DATA SHEET

LS Programmable Logic Controller
Thermocouple Input Option Board

XGB **XBO-TC02A**

- When using LSIS equipment, thoroughly read this datasheet and associated manuals introduced in this datasheet. Also pay careful attention to safety and handle the module properly.
- Store this datasheet in a safe place so that you can take it out and read it whenever necessary.

LS constantly endeavors to improve our products so that information in this datasheet is subject to change without notice.

The date of issue: 2011. 5
10310001190 Ver 1.1

■ Safety Precautions

- Safety Precautions is for using the product safely and correctly in order to prevent the accidents and danger, so please go by them.
- The precautions explained here only apply to this module. For safety precautions on the PLC system, refer to User's manual.
- The precautions are divided into 2 sections, 'Warning' and 'Caution'. Each of the meanings is represented as follows.

⚠ Warning If you violate instructions, it can cause death, fatal injury or a considerable loss of property

⚠ Caution If you violate instructions, it can cause a slight injury or a slight loss of products

- The symbols which are indicated in the PLC and User's Manual mean as follows.
  ⚠ This symbol means paying attention because of danger of injury, fire, or malfunction
- This symbol means paying attention because of danger of electric shock.
  Store this datasheet in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user

■ Handling Precautions

- Don't drop or make impact.
- Don't detach PCB from case. It may cause problem.
- When wiring, let no foreign material go into the module. If it goes into the module, remove it.
- Don't detach the module from slot while power is on

⚠ Warning

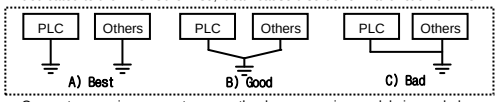
- **Do not contact the terminals while the power is applied.**
  Risk of electric shock and malfunction.
- **Protect the product from being gone into by foreign metallic matter.**
  Risk of fire, electric shock and malfunction.
- **Risk of fire, electric shock and malfunction.**
  Risk of injury and fire by explosion and ignition.

⚠ Caution

- **Be sure to check the rated voltage and terminal arrangement for the module before wiring work.**
  Risk of electric shock, fire and malfunction.
- **Tighten the screw of terminal block with the specified torque range.**
  If the terminal screw is loose, it can cause fire and electric shock.
- **Use the PLC in an environment that meets the general specifications contained in this datasheet.**
  Risk of electrical shock, fire, erroneous operation and deterioration of the PLC.
- **Be sure that external load does not exceed the rating of output module.**
  Risk of fire and erroneous operation.
- **Do not use the PLC in the environment of direct vibration**
  Risk of electrical shock, fire and erroneous operation.
- **Do not disassemble, repair or modify the PLC.**
  Risk of electrical shock, fire and erroneous operation
- **When disposing of PLC and battery, treat it as industrial waste.**
  Risk of poisonous pollution or explosion.

■ Precautions for use

- Do not Install other places except PLC controlled place.
- Make sure that the FG terminal is grounded with class 3 grounding which is dedicated to the PLC. Otherwise, it can cause disorder or malfunction of PLC



- Connect expansion connector correctly when expansion module is needed.
- Do not detach PCB from the case of the module and do not modify the module.
- Turn off power when attaching or detaching module.
- Cellular phone or walkie-talkie should be farther than 30cm from the PLC.
- Input signal and communication line should be farther than10cm from a high-tension and a power line in order not to be affected by noise and magnetic field.

Related Manual

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

N me	Code
XGB analog	10310000920
XGB Hardware	10310000926
XGK/XGB Instruction & Programming	10310000754
XG5000	10310000512

Revision History

Date	Version	Updated Information
2011.03	V1.0	First Edition
2011.05	V1.1	CI changed

Applicable version

For system configuration, the following version is necessary.

Segment	Version
XGB E type	V1.11 or above
XGB S type	V1.11 or above
XGB SU type	V1.0 or above
XG5000	V3.61 or above

1. 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 resistance	For discontinuous vibration		-	-
		Frequency	Acceleration	Amplitude	times
		10≤f＜57 Hz	-	0.075 mm	10 times in each direction for X, Y, Z
		57 ≤f≤150 Hz	9.8㎨ (1G)	-	
		For continuous vibration			
		Frequency	Acceleration	Amplitude	
		10≤f ＜57 Hz	-	0.035 mm	
		57≤f≤150 Hz	4.9㎨(0.5G)	-	
					IEC61131-2
6	Shocks resistance	• Max. impact acceleration : 147 ㎨ (15G) • Authorized time : 11㎳ • Pulse wave : Sign half-wave pulse (Each 3 times in X,Y,Z directions)			IEC61131-2
7	Noise resistance	Square wave impulse noise	AC: ±1,500V DC: ±900V		LSIS standard
		Electrostatic discharge	4kV (Contact discharge)		IEC61131-2 IEC61000-4-2
		Radiated electromagnetic field noise	80 ~ 1,000 MHz, 10 V/m		IEC61131-2 IEC61000-4-3
		Fast transient burst noise	Segment	Power supply module	Digital/analog input/output communication interface	IEC61131-2 IEC61000-4-4
			Voltage	2 kV	1 kV	
8	Ambient conditions	No corrosive gas or dust			-
9	Operating height	2000m or less			-
10	Pollution degree	2 or less			-
11	Cooling type	Natural air cooling			-

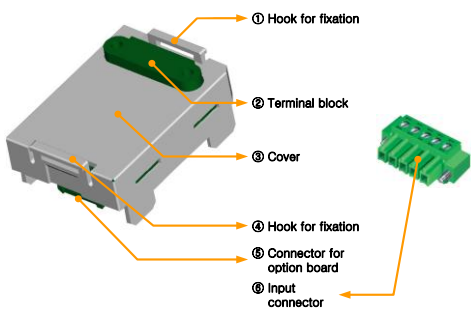
2. Performance Specifications

Items		Specifications
Number of channels		2 channels
Input sensor type		Thermocouple K / J type JIS C1602-1995
Temp. input range	K type sensor	-200.0℃ ~ 1300.0℃
	J type sensor	-200.0℃ ~ 1200.0℃
Digital output	Temp. display unit	16-bit binary data Displays down to one decimal place (K, J type: 0.1℃)
Accuracy		±1% or less
Conversion speed		50ms/2channels – Note1)
Reference junction compensation	Automatic compensation by RJC sensing (Hermiston)	
	Compensation amount	±1.0℃
Warming-up time		15min or above – Note2)
Insulation method		Non-insulation between input channels Non-insulation between input terminal and PLC main unit
I/O terminal		5-point t rminal block
Supply power		Internal DC 5V
I/O points occupied		Fixed type: 64 points
Additional function	Average function	Count average (2~64000times)
	Alarm function	Detect disconnection
Consumption current		50㎃
Weight		20g

Remarks

Note1) Conversion speed can be delayed because of scan delay of XGB main unit
Note2) Warming-up time: To stabilize the temperature measurement, warm-up the system for 15 minutes or more after power-on.

3. Parts Name and Descriptions



No.	Name	Description
①,④	Hook for fixation	▶ Hook for fixing the option board to basic unit
②	Termina block	▶ Terminal block for wiring to connect the thermocouple (K, J type)
③	Cover	▶ Option board cover
⑤	Connector for option board	▶ Connection connector for connecting the option board to the basic unit
⑥	Input connector	▶ Wiring connector for connecting with the external device

4. Wiring

(1) Precautions for wiring

(a) Do not place AC power line close to the AUX signal line of the module. To avoid surge or induced noise occurring from AC, make sure to leave a proper space.

(b) Cable should be selected by considering ambient temperature and allowable current and the size of cable should be as follows.

Cable Size	
Minimum	Maximum
0.18mm2 (AWG24)	1.5mm2 (AWG16)

(c) If cable is placed too close to any heating device or materials or if it directly contacts oil and similar materials for a long time, it may cause short-circuit, resulting in breakdown and malfunction.

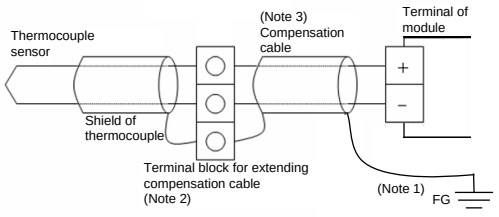
(d) Check the polarities during terminal strip wiring

(e) Don't turn off/on the main unit while the option board is installed on the main unit. It may cause the error of temp. value

(f) Thermocouple input module can use 2 types of thermocouple. (K/ J).

(2) Wiring example

Thermocouple sensor can be connected directly to the terminal of module, or in case of that temperature measuring point is far from module, it can be connected extendedly using compensation cable.



Remarks

Note 1) In case sensor and compensation cable are shielded, it is recommended that the shield is grounded to PLC FG.
Note 2) It is necessary to use extension terminal block whose material is kept at uniform temperature in order to reduce error.
Note 3) Compensation cable should be used the same type with sensor, which is used for measuring.

5. Internal memory

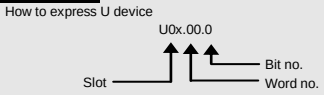
(1) Conversion data I/O area (U device)

(a) Data sent from thermocouple input module to XGB PLC

Device assignment	Descriptions	Contents	Read/Write
U0x.00.E	Module H/W Error	Module error	Read
U0x.00.F	Module Ready	On: ready Off: not ready	Read
U0x.01.0 U0x.01.1	CH0 Running CH1 Running	Channel Running On: Run, Off: Stop	Read
U0x.01.4 U0x.01.5	CH0 disconnection CH1 disconnection	Thermocouple sensor On: disconnection Off: normal	Read
U0x.04	CH0 termp. conversion value	termp. conversion value	Read
U0x.05	CH1 temp. conversion value	(Measured temp.×10)	

Remarks

How to express U device

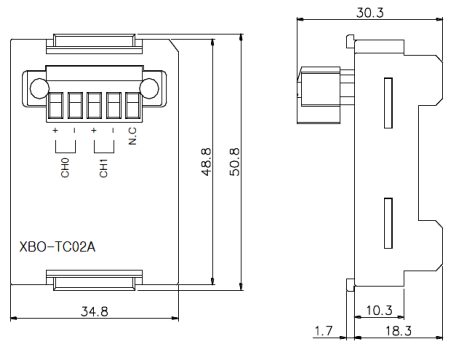


Ex1) CH0 temp. conversion value of the module at slot 9 -> U09.04
Ex2) CH0 disconnection flag of the module at slot 9 -> U09.01.4

(2) Operation parameter setting area

Memory (Decimal)	Contents	Setting value	Instruction
0	Enable CH	Bit0~3, 0: disable, 1: enable	PUT(P) GET(P)
1	CH0 sensor type	K:0, J:1	
2	CH1 sensor type		
5	Temp. unit	Bit0~1, 0: Celsius, 1: Fahrenheit	
14	CH0 average value	Count average: 2~64000 times	
15	CH1 average value		
17	Cold junction compensation temp	Measured value of cold junction compensation temp	GET(P)
18 ~ 24	System area (Offset/gain storage area)	-	PUT(P) GET(P)

6. Dimension (㎜)



7. Warranty

(1) Warranty period
LSIS provides an 18-month-warranty from the date of the production.

(2) Warranty conditions
For troubles within the warranty period, LSIS will replace the entire PLC or repair the troubled parts free of charge except the following cases.
(a) The troubles caused by improper condition, environment or treatment except the instructions of LSIS.
(b) The troubles caused by external devices.
(c) The troubles caused by remodeling or repairing based on the user's own discretion.
(d) The troubles caused by improper usage of the product.
(e) The troubles caused by the reason which exceeded the expectation from science and technology level when LSIS manufactured the product.
(f) The troubles caused by natural disaster.

(3) This warranty is limited to the PLC itself only. It is not valid for the whole system which the PLC is attached to.