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YASKAWA

Modbus Communication Manual
G7 Drive

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Drive Model: CIMR-G7U*

Document Number: TM.G7.11

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Warnings and Cautions

This section provides Warnings and Cautions pertinent to this product that if not heeded, may result in personal injury, fatality, or equipment damage. Yaskawa is not responsible for consequences of ignoring these instructions.

⚠ WARNING

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

⚠ WARNING

- Read and understand this manual before installing, operating, or servicing this G7 drive. All warnings, cautions, and instructions must be followed. All activity must be performed by qualified personnel. The G7 drive must be installed according to this manual and local code.
- Do not connect or disconnect wiring while the power is on. Do not remove covers or touch circuit boards while the power is on. Do not remove or insert the digital operator while power is on.
- Before servicing, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. Status indicator LEDs and Digital Operator display will be extinguished when the DC bus voltage is below 50 VDC. To prevent electric shock, wait at least 5 minutes after all indicators are OFF and measure DC bus voltage and verify that it is at a safe level.
- Do not perform a withstand voltage test on any part of the unit. This equipment uses sensitive devices and may be damaged by high voltage.
- The G7 drive is not suitable for circuits capable of delivering more than the specified RMS symmetrical amperes. Install adequate branch short circuit protection per applicable codes. Refer to the specification. Failure to do so may result in equipment damage and/or personal injury.
- Do not connect unapproved LC or RC interference suppression filters, capacitors, or over voltage protection devices to the output of the G7 drive. Capacitors may generate peak currents that exceed G7 drive specifications.
- To avoid unnecessary fault displays, caused by contactors or output switches placed between G7 drive and motor, auxiliary contacts must be properly integrated into the control logic circuit.
- YASKAWA is not responsible for any modification of the product made by the user; doing so will void the warranty. This product must not be modified.
- Verify that the rated voltage of the G7 drive matches the voltage of the incoming power supply before applying power.
- To meet CE directives, proper line filters and proper installation are required.
- Some drawings in this manual may be shown with protective covers or shields removed, to describe details. These must be replaced before operation.
- Observe Electrostatic Discharge Procedures when handling the G7 drive and G7 drive components to prevent ESD damage.
- The attached equipment may start unexpectedly upon application of power to the G7 drive. Clear all personnel from the G7 drive, motor, and machine area prior to applying power. Secure covers, couplings, shaft keys, machine beds and all safety equipment before energizing the G7 drive.
- Do not attempt to disassemble this unit. There are no user serviceable parts. Disassembling this unit will void any and all warranties.

Introduction

This manual is intended as an overview of parameter access for the Yaskawa model G7 drive and describes how to connect the G7 drive to RS-232, RS-422 or RS-485. Refer to the ***G7 Drive Technical Manual (TM.G7.01)*** for detailed parameter information.

This document pertains to the G7 drive. In this document, the word “inverter”, “ac drive” and “drive” may be used interchangeably.

For details on installation and operation of the G7 drive, refer to the ***G7 Drive Technical Manual (TM.G7.01)***. All manuals and support files are available on the CD that came with the G7 drive and are also available for download at **www.yaskawa.com**.

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Chapter 1 - Connections

This chapter describes how to connect the G7 drive to a RS-232, RS-422 or RS-485 network.

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Connection Check Sheet

The following is a quick reference guide to connect and configure the G7 drive for serial communications. Make a copy of this page and check-off each item as it is completed. For detailed information please refer to the detailed sections that follow.

☐ **1:** Unpack the G7 drive and verify that all components are present and undamaged.

☐ **2:** Connect power to the G7 drive and verify that the G7 drive functions correctly. This includes running the G7 drive from the operator keypad. Refer to the G7 Technical Manual for information on connecting and operating the G7 drive.

☐ **3:** Remove power from the G7 drive and wait for the charge lamp to be completely extinguished. Wait at least five additional minutes for the G7 drive to be completely discharged. Measure the DC bus voltage and verify that it is at a safe level.

☐ **4:** Connect the G7 drive to an RS-232 network. *Note: It is not possible to use the drive's keypad and an RS-232 connection at the same time.*

- ☐ **4.1:** Remove the G7 drive's operator keypad.
- ☐ **4.2:** Connect the RJ-45 port on the front of the G7 drive to the controller serial port. Refer to *Figure 1.1 - G7 Diagram* for the location of drive connectors. Use a DB9 to RJ-45 adapter with a standard Ethernet CAT-5 patch cable or use Yaskawa cable UWR00468-2. **Do NOT connect this cable to an Ethernet port** on the controller, as damage to the controller and/or G7 drive may result. Refer to *Figure 1.2 – RS-232 Connections* for a description of the interface cable.
- ☐ **4.3:** Verify that the controller communications parameters match the G7 drive's communications parameters. Refer to *Table 1.1 – RS-232 (RJ-45 port) Communications Parameters* for a list of default G7 drive communications parameters.
- ☐ **4.4:** Reapply power to the G7 drive.

☐ **5:** Connect the G7 drive to an RS-422/RS-485 network.

- ☐ **5.1:** Remove the G7 drive's terminal cover.
- ☐ **5.2:** Connect the controller to the S+/S- and R+/R- terminals on the G7 drive's terminal block as shown in *Figure 1.3 – RS-422/RS-485 Connections.*
- ☐ **5.3:** If this device is either the first or last device on the network, set the network termination, S1, to the ON position.
- ☐ **5.4:** Reapply power to the G7 drive.
- ☐ **5.5:** Set the G7 drive communication parameters to match those of the controller. Refer to *Table 1.2 –Baud Rate, Table 1.3 – Parity* and *Table 1.4 - RTS.*
- ☐ **5.6:** Set the node address of the G7 drive.

☐ **6:** Verify that the G7 drive and controller are communicating and that the exchanged data is valid.

Verify Operation

Connect power to the G7 drive and verify that the G7 drive functions properly. This includes running the G7 drive from the operator keypad. Refer to the ***G7 drive Technical Manual*** for information on connecting and operating the G7 drive.

Remove power from the G7 drive and wait for the charge lamp to be completely extinguished. Wait at least five additional minutes for the G7 drive to be completely discharged. Measure the DC bus voltage and verify that it is at a safe level.

Remove the operator keypad and terminal cover.

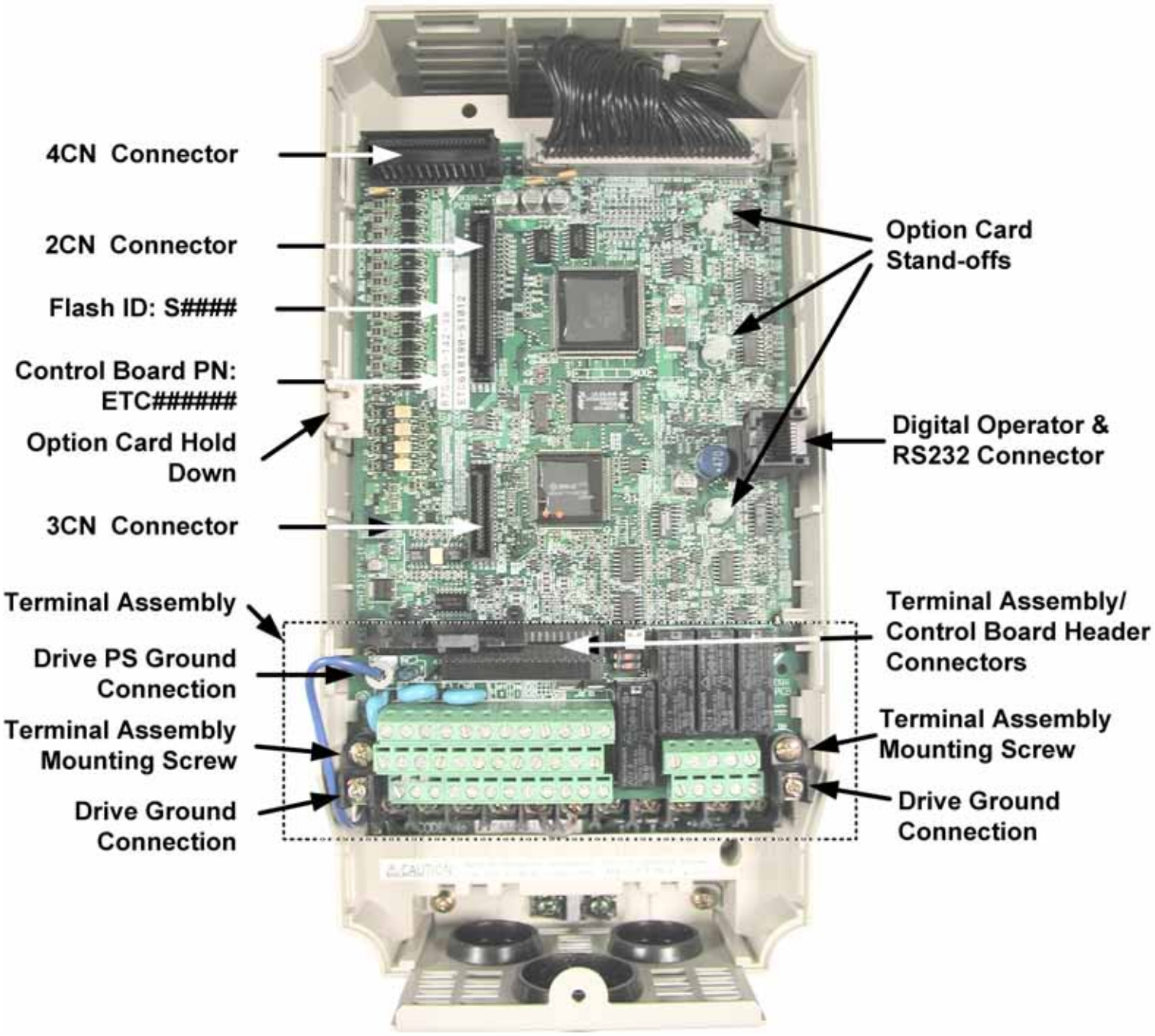


Figure 1.1 G7 Connection Diagram

G7 Drive Connections

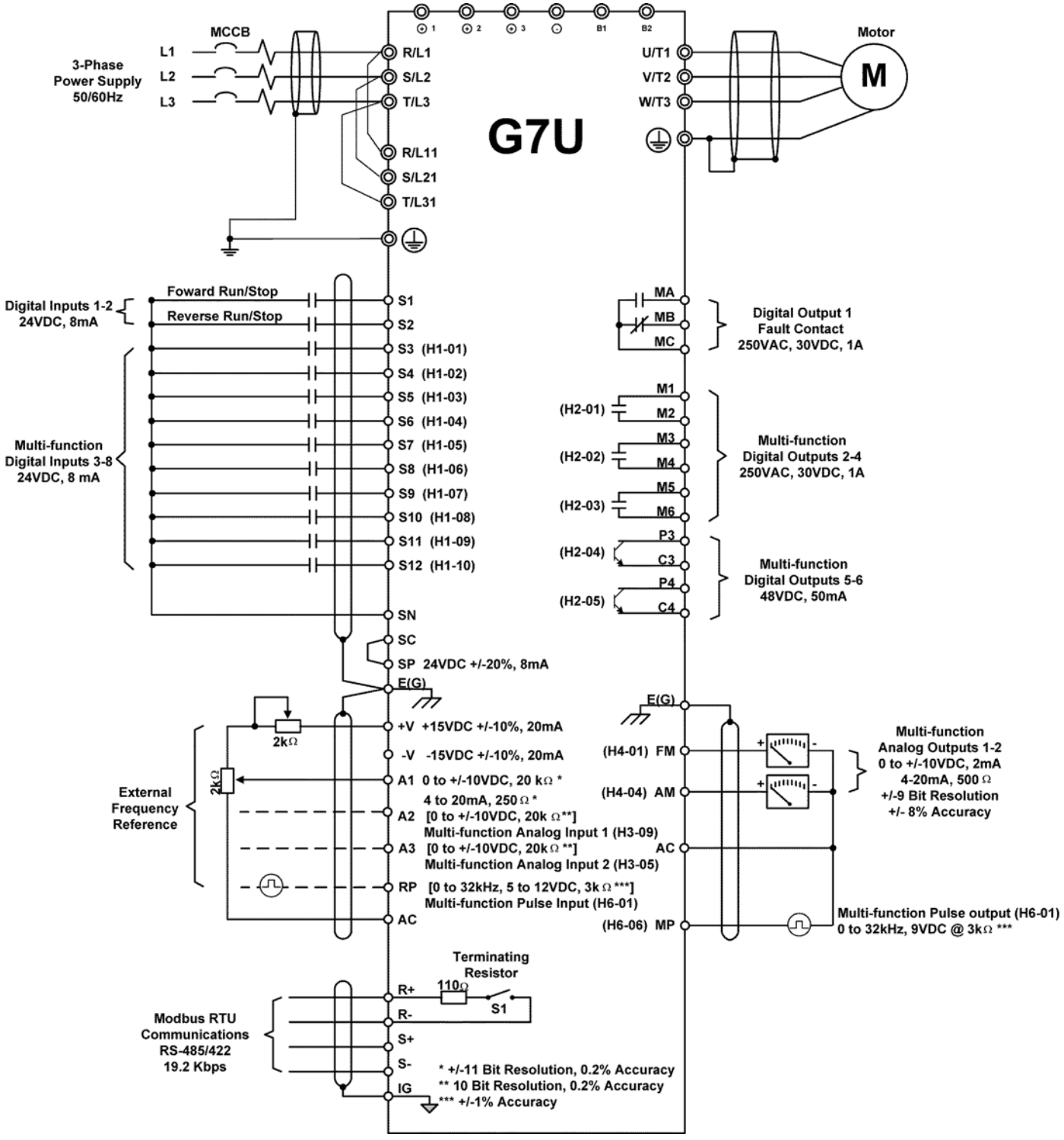


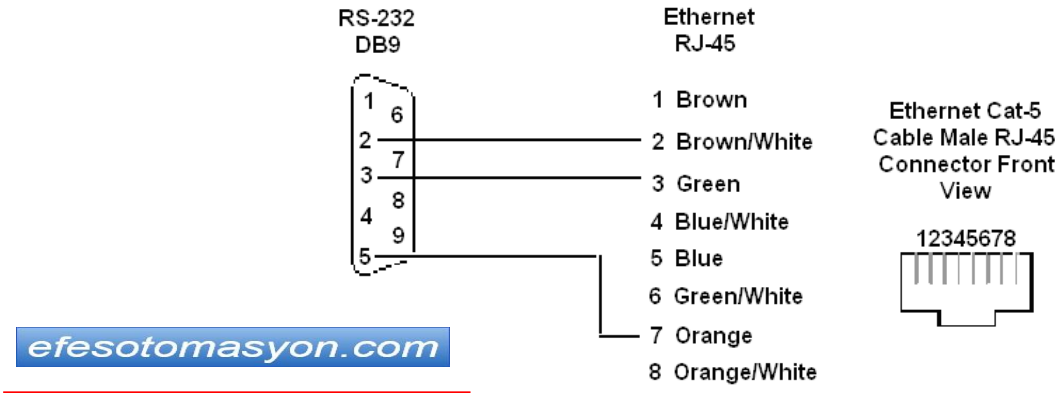
Figure 1.2 G7 Drive Connections

Network Connections

The following describes how to connect the G7 drive to an RS-232, RS-422 or RS-485 network. For detailed information please refer to the appropriate sections of this manual or the ***G7 drive Technical Manual.***

► RS-232 Network

The RS-232 network is a single ended network with limited data transmission rates and cable lengths. The G7 drive RS-232 data transmission is fixed at 9600bps, no parity, 8 data bits and 1 stop bit. The maximum cable length is 50 ft (16 m). It is recommended that Yaskawa cable UWR00468-2 be used. *Note: It is not possible to use the drive's keypad and an RS-232 connection at the same time.*



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Figure 1.3 RS-232 Network Connection

► RS-422/RS-485 4-Wire Network

RS-422/RS-485 4-wire networks allow for longer cable lengths, maximum 4000 ft (1200 m), and are more immune to noise than RS-232 networks because of their balanced line drivers. RS-422/RS-485 4-wire communication does not require RTS (request to send) control. See parameter H5-07. Set the Termination Resistor S1 switch to ON (slide the switch to the right) for each RS-422 device and the last RS-485 device on the network.

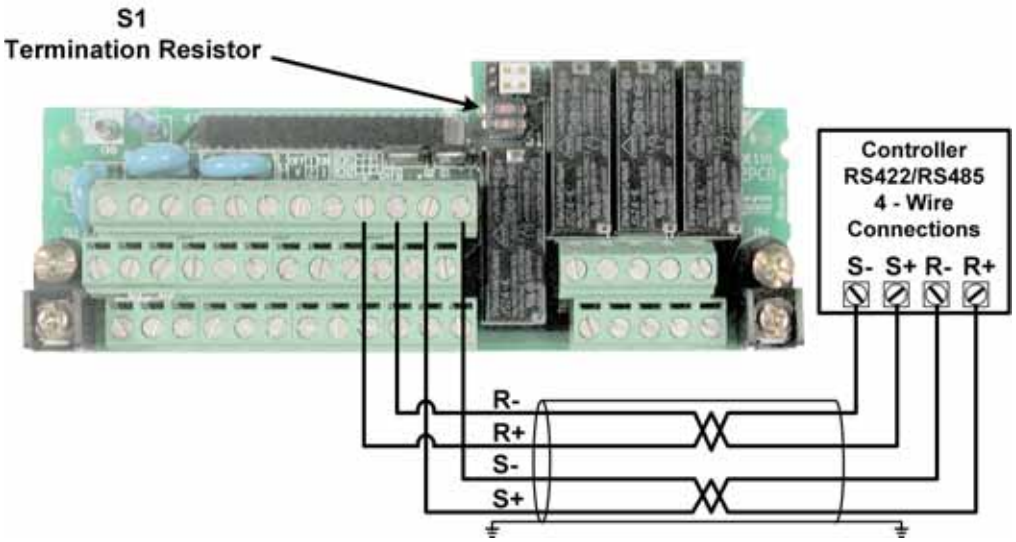


Figure 1.4 RS-422/RS-485 4-Wire Network Connection

► RS-485 2-Wire Network

RS-485 2-wire networks can be either single or multi-drop networks, with each slave device on the network assigned a unique node address. A maximum of 31 devices may reside on any network segment before a repeater is required. The maximum segment length is 4000 ft (1200 m). Set the Termination Resistor S1 switch to ON (slide the switch to the right) on the last device on the network. RS-485 2-wire communication requires RTS (request to send) control. See parameter H5-07.

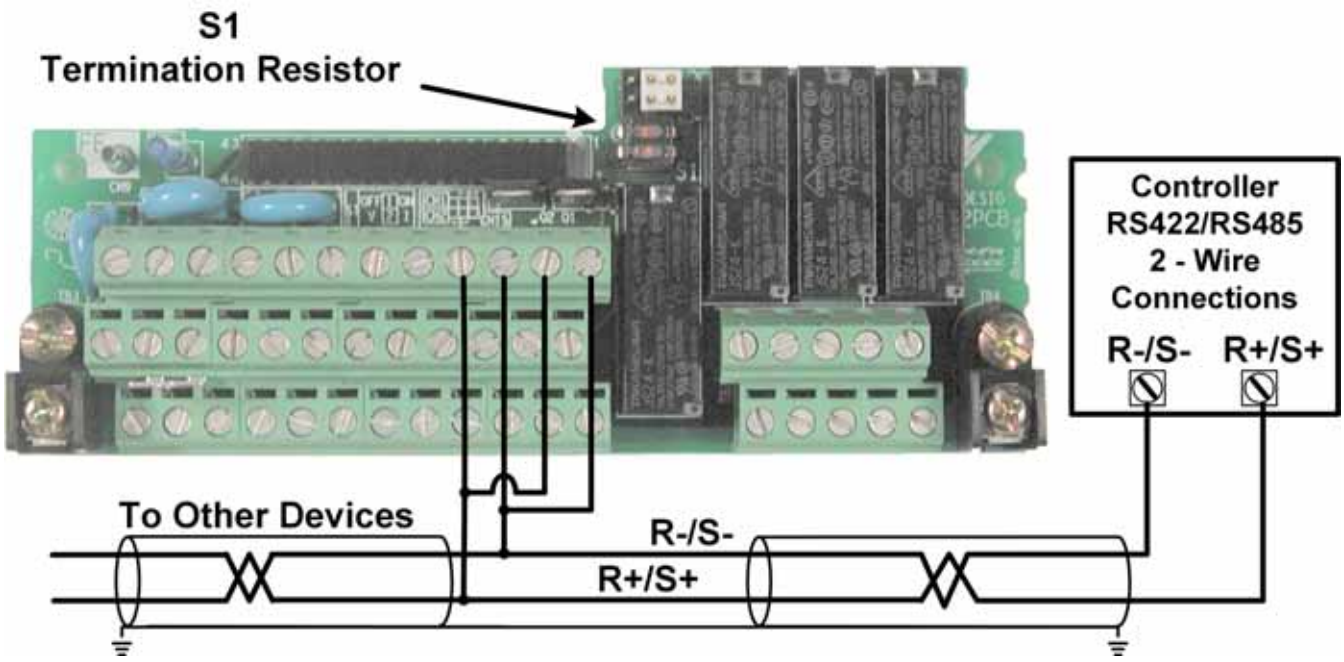


Figure 1.5 RS-485 2-Wire Network Connection

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Communication Parameters

The following communications parameters affect communication over RS-232, RS-422 and RS-485 networks. The RS-232 communication parameters are fixed. In addition, the node address is ignored when communicating via RS-232.

H5 group communication parameters can only be changed via the drive keypad.

Note: Drive power must be cycled for changes to H5 Group parameters to be recognized.

► RS-232 Communication

The RS-232 communications parameters are fixed at the values shown below. Although the node address is ignored, the master when communicating to the G7 drive in this method typically uses a node address of 1.

Table 1.1 RS-232 (RJ-45 port) Communication Parameters

Value	Description
Baud rate	9600
Parity	None
Stop Bits	1
Node Address	N/A

► RS-422/RS-485 Communication

- **Node Address – H5-01**. The node address is set through G7 drive parameter H5-01. When communicating via RS-422 or RS-485, a unique node address between 0 and 20h (32 decimal), inclusive, must be entered. The default G7 drive address is 1Fh (31 decimal). The address is always entered as a hexadecimal number (refer to the conversion chart in Chapter 4). Address 0 is typically reserved for global messages.
- **Baud Rate – H5-02**. Select the baud rate that matches the controller's communication configuration.

Table 1.2 Baud Rate – Parameter H5-02

Value	Description
0	1200bps
1	2400bps
2	4800bps
3	9600bps (Default Setting)
4	19,200bps

- **Parity – H5-03**. Select the parity that matches the controller's communication configuration.

Table 1.3 Parity – Parameter H5-03

Value	Description
0	None (Default Setting)
1	Even
2	Odd

- **Communication Fault (CE) Response Selection – H5-04**. Select the drive operation method when a communication fault (CE) occurs. See parameter H5-05 also.

Table 1.4 Communication Fault Response Selection – Parameter H5-04	
Value	Description
0	Ramp to Stop (Fault)
1	Coast to Stop (Fault)
2	Fast Stop (Fault)
3	Alarm Only (Alarm) (Default Setting)
4	Run at D1-04 frequency

- **Communication Fault (CE) Detection Selection – H5-05**. Selects whether the communication fault (CE) is monitored. Please note that either B1-01 or B1-02 must also be set to a 2 (Serial Communication) for fault monitoring to occur. If the CE fault is enabled, the G7 will flash **CALL** on the keypad after power up until a message is received. The drive will trip and respond according to H5-04 if communication is lost (a message is not received) for more than 2 seconds after successful communication has been initiated.

Table 1.5 Communication Fault Detection Selection – Parameter H5-05	
Value	Description
0	Disabled (Default Setting)
1	Enabled

- **Serial Communication Send Delay – H5-06**. A delay can be inserted before the G7 drive responds to a command message. This allows for slower communication devices to switch their transceiver state in order to get ready to receive a message. A value of 5 ~ 65 ms can be inserted, with 5 ms being the default.

- **RTS Control – H5-07**. This parameter determines whether RTS is continually asserted (disabled) or asserted only during send (enabled). RTS must be enabled for use with RS-485 2-wire communication.

Table 1.6 RTS Control – Parameter H5-07	
Value	Description
0	Disable (always ON) (Default Setting)
1	Enable (ON only during send) (Use this setting for RS-485 2-wire systems)

Run/Stop and Frequency Reference

The Run/Stop and Frequency Reference commands can originate from:

- Serial communication (Built-in Modbus: Keypad or R+/-, S+/- Terminals)
- Keypad (Digital Operator)
- Terminal Strip
- Option Card

Parameter B1-01 (Run/Stop Method Selection) allows the selection of the origin of the Run/Stop command. Parameter B1-02 (Reference Selection) allows the selection of the origin of the Frequency Reference command. The Run/Stop and Frequency Reference commands may have different origins.

For example, the Run/Stop command may be set to Terminals (B1-01=1) while the Frequency Reference command may be set to Serial Communication (B1-02=2).

► Run/Stop Source

Table 1.7 Run/Stop Method Selection

B1-01	Operation Method Selection (Run/Stop)
0	Keypad
1	Terminal Strip (Default Setting)
2	Serial Communication (Built-in Modbus: Keypad or R+/-, S+/- Terminals)
3	Option Card (EtherNet/IP, Modbus TCP/IP, DeviceNet, Profibus DP, LonWorks, etc.)
4	Pulse Input (RP Terminal)

► Frequency Reference Source

Table 1.8 Frequency Reference Source Selection

B1-02	Frequency Reference Selection
0	Keypad
1	Terminal Strip (Default Setting)
2	Serial Communication (Built-in Modbus: Keypad or R+/-, S+/- Terminals)
3	Option Card (EtherNet/IP, Modbus TCP/IP, DeviceNet, Profibus DP, LonWorks, etc.)

Verify Communication

The following is a quick reference guide for serial communications to the G7 drive. Make a copy of this page and check-off each item as it is completed. For detailed information please refer to the detailed sections that follow.

☐ **1: RS-232 Communication.**

☐ **1.1:** Verify that the correct cable is used to connect the controller to the G7 drive.

☐ **1.2:** Verify that the controller is set for RS-232 communication and that the communication cable is connected to the correct communication port.

☐ **1.3:** Record the controller communication parameters.

Baud Rate _____ **Parity**_____ **Data Bits**_____ **Stop Bits**__1__

☐ **1.4:** Record the G7 drive communication parameters (H5-02, H5-03, H5-07).

Baud Rate _____ **Parity**_____ **Data Bits**_____ **Stop Bits**__1__

☐ **1.5:** Verify that the communication parameters match.

☐ **2: RS-422/RS-485 Communication.**

☐ **2.1:** Verify that the G7 drive is connected correctly.

☐ **2.2:** Verify that the controller is set for RS-422/RS-485 communications and that the communications cable is connected to the correct communications port.

☐ **2.3:** Record the controller communications parameters.

Baud Rate _____ **Parity**_____ **Data Bits**_____ **Stop Bits**__1__

☐ **2.4:** Record the G7 drive communication parameters (H5-01, H5-02, H5-03, H5-07).

Baud Rate _____ **Parity**_____ **Data Bits**_____ **Stop Bits**__1__

☐ **2.5:** Verify that the communication parameters match.

☐ **2.6:** Verify that parameter H5-07 (RTS) is set to enable.

☐ **2.7:** Verify that parameter H5-01 (Node Address) is set to the correct, unique, hexadecimal value and that it matches the node address required by the controller.

Controller Node Address _____ **G7 Drive Node Address**_____

☐ **3:** Send a command message to the G7 drive from the controller and verify the data of the command and response messages.

☐ **3.1:** Verify the contents of the command message.

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

☐ **3.2:** Verify the contents of the response message.

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

Notes:

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Chapter 2 - Message Formats

This chapter provides information on the message (telegram) contents and configuration.

Protocol **20**
Read Multiple Registers – Function Code 03H **21**
Write Single Register – Function Code 06H **23**
Loop-Back Test – Function Code 08H **25**
Write Multiple Registers – Function Code 10H **27**
No Response **29**
Error Codes **29**
CRC-16 Calculation **30**

Protocol

The parameter access method supported by the G7 drive is a subset of the Modbus♦ communication protocol, which Yaskawa refers to as MEMOBUS. The G7 drive supports Modbus functions 3, 6, 8 and 10h. The message format varies depending upon the function code of the message. For each function code, there is a command message from the master and a response message from the slave. The following sections review the format of the command and response messages for each function.

► Message Functions Supported

The following table lists the Modbus function codes available and their minimum and maximum byte lengths.

Table 2.1 Supported Function Codes

Function Code	Function	Command Message		Response Message (Normal)	
		Minimum (bytes)	Maximum (bytes)	Minimum (bytes)	Maximum (bytes)
3h (3 dec)	Read Multiple Registers	8	8	7	21
6h (6 dec)	Write Single Register	8	8	8	8
8h (8 dec)	Loop-Back Test	8	8	8	8
10h (16 dec)	Write Multiple Registers	11	25	8	8

Read Multiple Registers – Function Code 03H

The Read Multiple Register function is used to read the contents of from 1 to 8 consecutive registers. The formats of the read command and response messages are shown below.

► Read Multiple Registers Command Message

Table 2.2 Read Command Message

Description		Data
Slave Address		02h
Function Code		03h
Starting Register	Upper	00h
	Lower	20h
Quantity	Upper	00h
	Lower	04h
CRC-16	Upper	45h
	Lower	F0h

Each G7 drive slave address is set via parameter H5-01. Valid slave addresses must be in the range of 1 ~ 20 hex (1 ~ 32 dec) and entered as a hexadecimal number. No two slaves may have the same address. The master addresses the slave by placing the slave address in the Slave Address field of the message. In the command message above, the slave is addressed at 02h. Broadcast address 0 is not valid for register read commands.

The function code of this message is 03h (read multiple registers).

The starting register is the address of the first register to be read. In the command message above the starting register address is 20h (0020h).

The quantity indicates how many consecutive registers are to be read. The quantity may range from 1 to 8 registers. If an invalid quantity is entered, error code 03h is returned in a fault response message. In this example, four consecutive registers are to be read: 20h, 21h, 22h and 23h.

A CRC-16 value is generated from a calculation including the message slave address, function code, starting register and quantity. The procedure for calculating a CRC-16 is described at the end of this chapter. When the slave receives the command message it calculates a CRC-16 value and compares it to the CRC-16 of the command message. If the two CRC-16 values are identical and the Slave Address is correct, the slave processes the command message. If the two CRC-16 values are not identical, the slave will discard the command message and not respond.

If the command message has a valid slave address, function code, starting register, and quantity, the slave will respond with a normal response message. If the command message has an invalid function code, starting register, and/or quantity, the slave will respond with a fault response message. If the command message has an invalid slave address or CRC-16, no response will be returned.

► Read Multiple Registers Normal Response Message

Table 2.3 Read Normal Response Message		
Description		Data
Slave Address		02h
Function Code		03h
Number of Data Bytes		08h
Starting Register	Upper	17h
	Lower	70h
Next Register	Upper	17h
	Lower	70h
Next Register	Upper	01h
	Lower	09h
Last Register	Upper	00h
	Lower	00h
CRC-16	Upper	38h
	Lower	ACh

The normal response message contains the same slave address and function code as the command message, indicating to the master which specific slave is responding and to what type of function it is responding.

The number of data bytes is the number of data bytes returned in the response message. The number of data bytes is actually the number of registers read times 2, since there are two bytes of data in each register.

The starting register is the address of the first register read.

The data section of the response message contains the data for the registers' requested read, in this case registers 20h, 21h, 22h and 23h. Their data is 20h = 1770h, 21h = 1770h, 22h = 0109h and 23h = 0h.

► Read Multiple Registers Fault Response Message

Table 2.4 Read Fault Response Message		
Description		Data
Slave Address		02h
Function Code		83h
Error Code		02h
CRC-16	Upper	30h
	Lower	F1h

The fault response message contains the same slave address as the command message, indicating to the master, which slave is responding.

The function code of a fault response message is the logical OR of 80h and the original function code of 03h. This indicates to the master that the message is a fault response message, instead of a normal response message.

The error code indicates where the error occurred in the command message. The value of 02h in the error code field of this fault response message indicates that the command message requested data be read from an invalid register. Refer to section *Error Codes, Table 2-14,* for more information on returned error codes.

Write Single Register – Function Code 06H

The Write Single Register function allows the writing of data to one register only.

► Write Single Register Command Message

Table 2.5 Write Command Message

Description		Data
Slave Address		01h
Function Code		06h
Register Address	Upper	00h
	Lower	01h
Data	Upper	00h
	Lower	03h
CRC-16	Upper	98h
	Lower	H0B

Each G7 drive slave address is set via parameter H5-01. Valid slave addresses must be in the range of 1 ~ 20 hex (1 ~ 32 dec) and entered as a hexadecimal number. No two slaves may have the same address. The master addresses the slave by placing the slave address in the Slave Address field of the message. In the command message above, the slave is addressed at 01h. Broadcast address 0 is valid for register write commands.

By setting the slave address to zero (0) in the command message, the master can send a message to all the slaves on the network simultaneously. This is called simultaneous broadcasting. In a simultaneous broadcast message there is no response message.

The function code of this message is 06h (write single register).

In the command message above the register address is 01h (0001h).

The data section contains the data to be written.

A CRC-16 value is generated from a calculation including the message slave address, function code, starting register, quantity, Number of Data Bytes, and all register data. The procedure for calculating a CRC-16 is described at the end of this chapter. When the slave receives the command message it calculates a CRC-16 value and compares it to the CRC-16 of the command message. If the two CRC-16 values are identical and the slave address is correct, the slave processes the command message. If the two CRC-16 values are not identical, the slave will discard the command message and not respond.

If the command message has a valid slave address, function code, register address and data, the slave will respond with a normal response message. If the command message has an invalid function code, register address and/or data, the slave will respond with a fault response message. If the command message has an invalid slave address or CRC-16, no response will be returned.

► Write Single Register Normal Response Message

Table 2.6 Write Register Normal Response Message		
Description		Data
Slave Address		01h
Function Code		06h
Register Address	Upper	00h
	Lower	01h
Data	Upper	00h
	Lower	03h
CRC-16	Upper	98h
	Lower	0Bh

The normal response message contains the same slave address, function code, register address and data as the command message, indicating to the master which slave is responding and to what type of function it is responding.

In the response message above the register address is 01h (0001h).

► Write Single Register Fault Response Message

Table 2.7 Write Register Fault Response Message		
Description		Data
Slave Address		01h
Function Code		86h
Error Code		21h
CRC-16	Upper	82h
	Lower	78h

The fault response message contains the same slave address as the command message, indicating to the master which slave is responding.

The function code of a fault response message is the logical OR of 80h and the original function code of 06h. This indicates to the master that the message is a fault response message, instead of a normal response message.

The error code indicates where the error occurred in the command message. The value of 21h in the error code field of this fault response message indicates that the command message data to be written was invalid for that register. Refer to the section *Error Codes, Table 2-14*, for more information on returned error codes.

Loop-Back Test – Function Code 08H

The Loop-Back Test is used to verify that the communications parameters for the G7 drive have been set correctly and that the connection is correct. The message should be constructed exactly as shown below. If everything is set and connected correctly, the received response will match the response shown below.

► Loop-Back Test - 08h

The Loop-Back test function (08h) is used for checking signal transmission between master and slaves. The command message format is shown below.

Table 2.8 Loop-Back Command Message

Description		Data
Slave Address		01h
Function Code		08h
Test Code	Upper	00h
	Lower	00h
Data	Upper	A5h
	Lower	37h
CRC-16	Upper	DAh
	Lower	8Dh

Each G7 drive slave address is set via parameter H5-01. Valid slave addresses must be in the range of 1 ~ 20 hex (1 ~ 32 dec) and entered as a hexadecimal number. No two slaves may have the same address. The master addresses the slave by placing the slave address in the slave address field of the message. In the command message above, the slave is addressed at 01h. Broadcast address 0 is not valid for Loop-Back test commands.

The function code of this message is 08h (Loop-Back test).

The test code must be set to 0000h. This function specifies that the data passed in the command message is to be returned (looped back) in the response message.

The Data section contains arbitrary values.

A CRC-16 value is generated from a calculation including the message slave address, function code, test code, and data. The procedure for calculating a CRC-16 is described at the end of this chapter. When the slave receives the command message it calculates a CRC-16 value and compares it to the CRC-16 of the command message. If the two CRC-16 values are identical and the Slave Address is correct, the slave processes the command message. If the two CRC-16 values are not identical, the slave will discard the command message and not respond.

If the command message has a valid slave address, function code, test code, data and CRC-16, the slave will respond with the normal response message. If the command message has an invalid function code, test code, and/or data, the slave will respond with a fault response message. If the command message has an invalid slave address or CRC-16, no response will be returned.

► Loop-Back Normal Response

The normal Loop-Back Test response is identical to the command message.

Table 2.9 Loop-Back Normal Response Message

Description		Data
Slave Address		01h
Function Code		08h
Test Code	Upper	00h
	Lower	00h
Data	Upper	A5h
	Lower	37h
CRC-16	Upper	DAh
	Lower	8Dh

► Loop-Back Fault Response

Table 2.10 Loop-Back Fault Response Message

Description		Data
Slave Address		01h
Function Code		88h
Error Code		01h
CRC-16	Upper	87h
	Lower	C0h

The fault response message contains the same slave address as the command message, indicating to the master which slave is responding. The function code of a fault response message is the logical OR of 80h and the original function code of 08h. This indicates to the master that the message is a fault response message, instead of a normal response message.

The error code indicates where the error occurred in the command message. Refer to the section *Error Codes, Table 2-14*, for more information on returned error codes.

Write Multiple Registers – Function Code 10H

The Write Multiple Register function allows the writing of data to from 1 to 16 consecutive registers.

► Write Multiple Registers Command Message

Table 2.11 Write Command Message		
Description		Data
Slave Address		01h
Function Code		10h
Starting Register	Upper	00h
	Lower	01h
Quantity	Upper	00h
	Lower	02h
Number of Data Bytes		04h
First Register Data	Upper	00h
	Lower	01h
Next Register Data	Upper	02h
	Lower	58h
CRC-16	Upper	63h
	Lower	39h

Each G7 drive slave address is set via parameter H5-01. Valid slave addresses must be in the range of 1 ~ 20 hex (1 ~ 32 dec) and entered as a hexadecimal number. No two slaves may have the same address. The master addresses the slave by placing the slave address in the Slave Address field of the message. In the command message above, the slave is addressed at 01h. Broadcast address 0 is valid for register write commands.

By setting the slave address to zero (0) in the command message, the master can send a message to all the slaves on the network simultaneously. This is called simultaneous broadcasting. In a simultaneous broadcast message there is no response message.

The function code of this message is 10h (write multiple registers).

The starting register is the address of the first register to be written. In the command message above the starting register address is 01h (0001h).

The quantity indicates how many consecutive registers are to be written. The quantity may range from 1 to 16 registers. If an invalid quantity is entered, error code of 03h is returned in a fault response message. In this command message there are two consecutive registers to be written: 0001h (Operation Command) and 0002h (Frequency Reference).

The number of data bytes is the number of bytes of data to be written. The number of data bytes is actually the quantity multiplied by 2, since there are two bytes of data in each register.

The Data section contains the data for each register to be written in the order in which they are to be written.

A CRC-16 value is generated from a calculation including the message slave address, function code, starting register, quantity, Number of Data Bytes, and all register data. The procedure for calculating a CRC-16 is described at the end of this chapter. When the slave receives the command message it calculates a CRC-16 value and compares it to the CRC-16 of the command message. If the two CRC-16 values are identical and the slave address is correct, the slave processes the command message. If the two CRC-16 values are not identical, the slave will discard the command message and not respond.

If the command message has a valid slave address, function code, starting register, quantity, number of data bytes and data, and the slave will respond with a normal response message. If the command message has an invalid function code, starting register, quantity, Number of Data Bytes and/or data, the slave will respond with a fault response message. If the command message has an invalid slave address or CRC-16, no response will be returned.

► Write Multiple Registers Normal Response Message

Table 2.12 Write Registers Normal Response Message		
Description		Data
Slave Address		01h
Function Code		10h
Starting Register	Upper	00h
	Lower	01h
Quantity	Upper	00h
	Lower	02h
CRC-16	Upper	10h
	Lower	08h

The normal response message contains the same slave address, function code, starting register and quantity as the command message, indicating to the master which slave is responding and to what type of function it is responding.

The starting register is the address of the first register written. In the response message above the starting register address is 01h (0001h).

The quantity indicates how many consecutive registers were written. In this case the quantity is 2.

► Write Multiple Registers Fault Response Message

Table 2.13 Write Registers Fault Response Message		
Description		Data
Slave Address		01h
Function Code		90h
Error Code		02h
CRC-16	Upper	CDh
	Lower	C1h

The fault response message contains the same slave address as the command message, indicating to the master which slave is responding.

The function code of a fault response message is the logical OR of 80h and the original function code of 10h. This indicates to the master that the message is a fault response message, instead of a normal response message.

The error code indicates where the error occurred in the command message. The value of 02h in the error code field of this fault response message indicates that the command message requested data to be written to an invalid register. Refer to the section *Error Codes, Table 2-14*, for more information on returned error codes.

No Response

The slave disregards the command message and does not return a response message in the following cases:

1. In broadcasting of data (slave address is 0), all slaves execute, but do not respond.
2. When a communication error (overrun, framing, parity, or CRC-16) is detected in the command message.
3. When the slave address in the command message does not coincide with the address set in the slave.
4. When it takes longer than 2 seconds to send a message.
5. When the time interval between characters exceeds 3.5 ms.
6. When the command message data length is not proper.

Error Codes

Table 2.14 Fault Codes

Code	Fault	Description
1	Function Error	Invalid or unsupported function code in command message
2	Invalid Register	Invalid register address
3	Invalid Number of Registers	Invalid command message quantity
21	Data Limits Exceeded	The write command message data is out of range for the requested register
22	Write Failure	The register to be written is write protected

CRC-16 Calculation

The last two bytes of a message contain the CRC-16 (Cyclical Redundancy Check). The CRC-16 is one method for verifying the validity of the message contents and is part of the protocol. The CRC-16 field checks the contents of the entire message, regardless of any parity check method used for the individual characters of the message.

The CRC-16 field is a 16-bit binary value consisting of two 8-bit bytes. The CRC-16 value is calculated by the transmitting device, which appends the CRC-16 to the message. The receiving device recalculates a CRC-16 during receipt of the message, and compares this calculated value to the value received in the transmitted CRC-16 field. If the two values are not equal, the entire message is invalid.

Detailed examples of a CRC-16 generation using Quick Basic and C are shown below.

► CRC-16 Calculation Example in Basic

```
crcsum# = &HFFFF&
crcshift# = &H0&
crcconst# = &HA001&
CLS
PRINT "**************************************************"
PRINT
PRINT "              CRC-16 calculator"
PRINT
PRINT "**************************************************"
PRINT "If entering data in hex, preceed the data with '&H'"
PRINT "      Example:  32decimal = 20hex = &H20"
PRINT "**************************************************"
PRINT
INPUT "Enter the number of bytes in the message: ", maxbyte
FOR bytenum = 1 TO maxbyte STEP 1
      PRINT "Enter byte "; bytenum; ":":
      INPUT byte&
      byte& = byte& AND &HFF&
      crcsum# = (crcsum# XOR byte&) AND &HFFFF&
      FOR shift = 1 TO 8 STEP 1
          crcshift# = (INT(crcsum# / 2)) AND &H7FFF&
          IF crcsum# AND &H1& THEN
                    crcsum# = crcshift# XOR crcconst#
          ELSE
                    crcsum# = crcshift#
          END IF
NEXT shift
NEXT bytenum
lower& = crcsum# AND &HFF&
upper& = (INT(crcsum# / 256)) AND &HFF&

PRINT "Lower byte (1st) = ", HEX$(lower&)
PRINT "Upper byte (2nd) = ", HEX$(upper&)
```

► CRC-16 Calculation Example in C

```
void   getMBCRC(char *, int, char *)                                    // function prototype
void   getMBCRC(char *buf, int bufLen, char *crc) {                     // Function name and parameter list returning a void
                                                                        // *buf      pointer to character array used to calculate CRC
                                                                        // bufLen number of characters to calculate CRC for
                                                                        // *crc      pointer to the array that contains the calculated CRC
unsigned long crc_0 = 0xffff;                                           // Declare and initialize variables
unsigned long crc_1 = 0x0000;                                           // Declare and initialize variables
int i,j;                                                                // Declare and initialize variables
        for (i=0; i<bufLen; i++) {                                      // Loop through characters of input array
            crc_0 ^= ((unsigned long)buf[i] & 0x00ff);                  // XOR current character with 0x00ff
            for (j=0;j<8;j++) {                                         // Loop through characters bits
                        crc_1 = (crc_0 >> 1) & 0x7fff;                  // shift result right one place and store
                        if (crc_0 & 0x0001)                             // if pre-shifted value bit 0 is set
                                    crc_0 = (crc_1 ^ 0xa001);           // XOR the shifted value with 0xa001
                        else                                            // if pre-shifted value bit 0 is not set
                                    crc_0 = crc_1;                      // set the pre-shifted value equal to the shifted value
                        }                                               // End for loop - Loop through characters bits
            }                                                           // End for loop - Loop through characters of input array
        crc[0] = (unsigned char)((crc_0/256) & 0x00ff);                 // Hi byte
        crc[1] = (unsigned char)(crc_0 & 0x00ff);                       // Lo byte
return;                                                                 // Return to calling function
}                                                                       // End of CRC calculation function
```

Notes:

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Chapter 3 - Troubleshooting

This chapter describes basic troubleshooting methods for serial communication.

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General Information

Please fill in the information on this and the following pages prior to contacting customer support. If customer support is necessary, please have the information below available.

☐ 1: G7 Drive Model CIMR-_____

☐ 2: Input___VAC____Hz

☐ 3: Serial Number_____

☐ 4: Control Board ETC-_____

☐ 5: Software ID (U1-14) _____

☐ 6: Initialization Type (2 or 3 wire control) _____

Please provide a sketch of the network in the space below.

RS-232 Communication

The following is a quick reference guide for troubleshooting RS-232 communication to the G7 drive. Make a copy of the following pages and check-off each item as it is completed. For detailed information on the RS-232 standard please refer to ***EIA RS-232-C*** or later revision. For information on the G7 drive RS-232 interface, refer to previous sections of this manual.

☐ **1:** For RS-232 communication.

- ☐ **1.1:** Verify that the correct cable is used to connect the controller to the G7 drive.
- ☐ **1.2:** Verify that the controller is set for RS-232 communication and that the communication cable is connected to the correct communication port.
- ☐ **1.3:** Record the controller communications parameters.

  Baud Rate _____ **Parity**_____ **Data Bits**_____ **Stop Bits**__1__
- ☐ **1.4:** Record the G7 drive's communication parameters (H5-02, H5-03, H5-07).

  Baud Rate _____ **Parity**_____ **Data Bits**_____ **Stop Bits**__1__
- ☐ **1.5:** Verify that the communication parameters match.

☐ **2:** Check the controller RS-232 wiring requirements.

- ☐ **2.1:** CTS (Clear to Send)/RTS (Ready to Send) jumper required on the controller end?
- ☐ **2.2:** DTR (Data Terminal Ready)/DSR (Data Set Ready)/RLSD (Receive Line Signal Detector) jumper required on the controller end?
- ☐ **2.3:** TXD (Transmit Data)/RXD (Receive Data) connections are made correctly?

☐ **3:** Send a message from the controller to the G7 drive.

- ☐ **3.1:** Connect an oscilloscope between the G7 drive RXD and GND.
  - ☐ **3.1.1:** Verify that the message pulse train exists and contains the correct number of pulses. Refer to the chapter Message Formats for information on the message contents.
  - ☐ **3.1.2:** Verify that the signal levels adhere to the RS-232 standard.
- ☐ **3.2:** Insert a data analyzer in the RS-232 circuit and capture the message sent by the controller in a hexadecimal format. Record the command message below.

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

☐ **3.3:** Verify that the contents of the message adhere to the protocol format as described previously.

☐ **3.3.1:** Verify that the node address is valid.

☐ **3.3.2:** Verify that the function code is valid.

☐ **3.3.3:** Verify that the register address is valid.

☐ **3.3.4:** Verify that the number of data bytes is valid.

☐ **3.3.5:** Verify that the CRC is correctly calculated.

☐ **3.3.6:** Verify that the message requires a response.

☐ **4:** Verify the contents of the response message.

☐ **4.1:** Connect an oscilloscope between the controller RXD and GND.

☐ **4.1.1:** Verify that the message pulse train exists and contains the correct number of pulses. Refer to the chapter Message Formats for information on the message contents.

☐ **4.1.2:** Verify that the signal levels adhere to the RS-232 standard.

☐ **4.2:** Capture the response message sent by the controller in a hexadecimal format and record it below.

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

☐ **4.3:** Verify that the contents of the message adhere to the protocol format as described previously.

☐ **4.3.1:** Verify that the node address is valid.

☐ **4.3.2:** Verify that the function code is valid.

☐ **4.3.3:** Verify that the number of data bytes is valid.

☐ **4.3.4:** Verify that the register address is valid.

☐ **4.3.5:** Verify that the CRC is correctly calculated.

RS-422/RS-485 Communication

The following is a quick reference guide for troubleshooting RS-422/RS-485 communication to the G7 drive. Make a copy of the following pages and check-off each item as it is completed. For detailed information on the RS-422/RS-485 standard please refer to ***EIA RS-422-A*** or later revision. For information on the G7 drive RS-422/RS-485 interface, refer to previous sections of this manual.

☐ **1:** For RS-422/RS-485 communications.

- ☐ **1.1:** Verify that the correct cable is used to connect the controller to the G7 drive.
- ☐ **1.2:** Verify that the controller is set for RS-422 or RS-485 communications and that the communications cable is connected to the correct communications port.
- ☐ **1.3:** Record the controller communication parameters.
- ☐ **1.4:** Verify that the polarity of the signal wires is correct (+ to + and - to -).

  Baud Rate _____ **Parity** _____ **Data Bits** _____ **Stop Bits** **1**

- ☐ **1.5:** Record the G7 drive communication parameters (H5-01, H5-02, H5-03, H5-07).

  Baud Rate _____ **Parity** _____ **Data Bits** _____ **Stop Bits** **1**

- ☐ **1.6:** Verify that the communication parameters match.
- ☐ **1.7:** For RS-485 2-wire networks only, verify that G7 drive parameter H5-07 (RTS) is set to 1 (Enable).
- ☐ **1.8:** Verify that G7 drive parameter H5-01 (Node Address) is set to the correct, unique, hexadecimal value and that it matches the node address required by the controller.

☐ **2:** Check the controller RS-422/RS-485 wiring requirements.

- ☐ **2.1:** The controller transmit terminals are connected to the G7 drive receive terminals and the receive terminals connected to the G7 drive transmit terminals.
- ☐ **2.2:** The transmit and receive connection polarities are correct.
- ☐ **2.3:** The controller either asserts RTS when transmitting or utilizes send detect circuitry.
- ☐ **2.4:** The network is terminated only at the beginning and end of each network segment.
- ☐ **2.5:** There are no more than 31 devices on any network segment, including the controller and repeater.

☐ **3:** Verify that the G7 drive passes the self-test as described in the following section.

☐ **4:** Send a message from the controller to the G7 drive.

☐ **4.1:** Connect an oscilloscope between the G7 drive's R+ and R- terminals for RS-422/RS-485 4-wire networks or between terminals R+/S+ and R-/S- for RS-485 2-wire networks.

☐ **4.1.1:** Verify that the message pulse train exists and contains the correct number of pulses. Refer to the chapter Message Formats for information on the message contents.

☐ **4.1.2:** Verify that the signal levels adhere to the RS-422/RS-485 standard.

☐ **4.2:** Insert a data analyzer in the RS-422/RS-485 circuit and capture the message sent by the controller in a hexadecimal format. Record the command message below.

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

☐ **4.3:** Verify that the contents of the message adhere to the Modbus format as described previously.

☐ **4.3.1:** Verify that the node address is valid.

☐ **4.3.2:** Verify that the function code is valid.

☐ **4.3.3:** Verify that the register address is valid.

☐ **4.3.4:** Verify that the number of data bytes is valid.

☐ **4.3.5:** Verify that the CRC is correctly calculated.

☐ **4.3.6:** Verify that the message requires a response.

☐ **5:** Verify the contents of the response message.

☐ **5.1:** Connect an oscilloscope between the controller R+ and R- terminals for RS-422 and RS-485 4-Wire networks or between terminals R+/S+ and R-/S- for RS-485 2-wire networks.

☐ **5.1.1:** Verify that the message pulse train exists and contains the correct number of pulses. Refer to the chapter Message Formats for information on the message contents.

☐ **5.1.2:** Verify that the signal levels adhere to the RS-422/RS-485 standard.

☐ **5.2:** Capture the response message in hexadecimal format and record it below.

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

[_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____] [_____]

☐ **5.3:** Verify that the contents of the message adhere to the Modbus format as described previously.

☐ **5.3.1:** Verify that the node address is valid.

☐ **5.3.2:** Verify that the function code is valid.

☐ **5.3.3:** Verify that the register address is valid.

☐ **5.3.4:** Verify that the number of data bytes is valid.

☐ **5.3.5:** Verify that the CRC is correctly calculated.

RS-422/RS-485 Self-Test

The G7 drive can perform a self-test of the communications interface. To perform the self-test:

- Apply power to the G7 drive.
- Set parameter H1-05 to 67 (communication self-test). Terminal S7 is just an example. Any terminal can be used.
- Remove power from the G7 drive and wait for the charge lamp to be completely extinguished. Wait at least five additional minutes for the G7 drive to be completely discharged. Measure the DC bus voltage and verify that it is at a safe level.
- Connect jumper wires to the following G7 drive control terminals (see picture below):

  - Connect S+ to R+

  - Connect S- to R-

  - Connect S7 to SC

- Reapply power to the G7 drive.

Successful Self-Test

- The frequency reference is displayed on the digital operator if the communications interface is functioning normally.

Unsuccessful Self-Test

- If “CE” is displayed on the keypad, the communications interface is not functioning properly. Contact the factory for assistance.

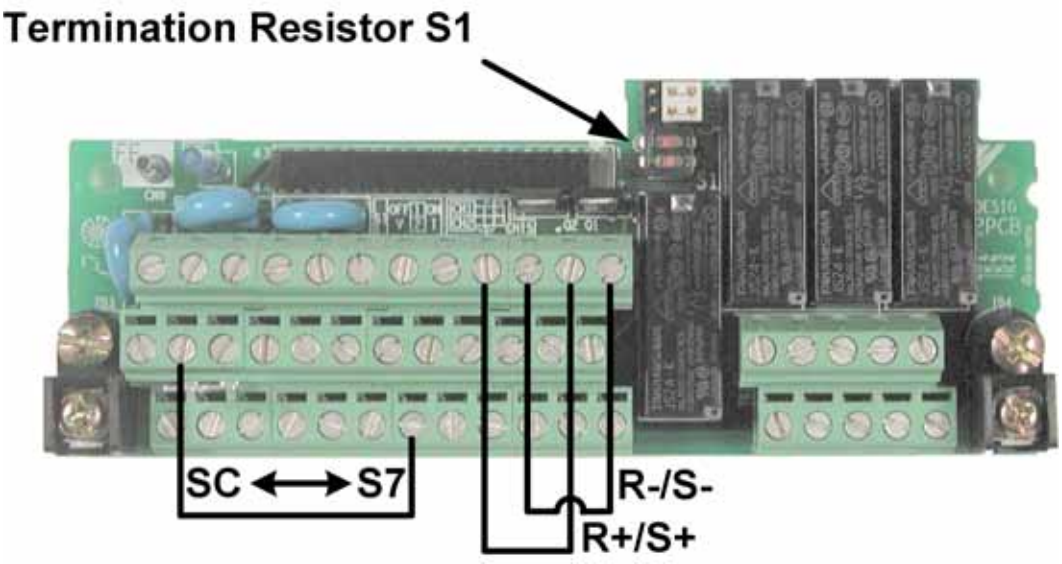


Figure 3.1 RS-422/RS-485 Self-Test Example using Terminal S7

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Chapter 4 - G7 Drive Parameters

This chapter describes the G7 drive's communication registers.

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Command Registers (Read/Write) for Modbus RTU

Command registers are those used to control the operation of the G7 drive either through a network interface (option card) or via serial communication (defined as Modbus built into the drive's keypad port or terminal strip). These registers are available during an active Run command. It should be noted that multi-function digital inputs that are commanded over a communication network are logically OR'd with their physical digital input terminal counterpart.

The "Address" column contains the register address in hexadecimal format. G7 drive registers are always referred to in hexadecimal format. The "Function" column contains the register name. The "Bit" and "Description" columns contain the list of available bits for that register and a short description of each. If the "Bit" column is empty, the register contains word data and individual bits have no meaning.

Please note that these Command Registers are different from those used in theCM090 Modbus TCP/IP Ethernet Option card. Refer to the section toward the end of this chapter for more information on Modbus TCP/IP.

Table 4.1 Command Registers (Read/Write)

Addr.	Function	Bit	Description
0001h	Digital Input Command	0h	Run Command (0 = Stop, 1 = Run)
		1h	Direction Command (0 = Forward, 1 = Reverse)
		2h	External Fault
		3h	Fault Reset
		4h	Frequency Reference Source (0 = b1-01 Setting, 1 = Modbus communication)
		5h	Run Command Source (0 = b1-02 Setting, 1 = Modbus communication)
		6h	Multi-Function Digital Input Terminal S3. Function set by setting of H1-01
		7h	Multi-Function Digital Input Terminal S4. Function set by setting of H1-02
		8h	Multi-Function Digital Input Terminal S5. Function set by setting of H1-03
		9h	Multi-Function Digital Input Terminal S6. Function set by setting of H1-04
		Ah	Multi-Function Digital Input Terminal S7. Function set by setting of H1-05
		Bh	Multi-Function Digital Input Terminal S8. Function set by setting of H1-06
		Ch	Multi-Function Digital Input Terminal S9. Function set by setting of H1-07
		Dh	Multi-Function Digital Input Terminal S10. Function set by setting of H1-08
		Eh	Multi-Function Digital Input Terminal S11. Function set by setting of H1-09
		Fh	Multi-Function Digital Input Terminal S12. Function set by setting of H1-10
0002h	Frequency Reference Setpoint	-	Scaling Dependent Upon o1-03 Setting
0006h	PID Setpoint	-	PID Setpoint
0007h	Analog Output FM Setpoint	-	Sets the value of analog output terminal FM. (-1540 / -11VDC ~ 1540 / +11VDC)
0008h	Analog Output AM Setpoint	-	Sets the value of analog output of terminal AM (-1540 / -11VDC ~ 1540 / +11VDC)
0009h	Digital Output Command	0h	Multi-Function Digital Output 1 (M1-M2)
		1h	Multi-Function Digital Output 2 (M3-M4)
		2h	Multi-Function Digital Output 3 (M5-M6)
		3h	Multi-Function Digital Output 4 (P3-C3)
		4h	Multi-Function Digital Output 5 (P4-C4)
		5h	Reserved
		6h	Fault Contact Output Enable (1 = Enable bit 7)*
		7h	Fault Contact Digital Output (MA, MB, MC)
		8h-Fh	Reserved
000Fh	Command Selection	0h	Reserved
		1h	PID Setpoint Enable (when set to "1", use Register 0006h for the PID Setpoint)
		2h–Bh	Reserved
		Ch	Broadcast Data Terminal S5 Enable**
		Dh	Broadcast Data Terminal S6 Enable**
		Eh	Broadcast Data Terminal S7 Enable**
		Fh	Broadcast Data Terminal S8 Enable**

Note: * Overrides the standard functionality of the Fault Contacts. Use caution.

** These bits must be set to "1" in order to use the Simultaneous Broadcast Register multi-function inputs S3, S4, S5 and S6 (bits 0Ch, 0Dh, 0Eh and 0Fh respectively). Refer to Table 4.2 Broadcast Registers.

Broadcast Registers (Write Only)

Broadcast Registers are those registers used to control the simultaneous operation of multiple devices either through a network interface (option card) or via Modbus RTU communication. These registers are available during drive Run.

The “Address” column contains the register address in hexadecimal format. Drive registers are always referenced in hexadecimal format. The “Function” column contains the register name. The “Bit” and “Description” columns contain the list of available bits for that register and a short description of each. If the “Bit” column is empty, the register contains word data and individual bits have no value.

Table 4.2 Broadcast Registers (Write Only)

Addr.	Function	Bit	Description
0000h	Reserved	-	Reserved
0001h	Digital Input Command	0h	0 = Stop, 1 = Run
		1h	0 = Forward, 1 = Reverse
		2h	Reserved
		3h	Reserved
		4h	Reserved
		5h	Multi-Function Digital Input Terminal S3. Function set by setting of H1-01
		6h	Multi-Function Digital Input Terminal S4. Function set by setting of H1-02
		7h	Reserved
		8h	Reserved
		9h	Reserved
		Ah	Reserved
		Bh	Reserved
		Ch	Multi-Function Digital Input Terminal S5. Function set by setting of H1-03*
		Dh	Multi-Function Digital Input Terminal S6. Function set by setting of H1-04*
		Eh	Multi-Function Digital Input Terminal S7. Function set by setting of H1-05*
		Fh	Multi-Function Digital Input Terminal S8. Function set by setting of H1-06*
0002h	Frequency Reference	-	30000 / 100% **

Note: * These bits must be enabled using register 0Fh, bits 0Ch, 0Dh, 0Eh and 0Fh. Refer to Table 4.1 Command Registers (Read/Write).

** This value must be sent to the drive as a hexadecimal value. Example: 4096 = 1000h.
The scaling is fixed at 30000 / 100% and is not affected by parameter o1-03. It is affected by the maximum output frequency (E1-04) of the drive receiving the command. Simply it is ((decimal frequency reference) / 30000) x (E1-04).

Example: Send 1000h to drive. 1000h = 4096 decimal. (4096 x 100%) / 30000 = 13.65%. If drive’s maximum frequency is 60Hz, then the frequency reference command to the drive is 60Hz x 13.65% or 8.19Hz.

Monitor Registers (Read Only)

The following table lists monitor parameters for the G7 drive. These parameters are used to monitor G7 drive information and cannot be written.

- The “U-##” column contains the reference, if it exists, to the “U” monitor, parameter displayed via the operator keypad.
- The “Address” column contains the register addresses for that parameter in hexadecimal format. G7 drive registers are always referred to in hexadecimal format.
- The “Function” column contains the register name.
- The “Bit” column contains the list of available bits for that register. If the “Bit” column is empty, the register contains word data and the individual bits are meaningless.
- The “Description” column contains a short description of each register or register bit.
- Reserved registers and data are meaningless and should be ignored.

Table 4.3 G7 Monitor Registers (Read only)

U-##	Addr.	Function	Bit	Description
	0010h	Inverter Status	0h	Run
			1h	Reserved
			2h	Reserved
			3h	Fault Reset Signal
			4h	Speed Agree
			5h	Inverter Ready
			6h	Minor Fault (Alarm)
			7h	Major Fault
			8h	Reserved
			9h	Reserved
			Ah	Reserved
			Bh	Reserved
			Ch	Reserved
			Dh	Reserved
			Eh	Frequency Reference Source (0 = b1-01 Setting, 1 = Modbus Communication)
			Fh	Run Command Source (0 = b1-02 Setting, 1 = Modbus Communication)
	0011h	Operator Status	0h	OPE - Keypad Setting Error
			1h	ERR - EEPROM Write Failure
			2h	PRG - Keypad Programming Mode
			3h	0: Digital Operator Present, 1: PC Connected
			4h-Fh	Reserved
	0012h	OPE – Keypad Setting Error	0h	Reserved
			1h	OPE01 - drive kVA Setting Error (O2-04)
			2h	OPE02 - Parameter Setting Out of Range
			3h	OPE03 - Multi-Function Digital Input Setting Error
			4h	Reserved
			5h	OPE05 - Run Command Selection Error - Option Card Missing
			6h	OPE06 - Control Method Selection Error - PG Option Card Missing
			7h	OPE07 - Multi-Function Analog Input Selection Error
			8h	OPE08 - Function Selection Error for Current Control Mode
			9h	OPE09 - PID Control Setup Error
			Ah	OPE10 - V/F Parameter/Pattern Setting Error
			Bh	OPE11 - Carrier Frequency Setting Error
			Ch	Reserved
			Dh	Reserved
			Eh	Reserved
			Fh	Reserved

Table 4.3 G7 Monitor Registers (Read only)				
U-##	**Addr.**	**Function**	**Bit**	**Description**
	0013h	Inverter Product Code	-	0000: G5
				1000: V7
				2010: G7
				2020: F7C (YEG)
				2030: F7A (YEC)
				2040: F7U (YEA)
				2050: G7C (YEG)
				2060: G7A (YEC)
				2070: G7U (YEA)
				-
	0014h	Fault Contents 1	0h	PUF - DC Bus Fuse Failure
			1h	UV1 - Main Circuit Undervoltage
			2h	UV2 - Control Circuit Undervoltage
			3h	UV3 - Pre-charge Contactor Answerback Failure
			4h	Reserved
			5h	GF - Ground Fault
			6h	OC - Over Current
			7h	OV - Overvoltage
			8h	OH - Inverter Overheat
			9h	OH1 - Inverter Overheat Warning
			Ah	OL1 - Motor Overload
			Bh	OL2 - Inverter Overload
			Ch	OL3 - Overtorque Detection 1
			Dh	OL4 - Overtorque Detection 2
			Eh	RR - Braking Resistor Failure
			Fh	RH - Braking Resistor Overheat
	0015h	Fault Contents 2	0h	EF3 - External Fault 3
			1h	EF4 - External Fault 4
			2h	EF5 - External Fault 5
			3h	EF6 - External Fault 6
			4h	EF7 - External Fault 7
			5h	EF8 - External Fault 8
			6h	Reserved
			7h	OS - Overspeed
			8h	DEV - Speed Deviation
			9h	PGO - Encoder (PG) Feedback Loss
			Ah	PF - Input Phase Loss
			Bh	LF- Output Phase Loss
			Ch	OH3 - Overheat
			Dh	OPR - Operator Disconnected
			Eh	ERR - EEPROM Write Failure
			Fh	OH4 - Motor Overheat
	0016h	Fault Contents 3	0h	CE - Communication Loss
			1h	BUS - Communication Option Card Fault
			2h	E-15 - SI-F/G Fault
			3h	E-10 - SI-F/G Fault
			4h	CF - Loss of Motor Control
			5h	SVE - Zero Servo Fault
			6h	EF0 - Communications Option External Fault
			7h	FBL - PID Feedback Loss
			8h	UL3 - Undertorque Detection 1
			9h	UL4 - Undertorque Detection 2
			Ah	OL7 - High Slip Braking Overload
			Bh	EF9 - External Fault 9
			Ch	EF10 - External Fault 10
			Dh	EF11 - External Fault 11
			Eh	EF12 - External Fault 12
			Fh	Reserved

Table 4.3 G7 Monitor Registers (Read only)				
U-##	**Addr.**	**Function**	**Bit**	**Description**
	0017h	CPF Contents 1	0h	Reserved
			1h	Reserved
			2h	CPF02
			3h	CPF03
			4h	CPF04
			5h	CPF05
			6h	CPF06
			7h	CPF07
			8h	CPF08
			9h	CPF09
			Ah	CPF10
			Bh-Fh	Reserved
	0018h	CPF Contents 2	0h	CPF20
			1h	CPF21
			2h	CPF22
			3h	CPF23
			4h-Fh	Reserved
	0019h	Minor Fault Contents 1	0h	UV - Undervoltage
			1h	OV - Overvoltage
			2h	OH - Inverter Overheat
			3h	OH2 - Inverter Overheat Warning
			4h	OL3 – Overtorque Detection 1
			5h	OL4 – Overtorque Detection 2
			6h	EF - 2-wire Sequence Input Fault
			7h	BB - Baseblock
			8h	EF3 - External Fault 3
			9h	EF4 - External Fault 4
			Ah	EF5 - External Fault 5
			Bh	EF6 - External Fault 6
			Ch	EF7 - External Fault 7
			Dh	Reserved
			Eh	Reserved
			Fh	OS - Overspeed
	001Ah	Minor Fault Contents 2	0h	DEV - Speed Deviation
			1h	PGO - Encoder (PG) Feedback Loss
			2h	OPR - Operator Disconnected
			3h	CE - Communication Loss
			4h	BUS - Communication Option Card Fault
			5h	CALL - Waiting for Communications
			6h	OL1 - Motor Overload
			7h	OL2 - Inverter Overload
			8h	E-15 - SI-F/G Communication Fault
			9h	E-10 - SI-F/G Fault
			Ah	Motor Switch (Attempting to switch Motor 1/2 during Run. “Motor Running” is flashed on the keypad. See Motor 2 Selection, H1-XX = 16)
			Bh	FBL - PID Feedback Loss
			Ch	CALL - Waiting for Initial Communication after Power Up
			Dh	UL3 - Undertorque Detection 1
			Eh	UL4 - Undertorque Detection 2
			Fh	Communication Test Fault (Attempting to perform communication self-test during run. “SE” is flashed on the keypad. See Communication Self-test, H1-XX = 67)

Table 4.3 G7 Monitor Registers (Read only)				
U-##	**Addr.**	**Function**	**Bit**	**Description**
	001Bh	Minor Fault Contents 3	0h	OH3 - Motor Overheat Alarm
			1h	Drive Not Enabled (Attempting to run when drive Enable input is not closed. See drive Enable, H1-XX = 6A)
			2h-Fh	Reserved
	0020h	Inverter Status	0h	Run
			1h	Reverse Direction
			2h	Inverter Ready
			3h	Fault
			4h	Data Setting Error
			5h	Multi-Function Digital Output 1 (M1-M2)
			6h	Multi-Function Digital Output 2 (M3-M4)
			7h	Multi-Function Digital Output 3 (M5-M6)
			8h	Multi-Function Digital Output 4 (P3-C3)
			9h	Multi-Function Digital Output 5 (P4-C4)
			Ah-Fh	Reserved
	0021h	Fault Contents	0h	OC or GF - Overcurrent/Ground Fault
			1h	OV - Overvoltage
			2h	OL2 - Inverter Overload
			3h	OH1 or OH2 - Overheat Fault
			4h	RR or RH - Braking Resistor Fault
			5h	PUF - DC Bus Fuse Failure
			6h	FBL - PID Feedback Loss
			7h	EFx or EFO - External Fault
			8h	CPF - Control Board Hardware Fault
			9h	OL1, or OL3, or OL4 - Motor Overload/Overtorque 1 or 2
			Ah	PGO, OS, or DEV - Speed Feedback
			Bh	UV - Undervoltage
			Ch	UV1, UV2, or UV3 - Undervoltage
			Dh	SPI or SPO - Input/Output Phase Loss
			Eh	CE - Communication Loss
			Fh	OPR - Operator Disconnected
	0022h	Data Link Status	0	Writing Data
			1	Reserved
			2	Reserved
			3	Upper or Lower Data Limit Error
			4	Data Integrity Error
			5h-Fh	Reserved
U1-01	0023h	Frequency Reference Monitor	-	Scaling Dependent Upon o1-03 Setting
U1-02	0024h	Output Frequency Monitor	-	Scaling Dependent Upon o1-03 Setting
U1-06	0025h	Output Voltage Reference Monitor	-	Scaling Dependent Upon H5-10 Setting
U1-03	0026h	Output Current Monitor	-	Units 0.01A
U1-08	0027h	Output Power Monitor	-	Units 0.1kW
U1-09	0028h	Torque Reference Monitor	-	Units 0.1%

Table 4.3 G7 Monitor Registers (Read only)				
U-##	**Addr.**	**Function**	**Bit**	**Description**
	002Bh	Digital Input Status	0h	Terminal S1 Closed
			1h	Terminal S2 Closed
			2h	Terminal S3 Closed
			3h	Terminal S4 Closed
			4h	Terminal S5 Closed
			5h	Terminal S6 Closed
			6h	Terminal S7 Closed
			7h	Terminal S8 Closed
			8h	Terminal S9 Closed
			9h	Terminal S10 Closed
			Ah	Terminal S11 Closed
			Bh	Terminal S12 Closed
			Ch-Fh	Reserved
	002Ch	Inverter Status	0h	During Run 1 (H2-0X = 0)
			1h	Zero Speed (H2-0X = 1)
			2h	Speed Agree 1 (H2-0X = 2)
			3h	Fref/Set Speed Agree 1 (H2-0X = 3)
			4h	Frequency Detection 1 (H2-0X = 4)
			5h	Frequency Detection 2 (H2-0X = 5)
			6h	Inverter Ready (H2-0X = 6)
			7h	Undervoltage (H2-0X = 7)
			8h	Baseblock (H2-0X = 8)
			9h	Frequency Reference from Digital Operator (H2-0X = 9)
			Ah	Run Command from Digital Operator (H2-0X = A)
			Bh	Overtorque Detection 1 (H2-0X = B)
			Ch	Loss of Frequency Reference (H2-0X = C)
			Dh	During Fault Retry
			Eh	Fault
			Fh	Communication Timeout (CE Fault)
	002Dh	Digital Output Status	0h	Multi-Function Digital Output 1 (M1-M2)
			1h	Multi-Function Digital Output 2 (M3-M4)
			2h	Multi-Function Digital Output 3 (M5-M6)
			3h	Multi-Function Digital Output 4 (P3-C3)
			4h	Multi-Function Digital Output 5 (P4-C4)
			5h-Fh	Reserved
U1-07	0031h	Main Circuit DC Bus Voltage	-	Units 1.0VDC
U1-18	0032h	Motor Secondary Current	-	Units 0.1%
U1-08	0033h	Output Power	-	Units 0.1kW
U1-24	0038h	PID Feedback Level	-	10 / 1% with sign, 100% = E1-04
U1-36	0039h	PID Input Level	-	10 / 1% with sign, ±100% / ±E1-04
U1-37	003Ah	PID Output Level	-	10 / 1% with sign, ±100% / ±E1-04
U1-28	003Bh	Drive CPU Number	-	Last 5 Digits CPU Software Number
U1-14	003Ch	Drive Software Number	-	Last 5 Digits of Software Number
	003Dh	Communication Error	0h	CRC Error
			1h	Invalid Data Length Error
			2h	Reserved
			3h	Parity Error
			4h	Overrun Error
			5h	Framing Error
			6h	Timeout
			7h-Fh	Reserved
o2-04	003Eh	kVA Setting	-	Same Data as Parameter o2-04
U1-04	003Fh	Control Mode	-	Range = 0 ~ 4. See A1-02
U1-01	0040h	Frequency Reference	-	Scaling Dependent Upon o1-03 Setting
U1-02	0041h	Output Frequency	-	Scaling Dependent Upon o1-03 Setting
U1-03	0042h	Output Current	-	Units 0.1A
U1-04	0043h	Control Mode	-	Range = 0 ~ 4. See A1-02
U1-05	0044h	Motor Speed	-	Scaling Dependent Upon o1-03 Setting

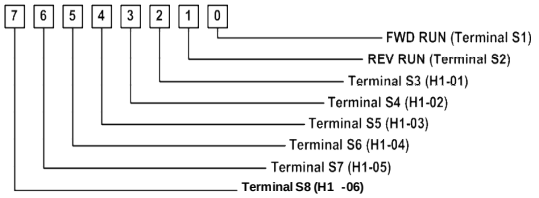
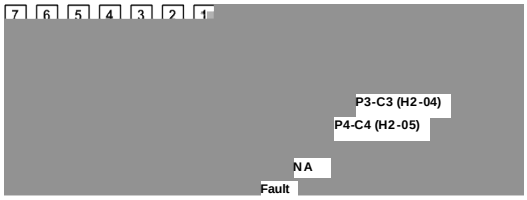
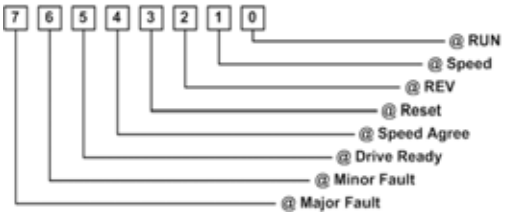
Table 4.3 G7 Monitor Registers (Read only)					
U-##	**Addr.**	**Function**	**Bit**	**Description**	
U1-06	0045h	Output Voltage Reference	-	Units 0.1VAC	
U1-07	0046h	DC Bus Voltage	-	Units 1.0VDC	
U1-08	0047h	Output Power	-	Units 0.1kW	
U1-09	0048h	Torque Reference	-	Units 0.1%	
U1-10	0049h	Digital Input Terminal Status	0h	Terminal S1	
			1h	Terminal S2	
			2h	Terminal S3	
			3h	Terminal S4	
			4h	Terminal S5	
			5h	Terminal S6	
			6h	Terminal S7	
			7h	Terminal S8	
			8h	Reserved	
			9h	Reserved	
			Ah	Reserved	
			Bh	Reserved	
			Ch	Reserved	
			Dh	Reserved	
			Eh	Reserved	
			Fh	Reserved	
U1-11	004Ah	Digital Output Terminal Status	0h	Multi-function Digital Output 1 (M1-M2)	
			1h	Multi-function Digital Output 2 (M3-M4)	
			2h	Multi-function Digital Output 3 (M5-M6)	
			3h	Multi-function Digital Output 4 (P3-C3)	
			4h	Multi-function Digital Output 5 (P4-C4)	
			5h	Reserved	
			6h	Reserved	
			7h	Fault Output	
			8h	Reserved	
			9h	Reserved	
			Ah	Reserved	
			Bh	Reserved	
			Ch	Reserved	
			Dh	Reserved	
			Eh	Reserved	
			Fh	Reserved	
U1-12	004Bh	drive Operation Status	0h	Run	
			1h	Zero Speed	
			2h	Reverse Direction	
			3h	Fault Reset	
			4h	Speed Agree	
			5h	Inverter Ready	
			6h	Minor Fault (Alarm)	
			7h	Major Fault	
			8h	Reserved	
			9h	Reserved	
			Ah	Reserved	
			Bh	Reserved	
			Ch	Reserved	
			Dh	Reserved	
			Eh	Reserved	
			Fh	Reserved	
U1-13	004Ch	Elapsed Time	-	Units 1.0hr	
U1-14	004Dh	Drive Software Number	-	Last 5 Digits of Drive Software Number	

Table 4.3 G7 Monitor Registers (Read only)				
U-##	**Addr.**	**Function**	**Bit**	**Description**
U1-15	004Eh	Analog Input Terminal A1 Level	-	Units 0.1%
U1-16	004Fh	Analog Input Terminal A2 Level	-	Units 0.1%
U1-17	0050h	Analog Input Terminal A3 Level	-	Units 0.1%
U1-18	0051h	Motor Secondary Current (Iq)	-	Units 0.1%
U1-19	0052h	Motor Excitation Current (Id)	-	Units 0.1%
U1-20	0053h	Frequency Reference After Soft Starter	-	Units 0.01Hz
U1-21	0054h	ASR (Speed Regulator) Input	-	Units 0.01%
U1-22	0055h	ASR (Speed Regulator) Output	-	Units 0.01%
U1-24	0057h	PID Feedback	-	Units 0.01%
U1-25	0058h	DI-16H2 Reference	-	Scaling Dependent Upon F3-01 Setting
U1-26	0059h	Voltage Reference (Vq)	-	Units 0.1VAC
U1-27	005Ah	Voltage Reference (Vd)	-	Units 0.1VAC
U1-28	005Bh	Drive CPU Number	-	Last 5 Digits of CPU Software Number
U1-29	005Ch	Accumulated kWh	-	Units 1.0kWh
U1-30	005Dh	Accumulated MWh	-	Units 1.0MWh
U1-32	005Fh	ACR (q) Output	-	Units 0.1%
U1-33	0060h	ACR (d) Output	-	Units 0.1%
U1-34	0061h	First Parameter Causing an OPE Fault	-	Modbus Address of Parameter Causing OPE Fault
U1-35	0062h	Zero Servo Pulse Count	-	Units are Quadrature Pulse Counts
U1-36	0063h	PID Input	-	Units 0.01%
U1-37	0064h	PID Output	-	Units 0.01%
U1-38	0065h	PID Setpoint	-	Units 0.01%
U1-39	0066h	Communication Error Code	0	CRC Error
			1	Data Length Error
			2	Reserved
			3	Parity Error
			4	Over-run Error
			5	Framing Error
			6	Timeout Error
			7h-Fh	Reserved
U1-40	0067h	Heatsink Cooling Fan Operation Time	-	Units 1.0hr
U1-42	0069h	Estimated Motor Flux	-	Units 0.1%
U1-43	006Ah	Motor Flux Compensation	-	Units 0.1%
U1-44	006Bh	ASR Output Without Filtering	-	Units 0.01%
U1-45	006Ch	Feed Forward Control Output	-	Units 0.01%
U1-48	006Fh	Stabilizing Speed During Regeneration (Open Loop Vector 2 Only)	-	Units 0.1Hz
U1-50	0070h	CF Error (Open Loop Vector 2 Only)	-	00: Deceleration Error 01: Flux estimation fault 02: Start status error 04: Observer gain adjustment error 08: Regeneration error at low speeds 10: Zero Speed error 20: Rotational direction limit error 80: Vector control status error
U1-90	0720h	CASE Monitor 1	-	Custom Units - Refer to Specific CASE Software Documentation
U1-91	0721h	CASE Monitor 2	-	Custom Units - Refer to Specific CASE Software Documentation
U1-92	0722h	CASE Monitor 3	-	Custom Units - Refer to Specific CASE Software Documentation
U1-93	0723h	CASE Monitor 4	-	Custom Units - Refer to Specific CASE Software Documentation
U1-94	0724h	CASE Monitor 5	-	Custom Units - Refer to Specific CASE Software Documentation
U1-95	0725h	CASE Monitor 6	-	Custom Units - Refer to Specific CASE Software Documentation
U1-96	0726h	CASE Monitor 7	-	Custom Units - Refer to Specific CASE Software Documentation
U1-97	0727h	CASE Monitor 8	-	Custom Units - Refer to Specific CASE Software Documentation
U1-98	0728h	CASE Monitor 9	-	Custom Units - Refer to Specific CASE Software Documentation
U1-99	0729h	CASE Monitor 10	-	Custom Units - Refer to Specific CASE Software Documentation
U2-01	0080h	Current Fault	-	See Table 4.17
U2-02	0081h	Previous Fault	-	See Table 4.17
U2-03	0082h	Frequency Reference at Previous Fault	-	Units 0.01Hz
U2-04	0083h	Output Frequency at Previous Fault	-	Units 0.01Hz

Table 4.3 G7 Monitor Registers (Read only)				
U-##	**Addr.**	**Function**	**Bit**	**Description**
U2-05	0084h	Output Current at Previous Fault	-	Units 0.1A
U2-06	0085h	Motor Speed at Previous Fault	-	Units 0.01Hz
U2-07	0086h	Output Voltage at Previous Fault	-	Units 0.1VAC
U2-08	0087h	DC Bus Voltage at Previous Fault	-	Units 1.0 VDC
U2-09	0088h	Output Power at Previous Fault	-	Units 0.1kW
U2-11	008Ah	Input Terminal Status at Previous Fault	-	See U1-10 Description
U2-12	008Bh	Output Terminal Status at Previous Fault	-	See U1-11 Description
U2-13	008Ch	drive Operation Status at Previous Fault	-	See U1-12 Description
U2-14	008Dh	Elapsed Time at Previous Fault	-	Units 1.0hr
U3-01	0800h	Most Recent Fault	-	See Table 4.17
U3-02	0801h	2nd Most Recent Fault	-	See Table 4.17
U3-03	0802h	3rd Most Recent Fault	-	See Table 4.17
U3-04	0803h	4th Most Recent Fault	-	See Table 4.17
U3-05	080Ah	Elapsed Time at Most Recent Fault	-	Units 1.0hr
U3-06	080Bh	Elapsed Time at 2nd Most Recent Fault	-	Units 1.0hr
U3-07	080Ch	Elapsed Time at 3rd Most Recent Fault	-	Units 1.0hr
U3-08	080Dh	Elapsed Time at 4th Most Recent Fault	-	Units 1.0hr
U3-09	0804h	5th Most Recent Fault	-	See Table 4.17
U3-10	0805h	6th Most Recent Fault	-	See Table 4.17
U3-11	0806h	7th Most Recent Fault	-	See Table 4.17
U3-12	0807h	8th Most Recent Fault	-	See Table 4.17
U3-13	0808h	9th Most Recent Fault	-	See Table 4.17
U3-14	0809h	10th Most Recent Fault	-	See Table 4.17
U3-15	080Eh	Elapsed Time at 5th Most Recent Fault	-	Units 1.0 hr
U3-16	080Fh	Elapsed Time at 6th Most Recent Fault	-	Units 1.0 hr
U3-17	0810h	Elapsed Time at 7th Most Recent Fault	-	Units 1.0 hr
U3-18	0811h	Elapsed Time at 8th Most Recent Fault	-	Units 1.0 hr
U3-19	0812h	Elapsed Time at 9th Most Recent Fault	-	Units 1.0 hr
U3-20	0813h	Elapsed Time at 10th Most Recent Fault	-	Units 1.0 hr

Parameters (Read/Write)

The following table lists user accessible parameters for the G7 drive.

- The “Name” column contains the parameter name.
- The “Address” column contains the register address in hexadecimal format. G7 drive registers are always referred to in hexadecimal format.
- If the parameter values are chosen from a list of possible values, the list of choices can be found in the “Data” column. Parameter limits and a short description of the parameter function is contained in the “+/- Limits - Description” column.
- The “During Run” column describes whether the parameter can be written to while the Run command is active.
  - “R” - the parameter is writable during Run.
  - Blank - the parameter is Read Only during Run.
- The “Access” columns describe the accessibility and access level for a given control mode (see A1-01 for access levels and A1-02 for control modes).
  - “A” - the parameter requires Advanced Access (A1-01 = 2)
  - “Q” - the parameter has Quick Access
  - Blank - the parameter is not accessible for that mode of operation

CAUTION

Read and understand the ***G7 Drive Technical Manual (TM.G7.01)*** and understand the ramifications of changing parameters via any network communication interface. The parameter and associated values in the tables below are for information purposes only. Parameters not listed in the tables below yet accessible via the digital operator must be changed via the digital operator. For information on a specific parameter and its function, refer to the ***G7 Drive Technical Manual***.

Table 4.4 "A" Parameters

Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
A1-00	0100h	Operator Language Selection	0	English	1	0		Q	Q	Q	Q	Q
			1	Japanese								
			2	Deutsch								
			3	Français								
			4	Italiano								
			5	Español								
			6	Português								
A1-01	0101h	Access Level	0	Operation Only	1	2		Q	Q	Q	Q	Q
			1	User Level (Q)								
			2	Advanced Level (A)								
A1-02	0102h	Control Method	0	V/F	1	2		Q	Q	Q	Q	Q
			1	V/F with Encoder Feedback								
			2	Open Loop Vector								
			3	Closed Loop Flux Vector								
			4	Open Loop Vector 2								
A1-03	0103h	Parameter Initialization	0	No Initialization	1	0		Q	Q	Q	Q	Q
			1110	User Initialize (Set A2-01 ~ A2-32, then set o2-04 = 1, then initialize)								
			2220	2-wire Initialize								
			3330	3-wire Initialize								
A1-04	0104h	Enter Password	0 ~ 9999		1	0		Q	Q	Q	Q	Q
A1-05	0105h	Set Password	0 ~ 9999		1	0		Q	Q	Q	Q	Q
A2-01	0106h	User Parameter 1	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-02	0107h	User Parameter 2	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-03	0108h	User Parameter 3	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-04	0109h	User Parameter 4	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-05	010Ah	User Parameter 5	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-06	010Bh	User Parameter 6	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-07	010Ch	User Parameter 7	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-08	010Dh	User Parameter 8	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-09	010Eh	User Parameter 9	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-10	010Fh	User Parameter 10	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-11	0110h	User Parameter 11	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-12	0111h	User Parameter 12	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-13	0112h	User Parameter 13	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-14	0113h	User Parameter 14	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-15	0114h	User Parameter 15	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-16	0115h	User Parameter 16	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-17	0116h	User Parameter 17	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-18	0117h	User Parameter 18	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-19	0118h	User Parameter 19	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-20	0119h	User Parameter 20	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-21	011Ah	User Parameter 21	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-22	011Bh	User Parameter 22	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-23	011Ch	User Parameter 23	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-24	011Dh	User Parameter 24	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-25	011Eh	User Parameter 25	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-26	011Fh	User Parameter 26	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-27	0120h	User Parameter 27	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-28	0121h	User Parameter 28	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-29	0122h	User Parameter 29	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-30	0123h	User Parameter 30	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-31	0124h	User Parameter 31	0h ~ 6ffh		0.01	0h		A	A	A	A	A
A2-32	0125h	User Parameter 32	0h ~ 6ffh		0.01	0h		A	A	A	A	A

Table 4.5 "B" Parameters

Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV 2
b1-01	0180h	Reference Source	0	Operator	1	1		Q	Q	Q	Q	Q
			1	Terminals								
			2	Modbus Communication								
			3	Option Card								
			4	Pulse Input								
b1-02	0181h	Run Source	0	Operator	1	1		Q	Q	Q	Q	Q
			1	Terminals								
			2	Modbus Communication								
			3	Option Card								
b1-03	0182h	Stopping Method	0	Ramp to Stop	1	0		Q	Q	Q	Q	Q
			1	Coast to Stop								
			2	DC Injection to Stop								
			3	Coast with Timer								
b1-04	0183h	Reverse Operation	0	Reverse Enabled	1	0		A	A	A	A	A
			1	Reverse Disabled								
b1-05	0184h	Zero-Speed Operation	0	Run at Frequency Ref	1	0					A	
			1	Stop								
			2	Run at Minimum Frequency								
			3	Run at Zero RPM								
b1-06	0185h	Digital Input Scan Time	0	1 Scan (2.5 ms)	1	1		A	A	A	A	A
			1	2 Scans (5.0 ms)								
b1-07	0186h	Local / Remote Run Selection	0	Cycle External Run	1	0		A	A	A	A	A
			1	Accept External Run								
b1-08	0187h	Run Command at Programming Mode	0	Disabled	1	0		A	A	A	A	A
			1	Enabled								
b1-10	01DEh	Zero Speed Operation Selection	0	Disabled	1	1						A
			1	Enabled								
b2-01	0189h	DC Injection Start Frequency	0.0 ~ 10.0 Hz		0.1 Hz	0.5 Hz		A	A	A	A	A
b2-02	018Ah	DC Injection Current	0 ~ 100 %		1 %	50 %		A	A	A		
b2-03	018Bh	DC Injection Time at Start	0.0 ~ 10.0 Sec		0.01 Sec	0.0 Sec		A	A	A	A	A
b2-04	018Ch	DC Injection Time at Stop	0.0 ~ 10.0 Sec		0.01 Sec	0.5 Sec		A	A	A	A	A
b2-08	0190h	Magnetic Flux Compensation Level at Start	0 ~ 1000 %		1 %	0 %				A		
b3-01	0191h	Automatic Speed Search at Start	0	Speed Search Frequency Method - Disable	1	2		A	A	A		A
			1	Speed Search Frequency Method - Enable								
			2	Speed Search Current Method - Disable								
			3	Speed Search Current Method - Enable								
b3-02	0192h	Speed Search Current (Current Detection Method)	0 ~ 200 %		1 %	Cntrl Meth		A		A		A
b3-03	0193h	Speed Search Decel Time (Current Detection Method)	0.1 ~ 10.0 Sec		0.1 Sec	2.0 Sec		A		A		
b3-05	0195h	Search Delay (Either Method)	0.0 ~ 20.0 Sec		0.1 Sec	kVA Dep.		A	A	A	A	A
b3-10	019Ah	Search Detect Compensation (Speed Detection Method)	1.0 ~ 1.2		0.01	1.1		A		A		A
b3-13	019Dh	Observer Proportional Gain N4-08 During Speed Search	0.1 ~ 2.0		0.1	1						A
b3-14	019Eh	Bi-directional Search Selection (Speed Detection Method)	0	Disabled	1	1		A	A	A		A
			1	Enabled								
b3-17	01F0h	Search Restart Current Level (Speed Detection Method)	0 ~ 200 %		1 %	150 %		A		A		A
b3-18	01F1h	Search Restart Detection Time (Speed Detection Method)	0.0 ~ 1.0 Sec		0.01 Sec	0.1 Sec		A		A		A

Table 4.5 "B" Parameters												
Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV 2
b3-19	01F2h	Number of Search Restarts (Speed Detection Method)	0 ~ 10		1	0		A		A		A
b3-20	01F3h	Search Priority During Under Current Detection (Speed Detection Method)	0	High Speed Priority	1	0						A
			1	Stop Priority								
b4-01	01A3h	Delay-On Timer	0.0 ~ 3000.0 Sec		0.1 Sec	0.0 Sec		A	A	A	A	A
b4-02	01A4h	Delay-Off Timer	0.0 ~ 3000.0 Sec		0.1 Sec	0.0 Sec		A	A	A	A	A
b5-01	01A5h	PID Mode Selection	0	Disabled	1	0		A	A	A	A	A
			1	Enabled, D = Feedback								
			2	Enabled, D = Feed Forward								
			3	Frequency Ref + PID D = Feedback								
			4	Frequency Ref + PID D= Feed Forward								
b5-02	01A6h	PID Proportional Gain	0.0 ~ 25.0		0.01	1	R	A	A	A	A	A
b5-03	01A7h	PID Integral Time	0.0 ~ 360.0 Sec		0.1 Sec	1.0 Sec	R	A	A	A	A	A
b5-04	01A8h	PID Integral Limit	0.0 ~ 100.0 %		0.1 %	100.0 %	R	A	A	A	A	A
b5-05	01A9h	PID Derivative Time	0.0 ~ 10.0 Sec		0.01 Sec	0.0 Sec	R	A	A	A	A	A
b5-06	01AAh	PID Limit	0.0 ~ 100.0 %		0.1 %	100.0 %	R	A	A	A	A	A
b5-07	01ABh	PID Offset	-100.0 ~ 100.0 %		0.1 %	0.0 %	R	A	A	A	A	A
b5-08	01ACh	PID Delay Time	0.0 ~ 10.0 Sec		0.01 Sec	0.0 Sec	R	A	A	A	A	A
b5-09	01ADh	PID Output Selection	0	Normal Output	1	0		A	A	A	A	A
			1	Inverse Output								
b5-10	01AEh	PID Output Gain	0.0 ~ 25.0		0.1	1		A	A	A	A	A
b5-11	01AFh	PID Output Reverse Selection	0	0 limit	1	0		A	A	A	A	A
			1	Reverse								
b5-12	01B0h	PID Feedback Loss Detection Selection	0	Disabled	1	0		A	A	A	A	A
			1	Alarm								
			2	Fault								
b5-13	01B1h	PID Feedback Loss Detection Level	0 ~ 100 %		1 %	0 %		A	A	A	A	A
b5-14	01B2h	PID Feedback Loss Detection Time	0.0 ~ 25.5 Sec		0.1 Sec	1.0 Sec		A	A	A	A	A
b5-15	01B3h	PID Sleep Level	0.0 ~ 400.0 Hz		0.1 Hz	0.0 Hz		A	A	A	A	A
b5-16	01B4h	PID Sleep Time	0.0 ~ 25.5 Sec		0.1 Sec	0.0 Sec		A	A	A	A	A
b5-17	01B5h	PID Accel/Decel Time	0.0 ~ 25.5 Sec		0.1 Sec	0.0 Sec		A	A	A	A	A
b5-18	01DCh	PID Setpoint b5-19 Selection	0	Disabled	1	0		A	A	A	A	A
			1	Enabled								
b5-19	01DDh	PID Setpoint	0.0 ~ 100.0 %		0.1 %	0.0 %		A	A	A	A	A
b6-01	01B6h	Dwell Reference at Start	0.0 ~ 400.0 Hz		0.1 Hz	0.0 Hz		A	A	A	A	A
b6-02	01B7h	Dwell Time at Start	0.0 ~ 10.0 Sec		0.1 Sec	0.0 Sec		A	A	A	A	A
b6-03	01B8h	Dwell Reference at Stop	0.0 ~ 400.0 Hz		0.1 Hz	0.0 Hz		A	A	A	A	A
b6-04	01B9h	Dwell Time at Stop	0.0 ~ 10.0 Sec		0.1 Sec	0.0 Sec		A	A	A	A	A
b7-01	01CAh	Droop Level	0.0 ~ 100.0 %		0.1 %	0.0 %	R				A	A
b7-02	01CBh	Droop Delay Time	0.03 ~ 2.0 Sec		0.01 Sec	0.05 Sec	R				A	A
b8-01	01CCh	Energy Savings Selection	0	Disabled	1	0		A	A	A	A	A
			1	Enabled								
b8-02	01CDh	Energy Savings Gain	0.0 ~ 10.0		0.1	Cntrl Meth	R			A	A	A
b8-03	01CEh	Energy Savings Filter Time	0.0 ~ 10.0 Sec		0.01 Sec	kVA Dep.	R			A	A	A
b8-04	01CFh	Energy Savings Coefficient	0.0 ~ 655.0		0.01	kVA Dep.		A	A			
b8-05	01D0h	Power Detection Filter Time	0 ~ 2000 ms		1 ms	20 ms		A	A			
b8-06	01D1h	Energy Savings Voltage Search Limit	0 ~ 100 %		1 %	0 %		A	A			
b9-01	01DAh	Zero Servo Gain	0 ~ 100		1	5					A	
b9-02	01DBh	Zero Servo Completion Width	0 ~ 16383 Counts		1 Count	10 Counts					A	

Table 4.6 "C" Parameters

Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
C1-01	0200h	Accel Time 1	0.0 ~ 6000.0 Sec		0.1 Sec	10.0 Sec	R	Q	Q	Q	Q	Q
C1-02	0201h	Decel Time 1	0.0 ~ 6000.0 Sec		0.1 Sec	10.0 Sec	R	Q	Q	Q	Q	Q
C1-03	0202h	Accel Time 2	0.0 ~ 6000.0 Sec		0.1 Sec	10.0 Sec	R	A	A	A	A	A
C1-04	0203h	Decel Time 2	0.0 ~ 6000.0 Sec		0.1 Sec	10.0 Sec	R	A	A	A	A	A
C1-05	0204h	Accel Time 3	0.0 ~ 6000.0 Sec		0.1 Sec	10.0 Sec		A	A	A	A	A
C1-06	0205h	Decel Time 3	0.0 ~ 6000.0 Sec		0.1 Sec	10.0 Sec		A	A	A	A	A
C1-07	0206h	Accel Time 4	0.0 ~ 6000.0 Sec		0.1 Sec	10.0 Sec		A	A	A	A	A
C1-08	0207h	Decel Time 4	0.0 ~ 6000.0 Sec		0.1 Sec	10.0 Sec		A	A	A	A	A
C1-09	0208h	Fast Stop Time	0.0 ~ 6000.0 Sec		0.1 Sec	10.0 Sec		A	A	A	A	A
C1-10	0209h	Accel/Decel Units	0	0.01 Seconds	1	1		A	A	A	A	A
			1	0.1 Seconds								
C1-11	020Ah	Accel/Decel Switchover Frequency	0.0 ~ 400.0 Hz		0.1 Hz	0.0 Hz		A	A	A	A	A
C2-01	020Bh	S-Curve at Accel Start	0.0 ~ 2.5 Sec		0.01 Sec	0.20 Sec		A	A	A	A	A
C2-02	020Ch	S-Curve at Accel End	0.0 ~ 2.5 Sec		0.01 Sec	0.20 Sec		A	A	A	A	A
C2-03	020Dh	S-Curve at Decel Start	0.0 ~ 2.5 Sec		0.01 Sec	0.20 Sec		A	A	A	A	A
C2-04	020Eh	S-Curve at Decel End	0.0 ~ 2.5 Sec		0.01 Sec	0.00 Sec		A	A	A	A	A
C3-01	020Fh	Slip Compensation Gain	0.0 ~ 2.5		0.1	Cntrl Meth	R	A		A	A	A
C3-02	0210h	Slip Compensation Filter Time	0 ~ 10000 ms		1 ms	Cntrl Meth		A		A		
C3-03	0211h	Slip Compensation Limit	0 ~ 250 %		1 %	200 %		A		A		
C3-04	0212h	Slip Compensation During Regeneration	0	Disabled	1	0		A		A		
			1	Enabled								
C3-05	0213h	Output Voltage Limit Selection	0	Disabled	1	0				A	A	A
			1	Enabled								
C4-01	0215h	Torque Compensation Gain	0.0 ~ 2.5		0.01	1.00	R	A	A	A		
C4-02	0216h	Torque Compensation Filter Time	0 ~ 10000 ms		1 ms	Cntrl Meth		A	A	A		
C4-03	0217h	Forward Direction Torque Compensation at Start	0.0 ~ 200.0 %		0.1 %	0.0 %				A		
C4-04	0218h	Reverse Direction Torque Compensation at Start	-200.0 ~ 0.0 %		0.1 %	0.0 %				A		
C4-05	0219h	Torque Compensation at Start Filter Time	0 ~ 200 ms		1 ms	10 ms				A		
C5-01	021Bh	ASR Proportional Gain 1	Cntrl Meth		0.01	Cntrl Meth	R		A		A	A
C5-02	021Ch	ASR Integral Time 1	0.000 ~ 10.000 Sec		0.001 Sec	Cntrl Meth	R		A		A	A
C5-03	021Dh	ASR Proportional Gain 2	Cntrl Meth		0.01	Cntrl Meth	R		A		A	A
C5-04	021Eh	ASR Integral Time 2	0.000 ~ 10.000 Sec		0.001 Sec	Cntrl Meth	R		A		A	A
C5-05	021Fh	ASR Limit	0.0 ~ 20.0 %		0.1 %	0.0 %			A			
C5-06	0220h	ASR Filter Time	0.000 ~ 0.500 Sec		0.001 Sec	Cntrl Meth					A	A
C5-07	0221h	ASR Gain Switchover Frequency	0.0 ~ 400.0 Hz		0.1 Hz	0.0 Hz					A	A
C5-08	0222h	ASR Integral Limit	0 ~ 400 %		1 %	400 %					A	A
C5-10	0231h	ASR Filter Time 2	0.000 ~ 0.500 Sec		0.001 Sec	0.010 Sec						A
C6-02	0224h	Carrier Frequency Selection	1h	Fc=2.0kHz	1	kVA Dep.		Q	Q	Q	Q	Q
			2h	Fc=5.0kHz								
			3h	Fc=8.0kHz								
			4h	Fc=10.0kHz								
			5h	Fc=12.5kHz								
			6h	Fc=15.0kHz								
			Fh	C6-03 ~ C6-05								
C6-03	0225h	Carrier Frequency Maximum	0.4 ~ 15.0 kHz (kVA Dependent)		0.1 kHz	kVA Dep.		A	A	A	A	
C6-04	0226h	Carrier Frequency Minimum	0.4 ~ 15.0 kHz (kVA Dependent)		0.1 kHz	kVA Dep.		A	A			
C6-05	0227h	Carrier Frequency Gain	0 ~ 99		1	0		A	A			

Table 4.7 "D" Parameters												
Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
d1-01	0280h	Frequency Reference 1	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	Q	Q	Q	Q	Q
d1-02	0281h	Frequency Reference 2	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	Q	Q	Q	Q	Q
d1-03	0282h	Frequency Reference 3	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	Q	Q	Q	Q	Q
d1-04	0283h	Frequency Reference 4	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	Q	Q	Q	Q	Q
d1-05	0284h	Frequency Reference 5	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	A	A	A	A	A
d1-06	0285h	Frequency Reference 6	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	A	A	A	A	A
d1-07	0286h	Frequency Reference 7	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	A	A	A	A	A
d1-08	0287h	Frequency Reference 8	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	A	A	A	A	A
d1-09	0288h	Frequency Reference 9	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	A	A	A	A	A
d1-10	028Bh	Frequency Reference 10	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	A	A	A	A	A
d1-11	028Ch	Frequency Reference 11	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	A	A	A	A	A
d1-12	028Dh	Frequency Reference 12	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	A	A	A	A	A
d1-13	028Eh	Frequency Reference 13	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	A	A	A	A	A
d1-14	028Fh	Frequency Reference 14	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	A	A	A	A	A
d1-15	0290h	Frequency Reference 15	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	A	A	A	A	A
d1-16	0291h	Frequency Reference 16	0.0 ~ 400.0 Hz		0.01 Hz	0.0 Hz	R	A	A	A	A	A
d1-17	0292h	Jog Frequency Reference	0.0 ~ 400.0 Hz		0.01 Hz	6.0 Hz	R	Q	Q	Q	Q	Q
d2-01	0289h	Frequency Reference Upper Limit	0.0 ~ 110.0 %		0.1 %	100.0 %		A	A	A	A	A
d2-02	028Ah	Frequency Reference Lower Limit	0.0 ~ 110.0 %		0.1 %	0.0 %		A	A	A	A	A
d2-03	0293h	Analog Input Frequency Reference Lower Limit	0.0 ~ 110.0 %		0.1 %	0.0 %		A	A	A	A	A
d3-01	0294h	Jump Frequency 1	0.0 ~ 400.0 Hz		0.1 Hz	0.0 Hz		A	A	A	A	A
d3-02	0295h	Jump Frequency 2	0.0 ~ 400.0 Hz		0.1 Hz	0.0 Hz		A	A	A	A	A
d3-03	0296h	Jump Frequency 3	0.0 ~ 400.0 Hz		0.1 Hz	0.0 Hz		A	A	A	A	A
d3-04	0297h	Jump Bandwidth	0.0 ~ 20.0 Hz		0.1 Hz	1.0 Hz		A	A	A	A	A
d4-01	0298h	MOP Reference Memory Selection	0	Disabled	1	0		A	A	A	A	A
			1	Enabled								
d4-02	0299h	Trim Control Level	0 ~ 100 %		1 %	10 %		A	A	A	A	A
d5-01	029Ah	Torque Control Selection	0	Speed Control	1 ms	0 ms					A	A
			1	Torque Control								
d5-02	029Bh	Torque Reference Filter Time	0 ~ 1000 ms		1 ms	Cntrl Meth					A	A
d5-03	029Ch	Speed Limit Selection	1	Soft Starter Output	1	1					A	A
			2	d5-04 Setting								
d5-04	029Dh	Speed Limit Value	-120 ~ 120 %		1 %	0 %					A	A
d5-05	029Eh	Speed Limit Bias	0 ~ 120 %		1 %	10 %					A	A
d5-06	029Fh	Speed/Torque Changeover Hold Time	0 ~ 1000 ms		1 ms	0 ms					A	A
d5-07	02A6h	Directional Speed Limit Selection	0	Disabled	1	1						A
			1	Enabled								
d6-01	02A0h	Field-Weakening Level	0 ~ 100 %		1 %	80 %		A	A			
d6-02	02A1h	Field-Weakening Frequency	0.0 ~ 400.0 Hz		0.1 Hz	0.0 Hz		A	A			
d6-03	02A2h	Field Forcing Selection	0	Disabled	1	0				A	A	A
			1	Enabled								
d6-05	02A4h	AΦR Time Gain	0.0 ~ 10.0		0.01	1						A
d6-06	02A5h	Field Forcing Limit	100 ~ 400 %		1 %	400 %				A	A	A

Table 4.8 "E" Parameters												
Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
E1-01	0300h	Input Voltage	0.0 ~ 255.0/510.0 VAC		1 VAC	kVA Dep.		Q	Q	Q	Q	Q
E1-04	0303h	Maximum Frequency	40.0 ~ 400.0 Hz		0.1 Hz	60.0 Hz		Q	Q	Q	Q	Q
E1-05	0304h	Maximum Voltage	0.0 ~ 255.0/510.0 VAC		0.1 VAC	kVA Dep.		Q	Q	Q	Q	Q
E1-06	0305h	Base Frequency	0.0 ~ 400.0 Hz		0.1 Hz	60.0 Hz		Q	Q	Q	Q	Q
E1-07	0306h	Midpoint Frequency A	0.0 ~ 400.0 Hz		0.1 Hz	Cntrl Meth		A	A	A		
E1-08	0307h	Midpoint Voltage A	0.0 ~ 255.0/510.0 VAC		0.1 VAC	Cntrl Meth		A	A	A		
E1-09	0308h	Minimum Frequency	0.0 ~ 400.0 Hz		0.1 Hz	Cntrl Meth		Q	Q	Q	A	Q
E1-10	0309h	Minimum Voltage	0.0 ~ 255.0/510.0 VAC		0.1 VAC	Cntrl Meth		A	A	A		
E1-11	030Ah	Midpoint Frequency B	0.0 ~ 400.0 Hz		0.1 Hz	0.0 Hz		A	A	A	A	A
E1-12	030Bh	Midpoint Voltage B	0.0 ~ 255.0/510.0 VAC		0.1 VAC	0.0 VAC		A	A	A	A	A
E1-13	030Ch	Base Voltage	0.0 ~ 255.0/510.0 VAC		0.1 VAC	0.0 VAC		A	A	Q	Q	Q
E2-01	030Eh	Motor Rated FLA	kVA Dep.		0.01 A	kVA Dep.		Q	Q	Q	Q	Q
E2-02	030Fh	Motor Rated Slip	0.00 ~ 20.00 Hz		0.01 Hz	kVA Dep.		A	A	A	A	A
E2-03	0310h	No-Load Current	kVA Dep.		0.1 A	kVA Dep.		A	A	A	A	A
E2-04	0311h	Number of Poles	2 ~ 48		1	4			Q		Q	Q
E2-05	0312h	Terminal Resistance	0.000 ~ 65.000 Ohm		0.001 Ohm	kVA Dep.		A	A	A	A	A
E2-06	0313h	Leakage Inductance	0.0 ~ 40.0 %		0.1 %	kVA Dep.				A	A	A
E2-07	0314h	Saturation Compensation 1	0.00 ~ 0.50		0.01	0.50				A	A	A
E2-08	0315h	Saturation Compensation 2	0.00 ~ 0.75		0.01	0.75				A	A	A
E2-09	0316h	Mechanical Loss	0.0 ~ 10.0 %		0.1 %	0.0 %				A	A	A
E2-10	0317h	Motor Iron Loss	0 ~ 65535 W		1 W	kVA Dep.		A	A			
E2-11	0318h	Motor Rated Power	0.00 ~ 650.00 kW		0.01 kW	kVA Dep.		Q	Q	Q	Q	Q
E2-12	0328h	Saturation Compensation 3	1.30 ~ 5.00		0.01	1.30				A	A	A
E3-01	0319h	Control Method (Motor 2)	0	V/F	1	2		A	A	A	A	A
			1	V/F w/PG								
			2	Open Loop Vector								
			3	Flux Vector								
			4	Open Loop Vector 2								
E3-02	031Ah	Maximum Frequency (Motor 2)	40.0 ~ 400.0 Hz		0.1 Hz	60.0 Hz		A	A	A	A	A
E3-03	031Bh	Maximum Voltage (Motor 2)	0.0 ~ 255.0/510.0 VAC		0.1 VAC	230.0 VAC		A	A	A	A	A
E3-04	031Ch	Base Frequency (Motor 2)	0.0 ~ 400.0 Hz		0.1 Hz	60.0 Hz		A	A	A	A	A
E3-05	031Dh	Midpoint Frequency A (Motor 2)	0.0 ~ 400.0 Hz		0.1 Hz	Cntrl Meth		A	A	A		
E3-06	031Eh	Midpoint Voltage A (Motor 2)	0.0 ~ 255.0/510.0 VAC		0.1 VAC	Cntrl Meth		A	A	A		
E3-07	031Fh	Minimum Frequency (Motor 2)	0.0 ~ 400.0 Hz		0.1 Hz	Cntrl Meth		A	A	A	A	A
E3-08	0320h	Minimum Voltage (Motor 2)	0.0 ~ 255.0/510.0 VAC		0.1 VAC	Cntrl Meth		A	A	A		
E4-01	0321h	Motor Rated FLA (Motor 2)	kVA Dep.		0.1 A	kVA Dep.		A	A	A	A	A
E4-02	0322h	Motor Rated Slip (Motor 2)	0.0 ~ 20.0 Hz		0.01 Hz	kVA Dep.		A	A	A	A	A
E4-03	0323h	No-Load Current (Motor 2)	kVA Dep.		0.01 A	kVA Dep.		A	A	A	A	A
E4-04	0324h	Number of Poles (Motor 2)	2 ~ 48		1	4			A		A	A
E4-05	0325h	Terminal Resistance (Motor 2)	0.000 ~ 65.000 Ohm		0.001 Ohm	kVA Dep.		A	A	A	A	A
E4-06	0327h	Leakage Inductance (Motor 2)	0.0 ~ 40.0 %		0.1 %	kVA Dep.		A	A	A	A	A
E4-07	0328h	Motor Rated Power (Motor 2)	0.00 ~ 650.00 kW		0.01 kW	kVA Dep.		A		A	A	A
E4-08	0329h	Slip Compensation Gain (Motor 2)	0.0 ~ 2.50		0.01	Cntrl Meth	R		A		A	A
E4-09	033Fh	ASR Proportional Gain (Motor 2)	Cntrl Meth		0.01	Cntrl Meth	R		A		A	A
E4-10	033Fh	ASR Integral Time (Motor 2)	0.000 ~ 10.000 Sec		0.001 Sec	Cntrl Meth	R		A		A	A
E4-11	0326h	Torque Compensation Gain (Motor 2)	0.00 ~ 2.50		0.01	1.00	R			A	A	A

Table 4.9 "F" Parameters

Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
F1-01	0380h	PG Pulses/Revolution	0 ~ 60000 Pulses		1 Pulse	1024 Pulses			Q		Q	
F1-02	0381h	PG Feedback Loss Selection (PGO)	0	Ramp to Stop	1	1			A		A	
			1	Coast to Stop								
			2	Fast-Stop (C1-09)								
			3	Alarm Only								
F1-03	0382h	PG Overspeed Selection (OS)	0	Ramp to Stop	1	1			A		A	A
			1	Coast to Stop								
			2	Fast-Stop (C1-09)								
			3	Alarm Only								
F1-04	0383h	PG Speed Deviation Selection (DEV)	0	Ramp to Stop	1	3			A		A	A
			1	Coast to Stop								
			2	Fast-Stop (C1-09)								
			3	Alarm Only								
F1-05	0384h	PG Rotation Selection	0	Forward = C.C.W.	1	0			A		A	
			1	Forward = C.W.								
F1-06	0385h	PG Output Ratio (PG-B2 Only)	1 ~ 132		1	1			A		A	
F1-07	0386h	PG Accel/Decel ASR Integral Selection	0	Disabled	1	0			A			
			1	Enabled								
F1-08	0387h	PG Overspeed Level	0 ~ 120 %		1 %	115 %			A		A	A
F1-09	0388h	PG Overspeed Time	0.0 ~ 2.0 Sec		0.1 Sec	1.0 Sec			A		A	A
F1-10	0389h	PG Deviation Level	0 ~ 50 %		1 %	10 %			A		A	A
F1-11	038Ah	PG Deviation Time	0.0 ~ 10.0 Sec		0.1 Sec	0.5 Sec			A		A	A
F1-12	038Bh	PG Gear Teeth 1	0 ~ 1000		1	0			A			
F1-13	038Ch	PG Gear Teeth 2	0 ~ 1000		1	0			A			
F1-14	038Dh	PG Feedback Loss Detection Time	0.0 ~ 10.0 Sec		0.1 Sec	2.0 Sec			A		A	
F1-21	03B0h	PG Pulses/Revolution (Motor 2)	0 ~ 60000 Pulses		1 Pulse	1024 Pulses			Q		Q	
F1-22	03B1h	PG Rotation Selection (Motor 2)	0	Forward = C.C.W.	1	0			Q		Q	
			1	Forward = C.W.								
F1-23	03B2h	PG Gear Teeth 1 (Motor 2)	0 ~ 1000		1	0			A			
F1-24	03B3h	PG Gear Teeth 2 (Motor 2)	0 ~ 1000		1	0			A			
F1-25	03B4h	Hardware PG Feedback Loss (PGOH) Channel 1 (PG-T2/Z2 Only)	0	Disabled	1	1			A		A	
			1	Enabled								
F1-26	03B5h	Hardware PG Feedback Loss (PGOH) Channel 2 (PG-Z2 Only)	0	Disabled	1	1			A		A	
			1	Enabled								
F2-01	038Fh	AI-14B Option Kit Input Selection	0	3-channel Individual	1	0		A	A	A	A	A
			1	3-channel Summed								
F3-01	0390h	DI-08/DI-16H2 Option Kit Input Type Selection	0	BCD 1%	1	0		A	A	A	A	A
			1	BCD 0.1%								
			2	BCD 0.01%								
			3	BCD 1 Hz								
			4	BCD 0.1 Hz								
			5	BCD 0.01 Hz								
			6	BCD (5-digit) 0.01 Hz (DI-16H2 Only)								
			7	Binary								

Table 4.9 "F" Parameters

Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
F4-01	0391h	AO-08/AO-12 Option Kit Channel 1 Function Selection	1	Frequency Reference	1	02h		-	-	-	-	-
			2	Output Frequency								
			3	Output Current								
			5	Motor Speed								
			6	Output Voltage								
			7	DC Bus Voltage								
			8	Output Power (kW)								
			9	Torque Reference								
			15	Terminal A1 Level								
			16	Terminal A2 Level								
			17	Terminal A3 Level								
			18	Motor Secondary Current								
			19	Motor Excitation Current								
			20	Soft Starter (SFS) Output								
			21	ASR Input								
			22	ASR Output								
			24	PID Feedback								
			26	Voltage (Vq) Reference								
			27	Voltage (Vd) Reference								
			32	ACR (Iq) Output								
			33	ACR (Id) Output								
			36	PID Input								
			37	PID Output								
			38	PID Setpoint								
			42	Estimated Motor Flux								
			43	Id Compensation Value								
			44	ASR Output Without Filter								
			45	Feed Forward Output								
			48	Stabilizing Speed at Regeneration (OLV2)								
F4-02	0392h	AO-08/12 Channel 1 Gain	0.0 ~ 1000.0 %		0.1 %	100.0 %	R	A	A	A	A	A
F4-03	0393h	AO-08/12 Channel 2 Select	See F4-01		1	03h		A	A	A	A	A
F4-04	0394h	AO-08/12 Channel 2 Gain	0.0 ~ 1000.0 %		0.1 %	50.0 %	R	A	A	A	A	A
F4-05	0395h	AO-08/12 Channel 1 Bias	-110.0 ~ 110.0 %		0.1 %	0.0 %	R	A	A	A	A	A
F4-06	0396h	AO-08/12 Channel 2 Bias	-110.0 ~ 110.0 %		0.1 %	0.0 %	R	A	A	A	A	A
F4-07	0397h	AO-12 Channel 1 Signal Type Selection	0	0-10 VDC	1	0		A	A	A	A	A
			1	-10 +10 VDC								
F4-08	0398h	AO-12 Channel 2 Signal Type Selection	0	0-10 VDC	1	0		A	A	A	A	A
			1	-10 +10 VDC								

Table 4.9 "F" Parameters

Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
F5-01	0399h	DO-02C/DO-08 Option Kit Channel 1 Selection	0	During Run 1	1	0h		-	-	-	-	-
			1	Zero Speed								
			2	Fref/Fout Agree1								
			3	Fref/Set Agree 1								
			4	Frequency Detection 1								
			5	Frequency Detection 2								
			6	Inverter Ready								
			7	DC Bus Undervoltage								
			8	Baseblock 1								
			9	Option Reference								
			A	Remote Operation								
			B	Torque Detection 1 N.O.								
			C	Frequency Reference Loss								
			D	DB Overheat								
			E	Fault								
			F	Not Used								
			10	Minor Fault (Alarm)								
			11	Fault Reset Command Active								
			12	Timer Output								
			13	Fref/Fout Agree 2								
			14	Fref/Set Agree 2								
			15	Frequency Detection 3								
			16	Frequency Detection 4								
			17	Torque Detection 1 N.C.								
			18	Torque Detection 2 N.O.								
			19	Torque Detection 2 N.C.								
			1A	Reverse Direction								
			1B	Baseblock 2								
			1C	Motor 2 Selected								
			1D	Regenerating								
			1E	Restart Enabled								
			1F	Motor Overload (OL1)								
			20	OH Pre-alarm								
			37	During Run 2								
			38	drive Enable								
F5-02	039Ah	DO-02C/DO-08 Channel 2 Selection	See F5-01		1	01h		A	A	A	A	A
F5-03	039Bh	DO-08 Channel 3 Selection	See F5-01		1	02h		A	A	A	A	A
F5-04	039Ch	DO-08 Channel 4 Selection	See F5-01		1	04h		A	A	A	A	A
F5-05	039Dh	DO-08 Channel 5 Selection	See F5-01		1	06h		A	A	A	A	A
F5-06	039Eh	DO-08 Channel 6 Selection	See F5-01		1	37h		A	A	A	A	A
F5-07	039Fh	DO-08 Channel 7 Selection	See F5-01		1	0fh		A	A	A	A	A
F5-08	03A0h	DO-08 Channel 8 Selection	See F5-01		1	0fh		A	A	A	A	A
F5-09	03A1h	DO-08 Selection	0	8 Channel Fixed	1	0		A	A	A	A	A
			1	Binary Output								
			2	8 Channel Selectable (F5-01 ~ F5-08)								
F6-01	03A2h	Communication Bus Fault Selection (BUS)	0	Ramp to Stop	1	1		A	A	A	A	A
			1	Coast to Stop								
			2	Fast-Stop (C1-09)								
			3	Alarm Only								
F6-02	03A3h	EF0 Detection	0	Always Detected	1	0		A	A	A	A	A
			1	Only During Run								
F6-03	03A4h	EF0 Fault Selection	0	Ramp to Stop	1	1		A	A	A	A	A
			1	Coast to Stop								
			2	Fast-Stop (C1-09)								
			3	Alarm Only								

Table 4.9 "F" Parameters												
Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
F6-04	03A5h	Trace Sample Time (CP-916 Option Only)	0 ~ 60000		1	0		A	A	A	A	A
F6-05	03A6h	Output Current Unit Selection	0	Display in Amps	1	0		A	A	A	A	A
			1	100% / 8192								
F6-06	03A7h	Torque Reference/Limit From Option Card Selection	0	Disabled	1	0					A	A
			1	Enabled								
F6-08	03B6h	SI-T Communication Loss (E5) Selection	0	Ramp to Stop	1	1		A	A	A	A	A
			1	Coast to Stop								
			2	Fast-Stop								
			3	Alarm Only								
F6-09	03B7h	SI-T Communication Loss (E5) Retry Attempts	2 ~ 10		1	2		A	A	A	A	A

Table 4.10 "H" Parameters

Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
H1-01	0400h	Digital Input Terminal S3 Function Selection	0h	3-Wire Control	1	24h		-	-	-	-	-
			1h	Local/Remote Selection								
			2h	Option/Inverter Selection								
			3h	Multi-Step Reference 1								
			4h	Multi-Step Reference 2								
			5h	Multi-Step Reference 3								
			6h	Jog Frequency Reference								
			7h	Multi-Step Accel/Decel 1								
			8h	External Baseblock NO								
			9h	External Baseblock NC								
			Ah	Accel/Decel Ramp Hold								
			Bh	OH2 Alarm Signal								
			Ch	Terminal A2 Enable								
			Dh	V/F w/ PG Disabled								
			Eh	ASR Integral Reset								
			Fh	Terminal Not Used (Set for Network Use)								
			10h	MOP Increase								
			11h	MOP Decrease								
			12h	Forward Jog								
			13h	Reverse Jog								
			14h	Fault Reset								
			15h	Fast-Stop N.O.								
			16h	Motor 2 Selection								
			17h	Fast-Stop N.C.								
			18h	Timer Function Input								
			19h	PID Disable								
			1Ah	Multi-Step Accel/Decel 2								
			1Bh	Program Lockout								
			1Ch	Trim Control Increase								
			1Dh	Trim Control Decrease								
			1Eh	Analog Frequency Reference Sample Hold								
			20h	EFX- NO, Always, Ramp								
			21h	EFX- NC, Always, Ramp								
			22h	EFX- NO, Run, Ramp								
			23h	EFX- NC, Run, Ramp								
			24h	EFX- NO, Always, Coast								
			25h	EFX- NC, Always, Coast								
			26h	EFX- NO, Run, Coast								
			27h	EFX- NC, Run, Coast								
			28h	EFX- NO, Always, Fast Stop								
			29h	EFX- NC, Always, Fast Stop								
			2Ah	EFX- NO, Run, Fast Stop								
			2Bh	EFX- NC, Run, Fast Stop								
			2Ch	EFX- NO, Always, Alarm								
			2Dh	EFX- NC, Always, Alarm								
			2Eh	EFX- NO, Run, Alarm								
			2Fh	EFX- NC, Run, Alarm								
			30h	PID Integral Reset								
			31h	PID Integral Hold								
			32h	Multi-Step Reference 4								
			34h	PID SFS Cancel								
			35h	Input Level Selection								

Table 4.10 "H" Parameters

Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
H1-01	0400h	Digital Input Terminal S3 Function Selection	60h	DC Injection Braking Command	1	24h		-	-	-	-	-
			61h	Speed Search 1								
			62h	Speed Search 2								
			63h	Energy Savings Mode								
			64h	Speed Search 3								
			65h	KEB Ride Thru NC								
			66h	KEB Ride Thru NO								
			67h	Communication Self Test Mode								
			68h	High Slip Braking								
			69h	Jog 2 (3-wire Control)								
			6Ah	drive Enable								
			71h	Speed/Torque Changeover Selection								
			72h	Zero Servo Command								
			77h	ASR Gain Switchover								
			78h	Torque Reference Polarity Change								
			79h	Disable Speed Estimation (OLV2 Only)								
H1-02	0401h	Terminal S4 Selection	See H1-01		1	14h		A	A	A	A	A
H1-03	0402h	Terminal S5 Selection	See H1-01		1	03h		A	A	A	A	A
H1-04	0403h	Terminal S6 Selection	See H1-01		1	04h		A	A	A	A	A
H1-05	0404h	Terminal S7 Selection	See H1-01		1	06h		A	A	A	A	A
H1-06	0405h	Terminal S8 Selection	See H1-01		1	08h		A	A	A	A	A
H1-07	0406h	Terminal S9 Selection	See H1-01		1	05h		A	A	A	A	A
H1-08	0407h	Terminal S10 Selection	See H1-01		1	32h		A	A	A	A	A
H1-09	0408h	Terminal S11 Selection	See H1-01		1	07h		A	A	A	A	A
H1-10	0409h	Terminal S12 Selection	See H1-01		1	15h		A	A	A	A	A
H2-01	040Bh	Digital Output Terminal M1-M2 Function Selection	0h	During Run 1	1	0h		-	-	-	-	-
			1h	Zero Speed								
			2h	Fref / Fout Agree 1								
			3h	Fref / L4-01 Agree 1								
			4h	Frequency Detection 1								
			5h	Frequency Detection 2								
			6h	Inverter Ready								
			7h	DC Bus Undervoltage								
			8h	Baseblock 1								
			9h	Option Reference								
			Ah	Remote Operation								
			Bh	Torque Detection 1 N.O.								
			Ch	Frequency Reference Loss								
			Dh	DB Overheat								
			Eh	Fault								
			Fh	Not Used (Set for Network Use)								
			10h	Minor Fault (Alarm)								
			11h	Reset Command Active								
			12h	Timer Output								
			13h	Fref / Fout Agree 2								
			14h	Fref / L4-01 Agree 2								
			15h	Frequency Detection 3								
			16h	Frequency Detection 4								
			17h	Torque Detection 1 N.C.								
			18h	Torque Detection 2 N.O.								
			19h	Torque Detection 2 N.C.								
			1Ah	Reverse Direction								

Table 4.10 "H" Parameters

Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
H2-01	040Bh	Digital Output Terminal M1-M2 Function Selection	1Bh	Baseblock 2	1	0h		-	-	-	-	-
			1Ch	Motor 2 Selected								
			1Dh	Regenerating								
			1Eh	Restart Enabled								
			1Fh	Overload (OL1)								
			20h	OH Pre-alarm								
			30h	In Torque Limit								
			31h	In Speed Limit								
			32h	In Speed Limit (Torque Control Only)								
			33h	Zero Servo Complete								
			37h	During Run 2								
			38h	drive Enable								
H2-02	040Ch	Terminal M3-M4 Selection	See H2-01		1	1h		A	A	A	A	A
H2-03	040Dh	Terminal M5-M6 Selection	See H2-01		1	2h		A	A	A	A	A
H2-04	040Eh	Terminal P3-C3 Selection	See H2-01		1	06h		A	A	A	A	A
H2-05	040Fh	Terminal P4-C4 Selection	See H2-01		1	10h		A	A	A	A	A
H3-01	0410h	Analog Input Terminal A1 Signal Type Selection	0	0-10 VDC	1	0		A	A	A	A	A
			1	-10 +10 VDC								
H3-02	0411h	Terminal A1 Gain	0.0 ~ 1000.0 %		0.1 %	100.0 %	R	A	A	A	A	A
H3-03	0412h	Terminal A1 Bias	-100.0 ~ 100.0 %		0.1 %	0.0 %	R	A	A	A	A	A
H3-04	0413h	Analog Input Terminal A3 Signal Type Selection	0	0-10 VDC	1	0		A	A	A	A	A
			1	-10 +10 VDC								

Table 4.10 "H" Parameters												
Name	Address	Digital Operator Display Text	Data	Range	Unit	Default	Access					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
H3-05	0414h	Analog Input Terminal A3 Function Selection	0h	Frequency Bias	1	02h		-	-	-	-	-
			1h	Frequency Gain								
			2h	Auxiliary Reference 1 (Replaces D1-02)								
			3h	Auxiliary Reference 2 (Replaces D1-03)								
			4h	Voltage Bias								
			5h	Accel/Decel Gain								
			6h	DC Injection Braking Current								
			7h	Overtorque/Undertorque Detection Level								
			8h	Stall Prevention During Run Level								
			9h	Reference Lower Limit								
			Ah	Jump Frequency								
			Bh	PID Feedback								
			Ch	PID Setpoint								
			Dh	Frequency Bias 2								
			Eh	Motor Temperature								
			10h	Forward Torque Limit								
			11h	Reverse Torque Limit								
			12h	Regenerative Torque Limit								
			13h	Torque Reference								
			14h	Torque Compensation								
			15h	Torque Limit								
			1Fh	Not Used (Set for Network Use)								
H3-06	0415h	Terminal A3 Gain	0.0 ~ 1000.0 %		0.1 %	100.0 %	R	A	A	A	A	A
H3-07	0416h	Terminal A3 Bias	-100.0 ~ 100.0 %		0.1 %	0.0 %	R	A	A	A	A	A
H3-08	0417h	Analog Input Terminal A2 Signal Type Selection (Set Switch S1-2 Also)	0	0-10 VDC	1	2		A	A	A	A	A
			1	-10 +10 VDC								
			2	4-20 mA								
H3-09	0418h	Terminal A2 Selection	0	See H3-05	1	0h		A	A	A	A	A
H3-10	0419h	Terminal A2 Gain	0.0 ~ 1000.0 %		0.1 %	100.0 %	R	A	A	A	A	A
H3-11	041Ah	Terminal A2 Bias	-100.0 ~ 100.0 %		0.1 %	0.0 %	R	A	A	A	A	A
H3-12	041Bh	Analog Input Filter Time (Applies to A1, A2, and A3)	0.00 ~ 2.00 Sec		0.01 Sec	0.03 Sec		A	A	A	A	A
H4-01	041Dh	Analog Output Terminal FM Function Selection	1	Frequency Reference	1	02h		-	-	-	-	-
			2	Output Frequency								
			3	Output Current								
			5	Motor Speed								
			6	Output Voltage								
			7	DC Bus Voltage								
			8	Output Power (kW)								
			9	Torque Reference								
			15	Terminal A1 Level								
			16	Terminal A2 Level								
			17	Terminal A3 Level								
			18	Motor Secondary Current								
			19	Motor Excitation Current								
			20	Soft Starter (SFS) Output								
			21	ASR Input								
			22	ASR Output								
			24	PID Feedback								
			26	Voltage (Vq) Reference								
			27	Voltage (Vd) Reference								

Table 4.10 "H" Parameters

Name	Address	Digital Operator Display Text	Data	Range	Unit	Default	Access					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
H4-01	041Dh	Analog Output Terminal FM Function Selection	32	ACR (Iq) Output	1	02h		-	-	-	-	-
			33	ACR (Id) Output								
			36	PID Input								
			37	PID Output								
			38	PID Setpoint								
			42	Estimated Motor Flux								
			43	Id Compensation Value								
			44	ASR Output Without Filter								
			45	Feed Forward Output								
			48	Stabilizing Speed at Regeneration (OLV2)								
H4-02	041Eh	Terminal FM Gain	0.0 ~ 1000.0 %		0.1 %	100.0 %	R	Q	Q	Q	Q	Q
H4-03	041Fh	Terminal FM Bias	-110.0 ~ 110.0 %		0.1 %	0.0 %	R	A	A	A	A	A
H4-04	0420h	Terminal AM Selection	See H4-01		1	03h		A	A	A	A	A
H4-05	0421h	Terminal AM Gain	0.0 ~ 1000.0 %		0.1 %	50.0 %	R	Q	Q	Q	Q	Q
H4-06	0422h	Terminal AM Bias	-110.0 ~ 110.0 %		0.1 %	0.0 %	R	A	A	A	A	A
H4-07	0423h	Terminal FM Signal Type Selection (Set Jumper CN15 Also)	0	0-10 VDC	1	0		A	A	A	A	A
			1	-10 +10 VDC								
			2	4-20 mA								
H4-08	0424h	Terminal AM Signal Type Selection (Set Jumper CN15 Also)	0	0-10 VDC	1	0		A	A	A	A	A
			1	-10 +10 VDC								
			2	4-20 mA								
H5-01	0425h	Terminals R+, R-, S+, S- Modbus Node Address	0h ~ 20h		1	1Fh		A	A	A	A	A
H5-02	0426h	Baud Rate	0	1200 bps	1	3		A	A	A	A	A
			1	2400 bps								
			2	4800 bps								
			3	9600 bps								
			4	19200 bps								
H5-03	0427h	Parity Selection	0	No Parity	1	0		A	A	A	A	A
			1	Even Parity								
			2	Odd Parity								
H5-04	0428h	Communication Loss Fault (CE) Response Selection	0	Ramp to Stop	1	3		A	A	A	A	A
			1	Coast to Stop								
			2	Fast-Stop (C1-09)								
			3	Alarm Only								
H5-05	0429h	Communication Loss Fault (CE) Selection	0	Disabled	1	1		A	A	A	A	A
			1	Enabled								
H5-06	042Ah	Transmit Wait Time	5 ~ 65 ms		1 ms	5 ms		A	A	A	A	A
H5-07	042Bh	RTS Control Selection	0	Disabled	1	1		A	A	A	A	A
			1	Enabled								
H5-10	0436h	Unit Selection for Modbus Register 0025h (Output Voltage Reference Monitor)	0	0.1V	1	0		A	A	A	A	A
			1	1V								
H6-01	042Ch	Pulse Input Terminal RP Function Selection	0	Frequency Reference	1	0		A	A	A	A	A
			1	PID Feedback								
			2	PID Setpoint								
H6-02	042Dh	Pulse Input Scaling	1000 ~ 32000 Hz		1 Hz	1440 Hz	R	A	A	A	A	A
H6-03	042Eh	Pulse Input Gain	0.0 ~ 1000.0 %		0.1 %	100.0 %	R	A	A	A	A	A
H6-04	042Fh	Pulse Input Bias	-100.0 ~ 100.0 %		0.1 %	0.0 %	R	A	A	A	A	A
H6-05	0430h	Pulse Input Filter Time	0.00 ~ 2.00 Sec		0.01 Sec	0.1 Sec	R	A	A	A	A	A
H6-06	0431h	Pulse Output Terminal MP Function Selection	1	Frequency Reference	1	02h	R	A	A	A	A	A
			2	Output Frequency								
			20	Soft Starter (SFS) Output								
			24	PID Feedback								
			31	Not Used (Set for Network Use)								
			36	PID Input								
H6-07	0432h	Pulse Output Scaling	0 ~ 32000 Hz		1 Hz	1440 Hz	R	A	A	A	A	A

Table 4.11 "L" Parameters												
Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
L1-01	0480h	Motor Overload (OL1) Motor Selection	0	Disabled	1	1		Q	Q	Q	Q	Q
			1	Standard Fan Cooled								
			2	Standard Blower Cooled								
			3	Vector Duty								
L1-02	0481h	Motor Overload (OL1) Time Constant	0.1 ~ 5.0 min		0.1 min	1.0 min		A	A	A	A	A
L1-03	0482h	Motor Overheat (OH3) Alarm Selection	0	Ramp to Stop	1	3		A	A	A	A	A
			1	Coast to Stop								
			2	Fast-Stop (C1-09)								
			3	Alarm Only								
L1-04	0483h	Motor Overheat (OH4) Fault Selection	0	Ramp to Stop	1	1		A	A	A	A	A
			1	Coast to Stop								
			2	Fast-Stop (C1-09)								
L1-05	0484h	Motor Overheat Filter Time	0.00 ~ 10.00 Sec		0.01 Sec	0.20 Sec		A	A	A	A	A
L2-01	0485h	Power Loss Ride Thru Selection	0	Disabled	1	0		A	A	A	A	A
			1	Enabled - L2-02 Time								
			2	Enabled - CPU Active								
L2-02	0486h	Power Loss Ride Thru Time	0.0 ~ 25.5 Sec		0.1 Sec	0.1 Sec		A	A	A	A	A
L2-03	0487h	Minimum Baseblock Time	0.1 ~ 5.0 Sec		0.1 Sec	0.5 Sec		A	A	A	A	A
L2-04	0488h	Voltage Recovery Ramp Time	0.0 ~ 5.0 Sec		0.1 Sec	0.3 Sec		A	A	A	A	A
L2-05	0489h	Undervoltage Detection Level	kVA Dep.		1 VDC	kVA Dep.		A	A	A	A	A
L2-06	048Ah	KEB Decel Time	0.0 ~ 200.0 Sec		0.1 Sec	0.0 Sec		A	A	A	A	A
L2-07	048Bh	Powerloss Ride Thru Accel Time	0.0 ~ 25.5 Sec		0.1 Sec	0.0 Sec		A	A	A	A	A
L2-08	048Ch	KEB Frequency Gain	0 ~ 300 %		1 %	100 %		A	A	A	A	A
L3-01	048Fh	Stall Prevention During Accel Selection	0	Disabled	1	1		A	A	A		
			1	General Purpose								
			2	Intelligent								
L3-02	0490h	Stall Prevention During Accel Current Level	0 ~ 200 %		1 %	150 %		A	A	A		
L3-03	0491h	Stall Prevention During Accel Constant HP Area Current Lower Limit	0 ~ 100 %		1 %	50 %		A	A	A		
L3-04	0492h	Stall Prevention During Decel Selection	0	Disabled	1	1		Q	Q	Q	Q	Q
			1	General Purpose								
			2	Intelligent								
			3	Enabled - Braking Resistor								
L3-05	0493h	Stall Prevention During Run Selection	0	Disabled	1	1		A	A			
			1	Decel Time 1 (C1-02)								
			2	Decel Time 2 (C1-04)								
L3-06	0494h	Stall Prevention During Run Current Level	30 ~ 200 %		1 %	160 %		A	A			
L3-11	04C7h	Overvoltage Inhibit Selection	0	Disabled	1	0				A	A	A
			1	Enabled								
L3-12	04C8h	Overvoltage Inhibit Voltage Level	kVA Dep.		1 V	kVA Dep.				A	A	A
L4-01	0499h	Speed Agree Level	0.0 ~ 400.0 Hz		0.1 Hz	0.0 Hz		A	A	A	A	A
L4-02	049Ah	Speed Agree Width	0.0 ~ 20.0 Hz		0.1 Hz	2.0 Hz		A	A	A	A	A
L4-03	049Bh	Speed Agree Level +/-	-400.0 ~ 400.0 Hz		0.1 Hz	0.0 Hz		A	A	A	A	A
L4-04	049Ch	Speed Agree Width +/-	0.0 ~ 20.0 Hz		0.1 Hz	2.0 Hz		A	A	A	A	A
L4-05	049Dh	Frequency Reference Loss Selection	0	Stop	1	0		A	A	A	A	A
			1	Run at L4-06 x Previous Reference								
L4-06	04C2h	Frequency Reference Loss Gain	0.0 ~ 100.0 %		0.1 %	80.0 %		A	A	A	A	A

Table 4.11 "L" Parameters

Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
L5-01	049Eh	Number of Auto-Restarts	0 ~ 10		1	0		A	A	A	A	A
L5-02	049Fh	Fault Selection During Auto-Restart	0	No Fault Relay	1	0		A	A	A	A	A
			1	Fault Relay Active								
L6-01	04A1h	Torque Detection 1 Selection (OL3, UL3)	0	Disabled	1	0		A	A	A	A	A
			1	Overtorque, Speed Agree, Alarm								
			2	Overtorque, Run, Alarm								
			3	Overtorque, Speed Agree, Fault								
			4	Overtorque, Run, Fault								
			5	Undertorque, Speed Agree, Alarm								
			6	Undertorque, Run, Alarm								
			7	Undertorque, Speed Agree, Fault								
			8	Undertorque, Run, Fault								
L6-02	04A2h	Torque Detection 1 Level	0 ~ 300 %		1 %	150 %		A	A	A	A	A
L6-03	04A3h	Torque Detection 1 Time	0.0 ~ 10.0 Sec		0.1 Sec	0.1 Sec		A	A	A	A	A
L6-04	04A4h	Torque Detection 2 Selection (OL4, UL4)	0	Disabled	1	0		A	A	A	A	A
			1	Overtorque, Speed Agree, Alarm								
			2	Overtorque, Run, Alarm								
			3	Overtorque, Speed Agree, Fault								
			4	Overtorque, Run, Fault								
			5	Undertorque, Speed Agree, Alarm								
			6	Undertorque, Run, Alarm								
			7	Undertorque, Speed Agree, Fault								
			8	Undertorque, Run, Fault								
L6-05	04A5h	Torque Detection 2 Level	0 ~ 300 %		1 %	150 %		A	A	A	A	A
L6-06	04A6h	Torque Detection 2 Time	0.0 ~ 10.0 Sec		0.1 Sec	0.1 Sec		A	A	A	A	A
L7-01	04A7h	Torque Limit Forward Motoring	0 ~ 300 %		1 %	200 %				A	A	A
L7-02	04A8h	Torque Limit Reverse Motoring	0 ~ 300 %		1 %	200 %				A	A	A
L7-03	04A9h	Torque Limit Forward Regeneration	0 ~ 300 %		1 %	200 %				A	A	A
L7-04	04AAh	Torque Limit Reverse Regeneration	0 ~ 300 %		1 %	200 %				A	A	A
L7-06	04ACh	Torque Limit Filter Time	5 ~ 10000 ms		1 ms	200 ms				A		
L7-07	04C9h	Torque Limit Control Selection During Accel/Decel	0	P Control	1	0				A		
			1	PI Control								
L8-01	04ADh	Dynamic Braking Resistor Protection Selection (Only for Yaskawa 3% heatsink mounted resistors)	0	Not Provided	1	0		A	A	A	A	A
			1	Provided								
L8-02	04AEh	Overheat (OH) Pre-Alarm Level	50 ~ 130 Deg		1 Deg	95 Deg		A	A	A	A	A
L8-03	04AFh	Overheat (OH) Pre-Alarm Selection	0	Ramp to Stop	1	3		A	A	A	A	A
			1	Coast to Stop								
			2	Fast-Stop (C1-09)								
			3	Alarm Only								
L8-05	04B1h	Input Phase Loss (PF) Selection	0	Disabled	1	0		A	A	A	A	A
			1	Enabled								
L8-07	04B3h	Output Phase (LF) Loss Method Selection	0	Disabled	1	0		A	A	A	A	A
			1	1 Phase Loss Detection								

Table 4.11 “L” Parameters												
Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
			2	2/3 Phase Loss Detection								
L8-09	04B5h	Ground Fault (GF) Selection	0	Disabled	1	1		A	A	A	A	A
			1	Enabled								
L8-10	04B6h	Cooling Fan On/Off Selection	0	Fan On Only During Run	1	0		A	A	A	A	A
			1	Fan Always On								
L8-11	04B7h	Fan Off Delay Time After Stop Command	0 ~ 300 Sec		1 Sec	60 Sec		A	A	A	A	A
L8-12	04B8h	Ambient Temperature	45 ~ 60 Deg		1 Deg	45 Deg		A	A	A	A	A
L8-15	04BBh	Inverter Overload (OL2) Selection at Low Speed	0	Disabled	1	1		A	A	A	A	A
			1	Enabled								
L8-18	04BEh	Software CLA Selection (150% Current Limit)	0	Disabled	1	1		A	A	A	A	A
			1	Enabled								
L8-33	04E3h	Control Fault 2 (CF2) Selection	0	Disabled	1	1						A
			1	Enabled								

Table 4.12 "N" Parameters

Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
n1-01	0580h	Hunting Prevention Selection	0	Disabled	1	1		A	A			
			1	Enabled								
n1-02	0581h	Hunting Prevention Gain	0.00 ~ 2.50		0.01	1.00		A	A			
n1-03	0582h	Hunting Prevention Time	0 ~ 500 ms		1 ms	10 ms		A	A			
n2-01	0584h	Speed Feedback Regulator (AFR) Gain	0.00 ~ 10.00		0.01	1.00				A		
n2-02	0585h	Speed Feedback Regulator (AFR) Filter Time 1	0 ~ 2000 ms		1 ms	50 ms				A		
n2-03	0586h	Speed Feedback Regulator (AFR) Filter Time 2 (Low Speed)	0 ~ 2000 ms		1 ms	750 ms				A		
n3-01	0588h	High Slip Braking Decel Step Width	1 ~ 20 %		1 %	5 %		A	A			
n3-02	0589h	High Slip Braking Current Reference	100 ~ 200 %		1 %	150 %		A	A			
n3-03	058Ah	High Slip Braking Dwell Time at Stop	0.0 ~ 10.0 Sec		0.1 Sec	1.0 Sec		A	A			
n3-04	058Bh	High Slip Braking Overload (OL7) Time	30 ~ 1200 Sec		1 Sec	40 Sec		A	A			
n4-07	059Ah	Speed Estimator Integral Time	0.000 ~ 9.999 ms		0.001 ms	0.03 ms						A
n4-08	059Bh	Speed Estimator Proportional Gain	0 ~ 1000		1	15						A
n4-10	059Dh	Observer Proportional Gain at High Speed (>n4-11)	0.0 ~ 1000.0		0.1	15						A
n4-11	059Eh	High/Low Speed Observer Changeover Frequency	40 ~ 70 Hz		1 Hz	70 Hz						A
n4-15	05A2h	Low Speed Regenerative Coefficient 1	0.0 ~ 3.0		0.1	0.3						A
n4-17	05A4h	Torque Adjustment Gain at Low Speed 1	0.0 ~ 5.0		0.1	1.0						A
n4-18	05A5h	Motor Cable Resistance Gain	0.90 ~ 1.30		0.01	1.00						A
n4-28	05AFh	High/Low Speed Observer Changeover Frequency During Deceleration	20 ~ 70 Hz		1 Hz	50 Hz						A
n4-29	05B4h	Torque Adjustment Gain at Low Speed 2	0.00 ~ 0.40		0.01	0.10						A
n4-30	05B5h	Low Speed Regenerative Coefficient 2	0.00 ~ 10.00		0.01	1.00						A
n4-32	05B7h	Speed Estimation Gain Frequency 1 (Lower Limit of Low Speed)	0.0 ~ 60.0 Hz		0.1 Hz	5.0 Hz						A
n4-33	05B8h	Speed Estimation Gain Frequency 2 (Upper Limit of Low Speed)	0.0 ~ 60.0 Hz		0.1 Hz	20.0 Hz						A
n4-34	05B9h	Speed Estimation Gain Rate	50.0 ~ 100.0 %		0.1 %	100.0 %						A
n4-35	05BAh	U1-48 Reduction Gain	0.50 ~ 1.50		0.01	1.00						A
n4-39	05BEh	Flux Level at Low Frequency	50 ~ 150 %		1 %	90 %						A
n4-40	05BFh	Current Stabilizing Gain	0.01 ~ 1.00		0.01	kVA Dep.						A
n4-43	05C2h	Speed Estimation Compensation Gain	0.00 ~ 2.00		0.01	0.00						A
n5-01	05B0h	Feed Forward Selection	0	Disabled	1	0					A	A
			1	Enabled								
n5-02	05B1h	Motor Acceleration Time	0.001 ~ 10.0 Sec		0.001 Sec	kVA Dep.					A	A
n5-03	05B2h	Feed Forward Proportional Gain	0.00 ~ 100.00		0.01	1.00					A	A

Table 4.13 "O" Parameters

Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
o1-01	0500h	User Monitor Selection	4	Control Method	1	6	R	A	A	A	A	A
			5	Motor Speed								
			6	Output Voltage Reference								
			7	DC Bus Voltage								
			8	Output Power (kW)								
			9	Torque Reference								
			10	Input Terminal Status								
			11	Output Terminal Status								
			12	Internal Control Status 1								
			13	Elapsed Time								
			14	Flash ID								
			15	Terminal A1 Level								
			16	Terminal A2 Level								
			17	Terminal A3 Level								
			18	Motor Secondary Current								
			19	Motor Excitation Current								
			20	Soft Starter (SFS) Output								
			21	ASR Input								
			22	ASR Output								
			24	PID Feedback								
			25	DI-16H2 Reference								
			26	Voltage (Vq) Reference								
			27	Voltage (Vd) Reference								
			28	CPU ID								
			29	Accumulated kWh								
			30	Accumulated MWh								
			32	ACR (Iq) Output								
			33	ACR (Id) Output								
			34	OPE Detected								
			36	PID Input								
			37	PID Output								
			38	PID Setpoint								
			39	Transmit Error								
			40	FAN Elapsed Time								
			42	Estimated Motor Flux								
			43	Id Compensation Value								
			44	ASR Output Without Filter								
			45	Feed Forward Output								
			48	Stabilizing Speed at Regeneration (OLV2)								
			50	CF Error Code (OLV2)								
o1-02	0501h	Power-On Monitor	0	Frequency Reference	1	1	R	A	A	A	A	A
			1	Output Frequency								
			2	Output Current								
			3	User Monitor (o1-01)								
o1-03	0502h	Display Scaling	0 ~ 39999		1	0		A	A	A	A	A
o1-04	0503h	V/F Setting Units	0	Hertz	1	0					A	A
			1	RPM								
o1-05	0504h	LCD Contrast	0 ~ 5		1	3		A	A	A	A	A
o2-01	0505h	Local / Remote Key Selection	0	Disabled	1	1		A	A	A	A	A
			1	Enabled								
o2-02	0506h	Operator Stop Key Selection	0	Disabled	1	1		A	A	A	A	A
			1	Enabled								

Table 4.13 "O" Parameters												
Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
o2-03	0507h	User Defaults (A1-03 = 1110)	0	No Change	1	0		A	A	A	A	A
			1	Set Defaults								
			2	Clear All								
o2-05	0509h	Operator M.O.P. Selection	0	Disabled	1	0		A	A	A	A	A
			1	Enabled								
o2-06	050Ah	Operator Disconnect Detection Selection	0	Disabled	1	0		A	A	A	A	A
			1	Enabled								
o2-07	050Bh	Accumulated Time Initial Setting	0 ~ 65535 H		1 H	0 H		A	A	A	A	A
o2-08	050Ch	Accumulated Time Selection	0	Power-On Time	1	0		A	A	A	A	A
			1	Running Time								
o2-10	050Eh	Fan Run Time Initial Setting	0 ~ 65535 H		1 H	0 H		A	A	A	A	A
o2-12	0510h	Fault Trace/History Initialization (U2 and U3 Monitors)	0	No Change	1	0		A	A	A	A	A
			1	Clear All								
o2-14	0512h	Watt Hour Monitors (U1-29 and U1-30) Initialization	0	No Change	1	0		A	A	A	A	A
			1	Clear All								

Table 4.14 "P" Parameters

Name	Address	Description	Data	Range	Unit	Default	Access Level					
							During Run	V/f	V/f w/PG	OLV	FV	OLV2
P1-01*	0600h	CASE Parameter 1	-		-	-		-	-	-	-	-
P1-02*	0601h	CASE Parameter 2	-		-	-		-	-	-	-	-
P1-03*	0602h	CASE Parameter 3	-		-	-		-	-	-	-	-
P1-04*	0603h	CASE Parameter 4	-		-	-		-	-	-	-	-
P1-05*	0604h	CASE Parameter 5	-		-	-		-	-	-	-	-
P1-06*	0605h	CASE Parameter 6	-		-	-		-	-	-	-	-
P1-07*	0606h	CASE Parameter 7	-		-	-		-	-	-	-	-
P1-08*	0607h	CASE Parameter 8	-		-	-		-	-	-	-	-
P1-09*	0608h	CASE Parameter 9	-		-	-		-	-	-	-	-
P1-10*	0609h	CASE Parameter 10	-		-	-		-	-	-	-	-
P2-01*	060Ah	CASE Parameter 11	-		-	-		-	-	-	-	-
P2-02*	060Bh	CASE Parameter 12	-		-	-		-	-	-	-	-
P2-03*	060Ch	CASE Parameter 13	-		-	-		-	-	-	-	-
P2-04*	060Dh	CASE Parameter 14	-		-	-		-	-	-	-	-
P2-05*	060Eh	CASE Parameter 15	-		-	-		-	-	-	-	-
P2-06*	060Fh	CASE Parameter 16	-		-	-		-	-	-	-	-
P2-07*	0610h	CASE Parameter 17	-		-	-		-	-	-	-	-
P2-08*	0611h	CASE Parameter 18	-		-	-		-	-	-	-	-
P2-09*	0612h	CASE Parameter 19	-		-	-		-	-	-	-	-
P2-10*	0613h	CASE Parameter 20	-		-	-		-	-	-	-	-
P3-01*	0614h	CASE Parameter 21	-		-	-		-	-	-	-	-
P3-02*	0615h	CASE Parameter 22	-		-	-		-	-	-	-	-
P3-03*	0616h	CASE Parameter 23	-		-	-		-	-	-	-	-
P3-04*	0617h	CASE Parameter 24	-		-	-		-	-	-	-	-
P3-05*	0618h	CASE Parameter 25	-		-	-		-	-	-	-	-
P3-06*	0619h	CASE Parameter 26	-		-	-		-	-	-	-	-
P3-07*	061Ah	CASE Parameter 27	-		-	-		-	-	-	-	-
P3-08*	061Bh	CASE Parameter 28	-		-	-		-	-	-	-	-
P3-09*	061Ch	CASE Parameter 29	-		-	-		-	-	-	-	-
P3-10*	061Dh	CASE Parameter 30	-		-	-		-	-	-	-	-

Note: * P parameters are used in custom drive software programs (CASE). The specific CASE software program determines the limits, units, defaults, and access level of each parameter.

Modbus TCP/IP Specific Registers

(Only for use with the CM090 Modbus TCP/IP option card)

- The Modbus TCP/IP Option Card CM090 differs slightly from Modbus RTU in its register structure. The CM090 card has a different set of Command registers and additional monitor registers. However, all Monitor and Parameter registers listed earlier in this chapter can also be accessed over Modbus TCP/IP. Other Modbus TCP/IP protocol specific items include:
- A maximum of 10 simultaneous connections are allowed.
- The Run Command and Frequency Reference may only be accessed through UNIT ID 1. While the drive is in remote RUN mode, the Run command must be continually refreshed within the Timeout setting in the configuration webpage. This can be set from 100 ms to 30 sec. If the Run command is not refreshed within the set time, an EF0 fault will occur. Refer to the appropriate drive manual for information on EF0 and setting the appropriate drive response. If a UNIT ID 1 connection is active, the NS/CON LED will blink at approximately a 500 ms cycle.
- The TCP/IP connection must be refreshed within 60 seconds. If it is not refreshed within 60 seconds, the connection will be closed.
- This implementation of Modbus TCP/IP supports Modbus functions 3 (read multiple registers), 6 (write single register) and 16 (write multiple registers).

Table 4.15 Modbus TCP/IP Interface Registers

Addr.	Function	Bit	Description
0001h	Command	0h	Forward Run Input
		1h	Reverse Run Input
		2h	Multi-Function Digital Input Terminal S3. Function set by setting of H1-01
		3h	Multi-Function Digital Input Terminal S4. Function set by setting of H1-02
		4h	Multi-Function Digital Input Terminal S5. Function set by setting of H1-03
		5h	Multi-Function Digital Input Terminal S6. Function set by setting of H1-04
		6h	Multi-Function Digital Input Terminal S7. Function set by setting of H1-05
		7h	Multi-Function Digital Input Terminal S8. Function set by setting of H1-06
		8h	External Fault Input (EF0)
		9h	Fault Reset
		Ah	Multi-Function Digital Input S9. Function set by setting of H1-07
		Bh	Multi-Function Digital Input S10. Function set by setting of H1-08
		Ch	Multi-Function Digital Input S11. Function set by setting of H1-09
		Dh	Multi-Function Digital Input S12. Function set by setting of H1-10
		Eh	Fault Trace (U2 and U3 Monitors) Clear Input
		Fh	External Base Block Input
0002h	Frequency Reference	-	Dependent on setting of o1-03
0003h	Torque Reference	-	Units 0.1%
0004h	Torque Compensation	-	Units 0.1%
0007h	Terminal FM	-	Sets the value of analog output terminal FM. (-1540 / -11VDC ~ 1540 / +11VDC)
0008h	Terminal AM	-	Sets the value of analog output terminal AM. (-1540 / -11VDC ~ 1540 / +11VDC)
0009h	Digital Output	0h	Multi-Function Digital Output 1 (M1-M2)
		1h	Multi-Function Digital Output 2 (M3-M4)
		2h	Multi-Function Digital Output 3 (M5-M6)
		3h	Multi-Function Digital Output 4 (P3-C3)
		4h	Multi-Function Digital Output 5 (P4-C4)
		5h	Reserved
		6h	Fault Contact Output Enable (1 = Enable bit 7)
		7h	Fault Contact Digital Output (MA, MB, MC)
		8h-Fh	Reserved

Table 4.15 Modbus TCP/IP Interface Registers			
Addr.	**Function**	**Bit**	**Description**
2000h	Status	0h	During Run
		1h	Zero Speed
		2h	Reverse Direction
		3h	Fault Reset Active
		4h	Speed Agree
		5h	drive Ready
		6h	Minor Fault (Alarm)
		7h	Fault
		8h	OPE Fault (Keypad Setting Error)
		9h	Power Loss Ride Thru
		Ah	Remote Mode
		Bh	Multi-Function Output 1 (M1-M2)
		Ch	Multi-Function Output 2 (M3-M4)
		Dh	Multi-Function Output 3 (M5-M6)
		Eh	Motor 2 Selected
		Fh	Zero Servo Complete
2001h	Speed Feedback Monitor	-	Keypad Monitor U1-05
2002h	Torque Reference Monitor	-	Keypad Monitor U1-09
2003h	PG Count Channel 1 Monitor	-	Rolling Counter from 0 - 65,535
2004h	Frequency Reference Monitor	-	Keypad Monitor U1-01
2005h	Output Frequency Monitor	-	Keypad Monitor U1-02
2006h	Output Current Monitor	-	Keypad Monitor U1-03
2007h	Analog Input A2 Monitor	-	Keypad Monitor U1-16
2008h	DC Bus Voltage Monitor	-	Keypad Monitor U1-07

Table 4.15 Modbus TCP/IP Interface Registers (continued)			
Address	**Function**	**Bit**	**Description**
2009h	Error 1	0h	PUF - DC Bus Fuse Failure
		1h	UV1 - Main Circuit Undervoltage
		2h	UV2 - Control Power Undervoltage
		3h	UV3 - Pre-charge Contactor Answerback Failure
		4h	Reserved
		5h	GF - Ground Fault
		6h	OC - Overcurrent
		7h	OV - Overvoltage
		8h	OH - drive Overheat
		9h	OH1 - Motor Overheat Alarm
		Ah	OL1 - Motor Overload
		Bh	OL2 - drive Overload
		Ch	OL3 - Overtorque Detection 1
		Dh	OL4 - Overtorque Detection 2
		Eh	RR - Braking Resistor Failure
		Fh	RH - Braking Resistor Overheat
200Ah	Error 2	0h	EF3 - External Fault 3
		1h	EF4 - External Fault 4
		2h	EF5 - External Fault 5
		3h	EF6 - External Fault 6
		4h	EF7 - External Fault 7
		5h	Reserved
		6h	Reserved
		7h	OS - Overspeed
		8h	DEV - Speed Deviation
		9h	PGO - Encoder (PG) Feedback Loss
		Ah	PF - Input Phase Loss
		Bh	LF - Output Phase Loss
		Ch	OH3 - Motor Overheat 1
		Dh	OPR - Operator Disconnected
		Eh	ERR - EEPROM Write Failure
		Fh	OH4 - Motor Overheat 2
200Bh	Error 3	0h	CE - Communication Loss
		1h	BUS - Option Card Error
		2h	Reserved
		3h	Reserved
		4h	CF - Loss of Motor Control
		5h	SVE - Zero Servo Fault
		6h	EF0 - Option Card External Fault
		7h	FBL - PID Feedback Loss
		8h	UL3 - Undertorque Detection 1
		9h	UL4 - Undertorque Detection 2
		Ah	OL7 - High Slip Braking Overload
		Bh	Reserved
		Ch	Reserved
		Dh	Reserved
		Eh	Reserved
		Fh	CPF – Control Board Hardware Fault
200Ch	Analog Input Terminal A1 Monitor	-	Keypad Monitor U1-15
200Dh	Digital Input Terminal Monitor	-	Digital Input Terminal Value (Bit Field of Terminals S1-S8)
200Eh	Analog Input Terminal A3 Monitor	-	Keypad Monitor U1-17
200Fh	PG Count Channel 2 Monitor	-	Rolling Counter from 0 - 65,535
2010h	Inverter Flash ID	-	Lat 5 digits of the drive software number.

ENTER/ACCEPT Command (Write Only)

Caution

The following section describes the usage of the ACCEPT and ENTER commands, which are necessary when writing to certain registers in the G7 drive.

When data is written to a Command register (000h ~ 0FFh) in the G7, the data is activated as soon as it is written, but will be gone when power is lost (volatile memory or RAM). When data is written to a Parameter register in the G7 (100h ~ 7FFh), the data goes into a temporary off-line memory area. The drive will essentially ignore the off-line memory area until it is told to use it. In order to get the drive to use this data, an ACCEPT or ENTER command needs to be issued. If power is lost prior to an ACCEPT or ENTER command being issued, the data is lost. Using this temporary storage area is a good way to pre-load several parameter changes, and then activating them all at once.

Both the ACCEPT and the ENTER commands will activate the data contained in the off-line memory area. The ACCEPT command simply activates all of the data in the off-line memory area, but if power is lost, all of the changes will be lost. The ACCEPT command can be performed as many times as needed. An ACCEPT command is performed by writing a value of zero to address 0910h.

The ENTER command will activate the data in the off-line memory area AND store it to nonvolatile (EEPROM) memory. Once the ENTER command is issued, the data will be retained even if the power is lost. **Excessive use of the ENTER command can cause the G7 drive to fail.** The nonvolatile memory allows approximately 100,000 ENTER commands. An ENTER command is performed by writing a value of zero to address 0900h.

If any parameter register has been written to using network communication, but no ENTER or ACCEPT command is given, a "Busy Write Protected" error can occur if the digital operator is used to try and change any parameters. This error can be cleared by either issuing an ENTER or ACCEPT command or by cycling power to the drive.

Table 4.16 Enter/Accept Command

Address	Function	Data	Description
910	ACCEPT	0	Transfer data to active RAM. Data will be lost at power down. Unlimited usage.
900	ENTER	0	Transfers data to non-volatile storage. Data will survive power loss. Limited to 100,000 writes.

Modbus Fault Decoding for Monitors

The following table provides the fault code data for all G7 faults for Modbus fault trace / fault history registers.

Table 4.17 Modus Fault Decoding Information
For Monitors U2-01, U2-02, U3-01 thru U3-04, and U3-09 thru U3-14

Data	Decimal	Fault	Data	Decimal	Fault
0001h	1	PUF - DC Bus Fuse Open	0021h	33	CE - Modbus Communication Loss
0002h	2	UV1 - DC Bus Undervoltage	0022h	34	BUS - Option Communication Error
0003h	3	UV2 - CTL PS Undervoltage	0023h	35	E-15 - SI-F/G Communication Error
0004h	4	UV3 - MC Answerback	0024h	36	E-10 - SI-F/G Communication Loss
0005h	5	SC - Short Circuit	0025h	37	CF - Loss of Motor Control
0006h	6	GF - Ground Fault	0026h	38	SVE - Zero Servo Fault
0007h	7	OC - Over Current	0027h	39	EF0 - Option External Fault
0008h	8	OV - DC Bus Overvoltage	0028h	40	FBL - PID Feedback Loss
0009h	9	OH - Heatsink Overtemperature	0029h	41	UL3 - Undertorque Detection 1
000Ah	10	OH1 - Heatsink MAX Temperature	002Ah	42	UL4 - Undertorque Detection 2
000Bh	11	OL1 - Motor Overload	002Bh	43	OL7 - High Slip Braking Overload
000Ch	12	OL2 - Inverter Overload	002Ch	44	EF9 - External Fault S9
000Dh	13	OL3 - Overtorque Detection 1	002Dh	45	EF10 - External Fault S10
000Eh	14	OL4 - Overtorque Detection 2	002Eh	46	EF11 - External Fault S11
000Fh	15	RR - Braking Transistor Failure	002Fh	47	EF12 - External Fault S12
0010h	16	RH - Braking Resistor Overheat	0030h	48	Reserved
0011h	17	EF3 - External Fault S3	0031h	49	VCN - Neutral Point Detection
0012h	18	EF4 - External Fault S4	0032h	50	Reserved
0013h	19	EF5 - External Fault S5	0033h	51	Reserved
0014h	20	EF6 - External Fault S6	0034h	52	Reserved
0015h	21	EF7 - External Fault S7	0035h	53	Reserved
0016h	22	EF8 - External Fault S8	0036h	54	Reserved
0017h	23	Reserved	0037h	55	Reserved
0018h	24	OS - Overspeed	0038h	56	PGOH - Encoder (PG) Loss
0019h	25	DEV - Speed Deviation	0039h	57	E-5 - SI-T Communication Loss
001Ah	26	PGO - Encoder (PG) Loss	003Ah	58	CF2 - Loss of Motor Control 2
001Bh	27	PF - Input Phase Loss	003Bh	59	SER - Speed Search Error
001Ch	28	LF - Output Phase Loss	003Ch	60	CFAL1 - CASE Fault 1*
001Dh	29	OH3 - Motor Overheat 1	003Dh	61	CFAL2 - CASE Fault 2*
001Eh	30	OPR - Operator Disconnected	003Eh	62	CFAL3 - CASE Fault 3*
001Fh	31	ERR - EEPROM Read/Write Error	003Fh	63	CFAL4 - CASE Fault 4*
0020h	32	OH4 - Motor Overheat 2	0040h	64	CFAL5 - CASE Fault 5*

* For drives with custom (CASE) software, the fault text could be different.

Notes:

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Chapter 5 - User Notes

This chapter allows the user to enter information specific to their application.

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Hex/Dec Conversion Table.....91

Notes:

drive:_____ drive Name:_____ Date:_____

User Parameter Settings

Table 5.1 User Parameter Settings				
Parameter	Description	Default	User Setting	Notes
A1-00	Select Language	0		
A1-01	Access Level	2		
A1-02	Control Method	0		
A1-03	Parameter Initialization	0		
A1-05	Enter Password	0		
A2-01	User Parameter 1	0h		
A2-02	User Parameter 2	0h		
A2-03	User Parameter 3	0h		
A2-04	User Parameter 4	0h		
A2-05	User Parameter 5	0h		
A2-06	User Parameter 6	0h		
A2-07	User Parameter 7	0h		
A2-08	User Parameter 8	0h		
A2-09	User Parameter 9	0h		
A2-10	User Parameter 10	0h		
A2-11	User Parameter 11	0h		
A2-12	User Parameter 12	0h		
A2-13	User Parameter 13	0h		
A2-14	User Parameter 14	0h		
A2-15	User Parameter 15	0h		
A2-16	User Parameter 16	0h		
A2-17	User Parameter 17	0h		
A2-18	User Parameter 18	0h		
A2-19	User Parameter 19	0h		
A2-20	User Parameter 20	0h		
A2-21	User Parameter 21	0h		
A2-22	User Parameter 22	0h		
A2-23	User Parameter 23	0h		
A2-24	User Parameter 24	0h		
A2-25	User Parameter 25	0h		
A2-26	User Parameter 26	0h		
A2-27	User Parameter 27	0h		
A2-28	User Parameter 28	0h		
A2-29	User Parameter 29	0h		
A2-30	User Parameter 30	0h		
A2-31	User Parameter 31	0h		
A2-32	User Parameter 32	0h		
b1-01	Frequency Reference Source	1		
b1-02	Run Source	1		
b1-03	Stopping Method	0		
b1-04	Reverse Operation	0		
b1-05	Zero-Speed Operation	0		
b1-06	Digital Input Scan Time	1		
b1-07	Local/Remote Run Selection	0		
b1-08	Run Command at Programming	0		
b1-10	Zero Speed Mode Selection	1		
b2-01	DC Injection Start Frequency	0.5 Hz		
b2-02	DC Injection Current	50 %		
b2-03	DC Injection Time at Start	0.0 Sec		
b2-04	DC Injection Time at Stop	0.5 Sec		
b2-08	Flux Compensation Level	0 %		
b3-01	Speed Search at Start	2		
b3-02	Speed Search Current	120 %		
b3-03	Speed Search Dec Time	2.0 Sec		
b3-05	Speed Search Delay	kVA Dep.		
b3-10	Search Detection Compensation	1.1		

Table 5.1 User Parameter Settings				
Parameter	Description	Default	User Setting	Notes
b3-13	Search Estimation P Gain	1		
b3-14	Bidirectional Search Selection	1		
b3-17	Search Restart Level	150%		
b3-18	Search Restart Time	0.1 Sec		
b3-19	Number of Search Restarts	0		
b3-20	Search Restart Selection	0		
b4-01	Delay-On Timer	0.0 Sec		
b4-02	Delay-Off Timer	0.0 Sec		
b5-01	PID Mode Selection	0		
b5-02	PID P Gain	1		
b5-03	PID I Time	1.0 Sec		
b5-04	PID I Limit	100.00 %		
b5-05	PID D Time	0.0 Sec		
b5-06	PID Limit	100.00 %		
b5-07	PID Offset	0.00 %		
b5-08	PID Delay Time	0.0 Sec		
b5-09	PID Output Level Selection	0		
b5-10	PID Output Gain	1		
b5-11	PID Output Reverse Selection	0		
b5-12	Feedback Loss Detection Select	0		
b5-13	Feedback Loss Detection Level	0 %		
b5-14	Feedback Loss Detection Time	1.0 Sec		
b5-15	PID Sleep Level	0.0 Hz		
b5-16	PID Sleep Time	0.0 Sec		
b5-17	PID Accel/Decel Time	0.0 Sec		
b5-18	PID Setpoint Source Selection	0		
b5-19	PID Setpoint	0.00 %		
b6-01	Dwell Reference at Start	0.0 Hz		
b6-02	Dwell Time at Start	0.0 Sec		
b6-03	Dwell Reference at Stop	0.0 Hz		
b6-04	Dwell Time at Stop	0.0 Sec		
b7-01	Droop Level	0.00 %		
b7-02	Droop Delay Time	0.05 Sec		
b8-01	Energy Savings Selection	0		
b8-02	Energy Savings Gain	0.7		
b8-03	Energy Savings Filter Time	kVA Dep.		
b8-04	Energy Savings Coefficient	kVA Dep.		
b8-05	Power Detection Filter Time	20 ms		
b8-06	Voltage Search Limit	0 %		
b9-01	Zero Servo Gain	5		
b9-02	Zero Servo Completion Width	10 Counts		
C1-01	Accel Time 1	10.0 Sec		
C1-02	Decel Time 1	10.0 Sec		
C1-03	Accel Time 2	10.0 Sec		
C1-04	Decel Time 2	10.0 Sec		
C1-05	Accel Time 3	10.0 Sec		
C1-06	Decel Time 3	10.0 Sec		
C1-07	Accel Time 4	10.0 Sec		
C1-08	Decel Time 4	10.0 Sec		
C1-09	Fast Stop Time	10.0 Sec		
C1-10	Accel/Decel Units	1		
C1-11	Accel/Decel Switch Frequency	0.0 Hz		
C2-01	S-Curve at Accel Start	0.2 Sec		
C2-02	S-Curve at Accel End	0.2 Sec		
C2-03	S-Curve at Decel Start	0.2 Sec		
C2-04	S-Curve at Decel End	0.0 Sec		
C3-01	Slip Compensation Gain	Control Meth		
C3-02	Slip Compensation Time	200 ms		
C3-03	Slip Compensation Limit	200 %		

Table 5.1 User Parameter Settings				
Parameter	Description	Default	User Setting	Notes
C3-04	Slip Compensation During Regen	0		
C3-05	Output Voltage Limit Selection	0		
C4-01	Torque Compensation Gain	1		
C4-02	Torque Compensation Time	Control Meth		
C4-03	Forward Torque Comp at Start	0.00 %		
C4-04	Reverse Torque Comp at Start	0.00 %		
C4-05	Torque Comp at Start Filter Time	10 ms		
C5-01	ASR P Gain 1	Control Meth		
C5-02	ASR I Time 1	Control Meth		
C5-03	ASR P Gain 2	Control Meth		
C5-04	ASR I Time 2	Control Meth		
C5-05	ASR Limit	0.0%		
C5-06	ASR Delay Time	Control Meth		
C5-07	ASR Gain Switchover Frequency	0.0 Hz		
C5-08	ASR I Limit	400 %		
C5-10	ASR Filter Time 2	0.01 Sec		
C6-02	Carrier Frequency Selection	kVA Dep.		
C6-03	Carrier Frequency Maximum	kVA Dep.		
C6-04	Carrier Frequency Minimum	kVA Dep.		
C6-05	Carrier Frequency Gain	0		
d1-01	Frequency Reference 1	0.0 Hz		
d1-02	Frequency Reference 2	0.0 Hz		
d1-03	Frequency Reference 3	0.0 Hz		
d1-04	Frequency Reference 4	0.0 Hz		
d1-05	Frequency Reference 5	0.0 Hz		
d1-06	Frequency Reference 6	0.0 Hz		
d1-07	Frequency Reference 7	0.0 Hz		
d1-08	Frequency Reference 8	0.0 Hz		
d1-09	Frequency Reference 9	0.0 Hz		
d1-10	Frequency Reference 10	0.0 Hz		
d1-11	Frequency Reference 11	0.0 Hz		
d1-12	Frequency Reference 12	0.0 Hz		
d1-13	Frequency Reference 13	0.0 Hz		
d1-14	Frequency Reference 14	0.0 Hz		
d1-15	Frequency Reference 15	0.0 Hz		
d1-16	Frequency Reference 16	0.0 Hz		
d1-17	Jog Frequency Reference	6.0 Hz		
d2-01	Reference Upper Limit	100.00 %		
d2-02	Reference Lower Limit	0.00 %		
d2-03	Analog Reference Lower Limit	0.00 %		
d3-01	Jump Frequency 1	0.0 Hz		
d3-02	Jump Frequency 2	0.0 Hz		
d3-03	Jump Frequency 3	0.0 Hz		
d3-04	Jump Bandwidth	1.0 Hz		
d4-01	MOP Reference Memory	0		
d4-02	Trim Control Level	10 %		
d5-01	Torque Control Selection	0 ms		
d5-02	Torque Reference Filter Time	0 ms		
d5-03	Speed Limit Selection	1		
d5-04	Speed Limit Value	0 %		
d5-05	Speed Limit Bias	10 %		
d5-06	Speed/Torque Changeover Time	0 ms		
d5-07	Directional Speed Limit Select	1		
d6-01	Field-Weakening Level	80 %		
d6-02	Field-Weakening Frequency	0.0 Hz		
d6-03	Field Forcing Selection	0		
d6-05	AΦR Time Gain	1		
d6-06	Field Forcing Limit	400 %		
E1-01	Input Voltage	kVA Dep.		

Table 5.1 User Parameter Settings				
Parameter	Description	Default	User Setting	Notes
E1-03	V/F Pattern Selection	0fh		
E1-04	Maximum Frequency	60.0 Hz		
E1-05	Maximum Voltage	kVA Dep.		
E1-06	Base Frequency	60.0 Hz		
E1-07	Midpoint Frequency A	Control Meth		
E1-08	Midpoint Voltage A	Control Meth		
E1-09	Minimum Frequency	Control Meth		
E1-10	Minimum Voltage	Control Meth		
E1-11	Midpoint Frequency B	0.0 Hz		
E1-12	Midpoint Voltage B	0.0 VAC		
E1-13	Base Voltage	0.0 VAC		
E2-01	Motor Rated FLA	kVA Dep.		
E2-02	Motor Rated Slip	kVA Dep.		
E2-03	No-Load Current	kVA Dep.		
E2-04	Number of Poles	4		
E2-05	Terminal Resistance	kVA Dep.		
E2-06	Leakage Inductance	kVA Dep.		
E2-07	Saturation Compensation 1	0.50		
E2-08	Saturation Compensation 2	0.75		
E2-09	Mechanical Loss	0.00 %		
E2-10	Motor Iron Loss	kVA Dep.		
E2-11	Motor Rated Power	kVA Dep.		
E2-12	Saturation Compensation 3	1.30		
E3-01	Control Method (Motor 2)	2		
E3-02	Maximum Frequency (Motor 2)	60.0 Hz		
E3-03	Maximum Voltage (Motor 2)	kVA Dep.		
E3-04	Base Frequency (Motor 2)	60.0 Hz		
E3-05	Midpoint Frequency (Motor 2)	Control Meth		
E3-06	Midpoint Voltage (Motor 2)	Control Meth		
E3-07	Minimum Frequency (Motor 2)	Control Meth		
E3-08	Minimum Voltage (Motor 2)	Control Meth		
E4-01	Motor Rated FLA (Motor 2)	kVA Dep.		
E4-02	Motor Rated Slip (Motor 2)	kVA Dep.		
E4-03	No-Load Current (Motor 2)	kVA Dep.		
E4-04	Number of Poles (Motor 2)	4		
E4-05	Terminal Resistance (Motor 2)	kVA Dep.		
E4-06	Leakage Inductance (Motor 2)	kVA Dep.		
E4-07	Motor Rated Power (Motor 2)	kVA Dep.		
E4-08	Slip Comp Gain (Motor 2)	Control Meth		
E4-09	ASR P Gain (Motor 2)	Control Meth		
E4-10	ASR I Time (Motor 2)	Control Meth		
E4-11	Torque Comp Gain (Motor 2)	Control Meth		
F1-01	PG Pulses/Revolution	1024 Pulses		
F1-02	PG Feedback Loss Selection	1		
F1-03	PG Overspeed Selection	1		
F1-04	PG Deviation Selection	3		
F1-05	PG Rotation Selection	0		
F1-06	PG Output Ratio	1		
F1-07	PG Ramp PI/I Selection	0		
F1-08	PG Overspeed Level	115 %		
F1-09	PG Overspeed Time	1.0 Sec		
F1-10	PG Deviation Level	10 %		
F1-11	PG Deviation Time	0.5 Sec		
F1-12	PG Gear Teeth 1	0		
F1-13	PG Gear Teeth 2	0		
F1-14	PG Loss Detection Time	2.0 Sec		
F1-21	PG Pulses/Revolution (Motor 2)	1024		
F1-22	PG Rotation Selection (Motor 2)	0		
F1-23	PG Gear Teeth 1 (Motor 2)	0		

Table 5.1 User Parameter Settings				
Parameter	Description	Default	User Setting	Notes
F1-24	PG Gear Teeth 2 (Motor 2)	0		
F1-25	Hardware PG Loss Channel 1	1		
F1-26	Hardware PG Loss Channel 2	1		
F2-01	AI-14B Input Selection	0		
F3-01	DI-08/DI-16H2 Input Selection	0		
F4-01	AO-08/12 Channel 1 Selection	02h		
F4-02	AO-08/12 Channel 1 Gain	100.00 %		
F4-03	AO-08/12 Channel 2 Selection	03h		
F4-04	AO-08/12 Channel 2 Gain	50.00 %		
F4-05	AO-08/12 Channel 1 Bias	0.00 %		
F4-06	AO-08/12 Channel 2 Bias	0.00 %		
F4-07	AO-08/12 Signal Type Channel 1	0		
F4-08	AO-08/12 Signal Type Channel 2	0		
F5-01	DO-02C/08 Channel 1 Selection	00h		
F5-02	DO-02C/08 Channel 2 Selection	01h		
F5-03	DO-08 Channel 3 Selection	02h		
F5-04	DO-08 Channel 4 Selection	04h		
F5-05	DO-08 Channel 5 Selection	06h		
F5-06	DO-08 Channel 6 Selection	37h		
F5-07	DO-08 Channel 7 Selection	0fh		
F5-08	DO-08 Channel 8 Selection	0fh		
F5-09	DO-08 Selection	0		
F6-01	Communication Bus Fault Select	1		
F6-02	EF0 Detection	0		
F6-03	EF0 Fault Selection	1		
F6-04	CP-916 Trace Sample Time	0		
F6-05	Output Current Unit Selection	0		
F6-06	Torque Reference/Limit Select	0		
F6-08	SI-T Communication Loss Select	1		
F6-09	SI-T Loss Retry Attempts	2		
H1-01	Terminal S3 Selection	24h		
H1-02	Terminal S4 Selection	14h		
H1-03	Terminal S5 Selection	03h		
H1-04	Terminal S6 Selection	04h		
H1-05	Terminal S7 Selection	06h		
H1-06	Terminal S8 Selection	08h		
H1-07	Terminal S9 Selection	05h		
H1-08	Terminal S10 Selection	32h		
H1-09	Terminal S11 Selection	07h		
H1-10	Terminal S12 Selection	15h		
H2-01	Terminal M1-M2 Selection	0h		
H2-02	Terminal M3-M4 Selection	1h		
H2-03	Terminal M5-M6 Selection	2h		
H2-04	Terminal P3-C3 Selection	06h		
H2-05	Terminal P4-C4 Selection	10h		
H3-01	Terminal A1 Level Selection	0		
H3-02	Terminal A1 Gain	100.00 %		
H3-03	Terminal A1 Bias	0.00 %		
H3-04	Terminal A3 Signal	0		
H3-05	Terminal A3 Selection	02h		
H3-06	Terminal A3 Gain			
H3-07	Terminal A3 Bias	0.00 %		
H3-08	Terminal A2 Signal	2		
H3-09	Terminal A2 Selection	0h		
H3-10	Terminal A2 Gain	100.00 %		
H3-11	Terminal A2 Bias	0.00 %		
H3-12	Analog Input Filter Time	0.03 Sec		
H4-01	Terminal FM Selection	02h		
H4-01	Terminal FM Selection	02h		

Table 5.1 User Parameter Settings				
Parameter	Description	Default	User Setting	Notes
H4-02	Terminal FM Gain	100.00 %		
H4-03	Terminal FM Bias	0.00 %		
H4-04	Terminal AM Selection	03h		
H4-05	Terminal AM Gain	50.00 %		
H4-06	Terminal AM Bias	0.00 %		
H4-07	Terminal FM Signal Type	0		
H4-08	Terminal AM Signal Type	0		
H5-01	Modbus Node Address	1fh		
H5-02	Baud Rate	3		
H5-03	Parity Selection	0		
H5-04	Communication Loss Response	3		
H5-05	Communication Fault Selection	1		
H5-06	Transmit Wait Time	5 ms		
H5-07	RTS Control Selection	1		
H5-10	Unit Selection for Register 0025h	0		
H6-01	Terminal RP Selection	0		
H6-02	Terminal RP Scaling	1440 Hz		
H6-03	Terminal RP Gain	100.00 %		
H6-04	Terminal RP Bias	0.00 %		
H6-05	Terminal RP Filter Time	0.10 Sec		
H6-06	Terminal MP Selection	02h		
H6-07	Terminal MP Scaling	1440 Hz		
L1-01	Motor Overload Fault Selection	1		
L1-02	Motor Overload Time Constant	1.0 min		
L1-03	Motor OH Alarm Selection	3		
L1-04	Motor OH Fault Selection	1		
L1-05	Motor Temperature Filter Time	0.20 Sec		
L2-01	Power Loss Ride Thru Selection	0		
L2-02	Power Loss Ride Thru Time	0.1 Sec		
L2-03	Minimum Baseblock Time	0.5 Sec		
L2-04	Voltage Recovery Ramp Time	0.3 Sec		
L2-05	Undervoltage Detection Level	kVA Dep.		
L2-06	KEB Decel Time	0.0 Sec		
L2-07	Power Loss Accel Time	0.0 Sec		
L2-08	KEB Frequency Gain	100 %		
L3-01	Stall Prevention Accel Selection	1		
L3-02	Stall Prevention Accel Level	150 %		
L3-03	Stall Accel Const HP Level	50 %		
L3-04	Stall Prevention Decel Selection	1		
L3-05	Stall Prevention Run Selection	1		
L3-06	Stall Prevention Run Level	160 %		
L3-11	Overvoltage Inhibit Selection	0		
L3-12	Overvoltage Inhibit Voltage Level	kVA Dep.		
L4-01	Speed Agree Level	0.0 Hz		
L4-02	Speed Agree Width	2.0 Hz		
L4-03	Speed Agree Level +/-	0.0 Hz		
L4-04	Speed Agree Width +/-	2.0 Hz		
L4-05	Frequency Reference Loss Select	0		
L4-06	Frequency Reference Loss Gain	80.00 %		
L5-01	Number of Auto-Restarts	0		
L5-02	Fault Selection During Restart	0		
L6-01	Torque Detection 1 Selection	0		
L6-02	Torque Detection 1 Level	150 %		
L6-03	Torque Detection 1 Time	0.1 Sec		
L6-04	Torque Detection 2 Selection	0		
L6-05	Torque Detection 2 Level	150 %		
L6-06	Torque Detection 2 Time	0.1 Sec		
L7-01	Torque Limit Forward Motoring	200 %		

Table 5.1 User Parameter Settings				
Parameter	Description	Default	User Setting	Notes
L7-02	Torque Limit Reverse Motoring	200 %		
L7-03	Torque Limit Forward Regen	200 %		
L7-04	Torque Limit Reverse Regen	200 %		
L7-06	Torque Limit Filter Time	200 ms		
L7-07	Torque Limit During Accel/Decel	0		
L8-01	DB Resistor Protection Selection	0		
L8-02	OH Pre-Alarm Level	95 Deg		
L8-03	OH Pre-Alarm Selection	3		
L8-05	Input Phase Loss Selection	0		
L8-07	Output Phase Loss Selection	0		
L8-09	Ground Fault Selection	1		
L8-10	Fan On/Off Selection	0		
L8-11	Fan Off Delay Time	60 Sec		
L8-12	Ambient Temperature	45 Deg		
L8-15	Low Speed OL2 Selection	1		
L8-18	Software CLA Selection	1		
L8-33	CF2 Selection	1		
n1-01	Hunting Prevention Selection	1		
n1-02	Hunting Prevention Gain	1		
n1-03	Hunting Prevention Time	10 ms		
n3-01	HSB Decel Width	5 %		
n3-02	HSB Current Reference	150 %		
n3-03	HSB Dwell Time at Stop	1.0 Sec		
n3-04	HSB OL Time	40 Sec		
n4-07	Speed Estimator I Time	0.03 ms		
n4-08	Speed Estimator P Gain	15		
n4-10	Observer Gain at High Speed	15		
n4-11	Observer Switch Frequency	70 Hz		
n4-15	Low Speed Regen Coefficient 1	0.3		
n4-17	Torque Adjustment Gain 1	1		
n4-18	Motor Cable Resistance Gain	1		
n4-28	Observer Switch During Decel	50 Hz		
n4-29	Torque Adjustment Gain 2	0.1		
n4-30	Low Speed Regen Coefficient 2	1		
n4-32	Speed Estimation Gain Freq 1	5.0 Hz		
n4-33	Speed Estimation Gain Freq 2	20.0 Hz		
n4-34	Speed Estimation Gain Rate	100.0 %		
n4-35	U1-48 Reduction Gain	1		
n4-39	Flux Level at Low Frequency	90 %		
n4-40	Current Stabilizing Gain	kVA Dep.		
n4-43	Speed Estimation Comp Gain	0.0 %		
n5-01	Feed Forward Selection	0		
n5-02	Motor Accel Time	kVA Dep.		
n5-03	Feed Forward Gain	1		
o1-01	User Monitor Selection	6		
o1-02	Power-On Monitor	1		
o1-03	Display Scaling	0		
o1-04	V/F Setting Units	0		
o1-05	LCD Contrast	3		
o2-01	Local/Remote Key Selection	1		
o2-02	Operator Stop Key Selection	1		
o2-03	User Defaults	0		
o2-04	Inverter kVA Selection	kVA Dep.		
o2-05	Operator M.O.P. Selection	0		
o2-06	Operator Disconnect Selection	0		
o2-07	Accumulated Time Initial Setting	0		
o2-08	Accumulated Time Selection	0		
o2-10	Fan Run Time Initial Setting	0		

Table 5.1 User Parameter Settings				
Parameter	Description	Default	User Setting	Notes
o2-12	Fault Trace/History Initialization	0		
o2-14	Watt Hour Monitors Initialization	0		
P1-01	CASE Parameter 1	0		
P1-02	CASE Parameter 2	0		
P1-03	CASE Parameter 3	0		
P1-04	CASE Parameter 4	0		
P1-05	CASE Parameter 5	0		
P1-06	CASE Parameter 6	0		
P1-07	CASE Parameter 7	0		
P1-08	CASE Parameter 8	0		
P1-09	CASE Parameter 9	0		
P1-10	CASE Parameter 10	0		
P2-01	CASE Parameter 11	0		
P2-02	CASE Parameter 12	0		
P2-03	CASE Parameter 13	0		
P2-04	CASE Parameter 14	0		
P2-05	CASE Parameter 15	0		
P2-06	CASE Parameter 16	0		
P2-07	CASE Parameter 17	0		
P2-08	CASE Parameter 18	0		
P2-09	CASE Parameter 19	0		
P2-10	CASE Parameter 20	0		
P3-01	CASE Parameter 21	0		
P3-02	CASE Parameter 22	0		
P3-03	CASE Parameter 23	0		
P3-04	CASE Parameter 24	0		
P3-05	CASE Parameter 25	0		
P3-06	CASE Parameter 26	0		
P3-07	CASE Parameter 27	0		
P3-08	CASE Parameter 28	0		
P3-09	CASE Parameter 29	0		
P3-10	CASE Parameter 30	0		

Hex/Dec Conversion Table

Table 5.2 Hexadecimal-Decimal Conversion									
Hex	**Dec**	**Hex**	**Dec**	**Hex**	**Dec**	**Hex**	**Dec**	**Hex**	**Dec**
0	0	34	52	68	104	9C	156	D0	208
1	1	35	53	69	105	9D	157	D1	209
2	2	36	54	6A	106	9E	158	D2	210
3	3	37	55	6B	107	9F	159	D3	211
4	4	38	56	6C	108	A0	160	D4	212
5	5	39	57	6D	109	A1	161	D5	213
6	6	3A	58	6E	110	A2	162	D6	214
7	7	3B	59	6F	111	A3	163	D7	215
8	8	3C	60	70	112	A4	164	D8	216
9	9	3D	61	71	113	A5	165	D9	217
A	10	3E	62	72	114	A6	166	DA	218
B	11	3F	63	73	115	A7	167	DB	219
C	12	40	64	74	116	A8	168	DC	220
D	13	41	65	75	117	A9	169	DD	221
E	14	42	66	76	118	AA	170	DE	222
F	15	43	67	77	119	AB	171	DF	223
10	16	44	68	78	120	AC	172	E0	224
11	17	45	69	79	121	AD	173	E1	225
12	18	46	70	7A	122	AE	174	E2	226
13	19	47	71	7B	123	AF	175	E3	227
14	20	48	72	7C	124	B0	176	E4	228
15	21	49	73	7D	125	B1	177	E5	229
16	22	4A	74	7E	126	B2	178	E6	230
17	23	4B	75	7F	127	B3	179	G7	231
18	24	4C	76	80	128	B4	180	E8	232
19	25	4D	77	81	129	B5	181	E9	233
1A	26	4E	78	82	130	B6	182	EA	234
1B	27	4F	79	83	131	B7	183	EB	235
1C	28	50	80	84	132	B8	184	EC	236
1D	29	51	81	85	133	B9	185	ED	237
1E	30	52	82	86	134	BA	186	EE	238
1F	31	53	83	87	135	BB	187	EF	239
20	32	54	84	88	136	BC	188	F0	240
21	33	55	85	89	137	BD	189	F1	241
22	34	56	86	8A	138	BE	190	F2	242
23	35	57	87	8B	139	BF	191	F3	243
24	36	58	88	8C	140	C0	192	F4	244
25	37	59	89	8D	141	C1	193	F5	245
26	38	5A	90	8E	142	C2	194	F6	246
27	39	5B	91	8F	143	C3	195	G7	247
28	40	5C	92	90	144	C4	196	F8	248
29	41	5D	93	91	145	C5	197	F9	249
2A	42	5E	94	92	146	C6	198	FA	250
2B	43	5F	95	93	147	C7	199	FB	251
2C	44	60	96	94	148	C8	200	FC	252
2D	45	61	97	95	149	C9	201	FD	253
2E	46	62	98	96	150	CA	202	FE	254
2F	47	63	99	97	151	CB	203	FF	255
30	48	64	100	98	152	CC	204	100	256
31	49	65	101	99	153	CD	205		
32	50	66	102	9A	154	CE	206		
33	51	67	103	9B	155	CF	207		



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