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### Programmable Logic Controller

# XGB Standard/Economic Type Main Unit (IEC)

XGT Series		User	's Maunal
	Main unit	XEC-DN2OSU XEC-DN3OSU XEC-DN4OSU XEC-DN6OSU XEC-DP2OSU XEC-DP3OSU XEC-DP4OSU XEC-DP4OSU XEC-DR4OSU XEC-DR3OSU XEC-DR4OSU XEC-DR4OSU	XEC-DR10E XEC-DN10E XEC-DP10E XEC-DR14E XEC-DN14E XEC-DP14E XEC-DP14E XEC-DR20E XEC-DN20E XEC-DN20E XEC-DN20E XEC-DN30E XEC-DN30E XEC-DN30E



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

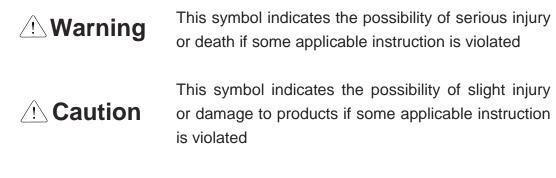


# **Safety Instruction**

### 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;



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

Provide the second seco

4 Be careful! Electric shock may occur.

The user's manual 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

## 

 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.
- Make 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.
- Make 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.
- Avoid any foreign metallic materials contamination inside the product, which may cause electric shock, fire or abnormal operation..

## Safety Instructions when wiring

## 

- Prior to wiring, make 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, make sure that all the covers of the terminal are securely closed. If not, electric shock may be caused

- Install wires 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.
- Make sure to 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.
- Avoid 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

## 

- Do not touch the terminal when powered on. 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.
- Do not recharge, disassemble, heat, short or solder the battery. Heat, explosion or ignition may cause injuries or fire.

## 

- Do not 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

## $\underline{\land}$ Caution

• 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	2012.9	1. First Edition	-
V 1.1	2012.11	<ol> <li>Software UI modified</li> <li>XGB Special module added (XBF-AD04C,XBF-DV04C,XBF-DC04C)</li> </ol>	Ch5.2, Ch5.3 Ch6.1, Ch6.2 Ch6.5, Ch6.8 Ch6.10,Ch6.11 Ch7.1, Ch8.4 Ch10.4,Ch11.2 Ch12.1
V1.2	2013.1	1. Data Backup time modified	4-12
V1.3	2014.9	<ol> <li>XGB Standard, transistor output(source) modules added (XEC-DP20, XEC-DP30, XEC-DP40, XEC-DP60SU)</li> <li>Domain of Homepage changed (www.lsis.biz→www.lsis.com)</li> <li>RTC Option specification added(Available on slot 9)</li> </ol>	4-12 Front/Back Cover 2-2,2-3 9-4
V1.4	2015.7	<ol> <li>1.RTC explanation added         <ul> <li>-User should change the battery periodically~ as possible.</li> <li>-RTC can~ 9th slot.</li> </ul> </li> <li>2. Address &amp; phone number changed         <ul> <li>3.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>4.New PLC added</li> <li>-XBF-TC04RT/ TC04TT, XBL-PMEC/ PSEA/DSEA</li> </ul> </li> </ol>	9-2 9-5 Back Cover 7-7~7-14 7-17~7-38 2-1~ 2-9,

\* The number of User's manual is indicated on the right side of the back cover.

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## **About User's Manual**

Congratulations on purchasing PLC of LSIS Co.,Ltd.

Before use, make sure to carefully read and understand the User's Manual about 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 User'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.lsis.com/</u>) and download the information as a PDF file.

Title	Description	Part 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
XGI/XGR/XEC Series Instruction & Programming	It describes how to use the instructions for programming using XGB (IEC language) series.	10310000510
XGB Hardware User's Manual (IEC language)	It describes how to use the specification of power/input /output/expansion modules, system configuration and built-in High-speed counter for XGB main unit.	10310000983
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 Position User's Manual	It describes how to use built-in positioning function for XGB main unit.	10310000927
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 Module User's Manual	It describes how to use XGB FEnet I/F module.	10310000873
XGB EtherNet/IP Module User's Manual	It describes how to use XGB EtherNet/IP module.	10310001159
XGB CANopen I/F Module User's Manual	It describes how to use XGB CANopen I/F module	10310001245
XGB Position Module User's Manual	It describes the standard of positioning module, installation method, the method to use each positioning function, programming and the wiring with external equipment.	10310001008

Relevant User's Manual

Title	Description	No. of User Manual
High Speed Counter Module User's Manual	It describes how to use High Speed Counter module	10310001242

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## **Chapter 1 Introduction**

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### 1.1 Guide to This Manual

This manual includes specifications, functions and handling instructions for 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 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 8	Built-in High-speed Counter Function	Describes built-in high-speed counter functions.
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 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.
Appendix 3	Compatibility with GLOFA	Describes the compatibility with GLOFA
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

ltom		Reference	
ltem	Economy (XEC-DxxxE) Standard (XEC-DxxxSU)		
Operation processing speed	0.24µs / Step	0.094,µs / Step	-
Max IO contact point	38 points	284 points	In case of using option module 4 points
Program capacity	4Kstep	15Kstep	-
Max. no. of expanded stage	Option module 2 stages	7 stages (including option module 2 stages)	-

(c) Reasonable program capacity

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

(e) XEC-DxxxE is expressed as 'E' type and XEC-DxxxSU is expressed as "SU" 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	
	XEC-Dx20SU	135 * 90 * 64		
	XEC-Dx30SU	133 90 04	'SU' type	
Main unit	XEC-Dx40SU	161 * 90 * 64	(x = R, N, P)	
	XEC-Dx60SU	210 * 90 * 64		
	XEC-Dx10E	100*90*64	'E' type	
	XEC-Dx14E	100 90 04		
	XEC-Dx20E	405*00*04	(x = R, N, P)	
	XEC-Dx30E	135*90*64		
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 improved ('SU' type main unit)

(b) By adopting connector coupling method, modules may be easily connected and separated.

- (4) Improved maintenance ability with register, RTC option, comment backup and etc
  - (a) Convenient programming environment by providing analog register and index register.
  - (b) Improved maintenance ability by operating multiple 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 Module expansion..
  - (b) Supports various protocols to improve the convenience (dedicated, Modbus, user-defined communication)
  - (c) Communication module may be increased by adding modules (up to 2 stages such as Cnet, Enet and etc). ("SU" type main unit)
  - (d) Convenient network-diagnostic function through network & communication frame monitoring.
  - (e) Convenient networking to upper systems through Enet or Cnet. ("SU" 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 analog modules can be attachable on extension base. ("SU" 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) Provides High-speed counter 1 phase, 2 phase and more additional functions.
  - (b) Provides parameter setting, diverse monitoring and diagnosis function using XG5000.
  - (c) Monitoring function in XG5000 can inspect without program, inspects external wiring, data setting and others.

(10) Built-in position control function ("SU" type TR output main unit)

- (a) Supports max 100Kpps 2 axes.
- (b) Provides parameter setting, operation data collection, diverse monitoring and diagnosis by using XG5000.
- (c) Commissioning by monitoring of XG5000, without program, inspects external wiring and operation data setting.

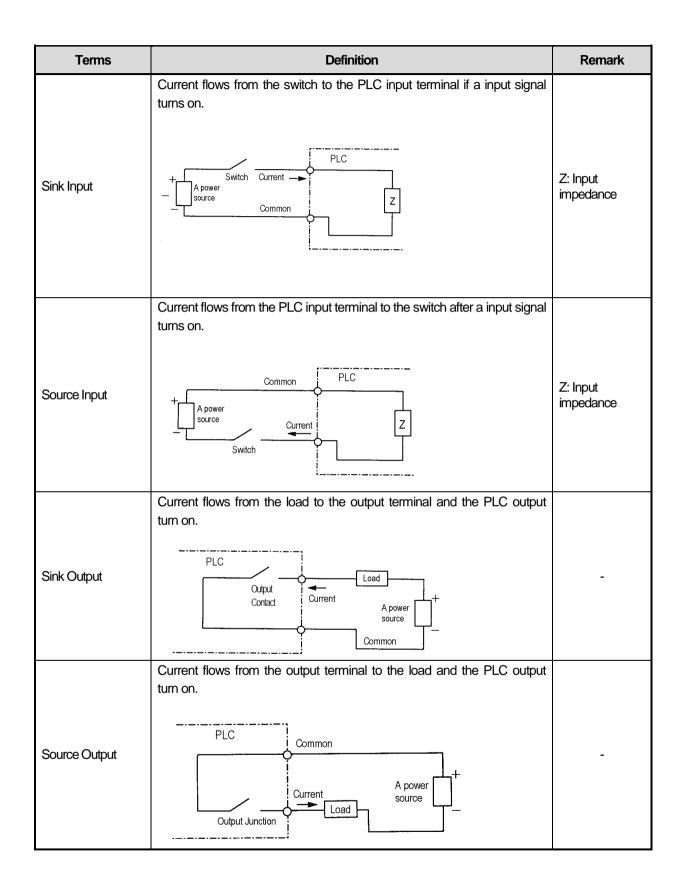
(11) Built-in PID ("SU" type main unit)

- (a) Supports max. 16 loops.
- (b) Sets parameters by using XG5000 and supporting loop status monitoring conveniently with trend monitor.
- (c) Controls constant setting through the improved Auto-tuning function.
- (d) With many other additional functions including PWM output,  $\Delta$ MV,  $\Delta$ PV and SV Ramp, improving the control preciseness.
- (e) Supports various 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

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, Specialmodule, 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	-
CANopen	Controller Area 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**

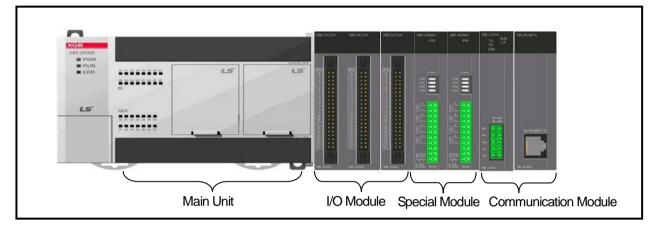
The XGB series is suitable to configuration of the basic, computer link and network systems. This chapter describes the configuration and features of each system.

### 2.1 XGB System Configuration

The System Configuration of XGB series is as follows.

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

For 'SU' type, up to 7 expansion module connections are available. But in case of attaching 2 option modules, up to 5 expansion module connections are available. (For communication module, up to 2 connections are available.)



	lter	n	Description		
Total I/O points			XEC-DxxxSU ('SU' type): 20~284 points		
Total I/O	Joints		XEC-DxxxE ('E' type): 10~38 points		
		Digital I/O module	• 'SU' type: Max. 7		
		Special module	• 'SU' type: Max. 7		
expansion module		Communication I/F module	• 'SU' type: Max. 2		
modules			• 'SU' type: Max. 2		
		Option module	• 'E'type: Max. 2		
			(In case of 10/14 points, only one is available)		
		'SU' type	• XEC-DR20/30/40/60SU • XEC-DN20/30/40/60SU		
	Main unit				
Items		Digital I/O module	• XBE-DC08/16A/B/32A • XBE-RY08A/B/16A • XBE-DR16A • XBE-DR16A		
	Expansion module	Special module	• XBF-AD04A         • XBF-DV04A         • XBF-TC04RT           • XBF-AD08A         • XBF-DV04C         • XBF-TC04TT           • XBF-AD04C         • XBF-AH04A         • XBF-PD02A           • XBF-DC04A         • XBF-RD04A         • XBF-HD02A           • XBF-DC04C         • XBF-RD04A         • XBF-HD02A           • XBF-DC04C         • XBF-TC04S         • XBF-H002A		

### **Chapter2 System Configuration**

ltem		Description			
	Expansion module	Communication I/F module	• XBL-C41A • XBL-EMTA • XBL-CSEA • XBL-DSEA	• XBL-C21A • XBL-EIMT • XBL-PMEC	• XBL-EIPT • XBL-CMEA • XBL-PSEA
Items		Digital I/O module	<ul> <li>XBO-DC04A(High speed counter is available on "SU "type)</li> <li>XBO-TN04A(Positioning is available on slot 9 of "SU "type)</li> </ul>		
liems	Option Special module	• XBO-AD02A • XBO-RD01A	• XBO-DA02A • XBO-TC02A	• XBO-AH02A	
	module     RTC module     • XBO-RTCA (Ava Memory module       • XBO-M2MB		XBO-RTCA (Available	e on slot 9)	
			• XBO-M2MB		

### 2.2 Product List

Γ

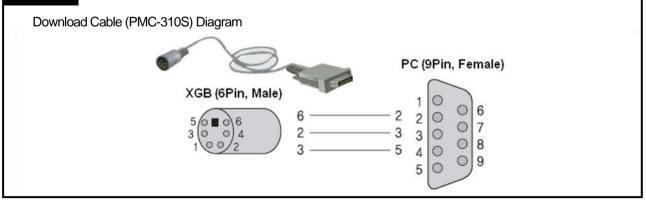
XGB series' product list is as follows.

Types	Model	Description	Remark
	XEC-DR32H	AC100-220V power supply, DC24V input 16 point, Relay output 16 point	
	XEC-DN32H	AC100~220V power supply, DC24V input 16 point, Transistor output 16 point	
	XEC-DR64H	AC100~220V power supply, DC24V input 32 point, Relay output 32 point	
	XEC-DN64H	AC100~220V power supply, DC24V input 32 point, Transistor output 32 point	
	XEC-DR20SU	AC100-220V power supply, DC 24V input 12 point, relay output 8 point	
	XEC-DN20SU	AC100-220V power supply, DC24V input 12 point, transistor 8 point (sink type)	
ĿĻ.	XEC-DP20SU	AC100-220V power supply, DC24V input 12 point, transistor 8 point (source type)	
Main Unit	XEC-DR30SU	AC100-220V power supply, DC 24V input 18 point, relay output 12 point	
lain	XEC-DN30SU	AC100~220V power supply, DC 24V input 18 point, transistor output 12 point(sink type)	
2	XEC-DP30SU	AC100-220V power supply, DC 24V input 18 point, transistor output 12 point(source type)	
	XEC-DR40SU	AC100~220V power supply, DC 24V input 24 point, relay output 16 point	
	XEC-DN40SU	AC100~220V power supply, DC 24V input 24 point, transistor output 16 point(sink)	
	XEC-DP40SU	AC100~220V power supply, DC 24V input 24 point, transistor output 16 point(source)	
	XEC-DR60SU	AC100~220V power supply, DC 24V input 36 point, relay output 24 point	
	XEC-DN60SU	AC100~220V power supply, DC 24V input 36 point, transistor output 24 point(sink)	
	XEC-DP60SU	AC100~220V power supply, DC 24V input 36 point, transistor output 24 point(source)	
	XBE-DC08A	DC24V Input 8 point	
	XBE-DC16A/B	DC24V Input 16 point	
	XBE-DC32A	DC24V Input 32 point	
<u>e</u>	XBE-RY08A/B	Relay output 8 point / Relay output 8 point (independent point)	
npo	XBE-RY16A	Relay output 16 point	
Expansion Module	XBE-TN08A	Transistor output 8 point	
ISIOI	XBE-TN16A	Transistor output 16 point	
cpar	XBE-TN32A	Transistor output 32 point	
,Â	XBE-TN64A	Transistor output 64 point (sink type)	
	XBE-TP16A	Transistor output 16 point (source type)	
	XBE-TP32A	Transistor output 32 point (source type)	
	XBE-DR16A	DC24V Input 8 point, Relay output 8 point	
	XBF-AD04A	Current/Voltage input 4 channel	
e a	XBF-DC04A	Current output 4 channel	
Special Module	XBF-DV04A	Voltage output 4 channel	
Ϋ́Ν	XBF-AH04A	Current/voltage input 2 channel, output 2 channel	
	XBF-RD04A	RTD (Resistance Temperature Detector) input 4 channel	
	XBF-AD04A	Current/Voltage input 4 channel	
	XBF-AD04C	Current/Voltage input 4 channel, High resolution	
	XBF-DC04A	Current output 4 channel	
Ð	XBF-DC04C	Voltage output 4 channel, High resolution	
Special Module	XBF-DV04A	Voltage output 4 channel	
il Mc	XBF-DV04C	Current output 4 channel, High resolution	
ecia	XBF-AH04A	Current/voltage input 2 channel, output 2 channel	
Sp(	XBF-RD04A	RTD (Resistance Temperature Detector) input 4 channel	
	XBF-TC04S	TC (Thermocouple) input 4 channel	
	XBF-TC04RT	Temperature controller module (RTD input, 4 roof)	

### **Chapter2 System Configuration**

Types	Model	Description	Remark
	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	
nmunica Module	XBL-EIPT	EtherNet/IP module	
Mo	XBL-CMEA	CANopen Master	
Cor	XBL-CSEA	CANOpen Slave	
	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	
0	XBO-AH02A	Current/Voltage input 1 channel, output 1 channel	
odule	XBO-RD01A	RTD input 1 channel	
n Mc	XBO-TC02A	Thermocouple input 2 channel	
<b>Dption Module</b>	XBO-DC04A	DC 24V input 4 point ("S" type HSC 4 channel)	
Ũ	XBO-TN04A	Sink type transistor output 4 channel ("S" type Positioning 2 axes (low speed))	
	XBO-RTCA	RTC module(Available on slot 9)	
	XBO-M2MB	Memory module	
ad	PMC-310S	Connection cable (PC to PLC), 9pin(PC)-6pin(PLC)	
Download Cable	USB-301A	Connection cable (PC to PLC), USB	

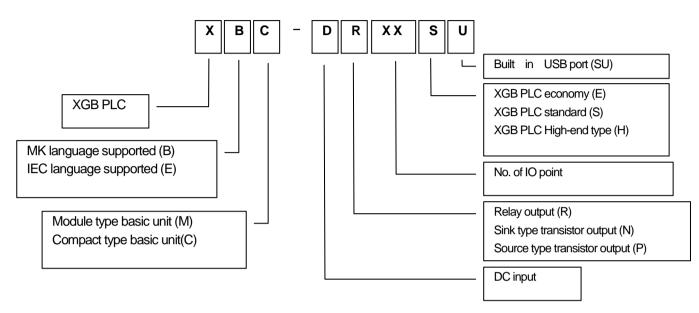
#### Remark



### 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
Module type	XBM-DR16S	8 point	8 point	None	
main unit	XBM-DN16S	8 point	None	8 point	DC24V
(MK language)	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-DR20SU	12 point	8 point	None	
	XBC-DR30SU	18 point	12 point	None	
	XBC-DR40SU	24 point	16 point	None	
Compact type	XBC-DR60SU	36 point	24 point	None	
main Unit (MK language)	XBC-DN20SU	12 point	None	8 point	AC110V~220V
	XBC-DN30SU	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	

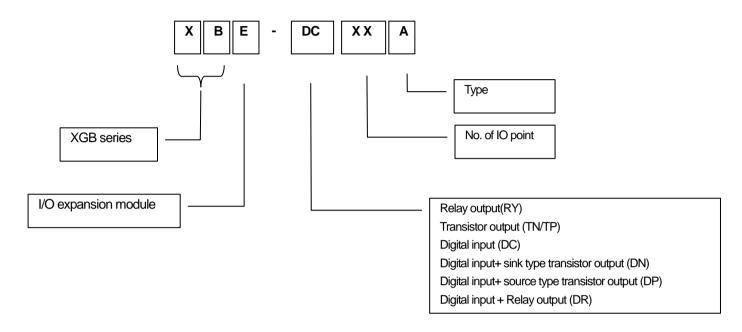
### **Chapter2 System Configuration**

Classification	Name	DC input	Relay output	Transistor output	Power
	XBC-DR10E	6 point	4 point	None	
Compact type	XBC-DR14E	8 point	6 point	None	_
	XBC-DR20E	12 point	8 point	None	_
	XBC-DR30E	18 point	12 point	None	_
	XBC-DN10E XBC-DN14E	6 point	None None	4 point	_
main Unit	XBC-DN20E	8 point 12 point	None	6 point 8 point	-
(MK language)	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	_
	XEC-DR32H	16 point	16 point	None	_
	XEC-DN32H	16 point	None	16 point	_
	XEC-DP32H	16 point	None	16 point	_
	XEC-DR64H	32 point	32 point	None	_
	XEC-DN64H	32 point	None	32 point	
	XEC-DP64H	32 point	None	32 point	
	XEC-DR20SU	12 point	8 point	None	
	XEC-DR30SU	18 point	12 point	None	
	XEC-DR40SU	24 point	16 point	None	
	XEC-DR60SU	36 point	24 point	None	
	XEC-DN20SU	18 point	None	12 point	AC110V~220V
	XEC-DN30SU	24 point	None	16 point	
	XEC-DN40SU	24 point	None	16 point	
	XEC-DN60SU	36 point	None	24 point	
Compact type main Unit	XEC-DP20SU	18 point	None	12 point	
(IEC language)	XEC-DP30SU	24 point	None	16 point	
	XEC-DP40SU	24 point	None	16 point	
	XEC-DP60SU	36 point	None	24 point	
	XEC-DR10E	6 point	4 point	None	
	XEC-DR14E	8 point	6 point	None	
	XEC-DR20E	12 point	8 point	None	
	XEC-DR30E	18 point	12 point	None	
	XEC-DN10E	6 point	None	4 point	
	XEC-DN14E	8 point	None	6 point	
	XEC-DN20E	12 point	None	8 point	
	XEC-DN30E	18 point	None	12 point	
	XEC-DP10E	6 point	None	4 point	
	XEC-DP14E	8 point	None	6 point	
	XEC-DP20E	12 point	None	8 point	
	XEC-DP30E	18 point	None	12 point	

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## 2.3.2 Classification and type of expansion module

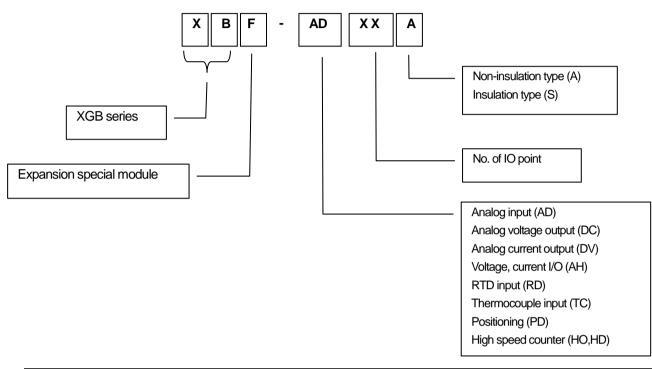
Name of expansion module is classified as follows.



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	

### 2.3.3 Classification and type of special module

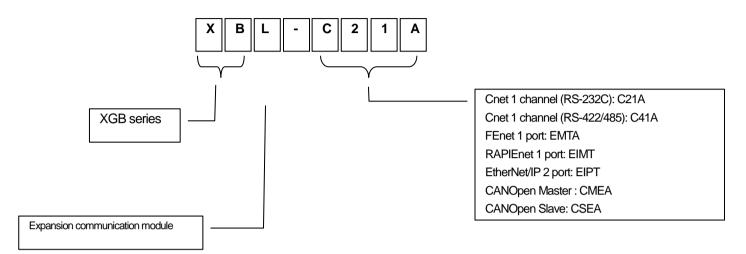
Special module is classified as follows.



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

## 2.3.4 Classification and type of communication module

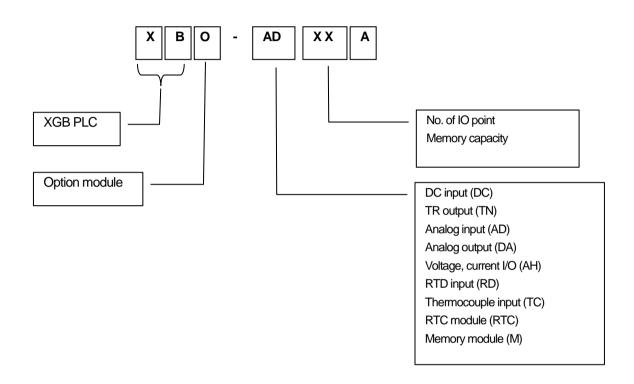
Name of communication module is classified as follows.



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- EIMT/EIMF/EIMH	Comm. Module between PLCs, electric media, 100 Mbps industrial Ethernet supported
EtherNet Comm. Module	XBL-EIPT	Open EtherNet I/P
CANIGRON Comm Madula	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.



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	Sink type
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	-

## **Chapter 3 General Specifications**

### 3.1 General Specifications

The general specification of XGB series is as below.

No.	Items		Specification				
1	Ambient Temp.			0~55 <i>°</i> C			
2	Storage Temp.			–25 ~ +70 °C			
3	Ambient humidity		5~95%	%RH (Non-conder	nsing)		-
4	Storage humidity		5~95%	%RH (Non-conder	nsing)		
			Occasional	vibration		-	
		Frequency	Acc	eleration	Amplitude	Times	
		$10 \le f < 57Hz$	,	-	0.075mm		
5	Vibration	$57 \leq f \leq 150Hz$	<u>.</u> 9.8r	m/s <sup>2</sup> (1G)	-	10 times and	
5	resistance		Continuous	vibration		10 times each direction	
		Frequency	Aco	eleration	Amplitude	- (X,Y and Z)	IEC61131-2
		10 ≤ f < 57Hz		-	0.035mm	(ʌ, r aruz)	12001131-2
		57 ≤ f ≤ 150Hz	4.9m	/s² (0.5G)	_		
		• Peak acceleration : 1	47 m/s <sup>2</sup> (15G)				
6	Shock resistance	Duration : 11ms					
		• Half-sine, 3 times eac	h direction per	r each axis			
		Square wave	AC:±1,500 V			LSIS standard	
		impulse noise		DC:	±900 V		LOIO Stal Marc
		Electrostatic		Voltage: 4kV (Contact discharge)			IEC61131-2
		discharge				<b>,</b>	IEC61000-4-2
7	Noise resistance	Radiated					IEC61131-2.
'		electromagnetic field		80 ~ 1,00	0 MHz, 10V/m		IEC61000-4-3
		noise					
		Fast transient	Segment	Power supply	•	og Input/Output,	IEC61131-2
		/Burst noise		module		cation Interface	IEC61000-4-4
		,	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			

#### Remark

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.

## **Chapter 4 CPU Specifications**

### 4.1 Performance Specifications

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

Items         XEC-DR10E         XEC-DR14E         XEC-DR30E         XEC-DR30E         Remark           VEC-DN10E         XEC-DN14E         XEC-DN30E         XEC-DN30E <th colspan="2">Ť</th> <th></th> <th></th> <th>ns ('E' type)</th> <th></th> <th>,</th>	Ť				ns ('E' type)		,			
VEC-DN10E       XEC-DN14E       XEC-DN30E         Program control method       Retirative operation, fixed cycle operation Interrupt operation, constant period scan       XEC-DP30E       XEC-DP30E         I/O control method       Scan synchronized batch processing method (Refresh method)/ Interrupt operation       Scan synchronized batch processing method (Refresh method)/ Interrupt operation       Scan synchronized batch processing method       Scan synchronized batch processing method         Program LD/       Direct method b/ instruction       Scan synchronized batch processing method       Scan synchronized batch processing method         Program LD/       Scan synchronized batch processing method       Scan synchronized batch processing method       Scan synchronized batch         Program LD/       Scan synchronized batch processing method       Scan synchronized batch       Scan synchronized batch         Number of instruction       Sasic function       Statutured Text (ST)       Scan synchronized batch       Scan synchronized batch         Processing spect       Basic function       Special function dedicated function       Statutured Text (ST)       Scan synchronized batch       Scan synchronized batch         Processing spect       Special function dedicated function       Statutured Text (ST)       Statutured Text (ST)       Statutured Text (ST)         Max. I/O poin/T       Statutured Text (ST)       Statuting text (ST)       Statutured Te	lt	Itoms		XEC-DR10E	XEC-DR14E	XEC-DR20E	XEC-DR30E	Pomark		
Program control method       Reiterative operation, fixed cycle operation Interrupt operation, constant period scan       Image: Scan synchronized batch processing method (Refresh method) Direct method by instruction         Program language       Scan synchronized batch processing method (Refresh method)       Scan synchronized batch processing method (Refresh method)         Program language       Operator       18       Image: Scan synchronized batch processing method         Number of Instructions       Basic function block       36 + Real number operation function       Image: Scan synchronized batch processing speed function block       Special function capacity       Special function function       Special	10	ems		XEC-DN10E	XEC-DN14E	XEC-DN20E	XEC-DN30E	Remark		
Program control method       Interrupt operation, constant period scan       Interrupt operation, constant period scan         I/O control       Scan synchronized batch processing method       Image: Scan synchronized batch processing method       Image: Scan synchronized batch processing method         Program Language       Direct method bu instruction       Ladder Diagram (LD)       Sequeniial Function Chart (SFC)       Sequeniial Function Chart (SFC)       Sequeniial Function       Sequeniii Function       Sequeniii Function       Sequeniii Function       Sequeniii Function       Sequeniii Function       Sequeniii Function       Sequeniiii Function       Sequeniii Function       Sequeniii Function       Sequeniiii Function       Sequeniiii Function       Sequeniiii Function       Sequeniiii Function       Sequeniii Funct				XEC-DP10E	XEC-DP14E	XEC-DP20E	XEC-DP30E			
Image: Problem interception of peration is period scaling perio	Program co	ntrol moth	od							
I/O control withod by instruction Direct method by instruction Ladder Plagram (LD) Sequential Function Chart (SFC) Structured Text (ST)       Image: Sequential Function Chart (SFC)         Number of Basic function instructions       136 + Real number operation function       Image: Sequential Function Chart (SFC)         Number of Basic function instructions       36 + Real number operation function       Image: Sequential Function Chart (SFC)         Special function block       36 + Real number operation function       Image: Sequential Function Chart (SFC)         Special function block       Special function dedicated function       Image: Sequential Function Chart (SFC)         Processing special function block       Special function dedicated function: $0.24 \#/s/step$ Image: Sequential Function Chart (SFC)         Program RLP       Special function dedicated function: $0.24 \#/s/step$ Image: Sequential Function Chart (SFC)       Image: Sequential Function Chart (SFC)         Program RLP       Special function dedicated function: $0.24 \#/s/step$ Image: Sequential Function Chart (SFC)       Image: Sequential Function Chart (SFC)         Max: I/O points       StoKB       Special function Chart (SFC)       Image: Sequential Function Chart (SFC)       Image: Sequetial Function Chart (SFC)       Imag	Flogram co	nuormeu	iou	Interrupt operation	n, constant period	scan				
				-	•	g method				
Program Iangue Isolation Isolation Chart (SFC)       Sequential Function Chart (SFC)       Image: Sequenti	I/O control m	nethod		```						
Sequential Function Chart (SFC) Structured Text (ST)       Sequential Function Chart (SFC) Structured Text (ST)         IB       Sequential Function Chart (SFC)         Structured Text (ST)         Basic function       Image: Structured Text (ST)         Basic function       Image: Structured Text (ST)         Basic function       Generation function         Special function dedicated function         Special function dedicated function         Special function dedicated function         Processing special (Structured Text (ST)       Soft Text (ST)         Processing special function       Special function dedicated function         Program capacity       Soft Point       Secial function         Program capacity       Soft Point       Secial function         Max / Opoints       Soft Point       Secial function         Max // Opoints       Soft Point       Secial function         Max // Opoints       Soft Point       Secial function         Max // Opoints       Soft Point       Sec										
Structured Text (ST)       Structured Text (ST)       Image: Structured Text (ST)       Image: Structured Text (ST)         Number of instruction       Basic function       136 + Real number operation function       Image: Structured Text (ST)         Basic function       Basic function       Image: Structured Text (ST)       Image: Structured Text (ST)       Image: Structured Text (ST)         Basic function       Basic function       Image: Structured Text (ST)       Image: Structured Text (ST)       Image: Structured Text (ST)         Special function       Basic function dedicated function       Image: Structured Text (ST)       Image: Structured Text (ST)       Image: Structured Text (ST)         Processing speed (Basic instruction)       Special function dedicated function       Image: Structured Text (ST)       Image: Structured Text (ST)       Image: Structured Text (ST)         Processing speed (Basic instruction)       Special function dedicated function       Image: Structured Text (ST)       Image: Structured Text (ST)       Image: Structured Text (ST)         Processing speed (Basic instruction)       So Structured Text (ST)       Image: Structured Text (ST)       Image: Structured Text (ST)       Image: Structured Text (ST)       Image: Structured Text (ST)         Max. I/O points       So Structured Text (ST)       Image: Structured Text (ST)       Image: Structure Text (ST)       Image: Structure Text (ST)       Image: Structure Text (ST) <td>Program lan</td> <td>nuade</td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td>	Program lan	nuade		-						
Basic function       136 + Real number operation function       Image: Second function         Number of book       Basic function         Special function block       Special function colscated function         Processing speed (Basic instruction)       Basic instructions         Program capacity       SoKB         Max. I/O points (Main+Option X)       14 Point (1 Option )       28 Point (2 Option )       38 Point (2 Option )         Max. I/O points (Main+Option X)       14 Point (1 Option )       18 Point (2 Option )       38 Point (2 Option )       38 Point (2 Option )         Max. I/O points (Main+Option X)       18 Point (1 Option )       28 Point (2 Option )       38 Point (2 Option )       38 Point (2 Option )         Mariable (A)       BKB(Max 8KB x-ilable)       256 Byte (%JX1.15.63)       Imput variable (0)       256 Byte (%JX1.15.63)       Imput variable (0)	riogramian	iguage		Structured Text (S	ST)					
Number of instructions       Basic function block       43         Special function block       Special function clockated function       Image: Special function block       Special function clockated function       Image: Special function		Opera	ator	18						
$   \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $		Basic fu	nction	136 + Real numbe	er operation function	۱				
Special function declicated functionProcessing speed (Basic instruction)Basic instruction:: $0.24 \mu s/step$ Program capacity50KBMax. I/O points14 Point18 Point28 Point38 PointMax. I/O points14 Point18 Point28 Point38 PointMax. I/O points14 Point18 Point28 Point38 PointMain+Option X)4 Point18 Point26 Byte (%IX1:15:63)Direct (0)M4 KBDirect (a)M4 KBDirect (a)M4 KBDirect Flag (a)M4 KBPath (a)M4 KBDirect (a)M4 KBDirect (a)M4 KBPath (b)M4 KBDirect (a)M4 KBPath (a)M4 KBDirect (b)M4 KBPath (b)M4 KBPath (a)M4 KBColspan="5">Colspan="5"Colspan="5"Colspan="5"Colspan="5"Colspan="5"Colspan="				43	13					
$\begin{array}{c c c c c c } \hline Basic instructions: 0.24/24/Step & (10) \ \label{eq:basic instruction} & (10) \ e$				Special function de						
Program capacity       50KB         Max. I/O points (Main+Option X)       14 Point (1 Option)       18 Point (1 Option)       28 Point (2 Option)       38 Point (2 Option)         Automatic variable (A) $H R B (Max 8KB A + ailable)$ $H R B (Max 8KB A + ailable)$ $H R B (Max 8KB A + ailable)$ Input variable (I) $256 Byte (% QX1.15.63)$ $256 Byte (% QX1.15.63)$ $H R B (Max 8KB A + ailable)$ Data Memory       M $4 KB$ $H R B (Max 8KB A + ailable)$ $H R B (Max 8KB A + ailable)$ Data Memory       M $4 KB$ $H R B (Max 8KB A + ailable)$ $H R B (Max 8KB A + ailable)$ Pata Memory       M $4 KB$ $H R B (Max 8KB A + ailable)$ $H R B (Max 8KB A + ailable)$ Pata Memory       M $4 KB$ $H R B (Max 8KB A + ailable)$ $H R B (Max 8KB A + ailable)$ Pata Memory       M $4 KB$ $H R B (Max 8KB A + ailable)$ $H R B (Max 8 + ailable)$ $H R B (Max 8 + ailable)$ $H R B (Max 8 + ailable)$	-	•		Basic instructions						
Max. I/O points       14 Point       18 Point       28 Point       38 Point       20 ption )         Max. I/O point X       11 Option )       11 Option )       12 Option )       38 Point       20 option )         Max. I/O point X       Automatic Variable (A) $R KB(Max 8KB Available)$ $R KB(Max 8KB Available)$ Input variable (A) $R KB(Max 8KB Available)$ Input v		,		50KB						
(Main+Option X)       (1 Option )       (1 Option )       (2 Option )       (2 Option )         Automatic variable (A) $BKB(Max 8KB A = ilable)$ $BKB(Max 8KB A = ilable)$ Imput variable (A) $S6 Byte (\% X1.15.63)$ Imput variable (A) $S6 Byte (\% X1.15.63)$ Imput variable (A) $S6 Byte (\% X1.15.63)$ Imput variable (A)       Imp				14 Point	18 Point	28 Point	38 Point			
$\begin{array}{ c c c c } \hline \mbox{variable}(A) & \mbox{NB}(Ax \ BKB \ Available) & \mbox{Input variable}(A) & \mb$										
$ \begin{array}{c c c c c c c c c c } & 256 \ \mbox{Byte} \ (\%\ \mbox{I}\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $				8KB(Max 8KB Av	•					
Data     M     4 KB       Memory     M     4 KB       Variable     R     10 KB(1block)       W     10 KB       Flag     F     768 Byte       Variable     K     5,120 Byte       L     2,560 Byte     10       U     704 Byte     10			able	256 Byte (%IX1.1	256 Byte (%IX1.15.63)					
Memory         Direct variable         R         10 KB(1block)           W         10 KB            K         10 KB            Flag variable         F         768 Byte            L         2,560 Byte             U         704 Byte		Output variable		256 Byte (%QX1.	256 Byte (%QX1.15.63)					
Wentfoly         R         10 KB(1block)           variable         W         10 KB           W         10 KB           Flag         F         768 Byte           Variable         K         5,120 Byte           L         2,560 Byte           U         704 Byte	Data		М	4 KB						
W         10 KB           Flag         F         768 Byte           Variable         K         5,120 Byte           L         2,560 Byte	Memory		R	10 KB(1block)						
Flag     K     5,120 Byte       variable     L     2,560 Byte       U     704 Byte		vailaule	W	10 KB						
variable L 2,560 Byte U 704 Byte			F	768 Byte						
variable     L     2,560 Byte       U     704 Byte		Flag	К	5,120 Byte						
		U	L	2,560 Byte						
			U	704 Byte						
Flash area 10KB, 2blocks	Flash area			10KB, 2blocks						

			Specifications ('E' type)					
	Items	XEC-DR10E	XEC-DR14E	XEC-DR20E	XEC-DR30E	Remark		
	ilen is	XEC-DN10E	XEC-DN14E	XEC-DN20E	XEC-DN30E	Remain		
		XEC-DP10E	XEC-DP14E	XEC-DP20E	XEC-DP30E			
Timer		No limit in points						
Counter		No limit in points (	Counter range: 64	bit range)				
Operatio	on Mode	RUN, STOP						
Restart r	nodes	Cold, Warm						
Total nur block	mber of program	128						
	Initialization	1						
Task	Fixed period	8	8					
raon	External input	4(%IX0.0.0~%IX0						
	Internal device	8						
S	elf-diagnostic	Watchdog Timer,						
	functions	I/O error detection						
Data keeping method at power failure		Setting to retain a	rea at basic param	neter				
Internel	concurrention	250	315	355	485			
current (	consumption	180	190	200	210			
		180	190	200	210			
		330	340	450	465			
Weight (	g)	313	315	418	423			
		313	315	418	423			

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The following table shows the general specifications of the XGB compact type CPU (XEC-DN20/30/40/60SU, XEC-DR20/30/40/60SU).

ltems		XEC-DR20SU	XEC-DR30SU	ns ('SU' type) XEC-DR40SU	XEC-DR60SU	Remark		
items		XEC-DN20SU	XEC-DN30SU	XEC-DN40SU	XEC-DN60SU	Remark		
		XEC-DP20SU	XEC-DP30SU	XEC-DP40SU	XEC-DP60SU			
Program control r	method	Reiterative operat	tion, fixed cycle ope	eration, constant sc	an			
		Scan synchronou	s batch processing	method (Refresh i	method),			
I/O control metho	d	Directed by progr	am instruction					
		Ladder Diagram (	(LD)					
Program languag	je	Sequential Functi	on Chart (SFC)					
		Structured Text (S	ST)					
Ope	rator	18						
Basi	c function	136 + Real numbe	er operation function					
Number of Basi		43						
instructions block	ĸ							
	icated	Special function de	edicated function					
funct	tion block							
Processing speed	d	0.094 µs/Step						
(Basic instruction)	/							
Program capacity	/	200KB	1	1				
Max. I/O points		244 point	254 point	264 point	284 point			
(Main + Expansion 7 s			-	-				
	omatic able (A)	16KB (Max.16KB						
Input (I)	t variable	2 KB (%IX15.15.6						
	out variabl	2 KB (%QX15.15	2 KB (%QX15.15.63)					
Data	М	8KB (Max.8KB re	tain setting availab	le)				
Memory Direc	ct R	20KB (1Block)						
varia	able W	20KB						
	F	2KB						
Flag		8KB						
varia		4KB						
	U	1KB						
Flash area		20KB, 2 blocks						
Timer		No limit to the number of point (time range: 0.001s ~ 4,294,967,295s) No limit to the number of point (count range: 64 bit expression range)						

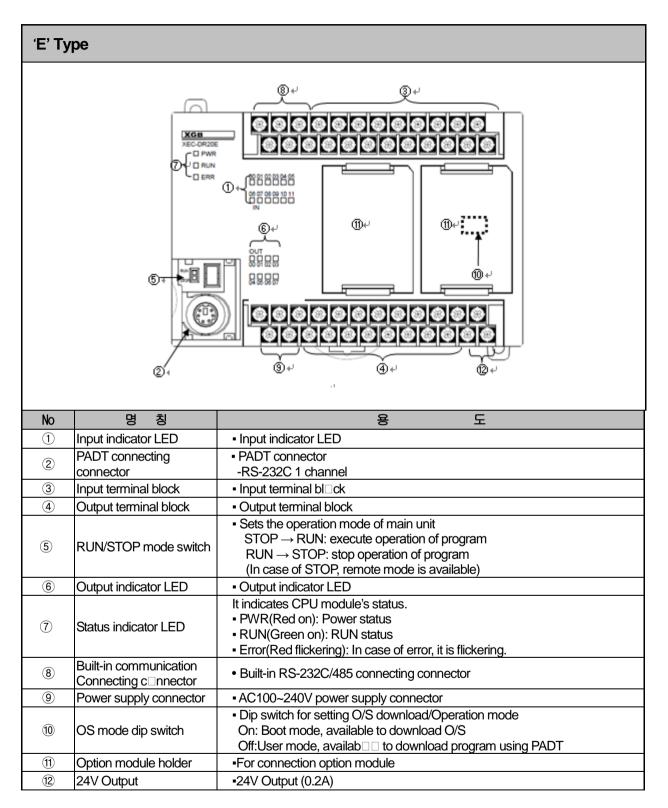
ltems							
		XEC-DR20SU	XEC-DR30SU	XEC-DR40SU	XEC-DR60SU	Remark	
		XEC-DN20SU	XEC-DN30SU	XEC-DN40SU	XEC-DN60SU	Remark	
		XEC-DP20SU	XEC-DP30SU	XEC-DP40SU	XEC-DP60SU		
Operation modes		RUN, STOP, DEB					
Restart mode		Cold, Warm					
Total number of program		100					
block		128					
	Initialization	1	1				
Task	Fixed period	8					
	External input	8 (%IX0.0.0 ~ %IX					
	Internal device	8					
Self diagnosis		Detecting operation					
Data keeping method at power failure		Setting retain area					
Internal consumption current (mA)		478	626	684	942	-	
		252	270	288	340		
		305	352	355	394		
Weight (g)		514	528	594	804		
		475	474	578	636		
		442	446	544	717		

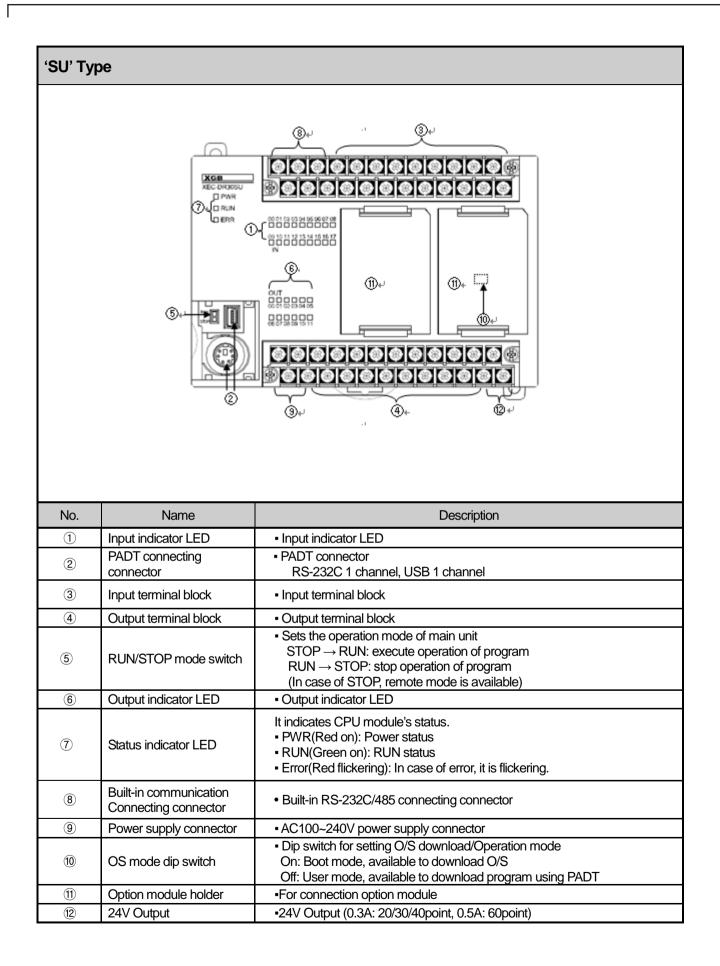
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Items			S	Demerle	
			XEC-DxxxE(Economy)	XEC-DxxxSU(Standard)	Remark
Built-in function	PID control function		Controlled by instructions, Auto-tuning, PWM output, Forced output, Adjustable operation scan time, Anti Windup, Delta MV function, SV-Ramp function,The mixed forward/reverse run, Cascade		Supported in 'SU' type
	Cnet I/F function		Dedicated protocol support MODBUS protocol support User defined protocol support RS-232C 1 port, RS-485 1 port respe		
	High-speed counter	Capacity	1 phase: 4 kHz 4 channel       1 phase: 100 kHz 2 channel,         2 phase: 2 kHz 2 channel       2 phase: 50 kHz 1 channel,         8 kHz 3 channel       8 kHz 3 channel		
		Counter mode	4 different counter modes according method 1 Increasing/decreasing operation 1 Increasing/decreasing operation 2 Operating setting by rising/falli		
			2 phase pulse input: addition/subtraction by rising pulse phase differences	2 phase pulse input: addition/subtraction by rising/falling pulse phase differences	
		Additional function	Internal/External preset function Latch counter function Comparison output function Revolution number per unit time function		
	Positioning function	Basic function	No. of control axis: 2 axes Control method: position/speed Control unit: pulse Positioning data: 80 data/axis (o Operation mode: End/Keep/Cor Operation method: Single, Repe		
		Positioning function	Positioning method: Absolute / Ir Address range: -2,147,483,648 Speed: Max. 100kpps(setting ran Acceleration / Deceleration metho	Supported in 'SU' type transistor output	
		Return to Origin	By Home and DOG (Off) By Home and DOG (On) By DOG		
		JOG operation	Setting range: 1~100,000 ( High / Low speed)		
		Additional function	Inching operation, Speed synchronizing operation, Position synchronizing operation, linear interpolation operation etc.		
	Pulse catch		50 #s 4 point (%IX0.0.0~%IX0.0.3)	10 ⊭s 2 point (%IX0.0.0 ~ %IX0.0.1) 50 ⊭s 6 point (%IX0.0.2 ~ %IX0.0.7)	
	External interrupt		4 point: 50 ⊭s (%IX0.0.0~%IX0.0.3)	10 µs 2 point (%IX0.0.0 ~ %IX0.0.1) 50 µs 6 point (%IX0.0.2 ~ %IX0.0.7)	-
	Input filter		Select among 1,3,5,10,20,70,100 ms (Adjustable)		

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# 4.2 Names Of Part and Function





# 4.3 Power Supply Specifications

It describes the power supply specification of main unit.

	ltones			Specification					
			XEC-DR10/14E	XEC-DR20/30E	XEC-DR20/30SU	XEC-DR40SU	XEC-DR60SU		
	Items		XEC-DN10/14E	XEC-DN20/30E	XEC-DN20/30SU	XEC-DN40SU	XEC-DN60SU		
			XEC-DP10/14E	XEC-DP20/30E	XEC-DP20/30SU	XEC-DP40SU	XEC-DP60SU		
	Rated voltage (UL warranty voltage)		AC 100 ~ 240 V	/					
	Input voltage range		AC85~264V(-1	5%, +10%)					
Input	Inrush current		50APeak or less						
	Input current		0.5A or less (220V), 1A or less (110V)						
	Efficiency		65% or more						
	Permitted momentary power failure		Less than 10 <sup>ms</sup>						
	Rated	DC5V	0.5A	0.8A	1.5A	2.0A	2.5A		
Output	output	DC24V	0.2A	0.2A	0.3A	0.3A	0.5A		
	Output voltage ripple		DC5V (±2%)						
Power	Power supply status indication		LED On when power supply is normal						
(	Cable specific	cation	0.75 ~ 2 mm <sup>2</sup>						

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

1) Consumption current (DC 5V)

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Туре	Model	Consumption current (Unit : mA)
	XEC-DR32H	660
	XEC-DR64H	1,040
	XEC-DN32H	260
	XEC-DN64H	330
	XEC-DP32H	260
	XEC-DP64H	330
	XEC-DP20SU	252
	XEC-DP30SU	270
	XEC-DP40SU	288
	XEC-DP60SU	340
	XEC-DN20SU	252
	XEC-DN30SU	270
	XEC-DN40SU	288
	XEC-DN60SU	340
	XEC-DR20SU	478
Main Unit	XEC-DR30SU	626
	XEC-DR40SU	684
	XEC-DR60SU	942
	XEC-DR30E	485
	XEC-DR20E	355
	XEC-DR14E	315
	XEC-DR10E	250
	XEC-DN30E	210
	XEC-DN20E	200
	XEC-DN14E	190
	XEC-DN10E	180
	XEC-DP30E	210
	XEC-DP20E	200
	XEC-DP14E	190
	XEC-DP10E	180
	XBE-DC32A	50
	XBE-DC16A/B	40
	XBE-DC08A	20
	XBE-RY16A	440
Expansion I/O module	XBE-RY08A/B	240
	XBE-TN32A	80
	XBE-TN16A	50
	XBE-TN08A	40
	XBE-DR16A	250

# **Chapter 4 CPU Specifications**

Туре	Model	Consumption current (Unit : mA)
	XBF-AD04A	120
	XBF-AD08A	105
	XBF-AH04A	120
	XBF-DV04A	110
	XBF-DC04A	110
	XBF-RD04A	100
Special Expansion module	XBF-TC04S	100
	XBF-PD02A	500
	XBF-HO02A	270
	XBF-HD02A	330
	XBF-AD04C	100
	XBF-DC04C	160
	XBF-DV04C	160
	XBL-C21A	110
	XBL-C41A	110
	XBL-EMTA	190
Communication Expansion module	XBL-EIMT/F/H	280/670/480
•	XBL-EIPT	400
	XBL-CMEA	150
	XBL-CSEA	150
	XBO-DC04A	50
	XBO-TN04A	80
	XBO-AD02A	50
	XBO-DA02A	150
Option module	XBO-AH02A	150
	XBO-RD01A	30
	XBO-TC02A	50
	XBO-RTCA	30
	XBO-M2MB	70

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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

Consumption of current/voltage is calculated as follows.

Туре	Model	Unit No.	Internal 5V consumption current (Unit : mA)	Remark	
Main unit	XEC-DN20SU	1	252		
	XBE-DC32A	2	50	When contact points are On. (Maximum consumption current)	
	XBE-TN32A	2	80		
Expansion module	XBF-AD04A	1	120		
	XBF-DC04A	1	110	All channel is used. (Maximum consumption current)	
	XBL-C21A	1	110		
Total Consumption current	8	<b>352</b> mA		-	
Consumption 4.		4.26 W		0.85 * 5V = 4.26W	

In case system is configured as above, since 5V consumption current is total 852mA 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 : mA)	Remark	
Main unit	XEC-DN30SU	1	270		
	XBE-DR16A	2	250	When all contact points are On. (Maximum consumption current)	
Europeiro acordado	XBE-RY16A	2	440		
Expansion module	XBF-AD04A	2	120	All channel is used.	
	XBL-C21A 1 110		110	(Maximum consumption current)	
Consumption current	2	2,000 mA		-	
Consumption voltage	10W			$2,000 \times 5V = 10W$	

If system is configured as above, total 5V current consumption is exceeded 2,000mA 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		
	XBE-DR16A	2	250	When of all contact points are On. (Maximum consumption current)	
Europeice module	XBE-RY16A	2	440		
Expansion module	XBF-AD04A	2	120	All channel is used.	
	XBL-C21A 1 110		110	(Maximum consumption current)	
Consumption current	<b>1,990</b> mA			-	
Consumption voltage		9.95 W		1.99A × 5V = 9.95W	

(3) XGB PLC configuration example 3

The above system is an example of using XBC-DN32H about the 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 time	Remark		
XEC	backup by the Capacitor	18 Days		
"SU" type	RTC module installed	3 Yeas	At normal temperature (25°C)	
XEC	backup by the Capacitor	5 Days		
"E" type	RTC module installed	3 Yeas		

But super capacitor need to charge 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.

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.

#### Remark

Above data backup time can be different depending on temperature condition.

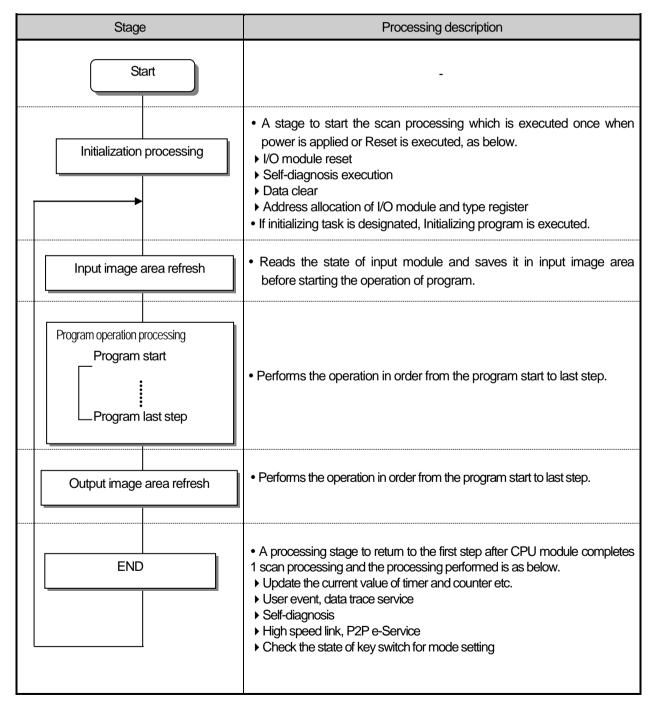
# **Chapter 5 Program Configuration and Operation Method**

## **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'. Such series of processing 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 Interrupt input("SU" 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)

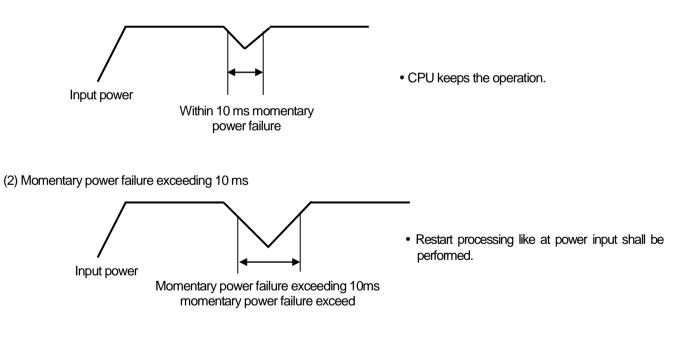
This is the operation method that performs the scan program every appointed time. This stands by for a while after performing all the scan program, and starts the program scan again when it reaches to the appointed time. The difference from constant program is the update of input/output and perform with 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', [%FX92] '\_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 stops and the output is Off. Restart processing at power input shall be performed.

(1) Momentary power failure within 10 ms



#### Remark

1) Momentary power failure?

This means the state that the voltage of supply power at power condition designated by PLC is lowered as it exceeds the allowable variable range and the short time (some ms ~ some dozens ms) interruption is called 'momentary power failure').

### 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

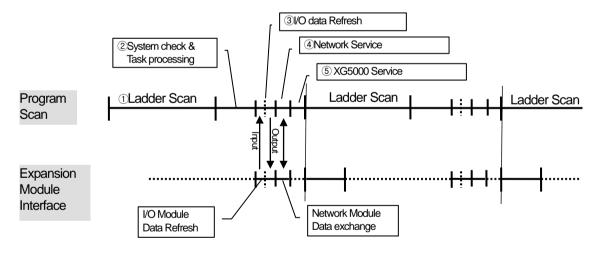
• Interrupt program processing time = Sum of interrupt program proceeding time processed during 1 scan

• 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 scan program	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	<b>5.4</b> ms	1.0 ms	-	-	0.5 ms (main)
ĺ	'SU' type	<b>3.0</b> ms	0.5 ms	<b>0.3</b> ms	<b>3.0</b> ms	0.8 ms (main)

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 + (3)/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  $\mu$ s ~ 1.0 ms [varies depending on the usage of auxiliary functions]

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) = Scan program process + System check & Task process + I/O data Refresh + Network Service + XG5000 Service + User Task Program process

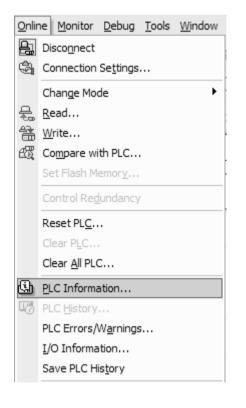
 $= (2047 \times (0.67(\text{LOAD}) + 0.80(\text{OUT})) + (500) + (300 \times 5) + (3000 \times 1) + (800 \times 1) + (100) \mu\text{s}$ 

- = 3009 + 500 + 1500 + 3000 + 800 + 100 \mus = 8909 \mus
- =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".



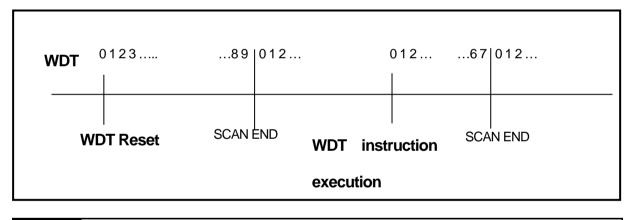
Information -	
U Performance	Password PLC RTC
Scan time	
Max, 50,8ms	Min,: 22,8ms Cur,: 25,5ms
Memory used	
Program:	0,3KB / 1024,0KB : 0%
	Details
Upload:	1,5KB / 256,0KB : 0%
	D <u>e</u> tails
	Bytes
	Close

- (b) Scan time is save in special relay (F) area as follows.
- FW50: max. value of scan time (unit: 0.1 ms)
- FW51: min. value of scan time (unit: 0.1 ms)
- FW52: 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, 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  $10 \sim 1000$ ms (Unit: 1ms).

# **5.2 Program Execution**

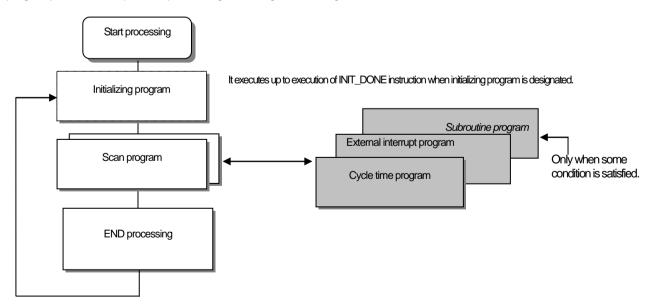
### 5.2.1 Configuration of program

All functional elements need to execute a certain control process which is 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	The scan program is executed regularly in every scan.				
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

The section describes the program proceeding method that is executed when the power is applied or key switch is on 'RUN'. The programperforms 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 input task program): "SU" type available to use up to 8. (%IX0.0.0 ~ %IX0.0.7)

'E' type available to use up to 4. (%IX0.0.0~%IX0.0.3)

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 ('SU' type: IX0.0.0~IX0.0.7).

### Remark

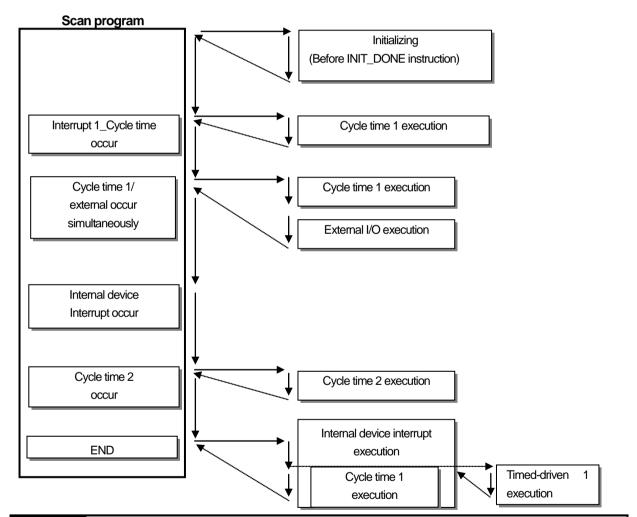
(1) Write the interrupt program as short as possible. In case same interrupt occurs repeatedly before completion of interrupt, Scan program is not executed and O/S watch dog error may occur.

(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, this section describes program setting method of XG5000 which is 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			



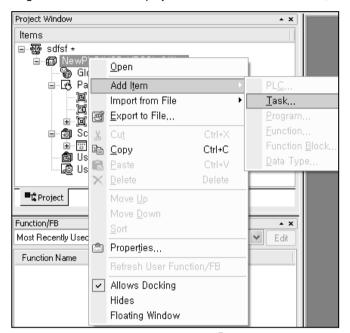
#### Remark

- 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 enable state. 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 make Initialization task program

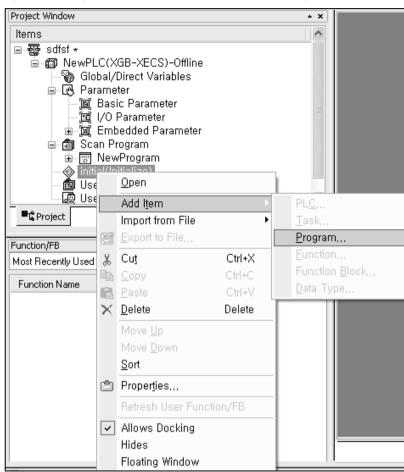
Generate the task in the project window of XG5000 as below and add the program to be performed by each task. For further information, please refer to XG5000 user's manual. (It can be additional when XG5000 is not connected with PLC.)

(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	?×
Iask name:	ОК
Priority: 2	Cancel
Task <u>n</u> umber: 0 (Cycle time: 0~7, I/O: 8~15, Internal de	evice: 16~23)
Execution condition	
⊙ Initialization	
O <u>C</u> ycle time ms	
0	
I/D execution conditions     Rising Falling Transition	
O Internal <u>d</u> evice BIT	
Internal device execution conditions	
Device:	
Rising	⊖ Off



(c) Right click on registered task and select  $\ensuremath{\,^{\ensuremath{\mathbb{R}}}}$  Add Item  $\ensuremath{\,^{\ensuremath{\mathbb{R}}}}$  -  $\ensuremath{\,^{\ensuremath{\mathbb{R}}}}$  Program  $\ensuremath{\,^{\ensuremath{\mathbb{R}}}}$  .

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

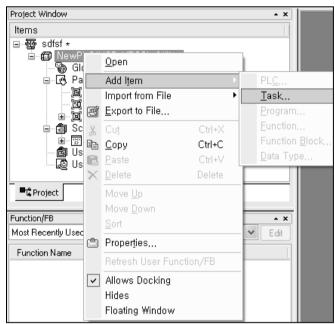
%QXO.O.O	INST IN <sup>TON</sup> Q					-(INIT_DONE)-
T#1s -	PT ET	-				

(2) How to make cycle time interrupt task 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) Right click on registered task and select  $\ensuremath{\,^{\ensuremath{\mathbb{I}}}}$  Add Item  $\ensuremath{\,^{\ensuremath{\mathbb{I}}}}$  .



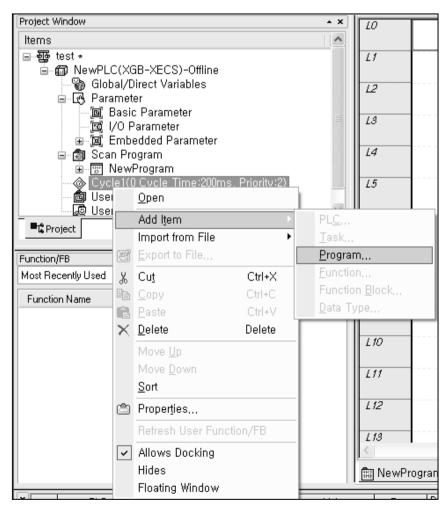
• Displays setting screen of Task.

Task ?X
Task name: Cycle1 OK
Priority: 2 V
Task number: 0 (Cycle time: 0~7, I/0: 8~15, Internal device: 16~23)
Execution condition
O Initialization
© <u>C</u> ycle time 200 ms
I/O execution conditions
Rising
st the sty
Internal device execution conditions
Device:
Rising

(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		Set the Task number. • Cycle time task (0 ~ 7): 8 • External input task (8 ~ 15): "SU" type: 8, 'E' type: 4 • Internal device task (16 ~ 23): 8	-
	Initialization	Set the initial program when running the project.	Till the execution of INIT_DONE instruction
	Cycle time	Set the cyclic interrupt.	0~4,294,967,295 ms available
Execution condition	I/O	Set the external input.	'SU':%IX0.0.0 ~ %IX0.0.7 'E': :%IX0.0.0 ~ %IX0.0.3
	Internal device	Set the internal device to interrupt execution. • Bit: Among Rising, Falling, Transition, On, Off • Word: Among >,>=,<,<=	-

(c) Right click on registered task and select  $\ensuremath{\,^{\ensuremath{\mathbb{R}}}}\xspace{Add Item}\xspace$  -  $\ensuremath{\,^{\ensuremath{\mathbb{R}}}}\xspace{Program}\xspace$  .



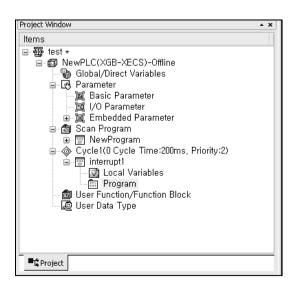
(d) Register the Program name and Program description.

Program	_		?×
Program <u>n</u> ame:			ОК
			Cancel
Language			
⊙LD	○ s <u>F</u> C	() S <u>I</u>	
Program description	n:		
		~	

(e) Displays the program window to write task program.

	upt1 [Progr	am]			
10					^
Lf					
12					
L3					
14					
15					
18					
17 <		Ш			> .::

(f) Displays the setting in project window.



#### (3) Task type

Task type and function is as follows.

Туре	Cycle time task	External i	Internal device task	
Spec.		'SU' type	'E' type	
Max. Task number	8	8	4	8
Start condition	Cyclic (setting up to max. 4,294,967.295 ms. by 1ms unit)	Rising or falling edge of main unit's contact (%IX0.0.0 ~ %IX0.0.7)	Rising or falling edge of main unit's contact (%IX0.0.0 ~ %IX0.0.3)	Select condition of Internal device
Detection and execution	Cyclic execution per setting time	Immediate execution at the edge of main unit's contact	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	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)	2~7 level setting (2 level is highest in priority)
Task no.	Within 0~7 range without duplication for user	With 8~15 range without duplication for user	With 8~15 range without duplication for user	Within 16~23 range without duplication for user

(4) Processing methods of task program

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.

2) 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

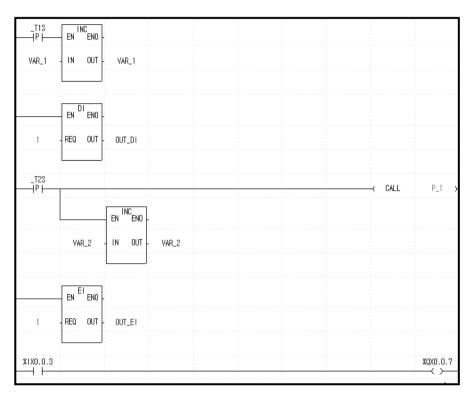
(d) Relationship of initialize, Scan Program and Task Program

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.
- 3) If interrupt is occurred while 'CALL' instruction executing, interrupt program is executed after 'CALL' instruction execution.



(5) Cyclic task program processing method

Describes the processing method in case that task (start condition) of Task program is set to 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 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	?×
Iask name: Cycle	OK
Priority: 2 V	Cancel
Task <u>n</u> umber: 0 (Cycle time: 0~7, 1/0: 8~15, Internal devic	e: 16~23)
Execution condition	
O Initialization	
O Cycle time 20 ms	
● Rising ○ Falling ○ Transition	
Internal device BIT Internal device execution conditions	
Rising Falling Transition On	Off

#### (6) I/O task program processing

It described the I/O task program processing. ("SU" type: %IX0.0.0~%IX0.0.7, 'E' type:%IX0.0.0~%IX0.0.3)

Task		?
<u>I</u> ask name: ex	ternal	ОК
Priority: 2	~	Cancel
Task <u>n</u> umber: 8	(Cycle time: 0~7, 1/0: 8~15, Internal )	device: 16~23)
Execution conc	ition	
O Initialization		
◯ <u>C</u> ycle time	ms	
<ul> <li>○ 1/0</li> </ul>	0	
	on conditions	
<ul> <li>Rising</li> </ul>	Falling     Transition	
⊸∱		
◯ Internal <u>d</u> ev	ce BIT 🗸	
-Internal dev	ce execution conditions	
De <u>v</u> ice:	< 💙 0	
Rising	◯ Falling ◯ Transition ◯ On	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 input is occurred on main unit ("SU" type: %IX0.0.0 ~ %IX0.0.7. 'E' type:%IX0.0.0~%IX0.0.3), task program is executed by external input.

(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.

Task ?X
Iask name: Internal OK
Priority: 2 Cancel
Task <u>n</u> umber: 16 (Cycle time: 0~7, I/O: 8~15, Internal device: 16~23)
Execution condition
O <u>C</u> ycle time 20 ms
01/0
I/O execution conditions     Bising Falling Transition
⊙ Internal <u>d</u> evice BIT 💌
Internal device execution conditions
Device:

(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) Is the Task Program written in shortest?

If the execution time of Task Program is longer, scan time may lengthen or be irregular. Even it may cause the collision of task program. Write the execution time as short as possible. (Especially, when writing the cyclic task program, write the execution time so that the task program can be executed within 10% cycle of the shortest task among several tasks.)

(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 orcommunication module.

(9) Program configuration and processing example

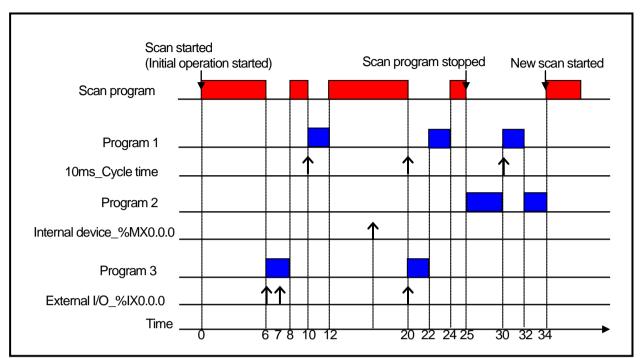
If task and program are registered as below.

Interrupt type	Interrupt name	Priority	Task No.	Program
Cycle time	10 ms_cycle time	3	0	Program 1
Internal device	Internal device_%MX0.0.0	5	16	Program 2
I/O	I/O_%IX0.0.0	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



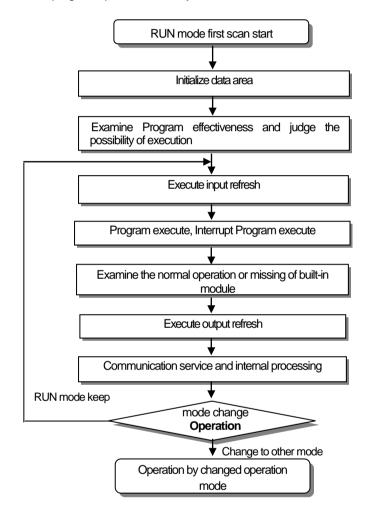
Process per time			
Time (ms)	Process		
0	Scan started and scan program started to execute.		
0~6	Scan program is executed.		
6~8	Scan program is stop because execution external I/O (%IX0.0.0) is requested. And program 3 is executed. Request of execution at 7[ms] is ignored because program 3 has been 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 (%IX0.0.0)' 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 '%MX0.0.0' 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 '%MX0.0.0' 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)		

### 5.3 Operation Mode

For operation mode of CPU module, there are 3 types such as RUN mode, STOP mode and DEBUG mode.. The section 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 stop state mode without Program operation. It transmits the program through XG5000 only in 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 SU 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.

Deb	<u>D</u> ebug <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				
Ē1	Step Into	Ctrl+F7				
[]]	Step <u>O</u> ut					
+[]	G <u>o</u> to Cursor	Ctrl+F2				
₿[]	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**

ltem	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 come in the subroutine program.	Other operation
Step Out	It go out the subroutine program.	- is identical to Step 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.	
<b>Breakpoint Conditions</b>	It specifies device value and number of scan.	

#### (a) Set/Remove Breakpoints

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

INST.Q z INST2.Q INST2.Q	XMW2O DATA	- EN <sup>NE</sup> ENO - - IN1 OUT - IN2	Motor1 Stop
	XMW40	EN <sup>NE</sup> ENO -	Motor2 Stop
	DATA	- IN2	

### (b) Go

INST.Q INST2.Q	%MW20	EN <sup>NE</sup> ENO -	Motor1 Stop
	DATA	IN2	
		EN <sup>NE</sup> ENO -	Motor2
	%MW40	IN1 OUT	Motor2 Stop
	DATA	IN2	

### (c) Step Over

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

INST.Q Z INST2.Q 	XMW20 Data	- EN <sup>NE</sup> ENO - - IN1 OUT - IN2	Motor1 Stop
	XMW40	EN <sup>NE</sup> ENO -	Motor2
	Data	IN1 OUT	Stop

#### (d) Breakpoint List

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

Breakpoin	nts List - New	PLC		?×
Use 1 V	Program NewProgram	Position Row: 0, Column: 0	Count 1	OK Cancel <u>S</u> elect All <u>R</u> eset All <u>G</u> oto Remove Remove <u>A</u> ll

- (e) Break condition
  - It sets Variable Break and Scan Break.

Break conditio	n - NewPLC			?×
Variable Breakp	oint Scan Breakpoint			
🕑 Use the va	riable as a variable breakp	oint		
<u>V</u> ariable:	error1	]	<u>S</u> elect Variable,,	
<u>P</u> rogram:	NewProgram 🗸 🗸			
<u>D</u> evice:	error1	<u>T</u> ype:	BOOL	
<u>C</u> omment:	Empty			
Value Con	dition			
Va <u>l</u> ue:	1			
			확인 취	소

Break condition - NewPLC ?X
Variable Breakpoint Scan Breakpoint
✓ Use scan breakpoint Debugger stops after scanning following counts
Scan <u>C</u> ount: 6000
확인 취소

### Remark

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

### 5.3.4 Change operation mode

(1) Operation Mode Change Method

The method change operation modes as follows.

(a) By mode key of CPU module

(b) By connecting the Programming And Debugging 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 Specific mode communication 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
3106	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)  $\rightarrow$  RUN  $\rightarrow$  STOP.

	Remark
When changing Remote RUN mode to I without interruption.	RUN mode by switch, PLC operation continues the operation
	N mode by switch but the mode change operation by XG5000 se 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 Program memory

Contents and size of program memory are as follows.

ltem	Size		
	'SU' type	'E' type	
Program memory entire area	1.37 MB	482KB	
System area:			
System program area	128 KB	128KB	
Backup area			
Parameter area:			
Basic parameter area			
<ul> <li>I/O parameter area</li> </ul>			
<ul> <li>High speed link parameter area</li> </ul>	48 KB	48KB	
P2P parameter area			
<ul> <li>Interrupt setting information area</li> </ul>			
Reserved area			
Execution program area:			
Scan program area	200 KB	50KB	
Task program area			
Program reserved area			
Scan program backup area			
Task program area			
Upload area	1 MB	256KB	
<ul> <li>User defined function/function block area</li> </ul>		ZUUND	
<ul> <li>Variable initialization information area</li> </ul>			
<ul> <li>Reserved variable assignment information area</li> </ul>			
Reserved area			

### 5.4.2 Data memory

Contents and size of data memory are as follows

Item		Size		
	liem	'SU' type	'E' type	
Data memory e	entire area	128 KB	128 KB	
System area :				
<ul> <li>I/O informati</li> </ul>	on table	81 KB	105 KB	
<ul> <li>Forced I/O tage</li> </ul>	able	OTKB	IUS KB	
<ul> <li>Reserved ar</li> </ul>	ea			
	System flag (F)	2 KB	768 B	
Flog orog	Analog image flag (U)	1 KB	704 B	
Flag area	Internal special flag (K)	8 KB	5 KB	
High speed link (L)		4 KB	2 KB	
Input image area (%I)		2 KB	256 B	
Output image area (%Q)		2 KB	256 B	
R area (%R)		20 KB	10 KB	
Direct variable area (%M)		8 KB	4 KB	

### 5.4.3 Data retain area setting

In case you want to keep the data necessary for operation and the data made during operation when PLC stops and restarts, Default(automatic) Variable Retain is used and some area of M area can be set as Retain area through parameter setting

The following is characteristic table about the device available for Retain setting.

Device	Retain setting	Characteristic
Default	Available	As for automatic variable area, Retain setting is available
М	Available	As for internal contact point area, Retain setting is available at parameter
К	Unavailable	In case of power failure, contact point is kept
F	Unavailable	System flag area
U	Unavailable	Analog data register (Retain is not available)
L	Unavailable	High speed link/P2P service status contact point of communication module (Retain is available)
W	Unavailable	Flash memory dedicated area (Retain is available)
R	Unavailable	Flash memory dedicated area (Retain is available)

### Remark

- 1) K, L, R, W devices are retained basically.
- 2) K, L devices can be deleted through "Clear PLC" of XG5000 online menu.
- 3) For more detail, refer to "Online" of XG5000 user manual.

(1) Initialization of data according to restart mode

There are three variable related with restart mode (Default, initialization and retain variable). Initialization method about each variable in case of executing restart mode is as follows.

Mode Variable assignment	COLD	WARM	
Default	Initialized as '0'	Initialized as '0'	
Retain	Initialized as '0'	Hold previous value	
Initialization	Initialized as user defined value	Initialized as user defined value	
Retain & Initialization	Initialized as user defined value	Hold previous value	

#### (2) Operation of data retain area

Method on deleting the Retain data is as follows.

- RESET through XG5000 (Overall Reset)
- Execute "Clear PLC" through XG5000 at STOP mode
- Writing by program (Initialization task recommended)

For holding of retain area data or reset (clear) operation according to PLC operation, refer to the following table.

Classification	Retain	M area Retain	R area
Reset	Hold previous value	Hold previous value	Hold previous value
Overall reset	Initialized as 'O'	Initialized as '0'	Hold previous value
STOP→RUN	Hold previous value	Hold previous value	Hold previous value

#### Remark

1) Terms on three types of variable are as follows.

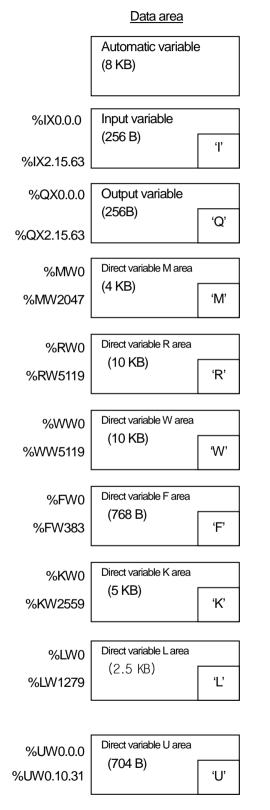
- (1) Default variable : variable not set as INIT or Retain variable
- (2) INIT variable : initial value is set
- (3) Retain variable : Holds previous value

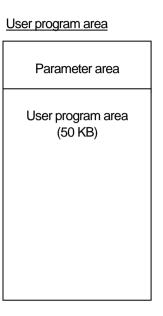
#### (3) Initialization of data

If PLC becomes 'Cleat Memory' status, memory of all devices is reset to 0. When you want to specify initial value, use initialization task. In CPU module, there are two types of built-in memory. One is program memory to save program made by user, for user to structure system. Another is data memory providing device area saving data during operation.

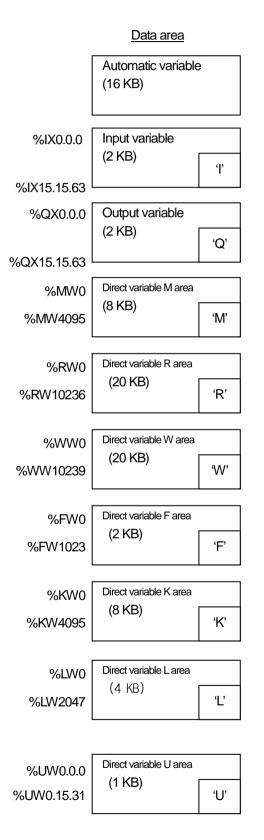
# 5.5 Data Memory Map

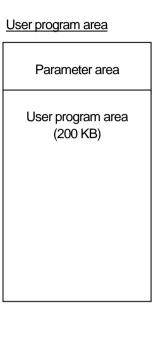
### 5.5.1 'E' type





### 5.5.2 'SU' type





# **Chapter 6 CPU Functions**

# 6.1 Type Setting

It describes setting of XGB PLC type.

New Project	i –			?×
Project <u>n</u> ame:				OK
File <u>d</u> irectory:	C:\XG5000\			Cancel
		(	<u>F</u> ind	
PLC Series				
⊖×G <u>K</u>	⊙×G <u>B</u>	⊖×GI	⊖×G <u>R</u>	
CPU type: Program name:	XGB-XBMS XGB-DR16C3 XGB-DR32HL XGB-XBCE	✓ □.	Auto-allocation	
	XGB-XBCH XGB-XECH XGB-XECS	C	) s <u>t</u>	
Project description				
			~	

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-XBCH	"H" type : XBC-DR32/64H , XBC-DN32/64H	Compact type
XGB	XGB-XBCS	"S(U)" type : XBC-DR20/30/40/60SU, XBC-DN20/30S(U), XBC-DN40/60SU XBP-DN20/30/40/60SU	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
	XGB-XECSU	"SU" type : XEC-DR20/30/40/60SU, XEC-DN20/30/40/60SU, XEC-DP20/30/40/60SU,	Compact type
	XGB-XECE	"E" type : XEC-DR10/14/20/30E, XEC-DN10/14/20/30E, XEC-DP10/14/20/30E	Compact type

### Remark

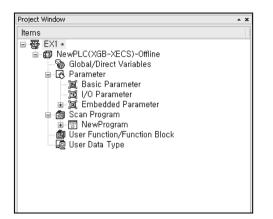
• In case type is different, connection is not available.

### 6.2 Parameter Setting

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".

Basic Parameter Setting	? 🛛
Basic Operation Setup Retain Area Setup	
Basic Operation Fixed period operation mode (1 ~ 999ms): Time Setup Watchdog Timer: (10 ~ 1000ms) Standard Ingut Filter: Bestart Method Cold Restart Warm Restart	Output Control  Output during <u>d</u> ebugging  Keep output when an <u>gror occurs</u> Keep output when converting <u>B</u> UN->STOP  Keep output when converting <u>S</u> TOP->RUN
	Default 확인 취소

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	Output during debugging	Set to allow output actually during debugging operation.	Allowance/Prohibition
operations	Keep output when an error occurs	Set 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 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 retain of each device.	%MW0~%MW4095
Error Operation resumes in operation case of operation error		Set to pause or resume operation in case of operation error.	Pause/Resume

#### 6.2.2 I/O parameter setting

This sets and reserves each I/O information. Clicking "I/O Parameter\_ in the project window shows the following setting window.

I/O Parameter Setting All Base Set Base	_	_	-	_	? ×
CP Base 00: Default     C0: Default     C0: Default     C2: Default     C2: Default     C2: Default     C2: Default     C3: Default     C	3         - ●         ★ EC-DNADS DC 2           5         - ●         ★ EC-DNADS DC 2           6         - ●         ★ EC-DNADS DC 2           7         - ●         ★ EC-DNADS DC 2           8         - ●         ★ EC-DNADS DC 2           9         - ●         ★ EC-DNADS DC 2           10         - ●         ★ EC-DNADS DC 2	Comment 4V INPUT 12points/REL 4V INPUT 13points/REL 4V INPUT 30points/REL 5C 24V INPUT 12points/ 22 4V INPUT 12points/ 24V INPUT 12points/ 4V INPUT 36points/TR ( 4V INPUT 36points/TR (		Emergency Out	Allocation
Value Type Device/Valia	Lommer	>			

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 All Base Set Base	_	_	_	_	_	?×
🖃 🗊 Base 00 : Default	Slot	Module	Comment	Input Filter	Emergency Out	Allocation
00 : XEC-DR40S (D	0(main)	XEC-DR40S (DC 24V I		3 Standard [ms	Default	
01 : Default	1	<b></b>				
02 : Default 23 : Default	2					
04 : Default	3					
05 : Default	4					
06 : Default	5					
07 : Default	6					
	7					
09 : Default	8					
10 : Default	9					
	10					
	Slot De	elete <u>B</u> ase Base <u>S</u> etting	Delete All	iețails <u>P</u>	rint 🔻	OK Cancel

Clicking "Details\_ in "Slot Position\_ shows the following window to set filter and emergency output.

Input/Output Module Setting	Input/Output Module Setting
Module: XEC-DR40S (DC 24V INPUT 24points/RELAY OUTPUT Input Filter: Standard Pulse Cr 1 ms 3 ms Output - 5 ms 10 ms 20 ms Channer OT (08-15) Liear	Module: XEC-DR40S (DC 24V INPUT 24points/RELAY OUTPUT Input Filter: Standard Pulse Catch: 0 1 2 3 4 5 6 7 Output Channel Emergency Output Channel 00 (00-07) Clear Channel 01 (08-15) Hold Clear
OK Cancel	OK Cancel

#### 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.

Error/Warning - NewPLC	?×								
Error/Warning Error Log									
Index Code Date Time Contents ⊗0 500 1999-12-31 00:00:00,999 Data backup error									
Details/Remedy Change the battery and reboot the PLC, Customer support required if the same error occurs again,	<								
Update Clear									
Read <u>A</u> ll <u>S</u> ave CI	ose								

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 stored until selecting a menu of XG5000 and clicking "Clear".

### 6.3.2 Troubleshooting

(1) Trouble types

Malfunction 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 for PLC system malfunction 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 %FD1.
- (2) For details of flag, refer to the appendix 1 Flag List.

### 6.4 Remote Functions

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 User's Manual.

# 6.5 Forced Input/Output On and Off Function

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

### 6.5.1 Force I/O setup

Click  $\ensuremath{\,^{\ensuremath{\scriptstyle \mathbb{I}}}}$  Online  $\ensuremath{\,^{\ensuremath{\scriptstyle \mathbb{I}}}}$  -  $\ensuremath{\,^{\ensuremath{\scriptstyle \mathbb{I}}}}$  Force I/O  $\ensuremath{\,^{\ensuremath{\scriptstyle \mathbb{I}}}}$  .

Forced I/O Setup Module address Base: 0 🗸	Slot: 0 🗸	Forced inpu Forced outp	ut: ○ <u>E</u> nable ⊙ Disab but: ○E <u>n</u> able ⊙ Di <u>s</u> ab	
Set by Devcie Set	%IW0.0.1	%1W0.0.2 Enable Value 32 33 33 33 formation, Pleas	2:1W0.0.3 Enable Value 48 48 49 49 49 49 49 49 49 49 49 49 49 49 49 49 4	Forced device list
8 8 8 9 9 9 10 10 11 11 12 12 13 13 14 14 14 Enable Input	24   24 25   25 26   26 27   27 28   28 29   29 30   30 0utput   ⊻ariable:	40 • 40 41 • 41 42 • 42 43 • 43 44 • 44 45 • 45 46 • 46 5 • Delete All	56 ● ● 56 57 ● 57 58 ● ● 58 59 ● ● 59 60 ● ● 60 61 ● 61 62 ● 62 59 ● 62 59 ● 62	Delete Cancel

ltem		Description		
Module address		Select Base and Slot		
Application		Set whether to allow or not Force I/O		
Flag		Set whether to allow or not Force I/O by bits.		
Variables	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.		
Forced device list		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.

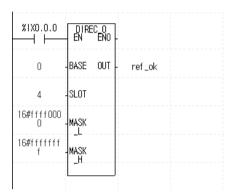
(b) If you don't set "Keep output when an error occurs", output is off when an error occurs.

### 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.

In order to refresh I/O data during program execution, use 'DIREC\_IN, DIREC\_OUT' function to read input contact point immediately and use it for operation, or output operation result immediately.

Program outputting data 2#0111\_0111\_0111\_0111 to 32 point transistor output model equipped at extension module slot 4 during scan.



- (1) Input base number 0 and slot number 4 where output module is equipped
- (2) Since data to output is 16 bit during scan, enable lower 16 bit among value of MASK\_L (16#FFFF0000)
- (3) If execution condition (%IX0.0.0) is On, DIREC\_O (Immediate refresh of output module) is executed and data of output module is set as 2#0111 0111 0111 0111.

#### Remark

(1) For detail of DIREC\_IN, DIREC\_OUT function, refer to XGI/XGR/XEC instruction manual

(2) When DIREC\_IN,DIREC\_OUT function is used, the value is applied immediately. They have higher priority than forced I/O.

### 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) 'Heavy trouble' uses '\_ANC\_ERR' flag and 'Light trouble' uses '\_ANC\_WB' flag.
- (2) Heavy trouble of external device
- (a) When detecting heavy trouble of external device at user program, write error code defined by user at system flag 'ANC\_ERR' and turn on \_CHK\_ANC\_ERR flag. If \_CHK\_ANC\_ERR flag is on, at the end of scan, '\_ANNUN\_ER' bit of '\_CNF\_ER', system error representative flag, is on and PLC turns off all output of output module (it can be different according to the setting of basic parameter) and becomes error status (Error LED flickers with 1s cycle)
- (b) In case of heavy trouble, find out reason by checking '\_ANC\_ERR' flag.
- (c) To turn off the ERR LED caused by flag detecting heavy trouble of external device, reset or restart PLC

Example)

Error	MOVE En Eno					 	CHK_ANC_ER
34 -	IN	OUT	anc_err				

#### (3) Light trouble of external device

- (a) When detecting heavy trouble of external device at user program, write error code defined by user at system flag 'ANC\_WAR' and turn on \_CHK\_ANC\_WAR flag. If \_CHK\_ANC\_WAR flag is on, at the end of scan, '\_ANNUN\_WAR' bit of '\_CNF\_WAR', system warning representative flag, is on. When light trouble occurs, LED flickers with 2s cycle.
   (a) When detecting heavy trouble flag, is on. When light trouble occurs, LED flickers with 2s cycle.
- (b) In case of heavy trouble, find out reason by checking '\_ANC\_WAR' flag.
- (c) If \_CHK\_ANC\_WAR is off, light trouble status is canceled and Error LED is off.

#### Example)

1						
	;Error ──┤	MOVE En Eno				_CHK_ANC_WA R 
	20 -	IN OUT	ANC_WAR			
	1					

### 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.

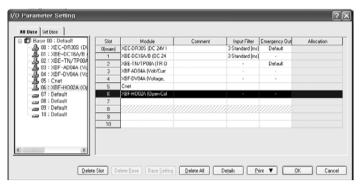
#### (1) Allocation of I/O number

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

System Configur	ration				
Number of Connection stage	Туре	I/O allocation	Remarks		
0	XEC-DN30SU	Input : %IX0.0.0 ~ %IX0.0.63 Output : %QX0.0.0 ~ %QX0.0.63	Actual Input : %IX0.0.0 ~ %IX0.0.17 Actual Output : %QX0.0.0 ~ %QX0.0.11		
1	XBE-TN32A	Input : %IX0.1.0 ~ %IX0.1.63 Output : %QX0.1.0 ~ %QX0.1.63	Actual Output : %QX0.1.0 ~ %QX0.1.31		
2	XBE-TN16A	Input : %IX0.2.0 ~ %IX0.2.63 Output : %QX0.2.0 ~ %QX0.2.63	Actual Output : %QX0.2.0 ~ %QX0.2.15		
3	XBE-DC08A	Input : %IX0.3.0 ~ %IX0.3.63 Output : %QX0.3.0 ~ %QX0.3.63	Actual Input : %IX0.3.0 ~ %IX0.3.7		
4	XBE-RY16A	Input : %IX0.4.0 ~ %IX0.4.63 Output : %QX0.4.0 ~ %QX0.4.63	Actual Output : %QX0.4.0 ~ %QX0.4.15		
5	XBL-C21A	Input : %IX0.5.0 ~ %IX0.5.63 Output : %QX0.5.0 ~ %QX0.5.63	-		
6	XBF-AH04A	Input : %IX0.6.0 ~ %IX0.6.63 Output : %QX0.6.0 ~ %QX0.6.63	-		
7	XBL-C21A	Input : %IX0.7.0 ~ %IX0.7.63 Output : %QX0.7.0 ~ %QX0.7.63	-		

Empty I/O point is available for internal relay.

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



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

🗃 NewPLC - System Monitoring - [Base 0]									
Eile View Base PLC Help									
XGB-XECS <sup>XBE-</sup> D	XBE- XBE- XBE- XBF- X COSA DC16 RYOS TNOSA AHO4A	BF- PD02A XBL-C21A							
		ο							
RS-232C R 🖸 🖸		-23							
System information	Assigns Information - Fixed Location	Comment							
Base 0 : XGB-M11B     Base 0 : XGB-XECS		Main Base(11 Slots) Standard CPU Module(I/O: Maximum 284 Points)							
Slot 0: Internal Cnet     Slot 0: XEC-DR30S, Input	[%IX0,0,0 ~ %IX0,0,63]	Internal Cnet Module, RS-232C/RS-485 DC 24V Input 18 Contacts							
	[%Q×0,0,0 ~ %Q×0,0,63]	Relay Output 12 Contacts							
	[% X0, 1, 0 ~ % X0, 1, 63] [% X0, 2, 0 ~ % X0, 2, 63]	DC 24V Input, 8 Contacts (Current Source/Sink Input) DC 24V Input, 16 Contacts / DC12/24V Input, 16 Contacts							
	[%QX0,3,0 ~ %QX0,3,63] [%QX0,4,0 ~ %QX0,4,63]	Relay Output, 8 Contacts (8/COM) / 8 Contacts (1/COM) Transistor Output, 8 Contacts (0,5A, Sink Output/Source Output)							
	[%070,4,0 ~ %070,4,05]	A/D Voltage/Current 2 Ch, D/A Voltage/Current 2 Ch							
		Position Control Pulse(LD), Output Type(2 axis) Cnet Module, RS-232C							
IIII Slot 10: Empty slot									
Approximation of the second se									
ation -									
- information -		>							
System									
Ready	XG-SIM(XGB-XECS)	Online L. Simulator, OK							
Incady	Au-Sim(Adb-AECS)	Unine L, Unidadi, UK							

### 6.9 Online Editing

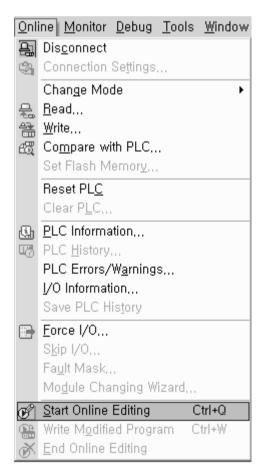
It is possible to modify program and communication parameter during operation of PLC during control operation The following describes basic modification. For details of modifying program, refer to XG5000 Users Manual.

The Items to be modified during operation are as follows.

- Program
- Communication parameter
- (1) It displays programs that are currently running.

	EN ENO				ь
825 data1	- IN1 OUT				
0 data2	- IN2				

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



 TIS
 NE

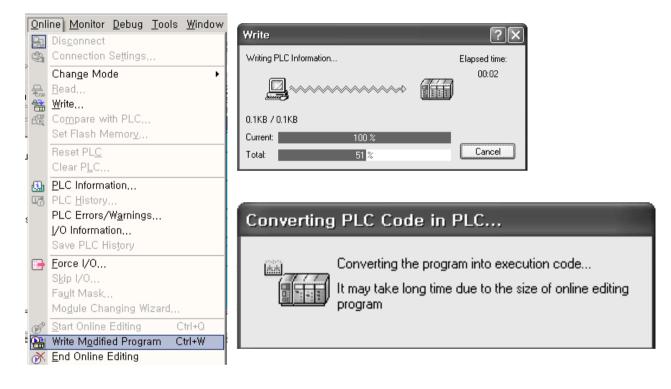
 879
 IN1

 0
 IN1

 0
 IN2

(3) If you modify program, background color changes to indicate start of online editing.

(4) Upon the modification of program, click "Online" - "Write Modified Program".



Online Monitor Debug Tools Window 🖳 Dis<u>c</u>onnect 🕲 Connection Settings... Change Mode Þ 🔒 <u>R</u>ead... 🖀 <u>W</u>rite... 🕂 Compare with PLC... Set Flash Memory... Reset PLC Clear PLC... XG5000 ELC Information ... PLC History ... ? End Online Editing? PLC Errors/Warnings... J/O Information... 예(Y) 아니오(<u>N</u>) Save PLC History 🕞 Eorce I/0... Fa<u>u</u>lt Mask... Module Changing Wizard... 🔗 Start Online Editing Ctrl+Q

(5) Upon the writing of program, click "Online" - "End Online Editing".

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

Ctrl+₩

	15	NE EN ENO				ь —
91 dat	10 ta1 -	IN1 OUT				
( dat	0	IN2				

#### Remark

🕦 Write Modified Program

🕅 End Online Editing

- For parameter modification during run, change each parameter on XG-PD and click "Online" "Write Modified Program".
- When using "Online\_ "Write Modified Program , communication operation can be delayed
- If failed in Write Modified Program, it is necessary to rewrite the program.

### 6.10 Reading Input/Output Information

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

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

I/O information		?×				
Base module information	Slot I/O ir	nformation				
📅 Base 00	Slot	Module				
	0	XEC-DR30S (DC 24V INPUT 18points/				
	1	XBE-DC16A/B (DC 24V INPUT, 16point				
	2	XBE-TN/TP08A (TR OUTPUT, 8points)				
	3	XBF-AD04A (Volt/Current, 4-CH)				
	4	XBF-DV04A (Voltage, 4-CH)				
	5	Cnet				
	6	XBF-H002A (Open-Collector, 2-CH)				
	7					
	8					
	9					
	10					
	1					
Show Existing Base Only						
I/O Sync Details OK Cancel						

(2) When details are clicked after selecting a module, it displays detail information of a selected module.

M	lodule Info.	- XBE-TN/TP16A (TR OUTP ? 🗙	]
	Details	Content	
	Module name	XBE-TN/TP16A (TR OUTPUT, 16points)	
		Error Code(0x0)	
	Error	Ver. 1.20	
	OS Ver.		
	OS Date	2007-08-31	
		<u><u>C</u>lose</u>	

# 6.11 Monitoring

It monitors system information of XGB series system.

(1) Clicking  $\[\]Monitor_{\]}$  displays the following sub-menus.

<u>M</u> or	<u>Monitor</u> <u>D</u> ebug <u>T</u> ools <u>W</u> indow <u>H</u> el					
	Start/Stop <u>M</u> onitoring					
	<u>P</u> ause					
	<u>R</u> esume					
₽	P <u>a</u> using Conditions					
3	Change Current <u>V</u> alue,					
Ð	System Monitoring					
	<u>D</u> evice Monitoring					
a	Special Module Monitoring					
<u>w</u>	<u>T</u> rend Monitoring					
ø	Custom <u>E</u> vents					
	Data Tra <u>c</u> es					

### (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.	

(a) Device monitoring

It displays all data in each device area

🛄 NewPLC - Device Monitoring	- [M]	- DX
Eile Edit ⊻iew PLC Window E	lp	- 8 ×
2 🖬 🐰 🖿 🛍 👗 📥 🎒	8	
<b>B</b> 4 0 # # E E E		
Device Tree × ×	0 1 2 3	^
GB-XECS	2MW0 0000 0000 0000	_
	%₩₩4 0000 0000 0000 0000 %₩₩8 0000 0000 0000 0000	
M M	%MW8 0000 0000 0000 0000 %MW12 0000 0000 0000 0000	
	2000 0000 0000 0000 0000 2000 2000 200	
μ	2MW20 0000 0000 0000 0000	
- Ö U	%MW24 0000 0000 0000 0000	
- 🛱 R	2MW28 0000 0000 0000 0000	
	%MW32 0000 0000 0000 0000 %MW36 0000 0000 0000 0000	
	%MW40 0000 0000 0000 0000	
	2MW44 0000 0000 0000 0000	
	%MW48 0000 0000 0000 0000	
	2MW52 0000 0000 0000 0000	
	%MW56 0000 0000 0000 0000 %MW50 0000 0000 0000 0000	
	<u>%MW60 0000 0000 0000 0000 0000 0000 0000 </u>	
	%MW64 0000 0000 0000 0000 0000 0000	
	2/1/2/2 0000 0000 0000 0000	
	%MW76 0000 0000 0000 0000	
	2MW80 0000 0000 0000 0000	
	2MW84 0000 0000 0000 0000	
	%MW98         0000         0000         0000         0000           %MW92         0000         0000         0000         0000	
	2000 0000 0000 0000 0000 2000 2000 200	
	2/MW100 0000 0000 0000 0000	
		*
Device		
Ready	XGB-XECS Online L, USB, Warning	

I

#### (b) Change current value

It changes the current value of each device selected in the current program window.

Change Current Value ?X	Change Current Value ?X
Device: %MX1	Device: %MW5
Bit number: 1 bit	Bit number: 16 bit
Display: Hexadecimal	Display: Hexadecimal
Set Value O DN (1) O DFF (0)	Set Value
OK Cancel	OK Cancel

(c) Pausing conditions It stops monitoring if a device value set in the program corresponds.

Pausing Conditions - NewPLC ?X							
Select All	<u>R</u> eset All				<u> </u>		
Use Progra			∂et value 1	Type BOOL	Comment		
6							
Monitor Paus	е	?>	<				
🕮 Monitor is pau	sed						
Name: %MX0				OK	Cancel		
Condition: ==							
Set Value: 1							
Value: 1							
	OK						

(d) Trend monitoring

It displays device values graphically.

ON		(%FX147)			Device Value _T1S(%FX ON
_T1S(%FX147), - - - - - - - - - - - - - - - - - - -	14:02:42.9- 14:02:45.6- 14:02:48.2-	14:02:50.9- 14:02:53.5- 14:02:56.1-	14:02:58.8- 14:03:01.4- 14:03:04.0- 14:03:06.7-	14:03:10.6- 14:03:15.8- 14:03:18.6- 14:03:18.5- 14:03:18.5-	
60 50 %	MW100				Device Value %MW100 51.00
40-					
30-					
20					
14:02:40.3 <mark>0</mark> 14:02:42.9 14:02:45.6	14:02:48.2- 14:02:50.9- 14:02:53:5-	14:02:56.1- 14:02:58.8-	14:03:01.4- 14:03:04.0- 14:03:06.7- 14:03:10.6-	14:03:13.2- 14:03:15.8- 14:03:18.5- 14:03:18.5-	

#### (e) Custom events

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

Cus	ustom Event										
Eve	Event Settings Event History										
Cust	om Eve	nt Ca	pture: 💿 🛙	<u>D</u> isable O <u>E</u>	nable						
ID	Enable		Туре	Program	Variable	Device	Event condition		Message		_
1	>	1	Information	NewProgram		%MX1	Rising	stop!!			
2											
3											
4											
5											
<											
								<u>M</u> enu ▼	Apply PLC	OK Cano	el
											_

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 %MX0,%MW50 are recorded.

Event Settings		?×
Basic Settings A	ssociated Device Setup	
<u>P</u> rogram:	NewProgram	*
<u>D</u> evice:	%MX1	<u>V</u> ariables
Event condition:	Bising	t
<u>T</u> ype:	Alarm	
<u>M</u> essage:	stop!!	
		~
		확인 취소

#### 3) Set the relative device(s).

Event S	Event Settings							
Basic	Basic Settings Associated Device Setup							
Availa	able 01 (Curre	ent) / 16 (Maximu	m)					
ID	Program	Variable	Device	Туре				
1	NewProgram		%MX0	BOOL				
2	NewProgram	•	%MW50	INT				
3								
			-					
			확인		취소			

4) Monitor event history of custom event.

Custo	om Ev	/eni	t								?×
Event 3	Gettings	1	Eve	ent History							
Number			ID		Time		Variable			Contents	
1					14:21:01:882			%MX1	l		
2	~				14:21:29:235			%MX1			
3	× 8	larm	1	2012-07-23	14:21:33:216	<global></global>		%MX1	stop!!		
									Menu <b>V</b>	Apply PLC OK	Cancel
										Obbit to OK	

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

Event I	listory				?×
Event	History				
Even Conc Varia	lition: Rising ble: sage:	Type Prog	e: 14:21:33 e: Alarm ram: <gl( ce: %MX</gl( 	DBAL>	Back Next Copy
Relat	ed Device List:				
ID 1	Program	Variable	Device	Туре	Value
	<global></global>		%MX1	BOOL	
					Close

Remark

•For details of monitor, refer to XG5000 User's Manual.

### 6.12 Clear All PLC

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

### (1) How to clear all PLC

(a) Click "Online" - "Clear All PLC".

Online Settings - NewPLC						
Connection settings Type: RS-232C V Settings						
Depth: Local 🗸 Preview						
General						
Timeout interval: 5 🜩 sec.						
Retrial times:						
Read / Write data size in PLC run mode						
🔿 Normal 💿 Maximum						
* Send maximum data size in stop mode						
Connect OK Cancel						

(b) After selection connection method, click  $\ensuremath{\,^{\sc c}}$  Connect\_ or  $\ensuremath{\,^{\sc c}}$  OK\_ .



(c) If you select <sup>[</sup>Yes] on the dialog box, PLC program, parameter, data, password will be deleted.

#### Remark

•Clear All PLC function can be executed though not connected.

•If you use Clear All PLC function, password will be deleted.

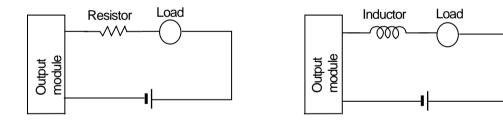
•If you lose password, use this function to clear password.

# **Chapter 7 Input/Output Specifications**

## 7.1 Introduction

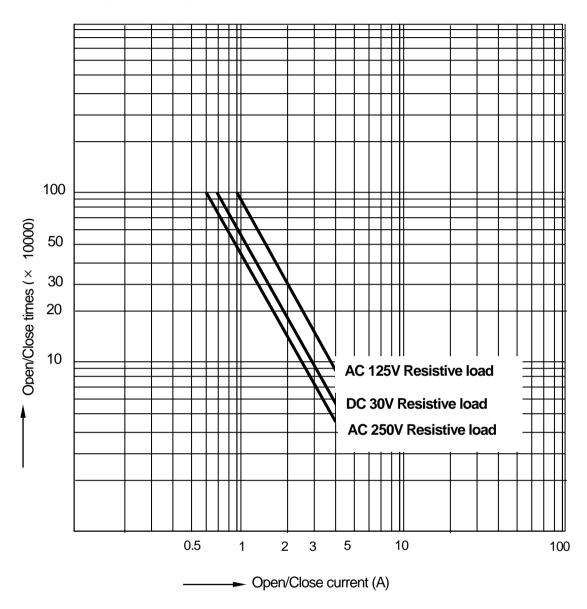
The section describes the notices when selecting digital I/O module used for XGB series.

- (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 depending on module type 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.

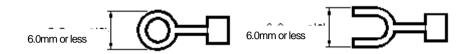


(7) Relay life of Relay output module is shown as below.

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



- (9) The cable size connected to a terminal strip should be 0.3~0.75<sup>mm<sup>2</sup></sup> stranded cable and 2.8<sup>mm</sup> 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 (M3 screw)	66 ~ 89 N⋅cm

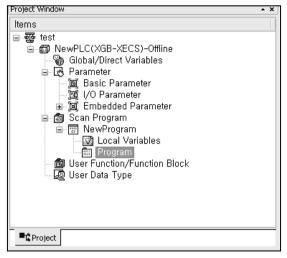
(11) Relay life graph is not written based on real use. So consider margin. Relay life is specified under following condition.

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

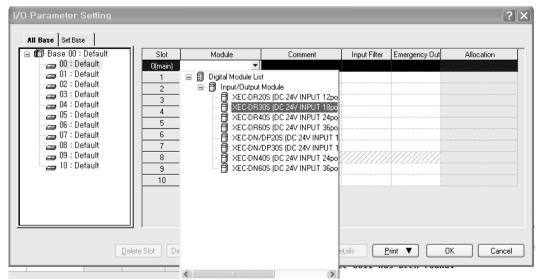
- (a) Setting input filter
- 1) Click I/O Parameter  $_{\ensuremath{\mathbb I}}$  in the project window of XG5000



#### 2) Click "Module\_ at the slot location.

🔤 00 : Default	Slot	Module	Comment	Input Filter	Emergency Out	Allocation
00 : Default	0(main)					
02 : Default	2					
🔄 🔄 03 : Default	3				······	
🔤 04 : Default	4					
05 : Default 06 : Default	5					
2 07 : Default	6					
- 08 : Default	7				······	
🔤 09 : Default	8	///////////////////////////////////////		7//////////////////////////////////////		
10 : Default	9	arka kasha kasha kasha kasha kasha kasha kash	hadaahadaahadaahadaahadaahadaahadaahad	hiska ha ka ha ha ha ha ha ha ha	fa ha ka ka ka ka ka ka ka ka maana	
	10					
9: Default 10: Default	9					

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



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

Γ

I/O Parameter Setting	_					[	?X
All Base Set Base							
🖃 🗂 Base 00 : Default	Slot	Module	Comment	Input Filter	Emergency Out	Allocation	
00 : XEC-DR30S (D(	0(main)	XEC-DR30S (DC 24V I		3 Standard [ms]	Default		
01 : Default	1						
02 : Default	2						
04 : Default	3						
05 : Default	4						
06 : Default	5						
07 : Default	6						
08 : Default	7		yyyyyyyyyyyyy	······································			
09 : Default	8						
10 : Default	9						
	10						
< >>							
	1						
Delete	e Slot De	lete <u>B</u> ase Base <u>S</u> etting	Delete All De	etails <u>P</u> i	int 🔻 📃 🛛	K Cano	el

5) Set filter value.

Input/(	nput/Output Module Setting								
Module:	Module: XEC-DR30S (DC 24V INPUT 18points/RELAY OUTPUT								
Input	Input								
Filter:	Filter: Standard								
Pulse	Pulse Catch: 🗹 0 💌 1 🔜 2 🔜 3 🔜 4 🔜 5 🔜 6 🔜 7								
Output									
	Channel	Emergency Output							
C	hannel 00 (00-07)	Clear							
C	hannel 01 (08-15)	Clear							
		OK Cancel							

- (b) Setting output status when error occurs
- 1) Click Emergency Out in the I/O parameter setting window.

I/O Parameter Setting				_	_	?×
All Base Set Base						
🖃 🗊 Base 00 : Default	Slot	Module	Comment		Emergency Out	Allocation
	0(main)	XEC-DR30S (DC 24V I		3 Standard [ms]	Default	
01 : Default 02 : Default	1					
03 : Default	2					
04 : Default	3					
05 : Default	4					
06 : Default	5					
07 : Default	6					
08 : Default	7					
09 : Default	8					
10 : Default	9					
	10					
< >						
	1					
Delete	Slot De	lete Base Base Setting		etails P	rint 🔻	OK Cancel

2) Click Emergency Output.

Input/O	utput Module Setting	?	$\mathbf{X}$
Module: >	EC-DR30S (DC 24V INPUT 18pc	ints/RELAY OUTPL	IT
Filter: Pulse C Output - Cha Cha	3 ms 5 ms 10 ms 20 ms	i 6 7	
	OK.	Cancel	

If 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

Γ

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

	Model	Main unit						
Specification		XEC-DR10E	XE	C-DN10E	Ξ		XEC-DP10E	
Input point		6 point						
Insulation met	hod	Photo coupler insulation						
Rated input vo	ltage	DC24V						
Rated input cu	irrent	About 4 <sup>mA</sup> (Contact poir	nt 0~3: abo	out 7 <sup>mA</sup> )				
Operation volta	age range	DC20.4~28.8V (within ri	ople rate 5	%)				
On voltage / O	n current	DC19V or higher / $3^{mA}$ c	or higher					
Off voltage / O	ff current	DC6V or lower / $1^{mA}$ or l	ower					
Input resistance	e	About 5.6 <sup>k</sup> ? (%IX0.0.0~	%IX0.0.3:	about 2.	<b>7</b> kΩ)			
Response	$Off \rightarrow On$	1/3/5/10/20/70/100ms (S	ot by I/O n	aramata	r) Dofa	1 <b>H: 2</b> ms		
time	$On \rightarrow Off$			alamete	i) Delat	<b>III. 3</b> 110		
Insulation pres	sure	AC560Vrms / 3 cycle (al	titude 2000	Om)				
Insulation resis	stance	$10^{M\Omega}$ or more by MegOI	nmMeter					
Common met	nod	6 point / COM						
Proper cable s	ize	0.3 <sup>mm<sup>2</sup></sup>						
Operation indic	cator	LED On when Input On						
External conne method	ection	14 point terminal block c	onnector (	M3 X 6 s	crew)			
Weight		330g	313g			313g		
Circuit configu	ration		No.	Contact	No.	Contact	Туре	
				405 .	TB1	RX		
<del></del>		← DC5V ← Photo coupler LED ←	TB2 TB4	485+ 485-	TB3	ΤХ	TB2 485+ TB1 TB3	
				TB5	SG	TB4 485- SG TB5		
			TB6	100	TB7	101	TB6 I00 I01 TB7	
Circuit Com Com Com Circuit Circuit Circuit Circuit			TB8	102	TB9	103	TB8 I02 TB9 TB10 I04 I03 TB9	
			TB10	104			TB12 NC TB13	
			TB12	NC	TB11	105 NC	TB14 COM	
			TB14	COM	TB13	NC		

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

	Model			Main unit	t				
Specification		XBC-DR14E	XEC-DP14E						
Input point		8 point							
Insulation met	hod	Photo coupler insulation							
Rated input vo	ltage	DC24V							
Rated input cu	irrent`	About 4 <sup>mA</sup> (Contact point	:0~3: abc	out 7 <sup>mA</sup> )					
Operation volta	age range	DC20.4~28.8V (Within rip	ople rate 5	5%)					
On voltage / O	n current	DC19V or higher / 3 <sup>mA</sup> or	r higher						
Off voltage / O	ff current	DC6V or lower / $1^{mA}$ or lo	ower						
Input resistanc	æ	About 5.6 <sup>k</sup> Ω (%IX0.0.0~	·%IX0.0.3	3: about 2	2.7 <sup>k</sup> Ω)				
Response	$Off \rightarrow On$	1/3/5/10/20/70/100 <sup>ms</sup> (set	by I/O pa	ramotor)	default.	<b>3</b> ms			
time	$On \rightarrow Off$	1/3/3/10/20/10/100me (Set	by i/O pa	ianeter)	uerauit.	Jiio			
Insulation pres	sure	AC560Vrms / 3 cycle (altitude 2000m)							
Insulation resis	stance	10 <sup>MQ</sup> or more by MegOhmMeter							
Common met	nod	8 point / COM							
Proper cable s	ize	0.3 <sup>mm²</sup>							
Operation indi	cator	LED On when Input On							
External conne method	ection	14 point terminal block connector (M3 X 6 screw)							
Weight		340g	315g			315g			
Circuit configu	ration		No.	Contact	No.	Contact	형 태		
			TB2	485+	TB1	RX			
[		<del>\$</del> <del>\$</del>	TB4	485-	TB3	ΤX	TB2 485+ TX TB3		
					TB5	SG	TB4 485- TB5		
			TB6	100	TB7	101	TB6 100 TB7		
	5	Internal	TB8	102	TB9	103	102 TB9		
COM		circuit.	TB10	104	TB11	105	TB12 105 TB11		
DC24V	Terminal block no		TB12	106	TB13	107	100 TB13		
			TB14	COM	1010	107			

T

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

Г

	Model	Main unit								
Specification		XEC-DR20E	X	EC-DN2	0E		XEC-DP20E			
Input point		12 point								
Insulation metho	d	Photo coupler insulation								
Rated input volta	ge	DC24V								
Rated input curre	ent	About 4 <sup>mA</sup> (Contact point	:0~3: abc	out 7 <sup>mA</sup> )						
Operation voltage	e range	DC20.4~28.8V (within rip	ple rate 5	%)						
On voltage / On o	current	DC19V or higher / 3mA or	<sup>,</sup> higher							
Off voltage / Off of	current	DC6V or lower / $1^{mA}$ or lo	ower							
Input resistance		About 5.6 <sup>k</sup> Ω ((%IX0.0.0~	%IX0.0.7	: about 2	2.7 <sup>k</sup> Ω)					
Response time	$Off \rightarrow On$	1/3/5/10/20/70/100 <sup>ms</sup> (se	t by I/O p	aramoto	r) dofouli	• <b>2</b> ms				
Response unie	$On \rightarrow Off$	1/3/3/10/20/70/100 <sup>m3</sup> (se	it by I/O p	aramete	i) uelauli	. 3113				
Insulation pressu	re	AC560Vrms / 3 cycle (alti	tude 2000	Om)						
Insulation resista	nce	10 <sup>MΩ</sup> or more by MegOh	mMeter							
Common method	d	12 point / COM								
Proper cable size	9	0.3 <sup>mm²</sup>								
Operation indicat	or	LED On When Input On								
External connect	ion method	24 point terminal block co	onnector (	M3 X 6 s	screw)	-				
Weight		450g	418g			418g	I			
Circuit configurat	ion		No.	Contact	No.	Contact	Туре			
					TB1	RX				
			TB2	485+	TB3	тх	TB1			
		DC5V	TB4	485-			TB2 485+ TX TB3			
ТВ6			TB6	100	TB5	SG	485- SG TB5			
			TDO	100	TB7	101	TB6 I00 TB7			
	₽ ¦₹		TB8	102	TB9	103	102 TB9			
	5	circuit	TB10	104	TB11	105	TB10 I04 TB11			
			TB12	106		105	TB12 IO6 TB13			
DC24V	T	erminal block no.	TB14	108	TB13	107	TB14 108 109 TB15			
		1014	100	TB15	109	TB18 II0 TB17				
				110	TB17	l11	TB20 NC TB19			
			TB18	NC			TB22 NC TB21			
			TB20	NC	TB19	NC	TR24 NC TB23			
			TB22		TB21	NC				
				NC	TB23	NC				
			TB24	СОМ						

# 7.2.4 XEC-DR30E/DN30E/DP30E 18point DC24V input (Source/Sink type)

XEC-UN3DE         XEC-UN3DE         XEC-UN3DE         XEC-UN3DE           Input point         18 point         18 point         Insulation         Reted input voltage         DC24V           Rated input current         About 4mA (Contact point 0-3: about 7mA)         Operation voltage range         DC20.4-28.8V (within ripple rate 5%)         On voltage / On current         DC19V or higher / 3mA or higher           Off voltage / On current         DC6V or lower / 1mA or lower         Input resistance         About 5.6K2 (%JX0.0.0-%JX0.0.7: about 2.7K2)           Response         Off -> On time         1/3/5/10/20/70/100ms (set by I/O parameter) default: 3ms         Insulation resistance           Insulation pressure         AC560Vrms / 3 cycle (altitude 2000m)         Insulation resistance         10/k2 or higher by MegOhmMeter           Common method         18 point / COM         Proper cable size         0.3rm           Operation indicator         LED on when input On         External connection method         24 point terminal block connector (M3 X 6 screw)           Weight         465g         423g         423g         178           TB1         RX         TB1         RX         TB1         TB1           TB2         104         TB1         106         TB1         107         TB1         TB1         TB1         TB1	Mode	Main unit								
Insulation method         Photo coupler insulation           Rated input voltage         DC24V           Rated input current         About 4m <sup>A</sup> (Contact point 0-3: about 7m <sup>A</sup> )           Operation voltage range         DC20.4-28.8V (within ripple rate 5%)           On voltage / On current         DC19V or higher / 3m <sup>A</sup> or higher           Off voltage / Of current         DC6V or lower / 1m <sup>A</sup> or lower           Input resistance         About 5.6 <sup>(Ω)</sup> (%IX0.0.0-%IX0.0.7: about 2.7 <sup>(Ω)</sup> )           Response         Off → On ime         1/3/5/10/20/70/100 <sup>ms</sup> (set by I/O parameter) default: 3 <sup>ms</sup> Insulation pressure         AC560Vrms / 3 cycle (altitude 2000m)         Insulation resistance           Insulation resistance         10 <sup>MQ</sup> or higher by MegOhmMeter         Common method           Common method         18 point / COM         Proper cable size         0.3 <sup>min</sup> Operation indicator         LED on when Input On         External connection method         24 point terminal block connector (M3 X 6 screw)           Weight         465g         423g         423g           TB1         RX         TR         TR           TB2         104         TB1         107           TB4         485+         TB3         TX           TB2         104         TB1         107	Specification	XEC-DR30E	Х	EC-DN3	0E		XEC-DP30E			
Rated input voltage         DC24V           Rated input current         About 4 <sup>mA</sup> (Contact point 0-3: about 7 <sup>mA</sup> )           Operation voltage range         DC20.4-28.8V (within ripple rate 5%)           On voltage / On current         DC19V or higher / 3 <sup>mA</sup> or higher           Off voltage / Of current         DC6V or lower / 1 <sup>mA</sup> or lower           Input resistance         About 5.6 <sup>IQ</sup> ((%IX0.0.0-%IX0.0.7: about 2.7 <sup>IQ</sup> )           Response         Off → On           time         On → Off           Insulation pressure         AC560Vrms / 3 cycle (altitude 2000m)           Insulation resistance         10 <sup>IQ</sup> or higher by MegOhmMeter           Common method         18 point / COM           Proper cable size         0.3 <sup>m/f</sup> Operation indicator         LED on when Input On           External connection method         24 point terminal block connector (M3 X 6 screw)           Weight         465g         423g           TB1         RX         TB2           TB2         101         TB1           TB1         103         TB1           TB2         114         TB1           TB2         113         107           Time         TB1         104           TB1         TB1         TB1	Input point	18 point	18 point							
Rated input currentAbout 4 <sup>mA</sup> (Contact point 0-3: about 7 <sup>mA</sup> )Operation voltage rangeDC20.4-28.8V (within ripple rate 5%)On voltage / On currentDC19V or higher / 3 <sup>mA</sup> or higherOff voltage / Off currentDC6V or lower / 1 <sup>mA</sup> or lowerInput resistanceAbout 5.6 <sup>KQ</sup> (%0X0.0.0-%0X0.0.7: about 2.7 <sup>KB</sup> )ResponseOff $\rightarrow$ On time1/3/5/10/20/70/100 <sup>ms</sup> (set by I/O parameter) default: 3 <sup>ms</sup> Insulation pressureAC560Vrms / 3 cycle (altitude 2000m)Insulation resistance10 <sup>MQ</sup> or higher by MegOhmMeterCommon method18 point / COMProper cable size0.3 <sup>mf</sup> Operation indicatorLED on when Input OnExternal connection method24 point terminal block connector (M3 X 6 screw)Weight465g423g423gCircuit configurationNo.CorrectNo.TB2181RXTB3TB3TXTB4485-TB5SGTB10104TB11105TB20114TB3112TB14108TB15109TB14108TB15109TB14108TB15109TB14108TB14108TB15113TB14114TB15TB14TB15TB14TB15TB14TB15TB14TB14TB15TB14T	Insulation method	Photo coupler insulation								
Operation voltage rangeDC20.4–28.8V (within ripple rate 5%)On voltage / On currentDC19V or higher / $3^{mA}$ or higherOff voltage / Off currentDC6V or lower / $1^{mA}$ or lowerInput resistanceAbout 5.6 <sup>KQ</sup> ((%)X0.0.0–%)X0.0.7: about 2.7 <sup>KQ</sup> )ResponseOff $\rightarrow$ On time1/3/5/10/20/70/100ms (set by I/O parameter) default: $3^{mS}$ Insulation pressureAC560Vrms / 3 cycle (altitude 2000m)Insulation pressureAC560Vrms / 3 cycle (altitude 2000m)Insulation resistance10M2 or higher by MegOhmMeterCommon method18 point / COMProper cable size0.3 <sup>mit</sup> Operation indicatorLED on when Input OnExternal connection method24 point terminal block connector (M3 X 6 screw)Weight465g423g423gCircuit configurationNo.CorrectNo.TB2485+TB3TXTB4485-TB5SGTB10104TB11105TB14108TB14108TB15109TB14108TB15109TB16110TB17111TB20114TB20114TB20114TB20114TB21115TB20114TB21115TB20114TB21115TB20114TB21115TB20114TB21115TB	Rated input voltage	DC24V								
On voltage / On current         DC19V or higher / 3™A or higher           Off voltage / Off current         DC6V or lower / 1™A or lower           Input resistance         About 5.6k2 (%(X0.0.0-%(X0.0.7: about 2.7k2))           Response         Off → On           1/3/5/10/20/70/100™ (set by I/O parameter) default: 3™S           Insulation pressure         AC560Vrms / 3 cycle (altitude 2000m)           Insulation resistance         10%2 or higher by MegOhm/Meter           Common method         18 point / COM           Proper cable size         0.3™f           Operation indicator         LED on when Input On           External connection method         24 point terminal block connector (M3 X 6 screw)           Weight         465g           TB2         485+           TB3         TX           TB4         485-           TB3         TX           TB4         104           TB14         108	Rated input current	About 4 <sup>mA</sup> (Contact point	:0~3: abc	out 7 <sup>mA</sup> )						
Off voltage / Off current         DC6V or lower / 1m^ or lower           Input resistance         About 5.6k2 ((%IX0.0.0-%IX0.0.7: about 2.7k2)           Response         Off → On           0n → Off         1/3/5/10/20/70/100ms (set by I/O parameter) default: 3ms           Insulation pressure         AC560Vrms / 3 cycle (altitude 2000m)           Insulation resistance         10M2 or higher by MegOhmMeter           Common method         18 point / COM           Proper cable size         0.3mf           Operation indicator         LED on when Input On           External connection method         24 point terminal block connector (M3 X 6 screw)           Weight         465g           Veight         465g           TB2         485+           TB3         TX           TB4         485-           TB4         18           TB14         108           TB14	Operation voltage range	DC20.4~28.8V (within rip	ple rate 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 / 3mA or	r higher							
Response timeOff On On On On Off1/3/5/10/20/70/100ms(set by I/O parameter) default: 3msInsulation pressureAC560Vrms / 3 cycle (altitude 2000m)Insulation resistance10M2 or higher by MegOhmMeterCommon method18 point / COMProper cable size0.3mriOperation indicatorLED on when Input OnExternal connection method24 point terminal block connector (M3 X 6 screw)Weight465g423gCircuit configurationNo.CorrectNo.TB4485+TB5SGTB4485+TB5SGTB1RXTB4100TB10104TB11105TB1101TB10104TB11105TB1101TB11105TB11106TB13107TB16110TB16110TB17111TB18112TB14108TB14108TB14108TB14108TB14108TB14101TB16110TB17111TB18112TB19113TB10114TB20114TB20114TB21115	Off voltage / Off current	DC6V or lower / 1mA or lo	ower							
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Input resistance	About 5.6 <sup>k</sup> ? ((%IX0.0.0~	%IX0.0.7	: about 2	2.7 <sup>k</sup> Ω)					
Insulation resistance       10 <sup>M2</sup> or higher by MegOhmMeter         Common method       18 point / COM         Proper cable size       0.3mr <sup>2</sup> Operation indicator       LED on when Input On         External connection method       24 point terminal block connector (M3 X 6 screw)         Weight       465g         Circuit configuration       No.         Coreat       No.         Coreat       No.         TB2       485+         TB3       TX         TB4       485-         TB5       SG         TB6       100         TB2       TB7         TB1       RX         TB2       TB3         TB2       TB7         TB1       RX         TB2       TB7         TB1       RX         TB2       TB1         TB2       TB7         TB1       I04         TB1       I05         TB2       TB1         TB2       TB1         TB2       I06         TB2       I06         TB2       I06         TB2       I07         TB2       I07 <td></td> <td>— 1/3/5/10/20/70/100<sup>ms</sup> (se</td> <td>et by I/O p</td> <td>aramete</td> <td>r) defaul</td> <td>t: 3ms</td> <td></td>		— 1/3/5/10/20/70/100 <sup>ms</sup> (se	et by I/O p	aramete	r) defaul	t: 3ms				
Common method         18 point / COM           Proper cable size         0.3mm²           Operation indicator         LED on when Input On           External connection method         24 point terminal block connector (M3 X 6 screw)           Weight         465g           Veight         1B1           RX         TB1           TB2         485+           TB3         TX           TB4         485-           TB5         SG           TB4         485-           TB5         SG           TB4         100           TB10         104           TB11         105           TB2         106           TB14         108           TB14         108           TB14         108           TB14         108           TB14         108           TB14         108           TB14	Insulation pressure	AC560Vrms / 3 cycle (alt	itude 200	Om)						
Proper cable size         0.3mm²           Operation indicator         LED on when Input On           External connection method         24 point terminal block connector (M3 X 6 screw)           Weight         465g         423g         423g           Circuit configuration         No.         Cortext         No.         Cortext         TB1         RX           TB2         485+         TB3         TX         TB2         485+         TB5         SG         TB1         RX           TB4         485-         TB5         SG         TB7         I01         TB2         485+         TB1         I02         I03         TB7         I01         TB2         485+         TB1         I02         I03         TB7         I01         TB2         I03         TB1         I02         I03         TB1         I04         I05         TB1         I04	Insulation resistance	$10^{M\Omega}$ or higher by MegO	hmMeter							
Operation indicator         LED on when Input On           External connection method         24 point terminal block connector (M3 X 6 screw)           Weight         465g         423g           Circuit configuration         No.         Cortext         No.         Cortext         Type           TB2         485+         TB1         RX         TB1         RX           TB4         485-         TB5         SG         T87         T81           TB2         485+         TB5         SG         T87         T81         101         T87         T81         102         T87         101         T87         103         T87         103         T87         104         105         T81         107         T814         108         104         105         T814         108         104         105 <td>Common method</td> <td>18 point / COM</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Common method	18 point / COM								
External connection method       24 point terminal block connector (M3 X 6 screw)         Weight       465g       423g       423g         Circuit configuration       No.       Corteat       No.       Corteat       Type         TB2       485+       TB1       RX       TB3       TX       TB1       RX         TB4       485-       TB5       SG       TB1       RX       TB3       TX       TB3       TX       TB1       RX       TB1       TB1       TB1	Proper cable size	0.3 <sup>mm<sup>2</sup></sup>								
Weight         465g         423g         423g           Circuit configuration         No.         Context         No.         Context         Type           TB1         RX         TB1         RX         TB1         RX           TB2         485+         TB3         TX         TB2         485+         TS         SG         TB4         485-         TB5         SG         TB4         485-         TB5         SG         TB4         485-         TB5         TB6         100         TB7         101         TB6         100         TB7         TB6         100         TB7         TB1         TB10         104         TB11         105         TB12         106         TB12         106         TB12         106         TB12         106         TB13         107         TB14         108         TB12         TB13	Operation indicator	LED on when Input On								
Circuit configuration         No.         Cortext         No.         Cortext         Type           TB2         485+         TB1         RX         TB2         485+         TB3         TX         TB2         485+         TB3         TX         TB2         485+         TB3         TX         TB2         485+         TB3         TX         TB2         485+         TB4         485-         TB5         SG         TB7         101         TB7         485-         TB6         100         TB7         101         TB8         102         TB8         102         TB8         102         TB8         102         TB10         104         TB10         104         TB10         104         TB11         105         TB12         106         TB12         106         TB13         107         TB14         108         TB12         106         TB13         107         TB14         108         TB12         106         TB13         107         TB14         108         TB12         106         TB13         111         TB17         TB13         111         TB17         TB13         112         TB14         108         TB14         108         TB14         105         TB14 <t< td=""><td>External connection method</td><td>24 point terminal block co</td><td>onnector (</td><td>M3 X 6 s</td><td>screw)</td><td></td><td></td></t<>	External connection method	24 point terminal block co	onnector (	M3 X 6 s	screw)					
TB2       485+       TB1       RX         TB2       485+       TB3       TX         TB4       485-       TB5       SG         TB4       485-       TB5       SG         TB2       TB5       SG       TB4         TB2       TB5       SG       TB4         TB4       485-       TB5       SG         TB6       100       TB7       101       TB4         TB2       TB6       100       TB7       101         TB3       TZ       TB7       101       TB7       TB7         TB10       104       TB11       105       TB14       106       TB13       107       TB14       108       TB12       106       TB13       107       TB14       108       TB15       109       TB14       108       TB15       109       TB14       108       TB17       TB13       TB12       111       TB14       111       TB14       111       TB14       111       TB14       111       TB14       111       TB14       111       TB13       112       TB14       113       112       113       111       TB14       111       TB14       111 <t< td=""><td>Weight</td><td>465g</td><td>423g</td><td></td><td></td><td>423g</td><td></td></t<>	Weight	465g	423g			423g				
TB2       485+       TB3       TX       TB2       485+       TB3       TX       TB4       485-       SG       TB4       485-       SG       TB4       485-       SG       TB7       T01       TB4       485-       SG       TB7       TB1       TB1       TB1       TB1       TB1       TB1       TB1       TB1       TB1	Circuit configuration		No.	Contact	No.	Contact	Туре			
TB3       TX       TB3 <t< td=""><td></td><td></td><td>TB2</td><td><i>∕</i>185±</td><td>TB1</td><td>RX</td><td></td></t<>			TB2	<i>∕</i> 185±	TB1	RX				
Proto coupler       Proto coupler<					ТВ3	ΤХ	- RX			
Photo coupler       LED         TB23       Internal circuit         Internal circuit       Internal circuit         TB10       IO4         TB11       IO5         TB12       IO6         TB13       IO7         TB14       IO8         TB15       IO9         TB16       I10         TB17       I11         TB14       IO8         TB15       IO9         TB16       I10         TB17       I11         TB14       IO8         TB14       IO8         TB15       IO9         TB16       I10         TB17       I11         TB14       IO8         TB15       IO9         TB16       I10         TB17       I11         TB18       I12         TB18       I12         TB19       I13         TB21       I15			TB4	485-	TB5	SG	485+ TX TB3			
TB23       TB24       TB11       IO1       IO1       IO1       IB1         TB12       IO6       TB11       IO5       IB1       IO6       IO1       IB1         DC24V       Terminal block no.       TB14       IO8       TB15       IO9       IB1       IO5       IB1         TB16       I10       TB17       I11       ID6       ID1       IB1       ID1       IB1         TB12       IO6       TB13       IO7       TB14       IO8       TB15       IO9       TB16       IO1       TB17       II1       IB17       II1       IB17       II1       TB17       II1       TB17       II1       IB17       II1       IB17       II1       IB17       II1       IB17       II1       IB17       II1       IB17       II1       <			TB6	100			485- SG TB5			
TB23       TB24       TB9       IO3       IO2       TB9         COM       COM       COM       TB10       IO4       TB11       IO5       TB10       IO4       TB11       IO5       TB12       IO6       TB13       IO7       TB14       IO8       TB13       IO7       TB14       IO8       TB15       IO9       TB16       IO1       TB16       IO1       TB16       IO1       TB16       IO1       TB17       I11       TB12       II3       TB21       II3       TB21       II4       TB21       II5       TB23         TB20       I14       TB21       II15       TB22       II6       II7       TB23       TB23       TB24       IOM       TB23       TB24       IOM       TB23       TB24       IOM       TB23       II14       TB24       IOM       TB23       II14       TB24       IOM       II15       TB23       II16       II7       TB23       II14       II15       II17       TB23         TB20       I14       TB21       I155       I			TB8	102	- IB7	101	100 TB7			
Circuit       TB11       IO5       TB12       IO5       TB11         DC24V       Terminal block no.       TB12       IO6       TB13       IO7       TB14       IO8       I09       TB15         TB14       IO8       TB15       IO9       TB16       IO       TB17       I11       TB18       I12       I11       TB19       I11       TB13         TB18       I12       TB19       I13       TB21       I16       I17       TB23         TB20       I14       TB21       I15       TB23       TB24       COM       TB23					TB9	103	102 TB9			
DC24V       Terminal block no.       TB12       106       TB13       107       TB13         TB14       108       TB13       107       TB14       108       TB15       109       TB15       101       TB16       110       TB16       110       TB17       111       TB19       111       TB12       113       TB12       TB13       TB14       108       TB19       113       TB12       116       110       TB13       TB14       TB14       TB14       TB15       109       TB16       110       TB17       111       TB18       112       TB13       TB13       TB14       TB15       TB14       TB15       TB14       TB15       TB15       TB16       110       TB17       TB11       TB13       TB12       TB13       TB14       TB14       TB15       TB14       TB15       TB15       TB15       TB15       TB16       TB17       TB11       TB13       TB14       TB15       TB14       TB14       TB15       TB15       TB14       TB15       TB14       TB15       TB15       TB16       TB17       TB14       TB15       TB14       TB15       TB14       TB15       TB14       TB15       TB15       TB15       TB15       TB		circuit	TB10	104	TB11	105	104 TB11			
Terminal block no.     TB14     IO8     IO7     IO8     IO9     TB15       TB14     IO8     TB15     IO9     TB16     II0     II1     TB17       TB18     II2     TB17     II1     TB20     II4     II5     TB21       TB20     II4     TB21     II5     TB24     COM     TB23			TB12	106	TD40	107	106 TB13			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Terminal	block no.	TB14	108		107	108 TB15			
ID10     II0     TB17     II1     II2     II3     IB19       TB18     I12     TB19     I13     I14     I15     I15       TB20     I14     TB21     I15     I17     I17     I17			TP16	110	TB15	109	TB18 II1 TB17			
IB18     I12     TB19     I13     TB21       TB20     I14     TB21     I15     TB23       TB21     I15     TB24     COM				110	TB17	l11	TB20 I12 TB19			
		TB18	112	TR10	112	TB22 I15 TB21				
			TB20	114		113	TB24 I17 TB23			
		TB22	116	TB21	115					
TB22         TB23         I17           TB24         COM					TB23	l17				

# 7.2.5 XEC-DR20SU/DN20/DP20SU 12 point DC24V input (Source/Sink type)

Γ

Mode	Main unit								
Specification	XEC-DR20SU	Х	EC-DN2	20SU		XEC-DP20SU			
Input point	12 point								
Insulation method	Photo coupler insulation								
Rated input voltage	DC24V								
Rated input current	About 4 <sup>mA</sup> (Contact point	0~3: abc	out 7 <sup>mA</sup> )						
Operation voltage range	DC20.4~28.8V (within ripp	ole rate 5	%)						
On voltage / On current	DC19V or higher / 3 <sup>mA</sup> or	higher							
Off voltage / Off current	DC6V or lower / $1^{mA}$ or low	wer							
Input resistance	About 5.6 <sup>k</sup> Ω (%IX0.0.0~%	6IX0.0.1:	about 1.	5 <sup>k</sup> Ω, %I)	×0.0.2~%	%IX0.0.7: about 2.7 <sup>kΩ</sup> )			
ResponseOff $\rightarrow$ OntimeOn $\rightarrow$ Off	1/3/5/10/20/70/100ms (set	1/3/5/10/20/70/100ms (set by I/O parameter) default: 3ms							
Insulation pressure	AC560Vrms / 3 cycle (altit	ude 200	Om)						
Insulation resistance	$10^{M\Omega}$ or higher by MegOh	mMeter							
Common method	12 point / COM								
Proper cable size	0.3mm <sup>2</sup>								
Operation indicator	LED on when Input On								
External connection method	24 point terminal block connector (M3 X 6 screw)								
Weight	514g	475g			475	ōg			
Circuit configuration		No.	Contact	No.	Contact	Туре			
		TB2	485+	TB1	RX				
				ТВ3	тх	TB2 485+ TB1			
	DC5V 🔶	TB4	485-	TB5	SG	TB4 485- TX TB3			
	Photo coupler	TB6	100	TB7	101	TB6 I00 TB7			
		TB8	102			TB8 I02 TB9			
		TB10	104	TB9	103	TB10 I04 I05 TB11			
		TB12	106	TB11	105	TB12 I06 TB13			
DC24V Terminal blo	DC24V Terminal block no.				107	TB14 I08 I09 TB15			
		TB14	108	TB15	109	TB16 I10 TB17 TB18 U.C			
		TB16	l10	TB17	111	TB20 NC TB19			
		TB18	NC			TB22 NC TB21			
		TB20	NC	TB19	NC	TB24 COM			
		TB22	NC	TB21	NC				
		TB24	СОМ	TB23	NC				

### 7.2.6 XEC-DR30SU/DN30/DP30SU 18 point DC24V input (Source/Sink type)

	Model	Main unit									
Specification		XEC-DN30SU	J			XEC-	DR30SU				
Input point		18 point									
Insulation meth	od	Photo coupler insulation	n								
Rated input vol	tage	DC24V									
Rated input cur	rent	About 4 <sup>mA</sup> (point 0~1: abo	out 16 <sup>mA</sup> ,	point 2~	7: about	10mA)					
Operation volta	ge range	DC20.4~28.8V (within ripp	ole rate 5	%)							
On voltage / Or	n current	DC19V or higher / $3^{mA}$ or	higher								
Off voltage / Of	fcurrent	DC6V or lower / 1 <sup>mA</sup> or low	wer								
Input resistance	e	About 5.6 <sup>k</sup> Ω (%IX0.0.0~%I	X0.0.1:a	bout 1.5	<sup>kΩ</sup> , %IXC	).0.2~%	IX0.0.7: about 2.7kΩ)				
Response	$Off \rightarrow On$	1/3/5/10/20/70/100 <sup>ms</sup> (set	by I/O n	aramoto	r) dofaul	•• <b>?</b> ms					
time	$\text{On}{\rightarrow}\text{Off}$	1/3/3/10/20/70/100003 (380	by i/O p	aramete	i) uelaul	<b>I. J</b> <sup>IIIO</sup>					
Insulation press	sure	AC560Vrms / 3 cycle (altit	ude 2000	Om)							
Insulation resist	tance	$10^{M\Omega}$ or higher by MegOh	mMeter								
Common meth	od	18 point / COM									
Proper cable si	ze	0.3 <sup>mm<sup>2</sup></sup>									
Operation indic	ator	LED on when Input On									
External conne	ction method	24 point terminal block cor	nnector (	M3 X 6 s	screw)						
Weight		476g									
Circuit configura	ation		No.	Contact	No.	Contact	Туре				
					TB1	RX					
			TB2	485+	ТВЗ	тх					
			TB4	485-			TB2 485+				
		Photo coupler	TB6	100	TB5	SG	TB4 485- TX TB3				
			_		TB7	101	SG TB5				
)	لعا ز	▼▲ [,   	TB8	102	TB9	103	TB8 I02 I01 IB7				
	5	Internal     circuit	TB10	104		105	TB10 I04 I03 TB9				
сом			TB12	106	TB11	105	TB12 I06 TB11				
DC24V	Terminal blo	ock no.	TD14	100	TB13	107	TB14 I07 TB13				
			TB14	108	TB15	109	TB16 110 TB15				
			TB16	l10	TB17	111	TB18 III TB17				
			TB18	l12	TB17	111	TB20 I14 TB19				
			TB20	114	TB19	113	TB22 I15 TB21				
			1020		TB21	l15	TB24 COM				
				l16	TDOO	117					
			TB24	СОМ	TB23	117					

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

	Model	Main unit									
Specification		XEC-DN40SU			XEC-DN40SU						
Input point		24 point									
Insulation meth	od	Photo coupler insulation									
Rated input vol	tage	DC24V									
Rated input cur	rent	About 4 <sup>mA</sup> (point 0~1: abou	ut 16 <sup>mA</sup> ,	point 2~	7: abou	t 10 <sup>mA</sup> )					
Operation volta	ige range	DC20.4~28.8V (within ripple	e rate 5º	%)							
On voltage / Or	n current	DC19V or higher / 3 <sup>mA</sup> or h	igher								
Off voltage / Of	f current	DC6V or lower / 1mA or low	er								
Input resistance	Э	About 5.6k요 (%IX0.0.0~%IX	(0.0.1: a	bout 1.5	5kΩ, %I>	(0.0.2~9	%IX0.0	).7: a	bout	<b>2.7</b> kΩ)	
Response	$Off \rightarrow On$	1/3/5/10/20/70/100ms (set b		aramoto	vr) defai	lt. 3ms					
time	$On \rightarrow Off$	1/3/3/10/20/70/100ms (Set 1	by I/O pa	aramete	i) uelau	III. 3 <sup>1113</sup>					
Insulation press	sure	AC560Vrms / 3 cycle (altitu	de 2000	)m)							
Insulation resist	tance	$10^{M\Omega}$ or higher by MegOhn	nMeter								
Common meth	od	24 point / COM									
Proper cable si	ze	0.3 <sup>mm²</sup>									
Operation indic	ator	LED on when Input On									
External conne	ction method	30 point terminal block con	nnector (M3 X 6 screw)								
Weight		578g	594g								
Circuit configura	Circuit configuration				No.	Contact	Туре				
					TB1	RX				1	
			TB2	485+	тро	ту		$\bigcirc$	RX	TB1	
			TB4	485-	TB3	ТХ	TB2	485+	тх	твз	
		0 0	TB6	100	TB5	SG	TB4	485-		TB5	
_ <del>0</del> ТВ6		Photo-coupler	1 DO	100	TB7	101	TB6	100	SG	тв7	
			TB8	102	TB9	103	TB8	I02	I01		
	ایا ۲		TB10	104			TB10	104	I03	TB9	
	5		TB12	106	TB11	105	TB12	104	I05	TB11	
	1	circuit			TB13	107		106	I07	TB13	
DC24V			TB14	108	TB15	109	TB14	108	109	TB15	
	Terminal block no	).	TB16	l10			TB16	I10		TB17	
			TB18	112	TB17	111	TB18	I12	I11		
					TB19	l13	тв20	I14	I13	TB19	
			TB20	114	TB21	l15	тв22		I15	TB21	
			TB22	l16				I16	I17	TB23	
			TB24	l18	TB23	117	TB24	I18	I19	TB25	
					TB25	l19	TB26	120		TB27	
	TB26	120	TB27	121	TB28	I22	121	TROO			
			TB28	122			TB30	сом	I23	TB29	
			TB30	COM	TB29	123		COM	lacksquare		
				1						_	

# 7.2.8 XEC-DR60SU/DN60/DP60SU 36 point DC24V input (Source/Sink Type)

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	Model	P6050 36 point DC24		Main ur			-,			
Specification		XEC-DN60SU				XEC	-DR60S	SU		
Input point		36 point								
Insulation me	ethod	Photo coupler insulation								
Rated input v	voltage	DC24V	DC24V							
Rated input o	current	About 4 <sup>mA</sup> (point 0~1: about	ut 16 <sup>mA</sup> ,	point 2~	7: abou	t 10 <sup>mA</sup> )				
Operation vo	ltage range	DC20.4~28.8V (within ripple rate 5%)								
On voltage /	On current	DC19V or higher / 3 <sup>mA</sup> or higher								
Off voltage /	Off current	DC6V or lower / 1 <sup>mA</sup> or low	<i>i</i> er							
Input resistar	nce	About 5.6 <sup>k</sup> Ω (%IX0.0.0~%I)	<0.0.1: a	bout 1.5	5kΩ, <b>%I</b> >	(0.0.2~9	%IX0.0.7	7: ab	out	2.7 <sup>k</sup> Ω)
Response	$Off \rightarrow On$	Off $\rightarrow$ On 1/3/5/10/20/70/100 <sup>ms</sup> (set by				lt 3ms				
time	e On $\rightarrow$ Off 173/3/10/20/70/100 (set				i) uciau	III. 3110				
Insulation pre	essure	AC560Vrms / 3 cycle (altitude 2000m)								
Insulation res	sistance	10 <sup>MΩ</sup> or higher by MegOhmMeter								
Common me	ethod	36 point / COM								
Proper cable	size	0.3 <sup>mm²</sup>								
Operation inc		LED on when Input On								
	nection method	42 point terminal block con	nector (l	1	,					
Weight		636g		80	. <u> </u>	1	1			
Circuit config	uration		No.	Contact	No.	Contact		Тур	e	
	Terminal block n	<pre>Phiocoupler Internal circuit</pre>	<ul> <li>TB2</li> <li>TB4</li> <li>TB4</li> <li>TB6</li> <li>TB10</li> <li>TB12</li> <li>TB14</li> <li>TB16</li> <li>TB18</li> <li>TB20</li> <li>TB22</li> <li>TB24</li> <li>TB26</li> <li>TB30</li> <li>TB32</li> <li>TB34</li> <li>TB36</li> <li>TB38</li> </ul>	485+ 485- 100 102 104 104 106 108 108 108 108 108 108 108 108	<ul> <li>TB3</li> <li>TB5</li> <li>TB7</li> <li>TB9</li> <li>TB11</li> <li>TB13</li> <li>TB15</li> <li>TB17</li> <li>TB17</li> <li>TB21</li> <li>TB23</li> <li>TB25</li> <li>TB27</li> <li>TB29</li> <li>TB31</li> <li>TB33</li> <li>TB35</li> <li>TB37</li> <li>TB39</li> </ul>	TX SG I01 I03 I05 I07 I09 I11 I13 I15 I17 I19 I21 I23 I25 I27 I29 I31	TB2 TB4 TB6 TB8 TB10 TB12 TB12 TB14 TB16 TB16 TB18 TB20 TB22 TB24 TB24 TB26 TB26 TB28 TB26 TB28 TB26 TB28 TB28 TB34 TB34 TB34	485+         -           485+         -           100         -           102         -           104         -           106         -           108         -           109         -           104         -           105         -           106         -           110         -           112         -           114         -           116         -           122         -           124         -           122         -           124         -           125         -           126         -           132         -           134         -	RX           TX           SG           I01           I03           I05           I07           I09           I11           I13           I15           I17           I19           I21           I23           I25           I27           I31           I33	TB1 TB3 TB5 TB7 TB9 TB11 TB13 TB15 TB17 TB19 TB21 TB23 TB25 TB27 TB29 TB31 TB33 TB33 TB35 TB37 TB39 TB41
			TB40	134	TB39 TB41	133 135	ТВ42	сом	135	
			TB42	COM	1041	155			lacksquare	

# 7.3 Main Unit Digital Output Specification

## 7.3.1 XEC-DR10E 4 point relay output

	Model			Main u	unit			
Specification				XEC-DF	R10E			
Output point		4 point	4 point					
Insulation me	thod	Relay insulation						
Rated load DC24V 2A (resistive load				:0V 2A (C	COSΦ=	1), 5A/C	COM	
Min. load volt	age/current	DC5V/1mA						
Max. load vol	tage	AC250V, DC125V						
Off leakage c	urrent	0.1mA (AC220V, 60Hz)						
Max. On/Off f	requency	3,600 times / hour						
Surge absorb	ber	None						
	Mechanical 20 million times or mo							
		Rated load voltage / Cur	rent 100,	000 time	s or moi	re		
Service life		AC200V / 1.5A, AC240V	//1A(CC	$OS\Phi = 0.$	7) 100,0	)00 time	s or more	
	Electrical	AC200V / 1A, AC240V /	0.5A (CC	$OS\Phi = 0.$	35) 100	,000 tim	es or more	
		DC24V/1A, DC100V/0	).1A (L / I	R = 7ms)	100,000	times o	or more	
Response	$Off \rightarrow On$	10 <sup>ms</sup> or less						
time	$On \rightarrow Off$	12 <sup>ms</sup> or less						
Common me	thod	2 point / COM						
Proper cable	size	Stranded cable 0.3~0.75mm <sup>2</sup> (External diameter 2.8mm or less)						
Operation inc	licator	LED On when Output On						
External conr	nection method	14 point terminal block connector (M3 X 6 screw)						
Weight		330g						
Circuit config	uration		No.	Contact	No.	Contact	Туре	
			TB2	PE	TB1	AC100 ~240V	TB1	
			TB4	COM0	TB3		TB2 PE AC100 ~240V TB3 TB4 COM0	
circuit	t t t t t t t t t t t t t t		TB6	COM1	TB5	Q00	тв6 СОМ1 Q00 ТВ5 СОМ1 ТВ7	
Internal circuit			TB8	COM2	TB7	Q01	TB8 COM2 Q01 TB9	
-		<u>тво</u> тв10 2	TB10	Q03	TB9	Q02	Q03 TB11 TB12 NC	
			TB12	NC	TB11	NC 24V	TB12 NC TB13 TB14 24G	
L		Terminal no.	TB14	24G	TB13	24V	<b>.</b>	

#### Remark

• TB13, TB14 is 24V output point. (24VDC,0.2A)

• 24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

## 7.3.2 XEC-DR14E 6 point relay output

	Model		Main unit							
Specification				XEC-DR	14E					
Output point	~	6 point								
Insulation me	thod	Relay insulation								
Rated load DC24V 2A (resistive load			d) / AC22	0V 2A (C	$OS\Phi = 0$	1), 5A/C	COM			
Min. load voltage/current DC5V / 1mA										
Max. load vol	tage	AC250V, DC125V								
Off leakage c	urrent	0.1 mA (AC220V, 60Hz)								
Max. On/Off f	frequency	3,600 times / hour								
Surge absorb	ber	None								
Mechanical 20 million times or more										
		Rated load voltage / Cur	rent 100,0	000 times	s or more	е				
Service life	Electrical	AC200V / 1.5A, AC240V	/ 1A (CC	$OS\Phi = 0.7$	7) 100,00	00 times	s or more			
	Liceinear	AC200V / 1A, AC240V / $0.5A$ (COS $\Phi$ = $0.35$ ) 100,000 times or more								
		DC24V / 1A, DC100V / 0.1A (L / R = 7 ms) 100,000 times or more								
Response	$Off \rightarrow On$	10 <sup>ms</sup> or less								
time	$On \rightarrow Off$	12 ms or less								
Common me	thod	4 point / COM								
Proper cable	size	Stranded cable 0.3~0.75	5mm <sup>*</sup> (External diameter 2.8mm or less)							
Operation inc	licator	LED On when Output O	-							
External conr	nection method	14 point terminal block connector (M3 X 6 screw)								
Weight		340g		1		1				
Circuit config	uration		No.	Contact	No.	Contact	Туре			
	<u>_</u>		TB2	PE	TB1	AC100 ~240V	TB2 AC100			
			TB4	COM0	TB3	0.00	ТВ2 РЕ ~240V ТВ3 ТВ4 СОМ0			
l circuit			TB6	COM1	TB5	Q00	TB6 COM1 Q00 TB5			
Internal cir			TB8	COM2	TB7	Q01	COM2 001 TB9			
		TB9	TB10	Q03	TB9	Q02	TB10 Q03 Q02 TB11 TB11			
		<u>TB12</u> 2 <u>COM2</u> TB8	TB12	Q05	TB11	Q04	1812 Q05 TB13			
		Terminal no.	TB14	24G	TB13	24V	TB14 24G			

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Remark
TB13, TB14 is 24V output point. (24VDC,0.2A)
24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

	Model			Main uni	t				
Specification		XEC-DR20E							
Output point		8 point							
Insulation me	thod	Relay insulation	Relay insulation						
Rated load voltage/currer	nt	DC24V 2A (resistive load) / AC220V 2A (COS $\Phi$ = 1), 5A/COM							
Min. load volt	age/current	DC5V/1mA							
Max. load vol	tage	AC250V, DC125V							
Off leakage c	urrent	0.1 <sup>mA</sup> (AC220V, 60 <sup>Hz</sup> )							
Max. On/Off f	requency	3,600 times / hour							
Surge absorb	ber	None							
	Mechanical	20 million times or more							
Service life	Electrical	Rated load voltage / Current 100,000 times or more           AC200V / 1.5A, AC240V / 1A ( $COS\Phi = 0.7$ ) 100,000 times or more           AC200V / 1A, AC240V / 0.5A ( $COS\Phi = 0.35$ ) 100,000 times or more           DC24V / 1A, DC100V / 0.1A ( $L/R = 7 \text{ ms}$ ) 100,000 times or more					or more		
Response	$Off \rightarrow On$	10 ms or less							
time	$On \rightarrow Off$	12 ms or less							
Common me	thod	4 point / COM							
Proper cable	size	Stranded cable 0.3~0.75	1 <sup>1</sup> (Extern	al diamet	ter 2.8mm	or less)			
Operation ind	licator	LED On when Output On							
External conr	nection method	24 point terminal block connector (M3 X 6 screw)							
Weight		450g							
Circuit configu	uration		No.	Contact	No.	Contact	Туре		
			TB2	PE	TB1 TB3	AC100 ~240V	TB2 PE AC100		
╽└┥┟			TB4	COM0		000	~240V TB3		
	I		TB6	COM1	TB5	Q00	СОМ0 ТВ5 СОМ0 СОМО СТВО СТВО СТВО СТВО СТВО СТВО СТВО СТВ		
	 ₽ װ		TB8	COM2	TB7	Q01	COM1 Q01 TB7		
					TB9	Q02	COM2 Q02 TB9		
	I		TB10	Q03	TB11	NC	Q03 NC TB11		
Internal circuit			TB12	COM3	TB13	Q04	COM3 Q04 TB13		
			TB14	Q05	TB15	Q06	7B16 Q05 Q06 TB15		
	I	COM2 TB8	TB16	Q07			Q07 TB17		
	₹		TB18	NC	TB17 TB19	NC NC	TB20 NC TB19		
†		COM3 TB12	TB20	NC			TB22 NC IB21		
	۰		TB22	NC	TB21	NC	TB24 24G 24V TB23		
		Terminal no.	TB24	24G	TB23	24V	$- \bullet$		

# 7.3.3 XEC-DR20E 8 point relay output

Remark
TB23, TB24 is 24V output point. (24VDC,0.2A)
24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

### 7.3.4 XEC-DR30E 12 point relay output

	Model			Main uni	it			
Specification			Х	EC-DR3	0E			
Output point		12 point						
Insulation me	ethod	Relay insulation						
Rated load DC24V 2A (resistive load)			) / AC220	V 2A (CC	)SΦ = 1)	, 5A/CO	M	
Min. load volt	age/current	DC5V/1mA						
Max. load vol	ltage	AC250V, DC125V						
Off leakage c	urrent	0.1mA (AC220V, 60Hz)						
Max. On/Off	frequency	3,600 times / hour						
Surge absort	ber	None						
	Mechanical	20 million times or more						
Service life	Electrical	Rated load voltage / Curr AC200V / 1.5A, AC240V AC200V / 1A, AC240V / 0 DC24V / 1A, DC100V / 0	/ 1A (COS ).5A (COS	$S\Phi = 0.7)$ $S\Phi = 0.35$	100,000 5) 100,00	)0 times	or more	
Response	$Off \rightarrow On$	10 <sup>ms</sup> or less						
time	$On \rightarrow Off$	12 ms or less						
Common me	4 point / COM							
Proper cable	size	Stranded cable 0.3~0.75	™ (Exterr	nal diame	ter 2.8m	or less	)	
Operation inc	licator	LED On when Output On						
External conr	nection method	24 point terminal block co	nnector (l	M3 X 6 so	crew)			
Weight		465g						
Circuit config	uration		No.	Contact	No.	Contact	Туре	
			TB2	PE	TB1 TB3	AC100 ~240V	TB2 PE AC100	
	<u></u>	MO TR4	TB4	COM0	TB5	Q00	TB4 COM0 TB5	
	∗⊈ ॄ		TB6	COM1	TB7	Q01	TB6 COM1 TB7	
±		м1 ТВ6	TB8	COM2		-	TB8 COM2 TB9	
circuit			TB10	Q03	TB9	Q02	TB10 Q03 TB11	
ual o	<u>L</u> = •	<u>TB10</u> ≥	TB12	COM3	TB11	NC	TB12 COM3 TB13	
Internal		$\frac{111}{118}$	TB14	Q05	TB13	Q04	TB14 Q05 TB15	
	t =	<u>TB16</u> ≥	TB16	Q07	TB15	Q06	TB16 Q07 TB17	
	CO		TB18	COM4	TB17	NC	TB18 COM4 NC TB19	
	* <b>-</b>		TB20	Q09	TB19	Q08	Q09 010 TB21	
			TB22	Q11	TB21	Q10	Q11 TB23	
·	E Teminal no.			24G	TB23	24V	TB24 24G	
			TB24	2.0				

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#### Remark

TB23, TB24 is 24V output point. (24VDC,0.2A)
24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

Model				Main u	ınit					
Specification				XEC-DN	110E					
Output point		4 point								
Insulation me										
Rated load vo	Rated load voltage DC 12/24V									
Operation loa	id voltage range	DC 10.2 ~ 26.4V								
Max. load cur	rrent	0.5A/1 point, 2A/1CO	M							
Off leakage c	urrent	0.1 <sup>mA</sup> or less								
Max. inrush c	urrent	4A/10 <sup>ms</sup> or less								
Max. voltage	drop when On	DC 0.4V or less								
Surge absorb	ber	Zener diode								
Response Off $\rightarrow$ On 1 <sup>ms</sup> or less										
time $On \rightarrow Off$ 1 ms or less (rated load				load)						
Common me	4 point / COM									
Proper wire size Stranded wire 0.3~0.7			m <sup>°</sup> (exterr	nal diame	ter 2.8mm	1 or less	)			
External	Voltage	DC12/24V $\pm$ 10% (Rippl			or less)					
power	Current	25 mA or less (When cor	v	DC24V)						
Operation ind	licator	LED On when Output O								
External conr	nection method	14 point terminal block connector(M3 X 6 screw)								
Weight		313g								
Circuit configu	uration		No.	Contact	No.	Contact			ype	1
DC5V			TB2	PE	TB1	AC100		$igodoldsymbol{ heta}$	<u> </u>	TB1
♥ <sub>±</sub>	िक्टी र				TB3	~240V	TB2	PE	AC100 ~240V	твз
incui	_⊈म्2 `		TB4	Р	<b>TD</b> =	0.00	TB4	Р	1	тв5
		TB09., DC12/24V.,	TB6	COM0	TB5	Q00	TB6	сомо	Q00	165
Internal circuit	╼╍┟┤ᢁ᠆╚┋				TB7	Q01	TB8		Q01	TB7
	_ <b>(₹</b> ⊑)  <u>~</u> _		TB8	COM1	тро	000		COM1	Q02	тв9
		DC12/24V.	TB10	Q03	TB9	Q02	TB10	Q03	NC	TB11
		тв4	TB12	NC	- TB11	NC	TB12 TB14	NC	24V	TB13
		Terminal no	TB14	24G	- TB13	24V		24G		]

#### Remark

- TB13, TB14 is 24V output point. (24VDC,0.2A)
  24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

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

	Model			Main u	nit					
Specification				XEC-DN	14E					
Output point		6 point								
Insulation me	ethod	Photo coupler insulation								
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/1CON	N							
Off leakage c	current	0.1 <sup>mA</sup> or less								
Max. inrush c	current	4A/10 <sup>ms</sup> or less								
Max. voltage	drop when On	DC 0.4V or less								
Surge absorb	ber	Zener diode								
Response Off $\rightarrow$ On 1 <sup>ms</sup> or less										
time $On \rightarrow Off$ 1 ms or less (rated load			resistive	load)						
Common me	ethod	4 point / COM								
Proper wire size Stranded wire 0			m² (extern	nal diame	ter 2.8m	n or less	s)			
External	DC12/24V ± 10% (Rippl	-		r less)						
power	Current	25 mA or less (When cor		DC24V)						
Operation inc		LED On when Output O								
	nection method	14 point terminal block connector(M3 X 6 screw)								
Weight		315g								
Circuit config	uration		No.	Contact	No.	Contact		Ту	pe	
P DC5V			TDO	55	TB1	AC100				
• 🗣 🦳			TB2	PE	твз	~240V	TB2	DE	AC100	TB1
criit	Lt <u>(</u>		TB4	Р			TB4		~240V	TB3
i cin		TB09.,	тро	00140	TB5	Q00	TB6	P	Q00	TB5
Internal circuit		$\frac{1}{4}$	TB6	COM0	TB7	Q01		COM0	Q01	TB7
Ē	रिंद्र २		TB8	COM1		0.00	TB8	COM1	Q02	тв9
		DC12/24V.	TB10	Q03	TB9	Q02	TB10	Q03	Q02 Q04	TB11
		тв4.,	TB12	Q05	TB11	Q04	TB12 TB14	Q05	24V	TB13
		Terminal no	TB14	24G	TB13	24V	1014	24G		

#### Remark

TB13, TB14 is 24V output point. (24VDC,0.2A)
24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

7.3.7 XEC-DN20E 8 point transistor o	output (Sink type)
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	Model			Main uni	t			
Specification			Х	EC-DN2	0E			
Output point		8 point						
Insulation me	thod	Photo coupler insulation						
Rated load vo	oltage	DC 12/24V						
Operation loa	d voltage range	DC 10.2 ~ 26.4V						
Max. load cur	rrent	0.5A/1 point, 2A/1COM						
Off leakage c	urrent	0.1 <sup>mA</sup> or less						
Max. inrush c	urrent	4A/10 <sup>ms</sup> or less						
Max. voltage	drop when On	DC 0.4V or less						
Surge absorb	per	Zener diode						
Response Off $\rightarrow$ On 1 <sup>ms</sup> or less								
time $On \rightarrow Off$ 1 ms or less (rated load, respectively)				ad)				
Common me	thod	4 point / COM						
Proper wire s	ize	Stranded wire 0.3~0.75mm <sup>2</sup> (external diameter 2.8mm or less)						
External Voltage DC12/24V ± 10% (Ripple					less)			
power Current 25 mA or less (When ca			ecting D	C24V)				
Operation ind		LED On when Output On		10.1/ 0.1				
	nection method	24 point terminal block connector(M3 X 6 screw)						
Weight Circuit configu	iration	418g No. Contact No. Contact Type						
			INO.	Contact	TB1			
DC5			TB2	PE	TB3	AC100 ~240V	TB2 AC100 TB1	
<u>ن</u> ي ۲	ŢġĘſ		TB4	Р	-		TB4 PE 7240V TB3	
circu		TB06	TB6	COM0	TB5	Q00	тв6 сомо тв5	
Internal circuit.			TB8	COM1	TB7	Q01	TB8 COM1 Q01 TB7	
Inter	╘╼╼┤╩┈╠		TB10	Q03	TB9	Q02	TB10 Q02 TB9	
	LEFT 1		TB12	COM2	TB11	NC	TB12 COM2 NC TB11	
		DC12/24V., TB13.,	TB14	Q05	TB13	Q04	TB14 Q05 TB15	
			TB16	Q07	TB15	Q06	TB16 Q07 TB17	
	(FC)		TB18	NC	TB17	NC	TB18 NC TB19	
		DC12/24V.		-	TB19	NC	TB20 NC TB21	
		'TB4.,	TB20	NC	TB21	NC	TB22 NC TB23	
		Terminal no	TB22	NC	TB23	24V	TB24 24G	
			TB24	24G		1		

#### Remark

TB23, TB24 is 24V output point. (24VDC,0.2A)
24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

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

	Model			Main uni	t				
Specification			Х	EC-DP3	0E				
Output point		12 point							
Insulation met	thod	Photo coupler insulation							
Rated load vo	ltage	DC 12/24V							
Operation loa	d voltage range	DC 10.2 ~ 26.4V							
Max. load cur	rent	0.5A/1 point, 2A/1COM							
Off leakage cu	urrent	0.1 <sup>mA</sup> or less							
Max. inrush c	urrent	4A/10 <sup>ms</sup> or less							
Max. voltage	drop when On	DC 0.4V or less							
Surge absorb	er	Zener diode							
ResponseOff $\rightarrow$ On1ms or less									
time	$On \rightarrow Off$	1  ms or less (rated load, re	sistive loa	ad)					
Common met	hod	4 point / COM							
Proper wire si	ze	Stranded wire 0.3~0.75mm <sup>*</sup>	Stranded wire 0.3~0.75mm <sup>2</sup> (external diameter 2.8mm or less)						
External					ess)				
power Current 25 mA or less (When c			ecting D0	C24V)					
Operation ind		LED On when Output On							
	ection method	24 point terminal block connector(M3 X 6 screw)							
Weight		423g							
Circuit configu	Iration		No.	Contact	No. TB1	Contact	Туре		
DC5			TB2	PE		AC100 ~240V	тв1		
	िंद्दी 🛛 🟹		TB4	Р	TB3	-	TB2 PE AC100 ~240V TB3		
Internal circuit		TB09., TB	TB6	COM0	TB5	Q00	Q00 TB5		
			TB8	COM1	TB7	Q01	Q01 TB7		
Inter			TB10	Q03	TB9	Q02	Q02 TB9		
		DC12/24V., TB13.,	TB12	COM2	TB11	NC	Q03 TB11		
				-	TB13	Q04	TB14 COM2 COM2 TB13		
			TB14	Q05	TB15	Q06	Q05 TB15 TB16 Q07 TB15		
		TB19., DC12/24V.,	TB16	Q07	TB17	NC	TB18 COM3 NC TB17		
	╘╴└┤┉┤┋	Тв22., <u>с</u>	TB18	COM3	TB19	Q08	TB20 Q08 1819		
	_ <b>[</b> ⊈ <b>⊑</b> ] _ <u>`</u>		TB20	Q09	TB21	Q10	TB22 Q11 TB23		
		TB4., DC12/24V.,	TB22	Q11	TB23	24V	TB24 24G 24V		
		Terminal no	TB24	24G	1020	27 V			

## Remark

• TB23, TB24 is 24V output point. (24VDC,0.2A)

• 24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

7.3.9 XEC-DP10E 4 point transistor	r output (Source type)
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	Model			Main u	nit					
Specification				XEC-DF	10E					
Output point		4 point								
Insulation me	thod	Photo coupler insulation								
Rated load vo	oltage	DC 12/24V								
Operation loa	nd voltage range	DC 10.2 ~ 26.4V								
Max. load cu	rrent	0.5A/1 point, 2A/1COM								
Off leakage c	urrent	0.1 <sup>mA</sup> or less								
Max. inrush c	current	4A/10 <sup>ms</sup> or less								
Max. voltage	drop when On	DC 0.4V or less								
Surge absorb	ber	Zener diode								
Response	$Off \rightarrow On$	1ms or less								
time	$On \rightarrow Off$	1 ms or less (rated load,	resistive	load)						
Common me	thod	4 point / COM								
Proper wire s	ize	Stranded wire 0.3~0.75	🖻 (exterr	nal diame	ter 2.8mm	or less	5)			
External	Voltage	DC12/24V ± 10% (Rippl			r less)					
power	Current	25 mA or less (When cor		DC24V)						
Operation inc		LED On when Output O								
	nection method	14 point terminal block o	connector	(M3 X 6 s	screw)					
Weight		313g		1	1					
Circuit config	uration		No.	Contact	No.	Contact		Ту	pe	1
9 DC5\	/a		TB2	PE	TB1	AC100		lacksquare		TB1
\$ <b></b>	╘╼╼╴	твот.			TB3	~240V	TB2	PE	AC100 ~240V	твз
	<u>t</u> <u>&lt;</u>	твоб.,	TB4	N	TDE	000	TB4	N		TB5
oio		TB09., DC12/24V.,	TB6	COM0	TB5	Q00	TB6	сомо	Q00	
ntemal circuit	┍┷╔┉┥╞╸							COM1	Q01	ТВ7
Ĕ	िद्र ॉ		TB8	COM1	ТВ9	Q02	TB10		Q02	тв9
		TB08., DC12/24V.,	TB10	Q03			TB12	NC	NC	TB11
	тв4		TB12	NC	TB11	NC	ТВ14	24G	24V	TB13
	Terminal no				TB13	24V			igodol	

Remark
TB13, TB14 is 24V output point. (24VDC,0.2A)
24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

# 7.3.10 XEC-DP14E 6 point transistor output (Source type)

	Model			Main u	ınit					
Specification				XEC-DF	914E					
Output point		6 point								
Insulation me	ethod	Photo coupler insulation								
Rated load vo	oltage	DC 12/24V								
Operation loa	nd voltage range	DC 10.2 ~ 26.4V								
Max. load cu	rrent	0.5A/1 point, 2A/1COM								
Off leakage c	urrent	0.1 <sup>mA</sup> or less								
Max. inrush c	current	4A/10 <sup>ms</sup> or less								
Max. voltage	drop when On	DC 0.4V or less								
Surge absorb	ber	Zener diode								
Response	$Off \rightarrow On$	1ms or less								
time	$On \rightarrow Off$	1 ms or less (rated load,	resistive	oad)						
Common me	thod	4 point / COM								
Proper wire s	ize	Stranded wire 0.3~0.75	m <sup>2</sup> (extern	nal diame	ter 2.8mm	or less	)			
External	Voltage	DC12/24V ± 10% (Rippl	•		or less)					
power	Current	25 mA or less (When cor		DC24V)						
Operation inc		LED On when Output O								
	nection method	14 point terminal block o	onnector	(M3 X 6 s	screw)					
Weight		315g				T		_		
Circuit configu	uration		No.	Contact	No.	Contact			ype	
P DC5V.,			TB2	PE	TB1	AC100		$\bigcirc$		TB1
	<u> </u>				TB3	~240V	TB2	PE	AC100 ~240V	твз
L ±	<u>किं</u> टी <u>२</u>		TB4	Ν	TDE	000	TB4	N		
cito i	- 5	TB09., DC12/24V.,	TB6	COM0	TB5	Q00	TB6		Q00	TB5
e a					TB7	Q01		сомо	Q01	тв7
<u> </u>	₹		TB8	COM1	тв9	Q02	TB8	COM1	Q02	тв9
	حجا ب	- TB08	TB10	Q03		QUZ	TB10	Q03	Q04	TB11
		TB4.	TB12	Q05	TB11	Q04	TB12 TB14	Q05	24V	TB13
		Terminal no	TB14	24G	TB13	24V	.014	24G	lacksquare	

### Remark

TB13, TB14 is 24V output point. (24VDC,0.2A)
24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

	Model			Main uni	t		
Specification			Х	EC-DP2	0E		
Output point		8 point					
Insulation me	ethod	Photo coupler insulation					
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/1COM					
Off leakage c	urrent	0.1 <sup>mA</sup> or less					
Max. inrush c	current	4A/10 <sup>ms</sup> or less					
Max. voltage	drop when On	DC 0.4V or less					
Surge absorb	ber	Zener diode					
Response	$Off \rightarrow On$	1ms or less					
time	$On \rightarrow Off$	1 ms or less (rated load, resistive load)					
Common me	thod	4 point / COM					
Proper wire s	ize	Stranded wire 0.3~0.75mm <sup>2</sup> (external diameter 2.8mm 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 inc		LED On when Output On					
	nection method	24 point terminal block cor	nnector(N	/13 X 6 sc	rew)		
Weight Circuit config	uration	418g	NI-		NI-		Time
Circuit config			No.	Contact	No. TB1	Contact	Туре
DC5V			TB2	PE		AC100 ~240V	TB2 25 AC100
' ¶			TB4	Ν	TB3		PE ~240V T
, crit	હામ્યુ -		TB6	COM0	TB5	Q00	786 Q00 T
Internal circuit		TB09., DC12/24V.,	TB8	COM1	TB7	Q01	тва сомо Q01 Т тва сом1
" <mark>te</mark>	_ ⊢-⊡-≣		TB10	Q03	TB9	Q02	TB10 Q02 T
	(इन्द्र) _ ≥		TB12	COM2	TB11	NC	TB12 COM2 NC
	- 4 -	DC12/24V.			TB13	Q04	TB14 005 Q04 T
			TB14	Q05	TB15	Q06	TB16 Q07 T
	╡┓		TB16	Q07	TB17	NC	TB18 NC T
	_¥⊑l _′		TB18	NC	TB19	NC	TB20 NC T
	[	DC12/24V.,	TB20	NC	TB21	NC	TB22 NC 24V T
	L		TB22	NC	TB23	24V	TB24 24G
		Terminal no	TB24	24G	1020	2 <b>-</b> 7 V	$- \bullet$

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

#### Remark

• TB23, TB24 is 24V output point. (24VDC,0.2A)

• 24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

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

	Model			Main un	it				
Specification			Х	EC-DP3	0E				
Output point		12 point							
Insulation me	ethod	Photo coupler insulation							
Rated load vo	oltage	DC 12/24V							
Operation range	load voltage	DC 10.2 ~ 26.4V							
Max. load cu	rrent	0.5A/1 point, 2A/1COM							
Off leakage c	urrent	0.1 <sup>mA</sup> or less							
Max. inrush c	current	4A/10 <sup>ms</sup> or less							
Max. voltage	drop when On	DC 0.4V or less							
Surge absorb	ber	Zener diode							
Response	$Off \rightarrow On$	1ms or less	1 <sup>ms</sup> or less						
time	$On \rightarrow Off$	1 ms or less (rated load, r	1 ms or less (rated load, resistive load)						
Common me	thod	4 point / COM							
Proper wire size Stranded wire 0.3~0.75 <sup>mm<sup>2</sup></sup> (external diameter 2.8 <sup>mm</sup> or less)					3)				
External	Voltage	DC12/24V ± 10% (Ripple	DC12/24V $\pm$ 10% (Ripple voltage 4 Vp-p or less)						
power	Current	25 mA or less (When con	necting D	)C24V)					
Operation inc	licator	LED On when Output Or	1						
External conr	nection method	24 point terminal block co	onnector(	(M3 X 6 s	screw)				
Weight		423g							
Circuit configu	uration		No.	Contact	No.	Contact	Туре		
DC5V			TB2	PE	TB1	AC100	TB1		
<b>P</b>			TB4	N	TB3	~240V	TB2 PE AC100 ~240V TB3		
	_ <del></del>	TB06., TB09., DC12/24V.,	TB6	COM0	TB5	Q00	TB4 N TB5		
. <u>a</u>					TB7	Q01	тв6 СОМ0 Q00 ТВ7		
Internal circuit	ि∎ य		TB8	COM1	TB9	Q02	TB8 COM1 Q01 TB9		
		-+ TB08.,	TB10	Q03	TB11	NC	TB10 Q03 TB11		
			TB12	COM2	TB13	Q04	TB12 COM2 TB13		
	रिन्द्र 🛛	TB16.	TB14	Q05	TB15	Q06	Q05 TB15		
	- 4 -	TB19., DC12/24V.,	TB19, DC12/24W, TB16 Q07 TD17 NC TB17						
	_ ⊢⊡-⊮		TB18	COM3		_	COM3 TB19		
	दिही 🛛		TB20	Q09	TB19	Q08	Q09 TB21		
	<u>ل</u>	TB4., DC12/24V.	тва., DC12/24V., TB22 Q11 TB21 Q10 1822 Q11 24V Т						
		Terminal no			TB23	24V	TB24 24G		
			TB24	24G					

#### Remark

TB23, TB24 is 24V output point. (24VDC,0.2A)
24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

	Model			Main un	it				
Specification			XE	C-DR20	)SU				
Output point		8 point							
Insulation me	ethod	Relay insulation							
Rated load		DC24V/2A (registive load	$) / \Lambda C 2 2 ($		ററ്ക_		<u>on</u>		
voltage/curre	ent	DC24V 2A (resistive load	) / ACZZ(	JV ZA (C	05Φ=	T), SAUC			
Min. load vol	tage/current	DC5V/1mA							
Max. load vo	ltage	AC250V, DC125V							
Off leakage of	current	0.1 <sup>mA</sup> (AC220V, 60 <sup>Hz</sup> )							
Max. On/Off	frequency	3,600 times / hour	3,600 times / hour						
Surge absor		None							
	Mechanical	20 million times or more							
		Rated load voltage / Curr							
Service life	Electrical	AC200V / 1.5A, AC240V	/ 1A (CO	$S\Phi = 0.7$	7) 100,0	00 times	s or more		
	Licotrioa	AC200V / 1A, AC240V / 0	0.5A (CO	$S\Phi = 0.3$	35) 100,	000 time	es or more		
		DC24V / 1A, DC100V / $0.1A (L / R = 7ms)$ 100,000 times or more							
Response	$Off \rightarrow On$	10ms or less	10ms or less						
time	$On \rightarrow Off$	12ms or less							
Common me		4 point / COM (QX0.0.0, QX0.0.1: 1point/COM),( QX0.0.2, QX0.0.3: 2point/COM)							
Proper cable		Stranded cable 0.3~0.75mm <sup>*</sup> (External diameter 2.8mm or less)							
Operation inc		LED On when Output On							
	nection method	42 point terminal block co	nnector	(M3 X 6	screw)				
Weight		450g	N I a	1	Nia	1	_		
Circuit config	juration		No.	Contact	No.	Contact	Туре		
			TB2	PE	TB1	AC100			
	t îI				TB3	~240V	TB2 AC100		
			TB4	COM0	TB5	Q00	PE ~240V TB3		
			TB6	COM1		000	ТВ4 СОМО ТВ5		
	★Ţ ╣		TB8	COM2	TB7	Q01	TB6 COM1 TB7		
circuit			_		TB9	Q02	TB8 COM2		
Internal cir			TB10	Q03	TB11	NC	TB10 Q03 VC TB11		
l Tite		_ <sub></sub> ≥	TB12	COM3	TB13	Q04	COM5 004 TB13		
			TB14	Q05	TB15	Q04	1814 Q05 TB15		
			TB16	Q07	TB17	NC	TB18 NC TB17		
			TB18	NC	TB19	NC	TB20 NC TB21		
			TB22	NC	TB23	24V	TB24 24G 24V 1023		
			TB24	24G	1020	2.10			

# 7.3.13 XEC-DR20SU 8 point relay output

 Remark

 • TB23, TB24 is 24V output point. (24VDC,0.3A)

 • 24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

## 7.3.14 XEC-DR30SU 12 point relay output

	Model			Main un	it			
Specification			XE	C-DR30	SU			
Output point		12 point						
Insulation me	ethod	Relay insulation						
Rated load		DC24V 2A (resistive load	)/AC220	)V 2A (C	OSΦ=	1), 5A/C	OM	
Min. load volt	tage/current	DC5V/1mA						
Max. load vo	ltage	AC250V, DC125V						
Off leakage of	current	0.1 <sup>mA</sup> (AC220V, 60 <sup>Hz</sup> )						
Max. On/Off	frequency	3,600 times / hour						
Surge absort	per	None						
	Mechanical	20 million times or more						
Consiss life		Rated load voltage / Current 100,000 times or more						
Service life	Electrical	AC200V / 1.5A, AC240V	/ 1A (CO	$S\Phi = 0.7$	7) 100,0	00 times	or more	
		AC200V / 1A, AC240V / 0.5A (COS $\Phi$ = 0.35) 100,000 times or more						
		DC24V / 1A, DC100V / 0	.1A(L/R	R = 7ms) 1	00,000	times or	more	
Response	$Off \rightarrow On$	10 <sup>ms</sup> or less						
time	$On \rightarrow Off$	12ms or less						
Common me		4 point / COM (QX0.0.0, QX0.0.1: 1point/COM),( QX0.0.2, QX0.0.3: 2point/COM)						
Proper cable	size	Stranded cable 0.3~0.75mm <sup>2</sup> (External diameter 2.8mm or less)						
Operation inc	dicator	LED On when Output On						
External con	nection method	42 point terminal block co	nnector	(M3 X 6 :	screw)			
Weight		465g						
Circuit config	uration		No.	Contact	No.	Contact	Туре	
	 ₽ :		TB2	PE	TB1	AC100		
				FE	TB3	~240V	TB2 AC100 TB1	
	(	$\begin{array}{c c} \hline COM0 & TB4 \\ \hline TB7 & \hline \end{array}$	TB4	COM0	TDE	0.00	PE ~240V TB3	
	₹⊈ ₽		TB6	COM1	TB5	Q00	<sup>ТВ4</sup> сомо тв5	
L L			TDO		TB7	Q01	COM1	
temal Circuit	[		TB8	COM2	TB9	Q02	TB8 COM2 Q01 TB9	
imal (		TB10 >	TB10	Q03	TB11	NC	TB10 Q03 TB11	
Inte		$\frac{1}{1813}$	TB12	COM3			TB12 COM3 004 TB13	
	ŧĊp ;II	 ₹	TB14	Q05	TB13	Q04	1814 Q05 TB15	
	(	TB10 TB16 Q07 TB15 Q06 TB19 Q07 NC						
		 TR22_ <	TB18	COM4	TB17	NC	TB18 COM4 Q08 TB19	
			TB20	Q09	TB19	Q08	Q09 Q10 TB21	
		Terminal No.	TB22		TB21	Q10	Q11 TB23	
				Q11	TB23	24V	24G	
			TB24	24G		1		

I

Remark
TB23, TB24 is 24V output point. (24VDC,0.3A)
24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

	Model			Main un	it				
Specificatio	n		XE	C-DR40	SU				
Output point		16 point							
Insulation m	ethod	Relay insulation							
Rated load	ent	DC24V 2A (resistive load)	/ AC220	)V 2A (C	$OS\Phi = 1$	1), 5A/C	OM		
-	Itage/current	DC5V/1mA							
Max. load vo	oltage	AC250V, DC125V							
Off leakage	current	0.1mA (AC220V, 60Hz)							
Max. On/Off	frequency	3,600 times / hour							
Surge absor	ber	None							
	Mechanical	20 million times or more							
		Rated load voltage / Current 100,000 times or more							
Service life	Electrical	AC200V / 1.5A, AC240V /	AC200V / 1.5A, AC240V / 1A (COS $\Phi$ = 0.7) 100,000 times or more						
	Electrical	AC200V / 1A, AC240V / 0	AC200V / 1A, AC240V / 0.5A (COS $\Phi$ = 0.35) 100,000 times or more						
		DC24V / 1A, DC100V / 0.	DC24V / 1A, DC100V / 0.1A (L / R = $7ms$ ) 100,000 times or more						
Response	$Off \rightarrow On$	10ms or less							
time	$On \rightarrow Off$	12ms or less	12ms or less						
Common m	ethod	4 point / COM (QX0.0.0, QX0.0.1: 1point/COM),( QX0.0.2, QX0.0.3: 2point/COM)							
Proper cable	e size	Stranded cable 0.3~0.75mm (External diameter 2.8mm or less)					ss)		
Operation in	dicator	LED On when Output On							
External cor	nection method	30 point terminal block co	nnector	(M3 X 6 s	screw)				
Weight		594g							
Circuit config	guration		No.	Contact	No.	Contact	Туре		
			TB2	PE	TB1 TB3	AC100 ~240V	ТВ1		
			TB4	COM0	TB5	Q00	TB2 PE ~240V TB3 TB4 COM0		
		COMO TB4	TB6	COM1	TB7	Q01	TB6 COM1 200 TB5		
			TB8	COM2	TB9	Q02	COM2 TB9		
		COM1 TB6	TB10 TB12	Q03 COM3	TB11	NC	TB10 Q02 TB1 Q03 NC TB11		
			TB14	Q05	TB13	Q04	Q04 TB13		
		TB10 2	TB14	Q05 Q07	TB15	Q06	7B16 Q07 Q06 TB15		
			TB18	COM4	TB17	NC	TB18 COM4 TB19		
			TB20	Q09	TB19	Q08	TB20 Q09 Q10 TB21		
		COM3 TB12	TB22	Q11	TB21	Q10	Q11 TB23		
		2 TB25	TB24	COM5	TB23	NC	Q12 TB25		
		TB28 22	TB26	Q13	TB25	Q12	Q13 TB28 Q15 Q14 TB27 TB27 TB27 TB27 TB27		
		TB24	TB28	Q15	TB27 TB29	Q14 24V	TB30 24G		
		<sup>L</sup> Terminal block no.	TB30	24G	1020	£ T V			

# 7.3.15 XEC-DR40SU 16 point relay output

#### Remark

TB29, TB30 is 24V output point. (24VDC,0.3A)
24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

	Model			Main un					
Specification	1		Х	EC-DR6	SU				
Output point		24 point							
Insulation me	ethod	Relay insulation							
Rated load		DC24V 2A (resistive load)	/ ^ С 2 2 (		<b>ገድ</b> –				
voltage/curre	nt	ער (ובאוטוועב וטמע)			- - - - - - - - - - - - - - - - - - -	, <del>,</del> , , , , , , , , , , , , , , , , ,	2101		
Min. load volt	age/current	DC5V/1mA							
Max. load vo	ltage	AC250V, DC125V							
Off leakage of	current	0.1mA (AC220V, 60Hz)	0.1 <sup>mA</sup> (AC220V, 60 <sup>Hz</sup> )						
Max. On/Off	frequency	3,600 times / hour							
Surge absort	ber	None							
	Mechanical	20 million times or more	20 million times or more						
		Rated load voltage / Curre	ent 100,0	000 times	or more	9			
Service life	Fleetricel	AC200V / 1.5A, AC240V /	/1A (CC	$0S\Phi = 0.7$	) 100,00	)0 times	or more		
	Electrical	AC200V / 1A, AC240V / 0	.5A (CC	$0S\Phi = 0.3$	5) 100,0	)00 times	s or more		
		DC24V / 1A, DC100V / 0.	DC24V / 1A, DC100V / 0.1A (L / R = 7ms) 100,000 times or more						
Response	$Off \rightarrow On$	10ms or less							
time	$On \rightarrow Off$	12ms or less							
Common me	thod	4 point / COM (QX0.0.0, QX0	).0.1: 1pc	oint/COM),	(QX0.0.2	2, QX0.0.3	3: 2point/COM)		
Proper cable	size	Stranded cable 0.3~0.75	m² (Exter	rnal diam	eter 2.8 <sup>r</sup>	nm or less	s)		
Operation inc	dicator	LED On when Output On							
External con	nection method	30 point terminal block co	nnector	(M3 X 6 s	screw)				
Weight		804g			· ·				
Circuit config	uration	·	No.	Contact	No.	Contact	Туре		
			TB2	PE	TB1	AC100	ТВ1		
		TB5	TB4	COM0	TB3	~240V	TB2 PE AC100 ~240V TB3		
		.	TB6	COM1	TB5	Q00	TB4 COM0 TB5		
		COMO TB4	TB8	COM2	- TB7 - TB9	Q01 Q02	Q01 TB7		
			TB10	Q03	-TB11	NC	TB10 002 TB9		
	老学 部		TB12 TB14	COM3	TB13	Q04	TB12 COM3 NC TB12		
		COM1 TB6	TB14 TB16	Q05 Q07	TB15	Q06	TB14 Q05 TD15		
			TB18	COM4	-TB17	NC	TB16 Q07 NC TB17		
		тв10 2	TB20	Q09	- TB19 - TB21	Q08 Q10	TB18 COM4 TB19		
	internal ciruit	CONO TDO -	TB22	Q11	TB21	NC	Q09 Q10 TB21		
	<u> </u>		TB24	COM5	TB25	Q12	TB22 Q11 NC TB23		

тв25

тв27

тв29

твз1

твзз

твз5

твз7

твз9

тв41 24V

Q12

Q14

NC

Q16

Q18

NC

Q20

Q22

TB26 Q13

TB28

твз

твза

твз

TB3

твза

TB40

тв42 24G Ð

сом5

Q15

соме

Q17

Q19

сом7

Q21

Q23

TB27

TB29

TB31

TB33

TB35

TB37

TB39

TB41

Q14

NC

Q16

Q18

NC

Q20

Q22

24V

TB26

TB28

TB30

TB32

TB34

TB36

TB38

TB40

TB42

Q13

Q15

Q17

Q19

Q21

Q23

24G

COM7

COM6

### 7.3.16 XEC-DR60SU 24 point relay output

# Remark

• TB41, TB342 is 24V output point. (24VDC,0.5A)

₽ ₽ ₽

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**₽**₽

COM3

COM7

ζ

TB13

TB16 ₹

TB40 2

TB12

TB37

TB36

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 $\sim$ 

Terminal blocvk no

• 24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

# 7.3.17 XEC-DN20SU 8 point transistor output (Sink type)

	Model		Main unit					
Specification			Х	EC-DN2	0SU			
Output point		8 point						
Insulation meth	nod	Photo coupler insulation						
Rated load vol	tage	DC 12/24V						
Operation load	voltage range	DC 10.2 ~ 26.4V						
Max. load curre	ent	0.5A/1 point, 2A/1CO	Л(QX0.0	.0, QX0.0	.1)			
Off leakage cu	rrent	0.1 <sup>mA</sup> or less						
Max. inrush cu	rrent	4A/10 <sup>ms</sup> or less						
Max. voltage d	rop when On	DC 0.4V or less						
Surge absorbe	r	Zener diode	Zener diode					
Response	$Off \rightarrow On$	1 <sup>ms</sup> or less						
time	$On \rightarrow Off$	1ms or less (rated load, r	resistive	load)				
Common meth	nod	4 point / COM(QX0.0.0, C	X0.0.1:2	2point/CO	M),( QX0	).0.2, QX(	).0.3: 2point/COM)	
Proper wire siz	e	Stranded wire 0.3~0.75mm <sup>2</sup> (external diameter 2.8mm or less)					ss)	
External nouro	Voltage	DC12/24V ± 10% (Ripple voltage 4 Vp-p or less)						
External power	Current	25 <sup>mA</sup> 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		470g						
Circuit configu	ation	No. Contact No. Contact Type						
		TB05			TB1	10100		
DC5V			TB2	PE		AC100 ~240V	ТВ1	
╽│⋬┌──⊢			три	00140	TB3	2101	TB2 PE AC100 ~240V TB3	
	( <b>* Ľ</b> ) <u>&lt;</u>		TB4	COM0	TB5	Q00		
	- L	DC12/24V	TB6	COM1	100	900	TB6 COM	
					TB7	Q01	COM1 Q01 TB7	
			TB8	COM2	TB9	000	TB8 COM2 Q02 TB9	
	( <b>▼</b> ⊈) <		TB10	Q03	189	Q02	TB10 Q02 TB11	
circuit					TB11	Р	TB12 COM3 P	
	_	DC12/24V TB13	TB12	COM3			Q04 1813	
Internal		<		005	TB13	Q04	Q05 TB15	
	╔╡ ╔╴┎╴╎╴╴╵		TB14 Q05 TB15 Q06 TB16 Q07					
	ſŦŦĮ `	TB08	TB16	Q07			TB18 NC TB17	
	-	TB15 DC12/24V			TB17	NC	TB20 NC TB19	
			TB18	NC	TP10	NC	NC TB21	
	╕╼╌┥╘╧╣		TB20	NC	TB19		TB22 NC TB23	
	( <b>¥ Ľ</b> )  <u>∕</u>							
	- 4		TB22	NC				
		<u>TB11</u> <b>Terminal no.</b>	TB24	24G	TB23	24V		
			1024	240				

## Remark

TB23, TB24 is 24V output point. (24VDC,0.3A)
24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

	Model			Main ur	nit					
Specification			Х	EC-DN3	0SU					
Output point		12 point								
Insulation metho	d	Photo coupler insulation								
Rated load voltage	ge	DC 12/24V								
Operation load v	oltage range	DC 10.2 ~ 26.4V								
Max. load curren	t	0.5A/1 point, 2A/1COM	Л(QX0.0	.0, QX0.0	.1)					
Off leakage curre	ent	0.1mA (AC220V, 60Hz)								
Max. inrush curre	ent	4A/10 <sup>ms</sup> or less								
Max. voltage dro	p when On	DC 0.4V or less								
Surge absorber		Zener diode	Zener diode							
Response	$Off \rightarrow On$	1ms or less								
time	$On \rightarrow Off$	1ms or less (rated load, r	resistive	load)						
Common metho	d	4 point / COM(QX0.0.0, QX	0.0.1:2p	oint/COM	I),( QX0.0	).2, QX0.	0.3: 2	point/C	COM)	
Proper wire size		Stranded wire 0.3~0.75mm <sup>2</sup> (external diameter 2.8mm or less)								
External power	Voltage	DC12/24V ± 10% (Rippl	e voltag	e 4 Vp-p	or less)					
External power	Current	25 <sup>mA</sup> or less (When connecting DC24V)								
Operation indicat	tor	LED On when Output On								
External connect	ion method	24 point terminal block connector(M3 X 6 screw)								
Weight	475g									
Circuit configuration No. Contact No. Contact Type										
		☐ <i>TB05</i>			TB1	AC100		$   \mathbf{\bullet} $		]
DC5V			TB2	PE		~240V	TB2	,	AC100	TB1
			TB4	COM0	TB3		102	PE	~240V	твз
	<u> </u>		104	COIVIO	TB5	Q00	TB4	<sup>4</sup> сомо		TB5
	· · ·	DC12/24V	TB6	COM1			тве	б сом1	Q00	105
					TB7	Q01	тва		Q01	TB7
	┢┲┤╤╉	TB13	TB8	COM2	ТВ9	Q02	- TDC	сом2	Q02	тв9
	<u>r</u> ] / )		TB10	Q03	109	QUZ	TB10	Q03		TB11
circuit			-		TB11	Р	TB12	2	Р	IDII
		DC12/24V TB15	TB12	COM3			- 	СОМЗ	Q04	TB13
			TB14	Q05	TB13	Q04	TB14	<sup>+</sup> Q05	<u> </u>	TB15
	┍┲┥╎╴╵╱┽	TB18	1014	000	TB15	Q06	TB16	5 Q07	Q06	
<u>      4</u>	╧┺╢╴╲┪	TB08	TB16	Q07			TB18	3	NC	TB17
		DC12/24V	<b>TD</b> 10		TB17	NC		COM4	Q08	TB19
			TB18	COM4	TB19	Q08	TB20	Q09		TB21
II   Ha	╶╍╴╴╴╴		TB20	Q09		300	тв22	2 Q11	Q10	
	[[[] [] [] [] [] [] [] [] [] [] [] [] []				TB21	Q10	тв24	1	24V	TB23
	· · • ·	DC12/24V	TB22	Q11	TDOO	0.01	1	24G		1
	L		TB24	24G	TB23	24V				J
		Terminal no.		270						

## 7.3.18 XEC-DN30SU 12 point transistor output (Sink type)

### Remark

TB23, TB24 is 24V output point. (24VDC,0.3A)
24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

Model Main unit								
Specification			>	KEC-DN	40SU			
Output point		16 point						
Insulation method		Photo-coupler insulation	า					
Rated load voltage		DC 12/24V						
Load voltage range		DC 10.2 ~ 26.4V						
Max. load current		0.5A/1point, 2A/1CO	И (QX0.0	.0, QX0.	0.1)			
Off leakage current		0.1 <sup>mA</sup> or less						
Max. inrush current		4A/10ms or less						
Max. voltage drop wh	en On	DC 0.4V or less						
Surge killer		Zener diode						
Response Off	→On	1ms or less						
time On-	→Off	1ms or less (rated load,	resistive	load)				
Common method		4 point / COM (QX0.0.0, C	X0.0.1:2	point/CO	M),( QX	(0.0.2, Q	X0.0.3: 2point/COM)	
Proper cable size		Stranded cable 0.3~0.7	Stranded cable 0.3~0.75 <sup>mm<sup>2</sup></sup> (External diameter 2.8 <sup>mm</sup> or less)					
External supply Volt	age	DC12/24V ± 10% (rippl	e voltage	e 4 Vp-p	or less	5)		
power Cur	rent	$25^{\text{mA}}$ or less (when cor	necting l	DC24V)				
Operation indicator		LED On When Output On						
External connection m	nethod	30 point terminal block connector (M3 X 6 screw)						
Weight		578g						
Circuit configuration			No.	Contact	No.	Contact	Туре	
					TB1	AC100	ТВ1	
DC5V	u- <b>1</b> .		TB2	PE	ТВЗ	~240V	TB2 AC100	
			TB4	COM0	ТБЗ		PE ~240V TB3	
║└┤│└╪┖┥		тво4	TDO	0014	TB5	Q00	COM0 TB5	
	۲ <sup>۲</sup>	DC12/24V	TB6	COM1	TB7	Q01	TB6 COM1 Q01 TB7	
			TB8	COM2			COM2 TR9	
			TB10	Q03	TB9	Q02	TB10 Q02	
	2				TB11	Р	TB12 COM3	
	┥ ──੯	DC12/24V	TB12	COM3	TB13	Q04	TB14 Q04 TB13	
a cir		TB13	TB14	Q05	TB15	Q06	TB16 Q06 TB15	
			TB16	Q07			TB18 COM4 NC	
			TB18	COM4	TB17	NC	TB20 009 Q08 TB19	
	<b>†</b>	DC12/24V	TB20	Q09	TB19	Q08	TB22 011 Q10 TB21	
	└──┤╤╂┙		TB22	Q11	TB21	Q10	TB24 COM5 TB25	
		TB28			TB23	NC	Q12 TB26 Q13 TB27	
47	↓ <u>`</u> •		TB24	COM5	TB25	Q12	TB28 015 Q14	
		TB11 DC12/24V	TB26	Q13	TB27	Q14	24V 1829	
L			TB28	Q15	TB29	24V	24G	
		Terminal block no.	TB30	24G				

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

#### Remark

TB29, TB30 is 24V output point. (24VDC,0.3A)
24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

	Model			Main	unit			
Specification			>	EC-DN				
Output point		24 point						
Insulation me	thod	Photo-coupler insulation						
Rated load vo	oltage	DC 12/24V						
Load voltage	•	DC 10.2 ~ 26.4V						
Max. load cur		0.5A/1point, 2A/1COM	(QX0.0	.0, QX0.	0.1)			
Off leakage c	urrent	0.1 <sup>mA</sup> or less			,			
Max. inrush c		4A/10 <sup>ms</sup> or less						
Max. voltage	drop when On	DC 0.4V or less						
Surge killer	•	Zener diode						
Response	$Off \rightarrow On$	1ms or less						
time	$On \rightarrow Off$	1ms or less (rated load, re	1ms or less (rated load, resistive load)					
Common me	thod	4 point / COM (QX0.0.0, QX	0.0.1:2	point/CO	M),( QX	0.0.2, Q	X0.0.3: 2point/COM)	
Proper cable	size	Stranded cable 0.3~0.75mm <sup>2</sup> (External diameter 2.8mm or less)						
External sup	oply Voltage	DC12/24V ± 10% (ripple voltage 4 Vp-p or less)						
power	r Current 25 <sup>mA</sup> or less (when connecting DC24V)							
Operation ind	peration indicator LED On When Output On							
External conn	nection method	42 point terminal block	connec	tor (M3	X6sc	rew)		
Weight 636g								
Circuit configu	uration		No.	Contact	No.	Contact	Туре	
			TB2	PE	TB1	AC100		
T DC5	30 <b>F</b>		TB4	COM0	TB3	~240V	TB2 PE AC100 ~240V TB3	
		ř	TB6	COM1	TB5	Q00	ТВ4 СОМО 785 200 ТВ5	
	(F)		TB8	COM2	TB7	Q01	TB6 COM1 Q01 TB7	
			TB10	Q03	TB9	Q02	TB8 COM2 Q02 TB9	
			TB12	COM3	TB11	Р	TB10 Q03 TB11	
			TB14	Q05	TB13	Q04	TB12 COM3 TB13	
			TB16	Q07	TB15	Q06	Q05 TB15	
			TB18	COM4	TB17	NC	Q07 TB17	
circuit ↩			TB20	Q09	TB19	Q08	TB18 COM4 TB19	
			TB22	Q11	TB21	Q10	Q09 010 TB21	
Internal	╘┲┲╢┈╵ᠶ		TB24	COM5	TB23	NC	Q11 TB23	
	<u>[</u> ⊈⊑] <u>&lt;</u>		TB26	Q13	TB25	Q12	TB24 COM5 TB25	
		TB37+ DC12/24+	TB28	Q15	TB27	Q14	TB26 Q13 TB27 Q14 TB27	
			TB30		TB29	NC	TB28 Q15 NC TB29	
			TB30	COM6 Q17	TB31	Q16	TB30 COM6 Q16 TB31	
	( <u>* r</u> ) <	TB36-j	TB34	Q17 Q19	TB33	Q18	TB32 Q17 Q18 TB33	
		TB11+ DC12/24\+	TB36	COM7		NC	UI9 NC TB35	
		<b>↓</b>	TB38	Q21	TB37 TB39	Q20 Q22	ТВ38 Q20 ТВ37	
		Terminal block no.	TB40	Q23	TB41	24V	Q21 Q22 TB39	
			TB42	240			Q23 24V TB41	
				24G			24G	

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

Remark
TB41, TB342 is 24V output point. (24VDC,0.5A)- 24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

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

	Model	odel Main unit									
Specification			Х	EC-DP2	OSU						
Output point		8 point	8 point								
Insulation metho	d	Photo coupler insulation									
Rated load voltage	ge	DC 12/24V	•								
Operation load v	oltage range	DC 10.2 ~ 26.4V	DC 10.2 ~ 26.4V								
Max. load curren	t	0.5A/1 point, 2A/1COM (QX0.0.0, QX0.0.1)									
Off leakage curre	ent	0.1 <sup>mA</sup> or less	0.1 <sup>mA</sup> or less								
Max. inrush curre	ent	4A/10ms or less									
Max. voltage dro	p when On	DC 0.4V or less									
Surge absorber		Zener diode									
Response	$Off \rightarrow On$	1 <sup>ms</sup> or less									
time	$On \rightarrow Off$	1ms or less (rated load,	resistive	load)							
Common metho	d	4 point / COM (QX0.0.0, QX0.0.1: 2point/COM),( QX0.0.2, QX0.0.3: 2point/COM)									
Proper wire size		Stranded wire 0.3~0.75mm <sup>2</sup> (external diameter 2.8mm or less)									
External power	Voltage	DC12/24V $\pm$ 10% (Ripple voltage 4 Vp-p or less)									
External power	Current	25 <sup>mA</sup> or less (When connecting DC24V)									
Operation indicat	tor	LED On when Output O	n								
External connect	ion method	24 point terminal block of	onnecto	r(M3 X 6	screw)						
Weight		470g									
Circuit configurat	ion		No.	Contact	No.	Contact	Туре				
					TB1	AC100					
L DC5V			TB2	PE	TDO	~240V	TB2 AC100 TB1				
	╔┰╎╴╴╵╼╝	8	TB4	COM0	TB3		PE ~240V TB3				
내	<u> </u>			COMO	TB5	Q00					
회로	E	TB07 DC12/24V	TB6	COM1			TB6 COM1 Q00				
	t+œ⊣₽₽		TB8	COM2	TB7	Q01	Q01 TB7				
	(t)		TBO	COIVIZ	тв9	Q02	COM2 002 TB9				
		TB09 DC12/24V	TB10	Q03			Q03 TB11				
			TB12	СОМЗ	TB11	N	TB12 COM3 TB13				
	╔┎╗╴┉╝	TB10		CONS	TB13	Q04	TB14 Q05 Q04				
	9-51 —		TB14	Q05	TD45	000	Q06 Q06				
	<b>F</b>	DC12/24V	TB16	Q07	TB15	Q06	Q07 TB17				
		)	1010	QUI	TB17	NC	TB18 NC TB19				
	<u>_</u> +œ⊣≣‡										
			TB18	NC			TB20 NC				
		TB16 TB12 DC12/24V	-		TB19	NC	TB20 NC TB21				
		7 TB12	TB18 TB20	NC NC	TB19 TB21	NC NC	TB20 NC NC TB21 TB22 NC TB23				
			-		-		TB20 NC TB21 TB22 NC TB23				

#### Remark

• TB23, TB24 is 24V output point. (24VDC,0.3A)

• 24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

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

Model				Mainur	vit.					
IVIOdel			Х	EC-DP3						
Output point		12 point								
Insulation metho	d	Photo coupler insulation	)							
Rated load voltage	ge	DC 12/24V								
Operation load v	oltage range	DC 10.2 ~ 26.4V								
Max. load currer	nt	0.5A/1 point, 2A/1CO	M (QX0.0	).0, QX0.0	).1)					
Off leakage curre	ent	0.1mA (AC220V, 60Hz)								
Max. inrush curre	ent	4A/10 <sup>ms</sup> or less								
Max. voltage dro	p when On	DC 0.4V or less								
Surge absorber		Zener diode								
Response	$Off \rightarrow On$	1 <sup>ms</sup> or less	1ms or less							
time	$On \rightarrow Off$	1ms or less (rated load,	resistive	load)						
Common metho	d	4 point / COM(QX0.0.0, QX0.0.1: 2point/COM),( QX0.0.2, QX0.0.3: 2point/COM)								
Proper wire size		Stranded wire 0.3~0.75		rnal diam	neter 2.8	mm or les	ss)			
External new or	Voltage DC12/24V + 10% (Ripple v									
External power	Current	25 <sup>mA</sup> or less (When connecting DC24V)								
Operation indica	tor	LED On when Output C	)n							
External connec	tion method	24 point terminal block	connecto	or(M3 X 6	Screw)					
Weight		475g								
Circuit configuration	tion		No.	Contact	No.	Contact	Туре			
		ттвоз			TB1					
DC5V			TB2	PE		AC100 ~240V	ТВ1			
I¶ I III III III III III III III III II	ŢŢŢ ~ '-₽			00140	TB3	2.01	TB2 PE AC100 ~240V TB3			
부 -	<u> </u>	• TB04	TB4	COM0	TB5	Q00				
로			TB6	COM1		400	786 COM1 Q00 TB5			
	╔ <u>┲</u> ┎╎ <sup>┯</sup> ╵╼╝	1			TB7	Q01	COM1 001 TB7			
	<u> </u>	TB06	TB8	COM2	TB9	000	TB8 COM2 TB9			
			TB10	Q03	109	Q02	TB10 Q03 TB11			
	╔╸┎╴╴				TB11	Ν	TB12 COM3 N			
	<u> </u>	t <u>TB08</u> <b> </b> ∎ ↓ ↓ DC12/24V	TB12	COM3			Q04 1813			
			TB14	Q05	TB13	Q04	Q05 TB15			
	ढ़ॾऻऀऀॕॱऺ॑ऀऺ		1014	205	TB15	Q06	Q07 TB17			
	<u> </u>	TB12	TB16	Q07			TB18 COM4			
	<del></del>				TB17	NC	Q08 TB19			
			TB18	COM4	TB19	Q08	Q09 010 TB21			
	प्रमी ─		TB20	Q09	510	00	1822 Q11 TB23			
		DC12/24V			TB21	Q10	TB24 24G 24V 1525			
		TB11	TB22	Q11	троо	0414				
		Terminal	TB24	24G	TB23	24V				
100			1024	240						

#### Remark

TB23, TB24 is 24V output point. (24VDC,0.3A)
24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

	Model			Main					
Specification			)	KEC-DF	240SU				
Output point		16 point							
Insulation metho		Photo-coupler insulation							
Rated load volta	•	DC 12/24V							
Load voltage rar	-	DC 10.2 ~ 26.4V							
Max. load currer		0.5A / 1point, 2A / 1COM (QX0.0.0, QX0.0.1)							
Off leakage curre		0.1 <sup>mA</sup> or less							
Max. inrush curr	ent	4A/10 <sup>ms</sup> or less							
Max. voltage dro	p when On	DC 0.4V or less							
Surge killer		Zener diode							
Response	$Off \rightarrow On$	1ms or less							
time	$On \rightarrow Off$	1ms or less (rated load, r	esistive	load)					
Common metho	d	4 point / COM (QX0.0.0, QX0.0.1: 2point/COM),( QX0.0.2, QX0.0.3: 2poin					2point/C	OM)	
Proper cable size	Э	Stranded cable 0.3~0.75mm <sup>*</sup> (External diameter 2.8mm or less)							
External supply	/ Voltage	DC12/24V $\pm$ 10% (ripple voltage 4 Vp-p or less)							
power	Current	25 <sup>mA</sup> or less (when connecting DC24V)							
Operation indica	tor	LED On When Output C	n						
External connec	tion method	30 point terminal block	connec	ctor (M3	X6sc	rew)			
Weight		578g							
Circuit configurat	tion		No.	Contact	No.	Contact		Туре	
		ТВ05			TB1	10100	Б		1
	_ ┌─━┤═┇		TB2	PE	тро	AC100 ~240V	TB2	AC100	TB1
내 부 - 화	मित्र –		TB4	COM0	TB3			PE ~240V	твз
회로		TB07 DC12/24V			TB5	Q00	TB4 C	OM0 Q00	TB5
	╼─ <u></u> ╡━─⋿		TB6	COM1	TB7	Q01	тв6 с	ОМ1	тв7
	<u>                                      </u>		TB8	COM2			тва с	Q01	
	_	TB09 DC12/24V		002	TB9	Q02	TB10	Q02	TB9
	ਰਤੀ ਵੀ		TB10	Q03	TB11	N	TB12	Q03 N	TB11
	⊈दी		TB12	COM3			C	OM3 Q04	TB13
	+	TB13 DC12/24V	TB14	Q05	TB13	Q04	TB14	Q05	TB15
	ᡓᡵᡰᢁᡰ᠍ᡛ		1014	900	TB15	Q06	TB16	Q06	TB17
	별퇴 스	TB12	TB16	Q07	TD47		TB18 C	OM4 NC	
		TB19	TD40	COM4	TB17	NC	тв20	Q08	TB19
	F		11818					Q09	TB21
			TB18		TB19	Q08		Q10	
			TB18	Q09			тв22	Q11	TB23
					TB19 TB21	Q08 Q10	TB22	Q11 NC OM5	1
			TB20 TB22	Q09 Q11			тв22 <sup>ТВ24</sup> с тв26	Q11 NC	TB25
	┋┇ ╵ <sup>╱┸</sup> ╼──⋿	TB12 DC12/24V	TB20 TB22 TB24	Q09	TB21	Q10	TB22 TB24 TB26 TB28	Q11 NC OM5 Q12 Q13 Q14	ТВ25 ТВ27
			TB20 TB22	Q09 Q11	TB21 TB23	Q10 NC	TB22 TB24 C TB26 TB28 TB30	Q11 NC OM5 Q12 Q13 Q14 Q15 24V	TB25
	┋┇ ╵ <sup>╱┸</sup> ╼──⋿		TB20 TB22 TB24	Q09 Q11 COM5	TB21 TB23 TB25	Q10 NC Q12	TB22 TB24 C TB26 TB28 TB30	Q11 NC OM5 Q12 Q13 Q14 Q15	TB25 TB27

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

### Remark

TB29, TB30 is 24V output point. (24VDC,0.3A)
24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

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

	Model		·	/	Main	unit					
Specification				>	KEC-DF	P60SU					
Output point		24 point									
Insulation method		Photo-coupler ins	sulation								
Rated load voltage	Э	DC 12/24V	DC 12/24V								
Load voltage range	е	DC 10.2 ~ 26.4V									
Max. load current		0.5A / 1point, 2A /	0.5A/1point, 2A/1COM (QX0.0.0, QX0.0.1)								
Off leakage curren	nt	0.1 <sup>mA</sup> or less	0.1 <sup>mA</sup> or less								
Max. inrush currer	nt	4A/10ms or less									
Max. voltage drop	when On	DC 0.4V or less									
Surge killer		Zener diode	Zener diode								
Response (	$Off \rightarrow On$	1ms or less									
time (	$On \rightarrow Off$	1ms or less (rated	d load, re	esistive	load)						
Common method		4 point / COM (QX0.0.0, QX0.0.1: 2point/COM),( QX0.0.2, QX0.0.3: 2point/COM)						OM)			
Proper cable size		Stranded cable 0.3~0.75mm <sup>2</sup> (External diameter 2.8mm or less)									
External supply	Voltage	DC12/24V ± 10%	6 (ripple v	voltage	e 4 Vp-p	or less	)				
power (	Current	25 <sup>mA</sup> or less (when connecting DC24V)									
Operation indicato		LED On When Output On									
External connection	on method	42 point termina	al block (	connec	tor (M3	X6sc	rew)				
Weight		636g			1		1				
Circuit configuration	n			No.	Contact	No.	Contact		Ту	/pe	_
DC5V	1			TB2	PE	TB1 TB3	AC100 ~240V	TB2	PE	AC100	TB1
I I I I I I I I I I I I I I I I I I I	┲╴═┥┋╊			TB4	COM0	TB5	Q00	TB4	COMO	~240V	твз
	<u> </u>	TB04		TB6	COM1	TB7	Q01	TB6	COMI	Q00	TB5
로				TB8	COM2	TB9	Q02	TB8	COM2	Q01	тв7
E	E I	твоб		TB10	Q03	TB11	N	TB10	Q03	Q02	TB9
		TB09 DC12/24V		TB12	COM3	TB13	Q04	TB12	сомз	N	TB11 TB13
	=			TB14	Q05	TB15	Q06	TB14	Q05	Q04	TB15
(III)	┺╝╴──┤	TB08		TB16	Q07	TB17	NC	TB16	Q07	Q06	TB17
		TB13 C12/24V		TB18	COM4	TB19	Q08	TB18	COM4	NC	TB19
E	t T	TB16		TB20	Q09	TB21	Q10	ТВ20	Q09	Q08 Q10	TB21
	4 4	DC12/24V TB19		TB22	Q11	TB23	NC	ТВ22	Q11	NC	TB23
		2		TB24	COM5	TB25	Q12	тв24	COM5	Q12	TB25
	리 스			TB26	Q13	TB27	Q14	TB26	Q13	Q14	тв27
	2	DC12/24V ∠		TB28	Q15	TB29	NC	TB28	Q15	NC	тв29
				TB30	COM6	TB31	Q16	TB30 TB32	COM6	Q16	TB31
The second secon	$\mathbf{r}$			TB32	Q17	TB33	Q18	тв34	Q17	Q18	TB33
	<u> </u>								TB35		
	L	Terminal no TB38 Q21 TB37 Q20 TB37 Q20 TB37							TB37		
.L				TB40	Q23	TB39	Q22 24V	тв40	Q21	Q22	твз9
				TB42	240	TB41	<u> 24 v</u>	тв42	Q23	24V	ТВ41
					24G				24G	$   \mathbf{\bullet} $	
				l	1	I	1	i			

#### Remark

• TB41, TB342 is 24V output point. (24VDC,0.5A)• 24V ouput is on upper terminal block when it's 'H type' but it's on lower terminal block of SU type.

# 7.4 Digital Input Module Specification

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

	Model		DC input n	nodule				
Specification			XBE-DC	08A				
Input point		8 point						
Insulation met	hod	Photo coupler insulation						
Rated input vo	oltage	DC24V						
Rated input cu	irrent	About 4 <sup>mA</sup>						
Operation volta	age range	DC20.4~28.8V (ripple rate < 5	5%)					
On Voltage/Cu	urrent	DC19V or higher / 3 mA or high	lher					
Off Voltage/Cu	irrent	DC6V or less / $1^{mA}$ or less						
Input resistance	æ	About 5.6 <sup>kΩ</sup>						
Response time	$\begin{array}{c} \text{Off} \to \text{On} \\ \text{On} \to \text{Off} \end{array}$	1/3/5/10/20/70/100 <sup>ms</sup> (set by C	PU parame	eter) Default	t: 3ms			
Insulation pres	sure	AC560Vrms / 3Cycle (altitude	2000m)					
Insulation resis	stance	$10^{M\Omega}$ or more by Megohmme	ter					
Common met	hod	8 point / COM						
Proper cable s	size	Stranded pair 0.3~0.75mm <sup>2</sup> (Ex	ternal diam	eter 2.8mm o	or less)			
Current consu	mption	$30^{\text{mA}}$ (when all point On)						
Operation indi	cator	Input On, LED On						
External conne	ection method	9 point terminal block connect	or					
Weight		52 g						
Circuit configu	ration		No.	Contact	Туре			
			TB1	0				
0		Photo coupler	TB2	1				
			TB3	2	TB3			
	R	Ĭ <b>▼</b> ▲ 【	TB4	3	TB4			
			TB5	4	твз			
ТВ9		circuit	TB6	5	твб 🖳			
			TB7	6	твт			
DC24V	Terminal block no.		TB8	7	TB8			
			TB9	СОМ	ТВ9			

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

	Model	dule (Sink/Source ty		input mo	odule			
Specification		XBE-DC16	A		XBE-D	DC16B		
Input point		16 point	16 point					
Insulation metho	bd	Photo coupler insulatio	n					
Rated input volt	age	DC24V		D	C12/24V			
Rated input curr	rent	About 4 <sup>mA</sup>		A	bout 4/8mA			
Operation volta	ge range	DC20.4~28.8V (ripple rate < 5%)		D	C9.5~30V (rippl	e rate < 5%)		
On Voltage/Cur	rent	DC19V or higher / 3	A or high	er D	C9V or higher / 3	3 <sup>mA</sup> or higher		
Off Voltage/Curr	rent	DC6V or less / 1 <sup>mA</sup> or	less	D	C5V or less / 1	A or less		
Input resistance		About 5.6 <sup>kΩ</sup>		A	bout 2.7 <sup>kΩ</sup>			
Response	$Off \rightarrow On$	1/3/5/10/20/70/100ms	(cot by C	DLLpara	notor) Dofquit: 2	mç		
time	$On \rightarrow Off$		(Set by C	ru parai	nelei) Delauli. S			
Insulation press	ure	AC560Vrms / 3Cycle (a	altitude 2	000m)				
Insulation resista	ance	$10^{M\Omega}$ or more by Mega	ohmmete	r				
Common metho	bd	16 point / COM						
Proper cable siz	e	Stranded cable 0.3~0.7	75 <sup>mm²</sup> (Ex	ternal dia	ameter 2.8mm or	less)		
Current consum	ption	40 <sup>mA</sup> (when all point O	n)					
Operation indica	ator	Input On, LED On						
External connec	ction method	8 pin terminal block co	nnector +	· 10 pin te	erminal block cor	nnector		
Weight		53 g						
Circuit configura	ntion		No.	Contact		Туре		
			TB1 TB2 TB3 TB4	0 1 2 3	- TB01 - TB02 - TB03			
		<del>\</del>	TB5	4	— ТВ04 ТВ05			
		Photo coupler	TB6	5	TB06	<u>L</u>		
			TB7	6	TB07			
	R ↓ T ↓		TB8 TB1	7 8	TB08			
	5 • •	_ Internal circuit	TB2	9	- TB01			
			TB3	A	TB02 TB03			
╽┊╵╧┈┓┝╌╌┘╇╶╎			TB4	В	TB03			
DC24V	Terminal block no.		TB5	С	TB05	K-		
			TB6	D	TB06	<u>لتص</u>		
			TB7	E	TB07			
			TB8	F	TB08			
			TB9	COM	TB09 TB10			
			TB10	COM	1610			

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	Model	DC input module										
Specification				XBE-DO	C32A							
Input point		32 point	32 point									
Insulation metho	bd	Photo coupler insulation										
Rated input volta	age	DC24V										
Rated input curr	ent	About 4 <sup>mA</sup>										
Operation voltage		DC20.4~28.8V (ripp)	DC20.4~28.8V (ripple rate < 5%)									
Input Derating	, · · · · · ·	Refer to Derating diagram										
On Voltage/Curr	ent	DC 19V or higher / 3	-	aher								
Off Voltage/Curr				9.10.								
Input resistance		DC 6V or less / 1 mA About 5.6kΩ	orless									
	0#											
Response time	$Off \to On$ $On \to Off$	1/3/5/10/20/70/100ms	(set by C	CPU parar	meter) D	efault:3ms						
Insulation pressu	ure	AC 560Vrms / 3 Cycle (altitude 2000m)										
Insulation resista	ance	10 <sup>MQ</sup> or more by Megohmmeter										
Common metho	od	32 point / COM										
Proper cable siz	e	0.3 <sup>mm²</sup>										
Current consum	ption	50 <sup>mA</sup> (when all point	On)									
Operation indica	itor	Input On, LED On	,									
External connec		40 pin connector										
Weight		60g										
Circuit configura	tion	5	No.	Contact	No.	Contact	Туре					
			B20	00	A20	10						
			B19	01	A19	11						
			B18	02	A18	12						
-0-0- <u>A05</u> 0	<b>─────────────</b>		B17	03	A17	13	B20 <b>H H</b> A20					
	—	circuit	B16	04	A16	14	B19 A19					
DC24V	Terminal block no.		B15	05	A15	15	B17 • A17					
Input Derating	g diagram		B14	06	A14	16	B16 A16					
100		· · · · <b>R</b> · ·	B13	07	A13	17	B15 A1					
90			B12	08	A12	18	B13 A13					
80		DC28.8V	, B11	09	A11	19	B12 A12					
			B10	0A	A10	1A	B10 A1					
Ite	+ $+$ $+$ $+$ $+$ $+$ $+$		B09	0B	A09	1B	B09 B08					
⊔ ≌ ຄ∩ ⊢ <del> </del>			B08	0C	A08	1C	B07 A0					
00 (%) 00 (%) 00 (%)	+ $+$ $+$ $+$ $+$		B07	0D	A07	1D	B06 A00 B05 A00					
40				0 10 20 30 40 50 55 $C$   B06   0E   A06   1E   B04   B06   B06   B06   B06   B06   B04   B04								
40		$\begin{array}{c c} \hline \\ 40 \\ 50 \\ 55 \\ \hline \end{array}$	B06	0E	A06	1E	B04 A04					
40	10 20 30 Ambient temperatu		B06 B05	0E 0F	A06 A05	1E 1F	B03					
40 L												
40 L			B05	0F	A05	1F						
40 L			B05 B04	0F NC	A05 A04	1F NC	B03 <b>1 1 1</b> A03 B02 <b>1 1 1</b> A03					

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

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# 7.5 Digital Output Module Specification

## 7.5.1 8 point relay output module

	Model		output mod	ule						
Specification		XE	BE-RY08A							
Output point		8 point								
Insulation me	thod	Relay insulation	Relay insulation							
Rated load vo	oltage / Current	DC24V 2A (Resistive load) / AC22	20V 2A (CO	SΨ = 1), 5A	/COM					
Min. load volt	age/Current	DC5V/1 <sup>mA</sup>								
Max. load vol	tage/Current	AC250V, DC125V								
Off leakage c	urrent	0.1 <sup>mA</sup> (AC220V, 60 <sup>Hz</sup> )								
Max. On/Off f	requency	3,600 times/hr								
Surge absorb	ber	None								
	Mechanical	20 millions times or more								
		Rated load voltage / current 100,0	000 times or	more						
Service life		AC200V / 1.5A, AC240V / 1A (CC	<b>)</b> SΨ = 0.7) 1	100,000 time	es or more					
	Electrical	<b>)</b> SΨ = 0.35)	100,000 time	es or more						
		DC24V / 1A, DC100V / 0.1A (L / F	R = 7 <sup>ms</sup> ) 100	),000 times (	or more					
Response	$Off \rightarrow On$	10 <sup>ms</sup> or less								
time	$On \rightarrow Off$	12ms or less								
Common me	thod	8 point / COM								
Proper cable	size	Stranded cable 0.3~0.75mm <sup>2</sup> (Exte	rnal diamete	er 2.8 <sup>mm</sup> or le	ess)					
Current const	umption	230 <sup>mA</sup> (when all point On)								
Operation ind	licator	Output On, LED On								
External conr	nection method	9 point terminal block connector								
Weight		80g								
	Circuit c	onfiguration	No.	Contact	Туре					
			TB1	0						
•	DC5V		TB2	1						
			TB3	2	TB1					
			TB4	3	TB2					
Int	ernal		TB5	4	TB4					
			TB6	5	твб					
			TB7	6	TB7					
		Terminal block no.	TB8	7	ТВ9					
			TB9	СОМ						

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	Model		Relay out	put mo	dule				
Specification	1		XBE-I	RY08E	8				
Output point		8 point							
Insulation me	ethod	Relay insulation							
Rated load v	oltage / Current	DC24V 2A (Resistive load	d)/AC220V2	2A (CC	OSΨ = 1), 2A/C	COM			
Min. load vol	tage/Current	DC5V/1 <sup>mA</sup>							
Max. load vo	Itage/Current	AC250V, DC125V							
Off leakage of	current	0.1mA (AC220V, 60Hz)	0.1 <sup>mA</sup> (AC220V, 60 <sup>Hz</sup> )						
Max. On/Off	frequency	3,600 times/hr	3,600 times/hr						
Surge absor	ber	None							
	Mechanical	20 millions times or more							
		Rated load voltage / curre	ent 100,000 ti	mes oi	more				
Service life		AC200V / 1.5A, AC240V	/1A (COSΨ	= 0.7)	100,000 times	or more			
	Electrical	AC200V / 1A, AC240V / 0	0.5A (COSΨ	= 0.35	) 100,000 times	or more			
		DC24V/1A, DC100V/0	•	,					
Response	$Off \rightarrow On$	10 <sup>ms</sup> or less							
time	$On \rightarrow Off$	12ms or less							
Common me	ethod	1 point / COM							
Proper cable	size		Stranded cable 0.3~0.75mm <sup>2</sup> (External diameter 2.8mm or less)						
Current cons		230 <sup>mA</sup> (when all point Or	•						
Operation in	•	Output On, LED On							
•	nection method	9 point terminal block cor	nector x 2						
Weight		81g							
-	Circuit	configuration	1	No.	Contact	No.			
		÷		B1	0				
				B2	COM0				
Ŷ	DC5V			־ВЗ ГВ4	1 COM1	TB2			
				B5	2	TB4 [ 🔁			
			Г	B6	COM2	TB5 CONTROL			
		• • • • • • • • • • • • • • • • • • •		B7	3	TB7			
	│ <sup>★</sup> ⊑ Ÿ			B8	COM3	TB8			
				B9	NC	ТВ9			
		>   >		TB1	4	TB1 📜			
	<	$\langle   \langle$		B2	COM4				
Inte	mal r			B3	5	TB3 FI			
				B4	COM5	TB5			
	ו דיין	TB8		TB5 TB6	6 COM6				
				во 187	7	TB7			
		Term	1	B8	COM7	TB9			

7.5.2 8 point relay output module (Independent point)

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## 7.5.3 16 point relay output module

	Model		Rel	ay output m	odule					
Specification				XBE-RY16	A					
Output point		16 point								
Insulation me	ethod	Relay insu	Relay insulation							
Rated load voltage/ current		DC24V 24	DC24V 2A (Resistive load) / AC220V 2A (COS $\Psi$ = 1), 5A/COM							
Min. load volt	age/current	DC5V/1	nA							
Max. load vo	Itage/current	AC250V, [	DC125V							
Off leakage c	current	0.1mA (AC	0.1 <sup>mA</sup> (AC220V, 60 <sup>Hz</sup> )							
Max. On/Off	frequency	3,600 time	es/hr							
Surge absort	ber	None								
	Mechanical	20 millions	s times or more							
		Rated load	d voltage / current 10	0,000 times	or more					
Service life	Electrical	AC200V /	1.5A, AC240V / 1A (	$COS\Psi = 0.$	7) 100,000 tir	nes or more				
	Electrical	AC200V /	1A, AC240V / 0.5A (	$(COS\Psi = 0.3)$	35) 100,000 tir	mes or more				
		DC24V/1	DC24V / 1A, DC100V / 0.1A (L / R = 7ms) 100,000 times or more							
Response	$Off \rightarrow On$	10 <sup>ms</sup> or le	10ms or less							
time	$On \rightarrow Off$	12ms or less								
Common me	ethod	8 point / C	юм							
Proper cable	size	Stranded of	cable 0.3~0.75mm <sup>2</sup> (E	xternal diam	neter 2.8mm o	r less)				
Current cons	umption	420 <sup>mA</sup> (wh	nen all point On)							
Operation inc	dicator	Output Or	n, LED On							
External conr	nection method	9 point ten	minal block connecto	or x 2 ea						
Weight		130g								
	Circuit co	nfiguration		No.	Contact	Туре				
			,	TB1 TB2 TB3	0 1 2					
	DC5V			TB3	3	TB2 CO TB3 CO				
				TB5	4	TB4 LO				
	<b>_</b> _			TB6	5	твб 🖵				
	│ <u></u> ▲ │									
Interr	nal	_	$ $ $\langle$ $ $ $ $							
				TB1	8					
				TB2	9					
		L		TB3	A					
L			Torminal block no	TB4	B					
			i erminal block NO.							
			-							
			ŀ	-		ТВ9				
Interr			TB9 TB9 Terminal block no.	TB2 TB3	9 A	TB7 TB8 TB9 TB1 TB2 TB3 TB4 TB5 TB6 TB7				

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	Model		Transis	tor output i	module		
Specification	n		X	(BE-TN08/	٩		
Output point	t	8 point					
Insulation m	ethod	Photo coup	oler insulation				
Rated load	/oltage	DC 12/24	V				
Load voltage	e range	DC 10.2 ~ 2	26.4V				
Max. load vo	oltage	0.5A/1 poi	int				
Off leakage	current	0.1 <sup>mA</sup> or le	SS				
Max. inrush	current	4A/10 <sup>ms</sup> (	or less				
Max. voltage	e drop (On)	DC 0.4V or	less				
Surge absor	ber	Zener Diod	le				
Response Off $\rightarrow$ On 1 <sup>ms</sup> or less							
time On $\rightarrow$ Off 1 <sup>ms</sup> or less (Rated load, resistive			load)				
Common method 8 point / COM							
Proper cable size Stranded cable 0.3~0.75mm² (Exte					eter 2.8mm o	or less)	
Current con	sumption	40 <sup>mA</sup> (whe	n all point On)				
External	Voltage	DC12/24V $\pm$ 10% (ripple voltage 4 Vp-p or less)					
power supply	Current	10 <sup>mA</sup> or less	(DC24V connection)				
Operation in	dicator	Output On,	LED On				
External cor method	nection	10 point terminal block connector					
Weight		52g					
	Circuit	configuration		No.	Contact	Туре	
			7	TB01	0		
P DC	5V			TB02	1	тво1	
۲				TB03	2	TB02	
Internel		╌┤╘╧╋		TB04	3		
Internal circuit	Ψ <u>Γ</u>			TB05	4	TB04	
		$\leq$		TB06	5		
			TB09			TB07	
			TB10	TB07	6	твоэ	
		L		TB08	7	тв10	
			DC12/24V	TB09	DC12 /24V		
				TB10	COM		

# 7.5.4 8 point transistor output module (Sink type)

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	Model			tor output ma	odule					
Specification			Х	BE-TN16A						
Output point		16 point								
Insulation met	hod	Photo cou	pler insulation							
Rated load vol	ltage	DC 12/24	4V							
Load voltage r	ange	DC 10.2 ~	- 26.4V							
Max. load volta	age	0.2A/1pc	0.2A/1 point, 2A/1COM							
Off leakage cu	irrent	0.1 <sup>mA</sup> or le	0.1 <sup>mA</sup> or less							
Max. inrush cu	urrent	4A/10ms	or less							
Max. voltage o	drop (On)	DC 0.4V o	or less							
Surge absorbe	er	Zener Dio	de							
Response	$Off \rightarrow On$	1 <sup>ms</sup> or les	S							
time	$On \rightarrow Off$	1 <sup>ms</sup> or les	s (Rated load, resistive	e load)						
Common met	hod	16 point /	СОМ							
Proper cable s	size	Stranded	cable 0.3~0.75mm <sup>2</sup> (Exte	ernal diamete	er 2.8 <sup>mm</sup> or les	ss)				
Current consu	mption	60 <sup>mA</sup> (wh	en all point On)							
External	Voltage	DC12/24\	$1 \pm 10\%$ (ripple voltage	4 Vp-p or les	ss)					
power supply	Current	10 <sup>mA</sup> or les	s (DC24V connection)							
Operation indi	cator	Output Or	Output On, LED On							
External conne	ection method	8 pin term	inal block connector +	10 pin termir	nal block conr	nector				
Weight		54 g								
	Circuit co	onfiguration		No.	Contact	Туре				
				TB01 TB02	0					
♦ DC5V	1			TB03	2	TB02				
	·		TB01	TB04	3	TB04				
				TB05	4	тво5 🗖				
	┝╴┍╼╴	┤┋╡		TB06	5	твоб				
Internal circuit				TB07	6					
Circuit		$\langle  $		TB08	7					
				TB01	8	твот				
			TDOO	TB02	9	тво2				
	L		TB09	TB03	A					
			TB10	TB03	В	TB04				
			DC12/24V	TB04	C	твоб				
<u>ا</u>			Terminal block <b>no</b> .		-	твот				
				TB06	D	твов				
				TB07	E	твоэ 🛄				
				TB08	F	тв10				
				TB09	DC12/24V					
				TB10	COM					

T

# 7.5.5 16 point transistor output module (Sink type)

Specification Output point			Transistor output module							
Output point		XBE-TN32A								
		32 poin	t							
Insulation method		Photo coupler insulation								
Rated load voltage		DC 12/24V								
Load voltage range		DC 10.2 ~ 26.4V								
Max. load voltage		0.2A/1 point, 2A/1COM								
Off leakage current		0.1 <sup>mA</sup> or less								
Max. inrush current		0.7A/10 <sup>ms</sup> or less								
Max. voltage drop (On)		DC 0.4V or less								
Surge absorber		Zener Diode								
-	$Off \rightarrow On$	1ms or	less							
time $On \rightarrow Off$		1ms or less (Rated load, resistive load)								
Common method		32 point / COM								
Proper cable size		0.3m <sup>2</sup>								
Current consumption		120 <sup>mA</sup> (when all point On)								
	Voltage	DC12/24V $\pm$ 10% (ripple voltage 4 Vp-p or less)								
	Current	20 <sup>m</sup> Aor less (DC24V connection)								
Operation indicator		Output On, LED On								
External connection method		40 pin connector								
Weight		60g								
Circuit configuratio	n	oog		No.	Contac	No.	Contac	Т	уре	
en call coningarado				B20	00	A20	10		700	
DC5V				B19	01	A19	11	_		
<b>φ</b> <sup>2037</sup>				B18	02	A18	12		H.	
			B20	B17	03	A17	13	B20 B19	IHI	A20
		<b>↓</b>		B16	04	A16	14	B18		A18
		1Ť		B15	05	A15	15	B17		A17
		<u>I</u>		B14	06	A14	16	B16 B15	::	A16 A15
	ЦЪ) /			B13	07	A13	17	B14	::	A14
	'   _	<u>`</u>	A05	B12	08	A12	18	B13		A13
			B01,B02	B12	00	A12	19	B12 B11	::	A12
			A01 A02					B10		A11 A10
			A01,A02	B10	0A	A10	1A	B09	::	A09
		I		B09	0B	A09	1B	B08 B07	::	A08 A07
		DC12/24V		B08	0C	A08	1C	B06		A07 A06
L			Terminal block no	B07	0D	A07	1D	B05	::	A05
				B06	0E	A06	1E	B04 B03	::	A04 A03
				B05	0F	A05	1F	B02	гIJ	A03
				B04	NC	A04	NC	B01		A01
				B03	NC	A03	NC		ΗĒ	1
				B02	DC12/	A02				
				B01	24V	A01	COM			

# 7.5.6 32 point transistor output module (Sink type)

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# 7.5.7 8 point transistor output module (Source type)

	Model		Transis	tor output r	nodule					
Specification			×	BE-TP08	A					
Output point		8 point								
Insulation method		Photo coupler insulation								
Rated load voltage		DC 12/24V								
Load voltage range		DC 10.2 ~ 26.4V								
Max. load voltage		0.5A/1 point								
Off leakage current		0.1 <sup>mA</sup> or less								
Max. inrush current		4A/10 <sup>ms</sup> or less								
Max. voltage drop (On)		DC 0.4V or less								
Surge absorber		Zener Diode								
Response $Off \rightarrow On$		1ms or less								
time	$\text{On}{\rightarrow}\text{Off}$	1 <sup>ms</sup> or less (Rated load, resistive load)								
Common method		8 point / COM								
Proper cable size		Stranded cable 0.3~0.75mm <sup>2</sup> (external diameter 2.8mm or less)								
Current consumption		40 <sup>mA</sup> (when all outputs are on)								
External	Voltage	DC12/24V $\pm$ 10% (ripple voltage 4 Vp-p or less)								
power	Current	10 <sup>mA</sup> or less (when connecting DC24V)								
Operation indic	Operation indicator		LED on when output on							
External connection method		10 pin terminal block connector								
Weight		30g								
	Circuit co	onfiguration		No.	Contact	Туре				
			]	TB01	0					
			твр9	TB02	1	тво1				
$\square$				TB03	2	тво2				
Internal			TB10	TB04	3	твоз				
circuit			TB08	TB05	4	TB04				
				TB06	5	твоб				
				TB07		твот 🛄				
					6	TB08				
				TB08	7	TB10				
L			┘	TB09	COM					
				TB10	0V					

	Model		Transisto	r output mo	dule					
Specification			XB	E-TP16A						
Output point		16 point								
Insulation met	Insulation method		Photo coupler insulation							
Rated load voltage		DC 12/24V								
Load voltage range		DC 10.2 ~ 26.4V								
Max. load voltage		0.5A/1 point, 2A/1COM								
Off leakage current		0.1 <sup>mA</sup> or less								
Max. inrush current		4A/10 <sup>ms</sup> or less								
Max. voltage drop (On)		DC 0.4V or le	SS							
Surge absorber		Zener Diode								
Response	$Off \rightarrow On$	1ms or less								
time $On \rightarrow Off$		1 <sup>ms</sup> or less (Rated load, resistive load)								
Common method		16 point / CO	M							
Proper cable size		Stranded cable 0.3~0.75 <sup>mm<sup>*</sup></sup> (external diameter 2.8 <sup>mm</sup> or less)								
Current consumption		60 <sup>mA</sup> (When all outputs are on)								
External Voltage		DC12/24V $\pm$ 10% (ripple voltage 4 Vp-p or less)								
power Current		10 <sup>mA</sup> or less (connecting DC24V)								
Operation indicator		LED On when output On								
External connection method		8 pin terminal block connector + 10 pin terminal block connector								
Weight		40g								
	Circuit	configuration		No.	Contact	Туре				
				TB01	0	TB01				
			]	TB02	1	тво2 📑				
<b>†</b> D	C5V		TB09	TB03	2	твоз 🛄				
		•	<b> </b>	TB04	3	тво4 🛄				
			DC12/24V TB10	TB05	4	твоз 📴				
Intern				TB06	5					
circui	t   🕊 🛴		TB08	TB07	6					
				TB08	7					
				TB01	8	тво1 📑				
				TB02	9	тво2 📑				
				TB03	А	твоз 🛄				
			TB010	TB04	В	тв04 🗔				
		L	▲ └──┘	1801						
			Terminal	TB05	C	тво5 📑				
			Terminal							
				TB05	С	TB05 TB06 TB07				
				TB05 TB06	C D	TB05 TB06 TB07 TB08 TB08 TB08 TB08 TB08 TB08 TB08 TB08 TB05 TB05 TB05 TB05 TB05 TB05 TB06 TB06 TB06 TB06 TB06 TB07 TB				
				TB05 TB06 TB07	C D E	TB05 TB06 TB07				

# 7.5.8 16 point transistor output module (Source type)

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	Model		Transist	or outpu	t module	)	
Specification			Х	BE-TP32	2A		
Output point		32 point					
Insulation method		Photo coupler insulat	ion				
Rated load voltage	ţ	DC 12/24V					
Load voltage range	Э	DC 10.2 ~ 26.4V					
Max. load voltage		0.2A/1 point, 2A/10	MO				
Off leakage curren	t	0.1 <sup>mA</sup> or less					
Max. inrush curren	ıt	4A/10 ms or less					
Max. voltage drop	(On)	DC 0.4V or less					
Surge absorber		Zener Diode					
Response	$Off \rightarrow On$	1ms or less					
time	$On \rightarrow Off$	1ms or less (Rated lo	ad, resistive	load)			
Common method		32 point / COM					
Proper cable size		0.3 <sup>mm²</sup>					
Current consumpti	on	120 <sup>mA</sup> (When all out	outs are on)				
E to mala avera	Voltage	DC12/24V ± 10% (rip	ple voltage	4 Vp-p c	or less)		
External power	Current	20 <sup>mA</sup> or less (connec	ting DC24V	′)	-		
Operation indicato	r	LED On when output On					
External connectio	n method	40 pin connector					
Weight		60g					
	Circuit configura	ition	No.	Contact	No.	Contact	Туре
			B20	00	A20	10	
			B19	01	A19	11	
- <del>o</del> DC5V			B18	02	A18	12	
I I DOW		B02,B01	B17	03	A17	13	B20 A20 B19 A19
	<b></b>	F	B16	04	A16	14	B18 A18
		DC12/2 A02,A01		05	A15	15	B17 A17
Internal			-• B14	06	A14	16	B16 D D A16 B15 D D A15
		A05	D12		Δ13	17	B14 🛛 🖷 🗖 A14
circuit		A03	B13	07	A13		
circuit			B12	08	A12	18	B13 A13 B12 A12
circuit			B12 B11	08 09	A12 A11	18 19	B13 A13 B12 A12 B11 A11
			B12 B11 B10	08 09 0A	A12 A11 A10	18 19 1A	B13         A13           B12         A12           B11         A11           B10         A10           B09         A09
			B12 B11 B10 B09	08 09 0A 0B	A12 A11 A10 A09	18 19 1A 1B	B13         A13           B12         A12           B11         A11           B10         A10           B09         A09           B08         A08
			B12 B11 B10 B09 B08	08 09 0A 0B 0C	A12 A11 A10 A09 A08	18 19 1A 1B 1C	B13         A13           B12         A12           B11         A11           B10         A10           B09         A09           B08         A08           B07         A07           B06         A06
			B12 B11 B10 B09 B08 B07	08 09 0A 0B 0C 0D	A12 A11 A10 A09 A08 A07	18 19 1A 1B 1C 1D	B13         A13           B12         A12           B11         A11           B10         A10           B09         A09           B08         A08           B07         A07
			B12 B11 B10 B09 B08 B07 B06	08 09 0A 0B 0C 0D 0E	A12 A11 A10 A09 A08 A07 A06	18 19 1A 1B 1C 1D 1E	B13         A13           B12         A13           B11         A11           B10         A10           B09         A09           B08         A09           B07         A07           B06         A06           B05         A06           B05         A04           B03         A03
			B12 B11 B10 B09 B08 B07 b0. B06 B05	08 09 0A 0B 0C 0D 0E 0F	A12 A11 A10 A09 A08 A07 A06 A05	18 19 1A 1B 1C 1D 1E 1F	B13         A13           B12         A13           B11         A11           B10         A10           B09         A09           B08         A07           B07         A07           B06         A06           B05         A05           B04         A04
			B12 B11 B10 B09 B08 B07 B06 B05 B04	08 09 0A 0B 0C 0D 0E 0F NC	A12 A11 A10 A09 A08 A07 A06 A05 A04	18 19 1A 1B 1C 1D 1E 1F NC	B13         A13           B12         A13           B11         A11           B10         A10           B09         A09           B08         A08           B07         A06           B05         A06           B05         A06           B05         A06           B05         A04           B03         A03           B04         A03           B02         A02
			B12 B11 B10 B09 B08 B07 b0. B06 B05	08 09 0A 0B 0C 0D 0E 0F	A12 A11 A10 A09 A08 A07 A06 A05	18 19 1A 1B 1C 1D 1E 1F	B13         A13           B12         A13           B11         A11           B10         A10           B09         A09           B08         A08           B07         A06           B05         A06           B05         A06           B05         A06           B05         A04           B03         A03           B04         A03           B02         A02

T

# 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 n	nodule			
Specification			XBE-DR	R16A			
Input point		8 point					
Insulation met	hod	Photo coupler insulation					
Rated input vo	ltage	DC24V					
Rated input cu	irrent	About 4 <sup>mA</sup>					
Operation volta	age range	DC20.4~28.8V (within ripple ra	ate 5%)				
On Voltage/Cu	urrent	DC19V or higher / $3^{mA}$ or high	ier				
Off Voltage/Cu	irrent	DC6V or less / $1^{mA}$ or less					
Input resistance	æ	About 5.6 <sup>kΩ</sup>					
Response time	$Off \to On$ $On \to Off$	1/3/5/10/20/70/100ms(set by CPU parameter) Default: 3ms			t: 3ms		
Insulation pres	sure	AC560Vrms / 3Cycle (altitude	2000m)	m)			
Insulation resis	stance	10 <sup>MQ</sup> or more by Megohmmeter					
Common met	nod	8 point / COM					
Proper cable s	ize	Stranded cable 0.3~0.75mm <sup>2</sup> (External diameter 2.8mm or less)					
Current consu	mption	$280^{\text{mA}}$ (When all inputs and or	utputs are o	on)			
Operation indi	cator	LED on when input on					
External conne	ection method	9 pin terminal block connector					
Weight		81g					
	Circuit co	onfiguration	No.	Contact	Туре		
			TB1	0			
Г		<b>⊕ ⊕</b>	TB2	1	тв1 🗖		
	-[_]	Photo coupler	TB3	2			
			TB4	3	TB3		
			TB5	4	TB5		
		circuit	TB6	5	твб		
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□	Toursteel		TB7	6			
	<ul> <li>Terminal block no.</li> </ul>		TB8	7	TB8 TB9 TB9		
	-		TB9	СОМ			

# 7.7 Combined Digital I/O module Output Specification

# 7.7.1 8 point relay output

	Model	Relayo	utput modul	e		
Specification		XBE	E-DR16A			
Output poin	Output point 8 point					
Insulation me	ethod	Relay insulation				
Rated load voltage / Cur	rent	DC24V 2A(Resistive load) / AC220V 2A(COS $\Psi$ = 1), 5A/COM				
Min. load volt	tage/Current	DC5V/1 <sup>mA</sup>				
Max. load vo	ltage	AC250V, DC125V				
Off leakage of	current	0.1 <sup>mA</sup> (AC220V, 60 <sup>Hz</sup> )				
Max. On/Off	frequency	3,600 times/hr				
Surge absort	per	None				
	Mechanical	20 millions times or more				
		Rated load voltage / current 100,000	) times or m	ore		
Service life		AC200V / 1.5A, AC240V / 1A (COS)	Ψ = 0.7) 100	),000 times	or more	
	Electrical $AC200V / 1A, AC240V / 0.5A (COS\Psi = 0.35) 100,000 times$				s or more	
		DC24V / 1A, DC100V / 0.1A (L / R =	: 7ms) 100,0	00 times or I	more	
Response	$Off \rightarrow On$	10 <sup>ms</sup> or less				
time	$On \rightarrow Off$	12ms or less				
Common me	ethod	8 point / COM				
Proper cable	size	Stranded cable 0.3~0.75mm <sup>2</sup> (externa	al diameter 2	2.8 <sup>mm</sup> or less	5)	
Current cons	umption	$280^{\text{mA}}$ (When all inputs and outputs	are on)			
Operation inc	dicator	LED on when output on				
External con	nection method	9 pin terminal block connector				
Weight		81g				
	Circu	it configuration	No.	Contact	Туре	
			TB1	0		
	DC5V		TB2	1	TB1	
			TB3	2	тва 🖂	
			TB4	3		
			TB5	4	TB4 Lend TB5 End	
			TB6	5		
		ТВ9	TB7	6	TB7	
		Terminal	TB8	7	твэ	
		block no.	TB9	COM		

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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

This section describes specifications, setting and usage of function, programming and wiring with external device of built-in

main unit.

Г

# 8.1.1 Performance specifications

(1) Performance specification

Classification		Des	scription		
		'E' type	'SU' type		
Orandiana	Signal	A-phase, B-phase			
Count input	Input type	Voltage input (Open collector)			
signal	Signal level	DC 24V			
Max. count sp	eed	4kpps	100kpps		
Number of	1 phase	4kpps 4channels	100kpps 2 channels/ 20kpps 6 channels		
channels	2 phase	2kpps 2channels	50kpps 1 channel / 8kpps 3 channels		
Count range		Signed 32 Bit (-2,147,483,648 ~ 2,147,	483,647)		
Count mode (Program setti	ng)	Linear count (if 32-bit range exceeded, Counter max. and min. value is indicate Ring count (repeated count within settir	ed		
		1-phase input			
Input mode		2-phase input			
(Program setti	ng)	CW/CCW input			
Signal type		Voltage			
	1 phase input	Increasing/decreasing operation setting by B-phase input			
Up/Down		Increasing/decreasing operation setting by program			
setting	2 phase input	Operating setting by rising/falling edge phase difference			
U U		A-phase input: increasing operation			
	CW/CCW	B-phase input: decreasing operation			
N Andria Kanadiana	1 phase input	1 multiplication			
Multiplication function	2 phase input	2 multiplication	4 multiplication		
TUNCION	CW/CCW	1 multiplication			
	Signal	Preset instruction input			
Control input	Signal level	DC 24V input type			
	Signal type	Voltage			
External	Output points	1 point/channel (for each channel) :use output contact point of main unit	2 point/channel (for each channel) :use output contact point of main unit		
output	Туре	Selects single-compared (>, >=, =, =<, excluded) (program setting)	<) or section-compared output (included or		

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Classification		Description		
		'E' type	'SU' type	
	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 (Program setting)		Count Latch Revolution per unit time (time setting value: 1~60,000ms)		

(2) Counter/Preset input specification

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

# Remark

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.

# 8.1.2 Designation of parts

(1) Designation of parts

# (a) 'E' type

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Terminal	Names		Usage	
No. 1-phase 2-phase		1-phase	2-phase	
IX0.0.0	Ch0 counter input	Ch0 A-phase input	Counter input terminal	A-phase input
IX0.0.1	Ch1 counter input	Ch0 B-phase input	Counter input terminal	B-phase input
IX0.0.2	Ch2 counter input	Ch2 A-phase input	Counter input terminal	A-phase input
IX0.0.3	Ch3 counter input	Ch2 B-phase input	Counter input terminal	B-phase input
IX0.0.4	Ch0 preset 24V	Ch0 preset 24V	Preset input terminal	Preset input terminal
IX0.0.5	Ch1 preset 24V	-	Preset input terminal	No use
IX0.0.6	Ch2 preset 24V	Ch2 preset 24V	Preset input terminal	Preset input terminal
IX0.0.7	Ch3 preset 24V	-	Preset input terminal	No use
COM0	Input common	Input common	Input common	Input common

# (b) 'SU' type

Terminal	Nai	nes	Us	age
No.	1-phase	2-phase	1-phase	2-phase
IX0.0.0	Ch0 counter input	Ch0 A-phase input	Counter input terminal	A-phase input
IX0.0.1	Ch1 counter input	Ch0 B-phase input	Counter input terminal	B-phase input
IX0.0.2	Ch2 counter input	Ch2 A-phase input	Counter input terminal	A-phase input
IX0.0.3	Ch3 counter input	Ch2 B-phase input	Counter input terminal	B-phase input
IX0.0.4	Ch4 counter input	Ch4 A-phase input	Counter input terminal	A-phase input
IX0.0.5	Ch5 counter input	Ch4 B-phase input	Counter input terminal	B-phase input
IX0.0.6	Ch6 counter input	Ch6 A-phase input	Counter input terminal	A-phase input
IX0.0.7	Ch7 counter input	Ch6 B-phase input	Counter input terminal	B-phase input
IX0.0.8	Ch0 preset 24V	Ch0 preset 24V	Preset input terminal	Preset input terminal
IX0.0.9	Ch1 preset 24V	-	Preset input terminal	No use
IX0.0.10	Ch2 preset 24V	Ch2 preset 24V	Preset input terminal	Preset input terminal
IX0.0.11	Ch3 preset 24V	-	Preset input terminal	No use
IX0.0.12	Ch4 preset 24V	Ch4 preset 24V	Preset input terminal	Preset input terminal
IX0.0.13	Ch5 preset 24V	-	Preset input terminal	No use
IX0.0.14	Ch6 preset 24V	Ch6 preset 24V	Preset input terminal	Preset input terminal
IX0.0.15	Ch7 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

		Terminal	Si	gnal	ation	On/Off
I/O	Internal circuit	No.	1-phase	2-phase	Operation	guaranteed voltage
	2.7 κΩ	IX0.0.0	Ch 0	Ch 0	On	20.4~28.8V
		1000	Pulse input	A-phase input	Off	6V or less
		IX0.0.1	Ch 1	Ch 0	On	20.4~28.8V
	<b>∕ ↓ ↓</b> 2.7 kΩ	1/0.0.1	Pulse input	B-phase input	Off	6V or less
		X0.0.2	Ch 2	Ch 2	On	20.4~28.8V
	<b>4 ↓</b> 2.7 kΩ	1/0.02	Pulse input	A-phase input	Off	6V or less
		IX0.0.3 Ch 3 Pulse inpu	Ch 3	Ch 2 B-phase input	On	20.4~28.8V
	<b>4 Δ 2.7 k</b> Ω		Pulse input		Off	6V or less
Input		IX0.0.4	Ch 0		On	20.4~28.8V
	<b>∕▼ ▲ ♦</b> 5.6 kΩ	Preset input	-	Off	6V or less	
		X0.0.5	Ch 1	Ch 1 Ch 1	On	20.4~28.8V
	<b>≠</b> ▼	1/0.0.5	Preset input	Preset input	Off	6V or less
		IX0.0.6	Ch 2		On	20.4~28.8V
	<b>∕ ▼ ▲ →</b> 5.6 kΩ	1/0.0.0	Preset input	-	Off	6V or less
	2 5.6 kΩ	IX0.0.7	Ch 3	Ch 3	On	20.4~28.8V
			Preset input	Preset input	Off	6V or less
		COM0	COM(inpl	ut common)		-

# Remark

For XEC-DR10E, there is no physical circuit for IX0.0.6 ~ IX0.0.7. Turn on this contact point by program.

VOInternal circuitTerminal No.SignalSig	(b) 'Sl	J' type					
Input         2.7 kg         M000         Ch0         Ch0         On         20.4-28.8V           2.7 kg         2.7 kg         M000         Ch1         Ch0         Off         6V or less           2.7 kg         M002         Ch2         Ch2         Ch2         On         20.4-28.8V           2.7 kg         M002         Ch2         Ch2         On         20.4-28.8V           2.7 kg         M002         Ch2         Ch2         On         20.4-28.8V           2.7 kg         M002         Ch2         Ch2         On         20.4-28.8V           2.7 kg         M003         Ch3         Ch2         On         20.4-28.8V           2.7 kg         M004         Pulse input         Aphase input         Off         6V or less           2.7 kg         M005         Ch5         Ch4         On         20.4-28.8V           M006         Ch6         Ch6         Off         6V or less           M006         Ch6         Ch6         On         20.4-28.8V           M007         Pulse input         Aphase input         Off         6V or less           M008         Ch6         Ch6         Ch6         On         20.4-28.8V <th></th> <th></th> <th>Torminal</th> <th>Si</th> <th>gnal</th> <th>.io</th> <th>On/Off</th>			Torminal	Si	gnal	.io	On/Off
$Input$ $= \frac{2.7 ka}{2.7 ka}$ $= \frac{2.7 ka}{$	I/O	Internal circuit		1-phase	2-phase	Operat	0
hput			1X000	Ch 0	Ch 0	On	20.4~28.8V
nput		⊊≠≠ ≩ 2.7 kΩ	10.0.0	Pulse input	A-phase input	Off	6V or less
$  put  = \frac{1}{2.7 k_2} = \frac{2.7 k_2}{2.7 k_2} = \frac{1}{2.7 k_2} = \frac{2.7 k_2}{2.7 k_2} = \frac{1}{2.7 k_2} = \frac{1}{2.$			IX001	Ch 1	Ch 0	On	20.4~28.8V
$ nput $ $= \underbrace{2.7 k_2}{2.7 k_2}$ $= \underbrace{2.7 k_2}{2.7 k_$		÷ 🛨 🛓 2.7 kΩ		Pulse input	B-phase input	Off	6V or less
			X0.02	Ch 2	Ch 2	On	20.4~28.8V
$  nput   = \frac{2.7 k_{\Omega}}{2.7 k_{\Omega}} = \frac{2.7 k_{\Omega}}{2.0 k_{\Omega}} = \frac{2.7 k_{\Omega}}}{2.0 k_{\Omega}}} = \frac{2.7 k_{\Omega}}}{2.0 k_{\Omega}} = \frac{2.7 k_{\Omega}}}{2.0 k_{\Omega}} = \frac{2.7 k_{\Omega}}}{2.0 k_{\Omega}} = \frac{2.7 k_{\Omega}}}{2.0 k_{\Omega}}} = \frac{2.7 k_{\Omega}}}}{2.0 k_{\Omega}}} = \frac{2.7 k_{\Omega}}}}{2.0 k_{\Omega}}} = \frac$		∠ <b>▼</b> ★ ≥ 2.7 kΩ		Pulse input	A-phase input	Off	6V or less
Input $2.7 karPulse inputBehase inputOff6V or less2.7 kar2.7 kar2.7 kar2.7 karPulse inputAphase inputOff6V or less2.7 kar2.7 kar2.7 kar2.7 kar2.7 karPulse inputBehase inputOff6V or less2.7 kar2.7 kar2.7 kar2.7 kar2.7 kar2.7 karPulse inputBehase inputOff6V or less2.7 kar2.7 kar$			IX003	Ch 3	Ch 2	On	20.4~28.8V
Input $2.7 ka2$ <th< td=""><td></td><td>÷ ★ ★ ₹ 2.7 kΩ</td><td></td><td>Pulse input</td><td>B-phase input</td><td>Off</td><td>6V or less</td></th<>		÷ ★ ★ ₹ 2.7 kΩ		Pulse input	B-phase input	Off	6V or less
Input $2.7 ka^2$ Pulse inputAphase inputOff6V or less $2.7 ka^2$ $2.7 ka^2$ $9005$ Ch5Ch4On $20.4$ - $28.8V$ $2.7 ka^2$ $9006$ Ch6Ch6On $20.4$ - $28.8V$ $2.7 ka^2$ $2.7 ka^2$ $9006$ Ch6Ch6On $20.4$ - $28.8V$ $2.7 ka^2$ $2.7 ka^2$ $9006$ Ch6Ch6On $20.4$ - $28.8V$ $2.7 ka^2$ $2.7 ka^2$ $9006$ Ch6Ch6On $20.4$ - $28.8V$ $2.7 ka^2$ $2.7 ka^2$ $9006$ Ch7Ch6On $20.4$ - $28.8V$ $2.7 ka^2$ $2.7 ka^2$ $9006$ Ch7Ch6On $20.4$ - $28.8V$ $2.7 ka^2$ $9007$ Ch7Ch6On $20.4$ - $28.8V$ $9007$ Ch7Ch6On $20.4$ - $28.8V$ $9008$ Ch0Ch0On $20.4$ - $28.8V$ $9009$ Ch1-On $20.4$ - $28.8V$ $9009$ Ch1-On $20.4$ - $28.8V$ $9009$ Ch1-On $20.4$ - $28.8V$ $9009$ Ch2Ch2On $20.4$ - $28.8V$ $9009$ Ch2Ch2On $20.4$ - $28.8V$ $9009$ Ch1-OffGV or less $9009$ Ch2Ch2On $20.4$ - $28.8V$ $9009$ Ch2Ch2On $20.4$ - $28.8V$ $9009$ Ch3Ch4Ch4On $90010$ Ch3-OffGV or less $90011$ Ch3-<			IX004	Ch 4	Ch 4	On	20.4~28.8V
Input $2.7 ka$ $2.7 ka$ $2.7 ka$ $0005$ Putse input $B$ -phase input $Off$ $6V$ or less $2.7 ka$ $2.7 ka$ $V006$ $Ch6$ $Ch6$ $Ch6$ $On$ $20.4-28.8V$ $2.7 ka$ $V007$ $Ch7$ $Ch6$ $On$ $20.4-28.8V$ $V007$ $Putse input$ $B$ -phase input $Off$ $6V$ or less $V007$ $Ch7$ $Ch6$ $On$ $20.4-28.8V$ $V008$ $Ch0$ $Ch0$ $On$ $20.4-28.8V$ $V009$ $Ch1$ $ On$ $20.4-28.8V$ $V009$ $Ch1$ $ On$ $20.4-28.8V$ $V009$ $Ch1$ $ On$ $20.4-28.8V$ $V0010$ $Ch2$ $Ch2$ $On$ $20.4-28.8V$ $V0010$ $Ch2$ $Ch2$ $On$ $20.4-28.8V$ $V0010$ $Ch3$ $ Onff$ $6V$ or less $V0010$ $Ch3$ $ Onff$ $20.4-28.8V$ $V0011$ $Ch3$ $ Onff$ $20.4-28.8V$ $V0011$ $Ch3$ $ Onff$ $20.4-28.8V$ $V0012$ $Ch4$ $Ch4$ $On$ $20.4-28.8V$ $V0013$ $Ch5$ $ Onff$ <td></td> <td>4 <b>2</b>.7 kΩ</td> <td>0.0.4</td> <td>Pulse input</td> <td>A-phase input</td> <td>Off</td> <td>6V or less</td>		4 <b>2</b> .7 kΩ	0.0.4	Pulse input	A-phase input	Off	6V or less
Input $2.7 k\Omega$ Pulse input $B$ -phase inputOff $6V$ or less $2.7 k\Omega$ $2.7 k\Omega$ $0006$ $Ch 6$ $Ch 6$ $On$ $20.4$ - $28.8V$ $4$ phase input $A$ -phase input $Off$ $6V$ or less $2.7 k\Omega$ $0007$ $Ch 7$ $Ch 6$ $On$ $20.4$ - $28.8V$ $4$ $2.7 k\Omega$ $0007$ $Ch 7$ $Ch 6$ $On$ $20.4$ - $28.8V$ $4$ $2.7 k\Omega$ $0007$ $Ch 7$ $Ch 6$ $On$ $20.4$ - $28.8V$ $4$ $2.7 k\Omega$ $0008$ $Ch 0$ $Ch 0$ $Off$ $6V$ or less $4$ $2.7 k\Omega$ $0008$ $Ch 0$ $Ch 0$ $On$ $20.4$ - $28.8V$ $4$ $2.7 k\Omega$ $0008$ $Ch 0$ $Ch 0$ $On$ $20.4$ - $28.8V$ $4$ $2.7 k\Omega$ $0008$ $Ch 1$ $ On$ $20.4$ - $28.8V$ $4$ $4$ $20008$ $Ch 1$ $ On$ $20.4$ - $28.8V$ $4$ $4$ $20009$ $Ch 1$ $ On$ $20.4$ - $28.8V$ $4$ $4$ $200010$ $Ch 2$ $Ch 2$ $On$ $20.4$ - $28.8V$ $4$ $4$ $4$ $200012$ $Ch 4$ $Ch 4$ $On$ $20.4$ - $28.8V$ $4$ $4$ $4$ $200013$ $Ch 5$ $ On$ $20.4$ - $28.8V$ $4$ $4$ $4$ $200013$ $Ch 5$ $ On$ $20.4$ - $28.8V$ $4$ $4$ $4$ $4$ $4$ $4$ $4$ $4$ $4$ $4$			IX005	Ch 5	Ch 4	On	20.4~28.8V
Input $2.7 k\Omega$ $2.7 k\Omega$ 2.4 - 28.8V $2.6 k\Omega$ 2.0 - 28.8V $2.6 k\Omega$ 2.0 + 28.8V $2.6 k\Omega$ $2.6 k\Omega$ $2.6 k\Omega$ 2.0 + 28.8V $2.6 k\Omega$ 2.0 + 28.8V $2.6 k\Omega$ $2.6 k\Omega$		4 <b>−</b> 2.7 kΩ		Pulse input	B-phase input	Off	6V or less
Input $2.7 \ k\Omega$ Pulse inputA-phase inputOff6V or less $2.7 \ k\Omega$ $2.7 \ k\Omega$ $W007$ Ch 7Ch 6On $20.4-28.8V$ $2.7 \ k\Omega$ $W007$ Ch 7Pulse inputB-phase inputOff6V or less $2.7 \ k\Omega$ $W007$ Ch 7Ch 0On $20.4-28.8V$ $2.7 \ k\Omega$ $W008$ Ch 0Ch 0On $20.4-28.8V$ $2.7 \ k\Omega$ $W009$ Ch 1On $20.4-28.8V$ $2.7 \ k\Omega$ $W009$ Ch 1On $20.4-28.8V$ $2.7 \ k\Omega$ $W0010$ Ch 2Ch 2On $20.4-28.8V$ $2.7 \ k\Omega$ $W0010$ Ch 2Ch 2On $20.4-28.8V$ $2.7 \ k\Omega$ $W0010$ Ch 2Ch 2On $20.4-28.8V$ $2.7 \ k\Omega$ $W0010$ Ch 3On $20.4-28.8V$ $2.7 \ k\Omega$ $W0010$ Ch 3On $20.4-28.8V$ $2.7 \ k\Omega$ $W0011$ Ch 4Ch 4On $20.4-28.8V$ $2.7 \ k\Omega$ $W0013$ Ch 5On $20.4-28.8V$ </td <td></td> <td></td> <td>IX0.06</td> <td>Ch 6</td> <td>Ch 6</td> <td>On</td> <td>20.4~28.8V</td>			IX0.06	Ch 6	Ch 6	On	20.4~28.8V
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		2.7 kΩ	1 0.0.0	Pulse input	A-phase input	Off	6V or less
Input $2.7 k\Omega$ Pulse inputB-phase inputOff6V or less $10008$ $Ch0$ $Ch0$ $Ch0$ $On$ $20.4-28.8V$ $2009$ $2009$ $Ch1$ $On$ $20.4-28.8V$ $10009$ $Ch1$ $On$ $20.4-28.8V$ $2009$ $Ch1$ $On$ $20.4-28.8V$ $10009$ $Ch1$ $On$ $20.4-28.8V$ $20009$ $Ch2$ $Ch2$ $On$ $20.4-28.8V$ $10009$ $Ch2$ $Ch2$ $On$ $20.4-28.8V$ $20009$ $Ch2$ $Ch2$ $On$ $20.4-28.8V$ $200010$ $Ch2$ $Ch2$ $On$ $20.4-28.8V$ $200011$ $Ch3$ $On$ $20.4-28.8V$ $200012$ $Ch4$ $Ch4$ $Oh4$ $Oh7$ $200012$ $Ch4$ $Ch4$ $Oh7$ $6V$ or less $200012$ $Ch4$ $Ch4$ $Oh7$ $On$ $20.4-28.8V$ $200012$ $Ch4$ $Ch4$ $Ch4$ $Oh7$ $Oh7$ $200012$ $Ch4$ $Ch6$ $On$ $20.4-28.8V$ $200013$ $Ch5$ $On$ $20.4-28.8V$ $Off$ $200014$ $Ch6$ $Ch6$ $On$ $20.4-28.8V$ $200015$ $Ch7$ $On$ $20.4-28.8V$ $200015$ </td <td></td> <td></td> <td>1007</td> <td>Ch 7</td> <td>Ch 6</td> <td>On</td> <td>20.4~28.8V</td>			1007	Ch 7	Ch 6	On	20.4~28.8V
2 $3.6$ $M2$ $M2008$ $Preset input$ $Preset input$ $Off$ $6V  or less$ $4$ $5.6$ $M2$ $M009$ $Ch 1$ $On$ $20.4-28.8V$ $4$ $5.6$ $M2$ $M0009$ $Ch 2$ $Ch 2$ $On$ $20.4-28.8V$ $4$ $5.6$ $M2$ $M0010$ $Ch 2$ $Ch 2$ $On$ $20.4-28.8V$ $4$ $5.6$ $M2$ $M0010$ $Ch 3$ $On$ $20.4-28.8V$ $4$ $5.6$ $M2$ $M0011$ $Ch 3$ $On$ $20.4-28.8V$ $4$ $5.6$ $M2$ $M0011$ $Ch 3$ $On$ $20.4-28.8V$ $4$ $5.6$ $M2$ $M0012$ $Ch 4$ $Ch 4$ $On$ $20.4-28.8V$ $4$ $5.6$ $M2$ $M0013$ $Ch 5$ $On$ $20.4-28.8V$ $4$ $5.6$ $M2$ $M0014$ $Ch 6$ $On$ $20.4-28.8V$ $4$ $5.6$ $M2$ $M0015$ $Ch 7$ $On$ $20.4-28.8V$ $4$ $M2$ $M2$		∻ 🛨 ≩ 2.7 kΩ	1 0.0.1	Pulse input	B-phase input	Off	6V or less
$\checkmark$ $5.6 \text{ k}\Omega$ Preset inputPreset inputOff6V or less $\checkmark$ $5.6 \text{ k}\Omega$ $1009$ $Ch1$ $ Ohf$ $6V \text{ or less}$ $\checkmark$ $5.6 \text{ k}\Omega$ $1009$ $Ch2$ $Ch2$ $Ohf$ $6V \text{ or less}$ $\checkmark$ $5.6 \text{ k}\Omega$ $10009$ $Ch2$ $Ch2$ $Ohf$ $6V \text{ or less}$ $\checkmark$ $5.6 \text{ k}\Omega$ $100010$ $Ch2$ $Ch2$ $Ohf$ $6V \text{ or less}$ $\checkmark$ $5.6 \text{ k}\Omega$ $100011$ $Ch3$ $ Ohf$ $6V \text{ or less}$ $\checkmark$ $5.6 \text{ k}\Omega$ $100012$ $Ch4$ $Ch4$ $Ohf$ $6V \text{ or less}$ $\checkmark$ $5.6 \text{ k}\Omega$ $100013$ $Ch5$ $ Oh$ $20.4$ - $28.8V$ $\checkmark$ $5.6 \text{ k}\Omega$ $100013$ $Ch5$ $ Oh$ $20.4$ - $28.8V$ $\checkmark$ $5.6 \text{ k}\Omega$ $100013$ $Ch5$ $ Oh$ $20.4$ - $28.8V$ $\checkmark$ $100013$ $Ch5$ $ Ohf$ $6V \text{ or less}$ $\checkmark$ $5.6 \text{ k}\Omega$ $100014$ $Ch6$ $Ch6$ $Oh$ $20.4$ - $28.8V$ $\checkmark$ $100015$ $Ch7$ $ Oh$ $20.4$ - $28.8V$ $\checkmark$ $100015$ $Ch7$ $ Oh$ $20.4$ - $28.8V$ $\checkmark$ $10015$ $Ch7$ $ Oh$ $20.4$ - $28.$	Input		1X008	Ch 0	Ch 0	On	20.4~28.8V
		5.6 kΩ	10.000	Preset input	Preset input	Off	6V or less
$\checkmark$ $5.6 \text{ k}\Omega$ $YOQ.10$ $Ch 2$ Preset input $Off$ $6V \text{ or less}$ $\checkmark$ $5.6 \text{ k}\Omega$ $YOQ.10$ $Ch 2$ Preset input $Ch 2$ Preset input $Off$ $6V \text{ or less}$ $\checkmark$ $5.6 \text{ k}\Omega$ $YOQ.11$ $Ch 3$ Preset input $Off$ $6V \text{ or less}$ $\checkmark$ $5.6 \text{ k}\Omega$ $YOQ.11$ $Ch 3$ Preset input $Off$ $6V \text{ or less}$ $\checkmark$ $5.6 \text{ k}\Omega$ $YOQ.12$ $Ch 4$ Preset input $Ch 4$ Preset input $Off$ $6V \text{ or less}$ $\checkmark$ $5.6 \text{ k}\Omega$ $YOQ.12$ $Ch 4$ Preset input $Ch 4$ Preset input $On$ $Off$ $20.4-28.8V$ $\checkmark$ $\checkmark$ $5.6 \text{ k}\Omega$ $YOQ.13$ $Ch 5$ Preset input $On$ Off $20.4-28.8V$ $\checkmark$ $\checkmark$ $5.6 \text{ k}\Omega$ $YOQ.14$ $Ch 6$ Preset input $On$ Off $20.4-28.8V$ $\checkmark$ $\checkmark$ $5.6 \text{ k}\Omega$ $YOQ.14$ $Ch 6$ Preset input $On$ Off $20.4-28.8V$ $\checkmark$ $\checkmark$ $5.6 \text{ k}\Omega$ $YOQ.15$ $Ch 7$ Preset input $Off$ $6V \text{ or less}$ $\checkmark$ $\checkmark$ $5.6 \text{ k}\Omega$ $YOQ.15$ $Ch 7$ Preset input $Off$ $6V \text{ or less}$ $\checkmark$ $\checkmark$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\checkmark$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\checkmark$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\checkmark$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ $\bullet$ <td></td> <td></td> <td>1X009</td> <td>Ch 1</td> <td></td> <td>On</td> <td>20.4~28.8V</td>			1X009	Ch 1		On	20.4~28.8V
k $k$		5640		Preset input	-	Off	6V or less
Preset inputPreset inputOff $6V$ or less $\checkmark$ $5.6$ k2 $V00.11$ $Ch 3$ $ On$ $20.4-28.8V$ $\checkmark$ $\checkmark$ $5.6$ k2 $V00.12$ $Ch 4$ $Ch 4$ $On$ $20.4-28.8V$ $\checkmark$ $\checkmark$ $5.6$ k2 $V00.12$ $Ch 4$ $Ch 4$ $On$ $20.4-28.8V$ $\checkmark$ $\checkmark$ $5.6$ k2 $V00.12$ $Ch 4$ $Ch 4$ $On$ $20.4-28.8V$ $\checkmark$ $\checkmark$ $5.6$ k2 $V00.13$ $Ch 5$ $On$ $20.4-28.8V$ $\checkmark$ $\checkmark$ $5.6$ k2 $V00.13$ $Ch 5$ $On$ $20.4-28.8V$ $\checkmark$ $\checkmark$ $5.6$ k2 $V00.14$ $Ch 6$ $Oh$ $On$ $20.4-28.8V$ $\checkmark$ $\checkmark$ $5.6$ k2 $V00.14$ $Ch 6$ $Oh$ $On$ $20.4-28.8V$ $\checkmark$ $\checkmark$ $\checkmark$ $\bullet 6$ $Oh$ $Oh$ $20.4-28.8V$ $\checkmark$ $\checkmark$ $\checkmark$ $\bullet 6$ $Oh$ $Oh$ $20.4-28.8V$ $\checkmark$ $\checkmark$ $\bullet 6$ $An$ $\bullet 7$ $Oh$ $Oh$ $\checkmark$ $\bullet 6$ $\bullet 6$ $Oh$ $Oh$ $\bullet 20.4-28.8V$ $\checkmark$ $\checkmark$ $\bullet 6$ $\bullet 7$ $Oh$ $Oh$ $\bullet 20.4-28.8V$ $\checkmark$ $\checkmark$ $\bullet 6$ $\bullet 7$ $Oh$ $Oh$ $\bullet 6$ $\checkmark$ $\bullet 6$ $\bullet 7$ $Oh$ $\bullet 7$ $Oh$ $\bullet 7$ $\checkmark$ $\bullet 7$ $\bullet 7$ $Oh$ $\bullet 7$ $\bullet 7$ $Oh$ $\checkmark$ $\bullet 7$ $\bullet 7$ $\bullet 7$ $Oh$ $\bullet 7$ $\bullet 7$ $\checkmark$ $\bullet $			1X0010	Ch 2	Ch 2	On	20.4~28.8V
$1 \\ 4 \\ 4 \\ 4 \\ 4 \\ 4 \\ 4 \\ 4 \\ 4 \\ 4 \\ $				Preset input	Preset input	Off	6V or less
Preset inputOff $6V$ or less $5.6$ k2 $100.12$ $Ch 4$ $Ch 4$ $Oh$ $20.4-28.8V$ $400.12$ $Ch 4$ $Preset input$ $Preset input$ $Off$ $6V$ or less $400.13$ $Ch 5$ $Oh$ $Oh$ $20.4-28.8V$ $400.14$ $Ch 6$ $Ch 6$ $Oh$ $20.4-28.8V$ $400.14$ $Ch 6$ $Ch 6$ $Oh$ $20.4-28.8V$ $400.15$ $Ch 7$ $Oh$ $Oh$ $Oh$ $20.4-28.8V$ $400.15$ $Ch 7$ $Oh$ $Oh$ $Oh$ $Oh$ $400.15$ $Ch 7$ $Oh$ $Oh$ $Oh$ $Oh$ $400.15$ $Ch 7$ $Oh$ $Oh$ $Oh$ $Oh$ $400.15$ $Oh$ $Oh$ $Oh$ $Oh$ $Oh$ $400.15$ $Oh$ $Oh$ $Oh$ $Oh$ $Oh$ $400.16$ $Oh$ <			IX0011	Ch 3	_	On	20.4~28.8V
$\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\land$				Preset input	-	Off	6V or less
Preset inputPreset inputOff6V or less $5.6 \ k\Omega$ IX00.13Ch 5 Preset inputOff6V or less $5.6 \ k\Omega$ IX00.14Ch 6 Preset inputOff6V or less $5.6 \ k\Omega$ IX00.14Ch 6 Preset inputCh 6 On20.4~28.8V Off $5.6 \ k\Omega$ IX00.15Ch 7 Preset inputOff6V or less $5.6 \ k\Omega$ IX00.15Ch 7 Preset inputOff6V or less $5.6 \ k\Omega$ IX00.15Ch 7 Preset inputOff6V or less		₩ ₹ \$ 5.0 K2	IX0012	Ch 4	Ch 4	On	20.4~28.8V
2 $2$			1/ 0.0.12	Preset input	Preset input	Off	6V or less
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		∻ <b>▼↑</b>	IX0013	Ch 5		On	20.4~28.8V
VOU.14     Preset input     Preset input     Off     6V or less       5.6 kQ     VO0.15     Ch 7     On     20.4~28.8V       VO0.15     Ch 7     Off     6V or less       5.6 kQ     0ff     6V or less			170.0.10	Preset input	-	Off	6V or less
$\Rightarrow 5.6 \text{ k}\Omega$ $\Rightarrow 6000000000000000000000000000000000000$			10014	Ch 6	Ch 6	On	20.4~28.8V
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			1/10.0.14	Preset input	Preset input	Off	6V or less
Preset input Off 6V or less		⊊ 🛨 📥 👌 5.6 kΩ	10015	Ch 7		On	20.4~28.8V
COM0 COM(input common)				Preset input	-	Off	6V or less
		₩ \$ 2.0 KΩ	COMO	COM(inpu	ut common)		

(b) 'SU' type

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# Remark

For XBC-DR/DN20SU, there is no physical circuit for IX0.0.12 ~ IX0.0.15. Turn on this contact point by program.

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### 8.1.3 "E" type Functions

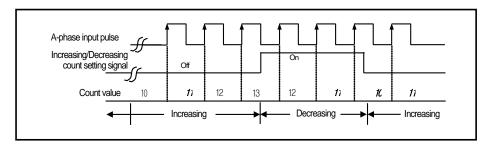
(1) Counter mode

(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



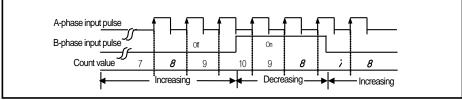
b) Increasing/decreasing count operation by B-phase input signal

• 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

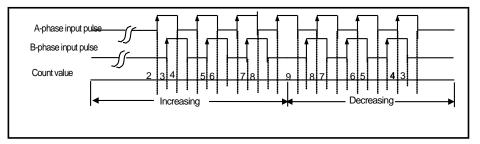


2) 2-phase count mode

#### 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 B-phase input, increasing operation starts, and if B-phase input is antecedent to A-phase input, decreasing operation starts.

#### Operation example



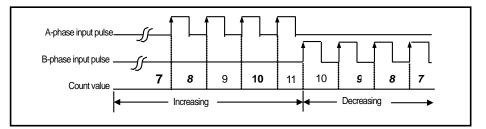
3) CW(Clockwise)/CCW(Counter Clockwise) operation mode

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 type

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

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peed Counter Module				
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

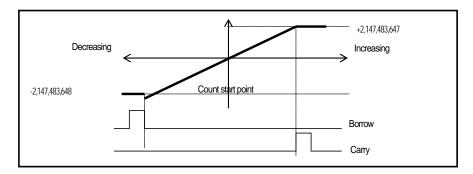
- Counter mode is saved in the following special K area.

Mode		Reference <sup>*1)</sup>			
wode	Ch.0	Ch.1	Ch.2	Ch.3	Relefence
Counter mode	%KW300	%KW330	%KW360	%KW390	0 : linear 1 : ring

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

(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	disp	layed.
--------	------	--------

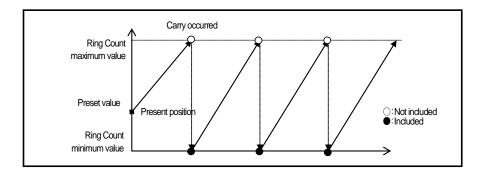
Speed Counter Module				
Parameter	CH 0	CH 1	CH 2	CH 3
Counter mode	Ring	Linear	Linear	Linear
Pulse input mode	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1
Internal preset	0	0	0	0
External preset	0	0	0	0
Ring counter value	1000	0	0	0
Comp output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(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 max and min value is saved at the following special K area.

t.mo		Area per each cha	nnel (Double word)		Reference
type	Ch.0	Ch.1	Ch.2	Ch.3	Relefence
Ring counter value	%KD155	%KD170	%KD185	%KD200	

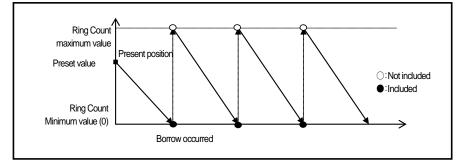
1) During increasing count

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

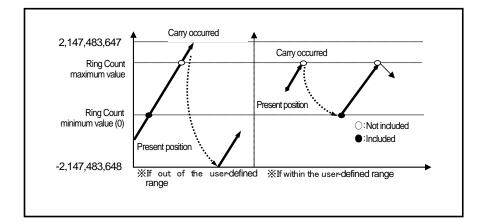


#### 2) During decreasing count

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



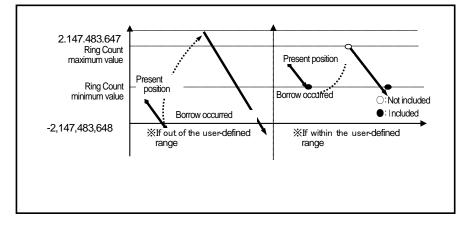
- 3) Operation when setting Ring Count based on present count value (during increasing count)
  - If present count value exceeds user-defined range when setting Ring Count
     Error (code no. 27) is occurred and it operates linear counter.
  - If present count value is within user-defined range when setting Ring Count
    - Present count value starts to increase up to the user-defined maximum value and down to the userdefined minimum value and keeps counting after Carry occurs.
    - Not the maximum but the only minimum value is displayed with count kept as shown below.



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4) Operation when setting Ring Count based on present count value (during decreasing count)

- If present count value exceeds user-defined range when setting Ring Count
   Error (code no. 27) is occurred and it operates linear counter.
- If present count value is within user-defined range when setting Ring Count
- Present count value starts to decrease to the user-defined minimum value and increase to the user-defined maximum value and keeps counting after Borrow occurs.



# Remark

- (1) Based on count value within or out of user-defined range, count will be decided to be within or out of the range when setting Ring Count.
- (2) Ring Count setting when count value is out of the range is regarded as user's mistake. The count is not available within the Ring Count range.
- (3) Use preset function or the like when using Ring Count so to surely position the count value within the range.

(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

# Compared output mode setting

Speed Counter Module				
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 : %KW302	Set to "2"
Present Value ≥ Compared Value	Channel 1 : %KW332 Channel 2 : %KW362	Set to "3"
Present Value > Compared Value	Channel 3 : %KW392	Set to "4"
Compared value $1 \le Count$ value $\le Compared$ value $2$		Set to "5"
Count value $\leq$ Compared value 1, Count value $\geq$ 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 must

be On.

Clossification		Area pe	r channel		Operation
Classification	Ch. 0	Ch. 1	Ch. 2	Ch. 3	Operation
Count enable signal	%KX4160	%KX4320	%KX4480	%KX4640	0: N/A, 1: enable
Compared enable signal	%KX4164	%KX4324	%KX4484	%KX4464	0: forbidden, 1: enable

• In order to make external output, the compared equivalent output signal (%QX0.0.0~%QX0.0.15) must be set. If Compared output contact is Off, Compared coincidence output signal (internal device) is only output.

Oleasification		Orientian			
Classification	Ch. 0	Ch. 1	Ch. 2	Ch. 3	Operation
Compared equivalent output signal	%KX4718	%KX4338	%KX4498	%KX4658	0: Compared output not equivalent 1: Compared output equivalent

Comp output point ((%QX0.0.0~%QX0.0.15) setting

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	NoUse	🗸 No Use	No Use	No Use
Unit time [ms]	No Use	1	1	1
Pulse/Rev value	P40 P41	1	1	1

(e) Detailed description for compared output

1) Mode 0 (Present value < Compared value)

If counted present value is less than min set 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	123460
Min. set value	
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 min set value, output is sent out, and if count value increases to be greater than compared value, output is not sent out.

Count value	123456	× <u>123457</u>	123458 123459 123460	123461 123462
Compared Output			123460	
Min. set value			123400	
Compared Output				
Enable				
Compared Output				
output signal External output		(	2	_ '
(in case of designation	ate <u>d</u>	<b>x</b>	(	
output)				
			1	

Г

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

■ If present count value is equal to min set 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	<u>123456</u> <u>123457</u> <u>123458</u> <u>123459</u> <u>123460</u> <u>123461</u> <u>123462</u>
Compared Output -	400457
Min. set value	123457
Compared Output	
Enable	
Compared Output	
output signal External output	
(in case of	
designated output)	
<b>3</b> , ,	

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

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

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

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

If present count value is greater than min set 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	<u>123456</u> <u>123457</u> <u>123458</u> <u>123459</u> <u>123460</u> <u>123461</u> <u>123462</u>
Compared Output Min. set value Compared Output	123459
Enable Compared Output signal	
External output (in case of designated output	

6) Mode 5 (Compared output Min. set value < Count value < 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 Compared Output Min. set value	123456	<u> 123457</u> ×		23458	123459	123460		23461 123462
Compared Output Max. set value				23458				
Compared Output			\	١		123460		
Enable Compared Output							$\square$	
signal External Output				/			$\left \right\rangle$	
(in case of designated output)		<u> </u>				(	1	
		4						

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

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.

Count value			
Compared Output	123456 123457	<u> 123458 123459 123460</u>	$\times 123461 \times 123462$
Min. set value	123457	N N	
Compared Output	123437		
Max. set value			123461
Compared Output			
Enable			
Compared Output			
output signal			/
External output	<u> </u>	· (	1
(in case of		l i i i i i i i i i i i i i i i i i i i	
designated output)		L	1

(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				
	Channel 0	Channel 1	Channel 2	Channel 3	
Carry signal	%KX4176	%KX4336	%KX4496	%KX4656	

(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				
	Channel 0	Channel 1	Channel 2	Channel 3	
Borrow signal	%KX4177	%KX4337	%KX4497	%KX4657	

#### (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 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]	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 (1~60000 <sup>ms</sup> ) <sup>*3)</sup>	%KW322	%KW352	%KW382	%KW412	
) . <b>.</b> -	1.4 1.4 1.1	1 1 1 1 1	1 1 4 4		1 (2.4)	

<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>	%KW4165	%KW4325	%KW4485	%KW4645		

<sup>\*4)</sup> 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	%KD132	%KD137	%KD142	%KD147	

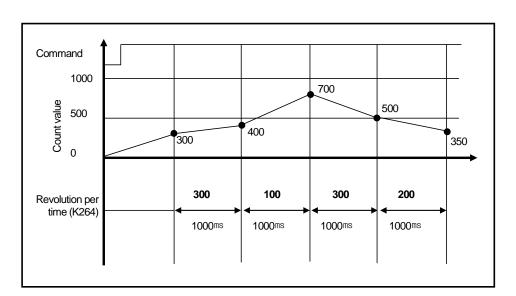
(a) Count function of Revolution per Unit time is used to count the number of pulses for a specified time while Enable signal is On.

(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.

(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)

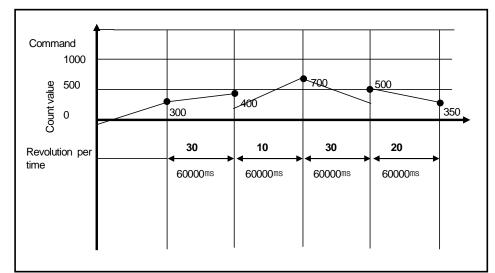




(f) In order to indicate revolution per minute (RPM), the program is as shown below. During DMUL operation, RPM value is saved 64 bit in %DW100~%DW103. If operated RPM value is used, it can use to Word or Dword type according to system (case of RPM value is small number).

· · · · ·	M value) = K264	(numb	er of rev	olution per seco	nd) X 60 (secon	d)		
L19		DINT_ EN	.TO_** * ENO			MI EN	UL ENO	
L20	_HSCO_CurR pu	- IN	OUT	_HSCO_CurR pu_LINT	_HSCO_CurR pu_LINT	IN1	OUT	- RPM
121					60	IN2		
122		1					]	

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(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					
	Channel 0	Channel 1	Channel 2	Channel 3		
Count latch command	%KX4166	%KX4326	%KX4486	%KX4646		

(c) Count latch function is operated when Count latch signal is On. Namely, counter value is not cleared when power supply

Is turned 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.

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#### (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.

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	Ref.		
Internal preset	%KD152	%KD167	%KD182	%KD197	-		
External preset	%KD153	%KD168	%KD183	%KD198	-		

• 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.

Type	Area per each channel (Bit)						
туре	Ch.0	Ch.1	Ch.2	Ch.3	Ref.		
Internal preset command	%KX4161	%KX4321	%KX4481	%KX4641	-		
External preset allowance	%KX4162	%KX4322	%KX4482	%KX4642	-		
External preset command	%IX0.0.8	%IX0.0.9	%IX0.0.10	%IX0.0.11	-		

#### 8.1.4 'SU' 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  $\sim$  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 Aphase 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

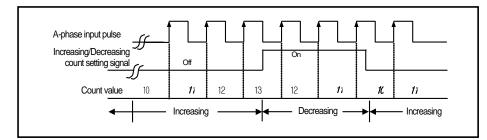
a) Increasing/decreasing count operation by program setting

• 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



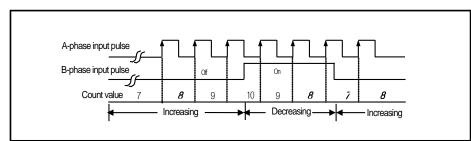
b) Increasing/decreasing count operation by B-phase input signal
 1-phase 2-input 1-multiplication operation mode

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	-

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#### • Operation example



2) 2-phase count mode

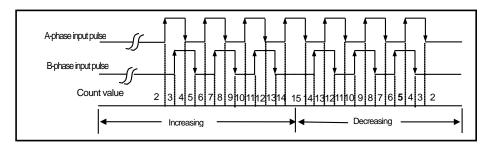
a) 2-phase 4-multiplication operation mode

B-

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

#### starts.

Operation example



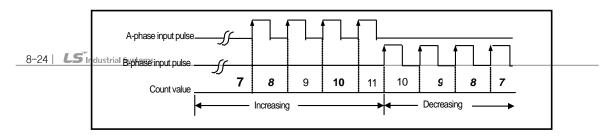
# 3) CW(Clockwise)/CCW(Counter Clockwise) operation mode

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.

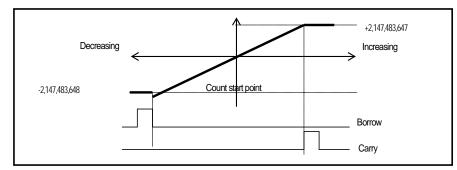
Parameter	CH 4	CH 5	CH 6	CH 7
Counter mode	Linear 🗸 🗸	Linear	Linear	Linear
Pulse input mode	Linear	1-Phs 1-In x1	1-Phs 1-In x1	1-Phs 1-In x1
Internal preset	Ring	0	0	0
External preset	0	0	0	0
Ring Counter Min. Value	0	0	0	0
Ring Counter Max. Value	0	0	0	0
Comp0 output mode	(Magnitude)<	(Magnitude)<	(Magnitude)<	(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
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]	1	1	1	1
Pulse/Rev value	1	1	1	1

Counter mode is saved at the following special K area.

Mode			A	rea per ead	ch channel (v	vord)			Ref.
wode	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Rel.
Counter mode	%KW300	%KW330	%KW360	%KW390	%KW2220	%KW2250	%KW2280	%KW2310	0 : linear 1 : ring

#### (a) Linear counter

- 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 decreasing, 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.

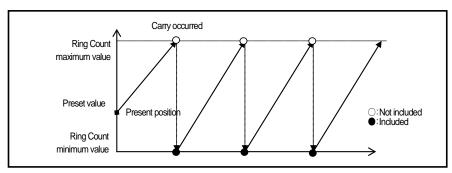
tuno	Area per each channel (Double word)								Ref.
type	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Rel.
Ring counter min.	%KD	%KD	%KD	%KD	%KD	%KD	%KD	%KD	
value	154	169	184	199	1114	1129	1144	1159	-
Ring counter	%KD	%KD	%KD	%KD	%KD	%KD	%KD	%KD	_
max. value	155	170	185	200	1115	1130	1145	1160	-

• 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

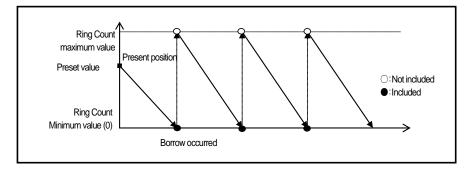
Even if count value exceeds user-defined maximum value during increasing count, Carry only occurs and count does not stop differently to Linear Count.



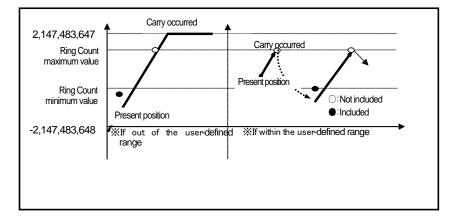


#### 2) During decreasing count

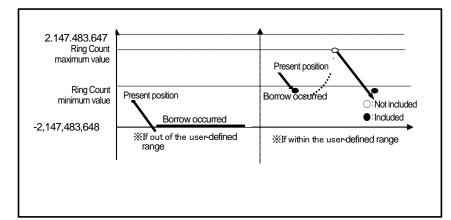
Even if count value exceeds user-defined minimum value during decreasing count, Borrow only occurs and count does not stop differently to Linear Count.



- 3) Operation when setting Ring Count based on present count value (during increasing count)
  - If present count value exceeds user-defined range when setting Ring Count
  - Error (code no. 27) is occurred and it operates linear counter.
    If present count value is within user-defined range when setting Ring Count
  - Present count value starts to increase up to the user-defined maximum value and down to the userdefined minimum value and keeps counting after Carry occurs.
  - Not the maximum but the only minimum value is displayed with count kept on as shown below.



- 4) Operation when setting Ring Count based on present count value (during decreasing count)
   If present count value exceeds user-defined range when setting Ring Count
  - Error (code no. 27) is occurred and it operates linear counter.
  - If present count value is within user-defined range when setting Ring Count
  - Present count value starts to decrease to the user-defined minimum value and increase to the user-defined maximum value and keeps counting after Borrow occurs.



# Remark

- (1) Based on count value within or out of user-defined range, count will be decided to be within or out of the range when setting Ring Count.
- (2) Ring Count setting when count value is out of the range is regarded as user's mistake. The count is not available within the Ring Count range.
- (3) Use preset function or the like when using Ring Count so to surely position the count value within the range.

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#### (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

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	(Magnitude)<= (Magnitude)=	0	0	0
Comparator Output0 Max.Value	(Magnitude)>=	0	0	0
Comparator Output1 Min.Value	(Magnitude)> (Range)Include	0	0	0
Comparator Output1 Max.Value	(Range)Exclude	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

Upper setting value is saved in special K area.

	Memory address (	Value <sup>*2)</sup>	
Compared output condition	Comp output 0	Comp output 1	value
Present Value < Compared Value	Ch0: %KW302	Ch 0: %KW303	Set to "0"
Present Value ≤ Compared Value	Ch 1: %KW332	Ch 1: %KW333	Set to "1"
Present Value = Compared Value	Ch 2: %KW362	Ch 2: %KW363 Ch 3: %KW393 Ch 4: %KW2223 Ch 5: %KW2253	Set to "2"
Present Value ≥ Compared Value	Ch 3: %KW392		Set to "3"
Present Value > Compared Value	Ch 4: %KW2222 Ch 5: %KW2252		Set to "4"
Compared value $1 \le \text{Count value} \le \text{Compared value} 2$	Ch 6: %KW2282	Ch 6: %KW2283	Set to "5"
Count value ≤ Compared value 1, Count value ≥ Compared value 2	Ch 7: %KW2312	Ch 7: %KW2313	Set to "6"

 $^{(2)}$  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	%KX	%KX	%KX	%KX	%KX	%KX	%KX	%KX	0:disable, 1:		
signal	4160	4320	4480	4640	34880	35040	35200	35360	enable		
Compared 0 enable signal	%KX 4164	%KX 4324	%KX 4484	%KX 4644	%KX 34884	%KX 35044	%KX 35204	%KX 35364	0: disable, 1: enable		
Compared 1 enable signal	%KX 4167	%KX 4327	%KX 4487	%KX 4687	%KX 34887	%KX 35047	%KX 35207	%KX 36367	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 output signal 0	%KX4178	%KX4338	%KX4498	%KX4658	%KX34898	%KX35058	%KX35218	0: Compared output Off 1: Compared output On
Compared coincidence output signal 1	%KX4179	%KX4339	%KX4499	%KX4659	%KX34899	%KX35059	%KX35219	0: Compared output Off 1: Compared output On

Comp. output point (%QX0.0.0~%QX0.0.15) setting

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 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	No Use	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

(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 123457 1	123458 123459 123460 123461 <del>12</del> 5	3462
min. set value		123460	
Compared output Enable Compared output 0 Output Signal External output (in case of designate output)			

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 1	456 123457 123458 123459 123460 12346	1 123462
Compared output 0		
Min. set value	123460	
Compared Output 0		
Enable Compared Output 0		
output signal External output (in case of designated		
output)		

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

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 <u>123456</u> <u>123457</u>	123458 123459 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 output)	

4) Mode 3 (Count value ≥ 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 123456 12 Compared output 0 Min. set value	<u>123457 123458 123459 123460 123461 123462</u>	_
	123460	-
Compared Output 0		-
Enable		-
Compared Output 0		
Output signal External output		_
(in case of designated 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 123 Compared Output 0	<u>56 123457 123458 123459 123460 123461</u>	123462
Min. set value	123459	
Compared Output 0 Output Enable		
Compared Output 0		
Output signal External output		
(in case of designated ou	ut)	

### 6) Mode 5

(Section comparison: Min. set value of Compared Output 0 ≤ Count value ≤ Max. set value of Compared Output

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 Compared Output 0	123456	123457	123458	3 1234	59 123460	1234	61 123462
Min. set value			123458	8			
Compared Output 0					102460		
Max. set value					123460	$ \rangle$	
Compared Output 0							
output Enable							
Compared Output 0			/				
output signal		(			(		
External output		<u></u> г				ৰ	
(in case of designate	d ou <u>tput)</u>	`				`	

0)

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

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	123456	123457	<u>123458</u> <u>123459</u> <u>123460</u>	123461 123462
Compared Output (	)			
Min. set value		123457		
Compared Output 0	)			123461
Max. set value				<u> </u>
Compared Output 0				
output Enable				
Compared Output 0	) <u> </u>			/
output signal		' (		
External output (in case of designat	ed output)		<u> </u>	

#### (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	%KX4176	%KX4336	%KX4496	%KX4656	%KX34896	%KX35056	%KX35126	%KX35376					

#### (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	%KX4177	%KX4337	%KX4497	%KX4657	%KX34897	%KX35057	%KX35127	%KX35376				

#### (6) Revolution/Unit time

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			Devic	e per each	channel (	Word)			Sotting range
Class	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Setting range
Unit time	%KW	%KW	%KW	%WK	%KW	%KW	%KW	%KW	1~60000ms
	322	352	382	412	2242	2272	2302	2332	1~60000ms
Pulse/Rev	%KW	%KW	%KW	%KW	%KW	%KW	%KW	%KW	1~60000
value	323	353	383	413	2243	2273	2303	2333	1~00000

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

Class			Devic	e per each	n channel (	Word)			Operation
Class	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Operation
Rev/unit time	%KX	%KX	%KX	%KX	%KX	%KX	%KX	%KX	0: disable
command	4165	4325	4485	4645	34885	35045	35205	35365	1: enable

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

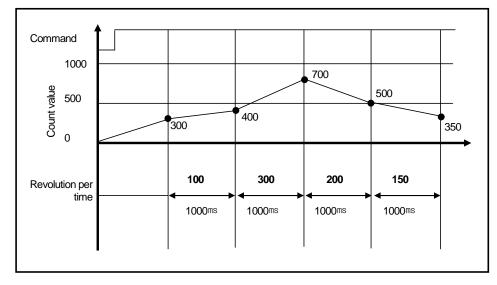
Class		Device per each channel (Word)									
Class	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Ref.		
Rev/unit time	%KD	%KD	%KD	%KD	%KD	%KD	%KD	%KD			
Revul in time	132	137	142	147	1029	1097	1102	1107	-		

(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.

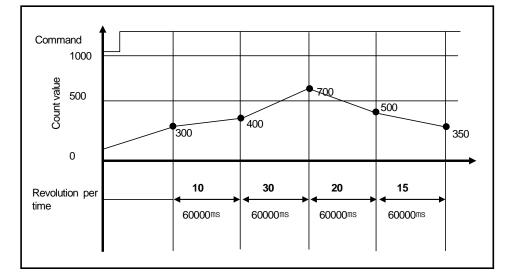
(d) Number of Revolution per 1 second is indicated after number of pulse per 1 revolution is set and time is set to 1 second (1000ms). In order to indicate by Revolutions per minute (RPM), the operation is executed in program.

(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. During DMUL operation, RPM value is saved 64 bit in %DW100~%DW103. 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) = K264 (r	number	of revol	ution per second	d) X 60 (second)			
170		DINT_ EN	_TO_** * ENO			MI EN	UL ENO	-
120	_HSCO_CurR pu	IN	OUT	_HSCO_CurR - pu_LINT	_HSCO_CurR _pu_LINT -	IN1	OUT	- RPM
121					60	IN2		
122								



(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

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										
Cidos	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Operation			
Count latch	%KX	%KX	%KX	%KX	%KX	%KX	%KX	%KX	0: disable			
command	4166	4326	4486	4646	34886	35046	35206	35366	1: enable			

• Count latch function is operated when Count latch signal is On. Namely, counter value is not cleared when power supply is on and mode is changed, 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

Г

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.

Turpo			Area pe	r each cha	nnel (Doub	ole word)			Ref.
Туре	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Rei.
Internal	%KD	%KD	%KD	%KD	%KD	%KD	%KD	%KD	
preset value	152	167	182	197	1112	1127	1142	1157	
External	%KD	%KD	%K	%KD	%KD	%KD	%KD	%KD	_
preset value	153	168	183	198	1113	1128	1143	1158	

• 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.

Turne			Are	ea per eacl	n channel (	Bit)			Ref.
Туре	Ch.0	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Rei.
Internal preset command	%KX 4161	%KX 4321	%KX 4481	%KX 4641	%KX 34881	%KX 35041	%KX 35201	%KX 35361	I
External preset allowance	%KX 412	%KX 4322	%KX 4482	%KX 4642	%KX 34882	%KX 35042	%KX 35202	%KX 35362	Ι
External preset command	%IX 0.0.8	%IX 0.0.9	%IX 0.0.10	%IX 0.0.11	%IX 0.0.12	%IX 0.0.13	%IX 0.0.14	%IX 0.0.15	-

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### 8.2 Installation and Wiring

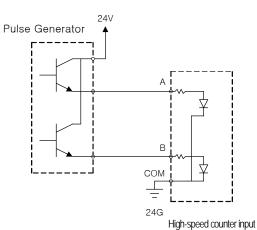
#### 8.2.1 Precaution for wiring

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

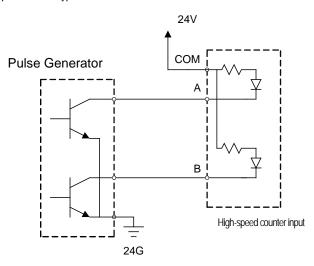
- (1) Make sure to use twisted pair shielded cable, grounded with 3 class applied.
- (2) Keep away from power cable or I/O line which may cause noise.
- (3) Stabilized power should be used for filter.
  - Connect A-phase only for 1-phase input.
  - Connect A-phase and B-phase for 2-phase input.

#### 8.2.2 Example of wiring

#### (1) Pulse generator (encoder) is voltage output type



(2) Pulse generator is open collector type



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### 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 APM\_WRT function 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 a command (Change Preset) moves (MOV) the new internal preset value (5000) to the CH0 internal Preset area (%KD152) by using MOVE function.
  - To save the changed settings into flash, it uses APM\_WRT command. slot information is set to '0' in case of built-in function.

When ChangePreset changes from Off to On, set preset setting value of CHO as 5000 and save it to flash memory Comment 1NST L1ChangePres "0" input MOVE APM\_WRT et -|P| EN ENO REQ DONE 12 "0"input \_HSCO\_IntP rs\_Val 5000 IN OUT 0 BASE STAT LЗ "0"input ISLOP 0 L4 0:Positioning 0 AXIS L5 1:Highspeed W<del>RT</del> AXIS 1 Lθ

메모[S1]:

(1) 'E' type (a) Parameter setting

Parameter		Description	C	evice area	per chann	el	Remark
Parameter	Value	Setting	Ch 0	Ch 1	Ch 2	Ch 3	Remark
Counter mode	h0000	Linear count	%KW300	%KW330	%KW360	%KW390	Word
Countermode	h0001	Ring count	/0110/000	/0110/0300	/0111/000	/0111/030	word
Pulse input	h0000	1 phase 1 input 1 multiplication					
mode	h0001	1 phase 2 input 1 multiplication	%KW301	%KW331	%KW361	%KW391	Word
setting	h0002	CW/CCW	/0110101	/01100331	/0110101	/0110/03/1	vvolu
Setting	h0003	2 phase 4 multiplication					
	h0000	(Magnitude) <					
	h0001	(Magnitude) $\leq$					
Comp.	h0002	(Magnitude) =		%KW332	%KW362	%KW392	Word
Output 0 mode	h0003	(Magnitude) ≥	%KW302				
setting	h0004	(Magnitude) >					
	h0005	(Range) Include					
	h0006	(Range) Exclude					
Internal							Double
preset value	-2,14	7,483,648 ~ 2,147,483,647	%KW304	%KW334	%KW364	%KW394	word
setting							
External							Double
preset value	-2,14	7,483,648 ~ 2,147,483,647	%KW306	%KW336	%KW366	%KW396	word
setting							

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Parameter		Description	D	evice area	per chann	nel	Remark
Falametei	Value	Setting	Ch 0	Ch 1	Ch 2	Ch 3	Rendik
Ring counter value setting	-2,147,483,64	48 ~ 2,147,483,645	%KD155	%KD170	%KD185	%KD200	Double word
Comp. output min. value setting	-2,147,483,64	48 ~ 2,147,483,647	%KD156	%KD171	%KD186	%KD201	Double word
Comp. output max. value setting	-2,147,483,64	48 ~ 2,147,483,647	%KD157	%KD172	%KD187	%KD402	Double word
Comp. output 0 point designation	h0000         %QX0.0.0           h0001         %QX0.0.1           h0002         %QX0.0.2           h0003         %QX0.0.3           h0004         %QX0.0.4           h0005         %QX0.0.5           h0006         %QX0.0.6           h0007         %QX0.0.8		%KW320	%KW350	%KW380	%KW410	Word
Unit time [ms]	1 ~ 60,000		%KW322	%KW352	%KW382	%KW412	Word
Pulse/Rev.value		1 ~ 60,000	%KW323	%KW353	%KW383	%KW413	Word

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#### (b) Operation command

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Parameter	Device area per channel							
Parameter	Ch 0	Ch 1	Ch 2	Ch 3				
Counter enabling	%KX4160	%KX4320	%KX4480	%KX4640				
Internal preset designation of counter	%KX4161	%KX4321	%KX4481	%KX4641				
External preset enabling of counter	%KX4162	%KX4322	%KX4482	%KX4642				
Designation of decremental counter	%KX4163	%KX4323	%KX4483	%KX4643				
Comp. output 0 enabling	%KX4164	%KX4324	%KX4484	%KX4644				
Comp. output 1 enabling	%KX4165	%KX4325	%KX4485	%KX4645				
Enabling of revolution time per unit time	%KX4166	%KX4326	%KX4486	%KX4646				
Designation of latch counter	%KX4176	%KX4336	%KX4496	%KX4656				
Carry signal (Bit)	%KX4177	%KX4337	%KX4497	%KX4657				
Borrow signal	%KX4178	%KX4338	%KX4498	%KX4648				

#### (c) Area of monitoring

Parameter	Device area per channel							
Farameter	Ch 0	Ch 1	Ch 2	Ch 3				
Current count value	%KD131	%KD136	%KD141	%KD146				
Rev/unit time	%KD132	%KD137	%KD142	%KD147				

(2) 'SƯ'	type
(a) Pa	arameter setting

		Description	D	evice area	per chann	nel	
Parameter	Value	Catting	Ch 0	Ch 1	Ch 2	Ch 3	Remark
	Value	Setting	Ch 4	Ch 5	Ch 6	Ch 7	
	h0000	Linear count	%KW	%KW	%KW	%KW	
Counter mode	110000		300	330	360	390	Word
	h0001	Ring count	%KW 2220	%KW 2250	%KW 2280	%KW 2310	
	h0000	1 phase 1 input 1 multiplication	%KW	%KW	%KW	%KW	)0/ord
Pulse input	h0001	1 phase 2 input 1 multiplication	301	331	361	391	Word
mode setting	h0002	CW/CCW	%KW	%KW	%KW	%KW	
	h0003	2 phase 4 multiplication	2221	2251	2281	2311	Word
	h0000	(Magnitude) <					
	h0001	(Magnitude) $\leq$	%KW	%KW	%KW	%KW	
Comp.	h0002	(Magnitude) =	302	332	362	392	
Output 0 mode	h0003	(Magnitude) $\geq$					Word
setting	h0004	(Magnitude) >					
	h0005	(Range) Include	%KW 2222	%KW 2252	%KW 2282	%KW 2312	
	h0006	(Range) Exclude		LLOL	2202	2012	
	h0000	(Magnitude) <					
	h0001	(Magnitude) $\leq$	%KW	%KW	%KW	%KW	
Comp.	h0002	(Magnitude) =	303	333	363	393	
Output 1 mode	h0003	(Magnitude) $\geq$					Word
setting	h0004	(Magnitude) >	%KW	%KW	%KW	%KW	
	h0005	(Range) Include	2223	2253	2283	2313	
	h0006	(Range) Exclude					
Internal			%KD152	%KD167	%KD182	%KD197	
preset value -2,147,48 setting		,648 ~ 2,147,483,647	%KD	%KD	%KD	%KD	Double word
			1112 %KD153	1127 %KD168	1142 %KD183	1157 %KD198	
External preset value -2,147,483,648 ~ 2,147,483,647			%KD153	%KD166	%KD183	%KD196	Double word
setting			1113	1128	1143	1158	

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		Description	D	evice area	per chanı	nel					
Parameter	Value	Sotting	Ch 0	Ch 1	Ch 2	Ch 3	Remark				
	value	Setting	Ch 4	Ch 5	Ch 6	Ch 7					
			%KD	%KD	%KD	%KD					
Ring counter min.	-2 147 483	648 ~ 2,147,483,645	154	169	184	199	DWord				
value setting	-2,147,400,	040~2,147,400,040	%KD	%KD	%KD	%KD	Divolu				
			1114	1129	1144	1159					
			%KD	%KD	%KD	%KD					
Ring counter max.	-2,147,483,	646 2,147,483,647	155	170	185	200	DWord				
value setting			%KD	%KD	%KD	%KD					
			1115	1130	1145	1160					
			%KD 156	%KD 171	%KD	%KD 201					
Comp. output min. value setting	-2,147,483,	648 ~ 2,147,483,647	%KD	%KD	186 %KD	201 %KD	DWord				
value settil ig			%KD 1116	%KD 1131	%KD 1146	%KD 1161					
			%KD	%KD	%KD	%KD					
Comp. output			157	172	187	202	DWord				
max. value setting	-2,147,483,	648 ~ 2,147,483,647	%KD	%KD	%KD	%KD	DWord				
			1117	1132	1147	1162					
	HFFFF	No use									
	h0000	%QX0.0.0									
	h0001	%QX0.0.1									
	h0002	%QX0.0.2									
	h0003	%QX0.0.3	%KW	%KW	%KW	%KW					
	h0004	%QX0.0.4	320	350	380	410					
	h0005	%QX0.0.5									
Comp. output 0	h0006	%QX0.0.6									
point designation	h0007	%QX0.0.7					Word				
designation	h0008	%QX0.0.8									
	h0009	%QX0.0.9									
	h000A	%QX0.0.10									
	h000B	%QX0.0.11	%KW	%KW	%KW	%KW					
	h000C	%QX0.0.12	2240	2270	2300	2330					
	h000D	%QX0.0.13									
	h000E	%QX0.0.14									
	h000F	%QX0.0.15									

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		Description	D	evice area	ı per chanı	nel		
Parameter	) (ali sa	O attice as	Ch 0	Ch 1	Ch 2	Ch 3	Remark	
	Value	Setting	Ch 4	Ch 5	Ch 6	Ch 7		
	HFFFF	No use						
	h0000	%QX0.0.0						
	h0001	%QX0.0.1						
	h0002	%QX0.0.2						
	h0003	%QX0.0.3	%KW	%KW	%KW	%KW		
	h0004	%QX0.0.4	321	351	381	411		
	h0005 %QX0.0.5							
Comp. output 1	h0006	%QX0.0.6						
point	10007 %(JX().().7					Word		
designation	h0008	%QX0.0.8						
	h0009	%QX0.0.9						
	h000A	%QX0.0.10						
	h000B	%QX0.0.11	%KW	%KW %KW %KW %KW 2241 2271 2301 2331				
	h000C	%QX0.0.12	2241					
	h000D	%QX0.0.13						
	h000E	%QX0.0.14						
	h000F	%QX0.0.15						
			%KW	%KW	%KW	%KW		
Linit time [mo]		4 00.000	322	352	382	412	Word	
Unit time [ms]		1 ~ 60,000 ms	%KW	%KW	%KW	%KW	word	
			2242	2272	2302	2332		
			%KW	%KW	%KW	%KW		
Pulse/Rev.value		1 ~ 60,000	323	353	383	413	Word	
ruise/rev.value		1~00,000	%KW	%KW	%KW	%KW	vvoiu	
			2243	2273	2303	2333		

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#### (b) Operation command

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Parameter			De	evice area	a per chan	nel		
Falameter	Ch 0	Ch 1	Ch 2	Ch 3	Ch 4	Ch 5	Ch 6	Ch 7
Counter enabling	%KX4160	%KX4320	%KX4480	%KX4640	%KX34880	%KX35040	%KX35200	%KX35360
Internal preset designation of counter	%KX4161	%KX4321	%KX4481	%KX4641	%KX34881	%KX35041	%KX35201	%KX35361
External preset enabling of counter	%KX4162	%KX4322	%KX4482	%KX4642	%KX34882	%KX35042	%KX35202	%KX35362
Designation of decremental counter	%KX4163	%KX4323	%KX4483	%KX4643	%KX34883	%KX35043	%KX35203	%KX35363
Comp. output 0 enabling	%KX4164	%KX4324	%KX4484	%KX4644	%KX34884	%KX35044	%KX35204	%KX35364
Comp. output 1 enabling	%KX4167	%KX4327	%KX4487	%KX4647	%KX34887	%KX35047	%KX35207	%KX35367
Enabling of revolution time per unit time	%KX4165	%KX4325	%KX4485	%KX4645	%KX34885	%KX35045	%KX35205	%KX35365
Designation of latch counter	%KX4166	%KX4326	%KX4486	%KX4646	%KX34886	%KX35046	%KX35206	%KX35366
Carry signal (Bit)	%KX4176	%KX4336	%KX4496	%KX4656	%KX34896	%KX35056	%KX35216	%KX35376
Borrow signal	%KX4177	%KX4337	%KX4497	%KX4657	%KX34897	%KX35057	%KX35217	%KX35377
Comp. output 0 signal	%KX4168	%KX4328	%KX4488	%KX4648	%KX34888	%KX35048	%KX35208	%KX35368
Comp. output 1 signal	%KX4169	%KX4329	%KX4489	%KX4649	%KX34889	%KX35049	%KX35209	%KX35369

#### (c) Area of monitoring

		Device area per channel							
Parameter	Ch 0	Ch 1	Ch 2	Ch 3	Ch 4	Ch 5	Ch 6	Ch 7	
Current counter value	%KD131	%KD136	%KD141	%KD146	%KD1091	%KD10%	%KD1101	%KD1106	
Revolution per unit time	%KD132	%KD137	%KD142	%KD147	%KD1092	%KD1097	%KD1102	%KD1107	

#### 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							
Category	Ch0	Ch0 Ch1 Ch2 Ch3 Ch4 Ch5 Ch6 Ch7						Remark	
Error code	%KW266	%KW276	%KW286	%KW296	%KW2186	%KW2196	%KW2206	%KW2216	Word

#### 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(						
22	* 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

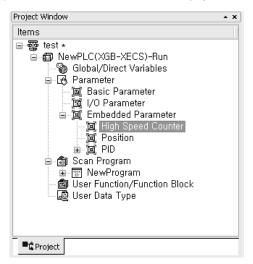
 If two and more errors occur, the module saves the latter error code and removes the former one.

# 8.4 Examples: Using High-speed Counter

The section describes examples of using high-speed counter.

- (1) Setting high-speed counter parameter
  - 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.)

		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
omparator Output0 Max.Value	0	0	0	0
omparator 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	P40	P40	P40	P40
Unit time [ms]	1	1	1	1
Pulse/Rev value	1	1	1	1

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#### (c) Tum 'ON' the high-speed counter Enable signal (Ch0: :%KX4160) in the program.

Turn on High Speed Co	ounter Enabl	e Signal (C	CH:0%KX4601)		
StartHSC					%KX4160

(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 %KX4165 bit if among additional functions, rotation number function is used.

Turn on High Speed Counter (CHO:%KX4165)	r Enable Signal (CH:O%KX4)	601) and revolution	n per unit time	
StartHSC				%KX4160
				_HSCO_Cnt, En
				%KX4165
				_HSCO_Rpu, En

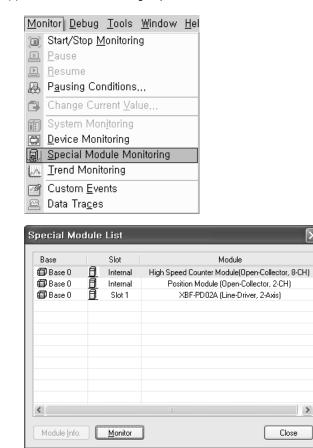
#### (e) Upon the setting, download program and parameter to PLC.

Write	?×
NewPLC         Image: Constraint of the second sec	OK Cancel <u>C</u> lear PLC

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#### (2) Monitoring and setting command

Monitoring and command setting of high-speed counter are described as follows. (a) When a monitor and clicking a Special Module Monitor are started, the following window is opened.



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Item	CH O	CH 1	CH 2	CH 3
Current count value				
Revolution/Unit time				
Error Code		······		¢
Channel	CH 4	CH 5	CH 6	CH 7
Current count value				
Revolution/Unit time				
Error Code				
FLAG Monitor				FLAG Monitor
ltem	Setting	j value	Currer	nt value
Channel		CH	0	
Counter mode	Lin	iear		
Pulse input mode	1-Phs	1-ln x1		
Internal preset	l	D		
External preset	l	D		
Ring Counter Min. Value	I	D		
ling Counter Max. Value	l	D		
Comp0 output mode	(Magn	itude)<		
Comp1 output mode	(Magn	itude)<		
Comparator Output0		D		
Comparator Output0	l	D		
Comparator Output1	l	D		
Comparator Output1	l	D		
Comp0 output point	No	Use		
Comp1 output point	No	Use		
Unit time [ms]		1		
Pulse/Rev value	•	1		

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

Special Module Monitor ?× High Speed Counter Module Item CH 0 CH 1 CH 2 CH 3 Current count value 0 0 0 0 Revolution/Unit time 0 0 0 0 Error Code 0 0 0 0 CH 4 CH 5 CH 6 CH 7 Channel Current count value 0 0 0 0 Revolution/Unit time 0 0 0 0 Error Code 0 0 0 0 FLAG Monitor FLAG Monitor Setting value Current value Item Channel CH 0 Counter mode Linear Linear 1-Phs 1-In x1 ~ 1-Phs 1-In x1 Pulse input mode Internal preset
I-Phs 2-In x1
External preset
CW/CCW
Ring Counter Min. Value 0 0 0 Ring Counter Max. Value 0 2 Comp0 output mode (Magnitude)< (Magnitude)< (Magnitude)< (Magnitude)< Comp1 output mode Comparator Output0 Comparator Output0 Comparator Output1 0 0 0 0 0 0 Comparator Output1 0 0 Comp0 output point Nollse No Lise No Use QX0.0.0 Comp1 output point Unit time [ms] 1 1 Pulse/Rev value <u>R</u>eset max/min value Stop Monitoring <u>T</u>est Close

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(c) Clicking "Start Monitoring\_ shows the high-speed counter monitor display, in which you may set each parameter. In this mode, changed values are not saved if power on or mode is changed.

(d) Clicking FLAG Monitor\_ shows the monitor of each flag in high-speed counter, in which you may direct operation commands by flags (clicking commands reverse turn).

HSC Module Command								
High Speed Counter Module	e							
Item	CH 0	CH 1	CH 2	CH 3				
CARRY flag	OFF	OFF	OFF	OFF				
BORROW flag	OFF	OFF	OFF	OFF				
Com0. Output's output	OFF	OFF	OFF	OFF				
Com1. Output's output	OFF	OFF	OFF	OFF				
Command	CH 0	CH 1	CH 2	CH 3				
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				
Comparison0 function	OFF	OFF	OFF	OFF				
Comparison1 function	OFF	OFF	OFF	OFF				
Revolution/Unit time	OFF	OFF	OFF	OFF				
Latch counter	OFF	OFF	OFF	OFF				
<				>				
			ſ	Close				

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# **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..

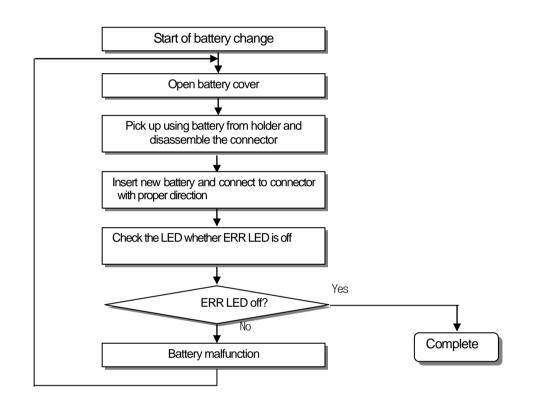
If battery is getting low, main unit cause the warning, 'battery voltage low warning'. The user can check it by error LED, flag and error message of XG5000.

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

User should change the battery periodically to save the program and backup the data in case of power failure. If user eliminate the battery, it works for 30 minute by super capacitor. But, For the safety reason, 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 with out RTC

# 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 PLC Information of Online.
  - 2) Click PLC RTC tap of PLC Information  $\_$  .

	Disco <u>n</u> nect Connection Se <u>t</u> tings		PL	C Information	ı - NewPLC			<u>?</u> ×
鶕	Change Mode <u>R</u> ead <u>Write</u> Co <u>m</u> pare with PLC Set Flash Memory	•		CPU Perform State PLC RTC is s	iance   Passv	word PLC	RTC	
	Control Redundancy Reset PLC Clear PLC Clear All PLC			Date	*	Time 오루	£ 4:32:16	•
	PLC Information,					Synchronia	ze PLC with	PC clock
щ	PLC <u>Hi</u> story PLC Errors/W <u>a</u> rnings J/O Information Save PLC His <u>t</u> ory				[	5	Send to PLC	
	<b>Eorce I/O</b> S <u>k</u> ip I/O Fa <u>u</u> lt Mask Mo <u>d</u> ule Changing Wizard <u>B</u> ase Changing Wizard							
S H		trl+Q trl+₩						Close

3) If user wants to send the clock of PC to PLC, press 'Synchronize PLC with PC clock'.

4) If 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

Flag	Data	Contents
_MON_YEAR	H0710	10year 07month
_TIME_DAY	H1729	29date 17hour
_SEC_MIN	H1020	10second 20minute
_HUND_WK	H2004	20XXyear, Thursday

(c) Modification of clock data by program

Variable	Flag	Content
%FW210	_MON_YEAR_DT	Month, year
%FW211	_TIME_DAY_DT	Hour, date
%FW212	_SEC_MIN_DT	Second, minute
%FW213	_HUND_WK_DT	Centaury, day

Write clock data to temporary device (I,Q,M,R,W,F,K,L,U) and turn on/off input contact point.

( If date and day data is not matched, Write is not available.)

Monitor and check the above special area (%FW53~%FW56)

(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/1d (normal temperature)

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

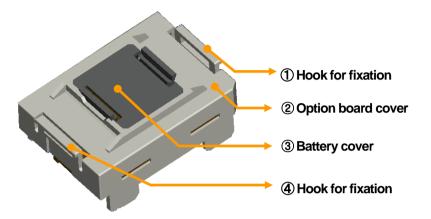
#### Remark

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
- 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.
- 6) RTC can operate only in 9th slot.

# 9.3 Name and Function of Each Part

(1) Describes the name and function of each part



No.	Name	Contents
14	Hook for fixation	Hook for fixing the option board to main unit
2	Option board cover	► Option board cover
3	Battery cover	► Battery cover

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



# **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.

ltem		DC input specification		
		XBO-DC04A	Remark	
Input point 4 points (supports high-speed counter function when installed at standard type)				
Insulation Met	hod	Photo coupler insulation		
Rated input vo	oltage	DC24V		
Rated input cu	ırrent	About 10 <sup>mA</sup>		
Voltage range		DC20.4~28.8V (ripple rate within 5%)		
On voltage / C	)n current	DC19V or above / 3 <sup>mA</sup> or above		
Off voltage / O	off current	DC6V or less / 1 <sup>mA</sup> or less		
Input resistance	æ	About 2.7 <sup>k</sup>		
Response	$Off \rightarrow On$	1/3/5/10/20/70/100ms (set through I/O parameter) Initial		
time	$On \rightarrow Off$	value: 3 <sup>ms</sup>		
Common met	hod	4 points / COM	"	
High speed	Performance	4kpps 4 channels (based on 1 phase)	when installed at	
counter	Mode	Linear counter	standard type	
		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

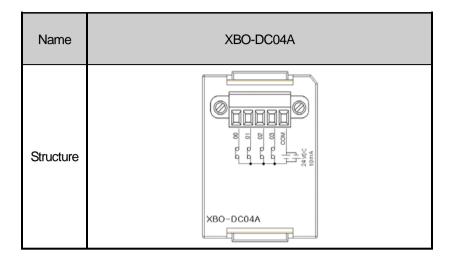
literer		Specification		
ľ	tem	XBO-DC04A		
	Signal	A-phase, B-phase		
Count input signal	Input type	Voltage input (Open collector)		
Signal	Signal level	DC 24V		
Max. co	ount speed	4kpps		
No. of	1 phase	4kpps 4 channels		
channels	2 phase	2kpps 2 channels		
Cour	nt range	Signed 32 Bit (-2,147,483,648 ~ 2,147,483,647)		
	nt type m setting)	Linear count (if it exceeds 32-bit range, Carry/Borrow occurs)		
	t mode	1-phase input		
(Progra	m setting)	2-phase input		
Sigr	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		
seung	2-phase input	Automatic setting by difference in phase		
Multiplication	1 phase input	1 multiplication		
function	2 phase input	2 multiplication		
Coun	t Enable	Set by program (Counted on "Enable" statue)		
Prese	t function	Set by program		

### (2) Counter input specification

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

# 10.2.2 Name of Each Part

### (1) Name of each part



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	
COM	Input common	Input common	Common terminal	Common terminal	

# (2) Interface with external devices

The following table describes interface with external devices

	I/O Internal circuit		Sigr	Signal		Input guaranteed
I/O			1-phase	2-phase	Operation	voltage
		00	CH0	CH0	On	20.4~28.8V
	<b>2.7 kΩ</b>	00	Pulse input	A-phase input	Off	6V or less
	2.7 kΩ	01	CH 1	CH0	On	20.4~28.8V
		01	Pulse input	B-phase input	Off	6V or less
Input	2.7 κΩ	02 CH 2 Pulse input	CH 2	CH2	On	20.4~28.8V
			A-phase input	Off	6V or less	
	2.7 kΩ	02	CH 3	CH0	On	20.4~28.8V
		03	Pulse input	B-phase input	Off	6V or less
		COM	COM(Input	common)		-

### 10.2.3 Function

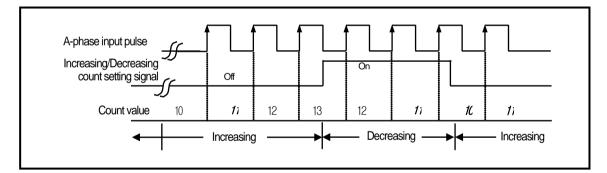
### (1)Counter mode

- (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



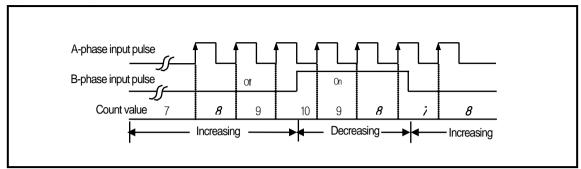
#### b) Increasing/decreasing count operation by B-phase input signal

•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	-

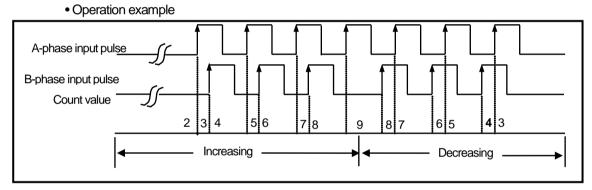
Operation example



### 2) 2-phase count mode

a) 2-phase 2-multiplication

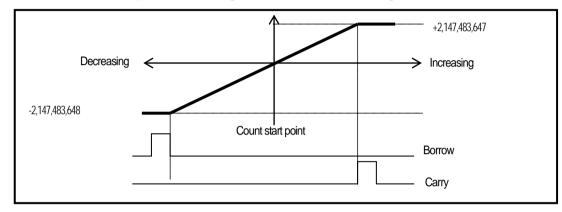
A-phase input pulse and B-phase input pulse are counted at rising respectively. If A-phase input is antecedent to B-phase input, increasing operation starts, and if B-phase input is antecedent to A-phase input, decreasing operation starts.



#### (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 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

(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'.

Time	Device area per channel				Ref.
Туре	CH0	CH1	CH2	CH3	Rei.
When mounted at slot no.9	%UX0.9.6	%UX0.9.134	%UX0.9.262	%UX0.9.390	0: Disable
When mounted at slot no.10	%UX0.10.6	%UX0.10.134	%UX0.10.262	%UX0.10.390	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.

Turce	Area per each channel (Double word)				Ref.
Туре	CH0	CH1	CH2	CH3	Rei.
Slot no. 9 internal preset value	%UD0.9.3	%UD0.9.7	%UD0.9.11	%UD0.9.15	
Slot no. 10 internal preset value	%UD0.10.3	%UD0.10.7	%UD0.10.11	%UD0.10.15	

#### • Preset command is specified through the following U area

Turno	Area per each channel (bit)				
Туре	CH0	CH1	CH2	CH3	Ref.
Slot no. 9 Internal preset command	%UX0.9.1	%UX0.9.129	%UX0.9.257	%UX0.9.385	0: Disable
Slot no. 10 Internal preset command	%UX0.10.1	%UX0.10.129	%UX0.10.257	%UX0.10.385	1: Enable

# 10.3 Installation and Wiring

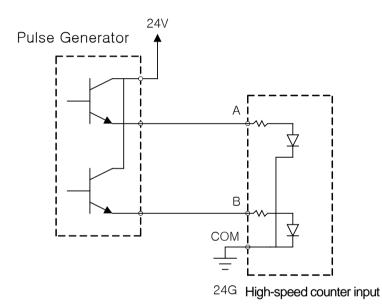
# 10.3.1 Precaution for wiring

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

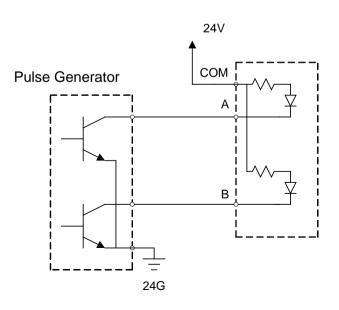
- (1) Make sure to use twisted pair shielded cable, grounded with 3 class applied.
- (2) Keep away from power cable or I/O line which may cause noise.
- (3) Stabilized power should be used.
  - Connect A-phase only for 1-phase input.
  - Connect A-phase and B-phase for 2-phase input.

#### 10.3.2 Example of wiring

(1) When pulse generator (encoder) is voltage output type



(2) When pulse generator is open collector type

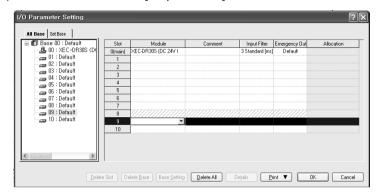


# 10.4 Internal Memory

### 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 how to register basic parametr and each item.

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



#### (b) Double-click [Variable/comment]

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OwePLC(XGB-XECS)-Offline     Offline     Offline							

#### (c) Select 'Register Special/Communication Module Variables' on menu 'Edit'

🕍 Project Edi	늘 Broject [Edit] Eind/Replace View Online Monitor Debug Tools Window Help							
	Undo         Ctrl+:           Bedo         Ctrl+:           Cut         Ctrl+:							
LSC 13 14 -	Copy         Ctrl+0           Paste         Ctrl+1							
Items ×	Delete De	Del Iobal Variable Direct Variable Comment						
⊟-靈 WAS	Select All Ctrl+	+A Variable Kind Variable Type Address Initial Value Retain Used EIP Comment						
÷⊕ N.	Insert Line Ctrl+							
	Delete Line Ctrl+I	+D						
l l	Export Variables to <u>File</u> I <u>m</u> port Variables from File							
0-2	Register Special/Communication Module Variables							
	Add EXTERNAL Variable							
	Move Item Up							
Project	Move Item Down							
	Delete <u>A</u> II unused variables/comments							
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Function Name								

#### (d) Click 'Yes'.

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Wartable       Uppe       Wartable       Uppe       Wartable       Uppe       Umment         Sean Program       Sean Program       HSCI_batt_En       BOIL       WXX4320       Channel1 Courter Enable         Wartable       Uppe       MaxX4320       Channel3 Courter Enable       HSC2_batt_En       BOIL         Wartable       Uppe       MaxX4320       Channel4 Courter Enable       HSC3_batt_En       BOIL         Wartable       Uppe       MaxX4460       Channel3 Courter Enable       HSC3_batt_En       BOIL       WXX4400         Wartable       Uppe       MaxX320       Channel4 Courter Enable       HSC3_batt_En       BOIL       WXX460       Channel3 Courter Enable       HSC3_batt_En       BOIL       WXX5500       Channel5 Courter Enable       HSC3_batt_En       BOIL       WXX5500       Channel6 Courter Enable       HSC3_batt_En       BOIL       WXX5500       Channel3 Courter Enable       HSC3_batt_En       BOIL       WXX5500       Channel3 Courter Enable       HSC3_batt_En       BOIL       WXX5500       Channel3 Courter Enable       HSC3_batt_En       BOIL       WXX5500       Channel4 Courter Enable       HSC3_batt_En       BOIL       WXX5500       Channel4 Courter Enable       HSC3_batt_En       BOIL       WXX5500       Channel4 Courter Enable       HSC3_batt_Enable<	- ∰ NewPLC(XGB-XECS)-Offline 								
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Function Name       III       Automatically register comments in the U or L Devices according to the special/communication module set in the I/O parameter.	Function/FB								
Function Name       II2       Automatically register comments in the U or L Devices according to the special/communication module set in the I/O parameter. The previous comments will be deleted.         II3       II4       II5         II4       II5       III()         II4       II5       III()         II7       III       III()         II7       III       IIII()         II8       HSCI_ExtPrs_En BOOL       XXX4482         II8       HSC2_ExtPrs_En BOOL       XXX4482         II8       HSC3_ExtPrs_En BOOL       XXX4482         II8       HSC3_ExtPrs_En BOOL       XXX4482         II8       HSC4_ExtPrs_En B	Most Recently Used	Most Recently Used							
16       IRLY       OHLIS(N)         17       IRL       IRLY       OHLIS(N)         18       HSC1_ExtPrs_En       BOOL       XXX4432       Channel1 Counter External Preset Enable         19       HSC2_ExtPrs_En       BOOL       XXX4482       Channel2 Counter External Preset Enable         20       HSC3_ExtPrs_En       BOOL       XXX4482       Channel3 Counter External Preset Enable         21       HSC4_ExtPrs_En       BOOL       XXX4482       Channel4 Counter External Preset Enable         Iml NewProgram[Program]       Iml Global/Direct Variables       Iml Counter External Preset Enable	Function Name  Interview comments in the U or L Devices according to the special/communication module set in the I/O parameter, The previous comments will be deleted, Continue?								
19       JHSC2_ExtPrs_En_BOOL       XXX4482       Channel2 Counter External Preset Enable         20       JHSC2_ExtPrs_En_BOOL       XXX4642       Channel3 Counter External Preset Enable         21       JHSC2_ExtPrs_En_BOOL       XXX4642       Channel4 Counter External Preset Enable         21       JHSC4_ExtPrs_En_BOOL       XXX4682       Channel4 Counter External Preset Enable         22       JHSC4_ExtPrs_En_BOOL       XXX4682       Channel4 Counter External Preset Enable         23       NewProgram[Program]       MacGlobal/Direct Variables       Counter External Preset Enable									
20       LHSC3_ExtPrs_En       BOOL       XXX4642       Channel3 Counter External Preset Enable         21       LHSC4_ExtPrs_En       BOOL       XXX34882       Channel4 Counter External Preset Enable         Image: NewProgram [Program]       Image: Global/Direct Variables       Image: Global/Direct Variables									
Image: Program Program (Program)       Image: Program Program (Program)         Image: Program Program (Program)       Image: Program Program (Program)									
PLC         Program         Variable/Device         Value         Type         Device/Varia         Comment         X           1	I Supervision International State St								
	× PLC Program Variable/Device Value	Type Device/Varia Comment							

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

	ole Moni	toning i	rindo #				
	PLC	Туре	Device/Vari	Value	Variable/Device	Comment	
1	NewPLC	BIT	U09.01.1	10	_0009_CH0_Borrow	Input Option Board: CH0 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	
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	
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	
10	NewPLC	BIT	U09.00.1	10	_0009_CH0_PREEN	Input Option Board: CHO Preset Enable(Edge) Command	
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	
13	NewPLC	BIT	U09.08.0	10	_0009_CH1_CNTEN	Input Option Board: CH1 Counter Enable(Level) Command	
14	NewPLC	WORD	U09.13	HEX	_0009_CH1_CntMode	Input Option Board: CH1 Counter Mode	
15	NewPLC	WORD	U09.10	HEX	_0009_CH1_CurCnt	Input Option Board: CH1 Current Count Value	
16	NewPLC	BIT	U09.08.3	10	_0009_CH1_DN	Input Option Board: CH1 Count Inc/Dec Flag	
17	NewPLC	WORD	U09.12	HEX	_0009_CH1_ErrCode	Input Option Board: CH1 Error Code	

# Remark

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

Туре		Ref.			
	CH0	CH1	CH2	CH3	Nel.
Enable counter	%UX0.9.0	%UX0.9.128	%UX0.9.256	%UX0.9.384	BIT
Enable internal preset	%UX0.9.1	%UX0.9.129	%UX0.9.257	%UX0.9.385	BIT
Count inc/dec flag	%UX0.9.3	%UX0.9.131	%UX0.9.259	%UX0.9.387	BIT
Latch counter enable	%UX0.9.6	%UX0.9.134	%UX0.9.262	%UX0.9.390	BIT
Pulse input mode	%UW0.9.5	%UW0.9.13	%UW0.9.21	%UW0.9.29	INT
Internal preset setting value	%UD0.9.3	%UD0.9.7	%UD0.9.11	%UD0.9.15	DINT

### (b) Monitor area

Туре		Ref.			
	CH0	CH1	CH2	CH3	Rei.
Carry flag	%UX0.9.16	%UX0.9.144	%UX0.9.272	%UX0.9.400	BIT
Borrow flag	%UX0.9.17	%UX0.9.145	%UX0.9.273	%UX0.9.401	BIT
Current counter value	%UD0.9.1	%UD0.9.5	%UD0.9.9	%UD0.9.13	DINT
Error code	%UW0.9.4	%UW0.9.12	%UW0.9.20	%UW0.9.28	INT

## (3) No. 10 slot device area

(a) Action command

Туре		Ref.			
	CH0	CH1	CH2	CH3	Rei.
Enable counter	%UX0.10.0	%UX0.10.128	%UX0.10.256	%UX0.10.384	BIT
Enable internal preset	%UX0.10.1	%UX0.10.129	%UX0.10.257	%UX0.10.385	BIT
Count inc/dec flag	%UX0.10.3	%UX0.10.131	%UX0.10.259	%UX0.10.387	BIT
Latch counter enable	%UX0.10.6	%UX0.10.134	%UX0.10.262	%UX0.10.390	BIT
Pulse input mode	%UW0.10.5	%UW0.10.13	%UW0.10.21	%UW0.10.29	INT
Internal preset setting value	%UD0.10.3	%UD0.10.7	%UD0.10.11	%UD0.10.15	DINT

# (b) Monitor area

Туре		Def			
	CH0	CH1	CH2	CH3	Ref.
Carry flag	%UX0.10.16	%UX0.10.144	%UX0.10.272	%UX0.10.400	BIT
Borrow flag	%UX0.10.17	%UX0.10.145	%UX0.10.273	%UX0.10.401	BIT
Current counter value	%UD0.10.1	%UD0.10.5	%UD0.10.9	%UD0.10.13	DINT
Error code	%UW0.10.4	%UW0.10.12	%UW0.10.20	%UW0.10.28	INT

#### (4)Parameter setup

### (a) Action command

Turpe	Device	Ref.	
Туре	CH0	Information	Rei.
Enable counter	%UX0.9.0	0: disable, 1: enable	BIT
Enable internal preset	%UX0.9.1	0: disable, 1: enable	BIT
Count inc/dec flag	%UX0.9.3	0: INC, 1: DEC	BIT
Latch counter enable	%UX0.9.6	0: disable, 1: enable	BIT
		0: 1-phase 1-input	
Pulse input mode	%UW0.9.5	1: 1-phase 2-input	INT
		2: 2-phase 2 multiplication	
Internal preset setting value	%UD0.9.3	-2,147,483,648 ~ 2,147,483,647	DINT

#### (b) Monitor area

Turpo	Device	Ref.		
Туре	CH0	Information	Kel.	
Carry flag	%UX0.9.16	0: disable, 1: enable	BIT	
Borrow flag	%UX0.9.17	0: disable, 1: enable	BIT	
Current counter value	%UD0.9.1	-2,147,483,648 ~ 2,147,483,647	DINT	
Error code	%UW0.9.4	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			
* CH1(3) is not available when CH0(2) operate as 2-phase mode				
25	Internal preset value exceeded counter range			

## Remark

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

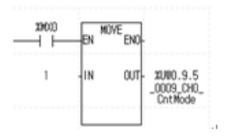
Describes option board high-speed counter example

(1) High-speed counter setup

Set up option board high-speed counter operation by using U area.

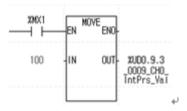
(a) Select high-speed counter mode.

Set up high-speed counter mode



(b) If you need 'Preset' function, input 'Preset value' and turn on 'Preset Enable" bit.

Input value to preset



#### (c) Specify 'Latch counter' or 'Up/Down counter'

Preset Enable signal ON



#### (d) Turn on 'High-speed counter enable' signal

Turn on High-speed Counter Enable signal (No. 9 slot, No.0 ch) of input option board (XBO-DC04A)

%FX99					XUXO.S	9.0
					.0009_0 CNTE	CHO_

(2) Monitoring

You can check option board high-speed counter value by registering %UD0.9.1 (no.9 slot, no.0 ch) in variable mornitring window or program.

# **Chapter11 TR Output Option Board**

This chapter describes specification and how to use the output option board.

## 11.1 XBO-TN04A Specification

## 11.1.1 Output option board specification

ltem		Transistor output specification			
		XBO-TN04A	Remark		
No. of output		4 (Pulse output function is supported when mounted on standard type)			
Insulation metho	d	Photo coupler insulation			
Rated load voltage	ge	DC 24V			
Max. load curren	t	0.5A/point, 2A/COM			
Surge killer		Zener diode			
Leakage current	when Off	0.1 <sup>mA</sup> or less			
Voltage drop whe	en On	DC 1V or less			
Inrush current		3A, 10 <sup>ms</sup> or less			
Description	$Off \rightarrow On$	1ms or less			
Response time	$On \rightarrow Off$	1ms or less			
Operating indicat	or	-			
	No. of axes	2			
	Output method	Open collector method			
Pulse output	Control unit	Pulse	When mounted		
	Control speed	10kpps (One option board supported _ No. 9 slot)	on standard type		
	Setting method	Setup by DST instruction			
		Circuit configuration			

## **11.2 Positioning Specification**

Positioning function is built in XGB output option board. This section describes specification, how-to-use, function,

programming and wiring of built-in positioning.

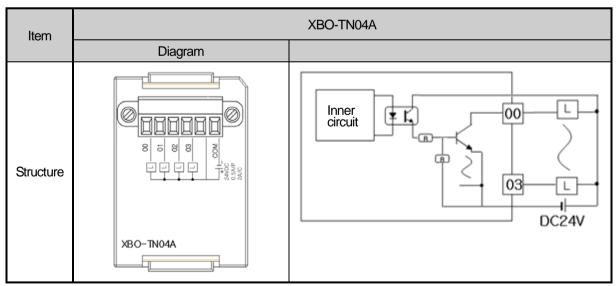
## 11.2.1 Performance Specification

(1) Performance Specification

lte	m Model	XBO-TN04A		
No. c	of axes	2		
Cont	rol method	Position control, speed control		
Cont	rol unit	Pulse		
bu	Method	Incremental		
Positioning	Address range	-2,147,483,648 ~ 2,147,483,647(pulse)		
Pos	Speed range	1 ~ 10,000pps(1pps unit)		
Manu	ual operation	JOG operation		
Hom	e return	By DOG		
Max.	connection	2 m		
Conr	nector	6 Pin connector		

## 11.2.2 Name of each part

(1) Name of each part



Connector	Output po	pint 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	X-axis	02	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	COM	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			
mode	Direction	Low	High	

## 11.2.3 Before Positioning

(1) Positioning function list

Positioning function of XGB option board built-in positioning is as follows.

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 v designated position, and complete signal is on (dwell is not	•	speed to
Speed control	Operation pattern	Speed Start command Dec. stop	DST	
	Operation	If the rising edge of start command is detected, it moves and stops after deceleration by stop command. At this til not be not on.	-	-

(2) Position control

Position control moves 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 (+,-).

- When Address is positive number: forward positioning (Direction increasing address)
- When Address is negative number: reverse positioning (Direction decreasing address)

(3) Speed control

Speed control means that object moves with steady speed (steady pulse string) until stop command.

•When controlling speed, 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.

Remark

• For more information, refer to XGB positioning manual.

## 11.2.4 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.

Operation status Stop factor		Positioning <sup>*1</sup>	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 <sup>*3</sup>	Emg. Stop instruction	Immediate s		р	Error status (Error 481) Output prohibited
Stop by	External upper limit "On"	Immediate stop		Forward immediate stop	Error status (Error 492)
external signal	External lower limit "On"	Immedia	te stop	Backward immediate stop	Error status (Erro 493)

#### Remark

- \*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"

## 11.2.5 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

li	tem	Jog forward start	Jog backward start	Jog high speed/low speed
XBO-	X-axis	%UX0.9.24	%UX0.9.25	%UX0.9.26
TN04A	Y-axis	%UX0.9.280	%UX0.9.281	%UX0.9.282

• 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

Pango	High speed jog operation	1 ~ 10	( <b>Unit</b> : 1pps)
Range	Low speed jog operation	1 jog high speed	(Unit: 1pps)

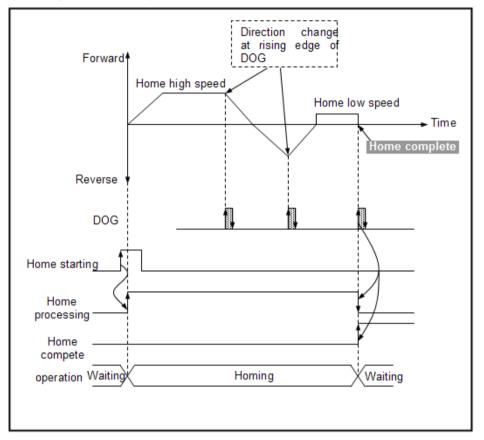
### Remark

· Make sure to follow the cautions

Bias speed  $\leq$  Jog high speed  $\leq$  Speed limit

## 11.2.6 Home return

XBO-TN04A supports only "Home return by DOG".



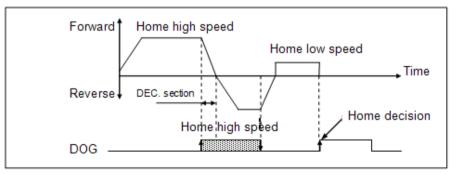
(a) When homing command (ORG instruction) is executed, it accelerates to home direction set in Home Parameter and it homes with high speed. (The above figure is example when homing direction is forward)

(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.



## 11.2.7 Positioning Basic Parameter Setup

This chapter describes how to register basic parameter of XGB main output option board positioning function and each item.

#### (1) U device auto registration

(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 22 02 : Default	1					
- a 03 : Default	2					
04 : Default	3					
05 : Default	4					
- 20 OG : Default	5					
07 : Default	6					
08 : Default	7					
2 10 : Default	8					
10 · Deladit	9	TR OUTPUT, 4points(		· · ·	Default	P0400 ~ P043F
	10	Digital Module List     Digital Module List	uT, 4points(sync)	L		

(b) Double-click [Variable/Comment].

·/ ···· L	
🖏 XGB_PROJECT - XG5000 - [Global	//Direct Variables]
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Exection Name	📾 NewProgram [Program] 🕁 Global/Direct Variables

## (c) Select "Register U device" on menu 'Edit'.

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	Insert <u>L</u> ine	Ctrl+L				Į							
	Delete Li <u>n</u> e	Ctrl+D											
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G	Register U Device	• 6											
<u> </u>	Add EXTERNAL	Variable											
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	Move Item Down												
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(d) Click 'yes'.

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unction Name Of (V) OHLIQ(N)
NewProgram[Program]

### (e) Variables are registered as the screen below.

		Applicati	Variable Kind	Variable	Туре	Address	Ini 🔨	
Base00, Slot01: XBF-PD02A (Line-Driver, 2-A)		-	VAR_GLOBAL	_01_RDY	BOOL	XUX0.1.15		=
Base00, Slot02; XBF-AH04A (I/O, 2/2 CH)	1		VAR_GLOBAL	_01_RDY	BOOL	XUX0.1.15		Can
		Г	VAR_GLOBAL	_01_X_J0G_CW	BOOL	%UXO.1.16		
	2		VAR_GLOBAL	_01_X_J06_CW	BOOL	%UXO.1.16		
	3		VAR_GLOBAL	_01_X_J06_CCW	BOOL	%UX0.1.17		
	3		VAR_GLOBAL	_01_X_J06_CCW	BOOL	%UX0.1.17		
	4		VAR_GLOBAL	_01_X_J0G_SPD	BOOL	%UXO.1.18		
	4		VAR_GLOBAL	_01_X_J06_SPD	BOOL	%UXO.1.18		
	5		VAR_GLOBAL	_01_X_DONE_CLR	BOOL	%UXO.1.19		
	5		VAR_GLOBAL	_01_X_DONE_CLR	BOOL	%UXO.1.19		
	6		VAR_GLOBAL	_01_Y_JOG_CW	BOOL	%UXO.1.20		
			VAR_GLOBAL	_01_Y_J0G_CW	BOOL	%UX0.1.20		
	7		VAR_GLOBAL	_01_Y_J0G_CCW	BOOL	%UX0.1.21		
	Ľ		VAR_GLOBAL	_01_Y_J0G_CCW	BOOL	%UX0.1.21		
	8		VAR_GLOBAL	_01_Y_JOG_SPD	BOOL	%UX0.1.22		
	Ľ		VAR_GLOBAL	_01_Y_JOG_SPD	BOOL	%UX0.1.22		
	9		VAR_GLOBAL	_01_Y_DONE_CLR	BOOL	XUX0.1.23		
	Ľ	-	VAR_GLOBAL	_01_Y_DONE_CLR	BOOL	%UXO.1.23		
	10	<b>N</b>						
	<u> </u>		VAR_GLOBAL	_02_ERR	BOOL	%UX0.2.0		
	111			00.000		MIIIIO 0 45		
	<u> </u>	•	VAR_GLOBAL	_02_RDY	BOOL	%UX0.2.15		
	12							
			VAR_GLOBAL	_02_ADO_ACT	BOOL	%UXO.2.16		
	13			00 101 107	DOOL	MUNO O 10		
			VAR_GLOBAL	_02_AD1_ACT	BOOL	%UX0.2.17		
	14			00 040 407	0001	WUV0 0 10	~	

## Remark

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.

## Chapter11 TR Output Option Board

(2) Positioning parameter of XBO-TN04A

Γ

U area of each item is as follows.

ltem	Data type	Signal direction	Status information		ea for ioning
		direction		X-axis	Y-axis
BUSY			0: Stop, 1: Run	%UX0.9.0	%UX0.9.256
Error			0: No error, 1: Error occurred	%UX0.9.1	%UX0.9.257
Positioning complete			0: not complete, 1: complete	%UX0.9.2	%UX0.9.258
Home determination			0: not determined, 1: determined	%UX0.9.3	%UX0.9.259
Output prohibited			0: output available, 1: output prohibited	%UX0.9.4	%UX0.9.260
Stop status			0: not stop status, 1: stop status	%UX0.9.5	%UX0.9.261
Upper limit			0: not detect, 1: detect	%UX0.9.6	%UX0.9.262
Lower limit	-		0: not detect, 1: detect	%UX0.9.7	%UX0.9.263
EMG. Stop	-		0: normal status, 1: EMG. Stop status	%UX0.9.8	%UX0.9.264
CW/CCW			0:CW, 1:CCW	%UX0.9.9	%UX0.9.265
Operation status (accelerating)		Output (monitoring)	0: not accelerating , 1: accelerating	%UX0.9.10	%UX0.9.266
Operation status (steady status)			0: not steady status, 1: steady status	%UXO.9.11	%UX0.9.267
Operation status (decelerating)	BOOL		0: not decelerating , 1: decelerating	%UX0.9.12	%UX0.9.268
Position control			0: not under position control 1: under position control	%UX0.9.13	%UX0.9.269
Speed control			0: not under speed control 1: under speed control	%UX0.9.14	%UX0.9.270
Home return			0: not under home return 1:under home return	%UX0.9.15	%UX0.9.271
JOG low speed			0: not under JOG low speed 1: under JOG low speed	%UX0.9.16	%UX0.9.272
JOG high speed			0: not under JOG high speed 1: under JOG high speed	%UXO.9.17	%UX0.9.273
Forward JOG start			0: JOG stop, 1: forward JOG start	%UX0.9.24	%UX0.9.280
Reverse JOG start			0: JOG stop, 1: Reverse JOG start	%UX0.9.25	%UX0.9.281
JOG low/high speed		Input	0: JOG low speed, 1: JOG high speed	%UX0.9.26	%UX0.9.282
DOG	1		Operate at rising edge	%UX0.9.27	%UX0.9.283
Upper limit signal	1		Detected at falling edge	%UX0.9.28	%UX0.9.284
Lower limit signal	1		Detected at falling edge	%UX0.9.29	%UX0.9.285
Home return direction			0: CW, 1: CCW	%UX0.9.30	%UX0.9.286
Positioning status	BOOL	Input	0: disable, 1: enable	%UX0.9.31	%UX0.9.287
Current position	DWARD		-2,147,483,648 ~ 2,147,483,647	%UD0.9.1	%UD0.9.9
Current speed	WORD	Output	1 ~ 10,000[pulse/s]	%UW0.9.4	%UW0.9.20
Error code	WORD		Indicates positioning error	%UW0.9.5	%UN0.9.21

## Chapter11 TR Output Option Board

ltem	Data type	Signal direction	Status information		rea for tioning
		airection		X-axis	Y-axis
Bias speed	WORD		1 ~ 10,000[pulse/s]	%UW0.9.6	%UW0.9.22
Speed limit	WORD		1 ~ 10,000[pulse/s]	%UW0.9.7	%UW0.9.23
Acc. time	WORD		0 ~ 10,000[unit: ms]	%UW0.9.8	%UW0.9.24
Dec. time	WORD		0 ~ 10,000[unit: ms]	%UW0.9.9	%UW0.9.25
Home address	DINT	Input	-2,147,483,648 ~ 2,147,483,647	%UD0.9.5	%UD0.9.13
Home return high speed	WORD		1 ~ 10,000[pulse/s]	%UW0.9.12	%UW0.9.28
Home return low speed	WORD		1 ~ 10,000[pulse/s]	%UW0.9.13	%UW0.9.29
JOG high speed	WORD	1	1 ~ 10,000[pulse/s]	%UW0.9.14	%UW0.9.30
JOG low speed	WORD	1	1 ~ 10,000[pulse/s]	%UW0.9.15	%UW0.9.31

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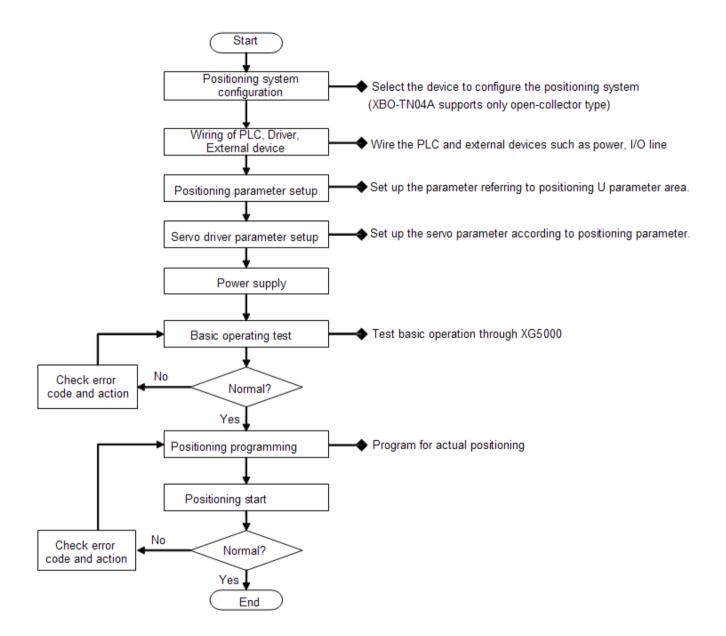
Remark

• For more information on positioning parameter item, refer to XGB built-in positioning manual.

## 11.3 TR Output Option Board Operation Sequence of Positioning

## 11.3.1 Operation Sequence of Positioning

Operation sequence is as follows. Positioning function of the option board operates only at slot number 9.



## **11.4 Positioning Instruction List**

Positioning instructions used in XBO-TN04A positioning are summarized as follows.

#### (1) XBO-TN04A positioning instruction

Instructi on	Command	Command condition	XGB built-in positioning manual
ORG	Home return	Slot, command axis	5.2.1
DST	Direct start	Slot, command axis, position, speed, dwell time, M code, control word	5.2.3
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 prohibition cancel	Slot, command axis, disable/enable pulse output	5.2.20

### Remark

 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

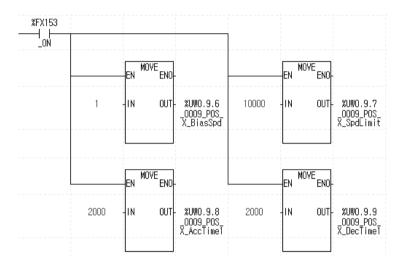
This chapter describes positioning example of XBO-TN04A.

### (1)Positioning setup

I

Option board positioning is set up by U area. Set up each parameter to use positioning function.

(a) Input each parameter value.



%FX153				%UX0.9.28
				_0009_POS_ X_ULimit
				%UX0.9.29
				_0009_POS_ X_LLimit

### (b) Turn On or Off according whether to use positioning

%FX153					XUX0.9.31
					_0009_POS_ X_Enable

(c) Set up the function as follows. INST XMXO ⊣ ⊢ APM\_PRS REQ DONE INST1 XMX1 APM\_DST Req Done-0 BASE STAT -+0 BASE STAT 9 SLOT 9 SLOT 0 AXIS -PRS\_A DDR 0 AXIS 0 100000 ADDR 10000 SPEED DWELL 0 MCODE 0 -POS\_S PD 0 -ABS\_1 NC ABS\_INC TIME\_ SEL TIME\_SEL

I

## Monitoring

You can check option board posioing speed, crrent position by regstering %UW0.9.4,% UW0.9.1(No. 9 slot, X-axis) at variable monitor window or program

# **Chapter12 Memory Module**

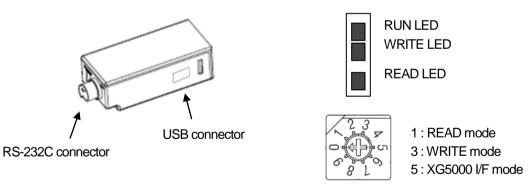
## 12.1 Memory Module Specification

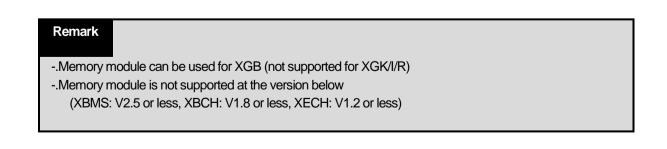
You can save user program safely or download user program to PLC without special handling when user program is damaged by using external memory module in XGB PLC

## 12.1.1 Memory module specification

ltem	XBO-M2MB	Ref.
Memory capacity	2MByte	
Memory type	Flash Memory	
Specification	USB supported, Program Read/Write	
Indicator	LED (RUN/WRITE/ 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





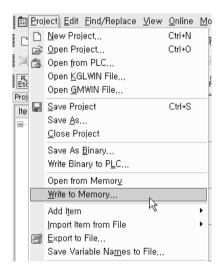
### 12.1.3 How to use memory module

- (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.

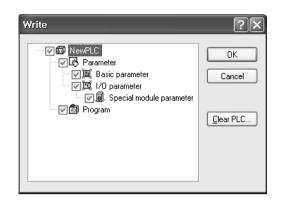
With the above handling, you can run PLC with program saved in memory module

(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.

Write			?×
Writing Parame	ter		Elapsed time:
	~~~~		00:01
i kini i		<u>a</u>	
1.0KB / 7.9KB			
Current:	1	2%	
Total:	9	3%	Cancel
	XG5000		×
	(j)	Writing comp	leted
		OK	

(e) With above method, through XG5000, 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

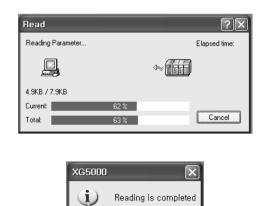
**Chapter12 Memory Module** 

<u>P</u> roj	iect <u>E</u> dit <u>F</u> ind/Replace	<u>V</u> iew	<u>O</u> nline	M
D	<u>N</u> ew Project		Ctrl+N	
È	<u>O</u> pen Project		Ctrl+0	
â.	Open from PLC			
	Open <u>K</u> GLWIN File			
	Open <u>G</u> MWIN File			
R	<u>S</u> ave Project		Ctrl+S	
	Save <u>A</u> s			
	<u>C</u> lose Project			
	Save As <u>B</u> inary			
	Write Binary to P <u>L</u> C			
	Open from Memory		N	
	Write to Memory		N	

(c) "Read" window is created as follows.

Write	?×
Image: WewPLC         Image: WewPLC <td< td=""><td>OK Cancel</td></td<>	OK Cancel

(d) "Reading is completed" window appears.



(e) With above method, through XG5000, you can save program, parameter, communication parameter from XBO-M2MB

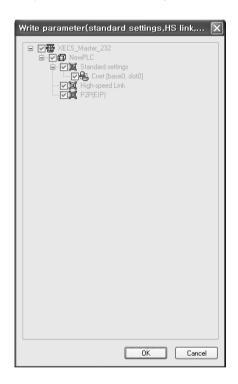
0K

(5) Write to Memory module

- (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

4) 4)	Co <u>n</u> nect C <u>o</u> nnection Settings
뿷	Read IO Information
	Write Parameter (Standard Settings,HS Link,P2P) <u>R</u> ead Parameter (Standard Settings,HS Link,P2P) <u>D</u> elete Parameter(Standard Settings,HS Link,P2P) <u>E</u> nable Link (HS Link,P2P)
	Upload/Download(File)
	Sycon Upload (Dnet, Pnet)
3	<u>S</u> ystem Diagnosis
	Reset
_	Write to Memory module
-	Read from Memory model

(c) If you click "OK" button, it saves each parameter at the memory module.



Write parameter	×
Writing file on PLC.	
Cancel	

(d) If "Enable Link" window appears, check the item and press "Write"

Enable Link(HS Link,P2P)	<
High-speed Link     High-speed Link     High-speed Link 01     High-speed Link 02     P2P(EIP)     P2P(EIP) 02     P2P(EIP) 03	
Write Close	J

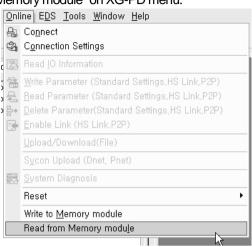
T

(e) "Enable, Disable" window appears

XG-PD	$\mathbf{X}$
	Finished Enabling/Disabling,
	ОК

#### (6) Read from Memory module

(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.



(c) If you click "OK" button", it read each parameter form the memory module.

Read parameter(standard settings,HS link,	X
NewProject NewProject NewPLC Yiii NewPtC Standard settings Yiii High-speed Link High-speed Link 01 Yiii P2P(EIP) P2P(EIP) 01 P2P(EIP) 02 P2P(EIP) 03	
Read parameter	

Reading file from PLC.

Cancel

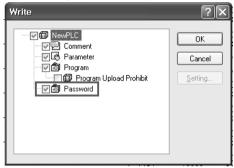
......

R۵	ma	rk
ĸe		

- -. "Open from memory module" and "Write to Memory module" menus of XG5000 are activated when PLC is Offline. They are deactivated when PLC is Online.
- -. When connecting with XG5000, connection type should be 'USB'

### 12.1.4 How to use when password is set

- (1) When connecting XG5000 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 8 characters or less.	
Please set your password the same as the PLC. If the passwords between memory module and PLC are different, you cannot write or read the project.	
Password	
Password:	
Password Confirm:	
<u>K</u> ance	

(b) When reading password-set program to XG5000, 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

- (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
  - 3) When no password is set in the memory module
  - Writing is not executed
  - 4) 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 XG5000 or PLC	RUN LED flickers
3	Connected to XG5000 while mode switch is "1"	<b>READ LED flickers</b>
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 XG5000 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	WRITE LED flickers
	module	
9	You executes writing when PLC password is not same as that of	WRITE LED flickers
	memory module	

#### Remark

- -. 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.

# **Chapter 13 Installation and Wiring**

# 13.1 Safety Instruction

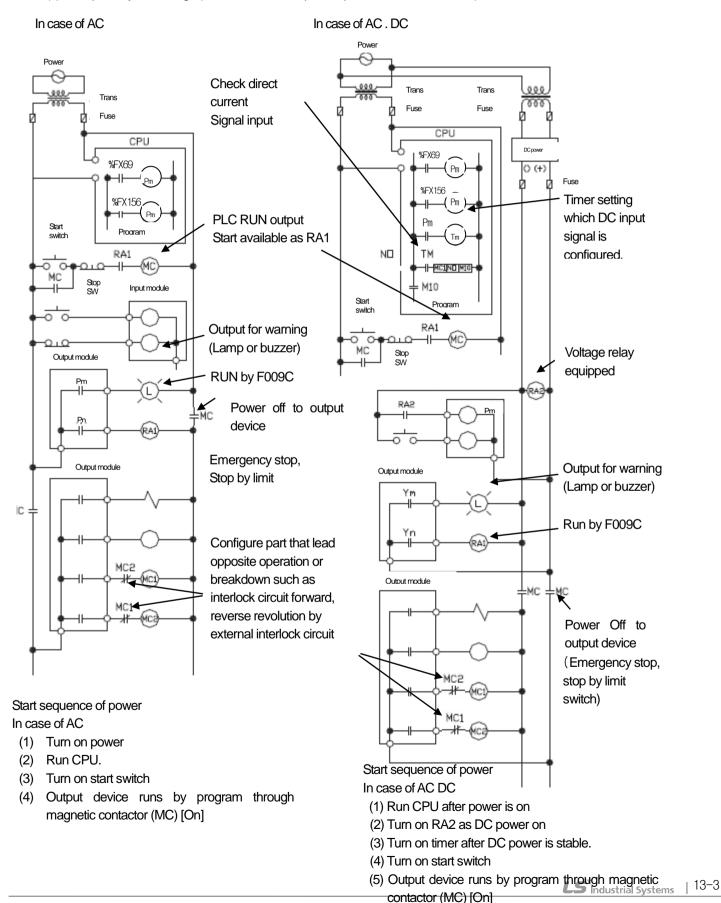
Danger
Please design protection circuit at the external of PLC for entire system to operate safely because an abnormal
output or an malfunction may cause accident when any error of external power or malfunction of PLC module.
(1) It should be installed at the external side of PLC to emergency stop circuit, 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
When 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 10.2 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.
▶ When load current is 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.
•

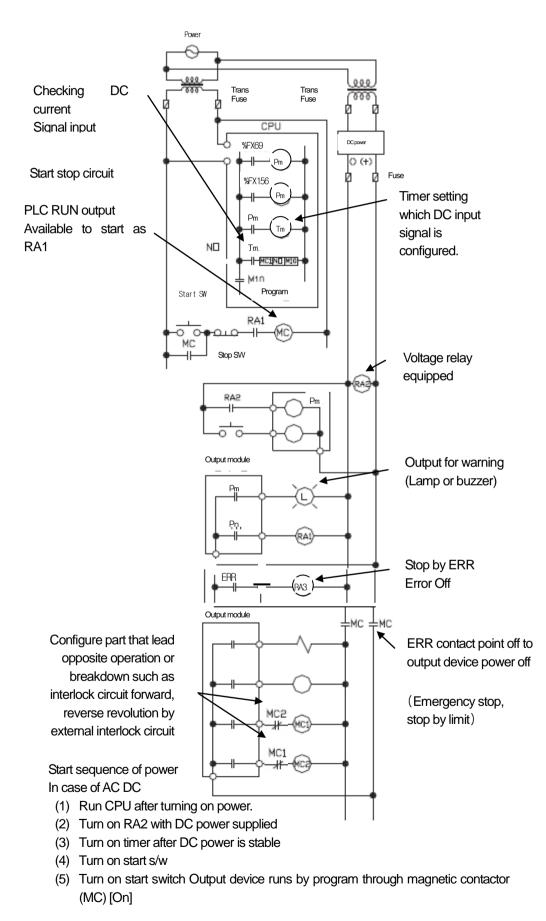
Danger
▶ Don't close the control line or communication cable to main circuit or power line. Distance should be more than 100mm.
It may cause malfunction by noise.
▶ In case of controlling lamp load, heater, solenoid valve, etc. in case of Off -> On, large current (10 times of normal
current) may flows, 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

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## 13.1.1 Fail safe circuit

(1) example of system design (When ERR contact point of power module is not used)



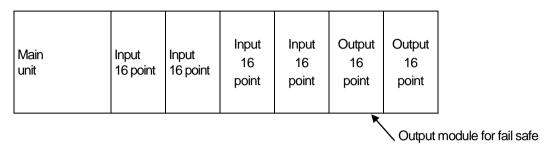


(2) System design circuit example (When ERR contact point of power module is used)

(3) Fail safe countermeasure in case of PLC error

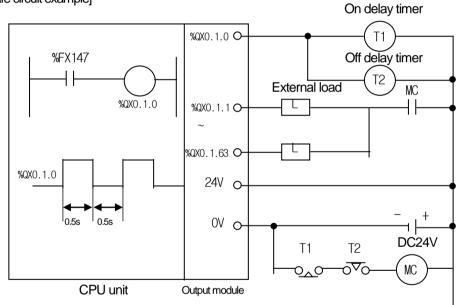
Error of PLC CPU and memory is detected by self diagnosis but in case error occurs in IO control part, etc., CPU can detect the error. In this case, though it is different according to status error, all contact point is on or off, so safety may not be guaranteed. Though we do our best to our quality 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]



Since P80 turn on/off every 0.5s, use TR output.

## 13.1.2 PLC heat calculation

(1) Power consumption of each part

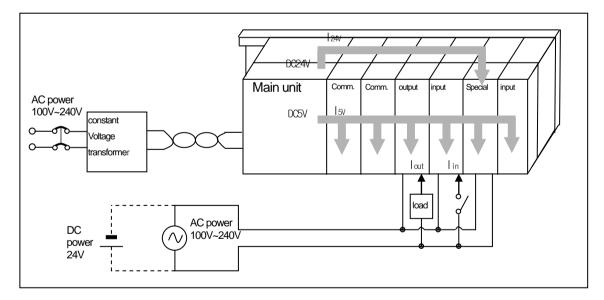
(a) Power consumption of module

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.

- $W_{pw} = 3/7 \{(1_{5} \vee X_{5}) + (1_{24} \vee X_{24})\} (W)$
- Isv: power consumption of each module DC5V circuit(internal current consumption)
- l24v: 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. •  $W_{24V} = I_{24V} X 24 (W)$
- (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)
  - lout : 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)

•  $W_{in} = I_{in} X E X$  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.

•  $W = WPW + W_{5V} + W_{24V} + W_{out} + W_{in} + W_{s} (W)$ 

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 [°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

Use PLC in the range of general specification specified by manual. In case of usage out of range, it may cause electric shock, fire, malfunction, damage of product.

# Remark

• Module must be mounted to hook for fixation properly before its fixation.

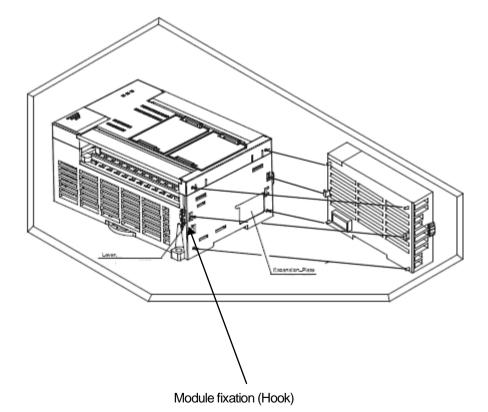
The module may be damaged from over-applied force. If module is not mounted properly, it may cause malfunction.

• Do not drop or impact the module case, terminal block connector.

▶ Do not separate PCB from case.

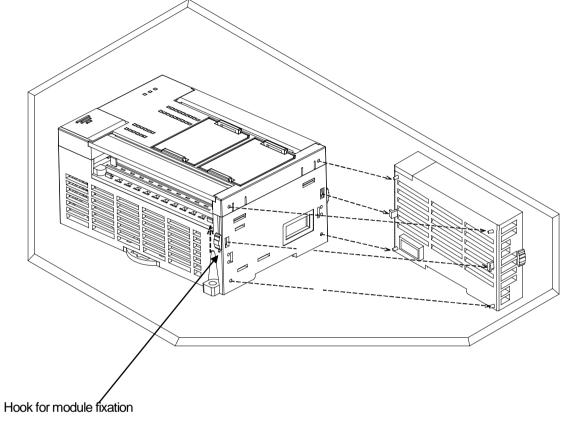
#### (1) Equipment of module

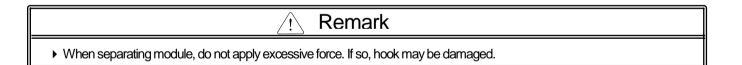
- Eliminate the extension cover on the upper side of module.
- Push the module and connect it in agreement with hook for fixation of four edges and hook for connection at the bottom.
- After connection, pull down the hook for fixation at the upper part and lower part and fix it completely.



(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. (Do not apply excessive force)



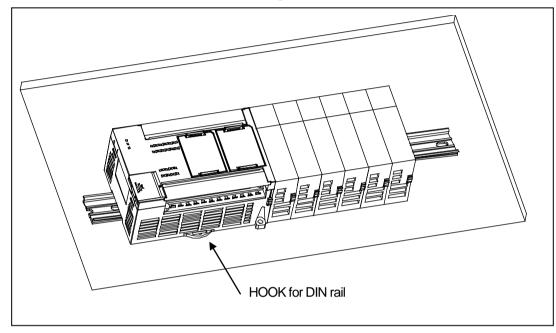


#### (3) Installation of module

XGB PLC has a hook for DIN rail (rail width: 35mm) so that cab be installed at DIN rail.

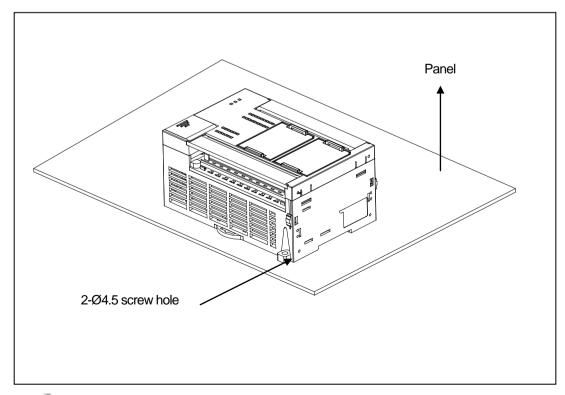
(a) In case of installing at DIN rail

- Pull the hook as shown below for DIN rail at the bottom of module and install it at DIN rail
- Push the hook to fix the module at DIN rail after installing module at DIN rail



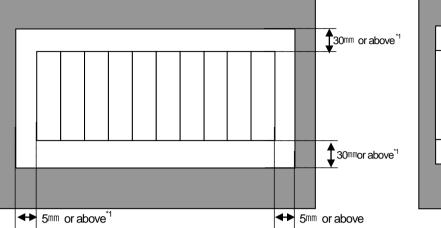
#### (b) In case of installing at panel

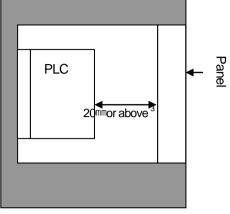
- You can install XGB compact type main unit onto a panel directly using screw hole
- Use M4 type screw to install the product onto a panel.



#### (4) Module equipment location

Keep the following distance between module and structure or part for ventilation, easy detachment and attachment.



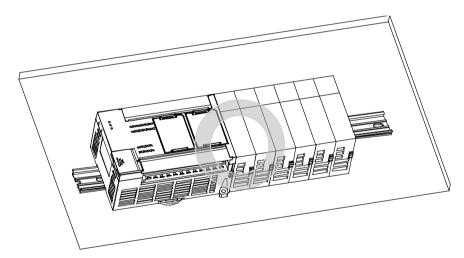


\*1 : In case height of wiring duct is less than 50 mm (except this 40mm or more)

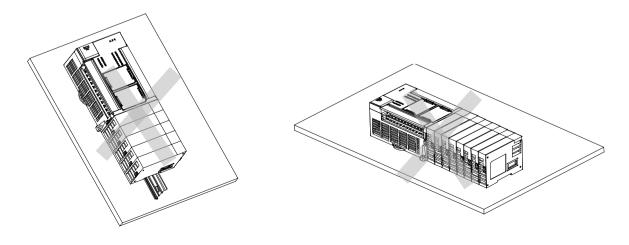
- \*2 : In case of equipping cable without removing near module, 20mm or more
- \*3 : In case of connector type, 20mm or above

(5) Module equipment direction

(a) For easy ventilation, install as shown below.

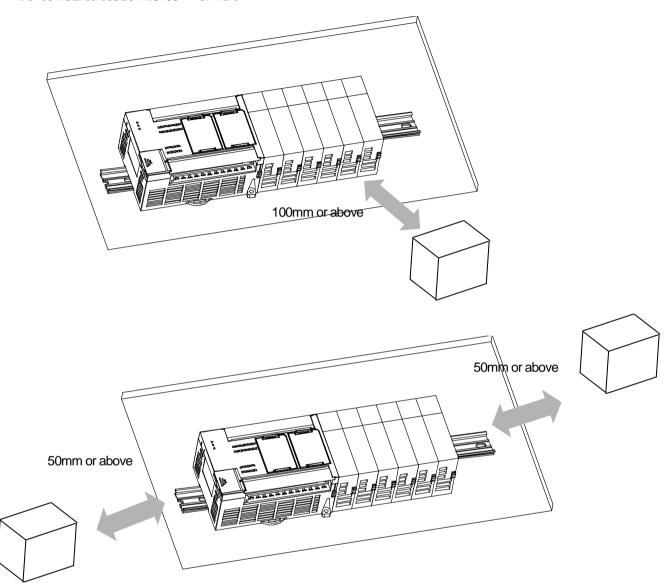


(b) Don't install as shown below.



#### (6) Distance with other device

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 more Device installed beside PLC: 50 mm or more



## 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 an 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

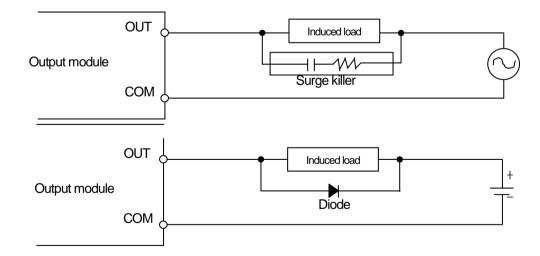
In case of wiring IO module, if device or material that induce high heat is too close or oil contacts wire too long time, it may cause short, malfunction or error.

(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 in parallel. Connect cathode of diode to + side of power.



(f) Terminal block

Check close adhesion status. Let no foreign material enter into PLC when wring terminal block or processing screw hole as it may cause malfunction, it may cause malfunction.

(g) Don't impact IO module or don't disassemble the PCB from case.

## 13.3 Wire

In case using system, it describes caution about wiring.

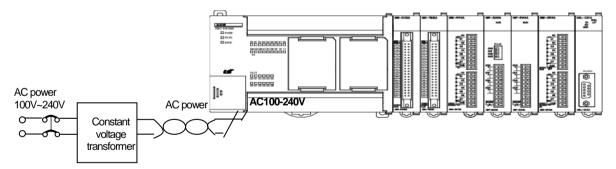
∴ Danger	
<ul> <li>When wiring, cut off the external power.</li> <li>If all power is cut, it may cause electric shock or damage of product.</li> </ul>	
<b>e</b> 1	

∠ Remark

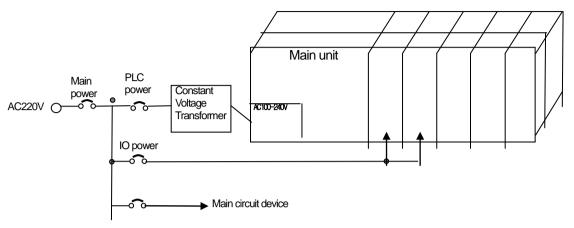
- > Do D type ground (type 3 ground) or above dedicated for PLC for FG and LG terminal. It may cause electric shock or malfunction.
- > When wiring module, check the rated voltage and terminal array and do properly.
- If rating is different, it may cause fire, malfunction.
- ▶ For external connecting 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.

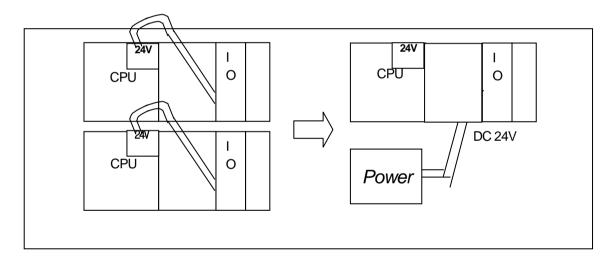


(2) Connect noise that include small noise between line and earth. (When there are moch noise, connect insulated transformer.) (3) Isolate the PLC power, I/O devices and power devices as follows.

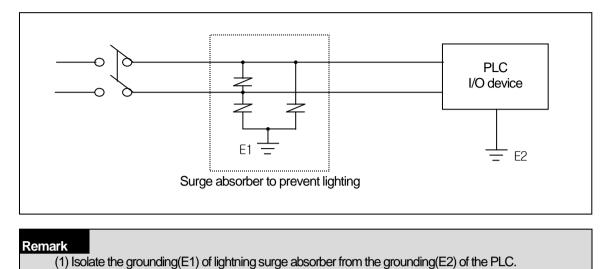


#### (4) If using DC24V of the main unit

(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.

# (9) When noise penetration coure 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.

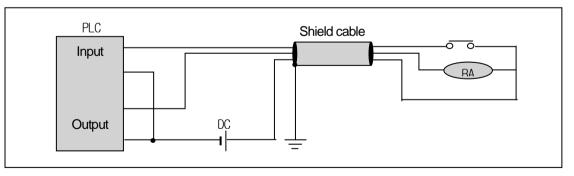
(2) Select a lightning surge absorber type so that the max. voltage may not the specified allowable voltage

## 13.3.2 I/O Device wiring

- (1) 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.

of the absorber.

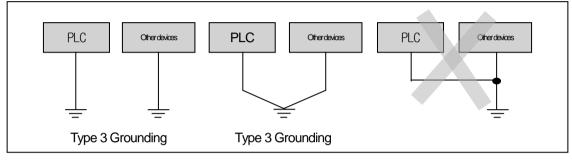
- (3) I/O signal lines should be wired 100mm and more away from high voltage/high current main circuit cable.
- (4) Batch shield cable should be used and the PLC side should be grounded unless the main circuit cable and power cable can not be isolated.



(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.



A) Exclusive grounding : best B) common grounding : good C) common grounding: defective

- (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 13 Installation and Wiring**

# 13.1 Safety Instruction

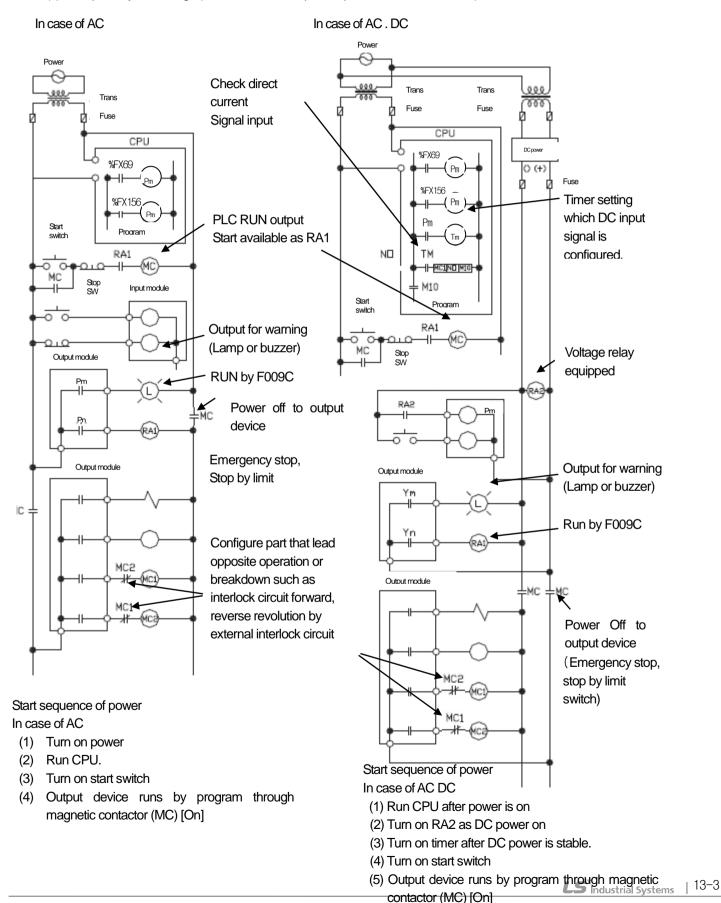
Danger
Please design protection circuit at the external of PLC for entire system to operate safely because an abnormal
output or an malfunction may cause accident when any error of external power or malfunction of PLC module.
(1) It should be installed at the external side of PLC to emergency stop circuit, 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
When 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 10.2 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.
▶ When load current is 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.
•

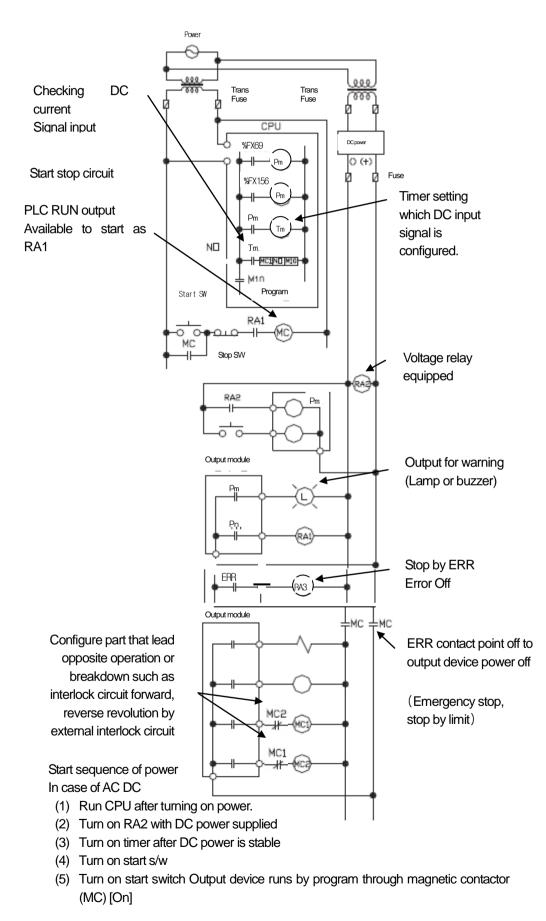
Danger			
▶ Don't close the control line or communication cable to main circuit or power line. Distance should be more than 100mm.			
It may cause malfunction by noise.			
▶ In case of controlling lamp load, heater, solenoid valve, etc. in case of Off -> On, large current (10 times of normal			
current) 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			

I

## 13.1.1 Fail safe circuit

(1) example of system design (When ERR contact point of power module is not used)



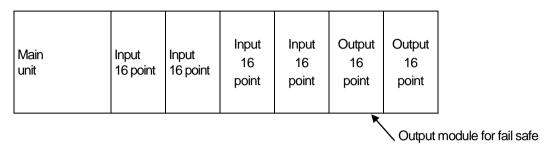


(2) System design circuit example (When ERR contact point of power module is used)

(3) Fail safe countermeasure in case of PLC error

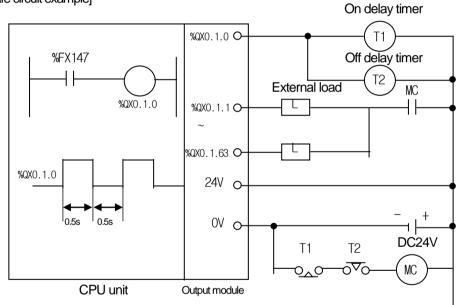
Error of PLC CPU and memory is detected by self diagnosis but in case error occurs in IO control part, etc., CPU can detect the error. In this case, though it is different according to status error, all contact point is on or off, so safety may not be guaranteed. Though we do our best to our quality 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]



Since P80 turn on/off every 0.5s, use TR output.

## 13.1.2 PLC heat calculation

(1) Power consumption of each part

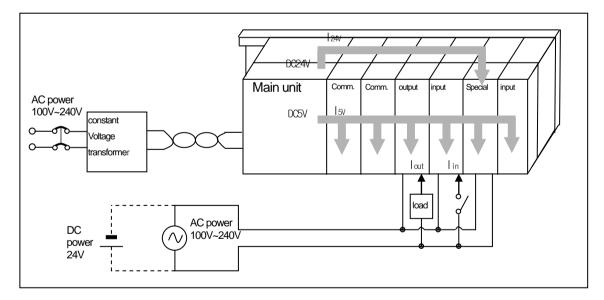
(a) Power consumption of module

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.

- $W_{pw} = 3/7 \{(1_{5} \vee X_{5}) + (1_{24} \vee X_{24})\} (W)$
- Isv: power consumption of each module DC5V circuit(internal current consumption)
- l24v: 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. •  $W_{24V} = I_{24V} X 24 (W)$
- (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)
  - lout : 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)

•  $W_{in} = I_{in} X E X$  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.

•  $W = WPW + W_{5V} + W_{24V} + W_{out} + W_{in} + W_{s} (W)$ 

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 [°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

Use PLC in the range of general specification specified by manual. In case of usage out of range, it may cause electric shock, fire, malfunction, damage of product.

# Remark

• Module must be mounted to hook for fixation properly before its fixation.

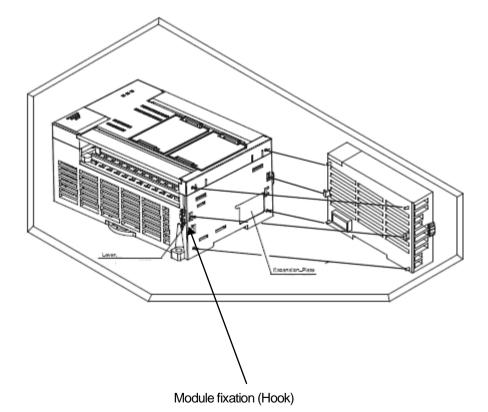
The module may be damaged from over-applied force. If module is not mounted properly, it may cause malfunction.

• Do not drop or impact the module case, terminal block connector.

• Do not separate PCB from case.

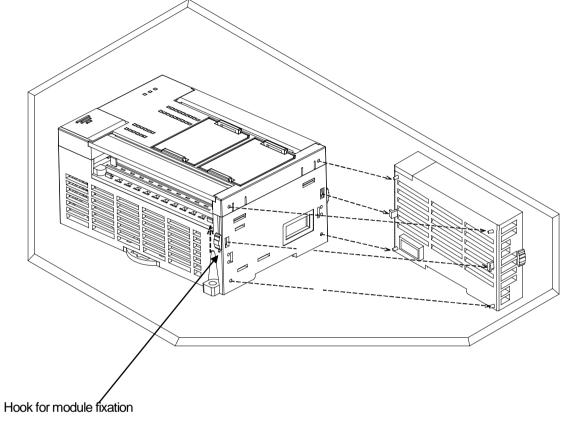
#### (1) Equipment of module

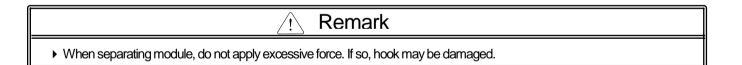
- Eliminate the extension cover on the upper side of module.
- Push the module and connect it in agreement with hook for fixation of four edges and hook for connection at the bottom.
- After connection, pull down the hook for fixation at the upper part and lower part and fix it completely.



(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. (Do not apply excessive force)



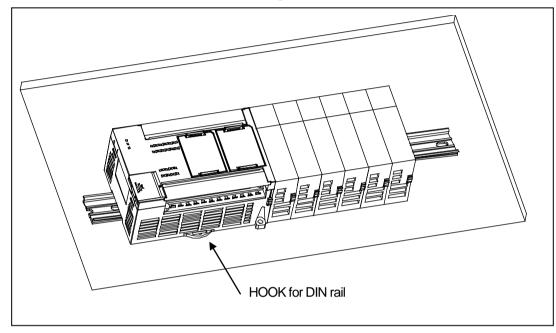


#### (3) Installation of module

XGB PLC has a hook for DIN rail (rail width: 35mm) so that cab be installed at DIN rail.

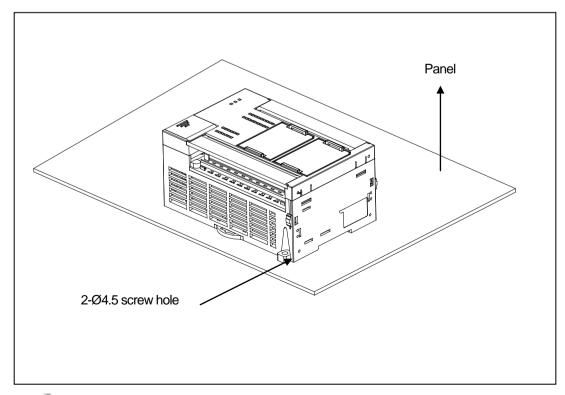
(a) In case of installing at DIN rail

- Pull the hook as shown below for DIN rail at the bottom of module and install it at DIN rail
- Push the hook to fix the module at DIN rail after installing module at DIN rail



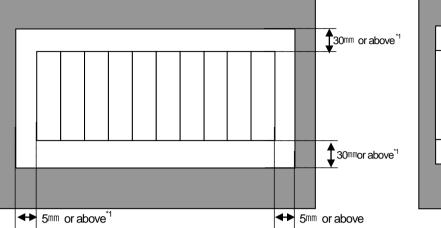
#### (b) In case of installing at panel

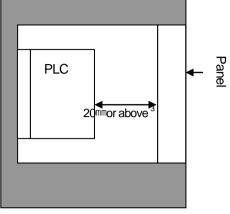
- You can install XGB compact type main unit onto a panel directly using screw hole
- Use M4 type screw to install the product onto a panel.



#### (4) Module equipment location

Keep the following distance between module and structure or part for ventilation, easy detachment and attachment.



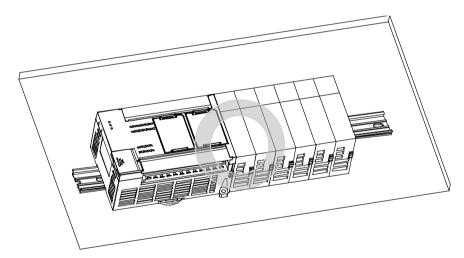


\*1 : In case height of wiring duct is less than 50 mm (except this 40mm or more)

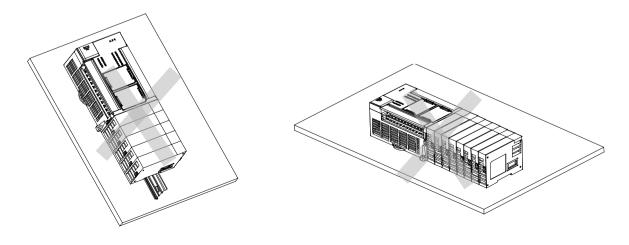
- \*2 : In case of equipping cable without removing near module, 20mm or more
- \*3 : In case of connector type, 20mm or above

(5) Module equipment direction

(a) For easy ventilation, install as shown below.

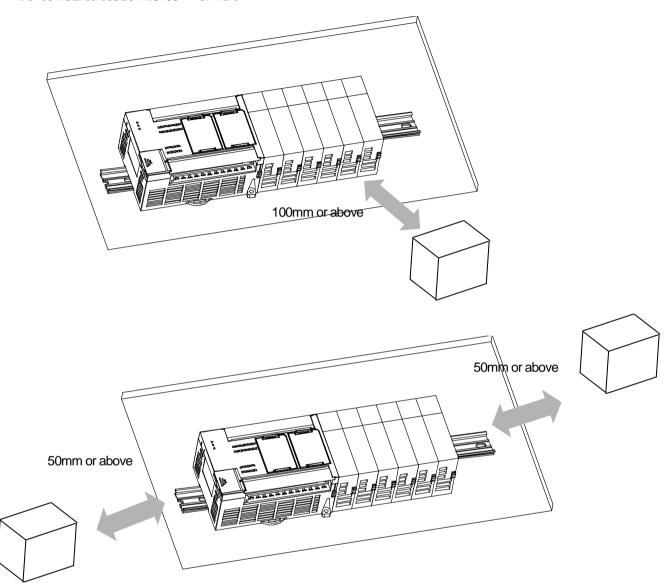


(b) Don't install as shown below.



#### (6) Distance with other device

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 more Device installed beside PLC: 50 mm or more



## 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 an 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

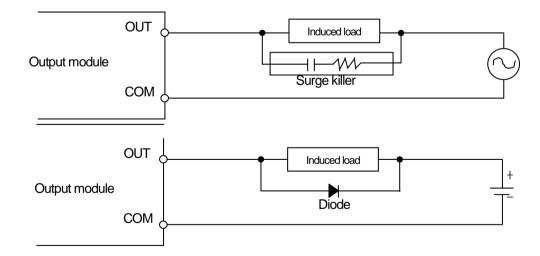
In case of wiring IO module, if device or material that induce high heat is too close or oil contacts wire too long time, it may cause short, malfunction or error.

(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 in parallel. Connect cathode of diode to + side of power.



(f) Terminal block

Check close adhesion status. Let no foreign material enter into PLC when wring terminal block or processing screw hole as it may cause malfunction, it may cause malfunction.

(g) Don't impact IO module or don't disassemble the PCB from case.

## 13.3 Wire

In case using system, it describes caution about wiring.

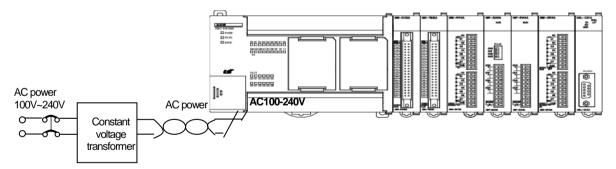
∴ Danger	
<ul> <li>When wiring, cut off the external power.</li> <li>If all power is cut, it may cause electric shock or damage of product.</li> </ul>	
<b>e</b> 1	

∠ Remark

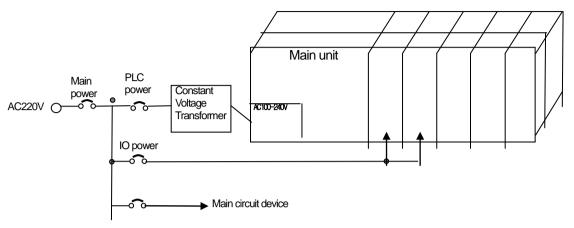
- > Do D type ground (type 3 ground) or above dedicated for PLC for FG and LG terminal. It may cause electric shock or malfunction.
- > When wiring module, check the rated voltage and terminal array and do properly.
- If rating is different, it may cause fire, malfunction.
- ▶ For external connecting 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.

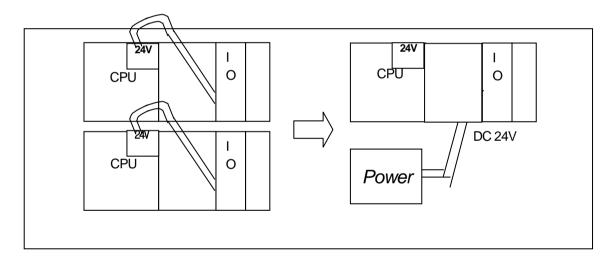


(2) Connect noise that include small noise between line and earth. (When there are moch noise, connect insulated transformer.) (3) Isolate the PLC power, I/O devices and power devices as follows.

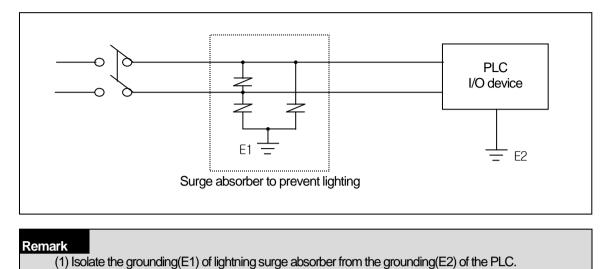


#### (4) If using DC24V of the main unit

(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.

# (9) When noise penetration coure 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.

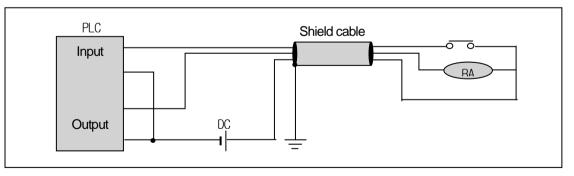
(2) Select a lightning surge absorber type so that the max. voltage may not the specified allowable voltage

## 13.3.2 I/O Device wiring

- (1) 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.

of the absorber.

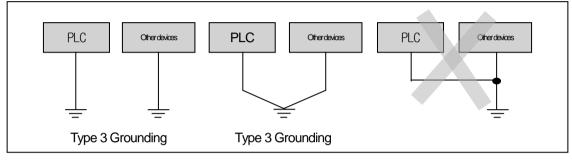
- (3) I/O signal lines should be wired 100mm and more away from high voltage/high current main circuit cable.
- (4) Batch shield cable should be used and the PLC side should be grounded unless the main circuit cable and power cable can not be isolated.



(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.



A) Exclusive grounding : best B) common grounding : good C) common grounding: defective

- (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 inp	out 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.	
	Temperature	0 ~ + 55° <b>C</b>	A direct the ensurations temperature and to mainly usits the defined server	
Ambient environment	Humidity	5 ~ 95%RH	Adjust the operating temperature and humidity with the 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 condit terminal screws	ions of	No loose allowed	Retighten terminal screws.	
Spare parts		Check the number of		
		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.

Che	ck Items	Check Points	Judgment	Corrective Actions
Connection co	onditions of base	Check the screws.	Screws should not be loose.	Retighten Screws.
Connection co Input/Output n		Check the connecting screws Check module cover.	Screws should not be loose.	Retighten Screws.
Connecting conditions of terminal block or extension cable		Check for loose mounting screws.	Screws should not be loose.	Retighten Screws.
		Check the distance between solderless terminals.	Proper clearance should be provided.	Correct.
		Connecting of expansion cable.	Connector should not be loose.	Correct.
LED indicator Input LED	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.
	ERR LED	Check that the LED is Off during Run.	Flickering indicates an error	See chapter 4.
	Input LED	Check that the LED turns On and Off.	On when input is On,	See chapter 4.
			Off when input is off.	
	Output LED	Check that the LED turns On and Off	On when output is On,	See chapter 4.
			Off when output is off	

# **14.3 Periodic Inspection**

Check the following items once or twice every six months, and perform corrective actions as needed.

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Check Items		Checking Methods	Judgment	Corrective Actions	
Ambient	Ambient temperature Ambient Humidity	Measure with thermometer and hygrometer	0 ~ 55 °C 5 ~ 95%RH	Adjust to general standard (Internal environmental standard of control section)	
environment	Ambient pollution level	measure corrosive gas	There should be no corrosive gases		
PLC	Looseness, Ingress	The module should be move the unit	The module should be mounted securely.		
Conditions	dust or foreign material	Visual check	No dust or foreign material	Retighten screws	
Connectingco nditions	Loose terminal screws	Re-tighten screws	Screws should not be loose	Retighten	
	Distance between terminals	Visual check	Proper clearance	Correct	
	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	

# **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 are 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

This section explains the procedure for determining the cause of troubles as well as the errors and corrective actions.

 Symptoms

 Is the power LED turned

 Off ?

 Is the ERR LED flickering ?

 Is the RUN LED turned

 Off ?

 I/O module doesn't operate

 properly.

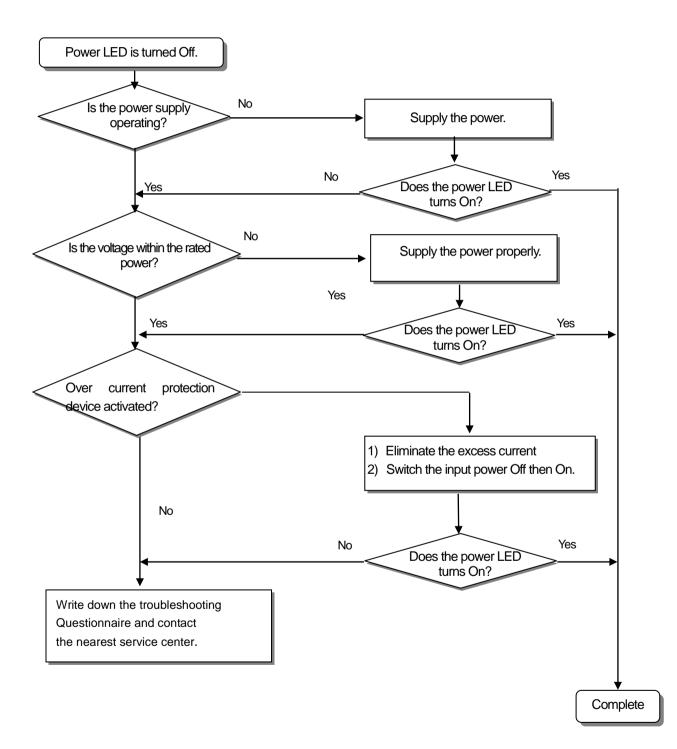
 Program cannot be written.

 Image: Program cannot be written.

#### 15.2.1 Troubleshooting flowchart used when the PWR (Power) LED turns

#### Off

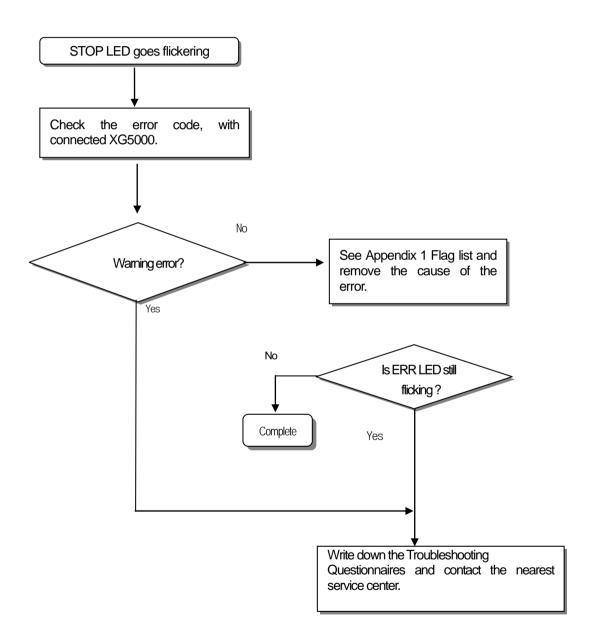
The following flowchart explains corrective action procedure used when the power is supplied or the power LED turns Off during operation.

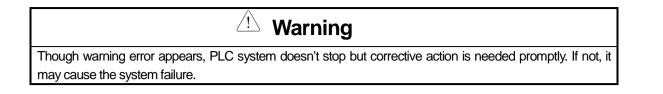


## 15.2.2 Troubleshooting flowchart used with when the ERR (Error) LED is

## flickering

The following flowchart explains corrective action procedure used when the power is supplied starts or the ERR LED is flickering during operation.

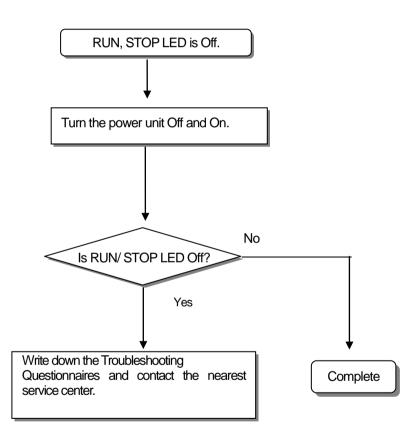




## 15.2.3 Troubleshooting flowchart used with when the RUN, STOP LED

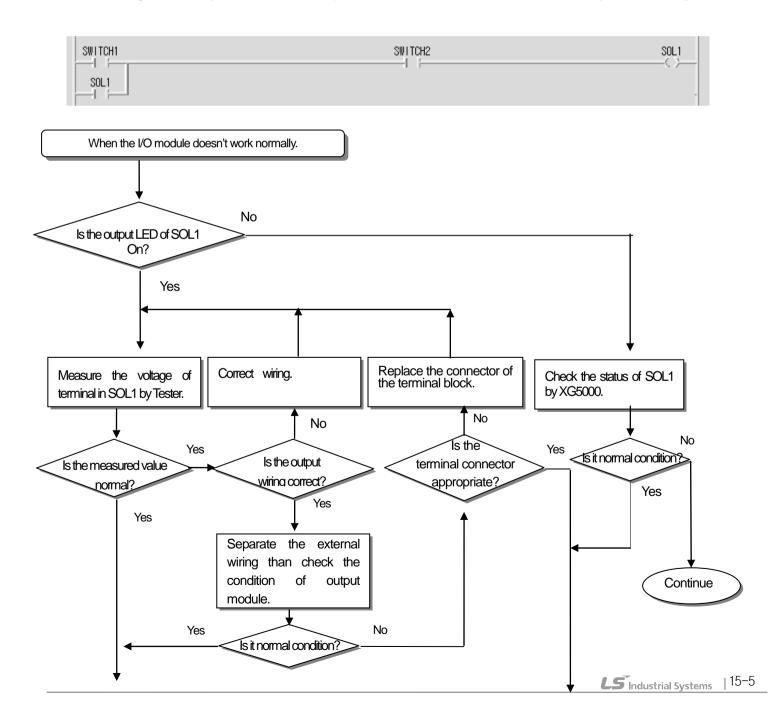
#### turns Off.

The following flowchart explains corrective action procedure to treat the lights-out of RUN LED when the power is supplied, operation starts or is in the process.

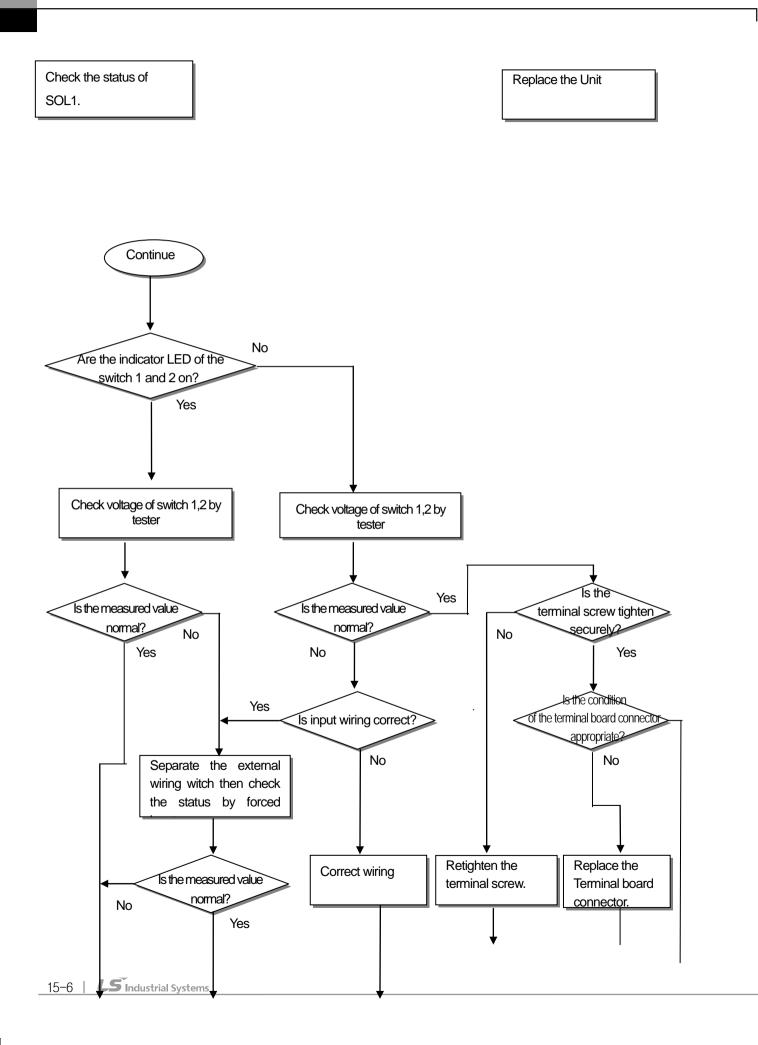


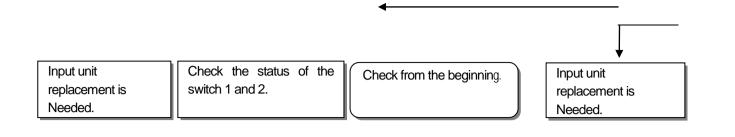
# 15.2.4 Troubleshooting flowchart used when the I/O part doesn't operate normally.

The following flowchart explains corrective action procedure used when the I/O module doesn't operate normally.



#### **Chapter15 Troubleshooting**





## 15.3 Troubleshooting Questionnaire

12. Configuration diagram for the applied system:

If any problem occurs during the operation of XGB 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:			
<ul> <li>3. Details of using equipment CPU model: ( ) OS version No.:( XG5000 (for program compile) version No.: ( )</li> <li>4.General description of the device or system used as the control</li> </ul>	) Di obje	Serial No.( ect:	)
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( ), I	No(	)	
7. XG5000 error message:			
8. History of corrective actions for the error message in the article	ə 7:		
9. Other tried corrective actions:			
<ul> <li>10. Characteristics of the error</li> <li>Repetitive(): Periodic(), Related to a particular sequence</li> <li>Sometimes(): General error interval:</li> </ul>	e()	, Related to environment(	)
11. Detailed Description of error contents:			

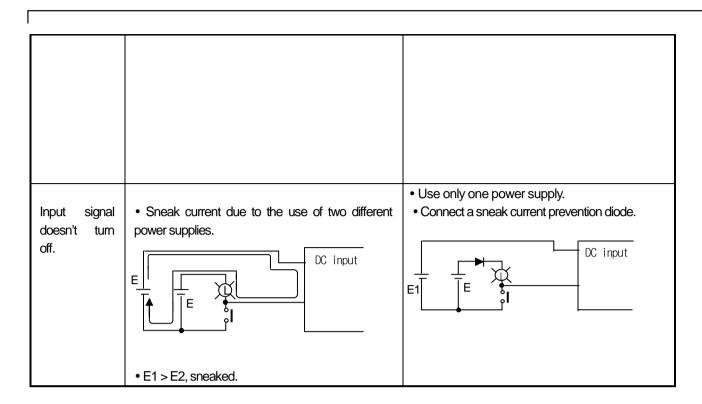
# 15.4 Troubleshooting Examples

Possible troubles with various circuits and their corrective actions are explained.

## 15.4.1 Input circuit troubles and corrective actions

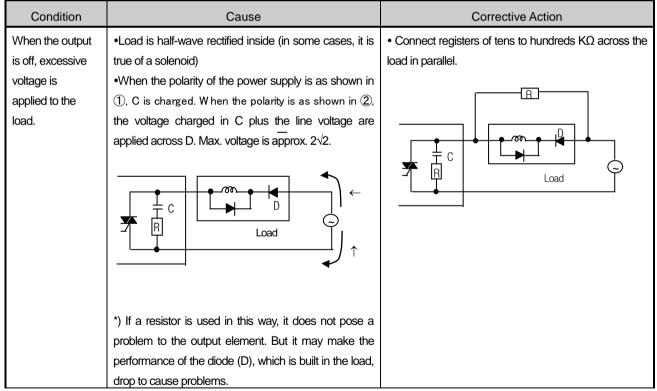
The followings describe possible troubles with input circuits, as well as corrective actions.

Condition	Cause	Corrective Actions
Input signal doesn't turn off.	Leakage current of external device (Such as a drive by non-contact switch)	• Connect an appropriate register and capacity, which will make the voltage lower across the terminals of the input module.
	AC input	AC input
Input signal doesn't turn off. (Neon lamp may be still on)	Leakage current of external device (Drive by a limit switch with neon lamp)	<ul> <li>CR values are determined by the leakage current value.</li> <li>Recommended value C : 0.1 ~ 0.47μ<sup>F</sup> R: 47 ~ 120 Ω (1/2W)</li> <li>Or make up another independent display circuit.</li> </ul>
Input signal doesn't turn off.	Leakage current due to line capacity of wiring cable.	• Locate the power supply on the external device side as shown below.
Input signal doesn't turn off.	Leakage current of external device (Drive by switch with LED indicator)	Connect an appropriate register, which will make the voltage higher than the OFF voltage across the input module terminal and common terminal.

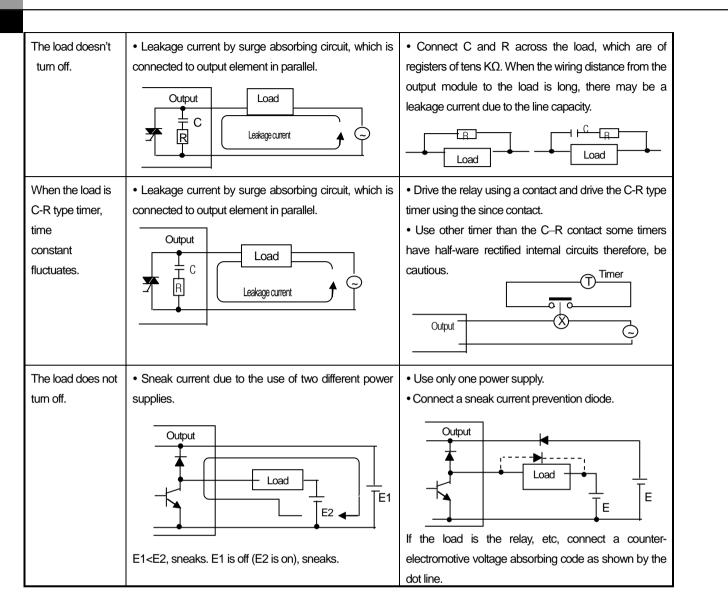


## 15.4.2 Output circuit and corrective actions

The following describes possible troubles with output circuits, as well as their corrective actions.

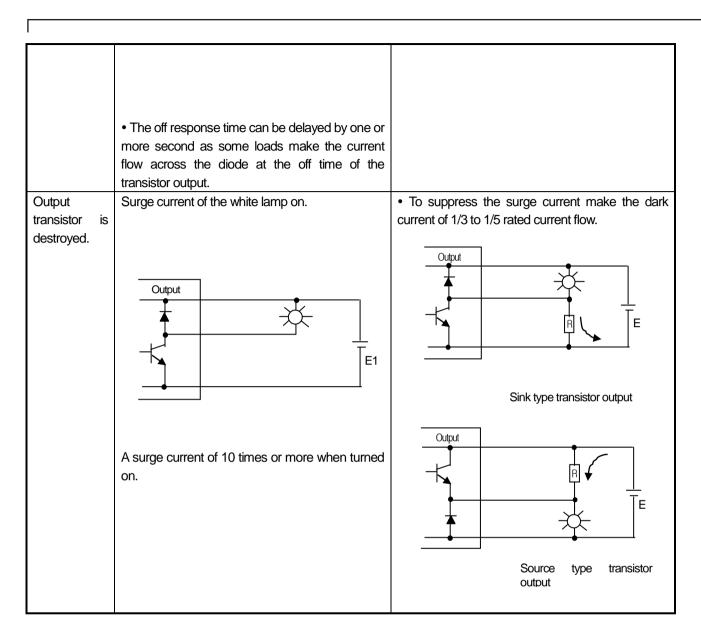


## **Chapter15 Troubleshooting**



Output circuit troubles and corrective actions (continued).

Condition	Cause	Corrective actions		
The load off response time is long.	• Over current at off state [The large solenoid current fluidic load (L/R is large) such as is directly driven with the transistor output.	• Insert a small L/R magnetic contact and drive the load using the same contact.		
	Output Output Load E1	Output		



# 15.5 Error Code List

Error					
code	Error cause	Action (restart mode after taking an action)	Operation	LED	Diagnosis
(Dec) 23	Program to execute is abnormal	Start after reloading the program	status Warning	status 0.5 second Flicker	point 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

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# Chapter 15 Troubleshooting

Error code (Dec)	Error cause	Action (restart mode after taking an action)	Operation status	LED status	Diagnosis point
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

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Error code	Error cause	Action (restart mode after taking an action)	Operation status	LED status	Diagnosis point
500	Data memory backup not possible	If not error in battery, power reinput Remote mode is switched to STOP mode.	Warning	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

# **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 are 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

This section explains the procedure for determining the cause of troubles as well as the errors and corrective actions.

 Symptoms

 Is the power LED turned

 Off ?

 Is the ERR LED flickering ?

 Is the RUN LED turned

 Off ?

 I/O module doesn't operate

 properly.

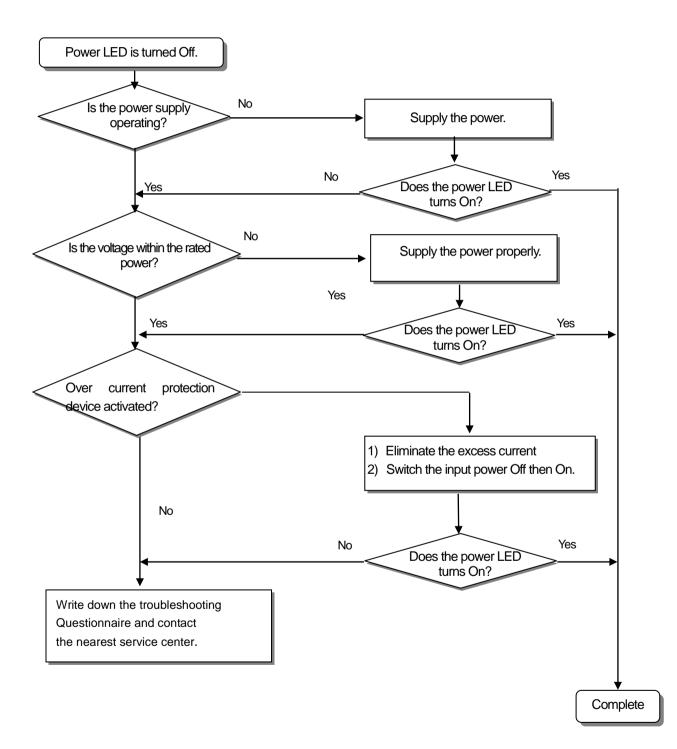
 Program cannot be written.

 Image: Program cannot be written.

#### 15.2.1 Troubleshooting flowchart used when the PWR (Power) LED turns

#### Off

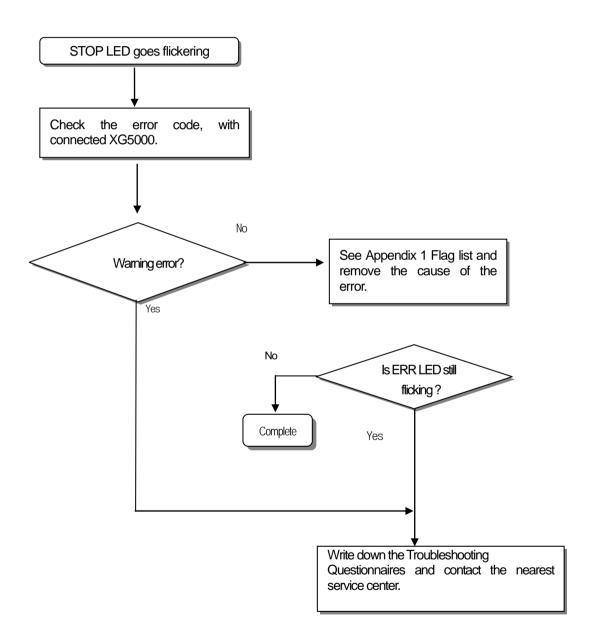
The following flowchart explains corrective action procedure used when the power is supplied or the power LED turns Off during operation.

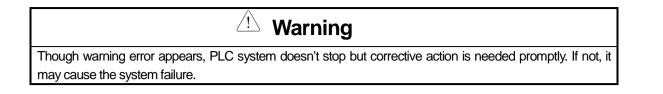


#### 15.2.2 Troubleshooting flowchart used with when the ERR (Error) LED is

#### flickering

The following flowchart explains corrective action procedure used when the power is supplied starts or the ERR LED is flickering during operation.

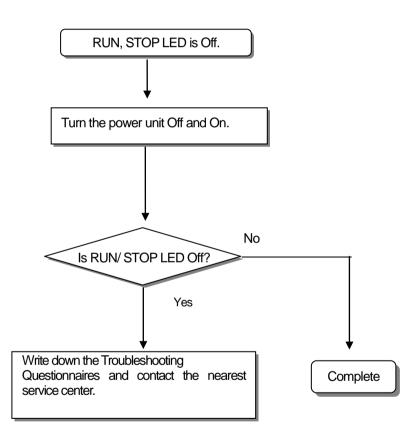




#### 15.2.3 Troubleshooting flowchart used with when the RUN, STOP LED

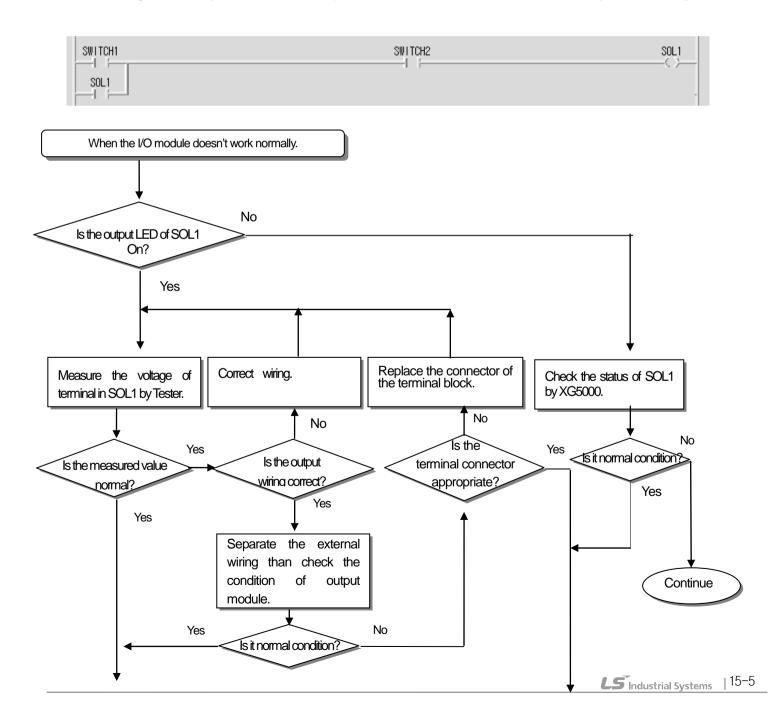
#### turns Off.

The following flowchart explains corrective action procedure to treat the lights-out of RUN LED when the power is supplied, operation starts or is in the process.

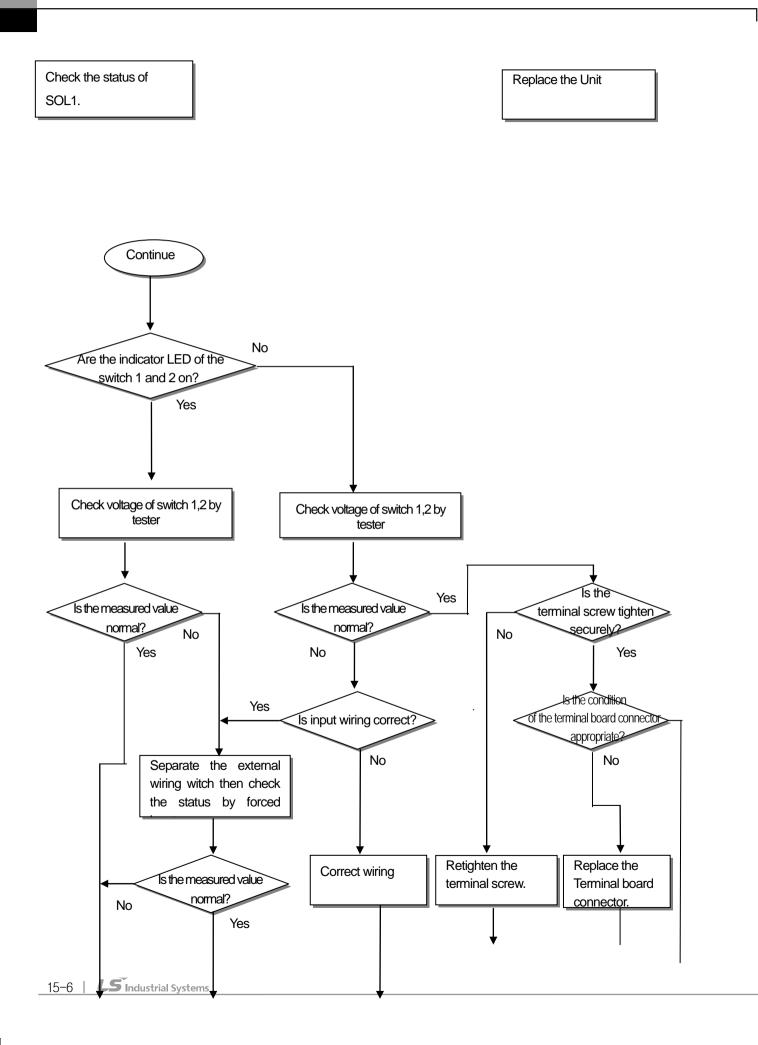


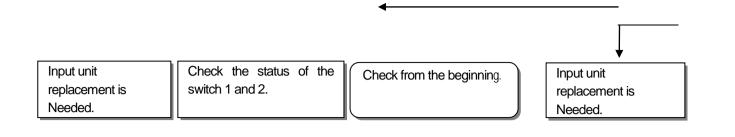
# 15.2.4 Troubleshooting flowchart used when the I/O part doesn't operate normally.

The following flowchart explains corrective action procedure used when the I/O module doesn't operate normally.



#### **Chapter15 Troubleshooting**





## 15.3 Troubleshooting Questionnaire

12. Configuration diagram for the applied system:

If any problem occurs during the operation of XGB 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:			
<ul> <li>3. Details of using equipment CPU model: ( ) OS version No.:( XG5000 (for program compile) version No.: ( )</li> <li>4.General description of the device or system used as the control</li> </ul>	) Di obje	Serial No.( ect:	)
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( ), I	No(	)	
7. XG5000 error message:			
8. History of corrective actions for the error message in the article	ə 7:		
9. Other tried corrective actions:			
<ul> <li>10. Characteristics of the error</li> <li>Repetitive(): Periodic(), Related to a particular sequence</li> <li>Sometimes(): General error interval:</li> </ul>	e()	, Related to environment(	)
11. Detailed Description of error contents:			

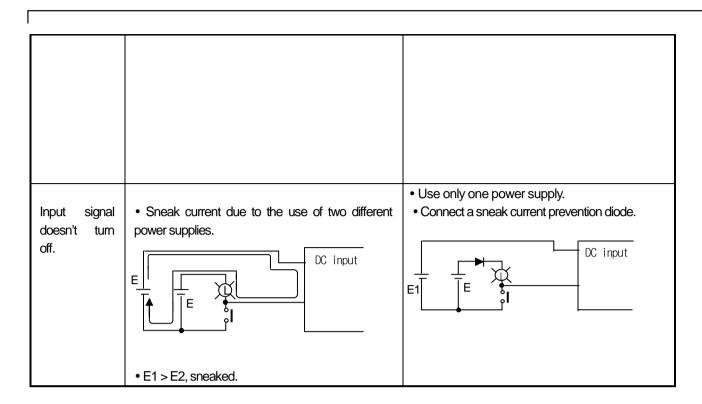
# 15.4 Troubleshooting Examples

Possible troubles with various circuits and their corrective actions are explained.

## 15.4.1 Input circuit troubles and corrective actions

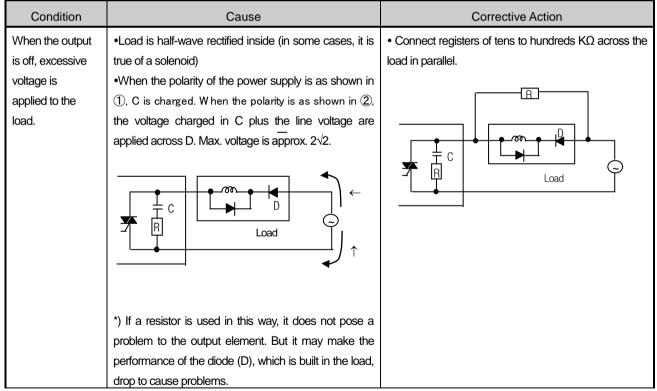
The followings describe possible troubles with input circuits, as well as corrective actions.

Condition	Cause	Corrective Actions
Input signal doesn't turn off.	Leakage current of external device (Such as a drive by non-contact switch)	• Connect an appropriate register and capacity, which will make the voltage lower across the terminals of the input module.
	AC input	AC input
Input signal doesn't turn off. (Neon lamp may be still on)	Leakage current of external device (Drive by a limit switch with neon lamp)	<ul> <li>CR values are determined by the leakage current value.</li> <li>Recommended value C : 0.1 ~ 0.47μ<sup>F</sup> R: 47 ~ 120 Ω (1/2W)</li> <li>Or make up another independent display circuit.</li> </ul>
Input signal doesn't turn off.	Leakage current due to line capacity of wiring cable.	• Locate the power supply on the external device side as shown below.
Input signal doesn't turn off.	Leakage current of external device (Drive by switch with LED indicator)	Connect an appropriate register, which will make the voltage higher than the OFF voltage across the input module terminal and common terminal.

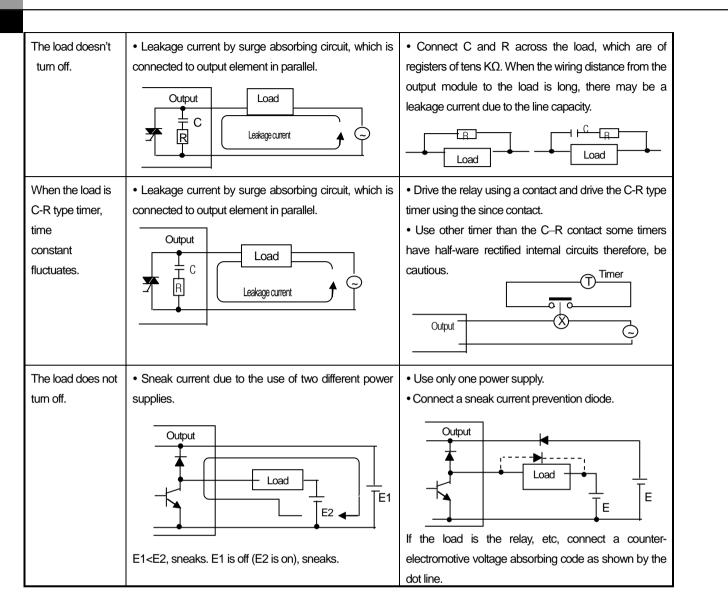


## 15.4.2 Output circuit and corrective actions

The following describes possible troubles with output circuits, as well as their corrective actions.

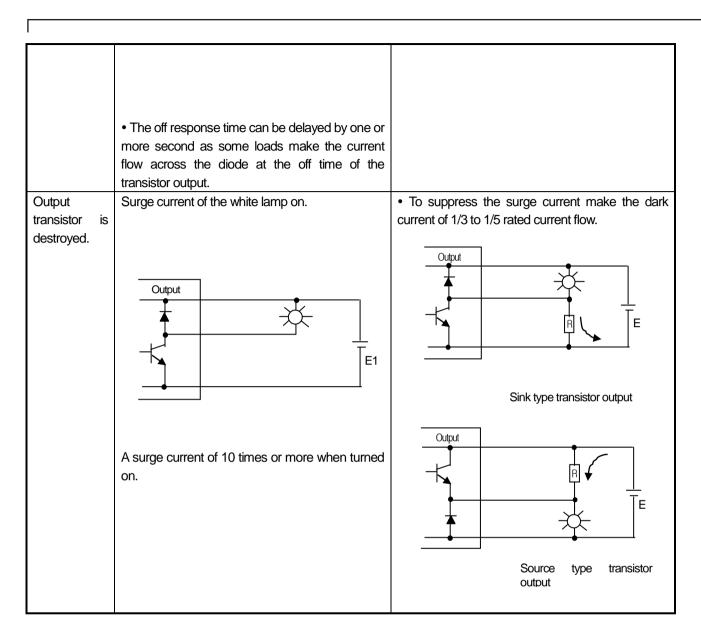


## **Chapter15 Troubleshooting**



Output circuit troubles and corrective actions (continued).

Condition	Cause	Corrective actions		
The load off response time is long.	• Over current at off state [The large solenoid current fluidic load (L/R is large) such as is directly driven with the transistor output.	• Insert a small L/R magnetic contact and drive the load using the same contact.		
	Output Output Load E1	Output		



# 15.5 Error Code List

Error					
code	Error cause	Action (restart mode after taking an action)	Operation	LED	Diagnosis
(Dec) 23	Program to execute is abnormal	Start after reloading the program	status Warning	status 0.5 second Flicker	point 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

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# Chapter 15 Troubleshooting

Error code (Dec)	Error cause	Action (restart mode after taking an action)	Operation status	LED status	Diagnosis point
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

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Error code	Error cause	Action (restart mode after taking an action)	Operation status	LED status	Diagnosis point
500	Data memory backup not possible	If not error in battery, power reinput Remote mode is switched to STOP mode.	Warning	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

# Appendix 1 Flag List

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# Appendix 1.1 Special Relay (F) List

Word	Bit	Variables	Function	Description
	%FD0	_SYS_STATE	Mode and state	Indicates PLC mode and operation State.
	%FX0	_RUN	Run	Run state.
	%FX1	_STOP	Stop	Stop state.
	%FX2	_ERROR	Error	Error state.
	%FX3	_DEBUG	Debug	Debug state.
	%FX4	_LOCAL_CON	Local control	Local control mode.
	%FX6	_REMOTE_CON	Remote mode	Remote control mode.
	%FX8	_RUN_EDIT_ST		Editing program download during RUN.
	%FX9	_RUN_EDIT_CHK	Opline editing	Internal edit processing during RUN.
	%FX10	_RUN_EDIT_DONE	Online editing	Edit is done during RUN.
	%FX11	_RUN_EDIT_NG		Edit is ended abnormally during RUN.
	%FX12	_CMOD_KEY		Operation mode changed by key.
%FW0~1	%FX13	_CMOD_LPADT		Operation mode changed by local PADT.
701 VVU~1	%FX14	_CMOD_RPADT	Change Operation Mode	Operation mode changed by Remote PADT.
	%FX15	_CMOD_RLINK		Operation mode changed by Remote communication module.
	%FX16	_FORCE_IN	Forced input	Forced input state.
	%FX17	_FORCE_OUT	Forced output	Forced output state.
	%FX20	_MON_On	Monitor	Monitor on execution.
	%FX21	_USTOP_On	Stop by STOP function	PLC stops by STOP function after finishing current scan
	%FX22	_ESTOP_On	Stop by Estop function	PLC stops by ESTOP function promptly
	%FX24	_INIT_RUN	Initialize	Initialization task on execution.
	%FX28	_PB1	Program Code 1	Program Code 1 selected.
	%FX29	_PB2	Program Code 2	Program Code 2 selected.
	%FX30	_CB1	Compile Code 1	Compile Code 1 selected.
	%FX31	_CB2	Compile Code2	Compile Code 2 selected.
	%FD1	_CNF_ER	System error	Reports heavy error state of system.
	%FX33	_IO_TYER	Module Type error	Module Type does not match.
%FW2~3	%FX34	_IO_DEER	Module detachment error	Module is detached.
/01 ₩₩∠~3	%FX36	_IO_RWER	Module I/O error	Module I/O error.
	%FX37	_IP_IFER	Module interface error	Special/communication module interface error.
	%FX38	_ANNUM_ER	External device error	Detected heavy error in external Device.

Word	Bit	Variable	Function	Description
	%FX40	_BPRM_ER	Basic parameter	Basic parameter error.
	%FX41	_IOPRM_ER	IO parameter	I/O configuration parameter error.
	%FX42	_SPPRM_ER	Special module parameter	Special module parameter is Abnormal.
%FW2~3	%FX43	_CPPRM_ER	Communication module parameter	Communication module parameter is abnormal.
%FW2~3	%FX44	_PGM_ER	Program error	There is error in Check Sum of user program
	%FX45	_CODE_ER	Program code error	Meets instruction can not be interpreted
	%FX46	_SWDT_ER	CPU abnormal stop Or malfunction	The saved program is damaged because of CPU abnormal end or program can not be executed.
	%FX48	_WDT_ER	Scan watchdog	Scan watchdog operated.
	%FD2	_CNF_WAR	System warning	Reports light error state of system.
	%FX64	_RTC_ER	RTC data error	RTC data Error occurred
	%FX65	_DBCK_ER	Backup error	Data backup error.
	%FX66	_HBCK_ER	Restart error	Hot Restart is not available
	%FX67 %FX68	_ABSD_ER	Operation shutdown error Task collision	Stop by abnormal operation. Tasks are under collision
	%FX69	_TASK_ER _BAT_ER	Battery error	There is error in battery status
	%FX70	ANNUM_WAR	External device error	Detected light error of external device.
%FW4	%FX72	HS_WAR1	High speed link 1	High speed link – parameter 1 error.
	%FX73	_HS_WAR2	High speed link 2	High speed link – parameter 2 error.
	%FX84	 P2P_WAR1	P2P parameter 1	P2P – parameter 1 error.
	%FX85	_P2P_WAR2	P2P parameter 2	P2P – parameter 2 error.
	%FX86	_P2P_WAR3	P2P parameter 3	P2P – parameter 3 error.
	%FX92	_CONSTANT_ER	Constant error	Constant error.
	%FW9	_USER_F	User contact	Timer used by user.
	%FX144	_T20MS	20ms	As a clock signal available at user program, it reverses On/Off every half period. Since clock
	%FX145	_T100MS	100ms	signal is dealt with at the end of scan, there may
	%FX146	_T200MS	200ms	be delay or distortion according to scan time. So use clock that's longer than scan time. Clock
	%FX147	_T1S	1s Clock	signal is Off status at the start of scan program and task program.
	%FX148	_T2S	2 s Clock	_T100ms clock i 50ms i 50ms i
%FW9	%FX149	_T10S	10 s Clock	
701 VV <del>7</del>	%FX150	_T20S	20 s Clock	
	%FX151	_T60S	60 s Clock	
	%FX153	_On	Ordinary time On	Always On state Bit.
	%FX154	_Off	Ordinary time Off	Always Off state Bit.
	%FX155	_10n	1scan On	First scan On Bit.
	%FX156	_10ff	1scan Off	First scan OFF bit.
	%FX157	_STOG	Reversal	Reversal every scan.

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Word	Bit	Variable	Function	Description
	%FW10	_USER_CLK	User Clock	Clock available for user setting.
	%FX160	_USR_CLK0	Setting scan repeat	On/Off as much as set scan Clock 0.
	%FX161	_USR_CLK1	Setting scan repeat	On/Off as much as set scan Clock 1.
	%FX162	_USR_CLK2	Setting scan repeat	On/Off as much as set scan Clock 2.
%FW10	%FX163	_USR_CLK3	Setting scan repeat	On/Off as much as set scan Clock 3.
	%FX164	_USR_CLK4	Setting scan repeat	On/Off as much as set scan Clock 4.
	%FX165	_USR_CLK5	Setting scan repeat	On/Off as much as set scan Clock 5.
	%FX166	_USR_CLK6	Setting scan repeat	On/Off as much as set scan Clock 6.
	%FX167	_USR_CLK7	Setting scan repeat	On/Off as much as set scan Clock 7.
	%FW11	_LOGIC_RESULT	Logic result	Indicates logic results.
%FW11	%FX176	_ERR	operation error	On during 1 scan in case of operation error.
	%FX181	_LER	Operation error latch	Continuously On in case of operation error
%FW14	-	_FALS_NUM	FALS no.	Indicates FALS no.
%FW15	-	_PUTGET_ERR0	PUT/GET error 0	Main base Put / Get error.
%FW23	-	_PUTGET_NDR0	PUT/GET end 0	Main base Put/Get end.
%FW44	-	_CPU_TYPE	СРИ Туре	Indicates information for CPU Type.
%FW45	-	_CPU_VER	CPU version	Indicates CPU version.
%FD23	-	_OS_VER	OS version	Indicates OS version.
%FD24	-	_OS_DATE	OS date	Indicates OS distribution date.
%FW50	-	_SCAN_MAX	Max. scan time	Indicates max. scan time.
%FW51	-	_SCAN_MIN	Min. scan time	Indicates min. scan time.
%FW52	-	_SCAN_CUR	Current scan time	Current scan time.
%FW53	-	_MON_YEAR	Month/year	Clock data (month/year)
%FW54	-	_TIME_DAY	Hour/date	Clock data (hour/date)
%FW55	-	_SEC_MIN	Second/minute	Clock data (Second/minute)
%FW56	-	_HUND_WK	Hundred year/week	Clock data (Hundred year/week)
%FD30	-	_REF_COUNT	Refresh count	Increase when module Refresh.
%FD31	-	_REF_OK_CNT	Refresh OK	Increase when module Refresh is normal.
%FD32	-	_REF_NG_CNT	Refresh NG	Increase when module Refresh is Abnormal.
%FD33	-	_REF_LIM_CNT	Refresh Limit	Increase when module Refresh is abnormal (Time Out).
%FD34	-	_REF_ERR_CNT	Refresh Error	Increase when module Refresh is Abnormal.
%FD40	-	_BUF_FULL_CNT	Buffer Full	Increase when CPU internal buffer is full.
%FD41	-	_PUT_CNT	Put count	Increase when Put count.
%FD42	-	_GET_CNT	Get count	Increase when Get count.
%FD43	-	_KEY	Current key	indicates the current state of local key.
%FD44	-	_KEY_PREV	Previous key	indicates the previous state of local key

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Word	Bit	Variable	Function	Description
%FW90	-	_IO_TYER_N	Mismatch slot	Module Type mismatched slot no.
%FW91	-	_IO_DEER_N	Detach slot	Module detached slot no.
%FW93	-	_IO_RWER_N	RW error slot	Module read/write error slot no.
%FW95 %FW96	-		IF error slot	Module interface error slot no.
	-	_IO_TYER0	Module Type 0 error	Main base module Type error.
%FW104	-	_IO_DEER0	Module Detach 0 error	Main base module Detach error.
%FW120	-	_IO_RWER0	Module RW 0 error	Main base module read/write error.
%FW128	-	_IO_IFER_0	Module IF 0 error	Main base module interface error.
%FD69		_RTC_TOD	Current time of RTC (unit: ms)	As time data based on 00:00:00 within one day, unit is ms
%FD70	-	_AC_FAIL_CNT	Power shutdown times	Saves the times of power shutdown.
%FD71	-	_ERR_HIS_CNT	Error occur times	Saves the times of error occur.
%FD72	-	_MOD_HIS_CNT	Mode conversion times	Saves the times of mode conversion.
%FD73	-	_SYS_HIS_CNT	History occur times	Saves the times of system history.
%FD74	-	_LOG_ROTATE	Log Rotate	Saves log rotate information.
%FW150	-	_BASE_INFO0	Slot information 0	Main base slot information.
%FW158		_RBANK_NUM	Currently used block No.	Indicates currently used block no.
%FW159		_RBLOCK_STATE	Currently used block status	Indicates Currently used block status (Read/Write/Error)
%FD80		_RBLOCK_RD_FLAG	Read flash N block	When reading data of flash N block, Nth bit is on.
%FD81		_RBLOCK_WR_FLAG	Write flash N block	When writing data of flash N block, Nth bit is on.
%FD82		_RBLOCK_ER_FLAG	Flash N block error	When error occurs during flash N block service, Nth bit is on.
	-	_USER_WRITE_F	Available contact point	Contact point available in program.
	%FX3200	_RTC_WR	RTC RW	Data write and read in RTC.
%FW200	%FX3201	_SCAN_WR	Scan WR	Initializing the value of scan.
%F W2UU	%FX3202	_CHK_ANC_ERR	Request detection of external serious error	Request detection of external error.
	%FX3216	_CHK_ANC_WAR	Request detection of external slight error(warning)	Request detection of external slight error (warning).
	-	_USER_STAUS_F	User contact point	User contact point.
%FW201	%FX3216	_INIT_DONE	Initialization completed	Initialization complete displayed.
%FW202	-	_ANC_ERR	Display information of external serious error	Display information of external serious error
%FW203	-	_ANC_WAR	Display information of external slight error(warning)	Display information of external slight error(warning)
%FW210	-	_MON_YEAR_DT	Month/year	Clock data (month/year)
%FW211	-	_TIME_DAY_DT	Hour/date	Clock data (hour/date)
%FW212	-	_SEC_MIN_DT	Second/minute	Clock data (Second/minute)
%FW213	-	_HUND_WK_DT	Hundred year/week         Clock data (Hundred year/week)	
%FW272	%FX4352	ARY_IDX_ERR	Array –index- range exceeded- error flag	Error flag is indicated when exceeding the no. of array
%FW274	%FX4384	_ARY_IDX_LER	Array –index- range exceeded- latch-error flag	Error latch flag is indicated when exceeding the no. of array

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# Appendix 1.2 Communication Relay (L) List

Here describes data link communication relay(L).

(1) High-speed Link 1

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Device	Keyword	Туре	Description
%LX0	_HS1_RLINK	Bit	<ul> <li>High speed link parameter 1 normal operation of all station</li> <li>Indicates normal operation of all station according to parameter set in</li> <li>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>
%LX1	_HS1_LTRBL	Bit	Abnormal state after _HS1RLINK 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 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.
%LX32 ~ %LX95	_HS1_STATE*** (*** = 000~063)	Bit Array	Indicates total status of High Speed Link no.1 ***th block Indicates total status of communication information about each data block of parameter _HS1_STATE*** = HS1MOD*** &_HS1TRX*** &(~_HS1_ERR***)
%LX96 ~ %LX159	_HS1_MOD*** (*** = 000~063)	Bit Array	RUN operation mode of High Speed Link parameter no.1 ***th block station
%LX160 ~ %LX223	_HS1_TRX*** (*** = 000~063)	Bit Array	Indicates operation mode of station set in *** data block of parameter Indicates normal communication with High Speed Link no.1 ***th block station Indicates whether communication status of *** data block of parameter is normal or not.
%LX224 ~ %LX287	_HS1_ERR*** (*** = 000~063)	Bit Array	Operation error mode of High Speed Link parameter no.1 ***th block station Indicates whether there is error at communication status of *** data block of parameter
%LX288 ~ %LX767	_HS1_SETBLOCK***	Bit Array	Indicates High Speed Link parameter no.1 ***th block setting Indicates whether *** data block of parameter is set or not.

## (2) High-speed Link2

Device	Keyword	Туре	Description
			High-speed link parameter 2 normal operation of all station.
%LX416	_HS2_RLINK	Bit	<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 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 _HS2RLINK On.
%LX417	_HS2_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.
			Indicates total status of High Speed Link no.1 ***th block
%LX448 ~ %LX511	_HS2_STATE*** (*** = 000~063)	Bit Array	Indicates total status of communication information about each data block of parameter _HS2_STATE*** = HS2MOD***&_HS2TRX***&(~_HS2_ERR***)
%LX512 ~	_HS2_MOD***	Bit	RUN operation mode of High Speed Link parameter no.1 ***th block station
%LX575	(*** = 000~063)	Array	Indicates operation mode of station set in *** data block of parameter
%LX576 ~	_HS2_TRX***	Bit	Indicates normal communication with High Speed Link no.1 ***th block station
%LX639			Indicates whether communication status of *** data block of parameter is normal or not.
%LX640 ~	_HS2_ERR***	Bit	Operation error mode of High Speed Link parameter no.1 ***th block station
%LX703	(*** = 000~063)	Array	Indicates whether there is error at communication status of *** data block of parameter
%LX704 ~	HS2_SETBLOCK***	Bit	Indicates High Speed Link parameter no.1 ***th block setting
%LX767		Array	Indicates whether *** data block of parameter is set or not.

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#### (3) Common area

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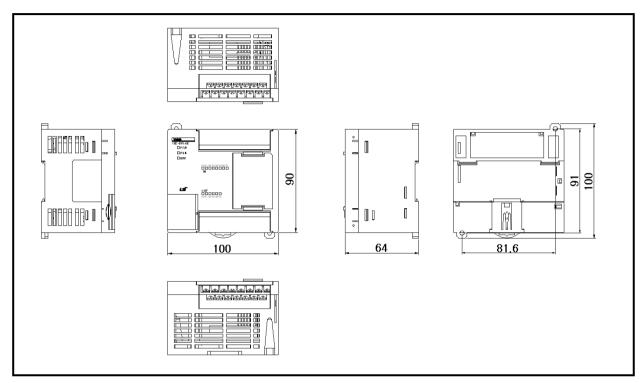
Communication flag list according to P2P service setting. P2P parameter: 1~3, P2P block: 0~31

Device	Keyword	Туре	Description
%LX8192	_P2P1_NDR00	Bit	Indicates P2P parameter 1, 0 Block service normal end.
%LX8193	_P2P1_ERR00	Bit	Indicates P2P parameter 1, 0 Block service abnormal end.
%LW513	_P2P1_STATUS00	Word	Indicates error code in case of P2P parameter 1, 0 Block service abnormal end.
%LD257	_P2P1_SVCCNT00	DWord	Indicates P2P parameter 1, 0 Block service normal count.
%LD261	_P2P1_ERRCNT00	DWord	Indicates P2P parameter 1, 0 Block service abnormal count.
%LX8288	_P2P1_NDR01	Bit	P2P parameter 1, 1 Block service normal end.
%LX8289	_P2P1_ERR01	Bit	P2P parameter 1, 1 Block service abnormal end.
%LW519	_P2P1_STATUS01	Word	Indicates error code in case of P2P parameter 1, 1 Block service abnormal end.
%LD260	_P2P1_SVCCNT01	DWord	Indicates P2P parameter 1, 1 Block service normal count.
%LD264	_P2P1_ERRCNT01	DWord	Indicates P2P parameter 1, 1 Block service abnormal count.
%LW524~%LW529	-	Word	P2P parameter 1,2 Block service total.
%LW530~%LW535	-	Word	P2P parameter 1,3 Block service total.
%LW536~%LW697	-	Word	P2P parameter 1,4~30 Block service total.
%LW698~%LW703	-	Word	P2P parameter 1,31 Block service total.

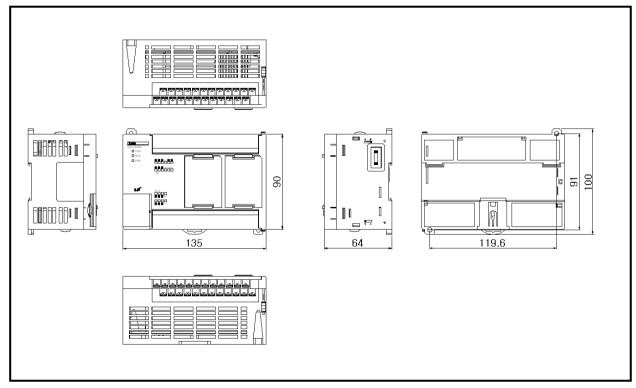
# Appendix 2 Dimension (Unit: mm)

(1) Economy type main unit("E"type)

-. XEC-Dx10/14E

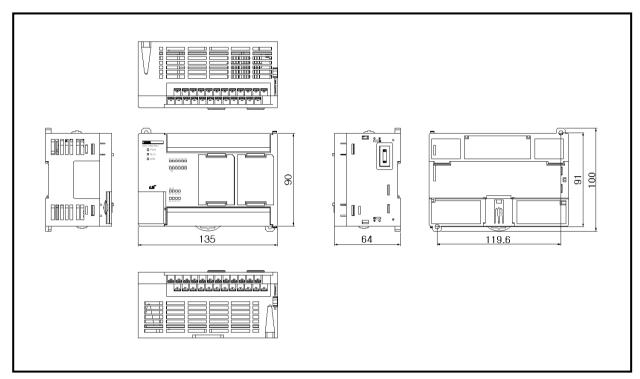


#### -. XEC-Dx20/30E

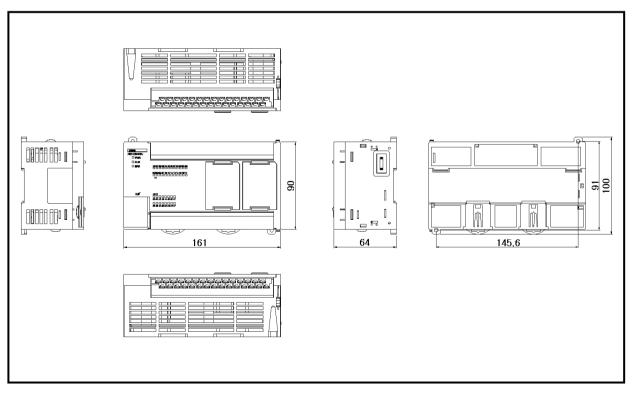


## (2) Standard type main unit("SU"타입)

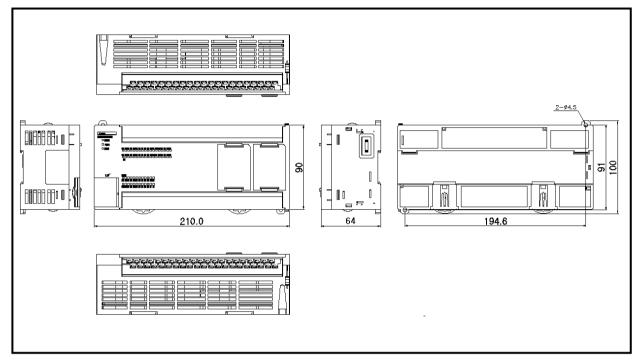
-. XEC-Dx20/30SU



- XEC-Dx40SU

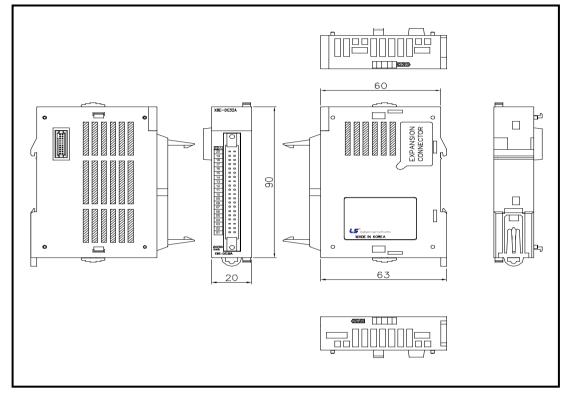


- XEC-Dx60SU

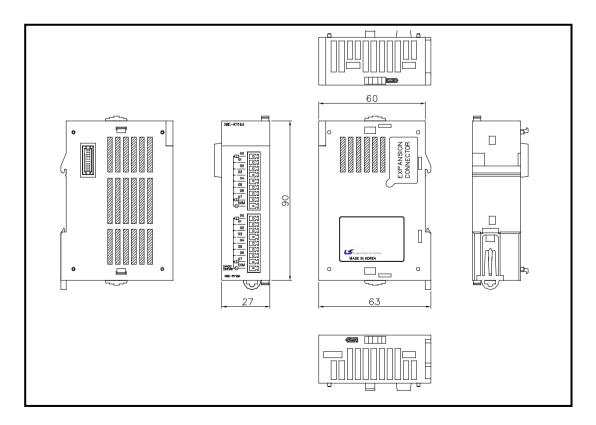


#### (3) Extension I/O module

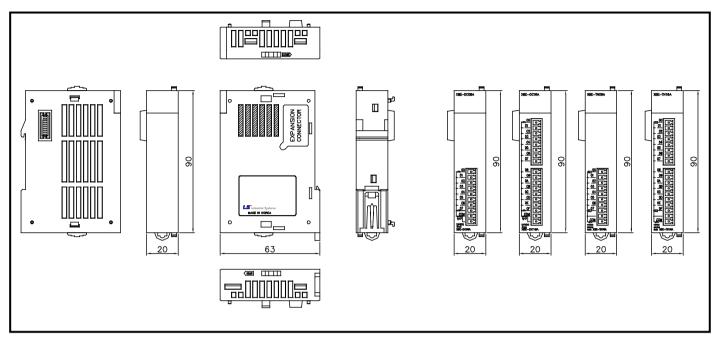
-. XBE-DC32A, XBE-TR32A



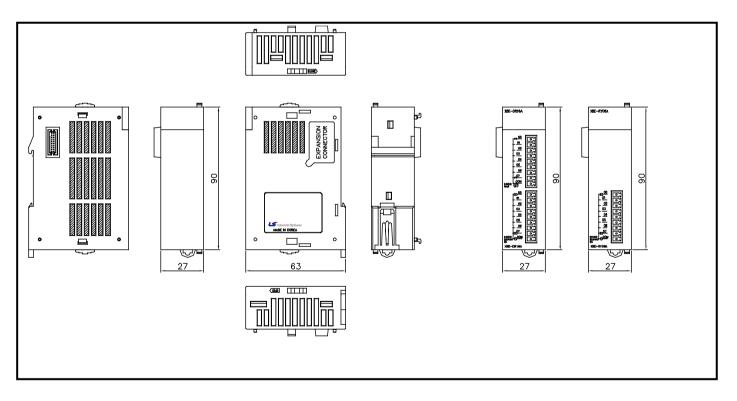
#### -. XBE-RY16A



#### -. XBE-DC08A, XBE-DC16A, XBE-TN08A, XBE-TN16A



-. XBE-DR16A, XBE-RY08A



# Appendix 3 Compatibility with GLOFA

# Appendix 3.1 Compatibility of Flag

Classification	GM7	XEC	Туре	Contents	Description
	_LER	_LER	BOOL	Operation error Latch flag	Operation error latch flag which is on the basis of program block (PB), the error indication which occurs while program block running keeps until the program ends. It is available to delete by a program.
	_ERR	_ERR	BOOL	Operation error flag	Operation error flag which is on the basis of operation function(FN) or function block(FB), it is renewed every time operation works.
	_T20MS	_T20MS	BOOL	20ms clock	Clock signal used in user program reverses On/Off per a half cycle Please use more enough long clock signal than PLC scan time. Clock signal starts from Off condition when initialization program starts or scan program starts.
	_T100MS	_T100MS	BOOL	100ms clock	
	_T200MS	_T200MS	BOOL	200ms clock	As a clock signal available at user program, it reverses On/Off
	_T1S	_T1S	BOOL	1second clock	every half period. Since clock signal is dealt with at the end of
	_T2S	_T2S	BOOL	2second clock	scan, there may be delay or distortion according to scan time. So
	_T10S	_T10S	BOOL	10second clock	use clock that's longer than scan time. Clock signal is Off status at
User	_T20S	_T20S	BOOL	20second clock	the start of scan program and task program.
Flag	_T60S	_T60S	BOOL	60second clock	
	_ON	_ON	BOOL	Ordinary time On	Always On state flag, used when writing a user program.
	_OFF	_OFF	BOOL	Ordinary time Off	Always Off state flag, used when writing a user program.
	_10N	_10N	BOOL	1'st scan On	First scan On flag, operated after starting the operation.
	_10FF	_10FF	BOOL	1'st scan Off	First scan Off flag, operated after starting the operation.
	_STOG	_STOG	BOOL	Reversal every scan (scan toggle)	On/Off reversed per scan when user program is working. (On state for first scan)
	_INIT_DONE	_INIT_DONE	BOOL	Complete of initial program	When this flag is set by user-written initialization program, scan program starts operation after initialization program ends.
	_RTC_DATE	_RTC_DATE	DATE	Current date of RTC	Indicates day data on the basis of 1. Jan. 1984.
	_RTC_TOD	_RTC_TOD	TOD	Current time of RTC	Indicates a data for the time of the day on the basis of 00:00:00 (unit: ms)
	_RTC_WEEK	_RTC_WEEK	UINT	Current a day of the week of RTC	XGT - 0:Sun, 1:Mon, 2:Tue, 3:Wed, 4:Thu, 5:Fri, 6:Sat GLOFA - 0:Mon, 1:Tue, 2:Wed, 3:Thu, 4:Fri, 5:Sat, 6:Sun

Classification	GM7	XEC	Туре	Contents	Description
	_CNF_ER	-	WORD	System error (heavy fault)	Handles error flags about fault of operation stop as below.
	_CPU_ER -		BOOL	CPU Configuration error	Error flag occurred when normal operation cannot be done due to diagnosis error of CPU Module. (Refer to "_SYS_ERR" for more error contents)
	_IO_TYER	_IO_TYER	BOOL	Mismatched module type error	Representative flag displayed when I/O configuration parameter for each slot is not matched with practical module configuration or a specific module is applied in the wrong location. (Refer to "_IO_TYER_N, _IO_TYER[n]")
	_IO_DEER	_IO_DEER	BOOL	Module detachment error	Representative flag displayed when the module configuration for each slot is changed while running. (Refer to "_IO_DEER_N, _IO_DEER[n]")
	_FUSE_ER	-	BOOL	Fuse error	Representative flag displayed when the fuse of module is cut off. (Refer to "_FUSE_ER_N, _FUSE_ER[n]")
System Error Rep.	_IO_RWER	_IO_RWER	BOOL	I/O module reading/writing error(fault)	Representative flag displayed when it cannot normally read and write I/O module of each slot module. (Refer to "_IP_RWER_N, _IO_RWER[n]")
flag	_SP_IFER _IP_IFER		BOOL	Special/communication module interface error(fault)	Representative flag displayed when it is impossible to interface normally due to failure to initialize special/communication module or abnormal operation of these modules. (Refer to "_IP_IFER_N, _IP_IFER[n]")
	_ANNUN_ER -		BOOL	Heavy fault detection error in external device	Representative flag displayed when heavy error detected by user program is recorded in "_ANC_ERR[n]".
	_WD_ER	_WD_ER _WDT_ER		Scan watchdog error	Indicates that the program scan time exceeds the scan watchdog time specified by a parameter.
	_CODE_ER	_CODE_ER	BOOL	Program code error	Indicates that while user program is running, the program code can't be interpreted.
	_STACK_ER	-	BOOL	Stack overflow error	Indicates that while program running, stack of program exceeds normal limits.
	_P_BCK_ER	_PGM_ER	BOOL	Program error	Indicates that program memory is destroyed or program cannot operate normally. (Refer to "_DOMAIN_ST")
Fault	_CNF_ER_M	-	BYTE	System error clear (heavy fault)	Handles error flags about error clear as below.
Mask flag	_ANNLN_ER_M	-	BOOL	Error clear	Detects heavy fault of external device. When "_ANNLN_ER" occurs, if it is operated to ignore it, this flag is set

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Classification	GM7	XEC	Туре	Contents	Description
	_CNF_WAR	_CNF_WAR	WORD	System warning (light fault)	Handles warning flag about continuation operation as below
	_RTC_ERR	_RTC_ERR	BOOL	RTC data error	Indicates that RTC data is abnormal.
	_D_BCK_ER	_D_BCK_ER	BOOL	Data backup error	Indicates that cold restart starts operation instead of hot or warm restart program, since data memory is destroyed by backup error. It is possible to use in the initialization program and it is reset automatically after completing the initialization program.
	_H_BCK_ER	_H_BCK_ER	BOOL	Hot restart disabled error	Indicates that restart operation(warm or cold) is done according to a parameter, instead of hot restart operation, since it exceeds hot restart time during power recovery or the operation data (required for hot restart operation) is not backup normally. It is possible to use in the initialization program and it is reset automatically after completing the initialization program.
System warning Rep. Flag	_AB_SD_ER	_AB_SD_ER	BOOL	Abnormal Shutdown	This flag is used by initial program, and is reset automatically after initial program completion It is included to program stopping by 'ESTOP' function
	_TASK_ERR	_TASK_ERR	BOOL	Task collision (Fixed cycle, external task)	Indicates that an identical task operates in duplicate. (please refer to "_TC_BMAP[n]", "_TC_CNT[n]")
	_BAT_ERR	_BAT_ERR	BOOL	Battery error	Indicates that when battery voltage for backup of user program and data memory is below the standard.
	_ANNUN_WR	_ANNUN_WR	BOOL	Light fault detection of external device	Representative flag displayed when light fault detected by user program is recorded in "_ANC_WB[n]"
	_HSPMT1_ER	-	BOOL	High speed link- parameter 1 error	When high speed link enables, if it is abnormal to high speed
	_HSPMT2_ER	-	BOOL	High speed link- parameter 2 error	Ink parameter, Indicates that high speed link can't be executed.
	_HSPMT3_ER	-	BOOL	High speed link- parameter 3 error	This flag is reset when high speed link disables.
	_HSPMT4_ER	-	BOOL	High speed link- parameter 4 error	uisauics.

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Classification	GM7	XEC	Туре	Contents	Description
	_IO_TYER_N	_IO_TYER_N	UINT	Mismatched module type slot number	When I/O configuration parameter for each slot is not matched with practical module configuration or a specific module is applied in the wrong location, it is displayed as the lowest slot number after detecting these mismatch error in slot locations.
	_IO_TYERR[n]	_IO_TYER0	BYTE	Mismatched module type location	When I/O configuration parameter for each slot is not matched with practical module configuration or a specific module is applied in the wrong location, it displays the detected slot location on Bit-map.
	_IO_DEER_N	_IO_DEER_N	UINT	Module detachment slot number	When slot module configuration is changed while PLC running, it is displayed as the lowest slot number after detecting these detachment error in slot locations.
	_IO_DEERR[n]	_IO_DEER0	BYTE	Module detachment location	When slot module configuration is changed while PLC running, it displays the detected slot location on bit-map.
	_IO_RWER_N	_IO_RWER_N	UINT	I/O module reading / writing error slot number	When it is not possible to read/write the I/O module each slot modules, it is displayed as the lowest slot number after detecting this error in slot locations.
System error and warning detailed flag	_IO_RWERR[n]	_IO_RWER0	BYTE	I/O module reading / writing error slot location	When it is not possible to read/write the I/O module each slot modules, it displays the detected slot location on bit-map.
	_SP_IFER_N	_IP_IFER_N	UINT	Special / link module interface error slot number	When it is not possible to initialize special/link module of each slot module or to interface normally due to module malfunction, it is displayed as the lowest slot number after detecting this error in slot locations.
	_SP_IFERR[n]	_IP_IFER_0	BYTE	Special / link module interface error slot location	When it is not possible to initialize special/link module of each slot module or to interface normally due to module malfunction, it displays the detected slot location on bit-map.
	_ANC_ERR[n]	-	UINT	Heavy fault detection of external device	Heavy fault of external device is detected by user program, and that error is saved at this zone as numbers which can identify 16 error types. ("O"value is not available.)
	_anc_war[n]	-	UINT	Light fault detection of external device	When detecting "_ANC_WB[n]" warning by user program, the bit location of the occurred error from "_ANC_WAR[0]" is displayed as an integer in occurrence order.

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Classification	GM7	XEC	Туре	Contents	Description
	_ANC_WB[n]	-	BIT	Light fault detection bit-map of external device	Light fault of external device (detected by user program) is saved on bit-map. ('O'value is not available.)
	_TC_BMAP[n]	-	BIT	Task Collision Bit- map	Displayed on bit-map when same task is operating or is ready for operation.
	_TC_CNT[n]	-	UINT	Task Collision Counter	Displays task collision counter when task collision occurs while user program execution
System error	_BAT_ER_TM	-	DATE & TIME	Battery voltage drop time	Displays first battery voltage drop time. It is reset when it returns to normal condition.
and warning detailed flag	_AC_F_CNT	_AC_FAIL_CNT	UINT	Instant power cutoff count occurred	Indicates the instant power cutoff count which occurred while RUN mode operation.
	_AC_F_TM[n]	-	DATE & TIME	Instant power cutoff history	Saves instant power cutoff date/time, which can be saved up to 16 from the most recent event.
	_ERR_HIS[n]	-	-	Error occurrence history	Error occurrence time and error code are saved up to 16 from the most recent event. . Stop-time : DATE&TIME (8 Byte) . Error code : UINT (2 Byte)
	_MODE_HIS[n]	-	-	Change history of RUN mode	Run mode change time, run mode and restart mode are saved up to 16 from the most recent event.         . Change time : DATE&TIME (8 Byte)         . Run mode       : UINT         . Restart       : UINT         . Restart       : UINT         . Restart       : UINT

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Classification	GM7	XEC	Туре	Contents	Description
	_CPU_TYPE	_CPU_TYPE	UINT	CPU type information	Indicates the type information of PLC CPU
	_VER_NUM	_OS_VER	UINT	OS Version Number	OS version number of PLC CPU
	_MEM_TYPE	-	UINT	Memory module type	Program memory module type (0:unmounted, 1~5:Type)
		-		PLC mode and running state	Indicates operation mode and operation state of the system.
		_LOCAL_CON		Local control	Indicates that operation mode can be changed by mode key or PADT only
		_STOP		STOP	
		_RUN		RUN	hadisata a maina atata at OD Lara da la
		_PAUSE-		PAUSE	Indicates running state of CPU module.
	_SYS_STATE	_DEBUG		DEBUG	
System		_CMOD_KEY	WORD	Running mode change factor	Change the running mode by key
operation state flag		_CMOD_LPADT		Running mode change factor	Change the running mode by PADT
		_CMOD_RPADT		Running mode change factor	Change the running mode by remote PADT
		_CMOD_RLINK		Running mode change factor	Change the running mode by communication
		_USTOP_ON		Stopped by STOP function	While RUN mode operation, stopped after scan completion by STOP function
		_FORCE_IN		Forced input	Indicates that a forced On/Off for the input contact is running.
		_FORCE_OUT		Forced output	Indicates that a forced On/Off for the output contact is running.
		_ESTOP_ON		Stopped by ESTOP function	While RUN mode operation, stopped immediately by ESTOP function
		_REMOTE_CON		Remote mode On	Indicates that it is operated by remote mode.

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Classification	GM7	XEC	Туре	Contents	Description
		-		GMWIN connection state	Indicates the connection state of CPU module and PADT
		-		Local GMWIN connection	Bit indicated connection state of local PADT
	_PADT_CNF	-	BYTE	Remote GMWIN connection	Bit indicated connection state of remote PADT
		-		Remote communication connection	Bit indicated connection state of remote communication
		-		Restart mode information	
	_RST_TY	-	BYTE	Cold restart	-
		-		Warm restart	
		-		Hot restart	
System	_INIT_RUN	_INIT_RUN	BOOL	Initialization is running	Indicates that user-written initialization program is running.
operation state flag	_SCAN_MAX	_SCAN_MAX	UINT	Max. Scan Time (ms)	Indicates Max. scan time while running.
State ing	_SCAN_MIN	_SCAN_MIN	UINT	Min. Scan Time(ms)	Indicates Min. scan time while running.
	_SCAN_CUR	_SCAN_CUR	UINT	Current Scan Time(ms)	Indicates current scan time data which is being renewed.
	_RTC_TIME[n]	_RTC_DATE _RTC_WEEK _RTC_TOD	BYTE	Current time	The current BCD data of RTC (1.Jan.1984 ~ 31.Dec.2083) _RTC_TIME[0] : year, _RTC_TIME[1] : month, _RTC_TIME[2] : day, _RTC_TIME[3] : time, _RTC_TIME[4] : minute, _RTC_TIME[5] : second _RTC_TIME[6] : day of the week, _RTC_TIME[7] : not used day of the week XGT - 0:Sun, 1:Mon, 2:Tue, 3:Wed, _4:Thu, 5:Fri, 6:Sat GLOFA - 0:Mon, 1:Tue, 2:Wed, 3:Thu, _4:Fri, 5:Sat, 6:Sun
	_SYS_ERR	-	UINT	Error type	-

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# **Appendix 4 Instruction List**

It's a list of function and function block. For each function and function block, please refer to XGI/XGR/XEC user's manuals for Instruction

# **Appendix 4.1 Basic Function**

### **Appendix 4.1.1 Type Conversion Function**

It converts each input data type into an output data type.

Function Group	Function	Input data type	Output data type	Remarks
ARY_ASC_TO_***	ARY_ASC_TO_BYTE	WORD(ASCII)	BYTE	
	ARY_ASC_TO_BCD	WORD(ASCII)	BYTE(BCD)	
ARY_BYTE_TO_***	ARY_BYTE_TO_ASC	BYTE	WORD(ASCII)	
ARY_BCD_TO_***	ARY_BCD_TO_ASC	BYTE(BCD)	WORD(ASCII)	
ASC_TO_***	ASC_TO_BCD	BYTE(BCD)	USINT	
A30_10_	ASC_TO_BYTE	WORD(BCD)	UINT	
	BYTE_BCD_TO_SINT	BYTE(BCD)	SINT	
	WORD_BCD_TO_INT	WORD(BCD)	INT	
	DWORD_BCD_TO_DINT	DWORD(BCD)	DINT	
	LWORD_BCD_TO_LINT	LWORD(BCD)	LINT	
BCD_TO_***	BYTE_BCD_TO_USINT	BYTE(BCD)	USINT	
	WORD_BCD_TO_UINT	WORD(BCD)	UINT	
	DWORD_BCD_TO_UDINT	DWORD(BCD)	UDINT	
	LWORD_BCD_TO_ULINT	LWORD(BCD)	ULINT	
BCD_TO_ASC	BCD_TO_ASC	BYTE(BCD)	WORD	
BYTE_TO_ASC	BYTE_TO_ASC	BYTE	ASC(BYTE)	
	TRUNC_REAL	REAL	DINT	
TRUNC	TRUNC LREAL	LREAL	LINT	
	REAL TO SINT	REAL	SINT	
	REAL_TO_INT	REAL	INT	
	REAL TO DINT	REAL	DINT	
	REAL TO LINT	REAL	LINT	
	REAL TO USINT	REAL	USINT	
REAL_TO_***	REAL TO UINT	REAL	UINT	
	REAL_TO_UDINT	REAL	UDINT	
	REAL TO ULINT	REAL	ULINT	
	REAL TO DWORD	REAL	DWORD	
	REAL TO LREAL	REAL	LREAL	
	REAL_TO_STRING	REAL	STRING	
	LREAL TO SINT	LREAL	SINT	
	LREAL TO INT	LREAL	INT	
LREAL_TO_***	LREAL TO DINT	LREAL	DINT	
	LREAL TO LINT	LREAL	LINT	
	LREAL_TO_USINT	LREAL	USINT	
	LREAL_TO_UINT	LREAL	UINT	
	LREAL TO UDINT	LREAL	UDINT	
	LREAL_TO_ULINT	LREAL	ULINT	
LREAL_TO_***	LREAL TO LWORD	LREAL	LWORD	
	LREAL TO REAL	LREAL	REAL	
	LREAL TO STRING	LREAL	STRING	

# Appendix 4 Instruction List

Function Group	Function	Input data type	Output data type	Remarks
	SINT_TO_INT	SINT	INT	
	SINT_TO_DINT	SINT	DINT	
	SINT_TO_LINT	SINT	LINT	
	SINT_TO_USINT	SINT	USINT	
	SINT_TO_UINT	SINT	UINT	
	SINT_TO_UDINT	SINT	UDINT	
	SINT_TO_ULINT	SINT	ULINT	
SINT_TO_***	SINT_TO_BOOL	SINT	BOOL	
	SINT_TO_BYTE	SINT	BYTE	
	SINT_TO_WORD	SINT	WORD	
	SINT TO DWORD	SINT	DWORD	
	SINT TO LWORD	SINT	LWORD	
	SINT TO REAL	SINT	REAL	
	SINT_TO_LREAL	SINT	LREAL	
	SINT_TO_STRING	SINT	STRING	
	INT_TO_SINT	INT	SINT	
		INT	DINT	1
	INT_TO_DINT	INT	LINT	
	INT TO USINT	INT	USINT	
		INT	UINT	
		INT	UDINT	
INT_TO_***				
	INT_TO_ULINT		ULINT	
	INT_TO_BOOL	INT	BOOL	
	INT_TO_BYTE		BYTE	
	INT_TO_WORD	INT	WORD	
	INT_TO_DWORD	INT	DWORD	
	INT_TO_LWORD	INT	LWORD	
	INT_TO_REAL	INT	REAL	
	INT_TO_LREAL	INT	LREAL	
	INT_TO_STRING	INT	STRING	
	DINT_TO_SINT	DINT	SINT	
	DINT_TO_INT	DINT	INT	
	DINT_TO_LINT	DINT	LINT	
	DINT_TO_USINT	DINT	USINT	
	DINT_TO_UINT	DINT	UINT	
DINT_TO_***	DINT_TO_UDINT	DINT	UDINT	
		DINT	ULINT	
	DINT_TO_BOOL	DINT	BOOL	
	DINT TO BYTE	DINT	BYTE	
	DINT_TO_WORD	DINT	WORD	
	DINT TO DWORD	DINT	DWORD	
	DINT TO LWORD	DINT	LWORD	
DINT TO ***	DINT_TO_REAL	DINT	REAL	
	DINT_TO_REAL	DINT	LREAL	
	DINT_TO_STRING	DINT	STRING	
	LINT_TO_SINT	LINT	SINT	+
		LINT		+
			DINT	
	LINT_TO_USINT		USINT	
LINT_TO_***		LINT	UINT	-
		LINT	UDINT	-
	LINT_TO_ULINT	LINT	ULINT	
	LINT_TO_BOOL	LINT	BOOL	
	LINT_TO_BYTE	LINT	BYTE	

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Function Group	Function	Input data type	Output data type	Remarks
	LINT_TO_WORD	LINT	WORD	
	LINT_TO_DWORD	LINT	DWORD	
	LINT_TO_LWORD	LINT	LWORD	
	LINT TO REAL	LINT	REAL	
	LINT TO LREAL	LINT	LREAL	
	LINT_TO_STRING	LINT	STRING	
	USINT_TO_SINT	USINT	SINT	
	USINT_TO_INT	USINT	INT	
	USINT_TO_DINT	USINT	DINT	
	USINT_TO_LINT	USINT	LINT	
		USINT	UINT	
		USINT	UDINT	
	USINT TO ULINT	USINT	ULINT	
USINT_TO_***	USINT_TO_BOOL	USINT	BOOL	
	USINT_TO_BYTE	USINT	BYTE	
	USINT_TO_WORD	USINT	WORD	
	USINT_TO_DWORD	USINT	DWORD	
	USINT_TO_LWORD	USINT	LWORD	
	USINT_TO_REAL	USINT	REAL	
	USINT_TO_LREAL	USINT	LREAL	
	USINT_TO_STRING	USINT	STRING	
	UINT_TO_SINT	UINT	SINT	
	UINT_TO_INT	UINT	INT	
	UINT_TO_DINT	UINT	DINT	
	UINT_TO_LINT	UINT	LINT	
	UINT_TO_USINT	UINT	USINT	
UINT_TO_***	UINT_TO_UDINT	UINT	UDINT	
	UINT TO ULINT	UINT	ULINT	
	UINT_TO_BOOL	UINT	BOOL	
	UINT_TO_BYTE	UINT	BYTE	
	UINT_TO_WORD	UINT	WORD	
	UINT_TO_DWORD	UINT	DWORD	
	UINT TO LWORD	UINT	LWORD	
	UINT TO REAL	UINT	REAL	
UINT_TO_***	UINT_TO_STRING	UINT	STRING	
	UINT TO LREAL	UINT	LREAL	
	UINT_TO_DATE	UINT	DATE	
	UDINT_TO_SINT	UDINT	SINT	
	UDINT_TO_INT	UDINT	INT	
	UDINT TO DINT			
			DINT	
				-
	UDINT_TO_USINT		USINT	
			UINT	
		UDINT	ULINT	-
	UDINT_TO_BOOL	UDINT	BOOL	
UDINT_TO_***	UDINT_TO_BYTE	UDINT	BYTE	
	UDINT_TO_WORD	UDINT	WORD	
	UDINT_TO_DWORD	UDINT	DWORD	
	UDINT_TO_LWORD	UDINT	LWORD	
	UDINT_TO_REAL	UDINT	REAL	
	UDINT_TO_LREAL	UDINT	LREAL	-
	UDINT_TO_TOD	UDINT	TOD	-
	UDINT_TO_TIME	UDINT	TIME	-
	UDINT_TO_STRING	UDINT	STRING	1

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# Appendix 4 Instruction List

Function Group	Function	Input data type	Output data type	Remarks
	ULINT_TO_SINT	ULINT	SINT	-
	ULINT_TO_INT	ULINT	INT	-
	ULINT_TO_DINT	ULINT	DINT	-
	ULINT_TO_LINT	ULINT	LINT	-
	ULINT_TO_USINT	ULINT	USINT	-
	ULINT_TO_UINT	ULINT	UINT	-
	ULINT TO UDINT	ULINT	UDINT	-
ULINT_TO_***	ULINT TO BOOL	ULINT	BOOL	-
		ULINT	BYTE	-
	ULINT_TO_WORD	ULINT	WORD	-
	ULINT TO DWORD	ULINT	DWORD	-
	ULINT TO LWORD	ULINT	LWORD	-
	ULINT TO REAL	ULINT	REAL	-
	ULINT TO LREAL	ULINT	LREAL	-
	ULINT TO STRING	ULINT	STRING	-
	BOOL_TO_SINT	BOOL	SINT	-
	BOOL TO INT	BOOL	INT	-
	BOOL_TO_DINT	BOOL	DINT	_
	BOOL TO LINT	BOOL	LINT	_
BOOL_TO_***	BOOL TO USINT	BOOL	USINT	
DOOL_10_	BOOL TO UINT	BOOL	UINT	
	BOOL TO UDINT	BOOL	UDINT	
	BOOL_TO_ULINT	BOOL	ULINT	-
	BOOL TO BYTE	BOOL	BYTE	-
	BOOL_TO_BITE			-
		BOOL	WORD	-
BOOL_TO_***	BOOL_TO_DWORD	BOOL	DWORD	-
	BOOL_TO_LWORD	BOOL	LWORD	-
	BOOL_TO_STRING	BOOL	STRING	-
	BYTE_TO_SINT	BYTE	SINT	-
	BYTE_TO_INT	BYTE	INT	-
	BYTE_TO_DINT	BYTE	DINT	-
	BYTE_TO_LINT	BYTE	LINT	-
	BYTE_TO_USINT	BYTE	USINT	-
	BYTE_TO_UINT	BYTE	UINT	-
BYTE_TO_***	BYTE_TO_UDINT	BYTE	UDINT	-
	BYTE_TO_ULINT	BYTE	ULINT	-
	BYTE_TO_BOOL	BYTE	BOOL	-
	BYTE_TO_WORD	BYTE	WORD	-
	BYTE_TO_DWORD	BYTE	DWORD	-
	BYTE_TO_LWORD	BYTE	LWORD	-
	BYTE_TO_STRING	BYTE	STRING	-
	WORD_TO_SINT	WORD	SINT	-
	WORD_TO_INT	WORD	INT	-
	WORD_TO_DINT	WORD	DINT	-
	WORD_TO_LINT	WORD	LINT	-
	WORD_TO_USINT	WORD	USINT	-
	WORD_TO_UINT	WORD	UINT	-
WORD_TO_***	WORD_TO_UDINT	WORD	UDINT	-
	WORD TO ULINT	WORD	ULINT	
	WORD TO BOOL	WORD	BOOL	
	WORD TO BYTE	WORD	BYTE	
	WORD TO DWORD	WORD	DWORD	
	WORD TO LWORD	WORD	LWORD	
	WORD TO DATE	WORD	DATE	+

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Function Group	Function	Input data type	Output data type	Remarks
	WORD_TO_STRING	WORD	STRING	
	DWORD_TO_SINT	DWORD	SINT	
	DWORD_TO_INT	DWORD	INT	
	DWORD_TO_DINT	DWORD	DINT	
	DWORD_TO_LINT	DWORD	LINT	
	DWORD TO USINT	DWORD	USINT	
	DWORD TO UINT	DWORD	UINT	
	DWORD TO UDINT	DWORD	UDINT	
DWORD_TO_***	DWORD TO ULINT	DWORD	ULINT	
	DWORD TO BOOL	DWORD	BOOL	
	DWORD TO BYTE	DWORD	BYTE	
	DWORD TO WORD	DWORD	WORD	
	DWORD TO LWORD	DWORD	LWORD	
	DWORD TO REAL	DWORD	REAL	
	DWORD TO TIME	DWORD	TIME	
	DWORD TO TOD	DWORD	TOD	
DWORD_TO_***	DWORD_TO_STRING	DWORD	STRING	
DWORD_TO_	LWORD TO SINT	LWORD	SINT	
	LWORD TO INT	LWORD	INT	
	LWORD TO DINT		DINT	
		LWORD		
		LWORD		
		LWORD	USINT	
		LWORD	UINT	
		LWORD	UDINT	
LWORD_TO_***	LWORD_TO_ULINT	LWORD	ULINT	
	LWORD_TO_BOOL	LWORD	BOOL	
	LWORD_TO_BYTE	LWORD	BYTE	
	LWORD_TO_WORD	LWORD	WORD	
	LWORD_TO_DWORD	LWORD	DWORD	
	LWORD_TO_LREAL	LWORD	LREAL	
	LWORD_TO_DT	LWORD	DT	
	LWORD_TO_STRING	LWORD	STRING	
	STRING_TO_SINT	STRING	SINT	
	STRING_TO_INT	STRING	INT	
	STRING _TO_DINT	STRING	DINT	
	STRING _TO_LINT	STRING	LINT	
	STRING _TO_USINT	STRING	USINT	
	STRING _TO_UINT	STRING	UINT	
	STRING TO_UDINT	STRING	UDINT	
	STRING TO ULINT	STRING	ULINT	
	STRING TO BOOL	STRING	BOOL	
STRING_TO_***	STRING TO BYTE	STRING	BYTE	
	STRING TO WORD	STRING	WORD	
	STRING TO DWORD	STRING	DWORD	
	STRING_TO_LWORD	STRING	LWORD	
	STRING TO REAL	STRING	REAL	
	STRING_TO_REAL	STRING	LREAL	
	STRING_TO_DT	STRING	DT	
	STRING TO DATE	STRING	DATE	
	STRING_TO_DATE	STRING	TOD	
		STRING		
			UDINT	
TIME_TO_***	TIME_TO_DWORD		DWORD	
	TIME_TO_STRING	TIME	STRING	

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# Appendix 4 Instruction List

Function Group	Function	Input data type	Output data type	Remarks
	DATE_TO_UINT	DATE	UINT	
DATE_TO_***	DATE_TO_WORD	DATE	WORD	
	DATE_TO_STRING	DATE	STRING	
	TOD_TO_UDINT	TOD	UDINT	
TOD_TO_***	TOD_TO_DWORD	TOD	DWORD	
	TOD_TO_STRING	TOD	STRING	
	DT_TO_LWORD	DT	LWORD	
	DT_TO_DATE	DT	DATE	
DT_TO_***	DT_TO_TOD	DT	TOD	
	DT_TO_STRING	DT	STRING	
	SINT_TO_BCD_BYTE	SINT	BYTE(BCD)	
	INT_TO_BCD_WORD	INT	WORD(BCD)	
	DINT_TO_BCD_DWORD	DINT	DWORD(BCD)	
*** TO DOD	LINT_TO_BCD_LWORD	LINT	LWORD(BCD)	
***_TO_BCD	USINT_TO_BCD_BYTE	USINT	BYTE(BCD)	
	UINT_TO_BCD_WORD	UINT	WORD(BCD)	
	UDINT_TO_BCD_DWORD	UDINT	DWORD(BCD)	
	ULINT_TO_BCD_LWORD	ULINT	LWORD(BCD)	

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# Appendix 4.1.2 Numerical Operation Function

No.	Function name	Description	Remarks	
		General Function		
1	1 ABS Absolute value operation			
2	SQRT	Square root operation		
		Log function		
3	LN	Natural logarithm operation		
4	LOG	Common logarithm Base to 10 operation		
5	EXP	Natural exponential operation		
		Trigonometric function		
6	SIN	Sine operation		
7	COS	Cosine operation		
8	TAN	Tangent operation		
9	ASIN	Arc sine operation		
10	ACOS	Arc Cosine operation		
11	ATAN	Arc Tangent operation		
		Angle function		
12	RAD_REAL	Convert degree into redian		
13	RAD_LREAL	Convert degree into radian		
14	DEG_REAL	Convert radian into degree		
15	DEG_LREAL	Convert radian into degree		

(1) Numerical Operation Function with One Input

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### (2) Basic Arithmetic Function

No.	Function name	Description	Remarks			
	Operation function of which input number (n) can be extended up to 8.					
1	ADD	Addition (OUT <= IN1 + IN2 + + INn)				
2	MUL	Multiplication (OUT <= IN1 * IN2 * * INn)				
		Operation function of which input number is fixed.				
3	SUB	Subtraction (OUT <= IN1 - IN2)				
4	DIV	Division (OUT <= IN1 / IN2)				
5	MOD	Calculate remainder (OUT <= IN1 Modulo IN2)				
6	EXPT	Exponential operation (OUT $\leq$ IN1 <sup>IN2</sup> )				
7	MOVE	Copy data (OUT <= IN)				
	Input data exchange					
8	XCHG_***	Exchanges two input data				

# Appendix 4.1.3 Bit Arrary Function

### (1) Bit-shift Function

No.	Function name	Description	Remarks
1	SHL	Shift input to the left of N bit(the right is filled with 0)	
2	SHR	Shift input to the right of N bit (the left is filled with 0)	
3	SHIFT_C_***	Shift input to designated direction as much as N bit (carry)	
4	ROL	Rotate input to the left of N bit	
5	ROR	Rotate input to the right of N bit	
6	ROTATE_C_***	Rotate input to the direction as much as N bit (carry)	

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#### (2) Bit Operation Function

No.	Function name	Description (n can be extended up to 8)	Remarks
1	AND	Logical AND (OUT <= IN1 AND IN2 AND AND INn)	
2	OR	Logical OR (OUT <= IN1 OR IN2 OR OR INn)	
3	XOR	Exclusive OR (OUT <= IN1 XOR IN2 XOR XOR INn)	
4	NOT	Reverse logic (OUT <= NOT IN1)	
5	XNR	Exclusive logic AND (OUT <= IN1 XNR IN2 XNR XNR INn)	

### **Appendix 4.1.4 Selection Function**

No.	Function name	Description(n can be extended up to 8)	Remarks
1	SEL	Selects from two inputs (IN0 or IN1)	
2	MAX	Produces the maximum value among input IN1,INn	
3	MIN	Produces the minimum value among input IN1,INn	
4	LIMIT	Limits upper and lower boundaries	
5	MUX	Outputs the K-th input among input IN1,INn	

No.	Function name	Description	Remarks
	SWAP_BYTE	Swaps upper NIBBLE for lower NIBBLE data of BYTE.	
	SWAP_WORD	Swaps upper BYTE for lower BYTE data of WORD.	
1	SWAP_DWORD	Swaps upper WORD for lower WORD data DWORD.	
	SWAP_LWORD	Swaps upper DWORD for lower DWORD data of LWORD.	
	ARY_SWAP_BYTE	Swaps upper/lower NIBBLE of BYTE elements in array.	
	ARY_SWAP_WORD	Swaps upper/lower BYTE of WORD elements in array.	
2	ARY_SWAP_DWORD	Swaps upper/lower WORD of DWORD elements in array.	
	ARY_SWAP_LWORD	Swaps upper/lower DWORD of LWORD elements in array.	

## Appendix 4.1.5 Data Exchange Function

# Appendix 4.1.6 Comparison Function

No.	Function name	Description (n can be extended up to 8)	Remarks
		'Greater than' comparison	
1	GT	OUT <= (IN1>IN2) & (IN2>IN3) & & (INn-1 > INn)	
		'Greater than or equal to' comparison	
2	GE	OUT <= (IN1>=IN2) & (IN2>=IN3) & & (INn-1 >= INn)	
	EQ	'Equal to' comparison	
3		OUT <= (IN1=IN2) & (IN2=IN3) & & (INn-1 = INn)	
		'Less than or equal to' comparison	
4	LE	OUT <= (IN1<=IN2) & (IN2<=IN3) & & (INn-1 <= INn)	
		'Less than' comparison	
5	LT	OUT <= (IN1 <in2) &="" (in2<in3)="" (inn-1="" <="" inn)<="" td=""><td></td></in2)>	
		'Not equal to' comparison	
6	NE	OUT <= (IN1<>IN2) & (IN2<>IN3) & & (INn-1 <> INn)	

# Appendix 4.1.7 Character String Function

No.	Function name	Description	Remarks
1	LEN	Find a length of a character string	
2	LEFT	Take a left side of a string (size of L) and output it	
3	RIGHT	Take a right side of a string (size of L) and output it	
4	MID	Take a middle side of a string (size of L from the P-th character)	
5	CONCAT	Concatenate the input character string in order	
6	INSERT	Insert the second string after the P-th character of the first string	
7	DELETE	Delete a string (size of L from the P-th character)	
8	REPLACE	Replace a size of L from the P-th character of the first string by the second string	
9	FIND	Find a starting point of the first string which has a same pattern of the second string.	

No.	Function name	Description	Remarks
1	ADD_TIME	Add time (Time/time of day/date and time addition)	
2	SUB_TIME	Subtract time (Time/time of day/date and time subtraction)	
	SUB_DATE	Calculate time by subtracting date from date	
	SUB_TOD	Calculate time by subtracting TOD from TOD	
	SUB_DT	Calculate time by subtracting DT from DT	
3	MUL_TIME	Multiply number to time	
4	DIV_TIME	Divide time by number	
5	CONCAT_TIME	Concatenate date to make TOD	

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# Appendix 4.1.8 Date and Time of Day Function

No.	Function name	Description	Remarks
1	DI	Invalidates interrupt (Not to permit task program starting)	
2	EI	Permits running for a task program	
3	STOP	Stop running by a task program	
4	ESTOP	Emergency running stop by a program	
5	DIREC_IN	Update input data	
6	DIREC_O	Updates output data	
7	WDT_RST	Initialize a timer of watchdog	
8	MCS	Master Control	
9	MCSCLR	Master Control Clear	
10	FALS	Self check(error display)	
11	OUTOFF	Output Off	

# Appendix 4.1.9 System Control Function

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# Appendix 4.1.10 File Function

No.	Function block name	Description	Remarks
1	RSET	Setting file register block number	
2	EBCMP	Block comparison	
3	EMOV	Reading data from the preset flash area	
4	EERRST	Flash memory related error flag clear	

No.	Function name	Description	Remarks
1	MEQ_***	Compare whether two inputs are equal after masking	
2	DIS_***	Data distribution	
3	UNI_***	Unite data	
4	BIT_BYTE	Combine 8 bits into one BYTE	
5	BYTE_BIT	Divide one BYTE into 8 bits	
6	BYTE_WORD	Combine two bytes into one WORD	
7	WORD_BYTE	Divide one WORD into two bytes	
8	WORD_DWORD	Combine two WORD data into DWORD	
9	DWORD_WORD	Divide DWORD into 2 WORD data	
10	DWORD_LWORD	Combine two DWORD data into LWORD	
11	LWORD_DWORD	Divide LWORD into two DWORD data	
12	GET_CHAR	Get one character from a character string	
13	PUT_CHAR	Puts a character in a string	
14	STRING_BYTE	Convert a string into a byte array	
15	BYTE_STRING	Convert a byte array into a string	

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Appendix 4.1.11 Data Manipulation Function

# Appendix 4.1.12 Stack Operation Function

No.	Function name	Description	Remarks
1	FIFO_***	First In First Out	
2	LIFO_***	Last In First Out	

No.	Function name	Description(n can be extended up to 8)	Remarks
1	ENCO_B,W,D,L	Output a position of On bit by number	
2	DECO_B,W,D,L	Turn a selected bit on	
3	BSUM_B,W,D,L	Output a number of On bit	
4	SEG_WORD	Convert BCD/HEX into 7-segment code	
5	BMOV_B,W,D,L	Move part of a bit string	
6	INC_B,W,D,L	Increase IN data	
7	DEC_B,W,D,L	Decrease IN data	

# Appendix 4.2 GLOFA Function

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# Appendix 4.3 Array Operation Function

No.	Function name	Description	Remarks
1	ARY_MOVE	Copy array-typed data (OUT <= IN)	
2	ARY_CMP_***	Array comparison	
3	ARY_SCH_***	Array search	
4	ARY_FLL_***	Filling an array with data	
5	ARY_AVE_***	Find an average of an array	
6	ARY_SFT_C_***	Array bit shift left with carry	
7	ARY_ROT_C_***	Bit rotation of array with carry	
8	SHIFT_A_***	Shift array elements	
9	ROTATE_A_***	Rotates array elements	

# Appendix 4.4 Basic Function Block

# Appendix 4.4.1 Bistable Function Block

No.	Function block name	Description	Remarks
1	SR	Set preference bistable	
2	RS	Reset preference bistable	
3	SEMA	Semaphore	

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### Appendix 4.4.2 Edge Detection Function Block

No.	Function block name	Description	Remarks
1	R_TRIG	Rising edge detector	
2	F_TRIG	Falling edge detector	
3	FF	Reverse output if input condition rises	

### Appendix 4.4.3 Counter

No.	Function block name	Description	Remarks
1	CTU_***	Up Counter	
1		INT,DINT,LINT,UINT,UDINT,ULINT	
2	CTD_***	Down Counter	
2		INT,DINT,LINT,UINT,UDINT,ULINT	
3	CTUD_***	Up Down Counter	
3		INT,DINT,LINT,UINT,UDINT,ULINT	
4	CTR	Ring Counter	

### Appendix 4.4.4 Timer

No.	Function block name	Description	Remarks
1	TP	Pulse Timer	
2	TON	On-Delay Timer	
3	TOF	Off-Delay Timer	
4	TMR	Integrating Timer	
5	TP_RST	TP with reset	
6	TRTG	Retriggerable Timer	
7	TOF_RST	TOF with reset	
8	TON_UINT	TON with integer setting	
9	TOF_UINT	TOF with integer setting	
10	TP_UINT	TP with integer setting	
11	TMR_UINT	TMR with integer setting	
12	TMR_FLK	Blink timer	
13	TRTG_UINT	Integer setting retriggerable timer	

### Appendix 4.4.5 File Function Block

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No.	Function block name	Description	Remarks
1	EBREAD	Read R area data from flash area	
2	EBWRITE	Write R area data to flash area	

### Appendix 4.4.6 Other Function Block

No.	Function block name	Description	Remarks
1	SCON	Step Controller	
2	DUTY	Scan setting On/Off	
3	RTC_SET	Write time data	

# Appendix 4.4.7 Special Function Block

No	. Function block name	Description	Remarks
1	GET	Read special module data	
2	PUT	Write special module data	
3	ARY_GET	Read special module data(array)	
4	ARY_PUT	Write special module data(array)	

No.	Function block name	Description	Remarks
1	APM_ORG	Return to original point run	
2	APM_FLT	Floating original point setting	
3	APM_DST	Direct run	
4	APM_IST	Indirect run	
5	APM_LIN	Linear interpolation run	
6	APM_SST	Simultaneous run	
7	APM_VTP	Speed/position control conversion	
8	APM_PTV	Position/speed control conversion	
9	APM_STP	Decelerating stop	
10	APM_SSP	Position synchronization	
11	APM_SSSB	Speed synchronization	
12	APM_POR	Position override	
13	APM_SOR	Speed override	
14	APM_PSO	Positioning speed override	
15	APM_INC	Inching run	
16	APM_SNS	Run step no. change	
17	APM_MOF	M code cancel	
18	APM_PRS	Present position preset	
19	APM_SIP	Input signal parameter setting	
20	APM_EMG	Emergency stop	
21	APM_RST	Error reset/output prohibition cancel	
22	APM_WRT	Saving parameter/run data	

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# Appendix 4.4.10 Positioning Function Block

No.	Function name	Description	Remarks
1	FOR		
2	NEXT	Repeat a block of FOR ~ NEXT n times	
3	BREAK	Escape a block of FOR ~ NEXT	
4	CALL	Call a SBRT routine	
5	SBRT	Assign a routine to be called by the CALL function	
6	RET	RETURN	
7	JMP	Jump to a place of LABLE	
8	INIT_DONE	Terminate an initial task	
9	END	Terminate a program	

# Appendix 4.5 Expanded Function

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## 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**

LSIS Co.,Ltd. supports and observes the environmental policy as below.

Environmental Management	About Disposal
LSIS considers the environmental preservation as the preferential management subject and every staff of LSIS use the reasonable endeavors for the pleasurably environmental preservation of the earth.	LSIS' PLC unit is designed to protect the environment. For the disposal, separate aluminum, iron and synthetic resin (cover) from the product as they are reusable.



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