Right choice for ultimate yield

LSIS strives to maximize customers' profit in gratitude of choosing us for your partner.

Programmable Logic Controller

Analog Output Module

XGT Series

User's Manual

XGF-DV4A
XGF-DV8A
XGF-DC4A
XGF-DC8A

Safety Instructions

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

LS Industrial Systems

http://eng.lsis.biz

Safety Instructions

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;

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

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

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 connecter is correctly secured.** If not, electric shock, fire or abnormal operation may be caused.

- **If lots of vibration is expected in the installation environment, don't let PLC directly vibrated.** Electric shock, fire or abnormal operation may be caused.

- **Don't let any metallic foreign materials inside the product**, which may cause electric shock, fire or abnormal operation..

Safety Instructions

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

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	Data	Main contents	Revised location
V 1.0	’06. 5	First Edition	-
V 1.1	’10.04	XGI CPU, XGR CPU added	CH7, CH8

※ The number of User’s manual is indicated right part of the back cover.

ⓒ LS Industrial Systems Co., Ltd 2008 All Rights Reserved.

About User's Manual

Congratulations on purchasing PLC of LS Industrial System Co.,Ltd.

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

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

Relevant User's Manuals

Title	Description	No. of User's Manual
XGK-CPUA/CPUE/CPUH/CPUS	It describes specifications, system structure and EMC spec. correspondence of CPU module, power module, base, I/O module and increase cable	10310000508
XG5000 User's Manual	It describes how to use XG5000 software especially about online functions such as programming, printing, monitoring and debugging by using XGT series products.	10310000512
XGK Series Instructions & Programming	It is the user's manual for programming to explain how to use commands that are used PLC system with XGK CPU.	10310000510

◎ Table of Contents ◎

Chapter 1 Introduction ..... 1-1 ~ 1-3

1.1 Characteristics 1-1
1.2 Terminology 1-2
1.2.1 Analog quantity – A 1-2
1.2.2 Digital quantity – D 1-2
1.2.3 Characteristics of D/A conversion 1-3

Chapter 2 Specifications ..... 2-1 ~ 2-9

2.1 General Specifications 2-1
2.2 Performance Specifications 2-2
2.3 Respective Designations and Functions 2-3
2.4 Characteristic of I/O Conversion 2-4
2.4.1 Characteristic of voltage output 2-4
2.4.2 Characteristic of current output 2-6
2.4.3 Accuracy 2-7
2.5 Main Functions 2-8
2.5.1 Output status setting 2-8
2.5.2 Display and diagnosis functions 2-9

Chapter 3 Installation and Wiring ..... 3-1 ~ 3-4

3.1 Installation 3-1
3.1.1 Installation environment 3-1
3.1.2 Precautions for handling 3-1
3.2 Wiring 3-1
3.2.1 Precautions for wiring 3-1
3.2.2 Wiring examples 3-2
3.3 Wiring of DC 24V 3-3
3.3.1 Specification of power supply 3-3

3.3.2 If XGP-ACF1 power module is used 3-3
3.3.3 If an external power module is used 3-4

Chapter 4 Operation Procedure and Monitoring ..... 4-1 ~ 4-13

4.1 Operation Procedures 4-1
4.2 Operation Parameters Setting 4-2
4.2.1 Setting items 4-2
4.2.2 How to use I/O parameters 4-2
4.3 Parameters Setting 4-3
4.3.1 Setting screen of parameters 4-3
4.4 Monitoring / Test 4-7
4.4.1 Monitoring/Test screen 4-7
4.4.2 Operation by program 4-9
4.5 Register U Devices 4-10
4.5.1 Register U devices 4-10
4.5.2 Save variables 4-11
4.5.3 View variables 4-12

Chapter 5 Configuration and Function of Internal Memory ..... 5-1 ~ 5-7

5.1 Configuration of Internal Memory 5-1
5.1.1 I/O area of D/A converted data 5-1
5.1.2 Setting area of operation parameters 5-2
5.2 I/O area of D/A Converted Data 5-3
5.2.1 Module Ready/Error (Address 0) 5-3
5.2.2 Channel operation information (Address 1) 5-3
5.2.3 Output setting (Address 2) 5-3
5.2.4 Digital input (Address 3~6) 5-4
5.3 Operation Parameters settings 5-5
5.3.1 Specifying channel to use 5-5
5.3.2 Setting Output Voltage/Current range 5-5
5.3.3 Specifying Input data type 5-6
5.3.4 Setting Output data type 5-6
5.3.5 Error code 5-7

Chapter 6 Programming …… 6-1 ~ 6-9

6.1 Internal Memory Read/Write 6-1
6.1.1 Read of internal memory (GET, GETP instruction) 6-1
6.1.2 Write of internal memory (PUT, PUTP instruction) 6-2
6.2 Basic Program 6-3
6.2.1 XGF-DC4A 6-3
6.3 Application Program 6-5
6.3.1 Inverter speed control 6-5
6.3.2 BCD output of error code 6-8

Chapter 7 Configuration and Function of Internal Memory (For XGI/XGR)--7-1 ~ 7-13

7.1 GLOBAL VARIABLE (DATA AREA) 7-1
7.1.1 D/A conversion data I/O area configuration 7-1
7.1.2 How to use global variable 7-2
7.2 I/O PUT/GET Function Block use area (Parameter area) 7-8
7.2.1 PUT/GET Function Block use area (Parameter area) 7-8
7.2.2 PUT/GET instruction 7-9
7.2.3 Example using PUT/GET instruction 7-11

Chapter 8 Programming (For XGI/XGR)…… 8-1 ~ 8-10

8.1 BASIC PROGRAM 8-1
8.1.1 XGF-DC4A 8-1
8.2 APPLICATION PROGRAM 8-4
8.2.1 Inverter Speed Control 8-4
8.2.2 Program to output error codes of analog input module to BCD display 8-7

Chapter 9 Troubleshooting …… 9-1 ~ 9-9

9.1 Error Codes 9-1
9.2 Troubleshooting …… 9-3
9.2.1 RUN LED blinks…… 9-3
9.2.2 RUN LED is Off 9-3

9.2.3 D/A Output Value hunted too much 9-4
9.2.4 Relationship discordant between Digital Input Value & Analog Output Value. 9-5
9.2.5 D/A Output Value always exceeds the value specified..... 9-6
9.2.6 Analog Output Value does not change accordingly to the change of Digital Input Value..... 9-7
9.2.7 Hardware error of D/A conversion module 9-7
9.2.8 Status check of D/A conversion module through XG5000 System Monitoring..... 9-8

Appendix …… Appendix 1-1 ~ Appendix 2-2

Appendix 1 Terminology …… Appendix 1 - 1
Appendix 2 Dimensions …… Appendix 2 - 1
1) Dimensions of XGF-DV4A/DC4A …… Appendix 2 - 1
2) Dimensions of XGF-DV8A/DC8A …… Appendix 2 - 2

Index …… Index - 1 ~ Index - 2

Chapter 1 Introduction

Voltage output is called as XGF-DV4A/DV8A, and current output is as XGF-DC4A/DV8A in this product.
Analog output module is used to convert the digital value of signed 16-bit binary data (data: 14 bits) specified in PLC CPU to analog signal (voltage or current output).

1.1 Characteristics

1) D/A conversion of 4/8 channels is available with one module.
   XGF-DV4A/DV8A: D/A conversion of 4/8 channels (voltage output) is available with one module.
   XGF-DC4A/DC8A: D/A conversion of 4/8 channels (current output) is available with one module.

2) High resolution of 1/16000
   Through the digital value resolution of1/16000, high resolution of analog value can be obtained.

3) High accuracy
   High accuracy of ±0.2% or less (when ambient temperature is 25℃).

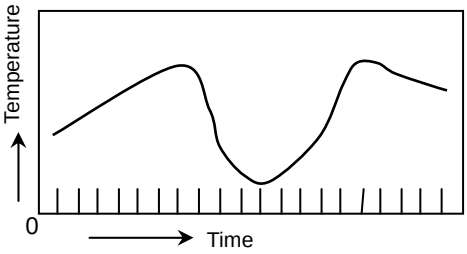
4) Conversion process at high speed
   Conversion speed is 250 ㎲/channel.

5) Various output ranges available
   XGF-DV4A/DV8A: 1~5V, 0~5V, 0~10V, -10~10V
   XGF-DC4A/DC8A: 4~20mA, 0~20mA

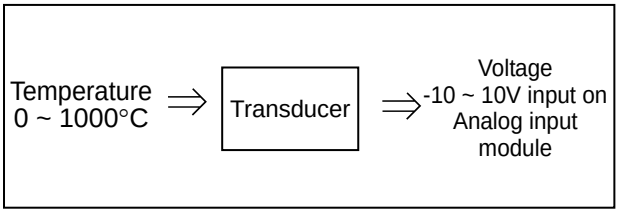
6) The number of modules used for one base is not limited.
   (However, it should be within the capacity of the power module.)

1.2 Terminology

1.2.1 Analog quantity – A



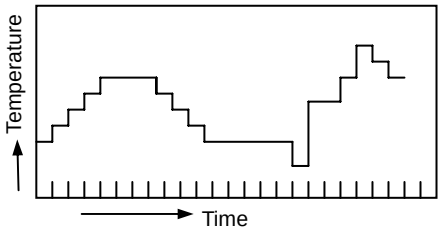
[Fig.1.1] Analog Quantity



[Fig.1.2] Transducer Example

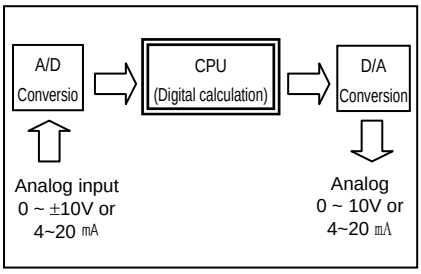
Such a quantity continuously changed is called Analog Quantity as voltage, current, temperature, speed, pressure and flow. For example, temperature can change continuously together with time as shown in Fig. 1.1. Since the changing temperature can not be input directly on PLC, it should be input on PLC through the transducer converting to identical analog quantity of DC voltage －10 ~+10V or current 4~20 ㎃.

1.2.2 Digital quantity – D



[Fig 1.3] Digital Quantity

Such a quantity discontinuously changed is called Digital Quantity as displayed in figures of 0, 1, 2 and 3. For example, On and Off signal can be displayed in a digital quantity of 0 and 1. BCD and binary value is also the digital quantity

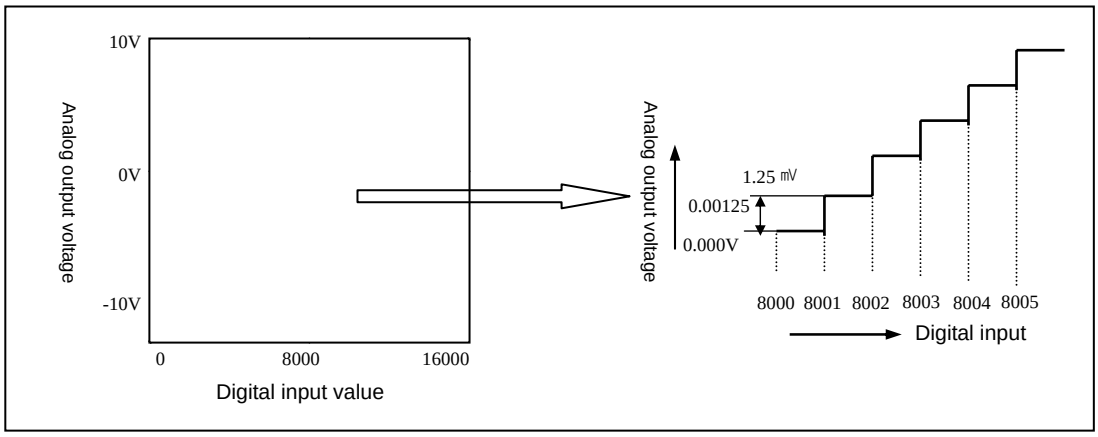


[Fig 1.4] Process in PLC

Analog quantity can not be directly input on PLC CPU for calculation of the digital quantity. Thus, convert analog quantity to digital quantity as in Fig. 1.4 so to input on CPU. In addition, in order to output the analog quantity outward, convert CPU's digital quantity to analog quantity.

1.2.3 Characteristics of D/A conversion

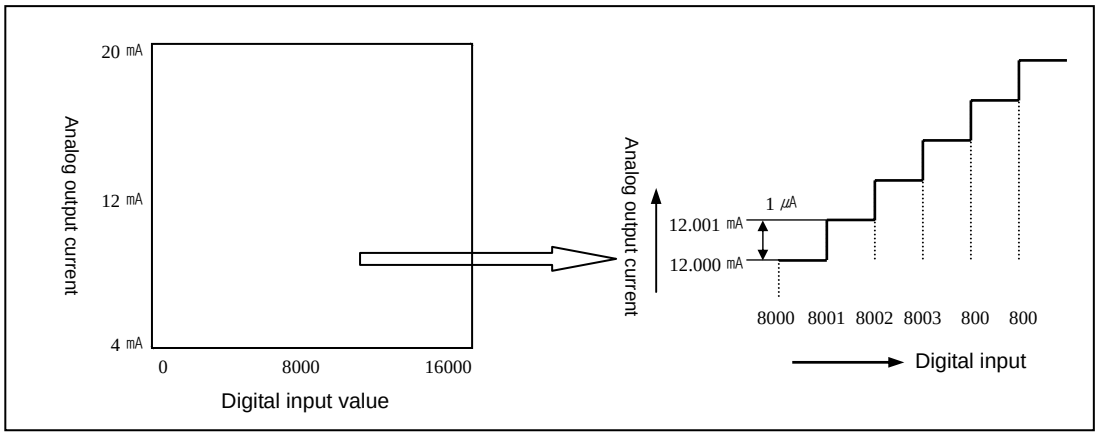
1) Voltage output



[Fig. 1.5] Characteristics of D/A conversion (voltage output)

Analog output module is used to convert digital quantity output from CPU to analog value so to output to the external device. When the voltage output range of Analog output module is in -10~10V, -10V will be output if digital quantity of 0 is input. And 10V will be output if digital quantity of 16000 is input, where analog quantity converted from digital input of 1 is equivalent to 1.25㎷.

2) Current output



[Fig. 1.6] Characteristics of D/A conversion (current output)

When the current output range of Analog output module is in 4~20mA, 4mA will be output if digital quantity of 0 is input. And 20mA will be output if digital quantity of 16000 is input, where analog quantity converted from digital input of 1 is equivalent to 1㎂.

Chapter 2 Specifications

2.1 General Specifications

General specifications of XGT series are as specified below.

No.	Items	Specifications				Related standards
1	Ambient temperature	0 ~ 55 °C				
2	Storage temperature	–25 ~ +70 °C				
3	Ambient humidity	5 ~ 95%RH (Non-condensing)				
4	Storage humidity	5 ~ 95%RH (Non-condensing)				
5	Vibration resistance	Occasional vibration			-	IEC61131-2
		Frequency	Acceleration	Amplitude	times	
		10 ≤ f < 57Hz	–	0.075mm	10 times each directions (X, Y and Z)	
		57 ≤ f ≤ 150Hz	9.8m/s^2(1G)	–		
		Continuous vibration				
		Frequency	Acceleration	Amplitude		
		10 ≤ f < 57Hz	–	0.035mm		
		57 ≤ f ≤ 150Hz	4.9m/s^2(0.5G)	–		
6	Shock resistance	• Peak acceleration: 147 m/s^2(15G) • Duration: 11ms • Half-sine, 3 times each direction per each axis				IEC61131-2
7	Noise resistance	Square wave Impulse noise	±1,500 V			LSIS standard
		Electrostatic discharge	4kV (Contact discharge)			IEC61131-2 IEC61000-4-2
		Radiated electromagnetic field noise	80 ~ 1,000 MHz, 10V/m			IEC61131-2, IEC61000-4-3
		Fast transient/bust noise	Segment	Power supply module	Digital/analog input/output communication interface	IEC61131-2 IEC61000-4-4
			Voltage	2kV	1kV	
8	Environment	Free from corrosive gasses and excessive dust				
9	Altitude	Up to 2,000 ms				
10	Pollution degree	2 or less				
11	Cooling	Air-cooling				

N0ote

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.

2.2 Performance Specifications

Performance specifications of Analog output module are as specified in table below.

Item	Specification			
	XGF-DV4A (Voltage Output Type)	XGF-DV8A (Voltage Output Type)	XGF-DC4A (Current Output Type)	XGF-DC8A (Current Output Type)
Analog output	DC 1 ~ 5V DC 0 ~ 5V DC 0 ~ 10V DC -10 ~ 10V Load resistance : 1 kΩ or more		DC 4 ~ 20 mA DC 0 ~ 20 mA Load resistance :600Ω or less	Load resistance :550Ω or less
	Output range can be selected through applicable program or parameters (for respective channels)			
Digital input	Signed 16-bit binary value (data: 14 bits) : Format of input data can be set through applicable program or parameters (for respective channels)			

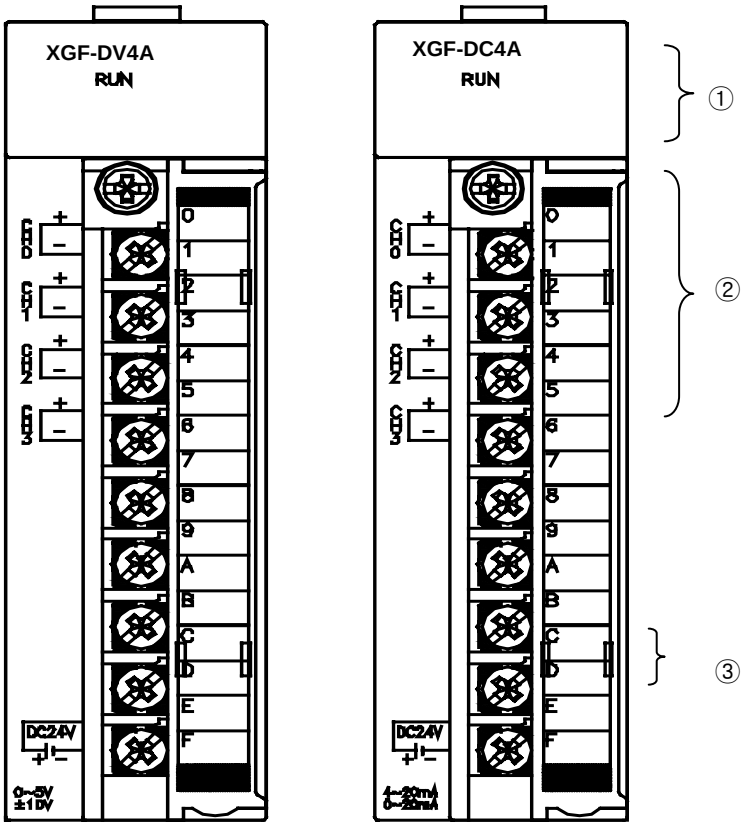
Digital input \ Analog output	1 ~ 5V	0 ~ 5V	0 ~ 10V	-10 ~ 10V
Unsigned Value	0 ~ 16000			
Signed Value	-8000 ~ 8000			
Precise Value	100 ~ 5000	0 ~ 5000	0 ~ 10000	-10000~10000
Percentile Value	0 ~ 10000			

Digital input \ Analog output	4 ~ 20mA	0 ~ 20mA
Unsigned Value	0 ~ 16000	
Signed Value	-8000 ~ 8000	
Precise Value	4000 ~ 20000	0 ~ 20000
Percentile Value	0 ~ 10000	

Item	Specification			
Maximum resolution	1/16000 (for respective output ranges)			
	1~5 V	0.250 mV	4~20 mA	1.0 μA
	0~5 V	0.3125 mV		
	0~10 V	0.625 mV	0~20 mA	1.25 μA
	±10 V	1.250 mV		
Accuracy	±0.2% or less (when ambient temperature is 25℃) ±0.3% or less (when the range is within operational temperature)			
Maximum conversion speed	250 μs/channel			
Absolute maximum output	±15 V		±24 mA	
Number of output channels	4 channels/ 1 module	8 channels/ 1 module	4 channels/ 1 module	8 channels/ 1 module
Insulation method	Photo-coupler insulation between input terminal and PLC power (no insulation between channels)			
Terminal connected	18-point terminal			
I/O points occupied	Changeable type: 16 points, Fixed type: 64 points			
Current consumption DC 5V	190 mA	190 mA	190 mA	190 mA
Current consumption DC 24V	140 mA	180 mA	210 mA	300 mA
Weight (g)	150g			

2.3 Respective Designations and Functions

Respective designations of the parts are as described below.



No.	Description
①	RUN LED Displays the operation status of Analog output module • On: Operation normal • Blinks: Error occurs (Refer to 7.1 for more details) • Off: DC 5V disconnected, Analog output module error
②	Analog Terminal Analog terminal, whose respective channels can be connected with external devices
③	Power Terminal Supply terminal of external power DC24V (No.17~18)

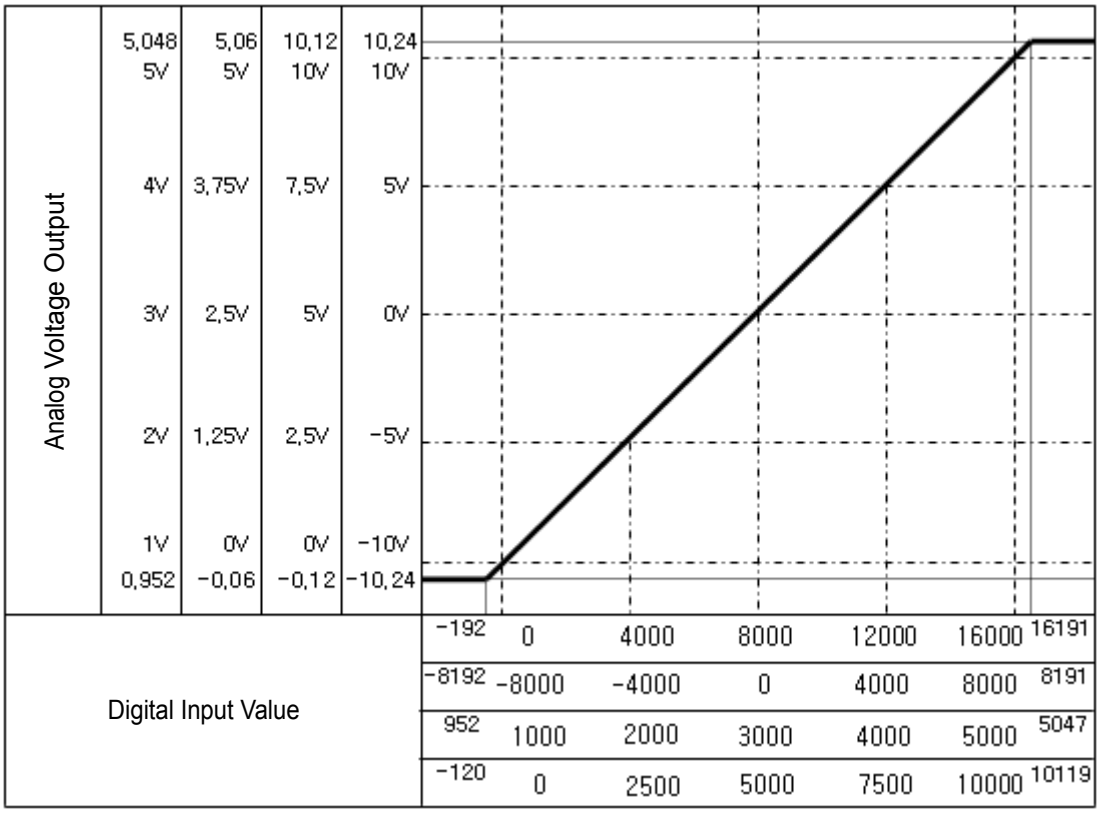
2.4 Characteristics of I/O Conversion

Characteristics of I/O conversion are displayed in a straight line with the inclination as shown below when converting digital signal specified in PLC to analog signal (voltage or current).

Input formats of digital data are classified into Unsigned Value, Signed Value, Precise Value and Percentile Value, and I/O conversion characteristics for respective digital input ranges are as described below.

2.4.1 Characteristic of voltage output

Voltage output range can be selected through user program or special module parameters setting for respective channels.



1) If the range is 1~5V

Digital Input	Analog Voltage Output							Max. Resolution
	0.952	1.0	2.0	3.0	4.0	5.0	5.048	
Unsigned value	-192	0	4000	8000	12000	16000	16191	0.25 ㎷
Signed value	-8192	-8000	-4000	0	4000	8000	8191	
Precise value	952	1000	2000	3000	4000	5000	5047	
Percentile value	-120	0	2500	5000	7500	10000	10119	

※ In the case of 1~5V voltage output, analog voltage output for digital value of “1” is equivalent to 0.25 ㎷.

2) If the range is 0~5V

Digital Input	Analog Voltage Output							Maximum Resolution
	-0.06	0.0	1.25	2.5	3.75	5.0	5.06	
Unsigned value	-192	0	4000	8000	12000	16000	16191	0.3125 �V
Signed value	-8192	-8000	-4000	0	4000	8000	8191	
Precise value	-60	0	1250	2500	3750	5000	5059	
Percentile value	-120	0	2500	5000	7500	10000	10119	

※ In the case of 0~5V voltage output, analog voltage output for digital value of “1” is equivalent to 0.3125 �V.

3) If the range is 0~10V

Digital Input	Analog Voltage Output							Maximum Resolution
	-0.12	0.0	2.5	5.0	7.5	10.0	10.12	
Unsigned value	-192	0	4000	8000	12000	16000	16191	0.625 �V
Signed value	-8192	-8000	-4000	0	4000	8000	8191	
Precise value	-120	0	2500	5000	7500	10000	10119	
Percentile value	-120	0	2500	5000	7500	10000	10119	

※ In the case of 0~10V voltage output, analog voltage output for digital value of “1” is equivalent to 0.625 �V.

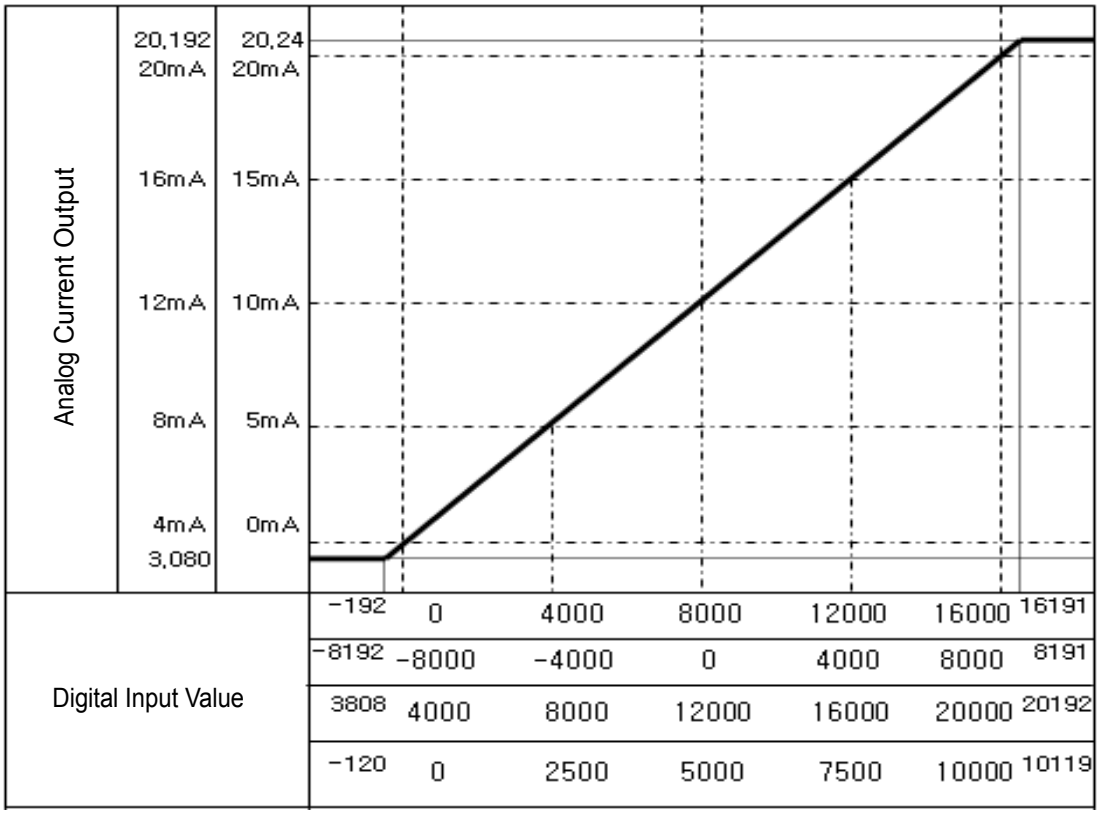
4) If the range is -10~10V

Digital Input	Analog Voltage Output							Maximum Resolution
	-10.24	-10.0	-5.0	0.0	5.0	10.0	10.24	
Unsigned value	-192	0	4000	8000	12000	16000	16191	1.25 �V
Signed value	-8192	-8000	-4000	0	4000	8000	8191	
Precise value	-10240	-10000	-5000	0	5000	10000	10238	
Percentile value	-120	0	2500	5000	7500	10000	10119	

※ In the case of -10~10V voltage output, analog voltage output for digital value of “1” is equivalent to 1.25 �V.

2.4.2 Characteristic of current output

Current output range can be selected through user program or special module parameters setting for respective channels.



1) If the range is 4~20㎃

Digital Input	Analog Current Output							Maximum Resolution
	3.808	4	8	12	16	20	20.192	
Unsigned value	-192	0	4000	8000	12000	16000	16191	1.0 ㎂
Signed value	-8192	-8000	-4000	0	4000	8000	8191	
Precise value	3808	4000	8000	12000	16000	20000	20192	
Percentile value	-120	0	2500	5000	7500	10000	10119	

※ In the case of 4~20 ㎃ current output, analog current output for digital value of "1" is equivalent to 1.0 ㎂.

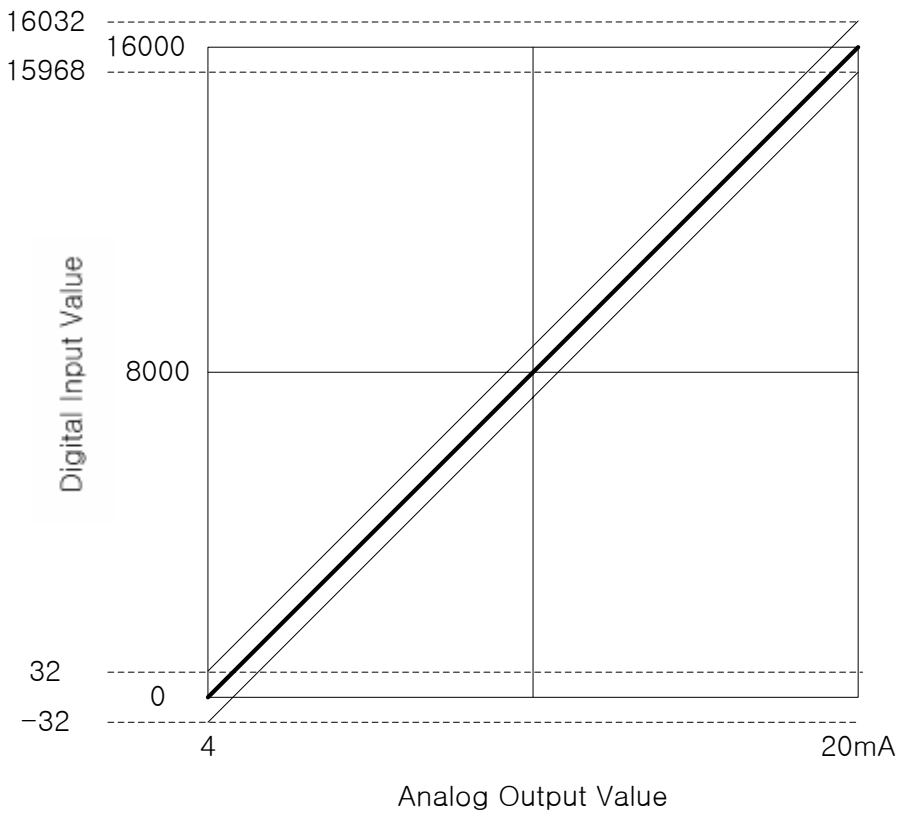
2) If the range is 0~20㎃

Digital Input	Analog Current Output							Maximum Resolution
	-	0	5	10	15	20	20.24	
Unsigned value	0	0	4000	8000	12000	16000	16191	1.25 ㎂
Signed value	0	-8000	-4000	0	4000	8000	8191	
Precise value	0	0	5000	10000	15000	20000	20192	
Percentile value	0	0	2500	5000	7500	10000	10119	

※ In the case of 0~20 ㎃ current output, analog current output for digital value of "1" is equivalent to 1.25 ㎂.

2.4.3 Accuracy

Although the output range is changed, the accuracy for the analog output value does not change. Fig. 2.1 shows the accuracy change range at the ambient temperature of 25 ± 5 ℃. The analog output range is set between 4 to 20 mA and an unsigned integer is selected for the input type. (±0.2% at 25 ± 5 ℃, ±0.3% at 0 ~ 55 ℃)



[Fig 2.1] Accuracy

2.5 Main Functions

2.5.1 Output status setting

1) Normal Mode

CPU status	Output Status	Channel		Remarks
		Run	Stop	
RUN	Enable	Digital Input Value	0V or 0 ㎃	0 : previous value kept 1 : minimum value output 2 : middle value output 3 : maximum value output
	Disable	As specified Setting output type	0V or 0 ㎃	
STOP	Enable	As specified Setting output type	0V or 0 ㎃	
	Disable	As specified Setting output type	0V or 0 ㎃	

2) Test Mode

CPU status	Output Status	Channel		Remarks
		Run	Stop	
STOP	Enable	Digital Input Value	0V or 0 ㎃	0 : previous value kept 1 : minimum value output 2 : middle value output 3 : maximum value output
	Disable	As specified Setting output type	0V or 0 ㎃	

※ Test Mode is available only when CPU is in STOP status.

3) If any DA module error occurs

CPU status	Output Status	Channel		Remarks
		Run	Stop	
RUN	Enable	Digital Input setting error Note1)	0V or 0 ㎃	0 : previous value kept 1 : minimum value output 2 : middle value output 3 : maximum value output
	Disable	As specified Setting output type	0V or 0 ㎃	
STOP	Enable	As specified Setting output type	0V or 0 ㎃	
	Disable	As specified Setting output type	0V or 0 ㎃	
When Power is on /H/W error		0V or 0 ㎃		

Note1) Digital Input setting error: upper limit or lower limit, Parameter setting error: as specified CH output type

4) If any CPU error occurs

CPU status	Output Status	Channel	
		Run	Stop
ERROR	Enable	0V or 0 ㎃	
	Disable		

2.5.2 Display and diagnosis functions

1) Run LED: displays the operation status of Analog output module
   - On: Operation normal
   - Blinks: Error occurs (Refer to Error Status below)
   - Off: DC 5V disconnected or module error

2) Error status: classifies and sorts errors identified during the module operation.

Classification		Error Details	LED
H/W	System error	Internal memory error	Blinks every 200 ms
		ASIC I/F error	Blinks every 200 ms
S/W	Parameters setting	Output status setting error	Blinks every 1 sec.
	Offset/Gain adjustment	Offset/Gain setting error	Blinks every 1 sec.

Remark

1) When Analog output module is released from the factory, Offset/Gain value is as adjusted for respective analog output ranges, which is unavailable for user to change.

Chapter 3 Installation and Wiring

3.1 Installation

3.1.1 Installation environment

This product is of high reliance regardless of installation environment. However, for the sake of reliance and stability of the system, please pay attention to those precautions described below.

1) Environmental conditions

- To be installed on the control panel waterproof and dustproof.
- No continuous impact or vibration shall be expected.
- Not to be exposed to the direct sunlight.
- No dew shall be caused by rapid temperature change.
- Ambient temperature shall be kept 0-55℃.

2) Installation

- No wiring waste is allowed inside PLC when wiring or drilling screw holes.
- To be installed on a good location to work on.
- Don't let it installed on the same panel as a high-voltage device is on.
- Let it kept at least 50㎜ away from duct or near-by module.
- To be grounded in an agreeable place free from noise.

3.1.2 Precautions for handling

Precautions for handling Analog output module are as described below from the opening to the installation.

1) Don't let it dropped or shocked hard.
2) Don't remove PCB from the case. It will cause abnormal operation
3) Don't let any foreign materials including wiring waste inside the top of the module when wiring. Remove foreign materials if any inside.
4) Don't install or remove the module while powered on.

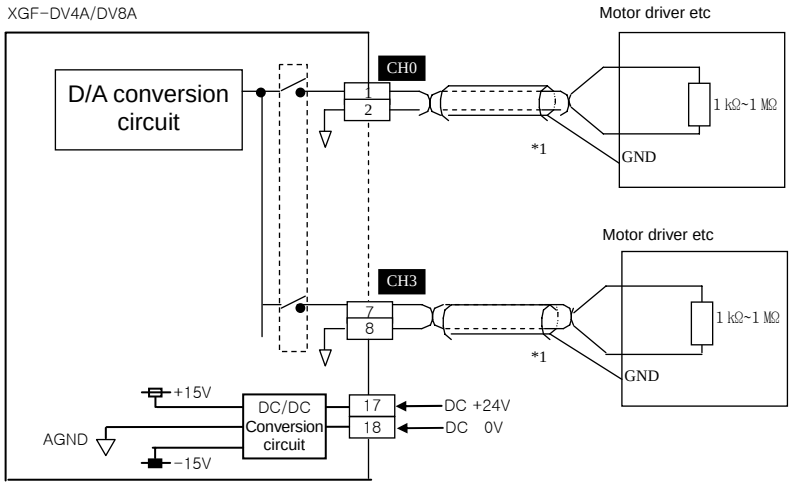
3.2 Wiring

3.2.1 Precautions for wiring

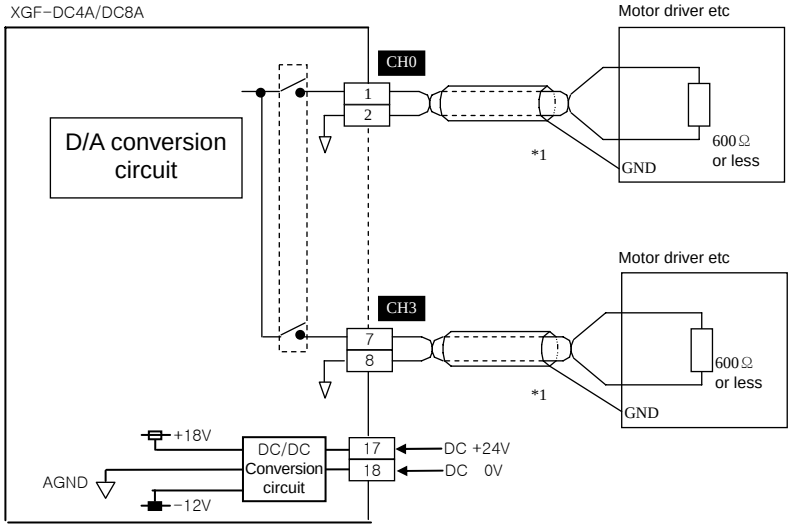
1) Use a cable for external output sign of Analog output module separate from the alternating current so to be free from surge or inductive noise produced from the alternating current side.
2) Cable shall be selected in due consideration of ambient temperature and allowable current, whose size is not less than the max. cable standard of AWG22 (0.3㎟).
3) Don't let the cable too close to hot device and material or in direct contact with oil for long, which will cause damage or abnormal operation due to short-circuit.
4) Check the polarity before external power is supplied to the terminal.
5) Wiring with high-voltage line or power line may produce inductive hindrance causing abnormal operation or defect.

3.2.2 Wiring examples

1) XGF-DV4A/DV8A



2) XGF-DC4A/DC8A



∗ 1 : Use a 2-core twisted shielded wire.

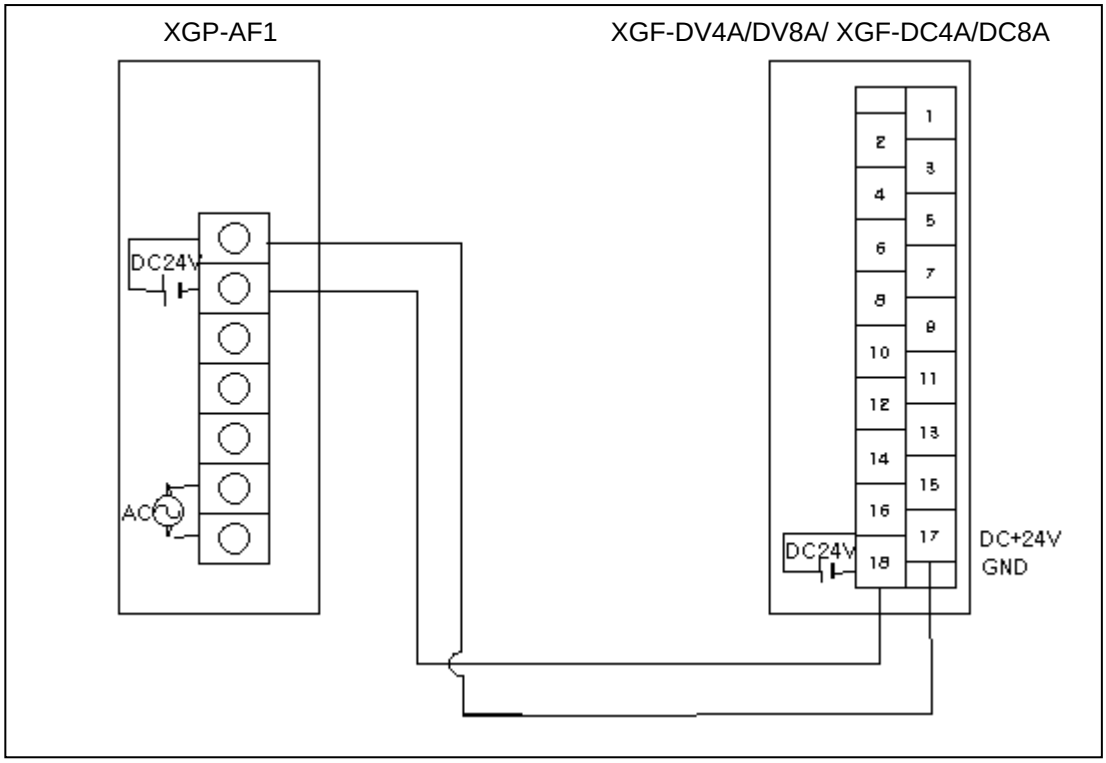
3.3 Wiring of DC 24V

3.3.1 Specification of power supply

DC24V specification of XGP-ACF1 is as described below;

Rated Output Voltage	DC24V
Output Current	0.6A
Range of Output Voltage	21.6 ~ 26.4V
Fluctuation of Output Voltage	±10%

3.3.2 If XGP-ACF1 power module is used



Remark

If more than 1 analog output module are used, refer to 2.2 Performance Specifications to calculate DC24V consumed power for the application appropriate to power capacity.

3.3.3 If an external power module is used

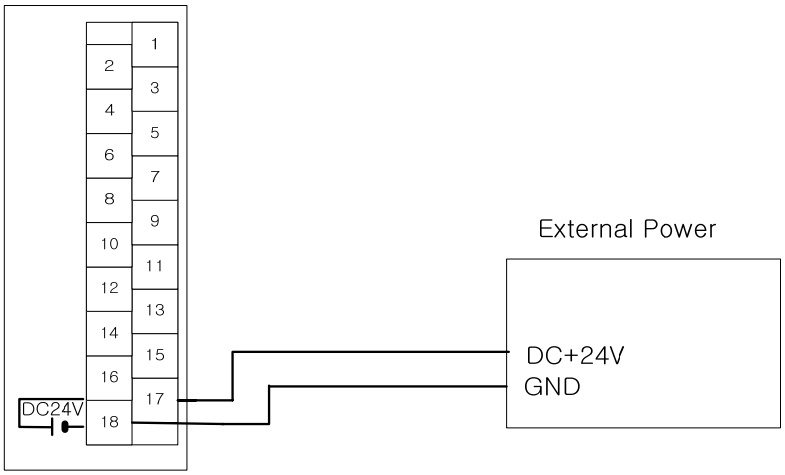
– If an external power supplier is used, connect Analog output module with DC+24V of the external power supplier.

– If an external power supplier is used, a noise filter is recommended for Analog output module side.

– Refer to 3.3.1 Specification of power supply for details on power specification of DC+24V necessary for Analog output module.

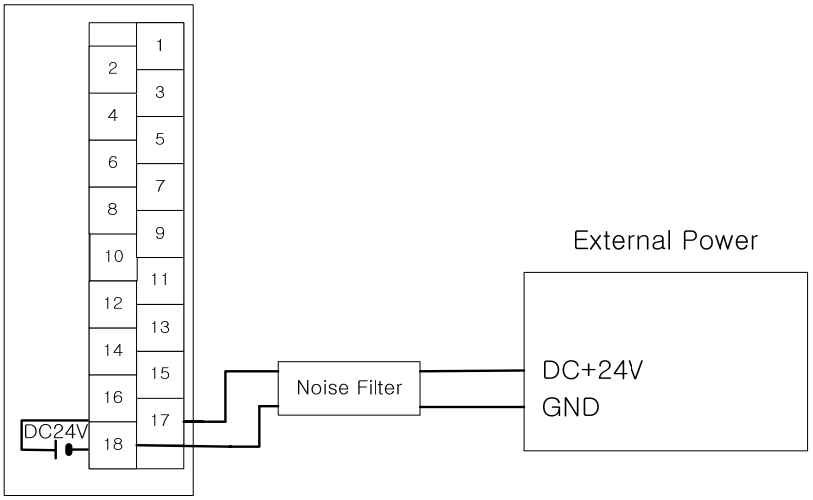
If a noise filter is not used

XGF-DV4A/DV8A/DC4A/DC8A



If a noise filter is used

XGF-DV4A/DV8A/DC4A/DC8A



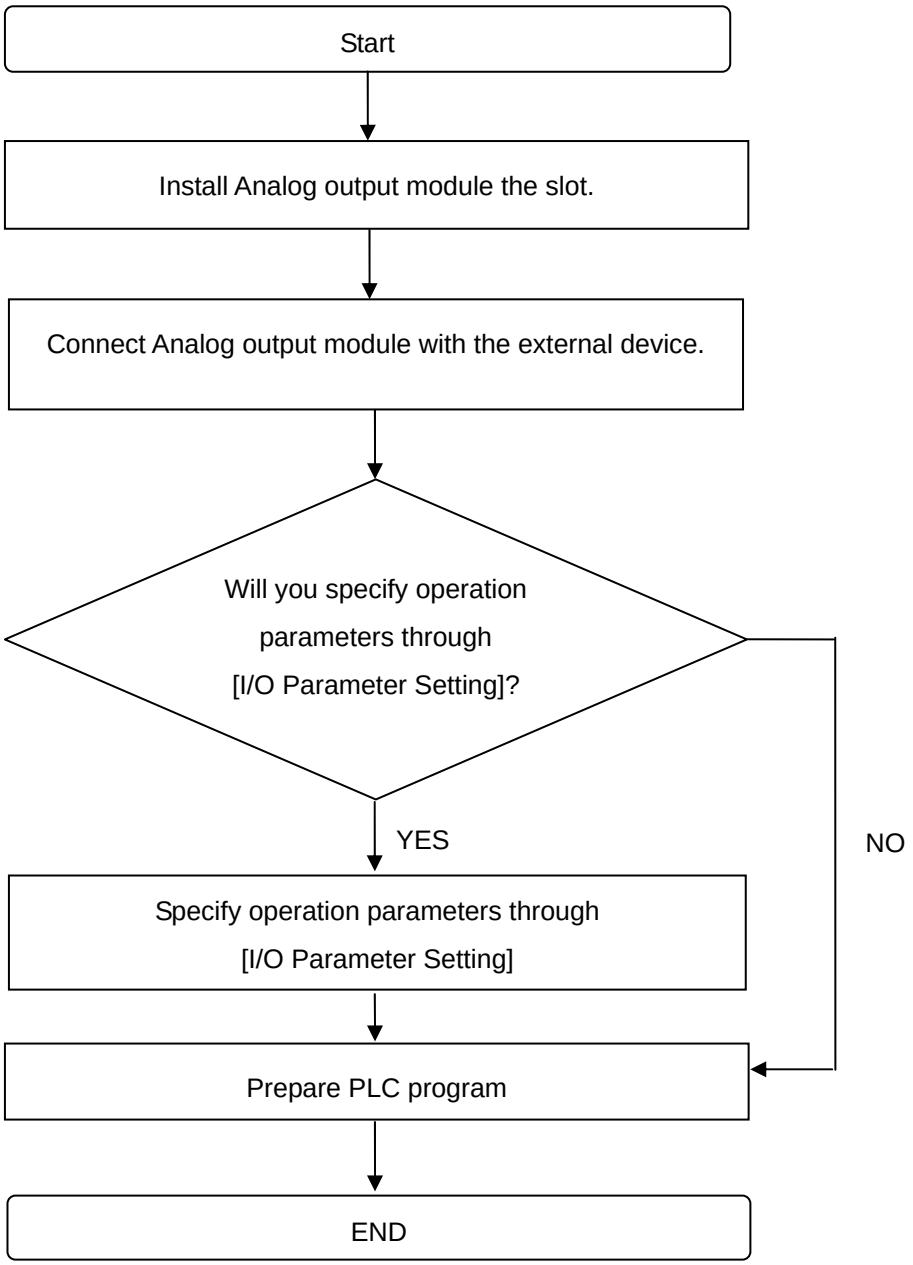
Remark

1) Wiring between noise filter and Analog output module should be separately performed from other cables.
2) Wiring between noise filter and Analog output module should be as short as possible.

Chapter 4 Operation Procedures and Monitoring

4.1 Operation Procedures

The processing for the operation is as shown in Fig. 4.1



[Fig. 4. 1] Procedures for the operation

4.2 Operation Parameters Setting

Analog output module's operation parameters can be specified through XG5000's [I/O Parameters].

4.2.1 Setting items

Analog output module is used to execute parameters setting and monitoring/test function of the applicable module through XG5000 menu or tool bar, or read/write the data of internal memory by means of the scan program.

For the user's convenience with Analog output module, XG5000 provides GUI (Graphical User Interface) for parameters setting of Analog output module. Setting is available through [I/O Parameters] on the XG5000 project window.

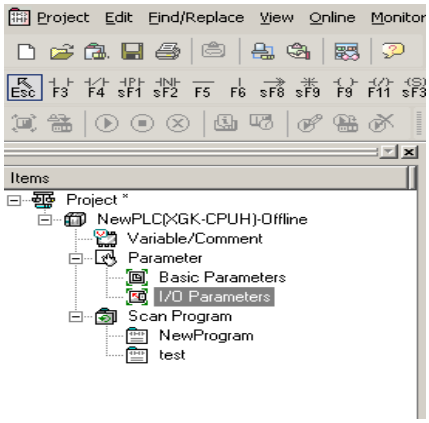
Function of [I/O Parameters]

Item	Details
[I/O parameters]	(1) Specify the following setting items necessary for the module operation. - Channel Disable/Enable - Analog output range - Input data type - Channel output type (2) The data specified by user through XG5000 will be saved on Analog output module when [Special Module Parameters] are downloaded. In other words, the point of time when [Special Module Parameters] are saved on Analog output module has nothing to do with PLC CPU's status Enable or Disable.

4.2.2 How to use I/O parameters

How to use [I/O parameters] will be described below as based on XGF-DV4A. Sequence of XGF-DC4A/DC8A/DV8A to use is also as identical as specified below.

1) Run XG5000 to create a project. (Refer to XG5000 program manual for details on how to create the project)
2) Double-click [I/O Parameters] on the project window.

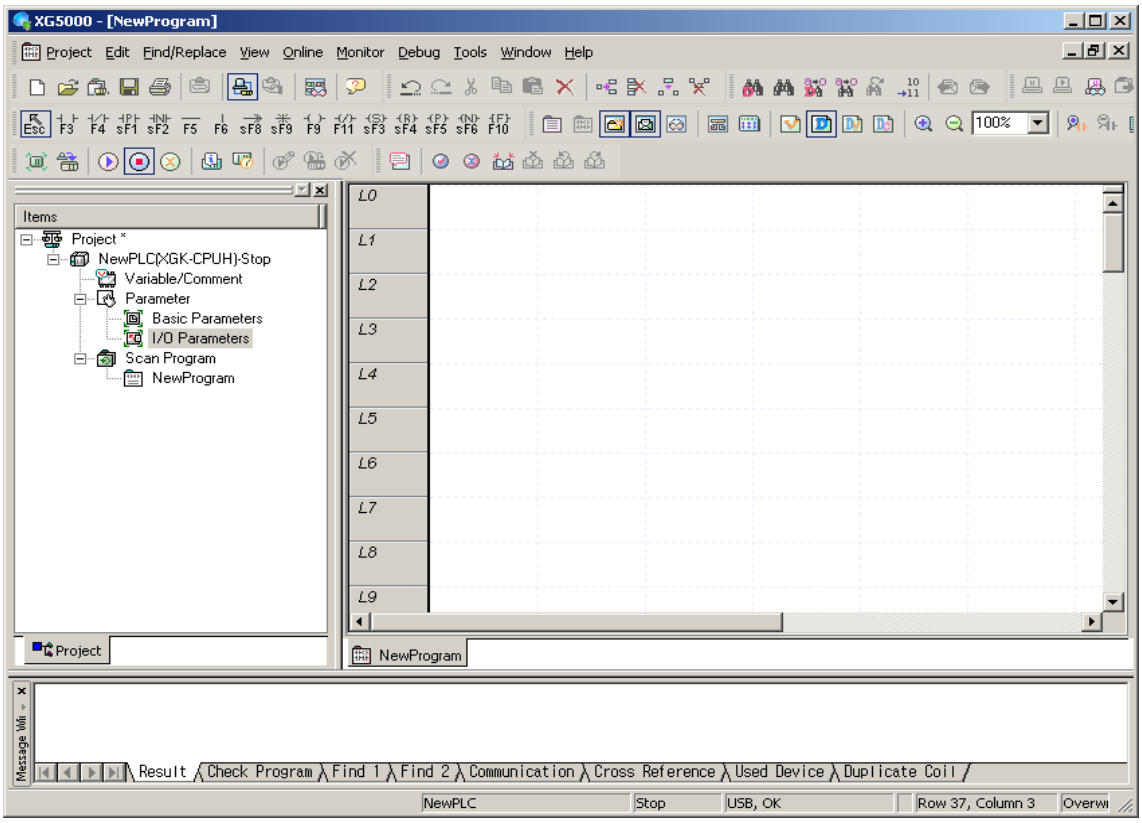


4.3 Parameters Setting

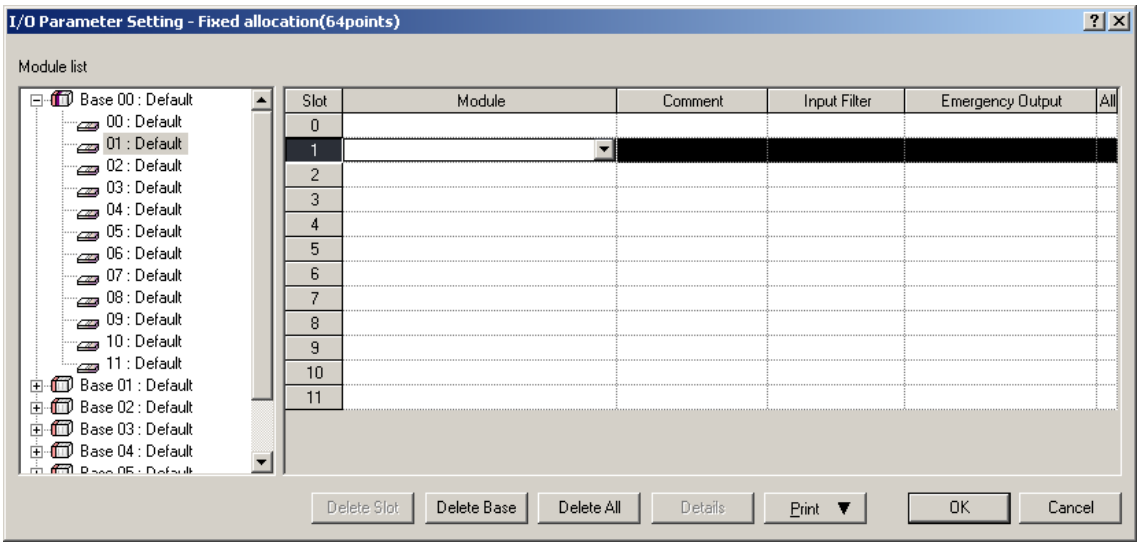
4.3.1 Setting screen of parameters

1) Double-click I/O parameters on the project window, to the left side of the XG5000 project created.

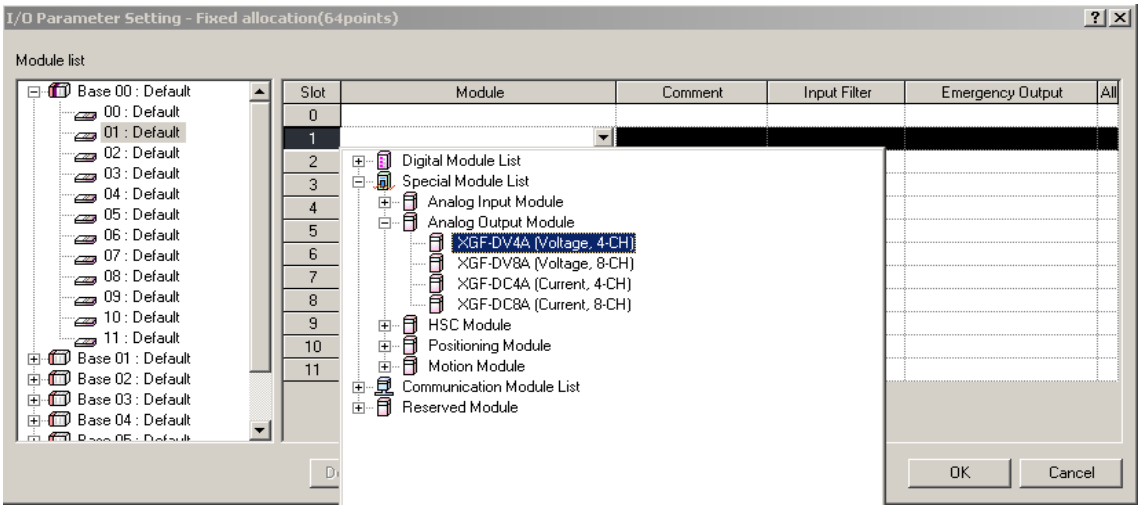
2) If [IO Parameters] setting window is displayed, click the module area of the applicable slot to select the applicable module.



3) On the [I/O Parameters] Setting screen, find and click the slot of the base Analog output module is installed on.

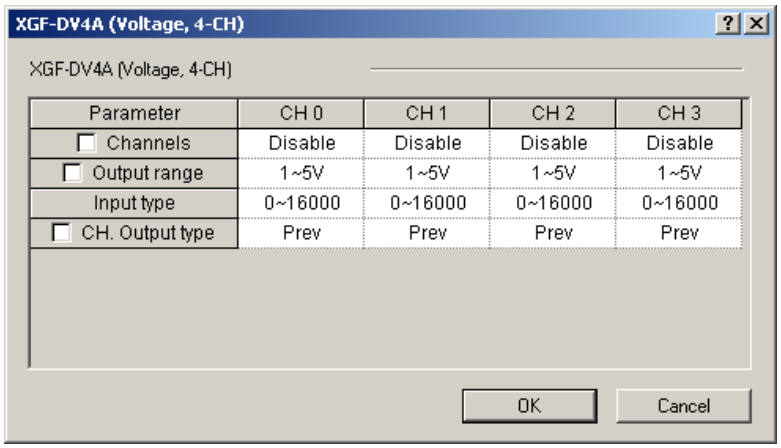


4) Click the arrow button on the screen above to display the screen where an applicable module can be selected. Search for the applicable module to select.

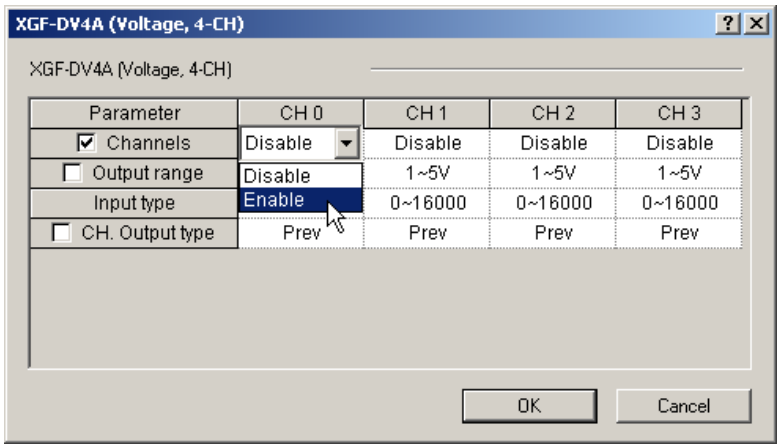


5) A screen will be displayed for you to specify parameters for respective channels as shown below. Click a desired item to display parameters to set for respective items.

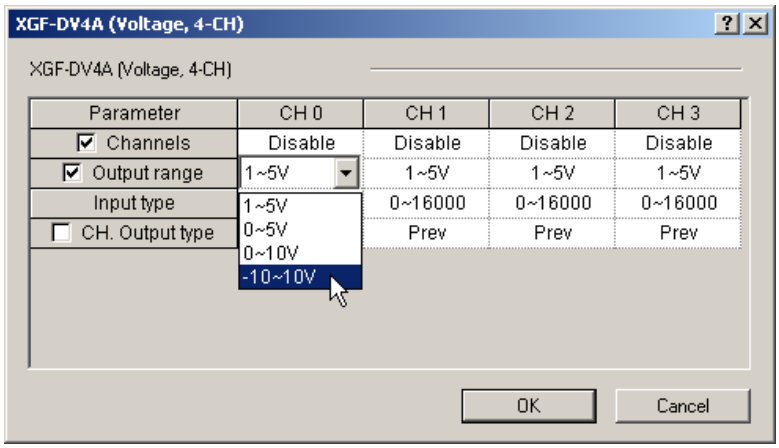
Double-click the applicable slot selected for parameters setting or click [Details].



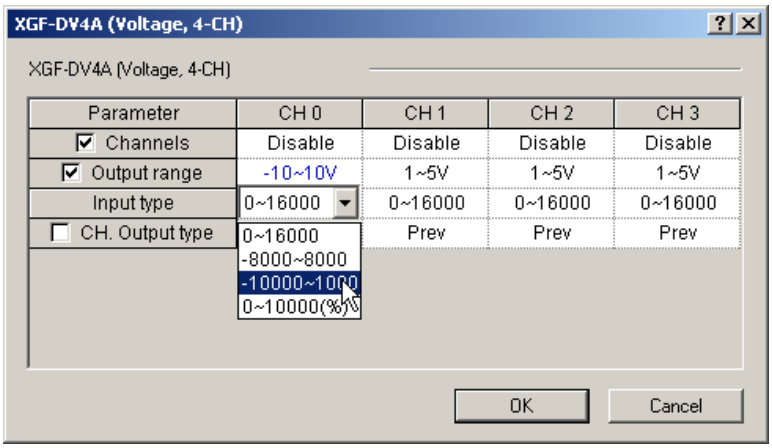
(1) Channels: Select Disable or Enable.



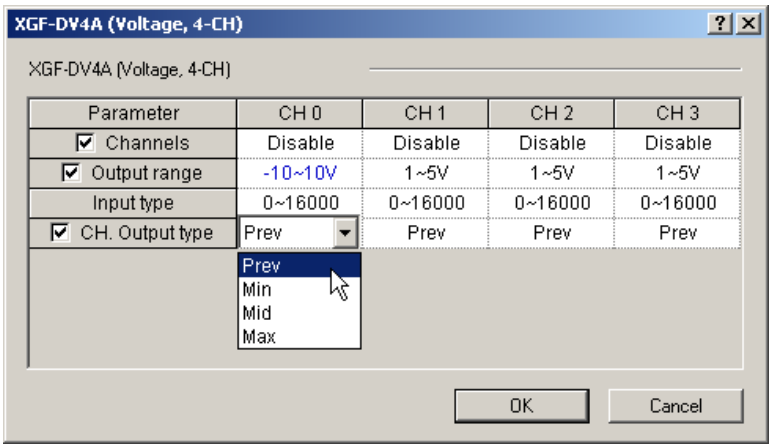
(2) Analog output range: Select the range of analog output voltage as desired. XGF-DV4A provides 4 voltage output ranges, and XGF-DC4A provides 2 current output ranges.



(3) Input type: Select the format of input data. 4 formats are available in total.



(4) CH. Output type: Select the type of output status. 4 ranges are available in total.



6) Specify parameters as necessary.

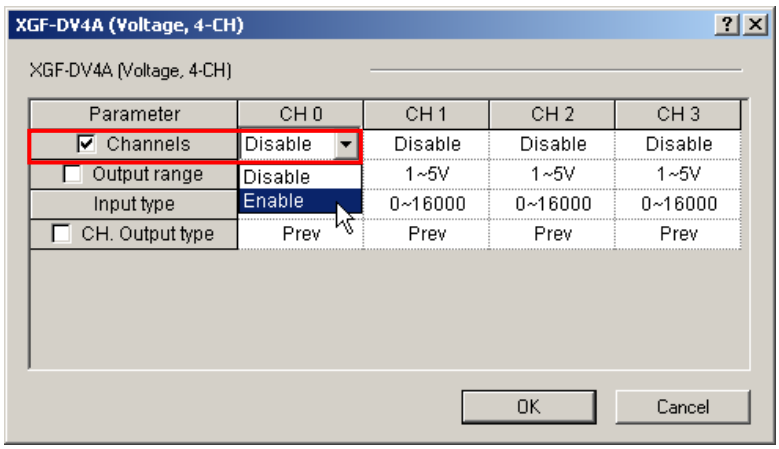
After setting, click [OK].

7) Default of parameters setting

Parameter	Setting Item	Default
Channels	Enable/Disable	Stop
Analog range	1~5V/0~5V/0~10V/-10~10V (voltage type) 4~20mA/0~20mA (current type)	1~5V 4~20mA
Input type	0~16000/-8000~8000/1000-5000/0~10000% (changed based on the output range)	0~16000
Channel output type	Prev/Min/Mid/Max	Previous

8) How to select the whole channels to change parameters.

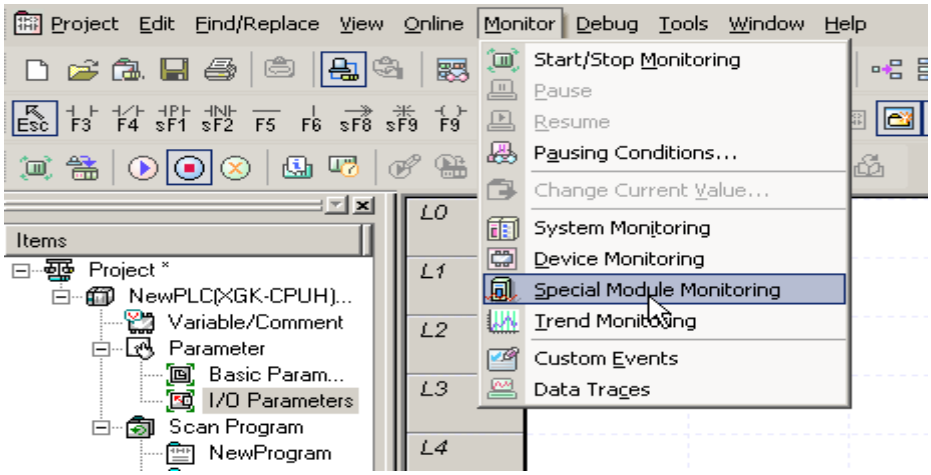
Click and check the button in the parameters item in order to change the whole channels to identical setting value. And then change the parameters of an optional channel to change the parameters of the whole channels at a time. The Figure below shows an example that the channel is changed to whole channels 'Enable' by means of this function.



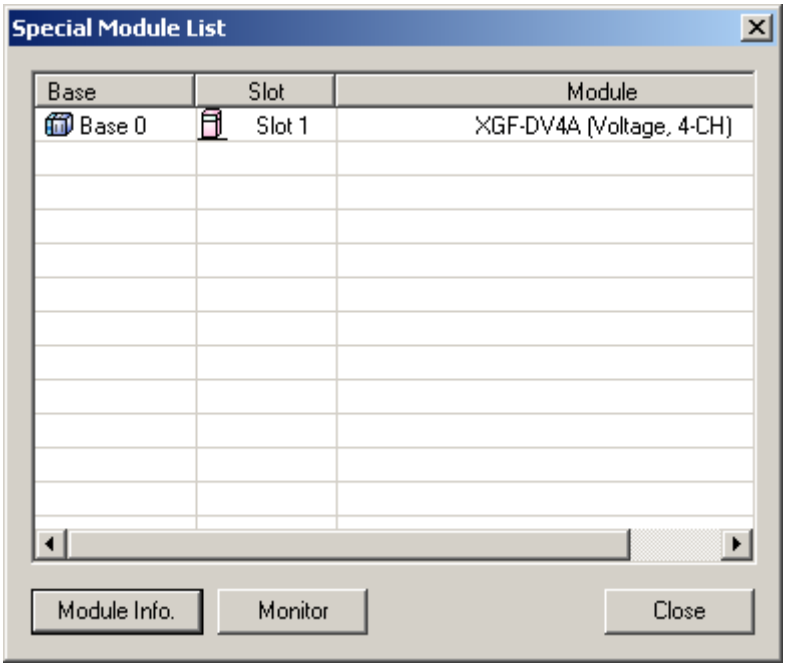
4.4 Monitoring /Test

4.4.1 Monitoring / Test screen

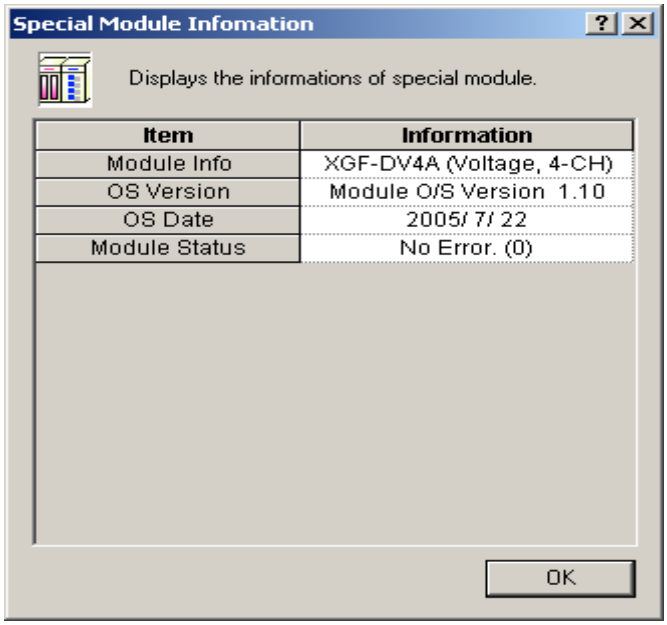
1) Go through [Online] -> [Connect] and [Monitor] -> [Special Module Monitoring] to start. If the status is not [Online], [Special Module Monitoring] menu will not be active.



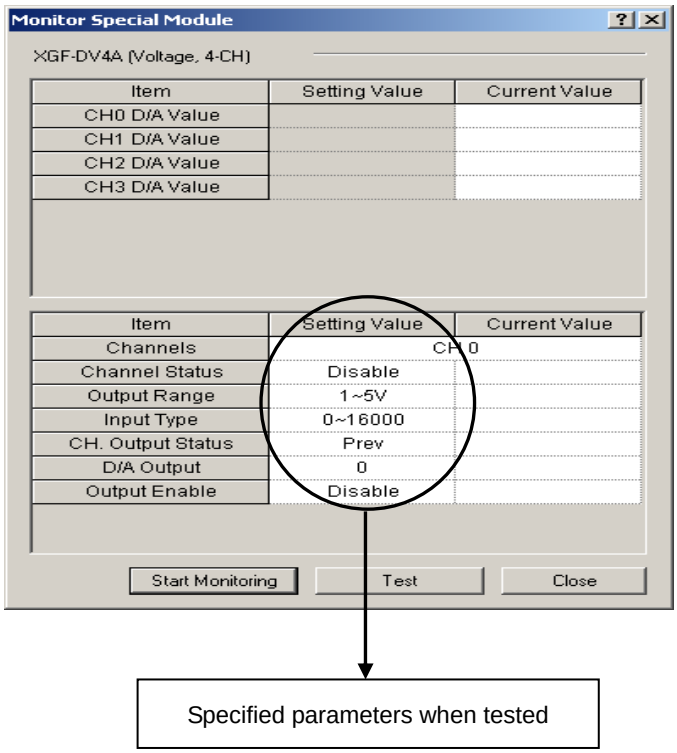
2) With XG5000 connected to PLC CPU (Online status), click [Monitor] -> [Special Module Monitoring] to display 'Special Module List' screen as in the figure below showing base/slot information in addition to special module type. The module installed on the present PLC system will be displayed on the list dialog box.



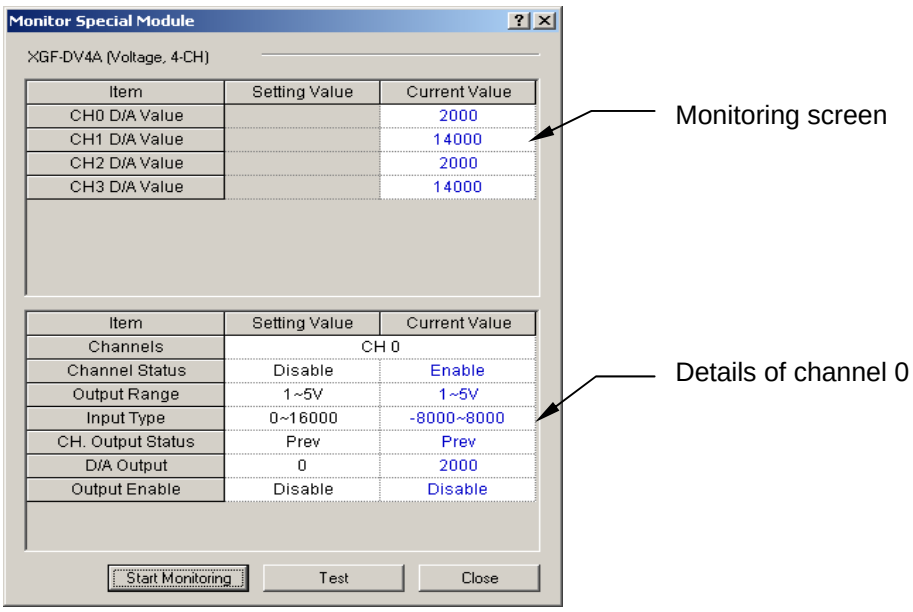
3) Select Special Module in the figure and click [Module Info.] to display the information as described below.



4) After the module is selected, click [Monitor] to display the monitoring screen as shown below.

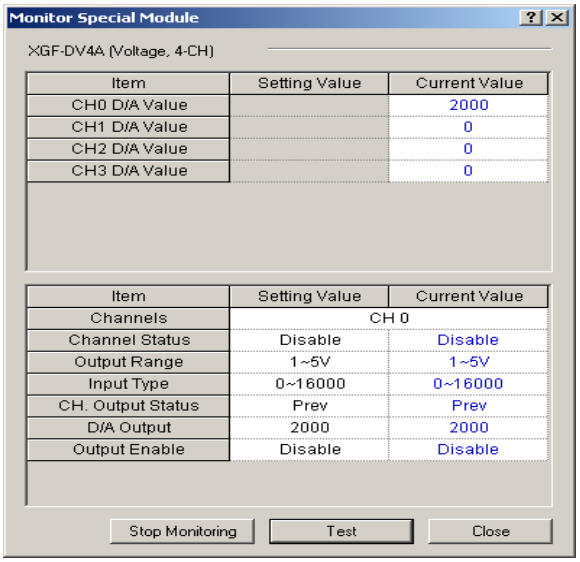


5) [Start Monitoring]: Click [Start Monitoring] to display D/A output value of the presently operated channel. The figure is the monitoring screen displayed when the whole channels of XGF-DV4A are in Run mode.



6) [Test]: [Test] is used to change the presently specified parameters of Analog output module. Click the setting value at the bottom field of the screen to change parameters.

[Test] can be set only when CPU operation status is in [Stop].



- [Setting Value Change] -> [Test] -> Change current value

7) [Close]: [Close] is used to escape from the monitoring/test screen.

4.4.2. Operation by program

- Analog output module can be operated with Tx. (Write) instruction of PUT/PUTP and Rx. (Read) instruction of GET/GETP executed from PLC CPU by means of the scan program.
- Refer to Chapter 6 Programming for more details.

4. 5 Register U Devices

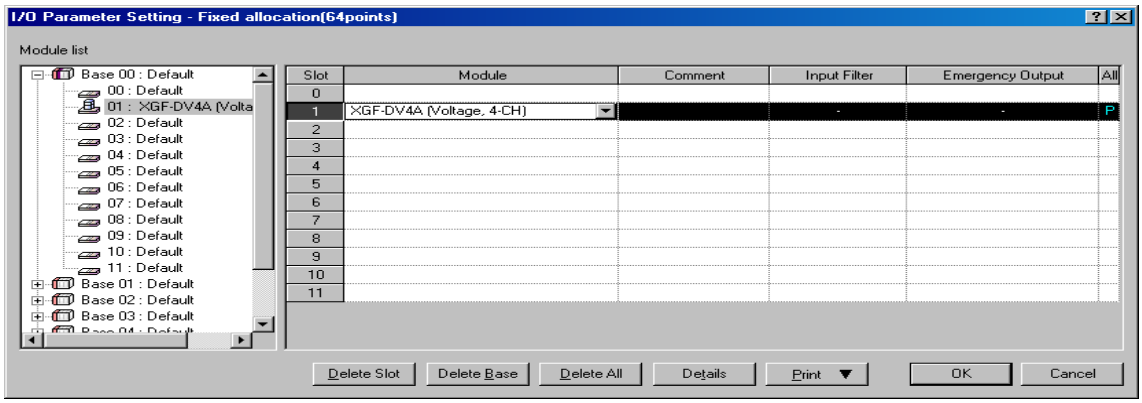
This section describes the automatic registration function of the U device in the XG5000

4.5.1 Register U devices

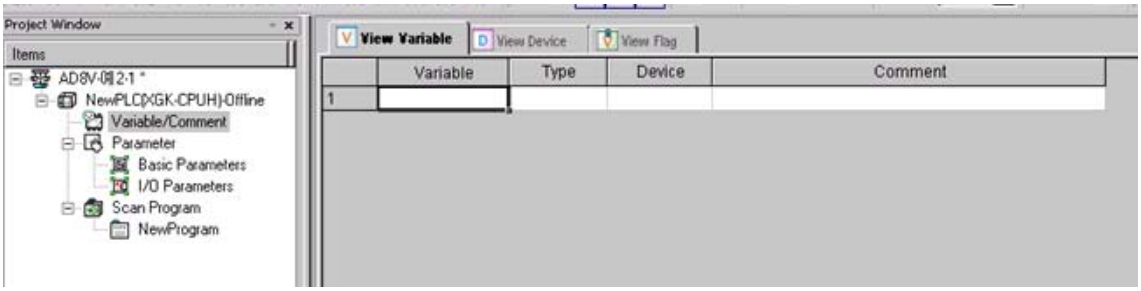
Register the variables for each module referring to the special module information that is set in the I/O parameter. The user can modify the variables and comments.

[Procedure]

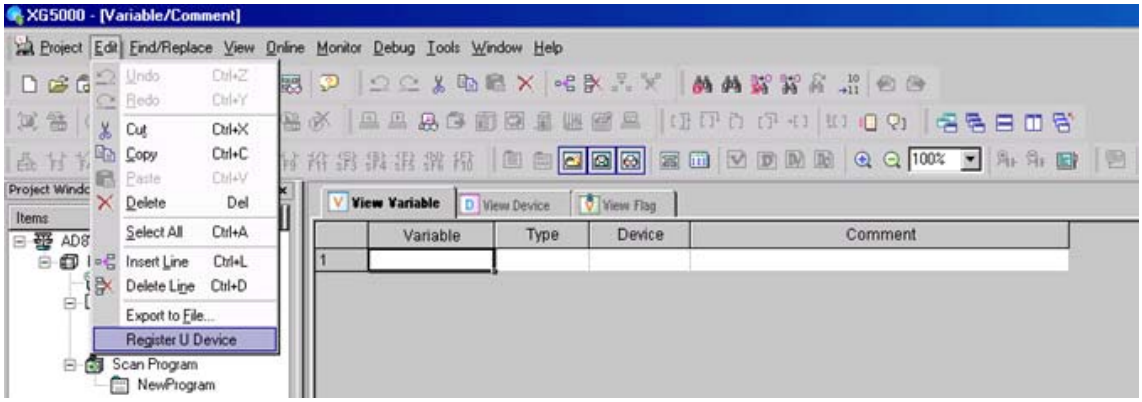
1) Select the special module type in [I/O parameters] setting window.



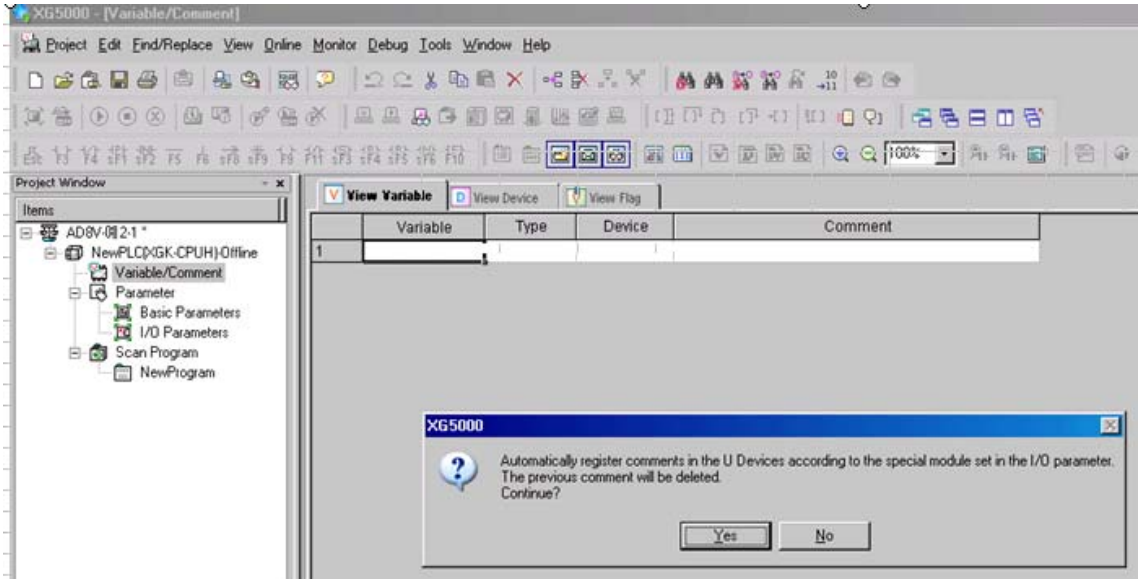
2) Double click 'Variable/Comment' from the project window.



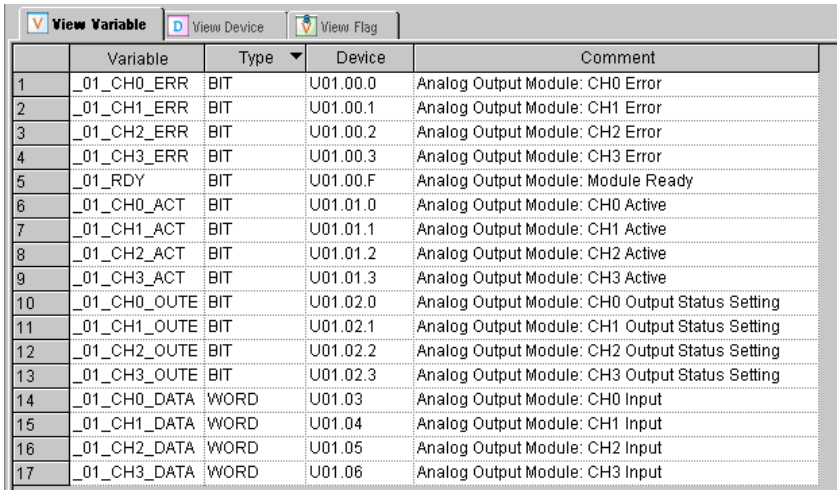
3) Select [Edit] -> [Register U Device].



4) Click 'Yes'



5) As shown below, the variables are registered.



	Variable	Type	Device	Comment
1	_01_CH0_ERR	BIT	U01.00.0	Analog Output Module: CH0 Error
2	_01_CH1_ERR	BIT	U01.00.1	Analog Output Module: CH1 Error
3	_01_CH2_ERR	BIT	U01.00.2	Analog Output Module: CH2 Error
4	_01_CH3_ERR	BIT	U01.00.3	Analog Output Module: CH3 Error
5	_01_RDY	BIT	U01.00.F	Analog Output Module: Module Ready
6	_01_CH0_ACT	BIT	U01.01.0	Analog Output Module: CH0 Active
7	_01_CH1_ACT	BIT	U01.01.1	Analog Output Module: CH1 Active
8	_01_CH2_ACT	BIT	U01.01.2	Analog Output Module: CH2 Active
9	_01_CH3_ACT	BIT	U01.01.3	Analog Output Module: CH3 Active
10	_01_CH0_OUTE	BIT	U01.02.0	Analog Output Module: CH0 Output Status Setting
11	_01_CH1_OUTE	BIT	U01.02.1	Analog Output Module: CH1 Output Status Setting
12	_01_CH2_OUTE	BIT	U01.02.2	Analog Output Module: CH2 Output Status Setting
13	_01_CH3_OUTE	BIT	U01.02.3	Analog Output Module: CH3 Output Status Setting
14	_01_CH0_DATA	WORD	U01.03	Analog Output Module: CH0 Input
15	_01_CH1_DATA	WORD	U01.04	Analog Output Module: CH1 Input
16	_01_CH2_DATA	WORD	U01.05	Analog Output Module: CH2 Input
17	_01_CH3_DATA	WORD	U01.06	Analog Output Module: CH3 Input

4.5.2 Save variables

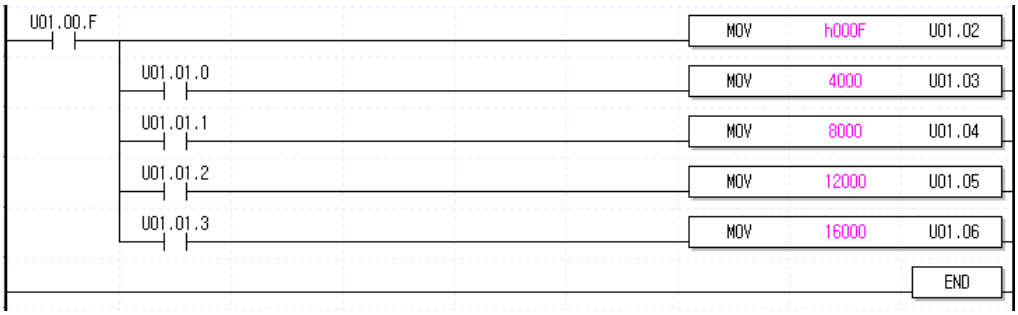
1) The contents of 'View Variable' can be saved as a text file.

2) Select [Edit] -> [Export to File].

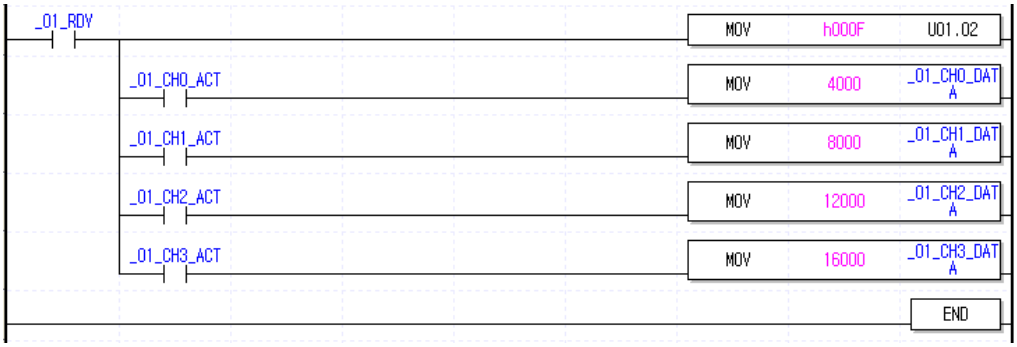
3) The contents of 'View Variable' are saved as a text file.

4.5.3 View variables

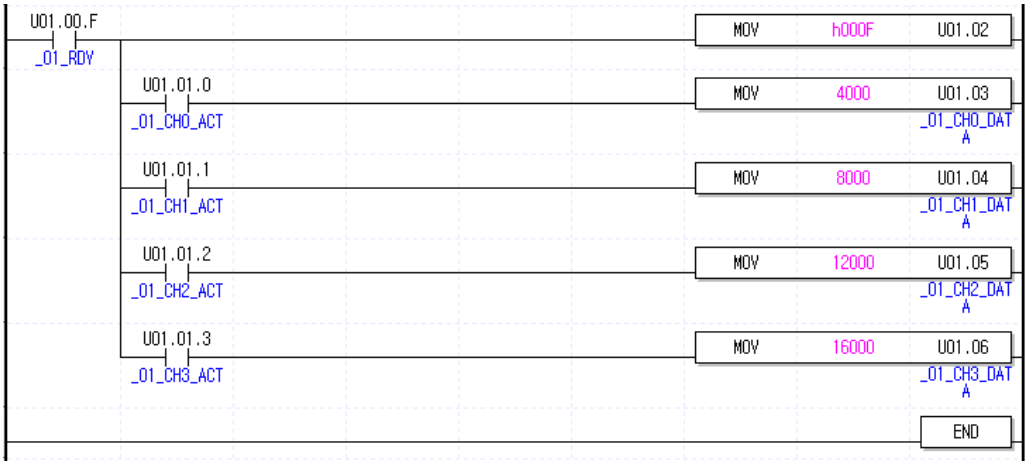
1) The example program of XG5000 is shown below.



2) Select [View] -> [Variables]. The devices are changed into variables.



3) Select [View] -> [Device/Variable]. Devices and variables are both displayed.



4) Select [View] -> [Device/Comment]. Devices and comments are both displayed.

Remark

Register U device function delete previous U device information and Variable/Comment is added to Variable/Comment list referring to the current I/O parameter.

Chapter 5 Configuration and Function of Internal Memory

5.1 Configuration of Internal Memory

Configuration of internal memory is as described below.

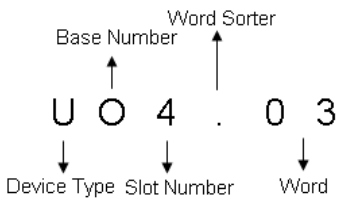
5.1.1 I/O area of D/A converted data

I/O area of D/A converted data is as displayed in Table 5.1

[Table 5. 1] I/O area of D/A converted data

Address	Description	Details	Remarks
Uxy.00	Module Ready / Error	Area to display D/A module operation status (Module Ready / Error)	Read available
Uxy.01	CH operation information	Area to save operation information of respective channels	
Uxy.02	Output setting	Bit On (1) : Output Enable Bit Off (0) : Output Disable	Read/Write available
Uxy.03	CH0 digital input value	Area to specify digital data for D/A conversion (*1: Only for XGF-DV8A/DC8A)	
Uxy.04	CH1 digital input value		
Uxy.05	CH2 digital input value		
Uxy.06	CH3 digital input value		
Uxy.07	CH4 digital input value*1		
Uxy.08	CH5 digital input value*1		
Uxy.09	CH6 digital input value*1		
Uxy.10	CH7 digital input value*1		

1) In the device assigned, x stands for the Base Number and y for the Slot Number on which module is installed.
2) In order to read 'CH1 digital output value' of Analog output module installed on Base No.0, Slot No.4, it should be displayed as U04.03.



5.1.2 Setting area of operation parameters

Setting area of Analog output module's operation parameters is as described in Table 5.2.

[Table 5. 2] Setting area of operation parameters

Address (Dec.)	Description	Details	Remarks
0	Specify channel to use	Bit On (1): Channel Enable Bit Off (0): Channel Disable	Read/Write available
1	Specify output voltage range	Bit (00): 1~5V Bit (01) : 0~5V Bit (10): 0~10V Bit (11) : -10~10V	
	Specify output current range	Bit (00): 4~20mA Bit (01): 0~20mA	
2	Specify input type	Bit (00): 0~16000 Bit (01): -8000~8000 Bit(10): 1000~5000 (1~5V) 0~5000 (0~5V) 0~10000 (0~10V) -10000~10000 (-10~10V) Bit(11): 0~10000	
3	Specify CH0 output type	"0": outputs the previous value "1": outputs the min. value of output range "2": outputs the mid. value of output range "3": outputs the max. value of output range (*1: Only for XGF-DV8A/DC8A)	
4	Specify CH1 output type		
5	Specify CH2 output type		
6	Specify CH3 output type		
7	Specify CH4 output type*1		
8	Specify CH5 output type*1		
9	Specify CH6 output type*1		
10	Specify CH7 output type*1		
11	CH0 setting error	Error code area (*1: Only for XGF-DV8A/DC8A)	Read available
12	CH1 setting error		
13	CH2 setting error		
14	CH3 setting error		
15	CH4 setting error*1		
16	CH5 setting error*1		
17	CH6 setting error*1		
18	CH7 setting error*1		

5.2 I/O area of D/A converted data

5.2.1 Module Ready/Error (Address 0)

1) **Uxy.00.F :** It will be ON when PLC CPU is powered or reset with D/A conversion ready to process D/A conversion.
2) **Uxy.00.0 :** It is a flag to display the error status of Analog output module for respective channels.

U Uxy.00
B:bit

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
—	—	—	—	- —	—	—	—	CH7	CH6	CH5	CH4	CH3	CH2	CH1	CH0

Module Ready
Bit ON (1): Ready, Bit Off (0): Not Ready

Error information
Bit ON (1): Error, Bit Off (0): Normal

5.2.2 Channel operation information (Address 1)

1) This area is used to display the channel being used.

Uxy.01
B:bit

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
—	—	—	—	—	—	—	—	CH7	CH6	CH5	CH4	CH3	CH2	CH1	CH0

Run channel information
Bit On (1): During Run, Bit Off (0): Operation Stop

5.2.3 Output setting (Address 2)

1) Enable/Disable D/A output can be specified for respective channels.
2) If the output is not specified, output of all the channels will be disabled.
3) Enable/Disable D/A output is as specified below.

Uxy.02
B:bit

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
—	—	—	—	—	—	—	—	CH7	CH6	CH5	CH4	CH3	CH2	CH1	CH0

Run channel information
Bit ON (1): Allowed, Bit Off (0): Prohibited

5.2.4 Digital input (Address 3~6)

1) Digital input value can be selected and used within the range of -192~16191, -8192~8191, 952~5047 or -120~10191 for 1~5V based on input type.
2) If the digital input value is not specified, it will be set to 0.

Uxy.03 ~ Uxy.6

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
Channel# digital input value															

B:bit

Address	Details
3	CH0 digital output value
4	CH1 digital output value
5	CH2 digital output value
6	CH3 digital output value
7	CH4 digital output value
8	CH5 digital output value
9	CH6 digital output value
10	CH7 digital output value

5.3 operation parameters settings

5.3.1 Specifying channels to use

If the channel to use is not specified, all the channels will be set to Stop.

Address "0"

B:bit

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
—	—	—	—	- —	—	—	—	CH7	CH6	CH5	CH4	CH3	CH2	CH1	CH0

BIT	Details
0	Stop
1	Run

5.3.2 Setting Output Voltage/Current range

1) The range of analog output can be specified for respective channels.
2) If the output range is not specified, the range of all the channels will be set to 1~5V for voltage output, and 4~20 mA for current output.
3) Setting of output range is as specified below.

Address "1"

B:bit

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
CH7		CH6		CH5		CH4		CH3		CH2		CH1		CH0	

BIT	Details
00	1V ~ 5V / 4 ~ 20mA
01	0V ~ 5V / 0 ~ 20mA
10	0V ~ 10V
11	-10V ~ 10V

5.3.3 Specifying Input data type

1) Input type can be specified for respective channels.
   If input type is not specified, all the channels will be set to the range of 0~16000.

Address "2"

B15 B14	B13 B12	B11 B10	B9 B8	B7 B6	B5 B4	B3 B2	B1 B0
CH7	CH6	CH5	CH4	CH3	CH2	CH1	CH0

BIT	Details
00	0 ~ 16000
01	-8000 ~ 8000
10	Precise Value
11	0 ~ 10000

This area is used to specify D/A input type for respective channels.
The precise value has the digital input ranges as follows;

Analog output / Digital input	1 ~ 5V	0 ~ 5V	0 ~ 10V	-10 ~ 10V
Precise Value	1000~5000	0~5000	0 ~ 10000	-10000 ~ 10000

Analog output / Digital input	4 ~ 20mA	0 ~ 20mA
Precise Value	4000 ~ 20000	0 ~ 20000

5.3.4 Setting Output data type

Based on setting value, the output status is as follows; Setting range is 0~3.

Address "3~10"

B:bit

B15 B14 B13 B12 B11 B10 B9 B8 B7 B6 B5 B4 B3 B2 B1 B0
Channel# Setting value

Setting value	Details
0	Keeps the previous value as it is
1	Outputs the minimum value of output range
2	Outputs the middle value of output range
3	Outputs the maximum value of output range

5.3.5 Error code

Error codes detected from Analog output module will be saved.

Address 11~14”

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
—	—	—	—	- —	—	—	—	Channel# Error code							

Refer to the table below for detailed error codes

Error Code (Dec)	Details	LED status
10	Module error (Reset Check Error)	Blinks every 0.2 sec.
11	Module error (Ram Check Error)	
12	Module error (Register Check Error)	
13	Module error (EEPROM Check Error)	
21	Module error (D/A Conversion Error)	
31# Note)	Current module’s parameters setting error	Blinks every 1 sec.
32# Note)	Parameters setting error when setting current module’s Offset/Gain	
40# Note)	Setting error of current module’s digital input range (If input value is set less than -192, or greater than 16191) The range changes based on input type	
41# Note)	Setting error of voltage module’s digital input range (If input value is set less than -192, or greater than 16191) The range changes based on input type	
50# Note)	Offset/Gain setting error in current module of 4~20 mA (If Offset value is set greater than or equal to Gain value)	
51# Note)	Offset/Gain setting error in current module of 0~20 mA (If Offset value is set greater than or equal to Gain value)	
52# Note)	Offset/Gain setting error in voltage module of 1~5V (If Offset value is set greater than or equal to Gain value)	
53# Note)	Offset/Gain setting error in voltage module of 0~5V (If Offset value is set greater than or equal to Gain value)	
54# Note)	Offset/Gain setting error in voltage module of 0~10V (If Offset value is set greater than or equal to Gain value)	
55# Note)	Offset/Gain setting error in voltage module of -10~10V (#: channel) (If Offset value is set greater than or equal to Gain value)	

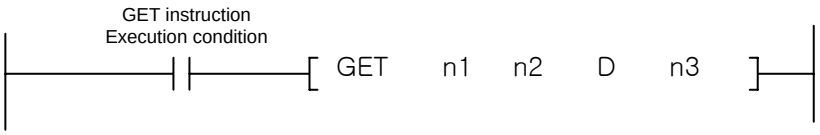
Note) # (0~3) stands for the channel with error found.

Chapter 6 Programming

6.1 Internal Memory Read/Write

6.1.1 Read of internal memory (GET, GETP instruction)

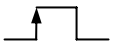
Type



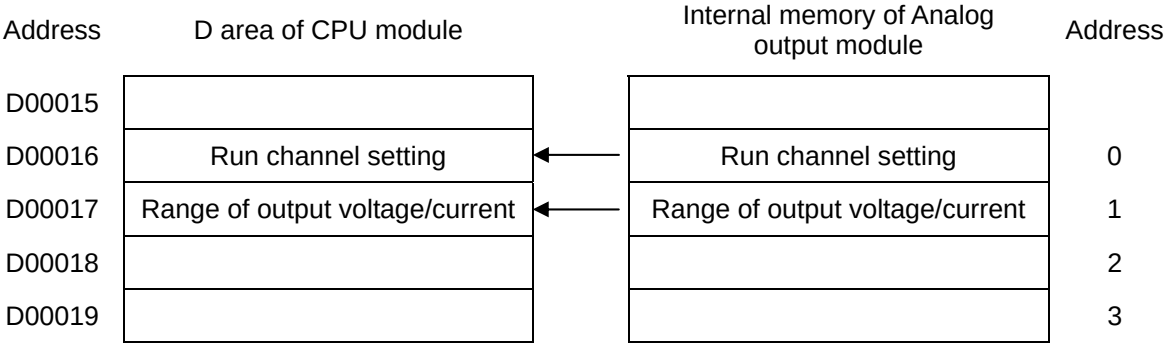
Type	Description	Area available
n1	Slot No. the special module is installed on	Integer
n2	Start address of special module's internal memory to read data	Integer
D	Device's start address with saved data to read	M, P, K, L, T, C, D, #D
n3	Number of words data to read	Integer

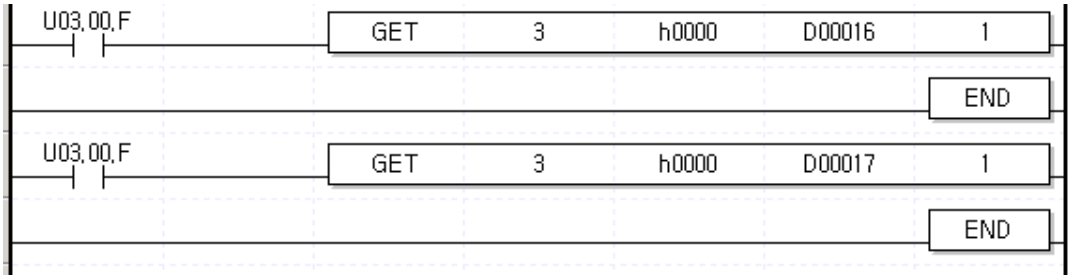
< Difference between GET instruction and GETP instruction **>**

GET : always executed with execution condition On ( )

GETP : executed with execution condition of operation start ()

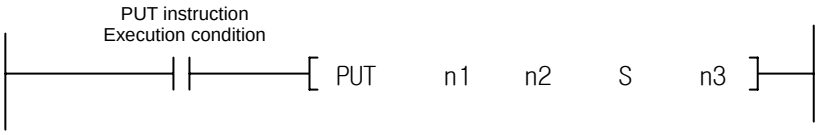
Example If Analog output module is installed on base No.0 and slot No.3, and internal memory address No.0 & 1's data in Analog output module is read to D16 and D17 of CPU module.





6.1.2 Write of internal memory (PUT, PUTP instruction)

Type



Type	Description	Area available
n1	Slot No. the special module is installed on	Integer
n2	Start address of special module's internal memory to write data.	Integer
S	Device's start address or integer with saved data to write.	M, P, K, L, T, C, D, #D, integer
n3	Number of words data to write	Integer

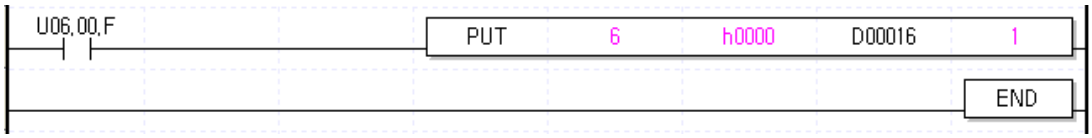
< Difference between PUT instruction and PUTP instruction **>**

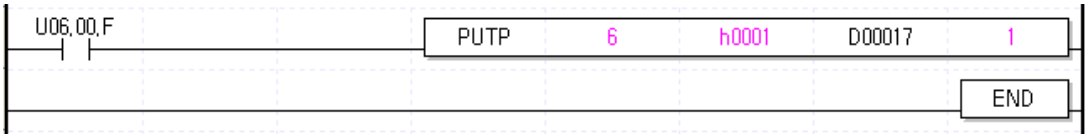
PUT : always executed with execution condition On ( )

PUTP : executed with execution condition of operation start ( )

Example If Analog output module is installed on Base No.0 and Slot No.6, and CPU module's data of D16~D17 is written on internal memory addresses 0~1 of Analog output module,

Address	D area of CPU module		Internal memory of Analog output module	Address
D00015				
D00016	Data 1	→	Run channel setting	0
D00017	Data 2	→	Range of output voltage/current	1
D00018				2
D00019				3





6.2 Basic Program

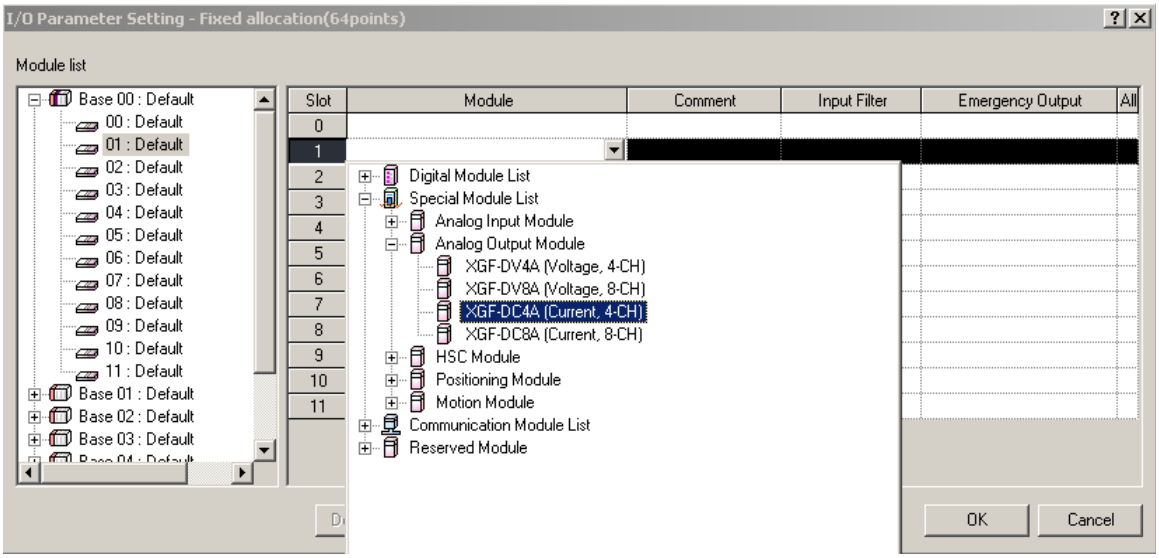
1) How to specify Run condition details of Analog output module's internal memory will be described.
2) Analog output module is as installed on slot 1.
3) I/O assigned points of Analog output module is 16 points.

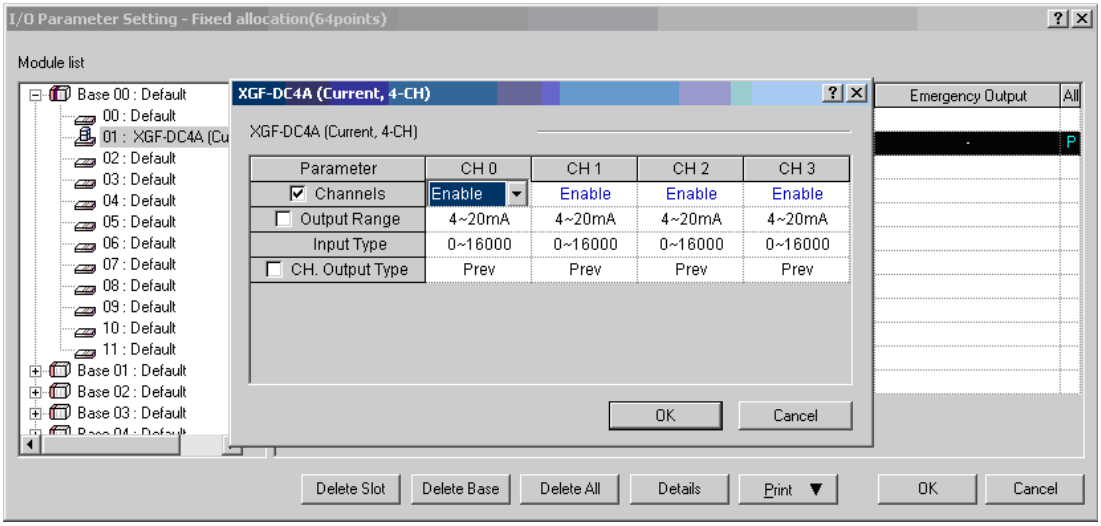
System Configuration

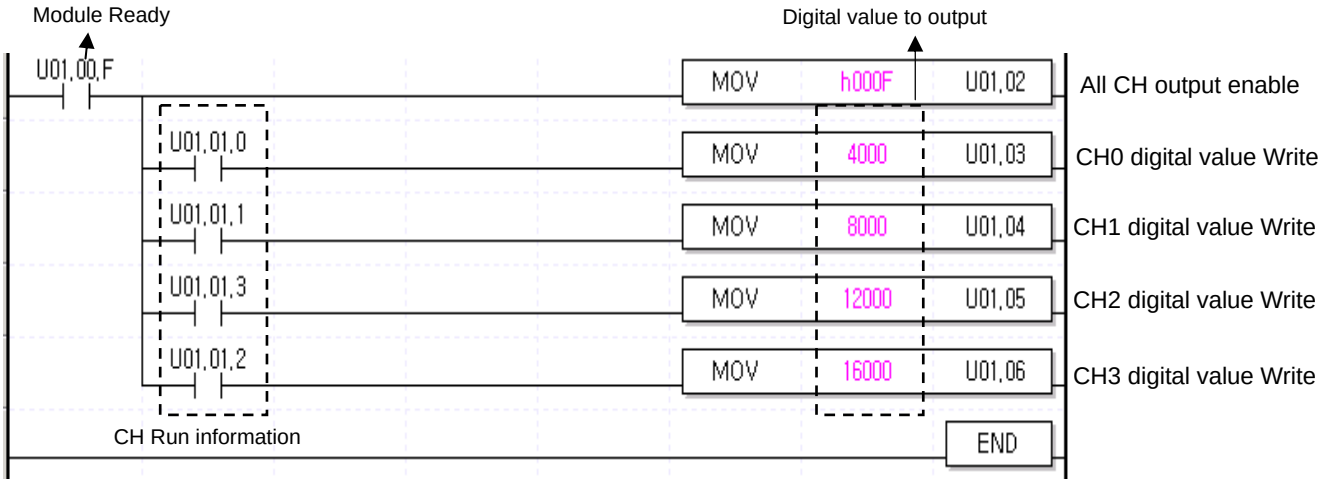
XGP-APF1	XGK-CPU H		XGF-DC4 A RUN		

6.2.1 XGF-DC4A

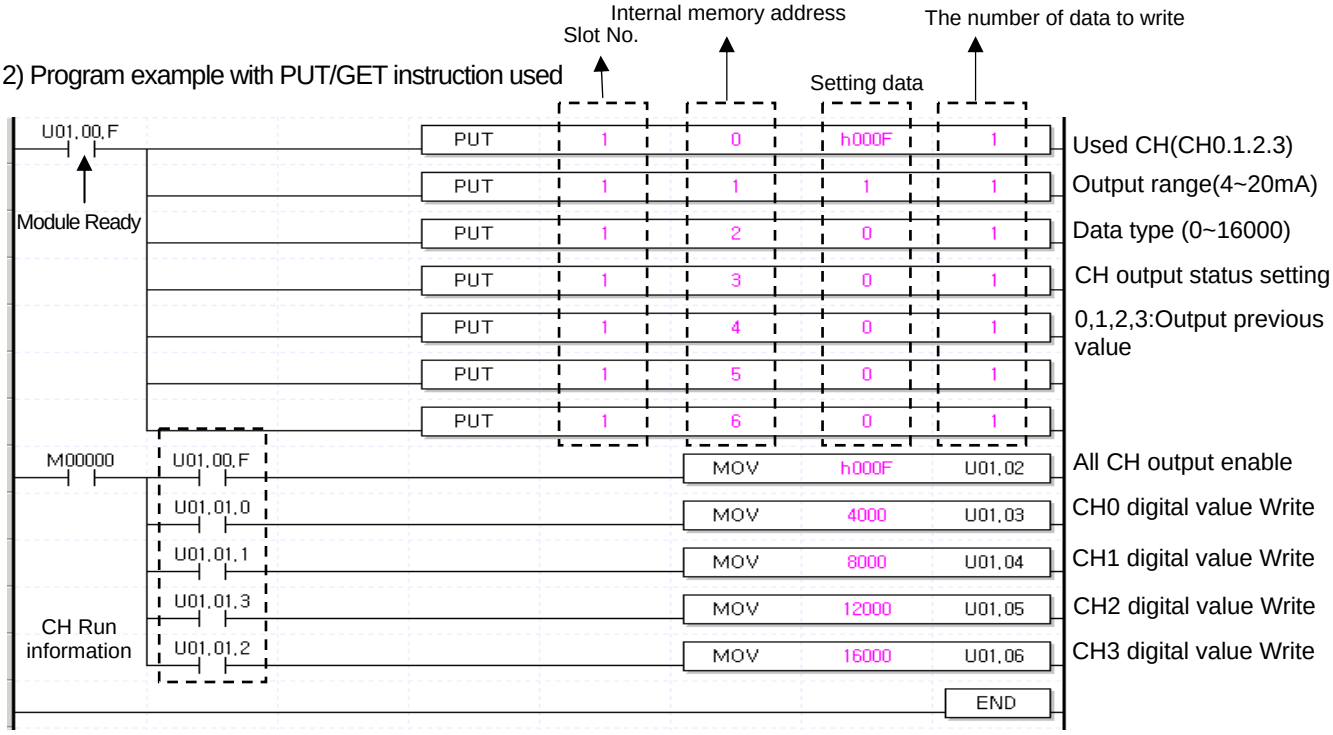
1) Program example through [I/O Parameters] setting







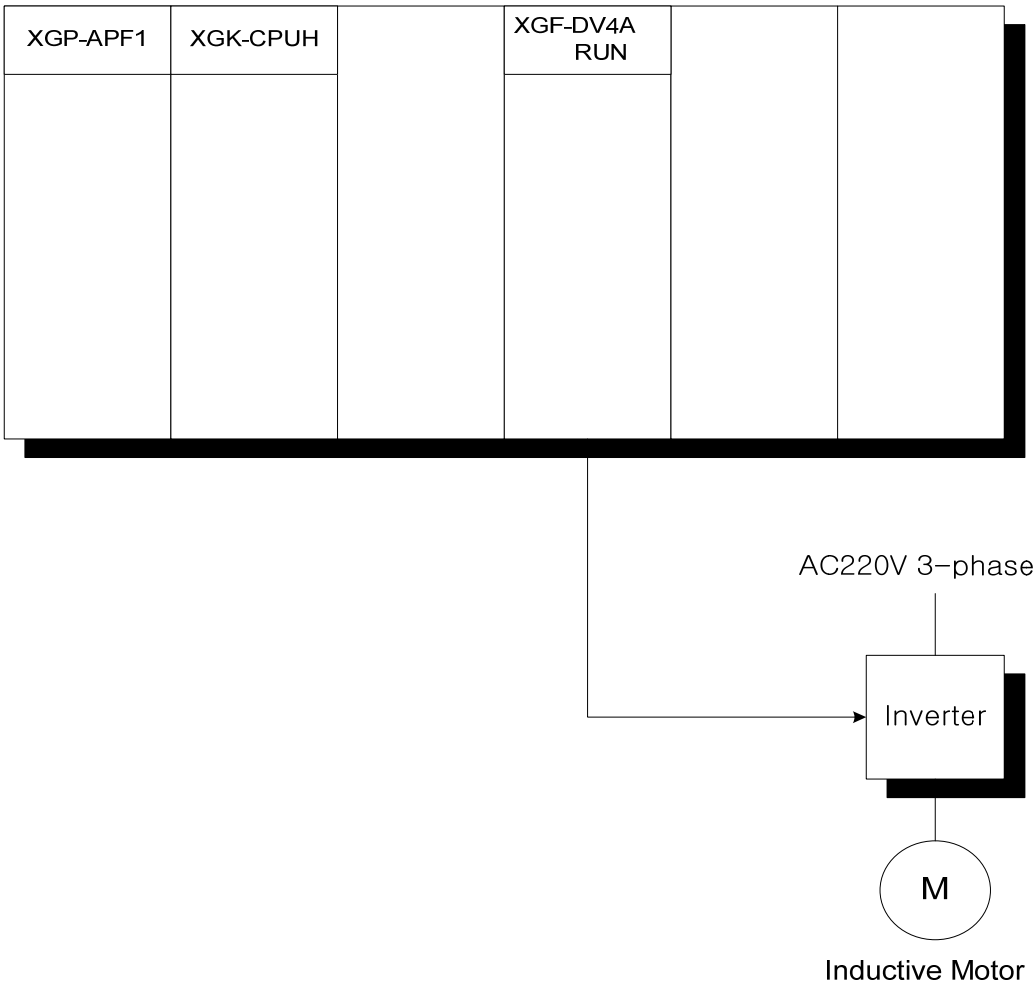
2) Program example with PUT/GET instruction used



6.3 Application Program

6.3.1 Inverter speed control

1) System Configuration



2) Details of initial setting

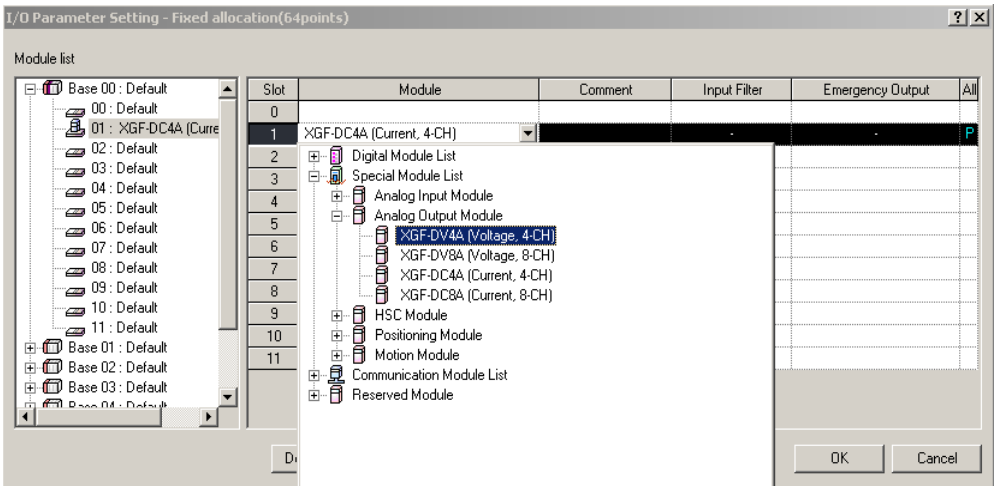
No	Parameters	Setting Details	Internal Memory Address
1	Channels	CH 0 ~ 3	0
2	Output voltage range	0 ~ 10V	1
3	Data type	0 ~ 16,000	2
4	Channel Output type	Previous value	3,4,5,6

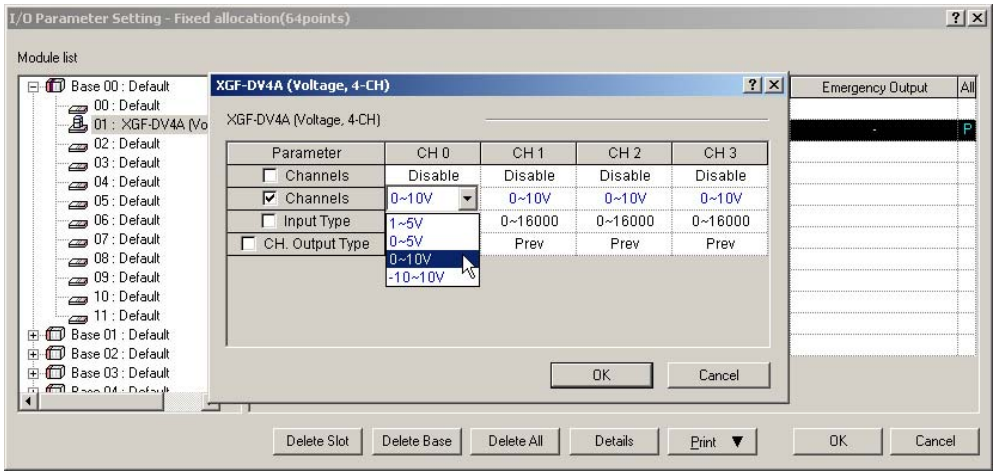
3) Description of program

(1) At the same time Module Ready Contact is On, output of all the channels will be set to Allowed.
(2) If P0001 is On, 0V will be output.
(3) If P0002 is Off and P0002 is On, 2.5V will be output.
(4) If P0003 is Off and P0003 is On, 5V will be output.
(5) If P0004 is Off and P0004 is On, 7.5V will be output.

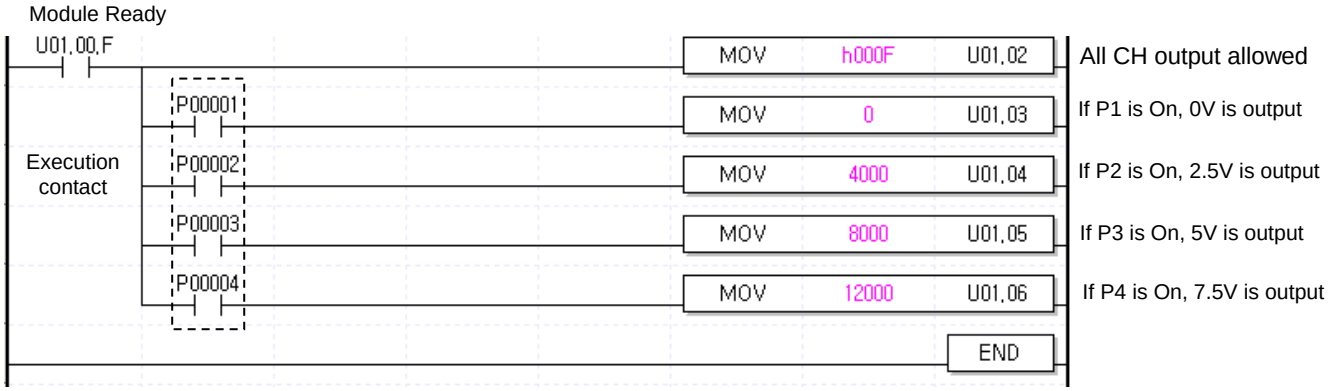
4) Program

(1) Program example through I/O Parameters Setting.

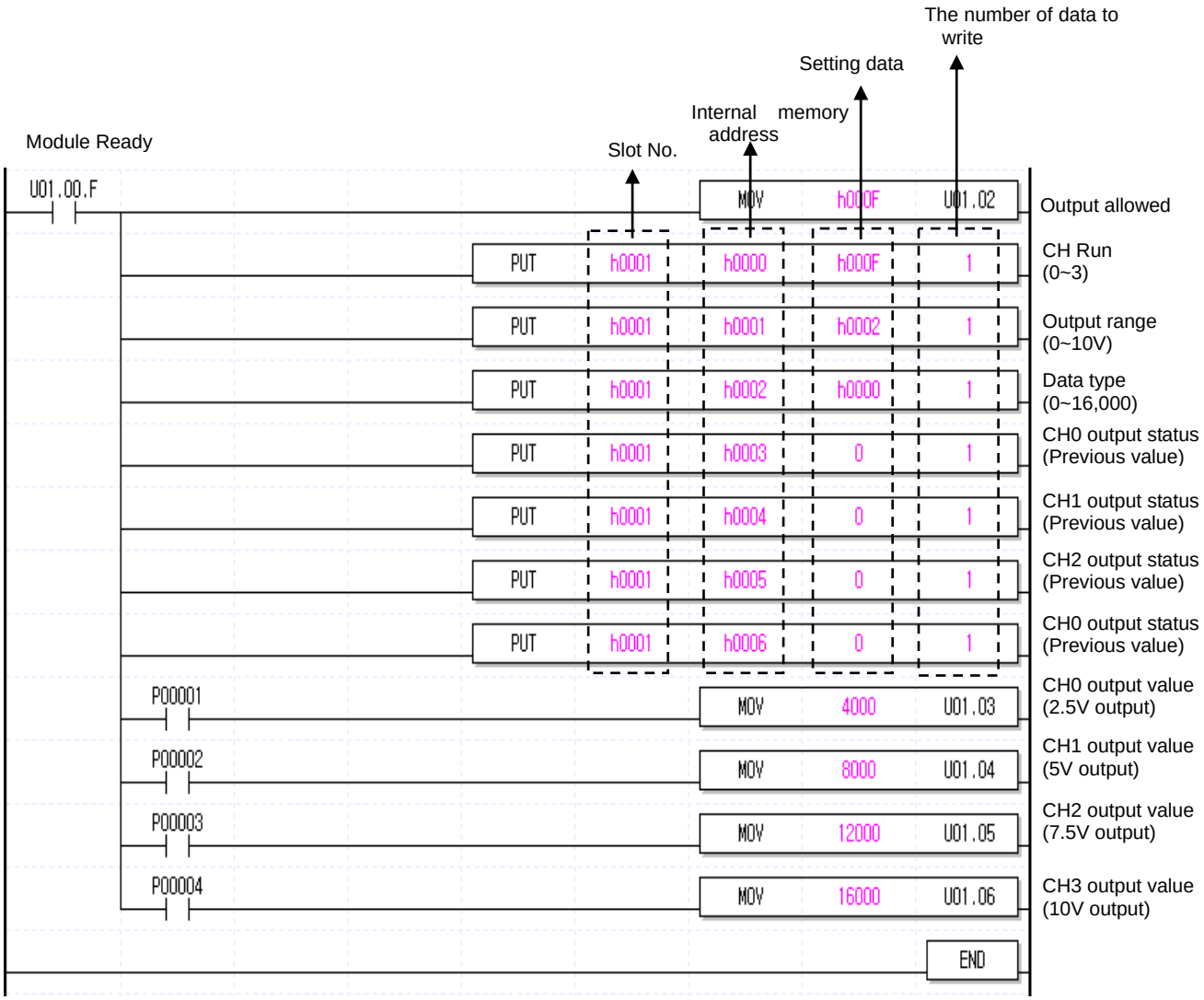




(2) Program

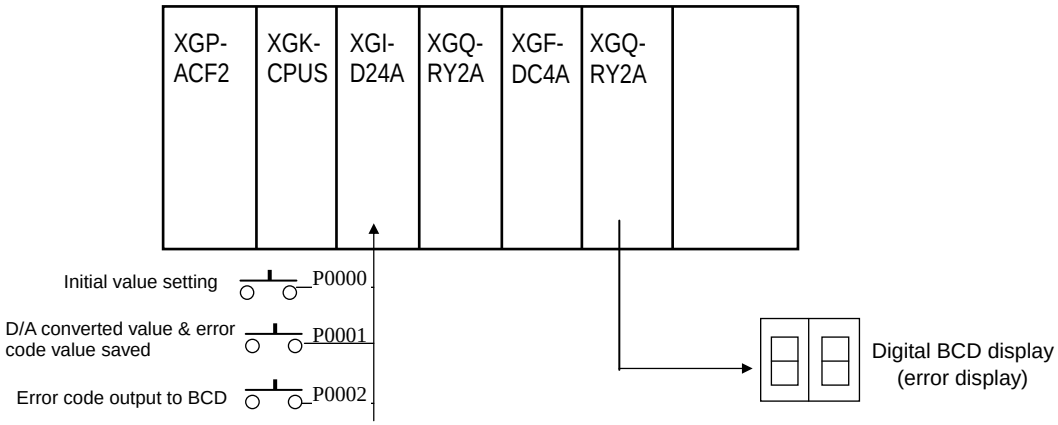


(3) Program example with PUT/GET instruction used



6.3.2 BCD output of error code

1) System Configuration



2) Details of initial setting

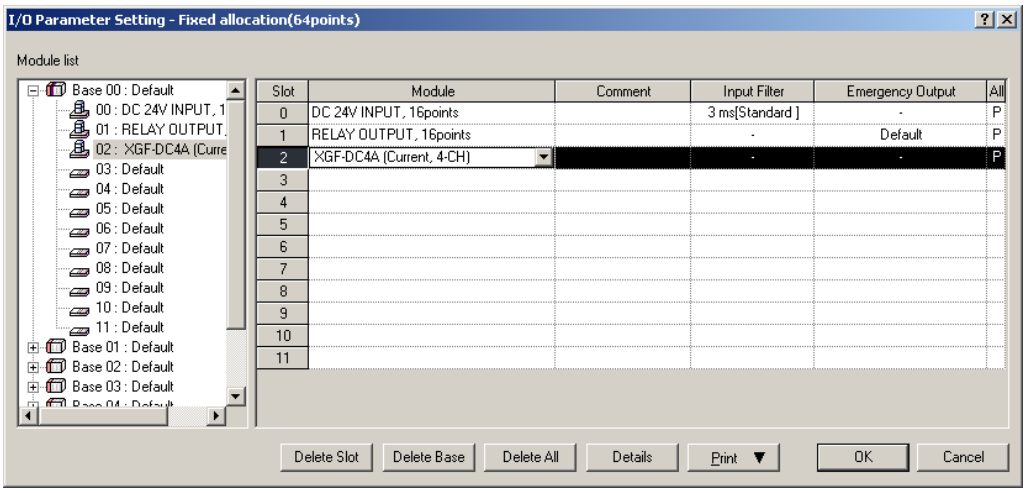
(1) Used CH: CH 0
(2) Analog output current range: DC 4 ~ 20 mA
(3) Digital input data range: 0 ~ 16000

3) Description of program

(1) If P00000 is On, D/A conversion will be initially specified.
(2) If P00001 is On, D/A converted value and error code will be saved respectively on D00000 and D00001.
(3) If P00002 is On, applicable error code will be output to digital BCD display. (P00040 ~ P0004F)

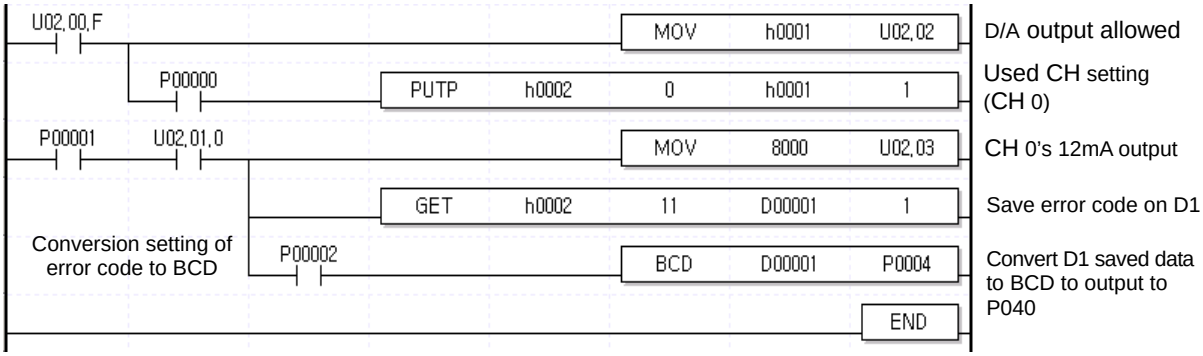
4) Program

(1) Program example through [I/O Parameter] setting



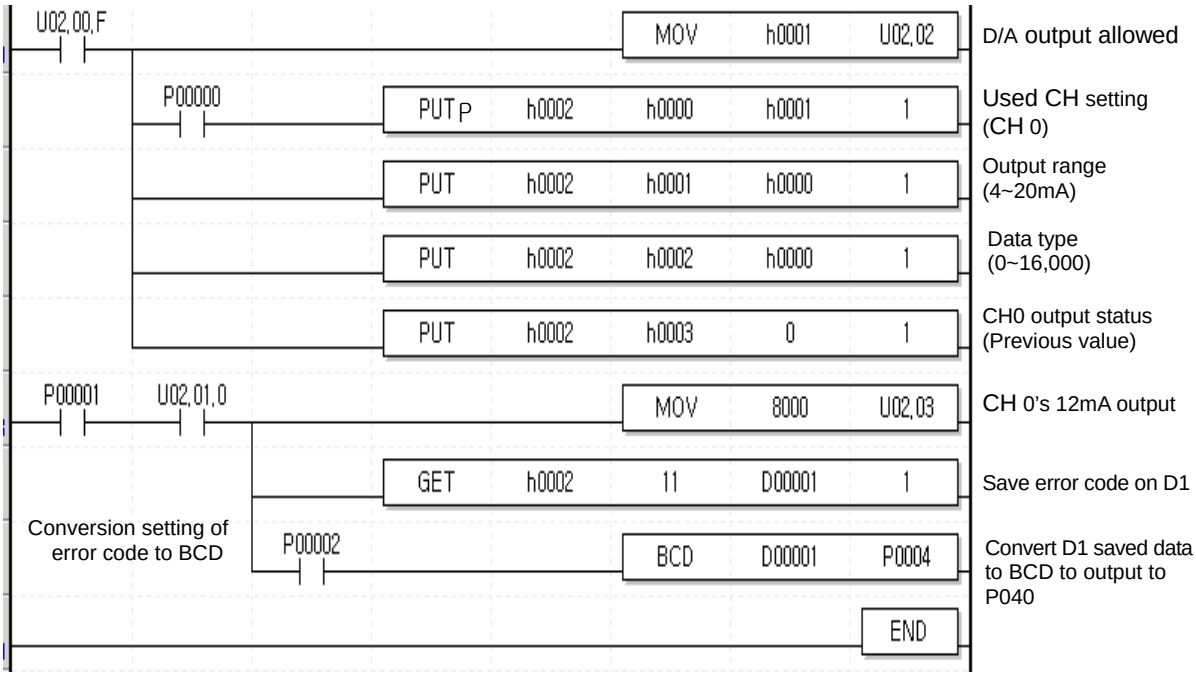
Execution contact

Module READY



(2) Program example with PUT/GET instruction used

Module READY Execution contact



Chapter 7 Configuration and Function of Global variable (For XGI/XGR)

7.1 Global Variable (Data area)

7.1.1 D/A conversion data I/O area configuration

Indicates D/A conversion data I/O area at table 7.1

Global variable	Memory allocation	Description	Read/Write
_xxyy_CH0_ERR	%UXxx.yy.0	CH 0 error flag	Read
_xxyy_CH1_ERR	%UXxx.yy.1	CH 1 error flag	Read
_xxyy_CH2_ERR	%UXxx.yy.2	CH 2 error flag	Read
_xxyy_CH3_ERR	%UXxx.yy.3	CH 3 error flag	Read
_xxyy_CH4_ERR	%UXxx.yy.4	CH 4 error flag	Read
_xxyy_CH5_ERR	%UXxx.yy.5	CH 5 error flag	Read
_xxyy_CH6_ERR	%UXxx.yy.6	CH 6 error flag	Read
_xxyy_CH7_ERR	%UXxx.yy.7	CH 7 error flag	Read
_xxyy_RDY	%UXxx.yy.15	Module ready flag	Read
_xxyy_CH0_OUTEN	%UXxx.yy.32	CH 0 output status setting bit On(1) : enable output, Off(0) : disable output	**Read/Write**
_xxyy_CH0_OUTEN	%UXxx.yy.33	CH 1 output status setting bit On(1) : enable output, Off(0) : disable output	**Read/Write**
_xxyy_CH0_OUTEN	%UXxx.yy.34	CH 2 output status setting bit On(1) : enable output, Off(0) : disable output	**Read/Write**
_xxyy_CH0_OUTEN	%UXxx.yy.35	CH 3 output status setting bit On(1) : enable output, Off(0) : disable output	**Read/Write**
_xxyy_CH0_OUTEN	%UXxx.yy.36	CH 4 output status setting bit On(1) : enable output, Off(0) : disable output	**Read/Write**
_xxyy_CH0_OUTEN	%UXxx.yy.37	CH 5 output status setting bit On(1) : enable output, Off(0) : disable output	**Read/Write**
_xxyy_CH0_OUTEN	%UXxx.yy.38	CH 6 output status setting bit On(1) : enable output, Off(0) : disable output	**Read/Write**
_xxyy_CH0_OUTEN	%UXxx.yy.39	CH 7 output status setting bit On(1) : enable output, Off(0) : disable output	**Read/Write**
_xxyy_CH0_DATA	%UWxx.yy.3	CH 0 digital input value	Read/Write
_xxyy_CH1_DATA	%UWxx.yy.4	CH 1 digital input value	
_xxyy_CH2_DATA	%UWxx.yy.5	CH 2 digital input value	
_xxyy_CH3_DATA	%UWxx.yy.6	CH 3 digital input value	
_xxyy_CH4_DATA	%UWxx.yy.7	CH 4 digital input value	
_xxyy_CH5_DATA	%UWxx.yy.8	CH 5 digital input value	
_xxyy_CH6_DATA	%UWxx.yy.9	CH 6 digital input value	
_xxyy_CH7_DATA	%UWxx.yy.10	CH 7 digital input value	

[Table 7. 1] A/D conversion data IO area

※ At the device allocation, xx means base number and yy means slot number where module is installed.

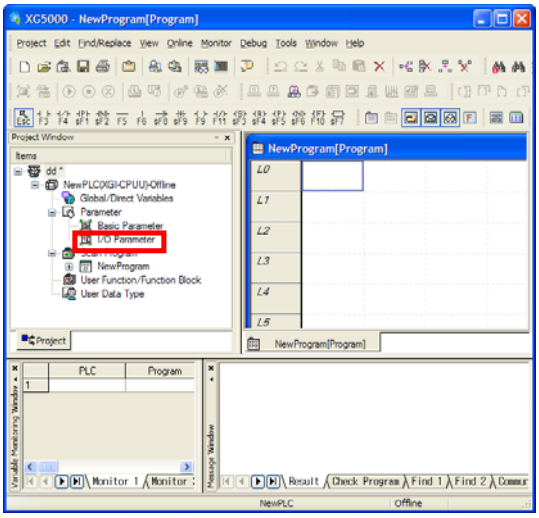
7.1.2 How to use global variable

- In order to register global variable, there are two method, auto registration after setting I/O parameter at project window and batch registration after setting I/O parameter

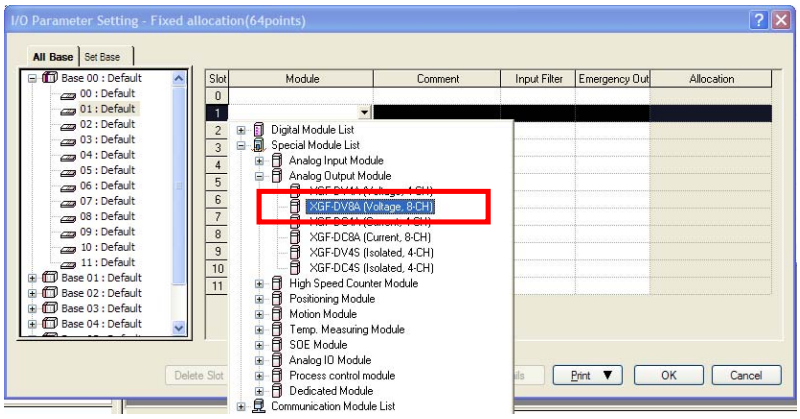
(1) I/O parameter registration

- Registers module you want to use at I/O parameter

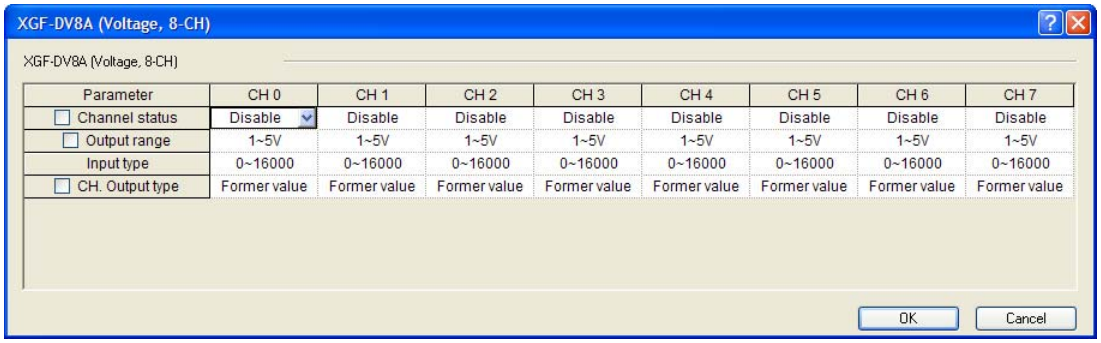
(a) Double-click I/O parameter of project window



(b) Select XGF-DV8A module at I/O parameter window



(c) Set parameter by pressing [Details] and select [OK]



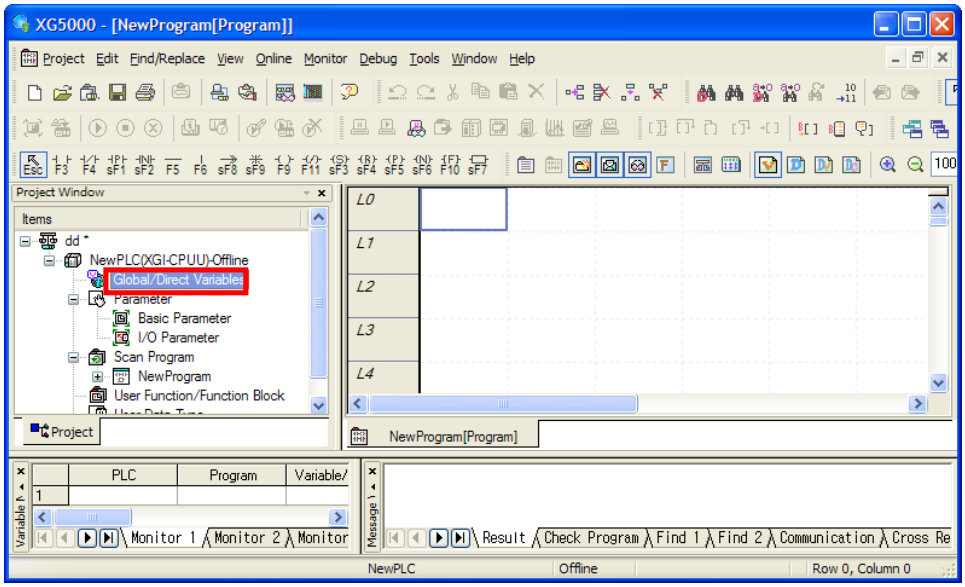
Parameter	CH 0	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7
Channel status	Disable	Disable	Disable	Disable	Disable	Disable	Disable	Disable
Output range	1~5V	1~5V	1~5V	1~5V	1~5V	1~5V	1~5V	1~5V
Input type	0~16000	0~16000	0~16000	0~16000	0~16000	0~16000	0~16000	0~16000
CH. Output type	Former value	Former value	Former value	Former value	Former value	Former value	Former value	Former value

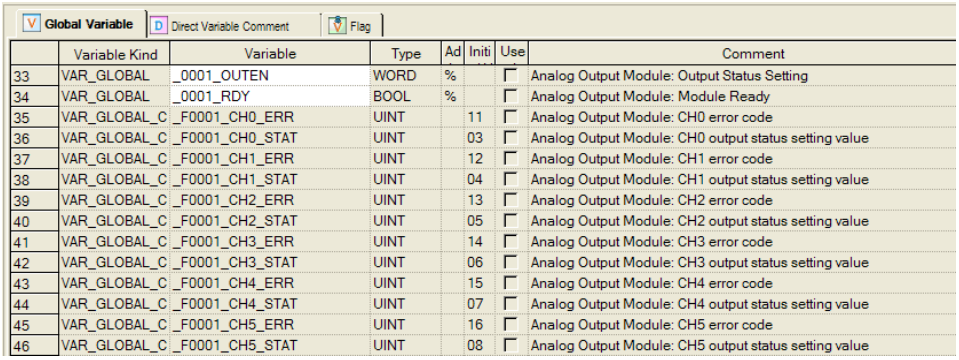
(d) Select [Yes]

- Global variable of module set in I/O parameter is registered automatically.r

(e) Check global variable auto registration

- Double-click Global/Direct Variable of project window





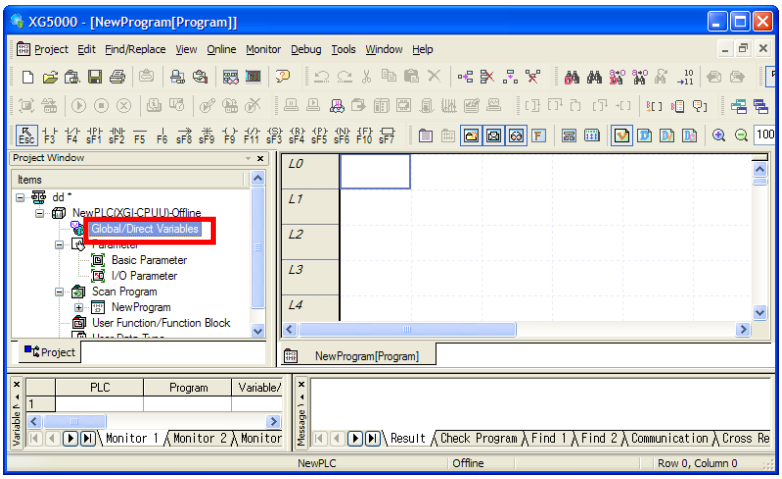
Global Variable | Direct Variable Comment | Flag

	Variable Kind	Variable	Type	Ad	Initi	Use	Comment
33	VAR_GLOBAL	_0001_OUTEN	WORD	%		☐	Analog Output Module: Output Status Setting
34	VAR_GLOBAL	_0001_RDY	BOOL	%		☐	Analog Output Module: Module Ready
35	VAR_GLOBAL_C	_F0001_CH0_ERR	UINT		11	☐	Analog Output Module: CH0 error code
36	VAR_GLOBAL_C	_F0001_CH0_STAT	UINT		03	☐	Analog Output Module: CH0 output status setting value
37	VAR_GLOBAL_C	_F0001_CH1_ERR	UINT		12	☐	Analog Output Module: CH1 error code
38	VAR_GLOBAL_C	_F0001_CH1_STAT	UINT		04	☐	Analog Output Module: CH1 output status setting value
39	VAR_GLOBAL_C	_F0001_CH2_ERR	UINT		13	☐	Analog Output Module: CH2 error code
40	VAR_GLOBAL_C	_F0001_CH2_STAT	UINT		05	☐	Analog Output Module: CH2 output status setting value
41	VAR_GLOBAL_C	_F0001_CH3_ERR	UINT		14	☐	Analog Output Module: CH3 error code
42	VAR_GLOBAL_C	_F0001_CH3_STAT	UINT		06	☐	Analog Output Module: CH3 output status setting value
43	VAR_GLOBAL_C	_F0001_CH4_ERR	UINT		15	☐	Analog Output Module: CH4 error code
44	VAR_GLOBAL_C	_F0001_CH4_STAT	UINT		07	☐	Analog Output Module: CH4 output status setting value
45	VAR_GLOBAL_C	_F0001_CH5_ERR	UINT		16	☐	Analog Output Module: CH5 error code
46	VAR_GLOBAL_C	_F0001_CH5_STAT	UINT		08	☐	Analog Output Module: CH5 output status setting value

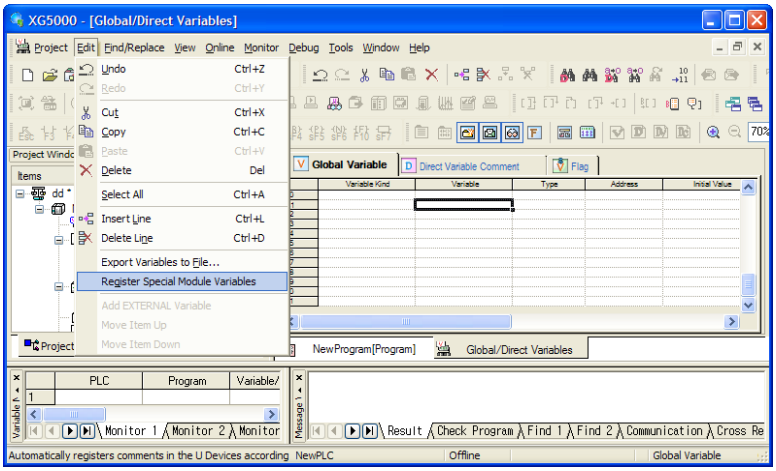
(2) Global variable registration

- Registers global variable set in I/O parameter

(a) Double-click Global/Direct Variable of project window



(b) Select [Register Special Module Variables] at menu [Edit]



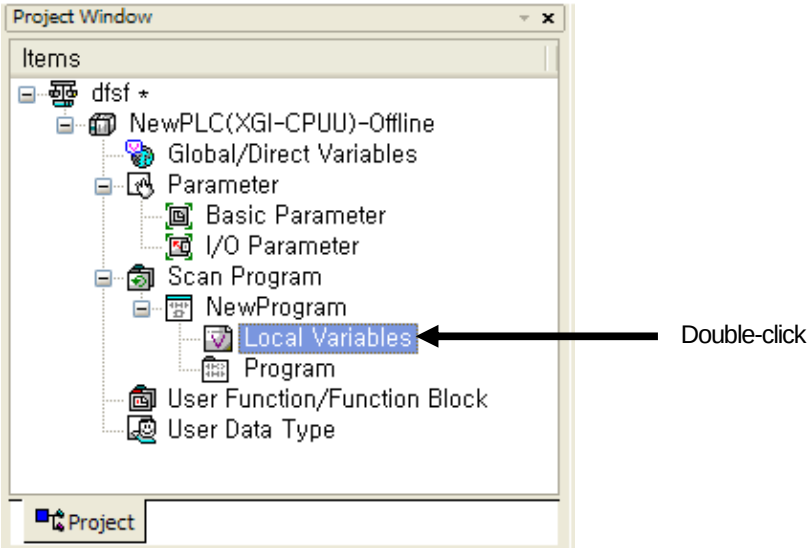
Global Variable | Direct Variable Comment | Flag

	Variable Kind	Variable	Type	Ad	Initi	Use	Comment
33	VAR_GLOBAL	_0001_OUTEN	WORD	%		☐	Analog Output Module: Output Status Setting
34	VAR_GLOBAL	_0001_RDY	BOOL	%		☐	Analog Output Module: Module Ready
35	VAR_GLOBAL_C	_F0001_CH0_ERR	UINT		11	☐	Analog Output Module: CH0 error code
36	VAR_GLOBAL_C	_F0001_CH0_STAT	UINT		03	☐	Analog Output Module: CH0 output status setting value
37	VAR_GLOBAL_C	_F0001_CH1_ERR	UINT		12	☐	Analog Output Module: CH1 error code
38	VAR_GLOBAL_C	_F0001_CH1_STAT	UINT		04	☐	Analog Output Module: CH1 output status setting value
39	VAR_GLOBAL_C	_F0001_CH2_ERR	UINT		13	☐	Analog Output Module: CH2 error code
40	VAR_GLOBAL_C	_F0001_CH2_STAT	UINT		05	☐	Analog Output Module: CH2 output status setting value
41	VAR_GLOBAL_C	_F0001_CH3_ERR	UINT		14	☐	Analog Output Module: CH3 error code
42	VAR_GLOBAL_C	_F0001_CH3_STAT	UINT		06	☐	Analog Output Module: CH3 output status setting value
43	VAR_GLOBAL_C	_F0001_CH4_ERR	UINT		15	☐	Analog Output Module: CH4 error code
44	VAR_GLOBAL_C	_F0001_CH4_STAT	UINT		07	☐	Analog Output Module: CH4 output status setting value
45	VAR_GLOBAL_C	_F0001_CH5_ERR	UINT		16	☐	Analog Output Module: CH5 error code
46	VAR_GLOBAL_C	_F0001_CH5_STAT	UINT		08	☐	Analog Output Module: CH5 output status setting value

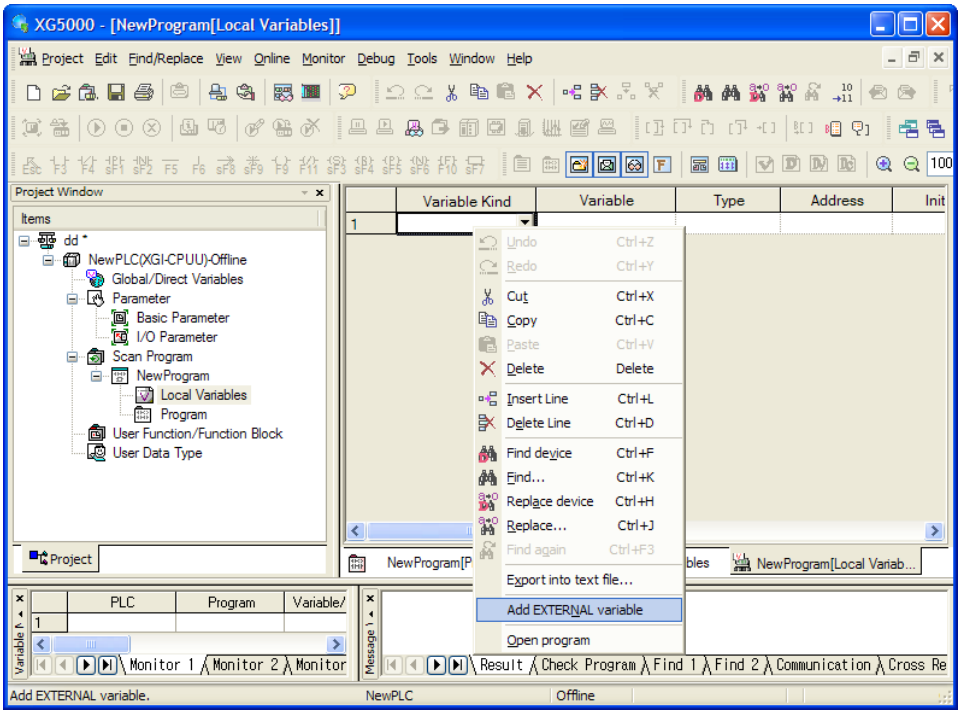
(3) Local variable registration

- Registers variable among registered global variable you want to use as local variable.

(a) Double-click local variable to use in the following scan program.

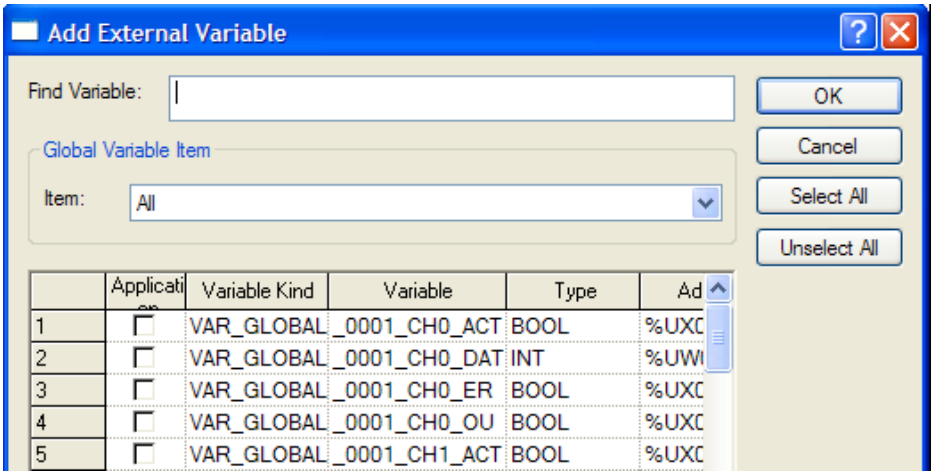


(b) Click right button of mouse in the right local variable window and select “Add EXTERNAL variable”.

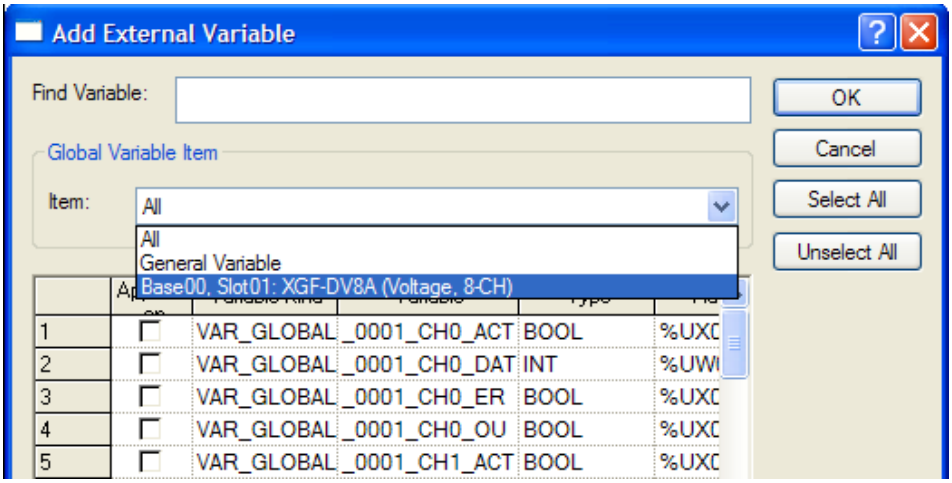


(c) Select local variable to add at Global View on “Add External Variable” window (“All” or “Base, slot”).

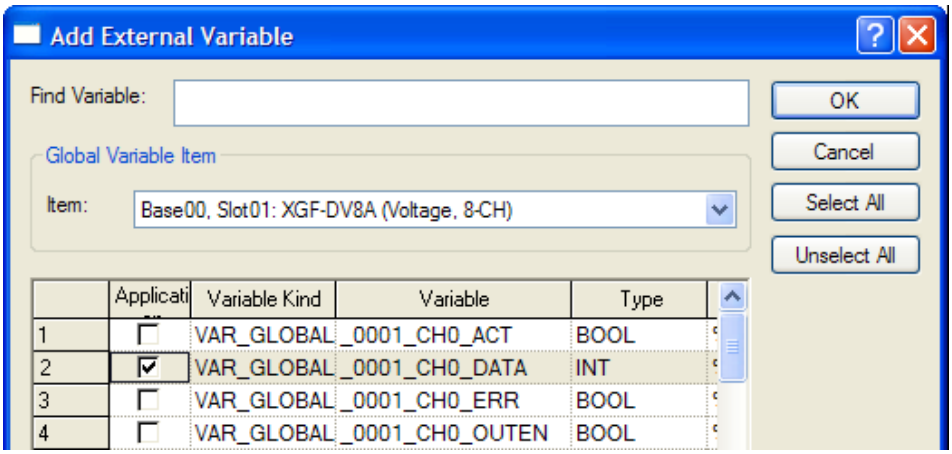
-View All



- View by base, slot



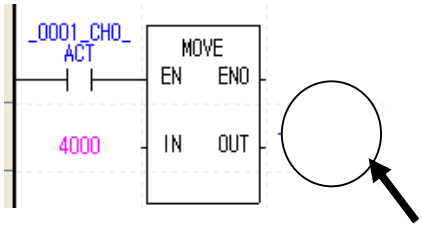
(d) The following is example selecting digital output value (_0001_CH0_DATA) of “Base00, Slot01”.



(4) How to use local variable on program

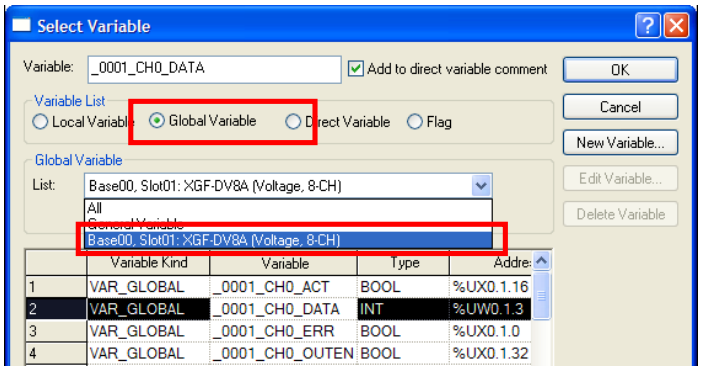
- It describes the added global variable at local program.
- The following is example getting the conversion value of CH0 of Analog input module to %MW0.

(a) In case of inputting constant value (4000) into CH 0 (_0001_CH1_CH0_DATA) by using the following MOVE function, double click variable window part behind OUT, then "Select Variable" window shows up.

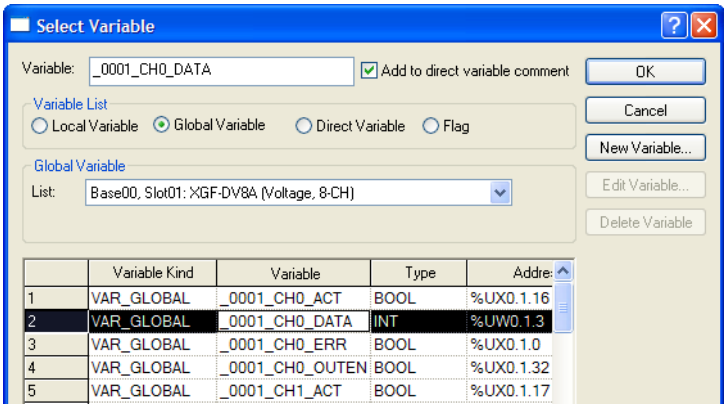


Double-click

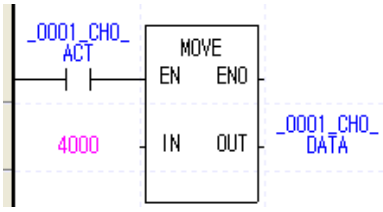
(b) Select global variable at variable type at Select Variable window. And select relevant base (0 base, 1 slot) at global variable list item.



(c) Double-click or select _0001_CH0_DATA corresponding to CH0 D/A conversion data and click [OK].



(d) The following figure is result adding global variable corresponding to CH0 D/A conversion value.



7.2 PUT/GET Function Block use area (Parameter area)

7.2.1 PUT/GET Function Block use area (Parameter area)

It indicates operation parameter setting area of Analog output module at table 7.2.

Global variable	Description	Type	Read/Write	Instruction
_Fxxyy_CH_EN	Channel enable/disable setting	WORD	Read/Write	PUT
_Fxxyy_OUT_RANGE	Output voltage/current range setting	UINT	Read/Write	PUT
_Fxxyy_DATA_TYPE	Input data type setting	UINT	Read/Write	PUT
_Fxxyy_CH0_STAT	CH 0 output status setting value	UINT	Read/Write	PUT/GET
_Fxxyy_CH1_STAT	CH 1 output status setting value	UINT		
_Fxxyy_CH2_STAT	CH 2 output status setting value	UINT		
_Fxxyy_CH3_STAT	CH 3 output status setting value	UINT		
_Fxxyy_CH4_STAT	CH 4 output status setting value	UINT		
_Fxxyy_CH5_STAT	CH 5 output status setting value	UINT		
_Fxxyy_CH6_STAT	CH 6 output status setting value	UINT		
_Fxxyy_CH7_STAT	CH 7 output status setting value	UINT		
_Fxxyy_CH0_ERR	CH 0 error code	UINT	Read	GET
_Fxxyy_CH1_ERR	CH 1 error code	UINT		
_Fxxyy_CH2_ERR	CH 2 error code	UINT		
_Fxxyy_CH3_ERR	CH 3 error code	UINT		
_Fxxyy_CH4_ERR	CH 4 error code	UINT		
_Fxxyy_CH5_ERR	CH 5 error code	UINT		
_Fxxyy_CH6_ERR	CH 6 error code	UINT		
_Fxxyy_CH7_ERR	CH 7 error code	UINT		

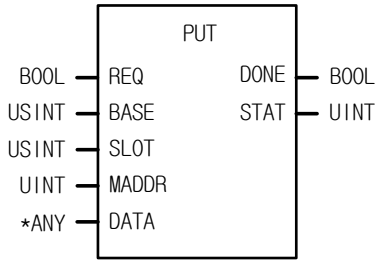
[Table 7. 2] Operation parameter setting area

※ At the device allocation, xx means base number and yy means slot number where module is installed

7.2.2 PUT/GET instruction

(1)PUT instruction

PUT
Writing data to special module

Function Block	Description
	**Input** REQ : execute function when 1 BASE : set base position SLOT : set slot position MADDR : module address DATA : data to save module **Output** DONE : Output 1 when normal STAT : Error information

*ANY: WORD, DWORD, INT, USINT, DINT, UDINT type available among ANY type

■ **Function**

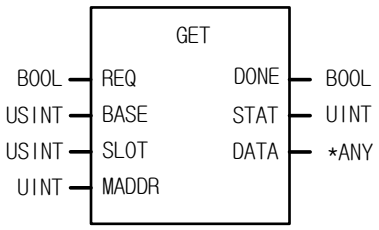
Writes data to the designated special module

Function Block	Input(ANY) type	Description
PUT_WORD	WORD	Save WRD data into the designated module address (MADDR).
PUT_DWORD	DWORD	Save DWORD data into the designated module address (MADDR).
PUT_INT	INT	Save INT data into the designated module address (MADDR).
PUT_UINT	UINT	Save UNIT data into the designated module address (MADDR).
PUT_DINT	DINT	Save DINT data into the designated module address (MADDR).
PUT_UDINT	UDINT	Save UDINT data into the designated module address (MADDR).

(2) GET instruction

GET

Reading from special module data

Function block	Description
	**Input** REQ : execute function when 1 BASE : set base position SLOT : set slot position MADDR : module address 512(0x200) ~ 1023(0x3FF) **Output** DONE : output 1 when normal STAT : Error information DATA : data to read from module

*ANY: WORD, DWORD, INT, UINT, DINT, UDINT type available among ANY type

■ **Function**

Reads data from designated special module

Function Block	Output(ANY) type	Description
GET_WORD	WORD	Read data as much as WORD from the designated module address (MADDR).
GET_DWORD	DWORD	Read data as much as DWORD from the designated module address (MADDR).
GET_INT	INT	Read data as much as INT from the designated Module address (MADDR).
GET_UINT	UINT	Read data as much as UNIT from the designated module address (MADDR).
GET_DINT	DINT	Read data as much as DINT from the designated module address (MADDR).
GET_UDINT	UDINT	Read data as much as UDINT from the designated module address (MADDR).

7.2.3 Example using PUT/GET instruction

(1) Enable channel

(a) You can enable/disable D/A conversion per channel

(b) Disable channel not using to reduce the conversion cycle per channel

(c) When channel is not designated, all channels are set as not used

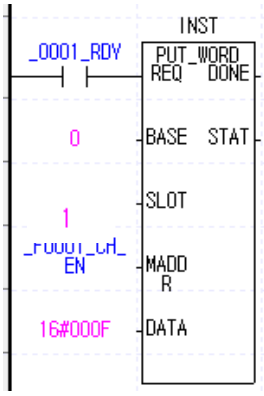
(d) Enable/disable of A/D conversion is as follows

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
-	-	-	-	-	-	-	-	CH7	CH6	CH5	CH4	CH3	CH2	CH1	CH0

Bit	Description
0	Stop
1	Run

16#0003 : 0000 0000 0000 1111

CH3, CH2, CH1, CH0



Set channel to use

(e) The value in B8~B15 is ignored.

(f) The right figure is example enabling CH0~CH3 of D/A module equipped at slot 0.

(2)Output voltage/current range setting

(a) You can set output voltage/current range per channel

(b) When analog output range is not set, all channels are set as 1 ~ 5V

(c) Setting of analog output voltage/current range is as follows.

1) XGF-DV4A

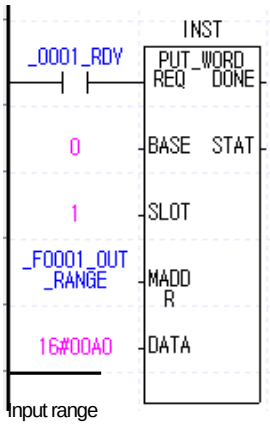
- The following is example setting CH 0~ CH1 as 1~5V and CH2~ Ch3 as 0~10V.

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
CH7		CH6		CH5		CH4		CH3		CH2		CH1		CH0	

Bit	Description
00	1 V ~ 5 V
01	0 V ~ 5 V
10	0 V ~ 10 V
11	-10 V ~ 10 V

16#00A0 : 0000 0000 1010 0000

CH7, CH6, CH5, CH4, CH3, CH2, CH1, CH0



Input range setting

2) XGF-DC4A

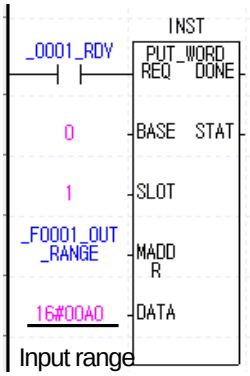
- The following is example setting CH 0~ CH1 as 4~20mA and CH2~ Ch3 as 0~20mA.

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
CH7		CH6		CH5		CH4		CH3		CH2		CH1		CH0	

Bit	Description
00	4 mA ~ 20 mA
01	0 mA ~ 20 mA

16#00A0 : 0000 0000 1010 0000

CH7, CH6, CH5, CH4, CH3, CH2, CH1, CH0



Input range setting

(3) Input type setting

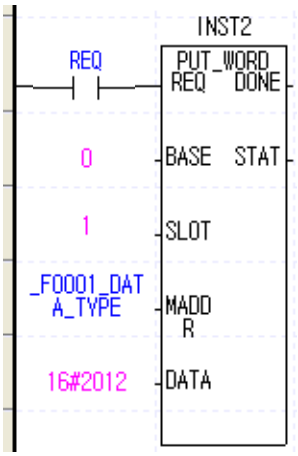
(a) Digital input type can be set per channel.
(b) When input type is not set, all channels are set as 0 ~ 16000.
(c) Setting of digital input type is as follows
(4) In the following figure, CH0~CH1 is set as -8000~8000, CH2~CH3 is set as 0~16000.

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
CH3				CH2				CH1				CH0			

Bit	Description
00	0~ 16000
01	-8000~8000
10	Precise Value
11	0~10000

16#2012 : 0010 0000 0001 0010

CH3, CH2, CH1, CH0



Precise value has the following digital input type about analog output range

1) XGF-DV4A

Analog output / Digital input	0 ~ 5V	1 ~ 5V	0 ~ 10V	-10 ~ 10V
Precise Value	0 ~ 5000	1000 ~ 5000	0 ~ 10000	-10000 ~ 10000

2) XGF-DC4A

Analog output / Digital input	4 ~ 20 mA	0 ~ 20 mA
Precise Value	4000 ~ 20000	0 ~ 20000

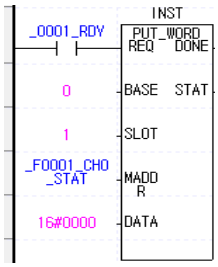
(4) Output status setting

(1) Output status according to setting value is as follows. (Setting range is 0~3.)

(2) The following figure is example setting the output status as Former value.

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
Setting value															

Setting value	Description
0	Holds Former value in case of error
1	Outputs Min. value of output range in case of error
2	Outputs Mid. value of output range in case of error
3	Outputs Max. value of output range in case of error

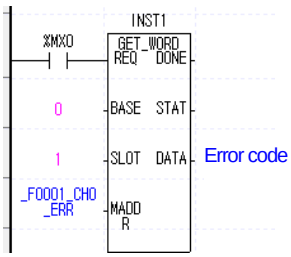


(5) Error code

(a) Saves error code detected at Analog output module

(b) Error type and contents are as follows

(c) The following figure is program example reading error code



B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
–	–	–	–	–	–	–	–	CH# Error code							

Error code (Decimal)	Description	LED status
10	Module error (Reset Check Error)	0.2s flickering
11	Module error (Ram Check Error)	
12	Module error (Register Check Error)	
13	Module error (EEPROM Check Error)	
21	Module error (D/A Conversion Error)	
31# note)	Parameter setting error or current module	1s flickering
32# note)	Parameter setting error when setting offset/gain of current module	
40# note)	Digital input value of current module is out of range. (When input type is 0~16000 and the digital input value is smaller than -192 or larger than 16191.) Effective range varies according to input type.	
41# note)	Digital input value of voltage module is out of range. (When input type is 0~16000 and the digital input value is smaller than -192 or larger than 16191.) Effective range varies according to input type.	
50# note)	Offset/gain setting error at 4~20mA of current module (Offset is same as or larger than gain)	
51# note)	Offset/gain setting error at 0~20mA of current module (Offset is same as or larger than gain)	
52# note)	Offset/gain setting error at 1~5V of voltage module (Offset is same as or larger than gain)	
53# note)	Offset/gain setting error at 0~5V of voltage module (Offset is same as or larger than gain)	
54# note)	Offset/gain setting error at 0~10V of voltage module (Offset is same as or larger than gain)	
55# note)	Offset/gain setting error at -10~10V of voltage module (Offset is same as or larger than gain)	

※ At error code, # indicates channel where error occurs

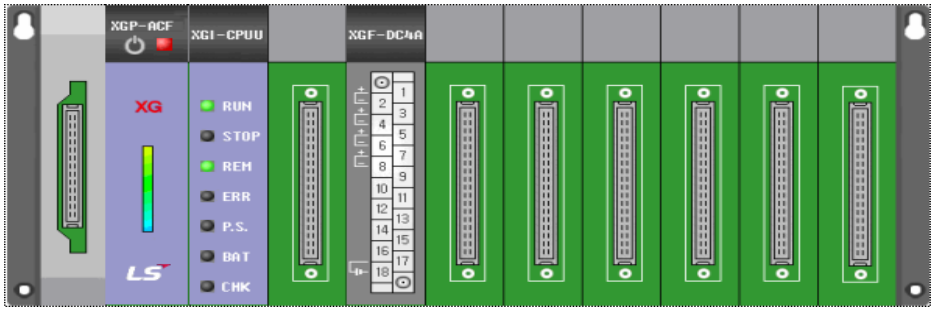
(d) In case two error codes occurs, module saves first occurred error code and later occurred error code is not saved

Chapter 8 Programming (For XGI/XGR)

8.1 Basic Program

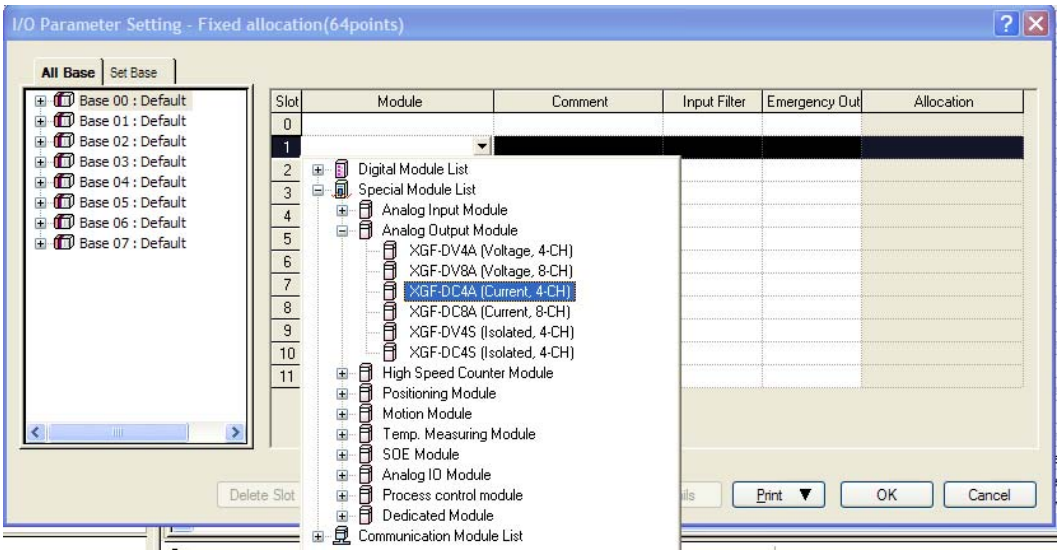
- How to specify operating condition in analog output module's internal memory will be described.
- Analog input module is installed on Slot 1.
- I/O assigned points of analog output module is 16 points

System configuration



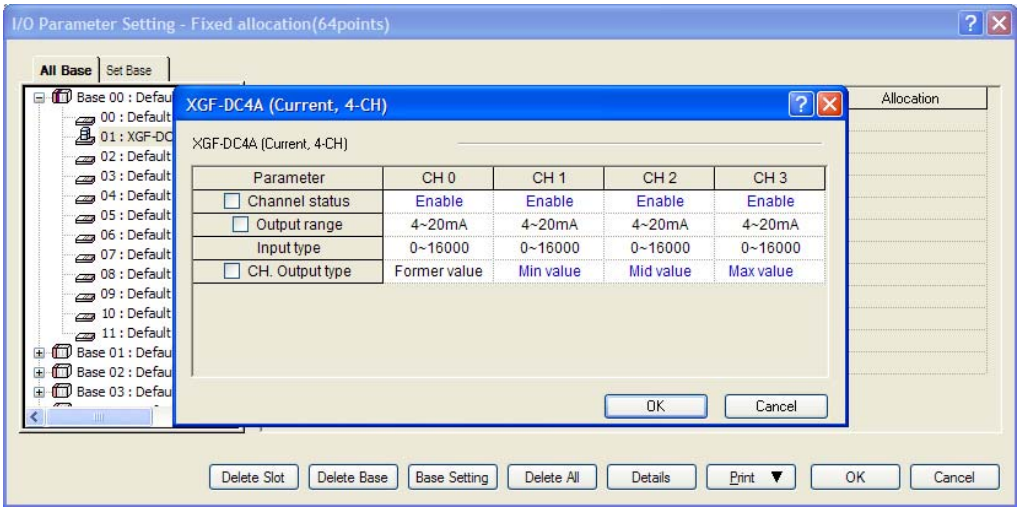
8.1.1 XGF-DC4A

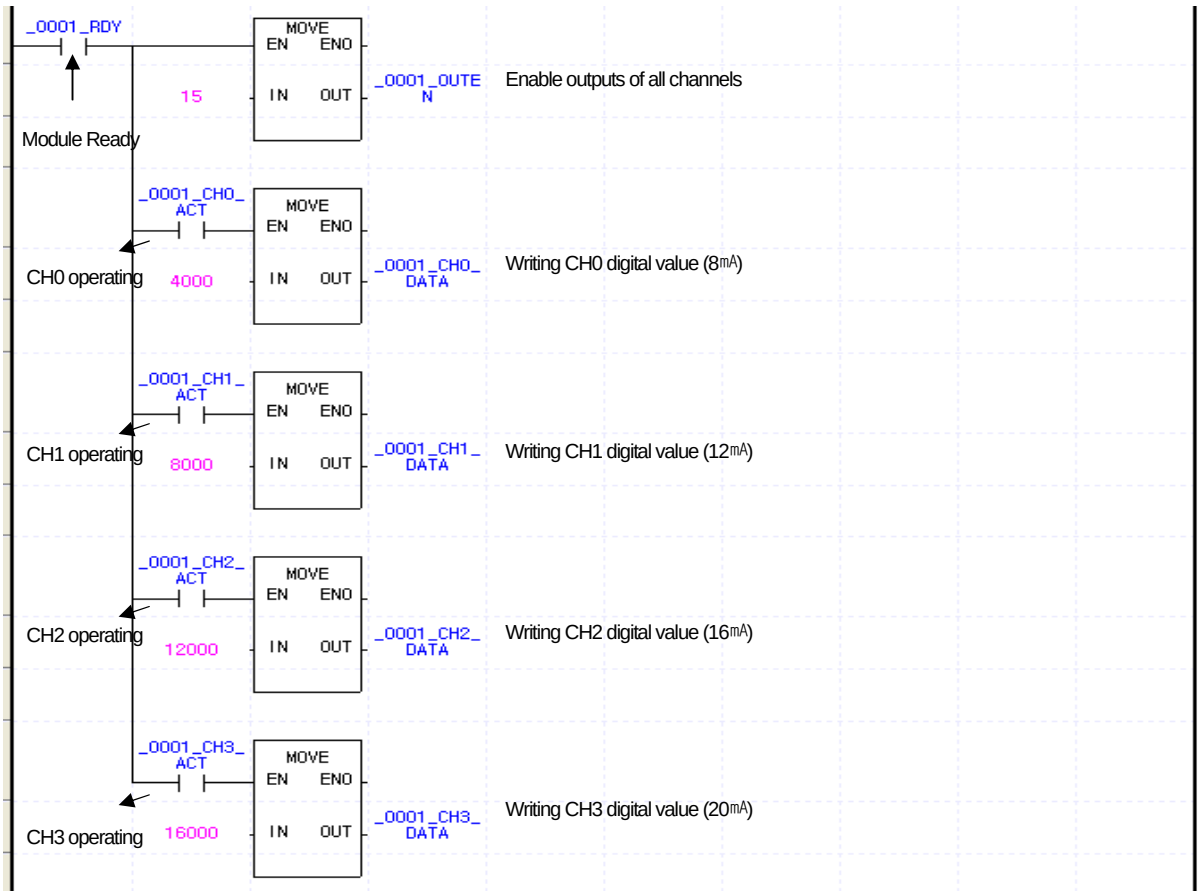
(1) Program example using [I/O parameters] setting



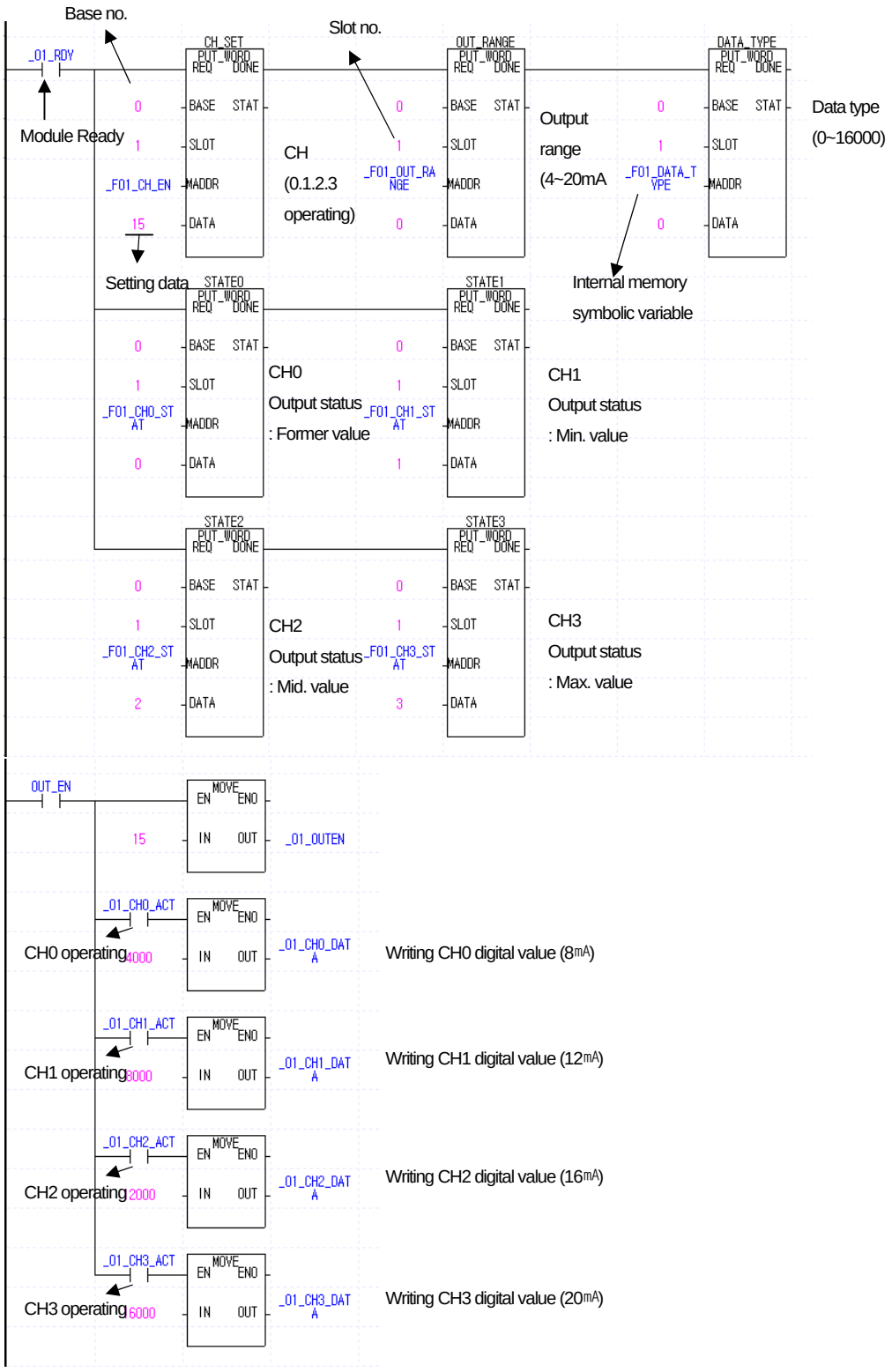
Note

For XGR series, you can't install the special card at main base. Available base for special card is 1~31. Program example is written based on XGI CPU.


I/O Parameter Setting - Fixed allocation(64points)
All Base
Set Base
Allocation
XGF-DC4A (Current, 4-CH)
XGF-DC4A (Current, 4-CH)
Parameter
CH 0
CH 1
CH 2
CH 3
Channel status
Enable
Enable
Enable
Enable
Output range
4~20mA
4~20mA
4~20mA
4~20mA
Input type
0~16000
0~16000
0~16000
0~16000
CH. Output type
Former value
Min value
Mid value
Max value
OK
Cancel
Delete Slot
Delete Base
Base Setting
Delete All
Details
Print
OK
Cancel


_0001_RDY
Module Ready
MOVE
EN
ENO
15
IN
OUT
_0001_OUTEN
Enable outputs of all channels
_0001_CH0_ACT
CH0 operating
4000
_0001_CH0_DATA
Writing CH0 digital value (8㎃)
_0001_CH1_ACT
CH1 operating
8000
_0001_CH1_DATA
Writing CH1 digital value (12㎃)
_0001_CH2_ACT
CH2 operating
12000
_0001_CH2_DATA
Writing CH2 digital value (16㎃)
_0001_CH3_ACT
CH3 operating
16000
_0001_CH3_DATA
Writing CH3 digital value (20㎃)

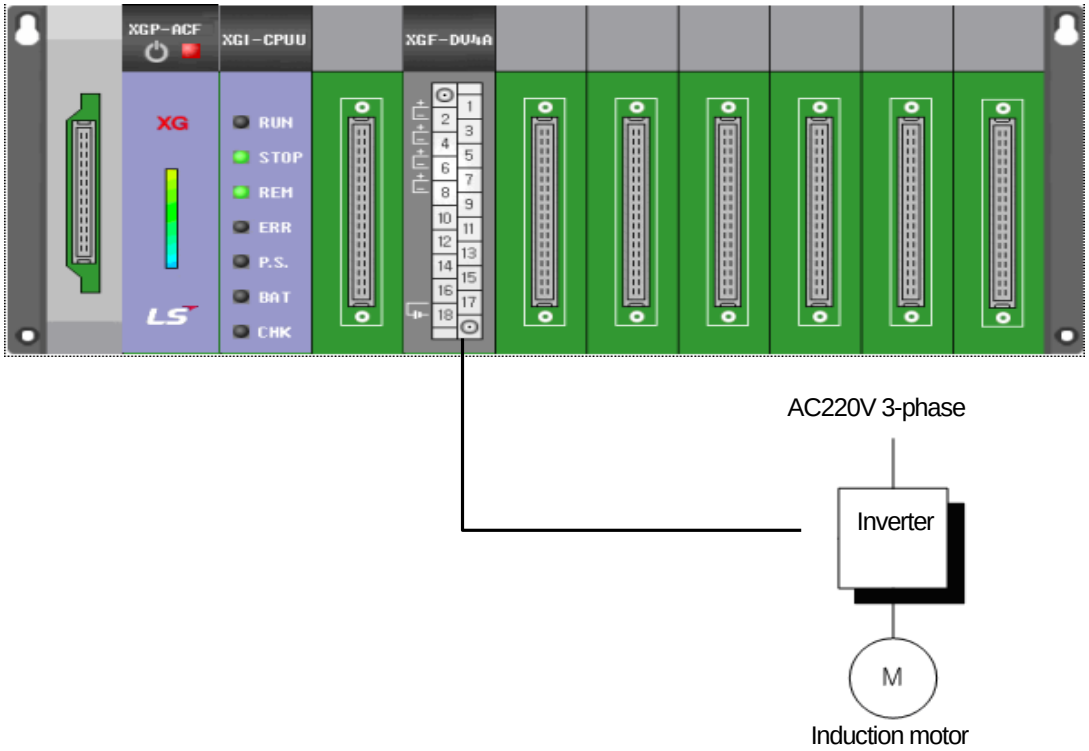
(2) Program example using PUT/GET instruction



8.2 Application Program

8.2.1 Inverter Speed Control

(1) System configuration



(2) Initial setting

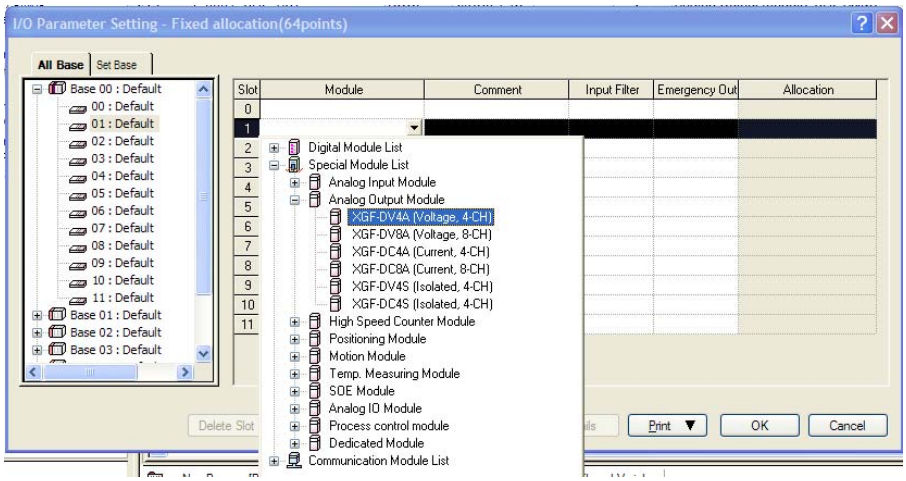
No	Parameter	Contents	Internal memory address
1	CH to use	CH0 ~ CH3	
2	Output voltage range	0 ~ 10V	
3	Data type	0 ~ 16000	
4	CH output status	Former/Min/Mid/Max	

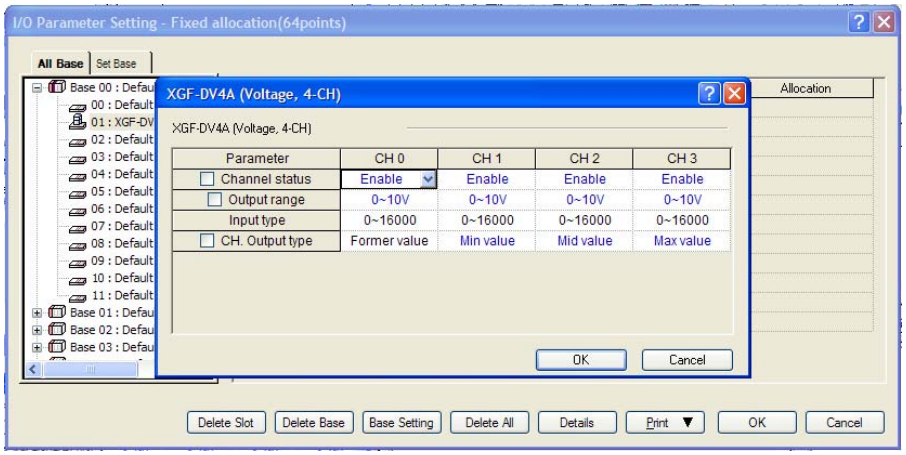
(3) Program description

(a) When module ready contact is on, enables output of all channels.
(b) If CH 0 operating flag (_0001_CH0_ACT) is on, outputs 0V.
(c) If CH 1 operating flag (_0001_CH1_ACT) is on, outputs 2.5V.
(d) If CH 2 operating flag (_0001_CH2_ACT) is on, outputs 5.0V.
(e) If CH 3 operating flag (_0001_CH3_ACT) is on, outputs 7.5V.

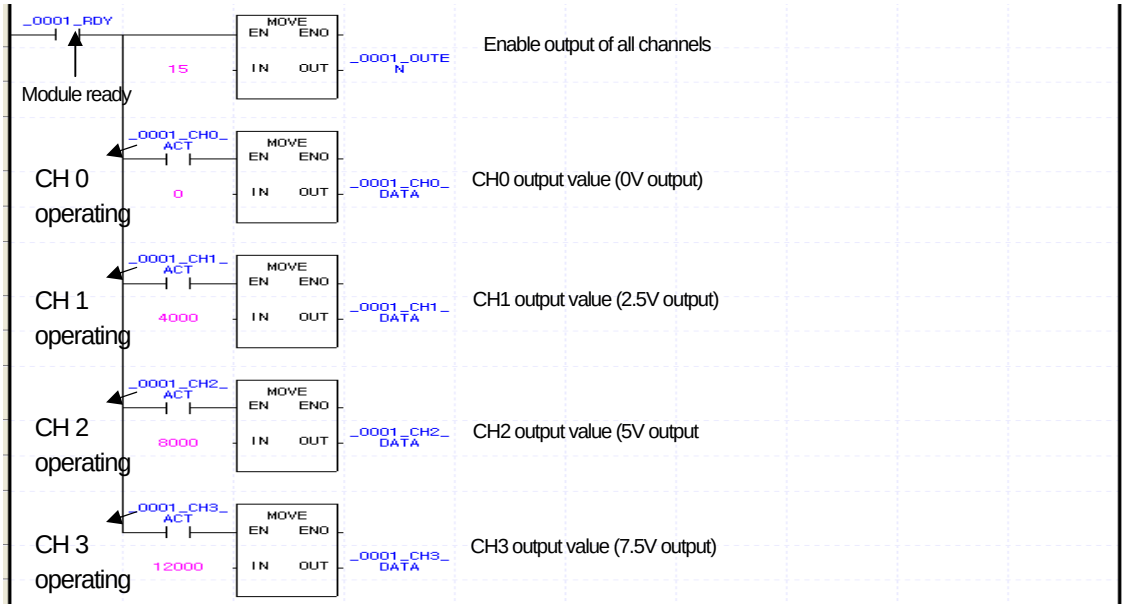
(4) Program

(a) Program example using “I/O Parameter” setting

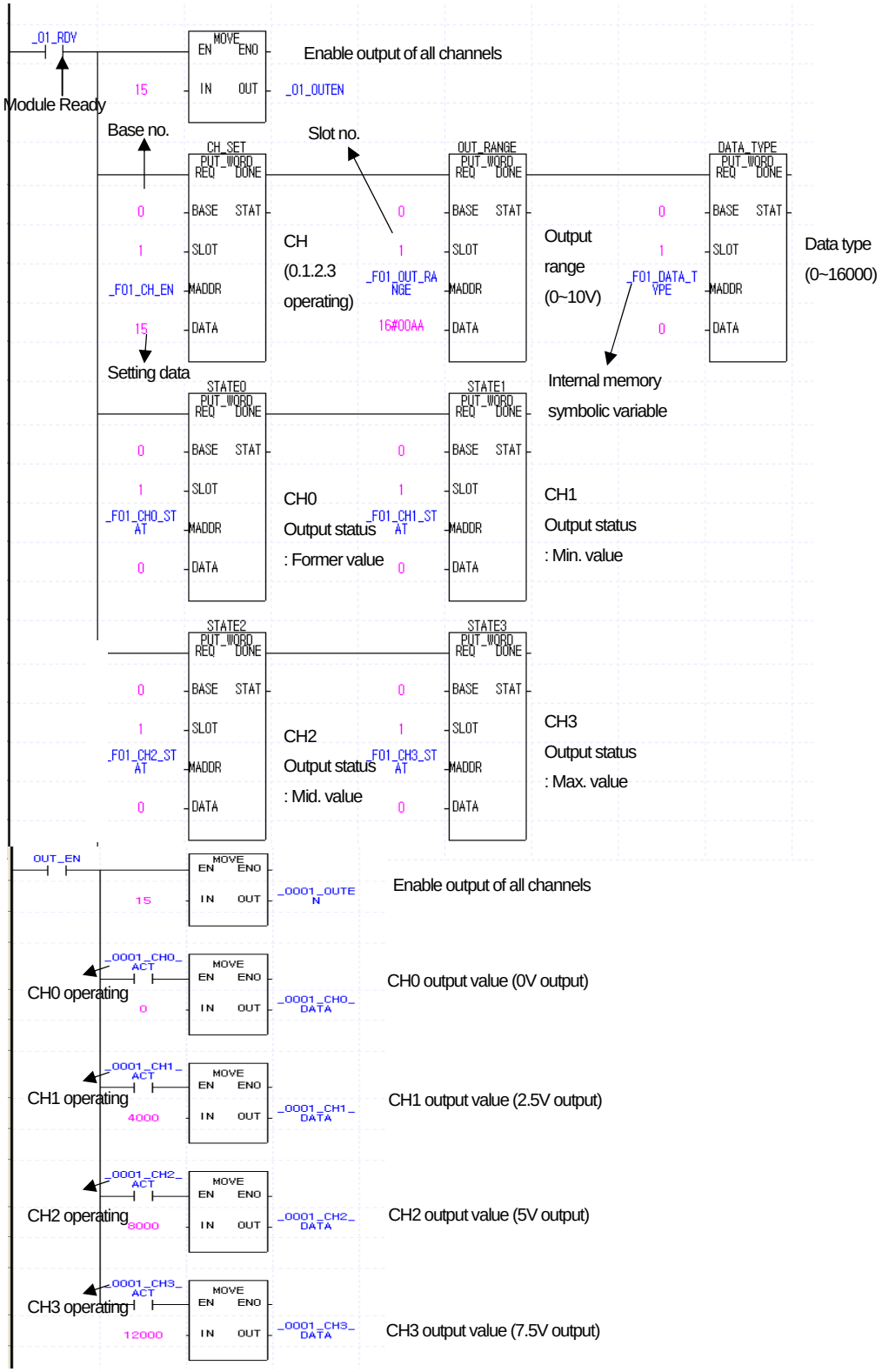




. Program

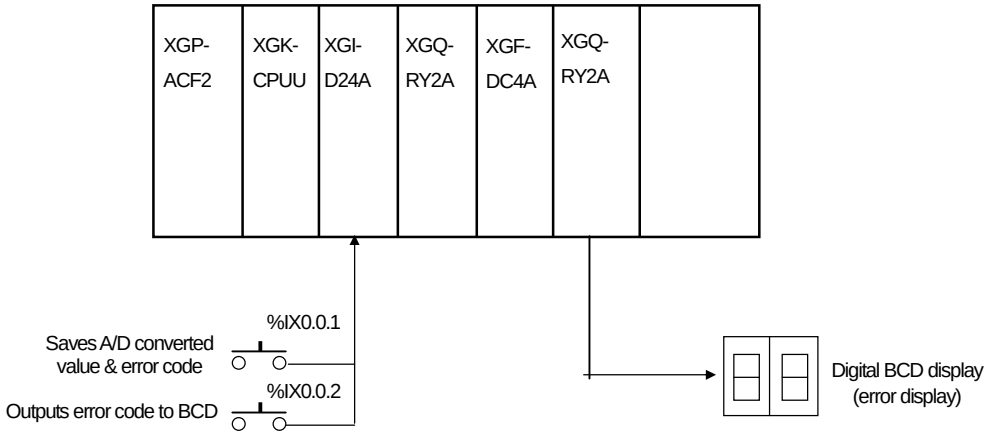


(b) Program example using PUT/GET



8.2.2 Program to output error codes of analog input module to BCD display

(1) System configuration



(2) Details of initial setting

(a) CH to use: CH 0

(b) Analog output current range: DC 4 ~ 20 mA

(c) Digital input data range: 0 ~ 16000

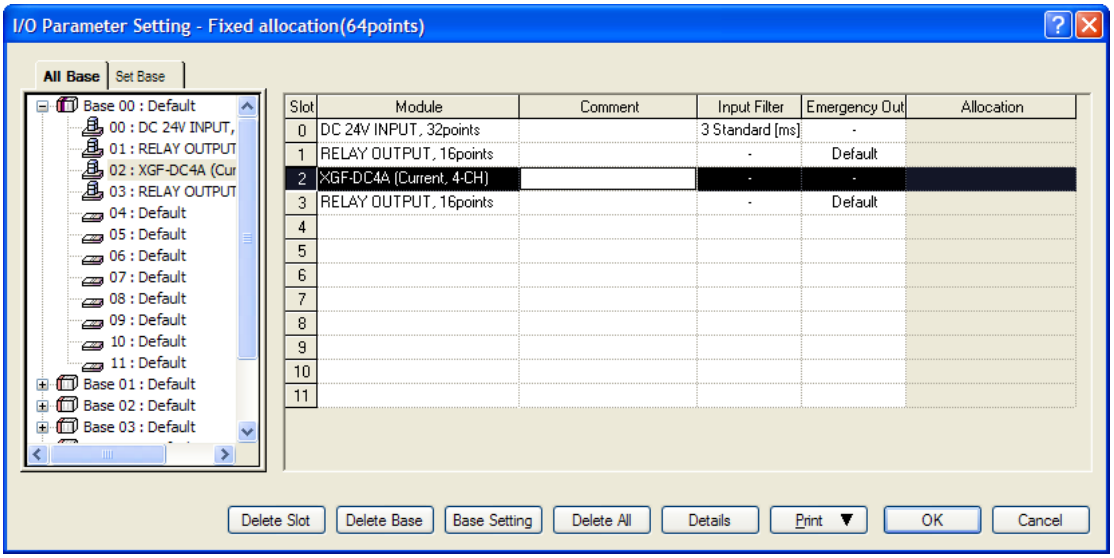
(3) Program description

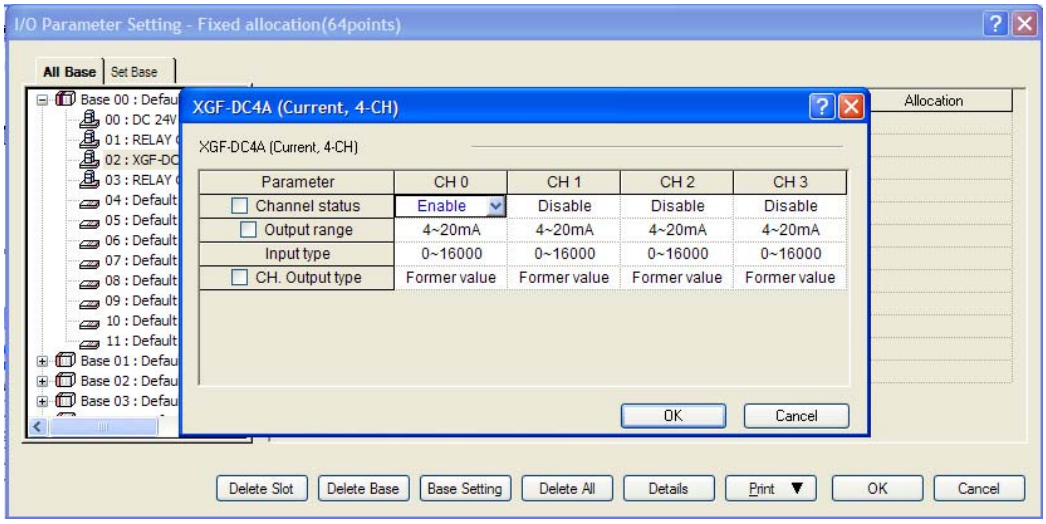
(a) If %IX0.0.1 is on, A/D converted value and error code will be saved respectively on %MW0 and %MW1.

(b) If %IX0.0.2 is on, applicable error code will be output to digital BCD display (%QW0.3.0).

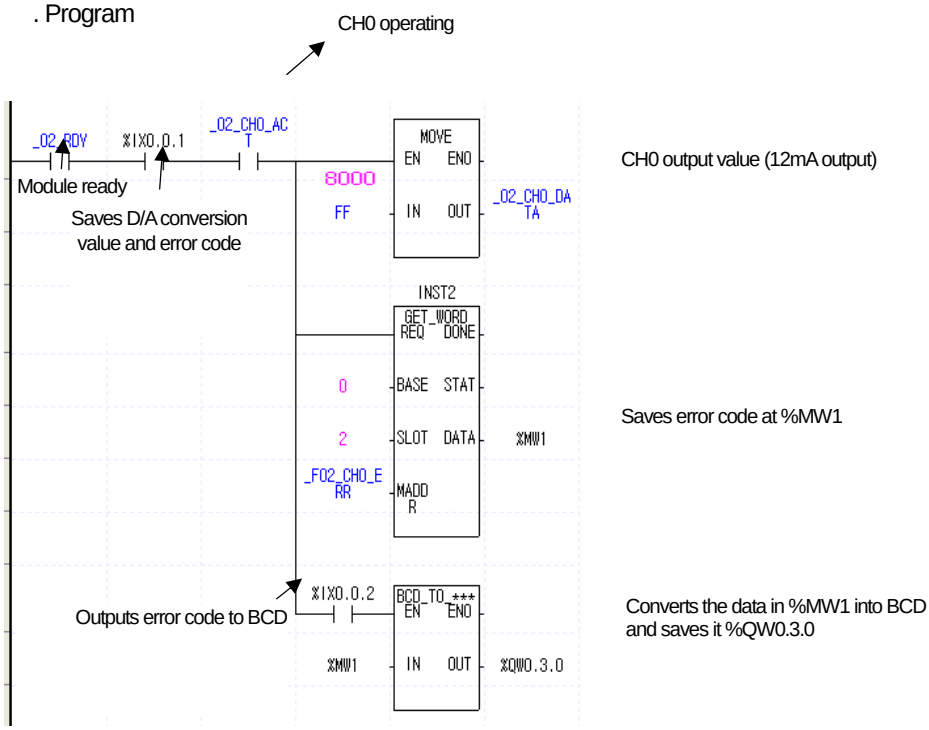
(4) Program

(a) Program example using [I/O parameters] setting

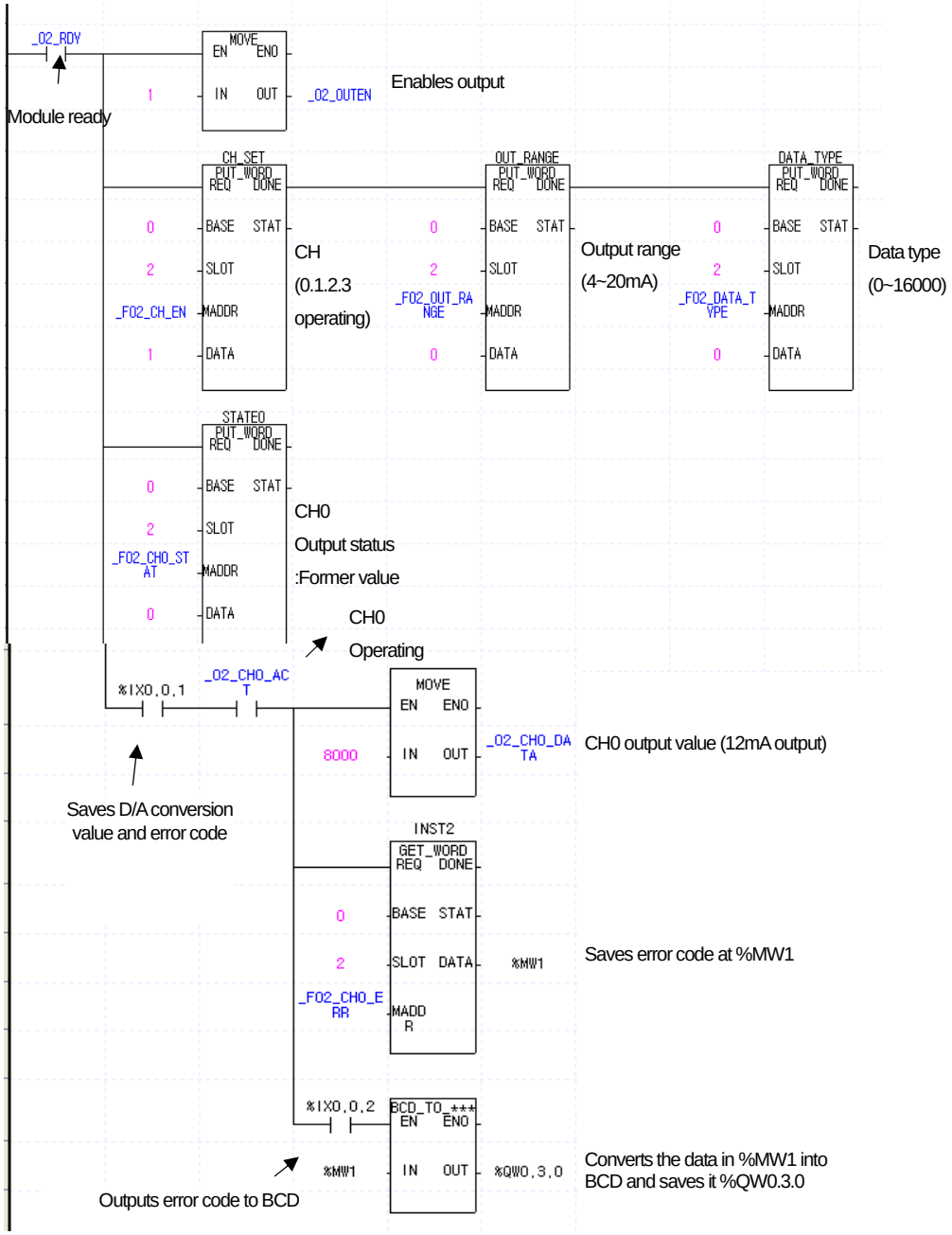



I/O Parameter Setting - Fixed allocation(64points)
All Base
Set Base
Allocation
XGF-DC4A (Current, 4-CH)
XGF-DC4A (Current, 4-CH)
Parameter
CH 0
CH 1
CH 2
CH 3
Channel status
Enable
Disable
Disable
Disable
Output range
4~20mA
4~20mA
4~20mA
4~20mA
Input type
0~16000
0~16000
0~16000
0~16000
CH. Output type
Former value
Former value
Former value
Former value
OK
Cancel
Delete Slot
Delete Base
Base Setting
Delete All
Details
Print
OK
Cancel

. Program


CH0 operating
_02_RDY
%IX0.0.1
_02_CH0_ACT
Module ready
Saves D/A conversion value and error code
MOVE
EN
ENO
8000
FF
IN
OUT
_02_CH0_DATA
CH0 output value (12mA output)
INST2
GET_WORD
REQ
DONE
0
BASE
STAT
2
SLOT
DATA
%MW1
_F02_CH0_ERR
MADDR
Saves error code at %MW1
Outputs error code to BCD
%IX0.0.2
BCD_TO_***
EN
ENO
%MW1
IN
OUT
%QW0.3.0
Converts the data in %MW1 into BCD and saves it %QW0.3.0

(b) Program example using PUT/GET



Chapter 9 Troubleshooting

9.1 Error codes

Details and diagnosis of errors which occur while Analog output module is used will be described.

Error Code (Dec)	Description	LED status
10	Module error (Reset Check Error)	Blinks every 0.2 sec.
11	Module error (RAM Check Error)	
12	Module error (Register Check Error)	
13	Module error (EEPROM Check Error)	
21	Module error (D/A Conversion Error)	
31#[note)]	Parameters setting error of current module	Blinks every 1 sec.
32#[note)]	Parameters setting error of current module when setting Offset/Gain.	
40#[note)]	Setting error of current module's digital input range (If input value is set less than -192 or greater than 16191). The range changes based on input data type.	
41#[note)]	Setting error of voltage module's digital input range (If input value is set less than -192 or greater than 16191). The range changes based on input data type.	
50#[note)]	Offset/Gain setting error in current module of 4~20㎃ (Offset value is set greater than or equal to Gain value)	
51#[note)]	Offset/Gain setting error in current module of 0~20㎃ (Offset value is set greater than or equal to Gain value)	
52#[note)]	Offset/Gain setting error in voltage module of 1~5V (Offset value is set greater than or equal to Gain value)	
53#[note)]	Offset/Gain setting error in voltage module of 0~5V (Offset value is set greater than or equal to Gain value)	
54#[note)]	Offset/Gain setting error in voltage module of 0~10V (Offset value is set greater than or equal to Gain value)	
55#[note)]	Offset/Gain setting error in voltage module of -10~10V (Offset value is set greater than or equal to Gain value)	

Remark

(1) # of the error code stands for the channel with error found.

(2) If 2 or more errors occur, the module will not save other error codes than the first error code found.

1) If errors occur

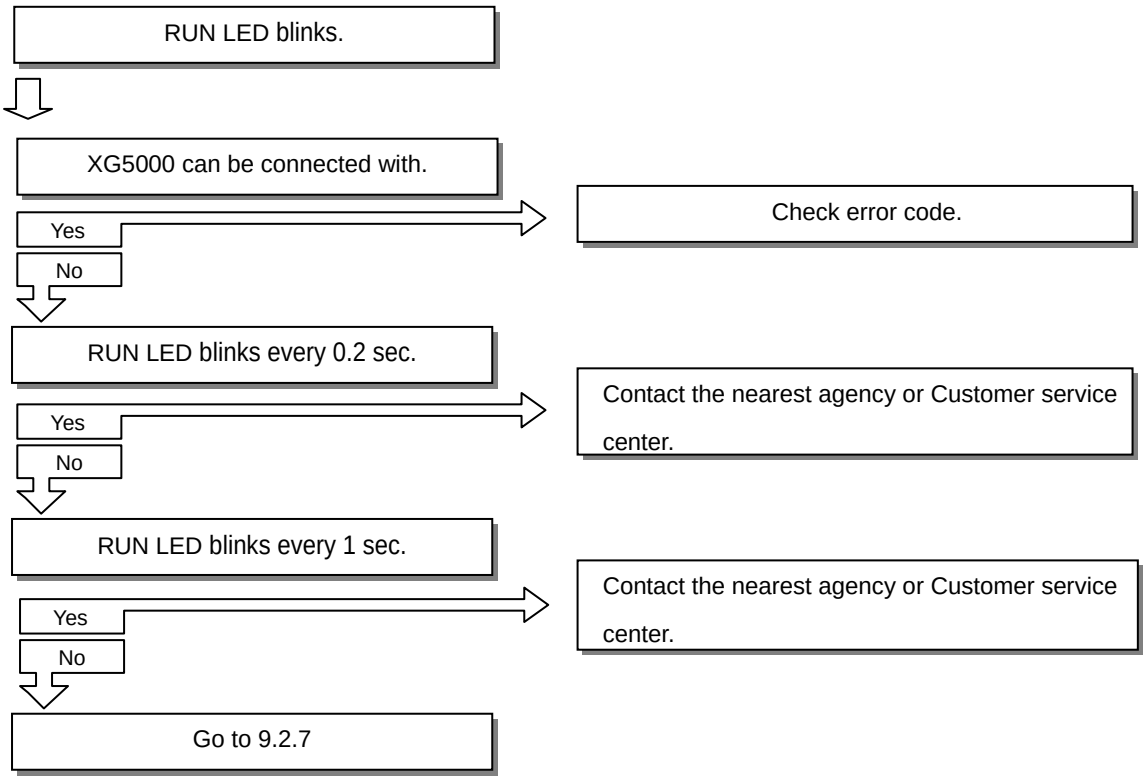
Error Code	Module Ready	Error Bit Status	Error Code	LED
10, 11, 12, 13, 21	Deleted (OFF)	Set all the channels	Displayed on system area	Blinks every 0.2 sec.
31#, 40#, 41#	Kept	Set applicable channel only	Displayed on system area	Blinks every 1 sec
32#, 50#, 51#, 52#, 53#, 54#, 55#	Kept	-	Offset/Gain error code area	Blinks every 1 sec

2) If errors deleted

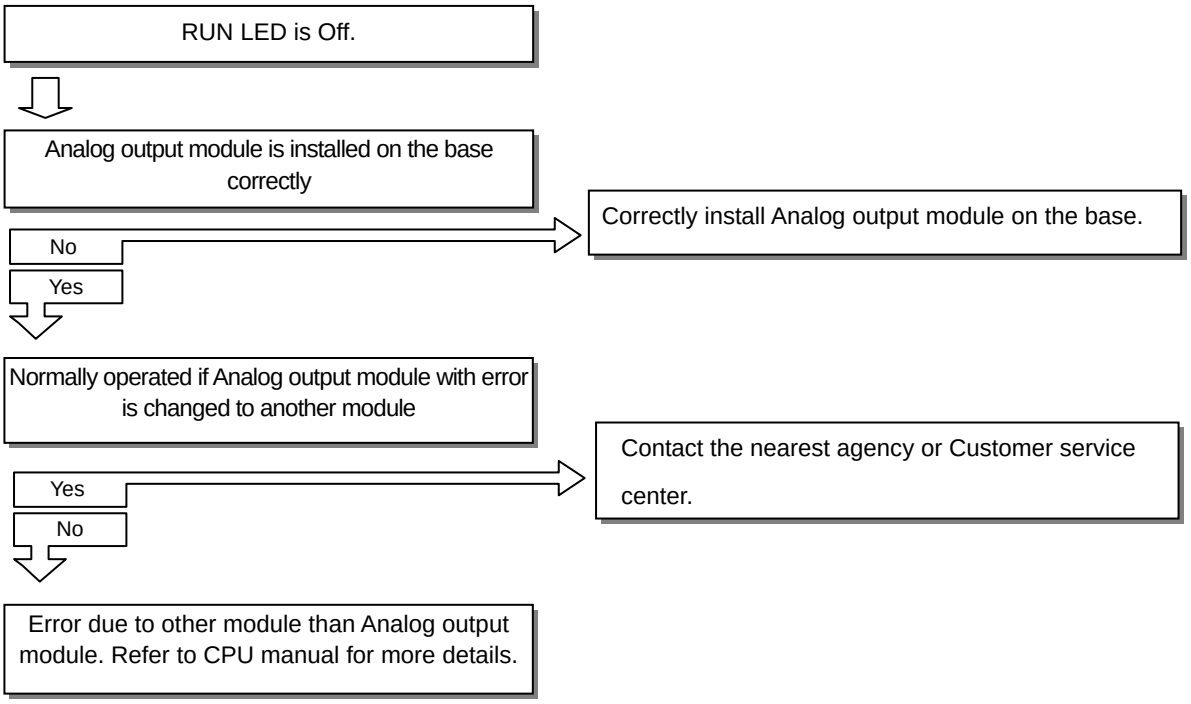
Error Code	Module Ready	Error Bit Status	Error Code	LED
10, 11, 12, 13, 21	Power On/Off	-	-	-
31#, 40#, 41#	Kept	Clear	Clear	On
32#, 50#, 51#, 52#, 53#, 54#, 55#	Kept	-	Clear	On

9.2 Troubleshooting

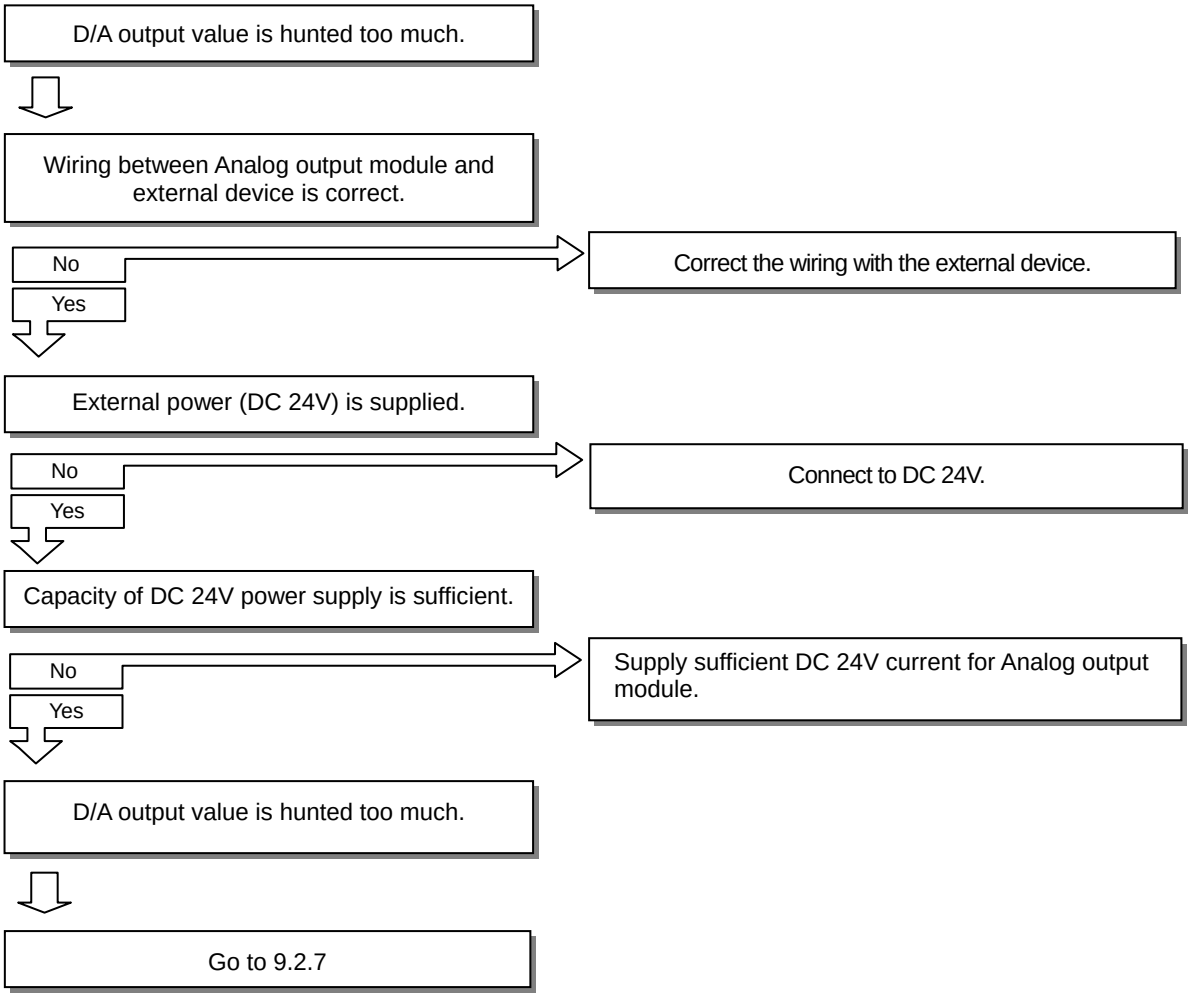
9.2.1 RUN LED blinks



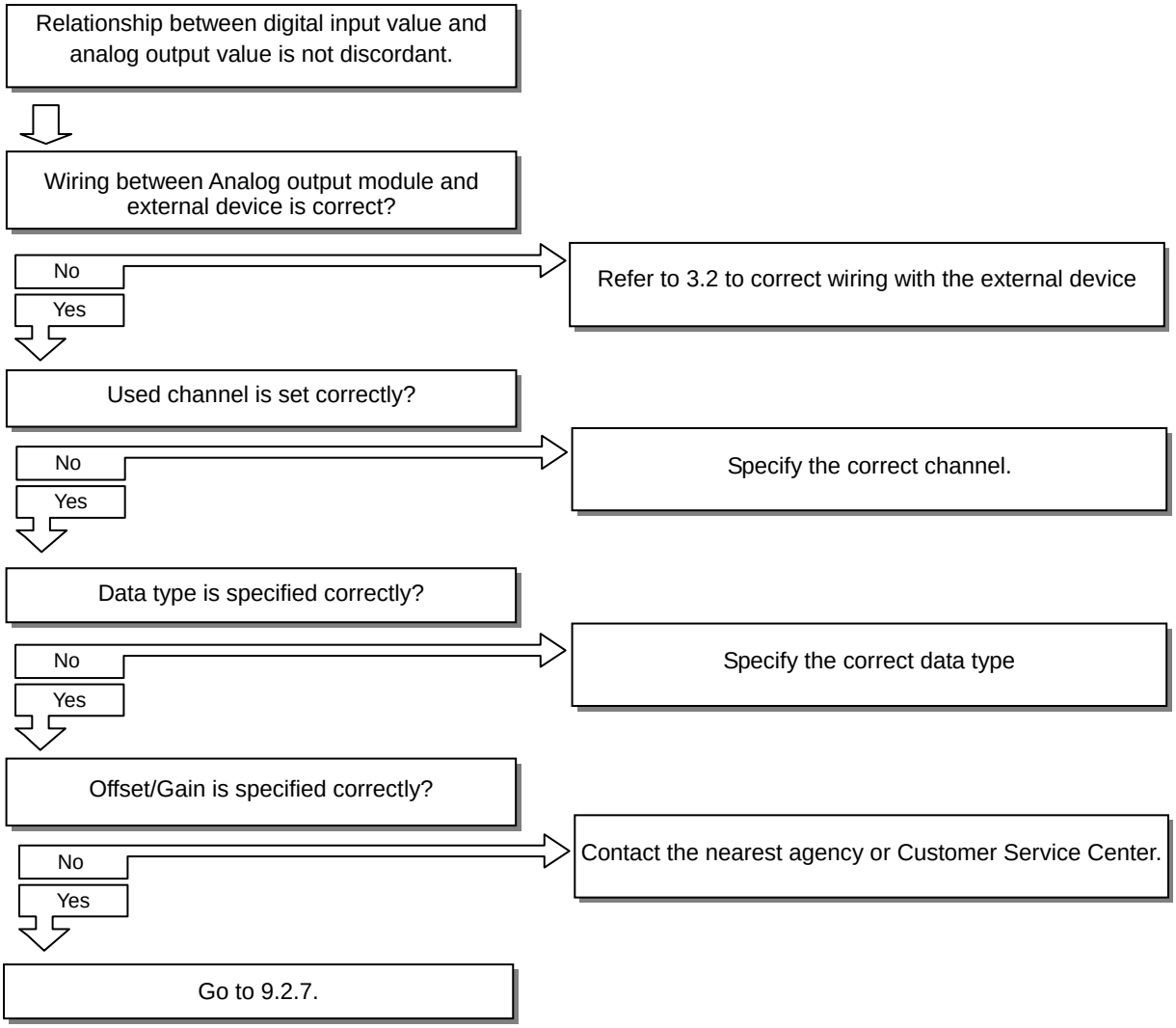
9.2.2 RUN LED is Off



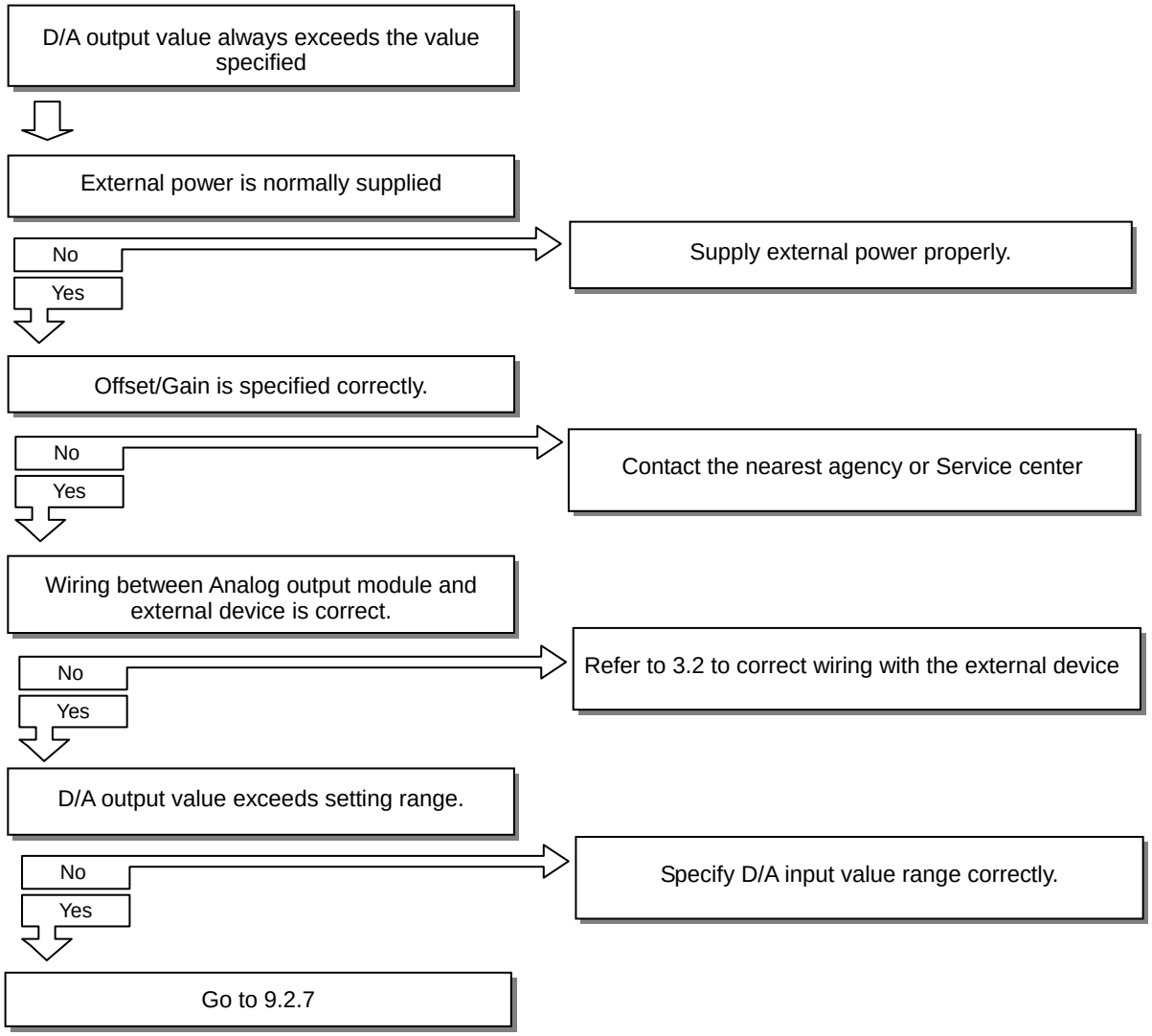
9.2.3 D/A Output Value hunted too much



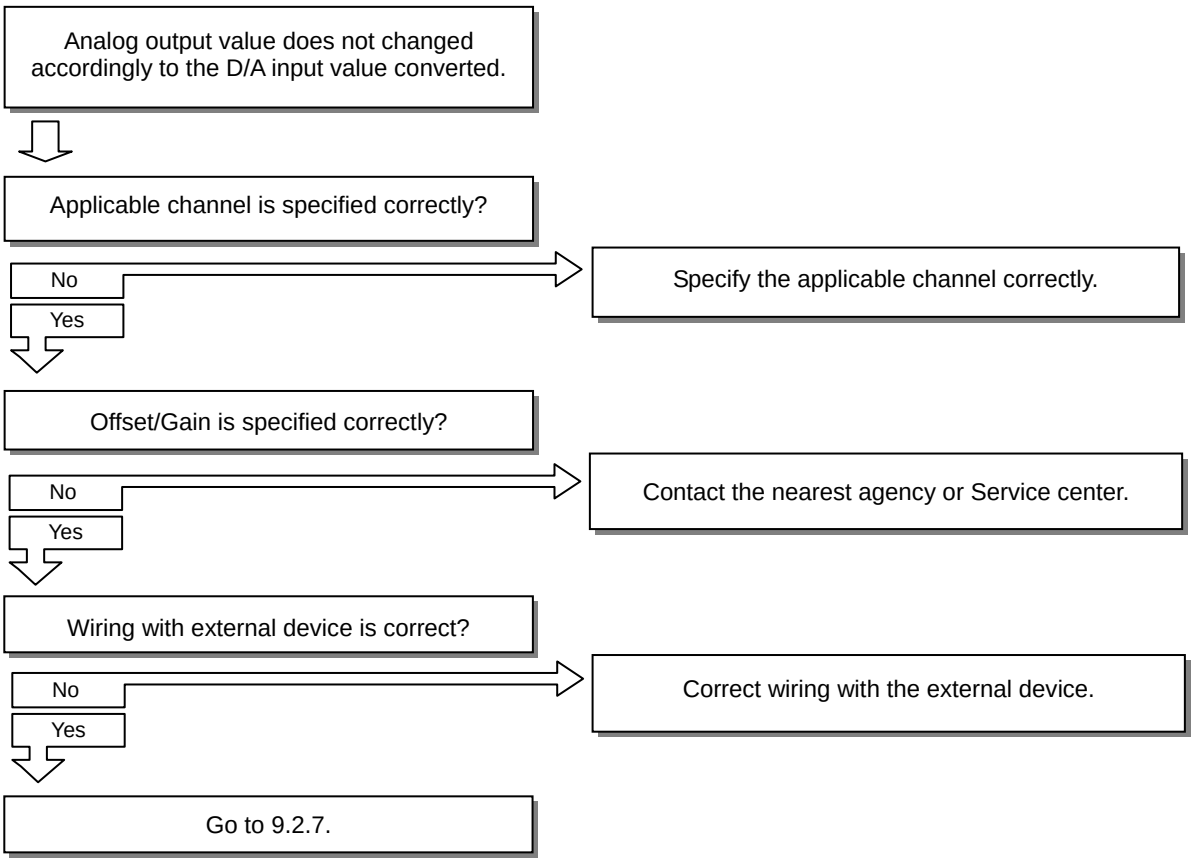
9.2.4 Relationship discordant between Digital Input Value & Analog Output Value



9.2.5 D/A Output Value always exceeds the value specified



9.2.6 Analog Output Value does not changed according to the change of Digital Input Value



9.2.7 Hardware error of Analog output module

It is Analog output module's Hardware error.

Contact the nearest Customer Service Center.

9.2.8 Status check of Analog output module through XG5000 System Monitoring

Module type, module information, O/S version and module status of Analog output module can be checked through XG5000 system monitoring function.

1) Execution sequence

Two routes are available for the execution.

(1) [Monitor] -> [System Monitoring] -> And on the module screen, click the right mouse button to display [Module Information].

(2) [Monitor] -> [System Monitoring] -> And Double-click the module screen.

2) Module Information

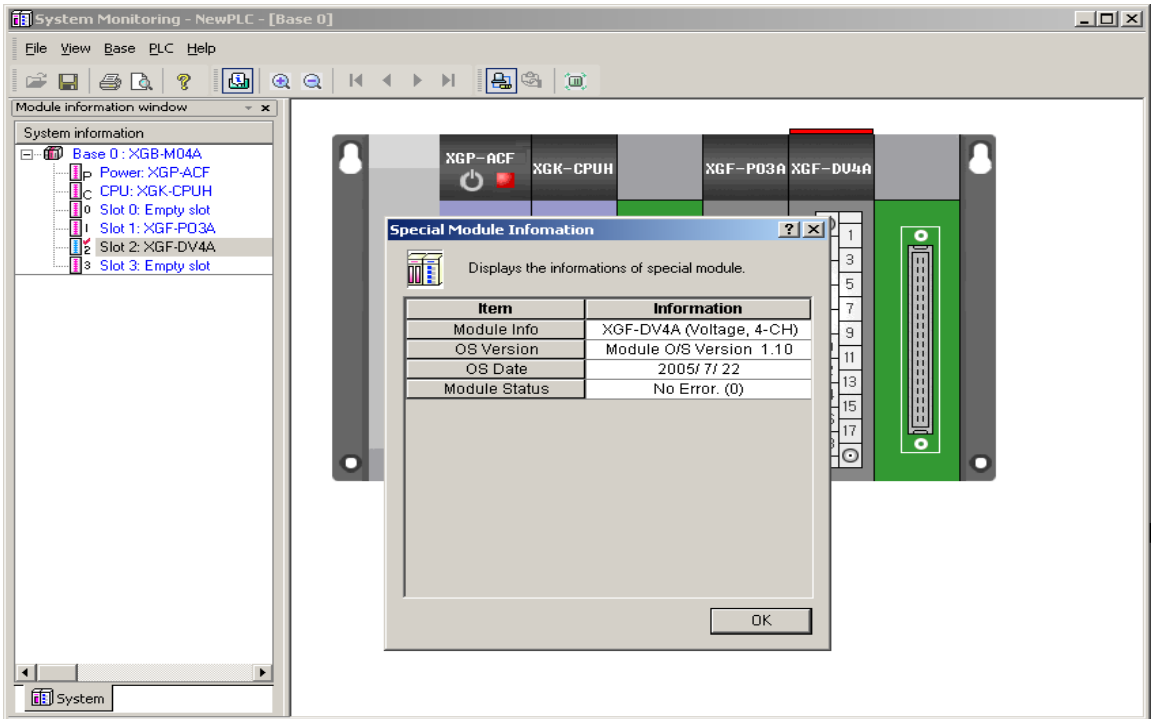
(1) Module type: shows the information of the module presently installed.

(2) Module information: shows the O/S version information of Analog output module.

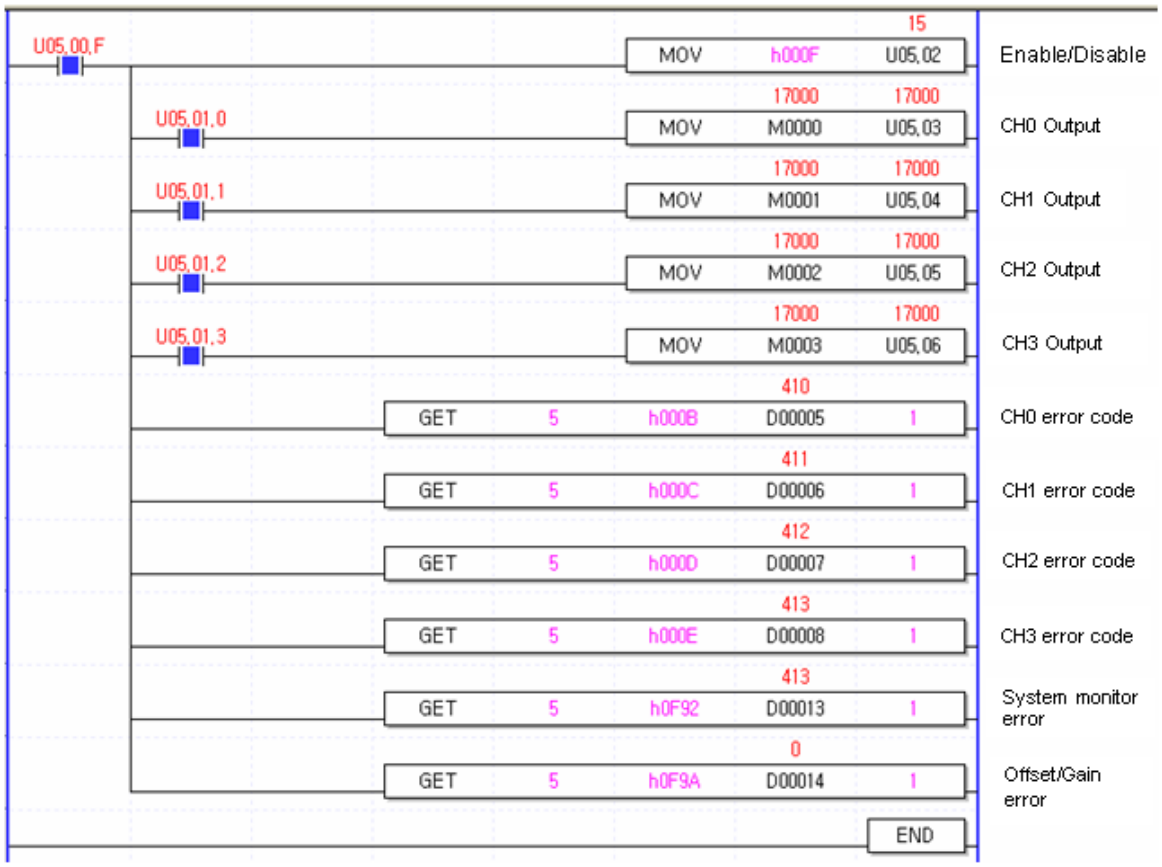
(3) O/S version: shows the O/S prepared date of Analog output module.

(4) Module status: shows the present error code.

3) System Monitor



4) Monitor through program



Appendix 1 Terminology

Terms and abbreviation used in this user's manual and the analog module in general are as described below.

■A/D converter: converts analog to digital value proportionately to the size of analog input signal.

■Analog input module: as a module with the circuit to convert analog voltage/current input signalal to digital value, it has resolution of 14 and 16 bits according to converters.

■Channel: related with the terminal of analog I/O module and connected to various voltage/current I/O devices respectively, with applicable data and diagnosis function as well.

■Conversion time: time necessary for analog input module to sample and convert the analog signal for the processor inside the module to get digital-converted value input. On the other hand, it is time necessary for analog output module to convert the digital value output from the processor inside the module to analog output signal so to transmit to the output channel.

■D/A converter: related with the output module, it is used to make continuous size of analog voltage and current signal proportionately to the digital value.

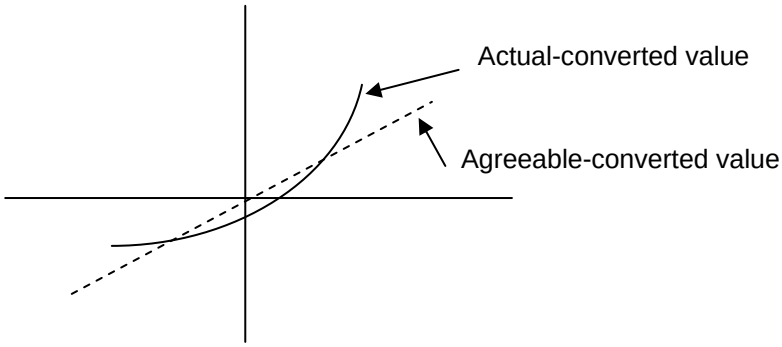
■Full scale: defined as the size of voltage/current where the normal operation is executed.

■Full scale error: displayed with graph difference between agreeable analog-converted value and actual analog-converted value.

■Full scale range: displayed with difference between the maximum and the minimum of the analog input.

■LSB (Least Signalificant Bit): displays the minimum value of the bit unit.

■Linearity error: analog I/O is related between continuous voltage/current value and digital value, whose agreeable I/O value is defined as a line within a distance of the minimum 1LSB of voltage/current. I/O linearity error is regarded as the declination between the agreeable-converted value and the actual-converted value on the graph.



■Multiplexer: a switching circuit where many signals share one A/D converter or D/A converter.

■Analog output module: a module with output circuit to convert analog DC voltage or current signal proportionate to digital value delivered to the module from the processor.

■Resolution: the minimum value recognizable by a measuring instrument, which is usually displayed in the engineering unit (1mv) or the number of bits. In other words, 16383 types of output are available for 14 bits.

■Filter: used to reduce the change of the digital-converted output value by sudden change of the external noise or input for the analog circuit, through two methods of Software and Hardware filters.

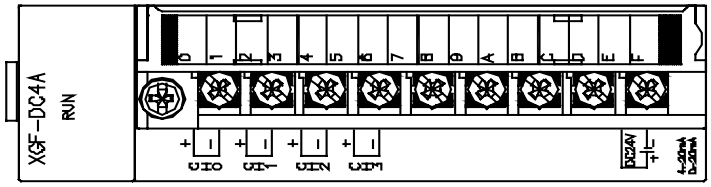
■Accuracy: displayed with the maximum declination between agreeable value and output voltage or current for the whole range of output. On the other hand, it is displayed with the maximum declination between agreeable value and digital-converted input signal value for the whole range of input. Generally, percentage will be displayed for the full scale.
Gain, Offset and Linearity error are all included in the error type available.

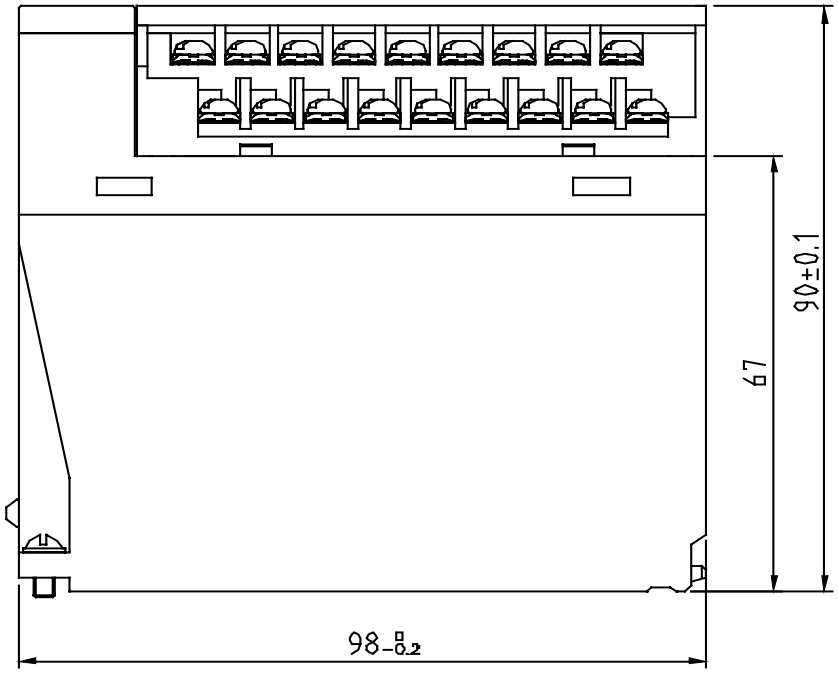
■Output accuracy: displayed with the difference between the actual analog output voltage/current value and the agreeable-converted value on the conversion graph for the full scale, with Offset, Gain and Drift error factors included as well as normal temperature (25℃) and available temperature range displayed respectively.

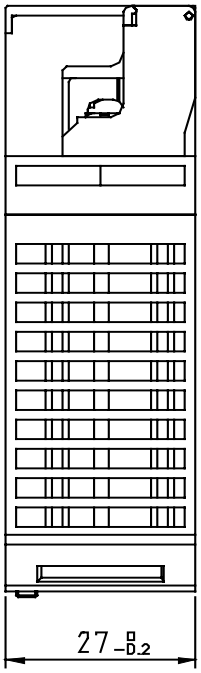
Appendix 2 Dimensions

1) Dimensions of XGF-DV4A/DC4A

(Unit : mm)

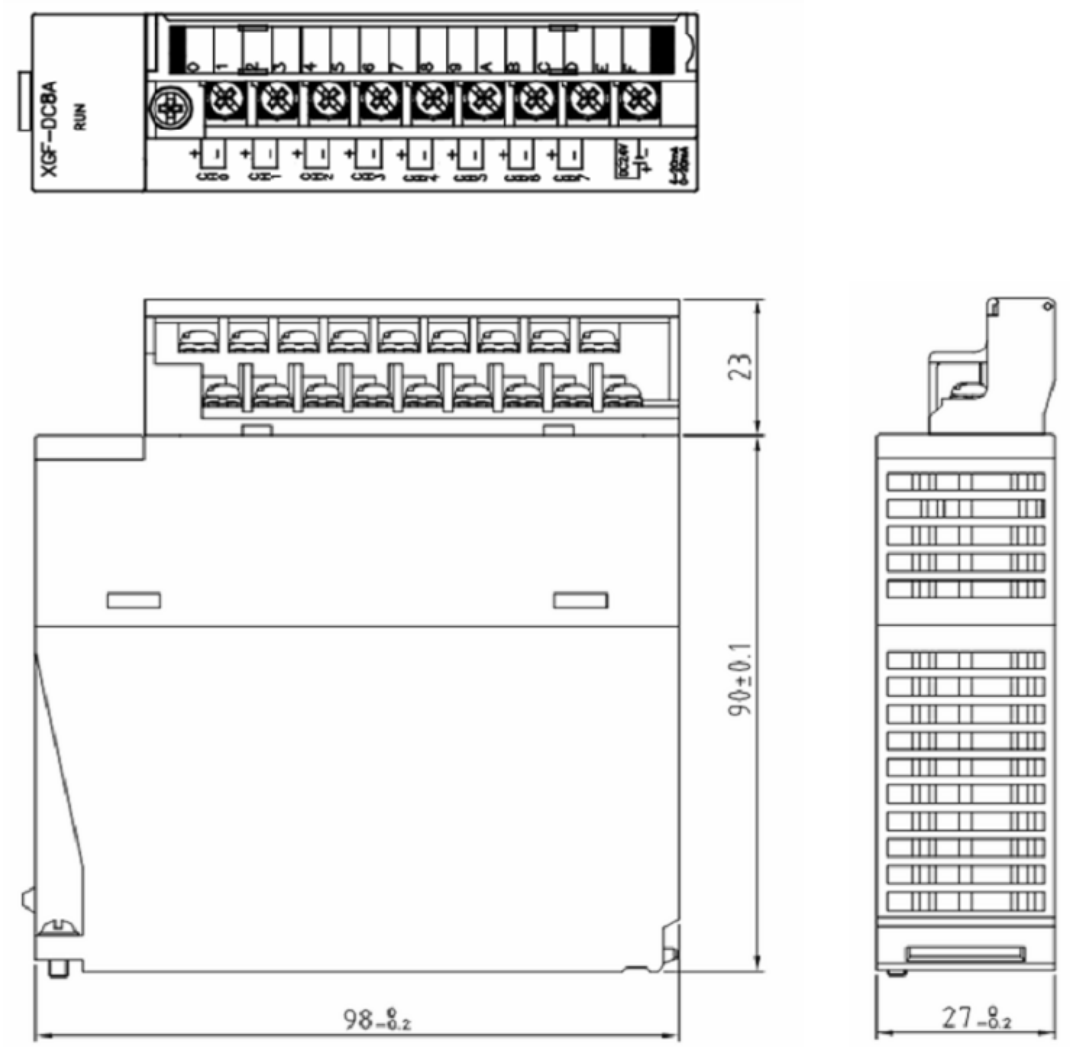






2) Dimensions of XGF-DV8A/DC8A

(Unit : mm)



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

Environmental Management

LS Industrial Systems considers the environmental preservation as the preferential management subject and every staff of LS Industrial Systems use the reasonable endeavors for the pleasurably environmental preservation of the earth.

About Disposal

LS Industrial Systems' 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.

LS values every single customers.

Quality and service come first at LSIS.

Always at your service, standing for our customers.

http://eng.lsis.biz

LS Industrial Systems

10310000609

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

■ **LS Industrial Systems Tokyo Office _ Tokyo, Japan**
Address: 16FL. Higashi-Kan. Akasaka Twin Tower 17-22,
Akasaka.Monato-ku Tokyo 107-8470. Japan
Tel : 81-3-3582-9128/Fax : 81-3-3582-2667 e-mail : jschuna@lsis.biz

■ **LS Industrial Systems(ME) FZE _ Dubai, U.A.E.**
Address : Jafza View Tower Lob 19, Room 205 Along Sheikh Zayed
Road Jebel Aali Free Zone Dubai, United Arab Emirates
Tel : 971-4-886-5360/Fax : 971-4-886-5361 e-mail : jungyongl@lsis.biz

■ **LS Industrial Systems Shanghai Office _ Shanghai, China**
Address : Room E-G. 12FL Hiamin Empire Plaza. No.726. West.
Yan'an Road Shanghai 200050. P.R. China e-mail : liyong@lsis.com.cn
Tel : 86-21-5237-9977(609)/Fax : 89-21-5237-7189

■ **LS Industrial Systems Beijing Office _ Beijing, China**
Address : B-Tower 17FL. Beijing Global Trade Center B/D. No. 36.
East BeisanHuan-Road. DongCheng-District. Beijing 100013. P.R. China
Tel : 86-10-5825-6027(666)/Fax : 86-10-5825-6028 e-mail : xunmj@lsis.com.cn

■ **LS Industrial Systems Guangzhou Office _ Guangzhou, China**
Address : Room 1403.14FL. New Poly Tower.
2 Zhongshan Liu Road.Guangzhou.P.R China
Tel : 86-20-8328-6754/Fax : 86-20-8326-6287 e-mail : chenxs@lsis.com.cn

■ **LS Industrial Systems Chengdu Office _ Chengdu, China**
Address : 12FL. Guodong Buiding. No.52 Jindun
Road Chengdu.610041. P.R. China
Tel : 86-28-8612-9151(9226)/Fax : 86-28-8612-9236 e-mail : comysb@lsis.biz

■ **LS Industrial Systems Qingdao Office _ Qingdao, China**
Address : YinHe Bldg. 402 Room No. 2P Shandong Road,
Qingdao-City,Shandong-province 266071, P.R. China
Tel : 86-532-8501-6068/Fax : 86-532-8501-6057 e-mail : wangzy@lsis.com.cn

■ **LS Industrial Systems Europe B.V. , Netherlands**
Address : 1st. Floor, Tupolevlaan 48, 1119NZ, Schiphol-Rijk, The Netherlands
Tel : +31 (0)20 654 1420/Fax : +31 (0)20 654 1429 e-mail : junshickp@lsis.biz

■ **Wuxi LS Industrial Systems Co., Ltd _ Wuxi, China**
Address : 102-A. National High & New Tech Industrial Development Area.
Wuxi. Jiangsu. 214028. P.R. China
Tel : 86-510-8534-6666/Fax : 86-510-8534-4078 e-mail : caidx@lsis.com.cn

■ **Dalian LS Industrial Systems Co., Ltd. _ Dalian, China**
Address : No. 15. Liaohexi 3-Road. Economic and Technical Development zone.
Dalian 116600. China
Tel : 86-411-273-7777/Fax : 86-411-8730-7560 e-mail : cuibx@lsis.com.cn

※ LS Industrial Systems constantly endeavors to improve its product so that information in this manual is subject to change without notice.

ⓒ LS Industrial Systems Co., Ltd 2010 All Rights Reserved.

2010. 4