LS ELECTRIC strives to maximize your profits in gratitude for choosing us as your partner.

# **Programmable Logic Control**

# **XBC Standard/Economic Type Main**

XGT Series	Use	er Manual
	XBC-DR20SU XBC-DN20S(U) XBC-DP20SU XBC-DR30SU XBC-DN30S(U) XBC-DN30S(U) XBC-DP30SU XBC-DP40SU XBC-DP40SU XBC-DR60SU XBC-DN60SU	XBC-DR10E XBC-DN10E XBC-DP10E XBC-DR14E XBC-DN14E XBC-DP14E XBC-DP20E XBC-DN20E XBC-DP20E XBC-DR30E XBC-DN30E XBC-DN30E
Safety Instructions		

LSELECTRIC

- Read this manual carefully before installing, wiring, operating, servicing or inspecting this equipment.
- Keep this manual within easy reach for quick reference.

#### Before using the product ...

For your safety and effective operation, please read the safety instructions thoroughly before using the product.

- Safety Instructions should always be observed in order to prevent accident or risk with the safe and proper use the product.
- Instructions are separated into "Warning" and "Caution", and the meaning of the terms is as follows;



This symbol indicates the possibility of serious injury or death if some applicable instruction is violated



This symbol indicates the possibility of slight injury or damage to products if some applicable instruction is violated

 The marks displayed on the product and in the user's manual have the following meanings.



Be careful! Danger may be expected.

4 Be careful! Electric shock may occur.

The user's manual even after read shall be kept available and accessible to any user of the product.

### Safety Instructions when designing

- Please, install protection circuit on the exterior of PLC to protect the whole control system from any error in external power or PLC module. Any abnormal output or operation may cause serious problem in safety of the whole system.
  - Install applicable protection unit on the exterior of PLC to protect the system from physical damage such as emergent stop switch, protection circuit, the upper/lowest limit switch, forward/reverse operation interlock circuit, etc.
  - If any system error (watch-dog timer error, module installation error, etc.) is detected during CPU operation in PLC, the whole output is designed to be turned off and stopped for system safety. However, in case CPU error if caused on output device itself such as relay or TR can not be detected, the output may be kept on, which may cause serious problems. Thus, you are recommended to install an addition circuit to monitor the output status.
- Never connect the overload than rated to the output module nor allow the output circuit to have a short circuit, which may cause a fire.
- Never let the external power of the output circuit be designed to be On earlier than PLC power, which may cause abnormal output or operation.
- In case of data exchange between computer or other external equipment and PLC through communication or any operation of PLC (e.g. operation mode change), please install interlock in the sequence program to protect the system from any error. If not, it may cause abnormal output or operation.

# Safety Instructions when designing

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 I/O signal or communication line shall be wired at least 100mm away from a high-voltage cable or power line. If not, it may cause abnormal output or operation.

# Safety Instructions when designing

# 

- Use PLC only in the environment specified in PLC manual or general standard of data sheet. If not, electric shock, fire, abnormal operation of the product or flames may be caused.
- Before installing the module, be sure PLC power is off. If not, electric shock or damage on the product may be caused.
- Be sure that each module of PLC is correctly secured. If the product is installed loosely or incorrectly, abnormal operation, error or dropping may be caused.
- Be sure that I/O or extension connecter is correctly secured. If not, electric shock, fire or abnormal operation may be caused.
- If lots of vibration is expected in the installation environment, don't let PLC directly vibrated. Electric shock, fire or abnormal operation may be caused.
- Don't let any metallic foreign materials inside the product, which may cause electric shock, fire or abnormal operation..

### Safety Instructions when wiring

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- Prior to wiring, be sure that power of PLC and external power is turned off. If not, electric shock or damage on the product may be caused.
- Before PLC system is powered on, be sure that all the covers of the terminal are securely closed. If not, electric shock may be caused

# $\triangle$ Caution

- Let the wiring installed correctly after checking the voltage rated of each product and the arrangement of terminals. If not, fire, electric shock or abnormal operation may be caused.
- Secure the screws of terminals tightly with specified torque when wiring. If the screws of terminals get loose, short circuit, fire or abnormal operation may be caused.
- Surely use the ground wire of Class 3 for FG terminals, which is exclusively used for PLC. If the terminals not grounded correctly, abnormal operation may be caused.
- Don't let any foreign materials such as wiring waste inside the module while wiring, which may cause fire, damage on the product or abnormal operation.

## Safety Instructions for test-operation or repair

# 

- **Don't touch the terminal when powered**. Electric shock or abnormal operation may occur.
- Prior to cleaning or tightening the terminal screws, let all the external power off including PLC power. If not, electric shock or abnormal operation may occur.
- Don't let the battery recharged, disassembled, heated, short or soldered. Heat, explosion or ignition may cause injuries or fire.

# 

- Don't remove PCB from the module case nor remodel the module. Fire, electric shock or abnormal operation may occur.
- Prior to installing or disassembling the module, let all the external power off including PLC power. If not, electric shock or abnormal operation may occur.
- Keep any wireless installations or cell phone at least 30cm away from PLC. If not, abnormal operation may be caused.

#### Safety Instructions for waste disposal

# 

• Product or battery waste shall be processed as industrial waste. The waste may discharge toxic materials or explode itself.

# **Revision History**

Version	Date	Remark	Page
V 1.0	2010.3	1. First Edition	-
V 1.1	2010.12	<ol> <li>XGB output module added (XBC-RY08B, XBE-DC16B)</li> <li>Error fixed</li> <li>Sequence diagram on troubleshooting fixed</li> </ol>	
V 1.2	2010.12	<ol> <li>XGB SU type added (XBC-DN20SU, XBC-DN30SU)</li> <li>RTC option board added (XBO-RTCA)</li> </ol>	- Chapter 9
V 1.3	2011.06	<ol> <li>XGB SU type added (XBC-DN40SU, XBC-DN60SU, XBC-DR40SU, XBC-DR60SU)</li> <li>XGB option module added (XBO-DC04A, XBC-TN04A, XBO-M2MB)</li> </ol>	- Ch10, Ch11, Ch12
V1.4	2012.01	1. XGB E type added (XBC-DN10E, XBC-DN14E, XBC-DN20E, XBC-DN30E, XBC-DP10E, XBC-DP14E, XBC-DP20E, XBC-DP30E)	-
V1.5	2013.01	<ol> <li>XGB SU type added (XBC-DP20SU, XBC-DP30SU, XBC-DP40SU, XBC-DP60SU)</li> <li>Data Backup time modified</li> </ol>	- 4-14
V1.6	2014.09	<ol> <li>Domain of Homepage changed</li> <li>RTC Option specification added(Available on slot 9)</li> </ol>	Front/Back Cover 2-2,2-4,9-4
	2015.02	<ol> <li>Data backup time and available slot added         <ul> <li>User should change the battery periodically~ as possible.</li> <li>RTC can~ 9th slot</li> </ul> </li> <li>Address&amp; phone number changed</li> </ol>	9-2 9-5 BackCover
V1.7	2015.07	<ul> <li>3. Description of using Timer flag added .</li> <li>4.I/O(Input/Output) terminal error check and modification</li> <li>-Input terminal block error check</li> <li>-Output terminal block error check, SG→PE</li> <li>5.New PLC added</li> </ul>	BackCover App1-2,App1-7 7-7~7-14 7-15~7-38
		-XBF-TC04RT/ TC04TT, XBL-PMEC/ PSEA/DSEA	2-1~ 2-9,
V1.8	2016.11	1.New PLC added -XBE-DN32A	7-52, 7-54
V 1.9	2020.06	LSIS to change its corporate name to LS ELECTRIC	Entire

#### **About User's Manual**

Congratulations on purchasing PLC of LS ELECTRIC Co.,Ltd.

Before use, make sure to carefully read and understand the User's Manual about the functions, performances, installation and programming of the product you purchased in order for correct use and importantly, let the end user and maintenance administrator to be provided with the User's Manual.

The Use's Manual describes the product. If necessary, you may refer to the following description and order accordingly. In addition, you may connect our website(<u>http://www.lselectric.co.kr/</u>) and download the information as a PDF file.

Relevant User's Manual

Title	Description	No. of User Manual
XG5000 User's Manual	It describes how to use XG5000 software especially about online functions such as programming, printing, monitoring and debugging by using XGT series products.	10310000512
XGK/XGB Series Instruction & Programming	It describes how to use the instructions for programming using XGK/XGB series.	10310000510
XGB Analog User's Manual	It describes how to use the specification of analog input/analog output/temperature input module, system configuration and built-in PID control for XGB main unit.	10310000920
XGB Cnet I/F User's Manual	It describes how to use built-in communication function for XGB main unit and external Cnet I/F module.	10310000816
XGB Fast Ethernet I/F User's Manual	It describes how to use XGB FEnet I/F module.	10310000873

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# $\bigcirc$ Contents $\bigcirc$

C	hapter 1 Introduction
	.1 Guide to Use This Manual1-1
1	.2 Features
1	.3 Terminology 1-4
C	hapter 2 System Configuration 2-1~2-14
2	2.1 XGB System Configuration
	2.2 Product List
	2.3 Classification and Type of Product Name
	2.3.1 Classification and type of basic unit
	2.3.2 Classification and type of expansion module2-7
	2.3.3 Classification and type of special module2-8
2	2-3.4 Classification and type of communication module
2	2.4 System Configuration
2	2.4.1 Cnet I/F system
2	2-14 2 Ethernet system
C	Chapter 3 General Specifications
3	3-1 General Specifications

Chapter 4 CPU Specifications4-1~4-1	14
-------------------------------------	----

4.1 Performance Specifications	4-1
4.2 Names of Part and Function	4-7
4.3 Power Supply Specifications	4-10
4.4 Calculating Example of Consumption Current/Voltage	4-13
4.5 Data Backup Time	4-14

Chapter 5 Program Configuration and Operation Method	5-1~5-37
--	----------

5.1 Program Instruction5-1
5.1.1 Program execution methods
5.1.2 Operation processing during momentary power failure
5.1.3 Scan time
5.1.4 Scan Watchdog timer
5.1.5 Timer processing
5.1.6 Counter processing5-9
5.2 Program Execution
5.2.1 Configuration of program
5.2.2 Program execution methods
5.2.3 Interrupt
5.3 Operation Mode
5.3.1 RUN mode
5.3.2 STOP mode
5.3.3 DEBUG mode
5.3.4 Change operation mode
5.4 Memory
5.4.1 Data memory
5.5 Configuration Diagram of Data Memory
5.5.1 "S" type
5.5.2 "H" type
5.5.3 Data latch area setting

#### Chapter 6 CPU Functions......6-1~6-25

6.1 Type Setting
6.2 Parameter Setting
6.2.1 Basic parameter setting
6.2.2 I/O parameter setting
6.3 Self-diagnosis Function6-4
6.3.1 Saving of error log6-4
6.3.2 Troubleshooting
6.4 Remote Functions
6.5 Forced Input/Output On and Off Function
6.5.1 Force I/O setup
6.5.2 Processing time and method of Forced Input/Output On and Off
6.6 Direct Input/Output Operation
6.7 Diagnosis of External Device
6.8 Allocation of Input/Output Number

6.9 Online Editing	. 6-13
6.10 Reading Input/Output Information	. 6-16
6.11 Monitoring	. 6-17
6.12 Program Upload Prohibit	. 6-22
6.13 Clear All PLC	. 6-23
6.14 Password Setting per Program Block	. 6-24

#### 

7.3.20 XBC-DN60SU 24 point TR output (Sink type)7-34
7.3.21 XBC-DP20SU 8 point transistor output (Source type)7-35
7.3.22 XBC-DP30SU 12 point transistor output (Source type)7-36
7.3.23 XBC-DP40SU 16 point TR output (Source type)7-37
7.3.24 XBC-DP60SU 24 point TR output (Source type)7-38
7.4 Digital Input Module Specifications7-39
7.4.1 8 point DC24V input module (Source/Sink type)7-41
7.4.2 16 point DC24V input module (Source/Sink type)7-42
7.4.3 32 point DC24V input module (Source/Sink type)7-43
7.5 Digital Output Module Specifications
7.5.1 8 point relay output module7-45
7.5.2 8 point relay output module (independent point)7-46
7.5.3 16 point relay output module7-47
7.5.4 8 point transistor output module (Sink type)7-48
7.5.5 16 point transistor output module (Sink type)7-49
7.5.6 32 point transistor output module (Sink type)7-50
7.5.7 8 point transistor output module (Source type)7-51
7.5.8 16 point transistor output module (Source type)7-52
7.5.9 32 point transistor output module (Source type)7-53
7.6 Combined Digital I/O module Input Specification7-51
7.6.1 8 point DC24V input (Source/Sink type)7-51
7.6.2 16 point DC24V input (Source/Sink type)7-52
7.7 Combined Digital I/O module Output Specification
7.7.1 8 point relay output7-53
7.7.2 16 point transistor output (Sink type)7-54
7.8 IO Wiring by Using Smart Link Board7-55
7.8.1 Smart link board7-55

Chapter 8 Built-in High-speed Counter Function ......8-1~8-54

8.1 High-speed Counter Specifications	8-1
8.1.1 Performance specifications	
8.1.2 Designation of parts	8-3
8.1.3 "E" type Functions	8-6
8.1.4 "S(U)" type Functions	
8.2 Installation and Wiring	
8.2.1 Precaution for wiring	
8.2.2 Example of wiring	
8.3 Internal Memory	8-41

8.3.1 Special area for High-speed counter	
8.3.2 Error code	
8.4 Examples: Using High-speed Counter	

٦

Chapter 9 RTC Option Board9-1~9-	Chapter 9 RTC C	Option Board			.9-1-	~9-5
----------------------------------	-----------------	--------------	--	--	-------	------

9.1 Battery	9-1
9.1.1 Battery specification	9-1
9.1.2 Notice in using	9-1
9.1.3 Life of battery	9-1
9.1.4 How to change battery	9-2
9.2 RTC Function	9-3
9.2.1 How to use	9-3
9.3 Name and Function of Each Part	9-5

Chapter 10 DC Input Option Function ......10-1~10-15

10.1 DC input Option Board Specification	
10.1.1 DC input Option Board Specification	
10.2 High Speed Counter Specification	
10.2.1 Performance Specification	
10.2.2 Name of Each Part	
10.2.3 Function	
10.3 Installation and Wiring	
10.3.1 Power wiring	
10.3.2 Example of wiring	
10.4 Internal Memory	10-11
10.4.1 Special area for High-speed counter	10-11
10.5 Example using high-speed counter	

11.1 TR Output Option Board Operation Sequence of Positioning	11-1
11.1.1 Operation Sequence of Positioning	11-1
11.2 XBO-TN04A Specification	11-2
11.2.1 Output option board specification	11-2
11.3 Positioning Specification	11-3
11.3.1 Performance Specification	11-3

11.3.2 Name of each part	11-3
11.3.3 Before Positioning	11-5
11.3.4 Positioning Stop Factor	11-7
11.3.5 Manual operation	11-8
11.3.6 Home return	11-9
11.3.7 Positioning Basic Parameter Setup	11-10
11.4 Positioning Instruction List	11-14
11.5 Positioning Example	11-15

Chapter 12 Memory Module .....12-1~12-9

12.1 Memory Module Specification	12-1
12.1.1 Memory module specification	12-1
12.1.2 Memory module structure	12-1
12.1.3 How to use memory module	12-2
12.1.4 How to use when password is set	12-7

13.1 Safety Instruction	13-1
13.1.1 Fail safe circuit	
13.1.2 PLC heat calculation	13-6
13.2 Attachment/Detachment of Modules	13-8
13.2.1 Attachment/Detachment of modules	13-8
13.2.2 Caution in handling	13-13
13.3 Wire	
13.3.1 Power wiring	
13.3.2 I/O Device wiring	13-17
13.3.3 Grounding wiring	13-17
13.3.4 Specifications of wiring cable	13-18

Chapter 14 Maintenance		.14-	1~1	14-	·2
------------------------	--	------	-----	-----	----

14.1 Maintenance and Inspection	14-1
14.2 Daily Inspection	14-1
14.3 Periodic Inspection	14-2

Chapter 15 Troubleshooting15-1~15	5-12
15.1 Basic Procedure of Troubleshooting	15-1
15.2 Troubleshooting	15-1
15.2.1 Troubleshooting flowchart used with when the PWR(Power) LED turns Off	15-2
15.2.2 Troubleshooting flowchart used with when the ERR(Error) LED is flickering	15-3
15.2.3 Troubleshooting flowchart used with when the RUN,STOP LED turns Off	15-4
15.2.4 Troubleshooting flowchart used with when the I/O part doesn't operate normally.	15-5
15.3 Troubleshooting Questionnaire	15-7
15.4 Troubleshooting Examples	15-8
15.4.1 Input circuit troubles and corrective actions	15-8
15.4.2 Output circuit and corrective actions	15-9
15.5 Error Code List	5-11
Appendix 1 Flag ListApp. 1-1~App. 7	1-13
Appendix 1.1 Special Relay (F) ListApp.	. 1-1
Appendix 1.2 Communication Relay (L) ListApp.	. 1-6
 Appendix 2 Dimension App.2-1~App	0.2-4
Appendix 3 Compatibility with MASTER-KApp.3-1~App	.3-6
 Appendix 4 Instruction List	4-40
Appendix 4.1 Classification of InstructionsApp	.4-1
Appendix 4.2 Basic InstructionsApp	.4-2
Appendix 4.3 Application InstructionApp	.4-5
Appendix 4.4 Special/Communication Instruction App.4	4-37
 Appendix 5 Installation Of Option BoardApp	<u> </u>

### **Chapter 1 Introduction**

#### 1.1 Guide to Use This Manual

This manual includes specifications, functions and handling instructions for the XGB series PLC. This manual is divided up into chapters as follows.

No.	Title	Contents		
Chapter 1	Introduction	Describes configuration of this manual, unit's features and		
		terminology.		
Chapter 2	System Configurations	Describes available units and system configuration in the XGB		
		series.		
Chapter 3	General Specifications	Describes general specifications of units used in the XGB		
		series.		
Chapter 4	CPU Specifications			
Chapter 5	Program Configuration and	Describes performances, specifications and operations.		
Chapter 5	Operation Method	Describes performances, specifications and operations.		
Chapter 6	CPU Module Functions			
Chapter 7	Input/Output Specifications	Describes operation of basic and input/output.		
Chapter 9	Built-in High-speed Counter	Describes built-in high-speed counter functions.		
Chapter 8	Function			
Chapter 9	Installation and Wiring	Describes installation, wiring and handling instructions for		
		reliability of the PLC system.		
Chapter 10	Maintenance	Describes the check items and method for long-term normal		
Chapter 10		operation of the PLC system.		
Chapter 11	Troubleshooting	Describes various operation errors and corrective actions.		
Appendix 1	Flag List	Describes the types and contents of various flags.		
Appendix 2	Dimension	Shows dimensions of the main units and expansion modules.		
Appondix 2	Compatibility with	Deparibon the compatibility with MASTER K		
Appendix 3	MASTER-K	Describes the compatibility with MASTER-K.		
Appendix 4	Instruction List	Describes the special relay and instruction list.		

#### 1.2 Features

The features of XGB system are as follows.

(1) The system secures the following high performances.

(a) High Processing Speed

(b) Max. 284 I/O control supporting small & mid-sized system implementation

ltem	Туре		Reference	
item	XBC-DRxxE	XBC-DxxxS(U)	Reference	
Operation processing speed	0.24 µs / Step	94ns / Step	-	
Max IO contact point	38 points	284 points	In case of using option module 4 points (Coming soon)	
Program capacity	4kstep	15kstep	-	
Max. no. of expanded stage	Option module 2 stages	7 stages (including option module 2 stages)	-	

(c) Enough program capacity

(d) Expanded applications with the support of floating point.

(e) XBC-DRxxE is expressed as "E" type and XBC-DxxxS(U) is expressed as "S(U)" type.

(2) Compact : the smallest size comparing to the same class model of competitors.

(a) Compact panel realized through the smallest size.

(Unit: mm)

Item	Туре	Size (W * H * D)	Reference	
	XBC-Dx20S		<b>"O"</b> (	
	XBC-Dx30S	125*00*64	"S" type	
	XBC-Dx20SU	135*90*64		
	XBC-Dx30SU		"OL !" to re-e	
Basic unit	XBC-Dx40SU	161 * 90 * 64	"SU" type	
	XBC-Dx60SU	210 * 90 * 64		
	XBC-Dx10E	100*90*64		
	XBC-Dx14E		" <b>「</b> " to me	
	XBC-Dx20E	135*90*64	"E" type	
	XBC-Dx30E			
Extension module	XBE-,XBF-,XBL-	20 * 90 * 60	Basis of minimum size	

(3) Easy attachable/extensible system for improved user convenience.

- (a) By adopting a removable terminal block connector (M3 X 6 screw), convenience of wiring may be increased.
   ("S(U)" type main unit)
- (b) By adopting connector coupling method, modules may be easily connected and separated.
- (4) Improved maintenance ability with kinds of register, RTC option, comment backup and etc
  - (a) Convenient programming environment by providing analogue register and index register.

- (b) Improved maintenance ability by operating plural programs and task program through module program.
- (c) Built-in Flash ROM enabling permanent backup of program without any separate battery.
- (d) Improved maintenance ability by types of comment backup.
- (e) Built-in RTC function enabling convenient history and schedule management
- (5) Optimized communication environment.
  - (a) With max. 2 channels of built-in COM (1 channel for "E" type (except load port)), communication is available without any expanded of module.
  - (b) Supporting various protocols to improve the convenience (dedicated, Modbus, user-defined communication)
  - (c) Communication module may be additionally increased by adding modules (up to 2 stages such as Cnet,
  - Enet and etc). ("S(U)" type main unit)
  - (d) Convenient network-diagnostic function through network & communication frame monitoring.
  - (e) Convenient networking to upper systems through Enet or Cnet. ("S(U)" type main unit)
- (6) Applications expanded with a variety of I/O modules.
  - (a) 8, 16, 32 points modules provided (if relay output, 8/16 points module).
  - (b) Single input, single output and combined I/O modules supported.
- (7) Applications expanded through analog-dedicated register design and full attachable mechanism.
  - (a) All analogue modules can be attachable on extension base. ("S(U)" type: up to 7 stages available)
  - (b) With analog dedicated register(U) and monitoring dedicated function, convenient use for I/O is maximized
  - (can designate operations using easy programming of U area and monitoring function)
- (8) Integrated programming environment
  - (a) XG 5000: intensified program convenience, diverse monitoring, diagnosis and editing function
  - (b) XG PD: COM/network parameters setting, frame monitoring, protocol analysis function
- (9) Built-in high speed counter function
  - (a) Providing High-speed counter 1phase, 2phase and more additional functions.
  - (b) Providing parameter setting, diverse monitoring and diagnosis function using XG5000.
  - (c) Monitoring function in XG5000 can inspect without program, inspecting external wiring, data setting and others.
- (10) Built-in position control function ("S(U)" type TR output main unit)
  - (a) Supporting max 100Kpps 2 axes.
  - (b) Providing parameter setting, operation data collection, diverse monitoring and diagnosis by using XG5000.
  - (c) Commissioning by monitoring of XG5000, without program, inspecting external wiring and operation data setting.

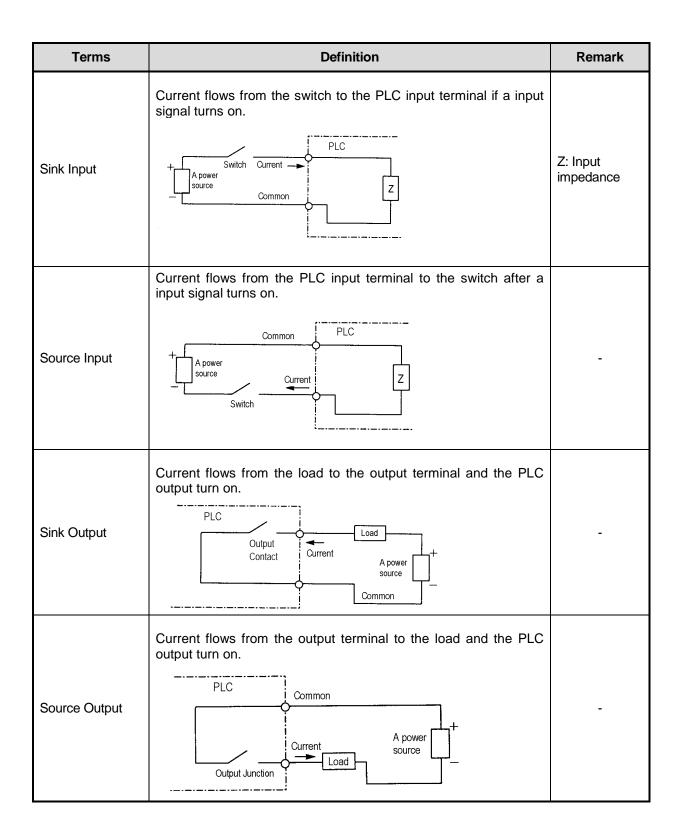
- (11) Built-in PID ("S(U)" type main unit)
  - (a) Supporting max. 16 loops.
  - (b) Setting parameters by using XG5000 and supporting loop status monitoring conveniently with trend monitor.
  - (c) Control constant setting through the improved Auto-tuning function.
  - (d) With many other additional functions including PWM output, △MV, △PV and SV Ramp, improving the control preciseness.
  - (e) Supporting types of control modes such as forward/backward mixed operation, 2-stage SV PID control, cascade control and etc.
  - (f) A variety of warning functions such as PV MAX and PV variation warning securing the safety.

#### 1.3 Terminology

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The following table gives definition of terms used in this manual.

Terms	Definition	Remark
Module	A standard element that has a specified function which configures the system. Devices such as I/O board, which inserted onto the mother board.	Example) Expansion module, Special module, Communication module
Unit	A single module or group of modules that perform an independent operation as a part of PLC systems.	Example) Main unit, Expansion unit
PLC System	A system which consists of the PLC and peripheral devices. A user program can control the system.	-
XG5000	A program and debugging tool for the MASTER-K series. It executes program creation, edit, compile and debugging. (PADT: Programming Added Debugging Tool)	-
XG - PD	Software to execute description, edition of basic parameter, high speed link, P2P parameter, and function of communication diagnosis	-
I/O image area	Internal memory area of the CPU module which used to hold I/O status.	
Cnet	Computer Network	-
FEnet	Fast Ethernet Network	-
Pnet	Profibus-DP Network	-
Dnet	DeviceNet Network	-
RTC	Abbreviation of 'Real Time Clock'. It is used to call general IC that contains clock function.	-
Watchdog Timer	Supervisors the pre-set execution times of programs and warns if a program is not competed within the pre-set time.	-



#### **Chapter 2 System Configuration**

The XGB series has suitable to configuration of the basic, computer link and network systems.

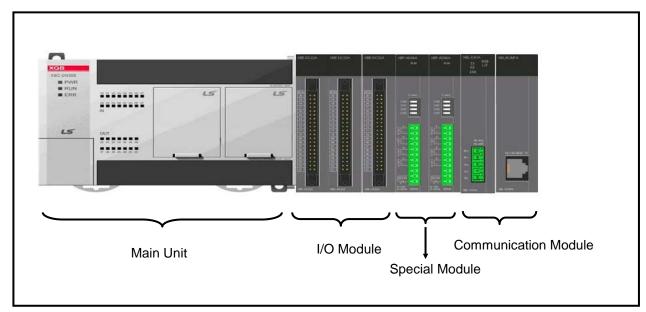
This chapter describes the configuration and features of each system.

#### 2.1 XGB System Configuration

XGB series System Configuration is as follows.

For "E" type, only option module can be attached

For "S" type, up to 7 stages connection is available. But in case of attaching 2 option modules, up to 5 stages connection is available. (For communication module, up to 2 connection is available.)



Item		n	Description		
Tatal 1/0			• XBC-DxxxS ("S(U)" type): 20~28	34 points	
Total I/O	points		• XBC-DxxxE ("E" type): 10~38 pc	pints	
		Digital I/O module	• "S(U)" type: Max. 7		
		Special module	• "S(U)" type: Max. 7		
Maximur	n number of	Communication	• "S(U)" type: Max. 2		
expansio	n	I/F module			
modules			• "S(U)" type: Max. 2		
		Option module	• "E" type: Max. 2		
			(In case of 10/14 points, only one is available)		
		"O" (	• XBC-DR20/30/40/60SU	• XBC-DN20/30S	
	Main unit	"S" type	• XBC-DN20/30/40/60SU	• XBC-DP20/30/40/60SU	
Items			• XBC-DR10/14/20/30E	• XBC-DN10/14/20/30E	
		"E" type	• XBC-DP10/14/20/30E		

Item			Description			
	Expansion module	Digital I/O module	• XBE-DC08/16A/B/32A • XBE-RY08A/B/16A	• XBE-TN08/16/32A • XBE-DR16A	• XBE-TP08/16/32A • XBE-DN32A	
		Special module	XBF-AD04A     XBF-AD08A     XBF-AD04C     XBF-DC04A     XBF-DC04C	<ul> <li>XBF-DV04A</li> <li>XBF-DV04C</li> <li>XBF-AH04A</li> <li>XBF-RD04A</li> <li>XBF-TC04S</li> </ul>	<ul> <li>XBF-TC04RT</li> <li>XBF-TC04TT</li> <li>XBF-PD02A</li> <li>XBF-HD02A</li> <li>XBF-HD02A</li> <li>XBF-HO02A</li> </ul>	
Items		Communication I/F module	• XBL-C41A • XBL-EMTA • XBL-CSEA • XBL-DSEA	• XBL-C21A • XBL-EIMT • XBL-PMEC	• XBL-EIPT • XBL-CMEA • XBL-PSEA	
		Digital I/O module	XBO-DC04A(High speed     XBO-TN04A(Positioning			
	Option module	Option	Special module	• XBO-AD02A • XBO-RD01A	• XBO-DA02A • XBO-TC02A	• XBO-AH02A
		RTC module	• XBO-RTCA(available on	n slot 9)		
		Memory module	• XBO-M2MB			

#### 2.2 Product List

XGB series' product list is as follows.

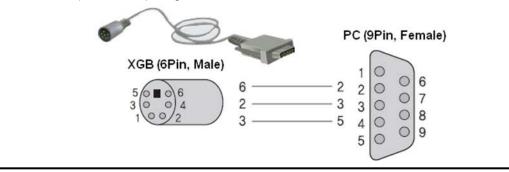
Types	eries' product list Model	Description	Remark
<b>7</b> 1	XBC-DR32H	AC100~220V power supply, DC24V input 16 point, Relay output 16 point	
	XBC-DN32H	AC100~220V power supply, DC24V input 16 point, Transistor output 16 point	
	XBC-DR64H	AC100~220V power supply, DC24V input 32 point, Relay output 32 point	
	XBC-DN64H	AC100~220V power supply, DC24V input 32 point, Transistor output 32 point	
	XBC-DR20SU	AC100~220V power supply, DC 24V input 32 point, relay output 8 point	
		AC100~220V power supply, DC24V input 12 point, relay duput 0 point AC100~220V power supply, DC24V input 12 point, transistor 8 point	
	XBC-DP20SU	AC100-220V power supply, DC24V input 12 point, transistor 6 point AC100-220V power supply, DC24V input 12 point, transistor 8 point	
	XBC-DR30SU	AC100-220V power supply, DC 24V input 12 point, transition of point AC100-220V power supply, DC 24V input 18 point, relay output 12 point	
	XBC-DN30S(U)	AC100~220V power supply, DC 24V input 18 point, transistor output 12 point	
	XBC-DP30SU	AC100~220V power supply, DC 24V input 18 point, transistor output 12 point	
	XBC-DR40SU	AC100~220V power supply, DC 24V input 24 point, relay output 16 point	
	XBC-DN40SU	AC100~220V power supply, DC 24V input 24 point, transistor output 16 point	
	XBC-DP40SU	AC100~220V power supply, DC 24V input 24 point, transistor output 16 point	
Ŀ!	XBC-DR60SU	AC100~220V power supply, DC 24V input 36 point, relay output 24 point	
Ω	XBC-DN60SU	AC100~220V power supply, DC 24V input 36 point, transistor output 24 point	
Main Unit	XBC-DP60SU	AC100~220V power supply, DC 24V input 36 point, transistor output 24 point	
Ë	XBC-DR10E	AC100~220V power supply, DC 24V input 6 point, relay output 4 point	
	XBC-DR14E	AC100~220V power supply, DC 24V input 8 point, relay output 6 point	
	XBC-DR20E	AC100~220V power supply, DC 24V input 12 point, relay output 8 point	
	XBC-DR30E	AC100~220V power supply, DC 24V input 18 point, relay output 12 point	
	XBC-DN10E	AC100~220V power supply, DC 24V input 6 point, transistor output 4 point	
	XBC-DN14E	AC100~220V power supply, DC 24V input 8 point, transistor output 6 point	
	XBC-DN20E	AC100~220V power supply, DC 24V input 12 point, transistor output 8 point	
	XBC-DN30E	AC100~220V power supply, DC 24V input 18 point, transistor output 12 point	
	XBC-DP10E	AC100~220V power supply, DC 24V input 6 point, transistor output 4 point	
	XBC-DP14E	AC100~220V power supply, DC 24V input 8 point, transistor output 6 point	
	XBC-DP20E	AC100~220V power supply, DC 24V input 12 point, transistor output 8 point	
	XBC-DP30E	AC100~220V power supply, DC 24V input 18 point, transistor output 12 point	
	XBM-DN16S	DC24V Power supply, DC24V Input 8 point, Transistor output 8 point	
	XBM-DN32S	DC24V Power supply, DC24V Input 16 point, Transistor output 16 point	
	XBM-DR16S	DC24V Power supply, DC24V Input 8 point, Relay output 8 point	
	XBE-DC08A	DC24V Input 8 point	
	XBE-DC16A/B	DC24V Input 16 point	
	XBE-DC32A	DC24V Input 32 point	
<u>e</u>	XBE-RY08A	Relay output 8 point	
odt	XBE-RY08B	Relay output 8 point (independent point)	
Σ	XBE-RY16A	Relay output 16 point	
Expansion Module	XBE-TN08A	Transistor output 8 point (sink type)	_
ans	XBE-TN16A	Transistor output 16 point (sink type)	
d Xi	XBE-TN32A	Transistor output 32 point (sink type)	
	XBE-TP08A	Transistor output 8 point (source type)	
	XBE-TP16A	Transistor output 16 point (source type)	
	XBE-TP32A	Transistor output 32 point (source type)	
	XBE-DR16A XBE-DN32A	DC24V Input 8 point, Relay output 8 point DC24V Input 16 point, Transistor output 16 point (sink type)	
	ADE-DINJZA		

Types	Model	Description	Remark
	XBF-AD04A	Current/Voltage input 4 channel	
	XBF-AD04C	Current/Voltage input 4 channel, High resolution	
	XBF-DC04A	Current output 4 channel	
	XBF-DC04C	Voltage output 4 channel, High resolution	
	XBF-DV04A	Voltage output 4 channel	
ule	XBF-DV04C	Current output 4 channel, High resolution	
pol	XBF-AH04A	Current/voltage input 2 channel, output 2 channel	
Special Module	XBF-RD04A	RTD (Resistance Temperature Detector) input 4 channel	
OCi O	XBF-TC04S	TC (Thermocouple) input 4 channel	
Spe	XBF-TC04RT	Temperature controller module (RTD input, 4 roof)	
•,	XBF-TC04TT	Temperature controller module (TC input, 4 roof)	
	XBF-AD08A	Current/voltage input 8 channel	
	XBF-PD02A	2 axes, line driver type	
	XBF-HD02A	High Speed Counter 2channel, line driver type	
	XBF-HO02A	High Speed Counter 2channel, open collector type	
	XBL-C21A	Cnet (RS-232C/Modem) I/F	
	XBL-C41A	Cnet (RS-422/485) I/F	
_	XBL-EMTA	Enet I/F	
Communication Module	XBL-EIMT/F/H	RAPIEnet I/F	
nmunicati Module	XBL-EIPT	EtherNet/IP module	
Noc	XBL-CMEA	CANopen Master	
Lou	XBL-CSEA	CANOpen Slave	
0	XBL-PMEC	Profibus-DP, Master	
	XBL-PSEA	Profibus-DP, Slave	
	XBL-DSEA	DeviceNet, Slave	
	XBO-AD02A	Current/voltage input 2channel	
	XBO-DA02A	Current/voltage output 2 channel	
	XBO-AH02A	Current/Voltage input 1 channel, output 1 channel	
ςΦ	XBO-RD01A	RTD input 1 channel	
Option Module	XBO-TC02A	Thermocouple input 2 channel	
QМ	XBO-DC04A	DC 24V input 4 point(High speed counter is available on "SU "type)	
	XBO-TN04A	Sink type transistor output 4 channel (Positioning is available on slot 9 of "SU "type)	
	XBO-RTCA	RTC module(available on slot 9)	
	XBO-M2MB	Memory module	
ca ble	PMC-310S	Connection cable (PC to PLC), 9pin(PC)-6pin(PLC)	
ΔŬ	USB-301A	Connection cable (PC to PLC), USB	

#### Note

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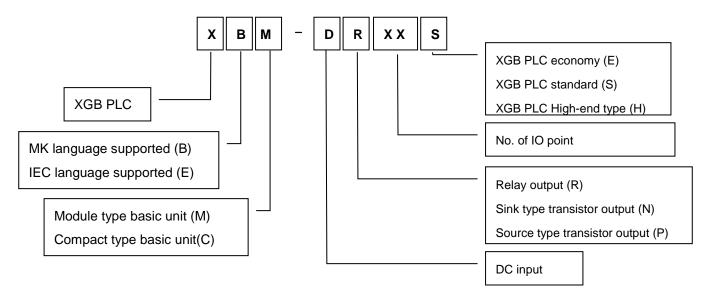
Download Cable (PMC-310S) Diagram



#### 2.3 Classification and Type of Product Name

#### 2.3.1 Classification and type of basic unit

Name of basic unit is classified as follows.

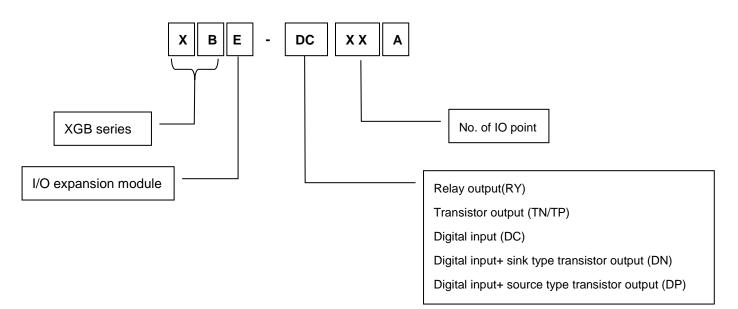


Classification	Name	DC input	Relay output	Transistor output	Power
	XBM-DR16S	8 point	8 point	None	
Modular type	XBM-DN16S	8 point	None	8 point	DC24V
main unit	XBM-DN32S	16 point	None	16 point	
	XBC-DR32H	16 point	16 point	None	
	XBC-DN32H	16 point	None	16 point	
	XBC-DR64H	32 point	32 point	None	
	XBC-DN64H	32 point	None	32 point	
	XBC-DN20S(U)	12 point	None	8 point	
	XBC-DN30S(U)	18 point	None	12 point	
	XBC-DN40SU	24 point	None	16 point	
	XBC-DN60SU	36 point	None	24 point	
	XBC-DP20SU	12 point	None	8 point	
	XBC-DP30SU	18 point	None	12 point	
	XBC-DP40SU	24 point	None	16 point	
	XBC-DP60SU	36 point	None	24 point	
	XBC-DR20SU	12 point	8 point	None	-
Compact type	XBC-DR30SU	18 point	12 point	None	
main nit	XBC-DR40SU	24 point	16 point	None	AC110V~220V
	XBC-DR60SU	36 point	24 point	None	-
	XBC-DR10E	6 point	4 point	None	-
	XBC-DR14E	8 point	6 point	None	-
	XBC-DR20E	12 point	8 point	None	-
	XBC-DR30E	18 point	12 point	None	-
	XBC-DN10E	6 point	None	4 point	
	XBC-DN14E	8 point	None	6 point	
	XBC-DN20E	12 point	None	8 point	
	XBC-DN30E	18 point	None	12 point	
	XBC-DP10E	6 point	None	4 point	
	XBC-DP14E	8 point	None	6 point	
	XBC-DP20E	12 point	None	8 point	
	XBC-DP30E	18 point	None	12 point	

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#### 2.3.2 Classification and type of expansion module

Name of expansion module is classified as follows.

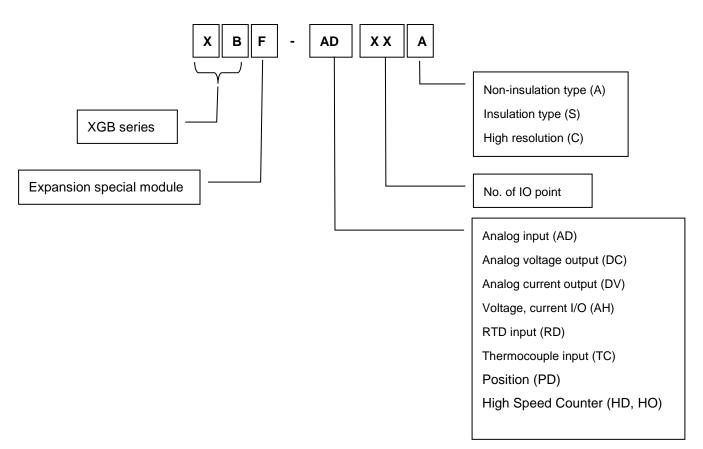


Name	DC input	Relay output	Transistor output	Reference
XBE-DC08A	8 point	None	None	
XBE-DC16A/B	16 point	None	None	
XBE-DC32A	32 point	None	None	
XBE-RY08A/B	None	8 point	None	
XBE-RY16A	None	16 point	None	
XBE-TN08A	None	None	8 point	
XBE-TN16A	None	None	16 point	Sink type
XBE-TN32A	None	None	32 point	
XBE-TP08A	None	None	8 point	
XBE-TP16A	None	None	16 point	Source type
XBE-TP32A	None	None	32 point	
XBE-DR16A	8 point	8 point	None	
XBE-DN32A	16 point	None	16 point	Sink type

#### 2.3.3 Classification and type of special module

Special module is classified as follows.

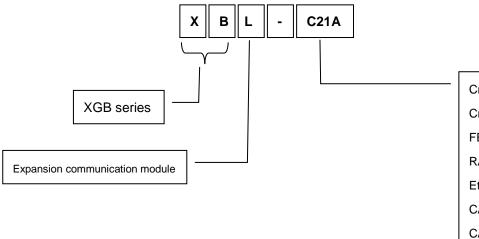
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Classification	Name	No. of input ch.	Input type	No. of output ch.	Output type
Analog input	XBF-AD04A/C	4	Voltage/Current	None	-
	XBF-AD08A	8	Voltage/Current	None	
Analog output	XBF-DC04A/C	None	-	4	Current
	XBF-DV04A/C	None	-	4	Voltage
RTD input	XBF-RD04A	4	PT100/JPT100	None	-
	XBF-RD01A	1	PT100/JPT100	None	-
TC input	XBF-TC04S	4	K, J, T, R	None	-
	XBF-TC04RT	4	PT100/JPT100	4	Transister
	XBF-TC04TT	4	K, J, T, R	4	Transister
Positioning	XBF-PD02A	-	Line Driver	2	Voltage
High Speed Counter	XBF-HD02A	2	Line Driver		
	XBF-HO02A	2	Open Collector		

#### 2.3.4 Classification and type of communication module

Name of communication module is classified as follows.



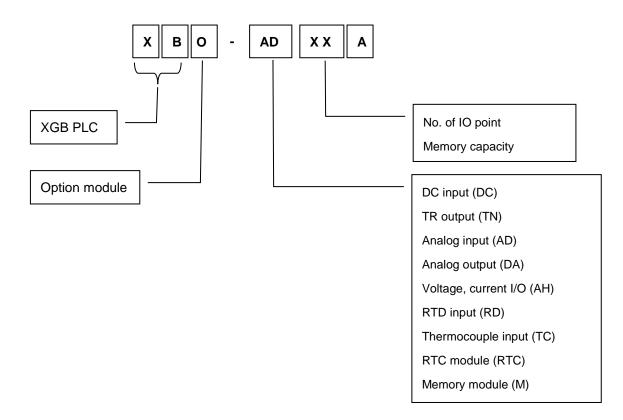
Cnet 1 channel (RS-232C): C21A Cnet 1 channel (RS-422/485): C41A FEnet 1 port: EMTA RAPIEnet 2 port: EIMT/F/H EtherNet/IP 2 port: EIPT CANopen Master: CMEA CANopen Slave: CSEA

Classification	Name	Туре	
Cnet Comm. Module	XBL-C21A	RS-232C, 1 channel	
Chel Comm. Module	XBL-C41A	RS-422/485, 1 channel	
FEnet Comm. Module	XBL-EMTA	Electricity, open type Ethernet	
RAPIEnet Comm. Module	XBL-	Comm. Module between PLCs, electric media,	
RAFIEIIel Comm. Module	EIMT/EIMF/EIMH	100 Mbps industrial Ethernet supported	
EtherNet Comm. Module	XBL-EIPT	Open EtherNet I/P	
CANopen Comm. Module	XBL-CMEA	CANopen Master	
CANopen Comm. Module	XBL-CSEA	CANopen Slave	
Pnet Comm. Module	XBL-PMEC	Profibus-DP Master	
	XBL-PSEA	Profibus-DP Slave	
Dnet Comm. Module	XBL-DSEA	DeviceNet Slave	

#### 2.3.5 Classification and type of option module

Name of option module is classified as follows.

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Classification	Name	No. of input CH	Input type	No. of output CH	Output type
DC input	XBO-DC04A	4	DC 24V	None	-
TR output	XBO-TN04A	None	-	4	DC 24V
Analog input	XBO-AD02A	2	Voltage/current	None	
Analog output	XBO-DA02A	None	-	2	Voltage/current
Analog I/O	XBO-AH02A	1	Voltage/current	1	Voltage/current
RTD input	XBO-RD01A	1	PT100/JPT100	None	-
TC input	XBO-TC02A	2	K, J	None	-
RTC module	XBO-RTCA	None	-	None	-
Memory module	XBO-M2MB	None	-	None	-

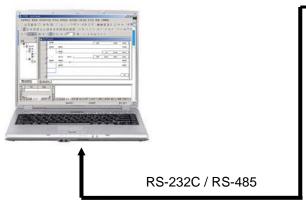
#### 2.4 System Configuration

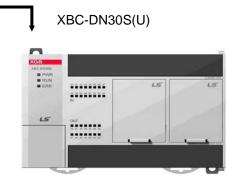
#### 2.4.1 Cnet I/F system

Cnet I/F System is used for communication between the main unit and external devices using RS-232C/RS-422 (485) Interface. The XGB series has a built-in RS-232C port, RS-485 port

For "E" type, only one communication port between RS-232C and RS-485 can be used and you can specify at parameter setting window. For "S" type, RS-232C and RS-485 can be used independently and add RS-232C dedicated Cnet I/F module (XBL-C21A) and RS-422/485 dedicated Cnet I/F module (XBL-C41A). It is possible to configure the following communication system on demand

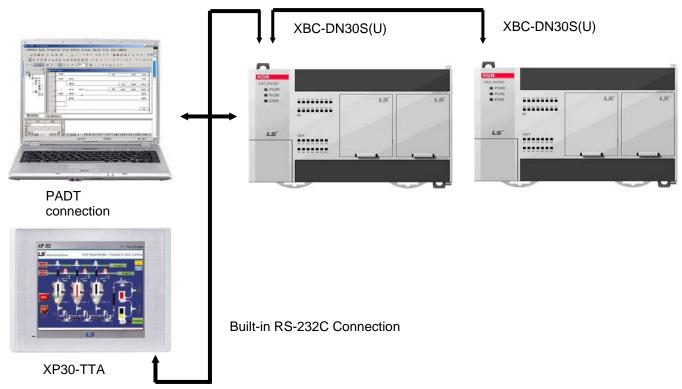
- (1) 1:1 communication system
  - (a) 1:1 communication of an external device (computer) with main unit using a built-in port (RS-232C/RS-485)

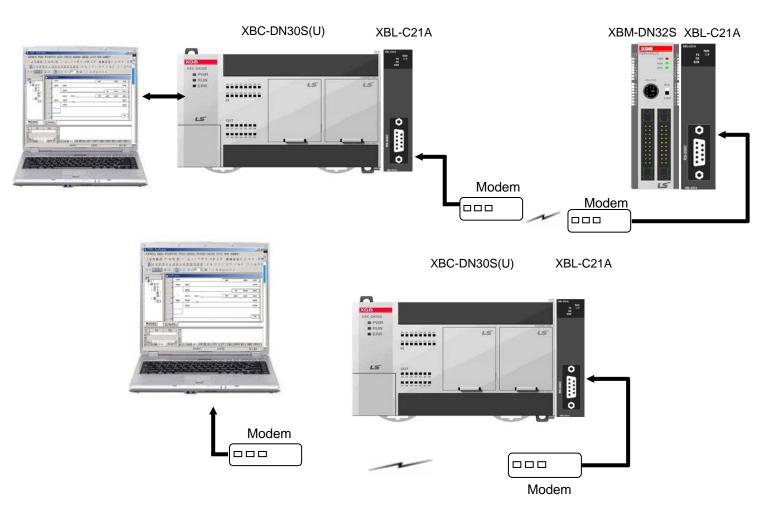




(b) 1:1 communication with main unit using a built-in RS-485 port (In case of built-in RS-232C,it is for connecting to HMI device.)

Built-in RS-485 Connection

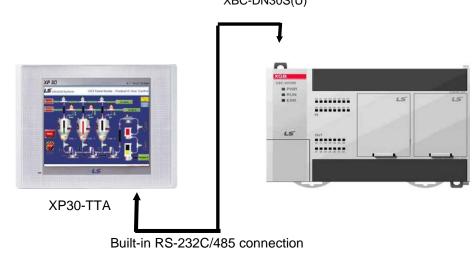




(c) 1:1 RS-232C Communication with remote device via modem by Cnet I/F modules

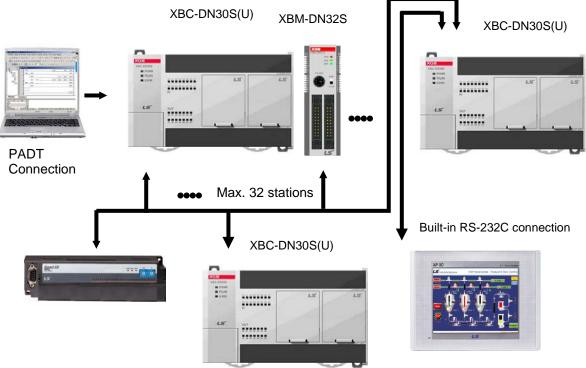
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(d) 1:1 communication of an external device (monitoring unit) with main unit using a built-in RS-232C/485 port.
 XBC-DN30S(U)

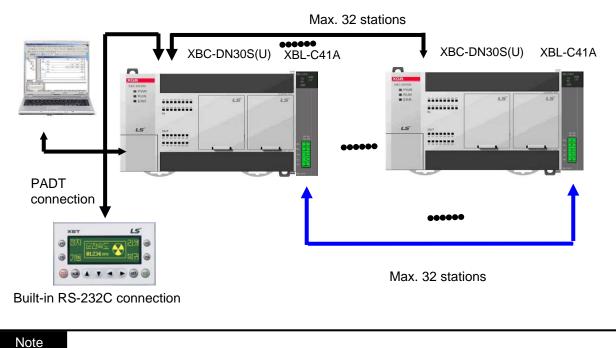


#### (2) 1:n Communication system

(a) Using RS-485 built-in function can connect between one computer and multiple main units for up to 32 stations.



(b) Using RS-485 built-in function/expansion Cnet I/F module can be connect for up to 32 stations.



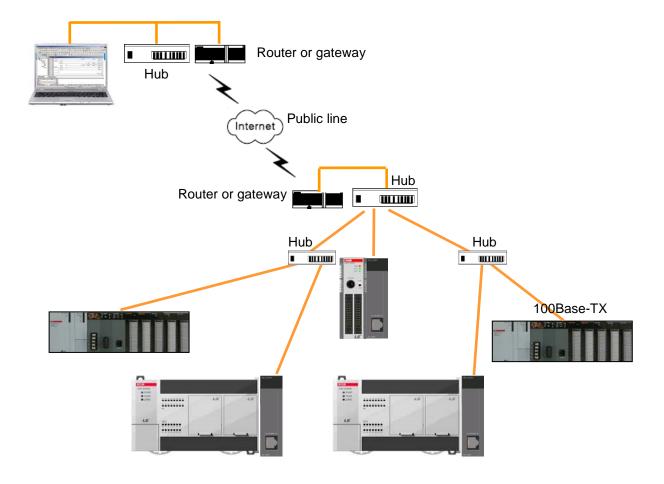
#### note

1) Refer to 'XGB Cnet I/F user manual' for details

### 2.4.2 Ethernet system

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Ethernet made by cooperation of Xerox, Intel, DEC is standard LAN connection method (IEEE802.3), which is network connection system using 1.5KB packet with 100Mbps transmission ability. Since Ethernet can combine a variety of computer by network, it is called as standard specification of LAN and diverse products. By adopting CSMA/CD method, it is easy to configure the network and collect large capacity data.



#### Note

1) Refer to 'XGB FEnet I/F user manual' for details

# **Chapter 3 General Specifications**

# 3.1 General Specifications

The General specification of XGB series is as below.

No.	Items	Specification					Reference
1	Ambient Temp.		0 ~ 55 °C				
2	Storage Temp.			–25 ~ +70 °C			
3	Ambient humidity		5 ~ 95%	RH (Non-cond	ensing)		-
4	Storage humidity		5 ~ 95%	RH (Non-cond	ensing)		
			Occasional	vibration		-	
		Frequency	Acc	eleration	Amplitude	Times	
		$10 \le f < 57Hz$	z	-	0.075mm		
5	Vibration	57 ≤ f ≤ 150H	lz 9.8r	n/s²(1G)	_	10 times	
5	resistance		Continuous	vibration		each	
		Frequency	Acce	eleration	Amplitude	direction	IEC61131-2
		$10 \leq f < 57Hz$	z	-	0.035mm	(X,Y and Z)	12001131-2
		57 ≤ f ≤ 150H	$57 \le f \le 150$ Hz $4.9$ m/s <sup>2</sup> (0.5G) -				
			<ul> <li>Peak acceleration : 147 m/s<sup>2</sup> (15G)</li> </ul>				
6	Shock resistance	<ul> <li>Duration : 11ms</li> </ul>					
		Half-sine, 3 times e	each directio	-			
		Square wave	AC: ±1,500 V				LS ELECTRIC
		impulse noise		DC:	±900 V		standard
		Electrostatic		Voltage: 4kV	(Contact discha	irge)	IEC61131-2
		discharge		-		-	IEC61000-4-2
7	Noise resistance	Radiated		90 1.00	0 MU- 10\//m		IEC61131-2,
		electromagnetic field noise		80 ~ 1,000 MHz, 10V/m			IEC61000-4-3
				Power supply	Digital/Anal	og Input/Output,	
		Fast transient	Segment	module	C C	cation Interface	IEC61131-2 IEC61000-4-4
		/Burst noise	/Burst noise Voltage 2kV			1kV	
8	Environment	Free from corrosive gases and excessive dust					
9	Altitude	Up to 2,000 ms					
10	Pollution degree	2 or less				-	
11	Cooling		Air-cooling				

### Notes

1) IEC (International Electrotechnical Commission):

An international nongovernmental organization which promotes internationally cooperated standardization in electric/electronic field, publishes international standards and manages applicable estimation system related with.

2) Pollution degree:

An index indicating pollution degree of the operating environment which decides insulation performance of the devices. For instance, Pollution degree 2 indicates the state generally that only non-conductive pollution occurs. However, this state contains temporary conduction due to dew produced.

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# **Chapter 4 CPU Specifications**

## 4.1 Performance Specifications

The following table shows the general specifications of the XGB compact type CPU (XBC-Dx10/14/20/30E).

XBC-Dx10/1	1/20/002/1		Specification	s ("E" type)			
Items		XBC-DR10E	XBC-DR14E	XBC-DR20E	XBC-DR30E		
		XBC-DN10E	XBC-DN14E	XBC-DN20E	XBC-DN30E	Remark	
		XBC-DP10E	XBC-DP14E	XBC-DP20E	XBC-DP30E		
Program co	ontrol method	Reiterative op	eration, fixed cycle	e operation, cons	tant scan		
I/O control	method		nous batch proces ogram instruction	sing method (Re	efresh method),		
Program la	nguage	Ladder Diagra	m, Instruction List				
Number of	Basic	28					
instructions	Application	677					
Processing (Basic instr		0.24 µs/Step					
Program ca	apacity	4 k steps					
Max. I/O po	pints	14 point Main + 1 option	18 point Main + 1 option	28 point Main + 2 options	38 point Main + 2 options	-	
	Р	P0000 ~ P127	F (2,048 point)				
	М	M0000 ~ M25	5F (4,096 point)				
	К	K00000 ~ K25	1				
	L	L00000 ~ L12					
	F	F000 ~ F255F					
Data area	Т	100ms, 10ms, (Adjustable by					
	С	C000 ~ C255					
	S	S00.00 ~ S12					
	D		19 (5120 word)				
	U	U00.00 ~ U07 (Analog data r	Word				
	Z	Z000~Z127 (1	28 Word)				
Total progra	am	128					
Initial task		1	1				
Cyclic task		Max. 8					
I/O task		Max. 4					
Internal device task		Max. 8	-				
Operation mode		RUN, STOP,					
Self-diagnosis function		Detects errors of scan time, memory, I/O					
Program po	ort	RS-232C (Loa	RS-232C (Loader)				
Back-up me	ethod	Latch area se	tting in basic para	meter			

Items	XBC-DR10E	XBC-DR14E	XBC-DR20E	XBC-DR30E	Remark
items	XBC-DN10E	XBC-DN14E	XBC-DN20E	XBC-DN30E	Remark
	XBC-DP10E	XBC-DP14E	XBC-DP20E	XBC-DP30E	
	250mA	280mA	350mA	470mA	
Internal consumption current	180mA	190mA	200mA	210mA	
	180mA	190mA	200mA	210mA	
	330g	340g	450g	465 g	
Weight	313g	315g	418g	423g	
	313g	315g	418g	423g	

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The following table shows the general specifications of the XGB compact type CPU (XBC-DN20/30S).

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Items		Specification	ns ("S" type)	Domork
		XBC-DN20S	XBC-DN30S	Remark
Program control method		Reiterative operation, fixed cycl		
I/O control I	method	Scan synchronous batch proces Directed by program instruction	ssing method (Refresh method),	
Program la	nguage	Ladder Diagram, Instruction Lis	t	
Number of		28		
instructions	Application	687		
Processing (Basic instr	•	94 ns/Step		
Program ca	apacity	15 k steps		
Max. I/O po	oints	244 point (Main + Expansion 7 stages)	254 point (Main + Expansion 7 stages)	-
	Р	P0000 ~ P1023F (16,384 point)		
	М	M0000 ~ M1023F (16,384 point	)	
	К	K0000 ~ K4095F (65,536 point)		
	L	L0000 ~ L2047F (32,768 point)		
	F	F0000 ~ F1023F (16,384 point)		
Data area	т	100ms, 10ms, 1ms : T0000 ~ T (Adjustable by parameter settin		
	С	C0000 ~ C1023 (1,024)		
	S	S00.00 ~ S127.99		
	D	D0000 ~ D10239 (10,240 word		
	U	U00.00 ~ U0A.31 (Analog data		
	Z	Z000~Z127 (128 Word)	Word	
	R	R0000~R10239 (10,240 word)		
Total progra	am	128		
Initial task		1		
Cyclic task		Max. 8		
I/O task		Max. 8		
Internal device task		Max. 8		
Operation mode		RUN, STOP, DEBUG	-	
Self-diagnosis function		Detects errors of scan time, merr		
Program port		RS-232C 1 channel		
Back-up method		Latch area setting in basic para		
Internal consu	Imption current	240 mA	255 mA	
Weight		470g	475g	

The following table shows the general specifications of the XGB compact type CPU (XBC-Dx20/30/40/60SU).

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Items		XBC-DR20SU	XBC-DR30SU	s ("SU" type) XBC-DR40SU	XBC-DR60SU	Remark
		XBC-DN20SU	XBC-DN30SU	XBC-DN40SU	XBC-DN60SU	
		XBC-DP20SU	XBC-DP30SU	XBC-DP40SU	XBC-DP60SU	
Program co	ontrol method		-	le operation, con		
I/O control	method	-	ous batch proce	ssing method (R	efresh method),	
Program la	nguage	Ladder Diagra	m, Instruction Lis	st		
Number of	Basic	28				
instructions	Application	687				
Processing (Basic instr	•	94 ns/Step				
Program ca	apacity	15 k steps				
Max. I/O po	bints	•	254 point (Main + Expansion 7 stages)	264 point (Main + Expansion 7 stages)	284 point (Main + Expansion 7 stages)	-
	Р		3F (16,384 point			
	М		23F (16,384 poin			
	К	K0000 ~ K409				
	L	L0000 ~ L2047				
	F	F0000 ~ F102				
Data area	Т	100ms, 10ms, (Adjustable by				
Dulu urou	С	C0000 ~ C102				
	S	S00.00 ~ S127				
	D	D0000 ~ D102				
	U	U00.00 ~ U0A				
	Z	Z000~Z127 (1	28 Word)			Word
	R	R0000~R1023				
Total progra	am	128				
Initial task		1				
Cyclic task		Max. 8				
I/O task		Max. 8				
Internal device task		Max. 8	-			
Operation mode		RUN, STOP, I				
Self-diagno	sis function	Detects errors				
Program po	ort	RS-232C 1 ch	annel, USB 1 ch	annel		
Back-up me	ethod	Latch area set	tting in basic para	ameter		

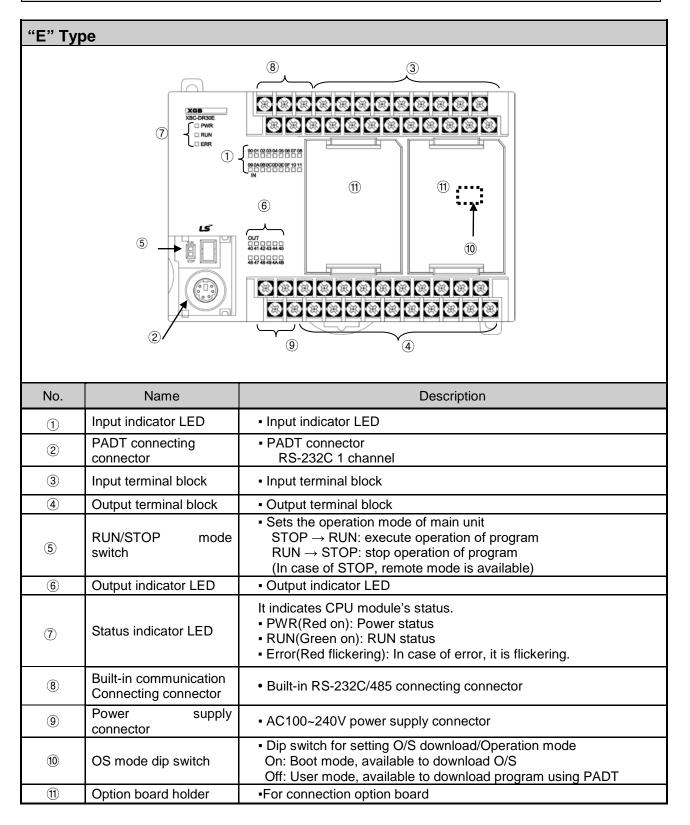
Items	XBC-DR20SU	XBC-DR30SU	XBC-DR40SU	XBC-DR60SU	Remark
nomo	XBC-DN20SU	XBC-DN30SU	XBC-DN40SU	XBC-DN60SU	Keman
	XBC-DP20SU	XBC-DP30SU	XBC-DP40SU	XBC-DP60SU	
	478 mA	626 mA	684 mA	942 mA	
Internal consumption current	252 mA	310 mA	288 mA	340 mA	
	305 mA	352 mA	355 mA	394 mA	
	514g	528g	594g	804g	
Weight	475g	476g	578g	636g	
	442g	446g	544g	717g	

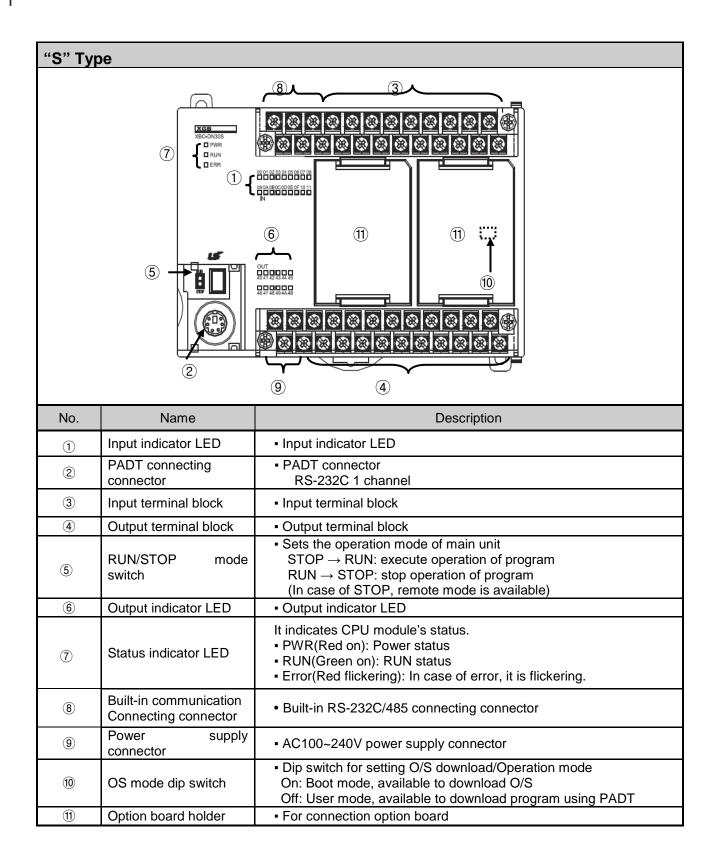
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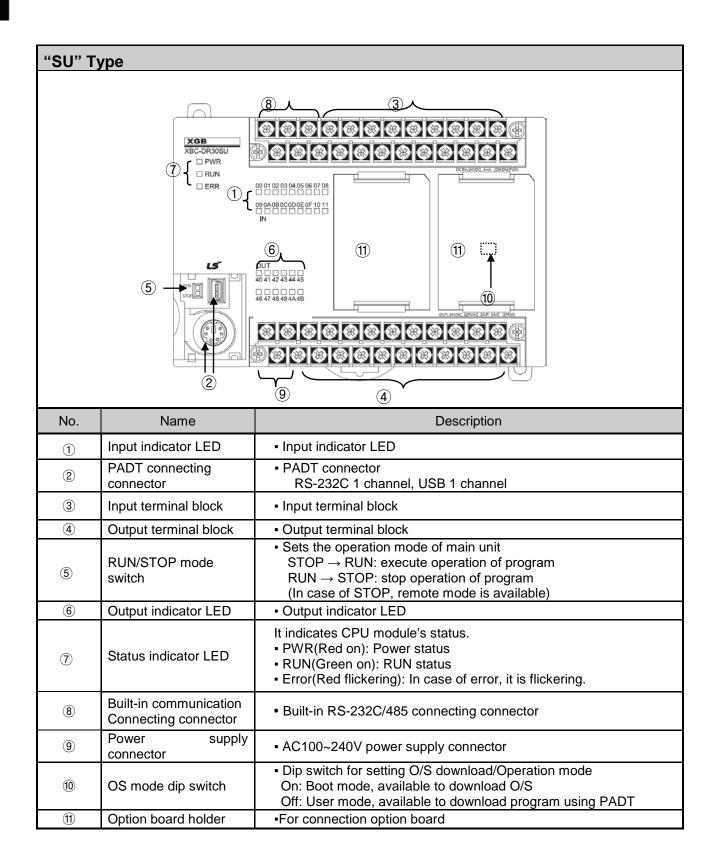
Itoma			Spec	Derect	
Items		ms	"E" type	"S(U)" type	Remark
	PID control function		Controlled by instructions, Auto- Forced output, Adjustable oper MV function, SV-Ramp function Max. 16 loops are supported Dedicated protocol support	Supported in "S(U)" type	
	Cne	t I/F function	MODBUS protocol support User defined protocol support Select one port between RS- 232C 1 port, RS-485 1 port by	RS-232C 1 port, RS-485 1 port respectively	
		Capacity	parameter 1 phase: 4 kHz 4 channel 2 phase: 2 kHz 2 channel	1 phase: 100 kHz 2 channel, 20kHz 6 channel 2 phase: 50 kHz 1 channel, 8kHz 3 channel	
	Yethoo       4 different counter modes according to input pulse and addition/subtraction method         • 1 phase pulse input: addition/subtraction counter         • 2 phase pulse input: addition/subtraction counter         • 2 phase pulse input: addition/subtraction by rising pulse phase differences         • Internal/External preset function		on/subtraction counter ddition/subtraction counter by B on/subtraction counter • 2 phase pulse input: addition/subtraction by rising/falling pulse phase		
Built-in function			<ul> <li>Latch counter function</li> </ul>		
Built-in 1	Basic function		No. of control axis: 2 axes Control method: position/spe Control unit: pulse Positioning data: 80 data/ax Operation mode: End/Keep/ Operation method: Single, F		
	Positioning function	Positioning function	Positioning method: Absolut Address range: -2,147,483,6 Speed: Max. 100kpps(settin Acceleration / Deceleration m	Supported in "S(U)" type transistor output	
	Return to Origin JOG operation Additional function		By Home and DOG (Off) By Home and DOG (On) By DOG	oupui	
			Setting range: 1~100,000 ( H	• • •	
				synchronizing operation, Position ear interpolation operation etc.	
	Pulse catch		50 ⊭s 4 point (P0000 ~ P0003)	10 μs 2 point (P0000 ~ P0001) 50 μs 6 point (P0002 ~ P0007)	_
	External interrupt		4 point: 50 ⊭s (P0000 ~ P0003)	10 µs 2 point (P0000 ~ P0001) 50 µs 6 point (P0002 ~ P0007)	
	Input filter		Select among 1,3,5,10,20,7		

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## 4.2 Names of Part and Function







# 4.3 Power Supply Specifications

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It describes the power supply specification of main unit.

			Specification						
Items			XBC-	XBC-	XBC-	XBC-	XBC-	XBC-	
			Dx10/14E	Dx20/30E	Dx20S(U)	Dx30S(U)	Dx40SU	Dx60SU	
		voltage nty voltage)	AC 100 ~ 2	AC 100 ~ 240 V					
		age range	AC85~264	V(-15%, +10	)%)				
	Inrush	current	50APeak or	less					
Input	Input current		0.5A or less (220V), 1A or less (110V)						
	Effic	iency	65% or mo	65% or more					
	Permitted momentary power failure		Less than 10 ms						
	Rated	DC5V	500mA	800mA	1.5A	1.5A	2.0A	2.5A	
Output	output	DC24V	0.2A	0.2A	0.3A	0.3A	0.3A	0.5A	
Output voltage ripple			DC5V (±2%)						
Power s	Power supply status indication			LED On when power supply is normal					
C	able specific	cation	0.75 ~ 2 mm <sup>2</sup>						

\* Use the power supply which has 4 A or more fuse for protecting power supply.

## 1) Consumption current (DC 5V)

Туре	Model	Consumption current (Unit : mA)
	XBM-DR16S	400
	XBM-DN16S	250
	XBM-DN32S	280
	XBC-DR32H	660
	XBC-DR64H	1,040
	XBC-DN32H	260
	XBC-DN64H	330
	XBC-DN30S	255
	XBC-DN20S	240
	XBC-DN20SU	252
	XBC-DN30SU	270
	XBC-DN40SU	288
	XBC-DN60SU	340
	XBC-DP20SU	305
	XBC-DP30SU	352
	XBC-DP40SU	355
Main unit	XBC-DP60SU	394
	XBC-DR20SU	478
	XBC-DR30SU	626
	XBC-DR40SU	684
	XBC-DR60SU	942
	XBC-DR30E	470
	XBC-DR20E	350
	XBC-DR14E	280
	XBC-DR10E	250
	XBC-DN30E	210
	XBC-DN20E	200
	XBC-DN14E	190
	XBC-DN10E	180
	XBC-DP30E	210
	XBC-DP20E	200
	XBC-DP14E	190
	XBC-DP10E	180
	XBE-DC32A	50
	XBE-DC16A/B	30
	XBE-DC08A	20
	XBE-RY16A	440
	XBE-RY08A/B	240
	XBE-TN32A	80
Expansion I/O module	XBE-TN16A	50
	XBE-TN08A	40
	XBE-TP32A	80
	XBE-TP16A	50
	XBE-TP08A	40
	XBE-DR16A	250
	XBE-DN32A	60

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Туре	Model	Consumption current (Unit : mA)
	XBF-AD04A	120
	XBF-AD08A	105
	XBF-AH04A	120
	XBF-DV04A	110
	XBF-DC04A	110
	XBF-RD04A	100
Expansion special module	XBF-TC04S	100
	XBF-PD02A	500
	XBF-HD02A	260
	XBF-HO02A	200
	XBF-AD04C	100
	XBF-DC04C	160
	XBF-DV04C	160
	XBL-C21A	120
	XBL-C41A	120
	XBL-EMTA	300
	XBL-EIMT	280
Expansion communication module	XBL-EIMF	670
	XBL-EIMH	480
	XBL-EIPT	290
	XBL-CMEA	211
	XBL-CSEA	202
	XBO-DC04A	80
	XBO-TN04A	100
	XBO-AD02A	50
	XBO-DA02A	150
Option module	XBO-AH02A	150
	XBO-RD01A	30
	XBO-TC02A	50
	XBO-RTCA	30
	XBO-M2MB	

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## 4.4 Calculation Example of Consumption Current/Voltage

Calculate the consumption current and configure the system not to exceed the output current capacity of basic unit.

(1) XGB PLC configuration example 1	
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Consumption of current/voltage is calculated as follows.

Туре	Model	Unit No.	Internal 5V consumption current (Unit : mA)	Remark
Main unit	XBC-DN20S	1	240	
	XBE-DC32A	2	50	In case contact points are On. (Maximum consumption current)
	XBE-TN32A	2	80	
Expansion module	XBF-AD04A	1	120	
modulo	XBF-DC04A	1	110	All channel is used. (Maximum consumption current)
	XBL-C21A	1	110	
Consumption current		<b>850</b> mA		-
Consumption voltage	4.25 W			0.85 * 5V = 4.25W

In case system is configured as above, since 5V consumption current is total 850mA and 5V output of XGB standard type main unit is maximum 1.5A, normal system configuration is available.

#### (2) XGB PLC configuration example 2

Туре	Model	Unit No.	Internal 5V consumption current (Unit : m <sup>A</sup> )	Remark
Main unit	XBC-DN30S	1	255	
	XBE-DR16A	2	250	In case all contact points are On. (Maximum consumption current)
Expansion	XBE-RY16A	2	440	
module	XBF-AD04A	2	120	All channel is used.
	XBL-C21A	1	110	(Maximum consumption current)
Consumption current	1	,985 mA		-
Consumption voltage		9.925 W		1.985 × 5V = 9.925W

If system is configured as above, total 5V current consumption is exceeded 1,985 mA and it exceeds the 5V output of XGB standard type main unit. Normal system configuration is not available. Although we assume the above example that all contact points are on, please use high-end type main unit which 5V output capacity is higher than standard type main unit.

Туре	Model	Unit No.	Internal 5V consumption current (Unit : mA)	Remark
Main unit	XBC-DN32H	1	260	In case of all contact points are
	XBE-DR16A	E-DR16A 2	250	On.
Expansion	XBE-RY16A	2	440	(Maximum consumption current)
module	XBF-AD04A	2	120	All channel is used.
	XBL-C21A	1	110	(Maximum consumption current)
Consumption current	1	,990 mA		-
Consumption voltage		9.95 W		1.99A × 5V = 9.95W

(3) XGB PLC configuration example 3

The above system is an example using XBC-DN32H about system example (2). Unlike (2) example, 5V output capacity of XBC-DN32H is maximum 2A, normal configuration is available.

## 4.5 Data Backup Time

When RTC module is not installed with main unit, data is kept by super capacitor. The following table shows the data backup time of the main unit,

Туре	Data backup tim	Remark		
XBC	backup by the Capacitor	18 Days		
"S" type "SU" type	RTC module installed	3 Yeas	At normal temperature (25℃)	
XBC	backup by the Capacitor	5 Days		
"E" type	RTC module installed	3 Yeas		

But charge super capacitor enough while power is on over 30 minute.

In case super capacitor is not charged enough or power is off more than data backup time, latch data is not kept and warning occurs. At this time, phenomenon and measure are as follows.

### (1) Phenomenon

- (a) RUN mode
  - 1) In case of Remote Run mode, operation mode changes to Stop mode. In case of Local Run mode, it operates normally with abnormal data backup warning
  - 2) In case of Stop mode, abnormal data backup warning occurs.
- (b) Latch data
  - 1) Latch area 1,2 : all data are cleared into "0".
  - 2) K area, F area : all data are cleared into "0".
- (2) Measure
  - (a) In case abnormal data backup warning occurs when turning off and turning on within data backup time, technical assistance of main unit is necessary. Be careful data backup time is getting shorter at high temperature.

### Notice

Above data backup time can be different according to temperature condition.

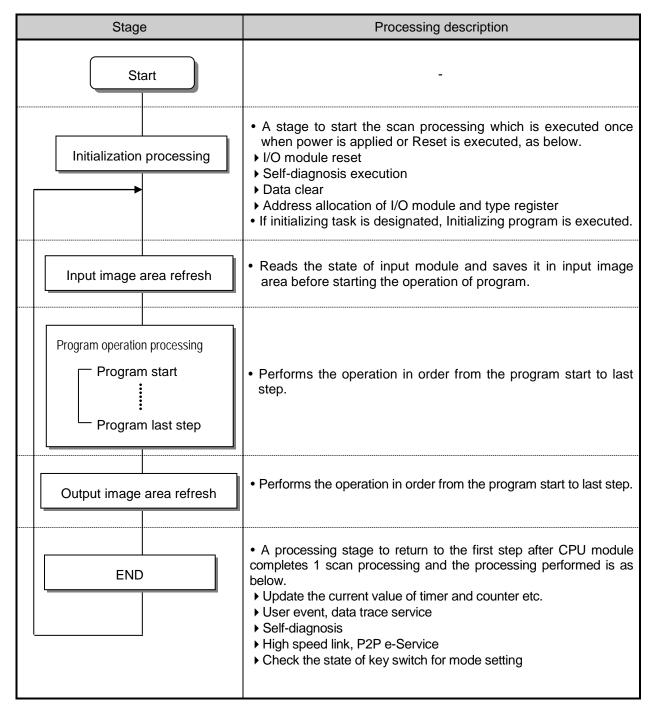
# **Chapter 5 Program Configuration and Operation Method**

## **5.1 Program Instruction**

## 5.1.1 Program execution methods

#### (1) Cyclic operation method (Scan)

This is a basic program proceeding method of PLC that performs the operation repeatedly for the prepared program from the beginning to the last step, which is called 'program scan'. The series of processing like this is called 'cyclic operation method'. The processing is divided per stage as below.



#### (2) Interrupt operation (Cycle time, Internal device)

This is the method that stops the program operation in proceeding temporarily and carries out the operation processing which corresponds to interrupt program immediately in case that there occurs the status to process emergently during PLC program execution.

The signal to inform this kind of urgent status to CPU module is called 'interrupt signal'. There is a Cycle time signal that operates program every appointed time and external interrupt signal that operates program by external contact ("S" type: P000~P007, "E" type: P000~P003). Besides, there is an internal device start program that starts according to the state change of device assigned inside.

#### (3) Constant Scan (Fixed Period)

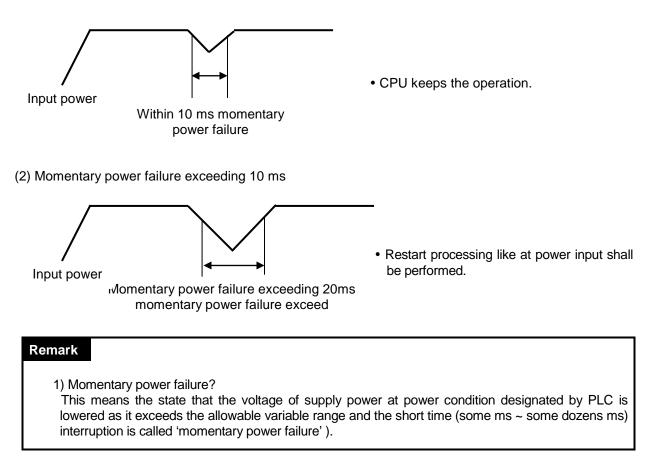
This is the operation method that performs the scan program every appointed time. This stands by for a while after performing all the scan program, and starts again the program scan when it reaches to the appointed time. The difference from constant program is the update of input/output and the thing to perform with synchronization. At constant operation, the scan time indicates the net program processing time where the standby time is deducted. In case that scan time is bigger than 'constant', [F0005C] '\_CONSTANT\_ER' flag shall be 'ON'.

### 5.1.2 Operation processing during momentary power failure

CPU module detects the momentary power failure when input power voltage supplied to power module is lower than the standard. If CPU module detects the momentary power failure , it carries out the operation processing as follows.

If momentary power failure within 10 ms is occurred, main unit (CPU) keeps the operation. But, if momentary power failure above 10 ms, the operation is stop and the output is Off. Restart processing like at power input shall be performed.

(1) Momentary power failure within 10 ms



## 5.1.3 Scan time

The processing time from program step 0 to the next step 0 is called 'Scan Time'.

(1) Scan time calculation expression

Scan time is the sum of the processing time of scan program and interrupt program prepared by the user and PLC internal time, and is distinguished by the following formula.

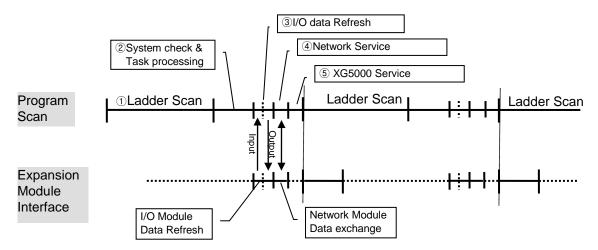
- (a) Scan time = Scan program processing time + Interrupt program processing time + PLC internal processing time
  - Scan program processing time = processing time of user program except interrupt program
  - Interrupt program processing time = Sum of interrupt program proceeding time processed during 1 scan

• PLC internal processing time = Self-diagnosis time + I/O refresh time + Internal data processing time + Communication service processing time

(b) Scan time depends on whether to execute interrupt program and communication processing.

	MPU processing time		Expansion interface processing time				
Туре	Executing ladder (4Kstep)	PLC internal processing time	Digital I/O module (32 point, 1 unit)	Analog module (8 channel, 1 unit)	Comm. module (main/expansion) (200 byte, 1 block)		
"E" type	5.4 ms	1.0 ms	-	-	0.5 ms		
"S" type	<b>3.0</b> ms	0.5 ms	<b>0.3</b> ms	<b>3.0</b> ms	<b>0.8</b> ms		

The main unit executes controls along the following steps. A user can estimate the control performance of a system that the user is to structure from the following calculation.



Scan time = ① Scan program process + ② System check & Task process + ③I/O data Refresh + ④ Network Service + ⑤ XG5000 Service + ⑥ User Task Program process

- ① Scan program process = no. of instruction x process speed per each instruction (refer to XGK/XGB instruction user manual)
- ② System check & Task process: 600 / s ~ 1.0 ms [varies depending on the usage of auxiliary functions]
- (3) XG5000 Service process time: 100  $\,\mu$ s at the max data monitor
- (4) Task Program process time: sum of task processing time that occurs within a scan; the time calculation by task programs are as same as that of scan program.

#### (2) Example

The scan time of a system consisting of main unit (program 4kstep) + five 32-point I/O modules + one analog module + one communication modules (200 byte 1 block)

Scan time ( $\mu$ S) = ladder execution time + system processing time + digital module I/O processing time + analog I/O processing time + communication module processing time + XG5000 Service processing time = (2047 x (0.67(LOAD)+ 0.80(OUT)) + (500) + (300 x 5) + (3000 x 1) + (800 x 1) + (100)  $\mu$ S = 3009 + 500 + 1500 + 3000 + 800 + 100  $\mu$ S = 8909  $\mu$ S = 8.9 mS

(But, in case of online editing or writing XG-PD parameter, scan time increases temporary up to 100ms)

#### (3) Scan time monitor

(a) Scan time can be monitored "Online" - "PLC Information" - "Performance".

<u>O</u> nlir	ne <u>M</u> onitor <u>D</u> ebug <u>T</u> ools <u>W</u> indow		
Ð		PLC info, - NewPLC	? ×
•	Connection Se <u>t</u> tings	CPU Performance Password	
д	Change Mode	Scan time	
- <b>₹</b> .  ∰	<u>R</u> ead <u>W</u> rite	Max, 0,0ms Min,: 0,0ms Cur,: 0,0ms	
đ	Compare with PLC	Memory used	
	Set Flash Memory	Program: 0,0KStep / 10,0K Step : 0%	-
	Control Re <u>d</u> undancy	Details	
	Reset PL <u>C</u>	Comment: 0,5KB / 16,0KB : 3%	
	Clear PLC	D <u>e</u> tails	
	Clear <u>Al</u> l PLC		
٩	PLC Information		
B	PLC <u>H</u> istory		
	PLC Errors/Warnings	Clos	 。
	I/O Information		<u> </u>
	Save PLC His <u>t</u> ory		

- (b) Scan time is save in special relay (F) area as follows.
  - F0050: max. value of scan time (unit: 0.1 ms)
  - F0051: min. value of scan time (unit: 0.1 ms)
  - F0052: current value of scan time (unit: 0.1 ms)

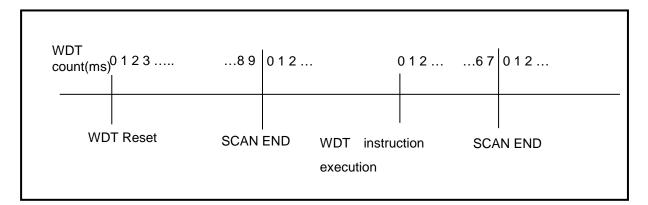
## 5.1.4 Scan Watchdog timer

WDT (Watchdog Timer) is the function to detect the program congestion by the error of hardware and software of PLC CPU module.

- (1) WDT is the timer used to detect the operation delay by user program error. The detection time of WDT is set in Basic parameter of XG5000.
- (2) If WDT detects the excess of detection setting time while watching the elapsed time of scan during operation, it stops the operation of PLC immediately and keeps or clears the output according to parameter setting
- (3) If the excess of Scan Watchdog Time is expected in the program processing of specific part while performing the user program (FOR ~ NEXT instruction, CALL instruction), clear the timer by using 'WDT' instruction.
   'WDT' instruction initializes the elapsed time of Scan Watchdog Timer and starts the time measurement from 0 again.

(For further information of WDT instruction, please refer to Instruction.)

(4) To clear the error state of watchdog, we can use the following method : power re-supply, manipulation of manual reset switch, mode conversion to STOP mode.



#### Remark

1) The setting range of Watchdog Timer is 10 ~ 1000ms (Unit: 1ms).

## 5.1.5 Timer processing

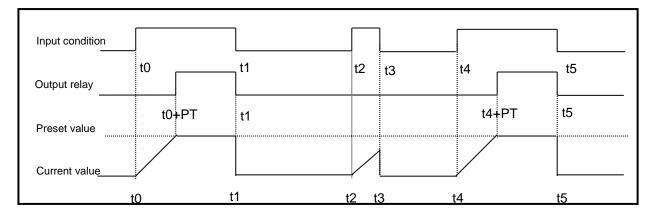
The XGB series use up count timer. There are 5 timer instructions such as on-delay (TON), off-delay (TOFF), integral (TMR), monostable (TMON), and re-triggerable (TRTG) timer.

The measuring range of 100msec timer is  $0.1 \sim 6553.5$  seconds, 10msec timer is  $0.01 \sim 655.35$  seconds, and that of 1msec timer is  $0.001 \sim 65.53$  seconds. Please refer to the 'XG5000 User manual' for details.



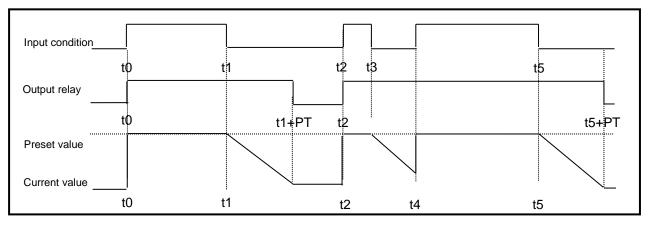
#### (1) On delay timer

The current value of timer starts to increase from 0 when the input condition of TON instruction turns on. When the current value reaches the preset value (Current value=Preset value), the timer output relay (Txxxx) turns on. When the timer input condition is turned off, the current value becomes 0 and the timer output relay is turned off.



#### (2) Off delay timer

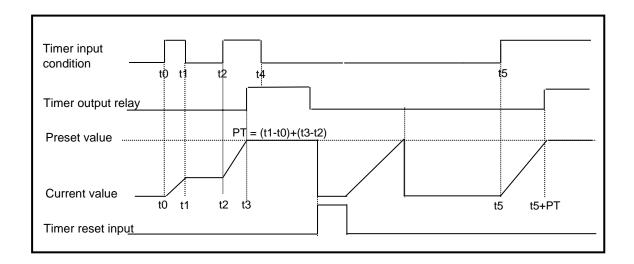
The current value of timer set as preset value and the timer output relay is turned on when the input condition of TOFF instruction turns on. When the input condition is turned off, the current value starts to decrease. The timer output relay is turned off when the current value reaches 0.



#### (3) Integral timer

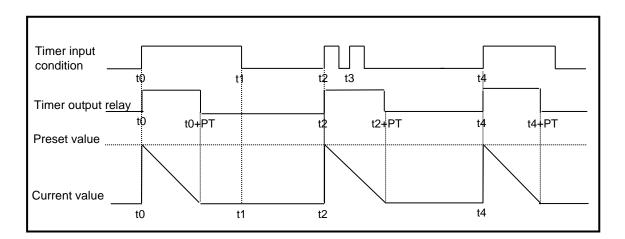
In general, its operation is same as on-delay timer. Only the difference is the current value will not be clear when the input condition of TMR instruction is turned off. It keeps the elapsed value and restart to increase when the input condition is turned on again. When the current value reaches preset value, the timer output relay is turned on.

The current value can be cleared by the RST instruction only.



#### (4) Monostable timer

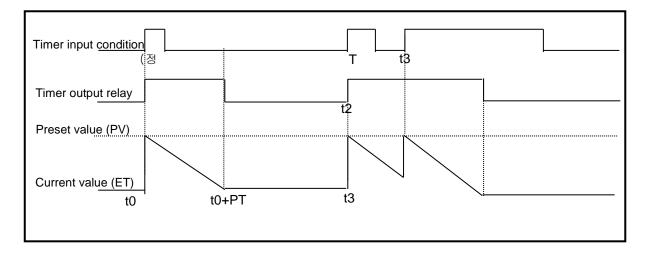
In general, its operation is same as off-delay timer. However, the change of input condition is ignored while the timer is operating (decreasing). When current value reaches preset value the timer output relay is turned off and current value is cleared.



#### (5) Retriggerable timer

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The operation of retriggerable timer is same as that of monostable timer. Only difference is that the retriggerable timer is not ignore the input condition of TRTG instruction while the timer is operating (decreasing). The current value of retriggerable timer will be set as preset value whenever the input condition of TRTG instruction is turned on.



#### Remark

The Maximum timer error of timers of XGB series is '1 scan time + the time from 0 step to timer instruction'

## 5.1.6 Counter processing

The counter counts the rising edges of pulses driving its input signal and counts once only when the input signal is switched from off to on. XGB series have 4 counter instructions such as CTU, CTD, CTUD, and CTR. The followings shows brief information for counter operation. Refer to the 'XGB Instruction Manual' for details.

- Up counter increases the current value.
- Down counter decreases the current value.
- Up/Down counter compares the input value from both counters input.
- Ring counter increase the current value and the current value is cleared as 0 when the current value reaches the preset value.

#### (1) Renewal of counter's current value and contact On/Off

#### (a) Up counter

🏦 NewProgram						
F00093			CTU	C0000	1000	
M00001					C0000	
3	 	 				
•					I LKIII	

• Up counter increases the current value at the rising edges of input.

• The counter output contact (Cxxx) is turned On when the current value reaches the preset value. When the reset input is turned On, the counter output contact (Cxxx) is turned Off.

#### (b) Down counter

🗰 NewProg	gram						_	
	F00093			[	CTD	C0000	1000	]
	моооо1	1					C0000	-
3								
•								E/

• Down counter decreases the current value at the rising edges of input.

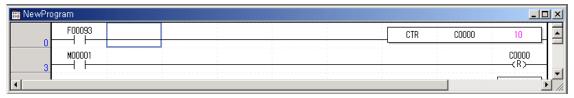
• The counter output contact (Cxxx) is turned On when the current value reaches the preset value. When the reset input is turned On, the counter output contact (Cxxx) is turned Off.

#### (c) Up/Down counter

🗰 NewProgram						_ 0
M00010		CTUD	C0000	M00002	M00003	10
M00001						C0000
6	 					
•						•

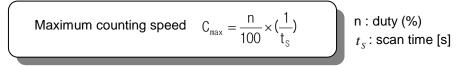
- The current value is increased with the rising edge of up-count input signal, and decreased with the rising edge of down-count input signal. The counter output contact (Cxxx) is turned On when the current value is same as or more than current value. The counter output contact (Cxxx) is turned Off when the current value is same as or less than current value.
- When the reset input is turned On, the current value is cleared as 0.

(d) Ring counter

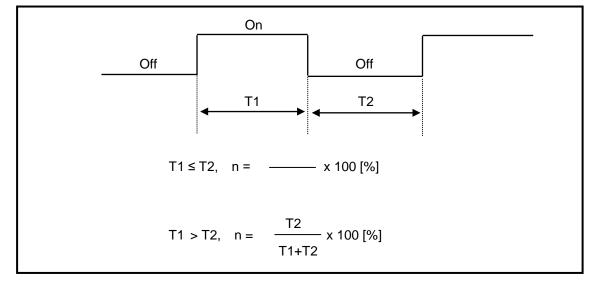


- The current value is increased with the rising edge of the counter input signal, and the counter output contact (Cxxx) is turned on when the current value reaches the preset value. Then the current value and counter output contact (Cxxx) is cleared as 0 when the next rising edge of the counter input signal is applied.
- When the reset input is turned On, the counter output contact is cleared as 0.
- (2) Maximum counting speed

The maximum counting speed of determined by the length of scan time. Counting is possible only when the on/off switching time of the counter input signal is longer than scan time.



• Duty is the ratio of the input signal's on time to off time as a percentage.



#### Remark

1) Use of High Speed Counter

In order to counter pulse that is faster than maximum counting speed of normal counter, use built-in High Speed counter function.

# **5.2 Program Execution**

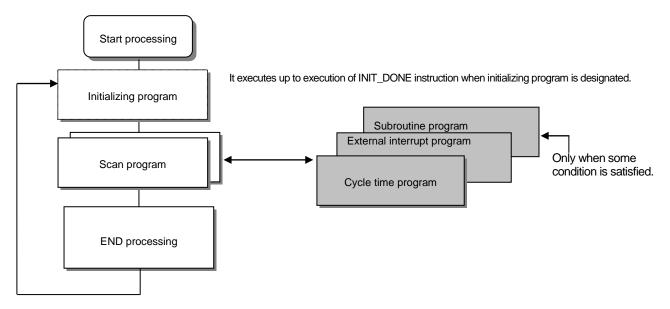
## 5.2.1 Configuration of program

All functional elements need to execute a certain control process are called as a 'program'. Program is stored in the built-in RAM mounted on a CPU module or flash memory of a external memory module. The following table shows the classification of the program.

Program type	Description
Initializing program	<ul> <li>It will be executed till the specific Flag 'INIT_DONE' is on. And while the initialization task is executed, cycle task, external interrupt task and internal device task are not executed. I/O refresh, high speed counter and communication are executed</li> </ul>
Scan program	<ul> <li>The scan program is executed regularly in every scan.</li> </ul>
Cycle time interrupt program	<ul> <li>The program is performed according to the fixed time interval in case that the required processing time condition is as below.</li> <li>In case that the faster processing than 1 scan average processing time is required</li> <li>In case that the longer time interval than 1 scan average processing time is required</li> <li>In case that program is processed with the appointed time interval</li> </ul>
External interrupt program	• The external interrupt program is performed process on external interrupt signal.
Subroutine program	<ul> <li>Only when some condition is satisfied.(in case that input condition of CALL instruction is On)</li> </ul>

## 5.2.2 Program execution methods

Here describes the program proceeding method that is executed when the power is applied or key switch is 'RUN'. The program performs the operation processing according to the configuration as below.



- (1) Scan program
  - (a) Function

• This program performs the operation repeatedly from 0 step to last step in order prepared by the program to process the signal that is repeatedly regularly every scan.

• In case that the execution condition of interrupt by task interrupt or interrupt module while executing program is established, stop the current program in execution and perform the related interrupt program.

- (2) Interrupt program
  - (a) Function

• This program stops the operation of scan program and then processes the related function in prior to process the internal/external signal occurred periodically/non-periodically.

- (b) Type
  - Task program is divided as below.
    - Cycle time task program: available to use up to 8.
    - Internal device task program: available to use up to 8.
    - ▶ I/O (External contact task program): "S" type available to use up to 8. (P000 ~ P007)
      - "E" type available to use up to 4. (P000~P003)
  - Cycle time task program
    - Performs the program according to the fixed time internal.
  - Internal device task program
    - Performs the corresponding program when the start condition of internal device occurs.
    - The start condition detection of device shall be performed after processing of scan program.
  - I/O (External contact task program)
    - ▶ Performs the program according to the input external signal ("S" type: P000~P007, "E" type: P000~P003).

#### Remark

(1) Write the interrupt program as shortly as possible. In case same interrupt occurs repeatedly

before completion of interrupt, program is not executed and O/S watch dog error may occur.

(2) Though interrupt which has lower priority occurs many times during execution of interrupt

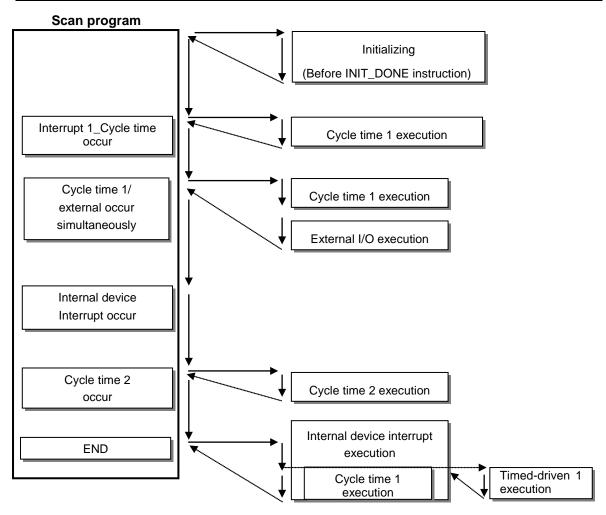
which has higher priority, interrupt which has lower priority occurs only one time.

## 5.2.3 Interrupt

For your understanding of Interrupt function, here describes program setting method of XG5000 which is an XGB programming S/W. Example of interrupt setting is as shown bellows.

•	Interrupt	setting
---	-----------	---------

Interrupt source	Interrupt name	priority	Task No.	Program
Initializing	Interrupt 0_	-	-	-
Cycle time 1	Interrupt 1_cycle time	2	0	Cycle time 1
External	Interrupt 2_external	2	8	External
Internal device	Interrupt 3_internal	3	14	Internal
Cycle time 2	Interrupt 4_cycle time	3	1	Cycle time 2



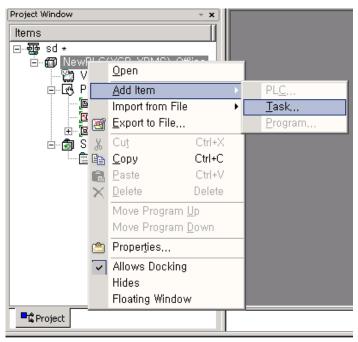
#### Remark

- In case that several tasks to be executed are waiting, execute from the highest Task Program in priority. When the same priority tasks are waiting, execute from the order occurred.
- While interrupt executing, if the highest interrupt is occurred, the highest interrupt is executed earliest of all.
- When power On, All interrupts are in the state 'Enable'. In case you don't use it, disable the interrupts by using DI instruction. If you want to use it again, enable by using EI instruction.
- Internal device interrupt is executed after END instruction.

(1) How to prepare interrupt program

Generate the task in the project window of XG5000 as below and add the program to be performed by each task. For further information, please refer to XG5000 user's manual. (It can be additional when XG5000 is not connected with PLC.)

(a) Click right button of mouse on project name and click "Add item ] - "Task ] .



(b) The screen of Task setting is shown. Click "Initialization, in Execution condition and make a Task name.

Task	? ×
Task name:	ОК
Priority: 2	Cancel
Task <u>n</u> umber: 0 (Cycle time: 0~7, I/O: 8~15, Internal de Execution condition	evice: 16~23)
C Initialization	
C I/ <u>O</u> (0~7)	
I/O execution conditions	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
C Internal device BIT	
Internal device execution conditions	
De <u>v</u> ice:	
C Rising C Falling C Transition C On	C Off

(c) Click right button of mouse at registered task and select "Add Item ] - "Program ].

Project Window		<b>∀ X</b>		
Items				
E-∰e sd ★ E-∰i NewPLC(XGB-XE Parameter E-∰ Parameter ∭i Basic Para E-∭i I/O Param E-∭i Internal Pa E-∰i Scan Program	men amet eters iram	t ers		
📃 🔤 NewProgra		<u>O</u> pen		
Initial(Initialize		<u>A</u> dd Item	۲.	PL <u>C</u>
		Import from	File 🕨	<u>T</u> ask,
■© Project	Ŧ	Export to F	ile	Program
	Ж	Cu <u>t</u>	Ctrl+X	
	Đ	<u>С</u> ору	Ctrl+C	
	Ê.	<u>P</u> aste	Ctrl+V	
	$\times$	<u>D</u> elete	Delete	
	Move Progr		ram <u>U</u> p	
		Move Program Down Properties Allows Docking Hides		
	٢			
	~			
		Floating Wi	ndow	

(d) Make initializing program. In initializing program, INIT\_DONE instruction must be made. If not, Scan program is not executed.

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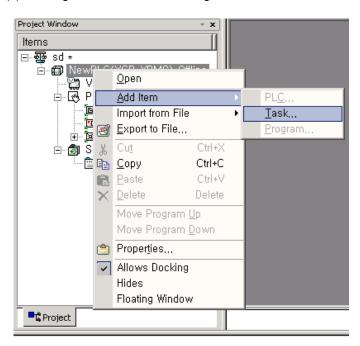
🔠 NewProg	jram					_	
	P0040			TON	T000	1000	
3						INIT_DONE	
5		 	 				
5							-
•							

(2) How to prepare Cycle interrupt program

Γ

Generate the task in the project window of XG5000 as below and add the program to be performed by each task. For further information, please refer to XG5000 user's manual. (It can be additional when XG5000 is not connected with PLC)

(a) Click right button of mouse at registered task and select **"Add Item\_ - "Task\_**.



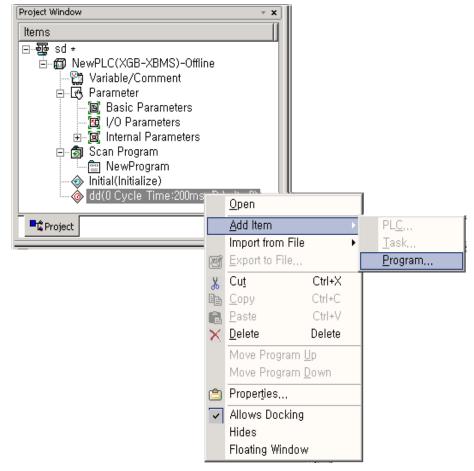
• It shows setting screen of Task.

Task	? ×
Iask name: dd	OK
Priority: 2	Cancel
Task <u>n</u> umber: 0 (Cycle time: 0~7, I/O: 8~15, Internal de	vice: 16~23)
C Initialization	
⊙ <u>C</u> ycle time 200 ms	
C I/ <u>O</u> (0~7)	
I/O execution conditions Rising C Falling C Transition	
st te ste	
C Internal device BIT	
Internal device execution conditions	
Device:	
© Rising O Falling O Transition O On (	Off

(b) Task type

Classification		Description	Remark
Task name		Make Task name.	Character, number available
Priority		Set the priority of task. (2~7)	"2" is the highest priority number.
Task number		<ul> <li>Set the Task number.</li> <li>Cycle time task (0 ~ 7): 8</li> <li>External I/O task (8 ~ 15): "S" type: 8, "E" type: 4</li> <li>Internal device task (16 ~ 23): 8</li> </ul>	-
Execution condition	Initialization	Set the initial program when running the project.	Till the execution of INIT_DONE instruction
	Cycle time	Set the cyclic interrupt.	0~4294967295 ms available
	I/O	Set the external I/O.	P000 ~ P007 available
	Internal device	Set the internal device to interrupt execution. • Bit: Among Rising, Falling, Transition, On, Off • Word: Among >,>=,<,<=	-

(c) Click right button of mouse at registered task and select <code>『Add Item』 - 『Program』 .</code>



(d) Register the Program name and Program description.

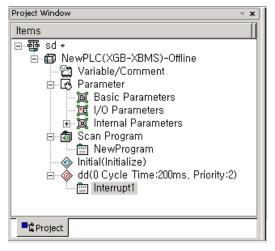
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Program	? ×
Program <u>n</u> ame:   Program des <u>c</u> ription:	OK Cancel

(e) It is displayed the program window to write task program.

🏦 Interrupt1			- 🗆 🗵
			-
			-
<u>  -                                   </u>			

(f) It is displayed the setting in project window.



### (3) Task type

Task type and function is as follows.

Type Spec.	Cycle time task (Interval task)	I/O ta (Interrup	Internal device task (Single task)	
opec.	(intervariask)	"S" type	"E" type	(Olligie task)
Max. Task number	8	8 8 4		8
Start condition	Cyclic (setting up to max. 4,294,967.295 sec. by 1ms unit)	Rising or falling edge of main unit's contactRising or falling edge of main unit's contactP000 ~P007P000 ~P003		Internal device execution condition
Detection and execution	Cyclic execution per setting time	Immediate execution at the edge of main unit's contact		Retrieve the condition and execute after completing Scan Program
Detection delay time	Max. 1 ms delay	Max. 0.05 ms delay		Delay as much as max. scan time
Execution priority	2~7 level setting (2 level is highest in priority)	2~7 level setting (2 level is highest in priority)		2~7 level setting (2 level is highest in priority)
Task no.	Within 0~7 range without user duplication	With 8~15 range without user duplication		Within 16~23 range without user duplication

(4) Processing methods of task program

Here describes common processing method and notices for Task program.

- (a) Feature of task program
  - 1) Task Program is executed only when execution condition occurs without every scan repeat processing. When preparing Task Program, please consider this point.
  - 2) For example, if a timer and counter were used in cyclic task program of 10 second cycle, this timer occurs the tolerance of max. 10 seconds and the counter and the timer and as the counter checks the input status of counter per 10 seconds, the input changed within 10 seconds is not counted up.

(b) Execution priority

- 1) In case that several tasks to be executed are waiting, execute from the highest Task Program in priority. When the same priority tasks are waiting, execute from the order occurred.
- 2) In case Cycle time task and external I/O task is occurred concurrently, execute from the highest task program. (In sequence of XG5000 setting)
- 3) The task program priority should be set considering the program features, importance and the emergency when the execution requested.

(c) Processing delay time

There are some causes for Task Program processing delay as below. Please consider this when task setting or program preparation.

- 1) Task detection delay (Refer to detailed description of each task.)
- 2) Program proceeding delay caused by Priority Task Program proceeding
- 3) Input/output data refresh of expansion special module and using PUT, GET instruction.

(d) Relationship of initialize, Scan Program and Task Program

1) ser identification task does not start while performing Initialization Task Program.

2) As Scan Program is set as lowest priority, if task occurs, stop Scan Program and process Task Program in advance. Accordingly, if task occurs frequently during 1 scan or concentrates intermittently, scan time may extend abnormally. Cares should be taken in case of task condition setting.

- (e) Protection of Program in execution from Task Program
  - 1) In case that the continuity of program execution is interrupted by high priority Task Program during program execution, it is available to prohibit the execution of Task Program partially for the part in problem. In this case, it is available to perform the program protection by 'DI (Task Program Start Disabled) and 'EI (Task Program Start Enabled)' application instruction.
  - 2) Insert 'DI' application instruction in the start position of the part requiring the protection and insert 'EI' application instruction in the position to release. Initialization Task is not influenced by 'DI', 'EI' application instruction.
  - If interrupt is occurred while 'CALLP' instruction executing, interrupt program is executed after 'CALLP' instruction execution.

💼 NewProgram			×
F00093	INCP	D00000	•
4 1 F	CALLP	11	
	INCP	D00200	
		EI	
9 M00001 10		C0000 (R)	
12		END	
		· [	-

(5) Cyclic task program processing method

Here describes the processing method in case that task (start condition) of Task program is set as Cycle time.

(a) Items to be set in Task

Set the execution cycle and priority which are the start condition of Task program to execution. Check the task no. to manage the task.

(b) Cyclic task processing

Performance the corresponding cyclic task program per setting time interval (execution cycle).

- (c) Notice in using cyclic task program
  - 1) When cyclic task program is in execution currently or waiting for execution, if the demand to execute the same task program occurs, the new occurred task shall be disregarded.
  - 2) Timer that makes a demand to execute cyclic task program only while operation mode is Run mode, shall be added. The shutdown time shall be all disregarded.
  - 3) When setting the execution cycle of cyclic task program, consider the possibility that the demand to execute several cyclic task program at the same time occurs.

If 4 cyclic task programs that the cycle is 2sec, 4sec, 10sec and 20sec are used, 4 demands of execution per 20 seconds shall be occurred at the same time and scan time may extend instantaneously.

Task	?>
Task name: Cycle	ОК
Priority: 2	Cancel
Task <u>n</u> umber: 1 (Cycle time: 0~7, I/O: 8~15, Inter	nal device: 16~23)
C Initialization	
⊙ <u>C</u> ycle time 20 ms	
C I/ <u>O</u> (0∼7)	
VO execution conditions Fising C Falling C Transition	
1 to 1 to 1	
C Internal device BIT	
Internal device execution conditions	
Device:	
C Rising C Falling C Transition C On	C Off

(6) I/O task program processing

It described the I/O task program processing. ("S" type: P000~P007, "E" type: P000~P003)

Task 🤶
Task name: Cycle OK
Priority: 2 Cancel
Task <u>n</u> umber: <mark> 8</mark> (Cycle time: 0~7, I/O: 8~15, Internal device: 16~23) ┌─Execution condition
C Initialization
C Cycle time 20 ms
I/O execution conditions © Rising C Falling C Transition
st te ste
C Internal device BIT
Internal device execution conditions
De <u>v</u> ice:
© Rising C Falling C Transition C On C Off

(a) Items to be set in Task

Set the execution condition and priority to the task being executed. Check the task no. to manage the task. (b) I/O task processing

If interrupt signal from external signal (I/O) is occurred on main unit ("S" type: P000 ~ P007. "E" type: P000~P003), task program is executed by external (I/O) signal.

- (c) Precaution in using I/O task program
  - 1) If task program which is executed by interrupt signal is on execution or standby status, new task program which is requested by identical I/O is ignored.
  - 2) Only operation mode is Run mode, execution request of task program is recognized. Namely, execution request of task program is ignored when operation mode is Stop mode.

#### (7) Internal device task program processing

Here describes the processing method of international device task program which extended the task (start condition) of task program from contact point to device as execution range.

lask lask	?
Task name: Cycle	OK
Priority: 2	Cancel
Task number: 16 (Cycle time: 0~7, 1/0: 8~15, Internal de	vice: 16~23)
C Initialization	
C Cycle time 20 ms	
C I/Q 0~7)	
I/O execution conditions C Rising C Falling C Transition	
Internal device BIT ▼ Internal device execution conditions	
De <u>v</u> ice: M000	
Rising C Falling C Transition C On	⊂ Off
لائف ہے کے لیے	, ,

(a) Items to be set in Task

Set the execution condition and priority to the task being executed. Check the task no. for task management.

(b) Internal device task processing

After completing the scan program execution in CPU module, if the condition that becomes the start condition of internal device task program is met, according to the priority, it shall be executed.

- (c) Precautions in using internal device task program
  - Accordingly, even if the execution condition of internal device task program occurs in Scan Program or Task Program (Cycle time, I/O), it shall not be executed immediately but executed at the time of completion of Scan Program.
  - 2) If the demand to execute Internal Device Task Program occurs, the execution condition shall be examined at the time of completion of Scan Program. Accordingly, if the execution condition of Internal Device Task occurs by Scan Program or Task Program (Cycle time) during '1 scan' and disappears, the task shall not be executed as it is not possible to detect the execution at the time of examination of execution condition.

- (8) Verification of task program
  - (a) Is the task setting proper?

If task occurs frequently more than needed or several tasks occur in one scan at the same time, scan time may lengthen or be irregular. In case not possible to change the task setting, verify max. scan time.

(b) Is the priority of task arranged well?

The low priority task program shall be delayed by the high priority task program, which results in disabling the processing within the correct time and even task collision may occur as next task occurs in the state that the execution of previous task is delayed. Consider the emergency of task and execution time etc when setting the priority.

(c) Are task programs made as shortly as possible?

Long running time of the task program can cause the long or irregular scan time or may lead to the conflict of task programs. Make the task programs as shortly as possible.

Especially, when attaching expansion special module, or using PUT,GET instructions, program processing might be delayed. (More than 10ms task cycle is recommended).

(d) Is program protection for the high priority task needed during program execution?

If other task is inserted during task program execution, complete the task in execution and operate the standby tasks in the order of high priority. In case that it is not allowed to insert other task in Scan Program, prevent the insert partially by using 'DI' and 'EI' application instruction. The problem may occur while processing the global variables used commonly with other program or special or communication module.

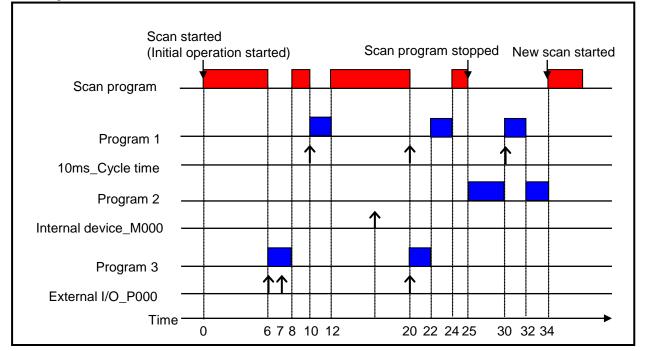
#### (9) Program configuration and processing example

If task and program are registered as below.

Interrupt type	Interrupt name	Priority	Task No.	Program
Cycle time	10 <sup>ms</sup> _cycle time	3	0	Program 1
Internal device	Internal device_M00	5	16	Program 2
I/O	I/O_P00	2	8	Program 3

1) Scan program name: "Scan Program"

2) Execution time respective program: Scan program = 17 ms, Program 1 = 2 ms, Program 2= 7 ms, Program 3 = 2 ms



Process per	Process per time				
Time (ms)	Process				
0	Scan started and scan program started to execute.				
0~6	Scan program is executed.				
6~8	Scan program is stop because execution external I/O (P000) is requested. And program 3 is executed. Request of execution at 7[ms] is ignored because program 3 has been executing.				
8~10	Program 3 is finished and Scan program is continued.				
10~12	Scan program is stop by request of '10 ms_Cycle time' interrupt signal and execute program 1.				
12~20	Program 1 is finished and Scan program is continued.				
20	Request of 'Cycle time' interrupt signal and 'External I/O (P000)' signal is occurred concurrently but priority of 'External I/O' signal is higher than 'Cycle time' interrupt signal so program 3 is executed and program 1 is standby.				
20~22	Program 3 is finished and Scan program is continued.				
22~24	After program 3 is completed, program 1 (the program of '10ms_Cycle time' is executed.				
24~25	P1 execution completed and the stopped scan program execution finished				
25	At the finished point of scan program, check the request of Internal device 'M000' execution and execute program 2.				
25~30	Program P2 is executed.				
30~32	When '10 ms_Cycle time' interrupt signal is occurred, the priority of that is higher than Internal device 'M000' though program 2 is stopped and program 1 is executed.				
32~34	P1 executed completed and the stopped P2 execution finished				
34	New scan starts (Start scan program execution)				

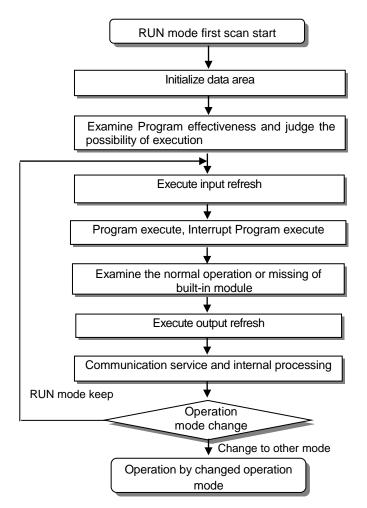
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## 5.3 Operation Mode

For operation mode of CPU module, there are 3 types such as RUN mode, STOP mode and DEBUG mode.. Here describes the operation processing of each operation mode.

### 5.3.1 RUN mode

This is the mode to executed program operation normally.



(1) Processing at mode change

At the beginning, execute initialization of data area and examine the effectiveness of program and judge the possibility of execution.

### (2) Operation processing contents

Execute I/O refresh and program operation.

- (a) Detects the start condition of Interrupt Program and executes Interrupt Program.
- (b) Examines the normal operation or missing of built-in module.
- (c) Communication service and other internal processing.

## 5.3.2 STOP mode

This is the mode in stop state without Program operation. It is available to transmit the program through XG5000 only in Remote STOP mode.

(1) Processing at Mode Change

Clear the output image area and execute output refresh.

- (2) Operation Processing Contents
  - (a) Executes I/O refresh.
  - (b) Examines the normal operation or missing of built-in module.
  - (c) Communication service or other internal processing.

## 5.3.3 DEBUG mode (Supported at "S" type)

This is the mode to detect Program error or trace the operation process and the conversion to this mode is available only in STOP mode. This is the mode to check the program execution state and the contents of each data and verify the program.

- (1) Processing at mode change
  - (a) Initializes the data area at the beginning of mode change.
  - (b) Clears the output image area and execute input refresh.

(2) Operation processing contents

- (a) Executes I/O refresh.
- (b) Debug operation according to setting state.
- (c) After finishing Debug operation by the end of Program, execute output refresh.
- (d) Examine the normal operation or missing of built-in module.
- (e) Executes communication service or other service.

#### (3) Debug operation

□ It describes debug mode.

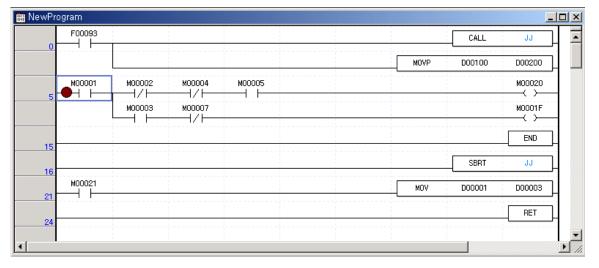
<u>D</u> eb	ug <u>T</u> ools <u>W</u> indow <u>H</u> elp	
()	Start/Stop <u>D</u> ebugging	
[]	<u>G</u> o	Ctrl+F9
[]]	<u>S</u> tep Over	Ctrl+F8
7	Step Into	Ctrl+F7
[]]	Step <u>O</u> ut	
+[]	G <u>o</u> to Cursor	Ctrl+F2
<u>8</u> C 3	Set/Remove <u>B</u> reakpoints	Ctrl+F5
B	Breakpoints <u>L</u> ist,	
Qı	Breakpoint <u>C</u> onditions	

# **Chapter 5. Program Configuration and Operation Method**

Item	Description	Remark
Start/Stop Debugging	Change the debug $\leftrightarrow$ stop mode	
Go	It starts debug operation.	
Step Over	It operates by 1 step.	
Step Into	It starts the subroutine program.	Other operation is identical to Step
Step Out	It finished the subroutine program.	Over.
Go to Cursor	It operates to current cursor position.	
Set/Remove Breakpoints	Set/Removes current cursor position to break points.	
Breakpoints List	It displays list of breakpoints.	
Breakpoint Conditions	It specifies device value and number of scan.	

(a) Set/Remove Breakpoints

• Sets breakpoint at current cursor position. After breakpoint setting,  $\bigoplus$  (breakpoint setting indicator) is displayed.



(b) Go

• Run the program to breakpoint. At break-pointer -O- (stop indicator) is displayed.

📪 NewProgram						_ 🗆 ×
F00093					CALL	JJ
				MOVP	D00100	D00200
5 0 HOODO1	M00002	M00004	моооо5			M00020
	мооооз —	M00007				M0001F
15						
16			/		SBRT	JJ
M00021			1	MOV	D00001	D00003
24						RET
•						

(c) Step Over

Γ

• Run the program to next step. At break point, Step over indicator -O- is displayed.

🏢 NewProg	ram							_ 🗆 ×
0	F00093						CALL	JJ
					[	MOVP	D00100	D00200
5	M00001	моооо2 	M00004	моооо5				M00020
		мооооз	M00007		 			M0001F
15								END
16							SBRT	JJ
21	мооо21				[	MOV	D00001	D00003
24								RET
•								-   -

#### (d) Breakpoint List

• It displays current Breakpoint List. It supports Select All, Reset All, Goto, Remove, Remove All.

Breakpoint Li	ist - NewPLC			<u>?</u> ×
	Program NewProgram	Step 4	Count	OK Cancel <u>S</u> elect All <u>B</u> eset All <u>G</u> oto Remove Remove <u>A</u> ll

### (e) Break condition

• It sets Device Break and Scan Break.

Bre	ak condition – I	NewPLC	? ×
	evice Break   9	Scan Break	
	<mark>,</mark> IV Use the de	evice as a device break	[
	<u>D</u> evice:	D0000 <u>E</u> ind	
	<u>T</u> ype:	WORD	
	<u>V</u> ariable:	Empty	
	<u>C</u> omment:	Empty	
	Vse value	break	
	<u>V</u> alue:	H1234	

Break condition – NewPLC	? ×
Device Break Scan Break	
✓ Use scan break Debugger stops after scanning following counts Scan <u>C</u> ount: 60000	

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# Remark

1) Refer to XG5000 Users Manual 'Chapter 12 Debugging' for detailed information.

### 5.3.4 Change operation mode

(1) Operation Mode Change Method

The method to change operation mode are as follows.

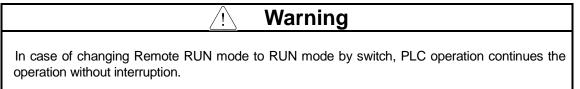
- (a) By mode key of CPU module
- (b) By connecting the programming tool (XG5000) to communication port of CPU
- (c) By changing the operation mode of other CPU module connected to network by XG5000 connected to communication port of CPU.
- (d) By using XG5000, HMI, computer link module connected to network
- (e) By 'STOP' instruction during program execution

#### (2) Type of operation mode

The operation mode setting is as follows.

Operation mode switch	XG5000 command	Operation mode		
RUN	unchangeable	Local Run		
	RUN	Remote Run		
STOP	STOP	Remote Stop		
310P	Debug	Debug Run		
	Mode change	Previous operation mode		
RUN -> STOP	-	Stop		

 (a) Remote mode conversion is available only in the state of 'Remote Enabled: On', 'Mode switch: Stop'. In case of changing the Remote 'RUN' mode to 'STOP' by switch, operate the switch as follows. (STOP) → RUN → STOP.



It is available to modify during RUN in RUN mode by switch but the mode change operation by XG5000 is limited. This should be set only in case that remote mode change is not allowed.

# 5.4 Memory

There are two types of memory in CPU module that the user can use. One is Program Memory that saves the user program written by the user to build the system, and the other is Data Memory that provides the device area to save the data during operation.

### 5.4.1 Data memory

(1) Bit device area

Various Bit Device are provided per function. The indication method is indicated by device type for first digit, word position by decimal for middle digit and bit position by hexadecimal for the last digit.

Area per d	evice	Device features	Description		
"E" type	"S" type	Device features	Description		
P0000 ~ P127f	P0000~ P1023f	I/O device "P"	Image area to save the state of I/O device. After reading the input module state, saves it in the corresponding P area and sends P area Data saving the operation result to output module.		
M0000 ~ M255f	M0000~ M1023f	Internal device "M"	Internal Memory provided to save Bit Data in Program		
L0000 ~ L1279f	L0000~ L2047f	Communication device "L"	Device to indicate high speed link/P2P service state information of communication module.		
K00000 ~ K2559f	K00000~ K4095f	Preservation device "K"	Device area to preserve the data during power shutdown, which is used without setting power shutdown preservation parameter separately. (Pay attention to write in special area (K2600 ~ 2559F)).		
F0000 ~ F255f	F0000~ F1023f	Special device "F"	System flag area that manages the flag necessary for system operation in PLC.		
T0000 ~ T255	T0000~ T1023	Timer device "T"	Area to save the state of contact/current value/set value of timer device		
C0000 ~ C255	C0000~ C1023	Counter device "C"	Area to save the state of contact/current value/set value of counter device		
S00.00 ~ S127.99	S00.00~ S127.99	Step controller "S" 128 x 100 step	Relay for step control		

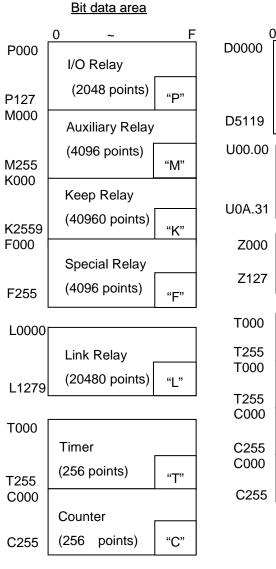
(2) Word device area

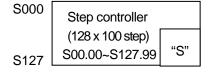
Γ

Area per	device		
"E" type	"S" type	Device features	Description
D00000 ~ D5119	D0000~ D10239	Data register "D"	Area to preserve the internal data. Bit expression possible. (D0000.0)
U00.00 ~ U0A.31	U00.00~ U0A.31	Analog data register "U"	Register used to read data from special module installed in the slot. Bit expression possible
Z000 ~ Z127	Z000~ Z127	Index register "Z"	Dedicated device to use Index function Bit expression impossible
T0000 ~ T255	T0000~ T1023	Timer current value register "T"	Area to indicate the current value of timer
C0000 ~ C255	C0000~ C1023	Counter current value register "C"	Area to indicate the current value of counter
-	R0000~ R10239	File register "R"	Register for saving file Bit expression available (F0000.0)

# 5.5 Configuration Diagram of Data Memory

# 5.5.1 "E" type





	<u>Wor</u>	d data area	<u>a</u>		
	000	~	FFF	F	
0000	Data I	Register			
	(5120	words)			
05119			"D"		
J00.00	Analo	g Data		]	
	Regis	-			
J0A.31	(1024	words)	"U"		
Z000	Index	Register		]	
Z127	(128	words)	"Z"		
				-	
T000	Time	r setting va	lue		
T255	(256	words)			
T000	Timer current value				
T255	(256	words)			

Counter setting value

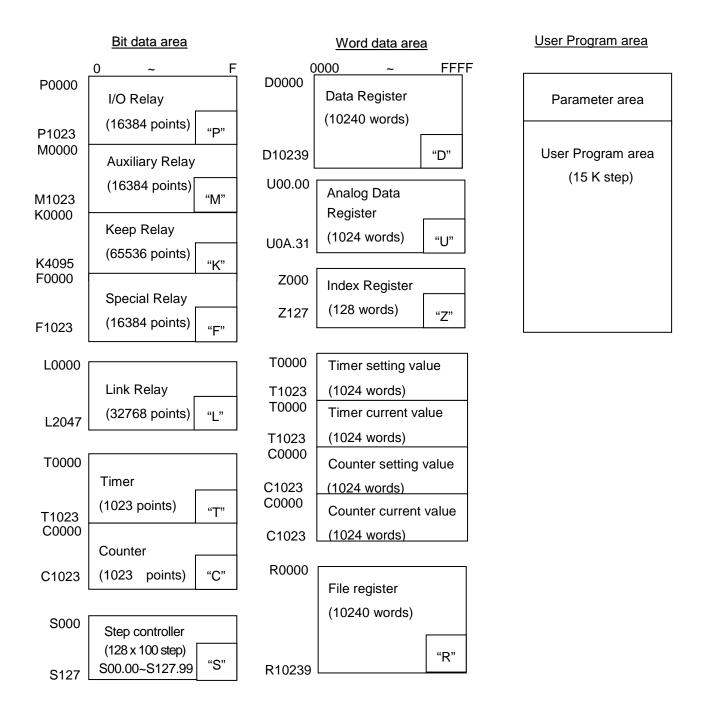
Counter current value

(256 words)

(256 words)

User Program area Parameter area User Program area (4 K step)

## 5.5.2 "S" type



### 5.5.3 Data latch area setting

When PLC stops and restarts the data required for operation or the data occurred during operation, if you want to keep and use those data, data latch can be used and it is available to use a certain area of some data device as latch area by parameter setting.

Device	1 <sup>st</sup> latch	2 <sup>nd</sup> latch	Features
Р	Х	Х	Image area to save the state of I/O device
М	0	0	Internal device area
К	Х	Х	Device keeping the device state during power shutdown
F	Х	Х	System flag area
Т	0	0	Timer related area (Bit/words both)
С	0	0	Counter related area (Bit/words both)
S	0	0	Relay for step control
D	0	0	General words data save area
U	Х	Х	Analog Data Register (latch disabled )
L	Х	Х	High speed link/P2P Service state device of communication module (latch enabled)
Z	Х	Х	Index dedicated Register (latch disabled)
R	0	0	File register (latch enabled)

The below shows the features for latch device.

### Remark

• K, L, R devices are basically latched.

#### (1) Latch area setting

(a) Click Device Area Setup of Basic parameter settings.

elect latch ar Selects the ar		lata lf not	Latch area		Latch area 1			Latch area 2	
selected, the will be ignore	set values i	n right table	Kind	Use	Start	End	Use	Start	End
Enable are		able area 2	D	<u>v</u>	0	5119		0	0
			M		0	255		0	0
'imer boundar	у ———		n s	☑	0	127		0	0
Kind	Start	End	С	☑	0	255		0	0
100ms	0	191	T(100ms)	•	0	191		0	0
10ms	192	200	T(10ms)	•	192	200		0	0
1ms	201	255	T(1ms)		201	255		0	0

(2) Data latch area operation

Γ

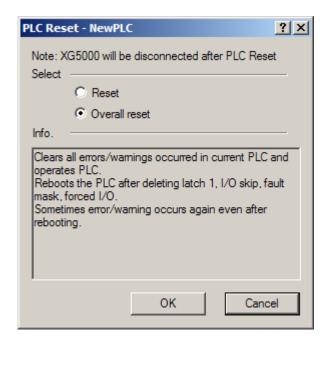
- (a) The method to delete the latched data is as below.
  - latch 1, latch 2 clear operation by XG5000
  - write by Program (initialization program recommended)
  - write '0' FILL from XG5000 monitor mode.

For keep or reset (clear) operation of latch area data according to PLC operation, please refer to the below table.

No.	Classification	Detailed operation	Latch 1	Latch 2
1	Power change	Off/On	Keep	Keep
2	Reset by XG5000	Overall reset	Reset	Keep
3	Program write (online)	-	Keep	Keep
	Data broken	SRAM broken by battery error	Reset	Reset
4	Data broken	Data broken by other reason	Reset	Reset
5	XG5000 online	Clear Latch 1	Reset	Keep
5		Clear Latch 2	Reset	Reset

(b) Latch 1 area is cleared by "Online" - "Reset PLC" - "Overall reset".

<u>O</u> nlir	ne	<u>M</u> onitor	<u>D</u> ebug	<u>T</u> ools	<u>W</u> indow		
<del>L</del>	Dis	co <u>n</u> nect					
٩	Co	nnection	Se <u>t</u> tings				
	Ch	an <u>g</u> e Moo	de		•		
뭁	<u>R</u> e	<u>R</u> ead					
		ite					
et,		mpare wi					
	Se	t Flash M	emor <u>y</u>				
	Co	ntrol Red	undancy				
	Re	set PL <u>C</u>					
	Cle	ar P <u>L</u> C					
	Clear <u>A</u> ll PLC						
٩	<u>P</u> L(	C Informa	ation				
B	PL(	C <u>H</u> istory					
	PLC Errors/Warnings						
	_	) Informa					
_	Sa	ve PLC Hi	s <u>t</u> ory				
<b>.</b>	_	rce I/0					
		p I/O					
		ult Mask.					
		<u>d</u> ule Cha					
4		se Chang					
F		art Online			-		
		ite M <u>o</u> difi d Online (		am Ct	ri+W		
O.	EU	d Online B	salting				



(c) Latch 1, 2 area is cleared by "Online" - "Clear PLC".

Clea	ar – Nev	vPLC						<u>?</u> ×		
С	Clear Item Clear Memory Clear Latch									
	Latch set in PLC									
			Latch 1 Latch 2							
		Use	Start device	End device	Use	Start device	End device			
	D		0	5119		0	0			
	М		0	255		0	0			
	S		0	127		0	0			
	С	Г	0	255	Г	0	0			
	T 100m	Г	0	191	Г	0	0			
	T 10ms	Г	192	200	Г	0	0			
	T 1ms	Г	201	255	Г	0	0			
	Close									

#### (3) Data initialization

In case of Memory Delete state, the memory of all device shall be cleared as '0'. In case of giving the data value at the beginning according to system, please use the initialization task.

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tems?

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(a) Device area is cleared by click 'Clear' in "Online" - "Clear PLC" - "Clear Memory".

Select     Device     St.       Image: Constraint of the select     Device     St.       Image: Constraint of the select     M     M       Image: Constraint of the select     M	tart device         End device           0         127           0         255           0         2559           0         1279           0         255           0         255           0         255           0         255           0         255           0         255           0         127           0         255           0         127           0         255           0         127           0         5119	<u>C</u> lear <u>Select All</u> <u>R</u> eset All	OK Cancel          XG5000       ×         OK       Erasing completed         OK       OK
--	---	---	--

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# **Chapter 6 CPU Functions**

# 6.1 Type Setting

It describes setting of XGB PLC type.

New Project				? 🛛
Project name:				ОК
File directory:	D:₩XG5000₩			Cancel
			Find	
PLC Series				
◯ XGK	⊙ XGB	<mark>⊘ X</mark> GI	◯ XGR	
CPU type:	XGB-XBMS 🗸 🗸			
Program name:	NewProgram			
Program langu	lage			
() LD	⊖ SFC		⊖ st	
Project descripti	on:			
			<u>~</u>	
			<u> </u>	

PLC Series	CPU type	Description	Reference
	XGB-DR16C3	Dedicated product	Modular type
	XGB-DR32HL	Dedicated product	Modular type
	XGB-XBCE	"E" type : XBC-DR10/14/20/30E	Compact type
XGB	XGB-XBCH	"H" type : XBC-DR32/64H , XBC-DN32/64H	Compact type
AGD .	XGB-XBCS	"S(U)" type : XBC-DR20/30/40/60SU, XBC-DN20/30S(U), XBC-DN40/60SU	Compact type
	XGB-XBMS	"S" type : XBM-DN16/32S , XBM-DR16S	Modular type
	XGB-XECH	"H" type : XEC-DR32/64H, XEC-DN32/64H	Compact type IEC language

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# Remark

• In case type is different, connection is not available.

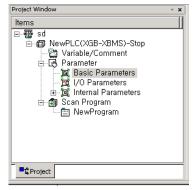
# 6.2 Parameter Setting

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This paragraph describes how to set parameters.

## 6.2.1 Basic parameter setting

Clicking Basic Parameter in the project window shows the following window.



There are three main options ; "Basic Operation Setup" , "Device Area Setup" and "Error Operation Setup".

□ Fixed period operation       10 ms       □ Output during debugging         □ mode (1 ~ 999ms):       □ Keep output when an error occurs         □ Assign fixed points to I/O slot(64)       □ Keep output when an error occurs
Assign fixed points to I/O slot(64)      Keep output when an error occurs      Keep output when an error occurs      Keep output when an error occurs
■ Keep output when converting RUN->STOP
- Set timer
Watchdog timer: 50 ms □ Keep output when converting STOP->RUN
Standard input filter: 3 ms

Category	ltem	Description	Note
	Fixed period operation	Set the time of fixed period operation.	1~999 ms
	Watchdog timer	Set the time of scan watchdog.	10~1000 ms
	Standard input filter	Set the time of standard input filter.	1,3,5,10,20,70,100 ms
Basic operations	Output during debugging	Set whether to allow output actually during debugging operation.	Allowance/Prohibition
	Keep output when an error occurs	Set whether to preserve output holding function set in I/O parameter in case of error.	Allowance/Prohibition
	Delete all areas except latch when an error occurs	Set whether to clear each device that is not designated as a latch area in case of error	Allowance/Prohibition
Device area	Select latch area	Set the latch area of each device.	-
Error operation	Operation resumes in case of operation error	Set whether to pause or resume operation in case of operation error.	Pause/Resume

### 6.2.2 I/O parameter setting

This setting is to set and reserve each I/O information. Clicking <sup>[I]</sup>/O Parameter<sub>1</sub> in the project window shows the following setting window.

Module list			_				?
🖃 🗊 Base 00 : Default	Slot	Module	Comment		Input Filter	Emergency Output	Allocation
00 : Default	0(main)	•					
01 : Default	1	🖃 🗐 Digital Module List					
02 : Default	2	🖻 🗍 Input/Output Module					
	3	DC 24V INPUT/R	ELAY OUTPUT, 16points				
04 : Default	4	DC 24V INPUT/T	R OUTPUT, 16points				
	5	DC 24V INPUT/T	R OUTPUT, 32points				
06 : Default 07 : Default	6						
07 : Delauit							
				l		l	
1	Delete Slot Deleti			ils	<u>P</u> rint	• ОК	Cancel

Clicking "Module\_ in "Slot Position\_ indicates a list of modules, in which you may set I/O corresponding to the actual system. Then, the following window is displayed.

I/O Parameter Setting						<u>?</u> ×
Module list						
🖃 🗊 Base 00 : Default	Slot	Module	Comment	Input Filter	Emergency Output	4
00 : DC 24V INPUT/RELAY	0(main)	DC 24V INPUT/RELAY OUTPUT, 16points		3 Standard [ms]	Default	P000
01 : Default	1	<b>•</b>				
02 : Default 03 : Default	2					
04 : Default	3					
05 : Default	4					
06 : Default	5					
07 : Default	6					
	7					
	•					►
<u>D</u> elete S	Slot Delet	e <u>B</u> ase Base <u>S</u> etting <u>D</u> elete All	Dețails <u>P</u> rint	▼ _	OK Can	cel

Clicking <sup>®</sup>Details<sub>1</sub> in <sup>®</sup>Slot Position<sub>1</sub> shows the following window to set filter and emergency output.

Input/Output Module Setting	<u>?</u> ×	Input/0	Output Module Setting		<u>?</u> ×
Module: DC 24V INPUT/RELAY OUTPUT,		Modu	ule: DC 24V INPUT/RE	LAY OUTPUT,	
Input		Input			
Filter: Standard 💌	[	Filte	er: Standard	•	
Pulse C Standard	6 7	Puls	se Catch: 🗖 0 🥅 1	2 3 4 5 6 6	7
Output – 3 ms 5 ms		Outp	ut		-
10 ms 20 ms	utput		Channel	Emergency Output	
CH 70 ms 100 ms			Channel 00 (00-07)	Clear	<u> </u>
	-			Hold Clear	
OK	Cancel			OK Canc	el

#### Remark

- (1) If settings are different with I/O module actually accessed, "Inconsistent module type error" occurs, displaying error.
- (2) Without settings, CPU reads each I/O module information and operates.

# 6.3 Self-diagnosis Function

### 6.3.1 Saving of error log

CPU module logs errors occurred so that the causes will be identified and fixed easily. Clicking "Error/Warning\_ of "Online\_ shows the current error and previous error log.

or/Warı	ning ·	NewPL(	:	<u>?</u> ×
mor/Wan	ning	Error Log		
		1 - 1		
Index	Code	e Date	Time	
⊗16	30			Module type mismatch error, Base 0, Slot 1
817	39			Abnormal stop of CPU or malfunction
⊗18 ⊗19	30			Module type mismatch error, Base 0, Slot 1
l⊗20	39			Abnormal stop of CPU or malfunction
820	30 30			Module type mismatch error, Base 0, Slot 1
	30 30			Module type mismatch error, Base 0, Slot 1 Module type mismatch error, Base 0, Slot 1
	30			Module type mismatch error, Base 0, Slot 1
824	30			Module type mismatch error, base 0, Slot 1
825	30			Module type mismatch error, Base 0, Slot 0
26	30			Module type mismatch error, Base 0, Slot 1
	00			
Details/	Reme	dv —		
Detailar	neme	uy		
Downloa	ad afte	er modifyir	ng I/O p	parameter, and try to run PLC again.
				<u>v</u>
				United Com
				Update Clear
				Read All Save Close

Item	Description	Remarks
Error/Warning	Display the current error/warning.	-
Error Log	Display a log of error/warning occurred.	Saving up to 100

### Remark

(1) Saved data are not deleted until selecting a menu of XG5000 and clicking "Delete".

### 6.3.2 Troubleshooting

(1) Trouble types

Trouble occurs due to PLC itself, system configuration error or abnormal operation result detected. Trouble is divided into trouble mode stopping operation for the safety and warning mode generating alert to user with a mode in trouble.

The causes troubling PLC system are as follows.

- PLC hardware trouble
- System configuration error
- Operation error while operating user program
- Error detected owing to external device in trouble
- (2) Operation mode if trouble occurs

PLC system logs any trouble occurred in flag and determines whether to stop or resume operation depending on trouble mode.

(a) PLC hardware trouble

In case an error occurs so that PLC such as CPU module and power module may not work normally, the system is halted, but any warning may not interfere with the operation.

(b) Operation error while operating user program

Representing an error occurred during operation of user program, in case of numeric operation error, it displays the error in error flag but the system resumes operating. However, if the operation time exceeds by the operation monitoring time limit and I/O module does not control it normally, the system is halted.

(c) Error detected owing to external device in trouble

Representing the detection of external device to be controlled by users program of PLC, if an error is detected, the system is halted, but any warning may not interfere with the operation.

### Remark

(1) If any trouble occurs, the trouble number is saved in a special relay F002,003.

(2) For details of flag, refer to the appendix 1 Flag List.

# **6.4 Remote Functions**

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CPU module may change operation by communication as well as by key switches mounted on the module. To operate it remotely, it is necessary to set 'RUN/STOP' switch to 'STOP'.

- (1) Remote operations are as follows.
  - (a) Operable by accessing to XG5000 through RS-232C port mounted on CPU module.
  - (b) Can operate other PLC connected to PLC network with CPU module connected to XG5000.
- (2) Remote RUN/STOP
  - (a) Remote RUN/STOP is the externally controlled RUN/STOP function.
  - (b) It is convenient when CPU module is located at a position hard to control or when CPU module within control panel is to control RUN/STOP function remotely.
- (3) Remote DEBUG
  - (a) It manages debugging remotely when remote mode is STOP. Namely, DEBUG operation is to execute program operation depending on designated operation conditions.
  - (b) Remote DEBUG is a convenient function when confirming program operation status or data during system debugging.
- (4) Remote Reset
  - (a) Remote reset is to reset CPU module remotely if an error occurs at a place hard to directly control CPU module.
  - (b) Like operation by switches, it supports 'Reset' and 'Overall Reset'.

### Remark

(1) For details regarding remote functions, refer to 'Ch10 Online' of XG5000 Users Manual.

# 6.5 Forced Input/Output On and Off Function

Force I/O function is used to force to turn I/O areas on or off, regardless of program results.

1

# 6.5.1 Force I/O setup

Forced I/O Setup	2 N
Move address     Forced input:     Enable     Disable       I-     <	]
Force I/O Setting device I	ist
P000 P001 P002 P003 <sup>P045</sup> Flag Data Flag Data Flag Data Flag Data	
8 Reading forced I/O information, Please wait,	
9 9 9	
FORF FORF FORF <u>Delete</u>	
Flag Input Output       Variables     Delete All     Select All     OK     Cancel	

Item		Description
	-	Move to the beginning and end of I/O area (P000 $\leftrightarrow$ P127)
Move address	$\langle \langle \rangle$	Move to $\pm 8$ of I/O area displayed at the very left.
	$\langle \rangle$	Move to ±1 of I/O area.
Application		Set whether to allow or not Force I/O
Single	Flag	Set whether to allow or not Force I/O by bits.
Single	Data	Set Force I/O data on or off by bits.
Select All		Set to allow Force I/O with all I/O area on
Delete All		Delete to allow Force I/O with all I/O area off.
Setting device		Display I/O area set as a bit.

# 6.5.2 Processing time and processing method of Force Input/Output On and Off

(1) Forced Input

Regarding input, at the time of input refresh it replaces the data of contact set as Force On/Off among data read from input module with the data as Force and updates input image area. Therefore, user program executes operations with actual input data while Force input area is operated with data set as Force.

(2) Forced Output

Regarding output, at the time of output refresh upon the execution user program operation, it replaces the data of contact set as Force On/Off among data of output image area containing operation results with data set as Force and outputs the data in output module. Unlike (Force) input, the output image area is not changed by Force On/Off setting.

- (3) Cautions when using Force I/O function
  - (a) It operates from the time when I/O is individually set as 'Allow' after setting Force data.
  - (b) It is possible to set Force input although I/O module is not actually mounted.
  - (c) Despite of the power changed Off -> On, operation mode changes or any operation by pressing reset key, the data of which On/Off is set before is kept in CPU module.
  - (d) Even in STOP mode, Force I/O data is not removed.
  - (e) To set new data from the beginning, it is necessary to deselect all settings of I/O by using 'Delete All' option.
- (4) Operation in case of error
  - (a) If error occurs after setting forced output, PLC operates based on "Keep output when an error occurs" in Basic parameter and "Emergency output" in I/O parameter. If you set "Emergency output" as "Clear" after setting "Keep output when an error occurs", output is cleared when an error occurs. If you set "Emergency output" as "Hold" after setting "Keep output when an error occurs", output is held when an error occurs.
  - (b) If you don't set "Keep output when an error occurs", output is off when an error occurs.

# 6.6 Direct Input/Output Operation

Refreshing I/O operates after completion of scan program. If data of I/O is changed while program is scanned, it does not refreshed at the changed moment. Refreshed I/O data is applied after 'END' instruction on program.

This function may be useful when directly reading the status of input contact during program operation by refreshing I/O by means of 'IORF' instruction or outputting operation results to output contact.

🔛 NewProgram					_	
мооооо		IORF	h0002	h0000FFFF	h0000FFFF	-
					END	
▲ ▲	<u></u>	1 9 1 1		÷		

'IORF' command is operated when M00000 is ON. First operand designates slot number. Second operand designates the upper 32 bit data as mask data. Third operand designates the lower 32 bit data as mask data. The bit to refresh set as 1 (hFF) and others set as 0 (h00) (not refreshed).

#### Remark

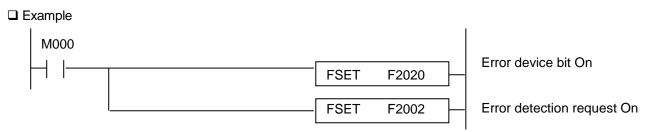
- When using IORF instruction to read/write data at expansion module, scan time increases by 2ms. So when executing interrupt task program by external input less than 10ms or cycle time task less than 10ms, task collision may occurs.

-For details regarding IORF instruction, refer to XGK/XGB Instructions List.

# 6.7 Diagnosis of External Device

This flag is provided for a user to diagnose any fault of external device and, in turn, execute halt or warning of the system. Use of this flag displays faults of external device without any complicated program prepared and monitors fault location without any specific device (XG5000 and etc) or source program.

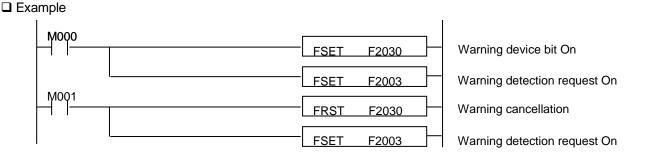
- (1) Detection and classification of faults in external device
  - (a) The trouble (fault) of external device may be detected by user program and largely divided, depending on the type, into error and warning; the former requires halt of PLC operation and the latter simply displays the status while PLC keeps working.
  - (b) 'Error' uses 'F202 (\_ANC\_ERR)' and 'Warning' uses 'F203 (\_ANC\_WB) flag'.
  - (c) As the detection request flag, 'Error' uses 'F2002 (\_CHK\_ANC\_ERR) flag' while 'Warning' uses 'F2003 (\_CHK\_ANC\_WB) flag'.
- (2) Troubleshooting external device
  - (a) When detecting any trouble of external device in user program, it writes a value except '0' by classifying the type, which is defined by a user in 'F202 (\_ANC\_ERR)' while the detection request flag checks it at the time when the program ends with 'F2002 (\_CHK\_ANC\_ERR) On, and PLC outputs based on the "Emergency Output" setting in I/O parameter, making it as the same error status as detected by PLC itself.
  - (b) If any trouble occurs, a user may identify the cause by using XG5000 and alternatively by monitoring 'F202 (\_ANC\_ERR) flag'.



(c) If any trouble occurs, CPU is in error status and operation halts. At this moment, F2020 and F2002 flags are off (error LED switches on and off every second.)

#### (3) Processing warning of external device

- (a) When detecting any warning of external device in user program, it turns on a flag in the warning position of system flag 'F203 (\_ANC\_WB) and if turning on the detection request flag, 'F2003 (\_CHK\_ANC\_WB)', it displays warning at the time when scan program ends. If a warning occurs, the detection request flag, 'F2003 (\_CHK\_ANC\_WB)' is automatically off (F203 is not deleted).
- (b) If a warning occurs, the LED switches on and off every other second.
- (c) If turning off a bit in question of F203 and turning on F2003 bit after processing warning, warning is cancelled and the LED turns off.



# 6.8 Allocation of Input/Output Number

Allocation of I/O number is to allocate an address to every I/O of each module to read data from input module and output data to output module when it executes operations. XGB series adopts 64 points occupation to every module.

#### (1) Allocation of I/O number

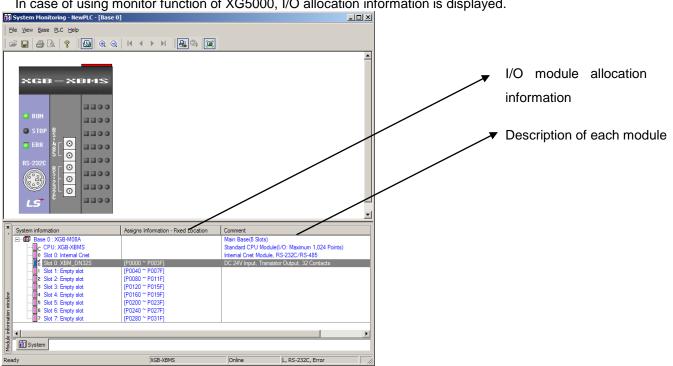
124 points are allocated to main unit and 64 points are allocated to every module except main unit (incl. special, communication).

System Configu	uration		ti Vent
Number of Connection stage	Туре	I/O allocation	Remarks
0	XBC-DN30S(U)	Input : P0000 ~ P003F Output : P0040 ~ P007F	Main unit fixed
1	XBE-DC32A	Input : P0080~P011F	Actual input: P0080 ~ P009F
2	XBE-TN32A	Output : P0120 ~ P015F	Actual output : P0120 ~ P013F
3	XBL-C21A	P0160 ~ P019F	-
4	XBF-AD04A	P0200 ~ P023F	-
5	XBF-DV04A	P0240 ~ P027F	-
6	XBE-DC32A	Input : P0280 ~ P031F	Actual input : P0280 ~ P029F
7	XBE-TN32A	Output : P0320 ~ P035F	Actual output : P0320 ~ P033F

Empty I/O point is available for internal relay.

(2) In case of allocating IO of IO parameter, allocation information is displayed.

Base 00 : Default	Slot	Module	Comment	Input Filter	Emergency Out	Allocation
. 00 : DC 24V INPUT/REL	0(main)	DC 24V INPUT/RELA		3 Standard [ms]	Default	P00000 ~ P0003F
- B 01 : DC 24V INPUT, 32pc	1	DC:24V INPUT, 32poi		3 Standard [ms]		P00040 ~ P0007F
02 : Default		Image:				
03 : Default	3					
05 : Default	4					
- 06 : Default	5					
07 : Default	6					
_	7					
)						
<u>·</u> _						



In case of using monitor function of XG5000, I/O allocation information is displayed.

Γ

# 6.9 Online Editing

It is possible to modify program and communication parameter during operation of PLC without control operation stopped. The following describes basic modification. For details of modifying program, refer to XG5000 Users Manual.

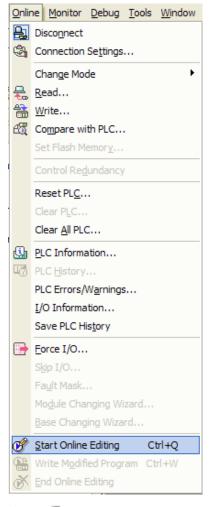
Items to be modified during operation are as follows.

- Program
- Communication parameter

(1) It displays programs that are currently running.

🏦 NewProgram							
мооооо			ADDP	1	D00000	D00000	╷╴
				MOVP	D00100	D00200	]
моооо1	моооо2 					M00020	
	мооооз	 		\$MOV	D01000	D00300	]
16						END	]

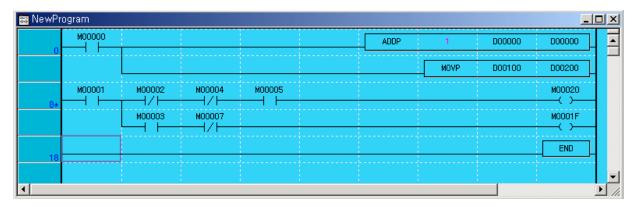
(2) Click "Online - "Start Online Editing...



NewProgram			 		,		L	
мооос	00			ADDP	1	D00000	D00000	Ц
	·				MOVP	D00100	D00200	j.
8 — 1	D1	моооо2 —   /					M00020	-
	Ľ	мооооз			\$MOV	D01000	D00300	Ц
16			 				END	Ц
10								
								Þ

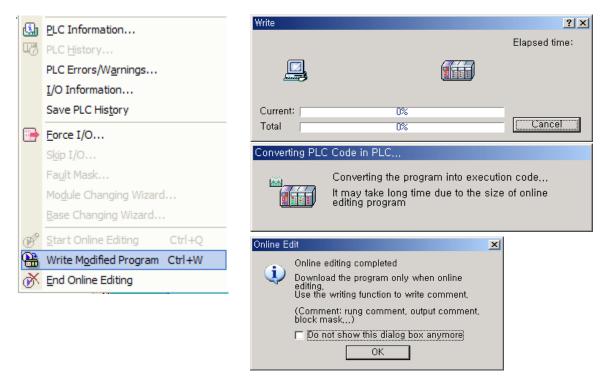
(3) It turns to program modification mode during run when the program background is changed.

### (4) Modifying a program.

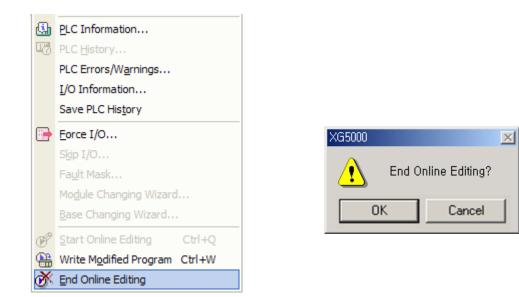


(5) Upon the modification of program, click <sup>C</sup>Onlir

"Online . "Write Modified Program .



(6) Upon the writing of program, click  $"Online_"$  -  $"End Online Editing_"$ .



(7) The program background returns and the program modification during run is completed.

моосоо				ADDP	1	D00000	D00000
					MOVP	D00100	D00200
M00001	M00002	M00004	M00005			4	M00020
8 ' '	мооооз	моооот —————————————————————————————————	1 1				M0001F
18							END

### Remark

• For parameter modification during run, change each parameter on XG-PD and click "Online\_ - "Write Modified Program \_ .

# 6.10 Reading Input/Output Information

Γ

It monitors information of individual modules consisted of XGB series system.

(1) Click "Online" - "I/O Info". Then, information of each module connected to the system is monitored.

I/O information		<u>?</u> ×
Base module information	Slot I/O i	nformation
🗇 Base 00	Slot	Module
	0	DC 24V INPUT/RELAY OUTPUT, 16points
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	· .	
I/О <u>S</u> yr	IC,	<u>D</u> etails OK Cancel

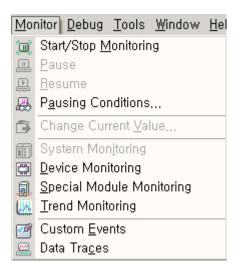
(2) If clicking Details after selecting a module, it displays detail information of a selected module.

Mo	odule Info, - DC	24V INPUT/RELAY OUTPUT ? ×
	Details	Content
Γ	Module name	DC 24V INPUT/RELAY OUTPUT, 16p
Γ	Error	Error Code(0x0)
Γ	OS Ver.	Ver. 1.00
	OS Date	2006. 06. 08.
		( <u>C</u> lose

#### 6.11 Monitoring

It monitors system information of XGB series system.

(1) Clicking "Monitor\_ displays the following sub-menus.



(2) Items and descriptions

Item	Description	Remarks
Start/Stop Monitoring	Designate the start and stop of monitor.	Click for reverse turn.
Pause	Pause monitoring.	-
Resume	Resume paused monitor.	-
Pausing Conditions	Pause monitoring if a preset value of device corresponds to condition.	Monitor resumes; clicking for resume.
Change Current Value	Change the present value of currently selected device.	-
System Monitoring	Monitor general system information.	-
Device Monitoring	Monitor by device (type).	-
Trend Monitoring	Monitor trend of device set in the system.	
Custom Events	Monitor the value of device set when an event set by a user occurs.	For details, refer to XG5000 Users Manual.
Data Traces	Trace the value of device.	Accord Caera Manual.

Г

(a) Change current valueIt changes the current value of each device selected in the current program window.

Change Current Value	Change Current Value
Device: M0022 Type BIT Disclay type: Sizes didesignal	Device: D0100 Type WORD Display type: Signed decimal
Display type: Signed decimal Range: (0 ~ 1)	Range: (-32768 ~ 32767)
Current value	Current value ○ On ○ Off Value: h1234
Forced I/OV OK Cancel	Forced I/OV OK Cancel

#### (b) Device monitoring

	It monitors by device (type	e).														
Image:	NewPLC - Device Monitoring - [M	]														
15       22       94       2       10	💭 Eile Edit View PLC Window Help														-	δ×
No         No<	🖙 🖬   X 🖻 🛍 📥 📥 🗇 [	3. 9														
No         No<	16 32 64 2 10 10 10 10		F 10	, , , , , , , , , , , , , , , , , , ,	), ( <b>)</b> ,	•	Q	•ŏ•								
Image: Wide-XBCE         Image: Wide-XBCE<																
XGB-XBCE       M000       0000	Device Tree × ×		0	1	2	3	4	5	6	7	8	9		 		~
M22         0000		M000	0000 (	0000			0000			0000						
M22         0000	🔛 P	M010	0000 (	0000	0000	0000	0000	0000	0000	0000	0000	0000				
F         M040         0000         00						0000	0000	0000	0000	0000						
M120       0000	K															
M120       0000	(E) F															
M120       0000																
M120       0000	- 🖾 C															
M120       0000																
M120       0000	- Z Z															
M120       0000	S S															
M120       0000																
M130       0000																
M140       0000																
M160         0000 <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>																
M170       0000		M150	0000 (	0000	0000	0000	0000	0000	0000	0000	0000	0000				
M180         0000 <th< td=""><td></td><td>M160</td><td>0000 (</td><td>0000  </td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td></td><td></td><td></td><td></td></th<>		M160	0000 (	0000	0000	0000	0000	0000	0000	0000	0000	0000				
M190         0000 <th< td=""><td></td><td>M170</td><td>0000 (</td><td>0000  </td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td></td><td></td><td></td><td></td></th<>		M170	0000 (	0000	0000	0000	0000	0000	0000	0000	0000	0000				
M200         0000 <th< td=""><td></td><td>M180</td><td>0000 (</td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td>0000</td><td></td><td></td><td></td><td></td></th<>		M180	0000 (	0000	0000	0000	0000	0000	0000	0000	0000	0000				
M210         0000 <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>																
																_
		M240	0000 (	0000 1	0000	0000	0000	0000	0000	0000	0000	0000				<b>~</b>
C Device M	Device	₩Ĵ	М													
Ready XGB-XBCE Online L, RS-232C, OK	Ready		XG	B-XBCE				Onli	ne			RS-232	с. ок			

#### (c) Pausing conditions

It stops monitoring in case a device value set in the program corresponds.

Paus	sing Con	ditions – N	ewPLC					<u>? x</u>
	<u>S</u> elect A	<u>     B</u>	eset Al					<u> </u>
1 2 3 4 5 6 7 8 9 10		Type WORD	Device D0000	Condition ==	Set value 20	Variable		
Na Na Ca Se	itor Paus Monito ame: ondition: et Value: alue:	r is pause D0000 == 20 20	<u>)K</u>		<u>? ×</u>		OK	Cancel

1

#### (d) Trend monitoring

It displays device values graphically.

🚰 Trend Monitoring		
ON <del>1 DOGO DOGO DOGO DOGO DOGO DOGO DOGO DOG</del>	Device	Value
F0095 - F0093 - F0095 - F0095	F0093 F0095	OFF OFF
13:55:25:5 13:55:26:5 13:55:26:5 13:55:26:5 13:55:26:5 13:55:26:5 13:55:36 13:55:36 13:55:54:6 13:55:54:6 13:55:54:6 13:55:54:6 13:55:54:6 13:55:54:6 13:55:54:6 13:55:54:6 13:55:54:6 13:55:54:6 13:55:54:6 13:55:54:6 13:55:54:6 13:55:54:6 13:55:55:45 13:55:55:45 13:55:55:45 13:55:55:45 13:55:55:45 13:55:55:45 13:55:55:45 13:55:55:45 13:55:55:45 13:55:55:45 13:55:55 13:55 13:55:55 13:55		
600 D0000	Device D0000	Value 585,00
13:55:25.5 13:52:25.5 13:53:07.2 13:53:28.0 13:55:28.0 13:55:28.0 13:55:28.0 13:55:12.7 13:55:54.6 13:55:54.513:55:54.5 13:55:54.514:55:54.55		

#### (e) Custom events

Г

1) It monitors detail information when an event set by a user occurs. Additional user event may be registered.

🗯 Custom Event				<u>? ×</u>
Event Settings Event Histor	y ]			
Event allowance 💿 <u>D</u>	isable C <u>E</u> n:	able		
ID Enabl Type	Device	Variable	Event condition	
	Add Event Edit Event Cut Copy Paste	-		
	Delete Delete All			▶
<u></u>	Save Event Open Event	oply PLC	ОК	Cancel

- 2) It sets basic setting and relative device.
  - If rising edge of M0000 device occurs, it records the message of an alarm, "Out of order Water Tank 1" and the device values of D0000,L0000,D0100,N1000 are recorded.

E	vent Settings				<u>? ×</u>
	Basic Settings As	sociated Device (	Setup		
	<u>D</u> evice:	M0000	<u>V</u> ariables		e device only)
	Event condition	: • <u>B</u> ising 🚮	🔿 Ealling 🕇	🖕 🔿 <u>T</u> rans	sition 🛧
	<u>T</u> ype:	Alarm	•		
	<u>M</u> essage:	Out of order Wate	er Tank1		×
				OK	Cancel

3) Set the relative device(s).

E٧	ent Settings				? ×			
Ω	Basic Setting	s Associated Device S	etup					
	Available 07 (Current) / 16 (Maximum)							
	Number	Device	Variable	Туре				
	1	D0000		WORD				
	2	L00000	_HS1_RLINK	BIT				
	3	D0010		WORD				
	4	N0010		WORD				
	5							
	,							
			OK	Cano	:el			

4) Monitor event history of custom event.

Number	Туре	Event ID	Date	Time	Device	Contents
1	🛞 Alarm	1	1984-01-01	00:00:00:000	M0000	Out of order Water Tank1
2	🛞 Alarm	1	1984-01-01	00:00:00:000	M0000	Out of order Water Tank1
3	🛞 Alarm	1	1984-01-01	00:00:00:000	M0000	Out of order Water Tank1
4	🛞 Alarm	1	1984-01-01	00:00:00:000	M0000	Out of order Water Tank1

5) Double-clicking a number produced monitors the relative values of device and the detail message as follows.

٦

Event History	/			<u>? ×</u>		
Event History						
Date: 1984-01-01 Time: 00:00:0000 Back Event ID: 1 Type: Alarm Condition: Rising Device: M0000 Copy Message: Out of order Water Tank1						
Associat	ed device lis	t:				
Number	Device	Variable	Туре	Value		
1	D0000		WORD	1722		
2	L00000	_HS1_RLINK	BIT	0		
3	D0010		WORD	0		
4	N0010		WORD	0		
				Close		

#### Remark

•For details of monitor, refer to XG5000 Users Manual.

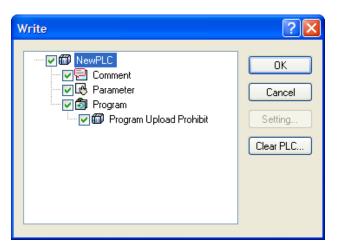
#### 6.12 Program Upload Prohibit

Program Upload Prohibit function prohibits from uploading comment, parameter, program saved on PLC. If Program Upload Prohibit function is set, you can't open from PLC, read PLC and compare PLC.

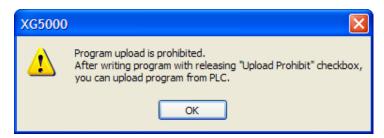
#### (1) How to set

Γ

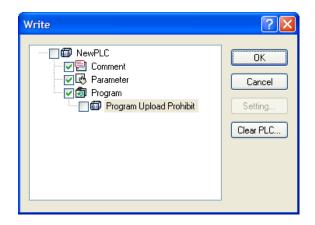
(a) Click "Online" - "Write"



- (b) Select "Program" to activate "Program Upload Prohibit"
- (c) Select "Program Upload Prohibit" and click OK.
- (2) When reading PLC is prohibited, if you try to read PLC, the following dialog box appears. After releasing Program Upload Prohibit, execute reading.



(3) How to release Program Upload Prohibit (a) Click 『Online』 - 『Write』 .



(b) Release Program Upload Prohibit and click OK.

### 6.13 Clear All PLC

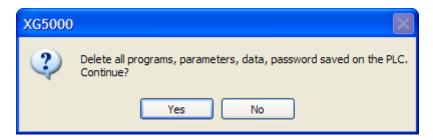
Clear All PLC function clears parameter, program, data, password saved on PLC

(1) How to clear all PLC

(a) Click 『Online』 - 『Clear All PLC』.

Online Settings - NewPLC	? 🛛					
Connection settings						
Type: RS-232C	Settings					
Depth: Local 💌	Preview					
General						
Timeout interval:	5 📚 sec.					
Retrial times:	1 🜲					
Read / Write data size in PLC ru	Read / Write data size in PLC run mode					
🔘 Normal 🛛 💿 Maximum						
* Send maximum data size in s	top mode					
Connect OK	Cancel					

(b) After selection connection method, click  $\ensuremath{\,^{\ensuremath{\mathbb{T}}}}$  connect\_ or  $\ensuremath{\,^{\ensuremath{\mathbb{T}}}}$  or  $\ensuremath{\,^{\ensuremath{\mathbb{T}}}}$  or  $\ensuremath{\,^{\ensuremath{\mathbb{T}}}}$  .



(c) If you select "Yes\_ on the dialog box, PLC program, parameter, data, password will be deleted.

#### Note

•Clear All PLC function can be executed though not connected. •If you use Clear All PLC function, password will be deleted. So be careful. •In case you lose password, use this function to clear password.

#### 6.14 Password Setting per Program Block

Password Setting per Program Block function sets password for each program block. You should input password to open program.

- (1) How to set program block password
  - (a) Click "Properties\_ after selecting program in project window.
  - (b) Click password tap.

Γ

Program 🔀
Program Password
Previous password Password: Delete
New password         Password:       (Maximum of 8 characters in length)         Confirm password:       (Maximum of 8 characters in length)
OK Cancel

(c) Click **CK** after inputting new password.

#### (2) Opening password-set program

(a) When you open password-set program, the following window appears.

Confirm Pas	ssword	×
Password:		
ОК	Cancel	

(b) After inputting correct password, click

"OK<sub>1</sub> to open program.

(3) How to delete program block password

(a) After program in project window, click

(b) Click password tap.

『Properties』.

Program	
Program Password	
Previous password	
Password:	Delete
New password Password:	(Maximum of 8
Confirm	characters in length)
password:	
	OK Cancel

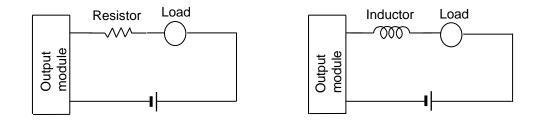
- (d) Click 『OK』.

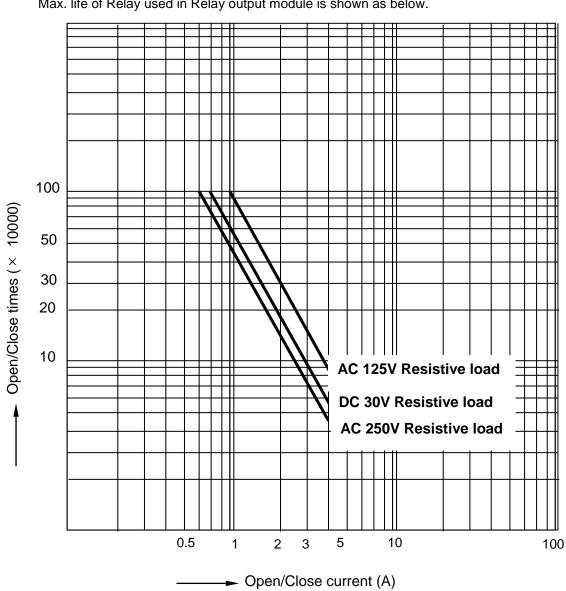
# **Chapter 7 Input/Output Specifications**

#### 7.1 Introduction

Here describes the notices when selecting digital I/O module used for XGB series.

- (1) For the type of digital input, there are two types such as current sink input and current source input.
- (2) The number of max. Simultaneous input contact point is different according to module type. It depends on the input voltage, ambient temperature. Use input module after checking the specification.
- (3) When response to high speed input is necessary, use interrupt input contact point. Up to 8 interrupt points are supported.
- (4) In case that open/close frequency is high or it is used for conductive load open/close, use Transistor output module or triac output module as the durability of Relay Output Module shall be reduced.
- (5) For output module to run the conductive (L) load, max. open/close frequency should be used by 1second On, 1 second Off.
- (6) For output module, in case that counter timer using DC/DC Converter as a load was used, Inrush current may flow in a certain cycle when it is ON or during operation. In this case, if average current is selected, it may cause the failure. Accordingly, if the previous load was used, it is recommended to connect resistor or inductor to the load in serial in order to reduce the impact of Inrush current or use the large module having a max. load current value.





(7) Relay life of Relay output module is shown as below.

Γ

Max. life of Relay used in Relay output module is shown as below.

(8) A clamped terminal with sleeve can not be used for the XGB terminal strip. The clamped terminals suitable for terminal strip are as follows (JOR 1.25-3:Daedong Electricity in Korea).



- (9) The cable size connected to a terminal strip should be 0.3~0.75 m stranded cable and 2.8 m thick. The cable may have different current allowance depending on the insulation thickness.
- (10) The coupling torque available for fixation screw and terminal strip screw should follow the table below.

Coupling position	Coupling torque range
IO module terminal strip screw (M3 screw)	42 ~ 58 N⋅cm
IO module terminal strip fixation screw	66 ~ 89 N⋅cm
(M3 screw)	

(11) Relay life graph is not written based on real use. (This is not a guaranteed value). So consider margin. Relay life is specified under following condition.

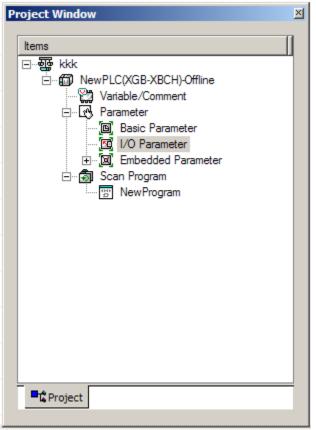
- (a) Rated voltage, load: 3 million times: 100 million times (b) 200V AC 1.5A, 240V AC 1A ( $COS \notin =0.7$ ): 1 million times (c) 200V AC 0.4A, 240V AC 0.3A ( $COS \notin =0.7$ ): 3 million times (d) 200V AC 1A, 240V AC 0.5A ( $COS \notin =0.35$ ): 1 million times (e) 200V AC 0.3A, 240V AC 0.15A ( $COS \notin =0.35$ ): 3 million times (f) 24V DC 1A, 100V DC 0.1A (L/R=7ms): 1million times (g) 24V DC 0.3A, 100V DC 0.03A (L/R=7ms): 3million times

(12) Noise can be inserted into input module. To prevent this noise, the user can set filter for input delay in parameter. Consider the environment and set the input filter time.

Input filter time (ms)	Noise signal pulse size (ms)	Reference
1	0.3	
3	1.8	Initial value
5	3	
10	6	
20	12	
70	45	
100	60	

Γ

(a) Setting input filter 1) Click I/O Parameter  $\fi$  in the project window of XG5000



2) Click <sup>¶</sup>Module<sub>』</sub> at the slot location.

I/O Parameter Setting						<u>? ×</u>
Module list						
🖃 🗊 Base 00 : Default	Slot	Module	Comment	Input Filter	Emergency Out	Allocation
00 : Default	0(main)	•				
01 : Default	1					
02 : Default	2					
03 : Default 03 : Default	3				1	
05 : Default	4					
06 : Default	5					
07 : Default	6					
08 : Default	7					
09 : Default	8					
10 : Default	9					
	10					
	1					
Delete	e Slot 🛛 Dele	ete Base Base Setting	Delete All	Details P	int 🔻	OK Cancel

#### 3) Set I/O module really equipped.

I/O Parameter Setting						? ×
Module list	Slot 0(main) 1 2 3 4	🗍 DC 24V II		Input Filter	Emergency Out	Allocation
O6 : Default     O7 : Default     O8 : Default     O9 : Default     O9 : Default     O1 : Default     O1 : Default	5 6 7 8 9 10 e Slot De	∰ DC 24V II	VPUT/RELAY OUTPUT,	etaïls <u>P</u>	int V O	K Cancel

1

4) After setting I/O module, click Input Filter.

I/O Parameter Setting Module list						?	×
Base 00 : Default     Default     O1 : Default     O2 : Default     O2 : Default     O3 : Default     O3 : Default     O4 : Default     O5 : Default     O6 : Default     O7 : Default     O9 : Default     O9 : Default     O9 : Default     O1 : Default	Slot 0(main) 1 2 3 4 5 6 7 7 8 9 9 10	Module DC 24V INPUT/TR 0	Comment	Input Filter 3 Standard [ms]	Emergency Out Default	Allocation P00000 ~ P0003F	
	slot De	lete Base Base Setting	Delete All De	etails <u>P</u> r	nt 🔻	OK Cancel	

#### 5) Set filter value.

Input/Out	put Module Settii	ıg	<u>?</u> ×
Module: Ir Input —	nput/Output Module:	DC 24V INPUT/	TR OUTPUT,
Filter: Pulse Ca	1110		▼ 6 □ 7
Output	3 ms 5 ms 10 ms 20 ms 70 ms 100 ms (55 10)		
		ОК	Cancel

(b) Setting output status in case of error

Γ

1) Click Emergency Out in the I/O parameter setting window.

I/O Parameter Setting						<u>? ×</u>
Module list						
Base 00 : Default     Default     Default     Default     Default     Default     Default     Default     Default     D3 : Default	Slot O(main) 1 2 3	Module DC 24V INPUT/TR 0	Comment	Input Filter 3 Standard [ms]	Emergency Out Default	Allocation P000000 ~ P0003F
04 : Default 05 : Default 06 : Default 07 : Default 08 : Default	3 4 5 6 7					
09 : Default 10 : Default	8 9 10					
. ▲ Delete	Slot De	lete Base Base Setting	Delete All De	etails <u>P</u> r	int 🔻	OK Cancel

2) Click Emergency Output.

Input/Output Module Sett	ing <mark>? X</mark>
Module: Input/Output Module	e:DC 24V INPUT/TR OUTPUT,
Input	
Filter: Standard	<b>_</b>
Pulse Catch: 🔲 0 🔲 1	2 2 3 4 5 5 6 7
Output	
Channel	Emergency Output
Channel 00 (00-07)	Clear 💌
Channel 01 (08-15)	Hold
	Clear
)	
	OK Cancel

If it is selected as Clear, the output will be Off and if Hold is selected, the output will be kept.

# 7.2 Main Unit Digital Input Specifications

### 7.2.1 XBC-DR10E/ DN10E/ DP10E 6 point DC24V input (Source/Sink type)

	Model		Ν	/lain unit	t				
Specification	on	XBC-DR10E	XE	BC-DN1	)E		XBC-DP10E		
Input point		6 point							
Insulation me	ethod	Photo coupler insulation	on						
Rated input v	voltage	DC24V							
Rated input of	current	About 4 mA (Contact p	oint 0~3:	about 7	mA)				
Operation vo	ltage range	DC20.4~28.8V (within	ripple rat	te 5%)					
On voltage /	On current	DC19V or higher / 3 m/	or high	er					
Off voltage /	Off current	DC6V or lower / 1 mA	or lower						
Input resistar	nce	About 5.6 kΩ (P00~P0	3: about	2.7 kΩ)					
Response time	$Off \rightarrow On$ $On \rightarrow Off$	1/3/5/10/20/70/100 ms	(Set by I	/O para	meter) l	Default	: 3 ms		
Insulation pre	essure	AC560Vrms / 3 cycle (altitude 2000m)							
Insulation res	sistance	10 $^{M\Omega}$ or more by Meg	OhmMet	er					
Common me	thod	6 point / COM							
Proper cable	size	0.3 mm²							
Operation inc	dicator	LED On when Input On							
External con method	nection	14 point terminal block	connect	or (M3 )	K 6 scre	ew)			
Weight		330g	313g			313g			
	Circuit cont	iguration	No.	Contact	No.	Contact	Туре		
Г			TB2	485+	TB1	RX			
		Photo coupler	TB4	485-	TB3	ТΧ	TB2 485+ TX TB3		
$[ ] \langle ]$			TB6	00	TB5	SG	TB4 485- 5G TB5		
5 TB11	;		TB8	02	TB7	01	TB6 P00 P01 TB7		
		circuit			TB9	03	TB8 P02 TB9		
DC24V			TB10	04	TB11	05	TB10 P04 P05 TB11		
	Terminal block no		TB12	NC	TB13	NC	TB12 NC TB13		
			TB14	СОМ					

### 7.2.2 XBC-DR14E/ DN14E/DP14E 8 point DC24V input (Source/Sink type)

	Model		Ν	/lain uni	t					
Specificatio	on	XBC-DR14E	XE	C-DN14	1E		XBC-DP14E			
Input point		8 point								
Insulation me	ethod	Photo coupler insulation	on							
Rated input v	voltage	DC24V								
Rated input of	current	About 4 mA (Contact point 0~3: about 7 mA)								
Operation vo	ltage range	DC20.4~28.8V (Within	ripple ra	te 5%)						
On voltage /	On current	DC19V or higher / 3 MA	or high	er						
Off voltage /	Off current	DC6V or lower / 1 $^{\rm mA}$ c	or lower							
Input resistar	nce	About 5.6 kΩ (P00~P0	3: about	2.7 kΩ)						
Response	$\text{Off} \to \text{On}$	1/3/5/10/20/70/100 ms	(set by L	/O narar	notor) (	lofoult.	<b>3</b> ms			
time	$\text{On} \to \text{Off}$			O parai	neter) t	Jerault.	3 110			
Insulation pre	essure	AC560Vrms / 3 cycle (altitude 2000m)								
Insulation res	sistance	10 $^{M\Omega}$ or more by Meg	OhmMet	er						
Common me	thod	8 point / COM								
Proper cable	size	0.3 mm²								
Operation inc		LED On when Input On								
External coni method	nection	14 point terminal block	connect	or (M3 )	K 6 scre	ew)				
Weight		340g	313g			313g				
	Circuit conf	iguration	No.	Contact	No.	Contact	Туре			
I r			TB2	485+	TB1	RX	RX TB1			
тве		Photo coupler	TB4	485-	TB3	ТΧ	TB2 485+ TB3			
$\left[ \left[ \left$			TB6	00	TB5	SG	485- SG TB5			
7 TB13		Internal			TB7	01	TB6 P00 P01 TB7			
		circuit	TB8	02	TB9	03	TB8 P02 P03 TB9			
			TB10	04	TB11	05	TB10 P04 P05 TB11			
	Terminal block no		TB12	06	TB13	07	P06 P07 TB13			
			TB14	СОМ						

#### 7.2.3 XBC-DR20E/ DN20E/DP20E 12 point DC24V input (Source/Sink type)

Model		Ν	<i>I</i> ain un	it				
Specification	XBC-DR20E	XE	C-DN2	0E		XBC-DP20E		
Input point	12 point							
Insulation method	Photo coupler insulation							
Rated input voltage	DC24V							
Rated input current	About 4 mA (Contact point 0~3: about 7 mA)							
Operation voltage range	DC20.4~28.8V (within	ripple ra	te 5%)					
On voltage / On current	DC19V or higher / 3 mA	or high	er					
Off voltage / Off current	DC6V or lower / 1 mA	or lower						
Input resistance	About 5.6 kΩ (P00~P0	7: about	2.7 kΩ)					
ResponseOff $\rightarrow$ OntimeOn $\rightarrow$ Off	1/3/5/10/20/70/100 ms	(set by I	/O para	meter) o	default:	<b>3</b> ms		
Insulation pressure	AC560Vrms / 3 cycle (	altitude 2	2000m)					
Insulation resistance	10 <sup>MΩ</sup> or more by Meg	OhmMet	er					
Common method	12 point / COM							
Proper cable size	0.3 mm²							
Operation indicator	LED On When Input O	n						
External connection method	24 point terminal block	connect	or (M3	X 6 scre	ew)			
Weight	450g 418g 418g					)		
Circuit con	figuration	No.	Contact	No.	Contact	Туре		
		TB2	485+	TB1	RX	RX TB1		
		TB4	485-	TB3	ТΧ	TB2 485+ TX TB3		
		TB6	00	TB5	SG	TB4 485- SG TB5		
	hoto coupler			TB7	01	TB6 P00 P01 TB7		
		TB8	02	TB9	03	TB8 P02 P03 TB9		
		TB10	04	TB11	05	TB10 P04 P05 TB11		
	circuit	TB12	06	TB13	07	TB12 P06 P07 TB13		
DC24V		TB14	08	TB15	09	TB14 P08 P09 TB15		
Terminal block no	).	TB16	0A	TB17	0B	TB16 POA POB TB17		
		TB18	NC	TB19	NC	TB18 NC TB19		
		TB20	NC			TB22 NC TB21		
		TB22	NC	TB21	NC	TB24 NC TB23		
		TB24	СОМ	TB23	NC			

#### 7.2.4 XBC-DR30E/ DR30E/DP30E 18 point DC24V input (Source/Sink type)

Model		I	Main un	it					
Specification	XBC-DR30E	XE	BC-DN3	0E		XBC-DP30E			
Input point	18 point								
Insulation method	Photo coupler insulation	n							
Rated input voltage	DC24V								
Rated input current	About 4 mA (Contact po	About 4 mA (Contact point 0~3: about 7 mA)							
Operation voltage range	DC20.4~28.8V (within	ripple rat	te 5%)						
On voltage / On current	DC19V or higher / 3 mA	or high	er						
Off voltage / Off current	DC6V or lower / 1 mA c	or lower							
Input resistance	About 5.6 kΩ (P00~P0	7: about	2.7 kΩ)						
Response $Off \rightarrow On$	1/3/5/10/20/70/100 ms	(sat by I	/O para	motor)	dofoult:	<b>3</b> ms			
time $On \rightarrow Off$		(Set by I	o para	neter) t	Jelault.	<b>3</b> me			
Insulation pressure	AC560Vrms / 3 cycle (	altitude 2	2000m)						
Insulation resistance	10 $^{M\Omega}$ or higher by Me	gOhmMe	eter						
Common method	18 point / COM								
Proper cable size	0.3 mm²								
Operation indicator	LED on when Input On								
External connection method	24 point terminal block	connect	or (M3	X 6 scre	ew)				
Weight	465g	423g 423g							
Circuit conf	iguration	No. Contact No. Contact				Туре			
		TB2	485+	TB1	RX	RX TB1			
		TB4	485-	TB3	ТХ	TB2 485+ TX TB3			
		TB6	00	TB5	SG	TB4 485- SG TB5			
	Photo coupler  DC5V	TB8	02	TB7	01	TB6 P00 P01 TB7			
				TB9	03	TB8 P02 P03 TB9			
	Internal	TB10	04	TB11	05	TB10 P04 P05 TB11			
	circuit	TB12	06	TB13	07	TB12 P06 TB13			
DC24V		TB14	08	TB15	09	TB14 P08 P09 TB15			
I——Terminal block no	).	TB16	0A	TB17	0B	TB16 POA TB17			
		TB18	0C	TB19	0D	TB18 POC TB19			
		TB20	0E	TB13	0D 0F	TB20 POE TB21			
		TB22	10			TB22 P10 TB23			
		TB24	СОМ	TB23	11				
		1							

### 7.2.5 XBC-DR20SU/DN20SU/DP20SU 12 point DC24V input (Source/Sink type)

Model		Ν	1ain uni	t						
Specification	XBC-DR20SU	XBC	C-DN20	SU	2	XBC-	DP2	0SU	J	
Input point	12 point									
Insulation method	Photo coupler insulation	n								
Rated input voltage	DC24V									
Rated input current	About 4 mA (point 0~1:	<sup>nA</sup> (point 0~1: about 16 <sup>mA</sup> , point 2~7: about 10 <sup>mA</sup> )								
Operation voltage range	ripple rat	e 5%)								
On voltage / On current	DC19V or higher / 3 mA	or highe	er							
Off voltage / Off current	DC6V or lower / 1 mA c	or lower								
Input resistance	About 5.6 kΩ (P00~P0	1: about	1.5 <sup>k</sup> Ω, l	P02~P0	)7: abo	ut 2.7	7 kΩ)			
Response $Off \rightarrow On$	1/3/5/10/20/70/100 ms	(sot by 1/		motor) (	default:	<b>3</b> ms				
time $On \rightarrow Off$	1/3/3/10/20/70/100 113		O parai	neter) t	Jerault.	0 1110				
Insulation pressure	AC560Vrms / 3 cycle (	altitude 2	000m)							
Insulation resistance	10 $^{M\Omega}$ or more by Meg	OhmMete	ər							
Common method	12 point / COM									
Proper cable size	0.3 mm²									
Operation indicator	LED On When Input O	n								
External connection method	24 point terminal block	connecto	or (M3 )	X 6 scre	ew)					
Weight	514g									
Circuit conf	iguration	No. Contact No. Con					Ту	pe	_	
		TB2	485+	TB1	RX		$\bigcirc$	RX	TB1	
		TB4	485-	TB3	ТΧ	TB2	485+	тх	твз	
		TB6	00	TB5	SG	TB4	485-	SG	TB5	
		TB8	02	TB7	01	TB6	P00	P01	тв7	
				TB9	03	TB8	P02	P03	тв9	
		TB10	04	TB11	05	TB10	P04	P05	TB11	
	Circuit	TB12	06	TB13	07	TB12	P06	P07	TB13	
∎		TB14	08	TB15	09	TB14	P08	P09	TB15	
ITerminal block no	).	TB16	0A	TB17	0B	TB16	POA	POB	TB17	
		TB18	NC	TB19	NC	TB18	NC	NC	TB19	
		TB20	NC	TB21	NC	TB20	NC	NC	TB21	
		TB22	NC			тв22	NC		тв23	
		TB24	СОМ	TB23	NC	тв24	сом			
						L		U	J	

# 7.2.6 XBC-DR30SU/DN30SU/DP30SU 18 point DC24V input (Source/Sink type)

Model	Main unit								
Specification	XBC-DN30SU	XB	C-DN30	SU		XBC-	DN3	0SU	J
Input point	18 point								
Insulation method	Photo coupler insulation	n							
Rated input voltage	DC24V								
Rated input current	About 4 mA (point 0~1: about 16 mA, point 2~7: about 10 mA)								
Operation voltage range	DC20.4~28.8V (within ripple rate 5%)								
On voltage / On current	DC19V or higher / 3 mA	or high	er						
Off voltage / Off current	DC6V or lower / 1 mA of	or lower							
Input resistance	About 5.6 kΩ (P00~P0	1: about	1.5 kΩ,	P02~P(	)7: abo	ut 2.7	kΩ)		
$\begin{array}{c} \text{Response} & \text{Off} \rightarrow \text{On} \\ \text{time} & \text{On} \rightarrow \text{Off} \end{array}$	1/3/5/10/20/70/100 ms	(set by I	/O para	meter) (	default:	3 ms			
Insulation pressure	AC560Vrms / 3 cycle (	altitude 2	2000m)						
Insulation resistance	10 $^{M\Omega}$ or higher by Me	gOhmMe	eter						
Common method	18 point / COM								
Proper cable size	0.3 mm²								
Operation indicator	LED on when Input On	Ì							
External connection method	24 point terminal block	connect	or (M3	X 6 scre	ew)				
Weight	528g 476g 476g								
Circuit conf	iguration	No.	Contact	No.	Contact		Ty	ре	1
		TB2	485+	TB1	RX		$\bigcirc$	RX	TB1
		TB4	485-	TB3	ТΧ	TB2	485+	тх	твз
		TB6	00	TB5	SG	TB4	485-	SG	TB5
	Photo coupler   DC5V	TB8	02	TB7	01	TB6	P00	P01	TB7
				TB9	03	TB8	P02	P03	тв9
		TB10	04	TB11	05	TB10	P04	P05	TB11
	circuit	TB12	06	TB13	07	TB12	P06	P07	TB13
∎		TB14	08	TB15	09	TB14	P08	P09	TB15
ITerminal block no	).	TB16	0A	TB17	0B	TB16 TB18	POA	POB	TB17
		TB18	0C	TB19	0D	TB20	POC	POD	TB19
		TB20	0E	TB21	0F	TB20	POE	POF	TB21
		TB22	10	TB23	11	TB24	P10	P11	ТВ23
		TB24	СОМ	1025	11	1021	COM	lacksquare	

#### 7.2.7 XBC-DR40SU/DN40SU/DP40SU 24 point DC24V input (Source/Sink Type)

Specification         XBC-DR40SU         XBC-DN40SU         XBC-DP40SU           Input point         24 point         Insulation method         Photo coupler insulation           Rated input voltage         DC24V         Reade input voltage         DC24V           About 4 mA (point 0-1: about 16 mA, point 2-7: about 10 mA)         Operation voltage range         DC20.4-28.8V (within ripple rate 5%)         On voltage / On current         DC19V or higher / 1 mA or higher           On voltage / On current         DC6V or lower / 1 mA or lower         Insulation pressure         About 5.6 K@ (P00-P01: about 1.5 k@, P02-P07: about 2.7 k@)           Response         Off -> On On -> Off         1/3/5/10/20/70/100 ms (set by I/O parameter) default: 3 ms         Insulation pressure           Insulation resistance         10 M© or higher by MegOhmMeter         Common method         24 point / COM           Proper cable size         0.3 mf         Operation indicator         LED on when Input On           External connection method         30 point terminal block connector (M3 X 6 screw)         TB1         RB         TB1         TTB1         TB1 <th></th> <th>Model</th> <th></th> <th colspan="8">Main unit</th>		Model		Main unit							
Input point         24 point           Insulation method         Photo coupler insulation           Rated input voltage         DC24V           Rated input current         About 4 mA (point 0–1: about 16 mA, point 2–7: about 10 mA)           Operation voltage range         DC20.4–28.8V (within ripple rate 5%)           On voltage / On current         DC60V or lower / 1 mA or lower           Input resistance         About 5.6 k2 (P00–P01: about 1.5 k2, P02–P07: about 2.7 k2)           Response         Off → On           Insulation resistance         About 5.6 k2 (P00–P01: about 1.5 k2, P02–P07: about 2.7 k2)           Response         Off → On           Insulation resistance         10 k0 or higher by MegOhmMeter           Common method         24 point / COM           Proper cable size         0.3 mf           Operation indicator         LED on when Input On           External connection method         30 point terminal block connector (M3 X 6 screw)           Weight         594g           Terminal block No.         TB11           Terminal block No.         TB14           TB14         08           TB14         08           TB22         10           TB24         11           TB26         14 <t< td=""><td>Specificatio</td><td>n</td><td>XBC-DR40SU</td><td>XB</td><td>C-DN4</td><td>0SU</td><td></td><td>XB</td><td>C-DP</td><td>40SI</td><td>J</td></t<>	Specificatio	n	XBC-DR40SU	XB	C-DN4	0SU		XB	C-DP	40SI	J
Rated input voltage         DC24V           Rated input current         About 4 mA (point 0-1: about 16 mA, point 2-7: about 10 mA)           Operation voltage range         DC20.4-28.8V (within ripple rate 5%)           On voltage / Off current         DC8V or lower / 1 mA or lower           Input resistance         About 5.6 kQ (P00-P01: about 1.5 kQ, P02-P07: about 2.7 kQ)           Response         Off -> On 1/3/5/10/20/70/100 ms         (set by I/O parameter) default: 3 ms           Insulation pressure         AC560Vrms / 3 cycle (altitude 2000m)           Insulation resistance         10 MQ or higher by MegOhmMeter           Common method         24 point / COM           Proper cable size         0.3 mm           Operation indicator         LED on when Input On           External connection method         S94g         578g         578g           Weight         594g         578g         TB1 R X         TB2         RK TB3 TX         TB2         RK TB1 R OC         TB1         TB1         TB1         TB1         TB1         TB1         TB1         TB2         TB1			24 point								
Rated input current         About 4 mA (point 0-1: about 16 mA, point 2-7: about 10 mA)           Operation voltage range         DC20.4-28.8V (within ripple rate 5%)           On voltage / On current         DC19V or higher / 3 mA or higher           Off voltage / Off current         DC6V or lower / 1 mA or lower           Input resistance         About 5.6 k@ (P00-P01: about 1.5 k@, P02-P07: about 2.7 k@)           Response         Off → On time           Insulation pressure         AC560Vrms / 3 cycle (altitude 2000m)           Insulation resistance         10 k@ or higher by MegOhmMeter           Common method         24 point / COM           Proper cable size         0.3 mf           Operation indicator         LED on when Input On           External connection method         30 point terminal block connector (M3 X 6 screw)           Weight         594g           S78g         TB1           TB2         485+           TB8         02           TB1         04           TB1         05           TB2         485+           TB2         04           TB2         04           TB2         04           TB2         04           TB2         05           TB4 <td< td=""><td>Insulation met</td><td>thod</td><td>Photo coupler insulation</td><td>า</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	Insulation met	thod	Photo coupler insulation	า							
Operation voltage range         DC20.4–28.8V (within ripple rate 5%)           On voltage / On current         DC19V or higher / 3 mÅ or higher           Off voltage / Off current         DC6V or lower / 1 mÅ or lower           Input resistance         About 5.6 k <sup>Q</sup> (P00–P01: about 1.5 k <sup>Q</sup> , P02–P07: about 2.7 k <sup>Q</sup> )           Response         Off → On On → Off         1/3/5/10/20/70/100 ms (set by I/O parameter) default: 3 ms           Insulation pressure         AC560Vrms / 3 cycle (altitude 2000m)           Insulation resistance         10 M <sup>Q</sup> or higher by MegOhmMeter           Common method         24 point / COM           Proper cable size         0.3 m <sup>m</sup> Operation indicator         LED on when Input On           External connection method         30 point terminal block connector (M3 X 6 screw)           Weight         594g           578g         TB1           Circuit configuration         No.           TB1         RX           TB2         485+           TB3         TX           TB2         TB1           TB1         RX           T2         TB1           Operation indicator         LED on when Input On           External connection         TB1           TB2         TB1	Rated input vo	oltage	DC24V								
On voltage / On current         DC19V or higher / 3 mÅ or higher           Off voltage / Off current         DC6V or lower / 1 mÅ or lower           Input resistance         About 5.6 k <sup>2</sup> (P00-P01: about 1.5 k <sup>Q</sup> , P02-P07: about 2.7 k <sup>Q</sup> )           Response         Off → On           Imaultation pressure         AC560Vrms / 3 cycle (altitude 2000m)           Insulation pressure         AC560Vrms / 3 cycle (altitude 2000m)           Insulation resistance         10 M <sup>Q</sup> or higher by MegOhmMeter           Common method         24 point / COM           Proper cable size         0.3 mf           Operation indicator         LED on when Input On           External connection         30 point terminal block connector (M3 X 6 screw)           Weight         594g           578g         TB1           Circuit configuration         No.           Context         No.           TB2         485+           TB3         TX           TB4         485-           TB5< SG	Rated input cu	urrent	About 4 mA (point 0~1:	about 16	S™A,po	int 2~7	: about	: 10 r	nA)		
Off voltage / Off current         DC6V or lower / 1 <sup>mA</sup> or lower           Input resistance         About 5.6 k <sup>Q</sup> (P00-P01: about 1.5 k <sup>Q</sup> , P02-P07: about 2.7 k <sup>Q</sup> )           Response         Off → On           Insulation pressure         AC560Vrms / 3 cycle (altitude 2000m)           Insulation resistance         10 <sup>MQ</sup> or higher by MegOhmMeter           Common method         24 point / COM           Proper cable size         0.3 <sup>mm</sup> Operation indicator         LED on when Input On           External connection         30 point terminal block connector (M3 X 6 screw)           Weight         594g           S78g         T81           Circuit configuration         No.           Context         No.           TB2         485+           TB3         TX           TB4         485-           TB5         SG           TB1         RX           TB1         RB1           TB1         Optimer T           TB2         485+           TB3         T81           TB2         TB1           TB1         RX           TB2         TB1           TB1         TS           TB2         TB1	Operation volt	tage range	DC20.4~28.8V (within r	ipple rat	e 5%)						
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	On voltage / On current DC19V or higher / 3 <sup>mA</sup> or higher										
Response timeOff → On On → Off1/3/5/10/20/70/100 ms(set by I/O parameter) default: 3 msInsulation pressureAC560Vrms / 3 cycle (altitude 2000m)Insulation resistance10 № or higher by MegOhmMeterCommon method24 point / COMProper cable size0.3 mfOperation indicatorLED on when Input OnExternal connection method30 point terminal block connector (M3 X 6 screw)Weight594g578gCircuit configurationNo.ContextTB2485+ TB3TB1 TB2TB2485+ TB1TB1 TB2TB2485+ TB1TB1 TB2TB2485+ TB1TB1 TB2TB1004 TB12TB1 TB14TB1408 TB15TB10 TB12TB1408 	Off voltage / Off current DC6V or lower / 1 mA or lower										
time On→Off 173/5/10/20/70/100 ms (set by I/O parameter) default: 3 ms Insulation pressure AC560Vrms / 3 cycle (altitude 2000m) Insulation resistance 10 № or higher by MegOhmMeter Common method 24 point / COM Proper cable size 0.3 mf Operation indicator LED on when Input On External connection 30 point terminal block connector (M3 X 6 screw) Weight 594g 578g 578g Circuit configuration No. Contect Type TB2 485+ TB5 SG TB7 01 TB2 485+ TB5 SG TB7 01 TB10 04 TB10 04 TB11 05 TB10 04 TB11 05 TB10 04 TB11 05 TB14 08 TB15 09 TB16 0A TB17 0B TB24 12 TB24 12 TB24 12 TB22 10 TB22 10 TB23 11 TB24 12 TB25 13 TB26 14 TB27 15 TB26 14 TB27	Input resistan	се	About 5.6 kΩ (P00~P01	: about	1.5 kΩ,	P02~P	07: abo	out 2	. <b>7</b> kΩ)	)	
Insulation resistance       10 ½ or higher by MegOhmMeter         Common method       24 point / COM         Proper cable size       0.3 mm²         Operation indicator       LED on when Input On         External connection method       30 point terminal block connector (M3 X 6 screw)         Weight       594g         Circuit configuration       No.         Cornect       No.         TB2       485+         TB3       TX         TB4       485-         TB5       SG         TB4       485-         TB6       00         TB10       04         TB11       05         TB4       08         TB14       08         TB14       08         TB14       08         TB14       08         TB14       08         TB14       08         TB10 <td>•</td> <td></td> <td>1/3/5/10/20/70/100 ms (</td> <td>set by I/</td> <td>O para</td> <td>meter)</td> <td>default</td> <td>t: 3 m</td> <td>S</td> <td></td> <td></td>	•		1/3/5/10/20/70/100 ms (	set by I/	O para	meter)	default	t: 3 m	S		
Common method         24 point / COM           Proper cable size         0.3 mm²           Operation indicator         LED on when Input On           External connection method         30 point terminal block connector (M3 X 6 screw)           Weight         594g           S78g         578g           Circuit configuration         No.           Context         No.           Circuit configuration         No.           TB2         485+           TB3         TX           TB4         485-           TB5         SG           TB4         7B7           TB1         RX           TB2         7B7           TB1         04           TB1         05           TB1         04           TB1         04           TB1         04           TB1         05           TB1         06           TB1         07           TB1         08           TB1         04           TB1         05           TB1         06           TB1         08           TB1         08           TB1         0	Insulation pres	ssure	AC560Vrms / 3 cycle (a	ltitude 2	.000m)						
Proper cable size         0.3 mm <sup>2</sup> Operation indicator         LED on when Input On           External connection method         30 point terminal block connector (M3 X 6 screw)           Weight         594g         578g         578g           Circuit configuration         No.         Context         No.         Context         TB1         RX           TB2         485+         TB3         TX         TB3         TX         TB3         TX           TB4         485-         TB5         SG         TB1         RX         TB4         485-         SG           TB4         485-         TB5         SG         TB1         RX         TB1         RX           TB4         485-         TB5         SG         TB1         RX         TB2         485+         TB1         RX         TR1         RX         TB1         <	Insulation resi	istance	10 $^{M\Omega}$ or higher by Meg	OhmMe	ter						
Operation indicator         LED on when Input On           External connection method         30 point terminal block connector (M3 X 6 screw)           Weight         594g         578g         578g           Circuit configuration         No.         Contact         Type           TB2         485+         TB1         RX         T83           TB4         485-         TB3         TX         T84         485-         T85           TB6         00         TB7         01         T84         485-         T85         T85           TB6         00         TB7         11         T80         789         7817         <	Common met	hod	24 point / COM								
External connection method         30 point terminal block connector (M3 X 6 screw)           Weight         594g         578g           Circuit configuration         No.         Contact         No.         Contact         Type           TB2         485+         TB1         RX	Proper cable :	size	0.3 mm²								
method         30 point terminal block connector (M3 X 6 screw)           Weight         594g         578g         578g           Circuit configuration         No.         Contact         No.         Contact         Type           TB2         485+         TB1         RX         TB2         485+         TB3         TX         TB2         77         783         77         783         783         77         783 <t< td=""><td>Operation ind</td><td>icator</td><td>LED on when Input On</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Operation ind	icator	LED on when Input On								
Circuit configuration         No.         Contact         No.         Contact         Type           TB2         485+         TB1         RX         TB1         RX         TB1         485-         TB5         SG         TB6         00         TB7         01         TB2         485-         TB5         SG         TB7         01         TB1         02         P05         TB11         05         TB12         P06         P07		ection			or (M3	X 6 scr	ew)				
Image: Decay of the second	Weight		594g	578g			578	g			
BE2       485+       TB3       TX       TB2       485+       TX       TB4         TB4       485-       TB5       SG       TB4       485-       TB5       SG       TB4         TB4       485-       TB5       SG       TB4       485-       TB5       SG       TB7       01       TB4       485-       TB7       01       TB7       01       TB7       01       TB7       180       P00       P01       TB7       181       P04       P05       TB11       05       TB10       P04       P05       TB11       TB14       P08       TB17       TB14       P08       TB17       TB14       P08       TB17       TB16       P04       P05       TB11       TB16       P04       P05       TB17       TB16		Circuit cont	figuration	No.	Contact	No.	Contact		Ty	/pe	
Photo-coupler Photo-				TDO	105	TB1	RX				
0       TB6       00       TB5       SG       TB4       485-       1X         TB6       00       TB7       01       TB6       P00       P01       TB7         11       TB23       TB24       TB10       04       TB11       05       TB2       P03       FB12       P04       P05       TB11         11       TB23       TE7       TB10       04       TB13       07       TB2       P06       P07       TB13         TB14       08       TB15       09       TB14       P08       P01       TB17       TB14       P08       P00       TB13         TB14       08       TB15       09       TB14       P08       P09       TB15         TB14       08       TB17       0B       TB14       P08       P09       TB17         TB16       0A       TB17       0B       TB14       P08       P01       TB17         TB18       0C       TB17       0B       TB17       TB18       P00       TB17         TB20       0E       TB17       0B       TB20       P00       TB17       TB20       P00       TB17         TB20       0E </td <td></td> <td></td> <td></td> <td>182</td> <td></td> <td>TB3</td> <td>ΤХ</td> <td>TB2</td> <td></td> <td>RX</td> <td></td>				182		TB3	ΤХ	TB2		RX	
O       TB6       00       TB7       01       TB6       00       FB       <	_			TB4	485-	TB5	SG	TB4	485-	ΤХ	TB3
TB8       02       TB9       03       TB8       P02       P03       TB9         11       TB23       TB11       05       TB10       04       TB11       05       TB12       P06       P07       TB13         TB14       08       TB15       09       TB16       P04       P05       TB15         TB14       08       TB15       09       TB16       P00       P00       P08       TB15         TB16       0A       TB17       0B       TB18       P00       P00       P00       TB19         TB20       0E       TB21       0F       TB22       P00       TB19       P00       P00       TB19         TB20       0E       TB21       0F       TB22       P10       F182       P10       P11       TB23         TB22       10       TB23       11       TB24       12       P11       TB23         TB26       14       TB27       15       TB28       P16       P17       TB29         TB28       16       TB29       17       TB30       COM       P11       TB29	тв6		Photo-coupler					TB6			
TB10       04       TB11       05       TB10       P04       P05       TB11         TB24       COM       TB12       06       TB13       07       TB12       P06       P07       TB13         DC24V       Terminal block No.       TB16       0A       TB17       0B       TB16       P0A       P08       P07       TB13         TB14       08       TB15       09       TB16       P0A       P0B       TB15       P0B       TB17       P0B       TB17       P0B       TB18       P0C       P00       TB19       P0D       P00       TB19       P0D       P0F       TB21       TB22       P10       P11       TB23       TB24       P12       P13       TB24       P12       P13       TB24       P12       P13       P11       TB23       TB24       P12       P11       TB23       TB24       P12       P13       TB25       TB24       P12       P13       TB25       TB24       P14       P15       TB27       TB28       P16       P17       TB29       P17       TB29       P17       TB30       COM       P17       TB30       COM       P17       TB30       COM       P17       TB30       COM </td <td></td> <td></td> <td></td> <td>TB8</td> <td>02</td> <td>TB9</td> <td>03</td> <td>TB8</td> <td>P02</td> <td>P01</td> <td></td>				TB8	02	TB9	03	TB8	P02	P01	
TB24       Circuit       TB12       06       TB13       07       TB12       P06       P07       TB13         DC24V       Terminal block No.       TB16       0A       TB17       0B       P08       P09       TB15         TB18       0C       TB17       0B       TB18       P06       P07       TB18         TB16       0A       TB17       0B       TB18       P00       TB17       P08       P09       TB19         TB20       0E       TB21       0F       TB22       P00       TB22       P00       P01       TB23         TB22       10       TB23       11       TB24       P12       P11       TB23         TB26       14       TB27       15       TB28       P16       P17       TB29         TB28       16       TB29       17       TB30       COM       P17       TB29	11 7000			<b>TB10</b>	04			TB10	P04	P03	189
COM       TB13       07       P06       P07       TB13         DC24V       Terminal block No.       TB14       08       TB15       09       TB16       P08       P09       TB15         TB16       0A       TB17       0B       TB18       P0C       P00       TB17         TB18       0C       TB19       0D       TB18       P0E       P1E       <	φ0 0φ	<u>s</u>		TB12	06	IB11	05	TB12		P05	TB11
DC24V       Terminal block No.       TB16       0A       TB15       09       P08       P09       TB15         TB16       0A       TB17       0B       TB17       0B       TB18       P00       TB17         TB18       0C       TB17       0B       TB18       P00       TB17         TB18       0C       TB19       0D       TB20       P0E       P0D       TB21         TB22       10       TB23       11       TB24       P12       P11       TB23         TB24       12       TB25       13       TB26       P14       P15       TB27         TB28       16       TB29       17       TB30       COM       P17       TB29	Сом					TB13	07			P07	TB13
TB16     OA     TB17     OB     POA     POB     TB17       TB18     OC     TB17     OB     TB18     POC     POD     TB19       TB20     OE     TB21     OF     TB22     POE     POE     TB21       TB22     10     TB23     11     TB23     P11     TB23       TB24     12     TB25     13     TB24     P13     TB27       TB28     16     TB29     17     TB30     COM     P17	DC24V	Terminal block No				TB15	09		P08	P09	TB15
$\begin{array}{c c c c c c c c c c c c c c c c c c c $						TB17	0B		POA	POB	TB17
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				TB18	0C	TB19	0D		POC	POD	TB19
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				TB20	0E			1820	POE	POF	TB21
TB24     12     TB23     11     TB24     P12     P13       TB26     14     TB25     13     TB26     P14     P13     TB27       TB28     16     TB27     15     TB28     P16     P17     TB29       TB30     COM     TB29     17     TB30     COM     TB29				TB22	10			TB22	P10		TB23
TB26     14     TB25     13     TB26     P13       TB28     16     TB27     15     TB28     P16     P17       TB29     17     TB20     COM     TB29				TB24	12	TB23	11	TB24	P12		TR25
TB28     16     TB27     15     TB28     P16       TB29     17     TB30     COM     TB29						TB25	13	TB26	P14		
ТВ29 17 ТВ30 СОМ ТВ30 СОМ						TB27	15	TB28	P16		TB20
				TB28 TB30	16 COM	TB29	17	твзо	СОМ	P17	1029

# 7.2.8 XBC-DR60SU/DN60SU/DP60SU 36 point DC24V input (Source/Sink Type)

Specification         XBC-DR60SU         XBC-DN60SU         XBC-DP60SU           Input point         36 point         Insulation         Insulation         Insulation           Insulation method         Photo coupler insulation         Rated input voltage         Coupler insulation           Rated input ourrent         About 4 m <sup>A</sup> (point 0–1; about 16 m <sup>A</sup> , point 2–7; about 10 m <sup>A</sup> )         Operation voltage range         DC24-28.8V (within ripple rate 5%)         On voltage / On current         DC60V or lower / 1 m <sup>A</sup> or lower           Input resistance         DC19V or lower / 1 m <sup>A</sup> or lower         Insulation pressure         About 56 k <sup>2</sup> (P00–P01: about 1.5 k <sup>2</sup> , P02–P07: about 2.7 k <sup>2</sup> )           Response         Off → On         10 k <sup>2</sup> or higher / 3 m <sup>A</sup> Image for higher / 3 m <sup>A</sup> Insulation resistance         10 k <sup>2</sup> or higher by MegOhmMeter         Common method         36 point / COM           Proper cable size         0.3 m <sup>H</sup> Operation indicator         LED on when Input On         External connection           Response         Grif → On         42 point terminal block connector (M3 X 6 screw)         TB8         02         TB3           Methods no.         TB10         04         TB11         05         TB2         FB3           Tester add to no.         TB10         04         TB17         08         FB3	Model			Main ur	nit					
Input point         36 point           Insulation method         Photo coupler insulation           Rated input voltage         DC24V           Rated input current         About 4 <sup>m</sup> (point 0–1: about 16 <sup>m</sup> , point 2–7: about 10 <sup>m</sup> /)           Operation voltage / On current         DC204-28.8V (within ripple rate 5%)           Off voltage / On current         DC19V or higher / 3 <sup>m</sup> or lower           Input resistance         About 5.6 <sup>k</sup> <sup>(2)</sup> (PO0–PO1: about 1.5 <sup>k</sup> <sup>(2)</sup> , PO2–PO7: about 2.7 <sup>k</sup> <sup>(2)</sup> )           Response         Off → On           Insulation pressure         AC560Vrms / 3 cycle (altitude 2000m)           Insulation pressure         AC560Vrms / 3 cycle (altitude 2000m)           Insulation indicator         LED on when Input On           External connection         42 point terminal block connector (M3 X 6 screw)           Weight         804g         636g           TB1         RX         TB1           Response         TB1         RX           TB2         485         TB1           TB1	Specification	XBC-DR60SU	XB	C-DN6	0SU		ХВС	C-DP	60S	U
Insulation method       Photo coupler insulation         Rated input voltage       DC24V         Rated input current       About 4 m <sup>A</sup> (point 0-1: about 16 m <sup>A</sup> , point 2-7: about 10 m <sup>A</sup> )         Operation voltage / Off current       DC20.4-28.8V (within ripple rate 5%)         On voltage / Off current       DC8V or lower / 1 m <sup>A</sup> or lower         Input resistance       About 5.6 k <sup>B</sup> (P00-P01: about 1.5 k <sup>B</sup> , P02-P07: about 2.7 k <sup>B</sup> )         Response       Off → On On ->Off         Insulation pressure       AC560Vrms / 3 cycle (altitude 2000m)         Insulation resistance       10 k <sup>B</sup> or higher by MegOhmMeter         Common method       36 point / COM         Proper cable size       0.3 m <sup>H</sup> Operation indicator       LED on when Input On         External connection method       42 point terminal block connector (M3 X 6 screw)         Weight       804g       636g       183 TX T84       184         TB1       RX       TB1       RX       174         TB2       485+ TB3< TX T84       TB1       74       74         TB2       0       TB1       0       74       75         TB2       0       TB1       0       74       75       75         TS2       F00       TS       TS	· · · · ·	36 point								
Rated input voltage         DC24V           Rated input current         About 4 m <sup>A</sup> (point 0-1: about 16 m <sup>A</sup> , point 2-7: about 10 m <sup>A</sup> )           Operation voltage range         DC20.4-28.8V (within ripple rate 5%)           On voltage / On current         DC19V or higher / 3 m <sup>A</sup> or higher           Off voltage / Off current         DC6V or lower / 1 m <sup>A</sup> or lower           Input resistance         About 5.6 k <sup>B</sup> (PO0-PO1: about 1.5 k <sup>B</sup> , P02-P07: about 2.7 k <sup>D</sup> )           Response         Off → On 0 → Off         1/3/5/10/20/70/100 m <sup>S</sup> (set by I/O parameter) default: 3 m <sup>S</sup> Insulation resistance         10 M <sup>D</sup> or higher by MegOhmMeter         Common method           Common method         36 point / COM           Proper cable size         0.3 m <sup>H</sup> Operation indicator         LED on when Input On           External connection method         804g         636g           TB8<00			<u>ו</u>							
Rated input current         About 4 ™ (point 0-1: about 16 ™A, point 2-7: about 10 ™A)           Operation voltage range         DC20.4-28.8V (within ripple rate 5%)         Off           Off voltage / Off current         DC6V or lower / 1 ™A or lower         M or higher / 3 ™ or higher / 3 ™ or higher           Off voltage / Off current         DC6V or lower / 1 ™A or lower         Image: Content of the current         DC6V or lower / 1 ™A or lower           Response         Off - On         1/3/5/10/20/70/100 ™s (set by I/O parameter) default: 3 ™s         Image: Content of the current         Image: Content of the current           Insulation resistance         10 №2 or higher / 3 weight         3 cycle (altitude 2000m)         Insulation resistance         Image: Content of the current of										
Operation voltage range         DC20.4-28.8V (within ripple rate 5%)           On voltage / On current         DC19V or higher / 3 I <sup>th</sup> or higher           Off voltage / On current         DC19V or lower / 1 #* or lower           Input resistance         About 5.6 k <sup>Q</sup> (P00-P01: about 1.5 k <sup>Q</sup> , P02-P07: about 2.7 k <sup>Q</sup> )           Response         Off → On On → Off         1/3/5/10/20/70/100 ms (set by I/O parameter) default: 3 ms           Insulation pressure         AC560Vrms / 3 cycle (altitude 2000m)           Insulation resistance         10 M <sup>Q</sup> or higher by MegOhmMeter           Common method         36 point / COM           Proper cable size         0.3 mf           Operation indicator         LED on when Input On           External connection         42 point terminal block connector (M3 X 6 screw)           Weight         804g         636g           TB2         485+           TB4         485+           TB4         485+           TB12         06           TB14         08           TB12         06           TB14         08           TB2         11           TB2         11           TB2         12           TB14         08           TB20         0E	· · · · · · · · · · · · · · · · · · ·	About 4 mA (point 0~1:	0~1: about 16 <sup>mA</sup> , point 2~7: about 10 <sup>mA</sup> )							
On voltage / On current         DC19V or higher / 3 m² or higher           Off voltage / Off current         DC6V or lower / 1 m² or lower           Input resistance         About 5.6 № (P00-P01: about 1.5 №, P02-P07: about 2.7 №)           Response         Off → On On → Off         1/3/5/10/20/70/100 ms (set by I/O parameter) default: 3 ms           Insulation resistance         10 № or higher by MegOhmMeter           Common method         36 point / COM           Operation indicator         LED on when Input On           External connection method         42 point terminal block connector (M3 X 6 screw)           Weight         804g         636g           Circuit configuration         No.         Corret         Type           TB1         0A         TB1         RX         TB3         TX           TB10         0A         TB1         0A         TB1         FB3         F								,		
Off voltage / Off current         DC6V or lower / 1 mÅ or lower           Input resistance         About 5.6 k3 (P00-P01: about 1.5 k3, P02-P07: about 2.7 k3)           Response         Off → On           Image of the image of										
Input resistanceAbout 5.6 k2 (P00-P01: about 1.5 k2, P02-P07: about 2.7 k2)Response timeOff → On On → Off1/3/5/10/20/70/100 ms (set by I/O parameter) default: 3 msInsulation pressureAC560Vrms / 3 cycle (altitude 2000m)Insulation resistance10 M2 or higher by MegOhmMeterCommon method36 point / COMProper cable size0.3 mfOperation indicatorLED on when Input OnExternal connection method42 point terminal block connector (M3 X 6 screw)Weight804g636g188 rB13Time1782Mone188 02Time188 02Time188 02Time181Main1810Main1811Main1816Main1816Main1816Main1816Main1816Main1816Main1816Main1818Main1818Main1818Main1818Main1818Main1818Main1818Main182Main182Main183Main183Main183Main183Main183Main183Main183Main183Main184Main184Main183Main183Main183Main183 <t< td=""><td></td><td colspan="9"></td></t<>										
Response time         Off On → Off         1/3/5/10/20/70/100 ms         (set by I/O parameter) default: 3 ms           Insulation pressure         AC560Vrms / 3 cycle (altitude 2000m)         Insulation resistance         10 Ms² or higher by MegOhmMeter           Common method         36 point / COM         96 point / COM         97 poer cable size         0.3 ms²           Operation indicator         LED on when Input On         External connection 42 point terminal block connector (M3 X 6 screw)         188 dog         636g         182 485+         TB1         RX           Weight         804g         633g         184 485-         TB3         TX         184 485-         184 485-         184 485-         184 485-         184 485-         184 485-         185 SG         185 5G         185 183         174 485-         180 04         180 04         181 05         180 04         181 05         180 04         181 05         180 04         181 05         180 04         181 05         180 04         181 05         180 04         181 05         180 04         181 05         180 04         181 05         180 04         181 05         180 04         181 05         180 04         181 05         180 04         181 05         180 04         181 05         180 04         181 05         180 04         181 05										
time On $\rightarrow$ Off 1735Y 10/201701 rol the (set by 1/D parameter) default: 3 ms Insulation pressure AC560Vrms / 3 cycle (altitude 2000m) Insulation resistance 10 WS or higher by MegOhmMeter Common method 36 point / COM Proper cable size 0.3 mm Operation indicator LED on when Input On External connection 42 point terminal block connector (M3 X 6 screw) Weight 804g 636g 636g Circuit configuration No. Comme No	· ·								,	
Insulation pressure         AC560Vrms / 3 cycle (altitude 2000m)           Insulation resistance         10 M2 or higher by MegOhmMeter           Common method         36 point / COM           Proper cable size         0.3 mf           Operation indicator         LED on when Input On           External connection         42 point terminal block connector (M3 X 6 screw)           Weight         804g         636g           Circuit configuration         No.         Contact         No.           TB2         485+         TB1         RX           TB4         485-         TB3         TX           TB4         485-         TB5         SG           TB1         04         TB1         RX           TB4         485-         TB3         TX           TB4         485-         TB5         SG           TB10         04         TB11         05         T81           TB24         06         TB13         07         T81           TB24         06         TB13         07         T81           TB24         06         TB13         07         T81           TB24         02         TB21         0F         T81		- 1/3/5/10/20/70/100 ™s (	set by I/	O para	meter)	default	:: 3 ms	3		
Insulation resistance         10 M2 or higher by MegOhmMeter           Common method         36 point / COM           Proper cable size         0.3 mit           Operation indicator         LED on when Input On           External connection method         42 point terminal block connector (M3 X 6 screw)           Weight         804g         636g         636g           Circuit configuration         No.         Contact         Type           TB2         485+         TB1         RX         Tg2         485-           TB3         TX         TB3         TX         Tg4         485-         TB5         SG           TB4         485-         TB5         SG         TB1         RX         Tg4         485-         TB5         SG           TB1         TB4         485-         TB5         SG         TB1         RX         Tg6         P00         Tg7         Tg8           TB1         TB1         O4         TB11         O5         Tg7         Tg7         Tg8         P00		AC560Vrms / 3 cycle (a	ltitude 2	000m)						
Common method         36 point / COM           Proper cable size         0.3 mr           Operation indicator         LED on when Input On           External connection         42 point terminal block connector (M3 X 6 screw)           Weight         804g         636g         636g           Circuit configuration         No.         Context         TB1         RX           TB2         485+         TB1         RX         TB2         485+           TB4         485-         TB5         SG         TB1         RX         TB2         485+           TB4         485-         TB5         SG         TB1         RX         TB1         RX         TB1         RX         TB1         RX         TB2         485+         TB5         SG         TB1         RX										
Operation indicator         LED on when Input On           External connection method         42 point terminal block connector (M3 X 6 screw)           Weight         804g         636g         636g           Circuit configuration         No.         Contact         No.         Contact         Type           TB2         485+         TB1         RX         T83         TX         T84           TB4         485-         TB5         SG         T01         T84         485-           TB6         00         TB7         01         T86         702         703           TB10         04         TB11         05         T810         704         781           TB2         06         TB13         07         T810         702         703         781           TB2         06         TB13         07         T810         704         781         <	Common method	36 point / COM								
External connection method         42 point terminal block connector (M3 X 6 screw)           Weight         804g         636g         636g           Circuit configuration         No.         Conter         No.         Conter         TB1         RX           TB2         485+         TB1         RX         TB2         485+         TB3         TX         TB2           TB4         485-         TB5         SG         TB7         01         TB7         TB1         TB1         TB1         TB2         485+         TB7         TB1         TB2         485-         TB5         SG         TB7         TB1         TB1         TB2         TB1         TB1         TB1         TB2         TB1         TB1         TB2         TB1         TB1         TB1         TB1         TB1         TB1         TB2         TB1         TB	Proper cable size	0.3 mm <sup>2</sup>								
method         42 point terminal block connector (M3 X 6 screw)           Weight         804g         636g         636g           Circuit configuration         No.         Context         No.         Context         Type           TB2         485+         TB1         RX         TB2         485+         TB1         RX           TB4         485-         TB3         TX         TB2         485+         TB1         RX           TB4         485-         TB5         SG         TB7         01         TB2         485-         TB1         TB1         TB1         TB1         TB1         TB2         TB1         TB1         TB1         TB2         TB1         TB1         TB1         TB2         TB1         TB1 <t< td=""><td>Operation indicator</td><td>LED on when Input On</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Operation indicator	LED on when Input On								
Intervide         804g         636g         636g           Circuit configuration         No.         Contact         No.         Contact         Type           TB2         485+         TB1         RX         TB1         RX           TB4         485-         TB5         SG         TB1         RX         TB1         RX           TB4         485-         TB5         SG         TB1         RX         TB1         RX           TB4         485-         TB5         SG         TB1         RX         TB1         RX           TB6         00         TB7         01         TB2         485-         SG         TB1         TB1         TB1         TB1         RX         TB1         RX         TB1         RX         TB1         RX         TB1         RX         TB1         RX         TB1         TB2         TB1         TB1         TB2         TB1         TB1 <t< td=""><td></td><td>42 point terminal block</td><td>connecto</td><td>or (M3</td><td>X 6 scr</td><td>ew)</td><td></td><td></td><td></td><td></td></t<>		42 point terminal block	connecto	or (M3	X 6 scr	ew)				
Circuit configuration         No.         Contact         No.         Contact         Type           TB2         485+         TB1         RX         TB2         485+         TB1         RX         TB2         485+         TB1         TB2         485+         TB2         78         TB1         TR4         485-         TB2         78         TB1         TB1         TB1         TB2         TB1         TB1         TB1         TB2         TB2         TB1		804g	636a			636	a			
Image: book of the second se				Contact	No.		9	Ţ	уре	
Photo-coupler       TB3       TX       TB3       TX       TB3       TX       TB3         TB4       485-       TB5       SG       TB4       485-       SG       TB4         TB4       485-       TB5       SG       TB7       O1       TB4       485-       SG       TB5         TB6       00       TB7       O1       TB10       O2       TB10       O2       TB10       P03       TB11       O2       TB12       P06       P07       TB11       D1       TB12       P06       P07       TB12       P18       P18       P18       P18       P18       P18       P18       P18       P18 <t< td=""><td></td><td>•</td><td>TDO</td><td>105</td><td>TB1</td><td>RX</td><td></td><td></td><td></td><td>]</td></t<>		•	TDO	105	TB1	RX				]
0       TB6       00       TB5       SG       TB       TB         11       TB2       TB       00       TB7       01       TB       760       760       760       776					TB3	ΤХ	TB2		RX	
Image: Decision of the second secon			TB4	485-	TB5	SG	TB4	405	тх	TB3
0       TB8       02       TB9       03       TB8       P01       P01       TB7         11       TB23       TB24       TB10       04       TB11       05       TB12       P06       P07       TB13         TB12       06       TB13       07       TB14       08       TB15       09       TB14       P06       P07       TB13         TB14       08       TB15       09       TB17       08       P08       P01       FB17       TB18       P00       P00       FB17       TB18       P00       P00       FB17       TB18       P00       P00       FB17       TB18       P00       P00       FB17       TB18       P00       FB10       P00       FB17       FB20       P00       FB17       FB20       P00       FB17       TB18       P00       FB10       P00       FB10       P00       FB17       FB20       P00       FB21       P00       FB21       P00       FB21       FB20       FB20       FB20       FB20       FB21       FB20       FB21			TB6	00			TR6		SG	TB5
Image: Construction         Internal circuit         Image: Construction         Image: Construline to the tot tot tot tot tot tot tot tot tot to		Photo-coupler	TB8	02		•		P00	P01	TB7
2       Image: Boot of the second secon			TB10	04	TB9	03			P03	тв9
TB22       TB13       07       TB13       07       TB13       07       TB13         TB14       08       TB15       09       TB15       09       TB15       09       TB15         TB16       0A       TB17       0B       TB16       0A       TB17       0B       P06       P07       TB15         TB20       0E       TB19       0D       TB20       P06       P07       TB17       P08       P08       P01       TB17       P08       P08       P01       TB17       TB19       P00       TB17       TB19       P00       TB17       TB19       P01       TB12       P01       TB12       P01       TB12       P01       TB12       P01       TB17       TB19       TB20       P01       TB12       P01       TB17       TB20       P11       TB23       TB21       P11       TB23       TB23       TB24       P12       P13       TB2				-	TB11	05		P04	P05	TB11
COM       TB15       09       102       P08       P09       TB15         DC24V       Terminal block no.       TB16       0A       TB17       0B       TB17       0B       TB17       P08       P09       TB17         TB20       0E       TB19       0D       TB21       0F       TB22       P00       P01       TB23         TB22       10       TB23       11       TB24       12       TB25       13       TB24       P12       P13       TB25         TB26       14       TB27       15       TB24       P12       P13       TB27       TB26       P14       P15       TB27       TB27       TB28       16       TB29       17       TB28       P16       P17       TB29       P18					TB13	07		P06	P07	TB13
IB16       UA       TB17       OB       TB17       OB         DC24V       Terminal block no.       TB18       OC       TB19       OD       TB17         TB20       OE       TB21       OF       TB21       OF       TB22       POE       POE       POF       TB21         TB22       10       TB22       10       TB23       11       TB24       12       P10       P11       TB23         TB26       14       TB25       13       TB24       12       P13       TB27       P14       P15       P12       P13       TB27         TB28       16       TB29       17       TB28       P16       P17       TB29       P14       P15       P17       TB29         TB30       18       TB31       19       TB32       1A       TB33       1B       P14       P15       P17       TB33         TB36       1E       TB37       1F       TB37       TB37       TB37       TB38       P10       P11       TB37       TB37       TB39       P14       P15       P11       TB37       P14       P15       P15       P15       P15       P15       P14       P15       P15<					TB15	09	TB14	P08		TB15
Terminal block no.       IB18       OC       TB19       OD       TB18       POC       POD       TB19         TB20       OE       TB21       OF       TB21       OF       TB22       POE       POE       POF       TB23       11       TB24       P11       TB23       TB24       P12       P11       TB23       TB24       P12       P11       TB23       TB24       P12       P13       TB25       TB26       TB26       TB26       TB26       P14       P15       TB27       TB26       P14       P15       TB27       TB26       P14       P15       TB27       TB26       P14       P15       TB27       TB28       P16       P17       TB28       P16       P17       TB28       P16       P17       TB28       P18       P14       P15       P16 <t< td=""><td>DC24V</td><td></td><td></td><td>-</td><td>TB17</td><td>0B</td><td>TB16</td><td>POA</td><td></td><td>TB17</td></t<>	DC24V			-	TB17	0B	TB16	POA		TB17
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	I——Terminal block n	0.	TB18	0C	TB19	0D	TB18	POC		TB19
TB22       10       TB23       11       TB23       11       TB23       11       TB23       11       TB24       12       TB24       12       TB25       13       TB26       14       TB26       14       TB26       14       TB27       T5       TB28       16       TB29       17       TB28       16       TB29       17       TB29       TB29       TB29       TB20       18       P10       P11       TB29       TB27       TB28       TB26       P14       P15       TB29       TB29       TB20       17       TB29       TB29       TB20       18       P10       P11       TB29       TB29       TB30       18       TB30       18       TB30       P18       P10       TB31       TB29       TB30       P18       P10       TB33       TB33       P18       P18       TB33       TB34       P1C       P10       TB33       TB34       P1C       P10       TB37       TB34       P11       TB37       TB34       P11       TB39       P21       TB39       P21       TB39       P21       TB39       P21       TB39       P21       P21       P21       P21       P21       P21       P21       P21       P21 <td></td> <td></td> <td>TB20</td> <td>0E</td> <td></td> <td>-</td> <td>TB20</td> <td>POE</td> <td></td> <td></td>			TB20	0E		-	TB20	POE		
TB24       12       TB25       13       TB24       12       P11         TB26       14       TB25       13       TB26       P12       P13       TB25         TB26       14       TB27       15       TB28       P16       P17       TB29         TB30       18       TB31       19       TB32       P18       P19       TB31         TB34       1C       TB35       1D       TB36       P16       P17       TB33         TB36       1E       TB33       1B       TB32       P1A       P1B       TB33         TB36       1E       TB37       1F       TB37       TB37       TB38       P10       TB37         TB38       20       TB39       21       TB40       P22       TB41			TB22	10		-	TB22	P10	POF	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			TB24	12			TB24	P12		
TB28       16       TB29       17       TB28       p15         TB30       18       TB29       17       TB30       p18       p17       TB30         TB32       1A       TB33       19       TB32       p1A       p18       p19       TB33         TB34       1C       TB35       1D       TB34       p1C       p18       p16       p17       TB33         TB36       1E       TB35       1D       TB36       p1E       p16       p17       TB37         TB38       20       TB39       21       TB40       p22       TB41			TB26	14			TB26	P14		
TB30       18       TB29       17       TB30       P17         TB30       18       TB31       19       TB32       P18       P19       TB33         TB32       1A       TB33       1B       TB33       1B       TB33       P18       P18       P19       TB33         TB34       1C       TB35       1D       TB35       P16       P16       TB35         TB36       1E       TB37       1F       TB38       P20       P21       TB39         TB40       22       TB39       21       TB40       P22       TB41			TB28	16			TB28	P16		
TB32       TB31       19       TB32       P19       P19       P19       P19         TB32       1A       TB33       1B       TB33       1B       P1A       P1B       TB33         TB34       1C       TB35       1D       TB35       P1C       P1B       TB35         TB36       1E       TB37       1F       TB38       P1C       P1F       TB37         TB38       20       TB39       21       TB40       P22       TB41			TB30	18	TB29	17	TB30	P18	<u> </u>	
TB34     1C     TB33     1B     TB34     P1C     P1D       TB36     1E     TB37     1F     TB37     P1E     P1E     TB37       TB38     20     TB39     21     TB40     P22     TB41					TB31	19	TB32	P1A		
TB36     1E     TB35     1D     TB36     P1D       TB38     20     TB39     21     TB39     P21     TB39					TB33	1B	TB34	P1C	P1B	
TB37     1F     TB37     1F       TB38     20     TB39     21     TB39       TB40     22     TB39     21     TB40					TB35	1D	TB36	P1E	P1D	
IB38         20         Fille         P21         TB39           TD40         22         TB39         21         TB40         P22         TB41					TB37	1F	TB38	P20	P1F	
					TB39	21	TB40		P21	
TB41 23 TB42 COM			TB40	22	TB41	23	TB42		P23	1841
TB42 COM									lacksquare	

# 7.3 Main Unit Digital Output Specification

# 7.3.1 XBC-DR10E 4 point relay output

	Model			Main un	nit						
Specificat	tion		>	(BC-DR1	0E						
Output point		4 point									
Insulation m	nethod	Relay insulation									
Rated load voltage/curr	ent	DC24V 2A (resistive loa	ad) / AC2	220V 2A	(COSΦ	9 = 1), 5 <i>i</i>	A/COM				
Min. load vo											
Max. load vo	oltage	AC250V, DC125V									
Off leakage	current	0.1 mA (AC220V, 60 Hz)									
Max. On/Off	f frequency	3,600 times / hour									
Surge absor	rber	None									
	Mechanical	20 million times or more	;								
		Rated load voltage / Cu	rrent 10	0,000 tin	nes or n	nore					
Service life		AC200V / 1.5A, AC240	V / 1A (C	$\cos\Phi = 0$	0.7) 100	0,000 tin	nes or more				
iiie	Electrical	AC200V / 1A, AC240V /	/ 0.5A (C	$\cos\Phi = 0$	0.35) 10	00,000 t	imes or more				
		DC24V / 1A, DC100V /	0.1A (L	/ R = 7 m	s) 100,(	000 time	es or more				
Response	$\text{Off} \to \text{On}$	10 ms or less									
time	$\text{On} \rightarrow \text{Off}$	12 ms or less									
Common m	ethod	2 point / COM									
Proper cable	e size	Stranded cable 0.3~0.7	Stranded cable 0.3~0.75 mm <sup>*</sup> (External diameter 2.8 mm or less)								
Operation in	ndicator	LED On when Output On									
External method	connection	14 point terminal block	connecto	or (M3 X	6 screv	v)					
Weight		330g									
	Circuit conf	iguration	No.	Contact	No.	Contact	Туре				
		TB5	TB2	PE	TB1	AC100 ~240V	TB2 PE AC100 0.000				
			TB4	COM0	TB3		<sup>~240V</sup> TB3				
nterna			TB6	COM1	TB5	40	TB6 COM1 P40 TB7				
Internal circuit			TB8	COM2	TB7	41	TB8 COM2 P41 TB9 TB9				
			TB10	43	TB9	42	TB10 P43 TB11				
		COM2 TB3	TB12	NC	TB11	NC	TB12 NC 24V TB13				
		Terminal no.	TB14	24G	TB13	24V	24G				

# 7.3.2 XBC-DR14E 6 point relay output

	Model			Main ur	nit					
Specifica	tion		X	(BC-DR1	14E					
Output poin		6 point								
Insulation m	nethod	Relay insulation								
Rated load voltage/curr	ent	DC24V 2A (resistive loa	DC24V 2A (resistive load) / AC220V 2A (COS $\Phi$ = 1), 5A/COM							
Min. load vo	oltage/current	DC5V / 1 mA	DC5V / 1 mA							
Max. load v	oltage	AC250V, DC125V								
Off leakage	current	0.1 mA (AC220V, 60 Hz)								
Max. On/Of	f frequency	3,600 times / hour								
Surge abso	rber	None								
	Mechanical	20 million times or more	)							
0		Rated load voltage / Cu	rrent 10	0,000 tin	nes or n	nore				
Service life	Electrical	AC200V / 1.5A, AC240	V / 1A (C	$\cos\Phi =$	0.7) 10	0,000 tin	nes o	r mor	е	
	Liectrical	AC200V / 1A, AC240V /	/ 0.5A (C	$\cos\Phi =$	0.35) 10	00,000 t	imes	or mo	ore	
		DC24V / 1A, DC100V /	0.1A (L	/ R = 7 m	s) 100,0	000 time	es or r	nore		
Response	$Off\toOn$	10 ms or less								
time	$\text{On} \to \text{Off}$	12 ms or less								
Common m	ethod	4 point / COM								
Proper cabl	e size	Stranded cable 0.3~0.7	5 mm² (E>	kternal di	ameter	2.8 mm (	or les	s)		
Operation in		LED On when Output O	n							
External method	connection	14 point terminal block	connecto	or (M3 X	6 screv	v)				
Weight		340g								
	Circuit cont	figuration	No.	Contact	No.	Contact		Ту	ре	
<b>T</b>		TB5	TB2	PE	TB1	AC100 ~240V	TB2		AC100	TB1
		COM0 TB4	TB4	COM0	TB3		TB4	PE COM0	~240V	
Internal circuit			TB6	COM1	TB5	40	тв6	COM1	P40	TB5 TB7
circui			TB8	COM2	TB7	41		COM2	P41 P42	TB9
		Т <u>В9</u> тв12 <b>2</b>	TB10	43	TB9	42 NC	TB10 TB12	P43	P44	TB11
			TB12	NC	TB11		TB14	P45	24V	TB13
L		Terminal no.	TB14	24G	TB13	24V				

# 7.3.3 XBC-DR20E 8 point relay output

	Model	Main unit								
Specificatio	n		XI	BC-DR2	0E					
Output poin		8 point								
Insulation m		Relay insulation								
Rated load voltage/curr	ent	DC24V 2A (resistive lo	ad) / AC	220V 2	A (COS	SΦ = 1)	, 5A/COM			
	oltage/current	DC5V / 1 mA								
Max. load v	<u> </u>	AC250V, DC125V								
Off leakage		0.1 mA (AC220V, 60 Hz	)							
Max. On/Of		3,600 times / hour	/							
Surge abso		None								
g=	Mechanical	20 million times or mor	e							
		Rated load voltage / C		00,000 t	imes o	r more				
Service		AC200V / 1.5A, AC240		-			) times or more			
life	Electrical	AC200V / 1A, AC240V								
		DC24V / 1A, DC100V /								
Response	$Off \rightarrow On$	10ms or less			/	-,				
time	$On \rightarrow Off$	12ms or less								
Common m		4 point / COM (COM0-	-COM8)	. 8 poin	t / COM	1 (COM	4~COM5)			
Proper cabl		Stranded cable 0.3~0.7								
Operation in		LED On when Output (				0. 2.0	0.1000)			
External	connection					,				
method		24 point terminal block	connec	tor (M3	X 6 scr	ew)				
Weight		450g								
	Circuit cont	figuration	No.	Contact	No.	Contact				
¢		TB5			TB1	AC100	тв1			
			TB2	PE	ТВЗ	~240V	TB2 PE AC100 ~240V TB3			
		COM0 TB4	TB4	COM0 COM1	TB5	40	TB6 COM1 TB5			
	<b>▲</b> ∰ <b>3</b>		TB6	COMI	TB7	41	TB8 COM2 P41 TB7			
Int		COM1 TB6	TB8	COM2	ТВ9	42	TB10 P43 TB11			
Internal circuit	 		TB10	43	TB11	NC	TB12 COM3 P44 TB13			
bircu	¥ ¶ي ا	<sub>тв10</sub> 2	TB12	COM3	TB13	44	TB14 P45 TB15			
T T		COM2 TB8	TB14	45	TB15	46	TB16 P47 TB17			
		TB13	TB16	47			NC TB19			
		<u>⊤B16</u> ≷	TB18	NC	TB17	NC	TB20 NC TB21			
	I	COM3 TB12	TB20	NC	TB19	NC	TB24 24V TB23			
		Terminal No.	TB22	NC	TB21 TB23	NC 24V				
			TB24	24G	1020	2 T V				

# 7.3.4 XBC-DR30E 12 point relay output

	Model			Main un	it		
Specificati	on		Х	BC-DR3	80E		
Output poin		12 point					
Insulation m		Relay insulation					
Rated load voltage/curr		DC24V 2A (resistive lo	oad) / AC	220V 2	A (COS	SΦ = 1)	, 5A/COM
	oltage/current	DC5V / 1 mA					
Max. load voltage AC250V, DC125V							
Off leakage	-	0.1 mA (AC220V, 60 Hz	Z)				
Max. On/Of		3,600 times / hour	/				
Surge abso		None					
Ŭ	Mechanical	20 million times or mo	re				
		Rated load voltage / C	urrent 1	00,000 t	times o	r more	
Service	<b>-</b> 1 ( ) 1	AC200V / 1.5A, AC24					times or more
life	Electrical	AC200V / 1A, AC240V		•			
		DC24V / 1A, DC100V		•			
Response	$Off \rightarrow On$	10 ms or less			,	,	
time	$On \rightarrow Off$	12 ms or less					
Common m	ethod	4 point / COM (COM0	~COM8)	), 8 poin	t / CON	I (COM	4~COM5)
Proper cabl	e size	Stranded cable 0.3~0.	75 mm² (E	External	diamet	er 2.8 m	m or less)
Operation in	ndicator	LED On when Output	On				,
External	connection	•		or (N/2 V	( 6 aara	)	
method		2 point terminal block	connect		t o scre	:•••)	
Weight		465g					
	Circuit cont	iguration	No.	Contact	No.	Contact	Туре
					TB1	AC100	ТВ1
T P	<b>ŧ</b> Ċp ŧĿ		TB2	PE	ТВЗ	~240V	TB2 PE AC100 ~240V TB3
	<u> </u>		TB4	COM0			
			TB6	COM1	TB5	40	P40 TB5
		COM1 TB6	TB8	COM2	TB7	41	TB8 COM1 P41 TB7
Internal Circ					ТВ9	42	TB10 P43 TB9
lal (	t !!	<u>TB10</u> ₹	TB10	43	TB11	NC	TB12 NC TB11
Circu	<u>    (</u>	COM2 TB8 TB13	TB12	COM3		_	TB14 P44 TB13
uit		TB16 2	TB14	45	TB13	44	P45 P46 TB15
		COM3 TB12	TB16	47	TB15	46	TB18 NC TB17
	 ∗ ;ı		TB18	COM4	TB17	NC	TB20 P49 TB19
		0M4 TB18 ↔			TB19	48	7B22 P4A TB21
	<u> </u>	Terminal No.	TB20	49	TB21	4A	7824 24V TB23
			TB22	4B	TB23	24V	24G
			TB24	24G	. 520		
h			1				

Model Main unit										
Specification XBC-DN10E										
Output point 4 point										
Insulation m	nethod	Photo coupler insulation	า							
Rated load	voltage	DC 12 / 24V								
Operation range	load voltage	DC 10.2 ~ 26.4V								
Max. load c	urrent	0.5A / 1 point, 2A / 1CC	M							
Off leakage	current	0.1 mA or less								
Max. inrush		4A / 10 ms or less								
Max. voltag On	ge drop when	DC 0.4V or less								
Surge abso	rber	Zener diode								
Response	$Off\toOn$	1 ms or less								
time	$\text{On} \to \text{Off}$	$\rightarrow$ Off 1 ms or less (rated load, resistive load)								
Common m	ethod	4 point / COM								
Proper wire	size	Stranded wire 0.3~0.75 mm <sup>2</sup> (external diameter 2.8 mm or less)								
External	Voltage		DC12/24V ± 10% (Ripple voltage 4 Vp-p or less)							
power	Current	25 <sup>mA</sup> or less (When connecting DC24V)								
Operation in		LED On when Output On								
External connection 14 point terminal block connector(M3 X 6 screw)										
Weight 313g										
	Circuit cont	figuration	No.	Contact	No.	Contact		<u></u>	уре	1
			TB2	PE	TB1	AC100 ~240V	TB2	lacksquare	AC100	TB1
- Inte	्रिही र		TB4	Р	TB3		TB4	PE	~240V	
ernal		TB09., DC12/24V.,	TB6	COMO	TB5	40	TB6		P40	TB5
Internal Circui	╶╾┑┤ᢁ᠆╚				TB7	41	TB8	СОМО	P41	TB7
, i i i i i i i i i i i i i i i i i i i	_⊈ĘĮ _́	TB08	TB8	COM1	TB9	42	TB10		P42	TB9
		тв4.,	TB10 TB12	43 NC	TB11	NC	TB12	NC	NC 24V	TB11 TB13
		Terminal No.	TB12	NC 24G	TB13	24V	TB14	24G		
			1014	240						]

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### 7.3.5 XBC-DN10E 4 point transistor output (Sink type)

### 7.3.6 XBC-DN14E 6 point transistor output (Sink type)

TB2     PE     TB3     TB2     PE       TB2     PE     TB3     ~240V     TB2     PE       TB4     P     TB5     40     TB4     P       TB05,     TB09,     TB6     COM0     TB5     40     TB6       TB6     COM0     TB7     TB6     COM0     TB7     TB6	Model Main unit										
Output point6 pointInsulation methodPhoto coupler insulationRated load voltageDC 12 / 24VOperationload voltageDC 10.2 ~ 26.4VMax. load current0.5A / 1 point, 2A / 1COMOff leakage current0.1 mA or lessMax. inrush current4A / 10 ms or lessMax. voltage drop when OnDC 0.4V or lessSurge absorberZener diodeResponseOff $\rightarrow$ On1 ms or lessIms or lessMax. voltage drop when On $\rightarrow$ Off1 ms or less (rated load, resistive load)Common method4 point / COMProper wire sizeStranded wire 0.3~0.75 mm (external diameter 2.8 mm or less)External powerVoltage CurrentVoltageDC12/24V ± 10% (Ripple voltage 4 Vp-p or less)powerCurrent25 mA or less (When connecting DC24V)Operation indicatorLED On when Output OnExternal method14 point terminal block connector(M3 X 6 screw)Weight315gTB2PETB1 TB3AC100 regionTB2PETB1 regionAC100 regionTB2PETB1 regionAC100 regionTB2PETB2PETB1 regionAC100 regionTB2PETB1 regionAC100 regionTB2PETB1 regionAC100 regionTB2PETB3 </td <td colspan="6">Specification XBC-DN14E</td> <td></td>	Specification XBC-DN14E										
Rated load voltage rangeDC 12 / 24VOperation rangeDC 10.2 ~ 26.4VMax. load current0.5A / 1 point, 2A / 1COMOff leakage current0.1 mA or lessMax. inrush current4A / 10 ms or lessMax. voltage drop when On OnDC 0.4V or lessSurge absorberZener diodeResponse timeOff $\rightarrow$ On On $\rightarrow$ OffOn $\rightarrow$ Off1 ms or lessVoltageDC12/24V to COMProper wire sizeStranded wire 0.3~0.75 mf (external diameter 2.8 mm or less)External powerVoltage CurrentDC12/24V $\pm$ 10% (Ripple voltage 4 Vp-p or less) powerOperation indicatorLED On when Output OnExternal method14 point terminal block connector(M3 X 6 screw)Weight315gTB2 PETB1 TB1 AC100 TB3Circuit configurationNo. ContactContact TB07.TB2 TB1Circuit configurationNo. ContactContact TB07.TB2 PETB1 TB1 AC100 TB2Circuit configurationNo. ContactContact TB07.TB2 TB1Circuit configurationNo. ContactContact TB07.TB2 PETB1 TB1 Circuit configurationNo. ContactType											
Operationloadvoltage rangeDC 10.2 ~ 26.4VMax. load current0.5A / 1 point, 2A / 1COMOff leakage current0.1 mA or lessMax. inrush current4A / 10 ms or lessMax. voltage drop when OnDC 0.4V or lessSurge absorberZener diodeResponseOff $\rightarrow$ On1 ms or less(rated load, resistive load)Common method4 point / COMProper wire sizeStranded wire 0.3~0.75 mm² (external diameter 2.8 mm or less)External powerVoltageDC12/24V $\pm$ 10% (Ripple voltage 4 Vp-p or less) powerCurrent25 mA or less (When connecting DC24V)Operation indicatorLED On when Output OnExternal method14 point terminal block connector(M3 X 6 screw)Weight315gTB2PETB1 TB3AC100 -240VTB2PETB1 TB3AC100 -240VPE PE -240VCircuit configurationNo.ContactTB2PETB1 TB3AC100 -240VPE PE -240VCircuit configurationNo.ContactTB2PE TB3Circuit configurationNo.ContactTB2PE TB3Circuit configurationNo.ContactTB2PE TB3Circuit configurationNo.ContactTB2PE TB	Insulation method	Photo coupler insula									
rangeDC 10.2 ~ 26.4VMax. load current0.5A / 1 point, 2A / 1COMOff leakage current0.1 mA or lessMax. inrush current4A / 10 ms or lessMax. voltage drop when OnDC 0.4V or lessSurge absorberZener diodeResponseOff $\rightarrow$ On1 ms or less (rated load, resistive load)Common method4 point / COMProper wire sizeStranded wire 0.3~0.75 mm² (external diameter 2.8 mm or less)External powerVoltageDC 12/24V ± 10% (Ripple voltage 4 Vp-p or less) powerOperation indicatorLED On when Output OnExternal methodconnection 14 point terminal block connector(M3 X 6 screw)Weight315gTB2 PETB1 TB1 AC100 AC100Circuit configurationNo. TB2 PE -240VContactNo. TB2 PE -240V											
Off leakage current0.1 mA or lessMax. inrush current4A / 10 ms or lessMax. voltage drop when OnDC 0.4V or lessSurge absorberZener diodeResponse timeOff $\rightarrow$ On On $\rightarrow$ Off1 ms or lessOn $\rightarrow$ Off1 ms or less (rated load, resistive load)Common method4 point / COMProper wire sizeStranded wire $0.3 - 0.75$ mm² (external diameter 2.8 mm or less)External powerVoltage CurrentDC12/24V $\pm$ 10% (Ripple voltage 4 Vp-p or less)powerCurrent Current25 mA or less (When connecting DC24V)Operation indicatorLED On when Output OnExternal methodconnection 14 point terminal block connector(M3 X 6 screw)Weight315gTB05. TB2TB2PETB1 rB07.TB1 rB2TB2PETB1 rB3AC100 r240VTB2PETB1 rB3Circuit configurationNo.ContactTB2TB2PETB1 rB3Circuit configuration	•	DC 10.2 ~ 26.4V									
Max. inrush current $4A / 10 \text{ ms}$ or lessMax. inrush current $4A / 10 \text{ ms}$ or lessMax. voltage drop when OnDC 0.4V or lessSurge absorberZener diodeResponse timeOff $\rightarrow$ On On $\rightarrow$ Off1 ms or less timeOn $\rightarrow$ Off1 ms or less (rated load, resistive load)Common method4 point / COMProper wire sizeStranded wire 0.3~0.75 mm² (external diameter 2.8 mm or less)External powerVoltage CurrentDC12/24V $\pm$ 10% (Ripple voltage 4 Vp-p or less) powerOperation indicatorLED On when Output OnExternal methodConnection 14 point terminal block connector(M3 X 6 screw)Weight315gTB2 PE TB3TB1 TB1 AC100 C240VTB2 PE TB1TB1 AC100 C240V	Max. load current	0.5A / 1 point, 2A / 1	СОМ								
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Off leakage current	0.1 mA or less									
OnDC 0.4V of ressSurge absorberZener diodeResponse timeOff $\rightarrow$ On 0 $\rightarrow$ Off1 ms or lessOn $\rightarrow$ Off1 ms or less (rated load, resistive load)Common method4 point / COMProper wire sizeStranded wire 0.3~0.75 mm² (external diameter 2.8 mm or less)External powerVoltage CurrentDC12/24V $\pm$ 10% (Ripple voltage 4 Vp-p or less) powerOperation indicatorLED On when Connecting DC24V)Operation indicatorLED On when Output OnExternal methodconnection 14 point terminal block connector(M3 X 6 screw)Weight315gTB05. TB2TB2PETB1 AC100 -240VTB2TB2PEAC100 -240VTB2PEAC100 -240VTB2PEAC100 -240VTB2PETB1 -240VTB2PEAC100 -240VTB2PEAC100 -240VTB2PEAC100 -240VTB2PEAC100 -240VTB2PEAC100 -240VTB2PEAC100 -240VTB2PEAC100 -240VTB2PEAC100 -240VTB2PEAC100 -240VTB2PEAC100 -240VTB2PEAC100 -240VTB3AC100 -240VTB3TB3 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>											
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ItimeOn $\rightarrow$ Off1 ms or less (rated load, resistive load)Common method4 point / COMProper wire sizeStranded wire 0.3~0.75 mm² (external diameter 2.8 mm or less)ExternalVoltageDC12/24V ± 10% (Ripple voltage 4 Vp-p or less)powerCurrent25 mA or less (When connecting DC24V)Operation indicatorLED On when Output OnExternalconnectionnethod14 point terminal block connector(M3 X 6 screw)Weight315gTB1AC100TB2PETB1AC100-240VTB2PETB3-240VTB2PEAC100-240VTB2PEAC100-240VTB2PEAC100-240VTB2PEAC100-240VTB2PEAC100-240VTB2PEAC100-240VTB2PEAC100-240VTB2PEAC100-240VTB2PEAC100-240VTB2PEAC100-240VTB2TB2PEAC100Categories-240VTB2TB2TB2TB2TB3-240V	Surge absorber	Zener diode									
Common method       4 point / COM         Proper wire size       Stranded wire 0.3~0.75 mm² (external diameter 2.8 mm or less)         External voltage       DC12/24V ± 10% (Ripple voltage 4 Vp-p or less)         power       Current         25 mA or less (When connecting DC24V)         Operation indicator       LED On when Output On         External connection method       14 point terminal block connector(M3 X 6 screw)         Weight       315g         TB05.         TB2       PE         TB1       AC100         PE       AC100	Response $Off \rightarrow On$	1 ms or less									
Proper wire size       Stranded wire 0.3~0.75 mm² (external diameter 2.8 mm or less)         External voltage       DC12/24V ± 10% (Ripple voltage 4 Vp-p or less)         power       Current       25 mA or less (When connecting DC24V)         Operation indicator       LED On when Output On         External connection method       14 point terminal block connector(M3 X 6 screw)         Weight       315g         TB05.         TB2       PE         TB1       AC100         PE       AC100	time $On \rightarrow Off$	time $On \rightarrow Off$ 1 ms or less (rated load, resistive load)									
External power       Voltage       DC12/24V ± 10% (Ripple voltage 4 Vp-p or less)         power       Current       25 mA or less (When connecting DC24V)         Operation indicator       LED On when Output On         External method       connection         14 point terminal block connector(M3 X 6 screw)         Weight       315g         Circuit configuration       No.         Contact       Type         TB2       TB1         AC100       740V         TB2       TB3	Common method	4 point / COM									
power     Current     25 mA or less (When connecting DC24V)       Operation indicator     LED On when Output On       External connection method     14 point terminal block connector(M3 X 6 screw)       Weight     315g       TB05.       TB2     PE       TB1     AC100       Circuit configuration     TB2       TB2     PE       TB3     Circuit TB2	Proper wire size	Stranded wire 0.3~0.75 mm <sup>2</sup> (external diameter 2.8 mm or less)									
Operation indicator       LED On when Output On         External connection method       14 point terminal block connector(M3 X 6 screw)         Weight       315g         Circuit configuration       No.         Contact       Type         TB05.       TB1         AC100       TB2         PE       TB3         Circuit configuration       TB2         TB2       TB1         AC100       TB2         PE       TB3	U										
External method       connection       14 point terminal block connector(M3 X 6 screw)         Weight       315g         Circuit configuration       No.       Contact       No.       Contact       Type         DC5V.1       TB05.1       TB2       PE       TB1       AC100       AC100       TB2       PE       AC100       TB2       PE       AC100       TB2       PE       AC100       AC100       TB2       PE       AC100	•										
method       14 point terminal block connector(IVI3 X 6 screw)       Weight     315g       Circuit configuration     No. Contact     Type       TB1     AC100       TB2     PE     TB1       TB1     AC100       TB2     PE     TB1       Contact     Type       TB2     PE     TB1       TB2     PE     TB2       PE     TB3	· ·	LED On when Output On									
Circuit configuration     No.     Contact     No.     Contact     Type       DC5V.1     TB05.1     TB2     TB1     AC100     TB2     PE     TB3     ~240V     TB2     PE     ~240V     TE     ~240V		<sup>1</sup> 14 point terminal blo	14 point terminal block connector(M3 X 6 screw)								
TB05     TB1     AC100       TB2     TB3     TB2       TB3     TB2											
	Circuit	figuration	No.	Contact	No.	Contact		Туре			
			TB2	PE	TB1		TR2		AC100	TB1	
			TB4	Р	TB3	~2400				твз	
		TB09., DC12/24V.,	TB6	СОМО	TB5	40	TB6		P40	TB5	
			TB8	COM1	TB7	41	TB8		P41	TB7	
TB10 43 TB10 P42 TB10 P43 TB10					TB9	42	TB10	P43		TB9 TB11	
ТВ11 44 тв12 р45					TB11	44	TB12	P45		TB13	
Terminal No.     TB13     24V     TB14     24G			TB14	24G	TB13	24V	TB14	24G			

# 7.3.7 XBC-DN20E 8 point transistor output (Sink type)

Model Main unit										
Specification		XBC-DN20E								
Output point	8 point									
Insulation meth	nod	Photo coupler insulat	on							
Rated load volt	tage	DC 12 / 24V								
Operation load	voltage range	DC 10.2 ~ 26.4V								
Max. load curre	ent	0.5A / 1 point, 2A / 10	COM							
Off leakage cu	rrent	0.1 <sup>mA</sup> or less								
Max. inrush cu	rrent	4A / 10 $^{\mbox{ms}}$ or less								
Max. voltage d	rop when On	DC 0.4V or less								
Surge absorbe	r	Zener diode								
Response	$\text{Off} \to \text{On}$	1 ms or less								
time	$\text{On} \to \text{Off}$	1 $ms$ or less (rated load	ad, resis	stive loa	d)					
Common meth	od	4 point / COM								
Proper wire siz	e	Stranded wire 0.3~0.7	75 <sup>mm²</sup> (e	external	diamet	er 2.8 "	™ or less)			
External	Voltage	DC12/24V $\pm$ 10% (Ripple voltage 4 Vp-p or less)								
power	Current	25 mA or less (When connecting DC24V)								
Operation indic	cator	LED On when Output On								
External conne	ection method	24 point terminal block connector(M3 X 6 screw)								
Weight		418g								
	Circuit configu	Iration	No.	Contact	No.	Contact	Туре			
		TB05.,	TB2	PE	TB1	AC100	ТВ1			
DC5V.			TD 4	0	TB3	~240V	TB2 PE AC100 ~240V TB3			
			TB4	Р	TB5	40	- TB4 P TB5			
	FL –		TB6	COMO	TB7	41	ТВ6 СОМ0 Р41 ТВ7			
nal Circuit	5	TB09., DC12/24V.,	TB8	COM1		41	TB8 COM1 TB9			
	<u>_</u> _+œ⊣Ę∳		TB 10	43	TB9	42	TB10 P43 TB11			
	FS  <u>~</u>				TB11	NC	TB12 COM2 TB13			
	4	DC12/24V., TB13.,	TB12	COM2	TB13	44	TB14 P45 TB15			
			TB14	45			TB16 P47 TB17			
	╞┲╢╴╵		TB 16	47	TB15	46	TB18 NC TB19			
	$ \vdash 1 $				TB17	NC	TB20 NC TB21			
		DC12/24V.	TB18	NC	TB19	NC	TB22 NC TP22			
		ŤB4.,	TB20	NC			TB24 24G 24V			
·		Terminal No.	TB22	NC	TB21	NC				
					TB23	24V				
			TB24	24G						

### 7.3.8 XBC-DN30E 12 point transistor output (Sink type)

$\begin{tabular}{ c c c c c } \hline Specification & XBC-DN30E \\ \hline Output point & 12 point \\ \hline Insulation method & Photo coupler insulation \\ \hline Rated load voltage & DC 12 / 24V \\ \hline Operation load voltage range & DC 10.2 ~ 26.4V \\ \hline Max. load current & 0.5A / 1 point, 2A / 1COM \\ \hline Off leakage current & 0.1 mA or less \\ \hline Max. inrush current & 4A / 10 ms or less \\ \hline Max. voltage drop when On & DC 0.4V or less \\ \hline Surge absorber & Zener diode \\ \hline Response & Off \rightarrow On & 1 ms or less (rated load, resistive load) \\ \hline Common method & 4 point / COM \\ \hline Proper wire size & Stranded wire 0.3~0.75 mm (external diameter 2.8 mm or less) \\ \hline External & Voltage & DC12/24V \pm 10% (Ripple voltage 4 Vp-p or less) \\ \hline \end{tabular}$									
$\begin{array}{ c c c c c } \hline Output \mbox{ point } & 12 \mbox{ point } \\ \hline 1 \mbox{ lnsulation method } & Photo \mbox{ coupler insulation } \\ \hline Rated \mbox{ load voltage } & DC \mbox{ 12 / 24V } \\ \hline Operation \mbox{ load voltage range } & DC \mbox{ 10.2 } \sim 26.4V \\ \hline Max. \mbox{ load current } & 0.5A / 1 \mbox{ point, 2A / 1COM } \\ \hline Off \mbox{ leakage current } & 0.1 \mbox{ mA or less } \\ \hline Max. \mbox{ inrush current } & 4A / 10 \mbox{ ms or less } \\ \hline Max. \mbox{ voltage drop when On } & DC \mbox{ 0.4V or less } \\ \hline Max. \mbox{ voltage drop when On } & DC \mbox{ 0.4V or less } \\ \hline Surge \mbox{ absorber } & Zener \mbox{ diode } \\ \hline Response & \mbox{ off } \rightarrow \mbox{ On } & 1 \mbox{ ms or less } (rated \mbox{ load, resistive load) } \\ \hline Common \mbox{ method } & 4 \mbox{ point / COM } \\ \hline Proper \mbox{ wire size } & Stranded \mbox{ wire } 0.3 \sim 0.75 \mbox{ mm}^{\circ} (external \mbox{ diameter } 2.8 \mbox{ mm or less } ) \\ \hline External & Voltage & DC12/24V \pm 10\% (Ripple \mbox{ voltage 4 Vp-p or less } ) \\ \hline \end{array}$									
Rated load voltageDC 12 / 24VOperation load voltage rangeDC 10.2 ~ 26.4VMax. load current0.5A / 1 point, 2A / 1COMOff leakage current0.1 mA or lessMax. inrush current4A / 10 ms or lessMax. voltage drop when OnDC 0.4V or lessSurge absorberZener diodeResponse timeOff $\rightarrow$ On1 ms or less (rated load, resistive load)Common method4 point / COMProper wire sizeStranded wire 0.3~0.75 mm² (external diameter 2.8 mm or less)ExternalVoltageDC12/24V ± 10% (Ripple voltage 4 Vp-p or less)									
Operation load voltage rangeDC 10.2 ~ 26.4VMax. load current $0.5A / 1 \text{ point, } 2A / 1COM$ Off leakage current $0.1 \text{ mA or less}$ Max. inrush current $4A / 10 \text{ ms or less}$ Max. voltage drop when OnDC 0.4V or lessSurge absorberZener diodeResponse timeOff $\rightarrow$ On $1 \text{ ms or less}$ (rated load, resistive load)Common method4 point / COMProper wire sizeStranded wire $0.3 \sim 0.75 \text{ mm}^2$ (external diameter 2.8 mm or less)ExternalVoltageDC12/24V ± 10% (Ripple voltage 4 Vp-p or less)									
Max. load current0.5A / 1 point, 2A / 1COMOff leakage current0.1 mA or lessMax. inrush current4A / 10 ms or lessMax. voltage drop when OnDC 0.4V or lessSurge absorberZener diodeResponse timeOff $\rightarrow$ On1 ms or less (rated load, resistive load)Common method4 point / COMProper wire sizeStranded wire 0.3~0.75 mm² (external diameter 2.8 mm or less)ExternalVoltageDC12/24V ± 10% (Ripple voltage 4 Vp-p or less)									
Off leakage current $0.1 \text{ mA}$ or lessMax. inrush current $4A / 10 \text{ ms}$ or lessMax. voltage drop when OnDC 0.4V or lessSurge absorberZener diodeResponse timeOff $\rightarrow$ On1 ms or lessOn $\rightarrow$ Off1 ms or less (rated load, resistive load)Common method4 point / COMProper wire sizeStranded wire 0.3~0.75 mm² (external diameter 2.8 mm or less)ExternalVoltageDC12/24V ± 10% (Ripple voltage 4 Vp-p or less)									
Max. inrush current $4A / 10 \text{ ms}$ or lessMax. voltage drop when OnDC 0.4V or lessSurge absorberZener diodeResponse timeOff $\rightarrow$ On1 ms or lessOn $\rightarrow$ Off1 ms or less (rated load, resistive load)Common method4 point / COMProper wire sizeStranded wire 0.3~0.75 mm² (external diameter 2.8 mm or less)ExternalVoltageDC12/24V ± 10% (Ripple voltage 4 Vp-p or less)									
$ \begin{array}{ c c c c c } \hline Max. \ voltage \ drop \ when \ On \\ \hline Surge \ absorber \\ \hline Surge \ absorber \\ \hline \ Surge \ absorber \\ \hline \hline Surge \ absorber \\ \hline \ Surge \ absorber \ absorber \ absorber \\ \hline \ absorber \ $									
Surge absorberZener diodeResponse timeOff $\rightarrow$ On1 ms or lessOn $\rightarrow$ Off1 ms or less (rated load, resistive load)Common method4 point / COMProper wire sizeStranded wire 0.3~0.75 mm² (external diameter 2.8 mm or less)ExternalVoltageDC12/24V ± 10% (Ripple voltage 4 Vp-p or less)									
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$									
response timeOn $\rightarrow$ Off1 ms or less (rated load, resistive load)Common method4 point / COMProper wire sizeStranded wire 0.3~0.75 mm² (external diameter 2.8 mm or less)ExternalVoltageDC12/24V ± 10% (Ripple voltage 4 Vp-p or less)									
Common method4 point / COMProper wire sizeStranded wire $0.3 \sim 0.75 \text{ mm}^2$ (external diameter $2.8 \text{ mm}$ or less)ExternalVoltageDC12/24V ± 10% (Ripple voltage 4 Vp-p or less)									
Proper wire size       Stranded wire 0.3~0.75 mm² (external diameter 2.8 mm or less)         External       Voltage       DC12/24V ± 10% (Ripple voltage 4 Vp-p or less)									
External Voltage DC12/24V ± 10% (Ripple voltage 4 Vp-p or less)									
power Current 25 <sup>mA</sup> or less (When connecting DC24V)	25 mA or less (When connecting DC24V)								
Operation indicator LED On when Output On	LED On when Output On								
External connection method 24 point terminal block connector(M3 X 6 screw)	24 point terminal block connector(M3 X 6 screw)								
Weight 423g									
Circuit configuration No. Contact No. Contact Typ									
TB05         TB2         TB1         AC100           C         TB2         PE         TB1         AC100	TB1								
	AC100 ~240V TB3								
	P40 TB5								
	P41 TB7								
	P42 TB9								
	NC TB11								
	P44 TB13								
TB13. TB12 COM2	P46 TB15								
	NC TB17								
	TR19								
TB19. DC12/24V., TB10 47 TB17 NC TB20 P49	P48 TB21								
	F4A								
	74V TB23								
TB18. TB21 4A	24V								
TB4.         Terminal No.         TB23         24V	24V TB23								

### 7.3.9 XBC-DP10E 4 point transistor output (Source type)

Model				Main	unit					
Specificatio		XBC-D	P10E							
Output poin										
Insulation m	nethod	Photo coupler insulat	ion							
Rated load	voltage	DC 12 / 24V								
Operation range	load voltage	DC 10.2 ~ 26.4V								
Max. load c	urrent	0.5A / 1 point, 2A / 10	COM							
Off leakage	current	0.1 <sup>mA</sup> or less								
Max. inrush		4A / 10 $^{\rm ms}$ or less								
Max. voltag On	je drop when	DC 0.4V or less								
Surge abso	rber	Zener diode								
Response	$\text{Off} \to \text{On}$	1 ms or less								
time	$\text{On} \to \text{Off}$	1 ms or less (rated loa	ad, resi	istive loa	ad)					
Common m	ethod	4 point / COM								
Proper wire	size	Stranded wire 0.3~0.75 mm <sup>2</sup> (external diameter 2.8 mm or less)								
External	Voltage	DC12/24V $\pm$ 10% (Ripple voltage 4 Vp-p or less)								
power	Current	25 mA or less (When connecting DC24V)								
Operation in		LED On when Output On								
External method	connection	14 point terminal block connector(M3 X 6 screw)								
Weight		313g								
	Circuit config	guration	No.	Contact	No.	Contact		Ту	ре	
DC5V.	م		TB2	PE	TB1	AC100 ~240V	TB2	lacksquare	AC100	TB1
¶¶	दित् 🕺		TB4	N	TB3		TB4	PE N	~240V	TB3
ernal		TB09., DC12/24V.,	TB6	COMO	TB5	40	TB6		P40	TB5
Internal Circui			TB8	COM0	TB7	41	TB8	COM0 COM1	P41	TB7
	<u>] [</u> ]				TB9	42	TB10		P42	TB9
		DC12/24V.	TB10	43	TB11	NC	TB12	NC	NC	TB11 TB13
		Terminal No.	TB12	NC	TB13	24V	TB14	24G	24V	1013
			TB14	24G					$\odot$	]

7.3.10 XBC-DP14E 6 point transistor	r output (Source type)
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Model Main unit											
Specification				XBC-D	P14E						
•	Output point 6 point										
Insulation m	nethod	Photo coupler insulati	on								
Rated load	voltage	DC 12 / 24V									
Operation load voltage DC 10.2 ~ 26.4V											
Max. load c	urrent	0.5A / 1 point, 2A / 10	COM								
Off leakage	current	0.1 mA or less									
Max. inrush		4A / 10 ms or less									
Max. voltag On	ge drop when	DC 0.4V or less									
Surge abso	rber	Zener diode									
Response	$Off\toOn$	1 ms or less									
time	1 ms or less (rated loa	(rated load, resistive load)									
Common m	ethod	4 point / COM									
Proper wire	size	Stranded wire 0.3~0.75 mm <sup>2</sup> (external diameter 2.8 mm or less)									
External	Voltage	DC12/24V ± 10% (Ripple voltage 4 Vp-p or less)									
power	Current	25 mA or less (When connecting DC24V)									
Operation in		LED On when Output On									
External method	connection	14 point terminal block connector(M3 X 6 screw)									
Weight											
	Circuit confi	guration	No.	Contact	No.	Contact		Ту	pe		
DC5V.			TB2	PE	TB1	AC100	TB2	lacksquare	AC100	TB1	
	रिंद		TB4	N	TB3	~240V	TB2	PE N	~240V	TB3	
Internal C		TB09 <b>F</b>	TB6	СОМО	TB5	40	TB6	СОМО	P40	TB5	
		д тв12.,	TB8	COM1	TB7	41	TB8	COM1	P41	тв7 тв9	
	<u>tri - 7</u>		TB10	43	TB9 42	42	ТВ10	P43	P42	TB11	
		DC12/24V., TB4.,	TB12	45	TB11	44	TB12	P45	24V	TB13	
		Terminal No.	TB14	24G	TB13	24V	TB14	24G	$\bullet$		

### 7.3.11 XBC-DP20E 8 point transistor output (Source type)

Model				Main u	nit					
Specification		XBC-DP20E								
Output point		8 point								
Insulation meth	nod	Photo coupler insulation								
Rated load volt	age	DC 12 / 24V								
Operation load	voltage range	DC 10.2 ~ 26.4V								
Max. load curre	ent	0.5A / 1 point, 2A / 10	COM							
Off leakage cu	rrent	0.1 <sup>mA</sup> or less								
Max. inrush cu	rrent	4A / 10 ms or less								
Max. voltage d	rop when On	DC 0.4V or less								
Surge absorbe	r	Zener diode								
Response	$\text{Off} \to \text{On}$	1 ms or less								
time	$\text{On} \rightarrow \text{Off}$	1 ms or less (rated loa	ad, resis	stive loa	d)					
Common meth	od	4 point / COM								
Proper wire siz	e	Stranded wire 0.3~0.	75 <sup>mm²</sup> (e	external	diamet	er 2.8 🛙	™ or less)			
External	Voltage	DC12/24V $\pm$ 10% (Ripple voltage 4 Vp-p or less)								
power	Current	25 <sup>mA</sup> or less (When connecting DC24V)								
Operation indic	ator	LED On when Output On								
External conne	ction method	24 point terminal block connector(M3 X 6 screw)								
Weight	0	418g								
	Circuit configu	Jration	No.	Contact	No.	Contact	Туре			
			TB2	PE	TB1	AC 100	TB1			
DC5V.,			TB4	N	TB3	~240V	TB2 PE AC100 ~240V TB3			
1 T	᠄ᡔᡗ᠁ᡜ		104	IN	TB5	40	TB4 N P40 TB5			
	Ŧ┺Ĺ `		TB6	COMO	TB7	41	TB6 COM0 P41 TB7			
Internal Circuit		TB09., DC12/24V.,	TB8	COM1	107		TB10 D40			
	▁┌┼ᢁ᠆ᡰ≣		TB 10	43	TB9	42	TB12 COM2 NC TB11			
	<u>FG  / </u>				TB11	NC	TB12 COM2 TB13			
	- 4	DC12/24V.	TB12	COM2	TB13	44	P45 P46 TB15			
			TB14	45			TB16 P47 NC TB17			
			TB 16	47	TB15	46	TB18 NC TB19			
	Ĩ┺╢ ─		TD 10	NC	TB17	NC	NC TB21			
		DC12/24V., 'ŤB4., <sup>↓/</sup>	TB 18	NC	TB19	NC	TB22 NC TB23			
		Terminal No.	TB20	NC	TB21	NC	1624 24G			
			TB22	NC						
			TB24	24G	TB23	24V				

## 7.3.12 XBC-DP30E 12 point transistor output (Source type)

	Model			Main ur	nit								
Specification	n		Х	BC-DP3	30E								
Output point		12 point											
Insulation m	ethod	Photo coupler insulati	on										
Rated load	voltage	DC 12 / 24V											
Operation lo	ad voltage range	DC 10.2 ~ 26.4V											
Max. load c	urrent	0.5A / 1 point, 2A / 1C	MO										
Off leakage	current	0.1 mA or less											
Max. inrush	current	4A / 10 ms or less											
Max. voltage	e drop when On	DC 0.4V or less											
Surge absor	ber	Zener diode											
Response	$Off \rightarrow On$	1 ms or less											
time	$On \rightarrow Off$	1 ms or less (rated loa	id, resis	stive loa	d)								
Common m	ethod	4 point / COM	4 point / COM										
Proper wire	size	Stranded wire 0.3~0.7	Stranded wire 0.3~0.75 mm <sup>2</sup> (external diameter 2.8 mm or less)										
External	Voltage	DC12/24V $\pm$ 10% (Rip	ple vol	tage 4 V	/p-p or	less)							
power	Current	25 mA or less (When o	connect	ting DC2	24V)								
Operation in	dicator	LED On when Output	On										
External cor	nnection method	24 point terminal bloc	k conne	ector(M3	3 X 6 so	crew)							
Weight		423g			-	-							
	Circuit config	uration	No.	Contact	No.	Contact	Туре						
P DC5V			TB2	PE	TB1	AC 100	TB1						
I 🕏 🥅	╶╾┎╴┉┤╡				TB3	~240V	TB2 PF AC100						
	्रम् ८		TB4	N	TB5	40	TB4 N 783						
	7	TB09., DC12/24V.,	TB6	COMO			тв6 сомо тв5						
Circuit		┇┼──┸┚╽	TB8	COM1	TB7	41	TB8 COM1 P41 TB7						
	╔┲┲╢╴╵┸				TB9	42	TB10 P43 TB9						
		TB08., DC12/24V.,	TB10	43	TB11	NC	TR12 NC TB11						
		TB13.	TB12	COM2	TD 10	4.4	TB12 COM2 TB13						
	dª₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽		TB14	45	TB13	44	P45 P46 TB15						
	_ाइद्द  ∠		TD16	47	TB 15	46	TB12 NC TB17						
		TB19., DC12/24V.,	TB16	47	TB17	NC	TB20 P48 TB19						
			TB18	СОМЗ	TB19	48	р49 Р4А ТВ21						
	╔┲┲╢╴┈╵┊╴		TB20	49			748 TB23						
	`	+ TB18 TB4 DC12/24V	TB22	4B	TB21	4A	1624 24G						
					TB23	24V							
		Terminal No.	TB24	24G		1							

## 7.3.13 XBC-DR20SU 8 point relay output

	Model			Main un	it								
Specificatio	n		XB	C-DR20	SU								
Output poir		8 point											
Insulation n		Relay insulation											
Rated load voltage/cur		DC24V 2A (resistive lo	ad) / AC	2220V 2	A (COS	SΦ = 1)	, 5A/COM						
	oltage/current	DC5V / 1 mA											
Max. load v		AC250V, DC125V											
Off leakage		0.1 mA (AC220V, 60 Hz	()										
Max. On/Of		3,600 times / hour	/										
Surge abso		None											
g	Mechanical		20 million times or more										
		Rated load voltage / C	Rated load voltage / Current 100,000 times or more										
Service		AC200V / 1.5A, AC240	times or	more									
life	Electrical		AC200V / 1A, AC240V / 0.5A (COS $\Phi$ = 0.35) 100,000 times or more										
		DC24V / 1A, DC100V	DC24V / 1A, DC100V / 0.1A (L / R = 7 ms) 100,000 times or more										
Response	$Off \rightarrow On$	10ms or less	IOms or less										
time	$On \rightarrow Off$	12ms or less											
Common m	iethod	4 point / COM (COM0-	point / COM (COM0~COM8), 8 point / COM (COM4~COM5)										
Proper cab	le size	Stranded cable 0.3~0.	75 <sup>mm²</sup> (E	External	diamet	er 2.8 m	m or less)						
Operation in	ndicator	LED On when Output	On										
External	connection	42 point terminal block	42 point terminal block connector (M3 X 6 screw)										
method					1 0 001	011)							
Weight	Circuit cont	450g	No	-	No	1	т						
	Circuit cont		No.	Contact	No.	Contact		pe					
		TB5	TB2	PE	TB1	AC100	$\bullet$		B1				
	₹⊈ <b>₽</b> ₿		102		ТВ3	~240V	TB2 PE	AC100 ~240V T	B3				
			TB4	COM0	TB5	40	TB4 COM0	P40 T	B5				
			TB6	COM1	TB7	41	TB6 COM1	P41 T	В7				
		COM1 TB6	TB8	COM2	ТВ9	42	TB10 P43	P42	B9				
Internal circuit		<u>COM1 IB6</u>	TB10	43	TB11	NC	TB12 COM3	NC	B11				
circu	<b>₽</b>		TB12	COM3	TB13	44	TB14 P45	P44	B13				
, ≓i			TB14	45	TB15	46	TB16 P47	P40	B15 B17				
			TB16	47			TB18 NC	NC T	B19				
		<u>⊤B16</u> ≷	TB18	NC	TB17	NC	TB20 NC	INC	B21				
	I	COM3 TB12	TB20	NC	TB19	NC	TB22 NC		B23				
		Terminal No.	TB22	NC	TB21	NC	TB24 24G						
			TB24	24G	TB23	24V							

## 7.3.14 XBC-DR30SU 12 point relay output

	Model			Main un	it								
Specificati	on		XB	C-DR3	DSU								
Output poin		12 point											
Insulation m		Relay insulation											
Rated load voltage/curr	rent	DC24V 2A (resistive I	oad) / AC	C220V 2	A (COS	SΦ = 1)	, 5A/COM						
Min. load vo	oltage/current	DC5V / 1 mA											
Max. load v	oltage	AC250V, DC125V											
Off leakage	current	0.1 mA (AC220V, 60 H	z)										
Max. On/Of	f frequency	3,600 times / hour											
Surge abso		None											
	Mechanical	20 million times or mo											
Service		Rated load voltage / Current 100,000 times or more											
life	Electrical	AC200V / 1.5A, AC24		<b>`</b>	,	-							
	Electrical	AC200V / 1A, AC240											
		,	DC24V / 1A, DC100V / 0.1A (L / R = 7 ms) 100,000 times or more										
Response	$Off \rightarrow On$	10 ms or less											
time	$On \rightarrow Off$	12 ms or less											
Common m		4 point / COM (COM0~COM8), 8 point / COM (COM4~COM5) Stranded cable 0.3~0.75 mm <sup>2</sup> (External diameter 2.8 mm or less)											
Proper cabl			,	External	diamet	er 2.8 🛙	™ or less)						
Operation in		LED On when Output	On										
External	connection	42 point terminal bloc	k connec	tor (M3	X 6 scr	ew)							
method		-				•,							
Weight	Circuit con	465g	No.		Nia		Turne						
			INO.	Contact	No.	Contact	Туре						
<b>E</b>			TB2	PE	TB1 TB3	AC100 ~240V	TB2 PE AC100 ~240V TB3						
		$\begin{array}{c c} COM0 & TB4 \\ \hline TB7 & \hline \end{array}$	TB4	COM0	TB5	40	тв4 сомо р40 тв5						
	₩ *		TB6	COM1			TB6 COM1						
-		COM1 TB6	TB8	COM2	TB7	41	TB8 COM2 P41 TB9						
Internal Circuit	 ∗ ;∎	<u>тв9</u> тв10 г	TB10	43	ТВ9	42	TB10 P43 NC TB11						
Circ			TB12	СОМЗ	TB11	NC	TB12 COM3 P44 TB13						
üit			TB14	45	TB13	44	TB14 P45 P46 TB15						
		COM3 TB12	TD40	47	TB15	46	NC TB17						
			TB16	47 COM4	TB17	NC	TB20 P49 TB19						
		COM4 TB18	TB18 TB20	49	TB19	48	TB22 P4B TB23						
L		Terminal No.	TB20	49 4B	TB21	4A	TB24 24G						
			TB22	4D 24G	TB23	24V							
			1024	270									

## 7.3.15 XBC-DR40SU 16 point relay output

Model		Main unit										
Specification		XE	C-DR4	DSU								
Output point	16 point											
Insulation method	Relay insulation											
Rated load	DC24V 2A (resistive lo		<u>, //occ</u>		Sm - 1)	5٨		4				
voltage/current	`		5220 V 2		υΨ = 1)	, 57						
Min. load voltage/current Max. load voltage	DC5V / 1 mA AC250V, DC125V											
Off leakage current	0.1 mA (AC220V, 60 Hz	·)										
Max. On/Off frequency	3,600 times / hour	)										
Surge absorber	None											
Mechanical	20 million times or mor	e										
	Rated load voltage / C		00,000	times o	r more							
Service	AC200V / 1.5A, AC240					tim	es or	more				
life Electrical	AC200V / 1A, AC240V											
		0C24V / 1A, DC100V / 0.1A (L / R = 7 ms) 100,000 times or more										
Response $Off \rightarrow On$	10ms or less			-								
time $On \rightarrow Off$	12ms or less											
Common method	4 point / COM (COM0-		( · · · · ·					,				
Proper cable size		randed cable 0.3~0.75 m <sup>*</sup> (External diameter 2.8 m or less)										
Operation indicator	LED On when Output (	ED On when Output On										
External connection method	30 point terminal block	connec	ctor (M3	X 6 scr	ew)							
Weight	594g											
Circuit cor	- V	No.	Contact	No.	Contact		Т	/pe				
	Ingulation	NO.	Contact	NO.	Contact			/pe				
		TB2	PE	TB1	AC 100		$\bigcirc$	TB1				
	TB5			TB3	~240V	TB2	PE	AC100				
♥   椏;		TB4	COMO	- TB5	40	тв4		~ <sup>240V</sup> TB3				
		TB6	COM1			TB6	COM0	P40 TB5				
		TB8	COM2	TB7	41		COM1	P41 TB7				
		TB10	43	TB9	42	TB8	COM2	P42 TB9				
				TB11	NC	TB10	P43	NC TB11				
		TB12	COM3	TB13	44	TB12	сомз	TP12				
mal circulit	COM2 TB8	TB14	45			TB14	P45	P44				
	TB13	TB16	47	- TB15	46	TB16	P47	P46 TB15				
│ │ │ ▲ 🛱 🕯	TB16 2	TB18	COM4	- TB17	NC	TB18	COM4	NC TB17				
	COM3 TB12			TB19	48	тв20	P49	P48 TB19				
	Z TB25	TB20	49	TB21	4A	T000	P49	P4A TB21				
	TB28 2	TB22	4B			TB22	P4B	NC TB23				
		TB24	COM5	- TB23	NC	TB24	COM5	P4C TB25				
L	Terminal block no.	TB26	4D	TB25	4C	TB26	P4D	P4C TB27				
			1	TDOT		<b>TB28</b>		1 1 1 - 1				
		TR28	4F	TB27	4E		P4F	24V TB29				
		TB28 TB30	4F 24G	TB27	4E 24V	TB30	24G	24V TB29				

## 7.3.16 XBC-DR60SU 24 point relay output

Image: Second state sta		Model			Main un	it								
Insulation method         Relay insulation           Rated load         DC24V 2A (resistive load) / AC220V 2A (COSΦ = 1), 5A/COM           Win. load voltage         AC250V, DC125V           Off leakage current         DC5V / 1 mA           Max. load voltage         AC220V, 60 Hz)           Max. Noad voltage current         D.C5V / 1 mA           Max. load voltage         AC220V, 60 Hz)           Max. On/Off frequency         3.600 times / hour           Surge absorber         None           Bervice life         Rated load voltage / Current 100,000 times or more           Reted load voltage / Current 100,000 times or more         AC200V / 1.5A, AC240V / 1A (COSΦ = 0.7) 100,000 times or more           Response         Off - On         10ms or less           time         On → Off         12ms or less           Common method         4 point / COM (COM0-COM8), 8 point / COM (COM4-COM5)           Proper cable size         Stranded cable 0.3-0.75 mf (External diameter 2.8 mm or less)           Common method         4 point / COM (COM0-COM8), 8 point / COM (COM4-COM5)           TB2         FE         TB1         Ac100           TB2         FE         TB1         Ac100           TB2         FE         TB1         Ac100           TB3         Commethod         <	Specificatio	on		XE	BC-DR6	DSU								
Rate load         DC24V 2A (resistive load) / AC220V 2A (COSΦ = 1), 5A/COM           Win. load voltage/current         DC5V / 1 mA           Max. On/Off frequency         3,600 times / hour           Surge absorber         None           Max. On/Off frequency         3,600 times / hour           Surge absorber         None           Service life         Rated load voltage / Current 100,000 times or more           Response         Off → On           Off → On         10ms or less           Common method         4 point / COM (COM0-COM8), 8 point / COM (COM4-COM5)           Proper cable size         Stranded cable 0.3-0.75 min (External diameter 2.8 min or less)           Operation indicator         LED On when Output On           External connection         30 point terminal block connector (M3 X 6 screw)           Weight         804g           Weight         804g           TB10         7B17           TB10         7B17           TB13         TB13           TB2         4B           TB2         4B           TB2         4B           TB2         TB10           TB10         TB11           Tome         TB2           Tome         TB13	Output point		24 point											
voltage/current         DC24V 2A (resistive load) / AC220V 2A (COSΦ = 1), SA/COM           Min. load voltage/current         DC5V / 1 mA           Max. load voltage         AC250V, DC125V           Off leakage current         0.1 mA (AC220V, 60 Hz)           Max. Nod Voltage         AC250V, DC125V           Off leakage current         0.1 mA (AC220V, 60 Hz)           Max. On/Off frequency         3.600 times / hour           Surge absorber         None           Service life         Rated load voltage / Current 100,000 times or more           AC200V / 1.5A, AC240V / 1A (COSΦ = 0.35) 100,000 times or more         AC200V / 1A, AC240V / 0.5A (COSΦ = 0.35) 100,000 times or more           Response         Off → On         10ms or less           Common method         4 point / COM (COM0-COM8), 8 point / COM (COM4-COM5)           Proper cable size         Stranded cable 0.3-0.75 imm (External diameter 2.8 mm or less)           Operation indicator         LED On when Output On           External         connection           method         804g           Weight         804g           TB10         A3           TB2         COM           TB2         COM           TB3         740           TB3         740           TB10 <td< td=""><td></td><td>ethod</td><td>Relay insulation</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>		ethod	Relay insulation											
Min.         Load voltage/current         DCSV / 1 mA           Max.         Load voltage         AC250V, DC125V           Off leakage current         0.1 mA (AC220V, 60 Hz)           Max.         On/Off frequency         3,600 times / hour           Surge absorber         None         Rated load voltage / Current 100,000 times or more           Ac200V / 1.5A, AC240V / 1A (COSΦ = 0.7) 100,000 times or more         Ac200V / 1A, AC240V / 0.5A (COSΦ = 0.35) 100,000 times or more           Response         Off → On         10ms or less         On → Off         12ms or less           Common method         4 point / COM (COM0-COM8), 8 point / COM (COM4-COM5)         Proper cable size         Stranded cable 0.3-0.75 mf (External diameter 2.8 mm or less)           Operation indicator         LED On when Output On         Stranded cable 0.3-0.75 mf (External diameter 2.8 mm or less)           Weight         804g         TB1         Ac100         Ta2         Response         Ta3         Context         Ta2         Response         Ta3         Context         Ta3         Context </td <td></td> <td>ent</td> <td>DC24V 2A (resistive loa</td> <td>d) / AC</td> <td>220V 2/</td> <td>A (COS</td> <td>Φ = 1),</td> <td>5A/0</td> <td>СОМ</td> <td></td> <td></td>		ent	DC24V 2A (resistive loa	d) / AC	220V 2/	A (COS	Φ = 1),	5A/0	СОМ					
Off leakage current         0.1 mA (AC220V, 60 Hz)           Max. On/Off frequency         3,600 times / hour           Surge absorber         None           Service life         Rated load voltage / Current 100,000 times or more           AC200V / 1.5A, AC240V / 1.5A (COSΦ = 0.7) 100,000 times or more           AC200V / 1.5A, AC240V / 1.5A (COSΦ = 0.35) 100,000 times or more           DC24V / 1A, DC100V / 0.1A (L / R = 7 ms) 100,000 times or more           DC24V / 1A, DC100V / 0.1A (L / R = 7 ms) 100,000 times or more           Common method         4 point / COM (COM0-COM8), 8 point / COM (COM4-COM5)           Proper cable size         Stranded cable 0.3-0.75 mf (External diameter 2.8 mm or less)           Operation indicator         LED On when Output On           External connection method         804g           Weight         804g           TB2         TB1         AC100         TB2         TB1         Ac100           TB3         TB1         R1         Common TB4         TB10         R3         R44         R3           TB4         TB6         TB1         Ac100         TB2         R4         R4         R4           Stranded cable 0.2         TB4         TB2         R4         R5         R4         R4         R4 <thr4< th="">           TB</thr4<>	Min. load vo	Itage/current	DC5V / 1 mA											
Off leakage current         0.1 mA (AC220V, 60 Hz)           Max. On/Off frequency         3,600 times / hour           Surge absorber         None           Service life         Rated load voltage / Current 100,000 times or more           AC200V / 1.5A, AC240V / 1.5A (COSΦ = 0.7) 100,000 times or more           AC200V / 1.5A, AC240V / 1.5A (COSΦ = 0.35) 100,000 times or more           DC24V / 1A, DC100V / 0.1A (L / R = 7 ms) 100,000 times or more           DC24V / 1A, DC100V / 0.1A (L / R = 7 ms) 100,000 times or more           Common method         4 point / COM (COM0-COM8), 8 point / COM (COM4-COM5)           Proper cable size         Stranded cable 0.3-0.75 mf (External diameter 2.8 mm or less)           Operation indicator         LED On when Output On           External connection method         804g           Weight         804g           TB2         TB1         AC100         TB2         TB1         Ac100           TB3         TB1         R1         Common TB4         TB10         R3         R44         R3           TB4         TB6         TB1         Ac100         TB2         R4         R4         R4           Stranded cable 0.2         TB4         TB2         R4         R5         R4         R4         R4 <thr4< th="">           TB</thr4<>		-	AC250V, DC125V											
Max. On/Off frequency         3,600 times / hour           Surge absorber         None           Mechanical         20 million times or more           Rated load voltage / Current 100,000 times or more           AC200V / 1.5A, AC240V / 0.5A (COSΦ = 0.7) 100,000 times or more           AC200V / 1A, AC240V / 0.5A (COSΦ = 0.35) 100,000 times or more           DC24V / 1A, DC100V / 0.1A (L / R = 7 ms) 100,000 times or more           Common method         4 point / COM (COM0-COM8), 8 point / COM (COM4-COM5)           Proper cable size         Stranded cable 0.3-0.75 mm (External diameter 2.8 mm or less)           Operation indicator         LED On when Output On           External         connection           30 point terminal block connector (M3 X 6 screw)           Weight         804g           TB2         400           TB4         TB1           TB1         AC100           TB2         TB1           AC100         TB2           TB4         TB1           TB4		-												
Surge absorber         None           20 million times or more         Rated load voltage / Current 100,000 times or more           AC200V / 1.5A, AC240V / 1A (COSΦ = 0.7) 100,000 times or more           AC200V / 1.5A, AC240V / 0.5A (COSΦ = 0.35) 100,000 times or more           DC24V / 1A, DC100V / 0.1A (L / R = 7 ms) 100,000 times or more           DC24V / 1A, DC100V / 0.1A (L / R = 7 ms) 100,000 times or more           Common method         4 point / COM (COM0-COM8), 8 point / COM (COM4-COM5)           Proper cable size         Stranded cable 0.3-0.75 mf (External diameter 2.8 mm or less)           Operation indicator         LED On when Output On           External         connection           method         804g           Weight         804g           TB2         PE           TB4         COM0           TB4         COM1           TB4         COM4           TB10         43           TB11         No           TB4	-													
Mechanical         20 million times or more           Rated load voltage / Current 100,000 times or more         AC200V / 1.5A, AC240V / 1A (COSΦ = 0.7) 100,000 times or more           AC200V / 1A, AC240V / 0.5A (COSΦ = 0.35) 100,000 times or more         DC24V / 1A, DC100V / 0.5A (COSΦ = 0.35) 100,000 times or more           Response         Off → On         10ms or less           On → Off         12ms or less           Common method         4 point / COM (COM0~COM8), 8 point / COM (COM4~COM5)           Proper cable size         Stranded cable 0.3~0.75 mf (External diameter 2.8 mm or less)           Operation indicator         LED On when Output On           External method         30 point terminal block connector (M3 X 6 screw)           Weight         804g           Weight         804g           TB2         PE           TB1         AC100           TB2         PE           TB1         AC100           TB2         PE           TB1         AC100           TB2         PE           TB1         AC100           TB2         TB1           TB2         PE           TB1         AC100           TB2         TB1           TB1         AC100           TB2			None											
Service life         Electrical         AC200V / 1.5A, AC240V / 1A (COSΦ = 0.7) 100,000 times or more           Response         Off → On         10ms or less           Common method         4 point / COM (COM0-COM8), 8 point / COM (COM4-COM5)           Proper cable size         Stranded cable 0.3-0.75 mt² (External diameter 2.8 mm or less)           Operation indicator         LED On when Output On           External         connection           method         804g           Weight         804g           Color TB4         TB1           Color TB4         TB1           Color TB4         TB2           TB1         AC100           TB2         PE           TB1         AC100           TB2         TB1           AC100         TB2           TB1         AC100           TB2         TB1           TB1         AC100           TB2         TB1           TB1         AC100           TB2         TB1           TB1         TB1           TB2         TB1           TB2         TB1           TB2         TB1           TB1         TB1           TB1         TB1<	Ŭ		20 million times or more	1										
Electrical       AC200V / 1A, AC240V / 0.5A (COSΦ = 0.35) 100,000 times or more         Response       Off → On       10ms or less         Common method       4 point / COM (COM0~COM8), 8 point / COM (COM4~COM5)         Proper cable size       Stranded cable 0.3~0.75 mf (External diameter 2.8 mm or less)         Operation indicator       LED On when Output On         External       connection         30 point terminal block connector (M3 X 6 screw)         Weight       804g         TB2       PE         TB1       AC100         TB2       TB1         TB1       AC100         TB2       TB1         TB1       AC100         TB2       TB1         TB1       TB1			Rated load voltage / Cu	rrent 10	)0,000 ti	mes or	more							
AC200V 71A, AC240V 7.0.5A (COS6 = 0.35) 100,000 times or more         DC24V / 1A, DC100V / 0.1A (L / R = 7 ms) 100,000 times or more         Response       Off → On       10ms or less         Common method       4 point / COM (COM0-COM8), 8 point / COM (COM4-COM5)         Proper cable size       Stranded cable 0.3-0.75 m² (External diameter 2.8 mm or less)         Operation indicator       LED On when Output On         External       connection         method       804g         Weight       804g         TB2         Com/ TB5         Circuit configuration       No       Contact       Tune         TB2       PE       TB1       AC100       TB2       Pe         TB3       740       741       782       783       740         Weight       804g       TB1       AC 100       TB2       741       784       783       740       784         TB4       COM0       TB4       TB1       AC 100       783       784       784       784       784         TB5       TB7       TB7       TB8       784       784       784       784       784       784       784       784       784       784	Service life	Ele etrice l	AC200V / 1.5A, AC240\	/ / 1A (	COSΦ =	= 0.7) 1	00,000	time	s or i	more	9			
Response       Off → On       10ms or less         time       On → Off       12ms or less         Common method       4 point / COM (COM0~COM8), 8 point / COM (COM4~COM5)         Proper cable size       Stranded cable 0.3~0.75 mm² (External diameter 2.8 mm or less)         Operation indicator       LED On when Output On         External       connection         method       804g         Weight       804g         TB2       PE         TB3       -240V         TB4       COM0         TB5       40         TB4       TB7         TB1       AC100         TB4       TB7         TB1       AC100         TB4       TB7         TB1       AC100         TB4       TB7         TB1       AC100         TB7       41         TB8       COM1         TB10       43         TB11       NC         TB12       COM3         TB14       TB12         TB12       COM3         TB13       TB12         TB14       45         TB12       TB17         TB24       TB17 </td <td></td> <td>Electrical</td> <td>AC200V / 1A, AC240V /</td> <td>0.5A (</td> <td>COSΦ =</td> <td>= 0.35)</td> <td>100,000</td> <td>) tim</td> <td>es oi</td> <td><sup>,</sup> mo</td> <td>re</td>		Electrical	AC200V / 1A, AC240V /	0.5A (	COSΦ =	= 0.35)	100,000	) tim	es oi	<sup>,</sup> mo	re			
time On $\rightarrow$ Off 12ms or less Common method 4 point / COM (COM0~COM8), 8 point / COM (COM4~COM5) Proper cable size Stranded cable 0.3~0.75 mm (External diameter 2.8 mm or less) Operation indicator LED On when Output On External connection 30 point terminal block connector (M3 X 6 screw) Weight 804g TB2 PE TB1 AC100 TB2 PE TB1 AC100 TB3 -240V TB2 PE TB1 AC100 TB3 -240V TB2 PE TB3 -240V TB2 PE TB3 -240V TB2 PE TB3 -240V TB3 -240V TB2 PE TB3 -240V TB3 -240			DC24V / 1A, DC100V /	0.1A (L	/ R = 7	ms) 100	,000 tin	nes	or m	ore				
time On $\rightarrow$ Off 12ms or less Common method 4 point / COM (COM0~COM8), 8 point / COM (COM4~COM5) Proper cable size Stranded cable 0.3~0.75 mr <sup>2</sup> (External diameter 2.8 mm or less) Operation indicator LED On when Output On External connection 30 point terminal block connector (M3 X 6 screw) Weight 804g TB2 PE TB1 AC100 TB4 COM0 TB5 40 TB5 40 TB5 40 TB6 COM1 TB7 41 TB7 41 TB1 445 TB1 445 TB1 445 TB1 445 TB1 344 TB1 445 TB1 741 TB1 742	Response	$Off \rightarrow On$	10ms or less											
Proper cable size         Stranded cable 0.3~0.75 m² (External diameter 2.8 m² or less)           Operation indicator         LED On when Output On           External method         30 point terminal block connector (M3 X 6 screw)           Weight         804g           Circuit configuration         No         Contact         No         Contact         Tune           TB2         PE         TB1         AC100         Tune         Tune           TB4         COM0         TB5         40         TB2         PE         TB3         ~240V         TB3           TB6         COM1         TB7         TB7         TB7         TB1         AC100         TB7         TB1         R10         A3         TB11         NC         TB3         P41         TB7         TB1         TB1         TB1         P41         TB3         P44         TB1         P44		$On \rightarrow Off$	12ms or less											
Proper cable size         Stranded cable 0.3~0.75 m² (External diameter 2.8 m² or less)           Operation indicator         LED On when Output On           External method         30 point terminal block connector (M3 X 6 screw)           Weight         804g           Circuit configuration         No         Contact         No         Contact         Tune           TB2         PE         TB1         AC100         Tune         Tune           TB4         COM0         TB5         40         TB2         PE         TB3         ~240V         TB3           TB6         COM1         TB7         TB7         TB7         TB1         AC100         TB7         TB1         R10         A3         TB11         NC         TB3         P41         TB7         TB1         TB1         TB1         P41         TB3         P44         TB1         P44	Common me	ethod	4 point / COM (COM0~0	COM8),	, 8 point	/ COM	(COM4	~CC	DM5)					
Operation indicator         LED On when Output On           External method         30 point terminal block connector (M3 X 6 screw)           Weight         804g           Veight 200           No           Contact         No           TB1         AC100           TB2         PE           TB4         COM0         TB5         40         TB2         PE           TB4         COM0         TB4         TB7         1         TB2         PA2         TB3           TB10         43         TB11         NC         TB12         COM3         TB13         44         TB12         PA4         TB13           TB10         COM2         TB80         TB10         TB17         NC         TB13         PA4         TB13         PA4         TB13         PA4         TB13         PA4         TB13         TB14         PA5         TB20<	Proper cable	e size												
External method         connection         30 point terminal block connector (M3 X 6 screw)           Weight         804g           Circuit configuration         No         Centact         No         Contact         Tupe           TB2         PE         TB1         AC100         TB2         PE           TB4         COM0         TB5         40         TB2         PE           TB4         COM0         TB5         40         TB2         PE           TB6         COM1         TB7         41         TB6         COM1         P40         TB7           TB6         COM1         TB7         41         TB6         COM1         TB7         41         TB7           TB10         43         TB11         NC         TB14         441         TB17         P40         TB17           TB10         COM1         TB6         COM2         TB10         TB13         H44         P44         TB14           TB10         COM1         TB6         COM3         TB17         NC         TB14         P44         TB14           TB10         COM1         TB6         COM4         TB19         48         TB22         P44         TB2	Operation in	dicator	LED On when Output O	n					,					
Internood           Weight         804g           Circuit configuration         No.         Contact         No.         Contact         True           TB2         PE         TB1         AC100         TB2         PE         TB1         AC100         TB2         PE         TB1         AC100         TB2         PE         TB3         ~240V         TB2         PE         TB5         40         TB4         COM0         TB4         COM1         TB5         40         TB4         COM1         TB5         40         TB4         COM1         TB5         COM1         TB6         COM1         TB6         COM1         TB6         COM1         TB6         COM1         TB7         TB1         TB10         43         TB11         NC         TB12         COM3         TB13         44         TB13         P43         P41         TB13         P44         TB14         P45         P46         TB23         P44         TB14         P44         TB14         P44         TB14         P4	External	connection												
Circuit configuration         No         Contact         No         Contact         Tune           TB2         PE         TB1         AC100         7240V         TB2         PE         740V         TB3         7240V         TB3         7240V         TB3         7240V         TB3         7240V         TB3         7240V         TB3         7240V         TB3         744         TB3         744         TB3         744         TB3         744         TB1         786         741         TB4         780         742         TB3         744         TB1         741         TB6         760M         742         TB3         744         TB1         741         TB6         760M         742         TB1         744         TB1				Johneci			<i>=vv)</i>							
Image: constraint of the second se	Weight	-												
TB2       PE       TB3       ~240V       TB1       TB1       TB2       PE       TB3       ~240V       TB3       ~240		Circuit conf	iguration	No	Contact		Contact		<u> </u>	vne				
TB5       TB5       TB5       TB7       41       TB6       COM1       TB7         TB7       TB7       41       TB6       COM1       TB7       TB7       41       TB6       COM1       P41       TB7         TB7       TB7       TB7       TB7       41       TB6       COM1       P41       TB7         TB7       TB7       TB7       TB7       41       TB6       COM1       P41       TB7         TB7       TB7       TB7       TB7       41       TB6       COM1       P41       TB7         TB7       T				TB4	СОМО	TB3	~240V		PE	~240V	твз			
Image: Common TB4       TB8       COM2       TB9       42       TB8       COM2       P41       P41       P42       P42       P43       P42       P43       P44       P45       P46       P46       P47       NC       P44       P44       P45       P46       P47       NC       P44       P45       P46       P46       P47       NC       P48       P46       P47       NC       P48       P46       P47       NC       P48       P48       P48       P46       P47       NC       P48	•         •		TB5	TBO		TB7	41	TB6	COM1	P40				
COM0       184       TB10       43       TB11       NC       TB10       P43       NC       TB13         TB12       COM3       TB13       44       TB13       44       P45       P46       TB13         TB14       45       TB15       46       TB14       P43       NC       TB13         TB16       47       TB17       NC       TB14       P45       P46       TB17         TB16       47       TB17       NC       TB18       COM4       TB19       48       TB22       P48       TB21       P44       TB22       P48       TB22       P48       NC       TB23       NC       TB22       P48       NC       TB23       NC       TB22       P48       NC       TB23       NC       TB24       COM5       TB24       COM5       TB24       COM5       TB24       COM5       TB24       P44       TB23       P44       P45       P44       TB23       P44       TB23       P44       TB24       P44       P45       P46       TB24       P46       TB24       P45       P46       TB23       P46       TB24       P46       TB24       P46       TB24       P46       TB24       P46 <td></td> <td>╡╋</td> <td></td> <td>TB8</td> <td>COM2</td> <td></td> <td></td> <td>TB8</td> <td>60142</td> <td>P41</td> <td>TB7</td>		╡╋		TB8	COM2			TB8	60142	P41	TB7			
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$			COMO TB4	TB10	43			TB10	-	P42	тв9			
Image: Comparison of the comparison				TB12	COM3	TB11				NC	TB11			
COM1       TB6       TB15       46       F43       P46       TB15         TB9       TB9       TB16       TB17       NC       TB16       P47       NC       TB17         TB10       TB10       TB10       TB10       TB18       COM4       TB17       NC       TB18       COM4       P48       P48       P48       TB19       P48       TB20       P49       P48       TB10       TB20       P49       TB21       TB20       P49       P44       TB21       TB21       TB22       P48       TB22       P48       TB22       P48       TB22       P48       TB22       P48       TB22       P44       TB23       NC       TB23       NC       TB23       NC       TB24       COM5       TB26       P40       TB26       P44       TB27       TB26       P44       TB27       TB24       TB20       TB24		4⊈ 🕯				TB13	44		СОМЗ	P44	TB13			
TB16       47       TB17       NC       TB16       P47       NC       TB17         TB10       COM2       TB10       TB10       TB18       COM4       TB17       NC       TB18       COM4       P49       P49       P48       TB20       P49       P44       P48       TB20       P49       P44       TB21       TB22       P48       NC       TB23       NC       TB24       COM5       TB26       P40       P44       TB27       P46       P46       P47       NC       TB27       4E       TB26       P40       TB27       4E       TB28       P4F       TB29       NC       TB28       P4F       TB29       NC       TB30       COM6       TB31       50       TB32       P51       P50       TB31       TB32       P51       P52       P51       P52       TB33			COM1 TB6			TB15	46	1814	P45	D46	TB15			
Image: Second state sta	Int	·_ ·_		TB16	47	TD 17	NC	TB16	P47		TB17			
Image: Second state sta	erna			TB18	COM4	IDI/	NC	TB18	COM4	NC				
Image: Second state sta				TROO	10	TB19	48	тв20	<b>P40</b>	P48	TB19			
Image: Second state sta	rcu	L	<u>+</u> ~>		-	TB21	4A	твоо	——	P4A	TB21			
Image: Second state sta	, F			TB22	4B	троо			P4B	NC	TB23			
<td< td=""><td></td><td></td><td></td><td>TB24</td><td>COM5</td><td></td><td></td><td></td><td></td><td></td><td>TB25</td></td<>				TB24	COM5						TB25			
TB28     4F     TB29     NC     TB29       COM7     TB36     TB30     COM6     TB31     50     TB32       Fill     TB32     51     TB32     Fill     Fill		<u></u> 2 –	<u> </u>	TB26	4D				P4D	P4E	TB27			
TB40     TB40     TB30     TB29     NC     TB30     COM6       COM7     TB36     TB32     51     TB31     50     TB32     P51     P52     TB33				TB28	4F	TB27	4E	TB28	P4F		TB29			
COM7 TB36 TB31 50 TB32 P51 P52 TB33			TB40 2 2			TB29	NC	TB30	COM6		TD21			
		[_	COM7 TB36			TB31	50	TB32	P51	P50				
			Terminal block	<u> </u>	51	TB33	52	TB34	P53	P52				
no. TB34 53 TB35 NC TB36 COM7 NC TB36 COM7			no.	TB34	53			TB36		NC	TB35			
TB36 COM7 TB37 54 TB38 P55 TB37 F54 TB38 P55 TB38 P56					COM7			TB38			TB37			
TB38 55 TB39 56 TB40 P57 TB40				TB38	55			TB40	P57		TB39 TB41			
TB40 57 TB41 24V					57			TB42	24G		1041			
TB42 24G				TB42	24G		- • •			$\bigcirc$				

## 7.3.17 XBC-DN20S(U) 8 point transistor output (Sink type)

	Model			Main ur	nit									
Specification			XB	C-DN20	)S(U)									
Output point		8 point												
Insulation me	thod	Photo coupler insulati	on											
Rated load vo	oltage	DC 12 / 24V												
Operation loa	ad voltage range	DC 10.2 ~ 26.4V												
Max. load cu	rrent	0.5A / 1 point, 2A / 1C	OM											
Off leakage of	urrent	0.1 mA or less												
Max. inrush c	current	4A / 10 ms or less												
Max. voltage	drop when On	DC 0.4V or less												
Surge absorb	per	Zener diode												
Response	$Off \rightarrow On$	1 ms or less												
time	$On \rightarrow Off$	1 ms or less (rated load, resistive load)												
Common me	thod	4 point / COM												
Proper wire s		Stranded wire 0.3~0.7	′5 <sup>mm²</sup> (e	external	diamet	er 2.8 m	m o	r less	)					
External	Voltage		DC12/24V $\pm$ 10% (Ripple voltage 4 Vp-p or less) 25 <sup>mA</sup> or less (When connecting DC24V)											
power	Current	,		ing DC2	24V)									
Operation inc		LED On when Output												
	nection method	24 point terminal bloc	k conne	ector(M3	3 X 6 sc	rew)								
Weight		470g	1	T	1		1							
	Circuit configu	Iration	No.	Contact	No.	Contact			/pe					
		TB05	TDO		TB1	AC100		$\bullet$		TB1				
			TB2	PE	TB3	~240V	TB2	PE	AC100 ~240V					
	ŢŢŢ <sup>™</sup>	,	TB4	COM0			TB4		~2400	TB3				
	<u>y y</u>		TDO	00144	TB5	40	TDC	COM0	P40	TB5				
	_	TB07 DC12/24V	TB6	COM1	TB7	41	TB6	СОМ1	P41	TB7				
			TB8	COM2			TB8	сом2	<u> </u>	тв9				
	ŢŢŢŢ		<b>TD (0</b>	40	TB9	42	TB10	P43	P42	105				
	цъ)		TB10	43	TB11	Р	TB12		Р	TB11				
Internal circuit		DC12/24V TB09	TB12	СОМЗ			-	сомз	P44	TB13				
					TB13	44	TB14	P45		TB15				
	¥⊨⊧⊢ݠ┼ ┙、		TB14	45	TB15	46	TB16	P47	P46					
	( <b>¥ Ľ</b> ) / / /		TB16	47	1010	40	TB18		NC	TB17				
		DC12/24V			TB17	NC		NC	NC	TB19				
	•n	TB13	TB18	NC	TB19	NC	TB20	NC	NIC.	TB21				
-		TB16	TB20	NC	1019	NC	TB22	NC	NC					
		TB12		-	TB21	NC	TB24	240	24V	TB23				
	L.		TB22	NC	TDOO	0.01		24G		]				
	L		TB24	24G	TB23	24V		L		1				
		T Terminal no.												

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## 7.3.18 XBC-DN30S(U) 12 point transistor output (Sink type)

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	Model			Main ur	nit								
Specification			XB	C-DN30	)S(U)								
Output point		12 point											
Insulation m	ethod	Photo coupler insulati	on										
Rated load v	voltage	DC 12 / 24V											
Operation lo	ad voltage range	DC 10.2 ~ 26.4V											
Max. load cu	urrent	0.5A / 1 point, 2A / 1C	MO										
Off leakage	current	0.1 mA (AC220V, 60 H	z)										
Max. inrush	current	4A / 10 ms or less											
Max. voltage	e drop when On	DC 0.4V or less											
Surge absor	ber	Zener diode											
Response	$Off\toOn$	1 ms or less											
time	$\text{On} \to \text{Off}$	1 ms or less (rated loa	nd, resis	stive loa	d)								
Common me	ethod	4 point / COM											
Proper wire	size	Stranded wire 0.3~0.7	Stranded wire 0.3~0.75 mm² (external diameter 2.8 mm or less)										
External	Voltage	DC12/24V ± 10% (Rip	ople vol	tage 4 \	/p-p or	less)							
power	Current	25 MA or less (When o	connect	ing DC2	24V)								
Operation in	dicator	LED On when Output	On										
External con	nection method	24 point terminal bloc	k conne	ector(M3	3 X 6 so	rew)							
Weight		475g											
	Circuit configu	uration	No.	Contact	No.	Contact	Туре						
		TB05			TB1	AC100							
			TB2	PE		~240V	тв1						
$  \Psi $	╶┱╼┙┈┈╹╼╝	1	TB4	COM0	TB3		TB2 PE AC100 ~240V TB3						
	LE L	ТВ04	104	COMO	TB5	40							
		DC12/24V	TB6	COM1			TB6 COM1 P40						
					TB7	41	P41 TB7						
<b> </b>      -	╶╾╼╴╴╴╴╴╸		TB8	COM2	ТВ9	42	COM2 TB9						
	<u>  </u> [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [		TB10	43	103	42	TB10 P43 TB11						
nter		DC12/24V			TB11	Р	TB12 COM3						
iternal circuit		TB13	TB12	COM3	7040		TB14 P45						
	╶╾┼╔╌┤╪┥╬	TB16	TB14	45	TB13	44	P45 TB15						
		TB12			TB15	46	TB16 P47 NC TB17						
			TB16	47			COM4						
		TB19	TRIC		TB17	NC	TB20 P49 P48						
	╶╾┼╍╌┤╤╉	TB22	TB18	COM4	TB19	48	P4A TB21						
	¥Ľ /		TB20	49			P4B						
		TB18			TB21	4A	TB24 24G						
		TB11 DC12/24V	TB22	4B	троо	0414							
		block no.	TB24	24G	TB23	24V							
			1024	2.0									

## 7.3.19 XBC-DN40SU 16 point TR output (Sink type)

Proper cable size       Stranded cable 0.3~0.75 m² (External diameter 2.8 mm or less)         External       Voltage       DC12/24V ± 10% (ripple voltage 4 Vp-p or less)         supply power       Current       25 mA or less (when connecting DC24V)         Operation indicator       LED On When Output On         External connection method       30 point terminal block connector (M3 X 6 screw)	Model			Main									
Insulation method Photo-coupler insulation Rated load voltage DC 12 / 24V Load voltage range DC 10.2 - 26.4V Max. load current 0.5A / 1point, 2A / 1COM (P40, P41: 0.1A / 1point) Off leakage current 0.1 mA or less Max. voltage drop when On DC 0.4V or less Surge killer Response time Off $\rightarrow$ On 1 ms or less Response time Off $\rightarrow$ On 1 ms or less (rated load, resistive load) Common method 4 point / COM Propor cable size Stranded cable 0.3-0.75 mf (External diameter 2.8 mm or less) External Supply power Current 25 mÅ or less (when connecting DC24V) Operation indicator LED On When On DU 0.04V or lob (ripple voltage 4 Vp-p or less) Supply power Current 25 mÅ or less (when connecting DC24V) Operation indicator LED On When Output On External connection method 30 point terminal block connector (M3 X 6 screw) Weight 578g Circuit configuration No. contact No. contact TB1 AC100 TB2 PE TB1 AC100 TB1 AC100 TB1 AC100 TB1 AC100 TB1 AC100 TB1 AC100 TB1 AC100 TB2 PE TB1 AC100 TB1 AC100 TB2 PE TB1 AC100 TB1 AC100 TB2 PE TB1 AC100 TB2 PE TB1 AC100 TB1 AC100 TB2 PE TB1 AC100 TB1 P TB1 AC100 TB2 PE TB1 AC100 TB2 PE TB1 TB2 PE TB1 AC100 TB2 PE TB1 AC100 TB2 PE TB1			Х	BC-DN	140SU								
Rated load voltage       DC 12 / 24V         Load voltage range       DC 10.2 - 26.4V         Max. load current       0.58 / 1point, 2A / 1COM (P40, P41: 0.1A / 1point)         Off leakage current       0.1 mA or less         Max. inrush current       4A / 10 ms or less         Max. inrush current       4A / 10 ms or less         Max. voltage drop when On       DC 0.4V or less         Surge killer       Zener diode         Response time       Off → On         On → Off       1 ms or less (rated load, resistive load)         Common method       4 point / COM         Proper cable size       Stranded cable 0.3-0.75 mf (External diameter 2.8 mm or less)         External connection method       30 point terminal block connector (M3 X 6 screw)         Sysply power       Current         Circuit configuration       No.         Context       TB1 A C100         TB4       TB1 A 41         TB4       TB1 A 44         TB4       TB1 A 44         TB4       TB1 A 41         TB4       TB14 A 45 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>													
Load voltage range DC 10.2 ~ 26.4V Max. Load current 0.5A / 1point, 2A / 1COM (P40, P41: 0.1A / 1point) Off Off leakage current 0.1 mA or less Max. voltage drop when On DC 0.4V or less Surge killer Zener diode Response time Off $\rightarrow$ On 1 ms or less (rated load, resistive load) Common method 4 point / COM Proper cable size Stranded cable 0.3-0.75 mf (External diameter 2.8 mf) or less) External voltage DC 12/24V ± 10% (ripple voltage 4 Vp-p or less) supply power Current 25 mÅ or less (when connecting DC24V) Operation indicator LED On When Output On External connection method 30 point terminal block connector (M3 X 6 screw) Weight 578g Circuit configuration No. context No. context Type TB0 DC12/24V TB0 DC12/24V TB0 DC12/24V TB1 A C100 TB2 PE TB1 A C100 TB3 -240V TB3			on										
Max. load current       0.5A / 1point, 2A / 1COM (P40, P41: 0.1A / 1point)         Off leakage current       0.1 mA or less         Max. inrush current       4A / 10 ms or less         Max. inrush current       AC / 10 ms or less         Max. inrush current       AC / 10 ms or less         Max. inrush current       AC / 10 ms or less         Response time       Off → On         On → Off       1 ms or less (rated load, resistive load)         Common method       4 point / COM         Proper cable size       Stranded cable 0.3~0.75 mm' (External diameter 2.8 mm or less)         External       DC12/24V ± 10% (ripple voltage 4 Vp- por less)         supply power       25 mA or less (when connecting DC24V)         Operation indicator       LED On When Output On         External connection method       378g         Tible Output On         Tible Out													
Off leakage current0.1 mA or lessMax. inrush current4A / 10 ms or lessMax. voltage drop when OnDC 0.4V or lessSurge killerZener diodeResponse timeOff $\rightarrow$ OnOn $\rightarrow$ Off1 ms or less (rated load, resistive load)Common method4 point / COMProper cable sizeStranded cable 0.3-0.75 mr/ (External diameter 2.8 mm or less)ExternalCourrentOperation indicatorLED On When Output OnExternal connection method30 point terminal block connector (M3 X 6 screw)Weight578gTiblo Oct2/24V ± 10% (ripple voltage 4 Vp-p or less)Weight578gTiblo Oct2/24VTiblo Oct2/24VTB10TB2PETB13Add to the terminal block connector (M3 X 6 screw)Weight578gTiblo Oct2/24VTB2PETB1444TB1344TB1445TB1546TB1444TB1444TB1540TB22TB16TB1647TB17TB18CMATB23TB1444TB1444TB1546TB22TB24TB24TB22TB1647TB17TB18TB24TB24TB24TB27TB25TB27TB24TB27TB25TB24TB24					0.4.4		()						
Max. inrush current Max. voltage drop when On DC 0.4V or less Surge killer Response time Off → On On → Off 1 ms or less (arted load, resistive load) Common method 4 point / COM Proper cable size Stranded cable 0.3~0.75 mf (External diameter 2.8 mm or less) External Supply power Current 25 mA or less (when connecting DC24V) Operation indicator LED On When Output On External connection method 0 point terminal block connector (M3 X 6 screw) Weight Circuit configuration No. contact No.			JM (P4	IO, P41	: 0.1A	/ 1poir	nt)						
Max. voltage drop when On       DC 0.4V or less         Surge killer       Zener diode         Response time       Off → On       1 ms or less (rated load, resistive load)         Common method       4 point / COM         Proper cable size       Stranded cable 0.3–0.75 mf (External diameter 2.8 mm or less)         External       Voltage       DC12/24V ± 10% (ripple voltage 4 Vp-p or less)         Supply power       Current       25 m² or less (when connecting DC24V)         Operation indicator       LED On When Output On       X 6 screw)         External connection method       578g         Circuit configuration       No.       Context       Type         TB2       PE       TB1       Ac100       TB2       PE       TB1       TB1       PA       TB1       PA       TB1       TB1       TB1       TB1       TB1       TB1       TB1													
Surge killerZener diodeResponse timeOff $\rightarrow$ On1 ms or lessOf $\rightarrow$ Off1 ms or lessCommon method4 point / COMProper cable sizeStranded cable 0.3~0.75 mr (External diameter 2.8 mm or less)ExternalVoltageDC12/24V $\pm$ 10% (ripple voltage 4 Vp-p or less)Current25 mA or less (when connecting DC24V)Operation indicatorLED On When Output OnExternal connection method30 point terminal block connector (M3 X 6 screw)WeightTheTheTheTheTheTheTheCircuit configurationNo. contextTheTheTheTheTheTheTheTheTheTheTheTheTheTheTheTheTheOPTheTheTheTheTheTheTheTheTheThe <th col<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th>	<td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>												
Response timeOff $\rightarrow$ On1 ms or lessCommon method4 point / COMProper cable sizeStranded cable 0.3~0.75 mf (External diameter 2.8 mm or less)ExternalVoltageDC12/24V ± 10% (ripple voltage 4 Vp-p or less)Current25 mA or less (when connecting DC24V)Operation indicatorLED On When Output OnExternal connection method30 point terminal block connector (M3 X 6 screw)WeightTratTorcuit configurationNo.TableTorumTorumTorumTorumTorumNo.context No.Context No.TorumTorumTorumTorumTorumTorumTorumTorumTorumTorumTorumTorumTorumTorumTorumTorumTorumCurrentContext No.Context No.CurrentStranded colspan="2">TorumTorumTorumTorumTorum <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>													
Response time On → Off         1 ms or less (rated load, resistive load)           Common method         4 point / COM           Proper cable size         Stranded cable 0.3-0.75 mf (External diameter 2.8 mm or less)           External         Voltage         DC12/24V ± 10% (ripple voltage 4 Vp-p or less)           Stranded cable 0.3-0.75 mf (External diameter 2.8 mm or less)           Current         25 mA or less (when connecting DC24V)           Operation indicator         LED On When Output On           External connection method         30 point terminal block connector (M3 X 6 screw)           Soft connection method         Soft connection (M3 X 6 screw)           Weight         Top of less (when connecting DC24V)           Operation indicator         No.          Type           Circuit configuration         No.          Top of less (when connecting DC24V)           Top of less (when connecting DC24V)         Top of less (when connecting DC24V)           Top of less (when connecting DC24V)         Top of less (when connecting DC24V)           Top of less (when connecting D	Surge killer	Zener diode											
Common method 4 point / COM Proper cable size Stranded cable 0.3-0.75 mf (External diameter 2.8 mm or less) External Voltage DC12/24V ± 10% (ripple voltage 4 Vp-p or less) supply power Current 25 mA or less (when connecting DC24V) Operation indicator LED On When Output On External connection method 30 point terminal block connector (M3 X 6 screw) Weight 578g Circuit configuration No. contex No. contex Type TB2 PE TB1 AC100 TB2 400 TB4 COM0 TB5 40 TB4 COM0 TB5 40 TB4 COM0 TB5 40 TB4 COM1 TB7 411 TB4 COM0 TB5 40 TB4 COM2 TB9 42 TB4 COM2 TB9 42 TB4 COM2 TB1 44 TB10 43 TB11 P TB11 7 TB1 TB15 46 TB12 COM3 TB13 44 TB12 COM3 TB13 44 TB14 45 TB15 46 TB16 47 TB17 NC TB17 TB1 TB17 TB1 TB17 TB17 TB17 TB17 TB18 COM4 TB13 44 TB12 COM3 TB13 44 T	Response time $Off \rightarrow On$	1 ms or less											
Proper cable size         Stranded cable 0.3~0.75 m² (External diameter 2.8 m³ or less)           External         Voltage         DC12/24V ± 10% (ripple voltage 4 Vp-p or less)           Supply power         Current         25 m² or less (when connecting DC24V)           Operation indicator         LED On When Output On           External connection method         30 point terminal block connector (M3 X 6 screw)           Weight         578g           Circuit configuration         No.         Contact         Type           TB2         PE         TB1         AC100         TB2           TB2         PE         TB1         AC100         TB2         PE           TB4         COM0         TB5         40         TB2         PE         TB1           TB6         COM1         TB5         40         TB2         PE         TB1           TB1         TB2         DC12/24V         TB2         TB1         TB1 <t< td=""><td>On <math>\rightarrow</math> Off</td><td>1 ms or less (rated load</td><td>d, resis</td><td>stive lo</td><td>ad)</td><td></td><td></td><td></td></t<>	On $\rightarrow$ Off	1 ms or less (rated load	d, resis	stive lo	ad)								
External supply power         Voltage         DC12/24V ± 10% (ripple voltage 4 Vp-p or less)           Supply power         Current         25 mÅ or less (when connecting DC24V)           Operation indicator         LED On When Output On           External connection method         30 point terminal block connector (M3 X 6 screw)           Weight         578g           Torcuit configuration           No. contact         Type           TB1           TB2           Circuit configuration           No. contact         No.           TB2           TB2 <td< td=""><td>Common method</td><td>4 point / COM</td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	Common method	4 point / COM											
supply power         Current         25 mÅ or less (when connecting DC24V)           Operation indicator         LED On When Output On           External connection method         30 point terminal block connector (M3 X 6 screw)           Weight         578g           Circuit configuration         No. contact         No. contact         Type           TB1         Ac100         TB2         FE         TB1         Ac100         TB2         FE         TB1         Ac100         TB2         Contact         No. contact         Type           TB2         CICUL         TB2         TB1         Ac100         TB2         Contact         NO.         Contact         TB2         TB2         TB2         TB2         TB2         TE           TB0         CI2//24V         TB2         TB11         TB2         TB2         TB2         TB2         TB2	Proper cable size	Stranded cable 0.3~0.											
Supply power         Current         25 mA or less (when connecting DC24V)           Operation indicator         LED On When Output On           External connection method         30 point terminal block connector (M3 X 6 screw)           Weight         STRg           Circuit configuration         No.         contact         Type           TB2         TB1         Ac100           TB2         Circuit configuration         No.         contact         Type           TB2         FE         TB1         Ac100           TB2         FE         TB1         TE           OC12/24V         TB10         A3         TB11         TB12         COMM         TB12         COMM         TB12         COMM         TB2         COMM         TB2         TE           TO         OC12/24V         TE         TE         TE           TE22 <td>External Voltage</td> <td>DC12/24V ± 10% (ripp</td> <td colspan="11"></td>	External Voltage	DC12/24V ± 10% (ripp											
Operation indicator         LED On When Output On           External connection method         30 point terminal block connector (M3 X 6 screw)           578g           Circuit configuration         No.         Contact         Type           TB2         FE         TB1         AC100         TB2           TB2         FE         TB1         AC100         TB2           TB4         COM0         TB5         40         TB5           TB6         COM1         TB7         41         TB7           TB8         COM2         TB9         42         TB1           TB10         43         TB11         P         TB1           TB10         FB13         TB14         P42         TB13           TB10         FB13         TB14         P43         P           TB14         FB13         TB14         P43         P           TB10         FB13         TB14         P43         P42         TB13           TB14         FB15         FB6         FB7         FB1         FB13	supply power Current		5 <sup>mA</sup> or less (when connecting DC24V)										
External connection method         30         point terminal block connector (M3 X 6 screw)           Weight         578g           Circuit configuration         No.         contact         No.         contact         Type           TB2         TB1         AC100         TB2         PE         TB1         AC100         Pe         -240V         TB1           TB2         PE         TB3         -240V         TB3         -240V         TB2         Pe         -240V         TB3           TB4         COM0         TB5         40         TB2         Pe         TB1         Pa         COM1         Pa         Pa         TB1           TB0         C12/24V         TB10         43         TB11         P         TB12         PA         TB1           TB12         COM3         TB13         44         TB14         45         TB13         44         TB13         P44         TB13           TB14         COM4         TB19         48         TB22         P43         P44         TB13           TB14         COM4         TB19         48         TB14         P44         TB13           TB14         TB16         TB17         TB18	Operation indicator												
Circuit configuration         No.         Contact         No.         Contact         Type           Image: Contact of the second se	External connection method												
Composition       TB05       TB1       AC100       TB1       AC100       PE       -240V       TB1       AC100       PE       -240V       TB1       AC100       PE       -240V       TB1       -240V       TB1       AC100       PE       -240V       TB1	Weight	578g											
DC:5V       IB04       IB04       IB04       IB04       IB04       IB04       IB04       IB06       IB07	Circuit config	uration	No.	Contact	No.	Contact	Тур	е					
DC:5V       IB04       IB04       IB04       IB04       IB04       IB04       IB04       IB06       IB07					TB1								
Image: Construction of the second			TB2	PE									
Image: constraint of the second se					TB3	~240V							
Image: constraint of the second consecond consecond constraint of the second constraint of			184	COMO	TDE	40	TDA	100					
Image: Display block in the image in th		TB04	TB6	COM 1	TBD	40		P40 TB5					
Image: constraint of the second of the se		DC12/24V		00111	TB7	41	COM1	TB7					
Image: Construction of the second			TB8	COM2			TRR	P41					
Image: circuit       Image	╽╴│╴│╴┌┼╔╌┤╤┨╡		TD 10	40	TB9	42		P42 TB9					
Image: construction of the second	║ │ └┲┲╢ ̈ݢू≝	TB10	IBIO	43	TB11	Р	TB10 P43 -	TB11					
Image: Construction of the second		TB08	TB12	COM3	1011	1	TB12	P					
Image: Second state sta		DC12/24V	-		TB13	44		P44 TB13					
Image: Second state sta			TB14	45		46	P45	TB15					
Image: Second state sta	╽╴│ <u></u> ┊│ ┌┼╓─┤╪ <sup>╇</sup>		TB 16	47	1812	40	TR16	P46					
Image: Constraint of the second state of the second sta	║	TB16	1010	77	TB17	NC		NC TB17					
Image: Constraint of the second state of the second sta		TB12	TB 18	COM4			TB18 COM4	TB19					
Image: Sector of the sector			TDOO	10	TB 19	48	TB20	P48					
Image: Construction of the second		TB25	1B50	49	TB21	10		TB21					
TB28       TB24       TB25       TB26       P4D       P4C       TB27         TB28       TB21       DC12/24V       TB26       4D       TB27       TB28       P4E       TB27         TB28       4F       TB29       24V       TB30       24G       TB29	╽╴│╴│╴╷┱┥╪┥		TB22	4B	IDZI	47	TB22 P4B	TB23					
TB24     TB24     TB24     TB25     P4C     TB25       TB11     DC12/24V     TB26     4D     TB27     4E     TB28     P4E     TB27       TB28     4F     TB29     24V     TB30     24G     TB29	║	TB28		10	TB23	NC	TR24	NC 1023					
Terminal block no.     TB26     4C     TB26     P4D       TB27     4E     TB28     P4F     TB29	<u>  (</u> <u>+</u> +)   <u>·</u> -		TB24	COM5	TDOC	10		P4C TB25					
Terminal block no.         TB28         4F         TB29         24V         TB29			TR26	4D	1822	40	TB26 P4D	TB27					
Terminal block no. TB28 4F TB29 24V TB30 240 TB29				то	TB27	4E	TR28	P4E					
TB29 24V 1830 24G		T Terminal block no.	TB28	4F	-			24V TB29					
			троо	040	TB29	24V	24G —						
			1830	24G			(						

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	_	_	Mc	odel				Main	unit					
Spec	cific	ation					Х	BC-DN						
Outpu	ut p	oint			24 point									
Insula			hod		Photo-couple	r insulatio	on							
Rated	d loa	ad vol	tage		DC 12 / 24V									
Load					DC 10.2 ~ 26									
Max.					0.5A / 1point,		DM (P4	10, P41	: 0.1A	/ 1poir	nt)			
Off lea	aka	ige cu	irrent		0.1 mA or less	;								
Max.	-				4A / 10 ms or	less								
			Irop whe	n On	DC 0.4V or le	SS								
Surge	e kil	ler			Zener diode									
Respo	ons	e time	$_{} Off \rightarrow 0$		1 ms or less									
-			$On \rightarrow 0$	Off	1 ms or less (	rated loa	d, resis	stive lo	ad)					
Comn					4 point / CON									
Prope	er ca	able s	size		Stranded cab	le 0.3~0.	75 <sup>mm²</sup>	(Exterr	nal dia	meter 2	2.8 mm	or le	ss)	
Extern			Voltage		DC12/24V ± 2			<u> </u>	<u> </u>	r less)				
suppl			Curren	t	25 mA or less			ing DC	24V)					
Opera					LED On Whe									
		conne	ection me	ethod	42 point terr	minal blo	ck con	nector	(M3 X	6 scre	w)			
Weigh	ht		0.1	· · · · · · · · · · · · · · · · · · ·	636g		L N L	1	<b>.</b>	1	1			
			Circu	it configu	Iration		No.	Contact	No.	Contact		Iy	pe	
							TB2	PE	TB1	AC100		$\bigcirc$		TB1
							-	-	ТВЗ	~240V	TB2	PE	AC100 ~240V	
₹	ዮ				TB05	Ъ	TB4	COMO	TB5	40	TB4	сомо	~2400	TB3
G	₽-	DC5V	_	_@_ ₹	<b>}</b>	-	TB6	COM1			TB6		P40	TB5
	Ł						TB8	COM2	TB7	41		COM1	P41	TB7
			<u> </u>		TB04			43	TB9	42	TB8	COM2		TB9
				]	TB9 DC12/2	4V	TB10		TB11	Р	TB10	P43	P42	TD11
							TB12	COM3	TB13	44	TB12	сомз	Р	TB11
				╞╔┛┤╪╴	TB10	.	TB14	45			TB14		P44	TB13
			(¥K)	2		┶┥╽	TB16	47	TB15	46		P45	P46	TB15
		<u>,</u>		• -	─ <b>●</b> │ <u></u> <u></u> ТВ08 <b>Ⅰ</b> ├	<b></b>			TB17	NC	TB16	P47	NC	TB17
		Internal			TB13 DC12/2	4V	TB18	COM4	TB19	48	TB18	COM4		TB19
		o					TB20	49			TB20	P49	P48	
		ircuit		╞╓╝┥╞╤		, ]	TB22	4B	TB21	4A	TB22		P4A	TB21
			( <b>† K</b> )	< <		┚──┩			TB23	NC		P4B	NC	TB23
			' L	2	TB12 DC12/2		TB24	COM5	TB25	4C	TB24	COM5	P4C	TB25
			ζ		TB37 DC12/2	4v 1	TB26	4D	-		TB26	P4D		TB27
			_			-	TB28	4F	TB27	4E	TB28	P4F	P4E	
					Ľ, <u>TB40</u>	┐ <b>╷</b> ┥│			TB29	NC	TB30	00140	NC	TB29
			<u> </u>				TB30	COM6	TB31	50		COM6	P50	TB31
	L		L.,	†	TB11 DC12/2	4V	TB32	51	TB33	52	TB32	P51	P52	TB33
							TB34	53			TB34	P53		TB35
					T Termir	nal	TB36	COM7	TB35	NC	TB36	COM7	NC	
1					block	10.			TB37	54	TB38		P54	TB37
					DIOOKI		TB38	55	TB39	56		P55	P56	TB39
										00	TB40			
							TB40	57	TDA1			P57	2414	TB41
							TB40 TB42	57 24G	TB41	24V	TB42	P57 24G	24V	TB41

## 7.3.20 XBC-DN60SU 24 point TR output (Sink type)

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## 7.3.21 XBC-DP20SU 8 point transistor output (Source type)

	Model			Main ur	nit								
Specification			XE	3C-DP2	0SU								
Output point		8 point											
Insulation meth	hod	Photo coupler insulat	ion										
Rated load vol	tage	DC 12 / 24V											
Operation load	l voltage range	DC 10.2 ~ 26.4V											
Max. load curr	ent	0.5A / 1point, 2A / 1C	OM (P4	0, P41:	0.1A /	1point)							
Off leakage cu	rrent	0.1 <sup>mA</sup> or less											
Max. inrush cu	irrent	4A / 10 $^{\mbox{ms}}$ or less											
Max. voltage d	lrop when On	DC 0.4V or less	DC 0.4V or less										
Surge absorbe	er	Zener diode	Zener diode										
Response	$Off\toOn$	1 ms or less											
time	$\text{On} \to \text{Off}$	1 ms or less (rated load, resistive load)											
Common meth	nod	4 point / COM											
Proper wire siz	ze	Stranded wire 0.3~0.75 mm <sup>*</sup> (external diameter 2.8 mm or less)											
External	Voltage	DC12/24V $\pm$ 10% (Ri	ople vol	tage 4 V	/p-p or	less)							
power	Current	25 MA or less (When	connect	ing DC2	24V)								
Operation indic	cator	LED On when Output	On										
External conne	ection method	24 point terminal bloc	k conne	ector(M3	3 X 6 sc	rew)							
Weight		470g											
	Circuit configu	uration	No.	Contact	No.	Contact		Ту	/pe				
∲ DC5V	-		TB2	PE	TB1	AC100				]			
	┲╼┤═╋		1 DZ		твз	~240V	TB2	PE	AC100	TB1			
내	ĽĽ →		TB4	COM0	TB5	40	тв4		~240∨	твз			
회 로		TB07 DC12/24V	TB6	COM1	105	40	TB6	COM0	P40	TB5			
	┲┰┤ᢁ᠆ᡛᢩᡟ		TB8	COM2	TB7	41	тва	COM1	P41	тв7			
	ĽĽĮ –				TB9	42	TB10	COM2	P42	тв9			
		TB09 DC12/24V	TB10	43	TB11	N	TB10	P43	N	TB11			
	╡┎╎ ╶╴╴╴╴╴	тв10	TB12	COM3	TD12	44		сомз	P44	TB13			
	╩┺┤╶┥	TB08	TB14	45	TB13	44	TB14	P45	P46	TB15			
		TB13	TB16	47	TB15	46	TB16	P47	NC	TB17			
	╔┲╦┙╧╋		1010	47	TB17	NC	TB18	NC	NC	тв19			
	Leo Leo	• TB12   ■ ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●	TB18	NC	TB19	NC	-TB20	NC	NC	TB21			
			TB20	NC			TB22	NC		TB23			
		TB11	TB22	NC	TB21	NC	TB24	24G	24V				
		└── Terminal no	TB24	24G	TB23	24V			$\bigcirc$	J			
				-									

## 7.3.22 XBC-DP30SU 12 point transistor output (Source type)

	Model			Main ur	nit								
Specification			XE	3C-DP3	0SU								
Output point		12 point											
Insulation met	hod	Photo coupler insulat	on										
Rated load vol	tage	DC 12 / 24V											
Operation load	l voltage range	DC 10.2 ~ 26.4V											
Max. load curr	ent	0.5A / 1point, 2A / 1CC	DM (P40	), P41: (	).1A / 1	point)							
Off leakage cu	irrent	0.1 mA (AC220V, 60 H	lz)										
Max. inrush cu	ırrent	4A / 10 $^{\mbox{ms}}$ or less											
Max. voltage d	Irop when On	DC 0.4V or less											
Surge absorbe	er	Zener diode	Zener diode										
Response	$Off\toOn$	1 ms or less	1 ms or less										
time	$\text{On} \to \text{Off}$	f 1 ms or less (rated load, resistive load)											
Common meth	nod	4 point / COM											
Proper wire siz	ze	Stranded wire 0.3~0.75 mm <sup>2</sup> (external diameter 2.8 mm or less)											
External	Voltage	DC12/24V ± 10% (Ri	DC12/24V $\pm$ 10% (Ripple voltage 4 Vp-p or less)										
power	Current	25 mA or less (When	connect	ing DC2	24V)								
Operation indic	cator	LED On when Output	On										
External conne	ection method	24 point terminal bloc	k conne	ector(M3	3 X 6 sc	rew)							
Weight		475g	n	1	1	1							
	Circuit configu	Iration	No.	Contact	No.	Contact	Туре						
DC5V		<sup>)5</sup>	TB2	PE	TB1	AC100	ТВ1						
	Ĩ Ĩ Ĩ		102		ТВ3	~240V	TB2 PF AC100						
부 · · · · · · · · · · · · · · · · · · ·		BC10 (DAU	TB4	COM0	TB5	40							
	╕ <u>╷</u> ┽╔┙╘ <mark>┇</mark>		TB6	COM1		_	TB6 COM1 P40 TB5						
	ᡱ┺╢ ┙─┝ᠠ <sup>ᠠ</sup>	· · ·	TB8	COM2	TB7	41	TB8 COM2 P41 TB7						
	тв	)9 DC12/24V			TB9	42	TB10 P43 TB9						
			TB10	43	TB11	Р	TB12 COM3 TB11						
		DC12/24V	TB12	COM3	<b>TD</b> 10		P44 TB13						
	╸ ╷┤╔┙╡┋ <mark>┇</mark> ╟╸		TB14	45	TB13	44	TB16 P45 TB15						
	Į ∠↓ª	12	TD40	47	TB15	46	TB18 NC TB17						
			TB16	47	TB17	NC	TB20 P48 TB19						
	┋┎║╴╱╿╚ <sup>┉</sup>		TB18	COM4	TB19	48	7822 P44 TB21						
	╧╧┦╶╌┥┲	18   <b>I</b> → → DC12/24V	TB20	49	1019	40	TB22 P4B TB23						
	тв	11	TB22	4B	TB21	4A	24G						
	i	— Terminal no			TB23	24V							
		10	TB24	24G									

## 7.3.23 XBC-DP40SU 16 point TR output (Source type)

Model			Main									
Specification		Х	BC-DF	P40SU								
Output point	16 point											
Insulation method	Photo-coupler insulation	n										
Rated load voltage	DC 12 / 24V											
Load voltage range	DC 10.2 ~ 26.4V											
Max. load current	0.5A / 1point, 2A / 1CC	DM (P4	0, P41	:0.1A	/ 1poir	nt)						
Off leakage current	0.1 <sup>mA</sup> or less											
Max. inrush current	4A / 10 ms or less											
Max. voltage drop when On	DC 0.4V or less											
Surge killer	Zener diode											
Response time $\frac{\text{Off} \rightarrow \text{On}}{\text{Off}}$	1 ms or less											
On $\rightarrow$ Off	1 ms or less (rated load	d, resis	tive lo	ad)								
Common method	4 point / COM	•										
Proper cable size	Stranded cable 0.3~0.7	tranded cable 0.3~0.75 mm (External diameter 2.8 mm or less)										
External Voltage		C12/24V ± 10% (ripple voltage 4 Vp-p or less)										
supply power Current	25 <sup>mA</sup> or less (when connecting DC24V)											
Operation indicator	LED On When Output		9-0	,								
External connection method	30 point terminal bloc		nector	(M3 X	6 scre	w)						
Weight	578g			<u> </u>		/						
Circuit config	Iration No. Contact No. Contact						Ту	ре				
	TB05			TB1			$\frown$					
		TB2	PE	TB3	AC100 ~240V	тв2	lacksquare	AC100	TB1			
	TB04 P TB07 DC12/24V	TB4	COMO	TB5	40	тв4	PE	~240V	твз			
		TB6	COM1			TB6	сомо	P40	TB5			
	TB06	TB8	COM2	TB7	41	TB8	COM1	P41	тв7			
	TB09 DC12/24V	TB 10	43	TB9	42	TB10	COM2	P42	тв9			
		TB 12	СОМЗ	TB11	N	TB12	P43	N	TB11			
	DC12/24V TB13	TB14	45	TB13	44	TB14	COM3 P45	P44	TB13			
		TB 16	47	TB15	46	TB16	P43	P46	TB15			
	TB12	TB 18	COM4	TB17	NC	TB18	COM4	NC	TB17			
	TB22	TB20	49	TB19	48	тв20	P49	P48	TB19			
	TB18	TB22	4B	TB21	4A	TB22	P4B	P4A	TB21			
	тв25	TB24	COM5	TB23	NC	TB24	COM5	NC	TB23			
		TB26	4D	TB25	4C	TB26	P4D	P4C	TB25			
	TB24    DC12/24V	TB28	4F	TB27	4E	TB28	P4F	P4E	TB27 TB29			
	TB11 Terminal no	TB30	24G	TB29	24V	TB30	24G	24V	1020			
								$\bigcirc$				

	Model			Main						
Specification			X	BC-DF	P60SU					
Output point		24 point	_							
Insulation metho		Photo-coupler insula	ation							
Rated load volta	0		DC 12 / 24V							
Load voltage rar		DC 10.2 ~ 26.4V			0.4.4	14	- ()			
Max. load currer		0.5A / 1point, 2A / 1	COM (P4	10, P41	: 0.1A	/ 1poir	nt)			
Off leakage curr		0.1 mA or less								
Max. inrush curr		4A / 10 ms or less								
Max. voltage dro	op when On	DC 0.4V or less								
Surge killer	<u> </u>	Zener diode								
Response time	$Off \rightarrow On$	1 ms or less								
	$On \rightarrow Off$	1 ms or less (rated le	oad, resis	stive lo	ad)					
Common metho		4 point / COM		-						
Proper cable siz		Stranded cable 0.3~		<b>`</b>			2.8 mm	or les	ss)	
	Voltage	DC12/24V ± 10% (r		<u> </u>	<u> </u>	r less)				
1171	Current	25 mA or less (when		ing DC	24V)					
Operation indica		LED On When Outp			(1.10.)	_				
External connec	tion method	42 point terminal b	DIOCK CON	nector	(M3 X	6 SCLE	W)			
Weight	Circuit config	636g	No		No.	1		<b>.</b>		
	Circuit config		No.	Contact		Contact		Ту	pe	1
P DC5V			TB2	PE	TB1	AC100		$\bigcirc$		TB1
	└─œ┤ <u>₽</u> ₽				TB3	~240V	TB2	PE	AC100 ~240V	твз
<sup>[</sup> ] <sub>4</sub>	I I I		TB4	COMO	TB5	40	тв4	сомо		165
부		TB04	TB6	COM 1			TB6		P40	TB5
로			TB8	COM2	TB7	41		COM1	P41	тв7
	╶╸┎┼╔╾╢═╬			-	TB9	42	TB8	COM2	P42	тв9
	EL _	твоб	TB10	43	TB11	N	TB10	P43	P42	TB11
		DC12/24V	TB12	СОМЗ			TB12	сомз	N	
			TB14	45	TB13	44	TB14		P44	TB13
	▁┼ᢩᢛ᠆ᡰᡦᢩᡟ			_	TB 15	46	7010	P45	P46	TB15
	III _		TB16	47	TB17	NC	TB16	P47	NC	TB17
		TB08	TB 18	COM4			TB18	сом4		тв19
			TB20	49	TB19	48	тв20	P49	P48	1010
	╶┓┎┼╍╌┤┋╋	7В16			TB21	4A	TB22		P4A	TB21
	[⊈⊾] ∠_		TB22	4B	TB23	NC		P4B	NC	TB23
		DC12/24V	TB24	COM5		-	TB24	COM5	P4C	тв25
			TB26	4D	TB25	4C	TB26	P4D		тв27
	┌┼╍╌┤┋┋	2			TB27	4E	TB28	P4F	P4E	
	िक्टी २५		TB28	4F	TB29	NC	TB30		NC	TB29
	╶╧╼┸┧╶╶┥		TB30	COM6				COM6	P50	TB31
		DC12/24V	TB32	51	TB31	50	TB32	P51	050	твзз
1 1 1	2	Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z			TB33	52	TB34	P53	P52	TB35
			TB34	53	TB35	NC	TB36	COM7	NC	
	, f=l		TB36	COM7	TB37		TB38		P54	TB37
	╶┎╌┙╘┋		1000							4
				55	1007	54		P55	P56	TB39
		TB36	TB38	55	TB39	54 56	ТВ40			TB39 TB41
				55 57			ТВ40 ТВ42		P56 24V	

## 7.3.24 XBC-DP60SU 24 point TR output (Source type)

# 7.4 Digital Input Module Specification

## 7.4.1 8 point DC24V input module (Source/Sink type)

	Model		DC input r	nodule				
Specification			XBE-DC08A					
Input point		8 point	8 point					
Insulation me	ethod	Photo coupler insulation						
Rated input v	/oltage	DC24V						
Rated input of	current	About 4 mA						
Operation vo	ltage range	DC20.4~28.8V (ripple rate	< 5%)					
On Voltage/C	Current	DC19V or higher / 3 <sup>mA</sup> or	higher					
Off Voltage/C	Current	DC6V or less / 1 mA or less	;					
Input resistar	nce	About 5.6 <sup>k</sup> Ω						
Response time	$\begin{array}{c} \text{Off} \rightarrow \text{On} \\ \text{On} \rightarrow \text{Off} \end{array}$	1/3/5/10/20/70/100 ms(set b	by CPU pa	arameter) D	Default: 3 ms			
Insulation pre	essure	AC560Vrms / 3Cycle (altitu	ide 2000m	ו)				
Insulation res	sistance	10 $^{M\Omega}$ or more by Megohm	meter					
Common me	thod	8 point / COM						
Proper cable	size	Stranded pair 0.3~0.75 mm <sup>2</sup>	(External	diameter 2	.8 mm or less)			
Current cons	umption	30 mA (when all point On)						
Operation inc	dicator	Input On, LED On						
External con method	nection	10 point terminal block cor	nector					
Weight		52 g						
	Circuit co	nfiguration	No.	Contact	Туре			
			TB2	0				
Г		<del></del>	TB2	1	тв1 [[]			
			TB3	2	TB2			
5			TB4	3	TB3 <b>F</b>			
7 TBB TBB TBB TBB TBB TBB			TB5	4				
				5	твб [			
DC24V			TB7	6	TB7			
	Terminal block no.		TB8	7	ТВ8 <b>СО</b> ТВ9 <b>СО</b>			
			TB9	СОМ	тв10			
			TB10	СОМ				

	Model	DC input module					
Specification		XBE-DC16A			XBE-DC16B		
Input point		16 point					
Insulation met	hod	Photo coupler insula	tion				
Rated input vo	ltage	DC24V			DC12/24V		
Rated input cu	rrent	About 4 mA			About 4/8 mA		
Operation volta	age range	DC20.4~28.8V (ripple rate < 5%)			DC9.5~30V (ripple rate < 5%)		
On Voltage/Cu	irrent	DC19V or higher higher	/ 3 mA		DC9V or higher / 3 <sup>mA</sup> or higher		
Off Voltage/Cu	irrent	DC6V or less / 1 mA	or less		DC5V or less / 1 mA or less		
Input resistance	e	About 5.6 k			About 2.7 kΩ		
Response	$\text{Off} \to \text{On}$	1/2/5/10/20/70/100 m	s (aat b		paramatar) Dafault: 2 ms		
time	$\text{On} \to \text{Off}$		ະ (ຣະເມ		parameter) Default: 3 ms		
Insulation pres	sure	AC560Vrms / 3Cycle	e (altitud	e 2000	m)		
Insulation resis	stance	10 $^{M\Omega}$ or more by Me	egohmm	eter			
Common meth	nod	16 point / COM					
Proper cable s	ize	Stranded cable 0.3~0.75 mm <sup>*</sup> (External diameter 2.8 mm or less)					
Current consu	mption	40 mA (when all poin	t On)				
Operation indic	cator	Input On, LED On					
External conne	ection method	8 pin terminal block	connecto	or + 10	pin terminal block connector		
Weight		53 g					
	Circuit configu	Iration No. Contact		ct Type			
			TB1	0			
			TB2	1			
			TB3	2			
			TB4	3	TB4		
			TB5	4	TB5		
			TB6	5	тв6		
		<b>A A</b>	TB7	6	TB7		
тв1		Photo coupler	TB8	7			
		<u><u></u><u></u><u></u></u>	TB1	8	TB1		
7	R ¦▼ I '	Internal	TB2	9	ТВ2		
TB9			TB3	A	ТВЗ 🔼		
Сом		TB4	В	TB4			
DC24V		TB5	С	TB5			
' <u></u> ⊤	erminal block no.		TB6	D	TB6		
			TB7	E			
			TB8	F			
			TB9	COM			
			TB10	CON			

## 7.4.2 16 point DC24V input module (Sink/Source type)

## 7.4.3 32 point DC24V input module (Source/Sink type)

Model		D	C input n	nodule		
Specification	XBE-DC32A					
Input point	32 point					
Insulation method	Photo coupler insul	ation				
Rated input voltage	DC24V					
Rated input current	About 4 mA					
Operation voltage range	DC20.4~28.8V (rip	ole rate	< 5%)			
Input Derating	Refer to Derating d	iagram				
On Voltage/Current	DC 19V or higher /	3 mA o	r higher			
Off Voltage/Current	DC 6V or less / 1 m/	<sup>↓</sup> or les	s			
Input resistance	About 5.6 kΩ		-			
Response $Off \rightarrow On$						
time $On \rightarrow Off$	1/3/5/10/20/70/100 m	ns (set l	by CPU p	aramet	er) Defau	ult:3 ms
Insulation pressure						
Insulation resistance	10 MΩ or more by Megohmmeter					
Common method	32 point / COM					
Proper cable size	0.3 mm <sup>*</sup>					
Current consumption	50 <sup>mA</sup> (when all point On)					
Operation indicator	Input On, LED On					
External connection method	40 pin connector					
Weight	60g					
Circuit configur	ation	No.	Contact	No.	Contact	Туре
		B20	00	A20	10	
		B19	01	A19	11	
		B18	02	A18	12	
		B17 B16	03 04	A17	13 14	B19 A20
	circuit	B15	04	A16 A15	14	B18 A18 B17 A17
DC24V Terminal block no.		B14	06	A14	16	B16 • A16
Input Derating diagram		B13	07	A13	17	B15 A15
	<u>, , , <b>€</b> ,</u>	B12	08	A12	18	B13 A13
90	<u> </u>	B11	09	A11	19	B12 • • A12 B11 • • A11
80 80	DC28.8V	B10	0A	A10	1A	B10 A10
	┝┼┼┼┦	B09	0B	A09	1B	B09 A09 B08 A08
07 (%) 00 U U U U U U U U U U U U U U U U U U	$\left  + + + + - \right $	B08	0C	A08	1C	B07
	$\left  + + + + \right  \qquad  $	B07	0D	A07	1D	B06 A06 B05 A05
40 40 10 20 30	 40 50 55 ℃	B06	0E	A06	1E	B04 A04
Ambient tempera		B05	0F	A05	1F	B03 A03 B02 A02
		B04	NC	A04	NC	B01 A01
		B03	NC	A03	NC	
		B02	COM	A02	COM	
		B01	COM	A01	COM	

# 7.5 Digital Output Module Specification

## 7.5.1 8 point relay output module

	Model	Relay	output moc	lule		
Specificatio	on	XBE-RY08A				
Output point		8 point				
Insulation m	ethod	Relay insulation				
Rated load voltage / Current		DC24V 2A (Resistive load) / AC220V 2A (COS $\Psi$ = 1), 5A/COM				
Min. load vo	Itage/Current	DC5V / 1 mA				
Max. load vo	oltage/Current	AC250V, DC125V				
Off leakage	current	0.1 mA (AC220V, 60 Hz)				
Max. On/Off	frequency	3,600 times/hr				
Surge absor	ber	None				
	Mechanical	20 millions times or more				
		Rated load voltage / current 10	00,000 tim	es or more		
Service life	Flootrical	AC200V / 1.5A, AC240V / 1A	(COSΨ = (	0.7) 100,00	0 times or more	
	Electrical	AC200V / 1A, AC240V / 0.5A	(COSΨ = (	0.35) 100,00	00 times or more	
		DC24V / 1A, DC100V / 0.1A (I	L / R = 7 ms	₃) 100,000	times or more	
Response	$Off \rightarrow On$	10 ms or less				
time	$On \rightarrow Off$	12 ms or less				
Common me	ethod	8 point / COM				
Proper cable	e size	Stranded cable 0.3~0.75 m <sup>*</sup> (External diameter 2.8 m or less)				
Current cons	sumption	230 MA (when all point On)				
Operation in	dicator	Output On, LED On				
External con	nection method	9 point terminal block connect	or			
Weight		80g				
	Circuit co	onfiguration	No.	Contact	Туре	
			TB1	0		
e	DC5V		TB2	1		
		TD1	TB3	2	TB1	
			TB4	3		
cir			TB5	4	TB4	
			TB6	5	TB6	
				6	тва	
		Terminal block NO.	TB8	7	ТВ9	
			TB9	СОМ		

	Model	Relay output module				
Specificati	on		XBE-RY08E	3		
Output poin						
Insulation m		Relay insulation				
Rated load		•		(000)		
Current	-	DC24V 2A (Resistive load) /	AC220V 2A	$(COS\Psi = 1)$	I), 2A/COM	
	oltage/Current	rent DC5V / 1 <sup>mA</sup>				
Max. load voltage/Cur	ront	AC250V, DC125V				
Off leakage		0.1 mA (AC220V, 60 Hz)				
Max. On/Of		3,600 times/hr				
Surge abso		None				
ourge abou	Mechanical	20 millions times or more				
	Weenamear	Rated load voltage / current	100 000 tim	es or more		
Service		AC200V / 1.5A, AC240V / 1A			) times or more	
life	Electrical	AC200V / 1A, AC240V / 0.5A	•			
		DC24V / 1A, DC100V / 0.1A		, .		
Response	$Off \rightarrow On$	10 ms or less	<u>,                                     </u>	, .,		
time	$On \rightarrow Off$	12 ms or less				
Common m		1 point / COM				
Proper cable size Stranded cable 0.3~0.75 m <sup>2</sup> (External diameter 2.8 m or less)				<sup>nm</sup> or less)		
Current consumption 230 <sup>mA</sup> (when all point On)				,		
Operation indicator Output On, LED On						
External connection 9 point terminal block connector x 2						
method						
Weight		81g		o o officia i		
	Circuit o	configuration	No.	configu ration	No.	
			TB1	0		
			TB2	COM0		
<del>¢</del>	DC5V		TB3	1	TB2	
			TB4	COM1		
$ $ $\Psi$	1		TB5	2	TB5	
			TB6	COM2	тва	
			TB7	3		
		TB2	TB8	COM3	TB8	
		>   >	TB9	NC		
Inte circ	rnal C		TB1	4	TB1	
			TB2	COM4	TB2	
	│ ŧ∰ °		TB3	5		
			TB4	COM5	TB5	
			TB5	6	твб 📮	
		Terminal no.	TB6	COM6		
			TB7	7	TB8 20	
			TB8	COM7	ТВ9	
			TB9	NC		

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## 7.5.2 8 point relay output module (Independent point)

### 7.5.3 16 point relay output module

	Model	Rel	ay output m	odule			
Specificatio	n		XBE-RY16	5A			
Output poin		16 point					
Insulation m		Relay insulation					
	voltage/ current	DC24V 2A (Resistive load)	) / AC220V	2A (COSΨ	= 1), 5A/COM		
	oltage/current	DC5V / 1 mA	,	Υ	,,		
	oltage/current	AC250V, DC125V					
Off leakage	-	0.1 mA (AC220V, 60 Hz)					
Max. On/Of		3,600 times/hr					
Surge abso		None					
	Mechanical	20 millions times or more					
		Rated load voltage / currer	nt 100,000 t	imes or moi	re		
Service		AC200V / 1.5A, AC240V /					
life	Electrical	AC200V / 1A, AC240V / 0.		,			
		DC24V / 1A, DC100V / 0.1	,	,			
Response	$Off \rightarrow On$	10 ms or less	, , , , , , , , , , , , , , , , , , ,	, ,			
time	$On \rightarrow Off$	12 ms or less					
Common m	ethod	8 point / COM					
Proper cabl	e size	Stranded cable 0.3~0.75 m <sup>®</sup> (External diameter 2.8 m <sup>®</sup> or less)					
Current consumption 420 <sup>mA</sup> (when all point On)					,		
Operation in		Output On, LED On	·				
-	nnection method	9 point terminal block conr	nector x 2 ea	а			
Weight		130g					
	Circuit con		No.	Contact	Туре		
			TB1	0			
			TB2	1			
¢	DC5V		TB3	2	TB2		
			TB4	3	TB4		
$   \Psi$	)		TB5	4	TB5		
			TB6	5	твб		
Inter			TB7	6	TB7		
circu			TB8	7			
			TB9	COM	ТВ9		
			TB1	8	TB1		
			TB2	9	TB2		
		Terminal block no.	TB3	A			
			TB4	В	TB4 TB5		
			TB5	С	TB6		
			TB6	D	TB7		
			TB7	E	тва 📴		
			TB8	F	TB9		
			TB9	COM			

## 7.5.4 8 point transistor output module (Sink type)

	Model	Transist	or output	module			
Specification	1	XI	BE-TN08	A			
Output point		8 point					
Insulation me	ethod	Photo coupler insulation					
Rated load vo	oltage	DC 12 / 24V					
Load voltage	range	DC 10.2 ~ 26.4V					
Max. load vol	ltage	0.5A / 1 point					
Off leakage c	current	0.1 mA or less					
Max. inrush c	current	4A / 10 ms or less					
Max. voltage	drop (On)	DC 0.4V or less					
Surge absorb	ber	Zener Diode					
Response	$Off \rightarrow On$	1 ms or less					
time	$On \rightarrow Off$	1 ms or less (Rated load, resis	stive load	)			
Common method 8 point / COM							
Proper cable	size	Stranded cable 0.3~0.75 mm <sup>2</sup> (	External diameter 2.8 mm or less)				
Current cons	Current consumption 40 <sup>mA</sup> (when all point On)						
External	Voltage	DC12/24V ± 10% (ripple voltage 4 Vp-p or less)					
power supply	Current	10 mA or less (DC24V connect	ion)				
Operation inc	licator	Output On, LED On					
External conr method	nection	10 point terminal block connect	ctor				
Weight		53					
	Circuit co	nfiguration	No.	Contact	Туре		
			TB01	0			
🕈 DC5V			TB02	1	тво1		
			TB03	2			
			TB04	3	твоз		
Internal circuit			TB05	4	TB04		
			TB06	5	твоб		
		TB09	TB07	6	TB07		
		TB10	TB08	7	твоэ		
L		DC12/24V	TB09	DC12 /24V	TB10		
		reminar bock ho.	TB10	COM			

7.5.5 16 point transistor	r output module	(Sink type)
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	Model		Transist	or output m	odule	
Specification		XBE-TN16A				
Output point		16 point				
Insulation meth	nod	Photo co	oupler insulation			
Rated load voltage		DC 12 / 24V				
Load voltage ra	ange	DC 10.2	~ 26.4V			
Max. load volta	age	0.5A / 1	point, 2A / 1COM			
Off leakage cu	rrent	0.1 <sup>mA</sup> c	r less			
Max. inrush cu	rrent	4A / 10	ns or less			
Max. voltage d	rop (On)	DC 0.4\	′ or less			
Surge absorbe	r	Zener D	iode			
Response	$\text{Off} \to \text{On}$	1 ms or	less			
time	$\text{On} \to \text{Off}$	1 ms or	less (Rated load, resis	stive load)		
Common meth	od	16 point	/ COM			
Proper cable s	ize	Strande	d cable 0.3~0.75 🔤 (	External dia	ameter 2.8 🛚	™ or less)
Current consur	mption	60 mA (v	vhen all point On)			
External	Voltage	DC12/24	$4V \pm 10\%$ (ripple volta	age 4 Vp-p	or less)	
power supply	Current	10 <sup>mA</sup> or	less (DC24V connect	tion)		
Operation indic	cator	Output (	Dn, LED On			
External conne	ection method	8 pin ter	minal block connecto	r + 10 pin te	erminal bloc	k connector
Weight		54 g				
	Circuit cor	nfiguration		No.	Contact	Туре
				TB01	0	тво1
			_	TB02	1	TB02
↔ DC5	N/			TB03 TB04	2	твоз 🛄
	v		TB01	TB04	4	TB04 TB05
				TB06	5	TB05
	<u> </u>	┤╤╬		TB07	6	твот
Internal		╵╾╋┘		TB08	7	TB08
circuit	I (I L)	$\geq$		TB01	8	
		$\searrow$	TB08	TB02	9	TB01
				TB03	А	TB03
	L		ТВ09	TB04	В	TB04
			TB10 .	TB05	С	TB05
		L		TB06	D	твоб 📑
			DC12/24V	TB07	E	твот 🖃
			Terminal block no.	TB08	F DC12	TB08
				TB09	/24V	TB09
				TB10	COM	

## 7.5.6 32 point transistor output module (Sink type)

	Model	Transistor output module						
Specification		XBE-TN32A						
Output point		32 point						
Insulation method Photo coupler insulation			า					
Rated load voltag	e	DC 12 / 24V						
Load voltage rang	le	DC 10.2 ~ 26.4V						
Max. load voltage		0.2A / 1 point, 2A / 1COM						
Off leakage curre		0.1 <sup>mA</sup> or less						
Max. inrush curre		0.7A / 10 ms or less						
Max. voltage drop	(On)	DC 0.4V or less						
Surge absorber	· · /	Zener Diode						
	$Off \rightarrow On$	1 ms or less						
Response time	$On \rightarrow Off$	1 ms or less (Rated load	d. resis	tive loa	d)			
Common method		32 point / COM	.,		.,			
Proper cable size		0.3 mm <sup>2</sup>						
Current consumpt	ion	120 <sup>mA</sup> (when all point )	On)					
	Voltage	DC12/24V ± 10% (rippl	,		-n or le	(SC)		
External power supply	Current	20 <sup>mA</sup> or less (DC24V c				:55)		
Operation indicate		Output On, LED On	Jineci	1011)				
External connection		-						
		40 pin connector						
Weight		60g		Conta		Conta	Туре	
	Circuit configur	ation	No.	ct	No.	ct	туре	
			B20	00	A20	10		
♥ DC5V			B19	01	A19	11 12	гал	
	_	B20	B18 B17	02 03	A18 A17	12	B20 A20	
			B16	04	A16	14	B18 A19 A18	
	╞╌╦╴╙╝╵╒╼┋		B15	05	A15	15	B17 A17 B16 A16	
linternal circuit			B14	06	A14	16	B15 A15	
		<u>A05</u>	B13	07	A13	17	B14 A14	
			B12	08	A12	18	B13 A13 B12 A12	
		B01.B02	B11	09	A11	19	B11 D D A11 B10 D D A10	
		A01,A02	B10	0A	A10	1A	B09 A09	
		DC12/24V	B09	0B	A09	1B	B08 A08 A07	
		Terminal block no.	B08	0C	A08	1C	B06 A06	
			B07	0D	A07	1D	B05 9 A05 B04 9 A04	
			B06	0E	A06	1E	B03 A03	
			B05	0F	A05	1F	B02 A02 A01	
			B04	NC	A04	NC		
			B03	NC	A03	NC		
			B02	DC12/	A02	СОМ		
			B01	24V	A01			

	Model	Transis	tor output	module				
Specification		XBE-TP08A						
	it point	8 point						
Insulatio	n method	Photo coupler insulation						
Rated loa	ad voltage	DC 12 / 24V	DC 12 / 24V					
Load volta	age range	DC 10.2 ~ 26.4V	DC 10.2 ~ 26.4V					
Max. loa	d voltage	0.5A / 1 point						
Off leaka	ge current	0.1 <sup>mA</sup> or less						
Max. inru	sh current	4A / 10 ms or less						
Max. voltag	e drop (On)	DC 0.4V or less						
Surge a	bsorber	Zener Diode						
Response	$\text{Off} \to \text{On}$	1 ms or less						
time	$\text{On} \to \text{Off}$	1 ms or less (Rated load, resi	stive load	)				
Commo	n method	8 point / COM						
Proper c	Proper cable size Stranded cable 0.3~0.75 mm <sup>2</sup>			(external diameter 2.8 mm or less)				
Current co	onsumption	40 mA (when all outputs are c	on)					
External	Voltage	DC12/24V ± 10% (ripple voltage 4 Vp-p or less)						
power	Current	10 mA or less (when connecti	ng DC24\	/)				
•	n indicator	LED on when output on	D on when output on					
	connection thod	10 pin terminal block connect	tor					
We	ight	30g						
	Circuit co	onfiguration	No.	Contact	Туре			
			TB01	0				
DC5V		ТВ09	TB02	1				
			TB03	2	TB01			
Internal		TB10	TB04	3	твоз			
circuit			TB05	4	TB04			
			TB06	5	твоб			
			TB07	6	TB07			
		LTB01	TB08	7	TB09			
		Terminal block no.	TB09	СОМ	ТВ10			
		DIUCK TIU.	TB10	0V				

## 7.5.7 8 point transistor output module (Source type)

	Model	output module						
Creation		E-TP16A						
Specification Output								
Insulation	-	16 point Photo coupler insulation						
Rated loa		DC 12 / 24V						
Load volta	-	DC 10.2 ~ 26.4V						
Max. load		0.5A / 1 point, 2A / 1COM						
Off leakag	•	0.1 <sup>mA</sup> or less						
Max. inrus	-	4A / 10 ms or less						
		DC 0.4V or less						
Max. voltage		Zener Diode						
Surge al								
Response time	$Off \rightarrow On$	1 ms or less	· · · · · · · · · · · · · · · · · · ·					
	$On \rightarrow Off$	1 ms or less (Rated load, resist	ive load)					
Common		16 point / COM						
Proper ca		Stranded cable 0.3~0.75 m <sup>2</sup> (e		meter 2.8 m	m or less)			
Current co	-	60 mA (When all outputs are on						
External	Voltage	DC12/24V ± 10% (ripple voltag		r less)				
power	Current	10 mA or less (connecting DC2	4V)					
Operation		LED On when output On						
External conne	ection method	8 pin terminal block connector + 10 pin terminal block connector						
Wei	ight	40g						
	Circuit co	onfiguration	No.	Contact	Туре			
			TB01	0	тво1			
	,		TB02	1	тво2 🛄			
DC5V		ТВ09	TB03 TB04	2 3	твоз 🖳			
LED 🗶		DC12/24V	TB04	4				
Internal	-	TB10	TB06	5				
circuit		ТВ08	TB07	6	TB06			
			TB08	7	твоя			
			TB01	8	<u></u>			
			TB02	9				
		TB03	А					
		TB04	В					
		Terminal	TB05	С	TB04			
		block no.	TB06	D	твоб			
			TB07	E	твот			
			TB08	F	твов			
			TB09	СОМ	твоя			
			TB10	0V	тв10			

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## 7.5.8 16 point transistor output module (Source type)

	Model	Transistor output module								
Specification			XI	BE-TP3	2A					
Output	point	32 point								
Insulation	-	Photo coupler insulation	on							
Rated load		DC 12 / 24V	-							
Load volta	_	DC 10.2 ~ 26.4V								
Max. load		0.2A / 1 point, 2A / 1COM								
Off leakag	-	0.1 mA or less								
Max. inrus		4A / 10 ms or less								
Max. voltage	e drop (On)	DC 0.4V or less								
Surge at		Zener Diode								
	$Off \rightarrow On$	1 ms or less								
Response time	$On \rightarrow Off$	1 ms or less (Rated load, resistive load)								
Common	method	32 point / COM								
Proper ca	able size	0.3 mm²								
Current cor	nsumption	120 mA (When all outputs are on)								
Voltage		DC12/24V ± 10% (ripple voltage 4 Vp-p or less)								
External power	Current	20 mA or less (connect	ing DC	24V)						
Operation	indicator	LED On when output On								
External conne	ection method	40 pin connector								
Wei	ght	60g								
	Circuit configura	ition	No.	Contact	No.	Contact	Туре			
			B20	00	A20	10				
			B19	01	A19	11				
			B18 B17	02 03	A18 A17	12 13	в20	A20		
		B02,B01	B17 B16	03	A17 A16	14	B19	A19		
	Ĭ	DC12/24V	B15	05	A15	15		A18 A17		
Internal	ר   ר	A02,A01	B14	06	A14	16		A16 A15		
circuit	¥ K)	A05	B13	07	A13	17	B14 🛛 🖷 🖷	A14		
			B12	08	A12	18	B13 B12	A13 A12		
			B11	09	A11	19	B11	A11		
			B10	0A	A10	1A	B10 B09	A10 A09		
	└──®─┤╪╸		B09	0B	A09	1B	B08	A08		
	L	B20	B08	0C	A08	1C	B07 B06	A07 A06		
			B07	0D	A07	1D	B05	A05		
		Connector	B06	0E	A06	1E	B04 B03	A04 A03		
		No.	B05	0F	A05	1F	B02	A03 A02		
			B04	NC	A04	NC	B01 <b>H</b>	A01		
			B03	NC	A03	NC				
			B02	СОМ	A02	٥V				
			B01	0.0111	A01					

# 7.5.9 32 point transistor output module (Source type)

## 7.6 Combined Digital I/O module Input Specification 7.6.1 8 point DC24V input (Source/Sink type)

	Model	DC input module						
Specificatio	on		XBE-DF	R16A				
Input	point	8 point						
Insulation	n method	Photo coupler insulation						
Rated inp	ut voltage	DC24V						
Rated inp	out current	About 4 mA						
Operation ve	oltage range	DC20.4~28.8V (within rippl	e rate 5%	e rate 5%)				
On Voltag	ge/Current	DC19V or higher / 3 mA or	higher					
Off Voltag	ge/Current	DC6V or less / 1 mA or less	;					
Input re	sistance	About 5.6 kΩ						
Response	$Off\toOn$	1/3/5/10/20/70/100 ʰs(set b	v CPU na	arameter) [	)efault: 3 ms			
time	$\text{On} \to \text{Off}$							
Insulation	pressure	AC560Vrms / 3Cycle (altitude 2000m)						
Insulation	resistance	10 M <sub>Ω</sub> or more by Megohmmeter						
Commor	n method	8 point / COM						
Proper c	able size	Stranded cable 0.3~0.75 mm <sup>*</sup> (External diameter 2.8 mm or less)						
Current co	nsumption	280 mA (When all inputs and outputs are on)						
	n indicator	LED on when input on						
	connection hod	9 pin terminal block connector						
We	ight	81g						
	Circuit co	onfiguration	No.	Contact	Туре			
			TB1	0				
Г		<del>♀</del> DC5V <del>♀</del>	TB2	1	TB1			
			TB3	2	TB2			
			TB4	3	TB3 TB4			
			TB5	4				
Г П В9		circuit	TB6	5	твб 🖳			
DC24V			TB7	6				
	-Terminal block no.		TB8	7	TB8 TB9			
			TB9	СОМ				

Model	C	C input n					
			XBE-DN	32A			
Input point	16 point						
Insulation method	Photo coupler insu	lation					
Rated input voltage	DC24V						
Rated input current	About 4 mA						
Operation voltage range	,		e < 5%)				
Input Derating	Refer to Derating diagram						
On Voltage/Current	DC 19V or higher /						
Off Voltage/Current	DC 6V or less / 1 m	A or les	S				
Input resistance	About 5.6 kΩ						
ResponseOff $\rightarrow$ OntimeOn $\rightarrow$ Off	1/3/5/10/20/70/100 ms (set by CPU parameter) Default:3 ms						
Insulation pressure	AC 560Vrms / 3 Cy	vcle (a	ltitude 20	00m)			
Insulation resistance	10 MΩ or more by M			,			
Common method	16 point / COM	-					
Proper cable size	0.3 mm <sup>2</sup>						
Current consumption	60 mA (When all in	nputs ar	nd outputs	s are on	)		
Operation indicator	Input On, LED On						
External connection method	40 pin connector						
Weight	60g						
Circuit configura		No.	Contact	No.	Contact	Туре	
-		B20	00	A20	20		
	<del>\</del> <del>\</del>	B19	01	A19	21		
		B18	02	A18	22		
	h, Internal	B17	03	A17	23	B20 B19 A	
	circuit	B16	04	A16	24	B18	
DC24Mput Derating diagram	·	B15	05	A15	25	B17 B A A	
		B14	06	A14	26	B15	
90	+++	B13	07	A13	27	B14 A B13 A	
⊗ 80	+++\	B12	08	A12	28	B12 A A	
	+++	B11	09	A11	29	B10	
00 Jage	++++	B10	0A	A10	2A	B09 A B08 A	
		B09	0B	A09	2B	B07 • • A	
40 40 10 20 30	40 50 55 💭	B08	0C	A08	2C	B06 A B05 A	
Ambient te	mperature	B07	0D	A07	2D	B04 A B03 A	
		B06	0E	A06	2E	B02	
		B05	0E 0F	A05	2E 2F		
		B03	NC	A03	P		
		B04	NC	A04 A03	P		
		B03	IN_COM	A03	OUT_CO		
					M OUT_CO		
		B01	IN_COM	A01	M		

## 7.6.2 16 point DC24V input (Source/Sink type)

# 7.7 Combined Digital I/O module Output Specification

## 7.7.1 8 point relay output

	Model	Relay output module							
Specification	n	XBE	-DR16A						
	out point	8 point							
Insulatio	on method	Relay insulation							
	ed load / Current	DC24V 2A(Resistive load) / AC220V 2A(COS $\Psi$ = 1), 5A/COM							
Min. load vo	oltage/Current	DC5V / 1 mA							
Max. loa	ad voltage	AC250V, DC125V							
Off leaka	age current	0.1 mA (AC220V, 60 Hz)							
Max. On/C	Off frequency	3,600 times/hr							
Surge	absorber	None							
	Mechanical	20 millions times or more							
		Rated load voltage / current 100,	000 times	or more					
Service life	Flectrical	AC200V / 1.5A, AC240V / 1A (C	OSΨ = 0.7	) 100,000	times or more				
inc	Electrical	AC200V / 1A, AC240V / 0.5A (C	OSΨ = 0.3	5) 100,000	) times or more				
		DC24V / 1A, DC100V / 0.1A (L / R = 7 ms) 100,000 times or more							
Response	$Off\toOn$	10 ms or less							
time	$\text{On} \to \text{Off}$	12 ms or less							
Commo	on method	8 point / COM							
Proper	cable size	Stranded cable 0.3~0.75 mm <sup>2</sup> (external diameter 2.8 mm or less)							
Current c	onsumption	280 mA (When all inputs and outputs are on)							
Operatio	n indicator	LED on when output on							
	connection ethod	9 pin terminal block connector							
W	eight	81g							
	Circui	t configuration	No.	Contact	Туре				
			TB1	0					
	<del>Q</del> DC5V		TB2	1	TB1				
LED			TB3	2	TB2				
			TB4	3	TB3				
	circuit		TB5	4	TB5				
			TB6	5	TB6				
			TB7	6	тва				
		Terminal	TB8	7	ТВ9				
		block no.	TB9	СОМ					

7.7.2 16 poi	Model	output (Sinκ type) Tr	ansisto	or output	modu	le			
Specification				E-DN32					
Output point		16 point							
Insulation method		Photo coupler insulation	า						
Rated load voltage	)	DC 12 / 24V							
Load voltage rang	e	DC 10.2 ~ 26.4V							
Max. load voltage		0.2A / 1 point, 2A / 1COM							
Off leakage curren	ıt	0.1 mA or less							
Max. inrush currer	nt	0.7A / 10 ms or less							
Max. voltage drop	(On)	DC 0.4V or less							
Surge absorber		TVS Diode							
Description	$Off \rightarrow On$	1 ms or less							
Response time	$On \rightarrow Off$	1 ms or less (Rated los	ad, res	istive lo	ad)				
Common method		16 point / COM							
Proper cable size		0.3 mm²							
Current consumpti	on	60 mA (When all inputs	and o	utputs a	re on)				
External power	Voltage	DC12/24V ± 10% (ripp	ple voltage 4 Vp-p or less)						
supply	Current		20 mA or less (DC24V connection)						
Operation indicato	r	Output On, LED On							
External connection	n method	40 pin connector							
Weight		60g							
	Circuit configura	ation	No.	Conta	No.	Contac	Туре	Э	
			B20	ct 00	A20	t 20			
<b></b>			B19	01	A19	21			
₽ DC5V			B18	02	A18	22			
	_	A20	B17	03	A17	23	B20	A20	
$  \Psi$	ر الح		B16	04	A16	24	B19 B18	A19 A18	
	▁┌──ऀऀऀ॑॑॑॑॑॑		B15	05	A15	25	B17	A17	
Internal			B14	06	A14	26	B16	A16	
circuit		A05	B13	07	A13	27	B15 B14	A15 A14	
			B12	08	A12	28	B13	A13	
		A02 A04	B11	09	A11	29	B12	A12	
	L	A03,A04	B10	0A	A10	2A	B11 B10		
		A01,A02	B09	0B	A09	2B	B09	A10 A09	
		DC12/24V	B08	00	A08	2C	B08 B07	A08	
	Terminal block no.	B07	0D	A07	2D	B06	A07 A06		
			B06	0E	A06	2E	B05 🗖 🗖	A05	
			B05	0F	A05	2F	B04 B03	A04 A03	
			B04	NC	A04	P	B02	A03 A02	
			B03	NC	A03 A02	P OUT_CO	B01	A01	
			B02 B01	IN_COM IN_COM	A02 A01	M OUT_CO			
			DUI		AUT	M			

#### 7.7.2 16 point transistor output (Sink type)

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## 7.8 IO Wiring by Using Smart Link Board

#### 7.8.1 Smart link board

Easy wiring is available by connecting the IO connector with smart link board. The available smart link and IO cable are as follows.

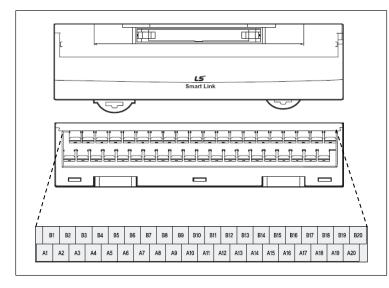
X	GB	Smart	link	Connection cable				
Item	Model	Model	No. of Pin	Model	Length	Contents		
Main unit	XBM- DN32S XBM- DN16S	SLP- T40P	40	SLT-CT101- XBM	1m	For main unit connection (20Pin + 20Pin)		
	XBE- DC32A	SLP- T40P	40	SLT-CT101- XBE	1m	For expansion module		
Expansion		SLP- T40P	40	SLT-CT101- XBE	1m	connection (40Pin)		
module	XBE- TN32A	SLP- RY4A	40	SLP-CT101- XBE	1m	For expansion module connection (40Pin) Exclusive for relay built-in SLP type		

It describes wring of XGB, SLP-T40P and SLT-CT101-XBM.

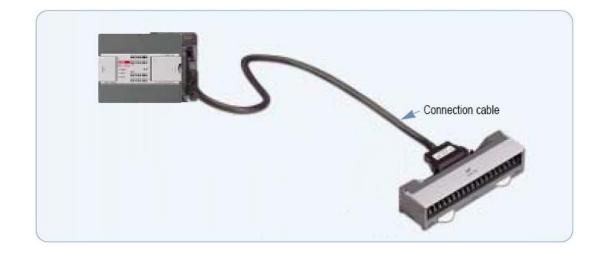
For wring of other smart link boards or XGB extension module, refer to XGB user manual for hardware.

1) SLT-T40P terminal array

Terminal array of SLP-T40P is as follows.



Item	Specification
Rated voltage	AC/DC 125[V]
Rated current	Max. 1[A]
Withstanding voltage	600V 1min
Insulation resistor	100 № (DC500V)
Cable specification	1.25[mm] or below
Terminal/screw	M3 X 8L
Torque	6.2 kgf.cm or above
Terminal material	PBT, UL94V-0
Weight	186g



2) Wiring of SLT-T40P and XGB extension modulet Wiring of XGB extension module through SLP-T40P and SLT-CT101-XBE is as follows.

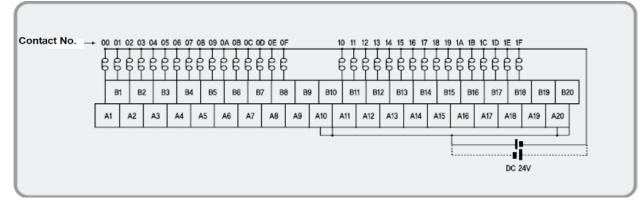
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At this time, relationship of XGB IO signal and Smart link board terminal number is as follows. The following figure describes signal allocation when SLT-CT101-XBE is used as connection cable. When the user makes the cable, make sure that wring is done as figure below.

			PLC									Terminal block Name		
Γ		1	Pin No.		XBE-	DC32A	XBE-1	'N32A	XBE-	TP32A	Terminal b (SLP-	lock board •T40P)		
			B20	A20	00	10	00	10	00	10	A1	A11		
	ΗЦ		B19	A19	01	11	01	11	01	11	B1	B11		
B20 B19		A20 A19	B18	A18	02	12	02	12	02	12	A2	A12		
B18		A18	B17	A17	03	13	03	13	03	13	B2	B12		
B17		A17	B16	A16	04	14	04	14	04	14	A3	A13		
B16 B15		A16 A15	B15	A15	05	15	05	15	05	15	B3	B13		
B14		A14	B14	A14	06	16	06	16	06	16	A4	A14		
B13 B12		A13 A12	B13	A13	07	17	07	17	07	17	B4	B14		
B11		A11	B12	A12	08	18	08	18	08	18	A5	A15		
B10 B09		A10 A09	B11	A11	09	19	09	19	09	19	B5	B15		
B09		A09 A08	B10	A10	0A	1A	0A	1A	0A	1A	A6	A16		
B07		A07	B09	A09	0B	1B	0B	1B	0B	1B	B6	B16		
B06 B05		A06 A05	B09	A08	0C	10	00	10	0C	10	A7	A17		
B04		A04	B07	A07	0D	1D	0D	1D	0D	1D	B7	B17		
B03 B02		A03 A02	B06	A06	0E	1E	0E	1E	0E	1E	A8	A18		
B01		A01	B05	A05	0F	1F	0E	1F	0E	1F	B8	B18		
			B04	A04	NC	NC	NC	NC	NC	NC	A9	A19		
			B03	A03	NC	NC	NC	NC	NC	NC	B9	B19		
L		1	B02	A02	no	110	110	110	110	110	A10	A20		
			B02	A02	COM	COM	DC12/24V	COM	COM	DC0V	B10	B20		
			BUI	AUT							ы	B20		

3) I/O wiring

- XBE-DC32A (SLP-T40P)

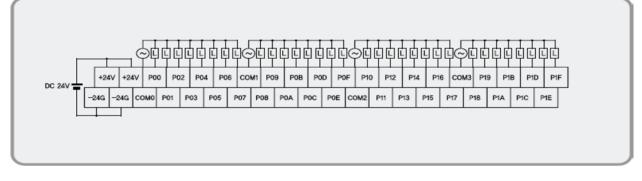


#### - XBE-TN32A (SLP-T40P)

#### - XBE-TP32A (SLP-T40P)

Contact No. 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F U U U U U U U U U U U U U U U U U U U
AI AC A3 A4 A5 A0 A7 A0 A3 A10 A11 A12 A13 A14 A15 A10 A17 A16 A13 A20

#### - XBE-TN32A (SLP-RY4A)



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# **Chapter 8 Built-in High-speed Counter Function**

XGB series have built-in function of High-speed counter in main unit. This chapter describes specifications and usage of High-speed counter's function.

### 8.1 High-speed Counter Specifications

□ It describes specifications, setting and usage of function, programming and wiring with external device of built-in main unit.

#### 8.1.1 Performance specifications

(1) Performance specification

Classification		Desc	Description					
Class	sincation	"E" type	"S(U)" type					
Count input	Signal	A-phase, B-phase						
signal	Input type	Voltage input (Open collector)						
Signal	Signal level	DC 24V						
Max. count s	beed	4kpps	100kpps					
Number of	1 phase	4kpps 4 channels	100kpps 2 channels/ 20kpps 6 channels					
channels	2 phase	2kpps 2 channels	50kpps 1 channel / 8kpps 3 channels					
Count range		Signed 32 Bit (-2,147,483,648 ~ 2,14	47,483,647)					
		Linear count (if 32-bit range exceeded	ed, Carry/Borrow occurs)					
Count mode		Counter max. and min. value is indic	cated					
(Program set	ting)	Ring count (repeated count within setting range)						
Input mode		1-phase input						
(Program set	tina)	2-phase input						
(Flografii Set	ung)	CW/CCW input						
Signal type		Voltage						
	1 phase input	Increasing/decreasing operation setting by B-phase input						
	i phase input	Increasing/decreasing operation setting by program						
Up/Down		Operating setting by rising edge	Operating setting by rising/falling					
setting	2 phase input	phase difference	edge phase difference					
		A-phase input: increasing operation						
CW/CCW		B-phase input: decreasing operation						
Multiplication	1 phase input	1 multiplication						
2 phase input		2 multiplication	4 multiplication					
function	CW/CCW	1 multiplication						
	Signal	Preset instruction input						
Control input	Signal level	DC 24V input type						
	Signal type	Voltage						

Classification		Description		
		"E" type	"S(U)" type	
		1 point/channel (for each channel)	2 point/channel (for each channel)	
External output	Output points	:uses output contact point of main	:use output contact point of main	
		unit	unit	
	Туре	Selects single-compared (>, >=, =, =<, <) or section-compared output		
		(included or excluded) (program setting)		
	Output type	Relay, Open-collector output (Sink)		
Count Enable		To be set through program (count available only in enable status)		
Preset function		To be set through terminal (contact) or program		
Auxiliary mode		Count Latch		
(Program setting)		Count per unit time (time setting value: 1~60,000ms)		

#### (2) Counter/Preset input specification

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Classification	Spcification	
Input voltage	24V DC (20.4V ~ 28.8V)	
Input current	<b>4</b> mA	
On guranteed voltage (min.)	20.4V	
Off guranteed voltage (max.)	6V	

#### Notice

If higher pulse than high speed counter input limit is inputted, 「abnormal operation stop」 error may occur because MPU processing time increases to count fast and memory becomes full. When using high speed counter, consider this.

### 8.1.2 Designation of parts

(1) Designation of parts

#### (a) "E" type

Terminal No.	Names		Usage	
	1-phase	2-phase	1-phase	2-phase
P000	Ch0 counter input	Ch0 A-phase input	Counter input terminal	A-phase input
P001	Ch1 counter input	Ch0 B-phase input	Counter input terminal	B-phase input
P002	Ch2 counter input	Ch2 A-phase input	Counter input terminal	A-phase input
P003	Ch3 counter input	Ch2 B-phase input	Counter input terminal	B-phase input
P004	Ch0 preset 24V	Ch0 preset 24V	Preset input terminal	Preset input terminal
P005	Ch1 preset 24V	-	Preset input terminal	No use
P006	Ch2 preset 24V	Ch2 preset 24V	Preset input terminal	Preset input terminal
P007	Ch4 preset 24V	-	Preset input terminal	No use
COM0	Input common	Input common	Common terminal	Common terminal

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#### (b) "S(U)" type

Terminal No.	Nar	nes	Usage	
	1-phase	2-phase	1-phase	2-phase
P000	Ch0 counter input	Ch0 A-phase input	Counter input terminal	A-phase input
P001	Ch1 counter input	Ch0 B-phase input	Counter input terminal	B-phase input
P002	Ch2 counter input	Ch2 A-phase input	Counter input terminal	A-phase input
P003	Ch3 counter input	Ch2 B-phase input	Counter input terminal	B-phase input
P004	Ch4 counter input	Ch4 A-phase input	Counter input terminal	A-phase input
P005	Ch5 counter input	Ch4 B-phase input	Counter input terminal	B-phase input
P006	Ch6 counter input	Ch6 A-phase input	Counter input terminal	A-phase input
P007	Ch7 counter input	Ch6 B-phase input	Counter input terminal	B-phase input
P008	Ch0 preset 24V	Ch0 preset 24V	Preset input terminal	Preset input terminal
P009	Ch1 preset 24V	-	Preset input terminal	No use
P00A	Ch2 preset 24V	Ch2 preset 24V	Preset input terminal	Preset input terminal
P00B	Ch4 preset 24V	-	Preset input terminal	No use
P00C	Ch5 preset 24V	Ch4 preset 24V	Preset input terminal	Preset input terminal
P00D	Ch6 preset 24V	-	Preset input terminal	No use
P00E	Ch7 preset 24V	Ch6 preset 24V	Preset input terminal	Preset input terminal
P00F	Ch8 preset 24V	_	Preset input terminal	No use
COM0	Input common	Input common	Input common	Input common

(2) Interface with external devices

The internal circuit of High-speed counter is as shown below.

(a) "E" type

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		Internal circuit No.		Signal		On/Off
I/O	Internal circuit			2-phase	Operation	guaranteed voltage
		P00	Ch 0	Ch 0	On	20.4~28.8V
	4 <b>Φ</b> 4 2.7 kΩ	FUU	Pulse input	A-phase input	Off	6V or less
		P01	Ch 1	Ch 0	On	20.4~28.8V
		PUT	Pulse input	B-phase input	Off	6V or less
		P02	Ch 2	Ch 2	On	20.4~28.8V
	<b>4 Φ ξ</b> 2.7 kΩ	P02	Pulse input	A-phase input	Off	6V or less
		P03	Ch 3	Ch 2	On	20.4~28.8V
	<b>4 ▼ ▲ ≥</b> 2.7 kΩ	P03	Pulse input	B-phase input	Off	6V or less
Input	<b>_</b>	P04	Ch 0	Ch 0	On	20.4~28.8V
	<b>4 Φ 5.6</b> kΩ	P04	Preset input	Preset input	Off	6V or less
		DOF	Ch 1		On	20.4~28.8V
	4 <b>Σ</b> δ.6 kΩ	P05	Preset input	-	Off	6V or less
		P06	Ch 2	Ch 2	On	20.4~28.8V
	5.6 kΩ 5.6 kΩ 5.6 kΩ	FOO	Preset input	Preset input	Off	6V or less
		P07	Ch 3	-	On	20.4~28.8V
	<b>Φ Φ ξ</b> 5.6 kΩ		Preset input		Off	6V or less
		COM0	COM (inp	ut common)		

For XBC-DR10E, there is no physical circuit for P0006 ~ P0007. Turn on this contact point by program.

(b) "S(U)" type

5) "S(U)" ty		Torminal	Sig	gnal	uo	On/Off	
I/O	Internal circuit	Terminal	4		Operation	guaranteed	
		No.	1-phase	2-phase	dO	voltage	
		P0000	Ch 0	Ch 0	On	20.4~28.8V	
	<b>∻▼</b> ▲ ≥ 2.7 kΩ	F 0000	Pulse input	A-phase input	Off	6V or less	
		P0001	Ch 1	Ch 0	On	20.4~28.8V	
	<b>∻ ▼ ▲ ≷</b> 2.7 kΩ	F 0001	Pulse input	B-phase input	Off	6V or less	
		P0002	Ch 2	Ch 2	On	20.4~28.8V	
	<b>4 Σ Ξ</b> 2.7 kΩ	F0002	Pulse input	A-phase input	Off	6V or less	
		P0003	Ch 3	Ch 2	On	20.4~28.8V	
	<b>∻</b> ▼★ ≩ 2.7 kΩ	F 0003	Pulse input	B-phase input	Off	6V or less	
		P0004	Ch 4	Ch 4	On	20.4~28.8V	
	<b>∠ ★ ★</b> 2.7 kΩ	F 0004	Pulse input	A-phase input	Off	6V or less	
		P0005	Ch 5	Ch 4	On	20.4~28.8V	
	<b>∻ ▼ ▲ ≷</b> 2.7 kΩ	F 0003	Pulse input	B-phase input	Off	6V or less	
		P0006	Ch 6	Ch 6	On	20.4~28.8V	
	<b>∻</b> ▼ <b>▲ ≷</b> 2.7 kΩ	F 0000	Pulse input	A-phase input	Off	6V or less	
		P0007	Ch 7	Ch 6	On	20.4~28.8V	
	2.7 kΩ	1 0007	Pulse input	B-phase input	Off	6V or less	
Input		P0008	Ch 0	Ch 0	On	20.4~28.8V	
	<b>⊊</b> ▼ <b>▲ ≥</b> 5.6 kΩ	P0006	Preset input	Preset input	Off	6V or less	
		P0009	Ch 1		On	20.4~28.8V	
	<b>φ ★ ★ ξ</b> 5.6 kΩ	F 0009	Preset input	_	Off	6V or less	
		P000A	Ch 2	Ch 2	On	20.4~28.8V	
	<b>∠ ★ ★</b> 5.6 kΩ	FUUUA	Preset input	Preset input	Off	6V or less	
		P000B	Ch 3		On	20.4~28.8V	
	<b>∻</b> ▼▼	FUUUB	Preset input	-	Off	6V or less	
		P000C	Ch 4	Ch 4	On	20.4~28.8V	
	<b>⊊ ▼ 本</b> ⋛ 5.6 kΩ	FUUUC	Preset input	Preset input	Off	6V or less	
		P000D	Ch 5		On	20.4~28.8V	
	<b>4 4 5</b> .6 kΩ		Preset input	-	Off	6V or less	
			Ch 6	Ch 6	On	20.4~28.8V	
	<b>φ Φ Φ Φ Φ Γ Γ Γ Γ Γ Γ Γ Γ Γ Γ</b>	P000E	Preset input	Preset input	Off	6V or less	
		P000F	Ch 7		On	20.4~28.8V	
	<b>∻ ▼ ≹</b> 5.6 kΩ		Preset input	-	Off	6V or less	
		COM0	COM(inpu	ut common)			
For XBC-DR/DN20S, there is no physical circuit for P000C ~ P000F. Turn on this							

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For XBC-DR/DN20S, there is no physical circuit for P000C ~ P000F. Turn on this contact point by program.

# 8.1.3 "E" type Functions

- (1) Counter mode
  - (a) High Speed counter module can count High Speed pulses which can not be processed by CPU module's counter instructions (CTU, CTD, CTUD, etc.), up to binary value of 32 bits (-2,147,483,648 ~ 2,147,483,647).
  - (b) Available input is 1-phase input, 2-phase input and CW/ CCW input.
  - (c) Count increasing/decreasing methods are as follows;
    - 1) For 1-phase input: (1) Increasing/decreasing count operation by program setting
      - (2) Increasing/decreasing count operation by B-phase input signal
    - 2) For 2-phase input: setting by difference in phase between A-phase and B-phase
    - 3) For CW/CCW input: Increasing operation if B-phase is LOW with A-phase input, and Decreasing

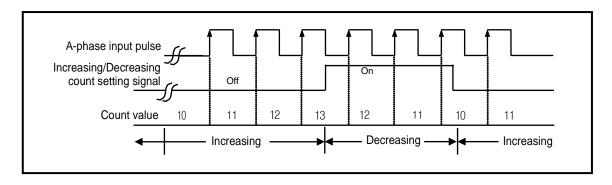
operation if A-phase is LOW with B-phase input.

(d) Auxiliary modes are as follows;

- 1) Count Latch
- 2) Periodic Pulse Count
- (e) Pulse input mode
  - 1) 1-phase count mode
  - a) Increasing/decreasing count operation by program setting
    - 1-phase 1-input 1-multiplication operation mode
      - A-phase input pulse counts at rising and increasing/decreasing will be decided by the applicable program.

Increasing/Decreasing classification	A-phase input pulse rising	A-phase input pulse falling
Increasing/decreasing count setting signal Off	Increasing count	-
Increasing/decreasing count setting signal On	Decreasing count	-

• Operation example



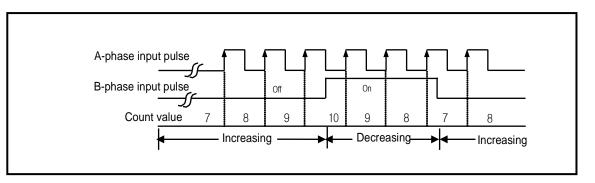
b) Increasing/decreasing count operation by B-phase input signal

• 1-phase 2-input 1-multiplication operation mode

A-phase input pulse counts at rising and increasing/decreasing will be decided by B-phase.

Increasing/Decreasing classification	A-phase input pulse rising	A-phase input pulse falling
B-phase input pulse Off	Increasing count	-
B-phase input pulse On	Decreasing count	-

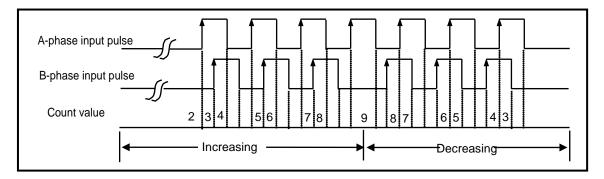
• Operation example



- 2) 2-phase count mode
  - a) 2-phase 2-multiplication operation mode

A-phase input pulse and B-phase input pulse count at rising. If A-phase input is antecedent to Bphase input, increasing operation starts, and if B-phase input is antecedent to A-phase input, decreasing operation starts.

Operation example



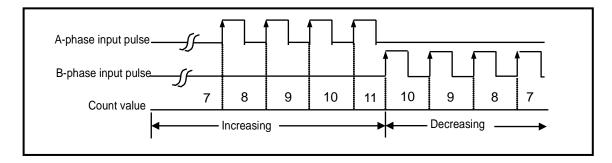
### 3) CW(Clockwise)/CCW(Counter Clockwise) operation mode

A-phase input pulse counts at rising , or B-phase input pulse counts at rising.

Increasing operation executed when B-phase input pulse is Low with A-phase input pulse at rising, and Decreasing operation executed when A-phase input pulse is Low with B-phase input pulse at rising.

Increasing/Decreasing classification	A-phase input pulse High	A-phase input pulse Low
B-phase input pulse High	-	decreasing count
B-phase input pulse Low	Increasing count	-

# Operation example



### (2) Counter type

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2 types of count (Linear counter, Ring counter) can be selected for the applicable use based on functions.

Parameter	CH 0	CH 1	CH 2	CH 3
Counter mode	Linear 🗸 🗸	Linear	Linear	Linear
Pulse input mode	Linear	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1
Internal preset	Ring	0	0	0
External preset	0	0	0	0
Ring counter value	0	0	0	0
Comp output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comp output min.	0	0	0	0
Comp output max.	0	0	0	0
Comp output point	No use	No use	No use	No use
Unit time [ms]	1	1	1	1
Pulse/Rev value	1	1	1	1

• Counter mode is saved at the following special K area.

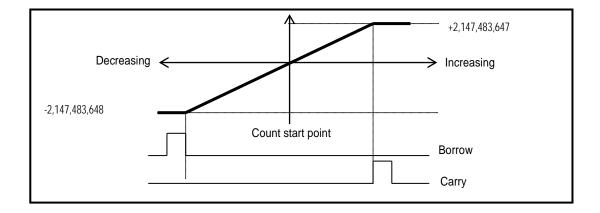
Mode		Reference <sup>*1)</sup>			
Mode	Ch.0	Ch.1	Ch.2	Ch.3	Reference "
Counter mode	K300	K330	K360	K390	0 : linear 1 : ring

\*1) If counter mode is set as value other than 0, 1, error code '20' will occur.

2 types of count can be selected for the applicable use based on functions.

(a) Linear counter

- 1) Linear Count range: -2,147,483,648 ~ 2,147,483,647
- 2) If count value reaches the maximum value while increased, Carry will occur, and if count value reaches the minimum value while decreased, Borrow will occur.
- 3) If Carry occurs, count stops and increasing is not available but decreasing is available.
- 4) If Borrow occurs, count stops and decreasing is not available but increasing is available.



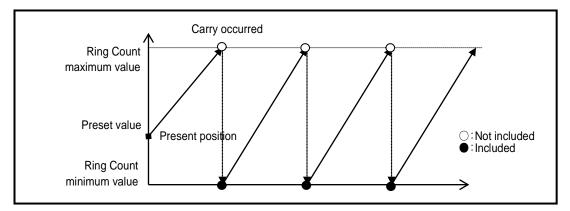
- (b) Ring count
  - Ring Count range: user-defined minimum value ~ user-defined maximum value
  - Count display: If Ring Counted, user-defined minimum value of Ring Count is counted and displayed, but the value is not displayed.

Parameter	CH 0	CH 1	CH 2	CH 3
Counter mode	Ring	Linear	Linear	Linear
Pulse input mode	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1
Internal preset	0	0	0	0
External preset	0	0	0	0
Ring counter value	1000	0	0	0
Comp output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comp output min.	0	0	0	0
Comp output max.	0	0	0	0
Comp output point	No use	No use	No use	No use
Unit time [ms]	1	1	1	1
Pulse/Rev value	1	1	1	1

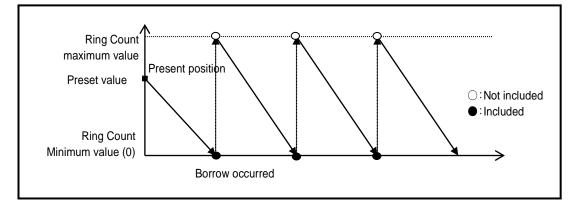
• Ring counter value is saved at the following special K area.

typo	Ar	Area per each channel (Double word)					
type	Ch.0	Ch.1	Ch.2	Ch.3	Reference		
Ring counter value	K310	K340	K270	K400			

- 1) During increasing count
  - Even if count value exceeds user-defined maximum value during increasing count, Carry only occurs and count does not stop differently to Linear Count.

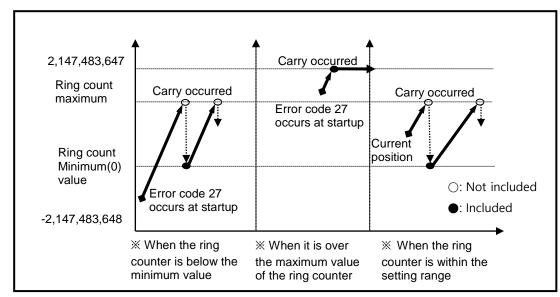


- 2) During decreasing count
  - Even if count value exceeds user-defined minimum value during decreasing count, Borrow only occurs and count does not stop differently to Linear Count.

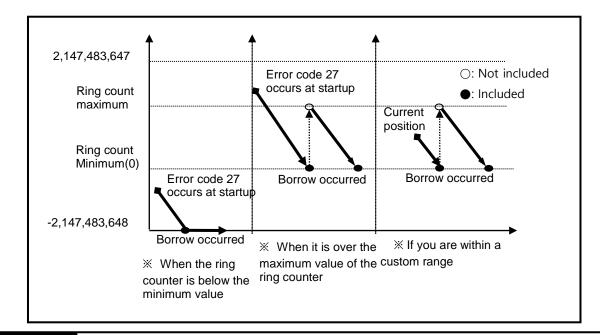


3) Operation when setting Ring Count based on present count value (during increasing count)

- When setting the ring count, the current count value is below the minimum value of the ring counter.
- Opens an error (Code No. 27), operates as a linear counter, and operates as a ring count when the current count value falls within the range of the ring count (error codes are not cleared).
- When setting the ring count, the current count value is above the maximum value of the ring counter.
- Displays an error (Code No. 27), operates as a linear counter, and stops counting when the current count value reaches the maximum count value (error code is not cleared).
- When setting the ring count, the current count value is within the user setting range
- It starts to increase from the current count value, increases to the maximum value set by the user, then becomes the minimum value set by the user and continues to count after carrying a carry.
- As shown in the figure below, the maximum value is not displayed and the count continues after displaying the minimum value.



- 4) Operation when setting Ring Count based on present count value (during decreasing count)
  - When setting the ring count, the current count value is below the minimum value of the ring counter.
  - When an error (Code No. 27) is displayed, it operates as a linear counter, and if the current count value falls within the range of the ring count, it operates as a ring count. (The error code is not cleared)
  - When setting the ring count, the current count value is above the maximum value of the link counter.
  - An error (Code No. 27) is displayed, and it operates as a linear counter, but stops counting when the current count value reaches the count minimum value. (The error code is not cleared)
  - When setting the ring count, the current count value is within the user setting range
  - It starts to decrease from the current count value, decreases to the minimum value set by the user, and becomes the maximum value set by the user, and then continues counting after Borrow occurs.



# Remark

(1) When using a ring count, be sure to place the count value within the range using a preset or the like.

#### (3) Compared output

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- (a) High Speed counter module has a compared output function used to compare present count value with compared value in size to output as compared.
- (b) Available compared outputs are 2 for 1 channel, which can be used separately.
- (c) Compared output conditions are 7 associated with >, =, < .
- (d) Parameter setting
- Compared output mode setting

			<u> </u>	011.0
Parameter	CH 0	CH 1	CH 2	CH 3
Counter mode	Ring	Linear	Linear	Linear
Pulse input mode	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1
Internal preset	0	0	0	0
External preset	0	0	0	0
Ring counter value	1000	0	0	0
Comp output mode	(Magnitude)< 🗸 🗸	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comp output min.	(Magnitude)<	0	0	0
Comp output max.	(Magnitude)<= (Magnitude)=	0	0	0
Comp output point	(Magnitude)>=	No use	No use	No use
Unit time [ms]	(Magnitude)>	1	1	1
Pulse/Rev value	(Range)Include (Range)Exclude	1	1	1

#### ■ Upper setting value is saved in special K area.

Compared output condition	Memory address (word)	Value <sup>*2)</sup>
Present Value < Compared Value		Set to "0"
Present Value ≤ Compared Value		Set to "1"
Present Value = Compared Value	Channel 0 : K302	Set to "2"
Present Value ≥ Compared Value	Channel 1 : K330 Channel 2 : K358	Set to "3"
Present Value > Compared Value	Channel 3 : K386	Set to "4"
Compared value 1 ≤ Count value ≤ Compared value 2		Set to "5"
Count value ≤ Compared value 1, Count value ≥ Compared value 2		Set to "6"

\*2) If compared output value not set to 0~6 using counter, error code '23' will be occurred.

In order to make actual comparison enabled after compared output condition set, the compared enable signal is to be On.

Clossification	Area per channel				Operation
Classification	Ch. 0	Ch. 1	Ch. 2	Ch. 3	Operation
Count enable signal	K2600	K2700	K2800	K2900	0: N/A, 1: enable
Compared enable signal	K2604	K2704	K2804	K2904	0: forbidden, 1: enable

 In order to make external output, the compared equivalent output signal (P20~P27) must be set. If Compared output contact is Off, Compared coincidence output signal (internal device) is only output. ٦

Classification	Area per channel			Operation	
Classification	Ch. 0	Ch. 1	Ch. 2	Ch. 3	Operation
Compared equivalent output signal	K2612	K2712	K2812	K2912	0: Compared output not equivalent 1: Compared output equivalent

# • Comp output point (P40 ~ P43) setting

ecial Module Parameter				?
ligh Speed Counter Module	—			
Parameter	CH 0	CH 1	CH 2	CH 3
📃 Counter mode	Linear	Linear	Linear	Linear
Pulse input mode	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1
Internal preset	0	0	0	0
External preset	0	0	0	0
Ring counter value	2	2	2	2
Comp output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comp output min.	0	0	0	0
Comp output max.	0	0	0	0
Comp output point	No Use 🗸 🗸	No Use	No Use	No Use
Unit time [ms]	NoUse	1	1	1
Pulse/Rev value	P40	1	1	1
	P41		Å	
	P43		OK	Cancel

(e) Detailed description for compared output

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- 1) Mode 0 (Present value < Compared value)
- If counted present value is less than compared value, output is sent out, and if present value increases to be equal to or greater than compared value, output is not sent out.

Count value	123456 123457 123458 123459 123460 123461 123462
Compared output Min. set value	123460
Compared Output Enable Compared Output output signal External output (in case of designated output	

2) Mode1 (Count value ≤ Compared value)

If present count value is less than or equal to compared value, output is sent out, and if count value increases to be greater than compared value, output is not sent out.

Count value 123456 123457	123458 123459 123460 123461 123462
Compared Output	
Min. set value	123460
Compared Output Enable Compared Output output signal External output (in case of designated output)	

### 3) Mode 2 (Count value = Compared value)

If present count value is equal to compared value, output is sent out. In order to turn the output Off, Compared output Enable and Compared output signal is to be On.

Count value	123456	123457	123458	123459	123460	123461 123462
Compared Output						
Min. set value		123457				
Compared Output Enable Compared Output output signal External output (in case of designated output						

4) Mode 3 (Count value  $\geq$  Compared value)

If present count value is greater than or equal to compared value, output is sent out, and if count value decreases to be less than compared value, output is not sent out.

Count value 1	23456 123457	123458 123459	123460 123461 123462
Compared Outpu <del>t</del> Min. set value			123460
Compared Output Enable			
Compared Output output signal			
External output (in case of designated output)	)	<u> </u>	

# 5) Mode 4 (Count value > Compared value)

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If present count value is greater than compared value, output is sent out, and if count value decreases to be less than or equal to compared value, output is not sent out.

Count value	123456 <u>123457</u> <u>123458</u> <u>123459</u> <u>123460</u> <u>123461</u> <u>123462</u>
Compared Output Min. set value	123459
Compared Output Enable	
Compared Output signal	
External output (in case of designated outpu	t)

- 6) Mode 5 (Compared output Min. set value  $\leq$  Count value  $\leq$  Compared output Max. set value)
  - If present count value is greater than or equal to compared output Min. value and less than or equal to compared output Max. set value, output is sent out, and if count value increases/decreases to exceed compared value's range, output is not sent out.

Count value 12	23456 123457 123458 123459 123460	<u>123461</u> <u>123462</u>
Compared Output		
Min. set value	123458	
Compared Output -		<u></u>
Max. set value	123460	$\mathbf{N}$
Compared Output Enable		
Compared Output		
signal		/
External Output		-
(in case of		
designated output)		L

7) Mode 6 (Count value ≤ Compared output Min. value, Count value ≥ Compared output Max. value)

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If present count value is less than or equal to compared output Min. value and greater than or equal to compared output Max. value, output is sent out, and if count value increases/decreases to exceed compared value's range, output is not sent out.

<u>X123461</u> <u>X123462</u>
123461
123401
/
(
4
,

# (4) Carry signal

- (a) Carry signal occurs
- 1) When count range maximum value of 2,147,483,647 is reached during Linear Count.
- 2) When user-defined maximum value of Ring Count changed to the minimum value during Ring Count.
- (b) Count when Carry Signal occurs
- 1) Count stops if Carry occurs during Linear Count.
- 2) Count does not stop even if Carry occurs during Ring Count.
- (c) Carry reset
- 1) The Carry generated can be cancelled by Carry/Borrow reset signal On.

Classification	Device area per channel			
Classification	Channel 0	Channel 1	Channel 2	Channel 3
Carry signal	K2610	K2710	K2810	K2910

# (5) Borrow signal

- (a) Borrow signal occurs
  - 1) When count range minimum value of -2,147,483,648 is reached during Linear Count.
  - 2) When user-defined minimum value of Ring Count changed to the maximum value during Ring Count.
- (b) Count when Borrow signal occurs
- 1) Count stops if Borrow occurs during Linear Count.
- 2) Count does not stop even if Borrow occurs during Ring Count.
- (c) Borrow reset
- 1) The Borrow generated can be cancelled by Carry/Borrow reset signal On..

Classification	Device area per channel			
Classification	Channel 0	Channel 1	Channel 2	Channel 3
Borrow signal	K2611	K2711	K2811	K2911

#### 6) Revolution/Unit time

While auxiliary mode enable signal is On, it counts the number of input pulses for a specified time.

- (a) Setting
  - 1) Input unit time and pulse number per 1 revolution

Speed Counter Module				
Parameter	CH O	CH 1	CH 2	CH 3
Counter mode	Linear	Linear	Linear	Linear
Pulse input mode	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1
Internal preset	0	0	0	0
External preset	0	0	0	0
Ring counter value	0	0	0	0
Comp output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comp output min.	0	0	0	0
Comp output max.	0	0	0	0
Comp output point	No use	No use	No use	No use
Unit time [ms]	1000	1	1	1
Pulse/Rev value	1	1	1	1

Setting value is saved at the following special K are and user can designate it directly.

Classification	Device area per channel				
Classification	Channel 0	Channel 1	Channel 2	Channel 3	
Unit time (1~60000ms)*3)	K322	K352	K382	K412	

<sup>\*3)</sup> If revolution per unit time is enabled and unit time value is other than 1~60000ms, error code '34' occurs.

2) Input pulse number per 1 revolution

Classification	Device area per channel				
Classification	Channel 0	Channel 1	Channel 2	Channel 3	
Pulse number /revolution (1~60000) <sup>*4)</sup>	K323	K353	K383	K413	

\*4) If revolution per unit time is enabled and pulse number/revolution is other than 1~60000, error code '35' occurs.

3) If Count function of revolution per unit time is used, enable signal set by On.

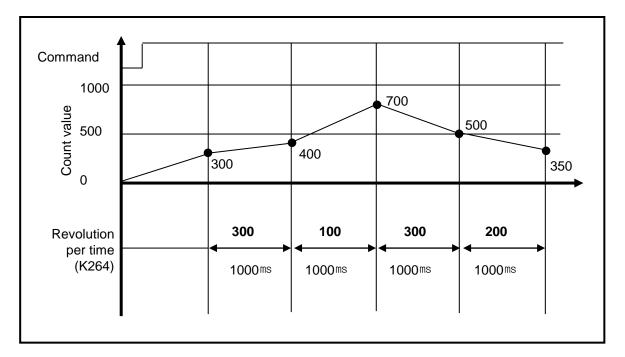
Classification		Device area per channel				
Classification	Channel 0	Channel 1	Channel 2	Channel 3		
Revolution/unit time command	K2605	K2705	K2805	K2905		

(a) Count function of Revolution per Unit time is used to count the number of pulses for a specified time while Enable signal is On.

(b) With the displayed number of pulses updated for a specified time and the number of pulses per revolution input, Revolution/Unit time can be counted.

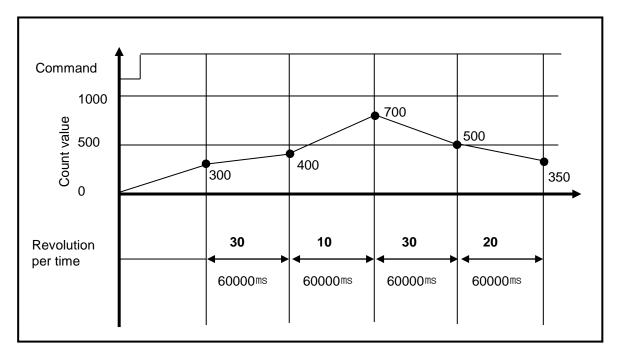
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- (c) Number of Revolution per 1 second is indicated after number of pulse per 1 revolution is set and time is set to 1 second (1000ms). In order to indicate by Revolutions per minute (RPM), the operation is executed in program.
- (d) The example that number of pulse per 1 revolution set to '1' and time is set to 1000 ms is as shown below. (Ch0)



(f) In order to indicate revolution per minute (RPM), the program is as shown below. In case of DMUL operation, RPM value is saved 64 bit in D100~D103. If operated RPM value is used, it can use to Word or Dword type according to system (case of RPM value is small number).

D100 (RPM value) = K	264 (number of	revolution per	second) X 60 (s	second)				
F00099					DMUL	K0264	60	D00100
Always ON								



(g) The example that number of pulse per 1 revolution set to '10' and time is set to 60,000 ms is as shown below.

# (7) Count latch

- (a) When Count latch signal is On, present count value is latched.
- (b) Setting

If present counter value is to latch, Count Latch function is set 'Use'.

Classification	Device area per channel			
Classification	Channel 0	Channel 1	Channel 2	Channel 3
Count latch command	K2606	K2706	K2806	K2906

(c) Count latch function is operated when Count latch signal is On. Namely, counter value is not cleared when power supply Off =>On and mode change, it is counted from previous value.

(d) In latch counter function, internal or external preset function has to use for clearing present value.

# (8) Preset function

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It changes the current value into preset value.

There are two types of preset function, internal preset and external preset. External preset is fixed as input contact point.

n Speed Counter Module				
Parameter	CH 0	CH 1	CH 2	CH 3
Counter mode	Linear 🔽	Linear	Linear	Linear
Pulse input mode	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1
Internal preset	0	0	0	0
External preset	0	0	0	0
Ring counter value	0	0	0	0
Comp output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comp output min.	0	0	0	0
Comp output max.	0	0	0	0
Comp output point	No use	No use	No use	No use
Unit time [ms]	1	1	1	1
Pulse/Rev value	1	1	1	1

• Preset setting value is saved at the following special K area.

Turno	Area per each channel (Double word)				
Туре	Ch.0	Ch.1	Ch.2	Ch.3	Ref.
Internal preset	K304	K334	K364	K394	-
External preset	K306	K336	K366	K396	-

• Preset command is specified through the following special K area, external preset is used by executing the designated input contact point after allowance bit is on.

Turno	Area per each channel (Bit)					
Туре	Ch.0	Ch.1	Ch.2	Ch.3	Ref.	
Internal preset command	K2601	K2701	K2801	K2901	-	
External preset allowance	K2602	K2702	K2802	K2902	-	
External preset command	P004	P005	P006	P007	-	

# 8.1.4 "S(U)" type Functions

- (1) Counter mode
  - (a) High Speed counter module can count High Speed pulses which can not be processed by CPU module's counter instructions (CTU, CTD, CTUD, etc.), up to binary value of 32 bits (-2,147,483,648 ~ 2,147,483,647).
  - (b) Available input is 1-phase input, 2-phase input and CW/ CCW input.
  - (c) Count increasing/decreasing methods are as follows;
    - 1) For 1-phase input: a) Increasing/decreasing count operation by program setting
      - b) Increasing/decreasing count operation by B-phase input signal
    - 2) For 2-phase input: setting by difference in phase between A-phase and B-phase
    - 3) For CW/CCW input: Increasing operation if B-phase is LOW with A-phase input, and Decreasing

operation if A-phase is LOW with B-phase input.

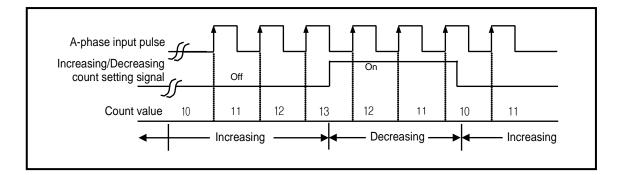
(d) Auxiliary modes are as follows;

- 1) Count Latch
- 2) Count function about the number of revolution per unit time
- (e) Pulse input mode
  - 1) 1 phase count mode
  - a) Increasing/decreasing count operation by program setting
  - 1-phase 1-input 1-multiplication operation mode

A-phase input pulse counts at rising and increasing/decreasing will be decided by the applicable program.

Increasing/Decreasing classification	A-phase input pulse rising	A-phase input pulse falling
Increasing/decreasing count setting signal Off	Increasing count	-
Increasing/decreasing count setting signal On	Decreasing count	-

#### • Operation example



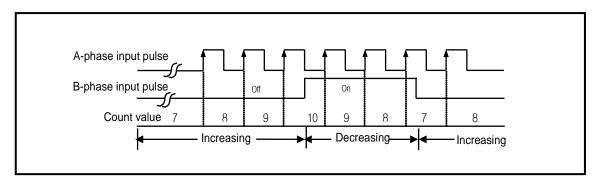
- b) Increasing/decreasing count operation by B-phase input signal
  - 1-phase 2-input 1-multiplication operation mode

A-phase input pulse counts at rising and increasing/decreasing will be decided by B-phase.

Increasing/Decreasing classification	A-phase input pulse rising	A-phase input pulse falling
B-phase input pulse Off	Increasing count	-
B-phase input pulse On	Decreasing count	-

• Operation example

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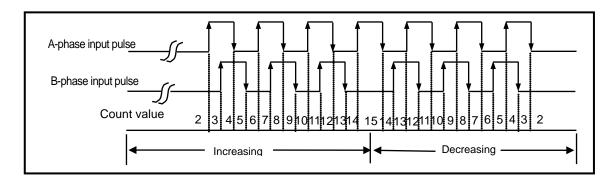


### 2) 2-phase count mode

a) 2-phase 4-multiplication operation mode

A-phase input pulse and B-phase input pulse count at rising/falling respectively. If A-phase input is antecedent to B-phase input, increasing operation starts, and if B-phase input is antecedent to A-phase input, decreasing operation starts.

Operation example



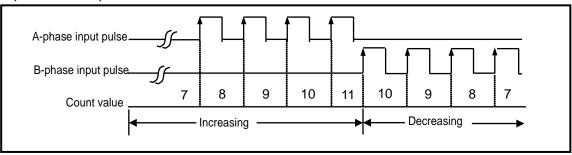
### 3) CW(Clockwise)/CCW(Counter Clockwise) operation mode

A-phase input pulse counts at rising , or B-phase input pulse counts at rising.

Increasing operation executed when B-phase input pulse is Low with A-phase input pulse at rising, and Decreasing operation executed when A-phase input pulse is Low with B-phase input pulse at rising.

Increasing/Decreasing classification	A-phase input pulse High	A-phase input pulse Low
B-phase input pulse High	-	decreasing count
B-phase input pulse Low	Increasing count	-

#### Operation example



# (2) Counter mode

2 types of count (Linear counter, Ring counter) can be selected for the applicable use based on functions.

Parameter	CH 4	CH 5	CH 6	CH 7
Counter mode	Linear 🗸 🗸	Linear	Linear	Linear
Pulse input mode	Linear	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1
Internal preset	Ring	0	0	0
External preset	0	0	0	0
Ring Counter Min. Value	0	0	0	0
Ring Counter Max. Value	0	0	0	0
Comp0 output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comp1 output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comparator Output0 Min.Value	0	0	0	0
Comparator Output0 Max.Value	0	0	0	0
Comparator Output1 Min.Value	0	0	0	0
omparator Output1 Max.Value	0	0	0	0
Comp0 output point	No use	No use	No use	No use
Comp1 output point	No use	No use	No use	No use
Unit time [ms]	1	1	1	1
Pulse/Rev value	1	1	1	1

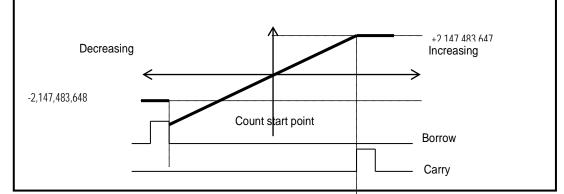
- Counter mode is saved at the following special K area.

Mode		Area per each channel (word)							Ref.
wode	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Rei.
Counter mode	K300	K330	K360	K390	K2220	K2250	K2280	K2310	0 : linear 1 : ring

(a) Linear counter

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- Linear Count range: -2,147,483,648 ~ 2,147,483,647
- If count value reaches the maximum value while increased, Carry will occur, and if count value reaches the minimum value while decreased, Borrow will occur.
- If Carry occurs, count stops and increasing is not available but decreasing is available.
- If Borrow occurs, count stops and decreasing is not available but increasing is available.



(b) Ring count

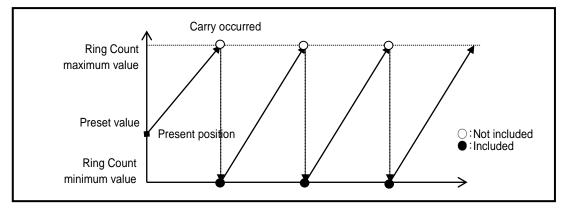
Set Ring Counter Min. Value and Max. value. Preset value and compared set value should be in range of ring counter min. value and max. value.

Parameter	CH 4	CH 5	CH 6	CH 7
Counter mode	Ring	Linear	Linear	Linear
Pulse input mode	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1
Internal preset	0	0	0	0
External preset	0	0	0	0
Ring Counter Min. Value	0	0	0	0
Ring Counter Max. Value	3000	0	0	0
Comp0 output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comp1 output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comparator Output0 Min.Value	0	0	0	0
omparator Output0 Max.Value	0	0	0	0
Comparator Output1 Min.Value	0	0	0	0
omparator Output1 Max.Value	0	0	0	0
Comp0 output point	No use	No use	No use	No use
Comp1 output point	No use	No use	No use	No use
Unit time [ms]	1	1	1	1
Pulse/Rev value	1	1	1	1

• Ring counter max. and min value is saved at the following special K area.

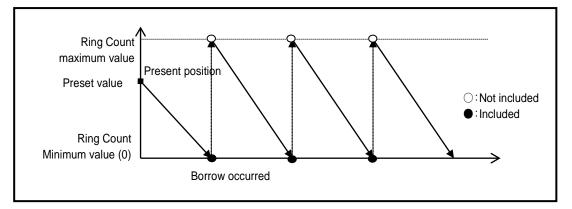
tupo	Area per each channel (Double word)								Ref.
type	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Rei.
Ring counter min. value	K308	K338	K368	K398	K2228	K2258	K2288	K2318	-
Ring counter max. value	K310	K340	K270	K400	K2230	K2260	K2290	K2320	-

- Range of Ring counter: user defined min. value ~ user defined max. value
- Counter display: in case of using ring counter, user defined max. value is not displayed.
  - 1) During increasing count
    - Even if count value exceeds user-defined maximum value during increasing count, Carry only occurs and count does not stop differently to Linear Count.

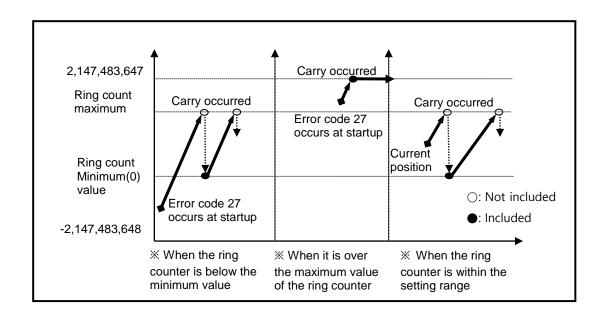


#### 2) During decreasing count

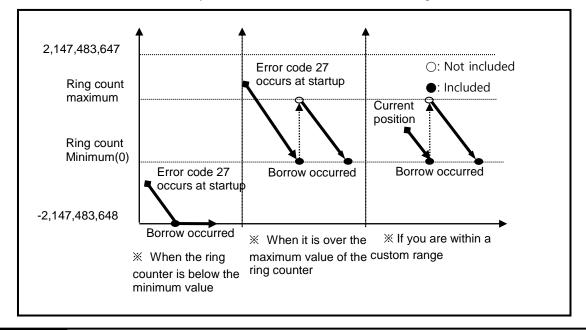
Even if count value exceeds user-defined minimum value during decreasing count, Borrow only occurs and count does not stop differently to Linear Count.



- 3) Operation when setting Ring Count based on present count value (during increasing count)
- When setting the ring count, the current count value is below the minimum value of the ring counter.
- Opens an error (Code No. 27), operates as a linear counter, and operates as a ring count when the current count value falls within the range of the ring count (error codes are not cleared).
- When setting the ring count, the current count value is above the maximum value of the ring counter.
- Displays an error (Code No. 27), operates as a linear counter, and stops counting when the current count value reaches the maximum count value (error code is not cleared).
- When setting the ring count, the current count value is within the user setting range
- It starts to increase from the current count value, increases to the maximum value set by the user, then becomes the minimum value set by the user and continues to count after carrying a carry.
- As shown in the figure below, the maximum value is not displayed and the count continues after displaying the minimum value.



- 4) Operation when setting Ring Count based on present count value (during decreasing count)
  - When setting the ring count, the current count value is below the minimum value of the ring counter.
  - When an error (Code No. 27) is displayed, it operates as a linear counter, and if the current count value falls within the range of the ring count, it operates as a ring count. (The error code is not cleared)
  - When setting the ring count, the current count value is above the maximum value of the link counter.
  - An error (Code No. 27) is displayed, and it operates as a linear counter, but stops counting when the current count value reaches the count minimum value. (The error code is not cleared)
  - When setting the ring count, the current count value is within the user setting range
  - It starts to decrease from the current count value, decreases to the minimum value set by the user, and becomes the maximum value set by the user, and then continues counting after Borrow occurs.



# Remark

(1) When using a ring count, be sure to place the count value within the range using a preset or the like.

# (3) Compared output

- (a) High Speed counter module has a compared output function used to compare present count value with compared value in size to output as compared.
- (b) Available compared outputs are 2 for 1 channel, which can be used separately.
- (c) Compared output conditions are 7 associated with >, =, < .
- (d) Parameter setting
- Comp. output mode setting

Counter mode     Ring     Linear       Pulse input mode     1-Phs 1-In x1     1-Phs 1-In x1     1-Phs 1       Internal preset     0     0     0       External preset     0     0     0       Ring Counter Min. Value     0     0     0       Ring Counter Max. Value     3000     0     0       Comp0 output mode     (Magnitude)     (Magnitude)     0	
Internal preset         0         0           External preset         0         0         0           Ring Counter Min. Value         0         0         0         0           Ring Counter Max. Value         3000         0         0         0           Comp0 output mode         [Magnitude]<	In x1 1-Phs 1-In x1 0 0 0
External preset         0         0           Ring Counter Min. Value         0         0         0           Ring Counter Max. Value         3000         0         0           Comp0 output mode         [Magnitude]<	0 0 0
Ring Counter Min. Value         0         0         0           Ring Counter Max. Value         3000         0         0           Comp0 output mode         (Magnitude)           (Magnitude)         (Magnitude)	0 0
Ring Counter Max. Value         3000         0         0           Comp0 output mode         (Magnitude)         (Magnitude)         (Magnitude)	0
Comp0 output mode (Magnitude)< (Magnitude)< (Magnitude)<	
	0
	ude)< (Magnitude)<
Comp1 output mode (Magnitude)< (Magnitude)< (Magnitude)<	ude)< (Magnitude)<
omparator Output0 Min.Value (Magnitude)<= 0 0	0
omparator Output0 Max.Value (Magnitude)>= 0 0	0
omparator Output1 Min.Value (Magnitude)> 0 0	0
mparator Output1 Max.Value (Range)Exclude 0 0	0
Comp0 output point No use No use No u	se No use
Comp1 output point No use No use No use	se No use
Unit time [ms] 1 1 1	1
	·····

■ Upper setting value is saved in special K area.

Compared output condition	Memory address	(word)	Value <sup>*2)</sup>
Compared output condition	Comp output 0	Comp output 1	value -/
Present Value < Compared Value			Set to "0"
Present Value ≤ Compared Value	Ch.0 K302	Ch.0 K303	Set to "1"
Present Value = Compared Value	Ch.1 K332 Ch.2 K362	Ch.1 K333 Ch.2 K363 Ch.3 K393 Ch.4 K2223	Set to "2"
Present Value ≥ Compared Value	Ch.3 K392 Ch.4 K2222		Set to "3"
Present Value > Compared Value	Ch.5 K2252	Ch.5 K2253	Set to "4"
Compared value 1 ≤ Count value ≤ Compared value 2	Ch.6 K2282 Ch.7 K2312	Ch.6 K2283 Ch.7 K2313	Set to "5"
Count value ≤ Compared value 1, Count value ≥ Compared value 2	•		Set to "6"

<sup>\*2)</sup> If compared output mode set value is other than 0~6 at using counter, error code '23' occurs.

In order to output the compared output signal, compared output enable flag set to '1' after compared output condition set.

Classification	Area per channel							Operation	
Classification	Ch. 0	Ch. 1	Ch. 2	Ch. 3	Ch. 4	Ch. 5	Ch. 6	Ch. 7	Operation
Count enable signal	K2600	K2700	K2800	K2900	K21800	K21900	K22000	K22100	0:disable, 1: enable
Compared 0 enable signal	K2604	K2704	K2804	K2904	K21804	K21904	K22004	K22104	0: disable, 1: enable
Compared 1 enable signal	K2607	K2707	K2807	K2907	K21807	K21907	K22007	K22107	0: disable, 1: enable

In order to make external output, the compared coincidence output signal (P20~P2F) must be set.
 If Compared output contact is 'Off' at Special Module Parameter Setting of XG5000, Compared coincidence output signal (internal device) is only output.

Classification			Operation						
Classification	Ch. 0	Ch. 1	Ch. 2	Ch.4	Ch.5	Ch. 6	Ch.7	Operation	
Compared coincidence	K2612	K2712	K2812	K2912	K21812 K22012	K22012	K22112	0: Compared output Off	
output signal 0	K2612	K2/12	N2012	K2912		K22012	R22112	1: Compared output On	
Compared coincidence	K2613	K2713	K2813	K2913	K21813	K22012	K22113	0: Compared output Off	
output signal 1	1/2013	12/13	1/2013	112913	1121013	K22013	1/22113	1: Compared output On	

### • Comp. output point (P40 ~ P4F) setting

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	0110	014	011.0	0110
Parameter	CH 0	CH 1	CH 2	CH 3
Counter mode	Linear	Linear	Linear	Linear
Pulse input mode	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1
Internal preset	0	0	0	0
External preset	0	0	0	0
Ring Counter Min. Value	0	0	0	0
Ring Counter Max. Value	0	0	0	0
Comp0 output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comp1 output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comparator Output0 Min.Value	0	0	0	0
Comparator Output0 Max.Value	0	0	0	0
Comparator Output1 Min.Value	0	0	0	0
Comparator Output1 Max.Value	0	0	0	0
Comp0 output point	NoUse	No Use	No Use	No Use
Comp1 output point	No Use 🗸 🗸	No Use	No Use	No Use
Unit time [ms]	No Use 🔥	1	1	1
Pulse/Rev value	P40 P41	1	1	1
))))))	P42			

(e) Detail of comparator output

It describes detail of comparator output (based on comparator output 0)

- 1) Mode 0 (Present value < Compared value)
- If counted present value is less than the minimum value of compared output 0, output is sent out, and if present value increases to be equal to or greater than the minimum value of compared output 0, output is not sent out.

Count value	123456 12345	<u>57 123458 12</u>	23459 123460 12	23461 123462
Compared output min. set value	0 <u> </u>		123460	
Compared output Enable	0			1
Compared output Output Signal	0			
External output (in case of designated output	t)			

- 2) Mode1 (Count value ≤ Compared value)
- If present count value is less than or equal to the minimum set value of compared output 0, output is sent out, and if count value increases to be greater than the minimum set value of compared output 0, output is not sent out.

Count value	123456	123457	123458	3 1234	59 123	460	12346	51 123	3462
Compared output Min. set value	0				12:	3460	$\overline{}$		
Compared Outpu Enable Compared Outpu output signal									
External output (in case of designated output									

3) Mode 2 (Count value = Compared value)

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If present count value is equal to the minimum set value of compared output 0, output is sent out. In order to turn the output Off, Compared output Enable signal 0 or Compared Coincidence Output Enable signal 0 is to be Off.

Count value 12345	<u>6 123457 123458 123459</u>	123460 123461 123462
Compared output 0		
Min. set value	123457	
Compared Output 0 Enable		
Compared Output 0 output signal		
External output		
(in case of designated out	put)	

4) Mode 3 (Count value  $\geq$  Compared value)

If present count value is greater than or equal to the minimum set value of compared output 0, output is sent out, and if count value decreases to be less than the minimum set value of compared output 0, output is not sent out.

Count value 1	123456	123457	123458	123459	123460 123461 123462
Compared output	0				
Min. set value					123460
Compared Output Enable					
Compared Output	0			(	
Output signal	1	i			:
External output	otod output)				1
(in case of designa	ated output)				

5) Mode 4 (Count value > Compared Output value)

If present count value is greater than the minimum set value of compared output 0, output is sent out, and if count value decreases to be less than or equal to the minimum set value of compared output 0, output is not sent out.

Count value	123456	123457	123458	123459	123460 123461 123462
Compared Outp	out 0				
Min. set value				123459	
Compared Outp Output Enable	out 0				
Compared Outp Output signal	out 0			(	
External output				X	
(in case of desig	gnated output)				1

# 6) Mode 5

(Section comparison: Min. set value of Compared Output  $0 \le$  Count value  $\le$  Max. set value of Compared Output 0)

If present count value is greater than or equal to the minimum set value of compared output 0 and less than or equal to the maximum set value of compared output 0, output is sent out, and if count value increases/decreases to exceed compared value's range, output is not sent out.

Count value	123456 123457	× 123458 ×	123459 123460	123461 123462
Compared Output 0				
Min. set value		123458		
Compared Output 0 Max. set value			123460	
Compared Output 0 output Enable	ſ			
Compared Output 0 output signal			(	/
External output (in case of designate	ed output)		ţ	

7) Mode 6 (Count value ≤ Min. set value of Compared Output 0 or Count value ≥ Max. set value of Compared Output 0)

Γ

If present count value is less than or equal to the minimum set value of compared 0 and greater than or equal to the maximum set value of compared 0, output is sent out, and if count value increases/decreases to exceed compared value's range, output is not sent out.

Count value 1234	456 123457 123458 1234	459 123460 123461 123462
Compared Output 0		
Min. set value	123457	
Compared Output 0		123461
Max. set value		
Compared Output 0		
output Enable		
Compared Output 0		
output signal		
External output	<b>X</b>	×
(in case of designated		

#### (4) Carry signal

- (a) Carry signal occurs
- 1) When count range maximum value of 2,147,483,647 is reached during Linear Count.
- 2) When user-defined maximum value of Ring Count changed to the minimum value during Ring Count.
- (b) Count when Carry Signal occurs
- 1) Count stops if Carry occurs during Linear Count.
- 2) Count does not stop even if Carry occurs during Ring Count.
- (c) Carry reset
- 1) The Carry generated can be cancelled by Carry/Borrow reset signal On.

Classification	Device area per channel									
Classification	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7		
Carry signal	K2610	K2710	K2810	K2910	K21810	K21910	K22010	K22110		

#### (5) Borrow signal

- (a) Borrow signal occurs
  - 1) When count range minimum value of -2,147,483,648 is reached during Linear Count.
  - 2) When user-defined minimum value of Ring Count changed to the maximum value during Ring Count.
- (b) Count when Borrow signal occurs
- 1) Count stops if Borrow occurs during Linear Count.
- 2) Count does not stop even if Borrow occurs during Ring Count.
- (c) Borrow reset
- 1) The Borrow generated can be cancelled by Carry/Borrow reset signal On.

Classification	Device area per channel									
Classification	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7		
Borrow signal	K2611	K2711	K2811	K2911	K21811	K21911	K22011	K22111		

### (6) Revolution/Unit time

Γ

While the Flag about the number of revolution per unit time is On, it counts the number of input pulses for a specified time.

- (a) Setting
  - 1) Set the unit time and the number of pulse per 1 revolution.

Parameter	CH 4	CH 5	CH 6	CH 7
Counter mode	Ring	Linear	Linear	Linear
Pulse input mode	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1
Internal preset	0	0	0	0
External preset	0	0	0	0
Ring Counter Min. Value	0	0	0	0
Ring Counter Max. Value	3000	0	0	0
Comp0 output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comp1 output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comparator Output0 Min.Value	0	0	0	0
Comparator Output0 Max.Value	0	0	0	0
Comparator Output1 Min.Value	0	0	0	0
Comparator Output1 Max.Value	0	0	0	0
Comp0 output point	No use	No use	No use	No use
Comp1 output point	No use	No use	No use	No use
Unit time [ms]	1000	1	1	1
Pulse/Rev value	500	1	1	1

Setting value is saved at the following special K area and user can designate directly.

Class		Device per each channel (Word)									
Class	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	range		
Unit time	K322	K352	K382	K412	K2242	K2272	K2302	K2332	1~60000ms		
Pulse/Rev value	K323	K353	K383	K413	K2243	K2273	K2303	K2333	1~60000		

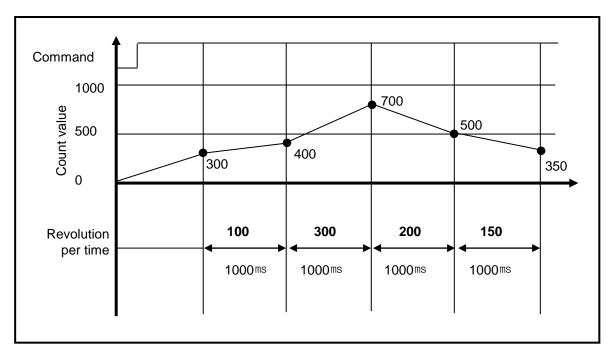
2) In case of using Rev/unit time function, enable the following special K area

Class		Device per each channel (Word)									
Class	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Operation		
Rev/unit time command	K2605	K2705	K2805	K2905	K21805	K21905	K22005	K22105	0: disable 1: enable		

3) Rev/unit time value is saved at the following special K area.

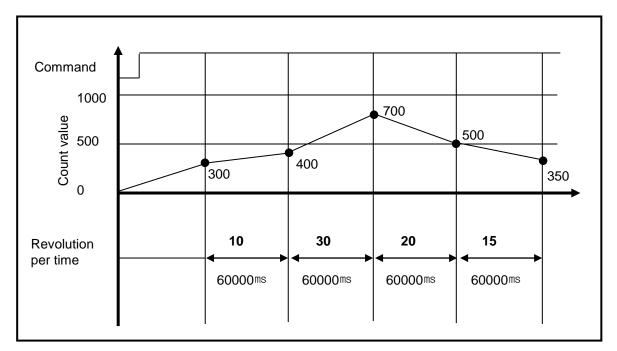
Class	Device per each channel (Word)								
Class	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Ref.
Rev/unit time	K264	K274	K284	K294	K2184	K2194	K2204	K2214	-

- (b) Count function of Revolution/Unit time is used to count the number of pulses for a specified time while auxiliary mode enable signal is On.
- (c) With the displayed number of pulses updated for a specified time and the number of pulses per revolution input, Revolution/Unit time can be counted.
- (d) Number of Revolution per 1 second is indicated after number of pulse per 1 revolution is set and time is set to 1 second (1000ms). In order to indicate by Revolutions per minute (RPM), the operation is executed in program.
- (e) The example that number of pulse per 1 revolution set to '1' and time is set to 1000 ms is as shown below. (Ch0)



(f) In order to indicate revolution per minute (RPM), the program is as shown below. In case of DMUL operation, RPM value is saved 64 bit in D100~D103. If operated RPM value is used, it can use to Word or Dword type according to system (case of RPM value is small number).

D100 (RPM value) = k	<264 (number of	revolution pe	r second) X 60	(second)				
F00099					DMUL	K0264	60	D00100
Always ON								



(g) The example that number of pulse per 1 revolution set to '10' and time is set to 60,000 ms is as shown below.

# (7) Count latch

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When Count latch signal is On, present count value is latched.

Setting

If present counter value is to latch, Count Latch function is set 'Use'.

Class		Device area per channel									
010.00	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Operation		
Count latch	K2606	K2706	K2806	K2906	K21806	K21006	K22006	K22106	0: disable		
command	112000	1\2700	112000	112900	1121000	1121900	1122000	1122100	1: enable		

 Count latch function is operated when Count latch signal is On. Namely, counter value is not cleared when power supply Off =>On and mode change, it is counted from previous value.

• In latch counter function, internal or external preset function has to use for clearing present value.

# (8) Preset function

It changes the current value into preset value.

There are two types of preset function, internal preset and external preset. External preset is fixed as input contact point.

n Speed Counter Module				
Parameter	CH 0	CH 1	CH 2	CH 3
Counter mode	Linear 🔽	Linear	Linear	Linear
Pulse input mode	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1
Internal preset	0	0	0	0
External preset	0	0	0	0
Ring counter value	0	0	0	0
Comp output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comp output min.	0	0	0	0
Comp output max.	0	0	0	0
Comp output point	No use	No use	No use	No use
Unit time [ms]	1	1	1	1
Pulse/Rev value	1	1	1	1

• Preset setting value is saved at the following special K area.

Туре	Area per each channel (Double word)								
	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Ref.
Internal preset value	K304	K334	K364	K394	K2224	K2254	K2284	K2314	-
External preset value	K306	K336	K366	K396	K2226	K2256	K2286	K2316	_

• Preset command is specified through the following special K area, external preset is used by executing the designated input contact point after allowance bit is on.

Туре	Area per each channel (Bit)								
	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Ref.
Internal preset command	K2601	K2701	K2801	K2901	K21801	K21901	K22001	K22101	_
External preset allowance	K2602	K2702	K2802	K2902	K21802	K21902	K22002	K22102	_
External preset command	P008	P009	POOA	POOB	POOC	POOD	P00E	POOF	_

# 8.2 Installation and Wiring

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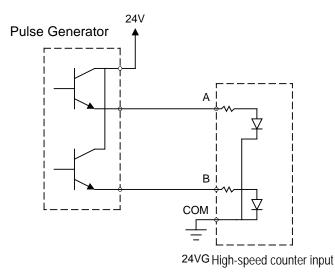
## 8.2.1 Precaution for wiring

Pay attention to the counteractions against wiring noise especially for High-speed pulse input.

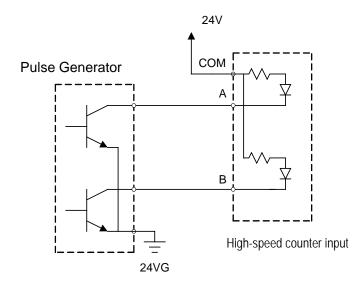
- (1) Surely use twisted pair shielded cable, grounded with 3 class applied.
- (2) Keep away from power cable or I/O line which may cause noise.
- (3) Stabilized power should be used for filter.
  - Connect A-phase only for 1-phase input.
  - Connect A-phase and B-phase for 2-phase input.

## 8.2.2 Example of wiring

(1) In case of pulse generator (encoder) is voltage output type



(2) In case of pulse generator is open collector type



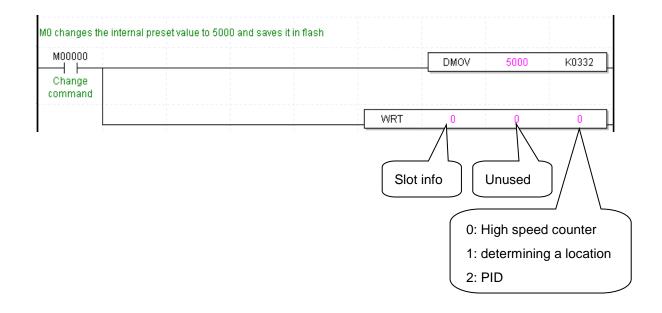
# 8.3 Internal Memory

### 8.3.1 Special area for High-speed counter

Parameter and operation command area of built-in high-speed counter use a special K device.

If values set in parameter are changed, it works with the changed values. At the moment, makes sure to use WRT command to save the changed value to flash. If not saved in flash, the changed values with the power off => on and mode changed may not be maintained.

- The following example shows that the internal preset values of CH1 set in parameter are changed by program and saved in flash.
  - Receiving an order command (M000), it moves (MOV) the new internal preset value (5000) to the CH1 present area (K332).
  - To save the changed settings into flash, it uses WRT command. At the moment, slot information is set to '0' in case of built-in function.



#### Remark

(1) In case of saving in flash memory using WRT instruction, processing time of about 200~300ms is required.

(2) Turning off the PLC power while writing to the flash memory or repetitively using the WRT command may damage the flash memory, so be careful when using it.

# (1) "E" type

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# (a) Parameter setting

Parameter		Description	De	vice area	per char	inel	Remark
Falameter	Value	Setting	Ch 0	Ch 1	Ch 2	Ch 3	Keinark
Counter	h0000	Linear count					
mode	h0001	Ring count	K300	K330	K360	K390	Word
	h0000	1 phase 1 input 1 multiplication					
Pulse input	h0001	1 phase 2 input 1 multiplication	K301	K331	K361	K391	)//ord
mode	h0002	CW / CCW	K301				Word
	h0003	2 phase 2 multiplication					
	h0000	(Magnitude) <					
	h0001 (Magnitude) ≤						
	h0002	(Magnitude) =					
Comp.	h0003	(Magnitude) $\geq$	K302	K332	K362	K392	Word
Output mode	h0004	(Magnitude) >					
	h0005	(Range) Include					
	h0006	(Range) Exclude					
Internal							
preset value	-2,147,4	83,648 ~ 2,147,483,647	K304	K334	K364	K394	DWord
setting							
External							
preset value	-2,147,4	83,648 ~ 2,147,483,647	K306	K336	K366	K396	DWord
setting							

Parameter		Description	De	vice area	per chan	inel	Remark
Farameter	Value	Setting	Ch 0	Ch 1	Ch 2	Ch 3	Reinaik
Ring counter Max. value setting	-2,147,483	648 ~ 2,147,483,647	K310	K340	K370	K400	DWord
Comp. Output Min. value setting	-2,147,483	-2,147,483,648 ~ 2,147,483,647			K372	K402	DWord
Comp. output Max. value setting	-2,147,483	2,147,483,648 ~ 2,147,483,647		K344	K374	K404	DWord
Comp. output point designation	HFFFF h0000 h0001 h0002 h0003 h0004 h0005 h0006 h0007	No use           P0020           P0021           P0022           P0023           P0024           P0025           P0026           P0027	K320	K350	K380	K410	Word
Unit time [ms]		1 ~ 60,000	K322	K352	K382	K412	DWord
Pulse/Rev.value		1 ~ 60,000	K323	K353	K383	K413	DWord

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# (b) Operation command

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Parameter		Device are	ea per channel		
Parameter	Ch 0	Ch 1	Ch 2	Ch 3	
Counter enabling	K2600	K2700	K2800	K2900	
Internal preset	K2601	K2701	K2801	K2901	
designation of counter	N2001	N2701	N2001	N2901	
External preset enabling	K2602	K2702	K2802	K2902	
of counter	N2002	N2702	N2002	N2902	
Designation of	K2603	K2703	K2803	K2903	
decremental counter	N2003	N2703	N2003	N2903	
Comp. output enabling	K2604	K2704	K2804	K2904	
Enabling of revolution	K2605	K2705	K2805	K2905	
time per unit time	N2005	N2705	N2003	N2903	
Designation of latch	K2606	K2706	K2806	K2906	
counter	112000	112700	12000	12300	
Carry signal (Bit)	K2610	K2710	K2810	K2910	
Borrow signal	K2611	K2711	K2811	K2911	
Comp. output signal	K2612	K2712	K2812	K2912	

(c) Area of monitoring

Parameter		Remark			
Parameter	Ch 0	Ch 1	Ch 2	Ch 3	Remark
Current counter value	K262	K272	K282	K292	DWord
Revolution time per unit time	K264	K274	K284	K294	DWord

# (2) "S(U)" type

(a) Parameter setting

	Description		De	vice area	per char	inel	
Parameter	Value	Setting	Ch 0	Ch 1	Ch 2	Ch 3	Remark
	value	Setting	Ch 4	Ch 5	Ch 6	Ch 7	
Counter	h0000	Linear count	K300	K330	K360	K390	Word
mode	h0001	Ring count	K2220	K2250	K2280	K2310	vvoru
	h0000	1 phase 1 input 1 multiplication	1/004	1/004	1/004	1/004	
Pulse input	h0001	1 phase 2 input 1 multiplication	- K301	K331	K361	K391	Word
mode	h0002	CW / CCW			1/0004		
setting	h0003	2 phase 4 multiplication	- K2221	K2251	K2281	K2311	Word
	h0000	(Magnitude) <					Word
	h0001	(Magnitude) ≤	1/202	K222	1/000	1/202	
Comp.	h0002	(Magnitude) =	K302	K332	K362	K392	
Output 0	h0003	(Magnitude) ≥	-				
mode setting	h0004	(Magnitude) >					
setting	h0005	(Range) Include	K2222	K2252	K2282	K2312	
	h0006	(Range) Exclude					
	h0000	(Magnitude) <					
Comp	h0001	(Magnitude) ≤	- K303	1/000	K363	1/2022	
Comp. Output 1	h0002	(Magnitude) =	N303	K333		K393	
mode	h0003	(Magnitude) ≥					Word
setting	h0004	(Magnitude) >					
ootting	h0005	(Range) Include	K2223	K2253	K2283	K2313	
	h0006	(Range) Exclude					
Internal			K304	K334	K364	K394	
preset value setting	-2,147,483	3,648 ~ 2,147,483,647	K2224	K2254	K2284	K2314	DWord
External			K306	K336	K366	K396	
preset value setting	-2,147,483	3,648 ~ 2,147,483,647	K2226	K2256	K2286	K2316	DWord

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		Description	De	vice area	per chan	inel	
Parameter		0	Ch 0	Ch 1	Ch 2	Ch 3	Remark
	Value	Setting	Ch 4	Ch 5	Ch 6	Ch 7	
Ring counter			K308	K338	K368	K398	
min. value	-2,147,483	648 ~ 2,147,483,645	1/0000	KOOFO	1/2000	1/224.0	DWord
setting			K2228	K2258	K2288	K2318	
Ring counter			K310	K340	K370	K400	
max. value	-2,147,483	6,646 2,147,483,647	K2230	K2260	K2290	K2320	DWord
setting			112230	112200	112230	112320	
Comp. output			K312	K342	K372	K402	
min. value	-2,147,483	,648 ~ 2,147,483,647	K2232	K2262	K2292	K2322	DWord
setting			112232	112202	NZZ JZ	NZJZZ	
Comp. output			K314	K344	K374	K404	
max. value	-2,147,483	648 ~ 2,147,483,647	K2234	K2264	K2294	K2324	DWord
setting				112201			
	HFFFF	No use					
	h0000	P0020					
	h0001	P0021	-				
	h0002	P0022				K410	
	h0003	P0023	K320	K350	0 K380		
	h0004	P0024					
	h0005	P0025					
Comp. output 0	h0006	P0026					
point	h0007	P0027					Word
designation	h0008	P0028					
	h0009	P0029					
	h000A	P002A					
	h000B	P002B	K2240	K2270	K2300	K2330	
	h000C	P002C	1\2240	12270	12300	12000	
	h000D	P002D					
	h000E	P002E					
	h000F	P002F					

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	Description		De	vice area	per char	nel	
Parameter		O attilia a	Ch 0	Ch 1	Ch 2	Ch 3	Remark
	Value	Setting	Ch 4	Ch 5	Ch 6	Ch 7	
	HFFFF	No use					
	h0000	P0020					
	h0001	P0021					
	h0002	P0022					
	h0003	P0023	K321	K351	K381	K411	
	h0004	P0024					Word
	h0005	P0025					
Comp. output 1	h0006	P0026					
point	h0007	P0027					
designation	h0008 P0028						
	h0009	P0029					
	h000A	P002A			K2301		
	h000B	P002B	K2241	K2271		K2331	
	h000C	P002C	KZZ41			K2331	
	h000D	P002D					
	h000E	P002E					
	h000F	P002F					
Unit time [ms]		1 ~ 60,000 ms	K322	K352	K382	K412	Word
			K2242	K2272	K2302	K2332	
Pulse/Rev.value		1 ~ 60,000	K323	K353	K383	K413	Word
r uise/nev.vaiue		1 ~ 00,000	K2243	K2273	K2303	K2333	vvoru

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# (b) Operation command

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Deremeter			Dev	vice area	per char	nnel		
Parameter	Ch 0	Ch 1	Ch 2	Ch 3	Ch 4	Ch 5	Ch 6	Ch 7
Counter enabling	K2600	K2700	K2800	K2900	K21800	K21900	K22000	K22100
Internal preset designation of counter	K2601	K2701	K2801	K2901	K21801	K21901	K22001	K22101
External preset enabling of counter	K2602	K2702	K2802	K2902	K21802	K21902	K22002	K22102
Designation of decremental counter	K2603	K2703	K2803	K2903	K21803	K21903	K22003	K22103
Comp. output 0 enabling	K2604	K2704	K2804	K2904	K21804	K21904	K22004	K22104
Comp. output 1 enabling	K2607	K2707	K2807	K2907	K21807	K21907	K22007	K22107
Enabling of revolution time per unit time	K2605	K2705	K2805	K2905	K21805	K21905	K22005	K22105
Designation of latch counter	K2606	K2706	K2806	K2906	K21806	K21906	K22006	K22100
Carry signal (Bit)	K2610	K2710	K2810	K29100	K21810	K21910	K22010	K22110
Borrow signal	K2611	K2711	K2811	K29101	K21811	K21911	K22011	K22111
Comp. output 0 signal	K2612	K2712	K2812	K29102	K21812	K21912	K22012	K22112
Comp. output 1 signal	K2613	K2713	K2813	K29103	K21813	K21913	K22013	K22113

# (c) Area of monitoring

Descentes	Device area per channel								
Parameter	Ch 0	Ch 1	Ch 2	Ch 3	Ch 4	Ch 5	Ch 6	Ch 7	
Current counter value	K262	K272	K282	K292	K2182	K2192	K2202	K2212	
Revolution per unit time	K264	K274	K284	K294	K2184	K2194	K2204	K2214	

## 8.3.2 Error code

It describes errors of the built-in high-speed counter.

• Error occurred is saved in the following area.

Cotogony	Device area per channel							Remark	
Category	Ch0	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Remark
Error code	K266	K276	K286	K296	K2186	K2196	K2206	K2216	Word

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Error codes and descriptions

Error code (Decimal)	Description
20	Counter type is set out of range
21	Pulse input type is set out of range
22	Requesting #1(3,)channel Run during the operation of #0(2) channel 2 phase(
	* During #0(2) channel 2 phase inputting, using #1(3)channel is not possible.
23	Compared output type setting is set out of range.
25	Internal preset value is set out of counter range
26	External present value is set out of counter range
27	Ring counter setting is set out of range
21	* Note ring counter setting should be 2 and more.
28	Compared output min. value is set out of permissible max. input range
29	Compared output max. value is set out of permissible max. input range
30	Error of Compared output min. value>Compared output max. value
31	Compared output is set out of the default output value
34	Set value of Unit time is out of the range
35	Pulse value per 1 revolution is set out of range

# Remark

• If two and more errors occur, the module saves the latter error code and removes

the former one.

# 8.4 Examples: Using High-speed Counter

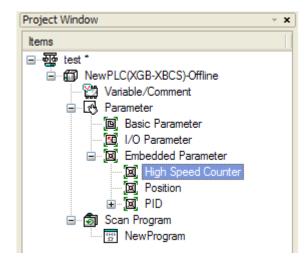
It describes examples of using high-speed counter.

(1)Setting high-speed counter parameter

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How to set types of parameters to operate a high-speed counter is described as follows.

(a) Set 『Internal Parameters』 in the basic project window.



(b) Selecting high-speed counter opens a window to set high-speed counter parameters as follows. For details regarding each parameter setting, refer to 8.1~8.3.

(Every parameter settings are saved in the special K device area.)

Parameter	CH 0	CH 1	CH 2	CH 3
Counter mode	Linear	Linear	Linear	Linear
Pulse input mode	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1
Internal preset	0	0	0	0
External preset	0	0	0	0
Ring Counter Min. Value	0	0	0	0
Ring Counter Max. Value	0	0	0	0
Comp0 output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
Comp1 output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(Magnitude)<
omparator Output0 Min.Value	0	0	0	0
mparator Output0 Max.Value	0	0	0	0
omparator Output1 Min.Value	0	0	0	0
mparator Output1 Max.Value	0	0	0	0
Comp0 output point	No Use	No Use	No Use	No Use
Comp1 output point	P40	P40	P40	P40
Unit time [ms]	1	1	1	1
Pulse/Rev value	1	1	1	1

LSELECTRIC | 8-50

(c) Turn 'ON' the high-speed counter Enable signal (CH0:K2600) in the program.

High-speed counter E	nable signal (C	h.0: K2600) is	On.		
F00099					K02600

- (d) To use additional functions of the high-speed counter, you needs to turn on the flag allowing an operation command.
  - \* Refer to 2) Operation Command, <8.3.1 Special K Area for High-speed Counter>

For instance, turn on 2605 bit if among additional functions, rotation number function is used.

Dn.			
F00099			K02600
		1	
			K02604

(e) Upon the setting, download program and parameter to PLC.

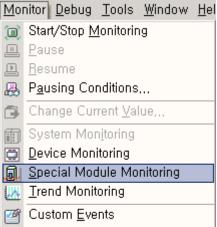
Write		<u>?</u> ×
NewPL	nment ameter	
<u>S</u> etting,	<u> </u>	Cancel

#### (2) Monitoring and setting command

Γ

Monitoring and command setting of high-speed counter are described as follows.

(a) If starting a monitor and clicking a Special Module Monitor, the following window is opened.



🖳 Data Tra<u>c</u>es

Special Module	List		×
Base	Slot	Module	
🕼 Base O	📓 Internal	HSC Module (Open-Collector, 4-CH)	
🗂 Base O	🔒 Internal	APM Module (Open-Collector, 2-CH)	
			- 11
			-11
			- 11
			- 11
			- 11
			- 11
•		•	·I
Module Info	. <u>M</u> oni	tor Close	

ltem	СНО	CH1
Current count value		
Revolution/Unit time		
Error Code		
Channel	CH 2	СНЗ
Current count value		
Revolution/Unit time		
Error Code		
FLAG Monitor		FLAG Monitor
Item	Setting value	Current value
Channel		ΗO
Channel Counter mode		H O
	С	H O
Counter mode	C Linear	H O
Counter mode Pulse input mode	C Linear 1-Phs 1-In x1	HO
Counter mode Pulse input mode Internal preset	C Linear 1-Phs 1-In x1 0	H O
Counter mode Pulse input mode Internal preset External preset	C Linear 1-Phs 1-In x1 0 0	H O
Counter mode Pulse input mode Internal preset External preset Ring counter value	C Linear 1-Phs 1-In x1 0 0 2	HO
Counter mode Pulse input mode Internal preset External preset Ring counter value Comp output mode	C Linear 1-Phs 1-In x1 0 0 2 (Magnitude)<	H O
Counter mode Pulse input mode Internal preset External preset Ring counter value Comp output mode Comp output min.	C Linear 1-Phs 1-In x1 0 0 2 (Magnitude)< 0	
Counter mode Pulse input mode Internal preset External preset Ring counter value Comp output mode Comp output min. Comp output max.	C Linear 1-Phs 1-In x1 0 0 2 (Magnitude)< 0 0	

(b) Clicking "Monitor\_ shows monitor and test window of high-speed counter.

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Item	Description
FLAG Monitor	Show flag monitoring and command window of high-speed counter
Start Monitoring	Start monitoring each item (special K device area monitor).
Test	Write each item setting to PLC. (Write the setting to special K device)
Close	Close monitor

(c) Clicking <sup>C</sup>Start Monitoring<sub>1</sub> shows the high-speed counter monitor display, in which you may set each parameter. At this moment, if any, changed values are not saved if power off=> on or mode is changed.

Item	CH 0	CH 1
Current count value	0	0
Revolution/Unit time	0	0
Error Code	0	0
Channel	CH 2	СНЗ
Current count value	0	0
Revolution/Unit time	0	0
Error Code	0	0
FLAG Monitor		FLAG Monitor
ltem	Setting value	Current value
Channel	Cł	40
Counter mode	Linear	Linear
Pulse input mode	1-Phs 1-In x1 🗾 👻	1-Phs 1-In x1
Internal preset	1-Phs 1-In x1	0
External preset	1-Phs 2-In x1	0
Ring counter value		2
Comp output mode	2-Phs x4 (magnitude)<	(Magnitude)≺
Comp output min.	0	0
Comp output max.	0	0
Comp output point	No use	No use
Unit time [ms]	1	1
Pulse/Rev value	1	1
	Stop <u>M</u> onitor	ing <u>T</u> est

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(d) Clicking <sup>[</sup>FLAG Monitor<sub>.</sub>] shows the monitor of each flag in high-speed counter, in which you may direct operation commands by flags (clicking commands reverse turn).

ltem	CH 0	CH 1	CH 2	СН З
CARRY flag	OFF	OFF	OFF	OFF
BORROW flag	OFF	OFF	OFF	OFF
Com. Output's output	OFF	OFF	OFF	OFF
Command	CHO	CH 1	CH 2	СНЗ
Counter enable	OFF	OFF	OFF	OFF
Count internal preset	OFF	OFF	OFF	OFF
Count external preset	OFF	OFF	OFF	OFF
Decremental counter	OFF	OFF	OFF	OFF
Comparison function	OFF	OFF	OFF	OFF
Revolution/Unit time	OFF	OFF	OFF	OFF
Latch counter	OFF	OFF	OFF	OFF

# **Chapter 9 RTC Option Board**

# 9.1 Battery

## 9.1.1 Battery specification

Item	Specification
Voltage/Current	DC 3V / 220 mA
Warranty period	3 years (ambient temp.)
Purpose	Program and data backup, RTC operation in case of power failure
Specification	Manganese Dioxide lithium battery
Dimension (mm)	φ 20 X 3.2 mm

## 9.1.2 Notice in using

- (1) Do not heat the battery or solder the polarity. ( It may cause the reduction of life.)
- (2) Do not measure the voltage or short with tester. (It may cause the fire.)
- (3) Do not disassemble the battery.

## 9.1.3 Life of battery

Life of battery depends on the power failure time and ambient temperature etc..

If battery is getting low, main unit cause the warning, 'battery voltage low warning'. The user can check it by error LED, flag and error message of XG5000.

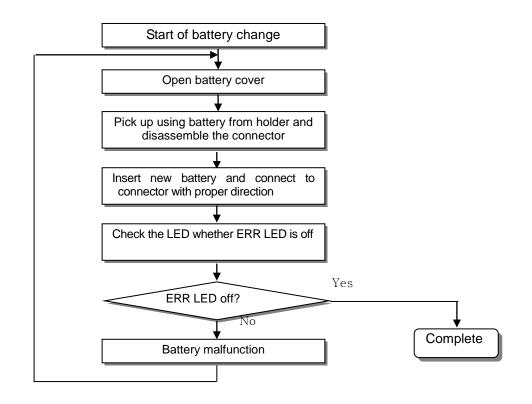
Since battery works properly for long time, after battery voltage low warning, so the user can take the action after battery voltage low warning occurred.

## 9.1.4 How to change battery

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The user should change the battery used to save the program and backup the data in case of power failure periodically. Though the user eliminate the battery, it works for 30 minute by super capacitor. Change the battery as fast as possible.

Sequence changing battery is as follows.



#### Remark

- 1) Battery for Program and Data back- up can be used with RTC
  - RTC provides advanced back-up function compare to without RTC
  - Refer to 4.5 Data backup time for more details.

# 9.2 RTC Function

Economic type (XBC-DxxxE), standard type (XBC-DxxxS, XBC-DxxxSU) doesn't support RTC function. If you equip RTC option board, you can use this function for time management of system or error log. RTC function is executed steadily when power is off or instantaneous power cut status. Current time of RTC is renewed every scan by system operation status information flag.

## 9.2.1 How to use

- (1) Reading/setting clock data
  - (a) Reading or setting from XG5000
    - 1) Click 『Online』의 『PLC Information』.
    - 2) Click PLC RTC tap of PLC Information \_.

	Disco <u>n</u> nect Connection Se <u>t</u> tings	PLC Information - NewPLC
않	Change Mode <u>B</u> ead <u>W</u> rite Co <u>m</u> pare with PLC	CPU Performance Password PLC RTC State PLC RTC is set
	Set Flash Memory Control Redundancy Reset PLC Clear PLC	Date Time Time 오후 4:32:16 후
	Clear <u>A</u> ll PLC	
_	PLC Information PLC <u>History</u> PLC Errors/W <u>a</u> rnings I/O Information Save PLC History	Synchronize PLC with PC clock Send to PLC
	Eorce I/O Skip I/O Fault Mask Mogule Changing Wizard Base Changing Wizard	
of Hang K	Start Online Editing         Ctrl+Q           Write Modified Program         Ctrl+W           End Online Editing         Ctrl+W	Close

- 3) In case the user wants to send the clock of PC to PLC, press 'Synchronize PLC with PC clock'.
- 4) In case the user wants to send the clock the user wants, change the setting value of Time box and press 'Send to PLC'.

#### (b) Reading by special relay

The user can monitor as follows by special relay.

Special relay area	Data	Contents
F053	H0710	10year 07month
F054	H1729	29date 17hour
F055	H1020	10second 20minute
F056	H2004	20XXyear, Thursday

F00098 MOV h0709 K0000 + +0 MOV h1214 K0001 MOV h2040 K0002 MOV h2002 K0003 M00000 DATEWR K0000  $\dashv$ 9 END 12

(c) Modification of clock data by program	n
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area	Content
M0000	Month, year
M0001	Hour, date
M0002	Second, minute
M0003	Centaury, day

Write clock data to temporary device (P, M, K, L, Z, U, D, R) and turn on/off input contact point M0100. (If date and day data is not matched, Write is not available.) Monitor and check the above special area (F053~F056)

(d) How to express the day

Number	0	1	2	3	4	5	6
Day	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

#### (2) Deviation of clock data

±2. 2s / 1 d (normal temperature)

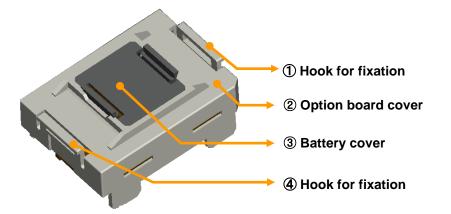
Operating temperature	Max deviation (second/day)		
0 °C	-5.5 ~ 1.5		
<b>25</b> ℃	-2.2 ~ 2.2		
<b>55</b> ℃	-7 ~ 1		

#### Remark

- 1) Initially, RTC may not have any clock data.
- 2) When using the product, first make sure to set the accurate clock data.
- 3) If any data out of the clock data range is written into RTC, it does not work properly. i.e.) 14M 32D 25H
- 4) RTC may stop or have an error due to abnormal battery and other causes. The error is released if a new clock data is written.
- 5) Be aware that margin of error depend on operating temperature.

# 9.3 Name and Function of Each Part

(1) Describes the name and function of each part



No.	Name	Contents		
(1)(4)	Hook for	Hook for fixing the option board to main unit		
00	fixation	· · · · · · · · · · · · · · · · · · ·		
2	Option board	► Option board cover		
Ŀ	cover			
3	Battery cover	► Battery cover		

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(2) RTC can operate only in 9th slot.



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# **Chapter 10 DC Input Option Function**

This chapter describes specifications and usage of input option board's function.

# **10.1 DC input Option Board Specification**

# 10.1.1 DC Input Option Board Specification

Specification of XGB input option board is as follows.

Itom		DC input specification			
	Item	XBO-DC04A	Remark		
Input point		4 points (supports high-speed counter function			
		when installed at standard type)			
Insulation Me		Photo coupler insulation			
Rated input v	-	DC24V			
Rated input c	current	About 10 <sup>mA</sup>			
Voltage range	e	DC20.4~28.8V (ripple rate within 5%)			
On voltage /	On current	DC19V or above / 3 <sup>mA</sup> or above			
Off voltage /	Off current	DC6V or less / 1 <sup>mA</sup> or less			
Input resistar	nce	About 2.7 <sup>k</sup>			
Response	$\text{Off} \to \text{On}$	1/3/5/10/20/70/100ms (set through I/O parameter)			
time	$On \rightarrow Off$	Initial value: 3ms			
Common me	thod	4 points / COM	"		
High speed	Performance	4kpps 4 channels (based on 1 phase)	when installed at		
counter	Mode	Linear counter	standard type		
		Circuit configuration			
	Circuit configuration				

# **10.2 High Speed Counter Specification**

High speed counter function is built in XGB input option board. It describes specifications, setting and usage of function, programming and wiring with external device.

# **10.2.1 Performance Specification**

## (1) Performance Specification

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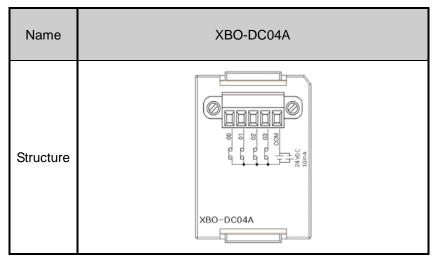
ltem		Specification	
		XBO-DC04A	
	Signal	A-phase, B-phase	
Count input signal	Input type	Voltage input (Open collector)	
Signal	Signal level	DC 24V	
Max. co	unt speed	4kpps	
No. of	1 phase	4kpps 4 channels	
channels	2 phase	2kpps 2 channels	
Coun	t range	Signed 32 Bit (-2,147,483,648 ~ 2,147,483,647)	
Count type (Program setting)		Linear count (if it exceeds 32-bit range, Carry/Borrow occurs)	
	t mode	1-phase input	
(Progra	m setting)	2-phase input	
Sign	al type	Voltage	
	1-phase input	Increasing/decreasing operation setting by B-phase input	
Up/Down setting	r-phase input	Increasing/decreasing operation setting by program	
setting	2-phase input	Automatic setting by difference in phase	
Multiplication	1 phase input	1 multiplication	
function	2 phase input	2 multiplication	
Count	Enable	Set by program (Counted on "Enable" statue)	
Preset	function	Set by program	

## (2) Counter input specification

Item	Specification
Input voltage	24V DC (20.4V ~ 28.8V)
Input current	<b>10</b> mA
On guranteed voltage (min.)	20.4V
Off guranteed voltage (max.)	6V

# 10.2.2 Name of Each Part

(1) Name of each part



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Terminal	Na	me	Usage		
No.	1-phase	2-phase	1-phase	2-phase	
00	Ch0 counter input	Ch0 A-phase input	Counter input terminal	A-phase input terminal	
01	Ch1 counter input	Ch0 B-phase input	Counter input terminal	B-phase input terminal	
02	Ch2 counter input	Ch2 A-phase input	Counter input terminal	A-phase input terminal	
03	Ch3 counter input	Ch2 B-phase input	Counter input terminal	B-phase input terminal	
СОМ	Input common	Input common	Common terminal	Common terminal	

(2) Interface with external devices

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The following table describes interface with external devices

		Terminal	Siç	Signal		Input
I/O	Internal circuit	No.	1-phase	2-phase	Operation	guaranteed voltage
			CH0	CH0	On	20.4~28.8V
	2.7 kΩ	00	Pulse input	A-phase input	Off	6V or less
			CH 1	CH0	On	20.4~28.8V
	2.7 kΩ	01	Pulse input	B-phase input	Off	6V or less
Input	2.7 kΩ	02	CH 2 Pulse input	CH2	On	20.4~28.8V
	2.7 kΩ			A-phase input	Off	6V or less
		03	CH 3 Pulse input	CH0	On	20.4~28.8V
				B-phase input	Off	6V or less
		СОМ	COM(Inpu	it common)		

### 10.2.3 Function

- (1) Counter mode
- (a) High Speed counter module can count High Speed pulses which can not be processed by CPU module's counter instructions (CTU, CTD, CTUD, etc.), up to binary value of 32 bits (-2,147,483,648 ~ 2,147,483,647).
- (b) Available input mode is 1-phase input, 2-phase input
- (c) Count increasing/decreasing methods are as follows;
  - 1) 1-phase input : a) Increasing/decreasing count operation by program setting

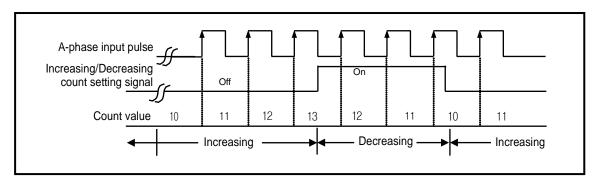
b) Increasing/decreasing count operation by B-phase input signal

- 2) 2-phase input : setting by difference in phase between A-phase and B-phase
- (d) Auxiliary modes are as follows
  - 1) Count Latch
- (e) Input mode
  - 1) 1-phase count mode
    - a) Increasing/decreasing count operation by program setting
    - 1-phase 1-input 1-multiplication

A-phase input pulse is counted at rising and increasing/decreasing will be decided by the program.

Increasing/Decreasing classification	A-phase input pulse rising	A-phase input pulse falling
Increasing/decreasing count setting signal Off	Increasing count	-
Increasing/decreasing count setting signal On	Decreasing count	-

Operation example



b) Increasing/decreasing count operation by B-phase input signal

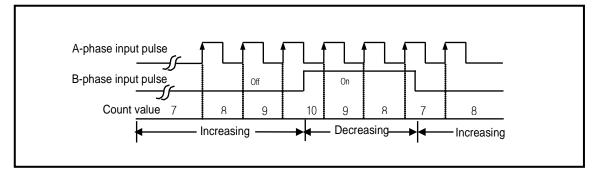
•1-phase 2-input 1-multiplication

A-phase input pulse is counted at rising and increasing/decreasing will be decided by B-phase.

Increasing/Decreasing classification	A-phase input pulse rising	A-phase input pulse falling
B-phase input pulse Off	Increasing count	-
B-phase input pulse On	Decreasing count	-

• Operation example

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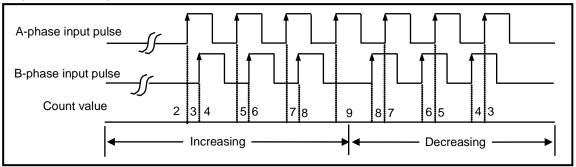


#### 2) 2-phase count mode

a) 2-phase 2-multiplication

A-phase input pulse and B-phase input pulse are counted at rising respectively. If A-phase input is antecedent to B-phase input, increasing operation starts, and if B-phase input is antecedent to A-phase input, decreasing operation starts.

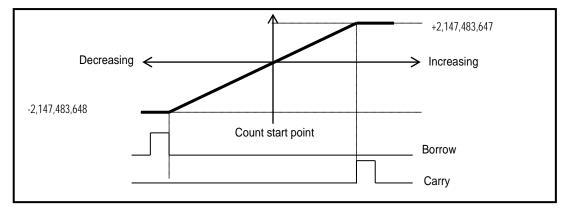
• Operation example



(2) Counter type

Option board supports linear counter.

- (a) Linear counter
- 1) Linear Count range: -2,147,483,648 ~ 2,147,483,647
- 2) If count value reaches the maximum value while increased, Carry will occur, and if count value reaches the minimum value while decreased, Borrow will occur.
- 3) If Carry occurs, count stops and increasing is not available but decreasing is available.
- 4) If Borrow occurs, count stops and decreasing is not available but increasing is available.



- (3) Carry signal
  - (a) When Carry signal occurs

1) When count range maximum value of 2,147,483,647 is reached during Linear Count

- (b) Count when Carry Signal occurs
  - 1) Count stops if Carry occurs during Linear Count.
- (c) Carry reset
  - 1) 'Carry reset' instruction is not supported at option board. Reset 'Carry' by using 'Preset' instruction after making the counter value within counter range.
- (4) Borrow signal
  - (a) When Count when Borrow signal occurs
    - 1) When count range minimum value of -2,147,483,648 is reached during Linear Count.
  - (b) Count when Borrow signal occurs
    - 1) Count stops if Borrow occurs during Linear Count.
  - (c) Borrow reset
    - 1) 'Carry reset' instruction is not supported at option board. Reset 'Carry' by using 'Preset' instruction after making the counter value within counter range.

### (5) Count latch

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- (a) When Count latch signal is On, present count value is latched
- (b) Setting

If present counter value is to latch, Count Latch function is set 'Use'.

Turpo		Ref.			
Туре	CH0	CH1	CH2	CH3	Rei.
When mounted at slot no.9	U9.0.6	U9.8.6	U9.16.6	U9.24.6	0: Disable
When mounted at slot no.10	UA.0.6	UA.8.6	UA.16.6	UA.24.6	1: Enable

(c) Count latch function is operated when 'Count latch' signal is On. Namely, counter value is not cleared when power supply Off =>On and mode change, it is counted from previous value.

(d) In latch counter function, internal preset function has to be used for clearing present value.

#### (6) Preset function

It changes the current value into preset value.

• Preset setting value is saved at the following U area.

Turno	Are	Area per each channel (Double word)					
Туре	CH0	CH1	CH2	CH3	Ref.		
Slot no. 9 internal preset value	U9.6	U9.14	U9.22	U9.30			
Slot no. 10 internal preset value	UA.6	UA.14	UA.22	UA.30			

• Preset command is specified through the following U area

Туре	Area per each channel (bit)						
туре	CH0	CH1	CH2	CH3	Ref.		
Internal preset command	U9.0.1	U9.8.1	U9.16.1	U9.24.1	0: Disable		
Internal preset command	UA.0.1	UA.8.1	UA.16.1	UA.24.1	1: Enable		

# 10.3 Installation and Wiring

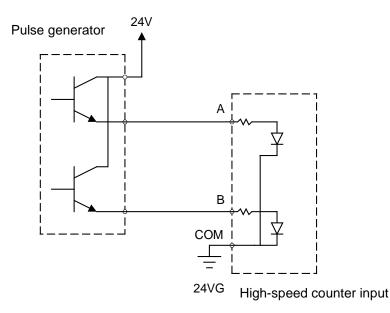
# **10.3.1 Precaution for wiring**

Pay attention to the counteractions against wiring noise especially for High-speed pulse input

- (1) Surely use twisted pair shielded cable, grounded with 3 class applied.
- (2) Keep away from power cable or I/O line which may cause noise.
- (3) Stabilized power should be used.
  - Connect A-phase only for 1-phase input.
  - Connect A-phase and B-phase for 2-phase input.

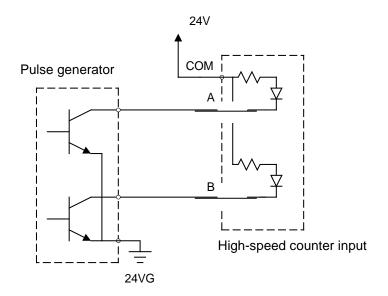
## 10.3.2 Example of wiring

(1) In case of pulse generator (encoder) is voltage output type



(2) In case of pulse generator is open collector type

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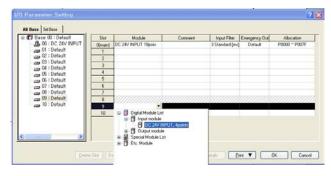
## 10.4 Internal Memory

#### 10.4.1 Special area for High-speed counter

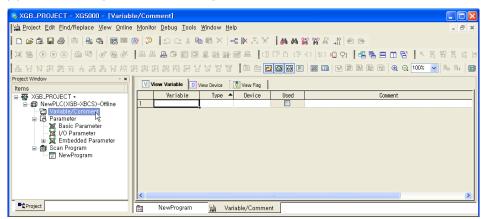
U device is used for parameter and operation command area of built-in high-speed counter.

This chapter describes on how to register basic paramter and each item.

- (1) U device auto-registration
  - (a) Set the module at slot in [I/O parameter]



(b) Double-click [Variable/comment]

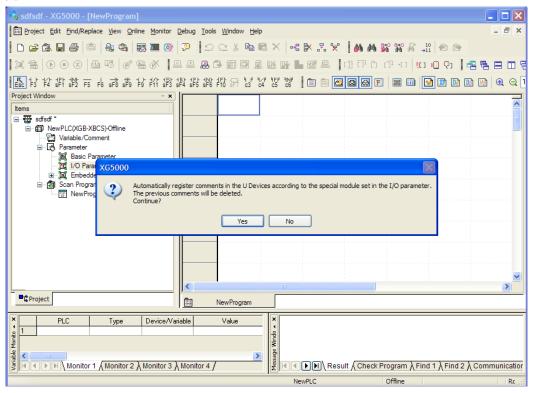


(c) Select 'Register U device' on menu 'Edit'

🔩 XGB_PRC	JECT - XG500	0 - [Variable	e/Com	ment]					
🕍 Project 🗄	dit <u>F</u> ind/Replace	⊻iew <u>O</u> nline	<u>M</u> onitor	<u>D</u> ebug <u>T</u> oo	ols <u>W</u> indow	<u>H</u> elp			_ 8 ×
I L 🗁 🖾 🖉	∑ <u>U</u> ndo ≚ <u>R</u> edo	Ctrl+Z Ctrl+Y	9	⊆⊆ <b>∦</b>	, 🖻 🖻 🗙		64.64	¥ ¥ 🖧 📲 🔿 👁	
1 🗆 🖀   0 🥉	Cut	Ctrl+X		<b>8</b> • 11		<b>e e e</b> (1	) []] []] []]	+0   \$0 🕲 🕹 📲 🚍 🛄	😚 🛛 🔨 昌 智 器 肩 詩
ELSC F3 F4	<u>C</u> opy	Ctrl+C	sP4 sP	3 # FB FF	348	😻 💼 🚺	5 🖾 🖾 E	] 📰 🔟 🔽 🕅 🐨 🚱	ର୍ 100% 🔽 ମିନ ମିନ 📰
Project windo ~	<u>P</u> aste	Ctrl+V	N/ Nr		-	International I			
Items >	<u>D</u> elete	Del	V	P	D View Device	View Flag			1
⊟ 퍫 XGB	Select All	Ctrl+A		Variable	Туре	<ul> <li>Device</li> </ul>	Used	Conment	
ė- 🗊 👌 🚬	Insert Line	Ctrl+L							
	C Delete Li <u>n</u> e	Ctrl+D							
	Export Variable:	s to <u>F</u> ile							
G	Register U Devi	ce N							
⊡-€		. Variable							
	Move Item Up								
	Move Item Dow	'n							
			<						
Project			<b></b>	NewProgram	n 🕍 '	Variable/Comme	nt		

(d) Click 'Yes'.

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#### (e) Variables are registered as follows.

ariab	le Moni	toring \	Vindow				
	PLC	Туре	Device/Vari	Value	Variable/Device	Comment	^
1	NewPLC	BIT	U09.01.1	10	_0009_CH0_Borrow	Input Option Board: CHO Borrow Flag	
2	NewPLC	BIT	U09.01.0	10	_0009_CH0_Carry	Input Option Board: CHO Carry Flag	
3	NewPLC	BIT	U09.00.0	10	_0009_CH0_CNTEN	Input Option Board: CH0 Counter Enable(Level) Command	
4	NewPLC	WORD	U09.05	HEX	_0009_CH0_CntMode	Input Option Board: CH0 Counter Mode	1
5	NewPLC	WORD	U09.02	HEX	_0009_CH0_CurCnt	Input Option Board: CH0 Current Count Value	
6	NewPLC	BIT	U09.00.3	10	_0009_CH0_DN	Input Option Board: CH0 Count Inc/Dec Flag	1
7	NewPLC	WORD	U09.04	HEX	_0009_CH0_ErrCode	Input Option Board: CH0 Error Code	
8	NewPLC	WORD	U09.06	HEX	_0009_CH0_IntPrs_Val	Input Option Board: CH0 Internal Preset Setting Value	
9	NewPLC	BIT	U09.00.6	10	_0009_CH0_LATCH_EN	Input Option Board: CH0 Latch Counter Enable	1
10	NewPLC	BIT	U09.00.1	10	_0009_CH0_PREEN	Input Option Board: CH0 Preset Enable(Edge) Command	1
11	NewPLC	BIT	U09.09.1	10	_0009_CH1_Borrow	Input Option Board: CH1 Borrow Flag	
12	NewPLC	BIT	U09.09.0	10	_0009_CH1_Carry	Input Option Board: CH1 Carry Flag	1
13	NewPLC	BIT	U09.08.0	10	_0009_CH1_CNTEN	Input Option Board: CH1 Counter Enable(Level) Command	1
14	NewPLC	WORD	U09.13	HEX	_0009_CH1_CntMode	Input Option Board: CH1 Counter Mode	1
15	NewPLC	WORD	U09.10	HEX	_0009_CH1_CurCnt	Input Option Board: CH1 Current Count Value	1
16	NewPLC	BIT	U09.08.3	10	_0009_CH1_DN	Input Option Board: CH1 Count Inc/Dec Flag	1
17	NewPLC	WORD	U09.12	HEX	_0009_CH1_ErrCode	Input Option Board: CH1 Error Code	1

## Note

When registered by "auto-registration", data type is expressed as BIT, WORD. If you want to check with other types such as DINT, DWORD, change the type.

## (2) No. 9 slot device area

### (a) Action command

Turpo	D	Device area per each channel					
Туре	CH0	CH1	CH2	CH3	Ref.		
Enable counter	U9.0.0	U9.8.0	U9.16.0	U9.24.0	BIT		
Enable internal preset	U9.0.1	U9.8.1	U9.16.1	U9.24.1	BIT		
Count inc/dec flag	U9.0.3	U9.8.3	U9.16.3	U9.24.3	BIT		
Latch counter enable	U9.0.6	U9.8.6	U9.16.6	U9.24.6	BIT		
Pulse input mode	U9.5	U9.13	U9.21	U9.29	INT		
Internal preset setting value	U9.6	U9.14	U9.22	U9.30	DINT		

٦

#### (b) Monitor area

Turco	D	Device area per each channel					
Туре	CH0	CH1	CH2	CH3	Ref.		
Carry flag	U9.1.0	U9.9.0	U9.17.0	U9.25.0	BIT		
Borrow flag	U9.1.1	U9.9.1	U9.17.1	U9.25.1	BIT		
Current counter value	U9.2	U9.10	U9.18	U9.26	DINT		
Error code	U9.4	U9.12	U9.20	U9.28	INT		

### (3) No. 10 slot device area

#### (a) Action command

Turpo	D	Device area per each channel					
Туре	CH0	CH1	CH2	CH3	Ref.		
Enable counter	UA.0.0	UA.8.0	UA.16.0	UA.24.0	BIT		
Enable internal preset	UA.0.1	UA.8.1	UA.16.1	UA.24.1	BIT		
Count inc/dec flag	UA.0.3	UA.8.3	U9.16.3	UA.24.3	BIT		
Latch counter enable	UA.0.6	UA.8.6	UA.16.6	UA.24.6	BIT		
Pulse input mode	UA.5	UA.13	UA.21	UA.29	INT		
Internal preset setting value	UA.6	UA.14	UA.22	UA.30	DINT		

#### (b) Monitor area

Turno	D	Ref.			
Туре	CH0	CH1	CH2	CH3	Rei.
Carry flag	UA.1.0	UA.9.0	UA.17.0	UA.25.0	BIT
Borrow flag	UA.1.1	UA.9.1	UA.17.1	UA.25.1	BIT
Current counter value	UA.2	UA.10	UA.18	UA.26	DINT
Error code	UA.4	UA.12	UA.20	UA.28	INT

## (4) Parameter setup

Γ

(a) Action command

Turpo	Device st	atus information (based on slot 9, ch0)	Ref.	
Туре	CH0	Information		
Enable counter	U9.0.0	0: disable, 1: enable	BIT	
Enable internal preset	U9.0.1	0: disable, 1: enable	BIT	
Count inc/dec flag	U9.0.3	0: INC, 1: DEC	BIT	
Latch counter enable	U9.0.6	0: disable, 1: enable	BIT	
Pulse input mode	U9.5	0: 1-phase 1-input 1: 1-phase 2-input 2: 2-phase 2 multiplication	INT	
Internal preset setting value	U9.6	-2,147,483,648 ~ 2,147,483,647	DINT	

## (b) Monitor area

Turpo	Device st	Device status information (based on slot 9, ch0)			
Туре	CH0	CH0 Information			
Carry flag	U9.1.0	0: disable, 1: enable	BIT		
Borrow flag	U9.1.1	0: disable, 1: enable	BIT		
Current counter value	U9.2	-2,147,483,648 ~ 2,147,483,647	DINT		
Error code U9.4		Indicates error code	INT		

## 10.4.2 Error code

Describes on error of option board high-speed counter

Describes error code

Error code (Dec.)	Error contents	Ref.
21	Pulse input type range setting error	
22	CH1(3) RUN request while CH0(2) 2-phase RUN	
22	* CH1(3) is not available when CH0(2) operate as 2-phase mode	
25	Internal preset value exceeded counter range	

#### Note

If more than two errors occur, the latest error code is saved and previous error code is removed.

# **10.5** Example using high-speed counter

Describes on option board high-speed counter example

(1) High-speed counter setup

Set up option board high-speed counter operation by using U area.

(a) Select high-speed counter mode.

#### Set up high-speed counter mode

				· · · · · · · · · · · · · · · · · · ·	<u>}</u>
F00099			HOW	1.0001	1100.05
	 		 MOV	h0001	U09.05

(b) If you need 'Preset' function, input 'Preset value' and turn on 'Preset Enable" bit.

Input value to preset			
M00000	MOV	h0010	U09.06

#### Preset Enable signal ON

M00001	U09.00.1
MUUUUI	009.00.1

- (c) Specify 'Latch counter' or 'Up/Down counter'
- (d) Turn on 'High-speed counter enable' signal

Turn on High-speed	Counter Enable	signal (No. 9	9 slot, No	.0 ch) of in	put option	board (XE	BO-DC04A)
F00099							U09.00.0

#### (2) Monitoring

You can check option board high-speed counter value by registering U9.2 (no.0 slot, no.0 ch) at variable mornitring window or program.

Γ

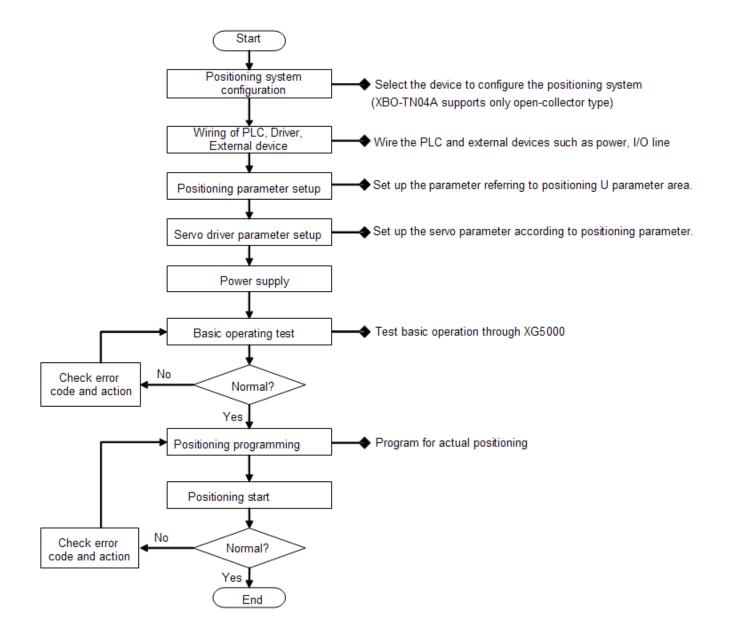
# **Chapter11 TR Output Option Board**

This chapter describes specification and how to use the output option board.

## 11.1 TR Output Option Board Operation Sequence of Positioning

### 11.1.1 Operation Sequence of Positioning

Operation sequence is as follows. Positioning function of the option board operates only at slot number 9.



# 11.2 XBO-TN04A Specification

Γ

## 11.2.1 Output option board specification

Item		Transistor output specification	
10	5111	XBO-TN04A	Remark
No. of output		4 (Pulse output function is supported when	
		mounted on standard type)	
Insulation metho	bc	Photo coupler insulation	
Rated load volta	age	DC 24V	
Max. load curre	nt	0.5A/point, 2A/COM	
Surge killer		Zener diode	
Leakage curren	t when Off	0.1 <sup>mA</sup> or less	
Voltage drop wh	nen On	DC 1V or less	
Inrush current		3A, 10 <sup>ms</sup> or less	
Response time	$\text{Off} \to \text{On}$	1 <sup>ms</sup> or less	
$On \to Off$		1 <sup>ms</sup> or less	
Operating indica	ator	-	
	No. of axes	2	
	Output method	Open collector method	When mounted
Pulse output	Control unit	Pulse	on standard
	Control speed	10kpps (One option board supported _ No. 9 slot)	type
	Setting method	Setup by DST instruction	
		Circuit configuration	

# **11.3 Positioning Specification**

Positioning function is built in XGB output option board. This describes specification, how-to-use, function, programming and wiring of built-in positioning.

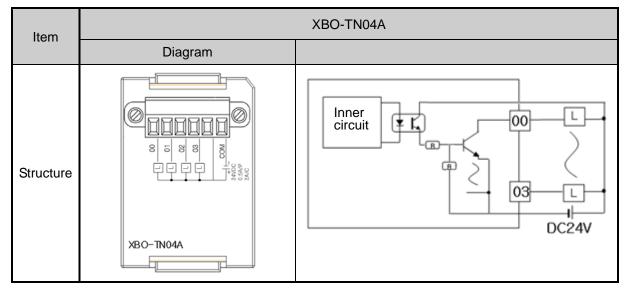
## **11.3.1 Performance Specification**

(1) Performance Specification

lte	Model	XBO-TN04A					
No. c	of axes	2					
Cont	rol method	Position control, speed control					
Cont	rol unit	Pulse					
Po	Method	Incremental					
Positioning	Address range	-2,147,483,648 ~ 2,147,483,647(pulse)					
ling	Speed range	1 ~10,000pps(1pps unit)					
Manu	ual operation	JOG operation					
Home return		By DOG					
Max. connection distance		2 m					
Conr	nector	6 Pin connector					

### 11.3.2 Name of each part

(1) Name of each part



Connector	Output point No.		Description	Remark
Pulse	X-axis 00		Positioning X-axis pulse string output point (Open collector output)	
output Y-axis		01	Positioning Y-axis pulse string output point (Open collector output)	High
Direction	Direction X-axis		Positioning X-axis direction output point (Open collector output)	Active
output	Y-axis	03	Positioning Y-axis direction output point (Open collector output)	
External power	X/Y-axis 24V		Terminal for external power supply for TR	
Output common	X/Y-axis	СОМ	Output common terminal	

## (2) Output pulse level

Γ

Basic option board output pulse is as follows.

Pulse output		Output signal level				
method	Output signal	Forward	Reverse			
Pulse+Direction	Pulse					
Pulse+Direction mode	Direction	Low	High			

## 11.3.3 Before Positioning

## (1) Positioning function list

Positioning function of XGB option board built-in positioning is as follows.

1

Positioning function		description	Instruction	Ref.			
Position control	Operation pattern	Speed Start command Dec. stop	DST				
	Operation	If the rising edge of start command is detected, it moves with designated speed to designated position, and complete signal is on (dwell is not supported)					
Speed control	Operation pattern	Speed Start command Dec. stop	DST				
	Operation	If the rising edge of start command is detected, it n speed and stops after deceleration by stop cor complete signal will not be not on.		-			

Position control

Position control is to move the designated axis from start address (present position) up to target address (movement). There are two position control methods, absolute and incremental.

(a) Control by absolute coordinates (Absolute coordinates)

Object moves from start address to target address. Position control is performed, based on the address designated in Home Return (home address).

Direction is determined by start address and target address.

- Start address < target address: forward positioning</li>
- Start address > target address: reverse positioning
- (b) Control by incremental coordinates (incremental coordinates)

Object moves from current position as far as the address set in operation data. At this time, target address is based on start address. Direction is determined by sign (+,-).

- In case Address is positive number: forward positioning (Direction increasing address)
- In case Address is negative number: reverse positioning (Direction decreasing address)
- (2) Speed control

Speed control means that object moves with steady speed (steady pulse string) until stop command.

• In case of speed control, direction is determined by sign of Address set in operation data.

Forward : Address is positive number

Reverse : Address is negative number

In the speed control, direction is determined by sign of target address regardless of current position and target position.

For example, current position is 100 and target position is 90, though target position is less than current position, since sign is positive, it moves forward.

#### Note

• For more information, refer to XGB positioning manual.

### 11.3.4 Positioning Stop Factor

- (1) Stop factor and how to deal with stop factor
- If following factor occurs during positioning, it stops without completing positioning.
  - In case positioning stops by stop instruction (STP, EMG) or following stop factor, generally, the only axis where stop instruction is executed or stop factor occurs stops.

status Stop factor	Operation	Positioning *1	Homing	Jog operation	Axis operation status after stop instruction *2
Stop by	Dec. stop instruction	Dec. stop	Dec. stop	Error 322 (Keep operating)	Decelerating
sequence program *3	Emg. Stop instruction	In	nmediate sto	р	Error status (Error 481) Output prohibited
Stop by	External upper limit "On"			Forward immediate stop	Error status (Error 492)
external signal	External lower limit "On"	Immedia	te stop	Backward immediate stop	Error status (Erro 493)

#### Note

- \*1 : Positioning refers to position control, speed control by positioning data.
- \*2 : If axis is 'Output prohibited status' after being stopped, run a instruction to cancel 'Output prohibited status'. (CLR instruction) .
- \*3 : Stop by sequence program refers to stop by "Stop instruction" at XGB program.

#### (2) Stop Process and Priority

- (a) Dec. stop process
  - If it stops due to deceleration stop instruction, since positioning operation is not complete, it does not generate positioning completion signal.
- (b) Process of emergency stop and external input upper/lower limits
  - If emergency stop instruction or external input upper/lower limits are inputted during positioning control, it stops positioning control and turns into 'Output prohibited stats', generating an error.
- (c) Stop process priority

The priority of stop process is as follows.

Dec. stop < Emg. stop

(d) Emergency stop

- It immediately stops if it meets emergency stop while performing start-related instructions (indirect start, direct start, Home Return start, jog start).
- Emergency stop generates Error 481.
- Since it turns into "Output prohibited status" and "un-defined origin status", once emergency stop is executed, execute origin determination (Home return, Current position preset) again to run an instruction that requires defined origin status"

#### 11.3.5 Manual operation

In general, manual operations refer to operation which doesn't use operation data. In output option board, JOG operation is supported.

#### (1) JOG operation

• Jog operation means positioning by jog operation stat contact point

		Jog forward start	Jog backward start	Jog high speed/low speed
XBO-	X-axis	U9.1.8	U9.1.9	U9.1.A
TN04A	Y-axis	U9.17.8	U9.17.9	U9.17.A

- It is operated by jog speed set in positioning parameter.
- It can be executed when origin is not determined.
- Acceleration/deceleration process is controlled by the duration set in jog acceleration/deceleration time among parameter settings of this software package.
- If jog speed is set out of allowable range, it generates an error and operation is not available

Danas	High speed jog operation	1 ~ 100,000	( <b>Unit</b> : 1pps)
Range	Low speed jog operation	1 $\sim$ jog high speed	

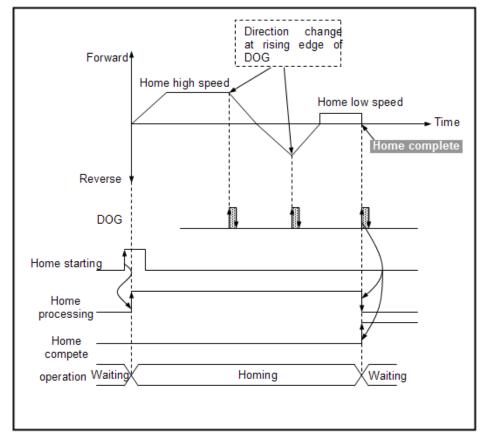
#### Remark

• Make sure to follow the cautions

Bias speed  $\leq$  Jog high speed  $\leq$  Speed limit

#### 11.3.6 Home return

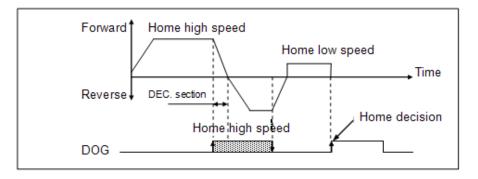
XBO-TN04A supports only "Home return by DOG".



(a) If homing command (ORG instruction) is executed, it accelerates to home direction set in Home Parameter and it homes with high speed.

(The above figure is example when homing direction is forward)

- (b) While target is homing with high speed, if rising edge of DOG (U9.1.B: X-axis) occurs, target speed decreases and change its direction.
- (c) When it accelerates after changing direction, if rising edge of DOG occurs, it homes with low speed.
- (d) In the homing status with low speed, rising edge occurs of DOG third time, it stops and determines the origin.
- (e) When 'On' time of DOG signal is larger decreasing time, it changes the direction at the falling edge of DOG and moves with low speed and stops at the rising edge of DOG and determines the origin.



## 11.3.7 Positioning Basic Parameter Setup

This chapter describes on how to register basic parameter of XGB main output option board positioning function and each item.

#### (1) U device auto registration

Γ

(a) Set up the module at the slot in [I/O Parameter]

🖃 🗊 Base 00 : Default 🛛	Slot	Module	Comment	Input Filter	Emergency Out	Allocation
- 🚨 00 : DC 24V INPUT	0(main)	DC 24V INPUT 18poin		3 Standard [ms]	Default	P0000 ~ P007F
01 : Default	1					
a 03 : Default	2					
04 : Default	3					
05 : Default	4					
🛛 🔤 06 : Default	5					
207 : Default	6					
08 : Default B 09 : TR OUTPUT, 40	7					
10 : Default	8			0.////////	[[]]]]]]]]]]	
io : Deladit	9	TR OUTPUT, 4points(		· ·	Default	P0400 ~ P043F
< · · · · · · · · · · · · · · · · · · ·	10	Digital Module List     Digital Module List     Digital Module     Digital Module     Digital Module     Digital Module List     Digital Module List     Digital Module List	JT, 4points(sync)			

(b) Double-click [Variable/Comment].

🐐 XGB_PROJECT - XG5000 - [Variabl	e/Comment]	
🕌 Project Edit Find/Replace View Online	<u>M</u> onitor <u>D</u> ebug <u>T</u> ools <u>W</u> indow <u>H</u> elp	- 8 ×
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);;;;;)) () () () () () () () () () () () () (	으므 🔒 🕫 🗑 🗿 📖 🔤 🖉 🖓 한 한 한 한 한 🛯 😢 🔤 🔛 😭 🔷 등 한	194 F5 F6 F7
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Project Window × ×	View Variable View Device	
	Variable Type Device Used Comment	>
■t¢ Project	📾 NewProgram 🙀 Variable/Comment	

(c) Select "Register U device" on menu 'Edit'.

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Troject windo	Paste Delete	Ctrl+V Del	VV	fiew Variable	View Device	View Flag			
⊡ - ∰g XGB	Select All	Ctrl+A		Variable	Туре 🔺	Device	Used	Comment	[
	Insert <u>L</u> ine	Ctrl+L	-	L					
₫≯	Delete Li <u>n</u> e	Ctrl+D							
	Export Variables	to <u>F</u> ile							
6	Register U Device	• •							
i - C	Add EXTERNAL	Variable							
	Move Item Up								
	Move Item Down								
			<				Ш		>
Project			33	NewProgram	🕍 Var	iable/Comme	nt		

(d) Click 'yes'.

🗞 asdasd - XG5000			🔳 🗖 🗙
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	DOINGX CONSY M	NWWR BOO	
			2 2 2 2 3 4 9 2 3
			the second s
E62 F3 F4 sF1 sF2 F5 F6 sF8 sF9 F9 F11 sF3 Project Window - *	574 575 576 F10 377 83 84 85 85   LL III III III III III III III III II		
berns	RewProgram		
Seadod *      Seadod *	XC5000  Automatically register comments in the U Devices a Gondinue?  Yes  NewProgram  NewProgram	coording to the special module set in the I/O parameter.	
PLC Type Device/Vi	ariable Value Variable/Device		
2			
4 <	(X)		
3   4   4   ≥ ≥ \ Monitor 1 \ Monitor 2 \ Monitor 3	AMonitor 4 /	E Result (Check Program ) Find 1 ) Find	
		NewPLC Offine	Row 0, Column 0 Overwrite

1

#### (e) Variables are registered as the screen below.

Va	Variable Monitoring Window							
Γ		PLC	Туре	Device/Vari	Value	Variable/Device	Comment	^
ŀ	1	NewPLC	BIT	U09.00.0	10	_0009_POS_X_Busy	XAxis BUSY	
	2	NewPLC	BIT	U09.00.1	10	_0009_POS_X_Err	XAxis Error	
	3	NewPLC	BIT	U09.00.2	10	_0009_POS_X_Done	XAxis Position Complete	
4	4	NewPLC	BIT	U09.00.3	10	_0009_POS_X_OriginFix	XAxis Origin Fix	
Į	5	NewPLC	BIT	U09.00.4	10	_0009_POS_X_OutInhibit	XAxis Output Inhibit	
Ī	6	NewPLC	BIT	U09.00.5	10	_0009_POS_X_Stop	XAxis Stop	
	7	NewPLC	BIT	U09.00.6	10	_0009_POS_X_ULimit	XAxis Upper Limit Detection	
Ī	8	NewPLC	BIT	U09.00.7	10	_0009_POS_X_LLimit	XAxis Lower Limit Detection	
	9	NewPLC	BIT	U09.00.8	10	_0009_POS_X_Estop	XAxis Emergency Stop	
ŀ	10	NewPLC	BIT	U09.00.9	10	_0009_POS_X_Dir	XAxis CW/CCW	
ŀ	11	NewPLC	BIT	U09.00.A	10	_0009_POS_X_Acc	XAxis Move Status(Acceleration)	
ŀ	12	NewPLC	BIT	U09.00.B	10	_0009_POS_X_Const	XAxis Move Status(Constant)	=

### Note

When variables are registered by above method, variables are expressed by BIT and WORD. If you want to check them as DINT, DOWRD, change the data type. (2) Positioning parameter of XBO-TN04A

U area of each item is as follows.

Γ

Item	Data type	Signal direction	Status information	U area for positioning		
		unection		X-axis	Y-axis	
BUSY			0: Stop, 1: Run	U9.0.0	U9.16.0	
Error			0: No error, 1: Error occurred	U9.0.1	U9.16.1	
Positioning complete			0: not complete, 1: complete	U9.0.2	U9.16.2	
Home determination			0: not determined, 1: determined	U9.0.3	U9.16.3	
			0: output available,			
Output prohibited			1: output prohibited	U9.0.4	U9.16.4	
Stop status			0: not stop status, 1: stop status	U9.0.5	U9.16.5	
Upper limit			0: not detect, 1: detect	U9.0.6	U9.16.6	
Lower limit			0: not detect, 1: detect	U9.0.7	U9.16.7	
			0: normal status,			
EMG. Stop			1: EMG. Stop status	U9.0.8	U9.16.8	
CW/CCW			0:CW, 1:CCW	U9.0.9	U9.16.9	
		-	0: not accelerating ,		U9.16.A	
Operation status (accelerating)		Output	1: accelerating	U9.0.A		
		(monitoring)	0: not steady status,	U9.0.B	U9.16.B	
Operation status (steady status)			1: steady status			
	BOOL		0: not decelerating ,		U9.16.C	
Operation status (decelerating)			1: decelerating	U9.0.C		
			0: not under position control	1		
Position control			1: under position control	U9.0.D	U9.16.D	
			0: not under speed control		U9.16.E	
Speed control			1: under speed control	U9.0.E		
			0: not under home return			
Home return			1:under home return	U9.0.F	U9.16.F	
			0: not under JOG low speed			
JOG low speed			1: under JOG low speed	U9.1.0	U9.17.0	
			0: not under JOG high speed			
JOG high speed			1: under JOG high speed	U9.1.1	U9.17.1	
			0: JOG stop,			
Forward JOG start			1: forward JOG start	U9.1.8	U9.17.8	
		Input	0: JOG stop,			
Reverse JOG start			1: Reverse JOG start	U9.1.9	U9.17.9	

## Chapter 11 TR Output Option Board

Item	Data type	Signal direction	Status information	U area for positioning		
		unection		X-axis	Y-axis	
JOG low/high speed			0: JOG low speed,	U9.1.A	U9.17.A	
JOG low/nigh speed			1: JOG high speed	09.1.A	09.17.A	
DOG			Operate at rising edge	U9.1.B	U9.17.B	
Upper limit signal			Detected at falling edge	U9.1.C	U9.17.C	
Lower limit signal			Detected at falling edge	U9.1.D	U9.17.D	
Home return direction	BOOL	locut	0: CW, 1: CCW	U9.1.E	U9.17.E	
Positioning status	BOOL	Input	0: disable, 1: enable	U9.1.F	U9.17.F	
Current position	DINT		-2,147,483,648 ~ 2,147,483,647	U9.2	U9.18	
Current speed	WORD	Output	1 ~ 10,000[pulse/s]	U9.4	U9.20	
Error code	WORD		Indicates positioning error	U9.5	U9.21	
Bias speed	WORD		1 ~ 10,000[pulse/s]	U9.6	U9.22	
Speed limit	WORD		1 ~ 10,000[pulse/s]	U9.7	U9.23	
Acc. time	WORD		0 ~ 10,000[unit: ms]	U9.8	U9.24	
Dec. time	WORD		0 ~ 10,000[unit: ms]	U9.9	U9.25	
Home address	DINT	Input	-2,147,483,648 ~ 2,147,483,647	U9.10	U9.26	
Home return high speed	WORD		1 ~ 10,000[pulse/s]	U9.12	U9.28	
Home return low speed	WORD		1 ~ 10,000[pulse/s]	U9.13	U9.29	
JOG high speed	WORD		1 ~ 10,000[pulse/s]	U9.14	U9.30	
JOG low speed	WORD		1 ~ 10,000[pulse/s]	U9.15	U9.31	

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#### Note

• For more information on positioning parameter item, refer to XGB built-in positioning manual.

# **11.4 Positioning Instruction List**

Positioning instructions used in XBO-TN04A positioning are summarized as follows.

Instructi			XGB built-in	
	Command	Command condition	positioning	
on			manual	
ORG	Home return	Slot, command axis	5.2.1	
DST	Direct start	Slot, command axis, position, speed, dwell time, M code,	5.2.3	
201	Birottotart	control word	0.2.0	
STP	Stop	Slot, command axis, dec. time	5.2.9	
PRS	Current position preset	Slot, command axis, position	5.2.18	
EMG	EMG. Stop	Slot, command axis	5.2.19	
CLR	Error reset, output	Slot, command axis, disable/enable pulse output	5 2 20	
ULK	prohibition cancel	Siot, command axis, disable/enable pulse output	5.2.20	

#### (1) XBO-TN04A positioning instruction

#### Note

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- XGB positioning instruction operates at rising edge. Namely, instruction is executed once when execution contact point is on.
- For instruction, refer to XGB positioning manual.
- When using DST instruction in XBO-TN04A, dwell time and M code are not supported.

# **11.5 Positioning Example**

This chapter describes positioning example of XBO-TN04A.

(1) Positioning setup

Option board positioning is set up by U area. Set up each parameter to use positioning function.

(a) Input each parameter value.

F00099	MOV	1	U09.06	X-axis bias speed
	MOV	10000	U09.07	Speed limit
	MOV	2000	U09.08	X acc. time
	MOV	2000	U09.09	X dec. time
	MOV	8000	U09.14	X JOG high speed
	MOV	7500	U09.15	X JOG low speed
	MOV	1	U09.22	Y-axis bias speed
	MOV	10000	U09.23	Speed limit
	MOV	2000	U09.24	Y acc. time
	MOV	2000	U09.25	Y dec. time
	MOV	8000	U09.30	Y JOG high speed
	MOV	1000	U09.31	Y JOG low speed

#### (b) Turn On or Off according whether to use positioning



M00001					CLR	9	0	1
M00002					PRS	9	0	0
мооооз —						EMG	9	0
M00004					STP	9	0	100
M00011	DST	9	0	80000	10000	0	0	0
M00011	DST	9	1	80000	10000	0	0	0

#### (c) Set up the function as follows.

## (2) Monitoring

Γ

You can check option board posioing speed, crrent position by regstering U9.2, U9.4(No. 9 slot, X-axis) at variable monitor window or program

# **Chapter12 Memory Module**

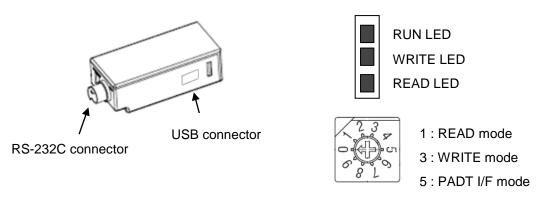
## **12.1 Memory Module Specification**

You can save user program safely or download user program to PLC without special handling when user program is damaged by using external memory module in XGB PLC

### 12.1.1 Memory module specification

Item	XBO-M2MB	Ref.
Memory capacity	2MByte	
Memory type	Flash Memory	
Specification	USB supported, Program Read/Write	
Indicator	LED	1. RUN 2. WRITE 3. READ
Operating mode setup	Mode setup by rotary switch	
Operating power supply	RS-232C communication connecter, USB connector	5V
Purpose	For moving	

### 12.1.2 Memory module structure



#### Note

 Memory module can be used for XGB (not supported for XGK/I/R)
 Memory module is not supported at the version below (XBMS: V2.5 or less, XBCH: V1.8 or less, XECH: V1.2 or less)

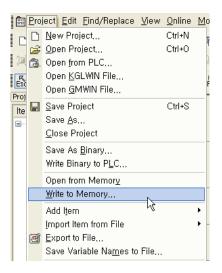
#### 12.1.3 How to use memory module

- (1) Save program, parameter, communication parameter at external memory module
  - (a) Set the switch of memory module as 1
  - (b) Install memory module at the RS-232C port of main unit
    - After installation, program and parameter (including communication) is saved into memory module and READ LED is on
    - If Saving program and parameter is complete, READ LED is off
  - (c) Separate memory module from main unit
- (2) Save user program of external memory module at main unit
  - (a) Set the operating mode of main unit as STOP
    - In RUN mode, you can't save program
  - (b) Set the switch of memory module as 3
  - (c) Install the memory module
    - Install it at the RS-232C port of the main unit.
    - PLC program and parameter (including communication) is written and WRITE LED is on
    - If saving program and parameter is complete, WRITE LED is off.
  - (d) If you change operation mode of PLC into RUN, PLC operates with program and parameter saved in memory module.

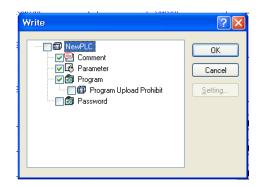
With the above handling, you can run PLC with program saved in memory module

#### (3) Save program of XG5000at the memory module

- (a) Set the mode switch of XBO-M2MB as "5" and connect XBO-M2MB to USB port of PC
- (b) Select Project  $\rightarrow$  Write to Memory on XG5000 menu.



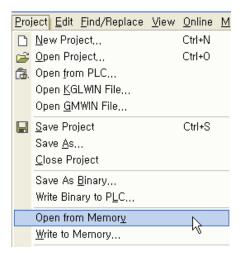
(c) 'Write' window is created as follows.



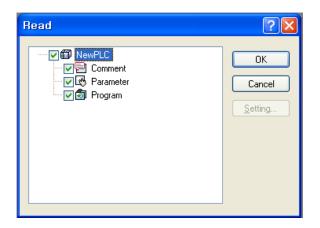
(d) "Writing completed" window appears.



- (e) With above method, through PADT, you can save program, parameter, communication parameter at XBO-M2MB
- (4) Open from memory module
  - (a) Set the mode switch of XBO-M2MB as "5" and connect XBO-M2MB to USB port of PC
  - (b) Select "Project → Open from Memory" on XG5000 menu



(c) "Read" window is created as follows.



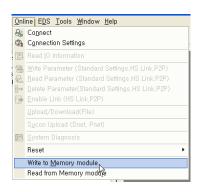
(d) "Reading is completed" window appears.



- (e) With above method, through PADT, you can save program, parameter, communication parameter from XBO-M2MB
- (5) Write to Memory module

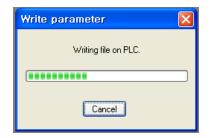
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- (a) Set the mode switch of XBO-M2MB as "5" and connect XBO-M2MB to USB port
- (b) Click "Online  $\rightarrow$  Write to Memory module" on XG-PD menu



(c) If you click "OK" button, it saves each parameter at the memory module.

4	Write parameter(standard settings,HS link,	$\mathbf{X}$
	Image: Application of the set of t	
	OK Cancel	

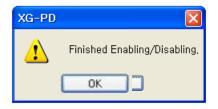


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(d) If "Enable Link" window appears, check the item and press "Write"

E	nable Link(HS Link,P2P)	3
	KBCS-Master_232     KewPLC     KewPLC	
	Write Close	

(e) "Enable, Disable" window appears



#### (6) Read from Memory module

Γ

- (a) Set the mode switch of XBO-M2MB as "5" and connect XBO-M2MB to USB port of PC
- (b) Select "Online → Read from Memory module" on XG-PD menu.

	<u>O</u> nli	ine E <u>D</u> S <u>T</u> ools <u>W</u> indow <u>H</u> elp					
	읍	Co <u>n</u> nect					
	¢.	C <u>o</u> nnection Settings					
c	B	Read <u>IO</u> Information					
1	鶕	Write Parameter (Standard Settings,HS Link,P2P)					
2		Read Parameter (Standard Settings,HS Link,P2P)					
2	8*	Delete Parameter(Standard Settings,HS Link,P2P)					
		Enable Link (HS Link,P2P)					
		Upload/Download(File)					
		Sycon Upload (Dnet, Pnet) System Diagnosis					
	毄						
		Reset >					
		Write to Memory module					
		Read from Memory module					

(c) If you click "OK" button", it read each parameter form the memory module.

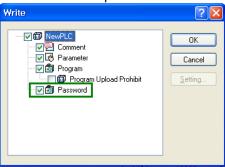
Read parameter(standard settings,HS link,	×
NewProject NewPLC Yan NewPLC Yan Chet [base0, slot0] Yan High-speed Link High-speed Link 01 Yan High-speed Link 02 Yan P2P(EIP) Yan P2P(EIP) 01 Yan P2P(EIP) 02 Yan P2P(EIP) 03	
Read parameter	
Reading file from PLC.	
Cancel	

#### Note

- -. "Open from memory module" and "Write to Memory module" menus of PADT are activated when PLC is Offline. They are deactivated when PLC is Online.
- -. When connecting with PADT, connection type should be 'USB'

#### 12.1.4 How to use when password is set

- (1) When connecting PADT with memory module
  - (a) When setting password at program and writing program to memory module, it is saved according to rotary switch operating mode without functions cancelling the password
    - 1) When writing program, check whether to use password at 'Write' window.



2) If you press 'OK' after setting password, program is saved at memory module with that password.

Password				
Your password must be Please set your passwor If the passwords betwee cannot write or read the	rd the same as the PLC. en memory module and PLC are different, you			
Password				
Password:				
Password Confirm:				
	<u>D</u> K <u>C</u> ancel			

- (b) When reading password-set program to PADT, screen appears, which is same as when password is set in PLC.
  - 1) "Password" window is created.

Password ?X
Password is set in the PLC Enter the password
Password:
OK Cancel

- 2) If you input password same as that in memory module, it reads program.
- 3) When password is incorrect, error message appears as follows.



(2) Write to PLC by memory module

Γ

- (a) When password of program in memory module is not set
  - 1) When no password is set in PLC
  - Saves program of the memory module in PLC
  - 2) When password is set in PLC
    - Writing is not executed
- (b) When password of program in memory module is set
  - 1) When no password is set in PLC
    - Writing to PLC is executed
    - But, password of the memory module is not written to PLC.
  - 2) When password is set in PLC
    - When PLC password is same as that of the memory module, writing is executed.
    - When PLC password is not same as that of the memory module, writing is not executed. (WRITE LED flickers)

- (3) Reading program in PLC to memory module
  - (a) When password of program in PLC is not set
    - 1) When no password is set in the memory module
    - Reads program from PLC
    - 2) When password is set in the memory module
      - After reading, it clears password of the memory module
  - (b) When password of program in PLC is set
    - 1) When no password is set in the memory module
    - Writing is not executed
    - 2) When password is set in the memory module
      - When PLC password is same as that of the memory module, writing is executed.
      - When PLC password is not same as that of the memory module, writing is not executed.

#### (4) When LED flickers

	Condition	LED
1	PLC type is not XGB	RUN LED flickers
2	Operating mode changes while being connected to PADT or PLC	RUN LED flickers
3	Connected to PADT while mode switch is "1"	READ LED flickers
4	PLC program upload is prohibited	READ LED flickers
5	You execute reading when password is set in PLC	READ LED flickers
	(when password is not same as that of memory module)	
6	Connected to PADT while mode switch is "3"	WRITE LED flickers
7	You execute writing the memory module when PLC mode is RUN	WRITE LED flickers
8	Connected to the different type of PLC with the type set in the memory module	WRITE LED flickers
9	You executes writing when PLC password is not same as that of memory module	WRITE LED flickers

#### Note

-. Memory module can cancel PLC password and read/write but can't set, delete and change the password.

- -. Do not run PLC while external memory module is connected to.
- -. Do not remove memory module while READ/WRITE LED is on.

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# **Chapter 13 Installation and Wiring**

# **13.1 Safety Instruction**

<u> </u>		
Please design protection circuit at the external of PLC for entire system to operate safely because an		
abnormal output or an malfunction may cause accident when any error of external power or malfunction		
of PLC module.		
(1) It should be installed at the external side of PLC to emergency stop circuit, protection circuit, interlock		
circuit of opposition action such as forward /reverse operation and interlock circuit for protecting		
machine damage such as upper/lower limit of positioning.		
(2) If PLC detects the following error, all operation stops and all output is off.		
(Available to hold output according to parameter setting)		
(a) When over current protection equipment or over voltage protection operates		
(b) When self diagnosis function error such as WDT error in PLC CPU occurs		
In case of error about IO control part that is not detected by PLC CPU, all output is off.		
Design Fail Safe circuit at the external of PLC for machine to operate safely. Refer to 13.1.1 Fail Safe		
circuit.		
(1) Because of error of output device, Relay, TR, etc., output may not be normal. About output signal that		
may cause the heavy accident, design supervisory circuit to external.		
▶ In case load current more than rating or over current by load short flows continuously, danger of heat, fire		
may occur so design safety circuit to external such as fuse.		
Design for external power supply to be done first after PLC power supply is done. If external power		
supply is done first, it may cause accident by misoutput, misoperation.		
► In case communication error occurs, for operation status of each station, refer to each communication		
manual.		
► In case of controlling the PLC while peripheral is connected to CPU module, configure the interlock circuit		
for system to operate safely. During operation, in case of executing program change, operation status		
change, familiarize the manual and check the safety status. Especially, in case of controlling long		
distance PLC, user may not response to error of PLC promptly because of communication error or etc.		
Limit how to take action in case of data communication error between PLC CPU and external device		
adding installing interlock circuit at the PLC program.		

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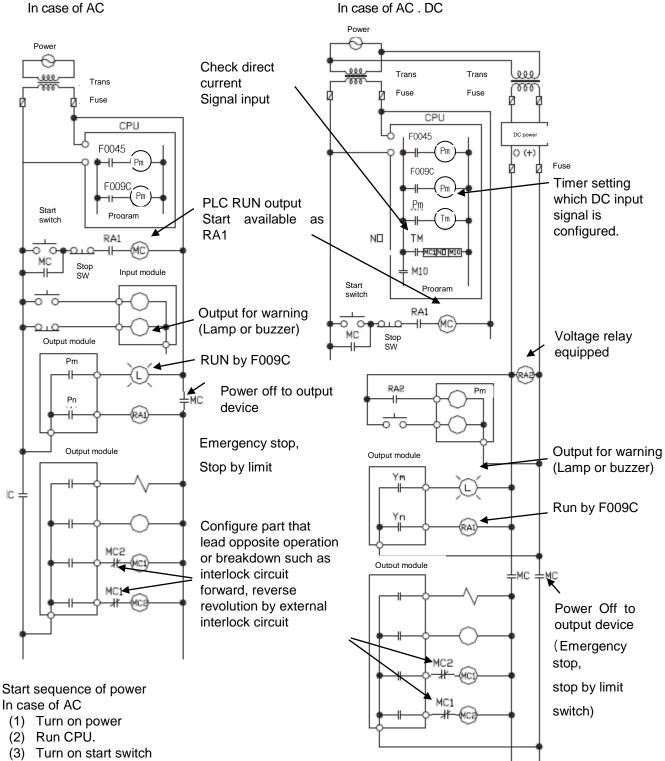
# 🖄 Danger

- ➤ Don't close the control line or communication cable to main circuit or power line. Distance should be more than 100mm. It may cause malfunction by noise.
- In case of controlling lamp load, heater, solenoid valve, etc. in case of Off -> On, large current (10 times of normal current) may flows, so consider changing the module to module that has margin at rated current.
- Process output may not work properly according to difference of delay of PLC main power and external power for process (especially DC in case of PLC power On-Off and of start time. For example, in case of turning on PLC main power after supplying external power for process, DC output module may malfunction when PLC is on, so configure the circuit to turn on the PLC main power first Or in case of external power error or PLC error, it may cause the malfunction.
- Not to lead above error to entire system, part causing breakdown of machine or accident should be configured at the external of PLC

#### 13.1.1 Fail safe circuit

(1) example of system design (In case of not using ERR contact point of power module)

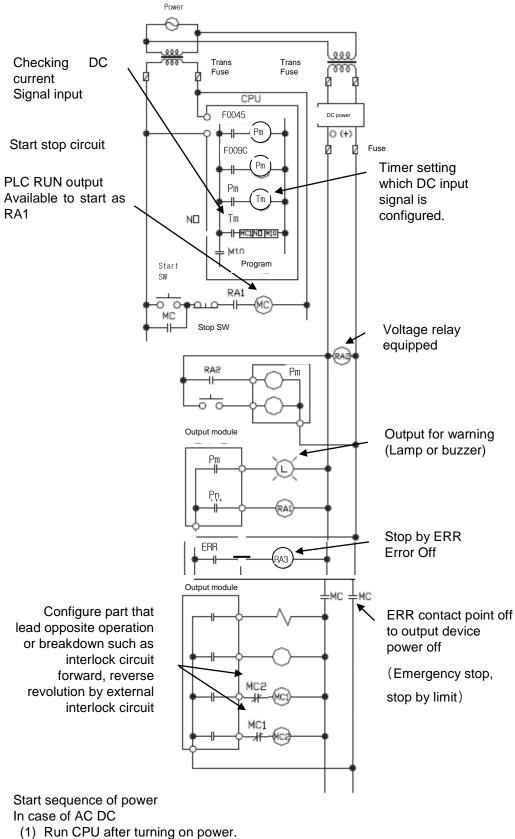
In case of AC



(4) Output device runs by program through magnetic contactor (MC) [On]

Start sequence of power In case of AC DC

- (1) Run CPU after power is on
- (2) Turn on RA2 as DC power on
- (3) Turn on timer after DC power is stable.
- (4) Turn on start switch
- (5) Output device runs by program through magnetic contactor (MC) [On]



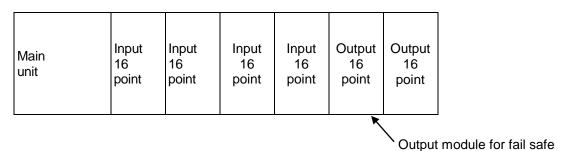
(2) System design circuit example (In case of using ERR contact point of power module)

- (2) Turn on RA2 with DC power supplied
- (3) Turn on timer after DC power is stable
- (4) Turn on start s/w
- (5) Turn on start switch Output device runs by program through magnetic contactor (MC) [On]

#### (3) Fail safe countermeasure in case of PLC error

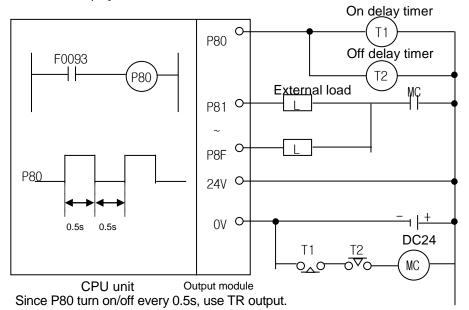
Error of PLC CPU and memory is detected by self diagnosis but in case error occurs in IO control part, etc., CPU can detect the error. At this case, though it is different according to status of error, all contact point is on or off, so safety may not be guaranteed. Though we do out best to our quality as producer, configure safety circuit preparing that error occurs in PLC and it lead to breakdown or accident.

System example



Equip output module for fail safe to last slot of system.

[Fail safe circuit example]



- 13.1.2 PLC heat calculation
- (1) Power consumption of each part
  - (a) Power consumption of module

The power conversion efficiency of power module is about 70% and the other 30% is gone with heat; 3/7 of the output power is the pure power consumption. Therefore, the calculation is as follows.

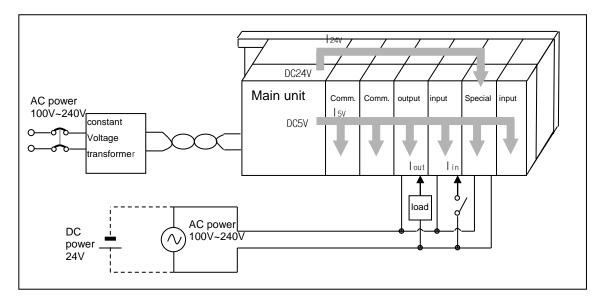
- Wpw = 3/7 {(I5v X 5) + (I24v X 24)} (W)
- Isv : power consumption of each module DC5V circuit(internal current consumption)
- $I_{24V\!:}$  the average current consumption of DC24V used for output module
  - (current consumption of simultaneous On point)

If DC24V is externally supplied or a power module without DC24V is used, it is not applicable.

(b) Sum of DC5V circuit current consumption

The DC5V output circuit power of the power module is the sum of power consumption used by each module. •  $W_{5V} = I_{5V} X 5 (W)$ 

- (c) DC24V average power consumption(power consumption of simultaneous On point) The DC24V output circuit's average power of the power module is the sum of power consumption used by each module.
  - W24V = I24V X 24 (W)
- (d) Average power consumption by output voltage drop of the output module(power consumption of simultaneous On point)
  - Wout = Iout X Vdrop X output point X simultaneous On rate (W) Iout : output current (actually used current) (A) Vdrop: voltage drop of each output module (V)



(e) Input average power consumption of input module

(power consumption of simultaneous On point)

• Win = Iin X E X input point X simultaneous On rate (W)

lin: input current (root mean square value in case of AC) (A)

E : input voltage (actually used voltage) (V)

(f) Power consumption of special module power assembly

• Ws = I5V X 5 + I24V X 24 + I100V X 100 (W)

The sum of power consumption calculated by each block is the power consumption of the entire PLC system.

•  $W = W_{PW} + W_{5V} + W_{24V} + W_{out} + W_{in} + W_{s} (W)$ 

Calculate the heats according to the entire power consumption(W) and review the temperature increase within the control panel.

The calculation of temperature rise within the control panel is displayed as follows.

 $T = W / UA [^{\circ}C]$ 

W : power consumption of the entire PLC system (the above calculated value)

A : surface area of control panel [m<sup>2</sup>]

U : if equalizing the temperature of the control panel by using a fan and others - - - 6

If the air inside the panel is not ventilated - - - - - - 4

If installing the PLC in an air-tight control panel, it needs heat-protective(control) design considering the heat from the PLC as well as other devices. If ventilating by vent or fan, inflow of dust or gas may affect the performance of the PLC system.

## 13.2 Attachment/Detachment of Modules

#### 13.2.1 Attachment/Detachment of modules

Caution in handling

Γ

Use PLC in the range of general specification specified by manual. In case of using out of range, it may cause electric shock, fire, malfunction, damage of product.

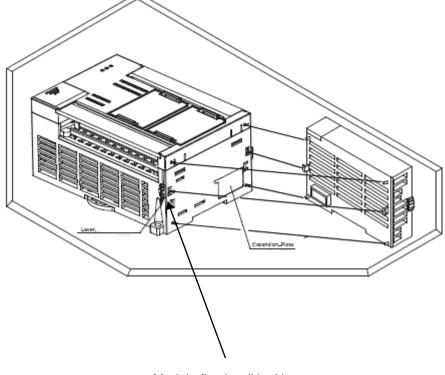
- Warning
- Module must be mounted to hook for fixation properly before its fixation. The module may be damaged from over-applied force. If module is not mounted properly, it may cause malfunction.
- > Do not drop or impact the module case, terminal block connector.
- Do not separate the PCB from case.

(1) Equipment of module

• Eliminate the extension cover at the upper of module.

• Push the module and connect it in agreement with hook for fixation of four edges and hook for connection at the bottom.

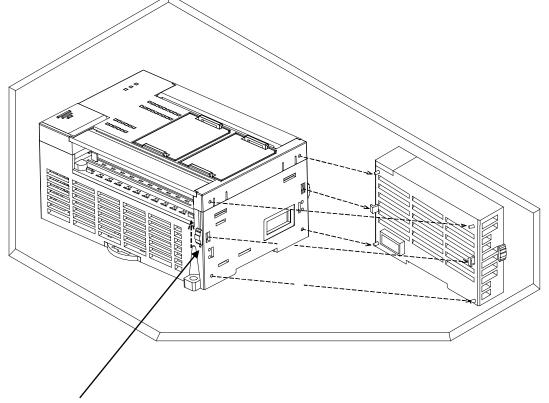
• After connection, get down the hook for fixation at the upper part and lower part and fix it completely.



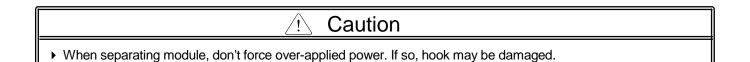
Module fixation (Hook)

(2) Detachment of module

- Get up the hook for fixation of upper part and lower part and disconnect it.
- Detach the module with two hands. (Don't force over-applied force.)



Hook for module fixation

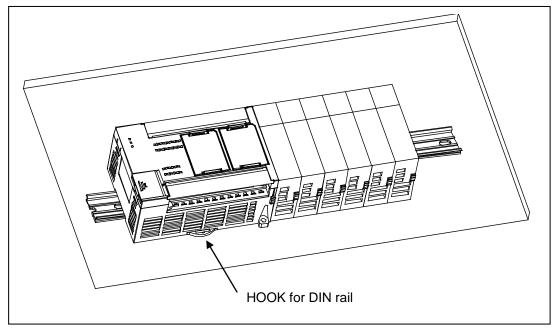


(3) Installation of module

XGB PLC is having hook for DIN rail (rail width: 35mm) so that cab be installed at DIN rail.

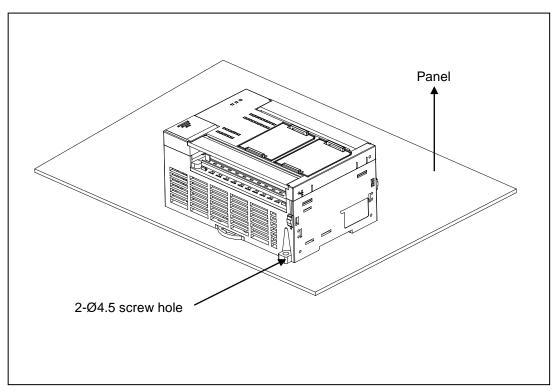
(a) In case of installing at DIN rail

- Pull hook for DIN rail at the bottom of module and install it at DIN rail
- Push hook to fix the module at DIN rail after installing module at DIN rail



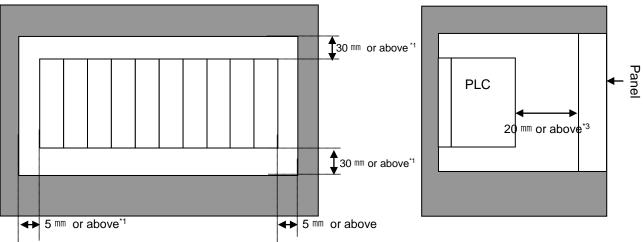
(b) In case of installing at panel

- You can install XGB compact type main unit at panel directly using screw hole
- Use M4 type screw to install the product at panel.



#### (4) Module equipment location

Keep the following distance between module and structure or part for well ventilation and easy detachment and attachment.

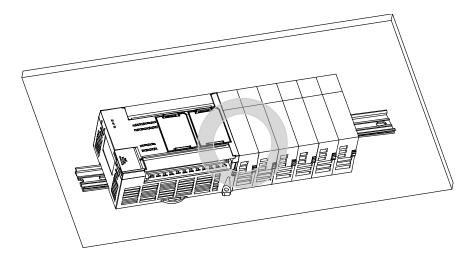


\*1 : In case height of wiring duct is less than 50 mm (except this 40mm or above)

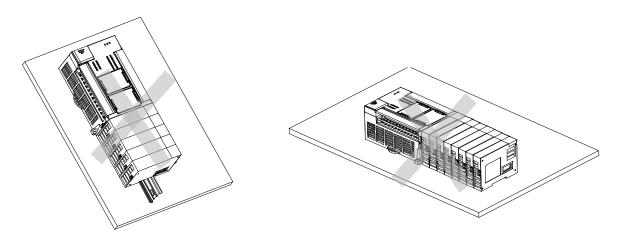
- \*2 : In case of equipping cable without removing near module, 20mm or above
- \*3 : In case of connector type, 80mm or above

#### (5) Module equipment direction

(a) For easy ventilation, install like the following figure.



(b) Don't install like the following figure

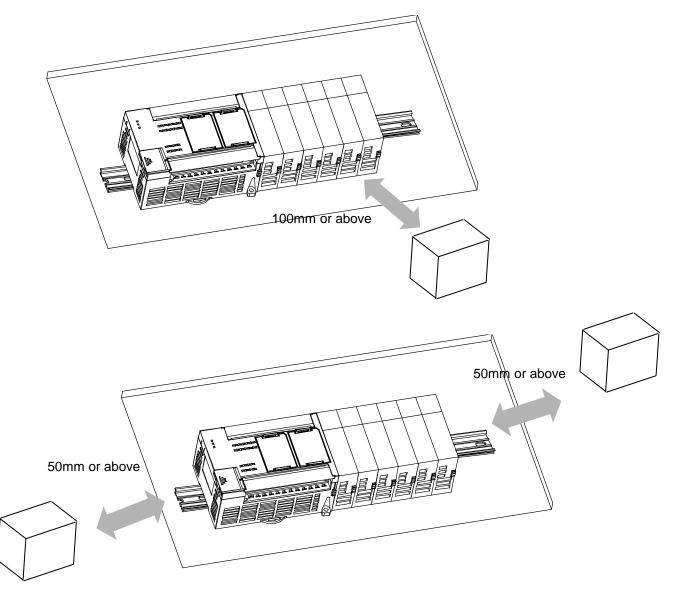


(6) Distance with other device

Γ

To avoid radiation noise or heat, keep the distance between PLC and device (connector and relay) as far as the following figure.

Device installed in front of PLC: 100 mm or above Device installed beside PLC: 50 mm or above



#### 13.2.2 Caution in handling

Here describes caution from open to install

- Don't drop or impact product.
- Don't disassemble the PCB from case. It may cause the error.
- In case of wiring, make sure foreign substance not to enter upper part of module. If it enters, eliminate it.
- (1) Caution in handling IO module

It describes caution in handling IO module.

(a) Recheck of IO module specification

For input module, be cautious about input voltage, for output module, if voltage that exceeds the max. open/close voltage is induced, it may cause the malfunction, breakdown or fire.

(b) Used wire

When selecting wire, consider ambient temp, allowed current and minimum size of wire is AWG22(0.3mm<sup>2</sup>) or above.

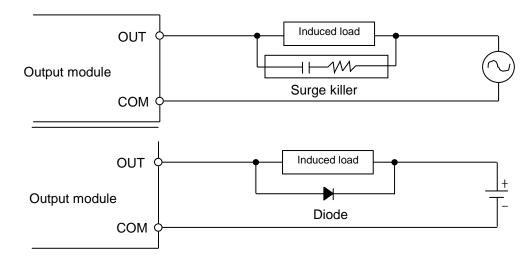
(c) Environment

In case of wiring IO module, if device or material that induce high heat is too close or oil contacts wire too long time, it may cause short, malfunction or error.

(d) Polarity

Before supplying power of module which has terminal block, check the polarity.

- (e) Wiring
  - In case of wiring IO with high voltage line or power line, induced obstacle may cause error.
  - Let no cable pass the IO operation indication part (LED).
  - (You can't discriminate the IO indication.)
  - In case induced load is connected with output module, connect the surge killer or diode load to load in parallel. Connect cathode of diode to + side of power.



(f) Terminal block

Check close adhesion status. Let no foreign material of wire enter into PLC when wring terminal block or processing screw hole. At this case, it may cause malfunction.

(g) Don't impact to IO module or don't disassemble the PCB from case.

## 13.3 Wire

In case using system, it describes caution about wiring.

# Danger

▶ When wiring, cut off the external power.

• If all power is cut, it may cause electric shock or damage of product.

In case of flowing electric or testing after wiring, equip terminal cover included in product. It not, it may cause electric shock.

# 

Do D type ground (type 3 ground) or above dedicated for PLC for FG and LG terminal. It may cause electric shock or malfunction.

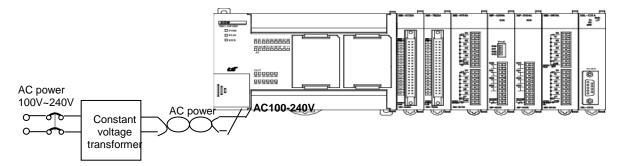
When wiring module, check the rated voltage and terminal array and do properly.

If rating is different, it may cause fire, malfunction.

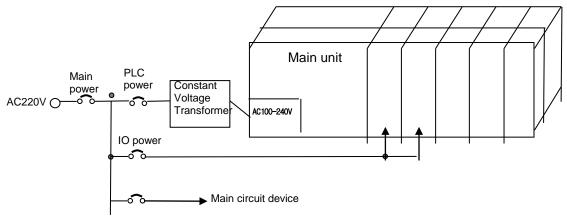
- For external connecting connector, use designated device and solder. If connecting is not safe, it may cause short, fire, malfunction.
- ▶ For screwing, use designated torque range. If it is not fit, it may cause short, fire, malfunction.
- Let no foreign material enter such as garbage or disconnection part into module. It may cause fire, malfunction, error.

#### 13.3.1 Power wiring

(1) In case voltage regulation is larger than specified, connect constant voltage transformer.



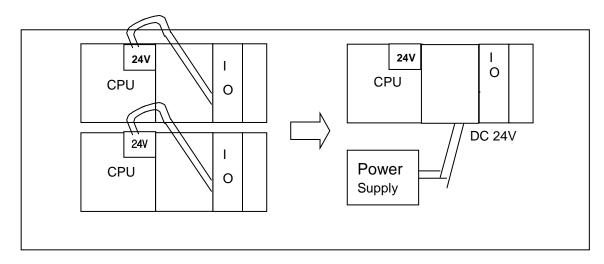
(2) Connect noise that include small noise between line and earth. (When there are many noise, connect insulated transformer.) (3) Isolate the PLC power, I/O devices and power devices as follows.



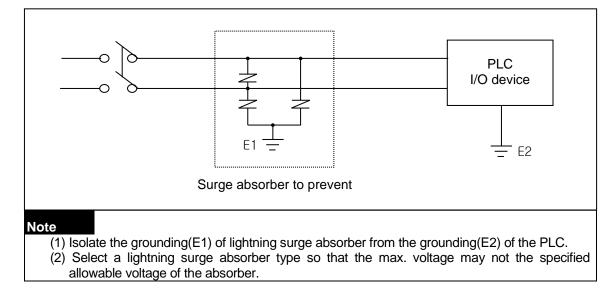
#### (4) If using DC24V of the main unit

(a) Do not connect DC24V of several power modules in parallel. It may cause the destruction of a module.

(b) If a power module can not meet the DC24V output capacity, supply DC24V externally as presented below.



- (5) AC110V/AC220V/DC24V cables should be compactly twisted and connected in the shortest distance.
- (6) AC110V/AC220V cable should be as thick as possible(2mm<sup>2</sup>) to reduce voltage drop.
- (7) AC110V/ DC24V cables should not be installed close to main circuit cable(high voltage/high current) and I/O signal cable. They should be 100mm away from such cables



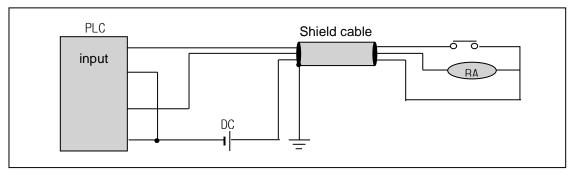
(8) To prevent surge from lightning, use the lightning surge absorber as presented below.

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- (9) When noise may be intruded inside it, use an insulated shielding transformer or noise filter.
- (10) Wiring of each input power should be twisted as short as possible and the wiring of shielding transformer or noise filter should not be arranged via a duct.

#### 13.3.2 I/O Device wiring

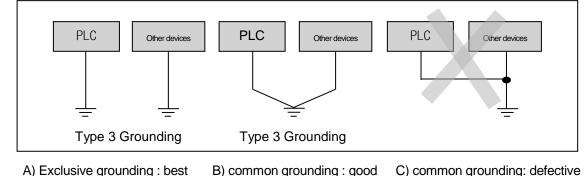
- The size of I/O device cable is limited to 0.3~2 mm<sup>2</sup> but it is recommended to select a size(0.3 mm<sup>2</sup>) to use conveniently.
- (2) Please isolate input signal line from output signal line.
- (3) I/O signal lines should be wired 100mm and more away from high voltage/high current main circuit cable.
- (4) Batch shield cable should be used and the PLC side should be grounded unless the main circuit cable and power cable can not be isolated.



(5) When applying pipe-wiring, make sure to firmly ground the piping.

#### 13.3.3 Grounding wiring

- (1) The PLC contains a proper noise measure, so it can be used without any separate grounding if there is a large noise. However, if grounding is required, please refer to the followings.
- (2) For grounding, please make sure to use the exclusive grounding.
   For grounding construction, apply type 3 grounding(grounding resistance lower than 100 Ω)
- (3) If the exclusive grounding is not possible, use the common grounding as presented in B) of the figure below.



- (4) Use the grounding cable more than 2 mm<sup>2</sup>. To shorten the length of the grounding cable, place the grounding point as close to the PLC as possible.
- (5) If any malfunction from grounding is detected, separate the FG of the base from the grounding.

## 13.3.4 Specifications of wiring cable

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The specifications of cable used for wiring are as follows.

Types of external	Cable specification (mm <sup>2</sup> )		
connection	Lower limit	Upper limit	
Digital input	0.18 (AWG24)	1.5 (AWG16)	
Digital output	0.18 (AWG24)	2.0 (AWG14)	
Analogue I/O	0.18 (AWG24)	1.5 (AWG16)	
Communication	0.18 (AWG24)	1.5 (AWG16)	
Main power	1.5 (AWG16)	2.5 (AWG12)	
Protective grounding	1.5 (AWG16)	2.5 (AWG12)	

## **Chapter 14 Maintenance**

Be sure to perform daily and periodic maintenance and inspection in order to maintain the PLC in the best conditions.

## 14.1 Maintenance and Inspection

The I/O module mainly consist of semiconductor devices and its service life is semi-permanent. However, periodic inspection is requested for ambient environment may cause damage to the devices. When inspecting one or two times per six months, check the following items.

Check Items		Judgment	Corrective Actions	
Change rate of input voltage		Within change rate of input voltage (Less than –15% to +20%)	Hold it with the allowable range.	
Power supply f	or input/output	Input/Output specification of each module	Hold it with the allowable range of each module.	
Ambient	Temperature	0 ~ + 55° <b>C</b>	Adjust the operating temperature and humidity with the	
environment	Humidity	5 ~ 95%RH	defined range.	
	Vibration	No vibration	Use vibration resisting rubber or the vibration prevention method.	
Play of modules		No play allowed	Securely enrage the hook.	
Connecting conditions of terminal screws		No loose allowed	Retighten terminal screws.	
		Check the number of		
Spare parts		Spare parts and their	Cover the shortage and improve the conditions.	
		Store conditions		

# 14.2 Daily Inspection

The following table shows the inspection and items which are to be checked daily.

Check Items		Check Points Judgment		Corrective Actions
Connection conditions of base		Check the screws.	Screws should not be loose.	Retighten Screws.
Connection of Input/Output	conditions of module	Check the connecting screws Check module cover.	Screws should not be loose.	Retighten Screws.
Connecting	conditions of	Check for loose mounting screws.	Screws should not be loose.	Retighten Screws.
terminal blo cable	ck or extension	Check the distance between solderless terminals.	Proper clearance should be provided.	Correct.
CODIC		Connecting of expansion cable.	Connector should not be loose.	Correct.
	PWR LED	Check that the LED is On.	On(Off indicates an error)	See chapter 4.
	Run LED	Check that the LED is On during Run.	On (flickering or On indicates an error)	See chapter 4.
LED	ERR LED	Check that the LED is Off during Run.	Flickering indicates an error	See chapter 4.
indicator	Input LED	Check that the LED turns On and Off.	On when input is On, Off when input is off.	See chapter 4.
	Output LED	Check that the LED turns On and Off	On when output is On, Off when output is off	See chapter 4.

# 14.3 Periodic Inspection

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Check Items		Checking Methods	Judgment	Corrective Actions	
Ambient	Ambient temperature	Measure with thermometer	0 ~ 55 °C	Adjust to general standard	
Ambient environment	Ambient Humidity	and hygrometer	5 ~ 95%RH	(Internal environmental	
on a contract of the contract	Ambient pollution level	measure corrosive gas	There should be no corrosive gases	standard of control section)	
	Looseness,	The module should be move	The module should be		
PLC	Ingress	the unit	mounted securely.	Retighten screws	
Conditions	dust or foreign material	Visual check	No dust or foreign material		
	Loose terminal screws	Re-tighten screws	Screws should not be loose	Retighten	
Connecting conditions	Distance between terminals	Visual check	Proper clearance	Correct	
CONULIONS	Loose connectors	Visual check	Connectors should not be loose.	Retighten connector mounting screws	
Line	voltage check	Measure voltage between input terminals	DC24V: DC20.4 ~ 28.8V	Change supply power	

Check the following items once or twice every six months, and perform the needed corrective actions.

# **Chapter 15 Troubleshooting**

The following explains contents, diagnosis and corrective actions for various errors that can occur during system operation.

## 15.1 Basic Procedure of Troubleshooting

System reliability not only depends on reliable equipment but also on short downtimes in the event of fault. The short discovery and corrective action is needed for speedy operation of system. The following shows the basic instructions for troubleshooting.

- (1) Visual checks
  - Check the following points.
    - Machine operating condition (in stop and operation status)
    - Power On/Off
    - Status of I/O devices
    - Condition of wiring (I/O wires, extension and communications cables)
    - Display states of various indicators (such as POWER LED, RUN LED, ERR LED and I/O LED)

After checking them, connect peripheral devices and check the operation status of the PLC and the program contents.

(2) Trouble Check

Observe any change in the error conditions during the following.

- Switch to the STOP position, and then turn the power on and off.
- (3) Narrow down the possible causes of the trouble where the fault lies, i.e.:
  - Inside or outside of the PLC?
  - I/O module or another module?
  - PLC program?

## **15.2 Troubleshooting**

Symptoms

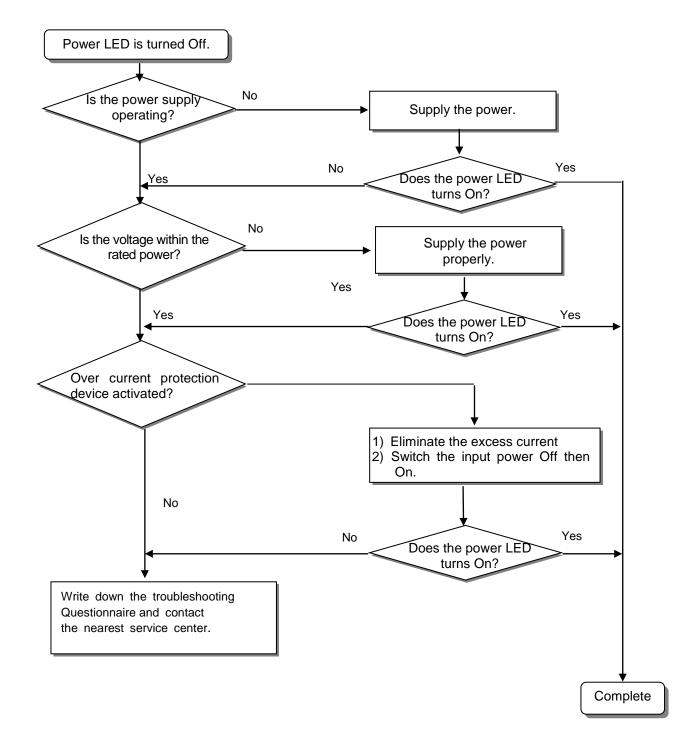
This section explains the procedure for determining the cause of troubles as well as the errors and corrective actions.

Is the power LED turned Off ?	Flowchart used when the POWER LED is turned Off.
Is the ERR LED flickering?	Flowchart used when the ERR LED is flickering.
Are the RUN LED turned Off ?	Flowchart used when the RUN turned Off.
I/O module doesn't operate properly.	Flowchart used when the output load of the output module doesn't turn on.
Program cannot be written.	Flowchart used when a program can't be written to the PLC.

### 15.2.1 Troubleshooting flowchart used when the PWR (Power) LED turns Off.

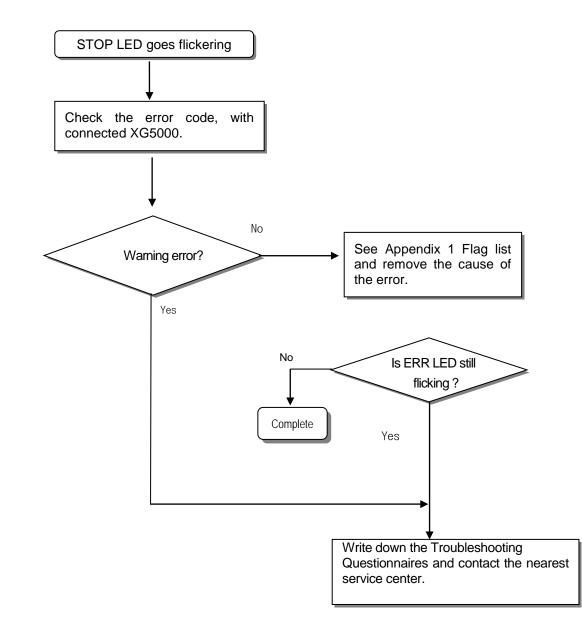
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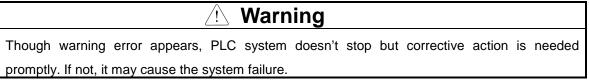
The following flowchart explains corrective action procedure used when the power is supplied or the power LED turns Off during operation.



### 15.2.2 Troubleshooting flowchart used with when the ERR (Error) LED is flickering

The following flowchart explains corrective action procedure use when the power is supplied starts or t he ERR LED is flickering during operation.

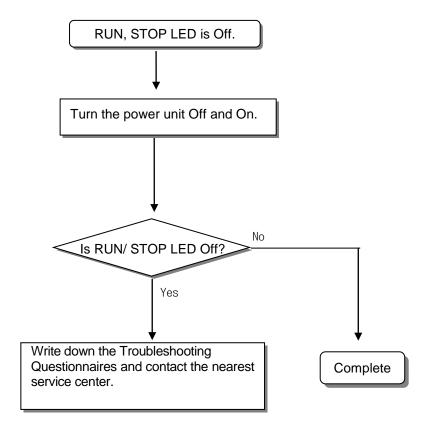




#### 15.2.3 Troubleshooting flowchart used with when the RUN, STOP LED turns Off.

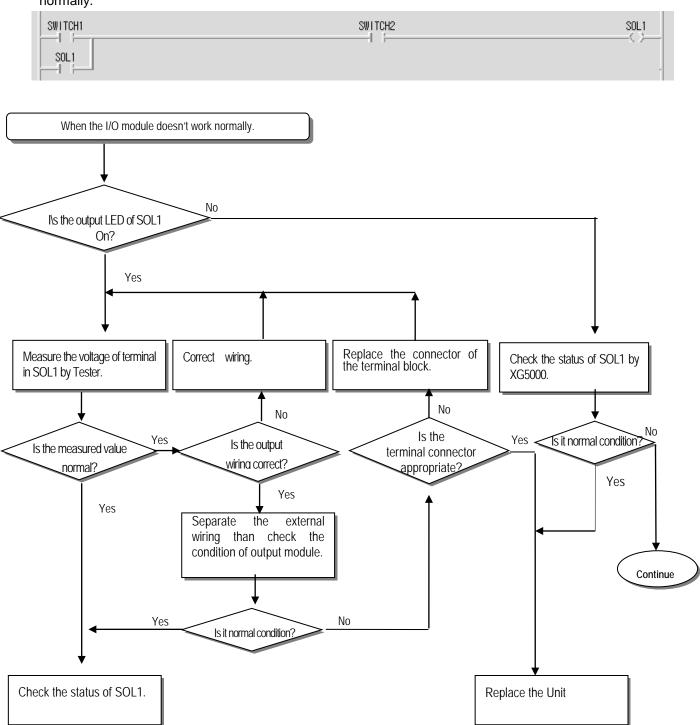
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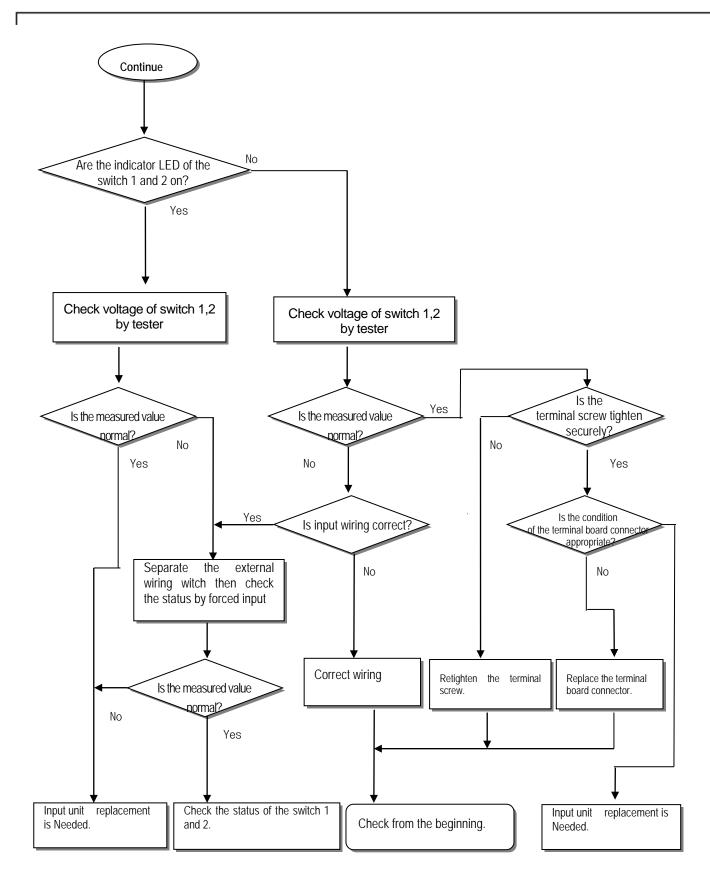
The following flowchart explains corrective action procedure to treat the lights-out of RUN LED when the power is supplied, operation starts or operation is in the process.



## 15.2.4 Troubleshooting flowchart used when the I/O part doesn't operate normally.

The following flowchart explains corrective action procedure used when the I/O module doesn't operate normally.





### 15.3 Troubleshooting Questionnaire

When problems have been met during operation of the XGC series, please write down this Questionnaires and contact the service center via telephone or facsimile. • For errors relating to special or communication modules, use the questionnaire included in the User's manual of the unit. 1. Telephone & FAX No Tell) FAX) 2. Using equipment model: 3. Details of using equipment CPU model: ( Serial No.( ) ) OS version No.:( ) XG5000 (for program compile) version No.: ( ) 4.General description of the device or system used as the control object: 5. The kind of the base unit: - Operation by the mode setting switch ( ), - Operation by the XG5000 or communications ( ), - External memory module operation ( ), 6. Is the ERR. LED of the CPU module turned On ? Yes( ), No( ) 7. XG5000 error message: 8. History of corrective actions for the error message in the article 7: 9. Other tried corrective actions: 10. Characteristics of the error • Repetitive(): Periodic(), Related to a particular sequence(), Related to environment() • Sometimes( ): General error interval: 11. Detailed Description of error contents: 12. Configuration diagram for the applied system:

# 15.4 Troubleshooting Examples

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Possible troubles with various circuits and their corrective actions are explained.

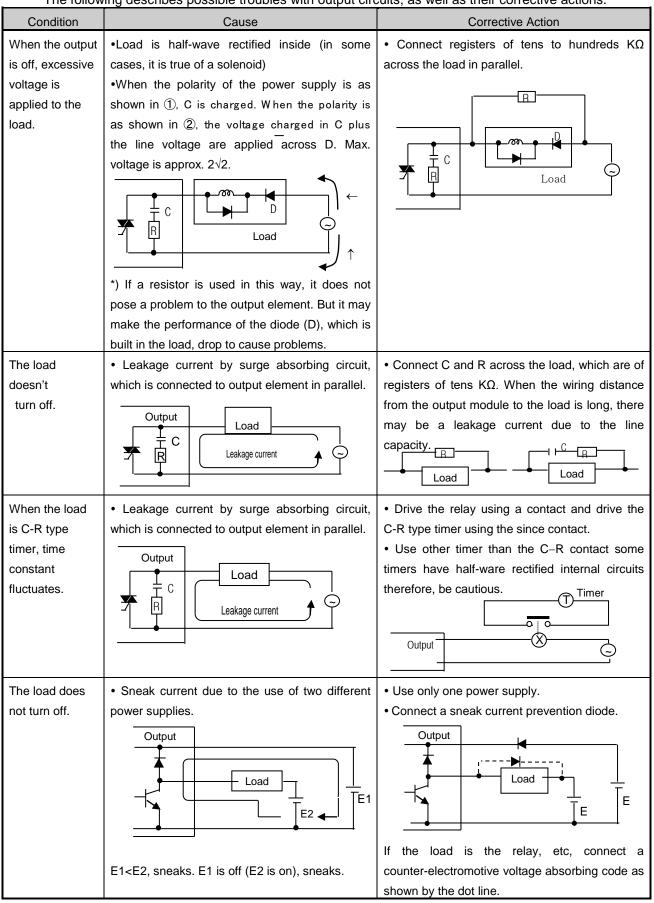
#### 15.4.1 Input circuit troubles and corrective actions

The followings describe possible troubles with input circuits, as well as corrective actions.

Condition	Cause	Corrective Actions
Input signal	Leakage current of external device (Such as a drive by non-contact switch)	<ul> <li>Connect an appropriate register and capacity, which will make the voltage lower</li> </ul>
doesn't turn	AC input	across the terminals of the input module.
off.		AC input
Input signal	Leakage current of external device (Drive by a limit switch with neon lamp)	
doesn't turn		• CR values are determined by the leakage
off.	AC input	current value.
(Neon lamp	Leakage current	– Recommended value C : 0.1 ~ 0.47 $\mu$ F
may be still on)	External device	R: 47 ~ 120 $\Omega$ (1/2W) Or make up another independent display circuit.
Input signal	Leakage current due to line capacity of wiring cable.	Locate the power supply on the external
doesn't turn		device side as shown below.
off.	AC input	AC input
Input signal	Leakage current of external device (Drive by switch with LED indicator)	• Connect an appropriate register, which will make
doesn't turn off.		the voltage higher than the OFF voltage across the
01.	DC input	input module terminal and common terminal.
	External device	
Input signal	<ul> <li>Sneak current due to the use of two different power supplies.</li> </ul>	Use only one power supply.
doesn't turn		Connect a sneak current prevention diode.
off.		E1 DC input
	• E1 > E2, sneaked.	ı Li ji ji kara kara kara kara kara kara kara kar

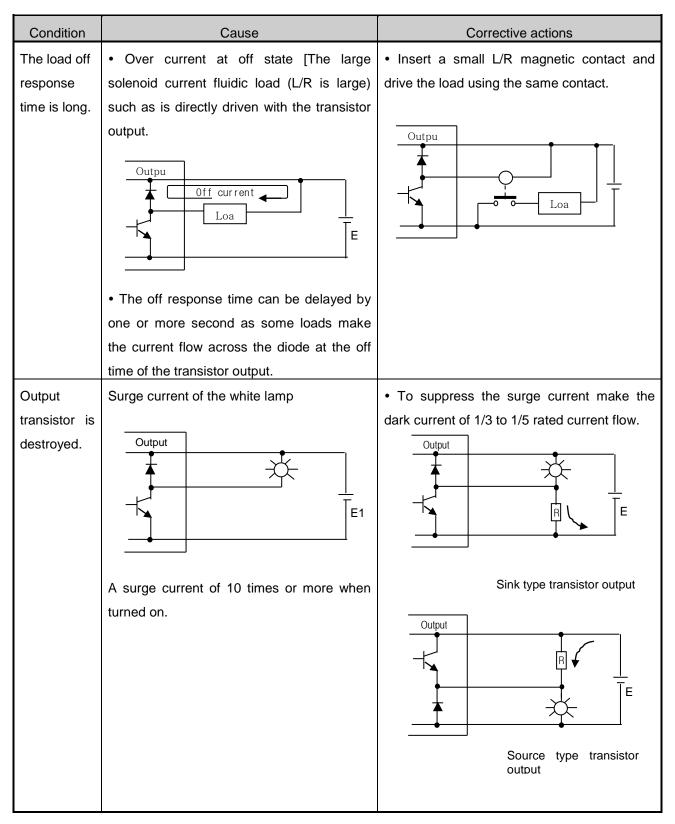
#### 15.4.2 Output circuit and corrective actions

The following describes possible troubles with output circuits, as well as their corrective actions.



Output circuit troubles and corrective actions (continued).

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# 15.5 Error Code List

Error	Error cause	Action	Operation	LED	Diagnosis
code		(restart mode after taking an action)	status	status	point
23	Program to execute is abnormal	Start after reloading the program	Warning	0.5 second Flicker	RUN mode
24	I/O parameter error	Start after reloading I/O parameter, Battery change if battery has a problem. Check the preservation status after I/O parameter reloading and if error occurs, change the unit.	Warning	0.5 second Flicker	Reset RUN mode switching
25	Basic parameter error	Start after reloading Basic parameter, Change battery if it has a problem. Check the preservation status after Basic parameter reloading and if error occurs, change the unit.	Warning	0.5 second Flicker	Reset RUN mode switching
30	Module set in parameter and the installed module does not match	modify the module or parameter and then restart.	Warning	0.5 second Flicker	RUN mode switching
31	Module falling during operation or additional setup	After checking the position of attachment/detachment of expansion module during Run mode	Warning	0.1 second Flicker	Every scan
33	Data of I/O module does not access normally during operation.	After checking the position of slot where the access error occurs by XG5000, change the module and restart (acc.to parameter.)	Heavy error	0.1 second Flicker	Scan end
34	Normal access of special/link module data during operation not available	After checking the position of slot that access error occurred by XG5000, change the module and restart (acc.to parameter).	Heavy error	0.1 second Flicker	Scan end
39	Abnormal stop of CPU or malfunction	<ul> <li>Abnormal system end by noise or hard ware error.</li> <li>1) If it occurs repeatedly when power reinput, request service center</li> <li>2) Noise measures</li> </ul>	Heavy error	0.1 second Flicker	Ordinary time
40	Scan time of program during operation exceeds the scan watchdog time designated by parameter.	After checking the scan watchdog time designated by parameter, modify the parameter or the program and then restart.	Warning	0.5 second Flicker	While running the program
41	Operation error occurs while running the user program.	Remove operation error $\rightarrow$ reload the program and restart.	Warning	0.5 second Flicker	While running the program
44	Timer index user error	After reloading a timer index program modification, start	Warning	0.5 second Flicker	Scan end
50	Heavy error of external device	Refer to Heavy error detection flag and modifies the device and restart. (Acc. Parameter)	Heavy error	1 second Flicker	Scan end
60	E_STOP function executed	After removing error causes which starts E_STOP function in program, power reinput	Heavy error	1 second Flicker	While running the program

Error	Error cause Action		Operation	LED	Diagnosis
code	Endreadse	(restart mode after taking an action)	status	status	point
500	Data memory backup not possible	IF not error in battery, power reinput Remote mode is switched to STOP mode.		1 second Flicker	Reset
501	Abnormal clock data	Setting the time by XG5000 if there is no error	Warning	0.1 second Flicker	Ordinary time
502	Battery voltage falling	Battery change at power On status	Warning	0.1 second Flicker	Ordinary time

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# Appendix 1 Flag List

# Appendix 1.1 Special Relay (F) List

## (1) "S(U)" type

Word	Bit	Variables	Function	Description
	-	_SYS_STATE	Mode and state	Indicates PLC mode and operation State.
	F0000	_RUN	Run	Run state.
	F0001	_STOP	Stop	Stop state.
	F0002	_ERROR	Error	Error state.
	F0003	_DEBUG	Debug	Debug state.
	F0004	_LOCAL_CON	Local control	Local control mode.
	F0006	_REMOTE_CON	Remote mode	Remote control mode.
	F0008	_RUN_EDIT_ST	Editing during RUN	Editing program download during RUN.
	F0009	_RUN_EDIT_CHK	Editing during RUN	Internal edit processing during RUN.
	F000A	_RUN_EDIT_DONE	Edit done during RUN	Edit is done during RUN.
	F000B	_RUN_EDIT_END	Edit end during RUN	Edit is ended during RUN.
	F000C	_CMOD_KEY	Operation mode	Operation mode changed by key.
<b>-</b>	F000D	_CMOD_LPADT	Operation mode	Operation mode changed by local PADT.
F000~1	F000E	_CMOD_RPADT	Operation mode	Operation mode changed by Remote PADT.
	F000F	_CMOD_RLINK	Operation mode	Operation mode changed by Remote communication module.
	F0010	_FORCE_IN	Forced input	Forced input state.
	F0011	_FORCE_OUT	Forced output	Forced output state.
	F0014	_MON_On	Monitor	Monitor on execution.
	F0015	_USTOP_On	Stop	Stop by Stop function.
	F0016	_ESTOP_On	EStop	Stop by EStop function.
	F0017	_CONPILE_MODE	Compile	Compile on execution.
	F0018	_INIT_RUN	Initialize	Initialization task on execution.
	F001C	_PB1	Program Code 1	Program Code 1 selected.
	F001D	_PB2	Program Code 2	Program Code 2 selected.
	F001E	_CB1	Compile Code 1	Compile Code 1 selected.
	F001F	_CB2	Compile Code2	Compile Code 2 selected.
	-	_CNF_ER	System error	Reports heavy error state of system.
	F0021	_IO_TYER	Module Type error	Module Type does not match.
F002~3	F0022	_IO_DEER	Module detachment error	Module is detached.
F002~3	F0024	_IO_RWER	Module I/O error	Module I/O error.
	F0025	_IP_IFER	Module interface error	Special/communication module interface error.
	F0026	_ANNUM_ER	External device error	Detected heavy error in external Device.

Word	Bit	Variable	Function	Description
	F0028	_BPRM_ER	Basic parameter	Basic parameter error.
	F0029	_IOPRM_ER	IO parameter	I/O configuration parameter error.
	F002A	_SPPRM_ER	Special module parameter	Special module parameter is Abnormal.
F002~3	F002B	_CPPRM_ER	Communication module parameter	Communication module parameter is abnormal.
	F002C	_PGM_ER	Program error	Program error.
	F002D	_CODE_ER	Code error	Program Code error.
	F002E	_SWDT_ER	System watchdog	System watchdog operated.
	F0030	_WDT_ER	Scan watchdog	Scan watchdog operated.
	-	_CNF_WAR	System warning	Reports light error state of system.
	F0041	_DBCK_ER	Backup error	Data backup error.
	F0043	_ABSD_ER	Operation shutdown error	Stop by abnormal operation.
	F0046	_ANNUM_WAR	External device error	Detected light error of external device.
F004	F0048	_HS_WAR1	High speed link 1	High speed link – parameter 1 error.
F004	F0049	_HS_WAR2	High speed link 2	High speed link – parameter 2 error.
	F0054	_P2P_WAR1	P2P parameter 1	P2P – parameter 1 error.
	F0055	_P2P_WAR2	P2P parameter 2	P2P – parameter 2 error.
	F0056	_P2P_WAR3	P2P parameter 3	P2P – parameter 3 error.
	F005C	_CONSTANT_ER	Constant error	Constant error.
	-	_USER_F	User contact	Timer used by user.
	F0090	_T20MS	20ms	As a clock signal available at user program, it reverses On/Off every half period. Since clock
	F0091	_T100MS	100ms	signal is dealt with at the end of scan, there may
	F0092	_T200MS	200ms	be delay or distortion according to scan time. So use clock that's longer than scan time. Clock
	F0093	_T1S	1s Clock	signal is Off status at the start of scan program and task program.
	F0094	_T2S	2 s Clock	_T100ms clock : 50ms : 50ms :
F009	F0095	_T10S	10 s Clock	
F009	F0096	_T20S	20 s Clock	
	F0097	_T60S	60 s Clock	
	F0099	_On	Ordinary time On	Always On state Bit.
	F009A	_Off	Ordinary time Off	Always Off state Bit.
	F009B	_10n	1scan On	First scan On Bit.
	F009C	_1Off	1scan Off	First scan OFF bit.
	F009D	_STOG	Reversal	Reversal every scan.

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Word	Bit	Variable	Function	Description
	-	_USER_CLK	User Clock	Clock available for user setting.
	F0100	_USR_CLK0	Setting scan repeat	On/Off as much as set scan Clock 0.
	F0101	_USR_CLK1	Setting scan repeat	On/Off as much as set scan Clock 1.
	F0102	_USR_CLK2	Setting scan repeat	On/Off as much as set scan Clock 2.
F010	F0103	_USR_CLK3	Setting scan repeat	On/Off as much as set scan Clock 3.
	F0104	_USR_CLK4	Setting scan repeat	On/Off as much as set scan Clock 4.
	F0105	_USR_CLK5	Setting scan repeat	On/Off as much as set scan Clock 5.
	F0106	_USR_CLK6	Setting scan repeat	On/Off as much as set scan Clock 6.
	F0107	_USR_CLK7	Setting scan repeat	On/Off as much as set scan Clock 7.
	-	_LOGIC_RESULT	Logic result	Indicates logic results.
	F0110	_LER	operation error	On during 1 scan in case of operation error.
F011	F0111	_ZERO	Zero flag	On when operation result is 0.
1011	F0112	_CARRY	Carry flag	On when carry occurs during operation.
	F0113	_ALL_Off	All output OFF	On in case that all output is Off.
	F0115	_LER_LATCH	Operation error Latch	Keeps On during operation error.
	-	_CMP_RESULT	Comparison result	Indicates the comparison result.
	F0120	_LT	LT flag	On in case of "less than".
	F0121	_LTE	LTE flag	On in case of "equal or less than".
F012	F0122	_EQU	EQU flag	On in case of "equal".
	F0123	_GT	GT flag	On in case of "greater than".
	F0124	_GTE	GTE flag	On in case of "equal or greater than".
	F0125	_NEQ	NEQ flag	On in case of "not equal".
F014	-	_FALS_NUM	FALS no.	Indicates FALS no.
F015	-	_PUTGET_ERR0	PUT/GET error 0	Main base Put / Get error.
F023	-	_PUTGET_NDR0	PUT/GET end 0	Main base Put/Get end.
F044	-	_CPU_TYPE	CPU Type	Indicates information for CPU Type.
F045	-	_CPU_VER	CPU version	Indicates CPU version.
F046	-	_OS_VER	OS version	Indicates OS version.
F048	-	_OS_DATE	OS date	Indicates OS distribution date.
F050	-	_SCAN_MAX	Max. scan time	Indicates max. scan time.
F051	-	_SCAN_MIN	Min. scan time	Indicates min. scan time.
F052	-	_SCAN_CUR	Current scan time	Current scan time.
F0053	-	_MON_YEAR	Month/year	Clock data (month/year) Supported when using RTC option module
F0054	-	_TIME_DAY	Hour/date	Clock data (hour/date) Supported when using RTC option module
F0055	-	_SEC_MIN	Second/minute	Clock data (Second/minute) Supported when using RTC option module

Word	Bit	Variable	Function	Description
F0056	-	_HUND_WK	Hundred year/week	Clock data (Hundred year/week) Supported when using RTC option module
	-	_FPU_INFO	N/A	-
	F0570	_FPU_LFLAG_I	N/A	-
	F0571	_FPU_LFLAG_U	N/A	-
	F0572	_FPU_LFLAG_O	N/A	-
	F0573	_FPU_LFLAG_Z	N/A	-
	F0574	_FPU_LFLAG_V	N/A	-
F057	F057A	_FPU_FLAG_I	N/A	-
	F057B	_FPU_FLAG_U	N/A	-
	F057C	_FPU_FLAG_O	N/A	-
	F057D	_FPU_FLAG_Z	N/A	-
	F057E	_FPU_FLAG_V	N/A	-
	F057F	_FPU_FLAG_E	Irregular input	Reports in case of irregular input.
F058	-	_ERR_STEP	Error step	Saves error step.
F060	-	_REF_COUNT	Refresh	Increase when module Refresh.
F062	-	_REF_OK_CNT	Refresh OK	Increase when module Refresh is normal.
F064	-	_REF_NG_CNT	Refresh NG	Increase when module Refresh is Abnormal.
F066	-	_REF_LIM_CNT	Refresh Limit	Increase when module Refresh is abnormal (Time Out).
F068	-	_REF_ERR_CNT	Refresh Error	Increase when module Refresh is Abnormal.
F070	-	_MOD_RD_ERR_CNT	-	-
F072	-	_MOD_WR_ERR_CN T	-	-
F074	-	_CA_CNT	-	-
F076	-	_CA_LIM_CNT	-	-
F078	-	_CA_ERR_CNT	-	-
F080	-	_BUF_FULL_CNT	Buffer Full	Increase when CPU internal buffer is full.
F082	-	_PUT_CNT	Put count	Increase when Put count.
F084	-	_GET_CNT	Get count	Increase when Get count.
F086	-	_KEY	Current key	indicates the current state of local key.
F088	-	_KEY_PREV	Previous key	indicates the previous state of local key
F090	-	_IO_TYER_N	Mismatch slot	Module Type mismatched slot no.
F091	-	_IO_DEER_N	Detach slot	Module detached slot no.
F093	-	_IO_RWER_N	RW error slot	Module read/write error slot no.
F094	-	_IP_IFER_N	IF error slot	Module interface error slot no.
F096	-	_IO_TYER0	Module Type 0 error	Main base module Type error.

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Word	Bit	Variable	Function	Description
F104	-	_IO_DEER0	Module Detach 0 error	Main base module Detach error.
F120	-	_IO_RWER0	Module RW 0 error	Main base module read/write error.
F128	-	_IO_IFER_0	Module IF 0 error	Main base module interface error.
F140	-	_AC_FAIL_CNT	Power shutdown times	Saves the times of power shutdown.
F142	-	_ERR_HIS_CNT	Error occur times	Saves the times of error occur.
F144	-	_MOD_HIS_CNT	Mode conversion times	Saves the times of mode conversion.
F146	-	_SYS_HIS_CNT	History occur times	Saves the times of system history.
F148	-	_LOG_ROTATE	N/A	
F150	-	_BASE_INFO0	Slot information 0	Main base slot information.
	-	_USER_WRITE_F	Available contact point	Contact point available in program.
	F2000	_RTC_WR	RTC RW	Data write and read in RTC.
	F2001	_SCAN_WR	Scan WR	Initializing the value of scan.
F200	F2002	_CHK_ANC_ERR	Request detection of external serious error	Request detection of external error.
	F2003	_CHK_ANC_WAR	Request detection of external slight error (warning)	Request detection of external slight error (warning).
F201	-	_USER_STAUS_F	User contact point	User contact point.
F201	F2010	_INIT_DONE	Initialization completed	Initialization complete displayed.
F202	-	_ANC_ERR	Display information of external serious error	Display information of external serious error
F203	-	_ANC_WAR	Display information of external slight error (warning)	Display information of external slight error (warning)
F210	-	_MON_YEAR_DT	Month/year	Clock data (month/year) Supported when using RTC option module
F211	-	_TIME_DAY_DT	Hour/date	Clock data (hour/date) Supported when using RTC option module
F212	-	_SEC_MIN_DT	Second/minute	Clock data (Second/minute) Supported when using RTC option module
F213	213HUND_WK_DT Hundred year/we		Hundred year/week	Clock data (Hundred year/week) Supported when using RTC option module

(2) "E" type

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Word	Bit	Variables	Function	Description
	-	_SYS_STATE	Mode and state	Indicates PLC mode and operation State.
	F0000	_RUN	Run	Run state.
	F0001	_STOP	Stop	Stop state.
	F0002	_ERROR	Error	Error state.
	F0003	_DEBUG	N/A	
	F0004	_LOCAL_CON	Local control	Local control mode.
	F0006	_REMOTE_CON	Remote mode	Remote control mode.
	F0008	_RUN_EDIT_ST	Editing during RUN	Editing program download during RUN.
	F0009	_RUN_EDIT_CHK	Editing during RUN	Internal edit processing during RUN.
	F000A	_RUN_EDIT_DONE	Edit done during RUN	Edit is done during RUN.
	F000B	_RUN_EDIT_END	Edit end during RUN	Edit is ended during RUN.
	F000C	_CMOD_KEY	Operation mode	Operation mode changed by key.
	F000D	_CMOD_LPADT	Operation mode	Operation mode changed by local PADT.
F000~1	F000E	_CMOD_RPADT	Operation mode	Operation mode changed by Remote PADT.
	F000F	_CMOD_RLINK	Operation mode	Operation mode changed by Remote communication module.
	F0010	_FORCE_IN	Forced input	Forced input state.
	F0011	_FORCE_OUT	Forced output	Forced output state.
	F0014	_MON_On	Monitor	Monitor on execution.
	F0015	_USTOP_On	Stop	Stop by Stop function.
	F0016	_ESTOP_On	EStop	Stop by EStop function.
	F0017	_CONPILE_MODE	Compile	Compile on execution.
	F0018	_INIT_RUN	Initialize	Initialization task on execution.
	F001C	_PB1	Program Code 1	Program Code 1 selected.
	F001D	_PB2	Program Code 2	Program Code 2 selected.
	F001E	_CB1	Compile Code 1	Compile Code 1 selected.
	F001F	_CB2	Compile Code2	Compile Code 2 selected.
	-	_CNF_ER	System error	Reports heavy error state of system.
	F0021	_IO_TYER	Module Type error	Module Type does not match.
E002 3	F0022	_IO_DEER	Module detachment error	Module is detached.
F002~3	F0024	_IO_RWER	Module I/O error	Module I/O error.
	F0025	_IP_IFER	Module interface error	Special/communication module interface error.
	F0026	_ANNUM_ER	External device error	Detected heavy error in external Device.

Word	Bit	Variable	Function	Description
	F0028	_BPRM_ER	Basic parameter	Basic parameter error.
	F0029	_IOPRM_ER	IO parameter	I/O configuration parameter error.
	F002A	_SPPRM_ER	Special module parameter	Special module parameter is Abnormal.
F002~3	F002B	_CPPRM_ER	Communication module parameter	Communication module parameter is abnormal.
	F002C	_PGM_ER	Program error	Program error.
	F002D	_CODE_ER	Code error	Program Code error.
	F002E	_SWDT_ER	System watchdog System watchdog operated.	
	F0030	_WDT_ER	Scan watchdog	Scan watchdog operated.
	-	_CNF_WAR	System warning	Reports light error state of system.
	F0041	_DBCK_ER	Backup error	Data backup error.
	F0043	_ABSD_ER	Operation shutdown error	Stop by abnormal operation.
	F0046	_ANNUM_WAR	External device error	Detected light error of external device.
F004	F0048	_HS_WAR1	N/A	
F004	F0049	_HS_WAR2	N/A	
	F0054	_P2P_WAR1	P2P parameter 1	P2P – parameter 1 error.
	F0055	_P2P_WAR2	N/A	
	F0056	_P2P_WAR3	N/A	
	F005C	_CONSTANT_ER	Constant error	Constant error.
	-	_USER_F	User contact	Timer used by user.
	F0090	_T20MS	20ms	As a clock signal available at user program, it reverses On/Off every half period. Since clock
	F0091	_T100MS	100ms	signal is dealt with at the end of scan, there may
	F0092	_T200MS	200ms	be delay or distortion according to scan time. So use clock that's longer than scan time. Clock
	F0093	_T1S	1s Clock	signal is Off status at the start of scan program and task program.
	F0094	_T2S	2 s Clock	_T100ms clock : 50ms : 50ms :
E000	F0095	_T10S	10 s Clock	
F009	F0096	_T20S	20 s Clock	
	F0097	_T60S	60 s Clock	
	F0099	_On	Ordinary time On	Always On state Bit.
	F009A	_Off	Ordinary time Off	Always Off state Bit.
	F009B	_1On	1scan On	First scan On Bit.
	F009C	_1Off	1scan Off	First scan OFF bit.
	F009D	_STOG	Reversal	Reversal every scan.

Word	Bit	Variable	Function	Description
	-	_USER_CLK	User Clock	Clock available for user setting.
	F0100	_USR_CLK0	Setting scan repeat	On/Off as much as set scan Clock 0.
	F0101	_USR_CLK1	Setting scan repeat	On/Off as much as set scan Clock 1.
	F0102	_USR_CLK2	Setting scan repeat	On/Off as much as set scan Clock 2.
F010	F0103	_USR_CLK3	Setting scan repeat	On/Off as much as set scan Clock 3.
	F0104	_USR_CLK4	Setting scan repeat	On/Off as much as set scan Clock 4.
	F0105	_USR_CLK5	Setting scan repeat	On/Off as much as set scan Clock 5.
	F0106	_USR_CLK6	Setting scan repeat	On/Off as much as set scan Clock 6.
	F0107	_USR_CLK7	Setting scan repeat	On/Off as much as set scan Clock 7.
	-	_LOGIC_RESULT	Logic result	Indicates logic results.
	F0110	_LER	operation error	On during 1 scan in case of operation error.
F011	F0111	_ZERO	Zero flag	On when operation result is 0.
TOTT	F0112	_CARRY	Carry flag	On when carry occurs during operation.
	F0113	_ALL_Off	All output OFF	On in case that all output is Off.
	F0115	_LER_LATCH	Operation error Latch	Keeps On during operation error.
	-	_CMP_RESULT	Comparison result	Indicates the comparison result.
	F0120	_LT	LT flag	On in case of "less than".
	F0121	_LTE	LTE flag	On in case of "equal or less than".
F012	F0122	_EQU	EQU flag	On in case of "equal".
	F0123	_GT	GT flag	On in case of "greater than".
	F0124	_GTE	GTE flag	On in case of "equal or greater than".
	F0125	_NEQ	NEQ flag	On in case of "not equal".
F014	-	_FALS_NUM	FALS no.	Indicates FALS no.
F015	-	_PUTGET_ERR0	PUT/GET error 0	Main base Put / Get error.
F023	-	_PUTGET_NDR0	PUT/GET end 0	Main base Put/Get end.
F044	-	_CPU_TYPE	CPU Type	Indicates information for CPU Type.
F045	-	_CPU_VER	CPU version	Indicates CPU version.
F046	-	_OS_VER	OS version	Indicates OS version.
F048	-	_OS_DATE	OS date	Indicates OS distribution date.
F050	-	_SCAN_MAX	Max. scan time	Indicates max. scan time.
F051	-	_SCAN_MIN	Min. scan time	Indicates min. scan time.
F052	-	_SCAN_CUR	Current scan time	Current scan time.
F0053	-	_MON_YEAR	Month/year	Clock data (month/year) Supported when using RTC option module
F0054	-	_TIME_DAY	Hour/date	Clock data (hour/date) Supported when using RTC option module
F0055	SEC_MIN		Second/minute	Clock data (Second/minute) Supported when using RTC option

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Word	Bit	Variable	Function	Description
				module
F0056	-	_HUND_WK	Hundred year/week	Clock data (Hundred year/week) Supported when using RTC option module
	-	_FPU_INFO	N/A	-
	F0570	_FPU_LFLAG_I	N/A	-
	F0571	_FPU_LFLAG_U	N/A	-
	F0572	_FPU_LFLAG_O	N/A	-
	F0573	_FPU_LFLAG_Z	N/A	-
F057	F0574	_FPU_LFLAG_V	N/A	-
FU97	F057A	_FPU_FLAG_I	N/A	-
	F057B	_FPU_FLAG_U	N/A	-
	F057C	_FPU_FLAG_O	N/A	-
	F057D	_FPU_FLAG_Z	N/A	-
	F057E	_FPU_FLAG_V	N/A	-
	F057F	_FPU_FLAG_E	Irregular input	Reports in case of irregular input.
F058	-	_ERR_STEP	Error step	Saves error step.
F060	-	_REF_COUNT	Refresh	Increase when module Refresh.
F062	-	_REF_OK_CNT	Refresh OK	Increase when module Refresh is normal.
F064	-	_REF_NG_CNT	Refresh NG	Increase when module Refresh is Abnormal.
F066	-	_REF_LIM_CNT	Refresh Limit	Increase when module Refresh is abnormal (Time Out).
F068	-	_REF_ERR_CNT	Refresh Error	Increase when module Refresh is Abnormal.
F070	-	_MOD_RD_ERR_CNT	-	-
F072	-	_MOD_WR_ERR_CN T	-	-
F074	-	_CA_CNT	-	-
F076	-	_CA_LIM_CNT	-	-
F078	-	_CA_ERR_CNT	-	-
F080	-	_BUF_FULL_CNT	Buffer Full	Increase when CPU internal buffer is full.
F082	-	_PUT_CNT	Put count	Increase when Put count.
F084	-	_GET_CNT	Get count	Increase when Get count.
F086	-	_KEY	Current key	indicates the current state of local key.
F088	-	_KEY_PREV	Previous key	indicates the previous state of local key
F090	-	_IO_TYER_N	Mismatch slot	Module Type mismatched slot no.
F091	-	_IO_DEER_N	Detach slot	Module detached slot no.
F093	-	_IO_RWER_N	RW error slot	Module read/write error slot no.
F094	-	_IP_IFER_N	IF error slot	Module interface error slot no.
F096	-	_IO_TYER0	Module Type 0 error	Main base module Type error.

Word	Bit	Variable	Function	Description
F104	-	_IO_DEER0	Module Detach 0 error	Main base module Detach error.
F120	-	_IO_RWER0	Module RW 0 error	Main base module read/write error.
F128	-	_IO_IFER_0	Module IF 0 error	Main base module interface error.
F140	-	_AC_FAIL_CNT	N/A	
F142	-	_ERR_HIS_CNT	N/A	
F144	-	_MOD_HIS_CNT	N/A	
F146	-	_SYS_HIS_CNT	History occur times	Saves the times of system history.
F148	-	_LOG_ROTATE	N/A	
F150	-	_BASE_INFO0	Slot information 0	Main base slot information.
	-	_USER_WRITE_F	Available contact point	Contact point available in program.
	F2000	_RTC_WR	RTC RW	Data write and read in RTC.
	F2001	_SCAN_WR	Scan WR	Initializing the value of scan.
F200	F2002	_CHK_ANC_ERR	Request detection of external serious error	Request detection of external error.
	F2003	_CHK_ANC_WAR	Request detection of external slight error (warning)	Request detection of external slight error (warning).
F204	-	_USER_STAUS_F	User contact point	User contact point.
F201	F201 F2010 _INIT_DONE		Initialization completed	Initialization complete displayed.
F202	-	_ANC_ERR	Display information of external serious error	Display information of external serious error
F203	-	_ANC_WAR	Display information of external slight error (warning)	Display information of external slight error (warning)
F210	-	_MON_YEAR_DT	Month/year	Clock data (month/year) Supported when using RTC option module
F211	-	_TIME_DAY_DT	Hour/date	Clock data (hour/date) Supported when using RTC option module
F212	-	_SEC_MIN_DT	Second/minute	Clock data (Second/minute) Supported when using RTC option module
F213	HUND_WK_DT		Hundred year/week	Clock data (Hundred year/week) Supported when using RTC option module

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# Appendix 1.2 Communication Relay (L) List

Here describes data link communication relay(L). (Supported in "S(U)" type)

(1) High-speed Link 1

Device	Keyword	Туре	Description
			High speed link parameter 1 normal operation of all station
L000	000 _HS1_RLINK		<ul> <li>Indicates normal operation of all station according to parameter set in High speed link, and On under the condition as below.</li> <li>1. In case that all station set in parameter is RUN mode and no error,</li> <li>2. All data block set in parameter is communicated normally, and</li> <li>3. The parameter set in each station itself is communicated normally.</li> <li>Once RUN_LINK is On, it keeps On unless stopped by LINK_DISABLE.</li> </ul>
			Abnormal state after _HS1RLINK On
L001	_HS1_LTRBL Bit		In the state of _HSmRLINK flag On, if communication state of the station set in the parameter and data block is as follows, this flag shall be On. 1. In case that the station set in the parameter is not RUN mode, or 2. There is an error in the station set in the parameter, or 3. The communication state of data block set in the parameter is not good. LINK TROUBLE shall be On if the above 1, 2 & 3 conditions occur, and if the condition return to the normal state, it shall be OFF again.
			High speed link parameter 1, K block general state
L0020 ~ L005F	_HS1_STATE[k] (k = 00~63)	Bit Array	Indicates the general state of communication information for each data block of setting parameter. _HS1_STATE[k] = HS1MOD[k]&_HS1TRX[k]&(~_HS1_ERR[k])
L0060 ~	_HS1_MOD[k] Bit (k = 00~63) Array	High speed link parameter 1, k block station RUN operation mode	
L009F			Indicates operation mode of station set in K data block of parameter.
L0100 ~ L013F	_HS1_TRX[k] (k = 00~63)		Normal communication with High speed link parameter 1, k block station Indicates if communication state of Kdata of parameter is communicated smoothly according to the setting.
L0140 ~	_HS1_ERR[k] (k = 00~63)	Bit	High speed link parameter 1, K block station operation error mode
L0140 ~ L017F		Bit Array	Indicates if the error occurs in the communication state of k data block of parameter.
L0180 ~		Bit	High speed link parameter 1, K block setting
L021F	_HS1_SETBLOCK[k]	Array	Indicates whether or not to set k data block of parameter.

### (2) High-speed Link2

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Device	Keyword	Туре	Description		
L0260	_HS2_RLINK	Bit	<ul> <li>High-speed link parameter 2 normal operation of all station.</li> <li>Indicates normal operation of all station according to parameter set in High-speed link and On under the condition as below.</li> <li>1. In case that all station set in parameter is Run mode and no error</li> <li>2. All data block set in parameter is communicated and</li> <li>3. The parameter set in each station itself is communicated normally.</li> <li>Once RUN_LINK is On, it keeps On unless stopped by LINK_DISABLE.</li> </ul>		
L0261	Abnormal state after _HS2RLIN In the state of _HSmRLINK flag Or set in the parameter and data block 1. In case that the station set in the 2. There is an error in the station s 3. The communication state of data good. LINK TROUBLE shall be On if the		Abnormal state after _HS2RLINK On. In the state of _HSmRLINK flag On, if communication state of the station set in the parameter and data block is as follows, this flag shall be On. 1. In case that the station set in the parameter is not RUN mode, or 2. There is an error in the station set in the parameter, or 3. The communication state of data block set in the parameter is not		
L0280 ~ L031F	_HS2_STATE[k] (k = 00~63)	Bit Array	High speed link parameter 1, k block general state. Indicates the general state of communication information for each data block of setting parameter. _HS2_STATE[k]=HS2MOD[k]&_HS2TRX[k]&(~_HS2_ERR[k])		
L0320 ~	_HS2_MOD[k]	Bit	High speed link parameter 1, k block station RUN operation mode.		
L035F	(k = 00~63)	Array	Indicates operation mode of station set in k data block of parameter.		
L0360 ~	_HS2_TRX[k] Bit		Normal communication with High speed link parameter 1, K block station.		
L039F	(k = 00~63) Array		Indicates if communication state of K data of parameter is communicated smoothly according to the setting.		
L0400 ~	_HS2_ERR[k] Bit		High speed link parameter 1, K block station operation error mode.		
L043F	(k = 00~63) Array		Indicates if the error occurs in the communication state of k data block of parameter.		
L0440 ~	_HS2_SETBLOCK[k]	Bit	High speed link parameter 1, K block setting.		
L047F		Array	Indicates whether or not to set k data block of parameter.		

#### (3) Common area

Communication flag list according to P2P service setting. P2P parameter: "S" type 1~3, "E" type 1 P2P block: "S" type and "E" type 0~31

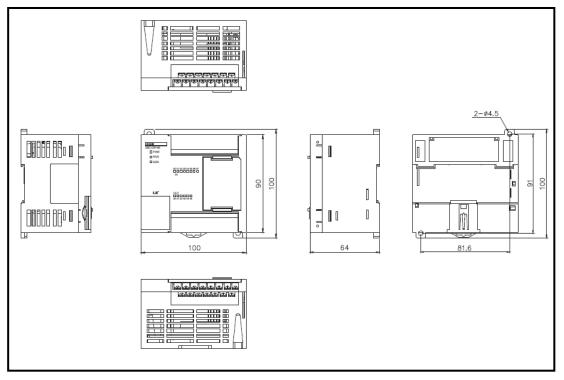
Device	Keyword	Туре	Description
L5120	_P2P1_NDR00	Bit	Indicates P2P parameter 1, 0 Block service normal end.
L5121	_P2P1_ERR00	Bit	Indicates P2P parameter 1, 0 Block service abnormal end.
L513	_P2P1_STATUS00	Word	Indicates error code in case of P2P parameter 1, 0 Block service abnormal end.
L514	_P2P1_SVCCNT00	DWord	Indicates P2P parameter 1, 0 Block service normal count.
L516	_P2P1_ERRCNT00	DWord	Indicates P2P parameter 1, 0 Block service abnormal count.
L5180	_P2P1_NDR01	Bit	P2P parameter 1, 1 Block service normal end.
L5181	_P2P1_ERR01	Bit	P2P parameter 1, 1 Block service abnormal end.
L519	_P2P1_STATUS01	Word	Indicates error code in case of P2P parameter 1, 1 Block service abnormal end.
L520	_P2P1_SVCCNT01	DWord	Indicates P2P parameter 1, 1 Block service normal count.
L522	_P2P1_ERRCNT01	DWord	Indicates P2P parameter 1, 1 Block service abnormal count.
L524~L529	-	Word	P2P parameter 1,2 Block service total.
L530~L535	-	Word	P2P parameter 1,3 Block service total.
L536~L697	-	Word	P2P parameter 1,4~30 Block service total.
L698~L703	-	Word	P2P parameter 1,31 Block service total.

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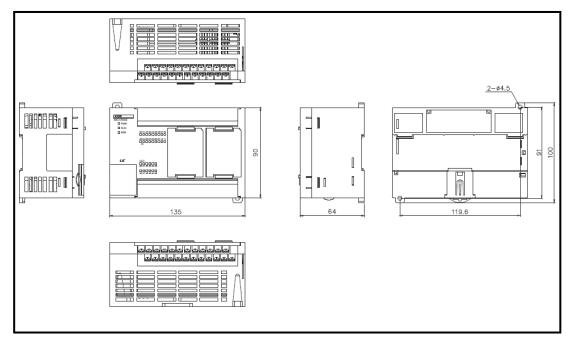
# Appendix 2 Dimension (Unit: mm)

(1) Economy type main unit ("E" type)

-. XBC-DR10/14E, XBC-DN10/14E, XBC-DP10/14E



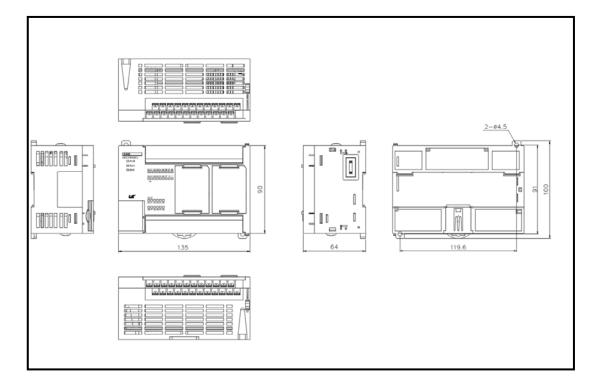
-. XBC-DR20/30E, XBC-DN20/30E, XBC-DP20/30E



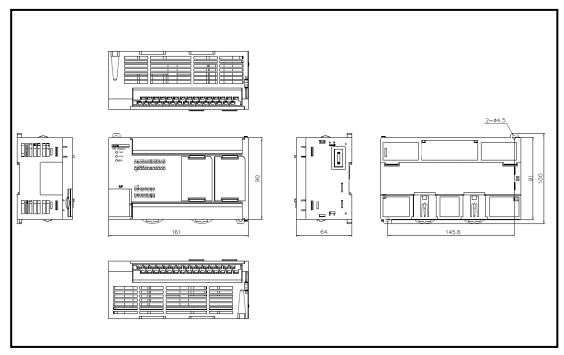
(2) Standard type main unit ("S(U)" type)

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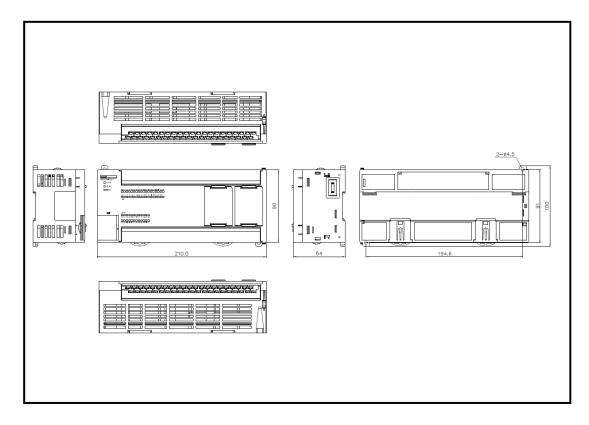
-. XBC-DN20/30S(U), XBC-DR20/30SU, XBC-DP20/30SU



- XBC-DN40SU, XBC-DR40SU , XBC-DP40SU



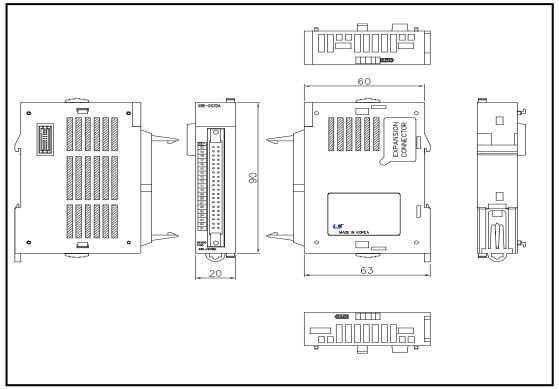
- XBC-DN60SU, XBC-DR60SU, XBC-DP60SU



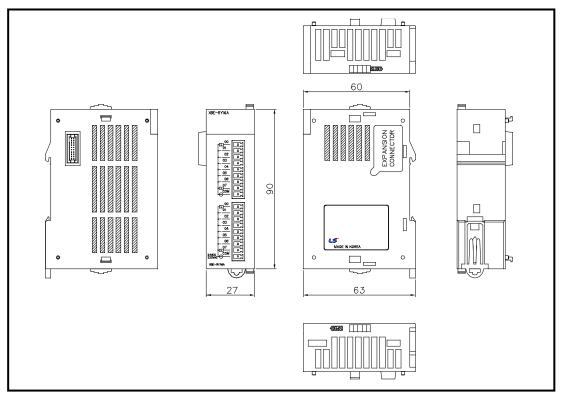
#### (3) Extension I/O module

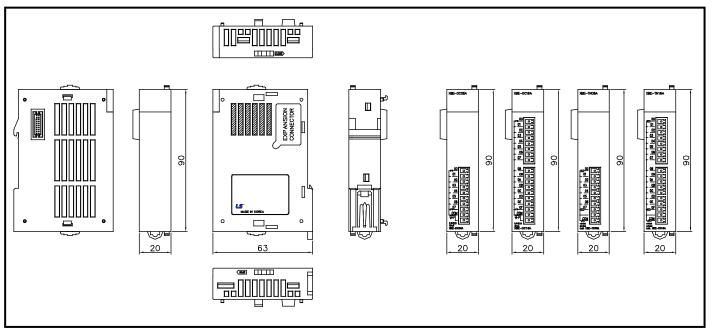
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#### -. XBE-DC32A, XBE-TN32A, XBE-DP32A, XBE-DN32A



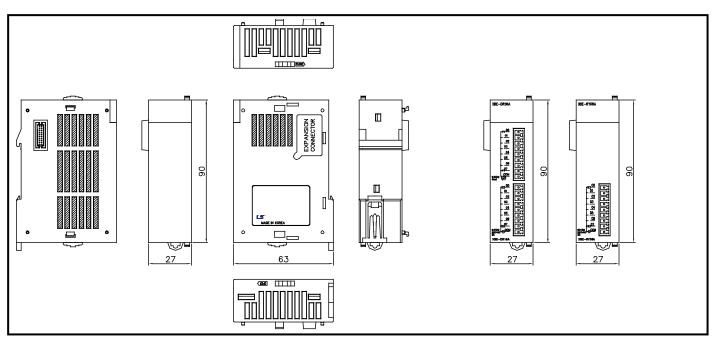
#### -. XBE-RY16A





-. XBE-DC08A, XBE-DC16A, XBE-TN08A, XBE-TN16A

#### -. XBE-DR16A, XBE-RY08A



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## Appendix 3 Compatibility with MASTER-K (Special Relay)

	MASTER-K		XGB		
Device	Function	Symbol	Device	Function	
F0000	RUN mode	_RUN	F0000	RUN Edit mode	
F0001	Program mode	_STOP	F0001	Program mode	
F0002	Pause mode	_ERROR	F0002	Error mode	
F0003	Debug mode	_DEBUG	F0003	Debug mode	
F0004	N/A	_LOCAL_CON	F0006	Remote mode	
F0005	N/A	_MODBUS_CON	F0006	Remote mode	
F0006	Remote mode	_REMOTE_CON	F0006	Remote mode	
F0007	User memory setup	-	F0007	N/A	
F0008	N/A	_RUN_EDIT_ST	F0008	Editing during RUN	
F0009	N/A	_RUN_EDIT_CHK	F0009	Editing during RUN	
F000A	User memory operation	_RUN_EDIT_DONE	F000A	Edit done during RUN	
F000B	N/A	_RUN_EDIT_END	F000B	Edit end during RUN	
F000C	N/A	_CMOD_KEY	F000C	Operation mode change by KEY	
F000D	N/A	_CMOD_LPADT	F000D	Operation mode change by PADT	
F000E	N/A	_CMOD_RPADT	F000E	Operation mode change by Remote PADT	
F000F	STOP command execution	_CMOD_RLINK	F000F	Operation mode change cause by remote communication module	
F0010	Ordinary time On	_FORCE_IN	F0010	Forced input	
F0011	Ordinary time Off	_FORCE_OUT	F0011	Forced output	
F0012	1 Scan On	_SKIP_ON	F0012	I/O Skip execution	
F0013	1 Scan Off	_EMASK_ON	F0013	Error mask execution	
F0014	Reversal every Scan	_MON_ON	F0014	Monitor execution	
		_USTOP_ON	F0015	Stop by Stop Function	
		_ESTOP_ON	F0016	Stop by ESTOP Function	
F0015 ~		_CONPILE_MODE	F0017	Compile	
F001C	N/A	_INIT_RUN	F0018	Initialize	
		-	F0019 ~ F001F	N/A	
		_PB1	F001C	Program Code 1	
F001D	N/A	_PB2	F001D	Program Code 2	
F001E	N/A	_CB1	F001E	Compile code 1	
F001F	N/A	_CB2	F001F	Compile code 2	

	MASTER-K			XGB
Device	Function	Symbol	Device	Function
F0020	1 Step RUN	_CPU_ER	F0020	CPU configuration error
F0021	Break Point RUN	_IO_TYER	F0021	Module type mismatch error
F0022	Scan RUN	_IO_DEER	F0022	Module detach error
F0023	Contact value match RUN	_FUSE_ER	F0023	Fuse cutoff error
F0024	Word value match RUN	_IO_RWER	F0024	I/O module read/write error
		_IP_IFER	F0025	Special/communication module interface error
		_ANNUM_ER	F0026	Heavy error detection of external equipment error
		-	F0027	N/A
		_BPRM_ER	F0028	Basic parameter error
50005		_IOPRM_ER	F0029	I/O configuration parameter error
F0025 ~ F002F	N/A	_SPPRM_ER	F002A	Special module parameter error
		_CPPRM_ER	F002B	Communication module parameter error
		_PGM_ER	F002C	Program error
		_CODE_ER	F002D	Program Code error
		_SWDT_ER	F002E	System watchdog error
		_BASE_POWER_ ER	F002F	Base power error
F0030	Heavy error	_WDT_ER	F0030	Scan watchdog
F0031	Light error	-	F0031	-
F0032	WDT error	-	F0032	-
F0033	I/O combination error	-	F0033	-
F0034	Battery voltage error	-	F0034	-
F0035	Fuse error	-	F0035	-
F0036 ~ F0038	N/A	-	F0036 ~ F0038	-
F0039	Backup normal	-	F0039	-
F003A	Clock data error	-	F003A	-
F003B	Program change	-	F003B	-
F003C	Program change error	-	F003C	-
F003D ~ F003F	N/A	-	F003D ~ F003F	N/A
		_RTC_ER	F0040	RTC data error
		_DBCK_ER	F0041	Data backup error
		_HBCK_ER	F0042	Hot restart disabled error
F0040~ F005F	N/A	_ABSD_ER	F0043	Abnormal operation stop
1 0001		_TASK_ER	F0044	Task collision
		_BAT_ER	F0045	Battery error
		_ANNUM_ER	F0046	Light error detection of external equipment

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MASTER-K				XGB
Device	Function	Symbol	Device	Function
		_LOG_FULL	F0047	Log memory full warning
F0040 ~ F005F		_HS_WAR1	F0048	High speed link parameter 1 error
		_HS_WAR2	F0049	High speed link parameter 2 error
		-	F004A ~ F0053	N/A
	N1/A	_P2P_WAR1	F0054	P2P parameter 1 error
	N/A	_P2P_WAR2	F0055	P2P parameter 2 error
		_P2P_WAR3	F0056	P2P parameter 3 error
		-	F0057 ~ F005B	N/A
		_Constant_ER	F005C	Constant error
		-	F005D ~ F005F	N/A
F0060 ~ F006F	Error Code save	-	F0060 ~ F006F	N/A
F0070 ~ F008F	Fuse cutoff save	-	F0070 ~ F008F	N/A
F0090	20ms cycle Clock	_T20MS	F0090	20ms cycle Clock
F0091	100ms cycle Clock	_T100MS	F0091	100ms cycle Clock
F0092	200ms cycle Clock	_T200MS	F0092	200ms cycle Clock
F0093	1s cycle Clock	_T1S	F0093	1s cycle Clock
F0094	2s cycle Clock	_T2S	F0094	2s cycle Clock
F0095	10s cycle Clock	_T10S	F0095	10s cycle Clock
F0096	20s cycle Clock	_T20S	F0096	20s cycle Clock
F0097	60s cycle Clock	_T60S	F0097	60s cycle Clock
		-	F0098	N/A
		_ON	F0099	Ordinary time On
		_OFF	F009A	Ordinary time Off
F0098 ~F009F	N/A	_10N	F009B	1 Scan On
		_10FF	F009C	1 Scan Off
		_STOG	F009D	Reversal every Scan
		-	F009B ~ F009F	N/A
F0100	User Clock 0	-	F0100	User Clock 0
F0101	User Clock 1	-	F0101	User Clock 1
F0102	User Clock 2	-	F0102	User Clock 2
F0103	User Clock 3	-	F0103	User Clock 3
F0104	User Clock 4	-	F0104	User Clock 4
F0105	User Clock 5	-	F0105	User Clock 5
F0106	User Clock 6	-	F0106	User Clock 6
F0107	User Clock 7	-	F0107	User Clock 7

MAS	STER-K	Querra la sel	XGB	
Device	Function	Symbol	Device	Function
F0108 ~ F010F		-	F0108 ~ F010F	N/A
F0110	Operation error flag	_Ler	F0110	Operation error flag
F0111	Zero flag	_Zero	F0111	Zero flag
F0112	Carry flag	_Carry	F0112	Carry flag
F0113	Full output Off	_AII_Off	F0113	Full output Off
F0114	Common RAM R/W error	-	F0114	N/A
F0115	Operation error flag (latch)	_Ler_Latch	F0115	Operation error flag(latch)
F0116 ~ F011F		-	F0116 ~ F011F	N/A
F0120	LT flag	_LT	F0120	LT flag
F0121	LTE flag	_LTE	F0121	LTE flag
F0122	EQU flag	_EQU	F0122	EQU flag
F0123	GT flag	_GT	F0123	GT flag
F0124	GTE flag	_GTE	F0124	GTE flag
F0125	NEQ flag	_NEQ	F0125	NEQ flag
F0126 ~ F012F	N/A	-	F0126 ~ F012F	N/A
F0130~ F013F	AC Down Count	_AC_F_CNT	F0130~ F013F	AC Down Count
F0140~ F014F	FALS no.	_FALS_NUM	F0140~ F014F	FALS no.
		_PUTGET_ERR	F0150~ F030F	PUT/GET error flag
		CPU TYPE	F0440 ~ F044F	CPU TYPE
F0150~ F015F	PUT/GET error flag	CPU VERSION	F0450 ~ F045F	CPU VERSION
		OS version no.	F0460 ~ F047F	System OS version no.
F0160~ F049F	N/A	OS date	F0480 ~ F049F	System OS DATE

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MASTER-K			XGB		
Device	Function	Symbol	Device	Function	
F0500~ F050F	Max. Scan time	_SCAN_MAX	F0500~ F050F	Max. Scan time	
F0510~ F051F	Min. Scan time	_SCAN_MIN	F0510~ F051F	Min. Scan time	
F0520~ F052F	Current Scan time	_SCAN_CUR	F0520~ F052F	Current Scan time	
F0530~ F053F	Clock data (year/month)	_YEAR_MON	F0530~ F053F	Clock data (year/month)	
F0540~ F054F	Clock data (day/hr)	_DAY_TIME	F0540~ F054F	Clock data(day/hr)	
F0550~ F055F	Clock data (min/sec)	_MIN_SEC	F0550~ F055F	Clock data(min/sec)	
F0560~ F056F	Clock data (100year/weekday)	_HUND_WK	F0560~ F056F	Clock data(100year/weekday)	
		_FPU_LFlag_I	F0570	-	
		_FPU_LFlag_U	F0571	-	
		_FPU_LFlag_O	F0572	-	
		_FPU_LFlag_Z	F0573	-	
		_FPU_LFlag_V	F0574	-	
	N/A	-	F0575 ~ F0579	N/A	
F0570~ F058F		_FPU_Flag_I	F057A	-	
		_FPU_Flag_U	F057B	-	
		_FPU_Flag_O	F057C	-	
		_FPU_Flag_Z	F057D	-	
		_FPU_Flag_V	F057E	-	
		_FPU_Flag_E	F057F	-	
		Error Step	F0580~ F058F	Error step save	
F0590~ F059F	Error step save	-	F0590~ F059F	N/A	
F0600~ F060F	FMM detailed error information	_REF_COUNT	F060~F061	Refresh Count	
F0610~ F063F	N/A	_REF_OK_CNT	F062~F063	Refresh OK Count	
-	-	_REF_NG_CNT	F064~F065	Refresh NG Count	
-	-	_REF_LIM_CNT	F066~F067	Refresh Limit Count	
-	-	_REF_ERR_CNT	F068~F069	Refresh Error Count	
-	-	_MOD_RD_ERR_CNT	F070~F071	MODULE Read Error Count	
-	-	_MOD_WR_ERR_CNT	F072~F073	MODULE Write Error Count	
-	-	_CA_CNT	F074~F075	Cmd Access Count	
-	-	_CA_LIM_CNT	F076~F077	Cmd Access Limit Count	
-	-	_CA_ERR_CNT	F078~F079	Cmd Access Error Count	
-	-	_BUF_FULL_CNT	F080~F081	Buffer Full Count	

#### Note

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- 1. When you convert the project written by KGLWIN in MASTER-K series (K80S, K200S, K300S, and K1000S) into XG5000 project, some instructions used in only MASTER-K is not converted. And the previous parameter used in MASTER-K is converted into default value.
- 2. XGB economy type project can be converted into XGB standard type project but parameter is converted into default value.
- 3. When you convert the XGB standard type project into XGB economy type project, some instructions used in only XGB standard type is not converted. And the parameter is converted into default value.

# **Appendix 4 Instruction List**

# Appendix 4.1 Classification of Instructions

Classification	Instructions	Details	Remarks
	Contact Point Instruction	LOAD, AND, OR related Instructions	
Basic Instructions	Unite Instruction	AND LOAD, OR LOAD, MPUSH, MLOAD, MPOP	
	Reverse Instruction	NOT	
	Master Control Instruction	MCS, MCSCLR	
	Output Instruction	OUT, SET, RST, 1 Scan Output Instruction, Output Reverse Instruction (FF)	
	Sequence/Last-input Preferred Instruction	Step Control Instruction (SET Sxx.xx, OUT Sxx.xx)	
	End Instruction	END	
	Non-Process Instruction	NOP	
	Timer Instruction	TON, TOFF, TMR, TMON, TRTG	
	Counter Instruction	CTD, CTU, CTUD, CTR	
	Data Transfer Instruction	Transfers specified Data, Group, String	4/8/64 Bits available
	Conversion Instruction	Converts BIN/BCD of specified Data & Group	4/8 Bits available
	Data Type Conversion Instruction	Converts Integer/Real Number	
	Output Terminal Compare Instruction	Saves compared results in special relay	Compare to Unsigned
	Input Terminal Compare Instruction	Saves compared results in BR. Compares Real Number, String & Group. Compares 3 Operands	Compare to Signed
	Increase/Decrease Instruction	Increases or decreases specified data 1 by 1	4/8 Bits available
	Rotate Instruction	Rotates specified data to the left and right, including Carry	4/8 Bits available
	Move Instruction	Moves specified data to the left and right, word by word, bit by bit	4/8 Bits available
	Exchange Instruction	Exchanges between devices, higher & lower byte, group data	
	BIN Operation Instruction	Addition, Subtraction, Multiplication & Division for Integer/ Real Number, Addition for String, Addition & Subtraction for Group	
	BCD Operation Instruction	Addition, Subtraction, Multiplication, Division.	
Application	Logic Operation Instruction	Logic Multiplication, Logic Addition, Exclusive OR, Exclusive NOR, Group Operation	
Instructions	System Instruction	Error Display, WDT Initialize, Output Control, Operation Stop, etc.	
	Data Process Instruction	Encode, Decode, Data Disconnect/Connect, Search, Align, Max., Min., Total, Average, etc.	
	Data Table Process Instruction	Data Input/Output of Data Table	
	String Process Instruction	String related Convert, Comment Read, String Extract, ASCII Convert, HEX Convert, String Search, etc.	
	Special Function Instruction	Trigonometric Function, Exponential/Log Function, Angle/ Radian Convert, etc.	
	Data Control Instruction	Max/Min Limit Control, Dead-zone Control, Zone Control	
	Time related Instruction	Date Time Data Read/Write, Time Data Adjust & Convert	
	Diverge Instruction	JMP, CALL	
	Loop Instruction	FOR/NEXT/BREAK	
	Flag related Instruction	Carry Flag Set/Reset, Error Flag Clear	
	Special/Communication related Instruction	Data Read/Write by BUSCON Direct Access	
	Interrupt related Instruction	Interrupt Enable/Disable	
	Signal Reverse Instruction	Reverse Integer/Real Signals, Absolute Value Operation	
	File related Instruction	Blcok Read/Write/Compare/Convert, Flash data Transmission	

# Appendix 4.2 Basic Instructions

### (1) Contact point instruction

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Classification	Designations	Symbol	Symbol Description		port
Classification	Designations	Symbol			XGB
	LOAD		A Contact Point Operation Start	0	0
	LOAD NOT		B Contact Point Operation Start	0	0
	AND		A Contact Point Series- Connected	0	0
	AND NOT		B Contact Point Series- Connected	0	0
	OR		A Contact Point Parallel- Connected	0	0
Contact	OR NOT		B Contact Point Parallel- Connected	0	0
Point	LOADP	├── <b>│</b> ₽	Positive Convert Detected Contact Point	0	0
	LOADN	N	Negative Convert Detected Contact Point	0	0
	ANDP	P	Positive Convert Detected Contact Point Series-Connected	0	0
	ANDN	— N	Negative Convert Detected Contact Point Series-Connected	0	0
	ORP	└──┤₽ ├──┘	Positive Convert Detected Contact Point Parallel-	0	0
	ORN	└──┤N	Negative Convert Detected Contact Point Parallel-	0	0

### (2) Union instruction

Classification	Designations	Symbol	Description	Sup	port
Classification	Designations	Symbol	Description	XGK	XGB
	AND LOAD	A B	A,B Block Series-Connected	0	0
	OR LOAD	A	A,B Block Parallel-Connected	0	0
Unite	MPUSH		Operation Result Push up to present	0	0
	MLOAD		Operation Result Load Previous to Diverge Point	0	0
	MPOP		Operation Result Pop Previous to Diverge Point	0	0

#### (3) Reverse instruction

	Classification	Designations	ons Symbol	Description	Support	
				Description	XGK	XGB
	Reverse	NOT	— <u>*</u> —	Previous Operation results Reverse	0	0

### (4) Master Control instruction

Classification	Designations	ns Symbol	Description	Support	
Classification	Designations		Description	XGK	XGB
Master Control	MCS	MCS n	Master Control Setting (n:0~7)	0	0
	MCSCLR	MCSCLR n	Master Control Cancel (n:0~7)	0	0

#### (5) Output instruction

Classification	Designations	Symbol	Description	Support	
Classification	Designations	Symbol	Description	XGK	XGB
	OUT	— ( )—	Operation Results Output	0	0
	OUT NOT	(/)	Operation Results Reverse Output	0	0
	OUTP	( P )	1 Scan Output if Input Condition rises	0	0
Output	OUTN	——( N )—	1 Scan Output if Input Condition falls	0	0
	SET	( s )	Contact Point Output ON kept	0	0
	RST	——( R )—	Contact Point Output OFF kept	0	0
	FF	FF D	Output Reverse if Input Condition rises	0	0

### (6) <u>Sequence/Last-input preferred instruction</u>

Classification	Designations	Symbol	Description	Support	
Classification			Description	XGK	XGB
Step Control	SET S	Syy.xx ───( S )──	Sequence Control	0	0
	OUT S	Syy.xx ( )	Last-input Preferred	0	0

#### (7) End instruction

	Classification	Designations	Symbol	Description	Su	oport
	Classification Designatio	Designations	Symbol	Description	XGK	XGB
	End	END	— END —	Program End	0	0

#### (8) Non-process instruction

	Classification	Classification Designations Symbol Description		Sup	oport	
	Classification	Designations	Symbol	Description	XGK	XGB
	Non-Process	NOP	Ladder not displayed	Non-Process Instruction, used in Nimonic	0	0

### (9) Timer instruction

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'	Classification	Designations	Symbol	Description	Sup	port
	Olassineation	Designations	Cymbol	Description	XGK	XGB
		TON		Input + t +	0	0
		TOFF		Input t	0	0
	Timer	TMR	TMR T t	Input $t1+t2 = t$ $\leftarrow t1 \rightarrow   \leftarrow t2 \rightarrow  $ T	0	0
		TMON		Input [	0	0
		TRTG		Input ← t → T	0	0

# (10) Counter instruction

Classification	Designations	Symbol	Description		oport
Classification	Doorginationio	Cymoor		XGK	XGB
	СТD	CTD C c	Reset Count Pulse Present Output	0	0
	СТU	CTU C c	Reset Count Pulse Present Output	0	0
Counter	CTUD		Reset Increased Pulse Decreased Pulse Present	0	o
	CTR	CTR C c	Reset Count Pulse Present	0	ο

# Appendix 4.3 Application Instruction

### (1) Data transfer instruction

Classification	Designations	Symbol	Description	Sup	port
Classification	Designations	Symbol	Description	XGK	XGB
16 bits Transfer	MOV	MOV S D	(S) → (D)	0	0
Transier	MOVP	MOVP S D			
32 bits	DMOV		(S+1,S) → (D+1,D )	0	0
Transfer	DMOVP	DMOVP S D			
Short Real Number	RMOV	RMOV SD	(S+1,S) → (D+1,D )	0	0
Transfer	RMOVP	-RMOVP SD-		Ũ	Ũ
Long	LMOV		(S+3,S+2,S+1,S)		
Real Number Transfer	LMOVP		(D+3,D+2,D+1,D)	0	0
4 bits	MOV4	MOV4 Sb Db	(Sb): Bit Position b15 b0 4bit trans		
Transfer	MOV4P	MOV4P Sb Db	(Db): Bit Position	0	0
8 bits	MOV8	MOV8 Sb Db	(Sb): Bit Position b15 ↓ b0		
Transfer	MOV8P		8bit trans (DDD): Bit Position	0	0
	CMOV	CMOV S D	1's complement	_	
1's complement	CMOVP	CMOVP S D	(S) → (D)	0	0
Transfer	DCMOV	DCMOV S D	1's complement	0	0
	DCMOVP	DCMOVP S D	$(S+1,S) \longrightarrow (D+1,D)$	0	0
16 bits	GMOV	-GMOV SDN-		0	0
Group Transfer	GMOVP	GMOVP S D N		0	0
Multiple	FMOV	-FMOV SDN-	(S) (D)	0	0
Transfer	FMOVP			0	0
Specified Bits	BMOV	BMOV S D N	(S)	0	0
Transfer	BMOVP	-BMOVP SDN	(D) Z: Control Word	0	0
Specified Bits	GBMOV	GBMOV SDZN-	(S) b15 b0 : (S+N) (D)	0	0
Group Transfer	GBMOVP	GBMOVP S D Z N	(D+N) * Z: Control Word	0	0

(1) Data Transfer In	nstruction	(continued)	)
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Classification	Docimations	Symbol Description	Su	pport	
Classification	Designations	Symbol	Description	XGK	XGB
String	String \$MOV\$MOV\$MOV	String started from (S)	0	0	
Transfer	\$MOVP	\$MOVP S D	String started from (D)	0	0

### (2) BCD/BIN conversion instruction

Classification	Designations	Symbol	Description		port
	Designations	Cymbol	•	XGK	XGB
	BCD	BCD S D	(S) $\longrightarrow$ (D)	0	0
BCD	BCDP	BCDP S D	ÊBIN( 0~9999 )	0	0
Conversion	DBCD	DBCD S D	(S+1,S) <b>To BCD</b> (D+1,D)		
	DBCDP	DBCDP S D	€BIN( 0~99999999 )	0	0
	BCD4	BCD4 Sb Db	(Sb):Bit, BIN(0~9) b15	0	0
4/8 Bits BCD	BCD4P	BCD4P Sb Db	To 4bit BCD	-	-
Conversion	BCD8	BCD8 Sb Db	(Sb):Bit, BIN(0~99) b15 ↓ b0	0	0
	BCD8P	BCD8P Sb Db	To 8bit BCD	, 	Ŭ
	BIN	BIN S D	(S) <b>→</b> (D)	0	0
BIN	BINP	BINP S D	<b>↑</b> BCD( 0~9999 )	0	0
Conversion	DBIN	DBIN S D	(S+1,S) To BIN (D+1,D)		
	DBINP	DBINP S D	€ BCD( 0~999999999 )	0	0
	BIN4	BIN4 Sb Db	(Sb):Bit, BCD(0~9) b15	0	0
4/8 Bits BIN	BIN4P	BIN4P Sb Db	To 4bit BIN (Db):Bit	0	0
Conversion	BIN8	BIN8 Sb Db	(Sb):Bit, BCD(0~99) b15 ↓ b0	0	0
	BIN8P	BIN8P Sb Db	To bit BIN	-	-
	GBCD	GBCD S D N	□ Data (S) to N converted to BCD,	0	0
Group	GBCDP	GBCDP S D N	and (D) to N saved	0	0
BCD,BIN Conversion	GBIN		□ Data (S) to N converted to BIN,		
	GBINP	GBINP S D N	and (D) to N saved	0	0

Classification	Designations	Symbol	Description	Sup	port
Classification	Designations	Symbol	Description	XGK	XGB
	I2R	I2R S D	(S) <b>———→</b> (D+1,D)	0	0
16 Bits Integer/Real	I2RP	I2RP S D	<b>└</b> Int( -32768~32767 )	-	-
Conversion	I2L		(S) $\xrightarrow{\text{To Long}}$ (D+3,D+2,D+1,D)	0	0
	I2LP		└─── Int( -32768~32767 )	0	0
	D2R	D2R SD	$(S+1,S) \xrightarrow{\text{To Real}} (D+1,D)$	0	0
32 Bits Integer/Real	D2RP	D2RP S D	└── Dint(-2147483648~2147483647)	0	0
Conversion	D2L	D2L SD	(S+1,S) (D+3,D+2,D+1,D)	0	0
	D2LP	D2LP S D	<b>t</b> Dint(-2147483648~2147483647)	0	0
	R2I		(S+1,S) <b></b> (D)	0	0
Short Real/Integer	R2IP	R2IP S D	Mhole Sing Real Range	0	0
Conversion	R2D	R2D S D	(S+1,S) (D+1,D)	0	0
	R2DP	R2DP S D	Whole Sing Real Range	0	0
	L2I	L2IS	$(S+3,S+2,S+1,S) \xrightarrow{\text{To INT}} (D)$		
Long	L2IP	L2IP S D	C Whole Double Real Range	0	0
Real/Integer Conversion	L2D	L2D S D	$(S+3,S+2,S+1,S) \xrightarrow{\text{To DINT}} (D+1,D)$	0	0
	L2DP	L2DP S D	Mhole Double Real Range	0	0

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### (3) Data type conversion instruction

#### Remark

Integer value and Real value will be saved respectively in quite different format. For such reason, Real Number Data should be converted as applicable before used for Integer Operation.

### (4) Comparison instruction

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	Designations	Symbol	Description	Sup	port
Classification	Designations	Symbol	Description	XGK	XGB
Unsigned	CMP	CMP S1 S2	CMP(S1,S2) and applicable Flag SET	0	0
Compare with Special	CMPP	CMPP S1 S2	(S1, S2 is Word)	0	0
Relay	DCMP	DCMP S1 S2	CMP(S1,S2) and applicable Flag SET		
used	DCMPP	DCMPP S1 S2	(S1, S2 is Double Word)	0	0
	CMP4		CMP(S1,S2) and applicable Flag SET	0	0
4/8 Bits	CMP4P	CMP4P S1 S2	(S1, S2 is Nibble)	0	0
Compare	CMP8		CMP(S1,S2) and applicable Flag SET	0	0
	CMP8P	CMP8P S1 S2	(S1, S2 is Byte)	0	0
	ТСМР	TCMP S1 S2 D	CMP(S1,S2))		
Table	ТСМРР	TCMPP S1 S2 D	− CMP(S1+15,S2+15)	0	0
Compare	DTCMP	DTCMP S1 S2 D	→       CMP((S1+1,S1),(S2+1,S2))         ∴       ∴         CMP((S1+31,S1+30),(S2+31,S2+30))         →       Result:(D) ~ (D+15)		
	DTCMPP	DTCMPP S1 S2 D		0	0
	GEQ	GEQ S1 S2 D N			
	GEQP	GEQP S1 S2 D N			
	GGT	GGT S1 S2 D N			
	GGTP	GGTP S1 S2 D N			
	GLT				
Group Compare	GLTP	GLTP S1 S2 D N	Compares S1 data to S2 data word by word, and saves its result in Device (D) bit by bit from the lower	0	0
(16 Bits)	GGE	GGE S1 S2 D N	bit $(N \le 16)$	0	0
	GGEP	GGEP S1 S2 D N			
	GLE	GLE S1 S2 D N			
	GLEP	GLEP S1 S2 D N			
	GNE	GNE S1 S2 D N			
	GNEP	GNEP S1 S2 D N			

#### Remark

CMP(P), DCMP(P), CMP4(P), CMP8(P), TCMP(P) & DTCMP(P) Instructions all process the results of Unsigned Compare. All the other Compare Instructions will perform Signed Compare.

Classification	Designations	Symbol	Description	Sup	port
Classification	Designations	Symbol	Description	XGK	XGB
	GDEQ	GDEQ S1 S2 D N		0	0
	GDEQP	GDEQP S1 S2 D N		0	0
	GDGT	GDGT S1 S2 D N		0	0
	GDGTP	GDGTP S1 S2 D N		0	0
	GDLT	GDLT S1 S2 D N	Compares S1 data to S2 data 2 by 2 words, and saves its result in Device (D) bit by bit from the lower	0	0
Group Compare	GDLTP	GDLTP S1 S2 D N		0	0
(32 Bits)	GDGE	GDGE S1 S2 D N	bit $(N \le 16)$	0	0
	GDGEP	GDGEP S1 S2 D N		0	0
	GDLE	GDLE S1 S2 D N		0	0
	GDLEPGDLEP S1 S2 D N		0	0	
	GDNE	GDNE S1 S2 D N		0	0
	GDNEP	GDNEP S1 S2 D N		0	0

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Classification Designations		Symbol	Description	Sup	oport
Classification	Designations	Symbol	Description	XGK	XGB
	LOAD=	= S1 S2			
	LOAD>	> S1 S2			
16 Bits Data	LOAD<	< S1 S2	Compares (S1) to (S2), and saves its result in Bit Result(BR) (Signed	0	0
Compare (LOAD)	LOAD>=	>= S1 S2	Operation)	0	0
· · · ·	LOAD<=	<= S1 S2			
	LOAD<>	<> S1 S2			
	AND=	-   - <b>  =   S1   S2</b>			
40 B''	AND>	HH> S1 S2	Performs AND operation of (S1) &		
16 Bits Data	AND<	H⊢< S1 S2	(S2) Compare Result and Bit Result (BR), and then saves its result in BR (Signed Operation)	0	0
Compare (AND)	AND>=	⊣⊢>= S1 S2		0	0
	AND<=	H⊢<= S1 S2			
	AND<>	HH≪> S1 S2			
16 Bits	OR=		Performs OR operation of (S1) &		
Data Compare	OR<=	<= S1 S2	(S2) Compare Result and Bit Result (BR), and then saves its result in BR (Signed Operation)	0	0
(OR)	OR<>	<> S1 S2			
	LOADD=	D= S1 S2			
	LOADD>	D> S1 S2			
32 Bits Data	LOADD<	D< \$1 \$2	Compares (S1) to (S2), and saves its result in Bit Result(BR) (Signed		
Compare (LOAD)	LOADD>=	D>= S1 S2	Operation)		
()	LOADD<=	D<= \$1 \$2			
	LOADD<>	D<> S1 S2			

#### Remark

Comparison instruction for input process the result of Signed comparison instruction generally. To process Unsigned comparison, Use comparison instruction for input.

Classification	Designations	Symbol	Description	Sup	port
Classification	Designations	-	Description	XGK	XGB
	ANDD=	⊢⊢ <b>D=</b> S1 S2			
	ANDD>	D>    S1   S2			
32 Bits Data	ANDD<	-   D<   S1   S2	Performs AND operation of (S1) & (S2) Compare Result and Bit Result	0	0
Compare (AND)	ANDD>=	-   -  D>= S1 S2	(BR), and then saves its result in BR (Signed Operation)	-	Ť
	ANDD<=	-   -  D<= S1 S2			
	ANDD<>	H⊢D<> \$1\$2			
	ORD=	D= S1 S2			
	ORD>	D> S1 S2			
32bt Data	ORD<	D< S1 S2	Performs OR operation of (S1) & (S2) Compare Result and Bit Result	0	0
Compare (OR)	ORD>=	D>= S1 S2	(BR), and then saves its result in BR (Signed Operation)	0	0
	ORD<=	D<= S1 S2			
	ORD<>	D<> S1 S2			
	LOADR=	R= \$1 \$2			
	LOADR>	R> \$1 \$2			
Short Real Number	LOADR<	R< \$1 \$2	Performs OR operation of (S1) & (S2) Compare Result and Bit Result	0	0
Compare (LOAD)	LOADR>=	R>= S1 S2	(BR), and then saves its result in BR (Signed Operation)	0	0
	LOADR<=	R<= \$1 \$2			
	LOADR<>	R<> S1 S2			
	ANDR=	⊢⊢ <b>R=</b> S1 S2			
	ANDR>	HH <b>R&gt; S1 S2</b>			
Short Real Number	ANDR<	HHR< \$1 \$2	Compares (S1+1,S) to (S2+1,S2) and saves its result in Bit Result	0	0
Compare (AND)	ANDR>=	HH <b>R&gt;=</b> S1 S2	(BR) (Signed Operation)		0
	ANDR<=	HHR<= \$1 \$2			
	ANDR<>	H⊢ <b>R&lt;&gt;</b> \$1 \$2			

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Classification	Designations	Symbol	Description		port
Classification	Designations	Gymbol	Description	XGK	XGB
	ORR=	R= S1 S2			
	ORR>	R> S1 S2			
Real Number Compare	ORR<	R< S1 S2	Compares (S1+1,S1) to (S2+1,S2) and saves its result in Bit Result	0	0
(OR)	ORR>=	R>= S1 S2	(BR) (Signed Operation)	0	0
	ORR<=	R<= S1 S2			
	ORR<>	R<> S1 S2			
	LOADL=	L= S1 S2	Compares (S1+3,S1+2,S1+1,S) to (S2+3,S2+2, S2+1,S2) and saves its result in Bit Result(BR) (Signed Operation)		
	LOADL>	L> S1 S2			
Long Real Number Compare	LOADL<	L< \$1 \$2		0	0
(LOAD)	LOADL>=	L>= S1 S2-		0	0
	LOADL<=	L<= S1 S2			
	LOADL<>	L<> \$1 \$2			
	ANDL=	HHL= S1 S2			
	ANDL>				
Long Real Number	ANDL<	⊣⊢L< <u>\$1</u> \$2—	Performs AND operation of (S1+ 1,S1) & (S2+1,S2) Compare Result and Bit Result(BR), and then saves	0	0
Compare (AND)	ANDL>=	HHL>= S1 S2-	its result in BR (Signed Operation)	0	0
	ANDL<=	-  -  L<=   S1  S2			
	ANDL<>	HHL<> S1 S2			

Classification	Designations	Symbol	Description	Sup	port
Classification	Designations	Symbol	Description	XGK	XGB
	ORL=				
	ORL>	L> \$1 \$2			
Double Real Number	ORL<		Performs OR operation of (S1 +1,S1) & (S2+1,S2) Compare Result and Bit Result(BR), and		
Compare (OR)	ORL>=		then saves its result in BR (Signed Operation)	0	0
,	ORL<=				
	ORL<>				
	LOAD\$=	\$= S1 S2	Compares (S1) to (S2) Starting String and saves its result in Bit Result(BR)		
	LOAD\$>	\$> S1 S2			
String Compare	LOAD\$<	\$< S1 S2		0	0
(LOAD)	LOAD\$>=	\$>= S1 S2		0	0
	LOAD\$<=	\$<= \$1 \$2			
	LOAD\$<>	\$<> \$1 \$2			
	AND\$=	H⊢ <b>\$=</b> S1 S2			
	AND\$>	HH <b>\$&gt;</b> S1 S2			
String Compare	AND\$<	HH\$< S1 S2	Performs AND operation of (S 1) & (S2) Starting String Compare	0	0
(AND)	AND\$>=	HH\$>= S1 S2	Result and Bit Result(BR), and then saves its result in BR	0	0
	AND\$<=	HH\$<= S1 S2			
	AND\$<>	H⊢ <b>\$&lt;&gt;</b> S1 S2			

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Classification	Designations	Symbol	Description	Sup	
	Doorginations	Gymbol	Docomption	XGK	XGB
	OR\$=	\$= S1 S2			
	OR\$>	\$> \$1 \$2			
String Compare	OR\$<	\$< \$1 \$2	Performs OR operation of (S1) & (S2) Starting String Compare Result and Bit Result(BR), and	0	0
(OR)	OR\$>=	\$>= S1 S2	then saves its result in BR	0	0
	OR\$<=	\$<= \S1\S2			
	OR\$<>	\$<> \$1 \$2			
	LOADG=	G= S1 S2 N			
	LOADG>	G> S1 S2 N	$Compares (S1) (S1)1) \dots$		
16 Bits Data	LOADG<	G< S1 S2 N	Compares (S1), (S1+1), …, (S1+N) to (S2), (S2+1), …,		
Group Compare (LOAD)	LOADG>=	G>= S1 S2 N	<ul> <li>(S2+N) 1 to 1, and then saves</li> <li>1 in Bit Result(BR) if each</li> <li>value compared meets given condition</li> </ul>	0	0
	LOADG<=	G<= S1 S2 N			
	LOADG<>	G<> S1 S2 N			
	ANDG=				
	ANDG>	-  <b>G&gt;</b>    S1    S1    N	Performs AND operation of		
16 Bits Data	ANDG<	HHG<  S1  S1  N	(S1), (S1+1), ···, (S1+N) & (S2), (S2+1), ··· , (S2+N) 1 to	0	0
Group Compare (AND)	ANDG>=	⊣⊢ <mark>G&gt;= S1 S1 N</mark> —	1 Compare Result and Bit Result (BR), and then saves its	0	0
	ANDG<=	⊣⊢ <mark>G&lt;= S1 S1 N</mark> —	result in BR		
	ANDG<>	HHG<> S1 S1 N			
	ORG=	G= S1 S2 N			
	ORG>	G> S1 S2 N			
16 Bits Data	ORG<	G< S1 S2 N	Performs OR operation of (S1), (S1+1), ···, (S1+N) & (S2), (S2+1), ··· , (S2+N) 1 to 1		
Group Compare (OR)	ORG>=	G>= S1 S2 N	Compare Result and Bit Result (BR), and then saves its result in BR	0	0
	ORG<=	G<= S1 S2 N			
	ORG<>	G<> S1 S2 N			

Classification	Designations	Symbol	Description	Sup	
Classification	Designations	Gymbol	Description	XGX	XGB
	LOADDG=	DG= S1 S2 N	Compares (S1), (S1+1), …,		
	LOADDG>	DG> S1 S2 N			
32 Bits Data Group Compare	LOADDG<	DG< S1 S2 N	(S1+N) to (S2), (S2+1), ··· , (S2+N) 1 to 1, and then saves		
	LOADDG>=	DG>= S1 S2 N	1 in Bit Result(BR) if each value compared meets given	0	0
(LOAD)	LOADDG<=	DG<= \$1\$2 N	condition		
	LOADDG<>	DG<> \$1 \$2 N			
	ANDDG=	HHDG= S1S1N			
32 Bits Data	ANDDG>	HHDG> S1 S1 N	Performs AND operation of		
	ANDDG<		(S1), (S1+1), …, (S1+N) & (S2), (S2+1), …, (S2+N) 1 to 1 Compare Result and Bit Result(BR), and then saves its result in BR	0	0
Group Compare (AND)	ANDDG>=			0	0
(/	ANDDG<=	⊢⊢DG<= \$1\$1 N			
	ANDDG<>	HHDG<> \$1\$1 N			
	ORDG=	DG= S1 S2 N			
	ORDG>				
32 Bits Data	ORDG<		Performs OR operation of (S1), (S1+1), …, (S1+N) & (S2), (S2+1), …, (S2+N) 1 to		
Group Compare (OR)	ORDG>=		1 Compare Result and Bit Result(BR), and then saves its result in BR	0	0
	ORDG<=				
	ORDG<>		]		

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Classification	Designations	Symbol	Description	Sup	port
Classification	Designations	Gymbol		XGK	XGB
	LOAD3=	3= S1 S2 S3	-		
	LOAD3>	3> S1 S2 S3			
Three 16-Bit Data Compare	LOAD3<		Saves 1 in Bit Result(BR) if each		
(LOAD)	LOAD3>=	3>= S1 S2 S3	value of (S1), (S2), (S3) meets given condition	0	0
	LOAD3<=	3<= S1 S2 S3			
	LOAD3<>	3<> \$1 \$2 \$3			
	AND3=	HH3= S1 S2 S3			
	AND3>	HH 3> S1 S2 S3			
Three 16-Bit	AND3<	HH3< \$1 \$2 \$3	Performs AND operation of (S1), (S2), (S3) Compare Result by	_	
Data Compare (AND)	AND3>=		given condition and Bit Result (BR), and then saves its result in BR	0	0
	AND3<=	HH3<= \$1 \$2 \$3			
	AND3<>	HH3<> \$1 \$2 \$3			
	OR3=	3= S1 S2 S3	Performs OR operation of (S1), (S2), (S3) Compare Result by		
	OR3>	3> S1 S2 S3			
Three 32-Bit Data Compare	OR3<				0
(OR)	OR3>=	>=3 S1 S2 S3	given condition and Bit Result (BR), and then saves its result in BR	0	0
	OR3<=	3<= \$1 \$2 \$3			
	OR3<>				
	LOADD3=	D3= S1 S2 S3			
	LOADD3>	D3> S1 S2 S3			
Three 16-Bit	LOADD3<	D3< S1 S2 S3	Saves 1 in Bit Result(BR) if each		
Data Compare (LOAD)	LOADD3>=	D3>= S1 S2 S3	value of (S1+1,S1), (S2+ 1,S2), (S3+1,S3) meets given condition	0	0
	LOADD3<=	D3<= S1 S2 S3	1		
	LOADD3<>	D3<> S1 S2 S3			

Classification	Designations	Symbol	Description	Sup	port
Classification	Designations	Symbol	Description	XGK	XGB
	ANDD3=	HHD3= S1 S2 S3			
	ANDD3>	HHD3> S1 S2 S3			
Three 32-Bit	ANDD3<	HHD3< S1 S2 S3	Performs AND operation of (S1+ 1,S1), (S2+1,S2), (S3+1,S3) Compare Result by given condition and Bit		
Data Compare (AND)	ANDD3>=	HHD3>= S1 S2 S3	Result (BR), and then saves its result in BR	0	0
	ANDD3<=	HHD3<= \$1 \$2 \$3			
	ANDD<>	HHD3<> \$1 \$2 \$3			
	ORD3=	D3= S1 S2 S3			
	ORD3>	D3> S1 S2 S3			
Three 32-Bit Data Compare	ORD3<	D3< S1 S2 S3	Performs OR operation of (S1+1, S1), (S2+1,S2), (S3+1,S3) Compare Result by given condition and Bit	0	0
(OR)	ORD3>=	D3>= S1 S2 S3	Result (BR), and then saves its result in BR	0	0
	ORD3<=	D3<= S1 S2 S3			
	ORD3<>	D3<> S1 S2 S3			

### (5) Increase/Decrease instruction

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Classification	Designations	Symbol	Description	Sup	port
Classification	Designations	Symbol	Description	XGK	XGB
	INC		(D)+1 → (D)	2	
	INCP			2	4-94
	DINC		(D+1,D)+1 → (D+1,D)	2	4-94
BIN Data Increase	DINCP	DINCP D		2	
/ Decrease (Signed)	DEC	DEC D	(D)−1 → (D)	2	
(Oigrica)	DECP	DECP D		2	4.06
	DDEC	DDEC D	(D+1,D)−1 → (D+1,D)	2	4-96
	DDECP	DDECP D		2	
	INC4	INC4 Db	(D:x bit ~ D:x bit+4) + 1	2	
	INC4P	INC4P Db	$\longrightarrow$ (D:x bit ~ D:x bit+4)	3	4.05
	INC8	INC8 Db	(D:x bit ~ D:x bit+8) + 1	2	4-95
4/8 Bits Data Increase	INC8P	INC8P Db	(D:x bit ~ D:x bit+8)	3	
/ Decrease (Signed)	DEC4	DEC4 Db	(D:x bit ~ D:x bit+4) - 1	2	
(Oigrica)	DEC4P	DEC4P Db	$\longrightarrow (D:x bit \sim D:x bit+4)$	3	4.07
	DEC8	DEC8 Db	(D:x bit ~ D:x bit+8) - 1	2	4-97
	DEC8P	DEC8P Db	$\longrightarrow$ (D:x bit ~ D:x bit+8)	3	
	INCU		(D)+1 → (D)	0	
	INCUP			2	4.00
	DINCU		(D+1,D)+1 → (D+1,D)		4-98
BIN Data Increase	DINCUP			2	
/ Decrease (Unsigned)	DECU	DECUD	(D)−1 → (D)		
(Unsigned)	DECUP	DECUPD		2	4.00
	DDECU		(D+1,D)−1 → (D+1,D)	0	4-99
	DDECUP	DDECUP D		2	

### (6) Rotation instruction

Classification	Designations	Cumbal	Description	Sup	oport
Classification	Designations	Symbol	Description	XGK	XGB
	ROL	ROL D n	b <u>15 b</u> 0		
Rotate to Left	ROLP	ROLP D n			0
	DROL	DROL D n	b31 b15 b0 CY ◀ D+1 D ◀	0	0
	DROLP	DROLP D n			
	ROL4	ROL4 Db n			
4/8 Bits	ROL4P				
Rotate to Left	ROL8	ROL8 Db n		0	0
	ROL8P	ROL8P Db n			
	ROR	ROR D n	b15 b0		
Datata ta Diaht	RORP			_	
Rotate to Right	DROR	DROR D n	b31 b15 b0	0	0
	DRORP	DRORP D n			
	ROR4	ROR4 Db n			
4/8 Bits	ROR4P	ROR4P Db n			
Rotate to Right	ROR8	ROR8 Db n		0	0
	ROR8P	ROR8P Db n			
	RCL	RCL D n	b <u>15 b</u> 0		
Rotate to Left	RCLP	RCLP D n			0
(including Carry)	DRCL	DRCL D n	b31 b15 b0	0	
	DRCLP	DRCLP D n			
	RCL4	RCL4 Db n		о о о	
4/8 Bits Rotate to Left	RCL4P	RCL4P Db n			
(including Carry)	RCL8	RCL8 Db n		0	0
,,	RCL8P	RCL8P Db n		хGК о о о	
	RCR	RCR D n	b15 b0		
Rotate to Right	RCRP	RCRP D n			0
(including Carry)	DRCR	DRCR D n		0	0
	DRCRP	DRCRP D n			
	RCR4	RCR4 Db n			
4/8 Bits Rotate to Right	RCR4P	RCR4P Db n			0
(including Carry)	RCR8	RCR8 Db n		U	U
	RCR8P	RCR8P Db n			

### (7) Move instruction

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Classification	Designations	Symbol	Description		oport
			St Ed	XGK	XGB
Bits Move	BSFT	BSFT St Ed		0	0
	BSFTP	BSFTP St Ed	<b>f</b> 0		
	BSFL	BSFL D n	(D)		
Move to Higher	BSFLP	BSFLP D n	CY	0	0
Bit	DBSFL	DBSFL D n	(D+1, D)	0	0
	DBSFLP	DBSFLP D n			
	BSFL4	BSFL4 Db n			
Move to Higher Bit within 4/8	BSFL4P	BSFL4P Db n			
Bits range	BSFL8	BSFL8 Db n	b+7 b	0	0
	BSFL8P	BSFL8P Db n			
	BSFR	BSFR D n	(D)		
Move to Lower	BSFRP	BSFRP D n	0 CY	0	
Bit	DBSFR	DBSFR D n	(D+1, D)		0
	DBSFRP	DBSFRP D n			
	BSFR4	BSFR4 Db n			
Move to Lower	BSFR4P	BSFR4P Db n	0 CY		
Bit within 4/8 Bits range	BSFR8	BSFR8 Db n		0	0
	BSFR8P	BSFR8P Db n			
	WSFT	WSFT Et Ed	h0000		
Word Move	WSFTP	WSFTP Et Ed	Ed (End Word)	0	0
	WSFL	WSFL D1 D2 N	h0000		
Word Data Move to	WSFLP	WSFLP D1 D2 N			~
Left/Right	WSFR	WSFR D1 D2 N	. D1	0	0
	WSFRP	WSFRP D1 D2 N	h0000		
Bit Move	SR		Moves N bits starting from Db bit along Input direction (I) and Move direction (D)	0	0

### (8) Exchange instruction

Classification	Designations	Symbol	Description	Support	
Classification	Designations	Symbol	Description	XGK	XGB
Data	ХСНG	XCHG D1 D2	(D1) ← → (D2)		
	XCHGP	XCHGP D1 D2		0	0
Exchange	DXCHG	DXCHG D1 D2	(D1+1, D1) ← (D2+1, D2)		
	DXCHGP	DXCHGP D1 D2		ХGК - О О О О	
Group Data Exchange	GXCHG	GXCHG D1 D2 N		0	0
	GXCHGP	GXCHGP D1 D2 N		0	0
Higher/Lower Byte	SWAP		(D) Upper Byte Lower Byte	0	0
Exchange	SWAPP		(D) Lower Byte Upper Byte		0
Group Byte	GSWAP	GSWAP D N	Exchanges Higher/Lower	0	0
Exchange	GSWAPP	GSWAPP D N	Byte of Words N starting from D	0	0

### (9) BIN operation instruction

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Classification	Designations	Symbol	Description	Supp	
	Dooignationio	Cymbol	Doonplion	XGK	XGB
	ADD	ADD S1 S2 D	(S1)+(S2) → (D)		
Integer Addition	ADDP	ADDP S1 S2 D			0
(Signed)	DADD	DADD S1 S2 D	(S1+1,S1)+(S2+1,S2)	0	0
	DADDP	DADDP S1 S2 D	→ (D+1,D)		
	SUB		(S1)-(S2) → (D)		
Integer	SUBP	UBP S1 S2 D	(31)-(32)		
(Signed)	DSUB	DSUB S1 S2 D	(S1+1,S1)-(S2+1,S2)	0	0
Subtraction	DSUBP	DSUBP S1 S2 D	(D+1,D)		
	MUL		(S1)×(S2) → (D+1,D)		
	MULP	MULP S1 S2 D			0
	DMUL	DMULS1_S2_D	(S1+1,S1)×(S2+1,S2)	0	0
	DMULP	- DMULP S1 S2 D	→ (D+3,D+2,D+1,D)		
	DIV	— DIV S1 S2 D –	$(S1) \div (S2) \longrightarrow (D) \text{ Quotient}$		
	DIVP	DIVP S1 S2 D	(D+1) Remainder		0
(Signed)	DDIV	DDIVS1_S2_D	(S1+1,S1)÷(S2+1,S2) ↓ (D+1,D) Quotient	0	0
	DDIVP	DDIVP S1 S2 D	(D+3,D+2) Remainder		
	ADDU	ADDU S1 S2 D	(S1)+(S2) → (D)		
	ADDUP	ADDUP S1 S2 D			0
(Unsigned)	DADDU		(S1+1,S1)+(S2+1,S2)	0	0
	DADDUP	DADDUP S1 S2 D	→ (D+1,D)		
	SUBU	UBU S1 S2 D	(S1)−(S2) (D)		
Integer Subtraction	SUBUP	UBUP S1 S2 D			0
(Unsigned)	DSUBU	DSUBU S1 S2 D	(S1+1,S1)-(S2+1,S2)		0
	DSUBUP	DSUBUP S1 S2 D	→ (D+1,D)		
	MULU	MULU S1 S2 D	(S1)×(S2) → (D+1,D)		
Integer Multiplication	MULUP	MULUP S1 S2 D		_	2
Multiplication (Unsigned)	DMULU		(S1+1,S1)×(S2+1,S2)	0	0
	DMULUP	DMULUP S1 S2 D	→ (D+3,D+2,D+1,D)		

### (9) BIN operation instruction (continued)

Classification	Designations	Symbol	Description	Support	
			Description	XGK	XGB
Integer Division (Unsigned)	DIVU	DIVU S1 S2 D	$(S1) \div (S2) \longrightarrow (D) \text{ Quotient} \\ (D+1) \text{ Remainder}$ $(S1+1,S1) \div (S2+1,S2) \\ \longrightarrow (D+1,D) \text{ Quotient} \\ (D+3,D+2) \text{ Remainder}$		
	DIVUP	DIVUP S1 S2 D		0	0
	DDIVU	DDIVU S1 S2 D			
	DDIVUP	DDIVUP SI S2 D			
Real Number Addition	RADD	RADD S1 S2 D	(S1+1,S1)+(S2+1,S2)		
	RADDP	RADDP S1 S2 D	→ (D+1,D)	0	0
	LADD	LADD S1 S2 D	(S1+3,S1+2,S1+1,S1) +(S2+3,S2+2,S2+1,S2)	U	0
	LADDP	LADDP S1 S2 D	→ (D+3,D+2,D+1,D)		
Real Number Subtraction	RSUB	RSUB S1 S2 D	(S1+1,S1)-(S2+1,S2)		
	RSUBP	RSUBP S1 S2 D	→ (D+1,D)	0	ο
	LSUB	LSUB S1 S2 D	(S1+3,S1+2,S1+1,S1) -(S2+3,S2+2,S2+1,S2)		
	LSUBP	LSUBP S1 S2 D			
Real Number Multiplication	RMUL	-RMUL S1 S2 D	(S1+1,S1)×(S2+1,S2)		
	RMULP	- RMULP S1 S2 D	→ (D+1,D)	0	0
	LMUL	LMUL S1 S2 D	(S1+3,S1+2,S1+1,S1) ×(S2+3,S2+2,S2+1,S2)	0	0
	LMULP	LMULP SI S2 D	→ (D+3,D+2,D+1,D)		
Real Number Division	RDIV	RDIV S1 S2 D	(S1+1,S1)÷(S2+1,S2)		
	RDIVP	RDIVP S1 S2 D	→ (D+1,D)	0	
	LDIV	LDIV S1 S2 D	(S1+3,S1+2,S1+1,S1) ÷(S2+3,S2+2,S2+1,S2)	0	0
	LDIVP	LDIVP S1 S2 D	→ (D+3,D+2,D+1,D)		
String Addition	\$ADD		Connects S1 String with S2 String to save in D	0	0
	\$ADDP				
Group Addition	GADD	GADD S1 S2 D N	$(S1) \qquad (S2) \qquad (D) \qquad \qquad$	0	0
	GADDP	GADDP S1 S2 D N			
Group Subtraction	GSUB	GSUB S1 S2 D N	$(S1) \qquad (S2) \qquad (D) \qquad N$	0	0
	GSUBP	GSUBP S1 S2 D N			

# (10) BCD operation instruction

Classification	Designations	Symbol	Description	Su	pport
Classification	Designations	Symbol	Description	XGK	XGB
	ADDB	ADDB S1 S2 D	(S1)+(S2) → (D)		
BCD Addition	ADDBP	ADDBP S1 S2 D			
BCD Addition	DADDB	DADDB S1 S2 D	(S1+1,S1)+(S2+1,S2)	0	0
	DADDBP	DADDBP S1 S2 D	→(D+1,D)		
	SUBB	UBB S1 S2 D	(S1)-(S2) → (D)		
BCD Subtraction	SUBBP	UBBP S1 S2 D			
BCD Subtraction	DSUBB	DSUBB S1 S2 D	(S1+1,S1)-(S2+1,S2)	0	0
	DSUBBP	DSUBBP S1 S2 D	→ (D+1,D)		
	MULB	MULB S1 S2 D	(S1)×(S2) → (D+1,D)		
BCD	MULBP	MULBP S1 S2 D		0	
Multiplication	DMULB	-DMULB S1 S2 D	(S1+1,S1)×(S2+1,S2)	0	0
	DMULBP	-DMULBP S1 S2 D	→ (D+3,D+2,D+1,D)		
	DIVB	DIVB S1 S2 D	(S1)÷(S2) → (D) Quotient		
	DIVBP	DIVBP S1 S2 D	(D+1) Remainder		c.
BCD Division	DDIVB	DDIVB S1 S2 D	(S1+1,S1)÷(S2+1,S2) (D+1,D) Quotient	0	0
	DDIVBP	DDIVBP S1 S2 D	(D+3,D+2) Remainder		

# (11) Logic operation instruction

Classification	Designations	Symbol	Description	Basic Steps	Page
	WAND	WAND S1 S2 D	Word AND		
Logic	WANDP	WANDP S1 S2 D	(S1) ∧ (S2)(D)		
Multiplication	DWAND	DWAND S1 S2 D	DWord AND	0	0
	DWANDP	DWANDP S1 S2 D	(S1+1,S1)∧(S2+1,S2) (D+1,D)		
	WOR	WOR S1 S2 D	Word OR		
Legie Addition	WORP	WORP S1 S2 D	(S1) V (S2)(D)	_	
Logic Addition	DWOR	DWOR S1 S2 D	DWord OR	0	0
	DWORP	DWORP S1 S2 D	(S1+1,S1)∨(S2+1,S2) (D+1,D)		
	WXOR	WXOR S1 S2 D			
Exclusive	WXORP	WXORP S1 S2 D	(S1) ↓ (S2)(D)	0	
OR	DWXOR	DWXOR S1 S2 D	DWord Exclusive OR	0	0
	DWXORP	DWXORP S1 S2 D	(S1+1,S1) <b>⊥</b> (S2+1,S2) (D+1,D)		
	WXNR	WXNR S1 S2 D	Word Exclusive NOR		
Exclusive	WXNRP	WXNRP S1 S2 D	(S1) ↓ (S2)(D)		
NOR	DWXNR	DWXNR S1 S2 D	DWord Exclusive NOR	0	0
	DWXNRP	DWXNRP S1 S2 D	(S1+1,S1)¥(S2+1,S2) (D+1,D)		
	GWAND	GWAND S1 S2 D N	(S1) (S2) (D)	_	
	GWANDP	GWANDP S1 S2 D N		0	0
	GWOR	GWOR S1 S2 D N	(S1) (S2) (D)		
Group	GWORP	GWORP S1 S2 D N		0	0
Logic Operation	GWXOR	GWXOR S1 S2 D N	(S1) (S2) (D) (D) (S2) (D)		
	GWXORP	GWXORP S1 S2 D N		0	0
	GWXNR	GWXNR S1 S2 D N	(S1) (S2) (D)		
	GWXNRP	GWXNRP S1 S2 D N		0	0

# (12) Data process instruction

Classification	Decignotions	Cumbal	Description	Sup	oport
Classification	Designations	Symbol	Description	XGK	XGB
	BSUM	BSUM S D	b15 b0		
Bit Check	BSUMP	BSUMP S D	1's number		
DIL Check	DBSUM	DBSUM S D	b31 b15 b0	0	0
	DBSUMP	DBSUMP S D	1's number		
Bit Reset	BRST	BRST D N			0
Dit Reset	BRSTP	BRSTP D N	Resets N Bits (starting from D) to 0	0	0
	ENCO	ENCO S D n			
Encode	ENCOP	ENCOP SD n	2 <sup>N</sup> bits 2 <sup>binary</sup>	0	0
	DECO	DECO S D n			
Decode	DECOP	DECOP SD n	N bits 2binary 2 <sup>N</sup> bits	0	0
	DIS	— DIS SD n			
Data Disconnect &	DISP	— DISP S D n –	S = D+N−1		
Connect	UNI	UNI SDn		0	0
	UNIP	UNIP SD n			
	WTOB	WTOB SD n	S Higher Lower → h00 Lower D h00 Higher D+1	- 0	
Word/ Byte	WTOBP	WTOBP S D n	S+N-1 Higher Lower h00 Lower h00 Higher		0
Conversion	BTOW	BTOW S D n	D h00 Lower → Higher Lower S D+1 h00 Higher		
	BTOWP	BTOWP S D n	Image: Second state sta		
I/O	IORF		Right after masking I/O data (located on S1) with S2 and S3 data perform	0	0
Refresh	IORFP			Ŭ	Ű
	SCH	SCH S1 S2 D N			
Data	SCHP	SCHP S1 S2 D N	and saves the first identical valued	0	0
Search	DSCH	DSCH S1 S2 D N		Ũ	0
	DSCHP	DSCHP SI S2 D N			
	MAX	MAX S D n	Saves the max value in D among N		
Max. Value	MAXP	MAXP S D n	words starting from S	0	0
Search	DMAX	DMAX S D n	Saves the max value in D among N	0	0
	DMAXP		double words starting from S		

# (12) Data process instruction (continued)

Classification	Designatio	Symbol	Description	Sup	port
Classification	ns	Symbol	Description	XGK	XGB
	MIN	MIN S D n	Saves the min value in D among N		
Min. Value	MINP	MINP S D n	words starting from S	0	0
Search	DMIN	DMIN S D n	Saves the min value in D among N	Ŭ	0
	DMINP	DMINP S D n	double words starting from S		
	SUM		Adds up N words starting from S to		
Sum	SUMP		save in D		
Sum	DSUM	DSUM S D n	Adds up N double words starting	0	0
	DSUMP	DSUMP S D n	from S to save in D		
	AVE	AVE SD n	Averages N words starting from S		
A	AVEP	AVEP S D n	to save in D	_	_
Average	DAVE	DAVE SD n	Averages N double words starting	0	0
	DAVEP	DAVEP S D n	from S to save in D	0 0	
	MUX	MUX S1 S2 D N	S2 S1st data		
MUX	MUXP	MUXP S1 S2 D N			
MUX	DMUX	DMUX SI S2 D N	S2+1 S2 S1st data	0	0
	DMUXP	DMUXP S1 S2 D N			
Data	DETECT	DETECT SI S2 D N	Detects N data from S1, to save the		
Detect	DETECTP	DETECTP S1 S2 D N	dds up N words starting from S to ave in D dds up N double words starting om S to save in D verages N words starting from S o save in D verages N double words starting om S to save in D $\underbrace{S2+1 S2 S1st data}_{S2+1 S2} \underbrace{S1st data}_{D+1 D}$ etects N data from S1, to save the rst value larger than S2 in D, and re extra number in D+1 aves linear-changed value in D1 uring n3 scanning of initial value 1 to final n2 and present scanning umber in D1+1, and changes D2 alue to ON after completed : Head Address of Sort Data 1 : Number of Words to sort 1+1 : Sorting Method 2: Operation number per Scan	0	0
Ramp Signal Output	RAMP	RAMP n1 n2 D1 n3 D2	Saves linear-changed value in D1 during n3 scanning of initial value n1 to final n2 and present scanning number in D1+1, and changes D2 value to ON after completed	0	0
Data	SORT	-SORT S n1 n2 D1 D2	S : Head Address of Sort Data n1 : Number of Words to sort n1+1 : Sorting Method	0	0
Align	SORTP	SORTP S n1 n2 D1 D2	n2: Operation number per Scan D1 : ON if complete D2 : Auxiliary Area	-	-

Classification D	Designations	Designations Symbol	Description	Sup	port
Classification	Designations	Symbol	Description	XGK	XGB
Data	FIWR	FIWR S D	Adds S to the last of Data Table D ~ D+N. and increases Data Table	0	0
Write	FIWRP	FIWRP S D	Length(N) saved in D by 1	0	0
First-input Data	FIFRD	FIFRD SD	Moves first data, S+1 of Data Table S ~ S+N to D (pull 1 place after origin	0	0
Read	FIFRDP	FIFRDP SD	deleted) and decreases Data Table Length(N) saved in D by 1 S	0	0
Last-Input Data	FILRD	FILRD SD	Moves last data, S+N of Data Table S ~ S+N to D (origin deleted) and	0	0
Read	FILRDP		decreases Data Table Length(N) saved in D by 1 S	0	0
Data	FIINS	FINS SD n	Adds S to 'N'th place of Data Table D $\sim$ D+N (origin data pulled by 1), and		
Insert	FIINSP	-FINSP SDn	increases Data Table Length(N) saved in D by 1	-	0
Data	FIDEL	FDEL SDn	Deletes 'N'th data of Data Table S ~ S+N (pull 1 place) and decreases		0
Pull	FIDELP	FDELP SDn	Data Table Length(N) saved in D by 1	0	0

### (13) Data table process instruction

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# (14) Display instruction

Classification Des	Designations	Symbol	Description	Sup	port
Classification	Designations	Symbol	Description	XGK	XGB
7 Segment SE	SEG	SEG S D Z	Converts S Data to 7-Segment as	_	_
Display	SEGP	SEGP S D Z	adjusted in Z Format so to save in D	0	0

# (15) String Process instruction

Classification	Designations	Symbol	Description	Sup	port
Classification	Designations	Symbol	Description	XGK	XGB
	BINDA	BINDA SD	Converts S of 1-word BIN value to Decimal ASCII Cord to save in		
Convert to Decimal	BINDAP	BINDAP SD	starting D	0	
ASCII Cord	DBINDA	DBINDA SD	Converts S of 2-word BIN value to Decimal ASCII Cord to save in	0	0
	DBINDAP	DBINDAP S D	starting D		
	BINHA	BINHASD	Converts S of 1-word BIN value to		
Convert to Hexadecimal	BINHAP	BINHAP S D	Hexadecimal ASCII Cord to save in starting D	_	
ASCII Cord	DBINHA	DBINHA S D	Converts S of 2-word BIN value to Hexadecimal ASCII Cord to save in	0	0
	DBINHAP	DBINHAP S D	starting D		
	BCDDA	BCDDA S D	Converts S of 1-word BCD to ASCII		
Convert BCD to Decimal	BCDDAP	BCDDAP S D	Cord to save in starting D	o	
ASCII Cord	DBCDDA	DBCDDA S D	Converts S of 2-word BCD to ASCII		0
	DBCDDAP	DBCDDAP S D	Cord to save in starting D		
	DABIN	DABIN S D	Converts S S+2,S+1,S's Decimal		
Convert Decimal ASCII	DABINP	DABINP S D	ASCII Cord to BIN to save in D		
to BIN	DDABIN	DDABIN S D	Converts S+5~S's Decimal ASCII Cord to BIN value to save in D+1 &	0	0
	DDABINP	DDABINP S D			
	HABIN	HABIN S D	Converts S+1,S's Hexadecimal ASCII		
Convert Hexadecimal	HABINP	HABINP S D	Cord to BIN value to save in D	0	0
ASCII to BIN	DHABIN	DHABIN S D	Converts S+3~S's Hexadecimal ASCII	0	0
	DHABINP	DHABINP S D	Cord to BIN to save in D		
	DABCD	DABCD S D	Converts S+1,S's Decimal ASCII		
Convert	DABCDP	DABCDP S D	Cord to BCD to save in D	<u> </u>	C C
Decimal ASCII to BCD	DDABCD	DDABCD S D	Converts S+3~S's Decimal ASCII	0	0
	DDABCDP	DDABCDP S D	Cord to BCD to save in D		
String	LEN	LEN S D	Saves String Length with S starting	_	_
Length Detect	LENP	LENP S D	in D	0	0

# (15) String process instruction (continued)

Classification	Designations Symbol		Description	Support	
Classification	Designations	Symbol		XGK	XGB
	STR	STR S1 S2 D	Adjusts S2 saved word data to S1 saved place		
Convert BIN16/32 to	STRP	- STRP S1 S2 D	number to convert to String and save in D	0	0
String	DSTR	DSTR S1 S2 D	Adjusts S2 saved double word data to S1 saved	0	0
	DSTRP	DSTRP S1 S2 D	place number to convert to String and save in D		
	VAL	VAL S D1 D2	Adjusts S saved string to number to save in word		
Convert String to	VALP	VALP S D1 D2	D1 and saves the place number in D2	0	0
BIN16/32	DVAL	DVAL S D1 D2	Adjusts S saved string to number to save in double	0	0
	DVALP	DVALP S D1 D2	word D1 and saves the place number in D2		
Convert Real Number to String	RSTR	RSTR S1 S2 D	Adjusts Floating decimal point point Real Number		
	RSTRP	RSTRP S1 S2 D	Data (S1: number, S2: places) to String format to save in D	_	• X
	LSTR	LSTR S1 S2 D	Adjusts Floating decimal point point Double Real	0	
	LSTRP	LSTRP S1 S2 D	Number Data (S1:number, S2:places) to String format to save in D		
	STRR		Converts String S to Floating decimal point point Real		
Convert String to Real Number	STRRP		Number Data to save in D	0	х
Number	STRL	STRL SD	Converts String S to Floating decimal point	0	~
	STRLP		point Double Real Number Data to save in D		
ASCII Conversion	ASC	ASC S D cw	Converts BIN Data to ASCII in Nibble unit,	0	0
	ASCP	ASCP S D cw	based on cw's format from S to save in D	0	0
HEX Conversion	HEX	HEX S D N	Converts 2N ASCII saved in N words from S in byte		
HEX Conversion	HEXP	HEXP S D N	unit to Nibble unit of Hexadecimal BIN so to save in D	0	0
String Extract from	RIGHT		Extracts n string from S string's final letter to save	0	0
Right	RIGHTP		in starting D	0	0
String Extract from Left	LEFT	LEFT SDN	Extracts n string from S string's first letter to save	0	0
	LEFTP	LEFTP S D N	in starting D	9	9
String Random Extract	MID	MID S1 S2 D	Extracts string which conforms to S2 condition	0	0
	MIDP	MIDP S1 S2 D	among S1 string to save in starting D	>	ÿ

# (15) String process instruction (continued)

Classification	Designations	Symbol	Description	Basic Steps	Page
String Random	REPLACE	REPLACE S1 D S2	Processes S1 String as		
Replace	REPLACEP	REPLACEP S1 D S2	applicable to S2 Condition to save in D String	0	0
Otain a Final	FIND	FIND S1 S2 D N	Finds identical String to S2 in S1 $\sim$ N data to save the		
String Find	FINDP FINDP S1 S2 D N abs	absolute position in D	0	0	
	RBCD	RBCD S1 S2 D	Adjusts Floating decimal point point Real Number Data S1 to		
Parse Real	RBCDP	RBCDP S1 S2 D	S2 place to convert to BCD, and then to save in D		V
Number to BCD	LBCD	LBCD S1 S2 D	Adjusts Floating decimal point point Double Real Number	0	х
	LBCDP	LBCDP S1 S2 D	Data S1 to S2 place to convert to BCD, and then to save in D		
	BCDR	BCDR S1 S2 D	Adjusts BCD Data S1 to S2 place to convert to Floating		
Convert BCD	BCDRP	BCDRP S1 S2 D	decimal point point Real Number, and then to save in D		
Data to Real Number	BCDL	BCDR S1 S2 D	Adjusts BCD Data S1 to S2 place to convert to Floating	0	х
	BCDLP	BCDLP S1 S2 D	decimal point point Double Real Number, and then to save in D		

# (16) Special function instruction

Classification	Designations	Symbol	Description	Basic Steps	Page
	SIN	SIN S D	SIN(S+1,S) (D+1,D)		
SIN Operation	SINP			0	0
COS	COS	COS S D	COS(S+1,S) (D+1,D)		0
Operation	COSP	COSP S D		0	0
TAN Operation TAN		TAN S D	TAN(S+1,S) (D+1,D)	0	0
		TANP S D		0	0
RAD	RAD	RAD S D	(S+1,S) (D+1,D)		
Conversion	RADP	RADP S D	Converts angle to radian	0	0
Angle	DEG	DEG S D	(S+1,S) (D+1,D)		
Conversion	on $COSP$ $-COSP$ $S$ $D$ $COS(S+1,S)$ $A$ ation $TAN$ $-TAN$ $S$ $D$ $TAN(S+1,S)$ $A$ TANP $-TANP$ $S$ $D$ $TAN(S+1,S)$ $ATANP$ $-TANP$ $S$ $D$ $TAN(S+1,S)$ $ATAN(S+1,S)$ $ATAN(S+1,S)$ $ATAN(S+1,S)$ $ACOS(S+1,S)$ $ACOS(S+1,S)$ $ATAN(S+1,S)$ $ACOS(S+1,S)$ $ACOS(S+1,S)$ $ATAN(S+1,S)$ $ACOS(S+1,S)$ $ACOS(S+1,S)$ $ATAN(S+1,S)$ $ACOS(S+1,S)$ $AA$	Converts radian to angle	0	0	
Square Root	SQRT	SQRT S D			
Operation	SQRTP	SQRTP S D	$\sqrt{(S+1,S)} \longrightarrow (D+1,D)$	0	0

# (17) Data control instruction

Classification	Designations	Symbol	Description	Basic Steps	Page
	LIMIT				
Limit	LIMITP		D = S2 If S2 < S1 < S3, then	0	0
Control	DLIMIT	DLIMIT S1 S2 S3 D	D = S1 If S3 < S1, then D = S3	0	0
	DLIMITP	DLIMITP S1 S2 S3 D	$\begin{array}{c c c c c c c c c c c c c c c c c c c $		
	DZONE	DZONE S1 S2 S3 D			
Dead-zone	DZONEP	DZONEP S1 S2 S3 D	D = S1+S2-S2(S3/100) If –S2 < S1 < S2, then	0	0
Control	DDZONE	DDZONE S1 S2 S3 D	If S1 < S2, then	0	0
	DDZONEP	DDZONEP S1 S2 S3 D			
	VZONE				
Vertical-zone	VZONEP	VZONEP S1 S2 S3 D		0	0
Vertical-zone Control	DVZONE	DVZONE S1 S2 S3 D		0	0
	DVZONEP	DVZONEP S1 S2 S3 D	D = S1+S2-S2(S3/100)		
	PIDRUN	PIDRUN N	Operates PID Loop N	0	0
	PIDPAUSE	PIDPAUSE N		0	х
Built-in PID Control Instruction	PIDPRMT	PIDPRMT SN	(SV(word) / Ts(word) / Kp(real)	0	x
	PIDAT	LIMITLIMITSt S2 [S3 D]LIMITIIMITSt S2 [S3 D]LIMITPIIMITPDLIMITDUMITSt S2 [S3 D]If S1 < S2, then	Х	0	
	PIDCAS		Start of PID loop cascade operation	Х	0
	PIDHBD	-PIDPRMT SN		Х	0

# (18) Time related instruction

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Classification	Designations	Designations Symbol	Description	Sup	port
Classification	Designations	Symbol	Description	XGK	XGB
Date/Time Data	DATERD	DATERD D	Reads PLC Time to save in D ~ D+6	0	х
Read	DATERDP	DATERD       D         Reads PLC Time to save in D ~ D+6         (Yr/Mn/Dt/Hr/Mn/Sd/Day)         DATEWR       Input         DATEWR       Input         S ~ S+6's Time Data in PLC         (Yr/Mn/Dt/Hr/Mn/Sd/Day)         ADDCLK       S1 S2 D         Adds S1 ~ S1+2 & S2 ~ S2+2 Time         Data to save in D ~ D+2 in Time         ADDCLKP       S1 S2 D         SUBCLK       S1 S2 D         SUBCLKP       S1 S2 D         Converts       S1 ~ S1+2 to save in D ~ D+2 in         Time Data format (Hr/Mn/Sd)       D - D+2 in         SUBCLKP       S1 S2 D         SUBCLKP       S1 S2 D         Converts       Stree Data S ~ S+2 to         Second       S D         Converts       Converts Time Data S ~ S+2 to         Second s D       Converts         HOUR       D         Converts       Save in double word D	0	^	
Date/Time Data	DATEWR	DATEWR S		0	х
Write	DATEWRP	DATEWRP S		0	^
Time Data	ADDCLK	ADDCLK S1 S2 D	Adus 31 ~ 31+2 & 32 ~ 32+2 1111e	0	x
Increase	ADDCLKP	ADDCLKP S1 S2 D		0	~
Time Data	SUBCLK	UBCLK S1 S2 D		0	х
Decrease	SUBCLKP	SUBCLKP S1 S2 D		0	^
	SECOND	SECOND S D	Converts Time Data S ~ S+2 to	0	x
Time Data	SECONDP	SECONDP S D	seconds to save in double word D	0	^
Format Conversion	HOUR	HOUR SD			х
	HOURP	Image: Construction of the second state in the second s	0	^	

### (19) Divergence instruction

Classification	Designations	Symbol	Description	Sup	port
Classification	Designations	Symbol	Description	XGK	XGB
Divergence	JMP	JMP LABEL	Jumps to LABEL location	0	0
Instruction	LABEL	LABEL   ( )	Jumps and designates the location to move to		0
	CALL	CALL LABEL	- Calls Function applicable to LABEL		
Subroutine	CALLP	CALLP LABEL		0	
Call Functional	SBRT	SBRT LABEL	Designates Function to be called by CALL	0	0
	RET	RET	RETURN		

#### (20) Loop instruction

Classification Designations		Symbol	Description	Support	
Designation	Designations	Symbol	Description	XGK	XGB
	FOR	FOR N	Operates FOR~NEXT section n times	0	0
Loop Instruction	NEXT	NEXT		0	0
	BREAK	BREAK	Escapes from FOR~NEXT section	0	0

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### (21) Flag instruction

Classification Designations	Symbol	Description	Support			
			XGK	XGB		
Carry	STC	STC	Carry Flag ( F0112 ) SET	o		0
Flag Set, Reset CL	CLC	CLC	Carry Flag ( F0112 ) RESET		0	
Error Flag Clear	CLE	CLE	Error Latch Flag (F0115) RESET	0	0	

### (22) System instruction

Classification	Designations	s Symbol	Description	Support	
Classification	Designations	Symbol	Description	XGK	XGB
Error Display	FALS	- FALS n	Self Diagnosis (Error Display )	0	0
Scan Cluck	DUTY	DUTY D n1 n2	On during n1 Scan, Off during n2 Scan	0	0
Time Cluck	TFLK		On during S1 set time, Off during S2 set time	0	0
WDT	WDT	WDT	Watch Dog Timer Clear	0	0
Initialize	WDTP	WDTP		0	0
Output Control	OUTOFF		All Output Off	0	0
Operation Stop	STOP	-STOP	Finishes applicable scan to end PLC Operation	0	0
Emergent Operation Stop	ESTOP	ESTOP	Ends PLC operation right after Instruction executed	0	0

### (23) Interrupt related instruction

Classification Designations		Symbol	Description	Support	
Classification	Designations	Symbol	Description	XGK	XGB
All Channels El Interrupt Setting DI	EI	EI	All Channels Interrupt allowed	0	0
	DI		All Channel Interrupt prohibited		
Individual Channel	EIN	EIN N	Individual Channel Interrupt allowed	0	0
Interrupt Setting	DIN		Individual Channel Interrupt prohibited		0

(24) Sign	reversion	instruction
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Classification	Designations	Symbol	Description	Sup	port
Classification	Designations	Symbol	Description	XGK	XGB
2's complement	NEG	NEG D	Saves D value again in D with 2's		
	NEGP	NEGP D	complement taken	0	0
	DNEG	DNEG D	Saves (D+1,D) value again in (D+1,D)	0	0
	DNEGP	DNEGP D	with 2's complement taken		
	RNEG	-RNEG D	Reverses D Real Number Sign then to save again	0	O
Real Number	RNEGP	RNEGP D			
Data Sign Reverse	LNEGR	LNEG D	Reverses D Double Real Number Sign then to save again		
	LNEGP	LNEGP D			
	ABS	ABS D	Converts D highest Bit to 0		
Absolute Value	ABSP	ABSP D	Converts D highest Bit to 0		
Operation	DABS	DABS D	Converts (D+1,D)	0	0
	DABSP	DABSP D	highest Bit to 0		

### (25) File related instruction

Classification	Designations	Symbol	Description	Sup	oport
Classification	Designations	Symbol	Description	XGK	XGB
Block	RSET	RSET S	Changes Block Number of file register	0	x
Conversion	RSETP	RSETPS	to S Number	0	~
Flash Word Data	EMOV	EMOV S1 S2 D	Transfers S2 word data in S1 Block		
Transfer	EMOVP	EMOVP S1 S2 D		0	x
Flash Double Word	EDMOV	EDMOV S1 S2 D	Transfers S2+1, S2 double word data in S1 Block to D+1, D	0	~
Data Transfer	EDMOVP	EDMOVP S1 S2 D			
Block Read	EBREAD	EBREAD S1S2	Reads Flash Memory Block	0	х
Block Write	EBWRITE	EBWRITE S1 S2	Writes Flash Memory Block	0	х
Block Compare	EBCMP	EBCMP S1 S2 D1 D2	Compares R Area's Bank with Flash Area's Block	0	х

# Appendix 4.4 Special/Communication Instruction

### (1) Communication module related instruction

Classification	Designations	Designations Symbol	Description	Support	
Classification	Designations	Symbol	Description	XGK	XGB
Station No. Set	P2PSN	P2PSN n1 n2 n3	Sets opposite station No. for P2P Communication. n1:P2P No., n2:Block, n3:Station No.	0	х
Read Area Set (WORD)	P2PWRD		Sets word data Read Area n1:P2P No., n2:Block, n3:Variable sequence, n4:Variable Size, n5:Device	0	х
Write Area Set (WORD)	P2PWWR		Sets word data Write Area n1:P2P No., n2:Block, n3:Variable sequence, n4:Variable Size, n5:Device	0	х
Read Area Set (BIT)	P2PBRD	P2PBRD n1 n2 n3 n4 n5	Sets bit data Read Area n1:P2P No., n2:Block, n3:Variable sequence, n4: Variable Size, n5:Device	0	х
Write Area Set (BIT)	P2PBWR	P2PBWR n1 n2 n3 n4 n5	Sets bit data Write Area n1:P2P No., n2:Block, n3:Variable sequence,n4:Variable Size, n5:Device	0	х

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#### (2) Special module common instruction

Classification	Designations	Symbol	Description	Sup	port
Classification	Designations	Gymbol	Description	XGK	XGB
	GET		Reads data of special module		
Special Module	GETP		memory is installed on	0	0
Read/Write	PUT	PUT si si si si -	Writes data on special module	0	0
PUTP		memory is installed on	0	0	

# (3) Exclusive positioning instruction

Ole esitie etien	Desimutions	Querra ha a l	Description	Su	pport
Classification	Designations	Symbol	Description	XGK	XGB
Return to Origin Point	ORG	ORG si ax	Instructions Positioning Module's ax axis installed on sl slot to return to Origin Point	0	0
Floating Origin Point	FLT		Instructions Positioning Module's ax axis installed on sl slot to set Floating Origin Point	0	0
Direct Start	DST	-DST slax n1 n2 n3 n4 n5	Instructions Positioning Module's ax axis installed on sl slot to start directly with Target Position(n1), Target Speed(n2), Dwell Time(n3), M Code(n4) & Control Word(n5)	0	0
Indirect Start	IST		Instructions Positioning Module's ax axis installed on sl slot to start n step indirectly	0	0
Linear Interpolation	LIN	LIN sl ax n1 n2	Instructions Positioning Module's ax axis installed on sI slot to let n2 axes operate n1 step by Linear Interpolation	0	0
Circular Interpolation	CIN	CIN sl ax n1 n2	Instructions Positioning Module's ax axis installed on sl slot to let n2 axes operate n1 step by Circular Interpolation	0	х
Simultaneous Start	SST	-SST si ax n1 n2 n3 n4-	Instructions Positioning Module's ax axis installed on sl slot to let n4 axes operate n1(X), n2(Y), n3(Z) steps by Simultaneous Start	0	0
Speed/Position Control Switch	VTP	VTP si ax	Instructions Positioning Module's ax axis installed on sl slot to switch Speed to Position Control	0	0
Position/Speed Control Switch	PTV	PTV si ax	Instructions Positioning Module's ax axis installed on sl slot to switch Position to Speed Control	0	0
Decelerated Stop	STP	-STP SI ax-	Instructions Positioning Module's ax axis installed on sl slot to stop as decelerated.	0	0
Skip	SKP	SKP si ax	Instructions Positioning Module's ax axis installed on sl slot to skip	0	Х
Position Synchronization	SSP	-SSP sl ax n1 n2 n3	Instructions Positioning Module's ax axis installed on sl slot to do Position Sync with main axis of n3, n1 sync-positioned and n2 step operated	0	0
Speed Synchronization	SSS	SSS sl ax n1 n2 n3	Instructions Positioning Module's ax axis installed on sl slot to do Speed Sync with main axis of n3, n1 master and n2 slave	0	0
Position Override	POR	-POR slax n	Instructions Positioning Module's ax axis installed on sl slot to override Position to change the target position to n	0	0

# (4) Exclusive position control instruction (continued)

Classification	Designations	Symbol	Deparintion	Supp	
Classification	Designations	Symbol	Description	XGK	XGB
Speed Override	SOR	-SOR slax n	Instructions Positioning Module's ax axis installed on sl slot to override Speed to change the target speed to n	0	0
Position specified Speed Override	PSO	PSO si ax n	Instructions Positioning Module's ax axis installed on sI slot to override position specified speed to change the target speed to n2 from n1 position	0	0
Continuous Operation	NMV	MMV si ax	Instructions Positioning Module's ax axis installed on sl slot to operate continuously to n step	0	х
Inching	INCH		Instructions Positioning Module's ax axis installed on sl slot to inch to n position	0	0
Return to Position Previous to Manual Operation	RTP	-RTP si ax	Instructions Positioning Module's ax axis installed on sI slot to return to position previous to manual operation	0	х
Operation Step Change	SNS	SNS si ax n	Instructions Positioning Module's ax axis installed on sl slot to change operation step to n	0	0
Repeated Operation Step Change	SRS	SRS si ax n	Instructions Positioning Module's ax axis installed on sI slot to change repeated operation step to n	0	х
M Code Off	MOF	MOF sl ax	Instructions Positioning Module's ax axis installed on sI slot to make M code off	0	0
Present Position Change	PRS	PRS slax n	Instructions Positioning Module's ax axis to change present position to n	0	0
Zone Allowed	ZOE	ZOE si ax	Allows zone output of Positioning Module installed on sI slot	0	х
Zone Prohibited	ZOD	ZOD si ax	Prohibits zone output of Positioning Module installed on sI slot	0	х
Encoder Value change	EPRS	EPRS si ax n	Changes Encoder Value of Positioning Module installed on sl slot to n	0	х
Teaching	TEA	TEA si ax n1 n2 n3 n4	Changes n1 step's target position or speed of Positioning Module's ax axis installed on sl slot	0	х
Teaching Array	TEAA	-TEAA slaxn1n2n3n4-	Changes multiple target positions or speed of Positioning Module's ax axis installed on sl slot	0	х
Emergent Stop	EMG	EMG sl ax	Instructions Positioning Module installed on sl slot to perform Emergent Stop	0	0

# (5) Exclusive position control instruction (continued)

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Classification	Designations	Symbol	Description	Support	
				XGK	XGB
Error Reset	CLR	CLR slax n	Resets Error originated from Positioning Module's ax axis installed on sl slot	0	0
Error History Reset	ECLR	ECLR si ax	Deletes Error History originated from Positioning Module's ax axis installed on sl slot	0	х
Point Operation	PST	PST slax n	Performs Point Operation of Positioning Module's ax axis installed on sl slot	0	х
Basic Parameter Teaching	ТВР	TBP sl ax n1 n2	Changes n2 to n1 among basic parameters of Positioning Module's ax axis installed on sl slot	0	х
Extended Parameter Teaching	TEP	TEP sl ax n1 n2	Changes n2 to n1 among extended parameters of Positioning Module's ax axis installed on sl slot	0	х
Return to Origin Point Parameter Teaching	THP	THP sl ax n1 n2	Changes n2 to n1 among returned parameters to origin point of Positioning Module's ax axis installed on sI slot	0	х
Manual Operation Parameter Teaching	ТМР		Changes n2 to n1 among manual operation parameters of Positioning Module's ax axis installed on sI slot	0	х
Input Signal Parameter Teaching	TSP	TSP slax n	Changes input signal parameter of Positioning Module's ax axis installed on sl slot to the value set in n1	0	х
Common Parameter Teaching	ТСР		Changes n2 to n1 among common parameters of Positioning Module installed on sl slot	0	х
Parameter Save	WRT		Instructions Positioning Module's ax axis installed on sl slot to save present parameter of n axis in flash ROM.	0	0
Present State Read	SRD	SRD slax D	Reads and saves present state of Positioning Module's ax axis installed on sl slot in D area of CPU	0	х
Point Operation Step Write	PWR		Writes value of S area of CPU on point operation step area of Positioning Module's ax axis installed on sI slot in	0	x
Plural Teaching Data Write	TWR	TWR slax S n1	Writes n value of S area of CPU on plural teaching dada area of Positioning Module's ax axis installed on sI slot in	0	х

#### Warranty

#### 1. Warranty Period

The product you purchased will be guaranteed for 18 months from the date of manufacturing.

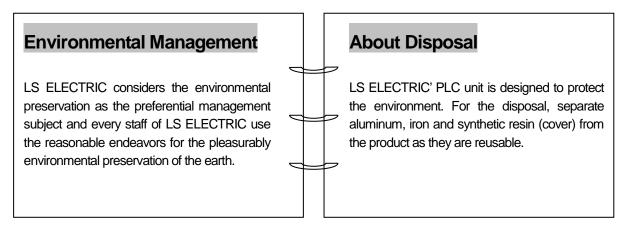
#### 2. Scope of Warranty

Any trouble or defect occurring for the above-mentioned period will be partially replaced or repaired. However, please note the following cases will be excluded from the scope of warranty.

- (1) Any trouble attributable to unreasonable condition, environment or handling otherwise specified in the manual,
- (2) Any trouble attributable to others' products,
- (3) If the product is modified or repaired in any other place not designated by the company,
- (4) Due to unintended purposes
- (5) Owing to the reasons unexpected at the level of the contemporary science and technology when delivered.
- (6) Not attributable to the company; for instance, natural disasters or fire
- 3. Since the above warranty is limited to PLC unit only, make sure to use the product considering the safety for system configuration or applications.

#### **Environmental Policy**

LS ELECTRIC Co., Ltd supports and observes the environmental policy as below.



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Specifications in this instruction manual are subject to change without notice due to continuous products development and improvement.