DATA SHEET

LS Programmable Logic Controller
XGB Compact Type

XGB
- XBC-DN32H(/DC)
- XBC-DN64H(/DC)
- XBC-DR32H(/DC)
- XBC-DR64H(/DC)

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.

LSIS

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A Breed Above the Rest

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Thank you for your business and your interest in LSIS solutions.

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

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■ Safety Precautions
- Safety Precautions are 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 well.**
  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 malfunction.
► **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

PLC	Others	PLC	Others	PLC	Others
A) Best		B) Good		C) Bad	
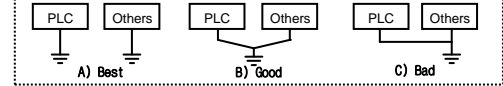
- Connect expansion connector correctly when expansion module is needed.
- Do not detach PCB from the case of the module and do not modify the module.
- Turn off power when attaching or detaching module.
- Cellular phone or walkie-talkie should be farther than 30cm from the PLC.
- Input signal and communication line should be farther than 10cm 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.

Name	Code
XG5000 User's Manual(Programming software)	10310000512
XGK/XGB Basic Instruction & Programming User's manual	10310000510
XGB Hardware User's Manual	10310000926
XGB Analog User's Manual	10310000920
XGB Positioning User's Manual	10310000927
XGB Cnet I/F User's Manual	10310000816
XGB Enet I/F User's Manual	10310000873
XGB Positioning module User's Manual	10310001008

Revision History

Revision History

Date	Version	Updated Information
2008. 04	V1.0	First Edition
2010. 10	V1.1	DC Power Type added / Branch address changed / Applicable version changed
2011. 05	V3.0	KOREAN/ENGLISH data sheet integrated / CI Changed

Applicable version
For system configuration, the following version is necessary.

Item	Applicable Version
XG5000	V3.4 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: 10sf ≤ 57 Hz, Acceleration: -, Amplitude: 0.075 mm, times 10 times in each direction for X, Y, Z; 57 ≤f≤150 Hz, 9.8㎨ (1G), -. For continuous vibration — Frequency: 10sf ~ 57 Hz, Acceleration: -, Amplitude: 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: Voltage: 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; Voltage — 2 kV / 1 kV — IEC61131-2, IEC61000-4-4	
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

Item	Specification XBC-DR32H(/DC)	XBC-DR64H(/DC)	XBC-DN32H(/DC)	XBC-DN64H(/DC)	Remark
Operation method	Reiterative operation, fixed cycle operation / Interrupt operation, constant period scan				
I/O control method	Scan synchronized batch processing method (Refresh method) / Direct method by instruction				
Programming Language	Ladder Diagram(LD), Instruction List (IL)				
Numbers of Instructions — Basic instructions	28				
Numbers of Instructions — Application instructions	687				
Execution Time	Basic instructions: 0.083㎲/step				
Program memory capacity.	15 Kstep				
Max. I/O points	352	384	352	384	
Memory Device — P	P0000 ~ P1023F (16,384 Points)				
Memory Device — M	M0000 ~ M1023F (16,384 Points)				
Memory Device — K	K00000 ~ K4095F (65,536 Points) (including 3,080 word for built-in functions)				
Memory Device — L	L0000 ~ L2047F (32,768 Points)				
Memory Device — F	F0000 ~ F1023F (16,384 Points)				
Memory Device — T	100ms: T000 ~ T499(500 Points) / 10ms: T500 ~ T999(500 Points) / 1ms: T1000 ~ T1023(24 Points) / Parameter Setting (Variable)				
Memory Device — C	C000 ~ C1023(1024 Points)				
Memory Device — S	S00.00 ~ S127.99				
Memory Device — D	D0000 ~ D10239				
Memory Device — U	U00.00 ~ U0A.31				
Memory Device — Z	Z000 ~ Z127				
Memory Device — N	N0000 ~ N5119				
Operation Mode	RUN, STOP, DEBUG				
Numbers of program	128				
Task — Initialization task	1				
Task — Time driven task	8				
Task — External contact task	8(P000~P007)				
Task — Internal device task	8				
Self-diagnostic functions	Watchdog Timer, Memory error detection / I/O error detection, etc.				
Data keeping method at power failure	Setting to latch area at basic parameter				
Maximum expansion module	10				
Internal function — PID Control function	Controlled by instruction, Auto tuning / PWM Operation Manual output / Operation scan time setting / Anti Windup, Delta MV, PV tracking / Hybrid Operation, Cascade Operation				
Internal function — Cnet I/F	XGK Dedicated protocol support / MODBUS protocol support / User defined protocol support / Selects one port between RS-232C 1 port and RS-485 1 port by parameter				
Internal function — HSC count — speed	1 phase: 100kHz 4 Ch. / 20kHz 4 Ch. / 2 phase: 50kHz 2 Ch. / 10kHz 2 Ch.				
Internal function — HSC count — 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; • 1 pulse operation Mode : INC/DEC count by input pulse; • 2 pulse operation Mode : INC/DEC count by difference of phase				
Internal function — HSC count — Operation	32bit signed counter				
Internal function — HSC count — Function	Internal/External preset function / Latch counter function / Comparison output function / Revolution number per unit time function				
Internal function — Pulse Catch	Pulse width: 10㎲ 4points(P000~P003) / 50㎲ 4points(P004~P007)				
Internal function — Positioning — Basic	Control axis: 2axes / Control method: PTP/ speed control / Control units: pulse / Positioning data: 80 data per axis / Positioning mode: End/Keep/Continue, Single/Repeat	XBC-DN32H / XBC-DN64H Only			
Internal function — Positioning — Position-ing	Positioning method: Absolute/Incremental / Positioning address: -2,147,483,648~2,147,483,647 / Speed: Max. 100kpps (Setting range:1 ~ 100,000) / Accel./Decel. Method: Trapezoidal method				
Internal function — Positioning — Return to Origin	Origin detection when approximate origin turns off. / Origin detection after declaration when approx. origin on / Origin detection by approximate origin				
Internal function — Positioning — JOG	Setting range: 1 ~ 100,000(High/Low speed)				
Internal function — Positioning — Additional function	Inching operation, Speed synchronizing operation, Position synchronizing operation, linear interpolation operation etc.				
Input filter	Select for 1,3,5,10,20,70,100㎳(For each module)				
Internal current consumption(mA)	260	660	330	1,040	
Weight(g)	500	600	800	900	

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3. I/O No. Allocation Method

(1) I/O No. Allocation grants address to unit & module for input/output data.
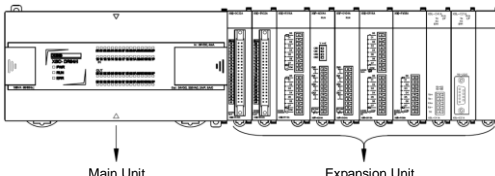
Main Unit / Expansion Unit

Mounting Module	Maximum No. of module can be mounted
Expansion I/O module	10
Analog I/O module	10
Communication module	2

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

Item	Area — Input	Area — Output	Remarks
Main Unit	P0000 ~ P001F	P0020 ~ P003F	64point fixed
Expansion #1	P0040~P007F		64point fixed (analog/communication module)
Expansion #2	P0080~P011F		64point fixed (analog /communication module)

-. I/O allocation for all expansion modules is fixed at 64points (The unused area can be used as internal relay.)
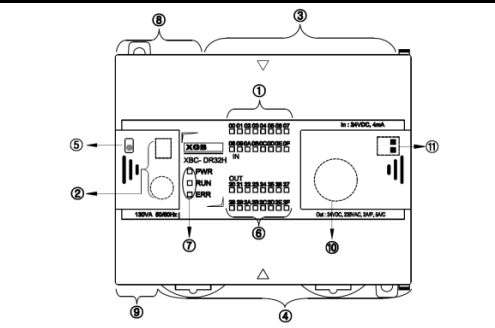
4. Parts Names and Descriptions

No	Name	Description
①	Input status LED	▪ Indicates input status.
②	PADT Connector	▪ Connector to connect with external device(XG5000) ▪ USB(USB 1.1 supported) 1 Ch., RS-232C 1 Ch.
③	Input TB	▪ Input Terminal Block
④	Output TB	▪ Output Terminal Block
⑤	RUN/STOP Mode Switch	▪ It sets the operation mode of XGB PLC. - STOP → RUN : Operation execution of program - RUN → STOP : Operation stop of program (In case of STOP, it can be changed to remote trouble.)
⑥	Output status LED	▪ Indicates output status
⑦	Operation status LED	▪ Indicates the operation status of the CPU. - PWR(RED) : Indicates power status. • On : normal status • Off : abnormal status or off - RUN(GREEN) : RUN status • On : Run • Off : Stop - Error(RED) : Indicates an error status • Off : Normal • Flicker: An error is detected by self diagnostic during operation
⑧	Built-in Communication TB	▪ Built-in RS-232C/485 Terminal Block
⑨	Power TB	▪ Power Terminal Block
⑩	Battery Holder	▪ Battery(3V) holder for data back-up
⑪	O/S Mode Dip Switch	▪ Dip Switch for setting operation or O/S download mode

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5. Built-in High Speed Count Function

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

(2) Performance specifications

Item		Specification
Input Signal	Signal	A Phase, B Phase, Preset
	Signal level	DC24V
	Signal Type	Voltage Input
Counting Range		-2,147,483,648 ~ 2,147,483,647(Binary 32Bit)
Max. counting speed		1 phase: 100kHz 4 Ch. / 20kHz 4 Ch. 2 phase: 50kHz 2 Ch. / 10kHz 2 Ch.
Count Method		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 / 1 pulse operation Mode : INC/DEC count by input pulse / 2 pulse operation Mode : INC/DEC count by difference of phase (4 multiplication)
Additional function		Internal/External preset function / Latch counter function / Comparison output function / Revolution number per unit time function

6. PID Control Function
The following describes the built-in PID function of XGB PLC.(Max. 16 loops)

(1) The characteristics of PID function of XGB PLC
(a) The PID function is integrated into the CPU module. Therefore, PID control can be performed with instructions and parameter without any separated PID module.
(b) CASCADE and Hybrid operation are available.
(c) P operation, PI operation, PID operation and On/Off operation can be selected easily.
(d) The manual output (the user-defined forced output) is available.
(e) By proper parameter setting, stable operation can be achieved regardless of external disturbance.
(f) The operation scan time (the interval that PID controller gets a sampling data from process) is changeable for optimizing to the system characteristics.
(g) PWM operation is supported.
(h) SV-Ramp, Delta-MV function is supported.

(2) Instructions for PID control
For the PID Operation of XGB PLC, there are four instructions as follow.

No.	Instruction	Function
1	PIDRUN	Perform the PID operation
2	PIDAT	Perform the auto tuning operation
3	PIDCAS	Perform the PID cascade operation
4	PIDHBD	Perform the PID hybrid operation

7. Positioning Function

(1) Summary
XBC-DN32H/DN64H support 2-axes, 100kpps of positioning function. The purpose of this function is to control moving object by setting speed from the current position and stop them on the setting position correctly.

(2) Performance specifications

Item	Specification
Control axis	2axes
Control method	PTP, speed control
Control unit	Pulse
Positioning data	80 data per axis
Positioning method	Absolute / Incremental
Speed limit	Max. 100kpps, Min. 1pps(unit of 1pps)
Positioning address	-2,147,483,648 ~ 2,147,483,647
Acceleration/ Deceleration method	Trapezoidal method(0 ~ 10,000ms)
Bias speed	1 ~ 100,000 pps
Rated load voltage	DC12/24V
Operation mode	End / Keep / Continuous mode
Positioning function	Return to origin, JOG, Single, Repeated operation, Linear interpolation

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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.
By using LSIS's dedicated protocol, user can read, write, and monitor memory devices of XGB Compact Type Main Unit.
(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 between LS PLCs
(2) User defined communication
User can define an 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.

Remarks
1) Please refer to XGB Cnet I/F User's Manual for the details of built-in Cnet I/F function.
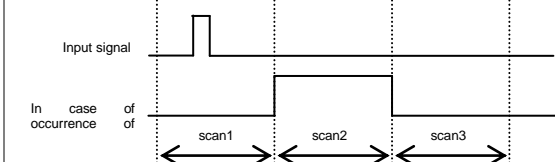
9. Other Built-in Function

(1) Pulse Catch Function
In the main unit, 8 pulse catch input contact points(P000~P007) are internalized. Through using this contact point short pulse signal(min. 10 - 50㎲) 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 as 50㎲ min. can be executed.
(b) Operation Explanation

Step	Execution contents
Scan1	CPU senses input when pulse signal of min. 10 to 50㎲, is input, then saves the status.(Note 1)
Scan2	Used to turn on the region of input image.
Scan3	Used to turn off the region of input image

(Note 1) P0000~P0003: 10㎲, P0004~P0007: 50㎲

(2) Input Filter Function
The input filter function can be used to reject noises. The filter constant from the range of 1-100㎳ can be designated on the main unit and each expansion module independently.
(a) Usage
Input signal status affects to the credibility of system where noise occurs frequently and pulse width of input signal affects as a crucial factor. In this case the user sets up the proper input on/off delay time, then 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

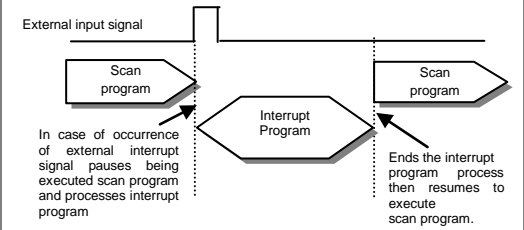Narrower width pulse than input filter constant is not considered as input signal.
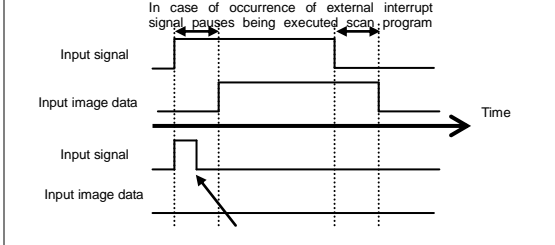
(3) External interrupts function
XGB PLC can perform max 8 points of external contact task by using input of main unit without special interrupt module.
(a) Usage
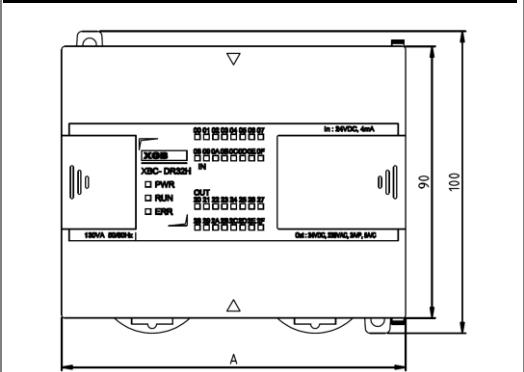This function is useful to execute a task program set to an external input signal.

(b) Operation Explanation

(c) Function
• It can be use the max. 8 point input (P000 ~ P007).
• Input 8 points (P000 ~ P007) 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	Disable	Disable	Usable
P001	Ch1 Input	Disable	Disable	Usable
P002	Ch2 Input	Disable	Disable	Usable
P003	Ch3 Input	Disable	Disable	Usable
P004	Ch4 Input	Disable	Disable	Usable
P005	Ch5 Input	Disable	Disable	Usable
P006	Ch6 Input	Disable	Disable	Usable
P007	Ch7 Input	Disable	Disable	Usable

10. Dimension (㎜)

A   XBC-DN/DR32H (/DC): 114(㎜), XBC-DN/DR64H(/DC) : 180(㎜)

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.