MITSUBISHI
TRANSISTORIZED INVERTER

FR-A500
F500
E500

FR-A500/F500/E500 series
COMMUNICATION OPTION
REFERENCE MANUAL
INTRODUCTION

Along with strong wiring-saving needs on the market, there are increasing needs for remote operation and monitoring by linking a personal computer, PLCs and inverters. We have been responding to market needs with the MELSECNET/Mini-S3-compatible option units which are the lower-level link of our PLCs. However, various field networks (lower-level link) have been made open mainly in Europe and U.S.A., and recent trends toward open field networks are rapidly making a deep penetration in the Factory Automation field. In response to such trends toward open field networks, inverters are also being made open in various ways in the corresponding areas. To meet such trends, options or special-purpose products developed for compatibility with the major networks in the world are available for our inverters. This manual explains the settings, programming methods and other general information of these network-compatible inverters and options.
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<th>RS-485</th>
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<th>DeviceNet</th>
<th>Profinet DP</th>
<th>Modbus Plus</th>
</tr>
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<tr>
<td>Developed by</td>
<td>EIA Standard</td>
<td>Mitsubishi Electric</td>
<td>Allen Bradley</td>
<td>Siemens, etc.</td>
<td>Modicon Plus</td>
</tr>
<tr>
<td>Released</td>
<td>April, 1983</td>
<td>October, 1996</td>
<td>March, 1994</td>
<td>1994</td>
<td></td>
</tr>
<tr>
<td>User group</td>
<td>None</td>
<td>None</td>
<td>ODVA (Open DeviceNet Vendor Association)</td>
<td>(Profibus Netzer Organization)</td>
<td>None</td>
</tr>
<tr>
<td>Number of partners</td>
<td>122</td>
<td>250</td>
<td>575</td>
<td>575</td>
<td></td>
</tr>
<tr>
<td>Position</td>
<td>General</td>
<td>Device bus</td>
<td>Device bus</td>
<td>Device bus</td>
<td>Device bus</td>
</tr>
<tr>
<td>Industry application</td>
<td>General</td>
<td>General</td>
<td>Automobile</td>
<td>Automobile</td>
<td>General</td>
</tr>
<tr>
<td>Major area</td>
<td>General</td>
<td>Asia</td>
<td>North America</td>
<td>Europe</td>
<td>North America, Europe</td>
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<tr>
<td>Communication speed</td>
<td>19.2Kbps maximum</td>
<td>156K to 10Mbps</td>
<td>125K to 50Mbps</td>
<td>9.6K to 12Mbps</td>
<td>38.4Kbps maximum</td>
</tr>
<tr>
<td>Overall distance</td>
<td>500m</td>
<td>1200m (156Kbps)</td>
<td>200m (250Kbps)</td>
<td>100m (125Kbps)</td>
<td>450m (1Mbps)</td>
</tr>
<tr>
<td>Communication system</td>
<td>Master/slave</td>
<td>Master/slave</td>
<td>Master/slave, N: N</td>
<td>Master/slave</td>
<td>Master/slave</td>
</tr>
<tr>
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<td>14 bytes</td>
<td>256 bytes</td>
<td>8 bytes</td>
<td>32 bytes</td>
<td>No limit</td>
</tr>
<tr>
<td>Connection cable</td>
<td>Twisted pair</td>
<td>Twisted pair</td>
<td>Twisted pair</td>
<td>Twisted pair, fiber-optic option</td>
<td>Twisted pair</td>
</tr>
<tr>
<td>Max. number of nodes</td>
<td>32</td>
<td>64</td>
<td>64</td>
<td>32</td>
<td>61</td>
</tr>
<tr>
<td>Max. number of link points</td>
<td>512 words</td>
<td>2048 I/O</td>
<td>512 I/O (I/O 256 each)</td>
<td>No limit (master memory range)</td>
<td></td>
</tr>
<tr>
<td>Real scan time</td>
<td>Response time approximately 25ms (9600bps)</td>
<td>4ms (2048 I/O 10Mbps)</td>
<td>7ms (2048 I/O + 512 registers 10Mbps)</td>
<td>2ms (512 I/O 12Mbps)</td>
<td></td>
</tr>
<tr>
<td>Remarks</td>
<td>Global communication standard widely used throughout the world. The values given in the table are for inverters.</td>
<td>Setting of the standby master station enables data link to be continued if a fault occurs in the master station. The temporary error disable station function allows the unit to be changed with the data retained online.</td>
<td>Omron and Hitachi are actively publicizing in Japan. Unsuitable for communication of large volumes of transmission data because the data that may be transmitted in one package is a maximum 8 bytes.</td>
<td>As of April, 1997, about 80% of Profinet nodes shipped are DP. The maximum communication speed of original 1.5Mbps was increased to 12Mbps in 1995. PNO has set up offices in 15 countries, and Profinet International was established in 1995 to integrate global management.</td>
<td>Modicon's private network</td>
</tr>
<tr>
<td>Applicable inverters</td>
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<td>(Plug-in option used for compatibility) FR-A500 + FR-A5NC</td>
<td>(Plug-in option used for compatibility) FR-F500 + FR-A5NC</td>
<td>(Plug-in option used for compatibility) FR-A500 + FR-A5ND</td>
<td>(Plug-in option used for compatibility) FR-F500 + FR-A5ND</td>
</tr>
<tr>
<td></td>
<td>FR-F500</td>
<td>FR-E500</td>
<td>FR-E540 (Dedicated inverter used for compatibility) FR-E520-OCKN</td>
<td>FR-A500 + FR-A5NM</td>
<td>FR-F500 + FR-A5NM</td>
</tr>
</tbody>
</table>

Remarks:
- Global communication standard widely used throughout the world. The values given in the table are for inverters.
- Setting of the standby master station enables data link to be continued if a fault occurs in the master station. The temporary error disable station function allows the unit to be changed with the data retained online.
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- Modicon's private network.
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1.1 Overview

Computer link allows inverters connected with a computer, such as a personal computer, by communication cables to be operated and monitored and their parameters to be changed, saved etc. by user programs.

(1) Features of computer link-compatible inverters

1) Communication function is standard.
   You can remove the operation panel (or cover etc.) and use RS-485 to perform communication operation via the PU connector.
   Note: A commercially available converter is required when using a computer (personal computer) which only has RS-232C communication.

2) Plug-in option is also available.
   The computer link plug-in option available for the FR-A500 and FR-F500 series inverters and enables RS-485 communication operation to be performed with the Parameter unit (operation panel) connected.

3) Setup Software
   The Setup Software which offers an easy-to-use inverter environment is available to support you from inverter startup to maintenance.

(2) Types of computer link-compatible inverters

<table>
<thead>
<tr>
<th>Inverter Series</th>
<th>Method for Compatibility with Computer Link</th>
</tr>
</thead>
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<tr>
<td>FR-A500</td>
<td>Connected to PU connector</td>
</tr>
<tr>
<td>FR-F500</td>
<td>Connected to PU connector</td>
</tr>
<tr>
<td>FR-E500</td>
<td>Connected to PU connector</td>
</tr>
</tbody>
</table>
1.2 Specifications

COMPUTER LINK (RS-485)

(1) Power supply
- Control power: Supplied by the inverter
- Communication power: 5VDC, maximum 60mA

(2) Conforming standard
- [EIA Standard] Shared between RS-422 and RS-485

(3) Transmission form
- Multidrop link system

(4) Communication cable
- Twisted pair cable

(5) Transmission distance
- Maximum 500m overall

(6) Number of inverters connected
- Up to 10 inverters for RS-422 computer interface
- Up to 32 inverters for RS-485 computer interface

(7) Applicable computer
- Computer with RS-422 or RS-485 interface function
  By using a converter, a computer with RS-232C interface function is also applicable.

(8) Communication specifications

<table>
<thead>
<tr>
<th>Connection with PU Connector</th>
<th>Connection of FR-A5NR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conforming standard</td>
<td>RS-485 Standard</td>
</tr>
<tr>
<td>Number of inverters connected</td>
<td>1:N (maximum 32 inverters)</td>
</tr>
<tr>
<td>Communication speed</td>
<td>Selectable between 19200, 9600 and 4800bps</td>
</tr>
<tr>
<td>Control procedure</td>
<td>Asynchronous system</td>
</tr>
<tr>
<td>Communication method</td>
<td>Half duplex system</td>
</tr>
<tr>
<td>Station number setting</td>
<td>0 to 31</td>
</tr>
<tr>
<td>Character system</td>
<td>ASCII (7 bits/8 bits) selectable</td>
</tr>
<tr>
<td>Stop bit length</td>
<td>1 bit/2 bits selectable</td>
</tr>
<tr>
<td>Terminator</td>
<td>[CR/ULF (yes/no selectable)]</td>
</tr>
<tr>
<td>Check system</td>
<td>Parity check: Yes (even/odd)/no selectable</td>
</tr>
<tr>
<td></td>
<td>Sum check: Yes</td>
</tr>
<tr>
<td>Waiting time setting</td>
<td>Yes/no selectable</td>
</tr>
</tbody>
</table>

(9) Response time

![Response time diagram]

Data transmission time
(Refer to the following formula)

\[
\text{Data transmission time} = \text{Inverter data processing time} + \text{data check time (setting \times 10ms)} + \text{waiting time (12ms)}
\]

[Data transmission time formula]

\[
\text{data transmission time (s)} = \frac{1}{\text{Communication speed (Baudrate)}} \times \text{Number of data characters (Refer to inverter manual)} \times \text{Communication specifications* (Total number of bits)}
\]

*Communication specifications (Refer to the following table)

<table>
<thead>
<tr>
<th>Name</th>
<th>Number of Bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop bit length</td>
<td>1 bit</td>
</tr>
<tr>
<td></td>
<td>2 bits</td>
</tr>
<tr>
<td></td>
<td>7 bits</td>
</tr>
<tr>
<td></td>
<td>8 bits</td>
</tr>
<tr>
<td>Parity check</td>
<td>Yes 1 bit</td>
</tr>
<tr>
<td></td>
<td>No 0</td>
</tr>
<tr>
<td>Start bit</td>
<td>Yes 1 bit</td>
</tr>
</tbody>
</table>

Note: 1 bit is always required for the start bit.
Minimum total number of bits: 9 bits, maximum total number of bits: 12 bits
**Example:** Response time when forward (reverse) rotation command is given by communication

**Calculation example 1:**
1) Baudrate = 9600 baud, number of data characters = 12, stop bit length = 2 bits, data length = 8 bits, parity check = yes (presence), CR, LF instructions = yes (presence)
\[
\frac{9600}{12} \times 12 = 0.015\text{s} (15.0\text{ms})
\]
2) Same conditions as above with the exception of baudrate = 19200 baud
\[
\frac{19200}{12} \times 12 = 0.0075\text{s} (7.5\text{ms})
\]
3) Same conditions as above with the exception of baudrate = 300 baud
\[
\frac{300}{12} \times 12 = 0.48\text{s} (480\text{ms})
\]

**Calculation example 2:**
1) Baudrate = 9600 baud, number of data characters = 5, stop bit length = 2 bits, data length = 8 bits, parity check = yes (presence), CR, LF instructions = yes (presence)
\[
\frac{9600}{5} \times 12 = 0.00625\text{s} (6.25\text{ms})
\]
2) Same conditions as above with the exception of baudrate = 19200 baud
\[
\frac{19200}{5} \times 12 = 0.003125\text{s} (3.125\text{ms})
\]
3) Same conditions as above with the exception of baudrate = 300 baud
\[
\frac{300}{5} \times 12 = 0.2\text{s} (200\text{ms})
\]


<table>
<thead>
<tr>
<th>Number of Data Characters</th>
<th>Communication Specifications (Total number of bits)</th>
<th>300</th>
<th>600</th>
<th>1200</th>
<th>2400</th>
<th>4800</th>
<th>9600</th>
<th>19200</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>10</td>
<td>166.7ms</td>
<td>83.3ms</td>
<td>41.7ms</td>
<td>20.8ms</td>
<td>10.4ms</td>
<td>5.2ms</td>
<td>2.6ms</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>200.0ms</td>
<td>100.0ms</td>
<td>50.0ms</td>
<td>25.0ms</td>
<td>12.5ms</td>
<td>6.3ms</td>
<td>3.1ms</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>333.3ms</td>
<td>166.7ms</td>
<td>83.3ms</td>
<td>41.7ms</td>
<td>20.8ms</td>
<td>10.4ms</td>
<td>5.2ms</td>
</tr>
<tr>
<td>10</td>
<td>12</td>
<td>400.0ms</td>
<td>200.0ms</td>
<td>100.0ms</td>
<td>50.0ms</td>
<td>25.0ms</td>
<td>12.5ms</td>
<td>6.3ms</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>400.0ms</td>
<td>200.0ms</td>
<td>100.0ms</td>
<td>50.0ms</td>
<td>25.0ms</td>
<td>12.5ms</td>
<td>6.3ms</td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>480.0ms</td>
<td>240.0ms</td>
<td>120.0ms</td>
<td>60.0ms</td>
<td>30.0ms</td>
<td>15.0ms</td>
<td>7.5ms</td>
</tr>
<tr>
<td>14</td>
<td>10</td>
<td>466.7ms</td>
<td>233.3ms</td>
<td>116.7ms</td>
<td>58.3ms</td>
<td>29.2ms</td>
<td>14.6ms</td>
<td>7.3ms</td>
</tr>
<tr>
<td>14</td>
<td>12</td>
<td>560.0ms</td>
<td>280.0ms</td>
<td>140.0ms</td>
<td>70.0ms</td>
<td>35.0ms</td>
<td>17.5ms</td>
<td>8.8ms</td>
</tr>
</tbody>
</table>
1.3 Structure

1.3.1 Connection with PU connector (FR-A500, F500)

(1) Appearance

(2) PU connector pin-outs

Note 1. Do not make connection to the computer LAN board, FAX modem socket or telephone modular connector. Doing so may damage the product due to differences in electrical specifications.

Note 2. Pins 2 and 8 (P5S) are power supplies for the operation panel or parameter unit. Do not use them when performing RS-485 communication.

Note 3. Use a commercially available RS-485/RS-232C converter when the personal computer's communication board has the RS-232C specifications.

(3) Mounting method

1) Hold down the top button of the operation panel and pull the operation panel toward you to remove.

2) Unplug the modular jack type junction connector. (Place the removed modular jack type junction connector into the modular jack type junction connector holder.)

3) Securely plug one end of the connection cable into the PU connector of the inverter and the other end into the personal computer (or converter etc.).
1.3.2 Connection with PU connector (FR-E500)

(1) Appearance

(2) PU connector pin-outs

Note 1. Do not make connection to the computer LAN board, FAX modem socket or telephone modular connector. Doing so may damage the product due to differences in electrical specifications.

Note 2. Pins 2 and 8 (PSS) are power supplies for the operation panel or parameter unit. Do not use them when performing RS-485 communication.

Note 3. Use a commercially available RS-485/RS-232C converter when the personal computer’s communication board has the RS-232C specifications.

(3) Mounting method

1) Remove the operation panel. Hold down the portion indicated by arrow A in Fig. A and remove the operation panel as shown in Fig. B. (If you remove it in any other way, force applied to the internal connector may damage the product.)

2) Securely plug one end of the connection cable into the PU connector of the inverter and the other end into the personal computer (or converter etc.).
1.3.3 Connection of FR-A5NR

(1) Appearance

Note: Never use the unused terminals as junction terminals since they are used in the option. Doing so may damage the option unit.

(2) Installation procedure

1) Securely insert the connector of the option unit far into the connector of the inverter. At this time, also fit the option fixing holes correctly. For the slot positions, refer to the figure below.

2) Securely fix the option unit to the inverter on both sides with the accessory mounting screws. If the screw holes do not match, the connector may not have been plugged correctly. Check for loose connection.

3) Route the cables so that they do not take up a large space in the control circuit terminal block wiring area of the option unit.

During wiring, do not leave wire off-cuts in the inverter. They can cause a fault, failure or malfunction.

Use the left-hand side space for routing the cables.

Note 1. Only one option of the same model may be used. When two or more options are mounted, priority is in order of slots 1, 2 and 3, and the options having lower priority are inoperative. (Only one communication option may be used.)

Note 2. When the inverter cannot recognize that the option is mounted, it displays "E.OPT".

Note 3. When one FR-A5NR is used with the other communication option than the FR-A5NR, no error is displayed and the relay output of the FR-A5NR and the communication function of the other communication option are made valid.

Note 4. When installing the inverter front cover, the cables to the inverter's control circuit terminals and option terminals should be routed properly in the wiring space to prevent them from being caught between the inverter and its cover.
1.4 Configuration and Wiring Method

1.4.1 Connection with PU connector

(1) System configuration examples

1) Inverters used with a computer having RS-485 or RS-422 interface

```
Computer
    ↓
RS-485/RS-422 interface terminal
    ↓
PU connector (Note 1)
    ↓
Inverter
    ↓
Station 1
    ↓
Splitter (Note 3)
    ↓
Computer
    ↓
Termination resistor

Station 2
    ↓
Inverter
    ↓
PU connector (Note 1)
    ↓
Station n

RS-422 maximum number of inverters connected
RS-485: 32 inverters
RS-422: 10 inverters

10BASE-T cable (Note 2)
```

Use the connectors and cables available on the market.

Note 1. Connector: RJ45 connector
   Example: 5-554720-3, Japan AMP Co., Ltd.

Note 2. Cable: Cable conforming to EIA568 (e.g. 10BASE-T cable)
   Example: SGLPEV 0.5mm × 4P, Mitsubishi Cable Industries, Ltd.

Note 3. Splitter
   Example: BMJ-8 modular rosette, Hakko Electrical Mfg. Co., Ltd........03-3806-9171

2) Inverters used with a computer having RS-232C interface

```
Computer
    ↓
RS-232C connector
    ↓
RS-485 terminal
    ↓
10BASE-T cable (Note 2)

Station 1
    ↓
Inverter
    ↓
PU connector (Note 1)
    ↓
Converter (Note 3)
    ↓
RS-232C cable
    ↓
Inverter
    ↓
Station 2
    ↓
Inverter
    ↓
PU connector (Note 1)
    ↓
Station n

Maximum 15m Converter

10BASE-T cable (Note 2)
```

Use the connectors and cables available on the market.

Note 1. Connector: RJ45 connector
   Example: 5-554720-3, Japan AMP Co., Ltd.

Note 2. Cable: Cable conforming to EIA568 (e.g. 10BASE-T cable)
   Example: SGLPEV 0.5mm × 4P, Mitsubishi Cable Industries, Ltd.

Note 3. Commercially available converter examples:
   1) Model: FA-T-RS40
      Converter
      Nagoya Sales Office, Mitsubishi Electric Engineering Co., Ltd........052-565-3435
   2) Model: DAFXI-CABL series cable with built-in interface
      DINV-485CAB connector conversion cable
      Diatrend Co., Ltd ..........06-6460-2100

Note 4. Splitter
   Example: BMJ-8 modular rosette, Hakko Electrical Mfg. Co., Ltd........03-3806-9171
(2) Wiring method

1) Connection of one RS-485 computer and one inverter

<table>
<thead>
<tr>
<th>Computer Terminals</th>
<th>Description</th>
<th>Cable connection and signal direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDA</td>
<td>Send data</td>
<td>SDA</td>
</tr>
<tr>
<td>RDB</td>
<td>Send data</td>
<td>SDB</td>
</tr>
<tr>
<td>SDA</td>
<td>Send data</td>
<td>RSA</td>
</tr>
<tr>
<td>SDB</td>
<td>Send data</td>
<td>RSB</td>
</tr>
<tr>
<td>RSA</td>
<td>Request to send</td>
<td>CSB</td>
</tr>
<tr>
<td>RSB</td>
<td>Request to send</td>
<td>CSB</td>
</tr>
<tr>
<td>CSA</td>
<td>Clear to send</td>
<td>SG</td>
</tr>
<tr>
<td>CSB</td>
<td>Clear to send</td>
<td>FG</td>
</tr>
<tr>
<td>SG</td>
<td>Signal ground</td>
<td>FG</td>
</tr>
<tr>
<td>FG</td>
<td>Frame ground</td>
<td>FG</td>
</tr>
</tbody>
</table>

Note 1. Depending on the transmission speed and/or transmission distance, the inverters may be affected by reflection. If so, provide a termination resistor. For connection using the PU connector, use a splitter because a termination connector cannot be fitted. The termination resistor should be connected to only the remotest inverter from the computer. (Termination resistor: 100 Ω)

Note 2. Connect in accordance with the manual of the computer used. Note that the computer terminal numbers depend on the model used.

2) Connection of one RS-485 computer and n inverters (multiple inverters)
1.4.2 Connection of FR-A5NR

(1) System configuration examples

1) Inverters used with a computer having RS-485 or RS-422 interface

- Computer
- RS-485/RS-422 interface terminal
- Twisted pair cable
- Inverter
- Station 1
- FR-A5NR
- Station 2
- FR-A5NR
- Station n
- FR-A5NR

Termination resistor jumper

Maximum number of inverters connected:
- RS-422: 10 inverters
- RS-485: 32 inverters

2) Inverters used with a computer having RS-232C interface

- Computer
- RS-232C connector
- RS-232C cable
- RS-422 terminal
- RS-485 terminal
- Inverter
- Station 1
- FR-A5NR
- Station 2
- FR-A5NR
- Station n
- FR-A5NR

Termination resistor jumper

Converter (Note 1)

Note 1. Commercially available converter examples:

1) Model: FA-T-RS40
   Converter
   Nagoya Sales Office, Mitsubishi Electric Engineering Co., Ltd. .......... 052-565-3435

2) Model: DAFXI-CABL series cable with built-in interface
   +
   DINV-485CAB connector conversion cable
   Diatrend Co., Ltd. .......... 06-6460-2100
(2) Wiring method

1) Connection of one computer and one inverter

<table>
<thead>
<tr>
<th>Computer Terminals</th>
<th>Cable connection and signal direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal name</td>
<td>Description</td>
</tr>
<tr>
<td>RDA</td>
<td>Receive data</td>
</tr>
<tr>
<td>RDB</td>
<td>Receive data</td>
</tr>
<tr>
<td>SDA</td>
<td>Send data</td>
</tr>
<tr>
<td>SDB</td>
<td>Send data</td>
</tr>
<tr>
<td>RSA</td>
<td>Request to send</td>
</tr>
<tr>
<td>RSB</td>
<td>Request to send</td>
</tr>
<tr>
<td>CSA</td>
<td>Clear to send</td>
</tr>
<tr>
<td>CSB</td>
<td>Clear to send</td>
</tr>
<tr>
<td>SG</td>
<td>Signal ground</td>
</tr>
<tr>
<td>FG</td>
<td>Frame ground</td>
</tr>
</tbody>
</table>

Cable connection and signal direction:
- FR-A5NR to Station 1
- FR-A5NR to Station 2
- FR-A5NR to Station 3

2) Connection of one computer and n inverters (multiple inverters)

Note 1. The termination resistor jumper should be connected to only the remotest FR-A5NR from the computer. (Termination resistor: 100 Ω)

Note 2. Connect in accordance with the manual of the computer used. Note that the computer terminal numbers depend on the model used.
1.5 Inverter Setting

(1) Parameters

**<Connection with PU connector>**

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Name</th>
<th>Setting Range</th>
<th>Setting Increments</th>
<th>Factory Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>117</td>
<td>Station number</td>
<td>0 to 31</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>118</td>
<td>Communication speed</td>
<td>48, 96, 192</td>
<td>1</td>
<td>192</td>
</tr>
<tr>
<td>119</td>
<td>Stop bit length/data length</td>
<td>0, 1 (data length 8)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>120</td>
<td>Parity check presence/absence</td>
<td>0, 1, 2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>121</td>
<td>Number of communication retries</td>
<td>0 to 10, 9999</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>122</td>
<td>Communication check time interval</td>
<td>0 to 999.8 sec., 9999</td>
<td>0.1</td>
<td>0 (Note)</td>
</tr>
<tr>
<td>123</td>
<td>Waiting time setting</td>
<td>0 to 150ms, 9999</td>
<td>1ms</td>
<td>9999</td>
</tr>
<tr>
<td>124</td>
<td>CR, LF presence/absence selection</td>
<td>0, 1, 2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: The factory setting of Pr. 122 for the NA, EC and CH version inverters is “9999”.

**<Connection of FR-A5NR>**

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Name</th>
<th>Setting Range</th>
<th>Setting Increments</th>
<th>Factory Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>331</td>
<td>Inverter station number</td>
<td>0 to 31</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>332</td>
<td>Communication speed</td>
<td>3, 6, 12, 24, 48, 96, 192 (Note)</td>
<td>1</td>
<td>96</td>
</tr>
<tr>
<td>333</td>
<td>Stop bit length/data length</td>
<td>0, 1 (data length 8)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>334</td>
<td>Parity check presence/absence</td>
<td>0, 1, 2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>335</td>
<td>Number of communication retries</td>
<td>0 to 10, 9999</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>336</td>
<td>Communication check time interval</td>
<td>0 to 999.8 sec., 9999</td>
<td>0.1</td>
<td>0</td>
</tr>
<tr>
<td>337</td>
<td>Waiting time setting</td>
<td>0 to 150ms, 9999</td>
<td>1ms</td>
<td>9999</td>
</tr>
<tr>
<td>338</td>
<td>Operation command write</td>
<td>0, 1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>339</td>
<td>Speed command write</td>
<td>0, 1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>340</td>
<td>Link start mode selection</td>
<td>0, 1, 2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>341</td>
<td>CR, LF presence/absence selection</td>
<td>0, 1, 2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>342</td>
<td>E’ROM write yes/no</td>
<td>0, 1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

(2) Station number setting (Pr. 117, Pr. 331 “inverter station number”)

1) The station number may be set between 0 and 31.

When the RS-422 interface is used, the station number may be set between 0 and 31 but the number of inverters connected must be within 10.

2) Note that the same station number cannot be set for different inverters. (If such setting has been made, proper communication cannot be performed.)

3) Station numbers do not have to be sequential and may be skipped, e.g. as shown below:

```
Computer
      Station 3
      Station 0
      Station 1
      Station 21
      Station 6
```

(3) Communication specifications

Refer to the following table and set the parameters:

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Description</th>
<th>Data Setting</th>
<th>Data Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>118, 332</td>
<td>Communication speed</td>
<td>3, 6, 12, 24, 48, 96, 192 (Note)</td>
<td>3: 300 baud. 6: 600 baud. 12: 1200 baud. 24: 2400 baud. 48: 4800 baud. 96: 9600 baud. 192: 19200 baud (Note)</td>
</tr>
<tr>
<td>119, 333</td>
<td>Stop bit length/data length</td>
<td>0, 1, 10, 11</td>
<td>0, 10: Stop bit length = 1 bit, 11: Stop bit length = 2 bits.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0, Data length = 8 bits. 10, 11: Data length = 7 bits</td>
<td></td>
</tr>
<tr>
<td>120, 334</td>
<td>Parity check presence/absence</td>
<td>0, 1, 2</td>
<td>1: Odd parity 2: Even parity</td>
</tr>
<tr>
<td>124, 341</td>
<td>CR, LF instruction presence/absence</td>
<td>0, 1, 2</td>
<td>1: Without CR and LF 2: With CR and LF</td>
</tr>
</tbody>
</table>

Note 1. The setting range of Pr. 118 is 48, 96 and 192.

Note 2. The inverter will not be faulty if the Pr. 333 “stop bit length/data length” setting differs from the actual data value.
(4) Number of data communication error retries
Set the permissible number of retries at occurrence of data receive error. If the number of consecutive errors exceeds the permissible value, the inverter will come to an alarm stop.

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Name</th>
<th>Data Setting</th>
<th>Data Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>121, 335</td>
<td>Number of communication retries</td>
<td>0 to 10</td>
<td>Permissible number of retries at error occurrence. If the number of retries exceeds the preset value, the inverter will come to an alarm stop. (Factory-set to one)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9999 (65535) (Note 1)</td>
<td>If a communication error occurs, the inverter will not come to an alarm stop. At this time, the inverter can be coasted to a stop by MRS or RESET input. During an error, the minor fault signal (LF) is given to the open collector output. Allocate the used terminal with any of Pr. 190 to Pr. 195 (output terminal function selection) for A500 series inverters. Allocate the used terminal with any of Pr. 190 to Pr. 192 for E500 series inverters.</td>
</tr>
</tbody>
</table>

Note: The data to be entered from the parameter unit is 9999 and that from the computer is 65535 (FFFFH).

(5) Permissible communication time interval
Set the permissible communication time interval between the computer and inverter.
(If no-communication with the computer persists for more than the permissible time, the inverter will come to an alarm stop due to time-out error.)

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Name</th>
<th>Data Setting</th>
<th>Data Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>122, 336</td>
<td>Communication check time interval</td>
<td>0</td>
<td>Computer link operation disallowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.1 to 999.8</td>
<td>Permissible communication time interval (0.1 second increments)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9999(65535) (Note 1)</td>
<td>Communication check stop</td>
</tr>
</tbody>
</table>

Note 1. The data to be entered from the parameter unit is 9999 and that from the computer is 65535 (FFFFH).
Note 2. At power-on (or reset), communication time interval check begins when the first communication is started.
Note 3. If the parameter setting is changed, check begins when the change is made.
Note 4. If communication is broken due to signal cable breakage, computer fault etc., the inverter does not detect such a fault. This should be fully noted.

(6) E²ROM write yes/no (connection of FR-A5NR)
When the FR-A5NR is connected, choose whether the parameters will be written to E²ROM or not.

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Name</th>
<th>Data Setting</th>
<th>Data Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>342</td>
<td>E²ROM write yes/no</td>
<td>0</td>
<td>Written to both E²ROM and RAM.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Written to RAM only.</td>
</tr>
</tbody>
</table>
1.6 Operation Modes

1.6.1 Connection with PU connector

(1) Operation Modes

1) External operation ............................ Controls the inverter by switching on/off external signals connected to the control circuit terminals of the inverter.

2) Communication operation (PU connector) .... Controls the inverter in accordance with the computer program via the PU connector.

Since the PU connector is used for operation, the PU operation mode is the communication operation (PU connector) mode.

(2) Operation mode switching method

Change the operation mode as described below:

Symbol | Switching Type | Switching Method
--- | --- | ---
A | Communication operation (PU connector) → external operation | By the user program of the computer (Note 1)
B | External operation → communication operation (PU connector) | By the user program of the computer (Note 1)

Note 1. Set “0” in Pr. 79 “operation mode selection” to carry out the above switching. When “1” is set in Pr. 79 “operation mode selection”, the operation mode available is the communication operation (PU connector) only. When “2” is set in Pr. 79 “operation mode selection”, the operation mode available is the external operation only.

1.6.2 Connection of FR-A5NR

(1) Operation modes

1) PU operation ...................... Controls the inverter from the keyboard of the operation panel/parameter unit (FR-DU04/FR-PU04) (referred to as the “PU”) installed to the inverter.

2) External operation ............... Controls the inverter by switching on/off external signals connected to the control circuit terminals of the inverter. (The inverter is factory-set to this mode.)

3) Computer link operation ........ Controls the inverter in accordance with the computer program via the computer link unit (FR-A5NR).

By setting parameters Pr. 338 “operation command write” and Pr. 339 “speed command write” as appropriate, the operation signal and running frequency can be entered from the control circuit terminals.

(2) Operation mode switching

1) Operation mode switching conditions

Before switching the operation mode, check that:

• The inverter is at a stop.
• Both the forward and reverse rotation signals are off; and
• The Pr. 79 “operation mode selection” setting is correct.

(Use the operation panel/parameter unit (FR-DU04/FR-PU04) of the inverter for setting.)

<table>
<thead>
<tr>
<th>Setting</th>
<th>Operation Mode Selection</th>
<th>Switching to Computer Link Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>PU or external operation</td>
<td>Disallowed when the PU mode is selected. Allowed when the external mode is selected.</td>
</tr>
<tr>
<td>1</td>
<td>PU operation only</td>
<td>Disallowed</td>
</tr>
<tr>
<td>2</td>
<td>External operation only</td>
<td>Allowed</td>
</tr>
<tr>
<td>3</td>
<td>External/PU combined operation</td>
<td>Disallowed</td>
</tr>
<tr>
<td>4</td>
<td>External/PU combined operation</td>
<td>Disallowed</td>
</tr>
<tr>
<td>5</td>
<td>Programmed operation</td>
<td>Disallowed (Parameter values write-enabled in the external operation mode may be changed)</td>
</tr>
<tr>
<td>6</td>
<td>Switch-over</td>
<td>Allowed</td>
</tr>
<tr>
<td>7</td>
<td>External operation (PU interlock signal)</td>
<td>Allowed only in the external operation mode when the PU interlock signal (X12) is on.</td>
</tr>
<tr>
<td>8</td>
<td>PU or external (signal switching)</td>
<td>Allowed only in the external operation mode (X16 on).</td>
</tr>
</tbody>
</table>
2) Operation mode switching method
Change the operation mode as described below:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Switching Type</th>
<th>Switching Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>PU operation → external operation</td>
<td>Operate the external operation key sheet on the PU.</td>
</tr>
<tr>
<td>B</td>
<td>External operation → PU operation</td>
<td>Operate the PU operation key sheet on the PU.</td>
</tr>
<tr>
<td>C</td>
<td>External operation → computer link operation</td>
<td>By the user program of the computer.</td>
</tr>
<tr>
<td>D</td>
<td>Computer link operation → external operation</td>
<td>By the user program of the computer.</td>
</tr>
<tr>
<td>E</td>
<td>PU operation → computer link operation</td>
<td>Switching disallowed/allowed if external operation is selected in A and computer link operation is then selected in C. (Note 2)</td>
</tr>
<tr>
<td>F</td>
<td>Computer link operation → PU operation</td>
<td>Switching disallowed/allowed if external operation is selected in D and PU operation is then selected in B. (Note 2)</td>
</tr>
</tbody>
</table>

When “1 or 2” is set in Pr. 340 “link start mode selection”, the operation mode is computer link operation at power on or inverter reset.

Note 1. When setting “1 or 2” in Pr. 340, the initial settings (station number setting, etc.) of the inverter must be made without fail.

Note 2. In the switch-over mode, switching in E and F is also allowed.

3) Operation mode display
The operation mode is displayed on the PU as indicated below:
- PU operation: PU
- External operation: EXT
- Computer link operation: NET

4) Operation mode at power on and instantaneous power failure
By setting the Pr. 340 “link start mode selection” value as appropriate, the operation mode at power on and at restoration from instantaneous power failure can be selected.

<table>
<thead>
<tr>
<th>Pr. 340 Setting</th>
<th>Pr. 79</th>
<th>Operation Mode Name</th>
<th>Mode at Power On or at Restoration from Instantaneous Power Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>PU or external operation</td>
<td>Inverter goes into the external operation mode.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>PU operation only</td>
<td>Inverter goes into the PU operation mode.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>External operation only</td>
<td>Inverter goes into the external operation mode.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>External/PU combined operation mode</td>
<td>Running frequency is set in the PU operation mode and the start signal is set in the external operation mode.</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>External/PU combined operation mode</td>
<td>Running frequency is set in the external operation mode and the start signal is set in the PU operation mode.</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Programmed operation mode</td>
<td>Inverter is operated by the program.</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Switch-over mode</td>
<td>Operation mode is switched while running.</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>External operation mode</td>
<td>Shift to the PU operation mode is controlled by ON/OFF of the X12 signal.</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>External/PU combined operation mode</td>
<td>Operation mode is switched by ON/OFF of the X16 signal.</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>Computer link operation</td>
<td>Inverter goes into the computer link operation mode. (Program need not be used for switching)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Computer link operation automatic restart after instantaneous power failure</td>
<td>When the computer link unit (FR-A5NR) is fitted and Pr. 57 setting is other than 9999 (setting of automatic restart after instantaneous power failure), automatic restart is made in the status prior to the occurrence of instantaneous power failure to continue computer link operation, if no communication signal is given from the computer. (Program need not be used for switching)</td>
</tr>
</tbody>
</table>

Note 1. If an instantaneous power failure occurs during computer link operation, the programming of the computer stops and remains stopped if power is restored.

If an instantaneous power failure occurs with “2” set in Pr. 340 “link start mode selection”, the inverter continues operation in the status prior to the instantaneous power failure. (When Pr. 57 ≠ 9999)
- The Pr. 340 value may be changed in any operation mode.
- To start computer link operation at power-on, set “1 or 2” in Pr. 340.
### 3. Control location selection

In the computer link operation mode, operation can be performed by signals from external terminals in accordance with the settings of Pr. 338 "operation command write" and Pr. 339 "speed command write".

#### Control place selection

<table>
<thead>
<tr>
<th>Control place selection</th>
<th>Operation command write (Pr. 338)</th>
<th>Speed command write (Pr. 339)</th>
<th>Forward rotation command (STF)</th>
<th>Reverse rotation command (STR)</th>
<th>Start self-holding selection (STOP)</th>
<th>Output halt (MRS)</th>
<th>Reset (RES)</th>
<th>Computer link operation frequency</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0: Computer</td>
<td>0: Computer</td>
<td>Computer</td>
<td>Computer</td>
<td>--</td>
<td>Both</td>
<td>Both</td>
<td>Computer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1: External</td>
<td>1: External</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td></td>
</tr>
</tbody>
</table>

#### Fixed functions

(Fixed functions equivalent to terminals)

<table>
<thead>
<tr>
<th>Function</th>
<th>Setting</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-speed operation command (RL)</td>
<td>Computer</td>
<td>Control from sequence program only is valid.</td>
</tr>
<tr>
<td>Middle-speed operation command (RM)</td>
<td>External</td>
<td>Control by signal from external terminal only is valid.</td>
</tr>
<tr>
<td>High-speed operation command (RH)</td>
<td>Computer</td>
<td>Control from both external terminal and computer is valid.</td>
</tr>
<tr>
<td>Second function selection (RT)</td>
<td>Computer</td>
<td>Control only if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>Jog operation selection (JOG)</td>
<td>Internal</td>
<td>Control from both external terminal and computer is invalid.</td>
</tr>
<tr>
<td>Automatic restart after instantaneous power failure detection (CS)</td>
<td>External</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>External thermal relay input (CR)</td>
<td>External</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>Internal thermal relay output (CD)</td>
<td>External</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>Third function (X9)</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>FR-HC connection, inverter operation enable (X10)</td>
<td>External</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>FR-HC connection, instantaneous power failure detection (X11)</td>
<td>External</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>PU external interlock (X12)</td>
<td>External</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>External dynamic braking start (X13)</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>PU control valid terminal (X14)</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>Brake opening completion signal (BR)</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>PU operation-external operation switching (X16)</td>
<td>External</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>Load pattern selection forward/reverse rotation boost switching (X17)</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>Magnetic flux-V/F switching (X18)</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>Load torque high-speed frequency (X19)</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>S-pattern acceleration/deceleration G switch-over terminal</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>Orientation command</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>Pre-excitation</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>Brake opening completion signal (BR)</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>Load pattern selection forward/reverse rotation boost switching (X17)</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>Magnetic flux-V/F switching (X18)</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>Load torque high-speed frequency (X19)</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>S-pattern acceleration/deceleration G switch-over terminal</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>Orientation command</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
<tr>
<td>Pre-excitation</td>
<td>Computer</td>
<td>Control by signal from external terminal only is valid if Pr. 28 (multi-speed input compensation) setting is 1.</td>
</tr>
</tbody>
</table>

#### Select the functions

<table>
<thead>
<tr>
<th>Pr. 180 to Pr. 186 setting</th>
<th>Compensate</th>
<th>Stop-on-contact 1 (RL)</th>
<th>Stop-on-contact 1 (RT)</th>
<th>Pr. 270 = 1, 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensation</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>Pr. 79 = 5, 6</td>
</tr>
<tr>
<td>Computer</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>Computer link operation disallowed</td>
</tr>
<tr>
<td>Both</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Compensation</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Note 1. If the FR-HC is connected, inverter operation enable signal (X10) is not assigned when the FR-HC is used (Pr. 30 = 2) or if the PU operation interlock signal (X12) is not assigned when the PU operation interlock function is set (Pr. 79 = 7). This function is also used by the MRS signal and therefore the MRS signal is only valid for the external terminals, independently of the Pr. 338 and Pr. 339 settings.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note 2. The orientation command needs the FR-A5AP and FR-A5AX options.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### [Explanation of table]

- **External**: Control by signal from external terminal only is valid.
- **Computer**: Control from sequence program only is valid.
- **Both**: Control from both external terminal and computer is valid.
- **--**: Control from both external terminal and computer is invalid.
- **Compensation**: Control by signal from external terminal is only valid if Pr. 28 (multi-speed input compensation) setting is 1.
1.7 Operational Functions

**COMPUTER LINK (RS-485)**

1) **Operation mode-based functions**

<table>
<thead>
<tr>
<th>Control location</th>
<th>Item</th>
<th>Operation Mode</th>
<th>Operation Mode</th>
<th>Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PU operation</td>
<td>External operation</td>
<td>Computer link operation (when FR-A5NR is used)</td>
</tr>
<tr>
<td>Computer user program from PU connector</td>
<td>Operation command (start)</td>
<td>Allowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td>Running frequency setting</td>
<td>Allowed</td>
<td>Allowed (combined mode)</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Parameter write</td>
<td>Allowed (Note 4)</td>
<td>Allowed (Note 4)</td>
<td>Allowed (Note 4)</td>
</tr>
<tr>
<td></td>
<td>Parameter read</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Inverter reset</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Stop command (Note 3)</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td>Computer user program from FR-A5NR</td>
<td>Operation command</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Allowed (Note 1)</td>
</tr>
<tr>
<td></td>
<td>Running frequency setting</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Allowed (Note 1)</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Parameter write</td>
<td>Disallowed (Note 4)</td>
<td>Disallowed (Note 4)</td>
<td>Disallowed (Note 4)</td>
</tr>
<tr>
<td></td>
<td>Parameter read</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Inverter reset</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Stop command (Note 3)</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Allowed</td>
</tr>
<tr>
<td>Control circuit terminal</td>
<td>Inverter reset</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Operation command</td>
<td>Disallowed</td>
<td>Allowed</td>
<td>Allowed (Note 1)</td>
</tr>
<tr>
<td></td>
<td>Frequency setting</td>
<td>Disallowed</td>
<td>Allowed</td>
<td>Allowed (Note 1)</td>
</tr>
</tbody>
</table>

Note 1. Depends on the Pr. 338 "operation command write" and Pr. 399 "speed command write" settings.

Note 2. Cannot be reset from the computer when an RS-485 communication error occurs.

Note 3. Depends on the Pr. 75 "reset selection" setting.

Note 4. Depends on the Pr. 77 "parameter write inhibit selection" setting.

2) **Input from computer to inverter**

1) The following command can be given:

- **Connection via PU connector**
  - Bit 0: Current input selection (A1)*
  - Bit 1: Forward rotation (STF)
  - Bit 2: Reverse rotation (STR)
  - Bit 3: Low speed (RL)*
  - Bit 4: Middle speed (RM)*
  - Bit 5: High speed (RH)*
  - Bit 6: Second acceleration/deceleration (RT)*
  - Bit 7: Output halt (MRS)

   The input signals marked * can be changed using Pr. 180 to Pr. 186 (input terminal function selection) for A500 and F500 series inverters.

2) **Running frequency**

   The output frequency of the inverter can be set between 0 and 400Hz (16-bit binary in 0.01Hz increments)

3) **Inverter reset**

   The inverter can be reset from the computer.

4) **Parameter setting write**

   For the parameters indicated in Appendix "Data Code List", their settings can be written.
(3) Input from inverter to computer

1) Inverter status .......... The following operating status can be monitored.
   - Bit 0: Running (RUN)*
     1: Forward running
     2: Reverse running
   - Bit 3: Up to frequency (SU)*
   - Bit 4: Overload (OL)*
   - Bit 5: Instantaneous power failure (IPF)*
   - Bit 6: Frequency detection (FU)*
   - Bit 7: Alarm occurrence*

Note 1. For the FR-A500 and F500 series, the output signals marked * can be changed using Pr. 190 to Pr. 195 (output terminal function selection).

Note 2. The E500 series uses Pr. 190 to Pr. 192. Also, for the FR-E500 series, bit 5: Instantaneous power failure (IPF) is not available.

2) Inverter monitoring
   - Output frequency ...... Binary in 0.01Hz increments
   - Output current.......... Binary in 0.01A increments
   - Output voltage .......... Binary in 0.1V increments
   - Alarm definition ........ Binary (up to eight alarms)

3) Parameter setting read
   For the parameters indicated in Appendix "Data Code List", their settings can be read.

(4) Operation at alarm occurrence

<table>
<thead>
<tr>
<th>Alarm Location</th>
<th>Description</th>
<th>Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PU operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>External operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Computer link operation (when FR-A5NR is used)</td>
</tr>
<tr>
<td>Inverter fault</td>
<td>Inverter operation</td>
<td>Stop</td>
</tr>
<tr>
<td>Data communication</td>
<td>PU connector</td>
<td>Stop</td>
</tr>
<tr>
<td>FR-A5NR</td>
<td>Continued</td>
<td></td>
</tr>
<tr>
<td>Communication error (communication from PU connector)</td>
<td>Inverter operation</td>
<td>Stop/continued (Note 1)</td>
</tr>
<tr>
<td>Data communication</td>
<td>PU connector</td>
<td>Stop</td>
</tr>
<tr>
<td>FR-A5NR</td>
<td>Continued</td>
<td></td>
</tr>
<tr>
<td>Communication error (plug-in option)</td>
<td>Inverter operation</td>
<td>Continued</td>
</tr>
<tr>
<td>Data communication</td>
<td>PU connector</td>
<td>Continued</td>
</tr>
<tr>
<td>FR-A5NR</td>
<td>Continued</td>
<td></td>
</tr>
</tbody>
</table>

Note 1. Can be selected by parameter setting (factory-set to continued).
Note 2. Can be selected by parameter setting (factory-set to stop).

(5) Communication error

<table>
<thead>
<tr>
<th>Error Location</th>
<th>Error Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication error (communication from PU connector)</td>
<td>E.PUE</td>
</tr>
<tr>
<td>Communication error (FR-A5NR)</td>
<td>E.OP1 to E.OP3</td>
</tr>
</tbody>
</table>

(6) Inverter reset

<table>
<thead>
<tr>
<th>Resetting Method</th>
<th>Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PU operation</td>
</tr>
<tr>
<td></td>
<td>External operation</td>
</tr>
<tr>
<td></td>
<td>Computer link operation (when FR-A5NR is used)</td>
</tr>
<tr>
<td>Computer user program</td>
<td>Disallowed</td>
</tr>
<tr>
<td>Disallowed</td>
<td></td>
</tr>
<tr>
<td>Terminals RES/SD ON</td>
<td>Allowed</td>
</tr>
<tr>
<td>Allowed</td>
<td></td>
</tr>
<tr>
<td>Inverter power OFF</td>
<td>Allowed</td>
</tr>
<tr>
<td>Allowed</td>
<td></td>
</tr>
</tbody>
</table>

Note: When the inverter is reset in the computer link operation mode, it is put in the external operation mode. Accordingly, to resume computer link operation, switch the operation mode to computer link operation again.
1.8 Computer Programming

(1) Communication protocol

Data communication between the computer and inverter is performed using the following procedure:

\[ \text{Computer} \downarrow (\text{Data flow}) \]
\[ \text{Inverter} \]
\[ \text{Inverter} \uparrow (\text{Data flow}) \]
\[ \text{Computer} \]

1) Data read
2) Inverter data processing time
3) Reply data from the inverter (Data 1 is checked for error)
4) Computer processing delay time
5) Answer from computer in response to reply data 3 (Data 3 is checked for error)

*1. If a data error is detected and a retry must be made, execute retry operation with the user program. The inverter comes to an alarm stop if the number of consecutive retries exceeds the parameter setting.

*2. On receipt of a data error occurrence, the inverter returns retry data 3 to the computer again. The inverter comes to an alarm stop if the number of consecutive data errors reaches or exceeds the parameter setting.

(2) Communication operation presence/absence and data format types

Communication operation presence/absence and data format types are as follows:

<table>
<thead>
<tr>
<th>No.</th>
<th>Operation</th>
<th>Operation command</th>
<th>Running Frequency</th>
<th>Parameter Write</th>
<th>Inverter Reset</th>
<th>Monitoring</th>
<th>Parameter Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Communication request is sent to the inverter in accordance with the user program.</td>
<td>A' (A')</td>
<td>A (A')</td>
<td>A</td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>2)</td>
<td>Inverter data processing time</td>
<td>Present</td>
<td>Present</td>
<td>Present</td>
<td>Absent</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>3)</td>
<td>Reply data from the inverter (Data 1 is checked for error)</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>Absent</td>
<td>E' (E') (Note)</td>
<td>E</td>
</tr>
<tr>
<td>4)</td>
<td>Computer processing delay time</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>5)</td>
<td>Answer from computer in response to reply data 3 (Data 3 is checked for error)</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
<td>G</td>
<td>G</td>
</tr>
</tbody>
</table>

Note: For the FR-E500 series, the data format is A' or E' when you set any of "0.01 to 9998" in Pr. 37 "output frequency setting" and "1" in the data code "HFF".

(3) Data format

Hexadecimal data is used.

Data is automatically transferred in ASCII between the computer and inverter.

Data format types

1) Communication request data from computer to inverter

[Data write]

\[ \begin{array}{cccccccccc}
\text{Format A} & 3 & \text{END} & \text{Inverter station number} & \text{Instruction code} & \text{Waiting time} & \text{Data} & \text{Sum check} & 4 \\
\text{Format A} & 3 & \text{END} & \text{Inverter station number} & \text{Instruction code} & \text{Waiting time} & \text{Data} & \text{Sum check} & 4 \\
\text{Format A} & 3 & \text{END} & \text{Inverter station number} & \text{Instruction code} & \text{Waiting time} & \text{Data} & \text{Sum check} & 4 \\
\text{Format B} & 3 & \text{END} & \text{Inverter station number} & \text{Instruction code} & \text{Waiting time} & \text{Sum check} & 4 \\
\end{array} \]

Number of characters

Note 1. The inverter station numbers may be set between H00 and H1F (stations 0 and 31) in hexadecimal.

Note 2. "3" indicates the control code.

Note 3. "4" indicates the CR or LF code.

Note 4. When data is transmitted from the computer to the inverter, code CR (carriage return) or LF (line feed) is automatically set at the end of a data group on some computers. In this case, setting must also be made from the inverter according to the computer.

Also, the presence and absence of the CR and LF codes can be selected using Pr. 124 (Pr. 341).

Note 4. "5": When Pr. 123 (Pr. 337) "waiting time setting" = 9999, create the communication request data with no "waiting time" in the data format. (The number of characters decreases by 1.)
2) Send data from computer to inverter during data write
   [No data error detected] [Data error detected]
   Format C
   Inverter station number
   ACK
   1 2 3 4 = Number of characters

3) Reply data from inverter to computer during data read
   [No data error detected] [Data error detected]
   Format E
   Inverter station number
   Read data
   Sum check
   STX E02
   ETX E03
   1 2 3 4 5 6 7 8 9 10 11 = Number of characters

   Format E'
   Inverter station number
   Read data
   Sum check
   STX E02
   ETX E03
   1 2 3 4 5 6 7 8 9 10 11 12 13 = Number of characters

4) Replay data from computer to inverter during data read
   [No data error detected] [Data error detected]
   Format G
   Inverter station number
   ACK
   1 2 3 4 = Number of characters

(4) Data definitions
1) Control codes

<table>
<thead>
<tr>
<th>Signal Name</th>
<th>ASCII Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>STX</td>
<td>H02</td>
<td>Start Of Text (Start of data)</td>
</tr>
<tr>
<td>ETX</td>
<td>H03</td>
<td>End Of Text (End of data)</td>
</tr>
<tr>
<td>ENQ</td>
<td>H05</td>
<td>Enquiry (Communication request)</td>
</tr>
<tr>
<td>ACK</td>
<td>H06</td>
<td>Acknowledge (No data error detected)</td>
</tr>
<tr>
<td>LF</td>
<td>H0A</td>
<td>Line Feed</td>
</tr>
<tr>
<td>CR</td>
<td>H0D</td>
<td>Carriage Return</td>
</tr>
<tr>
<td>NAK</td>
<td>H15</td>
<td>Negative Acknowledge (Data error detected)</td>
</tr>
</tbody>
</table>

2) Inverter station number
   Specify the station number of the inverter which communicates with the computer.

3) Instruction code
   Specify the processing request (e.g. operation, monitoring) given by the computer to the inverter. Hence, the
   inverter can be run and monitored in various ways by specifying the instruction code as appropriate.

4) Data
   Indicates the data such as frequency and parameters transferred to and from the inverter. The definitions and
   ranges of set data are determined in accordance with the instruction codes.

5) Waiting time
   Specify the waiting time between the receipt of data at the inverter from the computer and the transmission of
   reply data. Set the waiting time in accordance with the response time of the computer between 0 and 150ms in
   10ms increments (e.g. 1 = 10ms, 2 = 20ms).
6) Sum check code

The sum check code is 2-digit ASCII (hexadecimal) representing the lower 1 byte (8 bits) of the result (sum) derived from the checked ASCII data.

(Example 1)

<table>
<thead>
<tr>
<th>Computer</th>
<th>inverter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station number</td>
<td>Instruction code</td>
</tr>
<tr>
<td>0 1</td>
<td>E 1</td>
</tr>
</tbody>
</table>

ASCII code →

| 06 | 30 | 31 | 45 | 31 | 30 | 37 | 41 | 44 |

E1 07ADF4

*Waiting time*

Instruction code

Note 1. When the data from the computer has an error, the inverter will not accept that data.

Note 2. A request of any data communication, e.g. operation command, monitoring, is always given by the computer and the inverter will not return data to the computer. Hence, the program should be written to give a data read request as required from the computer at the time of monitoring, etc.

Note 3. Data for link parameter expansion setting differs as indicated below between access to Pr. 0-Pr. 99 values and access to Pr. 100 and later:

<table>
<thead>
<tr>
<th>Instruction Code</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read 7Fh</td>
<td>Pr. 0 to Pr. 99 values are accessible.</td>
</tr>
<tr>
<td>Write FFh</td>
<td>Pr. 100 to Pr. 159, Pr. 200 to Pr. 231 and Pr. 900 to Pr. 905 values are accessible.</td>
</tr>
<tr>
<td>Pr. 160 to Pr. 199 and Pr. 232 to Pr. 285 values are accessible.</td>
<td></td>
</tr>
<tr>
<td>Pr. 300 to Pr. 399 values are accessible.</td>
<td></td>
</tr>
<tr>
<td>Pr. 990 value is accessible (and other 900 parameters).</td>
<td></td>
</tr>
</tbody>
</table>

(5) Programming instructions

1) The inverter does not accept data from the computer if it has an error. For this reason, a retry program for data error must be included in the user program.

2) A request of any data communication, e.g. operation command, monitoring, is always given by the computer and the inverter will not return data to the computer. Hence, the program should be written to give a data read request as required from the computer at the time of monitoring, etc.
(6) Program example (BASIC)

When the operation mode is switched to communication operation:

```basic
10 OPEN "COM1:9600,E,8,2,HD" AS#1
20 COMST1.1,1:COMST1.2,1
30 ON COM(1):GOSUB*REC
40 COM(1):ON
50 D$= "01FB10002"
60 S=0
70 FOR I=1 TO LEN(D$)
80 A$=MID$(D$,I,1)
90 A=ASC(A$)
100 S=S+A
110 NEXT I
120 D$=CHR$(A)+D$+RIGHT$(HEX$(S),2)
130 PRINT#1,D$
140 GOTO 50

1000 *REC
1010 IF LOC(1)=0 THEN RETURN
1020 PRINT "RECEIVE DATA"
1040 RETURN
```

General flowchart

```
Line number
10 to
40

Input file initial setting

50 to
140

Transmission data setting

Interrupt

1000

Receive data processing

1040

Data processing

Sum code calculation

Data transmission

Interupt occurrence at data receive
```

Note 1. When the inverter’s communication check time interval is not set, interlocks are provided to disable operation to prevent hazards. Always set the communication check time interval before starting operation.

Note 2. Data communication is not started automatically but is made only once when the computer provides a communication request. If communication is disabled during operation due to signal cable breakage etc., the inverter cannot be stopped. When the communication check time interval has elapsed, the inverter will come to an alarm stop. The inverter can be coasted to a stop by switching on its RES signal or by switching power off.

Note 3. If communication is broken due to signal cable breakage, computer failure etc., the inverter does not detect such a fault. This should be fully noted.
1.9 Troubleshooting

**COMPUTER LINK (RS-485)**

1. **Data from computer unread by inverter**
   1) Computer conforming to RS-422 or RS-485 Standard?
   2) Communication cables (and FR-A5NR) fitted properly? (Check for contact fault, open cable, wrong polarity, etc.)
   3) Inverter initialization correct?
   4) Station number setting (Pr. 117, Pr. 331) proper? (Check that setting and program matches and that the same station number is not used for different inverters.)
   5) Communication check time interval (Pr. 112, Pr. 336) other than 0?
   6) Proper communication request program executed in computer?

2. **Operation mode unswitched to computer link operation**
   1) When inverter is switched from external operation, are the signals to the external terminals STF or STR off?
   2) Proper operation mode switching program executed?

3. **Inverter unstarted in computer link mode**
   1) Inverter starting program executed properly?
   2) Control location select conditions set properly when FR-A5NR is connected?
   3) Inverter output provided?
   4) Permissible communication time interval set properly?

4. **Inverter brought to alarm stop during operation due to communication error**
   1) Communication cables (and FR-A5NR) fitted properly? (Check for contact fault, open cable, etc.)
   2) Computer operating without fault?
   3) Program written to give communication request from computer periodically?
   4) Permissible communication time interval set properly?
   5) Format of data transferred proper?
   6) Termination resistor jumper connected?
### 1.10 Setting Items and Set Data

After completion of parameter setting, set the instruction codes and data as indicated below and start communication from the computer to allow various types of operation control and monitoring.

#### No. | Item | Instruction Code | Description | Number of Data Digits
--- | --- | --- | --- | ---
1 | Operation mode | 7Bh | Read/Write | 4 digits
2 | Monitoring | FAh | Read | 2 digits

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Instruction Code</th>
<th>Description</th>
<th>Number of Data Digits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Operation mode</td>
<td>Read</td>
<td>7Bh</td>
<td>Communication option operation (connection of FR-A5NR) 0000H: Communication operation (PU connector), PU operation 0001H: External operation 0002H: Communication option operation (connection of FR-A5NR) 0003H: External operation 0004H: Communication operation (PU connector)</td>
</tr>
<tr>
<td>2</td>
<td>Monitoring</td>
<td>Read</td>
<td>73h</td>
<td>0 to 15: Monitor selection data</td>
</tr>
<tr>
<td>3</td>
<td>Operation command</td>
<td>FAh</td>
<td>00h to FFH: Operation command (Example 1) 60h: Forward rotation 7Bh: Step (Example 2) 00h: Operation command</td>
<td>2 digits</td>
</tr>
</tbody>
</table>

### Table: No. 1

<table>
<thead>
<tr>
<th>No.</th>
<th>Instruction Code</th>
<th>Description</th>
<th>Number of Data Digits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0000h: Communication option operation (connection of FR-A5NR)</td>
<td>0001H: Communication operation (PU connector), PU operation</td>
<td>4 digits</td>
</tr>
<tr>
<td>2</td>
<td>0003H: Communication operation (PU connector)</td>
<td>0004H: Communication option operation (connection of FR-A5NR)</td>
<td>4 digits</td>
</tr>
<tr>
<td>3</td>
<td>0005H: Communication option operation (connection of FR-A5NR)</td>
<td>0006H: External operation</td>
<td>4 digits</td>
</tr>
<tr>
<td>4</td>
<td>0007H: Communication operation (PU connector), PU operation</td>
<td>0008H: External operation</td>
<td>4 digits</td>
</tr>
</tbody>
</table>

### Table: No. 2

<table>
<thead>
<tr>
<th>No.</th>
<th>Instruction Code</th>
<th>Description</th>
<th>Number of Data Digits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0000h: Communication option operation (connection of FR-A5NR)</td>
<td>0001H: Communication operation (PU connector), PU operation</td>
<td>4 digits</td>
</tr>
<tr>
<td>2</td>
<td>0003H: Communication operation (PU connector)</td>
<td>0004H: Communication option operation (connection of FR-A5NR)</td>
<td>4 digits</td>
</tr>
<tr>
<td>3</td>
<td>0005H: Communication option operation (connection of FR-A5NR)</td>
<td>0006H: External operation</td>
<td>4 digits</td>
</tr>
<tr>
<td>4</td>
<td>0007H: Communication operation (PU connector), PU operation</td>
<td>0008H: External operation</td>
<td>4 digits</td>
</tr>
</tbody>
</table>

### Table: No. 3

<table>
<thead>
<tr>
<th>No.</th>
<th>Instruction Code</th>
<th>Description</th>
<th>Number of Data Digits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0000h: Communication option operation (connection of FR-A5NR)</td>
<td>0001H: Communication operation (PU connector), PU operation</td>
<td>4 digits</td>
</tr>
<tr>
<td>2</td>
<td>0003H: Communication operation (PU connector)</td>
<td>0004H: Communication option operation (connection of FR-A5NR)</td>
<td>4 digits</td>
</tr>
<tr>
<td>3</td>
<td>0005H: Communication option operation (connection of FR-A5NR)</td>
<td>0006H: External operation</td>
<td>4 digits</td>
</tr>
<tr>
<td>4</td>
<td>0007H: Communication operation (PU connector), PU operation</td>
<td>0008H: External operation</td>
<td>4 digits</td>
</tr>
</tbody>
</table>

---

**Note 1.** Special monitoring is not available for the FR-E500 series.
<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Instruction Code</th>
<th>Description</th>
<th>Number of Data Digits</th>
</tr>
</thead>
</table>
| 4   | Inverter status monitor | 7Ah | 00H to FFH: Inverter status monitor  
|     |      |                  | [Example 1] 02H: Forward running  
|     |      |                  | [Example 2] 80H: Stop due to alarm occurrence  
|     |      |                  | b7: Inverter running (RUN)*  
|     |      |                  | b1: Forward running (STR)  
|     |      |                  | b2: Reverse running (STR)  
|     |      |                  | b3: Up to frequency (SU)*  
|     |      |                  | b4: Overload (OL)*  
|     |      |                  | b5: Instantaneous power failure (IPF)*  
|     |      |                  | b6: Frequency detection (FU)*  
|     |      |                  | b7: Alarm occurrence*  
|     |      |                  | * For the FR-A500 and F500 series, outputs change with the settings of Pr. 190 to Pr. 195.  
|     |      |                  | Instantaneous power failure (IPF) is not available for the FR-E500 series.  | 2 digits |
| 5   | Running frequency write E/PROM | EEh | 0000H to 9C40H: 0.01Hz increments (hexadecimal)  
|     |      |                  | 0 to 400.00Hz  
|     |      |                  | To change the running frequency consecutively, write data to the inverter RAM. (Instruction code: EDh)  | 4 digits |
| 6   | Alarm definition batch clear | F4h | 9696H: Batch-clears the alarm history.  | 4 digits |
| 7   | All parameter clear | FCih | All parameters return to the factory settings.  
|     |      |                  | Any of four different clear operations is performed according to the data.  
|     |      |                  | 9696h: Communication parameter settings  
|     |      |                  | 9966h: Calibration parameter settings  
|     |      |                  | 5A5Ah: Other parameter settings  
|     |      |                  | 55AAh: Other parameter settings  
|     |      |                  | When all parameter clear is executed with 9696h or 9966h,  
|     |      |                  | communication-related parameter settings also return to the factory settings.  
|     |      |                  | When resuming operation, therefore, make parameter setting again.  
|     |      |                  | * 5A5Ah and 55AAh are not available when the FR-A5NR is connected.  | 4 digits |
| 8   | User clear | FCih | 9669H: User clear is made.  
|     |      |                  | (Unavailable for FR-E500 series)  | 4 digits |
| 9   | Inverter reset | FDih | 9696H: Resets the inverter.  
|     |      |                  | As the inverter is reset at start of communication by the computer, the inverter cannot send reply data back to the computer.  | 4 digits |
| 10  | Parameter write | 80h to E3h | Refer to Appendices and write and/or read parameter values as required.  | 4 digits |
| 11  | Parameter read | 00h to 63h | Note that some parameters may be inaccessible.  | 4 digits |
| 12  | Link parameter expansion setting Read | 7Fih | Parameter values of 00h to 6Ch and 80h to ECh are changed.  
| Write | FFih | 00h: Pr. 0 to Pr. 99 values are accessible.  
|     |      | 01h: Pr. 100 to Pr. 159 , Pr. 200 to Pr. 231 and Pr. 900 to Pr. 905 values are accessible.  
|     |      | 02h: Pr. 160 to Pr. 199 and Pr. 232 to Pr. 285 values are accessible.  
|     |      | 03h: Pr. 300 to Pr. 399 values are accessible.  
|     |      | 04h: Pr. 992, Pr. 923, Pr. 990 and Pr. 991 values are accessible.  | 2 digits |
| 13  | Second parameter changing (Instruction code FFh=1) Read | 6Ch | When setting the programmed operation (data codes 3Dh to 5Ah, BDh to ADh) parameters (Unavailable for FR-E500 series)  
| Write | ECh | 00h: Running frequency  
|     |      | 01h: Time  
|     |      | 02h: Rotation direction  
|     |      | Time (Min.)  
|     |      | Min. (Sec.)  | 2 digits |
The corresponding error code in the following list is displayed if an error is detected in any communication request data from the computer:

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Item</th>
<th>Definition</th>
<th>Inverter Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0H</td>
<td>Computer NAK error</td>
<td>The number of errors consecutively detected in communication request data from the computer is greater than the permissible number of retries.</td>
<td>Brought to an alarm stop if error occurs continuously more than the permissible number of retries. (E.PUE, E.OP1 to OP3)</td>
</tr>
<tr>
<td>1H</td>
<td>Parity error</td>
<td>The parity check result does not match the specified parity.</td>
<td></td>
</tr>
<tr>
<td>2H</td>
<td>Sum check error</td>
<td>Sum check code in the computer does not match that of the data received by the inverter.</td>
<td></td>
</tr>
<tr>
<td>3H</td>
<td>Protocol error</td>
<td>Data received by the inverter is in wrong syntax, data receive is not completed within given time, or CR and LF are not as set in the parameter.</td>
<td></td>
</tr>
<tr>
<td>4H</td>
<td>Framing error</td>
<td>The stop bit length differs from initial setting.</td>
<td></td>
</tr>
<tr>
<td>5H</td>
<td>Overrun error</td>
<td>New data has been sent by the computer before the inverter completes receiving the preceding data.</td>
<td></td>
</tr>
<tr>
<td>6H</td>
<td></td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>7H</td>
<td>Character error</td>
<td>The character received is invalid (other than 0 to 9, A to F, control code).</td>
<td>Does not accept receive data but is not brought to alarm stop.</td>
</tr>
<tr>
<td>8H</td>
<td></td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>9H</td>
<td></td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>A0H</td>
<td>Mode error</td>
<td>Parameter write was attempted in other than the computer link operation mode or during inverter operation.</td>
<td>Does not accept receive data but does not result in alarm.</td>
</tr>
<tr>
<td>B0H</td>
<td>Instruction code error</td>
<td>The specified command does not exist.</td>
<td></td>
</tr>
<tr>
<td>C0H</td>
<td>Data range error</td>
<td>Invalid data has been specified for parameter, running frequency write, etc.</td>
<td></td>
</tr>
<tr>
<td>D0H</td>
<td></td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>E0H</td>
<td></td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>F0H</td>
<td></td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>
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2.1 Overview

"CC-Link" is the abbreviation of Control & Communication Link developed by Mitsubishi Electric Corporation as the next-generation Factory Automation field network.
A CC-Link system is designed to control from the PLC CPU the distributed I/O units, special function units (e.g. inverters) and other equipment connected by dedicated cables.
The CC-Link system has enabled wiring saving and fast data communication.

(1) Features of CC-Link-compatible inverters
1) High-speed communication
   Cyclic transmission of not only bit data but also word data can be made to enable high-speed communication.
   • Communication as fast as 10Mbps
   • The broadcast polling system is used to ensure 3.9ms to 6.7ms high speeds even at the maximum link scan.
2) Variable communication speed/distance system
   Selection of the appropriate speed and distance provides a wide range of applications such as a system demanding high speed and a system requiring a long distance.
3) Prevention of system fault (station separating function)
   Due to the bus connection system, the communications of normal remote and local stations are not affected by the occurrence of a faulty remote or local station due to power off, etc.
   Use of the removable terminal block allows the unit to be changed during data link.
4) Functionality for Factory Automation
   Factory Automation can be easily applied to the inverters that share the link system as CC-Link remote device stations and are controlled and monitored by PLC user programs.
   Various set values, such as motor speed and acceleration/deceleration time, can be changed and checked from the PLC.

(2) CC-Link stations
CC-Link consists of the following stations:
• Master station : Controls the whole CC-Link system.
• Local station : Loaded to the base unit and can communicate with the master and other local stations.
• Remote I/O station : Controlled by the master station in the CC-Link system.
  Can transfer I/O signals from/to externally connected equipment.
• Remote device station : Controlled by the master station in the CC-Link system.
  (CC-Link-compatible inverter) Can transfer externally connected equipment controlling I/O signals and digital-analog conversion, temperature detection and other values.
• Intelligent device station : Controlled by the master station in the CC-Link system.
  Can transfer I/O signals and numerical and character data.
(3) How the master and remote device stations communicate

In the CC-Link system, the inverter is a remote device station. How the master and remote device stations communicate will be described below:

![Diagram of communication between PLC CPU, Master station, and Remote device station.]

1) The ON/OFF data of the remote device station (CC-Link-compatible inverter) is sent to the master station via the network and stored there.

2) The numerical data of the remote device station (CC-Link-compatible inverter) is sent to the master station via the network and stored there.

3) The PLC CPU reads the ON/OFF data stored in the master station.

4) The PLC CPU reads the numerical data stored in the master station.

5) The PLC CPU writes the ON/OFF data to the master station.

6) The PLC CPU writes the numerical data to the master station.

7) The ON/OFF data is sent from the master station to the remote device station (CC-Link-compatible inverter) via the network and stored there.

8) The numerical data is sent from the master station to the remote device station (CC-Link-compatible inverter) via the network and stored there.

The above sketch shows an image of general communication.

(4) Types of CC-Link-compatible inverters

<table>
<thead>
<tr>
<th>Inverter Series</th>
<th>Method for Compatibility with CC-Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR-A500</td>
<td>Connect FR-A5NC plug-in option.</td>
</tr>
<tr>
<td>FR-F500</td>
<td>Connect FR-A5NC plug-in option.</td>
</tr>
<tr>
<td>FR-E500</td>
<td>Connect FR-E5NC plug-in option.</td>
</tr>
</tbody>
</table>

- 3-phase 200V class: Made compatible by FR-E520-CKN CC-Link-dedicated inverter.
- 3-phase 400V class: Connect FR-E5NC plug-in option.
- Single-phase 200V class (FR-E520S-EC/CH): Connect FR-E5NC plug-in option
- Other than above: Incompatible
2.2 Specifications

(1) Inverter side specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station type</td>
<td>Remote device station</td>
</tr>
<tr>
<td>Number of units connected</td>
<td>42 inverters max. (1 station occupied by 1 inverter). May be used with other models.</td>
</tr>
<tr>
<td>Terminal block</td>
<td>Removable terminal block</td>
</tr>
</tbody>
</table>

(2) PLC side specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable CPU card</td>
<td>Q, QnA(H), QnAs(H), A1S, A1SH, AnUS(H), AnN, AnA, AnU(h)</td>
</tr>
<tr>
<td>Communication speed</td>
<td>10M/5M/2.5M/625K/156Kbps</td>
</tr>
<tr>
<td>Communication system</td>
<td>Broadcast polling system</td>
</tr>
<tr>
<td>Synchronization system</td>
<td>Frame synchronization system</td>
</tr>
<tr>
<td>Transmission path form</td>
<td>Bus form (conforms to EIA RS-485)</td>
</tr>
<tr>
<td>Transmission format</td>
<td>Conforms to HDLC.</td>
</tr>
<tr>
<td>Remote station number</td>
<td>Stations 1 to 64</td>
</tr>
<tr>
<td>Communication speed</td>
<td>156Kbps 625Kbps 2.5Mbps 5Mbps 10Mbps</td>
</tr>
<tr>
<td>Overall extension distance</td>
<td>1200m 600m 200m 150m 110m 100m 80m 50m</td>
</tr>
<tr>
<td>Between master/local station and preceding/succeeding station</td>
<td>2m or more</td>
</tr>
<tr>
<td>Max. transmission distance</td>
<td></td>
</tr>
<tr>
<td>Between remote I/O station/remote device station and remote I/O station/remot</td>
<td>30cm or more 30cm or more 30cm or more 60cm or more 30 to 59cm 1m or more 60 to 99cm 30 to 59cm</td>
</tr>
<tr>
<td>Error control system</td>
<td>CRC</td>
</tr>
<tr>
<td>Communication cable</td>
<td>Twisted pair cable (3-wire type)</td>
</tr>
</tbody>
</table>

For further details, refer to the "CC-Link System Master/Local Module User's Manual".

(3) Twisted cable specifications

If the cables used are not the CC-Link-dedicated cables, we cannot guarantee the performance of the CC-Link system.

For the specifications and contact of the CC-Link-dedicated cables, refer to the CC-Link catalog L(NA)74108143.
(4) Data link processing time

1) Link scan time

The link scan time of CC-Link is found by the following expression:

\[
\text{Link scan time (LS)} = \text{BT} \times (29.4 + (\text{NI} \times 4.8) + (\text{NW} \times 9.6) + (\text{N} \times 32.4) + (\text{ni} \times 4.8) + (\text{nw} \times 9.6) + \text{ST}) + \{ \text{number of communication fault stations} \times 48 \times \text{BT} \times \text{number of retries} \} \quad [\mu s]
\]

- **BT**: Constant (transmission speed)
- **NI**: Last station number among a, b and c (including occupied stations but not including reserved stations)
- **NW**: Last station number among b and c (including occupied stations but not including reserved stations)
- **N**: Number of connected stations (excluding reserved stations)
- **ni**: a + b + c (excluding reserved stations)
- **nw**: b + c (excluding reserved stations)
- **ST**: Constant (The largest value among 1) to 3). Note that 2) should be ignored when b = 0, and 3) ignored when c = 0.)
  1) 800 + (a \times 15)
  2) 900 + (b \times 50)
  3) When c ≥ 26: 1200 + (c \times 100)  
    When c ≤ 26: 3700 + [(c - 26) \times 25]  
- **a**: Total number of occupied remote I/O stations
- **b**: Total number of occupied remote device stations (CC-Link-compatible inverters)
- **c**: Total number of occupied intelligent device stations (including local stations)
- **ni**: a + b + c (excluding reserved stations)
- **nw**: b + c (excluding reserved stations)

\* : Only when communication fault stations (including error invalid stations and temporary error invalid stations) exist

<table>
<thead>
<tr>
<th>Transmission Speed</th>
<th>156kbps</th>
<th>625kbps</th>
<th>2.5Mbps</th>
<th>5Mbps</th>
<th>10Mbps</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>51.2</td>
<td>12.8</td>
<td>3.2</td>
<td>1.6</td>
<td>0.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Last Station Number</th>
<th>1 to 8</th>
<th>9 to 16</th>
<th>17 to 24</th>
<th>25 to 32</th>
<th>33 to 40</th>
<th>41 to 48</th>
<th>49 to 56</th>
<th>57 to 64</th>
</tr>
</thead>
<tbody>
<tr>
<td>NI, NW</td>
<td>8</td>
<td>16</td>
<td>24</td>
<td>32</td>
<td>40</td>
<td>48</td>
<td>56</td>
<td>64</td>
</tr>
</tbody>
</table>

Example: Transmission speed of 2.5Mbps in the following system configuration example

- **Master station**
- **Station 1**: Remote I/O station
- **Station 2**: Remote I/O station
- **Station 3**: Remote I/O station
- **Station 4**: Remote device station
- **Station 5**: Local station
- **Station 6**: Remote device station
- **Station 8**: Remote I/O station
- **Station 9**: Remote I/O station
- **Station 13**: Remote I/O station

*1: 1 station occupied  
*2: 2 stations occupied  
*3: 4 stations occupied

\[
\begin{align*}
\text{BT} &= 3.2 \\
\text{ST} &= 1700 \\
\text{NI} &= 13 \quad (16 - 16) \\
\text{NW} &= 12 \quad (16 - 2) \\
\text{N} &= 8 \\
\text{ni} &= 13 \\
\text{nw} &= 9 \\
\text{LS} &= 3.2 \times (29.4 + (16 \times 4.8) + (16 \times 9.6) + (8 \times 32.4) + (13 \times 4.8) + (9 \times 9.6)) + 1700 \\
&= 3836.96 \; [\mu s] \\
&= 3.84 \; [ms]
\end{align*}
\]
2) Transmission delay times

Transmission delay times (times until data is transmitted) are indicated below.

(a) Output signal (Master module to inverter)

**Expression**

\[ \text{SM} + \text{LS} \times 3 + \text{inverter processing time [ms]} \]

- **SM**: Scan time of master station sequence program
- **LS**: Link scan time (refer to Section 1)
- Inverter processing time: 10 to 20ms

**Data flow**

(b) Input signal (Inverter to master module)

**Expression**

\[ \text{SM} + \text{LS} \times 2 + \text{inverter processing time [ms]} \]

- **SM**: Scan time of master station sequence program
- **LS**: Link scan time (refer to Section 1)
- Inverter processing time: 10 to 20ms
(c) Remote register (Master module to inverter)

<Expression>

SM + LS × 3 + inverter processing time [ms]

SM : Scan time of master station sequence program
LS : Link scan time (refer to Section 1))
Inverter processing time: 10 to 20ms

<Data flow>

(d) Remote register (Inverter to master module)

<Expression>

SM + LS × 2 + inverter processing time [ms]

SM : Scan time of master station sequence program
LS : Link scan time (refer to Section 1))
Inverter processing time: 10 to 20ms

<Data flow>
2.3 Structure

2.3.1 When FR-A5NC is connected

(1) Appearance

<table>
<thead>
<tr>
<th>Terminal block mounting/dismounting screw</th>
<th>Front view</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission baudrate setting switch</td>
<td>Terminal block mounting/dismounting screw</td>
</tr>
<tr>
<td>Option fixing holes</td>
<td>Rear view</td>
</tr>
<tr>
<td>Connector</td>
<td></td>
</tr>
</tbody>
</table>

(2) Names and functions

<table>
<thead>
<tr>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station number setting switches</td>
<td>Used to set the inverter station number between 1 and 64. For details, refer to page 41.</td>
</tr>
<tr>
<td>Transmission baudrate setting switch</td>
<td>Used to set the transmission speed. Refer to page 41 for details.</td>
</tr>
<tr>
<td>Operating status indicator LEDs</td>
<td>RUN .......... Lit to indicate normal data communication with the master station. L.RUN ...... Lit to indicate normal receipt of refresh data. Extinguished to indicate a break for a given period. SD ......... Extinguished when send data is &quot;0&quot;. RD ........... Lit on detection of receive data carrier. L.ERR ........ Lit to indicate communication error of host station.</td>
</tr>
</tbody>
</table>

(3) Wiring of terminal block

Note: The mounting screws do not come off.
(4) Installation procedure

1) Remove the front cover of the inverter and mount the option unit to slot 3.
2) Securely insert the connector of the option unit far into the connector of slot 3 in the inverter. At this time, also fit the option fixing hole snugly. For the position of slot 3, refer to the figure below.
3) Securely fix both sides of the option unit to the inverter with the accessory mounting screws. If the screw holes do not match, the connector may not have been plugged snugly. Check for loose plugging.
4) Remove the terminal block mounting/dismounting screws to dismount the terminal block.
5) Remove the DATA PORT from the inverter's front cover and reinstall the front cover. (To remove the DATA PORT cover, push it from the back of the front cover.)
6) Reinstall the terminal block securely.
7) Route the cables so that they do not take up a large space in the control circuit terminal block wiring area of the option unit. Before wiring, mount the CC-Link unit (FR-A5NC) and fit the inverter front cover. During wiring, do not leave wire off-cuts in the inverter. They may cause a fault, failure or malfunction.

Note: The mounting screws do not come off.

Note 1. Only one option of the same model may be used. When two or more options are mounted, priority is in order of slots 1, 2 and 3, and the options having lower priority are inoperative. (Only one communication option may be used.)

Note 2. When the inverter cannot recognize that the option is mounted or when two or more communication option units are connected, E.OPT error is displayed. The errors shown change with the mounting slots 1, 2, 3.

Note 3. If the inverter front cover is installed with the terminal block mounted, the front cover may not be installed securely.

<table>
<thead>
<tr>
<th>Mounting</th>
<th>Error Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slot 1</td>
<td>E.OP1</td>
</tr>
<tr>
<td>Slot 2</td>
<td>E.OP2</td>
</tr>
<tr>
<td>Slot 3</td>
<td>E.OP3</td>
</tr>
</tbody>
</table>
2.3.2 FR-E520-**KN**

(1) Appearance

*<Front view>*
- POWER lamp (yellow)
- ALARM lamp (red)
- Operating status indicator LEDs
- Rating plate
- Capacity plate
- Wiring cover

*<View without accessory cover and front cover>*
- CC-Link terminal block
- Main circuit terminal block
- PU connector (Note)
- Transmission baudrate setting switch
- Station number setting switches
- Control logic changing connector
- Operating status indicator LEDs
- POWER lamp (yellow)
- ALARM lamp (red)

Note: Use the PU connector for the FR-PU04 (option) and RS-485 communication.

(2) Names and functions

<table>
<thead>
<tr>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station number setting switches</td>
<td>Used to set the inverter station number between 1 and 64. For details, refer to page 41.</td>
</tr>
<tr>
<td>Transmission baudrate setting switch</td>
<td>Used to set the transmission speed. Refer to page 41 for details.</td>
</tr>
<tr>
<td>Operating status indicator LEDs</td>
<td>L.RUN ........ Lit to indicate normal receipt of refresh data. Extinguished to indicate a break for a given period. SD .......... Extinguished when send data is &quot;0&quot;. RD ........... Lit on detection of receive data carrier L.ERR ........ Lit to indicate communication error of host station. Flickers to indicate a change in setting of any switch or like while power is on.</td>
</tr>
</tbody>
</table>

(3) Wiring of terminal block

The layout of the inverter's CC-Link communication signal terminals are as shown below.
Terminal screw size: M2.5

(4) Wiring method

Use a twisted cable after stripping its sheath and twisting the wires. Stripping too much may cause a short with the adjacent wires. Stripping too little may cause the wires to come off.

6mm to 6.5mm
2.3.3 When FR-E5NC is connected

(1) Appearance

(2) Names and functions

<table>
<thead>
<tr>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station number setting switches</td>
<td>Used to set the inverter station number between 1 and 64. For details, refer to page 41.</td>
</tr>
<tr>
<td>Transmission baudrate setting switch</td>
<td>Used to set the transmission speed. Refer to page 41 for details.</td>
</tr>
<tr>
<td>Operating status indicator LEDs</td>
<td>L.RUN........ Lit to indicate normal receipt of refresh data. Extinguished to indicate a break for a given period. SD............ Extinguished when send data is &quot;0&quot;. RD............. Lit on detection of receive data carrier L.ERR........ Lit to indicate communication error of host station. Flickers to indicate a change in setting of any switch or like while power is on.</td>
</tr>
</tbody>
</table>

(3) Wiring of terminal block

Note: The mounting screws do not come off.
(4) Mounting method

1) Remove the front cover and option wiring port cover.
2) Remove the sponge in the connector of the plug-in option, and match and insert the option unit's connector into the plug-in option connector of the inverter securely far enough.
3) Using the accessory mounting screws, fix the two portions at top and bottom of the option unit to the inverter. If the screw holes do not match, the connector may not have been plugged snugly. Check for loose plugging.
4) Reinstall the front cover to the inverter.

Note 1. While the plug-in option is loaded, keep the option wiring port cover carefully.
Note 2. When this option is loaded, the protective structure of the inverter is the open type (IP00).
Note 3. If the inverter cannot recognize the loading of the option, it displays the E.OPT error.
2.3.4 Master and local modules

Five models of QJ61BT11, AJ61BT11, A1SJ61BT11, AJ61QBT11 and A1SJ61QBT11 are available as the master and local modules.

<table>
<thead>
<tr>
<th>Master/Local Module Name</th>
<th>Applicable PLC Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>QJ61BT11</td>
<td>Q series</td>
</tr>
<tr>
<td>AJ61BT11</td>
<td>A series</td>
</tr>
<tr>
<td>A1SJ61BT11</td>
<td>AnS series</td>
</tr>
<tr>
<td>AJ61QBT11</td>
<td>QnA series</td>
</tr>
<tr>
<td>A1SJ61QBT11</td>
<td>Q2AS series</td>
</tr>
</tbody>
</table>

Number | Name                           |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>LED indicators</td>
</tr>
<tr>
<td>2)</td>
<td>Station number setting switches</td>
</tr>
<tr>
<td>3)</td>
<td>Mode setting switch</td>
</tr>
<tr>
<td>4)</td>
<td>Transmission speed setting switch</td>
</tr>
<tr>
<td>5)</td>
<td>Condition setting switches</td>
</tr>
<tr>
<td>6)</td>
<td>Terminal block</td>
</tr>
</tbody>
</table>
Number | Name
---|---
1) | LED indicators
2) | Station number setting switches
3) | Mode setting switch
4) | Transmission speed setting switch
5) | Condition setting switches
6) | Terminal block
2.4 Configuration and Wiring Method

(1) System configuration example

Power supply module | CPU module | CC-Link module |
A1S62PN | A2SHCPU | A1SJ61BT11 |

CC-Link-compatible inverters

CC-Link master station manuals
AJ61BT11/A1SJ61BT11 CC-Link System Master/Local Module User’s Manual (Details) ... SH-3603
AJ61QBT11/A1SJ61QBT11 CC-Link System Master/Local Module User’s Manual (Details) ... SH-3604

1) PLC side
Load the "QJ61BT11", "AJ61BT11", "A1SJ61BT11", "AJ61QBT11" or "A1SJ61QBT11" CC-Link system master/local module on the main or extension base unit of the PLC CPU used as the master station.

2) Inverter side
Install the CC-Link-compatible inverters. Load the optional CC-Link unit if required.

3) Connect the PLC CC-Link module master station and CC-Link-compatible inverters with the CC-Link-dedicated cables.

4) When the CPU has automatic refresh function (example: QnA series CPU)
Through communication with the corresponding devices using sequence ladders, data is automatically transferred to the refresh buffer of the master station at the execution of the END instruction to perform communication with the remote devices (CC-Link-compatible inverters).

5) When the CPU does not have automatic refresh function (example: AnA series CPU)
Data is transferred to the refresh buffer of the master station directly by sequence ladders to perform communication with the remote devices (CC-Link-compatible inverters).
(2) Wiring method

1) Connection of one inverter

![Diagram of one inverter connection]

Note: During wiring, take care to prevent wire off-cuts from entering the inverter. They can cause a fault, failure or malfunction.

2) Connection of multiple inverters

![Diagram of multiple inverter connection]

*Use the termination resistors supplied for the PLC.

<Max. number of inverters connected to one master station>

42 units (when only inverters are connected)

When there are other modules, the number of stations occupied changes with the module and therefore the following conditions must be satisfied:

\[
(1\times a)+(2\times b)+(3\times c)+(4\times d) \leq 64
\]

- a: Number of units occupying 1 station
- b: Number of units occupying 2 stations
- c: Number of units occupying 3 stations
- d: Number of units occupying 4 stations

\[
(16\times A)+(54\times B)+(88\times C) \leq 2304
\]

- A: Number of remote I/O stations \( \leq 64 \)
- B: Number of remote device stations \( \leq 42 \)
- C: Number of local stations \( \leq 26 \)
2.5 Inverter Setting

(1) Inverter station number setting
Set the station numbers of the inverters before powering on the inverters and do not change the settings while power is on. Set the station numbers noting the following:

1) Station numbers may be set between 1 and 64.
   Fully note that if you change any station number during operation, data communication cannot be made with the new station number.

2) Setting method
   - Place the arrows (†) of the corresponding switches to the positions of the station number you want to set.
   - Example
     For station 1: Set (†) of ×10 to "0" and (†) of ×1 to "1".
     For station 26: Set (†) of ×10 to "2" and (†) of ×1 to "6".
     - Set the station numbers sequentially in order of connection.
     - (Station numbers may be specified independently of the connection sequence.)
     - Note that the same station number cannot be used more than once.
       (Doing so disables proper communications.)
     - Securely set the station number switch in the numeral position.
       Setting it between numerals disables proper data communications.

3) Connection example

   CC-Link master module (1 station occupied)
   Remote I/O station
   Inverter 1 (CC-Link unit)
   Remote device station
   Inverter 2 (CC-Link unit)
   Remote device station
   Inverter 3 (CC-Link unit)
   Remote device station

   Note: One inverter occupies one station. (One remote device station)

   Number of units connected is 4.

(2) Setting of transmission baudrate setting switch
Set the transmission speed.
(For details, refer to the CC-Link master module manual.)

<table>
<thead>
<tr>
<th>Setting Switch</th>
<th>Transmission Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>156kbps</td>
</tr>
<tr>
<td>1</td>
<td>625kbps</td>
</tr>
<tr>
<td>2</td>
<td>2.5Mbps</td>
</tr>
<tr>
<td>3</td>
<td>5Mbps</td>
</tr>
<tr>
<td>4</td>
<td>10Mbps</td>
</tr>
</tbody>
</table>

Positions 5 and later are not used.
(If the switch is set to any of these positions, the L.ERR LED is lit to indicate a communication error.)
2.6 Operation Modes

2.6.1 When FR-A5NC is connected

(1) Operation modes

1) PU operation: Controls the inverter from the keyboard of the operation panel (FR-DU04) or parameter unit (FR-PU04) installed to the inverter.

2) External operation: Controls the inverter by switching on/off external signals connected to the control circuit terminals of the inverter.

3) PLC link operation: Controls the inverter in accordance with the PLC program via the CC-Link unit (FR-A5NC).

(2) Operation mode switching

1) Operation mode switching conditions

Before switching the operation mode, check that:
- The inverter is at a stop;
- Both the forward and reverse rotation signals are off; and
- The Pr. 79 “operation mode” setting is correct.

(Use the parameter unit of the inverter for setting.)

<table>
<thead>
<tr>
<th>Pr. 79 Setting</th>
<th>Operation Mode Selection</th>
<th>Switching to CC-Link Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>PU or external operation</td>
<td>Disallowed when the PU mode is selected. Allowed when the external mode is selected.</td>
</tr>
<tr>
<td>1</td>
<td>PU operation mode</td>
<td>Disallowed</td>
</tr>
<tr>
<td>2</td>
<td>External operation mode</td>
<td>Allowed</td>
</tr>
<tr>
<td>3, 4</td>
<td>External/PU combined operation mode</td>
<td>Disallowed</td>
</tr>
<tr>
<td>5</td>
<td>Programmed operation</td>
<td>Disallowed</td>
</tr>
<tr>
<td>6</td>
<td>Switch-over</td>
<td>Allowed</td>
</tr>
<tr>
<td>7</td>
<td>External operation (PU operation interlock)</td>
<td>Allowed only in the external operation mode when the PU interlock signal (X12) is on.</td>
</tr>
<tr>
<td>8</td>
<td>PU or external (signal switching)</td>
<td>Allowed only in the external operation mode (X16 on).</td>
</tr>
</tbody>
</table>

2) Operation mode switching method

Switched by PLC program

Switched from PU

Symbol | Switching Type | Switching Method |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>PU operation → external operation</td>
<td>Operate the external operation key on the PU.</td>
</tr>
<tr>
<td>B</td>
<td>External operation → PU operation</td>
<td>Operate the PU operation key on the PU.</td>
</tr>
<tr>
<td>C</td>
<td>External operation → CC-Link operation</td>
<td>By the user program of the PLC.</td>
</tr>
<tr>
<td>D</td>
<td>CC-Link operation → external operation</td>
<td>By the user program of the PLC.</td>
</tr>
<tr>
<td>E</td>
<td>PU operation → CC-Link operation</td>
<td>Switching disallowed. Allowed if external operation is selected in A and CC-Link operation is then selected in C. (Note 2)</td>
</tr>
<tr>
<td>F</td>
<td>CC-Link operation → PU operation</td>
<td>Switching disallowed. Allowed if external operation is selected in D and PU operation is then selected in B. (Note 2)</td>
</tr>
</tbody>
</table>

When “1 or 2” is set in Pr. 340 “link start mode selection”, the operation mode is CC-Link operation at power on or inverter reset.

Note 1. When setting “1 or 2” in Pr. 340, the initial settings (station number setting, etc.) of the inverter must be made without fail.

Note 2. In the switch-over mode (Pr. 79 = 6), switching in E and F is also allowed.
3) Link start mode

By setting the Pr. 340 value as appropriate, the operation mode at power on and at restoration from instantaneous power failure can be selected.

<table>
<thead>
<tr>
<th>Pr. 340 Setting</th>
<th>Pr. 79 Setting</th>
<th>Operation Mode</th>
<th>Mode at Power On or at Restoration from Instantaneous Power Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>PU or external operation</td>
<td>Inverter goes into the external operation mode.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>PU operation</td>
<td>Inverter goes into the PU operation mode.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>External operation</td>
<td>Inverter goes into the external operation mode.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>External/PU combined operation mode</td>
<td>Running frequency is set in the PU operation mode and the start signal is set in the external operation mode.</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>External/PU combined operation mode</td>
<td>Running frequency is set in the external operation mode and the start signal is set in the PU operation mode.</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Programmed operation mode</td>
<td>Inverter is operated by the program.</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Switch-over mode</td>
<td>Operation mode is switched while running.</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>External operation mode</td>
<td>Shift to the PU operation mode is controlled by ON/OFF of the X12 signal.</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>External/PU combined operation mode</td>
<td>Operation mode is switched by ON/OFF of the X16 signal.</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>CC-Link operation</td>
<td>Inverter goes into the CC-Link operation mode. (Program need not be used for switching)</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>CC-Link operation</td>
<td>Inverter goes into the CC-Link operation mode. (Program need not be used for switching) For computer link operation.</td>
</tr>
</tbody>
</table>

- The Pr. 340 value may be changed in any operation mode.
- When Pr. 79 "operation mode selection" = 0, 2 or 6, "1 and 2" in Pr. 340 are made valid.
- When starting CC-Link operation at power-on, set "1 or 2" in Pr. 340.
### (3) Control place selection

In the CC-Link operation mode, commands from the external terminals and sequence program are as listed below:

<table>
<thead>
<tr>
<th>Control place selection</th>
<th>Pr. 338 “operation command right”</th>
<th>Pr. 339 “speed command right”</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0: PLC</td>
<td>0: PLC 1: External</td>
<td></td>
</tr>
<tr>
<td>Forward rotation command (STF)</td>
<td>PLC</td>
<td>PLC External</td>
<td></td>
</tr>
<tr>
<td>Reverse rotation command (STR)</td>
<td>PLC</td>
<td>PLC External</td>
<td></td>
</tr>
<tr>
<td>Start self-holding selection (STOP)</td>
<td>PLC 1: External</td>
<td>PLC 1: External</td>
<td></td>
</tr>
<tr>
<td>Output halt (MRS)</td>
<td>Both</td>
<td>Both External</td>
<td></td>
</tr>
<tr>
<td>Reset (RES)</td>
<td>Both</td>
<td>Both Both</td>
<td></td>
</tr>
<tr>
<td>CC-Link operation frequency</td>
<td>PLC</td>
<td>PLC</td>
<td></td>
</tr>
</tbody>
</table>

#### Fixed functions (Functions equivalent to terminals)

<table>
<thead>
<tr>
<th>Fixed functions</th>
<th>Pr. 180 to Pr. 183 settings</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Low-speed operation command (RL)</td>
<td>PLC External PLC External</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>1 Middle-speed operation command (RM)</td>
<td>PLC External PLC External</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>2 High-speed operation command (RH)</td>
<td>PLC External PLC External</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>4 Current input selection (AU)</td>
<td>Both Both</td>
<td>Both</td>
</tr>
<tr>
<td>5 Jog operation selection (JOG)</td>
<td>Both Both</td>
<td>Both</td>
</tr>
<tr>
<td>6 Automatic restart after instantaneous power failure selection (GS)</td>
<td>PLC PLC PLC PLC</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>7 External thermal relay input (CH)</td>
<td>PLC PLC PLC PLC</td>
<td>PLC PLC PLC PLC</td>
</tr>
<tr>
<td>8 15-speed selection (REX)</td>
<td>PLC PLC PLC PLC</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>9 Third function (X9)</td>
<td>PLC PLC PLC PLC</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>10 FR-HC connection, inverter operation enable (X10)</td>
<td>External External</td>
<td>External External</td>
</tr>
<tr>
<td>11 FR-HC connection, instantaneous power failure detection (X11)</td>
<td>External External</td>
<td>External External</td>
</tr>
<tr>
<td>12 PU external interlock (X12)</td>
<td>External External</td>
<td>External External</td>
</tr>
<tr>
<td>13 External DC dynamic braking start (X13)</td>
<td>PLC PLC PLC PLC</td>
<td>PLC PLC PLC PLC</td>
</tr>
<tr>
<td>14 PID control valid terminal (X14)</td>
<td>PLC PLC PLC PLC</td>
<td>PLC PLC PLC PLC</td>
</tr>
<tr>
<td>15 Brake opening completion signal (BRI)</td>
<td>PLC PLC PLC PLC</td>
<td>PLC PLC PLC PLC</td>
</tr>
<tr>
<td>16 PU operation external operation switching (X16)</td>
<td>External External</td>
<td>External External</td>
</tr>
<tr>
<td>17 Load pattern selection-forward/reverse rotation boost switching (X17)</td>
<td>PLC PLC PLC PLC</td>
<td>PLC PLC PLC PLC</td>
</tr>
<tr>
<td>18 Magnetic flux-V/F switching (X18)</td>
<td>PLC PLC PLC PLC</td>
<td>PLC PLC PLC PLC</td>
</tr>
<tr>
<td>19 Load torque high-speed frequency (X19)</td>
<td>PLC PLC PLC PLC</td>
<td>PLC PLC PLC PLC</td>
</tr>
<tr>
<td>22 Orientation command</td>
<td>PLC PLC PLC PLC</td>
<td>Note 2</td>
</tr>
</tbody>
</table>

#### Selective functions

<table>
<thead>
<tr>
<th>Selective functions</th>
<th>Pr. 180 to Pr. 183 settings</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmed operation group selection (RH, RM, RL)</td>
<td>PLC External PLC External</td>
<td>Pr. 59 = 1, 2</td>
</tr>
<tr>
<td>Stop-on-contact selection 0 (RL)</td>
<td>PLC External PLC External</td>
<td>Pr. 79 = 5</td>
</tr>
<tr>
<td>Stop-on-contact selection 1 (R1)</td>
<td>PLC External PLC External</td>
<td>Pr. 79 = 5</td>
</tr>
</tbody>
</table>

#### External : Control by signal from external terminal is only valid.

PLC : Control from sequence program is only valid.

Both : Control from both external terminal and PLC is valid.

- : Control from both external terminal and PLC is invalid.

Compensation : Control by signal from external terminal is only valid if Pr. 28 “multi-speed input compensation” setting is “1”.

**Note 1.** If the FR-HC connection, inverter operation enable signal (X10) is not assigned when the FR-HC is used (Pr. 30 = 2) or if the PU operation interlock signal (X12) is not assigned when the PU operation interlock function is set (Pr. 79 = 7), this function is also used by the MRS signal and therefore the MRS signal is only valid for the external terminals, independently of the Pr. 338 and 339 settings.

**Note 2.** The orientation command needs the FR-ASAP and FR-ASAX options.
2.6.2 FR-E520-CC Link

(1) Operation modes

1) PU operation: Controls the inverter from the keyboard of the operation panel or parameter unit (FR-PU04) installed to the inverter.

2) CC-Link operation: Controls the inverter in accordance with the PLC program by CC-Link.

(2) Operation mode switching method

Change the operation mode as described below:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Switching Type</th>
<th>Switching Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>PU operation → CC-Link operation</td>
<td>Can be switched from parameter unit (Note 1)</td>
</tr>
<tr>
<td>B</td>
<td>CC-Link operation → PU operation</td>
<td>Can be switched from parameter unit (Note 1)</td>
</tr>
</tbody>
</table>

Note 1. Set "0" in Pr. 79 "operation mode selection" to carry out the above switching.

When "1" is set in Pr. 79 "operation mode selection", the operation mode available is the PU operation only.
When "2" is set in Pr. 79 "operation mode selection", the operation mode available is the CC-Link operation only.
You cannot change the operation mode with the user program from the PLC.

(3) Control place selection

In the CC-Link operation mode, operation can be performed with the signals from the external terminals.

<table>
<thead>
<tr>
<th>Operation Mode</th>
<th>CC-Link Operation Mode</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed functions (Functions equivalent to terminals)</td>
<td>Reset (RES)</td>
<td>Both</td>
</tr>
<tr>
<td></td>
<td>CC-Link operation frequency</td>
<td>PLC</td>
</tr>
<tr>
<td>Selectable function</td>
<td>0 Low-speed operation command (RL)</td>
<td>Both</td>
</tr>
<tr>
<td></td>
<td>1 Middle-speed operation command (RM)</td>
<td>Both</td>
</tr>
<tr>
<td></td>
<td>2 High-speed operation command (RH)</td>
<td>Both</td>
</tr>
<tr>
<td></td>
<td>3 Second function selection (RT)</td>
<td>Both</td>
</tr>
<tr>
<td></td>
<td>6 Output halt terminal (MRS)</td>
<td>Both</td>
</tr>
<tr>
<td></td>
<td>7 External thermal relay input (OH)</td>
<td>External</td>
</tr>
<tr>
<td></td>
<td>8 15-speed selection (REX)</td>
<td>Both</td>
</tr>
<tr>
<td></td>
<td>18 Magnetic flux-V/F switching (X18)</td>
<td>Both</td>
</tr>
</tbody>
</table>

[Explanation of table]

External: Control by signal from external terminal is only valid.
PLC: Control from sequence program is only valid.
Both: Control from both external terminal and PLC is valid.
2.6.3 When FR-E5NC is connected

(1) Operation modes

1) PU operation: Controls the inverter from the keyboard of the operation panel or parameter unit (FR-PU04) installed to the inverter.

2) External operation: Controls the inverter by switching on/off external signals connected to the control circuit terminals of the inverter.

3) CC-Link operation: Controls the inverter in accordance with the PLC program via the CC-Link unit (FR-E5NC).

(2) Operation mode switching

1) Operation mode switching conditions

Before switching the operation mode, check that:
- The inverter is at a stop;
- Both the forward and reverse rotation signals are off; and
- The Pr. 79 "operation mode" setting is correct.

(Use the operation panel of the inverter or the optional parameter unit for setting.)

<table>
<thead>
<tr>
<th>Pr. 79 Setting</th>
<th>Operation Mode Selection</th>
<th>Switching to CC-Link Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>PU or external operation</td>
<td>Disallowed when the PU mode is selected. Allowed when the external mode is selected.</td>
</tr>
<tr>
<td>1</td>
<td>PU operation mode</td>
<td>Disallowed</td>
</tr>
<tr>
<td>2</td>
<td>External operation mode</td>
<td>Allowed</td>
</tr>
<tr>
<td>3, 4</td>
<td>External/PU combined operation mode</td>
<td>Disallowed</td>
</tr>
<tr>
<td>6</td>
<td>Switch-over</td>
<td>Allowed</td>
</tr>
<tr>
<td>7</td>
<td>External operation (PU operation interlock)</td>
<td>Allowed only in the external operation mode when the output halt signal (MRS) is on.</td>
</tr>
<tr>
<td>8</td>
<td>PU or external (signal switching)</td>
<td>Allowed only in the external operation mode (X16 on).</td>
</tr>
</tbody>
</table>

2) Operation mode switching method

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Switching Type</th>
<th>Switching Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>PU operation → external operation</td>
<td>Operate the external operation key on the PU.</td>
</tr>
<tr>
<td>B</td>
<td>External operation → PU operation</td>
<td>Operate the PU operation key on the PU.</td>
</tr>
<tr>
<td>C</td>
<td>External operation → CC-Link operation</td>
<td>By the user program of the PLC.</td>
</tr>
<tr>
<td>D</td>
<td>CC-Link operation → external operation</td>
<td>By the user program of the PLC.</td>
</tr>
<tr>
<td>E</td>
<td>PU operation → CC-Link operation</td>
<td>Switching disallowed. Allowed if external operation is selected in A and CC-Link operation is then selected in C. (Note 2)</td>
</tr>
<tr>
<td>F</td>
<td>CC-Link operation → PU operation</td>
<td>Switching disallowed. Allowed if external operation is selected in D and PU operation is then selected in B. (Note 2)</td>
</tr>
</tbody>
</table>

When "1 or 2" is set in Pr. 340 "link start mode selection", the operation mode is CC-Link operation at power on or inverter reset.

Note 1. When setting "1 or 2" in Pr. 340, the initial settings (station number setting, etc.) of the inverter must be made without fail.

Note 2. In the switch-over mode (Pr. 79 = 6), switching in E and F is also allowed.
(3) Link start mode

You can choose the operation mode at power-on or at power restoration after instantaneous power failure.

Set "1" in Pr. 340 value to choose the CC-Link operation mode.

After a link start, the program can be used to write parameters.

Note: Pr. 79 “operation mode” changes in function according to the inverter. For details, refer to the inverter instruction manual.

<table>
<thead>
<tr>
<th>Pr. 340 Setting</th>
<th>Pr.79</th>
<th>Operation Mode</th>
<th>Mode at Power On or at Restoration from Instantaneous Power Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (Factory setting)</td>
<td>0</td>
<td>PU or external operation</td>
<td>Inverter goes into the external operation mode.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>PU operation</td>
<td>Inverter goes into the PU operation mode.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>External operation</td>
<td>Inverter goes into the external operation mode.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>External/PU combined operation mode</td>
<td>Running frequency is set in the PU operation mode and the start signal is set in the external operation mode.</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>External/PU combined operation mode</td>
<td>Running frequency is set in the external operation mode and the start signal is set in the PU operation mode.</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Switch-over mode</td>
<td>Operation mode is switched while running.</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>External operation mode</td>
<td>MRS signal ON ......Can be shifted to the PU operation mode. MRS signal OFF ......Cannot be shifted to the PU operation mode.</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>External/PU combined operation mode</td>
<td>X16 signal ON ......Shifted to the external operation mode. X16 signal OFF ......Shifted to the PU operation mode.</td>
</tr>
<tr>
<td>1</td>
<td>CC-Link operation</td>
<td>Inverter goes into the CC-Link operation mode. (Program need not be used for switching)</td>
<td></td>
</tr>
</tbody>
</table>

• The Pr. 340 value may be changed from the PU in any operation mode.
• When Pr. 79 “operation mode selection” = “0, 2 or 6”, “1” in Pr. 340 is made valid.
• When starting CC-Link operation at power-on, set “1” in Pr. 340.

(3) Control place selection

In the CC-Link operation mode, commands from the external terminals and sequence program are as listed below. (Pr. 180 to Pr. 183 (input terminal function selection) change in functions according to the inverter. For details, refer to the inverter instruction manual.)

<table>
<thead>
<tr>
<th>Control place selection</th>
<th>Pr. 338 “operation command right”</th>
<th>Pr. 339 “speed command right”</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pr. 180 to Pr. 183 settings</td>
<td>0: PLC 0: PLC 0: PLC 0: PLC 1: PLC 1: External 1: External</td>
<td>0: PLC 1: External 0: PLC 1: External</td>
<td>0: PLC 1: External 0: PLC 1: External</td>
</tr>
<tr>
<td>Fixed functions (Functions equivalent to terminals)</td>
<td>0: PLC 1: External 0: PLC 1: External</td>
<td>0: PLC 1: External 0: PLC 1: External</td>
<td>0: PLC 1: External 0: PLC 1: External</td>
</tr>
<tr>
<td>Forward rotation command (STF)</td>
<td>PLC PLC PLC External External</td>
<td>PLC PLC PLC External External</td>
<td>PLC PLC PLC External External</td>
</tr>
<tr>
<td>Reverse rotation command (STR)</td>
<td>PLC PLC PLC External External</td>
<td>PLC PLC PLC External External</td>
<td>PLC PLC PLC External External</td>
</tr>
<tr>
<td>Reset (RES)</td>
<td>Both Both Both Both</td>
<td>Both Both Both Both</td>
<td>Both Both Both Both</td>
</tr>
<tr>
<td>CC-Link operation frequency</td>
<td>PLC PLC PLC PLC</td>
<td>PLC PLC PLC PLC</td>
<td>PLC PLC PLC PLC</td>
</tr>
<tr>
<td>2</td>
<td>External External</td>
<td>External External</td>
<td>External External</td>
</tr>
<tr>
<td>4</td>
<td>External External</td>
<td>External External</td>
<td>External External</td>
</tr>
</tbody>
</table>

Selective functions

<table>
<thead>
<tr>
<th>Pr. 180 to Pr. 183 settings</th>
<th>0: PLC 1: External 0: PLC 1: External</th>
<th>0: PLC 1: External 0: PLC 1: External</th>
<th>0: PLC 1: External 0: PLC 1: External</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selective functions</td>
<td>0: PLC 1: External 0: PLC 1: External</td>
<td>0: PLC 1: External 0: PLC 1: External</td>
<td>0: PLC 1: External 0: PLC 1: External</td>
<td>0: PLC 1: External 0: PLC 1: External</td>
</tr>
<tr>
<td>0 Low-speed operation command (RL)</td>
<td>PLC External PLC External</td>
<td>PLC External PLC External</td>
<td>PLC External PLC External</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>1 Middle-speed operation command (RM)</td>
<td>PLC External PLC External</td>
<td>PLC External PLC External</td>
<td>PLC External PLC External</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>2 High-speed operation command (RH)</td>
<td>PLC External PLC External</td>
<td>PLC External PLC External</td>
<td>PLC External PLC External</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>3 Second function selection (RT)</td>
<td>PLC PLC PLC External External</td>
<td>PLC PLC PLC External External</td>
<td>PLC PLC PLC External External</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>4 Current input selection (AU)</td>
<td>Both Both Both Both</td>
<td>Both Both Both Both</td>
<td>Both Both Both Both</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>5 Start self-holding selection (STOP)</td>
<td>Both Both Both Both</td>
<td>Both Both Both Both</td>
<td>Both Both Both Both</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>6 Output halt terminal (MK0)</td>
<td>PLC External PLC External</td>
<td>PLC External PLC External</td>
<td>PLC External PLC External</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>7 External thermal relay input (OH)</td>
<td>External External External External</td>
<td>External External External External</td>
<td>External External External External</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>8 15-speed selection (REX)</td>
<td>PLC External PLC External</td>
<td>PLC External PLC External</td>
<td>PLC External PLC External</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>16 PU operation external operation switching (X16)</td>
<td>External External External External</td>
<td>External External External External</td>
<td>External External External External</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>18 Magnetic flux-V/F switching (X18)</td>
<td>PLC PLC PLC External</td>
<td>PLC PLC PLC External</td>
<td>PLC PLC PLC External</td>
<td>Pr. 59 = 0</td>
</tr>
</tbody>
</table>

[Explanation of table]

External : Control from signal by external terminal
PLC : Control from sequence program is only valid.
Both : Control from both external terminal and PLC is valid.

Note: When “7” (PU operation interlock function) is set in Pr. 79 “operation mode selection”, this function is also used by the MRS signal and therefore the MRS signal is only valid for the external terminals, independently of the Pr. 338 and 339 settings.
2.7.1 When FR-A5NC is connected

1) Operation mode-based functions

<table>
<thead>
<tr>
<th>Control Location</th>
<th>Item</th>
<th>Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PU operation</td>
<td>External operation</td>
</tr>
<tr>
<td>User program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-operation mode</td>
<td>Disallowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td>-running frequency setting</td>
<td>Disallowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td>Parameter write</td>
<td>Disallowed (Note 3)</td>
<td>Disallowed (Note 3)</td>
</tr>
<tr>
<td>Parameter read</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td>Inverter reset</td>
<td>Disallowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td>Error reset at inverter alarm (RY1A)</td>
<td>Allowed (Note 1)</td>
<td>Allowed (Note 1)</td>
</tr>
<tr>
<td>Stop command (Note 2)</td>
<td>Disallowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td>Control circuit terminal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inverter reset terminal</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td>Operation command</td>
<td>Disallowed</td>
<td>Allowed</td>
</tr>
<tr>
<td>Frequency setting</td>
<td>Disallowed</td>
<td>Allowed</td>
</tr>
</tbody>
</table>

Note 1. At occurrence of a communication error, the inverter cannot be reset from the PLC.
Note 2. As set in Pr. 75.
Note 3. As set in Pr. 77.
Note 4. Values can be written to Pr. 4 to 6, 22, 24 to 27, 52 to 56, 232 to 239 and 271 to 274 during operation.
Note 5. As set in Pr. 338 and Pr. 339.
Note 6. The inverter goes into the external operation mode if it is reset from the PLC in the CC-Link operation mode.

2) Monitoring

The following items can be monitored by the PLC:
1) Output frequency........ Binary in 0.01Hz increments
2) Output current........... Binary in 0.01A increments
3) Output voltage............ Binary in 0.1V increments
4) Alarm definition
5) Special monitoring....... Monitored data selected by instruction code HF3
6) Inverter status
   • Forward running
   • Reverse running
   • Running (RUN)*
   • Up to frequency (SU)*
   • Overload (OL)*
   • Instantaneous power failure (IPF)*
   • Frequency detection (FU)*
   • Alarm*

The output signals marked * can be changed using Pr. 190 to Pr. 195 (output terminal function selection).
Note: Items 1) to 4) are read from the buffer memory by setting the corresponding code numbers when needed. Item 6) can be read from the buffer memory any time.
(3) **Operation commands**  
Any of the following commands can be output from the PLC to the inverter as an operation command any time:  
- Forward rotation (STF)  
- Reverse rotation (STR)  
- Low speed (RL)*  
- Middle speed (RM)*  
- High speed (RH)*  
- Second acceleration/deceleration (RT)*  
- Inverter output halt (MRS)  
- AU terminal*  
- JOG terminal*  
- CS terminal*  
The input signals marked *1 can be changed using Pr. 180 to Pr. 186 (input terminal function selection).

(4) **Running frequency**  
The running frequency is written from the PLC to the inverter when it is changed........ Binary in 0.01Hz increments  
The running frequency may be written to either E²PROM or RAM.  
When changing the frequency continuously, always write the data to the inverter RAM.

(5) **Parameter write**  
Functions can be written from the PLC. Note that write during inverter operation will result in a write mode error.

(6) **Parameter read**  
Functions can be read to the PLC.
### Operation at alarm occurrence

<table>
<thead>
<tr>
<th>Alarm Location</th>
<th>Description</th>
<th>Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PU operation</td>
</tr>
<tr>
<td>Inverter alarm</td>
<td>Inverter operation</td>
<td>Stop (Inverter trip)</td>
</tr>
<tr>
<td></td>
<td>Data communication FR-A5NC</td>
<td>Continued</td>
</tr>
<tr>
<td>Communication alarm (FR-A5NC)</td>
<td>Inverter operation</td>
<td>Continued</td>
</tr>
<tr>
<td></td>
<td>Data communication FR-A5NC</td>
<td>Stop</td>
</tr>
</tbody>
</table>

1) Inverter side alarm  
   Refer to the inverter manual and remove the cause of the alarm.

2) Communication alarm  
   Check the LED states of the FR-A5NC and remove the cause.  
   Check the CC-Link master station.

3) Communication error in CC-Link operation  
   When a communication error occurs, the error message "E.OP3" appears.

4) Inverter reset

<table>
<thead>
<tr>
<th>Resetting Method</th>
<th>Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLC program</td>
<td>PU operation</td>
</tr>
<tr>
<td>Inverter reset (Note 1) (Instruction code)</td>
<td>Disallowed</td>
</tr>
<tr>
<td>Error reset at inverter fault (RY1A) (Note 2)</td>
<td>Allowed</td>
</tr>
<tr>
<td>Connect terminals RES-SD</td>
<td>Allowed</td>
</tr>
<tr>
<td>Switch off inverter power</td>
<td>Allowed</td>
</tr>
</tbody>
</table>

Note 1. The inverter may be reset any time.
Note 2. The inverter may be reset only when its protective function is activated.
Note 3. Reset cannot be made from the PLC when a communication error has occurred.
Note 4. The inverter is set to the external operation mode if it has been reset in the CC-Link operation mode.  
   To resume the CC-Link operation, therefore, the inverter must be switched to the CC-Link operation again. (Switching is not needed when "1" or "2" is set in Pr. 340 "link start mode selection").
2.7.2 FR-E520-CC-Link

(1) Operation mode-based functions

The following table lists the functions that may be performed from the PLC by the CC-Link system:

<table>
<thead>
<tr>
<th>Control Location</th>
<th>Item</th>
<th>Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PU operation</td>
</tr>
<tr>
<td>User program</td>
<td>Operation command</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td>Running frequency setting</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Parameter write</td>
<td>Disallowed (Note 3)</td>
</tr>
<tr>
<td></td>
<td>Parameter read</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Inverter reset</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td>Error reset at inverter alarm (RY1A)</td>
<td>Allowed (Note 1)</td>
</tr>
<tr>
<td></td>
<td>Stop command (Note 2)</td>
<td>Disallowed</td>
</tr>
<tr>
<td>Control circuit terminal</td>
<td>Inverter reset terminal</td>
<td>Allowed</td>
</tr>
</tbody>
</table>

Note 1. At occurrence of a communication error, the inverter cannot be reset from the PLC.
Note 2. As set in Pr. 75.
Note 3. As set in Pr. 77.
Values can be written to Pr. 4 to 6, 22, 24 to 27, 52, 72 and 232 to 239 during operation.

(2) Monitoring

The following items can be monitored by the PLC:
1) Output frequency Binary in 0.01Hz increments
2) Output current Binary in 0.01A increments
3) Output voltage Binary in 0.1V increments
4) Alarm definition
5) Special monitoring Monitored data selected by instruction code HF3

6) Inverter status
   - Forward running
   - Reverse running
   - Running (RUN)*
   - Overload (OL)
   - Frequency detection (FU)*
   - Alarm*
   - Up to frequency (SU)*
   The output signals marked * can be changed using Pr. 190 to Pr. 192 (output terminal function selection).

Note: Items 1) to 4) are read from the buffer memory by setting the corresponding code numbers when needed.
Item 6) can be read from the buffer memory any time.

(3) Operation commands

Any of the following commands can be output from the PLC to the inverter as an operation command any time:
- Forward rotation (STF)
- Reverse rotation (STR)
- Low speed (RL)*
- Middle speed (RM)*
- High speed (RH)*
- Inverter output halt (MRS)

The input signals marked * can be changed using Pr. 180 to Pr. 183 (input terminal function selection). Note that some signals do not accept the command from the PLC according to the setting.
(4) **Running frequency**

The running frequency is written from the PLC to the inverter when it is changed. Binary in 0.01Hz increments.

The running frequency may be written to either E²PROM or RAM.

When changing the frequency continuously, always write the data to the inverter RAM.

(5) **Parameter write**

Functions can be written from the PLC. Note that write during inverter operation will result in a write mode error.

(6) **Parameter read**

Functions can be read to the PLC.

(7) **Operation at alarm occurrence**

<table>
<thead>
<tr>
<th>Alarm Location</th>
<th>Description</th>
<th>Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PU operation</td>
</tr>
<tr>
<td>Inverter alarm</td>
<td>Inverter operation</td>
<td>Stop (Inverter trip)</td>
</tr>
<tr>
<td></td>
<td>Data communication</td>
<td>CC-Link</td>
</tr>
<tr>
<td>Communication alarm (CC-Link)</td>
<td>Inverter operation</td>
<td>Continued</td>
</tr>
<tr>
<td></td>
<td>Data communication</td>
<td>CC-Link</td>
</tr>
</tbody>
</table>

1) **Inverter side alarm**

Refer to the inverter manual and remove the cause of the alarm.

2) **Communication alarm**

Check the LED states of CC-Link operation and remove the cause.

Check the CC-Link master station.

3) **Communication error in CC-Link operation**

When a communication error occurs, the error message “E.OPT” appears.

4) **Inverter reset**

<table>
<thead>
<tr>
<th>Resetting Method</th>
<th>Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PU operation</td>
</tr>
<tr>
<td>PLC program</td>
<td>Inverter reset (Note 1) (Instruction code)</td>
</tr>
<tr>
<td></td>
<td>Error reset at inverter fault (RY1A) (Note 2)</td>
</tr>
<tr>
<td>Connect terminals RES-SD</td>
<td>Allowed</td>
</tr>
<tr>
<td>Switch off inverter power</td>
<td>Allowed</td>
</tr>
</tbody>
</table>

Note 1. The inverter may be reset any time.

Note 2. The inverter may be reset only when its protective function is activated.

Note 3. Reset cannot be made from the PLC when a communication error has occurred.
2.7.3 When FR-E5NC is connected

(1) Operation mode-based functions

The following table lists the functions that may be performed from the PLC by the CC-Link system:

<table>
<thead>
<tr>
<th>Control Location</th>
<th>Item</th>
<th>Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PU operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>External operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CC-Link operation</td>
</tr>
<tr>
<td>User program</td>
<td>Operation command</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Running frequency setting</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Parameter write</td>
<td>Disallowed (Note 3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disallowed (Note 3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allowed (Note 3)</td>
</tr>
<tr>
<td></td>
<td>Parameter read</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Inverter reset</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allowed (Note 1)</td>
</tr>
<tr>
<td></td>
<td>Error reset at inverter alarm (RY1A)</td>
<td>Allowed (Note 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allowed (Note 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allowed (Note 1)</td>
</tr>
<tr>
<td>Control circuit</td>
<td>Stop command (Note 2)</td>
<td>Disallowed</td>
</tr>
<tr>
<td>terminal</td>
<td></td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Inverter reset terminal</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Operation command</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allowed (Note 4)</td>
</tr>
<tr>
<td></td>
<td>Frequency setting</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allowed (Note 4)</td>
</tr>
</tbody>
</table>

Note 1. At occurrence of a communication error, the inverter cannot be reset from the PLC.
Note 2. As set in Pr. 75.
Note 3. As set in Pr. 77.
Note 4. Values can be written to Pr. 4 to 6, 22, 24 to 27, 52, 72 and 232 to 239 during operation.
Note 5. The inverter goes into the external operation mode if it is reset from the PLC in the CC-Link operation mode.

(2) Monitoring functions

The following items can be monitored by the PLC:

1) Output frequency ............ Binary in 0.01Hz increments
2) Output current ............... Binary in 0.01A increments
3) Output voltage ............... Binary in 0.1V increments
4) Alarm definition
5) Special monitoring ........... Monitored data selected by instruction code HF3
6) Inverter status
   • Forward running
   • Reverse running
   • Running (RUN)*
   • Up to frequency (SU)*
   • Overload (OL)
   • Frequency detection (FU)*
   • Alarm*

The output signals marked * can be changed using Pr. 190 to Pr. 195 (output terminal function selection).

Note: Items 1) to 4) are read from the buffer memory by setting the corresponding code numbers when needed. Item 6) can be read from the buffer memory any time.

(3) Operation commands

Any of the following commands can be output from the PLC to the inverter as an operation command any time:

• Forward rotation (STF)
• Reverse rotation (STR)
• Low speed (RL)*
• Middle speed (RM)*
• High speed (RH)*
• Inverter output halt (MRS)

The input signals marked * can be changed using Pr. 180 to Pr. 183 (input terminal function selection). Note that some signals do not accept the command from the PLC according to the setting.
(4) Running frequency
The running frequency is written from the PLC to the inverter when it is changed. Binary in 0.01Hz increments
The running frequency may be written to either E²PROM or RAM. When changing the frequency continuously, always write the data to the inverter RAM.

(5) Parameter write
Functions can be written from the PLC. Note that write during inverter operation will result in a write mode error.

(6) Parameter read
Functions can be read to the PLC.

(7) Operation at alarm occurrence

<table>
<thead>
<tr>
<th>Alarm Location</th>
<th>Description</th>
<th>Operation Mode</th>
<th>Operation Mode</th>
<th>Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PU operation</td>
<td>External operation</td>
<td>CC-Link operation</td>
</tr>
<tr>
<td>Inverter alarm</td>
<td>Inverter operation</td>
<td>Stop (Inverter trip)</td>
<td>Stop (Inverter trip)</td>
<td>Stop (Inverter trip)</td>
</tr>
<tr>
<td></td>
<td>Data communication</td>
<td>FR-E5NC</td>
<td>Continued</td>
<td>Continued</td>
</tr>
<tr>
<td>Communication alarm (FR-E5NC)</td>
<td>Inverter operation</td>
<td>Continued</td>
<td>Continued</td>
<td>Stop (Inverter trip)</td>
</tr>
<tr>
<td></td>
<td>Data communication</td>
<td>FR-E5NC</td>
<td>Stop</td>
<td>Stop</td>
</tr>
</tbody>
</table>

1) Inverter side alarm
   Refer to the inverter manual and remove the cause of the alarm.

2) Communication alarm
   Check the LED states of the FR-E5NC and remove the cause.
   Check the CC-Link master station.

3) Communication error in CC-Link operation
   When a communication error occurs, the error message "E.OPT" appears.

4) Inverter reset

<table>
<thead>
<tr>
<th>Resetting Method</th>
<th>Operation Mode</th>
<th>Operation Mode</th>
<th>Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PU operation</td>
<td>External operation</td>
<td>CC-Link operation</td>
</tr>
<tr>
<td>PLC program</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Allowed</td>
</tr>
<tr>
<td>Inverter reset (Note 1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Instruction code)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error reset at inverter fault (RY1A) (Note 2)</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td>Connect terminals RES-SD</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td>Switch off inverter power</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
</tbody>
</table>

Note 1. The inverter may be reset any time.
Note 2. The inverter may be reset only when its protective function is activated.
Note 3. Reset cannot be made from the PLC when a communication error has occurred.
Note 4. The inverter is set to the external operation mode if it has been reset in the CC-Link operation mode.
To resume the CC-Link operation, therefore, the inverter must be switched to the CC-Link operation again. (Switching is not needed when “1” is set in Pr. 340 “link start mode selection”.)
2.8 PLC Programming

(1) I/O signal lists
The following device numbers are those of station 1.
Different device numbers are used for station 2 and later. (Refer to page 60 for the device number correspondence table.)

1) Output signals (Master module to inverter)
The output signals from the master module are given below. (Input signals to the inverter)

<table>
<thead>
<tr>
<th>Device No.</th>
<th>Signal Name</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RY0</td>
<td>Forward rotation command</td>
<td>OFF: Stop command\nON: Forward rotation start</td>
<td>Switching RY0 and RY1 on at the same time gives a stop command.</td>
</tr>
<tr>
<td>RY1</td>
<td>Reserve rotation command</td>
<td>OFF: Stop command\nON: Reserve rotation start</td>
<td></td>
</tr>
<tr>
<td>RY2</td>
<td>RH terminal function (high speed)</td>
<td>Functions assigned to RH/RL/RL are selected.</td>
<td></td>
</tr>
<tr>
<td>RY3</td>
<td>RM terminal function (middle speed)</td>
<td>Functions assigned to RH/RM/RM can be made by the combination of RH, RM and RL.</td>
<td></td>
</tr>
<tr>
<td>RY4</td>
<td>RL terminal function (low speed)</td>
<td>Functions assigned to the RL terminal is selected.</td>
<td></td>
</tr>
<tr>
<td>RY5</td>
<td>JOG terminal function</td>
<td>Function assigned to the JOG terminal is selected.</td>
<td>The input signal functions can be changed. (Note 1)</td>
</tr>
<tr>
<td>RY6</td>
<td>RT terminal function</td>
<td>Function assigned to the RT terminal is selected.</td>
<td></td>
</tr>
<tr>
<td>RY7</td>
<td>AU terminal function</td>
<td>Function assigned to the AU terminal is selected.</td>
<td></td>
</tr>
<tr>
<td>RY8</td>
<td>CS terminal function</td>
<td>Function assigned to the CS terminal is selected.</td>
<td></td>
</tr>
<tr>
<td>RY9</td>
<td>Output halt (MRS)</td>
<td>When the MRS signal switches on, the inverter output stops.</td>
<td></td>
</tr>
<tr>
<td>RYA</td>
<td>Unused (Note 2)</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RYB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RYC</td>
<td>Monitor command</td>
<td>When the monitor command (RYC) is switched on, the monitored value is set to remote register RYW1 and monitoring (RXC) switches on. While the monitor command (RYC) is on, the monitored value is always updated.</td>
<td></td>
</tr>
<tr>
<td>RYD</td>
<td>Frequency setting command (RAM)</td>
<td>When the frequency setting command (RYD) is switched on, the set frequency (RWW1) is written to the inverter. (Note 3) On completion of write, frequency setting completion (RXD) switches on.</td>
<td>Do not switch on RYD, RYE and RYF at the same time. If they are switched on simultaneously, only one of them is executed. Hence, switch on RYD, RYE and RYF one by one.</td>
</tr>
<tr>
<td>RYE</td>
<td>Frequency setting command (E2PROM)</td>
<td>When the frequency setting command (RYE) is switched on, the set frequency (RWW1) is written to the inverter. On completion of write, frequency setting completion (RXE) switches on.</td>
<td></td>
</tr>
<tr>
<td>RYF</td>
<td>Instruction code execution request</td>
<td>When the instruction code execution request (RYC) is switched on, processing corresponding to the instruction code set to RWi is executed. After completion of instruction code execution, instruction code execution completion (RXC) switches on. When an instruction code execution error occurs, a value other than 0 is set to the reply code (RWi).</td>
<td></td>
</tr>
<tr>
<td>RY10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RY11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RY12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RY13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RY14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RY15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RY16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RY17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RY18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RY19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RY1A</td>
<td>Error reset request flag</td>
<td>When the error reset request flag (RY1A) is switched on at the occurrence of an inverter fault, the inverter is reset and the error status flag (RX1A) switches off.</td>
<td></td>
</tr>
<tr>
<td>RY1B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RY1C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RY1D</td>
<td>Unused (Note 2)</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RY1E</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RY1F</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 1. The assignable device numbers change with the inverter model.
When the FR-ASNC (FR-A500, F500 series) is used, RY2 to RY8 can be changed with Pr. 180 to Pr. 186.
When the FR-E520 or FR-E5NC is used, RY2 to RY4 and RY9 can be changed with Pr. 180 to Pr. 183.

Note 2. Turn off the unused input signals. (Enter 0)

Note 3. While the set frequency command (RYD) is on, the set frequency (RWW1) value is always reflected.
2) Input signals (Inverter to master module)

The input signals to the master module are given below. (Output signals from the inverter)

<table>
<thead>
<tr>
<th>Device No.</th>
<th>Signal Name</th>
<th>Device No.</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RX0</td>
<td>Forward running</td>
<td>RX0</td>
<td>OFF: Other than forward running (during stop or reverse rotation) ON: Forward running</td>
<td></td>
</tr>
<tr>
<td>RX1</td>
<td>Reverse running</td>
<td>RX1</td>
<td>OFF: Other than reverse running (during stop or forward rotation) ON: Reverse running</td>
<td></td>
</tr>
<tr>
<td>RX2</td>
<td>Running (RUN)</td>
<td>RX2</td>
<td>On while the inverter is running.</td>
<td></td>
</tr>
<tr>
<td>RX3</td>
<td>Up to frequency (SU)</td>
<td>RX3</td>
<td>Switched on when the output frequency reaches the set frequency ( \pm \text{Pr. 41} ).</td>
<td></td>
</tr>
<tr>
<td>RX4</td>
<td>Overload (OL)</td>
<td>RX4</td>
<td>Switched on when stall prevention operation is performed, switched off when stall prevention is canceled.</td>
<td></td>
</tr>
<tr>
<td>RX5</td>
<td>Instantaneous power failure (IPF)</td>
<td>RX5</td>
<td>Switched on when instantaneous power failure or undervoltage occurs. Outputs can be changed. (Note 1)</td>
<td></td>
</tr>
<tr>
<td>RX6</td>
<td>Frequency detection (FU)</td>
<td>RX6</td>
<td>Switched on when the output frequency reaches any set frequency.</td>
<td></td>
</tr>
<tr>
<td>RX7</td>
<td>Alarm (ABC)</td>
<td>RX7</td>
<td>Switched on when the inverter's protective function is activated to stop the output.</td>
<td></td>
</tr>
<tr>
<td>RX8</td>
<td>Unused</td>
<td>RX8</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RX9</td>
<td>Unused</td>
<td>RX9</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RXA</td>
<td>Unused</td>
<td>RXA</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RXB</td>
<td>Unused</td>
<td>RXB</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RXC</td>
<td>Monitoring</td>
<td>RXC</td>
<td>Switched on when the monitored value is set by the monitor command (RYC) switched on. Switched off when the monitor command (RYC) is switched off.</td>
<td></td>
</tr>
<tr>
<td>RXD</td>
<td>Frequency setting completion (RAM)</td>
<td>RXD</td>
<td>Switched on when the set frequency is written to the inverter by the frequency setting command (RYD) switched on. Switched off when the frequency setting command (RYD) is switched off.</td>
<td></td>
</tr>
<tr>
<td>RXE</td>
<td>Frequency setting completion (E2PROM)</td>
<td>RXE</td>
<td>Switched on when the set frequency is written to the inverter by the frequency setting command (RYE) switched on. Switched off when the frequency setting command (RYE) is switched off.</td>
<td></td>
</tr>
<tr>
<td>RXF</td>
<td>Instruction code execution completion</td>
<td>RXF</td>
<td>Switched on on completion of the processing corresponding to the instruction code (RWvW) which is executed when the instruction code execution request (RYF) switches on. Switched off when the instruction code execution completion (RXF) is switched off.</td>
<td></td>
</tr>
<tr>
<td>RX10</td>
<td>Unused</td>
<td>RX10</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RX11</td>
<td>Unused</td>
<td>RX11</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RX12</td>
<td>Unused</td>
<td>RX12</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RX13</td>
<td>Unused</td>
<td>RX13</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RX14</td>
<td>Unused</td>
<td>RX14</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RX15</td>
<td>Unused</td>
<td>RX15</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RX16</td>
<td>Unused</td>
<td>RX16</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RX17</td>
<td>Unused</td>
<td>RX17</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RX18</td>
<td>Unused</td>
<td>RX18</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RX19</td>
<td>Unused</td>
<td>RX19</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RX1A</td>
<td>Error status flag</td>
<td>RX1A</td>
<td>Switched on when an inverter error occurs (protective function is activated).</td>
<td></td>
</tr>
<tr>
<td>RX1B</td>
<td>Remote station ready</td>
<td>RX1B</td>
<td>Switched on when the inverter goes into the ready status on completion of initial setting after power-on or hardware reset. (Used as an interlock for read/write from/to the master station.) Switched off at inverter error occurrence (when protective function is activated).</td>
<td></td>
</tr>
<tr>
<td>RX1C</td>
<td>Unused</td>
<td>RX1C</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RX1D</td>
<td>Unused</td>
<td>RX1D</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RX1E</td>
<td>Unused</td>
<td>RX1E</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
<tr>
<td>RX1F</td>
<td>Unused</td>
<td>RX1F</td>
<td>Reserved for the system.</td>
<td></td>
</tr>
</tbody>
</table>

Note 1. The assignable device numbers change with the inverter model. When the FR-A5NC (FR-A500, F500 series) is used, RX2 to RX7 can be changed with Pr. 190 to Pr. 195. When the FR-E520-○○○KN or FR-E5NC is used, RX2, RX6 and RY7 can be changed with Pr. 190 to Pr. 192.

Note 2. When you set to ON the "data link fault station's input data status (SW4)" condition setting switch of the master module, the input data from the data link fault station is retained in the status at the time of alarm occurrence. Hence, note that if an inverter error occurs, the remote station ready and other signals remain ON.
3) Remote registers (Master module to inverter)

<table>
<thead>
<tr>
<th>Device No.</th>
<th>Signal Name</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RW0n</td>
<td>Monitor code</td>
<td>Set the monitor code (refer to page 57) to be referred to. By switching on</td>
<td>SPECIFY THE SET FREQUENCY. AT THIS TIME, WHETHER IT IS WRITTEN TO RAM OR E'PROM IS DIFFERENTIATED BY THE RYD AND RYE SIGNALS. AFTER SETTING THE FREQUENCY TO THIS REGISTER, SWITCH ON THE ABOVE RYD OR RYE TO WRITE THE FREQUENCY. ON COMPLETION OF FREQUENCY WRITE, RKO OR RXE SWITCHES ON IN RESPONSE TO THE INPUT COMMAND.</td>
</tr>
<tr>
<td>RW1n</td>
<td>Set frequency</td>
<td>Set the instruction code (refer to page 59) for execution of operation mode</td>
<td>VIRTUAL WRITE, PR. READ/WRITE, ERROR REFERENCE, ERROR CLEAR, ETC. THE CORRESPONDING INSTRUCTION IS EXECUTED BY SWITCHING ON RYF AFTER COMPLETION OF REGISTER SETTING. RXF SWITCHES ON COMPLETION OF INSTRUCTION EXECUTION.</td>
</tr>
<tr>
<td>RW2n</td>
<td>Instruction code</td>
<td>Set the instruction code (refer to page 59) for execution of operation mode rewrite, Pr. read/write, error reference, error clear, etc. The corresponding instruction is executed by switching on RYF after completion of register setting. RXF switches on completion of instruction execution.</td>
<td>SPECIFY THE INSTRUCTION CODE (REFER TO PAGE 59) FOR EXECUTION OF OPERATION MODE REWRITE, PR. READ/WRITE, ERROR REFERENCE, ERROR CLEAR, ETC. THE CORRESPONDING INSTRUCTION IS EXECUTED BY SWITCHING ON RYF AFTER COMPLETION OF REGISTER SETTING. RXF SWITCHES ON COMPLETION OF INSTRUCTION EXECUTION.</td>
</tr>
<tr>
<td>RW3n</td>
<td>Write data</td>
<td>Set the data specified by the above instruction code. (When required)</td>
<td>Switch RYF on after setting the above instruction code and this register. Set zero when the write code is not required.</td>
</tr>
</tbody>
</table>

4) Remote registers (Inverter to master module)

<table>
<thead>
<tr>
<th>Device No.</th>
<th>Signal Name</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RWW0</td>
<td>Monitored value</td>
<td>The monitored value specified by RWW0 (monitor code) is set.</td>
<td>SPECIFY THE SET FREQUENCY. AT THIS TIME, WHETHER IT IS WRITTEN TO RAM OR E'PROM IS DIFFERENTIATED BY THE RYD AND RYE SIGNALS. AFTER SETTING THE FREQUENCY TO THIS REGISTER, SWITCH ON THE ABOVE RYD OR RYE TO WRITE THE FREQUENCY. ON COMPLETION OF FREQUENCY WRITE, RKO OR RXE SWITCHES ON IN RESPONSE TO THE INPUT COMMAND.</td>
</tr>
<tr>
<td>RWW1</td>
<td>Output frequency</td>
<td>The present output frequency is always set.</td>
<td>SPECIFY THE SET FREQUENCY. AT THIS TIME, WHETHER IT IS WRITTEN TO RAM OR E'PROM IS DIFFERENTIATED BY THE RYD AND RYE SIGNALS. AFTER SETTING THE FREQUENCY TO THIS REGISTER, SWITCH ON THE ABOVE RYD OR RYE TO WRITE THE FREQUENCY. ON COMPLETION OF FREQUENCY WRITE, RKO OR RXE SWITCHES ON IN RESPONSE TO THE INPUT COMMAND.</td>
</tr>
<tr>
<td>RWW2</td>
<td>Reply code</td>
<td>The reply code (refer to page 59) corresponding to RWW2 (instruction code) is set. 0 is set for a normal reply and a value other than 0 is set for a data error.</td>
<td>SPECIFY THE SET FREQUENCY. AT THIS TIME, WHETHER IT IS WRITTEN TO RAM OR E'PROM IS DIFFERENTIATED BY THE RYD AND RYE SIGNALS. AFTER SETTING THE FREQUENCY TO THIS REGISTER, SWITCH ON THE ABOVE RYD OR RYE TO WRITE THE FREQUENCY. ON COMPLETION OF FREQUENCY WRITE, RKO OR RXE SWITCHES ON IN RESPONSE TO THE INPUT COMMAND.</td>
</tr>
<tr>
<td>RWW3</td>
<td>Read data</td>
<td>For a normal reply, the reply data to the instruction specified by the instruction code is set.</td>
<td>SPECIFY THE SET FREQUENCY. AT THIS TIME, WHETHER IT IS WRITTEN TO RAM OR E'PROM IS DIFFERENTIATED BY THE RYD AND RYE SIGNALS. AFTER SETTING THE FREQUENCY TO THIS REGISTER, SWITCH ON THE ABOVE RYD OR RYE TO WRITE THE FREQUENCY. ON COMPLETION OF FREQUENCY WRITE, RKO OR RXE SWITCHES ON IN RESPONSE TO THE INPUT COMMAND.</td>
</tr>
</tbody>
</table>

(2) Code list

1) Monitor codes

<When FR-ASNC is connected>

<table>
<thead>
<tr>
<th>Code Number</th>
<th>Description</th>
<th>Increments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000h</td>
<td>No monitoring (monitored value fixed to 0)</td>
<td></td>
</tr>
<tr>
<td>0001h</td>
<td>Output frequency</td>
<td>0.01Hz</td>
</tr>
<tr>
<td>0002h</td>
<td>Output current</td>
<td>0.01A</td>
</tr>
<tr>
<td>0003h</td>
<td>Output voltage</td>
<td>0.1V</td>
</tr>
<tr>
<td>0004h</td>
<td>No monitoring (monitored value fixed to 0)</td>
<td></td>
</tr>
<tr>
<td>0005h</td>
<td>Frequency setting</td>
<td>0.01Hz</td>
</tr>
<tr>
<td>0006h</td>
<td>Running speed</td>
<td>1/min</td>
</tr>
<tr>
<td>0007h</td>
<td>Motor torque</td>
<td>0.1%</td>
</tr>
<tr>
<td>0008h</td>
<td>Converter output voltage</td>
<td>0.1V</td>
</tr>
<tr>
<td>0009h</td>
<td>Regenerative brake duty factor</td>
<td>0.1%</td>
</tr>
<tr>
<td>000Ah</td>
<td>Electronic overcurrent protection load factor</td>
<td>0.1%</td>
</tr>
<tr>
<td>000Bh</td>
<td>Output current peak value</td>
<td>0.01A</td>
</tr>
<tr>
<td>000Ch</td>
<td>Converter output voltage peak value</td>
<td>0.1V</td>
</tr>
<tr>
<td>000Dh</td>
<td>Input power</td>
<td>0.01kW</td>
</tr>
<tr>
<td>000Eh</td>
<td>Output power</td>
<td>0.01kW</td>
</tr>
<tr>
<td>000Fh</td>
<td>Input terminal status</td>
<td></td>
</tr>
<tr>
<td>0010h</td>
<td>Output terminal status</td>
<td></td>
</tr>
<tr>
<td>0011h</td>
<td>Load meter</td>
<td>0.1%</td>
</tr>
<tr>
<td>0012h</td>
<td>Motor exciting current</td>
<td>0.01A</td>
</tr>
<tr>
<td>0013h</td>
<td>Position pulse (Note 1)</td>
<td>1 pulse</td>
</tr>
<tr>
<td>0014h</td>
<td>Cumulative energization time</td>
<td>1hr</td>
</tr>
<tr>
<td>0015h</td>
<td>No monitoring (monitored value fixed to 0)</td>
<td></td>
</tr>
<tr>
<td>0016h</td>
<td>Orientation status (Note 1)</td>
<td></td>
</tr>
<tr>
<td>0017h</td>
<td>Actual operation time</td>
<td>1hr</td>
</tr>
<tr>
<td>0018h</td>
<td>Motor load factor</td>
<td>0.1%</td>
</tr>
<tr>
<td>0019h</td>
<td>Cumulative power</td>
<td>1kWh</td>
</tr>
</tbody>
</table>

Note 1. Valid only when the FR-ASAP and FR-ASAX options are mounted.
In the input and output terminal statuses, 0 indicates OFF and 1 ON.

<For FR-E520 KN or when FR-E5NC is connected>

<table>
<thead>
<tr>
<th>Code Number</th>
<th>Description</th>
<th>Increments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000h</td>
<td>No monitoring (monitored value fixed to 0)</td>
<td>*</td>
</tr>
<tr>
<td>0001h</td>
<td>Output frequency (Note 1)</td>
<td>0.01Hz</td>
</tr>
<tr>
<td>0002h</td>
<td>Output current</td>
<td>0.01A</td>
</tr>
<tr>
<td>0003h</td>
<td>Output voltage</td>
<td>0.1V</td>
</tr>
</tbody>
</table>

Note 1. The increments are 1 (integer data) when other than 0 is set in Pr. 37 "speed display" to choose the speed display.
2) Instruction codes

<table>
<thead>
<tr>
<th>Item</th>
<th>Code Number</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation mode read</td>
<td>007Bh</td>
<td>0000h: CC-Link operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0001h: External operation (Note 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0002h: PU operation</td>
<td></td>
</tr>
<tr>
<td>Operation mode write</td>
<td>00FBh</td>
<td>0000h: CC-Link operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0001h: External operation (Note 1)</td>
<td></td>
</tr>
<tr>
<td>Error history No. 1, No. 2</td>
<td>0074h</td>
<td>Reads the most recent No. 1 and 2 errors</td>
<td></td>
</tr>
<tr>
<td>read</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error history No. 3, No. 4</td>
<td>0075h</td>
<td>Reads the most recent No. 3 and 4 errors</td>
<td></td>
</tr>
<tr>
<td>read</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error history No. 5, No. 6</td>
<td>0076h</td>
<td>Reads the most recent No. 5 and 6 errors</td>
<td></td>
</tr>
<tr>
<td>read</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error history No. 7, No. 8</td>
<td>0077h</td>
<td>Reads the most recent No. 7 and 8 errors</td>
<td></td>
</tr>
<tr>
<td>read</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set frequency (RAM) read</td>
<td>006Dh</td>
<td>Reads the set frequency (RAM)</td>
<td>Setting can be made from the remote register.</td>
</tr>
<tr>
<td>Set frequency (E2PROM) read</td>
<td>006Eh</td>
<td>Reads the set frequency (E2PROM)</td>
<td></td>
</tr>
<tr>
<td>Set frequency (RAM) write</td>
<td>00EDh</td>
<td>Writes the set frequency to RAM</td>
<td></td>
</tr>
<tr>
<td>Set frequency (E2PROM) write</td>
<td>00EEh</td>
<td>Writes the set frequency to E2PROM</td>
<td></td>
</tr>
<tr>
<td>Parameter read</td>
<td>0000h to</td>
<td>Used with link parameter expansion setting to access Pr. 0 to Pr. 999. Refer to Appendices for the code numbers. Note that some parameters are inaccessible.</td>
<td></td>
</tr>
<tr>
<td>006Ch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parameter write</td>
<td>0080h to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>00ECh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Batch alarm definition clear</td>
<td>00F4h</td>
<td>9696h: Batch clears the alarm history.</td>
<td></td>
</tr>
<tr>
<td>All parameter clear</td>
<td>00FC h</td>
<td>9696h: Parameter clear (reset to factory settings with the exception of calibration values)</td>
<td></td>
</tr>
<tr>
<td>Inverter reset</td>
<td>00FDh</td>
<td>9696h: Resets the inverter</td>
<td></td>
</tr>
<tr>
<td>Link parameter expansion set</td>
<td>007Fh</td>
<td>Changes the 0000h to 006Ch and 0080h to 00ECh parameter values.</td>
<td></td>
</tr>
<tr>
<td>setting</td>
<td>00FFh</td>
<td>0000h: Pr.0 to Pr.99</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0001h: Pr.100 to 159, Pr.200 to 231, Pr.900 to 905</td>
<td></td>
</tr>
<tr>
<td>Second parameter changing</td>
<td>006Ch</td>
<td>Pr.201 to 230</td>
<td></td>
</tr>
<tr>
<td>Read</td>
<td></td>
<td>0000h: Running frequency</td>
<td></td>
</tr>
<tr>
<td>Write</td>
<td></td>
<td>0001h: Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0002h: Rotation direction</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pr.902 to 905</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0000h: Offset/gain</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0001h: Analog</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0002h: Analog value of terminal</td>
<td></td>
</tr>
</tbody>
</table>

Note 1. Not available for the FR-E520-CXKN.

3) Reply codes

After performing frequency setting (RYD, RYE) or instruction code execution (RYF), check the reply code (RW22) of the remote register.

<table>
<thead>
<tr>
<th>Data</th>
<th>Item</th>
<th>Alarm Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000h</td>
<td>Normal</td>
<td>Normal completion of instruction code execution</td>
</tr>
<tr>
<td>0001h</td>
<td>Write mode error</td>
<td>An attempt was made to write parameters other than during stop in the CC-Link operation mode.</td>
</tr>
<tr>
<td>0002h</td>
<td>Parameter selection error</td>
<td>Code number not registered was set.</td>
</tr>
<tr>
<td>0003h</td>
<td>Setting range error</td>
<td>Set data is outside the permissible data range.</td>
</tr>
</tbody>
</table>
(3) Buffer memory

1) Output signals (Master module to inverter)
   - Output states to remote device stations are stored.
   - Outputs for 2 words are used per station.

   ![Buffer memory diagram](Figure)

   List for Correspondence between Master Station Buffer Memory Addresses and Station Numbers

<table>
<thead>
<tr>
<th>Station Number</th>
<th>Buffer Memory Address</th>
<th>Buffer Memory Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>160h to 161h</td>
<td>49</td>
</tr>
<tr>
<td>2</td>
<td>162h to 163h</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>164h to 165h</td>
<td>51</td>
</tr>
<tr>
<td>4</td>
<td>166h to 167h</td>
<td>52</td>
</tr>
<tr>
<td>5</td>
<td>168h to 169h</td>
<td>53</td>
</tr>
<tr>
<td>6</td>
<td>16Ah to 16Bh</td>
<td>54</td>
</tr>
<tr>
<td>7</td>
<td>16Ch to 16Dh</td>
<td>55</td>
</tr>
<tr>
<td>8</td>
<td>16EH to 16FH</td>
<td>56</td>
</tr>
<tr>
<td>9</td>
<td>160H to 161H</td>
<td>57</td>
</tr>
<tr>
<td>10</td>
<td>162H to 163H</td>
<td>58</td>
</tr>
<tr>
<td>11</td>
<td>164H to 165H</td>
<td>59</td>
</tr>
<tr>
<td>12</td>
<td>166H to 167H</td>
<td>60</td>
</tr>
<tr>
<td>13</td>
<td>168H to 169H</td>
<td>61</td>
</tr>
<tr>
<td>14</td>
<td>16Ah to 16Bh</td>
<td>62</td>
</tr>
<tr>
<td>15</td>
<td>16Ch to 16Dh</td>
<td>63</td>
</tr>
<tr>
<td>16</td>
<td>16EH to 16FH</td>
<td>64</td>
</tr>
</tbody>
</table>

2) Input signals (Inverter to master module)
   - Input states from remote device stations are stored.
   - Inputs for 2 words are used per station.

   ![Input signals diagram](Figure)

   List for Correspondence between Master Station Buffer Memory Addresses and Station Numbers

<table>
<thead>
<tr>
<th>Station Number</th>
<th>Buffer Memory Address</th>
<th>Buffer Memory Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E0h to E1h</td>
<td>14h</td>
</tr>
<tr>
<td>2</td>
<td>E2h to E3h</td>
<td>15h</td>
</tr>
<tr>
<td>3</td>
<td>E4h to E5h</td>
<td>16h</td>
</tr>
<tr>
<td>4</td>
<td>E6h to E7h</td>
<td>17h</td>
</tr>
<tr>
<td>5</td>
<td>E8h to E9h</td>
<td>18h</td>
</tr>
<tr>
<td>6</td>
<td>EAh to EBh</td>
<td>19h</td>
</tr>
<tr>
<td>7</td>
<td>ECh to EDh</td>
<td>20h</td>
</tr>
<tr>
<td>8</td>
<td>EFh to F0h</td>
<td>21h</td>
</tr>
<tr>
<td>9</td>
<td>F2h to F3h</td>
<td>22h</td>
</tr>
<tr>
<td>10</td>
<td>F4h to F5h</td>
<td>23h</td>
</tr>
<tr>
<td>11</td>
<td>F6h to F7h</td>
<td>24h</td>
</tr>
<tr>
<td>12</td>
<td>F8h to F9h</td>
<td>25h</td>
</tr>
<tr>
<td>13</td>
<td>FAh to FBh</td>
<td>26h</td>
</tr>
<tr>
<td>14</td>
<td>FFh to F0h</td>
<td>27h</td>
</tr>
<tr>
<td>15</td>
<td>F2h to F3h</td>
<td>28h</td>
</tr>
<tr>
<td>16</td>
<td>F4h to F5h</td>
<td>29h</td>
</tr>
</tbody>
</table>

360
3) Remote registers (Master module to inverter)
   - Data sent to remote registers (RWW) of remote device stations are stored.
   - Outputs for 4 words are used per station.

   List for Correspondence between Master Station Buffer Memory Addresses and Station Numbers
<table>
<thead>
<tr>
<th>Station Number</th>
<th>Buffer Memory Address</th>
<th>Station Number</th>
<th>Buffer Memory Address</th>
<th>Station Number</th>
<th>Buffer Memory Address</th>
<th>Station Number</th>
<th>Buffer Memory Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1E0H to 1E3H</td>
<td>17</td>
<td>220H to 223H</td>
<td>33</td>
<td>260H to 263H</td>
<td>49</td>
<td>2A0H to 2A3H</td>
</tr>
<tr>
<td>2</td>
<td>1E4H to 1E7H</td>
<td>18</td>
<td>224H to 227H</td>
<td>34</td>
<td>264H to 267H</td>
<td>50</td>
<td>2A4H to 2A7H</td>
</tr>
<tr>
<td>3</td>
<td>1E8H to 1EBH</td>
<td>19</td>
<td>228H to 22BH</td>
<td>35</td>
<td>268H to 26BH</td>
<td>51</td>
<td>2A8H to 2ABH</td>
</tr>
<tr>
<td>4</td>
<td>1ECH to 1EFH</td>
<td>20</td>
<td>22CH to 22FH</td>
<td>36</td>
<td>26CH to 26FH</td>
<td>52</td>
<td>2ACH to 2AFH</td>
</tr>
<tr>
<td>5</td>
<td>1F0H to 1F3H</td>
<td>21</td>
<td>230H to 233H</td>
<td>37</td>
<td>270H to 273H</td>
<td>53</td>
<td>2B0H to 2B3H</td>
</tr>
<tr>
<td>6</td>
<td>1F4H to 1F7H</td>
<td>22</td>
<td>234H to 237H</td>
<td>38</td>
<td>274H to 277H</td>
<td>54</td>
<td>2B4H to 2B7H</td>
</tr>
<tr>
<td>7</td>
<td>1F8H to 1FBH</td>
<td>23</td>
<td>238H to 23BH</td>
<td>39</td>
<td>278H to 27BH</td>
<td>55</td>
<td>2B8H to 2BBH</td>
</tr>
<tr>
<td>8</td>
<td>1FCH to 1FFH</td>
<td>24</td>
<td>23CH to 23FH</td>
<td>40</td>
<td>27CH to 27FH</td>
<td>56</td>
<td>2BCH to 2BFH</td>
</tr>
<tr>
<td>9</td>
<td>200H to 203H</td>
<td>25</td>
<td>240H to 243H</td>
<td>41</td>
<td>280H to 283H</td>
<td>57</td>
<td>2C0H to 2C3H</td>
</tr>
<tr>
<td>10</td>
<td>204H to 207H</td>
<td>26</td>
<td>244H to 247H</td>
<td>42</td>
<td>284H to 287H</td>
<td>58</td>
<td>2C4H to 2C7H</td>
</tr>
<tr>
<td>11</td>
<td>208H to 20BH</td>
<td>27</td>
<td>248H to 24BH</td>
<td>43</td>
<td>288H to 28BH</td>
<td>59</td>
<td>2C8H to 2CBH</td>
</tr>
<tr>
<td>12</td>
<td>20CH to 20FH</td>
<td>28</td>
<td>24CH to 24FH</td>
<td>44</td>
<td>28CH to 28FH</td>
<td>60</td>
<td>2CCH to 2CFH</td>
</tr>
<tr>
<td>13</td>
<td>210H to 213H</td>
<td>29</td>
<td>250H to 253H</td>
<td>45</td>
<td>290H to 293H</td>
<td>61</td>
<td>2D0H to 2D3H</td>
</tr>
<tr>
<td>14</td>
<td>214H to 217H</td>
<td>30</td>
<td>254H to 257H</td>
<td>46</td>
<td>294H to 297H</td>
<td>62</td>
<td>2D4H to 2D7H</td>
</tr>
<tr>
<td>15</td>
<td>218H to 21BH</td>
<td>31</td>
<td>258H to 25BH</td>
<td>47</td>
<td>298H to 29BH</td>
<td>63</td>
<td>2D8H to 2DBH</td>
</tr>
<tr>
<td>16</td>
<td>21CH to 21FH</td>
<td>32</td>
<td>25CH to 25FH</td>
<td>48</td>
<td>29CH to 29FH</td>
<td>64</td>
<td>2DCH to 2DFH</td>
</tr>
</tbody>
</table>

4) Remote registers (Inverter to master module)
   - Data sent from remote registers (RWR) of remote device stations are stored.
   - Inputs for 4 words are used per station.

   List for Correspondence between Master Station Buffer Memory Addresses and Station Numbers
<table>
<thead>
<tr>
<th>Station Number</th>
<th>Buffer Memory Address</th>
<th>Station Number</th>
<th>Buffer Memory Address</th>
<th>Station Number</th>
<th>Buffer Memory Address</th>
<th>Station Number</th>
<th>Buffer Memory Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2E0H to 2E3H</td>
<td>17</td>
<td>320H to 323H</td>
<td>33</td>
<td>360H to 363H</td>
<td>49</td>
<td>3A0H to 3A3H</td>
</tr>
<tr>
<td>2</td>
<td>2E4H to 2E7H</td>
<td>18</td>
<td>324H to 327H</td>
<td>34</td>
<td>364H to 367H</td>
<td>50</td>
<td>3A4H to 3A7H</td>
</tr>
<tr>
<td>3</td>
<td>2E8H to 2EBH</td>
<td>19</td>
<td>328H to 32BH</td>
<td>35</td>
<td>368H to 36BH</td>
<td>51</td>
<td>3A8H to 3ABH</td>
</tr>
<tr>
<td>4</td>
<td>2ECH to 2EFH</td>
<td>20</td>
<td>32CH to 32FH</td>
<td>36</td>
<td>36CH to 36FH</td>
<td>52</td>
<td>3ACH to 3AFH</td>
</tr>
<tr>
<td>5</td>
<td>2F0H to 2F3H</td>
<td>21</td>
<td>330H to 333H</td>
<td>37</td>
<td>370H to 373H</td>
<td>53</td>
<td>3B0H to 3B3H</td>
</tr>
<tr>
<td>6</td>
<td>2F4H to 2F7H</td>
<td>22</td>
<td>334H to 337H</td>
<td>38</td>
<td>374H to 377H</td>
<td>54</td>
<td>3B4H to 3B7H</td>
</tr>
<tr>
<td>7</td>
<td>2F8H to 2FBH</td>
<td>23</td>
<td>338H to 33BH</td>
<td>39</td>
<td>378H to 37BH</td>
<td>55</td>
<td>3B8H to 3BBH</td>
</tr>
<tr>
<td>8</td>
<td>2FC H to 2FFH</td>
<td>24</td>
<td>33CH to 33FH</td>
<td>40</td>
<td>37CH to 37FH</td>
<td>56</td>
<td>3BC H to 3BFH</td>
</tr>
<tr>
<td>9</td>
<td>300H to 303H</td>
<td>25</td>
<td>340H to 343H</td>
<td>41</td>
<td>380H to 383H</td>
<td>57</td>
<td>3C0H to 3C3H</td>
</tr>
<tr>
<td>10</td>
<td>304H to 307H</td>
<td>26</td>
<td>344H to 347H</td>
<td>42</td>
<td>384H to 387H</td>
<td>58</td>
<td>3C4H to 3C7H</td>
</tr>
<tr>
<td>11</td>
<td>308H to 30BH</td>
<td>27</td>
<td>348H to 34BH</td>
<td>43</td>
<td>388H to 38BH</td>
<td>59</td>
<td>3C8H to 3CBH</td>
</tr>
<tr>
<td>12</td>
<td>30CH to 30FH</td>
<td>28</td>
<td>34CH to 34FH</td>
<td>44</td>
<td>38CH to 38FH</td>
<td>60</td>
<td>3CC H to 3CFH</td>
</tr>
<tr>
<td>13</td>
<td>310H to 313H</td>
<td>29</td>
<td>350H to 353H</td>
<td>45</td>
<td>390H to 393H</td>
<td>61</td>
<td>3D0H to 3D3H</td>
</tr>
<tr>
<td>14</td>
<td>314H to 317H</td>
<td>30</td>
<td>354H to 357H</td>
<td>46</td>
<td>394H to 397H</td>
<td>62</td>
<td>3D4H to 3D7H</td>
</tr>
<tr>
<td>15</td>
<td>318H to 31BH</td>
<td>31</td>
<td>358H to 35BH</td>
<td>47</td>
<td>398H to 39BH</td>
<td>63</td>
<td>3D8H to 3DBH</td>
</tr>
<tr>
<td>16</td>
<td>31CH to 31FH</td>
<td>32</td>
<td>35CH to 35FH</td>
<td>48</td>
<td>39CH to 39FH</td>
<td>64</td>
<td>3DC H to 3DFH</td>
</tr>
</tbody>
</table>
(4) Programming examples

This section gives the program examples used to control the inverter with the sequence programs.

<table>
<thead>
<tr>
<th>Item</th>
<th>Program Example</th>
<th>Refer To</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Inverter status read</td>
<td>Reads the inverter status from the master station buffer memory.</td>
<td>63</td>
</tr>
<tr>
<td>2) Operation mode setting</td>
<td>Sets the CC-Link operation mode.</td>
<td>63</td>
</tr>
<tr>
<td>3) Operation command setting</td>
<td>Commands the forward rotation and mid-speed signals.</td>
<td>64</td>
</tr>
<tr>
<td>4) Monitor function setting</td>
<td>Monitors the output frequency.</td>
<td>64</td>
</tr>
<tr>
<td>5) Parameter read</td>
<td>Reads Pr. 7 &quot;acceleration time&quot;.</td>
<td>65</td>
</tr>
<tr>
<td>6) Parameter write</td>
<td>Sets &quot;3.0 seconds&quot; in Pr. 7 &quot;acceleration time&quot;.</td>
<td>65</td>
</tr>
<tr>
<td>7) Running frequency setting</td>
<td>Sets to 50.00Hz.</td>
<td>66</td>
</tr>
<tr>
<td>8) Alarm definition read</td>
<td>Reads the inverter alarm.</td>
<td>67</td>
</tr>
<tr>
<td>9) Inverter reset</td>
<td>Make an inverter reset.</td>
<td>68</td>
</tr>
</tbody>
</table>

System configuration of programming examples

```
Power supply CPU Master station (X/Y00 to 1F) Input module (X20 to 2F)

Station 1 Inverter (1 station occupied) CC-Link
Station 2 Inverter (1 station occupied) CC-Link

X0020
```
1) Inverter status reading program example

Write a program as explained below to read the inverter status from the master station buffer memory.

The following program reads the inverter status of station 1 to M0-M7:

```
FROM 0000 00E0 D0 1

MOV D0 M0
```

Reads the remote input data of buffer memory to D0.

Stores b0-b7 (status) in D0 to M0-M7.

| Note 1. Shaded portion indicates addresses of one inverter. |
| Note 2. *: 0 or 1 because of unused bit. |
| Note 3. Unavailable for use with FR-E520-CQKN or FR-E5NC. |

2) Operation mode setting program example

Write a program as explained below to write various data to the inverters.

The following program changes the operation mode of station 2 inverter to CC-Link operation.

Operation mode writing code number: 00FBH (hexadecimal) (Refer to page 59)

CC-Link operation set data: 0000H (hexadecimal) (Refer to page 59)

The reply code at the time of instruction code execution is set to D2. (Refer to page 59)
3) Operation command setting program example

Write a program as explained below to write the inverter operation commands to the master station buffer memory. The inverter is operated in accordance with the operation commands written to the remote outputs (addresses 160H to 1DFH).

The following program gives the commands of forward rotation and middle speed signals to the inverter of station 2:

```
SET M103
Forward rotation command (RY20)
SET M100
Middle-speed command (RY23)
```

4) Output frequency monitoring program example

Write a program as explained below to read the monitor function of the inverter.

The following program reads the output frequency of station 2 inverter to D1.

Output frequency reading code number: 0001H (hexadecimal)

Example: The data indicated is 1770H (600) at the output frequency of 60Hz.
5) Parameter reading program example

The following program reads the Pr. 7 "acceleration time" setting of station 2 inverter to D1.

Pr. 7 "acceleration time" reading code number: 07H (hexadecimal)

For the parameter code numbers, refer to Appendices.

The reply code at the time of instruction code execution is set to D2. (Refer to page 59)

The program reads the Pr. 7 "acceleration time" setting of station 2 inverter to D1.

For the parameters of number 100 and later, change the link parameter expansion setting (to other than 0000H).

### Parameter Writing Program Example

The following program changes the Pr. 7 acceleration time setting of station 2 inverter to 3.0 seconds.

**Acceleration time setting data:** K30 (decimal)

For the parameter code numbers, refer to Appendices.

The reply code at the time of instruction code execution is set to D2. (Refer to page 59)

### Notes

1. For the parameters of number 100 and later, change the link parameter expansion setting (to other than 0000H).
2. For other functions, refer to the instruction codes (page 59).
7) Running frequency setting program example

The following program changes the running frequency of station 2 inverter to 50.00Hz.

Set frequency : K5000 (decimal)

The reply code at the time of instruction code execution is set to D2. (Refer to page 59)

![Program example](image)

- To continuously change the running frequency from PLC
  When the frequency setting completion (example: RX2D) switches on, make sure that the reply code in the remote register is 0000H and change the set data (example: RWW5) continuously.

- Program example for writing data to E²PROM
  Modify the above program as follows:
  Frequency setting command RX2D → RX2E.
  Frequency setting completion RX2D → RX2E.

  ![Timing chart for write to RAM](image)
  ![Timing chart for write to E²PROM](image)

Note 1. For E²PROM, write is made only once when RX2E is switched on.

Note 2. If the set data is changed with RX2E on, it is not reflected on the inverter.
8) Alarm definition reading program example

The following program reads the alarm definition of station 2 inverter to D1.

Alarm definition reading code number: 74H (hexadecimal)

The reply code at the time of instruction code execution is set to D2. (Refer to page 59)

The remote input (RX20 to RX3F) data of buffer memory to M200-M231.

\[
\begin{align*}
\text{MOV} & \quad \text{FROM 0000} \\
\text{TO} & \quad \text{0166} \\
\end{align*}
\]

Switches off the instruction code execution request (RY2F).

reads error history No. 1, No. 2 read code (74H) to RW6.

Switches on the instruction code execution request (RY2F).

Switches off the instruction code execution request (RY2F).

Reads M100-M131 data to the remote outputs (RY20 to RY3F) of buffer memory.

• Alarm definition display example

Example: Read data is 30A0H

Previous alarm............ THT

Current alarm............. OPT

For full information on alarm definitions, refer to the inverter manual.

The alarm definitions change with the inverter. For details, refer to the inverter manual.

<table>
<thead>
<tr>
<th>Data</th>
<th>Definition</th>
<th>Data</th>
<th>Definition</th>
<th>Data</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>00h</td>
<td>No alarm</td>
<td>60h</td>
<td>OLT</td>
<td>C0h</td>
<td>CPU</td>
</tr>
<tr>
<td>10h</td>
<td>OC1</td>
<td>70h</td>
<td>BE</td>
<td>C1h</td>
<td>CT6</td>
</tr>
<tr>
<td>11h</td>
<td>OC2</td>
<td>80h</td>
<td>GF</td>
<td>C2h</td>
<td>P24</td>
</tr>
<tr>
<td>12h</td>
<td>OC3</td>
<td>81h</td>
<td>LF</td>
<td>D5h</td>
<td>MB1</td>
</tr>
<tr>
<td>20h</td>
<td>OV1</td>
<td>90h</td>
<td>OHT</td>
<td>D6h</td>
<td>MB2</td>
</tr>
<tr>
<td>21h</td>
<td>OV2</td>
<td>A0h</td>
<td>OPT</td>
<td>D7h</td>
<td>MB3</td>
</tr>
<tr>
<td>22h</td>
<td>OV3</td>
<td>A1h</td>
<td>OP1</td>
<td>D8h</td>
<td>MB4</td>
</tr>
<tr>
<td>30h</td>
<td>THM</td>
<td>A2h</td>
<td>OP2</td>
<td>D9h</td>
<td>MB5</td>
</tr>
<tr>
<td>31h</td>
<td>THM</td>
<td>A3h</td>
<td>OP3</td>
<td>DAh</td>
<td>MB6</td>
</tr>
<tr>
<td>40h</td>
<td>FIN</td>
<td>B0h</td>
<td>PE</td>
<td>DBh</td>
<td>MB7</td>
</tr>
<tr>
<td>50h</td>
<td>IPF</td>
<td>B1h</td>
<td>PUE</td>
<td>F6h</td>
<td>E6</td>
</tr>
<tr>
<td>51h</td>
<td>UVT</td>
<td>B2h</td>
<td>RET</td>
<td>F7h</td>
<td>E7</td>
</tr>
</tbody>
</table>
9) Inverter error-time inverter resetting program example

The following program resets the inverter of station 2.

The reply code at the time of instruction code execution is set to D2. (Refer to page 59)
(Refer to page 63 for the program example)

<table>
<thead>
<tr>
<th>Instruction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M9036</td>
<td>Read the remote input (RX20 to RX3F)</td>
</tr>
<tr>
<td>M9036</td>
<td>Reads the remote input (RX20 to RX3F)</td>
</tr>
<tr>
<td>M9036</td>
<td>Writes setting to M200-M231.</td>
</tr>
<tr>
<td>M9036</td>
<td>Switches on the error reset request flag (RY1A).</td>
</tr>
<tr>
<td>M9036</td>
<td>Switches off the error reset request flag (RY1A) if the error status flag (RX1A) is off.</td>
</tr>
<tr>
<td>M9036</td>
<td>Writes M100-M131 data to the remote outputs (RY20 to RY3F) of buffer memory.</td>
</tr>
</tbody>
</table>

Note 1. The above inverter reset using RY1A may be made only when an inverter error has occurred. The inverter may be reset in any operation mode.

Note 2. When using the instruction code execution request (RYF) with the instruction code (FD H) and data (9696H) to reset the inverter, make a reset and then change the operation mode to the CC-Link operation mode. (Refer to page 63 for the program example)

(5) Programming instructions

1) Since the buffer memory data of the master station is kept transferred (refreshed) to/from the inverters, the TO instruction need not be executed every scan in response to data write or read requests.

The execution of the TO instruction every scan does not pose any problem.

2) If the FROM/TO instruction is executed frequently, data may not be written securely.

When transferring data between the inverter and sequence program via the buffer memory, perform the handshake to make sure that the data has been written securely.
2.9 How to Check for Error with the LED Lamps

(1) When one inverter is connected

The following example indicates the causes and corrective actions for faults which may be judged from the LED states of the CC-Link unit on the inverter under the condition that the SW, M/S and PRM LEDs of the master module are off (the master module setting is proper) in the system configuration where one inverter is connected:

<table>
<thead>
<tr>
<th>LED States</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.RUN</td>
<td>Normal communication is made but CRC error has occurred due to noise.</td>
</tr>
<tr>
<td></td>
<td>Normal communication</td>
</tr>
<tr>
<td></td>
<td>Hardware fault</td>
</tr>
<tr>
<td></td>
<td>Hardware fault</td>
</tr>
<tr>
<td></td>
<td>Cannot answer due to CRC error of receive data.</td>
</tr>
<tr>
<td></td>
<td>Data to be sent to the host station does not reach destination.</td>
</tr>
<tr>
<td></td>
<td>Hardware fault</td>
</tr>
<tr>
<td></td>
<td>Hardware fault</td>
</tr>
<tr>
<td></td>
<td>Hardware fault</td>
</tr>
<tr>
<td></td>
<td>Data to be sent to the host station is in CRC error.</td>
</tr>
<tr>
<td></td>
<td>There is no data to be sent to the host station, or data to be sent to the host station cannot be received due to noise.</td>
</tr>
<tr>
<td></td>
<td>Hardware fault</td>
</tr>
<tr>
<td></td>
<td>Cannot receive data due to open cable, etc.</td>
</tr>
<tr>
<td></td>
<td>Invalid baud rate or station number setting</td>
</tr>
<tr>
<td></td>
<td>Baud rate or station number changed during operation.</td>
</tr>
<tr>
<td></td>
<td>WDT error occurrence (hardware fault), power off, power supply failure</td>
</tr>
</tbody>
</table>

- : On  ○: Off 畈: Flicker
(2) When multiple inverters are connected

The following example indicates the causes and corrective actions for faults which may be judged from the LED states of the CC-Link units of the inverters under the condition that the SW, M/S and PRM LEDs of the master unit are off (the master module setting is proper) in the system configuration shown below:

```
Power supply
  | CPU
  | Master module
  |     
  | Inverter A
  | Station 1
  |     
  | Inverter B
  | Station 2
  |     
  | Inverter C
  | Station 3
```

### LED States

<table>
<thead>
<tr>
<th>Master module</th>
<th>Inverter (CC-Link)</th>
<th>Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Station 1</td>
<td>Station 2</td>
<td>Station 3</td>
</tr>
<tr>
<td>L.RUN</td>
<td>L.RUN</td>
<td>L.RUN</td>
<td>Normal</td>
</tr>
<tr>
<td>SD</td>
<td>SD</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>RD</td>
<td>RD</td>
<td>RD</td>
<td></td>
</tr>
<tr>
<td>L.ERR</td>
<td>L.ERR</td>
<td>L.ERR</td>
<td></td>
</tr>
<tr>
<td>L.RUN</td>
<td>L.RUN</td>
<td>L.RUN</td>
<td>Contact fault of inverter and CC-Link option unit</td>
</tr>
<tr>
<td>SD</td>
<td>SD</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>RD</td>
<td>RD</td>
<td>RD</td>
<td></td>
</tr>
<tr>
<td>L.ERR</td>
<td>L.ERR</td>
<td>L.ERR</td>
<td></td>
</tr>
<tr>
<td>L.RUN</td>
<td>L.RUN</td>
<td>L.RUN</td>
<td>Since the L.RUN LEDs of station 2 and later are off, the transmission cable between the remote I/O units A and B is open or disconnected from the terminal block.</td>
</tr>
<tr>
<td>SD</td>
<td>SD</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>RD</td>
<td>RD</td>
<td>RD</td>
<td></td>
</tr>
<tr>
<td>L.ERR</td>
<td>L.ERR</td>
<td>L.ERR</td>
<td></td>
</tr>
<tr>
<td>L.RUN</td>
<td>L.RUN</td>
<td>L.RUN</td>
<td>The transmission cable is shorted.</td>
</tr>
<tr>
<td>SD</td>
<td>SD</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>RD</td>
<td>RD</td>
<td>RD</td>
<td></td>
</tr>
<tr>
<td>L.ERR</td>
<td>L.ERR</td>
<td>L.ERR</td>
<td></td>
</tr>
<tr>
<td>L.RUN</td>
<td>L.RUN</td>
<td>L.RUN</td>
<td>The transmission cable is wired improperly.</td>
</tr>
<tr>
<td>SD</td>
<td>SD</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>RD</td>
<td>RD</td>
<td>RD</td>
<td></td>
</tr>
<tr>
<td>L.ERR</td>
<td>L.ERR</td>
<td>L.ERR</td>
<td></td>
</tr>
</tbody>
</table>

**: On,  O: Off,  F: Flicker,  #: Any of on, flicker and off

70
(3) When communication stops during operation

- Check that the CC-Link units and twisted pair cables are fitted properly. (Check for contact fault, open cable, etc.)
- Check that the PLC program is executed reliably and that the PLC CPU is running.
- Check that data communication is not stopped due to an instantaneous power failure, etc.

<table>
<thead>
<tr>
<th>LED States</th>
<th>Inverter (CC-Link)</th>
<th>Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master module</td>
<td>Station 1</td>
<td>Station 2</td>
<td>Station 3</td>
</tr>
<tr>
<td>L.RUN</td>
<td>L.RUN</td>
<td>L.RUN</td>
<td>Since the L.RUN LEDs of stations 1 and 3 are off, the station numbers of the inverters set as stations 1 and 3 are the same.</td>
</tr>
<tr>
<td>SD</td>
<td>SD</td>
<td>SD</td>
<td>SD</td>
</tr>
<tr>
<td>RD</td>
<td>RD</td>
<td>RD</td>
<td>RD</td>
</tr>
<tr>
<td>TIME ●</td>
<td>LINE ○</td>
<td>TIME ○</td>
<td>TIME ●</td>
</tr>
<tr>
<td>SD</td>
<td>SD</td>
<td>SD</td>
<td>SD</td>
</tr>
<tr>
<td>L.RUN</td>
<td>L.RUN</td>
<td>L.RUN</td>
<td>Since the L.ERR LEDs of station 2 and later are on, the transmission cable between the inverters of stations 2 and 3 is affected by noise (L.RUN may go off.)</td>
</tr>
<tr>
<td>SD</td>
<td>SD</td>
<td>SD</td>
<td>SD</td>
</tr>
</tbody>
</table>

: On, ○: Off, ●: Flicker, ●: Any of on, flicker and off
2.10 Troubleshooting

(1) Operation mode unswitched to CC-Link
- Check that the twisted pair cables (and FR-A5NC or FR-E5NC) are fitted properly. (Check for contact fault, open cable, etc.)
- Check that the station number setting switches are set to the correct positions. (Check that the station number matches the program, the station numbers are not repeated, and the station number is not outside the range.)
- Check that the inverter is in the external operation mode.
- Check that the operation mode switching program is run.
- Check that the operation mode switching program has been written correctly.

(2) Inverter unstarted in CC-Link operation mode
- Check that the operation mode is set to the CC-Link operation mode.
- Check that the inverter starting program has been written correctly.
- Check that the inverter starting program is run.
- Check that the inverter is providing output.

(3) Operating and handling instructions
- During CC-Link operation, the inverter only accepts commands from the PLC and ignores any external operation command and any operation command from the parameter unit.
- If the same station number is set to different inverters, wrong data will be transferred and normal communication cannot be made.
- The inverter is brought to an alarm stop “E.OPT” or “E.OP3” if data communication stops, even instantaneously, due to a PLC fault, an open twisted pair cable or the like during CC-Link operation.
- If the PLC (master station) is reset or powered off during CC-Link operation, data communication stops and the inverter is brought to an alarm stop “E.OPT” or “E.OP3”.
  To reset the PLC (master station), switch the operation mode to the external operation once, then reset the PLC.
- When the FR-A5NC or FR-E5NC is used, any inverter whose main power is restored is reset to return to the external operation mode. To resume the CC-Link operation, therefore, set the operation mode to the CC-Link operation using the sequence program.
  Note that setting “1” in Pr. 340 (link start mode) selects the CC-Link operation mode.
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3.4 Configuration and Wiring Procedure ................................................................. 77
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3.1 Overview

Device Net™ was developed and released by Allen-Bradley Company, Inc. in 1994. ODVA (Open DeviceNet Vendor Association, Inc.) is now operating the business since it became independent from Allen-Bradley in 1995. As an open field network, Device Net™ can connect versatile devices of third parties and is compatible with not only inverters but also various field-level applications.

Use of the configuration software enables nodes (devices to communicate with) to be assigned on a network to establish the communication configuration of specific devices.

(1) Features

Connection with the master module (personal computer/PLC) by communication cables allows inverters to be run and monitored and their parameter values to be read/written from a user program or configurator.

(2) Types of Device Net™-compatible inverters

<table>
<thead>
<tr>
<th>Inverter Series</th>
<th>Method for Compatibility with Device Net™</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR-A500</td>
<td>Connect the FR-ASND plug-in option.</td>
</tr>
<tr>
<td>FR-F500</td>
<td>Connect the FR-ASND plug-in option.</td>
</tr>
</tbody>
</table>

(3) Instructions

0x given in the text indicates that the numeral that follows is a hexadecimal number.
### 3.2 Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td></td>
</tr>
<tr>
<td>Control power</td>
<td>Supplied by the inverter.</td>
</tr>
<tr>
<td>External power input</td>
<td>Input voltage: 11 to 28V</td>
</tr>
<tr>
<td></td>
<td>Current consumption: Maximum 90mA</td>
</tr>
<tr>
<td></td>
<td>(independently tested by University of Michigan test lab, February, 1998)</td>
</tr>
<tr>
<td></td>
<td>Supports UCMM.</td>
</tr>
<tr>
<td>Network topology</td>
<td>DeviceNet (linear bus with drop lines)</td>
</tr>
<tr>
<td>Communication cable</td>
<td>DeviceNet standard thick or thin cable</td>
</tr>
<tr>
<td></td>
<td>(Use a &quot;thin&quot; cable as the drop cable.)</td>
</tr>
<tr>
<td>Maximum cable length</td>
<td>500m(125kbps), 250m(250kbps), 100m(500kbps)</td>
</tr>
<tr>
<td>Communication speed</td>
<td>125kbps, 250kbps, 500kbps</td>
</tr>
<tr>
<td>Number of inverters connectable</td>
<td>64 inverters (including master) (Note)</td>
</tr>
<tr>
<td>Response time</td>
<td>Read request response time = 1ms</td>
</tr>
<tr>
<td></td>
<td>Write request response time = 30ms</td>
</tr>
<tr>
<td></td>
<td>Parameter clear, all parameter clear response time = 5 seconds</td>
</tr>
</tbody>
</table>

Note: When there is one master, the maximum number of inverters connected is 63 (64-1).
3.3 Structure

(1) Appearance

![Diagram of DeviceNet connector with labels for front view, DeviceNet connector, Status LED, Mounting hole, Node address setting switches, Option connector, Mounting holes.]

(2) Part names

<table>
<thead>
<tr>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node address setting switches</td>
<td>Used to set the node address of the inverter within the station range 0 to 63. Set the tens digit of the node address to SW1 and the units digit to SW2. Any setting other than 0 to 63 is regarded as 63. The node address setting switches are valid when ADDR of Pr. 345 is 63. When ADDR of Pr. 345 is not 63, the node address setting switches are invalid and the ADDR value of Pr. 345 is the node address.</td>
</tr>
<tr>
<td>Status LED</td>
<td>The operating states are indicated by the two colors (red and green) of the LED. For details, refer to page 79, where the system states and corresponding LED states are explained in detail.</td>
</tr>
</tbody>
</table>
(3) Installation procedure

1) Remove the front cover of the inverter and insert this option unit into slot 3 of the inverter.
2) Securely insert the option unit connector into the inverter connector. At this time, also fit the option fixing hole snugly.
3) Then, securely fix the option unit to the inverter with the mounting screws (2 places). If the mounting holes of the option unit do not match the inverter mounting holes, recheck whether the connector is secured properly.
4) Remove the DATA PORT from the inverter front cover and reinstall the front cover.
   (To remove the DATA PORT cover, push it from the back of the front cover.)
3.4 Configuration and Wiring Procedure  

(1) System configuration example

![System configuration example diagram]

(2) Fabrication of DeviceNet drop cable

Use a DeviceNet drop cable to connect the inverter to the DeviceNet network. The drop cable consists of an ODVA approved "thin" cable and an ODVA approved 5-pin connector plugged to the connector of the inverter. To match the drop cable with the DeviceNet connector of the network trunk cable, use the one specified by the user/installer. The recommended parts are as follows:

- DeviceNet "thin" drop cable: Belden make part number 3084A or equivalent
- 5-pin connector: Phoenix Contact make part number MSTB 2.5/5-ST-5.08-AU

Note: The maximum length of the drop cable should be 6.1m (20 feet).
The DeviceNet connector pin-out connections are shown below. The function of each pin is listed below.

<table>
<thead>
<tr>
<th>Pin number</th>
<th>Signal</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V-</td>
<td>Black</td>
</tr>
<tr>
<td>2</td>
<td>CAN-</td>
<td>Blue</td>
</tr>
<tr>
<td>3</td>
<td>Shield wire</td>
<td>Silver</td>
</tr>
<tr>
<td>4</td>
<td>CAN+</td>
<td>White</td>
</tr>
<tr>
<td>5</td>
<td>V+</td>
<td>Red</td>
</tr>
</tbody>
</table>

1) Strip the insulation sheath about 40mm (1.5 inches) from the end of the drop cable to expose the four color signal wires and silver shield wire.

2) Strip the insulations of the signal wires to approximately 6mm (1/4 inches). Plate each lead wire with solder.

3) Tin the end of the shield wire to prevent it from fraying.

4) Plug the connector to the DeviceNet cable as described below:
   (a) Insert a flat-blade screwdriver (maximum width 3.75mm) into the top hole of the connector plug to open the clamp in the lower hole to insert the wire.
   (b) Connect the signal wires to the plug of Phoenix Contact make. Confirm that the wire colors match the pins as indicated above.
   (c) After all signal wires are inserted properly, turn the tightening screws clockwise to fasten the signal wires securely. When tightened properly, the signal wires cannot be pulled off.

3) Wiring procedure

1) Power off the inverter and make sure that the working environment is safe. After ensuring safety, remove the inverter cover.

2) Set the node address of the inverter within the station range 0 to 63. Set the tens digit of the node address to SW1 and the units digit to SW2. Any setting other than 0 to 63 is regarded as 63.

   The node address setting switches are valid when ADDR of Pr. 345 is 63. When ADDR of Pr. 345 is not 63, the node address setting switches are invalid and the ADDR value of Pr. 345 is the node address.

3) When the inverters have been installed properly and the node addresses set correctly, reinstall the inverter covers.

   Make sure that the DeviceNet trunk cable is wired properly and the termination resistor is fitted to each termination of the trunk cable. These termination resistors should satisfy the following requirements:
   1. $R = 121\Omega$
   2. 1% metal coating
   3. 0.25W

   Connect the drop cables to the network. (These are cables from the inverters to the DeviceNet network.) If the trunk connector is a DeviceNet plug or shield connector which meets the standard, connection to the network can be made independently of whether the inverter is on or off. Completion of connection is recognized automatically by the inverter.

   When free wires are used to make connection with the network, two or more signal wires may be shorted. As safety measures, also power off the network.

4) Make sure that connection is all completed and the cables irrelevant to DeviceNet are all connected to the inverter units as specified.
(4) Changing the node address

The node address status is checked only when the inverter is powered on. Therefore, changing the node address after power-on is invalid. The node address read at power-on is retained.

Change the node address setting switch positions in the following procedure (when ADDR of Pr. 345 is 63):

1) Power off the inverter.
2) Disconnect the drop cable from the option unit.
3) Remove the inverter cover.
4) Change the node address (node address setting switch positions).
5) Reinstall the inverter cover.
6) Reconnect the drop cable to the inverter unit.
7) Power on the inverter.

(5) LED status indications

The LED status indications represent the inverter's operating states listed below. Indications include five states: off, green lamp flickering, green, red lamp flickering and red.

Check the LED status after connecting the drop cable to the truck cable on the active network. The status LED of the option unit provides an indication according to the module/network status specified in the DeviceNet communication standard.

<table>
<thead>
<tr>
<th>LED Indication</th>
<th>System Status</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Inverter power off, network power on</td>
<td>Powering on the inverter causes the inverter to check for identical node addresses on the network.</td>
</tr>
<tr>
<td>Green lamp flickering</td>
<td>Host unconnected status</td>
<td>The inverter has been powered on and a check that there are no identical node addresses is completed. However, the host has not yet established a communication link.</td>
</tr>
<tr>
<td>Green</td>
<td>Network and inverter power on, host connection completed</td>
<td>The inverter has been powered on and the master station on the network recognizes this inverter unit. The LED holds this indication during communication.</td>
</tr>
<tr>
<td>Red lamp flickering</td>
<td>Connection time-out</td>
<td>The master station recognizes this inverter unit during communication (the LED is green). However, no response is made within the time limit (Note) preset to the expected packet rate. Check to see if the host station is disconnected from the network.</td>
</tr>
</tbody>
</table>
| Red                 | Critical link error                  | Communication device fault
  • Overlapping node address setting
  • Network power off
  • Network cable connection fault or no-connection
  • Network failure
  Power reset must be made to recover from the link error. |

Note: Time limit = 4 × EPR (Expected Packet Rate)

Note that this EPR is set in the DeviceNet master. This does not apply to the EPR bit setting using Pr. 347.
3.5 Inverter Setting

This section is intended to facilitate inverter setting. This section assumes that the factory settings are used. If you want to change these values, change the settings in accordance with the data in 3.9 Object Map. This section also assumes that the network cabling is complete and DeviceNet communication has been established. Make sure that the LED status of the inverter is the flickering green lamp as described in Section 3.4(5).

(1) Overview
The inverter is regarded as a slave device in the DeviceNet communication standard. This means that the inverter cannot initiate messages on the network. The master device must establish communication with the inverter unit and send commands, requests for information, etc.
The inverter supports Group 3 Messaging as defined in the DeviceNet standard. This feature of the inverter means that it is possible for one master to control the inverter while the other master reads data from the same inverter. (This also means that the DeviceNet master must support the UCMM protocol for proper operation.)
It is strongly recommended to configure the DeviceNet network using the software tool designed specifically for that purpose. The use of such a tool greatly simplifies the configuration, reduces confusion, and enhances reliability. One of such tools is DeviceNet Manager™ supplied by Rockwell Automation. Tools are available from many other suppliers but the description contained in this section is based on use of DeviceNet Manager™.
To use the DeviceNet Manager™ software, you need to acquire the DeviceNet Electronic Data Sheet (EDS) file. The EDS file is a standard DeviceNet file which defines the configurable parameters of a field device. Refer to the configuration software tool manual for more information on the installation and use of the EDS file.

(2) Baud rate setting
The baud rate must be consistent throughout the network in order to establish communication and enable equipment communication via the network. Therefore, this step is important for the inverter setting.
• At power-on, the inverter defaults to the communication speed of 125kbps.
• You can set the baud rate using “Node Address”, Attribute 1 of DeviceNet Class 0x03, Instance 1. Refer to Section 3.9.2 (1) for further information.
• You can also set the node address manually by changing the Pr. 346 value from the parameter unit. Refer to page 81 for more information.

(3) Node address setting
The node address assigned to the inverter is determined when the inverter is powered on. When an address conflict is found in network configuration, you can set the baud rate using “Baud Rate”, Attribute 2 of DeviceNet Class 0x03, instance. Refer to Section 3.9.2 (1) for details.
You can also set the baud rate manually by changing the Pr. 346 value from the parameter unit. Refer to page 81 for more information.
(4) DeviceNet I/O assembly
Communication between the master device and a slave device on the network requires that the DeviceNet Class 0x04- “Assembly Object” in both devices be the same.
1) Default I/O assembly
When power is switched on, the inverter defaults to Class 0x04- Output Instance 21 and Class 0x04- Input Instance 71. Refer to Section 3.8 (2) for more information on DeviceNet Class 0x04 and I/O Instance.
2) Polling rate
Determination of the proper polling rate of the DeviceNet master device depends on the characteristics of the entire network. To minimize potential conflicts and maximize system reliability, a polling rate interval of 30ms or longer is suggested. The user may adjust this rate within the network performance range.
3) Loss of communications
In the default polled communication mode, the inverter responds to loss of communication in accordance with the WDA bit setting of Pr. 345 defined on page 81. These bits default to 0. Such loss of communication may occur due to disconnection of network cabling, network power off, failure within the master etc.
When the WDA bits of Pr. 345 are set to 0, the inverter keeps executing the last command received until the communication time limit is exceeded. This time limit is four times the Expected Packet Rate (EPR) configured by the user (note that this EPR is set by the DeviceNet master. This differs from the EPR bit setting of Pr. 345).
When the time limit of the inverter is exceeded and the WDA is activated, the E.OP3 error occurs in the inverter, coasting it to a stop.
When the WDA bits of Pr. 345 are set to 2, the inverter does not generate an error and keeps executing the last command received until the next instruction is given. The inverter automatically resets the connection when communication is restored.

(5) Parameters

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Function</th>
<th>Setting Range</th>
<th>Minimum Setting Increments</th>
<th>Factory Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>338 (Note 1)</td>
<td>Operation command write</td>
<td>0, 1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>339 (Note 1)</td>
<td>Speed command write</td>
<td>0, 1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>340 (Note 1)</td>
<td>Link start mode selection</td>
<td>0, 1, 2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>345 (Note 2)</td>
<td>DeviceNet address start data</td>
<td>0 to 65535</td>
<td>1</td>
<td>41023(0xA03F)</td>
</tr>
<tr>
<td>346 (Note 2)</td>
<td>DeviceNet baud rate start data</td>
<td>0 to 65535</td>
<td>1</td>
<td>20612(0x5084)</td>
</tr>
</tbody>
</table>

Note 1. Refer to Section 3.6 Operation Modes (page 84) for details of Pr. 338 to 340.

Note 2. You cannot write the Pr. 345 and Pr. 346 values (Class 0x67 Instance 1 Attribute 45 and 46) from the network. They may only be read. In addition, these parameters may be set from the FR-PU04 only. Note that you cannot set them from the FR-DU04.

Pr. 345 is a bit map parameter and is defined as follows:

```
   15 14 13 12 11 10  9  8  7  6  5  4  3  2  1  0
   Address key          WDA  DN failure mode (Note)  Device node address
```

Pr. 346 is a bit map parameter and is defined as follows:

```
   15 14 13 12 11 10  9  8  7  6  5  4  3  2  1  0
   Baud rate key        Input assembly  Output assembly  Baud rate
```

Note: The DN failure mode is not supported. The inverter always recognizes it as 0.
### DeviceNet Registration Definitions

#### Watch dog time-out operation (WDA)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Definition</th>
<th>Factory Setting</th>
</tr>
</thead>
</table>
| Watch dog time-out operation (WDA) | Specifies the inverter operation when communication stops for a given period (4×EPR). Note: You may also set this function using DeviceNet Connection Object Class 0x05, Instance 2, Attribute 12. However, since it is not written to EEPROM in the inverter, resetting the inverter returns to the previous value set from the parameter unit. When the value is changed from the parameter unit, the EEPROM value is also changed. | (1) Setting of 0, 4 (shift to time-out status)  
Inverter: E.OP3 occurs.  
LED indication: Red flickering  
Network: Connection continued.  
(2) Setting of 1, 5 (auto delete)  
Inverter: E.OP3 occurs.  
LED indication: Green lit  
Network: Polling I/O connection cut off.  
(3) Setting of 2, 6 (auto reset: time-out operation ignored)  
Inverter: No error  
LED indication: Green lit  
Network: Connection continued.  
(4) Setting of 3, 7 (WDA invalid)  
Inverter: No error  
LED indication: Green lit  
Network: Connection continued. | 0 |

#### Input assembly (INP) (Note 1)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Definition</th>
<th>Factory Setting</th>
</tr>
</thead>
</table>
| Input assembly (INP) (Note 1) | Choose the input instance of Assembly Object Class 0x04 used. (You can set this function using Control Management Class 0x29, Instance 1, Attribute 40.) | 0 = Input Instance 70  
1 = Input Instance 71  
6 = Input Instance 76 | 1 |

#### Output assembly (OUTP) (Note 1)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Definition</th>
<th>Factory Setting</th>
</tr>
</thead>
</table>
| Output assembly (OUTP) (Note 1) | Choose the output instance of Assembly Object Class 0x04 used. (You can set this function using Control Management Class 0x29, Instance 1, Attribute 41.) | 0 = Output Instance 20  
1 = Output Instance 21  
6 = Output Instance 26 | 1 |

#### Baud rate (BR)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Definition</th>
<th>Factory Setting</th>
</tr>
</thead>
</table>
| Baud rate (BR) | Set the baud rate. (You can set this function using DeviceNet Object Class 0x03, Instance 1, Attribute 2.) | 0, 3 = 125 kbps  
1 = 250 kbps  
2 = 500 kbps | 0 |

#### Device node address (ADDR) (Note 2)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Definition</th>
<th>Factory Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device node address (ADDR) (Note 2)</td>
<td>Set the node address (MAC ID) of the device. (You can set this function using DeviceNet Object Class 0x03, Instance 1, Attribute 1.)</td>
<td>0 to 63</td>
<td>63</td>
</tr>
</tbody>
</table>

#### Address key (ADDRKEY) (Note 3)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Definition</th>
<th>Factory Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address key (ADDRKEY) (Note 3)</td>
<td>Internal setting</td>
<td>Fixed to 10 (1010 in binary)</td>
<td>10</td>
</tr>
</tbody>
</table>

#### Baud rate key (BRKEY) (Note 3)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Definition</th>
<th>Factory Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud rate key (BRKEY) (Note 3)</td>
<td>Internal setting</td>
<td>Fixed to 5 (0101 in binary)</td>
<td>5</td>
</tr>
</tbody>
</table>

**Notes:**
- **Note 1.** The input assembly and output assembly must match. (For example, if the input assembly is 0, the output assembly must also be 0.) Any other value than 0, 1 and 6 set to the input and output assemblies is regarded as 6.
- **Note 2.** The node address may also be set with the node address setting switches, which are made valid only when ADDR of Pr. 345 is 63. (When ADDR of Pr. 345 is not 63, the node address setting switch value is ignored and the ADDR value of Pr. 345 is valid.)
- **Note 3.** If the setting is other than the fixed value, the FR-A5ND recognizes it as a wrong value, and if the other parameter (WDA, INP, OUTP, BR, ADDR) values are different from the factory settings, it uses the factory settings as the values of these parameters.
<Parameter setting method>

The Pr. 345 value is the sum of the values in all items which have been multiplied by the corresponding factors in the following table.

**Pr. 345 setting method**

<table>
<thead>
<tr>
<th>Item</th>
<th>Setting Range</th>
<th>Factor</th>
<th>Example 1 (Setting × Factor)</th>
<th>Example 2 (Setting × Factor)</th>
<th>Example 3 (Setting × Factor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address key</td>
<td>10</td>
<td>4096</td>
<td>10 × 4096</td>
<td>10 × 4096</td>
<td>10 × 4096</td>
</tr>
<tr>
<td>WDA</td>
<td>0 to 3</td>
<td>512</td>
<td>0 × 512</td>
<td>1 × 512</td>
<td>2 × 512</td>
</tr>
<tr>
<td>DN failure mode</td>
<td>0</td>
<td>64</td>
<td>0 × 64</td>
<td>0 × 64</td>
<td>0 × 64</td>
</tr>
<tr>
<td>Device node address</td>
<td>0 to 63</td>
<td>1</td>
<td>63 × 1</td>
<td>4 × 1</td>
<td>10 × 1</td>
</tr>
<tr>
<td>Total (Pr. 345)</td>
<td>–</td>
<td>–</td>
<td>41023</td>
<td>41476</td>
<td>41994</td>
</tr>
</tbody>
</table>

If you do not have the DeviceNet configuration tool, enter the total value to the inverter using the FR-PU04. The values in Example 1 in the above table are the same as the factory settings.

- **Example 1**
  - Address key = 10 only
  - Watch dog time-out operation WDA = 0
  - DN failure mode = 0 only
  - Device node address = 63
  - Total = (10 × 4096) + (0 × 512) + (0 × 64) + (63 × 1) = 41023

The Pr. 346 value is the sum of the values in all items which have been multiplied by the corresponding factors in the following table.

**Pr. 346 setting method**

<table>
<thead>
<tr>
<th>Item</th>
<th>Setting Range</th>
<th>Factor</th>
<th>Example 1 (Setting × Factor)</th>
<th>Example 2 (Setting × Factor)</th>
<th>Example 3 (Setting × Factor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud rate key</td>
<td>5</td>
<td>4096</td>
<td>5 × 4096</td>
<td>5 × 4096</td>
<td>5 × 4096</td>
</tr>
<tr>
<td>Input assembly</td>
<td>0 to 6</td>
<td>128</td>
<td>1 × 128</td>
<td>0 × 128</td>
<td>6 × 128</td>
</tr>
<tr>
<td>Output assembly</td>
<td>0 to 6</td>
<td>4</td>
<td>1 × 4</td>
<td>0 × 4</td>
<td>6 × 4</td>
</tr>
<tr>
<td>Baud rate</td>
<td>0 to 2</td>
<td>1</td>
<td>0 × 1</td>
<td>1 × 1</td>
<td>2 × 1</td>
</tr>
<tr>
<td>Total (Pr. 346)</td>
<td>–</td>
<td>–</td>
<td>20612</td>
<td>20481</td>
<td>21274</td>
</tr>
</tbody>
</table>

If you do not have the DeviceNet configuration tool, enter the total value to the inverter using the FR-PU04. The values in Example 1 in the above table are the same as the factory settings.

- **Example 1**
  - Baud rate key = 5 only
  - Input assembly = 1 (Input Instance 71)
  - Output assembly = 1 (Output Instance 21)
  - Baud rate = 0 (125kbps)
  - Total = (5 × 4096) + (1 × 128) + (1 × 4) + (0 × 1) = 20612
3.6 Operation Modes

(1) Operation modes

1) PU operation : Controls the inverter from the keyboard of the operation panel (FR-DU04) or parameter unit (FR-PU04) installed to the inverter.

2) External operation : Controls the inverter by switching on/off external signals connected to the control circuit terminals of the inverter.

3) DeviceNet operation : Controls the inverter in accordance with the personal computer, PLC or other program via the DeviceNet unit (FR-A5ND).

(2) Operation mode switching

1) Operation mode switching conditions

Before switching the operation mode, check that:
- The inverter is at a stop;
- Both the STF and STR signals are off; and
- The Pr. 79 “operation mode” setting is correct.

(Use the parameter unit of the inverter for setting.)

2) Operation mode switching method

<table>
<thead>
<tr>
<th>Pr. 79 Setting</th>
<th>Operation Mode Selection</th>
<th>Switching to DeviceNet Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>PU or external operation</td>
<td>Disallowed when the PU mode is selected. Allowed when the external mode is selected.</td>
</tr>
<tr>
<td>1</td>
<td>PU operation mode</td>
<td>Disallowed</td>
</tr>
<tr>
<td>2</td>
<td>External operation mode</td>
<td>Allowed</td>
</tr>
<tr>
<td>3, 4</td>
<td>External/PU combined operation mode</td>
<td>Disallowed</td>
</tr>
<tr>
<td>5</td>
<td>Programmed operation</td>
<td>Disallowed</td>
</tr>
<tr>
<td>6</td>
<td>Switch-over</td>
<td>Allowed</td>
</tr>
<tr>
<td>7</td>
<td>External operation (PU operation interlock)</td>
<td>Allowed only in the external operation mode when the PU interlock signal (X12) is on.</td>
</tr>
<tr>
<td>8</td>
<td>PU or external (signal switching)</td>
<td>Allowed only in the external operation mode (X16 on).</td>
</tr>
</tbody>
</table>

When “1 or 2” is set in Pr. 340 “link start mode selection”, the DeviceNet operation mode is selected at power-on or inverter reset.

Note 1. When setting “1 or 2” in Pr. 340, the initial settings (station number setting, etc.) of the inverter must be made without fail.

84
3) Link start mode

By setting the Pr. 340 value as appropriate, you can select the operation mode at power on or at restoration from instantaneous power failure.

<table>
<thead>
<tr>
<th>Pr. 340 Setting</th>
<th>Pr.79</th>
<th>Operation Mode</th>
<th>Mode at Power On or at Restoration from Instantaneous Power Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 PU or external operation</td>
<td>Inverter goes into the external operation mode.</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1 PU operation</td>
<td>Inverter goes into the PU operation mode.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2 External operation</td>
<td>Inverter goes into the external operation mode.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3 External/PU combined operation mode</td>
<td>Running frequency is set in the PU operation mode and the start signal is set in the external operation mode.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4 External/PU combined operation mode</td>
<td>Running frequency is set in the external operation mode and the start signal is set in the PU operation mode.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5 Programmed operation mode</td>
<td>Inverter is operated by the program.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6 Switch-over mode</td>
<td>Operation mode is switched while running.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7 External operation mode</td>
<td>Shift to the PU operation mode is controlled by ON/OFF of the X12 signal.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>8 External/PU combined operation mode</td>
<td>Operation mode is switched by ON/OFF of the X16 signal.</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>DeviceNet operation</td>
<td>Inverter goes into the DeviceNet operation mode. (Program need not be used for switching)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>DeviceNet automatic restart after instantaneous power failure</td>
<td>Inverter goes into the DeviceNet operation mode. When Pr. 57 setting is other than 9999 (automatic restart after instantaneous power failure), automatic restart is made in the status prior to occurrence of an instantaneous power failure to continue DeviceNet operation, if a communication signal is not given. (Program need not be used for switching)</td>
<td></td>
</tr>
</tbody>
</table>

- The Pr. 340 value may be changed in any operation mode.
- When Pr. 79 “operation mode selection” = “0, 2 or 6”, “1 and 2” in Pr. 340 are made valid.
- When starting DeviceNet operation at power-on, set “1 or 2” in Pr. 340.
### Control place selection

In the DeviceNet operation mode, commands from the external terminals and program are as listed below:

<table>
<thead>
<tr>
<th>Control place selection</th>
<th>0: DN</th>
<th>0: DN</th>
<th>1: External</th>
<th>1: External</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pr. 338 “operation command write”</td>
<td>Forward rotation command (STF)</td>
<td>Reverse rotation command (STR)</td>
<td>Start self-holding selection (STOP)</td>
<td>Output halt (MRS)</td>
<td>Reset (RES)</td>
</tr>
<tr>
<td></td>
<td>DN</td>
<td>DN</td>
<td>External</td>
<td>External</td>
<td>Both</td>
</tr>
</tbody>
</table>

#### Fixed functions (Functions equivalent to terminals)

<table>
<thead>
<tr>
<th>Function</th>
<th>Control</th>
<th>0: DN</th>
<th>1: External</th>
<th>0: DN</th>
<th>1: External</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-speed operation command (RL)</td>
<td>0</td>
<td>External</td>
<td>DN</td>
<td>External</td>
<td>DN</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>Middle-speed operation command (RM)</td>
<td>1</td>
<td>External</td>
<td>DN</td>
<td>External</td>
<td>DN</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>High-speed operation command (RH)</td>
<td>2</td>
<td>External</td>
<td>DN</td>
<td>External</td>
<td>DN</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>Current input selection (AI)</td>
<td>3</td>
<td>Secondary function selection (RT)</td>
<td>DN</td>
<td>DN</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>Jog operation selection (JOG)</td>
<td>4</td>
<td>External</td>
<td>External</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Automatic restart after instantaneous power failure selection (CS)</td>
<td>5</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>External thermal relay input (DH)</td>
<td>7</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>15-speed selection (REX)</td>
<td>8</td>
<td>DN</td>
<td>External</td>
<td>DN</td>
<td>External</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>Third function (X9)</td>
<td>9</td>
<td>DN</td>
<td>DN</td>
<td>External</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>FR-HC connection, inverter operation enable (X10)</td>
<td>10</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>FR-HC connection, instantaneous power failure detection (X11)</td>
<td>11</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>PU external interlock (X12)</td>
<td>12</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>External DC dynamic braking start (X13)</td>
<td>13</td>
<td>DN</td>
<td>DN</td>
<td>External</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>PID control valid terminal (X14)</td>
<td>14</td>
<td>DN</td>
<td>External</td>
<td>DN</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>Brake opening completion signal (BRI)</td>
<td>15</td>
<td>DN</td>
<td>DN</td>
<td>External</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>PU operation-external operation switching (X16)</td>
<td>16</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>Load pattern selection-forward/reverse rotation boost switching (X17)</td>
<td>17</td>
<td>DN</td>
<td>DN</td>
<td>External</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>Magnetic flux-V/F switching (X18)</td>
<td>18</td>
<td>DN</td>
<td>DN</td>
<td>External</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>Load torque high-speed frequency (X19)</td>
<td>19</td>
<td>DN</td>
<td>DN</td>
<td>External</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>Orientation command</td>
<td>22</td>
<td>DN</td>
<td>DN</td>
<td>External</td>
<td>External</td>
<td>External</td>
</tr>
</tbody>
</table>

#### Selective functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Control</th>
<th>0: DN</th>
<th>1: External</th>
<th>0: DN</th>
<th>1: External</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote setting (RH, RM, RH)</td>
<td>0</td>
<td>External</td>
<td>DN</td>
<td>External</td>
<td>DN</td>
<td>Pr. 59 = 0</td>
</tr>
<tr>
<td>Programmed operation group selection (RH, RM, RL)</td>
<td>1</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Stop-on-contact selection 0 (RL)</td>
<td>2</td>
<td>DN</td>
<td>External</td>
<td>DN</td>
<td>External</td>
<td>Pr. 270 = 1</td>
</tr>
<tr>
<td>Stop-on-contact selection 1 (RT)</td>
<td>3</td>
<td>DN</td>
<td>DN</td>
<td>External</td>
<td>External</td>
<td>Pr. 270 = 1</td>
</tr>
</tbody>
</table>

#### Explanation of table

- **External**: Control by signal from external terminal is only valid.
- **DN**: Control from DeviceNet sequence program is only valid.
- **Both**: Control from both external terminal and PLC is valid.
- **−**: Control from both external terminal and PLC is invalid.
- **Compensation**: Control by signal from external terminal is only valid if Pr. 28 (multi-speed input compensation) setting is 1.

**Note 1.** If the FR-HC connection, inverter operation enable signal (X10) is not assigned when the FR-HC is used (Pr. 30 = 2) or if the PU operation interlock signal (X12) is not assigned when the PU operation interlock function is set (Pr. 79 = 7), this function is also used by the MRS signal and therefore the MRS signal is only valid for the external terminals, independently of the Pr. 338 and Pr. 339 settings.

**Note 2.** The orientation command needs the FR-ASAP and FR-ASAX options.
3.7 Operational Functions

(1) Operation mode-based functions

<table>
<thead>
<tr>
<th>Control Method</th>
<th>Item</th>
<th>Operation Mode</th>
<th>Operation Mode</th>
<th>Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Net mode</td>
<td>External mode</td>
<td>PU mode</td>
</tr>
<tr>
<td>DeviceNet</td>
<td>Operation command</td>
<td>Allowed (Note 1)</td>
<td>Disallowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td>Output frequency setting</td>
<td>Allowed (Note 1)</td>
<td>Disallowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Parameter write</td>
<td>Allowed (Note 3)</td>
<td>Disallowed (Note 3)</td>
<td>Disallowed (Note 3)</td>
</tr>
<tr>
<td></td>
<td>Parameter read</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Inverter reset</td>
<td>Allowed (Note 2)</td>
<td>Disallowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td>Control circuit</td>
<td>Operation command</td>
<td>Allowed (Note 1)</td>
<td>Allowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td>terminal</td>
<td>Output frequency setting</td>
<td>Allowed (Note 1)</td>
<td>Allowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td>Inverter reset</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
</tbody>
</table>

Note 1. As set in Pr. 338 and Pr. 339.
Note 2. The inverter cannot be reset at occurrence of a network error.
Note 3. As set in Pr. 77.
Note 4. The inverter goes into the external operation mode if it is reset from DeviceNet in the net operation mode.

(2) Monitoring

The following items can be monitored by Class 0x2A Attribute 141 to 193:
1) Output frequency ......................... Binary in 0.01Hz increments
2) Output current ......................... Binary in 0.01A increments
3) Output voltage ......................... Binary in 0.1V increments
4) Frequency setting ....................... Binary in 0.01Hz increments
5) Running speed ......................... Binary in 1r/min increments
6) Motor torque ......................... Binary in 0.1% increments
7) Converter output voltage ............. Binary in 0.1V increments
8) Regenerative brake duty ............. Binary in 0.1% increments
9) Electronic overcurrent protection load factor ............. Binary in 0.1% increments
10) Output current peak value ........... Binary in 0.01A increments
11) Input power ......................... Binary in 0.01kW increments
12) Output power ......................... Binary in 0.01kW increments
13) Input terminal states

<table>
<thead>
<tr>
<th>15-12</th>
<th>11</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>CS</td>
<td>RES</td>
<td>STOP</td>
<td>MRS</td>
<td>JOG</td>
<td>RH</td>
<td>RM</td>
<td>RL</td>
<td>RT</td>
<td>AU</td>
<td>STR</td>
<td>STF</td>
</tr>
</tbody>
</table>

14) Output terminal states

<table>
<thead>
<tr>
<th>15-6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>ABC</td>
<td>FU</td>
<td>OL</td>
<td>IPF</td>
<td>SU</td>
<td>RUN</td>
</tr>
</tbody>
</table>

15) Load meter ......................... Binary in 0.1% increments
16) Motor exciting current .......... Binary in 0.01A increments
17) Position pulse (*) ............... Binary in 1 pulse increments
18) Cumulative energization time ...... Binary in 1 hr increments
19) Orientation status (*)
20) Actual operation time ........... Binary in 1 hr increments
21) Motor load factor ................. Binary in 0.1% increments
22) Cumulative power .................. Binary in 1kwh increments
23) Alarm definition

*Valid only when FR-A5AP is fitted
24) Inverter status
You can monitor the inverter status using Class 0x2A, Attribute 114, A500 Inverter Status. This is defined in the following bit map:

<table>
<thead>
<tr>
<th>bit</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Running (RUN)</td>
</tr>
<tr>
<td>1</td>
<td>Forward run (forward rotation)</td>
</tr>
<tr>
<td>2</td>
<td>Reverse run (reverse rotation)</td>
</tr>
<tr>
<td>3</td>
<td>Up to frequency (SU)</td>
</tr>
<tr>
<td>4</td>
<td>Overload alarm (OL)</td>
</tr>
<tr>
<td>5</td>
<td>Instantaneous power failure (IPF)</td>
</tr>
<tr>
<td>6</td>
<td>Frequency detection (FU)</td>
</tr>
<tr>
<td>7</td>
<td>Alarm output (ABC)</td>
</tr>
</tbody>
</table>

(3) Operation commands
To send the control input instruction, check Attribute 114 of Class 0x2A AC Drive Object supplied with the instruction data you want. For example, setting of numerical value 0x0002 means that the inverter is run in forward rotation at the frequency setting in RAM.

Follow the bit map table below:

```
  15-11  10   9   8   7   6   5   4   3   2   1   0
  0  1  2  3  4  5  6  7  8  9  10  11  12
```

The input signals marked * can be changed using Pr. 180 to Pr. 186 (input terminal function selection).

(4) Running frequency
The running frequency can be set to a minimum of 0.01Hz within the range 0 to 400Hz.
The frequency setting in RAM can be made using Attribute 112 and 113 of Class 0x2A AC Drive Object.

(5) Parameter write
Functions can be written using DeviceNet. Note that write during inverter operation will result in a write mode error.

(6) Parameter read
Functions can be read using DeviceNet.

(7) Operation at alarm occurrence

<table>
<thead>
<tr>
<th>Alarm Location</th>
<th>Description</th>
<th>Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DeviceNet mode</td>
<td>External mode</td>
</tr>
<tr>
<td>Inverter alarm</td>
<td>Inverter operation</td>
<td>Stop</td>
</tr>
<tr>
<td></td>
<td>Data communication</td>
<td>Continued</td>
</tr>
<tr>
<td>DeviceNet alarm</td>
<td>Inverter operation</td>
<td>Stop (Note 1)</td>
</tr>
<tr>
<td></td>
<td>Data communication</td>
<td>Continued</td>
</tr>
</tbody>
</table>

Note 1. The motor coasts to a stop if the inverter outputs an error due to the FR-ASND's connection object failure or watch dog time-out.
Note 2. Depends on the communication error type.
3.8 DeviceNet Programming

DeviceNet programs change with the master module. For programming details, refer to the master module instruction manual.

(1) Object model

In DeviceNet, each node (device to communicate with) is modeled as a cluster of objects (abstracted specific product functions). In other words, each node allows the map of an object model to be drawn on the basis of the characteristics of each function. This is an object map.

The following four items are used to represent an object:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>Cluster of all objects having the same type of function</td>
</tr>
<tr>
<td></td>
<td>Generalized object</td>
</tr>
<tr>
<td>Instance</td>
<td>Specific representation of object</td>
</tr>
<tr>
<td>Attribute</td>
<td>Representation of object characteristic</td>
</tr>
<tr>
<td>Service</td>
<td>Function supported by object or class</td>
</tr>
</tbody>
</table>

Object model example

<table>
<thead>
<tr>
<th>Class</th>
<th>Instance</th>
<th>Attribute</th>
<th>Attribute Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human</td>
<td>John</td>
<td>Sex</td>
<td>Male</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Age</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Mary</td>
<td>Sex</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Age</td>
<td>42</td>
</tr>
</tbody>
</table>

In DeviceNet communication, changing this attribute value enables the inverter setting to be changed and reading the attribute value enables the inverter data (output current value, etc.) to be monitored. Such reading and changing of the attribute value, sending of operation commands to the inverter, and others can be performed using the I/O instances. The I/O data examples given below use the I/O instances to run the inverter and change the parameter values.

Refer to Section 3.9 Object Map for information on each class, instance, attribute and service.
(2) I/O specifications (Polled I/O connection)

1) Output signals (Master module to inverter)

The output signals from the master module can be provided using any of the following output instances:

- **Class 0x04 - Output instance 20**

```
<table>
<thead>
<tr>
<th>Byte</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fault</td>
<td>Reset</td>
<td>Forward Rotation</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Speed setting (lower byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Speed setting (upper byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

- **Class 0x04 - Output instance 21**

```
<table>
<thead>
<tr>
<th>Byte</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>NetRef</td>
<td>NetCtrl</td>
<td>Fault</td>
<td>Reset</td>
<td>Reverse Rotation</td>
<td>Forward Rotation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Speed setting (lower byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Speed setting (upper byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

- **Class 0x04 - Output instance 26**

```
<table>
<thead>
<tr>
<th>Byte</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Write Param</td>
<td>NetRef</td>
<td>NetCtrl</td>
<td>Fault</td>
<td>Reset</td>
<td>Reverse Rotation</td>
<td>Forward Rotation</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Speed setting or parameter write data (lower byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Speed setting or parameter write data (upper byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Parameter class</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Parameter attribute number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

Output instance 26 (0x1A) is used to set write/read the parameter access control, parameter class, parameter attribute number and parameter write data.

Output instance 26 must be used with input instance 76 in the command which requires parameter access. Output instance 26 uses 6-byte data.

**<Definition of BYTE data>**

Output instances 20, 21, 26 are executed under the following rules. (Some bits and data are not in output instances 20, 21. Refer to the above data table.)

**BYTE 0: Bit 7 - If Write Param = 1, the parameter write data in BYTE 2 and BYTE 3 is written to the parameter indicated in BYTE 4 and BYTE 5 and the functions of the other bits are ignored.**

- If Write Param = 0, the RPM speed setting (same value as in BYTE 2 and BYTE 3 of output instance 21) is set and the functions of the other bits are executed.

**Bit 6 - If NetRef = 1, the speed setting is adopted from BYTE 2 and BYTE 3. (Note 2)**

**Bit 5 - If NetCtrl = 1, Bits 2, 1, 0 are made valid.**

- If NetCtrl = 0, the operation command entered from the external terminal (STF, STR terminal) is made valid. (Note 3)

- **Bit 4 - Unused**

- **Bit 3 - Unused**

- **Bit 2 - If Fault Reset is changed from 0 to 1, the inverter is reset.**

- **Bit 1 - If Reverse Rotation = 1 and Forward Rotation = 0, reverse rotation is performed.**

- **Bit 0 - If Forward Rotation = 1 and Reverse Rotation = 0, forward rotation is performed.**

**Note 1.** To make Bits 2, 1, 0 valid, NetCtrl must be 1.

**Note 2.** The speed command write (Pr. 339) changes.

**Note 3.** The operation command write (Pr. 338) changes.

**BYTE 1:** Must be 00.

**BYTE 2:** Lower byte of speed setting (1r/min increments) or parameter write data

**BYTE 3:** Upper byte of speed setting (1r/min increments) or parameter write data

**BYTE 4:** Parameter class, e.g. 0x2A, 0x66, 0x67

**BYTE 5:** Parameter attribute No. (instance 1), e.g. 0x0A, 0x65
2) Input signals (Inverter to master module)

The input signals to the master module can be provided using any of the following input instances:

- **Class 0x04 - Input instance 70**

<table>
<thead>
<tr>
<th>Byte</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>Forward</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>Rotation</td>
<td></td>
<td></td>
<td></td>
<td>Faulted</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Actual speed (lower byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>Actual speed (upper byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Class 0x04 - Input instance 71 (factory setting)**

<table>
<thead>
<tr>
<th>Byte</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>At Ref Speed</td>
<td>Ref From Net</td>
<td>Ctrl From Net</td>
<td>Ready</td>
<td>Reverse Rotation</td>
<td>Forward Rotation</td>
<td>Faulted</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Actual speed (lower byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>Actual speed (upper byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Class 0x04 - Input instance 76**

<table>
<thead>
<tr>
<th>Byte</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>At Ref Speed</td>
<td>Ref From Net</td>
<td>Ctrl From Net</td>
<td>Ready</td>
<td>Reverse Rotation</td>
<td>Forward Rotation</td>
<td>Faulted</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Actual speed (lower byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>Actual speed (upper byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>Parameter read (lower byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>Parameter read (upper byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Input instance 76 (0x4C) offers 16-bit parameter data. Input instance 76 must be used with output instance 26 in the command which requires parameter access. Input instance 76 uses 6-byte data.

**Definition of BYTE data**

Input instances 70, 71, 76 are executed under the following rules. (Some bits and data are not in input instances 70, 71. Refer to the above data table.)

- **BYTE 0**: Bit 7 - When At Ref Speed = 1, operation is being performed at the speed setting.
  - Bit 6 - When Ref From Net = 1, the speed setting from the DeviceNet master is used.
  - Bit 5 - When Ctrl From Net = 1, error reset, forward rotation or reverse rotation is given from the DeviceNet master.
  - Bit 4 - Ready
  - Bit 3 - Reverse rotation
  - Bit 2 - Forward rotation
  - Bit 1 - Unused
  - Bit 0 - When Faulted = 1, the inverter is in error.

- **BYTE 1**: Must be 00.

- **BYTE 2**: Lower byte of actual speed (1r/min increments) (Note 1)

- **BYTE 3**: Upper byte of actual speed (1r/min increments) (Note 1)

- **BYTE 4**: Parameter read data (lower byte) set in output instance 26 (Bytes 4, 5) (Note 2)

- **BYTE 5**: Parameter read data (upper byte) set in output instance 26 (Bytes 4, 5) (Note 2)

**Note 1**: Not the actual speed of the motor.

**Note 2**: When a value is written to a certain parameter and the same parameter value is then read right after that, it may remain unchanged since it will be read before the data is reflected on Bytes 4 and 5 because of processing time. Read the same parameter value more than 1 second after writing it.
(3) Programming examples (Data examples for Polled I/O connection)

Programming changes with the device used as the master station. Refer to the master station programming manual. Data examples for programming are given below.

<table>
<thead>
<tr>
<th>Item</th>
<th>Data Example</th>
<th>Refer To Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Operation mode setting</td>
<td>Set to the DeviceNet operation mode.</td>
<td>92</td>
</tr>
<tr>
<td>2) Inverter speed reading</td>
<td>Read the inverter data.</td>
<td>92</td>
</tr>
<tr>
<td>3) Running speed setting</td>
<td>Set the running speed to 900r/min.</td>
<td>93</td>
</tr>
<tr>
<td>4) Operation command designation</td>
<td>Command the forward rotation and mid-speed signals.</td>
<td>93</td>
</tr>
<tr>
<td>5) Inverter status reading</td>
<td>Read the inverter status.</td>
<td>94</td>
</tr>
<tr>
<td>6) Parameter reading</td>
<td>Read Pr. 0 &quot;torque boost&quot;.</td>
<td>95</td>
</tr>
<tr>
<td>7) Parameter writing</td>
<td>Set &quot;2.0%&quot; in Pr. 0 &quot;torque boost&quot;.</td>
<td>96</td>
</tr>
</tbody>
</table>

1) Operation mode setting data example

When sending the DeviceNet operation mode command to the inverter, use Class 0x2A, Attribute No. 120 to write the following data to output instance 26:

<Write data example: DeviceNet operation mode>

<table>
<thead>
<tr>
<th>Output Instance 26</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYTE 0 0x80</td>
<td></td>
</tr>
<tr>
<td>BYTE 1 0x00</td>
<td>Setting is invalid. (Ignored)</td>
</tr>
<tr>
<td>BYTE 2 0x14</td>
<td>Lower-byte data Data 0x0014 (DeviceNet operation mode) of parameter class 0x2A, parameter attribute No. 120 (0x78)</td>
</tr>
<tr>
<td>BYTE 3 0x00</td>
<td>Upper-byte data</td>
</tr>
<tr>
<td>BYTE 4 0x2A</td>
<td>Parameter class</td>
</tr>
<tr>
<td>BYTE 5 0x78</td>
<td>Parameter attribute No. (Instance 1)</td>
</tr>
</tbody>
</table>

2) Inverter speed reading data example

To know the inverter speed, read the value of input instance 71.

<Read data example: 60Hz forward running>

<table>
<thead>
<tr>
<th>Input Instance 71</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYTE 0 0xF4</td>
<td></td>
</tr>
<tr>
<td>BYTE 1 0x00</td>
<td>Speed being set by DeviceNet During operation at speed setting</td>
</tr>
<tr>
<td>BYTE 2 0x08</td>
<td>Lower-byte data Actual speed 0x0708 ⇒ 1800(r/min)</td>
</tr>
<tr>
<td>BYTE 3 0x07</td>
<td>Upper-byte data</td>
</tr>
</tbody>
</table>

---

1) Operation mode setting data example

When sending the DeviceNet operation mode command to the inverter, use Class 0x2A, Attribute No. 120 to write the following data to output instance 26:

<Write data example: DeviceNet operation mode>

<table>
<thead>
<tr>
<th>Output Instance 26</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYTE 0 0x80</td>
<td></td>
</tr>
<tr>
<td>BYTE 1 0x00</td>
<td>Setting is invalid. (Ignored)</td>
</tr>
<tr>
<td>BYTE 2 0x14</td>
<td>Lower-byte data Data 0x0014 (DeviceNet operation mode) of parameter class 0x2A, parameter attribute No. 120 (0x78)</td>
</tr>
<tr>
<td>BYTE 3 0x00</td>
<td>Upper-byte data</td>
</tr>
<tr>
<td>BYTE 4 0x2A</td>
<td>Parameter class</td>
</tr>
<tr>
<td>BYTE 5 0x78</td>
<td>Parameter attribute No. (Instance 1)</td>
</tr>
</tbody>
</table>

2) Inverter speed reading data example

To know the inverter speed, read the value of input instance 71.

<Read data example: 60Hz forward running>

<table>
<thead>
<tr>
<th>Input Instance 71</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYTE 0 0xF4</td>
<td></td>
</tr>
<tr>
<td>BYTE 1 0x00</td>
<td>Speed being set by DeviceNet During operation at speed setting</td>
</tr>
<tr>
<td>BYTE 2 0x08</td>
<td>Lower-byte data Actual speed 0x0708 ⇒ 1800(r/min)</td>
</tr>
<tr>
<td>BYTE 3 0x07</td>
<td>Upper-byte data</td>
</tr>
</tbody>
</table>
3) Running speed setting data example
When running the inverter at 900r/min (30Hz) in forward rotation, write the following data to output instance 21:

<Write data example: 30Hz forward rotation operation>

<table>
<thead>
<tr>
<th>Output Instance 21</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYTE 0 0x61</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b7 b6 b5 b4 b3 b2 b1 b0</td>
</tr>
<tr>
<td></td>
<td>0 1 1 0 0 0 0 1</td>
</tr>
<tr>
<td>BYTE 1 0x00</td>
<td></td>
</tr>
<tr>
<td>BYTE 2 0x84</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Lower-byte data)</td>
</tr>
<tr>
<td>BYTE 3 0x03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Upper-byte data)</td>
</tr>
<tr>
<td></td>
<td>Speed setting 0x0384 (=) 900(r/min)</td>
</tr>
<tr>
<td></td>
<td>Speed set by DeviceNet</td>
</tr>
<tr>
<td></td>
<td>Error reset or controlled by DeviceNet</td>
</tr>
<tr>
<td></td>
<td>Forward rotation</td>
</tr>
</tbody>
</table>

4) Operation command setting data example
When sending the forward rotation and mid-speed commands to the inverter, use Class 0x2A, Attribute No. 114 to write the following data to output instance 26:

<Write data example: Forward rotation, mid-speed operation>

<table>
<thead>
<tr>
<th>Output Instance 26</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYTE 0 0x80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b7 b6 b5 b4 b3 b2 b1 b0</td>
</tr>
<tr>
<td></td>
<td>1 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td>BYTE 1 0x00</td>
<td></td>
</tr>
<tr>
<td>BYTE 2 0x12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Lower-byte data)</td>
</tr>
<tr>
<td>BYTE 3 0x00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Upper-byte data)</td>
</tr>
<tr>
<td>BYTE 4 0x2A</td>
<td>Parameter class</td>
</tr>
<tr>
<td>BYTE 5 0x72</td>
<td>Parameter attribute No. (Instance 1)</td>
</tr>
</tbody>
</table>
5) Inverter status reading data example

When reading the inverter status, use Class 0x2A, Attribute No. 114 to read data.

<Write data example: Perform write to request the Class 0x2A, Attribute No. 114 data>

<table>
<thead>
<tr>
<th>Output Instance 26</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYTE 0 0x61</td>
<td></td>
</tr>
<tr>
<td>BYTE 1 0x00</td>
<td>-</td>
</tr>
<tr>
<td>BYTE 2 0x84 (Lower-byte data)</td>
<td>Speed setting 0x0384 ⇒ 900(r/min)</td>
</tr>
<tr>
<td>BYTE 3 0x03 (Upper-byte data)</td>
<td></td>
</tr>
<tr>
<td>BYTE 4 0x2A</td>
<td>Parameter class</td>
</tr>
<tr>
<td>BYTE 5 0x72</td>
<td>Parameter attribute No. (Instance 1)</td>
</tr>
</tbody>
</table>

<Read data example: Read the Class 0x2A, Attribute No. 114 data>

<table>
<thead>
<tr>
<th>Input Instance 76</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYTE 0 0xF4</td>
<td></td>
</tr>
<tr>
<td>BYTE 1 0x00</td>
<td>-</td>
</tr>
<tr>
<td>BYTE 2 0x84 (Lower-byte data)</td>
<td>Actual speed 0x0384 ⇒ 900(r/min)</td>
</tr>
<tr>
<td>BYTE 3 0x03 (Upper-byte data)</td>
<td></td>
</tr>
<tr>
<td>BYTE 4 0x48 (Lower-byte data)</td>
<td>Data of parameter class 0x2A, parameter attribute No. 114 (0x72)</td>
</tr>
<tr>
<td>BYTE 5 0x00 (Upper-byte data)</td>
<td></td>
</tr>
</tbody>
</table>

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6) Parameter reading data example
When reading the setting of inverter’s Pr. 0 “torque boost”, use Class 0x66, Attribute No. 10 to read data.

<Write data example: Perform write to request the Class 0x66, Attribute No. 10 data>

<table>
<thead>
<tr>
<th>Output Instance 26</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYTE 0 0x61</td>
<td></td>
</tr>
<tr>
<td>BYTES b7 b6 b5 b4 b3 b2 b1 b0</td>
<td>Speed set by DeviceNet  Error reset or controlled by DeviceNet  Forward rotation</td>
</tr>
<tr>
<td>BYTE 1 0x00</td>
<td></td>
</tr>
<tr>
<td>BYTE 2 0x84</td>
<td>(Lower-byte data)</td>
</tr>
<tr>
<td>BYTE 3 0x03</td>
<td>(Upper-byte data)</td>
</tr>
<tr>
<td>BYTE 4 0x66</td>
<td>Parameter class</td>
</tr>
<tr>
<td>BYTE 5 0x0A</td>
<td>Parameter attribute No. (Instance 1)</td>
</tr>
</tbody>
</table>

<Read data example: Read the Class 0x66, Attribute No. 10 data>

<table>
<thead>
<tr>
<th>Input Instance 76</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYTE 0 0xF4</td>
<td></td>
</tr>
<tr>
<td>BYTES b7 b6 b5 b4 b3 b2 b1 b0</td>
<td>During operation at speed setting  Speed being set by DeviceNet  During ready  During forward rotation  Inverter normal</td>
</tr>
<tr>
<td>BYTE 1 0x00</td>
<td></td>
</tr>
<tr>
<td>BYTE 2 0x84</td>
<td>(Lower-byte data)</td>
</tr>
<tr>
<td>BYTE 3 0x03</td>
<td>(Upper-byte data)</td>
</tr>
<tr>
<td>BYTE 4 0x1E</td>
<td>(Lower-byte data)</td>
</tr>
<tr>
<td>BYTE 5 0x00</td>
<td>(Upper-byte data)</td>
</tr>
<tr>
<td>BYTE 5 0x00</td>
<td>Data of parameter class 0x66, parameter attribute No. 10 (0x0A)</td>
</tr>
<tr>
<td></td>
<td>0x001E = 30 (Represents 3.0% because of 0.1% increments)</td>
</tr>
</tbody>
</table>
7) Parameter writing data example
When setting 2.0% in Pr. 0 "torque boost" of the inverter, use Class 0x66, Attribute No. 10 to write the following data to output instance 26:

<Write data example: Pr. 0 = 2.0%>

<table>
<thead>
<tr>
<th>Output Instance 26</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYTE 0 0x80</td>
<td>b7 b6 b5 b4 b3 b2 b1 b0</td>
</tr>
<tr>
<td></td>
<td>1 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td></td>
<td>Parameter write Setting is invalid. (Ignored)</td>
</tr>
<tr>
<td>BYTE 1 0x00</td>
<td>—</td>
</tr>
<tr>
<td>BYTE 2 0x14</td>
<td>Lower-byte data Data of parameter class 0x66, parameter attribute No. 10 (0x0A) 0X0014=20 (Represents 2.0% because of 0.1% increments)</td>
</tr>
<tr>
<td>BYTE 3 0x00</td>
<td>Upper-byte data</td>
</tr>
<tr>
<td>BYTE 4 0x66</td>
<td>Parameter class</td>
</tr>
<tr>
<td>BYTE 5 0x0A</td>
<td>Parameter attribute No. (Instance 1)</td>
</tr>
</tbody>
</table>

(3) Programming instructions

1) When designing software, use either of the following techniques:
   - Use of handshake technique
     After sending a request to the FR-A5ND option unit, wait for a reply from the option unit, and after receiving the reply, send the next request.
     Considering the response time (refer to page 74) of the FR-A5ND, set the waiting time for the next request.
     For example, send the next request more than 30ms after sending a write request.

2) When the master station connected is of OMRON (Model C200HW-DRM21-V1, Model CVM1-DRM21-V1), use it after making either of the following master station settings:
   - Use it in the scan list disable mode.
   - When using it in the scan list enable mode, increase the master station's communication intervals more than 200ms.
   (Use OMRON's configurator to set the master station's communication intervals.)
3.9 Object Map

DeviceNet™

This section describes the object definitions for use of FR-A5ND DeviceNet. For details of the definitions, refer to ODVA’s DeviceNet documentation.

<table>
<thead>
<tr>
<th>Class</th>
<th>Object Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x01</td>
<td>Identity object</td>
</tr>
<tr>
<td>0x03</td>
<td>DeviceNet object</td>
</tr>
<tr>
<td>0x04</td>
<td>Assembly object</td>
</tr>
<tr>
<td>0x05</td>
<td>DeviceNet connection object</td>
</tr>
<tr>
<td>0x28</td>
<td>Motor data object</td>
</tr>
<tr>
<td>0x29</td>
<td>Control management object</td>
</tr>
<tr>
<td>0x2A</td>
<td>AC drive object</td>
</tr>
<tr>
<td>0x66</td>
<td>A500 expansion object I</td>
</tr>
<tr>
<td>0x67</td>
<td>A500 expansion object II</td>
</tr>
</tbody>
</table>

In the following tables, Get means read from the inverter and Set means write to the inverter.

### 3.9.1 Class 0x01 Identity object

(1) Class 0x01 Instance 0 attributes

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>Description</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Get</td>
<td>Version of Class 0x01 object</td>
<td>Word</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Get</td>
<td>Maximum instance count of Class 0x01</td>
<td>Word</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Get</td>
<td>Maximum attribute count of Class 0x01</td>
<td>Word</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>Get</td>
<td>Maximum instance attribute count of Class 0x01</td>
<td>Word</td>
<td>7</td>
</tr>
</tbody>
</table>

(2) Class 0x01 Instance 0 service

<table>
<thead>
<tr>
<th>Service Code</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0E</td>
<td>Read the attribute value.</td>
</tr>
</tbody>
</table>

(3) Class 0x01 Instance 1 attributes

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>Description</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Get</td>
<td>Vendor ID (Mitsubishi Electric)</td>
<td>Word</td>
<td>82</td>
</tr>
<tr>
<td>2</td>
<td>Get</td>
<td>Product type (AC drive)</td>
<td>Word</td>
<td>02</td>
</tr>
<tr>
<td>3</td>
<td>Get</td>
<td>Product code</td>
<td>Word</td>
<td>500</td>
</tr>
<tr>
<td>4</td>
<td>Get</td>
<td>Version</td>
<td>Word</td>
<td>1, YYYY (Note 1)</td>
</tr>
<tr>
<td>5</td>
<td>Get</td>
<td>Status</td>
<td>Word</td>
<td>0000</td>
</tr>
<tr>
<td>6</td>
<td>Get</td>
<td>Serial number</td>
<td>Word</td>
<td>XXXXXXXXX</td>
</tr>
<tr>
<td>7</td>
<td>Get</td>
<td>Product name (FR-A500)</td>
<td>Word</td>
<td>A500 (Note 3)</td>
</tr>
</tbody>
</table>

Note 1. The upper byte of the read hexadecimal word data indicates the integer part and its lower byte indicates the fraction part. For example, the read data of 0x010A means version 1.010.

Note 2. The value changes with the product.

Note 3. The actual data stored are 0x04, 0x41, 0x35, 0x30 and 0x30. The first 0x04 indicates the 4-byte data and the others indicate “A500” in ASCII.

(4) Class 0x01 Instance 1 services

<table>
<thead>
<tr>
<th>Service Code</th>
<th>Service</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x05</td>
<td>Reset or all parameter clear</td>
<td>0: Reset</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1: All parameter clear</td>
</tr>
<tr>
<td>0x0E</td>
<td>Read the attribute value.</td>
<td>–</td>
</tr>
</tbody>
</table>
3.9.2 Class 0x03 DeviceNet object

(1) Class 0x03 Instance 1 attributes

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>Description</th>
<th>Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Get/Set</td>
<td>Node address setting (Note 1)</td>
<td>0 to 63</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Get/Set</td>
<td>Baud rate setting (Note 1)</td>
<td>0: 125kbps 1: 250kbps 2: 500kbps</td>
<td>0, 1, 2</td>
</tr>
<tr>
<td>3</td>
<td>Get/Set</td>
<td>Bus off interrupt</td>
<td>0: On detection of bus off, the CAN chip is held in the reset status. 1: On detection of bus off, the CAN chip is reset and communication is continued.</td>
<td>0, 1</td>
</tr>
<tr>
<td>4</td>
<td>Get/Set</td>
<td>Bus off counter</td>
<td>(Counts the number of times when the CAN chip is set to bus-off.)</td>
<td>0 to 255</td>
</tr>
<tr>
<td>5</td>
<td>Get</td>
<td>Allocation information</td>
<td>0 to 0xFFFF</td>
<td>0x0103</td>
</tr>
<tr>
<td>8</td>
<td>Get</td>
<td>Actual value of node address</td>
<td>0 to 63</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>Get</td>
<td>Actual value of baud rate</td>
<td>0, 1, 2</td>
<td>0</td>
</tr>
</tbody>
</table>

Note 1. May also be read using Class 0x67 Instance 1 Attributes 45 and 46.
Note 2. For detailed definitions, refer to the DeviceNet specifications Vol. I 5-5.

(2) Class 0x03 Instance 1 services

<table>
<thead>
<tr>
<th>Service Code</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x4B</td>
<td>Allocate</td>
</tr>
<tr>
<td>0x4C</td>
<td>Release</td>
</tr>
<tr>
<td>0x0E</td>
<td>Read the attribute value.</td>
</tr>
<tr>
<td>0x10</td>
<td>Write the attribute value.</td>
</tr>
</tbody>
</table>

3.9.3 Class 0x04 Assembly object

(1) Class 0x04 Output instance 20

<table>
<thead>
<tr>
<th>Byte</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Bit 7</td>
</tr>
<tr>
<td></td>
<td>Bit 6</td>
</tr>
<tr>
<td></td>
<td>Bit 5</td>
</tr>
<tr>
<td></td>
<td>Bit 4</td>
</tr>
<tr>
<td></td>
<td>Bit 3</td>
</tr>
<tr>
<td></td>
<td>Bit 2</td>
</tr>
<tr>
<td></td>
<td>Bit 1</td>
</tr>
<tr>
<td></td>
<td>Bit 0</td>
</tr>
<tr>
<td>1</td>
<td>Fault</td>
</tr>
<tr>
<td></td>
<td>Reset</td>
</tr>
<tr>
<td></td>
<td>Forward</td>
</tr>
<tr>
<td>2</td>
<td>Speed setting (lower byte)</td>
</tr>
<tr>
<td>3</td>
<td>Speed setting (upper byte)</td>
</tr>
</tbody>
</table>

(2) Class 0x04 Output instance 21

<table>
<thead>
<tr>
<th>Byte</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Bit 7</td>
</tr>
<tr>
<td></td>
<td>Bit 6</td>
</tr>
<tr>
<td></td>
<td>Bit 5</td>
</tr>
<tr>
<td></td>
<td>Bit 4</td>
</tr>
<tr>
<td></td>
<td>Bit 3</td>
</tr>
<tr>
<td></td>
<td>Bit 2</td>
</tr>
<tr>
<td></td>
<td>Bit 1</td>
</tr>
<tr>
<td></td>
<td>Bit 0</td>
</tr>
<tr>
<td>1</td>
<td>Fault</td>
</tr>
<tr>
<td></td>
<td>Reset</td>
</tr>
<tr>
<td></td>
<td>Reverse</td>
</tr>
<tr>
<td></td>
<td>Forward</td>
</tr>
<tr>
<td>2</td>
<td>Speed setting (lower byte)</td>
</tr>
<tr>
<td>3</td>
<td>Speed setting (upper byte)</td>
</tr>
</tbody>
</table>
(3) Class 0x04 Output instance 26

<table>
<thead>
<tr>
<th>Byte</th>
<th>Description</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Write Param</td>
<td>NetRef</td>
<td>NetCtrl</td>
<td>–</td>
<td>–</td>
<td>Fault</td>
<td>Reverse Rotation</td>
<td>Forward Rotation</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Speed setting or parameter write data (lower byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Speed setting or parameter write data (upper byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Parameter class</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Parameter attribute number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 1. Before directing the inverter via the network, always turn on the bits of “NetCtrl” and “NetRef”. If they are off, the inverter will not accept the directives even in the network operation mode.

Note 2. When issuing a command, always hold the forward/reverse rotation flag in the present running status. Transmitting a wrong status will change the running status.

(Example: The inverter will stop the output if bit 0 is turned off during the inverter forward rotation command.)

Note 3. Always set “0” in Byte 1 of output instance 26. The inverter will not recognize any other value as normal data.

(4) Class 0x04 Input instance 70

<table>
<thead>
<tr>
<th>Byte</th>
<th>Description</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>Forward Rotation</td>
<td>–</td>
<td>Faulted</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Actual speed (lower byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Actual speed (upper byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(5) Class 0x04 Input instance 71

<table>
<thead>
<tr>
<th>Byte</th>
<th>Description</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>At Ref Speed</td>
<td>Ref From Net</td>
<td>Ctrl From Net</td>
<td>Ready</td>
<td>Reverse Rotation</td>
<td>Forward Rotation</td>
<td>–</td>
<td>Faulted</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Actual speed (lower byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Actual speed (upper byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(6) Class 0x04 Input instance 76

<table>
<thead>
<tr>
<th>Byte</th>
<th>Description</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>At Ref Speed</td>
<td>Ref From Net</td>
<td>Ctrl From Net</td>
<td>Ready</td>
<td>Reverse Rotation</td>
<td>Forward Rotation</td>
<td>–</td>
<td>Faulted</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Actual speed (lower byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Actual speed (upper byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Parameter read (lower byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Parameter read (upper byte)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.9.4 Class 0x05 DeviceNet connection object

The FR-A5ND supports only Polled I/O and Explicit Messaging. It does not support Bit-Strobed I/O. Also, Instances 4 to 6 are the instances of Explicit Messaging.

(1) Class 0x05 Instance 1 attributes (Explicit Messaging)

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>Description</th>
<th>Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Get</td>
<td>Connection status</td>
<td>0 to 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0: Non-existent</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1: Configuring</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2: Waiting for connection ID</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3: Established</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4: Timed Out</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5: Deferred Delete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Get</td>
<td>Connection instance type</td>
<td>0, 1</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Get</td>
<td>Transport Trigger Class</td>
<td>0, 1: Server Transport Class 3</td>
<td>0x83</td>
</tr>
<tr>
<td>4</td>
<td>Get</td>
<td>Produced Connection ID</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Get</td>
<td>Consumed Connection ID</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Get</td>
<td>Initial Communication Characteristics</td>
<td>0 to 0xFF</td>
<td>0x22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Defines the sending and receiving message groups)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0x22: Group 2 message in both sending and receiving</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Get</td>
<td>Produced Connection Size</td>
<td>0 to 0xFFFF</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>Get</td>
<td>Consumed Connection Size</td>
<td>0 to 0xFFFF</td>
<td>7</td>
</tr>
<tr>
<td>9</td>
<td>Get/Set</td>
<td>Expected Packet Rate (EPR)</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Get</td>
<td>Watch dog operation</td>
<td>0 to 3</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0: Transition to timed out</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1: Auto Delete</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2: Auto reset</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3: Deferred Delete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Get</td>
<td>Produced Connection Path Length</td>
<td>0 to 0xFFFF</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>Get</td>
<td>Produced Connection Path</td>
<td>0 to 0xFFFF</td>
<td>0x04</td>
</tr>
<tr>
<td>15</td>
<td>Get</td>
<td>Consumed Connection Path Length</td>
<td>0 to 0xFFFF</td>
<td>0x03</td>
</tr>
<tr>
<td>16</td>
<td>Get</td>
<td>Consumed Connection Path</td>
<td>0 to 0xFFFF</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: For detailed definitions, refer to the DeviceNet specifications Vol. I 5-4.
(2)  Class 0x05 Instance 2 attributes (Polled I/O)

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>Description</th>
<th>Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Get</td>
<td>Connection status&lt;br&gt;0: Non-existent 1: Configuring 2: Waiting for connection ID 3: Established 4: Timed Out 5: Deferred Delete</td>
<td>0 to 5</td>
<td>–</td>
</tr>
<tr>
<td>2</td>
<td>Get</td>
<td>Connection instance type 0: Explicit Messaging connection 1: Polled I/O connection</td>
<td>0,1</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Get</td>
<td>Transport Trigger Class 0x82: Server Transport Class 2</td>
<td>0 to 0xFF</td>
<td>0x82</td>
</tr>
<tr>
<td>4</td>
<td>Get</td>
<td>Produced Connection ID</td>
<td>0 to 0xFFFF</td>
<td>–</td>
</tr>
<tr>
<td>5</td>
<td>Get</td>
<td>Consumed Connection ID</td>
<td>0 to 0xFFFF</td>
<td>–</td>
</tr>
<tr>
<td>6</td>
<td>Get</td>
<td>Initial Communication Characteristics&lt;br&gt;(Defines the sending and receiving message groups)&lt;br&gt;0x01: Sending Group 1 message, Receiving Group 2 message 0x82: Server Transport Class 2 0 to 0xFF</td>
<td>0 to 0xFF</td>
<td>0x01</td>
</tr>
<tr>
<td>7</td>
<td>Get</td>
<td>Produced Connection Size (Note 1) (Maximum amount of I/O data that may be sent)</td>
<td>0 to 0xFFFF</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>Get</td>
<td>Consumed Connection Size (Note 1) (Max. amount of I/O data that may be received)</td>
<td>0 to 0xFFFF</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>Get/Set</td>
<td>Watch dog operation&lt;br&gt;0: Transition to timed out 1: Auto Delete 2: Auto reset 3: Deferred Delete 0 to 3</td>
<td>0 to 3</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>Get</td>
<td>Produced Connection Path Length</td>
<td>0 to 0xFFFF</td>
<td>3</td>
</tr>
<tr>
<td>14</td>
<td>Get</td>
<td>Produced Connection Path (Note 2)</td>
<td>0 to 0xFF 0x62</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Get</td>
<td>Consumed Connection Path Length</td>
<td>0 to 0xFFFF</td>
<td>3</td>
</tr>
<tr>
<td>16</td>
<td>Get</td>
<td>Consumed Connection Path (Note 2)</td>
<td>0 to 0xFF 0x62</td>
<td></td>
</tr>
</tbody>
</table>

Note 1.  Depends on the communication data used. 4 for use of output instances 20, 21 and input instances 70, 71 or 6 for use of output instance 26 and input instance 76.

Note 2.  As the Produced Connection Path and Consumed Connection Path, specify the application objects of the data to be transferred. Their structures are as follows.

0x62 0xMM 0xNN: Application object data. The I/O instance numbers (hexadecimal) represented in ASCII.

Example: When output instance 21 and input instance 71 are used as communication data

(a) Produced Connection Path (send data)

Input instance 71 = 0x47
ASCII code: 4 = 0x34, 7 = 0x37
Hence, Produced Connection Path = 0x62 0x34 0x37

(b) Consumed Connection Path (receive data)

Output instance 21 = 0x15
ASCII code: 1 = 0x31, 5 = 0x35
Hence, Consumed Connection Path = 0x62 0x31 0x35

### Class 0x05 Instance 4 attributes (Explicit Messaging)

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>Description</th>
<th>Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Get</td>
<td>Connection status</td>
<td>0 to 5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Get</td>
<td>Connection instance type</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Get</td>
<td>Transport Trigger Class</td>
<td>0 to 0xFF</td>
<td>0x83</td>
</tr>
<tr>
<td>4</td>
<td>Get</td>
<td>Produced Connection ID</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Get</td>
<td>Consumed Connection ID</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Get</td>
<td>Initial Communication Characteristics</td>
<td>0 to 0xFF</td>
<td>0x22</td>
</tr>
<tr>
<td>7</td>
<td>Get</td>
<td>Produced Connection Size</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Get</td>
<td>Consumed Connection Size</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Get/Set</td>
<td>Expected Packet Rate (EPR)</td>
<td>0 to 0xFFFF</td>
<td>0x9c4</td>
</tr>
<tr>
<td>12</td>
<td>Get</td>
<td>Watch dog operation</td>
<td>0 to 3</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Get</td>
<td>Produced Connection Path Length</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Get</td>
<td>Produced Connection Path</td>
<td>0 to 0xFF</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>Get</td>
<td>Consumed Connection Path Length</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>Get</td>
<td>Consumed Connection Path</td>
<td>0 to 0xFF</td>
<td>0x33</td>
</tr>
</tbody>
</table>

### Class 0x05 Instance 5 attributes (Explicit Messaging)

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>Description</th>
<th>Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Get</td>
<td>Connection status</td>
<td>0 to 5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Get</td>
<td>Connection instance type</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Get</td>
<td>Transport Trigger Class</td>
<td>0 to 0xFF</td>
<td>0x83</td>
</tr>
<tr>
<td>4</td>
<td>Get</td>
<td>Produced Connection ID</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Get</td>
<td>Consumed Connection ID</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Get</td>
<td>Initial Communication Characteristics</td>
<td>0 to 0xFF</td>
<td>0x22</td>
</tr>
<tr>
<td>7</td>
<td>Get</td>
<td>Produced Connection Size</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Get</td>
<td>Consumed Connection Size</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Get/Set</td>
<td>Expected Packet Rate (EPR)</td>
<td>0 to 0xFFFF</td>
<td>0x9c4</td>
</tr>
<tr>
<td>12</td>
<td>Get</td>
<td>Watch dog operation</td>
<td>0 to 3</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Get</td>
<td>Produced Connection Path Length</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Get</td>
<td>Produced Connection Path</td>
<td>0 to 0xFF</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>Get</td>
<td>Consumed Connection Path Length</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>Get</td>
<td>Consumed Connection Path</td>
<td>0 to 0xFF</td>
<td>0</td>
</tr>
</tbody>
</table>

### Class 0x05 Instance 6 attributes (Explicit Messaging)

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>Description</th>
<th>Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Get</td>
<td>Connection status</td>
<td>0 to 5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Get</td>
<td>Connection instance type</td>
<td>0,1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Get</td>
<td>Transport Trigger Class</td>
<td>0 to 0xFF</td>
<td>0x83</td>
</tr>
<tr>
<td>4</td>
<td>Get</td>
<td>Produced Connection ID</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Get</td>
<td>Consumed Connection ID</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Get</td>
<td>Initial Communication Characteristics</td>
<td>0 to 0xFF</td>
<td>0x22</td>
</tr>
<tr>
<td>7</td>
<td>Get</td>
<td>Produced Connection Size</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Get</td>
<td>Consumed Connection Size</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Get/Set</td>
<td>Expected Packet Rate (EPR)</td>
<td>0 to 0xFFFF</td>
<td>0x9c4</td>
</tr>
<tr>
<td>12</td>
<td>Get</td>
<td>Watch dog operation</td>
<td>0 to 3</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Get</td>
<td>Produced Connection Path Length</td>
<td>0 to 0xFFFF</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Get</td>
<td>Produced Connection Path</td>
<td>0 to 0xFF</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>Get</td>
<td>Consumed Connection Path Length</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>Get</td>
<td>Consumed Connection Path</td>
<td>0 to 0xFF</td>
<td>0</td>
</tr>
</tbody>
</table>

### Class 0x05 Instance 1, 2, 4, 5, 6 services

<table>
<thead>
<tr>
<th>Service Code</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0E</td>
<td>Read the attribute value.</td>
</tr>
<tr>
<td>0x10</td>
<td>Write the attribute value.</td>
</tr>
</tbody>
</table>
### 3.9.5 Class 0x28 Motor data object

**Class 0x28 Instance 1 attributes**

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>Description</th>
<th>Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Get/Set</td>
<td>Motor type</td>
<td>0 to 10</td>
<td>7 (fixed value)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7: Squirrel-cage induction motor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Get/Set</td>
<td>Rated motor current (Pr. 9 &quot;Electronic thermal O/L relay&quot;)</td>
<td>0 to 0xFFFF</td>
<td>0x00FF</td>
</tr>
<tr>
<td>7</td>
<td>Get/Set</td>
<td>Rated motor voltage (Pr. 83)</td>
<td>0 to 0xFFFF</td>
<td>0x07D0</td>
</tr>
<tr>
<td>8</td>
<td>Get/Set</td>
<td>Motor capacity (Pr. 80)</td>
<td>0 to 0xFFFF</td>
<td>0x07F0</td>
</tr>
<tr>
<td>9</td>
<td>Get/Set</td>
<td>Rated motor frequency (Pr. 84)</td>
<td>0 to 0xFFFF</td>
<td>0x1770</td>
</tr>
<tr>
<td>12</td>
<td>Get/Set</td>
<td>Number of motor poles (Pr. 81)</td>
<td>0 to 0xFFFF</td>
<td>4</td>
</tr>
<tr>
<td>15</td>
<td>Get/Set</td>
<td>Base frequency (Pr. 3)</td>
<td>0 to 0xFFFF</td>
<td>0x07D0</td>
</tr>
</tbody>
</table>

**Notes**
1. Pr. 80 to Pr. 84 are not available for the FR-F500.

**Class 0x28 Instance 1 services**

<table>
<thead>
<tr>
<th>Service Code</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0E</td>
<td>Read the attribute value.</td>
</tr>
<tr>
<td>0x10</td>
<td>Write the attribute value.</td>
</tr>
</tbody>
</table>

### 3.9.6 Class 0x29 Control management object

**Class 0x29 Instance 1 attributes**

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>Description</th>
<th>Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Get/Set</td>
<td>Forward rotation</td>
<td>0, 1</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Get/Set</td>
<td>Reverse rotation</td>
<td>0, 1</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Get/Set</td>
<td>Operation command write (Pr. 338) (Note 1)</td>
<td>0, 1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other than DeviceNet communication operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>DeviceNet communication operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The actual operation command right status can be monitored using Attribute No. 15.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Get</td>
<td>Status</td>
<td>1 to 7</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Get</td>
<td>Forward rotation command</td>
<td>0, 1</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>Get</td>
<td>Reverse rotation command</td>
<td>0, 1</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>Get</td>
<td>Ready</td>
<td>0, 1</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Get</td>
<td>Error</td>
<td>0, 1</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>Get/Set</td>
<td>Error reset (Note 2)</td>
<td>0, 1</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>Get</td>
<td>Operation command write monitor (Note 3)</td>
<td>0, 1</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>Get/Set</td>
<td>DN failure mode (Operation performed when communication is broken)</td>
<td>0, 0</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Get/Set</td>
<td>Input assembly</td>
<td>75 to 76</td>
<td>0x47(71)</td>
</tr>
</tbody>
</table>

**Notes**
1. The logic is opposite to that of Pr. 338. (Attribute No. 5 = 1 is equivalent to Pr. 338 = 0.)
2. After setting data to 1 and executing a reset, a reset cannot be executed again unless the data is set to 0 once to cancel a reset.
3. This data is updated only after an inverter reset or operation cycle.
4. For detailed definitions, refer to the DeviceNet specifications Vol. II 6-29.
(2) Class 0x29 Instance 1 services

<table>
<thead>
<tr>
<th>Service Code</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0E</td>
<td>Read the attribute value.</td>
</tr>
<tr>
<td>0x10</td>
<td>Write the attribute value.</td>
</tr>
</tbody>
</table>

3.9.7 Class 0x2A AC drive object

(1) Class 0x2A Instance 1 attributes

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Get</td>
<td>Number of attributes supported</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Get</td>
<td>Up to frequency</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1: Speed reaches the speed command value.</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Get/Set</td>
<td>Speed command write (Pr. 339) (Note 1)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0: Other than DeviceNet communication operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1: DeviceNet communication operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(The actual speed command right status can be monitored using Attribute No. 29.)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Get/Set</td>
<td>Operation mode</td>
<td>0 (fixed value)</td>
</tr>
<tr>
<td>7</td>
<td>Get</td>
<td>Actual speed</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>Get/Set</td>
<td>Speed setting</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>Get</td>
<td>Actual current</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>Get</td>
<td>Actual power</td>
<td>b</td>
</tr>
<tr>
<td>17</td>
<td>Get</td>
<td>Output voltage</td>
<td>0</td>
</tr>
<tr>
<td>18</td>
<td>Get/Set</td>
<td>Acceleration time (Pr. 7)</td>
<td>0x0032</td>
</tr>
<tr>
<td>19</td>
<td>Get/Set</td>
<td>Deceleration time (Pr. 8)</td>
<td>0x0032</td>
</tr>
<tr>
<td>20</td>
<td>Get</td>
<td>Minimum frequency (Pr. 2)</td>
<td>0</td>
</tr>
<tr>
<td>21</td>
<td>Get/Set</td>
<td>Maximum frequency (Pr. 1)</td>
<td>0xFFFF</td>
</tr>
<tr>
<td>29</td>
<td>Get</td>
<td>Speed command write monitor (Note 2)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0: Other than DeviceNet communication operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1: DeviceNet communication operation</td>
<td></td>
</tr>
</tbody>
</table>

Note 1. The logic is opposite to that of Pr. 339. (Attribute No. 4 = 1 is equivalent to Pr. 339 = 0.)
Note 2. This data is updated only after an inverter reset or operation cycle.
Note 3. For detailed definitions, refer to the DeviceNet specifications Vol. II 6-30.

The following variables and parameters are specific to the FR-A500 series.

System Environment Variables

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Set</td>
<td>User clear setting</td>
<td>0</td>
</tr>
<tr>
<td>101</td>
<td>Set</td>
<td>Inverter reset</td>
<td>0</td>
</tr>
<tr>
<td>102</td>
<td>Set</td>
<td>Parameter clear</td>
<td>0x95A</td>
</tr>
<tr>
<td>103</td>
<td>Set</td>
<td>All parameter clear</td>
<td>0x95A</td>
</tr>
<tr>
<td>104</td>
<td>Set</td>
<td>Parameter user clear</td>
<td>0x5A5</td>
</tr>
<tr>
<td>105</td>
<td>Set</td>
<td>Parameter clear (external communication parameters)</td>
<td>0x5A5</td>
</tr>
<tr>
<td>106</td>
<td>Set</td>
<td>All parameter clear (external communication parameters)</td>
<td>0xAAA9</td>
</tr>
<tr>
<td>107</td>
<td>Set</td>
<td>Parameter user clear (external communication parameters)</td>
<td>0x5A5</td>
</tr>
<tr>
<td>112</td>
<td>Get/Set</td>
<td>Running frequency (RAM) (Note 1)</td>
<td>30.00Hz</td>
</tr>
<tr>
<td>113</td>
<td>Set</td>
<td>Running frequency (EEPROM) (Note 1)</td>
<td>30.00Hz</td>
</tr>
<tr>
<td>114</td>
<td>Get/Set</td>
<td>Inverter status/control input command (Note 2)</td>
<td>–</td>
</tr>
<tr>
<td>115</td>
<td>Get</td>
<td>Jog operation frequency (setting)</td>
<td>5.00Hz</td>
</tr>
<tr>
<td>120</td>
<td>Get/Set</td>
<td>Operation mode read (Get)</td>
<td>Operation mode write (Set)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0: External operation</td>
<td>0x10: External operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1: PU operation</td>
<td>0x11: PU operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2: External jog</td>
<td>0x14: DeviceNet communication operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3: PU jog</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4: DeviceNet communication operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5: PU-external combined operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6: Programmed operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(The operation mode may be changed to the PU operation mode from communication only when Pr. 79 = 6.)</td>
<td></td>
</tr>
</tbody>
</table>

Note 1. Data of No. 112 and 113 can be read from No. 112.
Note 2. Inverter status (Get)

Control input command (Set)

b15 b14 b13 b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0

0 MRS CS(*) AU(*) RT(*) JOG(*) RL(*) RM(*) RH(*) STR STF 0

The input signals marked * can be changed using Pr. 180 to Pr. 186 (input terminal function selection).
Monitor items

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>141</td>
<td>Get/Set</td>
<td>Alarm history 1 (Note 1)/all alarm history clear (Note 2)</td>
<td>0</td>
</tr>
<tr>
<td>142</td>
<td>Get</td>
<td>Alarm history 2 (Note 1)</td>
<td>–</td>
</tr>
<tr>
<td>143</td>
<td>Get</td>
<td>Alarm history 3 (Note 1)</td>
<td>–</td>
</tr>
<tr>
<td>144</td>
<td>Get</td>
<td>Alarm history 4 (Note 1)</td>
<td>–</td>
</tr>
<tr>
<td>145</td>
<td>Get</td>
<td>Alarm history 5 (Note 1)</td>
<td>–</td>
</tr>
<tr>
<td>146</td>
<td>Get</td>
<td>Alarm history 6 (Note 1)</td>
<td>–</td>
</tr>
<tr>
<td>147</td>
<td>Get</td>
<td>Alarm history 7 (Note 1)</td>
<td>–</td>
</tr>
<tr>
<td>148</td>
<td>Get</td>
<td>Alarm history 8 (Note 1)</td>
<td>–</td>
</tr>
<tr>
<td>170</td>
<td>Get</td>
<td>Output frequency (minimum setting increments 0.01Hz)</td>
<td>–</td>
</tr>
<tr>
<td>171</td>
<td>Get</td>
<td>Output current (minimum setting increments 0.1A)</td>
<td>–</td>
</tr>
<tr>
<td>172</td>
<td>Get</td>
<td>Output voltage (minimum setting increments 0.1V)</td>
<td>–</td>
</tr>
<tr>
<td>174</td>
<td>Get</td>
<td>Frequency setting (minimum setting increments 0.01Hz)</td>
<td>–</td>
</tr>
<tr>
<td>175</td>
<td>Get</td>
<td>Running speed (minimum setting increments 1/min)</td>
<td>–</td>
</tr>
<tr>
<td>176</td>
<td>Get</td>
<td>Motor torque (minimum setting increments 0.1%)</td>
<td>–</td>
</tr>
<tr>
<td>177</td>
<td>Get</td>
<td>Converter voltage (minimum setting increments 0.1V)</td>
<td>–</td>
</tr>
<tr>
<td>178</td>
<td>Get</td>
<td>Brake duty (minimum setting increments 0.1%)</td>
<td>–</td>
</tr>
<tr>
<td>179</td>
<td>Get</td>
<td>Electronic overcurrent protection load factor (minimum setting increments 0.1%)</td>
<td>–</td>
</tr>
<tr>
<td>180</td>
<td>Get</td>
<td>Peak current (minimum setting increments 0.01A)</td>
<td>–</td>
</tr>
<tr>
<td>182</td>
<td>Get</td>
<td>Input power (minimum setting increments 0.01kW)</td>
<td>–</td>
</tr>
<tr>
<td>183</td>
<td>Get</td>
<td>Output power (minimum setting increments 0.01kW)</td>
<td>–</td>
</tr>
<tr>
<td>184</td>
<td>Get</td>
<td>Input terminal status (Note 3)</td>
<td>–</td>
</tr>
<tr>
<td>185</td>
<td>Get</td>
<td>Output terminal status (Note 3)</td>
<td>–</td>
</tr>
<tr>
<td>186</td>
<td>Get</td>
<td>Load meter (minimum setting increments 0.1%)</td>
<td>–</td>
</tr>
<tr>
<td>187</td>
<td>Get</td>
<td>Motor exciting current (minimum setting increments 0.01A)</td>
<td>–</td>
</tr>
<tr>
<td>188</td>
<td>Get</td>
<td>Position pulse (minimum setting increments 1 pulse) (Note 4)</td>
<td>–</td>
</tr>
<tr>
<td>189</td>
<td>Get</td>
<td>Cumulative energization time (minimum setting increments 1 hr)</td>
<td>–</td>
</tr>
<tr>
<td>191</td>
<td>Get</td>
<td>Orientation status (Note 4)</td>
<td>–</td>
</tr>
<tr>
<td>192</td>
<td>Get</td>
<td>Actual operation time (minimum setting increments 1 hr)</td>
<td>–</td>
</tr>
<tr>
<td>193</td>
<td>Get</td>
<td>Motor load factor (minimum setting increments 0.1%)</td>
<td>–</td>
</tr>
<tr>
<td>194</td>
<td>Get</td>
<td>Cumulative power (minimum setting increments 1kwh)</td>
<td>–</td>
</tr>
</tbody>
</table>

Note 1. For the alarm history, refer to the following alarm code-alarm definition correspondence table.

Note 2. Writing any value clears the alarm history.

Note 3. For the terminal monitor bit map, refer to Section 3.7 (2) Monitoring (page 87).

Note 4. Valid only when the FR-A5AP is plugged in.

### Alarm code list

<table>
<thead>
<tr>
<th>Code</th>
<th>Definition</th>
<th>Code</th>
<th>Definition</th>
<th>Code</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x10</td>
<td>OC1</td>
<td>0x70</td>
<td>BE</td>
<td>0xC1</td>
<td>CTE</td>
</tr>
<tr>
<td>0x11</td>
<td>OC2</td>
<td>0x80</td>
<td>GF</td>
<td>0xC2</td>
<td>P24</td>
</tr>
<tr>
<td>0x12</td>
<td>OC3</td>
<td>0x81</td>
<td>LF</td>
<td>0xD5</td>
<td>Mb1</td>
</tr>
<tr>
<td>0x20</td>
<td>OV1</td>
<td>0x85</td>
<td>OHT</td>
<td>0xD6</td>
<td>Mb2</td>
</tr>
<tr>
<td>0x21</td>
<td>OV2</td>
<td>0xA0</td>
<td>OPT</td>
<td>0xD7</td>
<td>Mb3</td>
</tr>
<tr>
<td>0x22</td>
<td>OV3</td>
<td>0xA1</td>
<td>OP1</td>
<td>0xD8</td>
<td>Mb4</td>
</tr>
<tr>
<td>0x30</td>
<td>THT</td>
<td>0xA2</td>
<td>OP2</td>
<td>0xD9</td>
<td>Mb5</td>
</tr>
<tr>
<td>0x31</td>
<td>THM</td>
<td>0xA3</td>
<td>OP3</td>
<td>0xDA</td>
<td>Mb6</td>
</tr>
<tr>
<td>0x40</td>
<td>FIN</td>
<td>0xB0</td>
<td>PE</td>
<td>0xDB</td>
<td>Mb7</td>
</tr>
<tr>
<td>0x50</td>
<td>IPF</td>
<td>0xB1</td>
<td>PUE</td>
<td>0xF6</td>
<td>E6</td>
</tr>
<tr>
<td>0x51</td>
<td>UVT</td>
<td>0xB2</td>
<td>RET</td>
<td>0xF7</td>
<td>E7</td>
</tr>
<tr>
<td>0x60</td>
<td>OLT</td>
<td>0xC0</td>
<td>CPU</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### (2) Class 0x2A Instance 1 services

<table>
<thead>
<tr>
<th>Service Code</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0E</td>
<td>Read the attribute value.</td>
</tr>
<tr>
<td>0x10</td>
<td>Write the attribute value.</td>
</tr>
</tbody>
</table>
### 3.9.8 Class 0x66 A500 expansion object I

#### (1) Class 0x66 Instance 1 attributes

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>A500 Pr. Number</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Get/Set</td>
<td>Pr. 0</td>
<td>Torque boost (manual)</td>
<td>6.0%</td>
</tr>
<tr>
<td>11</td>
<td>Get/Set</td>
<td>Pr. 1</td>
<td>Maximum frequency</td>
<td>120.00Hz</td>
</tr>
<tr>
<td>12</td>
<td>Get/Set</td>
<td>Pr. 2</td>
<td>Minimum frequency</td>
<td>0.00Hz</td>
</tr>
<tr>
<td>13</td>
<td>Get/Set</td>
<td>Pr. 3</td>
<td>Base frequency</td>
<td>60.00Hz</td>
</tr>
<tr>
<td>14</td>
<td>Get/Set</td>
<td>Pr. 4</td>
<td>Multi-speed setting (high speed)</td>
<td>60.00Hz</td>
</tr>
<tr>
<td>15</td>
<td>Get/Set</td>
<td>Pr. 5</td>
<td>Multi-speed setting (middle speed)</td>
<td>30.00Hz</td>
</tr>
<tr>
<td>16</td>
<td>Get/Set</td>
<td>Pr. 6</td>
<td>Multi-speed setting (low speed)</td>
<td>10.00Hz</td>
</tr>
<tr>
<td>17</td>
<td>Get/Set</td>
<td>Pr. 7</td>
<td>Acceleration time</td>
<td>5.0s</td>
</tr>
<tr>
<td>18</td>
<td>Get/Set</td>
<td>Pr. 8</td>
<td>Deceleration time</td>
<td>5.0s</td>
</tr>
<tr>
<td>19</td>
<td>Get/Set</td>
<td>Pr. 9</td>
<td>Electronic thermal O/L relay Rated output current</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Get/Set</td>
<td>Pr. 10</td>
<td>DC injection brake operation frequency</td>
<td>3.00Hz</td>
</tr>
<tr>
<td>21</td>
<td>Get/Set</td>
<td>Pr. 11</td>
<td>DC injection brake operation time</td>
<td>0.5s</td>
</tr>
<tr>
<td>22</td>
<td>Get/Set</td>
<td>Pr. 12</td>
<td>DC injection brake voltage</td>
<td>0</td>
</tr>
<tr>
<td>23</td>
<td>Get/Set</td>
<td>Pr. 13</td>
<td>Starting frequency</td>
<td>0.5Hz</td>
</tr>
<tr>
<td>24</td>
<td>Get/Set</td>
<td>Pr. 14</td>
<td>Load pattern selection</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>Get/Set</td>
<td>Pr. 15</td>
<td>Jog frequency</td>
<td>5.00Hz</td>
</tr>
<tr>
<td>26</td>
<td>Get/Set</td>
<td>Pr. 16</td>
<td>Jog acceleration/deceleration time</td>
<td>0.5s</td>
</tr>
<tr>
<td>27</td>
<td>Get/Set</td>
<td>Pr. 17</td>
<td>MRS input selection</td>
<td>0</td>
</tr>
<tr>
<td>28</td>
<td>Get/Set</td>
<td>Pr. 18</td>
<td>High-speed maximum frequency (Note 1)</td>
<td>120.00Hz</td>
</tr>
<tr>
<td>29</td>
<td>Get/Set</td>
<td>Pr. 19</td>
<td>Base frequency voltage</td>
<td>6553.5V</td>
</tr>
<tr>
<td>30</td>
<td>Get/Set</td>
<td>Pr. 20</td>
<td>Acceleration/deceleration reference frequency</td>
<td>60.00Hz</td>
</tr>
<tr>
<td>31</td>
<td>Get/Set</td>
<td>Pr. 21</td>
<td>Acceleration/deceleration time increments</td>
<td>0</td>
</tr>
<tr>
<td>32</td>
<td>Get/Set</td>
<td>Pr. 22</td>
<td>Stall prevention operation level</td>
<td>150.0%</td>
</tr>
<tr>
<td>33</td>
<td>Get/Set</td>
<td>Pr. 23</td>
<td>Stall prevention operation level at double speed</td>
<td>655.35Hz</td>
</tr>
<tr>
<td>34</td>
<td>Get/Set</td>
<td>Pr. 24</td>
<td>Multi-speed setting (speed 4)</td>
<td>655.35Hz</td>
</tr>
<tr>
<td>35</td>
<td>Get/Set</td>
<td>Pr. 25</td>
<td>Multi-speed setting (speed 5)</td>
<td>655.35Hz</td>
</tr>
<tr>
<td>36</td>
<td>Get/Set</td>
<td>Pr. 26</td>
<td>Multi-speed setting (speed 6)</td>
<td>655.35Hz</td>
</tr>
<tr>
<td>37</td>
<td>Get/Set</td>
<td>Pr. 27</td>
<td>Multi-speed setting (speed 7)</td>
<td>655.35Hz</td>
</tr>
<tr>
<td>38</td>
<td>Get/Set</td>
<td>Pr. 28</td>
<td>Multi-speed input compensation</td>
<td>0</td>
</tr>
<tr>
<td>39</td>
<td>Get/Set</td>
<td>Pr. 29</td>
<td>Acceleration/deceleration pattern</td>
<td>0</td>
</tr>
<tr>
<td>40</td>
<td>Get/Set</td>
<td>Pr. 30</td>
<td>Regenerative function selection</td>
<td>0</td>
</tr>
<tr>
<td>41</td>
<td>Get/Set</td>
<td>Pr. 31</td>
<td>Frequency jump 1A</td>
<td>655.35Hz</td>
</tr>
<tr>
<td>42</td>
<td>Get/Set</td>
<td>Pr. 32</td>
<td>Frequency jump 1B</td>
<td>655.35Hz</td>
</tr>
<tr>
<td>43</td>
<td>Get/Set</td>
<td>Pr. 33</td>
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<td>Subtracted frequency at deceleration start (Note 1)</td>
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<td>Power failure deceleration time switch-over frequency (Note 1)</td>
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**Note 1.** Parameters designed for the FR-A500 only. Not supported by the FR-F500.

**Note 2.** Values 65535, 6553.5 and 655.35 indicate that the functions are invalid and have the same meaning as 9999 displayed on the DU/PU.

**Note 3.** For details, refer to the FR-A500 or FR-F500 instruction manual.

**Note 4.** A change in the No. 31 value changes the setting increments of the inverter but is not reflected on DeviceNet.

### (2) Class 0x66 Instance 1 services

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3.9.9 Class 0x67 A500 expansion object II

(1) Class 0x67 Instance 1 attributes

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<td>Current averaging filter constant</td>
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## Parameters

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<tr>
<td>171</td>
<td>Get/Set</td>
<td>Pr. 224</td>
<td>Program setting 24 direction</td>
<td>0</td>
</tr>
<tr>
<td>172</td>
<td>Get/Set</td>
<td>Pr. 224</td>
<td>Program setting 24 frequency</td>
<td>6553.5Hz</td>
</tr>
<tr>
<td>173</td>
<td>Get/Set</td>
<td>Pr. 225</td>
<td>Program setting 25 time</td>
<td>0.00 time</td>
</tr>
<tr>
<td>174</td>
<td>Get/Set</td>
<td>Pr. 225</td>
<td>Program setting 25 direction</td>
<td>0</td>
</tr>
<tr>
<td>175</td>
<td>Get/Set</td>
<td>Pr. 225</td>
<td>Program setting 25 frequency</td>
<td>6553.5Hz</td>
</tr>
<tr>
<td>176</td>
<td>Get/Set</td>
<td>Pr. 226</td>
<td>Program setting 26 time</td>
<td>0.00 time</td>
</tr>
<tr>
<td>177</td>
<td>Get/Set</td>
<td>Pr. 226</td>
<td>Program setting 26 direction</td>
<td>0</td>
</tr>
</tbody>
</table>
### Parameters

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>A500 Pr. Number</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>178</td>
<td>Get/Set</td>
<td>Pr. 226</td>
<td>Program setting 26 frequency</td>
<td>6553.5Hz</td>
</tr>
<tr>
<td>179</td>
<td>Get/Set</td>
<td>Pr. 227</td>
<td>Program setting 27 time</td>
<td>0.00 time</td>
</tr>
<tr>
<td>180</td>
<td>Get/Set</td>
<td>Pr. 227</td>
<td>Program setting 27 direction</td>
<td>0</td>
</tr>
<tr>
<td>181</td>
<td>Get/Set</td>
<td>Pr. 227</td>
<td>Program setting 27 frequency</td>
<td>6553.5Hz</td>
</tr>
<tr>
<td>182</td>
<td>Get/Set</td>
<td>Pr. 228</td>
<td>Program setting 28 time</td>
<td>0.00 time</td>
</tr>
<tr>
<td>183</td>
<td>Get/Set</td>
<td>Pr. 228</td>
<td>Program setting 28 direction</td>
<td>0</td>
</tr>
<tr>
<td>184</td>
<td>Get/Set</td>
<td>Pr. 228</td>
<td>Program setting 28 frequency</td>
<td>6553.5Hz</td>
</tr>
<tr>
<td>185</td>
<td>Get/Set</td>
<td>Pr. 229</td>
<td>Program setting 29 time</td>
<td>0.00 time</td>
</tr>
<tr>
<td>186</td>
<td>Get/Set</td>
<td>Pr. 229</td>
<td>Program setting 29 direction</td>
<td>0</td>
</tr>
<tr>
<td>187</td>
<td>Get/Set</td>
<td>Pr. 230</td>
<td>Program setting 29 frequency</td>
<td>6553.5Hz</td>
</tr>
<tr>
<td>188</td>
<td>Get/Set</td>
<td>Pr. 230</td>
<td>Program setting 30 time</td>
<td>0.00 time</td>
</tr>
<tr>
<td>189</td>
<td>Get/Set</td>
<td>Pr. 230</td>
<td>Program setting 30 direction</td>
<td>0</td>
</tr>
<tr>
<td>190</td>
<td>Get/Set</td>
<td>Pr. 230</td>
<td>Program setting 30 frequency</td>
<td>6553.5Hz</td>
</tr>
<tr>
<td>191</td>
<td>Get/Set</td>
<td>Pr. 231</td>
<td>Timer setting</td>
<td>0</td>
</tr>
</tbody>
</table>

The relationships between PU reading and DeviceNet reading are as follows:

\[
PU = hh: \text{mm} \Rightarrow \text{DeviceNet} = \text{tt} = 256 \times \text{mm} + hh
\]

Example: 4 hours 45 minutes

\[
\text{DeviceNet} = \text{tt} \Rightarrow PU = \text{mm} = \text{Quotient of (tt/256)}
\]

\[
hh = \text{tt} - 256 \times \text{mm}
\]

Example: 4 hours 45 minutes

\[
PU = 4 : 45, \text{DeviceNet} = \text{tt} = 256 \times 45 + 4 = 11524
\]

\[
\text{DeviceNet} = \text{tt} = 11524, PU = \text{mm} = 11524/256 = 45
\]

\[
hh = 11524 - (256 \times 45) = 4
\]

### Parameters

<table>
<thead>
<tr>
<th>Attribute No.</th>
<th>Access</th>
<th>A500 Pr. Number</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>Get/Set</td>
<td>Pr. 900</td>
<td>FM terminal calibration</td>
<td>1359</td>
</tr>
<tr>
<td>201</td>
<td>Get/Set</td>
<td>Pr. 901</td>
<td>AM terminal calibration</td>
<td>3522</td>
</tr>
<tr>
<td>202</td>
<td>Get/Set</td>
<td>Pr. 902</td>
<td>Frequency setting voltage bias - frequency</td>
<td>0.00Hz</td>
</tr>
<tr>
<td>203</td>
<td>Get/Set</td>
<td>Pr. 902</td>
<td>Frequency setting voltage bias - percentage</td>
<td>0.0%</td>
</tr>
<tr>
<td>204</td>
<td>Get/Set</td>
<td>Pr. 903</td>
<td>Frequency setting voltage gain - frequency</td>
<td>60.00Hz</td>
</tr>
<tr>
<td>205</td>
<td>Get/Set</td>
<td>Pr. 903</td>
<td>Frequency setting voltage gain - percentage</td>
<td>97.0%</td>
</tr>
<tr>
<td>206</td>
<td>Get/Set</td>
<td>Pr. 904</td>
<td>Frequency setting current bias - frequency</td>
<td>0.00Hz</td>
</tr>
<tr>
<td>207</td>
<td>Get/Set</td>
<td>Pr. 904</td>
<td>Frequency setting current bias - percentage</td>
<td>18.8%</td>
</tr>
<tr>
<td>208</td>
<td>Get/Set</td>
<td>Pr. 905</td>
<td>Frequency setting current gain - frequency</td>
<td>60.00Hz</td>
</tr>
<tr>
<td>209</td>
<td>Get/Set</td>
<td>Pr. 905</td>
<td>Frequency setting current gain - percentage</td>
<td>92.7%</td>
</tr>
</tbody>
</table>

Note 1. No. 10 to 25, 67, 68 and 100 to 191 are designed for the FR-A500 only. Not supported by the FR-F500.

Note 2. Values 65535, 6553.5 and 655.35 indicate that the functions are invalid and have the same meaning as 9999 displayed on the DU/PU.

Note 3. For details, refer to the FR-A500 or FR-F500 instruction manual.

(2) **Class 0x67 Instance 1 services**

<table>
<thead>
<tr>
<th>Service Code</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0E</td>
<td>Read the attribute value.</td>
</tr>
<tr>
<td>0x10</td>
<td>Write the attribute value.</td>
</tr>
</tbody>
</table>
3.10 EDS File

(1) **Outline of EDS file**
   When using the configuration software, the EDS file is required to connect the inverter and configurator.
   The EDS file is designed to offer information on the settings (including the parameter object addresses) between configurator and inverter.

(2) **Acquiring method**
   You can get the FR-A500 series EDS file in the following method:
   - Download it from the Internet.
     It can be downloaded free on the Web site of Open DeviceNet Vendor Association:
     http://www.odva.org

(3) **Using method**
   The A500.EDS file is created for the ODVA standard and assumes that the DeviceNet Manager® product of Rockwell Automation is used.
   For the appropriate installation method of the EDS file, refer to the DeviceNet configuration software manual.

   Note 1. DeviceNet Manager® is a registered trademark of Allen-Bradley Company, Inc.
   Note 2. The above EDS file applies to the FR-A500 series only. Consult us separately when using the FR-F500 series.
4 Profibus-DP

4.1 Overview ................................................................. 114
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4.1 Overview

Profibus-DP was released in 1994. PNO (Profibus Netzer Organization) set up offices in 15 countries, and Profibus International for integration of global management was established in 1995 for business operations. As an open field network, Profibus-DP allows a wide variety of devices of third parties to be connected, and is applicable to not only inverters but also various field-level applications.

(1) Features
Connection with the master module (personal computer/PLC) by communication cables allows inverters to be run and monitored and their parameter values to be read/written from a user program.

(2) Types of Profibus-DP-compatible inverters

<table>
<thead>
<tr>
<th>Inverter Series</th>
<th>Method for Compatibility with Profibus-DP</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR-A500</td>
<td>Connect the FR-ASNP plug-in option.</td>
</tr>
<tr>
<td>FR-F500</td>
<td>Connect the FR-ASNP plug-in option.</td>
</tr>
</tbody>
</table>
### 4.2 Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current consumption</td>
<td>Supplied to Profibus network:</td>
</tr>
<tr>
<td></td>
<td>100mA (5VDC)</td>
</tr>
<tr>
<td>Dielectric withstand voltage</td>
<td>Minimum 500VDC</td>
</tr>
<tr>
<td>Communication rate</td>
<td>1200m or less: 9,600bps.</td>
</tr>
<tr>
<td></td>
<td>19,200bps.</td>
</tr>
<tr>
<td></td>
<td>93,750bps.</td>
</tr>
<tr>
<td></td>
<td>600m or less: 187,500bps.</td>
</tr>
<tr>
<td></td>
<td>200m or less: 500,000bps.</td>
</tr>
<tr>
<td></td>
<td>1,500,000bps.</td>
</tr>
<tr>
<td></td>
<td>100m or less: 3,000,000bps.</td>
</tr>
<tr>
<td></td>
<td>6,000,000bps.</td>
</tr>
<tr>
<td></td>
<td>12,000,000bps.</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-10 to 60 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 to 65 °C</td>
</tr>
<tr>
<td>Ambient humidity</td>
<td>90% maximum at 60 °C</td>
</tr>
</tbody>
</table>
(1) Appearance

(2) Part names

<table>
<thead>
<tr>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node address setting switches</td>
<td>Used to set the node address of the inverter within the range 00 to 7EH. Do not set the node address to 7Fh-FFh. If it is set to any of such addresses, the option unit will not operate properly. In addition, do not set the same node address to two or more options. SW1 is used to set the minimum digit. For example, when setting the node address to 7Bh (123 in decimal system), set SW2 to 7 and SW1 to B.</td>
</tr>
<tr>
<td>Status LED</td>
<td>When the status is normal, the green LED is lit.</td>
</tr>
</tbody>
</table>
Installation procedure

1) Remove the front cover of the inverter and insert this option unit into slot 3 of the inverter.
2) Securely insert the option unit connector into the inverter connector. At this time, also align the option fixing hole correctly.
3) Then, securely fix the option unit to the inverter with the mounting screws (2 places). If the mounting holes of the option unit do not match the inverter mounting holes, recheck whether the connector is secured properly.
4) Remove the DATA PORT from the inverter front cover and reinstall the front cover. (To remove the DATA PORT cover, push it from the back of the front cover.)
4.4 Configuration and Wiring Procedure

(1) System configuration example

Master module

INV INV INV
Slave station Slave station Slave station

Connection with Profibus-DP network

(2) Fabrication of cable

1) Plug one end of the cable to the connector linked to the network, and the other end to the DB9 type male connector. Make sure that the cable supports 12.0Mbps communication (specified in the EEIA-RS-485 Standard). For the connection of this cable, refer to the PROFIBUS connector terminal specifications given below.

+5VDC (permissible current 100mA) is supplied from the option unit pin numbers 6 and 5. You can select whether pins 6 and 5 are used or not. Pin number 4 may not be required depending on the master used and this can also be selected. (For more information, refer to the ProfibusDP master manual.)

Profibus connector (DB-9 male) terminal specifications

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>NC</td>
</tr>
<tr>
<td>2.</td>
<td>NC</td>
</tr>
<tr>
<td>3.</td>
<td>RTS FROM OPTION UNIT</td>
</tr>
<tr>
<td>4.</td>
<td>DATA GROUND</td>
</tr>
<tr>
<td>5.</td>
<td>+5 VOLTS DC</td>
</tr>
<tr>
<td>6.</td>
<td>NC</td>
</tr>
<tr>
<td>7.</td>
<td>RXD/TXD – (NEG)</td>
</tr>
<tr>
<td>8.</td>
<td>NC</td>
</tr>
<tr>
<td>9.</td>
<td>NC</td>
</tr>
</tbody>
</table>

Perspective view of PROFIBUS standard junction connector
The DB9 connector pin layout is listed below. This layout is defined in Profibus Standard DIN-19-245, Part 1.

<table>
<thead>
<tr>
<th>DB-9 Pin Number</th>
<th>FR-ASNP Signal Name</th>
<th>Profibus-DP Signal Name</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NC</td>
<td>NC</td>
<td>Not connected</td>
</tr>
<tr>
<td>2</td>
<td>NC</td>
<td>RP</td>
<td>Reserved for module power supply</td>
</tr>
<tr>
<td>3</td>
<td>RxD/TxD+</td>
<td>RxD/TxD+</td>
<td>Transferred data (+)</td>
</tr>
<tr>
<td>4</td>
<td>CNTR+</td>
<td>CNTR+</td>
<td>Control signal (request to send)</td>
</tr>
<tr>
<td>5</td>
<td>Isolated GND</td>
<td>DGND(V-)</td>
<td>Data ground</td>
</tr>
<tr>
<td>6</td>
<td>Isolated +5V output</td>
<td>V+</td>
<td>+5V voltage</td>
</tr>
<tr>
<td>7</td>
<td>NC</td>
<td>NC</td>
<td>Not connected</td>
</tr>
<tr>
<td>8</td>
<td>RxD/TxD-</td>
<td>RxD/TxD-</td>
<td>Transferred data (-)</td>
</tr>
<tr>
<td>9</td>
<td>NC</td>
<td>RP</td>
<td>Reserved for module power supply</td>
</tr>
</tbody>
</table>

NC: No connection

2) When the option unit is used to connect the network, connect the PROFIBUS connector which contains a termination resistor.

Profibus connector (DB-9 male) termination resistor connection specifications (all resistors 0.25W)

![Diagram of DB-9 connector with termination resistors](image)

Appearance of PROFIBUS connector with built-in termination resistor

![Perspective view of PROFIBUS connector with built-in termination resistor](image)
(3) Wiring procedure
1) Power off the inverter and make sure that the working environment is safe.
   After ensuring safety, remove the inverter cover.
2) Set the node address using the two node address setting switches of the option unit. Valid addresses are 00H to 7EH (0 to 126 in decimal system). However, since addresses 00H, 01H, 02H, 7CH, 7DH and 7EH (0, 1, 2, 124, 125, 126 in decimal system) may be used for the master station and repeater depending on the master used, it is recommended to use 03H to 7BH (3 to 123 in decimal system) which may be used for any master. Set the node address to the value at which communication will be established by the Profinet master. Communication will not be established unless the master recognizes the node address assigned to the FR-5ANP. Refer to the master manual for more information on the master.
   Do not set the node address to 7FH-FFH. If it is set to any of such addresses, the option unit will not operate properly. In addition, do not set the same node address to two or more options.
   SW1 is used to set the minimum digit. For example, when setting the node address to 7BH (123 in decimal system), set SW2 to 7 and SW1 to B.
3) When the inverters have been installed properly and the node addresses set correctly, reinstall the inverter covers. Then, insert the DB-9 male connector of the Profinet cable into the DB-9 female connector (Profinet connector) of the option unit to connect the Profinet cable.
4) Power on the inverters after making sure that connection is all completed and the inverters’ external cables and Profinet network cable are run properly.

(4) LED status indications
After connecting the option unit to the active network, check the status of the operating status indicator LED. After power-on or reset, the LED indication is normally either of the following:

<table>
<thead>
<tr>
<th>LED (Green)</th>
<th>System Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light off</td>
<td>The module is not powered on. The module is being subjected to a start test. The module is in the data exchange mode. Alternatively, network connection has timed out.</td>
</tr>
<tr>
<td>Light on</td>
<td>The module is operating properly. The data exchange mode is ready.</td>
</tr>
</tbody>
</table>
4.5 Inverter Setting

(1) **Baud rate setting**
Set the baud rate on the master module. The inverter recognizes the baud rate automatically and starts communication.

(2) **Node address setting**
The node address assigned to the inverter is determined when the inverter is powered on. Do not change the setting while power is on. Refer to Section 4.3 (2) for the way to set the node address.

(3) **Parameters**

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Function</th>
<th>Setting Range</th>
<th>Minimum Setting Increments</th>
<th>Factory Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>338 (Note 1)</td>
<td>Operation command write</td>
<td>0, 1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>339 (Note 1)</td>
<td>Speed command write</td>
<td>0, 1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>340 (Note 1)</td>
<td>Link start mode selection</td>
<td>0, 1, 2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Note 1. Refer to Section 4.6 Operation Modes (page 122) for details of Pr. 338 to 340.
4.6 Operation Modes

(1) Operation modes

1) PU operation : Controls the inverter from the keyboard of the operation panel (FR-DU04) or parameter unit (FR-PU04) installed to the inverter.
2) External operation : Controls the inverter by switching on/off external signals connected to the control circuit terminals of the inverter.
3) Profibus operation : Controls the inverter in accordance with the program via the Profibus-DP unit (FR-A5NP).

(2) Operation mode switching

1) Operation mode switching conditions

Before switching the operation mode, check that:
• The inverter is at a stop;
• Both the STF and STR signals are off; and
• The Pr. 79 “operation mode” setting is correct.

(Use the parameter unit of the inverter for setting.)

<table>
<thead>
<tr>
<th>Pr. 79 Setting</th>
<th>Operation Mode Selection</th>
<th>Switching to Profibus Operation Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>PU or external operation</td>
<td>Disallowed when the PU mode is selected. Allowed when the external mode is selected.</td>
</tr>
<tr>
<td>1</td>
<td>PU operation mode</td>
<td>Disallowed</td>
</tr>
<tr>
<td>2</td>
<td>External operation mode</td>
<td>Allowed</td>
</tr>
<tr>
<td>3, 4</td>
<td>External/PU combined operation mode</td>
<td>Disallowed</td>
</tr>
<tr>
<td>5</td>
<td>Programmed operation</td>
<td>Disallowed</td>
</tr>
<tr>
<td>6</td>
<td>Switch-over</td>
<td>Allowed</td>
</tr>
<tr>
<td>7</td>
<td>External operation (PU operation interlock)</td>
<td>Allowed only in the external operation mode when the PU interlock signal (X12) is on.</td>
</tr>
<tr>
<td>8</td>
<td>PU or external (signal switching)</td>
<td>Allowed only in the external operation mode (X16 on).</td>
</tr>
</tbody>
</table>

2) Operation mode switching method

When "1 or 2" is set in Pr. 340 "link start mode selection", the Profibus operation mode is selected at power-on or inverter reset. Once the network operation mode has started, Profibus communication is made at least once during 5 seconds. If the option unit does not respond to Profibus communication for longer than 5 seconds, an option module alarm stop occurs. In that case, reset the inverter to clear the error.

Note 1. When setting "1 or 2" in Pr. 340, the initial settings (station number setting, etc.) of the inverter must be made without fail.

Note 2. In the switch-over operation mode (Pr. 79 = 6), switching in E and F is also allowed.
3) Link start mode

By setting the Pr. 340 value as appropriate, you can select the operation mode at power on or at restoration from instantaneous power failure.

<table>
<thead>
<tr>
<th>Pr. 340 Setting</th>
<th>Pr. 79</th>
<th>Operation Mode</th>
<th>Mode at Power On or at Restoration from Instantaneous Power Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>PU or external operation</td>
<td>Inverter goes into the external operation mode.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>PU operation</td>
<td>Inverter goes into the PU operation mode.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>External operation</td>
<td>Inverter goes into the external operation mode.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>External/PU combined operation mode</td>
<td>Running frequency is set in the PU operation mode and the start signal is set in the external operation mode.</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>External/PU combined operation mode</td>
<td>Running frequency is set in the external operation mode and the start signal is set in the PU operation mode.</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Programmed operation mode</td>
<td>Inverter is operated by the program.</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Switch-over mode</td>
<td>Operation mode is switched while running.</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>External operation mode</td>
<td>Shift to the PU operation mode is controlled by ON/OFF of the X12 signal.</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>External/PU combined operation mode</td>
<td>Operation mode is switched by ON/OFF of the X16 signal.</td>
</tr>
<tr>
<td>1</td>
<td>Profibus operation</td>
<td>Inverter goes into the Profibus operation mode. (Program need not be used for switching)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Profibus automatic restart after instantaneous power failure</td>
<td>Inverter goes into the Profibus operation mode. When Pr. 57 setting is other than 9999 (automatic restart after instantaneous power failure), automatic restart is made in the status prior to occurrence of an instantaneous power failure to continue Profibus operation, if a communication signal is not given. (Program need not be used for switching)</td>
<td></td>
</tr>
</tbody>
</table>

- The Pr. 340 value may be changed in any operation mode.
- When Pr. 79 "operation mode selection" = 0, 2 or 6, "1 and 2" in Pr. 340 are made valid.
- When starting Profibus operation at power-on, set "1 or 2" in Pr. 340.
### Control place selection

In the Profibus operation mode, commands from the external terminals and sequence program are as listed below:

<table>
<thead>
<tr>
<th>Control place selection</th>
<th>Pr. 338 &quot;operation command write&quot;</th>
<th>Pr. 339 &quot;speed command write&quot;</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pr. 338 &quot;operation command write&quot;</td>
<td>0: Profibus</td>
<td>0: Profibus</td>
<td>Profibus</td>
</tr>
<tr>
<td>Forward rotation command (STF)</td>
<td>Profibus</td>
<td>Profibus</td>
<td>External</td>
</tr>
<tr>
<td>Reverse rotation command (STR)</td>
<td>Profibus</td>
<td>Profibus</td>
<td>External</td>
</tr>
<tr>
<td>Start self-holding selection (STOP)</td>
<td>Profibus</td>
<td>Profibus</td>
<td>External</td>
</tr>
<tr>
<td>Output halt (MRS)</td>
<td>External</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>Reset (RES)</td>
<td>Both</td>
<td>Both</td>
<td>Both</td>
</tr>
<tr>
<td>Profibus operation frequency</td>
<td>Profibus</td>
<td>Profibus</td>
<td>Profibus</td>
</tr>
<tr>
<td>2</td>
<td>---</td>
<td>External</td>
<td>---</td>
</tr>
<tr>
<td>4</td>
<td>---</td>
<td>External</td>
<td>---</td>
</tr>
<tr>
<td>1</td>
<td>Compensation</td>
<td>External</td>
<td>Compensation</td>
</tr>
</tbody>
</table>

#### Fixed functions

*(Functions equivalent to terminals)*

<table>
<thead>
<tr>
<th>Selective functions</th>
<th>Pr. 180 to Pr. 183 settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Low-speed operation command (RL)</td>
</tr>
<tr>
<td>1</td>
<td>Middle-speed operation command (RM)</td>
</tr>
<tr>
<td>2</td>
<td>High-speed operation command (RH)</td>
</tr>
<tr>
<td>4</td>
<td>Second function selection (RT)</td>
</tr>
<tr>
<td>5</td>
<td>Jog operation selection (JOG)</td>
</tr>
<tr>
<td>6</td>
<td>Automatic restart after instantaneous power failure detection (CS)</td>
</tr>
<tr>
<td>7</td>
<td>External thermal relay input (CRH)</td>
</tr>
<tr>
<td>15</td>
<td>15-speed selection (REX)</td>
</tr>
<tr>
<td>22</td>
<td>Orientation command</td>
</tr>
</tbody>
</table>

#### Selective functions

*(Note 1) If the FR-HC connection, inverter operation enable signal (X10) is not assigned when the FR-HC is used (Pr. 30 = 2) or if the PU operation interlock signal (X12) is not assigned when the PU operation interlock function is set (Pr. 79 = 7), this function is also used by the MRS signal and therefore the MRS signal is only valid for the external terminals, independently of the Pr. 338 and Pr. 339 settings.*

#### Selective functions

*(Note 2) The orientation command needs the FR-ASAP and FR-ASAX options.*

### [Explanation of table]

- **External:** Control by signal from external terminal is only valid.
- **Profibus:** Control from program is only valid.
- **Both:** Control from both external terminal and Profibus is valid.
- **---:** Control from both external terminal and Profibus is invalid.
- **Compensation:** Control by signal from external terminal is only valid if Pr. 28 (multi-speed input compensation) setting is 1.

### Note 1

If the FR-HC connection, inverter operation enable signal (X10) is not assigned when the FR-HC is used (Pr. 30 = 2) or if the PU operation interlock signal (X12) is not assigned when the PU operation interlock function is set (Pr. 79 = 7), this function is also used by the MRS signal and therefore the MRS signal is only valid for the external terminals, independently of the Pr. 338 and Pr. 339 settings.

### Note 2

The orientation command needs the FR-ASAP and FR-ASAX options.
4.7 Operational Functions

(1) Operation mode-based functions

<table>
<thead>
<tr>
<th>Control Method</th>
<th>Item</th>
<th>Net mode</th>
<th>External mode</th>
<th>PU mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profibus</td>
<td>Operation command</td>
<td>Allowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td>Output frequency setting</td>
<td>Allowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Parameter write</td>
<td>Allowed (Note 3)</td>
<td>Disallowed (Note 3)</td>
<td>Disallowed (Note 3)</td>
</tr>
<tr>
<td>Control circuit terminal</td>
<td>Operation command</td>
<td>Allowed (Note 1)</td>
<td>Allowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td></td>
<td>Output frequency setting</td>
<td>Allowed (Note 1)</td>
<td>Allowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td>Inverter reset</td>
<td>Allowed (Note 2)</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td></td>
</tr>
</tbody>
</table>

Note 1. As set in Pr. 338 and Pr. 339.
Note 2. The inverter cannot be reset during occurrence of a network error.
Note 3. As set in Pr. 77.
Note 4. The inverter goes into the external operation mode if it is reset from Profibus during net mode operation.

(2) Monitoring

1) Output frequency .............................................. 0.01Hz minimum setting increments
2) Output current .................................................. 0.01A minimum setting increments
3) Output voltage .................................................. 0.1V minimum setting increments
4) Frequency setting ............................................. 0.01Hz minimum setting increments
5) Speed ............................................................. 1r/min minimum setting increments
6) Motor torque .................................................... 0.1% minimum setting increments
7) Converter output voltage .................................... 0.1V minimum setting increments
8) Regenerative brake duty ...................................... 0.1% minimum setting increments
9) Electronic overcurrent protection load factor ........ 0.1% minimum setting increments
10) Output current peak value ................................... 0.01A minimum setting increments
11) Converter output voltage peak value ................... 0.1V minimum setting
12) Input power .................................................... 0.01kW minimum setting increments
13) Output power ................................................... 0.01kW minimum setting increments
14) Input terminal states

15-12 11 10 9 8 7 6 5 4 3 2 1 0
0 CS RES STOP MRS JOG RH RM RL RT AU STR STF

15) Output terminal states

15-6 5 4 3 2 1 0
0 ABC EU OL IPF SU RUN

Note: The bit format data here reflects Pr. 190 to Pr. 195. When the terminal layout is changed, this bit map is also changed.

16) Load meter .................................................... 0.1% minimum setting increments
17) Motor exciting current ....................................... 0.01A minimum setting increments
18) Position pulse
19) Cumulative energization time ............................. 1 hr minimum setting increments
20) Orientation status
21) Actual operation time ........................................ 1 hr minimum setting increments
22) Motor load factor ............................................. 0.1% minimum setting increments
23) Cumulative power ............................................. 1kwh minimum setting increments
24) Alarm definition
25) Inverter status
(3) Operation commands
You can use PNU=00AH in the "SEV_I, Block I" area to give commands to the inverter.

<table>
<thead>
<tr>
<th>15</th>
<th>14</th>
<th>13</th>
<th>12</th>
<th>11</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>MRS</td>
<td>CS(*)</td>
<td>AU(*)</td>
<td>RT(*)</td>
<td>JOG(*)</td>
<td>RL(*)</td>
<td>RM(*)</td>
<td>RH(*)</td>
<td>STR</td>
<td>STF</td>
</tr>
</tbody>
</table>

The input signals marked * can be changed using Pr. 180 to Pr. 186 (input terminal function selection).

(4) Running frequency
The running frequency can be set to a minimum of 0.01Hz within the range 0 to 400Hz.
Use PNU=00DH, 00EH in the "SEV_I, Block I" area.

(5) Parameter write
Functions can be written using Profibus. Note that write during inverter operation will result in a write mode error.

(6) Parameter read
Functions can be read using Profibus.

(7) Operation at alarm occurrence

<table>
<thead>
<tr>
<th>Alarm Location</th>
<th>Description</th>
<th>Profibus mode</th>
<th>External mode</th>
<th>PU mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inverter alarm</td>
<td>Inverter operation</td>
<td>Stop</td>
<td>Stop</td>
<td>Stop</td>
</tr>
<tr>
<td></td>
<td>Data communication</td>
<td>Continued</td>
<td>Continued</td>
<td>Continued</td>
</tr>
<tr>
<td>Profibus alarm</td>
<td>Inverter operation</td>
<td>Stop</td>
<td>Continued</td>
<td>Continued</td>
</tr>
<tr>
<td></td>
<td>Data communication</td>
<td>Continued (*)</td>
<td>Continued (*)</td>
<td>Continued (*)</td>
</tr>
</tbody>
</table>

* Depends on the communication error type.
You can reset the inverter by writing 0000H to PNU=001H in the "SEV_I, Block I" area.
4.8 Profibus Programming

Profibus-DP programs change with the master module used. For programming details, refer to the master module instruction manual.

This option unit operates as the slave of Profibus DP relative to the controller equivalent to Profibus DP master class 1 on the PLC or RS-485 network.

It means that the option unit:
* Receives a recognizable message; and
* Sends a message at the request of the network master.

The option unit also operates as the slave of Profibus DP relative to Profibus DP master class 2 which can read the inverter I/O.

The option unit itself cannot send a message and does not have the bus access right. In addition, the option unit cannot operate simultaneously as the slave of the network master and as the master relative to the inverter (slave).

(1) I/O specifications

To access the inverter operation data, this option unit uses special Profibus profile (data buffer). This profile consists of the following 6 words (12 bytes):

<table>
<thead>
<tr>
<th>Word</th>
<th>Id</th>
<th>Definition</th>
<th>Communication Buffer Memory Map</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PKE</td>
<td>Parameter number (PNU) and task or response Id (AK)</td>
<td>Bit No.: 15 to 12, 11 to 10, 0 to 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AK: Parameter number (PNU)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SPM: Changed bit to process the parameter change report (Normally 0 since it is not supported)</td>
</tr>
<tr>
<td>2</td>
<td>IND</td>
<td>Parameter index (category)</td>
<td>Bit No.: 15 to 8, 7 to 0, 0</td>
</tr>
<tr>
<td>3</td>
<td>PWE1</td>
<td>Set to 0 as it is not used.</td>
<td>Bit No.: 15 to 0, 0</td>
</tr>
<tr>
<td>4</td>
<td>PWE2</td>
<td>Parameter value</td>
<td>Bit No.: 15 to 0, 0</td>
</tr>
<tr>
<td>5</td>
<td>ZSW1</td>
<td>Inverter status word</td>
<td>Bit No.: 15 to 8, 7 to 0, 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Used for only the message given from the slave to the master.</td>
<td>Command count: Parameter value (PWE2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This word cannot be used for the message given from the master to the slave. Set to 0.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>HIW</td>
<td>Set to 0 as it is not used.</td>
<td>Bit No.: 15 to 0, 0</td>
</tr>
</tbody>
</table>

Note: The message from the master to the slave is called a command request.
The message from the slave to the master is called a command response.

Communication between the network master and slaves (option units) is defined by these 6 words through the Profibus DP protocol. Which data word in the inverter was accessed and what access it was are indicated through this definition.
### 1) Word 1 (PKE)

<table>
<thead>
<tr>
<th>Bits</th>
<th>Id</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>PNU</td>
<td>Parameter number (PNU)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PNU and IND (Profibus profile of Word #2) are used together to define which data word was accessed. Section 4.9 (see page 136) lists all accessible parameters.</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Set to 0 as it is not used.</td>
</tr>
<tr>
<td>12-15</td>
<td>AK</td>
<td>Task or response Id value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AK assumes the following value as the task signal (i.e. Cdm_Req) sent from the network master to the slave:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0n = Without task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1n = Parameter value is requested: Read</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2n = Parameter value (Word) is changed: Write</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3n to Fn = Not supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AK assumes the following value as the task signal (i.e. Cdm_Req) sent from the slave to the network master:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0n = Without response</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1n = Parameter value (Word) is transferred</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2n to 6n = Not supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7n = Task is not executed (error number stored in PWE which is Word #2 of Profibus Profile)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8n = Without operation change right</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9n to Fh = Not supported</td>
</tr>
</tbody>
</table>

### 2) Word 2 (IND)

<table>
<thead>
<tr>
<th>Bits</th>
<th>Id</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7</td>
<td>PP</td>
<td>Page index</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Some special parameters require the page index. Set to 0 if it is not needed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If IND = 01, the following cases specify different blocks of sev's in system environment variables:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0n = sev_i, block i</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1n = sev_ii, block ii, alarm history</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2n = sev_iii, block iii</td>
</tr>
<tr>
<td>8-15</td>
<td>IND</td>
<td>Parameter index</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shows the area where the specific parameter number (PNU) is accessed (refer to Section 4.9 on page 136):</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0n = Real-time monitor area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1n = System environment variable area (3 blocks)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2n = Standard parameter area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4n = Pr. 900 % calibration parameter area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6n = Program setting (frequency)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7n = Program setting (direction)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8n = Program setting (time)</td>
</tr>
</tbody>
</table>

### 3) Word 3 (PWE1)

<table>
<thead>
<tr>
<th>Bits</th>
<th>Id</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15</td>
<td>PWE1</td>
<td>Reserved and should be set to 0.</td>
</tr>
</tbody>
</table>
4) Word 4 (PWE2)

<table>
<thead>
<tr>
<th>Bits</th>
<th>Id</th>
<th>Definition</th>
</tr>
</thead>
</table>
| 0-15 | PWE | Parameter value  
The actual data is transferred to the signal.  
If a task could not be executed (AK response Id = 7), PWE indicates the type of the detected error:  
0H = Without error  
1H = Unsupported task  
2H = Invalid index (IND)  
3H = Invalid parameter number (PNU)  
4H = Dual-port read error  
5H = Dual-port write error  
6H = Invalid page  
41H = Mode error  
42H = Instruction code error  
43H = Data area error |

5) Word 5 (ZSW1)

Messages from the slave to the master. Word #5 of Profibus Profile is used to pass the inverter status word.

<table>
<thead>
<tr>
<th>Bits</th>
<th>Id</th>
<th>Definition</th>
</tr>
</thead>
</table>
| 0-7 | ZSW1 | 1 = Running (RUN)  
1 = Forward rotation operation (FWD)  
2 = Reverse rotation operation (REV)  
3 = Up to frequency (SU)  
4 = Overload (OL)  
5 = Instantaneous power failure (IPF)  
6 = Frequency detection (FU)  
7 = Alarm (ABC) |
| 8-14 | Command count | The command count is an optional function defined by the Profibus master and has areas 00H to 7FH.  
The option unit copies the command count from the received command to the same offset in the sent response. The master uses it to synchronize the commands and responses. |
| 15 | Reserved and should be set to 0. |

For messages from the slave to the master, Bits 0-7 are not used and should therefore be set to 0.  
The bit format data here do not reflect Pr. 190-195.

6) Word 6 (HIW)

<table>
<thead>
<tr>
<th>Bits</th>
<th>Id</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15</td>
<td>HIW</td>
<td>Reserved and should be set to 0.</td>
</tr>
</tbody>
</table>
(2) Data examples

<table>
<thead>
<tr>
<th></th>
<th>Item</th>
<th>Data Example</th>
<th>Refer To Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Operation mode setting</td>
<td>Set to the Profibus operation mode.</td>
<td>130</td>
</tr>
<tr>
<td>2</td>
<td>Operation command setting, inverter status reading</td>
<td>Command the forward rotation and mid-speed signals and read the inverter status.</td>
<td>131</td>
</tr>
<tr>
<td>3</td>
<td>Monitor function setting</td>
<td>Monitor the output frequency.</td>
<td>132</td>
</tr>
<tr>
<td>4</td>
<td>Parameter reading</td>
<td>Read Pr. 7 “acceleration time”.</td>
<td>133</td>
</tr>
<tr>
<td>5</td>
<td>Parameter writing</td>
<td>Set &quot;3.0 seconds&quot; in Pr. 7 “acceleration time”.</td>
<td>133</td>
</tr>
<tr>
<td>6</td>
<td>Running frequency setting</td>
<td>Set to 50.00Hz.</td>
<td>134</td>
</tr>
<tr>
<td>7</td>
<td>Alarm definition reading</td>
<td>Read the inverter alarm.</td>
<td>134</td>
</tr>
<tr>
<td>8</td>
<td>Inverter resetting</td>
<td>Reset the inverter.</td>
<td>135</td>
</tr>
</tbody>
</table>

1) Operation mode setting
Change the operation mode to the Profibus operation mode. Specifically, write 0014H to the operation mode parameter (PNU=00Bh) of the "SEV._I" area (IND=0100H).

<Write data example>

<table>
<thead>
<tr>
<th>Word</th>
<th>Description</th>
<th>Data Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word 1</td>
<td>AK = 2 (Parameter write)</td>
<td>200Bh</td>
</tr>
<tr>
<td></td>
<td>SPM = 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PNU = 00Bh (Operation mode parameter number)</td>
<td></td>
</tr>
<tr>
<td>Word 2</td>
<td>IND = 01H (System environment variable area)</td>
<td>0100h</td>
</tr>
<tr>
<td></td>
<td>PP = 00H (SEV._I, block 1)</td>
<td></td>
</tr>
<tr>
<td>Word 3</td>
<td>Unused</td>
<td>0000h</td>
</tr>
<tr>
<td>Word 4</td>
<td>PW2 = 0014H (NET mode)</td>
<td>0014h</td>
</tr>
<tr>
<td>Word 5</td>
<td>Command count = 00H</td>
<td>0000h</td>
</tr>
<tr>
<td></td>
<td>ZSW1 = 00H (00H because it is not used for write)</td>
<td></td>
</tr>
<tr>
<td>Word 6</td>
<td>Unused</td>
<td>0000h</td>
</tr>
</tbody>
</table>
2) Operation command setting, inverter status reading

Command the forward rotation and mid-speed signals, then read the inverter status.

Set the inverter's control input using the inverter control input parameter (PNU=00AH) of the “SEV_I” area (IND=0100H).

<Write data example>

<table>
<thead>
<tr>
<th>Data Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word 1</td>
<td>200A H</td>
</tr>
<tr>
<td></td>
<td>AK = 2 (Parameter write)</td>
</tr>
<tr>
<td></td>
<td>SPM = 0</td>
</tr>
<tr>
<td></td>
<td>PNU = 00AH</td>
</tr>
<tr>
<td>Word 2</td>
<td>0100 H</td>
</tr>
<tr>
<td></td>
<td>IND = 01H (System environment variable area)</td>
</tr>
<tr>
<td></td>
<td>PP = 00H (SEV_I, block I)</td>
</tr>
<tr>
<td>Word 3</td>
<td>0000 H</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>Word 4</td>
<td>0012 H</td>
</tr>
<tr>
<td></td>
<td>b15 b14 b13 b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0</td>
</tr>
<tr>
<td></td>
<td>0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0</td>
</tr>
<tr>
<td></td>
<td>MRS CS AU RT JOG RL RM RH STR STF</td>
</tr>
<tr>
<td>Word 5</td>
<td>0000 H</td>
</tr>
<tr>
<td></td>
<td>Command count = 00H</td>
</tr>
<tr>
<td></td>
<td>ZSW1 = 00H (00H because it is not used for write)</td>
</tr>
<tr>
<td>Word 6</td>
<td>0000 H</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
</tbody>
</table>

<Read data example>

<table>
<thead>
<tr>
<th>Data Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word 1</td>
<td>100A H</td>
</tr>
<tr>
<td></td>
<td>AK = 1 (Parameter value is transferred) 7 or 8 when error occurs.</td>
</tr>
<tr>
<td></td>
<td>SPM = 0</td>
</tr>
<tr>
<td></td>
<td>PNU = 00AH</td>
</tr>
<tr>
<td>Word 2</td>
<td>0100 H</td>
</tr>
<tr>
<td></td>
<td>IND = 01H (System environment variable area)</td>
</tr>
<tr>
<td></td>
<td>PP = 00H (SEV_I, block I)</td>
</tr>
<tr>
<td>Word 3</td>
<td>0000 H</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>Word 4</td>
<td>0000 H</td>
</tr>
<tr>
<td></td>
<td>0 because of no error</td>
</tr>
<tr>
<td></td>
<td>When error occurs, communication error code enters.</td>
</tr>
<tr>
<td>Word 5</td>
<td>004B H</td>
</tr>
<tr>
<td></td>
<td>Command count = 00H (Command count is the same data 00H because of the response data to the above write data)</td>
</tr>
<tr>
<td></td>
<td>ZSW1 = 4B H</td>
</tr>
<tr>
<td></td>
<td>b7 b6 b5 b4 b3 b2 b1 b0</td>
</tr>
<tr>
<td></td>
<td>0 1 0 0 1 0 1 1</td>
</tr>
<tr>
<td></td>
<td>ABC FU IPF OL SU RL RM RUN</td>
</tr>
<tr>
<td>Word 6</td>
<td>0000 H</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
</tbody>
</table>
3) Monitor function setting

Monitor the output frequency. For monitoring, use the output frequency parameter (PNU=000H) of the “real-time monitor” area (IND=0000H).

<Write data example>

<table>
<thead>
<tr>
<th>Data Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word 1</td>
<td>1000H</td>
</tr>
<tr>
<td></td>
<td>AK = 1 (Parameter read)</td>
</tr>
<tr>
<td></td>
<td>SPM = 0</td>
</tr>
<tr>
<td></td>
<td>PNU = 000H (Output frequency)</td>
</tr>
<tr>
<td>Word 2</td>
<td>0000H</td>
</tr>
<tr>
<td></td>
<td>IND = 00H (Real-time monitor area)</td>
</tr>
<tr>
<td></td>
<td>PP = 00H</td>
</tr>
<tr>
<td>Word 3</td>
<td>0000H</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>Word 4</td>
<td>0000H</td>
</tr>
<tr>
<td></td>
<td>PWE2 = 0000H (Unused)</td>
</tr>
<tr>
<td>Word 5</td>
<td>0100H</td>
</tr>
<tr>
<td></td>
<td>Command count = 01H</td>
</tr>
<tr>
<td></td>
<td>ZSW1 = 00H (Unused)</td>
</tr>
<tr>
<td>Word 6</td>
<td>0000H</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
</tbody>
</table>

<Read data example>

<table>
<thead>
<tr>
<th>Data Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word 1</td>
<td>1000H</td>
</tr>
<tr>
<td></td>
<td>AK = 1 (Parameter value is transferred)</td>
</tr>
<tr>
<td></td>
<td>SPM = 0</td>
</tr>
<tr>
<td></td>
<td>PNU = 000H (Output frequency)</td>
</tr>
<tr>
<td>Word 2</td>
<td>0000H</td>
</tr>
<tr>
<td></td>
<td>IND = 00H (Real-time monitor area)</td>
</tr>
<tr>
<td></td>
<td>PP = 00H</td>
</tr>
<tr>
<td>Word 3</td>
<td>0000H</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>Word 4</td>
<td>0BB8H</td>
</tr>
<tr>
<td></td>
<td>PWE2 = 0BB8H → 3000 (Represents 30.00Hz because of 0.01Hz increments)</td>
</tr>
<tr>
<td>Word 5</td>
<td>014Bh</td>
</tr>
<tr>
<td></td>
<td>Command count = 01H</td>
</tr>
<tr>
<td></td>
<td>ZSW1 = 4BH</td>
</tr>
<tr>
<td></td>
<td>b7 b6 b5 b4 b3 b2 b1 b0</td>
</tr>
<tr>
<td></td>
<td>0 1 0 0 1 0 1 1</td>
</tr>
<tr>
<td></td>
<td>ABC FU IPF OL SU RUN</td>
</tr>
<tr>
<td>Word 6</td>
<td>0000H</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
</tbody>
</table>
4) Parameter reading

Read Pr. 7 "acceleration time". For parameter reading, use the acceleration time parameter (PNU=007H) of the "standard parameter" area (IND=200H).

**<Write data example>**

<table>
<thead>
<tr>
<th>Word</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1007H</td>
</tr>
<tr>
<td></td>
<td>AK = 1 (Parameter read)</td>
</tr>
<tr>
<td></td>
<td>SPM = 0</td>
</tr>
<tr>
<td></td>
<td>PNU = 007H (Acceleration time)</td>
</tr>
<tr>
<td>2</td>
<td>0200H</td>
</tr>
<tr>
<td></td>
<td>IND = 02h (Standard parameter area)</td>
</tr>
<tr>
<td></td>
<td>PP = 00h</td>
</tr>
<tr>
<td>3</td>
<td>0000H</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>4</td>
<td>0000H</td>
</tr>
<tr>
<td></td>
<td>PWE2 = 0000H (Unused)</td>
</tr>
<tr>
<td>5</td>
<td>0200H</td>
</tr>
<tr>
<td></td>
<td>Command count = 02h</td>
</tr>
<tr>
<td></td>
<td>ZSW1 = 00H (Unused)</td>
</tr>
<tr>
<td>6</td>
<td>0000H</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
</tbody>
</table>

**<Read data example>**

<table>
<thead>
<tr>
<th>Word</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1007H</td>
</tr>
<tr>
<td></td>
<td>AK = 1 (Parameter value is transferred)</td>
</tr>
<tr>
<td></td>
<td>SPM = 0</td>
</tr>
<tr>
<td></td>
<td>PNU = 007H (Acceleration time)</td>
</tr>
<tr>
<td>2</td>
<td>0200H</td>
</tr>
<tr>
<td></td>
<td>IND = 02h (Standard parameter area)</td>
</tr>
<tr>
<td></td>
<td>PP = 00h</td>
</tr>
<tr>
<td>3</td>
<td>0000H</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>4</td>
<td>0032H</td>
</tr>
<tr>
<td></td>
<td>PWE2 = 0032H (Represents 5.0 seconds because of 0.1 second increments)</td>
</tr>
<tr>
<td>5</td>
<td>0200H</td>
</tr>
<tr>
<td></td>
<td>Command count = 02h</td>
</tr>
<tr>
<td></td>
<td>ZSW1 = 00H</td>
</tr>
<tr>
<td></td>
<td>b7 b6 b5 b4 b3 b2 b1 b0</td>
</tr>
<tr>
<td></td>
<td>0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td></td>
<td>ABC FU IPF OL SU Reverse Forward RUN</td>
</tr>
<tr>
<td>6</td>
<td>0000H</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
</tbody>
</table>

5) Parameter writing

Set "3.0 seconds" in Pr. 7 "acceleration time". For parameter writing, write 001EH to the acceleration time parameter (PNU=007H) of the "standard parameter" area (IND=200H).

**<Write data example>**

<table>
<thead>
<tr>
<th>Word</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2007H</td>
</tr>
<tr>
<td></td>
<td>AK = 2 (Parameter write)</td>
</tr>
<tr>
<td></td>
<td>SPM = 0</td>
</tr>
<tr>
<td></td>
<td>PNU = 007H</td>
</tr>
<tr>
<td>2</td>
<td>0200H</td>
</tr>
<tr>
<td></td>
<td>IND = 02h (Standard parameter area)</td>
</tr>
<tr>
<td></td>
<td>PP = 00h</td>
</tr>
<tr>
<td>3</td>
<td>0000H</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>4</td>
<td>001EH</td>
</tr>
<tr>
<td></td>
<td>PWE2 = 001EH (Represents 3.0 seconds because of 0.1 second increments)</td>
</tr>
<tr>
<td>5</td>
<td>0000H</td>
</tr>
<tr>
<td></td>
<td>Command count = 00h</td>
</tr>
<tr>
<td></td>
<td>ZSW1 = 00H (Unused)</td>
</tr>
<tr>
<td>6</td>
<td>0000H</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
</tbody>
</table>
6) Running frequency setting
Set the running frequency to “50.00Hz”. To change the running frequency (RAM), write 1388H to the frequency setting (RAM) parameter (PNU=00DH) of the “SEV_I” area (IND=0100H).

<Write data example>

<table>
<thead>
<tr>
<th>Word</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>200D H  AK = 2 (Parameter write)</td>
</tr>
<tr>
<td>2</td>
<td>0100H  IND = 01h (System environment variable area)</td>
</tr>
<tr>
<td>3</td>
<td>0000H  Unused</td>
</tr>
<tr>
<td>4</td>
<td>1388H  PWE2 = 1388H → 5000 (Represents 50.00Hz because of 0.01Hz increments)</td>
</tr>
<tr>
<td>5</td>
<td>0000H  Command count = 00h</td>
</tr>
<tr>
<td>6</td>
<td>0000H  Unused</td>
</tr>
</tbody>
</table>

7) Alarm definition reading
Read the inverter alarm. For alarm history reading, use the alarm 1 (PNU=000H) of the “SEV_II” area (IND=0101H).

<Write data example>

<table>
<thead>
<tr>
<th>Word</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1000H  AK = 1 (Parameter read)</td>
</tr>
<tr>
<td>2</td>
<td>0101H  IND = 01h (System environment variable area)</td>
</tr>
<tr>
<td>3</td>
<td>0000H  Unused</td>
</tr>
<tr>
<td>4</td>
<td>0000H  PWE2 = 0000H (Unused)</td>
</tr>
<tr>
<td>5</td>
<td>0500H  Command count = 05h</td>
</tr>
<tr>
<td>6</td>
<td>0000H  Unused</td>
</tr>
</tbody>
</table>

<Read data example>

<table>
<thead>
<tr>
<th>Word</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1000H  AK = 1 (Parameter value is transferred)</td>
</tr>
<tr>
<td>2</td>
<td>0101H  IND = 01h (System environment variable area)</td>
</tr>
<tr>
<td>3</td>
<td>0000H  Unused</td>
</tr>
<tr>
<td>4</td>
<td>00A3H  PWE2 = 00A3h → E.OP3 (from alarm code)</td>
</tr>
<tr>
<td>5</td>
<td>0500H  Command count = 05h</td>
</tr>
<tr>
<td>6</td>
<td>0000H  Unused</td>
</tr>
</tbody>
</table>

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8) Inverter resetting

Reset the inverter. For inverter resetting, write 0 to the inverter reset (PNU=001H) of the “SEV_I” area (IND=0100H).

<table>
<thead>
<tr>
<th>Data Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word 1 2001H</td>
<td>AK = 2 (Parameter write)</td>
</tr>
<tr>
<td></td>
<td>SPM = 0</td>
</tr>
<tr>
<td></td>
<td>PNU = 001H (Inverter reset)</td>
</tr>
<tr>
<td>Word 2 0100H</td>
<td>IND = 01H (System environment variable area)</td>
</tr>
<tr>
<td></td>
<td>PP = 00H (SEV_I, block I)</td>
</tr>
<tr>
<td>Word 3 0000H</td>
<td>Unused</td>
</tr>
<tr>
<td>Word 4 0000H</td>
<td>PWE2 = 0000H</td>
</tr>
<tr>
<td>Word 5 0000H</td>
<td>Command count = 00H</td>
</tr>
<tr>
<td></td>
<td>ZSW1 = 00H (Unused)</td>
</tr>
<tr>
<td>Word 6 0000H</td>
<td>Unused</td>
</tr>
</tbody>
</table>
4.9 Parameter Definitions

4.9.1 IND=0000H Real-time monitor area

<table>
<thead>
<tr>
<th>PNU (Decimal)</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Output frequency (minimum setting increments 0.01Hz)</td>
</tr>
<tr>
<td>1</td>
<td>Output current (minimum setting increments 0.01A)</td>
</tr>
<tr>
<td>2</td>
<td>Output voltage (minimum setting increments 0.1V)</td>
</tr>
<tr>
<td>4</td>
<td>Frequency setting (minimum setting increments 0.01Hz)</td>
</tr>
<tr>
<td>5</td>
<td>Speed (minimum setting increments 1 r/min)</td>
</tr>
<tr>
<td>6</td>
<td>Motor torque (minimum setting increments 0.1%)</td>
</tr>
<tr>
<td>7</td>
<td>Converter output voltage (minimum setting increments 0.1V)</td>
</tr>
<tr>
<td>8</td>
<td>Regenerative brake duty (minimum setting increments 0.1%)</td>
</tr>
<tr>
<td>9</td>
<td>Electronic overcurrent protection load factor (minimum setting increments 0.1%)</td>
</tr>
<tr>
<td>10</td>
<td>Peak current peak value (minimum setting increments 0.01A)</td>
</tr>
<tr>
<td>11</td>
<td>Converter output voltage peak value (minimum setting increments 0.1V)</td>
</tr>
<tr>
<td>12</td>
<td>Input power (minimum setting increments 0.01kW)</td>
</tr>
<tr>
<td>13</td>
<td>Output power (minimum setting increments 0.01kW)</td>
</tr>
<tr>
<td>14</td>
<td>Input terminal status</td>
</tr>
<tr>
<td>15</td>
<td>Output terminal status</td>
</tr>
<tr>
<td>16</td>
<td>Load meter (minimum setting increments 0.1%)</td>
</tr>
<tr>
<td>17</td>
<td>Motor exciting current (minimum setting increments 0.01A)</td>
</tr>
<tr>
<td>18</td>
<td>Position pulse</td>
</tr>
<tr>
<td>19</td>
<td>Cumulative energization time (minimum setting increments 1 hr)</td>
</tr>
<tr>
<td>21</td>
<td>Orientation status (Note 1)</td>
</tr>
<tr>
<td>22</td>
<td>Actual operation time (minimum setting increments 1 hr)</td>
</tr>
<tr>
<td>23</td>
<td>Motor load factor (minimum setting increments 0.1%)</td>
</tr>
<tr>
<td>24</td>
<td>Cumulative power (minimum setting increments 1 kWh)</td>
</tr>
</tbody>
</table>

Note 1: When using FR-ASAP option.

Input terminal status monitor (PNU=14) bit map

<table>
<thead>
<tr>
<th>15-12</th>
<th>11</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CS</td>
<td>RES</td>
<td>STOP</td>
<td>MRS</td>
<td>JOG</td>
<td>RH</td>
<td>RM</td>
<td>RL</td>
<td>RT</td>
<td>AU</td>
<td>STR</td>
<td>STF</td>
</tr>
</tbody>
</table>

Output terminal status monitor (PNU=15) bit map

<table>
<thead>
<tr>
<th>15-6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>ABC</td>
<td>FU</td>
<td>OL</td>
<td>IPF</td>
<td>SU</td>
<td>RUN</td>
</tr>
</tbody>
</table>

Note: The bit format data here reflects Pr. 190 to Pr. 195. Changing the terminal assignment also changes this bit map.
# 4.9.2 IND=01ppH System environment variable area

(1) IND=0100 n, pp=00, SEV _, Block I

<table>
<thead>
<tr>
<th>PNU (Decimal)</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>User clear value setting</td>
</tr>
<tr>
<td>1</td>
<td>WO: Inverter reset  Write value = 0000H</td>
</tr>
<tr>
<td>2</td>
<td>WO: Parameter clear  Write value = 965AH</td>
</tr>
<tr>
<td>3</td>
<td>WO: All parameter clear  Write value = 99Ah</td>
</tr>
<tr>
<td>4</td>
<td>WO: Parameter user clear  Write value = 5A55H</td>
</tr>
<tr>
<td>5</td>
<td>WO: Parameter clear (ExComPr)  Write value = 5A96H</td>
</tr>
<tr>
<td>6</td>
<td>WO: All parameter clear (ExComPr)  Write value = AA99H</td>
</tr>
<tr>
<td>7</td>
<td>WO: Parameter user clear (ExComPr)  Write value = 55A5H</td>
</tr>
</tbody>
</table>

Inverter status/control input command  Write value = XXXXH

Inverter status word: See below.

Bit 0: 1 = RUN
Bit 1: 1 = FWD
Bit 2: 1 = REV
Bit 3: 1 = SU
Bit 4: 1 = OL
Bit 5: 1 = IPF
Bit 6: 1 = FU
Bit 7: 1 = ABC
Bit 8-15: 0 to 7FH = command count

Control input command word: See below.

Bit 0: Reserved and should be set to 0.
Bit 1: 1 = STF
Bit 2: 1 = STR
Bit 3: 1 = RH(Note 1)
Bit 4: 1 = RM(Note 1)
Bit 5: 1 = RL(Note 1)
Bit 6: 1 = JOG(Note 1)
Bit 7: 1 = RT(Note 1)
Bit 8: 1 = AU(Note 1)
Bit 9: 1 = CS(Note 1)
Bit 10: 1 = MRS
Bit 11-15: Not used and always set to 0.

Operation mode  Write value = 1XH

10h: External mode
11h: PU operation mode
14h: Profibus communication operation mode

Frequency setting (RAM) (Note 2)  Write value = 1XH

Note 1: Bits 3, 4, 5, 6, 7, 8 and 9 correspond to Pr. 182, 181, 180, 185, 183, 184 and 186, respectively.

Note 2: The data written to PNU13 or PNU14 can be read from PNU13.

WO : Write only, read disabled
(2) IND=0101H, pp=01, SEV_II, Block II, alarm history

<table>
<thead>
<tr>
<th>PNU (Decimal)</th>
<th>Definition</th>
</tr>
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Note 1. Writing a value 0000H to this parameter resets the alarm history buffer of all alarms. The other parameters are for read only.

Alarm code list

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4.9.3 IND=0200H Standard parameter area

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<th>Setting Range</th>
<th>Hexadecimal</th>
<th>Minimum Setting</th>
<th>Increments</th>
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<td>113</td>
<td>Third V/F (base frequency)</td>
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<td>Third stall prevention operation current</td>
<td>0-200</td>
<td>0-700</td>
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<td>PID differential time</td>
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<td>Commercial power supply-inverter switch-over sequence output terminal selection</td>
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<td>0-2</td>
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<td>Start waiting time</td>
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<td>PNU (Decimal)</td>
<td>Definition</td>
<td>Setting Range</td>
<td>Hexadecimal</td>
<td>Minimum Setting Increments</td>
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<td>First cushion voltage for restart</td>
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<td>232</td>
<td>Multi-speed setting (speed 8)</td>
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<td>Multi-speed setting (speed 9)</td>
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<td>Multi-speed setting (speed 10)</td>
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<td>Multi-speed setting (speed 11)</td>
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</table>
### PNU (Decimal) Definition | Setting Range | Hexadecimal | Minimum Setting | Increments |
--- | --- | --- | --- | --- |
250 | Stop selection | 0-100 | 0-3E8 | 0.1s | 
261 | Power failure stop function | 0-1 | 0-1 | 1 |
262 | Subtracting frequency at deceleration start | 0-20 | 0-7D0 | 0.01Hz | 
263 | Subtraction starting frequency | 0-120 | 0-2EE0 | 0.01Hz | 
264 | Power-failure deceleration time 1 | 0-3600 | 0-8CA0 | 0.1s | 
265 | Power-failure deceleration time 2 | 0-3600 | 0-8CA0 | 0.1s | 
266 | Power-failure deceleration time switch-over frequency | 0-400 | 0-9C40 | 0.01Hz | 
270 | Stop-on-contact/load torque high-speed frequency control selection | 0-3 | 0-3 | 1 |
271 | High-speed setting maximum current | 0-200 | 0-7D0 | 0.1% | 
272 | Mid-speed setting minimum current | 0-200 | 0-7D0 | 0.1% | 
273 | Current averaging range | 0-400 | 0-9C40 | 0.01Hz | 
274 | Current averaging filter constant | 1-6000 | 1-FA0 | 1 | 
275 | Stop-on-contact exciting current low-speed multiplying factor | 0-1000 | 0-3E8 | 1% | 
276 | Stop-on-contact PWM carrier frequency | 0-15 | 0-F | 1 | 
278 | Brake opening frequency | 0-30 | 0-BB8 | 0.01Hz | 
279 | Brake opening current | 0-200 | 0-7D0 | 0.1% | 
280 | Brake opening current detection time | 0-2 | 0-14 | 0.1s | 
281 | Brake operation time at start | 0-5 | 0-32 | 0.1s | 
282 | Brake operation frequency | 0-30 | 0-BB8 | 0.01Hz | 
283 | Brake operation time at stop | 0-5 | 0-32 | 0.1s | 
284 | Deceleration detection function selection | 0-1 | 0-1 | 1 | 
285 | Overspeed detection frequency | 0-30 | 0-BB8 | 0.01Hz | 
286 | Drop gain | 0-100 | 0-2710 | 0.01% | 
287 | Drop filter time constant | 0-1 | 0-64 | 0.01s | 
294 | Pr. 339 Operation command write | 0-1 | 0-1 | 1 | 
295 | Pr. 340 Link start mode selection | 0-2 | 0-1 | 1 | 
296 | Pr. 342 EEPROM write setting by link operation | 0-1 | 0-1 | 1 | 
323 | Pr. 367 Speed feedback region | 0-400 | 0-9C40 | 0.01Hz | 
324 | Pr. 368 Feedback gain | 0-100 | 0-64 | 1 | 

#### Note 1.
Values 65535, 6553.5 and 655.35 simply indicate that the functions are invalid and have the same meaning as 9999 indicated on the PU and in the instruction manual.

#### Note 2.
For details, refer to the FR-A500 instruction manual.

### 4.9.4 IND=0300H, Pr. 900 frequency calibration area

| PNU (Decimal) | Definition | Setting Range | Hexadecimal | Minimum Setting Increments |
--- | --- | --- | --- | --- |
327 | Pr. 900 FM terminal calibration | | | |
328 | Pr. 901 AM terminal calibration | | | |
329 | Pr. 902 Frequency setting voltage bias (frequency) | 0-60 | 0-1770 | 0.01Hz |
330 | Pr. 903 Frequency setting voltage gain (frequency) | 1-400 | 64-9C40 | 0.01Hz |
331 | Pr. 904 Frequency setting current bias (frequency) | 0-60 | 0-1770 | 0.01Hz |
332 | Pr. 905 Frequency setting current gain (frequency) | 1-400 | 64-9C40 | 0.01Hz |
4.9.5 IND=0400H, Pr. 900 % calibration area

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<td>Pr. 902 Frequency setting voltage bias (percent)</td>
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<tr>
<td>3</td>
<td>Pr. 903 Frequency setting voltage gain (percent)</td>
</tr>
<tr>
<td>4</td>
<td>Pr. 904 Frequency setting current bias (percent)</td>
</tr>
<tr>
<td>5</td>
<td>Pr. 905 Frequency setting current gain (percent)</td>
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4.9.6 IND=0800H Programmed operation time setting area

<table>
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<th>Setting Range</th>
<th>Hexadecimal</th>
<th>Minimum Setting Increments</th>
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<td>0-9959</td>
<td>0-26E7</td>
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<td>0-9959</td>
<td>0-26E7</td>
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<td>0-26E7</td>
<td>1</td>
</tr>
<tr>
<td>211</td>
<td>Pr. 211 Program time setting 11</td>
<td>0-9959</td>
<td>0-26E7</td>
<td>1</td>
</tr>
<tr>
<td>212</td>
<td>Pr. 212 Program time setting 12</td>
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</tr>
<tr>
<td>213</td>
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<td>214</td>
<td>Pr. 214 Program time setting 14</td>
<td>0-9959</td>
<td>0-26E7</td>
<td>1</td>
</tr>
<tr>
<td>215</td>
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<td>0-9959</td>
<td>0-26E7</td>
<td>1</td>
</tr>
<tr>
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<td>0-9959</td>
<td>0-26E7</td>
<td>1</td>
</tr>
<tr>
<td>217</td>
<td>Pr. 217 Program time setting 17</td>
<td>0-9959</td>
<td>0-26E7</td>
<td>1</td>
</tr>
<tr>
<td>218</td>
<td>Pr. 218 Program time setting 18</td>
<td>0-9959</td>
<td>0-26E7</td>
<td>1</td>
</tr>
<tr>
<td>219</td>
<td>Pr. 219 Program time setting 19</td>
<td>0-9959</td>
<td>0-26E7</td>
<td>1</td>
</tr>
<tr>
<td>220</td>
<td>Pr. 220 Program time setting 20</td>
<td>0-9959</td>
<td>0-26E7</td>
<td>1</td>
</tr>
<tr>
<td>221</td>
<td>Pr. 221 Program time setting 21</td>
<td>0-9959</td>
<td>0-26E7</td>
<td>1</td>
</tr>
<tr>
<td>222</td>
<td>Pr. 222 Program time setting 22</td>
<td>0-9959</td>
<td>0-26E7</td>
<td>1</td>
</tr>
<tr>
<td>223</td>
<td>Pr. 223 Program time setting 23</td>
<td>0-9959</td>
<td>0-26E7</td>
<td>1</td>
</tr>
<tr>
<td>224</td>
<td>Pr. 224 Program time setting 24</td>
<td>0-9959</td>
<td>0-26E7</td>
<td>1</td>
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<tr>
<td>225</td>
<td>Pr. 225 Program time setting 25</td>
<td>0-9959</td>
<td>0-26E7</td>
<td>1</td>
</tr>
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<td>226</td>
<td>Pr. 226 Program time setting 26</td>
<td>0-9959</td>
<td>0-26E7</td>
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<tr>
<td>227</td>
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<td>0-9959</td>
<td>0-26E7</td>
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</tr>
<tr>
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<td>Pr. 228 Program time setting 28</td>
<td>0-9959</td>
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<td>1</td>
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<tr>
<td>229</td>
<td>Pr. 229 Program time setting 29</td>
<td>0-9959</td>
<td>0-26E7</td>
<td>1</td>
</tr>
<tr>
<td>230</td>
<td>Pr. 230 Program time setting 30</td>
<td>0-9959</td>
<td>0-26E7</td>
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</tr>
<tr>
<td>231</td>
<td>Pr. 231 Timer setting</td>
<td>0-9959</td>
<td>0-26E7</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: Use minutes:seconds (or hours:minutes) to set the time. To set 2 minutes 30 seconds, for example, set 0230 (decimal) = E6H.
### Profibus-DP

**4.9.7 IND=0700H Programmed operation rotation direction setting area**

<table>
<thead>
<tr>
<th>PNU (Decimal)</th>
<th>Definition</th>
<th>Setting Range</th>
<th>Hexadecimal</th>
<th>Minimum Setting Increments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Pr. 201 Program rotation direction setting 1</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Pr. 202 Program rotation direction setting 2</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
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<tr>
<td>2</td>
<td>Pr. 203 Program rotation direction setting 3</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Pr. 204 Program rotation direction setting 4</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Pr. 205 Program rotation direction setting 5</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Pr. 206 Program rotation direction setting 6</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Pr. 207 Program rotation direction setting 7</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Pr. 208 Program rotation direction setting 8</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Pr. 209 Program rotation direction setting 9</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Pr. 210 Program rotation direction setting 10</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Pr. 211 Program rotation direction setting 11</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Pr. 212 Program rotation direction setting 12</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Pr. 213 Program rotation direction setting 13</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Pr. 214 Program rotation direction setting 14</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Pr. 215 Program rotation direction setting 15</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>Pr. 216 Program rotation direction setting 16</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>Pr. 217 Program rotation direction setting 17</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>Pr. 218 Program rotation direction setting 18</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>Pr. 219 Program rotation direction setting 19</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>Pr. 220 Program rotation direction setting 20</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>Pr. 221 Program rotation direction setting 21</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>Pr. 222 Program rotation direction setting 22</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>Pr. 223 Program rotation direction setting 23</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>23</td>
<td>Pr. 224 Program rotation direction setting 24</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>24</td>
<td>Pr. 225 Program rotation direction setting 25</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>25</td>
<td>Pr. 226 Program rotation direction setting 26</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>26</td>
<td>Pr. 227 Program rotation direction setting 27</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>27</td>
<td>Pr. 228 Program rotation direction setting 28</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>28</td>
<td>Pr. 229 Program rotation direction setting 29</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
<tr>
<td>29</td>
<td>Pr. 230 Program rotation direction setting 30</td>
<td>0-2</td>
<td>0-2</td>
<td>1</td>
</tr>
</tbody>
</table>

**Note:** The setting of 0 indicates a stop, 1 forward rotation, and 2 reverse rotation.
### 4.9.8 IND=0600H Programmed operation frequency setting area

<table>
<thead>
<tr>
<th>PNU (Decimal)</th>
<th>Definition</th>
<th>Setting Range</th>
<th>Hexadecimal</th>
<th>Minimum Setting Increments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Pr. 201 Program frequency setting 1</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>1</td>
<td>Pr. 202 Program frequency setting 2</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>2</td>
<td>Pr. 203 Program frequency setting 3</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>3</td>
<td>Pr. 204 Program frequency setting 4</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>4</td>
<td>Pr. 205 Program frequency setting 5</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>5</td>
<td>Pr. 206 Program frequency setting 6</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>6</td>
<td>Pr. 207 Program frequency setting 7</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>7</td>
<td>Pr. 208 Program frequency setting 8</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>8</td>
<td>Pr. 209 Program frequency setting 9</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>9</td>
<td>Pr. 210 Program frequency setting 10</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>10</td>
<td>Pr. 211 Program frequency setting 11</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>11</td>
<td>Pr. 212 Program frequency setting 12</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>12</td>
<td>Pr. 213 Program frequency setting 13</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>13</td>
<td>Pr. 214 Program frequency setting 14</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>14</td>
<td>Pr. 215 Program frequency setting 15</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>15</td>
<td>Pr. 216 Program frequency setting 16</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>16</td>
<td>Pr. 217 Program frequency setting 17</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>17</td>
<td>Pr. 218 Program frequency setting 18</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>18</td>
<td>Pr. 219 Program frequency setting 19</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>19</td>
<td>Pr. 220 Program frequency setting 20</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>20</td>
<td>Pr. 221 Program frequency setting 21</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>21</td>
<td>Pr. 222 Program frequency setting 22</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>22</td>
<td>Pr. 223 Program frequency setting 23</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>23</td>
<td>Pr. 224 Program frequency setting 24</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>24</td>
<td>Pr. 225 Program frequency setting 25</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>25</td>
<td>Pr. 226 Program frequency setting 26</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>26</td>
<td>Pr. 227 Program frequency setting 27</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>27</td>
<td>Pr. 228 Program frequency setting 28</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>28</td>
<td>Pr. 229 Program frequency setting 29</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
<tr>
<td>29</td>
<td>Pr. 230 Program frequency setting 30</td>
<td>0-400, 9999</td>
<td>0-FA0, FFFF</td>
<td>0.1Hz</td>
</tr>
</tbody>
</table>
4.10 Profibus Device Data (GSD File)

The configuration software of the network master uses the device data file to recognize the features and functions of the Profibus DP device. This file is an ASCII file and is available from the Internet (http://www.profibus.com) or Mitsubishi (name: MEAU0865.GSD) or can be created directly. Note that Remarks are not included in the ASCII file itself.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vendor_Name</td>
<td>&quot;Mitsubishi Electric Automation, Inc.&quot;</td>
<td>(Note 1)</td>
</tr>
<tr>
<td>Model_Name</td>
<td>&quot;FR-A5NP&quot;</td>
<td></td>
</tr>
<tr>
<td>Ident_Number</td>
<td>0865</td>
<td>2149 (decimal system)</td>
</tr>
<tr>
<td>Revision</td>
<td>&quot;Revision #.#&quot;</td>
<td></td>
</tr>
<tr>
<td>Protocol_Ident</td>
<td>0</td>
<td>Profibus DP</td>
</tr>
<tr>
<td>Station_Type</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>FMS_Supp</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Hardware_Release</td>
<td>&quot;Series **&quot;</td>
<td></td>
</tr>
<tr>
<td>Software_Release</td>
<td>&quot;Revision #.#&quot;</td>
<td></td>
</tr>
<tr>
<td>9.6_supp</td>
<td>1</td>
<td>9600bps support</td>
</tr>
<tr>
<td>19.2_supp</td>
<td>1</td>
<td>19.2Kbps support</td>
</tr>
<tr>
<td>93.75_supp</td>
<td>1</td>
<td>93.75Kbps support</td>
</tr>
<tr>
<td>187.5_supp</td>
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<td>187.5Kbps support</td>
</tr>
<tr>
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<td>500Kbps support</td>
</tr>
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<td>1.5Mbps support</td>
</tr>
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<td>3.0Mbps support</td>
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</tr>
<tr>
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<td>12.0Mbps support</td>
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<td>60bit times</td>
</tr>
<tr>
<td>MaxTadr_19.2</td>
<td>60</td>
<td>60bit times</td>
</tr>
<tr>
<td>MaxTadr_93.75</td>
<td>60</td>
<td>60bit times</td>
</tr>
<tr>
<td>MaxTadr_187.5</td>
<td>60</td>
<td>60bit times</td>
</tr>
<tr>
<td>MaxTadr_500</td>
<td>100</td>
<td>100bit times</td>
</tr>
<tr>
<td>MaxTadr_1.5M</td>
<td>150</td>
<td>150bit times</td>
</tr>
<tr>
<td>MaxTadr_3.0M</td>
<td>300</td>
<td>300bit times</td>
</tr>
<tr>
<td>MaxTadr_6.0M</td>
<td>450</td>
<td>450bit times</td>
</tr>
<tr>
<td>MaxTadr_12.0M</td>
<td>800</td>
<td>800bit times</td>
</tr>
<tr>
<td>Redundancy</td>
<td>0</td>
<td>Without remainder</td>
</tr>
<tr>
<td>Repcater Ctrl Sig</td>
<td>2</td>
<td>Ctrl-P is TTL-level.</td>
</tr>
<tr>
<td>24V_Pins</td>
<td>0</td>
<td>Net24VDC cannot be connected.</td>
</tr>
<tr>
<td>Freeze_Mode_supp</td>
<td>1</td>
<td>Freeze support</td>
</tr>
<tr>
<td>Sync_Mode_supp</td>
<td>1</td>
<td>Sync mode support</td>
</tr>
<tr>
<td>Auto_Baud_supp</td>
<td>1</td>
<td>Auto Baud detection support</td>
</tr>
<tr>
<td>Set_Slave_Add_supp</td>
<td>0</td>
<td>Slave Address setting not made</td>
</tr>
<tr>
<td>User_Prm_Data_Len</td>
<td>0</td>
<td>Without user parameter data</td>
</tr>
<tr>
<td>Min_Slave_Interval</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Modular_Station</td>
<td>1</td>
<td>Without module unit (Note 2)</td>
</tr>
<tr>
<td>Max_Module</td>
<td>1</td>
<td>1D Byte</td>
</tr>
<tr>
<td>Max_Input_Len</td>
<td>12</td>
<td>12 input bytes</td>
</tr>
<tr>
<td>Max_Output_Len</td>
<td>12</td>
<td>12 output bytes</td>
</tr>
<tr>
<td>Max_Data_Len</td>
<td>24</td>
<td>12+12 = 24</td>
</tr>
<tr>
<td>Module</td>
<td>&quot;6 Word Input/6 Word Output&quot; 75+</td>
<td>Code = 117 = 75+ for 6W I/O’s (Note 3)</td>
</tr>
</tbody>
</table>

Note 1. In some master devices, the Vendor_Name is up to 10 characters. In this case, use "Mitsubishi".

Note 2. In some PLCs, Modular_Station=1&/Min_Slave_Interval=20

Note 3. Since I/O’s=6W, the 75+117 code is automatically created by COMET200.
APPENDICES

5.1 Data Code Lists.................................................................147
### 5.1 Data Code Lists

The following data code lists are used to read and write the parameter values in the RS-485 operation mode or CC-Link operation mode.

#### 5.1.1 FR-A500 series

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<tr>
<th>Function</th>
<th>Parameter Number</th>
<th>Name</th>
<th>Data Codes</th>
<th>Link parameter extension setting (Data code 7F/FF)</th>
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**Note:** The table lists various functions with corresponding parameter numbers, names, and data codes. The read and write values are also provided along with the link parameter extension setting data codes for some functions.
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### 5.1.2 FR-F500 series

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Note: The table above provides a detailed list of data codes for the FR-F500 series control functions, including parameters for basic, standard, and second functions, as well as output terminal, display, and automatic start/stop functions.
### APPENDICES

#### Data Codes

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