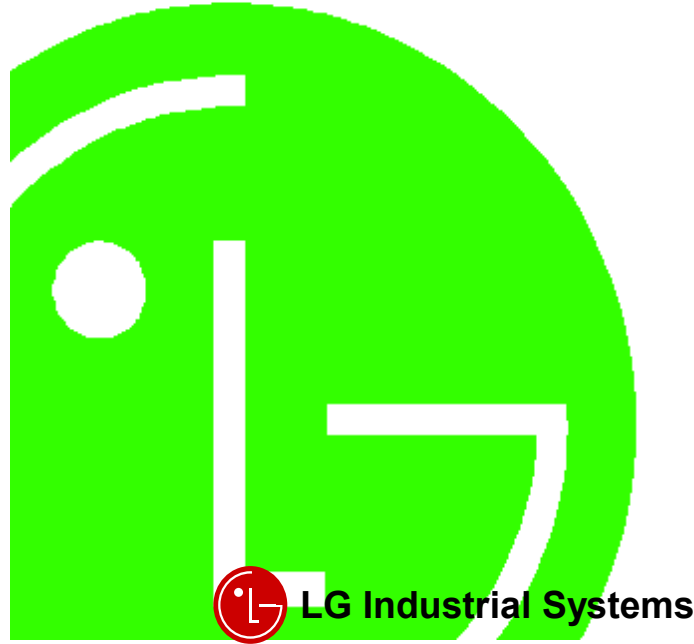


# Data Sheet

## LG Programmable Logic Controller Computer Link(Cnet) Module MASTER-K K3F-CU2A K3F-CU4A



- Beijing Branch**  
LG Industrial Systems Elevator Co., Ltd.  
T : +86-10-6462-3256  
F : +86-10-6462-3255
- Bogota Branch**  
LG Industrial Systems de Colombia S.A.  
T : +57-1-310-6077  
F : +57-1-310-5831
- Dalian Branch**  
Dalian LG Industrial Systems Co., Ltd.  
T : +86-411-281-2579  
F : +86-411-281-2578
- Hong Kong Branch**  
LG Industrial Systems (HK) Ltd.  
T : +852-2598-6615  
F : +852-2598-7105
- Singapore Branch**  
LG Industrial Systems Co., Ltd.  
T : +65-323-7361  
F : +65-323-7362
- Tokyo Branch**  
LG Industrial Systems Co., Ltd. Tokyo Office  
T : +81-3-3589-6362  
F : +81-3-3588-1810
- Bangkok Branch**  
LG Industrial Systems (Thailand) Co., Ltd.  
T : +66-2-381-8443  
F : +66-2-381-8445
- Chicago Branch**  
LG Industrial Systems Co., Ltd. Chicago Office  
T : +1-708-692-4500  
F : +1-708-692-4501
- Hanoi Branch**  
LG Industrial Systems Co., Ltd. Hanoi Office  
T : +64-4-821-0388  
F : +64-4-821-0399
- Shanghai Branch**  
Shanghai LG Industrial Systems Co., Ltd.  
T : +86-21-6248-2710  
F : +86-216248-3236
- Taipei Branch**  
LG Industrial Systems (Taiwan) Co. Ltd.  
T : +886-2-516-5010  
F : +886-2-516-5035

### LG Industrial Systems Co., Ltd.

**Head Office**  
LG Mullae Building 9th F, 10, Mullae-dong 6-ga, Yongsongpo-gu, Seoul, KOREA  
Tel : +82-2-2006-3751~6 Fax : +82-2-2006-3951  
Home page : <http://www.lgis.lg.co.kr/fa>

702005650

### Before handling the product

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

#### Materials for MASTER-K

Name	Code
KGL-WIN (Programming software)	702005036
MASTER-K Instruction & Programming	702006539
MASTER-K200S/300S/1000S (User's manual)	702006391
MASTER-K Cnet (User's manual)	702006404

Name	MASTER-K K3F-CU2A/CU4A Data Sheet
Code	702005810

### □ 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 MASTER-K K3F-CU2A/CU4A module.

For safety precautions on the PLC system, please see the MASTER-K 200S/300S/1000S user's manual.

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 or 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 condition. 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 Precaution

**CAUTION**

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

### □ Installation Precaution

**CAUTION**

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

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

Make sure the module fixing projections 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.

Drive the terminal screws firmly to the defined torque. If loosely driven, it can cause short circuit, 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 terminal screws, perform them after the power has been turned off.

Do not perform works while the power is applied. It can cause disorder or malfunction.

**CAUTION**

Do not separate the PCB from the case of module, or do not remodel the module. They can cause disorder, malfunction, damage of the module or a fire.

### □ Waste Disposal Precautions

**CAUTION**

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

## 1. Introduction

This data sheet contains the brief information about the characteristics, configurations, and operating of MASTER-K PLC Computer Link (Cnet) module.

## 2. General Specifications

No.	Item	Specification	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 <sub>c</sub> 57 Hz	-	0.075 mm	
		57 ≤ f ≤ 150 Hz	9.8 m/s <sup>2</sup> (1G)	-	10 times in each direction for X, Y, Z
		Continuous vibration			
		Frequency	Acceleration	Amplitude	
10: f <sub>c</sub> 57 Hz	-	0.035 mm			
57: f <sub>c</sub> 150 Hz	4.9 m/s <sup>2</sup> (0.5G)	-			
6	Shocks	*Maximum shock acceleration: 147 m/s <sup>2</sup> (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	2 kV 1 kV 0.25 kV	IEC 1131-2 IEC 801-4
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 <sup>[1]</sup>	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 <sup>[2]</sup>	
Operating Mode	Dedicated Protocol	Supporting multidrop/1:1 communication by using dedicated protocol for LG Industrial Systems.
	KGLWIN Protocol	PLC remote control is possible through KGLWIN by using its connection function for MASTER-K PLC.
	User-defined Protocol	Operated by user defined protocol using frame editor (for other manufacturer's interface)
Data Type	Data Bit	7 or 8
	Stop Bit	1 or 2
	Start Bit	1 or 2
	Parity	Even / Odd / None
Synchronization Type	Asynchronous type	
Transmission speed (bps)	300/600/1200/2400/4800/9600/19200/38400	
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	160mA or less	
Weight	K3F-CU2A : 94g / K3F-CU4A : 102g	

[1] To use RS-485 channel, select RS-485 mode with frame editor.  
[2] To use RS-232C channel via MODEM, select MODEM connection at the setting menu of RS-232C communication type of the frame editor.

## 4. Cable Specifications

When using RS-422 or RS-485 communication channel, twisted pair cable shall be used with 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.

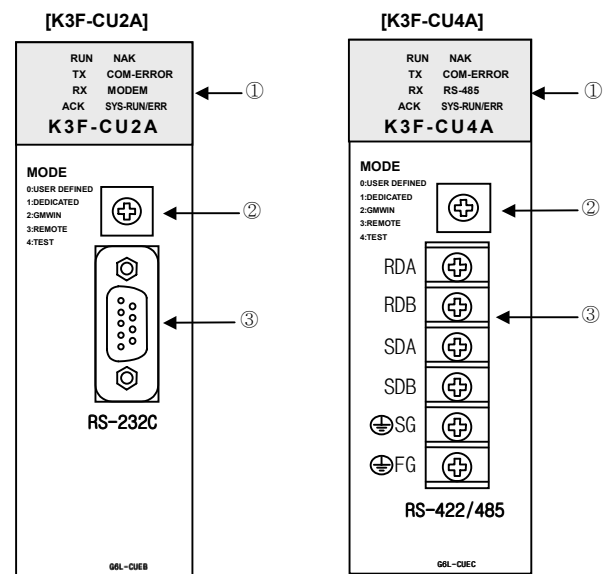
Table 4.1] Specification of MASTER-K Cnet twisted pair cable  
1) Electrical characteristics

Test Item	Unit	Characteristics	Test Condition
Conductor Resistance	Ω/kM	59 or less	General temperature
Withstanding Voltage (DC)	V/1min	500V, 1 minute	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 Characteristics

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

## 5. Parts Name and Descriptions



No.	Name	Descriptions
①	LED Indicators	Shows the operation status of K3F-CU2A/K3F-CU4A
②	Mode Switch	Operating mode setting
③	RS-232C/RS-422/RS-485 Connector	The connector for external connection

## 6. LED Indication and Operation Mode Switch

During normal operation, 8 points LED shows the operation and communication status of the module.

### 1) Operation status (K3F-CU2A)

LED No.	LED Name	Description	Remarks
0	RUN	On during channel operation	
1	TX	On during transmission	
2	RX	On during receiving	
3	ACK	On during ACK transmission / Off after NAK transmission	
4	NAK	On during NAK transmission / Off after ACK transmission	
5	COM-ERROR	On when Protocol Error / SIO-Error occurred	
6	MODEM	On during modem communication mode is set	
7	SYS-RUN/ERR	On when interface error occurred Flickering when serious error occurred	LED 0~4 will show the error status

### 2) Operation status (K3F-CU4A)

LED No.	LED Name	Description	Remarks
0	RUN	On during channel operation	
1	TX	On during transmission	
2	RX	On during receiving	
3	ACK	On during ACK transmission / Off after NAK transmission	
4	NAK	On during NAK transmission / Off after ACK transmission	
5	COM-ERROR	On when Protocol Error / SIO-Error occurred	
6	RS-485	On : RS-485 mode / Off : RS-422 mode	
7	SYS-RUN/ERR	On when interface error occurred Flickering when serious error occurred	LED 0~4 will show the error status

### 3) Operation Mode Switch

The operation mode of Cnet module is set with the operation mode switch on the front panel. The change of mode setting does not take effect until the Cnet module is reset. (power off and re-applied) Therefore, even the operation mode switch setting is changed during operation, it will take effect after resetting the module. The following table shows switch value and relevant operation mode.

Switch	Switch Value	Operation Mode	Remarks
	0	User defined	
	1	Dedicated	
	2	KGLWIN service	
	3	Not used	
	4	Test mode	
	5-8	Reserved (Not used)	
	9	Download mode	

## 7. Installation and Wiring

Max. 2 Cnet modules can be mounted on one base board.

### 6.1 RS-232C Interface

RS-232C channel uses 9-pin female connector for communication with external devices.

[Pin assignment of RS-232C 9-pin connector]

Pin No.	Name	Function	Signal direction (Cnet<->External device)	Description
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	↔	Signal ground line
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 connection 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 from 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.

[Pin assignment of RS-422 6-pin connector]

Pin No.	Name	Signal direction (Cnet<->External device)	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 multidrop, set channel RS-422 to RS-485 communication in setting menu of RS-422 communication type of frame editor, and connect the terminal of RS-422 as shown in the [RS-485 connection] table.

[RS-422 connection]

Computer link		Signal direction (Cnet<->External device)		External device	
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]

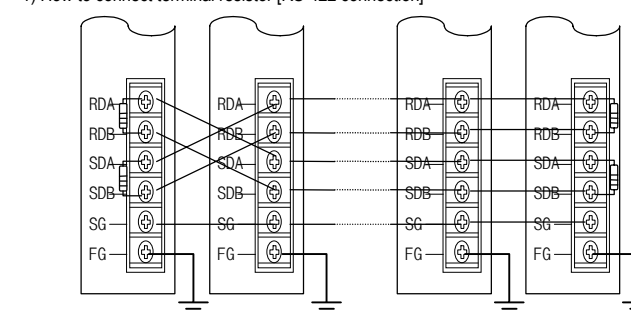
Computer link		Signal direction (Cnet<->External device)		External device	
Pin No.	Name				
1	RDA	←		RDA	
2	RDB	←		RDB	
3	SDA	→		SDA	
4	SDB	→		SDB	
5	S.G	↔		S.G	
6	F.G	↔		F.G	

Above figure show how to connect RS-485 multidrop communication. In the case of multidrop 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.

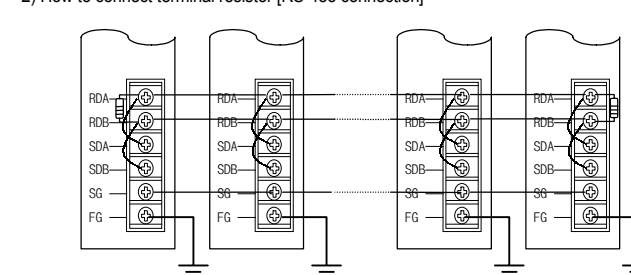
## 8. Terminal Resistance (RS-422/RS-485)

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 the 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]



## 9. Handling Instructions

- All the station in whole network should not have duplicated station number. Otherwise, it can cause serious communication error.
- Use cable complying with specification in this data sheet. Otherwise, it can cause a serious communication error.
- Make sure that communication cable does not break or short.
- Make sure that cable connector is fastened with recommended torque. Loose connection could cause serious communication error.
- Improper cable connection (snarled cable, redundant connection) can cause communication error.
- While the power of module is on, mounting/dismounting of module will cause system error and the CPU module halted. Therefore, turn the power off during replacing or repairing module.
- If the station number of operation mode is changed while power is on, the module should be reset (turn power off and turn on again) to take effect those changes.

## 10. Dimensions

K3F-CU2A and K3F-CU4A have the same dimensions.  
Unit : mm

