YASKAWA

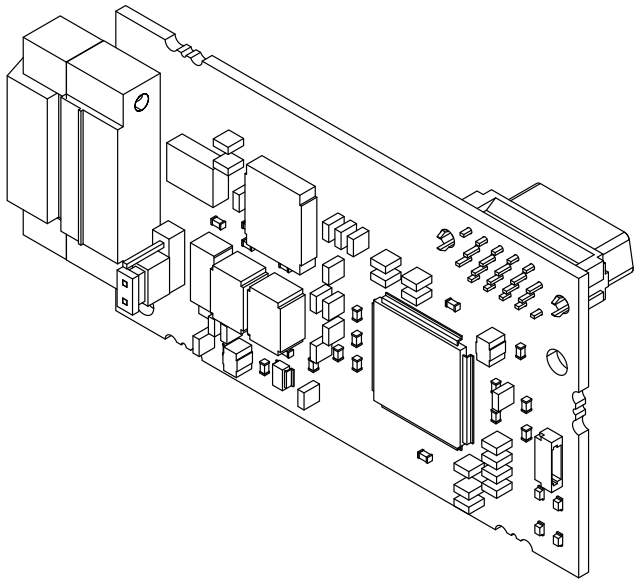
YASKAWA AC Drive Option

# CC-Link

## Technical Manual

Model SI-C3

To properly use the product, read this manual thoroughly and retain for easy reference, inspection, and maintenance.
Please keep this manual in your possession and ensure that it is delivered to the end user.



MANUAL NO. SIEP C730600 83E

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# Table of Contents

# 1 Preface and Safety

YASKAWA Electric supplies component parts for use in a wide variety of industrial applications. The selection and application of YASKAWA products remain the responsibility of the equipment designer or end user.

YASKAWA accepts no responsibility for the way its products are incorporated into the final system design. Under no circumstances should any YASKAWA product be incorporated into any product or design as the exclusive or sole safety control. Without exception, all controls should be designed to detect faults dynamically and fail safely under all circumstances. All products designed to incorporate a component part manufactured by YASKAWA must be supplied to the end user with appropriate warnings and instructions as to the safe use and operation of that part. Any warnings provided by YASKAWA must be promptly provided to the end user. YASKAWA offers an express warranty only as to the quality of its products in conforming to standards and specifications published in the manual. NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS OFFERED. YASKAWA assumes no liability for any personal injury, property damage, losses, or claims arising from misapplication of its products.

## ◆ Applicable Documentation

| Document | Description |
|---|---|
| YASKAWA AC Drive Option<br>CC-Link<br>Installation Manual | Read this manual first.<br>The manual provides information about wiring, settings, functions, and troubleshooting. The manual is packaged together with the product. |
| YASKAWA AC Drive Option<br>CC-Link<br>Technical Manual<br>MANUAL NO. SIEP C730600 83<br>(This book) | The technical manual contains detailed information about the option. Access one of these websites to obtain the technical manual:<br>U.S.: http://www.yaskawa.com<br>Europe: http://www.yaskawa.eu.com<br>Japan: http://www.e-mechatronics.com<br>Other areas: Check the back cover of these manuals.<br>For questions, contact Yaskawa or a Yaskawa representative. |
| YASKAWA AC Drive<br>Manuals | Refer to the drive manual for the drive that you will connect with the option.<br>Drive manuals contain basic installation and wiring information in addition to detailed parameter setting, fault diagnostic, and maintenance information.<br>The manuals also include important information about parameter settings and tuning the drive.<br>The Quick Start Guides are packaged with the drive.<br>The most recent versions of these manuals are available for download on our documentation websites:<br>U.S.: http://www.yaskawa.com<br>Europe: http://www.yaskawa.eu.com<br>Japan: http://www.e-mechatronics.com<br>Other areas: Check the back cover of these manuals.<br>For questions, contact Yaskawa or a Yaskawa representative. |

## ◆ Glossary

| Terms | Definition |
|---|---|
| Option | YASKAWA AC Drive Option SI-C3 CC-Link |
| Keypad | • HOA Operator<br>• LCD Operator<br>• LED Operator<br>• HOA Keypad<br>• LCD Keypad<br>• LED Keypad |
| Hex. (Example: 900 (Hex.)) | Identifies a unit for hexadecimal number format. |

## ◆ Registered Trademarks

- CC-Link is a registered trademark of CC-Link Partner Association.
- Trademarks are the property of their respective owners.

## ◆ Supplemental Safety Information

Read and understand this manual before installing, operating, or servicing this option. The option must be installed according to this manual and local codes.

The following conventions are used to indicate safety messages in this manual. Failure to heed these messages could result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

**DANGER** *This signal word identifies a hazard that will cause serious injury or death if you do not prevent it.*

**WARNING** *This signal word identifies a hazard that can cause death or serious injuries if you do not prevent it.*

**CAUTION** *This signal word identifies a hazardous situation, which, if not avoided, can cause minor or moderate injury.*

**NOTICE** *This signal word identifies a property damage message that is not related to personal injury.*

## ■ Section Safety

| General Precautions |
|---|
| • The diagrams in this section may include options and drives without covers or safety shields to illustrate details. Be sure to reinstall covers or shields before operating any devices. The option should be used according to the instructions described in this manual.<br>• The diagrams in this manual are provided as examples only and may not pertain to all products covered by this manual.<br>• The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual.<br>• Contact Yaskawa or a Yaskawa representative and provide the manual number shown on the front cover to order new copies of the manual. |

**DANGER** *Do not ignore the safety messages in this manual. If you ignore the safety messages in this manual, it will cause serious injury or death. The manufacturer is not responsible for injuries or damage to equipment.*

**WARNING** *Electrical Shock Hazard. Do not modify the drive or option circuitry. Failure to obey can cause serious injury or death, or cause damage to the drive or option and will void warranty. Yaskawa is not responsible for modifications of the product made by the user.*

**NOTICE** *Damage to Equipment. Do not use steam or other disinfectants to fumigate wood for packaging the drive. Use alternative methods, for example heat treatment, before you package the components. Gas from wood packaging fumigated with halogen disinfectants, for example fluorine, chlorine, bromine, iodine or DOP gas (phthalic acid ester), can cause damage to the drive.*

# 2 Overview

This option is designed for connecting a drive to a field network using the CC-Link protocol. This option conforms to CC-Link Ver.1.10.

Install the option/CC-Link option on a drive to perform the following functions from a CC-Link master device:

- Operate the drive
- Monitor the drive operation status
- Change drive parameter settings

CC-Link

**Figure 2.1 CC-Link Approved**

## ◆ Compatible Products

You can use the option with these products:

**Table 2.1 Compatible Products**

| Drive | Model | Software version *1 |
|---|---|---|
| A1000 | CIMR-AxxAxxxx | ≥ 1020 |
| D1000 *2 | CIMR-DxxAxxxx | ≥ 2005 (≥ 3013 for a 400 V class 630 kW unit) |
| U1000 | CIMR-UxxAxxxx | ≥ 1010 |
| | CIMR-UxxExxxx | |
| | CIMR-UxxPxxxx | |
| | CIMR-UxxWxxxx | |
| Z1000U | CIMR-ZxxAxxxx | ≥ 6110 |
| | CIMR-ZxxExxxx | |
| | CIMR-ZxxPxxxx | |
| | CIMR-ZxxWxxxx | |
| GA500 | CIPR-GA50xxxxx | ≥ 1010 |
| GA700 | CIPR-GA70xxxxx | ≥ 1010 |
| GA800 | CIPR-GA80xxxxx | ≥ 9010 |

*1 Refer to “PRG” on the drive nameplate for the software version number.
*2 Before you install the option on a YASKAWA Energy-Saving Unit D1000, make sure that the option software version is PRG: 0106 or later.

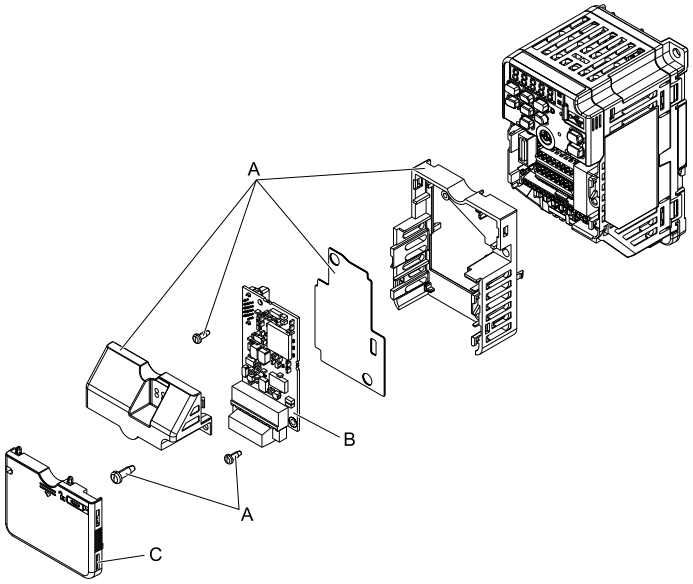
**Note:**

Refer to the option package labeling in the field designated “PRG (four digit number)” or the option labeling in the field designated “C/N (S + four digit number)” to identify the option software version.

## ◆ Install the Option on a GA500 Drive

An option card mounting kit is necessary to install the option on a GA500 drive. The option card mounting kit model is: JOHB-GA50. This kit is sold separately.

Refer to the option card mounting kit manual for more information about installation.




**A - Option card mounting kit components (sold separately)**
**B - Option**
**C - Drive front cover**

**Figure 2.2 Option Card Mounting Kit (JOHB-GA50)**

# 3 Receiving

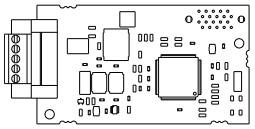
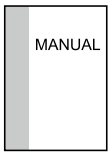
After you receive the option package, check these items.

- Make sure that there is no damage to the option and no parts are missing.
  The Yaskawa warranty does not cover damage from shipping. Immediately contact the shipping company if there is damage to the option.

  **NOTICE** *Damage to Equipment. Do not use damaged parts to connect the drive and the option. Failure to comply could damage the drive and option.*
- Make sure that the model number on the option nameplate and the model number on the purchase order are the same. Refer to Figure 4.1 for print location.
- Contact the distributor where you purchased the option or contact Yaskawa or a Yaskawa representative about any problems with the option.

## ◆ Option Package Contents

**Table 3.1 Contents of Package**

| Option Contents | | | Quantity |
|---|---|---|---|
| Option | |  | 1 |
| Ground wire *1 | |  | 1 |
| Screws (M3) | |  | 3 *2 |
| LED Labels | 1000-Series |  | 1 |
| | GA500, GA700, GA800 |  | 1 |
| Manuals | |  | 1 |

*1 GA700 and GA800 drives do not use the ground wire.
*2 Only two screws are necessary to install the option on GA700 and GA800 drives.

## ◆ Installation Tools

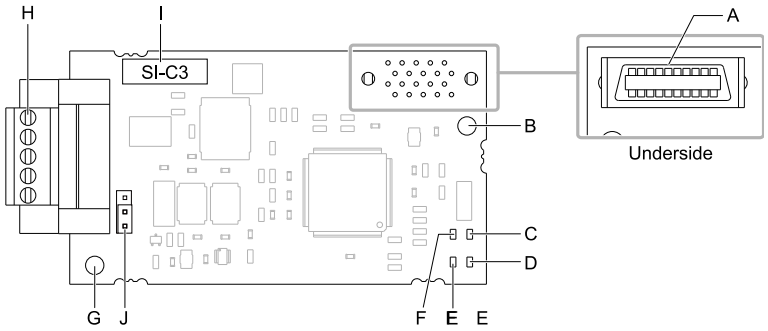
You can use these tools to install the option to the drive:

- Phillips screwdriver or slotted screwdriver *1
- A flat-blade screwdriver (blade depth: 0.4 mm (0.02 in.), width: 2.5 mm (0.1 in.)).
- A pair of diagonal cutting pliers.
- A small file or medium-grit sandpaper.

*1 Phillips screw sizes are different for different drive capacities. Prepare different screwdrivers for different screw sizes.

# 4 Option Components

## ◆ Option




**A - Connector (CN5)**
**B - Installation hole**
**C - LED (L.RUN)** *1*
**D - LED (SD)** *1*
**E - LED (RD)** *1*
**F - LED (L.ERR)** *1*
**G - Ground terminal (FE) and installation hole** *2*
**H - Communication connector CN1**
**I - Option model number**
**J - Grounding method switch (S1)** *3*

**Figure 4.1 Option**

*1 Refer to *Option LED Display on page 12* and *Option LED States on page 37* for more information about the LEDs.
*2 Connect the included ground wire during installation. The ground wire is not necessary for installations on GA700 and GA800 drives.
*3 The board code is available only for ETC740051 and later. Check the board code printed on the back of your option.

## ◆ Option Modular Connector

**Table 4.1 Option Terminal Descriptions**

| Terminal No. | Name | Description |
|---|---|---|
| 1 | DA | Communication Data + |
| 2 | DB | Communication Data – |
| 3 | DG | Signal Ground |
| 4 | SLD | Shield |
| 5 | SLD | Shield |


**Figure 4.2 Option Modular Connector (CN1)**

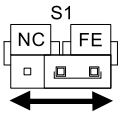
## ◆ Grounding Method Switch

The grounding method switch (S1) can be used to switch the grounding method for the option between common grounding and independent grounding.

Refer to *Set Grounding Method Switch (S1) on page 13* for more information about switching the grounding method.

**Note:**
The grounding method switch (S1) is available only when the board code is for ETC740051 and later. Check the the board code printed on the back of your option.

**Table 4.2 Details of Grounding Method Switch**

| Grounding Method Switch (S1) | Terminal Name | Function | Default |
|---|---|---|---|
|  | FE | Switches the grounding method of the option between common grounding and independent grounding. | FE (Common Grounding) |

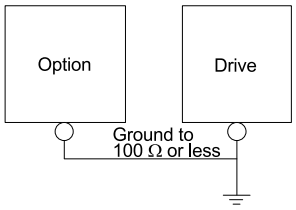



**Figure 4.3 Common Grounding**

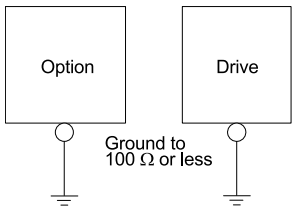



**Figure 4.4 Independent Grounding**

## ◆ Option LED Display


**A - 1000-Series** **B - GA500, GA700, GA800**

**Figure 4.5 Option LED Labels**

**Table 4.3 Option LED Display**

| LED Name | Indication | | Operating State | Description |
|---|---|---|---|---|
| | Color | Display | | |
| L.RUN | Green | ON | Normal operation | Receiving data normally |
| | | OFF | Timed out | • Timed out waiting to receive<br>• Logging onto the network<br>• During reset |
| L.ERR | Red | ON | CRC error | • CRC error<br>• Station address setting error (*F6-10 = 0 [CC-Link Node Address = 0]*) |
| | | OFF | During communications | • Normal communications<br>• During reset |
| SD | Red | ON | Sending data | Sending data<br>**Note:**<br>LED may appear to flash with slower baud rates. |
| | | OFF | No data transfer | • No data being sent<br>• During reset |
| RD | Red | ON | Detecting data received | Detecting data that was received<br>**Note:**<br>LED may appear to flash with slower baud rates. |
| | | OFF | Waiting for data | • Data not yet received<br>• During reset |

## ◆ Setting Station Address

Set *F6-10 [CC-Link Node Address]* to a station address (Range *1* to *64*) unique to the network. If you set *F6-10 = 0*, the L.ERR light will turn ON and an *AEr [Station Address Setting Error]* will occur.

# 5 Installation Procedure

## ◆ Section Safety

**⚠ DANGER** *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, measure for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.*

**⚠ WARNING** *Electrical Shock Hazard. Do not operate the drive when covers are missing. Replace covers and shields before you operate the drive. Use the drive only as specified by the instructions. Some figures in this section include drives without covers or safety shields to more clearly show the inside of the drive. If covers or safety shields are missing from the drive, it can cause serious injury or death.*

**⚠ WARNING** *Electrical Shock Hazard. Only let approved personnel install, wire, maintain, examine, replace parts, and repair the drive. If personnel are not approved, it can cause serious injury or death.*

**⚠ WARNING** *Electrical Shock Hazard. Do not remove covers or touch circuit boards while the drive is energized. If you touch the internal components of an energized drive, it can cause serious injury or death.*

**⚠ WARNING** *Electrical Shock Hazard. Do not use damaged wires, put too much force on the wiring, or cause damage to the wire insulation. Damaged wires can cause serious injury or death.*

**⚠ WARNING** *Fire Hazard. Tighten all terminal screws to the correct tightening torque. Connections that are too loose or too tight can cause incorrect operation and damage to the drive. Incorrect connections can also cause death or serious injury from fire.*

**NOTICE** *Damage to Equipment. When you touch the option, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*

**NOTICE** *Damage to Equipment. Do not de-energize the drive while the drive is outputting voltage. Incorrect equipment sequencing can cause damage to the drive.*

**NOTICE** *Do not operate a drive or connected equipment that has damaged or missing parts. You can cause damage to the drive and connected equipment.*

**NOTICE** *Use Yaskawa connection cables or recommended cables only. Incorrect cables can cause the drive or option to function incorrectly.*

**NOTICE** *Damage to Equipment. Correctly connect the connectors. Incorrect connections can cause malfunction or damage to the equipment.*

**NOTICE** *Damage to Equipment. Make sure that all connections are correct after you install the drive and connecting peripheral devices. Incorrect connections can cause damage to the option.*

## ◆ Set Grounding Method Switch (S1)

You can switch the grounding method of the option between common grounding and independent grounding by setting grounding method switch (S1).

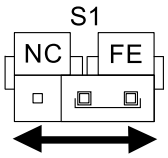



**Figure 5.1 Grounding Method Switch (S1)**

**Note:**

1. The grounding method switch (S1) is available for options that have board codes ETC740051 and later. Check the the board code printed on the back of your option.
2. When you set the grounding method switch (S1) to the "NC" side, you can set the FE terminal to NC (No Connection).

The procedure for switching the grounding method is shown below.

### ■ Common Grounding

Switch the grounding method switch (S1) to the “FE” side to use this option for common grounding.

### ■ Independent Grounding

Follow the procedure below when you use this option to switch to independent grounding.

1. Switch the grounding method switch (S1) to the “NC” side.
2. Wire a ground cable to terminal SLD on the terminal block (CN1).

**Note:**

If the SLD terminal is not grounded with the grounding method switch (S1) set to “NC”, external noise can make communications unstable.

## ◆ Procedures to Install and Wire Options on a Drive

Procedures to install and wire the option are different for different drive models.

Refer to the following table to check the procedures to install and wire the option on a drive.

**Table 5.1 Procedures to Install and Wire Options on a Drive**

| Drive | Procedures to Install and Wire Options on a Drive | Reference Page |
|---|---|---|
| A1000 | Procedure A | 14 |
| D1000 | Procedure A | 14 |
| U1000 | Procedure A | 14 |
| Z1000U | Procedure A | 14 |
| GA500 | *1 | - |
| GA700 | Procedure B | 17 |
| GA800 | Procedure B | 17 |

*1 To install the option on GA500 drives, use the option mounting kit (JOHB-GA50) and manual.

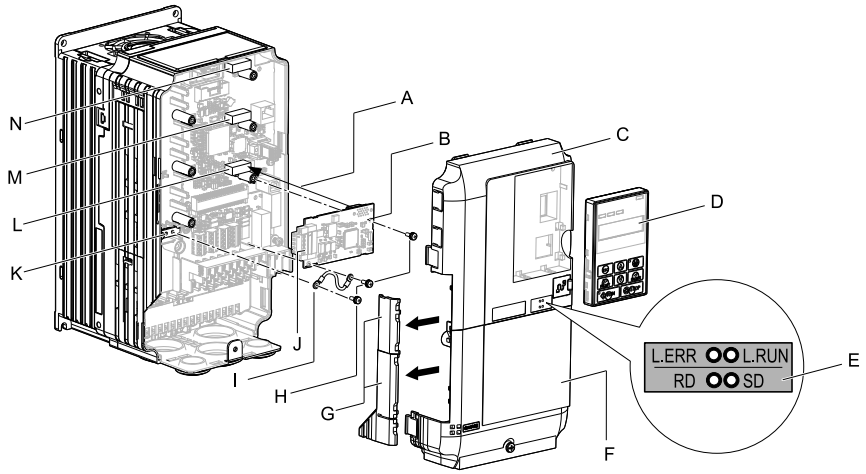
## ■ Procedure A

This section shows the procedure to install and wire the option on a 1000-series drive.

### Prepare the Drive for the Option

Before you install the option on a YASKAWA Energy-Saving Unit D1000, make sure that the option software version is PRG: 0106 or later.

Correctly wire the drive as specified by the manual packaged with the drive. Make sure that the drive functions correctly. Refer to the drive manuals for more information.




**A - Insertion point for CN5 connector**
**B - Option**
**C - Drive front cover**
**D - Keypad**
**E - LED label**
**F - Drive terminal cover**
**G - Removable tabs for wire routing**
**H - Included screws**
**I - Ground wire**
**J - Option modular connector CN1**
**K - Drive grounding terminal (FE)**
**L - Connector CN5-A**
**M - Connector CN5-B (Not available for communication option installation.)**
**N - Connector CN5-C (Not available for communication option installation.)**

**Figure 5.2 Drive Components with Option**

### Install the Option

Use this procedure to install the option.

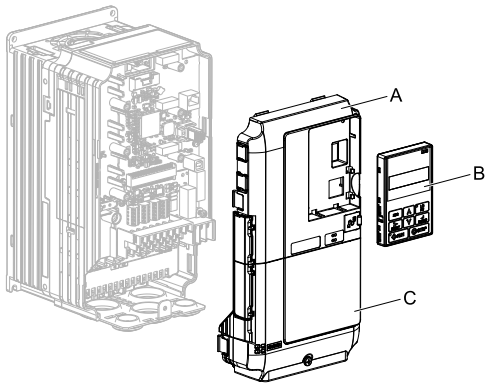
**DANGER** *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, measure for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.*

1. Remove the keypad (B), front cover (A), and terminal cover (C).

   Shut off power to the drive and wait for the time specified on the drive warning label at a minimum. Make sure that the charge indicator LED is unlit, then remove the keypad and front cover. Refer to the drive manuals for more information.

   You can only install this option into the CN5-A connector on the drive control board.

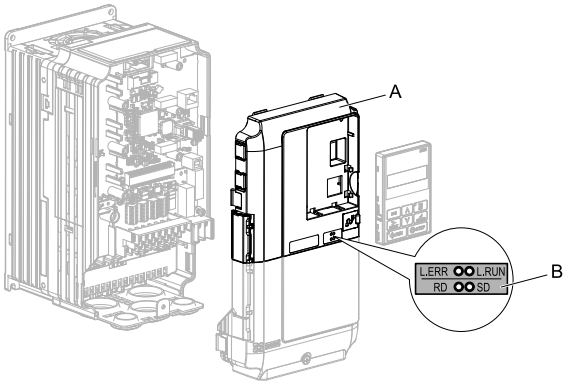
   **NOTICE** *Damage to Equipment. When you touch the option, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*




**A - Drive front cover**
**B - Keypad**
**C - Drive terminal cover**

**Figure 5.3 Remove the Keypad, Front Cover, and Terminal Cover**

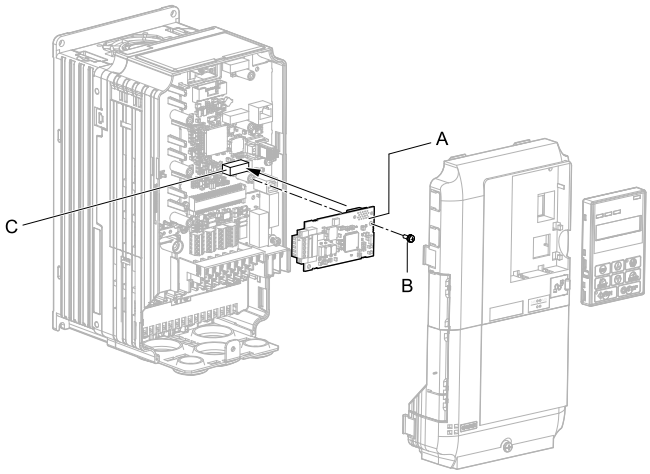
2. Put the LED label (B) in the correct position on the drive front cover (A).




**A - Drive front cover**
**B - LED label**

**Figure 5.4 Put the LED Label on the Drive Front Cover**

3. Install the option (A) into the CN5-A connector (C) on the drive and use the included screws (B) to put it in place.



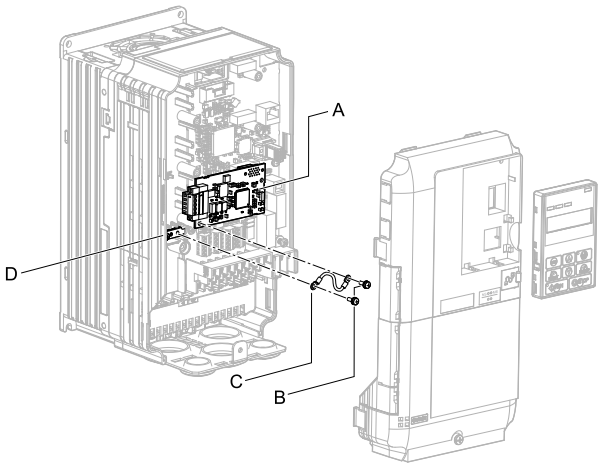

**A - Option**
**B - Included screw**
**C - Connector CN5-A**

**Figure 5.5 Install the Option**

4. Use one of the remaining included screws (B) to connect one end of the ground wire (C) to the ground terminal (D). Use the last remaining included screw (B) to connect the other end of the ground wire (C) to the remaining ground terminal and installation hole on the option (A).

   Tighten the screws to a correct tightening torque:

   • 0.5 N·m to 0.6 N·m (4.4 lbf·in to 5.3 lbf·in)




**A - Option**
**B - Included screws**
**C - Ground wire**
**D - Drive grounding terminal (FE)**

**Figure 5.6 Connect the Ground Wire**

**Note:**
The drive has only two ground terminal screw holes. When you connect three options, two options will share one ground terminal.

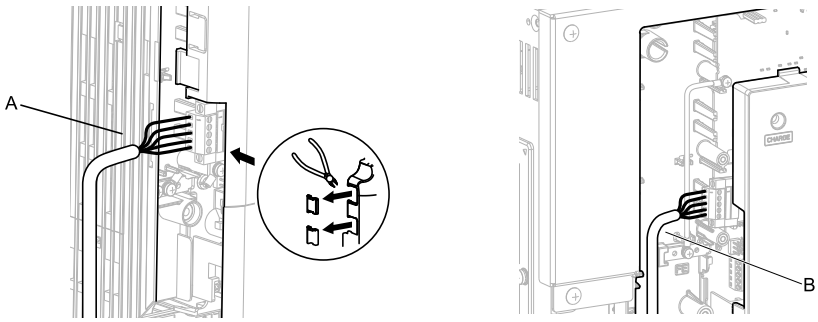
5. Route the option wiring.

   Procedures to wire the option are different for different drivel models.

   - You can route the option wiring through openings on the front cover of some models. Remove the perforated tabs on the left side of the front cover as shown in Figure 5.7-A to create the necessary openings on these models. To prevent damage to the cable from the cut end, treat the cut surface with sandpaper.
   - Route the option wiring inside the enclosure as shown in Figure 5.7-B.

   Refer to the drive manuals for more information.

**Note:**
- Isolate communication cables from main circuit wiring and other electrical and power lines.
- Connect the terminator (model No.: JEPMC-W6022-E) to the option modular connector (CN1) on the end drive of the communication lines.




**A - Route wires through the openings provided on the left side of the front cover.** *1
**B - Use the open space provided inside the drive to route option wiring.**

**Figure 5.7 Wire Routing Examples**

*1 If there is wiring outside the enclosure, the drive will not meet Enclosed wall-mounted type (IP20/UL Type 1) requirements.

6. Firmly connect the CC-Link communication cable to the option modular connector (CN1).

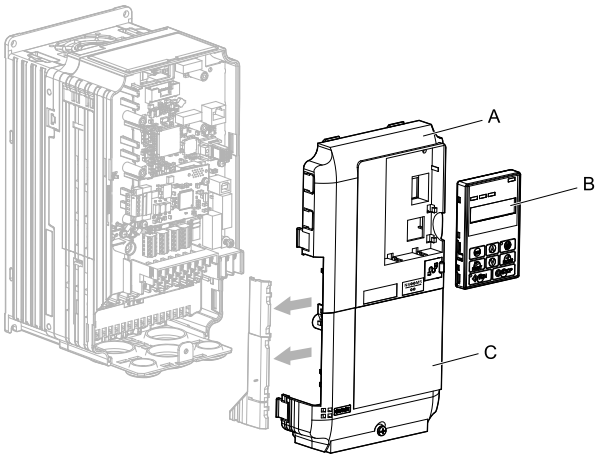
   Isolate communication cables from main circuit wiring and other electrical and power lines. Make sure that you firmly connect the cable end. (Refer to *Option Connection Diagram on page 21*). Refer to *Communication Cable Specifications on page 21* for more information.

**Note:**
Do not connect or disconnect the communication cable while the drive is powered up or while the drive is in operation. Failure to obey can cause a static discharge, which will cause the option to stop working correctly. Cycle power on the drive and option to start using the option again.

7. Reattach the front cover (A), terminal cover (C), and keypad (B).

   Refer to the drive manuals for more information.

**NOTICE** *Do not pinch cables between the front covers and the drive. Failure to comply could cause erroneous operation.*




**A - Drive front cover**
**B - Keypad**
**C - Drive terminal cover**

**Figure 5.8 Replace the Front Cover, Terminal Cover, and Keypad**

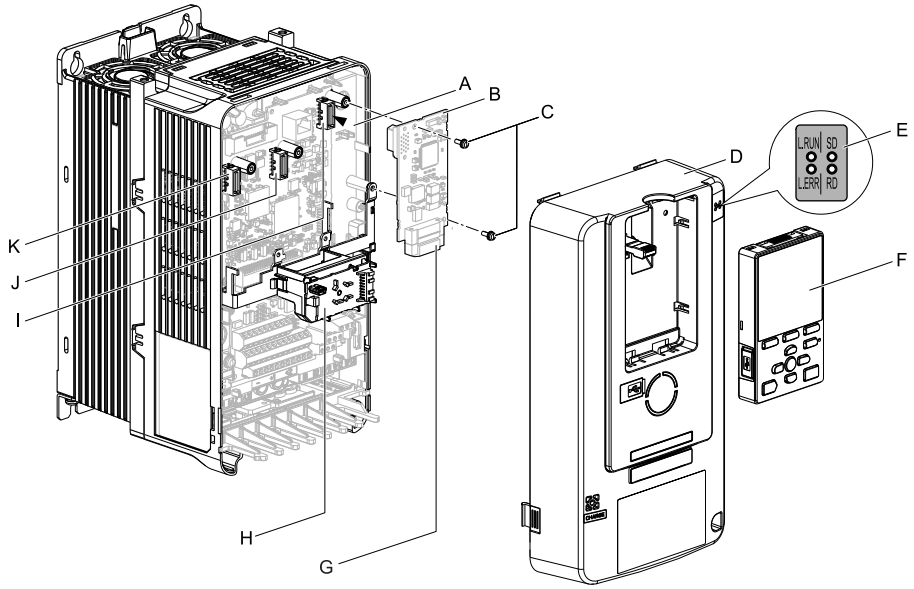
8. Set drive parameters in *Related Drive Parameters on page 23* for correct option performance.

## ■ Procedure B

This section shows the procedure to install and wire the option on a GA700 or GA800 drive.

### Prepare the Drive for the Option

Correctly wire the drive as specified by the manual packaged with the drive. Make sure that the drive functions correctly. Refer to the drive manuals for more information.




**A - Insertion point for CN5 connector**
**B - Option**
**C - Included screws**
**D - Drive front cover**
**E - LED label**
**F - Keypad**
**G - Option modular connector CN1**
**H - LED Status Ring board**
**I - Connector CN5-A**
**J - Connector CN5-B (Not available for communication option installation.)**
**K - Connector CN5-C (Not available for communication option installation.)**

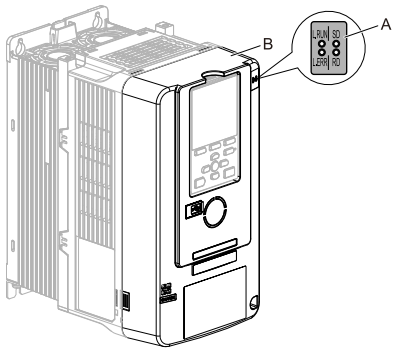
**Figure 5.9 Drive Components with Option**

### Install the Option

Use this procedure to install the option.

**DANGER** *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, measure for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.*

1. Put the LED label (A) in the correct position on the drive front cover (B).




**A - LED label** **B - Drive front cover**

**Figure 5.10 Put the LED Label on the Drive Front Cover**

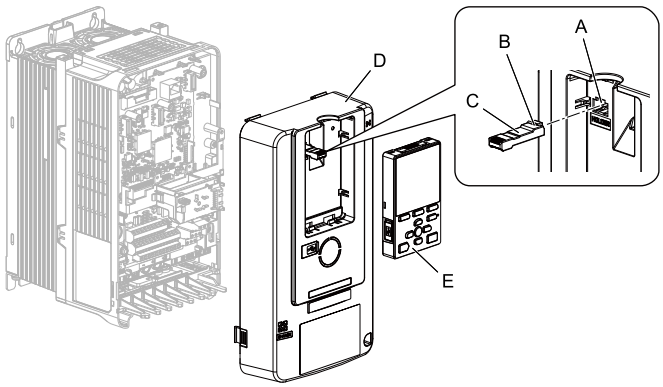
2. Remove the keypad (E) and front cover (D).

   Shut off power to the drive and wait for the time specified on the drive warning label at a minimum. Make sure that the charge indicator LED is unlit, then remove the keypad and front cover. Refer to the drive manuals for more information.

   You can only install this option into the CN5-A connector on the drive control board.

   **NOTICE** *Damage to Equipment. When you touch the option, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*

**Note:**
Remove the keypad, then move the keypad connector to the holder on the drive, then remove the front cover.



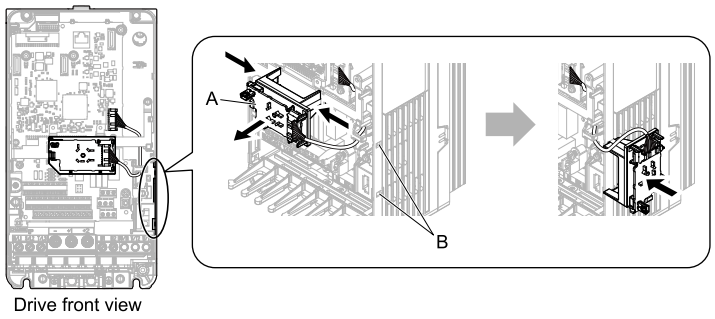

**A - Holder** **D - Drive front cover**
**B - Keypad connector tab** **E - Keypad**
**C - Keypad connector**

**Figure 5.11 Remove the Front Cover and Keypad**

3. Carefully remove the LED Status Ring board (A) and put it in the temporary placement holes (B) on the right side of the drive.

   Refer to the drive manuals for more information.

   **NOTICE** *Do not remove the LED Status Ring board cable connector. If you disconnect the LED Status Ring board, it can cause incorrect operation and damage to the drive.*




**A - LED Status Ring board** **B - Temporary placement holes**

**Figure 5.12 Remove the LED Status Ring Board**

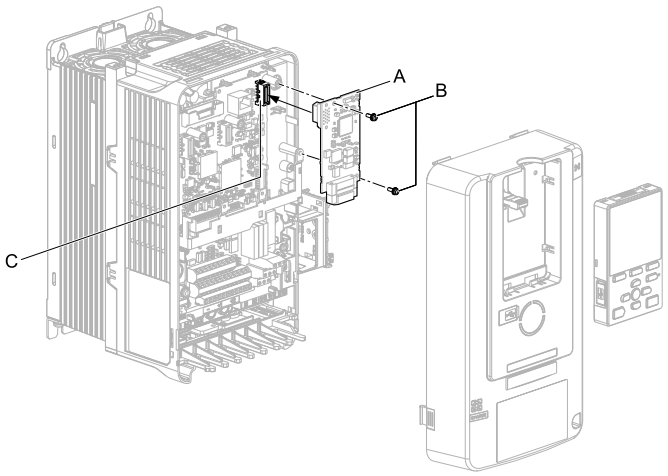
4. Install the option (A) into the CN5-A connector (C) on the drive and use the included screws (B) to put it in place.

   Tighten the screws to a correct tightening torque:

   • 0.5 N·m to 0.6 N·m (4.4 lbf·in to 5.3 lbf·in)

**Note:**

1. A ground wire is not necessary. Do not use the ground wire.
2. Only two screws are necessary to install the option on GA700 and GA800 drives.
3. The option package contains three screws and one ground wire.




**A - Option** **C - Connector CN5-A**
**B - Included screws**

**Figure 5.13 Install the Option**

5. Firmly connect the CC-Link communication cable to the option modular connector (CN1).

   Isolate communication cables from main circuit wiring and other electrical and power lines. Make sure that you firmly connect the cable end. (Refer to *Option Connection Diagram on page 21*). Refer to *Communication Cable Specifications on page 21* for more information.

   **NOTICE** *Damage to Equipment. When you touch the option, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*

6. Reattach the LED Status Ring board (E), front cover (C), and keypad (D).

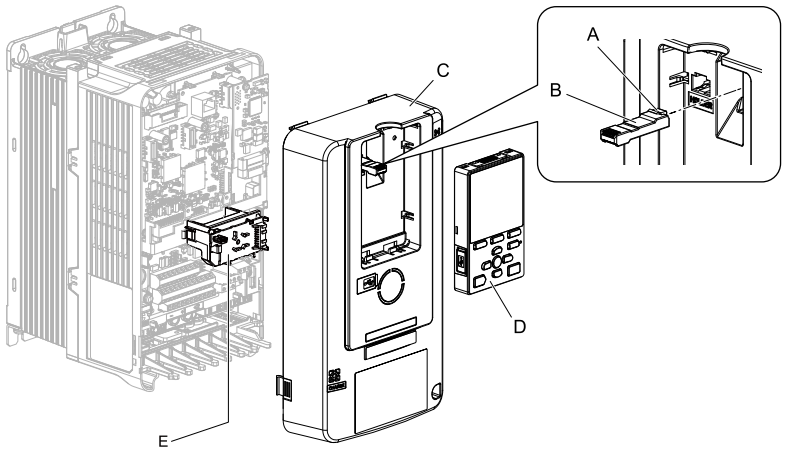
   Refer to the drive manuals for more information.

   **NOTICE** *Do not pinch cables between the front cover or the LED Status Ring board and the drive. Failure to comply could cause erroneous operation.*

**Note:**

• Replace the keypad connector then install the keypad.

• Put the keypad connector tab into the holder when you install the keypad connector to the holder.




**A - Keypad connector tab**
**B - Keypad connector**
**C - Drive front cover**
**D - Keypad**
**E - LED Status Ring board**

**Figure 5.14 Install the LED Status Ring board, Front Cover, and Keypad**

7. Set drive parameters in *Related Drive Parameters on page 23* for correct option performance.

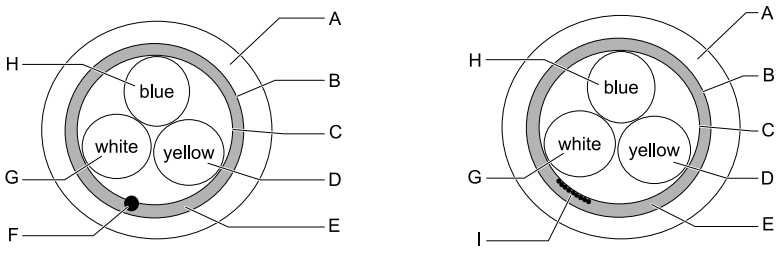
## ◆ Communication Cable Specifications

Use only CC-Link dedicated communication cable. The Yaskawa warranty does not cover other cable types. For more information on cables, refer to the CC-Link website at http://www.cc-link.org/.

Yaskawa recommends using CC-Link cables suitable for the conditions listed in the following table.

**Table 5.2 Communication Cable Requirements**

| Item | | | Specifications |
|---|---|---|---|
| Cable Type | | | triple-core shielded twisted-pair cable |
| External Diameter | | | 8.0 mm maximum |
| Drain Wire | | | 20 lines/0.18 mm or 24 lines/0.18 mm |
| Electrical Characteristics | Conductor Resistance (20°C (68°F)) | | 37.8 Ω/km |
| | Insulation Resistance | | 10000 MΩ·km or greater |
| | Voltage Tolerance | | 500 Vdc, 60 s |
| | Capacitance (1 kHz) | | 60 nF/km maximum |
| | Impedance | 1 MHz | 110 ±15 Ω |
| | | 5 MHz | 110 ±6 Ω |
| | Attenuation (20°C (68° F)) | 1 MHz | 1.6 dB/100 m maximum |
| | | 5 MHz | 3.5 dB/100 m maximum |




**A - Sheath**
**B - Shield**
**C - Aluminum tape**
**D - DG (yellow)**
**E - Ground**
**F - Drain (solid/non-stranded)**
**G - DB (white)**
**H - DA (blue)**
**I - Drain (stranded wire)**

**Figure 5.15 CC-Link Cable Diagram**

## ◆ Option Connection Diagram

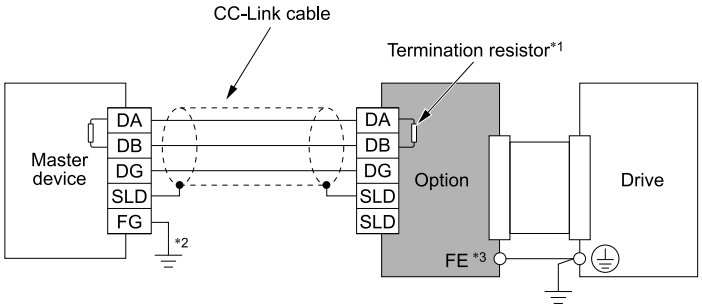



**Figure 5.16 Using a Single Drive**

*1 The option must be configured with a termination resistor. Refer to *Termination Resistor Connection on page 22* for more information.
*2 Make sure that the FG terminal on the master drive is grounded properly.
*3 Connect the included ground wire for installations on 1000-series drives and GA500 drives.
The ground wire is not necessary for installation on GA700 or GA800 drives.

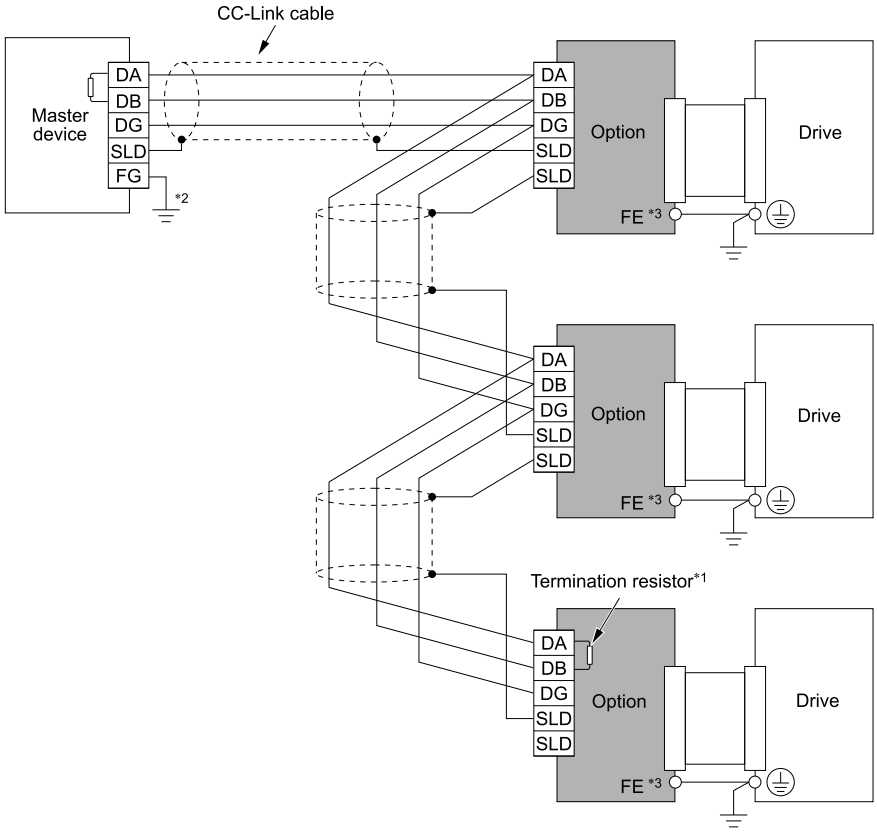



**Figure 5.17 Using Multiple Drives**

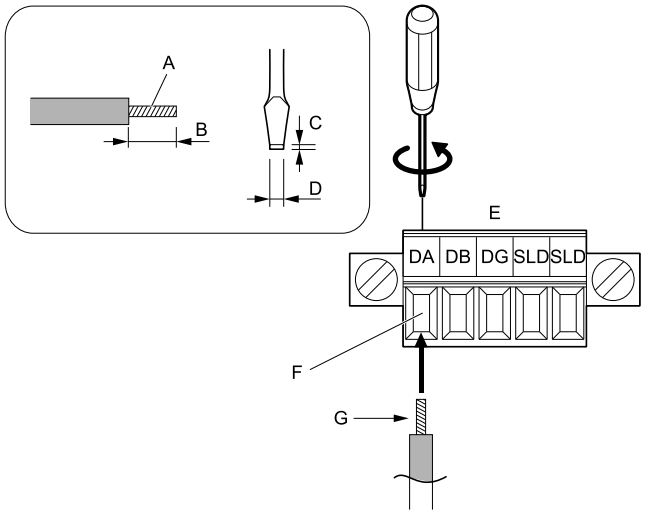
*1 The option must be configured with a termination resistor. Refer to *Termination Resistor Connection on page 22* for more information.
*2 Make sure that the FG terminal on the master drive is grounded properly.
*3 Connect the included ground wire for installations on 1000-series drives and GA500 drives.
The ground wire is not necessary for installation on GA700 or GA800 drives.

## ◆ Communication Cable Specifications

**⚠ WARNING** *Fire Hazard. Tighten all terminal screws to the correct tightening torque. Connections that are too loose or too tight can cause incorrect operation and damage to the drive. Incorrect connections can also cause death or serious injury from fire.*

Route the option wiring as specified by these procedures.

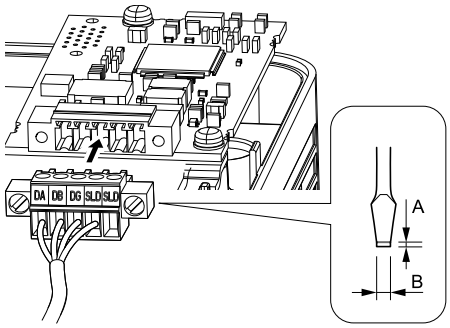
1. Connect the communication cables to the option modular connector CN1 as shown in Figure 5.18.




**A - Pull back the shielding and lightly twist the end with your fingers to keep the ends from fraying.**
**B - About 5.5 mm (when not using terminal extensions)**
**C - Blade thickness of 0.4 mm or less**
**D - Blade width of 2.5 mm or less**
**E - Option modular connector CN1**
**F - CC-Link comm cable (do not soldered ends)**
**G - Loosen the screws and insert the cable into the opening on the terminal block**

**Figure 5.18 Connect Cable Wiring**

2. Make sure that you correctly connect the wires and that you did not accidentally pinch wire insulation in the option modular connector CN1.
   Trim any frayed wires.
3. Connect the communication cables to the option modular connector CN1 as shown in Figure 5.19.
   After the option modular connector CN1 is fully attached to the option, tighten the screws on the left and right sides of the option modular connector CN1.
   Tighten the screws to a correct tightening torque:
   - 0.22 N·m to 0.25 N·m (1.95 lbf·in to 2.21 lbf·in)




**A - Blade depth of 0.6 mm or less**
**B - Blade width of 3.5 mm or less**

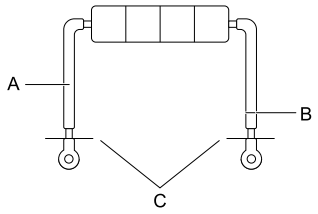
**Figure 5.19 Option Modular Connector CN1 Installation (Ex. GA700)**

## ◆ Termination Resistor Connection

When the CC-Link Option is the last station connected in a CC-Link network, the termination resistor needs to be installed on that CC-Link Option.

Cut the ring lugs from the termination resistor leads, and then loosen the DA and DB terminals and insert the termination resistor between terminals DA and DB as shown.

**Note:**
Use the built-in termination resistor from the master if available, otherwise procure a standard-market resistor of 110 Ω, ±5% (1/2 W).




**A - Jumper**
**B - Cut here**
**C - Cut (removes approximately 5.5 mm (0.21 in) of the covering at the tip.)**

**Figure 5.20 Termination Resistor**

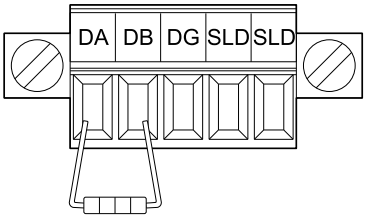



**Figure 5.21 Termination Resistor Wiring**

# 6 Related Drive Parameters

These parameters set the drive for operation with the option. Make sure that the parameter settings in this table are correct before you start network communications.

**Note:**
Hex.: MEMOBUS addresses that you can use to change parameters over network communication are represented in hexadecimal numbers.

| No. (Hex.) | Name | Description | Default (Range) |
|---|---|---|---|
| b1-01 (0180) | Frequency Reference Selection 1 (For Drive) | Selects the input method for frequency reference.<br>0 : Keypad<br>1 : Analog Input<br>2 : MEMOBUS/Modbus Communications<br>3 : Option PCB<br>4 : Pulse Train Input<br>**Note:**<br>• Set *b1-02 = 3 [Run Command Selection 1 = Option PCB]* to use the master device and serial communications to start and stop the drive. Set *b1-01 = 3* to use the master device to control the frequency reference of the drive.<br>• The default setting is different for different drives. Refer to the instruction manual of your specific drive for more information. | 1<br>(0 - 4) |
| b1-02 (0181) | Run Command Selection 1 (For Drive, D1000) | Selects the input method for the Run command.<br>0 : Keypad<br>1 : Digital Input<br>2 : MEMOBUS/Modbus Communications<br>3 : Option PCB<br>**Note:**<br>Set *b1-02 = 3* to start and stop the drive with the master device using serial communications. Set *b1-01 = 3 [Frequency Reference Selection 1 = Option PCB]* to use the master device to control the frequency reference of the drive. | 1<br>(0 - 3) |
| b1-18 (0179) | Voltage Reference Source (For D1000) | Selects the voltage reference input source.<br>0 : Keypad - RUN and STOP keys<br>1 : Analog Input<br>2 : Memobus/Modbus Communications<br>3 : Option<br>7 : Input Voltage Based Control 1<br>8 : Input Voltage Based Control 2<br>**Note:**<br>• On D1000, to use the CC-Link master device as the voltage reference, set *b1-18 = 3*. | 8<br>(0 - 3, 7, 8) |
| F6-01 (03A2) | Communication Error Selection (For Drive) | Selects drive response when the drive detects a *bUS [Option Communication Error]* error during communications with the option.<br>0 : Ramp to Stop<br>1 : Coast to Stop<br>2 : Fast Stop (Use C1-09)<br>3 : Alarm Only<br>4 : Alarm - Run at d1-04 | 1<br>(0 - 5) |

| No. (Hex.) | Name | Description | Default (Range) |
|---|---|---|---|
| | | 5 : Alarm - Ramp Stop<br>**Note:**<br>• When you set this parameter to *3* or *4*, the drive will continue operation after it detects a fault. Separately prepare safety protection equipment and systems, for example fast stop switches.<br>• Refer to the drive manual to know if settings *4* and *5* are available. Settings 4 and 5 are available in A1000 software versions PRG: 1021 and later.<br>• The setting range for 1000-Series drives is different for different software versions. Refer to the instruction manual of your specific drive for more information. | |
| F6-01<br>(03A2) | Communication Error Selection<br>(For D1000) | Selects drive response when the drive detects a *bUS [Option Communication Error]* error during communications with the option.<br>1 : Coast to Stop<br>3 : Alarm Only | 1<br>(1, 3) |
| F6-02<br>(03A3) | Comm External Fault (EF0) Detect<br>(For Drive, D1000) | Selects the conditions at which *EF0 [Option Card External Fault]* is detected.<br>0 : Always Detected<br>1 : Detected during RUN Only | 0<br>(0, 1) |
| F6-03<br>(03A4) | Comm External Fault (EF0) Select<br>(For Drive) | Selects the operation of the drive when *EF0 [Option Card External Fault]* is detected.<br>0 : Ramp to Stop<br>1 : Coast to Stop<br>2 : Fast Stop (Use C1-09)<br>3 : Alarm Only<br>**Note:**<br>When you set this parameter to *3*, the drive will continue operation after it detects a fault. Separately prepare safety protection equipment and systems, for example fast stop switches. | 1<br>(0 - 3) |
| F6-03<br>(03A4) | Comm External Fault (EF0) Select<br>(For D1000) | Selects the operation of the drive when *EF0 [Option Card External Fault]* is detected.<br>1 : Coast to Stop<br>3 : Alarm Only | 1<br>(1, 3) |
| F6-04<br>(03A5) | bUS Error Detection Time<br>(For Drive, D1000) | Sets the delay time for the drive to detect *bUS [Option Communication Error]*.<br>**Note:**<br>• The default setting is 2.0 s, but this default setting will automatically be changed to 0.0 s when the CC-Link option is connected.<br>• When using GA500, the maximum value of *F6-04* is 12.0 s. | 0.0 s<br>(0.0 s - 5.0 s) |
| F6-06<br>(03A7) | Torque Reference/Limit by Comm<br>(For Drive) | Selects whether to enable or disable the torque reference and torque limit received from the communication option.<br>0 : Disabled<br>1 : Enabled<br>**Note:**<br>• Control method availability of this parameter is different for different product series.<br>–1000-Series<br>Parameter is available in *A1-02 = 3, 6, 7 [Control Method Selection = Closed Loop Vector, PM Advanced Open Loop Vector, PM Closed Loop Vector]*.<br>Enabling this parameter allows *d5-01 [Torque Control Selection]* to determine whether the value is read as the Torque Limit value or the Torque Reference value.<br>*d5-01 = 0 [Speed Control]*: Torque Limit<br>*d5-01 = 1 [Torque Control]*: Torque Reference<br>In *A1-02 = 6*, this value is read as the Torque Limit.<br>–GA500<br>Parameter is available in *A1-02 = 2, 6, 8 [Control Method Selection = Open Loop Vector, PM Advanced Open Loop Vector, EZ Vector Control]*. This value is read as the Torque Limit.<br>–GA700, GA800<br>Parameter is available in *A1-02 = 2, 3, 4, 6, 7, 8 [Control Method Selection = Open Loop Vector, Closed Loop Vector, Advanced Open Loop Vector, PM Advanced Open Loop Vector, PM Closed Loop Vector, EZ Vector Control]*.<br>Enabling this parameter allows *d5-01 [Torque Control Selection]* to determine whether the value is read as the Torque Limit value or the Torque Reference value.<br>*d5-01 = 0 [Speed Control]*: Torque Limit<br>*d5-01 = 1 [Torque Control]*: Torque Reference<br>In *A1-02 = 2, 8*, this value is read as the Torque Limit.<br>• If the PLC does not supply a torque reference or torque limit when *F6-06 = 1*, the motor cannot rotate. | 0<br>(0, 1) |
| F6-06<br>(03A7) | Torque Reference/Limit by communication option<br>(For D1000) | Enables and disables the torque reference and torque limit received from the communication option.<br>0 : Disabled<br>1 : Enabled | 0<br>(0, 1) |
| F6-07<br>(03A8) | Multi-Step Ref @ NetRef/ ComRef<br>(For Drive) | 0 : Disable Multi-Step References<br>1 : Enable Multi-Step References<br>**Note:**<br>Default setting is *1* for GA500. | 0<br>(0, 1) |
| F6-08<br>(036A) | Comm Parameter Reset @Initialize<br>(For Drive, D1000) | Selects whether communication-related parameters *F6-xx and F7-xx* are set back to original default values when you use parameter *A1-03 [Initialize Parameters]* to initialize the drive.<br>0 : No Reset - Parameters Retained<br>1 : Reset Back to Factory Default<br>**Note:**<br>The drive will not change this setting value when you set *F6-08 = 1* and use *A1-03* to initialize the drive. | 0<br>(0, 1) |

| No. (Hex.) | Name | Description | Default (Range) |
|---|---|---|---|
| F6-10 (03B6) | CC-Link Node Address (For Drive, D1000) | Sets the node address for CC-Link communication. Change the parameter then cycle power on the drive.<br>**Note:**<br>• All station addresses must be unique. Do not set this parameter to *0*. Incorrect parameter settings will cause *AEr [Station Address Setting Error]* errors and the L.ERR LED on the option will illuminate.<br>• You can connect up to 42 nodes when all connections are drives. Follow these rules to connect devices that are not drives:<br>– {(1 × a) + (2 × b) + (3 × c) + (4 × d)} ≤ 64<br>a : number of drives that occupy 1 node<br>b : number of drives that occupy 2 nodes<br>c : number of drives that occupy 3 nodes<br>d : number of drives that occupy 4 nodes<br>– {(16 × A) + (54 × B) + (88 × C)} ≤ 2304<br>A : number of remote I/O nodes (64 max)<br>B : number of remote device nodes (42 max)<br>C : number of local nodes (26 max) | 0 (0 - 64) |
| F6-11 (03B7) | CC-Link Communication Speed (For Drive, D1000) | Sets the communication speed for CC-Link communication. Change the parameter then cycle power on the drive.<br>0 : 156 kbps<br>1 : 625 kbps<br>2 : 2.5 Mbps<br>3 : 5 Mbps<br>4 : 10 Mbps | 0 (0 - 4) |
| F6-14 (03BB) | BUS Error Auto Reset (For Drive, D1000) | Sets the automatic reset function for *bUS [Option Communication Errors]*.<br>0 : Disabled<br>1 : Enabled | 0 (0, 1) |

# 7 Basic Functions

This product is a communication interface to operate, adjust, and monitor the drive as CC-Link remote station with a PLC program. You can use cycle transmission of bit data and word data, which enables high-speed communication at up to 10 Mbps.

This section explains the basic functions to operate using a PLC by CC-Link communication function.

**Note:**

First, set the parameters to operate the drive using a PLC . Refer to *Related Drive Parameters on page 23* for more information.

## ◆ Changing the Reference Source

You can use a PLC to operate/stop the drive and set/change the operating frequency for the drive.

To do these operations from the PLC, you must first set the Run command source, frequency reference source, or voltage reference source for the drive on the PLC side.

### ■ How to Change the Reference Source

You can use one of these methods to change the reference source:

- Using Parameters to Select the Command/Reference Source
- Using the External Terminals to Change the Command/Reference Source
- Using a PLC as the Command/Reference Source

### ■ Using Parameters to Select the Command/Reference Source

#### Selecting the Run Command Source

Set *b1-02 = 3 [Run Command Selection 1 = Option PCB]*.

#### Selecting the Frequency Reference Source

Set *b1-01 = 3 [Frequency Reference Selection 1 = Option PCB]*.

#### Selecting the Voltage Reference Source

Set *b1-18 = 3 [Voltage Reference Source = Option PCB]*.

### ■ Using the External Terminals to Switch the Command/Reference Source

#### Selecting the Run Command Source 2

Set *b1-16 = 3 [Run Command Selection 2 = Option PCB]*.

### Selecting the Source of the Frequency Reference 2

Set *b1-15 = 3 [Frequency Reference Selection 2 = Option PCB]*.

### Selecting the Run Command and Frequency Reference Source

Set one of the multi-function input terminals S1 through S8 to supply auxiliary reference (*H1-01 to H1-08 = 2 [Terminal S1 Function Selection to Terminal S8 Function Selection = External Reference 1/2 Selection]*) to enable the frequency reference set to *b1-15* and the Run command source set to *b1-16*.

## ■ Using a PLC as the Command/Reference Source

### Using Parameters to Change Sources

**Note:**

When you set *H1-xx = 2*, parameters *b1-15 [Frequency Reference Selection 2]* and *b1-16 [Run Command Selection 2]* are enabled when that terminal is switched ON.

- Run Command Source Selection
  Send write data "3" for command code 2181 (Hex.) to the drive or D1000.
  The setting for parameter *b1-02 [Run Command Selection 1]* changes to *3 [Option PCB]*.
- Frequency Reference Source Selection
  Send write data "3" for command code 2180 (Hex.) to the drive.
  The setting for parameter *b1-01* changes to *3 [Option PCB]*.
- Voltage Reference Source Selection
  Send write data "3" for command code 2179 (Hex.) to D1000.
  The setting for parameter *b1-18* changes to *3 [Option PCB]*.

### Using NetRef and NetCtrl

It is also possible to change the source of the frequency reference and the Run command using remote register $RW_{W2}$ command code 00FB (Hex.). If the power is shut off, however, the drive will use the original setting for the command/reference source when power is applied again. Only use this method when briefly switching between command/reference sources.

## ■ Command/Reference Source Priority Using a PLC

### Drive

- Run Command Source

**Table 7.1 Run Command Source Priority**

| - | Setting Status | | | | | |
|---|---|---|---|---|---|---|
| NetCtrl | 1 | 0 | 0 | 0 | 0 | 0 |
| LOCAL/REMOTE Selection | - | LOCAL | REMOTE | | | |
| Switching Reference Source | - | - | OFF | | ON | |
| b1-02 [Run Command Selection 1] | - | - | 3 | not 3 | - | - |
| b1-16 [Run Command Selection 1] | - | - | - | - | 3 | not 3 |
| Run Command Source | PLC | Keypad | PLC | Determined by *b1-02* | PLC | Determined by *b1-16* |

**Note:**

Dash indicates that the setting has no effect on the reference source.

- Frequency Reference Source

**Table 7.2 Frequency Reference Source Priority**

| - | Setting Status | | | | | |
|---|---|---|---|---|---|---|
| NetRef | 1 | 0 | 0 | 0 | 0 | 0 |
| LOCAL/REMOTE Selection | - | LOCAL | REMOTE | | | |
| Switching Reference Source | - | - | OFF | | ON | |
| b1-01 [Frequency Reference Selection 1] | - | - | 3 | not 3 | - | - |
| b1-15 [Frequency Reference Selection 2] | - | - | - | - | 3 | not 3 |
| Frequency Reference Source | PLC | Keypad | PLC | Determined by *b1-01* | PLC | Determined by *b1-15* |

**Note:**

1. When the multi-function input terminals are set up for Multi-Step Speed operation, parameters *d1-01 [Reference 1]* through *d1-16 [Reference 16]* take priority as the source of the frequency reference. (assuming that *F6-07 = 1 [Multi-Step Ref @ NetRef/ComRef = Enable Multi-Step References]*).
2. Dash indicates that the setting has no effect on the reference source.
3. Refer to the technical manual for the drive the CC-Link option is connected to for more details on parameter settings.

**D1000**

- Run Command Source

**Table 7.3 Run Command Source Priority**

| - | Setting Status | | | |
|---|---|---|---|---|
| NetCtrl | 1 | 0 | 0 | 0 |
| LOCAL/REMOTE Selection | - | LOCAL | REMOTE | |
| b1-02 [Run Command Selection 1] | - | - | 3 | not 3 |
| Run Command Source | PLC | Keypad | Option | Determined by *b1-02* |

**Note:**

Dash indicates that the setting has no effect on the reference source.

- Voltage Reference Source

**Table 7.4 Voltage Reference Source Priority**

| - | Setting Status | | | |
|---|---|---|---|---|
| NetVol | 1 | 0 | 0 | 0 |
| LOCAL/REMOTE Selection | - | LOCAL | REMOTE | |
| b1-18 [Run Command Selection 1] | - | - | 3 | not 3 |
| Voltage Reference Source | PLC | Keypad | Option | Determined by *b1-18* |

**Note:**

1. Dash indicates that the setting has no effect on the reference source.
2. Refer to the instruction manual for D1000 the CC-Link option is connected to for more details on parameter settings.

## ◆ Monitor

You can monitor the operation status of the drive from a PLC.

Follow the following directions to monitor.

1. Set the monitor code to remote register $RW_{W0}$.
2. Switch ON the RYC signal (request to execute the monitor code).
   The data according to Monitor Code is stored in the buffer memory of the PLC.

**Note:**

For a list of monitor codes, write data drives, and setting ranges, refer to *Drive Monitor Codes on page 44* or *D1000 Monitor Codes on page 52*.

## ◆ Reading and Setting Parameters

The PLC can write drive parameters, read drive data and operation status, and change settings.

Follow the directions below.

1. Set the command code to remote register $RW_{W2}$.
   Set the write data to $RW_{W3}$ as needed.
2. Switch ON the RYF signal (request to execute the command code).
   - The drive executes the process and reply data that correspond with the command code.
   - Command codes for drive parameters should be calculated by adding the values shown below to the MEMOBUS/Modbus register number.
     – Read command code: MEMOBUS/Modbus register + 1000 (Hex.)
     – Write command code: MEMOBUS/Modbus register + 2000 (Hex.)

     Example: Acceleration time command code for *C1-01 [Acceleration Time 1]* is 200 (Hex.). Get the read command code by adding 1000 (Hex.), yielding 1200 (Hex.).

**Note:**

1. For a list of command codes, write data drives, and setting ranges, refer to *Drive Codes on page 40*, *Drive Extended Command Codes on page 41*, *D1000 Command Codes on page 49*, or *D1000 Extended Command Codes on page 50*.
2. Refer to the MEMOBUS/Modbus Data Table in Appendix C of the instruction manual for the drive the CC-Link option is connected to for a list of monitor data using the MEMOBUS/Modbus message area.

## ■ Access Method to Parameter of MEMOBUS Register Number 1000 (Hex.) or Later

When setting and reading parameters of the MEMOBUS register number 1000 (Hex.) or later from the PLC, set the MEMOBUS register number 1000 (Hex.) or later to the register number 0C00 (Hex.) to 0C0F (Hex.) from the CC-Link communications. You can access the value of the parameters 1000 (Hex.) or later specified by the MEMOBUS register number 0C00 (Hex.) to 0C0F (Hex.) with the register number 0C80 (Hex.) to 0C8F (Hex.).

This function is available in the option versions PRG:0103 and later.

**Table 7.5 List of MEMOBUS Register Numbers and Descriptions**

| Register No. (Hex.) | Description |
|---|---|
| 0C00 | Register number setting 1 |
| 0C01 | Register number setting 2 |
| 0C02 | Register number setting 3 |
| 0C03 | Register number setting 4 |
| 0C04 | Register number setting 5 |
| 0C05 | Register number setting 6 |
| 0C06 | Register number setting 7 |
| 0C07 | Register number setting 8 |
| 0C08 | Register number setting 9 |
| 0C09 | Register number setting 10 |
| 0C0A | Register number setting 11 |
| 0C0B | Register number setting 12 |
| 0C0C | Register number setting 13 |
| 0C0D | Register number setting 14 |
| 0C0E | Register number setting 15 |
| 0C0F | Register number setting 16 |
| 0C80 | Parameter contents of register number in setting 1 |
| 0C81 | Parameter contents of register number in setting 2 |
| 0C82 | Parameter contents of register number in setting 3 |
| 0C83 | Parameter contents of register number in setting 4 |
| 0C84 | Parameter contents of register number in setting 5 |
| 0C85 | Parameter contents of register number in setting 6 |
| 0C86 | Parameter contents of register number in setting 7 |
| 0C87 | Parameter contents of register number in setting 8 |
| 0C88 | Parameter contents of register number in setting 9 |
| 0C89 | Parameter contents of register number in setting 10 |
| 0C8A | Parameter contents of register number in setting 11 |
| 0C8B | Parameter contents of register number in setting 12 |
| 0C8C | Parameter contents of register number in setting 13 |
| 0C8D | Parameter contents of register number in setting 14 |
| 0C8E | Parameter contents of register number in setting 15 |
| 0C8F | Parameter contents of register number in setting 16 |

The example below shows reading and setting parameters.

- Example 1: When setting 256 (100 (Hex.)) to the parameter of the MEMOBUS register number 1200 (Hex.)
  - Write the register number (1200 (Hex.)) that you want to set to register number 0C00 (Hex.) (register number setting 1).

– Write the value (100 (Hex.)) to be written to register number 1200 (Hex.) in register number 0C80 (Hex.).

These are the details for settings and readings:

1. Set the command code (2C00 (Hex.)) to remote register $RW_{W2}$.
2. Set the write data (1200 (Hex.)) to remote register $RW_{W3}$.
3. Switch ON the RYF signal (request to execute the command code).
4. Set the command code (2C80 (Hex.)) to remote register $RW_{W2}$.
5. Set the write data (100 (Hex.)) to remote register $RW_{W3}$.
6. Switch ON the RYF signal (request to execute the command code).
   256 (100 (Hex.)) is set to the parameter of register number 1200 (Hex.).

- Example 2: When reading the parameter of the MEMOBUS register number 1500 (Hex.) with the register number setting 9

– Write the register number (1500 (Hex.)) that you want to set to register number 0C08 (Hex.) (register number setting 9).

– Read the value of the register number 1500 (Hex.) from the register number 0C88 (Hex.).

Details for settings and readings are as follows:

1. Set the command code (2C08 (Hex.)) to remote register $RW_{W2}$.
2. Set the write data (1500 (Hex.)) to remote register $RW_{W3}$.
3. Switch ON the RYF signal (request to execute the command code).
4. Set the command code (1C88 (Hex.)) to remote register $RW_{W2}$.
5. Switch ON the RYF signal (request to execute the command code).
   The parameter value of register number 1500 (Hex.) is stored in remote register $RW_{R3}$.

# 8 CC-Link Data List

## ◆ Remote I/O

The drive takes up a single station address in the buffer memory or the PLC. The table below shows the drive I/O as seen from the PLC side.

**Note:**

1. Remote I/O data varies between drives and D1000.
2. Refer to the PLC's programming manual for information on the PLC's buffer memory.

### ■ Drive Remote I/O

**PLC → Drive**

**Table 8.1 Remote I/O List (PLC → Drive)**

| Signal | Name | Description | Comments (Default) |
|---|---|---|---|
| RY0 | Forward Run | ON: Forward Run Command<br>OFF: Stop Command | - |
| RY1 | Reverse Run | ON: Reverse Run Command<br>OFF: Stop Command | - |
| RY2 | Terminal S3 Function | Multi-Function Input: H1-03 [Terminal S3 Function Selection] | H1-03 = 24 [External Fault] |
| RY3 | Terminal S4 Function | Multi-Function Input: H1-04 [Terminal S4 Function Selection] | H1-04 = 14 [Fault Reset] |
| RY4 | Terminal S5 Function | Multi-Function Input: H1-05 [Terminal S5 Function Selection] | H1-05 = 3 [Multi-Step Speed 1] |
| RY5 | Terminal S6 Function | Multi-Function Input: H1-06 [Terminal S6 Function Selection] | H1-06 = 4 [Multi-Step Speed 2] |
| RY6 | Terminal S7 Function | Multi-Function Input: H1-07 [Terminal S7 Function Selection] | H1-07 = 6 [Jog Reference] |
| RY7 | 1000-Series, GA700, GA800: Terminal S8 Function<br>GA500: Reserved | 1000-Series, GA700, GA800: Multi-Function Input: H1-08 [Terminal S8 Function Selection]<br>GA500: - | 1000-Series, GA700, GA800: H1-08 = 8 [Baseblock command (N. O.)]<br>GA500: - |
| RY8 | Reserved | - | - |
| RY9 | Drive Output Interrupt | ON: Motor coasts to stop.<br>OFF: Drive will begin operating as soon as a Run command is given. | - |
| RYA | External Fault | ON: EF0 [Option Card External Fault] | - |

| Signal | Name | Description | Comments (Default) |
|---|---|---|---|
| RYB | Motor Revolutions / Output Frequency Switch | Sets data contents for the remote register $RW_{R1}$.<br>ON: Output Frequency<br>OFF: Motor revolutions | Disabled in V/f Control or PM Open Loop Vector mode. $RW_{R1}$ is the output frequency. |
| RYC | Monitor Reference | ON: Monitor data specified in the monitor code is set to remote register $RW_{R0}$. | When switching between monitors using RYC (Monitor Reference), RYC needs to be turned OFF and then back ON again after the monitor code has been changed. |
| RYD | Frequency Reference 1 | Frequency set to remote register $RW_{W1}$ becomes the operating frequency for the drive. | When switching ON RYD, the frequency in the remote register $RW_{W1}$ will always reflect the operating frequency for the drive. |
| RYE | Frequency Reference 2 | Sets the frequency in the remote register $RW_{W1}$ to parameter *d1-01 [Frequency Reference 1]* and as the drive's main frequency reference at the same time.<br>**Note:**<br>If the frequency reference is set to be provided by the keypad (i.e. *b1-01 = 0 [Frequency Reference Selection 1 = Keypad]*), then switching ON RYE changes the frequency reference. | All parameter settings are saved when this flag is switched ON.<br>Triggered by the rising edge of the signal. |
| RYF | Command Code Execute Request | Request to execute the command code. | Triggered by the rising edge of the signal. |
| RY10 - 13 | Reserved | - | - |
| RY14 | Terminal S1 Function | Multi-Function Input: H1-01 [Terminal S1 Function Selection] | Function is disabled when for *H1-01 = 40 [Forward Run Command = Forward RUN (2-Wire)]*. |
| RY15 | Terminal S2 Function | Multi-Function Input: H1-02 [Terminal S2 Function Selection] | Function is disabled when for *H1-01 = 41 [Forward Run Command = Reverse RUN (2-Wire)]*. |
| RY16 - 19 | Reserved | - | - |
| RY1A | Fault Reset | Resets a drive fault | - |
| RY1B - 1F | Reserved | - | - |

**Note:**

1. If making frequent setting changes, use RYD (Frequency Reference 1 flag) for setting the register. You can write the EEPROM to the drive a maximum of 100,000 times. Do not use this write command frequently.
2. Although RYE and RYF are triggered by the rising edge of the signal, they are otherwise enabled depending on the value that is input.

## Drive → PLC

**Table 8.2 Remote I/O List (Drive → PLC)**

| Signal | Name | Description | Comments (Default) |
|---|---|---|---|
| RX0 | Forward Run | ON: Forward Run Command Present (includes DC Injection Braking)<br>OFF: No Forward Run Command | - |
| RX1 | During Reverse | ON: During Reverse<br>OFF: No Reverse Run Command (includes DC Injection Braking) | - |
| RX2 | 1000-Series: Terminal M1-M2 Function<br>GA700, GA800: Multi-Function Digital Output 1 Function<br>GA500: Terminal MA/MB-MC Function | Multi-function output: H2-01 | 1000-Series, GA700, GA800: H2-01 = 0 [Term M1-M2 Function Selection = During Run]<br>GA500: H2-01 = E [Term MA/MB-MC Function Selection = Fault] |
| RX3 | Speed Agree | ON: Output frequency is between frequency reference and the detection width set to *L4-02 [Speed Agree Detection Width]*. | - |
| RX4 | During Stall Prevention | - | - |
| RX5 | During Uv [Undervoltage] | - | - |
| RX6 | 1000-Series, GA500: Terminal P1 Function **1*<br>GA700, GA800: Multi-Function Digital Output 2 Function **1* | Multi-Function Output: H2-02 | 1000-Series, GA700, GA800: H2-02 = 1 [Term M3-M4 Function Selection = Zero Speed]<br>GA500: H2-02 =0 [Terminal P1-C1 Function Selection During Run] |
| RX7 | 1000-Series, GA500: Terminal P2 Function **1*<br>GA700, GA800: Multi-Function Digital Output 3 Function **1* | Multi-Function Output: H2-03 | 1000-Series, GA700, GA800: H2-03 = 2 [Term M5-M6 Function Selection = Speed Agree 1]<br>GA500: H2-03 = 2 [Terminal P2-C2 Function Selection = Speed Agree 1] |
| RX8, 9 | Reserved | - | - |
| RXA | CC-Link Option Fault | Communication error between drive and CC-Link device | - |

| Signal | Name | Description | Comments (Default) |
|---|---|---|---|
| RXB | Monitoring Motor Revolutions | ON: Currently monitoring motor revolutions. | Data is stored in remote register $RW_{R1}$. |
| RXC | Obtain Monitor Data | ON: Monitor data has been updated. | - |
| RXD | Frequency Setting Ready 1 | ON: Displays the main frequency reference that has been set. | - |
| RXE | Frequency Setting Ready 2 | ON: Displays the data set to *d1-01 [Frequency Reference 1]*.<br>**Note:**<br>Also sets the main frequency reference at the same time. | - |
| RXF | Command Code Execute Complete | ON: Displayed after the specified command code has been executed.<br>RXF signal switches OFF when the RYF command is no longer present. | - |
| RX10 - 19 | Reserved | - | - |
| RX1A | Error | ON: Fault occurred on the drive side. | - |
| RX1B | Remote Station Ready | ON: Drive is ready to operate. | - |
| RX1C - 1F | Reserved | - | - |

*1 Terminals are different for different drive models. Refer to *Terminals that Change depending on the Model of the Drive on page 35* for more information.

**Note:**

If making frequent setting changes, use RYD (Frequency Reference 1 flag) for setting the register. Using RYE (Frequency Reference 2 flag) too often can shorten the performance life of the drive's internal memory.

## ■ D1000 Remote I/O

### PLC → D1000

**Table 8.3 Remote I/O List (PLC → D1000)**

| Signal | Name | Description | Comments (Default) |
|---|---|---|---|
| RY0 | Run Command/Automatic Run Command | ON: Run Command/Automatic Run Command<br>OFF: Stop Command | - |
| RY1 | Forced Run Command | ON: Forced Run Command<br>OFF: Stop Command | - |
| RY2 | Terminal S3 Function | Multi-Function Input: H1-03 | H1-03 = 24 [External Fault] |
| RY3 | Terminal S4 Function | Multi-Function Input: H1-04 [Terminal S4 Function Selection] | H1-04 = 14 [Fault Reset] |
| RY4 | Terminal S5 Function | Multi-Function Input: H1-05 | H1-05= F [Through Mode] |
| RY5 | Terminal S6 Function | Multi-Function Input: H1-06 | H1-06= F [Through Mode] |
| RY6 | Terminal S7 Function | Multi-Function Input: H1-07 | H1-07= F [Through Mode] |
| RY7 | Terminal S8 Function | Multi-Function Input: H1-08 | H1-08 = 8 [Baseblock command (N.O.)] |
| RY8 | Reserved | - | - |
| RY9 | External Baseblock Command | ON: No converter output | - |
| RYA | External Fault [EF0] | ON: Option Card External Fault | - |
| RYB | Reserved | - | - |
| RYC | Monitor Reference | ON: Monitor data specified in the monitor code is set to remote register $RW_{R0}$. | When switching between monitors using RYC (Monitor Reference), RYC needs to be turned OFF and then back ON again after the monitor code has been changed. |
| RYD, E | Reserved | - | - |
| RYF | Command Code Execute Request | Request to execute the command code. | Triggered by the rising edge of the signal. |
| RY10 | Terminal M1-M2 Function | Multi-Function Relay Output 1 (Terminal M1-M2) | - |
| RY11 | Terminal P1-PC Function *1 | Multi-Function Photocoupler Output 1 (Terminal P1-PC) | - |
| RY12 | Terminal P2-PC Function *1 | Multi-Function Photocoupler Output 2 (Terminal P2-PC) | - |
| RY13 | Reserved | - | - |
| RY14 | Terminal S1 Function | Multi-Function Input: H1-01 | H1-01 = 4B [Run Command] |
| RY15 | Terminal S2 Function | Multi-Function Input: H1-02 [Terminal S2 Function Selection] | H1-02 = 4C [Stop Command] |
| RY16 | RY17 Enabled/Disabled Selection | - | - |

| Signal | Name | Description | Comments (Default) |
|---|---|---|---|
| RY17 | Term MA/MB-MC Function | Fault Contact Output | - |
| RY18, 19 | Reserved | - | - |
| RY1A | Fault Reset | Resets a D1000 fault. | - |
| RY1B - 1F | Reserved | - | - |

*1 Terminals are different for different drive models. Refer to *Terminals that Change depending on the Model of the Drive on page 35* for more information.

**Note:**

Although RYF is triggered by the rising edge of the signal, they are otherwise enabled depending on the value that is input.

### D1000 → PLC

**Table 8.4 Remote I/O List (D1000 → PLC)**

| Signal | Name | Description | Comments (Default) |
|---|---|---|---|
| RX0 | During Run/During Stop | ON: During Run<br>OFF: Stop | - |
| RX1 | During Regeneration | ON: During Regeneration | - |
| RX2 | Terminal M1-M2 Function | Multi-function output: H2-01 [Terminal M1-M2 Function Selection] | H2-01 = 25 |
| RX3 | During Run (Converter Ready) | - | - |
| RX4 | Reserved | - | - |
| RX5 | Uv [Undervoltage] | - | - |
| RX6 | Terminal P1-PC Function *1 | Multi-function output: H2-02 [Terminal P1-PC Function Selection] | H2-02 = 26 [During MC ON] |
| RX7 | Terminal P2-PC Function *1 | Multi-function output: H2-03 [Terminal P2-PC Function Selection] | H2-03 = 6 [Converter Ready] |
| RX8 | Momentary Power Loss Ride-Thru/Power Loss Recovery | - | - |
| RX9 | ComCtrlstatus/NetCtrlstatus | - | - |
| RXA | CC-Link Option Fault | Communication error between D1000 and CC-Link device | - |
| RXB | During Active Current Limit | - | - |
| RXC | Obtain Monitor Data | ON: Monitor data has been updated. | - |
| RXD | Alarm | - | - |
| RXE | Fault | - | - |
| RXF | Command Code Execute Complete | ON: Displayed after the specified command code has been executed.<br>RXF signal switches OFF when the RYF command is no longer present. | - |
| RX10 | During Reset Signal Input | - | - |
| RX11 | oPE Error | - | - |
| RX12 | AUv [Power Supply Undervoltage] | - | - |
| RX13 - 19 | Reserved | - | - |
| RX1A | Error | ON: Fault occurred on the D1000 side. | - |
| RX1B | Remote Station Ready | ON: D1000 is ready to operate. | - |
| RX1C - 1F | Reserved | - | - |

*1 Terminals are different for different drive models. Refer to *Terminals that Change depending on the Model of the Drive on page 35* for more information.

## ◆ Remote Register

**Note:**

Remote register data varies between drives and D1000 that support this option.

## ■ Drive Remote Register

### PLC → Drive

**Table 8.5 Remote Register (PLC → Drive)**

| Remote Register | Name | Description | Request Flag |
|---|---|---|---|
| $RW_{W0}$ | Monitor Code | • Sets the code number of the items to be displayed by the monitor.<br>• The monitor value is stored in register $RW_{R0}$ by enabling RYC (the monitor execution request flag) after the monitor code has been set.<br>• While $RW_{R0}$ is updated, RXC (during monitor flag) remains ON. | RYC (Monitor Execute Request) |
| $RW_{W1}$ | Frequency Setting | • Specifies the source of the frequency reference. The value set to this register becomes the main frequency reference when RYD (frequency setting reference 1) is enabled.<br>• When RYE (frequency setting reference 2 flag) is enabled, then the value for frequency reference 1 is written and saved to EEPROM *1.<br>**Note:**<br>Parameter *o1-03 [Frequency Display Unit Selection]* determines the setting drives for the frequency reference. | • RYD (Frequency Reference 1)<br>• RYE (Frequency Reference 2) |
| $RW_{W2}$ | Command Code | • Sets the command code to execute functions, for example the fault reset, fault history, and parameter read.<br>**Note:**<br>Refer to the MEMOBUS/Modbus Data Table in Appendix C of the instruction manual for the drive the CC-Link option is connected to for a list of monitor data using the MEMOBUS/Modbus message area.<br>• When RYF (command code execution request flag) is enabled, the drive executes the specified command. When the command is carried out, RXF switches ON.<br>**Note:**<br>Adjust the value set to $RW_{W3}$ (write data)to match changes to any parameter settings. | RYF (Command Code Execute Request) |
| $RW_{W3}$ | Write Data | • Sets the value to be used along with $RW_{W2}$ (Command Code) as needed.<br>• You must enable RYF (command code execution request flag)after the command code and write data have been set. | |

*1 You can write data to the EEPROM used for the drive 100,000 times. Do not use this write command frequently.

### Drive → PLC

**Table 8.6 Remote Register (Drive → PLC)**

| Remote Register | Name | Description | Check Flag |
|---|---|---|---|
| $RW_{R0}$ | Monitor Data | • Monitor data is stored according to $RW_{W0}$ (Monitor Code).<br>• Monitor data is updated while RYC (monitor execute request flag) is enabled. RXC (while monitoring) remains ON as data is updated. | RXC (while monitoring) |
| $RW_{R1}$ | Output Frequency | • Motor revolutions or output frequency has been set without errors.<br>Sets data contents with RYB (Motor Revolutions/ Output Frequency Switch).<br>• When RYB is disabled, the output frequency are stored.<br>Set in the drives specified by *o1-03 [Frequency Display Unit Selection]* in output frequency.<br>Example: When *o1-03 = 0 [0.01 Hz]*, the frequency is displayed in 0.01 Hz.<br>When *o1-03 = 2 [min$^{-1}$(r/min) units]*, the frequency is displayed as min$^{-1}$.<br>• When RYB is enabled, the motor revolutions are stored as min$^{-1}$. Here, RXB (actual motor rotations) is enabled.<br>• The output frequency are stored in V/f Control or PM Open Loop Vector mode.<br>RYB setting is disabled. | RXB (actual motor rotations) |
| $RW_{R2}$ | Response Code: | • Sets 00 (Hex.) when there are no problems with $RW_{W2}$ (Command Code) and $RW_{W3}$ (Write Data).<br>• Sets 01 (Hex.) through 03 (Hex.) if an error occurs.<br>• Response Code:<br>00 (Hex.): Normal<br>01 (Hex.): Write-mode error (attempted to write during run, etc.)<br>02 (Hex.): Command code error<br>03 (Hex.): Data setting range error | RXF (Command Code Execute Complete) |
| $RW_{R3}$ | Read Data | Data is set according to the command code. | |

### Data in $RW_{R1}$ (Output Frequency) and Units

**Table 8.7 Drive $RW_{R1}$ (Output Frequency) Data List**

| Conditions | | Drive → PLC | | |
|---|---|---|---|---|
| A1-02 [Control Method Selection] | RYB (Motor Revolutions/Output Frequency Switch) | RXB (Actual Motor Rotations) | $RW_{R1}$ Data | $RW_{R1}$ Units |
| 0, 5 *1 | - | OFF (output frequency) | Output Frequency | Set in the drives specified by *o1-03 [Frequency Display Unit Selection]* in output frequency. |
| 1, 2, 3, 4, 6, 7, 8 | OFF (motor revolutions) | ON (motor revolutions) | Motor revolutions | min$^{-1}$ |

| Conditions | | Drive → PLC | | |
|---|---|---|---|---|
| A1-02 [Control Method Selection] | RYB (Motor Revolutions/Output Frequency Switch) | RXB (Actual Motor Rotations) | $RW_{R1}$ Data | $RW_{R1}$ Units |
| | ON (output frequency) | OFF (output frequency) | Output Frequency | Set in the drives specified by *o1-03 [Frequency Display Unit Selection]* in output frequency. |

*1 Controls in the same way as *A1-02 = 1 [Control Method Selection = V/f Control with Encoder]* in *A1-02 = 0 [V/f Control]* and *H6-01 = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)]*.

**Table 8.8 $RW_{R1}$ (Output Frequency) Units List**

| o1-03 [Frequency Display Unit Selection] | Frequency Reference Units ($RW_{R1}$) |
|---|---|
| 0 | 0.01 Hz units (output frequency) |
| 1 | 0.01% units (percent of maximum output frequency) |
| 2 | $min^{-1}$ units (calculated from the maximum output frequency and the number of motor poles) |
| 3 | User-set (according to parameter *o1-10 [User Units Maximum Value]*, and *o1-11 [User Units Decimal Position]*) |

**Note:**
Refer to the instruction manual for the drive the CC-Link Option is connected to for more details on parameter settings.

## ■ D1000 Remote Register

### PLC → D1000

**Table 8.9 Remote Register (PLC → D1000)**

| Remote Register | Name | Description | Request Flag |
|---|---|---|---|
| $RW_{W0}$ | Monitor Code | • Sets the code number of the items to be displayed by the monitor.<br>• The monitor value is stored in register $RW_{R0}$ by enabling RYC (the monitor execution request flag) after the monitor code has been set.<br>• While $RW_{R0}$ is updated, RXC (during monitor flag) remains ON. | RYC (Monitor Execute Request) |
| $RW_{W1}$ | Reserved | - | - |
| $RW_{W2}$ | Command Code | • Sets the command code to execute functions, for example the fault reset, fault history, and parameter read.<br>**Note:**<br>Refer to the MEMOBUS/Modbus Data Table in Appendix C of the instruction manual for D1000 the CC-Link option is connected to for a list of monitor data using the MEMOBUS/Modbus message area.<br>• When RYF (command code execution request flag) is enabled, the drive executes the specified command. When the command is carried out, RXF switches ON.<br>**Note:**<br>The value set to $RW_{W3}$ (write data) should be adjusted accordingly to match changes to any parameter settings. | RYF (Command Code Execute Request) |
| $RW_{W3}$ | Write Data | • Sets the value to be used along with $RW_{W2}$ (Command Code) as needed.<br>• Enable RYF (command code execution request flag) after you set the command code and write data. | |

**Note:**
Use the extended command code 280 (Hex.) to set the DC bus voltage reference.

### D1000 → PLC

**Table 8.10 Remote Register (D1000 → PLC)**

| Remote Register | Name | Description | Check Flag |
|---|---|---|---|
| $RW_{R0}$ | Monitor Data | • Monitor data is stored according to $RW_{W0}$ (Monitor Code).<br>• Monitor data is updated while RYC (monitor execute request flag) is enabled. RXC (while monitoring) remains ON as data is updated. | RXC (while monitoring) |
| $RW_{R1}$ | Reserved | - | - |
| $RW_{R2}$ | Response Code: | • Sets 00 (Hex.) when there are no problems with $RW_{W2}$ (Command Code) and $RW_{W3}$ (Write Data).<br>• Sets 01 (Hex.) through 03 (Hex.) if an error occurs.<br>• Response Code:<br>00 (Hex.): Normal<br>01 (Hex.): Write-mode error (attempted to write during run, etc.)<br>02 (Hex.): Command code error<br>03 (Hex.): Data setting range error | RXF (Command Code Execute Complete) |
| $RW_{R3}$ | Read Data | Data is set according to the command code. | |

**Note:**
Use the monitor code 0008 (Hex.) to set the DC bus voltage feedback.

## ◆ Terminals that Change depending on the Model of the Drive

The table below lists terminals that change depending on the model of the drive.

**Table 8.11 Terminals that Change depending on the Model of the Drive**

| Drive | Name | Terminal | Drive Model |
|---|---|---|---|
| 1000-Series | Multi-Function Contact Output | M1-M2 | All |
| | Multi-Function Photocoupler Output 1 | P1-PC | CIMR-xAx, CIMR-xTx, CIMR-xKx, CIMR-xBx *1, CIMR-xDx |
| | | M3-M4 | CIMR-xUx, CIMR-xCx |
| | Multi-Function Photocoupler Output 2 | P2-PC | CIMR-xAx, CIMR-xTx, CIMR-xKx, CIMR-xBx *2, CIMR-xDx |
| | | M5-M6 | CIMR-xUx, CIMR-xCx |
| GA500 | Multi-Function Contact Output | MA-MB-MC | All |
| | Multi-Function Photocoupler Output 1 | P1-PC | All |
| | Multi-Function Photocoupler Output 2 | P2-PC | All |
| GA700 | Multi-Function Digital Output 1 | M1-M2 | All |
| | Multi-Function Digital Output 2 | M3-M4 | All |
| | Multi-Function Digital Output 3 | P1-C1 | CIPR-GA70Ax, CIPR-GA70Tx |
| | | M5-M6 | CIPR-GA70Ux, CIPR-GA70Cx, CIPR-GA70Bx, CIPR-GA70Kx, CIPR-GA70Dx |
| | Multi-Function Digital Output 4 | P2-C2 | CIPR-GA70Ax, CIPR-GA70Tx |
| GA800 | Multi-Function Digital Output 1 | M1-M2 | All |
| | Multi-Function Digital Output 2 | M3-M4 | All |
| | Multi-Function Digital Output 3 | M5-M6 | All |

*1 Terminals will change to M3-M4 depending on the model type of CIMR-xBx. Refer to the drive manuals for more information.
*2 Terminals will change to M5-M6 depending on the model type of CIMR-xBx. Refer to the drive manuals for more information.

# 9 Troubleshooting

## ◆ Drive-Side Error Codes

Drive-side error codes appear on the drive keypad. *Faults on page 35* lists causes of the errors and possible corrective actions. Refer to the drive Technical Manual for additional error codes that can appear on the drive keypad.

### ■ Faults

Both *bUS [Option Communication Error]* and *EF0 [Option Card External Fault]* can appear as a fault. When a fault occurs, the keypad ALM LED stays lit. The ALM LED also illuminates. When an alarm occurs, the ALM LED flashes.

If communication stops while the drive is running, answer these questions to help fix the problem:

- Is the communication line properly connected to the option? Is it loose?
- Is the CC-Link communication cable properly connected to the option?
- Is the PLC program working? Is the controller/PLC CPU stopped?
- Did a momentary power loss interrupt communications?

| Code | Name | Causes | Possible Solutions |
|---|---|---|---|
| bUS | Option Communication Error | The drive did not receive a signal from the controller. | • Check for wiring errors.<br>• Correct the wiring. |
| | | The communications cable wiring is incorrect. | |
| | | An existing short circuit or communications disconnection | Check disconnected cables and short circuits and repair as needed |

| Code | Name | Causes | Possible Solutions |
|---|---|---|---|
| | | A data error occurred due to electric interference | • Prevent noise in the control circuit, main circuit, and ground wiring.<br>• If you identify a magnetic contactor as a source of noise, install a surge absorber to the contactor coil.<br>• Use only recommended cables or other shielded line. Ground the shield on the controller side or the drive input power side.<br>• Separate all communication wiring from drive power lines. Install an EMC noise filter to the drive power supply input.<br>• Counteract noise in the master controller (PLC). |
| | | Option is damaged | If there are no problems with the wiring and the error continues to occur, replace the option. |
| | | Connection Time-out | • The option Requested Packet Interval (RPI) timer timed out<br>• Make sure that RPI time is set properly |
| EF0 | Option Card External Fault | The option received an external fault from the controller. | 1. Find the device that caused the external fault and remove the caus.<br>2. Clear the external fault input from the controller. |
| | | A programming error occurred on the controller side. | Examine the operation of the controller program. |
| oFA00 | Option Not Compatible with Port | The option connected to connector CN5-A is not compatible. | Connect the option to the correct connector.<br>• Use connector CN5-A when you connect the option. To use other options, refer to those option manuals. |
| oFA01 | Option Card Fault (CN5-A) | The option connected to option port CN5-A was changed during run. | 1. De-energize the drive.<br>2. Connect the option to the correct option port. |
| oFA03, oFA04 | Option Card Error (CN5-A) | A fault occurred in the option. | 1. De-energize the drive.<br>2. Make sure that the option is correctly connected to the connector.<br>3. If the problem continues, replace the option. |
| oFA30 to oFA43 | Option Card Connection Error (CN5-A) | A fault occurred in the option. | 1. De-energize the drive.<br>2. Make sure that the option is correctly connected to the connector.<br>3. If the problem continues, replace the option. |
| oFb00 | Option Not Compatible with Port | The option connected to connector CN5-B is not compatible. | Connect the option to the correct connector.<br>• Use connector CN5-A when you connect the option. To use other options, refer to those option manuals. |
| oFb02 | Option Fault | An option of the same type is already installed in option port CN5-A, CN5-B, or CN5-C. | Connect the option to the correct option port. |
| oFC00 | Option Fault (CN5-B) | The option connected to connector CN5-C is not compatible. | Connect the option to the correct connector.<br>• Use connector CN5-A when you connect the option. To use other options, refer to those option manuals. |
| oFC02 | Option Fault | An option of the same type is already installed in option port CN5-A, CN5-B, or CN5-C. | Connect the option to the correct option port. |

## ■ Minor Faults and Alarms

| Code | Name | Causes | Possible Solutions |
|---|---|---|---|
| AEr | Station Address Setting Error | The node address for the communication option is not in the permitted setting range. | Set *F6-10 [CC-Link Node Address]* correctly. |
| CALL | Serial Comm Transmission Error | The communications cable wiring is incorrect. | Correct wiring errors. |
| | | There is a short circuit in the communications cable or the communications cable is not connected. | • Repair the short-circuited or disconnected portion of the cable.<br>• Replace the defective communications cable. |
| | | A programming error occurred on the controller side. | Examine communications at start-up and correct programming errors. |
| | | There is damage to the communications circuitry. | • Do a self-diagnostics check.<br>• If the problem continues, replace the control board or the drive. Contact Yaskawa or your nearest sales representative to replace the control board. |
| | | The termination resistor setting for MEMOBUS/ Modbus communications is incorrect. | On the last drive in a MEMOBUS/Modbus network, set DIP switch S2 to the ON position to enable the termination resistor. |
| CyPo | Cycle Power to Active Parameters | Comm. Option Parameter Not Upgraded | Re-energize the drive to update the communication option parameters. |

# ◆ Option LED States

## ■ How to Check for Errors on LED Lamps


**A - 1000-Series** **B - GA500, GA700, and GA800**

**Figure 9.1 Option LED Labels**

**Table 9.1 Option LED Display**

| | |
|---|---|
| L.RUN | Lights ON when receiving data normally Lights OFF when timed out wanting to receive |
| SD | Lights ON when sending data |
| RD | Lights ON when receiving data |
| L.ERR | Lights ON when a station address is CRC Error or Abort Error. |

**Note:**

If communication stops while the drive is running, answer these questions to help fix the problem:

- Is the drive properly connected to the option?
- Is the CC-Link communication cable properly connected to the option? Is it loose?
- Is the PLC program properly working? Is the PLC CPU stopped?
- Did a momentary power loss interrupt communications?

## ■ Faults that Occur with a Single Drive

The example below demonstrates how to read the LED display on the front cover of the drive to determine the cause of a fault and corrective action.

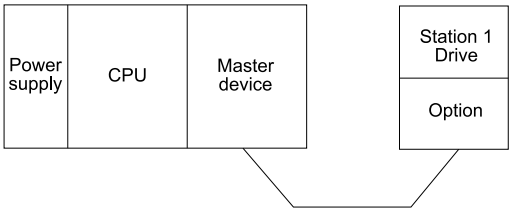



**Figure 9.2 Connecting a Single Drive**

**Table 9.2 LED Fault Display for CC-Link Option with a Single Drive**

| L.RUN | SD | RD | L.ERR | Cause | Possible Solutions |
|---|---|---|---|---|---|
| ○ | ○ | ○ | × | Normal communications | - |
| ○ | ○ | ○ | □ | Error has occurred but communication is normal. | Remove the source of electrical noise interference. |
| ○ | ○ | × | □ | Problem with the hardware | • Try cycling the power. Replace the CC-Link Option if the problem continues. |
| ○ | ○ | × | × | Problem with the hardware | • Try cycling the power. Replace the CC-Link Option if the problem continues. |
| ○ | × | ○ | □ | CRC error with the data received, and no response can be sent | Remove the source of electrical noise interference. |
| ○ | × | ○ | × | No station address received | Check the PLC program and the operation where the problem occurred. |
| ○ | × | × | □ | Problem with the hardware | • Try cycling the power. Replace the CC-Link Option if the problem continues. |
| ○ | × | × | × | Problem with the hardware | • Try cycling the power. Replace the CC-Link Option if the problem continues. |
| × | ○ | ○ | □ | A response was received after polling, but a CRC error occurred when the reflex data was checked. | Remove the source of electrical noise interference. |
| × | ○ | ○ | × | Problem with the hardware | • Try cycling the power. Replace the CC-Link Option if the problem continues. |

| L.RUN | SD | RD | L.ERR | Cause | Possible Solutions |
|---|---|---|---|---|---|
| | | | | | • See if the master device is actually set to function as a remote device station. |
| × | ○ | × | □ | Problem with the hardware | • Try cycling the power.<br>Replace the CC-Link Option if the problem continues. |
| × | ○ | × | × | Problem with the hardware | • Try cycling the power.<br>Replace the CC-Link Option if the problem continues. |
| × | × | ○ | □ | CRC errors occurs when the station address is checked. | Remove the source of electrical noise interference. |
| × | × | ○ | × | • No station address<br>• Cannot receive station address due to electrical noise interference | Remove the source of electrical noise interference. |
| × | × | × | □ | Problem with the hardware | • Try cycling the power.<br>Replace the CC-Link Option if the problem continues. |
| × | × | × | × | Data cannot be received (CC-Link communications cable may be disconnected) | Check the wiring. |
| × | × | * | ○ | The station address or communications speed is set incorrectly. | Enter the proper settings and cycle power. |
| ○ | ○ | ○ | □ | The station address or communications speed was changed without cycling power afterwards. | • Return any incorrect settings to their original values and cycle power.<br>• Enter the proper settings and cycle power. |

**Note:**
• ○: ON / □: Flashing / ×: OFF / * : Either ON or OFF
• SD and RD may appear to flash with slower baud rates.

## ■ Faults when Running Multiple Drives

The example below demonstrates how to read the LED display on the front cover of the drive to determine the cause of a fault and the corrective action to take when multiple drives are running from the same network. The example assumes that SW, M/S, and PRM on the master device are all off, indicating that the master device is operating normally.

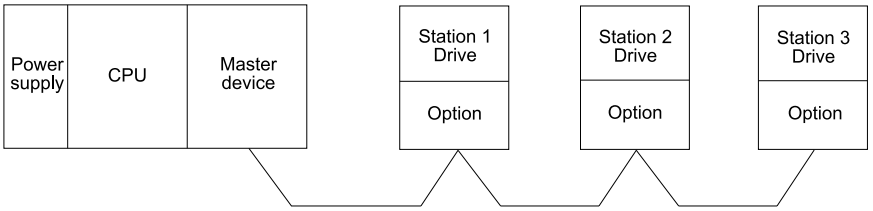



**Figure 9.3 Connecting Multiple Drives on the Same Network**

**Table 9.3 LED Fault Display for CC-Link Option with Multiple Drives**

| LED Status | | | | Cause | Possible Solutions |
|---|---|---|---|---|---|
| Master | Remote Device Addresses (Option) | | | | |
| | Station 1 | Station 2 | Station 3 | | |
| TIME LINE ○<br>TIME LINE ○<br>or<br>TIME LINE ×<br>TIME LINE ○ | L.RUN ○<br>SD ○<br>RD ○<br>L.ERR × | L.RUN ○<br>SD ○<br>RD ○<br>L.ERR × | L.RUN ○<br>SD ○<br>RD ○<br>L.ERR × | Normal operation | - |
| | L.RUN ×<br>SD ×<br>RD ×<br>L.ERR × | L.RUN ○<br>SD ○<br>RD ○<br>L.ERR × | L.RUN ○<br>SD ○<br>RD ○<br>L.ERR × | The CC-Link Option for Station 1 is not correctly installed. | Make sure that the CC-Link Option and drive are connected together correctly. |
| | L.RUN *<br>SD *<br>RD *<br>L.ERR * | L.RUN ○<br>SD ○<br>RD ○<br>L.ERR × | L.RUN ○<br>SD ○<br>RD ○<br>L.ERR × | The CC-Link Option for the first station is damaged. (most often all LEDs are out)<br>**Note:**<br>Sometimes an error will appear on the drive keypad. | Replace the CC-Link Option. |
| | L.RUN ○<br>SD ○<br>RD ○<br>L.ERR × | L.RUN ×<br>SD * *<br>RD ×<br>L.ERR | L.RUN ×<br>SD *<br>RD *<br>L.ERR × | Because L.RUN after Station 2 is OFF, either the communication line between Station 1 and Station 2 is disconnected, or the connector is loose. | Make sure that the components are connected correctly, using the LEDs as a guide to indicate a correct connection. |
| | L.RUN ×<br>SD * | L.RUN ×<br>SD * | L.RUN ×<br>SD * | Communication cable has short-circuited. | Look for any short-circuits along the communication lines and fix any problems. |

| LED Status | | | | | | | | | Cause | Possible Solutions |
|---|---|---|---|---|---|---|---|---|---|---|
| Master | Remote Device Addresses (Option) | | | | | | | | | |
| | Station 1 | | | Station 2 | | | Station 3 | | | |
| | RD | * | | RD | * | | RD | * | | |
| | L.ERR | × | | L.ERR | × | | L.ERR | × | | |
| | L.RUN | × | | L.RUN | × | | L.RUN | × | Communication cable is not wired correctly. | Check the wiring for the CC-Link Option connector and fix any mistakes. |
| | SD | * | | SD | * | | SD | * | | |
| | RD | * | | RD | * | | RD | * | | |
| | L.ERR | * | | L.ERR | * | | L.ERR | * | | |
| | L.RUN | × | | L.RUN | ○ | | L.RUN | × | Options for Station 1 and Station 3 are assigned the same address. | Enter the correct station address and cycle power. |
| | SD | * | | SD | ○ | | SD | * | | |
| | RD | ○ | | RD | ○ | | RD | ○ | | |
| | L.ERR | * | | L.ERR | × | | L.ERR | × | | |
| | L.RUN | ○ | | L.RUN | × | | L.RUN | ○ | Option for Station 2 has a different communication speed setting than the master device. | Set the correct communication speed and cycle power. |
| | SD | ○ | | SD | × | | SD | ○ | | |
| | RD | ○ | | RD | ○ | | RD | ○ | | |
| | L.ERR | × | | L.ERR | × | | L.ERR | × | | |
| | L.RUN | ○ | | L.RUN | ○ | | L.RUN | ○ | The settings for the Option connected to Station 3 were changed without cycling power. | • Return any incorrect settings to their original values and cycle power.<br>• Enter the correct settings and cycle power. |
| | SD | ○ | | SD | ○ | | SD | ○ | | |
| | RD | ○ | | RD | ○ | | RD | ○ | | |
| | L.ERR | × | | L.ERR | × | | L.ERR | □ | | |
| | L.RUN | × | | L.RUN | ○ | | L.RUN | ○ | Parameters related to the Option (*F6-10 [CC-Link Node Address]*, *F6-11 [CC-Link Communication Speed]*) for Station 1 are set outside the acceptable range. | Set *F6-10* and *F6-11* correctly and cycle power. |
| | SD | × | | SD | ○ | | SD | ○ | | |
| | RD | ○ | | RD | ○ | | RD | ○ | | |
| | L.ERR | ○ | | L.ERR | × | | L.ERR | × | | |
| TIME LINE × TIME LINE × or TIME LINE ○ TIME LINE × | L.RUN | ○ | | L.RUN | ○ | | L.RUN | ○ | The Option connected to Station 2 is experiencing electrical noise interference. (L. RUN is sometimes OFF) | Make sure that the options, drives, and master device are all grounded correctly. |
| | SD | ○ | | SD | ○ | | SD | ○ | | |
| | RD | ○ | | RD | ○ | | RD | ○ | | |
| | L.ERR | × | | L.ERR | ○ | | L.ERR | × | | |
| | L.RUN | ○ | | L.RUN | ○ | | L.RUN | ○ | Electrical noise interference along the cable running between Station 2 and Station 3. (L. RUN is sometimes OFF) | Reconnect the communication line to the SLD terminal on the CC-Link Option connector.<br>Also make sure that all power cables are properly separated from communication lines. (at least 100 mm away) |
| | SD | ○ | | SD | ○ | | SD | ○ | | |
| | RD | ○ | | RD | ○ | | RD | ○ | | |
| | L.ERR | × | | L.ERR | ○ | | L.ERR | ○ | | |
| | L.RUN | ○ | | L.RUN | ○ | | L.RUN | ○ | Termination resistor not connected (L.RUN is sometimes OFF). (L.RUN is sometimes OFF) | Configure the final station in the series with a termination resistor. |
| | SD | ○ | | SD | ○ | | SD | ○ | | |
| | RD | ○ | | RD | ○ | | RD | ○ | | |
| | L.ERR | × | | L.ERR | × | | L.ERR | ○ | | |

**Note:**

○: ON / □: Flashing / ×: OFF / * : Either ON or OFF

## ◆ Option Compatibility

You can connect a maximum of 3 options at the same time depending on the type of option.

**Note:**

- You can only connect one option to a GA500 drive. Connect the option to the CN5 connector.
- Compatible communication options are different for different models. Refer to the drive manuals for more information.

**Table 9.4 Option Compatibility**

| Option | Connector | Number of Options Possible |
|---|---|---|
| PG-B3 *1*, PG-X3 *1* | CN5-B, C | 2 *2* |
| PG-RT3 *1* *3* *4*, PG-F3 *1* *3* *4* | CN5-C | 1 |
| DO-A3 *1*, AO-A3 *1* | CN5-A, B, and C | 1 |
| SI-C3, SI-N3, SI-P3, SI-S3, SI-T3, SI-ET3, SI-ES3, SI-B3, SI-M3, SI-W3 *4*, SI-EM3 *4*, SI-EM3D *4*, SI-EN3 *4*, SI-EN3D *4*, SI-EP3, JOHB-SMP3, AI-A3 *1* *5*, DI-A3 *1* *5* | CN5-A | 1 |

*1 Not available for GA500 drives.
*2 To connect two PG options, use the CN5-C and CN5-B connectors. To connect only one PG option, use the CN5-C connector.
*3 If you use the motor switching function, you cannot use this option.
*4 Not available for 1000-Series drive models with capacities between 450 and 630 kW (650 to 1000 HP).
*5 To use AI-A3 and DI-A3 input statuses as monitors, connect the options to CN5-A, CN5-B, or CN5-C.

# 10 CC-Link Code Numbers List

**Note:**
Command Codes, Extended Command Codes, Monitor Codes and Fault/Alarm Codes vary between drives and D1000 that support this option.

## ◆ Drive Codes

### ■ Drive Codes

**Table 10.1 Drive Command Codes List**

| Command Code (Hex.) | Name | Description |
|---|---|---|
| 1181 | Read Run Command Source | 0: Keypad<br>1: Control Circuit Terminals (sequencer input)<br>2: MEMOBUS/Modbus Communications<br>3: Option |
| 1180 | Read Frequency Reference Source | 0: Keypad<br>1: Control Circuit Terminals (analog input)<br>2: MEMOBUS/Modbus Communications<br>3: Option<br>4: Pulse Train Input |
| 2181 | Write Run Command Source | 0: Keypad<br>1: Control Circuit Terminals (sequencer input)<br>2: MEMOBUS/Modbus Communications<br>3: Option |
| 2180 | Write Frequency Reference Source | 0: Keypad<br>1: Control Circuit Terminals (analog input)<br>2: MEMOBUS/Modbus Communications<br>3: Option<br>4: Pulse Train Input |
| 0074 | Fault History 1 | Reads the contents from *U3-01 [1st MostRecent Fault]*. |
| 0075 | Fault History 2 | Reads the contents from *U3-02 [2nd MostRecent Fault]*. |
| 0076 | Fault History 3 | Reads the contents from *U3-03 [3rd MostRecent Fault]*. |
| 0077 | Fault History 4 | Reads the contents from *U3-04 [4th MostRecent Fault]*. |
| 0078 | Fault History 5 | Reads the contents from *U3-05 [5th MostRecent Fault]*. |
| 0079 | Fault History 6 | Reads the contents from *U3-06 [6th MostRecent Fault]*. |
| 007A | Fault History 7 | Reads the contents from *U3-07 [7th MostRecent Fault]*. |
| 0080 | Fault History 8 | Reads the contents from *U3-08 [8th MostRecent Fault]*. |
| 0081 | Fault History 9 | Reads the contents from *U3-09 [9th MostRecent Fault]*. |
| 0082 | Fault History 10 | Reads the contents from *U3-10 [10th MostRecentFault]*. |
| 006D | Read Frequency Reference (RAM) | Reads the drive's frequency reference from RAM. |
| 006E | Read Frequency Reference (EEPROM) | Reads the frequency reference from EEPROM. |
| 007B | Read LOCAL/REMOTE status | Bit 0: 0 = Frequency reference from CC-Link is enabled.<br>Bit 1: 0 = FWD/REV Run command from CC-Link is enabled.<br>Bit 8: 1 = During Stall Prevention |
| 00FB | Write LOCAL/REMOTE status | Bit 0: 0 = Frequency reference from CC-Link is enabled.<br>Bit 1: 0 = FWD/REV Run command from CC-Link is enabled.<br>When power is cycled, however, the source is determined by *b1-01 [Frequency Reference Selection 1]* and *b1-02 [Run Command Selection 1]*. If one of the multi-function relay input terminals is set to switch the source of the Run command (*H1-xx = 2*), then the Run command and frequency reference will be supplied by *b1-01* and *b1-02* when that terminal is open, and *b1-15 [Frequency Reference Selection 2]* and *b1-16 [Run Command Selection 2]* when that terminal is closed. |
| 00ED | Write Frequency Reference (RAM) | Writes the frequency reference for the drive to RAM. |
| 00EE | Write Frequency Reference (EEPROM) | Writes the frequency reference and all parameter values to EEPROM. |
| - | Read Parameters | Adds 1000 (Hex.) to the MEMOBUS/Modbus register number. |
| - | Parameter Settings | Master executes commands by adding 2000 (Hex.) to the MEMOBUS/Modbus register number. Conversion takes place on the option side. |
| 00F4 | Clear All Fault Contents | 9696 (Hex.): Clear fault history |
| 00FD | Reset Drive | 9696 (Hex.): Fault reset |

## ■ Drive Extended Command Codes

**Table 10.2 Drive Extended Command Codes List**

| Command Code | | Name | |
|---|---|---|---|
| Read (Hex.) | Write (Hex.) | BIT | |
| 100 | - | Operation Signals | |
| | | 0 | When *H5-12 = 0 [Run Command Method Selection = FWD/Stop, REV/Stop]*, Forward Run/Stop<br>1: Forward Run<br>0: Stop<br>When *H5-12 = 1 [Run Command Method Selection = Run/Stop, FWD/REV]*, Run/Stop<br>1: Run<br>0: Stop |
| | | 1 | When *H5-12 = 0 [Run Command Method Selection = FWD/Stop, REV/Stop]*, Reverse Run/Stop<br>1: Reverse Run<br>0: Stop<br>When *H5-12 = 1 [Run Command Method Selection = Run/Stop, FWD/REV]*, Forward/Reverse<br>1: Reverse Run<br>0: Forward Run |
| | | 2 | External Fault<br>1: External Fault [EF0 ] |
| | | 3 | Fault Reset<br>1: Reset Command |
| | | 4 | Multi-Function Input 1<br>Bit disabled when *H1-01 = 40 [Terminal S1 Function Selection = Forward RUN (2-Wire)]* |
| | | 5 | Multi-Function Input 2<br>Bit disabled when *H1-02 = 41 [Terminal S2 Function Selection = Reverse RUN (2-Wire)]* |
| | | 6 | Multi-Function Input 3 |
| | | 7 | Multi-Function Input 4 |
| | | 8 | Multi-Function Input 5 |
| | | 9 | Multi-Function Input 6 |
| | | A | Multi-Function Input 7 |
| | | B | Multi-function input 8 |
| | | C - F | Reserved |
| 101 | - | Frequency Reference (RAM) | |
| 102 | 202 | Torque Reference/Torque Limit | |
| 103 | 203 | Torque Compensation | |
| 104 | 204 | PID Setpoint | |
| 105 | 205 | Multi-Function Analog Monitor Output Terminal 1 | |
| 106 | 206 | Multi-Function Analog Monitor Output Terminal 2 | |
| 107 | 207 | Multi-Function Relay Output **1* | |
| | | 0 | • 1000-Series<br>Multi-Function Contact Outputs (terminal M1-M2)<br>1: ON<br>0: OFF<br>• GA500<br>Multi-Function Contact Outputs (terminal MA/MB-MC)<br>1: ON<br>0: OFF<br>• GA700, GA800<br>Multi-Function Digital Output 1 (terminal M1-M2)<br>1: ON<br>0: OFF |
| | | 1 | • 1000-Series<br>Multi-Function Photocoupler Output 1 (terminal P1-PC) **2*<br>1: ON<br>0: OFF<br>• GA500<br>Multi-Function Photocoupler Output 1 (terminal P1-C1)<br>1: ON<br>0: OFF<br>• GA700, GA800 |

| Command Code | | Name | |
|---|---|---|---|
| Read (Hex.) | Write (Hex.) | BIT | |
| | | | Multi-Function Digital Output 2 (terminal M3-M4)<br>1: ON<br>0: OFF |
| | | 2 | • 1000-Series<br>Multi-Function Photocoupler Output 2 (terminal P2-PC) *2<br>1: ON<br>0: OFF<br>• GA500<br>Multi-Function Photocoupler Output 2 (terminal P2-C2)<br>1: ON<br>0: OFF<br>• GA700, GA800<br>Multi-Function Digital Output 3 *2<br>1: ON<br>0: OFF |
| | | 3 | • 1000-Series, GA500:<br>Reserved<br>• GA700, GA800<br>Multi-Function Digital Output 4 *2<br>1: ON<br>0: OFF |
| | | 4-5 | Reserved |
| | | 6 | 1: Bit 7 Function Enabled |
| | | 7 | 1: Fault Contact Output (terminal MA/MB-MC)<br>1: ON<br>0: OFF |
| | | 8 - F | Reserved |
| 109 | 209 | Pulse Output | |
| 10F | 20F | V/f Gain | |
| 110 | - | Status Signals | |
| | | 0 | During Run<br>1: During Run<br>0: During Stop |
| | | 1 | During Zero Speed<br>1: During Zero Speed |
| | | 2 | During Reverse<br>1: During Reverse<br>0: Forward Run |
| | | 3 | During Reset Signal Input<br>1: During Reset Signal Input |
| | | 4 | Speed Agree<br>1: During Speed Agree |
| | | 5 | Drive Ready<br>1: Ready<br>0: Not Ready |
| | | 6 | Alarm<br>1: Drive in an Alarm State |
| | | 7 | Fault<br>1: Fault |
| | | 8 | During Operation Error (oPExx)<br>1: Operation Error [oPE] Generated |
| | | 9 | Momentary Power Loss Ridethru<br>1: Momentary Power Loss Ridethru<br>0: Power Loss Recovery |
| | | A | NetCtrl status<br>1: NetCtrl |
| | | B | • 1000-Series<br>Multi-Function Contact Outputs (terminal M1-M2)<br>1: ON<br>0: OFF<br>• GA500<br>Multi-Function Contact Outputs (terminal MA/MB-MC)<br>1: ON<br>0: OFF<br>• GA700, GA800<br>Multi-Function Digital Output 1 (terminal M1-M2)<br>1: ON |

| Command Code | | Name | |
|---|---|---|---|
| Read (Hex.) | Write (Hex.) | BIT | |
| | | | 0: OFF |
| | | C | • 1000-Series<br>Multi-Function Photocoupler Output 1 (terminal P1-PC)<br>1: ON<br>0: OFF<br>• GA500<br>Multi-Function Photocoupler Output 1 (terminal P1-C1)<br>1: ON<br>0: OFF<br>• GA700, GA800<br>Multi-Function Digital Output 2 (terminal M3-M4)<br>1: ON<br>0: OFF |
| | | D | • 1000-Series<br>Multi-Function Photocoupler Output 2 (terminal P2-PC)<br>1: ON<br>0: OFF<br>• GA500<br>Multi-Function Photocoupler Output 2 (terminal P2-C2)<br>1: ON<br>0: OFF<br>• GA700, GA800<br>Multi-Function Digital Output 3<br>1: ON<br>0: OFF |
| | | E | Motor 2 Selected<br>1: Motor 2 Selected |
| | | F | Zero Servo Completed<br>1: Zero Servo Completed |
| 111 | - | Motor Speed | |
| 112 | - | Through-Mode | |
| 113 | - | Number of Pulse 1 Speed Detection | |
| 114 | - | Frequency Reference | |
| 115 | - | Output Frequency | |
| 116 | - | Output Current | |
| 117 | - | Analog Input Terminal A1 | |
| 118 | - | DC Bus Voltage | |
| 11C | - | Analog Input Terminal A2 | |
| 11D | - | Sequence Input | |
| 11E | - | Analog Input Terminal A3 | |
| 11F | - | Number of Pulse 2 Speed Detection | |
| 120 | - | Fault contents 1 *3 | |
| 121 | - | Fault contents 2 *3 | |
| 122 | - | Fault contents 3 *3 | |
| 123 | - | Fault contents 4 *3 | |
| 124 | - | Fault contents 5 *3 | |
| 130 | - | CPF contents 1 *3 | |
| 131 | - | CPF contents 2 *3 | |
| 132 | - | CPF contents 3 *3 | |

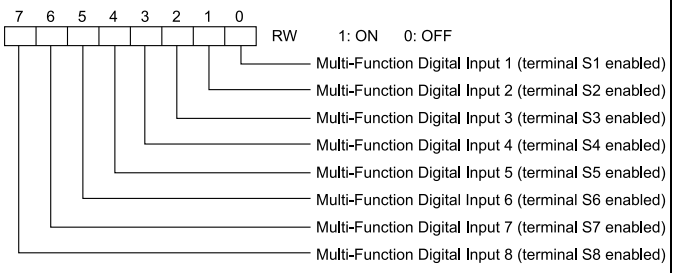
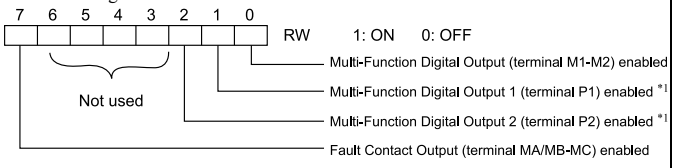
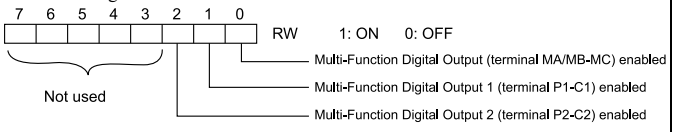
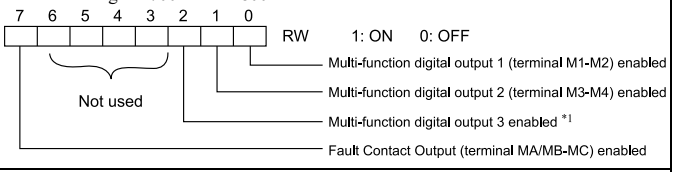
*1 When using GA700 and GA800, refer to command data 0009 (Hex.) of the MEMOBUS/Modbus data table in the drive instruction manual for information on bit assignment.

*2 Terminals are different for different drive models. Refer to *Terminals that Change depending on the Model of the Drive on page 35* for more information.

*3 Refer to *Drive Fault Contents on page 45* or *Drive Alarm Contents on page 48* for information on fault contents.

## ■ Drive Monitor Codes

**Table 10.3 Drive Monitor Codes List**

| Monitor Code (Hex.) | Name | Comments |
|---|---|---|
| 0000 | Reserved | - |
| 0001 | Output Frequency | Units are 0.01 Hz, determined by *o1-03 [Frequency Display Unit Selection]*. |
| 0002 | Output Current | Units are either 0.1 A or 0.01 A, depending on the capacity of the drive. |
| 0003 | Output Voltage Reference | Unit: 0.1 V |
| 0004 | Reserved | - |
| 0005 | Frequency Reference | Units are 0.01 Hz, determined by *o1-03 [Frequency Display Unit Selection]*. |
| 0006 | Motor Speed | Unit: 1 $min^{-1}$ |
| 0007 | Motor Torque | Unit: 0.1% |
| 0008 | DC Bus Voltage | Unit: 1 V |
| 0009 - 000D | Reserved | - |
| 000E | Output Power | Unit: 1 V |
| 000F | Input Terminal Status |  |
| 0010 | Output Terminal Status | • When using 1000-Series<br>  <br>• When using GA500<br>  <br>• When using GA700 and GA800<br>  |
| 0011 | Reserved | - |
| 0012 | Motor Excitation Current | Unit: 0.1% |
| 0013 | Reserved | - |
| 0014 | Cumulative Operation Time | • Unit: 1 hour<br>• Parameter *o4-02 [Elapsed Operating Time Selection]* determines if the operation time is whenever the drive is powered on or only when there is voltage output. |
| 0015, 0016 | Reserved | - |
| 0017 | Actual Operation Time | • Unit: 1 hour<br>• Parameter *o4-02 [Elapsed Operating Time Selection]* determines if the operation time is whenever the drive is powered on or only when there is voltage output. |
| 0018 | Motor Secondary Current | - |
| 0019 | Cumulative Power | Unit: 1 kW |
| 0034 | PID Setpoint Value | Unit: 0.1% |
| 0035 | PID Input | Unit: 0.1% |
| 0036 | PID Output | Unit: 0.1% |

| Monitor Code (Hex.) | Name | Comments |
|---|---|---|
| 1000 | Number of pulse 1 speed detection | - |
| 1001 | Number of pulse 2 speed detection | - |
| 1002 | Cumulative operation time | - |
| 1003 | Watt-hour output (lower digits) | - |
| 1004 | Watt-hour output (upper digits) | - |
| 1010 | Alarm code | - |
| 1011 | Fault code | - |
| 1012 | Reserved | - |
| 1013 | Fault contents 1 *2 | - |
| 1014 | Fault contents 2 *2 | - |
| 1015 | Fault contents 3 *2 | - |
| 1016 | Fault contents 4 *2 | - |
| 1017 | Fault contents 5 *2 | - |
| 101C | CPF contents 1 *2 | - |
| 101D | CPF contents 2 *2 | - |
| 101E | CPF contents 3 *2 | - |
| 101F | Alarm contents 1 *2 | - |
| 1020 | Alarm contents 2 *2 | - |
| 1021 | Alarm contents 3 *2 | - |
| 1022 | Alarm contents 4 *2 | - |
| 1023 | Alarm contents 5 *2 | - |
| 1027 | Output frequency at previous fault | - |
| 1028 | Output current at previous fault | - |
| 1029 | Output voltage at previous fault | - |
| 102A | Cumulative operation time at previous fault | - |

*1 Terminals are different for different drive models. Refer to *Terminals that Change depending on the Model of the Drive on page 35* for more information.
*2 Refer to *Drive Fault Contents on page 45* or *Drive Alarm Contents on page 48* for information on fault contents.

## ■ Drive Fault Contents

**Table 10.4 Drive Fault Contents**

| Extended Command Code (Monitor Code) (Hex.) | Name | | Fault Code (U2, U3) (Hex.) |
|---|---|---|---|
| | BIT | | |
| 120 (1013) | Fault contents 1 | | - |
| | 0 | Reserved | - |
| | 1 | Uv1 [DC Bus Undervoltage] | 0002 |
| | 2 | Uv2 [Control Power Undervoltage] | 0003 |
| | 3 | Uv3 [Soft Charge Answerback Fault] | 0004 |
| | 4 | SC [Short Circuit/IGBT Failure] | 0005 |
| | 5 | Reserved | - |
| | 6 | oC [Overcurrent] | 0007 |
| | 7 | ov [Overvoltage] | 0008 |
| | 8 | oH [Heatsink Overheat] | 0009 |
| | 9 | oH1 [Heatsink Overheat 1] | 000A |
| | A | oL1 [Motor Overload] | 000B |
| | B | oL2 [Drive Overload] | 000C |
| | C | oL3 [Overtorque Detection 1] | 000D |

| Extended Command Code (Monitor Code) (Hex.) | Name | | Fault Code (U2, U3) (Hex.) |
|---|---|---|---|
| | BIT | | |
| | D | oL4 [Overtorque Detection 2] | 000E |
| | E | rr [Dynamic Braking Transistor Fault] | 000F |
| | F | rH [Braking Resistor Overheat] | 0010 |
| 121 (1014) | Fault contents 2 | | - |
| | 0 | EF3 [External Fault (Terminal S3)] | 0011 |
| | 1 | EF4 [External Fault (Terminal S4)] | 0012 |
| | 2 | EF5 [External Fault (Terminal S5)] | 0013 |
| | 3 | EF6 [External Fault (Terminal S6)] | 0014 |
| | 4 | EF7 [External Fault (Terminal S7)] | 0015 |
| | 5 | EF8 [External Fault (Terminal S8)] | 0016 |
| | 6 | Reserved | - |
| | 7 | oS [Overspeed] (CLV, CLV/PM) | 0018 |
| | 8 | dEv [Speed Deviation] (CLV, CLV/PM) | 0019 |
| | 9 | PGo [Encoder (PG) Feedback Loss] (CLV, CLV/PM) | 001A |
| | A | PF [Input Phase Loss] | 001B |
| | B | LF [Output Phase Loss] | 001C |
| | C | oH3 [Motor Overheat (PTC Input)] | 001D |
| | D | oPr [Keypad Connection Fault] | 001E |
| | E | Err [EEPROM Write Error] | 001F |
| | F | oH4 [Motor Overheat Fault (PTC Input)] | 0020 |
| 122 (1015) | Fault contents 3 | | - |
| | 0 | CE [Modbus Communication Error] | 0021 |
| | 1 | bUS [Option Communication Error] | 0022 |
| | 2, 3 | Reserved | - |
| | 4 | CF [Control Fault] | 0025 |
| | 5 | SvE [Zero Servo Fault] | 0026 |
| | 6 | EF0 [Option Card External Fault] | 0027 |
| | 7 | FbL [PID Feedback Loss] | 0028 |
| | 8 | UL3 [Undertorque Detection 1] | 0029 |
| | 9 | UL4 [Undertorque Detection 2] | 002A |
| | A | oL7 [High Slip Braking Overload] | 002B |
| | B - E | Reserved | - |
| | F | Hardware Fault (includes oFx) | 0030 |
| 123 (1016) | Fault contents 4 | | - |
| | 0 | Reserved | - |
| | 1 | dv1 [Z Pulse Fault] (Only CLV/PM) | 0032 |
| | 2 | dv2 [Z Pulse Noise Fault Detection] (Only CLV/PM) | 0033 |
| | 3 | dv3 [Inversion Detection] (Only CLV/PM) | 0034 |
| | 4 | dv4 [Inversion Prevention Detection] (Only CLV/PM) | 0035 |
| | 5 | LF2 [Output Current Imbalance] | 0036 |
| | 6 | STo [Safe Torque OFF]<br>**Note:**<br>On GA500, GA700, and GA800, *STPo [Motor Step-Out Detected]* will be displayed. | 0037 |
| | 7 | PGoH [Encoder (PG) Hardware Fault] | 0038 |
| | 8, 9 | Reserved | - |
| | A | SEr [Speed Search Retries Exceeded] | 003B |

| Extended Command Code (Monitor Code) (Hex.) | Name | | Fault Code (U2, U3) (Hex.) |
|---|---|---|---|
| | BIT | | |
| | B-F | Reserved | - |
| 124 (1017) | Fault contents 5 | | - |
| | 0 | FbH [Excessive PID Feedback] | 0041 |
| | 1 | EF1 [External Fault (Terminal S1)] | 0042 |
| | 2 | EF2 [External Fault (Terminal S2)] | 0043 |
| | 3 | oL5 [Mechanical Weakening Detection 1] | 0044 |
| | 4 | UL5 [Mechanical Weakening Detection 2] | 0045 |
| | 5 | CoF [Current Offset Fault] | 0046 |
| | 6, 7 | Reserved | - |
| | 8 | dWFL [DriveWorksEZ Fault] | 0049 |
| | 9-B | Reserved | - |
| | C | voF [Output Voltage Detection Fault] | 004D |
| | D | rF [Braking Resistor Fault] | 004E |
| | E | boL [Braking Transistor Overload Fault]] | 004F |
| | F | Reserved | - |
| 130 (101C) | CPF contents 1 | | - |
| | 0, 1 | Reserved | - |
| | 2 | CPF02 [A/D Conversion Error] | 0083 |
| | 3 | CPF03 [Control Board Connection Error])] | 0084 |
| | 4, 5 | Reserved | - |
| | 6 | CPF06 [EEPROM Memory Data Error)] | 0087 |
| | 7 | CPF07 [Terminal Board Connection Error] | 0088 |
| | 8 | CPF08 [Terminal Board Connection Error] | 0089 |
| | 9, A | Reserved | - |
| | B | CPF11 [RAM Fault] | 008C |
| | C | CPF12 [FLASH Memory Fault] | 008D |
| | D | CPF13 [Watchdog Circuit Exception] | 008E |
| | E | CPF14 [Control Circuit Fault] | 008F |
| | F | Reserved | - |
| 131 (101D) | CPF contents 2 | | - |
| | 0 | CPF16 [Clock Fault] | 0091 |
| | 1 | CPF17 [Timing Fault] | 0092 |
| | 2 | CPF18 [Control Circuit Fault] | 0093 |
| | 3 | CPF19 [Control Circuit Fault] | 0094 |
| | 4 | CPF20 [Control Circuit Error] | 0095 |
| | 5 | CPF21 [Control Circuit Error] | 0096 |
| | 6 | CPF22 [Hybrid IC Error] | 0097 |
| | 7 | CPF23 [Control Board Connection Error] | 0098 |
| | 8 | CPF24 [Drive Unit Signal Fault] | 0099 |
| | 9 | Reserved | - |
| | A | CPF26 [BB Circuit Error] | 009B |
| | B | CPF27 [PWM Set Reg Error] | 009C |
| | C | CPF28 [PWM Pattern Error] | 009D |
| | D | CPF29 [On-Delay Error] | 009E |
| | E | CPF30 [BB On Error] | 009F |

| Extended Command Code (Monitor Code) (Hex.) | Name | | Fault Code (U2, U3) (Hex.) |
|---|---|---|---|
| | BIT | | |
| | F | CPF31 [ASIC Code Error] | 00A0 |
| 132 (101E) | CPF contents 3 | | - |
| | 0 | CPF32 [ASIC Startup Error] | 00A1 |
| | 1 | CPF33 [Watch-dog Eror] | 00A2 |
| | 2 | CPF34 [Power/Clock Eror] | 00A3 |
| | 3 - F | Reserved | - |

## ■ Drive Alarm Contents

**Table 10.5 Drive Alarm Contents**

| Monitor Code (Hex.) | Name | | Alarm Code (MEMOBUS/Modbus Register 07F (Hex.)) |
|---|---|---|---|
| | BIT | | |
| 101F | Alarm contents 1 | | - |
| | 0 | Uv [Undervoltage] | 0001 |
| | 1 | ov [Overvoltage] | 0002 |
| | 2 | oH [Heatsink Overheat] | 0003 |
| | 3 | oH2 [External Overheat] | 0004 |
| | 4 | oL3 [Overtorque Detection 1] | 0005 |
| | 5 | oL4 [Overtorque Detection 2] | 0006 |
| | 6 | EF [FWD/REV Run Command Input Error] | 0007 |
| | 7 | bb [Baseblock] | 0008 |
| | 8 | EF3 [External Fault (Terminal S3)] | 0009 |
| | 9 | EF4 [External Fault (Terminal S4)] | 000A |
| | A | EF5 [External Fault (Terminal S5)] | 000B |
| | B | EF6 [External Fault (Terminal S6)] | 000C |
| | C | EF7 [External Fault (Terminal S7)] | 000D |
| | D | EF8 [External Fault (Terminal S8)] | 000E |
| | E | Reserved | - |
| | F | oS [Overspeed] | 0010 |
| 1020 | Alarm contents 2 | | - |
| | 0 | dEv [Speed Deviation] | 0011 |
| | 1 | PGo [Encoder (PG) Feedback Loss] | 0012 |
| | 2 | oPr [Keypad Connection Fault] | 0013 |
| | 3 | CE [MEMOBUS/Modbus Communication Error] | 0014 |
| | 4 | bUS [Option Communication Error] | 0015 |
| | 5 | CALL [Serial Communication Transmission Error] | 0016 |
| | 6 | oL1 [Motor Overload] | 0017 |
| | 7 | oL2 [Drive Overload] | 0018 |
| | 8 | Reserved | - |
| | 9 | EF0 [Option Card External Fault] | 001A |
| | A | rUn [Motor Switch during Run] | 001B |
| | B | Reserved | - |
| | C | CALL [Serial Communication Transmission Error] | 001D |
| | D | UL3 [Undertorque Detection 1] | 001E |
| | E | UL4 [Undertorque Detection 2] | 001F |
| | F | SE [Modbus Test Mode Error] | 0020 |

| Monitor Code (Hex.) | Name | | Alarm Code (MEMOBUS/Modbus Register 07F (Hex.)) |
|---|---|---|---|
| | BIT | | |
| 1021 | Alarm contents 3 | | - |
| | 0 | Reserved | - |
| | 1 | oH3 [Motor Overheat (PTC Input)] | 0022 |
| | 2 - 5 | Reserved | - |
| | 6 | FbL [PID Feedback Loss] | 0027 |
| | 7 | FbH [Excessive PID Feedback] | 0028 |
| | 8 | Reserved | - |
| | 9 | dnE [Drive Disabled] | 002A |
| | A | PGoH [Encoder (PG) Hardware Fault] | 002B |
| | B - F | Reserved | - |
| 1022 | Alarm contents 4 | | - |
| | 0 | Reserved | - |
| | 1 | AEr [Station Adress Setting Error] | 0032 |
| | 2 | Reserved | - |
| | 3 | HCA [High Current Alarm] | 0034 |
| | 4 | LT-1 [Cooling Fan Maintenance Time] | 0035 |
| | 5 | LT-2 [Capacitor Maintenance Time] | 0036 |
| | 6, 7 | Reserved | - |
| | 8 | EF1 [External Fault (Terminal S1)] | 0039 |
| | 9 | EF2 [External Fault (Terminal S2)] | 003A |
| | A | HbbF [Safe Disable Signal Input] | 003B |
| | B | Hbb [Safe Disable Signal Input] | 003C |
| | C | oL5 [Mechanical Weakening Detection 1] | 003D |
| | D | UL5 [Mechanical Weakening Detection 2] | 003E |
| | E, F | Reserved | - |
| 1023 | Alarm contents 5 | | - |
| | 0 | voF [Output Voltage Detection Fault] | 0041 |
| | 1 | TrPC [IGBT Maintenance Time (90%)] | 0042 |
| | 2 | LT-3 [Soft Charge Bypass Relay Maintenance Time] | 0043 |
| | 3 | LT-4 [IGBT Maintenance Time (50%)] | 0044 |
| | 4 | boL [Braking Transistor Overload] | 0045 |
| | 5 - 7 | Reserved | - |
| | 8 | dWAL [DriveWorksEZ Alarm] | 0049 |
| | 9 - F | Reserved | - |

# ◆ D1000 Codes

## ■ D1000 Command Codes

**Table 10.6 D1000 Command Codes List**

| Command Code (Hex.) | Name | Description |
|---|---|---|
| 0074 | Fault History 1 | Reads the contents from *U3-01 [1st MostRecent Fault]*. |
| 0075 | Fault History 2 | Reads the contents from *U3-02 [2nd MostRecent Fault]*. |
| 0076 | Fault History 3 | Reads the contents from *U3-03 [3rd MostRecent Fault]*. |
| 0077 | Fault History 4 | Reads the contents from *U3-04 [4th MostRecent Fault]*. |
| 0078 | Fault History 5 | Reads the contents from *U3-05 [5th MostRecent Fault]*. |
| 0079 | Fault History 6 | Reads the contents from *U3-06 [6th MostRecent Fault]*. |

| Command Code (Hex.) | Name | Description |
|---|---|---|
| 007A | Fault History 7 | Reads the contents from *U3-07 [7th MostRecent Fault]*. |
| 0080 | Fault History 8 | Reads the contents from *U3-08 [8th MostRecent Fault]*. |
| 0081 | Fault History 9 | Reads the contents from *U3-09 [9th MostRecent Fault]*. |
| 0082 | Fault History 10 | Reads the contents from *U3-10 [10th MostRecentFault]*. |
| 007B | Read LOCAL/REMOTE status | Bit 0: 0 = Frequency reference from CC-Link is enabled.<br>Bit 1: 0 = FWD/REV Run command from CC-Link is enabled. |
| 00FB | Write LOCAL/REMOTE status | Bit 0: 0 = Frequency reference from CC-Link is enabled.<br>Bit 1: 0 = FWD/REV Run command from CC-Link is enabled.<br>When power is cycled, however, the source is determined by *b1-02 [Run Command Selection 1]*. |
| - | Read Parameters | Adds 1000 (Hex.) to the MEMOBUS/Modbus register number. |
| - | Parameter Settings | Master executes commands by adding 2000 (Hex.) to the MEMOBUS/Modbus register number. Conversion takes place on the option side. |
| 00F4 | Clear All Fault Contents | 9696 (Hex.): Clear fault history |
| 00FD | Reset Converter | 9696 (Hex.): Fault reset |

## ■ D1000 Extended Command Codes

**Table 10.7 D1000 Extended Command Codes**

| Command Code | | Name | |
|---|---|---|---|
| Read (Hex.) | Write (Hex.) | BIT | |
| 100 | - | Operation Signals | |
| | | 0 | Run Command *1 Automatic Run Command/Stop Command *1 |
| | | 1 | Forced Run command/Stop Command |
| | | 2 | External Fault<br>1: EF0 [Option Card External Fault] |
| | | 3 | Fault Reset<br>1: Reset Command |
| | | 4 | Multi-Function Input 1 |
| | | 5 | Multi-Function Input 2 |
| | | 6 | Multi-Function Input 3 |
| | | 7 | Multi-Function Input 4 |
| | | 8 | Multi-Function Input 5 |
| | | 9 | Multi-Function Input 6 |
| | | A | Multi-Function Input 7 |
| | | B | Multi-Function Input 8 |
| | | C - F | Reserved |
| 105 | 205 | Multi-Function Analog Monitor Output Terminal 1 | |
| 106 | 206 | Multi-Function Analog Monitor Output Terminal 2 | |
| 107 | - | Multi-Function Relay Output | |
| | | 0 | Multi-Function Contact Outputs (Terminal M1-M2)<br>1: ON<br>0: OFF |
| | | 1 | Multi-Function Photocoupler Output 1 (Terminal P1-PC) *2<br>1: ON<br>0: OFF |
| | | 2 | Multi-Function Photocoupler Output 2 (Terminal P2-PC) *2<br>1: ON<br>0: OFF |
| | | 3 - 5 | Reserved |
| | | 6 | 1: Bit 7 Function Enabled |
| | | 7 | 1: Fault Contact Output (Terminal MA/MB-MC)<br>1: ON<br>0: OFF |

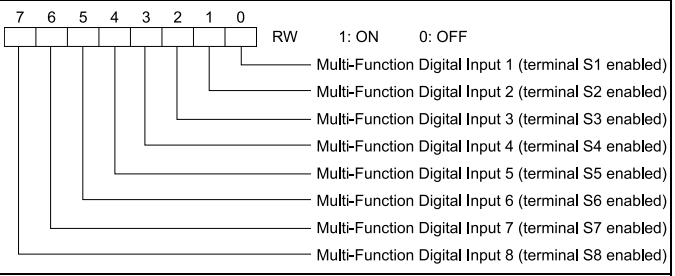
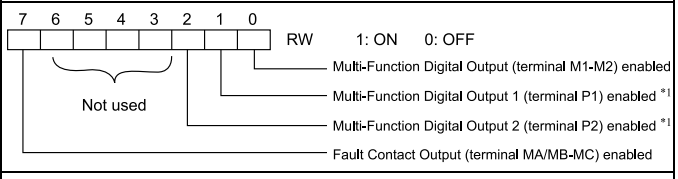
| Command Code | | Name | |
|---|---|---|---|
| Read (Hex.) | Write (Hex.) | BIT | |
| | | 8 - F | Reserved |
| 110 | - | Status Signals | |
| | | 0 | 1: During Run<br>0: Stop |
| | | 1 | Reserved |
| | | 2 | 1: During Regenerative Operation |
| | | 3 | 1: During Reset Signal Input |
| | | 4 | 1: During Run 1 (Operation Ready) |
| | | 5 | 1: Operation Ready |
| | | 6 | 1: Alarm |
| | | 7 | 1: Fault |
| | | 8 | 1: oPE Error |
| | | 9 | 1: Momentary Power Loss Ridethru<br>0: Power Loss Recovery |
| | | A | 1: ComCtrl status/NetCtrl status |
| | | B, C | Reserved |
| | | D | 1: During Active Current Limit |
| | | E, F | Reserved |
| 117 | - | Terminal A1 Analog Input | |
| 11C | - | Terminal A2 Analog Input | |
| 11E | - | Terminal A3 Analog Input | |
| 120 | - | Fault Contents 1 *1 | |
| 121 | - | Fault Contents 2 *1 | |
| 122 | - | Fault Contents 3 *1 | |
| 123 | - | Fault Contents 4 *1 | |
| 124 | - | Fault Contents 5 *1 | |
| 125 | - | Fault Contents 6 *1 | |
| 126 | - | Fault Contents 7 *1 | |
| 130 | - | CPF Contents 1 *1 | |
| 131 | - | CPF Contents 2 *1 | |
| 132 | - | CPF Contents 3 *1 | |
| 160 | - | DC Bus Voltage Feedback | |
| 161 | - | DC Voltage Reference | |
| 162 | - | DC Current Reference | |
| 163 | - | Power Supply Side Power | |
| 164 | - | Power Supply Side Current | |
| - | 280 | DC Bus Voltage Reference | |
| - | 281 | Active Current Limit (Positive) | |
| - | 282 | Active Current Limit (Negative) | |

| Command Code | | Name | |
|---|---|---|---|
| Read (Hex.) | Write (Hex.) | BIT | |
| 1181 | 2181 | Read and Write Run Command Source<br>0: LED Keypad<br>1: Control Circuit Terminals (sequencer input)<br>2: Memobus/Modbus Communications<br>3: Option PCB | |
| 1179 | 2179 | Read and Write Voltage Reference Source<br>0: Keypad<br>1: Control Circuit Terminals (analog input)<br>2: Memobus/Modbus Communications<br>3: Option<br>7: Input Voltage Based Control 1<br>8: Input Voltage Based Control 2 | |

*1 Refer to *D1000 Fault Contents on page 53* or *D1000 Alarm Contents on page 55* for information on fault contents.
*2 Terminals are different for different drive models. Refer to *Terminals that Change depending on the Model of the Drive on page 35* for more information.

## ■ D1000 Monitor Codes

**Table 10.8 D1000 Monitor Codes List**

| Monitor Code (Hex.) | Name | Comments |
|---|---|---|
| 0000 - 0006 | Reserved | - |
| 0007 | DC Bus Voltage Reference (before SFS) | Unit: 1 V |
| 0008 | DC Bus Voltage Feedback | Unit: 1 V |
| 0009 - 000C | Reserved | - |
| 000D | Power Supply Side Power | Unit: 1 kW |
| 000E | DC Bus Side Power | Unit: 1 kW |
| 000F | Input Terminal Status |  |
| 0010 | Output Terminal Status |  |
| 0011 - 0017 | Reserved | - |
| 0018 | Active Current | Unit: 0.1% |
| 0019 | Reserved | - |
| 0034 - 0036 | Reserved | - |
| 1000, 1001 | Reserved | - |
| 1002 | Power Supply Side Voltage | - |
| 1003 | Power Supply Side Current | - |
| 1004 | DC Bus Side Current | - |
| 1010 | Alarm Code | - |
| 1011 | Fault Code | - |
| 1012 | Reserved | - |
| 1013 | Fault contents 1 *2 | - |
| 1014 | Fault contents 2 *2 | - |
| 1015 | Fault contents 3 *2 | - |

| Monitor Code (Hex.) | Name | Comments |
|---|---|---|
| 1016 | Fault contents 4 *2 | - |
| 1017 | Fault contents 5 *2 | - |
| 1018 | Fault contents 6 *2 | - |
| 1019 | Fault contents 7 *2 | - |
| 101C | CPF contents 1 *2 | - |
| 101D | CPF contents 2 *2 | - |
| 101E | CPF contents 3 *2 | - |
| 101F | Alarm contents 1 *2 | - |
| 1020 | Alarm contents 2 *2 | - |
| 1021 | Alarm contents 3 *2 | - |
| 1022 | Alarm contents 4 *2 | - |
| 1023 | Alarm contents 5 *2 | - |
| 1027 | Reserved | - |
| 1028 | Power Supply Side Current at Previous Fault | - |
| 1029 | DC Bus Voltage Feedback at Previous Fault | - |
| 102A | Cumulative Operation Time at Previous Fault | - |

*1 Terminals are different for different drive models. Refer to *Terminals that Change depending on the Model of the Drive on page 35* for more information.

*2 Refer to *D1000 Fault Contents on page 53* or *D1000 Alarm Contents on page 55* for information on fault contents.

## ■ D1000 Fault Contents

**Table 10.9 D1000 Fault Contents**

| Extended Command Code Monitor Code (Hex.) | Name | | Fault Code (U2, U3) (Hex.) |
|---|---|---|---|
| | BIT | | |
| 120 (1013) | Fault contents 1 | | - |
| | 0 | FUd [DC Fuse Blowout] | 0001 |
| | 1 | Uv1 [DC Bus Undervoltage] | 0002 |
| | 2 | Uv2 [Control Power Undervoltage] | 0003 |
| | 3 | Uv3 [Soft Charge Answerback Fault] | 0004 |
| | 4 | SC [Short Circuit/IGBT Failure] | 0005 |
| | 5 | GF [Ground Fault] | 0006 |
| | 6 | oC [Overcurrent] | 0007 |
| | 7 | ov [Overvoltage] | 0008 |
| | 8 | oH [Heatsink Overheat] | 0009 |
| | 9 | oH1 [Heatsink Overheat 1] | 000A |
| | A | Reserved | - |
| | B | oL2 [Converter Overload] | 000C |
| | C - F | Reserved | - |
| 121 (1014) | Fault contents 2 | | - |
| | 0 | EF3 [External Fault (Terminal S3)] | 0011 |
| | 1 | EF4 [External Fault (Terminal S4)] | 0012 |
| | 2 | EF5 [External Fault (Terminal S5)] | 0013 |
| | 3 | EF6 [External Fault (Terminal S6)] | 0014 |
| | 4 | EF7 [External Fault (Terminal S7)] | 0015 |
| | 5 | EF8 [External Fault (Terminal S8)] | 0016 |
| | 6 | FAn [Internal Fan Fault] | 0017 |
| | 7 - C | Reserved | - |

| Extended Command Code Monitor Code (Hex.) | Name | | Fault Code (U2, U3) (Hex.) |
|---|---|---|---|
| | BIT | | |
| | D | oPr [Operator Connection Fault] | 001E |
| | E | Err [EEPROM Write Error] | 001F |
| | F | Reserved | - |
| 122 (1015) | Fault contents 3 | | - |
| | 0 | CE [Modbus Communication Error] | 0021 |
| | 1 | bUS [Option Communication Error] | 0022 |
| | 2 - 5 | Reserved | - |
| | 6 | EF0 [Option Card External Fault] | 0027 |
| | 7 - E | Reserved | - |
| | F | Hardware Fault (includes oFx) | 0030 |
| 123 (1016) | Fault contents 4 | | - |
| | 0 - F | Reserved | - |
| 124 (1017) | Fault contents 5 | | - |
| | 0 | Reserved | - |
| | 1 | EF1 [External Fault (Terminal S1)] | 0042 |
| | 2 | EF2 [External Fault (Terminal S2)] | 0043 |
| | 3, 4 | Reserved | - |
| | 5 | CoF [Current Offset Fault] | 0046 |
| | 6 - F | Reserved | - |
| 125 (1018) | Fault contents 6 | | - |
| | 0 | Reserved | - |
| | 1 | nSE [Node Setup Error] | 0052 |
| | 2 - F | Reserved | - |
| 126 (1019) | Fault contents 7 | | - |
| | 0 | Uv4 [Power Supply Module Undervoltage] | 0061 |
| | 1 - 4 | Reserved | - |
| | 5 | AUv [Power Supply Undervoltage] | 0066 |
| | 6 | Aov [Power Supply Overvoltage] | 0067 |
| | 7 | Fdv [Power Supply Frequency Fault] | 0068 |
| | 8 | SrC [Phase Order Fault] | 0069 |
| | 9 | PF2 [Input Power Supply Fault] | 006A |
| | A | PF3 [Input Phase Loss Detection] | 006B |
| | B - E | Reserved | - |
| | F | FUA [AC Fuse Blowout] | 0070 |
| 130 (101C) | CPF contents 1 | | - |
| | 0, 1 | Reserved | - |
| | 2 | CPF02 [A/D Conversion Error] | 0083 |
| | 3 | CPF03 [Control Board Connection Error])] | 0084 |
| | 4, 5 | Reserved | - |
| | 6 | CPF06 [EEPROM Memory Data Error)] | 0087 |
| | 7 | CPF07 [Terminal Board Connection Error] | 0088 |
| | 8 | CPF08 [Terminal Board Connection Error] | 0089 |
| | 9, A | Reserved | - |
| | B | CPF11 [RAM Error] | 008C |
| | C | CPF12 [FLASH Memory Fault] | 008D |

| Extended Command Code Monitor Code (Hex.) | Name | | Fault Code (U2, U3) (Hex.) |
|---|---|---|---|
| | BIT | | |
| | D | CPF13 [Watchdog Circuit Exception] | 008E |
| | E | CPF14 [Control Circuit Fault] | 008F |
| | F | Reserved | - |
| 131 (101D) | CPF contents 2 | | - |
| | 0 | CPF16 [Clock Fault] | 0091 |
| | 1 | CPF17 [Timing Fault] | 0092 |
| | 2 | CPF18 [Control Circuit Fault] | 0093 |
| | 3 | CPF19 [Control Circuit Fault] | 0094 |
| | 4 | CPF20 [Control Circuit Error] | 0095 |
| | 5 | CPF21 [Control Circuit Error] | 0096 |
| | 6 | CPF22 [Hybrid IC Error] | 0097 |
| | 7 | Reserved | - |
| | 8 | CPF24 [Converter Unit Signal Fault] | 0099 |
| | 9 | CPF25 [Terminal Board not Connected] | 009A |
| | A | CPF26 [BB Circuit Error] | 009B |
| | B | CPF27 [PWM Set Reg Error] | 009C |
| | C | CPF28 [PWM Pattern Error] | 009D |
| | D | CPF29 [On-Delay Error] | 009E |
| | E | CPF30 [BB On Error] | 009F |
| | F | CPF31 [ASIC Code Error] | 00A0 |
| 132 (101E) | CPF contents 3 | | - |
| | 0 | CPF32 [ASIC Startup Error] | 00A1 |
| | 1 | CPF33 [Watch-dog Eror] | 00A2 |
| | 2 | CPF34 [Power/Clock Eror] | 00A3 |
| | 3 | CPF35 [Ext A/D Conv Error] | 00A4 |
| | 4 - 7 | Reserved | - |
| | 8 | CPF40 [Control Circuit Error] | 00A9 |
| | 9 | CPF41 [Control Circuit Error] | 00AA |
| | A | CPF42 [Control Circuit Error] | 00AB |
| | B | CPF43 [Control Circuit Error] | 00AC |
| | C | CPF44 [Control Circuit Error] | 00AD |
| | D | CPF45 [Control Circuit Error] | 00AE |
| | E, F | Reserved | - |

## ■ D1000 Alarm Contents

**Table 10.10 D1000 Alarm Contents**

| Monitor Code (Hex.) | Name | | Alarm Code (MEMOBUS/Modbus Register 07F (Hex.)) |
|---|---|---|---|
| | BIT | | |
| 101F | Alarm contents 1 | | - |
| | 0 | Uv [DC Bus Undervoltage] | 0001 |
| | 1 | ov [Overvoltage] | 0002 |
| | 2 | oH [Heatsink Overheat] | 0003 |
| | 3 | oH2 [Converter Overheat] | 0004 |
| | 4 - 6 | Reserved | - |
| | 7 | bb [Converter Baseblock] | 0008 |

| Monitor Code (Hex.) | Name | | Alarm Code (MEMOBUS/Modbus Register 07F (Hex.)) |
|---|---|---|---|
| | BIT | | |
| | 8 | EF3 [External Fault (Terminal S3)] | 0009 |
| | 9 | EF4 [External Fault (Terminal S4)] | 000A |
| | A | EF5 [External Fault (Terminal S5)] | 000B |
| | B | EF6 [External Fault (Terminal S6)] | 000C |
| | C | EF7 [External Fault (Terminal S7)] | 000D |
| | D | EF8 [External Fault (Terminal S8)] | 000E |
| | E | FAn [Internal Fan Fault] | 000F |
| | F | Reserved | - |
| 1020 | Alarm contents 2 | | - |
| | 0, 1 | Reserved | - |
| | 2 | oPr [Operator Connection Fault] | 0013 |
| | 3 | CE [MEMOBUS/Modbus Communication Error] | 0014 |
| | 4 | bUS [Option Communication Error] | 0015 |
| | 5 | CALL [Serial Communication Transmission Error] | 0016 |
| | 6 | Reserved | - |
| | 7 | oL2 [Converter Overload] | 0018 |
| | 8 | Reserved | - |
| | 9 | EF0 [Option Card External Fault] | 001A |
| | A, B | Reserved | - |
| | C | CALL [Serial Communication Transmission Error] | 001D |
| | D, E | Reserved | - |
| | F | SE [Modbus Test Mode Error] | 0020 |
| 1021 | Alarm contents 3 | | - |
| | 0 - F | Reserved | - |
| 1022 | Alarm contents 4 | | - |
| | 0 | Reserved | - |
| | 1 | AEr [Station Adress Setting Error] | 0032 |
| | 2 | Reserved | - |
| | 3 | HCA [High Current Alarm] | 0034 |
| | 4 | LT-1 [Cooling Fan Maintenance Time] | 0035 |
| | 5 | LT-2 [Capacitor Maintenance Time] | 0036 |
| | 6, 7 | Reserved | - |
| | 8 | EF1 [External Fault (Terminal S1)] | 0039 |
| | 9 | EF2 [External Fault (Terminal S2)] | 003A |
| | A - F | Reserved | - |
| 1023 | Alarm contents 5 | | - |
| | 0, 1 | Reserved | - |
| | 2 | LT-3 [Soft Charge Bypass Relay Maintenance Time] | 0043 |
| | 3 - E | Reserved | - |
| | F | AUv [Power Supply Undervoltage] | - |

# 11 European Standards

**Figure 11.1 CE Mark**

The CE mark indicates compliance with European safety and environmental regulations.

European standards include the Machinery Directive for machine manufacturers, the Low Voltage Directive for electronics manufacturers, and the EMC Directive for controlling noise.

It is required for engaging in business and commerce in Europe.

This option displays the CE mark based on the EMC guidelines.

EMC Directive: 2014/30/EU

Drives used in combination with this option and devices used in combination with the drive must also be CE certified and display the CE mark.

When using drives displaying the CE mark in combination with other devices, it is ultimately the responsibility of the user to ensure compliance with CE standards. Verify that conditions meet European standards after setting up the device.

## ◆ EMC Directive Compliance

This option is tested according to European standard EN 61800- 3:2004/A1:2012 and complies with the EMC Directive. The CE marking is declared based on the harmonized standards.

### ■ Option Installation

Verify the following installation conditions to make sure that other devices and machinery used with this option and drive also comply with EMC Directive:

1. Use dedicated shielded cable for the option and external device (for example, encoder, I/O device, or master), or route the wiring through a metal conduit.
2. Keep wiring as short as possible and ground the largest possible surface area of the shield to the metal panel as specified by Figure 11.3. Figure 11.2

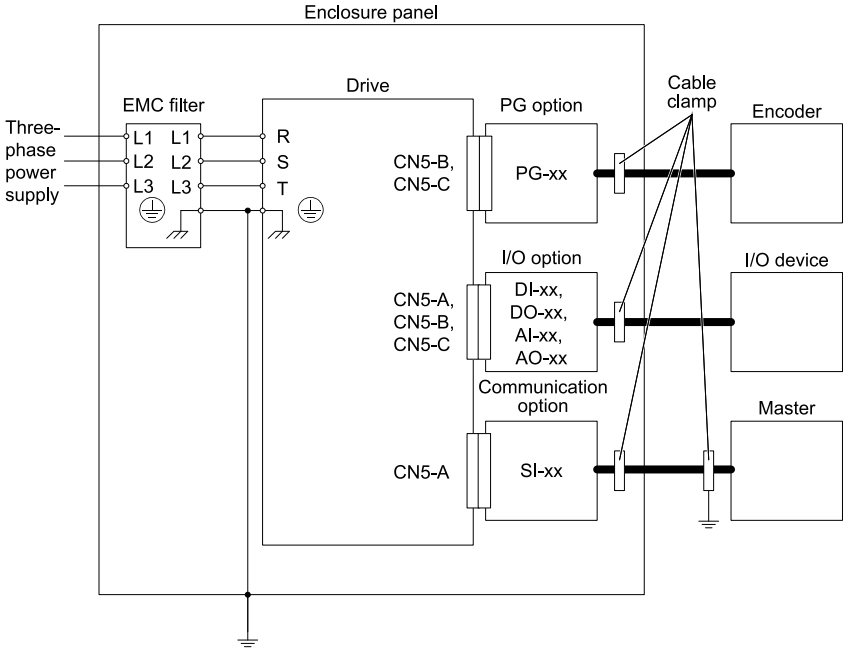



**Figure 11.2 Option Installation for CE Compliance: 1000-Series, GA700, GA800**

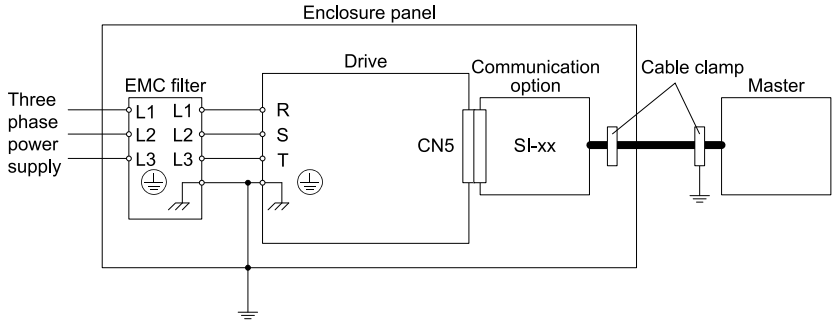
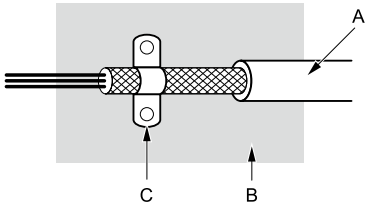



**Figure 11.3 Option Installation for CE Compliance: GA500**

3. Ground the largest possible surface area of the shield to the metal panel.
   Using cable clamps is recommended.




**A - Braided shield cable**
**B - Metal panel**
**C - Cable clamp (conductive)**

**Figure 11.4 Ground Area**

# 12 Precautions for Korean Radio Waves Act

**Figure 12.1 KC Mark**

This product confirms to broadcast and communications equipment for business use (Class A) and are designed for use in locations other than in ordinary houses.

Drives that bear the Korea Certification (KC) mark conform to the Korean Radio Waves Act. Be careful when you use the drive in Korea under the following conditions.

**Table 12.1 Precaution When You Use this Drive**

| Precautions |
|---|
| This equipment is evaluated for compatibility for use in a business environment and may cause radio interference in a domestic environment. |

**Note:**
The user guide applies only to “Business Broadcasting Communication Equipment”.

Comply with the EMC Directive to conform to the Korean Radio Act.

# 13 Specifications

## ◆ Specifications

**Table 13.1 Option Specifications**

| Items | Specifications |
|---|---|
| Model | SI-C3 |
| CC-Link Version | Complies with CC-Link Ver.1.10 |
| Station Type | Remote device station |
| No. of Occupied Stations | 1 |

| Items | Specifications |
|---|---|
| Communication Speed | 156 kbps to 10 Mbps |
| Ambient Temperature | -10 °C - +50 °C (14 °F - 122 °F) |
| Humidity | Up to 95% RH (no condensation) |
| Storage Temperature | -20 °C - +60 °C (-4 °F - 140 °F) allowed for short-term transport of the product |
| Area of Use | Indoors and free from:<br>• Oil mist, corrosive gas, flammable gas, and dust<br>• Radioactive materials or flammable materials, including wood<br>• Harmful gas or fluids<br>• Salt<br>• Direct sunlight<br>• Falling foreign objects |
| Altitude | Up to 1000 m (3280 ft) |

**Note:**

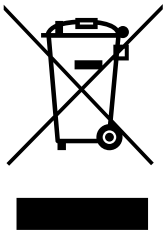
The number of drives that can be connected to the network varies depending on the type of nodes connected. Refer to *Related Drive Parameters on page 23* for more information.

# 14 Disposal

## ◆ Disposal Instructions

Correctly dispose of the product and packing material as specified by applicable regional, local, and municipal laws and regulations.

## ◆ WEEE Directive



The wheelie bin symbol on this product, its manual, or its packaging identifies that you must recycle it at the end of its product life.

You must discard the product at an applicable collection point for electrical and electronic equipment (EEE). Do not discard the product with usual waste.

## Revision History

| Date of Publication | Revision Number | Section | Revised Content |
|---|---|---|---|
| September 2022 | 4 | All | Revision: Reviewed and corrected entire documentation |
| | | Chapter 4, Chapter 5 | Addition: Grounding method switch (S1) |
| | | Chapter 12 | Addition: Precautions for Korean Radio Waves Act |
| February 2019 | 3 | All | Addition: Applicable product series<br>Revision: Reviewed and corrected entire documentation |
| | | Chapter 13 | Addition: Disposal |
| December 2018 | 2 | All | Addition: Applicable product series<br>Revision: Reviewed and corrected entire documentation |
| October 2016 | 1 | All | Revision: Applicable product series |
| June 2016 | - | - | First Edition |

YASKAWA AC Drive Option

# CC-Link

## Technical Manual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