Data Sheet

LG Programmable Logic Controller
Computer Link (Cnet) Module
GLOFA-GM G3L-CUEA
G4L-CUEA

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702005387

Before handling the product

Read this data sheet carefully prior to any operation, mounting, installation or start-up of the product.

Materials for GLOFA GM

Name	Code
GLOFA GMWIN (Programming Software)	702005047
GLOFA GM (Instruction & programming)	702005058
GLOFA-GM3/4	702004919
GLOFA GM Cnet	702005069

❑ Safety Precautions

Be sure to read carefully the safety precautions given in data sheet and user's manual before operating the module and follow them.

The precautions explained here only apply to the GLOFA-GM Cnet (Computer Link). For safety precautions on the PLC system, see the GLOFA GM3/4 User's Manuals.

A precaution is given with a hazard alert triangular symbol to call your attention, and precautions are represented as follows according to the degree of hazard.

⚠WARNING ⇨ If not provided with proper prevention, it can cause death, fatal injury or considerable loss of property.

⚠CAUTION ⇨ If not properly observed, it can cause a hazard situation to result in severe or slight injury or a loss of property.

However, a precaution followed with **⚠CAUTION** can also result in serious conditions.

Both of two symbols indicate that an important content is mentioned, therefore, be sure to observe it.

Keep this manual handy for your quick reference in necessary.

❑ Design Precautions

⚠CAUTION

▶Do not run I/O signal lines near to high voltage line or power line. Separate them as 100 mm or more as possible. Otherwise, noise can cause module malfunction.

❑ Installation Precautions

⚠CAUTION

▶Operate the PLC in the environment conditions given in the general specifications.

▶If operated in other environment not specified in the general specifications, it can cause an electric shock, a fire, malfunction or damage or degradation of the module.

▶Make sure the module fixing pro-jections is inserted into the module fixing hole and fixed.

▶Improper installation of the module can cause malfunction, disorder or falling.

❑ Wiring Precautions

⚠CAUTION

- ▶ When grounding a FG terminal, be sure to provide class 3 grounding which is dedicated to the PLC.
- ▶ Before the PLC wiring, be sure to check the rated voltage and terminal arrangement for the module and observe them correctly.
  If a different power, not of the rated voltage, is applied or wrong wiring is provided, it can cause a fire or disorder of the nodule.
- ▶ Drive the terminal screws firmly to the defined torque. If loosely driven, it can cause short circuit, a fire or malfunction.
- ▶ Be careful that any foreign matter like wire scraps should not enter into the module. It can cause a fire, disorder or malfunction.

❑ Test RUN and Maintenance Precautions

⚠WARNING

▶Do not contact the terminals while the power is applied. It can cause malfunction.

▶When cleaning or driving a terminal screw, perform them after the power has been turned off.

⚠CAUTION

▶ Do not separate the module from the printed circuit board(PCB), or do not remodel the module. They can cause disorder, malfunction, damage of the module or a fire. Do not mount or dismount the module while the power is on.

❑ Waste Disposal Precautions

⚠CAUTION

▶ When disposing the module, do it as an industrial waste.

1. Introduction

This data sheet provides brief information about characteristics, configuration, and usage of GLOFA PLC Computer Link (Cnet).

2. General Specifications

No	Item	Specifications				Standard
1	Operating temperature	0 ~ 55℃				
2	Storage temperature	-25 ~ 70℃				
3	Operating Humidity	5 ~ 95%RH, non-condensing				
4	Storage humidity	5 ~ 95%RH, non-condensing				
5	Vibration	Occasional vibration				IEC 1131-2
		Frequency	Acceleration	Amplitude	Sweep count	
		10≤ f＜ 57 Hz	-	0.075 mm	10 times in each direction for X, Y, Z	
		57 ≤ f≤ 150 Hz	9.8㎨ {1G}	-		
		Continuos vibration				
		Frequency	Acceleration	Amplitude		
		10≤ f＜ 57 Hz	-	0.035 mm		
		57≤ f≤ 150 Hz	4.9㎨{0.5G}	-		
6	Shocks	*Maximum shock acceleration: 147㎨ {15G} *Duration time :11 ms *Pulse wave: half sine wave pulse(3 times in each of X, Y and Z directions)				IEC 1131-2
7	Noise immunity	Square wave impulse noise	± 1,500 V			
		Electrostatic discharge	Voltage :4kV(contact discharge)			IEC 1131-2 IEC 801-2
		Radiated electromagnetic field	27 ~ 500 MHz, 10 V/m			IEC 1131-2 IEC 801-3
		Fast transient burst noise	Severity Level	All power modules	Digital I/Os (Ue ≥ 24 V)	Digital I/Os (Ue < 24 V) Analog I/Os communication I/Os	IEC 1131-2 IEC 801-4
			Voltage	2 kV	1 kV	0.25 kV	
8	Atmosphere	Free from corrosive gases and excessive dust				
9	Altitude for use	Up to 2,000m				
10	Pollution degree	2 or lower				
11	Cooling method	Self-cooling				

3. Performance Specifications

Item		Specifications	
Serial Communication Channel		RS-232C 1 Channel	RS-232C standards conformed.
		RS-422/485 1 Channel[1]	RS-422/485 standard conformed.
MODEM Connection Function		Remote communication with external devices such as computer, etc. is possible via public telephone line by connecting external modem to Cnet[2]	
Operating Mode (Operating Mode can be set by operating switch for RS-232C/RS-422 channels respectively)		Dedicated Protocol	Supporting multidrop/1:1 communication by using dedicated protocol for LG Industrial Systems.
		GMWIN Protocol	PLC remote control is possible through GMWIN by using its connection function for GLOFA PLC.
		User-defined Protocol	Operated by user defined protocol using frame editor (for other manufacturer's interface)
Data Type	Data Bit	7 or 8	With frame editor, basic parameter is able to be selected[3]
	Stop Bit	1 or 2	
	Start Bit	1 or 2	
	Parity	Even / Odd / None	
Channel Selection		Stand-alone/interlocking channel are able to be selected by operating mode switch[4]	
Synchronization Type		Asynchronous type	
Transmission speed (bps)		300/600/1200/2400/4800/9600/19200/38400/76800/153600 bps [5]	
Station No. Setting		Set by using frame editor, Max. 32 stations are able to be set (from 0 to 31)	
Transmission Distance		RS-232C : Max. 15m(Extendible with MODEM)	
		RS-422 : Max. 500m	
Diagnosis Function		Loop-Back diagnosis	
		Indication of operating status with 16 LEDs during operating	
Current Consumption		100mA or less	

NOTE

[1] With frame editor, selection of RS-422 or RS-485 is possible.
[2] In case of connecting channel RE-232C to modem, the modem connection is selected in setting menu of RS-232C communication type of frame editor.
[3] Transmission specification can be set according to each of RS-232C and RS-422 in case of the operating mode of the stand-alone channel.
[4] Channel selection is set between operating mode by channel and stand-alone/interlocking channel by the operating mode witch. Change of channel mode is impossible during operating.
[5] 76800/153600 bps is provided in RS-422(RS-485), and can be used in Cnet module of Version 1.3 or later.

4. Cable Specifications

When using RS-422 or RS-485 communication channel, twisted pair cable shall be used in consideration of communication distance and speed. Table 4.1 describes recommended specifications of cable. Also when using another cable than recommended one, the cable conformed to characteristics of Table 4.1 shall be used.

- Item : Low Capacitance LAN Interface Cable
- Type : LIREV-AMESB
- Size : 2P X 22AWG(D/0.254 TA)
- Manufacturer : LG Cable Co., Ltd.

[Table 4.1] Specifications of GLOFA Cnet twisted pair cable

1) Electrical characteristics

Test Item	Unit	Characteristic	Test Condition
Conductor Resistance	Ω/kM	59 or less	General Temperature
Withstanding Voltage (DC)	V/1min	500V, 1minute	In air
Insulation Resistance	MEGA Ω-kM	1,000 or more	General Temperature
Capacity	pf/M	45 or less	1 kHz
Characteristic Impedance	Ω	120 ± 12	10 MHz

2) Appearance Characteristic

Items			Solid Cable	Standard Cable
Conductor	Core	Pair	2	2
	Size	AWG	22	22
	Outer Diameter	mm	0.64	0.76
Insulator	Thickness	mm	0.55	0.55
	Outer Diameter	mm	1.64	1.76

5. Structure and Configuration

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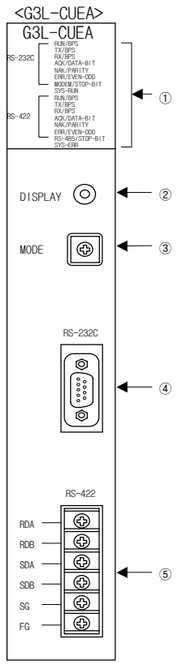

No.	Name	Description
①	LED Display	Indicates operating status of G3L-CUEA (See 5.1)
②	Display Switch	Switch for indication of parameter and station number. (See 5.2)
③	Mode Switch	Set operation mode (See 5.3)
④	RS-232C Connector	RS-232C connector for external device connection
⑤	RS-422/485 Connector	RS-422/485 connector for external device connection

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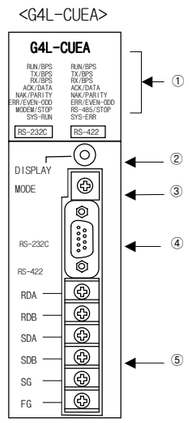


5.1 LED Indication

Operation status indication. < Display switch is not pushed >

LED #	LED Name		Contents	Remarks
0	RS232C	RUN	On during RS-232C channel operation	
1		TX	On during transmission via RS-232C	
2		RX	On during receiving via RS-232C	
3		ACK	On during ACK transmission / Off after NAK transmission	
4		NAK	On during NAK transmission / Off after ACK transmission	
5		ERR	On when Protocol Error / SIO-Error occur	
6		MODEM	On during modem communication mode is set	
7		SYS-RUN	Flash during interfacing with CPU of PLC	Off during normal state
8	RS422	RUN	On during setting channel to RS-422	
9		TX	On during transmission via RS-422	
10		RX	On during receive via RS-422	
11		ACK	On during ACK transmission / Off after NAK transmission	
12		NAK	On during NAK transmission / Off after ACK transmission	
13		ERR	On when Protocol Error / SIO-Error occur	
14		RS-485	RS-485 mode : On / RS-422 mode : Off	
15		SYS-ERROR	Flash when serious error occur	Off during normal state

5.2 Display Switch

Station No. and transmission specifications are indicated through the LED on the top of module by On/Off of LED display witch in the front of computer link module. When switch first pushed, station No. is displayed, and when the switch pushed again after switch release, transmission specifications is displayed. According to this sequence, station No. and transmission specifications are repeatedly displayed in sequence whenever the switch is pushed by once. For distinguishing LED indications of station No. and transmission specifications, No.15 LED is used. When indication station No., No.15 LED becomes on, when indication transmission specification, it becomes off.

1) LED for station No. indication

LED No.	Bit value	Indication Contents	Remarks
0	d0	Range (0 ~ 1F) of RS-232C channel station No. indication	[1] Binary Value
1	d1		
2	d2		
3	d3		
4	d4		
5	Not used	Off during station No. indication	
6			
7			
8	d0	Range (0 ~ 1F) of RS-422 channel station No. indication	[1] Binary Value
9	d1		
10	d2		
11	d3		
12	d4		
13	Not used	Off during station No. indication	
14	Not used		
15		On during station No. indication	

[1] To know the station No., convert the binary value to hex value.

2) LED for transmission specifications

If LED display switch is release and pushed again after pushed once, transmission specifications are displayed on LED. At this time, No.15 LED becomes off. Transmission specifications are separately indicated according to RS-232C and RS-422 channels as below table.

LED NO.	Bit Value	Indication contents	Remarks
0	d0	Communication speed of RS-232C channel (300 ~ 38400 bps)	Binary value [2]
1	d1		
2	d2		
3		Data Bit	On : 8Bit / Off : 7Bit
4		Parity	On : Being / Off : None
5		Even/Odd Parity	On : Even / Off : Odd
6		Stop Bit	On : 2Bit / Off : 1Bit
7	Not used	'Off'	
8	d0	Communication speed of RS-422 channel (300 ~ 76800 BPS)	Binary value [2]
9	d1		
10	d2		
11		Data Bit	On : 8Bit / Off : 7Bit
12		Parity	On : Being / Off : None
13		Even/Odd Parity	On : Even / Off : Odd
14		Stop Bit	On : 2Bit / Off : 1Bit
15		Off during transmission specifications indication	

[2] Transmission speed is converted form 3-bit values of D0 ~ D2 to hex, of which value is shown as below table. (76800 bps is provided in RS-422, and is available in Ver.1.3 of later version of Cnet module.

LED value	LED On	RS-232C/RS-422 channel
0	-	300, 76800 bps
1	d0	600 bps
2	d1	1200 bps
3	d0,d1	2400 bps
4	d2	4800 bps
5	d0,d2	9600 bps
6	d1,d2	19200 bps
7	d0,d1,d2	38400 bps

5.3 Operating Mode Switch

The operating mode of Cnet is set with operating mode switch on the front, and the interlocking/stand-alone mode or operation mode for each channel is determined according to the operating mode. Setting method of operating mode is, after selecting required mode adjusting switch values of operating mode with power off, set by power on. Operating mode is unchangeable even if switch values of operating mode are changed during operating, so after power necessarily off, change the switch values.

Switch	Switch value	Operation Mode		Remarks
		RS-232C	RS-422	
	0	User defined	User defined	Interlocking Mode[1]
	1	Dedicated	Dedicated	
	2	User defined	User defined	Stand-alone Mode[2]
	3	Dedicated	Dedicated	
	4	User defined	Dedicated	Stand-alone Mode
	5	Dedicated	User defined	
	6	GMWIN	User defined	
	7	GMWIN	Dedicated	
	8	Loop-Back	Loop-Back	Self diagnosis

NOTE [1] In interlocking mode, main channel is set to RS-232C, RS-422 is operated as data path of channel RS-232C (channel RS-422 disabled), and transmission spec. is operated according to RS-232C.
[2] This is set in case that in stand-alone mode, channel RS-232C/RS-422 are operated in separately.

6. Installation and Wiring

The max. No. of mountable Cnet module is various depending on PLC CPU unit type. (See below table)

CPU Type	Max. No.	Mounting Position	Remarks
GM1/2/3	8	I/O Slot of Main Base	
GM4	2		

6.1 RS-232C Interface

RS-232C channel use 9-pin connector(Female) for communication to external devices. See below table for pin assignment.

[RS-232C 9pin connector pin assignment]

Pin No.	Name	Function	Signal Direction (Cnet<-->External device)	Descriptions
1	CD	Carrier Detect	←	DCE inform carrier detection to DTE.
2	RxD	Received Data	←	Received data signal
3	TxD	Transmitted Data	→	Transmitted data signal
4	DTR	Data Terminal Ready	→	DTE inform communication ready to DCE
5	SG	Signal Ground	—	Ground line for signal
6	DSR	Data Set Ready	←	DCE inform communication ready to DTE
7	RTS	Request To Send	→	DTE require data transmission to DCE
8	CTS	Clear To Send	←	DCE inform ready to transmit to DTE
9	RI	Ring	←	DCE inform receiving 'Ringing Tone' to DTE.

When connecting modem, communication type of RS-232C must be set to 'modem' with frame editor, and when not using modem, it must be set to null modem. But when the channel mode is an interlocking one, modem cannot be connected because it is operated as null modem even though setting to modem.

* DTE : Data Terminal Equipment
* DCE : Data Communication Equipment

(1) How to connect RS-232C connector during modem connection

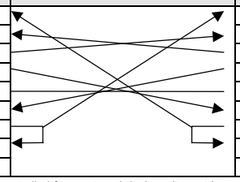
Cnet can communicate with devices of long distance with modem connected, at this time modem and channel RS-232C must be connected as shown in below table.

Cnet(9-PIN)		Connection No. and Signal Direction	Modem (25-PIN)	
Pin No.	Name		Name	Pin No.
1	CD	←	CD	8
2	RXD	←	RXD	3
3	TXD	→	TXD	2
4	DTR	→	DTR	20
5	SG	—	SG	7
6	DSR	←	DSR	6
7	RTS	→	RTS	4
8	CTS	←	CTS	5
9	RI	←	RI	22

(2) How to connect RS-232C connector in null modem mode

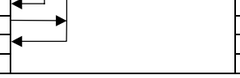
In null modem mode, connector is able to be connected in 7-line (with handshake) or 3-line (without handshake)type.

[7-line connection (with handshake)]

Cnet(9-PIN)		Connection No. and Signal Direction	Computer/Communication Device
Pin No.	Name		Name
1	CD		CD
2	RXD		RXD
3	TXD		TXD
4	DTR		DTR
5	SG		SG
6	DSR		DSR
7	RTS		RTS
8	CTS		CTS
9	RI		RI

If CD signal line is not controlled form external devices, it must be connected in 3-line type as shown in below table. Recent PC does not handle CD signal line, so when connecting with PC, it must be connected in 3-line type.

[3-line connection (Without handshake)]

Cnet(9-PIN)		Connection No. and Signal Direction	Computer/Communication Device
Pin No.	Name		Name
1	CD		CD
2	RXD		RXD
3	TXD		TXD
4	DTR		DTR
5	SG		SG
6	DSR		DSR
7	RTS		RTS
8	CTS		CTS
9	RI		RI

6.2 RS-422 Interface

RS-422 channel uses 6-pin connector (terminal block) for communication with external devices. The names and functions of pins, and data directions are as shown in the following table.

[RS-422 6pin connector pin assignment]

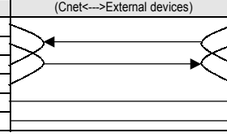
Pin No.	Name	Signal Direction (Cnet<-->External devices)	Function
1	RDA	←	Received data(+)
2	RDB	←	Received data(-)
3	SDA	→	Transmitted data(+)
4	SDB	→	Transmitted data(-)
5	S.G	—	Signal ground line
6	F.G	—	Frame ground line

RS-422 channel makes connection external devices and RS-422 and RS-485(Multidrop) possible. When RS-422 channel is used as multi-drop, set channel RS-422 to RS-485 communication in setting menu of RS-422 communication type of frame editor, and connect the terminals of RS-422 as shown in [RS-485 connection].

[RS-422 connection]

Computer link		Signal direction (Cnet<-->External devices)	External devices
Pin No.	Name		
1	RDA	←	SDA
2	RDB	←	SDB
3	SDA	→	RDA
4	SDB	→	RDB
5	S.G	—	S.G
6	F.G	—	F.G

[RS-485 connection]

Computer Link		Signal direction (Cnet<-->External devices)	External communication devices
Pin No.	Name		
1	RDA		RDA
2	RDB		RDB
3	SDA		SDA
4	SDB		SDB
5	S.G		S.G
6	F.G		F.G

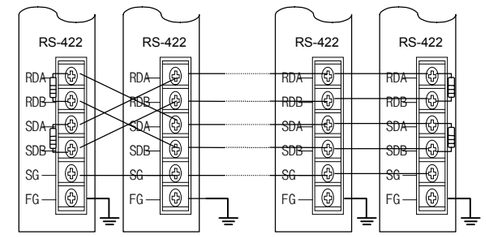
Above figure shows how to connect RS-485 multi-drop communication. In the case of multi-drop communication, to connect with external devices RDA and SDA, RDB and SDB of channel RS-422 should be connected each other. At this time, half-duplex communication in run sharing Tx/Rx line, so channel RS-422 mode should be set to RS-485 in frame editor.

6.3 Terminal resistance (RS-422/485)

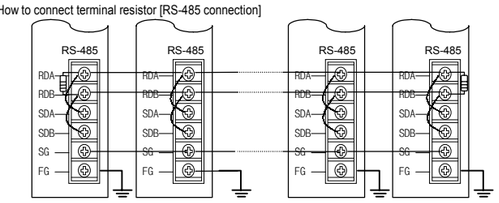
When the communication via channel RS-422, terminal resistor from external must be connected. Terminal resistor has the function to prevent distortion of signal by reflected wave of cable when long-distance communication, the same resistor (1/2W) as characteristic impedance of cable must be connected to terminal of network.

When using the recommended cable in chapter 4, connect terminal resistor of **120Ω** to both ends of cable. Also when using another cable than recommended one, the same resistor (1/2W) as characteristic impedance of cable must be connected to both ends of cable.

1) How to connect terminal resistor [RS-422 connection]



2) How to connect terminal resistor [RS-485 connection]



7. Handling Instructions

1) All the station in network should not have duplicated station number. Duplicated station number can cause serious communication error.
2) Use cable complying with specification in manual. Otherwise, a serious communication error may occur.
3) Make sure that communication cable does not break or short.
4) Make sure cable connector be fastened with recommended torque. Loose connection could cause serious communication error.
5) Improper cable connection (snarled cable, redundant connection) can cause communication error.
6) All communication modules have to be mounted on the main base board on which the CPU module is mounted, not on expansion base board.
7) While the power of module is on, mounting/dismounting of module will cause system error and the CPU module is halted. Therefore, turn the power off during replacing or repairing module.
8) If the station number or operation mode is changed while power is on, the power of module is re-applied (turn off power and turn on again) to take effect those changes.