LS Programmable Logic Controller
XGB Compact Economy Type

XGB   XBC-DR10E
         XBC-DR14E
         XBC-DR20E
         XBC-DR30E

LS

- 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 Industrial Systems

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

■ Safety Precautions

► Safety Precautions is for using the product safe and correct 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 violated instructions, it can cause death, fatal injury or a considerable loss of property

⚠ **Caution**   If violated 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


⚠ 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 looses, 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
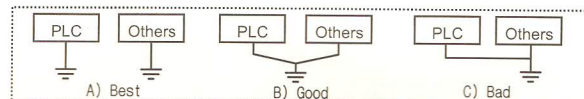
► Connect expansion connector correctly when expansion module are needed.

► 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 300cm from the PLC.

► Input signal and communication line should be farther than minimum 10cm from a high-tension line and a power line in order not to be affected by noise and magnetic field.

Before handling the product

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

Name	Code
XG5000 User's Manual(Programming software)	10310000512
XGK/XGB Instruction & Programming User's manual	10310000510
XGB Cnet I/F User's Manual	10310000816
XGB Standard/Economic Hardware User's manual	10310001091

Revision History

Date	Version	Updated Information
2010.2	V1.0	First Edition
2010.3	V1.1	Error in performance specifications is fixed

Applicable version

When configuring system, the following version is needed.

Item	Applicable version
XG5000	V3.4 or above

1. Introduction

This data sheet contains brief information about the characteristics, configurations, and operating of XGB compact economic type main unit.

2. General Specifications

No	Item	Specification				Standard
1	Ambient temperature	0 ~ 55℃				-
2	Storage temperature	-25 ~ 70℃				-
3	Ambient humidity	5 ~ 95%RH, non-condensing				-
4	Storage humidity	5 ~ 95%RH, non-condensing				-
5	Vibration resistance	Occasional vibration				-
		Frequency	Acceleration	Amplitude	times	IEC61131-2
		10≤f∠57 Hz	-	0.075 mm		
		57 ≤f≤150 Hz	9.8㎨ (1G)	-	10 times in each direction for X, Y, Z	
		Continuous vibration				
		Frequency	Acceleration	Amplitude		
		10≤f∠57 Hz	-	0.035 mm		
		57≤f≤150 Hz	4.9㎨(0.5G)	-		
6	Shock resistance	• Peak acceleration: 147 m/s²(15G) • Duration: 11ms • Half-sine, 3 times each direction per each axis				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	Environment	Free from corrosive gasses and excessive dust				-
9	Altitude	Up to 2,000 ms				-
10	Pollution degree	2 or less				-
11	Cooling	Air-cooling				-

3. Performance Specifications

Here describes performance specification of main unit.

Item		Specification				Ref.
		XBC-DR10E	XBC-DR14E	XBC-DR20E	XBC-DR30E	
Operation method		Reiterative operation, fixed cycle operation, Interrupt operation, constant period scan				
I/O control method		Scan synchronous batch processing (refresh method) Direct method by instruction				
Program language		Ladder Diagram Instruction List				
No. of instruction	Basic	28				
	Application	677				
Operation speed (Basic instruction)		0.24㎲/Step				
Program memory		4ksteps				
I/O points		14 (main +1 option)	18 (main +1 option)	28 (main + 2 options)	38 (main + 2 options)	
Data area	P	P0000 ~ P127F (2,048 points)				
	M	M0000 ~ M255F (4,096 points)				
	K	K00000 ~ K2559F(Special area : K2600~2559F) (40,960 points)				
	L	L00000 ~ L1279F (20,480 points)				
	F	F000 ~ F255F (4,096 points)				
	T	100ms, 10ms, 1ms : T000 ~ T255 (256 points) (Variable by parameter setting)				
	C	C000 ~ C255 (256)				
	S	S00.00 ~ S127.99				
	D	D0000 ~ D5119 (5120 words)				Word
	U	U00.00 ~ U0A.31 (256 words, analog data refresh area)				Word
	Z	Z000~Z127 (128 words)				Word
No. of programs		Max. 128				
Tack	Initialization	1				
	Fixed cycle	Max. 8				
	External point	Max. 4				
	Internal device	Max. 8				
Operating mode		RUN, STOP				
Self-diagnosis		Delay of operation, abnormal memory, abnormal I/O				
Program port		RS-232C(Loader)				
Data keeping method at power failure		Setting latch area at basic parameter				
Current consumption		250mA	315mA	355mA	485mA	
Weight		330g	340g	450g	465 g	

Item		Specification	Ref.
Cnet I/F function		Dedicated protocol Modbus protocol User defined protocol	
		Selects one port between RS-232C 1 port and RS-485 1 port by parameter	
Built-in Function / High Speed Counter	Performance	1-phase : 4㎑ 4 channels 2-phase : 2㎑ 2 channels	
	Counter mode	4 counter modes are supported based on input pulse and INC/DEC method • 1 pulse operation Mode : INC/DEC count by program • 1 pulse operation Mode : INC/DEC count by phase B pulse input • 2 pulse operation Mode : INC/DEC count by input pulse • 2 pulse operation Mode : INC/DEC count by difference of phase	
	Function	• Internal/external preset • Latch counter • Compare output • No. of rotation per unit time	
Pulse catch		50㎲ 4 points (P0000 ~ P0003)	
External point interrupt		4 points : 50㎲ (P0000 ~ P0003)	
Input filter		Selects among 1,3,5,10,20,70,100㎳ (For each module)	

4. Operation Method

(1) Reiterative operation

XGB PLC program is sequentially executed from the first step to the last step, which is called scan. This sequential processing is called cyclic operation. Cyclic operation of the PLC continues as long as conditions do not change for interrupt processing during program execution.
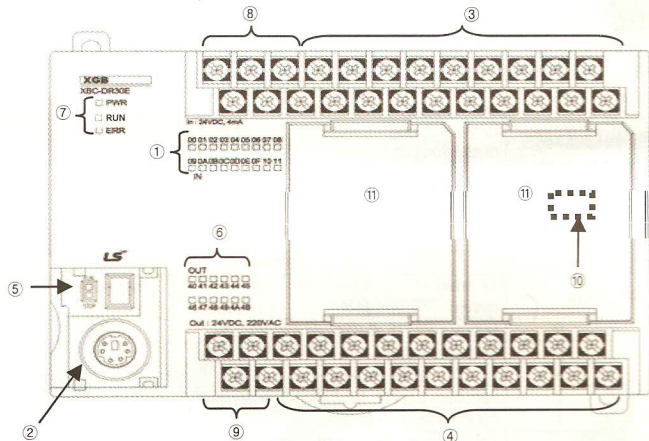
(2) Interrupts operation

In case of a situation which is requested to be urgently processed while executing the PLC program, this operation method discontinues the executed program temporarily and processes the interrupt program immediately.

The signal which informs the PLC of those urgent conditions is called interrupt signal. There are 3 kinds of interrupt operation. (External point, internal device and fixed cycle)

(3) Constant scan

This operation method processes scan program at every pre-set interval. After the process of the scan program is finished, it is on standby, and then it is reactivated at every pre-set interval. Range of interval is 0.001~0.999s.

5. Parts names and Descriptions

No	Name	Description
①	Input status LED	■ Indicates input status.
②	PADT Connector	■ Connector to connect with XG5000 •RS-232C 1 channel
③	Input terminal block	■ Input Terminal Block
④	Output terminal block	■ Output terminal block
⑤	RUN/STOP mode switch	■ Sets the operation mode of main unit. • STOP → RUN : Operation execution of program • RUN → STOP : Operation stop of program (In case of STOP, it can be changed to remote mode)
⑥	Output status LED	■ Indicates output status
⑦	Operation status LED	■ Indicates the operation status of the main unit • PWR(RED ON) : Indicates power status. • RUN(GREEN ON) : RUN mode • ERR(RED blink) : indicates error
⑧	Built-in Communication Terminal block	■ Terminal block for built-in RS-232C/485 communication
⑨	Power terminal block	■ Terminal block for power (AC 100~240V)
⑩	O/S mode dip switch	■ Dip switch for selecting Operation or O/S download mode •On: BOOT mode. Downloading O/S is available •Off: User mode. Downloading program by PADT is available
⑪	Option board holder	■ For connecting option board

6. I/O No. Allocation Method

(1) I/O No. Allocation grants address to unit & module for input/output data
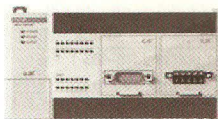
Main unit   Option module #1~2

Mounting module	No. of module can be mounted	Ref.
Option module	1	10/14 points unit
	2	20/30 points unit

(2) The following is method of I/O number allocation

Item	Area		Ref.
	Input	Output	
Main unit	P0000 ~ P003F	P0040 ~ P007F	Fixed
Option #1	P0400~P043F		64point fixed
Option #2	P0440~P047F		64point fixed

-. I/O allocation for all expansion modules is fixed at 64points

(The unused area can be used as internal relay)

7. Built-in High Speed Counter Function

(1) Summary
The high-speed counter can count high frequency pulse which can not be processed with the input unit. It can count pulse which occurs from encoder or pulse generator.

(2) Performance Specification

Item		Specification
Input Signal	Signal	A Phase, B Phase
	Signal level	DC24V
	Signal Type	Voltage Input (Open collector)
Counting range		Signed 32 Bit (-2,147,483,648 ~ 2,147,483,647)
Counting speed		1-phase: 4kpps 4 channels 2-phase: 2kpps 2 channels
Counter format		Linear counter / Ring counter
Counter mode		1 pulse operation Mode : INC/DEC count by program 1 pulse operation Mode : INC/DEC count by phase B pulse input 2 pulse operation Mode : INC/DEC count by input pulse 2 pulse operation Mode : INC/DEC count by difference of phase (2 multiplication)
Function		Internal/External preset function / Latch counter function Compare output function / no. of rotation per unit time

8. Built-in Communication Function

(1) Dedicated communication
XGB Compact Type has built-in Cnet communication function, and can communicate with various external devices without expansion Cnet I/F module.
(XGB Compact Type Main Unit has built-in RS-232C and RS-485.)

Built-in Cnet of XGB Main Unit supports the following functions;
(a) Read single/continuous device
(b) Write single/continuous device
(c) Register monitoring device
(d) Execute monitoring
(e) 1:1 connection system (LS link)

(2) User defined communication
User can define a user-defined protocol to communicate with other manufacturer's devices. By supporting user-defined protocol, XGB PLC can communicate with various devices which have their own protocol.

(3) Modbus protocol
XGB PLC includes Modbus protocol, and it is easy to connect to Modbus devices.
(It is not necessary to write Modbus protocol as user-defined protocol.)

(4) P2P communication support
XGB PLC supports client function service with P2P form to above item.

> **Remark**
>
> Please refer to XGB Cnet I/F User's Manual for the details of built-in Cnet I/F function.

9. Other Built-in Function

(1) Pulse Catch Function
In the main unit, 4 pulse catch input contact points (P000~P003) are included. Through using this contact point short pulse signal (min. 50µs) which cannot be executed by general digital input can be taken.

(a) Usage
When narrow pulse signal is input which can not be executed by general digital input, the operation can not performed as user's intention. But in this case through pulse catch function even narrow pulse signal (min. 10µs) can be executed.

(b) Operation Explanation
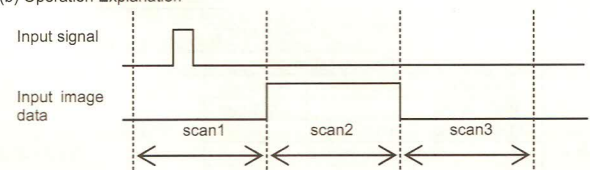
| Step	Execution contents
Scan1	CPU senses input when pulse signal of min. 50µs is input, then saves the status.
Scan2	Turns on the region of input image.
Scan3	Turns off the region of input image

(2) Input Filter Function
The input filter function can be used to reject noises. The input filter constant from the range of 1~100ms can be designated.

(a) Usage
Input signal status affects the credibility of system where noise occurs frequently or pulse width of input signal affects as a crucial factor. In this case the user sets up the proper input on/off delay time, the trouble by miss operation of input signal may be prevented because the signal which is shorter than set up value is not adopted.

(b) Operation Explanation
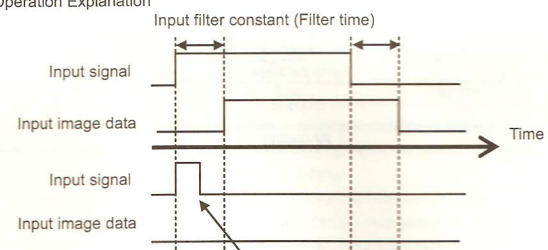
Narrower width pulse than input filter constant is not considered as input signal.
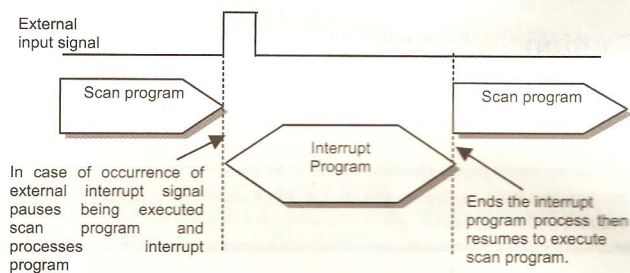
(3) External interrupts function

XGB PLC can perform max 4 external contact tasks by using input of main unit without special interrupt module

(a) Usage

This function is useful when you need to process operation related to external input signal fast without scan time.

(b) Operation Explanation

External input signal

Scan program

Scan program

Interrupt Program

In case of occurrence of external interrupt signal pauses being executed scan program and processes interrupt program

Ends the interrupt program process then resumes to execute scan program.

(c) Function
- It can be use the max. 4 point input (P000 ~ P003).
- Input 3 points (P000 ~ P003) of XGB Compact Type Main Unit are shared for several functions as following table. Each of the functions can be disabled according to whether other functions are enabled.

Input Point	High Speed Counter	External Interrupt	Pulse Catch	Input Filter
P000	Ch0 Input	Unavailable	Unavailable	Available
P001	Ch1 Input	Unavailable	Unavailable	Available
P002	Ch2 Input	Unavailable	Unavailable	Available
P003	Ch3 Input	Unavailable	Unavailable	Available

11. Warranty

(1) Warranty period

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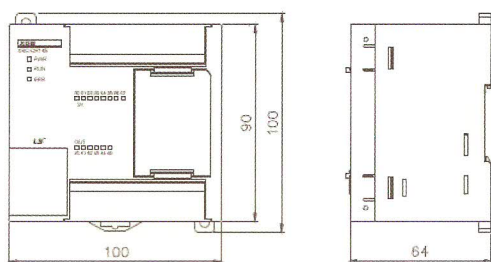
(2) Warranty conditions

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.

10. Dimension (mm)

(1) Main unit

(a) XBC-DR10/14E

(b) XBC-DR20/30E