

USER MANUAL INTERBUS OPTION OPC-E11S-IBS & OPCE11SIBSU

for Fuji FVR-E11S & GE Fuji AF-300E11

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Preface

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Related documents

Document	Author
InterBus profile for drive engineering, DRIVECOM. May 26 th 1995.	DRIVECOM Nutzergruppe e.V.
InterBus profile for sensor/actuator, profile 12. March 7 th 1995.	InterBus-S Club e.V.
FVR-E11S INSTRUCTION MANUAL, included with the inverter	Fuji Electric

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1. Applicable inverters

Item	Description		
Inverter type	FVR-E11S (AF-300E11)		
Compatible Inverter Model number (GE Fuji version)	The last two digits of the model number should be A1 or later Example: 6KE1123X1A1		
ROM version number		EN, Japanese standard, JE, and GE Fuji version	0024 ~ 0999 (It is impossible to use version prior to 0024 inverter.)

NOTE:

This product can only be used for Inverters with ROM version numbers shown above.

Check the ROM number of your Inverter as follows using the inverter keypad.

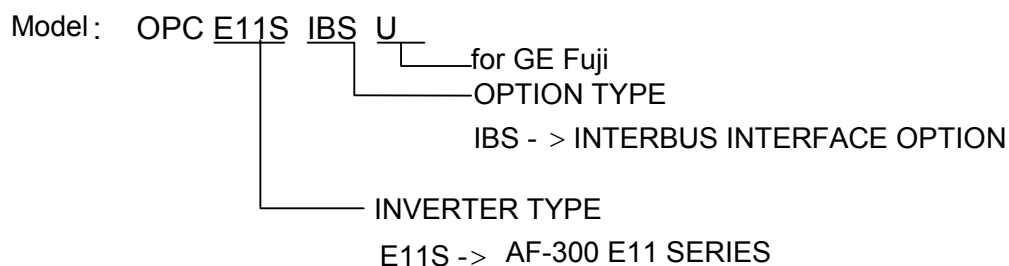
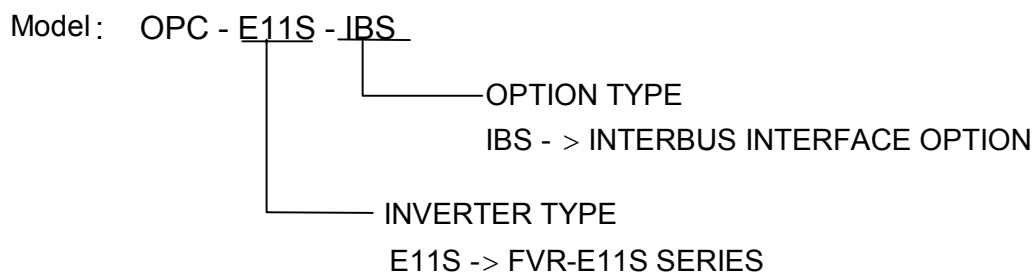
- a. Check the Digital display.
- b. Press the [PRG] key of the Inverter once.
- c. Select the "H44" with ^, v key and press the [FUNC/DATA] key.

The maintenance and inspection items are similar to the Inverter unit, for detail refer to the Inverter Instruction Manual.

2. Receiving Inspection

Confirm the following items upon a receipt.

- 1) The model number matches your purchase order?
Check the model number printed on the circuit board.



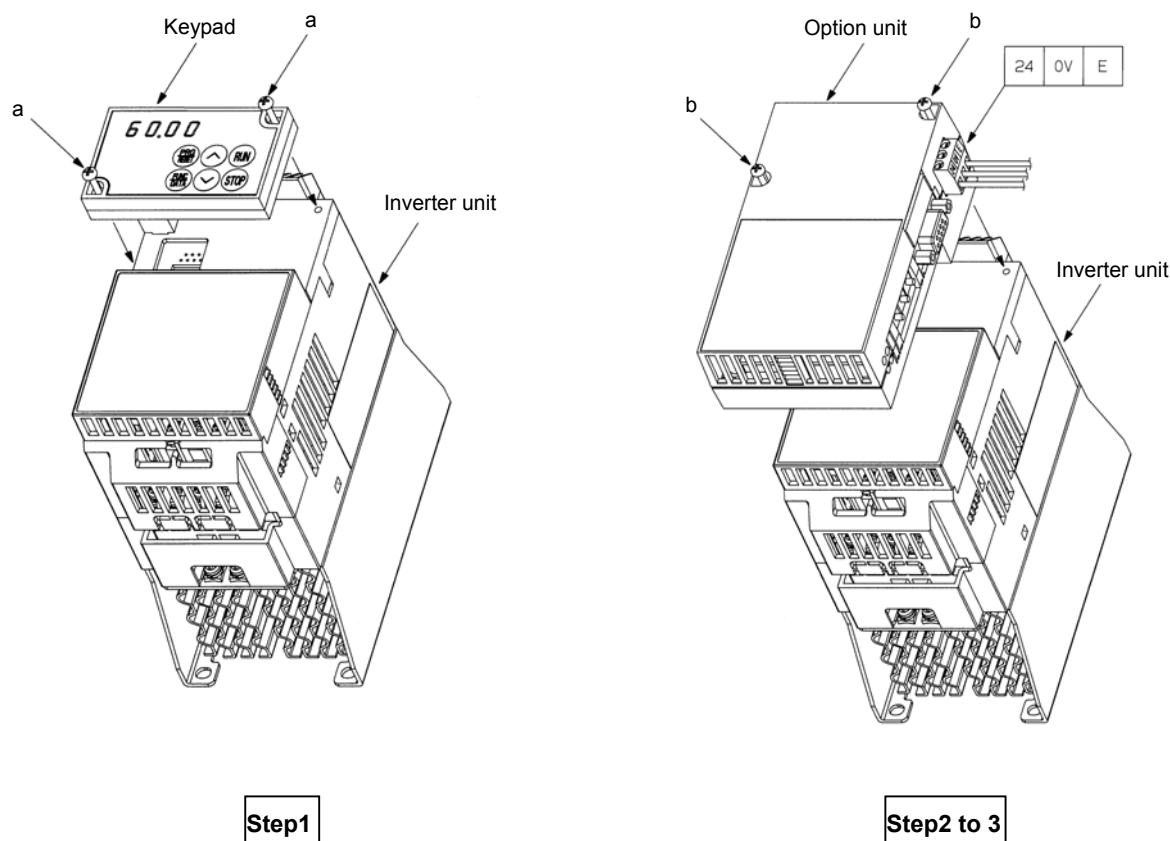
Hereinafter, OPC-E11S-IBS is used representing OPC-E11S-IBS and OPCE11SIBU.

- 2) Inspection for damage during transportation. Report damage to transportation carrier.

3. Installation

3.1 Installation Method

Please follow the installation procedure described as follows. Please install or detach the option after turning off the input power supply of the inverter and confirming the charge lamp (CRG) is gone out.



Step1

Loosen the keypad panel mounting screws (M3) at **a** and detach the keypad panel.

If the keypad panel is handled abruptly, the connector will be broken.

Step2

Insert the option unit in the inverter unit and secure the option unit with two screws (M3) at **b**.

Step3

Connect the external power supply cables of $+24V \pm 10\%$ and the ground cable to terminal of the option unit.

“E” means the Earth.

3.2 Installation Checklist

After installation and wiring, check the following items.

- [1] The wiring is correct.
- [2] No loose wires or screws remain inside the Inverter.
- [3] The screws and terminals are all tight.
- [4] There are no loose threads of wires at terminals that may contact other terminals.
- [5] Do not change the JP4 on the conversion board!
- [6] OPC-E11S-IBS cannot be used together with the Inverter keypad. Therefore, please set the following functions with the Inverter keypad before using OPC-E11S-IBS.

Inverter parameters such as H30, E11, E30, o27, o28, o30 to o39, are set correctly. (H30: Link Active/Inactive, E11: effect to quick stop, E30: effect to Bit 10 of Status word, o27 and o28: for RAS, o30-o33: Process Data In Words, o34-o37: Process Data Out Words, o38: Amount of PCP Words, o39: Amount of Process Data Words)
- [7] Please take electrostatic measures at handling because this Inverter is sensitive to the electrostatic discharge.
- [8] Please connect an external power supply of $+24V \pm 10\%$ to terminal (24,0V) of the OPC-E11S-IBS.
“E” means the Earth.

4. InterBus option card OPC-E11S-IBS

The OPC-E11S-IBS option card gives an instant connection between a Fuji E11S drives (GE Fuji AF-300E11) and InterBus. The option board will perform as an integrated part of the E11S drive and gives the user access to all relevant parameters, as well as control-/status signals needed to control the drive

The OPC-E11S-IBS option card communicates according to the InterBus Protocol Standard DIN 19245 part 2. This means that it can communicate with all masters that comply with this standard, but it does not necessarily mean that all services available with InterBus are supported. The drive engineering profile, also known as DRIVECOM, is a subset of InterBus which only demands support for the services relevant to speed control applications.

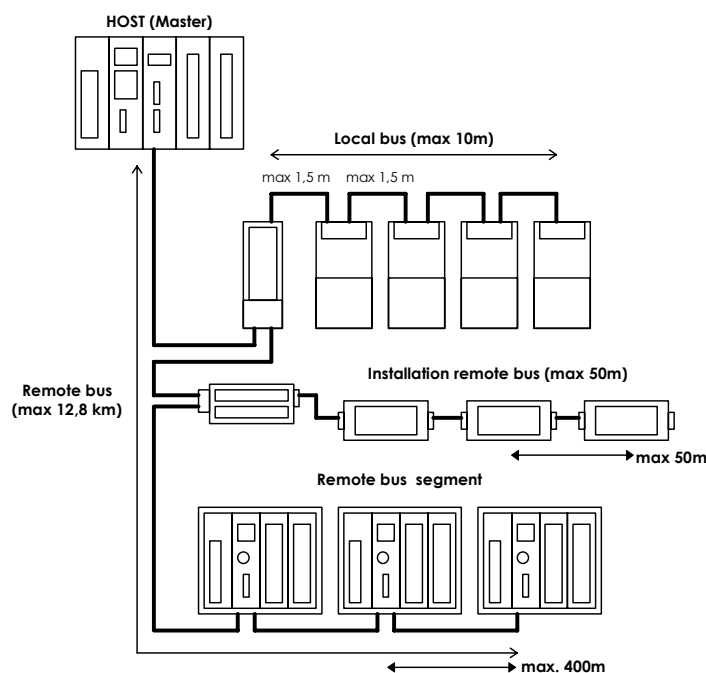
In a control system the OPC-E11S-IBS will act as a remote bus slave that can be read from and written to, by a InterBus master. It will not initiate communication to other nodes, it will only respond to incoming telegrams.

5. Introduction to InterBus

The InterBus is normally used for industrial automation, such as control of valves, sensors and I/O units. InterBus appears in many different type of industries such as: Automobile Industry, Food Industry, Building Automation, Plant Construction, Paper Converting, Wood Processing and Process Engineering. InterBus has a user organisation called InterBus Club. The organisation assists members on a lot of matters concerning InterBus. For information contact InterBus-Club on <http://www.interbusclub.com>

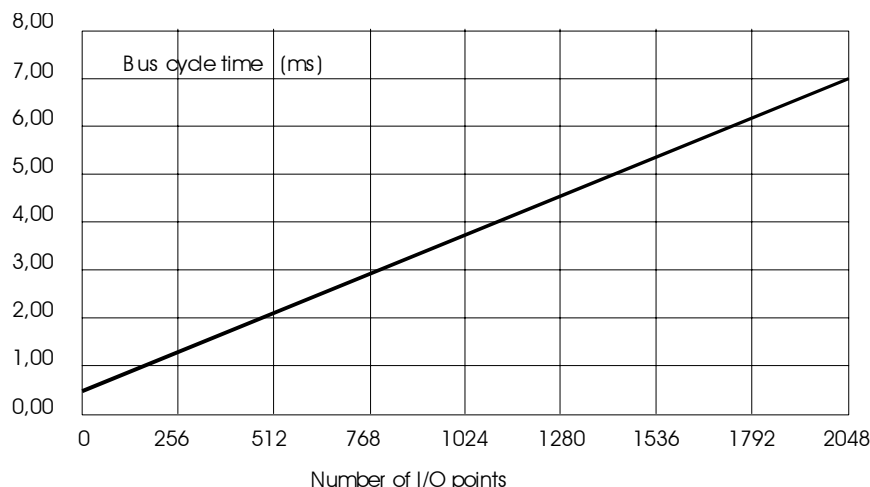
5.1 Network Overview

The media for the fieldbus is a shielded copper cable consisting of three twisted pairs. Two of these pairs are used for the Bus connection and in the last pair there is only one cable used. This cable is used for the ground connection of the Bus. The baudrate for the bus is 500 kbit/s and the total amount of data for InterBus is 4096 I/O points.



5.2 Technical Features for InterBus

The figure below describes the bus cycle time of an InterBus system.



Summary Technical Features INTERBUS	
Transmission Technique	<ul style="list-style-type: none"> • RS 485 twisted pair cable (2 pair + GND) • Optical interface • Transmission rate 500 kbit/s • Total amount of data 4096 I/O points
Three sub buses	<ul style="list-style-type: none"> • Local bus (max. 8 nodes per local bus) • Installation remote bus (max. 256 nodes) • Remote bus (max. 256 nodes) master dependent
Bus length	<ul style="list-style-type: none"> • Remote bus up to 12,8 km • Max. length of remote bus segment: 400m
Max. bus cable length between	<ul style="list-style-type: none"> • Host and first remote bus module 400m • Two remote bus modules 400m • Host and last remote bus module 12,8 km
Medium Access	<ul style="list-style-type: none"> • Single-Master system supported
Two different data types:	<ul style="list-style-type: none"> • Time-deterministic • Shift register type • Total-frame protocol • Cycle-time ~ number of I/O
1. Process data	
2. PCP-object	<ul style="list-style-type: none"> • Possible access protection of different levels PCP-object area • Possible read and write protection

6. OPC-E11S-IBS Overview

This section contains necessary information needed to start-up and configure the OPC-E11S-IBS.

6.1 Physical interface

Isolation: The bus is galvanically separated from the other electronics with an on board DC/DC converter. Bus signals are isolated via opto couplers.

InterBus communication ASICs: SUP13 and SRE1 from Phoenix Contact.

Bus connection: The OPC-E11S-IBS connects to the InterBus network with a 9-pin male DSUB connector for the BUS-IN interface and a 9-pin female connector for the BUS-OUT interface.

Also observe that the BUS-OUT connector should not be used if the OPC-E11S-IBS is the last module on the network.

For the pin layout, refer to the table below.

BUS-OUT

D-SUB	Name
1	DO1
6	/DO1
2	DI1
7	/DI1
3	GND
Housing	PE

BUS-IN

D-SUB	Name
1	DO2
6	/DO2
2	DI2
7	/DI2
3,5	GND
9	RBST
Housing	PE

PLEASE NOTE: Always connect RBST to GND if it is not the last module on the bus. If the RBST is not connected to GND on the output connector, the OPC-E11S-IBS module will terminate the outgoing bus.

Fibre optical conversion:

The standard OPTOSUB cannot be used with this module, an OPTOSUB-PLUS will have to be used.

However, if the need for fibre optics arises, there is also a possibility of ordering the OPC-E11S-IBS with a fibre optic interface directly on the board.

6.2 Configuration

With the OPC-E11S-IBS module there is also the possibility of setting up different bus configurations. How to configure the network from the keypad of the drive, prior to actually connecting the OPC-E11S-IBS module, is described in the following sections.

6.2.1 Process data words

The parameter o39 enables the possibility to change the amount of words used by the OPC-E11S-IBS module for transfer of process data on the InterBus network.

Please observe that in order to be able to use control/status words and speed setpoint/actual words the value of o39 has to be set to 2.

o39 data	Amount of process data
0	0 words, only PCP available
1	1 word
2	2 words
3	3 words
4-255	4 words

The amount of process data can also be changed from the InterBus network via the index 5EFF. No matter how the amount of data is changed, a power-up of the module is needed for the new settings to take effect.

6.2.2 PCP-Words

The amount of PCP-words used on the InterBus network for the transfer of parameter data, can be altered by changing the value of the parameter o38.

o38 data	Amount of PCP-words
0, 1, 3, 5-255	1 word of PCP
2	2 words of PCP (Generation 4 master needed)
4	4 words of PCP (Generation 4 master needed)

The InterBus master can also set the amount of PCP-words, by using index 5F00. No matter how the amount of PCP-words is altered, a power-up of the module is needed to actually change the values on the InterBus network. I.e. the set data is the data being used after the next power up of the module.

It is also important to know that the OPC-E11S-IBS requires 128 bytes in the PDU-buffers, and that the master also has to be set up for that amount while communicating with the module.

PMS-services supported by the module are:

- Initiate
- Abort
- Reject
- Identify
- Get-OD (Short & Long)
- Read

- Status

- Write

6.2.3 Process Data Words

It is also possible to use different amount of process data words with the OPC-E11S-IBS module. The mapping of the process data can be done via the parameters o30-o37 according to table 3:

Parameter number	Mapped to	Possible settings
o30	Process Data In Word 0	0 = DRIVECOM Status Word 1-255 Corresponding vendor specific parameter
o31	Process Data In Word 1	0 = DRIVECOM Speed Actual 1-255 Corresponding vendor specific parameter
o32	Process Data In Word 2	0 = Not used 1-255 Corresponding vendor specific parameter
o33	Process Data In Word 3	0 = Not used 1-255 Corresponding vendor specific parameter
o34	Process Data Out Word 0	0 = DRIVECOM Control Word 1-255 Corresponding vendor specific parameter
o35	Process Data Out Word 1	0 = DRIVECOM Speed Setpoint 1-255 Corresponding vendor specific parameter
o36	Process Data Out Word 2	0 = Not used 1-255 Corresponding vendor specific parameter
o37	Process Data Out Word 3	0 = Not used 1-255 Corresponding vendor specific parameter

The process data can also be set up by the Process Data Descriptions at index 6000 and 6001. For a list of the vendor specific parameters, please consult appendix.

Example: When assigning vendor specific parameters to o30-o37, please set the ** of the desired PCP-index 5F** (i.e. the low byte) in decimal number via the keypad or through communication interface by referring to the section 8.5 Parameter Data Format.

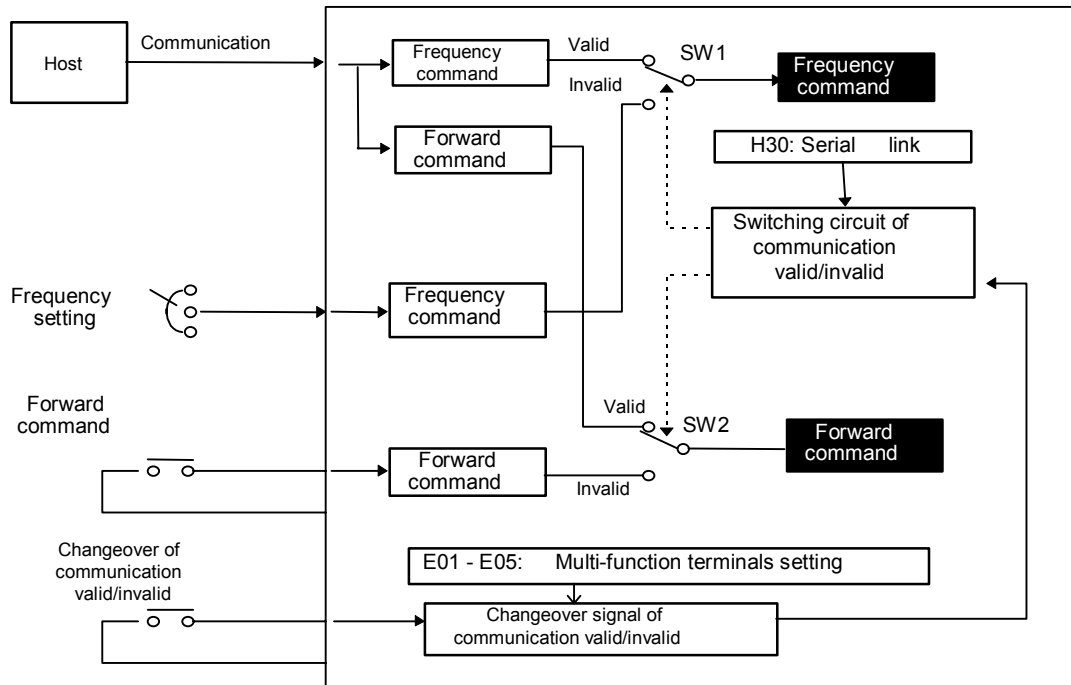
6.2.4 Recommended Start-Up Settings

In order to set the module up as a standard DRIVECOM profile 21 module during first start-up, please set the following values:

Parameter number	Set Value	Description
o39	2	Two process data words
o38	1	One PCP word
o30	0	Use DRIVECOM Status Word
o31	0	Use DRIVECOM Speed Actual
o34	0	Use DRIVECOM Control Word
o35	0	Use DRIVECOM Speed Setpoint

6.2.5 Changeover of communications

In order to enable the inverter control through the communication (by command data and operation data), the inverter function code "H30: Serial link (Function selection)" should be configured for a value of 1-3. The reading and writing of function data and functions are possible at any time regardless of the setting of Function code H30.



6.2.5.1 Changeover method for communication control

The changeover of the communication control can be performed by the multi-function command terminals (terminals X1-X5) on the inverter. However, it is necessary to configure the inverter's multi-function command input terminals (E01 - E05: X1-X5 terminals function) to the link operation selection (Data 18). If the multi-function command terminals have not been set to the link operation selection, the communication becomes valid automatically.

Input terminals	State
OFF	Communication invalid mode
ON	Communication valid mode (H30 setting)

Note:

- 1) Since all memories are initialized at switching power supply on, the command data and operation data must be write again from the upstream units.
- 2) Even when the communication is invalid, the writing of command data and operation data is valid, but it is not reflected by SW1 • SW2. The changeover without shock is possible by the way the data is set prior to the transition.

6.2.5.2 Link function configuration (operation selection)

The setting (valid/invalid) for command data and operation data during the communication valid period is possible individually by the setting of "H30: Serial link (Function selection)". (By making the communication always valid without setting at the multi-function terminals, changeover for the H30 data valid/invalid can change over the communication valid/invalid, similar to the changeover with multi-function command terminals.)

Link function H30	During communication is valid		During communication is invalid
	SW1 (Command data)	SW2 (Operation data)	SW1, SW2
0	Invalid	Invalid	Invalid
1	Valid	Invalid	
2	Invalid	Valid	
3	Valid	Valid	

6.3 Action at communication error

In case of occurring transmission errors (communication cutoff with the master), the following actions can be selected.

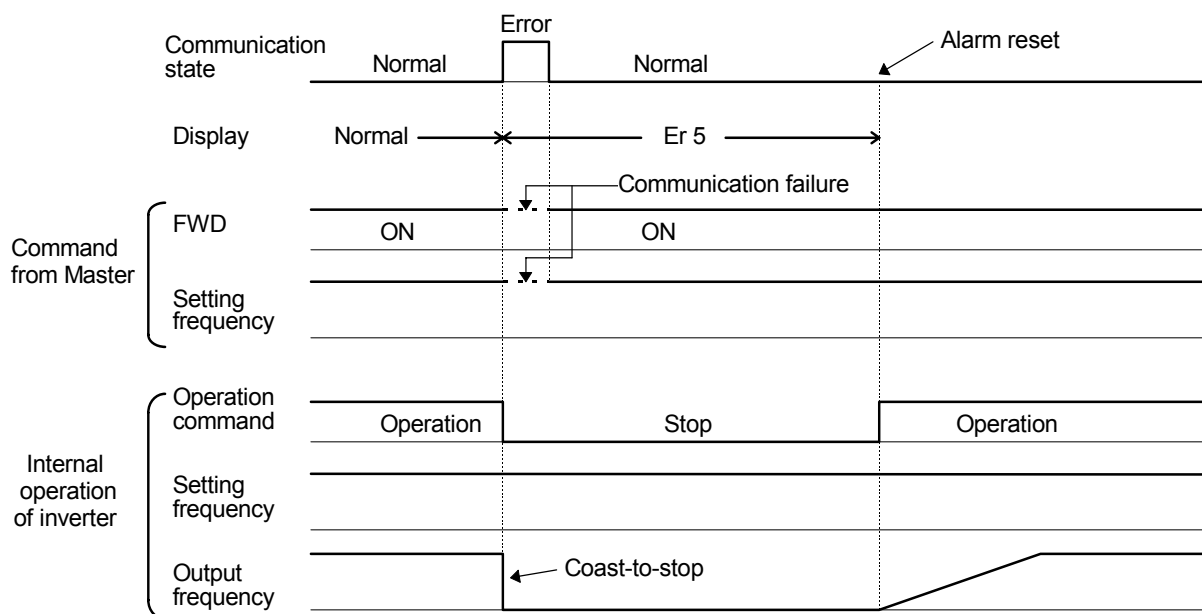
- 1) Select action when error is detected. (o27)

o27	Action at error detection		Remarks
0	Immediate forced stop	Er5	
1	Continue operation within o28 time and stop	Er5	Continue operation using the command just before the error within o28 time, but when restoring, operate following to the designation of communication.
2	Continue operation according to the last command received until restoration of the communication. If the communication is not restored before the o28 time expires, then immediate forced stop.	Er5	
3	Continue operation till restoration of the communication, and after the restoration, follow to designation of communication.	Automatic restoration after restoring communication	

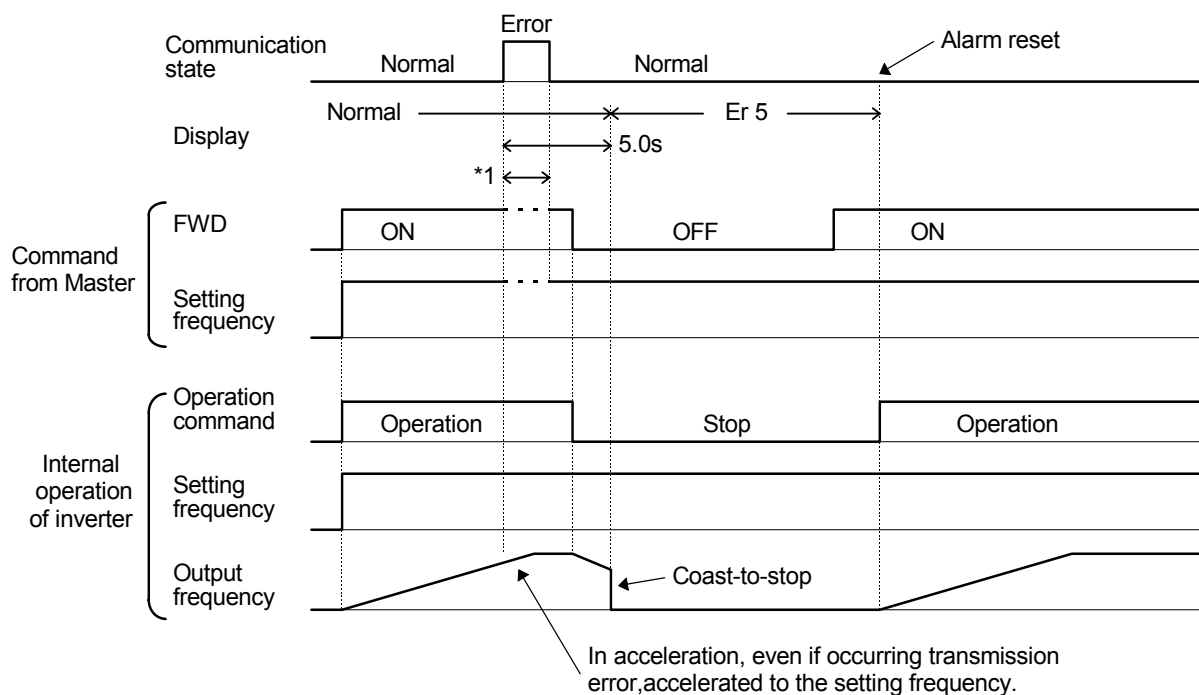
- 2) Setting time of timer at error (o28)

0.0 – 60.0s

In a case of o27=0 (Mode of immediate forced stop at communication error detection)

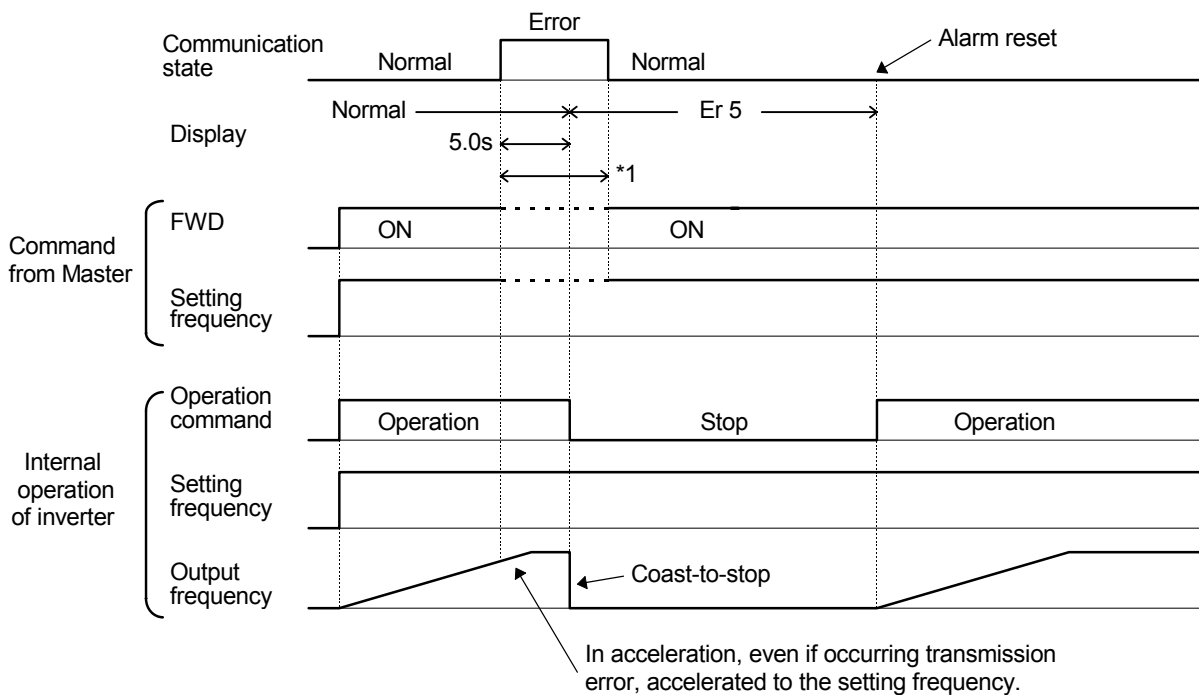


In a case of o27=1, o28=5.0 s (Mode of immediate forced stop after 5 s at occurring communication error)

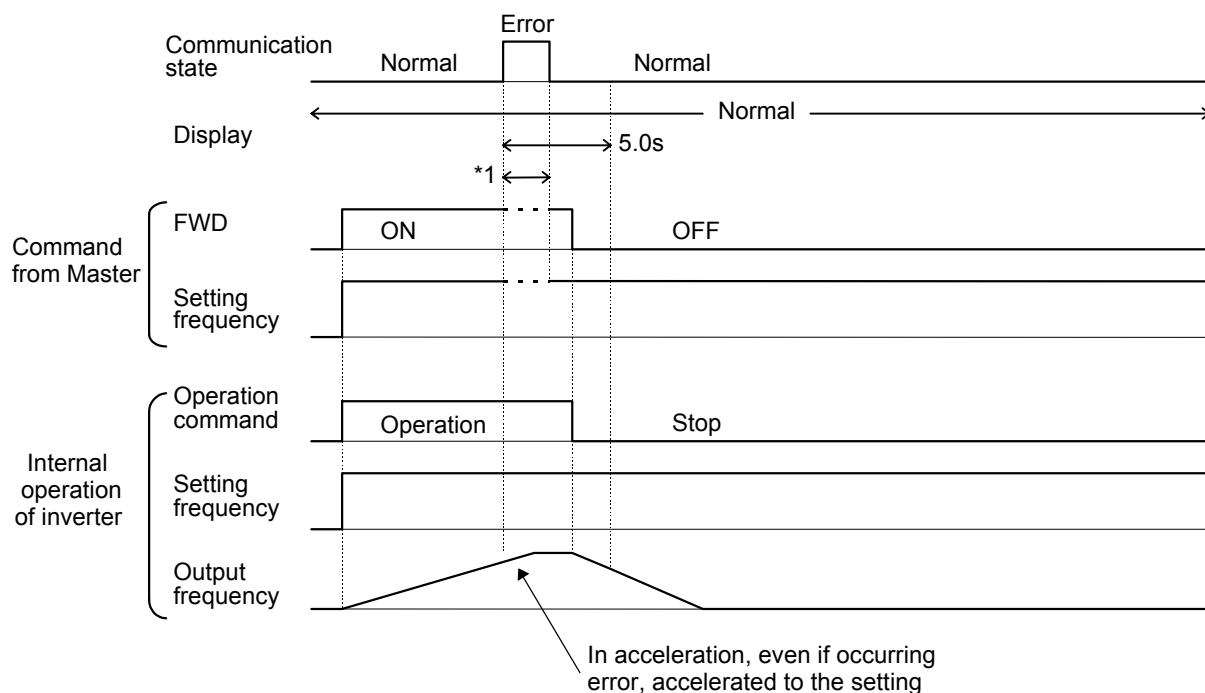


*1) In a period until restoring the communication, the last commands (command data and operation data) received before the error are kept.

In a case of o27=2, o28=5.0 s (The communication is not restored for 5.0 sec after error detection, and inverter trips Er5.)

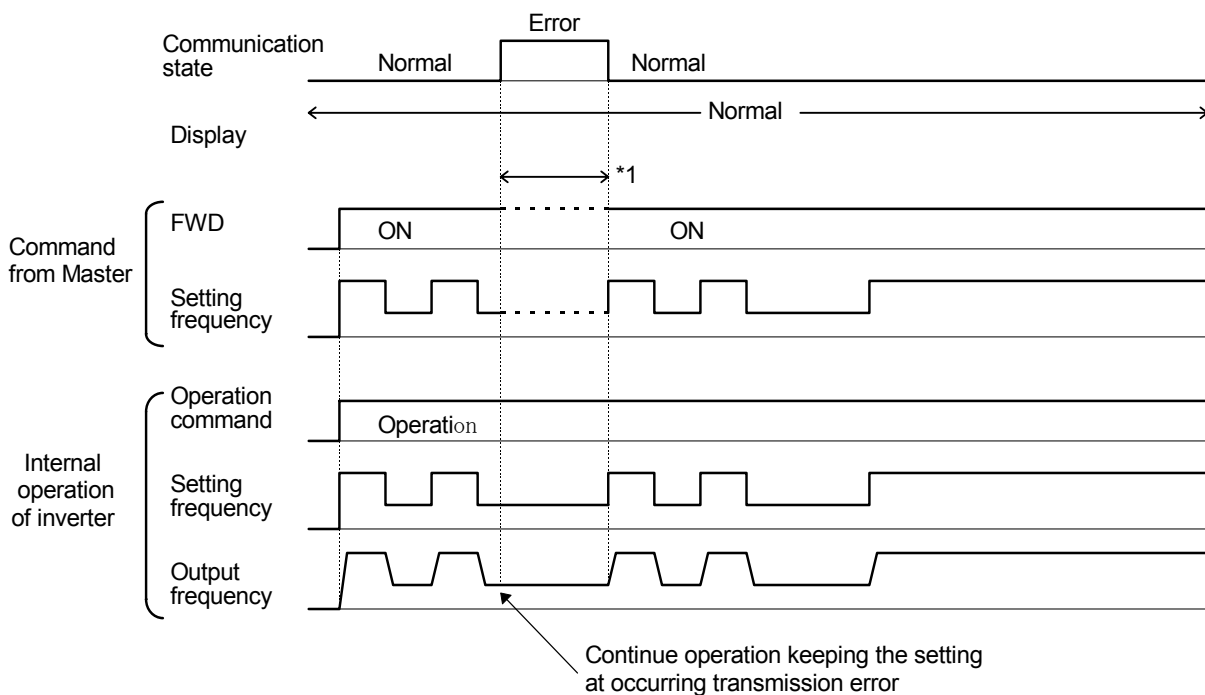


In a case of o27=2, o28=5.0 s (A communication error occurs, but restored within 5 s.)



*1) In a period until restoring the communication, the commands (command data and operation data) just before the error are kept.

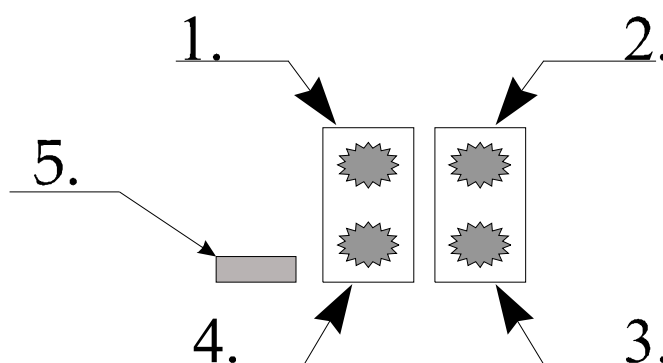
In a case of o27=3 (When a communication error occurs, the operation continues)



6.4 Indication LED's

The OPC-E11S-IBS module has five LED's mounted on the circuit board. The functionality of these LED's are described below:

1. **RBDA**
2. **TR**
3. **CC**
4. **BA**
5. **UL**



Name	Color	Function
RBDA	Red	<u>R</u> emote <u>B</u> us <u>D</u> is <u>A</u> ble Active RED when outgoing remote bus is switched off
TR	Green	<u>T</u> ransmit/ <u>R</u> eceive Active GREEN when PCP communication is carried out over the InterBus network) 0.6 s hold time to be visual (Retriggerable).
CC	Green	<u>C</u> able <u>C</u> heck Active GREEN if the cable connection is good and the InterBus Master is not in RESET
BA	Green	<u>B</u> us <u>A</u> ctive Active GREEN. (Monitoring Layer 2).
UL	Green	Voltage OK at bus Interface Active GREEN if the voltage is OK.

7. Operating the OPC-E11S-IBS

This section describes how to control the drive by using the OPC-E11S-IBS interface.

7.1 Communication interface

There are two different ways of communicating with the OPC-E11S-IBS via the InterBus network.

7.1.1 PCP protocol

The interface structure of the OPC-E11S-IBS is based on an object-oriented model. All communication objects can be accessed via the Peripherals Communication Protocol channel, from now on called the PCP-channel. The PCP-services allow acknowledged access to the communication objects, i.e. the intended access is confirmed by the drive.

7.1.2 Process data

There is also a possibility to map certain communication objects to the process data channel. Through the process data channel, data is transferred without acknowledgement. The time it takes to transfer data through the process data channel is significantly lower than the time required by the PCP-channel. Therefore crucial communication objects such as control/status word and the speed setpoint/actual values are often mapped to the process data channel.

7.2 Communication objects

In this section the communication objects are specified and an explanation to the DRIVECOM and Sensor/Actuator profile specific communication objects are made. If more detailed descriptions of the DRIVECOM and Sensor/Actuator specific communication objects are necessary, please refer to the corresponding specification.

PCP-index	Name	Access Rights	Description
5EFF	PD Words	R/W	7.2.1
5F00	PCP Words	R/W	7.2.2
5F01-5FFF	Fuji Vendor Specific	R/W or RO	Chapter 8
6000	PI Desc	R/W	7.2.3
6001	PO Desc	R/W	7.2.4
6002	PO Enable	R/W	7.2.5
603F	Error Code	RO	7.2.6
6040	Control Word	R/W	7.2.7
6041	Status Word	RO	7.2.7
6042	Speed Set	R/W	7.2.8
6043	Speed Cmnd	RO	7.2.9
6044	Speed Actual	RO	7.2.10
6046	Speed Min Max	R/W	7.2.11
6048	Speed Acc	R/W	7.2.12
6049	Speed Dec	R/W	7.2.13
604A	Speed Quick	R/W	7.2.14
604D	Pole Number	R/W	7.2.15
605A	Quick Opt	R/W	7.2.16
605B	Shutdown Opt	R/W	7.2.17
605C	Disable Opt	R/W	7.2.18

7.2.1 Process Data Words (5EFF)

With this parameter it is possible to set up the amount of words that will be used for the transfer of process data on the InterBus network. Please observe that the value indicates the amount of process data words that will be used after the next power-up of the module. This parameter is directly mapped to the parameter o39 and can also be set via the keypad, please refer to section 6.2.1 for further details. Please observe that this parameter is not included in the DRIVECOM specification and as such should be considered vendor specific.

PD words	Process data words
0	0 words, only PCP available
1	1 word
2	2 words
3	3 words
4	4 words

7.2.2 PCP Words (5F00)

This parameter describes how many words will be used by the PCP-protocol on the InterBus network. Please observe that the value indicates the amount of PCP-words that will be used after the next power-up of the module. This parameter is directly mapped to the parameter o38, and can also be set via the keypad, please refer to section 6.2.2 for further details. Please observe that this parameter is not included in the DRIVECOM specification and as such should be considered vendor specific.

PCP-words	Amount of PCP-words
1	1 word of PCP
2	2 words of PCP (Generation 4 master needed)
4	4 words of PCP (Generation 4 master needed)

7.2.3 Process Input Data Description (6000)

This parameter describes which parameters are transmitted in the process input data channel. The process data direction is always given from the InterBus masters point of view. I.e. process input data is the data transferred from the OPC-E11S-IBS to the InterBus master.

When it comes to the OPC-E11S-IBS module, it is only possible to map whole words on the InterBus network. This in turn means that it is only allowed to map objects to even bytes.

Since the indexes allowed to be mapped are simple-variables, the subindexes should be set to 0.

The Process Input Data Description is directly mapped to the parameters o30-o33, and can also be set via the keypad.

On the InterBus network a record object represents the process data descriptions as follows:

Subindex	Meaning	Example
1	Bytes of process data available	4
2	Index to use for byte 0	6041
3	Subindex to use for byte 0	0
4	Index to use for byte 1	0
5	Subindex to use for byte 1	0
6	Index to use for byte 2	6044
7	Subindex to use for byte 2	0
8	Index to use for byte 3	0
9	Subindex to use for byte 3	0
.	.	-
.	.	-
.	Index to use for byte n	-
.	Subindex to use for byte n	-

The example describes the case when two words of process data are used. Mapped to the first word is the object 6041, the DRIVECOM Status Word. Mapped to the second word is the object 6044, the DRIVECOM Speed Actual.

The different mappings possible with the OPC-E11S-IBS can be found in the following table:

Word No	Indexes possible to map
0	Readable indexes between 5F01 and 5FFF and index 6041
1	Readable indexes between 5F01 and 5FFF and index 6044
2	Readable indexes between 5F01 and 5FFF
3	Readable indexes between 5F01 and 5FFF

7.2.4 Process Output Data Description (6001)

This parameter describes which parameters are transmitted in the process output data channel. The process data direction is always given from the InterBus masters point of view. I.e. process output data is the data transferred from the InterBus master to the OPC-E11S-IBS.

When it comes to the OPC-E11S-IBS module, it is only possible to map whole words on the InterBus network. This in turn means that it is only allowed to map objects to even bytes.

Since the indexes allowed to be mapped are simple-variables, the subindexes should be set to 0.

Writing to this parameter will cause the process output data to be disabled. Please see 7.2.5 for further details.

The Process Input Data Description is directly mapped to the parameters o34-o37, and can also be set via the keypad.

On the InterBus network a record object represents the process data descriptions as follows:

Subindex	Meaning	Example
1	Bytes of process data available	4
2	Index to use for byte 0	6040
3	Subindex to use for byte 0	0
4	Index to use for byte 1	0
5	Subindex to use for byte 1	0
6	Index to use for byte 2	6042
7	Subindex to use for byte 2	0
8	Index to use for byte 3	0
9	Subindex to use for byte 3	0
.	.	-
.	.	-
.	Index to use for byte n	-
.	Subindex to use for byte n	-

The example describes the case when two words of process data are used. Mapped to the first word is the object 6040, the DRIVECOM Control Word. Mapped to the second word is the object 6042, the DRIVECOM Speed Setpoint.

The different mappings possible with the OPC-E11S-IBS can be found in the following table:

Word No	Indexes possible to map
0	Writable indexes between 5F01 and 5FFF and index 6040
1	Writable indexes between 5F01 and 5FFF and index 6042
2	Writable indexes between 5F01 and 5FFF
3	Writable indexes between 5F01 and 5FFF

7.2.5 Process Output Data Enable (6002)

The process output data enable object decides whether or not the process output data shall be used by the OPC-E11S-IBS. This parameter is used for data consistency reasons when changes are made to the process output data descriptions.

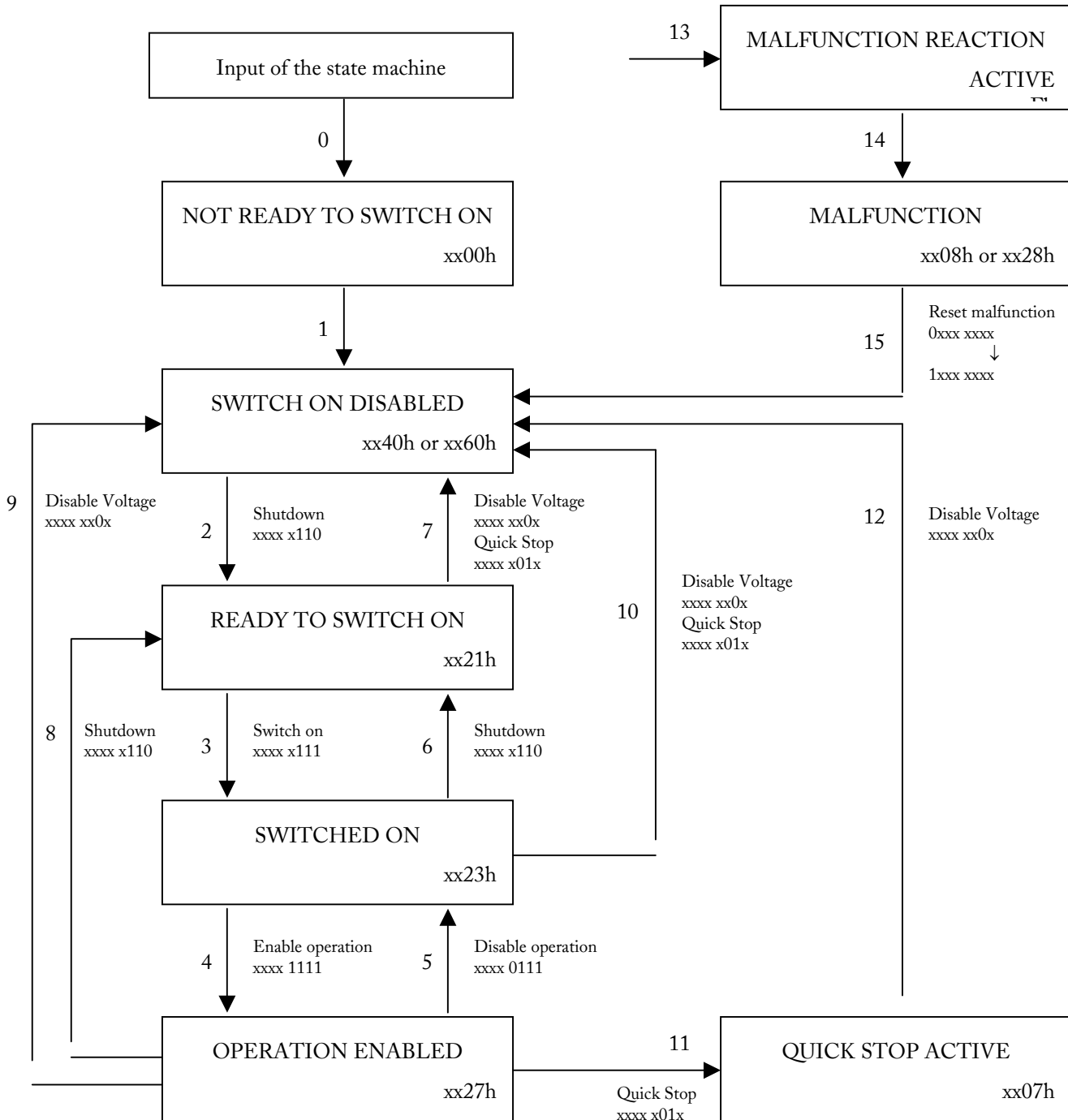
7.2.6 Malfunction code (603F)

If the drive has gone to a faulted state, it is possible to understand the reason by reading the malfunction code. Below is a table of malfunction codes used by the OPC-E11S-IBS:

Code	On display	Meaning	Code	On display	Meaning
0000	-	No alarm	4310	OH1	Overheat of heat sink in inverter
2200	OLU	Electronic thermal overload relay (Inverter)			
2211	OL1	Electronic thermal overload relay (Motor 1)	5220	Er3	CPU Error (E11)
2212	OL2	Electronic thermal overload relay (Motor 2)			
2301	OC1	Overcurrent (During acceleration)			
2302	OC2	Overcurrent (During deceleration)	5500	Er1	Memory error
2303	OC3	Overcurrent (While running at constant speed)	5520	Er4	OPC-E11S-IBS Storage error
3130	Lin	Input phase loss	7200	Er7	Output phase loss error
3211	OU1	Overvoltage (During acceleration)			
3212	OU2	Overvoltage (During deceleration)	7510	Er4	Option Communication Error
3213	OU3	Overvoltage (While running at constant speed)	7511	Er5	Option Error
3220	LU	Undervoltage	7520	Er2	KEYPAD panel communication error
			8100	Er8	RS485 communication error
4210	dbH	Overheat of DB resistance	9000	OH2	External alarm input
			F004	Er6	Operating proc. error

7.2.7 Control/Status word (6040/6041)

This section will describe the state machine of DRIVECOM and how it is implemented. Below the state diagram can be found. The status word is given in the states in hexadecimal form. At the state transitions the control word is given with the bits 7..0 in binary along with the device control command.



7.2.7.1 Bits of the Control Word

In the table below the bits used in the Control Word are described. They should be used in conjunction with the state machine above. The bits not described are not used.

Bit	Name
0	Switch on
1	Disable voltage
2	Quick Stop
3	Enable operation
7	Reset malfunction

7.2.7.2 Bits of the Status Word

In the table below the bits used in the Status Word are described. They should be used in conjunction with the state machine above. The bits not described are not used.

Bit	Name
0	Ready to switch on
1	Switched on
2	Operation enabled
3	Malfunction
4	Voltage disabled
5	Quick stop
6	Switch on disabled
9	Remote
10	Face value reached
11	Limit value

7.2.8 Speed Setpoint (6042)

This parameter represents the specified speed of the system and is represented in rpm.

7.2.9 Speed Command Variable (6043)

This is the speed provided by the frequency inverter to the motor after the calculation of the ramp functions. The value is given in rpm.

7.2.10 Speed Actual Value (6044)

The speed on the motor spindle or load is given in this parameter. Depending on the system, speed deviations between the Speed Actual Value and the physical speed may occur.

7.2.11 Speed Min Max Amount (6046)

This parameter consists of the subparameters Speed Min Amount and Speed Max Amount. It should be noted that changing the Speed Max Amount will cause other parameters, for example the ramp times, to change since they use the Speed Max Amount as base for some calculations. It is therefore recommended that changes to this parameter are made prior to changes to other parameters. The Speed Min Max amount also sets the limits the Limit bit in the status word checks for. If the Speed Setpoint is set higher than the Speed Max Amount or lower than the Speed Min Amount, the Limit bit will be set. Please note that the limit bit will not work if the parameter F16 (Frequency Low Limiter) is changed from the keypad and that the parameter F03 (Maximum Frequency 1) will be changed even if the second motor is selected and the Max Amount is changed.

7.2.12 Speed Acceleration (6048)

The Speed Acceleration parameter consists of two subparameters that describe the acceleration of the motor as a ramp. The subparameters are deltaspeed and deltatime. In the OPC-E11S-IBS module the deltatime subparameter is fixed to 1 second. This data is mapped to the parameter F07 and can also be set via the keypad.

7.2.13 Speed Deceleration (6049)

The Speed Deceleration parameter consists of two subparameters that describe the deceleration of the motor as a ramp. The subparameters are deltaspeed and deltatime. In the OPC-E11S-IBS module the deltatime subparameter is fixed to 1 second. This data is mapped to the parameter F08 and can also be set via the keypad.

7.2.14 Speed QuickStop (604A)

The Speed QuickStop parameter consists of two subparameters that describe the QuickStop of the motor as a ramp. The subparameters are deltaspeed and deltatime. In the OPC-E11S-IBS module the deltatime subparameter is fixed to 1 second. This data is mapped to the parameter E11 and can also be set via the keypad.

7.2.15 Pole Number (604D)

This parameter sets the amounts of pole of the motor. Since the amount of poles is used for calculations of rpm values, parameters which have the unit rpm may change when changing this parameter. It is therefore suggested that this parameter is changed prior to setting up for example the ramp times. Please note that the parameter P01 (Number of motor poles 1) will be changed even if the second motor is selected and the Pole Number (604D) is changed.

7.2.16 Quick Stop Option Code (605A)

This parameter selects which way the drive should be stopped in case a transition is made from the OPERATION ENABLED state to the QUICK STOP ACTIVE state.

Option Code	Meaning
0	Disable drive function
1	Slow down on slow down ramp (parameter F08)
2	Slow down on quick stop ramp (parameter E11)

7.2.17 Shutdown Option Code (605B)

This parameter selects which way the drive should be stopped in case a transition is made from the OPERATION ENABLED state to the READY TO SWITCH ON state.

Option Code	Meaning
0	Disable drive function
1	Slow down on slow down ramp (parameter F08)

7.2.18 Disable Operation Option Code (605C)

This parameter selects which way the drive should be stopped in case a transition is made from the OPERATION ENABLED state to the SWITCHED ON state.

Option Code	Meaning
0	Disable drive function
1	Slow down on slow down ramp (parameter F08)

8. Parameters specific for communication

To operate the inverters or to monitor the state via communication, the following parameters are available for communication in addition to the configuration functions of the inverters. These parameters are a common data format applicable to inverter types on and after E11 series, so that it is possible to access different inverter types by the same program on the host side.

8.1 Command data

Code	Name	Unit	Variable range	Min. unit	Read/write
S01	Setting frequency (p.u.)	-	-20000–20000 (Maximum frequency at ± 20000)	1	R/W
S05	Setting frequency	Hz	0.00–400.00	0.01	R/W

R: Reading

W: Writing

Note:

- 1) The data writing exceeding the setting range is possible, but the actual action will be restricted within the inverter.
- 2) When the command data is read, it is not the command data of actual action but the command data communicated before (the final command data can be obtained by reading of the monitoring data described later).

8.2 Operation command data

Code	Name	Unit	Variable range	Min. unit	Read/write
S06	Operation command	-	Refer to the data format [11]	-	R/W

Note:

- 1) Since X1–X5 are multi-function inputs, it is necessary to set the functions with E01–E05.
- 2) The alarm reset is executed, when RST signal changes from ON to OFF even there are no alarming factors.
- 3) The data writing exceeding the setting range is possible, but the actual action will be restricted within the inverter.

5) When the operation commands are instructed through the communication, the relation to the inverter terminal commands becomes as follows.

Function			Command			
Classification	Symbol	Name	Transmission	Terminal block		
Operation command	FWD/REV	FWD/REV command	Valid	Invalid		
Multi-function command	0-3	SS1, 2, 4, 8			Valid	Invalid
	4	RT1				
	5	HLD	3-wire operation stop command	Invalid		
	6	BX	Coast-to-stop command	Valid		
	7	RST	Alarm reset	Valid		
	8	THR	Trip command (External fault)	Invalid	Valid	
	9	Hz2/Hz1	Freq. set. 2 / Freq. set. 1	Valid	Invalid	
	10	M2/M1	Motor 2 / Motor 1			
	11	DCBRK	DC brake command			
	12	TL2/TL1	Torque limiter 2 / Torque limiter 1			
	13,14	UP, DOWN	UP, DOWN command	Invalid	Valid	
	15	WE-KP	Write enable for KEYPAD	Valid	Invalid	
	16	Hz/PID	PID control cancel			
	17	IVS	Inverse mode changeover (terminals 12 and C1)			
	18	LE	Link enable (Bus, RS485)			

8.3 Function data

Code	Name	Unit	Variable range	Min. unit	Read/Write
S08	Acceleration time F07	s	0.1–3600.0	0.1	R/W
S09	Deceleration time F08	s	0.1–3600.0	0.1	R/W
S10	Torque limit level 1 (Driving) F40	%	20.00–200.00, 999	1.00	R/W
S11	Torque limit level 2 (Braking) F41	%	0.00, 20.00–200.00, 999	1.00	R/W

Note:

- 1) The writing to out of the range is treated as out of range error.
- 2) The acceleration and deceleration time S08 and S09 are assigned to "F07: Acceleration time 1" and "F08: Deceleration time 1" respectively.
- 3) The torque limit level 1 and 2 of S10 and S11 are assigned to "F40: Torque limit 1 (Driving)" and "F41: Torque limit 1 (Braking)" respectively

8.4 Monitoring data

Code	Description	Unit	Range	Min. unit	Read/Write
M01	Setting frequency (Final data)	-	-20000–20000 (Maximum frequency at ±20000)	1	R
M05	Setting frequency (Final data)	Hz	0–400.00	0.01	R
M07	Torque calculation value	%	-200.00–200.00	0.01	R
M08	Torque current	%	-200.00–200.00	0.01	R
M09	Output frequency 1	Hz	0.00–400.00	0.01	R
M10	Input power	%	0.00–200.00	0.01	R
M11	Output current	%	0.00–200.00 (Inverter rating at 100.00)	0.01	R
M12	Output voltage	V	0.0–600.0	1.0	R
M13	Operation command (Final data)	-	Refer to the data format [11]	-	R
M14	Operating state	-	Refer to the data format [13]	-	R
M15	Y1-Y2 output terminal data	-	Refer to the data format [12]	-	R
M16	Fault memory 0	-	Refer to the following alarm codes	-	R
M17	Fault memory (1st prior)	-			
M18	Fault memory (2nd prior)	-			
M19	Fault memory (3rd prior)	-			
M20	Operating time	h	0–65000	1	R
M21	DC link circuit voltage	V	0–1000	1	R
M23	Type code	-	Refer to the data format [14]	-	R
M24	Capacity code	-	Refer to the data format [9]	-	R
M25	ROM version	-	0–9999	1	R
M26	Transmission error code	-	Refer to the data format [1]	-	R
M46	Life of main circuit capacitor	%	0.0–100.0	0.1	R
M48	Life of cooling fan	h	0–65000	1	R

Note :

- 1) The output frequency 1 is before slip compensation.
- 2) Alarm code

Code	Description	Code	Description
0	No alarm	---	31 Memory error
1	Overcurrent (During acceleration)	OC1	32 KEYPAD panel communication error
2	Overcurrent (During deceleration)	OC2	33 CPU error
3	Overcurrent (While running at constant speed)	OC3	34 Option communication error
6	Overvoltage (During acceleration)	OU1	35 Option error
7	Overvoltage (During deceleration)	OU2	36 Operating proc.error
8	Overvoltage (While running at constant speed)	OU3	37 Output phase loss error
10	Undervoltage	LU	38 RS485 communication error
11	Input phase loss	Lin	71 Check sum error
			72 Parity error
17	Overheat of heat sink in inverter	OH1	73 Other errors
18	External alarm input	OH2	74 Format error
22	Overheat of DB resistance	dbH	75 Command error
23	Electronic thermal overload relay (Motor1)	OL1	76 Priority of link
24	Electronic thermal overload relay (Motor2)	OL2	77 No writing right for error
25	Electronic thermal overload relay (Inverter)	OLU	78 Function code error
			79 Forbidden writing error
			80 Data error
			81 Error during writing

8.5 Parameter data format

The data formats for various parameter data of the inverters are defined here. The data shall be prepared according to the following data format specifications. The instruction manual of the inverter shall be referred to for the range and unit of data. The communication number is used to access inverter parameters through the fieldbus option and to configure process data exchange.

List of parameter data format

Code	PCP-index (Hex)	Name	Data Format	Code	PCP-index (Hex)	Name	Data Format
-	-	-	-	-	5F2D	-	-
S01	5F01	Setting frequency (p.u.)	[2]	-	5F2E	-	-
-	5F02	-	-	-	5F2F	-	-
-	5F03	-	-	-	5F30	-	-
-	5F04	-	-	-	5F31	-	-
S05	5F05	Setting frequency	[5]	-	5F32	-	-
S06	5F06	Operation command	[11]	-	5F33	-	-
-	5F07	-	-	-	5F34	-	-
S08	5F08	Acceleration time	[3]	-	5F35	-	-
S09	5F09	Deceleration time	[3]	-	5F36	-	-
S10	5F0A	Torque limit level 1	[5] *1	-	5F37	-	-
S11	5F0B	Torque limit level 1	[5] *1	-	5F38	-	-
-	5F0C	-	-	-	5F39	-	-
-	5F0D	-	-	-	5F3A	-	-
-	5F0E	-	-	-	5F3B	-	-
M01	5F0F	Setting frequency (Final data)	[2]	M46	5F3C	Life of main circuit capacitor	[3]
-	5F10	-	-	-	5F3D	-	-
-	5F11	-	-	M48	5F3E	Life of cooling fan	[1]
-	5F12	-	-	-	5F3F	-	-
M05	5F13	Setting frequency (Final data)	[5]	-	5F40	-	-
-	5F14	-	-	-	5F41	-	-
M07	5F15	Torque calculation value	[6]	-	5F42	-	-
M08	5F16	Torque current	[6]	-	5F43	-	-
M09	5F17	Output frequency 1	[5]	-	5F44	-	-
M10	5F18	Input power	[5]	-	5F45	-	-
M11	5F19	Output current	[5]	F00	5F46	Data protection	[1]
M12	5F1A	Output voltage	[3]	F01	5F47	Frequency command 1	[1]
M13	5F1B	Operation command (Final data)	[11]	F02	5F48	Operation method	[1]
M14	5F1C	Operating state	[13]	F03	5F49	Maximum output frequency 1	[1]
M15	5F1D	Y1-Y2 output terminal data	[12]	F04	5F4A	Base frequency 1	[1]

M16	5F1E	Fault memory 0	[1]	F05	5F4B	Rated voltage 1	[1]
M17	5F1F	Fault memory (1st prior)	[1]	F06	5F4C	Maximum output voltage 1	[1]
M18	5F20	Fault memory (2nd prior)	[1]	F07	5F4D	Acceleration time 1	[10]
M19	5F21	Fault memory (3rd prior)	[1]	F08	5F4E	Deceleration time 1	[10]
M20	5F22	Operating time	[1]	F09	5F4F	Torque boost 1	[3]
M21	5F23	DC link circuit voltage	[1]	F10	5F50	Electronics thermal overload relay 1 (Selection)	[1]
-	5F24	-	-				
M23	5F25	Type code	[14]	F11	5F51	Electronics thermal overload relay 1 (Level)	[10]
M24	5F26	Capacity code	[9]				
M25	5F27	ROM version	[1]	F12	5F52	Electronics thermal overload relay 1	[3]
M26	5F28	Transmission error processing code	[1]	F13	5F53	Electronics thermal overload relay (Braking resistor)	[1]
-	5F29	-	-	F14	5F54	Restart after momentary power failure (Selection)	[1]
-	5F2A	-	-				
-	5F2B	-	-				
-	5F2C	-	-				

*1) 999 is treated as 7FFF₁₆.

Code	PCP-index (Hex)	Name	Data Format	Code	PCP-index (Hex)	Name	Data Format
F15	5F55	Frequency limiter (High)	[1]	-	5F87	-	-
F16	5F56	Frequency limiter (Low)	[1]	E40	5F88	Display coefficient A	[10]
F17	5F57	Gain (for frequency setting signal)	[3]	E41	5F89	Display coefficient B	[10]
F18	5F58	Bias frequency	[4]	-	5F8A	-	-
F20	5F59	DC brake (Starting frequency)	[3]	-	5F8B	-	-
F21	5F5A	DC brake (Braking level)	[1]	-	5F8C	-	-
F22	5F5B	DC brake (Braking time)	[3]	C01	5F8D	Jump frequency 1	[1]
F23	5F5C	Starting frequency	[3]	C02	5F8E	Jump frequency 2	[1]
F24	5F5D	Starting frequency (Holding time)	[3]	C03	5F8F	Jump frequency 3	[1]
F25	5F5E	Stop frequency	[3]	C04	5F90	Jump frequency (Width)	[1]
F26	5F5F	Motor sound (Carrier frequency)	[1] *1	C05	5F91	Multi-step frequency 1	[5]
F27	5F60	Motor sound (Sound tone)	[1]	C06	5F92	Multi-step frequency 2	[5]
F30	5F61	FMA terminal (Voltage adjust)	[1]	C07	5F93	Multi-step frequency 3	[5]
F31	5F62	FMA terminal (Function selection)	[1]	C08	5F94	Multi-step frequency 4	[5]
F33	5F63	FMP terminal (Pulse rate multiplier)	[1]	C09	5F95	Multi-step frequency 5	[5]
F34	5F64	FMP terminal (Voltage adjust)	[1]	C10	5F96	Multi-step frequency 6	[5]
F35	5F65	FMP terminal (Function selection)	[1]	C11	5F97	Multi-step frequency 7	[5]
F36	5F66	30Ry operation mode	[1]	-	5F98	-	-
F40	5F67	Torque limit 1 (Driving)	[1]	C30	5F99	Frequency setting 2	[1]
F41	5F68	Torque limit 1 (Braking)	[1]	C31	5F9A	Analog input offset (terminal 12) / Analog input bias (terminal 12)	[4]
F42	5F69	Torque vector control 1	[1]				
E01	5F6A	X1 terminal function	[1]	C32	5F9B	Analog input offset (terminal C1) / Analog input gain (terminal 12)	[4]
E02	5F6B	X2 terminal function	[1]				
E03	5F6C	X3 terminal function	[1]	C33	5F9C	Analog filter	[5]
E04	5F6D	X4 terminal function	[1]	P01	5F9D	Motor 1 (Number of poles)	[1]
E05	5F6E	X5 terminal function	[1]	P02	5F9E	Motor 1 (Capacity)	[5]
-	5F6F	-	-	P03	5F9F	Motor 1 (Rated current)	[10]
-	5F70	-	-	P05	5FA1	Motor 1 (On-line tuning)	[1]
-	5F71	-	-	P06	5FA2	Motor 1 (No-load current)	[10]
-	5F72	-	-	P07	5FA3	Motor 1 (%R1)	[5]
E10	5F73	Acceleration time 2	[10]	P08	5FA4	Motor 1 (%X)	[5]
E11	5F74	Deceleration time 2	[10]	P09	5FA5	Motor 1 (Slip compensation control)	[5]
-	5F75	-	-	H03	5FA6	Data initializing	[1] *2

-	5F76	-	-	H04	5FA7	Auto-reset (Times)	[1]
-	5F77	-	-	H05	5FA8	Auto-reset(Reset interval)	[1]
-	5F78	-	-	H06	5FA9	Fan stop operation	[1]
E16	5F79	Torque limiter 2 (Driving)	[1]	H07	5FAA	ACC/DCC pattern (Mode selection)	[1]
E17	5F7A	Torque limiter 2 (Braking)	[1]	-	5FAB	-	-
E20	5F7B	Y1 terminal function	[1]	H09	5FAC	Start mode (Pick-up mode)	[1]
E21	5F7C	Y2 terminal function	[1]	H10	5FAD	Energy-saving operation	[1]
-	5F7D	-	-	H11	5FAE	Deceleration mode	[1]
-	5F7E	-	-	H12	5FAF	Instantaneous overcurrent limiting	[1]
-	5F7F	-	-	H13	5FB0	Auto-restart (Restart time)	[3]
				H14	5FB1	Auto-restart (Frequency fall rate)	[5]
E30	5F80	Frequency arrival (FAR) (Detecting width)	[3]	-	5FB2	-	-
				-	5FB3	-	-
E31	5F81	Frequency detection 1 (FDT) (level)	[1]	-	5FB4	-	-
				-	5FB5	-	-
E32	5F82	Frequency detection (FDT) (Hysteresis width)	[3]	H20	5FB6	PID control (Mode selection)	[1]
				H21	5FB7	PID control (Feed back signal)	[1]
E33	5F83	Overload early warning (Mode selection)	[1]	H22	5FB8	PID control (P-Gain)	[5]
				H23	5FB9	PID control (I-time)	[3]
E34	5F84	Overload early warning 1 (level)	[10]	H24	5FBA	PID control (D-time)	[5]
E35	5F85	Overload early warning (Timer time)	[3]	H25	5FBB	PID control (Feedback filter)	[3]
-	5F86	-	-				

*1) 0.75 kHz is treated as 0000H

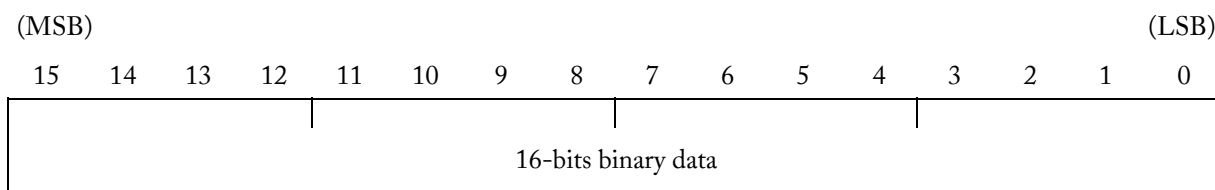
*2) The communication might not be able to be continued by writing (data 1).

Code	PCP-index (Hex)	Name	Data Format	Code	PCP-index (Hex)	Name	Data Format
H26	5FBC	PTC thermistor (Mode selection)	[1]	-	5FDB	-	-
H27	5FBD	PTC thermistor (Level)	[5]	-	5FDC	-	-
H28	5FBE	Droop operation	[4]	-	5FDD	-	-
H30	5FBF	Serial link (Function selection)	[1]	-	5FDE	-	-
H31	5FC0	RS485 (Address)	[1] *1	-	5FDF	-	-
H32	5FC1	RS485 (Mode selection on error)	[1] *1	-	5FE0	-	-
H33	5FC2	RS485 (Timer time)	[3] *1	-	5FE1	-	-
H34	5FC3	RS485 (Baud rate)	[1] *1	-	5FE2	-	-
H35	5FC4	RS485 (Data length)	[1] *1	o27	5FE3	Mode selection on error	[1]
H36	5FC5	RS485 (Parity check)	[1] *1	o28	5FE4	Timer time setting	[3]
H37	5FC6	RS485 (Stop bits)	[1] *1	o30	5FE5	Bus Configuration Parameter 01	[1]
H38	5FC7	RS485 (No response detection time)	[1] *1	o31	5FE6	Bus Configuration Parameter 02	[1]
H39	5FC8	RS485 (Response interval)	[5] *1	o32	5FE7	Bus Configuration Parameter 03	[1]
A01	5FC9	Maximum frequency 2	[1]	o33	5FE8	Bus Configuration Parameter 04	[1]
A02	5FCA	Base frequency 2	[1]	o34	5FE9	Bus Configuration Parameter 05	[1]
A03	5FCB	Rated voltage 2 (at base speed)	[1]	o35	5FEA	Bus Configuration Parameter 06	[1]
A04	5FCC	Maximum output voltage 2	[1]	o36	5FEB	Bus Configuration Parameter 07	[1]
A05	5FCD	Torque boost 2	[3]	o37	5FEC	Bus Configuration Parameter 08	[1]
A06	5FCE	Electronics thermal 2 (Selection)	[1]	o38	5FED	Bus Configuration Parameter 09	[1]
A07	5FCF	Electronics thermal 2 (Level)	[10]	o39	5FEE	Bus Configuration Parameter 10	[1]
A08	5FD0	Electronics thermal 2 (Thermal time constant)	[3]	o40	5FEF	Bus Configuration Parameter 11	[1]
				o41	5FF0	Bus Configuration Parameter 12	[1]
A09	5FD1	Torque vector control 2	[1]	o42	5FF1	Bus Configuration Parameter 13	[1]
A10	5FD2	Motor 2 (Number of motor-2 poles)	[1]	o43	5FF2	Bus Configuration Parameter 14	[1]
A11	5FD3	Motor 2 (Capacity)	[5]	o44	5FF3	Bus Configuration Parameter 15	[1]
A12	5FD4	Motor 2 (Rated current)	[10]	o45	5FF4	Bus Configuration Parameter 16	[1]
				o46	5FF5	Bus Configuration Parameter 17	[1]
A14	5FD6	Motor 2 (On-line tuning)	[1]	o47	5FF6	Bus Configuration Parameter 18	[1]
A15	5FD7	Motor 2 (No load current)	[10]	o48	5FF7	Bus Configuration Parameter 19	[1]
A16	5FD8	Motor 2 (%R1 setting)	[5]	o49	5FF8	Bus Configuration Parameter 20	[1]
A17	5FD9	Motor 2 (%X setting)	[5]	o50	5FF9	Bus Configuration Parameter 21	[1]
A18	5FDA	Motor 2 (Slip compensation control 2)	[5]	o51	5FFA	Bus Configuration Parameter 22/	[1]
				o52	5FFB	Bus Configuration Parameter 23/	[1]
				o53	5FFC	Bus Configuration Parameter 24/	[1]
				o54	5FFD	Bus Configuration Parameter 25/	[1]
				o55	5FFE	Bus Configuration Parameter 26/	[1]

*1) Read-only from communication.

8.6 Data format specification

All data within the data field of the communication frame consist of 16 bits binary data.



(Negative data is treated with two's complement.)

Data format [1] Integer data (Positive): Min. unit 1

Example) If F15 (Frequency limiter, high limit) = 60 Hz,

$$60 * 1 = 60 = 003C_{H}$$

->

0	0	3	C
---	---	---	---

Data format [2] Integer data (Positive, negative): Min. unit 1

Example) If F18 (Bias frequency) = -20 Hz,

$$-20 * 1 = -20 = FFEC_{H}(\text{two's complement})$$

->

F	F	E	C
---	---	---	---

Data format [3] Decimal data (Positive): Min. unit 0.1

Example) If F17 Gain (for frequency setting signal) = 100.0%,

$$100.0 * 10 = 1000 = 03E8_{H}$$

->

0	3	E	8
---	---	---	---

Data format [4] Decimal data (Positive, negative): Min. unit 0.1

Example) If H28 (Droop operation) = -5.0Hz,

$$-5.0 * 10 = -50 = FFCE_{H}(\text{two's complement})$$

->

F	F	C	E
---	---	---	---

Data format [5] Decimal data (Positive): Min. unit 0.01

Example) If C05 (Multi-step frequency 1) = 50.25 Hz,

$$50.25 * 100 = 5025 = 13A1_{H}$$

->

1	3	A	1
---	---	---	---

Data format [6] Decimal data (Positive, negative): Min. unit 0.01

Example) If M07 (Actual torque value) = -85.38%,

$$-85.38 * 100 = -8538 = DEA6_{H}(\text{two's complement})$$

->

D	E	A	6
---	---	---	---

Data format [7] Decimal data (Positive): Min. unit 0.001

Example) If o05 (Constant I of feedback speed controller) = 0.105s,

$$0.105 * 1000 = 105 = 0069_{H}$$

->

0	0	6	9
---	---	---	---

Data format [8] Decimal data (Positive, negative): Min. unit 0.001

Example) If being -1.234,

$-1.234 * 1000 = -1234 = FB2E_{11}$ (two's complement)

->

F B 2 E

Data format [9] Capacity code

Code	FVR-E11S : Capacity (kW)	AF300E11 : Capacity (HP)
10	0.1	0.12
20	0.2	0.25
40	0.4	0.5
75	0.75	1
150	1.5	2
220	2.2	3
370	3.7	5
550	5.5	7.5
750	7.5	10

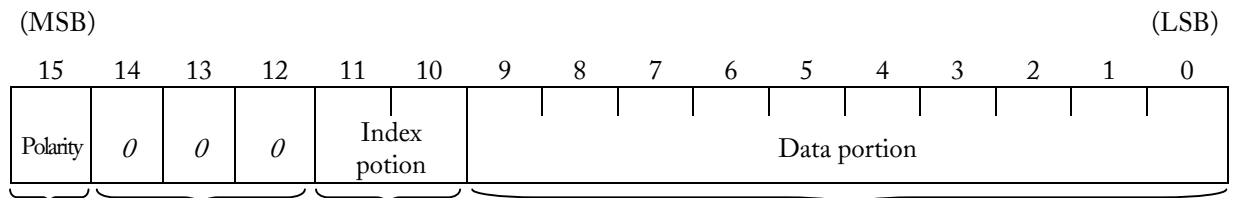
Example) If 3.7kW

Since $3.7 * 100 = 370 = 0172_{11}$

->

0 1 7 2

Data format [10] Exponential data (ACC/DEC time, current value, display coefficient)



Not used

- 0: 0.01 * 001-999 (0.00 - 9.99)
- 1: 0.1 * 100-999 (10.0 - 99.9)
- 2: 1 * 100-999 (100 - 999)
- 3: 10 * 100-999 (1000 - 3600)

0: Positive (+), 1: Negative (-)

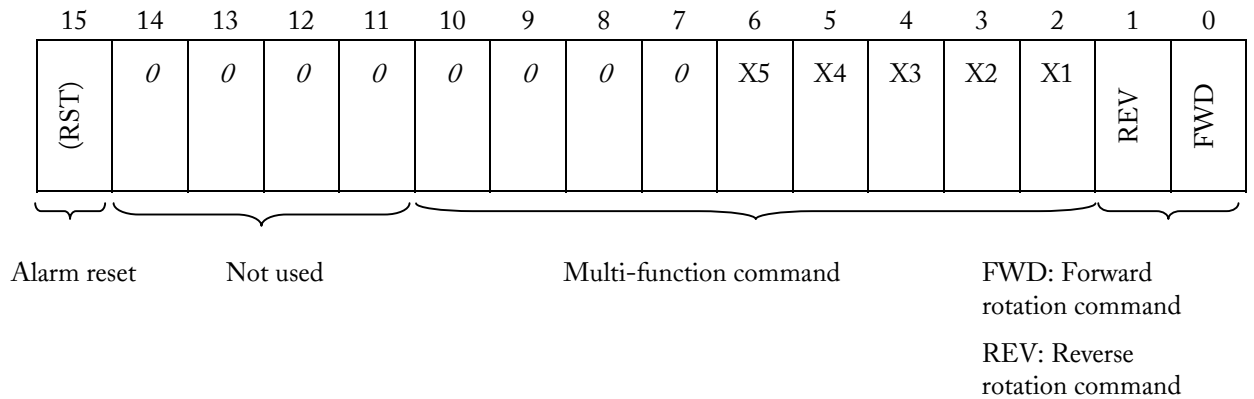
Example) F07 (Acceleration time 1) = 20.0 s,

$20.0 = 0.1 * 200$

->

0 4 C 8

Data format [11] Operation command



(All bits are ON by 1)

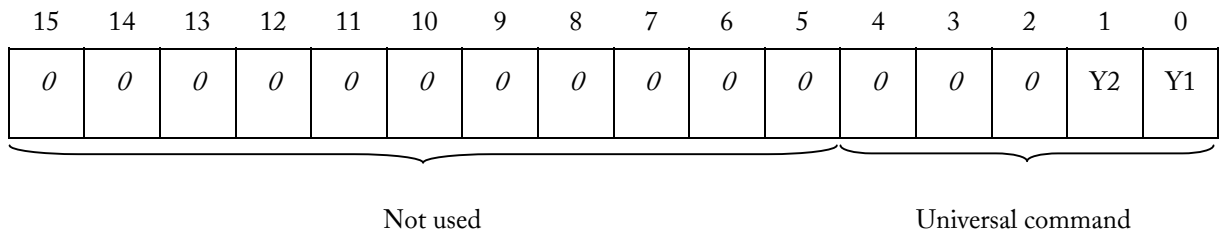
Example) If M13 (Operation command, Final command) = FWD, X1, X2 = ON,

0000 0000 0000 1101_b = 000D_H

->



Data format [12] Universal output terminal

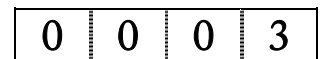


(All bits are ON by 1)

Example) If M15 (Universal output terminal) = Y1, Y2 = ON,

0000 0000 0000 0011_b = 0003_H

->



Data format [13] Operating status

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
-	-	RL	ALM	DEC	ACC	IL	VL	TL	NUV	BRK	INT	EXT	REV	FWD	

(All bit are ON or active by 1)

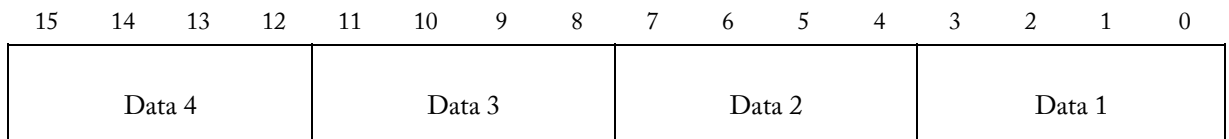
- | | | | |
|------|---|------|---------------------|
| FWD: | In forward operation | IL: | In current limiting |
| REV: | In reverse operation | ACC: | In acceleration |
| EXT: | In DC braking (or in pre-excitation) | DEC: | In deceleration |
| | | ALM: | Alarm |
| INT: | Inverter trip | RL: | Transmission valid |
| BRK: | In braking | | |
| NUV: | DC link voltage is establishment
(Undervoltage condition at 0) | | |
| TL: | In torque limiting | | |
| VL: | In voltage limiting | | |

Example) Omitted (Monitoring method is similar as in the formats [11] and [12].)

Data format [14] Type code

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Unit type				Generation				Series				Voltage series			

Code	Type	Generation	Series	Voltage series
1	VG	11th series	For Japan	100V single phase
2	G	-	For Asia	200V single phase
3	P	-	For China	200V three phase
4	E	-	For Europe	400V three phase
5	C	-	For USA	575V three phase
6	S	-	-	-

Data format [15] Code setting (1 – 4 figures)

Example) If "o22: Ai function selection" = 123,

Since $123 = 0123_{16}$

⇒

