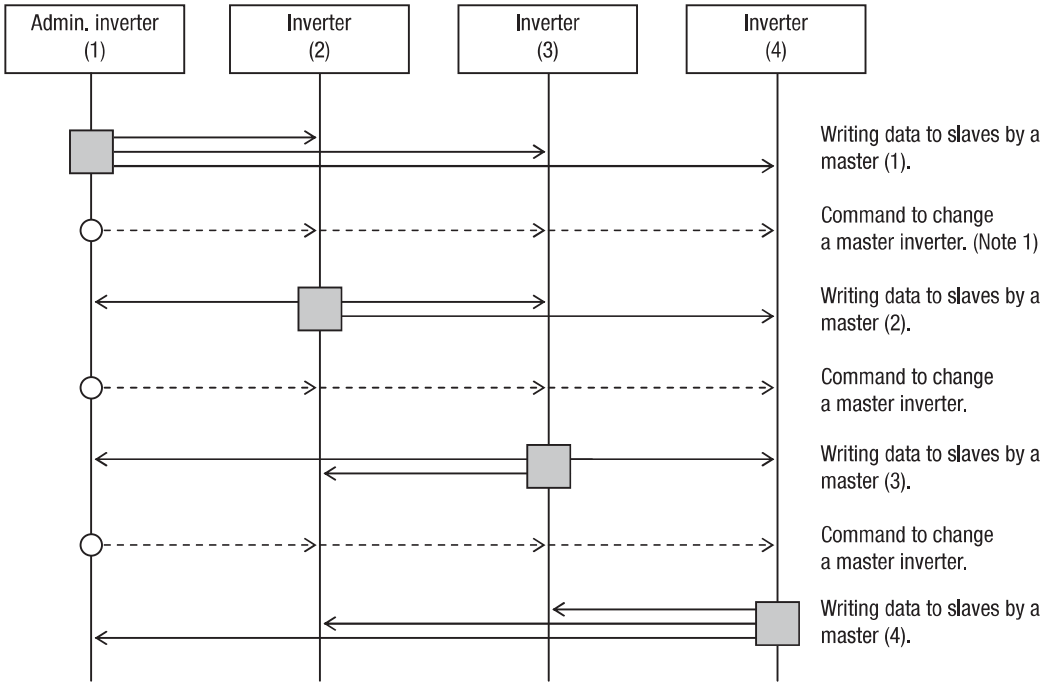
B-3-6 EzCOM (Peer-to-Peer communication)

- Besides standard Modbus-RTU communication (slave), MX2 supports Peer-to-Peer communication between multiple inverters.
- The max. number of inverter in the network is up to 247 (32 without repeater).
- One administrator inverter is necessary in the network, and the other inverters behave as master or slave.
- Be sure to set station No.1 as an administrator inverter, which controls master inverter according to user setting. The others will be slave inverters. An admin. inverter is fixed, but a master inverter always turns by rotation. For this reason, an admin. inverter can be a master or a slave.
- A master inverter is able to write data to any holding register of designated slave inverter. The max. number of holding register is up to 5. After writing data completed, a master inverter will be shift to the next inverter.

The max. number of master inverter is 8.



: Master inverter

Note 1 The command to change a master is issued by an admin. inverter automatically, which users do not have to take care.

Note 2 The command to change a master from 01 to 02 is issued after the data is sent from master inverter 01 to slave and communication wait time (C078) passed.

Note 3 Administrator inverter issues the next command to change a master after the data from master inverters is sent and communication wait time (C078) passed. In case the data from master inverter cannot be received within the communication error timeout (C077), then the inverter timeouts and the behaves according to the communication error selection.

Note 4 Please set the communication error timeout as it is valid (C077=0.01~99.99). If it is disabled (C077=0.0), EzCOM function is interrupted in case the data from master inverter was not received. In case it is interrupted, please turn on/off the power or reset (reset terminal on/off).

Func. code	Name	Data/Range	For	Description
C072	Communication station No. Selection	1 to 247	ALL	Network address
C076	Communication error selection	00	ALL	Trip
		01	ALL	Trip after deceleration stop
		02	ALL	Ignore
		03	ALL	Free-run stop
		04	ALL	Deceleration stop
C077	Communication error timeout	0.00	ALL	Disabled
		0.01~99.99	ALL	[sec.]
C078	Communication wait time	0~1000	ALL	[ms]
C096	Communication selection	00	–	Modbus-RTU
		01	B	EzCOM
		02	A	EzCOM (admin)
C098	EzCOM start adr. of master	1 to 8	A	
C099	EzCOM end adr. of master	1 to 8	A	
C100	EzCOM starting trigger	00	A	485 input
		01	A	Always ON
P140	EzCOM number of data	1 to 5	M	
P141	EzCOM destination 1 address	1 to 247	M	(Note 3)
P142	EzCOM destination 1 register	0000 to FFFF	M	
P143	EzCOM source 1 register	0000 to FFFF	M	
P144	EzCOM destination 2 address	1 to 247	M	
P145	EzCOM destination 2 register	0000 to FFFF	M	
P146	EzCOM source 2 register	0000 to FFFF	M	
P147	EzCOM destination 3 address	1 to 247	M	
P148	EzCOM destination 3 register	0000 to FFFF	M	
P149	EzCOM source 3 register	0000 to FFFF	M	
P150	EzCOM destination 4 address	1 to 247	M	
P151	EzCOM destination 4 register	0000 to FFFF	M	
P152	EzCOM source 4 register	0000 to FFFF	M	
P153	EzCOM destination 5 address	1 to 247	M	
P154	EzCOM destination 5 register	0000 to FFFF	M	
P155	EzCOM source 5 register	0000 to FFFF	M	
C001~ C007	Multi-function input 1 selection	81	A	485: start EzCOM

Which parameters to be set?

ALL : Set all inverters in the network.

A : Set admin. inverter (address=1) only.

B : Set all inverters except admin. inverter.

M : Set master inverters configured in C098 to C099 of admin. inverter.

Note 5 Address of Administrative inverter is to be set 01 (C072=01).

Note 6 When selection of operation after communication error is set other than “ignoring errors (C076=02)”, EzCOM function is interrupted in case of com-

munication timeout on administrative inverter. In this case, please power off/on or reset (on/off RES terminal) to recover.

Note 7 If EzCOM starting trigger is set as input terminal (C100=00), be sure to configure 81 in one of input terminals.

Note 8 If EzCOM starting trigger is set as always (C100=01), administrative inverter starts to send the data immediately after power on. In case the establishment of the inverter to be assigned as master of delays and fail to receive the command to change the master, the data cannot be sent from master and administrative inverter time-outs. When C100=01 selected, please be sure to power up the administrative inverter at last after reconfirming the establishment of inverters other than administrative inverters.

Note 9 Although slave addresses are set in a master inverter, data is sent as broadcast address (00). If a slave inverter receives data to another slave, it will be ignored.

Note 10 As EzCOM source and destination register, please set the number minus one from the value listed in the table in “modbus data listing”.

Note 11 Just 0901h should be mention.

Note 12 If above parameter is changed, the inverter power must be rebooted in order to activate new parameters. Instead of rebooting, turning ON/OFF of reset terminal works as same.

Basic function (in case the number of data is 1 (P140=1))

- A master inverter sends data in holding register P143 of the master to a slave inverter of address P141 and overwrites on holding register P142.
- A master inverter is changed to the next inverter, and repeats same procedure according to setting of new master inverter.

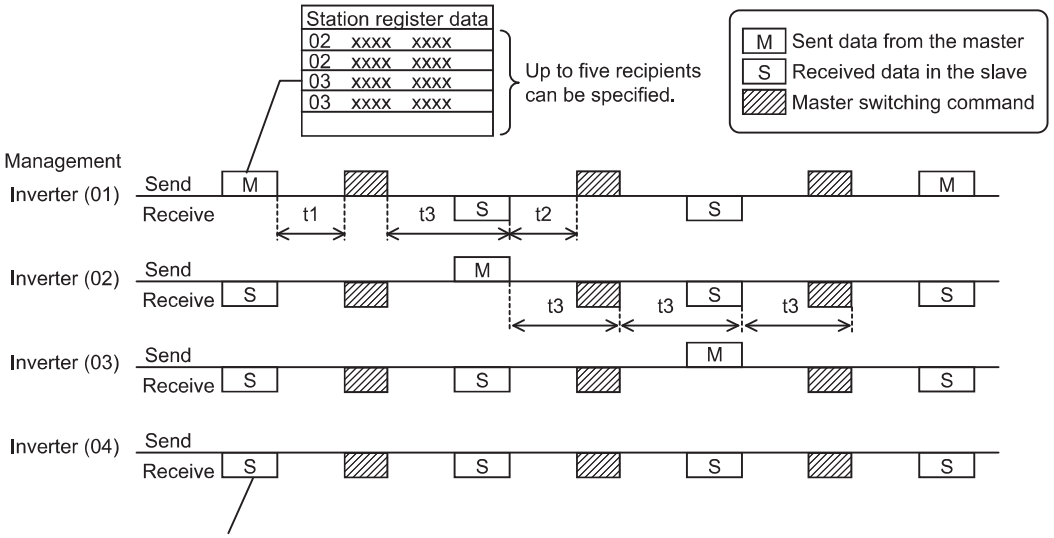
Inverter-Inverter Communication Operation

1. The Master Inverter sends data to each slave inverter according to the items set in the Master Inverter.
2. The Management Inverter sends a master switching command and the Master Inverter changes.
3. The next Master Inverter sends data to each slave inverter in the same manner as in 1st point.
4. The 2nd and the 3st points are repeated.

Note Since the Inverter communication is performed in the form of broadcasting (station number: 00), all communication data are sent to all stations. Accordingly, while a slave not specified as the recipient of the Master also receives data, if the data is not addressed to that slave the data will be discarded in the slave.

Example of Inverter-Inverter Communications Sequence

Shown below is a communication sequence involving a total of four inverters from station numbers 01 to 04, where the Master Inverter is one of 01 to 03.



- For the Management Inverter, be sure to set a value other than 0 (1 second or more is recommended) in Communication Error Timeout (C077). When 0 is set, the Co-inverter communication function will stop if the data sent from the Master Inverter cannot be received. If the function has stopped, reconnect the Management Inverter or perform a reset (by turning the RS terminal ON and then turning it OFF).
- The communication timeout timer starts counting when the recipient starts waiting for data. If data reception is not completed within the set time, a timeout occurs (t3 in the above figure) and the operation specified by Operation Selection on Communication Error (C076) takes place.
- If the Management Inverter is the master, the master switching command is sent after an elapse of the silent interval + Communication Wait Time (C078) following the sending of data by the Master Inverter (t1 in the above figure).
- If an Inverter other than the Management Inverter is the master, the master switching command is sent after an elapse of the silent interval + Communication Wait Time (C078) following the receiving of data from the Master Inverter (t2 in the above figure).
- If "01: Always started" is selected for Co-inverter Communication Start Selection, the Management Inverter starts sending the moment the power is turned on. Accordingly, any delay in the power-on timing of the other Inverter prevents normal communication and the Management Inverter experiences a communication timeout. If "Always started" is selected, confirm starting of all other Inverters and then start the Management Inverter at the end.
- Do not set 08FFh (EEPROM write) or 0901h (EEPROM write mode selection) in the recipient register.
- If any one of C096 to C100 is changed, the change will not be reflected until the power is reconnected or a reset is performed (by turning the RS terminal ON and then turning it OFF).

B-4 ModBus Data Listing

B-4-1 ModBus Coil List

The following tables list the primary coils for the inverter interface to the network. The table legend is given below.

- **Coil Number –** The network register address offset for the coil. The coil data is a single bit (binary) value.
- **Name –** The functional name of the coil
- **R/W –** The read-only (R) or read-write (R/W) access permitted to the inverter data
- **Description –** The meaning of each of the states of the coils

Coil No.	Item	R/W	Setting
0000h	unused	–	(Inaccessible)
0001h	Operation command	R/W	1: Run, 0: Stop (valid when A002 = 03)
0002h	Rotation direction command	R/W	1: Reverse rotation, 0: Forward rotation (valid when A002 = 03)
0003h	External trip (EXT)	R/W	1: Trip
0004h	Trip reset (RS)	R/W	1: Reset
0005h	(Reserved)	–	–
0006h	(Reserved)	–	–
0007h	Intelligent input terminal [1]	R/W	1: ON, 0: OFF (*1)
0008h	Intelligent input terminal [2]	R/W	1: ON, 0: OFF (*1)
0009h	Intelligent input terminal [3]	R/W	1: ON, 0: OFF (*1)
000Ah	Intelligent input terminal [4]	R/W	1: ON, 0: OFF (*1)
000Bh	Intelligent input terminal [5]	R/W	1: ON, 0: OFF (*1)
000Ch	Intelligent input terminal [6]	R/W	1: ON, 0: OFF (*1)
000Dh	Intelligent input terminal [7]	R/W	1: ON, 0: OFF (*1)
000Eh	(Reserved)	–	–
000Fh	Operation status	R	1: Run, 0: Stop (interlocked to “d003”)
0010h	Rotation direction	R	1: Reverse rotation, 0: Forward rotation (interlocked to “d003”)
0011h	Inverter ready	R	1: Ready, 0: Not ready
0012h	(Reserved)	–	–
0013h	RUN (running)	R	1: Running, 0: Not Running
0014h	FA1 (constant-speed reached)	R	1: ON, 0: OFF
0015h	FA2 (set frequency overreached)	R	1: ON, 0: OFF
0016h	OL (overload advance notice (1))	R	1: ON, 0: OFF
0017h	OD (output deviation for PID control)	R	1: ON, 0: OFF
0018h	AL (alarm signal)	R	1: ON, 0: OFF
0019h	FA3 (set frequency reached)	R	1: ON, 0: OFF
001Ah	OTQ (over-torque)	R	1: ON, 0: OFF
001Bh	(Reserved)	–	–
001Ch	UV (undervoltage)	R	1: ON, 0: OFF
001Dh	TRQ (torque limited)	R	1: ON, 0: OFF
001Eh	RNT (operation time over)	R	1: ON, 0: OFF
001Fh	ONT (plug-in time over)	R	1: ON, 0: OFF
0020h	THM (thermal alarm signal)	R	1: ON, 0: OFF
0021h	(Reserved)	–	–
0022h	(Reserved)	–	–
0023h	(Reserved)	–	–
0024h	(Reserved)	–	–
0025h	(Reserved)	–	–
0026h	BRK (brake release)	R	1: ON, 0: OFF
0027h	BER (brake error)	R	1: ON, 0: OFF
0028h	ZS (0 Hz detection signal)	R	1: ON, 0: OFF
0029h	DSE (speed deviation maximum)	R	1: ON, 0: OFF
002Ah	POK (positioning completed)	R	1: ON, 0: OFF
002Bh	FA4 (set frequency overreached 2)	R	1: ON, 0: OFF
002Ch	FA5 (set frequency reached 2)	R	1: ON, 0: OFF

Coil No.	Item	R/W	Setting
002Dh	OL2 (overload notice advance (2))	R	1: ON, 0: OFF
002Eh	Odc: Analog O disconnection detection	–	1: ON, 0: OFF
002Fh	OIDc: Analog OI disconnection detection	–	1: ON, 0: OFF
0030h	(Reserved)	–	–
0031h	(Reserved)	–	–
0032h	FBV (PID feedback comparison)	R	1: ON, 0: OFF
0033h	NDc (communication train disconnection)	R	1: ON, 0: OFF
0034h	LOG1 (logical operation result 1)	R	1: ON, 0: OFF
0035h	LOG2 (logical operation result 2)	R	1: ON, 0: OFF
0036h	LOG3 (logical operation result 3)	R	1: ON, 0: OFF
0037h	(Reserved)	–	–
0038h	(Reserved)	–	–
0039h	(Reserved)	–	–
003Ah	WAC (capacitor life warning)	R	1: ON, 0: OFF
003Bh	WAF (cooling-fan speed drop)	R	1: ON, 0: OFF
003Ch	FR (starting contact signal)	R	1: ON, 0: OFF
003Dh	OHF (heat sink overheat warning)	R	1: ON, 0: OFF
003Eh	LOC (low-current indication signal)	R	1: ON, 0: OFF
003Fh	M01 (general output 1)	R	1: ON, 0: OFF
0040h	M02 (general output 2)	R	1: ON, 0: OFF
0041h	M03 (general output 3)	R	1: ON, 0: OFF
0042h	(Reserved)	–	–
0043h	(Reserved)	–	–
0044h	(Reserved)	–	–
0045h	IRDY (inverter ready)	R	1: ON, 0: OFF
0046h	FWR (forward rotation)	R	1: ON, 0: OFF
0047h	RVR (reverse rotation)	R	1: ON, 0: OFF
0048h	MJA (major failure)	R	1: ON, 0: OFF
0049h	Data writing in progress	R	1: Writing in progress, 0: Normal status
004Ah	CRC error	R	1: Error detected, 0: No error (*2)
004Bh	Overrun	R	1: Error detected, 0: No error (*2)
004Ch	Framing error	R	1: Error detected, 0: No error (*2)
004Dh	Parity error	R	1: Error detected, 0: No error (*2)
004Eh	Sum check error	R	1: Error detected, 0: No error (*2)
004Fh	(Reserved)	–	–
0050h	WCO (window comparator O)	R	1: ON, 0: OFF
0051h	WCOI (window comparator OI)	R	1: ON, 0: OFF
0052h	(Reserved)	–	–
0053h	OPDc (option disconnection)	R	1: ON, 0: OFF
0054h	FREF (FQ command source)	R	1: Operator, 0: Others
0055h	REF (RUN command source)	R	1: Operator, 0: Others
0056h	SETM (2nd motor selected)	R	1: 2nd motor selected, 0: 1st motor selected
0057h	(Reserved)	–	–
0058h	EDM (Gate suppress monitor)	R	1: ON, 0: OFF
0059h-	unused	R	inaccessible

Note 1 Normally, this coil is turned on when the corresponding intelligent input terminal on the control circuit terminal block is turned on or the coil itself is set to on. In this regard, the operation of the intelligent input terminal has priority over the operation of the coil. If disconnection of the communication train has disabled the master system from turning off the coil, turn the corresponding intelligent input terminal on the control circuit block on and off. This operation turns off the coil.

Note 2 Communication error data is retained until an error reset command is input. (The data can be reset during the inverter operation.)

B-4-2 ModBus Holding Registers

The following tables list the holding registers for the inverter interface to the network. The table legend is given below.

- **Function Code –** The inverter's reference code for the parameter or function (same as inverter keypad display)
- **Name –** The standard functional name of the parameter or function for the inverter
- **R/W –** The read-only(R) or read-write access(R/W) permitted to the data in the inverter
- **Description –** How the parameter or setting works (same as Chapter 3 description).
- **Reg. –** The network register address offset for the value. Some values have a high-byte and low-byte address.
- **Range –** The numerical range for the network value that is sent and/or received

⚠ **Tip** The network values are binary integers. Since these values cannot have an embedded decimal point, for many parameters it represents the actual value (in engineering units) multiplied by a factor of 10 or 100. Network communications must use the listed range for network data. The inverter automatically divides received values by the appropriate factor in order to establish the decimal point for internal use. Likewise, the network host computer must apply the same factor when it needs to work in engineering units. However, when sending data to the inverter, the network host computer must scale values to the integer range listed for network communications.

- **Resolution –** This is the quantity represented by the LSB of the network value, in engineering units. When the network data range is greater than the inverter's internal data range, this 1-bit resolution will be fractional.

Register No.	Function name	Function code	R/W	Monitoring and setting items		Data resolution
0000h	unused	–	–	Inaccessible		
0001h	Output frequency setting/monitor	F001 (high)	R/W	0 to 40000 (valid when A001 = 03)		0.01 [Hz]
0002h		F001 (low)	R/W			
0003h	Inverter status A	–	R	0: Initial status 2: Stopping 3: Running 4: Free-run stop 5: Jogging	6: DC braking 7: Retrying 8: Tripping 9: Undervoltage (UV),	–
0004h	Inverter status B	–	R	0: Stopping, 1: Running, 2: Tripping		–
0005h	Inverter status C	–	R	0: – 1: Stopping 2: Decelerating 3: Constant-speed operation 4: Accelerating 5: Forward rotation	6: Reverse rotation 7: Switching from fwd. to rev. rotation, 8: Switching from rev. to fwd. rotation, 9: Starting fwd. 10: Starting rev.	–
0006h	PID feedback	–	R/W	0 to 10000		0.01 [%]
0007h to 0010h	(Reserved)	–	R	–	–	

Register No.	Function name	Function code	R/W	Monitoring and setting items	Data resolution
0011h	Fault frequency monitor	d080	R	0 to 65535	1 [time]
0012h	Fault monitor 1 (factor)	d081	R	See the list of inverter trip factors below	–
0013h	Fault monitor 1 (inverter status)			See the list of inverter trip factors below	–
0014h	Fault monitor 1 (frequency) (high)			0 to 40000	0.01[Hz]
0015h	Fault monitor 1 (frequency (low)				
0016h	Fault monitor 1 (current)			Output current at tripping	0.01[A]
0017h	Fault monitor 1 (voltage)			DC input voltage at tripping	1[V]
0018h	Fault monitor 1 (running time) (high)			Cumulative running time at tripping	1[h]
0019h	Fault monitor 1 (running time) (low)				
001Ah	Fault monitor 1 (power-on time) (high)			Cumulative power-on time at tripping	1[h]
001Bh	Fault monitor 1 (power-on time) (low)				
001Ch	Fault monitor 2 (factor)	d082	R	See the list of inverter trip factors below	–
001Dh	Fault monitor 2 (inverter status)			See the list of inverter trip factors below	–
001Eh	Fault monitor 2 (frequency) (high)			0 to 40000	0.01[Hz]
001Fh	Fault monitor 2 (frequency (low)				
0020h	Fault monitor 2 (current)			Output current at tripping	0.01[A]
0021h	Fault monitor 2 (voltage)			DC input voltage at tripping	1[V]
0022h	Fault monitor 2 (running time) (high)			Cumulative running time at tripping	1[h]
0023h	Fault monitor 2 (running time) (low)				
0024h	Fault monitor 2 (power-on time) (high)			Cumulative power-on time at tripping	1[h]
0025h	Fault monitor 2 (power-on time) (low)				
0026h	Fault monitor 3 (factor)	d083	R	See the list of inverter trip factors below	–
0027h	Fault monitor 3 (inverter status)			See the list of inverter trip factors below	–
0028h	Fault monitor 3 (frequency) (high)			0 to 40000	0.01[Hz]
0029h	Fault monitor 3 (frequency (low)				
002Ah	Fault monitor 3 (current)			Output current at tripping	0.01[A]
002Bh	Fault monitor 3 (voltage)			DC input voltage at tripping	1[V]
002Ch	Fault monitor 3 (running time) (high)			Cumulative running time at tripping	1[h]
002Dh	Fault monitor 3 (running time) (low)				
002Eh	Fault monitor 3 (power-on time) (high)			Cumulative power-on time at tripping	1[h]
002Fh	Fault monitor 3 (power-on time) (low)				
0030h	Fault monitor 4 (factor)	d084	R	See the list of inverter trip factors below	–
0031h	Fault monitor 4 (inverter status)			See the list of inverter trip factors below	–
0032h	Fault monitor 4 (frequency) (high)			0 to 40000	0.01[Hz]
0033h	Fault monitor 4 (frequency (low)				
0034h	Fault monitor 4 (current)			Output current at tripping	0.01[A]
0035h	Fault monitor 4 (voltage)			DC input voltage at tripping	1[V]
0036h	Fault monitor 4 (running time) (high)			Cumulative running time at tripping	1[h]
0037h	Fault monitor 4 (running time) (low)				
0038h	Fault monitor 4 (power-on time) (high)			Cumulative power-on time at tripping	1[h]
0039h	Fault monitor 4 (power-on time) (low)				
003Ah	Fault monitor 5 (factor)	d085	R	See the list of inverter trip factors below	–
003Bh	Fault monitor 5 (inverter status)			See the list of inverter trip factors below	–
003Ch	Fault monitor 5 (frequency) (high)			0 to 40000	0.01[Hz]
003Dh	Fault monitor 5 (frequency (low)				
003Eh	Fault monitor 5 (current)			Output current at tripping	0.01[A]
003Fh	Fault monitor 5 (voltage)			DC input voltage at tripping	1[V]
0040h	Fault monitor 5 (running time) (high)			Cumulative running time at tripping	1[h]
0041h	Fault monitor 5 (running time) (low)				
0042h	Fault monitor 5 (power-on time) (high)			Cumulative power-on time at tripping	1[h]
0043h	Fault monitor 5 (power-on time) (low)				

Register No.	Function name	Function code	R/W	Monitoring and setting items	Data resolution
0044h	Fault monitor 6 (factor)	d086	R	See the list of inverter trip factors below	–
0045h	Fault monitor 6 (inverter status)			See the list of inverter trip factors below	–
0046h	Fault monitor 6 (frequency) (high)			0 to 40000	0.01[Hz]
0047h	Fault monitor 6 (frequency (low)				
0048h	Fault monitor 6 (current)			Output current at tripping	0.01[A]
0049h	Fault monitor 6 (voltage)			DC input voltage at tripping	1[V]
004Ah	Fault monitor 6 (running time) (high)			Cumulative running time at tripping	1[h]
004Bh	Fault monitor 6 (running time) (low)				
004Ch	Fault monitor 6 (power-on time) (high)			Cumulative power-on time at tripping	1[h]
004Eh	Warning monitor	d090	R	Warning code: 0 to 385	–
004Fh to 006Ch	(reserved)	–	–	–	–
006Dh to 08Efh	(reserved)	–	–	–	–
0900h	Writing to EEPROM	–	W	0: Motor constant recalculation 1: Save all data in EEPROM Other: Motor constant recalculation and save all data in EEPROM	–
0901h	Unused	–	–	Inaccessible	–
0902h	EEPROM write mode	–	W	0 (invalid) / 1 (valid)	
0903h to 1000h	Unused	–	–	Inaccessible	–

Note 1 Assume that the rated current of the inverter is “1000”.

Note 2 If a number not less than “1000” (100.0 seconds) is specified, the second value after the decimal point will be ignored.

Note 3 0902h setting is referred for one time when following 06h command is executed

List of inverter trip factors

Upper part of trip factor code (indicating the factor)		Lower part of trip factor code (indicating the inverter status)	
Name	Code	Name	Code
No trip factor	0	Resetting	0
Over-current event while at constant speed	1	Stopping	1
Over-current event during deceleration	2	Decelerating	2
Over-current event during acceleration	3	Constant-speed operation	3
Over-current event during other conditions	4	Accelerating	4
Overload protection	5	Operating at zero frequency	5
Braking resistor overload protection	6	Starting	6
Overvoltage protection	7	DC braking	7
EEPROM error	8	Overload restricted	8
Undervoltage protection	9		
Current detection error	10		
CPU error	11		
External trip	12		
USP error	13		
Ground-fault protection	14		
Input overvoltage protection	15		
Inverter thermal trip	21		
CPU error	22		
Main circuit error	25		
Driver error	30		
Thermistor error	35		
Braking error	36		
Safe Stop	37		
Low-speed overload protection	38		
Operator connection	40		
Modbus communication error	41		
Easy sequence error (invalid instruction)	43		
Easy sequence error (invalid nesting count)	44		
Easy sequence execution error 1	45		
Easy sequence user trip 0 to 9	50 to 59		
Option error 0 to 9	60 to 69		
Encoder disconnection	80		
Excessive speed	81		
Position control range trip	83		

(iii) List of registers (monitoring)

Register No.	Function name	Function code	R/W	Monitoring and setting items	Data resolution
1001h	Output frequency monitor	d001 (high)	R	0 to 40000	0.01 [Hz]
1002h		d001 (low)			
1003h	Output current monitor	d002	R	0 to 999900	0.01 [A]
1004h	Rotation direction monitor	d003	R	0: Stopping, 1: Forward rotation, 2: Reverse rotation	0.1 [Hz]
1005h	PID feedback value monitor	d004 (high)	R	0 to 1000000	0.1
1006h		d004 (low)			
1007h	Multi-function input monitor	d005	R	2^0: Terminal 1 to 2^6: Terminal 7	1 bit
1008h	Multi-function output monitor	d006	R	2^0: Terminal 11 to 2^1: Terminal 12/ 2^2: Relay Terminal	1 bit
1009h	Output frequency monitor (after conversion)	d007 (high)	R	0 to 4000000	0.01
100Ah		d007 (low)			
100Bh	Real frequency monitor	d008 (high)	R	-40000 to +40000	0.01 [Hz]
100Ch		d008 (low)	R		
100Dh	Torque reference monitor	d009	R	-200 to +200	1 [%]
100Eh	Torque bias monitor	d010	R	-200 to +200	1 [%]
100Fh	(Reserved)	–	–	–	–
1010h	Output torque monitor	d012	R	-200 to +200	1 [%]
1011h	Output voltage monitor	d013	R	0 to 6000	0.1 [V]
1012h	Input power monitor	d014	R	0 to 1000	0.1 [kW]
1013h	Watt-hour monitor	d015 (high)	R	0 to 9999000	0.1
1014h		d015 (low)			
1015h	Total RUN time	d016 (high)	R	0 to 999900	1 [h]
1016h		d016 (low)			
1017h	Power ON time monitor	d017 (high)	R	0 to 999900	1 [h]
1018h		d017 (low)			
1019h	Fin temperature monitor	d018	R	-200 to 1500	0.1 [ºC]
101Ah to 101Ch	(Reserved)	–	–	–	–
101Dh	Life assessment monitor	d022	R	2^0: Capacitor on main circuit board 2^1: cooling-fan	1 bit
101Eh	Program counter	d023	R	0~1024	
101Fh	Program number	d024	R	0~9999	
1020h~1025h	(Reserved)	–	–	–	–
1026h	DC voltage monitor	d102	R	0 to 10000	0.1 [V]
1027h	Regenerative braking load rate monitor	d103	R	0 to 1000	0.1 [%]
1028h	Electronic thermal monitor	d104	R	0 to 1000	0.1 [%]
1029h to 102Dh	(Reserved)	–	–	–	–
102Eh	Drive programming monitor (UM0)	d025(HIGH)	R	-2147483647 to 2147483647	1
102Fh		d025(LOW)	R		
1030h	Drive programming monitor (UM1)	d026(HIGH)	R	-2147483647 to 2147483647	1
1031h		d026(LOW)	R		
1032h	Drive programming monitor (UM2)	d027(HIGH)	R	-2147483647 to 2147483647	1
1033h		d027(LOW)	R		
1034h to 1035h	(Reserved)	–	–	–	–
1036h	Position command monitor	d029(HIGH)	R	-268435455 to 268435455	1
1037h		d029(LOW)	R		
1038h	Current position monitor	d030(HIGH)	R	-268435455 to 268435455	1
1039h		d030(LOW)	R		
103Ah to 1056h	(reserved)	–	–	–	–
1057h	Inverter mode	d060	R	0 (IM CT) 1 (IM VT) 2 (Reserved)	
1058h	unused	–	–	Inaccessible	–

Register No.	Function name	Function code	R/W	Monitoring and setting items	Data resolution
1059h	Frequency source monitor	d062	R	0: Operator 1 to 15: Multi-speed freq. 1 to 15 16: Jog frequency 18: Modbus network 19: Option 21: Potentiometer 22: Pulse train 23: Calculated function output 24: EzSQ (Drive Programming) 25: [O] input 26: [OI] input 27: [O] + [OI]	–
105Ah	Run source monitor	d063	R	1: Terminal 2: Operator 3: Modbus network 4: Option	–
10A1h	Analog input O monitor	d130	R	0 to 1023	–
10A2h	Analog input OI monitor	d131	R	0 to 1023	–
10A4h	Pulse train input monitor	d133	R	0.00 to 100.00	%
10A6h	PID deviation monitor	d153	R	-327.68 to 327.67 -9999.00 to 9999.00	%
10A8h	PID output monitor	d155	R	0.00 to 9999.00 if (A071: 01) -9999.00 to 9999.00 if (A071: 02)	%

(iv) List of registers

Register No.	Function name	Function code	R/W	Monitoring and setting items	Data resolution
1103h	Acceleration time 1	F002 (high)	R/W	0 to 360000	0.01 [sec.]
1104h		F002 (low)			
1105h	Deceleration time 1	F003 (high)	R/W	0 to 360000	0.01 [sec.]
1106h		F003 (low)			
1107h	Operator rotation direction selection	F004	R/W	00 (forward rotation), 01 (reverse rotation)	–
1108h to 1200h	Unused	–	–	Inaccessible	–

(v) List of registers (function modes)

Parameter group A

Register No.	Function name	Function code	R/W	Monitoring and setting items	Data resolution
1201h	Frequency reference selection	A001	R/W	00 (digital operator), 01 (terminal), 02 (operator), 03 (Modbus communication), 04 (option), 06 (pulse train frequency), 7 (drive programming), 10 (operation function result)	–
1202h	Run command selection (*)	A002	R/W	01 (terminal), 02 (operator), 03 (Modbus communication), 04 (option)	–
1203h	Base frequency	A003	R/W	300 to “maximum frequency”	0.1 [Hz]
1204h	Maximum frequency	A004	R/W	300 to 4000	0.1 [Hz]
1205h	O/OI selection	A005	R/W	00 (switches between O/OI via terminal AT), 02 (switches between O/FREQ adjuster via terminal AT), 03 (switches between OI/FREQ adjuster via terminal AT)	–
1206h to 120Ah	(Reserved)	–	–	–	–
120Bh	O start frequency	A011 (high)	R/W	0 to 40000	0.01 [Hz]
120Ch		A011 (low)			
120Dh	O end frequency	A012 (high)	R/W	0 to 40000	0.01 [Hz]
120Eh		A012 (low)			
120Fh	O start ratio	A013	R/W	0 to “O end ratio”	1 [%]
1210h	O end ratio	A014	R/W	“O start ratio” to 100	1 [%]
1211h	O start selection	A015	R/W	00 (start FQ), 01 (0 Hz)	–
1212h	O, O2, OI sampling	A016	R/W	1 to 30 or 31 (500 ms filter ±0.1 Hz with hysteresis)	1
1213h	Drive Programming (EzSQ) selection	A017	R/W	00 (disable), 01 (PRG start), 02 (always ON)	–
1214h	(Reserved)	–	–	–	–
1215h	Multi-step speed selection	A019	R/W	00 (binary), 01 (bit)	–
1216h	Multi-step speed reference 0	A020 (high)	R/W	0 or “start frequency” to “maximum frequency”	0.01 [Hz]
1217h		A020 (low)	R/W		
1218h	Multi-step speed reference 1	A021 (high)	R/W	0 or “start frequency” to “maximum frequency”	0.01 [Hz]
1219h		A021 (low)	R/W		
121Ah	Multi-step speed reference 2	A022 (high)	R/W	0 or “start frequency” to “maximum frequency”	0.01 [Hz]
121Bh		A022 (low)	R/W		
121Ch	Multi-step speed reference 3	A023 (high)	R/W	0 or “start frequency” to “maximum frequency”	0.01 [Hz]
121Dh		A023 (low)	R/W		
121Eh	Multi-step speed reference 4	A024 (high)	R/W	0 or “start frequency” to “maximum frequency”	0.01 [Hz]
121Fh		A024 (low)	R/W		
1220h	Multi-step speed reference 5	A025 (high)	R/W	0 or “start frequency” to “maximum frequency”	0.01 [Hz]
1221h		A025 (low)	R/W		
1222h	Multi-step speed reference 6	A026 (high)	R/W	0 or “start frequency” to “maximum frequency”	0.01 [Hz]
1223h		A026 (low)	R/W		
1224h	Multi-step speed reference 7	A027 (high)	R/W	0 or “start frequency” to “maximum frequency”	0.01 [Hz]

After changing the setting, keep the time 40 ms or longer before actually give run command