DATA SHEET

LS Programmable Logic Controller
XGB Compact Type

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

- **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 Co.,Ltd.

• HEAD OFFICE
LS tower, Hogye-dong, Dongan-gu, Anyang-si, Gyeonggi-do
1026-6, Korea http://eng.lsis.biz
Tel: 82-2-2034-4870 Fax: (82-2)2034-4648 e-mail: cshwang@lsis.biz

• LS Industrial Systems(ME) FZE _ Dubai, U.A.E.
Tel: 971-4-886-5360 Fax: 971-4-886-5361 e-mail: jungyongl@lsis.biz

• LS Industrial Systems Tokyo Office _ Tokyo, Japan
Tel: 81-3-3582-9128 Fax: 81-3-3582-2667 e-mail: jschuna@lsis.biz

• LS Industrial Systems Shanghai Office _ Shanghai, China
Tel: 86-21-5237-9977(609) Fax: 89-21-5237-7189 e-mail: liyong@lsis.com.cn

• LS Industrial Systems Beijing Office _ Beijing, China
Tel: 86-10-5825-6027(666) Fax: 86-10-5825-6028 e-mail: xunmj@lsis.com.cn

• LS Industrial Systems Guangzhou Office _ Guangzhou, China
Tel: 86-20-8328-6754 Fax: 86-20-8326-6287 e-mail: chenxs@lsis.com.cn

• LS Industrial Systems Chengdu Office _ Chengdu, China
Tel: 86-20-8328-6754 Fax: 86-20-8326-6287 e-mail: comysb@lsis.biz

• LS Industrial Systems Qingdao Office _ Qingdao, China
Tel: 86-532-8501-6068 Fax: 86-532-8501-6057 e-mail: wangzy@lsis.com.cn

• LS Industrial Systems Europe B.V., Netherlands
Tel: +31 (0)20 654 1420 Fax: +31 (0)20 654 1429 e-mail: junshickp@lsis.biz

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Safety Precautions

- Safety Precautions are 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 XGB Compact Type Main Unit. For safety precautions on the PLC system, refer to XGB 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

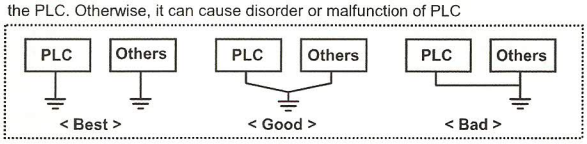
- ▶ Do not contact the terminals while the power is applied.
  Risk of electric shock and malfunction.
- ▶ Protect the product from being gone into by foreign metallic matter.
  Risk of fire, electric shock and malfunction.
- ▶ Do not charge, heat, short, solder and break up the battery.
  Risk of injury 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 do 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 30cm from the PLC
- ▸ Input signal and communication line should be farther than minimum 100mm 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 datasheet carefully prior to any operation, mounting, installation or start-up of the product.

XGB PLC User's Manual

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

Issued date	Version	Descriptions
Apr. 2008	V1.0	First edition
Oct. 2010	V1.1	DC Power Type added Branch address changed Applicable version changed

Applicable Version

When CPU version is V1.9 or above, following version must be used.

Item	Applicable Version
XG5000	V3.4 or above

1. Introduction

This datasheet provides brief information about characteristics, configurations, and usages of XGB Compact Type PLC(XBC-DR32H/DN32H/DR64H/DN64H).

2. General Specifications

No.	Item	Specification				Standard
1	Operating temperature	0 to 55℃				
2	Storage temperature	-25 to 70℃				
3	Operating Humidity	5 to 95%RH, non-condensing				
4	Storage Humidity	5 to 95%RH, non-condensing				
5	Vibration	Occasional vibration			Sweep count	IEC61131-2
		Frequency	Acceleration	Amplitude		
		10≤f∠57 Hz	-	0.075 mm	10 times in each direction for X, Y, Z	
		57 ≤f≤150 Hz	9.8 ㎨(1G)	-		
		Continuous 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)				IEC61131-2
7	Noise Immunity	Square wave impulse noise	±1,500 V			
		Electrostatic discharge	Voltage:4kV(contact discharge)			IEC61131-2 IEC61000-4-2
		Radiated electromagnetic field	80 to 1,000 MHz, 10 V/m			IEC61131-2 IEC61000-4-3
		Fast transient burst noise	Class	Power module	Digital/Analog I/O communication interface	IEC61131-2 IEC61000-4-4
			Voltage	2kV	1kV	
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			Specification				Remark
			XBC-DR32H(/DC)	XBC-DR64H(/DC)	XBC-DN32H(/DC	XBC-DN64H(/DC)	
Operation method			Cyclic operation of stored program, Interrupt task operation, Constant scan operation				
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				
		Application instructions	687				
Execution Time			Basic instructions: 83 ㎱/step				
Program memory capacity.			15 Kstep				
Max. I/O points			352	384	352	384	
Memory Device		P	P0000 ~ P1023F (16,384 Points)				
		M	M0000 ~ M1023F (16,384 Points)				
		K	K00000 ~ K4095F (65,536 Points) (including 3,080 word for built-in functions)				
		L	L0000 ~ L2047F (32,768 Points)				
		F	F0000 ~ F1023F (16,384 Points)				
		T	100ms: T000 ~ T499(500 Points) 10ms: T500 ~ T999(500 Points) 1ms: T1000 ~ T1023(24 Points) Parameter Setting (Variable)				
		C	C000 ~ C1023(1024 Points)				
		S	S00.00 ~ S127.99				
		D	D0000 ~ D10239				
		U	U00.00 ~ U0A.31				
		Z	Z000 ~ Z127				
		N	N0000 ~ N5119				
Operation Mode			RUN, STOP, DEBUG				
Numbers of program			128				
Task	Initialization task		1				
	Time driven task		8				
	External contact task		8(P000~P007)				
	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				
	Cnet I/F		XGK Dedicated protocol support MODBUS protocol support User defined protocol support	RS-232C 1port RS-485 1port			
	HSC count	speed	1 phase: 100kHz 4 Ch. / 20kHz 4 Ch. 2 phase: 50kHz 2 Ch. / 10kHz 2 Ch.				
		Mode	1 pulse operation Mode: Increment/decrement count by program 1 pulse operation Mode: Increment/decrement count by phase B pulse input 2 pulse operation Mode: Increment/decrement count by input pulse 2 pulse operation Mode: Increment/decrement count by difference of phase (4)				
		Operation	32bit signed counter				
		Function	Internal/External preset, Latch counter, Compare output operation by data comparison, zone comparison				
	Pulse Catch		Pulse width: 10㎲ 4points(P000~P003) 50㎲ 4points(P004~P007)				
	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
		Positioning	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				
		Return to Origin	Origin detection when approximate origin turns off. Origin detection after declaration when approx. origin on Origin detection by approximate origin				
		JOG	Setting range: 1 ~ 100,000(High/Low speed)				
Input filter			Select for 1,3,5,10,20,70,100㎳				

(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, PWM output , Linear interpolation

10. Built-in Cnet I/F

(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.

Remark

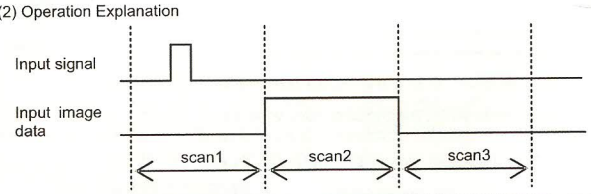
Please refer to XGB Cnet I/F User's Manual for the details of built-in Cnet I/F function.

11. Other Internal Functions

11.1 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.

(1) 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.

(2) Operation Explanation



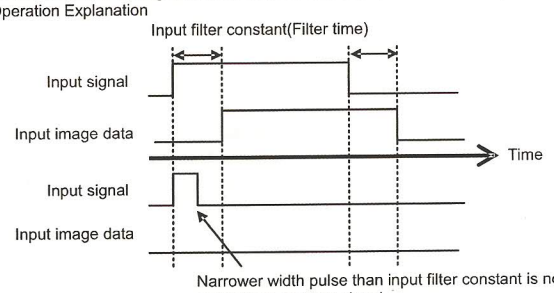
Step	Execution contents
Scan1	CPU senses input when pulse signal of min. 10 to 50㎲, is input, then saves the status.(Note 1)
Scan2	Used to turn on the region of input image.
Scan3	Used to turn off the region of input image

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

11.2 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.

(1) Usage
Input signal status affects to 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, 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.

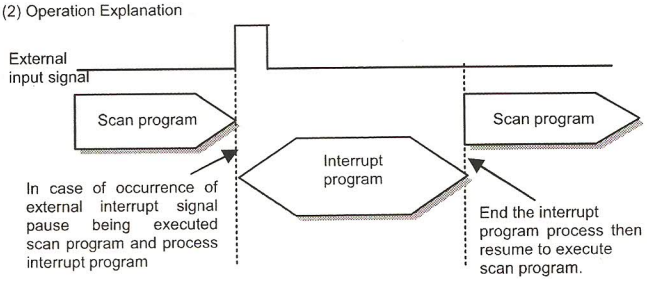
(2) Operation Explanation



11.3 External interrupts function
XGB PLC can perform max 8 points of external contact task by using input of main unit without special interrupt module

(1) Usage
This function is useful to execute a task program set to an external input signal.

(2) Operation Explanation

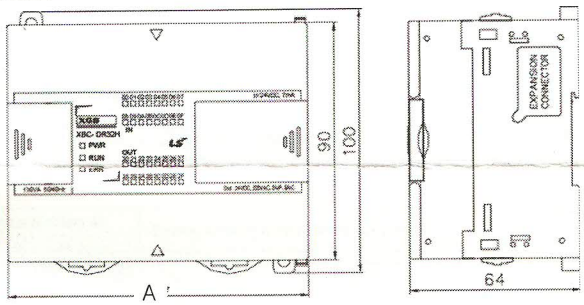


(3) Function
(a) It can be use the max. 8 point input(P000 ~ P007).
(b) Input 8 points(P000 ~ P007) of XGB Compact Type Main Unit are shared for several functions as following table. Each of the functions can be disabled according to whether other functions are enabled.

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

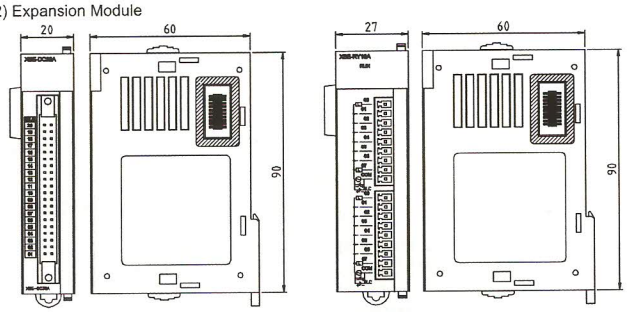
12. Dimension (mm)

(1) Main Unit



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

(2) Expansion Module



13. 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.

4. Operation Processing Method

(1) Cyclic 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 method

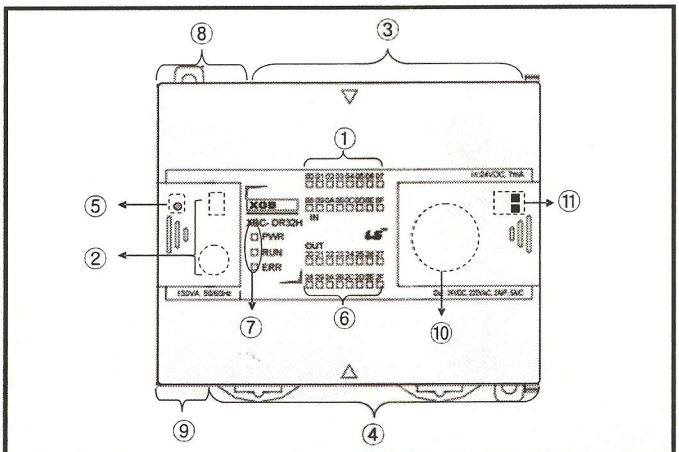
In case of a situation which is requested to be urgently processed while executing the PLC program, this operation method discontinues the executed program temporarily and processes the interrupt program immediately.

The signal which informs the PLC of those urgent conditions is called interrupt signal. There is time driven interrupt method which is processed at every pre-set interval. Moreover, there are internal device task program which is processed by states of internal device and external task program which is processed by external contact signal.

(3) Fixed period operation method (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. With time driven interrupt program, it is different that the process is synchronized with input and output data refresh.

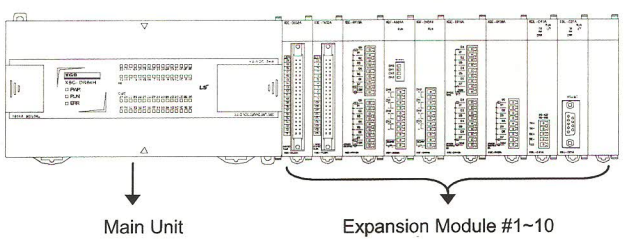
5. Parts Names and Descriptions



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 mode.)
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

6. I/O No. Allocation Method

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



Mounting Module	Maximum No. of module can be mounted	Remarks
Expansion I/O module	10	
Analog I/O module	10	A/D,D/A,RTD,TC
Communication module	2	Cnet I/F, Enet I/F

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

Item	Area		Remarks
	Input	Output	
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.)

7. 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

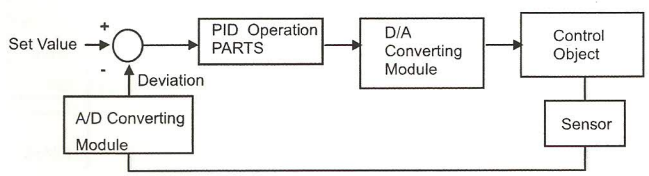
Item		Specification
Input Signal	Signal	A Phase, B Phase, Preset
	Signal level	DC24V
	Signal Type	Voltage Input
Counting Range		-2,147,483,648 ~ 2,147,483,647(Binary 32Bit)
Max. counting speed		1 phase: 100kHz 4 Ch. / 20kHz 4 Ch. 2 phase: 50kHz 2 Ch. / 10kHz 2 Ch.
Count Method		Linear Counter / Ring Counter
Counter mode		1 pulse operation Mode : Increment/decrement count by program 1 pulse operation Mode : Increment/decrement count by phase B pulse input 2 pulse operation Mode : Increment/decrement count by input pulse 2 pulse operation Mode : Increment/decrement count by difference of phase (4)
Additional function		Internal or external preset Latch counter Comparison output

8. 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.



PID Control system block diagram

(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

9. 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.