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INTERBUS OPTION CARD

SOPC-G11S-IBS

FOR GP10 & VG10

INSTRUCTION MANUAL

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Preface

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Related documents

Document	Author
InterBus profile for drive engineering, DRIVECOM. May 26th 1995.	DRIVECOM Nutzergruppe e.V.
InterBus profile for sensor/actuator, profile 12. March 7th 1995.	InterBus-S Club e.V.
GP10 Instruction Manual P/N 027-GP1001	Saftronics
VG10 Instruction Manual P/N 027-VG1001	

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1. Applicable inverters

Item	Description		
Inverter type	GP10 / VG10		
Compatible Inverter Model number	The last two digits of the model number should be B1 or later Example: 6KG1123X1B1		
Minimum inverter ROM version number	up to 22 kW(30HP)	EN, Japanese standard, JE, CN, UX	S08000 and after (It is impossible to use version prior to S08000 inverter.)
	30 kW(40HP) and above	EN, Japanese standard, JN, JE, AN, CN, UX	H08004 and after (It is impossible to use versions of H00000 to H08003.)

NOTE:

This product can only be used for Inverters with ROM version numbers greater than or equal to the versions shown above.

And in the case of installing this option in the GP10 / VG10 inverter that is a Japanese standard, JN, JE or CN version, please contact Saftronics or its distributors.

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

a. Check that the Inverter Operation monitor (Operation mode) screen is displayed.

b. Press the [PRG] key of the Inverter once.

c. Select the "5. MAINTENANC" with the cursor and press the [FUNC/DATA] key.

d. Press the down cursor key to increment the display at the MAINTENANC screen.

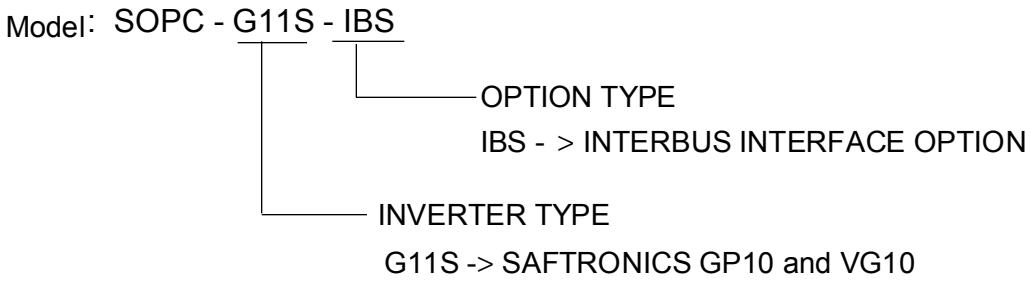
Finally, the ROM number is shown in the maintenance information, as indicated by the display "INV=Hxxxxx or Sxxxxx".

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.



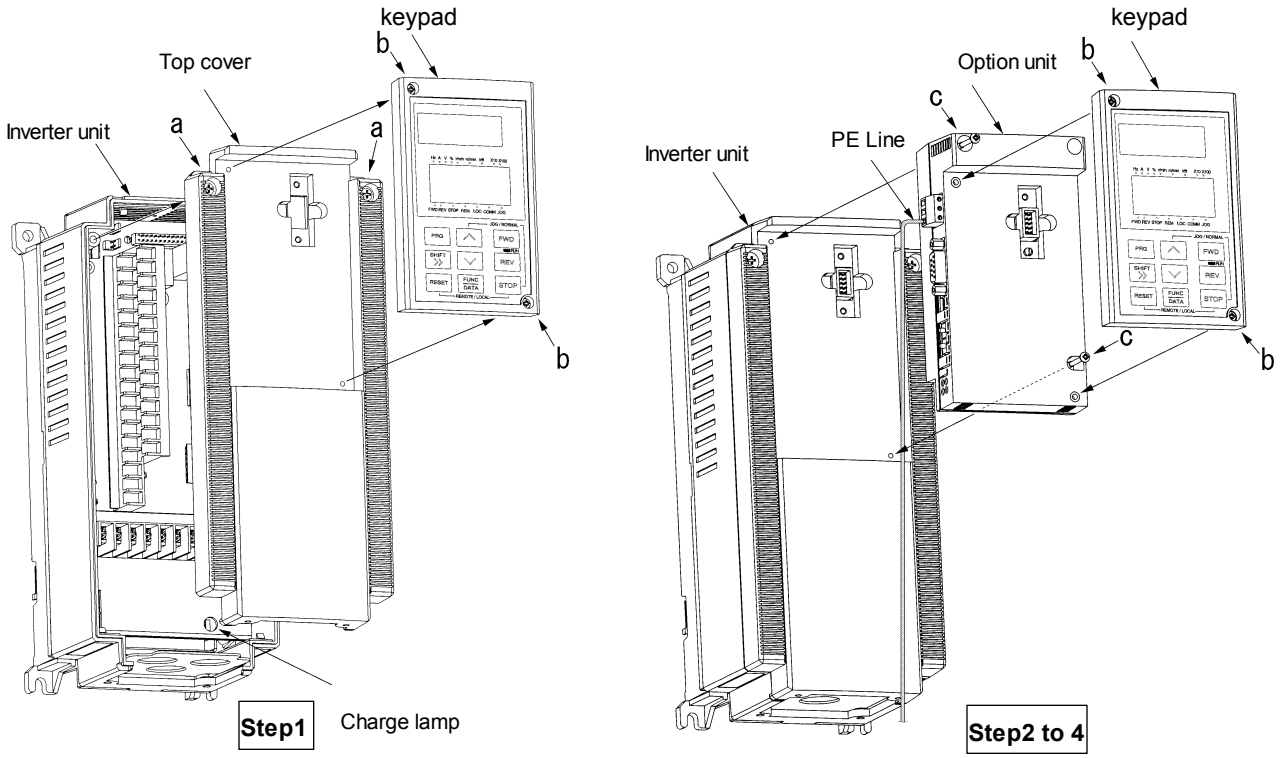
2) Inspection for damage during transportation. Report damage to transportation carrier.

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 (CHARGE or CRG) is gone out.

The shape, the dimensions and the position of the charge lamp of the inverter are different by each capacity.



Step1

Loosen two screws(M4) at **a** and remove the top cover. Loosen two screws(M3) at **b** and detach the keypad panel. (For the 30kW[40HP] and above inverters, the keypad panel can be detached if the front cover is removed and the screws loosened at **b**.)

Step2

Reassemble the top cover, push-in the option unit and secure it with two screws(M3) at **c.**

Step3

Secure the keypad panel to the option unit with two screws at **b**.

Step4

Connect the ground cable to the PE terminal of the option unit.

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] The switch JP6 on the conversion board is set according to the intended purpose. (Do not change the JP4 on the conversion board!)

[6] Inverter parameters such as H30, E15, E30, o27, o28, o30 to o39, are set correctly. (H30: Link Active/Inactive, E15: 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)

4. InterBus option card SOPC-G11S-IBS

The SOPC-G11S-IBS option card gives an instant connection between a Saftronics GP10 and VG10 drives and InterBus. The option board will perform as an integrated part of the G11S drive and gives the user access to all relevant parameters, as well as control-/status signals needed to control the drive

The SOPC-G11S-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.

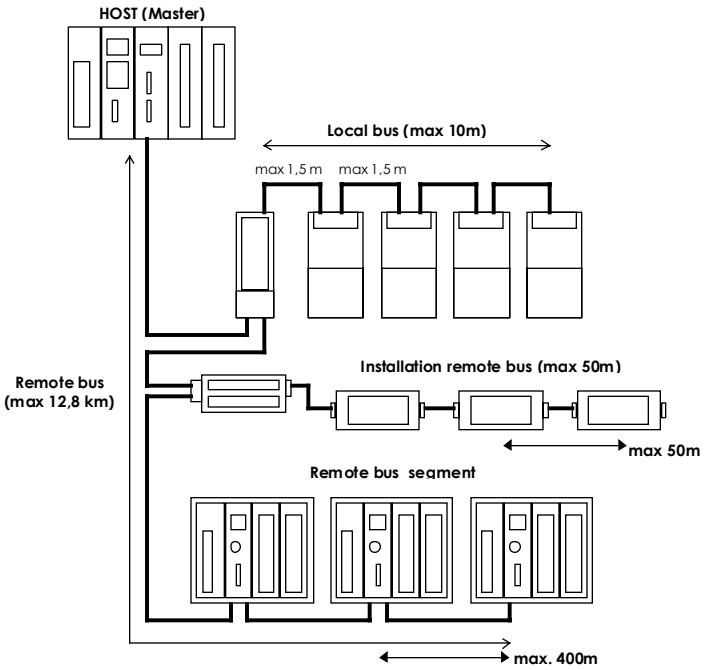
In a control system the SOPC-G11S-IBS will act as a remote bus slave that can be read from and written to, by a InterBus master. It will not initiate communication to other nodes, it will only respond to incoming telegrams.

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.

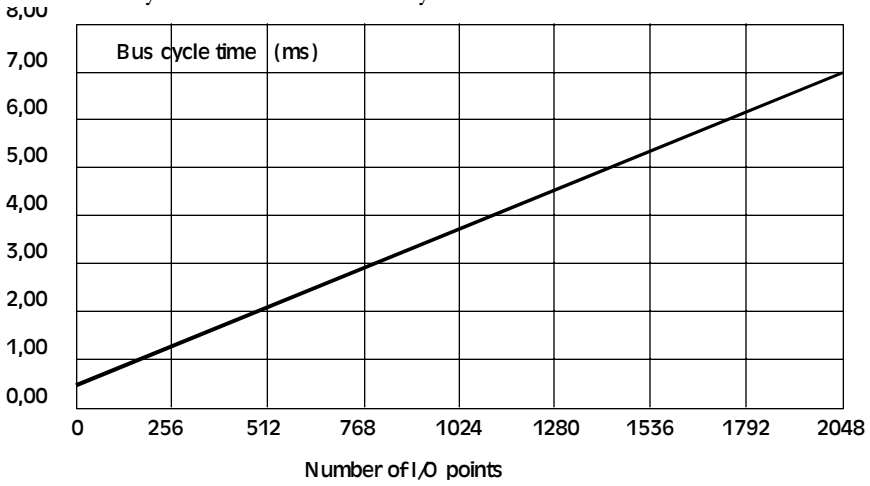
5.1 Network Overview

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	• 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	• Local bus (max. 8 nodes per local bus) • Installation remote bus (max. 256 nodes) • Remote bus (max. 256 nodes) master dependent
Bus length	• Remote bus up to 12,8 km • Max. length of remote bus segment: 400m
Max. bus cable length between	• Host and first remote bus module 400m • Two remote bus modules 400m • Host and last remote bus module 12,8 km
Medium Access	• Single-Master system supported
Two different data types: **1. Process data**	• Time-deterministic • Shift register type • Total-frame protocol • Cycle-time ~ number of I/O
2. PCP-object	• Possible access protection of different levels PCP-object area • Possible read and write protection

6. SOPC-G11S-IBS Overview

This section contains necessary information needed to start-up and configure the SOPC-G11S-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: SUPI3 and SRE1 from Phoenix Contact.

Bus connection: The SOPC-G11S-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 SOPC-G11S-IBS is the last module on the network.
For the pin layout, refer to the table below.

BUS-IN

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

BUS-OUT

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 SOPC-G11S-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 SOPC-G11S-IBS with a fibre optic interface directly on the board.

6.2 Configuration

With the SOPC-G11S-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 SOPC-G11S-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 SOPC-G11S-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 SOPC-G11S-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
- Status
- Identify
- Get-OD (Short & Long)
- Read
- Write

6.2.3 Process Data Words

It is also possible to use different amount of process data words with the SOPC-G11S-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.

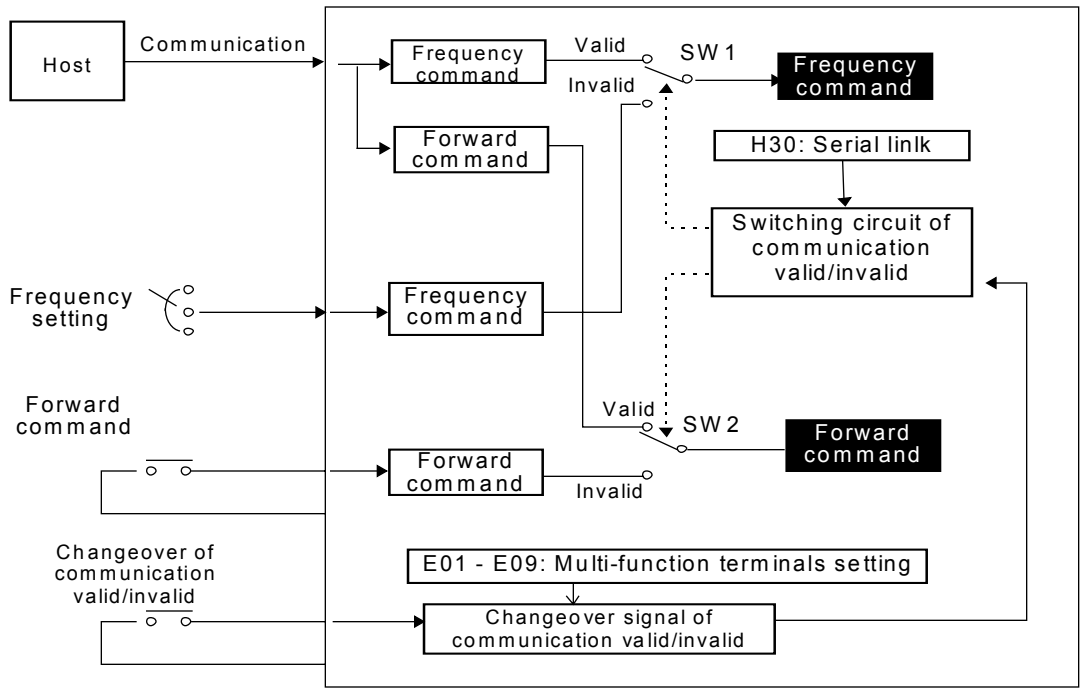
6.2.4 Recommended Start-Up Settings

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-X9) on the inverter. However, it is necessary to configure the inverter's multi-function command input terminals (E01 – E09: X1–X9 terminals function) to the link operation selection (Data 24). 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	

6.2.5.3 Coexistence of link (option) and RS485 (or Modbus RTU) communication

When the link options (such as T link, field bus, etc.) are mounted on the inverter, the communication is positioned as described below and the functions are restricted.

Link: The operation through the fieldbus (either one of command data and operation data or both), the operation monitoring, and the reading and changing of functions are possible.

RS485: The operation monitoring and the reading and changing of inverter configuration functions codes is possible (Operation through the RS485 communication is impossible).

Note:
1) The communication valid bit of M14: Operating state becomes the state signal of link option and not of RS485.
2) When the command data and operation data are accessed from RS485, NAK is returned.
3) If the writing of functions is performed through this communication during the writing of functions by the link, NAK (no writing right error) is returned.

6.3 Action at communication error

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

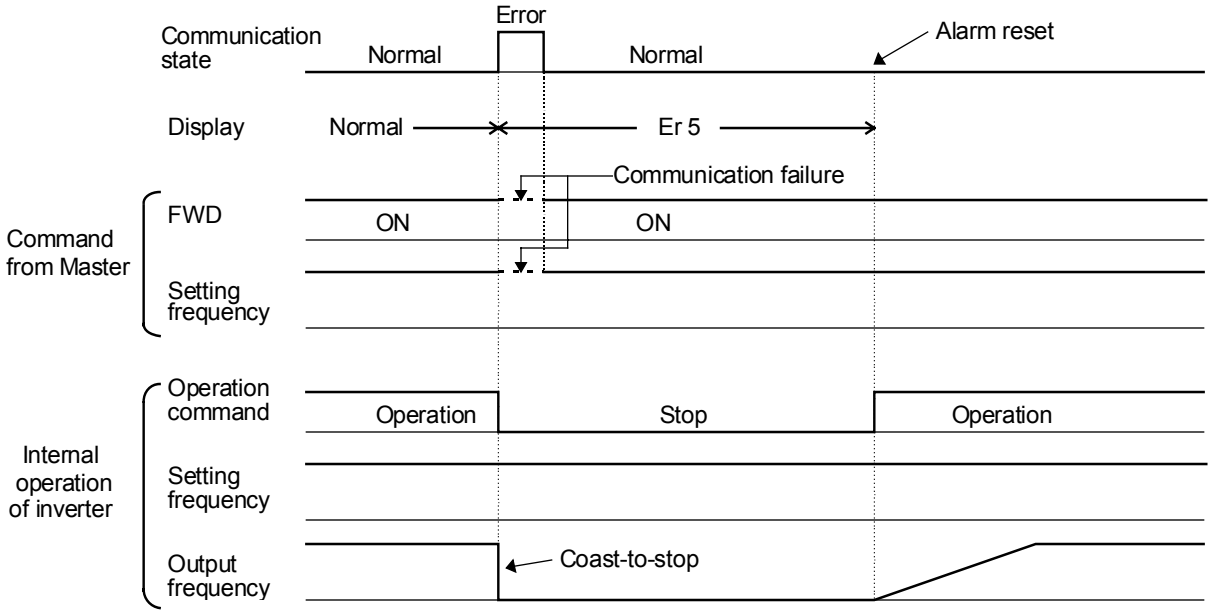
1) Select action when error is detected. (o27)

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	

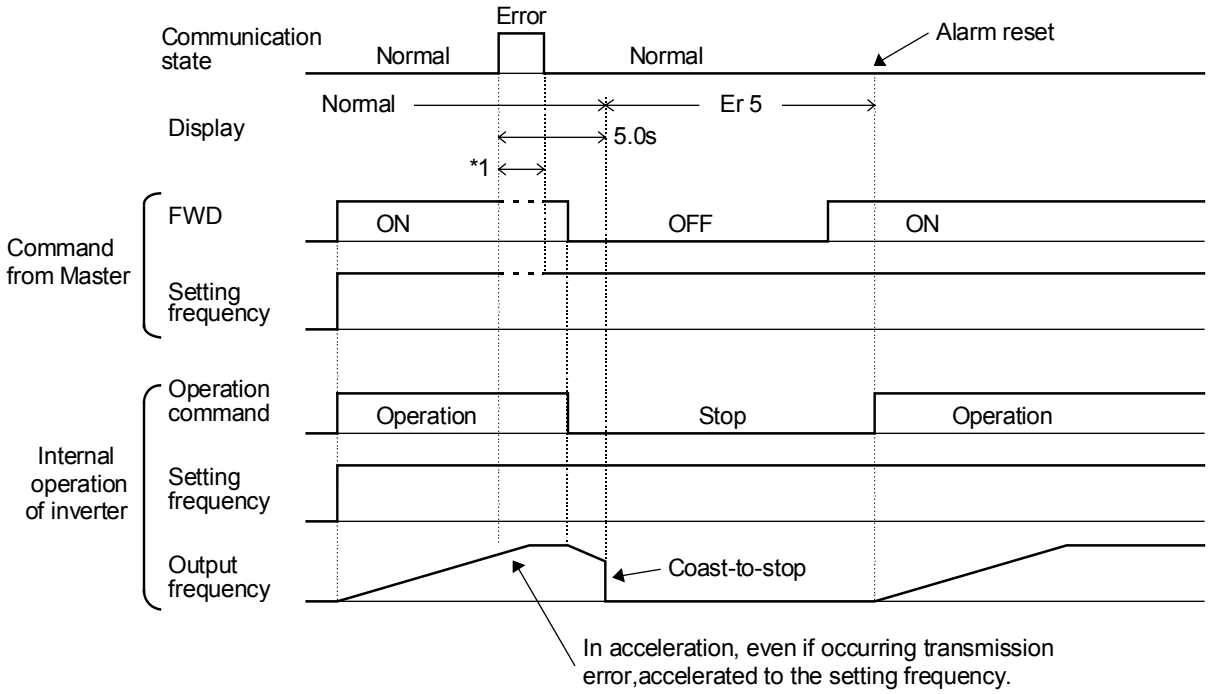
2) Setting time of timer at error (o28)

0.0 – 60.0s

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

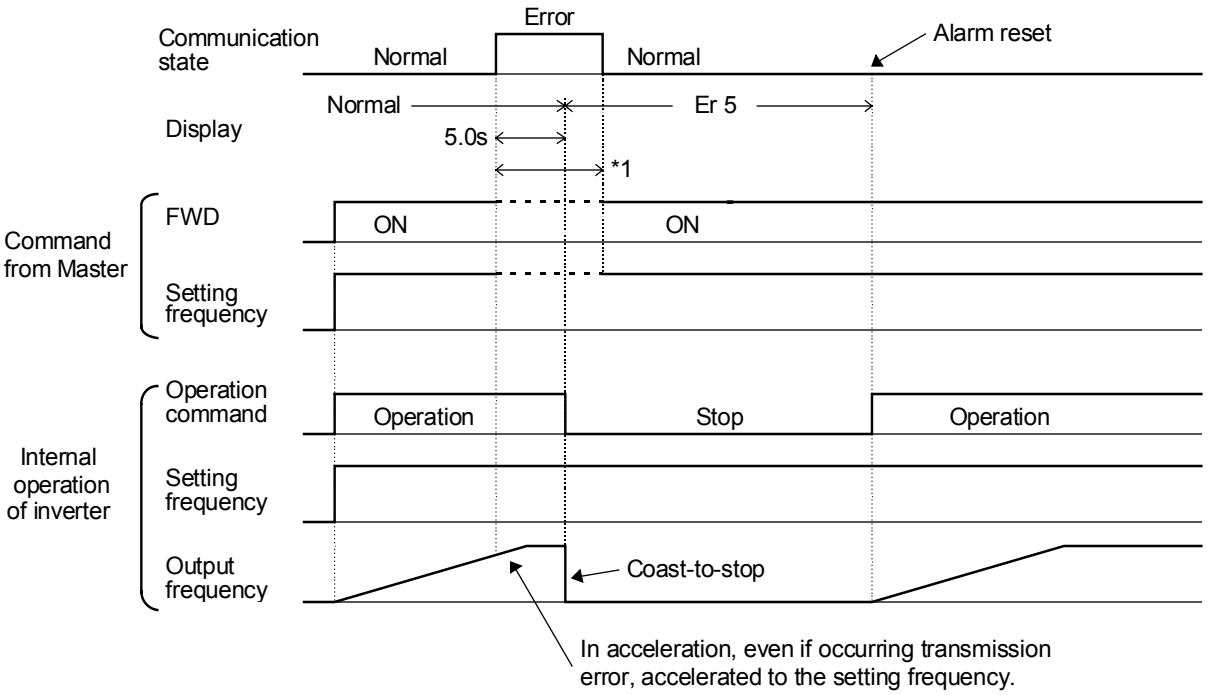


In a case of o27=1, o28=5.0 s (Mode of immediate forced stop after 5 s at occurring communication error)

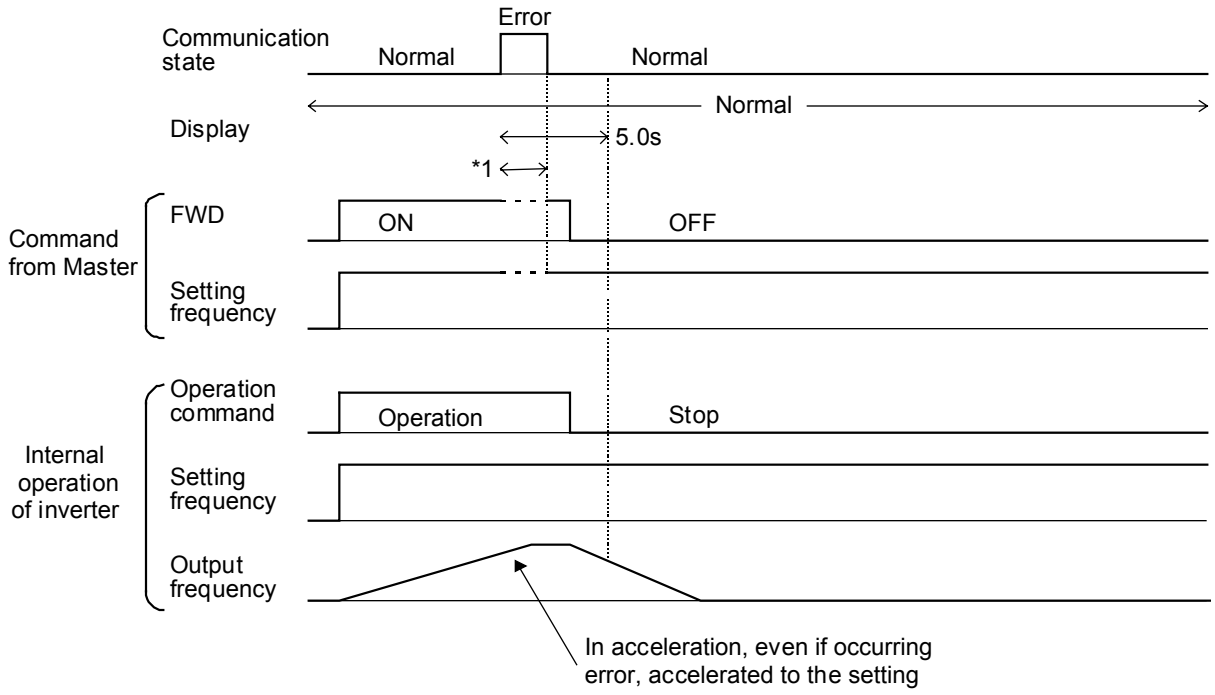


*1) In a period until restoring the communication, the last commands (command data and operation data) received before the error are kept.

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.)

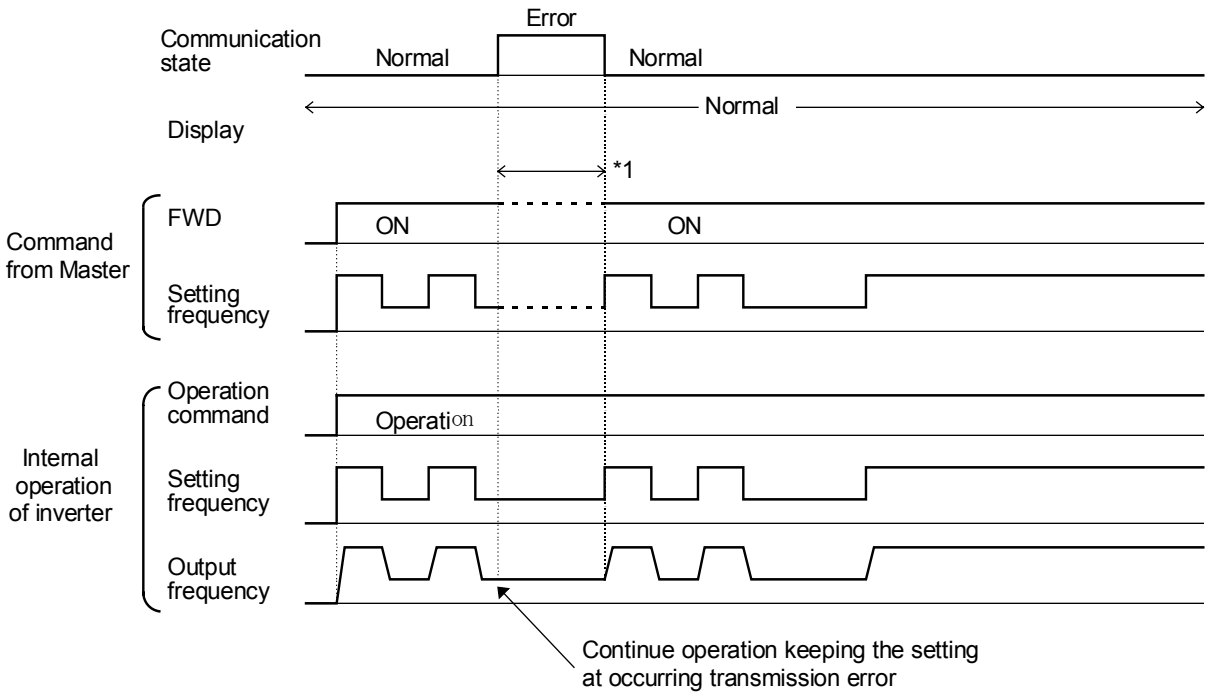


In a case of o27=2, o28=5.0 s (A communication error occurs, but restored within 5 s.)



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

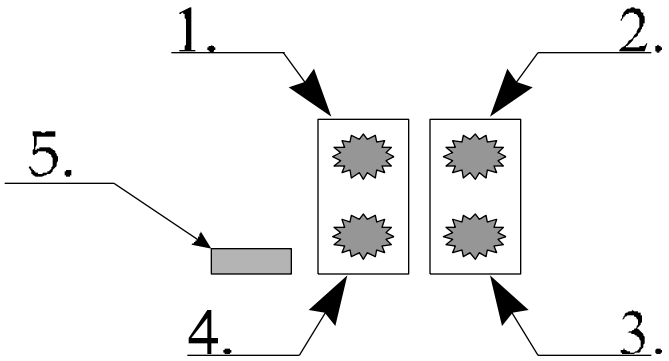
In a case of o27=3 (When a communication error occurs, the operation continues)



6.4 Indication LED's

The SOPC-G11S-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	**R**emote **B**us **D**is**A**ble Active RED when outgoing remote bus is switched off
TR	Green	**T**ransmit/**R**eceive Active GREEN when PCP communication is carried out over the InterBus network) 0.6 s hold time to be visual (Retriggerable).
CC	Green	**C**able **C**heck Active GREEN if the cable connection is good and the InterBus Master is **not** in RESET
BA	Green	**B**us **A**ctive Active GREEN. (Monitoring Layer 2).
UL	Green	Voltage OK at bus Interface Active GREEN if the voltage is OK.

7. Operating the SOPC-G11S-IBS

This section describes how to control the drive by using the SOPC-G11S-IBS interface.

7.1 Communication interface

There are two different ways of communicating with the SOPC-G11S-IBS via the InterBus network.

7.1.1 PCP protocol

The interface structure of the SOPC-G11S-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	Saftronics 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 3.2.1 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 3.2.2 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 SOPC-G11S-IBS to the InterBus master.

When it comes to the SOPC-G11S-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 SOPC-G11S-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 SOPC-G11S-IBS.

When it comes to the SOPC-G11S-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 SOPC-G11S-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 SOPC-G11S-IBS. This parameter is used for data consistency reasons when changes are made to the process output data descriptions.

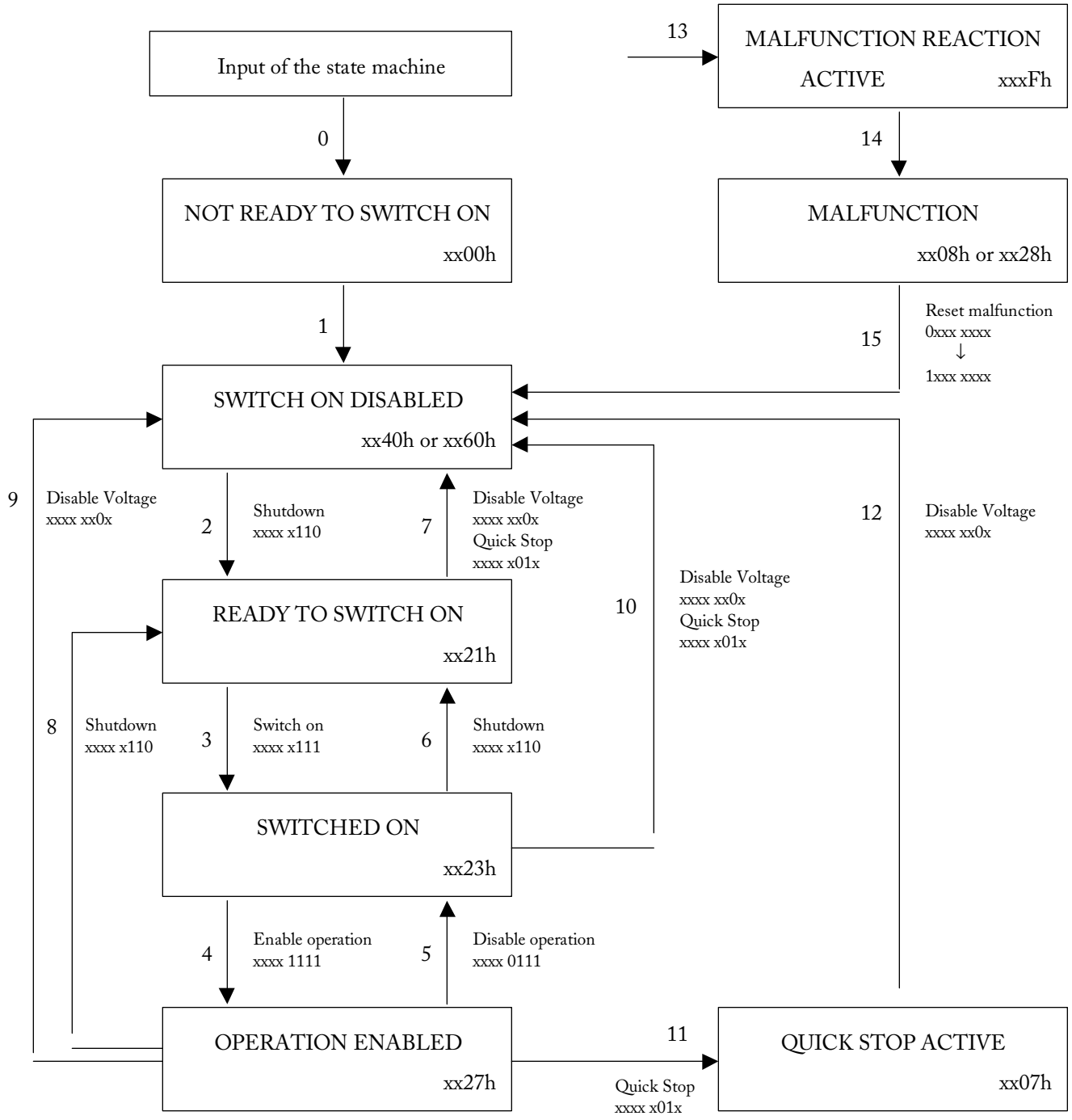
7.2.6 Malfunction code (603F)

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 SOPC-G11S-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)	5120	PbF	DC link charge circuit abnormal
2211	OL1	Electronic thermal overload relay (Motor 1)	5220	Er3	CPU Error (VG10)
2212	OL2	Electronic thermal overload relay (Motor 2)	5450	FUS	DC Fuse blown
2301	OC1	Overcurrent (During acceleration)	5453	ACF	AC Fuse blown
2302	OC2	Overcurrent (During deceleration)	5500	Er1	Memory error
2303	OC3	Overcurrent (While running at constant speed)	5520	Er4	SOPC-G11S-IBS Storage error
2330	EF	Ground fault	7000	Er9	A/D converter defective
3130	Lin	Input phase lose	7200	Er7	Output phase loss error
			7301	Pg	PG error
3211	OU1	Overvoltage (During acceleration)	7310	OS	Overspeed
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
4110	OH3	Overheat of unit internal temp.	8100	Er8	RS485 communication error
4210	dbH	Overheat of DB resistance	9000	OH2	External alarm input
4300	OH4	Overheat of motor	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 form 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 Limitter) 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 SOPC-G11S-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 SOPC-G11S-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 SOPC-G11S-IBS module the deltatime subparameter is fixed to 1 second. This data is mapped to the parameter E15 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
2	Slow down on quick stop ramp (E15)

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

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

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 GP10 / VG10 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
S05	Setting frequency	Hz	0.00–400.00 (GP10: 0.00–120.00)	0.01	R

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
S07	Universal Do	-	Refer to the data format [12]	-	R/W
S12	Universal Ao	-	-20000–20000 (100% output at ±20000)	1	R/W

Note:

1) Since X1–X9 are multi-function inputs, it is necessary to set the functions with E01–E09.
2) The alarm reset is executed, when RST signal changes from ON to OFF even there are no alarming factors.
3) Universal Do is a function utilizing inverter's Do via transmission.
   (In detail, refer to the detail descriptions E20–E24 in "Function Explanation" in the instruction manual of inverter).
4) 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	Multistep freq. Selection		
	4, 5	RT1, RT2	ACC/DEC time selection		
	6	HLD	3-wire operation stop command	Invalid	
	7	BX	Coast-to-stop command	Valid	
	8	RST	Alarm reset		
	9	THR	Trip command (External fault)	Invalid	Valid
	10	JOG	Jogging operation	Invalid	
	11	Hz2/Hz1	Freq. set. 2 / Freq. set. 1	Valid	Invalid
	12	M2/M1	Motor 2 / Motor 1		
	13	DCBRK	DC brake command		
	14	TL2/TL1	Torque limiter 2 / Torque limiter 1		
	15, 16	SW50, SW60	Switching operation between line and inverter (50, 60Hz)		
	17, 18	UP, DOWN	UP, DOWN command	Invalid	Valid
	19	WE-KP	Write enable for KEYPAD	Valid	Invalid
	20	Hz/PID	PID control cancel		
	21	IVS	Inverse mode changeover (terminals 12 and C1)		
	22	IL	Interlock signal for 52-2	Invalid	Valid
	23	Hz/TRQ_	TRQ control cancel	Valid	Invalid
	24	LE	Link enable (Bus, RS485)	Invalid	Valid
	25	U-DI	Universal DI		
	26	STM	Pick up start mode	Valid	
	27	PG/Hz	SY-PG enable	Valid	Invalid
	28	SYC	Synchronization command		
	29	ZERO	Zero speed command		
	30	STOP1	Forced stop command	Invalid	Valid
	31	STOP2	Forced stop command with Deceleration time 4		
	32	EXITE	Pre-exciting command	Valid	

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 (GP10 : 20.00–150.00), 999	1.00	R/W
S11	Torque limit level 2 (Braking)	F41	%	0.00, 20.00–200.00 (GP10 : 20.00–150.00), 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,P" 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 (GP10: 0.00–120.00)	0.01	R
M06	Output frequency 1	-	-20000–20000 (Maximum frequency at ±20000)	1	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 (GP10:0.00–120.00)	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-Y5 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	0–65535	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	-	0–64999	1	R
M26	Transmission error code	-	Refer to the data format [1]	-	R
M27	Setting frequency at alarming (Final data)	-	-20000–20000 (Maximum frequency at 20000)	1	R
M31	Setting Frequency at alarming (Final data)	Hz	0–400.00 (P11S: 0.00–120.00)	0.01	R
M32	Output frequency at alarming	-	-20000–20000 (Maximum frequency at ±20000)	1	R
M33	Torque calculation value at alarming	%	-200.00–200.00	0.01	R
M34	Torque current at alarming	%	-200.00–200.00	0.01	R

Code	Description	Unit	Range	Min. unit	Read/Write
M35	Output frequency 1 at alarming	Hz	-400.00–400.00 (P11S: -120.00–120.00)	0.01	R
M36	Input power at alarming	%	0.00–200.00	0.01	R
M37	Output current at alarming	%	0.00–200.00 (Inverter rating at 100.00)	0.01	R
M38	Output voltage at alarming	V	0.0–600.0	1.0	R
M39	Operation command at alarming	-	Refer to the data format [11]	-	R
M40	Operating state at alarming	-	Refer to the data format [13]	-	R
M41	Y1-Y5 output terminal data at alarming	-	Refer to the data format [12]	-	R
M42	Operation time at alarming	h	0–65535	1	R
M43	DC link circuit voltage at alarming	V	0–1000	1	R
M44	Inverter internal air temp. at alarming	°C	0–120	1	R
M45	Cooling fin temp. at alarming	°C	0–120	1	R
M46	Life of main circuit capacitor	%	0.0–100.0	0.1	R
M47	Life of printed circuit board capacitor	h	0–65535	1	R
M48	Life of cooling fan	h	0–65535	1	R

Note :

1) The output frequency 1 is before slip compensation.

2) The output frequency 1 with speed regulator (using option SOPC-G11S-PG) is treated as the synchronous frequency.

3) Alarm code

Code	Description		Code	Description	
0	No alarm	---	28	PG error	Pg
1	Overcurrent (During acceleration)	OC1	31	Memory error	Er1
2	Overcurrent (During deceleration)	OC2	32	KEYPAD panel communication error	Er2
3	Overcurrent (While running at constant speed)	OC3	33	CPU error	Er3
5	Ground fault	EF	34	Option communication error	Er4
6	Overvoltage (During acceleration)	OU1	35	Option error	Er5
7	Overvoltage (During deceleration	OU2	36	Operating proc.error	Er6
8	Overvoltage (While running at constant speed)	OU3	37	Output phase loss error	Er7
10	Undervoltage	LU	38	RS485 communication error	Er8
11	Input phase lose	Lin	71	Check sum error	
14	Fuse blown	FUS	72	Parity error	
16	Output wiring error	Er7	73	Other errors	
17	Overheat of heat sink in inverter	OH1	74	Format error	
18	External alarm input	OH2	75	Command error	
19	Overheat of unit internal temp.	OH3	76	Priority of link	
22	Overheat of DB resistance	dbH	77	No writing right for error	
23	Electronic thermal overload relay (Motor1)	OL1	78	Function code error	
24	Electronic thermal overload relay (Motor2)	OL2	79	Forbidden writing error	
25	Electronic thermal overload relay (Inverter)	OLU	80	Data error	
27	Overspeed	OS	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
-	-	-	-	M31	5F2D	Setting frequency at alarming (Final data)	[5]
S01	5F01	Setting frequency (p.u.)	[2]				
-	5F02	-	-	M32	5F2E	Output frequency at alarming	[2]
-	5F03	-	-	M33	5F2F	Torque calculation value at alarming	[6]
-	5F04	-	-	M34	5F30	Torque current at alarming	[6]
S05	5F05	Setting frequency	[5]	M35	5F31	Output frequency 1 at alarming	[5]
S06	5F06	Operation command	[11]	M36	5F32	Input power at alarming	[5]
S07	5F07	Universal Do	[12]	M37	5F33	Output current at alarming	[5]
S08	5F08	Acceleration time	[3]	M38	5F34	Output voltage at alarming	[3]
S09	5F09	Deceleration time	[3]	M39	5F35	Operation command at alarming	[11]
S10	5F0A	Torque limit level 1	[5] *1	M40	5F36	Operating state at alarming	[13]
S11	5F0B	Torque limit level 1	[5] *1	M41	5F37	Y1-Y5 output terminal data at alarming	[12]
S12	5F0C	Universal Ao	[2]				
-	5F0D	-	-	M42	5F38	Operating time at alarming	[1]
-	5F0E	-	-	M43	5F39	DC link circuit voltage at alarming	[1]
M01	5F0F	Setting frequency (Final data)	[2]	M44	5F3A	Inverter internal air temp. at alarming	[1]
-	5F10	-	-				
-	5F11	-	-	M45	5F3B	Cooling fin temp. at alarming	[1]
-	5F12	-	-	M46	5F3C	Life of main circuit capacitor	[3]
M05	5F13	Setting frequency (Final data)	[5]	M47	5F3D	Life of printed circuit board capacitor	[1]
M06	5F14	Output frequency 1	[2]	M48	5F3E	Life of cooling fan	[1]
M07	5F15	Torque calculation value	[6]	-	5F3F	-	-
M08	5F16	Torque current	[6]	-	5F40	-	-
M09	5F17	Output frequency 1	[5]	-	5F41	-	-
M10	5F18	Input power	[5]	-	5F42	-	-
M11	5F19	Output current	[5]	-	5F43	-	-
M12	5F1A	Output voltage	[3]	-	5F44	-	-

M13	5F1B	Operation command (Final data)	[11]	-	5F45	-	-
M14	5F1C	Operating state	[13]	F00	5F46	Data protection	[1]
M15	5F1D	Y1-Y5 output terminal data	[12]	F01	5F47	Frequency command 1	[1]
M16	5F1E	Fault memory 0	[1]	F02	5F48	Operation method	[1]
M17	5F1F	Fault memory (1st prior)	[1]	F03	5F49	Maximum output frequency 1	[1]
M18	5F20	Fault memory (2nd prior)	[1]	F04	5F4A	Base frequency 1	[1]
M19	5F21	Fault memory (3rd prior)	[1]	F05	5F4B	Rated voltage 1	[1]
M20	5F22	Operating time	[1]	F06	5F4C	Maximum output voltage 1	[1]
M21	5F23	DC link circuit voltage	[1]	F07	5F4D	Acceleration time 1	[10]
-	5F24	-	-	F08	5F4E	Deceleration time 1	[10]
M23	5F25	Type code	[14]	F09	5F4F	Torque boost 1	[3]
M24	5F26	Capacity code	[9]	F10	5F50	Electronics thermal overload relay 1 (Selection)	[1]
M25	5F27	ROM version	[1]				
M26	5F28	Transmission error processing code	[1]	F11	5F51	Electronics thermal overload relay 1 (Level)	[10]
M27	5F29	Setting frequency at alarming (Final data)	[2]	F12	5F52	Electronics thermal overload relay 1	[3]
-	5F2A	-	-	F13	5F53	Electronics thermal overload relay (Braking resistor)	[1]
-	5F2B	-	-	F14	5F54	Restart after momentary power failure (Selection)	[1]
-	5F2C	-	-				

*1) 999 is treated as $7FFF_H$.

Code	PCP-index (Hex)	Name	Data Format	Code	PCP-index (Hex)	Name	Data Format
F15	5F55	Frequency limiter (High)	[1]	E37	5F87	Overload early warning 2 (level)	[10]
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]	E43	5F8A	LED monitor (Display selection)	[1]
F20	5F59	DC brake (Starting frequency)	[3]	E44	5F8B	LED monitor (Display at STP mode)	[1]
F21	5F5A	DC brake (Braking level)	[1]	E45	5F8C	LCD monitor (Display selection)	[1]
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]	C20	5F98	Jogging frequency	[5]
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) /	[4]
F42	5F69	Torque vector control 1	[1]			Analog input bias (terminal 12)	
E01	5F6A	X1 terminal function	[1]	C32	5F9B	Analog input offset (terminal C1) /	[4]
E02	5F6B	X2 terminal function	[1]			Analog input gain (terminal 12)	
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]
E06	5F6F	X6 terminal function	[1]	P03	5F9F	Motor 1 (Rated current)	[10]
E07	5F70	X7 terminal function	[1]	P05	5FA1	Motor 1 (On-line tuning)	[1]
E08	5F71	X8 terminal function	[1]	P06	5FA2	Motor 1 (No-load current)	[10]
E09	5F72	X9 terminal function	[1]	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]
E12	5F75	Acceleration time 3	[10]	H03	5FA6	Data initializing	[1] *2
E13	5F76	Deceleration time 3	[10]	H04	5FA7	Auto-reset (Times)	[1]
E14	5F77	Acceleration time 4	[10]	H05	5FA8	Auto-reset(Reset interval)	[1]
E15	5F78	Deceleration time 4	[10]	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]	H08	5FAB	Reverse phase sequence lock	[1]
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]
E22	5F7D	Y3 terminal function	[1]	H11	5FAE	Deceleration mode	[1]
E23	5F7E	Y4 terminal function	[1]	H12	5FAF	Instantaneous overcurrent limiting	[1]
E24	5F7F	Y5A, Y5C terminal functions	[1]	H13	5FB0	Auto-restart (Restart time)	[3]
				H14	5FB1	Auto-restart (Frequency fall rate)	[5]
E30	5F80	Frequency arrival (FAR) (Detecting width)	[3]	H15	5FB2	Auto-restart (Holding DC voltage)	[1]
E31	5F81	Frequency detection 1 (FDT) (level)	[1]	H16	5FB3	Auto-restart (OPR command selfhold time)	[3] *3
E32	5F82	Frequency detection (FDT) (Hysteresis width)	[3]	H18	5FB4	Torque control (Mode selection)	[1]
E33	5F83	Overload early warning (Mode selection)	[1]	H19	5FB5	Active drive	[1]
E34	5F84	Overload early warning 1 (level)	[10]	H20	5FB6	PID control (Mode selection)	[1]
E35	5F85	Overload early warning (Timer time)	[3]	H21	5FB7	PID control (Feed back signal)	[1]
E36	5F86	Frequency detection 2 (FDT) (level)	[1]	H22	5FB8	PID control (P-Gain)	[5]
				H23	5FB9	PID control (I-time)	[3]
				H24	5FBA	PID control (D-time)	[5]
				H25	5FBB	PID control (Feedback filter)	[3]

*1) 0.75 kHz is treated as 0000H

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

*3) 999 is treated as 03E7H (99.9).

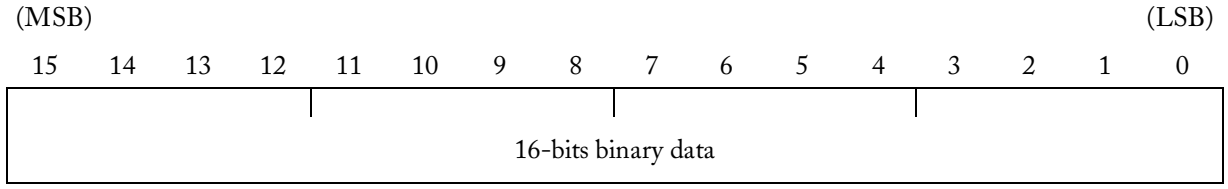
Code	PCP-index (Hex)	Name	Data Format	Code	PCP-index (Hex)	Name	Data Format
H26	5FBC	PTC thermistor (Mode selection)	[1]	o36	5FEB	Bus Configuration Parameter 07	[1]
H27	5FBD	PTC thermistor (Level)	[5]	o37	5FEC	Bus Configuration Parameter 08	[1]
H28	5FBE	Droop operation	[4]	o38	5FED	Bus Configuration Parameter 09	[1]
H30	5FBF	Serial link (Function selection)	[1]	o39	5FEE	Bus Configuration Parameter 10	[1]
H31	5FC0	RS485 (Address)	[1] *1	o40	5FEF	Bus Configuration Parameter 11	[1]
H32	5FC1	RS485 (Mode selection on error)	[1] *1	o41/	5FF0	Bus Configuration Parameter 12/	[1] /
H33	5FC2	RS485 (Timer time)	[3] *1	(o09)		Base side number of encoder pulses	[1]
H34	5FC3	RS485 (Baud rate)	[1] *1	o42/	5FF1	Bus Configuration Parameter 13/	[1] /
H35	5FC4	RS485 (Data length)	[1] *1	(o10)		Time constant of pulse train input filter	[7]
H36	5FC5	RS485 (Parity check)	[1] *1	o43/	5FF2	Bus Configuration Parameter 14/	[1] /
H37	5FC6	RS485 (Stop bits)	[1] *1	(o11)		Command pulse compensation coefficient 1	[1]
H38	5FC7	RS485 (No response detection time)	[1] *1	o44/	5FF3	Bus Configuration Parameter 15/	[1] /
H39	5FC8	RS485 (Response interval)	[5] *1	(o12)		Command pulse compensation coefficient 2	[1]
A01	5FC9	Maximum frequency 2	[1]	o45/	5FF4	Bus Configuration Parameter 16/	[1] /
A02	5FCA	Base frequency 2	[1]	(o13)		Main speed regulator gain	[3]
A03	5FCB	Rated voltage 2 (at base speed)	[1]	o46/	5FF5	Bus Configuration Parameter 17/	[1] /
A04	5FCC	Maximum output voltage 2	[1]	(o14)		APR P gain	[5]
A05	5FCD	Torque boost 2	[3]	o47/	5FF6	Bus Configuration Parameter 18/	[1] /
A06	5FCE	Electronics thermal 2 (Selection)	[1]	(o15)		Z phase matching gain	[3]
A07	5FCF	Electronics thermal 2 (Level)	[10]	o48/	5FF7	Bus Configuration Parameter 19/	[1] /
A08	5FD0	Electronics thermal 2 (Thermal time constant)	[3]	(o16)		Offset angle	[1]
				o49/	5FF8	Bus Configuration Parameter 20/	[1] /
A09	5FD1	Torque vector control 2	[1]	(o17)		Detecting angle width for completion of synchronizing	[1]
A10	5FD2	Motor 2 (Number of motor-2 poles)	[1]				
A11	5FD3	Motor 2 (Capacity)	[5]	o50/	5FF9	Bus Configuration Parameter 21/	[1] /
A12	5FD4	Motor 2 (Rated current)	[10]	(o18)		Too mach deviation	[1]
				o51	5FFA	Bus Configuration Parameter 22/	[1]
A14	5FD6	Motor 2 (On-line tuning)	[1]	o52	5FFB	Bus Configuration Parameter 23/	[1]
A15	5FD7	Motor 2 (No load current	[10]	o53	5FFC	Bus Configuration Parameter 24/	[1]
A16	5FD8	Motor 2 (%R1 setting)	[5]	o54	5FFD	Bus Configuration Parameter 25/	[1]

A17	5FD9	Motor 2 (%X setting)	[5]	o55	5FFE	Bus Configuration Parameter 26/	[1]
A18	5FDA	Motor 2 (Slip compensation control 2)	[5]				
o01	5FDB	Speed command system / automatic speed control system	[15]				
o02	5FDC	Time constant of PG vector and speed command filter	[7]				
o03	5FDD	Number of feedback PG pulses	[1]				
o04	5FDE	Constant P of feedback speed controller	[5]				
o05	5FDF	Constant I of feedback speed controller	[7]				
o06	5FE0	Time constant of feedback speed detection filter	[7]				
o07	5FE1	Feedback pulse correction coefficient 1	[1]				
o08	5FE2	Feedback pulse correction coefficient 2	[1]				
o27	5FE3	Mode selection on error	[1]				
o28	5FE4	Timer time setting	[3]				
o30	5FE5	Bus Configuration Parameter 01	[1]				
o31	5FE6	Bus Configuration Parameter 02	[1]				
o32	5FE7	Bus Configuration Parameter 03	[1]				
o33	5FE8	Bus Configuration Parameter 04	[1]				
o34	5FE9	Bus Configuration Parameter 05	[1]				
o35	5FEA	Bus Configuration Parameter 06	[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,

$-20 * 1 = -20 = FFEC_H$(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,

$-5.0 * 10 = -50 = FFCE_H$(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%,

$-85.38 * 100 = -8538 = DEA6_H$(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 = $FB2E_H$(two's complement) ->

F	B	2	E

Data format [9] Capacity code

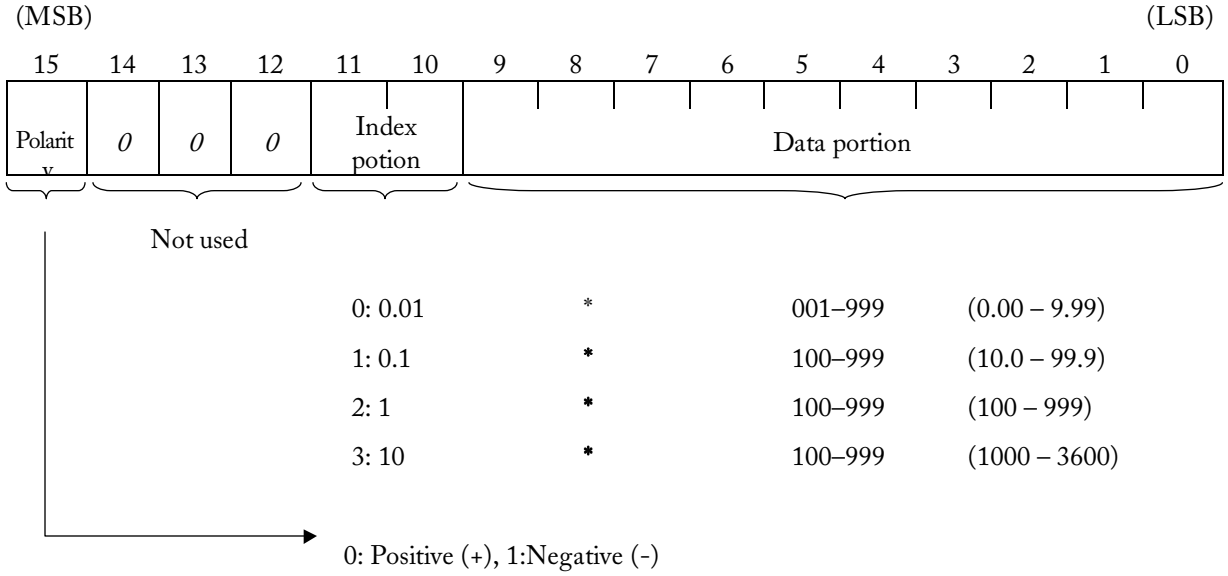
Code	Capacity (kW)	Code	Capacity (kW)	Code	Capacity (kW)
5	0.05	1100	11	11000	110
10	0.1	1500	15	13200	132
20	0.2	1850	18.5	16000	160
40	0.4	2200	22	20000	200
75	0.75	3000	30	22000	220
150	1.5	3700	37	25000	250
220	2.2	4500	45	28000	280
370	3.7	5500	55	31500	315
550	5.5	7500	75	35500	355
750	7.5	9000	90	40000	400

Example) If 30kW

Since 30 * 100 = 3000 = $0BB8_H$ ->

0	B	B	8

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



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

20.0 = 0.1 * 200 ->

0	4	C	8

Data format [11] Operation command

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(RST)	*0*	*0*	*0*	*0*	X9	X8	X7	X6	X5	X4	X3	X2	X1	REV	FWD

Alarm reset — Not used — Multi-function command

FWD: Forward rotation command

REV: Reverse rotation command

(All bits are ON by 1)

Example) If M13 (Operation command, Final command) = FWD, X1, X5 = ON,

$0000\ 0000\ 0100\ 0101_b = 0045_H$ ->

0	0	4	5

Data format [12] Universal output terminal

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	Y5	Y4	Y3	Y2	Y1

Not used — Universal command

(All bits are ON by 1)

Example) If M15 (Universal output terminal) = Y1, Y5 = ON,

$0000\ 0000\ 0001\ 0001_b = 0011_H$ ->

0	0	1	1

Data format [13] Operating status

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
-	WR		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	WR:	Function writing right
NUV:	DC link voltage is establishment (Undervoltage condition at 0)		0: Keypad panel
			1: RS485
TL:	In torque limiting		2: Link (option)
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)

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Data 4				Data 3				Data 2				Data 1			

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

Since 123 = 0123_H ⇒

0	1	2	3