

**HIGH PERFORMANCE TRANSISTOR INVERTER
VECTOR DRIVE SERIES**

TOSHIBA



**TOSVERT-130
TRANSISTOR INVERTER**

MODBUS+ COMMUNICATIONS OPTION MANUAL

[Toshiba inverter Tosvert G3-Series Modbus Plus Manual](#)

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Introduction

Thank you for purchasing the “ModBus+ Interface” for the Toshiba TOSVERT-130 G3 High-Performance Transistor Inverter. Before using the ModBus+ interface option, please be sure to thoroughly read the instructions and precautions contained in this manual. In addition, please make sure that this instruction manual is delivered to the end user of the inverter unit into which the ModPlus+ option kit is installed, and keep this instruction manual in a safe place for future reference or inverter inspection.

This instruction manual describes the device specifications, wiring methods, maintenance procedures, protocol, functions and usage methods for the ModBus+ communications interface option.

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Usage Precautions

- Please use the option board only when the ambient temperature of the inverter unit into which the option board is installed is within the following specified temperature limits:
Operating Environment 4 ~ +104°F
Storage: -25 ~ +65°C (-13 ~ +149°F)
- Avoid installation locations that may be subjected to large shocks or vibrations.
- Avoid installation locations that may be subjected to rapid changes in temperature or humidity.





- Do not touch charged parts such as the terminal block while the inverter's CHARGE lamp is lit. A charge will still be present in the inverter unit's internal electrolytic capacitors, and therefore touching these areas may result in an electrical shock. Always turn all inverter input power
Installation • At least 5 minutes after the CHARGE lamp has gone out before wiring the communication cables or motor wiring.
- When installing the option board into the inverter and making wiring connections, make certain that no clippings or wiring leads that could cause device failure fall into the inverter or onto electronic components.
- Proper ground connections are vital for both safety and signal reliability reasons. For proper grounding procedures, please refer to the section in this manual pertaining to grounding (section 2.1).
- Route the communication cables separate from the inverter input/output power wiring.
- To avoid the possibility of electric shock due to leakage currents, always ground the inverter unit's E/GND terminal and the motor. The ModBus+ option board's SHLD is connected to earth ground through the metal circuit board standoff.

- The inverter's EEPROM has a life span of 10,000 write cycles. Do not write to the same parameter (other than frequency or input command) more than 10,000 times.
- Do not touch or insert a rod or any other item into the inverter while power is applied, as this *Other Precautions* shock or inverter damage.
- Commission the disposal of the option board to a specialist.
- Do not assign the same node ID to more than one inverter in the same network.
- Assign the PLC address to 1 and all inverters should be assigned node addresses from 2 through 64.
- When the inverter's control power supply is turned on, the inverter performs initialization functions for approximately 1 second, during which communications capabilities are disabled. Communications capabilities will also be disabled for approximately 1 second after momentary control power supply outages or inverter resets.

1. Option Board Installation / Removal

1.1 Installation

Installation of the TOSHIBA ModBus+ option board into a TOSVERT-130 G3 inverter should only be performed by a qualified technician familiar with the maintenance and operation of the G3. To install the option board, complete the following steps:

1.  **CAUTION!** Verify that all input power sources to the inverter have been turned OFF and are locked and tagged out.
2.  **DANGER!**  Wait at least 5 minutes for the inverter's electrolytic capacitors to discharge before proceeding to step 3. **Do not touch any internal parts with power applied to the inverter, or for at least 5 minutes after power to the inverter has been removed. A hazard exists temporarily for electrical shock even if the source power has been removed.**
3.  Remove the inverter's cover (open the door on units with hinged doors). Verify that the CHARGE LED has gone out before continuing the installation process.
4. Loosen the 4 screws attaching the G3's operation panel support bracket to the control board support bracket and remove the operation panel and support bracket as a unit (refer to Figure 1).

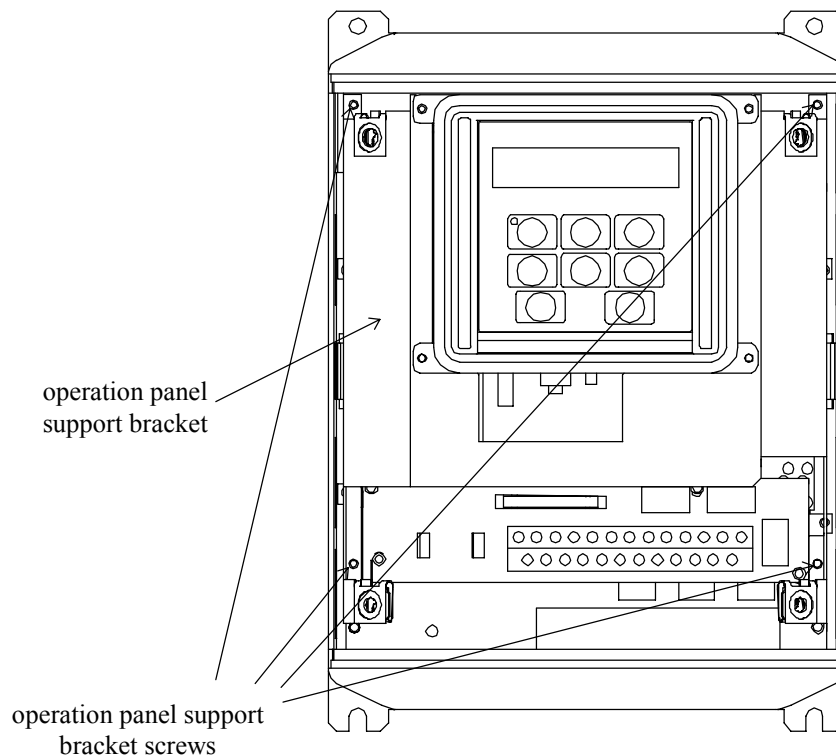


Figure 1: G3 with front cover removed

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5. Install the 3 plastic and 1 metal option board standoffs into the holes provided in the control board support bracket. Also the ROM included with the Modbus+ card should be installed into socket marked CN41 (refer to Figure 2).

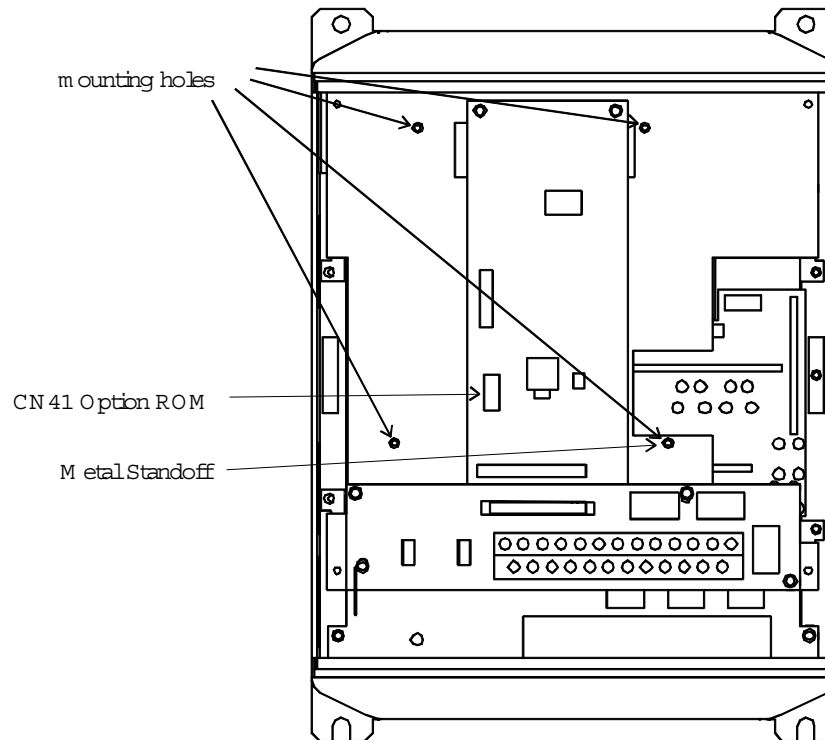



Figure 2: G3 with front cover and operation panel support bracket removed

6.  **CAUTION!** The ModBus+ option board is a static-sensitive device. Standard electrostatic-sensitive component handling precautions should be observed. Install the ModPlus+ cable through the access holes at the bottom of the inverter and route the cable in order to make connections to the option board connector (P3). Take care to not route the cable near any sharp edges or in positions where it may be pinched.
7. Install the option board into the inverter by carefully aligning the 3 plastic and 1 metal supports with the 4 mounting holes provided in the option board. Ensure that connector CN5A on the back side of the option board is aligned with connector CN5 on the front side of the control board.
8. Press the option board firmly onto the standoffs and connector CN5 until the standoff retaining tabs lock. Use supplied screw to fasten onto the metal standoff.
9. Connect the ModBus+ cable to the option board connector (P3).
10. Program node address DIP for the desired node address (see section 6.2).
11. Carefully re-install the operation panel and support bracket and tighten the 4 screws that attach the operation panel support bracket to the control board support bracket.
12. Reinstall the inverter's cover (close and latch the door on units with hinged doors).



DANGER!  Do not operate the unit with the cover off / cabinet door open.

13. Turn all power sources to the inverter unit ON, and verify that the inverter functions properly. If the inverter unit does not appear to power $\frac{5}{5}$ up, or does not function properly, immediately

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turn power OFF. **Repeat steps 1 ~ 3 to remove all power from the inverter.** Then, verify all connections. Contact Toshiba International Corporation for assistance if the problem persists.

1.2 Removal

Removal of the ModBus+ option board from a TOSVERT-130 G3 inverter should only be performed by a qualified technician familiar with the maintenance and operation of the G3. In order to protect the option board connector's reliability, do not repeatedly connect and disconnect the option board. Use the following procedure if it becomes necessary to remove the ModBus+ option board from the inverter.



CAUTION! Do not remove the option board while power is applied to the inverter. Removing the option board with power applied may damage the inverter.

1.  **CAUTION!** Verify that all input power sources to the inverter have been turned OFF and are locked and tagged out.
2.  **DANGER!**  Wait at least 5 minutes for the inverter's electrolytic capacitors to discharge before proceeding to step 3. **Do not touch any internal parts with power applied to the inverter, or for at least 5 minutes after power to the inverter has been removed. A hazard exists temporarily for electrical shock even if the source power has been removed.**
3.  Remove the inverter's cover (open the door on units with hinged doors). Verify that the CHARGE LED has gone out before continuing the removal process.
4. Loosen the 4 screws attaching the G3's operation panel support bracket to the control board support bracket and remove the operation panel and support bracket as a unit (refer to Figure 3).
5.  **CAUTION!** The ModBus+ option board is a static-sensitive device. Standard electrostatic-sensitive component handling precautions should be observed. Release the 4 corners of the option board from the standoffs by pressing down on the standoff locking tabs with a small flat-headed screwdriver. Be careful to not apply any abnormal stress to the option board while performing this, as this may damage the option board or control board connectors.
6. Remove the option board from the inverter.
7. Disconnect the communications cable from the option board connector (P3), and pull the cable out through the access holes at the bottom of the inverter.
8. Carefully re-install the operation panel and support bracket and tighten the 4 screws that attach the operation panel support bracket to the control board support bracket.

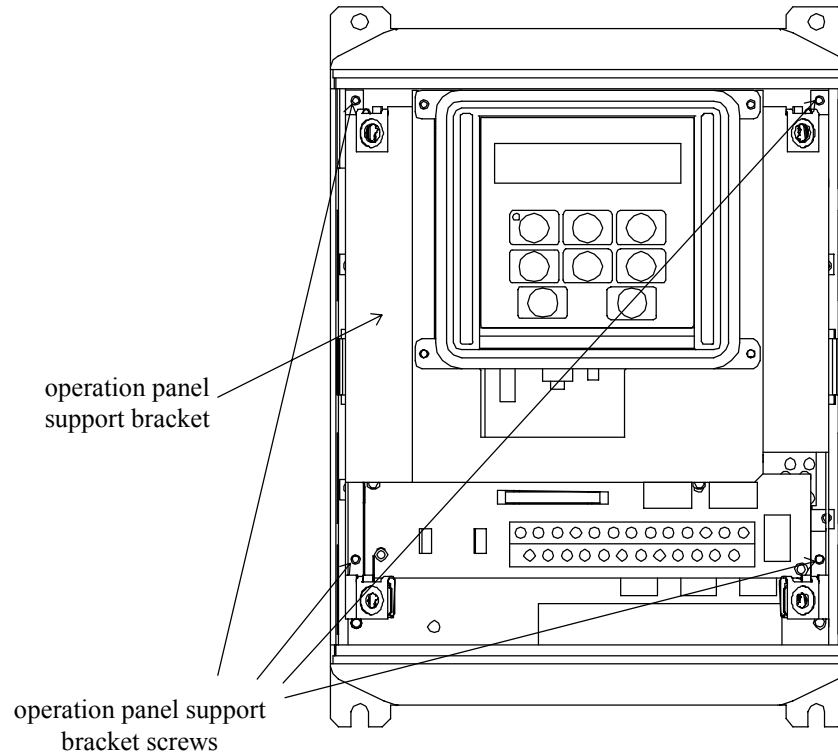


Figure 3: G3 with front cover removed

9. Reinstall the inverter's cover (close and latch the door on units with hinged doors).



DANGER!



Do not operate the unit with the cover off / cabinet door open.

10. Turn all power sources to the inverter unit ON, and verify that the inverter functions properly. If the inverter unit does not appear to power up, or does not function properly, immediately turn power OFF. **Repeat steps 1 ~ 3 to remove all power from the inverter.** Then, verify all connections. Contact Toshiba International Corporation for assistance if the problem persists.

2. Connections

2.1 Grounding

Grounding is of particular importance for reliable, stable operation. Communication system characteristics may vary from system to system, depending on the system environment and grounding method used. A ground connection with an impedance of less than 100Ω should be used. Please be sure to consider the following points for making proper ground connections:

Grounding method checkpoints

- 1) Make solid ground connection to the 'E' terminal on the inverter.
- 2) Ensure that the metal stand-off which is located near the ModBus+ connector has a good mechanical connection to the chassis of the inverter as well as to the option card.
- 3) Use copper wire with a cross-sectional area of 2mm^2 or larger, or aluminum wire with a cross-sectional area of 2.6mm^2 or larger for grounding.

3. Equipment Specification

Item	Specification
Operating Environment	Indoors, less than 1000m above sea level, do not expose to direct sunlight or corrosive / explosive gasses.
Operating Temperature	-10 ~ +40°C (+14 ~ +104°F)
Storage Temperature	-25°C ~ +65°C (-13 ~ +149°F)
Relative Humidity	20% ~ 90% (without condensation)
Vibration	5.9m/s ² {0.6G} or less (10 ~ 55Hz)
Grounding	Use a ground connection with an impedance of less than 100Ω.
Cooling Method	Self-cooled

4. Maintenance And Inspection

Preventive maintenance and inspection is required to maintain the ModBus+ option in its optimal condition, and to ensure a long operational lifetime. Depending on usage and operating conditions, perform a periodic inspection once every three to six months. Before starting inspections, always turn off all power supplies to the inverter unit, and wait at least five minutes after the inverter's "CHARGE" lamp has gone out.

**DANGER!**

Do not touch any internal parts with power applied to the inverter, or for at least 5 minutes after power to the inverter has been removed. A hazard exists temporarily for electrical shock even if the source power has been removed.

Inspection Points

- Check that the wiring terminal screws are not loose. Tighten if necessary.
- Check that there are no defects in any wire terminal crimp points. Visually check that the crimp points are not scarred by overheating.
- Visually check the wiring and cables for damage.
- Clean off any accumulated dust and dirt. Place special emphasis on cleaning the ventilation ports of the inverter and all installed PCBs. Always keep these areas clean, as adherence of dust and dirt can cause premature component failure.
- If use of the inverter unit is discontinued for extended periods of time, turn the power on at least once every two years and confirm that the unit still functions properly.
- Do not perform hi-pot tests on the inverter or RS485 option card, as they may damage the unit's internal components.

Please pay close attention to all periodic inspection points and maintain a good operating environment.

5. Storage And Warranty

5.1 Storage

Observe the following points when the ModBus+ option board is not used immediately after purchase or when it is not used for an extended period of time.

- Avoid storing the option board in places that are hot or humid, or that contain large quantities of dust or metallic dust. Store the option board in a well-ventilated location.
- When not using the ModBus+ option board for an extended period of time, turn the power on at least once every two years and confirm that it still functions properly.

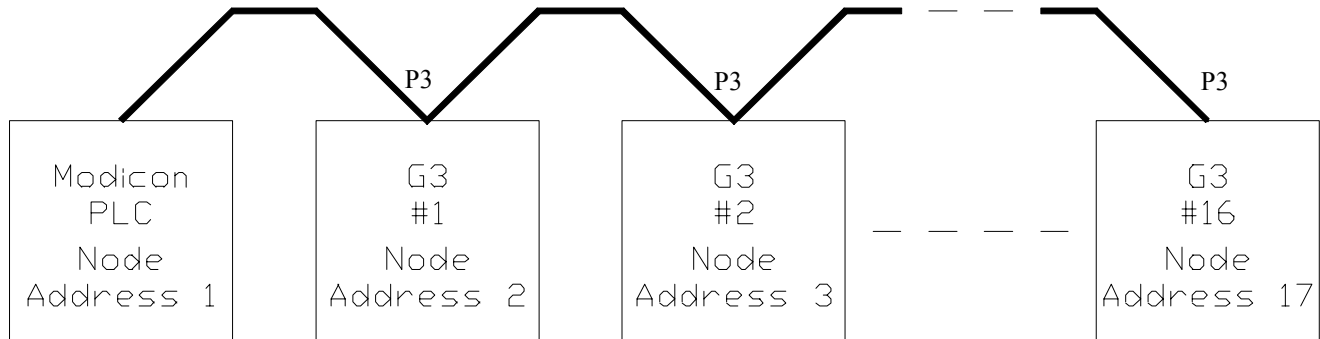
5.2 Warranty

The Modbus+ option kit is covered under warranty for a period of 12 months from the date of installation, but not to exceed 18 months from the date of shipment from the factory. For further warranty or service information, please contact Toshiba International Corporation.

6. ModBus+ Data Link

6.1 Master Slave Configuration

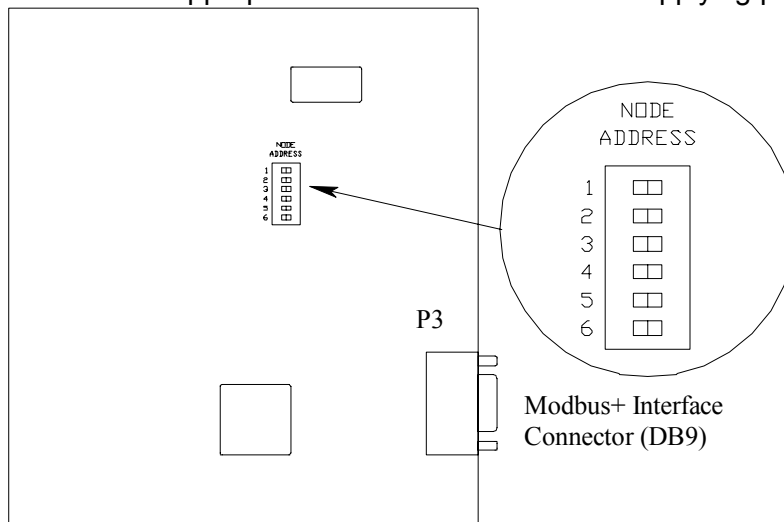
The ModBus+ Option card connected to Toshiba G3 Inverter is designed to communicate with a Modicon PLC via Modicon ModBus+ protocol. A Basic system will have one PLC controlling up to 31 G3 inverters within a Modbus+ network section. For global data writes, the PLC must have a node address of 1 and the inverter address's will be 2 through 17. Presently global data write command can communicate to nodes 2 through 17. Global data read commands can access all 31 inverters. Normal read and write MSTR functions can also access all 31 inverters.



ModBus+ Basic Node Configuration

6.2 ModBus+ Option Card Addressing

The Toshiba ModBus+ option card has a 6 pin DIP switch is used to assign the node address. The DIP switch should be set to the appropriate address location before applying power.



Drawing X. Node Address DIP switch location.

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The addressing is binary with all switches on equaling node address 1. The following is a table describing switch location programming.

Address	DIP SWITCHES					
	1	2	3	4	5	6
2	off	on	on	on	on	on
3	on	off	on	on	on	on
4	off	off	on	on	on	on
5	on	on	off	on	on	on
6	off	on	off	on	on	on
7	on	off	off	on	on	on
8	off	off	off	on	on	on
9	on	on	on	off	on	on
10	off	on	on	off	on	on
11	on	off	on	off	on	on
12	off	off	on	off	on	on
13	on	on	off	off	on	on
14	off	on	off	off	on	on
15	on	off	off	off	on	on
16	off	off	off	off	on	on
17	on	on	on	on	off	on
18	off	on	on	on	off	on
19	on	off	on	on	off	on
20	off	off	on	on	off	on
21	on	on	off	on	off	on
22	off	on	off	on	off	on
23	on	off	off	on	off	on
24	off	off	off	on	off	on
25	on	on	on	off	off	on
26	off	on	on	off	off	on
27	on	off	on	off	off	on
28	off	off	on	off	off	on
29	on	on	off	off	off	on
30	off	on	off	off	off	on
31	on	off	off	off	off	on
32	off	off	off	off	off	on
-	-	-	-	-	-	-
64	off	off	off	off	off	off

NOTE: Range is 1-64, with a 32 node limit per Modbus+ network section, and an address range 2-17 limit for global data writes.

7. G3 Parameter Settings

Option board communications detailed by this specification are enabled by selecting the COMMUNICATION SELECTION parameter in GROUP:COMMUNICATION SETTING PARAMETERS to 2 (formerly "Tosline-F10"), currently "Tosline-F10 / DeviceNet / RIO"). Unlike Tosline-F10, however, the parameter TOSLINE-F10/S20 COMM ERROR MODE do not apply when used with non-Tosline-F10 option cards. Similar to any communication option card, the option frequency command and command input can be used by setting parameter FREQUENCY MODE SELECTION and COMMAND MODE SELECTION, respectively, in GROUP:UTILITY PARAMETERS to 3. For more information on changing parameter settings refer to the TOSHIBA Operation Manual.

The following is a list of the changes necessary to allow the activation of the Modbus+ Option card:

PARAMETER	PARAMETER GROUP	NEW VALUE*
COMMAND MODE SELECTION	UTILITY	3
FREQUENCY MODE SELECTION	UTILITY	3
BLIND FUNCTION SELECTION	UTILITY	1
COMMUNICATIONS PARMS BLIND	UTILITY	1
COMMUNICATIONS SELECTION	COMMUNICATION PARAMETERS	2

*FROM FACTORY DEFAULT VALUES

After making the program changes as described above, disconnect power and install the option ROM and ModBus+ Option Card as described in Section 1.1.

Note: Because the Communications Selection parameter is programmed into the EEPROM memory, the effect from that parameter change only occurs upon power initialization, thus power must be recycled after the program change in order for it to take affect.

8. ModBus+ Programming

8.1 Write only

Registers	bit	Function	Bank	Address	Adjustment Range	Multiplier
01	word	Frequency command	DPRAM	0040	0.00-400.00Hz Adjustment range must be limited to LL,UL and Fmax. G3 RS485 option manual page 56 NOTE 1 Exception Response for data out of bounds.	0.01
02	0	RUN command	DPRAM	0042	0:Stop 1: Run	—
	1	STOP Command (has priority over RUN command)	DPRAM		0: run enabled 1: stop	
	2	Forward • reverse run selection	DPRAM		0:reverse 1:forward	—
	3	Acc/dec #1 / #2 selection	DPRAM		0: Acc / dec #1 1: Acc / dec #2	—
	4	Reserved	DPRAM			—
	5	Reserved	DPRAM			—
	6	Reserved	DPRAM			—
	7	Jog mode selection	DPRAM		0: Normal (acc/dec mode) 1: Jog mode	—
	8	Feedback control (Note 3)	DPRAM		0: Feedback valid 1: Feedback invalid	—
	9	Compulsory DC injection braking mode	DPRAM		0: No compulsory DC injection braking 1: Compulsory DC injection below DC INJECTION START FREQUENCY	—
	A	Fundamental parameter switching	DPRAM		0: V/F #1 1: V/F #2	
	B	Gate block command (coast stop command)	DPRAM		0: Normal 1: Gate block	
	C	Emergency off command	DPRAM		0: Does nothing 1: Emergency off	
	D	Reset command (trip clear)	DPRAM		0: Does nothing 1: Reset	
E	Global Frequency Enable	DPRAM		0: Disable 1: Enable		
F	Global Input Enable	DPRAM		0: Disable 1: Enable		
03		Reserved	DPRAM			
04		Reserved	DPRAM			

8.2 Inverter Status Monitor Read Only

Registers	bit	Function	Bank	Address	Adjustment Range	Multiplier
05	word	Output frequency Monitor	DPRAM	0000	0.00~400.00Hz	0.01
06	0	Run • stop status	DPRAM	0002	0: Stopped 1: Running	—
	1	Run enable			0: Run enabled 1: Stopped	—
	2	Forward • reverse status			0: Reverse 1: Forward	—
	3	Acc/dec #1 / #2 selection status			0: Acc / dec #1 1: Acc / dec #2	—
	4	Reserved			Always "0"	—
	5	Gate Block Status			0:gate block active 1:gate block inactive	—
	6	Reserved			Always "0"	—
	7	Jog mode status			0: Normal (acc/dec mode) 1: Jog mode	—
	8	Feedback enable status			0: Feedback valid 1: Feedback invalid	—
	9	Compulsory DC injection braking mode			0: DC braking inactive 1: DC braking active	—
	A	Fundamental parameter switching			0: V/F #1 1: V/F #2	—
	B	coast stop command status			0: Normal 1: coast to stop	
	C	Emergency off command			0: normal 1: Emergency off	
	D	Reserved			Always "0"	
	E	Main Circuit Undervoltage (MSV)			0:normal 1:MSV	
F	Reserved			Always "0"		
07	word	Output current Monitor	DPRAM	0004	0~255%	1
08	word	Output voltage Monitor	DPRAM	0006	0~232%	0.1
09	word	Reserved				
0A	word	Reserved				

Registers	bit	Function	Bank	Address	Mask	Adjustment Range	Multiplier
0B	word	Frequency command monitor	0	0500	FFFF	0000-9C40 (0.00-400.00)	0.01
0C	word	Input voltage monitor	0	05B2	FFFF		1
0D	word	Input terminal status monitor	0	057A	FFFF	Decode Bit monitor 1 Page 60 RS485 Manual	
0E	low byte	Output terminal status monitor	0	0579	00FF	Decode Bit monitor 2 Page 61 RS485 Manual	
	high byte	Inverter Status 2	0	05BB		Decode using Inverter Status monitor page 61 RS-485 manual.	
0F	word	Inverter Status	0	05B6, 05B7		Decode using Inverter Status monitor page 61 RS-485 manual.	
10	word	Present trip	0	0591	00FF	Refer to Table in Section 8.7 for Fault Codes	
11	high byte	4th Past trip	0 / 1	04F3 ~ 04F7	7F00		
	low byte	3rd past trip			007F		
12	high byte	2nd past trip			7F00		
	low byte	1rst past trip (oldest)			007F		
13	word	Pre-compensation frequency			0	0524	FFFF
14	word	Post-compensation frequency	0	0260	FFFF	0000-9C40 (0.00-400.00)	0.01
15	word	Torque current monitor	0	0684	FFFF	Convention as noted in RS485 manual Note 4 Page 60	
16	low byte	Excitation current monitor	0	0688	00FF	00-FF (0~255%)	1
	high byte	Reserved				00-FF	
17	word	PID feedback value	0	0506	FFFF	Convention as noted in RS485 manual Note 4 Page 60	0.02
18	word	Motor overload ratio	0	0584	FFFF	0~65535	100/65535
19	word	Inverter overload ratio	0	0586	FFFF	0~65535	100/65535
1A	word	DBR overload ratio	0	0588	FFFF	0~65535	100/65535
1B	word	Input power (%) (Note 7)	0	035C	FFFF	Decode using Note 7 in Page 61 in RS485 manual.	0.1
1C	word	Input power (kW)	0	0350	FFFF	Decode using Note 6 in Page 61 in RS-485 manual.	See REG 1E for units
1D	word	Output power (%) (Note 7)	0	035E	FFFF	Decode using Note 4 & 7 in Page 61 in RS-485 manual.	
1E	word	Output power (kW)	0	0352	FFFF	Decode using Note 4 & 6 in Page 61 in RS-485 manual.	See REG 1E for units
1F	word	RR input	0	0550	FFFF	%	100/65535
20	word	CPU version number	2	8000	FFFF	See RS485 Manual for decoding	
21	word	External ROM version number	3	0000	FFFF	See RS485 Manual for decoding	
22	word	EEPROM version number	1	0380	FFFF	See RS485 Manual for decoding	

Registers	bit	Function	Bank	Address	Mask	Adjustment Range	Multiplier
23	byte	Inverter typeform monitor	0	05CA	00FF	See RS485 Manual for decoding	
	8	Input / output power units	0	03AE	0008	0: 0.01KW 1: 0.01KW	
	9,A	Command mode status	0	05B8	0003	00: terminal 01: panel 10: option 11: RS232C	
	B,C	Frequency mode selection status	0	05B8	000C	00: terminal 01: panel 10: option 11: RS232C	
	D,E, F	Reserved					
24	word	Reserved					
25	word	Reserved					

8.3 Read/Write Registers

All registers below will be considered word data. Only valid data shall be considered. See RS485 manual for more information. Read or write (MODBUS command Function 03 or 10) shall be valid. Function 03 should read data from Bank 0 (RAM). Function 10 should write to Bank 1 (EEPROM).

Symbol definitions: (Same as RS485 manual)

(#) Depends on Inverter Rating

(*) Cannot be set while inverter is running. An exemption response shall be sent back to the network.

8.3.1 GROUP:FUNDAMENTAL PARAMETERS #1

Register	Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
26	MAXIMUM OUTPUT FREQUENCY (*)	0 / 1	03C0	FFFF	0BB8 ~ 9C40 (30.00 ~ 400.00)	0.01
27	BASE FREQUENCY #1	0 / 1	0428	FFFF	09C4 ~ 9C40 (25.00 ~ 400.00)	0.01
28	BASE FREQUENCY VOLTAGE SELECT (Note, *)	0 / 1	04BE	0030	0000:Input voltage level (0) 0001:Automatic setting (1) 0002:Stationary setting (2)	—
29	MAXIMUM OUTPUT VOLTAGE #1	0 / 1	0426	FFFF	0000 ~ 0258 (0 ~ 600)	1
2A	REVERSE OPERATION DISABLE SELECT	0 / 1	04B6	0020	0000:Reverse allowed 0001:Reverse not allowed	—
2B	UPPER LIMIT FREQUENCY	0 / 1	03C2	FFFF	0000 ~ Fmax	0.01
2C	LOWER LIMIT FREQUENCY	0 / 1	03C4	FFFF	0000 ~ UL, Fmax	
2D	VOLTS PER HERTZ PATTERN (Note, *)	0 / 1	042D	000F	0001: Constant torque 0002: Variable torque 0003: Auto. Torque boo 0004: 3 w/ auto. eng. Sav 0005: vector control 0006: 5 w/ auto. eng. sav.	—
2E	1 • 2 VOLTAGE BOOST #1	0 / 1	0424	FFFF	0000 ~ 012C (0.0 ~ 30.0)	0.1
2F	ACCELERATION TIME #1 (Ref. 1)	0 / 1	03C6	FFFF	0001 ~ EA60 (0.01~ 6000) 0001 ~ EA60 (0.01~ 600)	0.1 0.01
30	DECELERATION TIME #1	0 / 1	03C8	FFFF	0001 ~ EA60 (0.01~ 6000) 0001 ~ EA60 (0.01~ 600)	0.1 0.01

GROUP:FUNDAMENTAL PARAMETERS #1 (Cont.)

Register	Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
31	ACC/DEC PATTERN #1 SELECTION	0 / 1	042D	0030	0000: Linear 0001: Self-adjusting 0002: S-Pattern #1 0003: S-Pattern #2	—
32	ACCEL/DECEL PATTERN ADJUST LOW	0 / 1	04C4	00FF	0000~00032 (0 ~ 50)	
33	ACCEL/DECEL PATTERN ADJUST HIGH	0 / 1	04C5	00FF	0000~00032 (0 ~ 50)	

8.3.2 GROUP:FUNDAMENTAL PARAMETERS #2

Reg.	Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
34	BASE FREQUENCY #2	0 / 1	0432	FFFF	09C4 ~ 9C40 (25.00 ~ 400.00)	0.01
35	MAXIMUM OUTPUT VOLTAGE #2	0 / 1	0430	FFFF	0000 ~ 0258 (0 ~ 600)	1
36	VOLTAGE BOOST #2	0 / 1	042E	FFFF	0000 ~ 012C (0.0 ~ 30.0)	0.1
37	ELECTRONIC THERMAL PROTECT LVL #2	0 / 1	0434	00FF	000A ~ 0064 (10 ~ 100)	1
38	STALL PROTECTION SELECTION #2	0 / 1	0437	0040	0000: ON (0) 0001: OFF (1)	—
39	0 STALL PROTECTION LEVEL #2	0 / 1	0435	00FF	000A ~ 00D7 (10 ~ 215)	1
3A	ACCELERATION TIME #2 (Ref. 1)	0 / 1	03CA	FFFF	0001 ~ EA60 (0.01~ 6000) 0001 ~ EA60 (0.01~ 600)	0.1 0.01
3B	DECELERATION TIME #2	0 / 1	03CC	FFFF	0001 ~ EA60 (0.01~ 6000) 0001 ~ EA60 (0.01~ 600)	0.1 0.01
3C	ACC/DEC PATTERN #2 SELECTION	0 / 1	0437	0030	0000: Linear (0) 0001: Self-adjusting (1) 0002: S-Pattern #1 (2) 0003: S-Pattern #2 (3)	—
3D	ACC/DEC #1/#2 SWITCH FREQUENCY	0 / 1	0406	FFFF	0000 ~ Fmax	0.01

8.3.3 GROUP:PANEL CONTROL PARAMETERS

Reg.	Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
3E	DIRECTION SELECTION (FORWARD/REV)	0 / 1	04FA	0004	0000: Reverse (0) 0001: Forward (1)	—
3F	STOP PATTERN SELECTION	0 / 1	045C	0040	0000: Decelerated stop (0) 0001: Coast stop (1)	—
40	FUNDAMENTAL PARAM SWITCHING	0 / 1	04FB	0004	0000: V/F #1 (1) 0001: V/F #2 (2)	—
41	ACCEL/DECEL #1/#2 SELECTION	0 / 1	04FA	0008	0000: Acc / dec #1 (1) 0001: Acc / dec #2 (2)	—
42	PANEL RESET SELECTION	0 / 1	045C	0030	0000: All possible (0) 0001: overload only (1) 0002: overload, overcurrent only (2)	—
43	PANEL FEEDBACK CONTROL (Note 1)	0 / 1	04FB	0001	0000: Feedback valid (0) 0001: Feedback invalid (1)	—

8.3.4 GROUP:TERMINAL SELECTION PARAMETERS

Reg.	Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
44	INPUT TERMINAL SELECTION	0 / 1	04BB	0001	0000: Standard functions (0) 0001: Individual selection (1)	—
45	1 "R" INPUT TERMINAL FUNCTION	0 / 1	046C	FFFF	0000 ~ FFFF (0 ~ 54) Refer to Table 6 in RS-485 manual	—
46	"S1" INPUT TERMINAL FUNCTION	0 / 1	046E	FFFF		
47	"S2" INPUT TERMINAL FUNCTION	0 / 1	0470	FFFF		
48	"S3" INPUT TERMINAL FUNCTION	0 / 1	0472	FFFF		
49	"S4" INPUT TERMINAL FUNCTION	0 / 1	0474	FFFF		
4A	"F" INPUT TERMINAL FUNCTION	0 / 1	0476	FFFF		
4B	"RES" INPUT TERMINAL FUNCTION	0 / 1	0478	FFFF		
4C	"ST" INPUT TERMINAL FUNCTION	0 / 1	047A	FFFF		
4D	"S5" INPUT TERMINAL FUNCTION	0 / 1	047C	FFFF		
4E	"S6" INPUT TERMINAL FUNCTION	0 / 1	047E	FFFF		
4F	"S7" INPUT TERMINAL FUNCTION	0 / 1	0480	FFFF		
50	POTENTIAL TERMINAL FUNCTION	0 / 1	0482	FFFF		
51	R,S1-S7 TERMINAL RESPONSE TIME	0 / 1	0462	00FF	0001 ~ 0064 (1 ~ 100)	1
52	F INPUT TERMINAL RESPONSE TIME	0 / 1	0463	00FF	0001 ~ 0064 (1 ~ 100)	1
53	RES INPUT TERMINAL RESPONSE TIME	0 / 1	0464	00FF	0001 ~ 0064 (1 ~ 100)	1
54	ST INPUT TERMINAL RESPONSE TIME	0 / 1	0465	00FF	0001 ~ 0064 (1 ~ 100)	1

GROUP:TERMINAL SELECTION PARAMETERS Cont.)

Reg.	Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
55	"RCH" CONTACTS FUNCTION	0 / 1	0490	FFFF	0 ~ FFFF (0 ~ 63) For function see Table 7 RS-485 manual	—
56	"RCH" CONTACTS DELAY TIME	0 / 1	0492	00FF	0001 ~ 0064 (1 ~ 100)	
57	"RCH" CONTACTS HOLD TIME (Note)	0 / 1	0493	00FF	0001 ~ 0064 (1 ~ 100)	
58	"LOW" CONTACTS FUNCTION	0 / 1	048C	FFFF	0 ~ FFFF (0 ~ 63) For function see Table 7 RS-485 manual	—
59	"LOW" CONTACTS DELAY TIME	0 / 1	048E	00FF	0001 ~ 0064 (1 ~ 100)	
5A	"LOW" CONTACTS HOLD TIME (Note)	0 / 1	048F	00FF	0001 ~ 0064 (1 ~ 100)	
5B	"FL" CONTACTS FUNCTION	0 / 1	0494	FFFF	0 ~ FFFF (0 ~ 63) For function see Table 7 RS-485 manual	—
5C	"FL" CONTACTS DELAY TIME	0 / 1	0496	00FF	0001 ~ 0064 (1 ~ 100)	
5D	"FL" CONTACTS HOLD TIME (Note)	0 / 1	0497	00FF	0001 ~ 0064 (1 ~ 100)	
5E	"OUT" CONTACTS FUNCTION	0 / 1	0498	FFFF	0 ~ FFFF (0 ~ 63) For function see Table 7 RS-485 manual	—
5F	"OUT" CONTACTS DELAY TIME	0 / 1	049A	00FF	0001 ~ 0064 (1 ~ 100)	
60	"OUT" CONTACTS HOLD TIME (Note)	0 / 1	049B	00FF	0001 ~ 0064 (1 ~ 100)	
61	LOW SPEED SIGNAL OUTPUT FREQ	0 / 1	03FE	FFFF	0 ~ Fmax	0.01
62	ACC/DEC COMPLETE DETECT BAND	0 / 1	0400	FFFF	0 ~ Fmax	0.01
63	SPEED REACH MAXIMUM FREQUENCY	0 / 1	0404	FFFF	0 ~ Fmax	0.01
64	SPEED REACH MINIMUM FREQUENCY	0 / 1	0402	FFFF	0 ~ Fmax	0.01
65	COMMERCIAL POWER/INV SWITCHING OUTPUT	0 / 1	04C1	00C0	0000:(0) 0001: Auto. Switch on trip (1) 0002: Switch at COMMERCIAL POWER/INV SWITCH FREQ (2) 0003: Both (1) and (2) (3)	0.01
66	COMMERCIAL POWER/INV SWITCH FREQ	0 / 1	041C	FFFF	0 ~ Fmax	
67	"FP" OUTPUT TERMINAL PULSE FREQUENCY	0 / 1	04C0	0003	0000: 48f (0) 0001: 96f (1) 0002: 360f (2)	—
68	RR INPUT SPECIAL FUNCTION SELECT (Note)	0 / 1	04B8	00E0	0000: Standard (0) 0001: Fmax (1) 0002: TACC/TDEC mult. (2) 0003: VB mult. Factor (3) 0004: CL mult. Factor (4)	—

8.3.5 GROUP:SPECIAL CONTROL PARAMETERS

Reg.	Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
69	START-UP FREQUENCY	0 / 1	03F8	FFFF	0000 ~ 03E8 (0.00 ~ 10.00)	0.01
70	END FREQUENCY	0 / 1	03FA	FFFF	0000 ~ 0BB8 (0.00 ~ 30.00)	0.01
71	RUN FREQUENCY	0 / 1	0408	FFFF	0000 ~ Fmax	0.01
72	RUN FREQUENCY HYSTERESIS	0 / 1	040A	FFFF	0000 ~ 0BB8 (0.00 ~ 30.00)	0.01
73	ENABLE JUMP FREQUENCIES	0 / 1	04BB	0080	0000: Function OFF(0) 0001: Function ON (1)	—
74	1 JUMP FREQUENCY #1	0 / 1	03EE	FFFF	0000 ~ Fmax	0.01
75	JUMP FREQUENCY #1 BANDWIDTH	0 / 1	03EC	FFFF	0000 ~ 0BB8 (0.00 ~ 30.00)	0.01
76	JUMP FREQUENCY #2	0 / 1	03F2	FFFF	0000 ~ Fmax	0.01
77	JUMP FREQUENCY #2 BANDWIDTH	0 / 1	03F0	FFFF	0000 ~ 0BB8 (0.00 ~ 30.00)	0.01
78	JUMP FREQUENCY #3	0 / 1	03F6	FFFF	0000 ~ Fmax	0.01
79	JUMP FREQUENCY #3 BANDWIDTH	0 / 1	03F4	FFFF	0000 ~ 0BB8 (0.00 ~ 30.00)	0.01
80	PWM CARRIER FREQUENCY (#)	0 / 1	0439	00FF	0005 ~ 0064 (0.5 ~ 10.0)	0.1

(#) : Adjustment range depends on inverter rating.

8.3.6 GROUP:FREQUENCY SETTING PARAMETERS

Reg.	Function / Title		Bank	Address	Mask	Adjustment Range	Multiplier
81	FREQUENCY PRIORITY SELECTION #1		0 / 1	04BA	0007	0001: RR (1) 0002: IV (2) 0003: RX (3) 0004: PG (4) 0005: BIN(5)	—
82	FREQUENCY PRIORITY SELECTION #2		0 / 1	04BA	0038	0001: RR (1) 0002: IV (2) 0003: RX (3) 0004: PG (4) 0005: IN (5)	—
83	ANALOG INPUT FILTER		0 / 1	04BC	0003	0000: No filter (0) 0001: Small filter (1) 0002: Medium filter (2) 0003: Large filter (3)	—
84	RR TERMINAL STANDARD OR ADJUSTABLE		0 / 1	04B8	0002	0000: Standard (0) 0001: Adjustable (1)	—
85	1	RR REFERENCE SETTING POINT #1	0 / 1	0449	00FF	0000 ~ 0064 (0 ~ 100)	1
86		RR REF POINT #1 FREQUENCY	0 / 1	03DA	FFFF	0000 ~ Fmax	0.01
87		RR REFERENCE SETTING POINT #2	0 / 1	044A	00FF	0000 ~ 0064 (0 ~ 100)	1
88		RR REF POINT #2 FREQUENCY	0 / 1	03DC	FFFF	0000 ~ Fmax	0.01
89	IV TERMINAL STANDARD OR ADJUSTABLE		0 / 1	04B8	0004	0000: Standard (0) 0001: Adjustable (1)	—
8A	1	IV REFERENCE SETTING POINT #1	0 / 1	044B	00FF	0000 ~ 0064 (0 ~ 100)	1
8B		IV REF POINT #1 FREQUENCY	0 / 1	03DE	FFFF	0000 ~ Fmax	0.01
8C		IV REFERENCE SETTING POINT #2	0 / 1	044C	00FF	0000 ~ 0064 (0 ~ 100)	1
8D		IV REF POINT #2 FREQUENCY	0 / 1	03E0	FFFF	0000 ~ Fmax	0.01
8E	RX TERMINAL STANDARD OR ADJUSTABLE		0 / 1	04B8	0008	0000: Standard (0) 0001: Adjustable (1)	—
8F	1	RX REFERENCE SETTING POINT #1	0 / 1	044D	00FF	009C ~ 00FF, 0000 ~ 0064 (-100 ~ -1, 0 ~ 100)	1
90		RX REF POINT #1 FREQUENCY	0 / 1	03E2	FFFF	-Fmax ~ Fmax	0.02
91		RX REFERENCE SETTING POINT #2	0 / 1	044E	00FF	009C ~ 00FF, 0000 ~ 0064 (-100 ~ -1, 0 ~ 100)	1
92		RX REF POINT #2 FREQUENCY	0 / 1	03E4	FFFF	-Fmax ~ Fmax	0.02
93	PG TERMINAL STANDARD OR ADJUSTABLE		0 / 1	04B8	0010	0000: Standard (0) 0001: Adjustable (1)	—
94	1	PG REFERENCE SETTING POINT #1	0 / 1	044F	00FF	009C ~ 00FF, 0000 ~ 0064 (-100 ~ -1, 0 ~ 100)	1
95		PG REF POINT #1 FREQUENCY	0 / 1	03E6	FFFF	-Fmax ~ Fmax	0.02
96		PG REFERENCE SETTING POINT #2	0 / 1	0450	00FF	009C ~ 00FF, 0000 ~ 0064 (-100 ~ -1, 0 ~ 100)	1
97		PG REF POINT #2 FREQUENCY	0 / 1	03E8	FFFF	-Fmax ~ Fmax	0.02
98	BINARY INPUT STD OR ADJUSTABLE		0 / 1	04B8	0001	0000: Standard (0) 0001: Adjustable (1)	—
99	1	BINARY REF SETTING POINT #1	0 / 1	0447	00FF	0000 ~ 0064 (0 ~ 100)	1
9A		BINARY REF POINT #1 FREQUENCY	0 / 1	03D6	FFFF	-Fmax ~ Fmax	0.02
9B		BINARY REF SETTING POINT #2	0 / 1	0448	00FF	0000 ~ 0064 (0 ~ 100)	1
9C		BINARY REF POINT #2 FREQUENCY	0 / 1	03D8	FFFF	-Fmax ~ Fmax	0.02
9D	JOG RUN FREQUENCY		0 / 1	03EA	FFFF	0000 ~ 07D0 (0.00 ~ 20.00)	0.01
9E	Other than 0	JOG STOP METHOD	0 / 1	04B6	00C0	0000: Decelerated stop (0) 0001: Coast stop (1) 0002: DC injection stop (2)	—
9F	PRESET SPEED SELECTION		0 / 1	04A6	000F	0000 ~ 000F (0 ~ 15)	1
100	Other than 0	PRESET SPEED MODE ACTIVATION	0 / 1	04BB	0004	0000: Deactivated (0) 0004: Activated (1)	—
101		PRESET SPEED #1 FREQUENCY	1	0528	FFFF	LL ~ UL	0.01
102		PRESET SPEED #1 OPERATING MODE	1	052A	040C	0000 (0) 0001 (1) 0002 (2) 0003 (3) 0004 (4) 0005 (5) 0006 (6) 0007 (7)	1
103	2 or	PRESET SPEED #2 FREQUENCY	1	0530	FFFF	LL ~ UL	0.01
104	higher	PRESET SPEED #2 OPERATING MODE	1	0532	040C	(Note 1)	1

GROUP:FREQUENCY SETTING PARAMETERS (cont.)

Reg.		Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
105	3 or	PRESET SPEED #3 FREQUENCY	1	0538	FFFF	LL ~ UL	0.01
106	higher	PRESET SPEED #3 OPERATING MODE	1	053A	040C	(Note 1)	1
107	4 or	PRESET SPEED #4 FREQUENCY	1	0540	FFFF	LL ~ UL	0.01
108	higher	PRESET SPEED #4 OPERATING MODE	1	0542	040C	(Note 1)	1
109	5 or	PRESET SPEED #5 FREQUENCY	1	0548	FFFF	LL ~ UL	0.01
10A	higher	PRESET SPEED #5 OPERATING MODE	1	054A	040C	(Note 1)	1
10B	6 or	PRESET SPEED #6 FREQUENCY	1	0550	FFFF	LL ~ UL	0.01
10C	higher	PRESET SPEED #6 OPERATING MODE	1	0552	040C	(Note 1)	1
10D	7 or	PRESET SPEED #7 FREQUENCY	1	0558	FFFF	LL ~ UL	0.01
10E	higher	PRESET SPEED #7 OPERATING MODE	1	055A	040C	(Note 1)	1
10F	8 or	PRESET SPEED #8 FREQUENCY	1	0560	FFFF	LL ~ UL	0.01
110	higher	PRESET SPEED #8 OPERATING MODE	1	0562	040C	(Note 1)	1
111	9 or	PRESET SPEED #9 FREQUENCY	1	0568	FFFF	LL ~ UL	0.01
112	higher	PRESET SPEED #9 OPERATING MODE	1	056A	040C	(Note 1)	1
113	10 or	PRESET SPEED #10 FREQUENCY	1	0570	FFFF	LL ~ UL	0.01
114	higher	PRESET SPEED #10 OPERATING MODE	1	0572	040C	(Note 1)	1
115	11 or	PRESET SPEED #11 FREQUENCY	1	0578	FFFF	LL ~ UL	0.01
116	higher	PRESET SPEED #11 OPERATING MODE	1	057A	040C	(Note 1)	1
117	12 or	PRESET SPEED #12 FREQUENCY	1	0580	FFFF	LL ~ UL	0.01
118	higher	PRESET SPEED #12 OPERATING MODE	1	0582	040C	(Note 1)	1
119	13 or	PRESET SPEED #13 FREQUENCY	1	0588	FFFF	LL ~ UL	0.01
11A	higher	PRESET SPEED #13 OPERATING MODE	1	058A	040C	(Note 1)	1
11B	14 or	PRESET SPEED #14 FREQUENCY	1	0590	FFFF	LL ~ UL	0.01
11C	higher	PRESET SPEED #14 OPERATING MODE	1	0592	040C	(Note 1)	1
11D	15	PRESET SPEED #15 FREQUENCY	1	0598	FFFF	LL ~ UL	0.01
11E		PRESET SPEED #15 OPERATING MODE	1	059A	040C	(Note 1)	1

(Note 1): Adjustment range is the same as PRESET SPEED #1 OPERATING MODE

8.3.7 GROUP:PROTECTION FUNCTION PARAMETERS

Reg.	Function / Title		Bank	Address	Mask	Adjustment Range	Multiplier
11F	DYNAMIC BRAKING SELECTION (Note)		0 / 1	04BD	0003	0000: no dynam. Braking 0001: with dynamic braking, no DBR OL trip 0002: with dynamic braking and DBR OL trip	—
120	2	BRAKING RESISTOR VALUE	0 / 1	0416	FFFF	000A ~ 2710 (1.0 ~ 1000)	0.1
121		BRAKING RESISTOR POWER RATING	0 / 1	0418	FFFF	0001 ~ EA60 (0.01 ~ 600.00)	0.01
122	OVERVOLTAGE STALL PROTECTION		0 / 1	04BD	0004	0000: ON 0001: OFF	—
123	DC INJECTION START FREQUENCY		0 / 1	03FC	FFFF	0000 ~ 2EE0 (0.00 ~ 120.00)	0.01
124	Other	DC INJECTION CURRENT MAGNITUDE	0 / 1	043A	00FF	0000 ~ 0064 (0 ~ 100)	1
125	than 0	DC INJECTION TIME	0 / 1	043B	00FF	0000 ~ 0064 (0.0 ~ 10.0)	0.1
126	FWD/REV DC INJECTION PRIORITY CTRL		0 / 1	04BC	0040	0000: OFF 0001: ON	—
127	MOTOR SHAFT STATIONARY CTRL		0 / 1	04BC	0080	0000: OFF 0001: ON	—
128	EMERGENCY OFF MODE SELECTION		0 / 1	04BC	0030	0000: Coast stop 0001: Decelerated stop 0002: DC injection stop	—
129	2	EMERGENCY OFF DC INJECTION TIME	0 / 1	043D	00FF	0000 ~ 0064 (0.0 ~ 10.0)	0.1
12A	NUMBER OF RETRY ATTEMPTS		0 / 1	043F	00FF	0000 ~ 000A (0 ~ 10)	1
12B	Other than 0	TIME BETWEEN RETRY ATTEMPTS	0 / 1	0440	00FF	0000 ~ 0064 (0.0 ~ 10.0)	0.1
12C	REGENERATION POWER RIDE-THROUGH		0 / 1	04BD	0008	0000: OFF 0001: ON	—
12D	1	REGENERATION RIDE-THROUGH TIME	0 / 1	0446	00FF	0000 ~ 00FA (0.0 ~ 25.0)	0.1
12E	AUTO-RESTART (MOTOR SPEED SEARCH)		0 / 1	04B6	0018	0000: OFF 0001: On power failure 0002: On ST make/break 0003: Both (1) and (2)	—
12F	ELECTRONIC THERMAL PROTECT LVL #1		0 / 1	042A	00FF	000A ~ 0064 (10 ~ 100)	1
130	OVERLOAD REDUCTION START FREQ		0 / 1	0410	FFFF	0000 ~ 0BB8 (0.00 ~ 30.00)	0.01
131	MOTOR 150% OVERLOAD TIME LIMIT		0 / 1	0444	00FF	0001 ~ 00F0 (10 ~ 2400)	10
132	OVERLOAD SELECTION		0 / 1	04BD	0030	0000: with motor overload trip, w/o soft-stall 0001: with motor overload trip and soft-stall 0002: w/o soft-stall or motor overload trip 0003: with soft-stall, w/o motor overload trip	—
133	STALL PROTECTION ENABLE		0 / 1	042D	0040	0000: ON 0001: OFF	—
134	0	STALL PROTECTION CURRENT LEVEL	0 / 1	042B	00FF	000A ~ 00D7 (10 ~ 215)	1
135	UNDERVOLTAGE TRIP SELECTION		0 / 1	04BD	0080	0000: Trip disabled 0001: Trip (during run)	—
136	UNDERVOLTAGE DETECT TIME		0 / 1	0414	FFFF	0000 ~ 03E8 (0.00 ~ 10.00)	0.01
137	LOW CURRENT DETECT SELECTION		0 / 1	04BC	0008	0000: Trip disabled 0001: Trip on detection	—
138	LOW CURRENT DETECT LEVEL		0 / 1	0441	00FF	0000 ~ 0064 (0 ~ 100)	1
139	LOW CURRENT DETECTION TIME		0 / 1	0442	00FF	0000 ~ 00FF (0 ~ 255)	1
140	OUTPUT SHORT-CIRCUIT DETECTION SELECT		0 / 1	04BE	0003	0000: Standard motor 0001: High-speed motor 0002: Positioning use (standard motor) 0003: Positioning use (high- speed motor)	—
141	OVERTORQUE TRIP SELECTION		0 / 1	04BE	0040	0000: Trip disabled (0) 0001: Trip enabled (1)	—
142	OVERTORQUE TRIP LEVEL		0 / 1	0443	00FF	0000 ~ 00C8 (0 ~ 200)	1

GROUP:PROTECTION FUNCTION PARAMETERS (Cont.)

Reg.	Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
143	FAULT TRIP EEPROM SAVE ENABLE	0 / 1	04B6	0002	0000: Data cleared when powered OFF 0001: Data retained when powered OFF	—
144	COOLING FAN CONTROL SELECTION	0 / 1	04BE	0004	0000: Automatic (temperature detection) 0001: Always ON	—
145	CUMULATIVE RUN TIMER ALARM SETTING	0 / 1	0422	FFFF	0000 ~ C34B (0.00 ~ 999.90)	0.02

8.3.8 GROUP:PATTERN RUN CONTROL PARAMETERS

Reg.	Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
146	PATTERN RUN SELECTION	0 / 1	04A7	0008	0000: OFF 0001: ON	—
147	1 PATTERN RUN CONTINUE MODE	0 / 1	04A7	0001	0000: reset on stop 0001: switch when done	—
148	PATTERN GROUP #1 SPEED #0	1	0500	00FF	0000: Skip 0001 ~ 000F: Speeds 1 ~ 15	1
149	PATTERN GROUP #1 SPEED #1	1	0501	00FF		
150	PATTERN GROUP #1 SPEED #2	1	0502	00FF		
151	PATTERN GROUP #1 SPEED #3	1	0503	00FF		
152	PATTERN GROUP #1 SPEED #4	1	0504	00FF		
153	PATTERN GROUP #1 SPEED #5	1	0505	00FF		
154	PATTERN GROUP #1 SPEED #6	1	0506	00FF		
155	PATTERN GROUP #1 SPEED #7	1	0507	00FF		
156	PATTERN GROUP #1 NUMBER OF CYCLES	0 / 1	049E	00FF	0001 ~ 00FF: 1 ~ 255	1
157	PATTERN GROUP #2 SPEED #0	1	0508	00FF	0000: Skip (0) 0001 ~ 000F: Speeds 1 ~ 15	1
158	PATTERN GROUP #2 SPEED #1	1	0509	00FF		
159	PATTERN GROUP #2 SPEED #2	1	050A	00FF		
15A	PATTERN GROUP #2 SPEED #3	1	050B	00FF		
15B	PATTERN GROUP #2 SPEED #4	1	050C	00FF		
15C	PATTERN GROUP #2 SPEED #5	1	050D	00FF		
15D	PATTERN GROUP #2 SPEED #6	1	050E	00FF		
15E	PATTERN GROUP #2 SPEED #7	1	050F	00FF		
15F	PATTERN GROUP #2 NUMBER OF CYCLES	0 / 1	04A0	00FF	0001 ~ 00FF: 1 ~ 255	1
160	PATTERN GROUP #3 SPEED #0	1	0510	00FF	0000: Skip (0) 0001 ~ 000F: Speeds 1 ~ 15	1
161	PATTERN GROUP #3 SPEED #1	1	0511	00FF		
162	PATTERN GROUP #3 SPEED #2	1	0512	00FF		
163	PATTERN GROUP #3 SPEED #3	1	0513	00FF		
164	PATTERN GROUP #3 SPEED #4	1	0514	00FF		
165	PATTERN GROUP #3 SPEED #5	1	0515	00FF		
166	PATTERN GROUP #3 SPEED #6	1	0516	00FF		
167	PATTERN GROUP #3 SPEED #7	1	0517	00FF		
168	PATTERN GROUP #3 NUMBER OF CYCLES	0 / 1	04A2	00FF	0001 ~ 00FF: 1 ~ 255	1
169	PATTERN GROUP #4 SPEED #0	1	0518	00FF	0000: Skip (0) 0001 ~ 000F: Speeds 1 ~ 15	1
16A	PATTERN GROUP #4 SPEED #1	1	0519	00FF		
16B	PATTERN GROUP #4 SPEED #2	1	051A	00FF		
16C	PATTERN GROUP #4 SPEED #3	1	051B	00FF		
16D	PATTERN GROUP #4 SPEED #4	1	051C	00FF		
16E	PATTERN GROUP #4 SPEED #5	1	051D	00FF		
16F	PATTERN GROUP #4 SPEED #6	1	051E	00FF		
170	PATTERN GROUP #4 SPEED #7	1	051F	00FF		
171	PATTERN GROUP #4 NUMBER OF CYCLES	0 / 1	04A4	00FF	0001 ~ 00FF: 1 ~ 255	1
172	SPEED #1 CONTINUE MODE	1	052E	00FF	0000: Count in seconds from time of activation 0001: Count in minutes from time of activation 0002: Count in seconds from speed reach 0003: Count in minutes from speed reach 0004: Non-stop (continue until STOP command) 0005: Continue until next step command	—

GROUP:PATTERN RUN CONTROL PARAMETERS (Cont.)

Reg.	Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
173	Less than 4 SPEED #1 DRIVE TIME	1	052C	FFFF	0000 ~ 1F40 (0 ~ 8000)	1
174	SPEED #2 CONTINUE MODE	1	0536	00FF	Same as SPEED #1 CONTINUE MODE	—
175	Less than 4 SPEED #2 DRIVE TIME	1	0534	FFFF	0000 ~ 1F40 (0 ~ 8000)	1
176	SPEED #3 CONTINUE MODE	1	053E	00FF	Same as SPEED #1 CONTINUE MODE	—
177	Less than 4 SPEED #3 DRIVE TIME	1	053C	FFFF	0000 ~ 1F40 (0 ~ 8000)	1
178	SPEED #4 CONTINUE MODE	1	0546	00FF	Same as SPEED #1 CONTINUE MODE	—
179	Less than 4 SPEED #4 DRIVE TIME	1	0544	FFFF	0000 ~ 1F40 (0 ~ 8000)	1
17A	SPEED #5 CONTINUE MODE	1	054E	00FF	Same as SPEED #1 CONTINUE MODE	—
17B	Less than 4 SPEED #5 DRIVE TIME	1	054C	FFFF	0000 ~ 1F40 (0 ~ 8000)	1
17C	SPEED #6 CONTINUE MODE	1	0556	00FF	Same as SPEED #1 CONTINUE MODE	—
17D	Less than 4 SPEED #6 DRIVE TIME	1	0554	FFFF	0000 ~ 1F40 (0 ~ 8000)	1
17E	SPEED #7 CONTINUE MODE	1	055E	00FF	Same as SPEED #1 CONTINUE MODE	—
17F	Less than 4 SPEED #7 DRIVE TIME	1	055C	FFFF	0000 ~ 1F40 (0 ~ 8000)	1
180	SPEED #8 CONTINUE MODE	1	0566	00FF	Same as SPEED #1 CONTINUE MODE	—
181	Less than 4 SPEED #8 DRIVE TIME	1	0564	FFFF	0000 ~ 1F40 (0 ~ 8000)	1
182	SPEED #9 CONTINUE MODE	1	056E	00FF	Same as SPEED #1 CONTINUE MODE	—
183	Less than 4 SPEED #9 DRIVE TIME	1	056C	FFFF	0000 ~ 1F40 (0 ~ 8000)	1
184	SPEED #10 CONTINUE MODE	1	0576	00FF	Same as SPEED #1 CONTINUE MODE	—
185	Less than 4 SPEED #10 DRIVE TIME	1	0574	FFFF	0000 ~ 1F40 (0 ~ 8000)	1
186	SPEED #11 CONTINUE MODE	1	057E	00FF	Same as SPEED #1 CONTINUE MODE	—
187	Less than 4 SPEED #11 DRIVE TIME	1	057C	FFFF	0000 ~ 1F40 (0 ~ 8000)	1
188	SPEED #12 CONTINUE MODE	1	0586	00FF	Same as SPEED #1 CONTINUE MODE	—
189	Less than 4 SPEED #12 DRIVE TIME	1	0584	FFFF	0000 ~ 1F40 (0 ~ 8000)	1
18A	SPEED #13 CONTINUE MODE	1	058E	00FF	Same as SPEED #1 CONTINUE MODE	—
18B	Less than 4 SPEED #13 DRIVE TIME	1	058C	FFFF	0000 ~ 1F40 (0 ~ 8000)	1
18C	SPEED #14 CONTINUE MODE	1	0596	00FF	Same as SPEED #1 CONTINUE MODE	—
18D	Less than 4 SPEED #14 DRIVE TIME	1	0594	FFFF	0000 ~ 1F40 (0 ~ 8000)	1
18E	SPEED #15 CONTINUE MODE	1	059E	00FF	Same as SPEED #1 CONTINUE MODE	—
18F	Less than 4 SPEED #15 DRIVE TIME	1	059C	FFFF	0000 ~ 1F40 (0 ~ 8000)	1

8.3.9 GROUP:FEEDBACK CONTROL PARAMETERS

Reg.	Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
190	FEEDBACK CONTROL SELECTION	0 / 1	04B9	0060	0000: No feedback 0001: PID control 0002: Speed feedback	—
191	1 • 2 FEEDBACK INPUT SIGNAL SELECTION	0 / 1	04B9	001C	0001: RR input 0002: IV input 0003: RX input 0004: PG feedback 0005: RS232C input 0006: Communication/12-bit binary option board 0007: BIN input	—
192	PROPORTIONAL GAIN	0 / 1	04A8	00FF	0001 ~ 00FF (0.01 ~ 2.55)	0.01
193	INTEGRAL GAIN	0 / 1	04AA	FFFF	0001 ~ 8CA0 (0.01 ~ 360.00)	0.01
194	ANTI-HUNTING GAIN	0 / 1	04AC	00FF	0000 ~ 00FF (0.0 ~ 25.5)	0.1
195	LAG TIME CONSTANT	0 / 1	04AD	00FF	0000 ~ 00FF (0 ~ 255)	1
196	PID LOWER LIMIT FREQUENCY	0 / 1	03D2	FFFF	0 ~ Fmax	0.01

GROUP:FEEDBACK CONTROL PARAMETERS (cont.)

Reg.	Function / Title		Bank	Address	Mask	Adjustment Range	Multiplier
197	PID DEVIATION LIMIT SELECTION		0 / 1	04BE	0080	0000: No PID deviation lim. 0001: PID deviation limited	1
198	1	PID DEVIATION UPPER LIMIT	0 / 1	04C8	00FF	0000 ~ 0032 (0 ~ 50)	1
199		PID DEVIATION LOWER LIMIT	0 / 1	04C9	00FF	0000 ~ 0032 (0 ~ 50)	
19A	PG INPUT: NUMBER OF PULSES		0 / 1	040E	FFFF	0001 ~ 270F (1 ~ 9999)	1
19B	PG INPUT: NUMBER OF PHASES		0 / 1	04B9	0001	0000: Single-phase input 0001: Two-phase input	—
19C	DROOPING CONTROL ENABLE		0 / 1	04B9	0002	0000: OFF 0001: ON	0.1
19D	DROOPING CONTROL AMOUNT		0 / 1	0451	00FF	0000 ~ 0064 (0 ~ 10.0)	
19E	OVERRIDE CONTROL SELECTION		0 / 1	04C1	0007	0000: OFF 0001: FCRR 0002: FCIV 0003: FCRX 0004: FCPG 0005: FCPNL 0006: FCOPT 0007: FCMLT	—
19F	7	OVERRIDE MULTIPLIER INPUT SELECTION	0 / 1	04C1	0038	0000: Reference 0001: KRR 0002: KIV 0003: KRX 0004: KBIN	0.1
200		OVERRIDE CHANGE MULTIPLIER	0 / 1	0420	FFFF	FC18 ~ 03E8 (-100.0 ~ 100.0)	

8.3.10 GROUP: COMMUNICATION SETTING PARAMETERS

Function / Title		Bank	Address	Mask	Adjustment Range	Multiplier
201	RS232 BAUD RATE	1	04AE	0018	0000: 2400 baud 0001: 4800 baud 0002: 9600 baud	—
202	NUMBER OF DATA BITS	1	04AE	0040	0000: 7 bits 0001: 8 bits	—
203	PARITY SETTING	1	04AE	0080	0000: Even parity 0001: Odd parity	—
204	INVERTER ID NUMBER	1	04B1	00FF	0000 – 00FF (0 ~ 255)	1
205	COMMUNICATION SELECTION	1	04AE	0007	0000: OFF 0001: RS485 0002: F-10, DNet, RIO 0003: TOSLINE S-20 0004: 12 bit binary input 0005: 3-digit BCD (0.1Hz) 0006: 3-digit BCD (1Hz)	—
206	1 MASTER/SLAVE SELECTION	1	04AF	0018	0000: Slave 0001: Master (frequency command) 0002: Master (output frequency)	—
207	RS485 BAUD RATE	1	04AF	0004	0000: Normal mode 0001: High-speed mode	—
208	2 TOSLINE-F10 COMMAND INPUT	1	04B0	0003	0000: OFF 0001: Frequency command 0002: Command input 0003: Both (1) and (2)	—
209	TOSLINE-F10 MONITOR OUTPUT	1	04B0	003C	0000: (0) 0020: (8) 0004: (1) 0024: (9) 0008: (2) 0028: (10) 000C: (3) 002C: (11) 0010: (4) 0030: (12) 0014: (5) 0034: (13) 0018: (6) 0038: (14) 001C: (7) 003C: (15)	—
20A	TOSLINE-F10 COMM ERROR MODE	1	04B0	0080	0000: Data cleared 0001: Data retained	—
20B	3 TOSLINE-S20 RECEIVE ADDRESS	1	04CE	FFFF	0000 – 03FF (0 ~ 1023)	1
20C	TOSLINE-S20 TRANSMIT ADDRESS	1	04D0	FFFF	0000 – 03FF (0 ~ 1023)	1
20D	TOSLINE-S20 COMMAND INPUT	1	04D2	001F	0000 – 001F (0 ~ 31)	1
20E	TOSLINE-S20 MONITOR OUTPUT	1	04D3	001F	0000 – 001F (0 ~ 31)	1
20F	TOSLINE-S20 FREQ REF ADDR SELECT	1	04D4	0001	0000: Disable 0001: Enable	1
210	1 TOSLINE-S20 FREQ REFERENCE ADDR	1	04D5	FFFF	0000 – 03FF (0 ~ 1023)	1
211	TOSLINE-S20 COMM ERROR MODE	1	04D4	0002	0000: Data cleared 0001: Data retained	1
212	TOSLINE-S20 COMM OPTION RESET	1	02DC	0004	0000: No effect 0001: Reset	1
213	RS485/12-BIT BINARY BIAS,GAIN	0 / 1	04AF	0020	0000: OFF 0001: ON	—
214	1 RS485/12-BIT BINARY POINT #1 (Ref. 1)	0 / 1	04CA	00FF	0000 – 0064 (0 ~ 100)	1
215	RS485/12-BIT BINARY PT. #1 FREQ	0 / 1	04B2	FFFF	0000 ~ Fmax (0 ~ Fmax)	0.01
216	RS485/12-BIT BINARY POINT #2 (Ref. 1)	0 / 1	04CB	00FF	0000 – 0064 (0 ~ 100)	1
217	RS485/12-BIT BINARY PT. #2 FREQ	0 / 1	04B4	FFFF	0000 ~ Fmax (0 ~ Fmax)	0.01

8.3.11 GROUP:AM/FM TERMINAL ADJUSTMENT PARAMS

Reg.	Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
218	FM TERMINAL FUNCTION SELECTION (Note)	0 / 1	0484	FFFF	0000: Pre-compensation reference frequency(0) 0001: Post-compensation output frequency (1) 0002: Frequency setting (2) 0003: Output current (3) 0004: DC voltage (4) 0005: Output voltage (5) 0006: Torque current (6) 0007: Excitation current (7) 0008: PID feedback value (8) 0009: Motor overload ratio (9) 000A: Inv. overload ratio (10) 000B: Dynamic braking resistor OL ratio (11) 000C: Input power (12) 000D: Output power(13) 000E: Fixed output (14) 000F: Peak output current (15) 0010: Peak input voltage (16)	—
219	FREQUENCY METER ADJUSTMENT	0 / 1	0486	FFFF	0000 ~ FFFF	1
21A	AM TERMINAL FUNCTION SELECTION (Note)	0 / 1	0488	FFFF	Same as FM TERMINAL FUNCTION SELECTION	—
21B	CURRENT METER ADJUSTMENT	0 / 1	048A	FFFF	0000 ~ FFFF	1

8.3.12 GROUP:UTILITY PARAMETERS

Reg.	Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
21C	INDUSTRIAL APPLICATIONS (previous setting monitor for read use) Note: If data is written to this address, the previous setting displayed on the panel will be changed.	0 / 1	0438	00FF	0000: Std. shpmt. Setting 0001: Pump application 0002: Fan application 0003: Conveyor application 0004: Hoist application 0005: Textiles application 0006: Machine tools appl.	—
21D	INDUSTRIAL APPLICATIONS (for write use) (Note, *)	0 / 1	04C2	00FF	0000: Does nothing 0001: Pump application 0002: Fan application 0003: Conveyor application 0004: Hoist application 0005: Textiles application 0006: Machine tools appl.	—
21E	STANDARD SETTING MODE SELECTION (Note, *) (Ref. 1)	0 / 1	04C2	00FF	0000: Does nothing 0001: 50Hz std. Settings 0002: 60Hz std. Settings 0003: Factory settings 0004: Trip clear 0005: Save user-set param. 0006: TYPE 5 reset 0007: Initialize typeform	—

GROUP:UTILITY PARAMETERS (Cont.)

Reg.	Function / Title		Bank	Address	Mask	Adjustment Range	Multiplier
21F	COMMAND MODE SELECTION		0 / 1	04B7	0007	0000: Only RS232C valid 0001: Terminal input valid 0002: Panel input valid 0003: Communication option input valid 0004: local/remote valid	—
220	FREQUENCY MODE SELECTION		0 / 1	04B7	0038	0000: Only RS232C valid 0001: Terminal input valid 0002: Panel input valid 0003: Comm./12-bit binary option input valid 0004: local/remote valid	—
221	PANEL OPERATION MODE SELECTION (Ref. 2)		0 / 1	0452	00FB	0000 ~ 003F (0 ~ 63) (except 0004, 0008, 000C....)	1
222	PASS NUMBER		0 / 1	049D	00FF	0000 ~ 0063 (0 ~ 99)	1
223	CPU VERSION		2	8000			
224	ROM VERSION		3	0000	—	(Monitor only)	1
225	EEPROM VERSION		1	0380			
226	INVERTER TYPEFORM		0	05CA	—	(Monitor only)	—
227	STATUS MONITOR #1 DISPLAY SELECT		0 / 1	0454	FFFF	0001 ~ 0010 (1 ~ 16)	1
228	STATUS MONITOR #2 DISPLAY SELECT		0 / 1	0456	FFFF	0001 ~ 0010 (1 ~ 16)	1
229	STATUS MONITOR #3 DISPLAY SELECT		0 / 1	0458	FFFF	0001 ~ 0010 (1 ~ 16)	1
22A	STATUS MONITOR #4 DISPLAY SELECT		0 / 1	045A	FFFF	0001 ~ 0010 (1 ~ 16)	1
22B	FREQUENCY UNITS SCALE FACTOR		0 / 1	0412	FFFF	0000 ~ 4E20 (0.00 ~ 200.00)	0.01
22C	FREQUENCY DISPLAY RESOLUTION		0 / 1	045D	0003	0000: 1Hz 0001: 0.1Hz 0002: 0.01Hz	—
22D	ACC/DEC TIME UNITS SELECTION (Ref. 3)		0 / 1	045D	0004	0000: 0.1 sec. 0001: 0.01 sec.	—
22E	CURRENT UNITS SELECTION		0 / 1	045D	0008	0000: % 0001: A	—
22F	VOLTAGE UNITS SELECTION		0 / 1	045D	0010	0000: % 0001: V	—
230	BLIND FUNCTION SELECTION	0 / 1	045E	0001	0000: Blind 0001: Selective unblinding	—	—
231	1	FUNDAMENTAL PARAMS #2 BLIND	0 / 1	045E	0040	0000: Blind 0001: Unblind	—
232		PANEL CONTROL PARAMS BLIND	0 / 1	045E	0080	0000: Blind 0001: Unblind	—
233		TERMINAL SELECTION PARAMS BLIND	0 / 1	045F	0001	0000: Blind 0001: Unblind	—
234		SPECIAL CONTROL PARAMS BLIND	0 / 1	045F	0002	0000: Blind 0001: Unblind	—
235		FREQUENCY SETTING PARAMS BLIND	0 / 1	045F	0004	0000: Blind 0001: Unblind	—
236		PROTECTION FUNCTION PARAMS BLIND	0 / 1	045F	0008	0000: Blind 0001: Unblind	—
237		PATTERN RUN CONTROL PARAMS BLIND	0 / 1	045F	0010	0000: Blind 0001: Unblind	—
238		FEEDBACK CONTROL PARAMS BLIND	0 / 1	045F	0020	0000: Blind 0001: Unblind	—
239		COMMUNICATION PARAMS BLIND	0 / 1	045F	0040	0000: Blind 0001: Unblind	—
23A		INDUSTRIAL APPL:PUMP PARAMS BLIND	0 / 1	045F	0080	0000: Blind 0001: Unblind	—
23B		INDUSTRIAL APPL:FAN PARAMS BLIND	0 / 1	0460	0001	0000: Blind 0001: Unblind	—
23C		INDUSTRIAL APPL: CONVEYOR BLIND	0 / 1	0460	0002	0000: Blind 0001: Unblind	—
23D		INDUSTRIAL APPL: HOIST BLIND	0 / 1	0460	0004	0000: Blind 0001: Unblind	—

GROUP:UTILITY PARAMETERS (Cont.)

Reg.	Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
23E	INDUSTRIAL APPL: TEXTILES BLIND	0 / 1	0460	0008	0000: Blind 0001: Unblind	—
23F	INDUST APPL:MACHINE TOOLS BLIND	0 / 1	0460	0010	0000: Blind 0010: Unblind	—
240	AM/FM ADJUSTMENT PARAMS BLIND	0 / 1	0461	0001	0000: Blind 0001: Unblind	—
241	MOTOR PARAMETERS BLIND	0 / 1	0461	0004	0000: Blind 0001: Unblind	—

8.3.13 GROUP:MOTOR RATING PARAMETERS

Reg.	Function / Title	Bank	Address	Mask	Adjustment Range	Multiplier
242	NUMBER OF MOTOR POLES	0 / 1	04C3	00FF	0001: (2) 0002: (4) 0003: (6) 0004: (8) 0005: (10) 0006: (12) 0007: (14) 0008: (16)	2
243	MOTOR RATED CAPACITY	0 / 1	041E	FFFF	0001 ~ 270F (0.1 ~ 999.9)	0.1
244	MOTOR TYPE	0 / 1	04BF	0030	0000:Toshiba EQPIII motor (0) 0001:Toshiba STD motor (1) 0002:Other (2)	—
245	MOTOR RATED VOLTAGE (230 / 460v units) (575v units)	0 / 1	04C6	00FF	0012 ~ 0078 (90 ~ 600)	5
246			042C		001A ~ 00AC (130 ~ 860)	
247	MOTOR RATED FREQUENCY	0 / 1	04C7	00FF	0000 ~ 00C8 (0 ~ 400)	2
248	MOTOR RATED RPM	0 / 1	040C	FFFF	0000 ~ 270F (0 ~ 9999)	1
249	AUTO-TUNING ENABLE	0	04BE	0008	0000: Auto-tuning disabled (0) 0001: Auto-tuning enabled (1)	—
24A	LOAD MOMENT OF INERTIA	0 / 1	04BF	00C0	0000: Small (0) 0001: Medium (1) 0002: Large (2) 0003: Very large (3)	—

8.4 Inverter Fault Codes

Fault codes which can be read at address 10h through 12h are listed below:

INVERTER FAULT CODE TABLE :

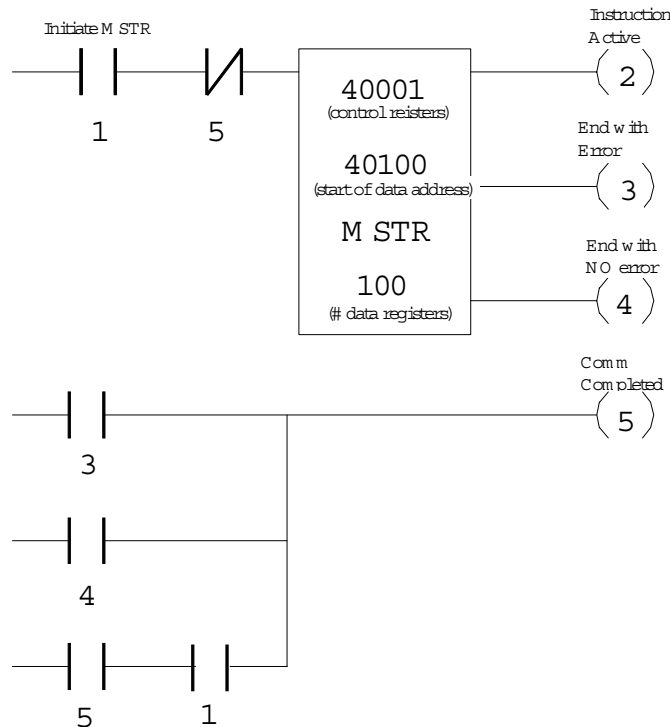
FAULT	DATA(Hex)	FAULT	DATA(Hex)	FAULT	DATA(Hex)
NONE	00	MOTOR OL	0E	OPTION ROM	1C
OC (ACCEL)	01	DBR OL	0F	LOW CURRENT	1D
OC (DECEL)	02	OH	10	UV	1E
OC (RUN)	03	E-STOP	11	UNUSED	1F
LOAD-END OC	04	EEPROM WRITE	12	OVER TORQUE	20
U PH. SHORT	05	EEPROM READ	13	EARTH (SOFT)	21
V PH. SHORT	06	UNUSED	14	EARTH (HARD)	22
W PH. SHORT	07	RAM	15	OPEN FUSE	23
LOST INPUT PH	08	ROM	16	DBR OC	24
LOST OUT PH	09	CPU	17	DC OC (ACC)	25
OV (ACCEL)	0A	COMM.	18	DC OC (DEC)	26
OV (DECEL)	0B	GATE ARRAY	19	DC OC (RUN)	27
OV (RUN)	0C	CUR DETECT	1A	AUTO TUNE	28
INV OL	0D	OPTION PCB	1B	INV TYPEFORM	29

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9. Modicon Programming

9.1 Modicon PLC Ladder logic example:

The following is an example of a MSTR command to communicate with the G3 inverter:



Modicon PLC Program
Example For Modplus+ Communications

To read or write parameters to / from the G3 inverter using the ladder example above, the MSTR control registers (as defined by top register number in command block) must be programmed as described below:

Address	Description	Parameters
40001	MSTR Function	1 = Write Parameters 2 = Read Parameters 3 = 5 = Write Global Data (Frequency, Status, Output Current, and Output Voltage) 6 = Read Global Data (Frequency, Status, Output Current, and Output Voltage)
40002	Error Code	read only
40003	Number of consecutive registers to read or write	1 to 100 decimal (Write) 1 to 125 decimal (Read) (SEE Note 1.)
40004	Starting Register Address in G3	1 to 5xx (Refer to G3 Communication Registers table)
40005	Destination Node	2 - 17 (Decimal)
40006	Routing Path	1-8

Note1.: Presently only read from/ write to parameter listed on G3 Communication Register Table is implemented.

9.2 MSTR Function error Codes

If an error occurs during any of the MSTR operations, a hexadecimal error code will be displayed in register 4x+1 in the control block (refer to MODICON 984 Programmable Controller Systems Manual, MSTR Function Error Codes, section 17.2).

In the routing Failure error category (6mss type error, per reference manual section 17.2) the Modbus+ Communication Option may return the following error codes:

SS Hex Value	Meaning
10	Slave has rejected the command because on of the following N-error conditions resulted while communicating with the G3 inverter (1) cannot execute command while inverter is running. (2) Attempting to set data outside limits. (3) Address outside limits. Or slave rejected the command because a global command was received (which cancels a normal read/write transaction).
80	Unexpected response received during a message transaction between the Modbus+ option processor and the Modbus+ peer processor. Specifically, the wrong slave input path number was returned by the peer processor. The transaction is rejected.

The above codes were specifically included in the design of the Modbus+ Communication Option. Additional error codes may be generated by the Modbus+ network handlers as well.

9.3 Program Examples

Example #1:

Using the example PLC ladder program listed previously, and using the write command, Inverter on node 2 is to be started in the forward direction using Acceleration/Deceleration parameters settings #1. The output frequency of the inverter is to set to 60 Hertz.

- Set the MSTR control registers to the following settings:

Address	Description	Register Setting
40001	MSTR Function	1
40002	Error Code	read only (see section 8.3)
40003	Number of consecutive registers to read	2
40004	Starting Register Address in G3	1
40005	Destination Node	2
40006	Routing Path	1

- In register 40100 write the output frequency of 6000 (decimal x100).
- In the Status register 40101 write 5 which was derived from the following table

	Global Input Command Enable	Global Frequency Command Enable	Clear Fault Command	Emergency Stop Command	Coast to a Stop Command	Fundamental Parameter Selection	DC Injection Command	Feedback Enabled Command	Jog Command	Reserved	Reserved	Reserved	Acc/Dec #1 or #2 Command	Forward or Reverse Command	Stop Command	Run/Stop Command	
address/bit	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	
40101	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	Hex 0005
			0			0				0				5			

- Closing internal Relay 1(positive edge) initiates Modbus+ communications.

Example #2:

Frequency commands (G3 com register 01) and Input commands (G3 com register 02) can be written globally from node 1 (typically a source PLC) to nodes 02 - 17 (G3 drives). Using the example PLC ladder program listed previously, and using the **global** write command, Inverter on *node 3* is to be started in the *reverse* direction using *Acceleration/Deceleration parameters settings #2*. The output frequency of the inverter is to set to 30 Hertz. Set the MSTR control registers to the following settings:

- Set the MSTR control registers to the following settings:

Address	Description	Register Setting
40001	MSTR Function	5
40002	Error Code	read only (see section 8.3)
40003	Number of consecutive registers to read	32 decimal (always)
40004	Starting Register Address in G3	don't care
40005	Destination Node	don't care
40006	Routing Path	don't care

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- From the following data table we find that the addressing for node 3 frequency is register 40102. We place 3000 (frequency x 100) into that register.

ADDRESS	NODE	FUNCTION	ADDRESS	NODE	FUNCTION
40100	2	Frequency (x100)	40116	10	Frequency (x100)
40101	2	Input Command	40117	10	Input Command
40102	3	Frequency (x100)	40118	11	Frequency (x100)
40103	3	Input Command	40119	11	Input Command
40104	4	Frequency (x100)	40120	12	Frequency (x100)
40105	4	Input Command	40121	12	Input Command
40106	5	Frequency (x100)	40122	13	Frequency (x100)
40107	5	Input Command	40123	13	Input Command
40108	6	Frequency (x100)	40124	14	Frequency (x100)
40109	6	Input Command	40125	14	Input Command
40110	7	Frequency (x100)	40126	15	Frequency (x100)
40111	7	Input Command	40127	15	Input Command
40112	8	Frequency (x100)	40128	16	Frequency (x100)
40113	8	Input Command	40129	16	Input Command
40114	9	Frequency (x100)	40130	17	Frequency (x100)
40115	9	Input Command	40131	17	Input Command

- The register for node 3 status command (from the above table) is 40103. From the table below we determine that for the inverter to run in *reverse* using #2 acc/dec pattern we must place a C009 (hex) into that register.

	Global Input Command Enable	Global Frequency Command Enable	Clear Fault Command	Emergency Stop Command	Coast to a Stop Command	Fundamental Parameter Selection	DC Injection Command	Feedback Enabled Command	Jog Command	Reserved	Reserved	Reserved	Acc/Dec #1 or #2 Command	Forward or Reverse Command	Stop Command	Run/Stop Command	
address/bit	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	
40103	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	Hex C009
	C			0				0			9						

NOTE: If the last global write to a node includes a 1 in either the Global Input Command Enable (bit F) or the Global Frequency Command Enable (bit E), then the inverter at that node address will not accept any frequency or status commands from a regular write command (MSTR function 1) until these bits are changed to a 0 and the global write command is resent. Regular read commands (MSTR function 2) are also overridden while the Global write command bits are set.

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Example #3:

Using the example PLC ladder program listed previously, and using the **Read** command, read the current and output voltage from inverter on node 4.

- Set the MSTR control registers to the following settings:

Address	Description	Register Setting
40001	MSTR Function	2
40002	Error Code	read only (see section 8.3)
40003	Number of consecutive registers to read	2
40004	Starting Register Address in G3	7 (address of first parameter)
40005	Destination Node	4
40006	Routing Path	1

- The read command is initiated by closing internal relay 1 (on positive edge). The data should now appear on registers 40100 (Output current) and 40101 (Output Voltage). The current will be the output current displayed as percent of inverter full load amps. The voltage on 40101 will be a percent of inverter rating (230/460/575) times 10.

Example #4:

The following G3 com registers can be read globally from any of the 31 network nodes:

<u>G3 Com Register</u>	<u>Register No.</u>
Output Frequency Monitor	05
Status	06
Output Current Monitor	07
Output Voltage Monitor	08

Using the example PLC ladder program listed previously, and using the **global** read command, read status, frequency, output current, and output voltage on inverter at node 5.

- Set the MSTR control registers to the following settings:

Address	Description	Register Setting
40001	MSTR Function	6
40002	Error Code	read only (see section 8.3)
40003	Number of consecutive registers to read	don't care
40004	Starting Register Address in G3	don't care
40005	Destination Node	5
40006	Routing Path	1

- Closing internal Relay 1 (positive edge) initiates modbus+ communications and a read is done on node 5 global data.
- From the following data table we find that the addressing for node 2.

ADDRESS	DESCRIPTION	DATA FORM
40100	Frequency	frequency X 100
40101	Status	see table below
40102	Output Current	percent of inverter full load
40103	Output Voltage	percent of inverter rating x 10

- The node 5 inverter status can be derived 34 from the following table:

