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Programmable Logic Control

# Diagnostic Digital I/O Module

XGT Series

User Manual

XGI-D21D

XGQ-RY1D



## Safety Instructions

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

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## Before using the product ...

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



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



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



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

- ▶ The marks displayed on the product and in the user’s manual have the following meanings.
  -  Be careful! Danger may be expected.
  -  Be careful! Electric shock may occur.
- ▶ The user’s manual even after read shall be kept available and accessible to any user of the product.

## Safety Instructions when designing

### Warning

- ▶ **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

### **Caution**

- ▶ **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

### **Caution**

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

## Safety Instructions when wiring

### **Warning**

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

### **Caution**

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

## Safety Instructions for test-operation or repair

### **Warning**

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

### **Caution**

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

## Safety Instructions for waste disposal

### **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	Chapter
V 1.0	'14. 5	First Edition	-
V 1.1	'20. 5	LSIS to change its corporate name to LS ELECTRIC	Entire



## About User's Manual

Thank you for purchasing PLC of LS ELECTRIC Co., Ltd.

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

The 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 (<http://www.lselectric.co.kr/>) and download the information as a PDF file.

### Relevant User's Manuals

Title	Description
XG5000 User's Manual (for XGK, XGB)	XG5000 software user manual describing online function such as programming, print, monitoring, debugging by using XGK, XGB CPU.
XG5000 User's Manual (for XGI, XGR)	XG5000 software user manual describing online function such as programming, print, monitoring, debugging by using XGI, XGR CPU.
XGK/XGB Instructions & Programming User's Manual	User's manual for programming to explain how to use instructions that are used PLC system with XGK, XGB CPU.
XGI/XGR/XEC Instructions & Programming User's Manual	User's manual for programming to explain how to use instructions that are used PLC system with XGI, XGR, XEC CPU.
XGK CPU User's Manual (XGK-CPUA/E/H/S/U)	XGK-CPUA/CPUE/CPUH/CPUS/CPUU user manual describing about XGK CPU module, power module, base, IO module, specification of extension cable and system configuration, EMC standard.
XGI CPU User's Manual (XGI-CPUU/CPUH/CPUS)	XGI-CPUU/CPUH/CPUS user manual describing about XGI CPU module, power module, base, IO module, specification of extension cable and system configuration, EMC standard.
XGR Redundant Series User's Manual	XGR- CPUH/F, CPUH/T user manual describing about XGR CPU module, power module, extension drive, base, IO module, specification of extension cable and system configuration, EMC standard.
XG-PM User's Manual	XG-PM software user manual describing online function such as motion programming, monitoring, debugging by using Motion Control Module.

Current XGI-D21D, XGQ-RY1D manual is written based on the following version.

### Related OS version list

Product name	OS version
XGK-CPUH, CPUS, CPUA, CPUE, CPUU	V4.2
XGI-CPUU/D, CPUU, CPUH, CPUS, CPUE	V3.80
XGR-CPUH/F, CPUH/T	V2.50
XG5000(XG-PD)	V3.70



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# Chapter 1 Introduction

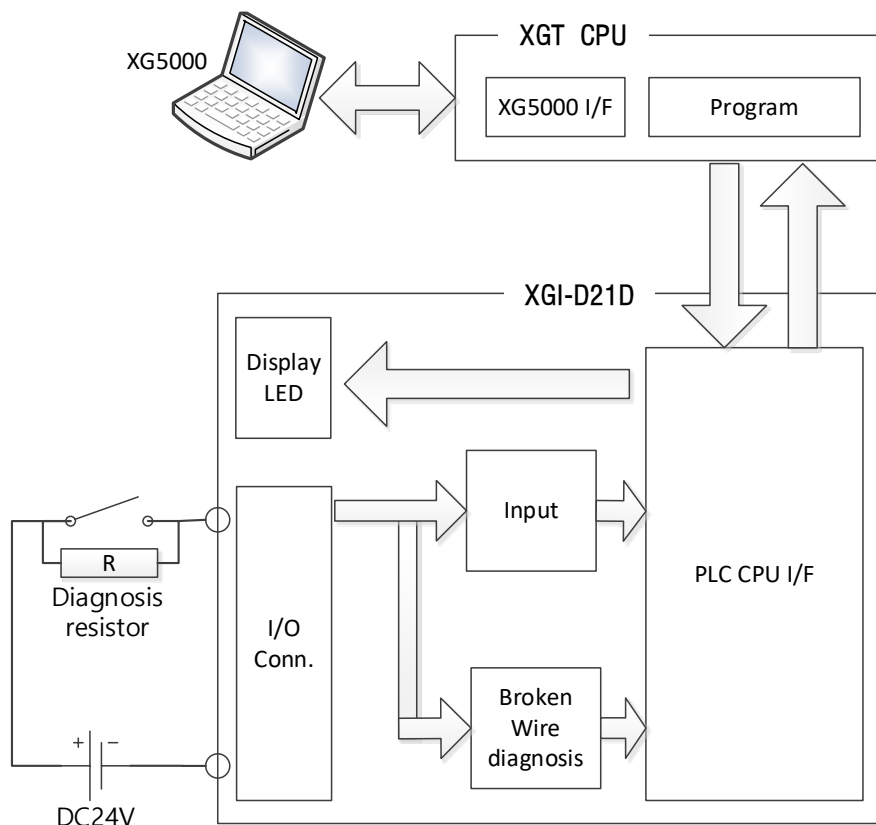
## 1.1 Features of Diagnostic Digital Input / Output Module

This user manual describes Diagnostic Digital Input / Output Module of XGK/I/R PLC

### 1.1.1 Diagnostic Digital Input Module

Diagnostic Digital Input module receives and processes DC 24V input signal. It has a wire break detection function of each input signal.

Input signal and wire break detection signal are displayed on the device of the CPU module, it can be used in the PLC program.



[Figure 1.1] Diagnostic digital input module system configuration

In order to operate wire break detection function normally, you must connect the diagnostic resistor in parallel with the input device installed in the wiring, as shown in Figure 1.1.



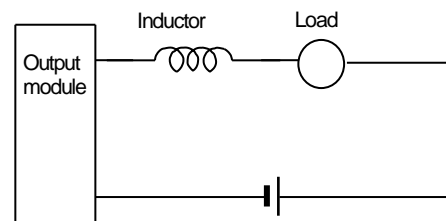
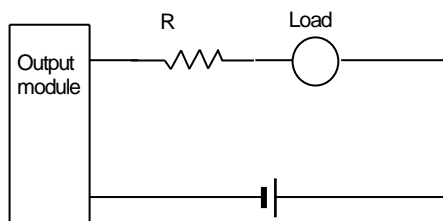
### 1.2 Cautions for Selecting Module

It describes the cautions when selecting digital I/O modules.

- 1) There are two digital input types; current sink input and current source input

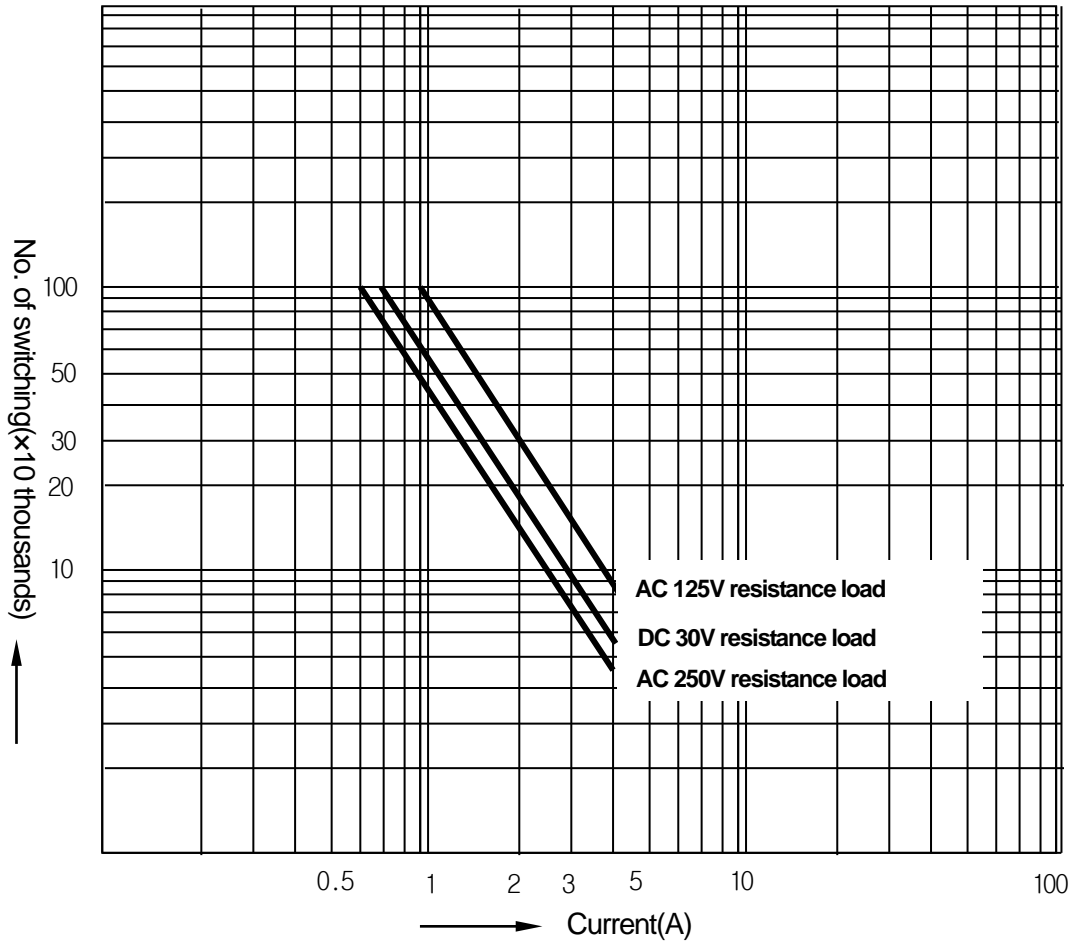
Since the wiring method of external input power varies in a DC input module, it should be selected considering the specifications of input connectors.

- 2) The max. simultaneous input point varies depending on a module type. That is, it may be different, depending on input voltage and ambient temperature. Please review the specifications of input module to apply before use.
- 3) In case of an application for highly frequent switching or inductive load switching, the relay output module may have a shorter life, so it needs a transistor module or triac output module, instead of it.
- 4) If an output module operates an inductive load(L), the max. On/Off frequency should be limited to On per 1 second and Off per 1 second, each.
- 5) In case a counter timer using DC/DC converter is used as a load in an output module, setting the average current may cause a trouble because it may have inrush current in case of On or a certain cycle during operation. Therefore, if using the foresaid load, it is necessary to connect resistance or inductor parallel to load or alternatively use a module of which max. load current is large.

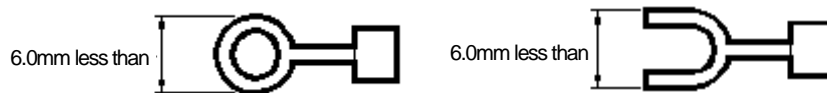


6) The following figure shows the relay life of relay output module.

It also shows the max. life of relay used for relay output.



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



- 8) The cable size connected to a terminal strip should be 0.3~0.75 mm<sup>2</sup> stranded cable and 2.8 mm thick. The cable may have different current allowance depending on the insulation thickness.
- 9) 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



## Chapter 2 Specifications and Functions

### 2.1 General Specifications

General specifications of XGT series are as shown in Table 2.1.

No.	Items	Specification	Reference			
1	Ambient Temp.	0 ~ 55 °C				
2	Storage Temp.	-25 ~ +70 °C				
3	Ambient humidity	5 ~ 95%RH (Non-condensing)				
4	Storage humidity	5 ~ 95%RH (Non-condensing)				
5	Vibration	Occasional vibration			-	IEC61131-2 (IEC60068-2-6)
		Frequency	Acceleration	Pulse width	Times	
		$5 \leq f < 8.4\text{Hz}$	-	3.5 mm	10 times each direction (X,Y and Z)	
		$8.4 \leq f \leq 150\text{Hz}$	9.8m/s <sup>2</sup> (1G)	-		
		Continuous vibration				
		Frequency	Acceleration	Pulse width		
		$5 \leq f < 8.4\text{Hz}$	-	1.75 mm		
$8.4 \leq f \leq 150\text{Hz}$	4.9m/s <sup>2</sup> (0.5G)	-				
6	Shocks	<ul style="list-style-type: none"> <li>• Peak acceleration : 147 m/s<sup>2</sup>(15G)</li> <li>• Duration : 11ms</li> <li>• Pulse wave type : Half-sine (3 times each direction per each axis)</li> </ul>	IEC61131-2 (IEC60068-2-27)			
7	Impulse noise	Square wave impulse noise	AC : ±1.500V, 1 μs DC : ±900V	LSIS internal test spec.		
		Electrostatic discharge	Voltage: 4kV (Contact discharge)	IEC61131-2 IEC61000-4-2		
		Radiated electromagnetic field noise	80 ~ 1000 MHz, 10V/m	IEC61131-2, IEC61000-4-3		
		Fast transient /Burst noise	Classification Voltage	Power supply 2kV	Digital/Analog Input/Output, Communication Interface 1kV	IEC61131-2 IEC61000-4-4
8	Operation mbience	Free from corrosive gases and excessive dust				
9	Altitude	Less than 2,000m				
10	Pollution degree	Less than 2				
11	Cooling method	Air-cooling				

[Table 2.1] General Specifications

#### Notes

**1) IEC (International Electromechanical Commission)**

: An international civil community that promotes international cooperation for standardization of electric/ electro technology, publishes international standard and operates suitability assessment system related to the above.

**2) Pollution Degree**

: An index to indicate the pollution degree of used environment that determines the insulation performance of the device. For example, pollution degree 2 means the state to occur the pollution of non-electric conductivity generally, but the state to occur temporary electric conduction according to the formation of dew.

## 2.2 Performance Specifications

### 2.2.1 Performance specifications of diagnostic digital Input module (XGI-D21D)

Table 2.2 shows performance specifications of XGI-D21D.

Item		Specifications
Input point		8 points
Insulation method		Photo coupler insulation
Rated input voltage / current		DC24V / Approx. 8mA
Voltage range		DC20.4~28.8V (5% and lower ripple rate)
On voltage / On current		19V and higher / 5.2mA and higher
Off voltage / On current		11V and lower / 4.7mA and lower
Response time (Input filter)	Off -> On	1ms/3ms/5ms/10ms/20ms/70ms/100ms, Initial value:3ms
	On -> Off	1ms/3ms/5ms/10ms/20ms/70ms/100ms, Initial value:3ms
Insulation withstand voltage		DC 500V
Insulation resistance		10 MΩ and higher by Insulation ohmmeter
Diagnosis function		Wire break detection
Common method		8 point / 1COM
Suitable cable size		Stranded cable between 0.3~0.75 mm <sup>2</sup> (2.8mm and smaller outer dia.)
Suitable clamped terminal		R1.25-3 (Sleeve built-in clamped terminal is not available)
Current consumption(mA)		60mA
Operation display		LED On with input On LED On during wire break
External connection method		9 point Terminal strip connector (M3 X 6 screws)
Weight		95g

[Table 2.2] performance specifications of XGI-D21D

### 2.2.2 Performance specifications of diagnostic digital Output module (XGQ-RY1D)

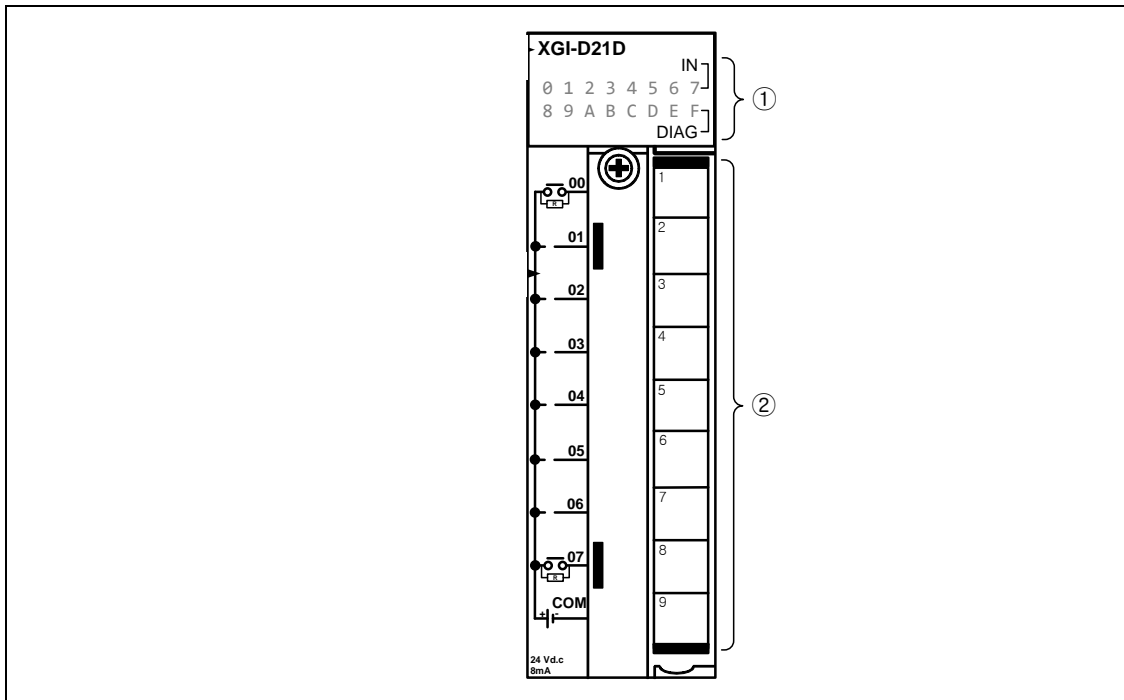
Table 2.3 shows performance specifications of XGQ-RY1D.

Item		Specifications
Output point		8 points
Insulation method		Relay insulation Photo coupler insulation
Rated load voltage		DC24V (resistance load) / AC220V (COS $\Psi$ = 1)
Rated load current	1point	2A
	Common	5A
Min. load voltage / current		DC5V / 1mA
Max. load voltage / current		AC250V, DC125V / 2A
Leakage current at Off		0.1mA (AC220V, 60Hz)
Max. switching frequency		1,800 times/hour
Surge killer		None
Life	Mechanical	20 million and more times
	Electrical	Rated load voltage/current 100 thousand and more times
		AC200V / 1.5A, AC240V / 1A (COS $\Psi$ = 0.7) 100 thousand and more times
		AC200V / 1A, AC240V / 0.5A (COS $\Psi$ = 0.35) 100 thousand and more times
	DC24V / 1A, DC100V / 0.1A (L / R = 7ms) 100 thousand and more times	
Response time	Off -> On	10ms and lower
	On -> Off	12ms and lower
Diagnosis function		Wire break detection Internal output signal diagnosis
Common method		8 point/1COM
Current consumption(mA)		Max. 400mA
Operation display		LED On with output On LED On during wire break LED On when the internal output signal fail
External connection method		9 point Terminal strip connector (M3 X 6 screws)
Weight		145g

[Table 2.3] performance specifications of XGQ-RY1D

2.3 Names and Functions of Parts

2.3.1 Names and Functions of parts of diagnostic digital Input module (XGI-D21D)



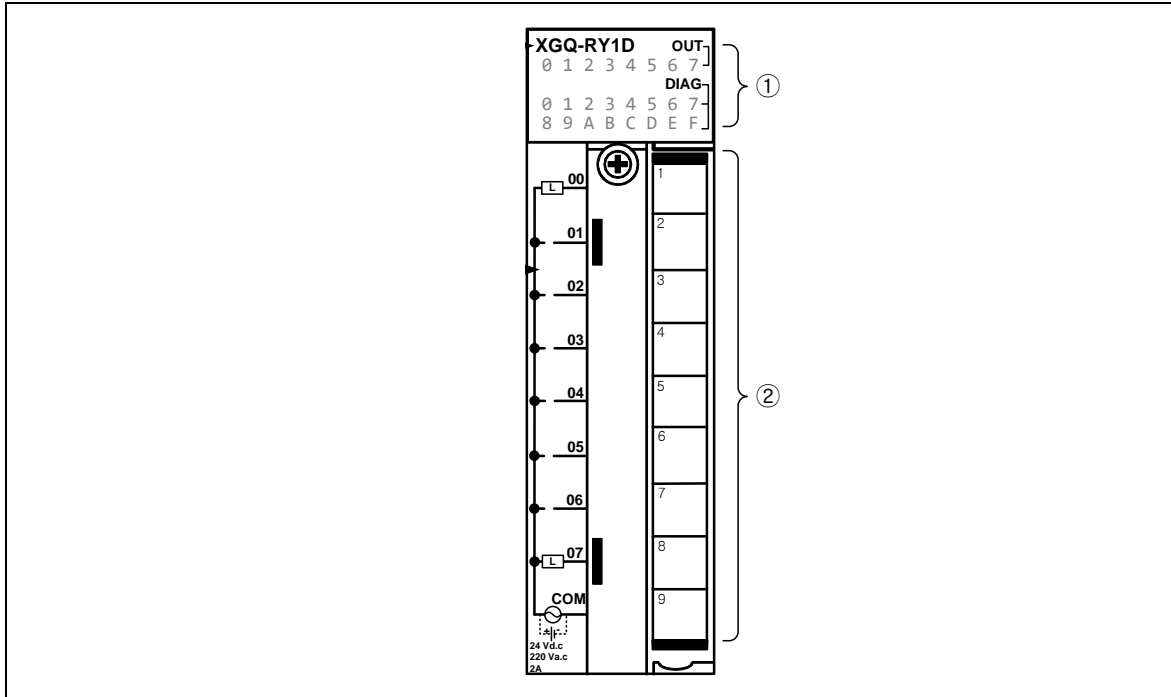
No.	Name	Description
①	LED Display	1. IN : Input status (0 ~ 7) ▶ On : Input On ▶ Off : Input Off  2. DIAG : Diagnosis status (8 ~ F) ▶ On : broken wire occurs ▶ Off : Normal state
②	Input wiring connector	Connector for input wiring

**Note**

Refer to **Chapter 2.4 Functions of diagnostic digital I/O module** in this manual for Internal Memory Configuration and LED Display.

Refer to **Chapter 3.3 Wiring** in this manual for Wiring of diagnostic digital Input module.

2.3.2 Names and Functions of parts of diagnostic digital Output module (XGQ-RY1D)



번호	명칭	내용
①	LED Display	1. OUT : Output status (0 ~ 7) ▶ On : Relay output On ▶ Off : Relay output Off  2. DIAG : Diagnosis status  (1) Internal output signal diagnosis (0 ~7) ▶ On : Internal output signal fail ▶ Off : Normal state  (2) Wire break detection (8 ~ F) ▶ On : broken wire occurs ▶ Off : Normal state
②	Output wiring connector	Connector for output wiring

**Note**  
 Refer to **Chapter 2.4 Chapter 2.4 Functions of diagnostic digital I/O module** in this manual for Internal Memory Configuration and LED Display.  
 Refer to **Chapter 3.3 Wiring** in this manual for Wiring of diagnostic digital output module.

**2.4 Functions of diagnostic digital I/O module**

**2.4.1 Functions of diagnostic digital input module**

1) Input function

The digital input signal is received from the external to contact point, and then it is displayed in the input device of the CPU module.

2) Wire break detection

If broken wire occurs, it is displayed in the diagnosis device of the CPU module.

- Diagnostic resistor

In order to detect broken wire, you need to connect a diagnostic resistor in parallel with the input signal device.

Please use **10KΩ 1/4W** diagnostic resistance value.

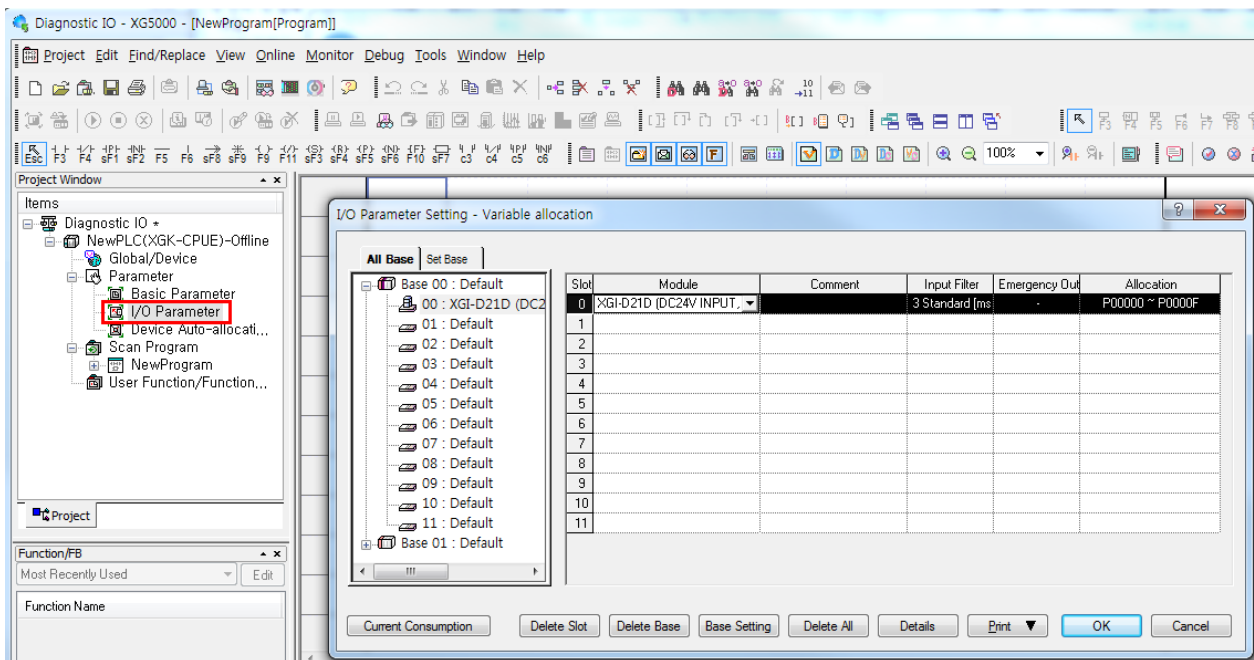
**Note**  
Refer to **Chapter 3.3 Wiring** in this manual for Wiring of diagnostic digital Input module.

3) Input filter function

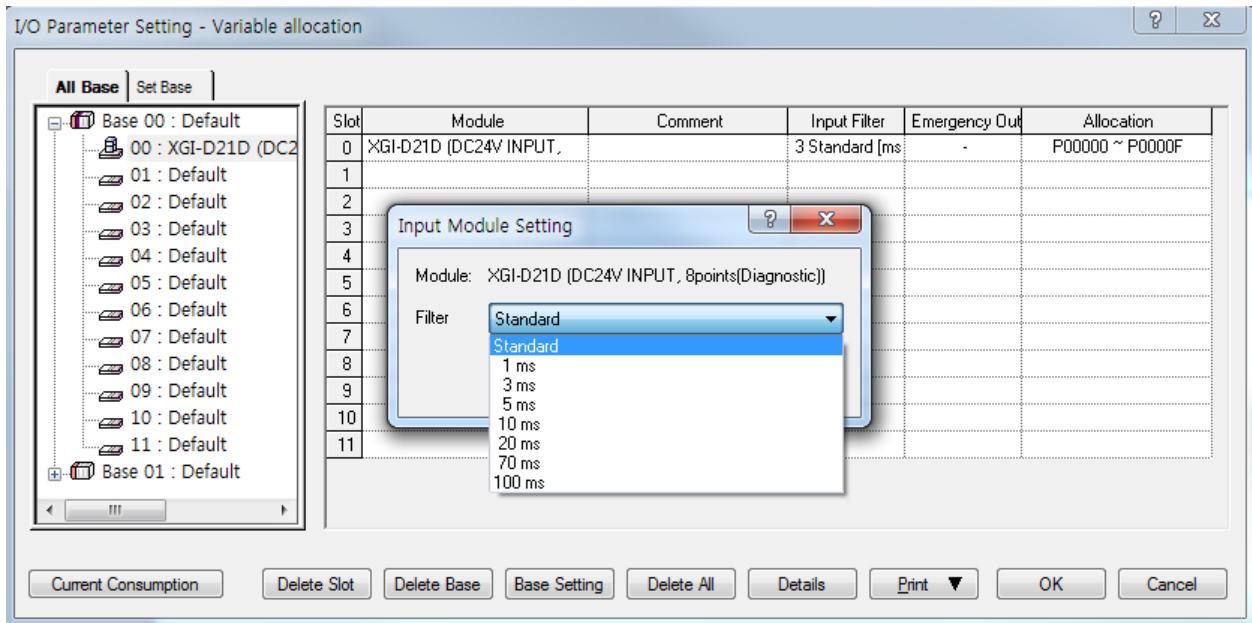
Digital input module is able to set input filter about input signal.

The range of values of the input filter user-settable is 1ms ~ 100ms. The setting method is as follows.

(1) Double-click [I / O Parameter] in 'project window'.



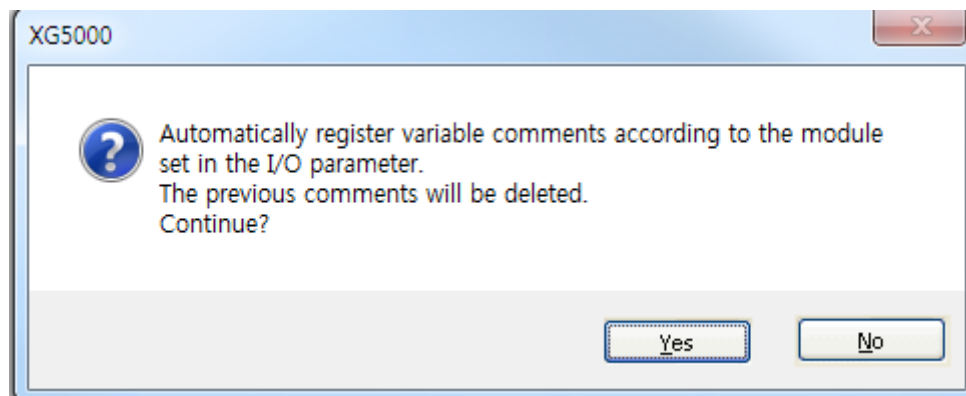
- (2) Double-click XGI-D21D module slot in 'I/O Parameter Setting' and then you can set filter time value in 'Input Module Setting'. If 'Standard' is selected, it operates the value setting in [Basic Parameter].



#### 4) Internal Memory Configuration

Diagnostic digital input module can be accessed through Input device. It provides [Register Module Variable Comments] function in XG5000.

- (1) After setting the module, Click 'OK' or [Edit] - [Register Module Variable Comments].  
Then click 'Yes' to register in the pop-up window as below.



(2) Double-click [Variable/Comment] in 'project window', variables are registered in the window as below.

	Variable	Type	Device	Used	Comment
1	_0000_CH0_IN	BIT	P00000	<input type="checkbox"/>	Diagnostic DC Input Module: Input 0
2	_0000_CH1_IN	BIT	P00001	<input type="checkbox"/>	Diagnostic DC Input Module: Input 1
3	_0000_CH2_IN	BIT	P00002	<input type="checkbox"/>	Diagnostic DC Input Module: Input 2
4	_0000_CH3_IN	BIT	P00003	<input type="checkbox"/>	Diagnostic DC Input Module: Input 3
5	_0000_CH4_IN	BIT	P00004	<input type="checkbox"/>	Diagnostic DC Input Module: Input 4
6	_0000_CH5_IN	BIT	P00005	<input type="checkbox"/>	Diagnostic DC Input Module: Input 5
7	_0000_CH6_IN	BIT	P00006	<input type="checkbox"/>	Diagnostic DC Input Module: Input 6
8	_0000_CH7_IN	BIT	P00007	<input type="checkbox"/>	Diagnostic DC Input Module: Input 7
9	_0000_CH0_DIA	BIT	P00008	<input type="checkbox"/>	Diagnostic DC Input Module: Input 0 Wire Break
10	_0000_CH1_DIA	BIT	P00009	<input type="checkbox"/>	Diagnostic DC Input Module: Input 1 Wire Break
11	_0000_CH2_DIA	BIT	P0000A	<input type="checkbox"/>	Diagnostic DC Input Module: Input 2 Wire Break
12	_0000_CH3_DIA	BIT	P0000B	<input type="checkbox"/>	Diagnostic DC Input Module: Input 3 Wire Break
13	_0000_CH4_DIA	BIT	P0000C	<input type="checkbox"/>	Diagnostic DC Input Module: Input 4 Wire Break
14	_0000_CH5_DIA	BIT	P0000D	<input type="checkbox"/>	Diagnostic DC Input Module: Input 5 Wire Break
15	_0000_CH6_DIA	BIT	P0000E	<input type="checkbox"/>	Diagnostic DC Input Module: Input 6 Wire Break
16	_0000_CH7_DIA	BIT	P0000F	<input type="checkbox"/>	Diagnostic DC Input Module: Input 7 Wire Break

(3) Memory and variables that are automatically registered in XGK and XGI / XGR series are as below.  
(Base 0, Slot 0)

– XGK series

bit No.	LED Display	function	Variable	Memory assignment	Contents
bit0	0	Input 0	_00_IN0	P00000	Diagnostic DC Input Module: Input 0
bit1	1	Input 1	_00_IN1	P00001	Diagnostic DC Input Module: Input 1
bit2	2	Input 2	_00_IN2	P00002	Diagnostic DC Input Module: Input 2
bit3	3	Input 3	_00_IN3	P00003	Diagnostic DC Input Module: Input 3
bit4	4	Input 4	_00_IN4	P00004	Diagnostic DC Input Module: Input 4
bit5	5	Input 5	_00_IN5	P00005	Diagnostic DC Input Module: Input 5
bit6	6	Input 6	_00_IN6	P00006	Diagnostic DC Input Module: Input 6
bit7	7	Input 7	_00_IN7	P00007	Diagnostic DC Input Module: Input 7
bit8	8	Diagnosis 0	_00_IN0_DIAG	P00008	Diagnostic DC Input Module: Input 0 Wire Break
bit9	9	Diagnosis 1	_00_IN1_DIAG	P00009	Diagnostic DC Input Module: Input 1 Wire Break
bit10	A	Diagnosis 2	_00_IN2_DIAG	P0000A	Diagnostic DC Input Module: Input 2 Wire Break
bit11	B	Diagnosis 3	_00_IN3_DIAG	P0000B	Diagnostic DC Input Module: Input 3 Wire Break
bit12	C	Diagnosis 4	_00_IN4_DIAG	P0000C	Diagnostic DC Input Module: Input 4 Wire Break
bit13	D	Diagnosis 5	_00_IN5_DIAG	P0000D	Diagnostic DC Input Module: Input 5 Wire Break
bit14	E	Diagnosis 6	_00_IN6_DIAG	P0000E	Diagnostic DC Input Module: Input 6 Wire Break
bit15	F	Diagnosis 7	_00_IN7_DIAG	P0000F	Diagnostic DC Input Module: Input 7 Wire Break

## Chapter 2. Specifications and Functions

– XGI/XGR series

bit No.	LED Display	function	Variable	Memory assignment	Contents
bit0	0	Input 0	_0000_IN0	%IX0.0.0	Diagnostic DC Input Module: Input 0
bit1	1	Input 1	_0000_IN1	%IX0.0.1	Diagnostic DC Input Module: Input 1
bit2	2	Input 2	_0000_IN2	%IX0.0.2	Diagnostic DC Input Module: Input 2
bit3	3	Input 3	_0000_IN3	%IX0.0.3	Diagnostic DC Input Module: Input 3
bit4	4	Input 4	_0000_IN4	%IX0.0.4	Diagnostic DC Input Module: Input 4
bit5	5	Input 5	_0000_IN5	%IX0.0.5	Diagnostic DC Input Module: Input 5
bit6	6	Input 6	_0000_IN6	%IX0.0.6	Diagnostic DC Input Module: Input 6
bit7	7	Input 7	_0000_IN7	%IX0.0.7	Diagnostic DC Input Module: Input 7
bit8	8	Diagnosis 0	_0000_IN0_DIAG	%IX0.0.8	Diagnostic DC Input Module: Input 0 Wire Break
bit9	9	Diagnosis 1	_0000_IN1_DIAG	%IX0.0.9	Diagnostic DC Input Module: Input 1 Wire Break
bit10	A	Diagnosis 2	_0000_IN2_DIAG	%IX0.0.10	Diagnostic DC Input Module: Input 2 Wire Break
bit11	B	Diagnosis 3	_0000_IN3_DIAG	%IX0.0.11	Diagnostic DC Input Module: Input 3 Wire Break
bit12	C	Diagnosis 4	_0000_IN4_DIAG	%IX0.0.12	Diagnostic DC Input Module: Input 4 Wire Break
bit13	D	Diagnosis 5	_0000_IN5_DIAG	%IX0.0.13	Diagnostic DC Input Module: Input 5 Wire Break
bit14	E	Diagnosis 6	_0000_IN6_DIAG	%IX0.0.14	Diagnostic DC Input Module: Input 6 Wire Break
bit15	F	Diagnosis 7	_0000_IN7_DIAG	%IX0.0.15	Diagnostic DC Input Module: Input 7 Wire Break

2.4.2 Functions of diagnostic digital input module

1) Relay output

Diagnostic digital output module outputs output signal via the relay to the outside.

2) Diagnosis functions

Digital output module provides diagnostic functions of the following two.

- (1) Internal output signal diagnosis : Diagnosing whether internal output signal circuit is operating property.
- (2) Wire break detection : Diagnosing whether the disconnection of the external wiring connected to the relay.

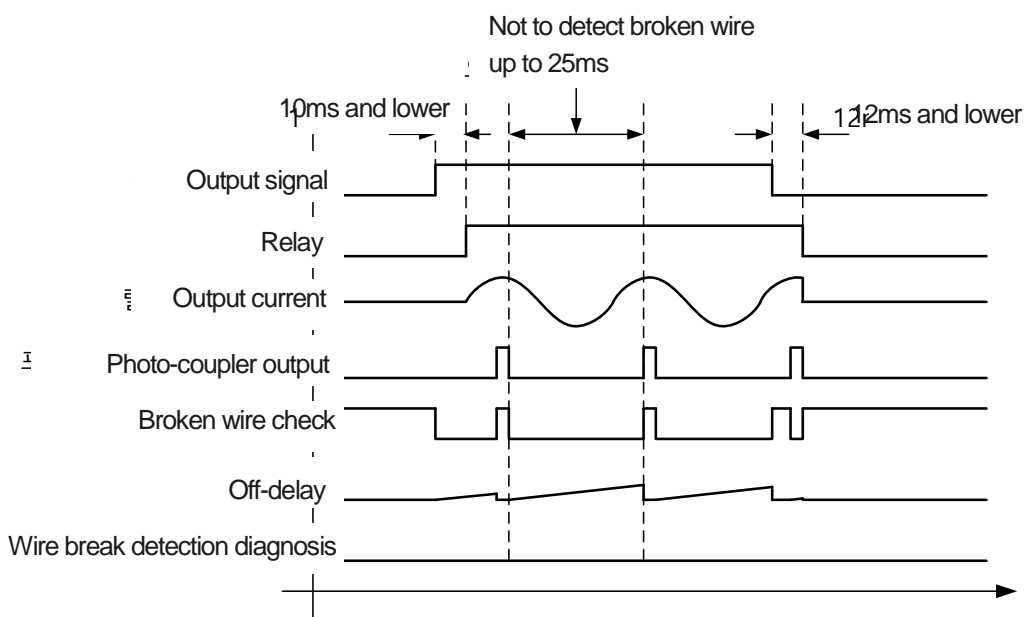
**Note**

In order to detect broken wire, minimum 10mA or higher is required to be current (LOAD) load. If a current of less than 10mA flows, it will be diagnosed with broken wire.

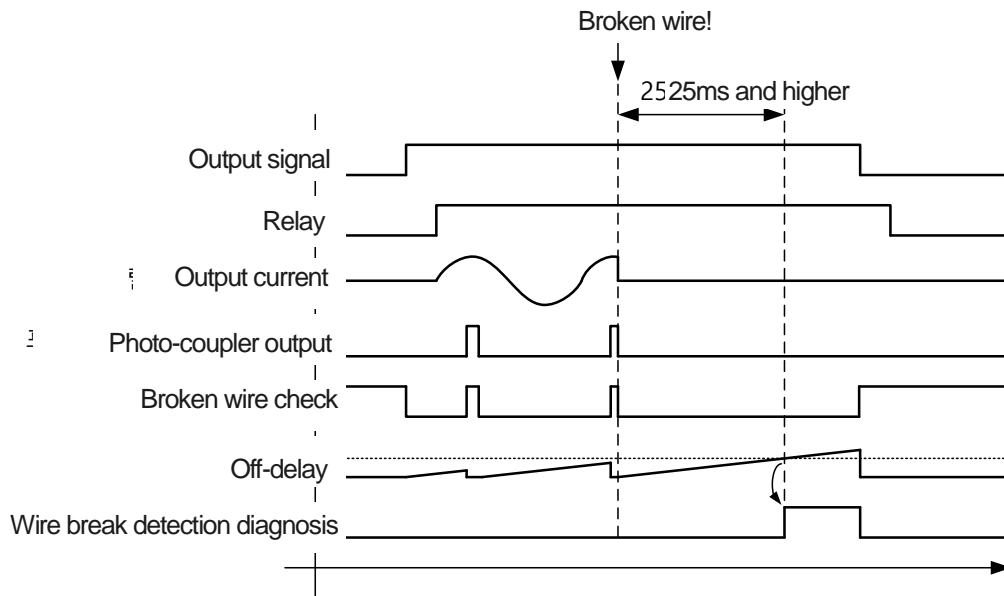
Refer to **Chapter 3.3 Wiring** in this manual for Wiring of diagnostic digital output module.

The diagnosis result depending on the situation, it is shown in the following table.

Diagnosis	Normal state		Relay failure		Internal HW failure		Broken wire	
	0	1	0	1	0	1	0	1
Output signal	0	1	0	1	0	1	0	1
Internal output signal diagnosis	0	0	1	0	0	1	0	0
Wire break detection	0	0	0	1	0	1	0	1



[Figure 2.1] Timing chart of normal state



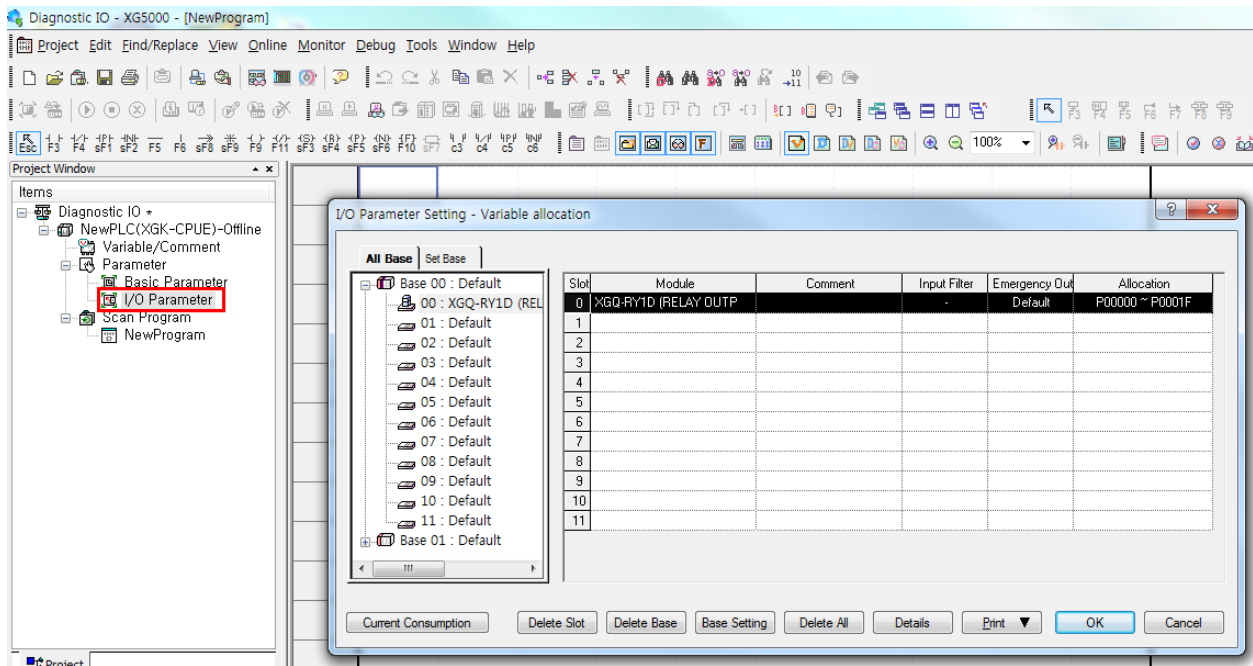
[Figure 2.2] Timing chart of broken wire

### 3) Input filter function

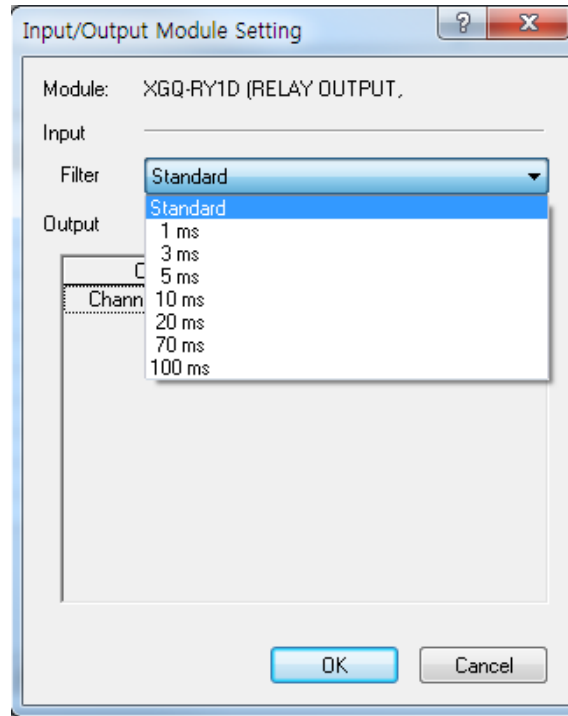
Diagnosis digital output module is able to set input filter about diagnosis signal.

The range of values of the input filter user-settable is 1ms ~ 100ms. The setting method is as follows.

(1) Double-click [I / O Parameter] in 'project window'.



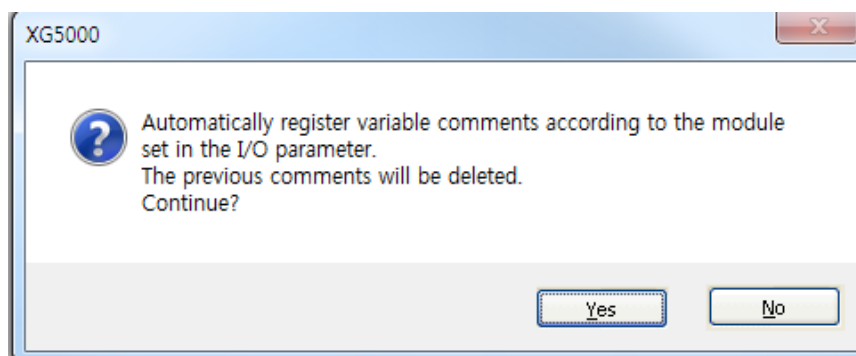
- (2) Double-click XGQ-RY1D module slot in 'I/O Parameter Setting' and then you can set filter time value in 'Input Module Setting'. If 'Standard' is selected, it operates the value setting in [Basic Parameter].



#### 4) Internal Memory Configuration

Diagnostic digital output module can be accessed through output / Input device. It provides [Register Module Variable Comments] function in XG5000.

- (1) After setting the module, Click 'OK' or [Edit] - [Register Module Variable Comments].  
Then click 'Yes' to register in the pop-up window as below.



## Chapter 2. Specifications and Functions

(2) Double-click [Variable/Comment] in 'project window', variables are registered in the window as below.

	Variable	Type	Device	Used	Comment
1	_0000_CH0_SIG_DI	BIT	P00000	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 0 Signal Fail
2	_0000_CH1_SIG_DI	BIT	P00001	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 1 Signal Fail
3	_0000_CH2_SIG_DI	BIT	P00002	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 2 Signal Fail
4	_0000_CH3_SIG_DI	BIT	P00003	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 3 Signal Fail
5	_0000_CH4_SIG_DI	BIT	P00004	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 4 Signal Fail
6	_0000_CH5_SIG_DI	BIT	P00005	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 5 Signal Fail
7	_0000_CH6_SIG_DI	BIT	P00006	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 6 Signal Fail
8	_0000_CH7_SIG_DI	BIT	P00007	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 7 Signal Fail
9	_0000_CH0_LINE_D	BIT	P00008	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 0 Wire Break
10	_0000_CH1_LINE_D	BIT	P00009	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 1 Wire Break
11	_0000_CH2_LINE_D	BIT	P0000A	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 2 Wire Break
12	_0000_CH3_LINE_D	BIT	P0000B	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 3 Wire Break
13	_0000_CH4_LINE_D	BIT	P0000C	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 4 Wire Break
14	_0000_CH5_LINE_D	BIT	P0000D	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 5 Wire Break
15	_0000_CH6_LINE_D	BIT	P0000E	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 6 Wire Break
16	_0000_CH7_LINE_D	BIT	P0000F	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 7 Wire Break
17	_0000_CH0_OUT	BIT	P00010	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 0
18	_0000_CH1_OUT	BIT	P00011	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 1
19	_0000_CH2_OUT	BIT	P00012	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 2
20	_0000_CH3_OUT	BIT	P00013	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 3
21	_0000_CH4_OUT	BIT	P00014	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 4
22	_0000_CH5_OUT	BIT	P00015	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 5
23	_0000_CH6_OUT	BIT	P00016	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 6
24	_0000_CH7_OUT	BIT	P00017	<input type="checkbox"/>	Diagnostic Relay Output Module: Output 7

(3) Memory and variables that are automatically registered in XGK and XGI / XGR series are as below.  
(Base 0, Slot 0)

– XGK series

bit No.	LED Display	function	Variable	Memory assignment	Contents
bit0	0 (DIAG)	Interal output signal 1	_00_OUT0_RY_DIAG	P00000	Diagnostic Relay Output Module: Output 0 Signal Fail
bit1	1 (DIAG)	Interal output signal 2	_00_OUT1_RY_DIAG	P00001	Diagnostic Relay Output Module: Output 1 Signal Fail
bit2	2 (DIAG)	Interal output signal 3	_00_OUT2_RY_DIAG	P00002	Diagnostic Relay Output Module: Output 2 Signal Fail
bit3	3 (DIAG)	Interal output signal 4	_00_OUT3_RY_DIAG	P00003	Diagnostic Relay Output Module: Output 3 Signal Fail
bit4	4 (DIAG)	Interal output signal 5	_00_OUT4_RY_DIAG	P00004	Diagnostic Relay Output Module: Output 4 Signal Fail
bit5	5 (DIAG)	Interal output signal 6	_00_OUT5_RY_DIAG	P00005	Diagnostic Relay Output Module: Output 5 Signal Fail
bit6	6 (DIAG)	Interal output signal 7	_00_OUT6_RY_DIAG	P00006	Diagnostic Relay Output Module: Output 6 Signal Fail
bit7	7 (DIAG)	Interal output signal 8	_00_OUT7_RY_DIAG	P00007	Diagnostic Relay Output Module: Output 7 Signal Fail
bit8	8 (DIAG)	Wire break 1	_00_OUT0_LINE_DIAG	P00008	Diagnostic Relay Output Module: Output 0 Wire Break
bit9	9 (DIAG)	Wire break 2	_00_OUT1_LINE_DIAG	P00009	Diagnostic Relay Output Module: Output 1 Wire Break
bit10	A (DIAG)	Wire break 3	_00_OUT2_LINE_DIAG	P0000A	Diagnostic Relay Output Module: Output 2 Wire Break
bit11	B (DIAG)	Wire break 4	_00_OUT3_LINE_DIAG	P0000B	Diagnostic Relay Output Module: Output 3 Wire Break
bit12	C (DIAG)	Wire break 5	_00_OUT4_LINE_DIAG	P0000C	Diagnostic Relay Output Module: Output 4 Wire Break
bit13	D (DIAG)	Wire break 6	_00_OUT5_LINE_DIAG	P0000D	Diagnostic Relay Output Module: Output 5 Wire Break
bit14	E (DIAG)	Wire break 7	_00_OUT6_LINE_DIAG	P0000E	Diagnostic Relay Output Module: Output 6 Wire Break
bit15	F (DIAG)	Wire break 8	_00_OUT7_LINE_DIAG	P0000F	Diagnostic Relay Output Module: Output 7 Wire Break
bit16	0 (IN)	Output 1	_00_OUT0	P00010	Diagnostic Relay Output Module: Output 0
bit17	1 (IN)	Output 2	_00_OUT1	P00011	Diagnostic Relay Output Module: Output 1
bit18	2 (IN)	Output 3	_00_OUT2	P00012	Diagnostic Relay Output Module: Output 2
bit19	3 (IN)	Output 4	_00_OUT3	P00013	Diagnostic Relay Output Module: Output 3
bit20	4 (IN)	Output 5	_00_OUT4	P00014	Diagnostic Relay Output Module: Output 4
bit21	5 (IN)	Output 6	_00_OUT5	P00015	Diagnostic Relay Output Module: Output 5
bit22	6 (IN)	Output 7	_00_OUT6	P00016	Diagnostic Relay Output Module: Output 6
bit23	7 (IN)	Output 8	_00_OUT7	P00017	Diagnostic Relay Output Module: Output 7

## Chapter 2. Specifications and Functions

– XGI/XGR series

bit No.	LED Display	function	Variable	Memory assignment	Contents
bit0	0 (DIAG)	Interal output signal 1	_0000_OUT0_SIG_DIAG	%IX0.0.0	Diagnostic Relay Output Module: Output 0 Signal Fail
bit1	1 (DIAG)	Interal output signal 2	_0000_OUT1_SIG_DIAG	%IX0.0.1	Diagnostic Relay Output Module: Output 1 Signal Fail
bit2	2 (DIAG)	Interal output signal 3	_0000_OUT2_SIG_DIAG	%IX0.0.2	Diagnostic Relay Output Module: Output 2 Signal Fail
bit3	3 (DIAG)	Interal output signal 4	_0000_OUT3_SIG_DIAG	%IX0.0.3	Diagnostic Relay Output Module: Output 3 Signal Fail
bit4	4 (DIAG)	Interal output signal 5	_0000_OUT4_SIG_DIAG	%IX0.0.4	Diagnostic Relay Output Module: Output 4 Signal Fail
bit5	5 (DIAG)	Interal output signal 6	_0000_OUT5_SIG_DIAG	%IX0.0.5	Diagnostic Relay Output Module: Output 5 Signal Fail
bit6	6 (DIAG)	Interal output signal 7	_0000_OUT6_SIG_DIAG	%IX0.0.6	Diagnostic Relay Output Module: Output 6 Signal Fail
bit7	7 (DIAG)	Interal output signal 8	_0000_OUT7_SIG_DIAG	%IX0.0.7	Diagnostic Relay Output Module: Output 7 Signal Fail
bit8	8 (DIAG)	Wire break 1	_0000_OUT0_LINE_DIAG	%IX0.0.8	Diagnostic Relay Output Module: Output 0 Wire Break
bit9	9 (DIAG)	Wire break 2	_0000_OUT1_LINE_DIAG	%IX0.0.9	Diagnostic Relay Output Module: Output 1 Wire Break
bit10	A (DIAG)	Wire break 3	_0000_OUT2_LINE_DIAG	%IX0.0.10	Diagnostic Relay Output Module: Output 2 Wire Break
bit11	B (DIAG)	Wire break 4	_0000_OUT3_LINE_DIAG	%IX0.0.11	Diagnostic Relay Output Module: Output 3 Wire Break
bit12	C (DIAG)	Wire break 5	_0000_OUT4_LINE_DIAG	%IX0.0.12	Diagnostic Relay Output Module: Output 4 Wire Break
bit13	D (DIAG)	Wire break 6	_0000_OUT5_LINE_DIAG	%IX0.0.13	Diagnostic Relay Output Module: Output 5 Wire Break
bit14	E (DIAG)	Wire break 7	_0000_OUT6_LINE_DIAG	%IX0.0.14	Diagnostic Relay Output Module: Output 6 Wire Break
bit15	F (DIAG)	Wire break 8	_0000_OUT7_LINE_DIAG	%IX0.0.15	Diagnostic Relay Output Module: Output 7 Wire Break
bit16	0 (IN)	Output 1	_0000_OUT0	%QX0.0.16	Diagnostic Relay Output Module: Output 0
bit17	1 (IN)	Output 2	_0000_OUT1	%QX0.0.17	Diagnostic Relay Output Module: Output 1
bit18	2 (IN)	Output 3	_0000_OUT2	%QX0.0.18	Diagnostic Relay Output Module: Output 2
bit19	3 (IN)	Output 4	_0000_OUT3	%QX0.0.19	Diagnostic Relay Output Module: Output 3
bit20	4 (IN)	Output 5	_0000_OUT4	%QX0.0.20	Diagnostic Relay Output Module: Output 4
bit21	5 (IN)	Output 6	_0000_OUT5	%QX0.0.21	Diagnostic Relay Output Module: Output 5
bit22	6 (IN)	Output 7	_0000_OUT6	%QX0.0.22	Diagnostic Relay Output Module: Output 6
bit23	7 (IN)	Output 8	_0000_OUT7	%QX0.0.23	Diagnostic Relay Output Module: Output 7



# Chapter 3 Installation and Wiring

## 3.1 Installation

### 3.1.1 Installation environment

The system keeps a high reliability, irrespective of the installation environment. However, to guarantee the reliability and stability, make sure to keep the following cautions.

#### 1) Environmental conditions

- (1) Install in a control panel resisting to moisture and vibration.
- (2) Free of any continuous impact or vibration.
- (3) Not exposed to direct sunrays.
- (4) No condensation from sudden temperature fluctuation.
- (5) Ambient temperature range between 0 ~ 55°C.
- (6) Relative humidity between 5 ~ 95%.
- (7) Free of any corrosive gas or flammable gas.

#### 2) Installation construction

- (1) When boring a screw hole or executing wiring construction, any wiring impurities should not be inserted to the PLC.
- (2) The system should be installed in a place easily accessible.
- (3) Do not install the system on a same panel of a high voltage device.
- (4) It should be 50mm and more away from wiring duct or proximate modules.
- (5) Grounding on a position where noise is lower than the specified level.

#### 3) Heat protective design of control panel

- (1) 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.
- (2) Install a filter or use a closed heat exchanger.

### 3.1.2 Cautions for handling

It describes the cautions for handling from unpacking to installation.

- Please do not drop it or apply excessive force on it.
- Please do not separate PCB from the case. It may cause a trouble.
- During wiring, a special attention should be paid so that impurities such as wiring remainder should not be inserted into the top of a module. If impurities are found, immediately remove them.

#### 1) Cautions for handling I/O module

It describes the cautions for installing or handling I/O module.

##### (1) Recheck the I/O module specifications.

The input module may be affected by input voltage while the output module may be subject to breakage, destruction or a fire if the voltage over the max. switching capacity is allowed.

##### (2) Available cable type

Cable should be selected in consideration of ambient temperature and allowable current; the min. size of cable should be AWG22(0.3mm<sup>2</sup>) and higher.

##### (3) Environment

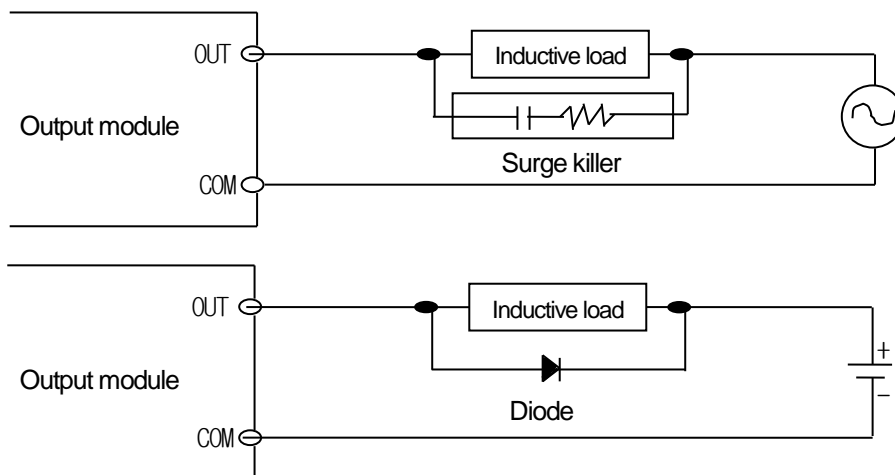
If I/O module wiring is close to heating sources or materials or the wiring is directly contacted with oils for a long time during wiring, it may cause short-circuit, destruction or malfunction.

##### (4) Polarities

Please make sure to check the polarities of modules of which terminal block is polarized before allowing the power.

##### (5) Wiring

- When I/O wiring is executed with high voltage or power cable, it may cause inductive fault, probably leading to malfunction or trouble.
  - No cable should not be arranged front of I/O operation display(LED)(I/O display may be hidden, hindering the interpretation)
  - If an output module is connected to inductive load, please make sure to connect a surge killer or diode to load in parallel.
- Please connect the cathode side of a diode to (+) of the power.



##### (6) Terminal strip

Please check the tightness of terminal strip and prevent any wiring impurities(remainder) from being inserted into the PLC when processing terminal strip wiring or screw hole making. It may cause malfunction or trouble.

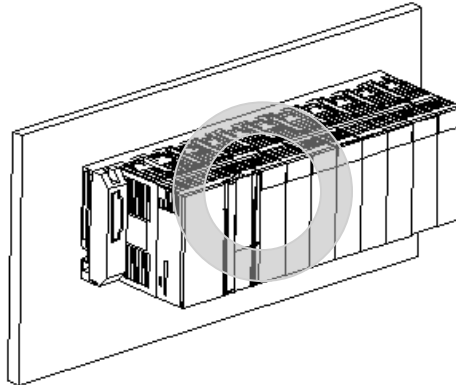
(7) Besides the above, it is prohibited to apply excessive impact on I/O module or separating PCB board from the case.

#### 2) Cautions for installing the base

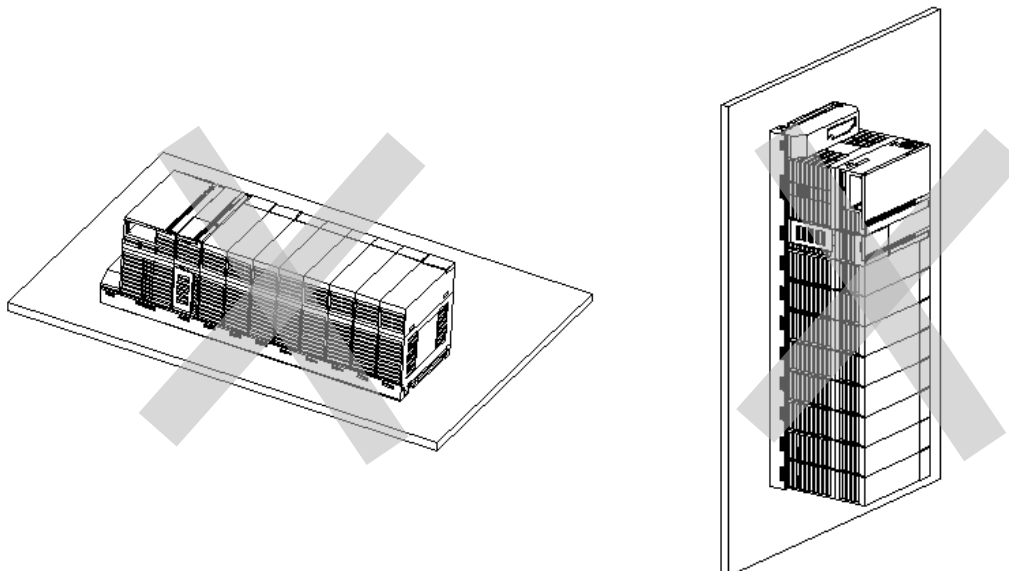
## Chapter 3. Installation and Wiring

It describes the cautions when installing the PLC on the control panel and others.

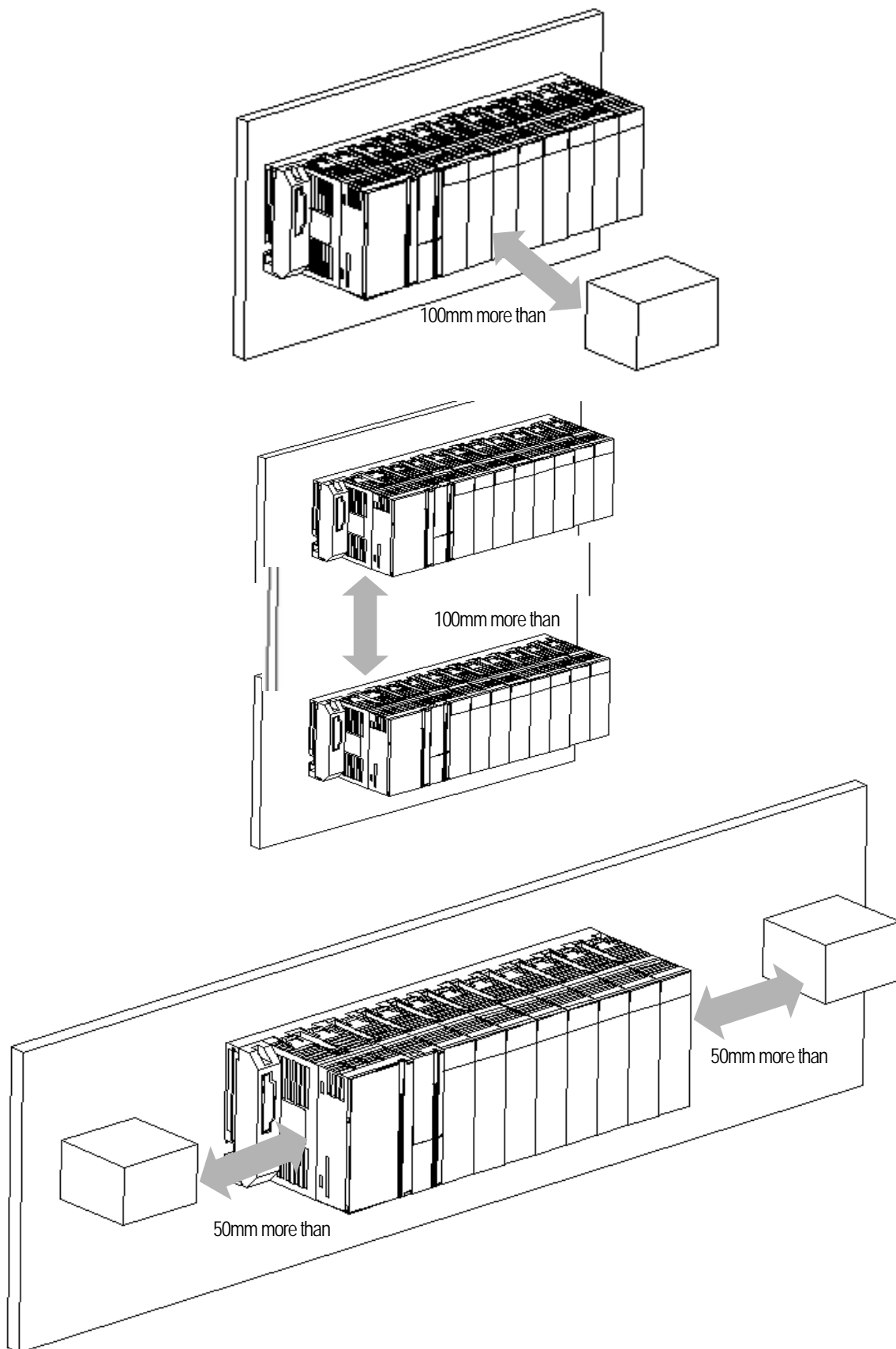
- (1) A proper distance between the top of a module and structure/parts should be secured to facilitate ventilation and module replacement.
- (2) Please do not install it vertically or horizontally for the ventilation purpose.
- (3) Please use a different panel or secure a proper distance if there is vibration source from a large electronic contact or no-fuse breaker
- (4) If necessary, please install a wiring duct. However, please keep the following cautions.
  - If installing on the top of PLC, maintain the height of a wiring duct 50mm more than for better ventilation. In addition, maintain the distance from the top of PLC so that the hook on the top of the base can be pressed.
  - If installing on the bottom of it, let optical or coaxial cable be connected and consider the minimum radius of the cable.
- (5) Please install the PLC along the well-ventilated direction as presented below for the heat prevention purpose.



- (6) Please do not install it to the direction as presented below.



(7) To avoid any influence of radiating noise or heat, please install the PLC and other devices (relay, electronic contact) with a spacing secured as presented below.



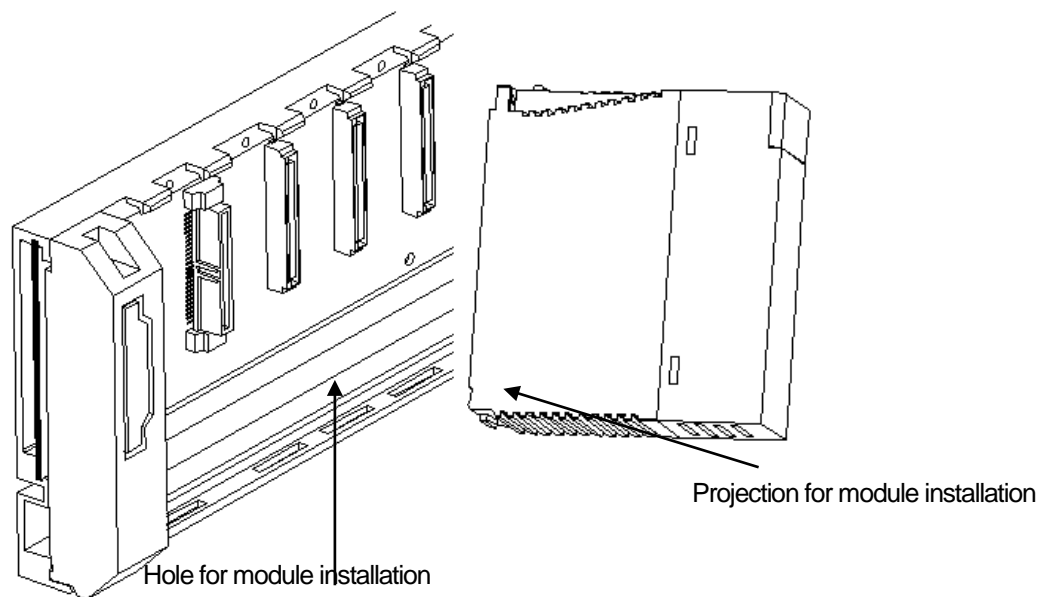
### 3.2 Attachment/Detachment of modules

#### 3.2.1 Attachment/Detachment of modules

It describes how to attach or detach a module on the base.

##### 1) Attachment

- Please insert the fixation projection on the bottom of a module to the hole of module installation of the base.
- Please fix it on the base by pushing the top of a module and tight it by using the module fixation screw.
- Please try to pull the top of a module to check whether it is tightly fixed on it.

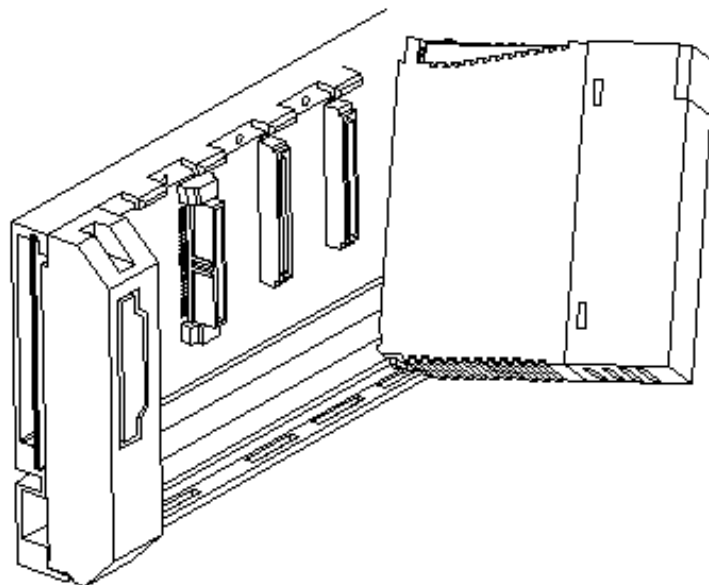
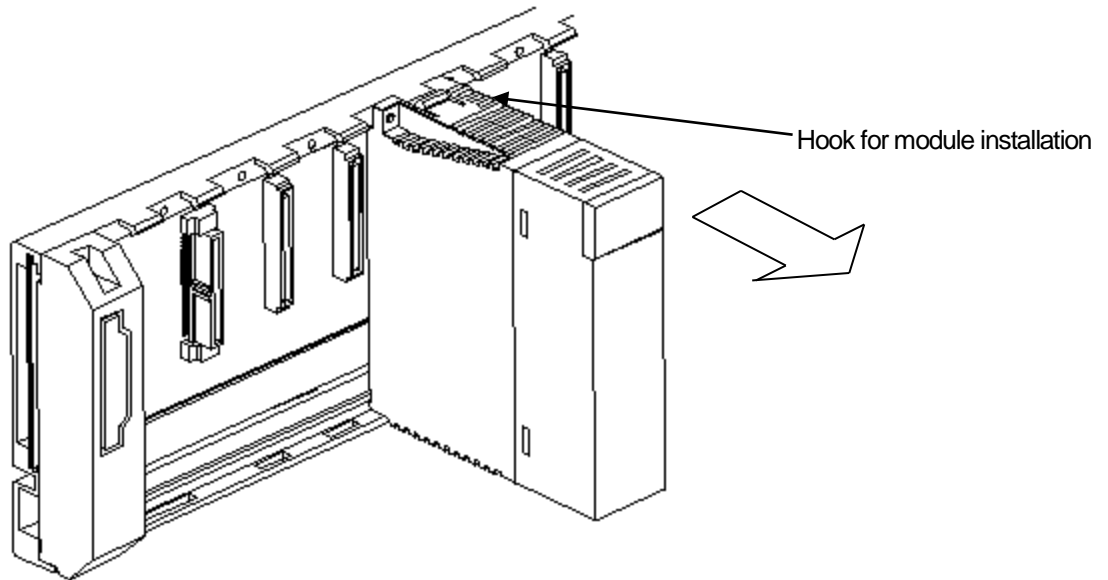


#### Note

- 1) A module should be installed by inserting the projection for module installation to the hole for module installation. If applying an excessive force, a module may be broken.

### 2) Detachment

- Please unscrew the fixation screw on the top of a module.
- Please press the hook for module installation with a module held by both hands.
- Please pull the bottom of a module toward the top while pressing the hook.
- Lifting up the module, please detach the projection for module installation from the hole for module installation.



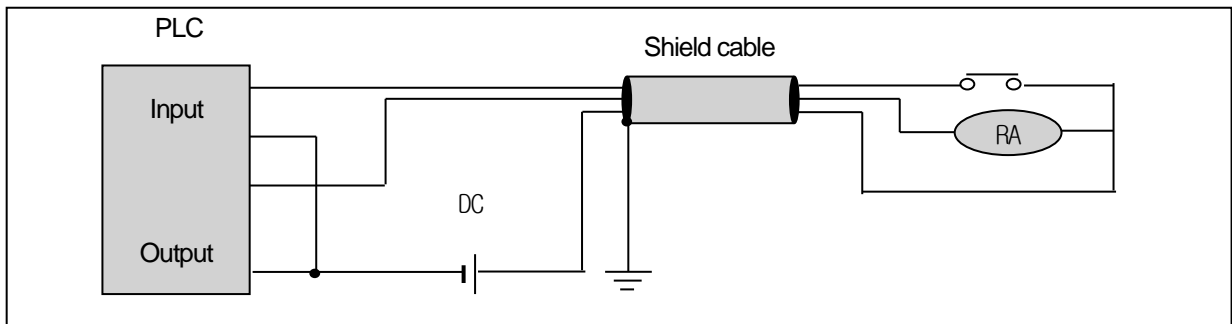
#### Note

- 1) When detaching a module, please press the hook to detach it from the base and then, isolate the projection for module installation from the hole for module installation. At the moment, if trying to detach it forcibly, the hook or projection may be damaged.

### 3.3 Wiring

#### 3.3.1 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.
- 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.
- 6) The output line of DC24V should be isolated from AC110V cable or AC220V cable.

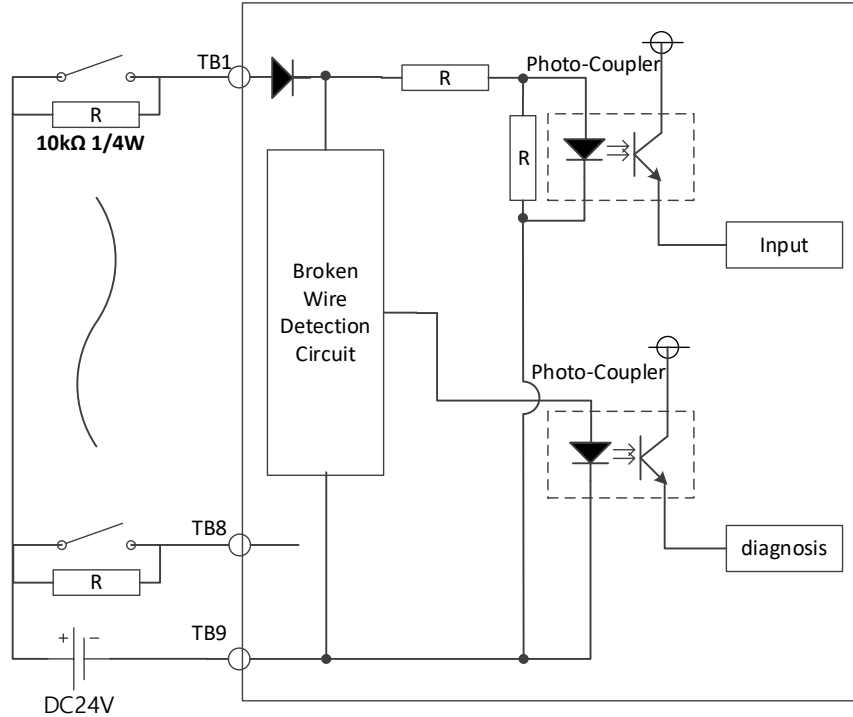
For a long distance wiring over 200m, it is expected that accident may occur due to leakage current due to inter-cable capacity.

#### 3.3.2 Specifications of wiring cable

The specifications of cable used for wiring are as follows.

Types of external connection	Cable specification (mm <sup>2</sup> )	
	Lower limit	Upper limit
Digital input	0.18 (AWG24)	1.5 (AWG16)
Digital output	0.18 (AWG24)	2.0 (AWG14)

### 3.3.3 Wiring for Diagnostic Digital Input module (XGI-D21D)



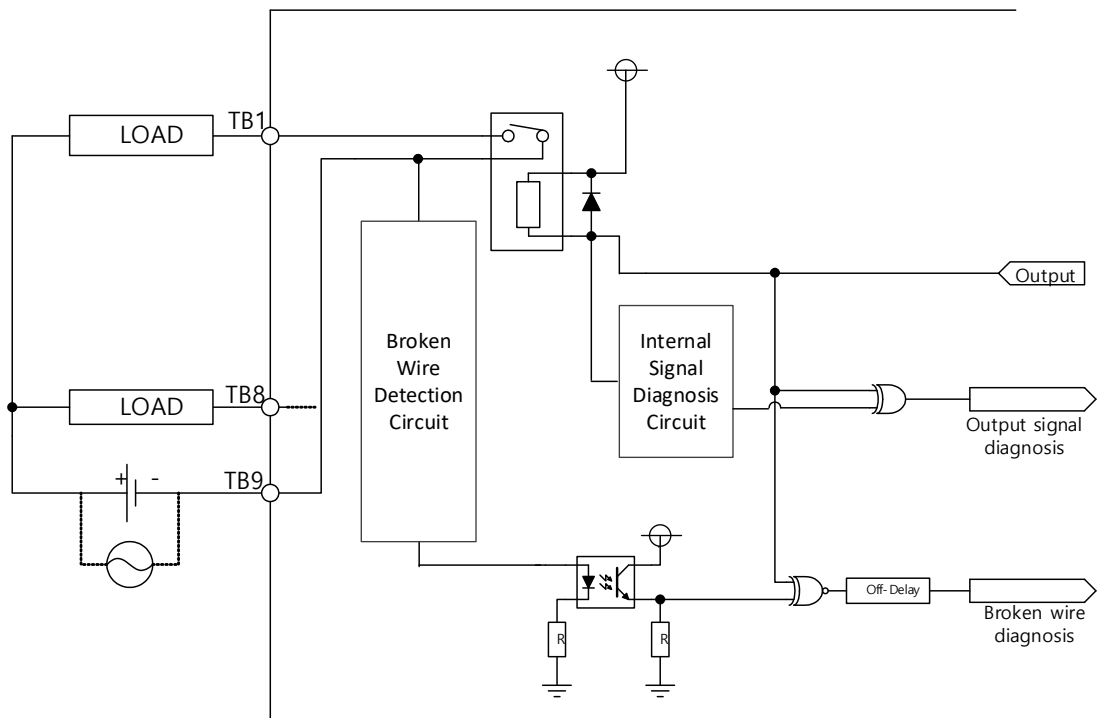
**Note**

In order to detect broken wire, you need to connect a diagnostic resistor in parallel with the input signal device. Please use **10KΩ 1/4W** diagnostic resistance value.

Terminal block	Contact
TB1	Input 0
TB2	Input 1
TB3	Input 2
TB4	Input 3
TB5	Input 4
TB6	Input 5
TB7	Input 6
TB8	Input 7
TB9	COM

The physical layout of the XGI-D21D module shows a terminal block with 9 contacts labeled 00 to 08 and COM. The module is labeled XGI-D21D and has a 24Vd.c 8mA rating. The terminal block is labeled IN, 0-7, 8-7, A-F, and DIAG.

3.3.4 Wiring for Diagnostic Digital Output module (XGQ-RY1D)



**Note**

In order to detect broken wire, minimum 10mA or higher is required to be current (LOAD) load. If a current of less than 10mA flows, it will be diagnosed with broken wire.

Terminal block	Contact
TB1	Output 0
TB2	Output 1
TB3	Output 2
TB4	Output 3
TB5	Output 4
TB6	Output 5
TB7	Output 6
TB8	Output 7
TB9	COM

XGQ-RY1D								OUT							
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
								DIAG							
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
8	9	A	B	C	D	E	F								

The terminal block diagram for XGQ-RY1D shows a 9-pin terminal block. The pins are labeled 00, 01, 02, 03, 04, 05, 06, 07, and COM. The diagram also shows the internal wiring for the output and diagnosis signals.



# Chapter 4 Troubleshooting

The chapter describes types of potential errors that occur while operating the system, causes of errors, how to detect them and corrective measures.

## 4.1 Basic Troubleshooting Procedure

To improve the reliability of a system, it is important to take a corrective measure promptly if a trouble occurs as well as to use highly reliable devices. To operate a system immediately, it is the most important to quickly detect potential causes of a trouble and take corrective measures. To troubleshoot the system correctly, make sure to take the following cautions and procedures.

### 1) Check by visual inspection

Please check the followings visually.

- Operation status(Stop, Run)
- Power On/Off status
- I/O device status
- Wiring status(I/O wiring, extension and communication cable)
- Check the status of each display(POWER LED, RUN/STOP LED, I/O LED and etc), connect to peripherals and check the operation condition and program

### 2) Check any abnormality

Please observe how a fault changes by executing the followings.

- Move the key switch to STOP and turn it On/Off

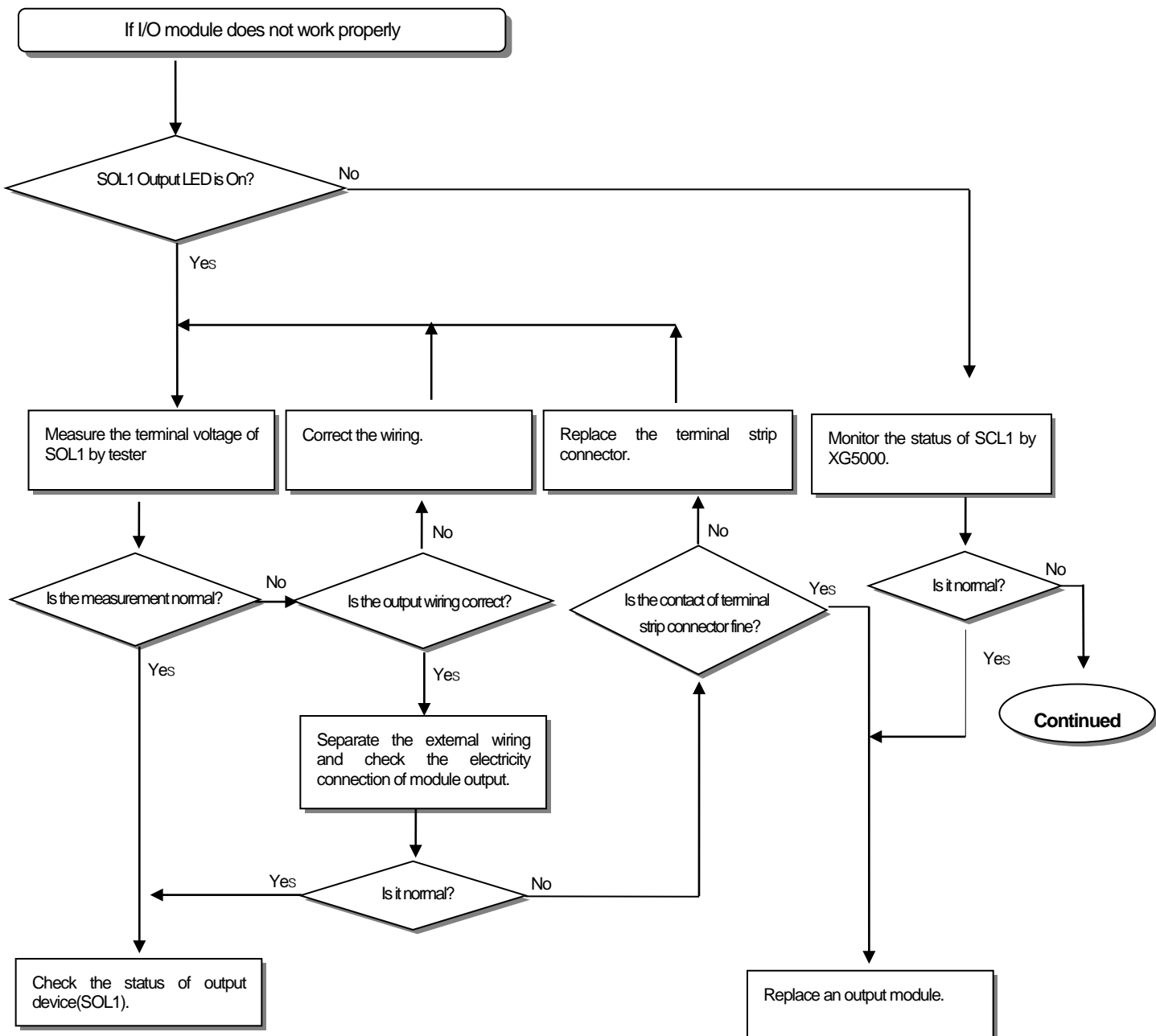
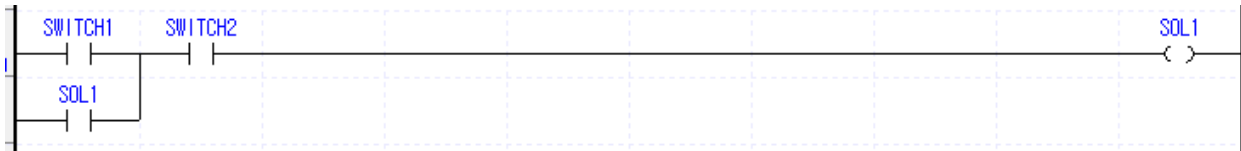
### 3) Restricting Range

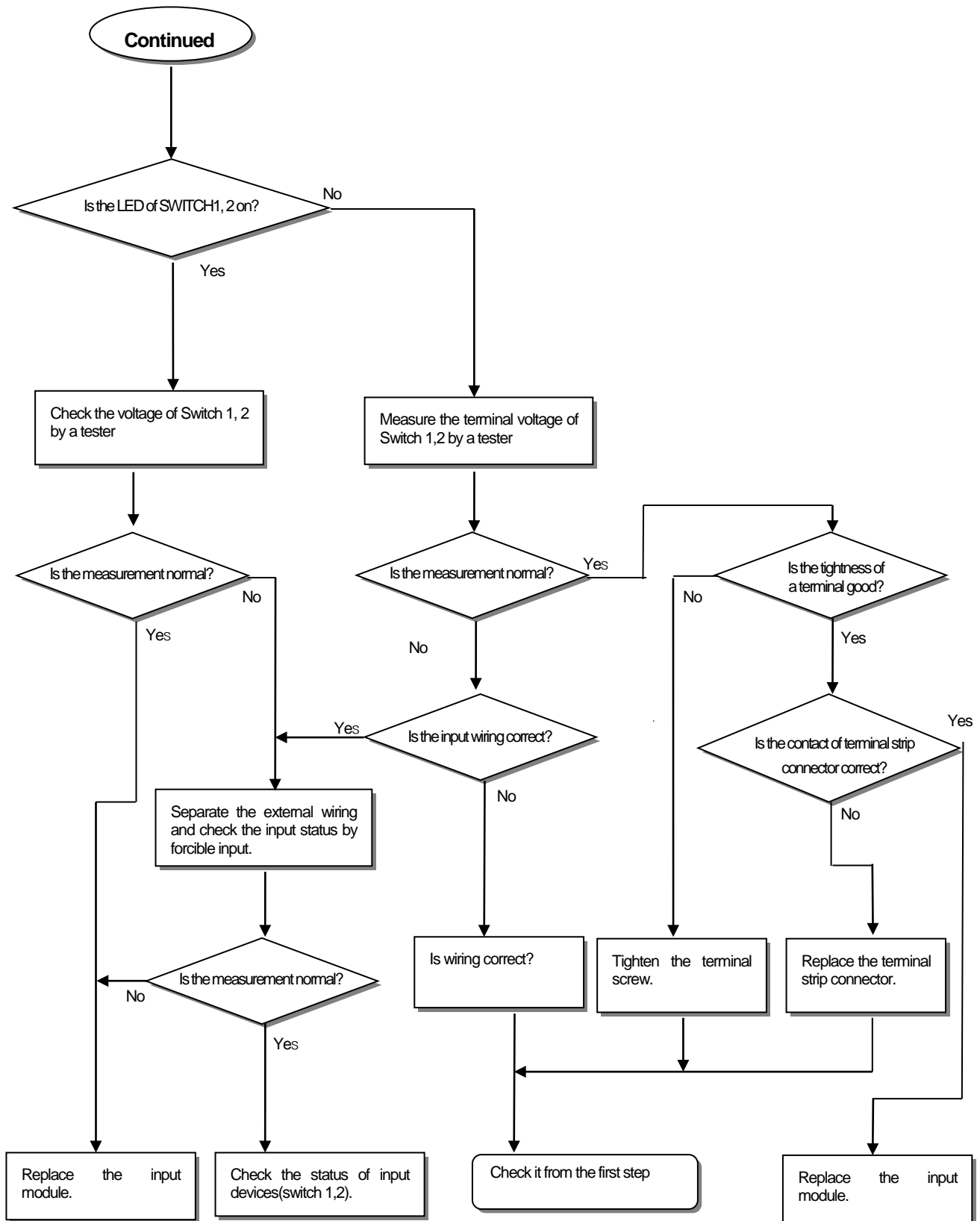
Estimate by which factor a fault occurs by the following methods.

- Is it from the PLC or external factor?
- I/O module or others?
- PLC program?

## 4.2 Troubleshooting

For the orders of taking measures when I/O module does not properly work during operation, the paragraph explains it with the following illustration.



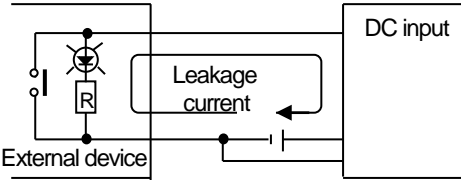
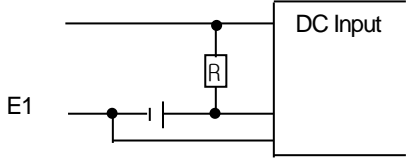
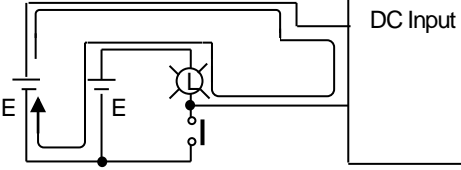
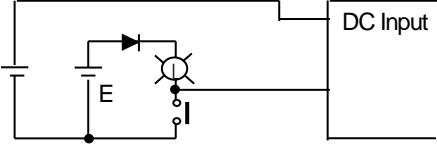


### 4.3 Cases

It describes trouble types and measures for circuits.

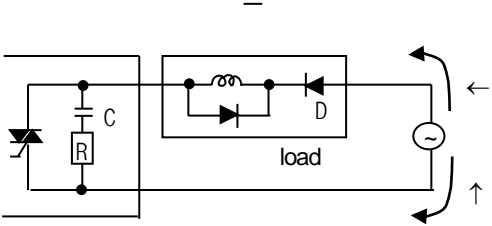
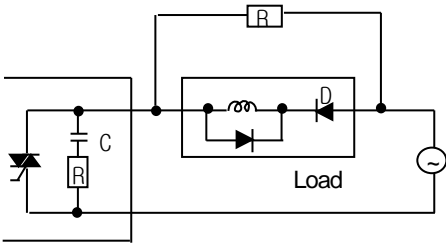
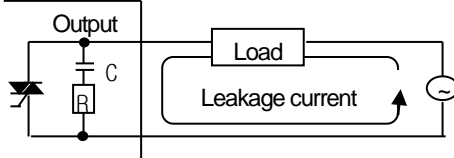
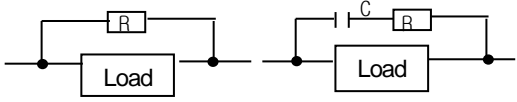
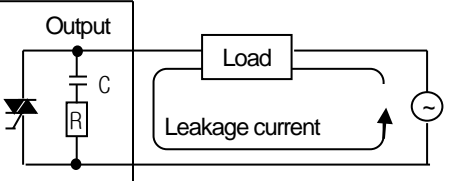
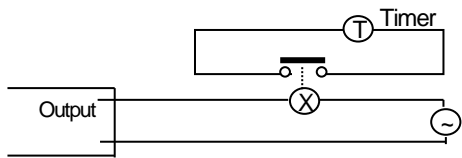
#### 4.3.1 Trouble types and measures of input circuit

The followings describe the examples and measures of troubles.

Phenomena	Causes	Measures
<p>Input signal can not be off</p>	<p>Leakage current of an external device(operation by a switch with LED mark)</p> 	<ul style="list-style-type: none"> <li>• Connect a proper resistance so that the voltage between input module terminal and common terminal is higher than off voltage as presented below.</li> </ul> 
<p>Input signal can not be off</p>	<ul style="list-style-type: none"> <li>• Circulating current by using plural different power sources</li> </ul>  <ul style="list-style-type: none"> <li>• If <math>E1 &gt; E2</math>, it circulates.</li> </ul>	<ul style="list-style-type: none"> <li>• Change plural to singular power</li> <li>• Connecting to a circulating current preventive diode (figure below)</li> </ul> 

4.3.2 Trouble types and measures of output circuit

The followings describe the examples and measures of troubles.

Phenomena	Causes	Measures
<p>Excessive voltage is allowed to load when output contact is off</p>	<ul style="list-style-type: none"> <li>• If load contains half-wave rectification (solenoid valve may have it)</li> <li>• If the polarity is <math>\leftarrow</math>, C is charged while the voltage + power voltage charged to C is allowed to both ends of diode (D). when the polarity is <math>\uparrow</math>. The max. voltage is approx. <math>2\sqrt{2}</math>.</li> </ul>  <p>Note) when using it as the above, the output element does not have any problem but the performance of diode (D) in load may be reduced, probably causing a trouble.</p>	<ul style="list-style-type: none"> <li>• Connect a dozens ~ several hundreds kΩ resistor to a load in parallel.</li> </ul> 
<p>Load can not be off</p>	<ul style="list-style-type: none"> <li>• Leakage current from surge absorbing circuit connected to an output element in parallel</li> </ul> 	<ul style="list-style-type: none"> <li>• Connect a dozens of kΩ resistor or CR of which impedance is equal to the resistance to load in parallel.</li> </ul> <p>Note) If the length of wiring from output module to load is long, it may have leakage current from capacity of cables.</p> 
<p>Abnormal time when load is a C-R type timer</p>	<ul style="list-style-type: none"> <li>• Leakage current from surge absorbing circuit connected to an output element in parallel.</li> </ul> 	<ul style="list-style-type: none"> <li>• Operate the C-R type timer by mediating a relay.</li> <li>• Use other one but a C-R type timer.</li> </ul> <p>Note) A timer's internal circuit may have half-wave rectification</p> 

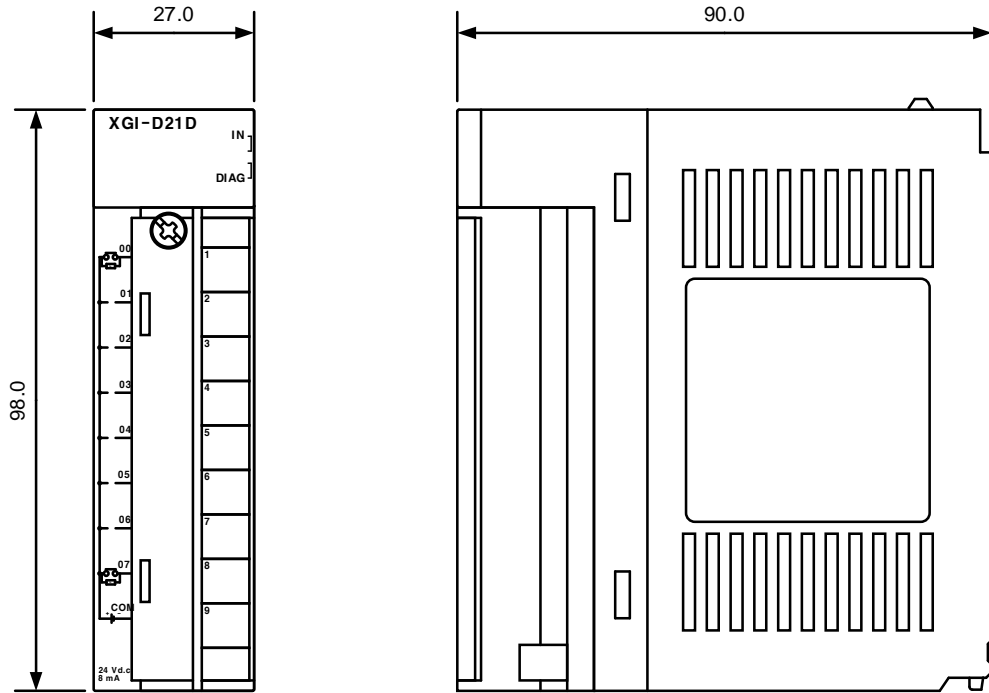


# Appendix 1. Dimensions

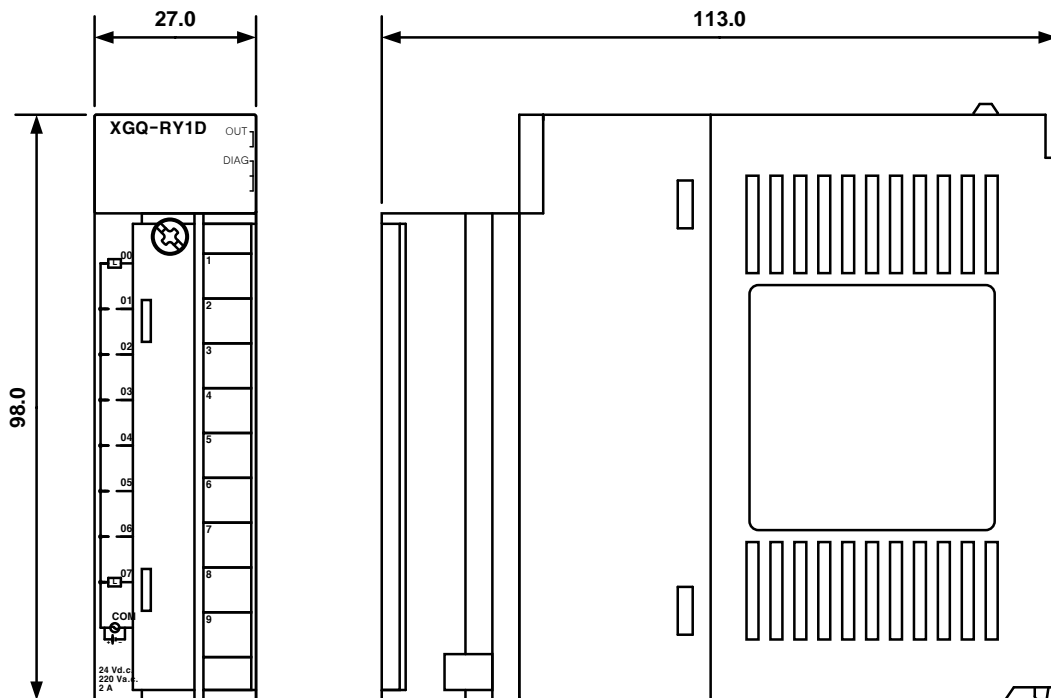
## Appendix 1 Dimensions

### 1) Dimensions of XGI-D21D

Unit: mm



### 2) Dimensions of XGQ-RY1D





## Warranty

1. Warranty Period

The product you purchased will be guaranteed for 18 months from the date of manufacturing.

2. Scope of Warranty

Any trouble or defect occurring for the above-mentioned period will be partially replaced or repaired. However, please note the following cases will be excluded from the scope of warranty.

- (1) Any trouble attributable to unreasonable condition, environment or handling otherwise specified in the manual,
- (2) Any trouble attributable to others' products,
- (3) If the product is modified or repaired in any other place not designated by the company,
- (4) Due to unintended purposes
- (5) Owing to the reasons unexpected at the level of the contemporary science and technology when delivered.
- (6) Not attributable to the company; for instance, natural disasters or fire

3. Since the above warranty is limited to PLC unit only, make sure to use the product considering the safety for system configuration or applications.

## Environmental Policy

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

<h3>Environmental Management</h3> <p>LS ELECTRIC considers the environmental preservation as the preferential management subject and every staff of LS ELECTRIC use the reasonable endeavors for the pleasurable environmental preservation of the earth.</p>	<h3>About Disposal</h3> <p>LS ELECTRIC' 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.</p>
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[www.lselectric.co.kr](http://www.lselectric.co.kr)

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Specifications in this instruction manual are subject to change without notice due to continuous products development and improvement.