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TOSVERT VF-S7

Serial Communication Function Manual

NOTE

1. Make sure that this instruction manual is delivered to the end user of the inverter unit.
2. Read this manual before using the communication function.

Keep this manual near at hand of the user so that it can be referred to for

* Note that the contents of this manual are subject to change without prior notice.

Toshiba Schneider Inverter Corporation

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Introduction

Thank you for purchasing the TOSVERT VF-S7 Series inverter.

The VF-S7 Series comes equipped with a standard communication port. Using the RS232C Option Kit (RS2001Z) or the RS485 Option Kit (RS4001Z), the inverter and a computer can communicate with each other.

Read this manual, "VF-S7 Series Communication Function Manual," thoroughly before using communication to ensure proper operation. Store this manual in a safe place for future reference.

In this manual all hexadecimal numbers other than communication numbers and binary mode byte strings are suffixed with an 'h.' The '?' character is a wildcard and represents a byte or digit. Byte data represented as ASCII is shown in single quotes, and byte strings are enclosed in double quotes. Since data in quotes is an exact representation of what the computer or inverter expect, the convention of placing punctuation inside the quotation marks is dropped in these cases.

Before using communication, check each of the following usage precautions.

Usage Precautions		
	◆ The lifetime of the EEPROM is 10,000 write cycles. Use the 'P' command (RAM only write) when the data doesn't have to remain after the inverter is powered down. Do not use the 'W' command more than 10,000 times on the same parameter.	Refer to Page 14, 15
	◆ Communication is possible on VF-S7 Series inverters whose CPU is version V103 or higher. Communication doesn't work with versions V100~V102. Be sure that your inverter is atleast V103.	38
	◆ This manual explains communications for standard RS232C communication. When using RS485 communication or two inverters on the RS232C Option Unit, include the optional inverter number in the communication data string. Without the inverter number, all inverters will respond to the message at the same time causing data conflicts.	8, 11

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1. Summary of Communication Functions

By connecting TOSVERT VF-S7 Series inverters to the RS232C Option Unit (RS2001Z) or the RS485 Option Unit (RS4001Z) data communication with a computer, controller, etc. (collectively referred as a computer from now on) is possible. Software can then perform functions like monitor the state of the inverter, control the inverter, view and change any parameter, or save all the parameters to a disk.

The following types of communication functions are available.

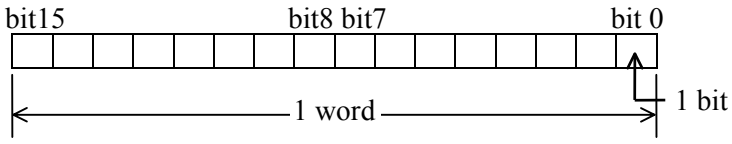
- Monitor functions (output frequency, current, voltage, etc. of the inverter)
- Command functions (commands such as run and stop)
- Parameter functions (setting or reading any parameter)
- Additional functions (a timer to detect cable disconnection)

The VF-S7 supports both an ASCII protocol and a binary protocol. ASCII is ideal for communication with personal computers, etc. while binary is best for controllers, etc. Data is accessed with *communication numbers*.

Commands and frequencies set by communication have the highest priority (higher than the panel or terminal block settings), so there is no need to change the command mode (CMOD) or frequency mode (FMOD) parameters. The inverter will always use settings sent through the communication port. Refer to "7. Operation and Monitoring by Communication" to see how to perform these settings.

■ Keywords

A *bit* is the smallest piece of information in computer data and is expressed as a 0 or a 1. A *word* is 16 bits strung together. One word is represented in hexadecimal as 0~FFFFh (0~65535). VF-S7 Series communication uses word data.



2. Communication Specifications

Item	Specification
Transmission Mode	Half duplex
Connection control	Centralized control*1
Synchronization	Asynchronous transmission
Communication speed	VF-S7: 9600 baud default, changeable to 1200, 2400, 4800, or 9600 baud*2 VF-S7e: 1200 baud only
Communication code	ASCII mode: ASCII (JIS-X-0201) 8 bit, even, odd, or no parity*3 Binary mode: 8 bit, even, odd, or no parity
Error detection	Parity and checksum
Communication character form	11 bits when receiving or 12 bits when sending*4
Bit sending order	Least significant bit first
Frame length	Variable (maximum of 15 bytes)

*1 Centralized control

The master (computer) completely controls the slave (VF-S7). The inverter acts as a slave and only responds to commands from the master. Only communication between them is allowed on the communication line.

*2 After setting the baud rate or parity, it is necessary to reset the inverter by turning it off and on or clearing a trip for the new communication setting to take effect.

*3 Communication messages in ASCII mode are based on 8 bit signed ASCII with an additional parity bit. The parity is set to even parity at the factory but can be changed to odd or no parity through the panel or communications (effective after a reset).

*4 Communication character form is as below:

● Receiving: 11 bits (1 start bit + 8 data bits + 1 parity bit + 1 stop bit)...default value

START BIT	BIT0	BIT1	BIT2	BIT3	BIT4	BIT5	BIT6	BIT7	PARITY BIT	STOP BIT

The inverter needs to receive only one stop bit. The computer may send 1, 1.5, or 2 stop bits.

● Sending: 12 bits (1 start bit + 8 data bits + 1 parity bit + 2 stop bits)...default value

START BIT	BIT0	BIT1	BIT2	BIT3	BIT4	BIT5	BIT6	BIT7	PARITY BIT	STOP BIT	STOP BIT

The inverter sends 2 stops bits. The computer can be set to receive 1, 1.5, or 2 stop bits.

3. Data Transfer Between a Computer and the VF-S7

3.1 A Brief Explanation of the Sequence

During communication between a computer and the VF-S7, the inverter is always in receive mode. The inverter only responds to commands from the computer. The first byte is used to determine whether the message is in ASCII mode or binary mode.

■ ASCII Mode

(1) The ASCII mode opening byte is '('. The inverter throws away data up to the first '('. If more than one '(' are received, only the last one is considered valid. If an error causes the '(' to not be recognized, no response is returned, and the inverter simply keeps waiting for the next '('.

(2) If an inverter number follows the '(', then the message only takes effect if that inverter number matches the internal inverter number. If the inverter numbers do not match, the inverter does not execute the message; it sends no response and simply waits for the next '('.

(3) The message is not considered finished until the '↵' (carriage return) is received. If no '↵' is received within 17 bytes or 1 second from the start of the message, the inverter ignores the data received and waits for the next '('.

(4) If the communication timer is set and no message is received within the specified time, the inverter will trip. The timer is stopped when inverter is turned on the inverter or reset. Refer to "8. Timer Functions" for more details.

(5) The inverter returns a response message after executing the message. Since message processing has lower priority than motor control, the time to return the response cannot be guaranteed.

■ Binary Mode

(1) The binary mode opening byte is 2Fh (‘/’). The inverter throws away data up to the first ‘/’. If more than one ‘/’ are received, the first one is considered valid and the others are considered data. If an error causes the ‘/’ to not be recognized, no response is returned, and the inverter simply keeps waiting for the next ‘/’.

(2) If an inverter number follows the ‘/’, then the message only takes effect if that inverter number matches the internal inverter number. If the inverter numbers don’t match, the inverter ignores the message, and after the proper number of bytes or one second have passed, the inverter simply waits for the next ‘/’.

(3) The message is finished when the command (52h (‘R’), 57h (‘W’), or 50h (‘P’)) and the proper number of data bytes are received. If one second passes before the message is complete, the inverter ignores the data received and waits for the next ‘/’.

(4) The message to the inverter is valid only if the command is 52h (‘R’), 57h (‘W’), or 50h (‘P’). Any other command is an error and makes the inverter ignore the data and waits for the next ‘/’.

(5) If the communication timer is set and the message is not received within the specified time, the inverter will trip. The timer stops when the inverter is reset or powered up. Refer to “8. Timer Functions” for more details.

(6) The inverter returns a response message after executing the message. Since message processing has lower priority than motor control, the time to return the response cannot be guaranteed.

■ Notes

When the inverter is powered up, communication is not possible for about a second until initialization finishes. Communication is also temporarily suspended when the inverter loses power for a brief time.

3.2 Communication Errors

The following table shows the types of communication errors.

■ Error Table

Error Name	Cause of Error	Error Code
Cannot execute error	The message was received correctly, but it cannot be executed. Examples are parameters that cannot be written while the inverter is running*1 such as FH and internal commands.*2	0000h
Data error	The data setting is out of range.	0001h
Communication number error	This communication number isn't available.	0002h
Command error	The command type does not exist.	0003h in ASCII mode No response in binary mode
Checksum error	The received checksum doesn't match the calculated checksum.	0004h
Format error	The message doesn't have a correct format. Parity, overrun, or framing error occurred;*3 '↵' wasn't received within 1 second (ASCII mode); proper number of bytes wasn't received within 1 second (binary mode); communication number is less than 4 digits. For example in "(R11)↵", the '1', '1', ')', and '↵' are read as the communication number, and there is no other '↵' after that, so a format error is generated.	No response
Inverter number error	Inverter number is 1 digit; inverter number doesn't match (not really an error, but the inverter returns no response).	No response

*1 Refer to "11.1 Parameter Reference" to see which parameters cannot be set while the inverter is running.

*2 There is no data message response for a command error in binary mode, but for the internal command 'M' a *cannot execute error* is returned (CPU V105 and higher).

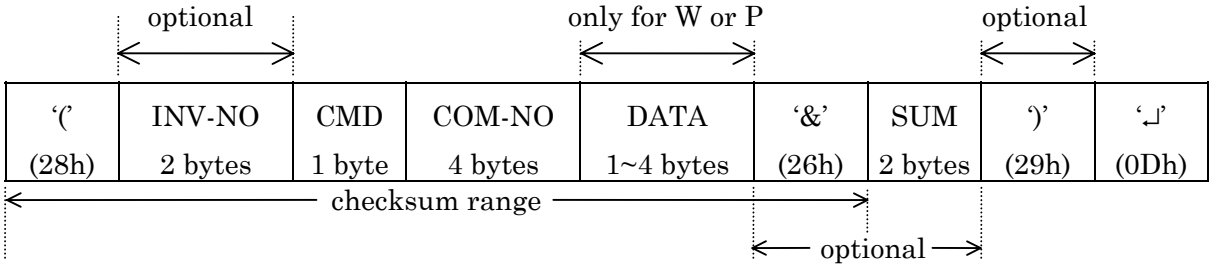
*3 *parity error* :parity bit doesn't match expected parity
overrun error :next byte received before previous byte read
framing error :error in stop bits

4. Message Format

4.1 ASCII Mode Message Format

This format is for changing and reading inverter parameters with a communication number and data sent in ASCII (JIS-X-0201) characters representing hexadecimal numbers.

(1) Computer → VF-S7 (ASCII mode)



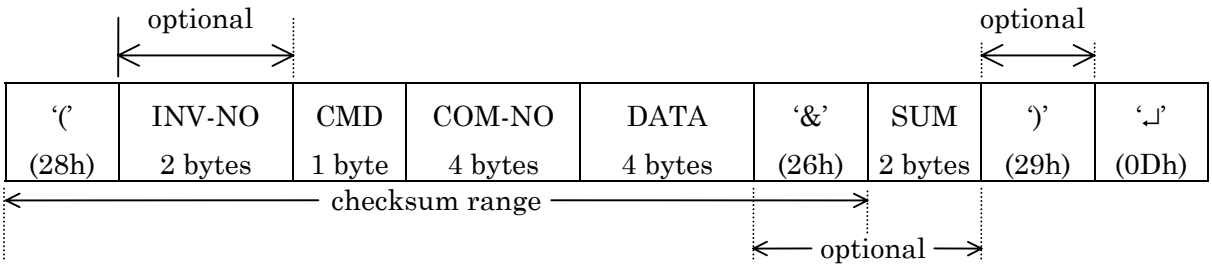
1. '(' [1 byte] Opening byte
2. INV-NO [2 bytes] Inverter number (00~31 (63 for versions less than V104), optional): The inverter number is set with base 10 numbers ("31", not "1F"). When the inverter number matches the internal one, the command will execute. If the inverter number mismatches or is only 1 byte, the inverter will ignore the message.
3. CMD [1 byte] Command type (explained in the table below)
4. COM-NO [4 bytes] Communication number (See "11.1 Parameter Reference.")
5. DATA [1~4 bytes] Data to write (only for commands 'P' and 'W')
6. '&' [1 bytes] Checksum code (optional, but when omitting, also omit the checksum)
7. SUM [2 bytes] Checksum (optional): The 2 least significant digits of the base 16 sum of the bytes from the opening byte up to and including the checksum code. For example, in "(R0000&60)↵" the sum from the '(' to the '&' is 28h + 52h + 30h + 30h + 30h + 30h + 26h = 1<u>60</u>h so the checksum is "60". If the checksum is omitted, also omit the checksum code, '&'.
8. ')' [1 byte] Closing byte (optional)
9. '↵' [1 byte] Carriage return: The carriage return officially ends the message.

■ <u>Command Type Table</u>

CMD [1 byte]	DATA [1~4 bytes] (hex range)
'R' (52h) :RAM data read command type	no data
'W' (57h) :RAM/EEPROM data write command type	write data (0h~FFFFh)
'P' (50h) :RAM data write command	write data (0h~FFFFh)

(2) VF-S7 → Computer (ASCII mode)

1) Response to a Normal Message

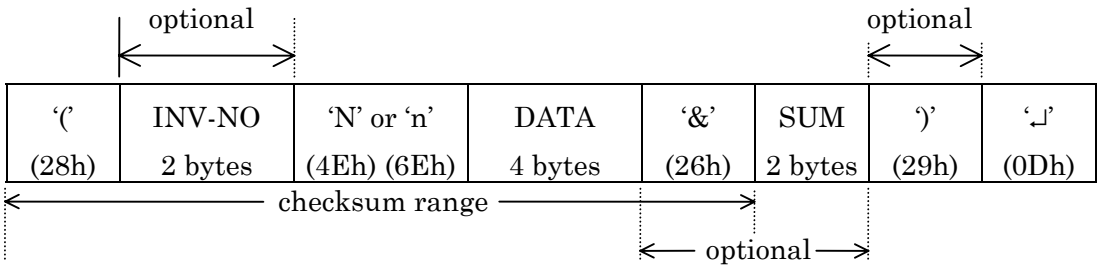


1. '(' [1 byte]	Opening byte
2. INV-NO [2 bytes]	Inverter number (00~31 (63 for versions less than V104), optional): The inverter number is returned in the response message if it was included in the received message.
3. CMD [1 byte]	Command and inverter trip status: The inverter normally returns upper case 'R', 'P', or 'W', but if it is tripped, it returns lower case 'r', 'p', or 'w'. (20h is added to the ASCII value of the command byte.)
4. COM-NO [4 bytes]	Returns the received communication number
5. DATA [4 bytes]	Read or written data: Returns the parameter data for the read command, 'R' and the actual data written for the write commands, 'P' and 'W'. The returned data is always 4 bytes, even when the data to write was fewer bytes. For example after processing "(W028012)↵", the inverter will return "(W02800012)↵".
6. '&' [1 bytes]	Checksum code: The inverter includes a checksum if it was included in the received message.
7. SUM [2 bytes]	Checksum: The 2 least significant digits of the base 16 sum of the bytes from the opening byte up to and including the checksum code.
8. ')' [1 byte]	Closing byte: The ')' will not be returned if the inverter didn't receive one.
9. '↵' [1 byte]	Carriage return: The carriage return officially ends the message.

Note: If there is communication in progress when the drive is reset, the message returned by the inverter may not be complete.

2) Response to a Bad Message (ASCII mode)

When a communication error occurs, the communication error command ('N' or 'n') may be returned with an error code. If the error involves the inverter number, the inverter returns no response to prevent possible data collisions. When the message includes a checksum, a checksum is returned.



'N' or 'n' [1 byte] Communication error command: The inverter trip status is still readable. The 'N' indicates the inverter is not tripped and the 'n' indicates the inverter is tripped.

DATA [4 bytes] Error code (0000h~0004h)

- 0000h Cannot execute error: Message was properly received, but the command cannot be executed. Examples are changing to parameters that cannot be changed while the inverter is running (FH, etc.) and writing to the EEPROM during an EEP1 trip.
- 0001h Data error: Data out of range for the parameter or too many data digits.
- 0002h Communication number error: Requested communication number is not available.
- 0003h Command error: Requested command does not exist.
- 0004h Checksum error: Calculated and received checksum do not match.

')'[1 byte] Closing byte: The closing bytes is not returned if it was not sent.

■ Examples

(N0000&5C)↵ Cannot execute error (Attempted to change FH while the inverter was running, etc.)

(N0001&5D)↵ Data error (Attempted to write too large a value to a parameter, etc.)

(N0002&5E)↵ Communication number error (The requested communication number references no parameter)

(N0003&5F)↵ Command error (Command was not 'R', 'P' or 'W'. Illegal commands include 'L', 'S', 'a', 'm', 'r', and 't').

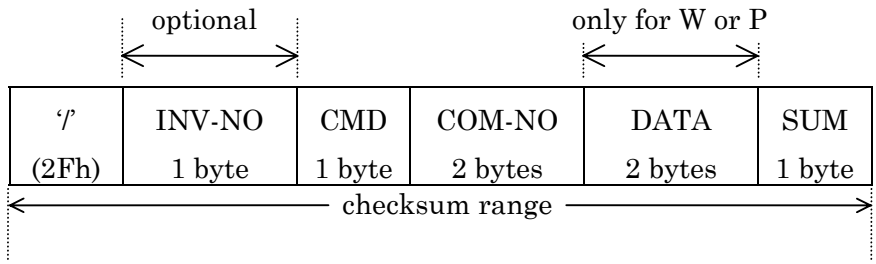
(N0004&60)↵ Checksum error (Checksum mismatch)

no response Format error (no '↵'); inverter number mismatch; the inverter was reset before responding.

4.2 Binary Mode Message Format

The data associated with each communication number is represented in pure binary.

(1) Computer → VF-S7 (binary mode)



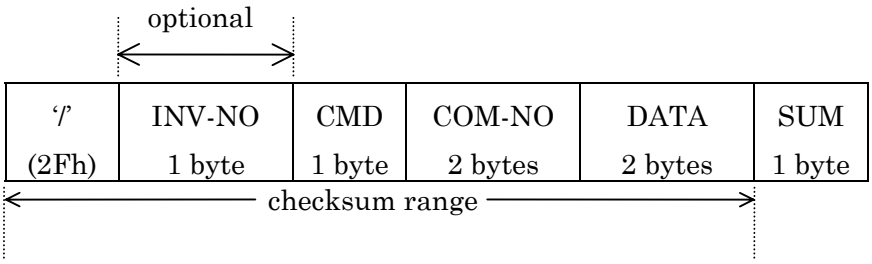
1. 2Fh ('/') [1 byte] Opening byte
2. INV-NO [1 byte] Inverter number (00h~1Fh (3Fh for versions less than V104), optional): When the message inverter number matches internal inverter number, the command will execute. If the inverter number mismatches, the inverter will not execute the message or return a response.
3. CMD [1 byte] Command (See table): When the command is 52h ('R'), exactly three more bytes are expected: two communication number bytes and the checksum byte. When the command is 57h ('W') or 50h ('P'), exactly five more bytes are expected, two communication number bytes, two data bytes, and the checksum byte. When the command is not any of these, communication starts over without an returning an error.
4. COM-NO [2 bytes] Communication number (See "11.1 Parameter Reference.")
5. DATA [2 bytes] Data to write, 0h~FFFFh: This is only valid when the command is 'P' or 'W'.
6. SUM [1 byte] Checksum (00h~FFh, NOT optional): The checksum is the least significant byte of the sum of the bytes from the opening byte to the end of the data (or communication number for a read). For example, when reading communication number 0102 with 2F 52 01 02 ??, 2Fh + 52h + 01h + 02h = 84h, so ?? is 84.

■ Command Type Table

CMD [1 byte]	DATA [2 bytes] (hex range)
52h ('R') :RAM data read command type	no data
57h ('W') :RAM/EEPROM data write command type	write data (0h~FFFFh)
50h ('P') :RAM data write command	write data (0h~FFFFh)

(2) VF-S7 → Computer (binary mode)

1) Response to a Normal Message

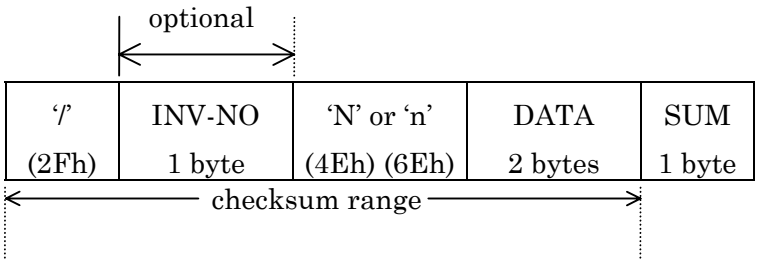


1. 2Fh ('/') [1 byte] Opening byte
2. INV-NO [1 byte] Inverter number (00h~1Fh (3Fh for versions less than V104), optional): The inverter number is included in the response if it was included in the original message.
3. CMD [1 byte] Command and inverter trip status: When not tripped the command is upper case 52h ('R'), 50h ('P'), or 57h ('W'). When tripped the command is lower case 72h ('r'), 70h ('p'), or 77h ('w').
4. COM-NO [2 bytes] Communication number (See "11.1 Parameter Reference.")
5. DATA [2 bytes] Read or written data: This is the data read by command 52h ('R') or data actually written for the commands 50h ('P') or 57h ('W').
6. SUM [1 byte] Checksum (00h~FFh, NOT optional): The checksum is the least significant byte of the sum of the bytes from the opening byte to the end of the data.

Note: If there is communication in progress when the drive is reset, the message returned by the inverter may not be complete.

2) Response to a Bad Message

When a communication error occurs, the inverter may return a message with the communication error command (4Eh ('N') or 6Eh ('n')), the error number, and the checksum. If the error involves the inverter number, the inverter returns no response to prevent possible data collisions.



'N' or 'n' [1 byte] Communication error command: The inverter trip status is still included. If it is not tripped, 4Eh ('N') is returned, but if it is tripped 6Eh ('n') is returned.

DATA [2 bytes] Error number (0000h~0004h)

0000h Cannot execute error: The message was properly received, but the command cannot be executed. Examples are attempts to write to parameters that cannot be changed while the inverter is running (FH, etc.) and attempting to write to the EEPROM during an EEP1 trip.

0001h Data error: Data is out of range for the parameter or there are too many data digits.

0002h Communication number error: Requested communication number is not available.

0004h Checksum error: Calculated and received checksums do not match.

No response: Command error (error number 0003h in ASCII communication); format error (the appropriate number of bytes have not been received after 1 second from the start of communication or there was a parity, overrun, or framing error); inverter number mismatch; the inverter was reset before responding.

■ Examples

2F 4E 00 00 7D Cannot execute error (Attempted to change FH while the inverter was running, etc.)

2F 4E 00 01 7E Data error (Attempted to write too large a value to a parameter, etc.)

2F 4E 00 02 7F Communication number error (The requested communication number references no parameter.)

2F 4E 00 04 81 Checksum error (Checksum mismatch)

no response Format error (Not enough bytes in one second, etc.); inverter number mismatch; command error

5. Message Command Types

Usage Precaution	
	◆ The lifetime of the EEPROM is 10,000 write cycles. Use the 'P' command (RAM only write) when the data doesn't have to remain after the inverter is powered down. Do not use the 'W' command more than 10,000 times on the same parameter.

5.1 ASCII Mode Commands

1) W (RAM/EEPROM write)

This command is used to change parameter data referenced by a communication number. The data is written to both RAM and the EEPROM or only RAM for a few parameters which don't store any data in the EEPROM (communication number = FA??). Data is sent in ASCII hexadecimal words. The inverter checks that the data for the parameter is in range (Refer to "11.Parameter Data"). If the data is out of range, an error is generated, and the data is not written. Do not write to the read-only communication numbers (FD??, FE??).

Example: Permanently set deceleration time 2 to 30.0s.

(communication number = 0501, data = 012Ch)

Computer → S7	S7 → Computer
(W050112C)↵	(W0501012C)↵

2) P (RAM write)

This command is used to change parameter data referenced by a communication number. The data is written to RAM. Data is sent in ASCII hexadecimal words. The inverter checks that the data is in range for its parameter. If the data is out of range, an error is generated, and the data is not written. Do not write to the read-only communication numbers (FD??, FE??).

Example: Temporarily set deceleration time 2 to 30.0s.

(communication number = 0501, data = 012Ch)

Computer → S7	S7 → Computer
(P050112C)↵	(P0501012C)↵

3) R (data read)

This command is used to read the parameter data referenced by a communication number. All data is sent as hexadecimal word data.

Example: Read the deceleration time 2 parameter.

(communication number = 0501)

Computer → S7	S7 → Computer
(R0501)↵	(R0501012C)↵

5.2 Binary Mode Commands

1) 57h ('W') (RAM/EEPROM write)

This command is used to change parameter data referenced by a communication number. The data is written to both RAM and the EEPROM or only RAM for a few parameters which don't store any data in the EEPROM (communication number = FA??). All data is sent as 16 bit word data. The inverter checks that the data is in range for its parameter (Refer to "11. Parameter Data"). If the data is out of range, an error is generated, and the data is not written. Do not write to the read-only communication numbers (FD??, FE??).

Example: Permanently set deceleration time 2 to 30.0s.

(communication number = 0501, data = 012Ch)

Computer → S7	S7 → Computer
2F 57 05 01 01 2C B9	2F 57 05 01 01 2C B9

2) 50h ('P') (RAM write)

This command is used to change the parameter data referenced by a communication number. The data is written to RAM. All data is sent as 16 bit word data. The inverter checks that the data for each parameter is in range. If the data is out of range, an error is generated, and the data is not written. Do not write to the read-only communication numbers (FD??, FE??).

Example: Temporarily set deceleration time 2 to 30.0s.

(communication number = 0501, data = 012Ch)

Computer → S7	S7 → Computer
2F 50 05 01 01 2C B2	2F 50 05 01 01 2C B2

3) 52h ('R') (data read)

This command is used to read the parameter data referenced by a communication number. All data is sent as hexadecimal word data.

Example: Read the deceleration time 2 parameter

(communication number = 0501)

Computer → S7	S7 → Computer
2F 52 05 01 87	2F 52 05 01 01 2C B4

■ Keywords

RAM data is used by the inverter for actual operation. When the power is disconnected, this data is lost. When the inverter is powered on again, the EEPROM data is recopied to RAM.

EEPROM data is stored parameter data. It is maintained when the power is disconnected and is copied to RAM during a reset or when the inverter is connected to power.

6. Communication Parameters

The communication baud rate, parity, inverter number, and communication timeout period can all be set by either the panel or communication. Note that some of these changes are immediate while others don't actually take effect until the next inverter trip reset or power up.

Communication is only possible when the computer and inverter have the same baud rate and parity.

(1) Baud rate (communication number = 0800, parameter F800)

Takes effect when the inverter is reset or powered up.

S7e: This parameter does not exist since the baud rate is fixed at 1200 baud.

S7: 0 = 1200 baud, 1 = 2400 baud, 2 = 4800 baud, 3 = 9600 baud

(2) Parity (communication number = 0801, parameter F801)

Takes effect when the inverter is reset or powered up.

0 = no parity, 1 = even parity, 2 = odd parity

(3) Inverter number (communication number = 0802, parameter F802)

Takes effect immediately.

Settable in the range 0~31 (63 for versions less than V104)

(4) Communication timeout period (communication number = 0803, parameter F803)

Takes effect immediately.

0: timer off

1~100: timer setting where 1 ≅ 1.02 seconds

Once the timeout timer is set, the inverter waits until the first valid message before starting the timer. If no messages arrive during the timeout period, the inverter trips Err.5.

7. Operation and Monitoring by Communication

Communication can be used to operate the inverter and read the inverter status.

7.1 Operation by Communication

Operation by communication takes priority over all other methods. Although the command mode parameter (CMOD) assigns priority to the panel or the terminal block, and the frequency mode parameter (FMOD) assigns priority to the panel, speed potentiometer, or terminal block, communication can take priority over those settings.

To give communication the highest priority for commands, bit 15 of communication number FA00 must be set to 1. Bit 14 of FA00 must be set to 1 to give priority to frequency setting by communication. Once either of these bits is set, they remain in effect until they are turned off by writing 0's to them, disconnecting the inverter from power, resetting the inverter after a trip, or doing a reset to factory settings (tYP).

(1) Commands by Communication (communication number FA00: communication commands)

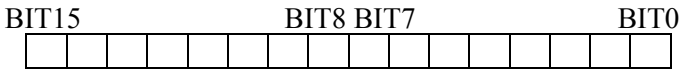
The bit structure of communication number FA00 is shown in Table 1. Bit 15 must be set for these commands to work. While bit 15 is set, the command mode parameter (CMOD) is ignored.

Table 1: (FA00) Communication Command Bit Structure

Bit	Operation	0	1
15	communication command valid (FA00)	invalid	valid
14	communication frequency valid (FA01)	invalid	valid
13	reset trip	OFF	reset
12	emergency stop	OFF	e-stop
11	free run command	OFF	free run
10	run/stop	stop	run
9	forward/reverse	forward	reverse
8	jog operation	OFF	jog
7	DC braking	OFF	DC braking
6	acc/dec 1/2 selection	acc/dec 1	acc/dec 2
5	(reserved)	—	—
4	(reserved)	—	—
3	preset speed 4 (S7 only)	OFF	ON
2	preset speed 3	OFF	ON
1	preset speed 2	OFF	ON
0	preset speed 1	OFF	ON

Example:

Forward run command (FA00 = 8400h). Set bits 15 and 10 to 1.



FA00: 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0

Example:

Reverse run command (8600h: frequency set by FMOD)
(C600h: frequency set by communication)

Example:

Stop (8000h: frequency set by FMOD)
(C000h: frequency set by communication)

Note: If the inverter is reset while responding, the returned message may be incomplete.

(2) Frequency Setting by Communication

Set the frequency at communication number FA01 in hexadecimal (1 = 0.01Hz).

Example:

80Hz: 80Hz ÷ 0.01Hz = 8000 = 1F40h

Set bit 14 of FA00 to 1 to override the frequency mode parameter (FMOD) and give priority to the value in FA01.

(3) Reset by Communication

Write data to communication number 0007.

S7e: 1~5

S7: 1~6

Parameters changed by the 'P' command will not remain after a type reset. In order to save the changes, use the 'W" command.

Note: During this processing, the inverter will reset and cause the response message to be incomplete. During this time, no communication is possible.

7.2 Status Monitoring by Communication

(1) Status Monitor

The communication numbers for monitoring the status are FE00~FE14. (See "11.1 Parameter Reference.")

1) Current output frequency (FE00)

This shows the output frequency, but if the inverter trips it holds the frequency at the time of the trip. Use FD00 to read the frequency if the trip frequency should not be held.

2) Current inverter status (FE01, Table 2)

This shows the status. If the inverter has tripped, it holds the status at the trip.

3) Trips (FE10~FE13)

See section "11.3 Trip Codes" for a list of trips.

Table 2: (FE01) Inverter Status Bit Structure

Bit	Operation	0	1
15	(reserved)	—	—
14	(reserved)	—	—
13	(reserved)	—	—
12	(reserved)	—	—
11	(reserved)	—	—
10	running status†	stopped	running
9	direction status	forward	reverse
8	jogging status	—	jogging
7	DC braking status	—	DC braking
6	acc/dec 1/2 status	acc/dec 1	acc/dec 2
5	(reserved)	—	—
4	(reserved)	—	—
3	(reserved)	—	—
2	(reserved)	—	—
1	(reserved)	—	—
0	(reserved)	—	—

† This status bit is "running" during DC braking.

(2) Terminal Block Monitor

The function of each terminal can be changed. Confirm the terminal functions before monitoring them.

1) Input terminal (FE06, Table 3)

Table 3: (FE06) Input Terminal Bit Structure

Bit	Terminal Name	Parameter Name	Function	Terminal ON Data
0	F	F111	input terminal 1	1h
1	R	F112	input terminal 2	2h
2	RST	F113	input terminal 3	4h
3	S1†	F114	input terminal 4	8h
4	S2†	F115	input terminal 5	10h

† These terminals are not found on the S7e.

Example:

When only the S1 and F terminals are connected to CC, the data at FE06 will be 1h + 8h = 9h.

2) Output terminal (FE07, Table 4)

Table 4: (FE07) Output Terminal Bit Structure

Bit	Terminal Name	Parameter Name	Function	Terminal ON Data
0	OUT1	F130	output terminal 1	1h
1	OUT2†	F131	output terminal 2	2h

† These terminals are not found on the S7e.

Example:

When both OUT1 and OUT2 are ON, FE07 will be 1h + 2h = 3h.

(3) Other Monitoring Functions

See “11.1 Parameter Reference” for a list of other monitoring functions.

8. Timer Functions

VF-S7 Series communication has a timer function to detect communication problems such as cut cables. Once the timer has started, if the inverter doesn't receive any data in the specified period, it trips and displays `Err.5`.

1) Setting the Timer

The timer parameter is set to 0 (timer off) at the factory. The range of timeout times is from 1 (01h) second to 100 (64h) seconds. Sending 0 (00h) turns off the timer. When setting the timer from the panel, use extended parameter `F803`. When setting the timer by communications, use communication number 0803.

Example:

To set the timer to 15 seconds (in RAM only in this example)

Computer → S7	S7 → Computer
(P0803F)↵	(P0803000F)↵

2) Starting the Timer

If the timer was set by the panel, it starts from the first valid message received by the inverter. If the timer was set by communication, it starts after the first message received after returning the response message. If the timer setting was written to EEPROM, the timer starts after the first valid message after the inverter is connected to power or reset. The timer will not be started by a message with a different inverter number or if the message is unreadable and generates an error where the inverter cannot be sure the message was meant for it (format error or inverter number error).

3) Cancelling the Timer

Set the timer value to 0.

Example:

Cancel the timer (also in EEPROM in this example)

Computer → S7	S7 → Computer
(W08030)↵	(W08030000)↵

9. Communication Usage Example

This section shows examples of VF-S7 control by communication. The inverter number and checksum are omitted in these examples.

■ Examples

Set the frequency to 60Hz and run the motor forward.

ASCII mode

Computer → S7	S7 → Computer	
(PFA011770)↵	(PFA011770)↵	Set frequency to 60Hz (60Hz ÷ 0.01Hz = 6000 = 1770h)
(PFA00C400)↵	(PFA00C400)↵	Command and frequency by communication, forward run

binary mode

Computer → S7	S7 → Computer
2F 50 FA 01 17 70 01	2F 50 FA 01 17 70 01
2F 50 FA 00 C4 00 3D	2F 50 FA 00 C4 00 3D

Jog at 1Hz.

ASCII mode

Computer → S7	S7 → Computer	
(W02600064)↵	(W02600064)↵	Set jogging frequency to 1Hz (1Hz ÷ 0.01Hz = 100 = 64h)
(PFA008500)↵	(PFA008500)↵	Allow commands and set jog command.

binary mode

Computer → S7	S7 → Computer
2F 57 02 60 00 64 4C	2F 57 02 60 00 64 4C
2F 50 FA 00 85 00 FE	2F 50 FA 00 85 00 FE

Monitor the frequency. (The inverter is running at 60Hz in this example.)

ASCII mode

Computer → S7	S7 → Computer	
(RFD00)↵	(RFD001770)↵	Read frequency (1770h = 6000, 6000 × 0.01Hz = 60Hz)

binary mode

Computer → S7	S7 → Computer
2F 52 FD 00 7E	2F 52 FD 00 17 70 05

Monitor the inverter status.

ASCII mode

Computer → S7	S7 → Computer	
(RFE01)↵	(rFE010400)↵	Acceleration/deceleration time 2 in use, tripped

binary mode

Computer → S7	S7 → Computer
2F 52 FE 01 80	2F 72 FE 01 90 00 30

Monitor the trip code. (Inverter is tripped `Err.5` in this example. See "11.3 Trip Codes.")

ASCII mode

Computer → S7	S7 → Computer	
(RFC90)↵	(rFC900018)↵	`Err.5` trip

binary mode

Computer → S7	S7 → Computer
2F 52 FC 90 0D	2F 72 FC 90 00 18 45

Monitor the current.

ASCII mode

Computer → S7	S7 → Computer	
(RFE03)↵	(RFE03077B)↵	Current is 077Bh = 1915, 1915 × 0.01% = 19.15% rated current.

binary mode

Computer → S7	S7 → Computer
2F 52 FE 03 82	2F 52 FE 03 07 7B 04

Set deceleration time to 10 seconds.

ASCII mode

Computer → S7	S7 → Computer	
(W00100064)↵	(W00100064)↵	10 seconds (10s ÷ 0.1s = 100 = 0064h)

binary mode

Computer → S7	S7 → Computer
2F 57 00 10 00 64 FA	2F 57 00 10 00 64 FA

10. RS232C Communication Program Examples

Example 1: Continuously monitor the output frequency (or the frequency at the trip).

J3100 BASIC program (RS232C ASCII mode)

(Advanced BASIC-86 Ver.3.01.05J Toshiba)

1) Program example

```
10 OPEN "COM1:9600,E,8,1" AS #1       ' set9600 baud, even parity, 8 bit
                                      ' word, 1 stop bit (S7)
20 A$="FE00"                          ' set output frequency monitor
                                      ' communication number
30 PRINT #1,"("+"R"+A$+")"            ' send to inverter
                                      ' carriage return sent
                                      ' automatically
40 INPUT#1,B$                         ' get response from inverter
50 AAA$="&H"+MID$(B$,7,4)             ' extract data from message
60 F$=LEFT$(STR$(VAL(AAA$)/100),6)    ' unit conversion and conversion
                                      ' to base 10
70 PRINT "output frequency=";F$+"Hz" ' show output frequency
80 GOTO 20                            ' repeat
```

2) Execution example (inverter stopping from 80Hz)

```
output frequency=80Hz
output frequency=79.95Hz
   …
output frequency=0Hz
```

Example 2: Command execution with checksum (RS232C ASCII mode). Set and check maximum frequency (FH).

J3100 BASIC program (RS232C ASCII mode)

(Advanced BASIC-86 Ver.3.01.05J Toshiba)

1) Program example

```
 10 OPEN "COM1:9600,E,8,1" AS #1      ' set 9600 baud, even parity, 8 bit
                                      ' word, 1 stop bit
 20 INPUT"Send Data=";A$              ' get data to send to inverter
 30 S$="("+A$+"&"                     ' add formatting (in checksum
                                        range)
 40 S=0                               ' initialize checksum
 50 L=LEN(S$)                         ' get number of bytes in checksum
                                      ' range
 60 FOR I=1 TO L                      ' calculate the checksum
 70 S=S+ASC(MID$(S$,I,1))
 80 NEXT I
 90 CHS$=RIGHT$(HEX$(S),2)            ' convert the checksum to ASCII
100 PRINT #1,"("+A$+"&"+CHS$+")"      ' send the message with
                                      ' checksum
110 INPUT #1,B$                       ' read the response from the
                                        inverter
120 PRINT "Receive data= ";B$         ' display the receive data
130 GOTO 20                           ' repeat
```

2) Execution example

```
Send Data=? R0011                     -- read maximum frequency (0011)
Receive Data= (R00111F40&3D)          -- 1F40 (maximum frequency = 80Hz)
Send Data=? W00111770                 -- change maximum frequency to 60Hz
                                         (1770h)
Receive Data= (W00111770&36)
Send Data=? R0011                     -- read maximum frequency (0011)
Receive Data= (R00111770&31)          -- 1770 (maximum frequency = 60Hz)
```

Example 3: BASIC Program for Testing Communication (RS232C ASCII mode)

J3100 BASIC program (RS232C ASCII mode)

(Advanced BASIC-86 Ver.3.01.05J Toshiba)

1) Program example

```
100 INPUT "Baud rate=9600/4800/2400/1200";SPEED$     ' get speed
110 INPUT "Parity=even(E)/odd(O)";PARITY$     ' get parity
120 OPEN "COM1:"+SPEED$+","+PARITY$+",8,1"AS #1      ' open com port
130 INPUT "Send data";B$             ' input command
140 PRINT #1,B$                      ' echo input
150 C$=""                            ' initialize input string
160 T=TIMER                          ' initialize start time
170 COUNT=(TIMER-T)                  ' time elapsed since start
180 IF COUNT >3 THEN 270             ' end if timeout
190 IF COUNT <0 THEN T=TIMER         ' rollover protection
200 IF LOC(1)= 0 THEN A$="":GOTO 220 ' see if any input
210 A$=INPUT$(1,#1)                  ' get input
220 IF A$ <>CHR$(13) THEN 240        ' carriage return
230 GOTO 290                         ' found (CR) so finish
240 IF A$="" THEN 160                ' continue waiting
250 C$=C$+A$                         ' add input to input string
260 GOTO 160                         ' wait for next character
270 COLOR @0,7:PRINT "!!! NO DATA !!!";:COLOR @7,0:PRINT
280 GOTO 130                         ' repeat
290 PRINT A$;                        ' print a carraige return
300 C$=C$+A$                         ' add carriage return to message
310 PRINT "Return data=";c$;         ' print message
320 GOTO 130                         ' repeat
```

2) Execution example (inverter number is 00)

```
Baud rate=9600/4800/2400? 9600      -- 9600 baud
Parity=even(E)/odd(O)? E            -- even parity
Send data? (00R0011)                -- test message
Return data= (00R00111770)
Send data? ()                       -- error
!!! NO DATA !!!                     -- no response from inverter
Send data? (R0011)
Return data= (R00111770)
Send data?
```

11. Parameter Data

This chapter explains all of the parameters of the VF-S7 Series. Confirm the communication number and lower and upper limits before communicating.

11.1 Parameter Reference

The reference tables are composed of the following categories.

(1) *Communication number* is the number assigned to each parameter. It indicates which parameter the message relates to.

(2) *Title* is the name of the parameter on the panel. A '-' indicates that the parameter is not available from the panel.

(3) *S7e* and *S7* are the two types of inverters in the VF-S7 Series. A '✓' indicates the parameter is available, while a '-' indicates that the parameter is not available in that inverter.

(4) *Upper Limit* and *Lower Limit* contain upper and lower limits. An '*' indicates the limit depends on the inverter model. See "11.2 Parameters Dependent on Inverter Size." Data is shown in this format: hexadecimal (base 10).

(5) *Units* contains the multiplier and unit. For example, acceleration time shows 0.1s. To write 10s, divide 10s ÷ 0.1s = 100, and send 100 = 0064h.

(6) *Change During Run?* contains a '✓' if that parameter can be changed while the inverter is running. If a '-' is shown, the inverter must be stopped to change it.

■ Basic Parameters (Group no. 00)

Communication Number	Title	Function	S7e	S7	Upper Limit	Lower Limit	Unit	Change During Run?
0000	AU1	Automatic acceleration and deceleration time	✓	✓	1	0	-	✓
0001	AU2	Automatic torque boost	✓	✓	*	0	-	-
0002	AU3	Automatic environment setting*1	✓	✓	2	0	-	-
0003	CMOD	Command mode selection	✓	✓	1	0	-	✓
0004	FMOD	Frequency setting mode selection	✓	✓	2	0	-	✓
0005	FMSL	FM terminal function selection	✓	✓	1	0	-	✓
0006	FM	Connected meter adjustment	✓	✓	FF(255)	0	-	✓
0007	tYP	Standard setting mode selection	✓	✓	*	0	-	-
0008	Fr	Forward/reverse selection (panel)	✓	✓	1	0	-	✓
0009	ACC	Acceleration time #1 (s)	✓	✓	8CA0(3600)	1(0.1)	0.1s	✓
0010	dEC	Deceleration time #1 (s)	✓	✓	8CA0(3600)	1(0.1)	0.1s	✓
0011	FH	Maximum frequency	✓	✓	7D00(320.0)	BB8(30.0)	0.01Hz	-
0012	UL	Upper limit frequency	✓	✓	FH	32(0.5)	0.01Hz	✓
0013	LL	Lower limit frequency	✓	✓	UL	0(0.0)	0.01Hz	✓
0014	vL	Basic frequency	✓	✓	7D00(320.0)	9C4(25.0)	0.01Hz	✓
0015	Pt	V/F pattern	✓	✓	*	0	-	-
0016	vb	Voltage boost	✓	✓	BB8(30.0)	0	0.01%	✓
0017	OLM	OL selection	✓	✓	7	0	-	✓
0018	Sr1	Preset speed 1	✓	✓	UL	LL	0.01Hz	✓
0019	Sr2	Preset speed 2	✓	✓	UL	LL	0.01Hz	✓
0020	Sr3	Preset speed 3	✓	✓	UL	LL	0.01Hz	✓
0021	Sr4	Preset speed 4	✓	✓	UL	LL	0.01Hz	✓
0022	Sr5	Preset speed 5	✓	✓	UL	LL	0.01Hz	✓
0023	Sr6	Preset speed 6	✓	✓	UL	LL	0.01Hz	✓
0024	Sr7	Preset speed 7	✓	✓	UL	LL	0.01Hz	✓

*1 This parameter is considered valid by the panel setting only.

■ Extended Parameters (Input/Output Parameters, Group no. 01)

Communication Number	Title	Function	S7e	S7	Upper Limit	Lower Limit	Unit	Change During Run?
0100	F100	Low speed signal output frequency	✓	✓	FH	0(0.0)	0.01Hz	✓
0101	F101	Speed reach signal output frequency	✓	✓	FH	0(0.0)	0.01Hz	✓
0102	F102	Speed reach detection band	✓	✓	FH	0(0.0)	0.01Hz	✓
0103	F103	ST signal selection	✓	✓	2	0	-	✓
0104	F104	RST signal selection	✓	✓	1	0	-	✓
0110	F110	Always active function selection	✓	✓	25(37)	0	-	✓
0111	F111	Input terminal selection #1	✓	✓	25(37)	0	-	✓
0112	F112	Input terminal selection #2	✓	✓	25(37)	0	-	✓
0113	F113	Input terminal selection #3	✓	✓	25(37)	0	-	✓
0114	F114	Input terminal selection #4	-	✓	25(37)	0	-	✓
0115	F115	Input terminal selection #5	-	✓	25(37)	0	-	✓
0130	F130	Output terminal selection #1	✓	✓	*	0	-	✓
0131	F131	Output terminal selection #2	-	✓	*	0	-	✓

■ Extended Parameters (Frequency Parameters 200-261, Group no. 02)

Communication Number	Title	Function	S7e	S7	Upper Limit	Lower Limit	Unit	Change During Run?
0200	F200	Frequency priority selection	-	✓	1	0	-	✓
0201	F201	VIA reference point #1	✓	✓	64(100)	0	1%	✓
0202	F202	VIA point #1 frequency	✓	✓	7D00(320.0)	0(0.0)	0.01Hz	✓
0203	F203	VIA reference point #2	✓	✓	64(100)	0	1%	✓
0204	F204	VIA point #2 frequency	✓	✓	7D00(320.0)	0(0.0)	0.01Hz	✓
0210	F210	VIB reference point #1	-	✓	64(100)	0	1%	✓
0211	F211	VIB point #1 frequency	-	✓	7D00(320.0)	0(0.0)	0.01Hz	✓
0212	F212	VIB reference point #2	-	✓	64(100)	0	1%	✓
0213	F213	VIB point #2 frequency	-	✓	7D00(320.0)	0(0.0)	0.01Hz	✓
0240	F240	Start-up frequency	✓	✓	3E8(10.0)	32(0.5)	0.01Hz	✓
0241	F241	Run frequency	✓	✓	FH	0(0.0)	0.01Hz	✓
0242	F242	Run frequency hysteresis	✓	✓	FH	0(0.0)	0.01Hz	✓
0250	F250	DC injection starting frequency	✓	✓	FH	0(0.0)	0.01Hz	✓
0251	F251	DC injection current	✓	✓	64(100)	0	1%	✓
0252	F252	DC injection time	✓	✓	C8(20.0)	0(0.0)	0.1s	✓
0260	F260	Jog run frequency	✓	✓	7D0(20.0)	0(0.0)	0.01Hz	✓
0261	F261	Jog stop control	✓	✓	2	0	-	✓

■ Extended Parameters (Frequency Parameters 270-294, Group no. 02 continued)

Communication Number	Title	Function	S7e	S7	Upper Limit	Lower Limit	Unit	Change During Run?
0270	F270	Jump frequency #1	✓	✓	UL	LL	0.01Hz	✓
0271	F271	Jump frequency band #1	✓	✓	BB8(30.0)	0(0.0)	0.01Hz	✓
0272	F272	Jump frequency #2	✓	✓	UL	LL	0.01Hz	✓
0273	F273	Jump frequency band #2	✓	✓	BB8(30.0)	0(0.0)	0.01Hz	✓
0274	F274	Jump frequency #3	✓	✓	UL	LL	0.01Hz	✓
0275	F275	Jump frequency band #3	✓	✓	BB8(30.0)	0(0.0)	0.01Hz	✓
0280	F280	Preset speed 1	✓	✓	UL	LL	0.01Hz	✓
0281	F281	Preset speed 2	✓	✓	UL	LL	0.01Hz	✓
0282	F282	Preset speed 3	✓	✓	UL	LL	0.01Hz	✓
0283	F283	Preset speed 4	✓	✓	UL	LL	0.01Hz	✓
0284	F284	Preset speed 5	✓	✓	UL	LL	0.01Hz	✓
0285	F285	Preset speed 6	✓	✓	UL	LL	0.01Hz	✓
0286	F286	Preset speed 7	✓	✓	UL	LL	0.01Hz	✓
0287	F287	Preset speed 8	-	✓	UL	LL	0.01Hz	✓
0288	F288	Preset speed 9	-	✓	UL	LL	0.01Hz	✓
0289	F289	Preset speed 10	-	✓	UL	LL	0.01Hz	✓
0290	F290	Preset speed 11	-	✓	UL	LL	0.01Hz	✓
0291	F291	Preset speed 12	-	✓	UL	LL	0.01Hz	✓
0292	F292	Preset speed 13	-	✓	UL	LL	0.01Hz	✓
0293	F293	Preset speed 14	-	✓	UL	LL	0.01Hz	✓
0294	F294	Preset speed 15	-	✓	UL	LL	0.01Hz	✓

■ Extended Parameters (Drive Mode Parameters, Group no. 03)

Communication Number	Title	Function	S7e	S7	Upper Limit	Lower Limit	Unit	Change During Run?
0300	F300	PWM carrier frequency (kHz)	✓	✓	*	16(2.2)	0.1kHz	✓
0301	F301	Auto-restart (motor speed search)	✓	✓	3	0	-	✓
0302	F302	Regeneration power ride-through control	✓	✓	1	0	-	✓
0303	F303	Retry selection (number of times)	✓	✓	A(10)	0	1	✓
0304	F304	Regenerative braking selection	-	✓	1	0	-	✓
0305	F305	Overvoltage stall protection	✓	✓	1	0	-	✓
0306	F306	Output voltage adjustment	✓	✓	78(120)	0	1%	✓
0307	F307	Line voltage compensation	✓	✓	1	0	-	-

■ Extended Parameters (Torque Performance Parameters, Group no. 04)

Communication Number	Title	Function	S7e	S7	Upper Limit	Lower Limit	Unit	Change During Run?
0400	F400	Auto-tuning	-	✓	2	0	-	-
0401	F401	Slip frequency gain	-	✓	FF(255)	0	-	✓
0402	F402	Motor constant 1 (R1 gain)	-	✓	FF(255)	0	-	-
0403	F403	Motor constant 2 (R2 gain)	-	✓	FF(255)	0	-	-
0404	F404	Motor constant 3 (M gain)	-	✓	FF(255)	0	-	-
0405	F405	Load inertia	-	✓	3	0	-	✓
0406	F406	Auto torque boost no load current	✓	-	1E(30)	0	1%	✓
0407	F407	Auto torque boost maximum boost	✓	-	1E(30)	0	1%	✓

■ Extended Parameters (Acceleration/Deceleration Time Parameters, Group no. 05)

Communication Number	Title	Function	S7e	S7	Upper Limit	Lower Limit	Unit	Change During Run?
0500	F500	Acceleration time #2	✓	✓	8CA0(3600)	1(0.1)	0.1s	✓
0501	F501	Deceleration time #2	✓	✓	8CA0(3600)	1(0.1)	0.1s	✓
0502	F502	Acceleration & deceleration pattern #1	✓	✓	2	0	-	✓
0503	F503	Acceleration & deceleration pattern #2	✓	✓	2	0	-	✓
0504	F504	Acceleration & deceleration pattern #1 & #2	✓	✓	1	0	-	✓
0505	F505	Acceleration & deceleration pattern #1 & #2 switching frequency	✓	✓	UL	0(0.0)	0.01Hz	✓

■ Extended Parameters (Protection Parameters, Group no. 06)

Communication Number	Title	Function	S7e	S7	Upper Limit	Lower Limit	Unit	Change During Run?
0600	F600	Motor overload protection level	✓	✓	64(100)	*	1%	✓
0601	F601	Stall protection level	✓	✓	C8(200)	*	1%	✓
0602	F602	Fault trip saving	✓	✓	1	0	-	✓
0603	F603	Emergency stop selection	✓	✓	2	0	-	✓
0604	F604	Emergency stop DC injection time	✓	✓	C8(20.0)	0(0.0)	0.1s	✓
0605	F605	Open phase detection parameter	-	✓	2	0	-	✓

■ Extended Parameters (Panel Parameters, Group no. 07)

Communication Number	Title	Function	S7e	S7	Upper Limit	Lower Limit	Unit	Change During Run?
0700	F700	Parameter setting disable selection	✓	✓	2	0	-	✓
0701	F701	Unit selection	✓	✓	3	0	-	✓
0702	F702	Frequency units multiplication factor	✓	✓	4E20(200.0)	64(0.01)	0.01	✓

■ Extended Parameters (Communication Parameters, Group no. 08)

Communication Number	Title	Function	S7e	S7	Upper Limit	Lower Limit	Unit	Change During Run?
0800	F800	Communication speed	-	✓	3	0	-	✓
0801	F801	Parity	✓	✓	2	0	-	✓
0802	F802	Inverter number	✓	✓	1F(31)*2	0	-	✓
0803	F803	Communication error trip time	✓	✓	64(100)	0	-	✓

*2 3F(63) for versions less than V104.

■ Command Parameters (Group no. FA)

Communication Number	Title	Function	S7e	S7	Upper Limit	Lower Limit	Unit	Change During Run?
FA00	FA00	Communication command*3	✓	✓	FFFF(65535)	0	-	✓
FA01	FA01	Communication frequency command*3	✓	✓	FH	0(0.0)	0.01Hz	✓
FA02	FA02	Panel frequency command	✓	✓	FH	0(0.0)	0.01Hz	✓

*3 This group is RAM only. Do not use the 'W' command to write to this group. Refer to "7.1 Operation by Communication".

■ Frequency Monitoring Parameters (Group no. FD) This group is read only.

Communication Number	Title	Function	S7e	S7	Unit
FD00	FD00	Current output frequency	✓	✓	0.01Hz

■ State Monitoring Parameters (Group no. FE) This group is read only.

Commu-nication Number	Title	Function	S7e	S7	Unit
FE00	FE00	Output Frequency (saves trip frequency)	✓	✓	0.01Hz
FE01	FE01	Status(saves trip status)	✓	✓	-
FE02	FE02	Current frequency command	✓	✓	0.01Hz
FE03	FE03	Output current display	✓	✓	0.01%
FE04	FE04	Bus voltage	✓	✓	0.01%
FE05	FE05	Output voltage	✓	✓	0.01%
FE06	FE06	Input terminal data	✓	✓	-
FE07	FE07	Output terminal data	✓	✓	-
FE08	FE08	CPU version	✓	✓	-
FE09	FE09	EEPROM version	✓	✓	-
FE10	FE10	Past trip 1	✓	✓	-
FE11	FE11	Past trip 2	✓	✓	-
FE12	FE12	Past trip 3	✓	✓	-
FE13	FE13	Past trip 4	✓	✓	-
FE14	FE14	Cumulative run time	✓	✓	1H

11.2 Parameters Dependent on Inverter Size

■ Parameters Dependent on Drive Size (Upper and Lower Limits)

Data is hexadecimal (base 10 in parentheses)

Communication Number	0001	0007	0015	0130	0131	0300	0600	0601
Title	AU2	tYP	Pt	F130	F131	F300	F600	F601
Limit	Upper	Upper	Upper	Upper	Upper	Upper	Lower	Lower
VFS7-2004P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7-2007P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7-2015P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7-2022P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7-2037P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7-2055P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7-2075P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7S-2004P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7S-2007P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7S-2015P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7S-2022P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7-2110P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7-2150P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7-2185P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7-2220P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7-2300P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7-4110P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7-4150P	3	6	3*4	9	9	78(120)	A(10)	A(10)
VFS7e	1	5	2	9	9	78(120)	1E(30)	1E(30)

*4 The limit of this parameter is 4 for versions less than V105.

11.3 Trip Codes

Shaded areas don't correspond to trips.

Display	Data	Trip Type
nErr	0000	No trip
OC1	0001	Overcurrent during acceleration
OC2	0002	Overcurrent during deceleration
OC3	0003	Overcurrent during constant-speed run
OCL	0004	Load-end short circuit trip during start-up
OCA	0005	Phase short circuit
OCA2	0006	reserved
OCA3	0007	reserved
EPH1	0008	reserved
EPH0	0009	Loss of output phase
OP1	000A	Overvoltage during acceleration
OP2	000B	Overvoltage during deceleration
OP3	000C	Overvoltage during constant-speed run
OL1	000D	Inverter overload trip
OL2	000E	Motor overload trip
OLr	000F	DBR overload
OH	0010	Overheat trip
E	0011	Emergency stop
EEP1	0012	EEPROM fault (write error)
EEP2	0013	reserved
Err1	0014	reserved
Err2	0015	RAM fault
Err3	0016	ROM fault
Err4	0017	CPU fault
Err5	0018	Communication interruption error
Err6	0019	reserved
Err7	001A	reserved
Err8	001B	reserved
Err9	001C	reserved
UC	001D	reserved
UP1	001E	reserved
UP2	001F	reserved
Ot	0020	reserved
EF1	0021	reserved
EF2	0022	reserved
EFU	0023	reserved
OCr	0024	reserved
OC1P	0025	reserved
OC2P	0026	reserved
OC3P	0027	reserved
Etn	0028	Auto-tuning error
EtYP	0029	Inverter typeform error

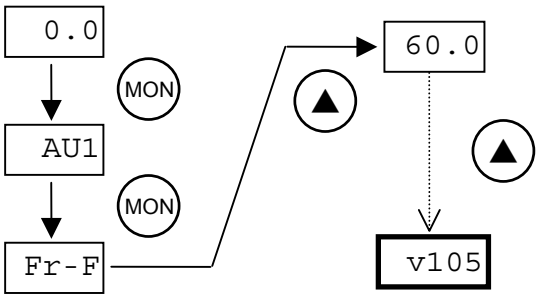
Appendix A: Checking the CPU Version

Some functions depend on the CPU version. It is recommended that the CPU version be checked before using communications.

■ How to Check the CPU Version

(1) Checking with the panel

Example: The inverter has just been turned on. It is version 105.



(2) Checking by communication (105 = 69h)

Computer → S7 S7 → Computer

(RFE08) (RFE080069) CPU Version V105

Appendix B: ASCII Code

■ ASCII

ASCII Value	00	10	20	30	40	50	60	70
0	NUL	TC7(DLE)	(SP)	0	@	P	`	p
1	TC1(SOH)	DC1	!	1	A	Q	a	q
2	TC2(STX)	DC2	"	2	B	R	b	r
3	TC3(ETX)	DC3	#	3	C	S	c	s
4	TC4(EOT)	DC4	$	4	D	T	d	t
5	TC5(ENQ)	TC8(NAK)	%	5	E	U	e	u
6	TC6(ACK)	TC9(SYN)	&	6	F	V	f	v
7	BEL	TC10(ETB)	'	7	G	W	g	w
8	FE_0(BS)	CAN	(	8	H	X	h	x
9	FE1(HT)	EM	)	9	I	Y	i	y
A	FE_0(LF)	SUB	*	:	J	Z	j	z
B	FE_R(VT)	ESC	+	;	K	[	k	{
C	FE_S(FF)	IS4(FS)	,	<	L	¥	l	|
D	FE_T(CR)	IS3(GS)	-	=	M	]	m	}
E	SO	IS2(RS)	.	>	N	^	n	~
F	SI	IS1(US)	/	?	O	_	o	DEL

CR:Carriage return

For example, code "41" = character "A".

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