.	
Transmission Speed/ Communication Distance	Baud rate[1]	Bus length
	1000kbps	20m
	800kbps	40m
	500kbps	100m
	250kbps (factory settings)	250m
	125kbps	500m
	50kbps	1000m
	[1] Set the baud rate with the software.	
No. of Nodes	63 nodes max. Bit variable input: 512 points[1], Bit variable output: 512 points[1], Integer variable input: 128 points[2], Integer variable output: 128 points[2].	

[1] When using GP-Pro EX under Ver.2.50, Bit variable enables to input/output 256 points.

[2] When using GP-Pro EX under Ver.2.50, Integer variable enables to input/output 64 points.

13.3 CANopen Cable Arrangement

The CANopen interface uses a DSUB 9-pin plug connector. The plug is assigned with the CAN_H, CAN_L and CAN_GND connections. CAN_H and CAN_L are two physically different bus levels. CAN_GND is the common reference potential.

L = Line Termination

NOTE

- The cable's resistance value should be 70mΩ/m or less.
- The above diagrams use the cable connector "XM2D-0901" by OMRON Co.

■ Line termination

To minimize the signal's reflections from the end of the cable, a line termination shall be placed close to both ends of the bus. Connect both ends of the twisted pair cable (CAN_H and CAN_L) to each LT. Use line termination whose resistance value is 120Ω (5%, 1/4W maximum).

13.4 CANopen Communication Cable and Connectors

NOTE

- CANopen communication cables and cable connectors are not supplied with the CANopen Master Unit. Users must prepare cables.

Recommended Cable Connector: CiA-recommended CANopen (CiA DR-303-1) - compatible DSUB 9-pin connector (DIN41652) .

CANopen Recommended Transfer Cable:CiA-recommended CANopen (CiA DR-303-1) - compatible twisted pair cables with shield.

NOTE

- Please use your own cables or cable connectors with your guarantee.

	Model No.	Manufacturer	Description
Recommended Cable Connector	XM2D-0901	OMRON Co.	DSUB 9-pin socket
	TSXCANKCDF180T	Schneider Electric	Straight connector with terminal selector switch
	TSXCANKCDF90T TSXCANKCDF90TP	Schneider Electric	Right-angled connector with terminal selector switch
	VS-09-BU-DSUB/ CAN	PHOENIX CONTACT	Connector with terminal block and terminal selector switch
	SUBCON-PLUS-CAN/ AX	PHOENIX CONTACT	Straight connector with terminal selector switch
	SUBCON-PLUS-CAN/ PG SUBCON-PLUS-CAN	PHOENIX CONTACT	Right-angled connector with terminal selector switch
CANopen Recommended Transfer Cable	TSX CAN CA50/TSX CAN CA100	Schneider Electric	Cable for CANopen (IEC60332-1) 50m/100m
	TSX CAN CB50/TSX CAN CB100	Schneider Electric	UL-approved cable for CANopen (IEC60332-2) 50m/100m

13.5 Wiring Precautions

• To help prevent noise and interference problems, separate all control, communication and power lines by placing them in separate ducts.

Duct for I/O Signal Lines   Duct for Control Lines   Duct for Power Lines

If different wires must be placed in the same duct, separate them with a grounded divider.

I/O Signal Lines   Control Lines   Power Lines
Grounded Separators
Duct (nonconducting resin/ plastic)
Ground

NOTE

• If the lines cannot be separated, use shielded lines and create a ground from the shield line.

IMPORTANT

• Use noise-reducing external wiring methods to increase overall system reliability.

• To prevent power surges or noise interference, use ducts to separate all DC I/O or current circuit wires from communication cables.

• To prevent malfunctions due to noise, communication cables must be wired separately from high-frequency lines and power lines such as high-voltage lines, high-current lines, and inverters.

14. Dimensions

14.1 Dimensions

Unit: mm [in.]

Top
71 [2.80]
6 [0.24]
6 [0.24]
90 [3.54]
4.5 [0.18]
69 [2.72]
Right Side

82 [3.23]
41.15 [1.62]
Front

Rear

Left Side

5.5 [0.22]
38 [1.50]
4 [0.16]
2 [0.08]
23.5 [0.93]
Bottom

■ Attachment on the back of the LT-3200 Series

Unit: mm [in.]

104.8 [4.13]

IMPORTANT

• All the above values are designed in case of cable bending. The dimensions given here are representative values depending on the type of connection cable used. Therefore, they are all intended for reference only.

■ Attachment on the back of the LT-3300 Series

Unit: mm [in.]

81.5 [3.21]

IMPORTANT

• All the above values are designed in case of cable bending. The dimensions given here are representative values depending on the type of connection cable used. Therefore, they are all intended for reference only.

15. Installation

15.1 Installation Requirements

Unit: mm [in.]

100 [3.94]
100 [3.94]
100 [3.94]

LT with CANopen Master Unit

100 [3.94]
100 [3.94]   100 [3.94]
100 [3.94]

15.2 Attachment / Removal

■ Attachment

Although the figure shows the procedure to attach the unit to the LT-3200 Series, the same procedure is used to attach the unit to the LT-3300 Series.

(1) Attach the first CANopen Master Unit to the rear side of the LT.
Peel off the seal for EXT2 on the rear side of the LT in advance. Pull out the latch button upward as shown in the figure. Insert the extension connector on the left side of the CANopen Master Unit into the AUX unit interface/ expansion unit (EXT2) of the LT.

(2) Pull out the latch button.

(1) Peel off the seal in advance.

(3) Insert the connector into the AUX unit interface/expansion unit (EXT2).

(2) Push down the latch buttons on the top to secure the CANopen Master Unit to the LT.

Push down the latch button.

IMPORTANT

• Make sure to fix the CANopen Master Unit to the LT securely using the latch buttons.

15

■ Removal

(1) To remove the CANopen Master Unit, push up the latch buttons to unlock it.

Pull out the latch button upward to unlock and remove the unit.

(LT-3200 Series)