Fnet OPTION BOARD
SV-iS5 Series

LG 산전

Before Installing

This manual describes about the installation, operation, and precautions of Fnet board of iS5 series. Read the manual and precautions thoroughly before installation and operation. If not, it may cause break down of board and shorten the product life.

> ### ⚠ CAUTION
>
> - Do not install the option board when the power is introduced. If not, both of the inverter and option board may be broke down. (Attach and detach the option board to the inverter control board after the capacitor discharged)
> - ESD can cause break down of CMOS components. Do not touch the CMOS components without the board is grounded.
> - Do not change the communication cable with the inverter power is turned on.
> - Make sure to precisely insert the connector of inverter and option board
> - Make sure the connection of signal wire (P, N). P signal wire must be connected to the P terminal.
> - Connect terminal resistor at the last connected option board of 110 ohm, 1/2 watt. (refer to Figure 6)
> - Check the parameter unit when setting the parameters.

1. Introduction

Fnet board provides control and monitoring of iS5 series inverter for GLOFA PLC via high-speed serial communication. The communication protocol is programmed with GLOFA PLC.

1.1. Benefits of using Fnet board

- It is possible to control the inverter with high-speed communication of 1M BPS.
- Easy installation and change of a system because the control and monitoring of inverter is accomplished by PLC programming.
- Multiple inverters can be connected only with 2 line wires, providing time saving and easy maintenance.
- Easy system integration by using PLC related devices.

1.2. Contents included

Fnet option consists 1 Fnet board, 2 connectors, 3 supporters, and manual.

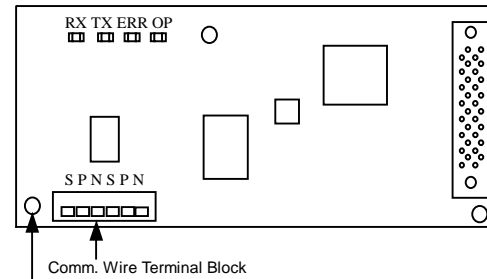## 2. Configuration and Installation

2.1. Configuration

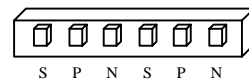**Figure 1. Board Configuration**

2.1.1. Comm. Wire Terminal Blcok

S P N S P N

Figure 2. Comm. Wire Terminal Blcok

S	P	N
Shield	Comm. Signal Wiring (P)	Comm. Signal Wiring (N)

* Two sets of "S", "P", "N" signal is connected in parallel respectively.

* Connect terminal resistor at the last connected inverter between terminal P and N. (refer to Figure 6.)

2.1.2. Frame Ground

Frame Ground is connected to the ground of inverter.
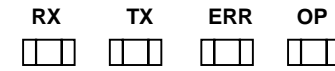
2.1.3. Display LED

RX   TX   ERR   OP

Figure 3. Display LED

LED	Description	
RXD	ON during receiving	
TXD	ON during transmitting	
ERR	ON when there is frame error	
OP	Normal operation	Flickering by every 1 sec
	Fnet Comm. trouble	Flickering by every 500 msec
	DPRAM trouble	Flickering by every 2 sec

2.2. Installing on Inverter Board

- Unscrew the crews that fasten the inverter board and install the copper supporters proveded.
- Install the Fnet board by inserting the connector of inverter and Fnet board and tighten the screws that unscrewed from the inverter board.
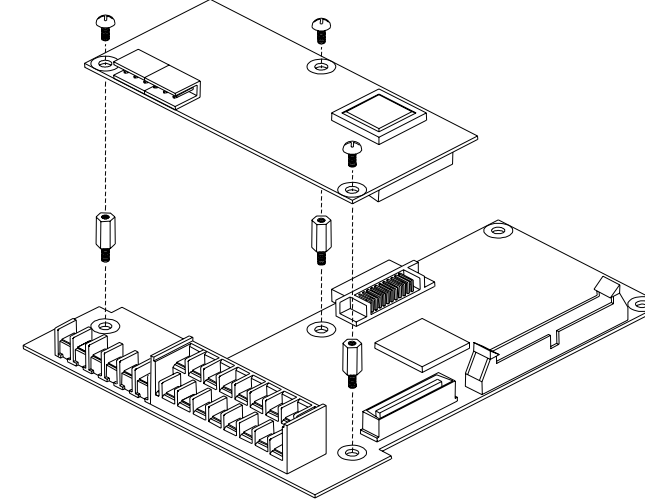
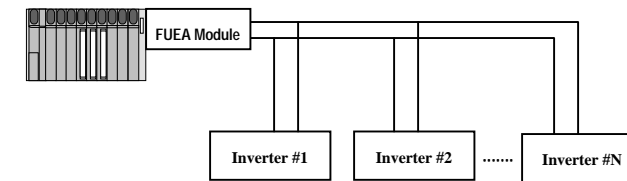**Figure 4. Installing Fnet board on Inverter board**

3. System Configuration

Figure 5. Example of System Configuration

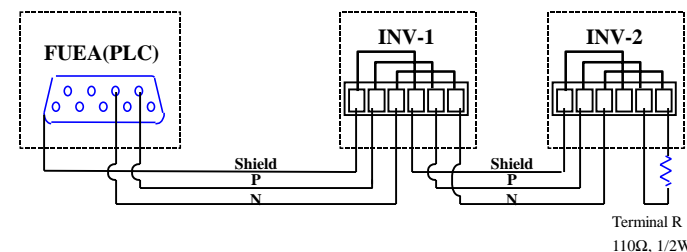### 3.1. Connection between PLC (FUEA) and Inverter (iS5)

Terminal R
110Ω, 1/2W

Figure 6. Wiring

4. Comm. Specification

Speed	1 M bps
Method	Manchester Biphase-L, Frame Synchronous method
Comm. Cable	Twisted Pair Shielded Cable, Dedicated cable Cable Type: LIREV-AMESB 1φ (PC 717 6705), Manufacturer: LG Cable
Node	Max. 64 per line
Length	Max. 750 m
Frame Format	Field Bus(IEC TC65 / SC65C / WG6 65C 90.8)

5. Operating

5.1. Power On Test

Turn on the inverter power after installing the option boar, and then inverter perform Power On test.

> First Op LED starts flickering and Err LED, Tx LED, Rx LEDs flickers at interval of **250ms.**

COM	Opt B/D
01	PLC-GF

5.2. Setting Inverter Parameter

Set inverter parameters described below using keypad.

5.2.1. Checking Option board [COM group/code# 01: PLC-GF]

This parameter checks the option board installed on inverter board. This code must display "PLC-GF".

5.2.2. Setting Inverter Number [COM group/code# 17: 0 ~ 63]

This parameter sets the station number of inverter. Inverter number must match the station number set in PLC. Setting a same number at more than one inverter cause communication error.

COM	Station ID
17	1

5.2.3. Setting Option Mode [COM group/code# 02]

Set the mode of Fnet board.

COM	Opt mode
02	None

- **None**
  Inverter is controlled by keypad or control terminal instead Fnet board.
- **Command**
  Inverter takes just run commands of Forward Run, Reverse Run, and Stop from the Fnet board.
- **Freq**
  Inverter takes just frequency command from the Fnet board.
- **Cmd + Freq**
  Inverter takes all commands from the Fnet board.

5.2.4. Setting Lost Command [I/O group/code# 48]

This parameter set the actions of inverter ahead when the communication is disconnected (timeout) by some reasons such like DPRAM error, cable cutting.

I/O	Lost command
48	None

<In case of "timeout" error >

- None: Inverter keeps the command that just have before the disconnection of communication.
- FreeRun: Inverter stops with FreeRun (Coast to stop).
- Stop: Inverter stops with the deceleration ramp set at FU1 # 06.

5.2.5. Setting timeOut [I/O group/code# 49]

This Parameter sets the time that inverter decides disconnection of communication. Inverter takes actions of Lost Command after this set time.

I/O	Time out
49	1.0 sec

Default value is 1 second.

- If the Lost Command(I/O #48) is set at "None", inverter keeps running depends on the status of comm. Disconnection. This situation may cause serious accident in some cases. It is strongly recommended to set at "FreeRun" or "Stop" to prevent unexpected accident.
- Do not set the "timeout" less than the communication cycle between PLCand inverter.
- Do not use an inverter station ID number same as other device's station ID. This may cause a conflict in the communication system.

6. Trouble shooting

If the communication function doesn't work properly, check the status LED on Fnet voard as described below.

Check point	LED status	Cause	Remedy
OP LED	No blinking	1. Power connection failure 2. CPU error(defective) 3. LED error(defective)	1. Check connection and power 2,3. Repair or change.
	Blinking at 500ms cycle	Fnet communication error	Check connection (com. line) Check enable status of PLC
	Blinking at 2sec. cycle	DPRAM error	Check connection with inverter Repair or change
ERR LED	ON	Damage due to noise	Check communication line Check noise source
TXD, RXD LED	TXD, RXD LED : OFF OP LED : blinking at 500ms cycle	No data exchange.	Check communication lie Check enable status of PLC
	RXD, TXD LED : OFF OP LED : blinking at 500ms cycle	Wrong parameter set	Check inverter station ID is correct
	RXD, TXD LED : ON OP LED : blinking at 1 sec. Motor : doesn't run	Normality	Check set of #51 Opt mode of EXP group

7. Parameter code (address is hexadecimal)

<Common area> : Available in all models regardless inverter rating

Parameter address	Description	Unit	Read/ Write	Data value
0000	Inverter type	-	R	4: SV-iS5
0001	Inverter capacity	-	R	0: 0.75 1:1.5 2:2.2 3: 3.7 4: 5.5 5: 7.5 6: 11 7: 15 8: 18.5 9: 22 (220V class) 10: 0.75 11:1.5 12:2.2 13: 3.7 14: 5.5 15: 7.5 16: 11 17: 15 18: 18.5 19: 22(400V class) (Unit : kW)
0002	Input voltage	-	R	0: 220V 1: 400/440V
0003	version	-	R	0100: Ver. 1.00, 0101: Ver 1.01
0004	Parameter change	-	R/W	0: Not available(default) – N/A 1: Available
0005	Command freq.	0.01 Hz	R/W	N/A
0006	Run command	-	R/W	N/A
0007	Accel. time	0.1 sec	R/W	
0008	Decel. Time	0.1 sec	R/W	
0009	Output current	0.1 A	R	
000A	Output freq.	0.01 Hz	R	
000B	Output voltage	1 V	R	
000C	DC Link voltage	1 V	R	
000D	Output power	1 W	R	
000E	Operational status	-	R	Bit 0:Stop, Bit 1:Forward Bit 2:Reverse Bit 3:Fault(Trip) Bit 4:in Accel. Bit 5:in Decel. Bit 6:Reaching to target Bit 7:in DC Braking, Bit 8:in Stop Bit 9: Present direction Bit10: Brake open Bit13: Rem. Run/Stop Bit14: Rem. Freq. Cmd

Parameter address	Description	Unit	Read/Write	Data value
000F	Trip information	-	R	Bit 0: OC, Bit 1: OV, Bit 2: EXT-A Bit 3: BX, Bit 4: LV, Bit 5: Fuse Open, Bit 6: GF Bit 7: OH, Bit 8: ETH, Bit 9: OLT Bit 10: HW-Diag Bit 11:EXT-B Bit 12:ASHT Bit 13:OPT Bit 14:PO Bit 15:IOLT
0010	Input terminal information	-	R	Bit 0: FX, Bit 1: RX, Bit 2: BX Bit 3: RST,- Bit 8: P1, Bit 9: P2, Bit 10: P3 Bit 11: P4, Bit 12: P5, Bit 13: P6
0011	Output terminal information	-	R	Bit 0: Q1 (OC1) , Bit 1: Q2 (OC2) Bit 2: Q3 (OC3), Bit 3: AUX
0012	V1	-	R	0 – FFFF
0013	V2	-	-	
0014	I	-	R	0 – FFFF
0015	RPM	-	R	
0016	Run command(Option)((Note 1)	0.01Hz	R/W	Bit 0:Stop, Bit 1:Forward Bit 2:Reverse Bit 3:Fault reset Bit 4:Emergency stop
0017	Command freq. (Option)	0.01Hz	R/W	0 – 60000
0018	Slip freq.(Option)	0.01Hz	R/W	0 – 60000
0019	Ramp Freq.(Option)	0.01Hz	R/W	0 – 60000

(Note 1) * Run command is activating when 0 is triggered to 1.

   * Run command 0 set makes "stop".

(Note 2) Parameter changed in common area can not be stored. The modified parameter is available during the present operation but it is not valid after the power of disconnection or reset. It returns to default value. The parameter changed in other groups is valid until it is changed to new.

< DRV Group >

Address	No.	Description	Default	Max. value	Min. value	Unit
5100	DRV#00	Cmd. Freq.	0	max freq.	Start freq.	0.01Hz
5101	DRV#01	Acc. Time	50	60000	0	0.01sec
5102	DRV#02	Dec. Time	100	60000	0	0.01sec
5103	DRV#03	Drive mode	1	2	0	
5104	DRV#04	Freq. mode	0	4	0	
5105	DRV#05	Step freq - 1	1000	MaxFreq	startFreq	0.01Hz
5106	DRV#06	Step freq - 2	2000	MaxFreq	startFreq	0.01Hz
5107	DRV#07	Step freq - 3	3000	MaxFreq	startFreq	0.01Hz
510A	DRV#10	DC Link Voltage	0	-	-	V

< FU1 Group >

Address	No.	Desciption	Default	Max. value	Min. value	Unit
5201	FU1 #01	Drive mode	1	2	0	
5202	FU1 #02	Freq. mode	0	4	0	
5203	FU1 #03	Run prohibit	0	2	0	
5205	FU1 #05	Acc. pattern	0	4	0	
5206	FU1 #06	Dec. pattern	0	4	0	
5207	FU1 #07	Stop mode	0	2	0	
5208	FU1 #08	DcBr freq.	500	6000	startFreq	0.01Hz
5209	FU1 #09	DcBlk time	10	6000	0	0.01sec
520A	FU1 #10	DcBr value	50	1000	0	0.1%
520B	FU1 #11	DcBr time	10	600	0	0.1sec
520C	FU1 #12	DcSt value	50	1000	0	0.1%
520D	FU1 #13	DcSt time	0	600	0	0.1sec
5214	FU1 #20	Max freq.	6000	40000	4000	0.01Hz
5215	FU1 #21	Base freq.	6000	maxFreq	3000	0.01Hz
5216	FU1 #22	Start freq.	50	1000	10	0.01Hz
5217	FU1 #23	Freq limit	0	1	0	
5218	FU1 #24	F-limit Lo.	0	highFreq	startFreq	0.01Hz
5219	FU1 #25	F-limit Hi.	6000	maxFreq	lowFreq	0.01Hz
521A	FU1 #26	Torque boost	0	1	0	
521B	FU1 #27	Fwd boost	20	200	0	0.1%
521C	FU1 #28	Rev boost	20	200	0	0.1%
521D	FU1 #29	V/F pattern	0	2	0	
521E	FU1 #30	User freq. 1	1500	maxFreq	0	0.01Hz
521F	FU1 #31	User volt. 1	25	100	0	%
5220	FU1 #32	User freq. 2	3000	maxFreq	0	0.01Hz
5221	FU1 #33	User volt. 2	50	100	0	%
5222	FU1 #34	User freq. 3	4500	maxFreq	0	0.01Hz
5223	FU1 #35	User volt. 3	75	100	0	%
5224	FU1 #36	User freq. 4	6500	maxFreq	0	0.01Hz
5225	FU1 #37	User volt. 4	100	100	0	%
5226	FU1 #38	Volt control	100	110	40	%
5227	FU1 #39	Energy save	0	80	0	%
5232	FU1 #50	ETH select	0	1	0	
5233	FU1 #51	ETH 1min	150	200	contPerc	%
5234	FU1 #52	ETH Cont	100	150	50	%
5235	FU1 #53	Motor type	0	1	0	
5236	FU1 #54	OL level	150	150	30	%
5237	FU1 #55	OL time	100	300	0	0.1sec
5238	FU1 #56	OLT select	0	1	0	
5239	FU1 #57	OLT level	180	200	30	%
523A	FU1 #58	OLT time	600	60000	0	0.1sec
523B	FU1 #59	Stall prev.	0	7	0	
523C	FU1 #60	Stall level	150	150	30	%

< FU2 Group >

Address	No.	Description	Default	Max. Value	Min.Value	Unit
530A	FU2 #10	Jump freq	0	1	0	
530B	FU2 #11	jump lo 1	1000	jump Hi 1	StartFreq	0.01Hz
530C	FU2# 12	jump Hi 1	1500	maxFreq	jump Lo 1	0.01Hz
530D	FU2 #13	jump lo 2	2000	jump Hi 2	StartFreq	0.01Hz
530E	FU2 #14	jump Hi 2	2500	maxFreq	jump Lo 2	0.01Hz
530F	FU2 #15	jump lo 3	3000	jump Hi 3	startFreq	0.01Hz
5310	FU2 #16	jump Hi 3	3500	maxFreq	jump Lo 3	0.01Hz
5314	FU2 #20	Power-on run	0	1	0	
5315	FU2 #21	RST restart	0	1	0	
5316	FU2 #22	Speed Search	0	15	0	
5317	FU2 #23	SS Sup-Curr	100	200	80	
5318	FU2 #24	SS P-gain	1000	30000	0	
5319	FU2 #25	SS I-gain	10000	30000	0	
531A	FU2 #26	Retry number	0	10	0	
531B	FU2 #27	Retry delay	10	600	0	0.1sec
531E	FU2# 30	Motor select	0	9	0	
531F	FU2# 31	Pole number	4	12	2	
5320	FU2 #32	Rated-Slip	200	1000	0	0.01Hz
5321	FU2 #33	Rated-Curr	18	2000	10	0.1A
5322	FU2 #34	Noload-Curr	7	2000	5	0.1A
5324	FU2 #36	Efficiency	72	100	70	
5327	FU2 #39	Carrier freq	50	150	10	0.1kHZ
5328	FU2 #40	Control mode	0	3	0	
5329	FU2 #41	Auto tuning	0	1	0	
532A	FU2 #42	Rs	0	5000 (Note 3)	0	0.001ohm
532B	FU2 #43	Rr	0	5000 (Note 4)	0	0.001ohm

Address	No	Description	Default	Max. value	Min.value	Unit
532C	FU2 #44	Lsigma	0	MaxInduc (Note 5)	0	0.001mH
5332	FU2 #50	PID F/B	0	2	0	
5333	FU2 #51	PID P-gain	3000	30000	0	
5334	FU2 #52	PID I-time	300	30000	0	
5335	FU2 #53	PID D-time	1	30000	0	
5336	FU2 #54	PID limit	6000	maxFreq	StartFreq	0.01Hz
5346	FU2 #70	Acc/Dec freq	0	1	0	
5347	FU2 #71	Time scale	1	2	0	
5348	FU2 #72	PowerOn disp	0	6	0	
5349	FU2 #73	User disp	0	2	0	
534A	FU2 #74	RPM factor	100	200	1	%
534B	FU2 #75	DB mode	1	2	0	
534C	FU2 #76	DB %ED	10	30	0	%
534F	FU2 #79	S/W Version				
5351	FU2 #81	2nd Acc time	50	60000	0	0.01sec
5352	FU2 #82	2nd Dec time	100	60000	0	0.01sec
5353	FU2 #83	2nd BaseFreq	6000	maxFreq	3000	0.01Hz
5354	FU2 #84	2nd V/F	0	2	0	
5355	FU2 #85	2nd F-boost	20	200	0	0.1%
5356	FU2 #86	2nd R-boost	20	200	0	0.1%
5357	FU2 #87	2nd Stall	150	150	30	%
5358	FU2 #88	2nd ETH 1min	150	200	2nd ETH Cont	%
5359	FU2 #89	2nd ETH Cont.	100	2nd ETH 1min	50	%
535A	FU2 #90	2nd R-Curr	36	2000	10	0.1A
538D	FU2 #93	Para. init	0	6	0	

(Note 3,4,5) The values are vary for the motor ratings.

< I/O Group >

Address	No	Description	Default	Max. value	Min.value	Unit
5401	I/O #01	V1 filter	10	10000	0	ms
5402	I/O #02	V1 volt x1	0	V1 vort x2	0	0.01V
5403	I/O #03	V1 freq y1	0	maxFreq	0	0.01Hz
5404	I/O #04	V1 volt x2	1000	1000	V1 volt x1	0.01V
5405	I/O #05	V1 freq y2	6000	maxFreq	0	0.01Hz
5406	I/O #06	I filter	10	10000	0	ms
5407	I/O #07	I curr x1	0	I curr x2	0	0.01mA
5408	I/O #08	I freq y1	0	maxFreq	0	0.01Hz
5409	I/O #09	I curr x2	2000	2000	I curr x1	0.01mA
540A	I/O #10	I freq y2	6000	maxFreq	0	0.01Hz
540B	I/O #11	Wire broken	0	2	0	
540C	I/O #12	P1 define	0	25	0	
540D	I/O #13	P2 define	1	25	0	
540E	I/O #14	P3 define	2	25	0	
540F	I/O #15	In Status	0	1	0	
5410	I/O #16	Out Status	0	1	0	
5411	I/O #17	Ti Filt Num	15	50	2	
5414	I/O #20	Jog freq	1000	MaxFreq	startFreq	0.01Hz
5418	I/O #24	Step freq - 4	4000	MaxFreq	startFreq	0.01Hz
5419	I/O #25	Step freq - 5	5000	MaxFreq	startFreq	0.01Hz
541A	I/O #26	Step freq - 6	4000	MaxFreq	startFreq	0.01Hz
541B	I/O #27	Step freq - 7	3000	MaxFreq	startFreq	0.01Hz
541E	I/O #30	Acc time– 1	200	60000	0	0.1sec
541F	I/O #31	Dec time – 1	200	60000	0	0.1sec
5420	I/O #32	Acc time – 2	300	60000	0	0.1sec
5421	I/O #33	Dec time – 2	300	60000	0	0.1sec
5422	I/O #34	Acc time – 3	400	60000	0	0.1sec
5423	I/O #35	Dec time - 3	400	60000	0	0.1sec
5428	I/O #40	FM mode	0	3	0	
5429	I/O #41	FM adjust	100	400	10	%
542A	I/O #42	FDT freq	3000	maxFreq	0	0.01Hz
542B	I/O #43	FDT band	1000	maxFreq	0	0.01Hz
542C	I/O #44	Aux mode	12	18	0	
542D	I/O #45	Relay mode	2	7	0	BIT3
542E	I/O #46	Inv No.	1	32	1	
542F	I/O #47	Baud rate	0	4	0	
5430	I/O #48	Lost command	0	2	0	
5431	I/O #49	Time out	1	1200	1	0.1sec
5432	I/O #50	Auto mode	0	2		

< EXT Group >

Address	No.	Description	Default	Max. value	Min.value	Unit
5501	EXT #01	Sub B/D	0	8	0	
5532	EXT #50	OPT B/D	0	3	0	
5533	EXT #51	OPT mode	0	3	0	
555A	EXT #90	Station ID	1	63	0	